TM03

TM03-TE16-TU77-DRT

CZTEDC0

AH-A801C-MC

FICHE 1 OF 1

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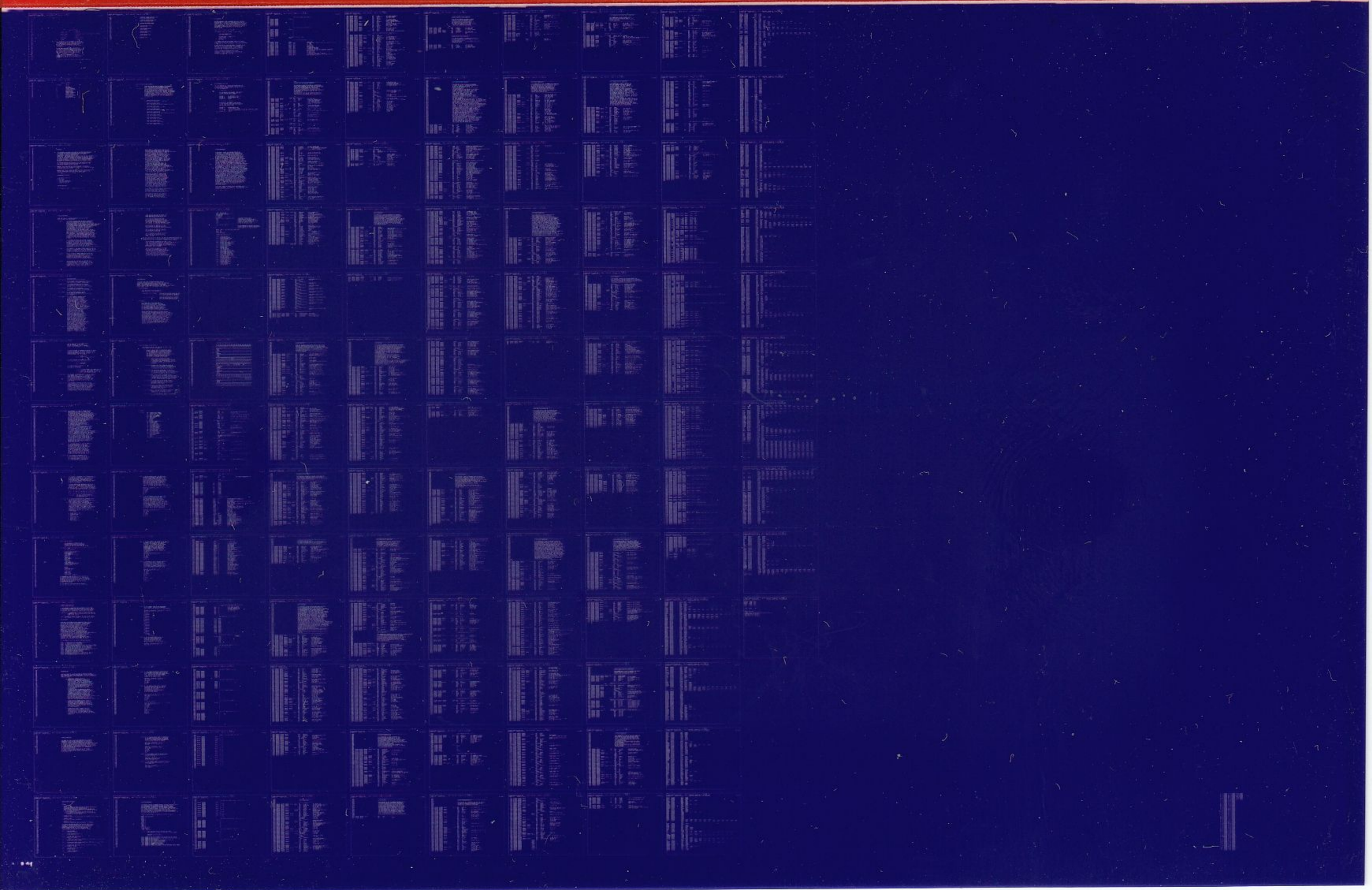

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IDENTIFICATION

PRODUCT CODE:	AC-A800C-MC
PRODUCT NAME:	CZTEDCO TM03-TE16/TU77 DATA RELIBILITY PROGRAM
DATE CREATED:	10 MAY 1979
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	J. G. ADAMS

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                        1.      ABSTRACT
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                                THIS PROGRAM IS DESIGNED TO BE USED BY AN EXPERIENCED ENGINEER
                                /TECHNICIAN FOR EVALUATION AND DEBUGGING OF MAG TAPE DRIVES.
                                THE PROGRAM IS CAPABLE OF EXERCISING THE TE16 MAGNETIC
                                ON A MASSBUS THROUGH THE TM03 MAG TAPE
                                CONTROLLER.   ANY COMBINATION OF TM03'S & TE16'S UP TO A MAXIMUM OF EIGHT
                                (8), MAY BE TESTED BY A SINGLE EXECUTION OF THE PROGRAM.  THIS
                                FLEXIBILITY IS POSSIBLE BECAUSE THE PROGRAM HAS NO FIXED PARAMETERS
                                OR TESTING SEQUENCE.  THE ENTIRE TEST PLAN, INCLUDING PARAMETERS
                                AND OPERATING SEQUENCE, IS DETERMINED BY THE OPERATOR THROUGH
                                RESPONSES TO TELETYPE REQUESTS AND SETTING OF CONSOLE SWITCHES.

                                THE PROGRAM PROVIDES FOR TESTING OF ALL TAPE DRIVE FUNCTIONS
                                SUCH AS WRITING,READING,REWINDING,TAPE POSITIONING,EOT - BOT
                                SENSING AND ASSUMES A GOOD RH AND TM03.

                                HOWEVER; THE RH AND TM03 ARE TESTED SOMEWHAT INTRINSICALLY
                                DURING THE TEST CYCLE IN ORDER TO PROVIDE FULL INFORMATION ABOUT
                                ANY ERROR CONDITIONS DETECTED.

                                DURING A TEST CYCLE, CHECKS ARE MADE FOR STATUS ERRORS,DATA ERRORS,
                                POSITION ERRORS,WORD COUNT AND CURRENT MEMORY ADDRESS ERRORS
                                WHEREVER APPLICABLE AS DETECTED BY THE RH OR TM03.


                        2.      REQUIREMENTS (HARDWARE)
                                -----------

                                A. ANY PDP-11 PROCESSER
                                B. 8K OF CORE
                                C. TELETYPE
                                D. TM03 TAPE CONTROLLER
                                E. 1 TO 8 MAG TAPE DRIVES
                                F. MASSBUS CONTROLLER


                        3.      LOADING PROCEDURE
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                                USE STANDARD PROCEDURE FOR LOADING BINARY TAPES
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4. STARTING PROCEDURE

THERE ARE FOUR (4) STARTING ADDRESSES THAT MAY BE USED;
200(8),204(8),210(8),AND 240(8):

A. 200(8): THIS ADDRESS MUST BE USED ON INITIAL START FROM LOAD AS ALL PARAMETERS ARE ENTERED FROM HERE. REQUESTS ARE PRINTED ON THE TELETYPE FOR ENTRY OF RH STARTING ADDRESS, VECTOR ADDRESS, DRIVE NUMBER(TM03 ADDRESS), SLAVE NUMBER, DENSITY,PARITY,FORMAT,RECORD COUNT,CHARACTER COUNT,PATTERN NUMBER,TAPE MARK AND STALL FOR READ,WRITE, AND TURNAROUND. ALL REPONSES SHOULD BE MADE IN OCTAL AND WITHIN THE LIMITS OF THE PARAMETER. A QUESTION MARK (?) WILL BE TYPED IF ANY CHARACTER ENTERED IS NOT BETWEEN 0 THRU 7 (OCTAL). THE CHARACTER MAY BE RETYPED FOLLOWING THE QUESTION MARK. IF THE RESPONSE IS NOT WITHIN ITS LIMITS. A QUESTION MARK (?) IS TYPED AND THE ENTIRE RESPONSE MAY BE RENTERED. SOME RESPONSES REQUIRE MORE THAN ONE (1) CHARACTER, BUT NONE REQUIRES MORE THAN SIX (6). RESPONSES OF MORE THAN ONE CHARACTER NEED NOT HAVE LEADING ZEROS AND SHOULD BE TERMINATED BY A CARRIAGE RETURN IF LESS THAN THE MAXIMUM NUMBER OF CHARACTERS IS INPUT.

B. 204(8): THIS ADDRESS SHOULD BE USED ANYTIME A RESTART OF THE PROGRAM IS NECESSARY AND THE PARAMETERS ENTERED AT THE INITIAL START OF 200(8) NEED NOT BE CHANGED. ALSO NOTE THAT ANY DATA PATTERN WHICH HAD BEEN GENERATED BY SETTING THE RANDOM DATA SWITCH (CONSOLE SWITCH EIGHT) WILL NOT BE OVERWRITTEN AND THERFORE IS HELD IN CORE FOR USE UNTIL CONSOLE SWITCH EIGHT(8) IS AGAIN SET AND THAT ALL STATISTICS WIL

C. 210(8): THIS ADDRESS IS THE SAME AS USING 204(8) IN THAT THE PREVIOUSLY SET PARAMETERS ARE USED; HOWEVER, THE DATA PATTERN IS RETURNED TO THE FIXED PATTERN ORIGINALLY CALLED FOR AT THE 200(8) START AND ALL STATISTICS ARE CLEARED TO

D. 240(8): THIS IS A SPECIAL ADDRESS WHICH WILL CAUSE THE PROGRAM TO EXECUTE A PREDETERMINED TEST P_AN ON ALL AVAILABLE DRIVES AND SLAVES. THE ONLY INPUT REQUIRED BY THE OPERATOR IS A RESPONSE TO REQUESTS FOR THE RH ADDRESS, VECTOR ADDRESS, CONTINUOUS OPERATION OF THE SEQUENCE, AND NRZ ONLY.

E. 300(8): THIS ADDRESS IS TO BE USED AS A RESTART ONLY AND WILL PERFORM JUST AS IN 200(8) EXCEPT THAT THE PARAMETER INPUT LIST IS SHORTENED. THE SHORT PARAMETER LIST CONSISTS OF DRIVE NUMBER, SLAVE NUMBER, DENSITY, PARITY, FORMAT, RECORD COUNT, CHARACTER COUNT, PATTERN, TAPE MARK, AND

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                                    INTERCHANGE READ.
                    **NOTE SEE ALSO SECTION 8-CONSOLE SWITCH SETTINGS

                                    THE FOLLOWING IS AN EXPLANATION OF THE INITIAL
                                    START (200 OCTAL) REQUESTS AND RESPONSES:

                    REGISTER START: THE RESPONSE REQUIRED FOR THIS REQUEST
                                    IS TO ENTER THE ADDRESS OF THE FIRST RH
                                    REGISTER (CS1) AS A SIX DIGIT UNIBUS ADDRESS.

                    VECTOR ADDRESS: THE RESPONSE FOR THIS REQUEST
                                    IS TO ENTER THE INTERRUPT VECTOR ADDRESS
                                    USED BY THE RH AS A THREE (3) DIGIT ADDRESS.

                    DRIVE NUMBER:   THE DRIVE NUMBER (MASSBUS ADDRESS
                                    OF THE TM03) IS ENTERED AS ONE (1)
                                    OCTAL CHARACTER AND MUST BE WITHIN THE LIMITS
                                    OF 0 THROUGH 7.

                    SLAVE NUMBER:   THE SLAVE NUMBER IS ENTERED AS ONE
                                    (1) OCTAL CHARACTER AND MUST BE
                                    WITHIN THE LIMITS OF 0 THROUGH 7.
                                    WHEN THE SLAVE NUMBER HAS BEEN
                                    ENTERED AND IS LEGAL, THE PROGRAM TESTS
                                    FOR THE PRESENCE OF A SLAVE OF THAT
                                    NUMBER.  IF THE SLAVE IS AVAILABLE
                                    A PRINTOUT OF 7 CHANNEL, IF APPLICABLE,
                                    AND ITS SERIAL NUMBER (IN BCD)
                                    WILL BE MADE TO ASSIST THE OPERATOR
                                    IN SETTING OF DENSITY, PARITY, AND FORMAT.
                                    A CHECK IS MADE FOR THE PROPER SETTING
                                    OF THE DRIVE TYPE REGISTER; IF WRONG, A
                                    MESSAGE IS PRINTED FOR INFORMATION ONLY.
                                    IF THE SLAVE IS NOT AVAILABLE,
                                    A MESSAGE STATING SO WILL BE
                                    PRINTED AND A NEW SLAVE NUMBER
                                    REQUEST WILL BE ISSUED.  WHEN A
                                    GOOD SLAVE NUMBER HAS BEEN ENTERED,
                                    REQUESTS FOR OPERATING DENSITY
                                    PARITY AND FORMAT ARE MADE FOR THAT
                                    SLAVE AND SHOULD BE RESPONDED TO
                                    ACCORDING TO THAT PARITICULAR SLAVE'S
                                    NEEDS.  AS MANY AS EIGHT (8) SLAVE
                                    NUMBER REQUESTS MAY BE USED, HOW-
                                    EVER, AT LEAST ONE MUST BE USED.
                                    THE SLAVE NUMBERS AND THEIR RESPECTIVE
                                    DENSITY, PARITY AND FORMAT MAY BE ENTERED
                                    IN ANY ORDER.  THE INFORMATION FOR
                                    EACH SLAVE ENTERED IS LOADED INTO A
                                    TABLE FOR REFERENCE IN TESTING.
                                    IF LESS THAN EIGHT(8) SLAVES ARE
                                    REQUIRED, THEN RESPONDING TO THE
                                    SLAVE NUMBER REQUEST WITH A CARRIAGE
                                    RETURN WILL TERMINATE THE SLAVE
                                    ENTRIES AND CONTINUE TO THE NEXT
                                    PARAMETER.  IT SHOULD BE REMEMBERED
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                                        THAT AT LEAST ONE SLAVE NUMBER REQUEST
                                        MUST BE ENTERED.  IF THE FIRST
                                        REQUEST IS RESPONDED TO BY A CARRIAGE
                                        RETURN, THEN THE REQUEST WILL BE REPEATED.


                    DENSITY:            THE DESITY REQUEST IS RESPONDED TO BY ONE (1) OCTAL
                                        CHARACTER AND MUST BE WITHIN THE LIMITS OF 0 THRU 4.
                                        AS EACH SLAVE NUMBER IS ENTERED, A REQUEST FOR THE
                                        OPERATING DENSITY FOR THAT SLAVE IS TYPED.  THE
                                        RESPONSE MEANINGS ARE AS FOLLOWING:

                                                A. 3 = 800BPI, NRZI
                                                B. 4 = 1600BPI, PE (9 CHANNEL ONLY)


                    PARITY:             THE PARITY REQUEST IS RESPONDED TO BY ONE (1)
                                        OCTAL CHARACTER AND MUST BE EITHER 0 OR 1.

                                                A. 1 = EVEN PARITY
                                                B. 0 = ODD PARITY

                    FORMAT:             THE FORMAT REQUEST IS RESPONDED
                                        TO BY TWO (2) CHARACTERS
                                        AND SHOULD BE AS FOLLOWS

                                                A. 14 = 9 CHANNEL NORMAL (TWO FRAMES PER WORD)
                                                B. 15 = CORE DUMP (FOUR FRAMES PER WORD)
                                                C. 16 = PDP-15 OR IBM COMPATABLE(TWO FRAMES PER
                                                     (DATA IS BYTE SWAPPED ON TAPE)

                RECORD COUNT:       THIS REQUEST IS RESPONDED TO BY A SIX (6) CHARACTER
                                    OCTAL NUMBER FROM 1 TO 177777.  REMEMBER LEADING
                                    ZEROS ARE NOT REQUIRED AND IF LESS THAN SIX
                                    CHARACTERS ARE ENTERED, A CARRIAGE RETURN
                                    WILL TERMINATE THE RESPONSE.  THE RECORD COUNT
                                    IS USED IN CONJUCTION WITH THE CHARACTER COUNT
                                    TO ESTABLISH A BLOCKING FACTOR FOR USE IN READ OR
                                    WRITE CYCLES.

            CHARACTER COUNT:        THIS RESPONSE IS ENTERED AS FOUR (4) OCTAL
                                    CHARACTERS WITHIN THE LIMITS OF 20 THRU 4000. AGAIN
                                    LEADING ZEROS ARE NOT REQUIRED AND A CARRIAGE
                                    RETURN TERMINATES A LESS THAN FOUR (4) CHARACTER
                                    RESPONSE.  THE CHARACTER COUNT IN CONJUNCTION
                                    WITH THE RECORD COUNT IS USED TO  ESTABLISH
                                    THE BLOCK SIZE (CHARACTERS PER RECORD, AND
                                    RECORDS PER BLOCK) USED IN READ AND WRITE CYCLES
                                    THE SAME BLOCKING IS USED ON ALL AVAILABLE UNITS.
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                    PATTERN NUMBER: THIS RESPONSE IS A TWO (2) CHARACTER OCTAL
                                    NUMBER WITHIN THE LIMITS OF 0 THRU 15(8).
                                    THE NU BER ENTERED WILL CAUSE A SPECIFIC DATA
                                    PATTERN TO BE USED FOR ALL READING AND WRITING. THIS
                                    DATA PATTERN IS NOT CHANGED UNLESS RANDOM DATA
                                    IS REQUESTED BY SETTING CONSOLE SWITCH EIGHT (8)
                                    TO A ONE.  RESETTING OF THE RANDOM DATA SWITCH
                                    DOES NOT CAUSE REVERSION TO THE FIXED PATTERN,
                                    BUT WILL HOLD THE LAST GENERATED PATTERN UNTIL
                                    A RESTART IS DONE FROM LOCATION 200(8), 210(8), OR 300(8).
                                    WHEN OPERATING IN NRZ MODE (DENSITY 0-3)
                                    THE PROGRAM CONSTRUCTS AND SAVES
                                    BOTH AN EXPECTED CRC CHARACTER AND AN
                                    LRC CHARACTER FOR COMPARISONS WITH
                                    THE HARDWARE GENERATED CHECK CHARACTER
                                    IN BOTH READ AND WRITE.
                                    THE SELECTION OF DATA PATTERN ZERO (0) HAS A
                                    SPECIAL USE.  PATTERN NUMBER ZERO (0) WILL
                                    CAUSE TO BE READ IN AT THE HIGH SPEED PAPER
                                    TAPE READER ANY DATA PATTERN DESIRED.
                                    THE EXTERNAL INPUT DATA THOUGH THE READER
                                    IS DONE BY PREPARING A PAPER TAPE WITH A PROGRAM
                                    CALLED DTC. (MAINDEC-11-DZTUF-A-D)  ANY CONFIGURATION
                                    OF BITS AND CHARACTERS MAY BE USED AND A LIMIT
                                    OF 377(8) CHARATERS IS IMPOSED.  WHEN EXTERNAL
                                    DATA IS INPUT, THE ENTIRE WRITE BUFFER IN
                                    CORE IS FILLED WITH THE PATTERN SO THAT ANY
                                    SIZE RECORD MAY BE USED.  DATA PATTERN
                                    PATTERN ZERO (0) EXTERNAL PAPER TAPE NEED ONLY
                                    BE READ ONCE AT INITIAL START OF 200(8), AND
                                    NEED NOT BE READ AGAIN UNLESS OVERWRITTEN BY
                                    RANDOM DATA. BE SURE TO LOAD THE READER
                                    BEFORE PRESSING START.

                    TAPE MARK:      THE TAPE MARK REQUEST IS USED TO DETERMINE
                                    IF THE OPERATOR WISHES TO HAVE EACH
                                    DATA BLOCK SEPERATED BY A TAPE MARK.  IF
                                    RESPONDED TO BY A ONE (1) THE TAPE MARK
                                    WILL BE WRITTEN AND WHEN READING WILL
                                    BE EXPECTED AT THE END OF DATA BLOCK.
                                    A ZERO (0) RESPONSE WILL DISALLOW TAPE
                                    MARK.  PLEASE NOTE THAT THE TAPE MARK
                                    RECORD INCREASES THE BLOCK SIZE BY ONE (1)
                                    RECORD; IN OTHER WORDS, A BLOCK OF 100
                                    RECORDS WILL HAVE THE TAPE MARK AS RECORD 101.

                    INTERCHANGE READ: THIS REQUEST IS RESPONDED TO BY
                                    A SINGLE CHARACTER INPUT OF EITHER
                                    ONE (1) OR ZERO (0). A RESPONSE OF ONE (1)
                                    WILL CAUSE ALL READING TO BE DONE IN
                                    THE INTERCHANGE MODE. A ZERO RESPONSE
                                    WILL CAUSE READING IN NORMAL MODE.
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                                SINGLE PASS:    THIS REQUEST IS RESPONDED TO BY EITHER A ONE (1)
                                                OR A ZERO (0). RESPONSE OF 1, WILL CAUSE THE TEST
                                                TO BE STOPPED AFTER THE LAST AVAILABLE DRIVE
                                                REACHES END OF TAPE. A RESPONSE OF 0, WILL
                                                ALLOW CONTINUOUS RUNNING THROUGH MULTIPLE PASSES.
                                                TO RESTART AT END OF PASS, PRESS CONTINUE, OR
                                                RESTART AT THE CONSOLE.

                                STALLS:         THE STALL REQUESTS ARE RESPONDED TO BY A SIX (6)
                                                CHARACTER OCTAL NUMBER WITHIN THE LIMITS OF 1
                                                THRU 177777.  LEADING ZEROS ARE NOT REQUIRED AND
                                                AN ENTRY OF LESS THAN SIX (6) CHARACTERS SHOULD
                                                BE TERMINATED BY A CARRIAGE RETURN.  EACH INCREMENT
                                                OF THE VALUE ADDS ABOUT 2.6 MICSEC TO THE DELAY.

                                                READ:   THE TIME DELAY BETWEEN EACH RECORD READ

                                                WRITE:  THE TIME DELAY BETWEEN EACH RECORD WRITTEN

                                                TURN AROUND:  TIME DELAY BETWEEN CHANGES OF
                                                              TAPE DIRECTION (FORWARD,TO REVERSE,ETC.)
                                                              AND BETWEEN BLOCKS.

                                FIXED PARAMETERS: IT SHOULD BE NOTED THAT ALL PARAMTERS EXCEPT
                                                FOR THE SLAVE DESCRIPTION VALUES (SLAVE
                                                NUMBER, DENSITY, PARITY, AND FORMAT) HAVE NOMINAL
                                                VALUES ALREADY STORED IN THE PROGRAM.
                                                COUNT, CHARACTER COUNT, TAPE MARK AND STALLS) IS TYPED.
                                                ITS PRESENT STORED VALUE IS ALSO PRINTED.
                                                IF THESE VALUES NEED NOT BE CHANGED, SIMPLY
                                                TYPE A CARRIAGE RETURN AS RESPONSE AND NO
                                                CHANGE WILL BE MADE.  EACH START OF THE PROGRAM
                                                AT 200(8) WILL SHOW THE CURRENT VALUES OF THESE
                                                PARAMETERS AS PER THE LAST ENTRY.  WHEN A
                                                FRESH LOAD OF THE PAPER TAPE IS DONE,  THE
                                                PARAMETERS WILL REFLECT THE FIXED VALUES STORED
                                                IN THE PROGRAM.

                                                A. RECORD COUNT = 100
                                                B. CHARACTER COUNT = 200
                                                C. PATTERN NUMBER = 1
                                                D. TM=0
                                                E. INTERCHANGE READ = 0
                                                F. SINGLE PASS = 0
                                                G. READ STALL = 1
                                                H. WRITE STALL = 1
                                                I. TURN AROUND STALL = 1
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                        SAMPLE START AT 200(8):

                                THE FOLLOWING IS A SAMPLE OF THE
                                PRINTED REQUESTS AND THEIR RESPONSES.
                                RESPONSES ARE ENCLOSED IN PARENS FOR
                                CLARITY ONLY AND (CR) MEANS CARRIAGE RETURN

                        LOAD ADDRESS 200(8), SET CONSOLE SWITCHES, PRESS START SWITCH:

                                TE16 TAPE DRIVE TEST

                                REGISTER START=172440(172440)
                                VECTOR ADDRESS=224(CR)
                                DRIVE NUMBER (4)
                                SLAVE NUMBER=(5) SN: 5009
                                DENSITY=(3)
                                PARITY=(0)
                                FORMAT=(14)
                                SLAVE NUMBER=(2) 9 CHAN SN: 0022
                                DENSITY=(3)
                                PARITY=(1)
                                FORMAT=(15)
                                SLAVE NUMBER=(CR)
                                RECORD COUNT=100 (500)(CR)
                                CHARACTER COUNT=200 (38)?(7)(CR)
                                PATTERN NUMBER=1 (22)
                                ?
                                (6)(CR)
                                TM=(0)
                                INTERCHANGE READ=(1)
                                SINGLE PASS=(0)

                                ENTER STALLS
                                READ=1 (CR)
                                WRITE=1 (CR)
                                TURN AROUND=1 (3000)(CR)

                        THE PROGRAM WILL NOW PERFORM THE TEST CYCLE SET IN
                        THE CONSOLE SWITCHES ON SLAVE FIVE (5) THEN TWO (2),
                        ONE BLOCK ON EACH UNIT PER CYCLE, USING DATA PATTERN
                        NUMBER SIX (6) WITH A BLOCKING FACTOR OF 37 CHARACTERS
                        PER RECORD AND 500 RECORDS PER BLOCK.  THE DELAYS ARE SET
                        FOR MINIMUM ON READ AND WRITE, AND APPROXIMATELY .75
                        SECONDS ON TURN AROUND.

                        NO TAPE MARKS WILL BE WRITTEN AND ALL READING
                        WILL BE DONE IN INTERCHANGE MODE (MAINT MODE 0001).
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4.1 AUTOMATIC MODE OPERATION

IF THE PROGRAM IS LOADED AND RUN IN AUTOMATIC (CHAIN) MODE
THE AUTO ACCEPT SEQUENCE TEST PLAN IS RUN. SEE SEC 11. BELOW;
THE SOFTWARE SWR IS INVOKED WITH A SWITCH SETTING OF 000000
IF LOADED VIA ACT11. NO OPERATOR INTERVENTION IS REQUIRED.

**EXCEPTION: IF THIS PROGRAM IS LOADED VIA TMDP CHAIN MODE THE
PROGRAM WILL TEST ALL SLAVES ON THE FIRST AVAILABLE
DRIVE EXCEPT SLAVE 0.

**NOTE: IN ORDER TO CHANGE THE DEFAULT SETTING OF THE SOFTWARE
SWR, CHANGE LOC: 176(SWREG:) TO THE DESIRED SETTING.

5. DATA PATTERNS

THERE ARE FIFTEEN DATA PATTERN GENERATORS STORED IN CORE
AND ANY ONE OF THESE MAY BE SELECTED. THE ONE UNIQUE
CASE IS PATTERN ZERO(0); SELECTION OF PATTERN ZERO(0)
REQUIRES THAT A PREVIOUSLY PREPARED PAPER TAPE BE
ENTERED AT THE HIGH SPEED READER. THIS TAPE CONTAINS
A DATA PATTERN OF NO MORE THAN 377 OCTAL
CHARACTERS. THE FIRST CHARACTER READ IN IS THE
NUMBER OF ACTUAL DATA CHARACTERS THAT ARE CONTAINED
ON THE TAPE. EACH DATA CHARACTER MAY BE ANY
COMBINATION OF BITS AND WILL BE LOADED INTO CORE
AS THEY APPEAR ON THE TAPE. NO MATTER HOW MANY
CHARACTERS ARE ON TAPE, THE ENTIRE WRITE BUFFER (4000 CHARACTERS)
WILL BE FILLED WITH THE PATTERN ENTERED SO THAT ANY
SIZE RECORD CAN BE USED. (SEE DTC MAINDEC-11-DZTUF-A-D)
THE PROGRAM GENERATES A CYLIC REDUNDENCY CHECK
CHARACTER (CRC) AND A LONGITUDINAL REDUNDENCY CHECK
CHARACTER (LRC) FOR COMPARISONS AGAINST THE CRC AND LRC
GENERATED BY THE HARDWARE IN NRZI READS OR WRITES.

THE FOLLOWING IS A LIST OF THE DATA PATTERNS AVAILABLE:

DATA0: EXTERNAL INPUT THRU HIGH SPEED READER (SEE DTC)
DATA1: ALL ONE BITS IN ALL CHARACTERS
DATA2: ALL ZERO BITS IN ALL CHARACTERS
DATA3: A ONE BIT WALKING FROM RIGHT TO LEFT IN A FIELD OF ZEROS
DATA4: A ZERO BIT WALKING FROM RIGHT TO LEFT IN A FIELD OF ONES.
DATA5: ALTERNATING ONE AND ZERO BITS IN EACH CHARACTER
DATA6: ALTERNATING ZERO AND ONE BITS IN EACH CHARACTER
DATA7: SAME AS DATA5 BUT WITH EVERY OTHER CHARACTER COMPLEMENTED
DATA10: WALKING ONE/ALL ONE IN ALTERNATING CHARACTERS
DATA11: INCREMENTING CHARACTERS (000-377)
DATA12: DECREMENTING CHARACTERS (377-000)
DATA13: ALTERNATING CHARACTERS OF ALL ZERO AND ALL ONE BITS
DATA14: WALKING ZERO/ALL ZERO IN ALTERNATING CHARACTERS
DATA15: AUTO SEQUENCE PATTERN 0,0,-1,-1,-1,0,0

6. RANDOMIZATION

THERE ARE THREE (3) VALUES THAT MAY BE GENERATED RANDOMLY; DATA, CHARACTER COUNT, AND RECORD COUNT. THESE ARE NORMALLY SET TO SOME FIXED VALUE BUT MAY BE RANDOMIZED BY SETTING THE APPROIATE CONSOLE SWITCHES.

A. RANDOM DATA: (CONSOLE SWITCH 8)
GENERATES AN ENTIRE BUFFER, CHARACTER BY CHARACTER, OF RANDOM DATA WHEN SWITCH 8 IS SET TO A ONE. ONCE SET, THE RESETTING OF SWITCH 8 CAUSES THE LAST GENERATED PATTERN TO BE RETAINED IN CORE. A RESTART AT LOCATION 200(8) OR 210(8) WILL CAUSE REVERSION OF THE DATA TO THE FIXED PATTERN REQUESTED INITIALLY. A RESTART AT LOCATION 204(8) WILL HOLD THE LAST GENERATED PATTERN IN CORE UNTIL SWITCH 8 IS AGAIN SET.
ALTHOUGH THE DATA IS GENERATED AS RANDOM, THE PROGRESSION OF RANDOM CHARACTERS IS ALWAYS THE SAME FROM THE OUTSET OF RANDOMIZATION. THEREFORE IT IS POSSIBLE TO GENERATE ONE TAPE REEL OF RANDOM DATA ON ONE UNIT, RESTART THE PROGRAM TO RE-ESTABLISH THE OUTSET POINT, AND READ THE RANDOM TAPE REEL ON ANOTHER UNIT FOR COMPATABILITY TESTING. IN MULTIDRIVE SYSTEMS THE SAME BLOCK OF DATA, WHETHER RANDOM OR FIXED, IS WRITTEN OR READ ON EACH AVAILABLE UNIT IN THE ORDER THAT THEY WERE ENTERED, BEFORE BEING CHANGED.

B. RANDOM CHARACTER COUNT: (CONSOLE SWITCH 7)
GENERATES A DIFFERENT NUMBER OF CHARACTERS PER RECORD TO BE WRITTEN ON EACH BLOCK CYCLE. THE SAME NUMBER OF CHARACTERS PER RECORD IS WRITTEN OR READ ON EACH AVAILABLE UNIT BEFORE BEING CHANGED. RESETTING SWITCH 7 HOLDS THE LAST VALUE GENERATED.

C. RANDOM RECORD COUNT: (CONSOLE SWITCH 6)
GENERATES A DIFFERENT NUMBER OF RECORDS FOR EACH BLOCK OF DATA WRITTEN OR READ ON EACH BLOCK CYCLE. THE SAME NUMBER OF RECORDS IS WRITTEN OR READ ON EACH AVAILABLE UNIT BEFORE BEING CHANGED. RESETTING SWITCH 6 HOLDS LAST VALUE GENERATED.

7. DYNAMIC PARAMETERS:

THE THREE (3) STALL VALUES ARE CONSIDERED TO BE DYNAMIC
PARAMETERS AS THEY MAY BE CHANGED WHILE THE PROGRAM IS
RUNNING BY TYPING A CONTROL B CHARACTER AT THE TELETYPE.
AS SOON AS THE BUS IS RELEASED BY THE MAG TAPE OPERATION
IN PROGRESS, THE PROGRAM WILL RESPOND TO THE CONTROL C INPUT
BY TYPING A REQUEST FOR NEW STALL PARAMETERS. THE LAST VALUES
THAT WERE ENTERED WILL BE PRINTED AS THE STORED VALUES AND MAY
BE CHANGED BY ENTERING NEW VALUES OR LEFT UNCHANGED BY
TYPING A CARRIAGE RETURN.
THE YOZZLE STALL IS ALSO DYNAMIC AND CA. BE CHANGED
BY TYPING A CONTROL B WHILE DOING A YOZZLE. A YOZZLE STALL
REQUEST WILL BE PRINTED AND SHOULD BE RESPONDED TO WITH
THE DESIRED VALUE.

8. CONSOLE SWITCH SETTINGS

CONTROL:

1) CONTROL G <^G>;
   SELECTS SOFTWARE SWR AND ALLOWS USER TO SELECT NEW SWITCHES.
   THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW=
   WHERE: XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWR.
   AFTER THE 'NEW=' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE
   OF THE FOLLOWING AT THE TTY:
     A) TYPE A NUMBER TO BE LOADED INTO THE SOFTWARE SWR
     B) IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWR
        CONTENTS WILL NOT BE CHANGED.

2) CONTROL A <^A>;
   ALTERNATES USAGE OF THE SWR BETWEEN THE HARDWARE SWR & SOFTWARE SWR.

3) CONTROL B <^B>;
   SEE SECTION 7 DYNAMIC PARAMETERS

4) CONTROL U <^U>;
   DELETES ALL CHARACTERS TYPED IN RESPONSE TO A REQUEST.

THE CONSOLE SWITCHES ARE USED TO SET UP THE TEST CYCLE
DESIRED, TO GENERATE RANDOM VALUES, AND TO CONTROL ERROR
RESPONSES. THE SWITCHES SHOULD BE SET IN THE DESIRED
MANNER BEFORE PRESSING THE START SWITCH BECAUSE THEY
ARE ALL DYNAMIC AND WILL RUN THE PROGRAM IN ANY
CONFIGURATION. ALL SWITCHES SET TO ZERO(0) IS NORMAL.

SW15: 1=STOP ON ERROR
       0=CONTINUE ON ERROR

SW14: 1=PRINT READ/WRITE STATISTICS
       0=DO NOT PRINT STATS

SW13: 1=DO NOT CHECK DATA ERRORS
       0=CHECK DATA ERRORS

SW12: 1=DO NOT CHECK WRITE STATUS ERRORS (NOR CLEAR THEM IF THEY DO OCCUR)
       0=CHECK WRITE STATUS ERRORS

SW11: 1=DO NOT CHECK READ STATUS ERRORS (NOR CLEAR THEM IF THEY DO OCCUR)
       0=CHECK READ STATUS ERRORS

SW10: 1=DO NOT PRINT ANY ERRORS (EXCEPT CATASTROPHIC ERRORS)
       0=PRINT ALL ERRORS

SW9:   1=REWIND ALL AVAILABLE TAPES
       0=DO NOT REWIND

SW8:   1=GENERATE RANDOM DATA
       0=USED FIXED DATA

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607                                     SW7:    1=GENERATE RANDOM CHARACTER COUNT
608                                             0=USE FIXED CHARACTER COUNT
609
610                                     SW6:    1=GENERATE RANDOM RECORD COUNT
611                                             0=USED FIXED RECORD COUNT
612
613                                     SW5:    1=YOZZLE ON CURRENT RECORD
614                                             0=DO NOT YOZZLE ON RECORD
615
616                                     SW4:    1=DO WRITE/READ RETRIES
617                                             0=DO NOT RETRY
618
619                                     SW3:    1=DO NOT READ FORWARD
620                                             0=READ FORWARD
621
622                                     SW2:    1=DO NOT READ REVERSE
623                                             0=READ REVERSE
624
625                                     SW1:    1=READ FORWARD FIRST
626                                             0=READ REVERSE FIRST
627
628                                     SW0:    1=DO NOT WRITE
629                                             0=WRITE
630
631
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632
633
634                                    SWITCH EXPLANATION AND EXAMPLES:
635
636                                    SW0-3:          THESE SWITCHES ARE USED TO CONTROL THE SEQUENCE
637                                                    OF MAG TAPE OPERATIONS PREFORMED ON EACH AVAILABLE
638                                                    UNIT.  THE BLOCK OF DATA DESCRIBED THROUGH
639                                                    THE RESPONSES TO TELETYPE REQUESTS AT INITIAL START
640                                                    WILL BE EITHER WRITTEN OR READ FROM EACH AVAILABLE
641                                                    UNIT IN THE ORDER THAT THEY WERE ENTERED. THE SEQUENCE
642                                                    OF OPERATIONS IS CALLED A CYCLE, AND WILL BE PERFORMED
643                                                    CONTINUOUSLY UNTIL STOPPED BY THE OPERATOR. WHEN END
644                                                    OF TAPE IS REACHED, THE UNIT WILL BE REWOUND AND
645                                                    FLAGGED AS UNAVAILABLE FOR TEST UNTIL ALL UNITS HAVE
646                                                    REACH EOT, AT WHICH TIME TESTING IS RESUMED ON ALL
647                                                    AVAILABLE UNITS.
648
649                                           EXAMPLES: 0-3
650
651                                                   A.  SW0=0,SW1=0,SW2=1,SW3=1
652                                                       WRITE ONLY X RECORDS OF Y CHARACTERS
653
654                                                   B.  SW0=0,SW1=0,SW2=1,SW3=0
655                                                       WRITE THEN BACKSPACE AND READ FORWARD X RECORDS
656
657                                                   C.  SW0=0,SW1=0,SW2=0,SW3=1
658                                                       WRITE THEN READ REVERSE X RECORDS.
659
660                                                   D.  SW0=0,SW1=0,SW2=0,SW3=0
661                                                       WRITE THEN READ REVERSE AND READ FORWARD X RECORDS
662
663                                                   E.  SW0=0,SW1=1,SW2=0,SW3=0
664                                                       WRITE THEN BACKSPACE AND READ FORWARD THEN REVERSE
665
666                                                   F.  SW0=1,SW1=0,SW2=1,SW3=0
667                                                       READ TAPE FORWARD X RECORDS
668
669                                                   G.  SW0=1,SW1=0,SW2=0,SW3=1
670                                                       READ TAPE REVERSE X RECORDS
671
672                                                   H.  SW0=1,SW1=0,SW2=0,SW3=0
673                                                       READ TAPE REVERSE THEN FORWARD
674
675                                                   I.  SW0=1,SW1=1,SW2=0,SW3=0
676                                                       READ TAPE FORWARD THEN REVERSE
677
```

```
678
679
680                                     SW4:            SWITCH FOUR (4), WHEN SET TO A ONE (1), WILL
681                                                     CAUSE ANY DATA RELATED ERROR TO BE RETRIED.
682                                                     THE WRITE RETRY SCHEME CONSISTS OF REWRITING THE RECORD
683                                                     IN THE SAME SPOT ON TAPE FOUR (4) TIMES. IF
684                                                     ALL FOUR (4) REPEATS ARE SUCCESSFUL, THE
685                                                     RECORD IS CONSIDERED AS RECOVERED, AND A TAPE
686                                                     WRITE ERROR IS LOGGED. IF ANY OF THE FOUR
687                                                     (4) REPEATS IS UNSUCESSFUL, A SKIP ERASE IS
688                                                     DONE, A SUPECTED BAD TAPE SPOT IS LOGGED
689                                                     AT THIS BLOCK AND RECORD NUMBER, AND A SECOND
690                                                     RETRY OF FOUR REPEATS IS DONE. IF AFTER FOUR
691                                                     (4) RETRIES, THE RECORD CANNOT BE RECOVERED
692                                                     A NOTIFICATION IS PRINTED, AND TESTING IS
693                                                     RESUMED ON THE NEXT RECORD.
694                                                     IF 20(8) BAD TAPE SPOTS ARE FOUND, THE
695                                                     SLAVE WILL BE REWOUND AND REMOVED FROM
696                                                     TESTING WITH AN APPROPRIATE MESSAGE PRINTED.
697                                                     THE READ RETRY SCHEME CONSISTS OF REREADING THE
698                                                     RECORD UP TO EIGHT TIMES. IF ALL EIGHT REREADS ARE
699                                                     BAD, IT IS A HARD ERROR. IF ANY REREAD IS
700                                                     SUCCESSFUL, THIS IS A SOFT ERROR.
701                                                     IF THE ORIGINAL ERROR IS OF THE NON-RETRYABLE
702                                                     TYPE (IE: ILF,RMR,ILR,NEF,CBUSPE), THE RETRY SCHEME
703                                                     IS NOT ENTERED AND A MESSAGE IS PRINTED.
704
705                                     SW5:            SWITCH FIVE (5) WHEN SET DURING A READ
706                                                     FORWARD OR REVERSE WILL CAUSE THE TAPE
707                                                     TO CONTINUOUSLY READ THE CURRENT RECORD
708                                                     BY SPACING EITHER FORWARD OR REVERSE AND
709                                                     REREADING THAT RECORD.  THIS TAPE MOVEMENT
710                                                     IS CALLED YOZZLING.  THERE IS A SOFTWARE
711                                                     DELAY EXECUTED BETWEEN EACH SPACE/READ
712                                                     OF THE RECORD AND IT MAY BE VARIED BY
713                                                     TYPING CONTROL C ON THE TELETYPE DURING
714                                                     THE EXECUTION OF THE YOZZLE AND RESPONDING
715                                                     TO THE PRINTED REQUEST WITH A SIX (6)
716                                                     DIGIT VALUE.  THE YOZZLE STALL IS PRESET
717                                                     TO A VALUE OF 3000 IN THE PROGRAM TO
718                                                     PREVENT EXCESSIVE TAPE WEAR, BUT MAY BE
719                                                     SET TO ANY VALUE THROUGH THE TELETYPE.
720
721                                     SW6-8:          THESE THREE (3) SWITCHES CONTROL THE RANDOMIZATION
722                                                     OF DATA AND BLOCK SIZE AND MAY BE SET
723                                                     AND RESET AT ANY TIME.  THE ACTUAL CHANGE
724                                                     WILL TAKE PLACE BETWEEN BLOCK CYCLES.
725
726                                     SW9:            SWITCH NINE (9) WHEN SET WILL CAUSE ALL
727                                                     AVAILABLE TAPE UNITS TO BE REWOUND AT
728                                                     THE END OF THE CURRENT BLOCK CYCLE. TESTING
729                                                     WILL BE RESUMED AT A BLOCK COUNT OF
730                                                     ONE (1) WHEN ALL UNITS HAVE REACHED BOT.
731
```

```
                                SW10-13:        THESE SWITCHES ARE USED TO CONTROL THE
                                                ERROR HANDLING TO BE DONE ON THE TAPE
                                                OPERATION DESCRIBED BY SWITCHES 0-3.

                                        A.      SWITCH TEN (10) WHEN SET TO A ONE
                                                WILL DISALLOW ANY ERROR PRINTOUTS MADE
                                                ON THE OPERATION IN PROGRESS.  CATASTROPHIC
                                                FAILURES AND INFORMATION PRINTOUTS WILL
                                                STILL OCCUR.  IE: UNIT NOT AVAILABLE, ILLEGAL
                                                BOT, DROP OR PICK OVERFLOW, AND EOT REWIND.

                                        B.      SWITCH ELEVEN (11) WHEN SET TO A ONE
                                                WILL DISALLOW THE CHECKING FOR STATUS
                                                ERRORS ON READ (FORWARD OR REVERSE) OPERATIONS.

                                        C.      SWITCH TWELVE (12) WHEN SET TO A ONE
                                                WILL DISALLOW THE CHECKING FOR STATUS
                                                ERRORS ON WRITE OPERATIONS.

                                        D.      SWITCH THIRTEEN (13) WHEN SET TO A ONE
                                                WILL DISALLOW THE CHECKING OF READ
                                                DATA.  THIS SWITCH HAS NO EFFECT ON
                                                STATUS CHECKING.

                                **NOTE THAT WHEN SW11 OR 12 ARE SET, NOT ONLY ARE ERRORS NOT CHECKED, BU
                                ***THEREFOR USE CAUTION TO ASSURE THAT OPERATIONS ARE NOT UNEXECUTED DUE
                                ****DO NOT SET SW 11 OR 12 TO A ONE (1), DURING A RETRY SEQUENCE.

                                SW14:           SWITCH FOURTEEN (14)WHEN SET TO A ONE (1) WILL
                                                PRINT THE ACCUMULATED READ/WRITE STATISTICS FOR THE SELECTED
                                                SLAVE UNDER TEST AT THE END OF THE CURRENT BLOCK
                                                CYCLE.  THE STATISTICS PRINTED ARE THE NUMBER OF BITS
                                                DROPPED OR PICKED, THE NUMBER OF RETRIES, WRITE ERRORS,
                                                READ ERRORS, AND DATA ERRORS.

                                SW15:           SWITCH FIFTEEN (15) WHEN SET TO A ONE,
                                                WILL CAUSE THE PROGRAM TO HALT ON ANY
                                                ERROR DETECTED BY THE OPERATION IN PROGRESS.
                                                IF BOTH SWITCH TEN (10) AND FIFTEEN (15)
                                                ARE SET, THE ACTUAL ERROR DETECTED WILL
                                                NOT BE PRINTED BUT WILL CAUSE A HALT.
                                                IF SWITCH TEN (10) IS RESET BEFORE PRESSING
                                                CONTINUE, THE ERROR WHICH CAUSED THE HALT
                                                WILL BE PRINTED BEFORE TESTING IS RESUMED.
```

9. ERROR PRINTOUTS

THERE ARE THREE TYPES OF ERROR PRINTOUTS MADE BY
THE PROGRAM; OPERATION ERRORS, DATA ERRORS, AND CONDITION
ERRORS. EACH ERROR MESSAGE PRINTED IS PROCEEDED BY A TWO LINE
HEADER WHICH CONTAINS THE DRIVE NUMBER, SLAVE NUMBER,
DENSITY, PARITY, AND FORMAT ON THE FIRST LINE, AND THE BLOCK NUMBER,
RECORD NUMBER, RECORD SIZE, AND ERROR TYPE ON THE SECOND.

A. OPERATION ERRORS:

THESE ARE ERRORS WHICH CAN OCCUR AS A
DIRECT RESULT OF A TAPE OPERATION.

1. READ/WRITE STATUS ERRORS: THESE ARE DETECTED BY EITHER THE TM03 ITSELF OR BY THE MASSBUS CONTROLLER. ALL STATUS ERRORS WILL BE REPORTED.

2. TAPE POSITION ERRORS: THESE ARE INDICATED BY AN INCORRECT SPACE OR REWIND OPERATION IN WHICH TAPE POSITION BECOMES UNRELIABLE.

B. DATA ERRORS:

DATA ERRORS WILL OCCUR WHEN TAPE IS
BEING READ AND THE DATA FROM TAPE DOES
NOT MATCH THE EXPECTED DATA. WHEN READING
IN THE REVERSE DIRECTION, THE RECORD NUMBERS
WILL BE COUNTED DOWN FROM LAST TO FIRST.
THE CHARACTER NUMBERS IN REVERSE READS WILL
ALSO BE COUNTED DOWN IN ORDER TO REFLECT
TAPE POSITION RATHER THAN THE ORDER TRANSFERRED.

BECAUSE DATA RECORDS CAN BE UP TO FOUR THOUSAND
CHARACTERS LONG, AN ERROR CONDITION WHICH WILL CAUSE
THE ENTIRE RECORD TO READ INCORRECTLY COULD CAUSE A VERY
LENGTHY PRINTOUT. THEREFORE, A COUNTER OF SUCCESSIVE
BAD CHARACTERS IS EMPLOYED. IF TEN (10) CHARACTERS IN
SUCCESSION ARE BAD, A NOTIFICATION IS PRINTED
(BAD RECORD) AND THE NEXT TWENTY FIVE (25) CHARACTERS
ARE SKIPPED BEFORE CHECKING IS RESUMED. IF THE
BAD RECORD CONDITION OCCURS THREE (3) TIMES IN ONE
RECORD, THE REST OF THE RECORD IS SKIPPED, DOWN
TO THE LAST TEN (10) CHARACTERS WHICH WILL BE
CHECKED. THE SKIPPING AND RESUMPTION OF CHECKING
WILL ONLY BE DONE ON RECORDS WHICH ARE LONG
ENOUGH TO ALLOW IT.

```
                        C. CONDITION ERRORS: (CATASTROPHIC)

                                THESE PRINTOUTS REFLECT THE STATE OF THE TAPE SYSTEM
                                EITHER BEFORE OR AFTER AN OPERATION

                                1. EOT: WHEN EOT (END OF TAPE) IS ENCOUNTERED DURING
                                        EITHER A READ OR WRITE, THE CYCLE IS COMPLETED
                                        ON THE SHORTENED BLOCK AFTER WHICH THE SLAVE
                                        WILL BE REWOUND AND FLAGGED AS UNAVAILABLE
                                        FOR TESTING UNTIL ALL SLAVES HAVE REACHED EOT AND
                                        ARE REWOUND.  WHEN THE LAST AVAILABLE SLAVE
                                        HAS REACHED EOT AND BEEN REWOUND TO BOT,
                                        TESTING WILL BE RESUMED ON ALL SLAVES.

                                2. ILLEGAL BOT: WHEN A SLAVE ENCOUNTERS BOT DURING
                                                A READ, WRITE, OR SPACE OPERATION, AN ERROR
                                                IS PRINTED AND THE PROGRAM HALTED.  THIS IS
                                                A CATASTROPHIC ERROR.  TESTING MAY BE RESUMED
                                                BY PRESSING CONTINUE; BUT A RESTART IS
                                                SUGGESTED.

                                3. NO INTERRUPT RETURNED: EACH TAPE OPERATION SHOULD BE
                                                TERMINATED BY THE SETTING OF AN INTERRUPT IN
                                                THE CPU.  IF NO INTERRUPT IS RETURNED WITHIN
                                                THE APPROPIATE TIME, AN ERROR IS PRINTED.

                                4. NO MEDIUM ON-LINE: BEFORE AN OPERATION IS ATTEMPTED,
                                                THE TM03 IS CHECKED FOR MOL.  IF IT IS NOT
                                                SET, AN ERROR IS PRINTED, AND THE PROGRAM STOPPED.
                                                TESTING MAY BE RESUMED BY PRESSING CONTINUE.

                                5. NO BOT ON REWIND: AS EACH SLAVE IS REWOUND A CHECK
                                                IS MADE TO ASSURE THAT PROPER POSITION AT BOT
                                                IS ESTABLISHED.  IF BOT IS NOT SET UPON COMPLETION OF
                                                A REWIND, AN ERROR IS PRINTED AND THE PROGRAM
                                                WILL HALT. PRESS CONTINUE TO RESUME TESTING.

                                6. POSITION ERROR: IF POSITION IS LOST DURING A RETRY,
                                                A MESSAGE IS PRINTED, THE TAPE REWOUND,
                                                AND REMOVED FROM TESTING UNTIL ALL ARE
                                                RESTARTED AT BLOCK ONE.

                                7. BAD TAPE OVERFLOW: IF 20(8) BAD TAPE SPOTS ARE FOUND,
                                                A MESSAGE IS PRINTED, THE TAPE REWOUND,
                                                AND REMOVED FROM TESTING UNITLL ARE
                                                RESTARTED AT BLOCK ONE.

                                8. HARD READ ERROR: IF ANY HARD READ ERROR IS ENCOUNTERED
                                                DURING A RETRY, A MESSAGE IS PRINTED
                                                REGARDLESS OF THE SETTING OF SW10.

                                9. NON-RETRYABLE: IF ANY NON-RETRYABLE ERROR IS ENCOUNTERED, A
                                                MESSAGE IS PRINTED REGARDLESS OF THE SETTING OF SW10.
```

```
885
886
887                                   D. EXAMPLES:
888
889                                      GLOSSARY:    BN = CURRENT BLOCK NUMBER
890                                                   RN = CURRENT RECORD NUMBER
891                                                   RS = RECORD SIZE, IN FRAMES
892                                                   WE = WRITE STATUS ERROR
893                                                   RE = READ STATUS ERROR
894                                                   SE = SPACE ERROR
895                                                   TM = TAPE MARK
896                                                   F = FORWARD
897                                                   R = REVERSE
898                                                   CS1 = RH/TE16 CONTROL REGISTER
899                                                   WC = RH WORD COUNT
900                                                   BA = RH BUS ADDRESS
901                                                   FC = TE16 FRAME COUNT
902                                                   CS2 = RH CONTROLLER STATUS
903                                                   DS = TE16 DRIVE STATUS
904                                                   ER = TE16 ERROR REGISTER
905                                                   AS = ATTENTION SUMMARY
906                                                   CK = TE16 CHECK CHARACTER
907                                                   DB = RH DATA BUFFER
908                                                   MR = TE16 MAINTENENCE REGISTER
909                                                   DT = TE16 DRIVE TYPE
910                                                   SN = TE16 SERIAL NUMBER
911                                                   TC = TE16 TEST CONTROL
912                                                   *F = DATA FORMAT
913                                                   *P = PARITY
914                                                   *D = DENSITY
915                                                   *PATRN = DATA PATTERN NUMBER (R   RANDOM)
916
```

```
917
918
919                                     EXAMPLE 1: IN THIS EXAMPLE SLAVE 1 ON TM03 0 WAS
920                                             OPERATING AT 1600 BPI IN ODD PARITY USING
921                                             THE NINE CHANNEL NORMAL DATA FORMAT.  A
922                                             WRITE STATUS ERROR WAS DETECTED.  THE BAD
923                                             STATUS INDICATES THAT AN UNCORRECTABLE DATA
924                                             ERROR (BIT 6 OF ER) AND A PE FORMAT ERROR
925                                             (BIT 7 OF ER) OCCURED DURING THE WRITE
926                                             OPERATION OF THE SIXTH (6) RECORD OF THE
927                                             FIFTY (50) RECORDS IN BLOCK (2).  THE
928                                             SIZE OF THE RECORD WAS TWO HUNDRED (200)
929                                             FRAMES.  THE CHECK CHARACTER REFLECTS THE BAD TRACK.
930
931                                             DRIVE NO. 0 *SLAVE NO. 1 *D 4 *P 0 *F 14 *PATRN 1
932                                             *BN 2 *RN 6-50 *RS = 200 *WE
933                                             CS1 144260
934                                             CS2 100
935                                             DS 150640
936                                             ER 300
937                                             WC 0
938                                             CK 4
939
940                                     EXAMPLE 2: IN THIS EXAMPLE SLAVE 3 ON TM03 1 WAS
941                                             OPERATING AT 800 BPI IN EVEN PARITY USING
942                                             THE NINE CHANNEL NORMAL DATA FORMAT.  A
943                                             READ STATUS ERROR WAS DETECTED DURING
944                                             THE REVERSE READ OF THE TENTH (10)
945                                             RECORD OF THE 25 RECORDS IN THIS BLOCK (12).
946                                             THE SIZE OF THE RECORD IS TWENTY (20) FRAMES.
947                                             THE PRINTOUT INDICATES THE DETECTION OF A
948                                             VERTICAL PARITY ERROR (VPE: BIT 6 OF ER) AND A
949                                             CYCLIC REDUNDENCY ERROR (CRC: BIT 15 OF ER).
950                                             THE CRC CHARACTER, AS RECEIVED, IS NOT
951                                             AS EXPECTED AND IS PRINTED SHOWING BOTH
952                                             THE ACTUAL (FIRST) AND THE EXPECTED (LAST).
953
954                                             DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 3
955                                             *BN 12 *RN 10-25 *RS 20 *RE R
956                                             CS1 144276
957                                             CS2 100
958                                             DS 150600
959                                             ER 100100
960                                             WC 0
961                                             CRC 767-777
962
```

```
963
964
965                                   EXAMPLE 3: IN THIS EXAMPLE, THE HEADER IS THE SAME AS
966                                           IN EXAMPLE TWO (2) EXCEPT THAT THE ERROR TYPE
967                                           REFLECTS A READ ERROR IN THE FORWARD
968                                           DIRECTION.  IT IS NORMAL FOR THE SYSTEM
969                                           TO DETECT AN ERROR IN THE FORWARD AND
970                                           REVERSE DIRECTION AT THE SAME RECORD.
971                                           REMEMBER THAT IN REVERSE OPERATIONS THE
972                                           RECORD NUMBER IS COUNTED DOWN SO THAT
973                                           RECORD NUMBER TEN (10) WILL SHOWN IN
974                                           THE PROPER POSITION IN BOTH FORWARD AND
975                                           REVERSE.
976
977                                           DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 2
978                                           *BN 12 *RN 10-25 *RS 20 *RE F
979                                           CS1 144270
980                                           CS2 100
981                                           DS 150600
982                                           ER 100100
983                                           WC 0
984                                           CRC 767-777
985
986                                   EXAMPLE 4: IN EXAMPLES 2 AND 3 THE READ OPERATION
987                                           RESULTED IN BAD STATUS, HOWEVER THE
988                                           DATA ASSOCIATED WITH THE OPERATION WAS
989                                           NOT BAD (OR WAS NOT CHECKED: SW 13=1).
990                                           THIS EXAMPLE (4) SHOWS A PRINTOUT REFLECTING
991                                           A READ STATUS ERROR ACCOMPANIED BY BAD
992                                           DATA IN CHARACTERS FOUR (4) AND SIX (6).
993
994                                           DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 2
995                                           *BN 12 *RN 10-25 *RS 20 *RE F
996                                           CS1 144270
997                                           CS2 100
998                                           DS 150600
999                                           ER 100100
1000                                          WC 0
1001                                          CRC 767-777
1002                                          CN 4
1003                                          G 11111111
1004                                          B 10111111
1005                                          CN 6
1006                                          G 11111111
1007                                          B 10111111
1008
```

```
1009
1010
1011                                    EXAMPLE 5: THIS EXAMPLE SHOWS A READ DATA ERROR
1012                                            WHICH OCCURRED, WITHOUT AN ACCOMPANING
1013                                            STATUS ERROR, WHICH RESULTED IN A BAD RECORD.
1014
1015                                            DRIVE NO. 3 *SLAVE NO. 1 *D 4 *P 0*F 14 *PATRN R
1016                                            *BN 100 *RN 66-200 *RS 2000 *DE F
1017                                            CN 0
1018                                            G 11111111
1019                                            B 00000000
1020                                            CN 1
1021                                            G 11111111
1022                                            B 00000000
1023                                            CN 2
1024                                            G 11111111
1025                                            B 00000000
1026                                            CN 3
1027                                            G 11111111
1028                                            B 00000000
1029                                            CN 4
1030                                            G 11111111
1031                                            B 00000000
1032                                            CN 5
1033                                            G 11111111
1034                                            B 00000000
1035                                            CN 6
1036                                            G 11111111
1037                                            B 00000000
1038                                            CN 7
1039                                            G 11111111
1040                                            B 00000000
1041                                                    BAD RECORD
1042
1043                                    EXAMPLE 6: THE FOLLOWING EXAMPLE SHOWS THE
1044                                            RESULT OF A SPACE OPERATION THAT
1045                                            SHOULD HAVE SPACED REVERSE OVER
1046                                            AN ENTIRE 100 RECORD BLOCK BUT
1047                                            WHICH TERMINATED AT THE END OF 40
1048                                            RECORDS.  LEAVING A POSITION ERROR OF 40
1049
1050                                            DRIVE NO. 2 *SLAVE NO. 6 *D 2 *P 0 *F 14
1051                                            *BN 3 *RN 100-100 *RS 1000 *SE R
1052                                            ERR AMT 40
1053
```

```
1054
1055
1056                                    EXAMPLE 7: THIS EXAMPLE REFLECTS AN ERROR DETECTED
1057                                            WHILE WRITING A TAPE MARK (TM) AT THE END
1058                                            OF THE CURRENT DATA BLOCK PER OPTION RESPONSE
1059                                            TM=1.  NOTE THAT THE TM RECORD NUMBER
1060                                            IS ONE GREATER THAN THE TOTAL NUMBER OF DATA
1061                                            RECORDS IN THE CURRENT BLOCK.
1062
1063                                            DRIVE NO. 1 *SLAVE NO. 1 *D 2 *P 0 *F 14
1064                                            *BN 67 *RN 101-100 *RS 36 *WE TM
1065                                            CS1 144226
1066                                            CS2 300
1067                                            DS 150604
1068                                            ER 1000
1069                                            WC 0
1070
1071                                    EXAMPLE 8: THIS EXAMPLE SHOWS TWO (2) PRINTOUTS
1072                                            REFLECTING A WRITE RETRY WHICH WAS NOT
1073                                            SUCCESSFUL THE FIRST TIME, BUT WHICH
1074                                            DID RECOVER ON THE SECOND.
1075                                            THE UNSUCCESSFUL RETRY IS LOGGED AS
1076                                            A SUSPECTED BAD TAPE SPOT BY ITS
1077                                            BLOCK AND RECORD NUMBER.
1078
1079
1080                                            DRIVE NO. 0 *SLAVE NO. 2 *D 4 *P 0 *F 14 *PATRN 6
1081                                            *BN 2 *RN 12-20 *RS 667 *WE
1082                                            CS1 144260
1083                                            CS2 100
1084                                            DS 150640
1085                                            ER 100
1086                                            WC 0
1087                                            ***ORIGINAL ERROR***
1088
1089                                            DRIVE NO. 0 SLAVE NO. 2 *D 4 *P 0 *F 14 *PATRN 6
1090                                            *BN 2 *RN 12-20 *RS 667 *WE
1091                                            CS1 144260
1092                                            CS2 100
1093                                            DS 150640
1094                                            ER 100
1095                                            WC 0
1096                                            SUSPECT BAD TAPE
1097                                            RETRY: 0
1098                                            REPT: 0
1099                                            RECOVERED
1100                                            RETRY: 1
1101
```

```
1102
1103
1104                                    EXAMPLE 9: IF , DURING A WRITE RETRY THE BACKSPACE
1105                                            OR THE ERASE OPERATION RESULT IN AN ERROR,
1106                                            THE ERROR WILL BE PRINTED AND THE PROGRAM
1107                                            HALTED.  THIS EXAMPLE SHOWS THE ERROR PRINT
1108                                            FOR A SPACE AND AN ERASE (2 EXAMPLES)
1109
1110                                            DRIVE NO. 1 *SLAVE NO. 1 *D 3 *P 0 *F 14
1111                                            BN 12 *RN 8-64 *RS 500 *SE RTRY
1112                                            ERR AMT 1
1113
1114                                            DRIVE NO. 1 *SLAVE NO. 1 *D 3 *P 0 *F 14
1115                                            *BN 12 *RN 8-64 *RS 500 *ERASE
1116                                            CS1 144224
1117                                            CS2 100
1118                                            DS 150600
1119                                            ER 400
1120                                            WC 0
1121
1122                                    EXAMPLE 10: THIS EXAMPLE SHOWS THE PRINTOUT FROM
1123                                            A REWIND OPERATION WHICH DOES NOT HAVE
1124                                            BOT SET AT THE END.
1125
1126                                            DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 0 *F 14
1127                                            *BN 66 *RN 15-20 *RS 1000
1128                                            NOT BOT ON REWIND: HALT
1129
1130                                    EXAMPLE 11: THIS EXAMPLE SHOWS THE PRINTOUT MADE WHEN
1131                                            THERE IS NO INTERRUPT RETURNED AT THE END
1132                                            OF AN OPERATION.
1133
1134                                            DRIVE NO. 7 *SLAVE NO. 7 *D 2 *P 1 *F 14
1135                                            *BN 1 *RN 25-26 *RS 1200
1136                                            NO INTERRUPT
```

```
1137
1138
1139                                10.     STATISTICS PRINTOUT
1140                                        ------------------
1141
1142                                        THE PROGRAM, THROUGH ITS ERROR CHECKING, IS ABLE TO GATHER CERTAIN
1143                                        STATISTICS ABOUT THE PERFORMANCE OF EACH UNIT UNDER TEST.
1144                                        THIS INFORMATION IS PRINTED OUT WHENEVER A UNIT IS REWOUND
1145                                        FROM END OF TAPE, OR BECAUSE IT IS TO BE REMOVED FROM TESTING
1146                                        DUE TO SOME CATASTROPHIC ERROR. (POSITION LOST, BAD TAPE OVERFLOW)
1147                                        THE STATISTICS MAY BE PRINTED AT ANY TIME BY SETTING
1148                                        SWITCH 14 TO A ONE (1). THIS PRESENTS A PICTURE OF PERFORMANCE
1149                                        UP TO THIS TIME. THE STATISTICS WILL BE CLEARED UPON REWIND OF THE
1150                                        UNIT; BUT NOT BY SETTING SW 14.
1151
1152                                        STATISTICS PRINT EXAMPLE (A HEADER WILL PRECEED THE STATS)
1153
1154                                        DROPS: 0 3 0 0 0 6 45 0
1155                                        PICKS: 1 0 0 0 0 0 0 2
1156                                        RETRY: 1
1157                                        WTERR: 2
1158                                        REFWD: 3
1159                                         SOFT: 2
1160                                         HARD: 1
1161                                        DEFWD: 0
1162                                        REREV: 4
1163                                         SOFT: 1
1164                                         HARD: 3
1165                                        DEREV: 0
1166                                        2 BAD TAPE SPOTS
1167                                        0 *BN 1 *RN 2
1168                                        1 *BN 15 *RN 100
1169
1170                                        ** NOTE ** DROPS AND PICKS REFLECT CORE BIT POSITIONS.
1171                                                   THE FOLLOWING IS A TABLE OF CORE BITS TO TRACK NUMBER.
1172
1173                                                   TRACK NO. 7 6 5 3 9 1 8 2
1174                                                   CORE BIT  7 6 5 4 3 2 1 0
1175
1176                                        DROPS: NUMBER OF DATA BITS DROPPED: PER CORE BIT(SEE NOTE ABOVE)
1177                                        PICKS: NUMBER OF DATA BITS PICKED UP: PER CORE BIT(SEE NOTE ABOVE)
1178                                        RETRY: NUMBER OF WRITE RETRIES
1179                                        WTERR: NUMBER OF WRITE ERRORS NOT ASSOCIATED WITH BAD TAPE
1180                                        REFWD: NUMBER OF READ FORWARD STATUS ERRORS
1181                                        REREV: NUMBER OF READ REVERSE STATUS ERRORS
1182                                         SOFT: NUMBER OF RECOVERED READ ERRORS
1183                                         HARD: NUMBER OF UNRECOVERED READ ERRORS
1184                                        DEFWD: NUMBER OF FORWARD DATA ERRORS WITH NO ASSOCIATED STATUS ERROR
1185                                        DEREV: NUMBER OF REVERSE DATA ERRORS WITH NO ASSOCIATED STATUS ERROR
1186
```

11. AUTO SEQUENCE

THE AUTO SEQUENCE (START AT ADDRESS 240) WILL EXECUTE A PREDETERMINED TEST PLAN ON ALL AVAILABLE SLAVES ON EACH AVAILABLE TM03. THE ONLY OPERATOR RESPONSE IS TO THE TYPED REQUESTS FOR THE RH ADDRESS, VECTOR, CONTINUOUS OR SINGLE CYCLE, AND NRZ ONLY. ALL SWITCHES REMAIN ACTIVE AND MAY BE USED NORMALLY; HOWEVER THE IDEA IS TO LEAVE ALL SWITCHES DOWN AND ALLOW FULL EXECUTION OF THE TEST PLAN FOR SYSTEM CHECKOUT.

SAMPLE START AT 240(8): AUTO SEQUENCE.

LOAD ADDRESS 240(8), SET SWITCHES TO ZERO, PRESS START:

```
        TE16 AUTO SEQUENCE TEST
        ENTER CONDITIONS IN OCTAL

        REGISTER START = 172400(172440)
        VECTOR ADDRESS = 224(CR)
        NRZ ONLY: (0)
        AUTO CONT: (1)
```

THIS EXAMPLE SHOWS AN AUTO SEQUENCE START WITH THE RH AT BUS ADDRESS 172440 AND A VECTOR OF 224. ALL AVAILABLE HARDWARE WILL BE TESTED CONTINUOUSLY IN BOTH NRZ AND PE MODE.

AS EACH TM03 AND ITS SLAVES ARE FOUND, A DIVIDER LINE OF ASTERICKS WILL BE PRINTED FOLLOWED BY A PRINTOUT OF THE TM03 AND ITS SLAVES BEING TESTED. AS EACH TM03 AND ITS SLAVES ARE FINISHED, ANOTHER DIVIDER IS PRINTED BEFORE TESTING IS RESUMED ON THE NEXT AVAILABLE DRIVE.

WHEN ALL AVAILABLE HARDWARE HAS BEEN TESTED, A PRINTOUT OF END OF SEQUENCE WILL BE DONE AND THE PROGRAM WILL EITHER HALT (AUTO CONT = 0) OR RESTART WITH THE FIRST AVAILABLE UNIT (AUTO CONT = 1).

AUTO SEQUENCE TEST PLAN:

THE AUTO SEQUENCE WILL EXECUTE BOTH AN NRZ AND A PE
CYCLE. EACH CYCLE WILL BE STARTED FROM BOT AND CONSIST
OF VARIOUS DATA PATTERNS INTENDED TO BE WORST CASE
FOR THAT PARTICULAR MODE.

1. NRZ CYCLE:

SIX (6) BLOCKS OF ONE HUNDRED (100) RECORDS
OF FOUR THOUSAND (4000) CHARACTERS FOR
EACH OF THE FOUR DATA PATTERNS.

PATTERN 1:	ALL ONES DATA IN ALL BYTES
PATTERN 10:	WALKING ONE/ALL ONE
PATTERN 14:	WALKING ZERO/ALL ZERO
RANDOM DATA:	RANDOM

2. PE CYCLE: (IF NRZ ONLY = 0)

SIX BLOCKS OF ONE HUNDRED (100) RECORDS
OF FOUR THOUSAND (4000) CHARACTERS EACH FOR
EACH OF THREE DATA PATTERNS, THEN RANDOM
DATA BLOCKS TO END OF TAPE.

PATTERN 10:	WALKING ONE/ALL ONE
PATTERN 14:	WALKING ZERO/ALL ZERO
PATTERN 15:	THREE (3) 0 CHARACTERS, TWO (2) ALL CHARACTERS, THREE 0 THEN COMPLIMENT PATTERN. REPEATED FOR A FULL BUFFER
RANDOM DATA:	RANDOM

12. TESTING PROCEDURES

AS PREVIOUSLY STATED THIS PROGRAM CONTAINS NO FIXED TESTS. THE ENTIRE TEST CYCLE TO BE EXECUTED IS DESCRIBED BY THE OPERATOR THOUGH RESPONSES TO TELETYPE REQUESTS FOR PARAMETERS AND CONSOLE SWITCH SETTINGS FOR OPERATION. THE OPERATION SELECTED WILL BE EXECUTED WITH THE PARAMETERS ENTERED CONTINUOUSLY ON EACH AVAILABLE UNIT, ONE BLOCK AT A TIME, UNTIL STOPPED BY THE OPERATOR. THE OPERATION MAY BE CHANGED DYNAMICALLY BY CHANGING THE CONSOLE SWITCHES AT ANY TIME. THE PROGRAM WILL ATTEMPT TO PERFORM ANY OPERATION SET AND THEREFORE CAUTION SHOULD BE TAKEN TO ASSURE THAT THE UNIT IS CAPABLE OF PERFORMING AS REQUESTED. FOR INSTANCE, ONE SHOULD NOT ATTEMPT TO PERFORM READ OPERATIONS ON A TAPE WHICH HAS NOT BEEN WRITTEN AS THE DATA, IF ANY, IS UNPREDICTABLE. HOWEVER, IF A TAPE HAS BEEN WRITTEN WITH THIS PROGRAM, IT CAN BE READ AS OFTEN AS DESIRED WITHOUT BEING REWRITTEN. THIS IS A GOOD PROCEDURE TO USE FOR TESTING TAPE COMPATABILITY. SCOPING OF TAPE UNITS BECOMES SIMPLE; BY SETTING THE DESIRED OPERATION AND ITS PARAMETER, A UNIT MAY BE CONTINUOUSLY EXERCISED IN ANY MANNER DESIRED. BY USING THE VARIOUS ERROR CONTROL SWITCHES AND ENTERING THE NEEDED STALL, ANY FUNCTION CAN BE SCOPED RATHER EASILY. RELIABILITY TESTING CAN BE PREFORMED BY USE OF THE RANDOMIZATION CAPABILITY. PERHAPS A CYCLE OF RANDOM TESTING MIGHT BE SET UP AND ALLOWED TO RUN FOR SOME PERIOD OF TIME, THE STATISTICAL COLLECTION OF DROPS AND PICKS IS THEN SIGNIFICANT. INTERMITTANT PROBLEMS CAN BE FOUND BY SETTING THE DESIRED OPERATION IN MOTION AND DISALLOWING ERROR PRINTOUTS WHILE ALLOWING A HALT ON ERROR. THE ERROR THAT CAUSED THE HALT CAN BE PRINTED BY RESETTING CONSOLE SWITCH TEN AND PRESSING CONTINUE. IF SOME PARTICULAR DATA PATTERN SHOULD BE CAUSING DATA ERROR, USE OF THE YOZZLE SWITCH AND ITS ASSOCIATED STALL WILL TO ALLOW SCOPING OF THIS PARTICULAR RECORD.

AS YOU SEE, THERE ARE MYRIAD TESTING PROCEDURES WHICH COULD BE PERFORMED. THE PARAMETERS, TAPE OPERATIONS, ERROR EXAMINATION AND REPORTING ARE ALL AT YOUR DISCRETION.

TRY IT, YOU'LL LIKE IT.

%

```
1310                                    .LIST   BIN,LOC,SEQ
1311                                    .TITLE CZTEDC0 TM03-TE16/TU77 DRT
1312                                    ;DATA RELIABILITY TEST
1313                                    ;AC-A800C-MC
1314                                    ;21 FEB 1977
1315                                    ;J.G.ADAMS
1316                                    ;REVISED (++B) J.G.ADAMS MAY 1978       1)INCORRECT RECORD COUNT
1317                                    ;++B                                    STORED WHEN EOT REACHED ON WRITE
1318                                    ;++B                                    2)ADJUST STACK PTR ON BAD TAPE OVFLW
1319                                    ;++B                                    3)ADDED TU77 TEST CAPABILITY
1320                                    ;++B                                    4)DOES NOT GENERATE LRC/CRC ON FIRST
1321                                    ;++B                                    RECORD IN AUTO ACCEPT MODE
1322
1323                                    ;(++C)  M.PAGE  FEB  79
1324                                    ;++C                                    RECORD NUMBERING SYSTEM NOT CONSISTENT
1325                                    ;                                       BETWEEN FORWARD AND REVERSE TAPE MOVEMEN
1326                                    ;                                       FORMAT ERROR (BIT 4) MADE RETRYABLE
1327
1328                                    .MCALL  .$ACT11,.$EOP,$SAVE,$RESTORE,$CHAIN
1329                                    .NLIST  MC
1330                                    .LIST   ME
1331                                    .ENABLE ABS,AMA
1332
1333                                    ;CONSOLE SWITCHES***********
1334
1335                                    ;SW15: 1=STOP ON ERROR
1336                                    ;       0=CONTINUE ON ERROR
1337                                    ;SW14: 1=PRINT READ/WRITE STATS
1338                                    ;       0=DO NOT PRINT STATS
1339                                    ;SW13: 1=DO NOT CHECK DATA
1340                                    ;       0=CHECK DATA
1341                                    ;SW12: 1=DO NOT CHECK WRITE ERRORS
1342                                    ;       0=CHECK WRITE ERRORS
1343                                    ;SW11: 1=DO NOT CHECK READ ERRORS
1344                                    ;       0=CHECK READ ERRORS
1345                                    ;SW10: 1=DO NOT PRINT ERRORS
1346                                    ;       0=PRINT ERRORS
1347                                    ;SW9:  1=REWIND TAPE
1348                                    ;       0=DO NOT REWIND
1349                                    ;SW8:  1=USE RANDOM DATA
1350                                    ;       0=USE FIXED DATA PATTERN
1351                                    ;SW7:  1=USE RANDOM CHARACTER COUNT
1352                                    ;       0=USE FIXED CHAR COUNT
1353                                    ;SW6:  1=USE RANDOM RECORD COUNT
1354                                    ;       0=USE FIXED RECORD COUNT
1355                                    ;SW5:  1=YOZZLE ON CURRENT RECORD
1356                                    ;       0=DO NOT YOZZLE
1357                                    ;SW4:  1=DO BOTH READ AND WRITE RETRIES
1358                                    ;       0=INHIBIT RETRIES
1359                                    ;SW3:  1=DO NOT READ FORWARD
1360                                    ;       0=READ FORWARD
1361                                    ;SW2:  1=DO NOT READ REVERSE
1362                                    ;       0=READ REVERSE
1363                                    ;SW1:  1=READ FORWARD FIRST
1364                                    ;       0=READ REVERSE FIRST
1365                                    ;SW0:  1=DO NOT WRITE
```

```
1366                                    ;       0=WRITE
1367                            ;IF SWR <15::00> = 177777 OR NOT AVAILABLE USE SOFTWARE SWITCH REGISTER
```

```
1368                                    ;TM03-TE16,TU77 REGISTER BITS**********
1369
1370                                    ;15 ;14 ;13 ;12 ;11 ;10 ;09 ;08 ;07 ;06 ;05 ;04 ;03 ;02 ;01 ;00 ;
1371                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1372                            ;CS1:   ;SC ;TRE;MCP;SPR;DNA;PSL;A17;A16;RDY;IE ;FUN;FUN;FUN;FUN;FUN;GO ;
1373                                    ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;
1374                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1375                            ;WC:    ; WORD                                                            ;
1376                                    ; COUNT                                                           ;
1377                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1378                            ;BA:    ; BUS                                                             ;
1379                                    ; ADDRESS                                                         ;
1380                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1381                            ;FC:    ; FRAME                                                           ;
1382                                    ; COUNT                                                           ;
1383                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1384                            ;CS2:   ;DLT;WCE;UPE;NED;NEM;PGE;MXF;MDP;OR ;IR ;CLR;PAT;BAI;U2 ;U1 ;U0 ;
1385                                    ;   ;   ;   ;   ;   ;   ;   ;ERR;   ;   ;   ;   ;   ;   ;   ;   ;
1386                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1387                            ;DS:    ;ATA;ERR;PIP;MOL;WRL;EOT;SPR;DPR;DRY;SSC;PES;SDN;IDP;EOF;BOT;SLA;
1388                                    ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;
1389                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1390                            ;ER:    ;CDE;UNS;OPI;DTE;NEF;CS ;FCE;NSG;PEF;INC;DAT;FMT;CNT;RMR;ILR;ILF;
1391                                    ;CRC;   ;   ;   ;   ;ITM;   ;   ;LRC;VPE;BPE;   ;BPE;   ;   ;   ;
1392                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1393                            ;ATS:   ; ATTENTION                                                       ;
1394                                    ; SUMMARY                                                         ;
1395                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1396                            ;CC:    ; CHECK                                                           ;
1397                                    ; CHARACTER                                                       ;
1398                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1399                            ;DB:    ; DATA                                                            ;
1400                                    ; BUFFER                                                          ;
1401                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1402                            ;MR:    ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;WRT;MM ;OP ;OP ;OP ;OP ;MM ;
1403                                    ; 7 ; 6 ; 5 ; 4 ; 3 ; 2 ; 1 ; 0 ; P ;CLK;CLK; 4 ; 3 ; 2 ; 1 ;GO ;
1404                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1405                            ;DT:    ; 1 ; 1 ;   ; 0 ;   ;SPR;   ;   ;   ;   ; 1 ; 0 ; 1 ;125; 75; 45;
1406                                    ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;IPS;IPS;IPS;
1407                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1408                            ;SN:    ; SERIAL                                                          ;
1409                                    ; NUMBER                                                          ;
1410                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1411                            ;TC:    ;ACL;FCS;TCW;ENA;SPR;DEN;DEN;DEN;FMT;FMT;FMT;FMT;EVN;SSN;SSN;SSN;
1412                                    ;   ;   ;   ;DT ;   ; 4 ; 2 ; 1 ; 8 ; 4 ; 2 ; 1 ;PAR; 4 ; 2 ; 1 ;
1413                                    ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

```
1414
1415                                    ;TRAP CATCHERS**********
1416
1417            000020                  .=20
1418  000020    022774                  .WORD   TTOUT           ;SET IOT TRAP TO TTOUT ROUTINE
1419  000022    000340                  .WORD   340             ;PRIORITY LEVEL 7
1420
1421            000004                  TYPE=IOT                ;EQUATE TYPE TO AN IOT INSTRUCTION
1422            000034                  .=34
1423  000034    023126                  .WORD   OCTP            ;SET TRAP TRAP TO OCTP ROUTINE
1424  000036    000340                  .WORD   340
1425            104400                  TYPOCT=TRAP             ;EQUATE TYPOCT TO TRAP INSTRUCTION
1426
1427                                ;ACT11 HOOK **********
1428            000040                  $SVPC=.                 ;SAVE CURRENT LOCATION CTR
1429            000042                  .=42
1430  000042    000000                  .WORD   0
1431            000046                  .=46
1432  000046    004676                  .WORD   $ENDAD          ;SET LOCATION 46
1433            000052                  .=52
1434  000052    000000                  .WORD   0               ;SET LOCATION 52 = 0
1435            000040                  .=$SVPC                 ;RESTORE LOCATION CTR
1436
1437                                    ;TTY INTERRUPT VECTOR**********
1438            000060                  .=60
1439  000060    020734                  .WORD   TTINT           ;TTY INTERRUPT HANDLER ADDRESS
1440  000062    000340                  .WORD   340             ;PRIORITY LEVEL 7
1441
1442                                    ;SOFTWARE SWITCH REGISTER*********
1443                                    ;INVOKED IF SWR <15::00> = 177777 OR NOT AVAILABLE
1444            000176                  .=176
1445  000176    000000          SWREG:  .WORD   0
1446
1447                                    ;START ADDRESS**********
1448            000200                  .=200
1449  000200    000137  003022          JMP     START           ;ENTER PARAMETERS VIA TTY
1450
1451            000204                  .=204
1452  000204    000137  003136          JMP     STARTC          ;USE FIXED PARAMETERS; HOLD DATA
1453
1454            000210                  .=210
1455  000210    005037  014404          CLR     RDFL
1456  000214    000137  003144          JMP     STARTA          ;USE FIXED PARAMETERS; NEW DATA
1457
1458                                    ;MAG TAPE INTERRUPT VECTOR**********
1459
1460            000224                  .=224
1461  000224    021160                  MTINT                   ;MAG TAPE INTERRUPT HANDLER ADDRESS
1462  000226    000340                  340
1463
1464                                    ;AUTO SEQUENCE START**********
1465
1466            000240                  .=240
1467  000240    005237  000734          INC     ASEQF           ;SET AUTO SEQUENCE FLAG
1468  000244    000137  003122          JMP     STAJT           ;GO TO START OF AUTO SEQUENCE
```

```
1469                                        ;SHORT CONVERSATION RESTART********
1470
1471            000300                      .=300
1472  000300    005237  013444              INC     SCVFL                   ;SET SHORT CONVERSATION FLAG
1473  000304    000137  003022              JMP     START                   ;ENTER SHORT PARAMETER LIST
1474
1475            000510                      .=510
1476                                        ;TU16 REGISTER EQUIVS**********
1477
1478  000510    172440              C1:     172440
1479  000512    172442              WC:     172442
1480  000514    172444              BA:     172444
1481  000516    172446              FC:     172446
1482  000520    172450              CS:     172450
1483  000522    172452              DS:     172452
1484  000524    172454              ER:     172454
1485  000526    172456              AS:     172456
1486  000530    172460              CC:     172460
1487  000532    172462              DB:     172462
1488  000534    172464              MR:     172464
1489  000536    172466              DT:     172466
1490  000540    172470              SN:     172470
1491  000542    172472              TC:     172472
1492
1493                                        ;CONSTANTS**********
1494
1495  000544    172440              REGS:   172440          ;STARTING REGISTER ADDRESS (CS1)
1496  000546    000224              VECT:   224             ;VECTOR ADDRESS (RH INTERRUPT)
1497  000550    000000              DVN:    0               ;DRIVE NUMBER
1498  000552    000000              UDES:   0               ;UNIT DESCRIPTION (PARITY,DENSITY,UNIT,FORMAT)
1499  000554    000100              RCNT:   100             ;RECORD COUNTER
1500  000556    177400              FMCNT:  177400          ;NUMBER OF CHAR (4 - 4000) OCTAL IN TWOS COMPLEMENT
1501  000560    000001              PATRN:  1               ;DATA PATTERN SELECTOR (0 - 15) OCTAL
1502  000562    000000              RDCMD:  0               ;READ COMMAND
1503  000564    000001              TMEX:   1               ;TAPE MARK FLAG: 1=TM 0=NO TM
1504  000566    000000              CRCC:   0               ;CRC CORRECTION FLAG (YES=1,NO=0)
1505  000570    000000              INTRF:  0               ;INTERCHANGE READ 1=YES 0=NO
1506  000572    000000              SPFLG:  0               ;SINGLE PASS 1=YES 0=NO
1507  000574    000001              RSTAL:  1               ;READ STALL
1508  000576    000001              WSTAL:  1               ;WRITE STALL
1509  000600    000001              TSTAL:  1               ;TURN AROUND STAL
1510  000602    002000              YSTAL:  2000            ;YOZZLE STAL
1511  000604    000010              RETRY:  10              ;READ RETRY NUMBER
1512  000606    177776              PSW:    177776          ;PROCESSOR STATUS
1513  000610    177570              SWR:    177570          ;CONSOLE SWITCHES
1514  000612    177560              TKS:    177560          ;TTY READ STATUS REGISTER
1515  000614    177562              TKB:    177562          ;TTY READ BUFFER
1516  000616    177564              TPS:    177564          ;TTY PUNCH STATUS REGISTER
1517  000620    177566              TPB:    177566          ;TTY PUNCH OUTPUT REGISTER
1518  000622    177550              PRS:    177550          ;H/S READER STATUS REGISTER
1519  000624    177552              PRB:    177552          ;H/S READER BUFFER
1520  000626    153624              RANBAS: 153624          ;RANDOM NUMBER GENERATOR BASE
1521  000630    032561              RANSAV: 032561          ;RANDOM NUMBER BUFFER
1522  000632    000100              RCSAV:  100             ;RECORD COUNT SAVE
1523  000634    177400              FCSAV:  177400          ;FRAME COUNT SAVE
1524
```

```
1525                                    ;FLAGS AND COUNTERS**********
1526
1527  000636  000000            TINF:   0               ;TTY ENTRY FLAG
1528  000640                    STFLG:
1529  000640  000000            TOB:    0               ;TTY OUTPUT BUFFER
1530  000642  000000            TIB:    0               ;TTY INPUT BUFFER
1531  000644  000000            TEMP1:  0               ;TEMP STORAGE
1532  000646  000000            TEMP2:  0               ;TEMP STORAGE
1533  000650  000000            TEMP3:  0               ;TEMP STORAGE
1534  000652  000000            EMADDR: 0               ;ERROR MSG ADDRESS STORAGE
1535  000654  000000            BLCNTR: 0               ;BLOCK COUNTER
1536  000656  000000            BBC:    0               ;BAD RECORD COUNTER
1537  000660  000000            EOTREC: 0               ;EOT FLAG
1538  000662  000000            RTRN:   0               ;INTERRUUPT RETURN STORAGE
1539  000664  000000            HDRFL:  0               ;HEADER FLAG
1540  000666  000000            STAL:   0               ;DELAY STORAGE
1541  000670  000000            PFLG:   0               ;PRINT FLAG
1542  000672  000000            MTC1:   0               ;MAG TAPE CONT REGISTER BUFFER
1543  000674  000000            UNP:    0               ;UNIT TABLE POINTER
1544  000676  000000            TMFLG:  0               ;TAPE MARK FLAG
1545  000700  000000            RPCNT:  0               ;REPEAT COUNTER
1546  000702  000000            RTCNT:  0               ;RETRY COUNTER
1547  000704  000000            DERFL:  0               ;DATA ERROR FLAG
1548  000706  000000            SERFL:  0               ;STATUS ERROR FLAG
1549  000710  000000            BCNT:   0               ;BIT COUNTER
1550  000712  000000            RTYFL:  0               ;RETRY FLAG
1551  000714  000000            UPS:    0               ;UNIT POINTER SAVE
1552  000716  000000            BDPP:   0               ;BITS DROPPED POINTER
1553  000720  000000            BPKP:   0               ;BITS PICKED POINTER
1554  000722  000000            ERSAV:  0               ;ERROR SAVE LOC
1555  000724  000000            BTFLG:  0               ;BAD TAPE FLAG
1556  000726  000000            BTSTF:  0               ;STATISTIC PRINT FLAG
1557  000730  000000            BTPT:   0               ;BAD TAPE POINTER
1558  000732  000000            ERTFL:  0               ;ERASE FLAG
1559  000734                    ENDFLG:
1560  000734  000000            ASEQF:  0               ;AUTO SEQ FLAG
1561  000736  000000            ABLCNT: 0               ;AUTO BLOCK COUNTER
1562  000740  000000            ASEQCF: 0               ;AUTO SEQ CONTINUOUS FLAG
```

```
1563
1564                                    ;UNIT ORDER AND DESCRIPTION TABLE **********
1565
1566  000742  000000            UN1:    0               ;THIS TABLE IS LOADED
1567  000744  000000            UN2:    0               ;WITH UNIT NUMBERS AND
1568  000746  000000            UN3:    0               ;THEIR DESCRIPTIONS IN
1569  000750  000000            UN4:    0               ;THE ORDER THAT THEY
1570  000752  000000            UN5:    0               ;WILL BE TESTED
1571  000754  000000            UN6:    0
1572  000756  000000            UN7:    0
1573  000760  000000            UN8:    0
1574  000762  177777            UNX:    -1
1575
1576                                    ;UNIT DROPS AND PICKS POINTERS*********
1577
1578  000764  001204            PIK1:   BP00
1579  000766  001224            PIK2:   BP10
1580  000770  001244            PIK3:   BP20
1581  000772  001264            PIK4:   BP30
1582  000774  001304            PIK5:   BP40
1583  000776  001324            PIK6:   BP50
1584  001000  001344            PIK7:   BP60
1585  001002  001364            PIK8:   BP70
1586  001004  001404            DRP1:   BD00
1587  001006  001424            DRP2:   BD10
1588  001010  001444            DRP3:   BD20
1589  001012  001464            DRP4:   BD30
1590  001014  001504            DRP5:   BD40
1591  001016  001524            DRP6:   BD50
1592  001020  001544            DRP7:   BD60
1593  001022  001564            DRP8:   BD70
1594
1595                                    ;UNIT BAD TAPE POINTERS**********
1596
1597  001024  001604            BTADDR: BT00
1598  001026  001710                    BT01
1599  001030  002014                    BT02
1600  001032  002120                    BT03
1601  001034  002224                    BT04
1602  001036  002330                    BT05
1603  001040  002434                    BT06
1604  001042  002540                    BT07
1605
1606                                    ;UNIT WRITE RETRY COUNTER**********
1607
1608                                    ;SET START OF STATISTICS TABLE
1609  001044                    STTBL:
1610  001044  000000            RTY1:   0
1611  001046  000000            RTY2:   0
1612  001050  000000            RTY3:   0
1613  001052  000000            RTY4:   0
1614  001054  000000            RTY5:   0
1615  001056  000000            RTY6:   0
1616  001060  000000            RTY7:   0
1617  001062  000000            RTY8:   0
1618
```

```
1619                                        ;UNIT WRITE ERRORS**********
1620
1621  001064  000000                WTER1:  0
1622  001066  000000                WTER2:  0
1623  001070  000000                WTER3:  0
1624  001072  000000                WTER4:  0
1625  001074  000000                WTER5:  0
1626  001076  000000                WTER6:  0
1627  001100  000000                WTER7:  0
1628  001102  000000                WTER8:  0
1629
1630                                        ;UNIT READ FORWARD ERRORS**********
1631
1632  001104  000000                RDER1:  0
1633  001106  000000                RDER2:  0
1634  001110  000000                RDER3:  0
1635  001112  000000                RDER4:  0
1636  001114  000000                RDER5:  0
1637  001116  000000                RDER6:  0
1638  001120  000000                RDER7:  0
1639  001122  000000                RDER8:  0
1640
1641                                        ;UNIT DATA ERRORS FORWARD**********
1642
1643  001124  000000                DATER1: 0
1644  001126  000000                        0
1645  001130  000000                        0
1646  001132  000000                        0
1647  001134  000000                        0
1648  001136  000000                        0
1649  001140  000000                        0
1650  001142  000000                        0
1651
1652                                        ;UNIT READ REVERSE ERRORS**********
1653
1654  001144  000000                RDERR1: 0
1655  001146  000000                        0
1656  001150  000000                        0
1657  001152  000000                        0
1658  001154  000000                        0
1659  001156  000000                        0
1660  001160  000000                        0
1661  001162  000000                        0
1662
1663                                        ;UNIT DATA ERRORS REVERSE**********
1664
1665  001164  000000                DEREV1: 0
1666  001166  000000                        0
1667  001170  000000                        0
1668  001172  000000                        0
1669  001174  000000                        0
1670  001176  000000                        0
1671  001200  000000                        0
1672  001202  000000                        0
```

```
1673                                        ;DROPS + PICKS PER CHANNEL PER UNIT**********
1674
1675  001204  000000                BP00:   0
1676          001224                        .=.+16
1677  001224  000000                BP10:   0
1678          001244                        .=.+16
1679  001244  000000                BP20:   0
1680          001264                        .=.+16
1681  001264  000000                BP30:   0
1682          001304                        .=.+16
1683  001304  000000                BP40:   0
1684          001324                        .=.+16
1685  001324  000000                BP50:   0
1686          001344                        .=.+16
1687  001344  000000                BP60:   0
1688          001364                        .=.+16
1689  001364  000000                BP70:   0
1690          001404                        .=.+16
1691  001404  000000                BD00:   0
1692          001424                        .=.+16
1693  001424  000000                BD10:   0
1694          001444                        .=.+16
1695  001444  000000                BD20:   0
1696          001464                        .=.+16
1697  001464  000000                BD30:   0
1698          001504                        .=.+16
1699  001504  000000                BD40:   0
1700          001524                        .=.+16
1701  001524  000000                BD50:   0
1702          001544                        .=.+16
1703  001544  000000                BD60:   0
1704          001564                        .=.+16
1705  001564  000000                BD70:   0
1706          001604                        .=.+16
1707
1708
```

```
1709
1710                                        ;UNIT BAD TAPE COUNTER:16 PER SLAVE**********
1711
1712  001604  000000                BT00:   0
1713          001710                        .=.+102
1714  001710  000000                BT01:   0
1715          002014                        .=.+102
1716  002014  000000                BT02:   0
1717          002120                        .=.+102
1718  002120  000000                BT03:   0
1719          002224                        .=.+102
1720  002224  000000                BT04:   0
1721          002330                        .=.+102
1722  002330  000000                BT05:   0
1723          002434                        .=.+102
1724  002434  000000                BT06:   0
1725          002540                        .=.+102
1726  002540  000000                BT07:   0
1727          002644                        .=.+102
1728
1729                                        ;UNIT END OF TAPE COUNTERS 1 PER SLAVE*******
1730
1731  002644  000000                EOTC0:  0
1732  002646  000000                        0
1733  002650  000000                        0
1734  002652  000000                        0
1735  002654  000000                        0
1736  002656  000000                        0
1737  002660  000000                        0
1738  002662  000000                        0
1739
1740                                        ;UNIT READ FORWARD SOFT ERROR*******
1741
1742  002664  000000              RFSOFT:   0
1743  002666  000000                        0
1744  002670  000000                        0
1745  002672  000000                        0
1746  002674  000000                        0
1747  002676  000000                        0
1748  002700  000000                        0
1749  002702  000000                        0
1750
1751                                        ;UNIT READ REVERSE SOFT ERROR*******
1752
1753  002704  000000              RRSOFT:   0
1754  002706  000000                        0
1755  002710  000000                        0
1756  002712  000000                        0
1757  002714  000000                        0
1758  002716  000000                        0
1759  002720  000000                        0
1760  002722  000000                        0
1761
```

```
1762
1763                                    ;UNIT READ FORWARD HARD ERROR*******
1764
1765  002724  000000            RFHARD: 0
1766  002726  000000                    0
1767  002730  000000                    0
1768  002732  000000                    0
1769  002734  000000                    0
1770  002736  000000                    0
1771  002740  000000                    0
1772  002742  000000                    0
1773
1774                                    ;UNIT READ REVERSE HARD ERROR*******
1775
1776  002744  000000            RRHARD: 0
1777  002746  000000                    0
1778  002750  000000                    0
1779  002752  000000                    0
1780  002754  000000                    0
1781  002756  000000                    0
1782  002760  000000                    0
1783  002762  000000                    0
1784                              ;SET END OF STATISTICS TABLE
1785  002764                      ENDTBL:
1786
1787                                    ;DATA PATTERN GENERATORS************
1788
1789  002764  002764            DATBL:  .                       ;ENTRY TABLE
1790  002766  013656            DATA0:  DAT0                    ;EXTERNAL INPUT FROM H/S READER(SEE MAINDEC-11-DZTUF)
1791  002770  014016            DATA1:  DAT1                    ;ALL ONES
1792  002772  014036            DATA2:  DAT2                    ;ALL ZEROS
1793  002774  014042            DATA3:  DAT3                    ;WALKING ONE
1794  002776  014066            DATA4:  DAT4                    ;WALKING ZERO
1795  003000  014076            DATA5:  DAT5                    ;ALTERNATING ONE/ZERO
1796  003002  014104            DATA6:  DAT6                    ;ALTERNATING ZERO/ONE
1797  003004  014112            DATA7:  DAT7                    ;ALTERNATING ONE/ZERO IN ALTERNATING CHARACTERS
1798  003006  014140            DATA10: DAT10                   ;WALKING ONE/ALL ONE IN ALTERNATING CHARACTERS
1799  003010  014170            DATA11: DAT11                   ;ALL BITS 0-377
1800  003012  014210            DATA12: DAT12                   ;ALL BITS 377-0
1801  003014  014232            DATA13: DAT13                   ;ALTERNATING CHARACTERS  0 AND 377
1802  003016  014242            DATA14: DAT14                   ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARACTERS
1803  003020  014272            DATA15: DAT15                   ;AUTO SEQUENCE PATTERN 0,0,-1,-1,-1,0,0
1804
```

```
                                        .EVEN
                                        ;*********************************************************
                                        ;PROGRAM START AND SEQUENCE FORMATTER:
                                        ;
                                        ;THIS ROUTINE IS USED TO PERFORM ALL HOUSEKEEPING,
                                        ;DECIDE WHICH TRANSPORT TO TEST AND ITS AVAILABILITY,
                                        ;LOAD THE WRITE BUFFER WITH THE SELECTED DATA PATTERN,
                                        ;GENERATE ANY RANDOM NUMBER AND THEN EXECUTE
                                        ;THE TEST CYCLE REQUESTED BY THE SWITCH SETTING.
                                        ;AT THE END OF THE TEST CYCLE THE NEXT UNIT IS SELECTED
                                        ;AND CHECKED FOR AVAILABILITY AND THE TEST CYCLE IS
                                        ;EXECUTED ON IT.
                                        ;THE READ WRITE STATS MAY BE PRINTED AT THE END OF
                                        ;EACH TEST CYCLE VIA CONSOLE SWITCH FOURTEEN (14).
                                        ;*********************************************************

                                ;START 200, & 300**********
003022  012706  000500        START:  MOV     #500,SP         ;SET STACK PTR
003026  005037  000734                CLR     ASEQF           ;CLEAR AUTO SEQUENCE FLAG
003032  005027                        CLR     (PC)+           ;;CLEAR CHAIN INDICATOR
003034  000000                CHNFLG: .WORD   0               ;;CHAIN MODE INDICATOR
                                                              ;;1/0 = CHAIN/NOT CHAIN MODE
003036  005737  000042                TST     @#42            ;;BRANCH IF IN DUMP MODE
003042  001407                        BEQ     50$
003044  012737  000176  000610        MOV     #SWREG,SWR      ;;INVOKE SOFTWARE SWR
003052  005237  003034                INC     CHNFLG          ;;SET CHNFLG = CHAIN MODE
003056  000137  003062                JMP     3$              ;;GO TO CHAIN ADDRESS
003062                          50$:
003062  122737  000006  000041  3$:   CMPB    #6,@#41         ;BRANCH IF LOADED VIA TMDP
003070  001003                        BNE     4$
003072  000004  026114                TYPE,MSG120             ;ADVISE USER TO REMOVE TMDP FROM SLAVE
003076  000000                        HALT
003100  005737  003034        4$:     TST     CHNFLG          ;SEE IF IN CHAIN MODE
003104  001406                        BEQ     STAUT
003106  005237  000734                INC     ASEQF           ;SET AUTO SEQUENCE FLAG
003112  000004  024157                TYPE,MSG30              ;TYPE TITLE
003116  000137  021226                JMP     ASEQ0           ;GO TO AUTO SEQUENCER

                                ;START 240**********
003122  012737  000001  000636  STAUT: MOV     #1,TINF         ;SET TTY ENTRY FLAG
003130  005037  014404                CLR     RDFL            ;CLEAR RANDOM DATA FLAG
003134  000405                        BR      STARTB

                                ;START 204**********
003136  005037  000636        STARTC: CLR     TINF            ;CLEAR TTY INPUT FLAG
003142  000442                        BR      STARTD

                                ;START 210**********
003144  005037  000636        STARTA: CLR     TINF            ;CLEAR TTY ENTRY FLAG
003150  012700  000640        STARTB: MOV     #STFLG,R0       ;GET STARTING ADDRESS OF FLAGS
003154  012701  000074                MOV     #ENDFLG-STFLG,R1
003160  105020                1$:     CLRB    (R0)+           ;CLEAR FLAGS AND COUNTERS
003162  005301                        DEC     R1
003164  001375                        BNE     1$
003166  012706  000500                MOV     #500,SP         ;SET STACK POINTER
```

```
 1861  003172  004737  004122                    JSR     PC,RANSET       ;GO RESET RANDOM BASE
 1862  003176  012700  001044                    MOV     #STTBL,R0       ;GET STARTING ADDRESS OF STAT TABLE
 1863  003202  012701  001720                    MOV     #ENDTBL-STTBL,R1        ;AND # OF BYTES IN TABLE
 1864  003206  105020                  2$:       CLRB    (R0)+           ;CLEAR STATISTIC COUNTERS
 1865  003210  005301                            DEC     R1
 1866  003212  001375                            BNE     2$
 1867  003214  012700  000742                    MOV     #UN1,R0         ;SET ALL SLAVES ON-LINE
 1868  003220  022710  177777          3$:       CMP     #-1,(R0)        ;BRANCH IF AT END OF TABLE
 1869  003224  001403                            BEQ     4$
 1870  003226  042720  040000                    BIC     #40000,(R0)+    ;MARK SLAVE ON-LINE
 1871  003232  000772                            BR      3$
 1872  003234  012737  177777  013652  4$:       MOV     #-1,PATS        ;PRESET PATTERN
 1873  003242  012737  000001  000654  STARTE:   MOV     #1,BLCNTR       ;PRESET BLOCK COUNTER
 1874  003250  013746  000004          STARTD:   MOV     @#4,-(SP)       ;SAVE ERROR TRAP VECTOR
 1875  003254  013746  000006                    MOV     @#6,-(SP)
 1876  003260  022737  000176  000610            CMP     #SWREG,SWR      ;BRANCH IF SOFTWARE SWR
 1877  003266  001413                            BEQ     2$              ;ALREADY SELECTED
 1878  003270  012737  003514  000004            MOV     #1$,@#4         ;SET TIMEOUT TRAP TO 1$ BELOW
 1879  003276  005037  000006                    CLR     @#6
 1880  003302  022777  177777  175300            CMP     #177777,@SWR    ;BRANCH IF SWR = 177777 TRAP
 1881  003310  001402                            BEQ     2$              ;IF NOT AVAIL (1$) OTHERWISE
 1882  003312  000404                            BR      3$              ;GO TO 3$
 1883  003314  022626                  1$:       CMP     (SP)+,(SP)+     ;RESET STACK
 1884  003316  012737  000176  000610  2$:       MOV     #SWREG,SWR      ;SET SWR = SOFTWARE SWR
 1885  003324  012637  000006          3$:       MOV     (SP)+,@#6       ;RESTORE ERROR TRAP
 1886  003330  012637  000004                    MOV     (SP)+,@#4
 1887  003334  012706  000500                    MOV     #500,SP
 1888  003340  004737  011750                    JSR     PC,TINP         ;GO GET PAR METERS FROM TTY
 1889  003344  012777  000040  175146            MOV     #40,@CS         ;INITIALIZE
 1890  003352  005000                  STAUTO:   CLR     R0              ;POINT TO FIRST ENTRY
 1891  003354  022760  177777  000742  1$:       CMP     #-1,UN1(R0)     ;BRANCH IF LAST ENTRY
 1892  003362  001406                            BEQ     2$
 1893  003364  042760  100000  000742            BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
 1894  003372  062700  000002                    ADD     #2,R0           ;POINT TO NEXT UNIT ENTRY
 1895  003376  000766                            BR      1$              ;CONTINUE CLEARING
 1896  003400  113737  004731  004730  2$:       MOVB    REOTC+1,REOTC   ;RESTORE EOT COUNTER
 1897  003406  012777  000100  175176  START1:   MOV     #100,@TKS       ;SET KEYBOARD IE BIT
 1898  003414  013700  000674                    MOV     UNP,R0          ;R0 = UNIT TABLE POINTER
 1899  003420  022760  177777  000742  STAR1A:   CMP     #-1,UN1(R0)     ;BRANCH IF LAST ENTRY
 1900  003426  001404                            BEQ     STAR1B
 1901  003430  016037  000742  000552            MOV     UN1(R0),UDES    ;LOAD NEXT UNIT DESCRIPTION
 1902  003436  000445                            BR      START4
 1903  003440  005237  000654          STAR1B:   INC     BLCNTR          ;BUMP BLOCK COUNTER
 1904  003444  005737  000734                    TST     ASEQF           ;SEE IF AUTO SEQ
 1905  003450  001411                            BEQ     STAR1C          ;IF NOT: BR
 1906  003452  023737  000654  000736            CMP     BLCNTR,ABLCNT   ;SEE IF DONE SEQ
 1907  003460  001005                            BNE     STAR1C          ;IF NOT: BR
 1908  003462  005037  000654                    CLR     BLCNTR          ;RESET BLOCK CNTR
 1909  003466  005037  000674                    CLR     UNP             ;RESET UNIT POINTER
 1910  003472  000207                            RTS     PC              ;RETURN TO AUTO SEQ
 1911  003474  005037  000674          STAR1C:   CLR     UNP
 1912  003500  005000                            CLR     R0
 1913  003502  016037  000742  000552            MOV     UN1(R0),UDES    ;LOAD FIRST UNIT DESCRIPTION
 1914  003510  105777  175074                    TSTB    @SWR            ;SEE IF RANDOM RECORD SIZE
 1915  003514  100002                            BPL     START2          ;IF NOT: BR
 1916  003516  004737  011664                    JSR     PC,CCNTR        ;GO GENERATE RANDOM RECORD SIZE
```

```
 1917  003522  032777  000400  175060  START2: BIT     #400,@SWR       ;SEE IF RANDOM DATA
 1918  003530  001402                  BEQ     START3          ;IF NOT: BR
 1919  003532  004737  014342          JSR     PC,DATR         ;GO GENERATE RANDOM DATA
 1920  003536  032777  000100  175044  START3: BIT     #100,@SWR       ;SEE IF RANDOM RECORD COUNT
 1921  003544  001402                  BEQ     START4          ;IF NOT: BR
 1922  003546  004737  011724          JSR     PC,RCNTR        ;GO GENERATE RANDOM RECORD COUNT
 1923  003552  032760  140000  000742  START4: BIT     #140000,UN1(R0) ;BRANCH IF UNIT AT EOT
 1924  003560  001065                  BNE     START7          ;OR MARKED OFF-LINE
 1925  003562  012777  000040  174730          MOV     #40,@CS         ;DO A MASSBUS CLEAR
 1926  003570  013777  000550  174722          MOV     DVN,@CS         ;SET DRIVE NUMBER
 1927  003576  013777  000552  174736          MOV     UDES,@TC        ;SET SLAVE NUMBER
 1928  003604  105777  174712          1$:     TSTB    @DS             ;SEE IF SLAVE AVAIL
 1929  003610  100405                  BMI     2$              ;IF SO: BR
 1930  003612  005337  000666          DEC     STAL
 1931  003616  001372                  BNE     1$              ;AWAIT TUR
 1932  003620  000137  020312          JMP     OFFLINE         ;GO MARK DRIVE OFF-LINE
 1933  003624  004737  013472          2$:     JSR     PC,DSUP         ;GO SET UP WRITE DATA
 1934  003630  004737  005236          JSR     PC,INIT         ;INIT SLAVE
 1935  003634  004737  004732          JSR     PC,RWND         ;REWIND
 1936  003640  004737  005352          JSR     PC,WRITE        ;WRITE
 1937  003644  013737  000600  000666  MOV     TSTAL,STAL      ;SET TURN AROUND DELAY
 1938  003652  004737  011654          JSR     PC,STALL                ;DELAY
 1939  003656  004737  007210          JSR     PC,RSEQ         ;GO TO READ SEQUENCER
 1940  003662  013737  000600  000666  MOV     TSTAL,STAL      ;SET TURN AROUND DELAY
 1941  003670  004737  011654          JSR     PC,STALL        ;DELAY
 1942  003674  032777  040000  174706  BIT     #40000,@SWR     ;SEE IF SHOULD PRINT STATISTICS
 1943  003702  001414                  BEQ     START7          ;IF NOT: BR
 1944  003704  012700  000001          MOV     #1,R0           ;SET RECORD COUNTER TO 1
 1945  003710  004737  022012          JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
 1946  003714  004737  003744          JSR     PC,STP          ;GO PRINT STATS
 1947  003720  005237  000726          INC     BTSTF           ;SET STAT ONLY PRINT
 1948  003724  004737  007126          JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
 1949  003730  005037  000726          CLR     BTSTF           ;CLEAR FLAG
 1950  003734  062737  000002  000674  START7: ADD     #2,UNP          ;POINT TO NEXT UNIT
 1951  003742  000621          START8: BR      START1          ;CONTINUE
```

```
1952                                    ;********** SUBROUTINE TO PRINT STATISTICS **********
1953
1954  003744  004737  016370      STP:  JSR     PC,DPPRT          ;PRINT DROPS AND PICKS
1955  003750  000004  025123            TYPE,MSG65              ;TYPE MSG
1956  003754  013700  000674            MOV     UNP,R0
1957  003760  016003  001044            MOV     RTY1(R0),R3
1958  003764  104400                    TYPOCT                  ;PRINT RETRIES
1959  003766  000004  025234            TYPE,MSG73              ;TYPE MSG
1960  003772  016003  001064            MOV     WTER1(R0),R3
1961  003776  104400                    TYPOCT                  ;PRINT WRITE ERRORS
1962  004000  000004  025223            TYPE,MSG72              ;TYPE MSG
1963  004004  016003  001104            MOV     RDER1(R0),R3
1964  004010  104400                    TYPOCT                  ;PRINT READ FORWARD ERRORS
1965  004012  000004  026001            TYPE,MSG113             ;TYPE MSG
1966  004016  016003  002664            MOV     RFSOFT(R0),R3
1967  004022  104400                    TYPOCT                  ;PRINT FORWARD SOFT ERRORS
1968  004024  000004  026012            TYPE,MSG114             ;TYPE MSG
1969  004030  016003  002724            MOV     RFHARD(R0),R3
1970  004034  104400                    TYPOCT                  ;PRINT HARD FORWARE ERRORS
1971  004036  000004  025320            TYPE,MSG77              ;TYPE MSG
1972  004042  016003  001124            MOV     DATER1(R0),R3
1973  004046  104400                    TYPOCT                  ;PRINT DATA ERROR FORWARD NUMBER
1974  004050  000004  025155            TYPE,MSG68              ;TYPE MSG
1975  004054  016003  001144            MOV     RDERR1(R0),R3
1976  004060  104400                    TYPOCT                  ;PRINT REVESE ERROR NUMBER
1977  004062  000004  026001            TYPE,MSG113             ;TYPE MSG
1978  004066  016003  002704            MOV     RRSOFT(R0),R3
1979  004072  104400                    TYPOCT                  ;PRINT REVERSE SOFT ERROR
1980  004074  000004  026012            TYPE,MSG114             ;TYPE MSG
1981  004100  016003  002744            MOV     RRHARD(R0),R3
1982  004104  104400                    TYPOCT
1983  004106  000004  025307            TYPE,MSG76              ;TYPE MSG
1984  004112  016003  001164            MOV     DEREV1(R0),R3
1985  004116  104400                    TYPOCT                  ;PRINT DATA REVERSE ERROR NUMBER
1986  004120  000207                    RTS     PC              ;RETURN
1987
1988                                    ;RANDOM BASE RESET**********
1989
1990  004122  012737  153624  000626 RANSET: MOV     #153624,RANBAS  ;RESET BASE
1991  004130  012737  032561  000630       MOV     #32561,RANSAV   ;RESET BUFFER
1992  004136  013737  000632  000554       MOV     RCSAV,RCNT      ;RESET RECORD COUNT
1993  004144  013737  000634  000556       MOV     FCSAV,FMCNT     ;RESET FRAME COUNT
1994  004152  000207                    RTS     PC
1995
```

```
                                        ;*********************************************************
                                        ;REWIND FROM EOT:
                                        ;
                                        ;WHEN ANY TRANSPORT BEING TESTED REACHES END OF TAPE
                                        ;DURING A READ OR WRITE OPERATION, IT WILL BE REWOUND
                                        ;AND FLAGGED AS UNAVAILABLE UNTIL ALL AVAILABLE UNITS •
                                        ;HAVE REACHED EOT AT WHICH TIME ALL TESTING WILL BE RESUMED
                                        ;AT A BLOCK COUNT OF ONE (1).  A MESSAGE WILL BE
                                        ;PRINTED ON THE SUPERVISORS CONSOLE AS EACH UNIT REACHES
                                        ;EOT AND IS REWOUND.
                                        ;*********************************************************

004154  013777  000552  174360  REOT:   MOV     UDES,@TC        ;LOAD TAPE CONTROL REGISTER
004162  013700  000674                  MOV     UNP,R0          ;GET UNIT POINTER
004166  032760  040000  000742          BIT     #40000,UN1(R0)  ;BRANCH IF UNIT MARKED OFF-LINE
004174  001014                          BNE     2$
004176  012777  000011  174304          MOV     #11,@C1         ;DRIVE CLEAR
004204  105777  174312          1$:     TSTB    @DS             ;WAIT FOR DRY
004210  100375                          BPL     1$
004212  012777  000007  174270          MOV     #7,@C1          ;START REWIND
004220  005737  000724                  TST     BTFLG           ;SEE IF BAD TAPE OVERFLOW REWIND
004224  001004                          BNE     3$              ;IF SO: BR
004226  013700  000660          2$:     MOV     EOTREC,R0
004232  042700  100000                  BIC     #100000,R0      ;SET RECORD NUMBER OF EOT
004236  005037  000660          3$:     CLR     EOTREC          ;CLEAR EOT INDICATOR & REC COUNT
004242  004737  022012                  JSR     PC,PAPRT        ;PRINT HEADER
004246  022737  000002  000724          CMP     #2,BTFLG        ;SEE IF POSITION ERROR
004254  001004                          BNE     4$              ;IF NOT: BR
004256  012737  025674  004306          MOV     #MSG109,6$      ;SET POSITION ERROR MSG
004264  000407                          BR      5$
004266  022737  000001  000724  4$:     CMP     #1,BTFLG        ;SEE IF BAD TAPE OVERFLOW
004274  001006                          BNE     REOT1C          ;IF NOT: BR
004276  012737  025527  004306          MOV     #MSG106,6$      ;SET BAD TAPE OVERFLOW MSG
004304  000004                  5$:     TYPE                    ;TYPE MSG
004306  000000                  6$:     .WORD   0               ;WILL CONTAIN MESSAGE ADDRESS
004310  000411                          BR      REOT1E
004312  000004  023660          REOT1C: TYPE,MSG20              ;TYPE EOT MSG
004316  013704  000674                  MOV     UNP,R4
004322  005264  002644                  INC     EOTC0(R4)       ;BUMP CNTR
004326  016403  002644                  MOV     EOTC0(R4),R3
004332  104400                          TYPOCT                  ;PRINT EOT CNTR
004334  000004  025552          REOT1E: TYPE,MSG16A             ;TYPE MSG
004340  005037  000724                  CLR     BTFLG           ;CLEAR BAD TAPE FLAG
004344  004737  003744                  JSR     PC,STP          ;PRINT STATS
004350  004737  007126                  JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
004354  013700  000674          REOT2:  MOV     UNP,R0          ;GET UNIT POINTER
004360  032760  040000  000742          BIT     #40000,UN1(R0)  ;BRANCH IF UNIT MARKED OFF-LINE
004366  001010                          BNE     REOT2A
004370  105777  174126                  TSTB    @DS             ;BRANCH IF DRY SET
004374  100405                          BMI     REOT2A
004376  005337  000666                  DEC     STAL
004402  001364                          BNE     REOT2           ;WAIT DRY
004404  000137  020312                  JMP     OFFLINE         ;GO MARK SLAVE OFFLINE

004410  105337  004730          REOT2A: DECB    REOTC           ;SEE IF LAST UNIT TO REACH EOT
004414  001410                          BEQ     REOT3           ;IF SO: BR
```

```
 2052  004416  013700  000674                      MOV     UNP,R0
 2053  004422  052760  100000  000742              BIS     #100000,UN1(R0) ;SET EOT FLAG
 2054  004430  005726                              TST     (SP)+           ;RESET STACK POINTER
 2055  004432  000137  003734                      JMP     START7          ;GO TO NEXT UNIT
 2056  004436  113737  004731  004730  REOT3:     MOVB    REOTC+1,REOTC   ;RESTORE UNITS EOT COUNTER
 2057  004444  005037  000674                      CLR     UNP
 2058  004450  005000                              CLR     R0              ;POINT TO FIRST UNIT
 2059  004452  016037  000742  000552  REOT4:     MOV     UN1(R0),UDES    ;LOAD UNIT DESCRIPTION
 2060  004460  013777  000552  174054              MOV     UDES,@TC        ;SELECT SLAVE
 2061  004466  032760  040000  000742              BIT     #40000,UN1(R0)  ;BRANCH IF UNIT NOT MARKED OFF-LINE
 2062  004474  001412                              BEQ     1$
 2063  004476  032777  010000  174016              BIT     #10000,@DS      ;BRANCH IF MEDIUM NOT ON LINE
 2064  004504  001427                              BEQ     10$
 2065  004506  062737  000401  004730              ADD     #401,REOTC      ;INCREMENT # OF UNITS UNDER TEST
 2066  004514  042760  140000  000742              BIC     #140000,UN1(R0) ;MARK UNIT BACK ON-LINE
 2067  004522  012777  000011  173760  1$:         MOV     #11,@C1         ;DRIVE CLEAR
 2068  004530  105777  173766          2$:         TSTB    @DS             ;WAIT FOR DRIVE READY
 2069  004534  100375                              BPL     2$
 2070  004536  012777  000007  173744              MOV     #7,@C1          ;REWIND UNIT
 2071  004544  032777  000002  173750  3$:         BIT     #2,@DS          ;WAIT FOR BOT TO SET
 2072  004552  001774                              BEQ     3$
 2073  004554  032777  020000  173740  4$:         BIT     #20000,@DS      ;WAIT FOR PIP TO CLEAR
 2074  004562  001374                              BNE     4$              ;AWAIT PIP RESET
 2075
 2076  004564  042760  100000  000742  10$:        BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
 2077  004572  062737  000002  000674              ADD     #2,UNP
 2078  004600  013700  000674                      MOV     UNP,R0          ;POINT TO NEXT UNIT
 2079  004604  022760  177777  000742              CMP     #-1,UN1(R0)     ;BRANCH IF NOT LAST UNIT
 2080  004612  001317                              BNE     REOT4
 2081  004614  005037  000674          REOT7:     CLR     UNP             ;CLEAR UNIT POINTER
 2082  004620  005037  000636                      CLR     TINF            ;CLEAR TTY INPUT FLAG
 2083  004624  005737  000734                      TST     ASEQF           ;SEE IF AUTO SEQ
 2084  004630  001402                              BEQ     REOTX           ;IF NOT: BR
 2085  004632  005726                              TST     (SP)+           ;RESET STACK POINTER
 2086  004634  000207                              RTS     PC              ;RETURN TO AUTO SEQ
 2087  004636  004737  004122          REOTX:     JSR     PC,RANSET       ;GO RESET RANDOM BASE
 2088  004642  012737  177777  013652              MOV     #-1,PATS        ;PRESET PATTERN
 2089  004650  005037  014404                      CLR     RDFL            ;CLEAR RANDOM FLAG
 2090  004654  005737  000572                      TST     SPFLG           ;SEE IF SINGLE PASS
 2091  004660  001421                              BEQ     REOTXX          ;IF NOT: BR
 2092  004662  000004  025430          TEND:      TYPE,MSG100             ;TYPE MSG
 2093  004666  013700  000042                      MOV     @#42,R0         ;GET ACT11 RETURN ADDRESS
 2094  004672  001405                              BEQ     HERE            ;BRANCH IF NOT ACT11
 2095  004674  000005                              RESET
 2096  004676  004710          $ENDAD:    JSR     PC,(R0)
 2097  004700  000240                      NOP
 2098  004702  000240                      NOP
 2099  004704  000240                      NOP
 2100  004706  000240          HERE:      NOP
 2101  004710  005737  003034                      TST     CHNFLG          ;BRANCH IF NOT CHAIN MODE
 2102  004714  001402                              BEQ     1$
 2103  004716  000137  021226                      JMP     ASEQ0           ;RETURN TO AUTO SEQUENCER
 2104  004722  000000          1$:        HALT
 2105  004724  000137  003242          REOTXX:    JMP     STARTE          ;RESTART AT BLOCK NUMBER ONE
 2106  004730  000000          REOTC:     0                               ;EOT UNIT COUNTER
```

```
                                        ;*****************************************************
                                        ;REWIND ALL AVAIL TAPES:
                                        ;
                                        ;THIS ROUTINE; ENTERED VIA CONSOLE SWITCH NINE (9),
                                        ;WILL REWIND ALL AVAILABLE TAPES TO BOT NO MATTER
                                        ;WHERE THEY ARE CURRENTLY POSITIONED AND RESUME TESTING
                                        ;ON THE CURRENTLY SELECTED UNIT.
                                        ;*****************************************************

004732  032777  001000  173650  RWND:   BIT     #1000,@SWR      ;SEE IF SHOULD REWIND
004740  001001                          BNE     RWNDA           ;IF SO: BR
004742  000207                          RTS     PC              ;ELSE EXIT
004744  013737  000674  000714  RWNDA:  MOV     UNP,UPS         ;SAVE UNIT POINTER
004752  005037  000674                  CLR     UNP             ;CLEAR POINTER
004756  005037  000660                  CLR     EOTREC          ;CLEAR EOT FLAG
004762  113737  004731  004730          MOVB    REOTC+1,REOTC   ;++B RESTORE UNIT CTR
004770  013700  000674          RWND0:  MOV     UNP,R0          ;POINT TO UNIT ENTRY
004774  022760  177777  000742          CMP     #-1,UN1(R0)     ;BRANCH IF LAST ENTRY
005002  001437                          BEQ     RWND2
005004  032760  140000  000742          BIT     #140000,UN1(R0) ;BRANCH IF ALREADY REWINDING
005012  001024                          BNE     RWND1A          ;OR MARKED OFF LINE
005014  016037  000742  000552          MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
005022  013777  000552  173512          MOV     UDES,@TC        ;LOAD COMMAND REGISTER
005030  012777  000011  173452          MOV     #11,@C1         ;DRIVE CLEAR
005036  012777  000007  173444          MOV     #7,@C1          ;START REWIND
005044  105777  173452          1$:     TSTB    @DS
005050  100405                          BMI     RWND1A          ;IF DRY: BR
005052  005337  000666                  DEC     STAL
005056  001372                          BNE     1$              ;AWAIT DRY
005060  000137  020312                  JMP     OFFLINE         ;GO MARK UNIT OFF LINE
005064  042760  100000  000742  RWND1A: BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
005072  062737  000002  000674          ADD     #2,UNP          ;BUMP POINTER
005100  000733                          BR      RWND0           ;DO NEXT UNIT
005102  005037  000674          RWND2:  CLR     UNP             ;CLEAR POINTER
005106  013700  000674          RWND3:  MOV     UNP,R0          ;POINT TO UNIT ENTRY
005112  022760  177777  000742          CMP     #-1,UN1(R0)     ;BRANCH IF LAST ENTRY
005120  001433                          BEQ     RWNDX
005122  016037  000742  000552          MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
005130  032760  040000  000742          BIT     #40000,UN1(R0)  ;BRANCH IF UNIT MARKED OFF LINE
005136  001015                          BNE     RWND5
005140  013777  000552  173374          MOV     UDES,@TC        ;LOAD UNIT DESCRIPTION
005146  032777  020000  173346  1$:     BIT     #20000,@DS
005154  001374                          BNE     1$              ;AWAIT PIP RESET
005156  032777  000002  173336          BIT     #2,@DS          ;BRANCH IF SLAVE AT BOT
005164  001002                          BNE     RWND5
005166  000137  020312                  JMP     OFFLINE         ;PRINT OFFLINE MESSAGE
005172  062737  000002  000674  RWND5:  ADD     #2,UNP          ;BUMP POINTER
005200  012777  000011  173302          MOV     #11,@C1         ;DRIVE CLEAR
005206  000737                          BR      RWND3           ;DO NEXT UNIT

005210  013700  000714          RWNDX:  MOV     UPS,R0          ;RESTORE UNIT POINTER
005214  010037  000674                  MOV     R0,UNP
005220  016037  000742  000552          MOV     UN1(R0),UDES    ;RESET UNIT DESCRIPTION
005226  013777  000552  173306          MOV     UDES,@TC
005234  000207                          RTS     PC              ;RETURN TO TEST
```

```
2163
2164                                    ;*******************************************************
2165                                    ;INITIALIZE SELECTED SALVE
2166                                    ;THIS ROUTINE REWINDS AND SETS THE PROPER DENSITY IF
2167                                    ;THE DENSITY REQUIRED FOR THE TEST IS DIFFERENT FROM
2168                                    ;THE DENSITY AT WHICH THE SLAVE IS SELECTED.
2169                                    ;*******************************************************
2170
2171  005236  013746  000552       INIT:   MOV     UDES,-(SP)      ;GET UNIT DESCRIPTION
2172  005242  012777  000040  173250       MOV     #40,@CS         ;DO A MASSBUS CLEAR
2173  005250  013777  000550  173242       MOV     DVN,@CS         ;LOAD DRIVE #
2174  005256  011677  173260              MOV     (SP),@TC        ;LOAD SLAVE # & SLAVE DESCRIPTION
2175  005262  042716  174377              BIC     #174377,(SP)    ;CLEAR ALL BUT DENSITY BITS
2176  005266  022726  001400              CMP     #1400,(SP)+     ;BRANCH IF NOT NRZ
2177  005272  001005                      BNE     1$
2178  005274  032777  000040  173220       BIT     #40,@DS         ;BRANCH IF SLAVE IS IN PE MODE
2179  005302  001422                      BEQ     4$              ;PES = 0
2180  005304  000404                      BR      2$
2181  005306  032777  000040  173206  1$:  BIT     #40,@DS         ;BRANCH IF SLAVE IS IN PE MODE
2182  005314  001015                      BNE     4$              ;PES =  1
2183  005316  012777  000007  173164  2$:  MOV     #7,@C1          ;LOAD REWIND COMMAND
2184  005324  105777  173172       20$: TSTB    @DS             ;WAIT FOR READY
2185  005330  100375                      BPL     20$
2186  005332  032777  020000  173162  3$:  BIT     #20000,@DS      ;WAIT FOR PIP = 0
2187  005340  001374                      BNE     3$
2188  005342  012777  000011  173140       MOV     #11,@C1         ;CLEAR DRIVE
2189  005350  000207               4$:    RTS     PC
```

```
                                        ;*********************************************************
                                        ;WRITE ROUTINE:
                                        ;
                                        ;THIS ROUTINE IS USED TO WRITE ONTO TAPE THE BLOCK
                                        ;OF DATA DESCRIBED BY THE OPERATOR AND SET UP
                                        ;IN THE SEQUENCE FORMATTER.  THE TAPE UNIT TO BE USED
                                        ;HAS BEEN ASSIGNED BY THE SEQUENCE FORMATTER AND
                                        ;ITS PARAMETERS SET IN A UNIT DESCRIPTION WORD.
                                        ;AS EACH RECORD OF THE BLOCK IS WRITTEN, IT IS CHECKED
                                        ;FOR STATUS ERRORS, WORD COUNT ZERO, AND CORRECT CURRENT
                                        ;MEMORY ADDRESS.  IF THE WRITE OPERATION RESULTS IN
                                        ;ANY ERROR CONDITION, A WRITE RETRY OF THAT OPERATION
                                        ;MAY BE DONE BY SETTING SWITCH FOUR (4) TO A ONE (1).
                                        ;THE RETRY CONSISTS OF A BACKSPACE, ERASE FORWARD, AND
                                        ;REWRITE OF THE RECORD.  (SEE WRITE RETRY SUBROUTINE)
                                        ;AFTER ALL DATA RECORDS IN THE BLOCK HAVE BEEN
                                        ;WRITTEN, THE WRITE ROUTINE WILL EXECUTE A WRITE
                                        ;TAPE MARK COMMAND IF THE TTY RESPONSE TM=1 WAS
                                        ;MADE AT INITIAL START.  THE TM IS COUNTED AS TOTAL
                                        ;DATA RECORDS PLUS ONE (IE: IF 100 DATA RECORDS; TM=RECORD 101)
                                        ;IF THE WRITE OPERATION (DATA OR TM) CAUSES THE SELECTED SLAVE
                                        ;TO REACH END OF TAPE (EOT) AND THERE IS TO BE NO READING DONE,
                                        ;(SW2 AND SW3 SET TO A 1) THEN THE SLAVE IS REWOUND AND
                                        ;FLAGGED AS UNAVAILABLE FOR TESTING UNTIL ALL SLAVES HAVE
                                        ;REACHED EOT AND BEEN REWOUND AT WHICH TIME TESTING IS
                                        ;RESUMED ON ALL AVAILABLE SLAVES.
                                        ;WRITE RETRY MAY BE ALLOWED VIA CONSOLE SWITCH FOUR (4).
                                        ;ERROR CHECKING MAY BE DISALLOWED VIA CONSOLE SWITCH
                                        ;TWELVE (12).
                                        ;WRITING TO TAPE MAY BE DISALLOWED VIA CONSOLE SWITCH
                                        ;ZERO (0).
                                        ;*********************************************************

005352  032777  000001  173230  WRITE:  BIT     #1,@SWR         ;SEE IF SHOULD WRITE
005360  001402                          BEQ     WRTE
005362  000137  006132                  JMP     WEX             ;IF NOT: BR
005366  013700  000554          WRTE:   MOV     RCNT,R0         ;R0=RECORD COUNT
005372  012737  023546  000652  W0:     MOV     #MSG5,EMADDR    ;SET ERROR MSG ADDRESS
005400  013777  000556  173110          MOV     FMCNT,@FC       ;LOAD CHAR COUNT
005406  012777  026344  173100          MOV     #WDATA,@BA      ;SET DATA ADDR
005414  112737  000060  000672          MOVB    #60,MTC1        ;SET WRITE OP COMMAND
005422  012737  005434  000662          MOV     #W1,RTRN        ;SET RETURN ADDRESS
005430  000137  020372                  JMP     TAPG            ;GO EXECUTE COMMAND
005434  032777  002000  173060  W1:     BIT     #2000,@DS       ;SEE IF EOT
005442  001412                          BEQ     1$              ;IF NOT AT EOT: BR
005444  005737  000660                  TST     EOTREC          ;BRANCH IF WRITTEN PAST EOT
005450  100407                          BMI     1$
005452  005300                          DEC     R0              ;ADJUST # OF RECORDS WRITTEN
005454  052700  100000                  BIS     #100000,R0      ;SET EOT INDICATOR
005460  010037  000660                  MOV     R0,EOTREC       ;SAVE RECORD COUNT
005464  012700  000002                  MOV     #2,R0           ;SET TO WRITE 1 LAST RECORD
005470  032777  010000  173112  1$:     BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERRORS
005476  001002                          BNE     2$              ;IF NOT: BR
005500  004737  016522                  JSR     PC,ERCHK        ;GO CHECK ERRORS
005504  013737  000576  000666  2$:     MOV     WSTAL,STAL      ;SET DELAY
005512  004737  011654                  JSR     PC,STALL        ;DELAY
```

```
2246  005516  005737  000712                  TST     RTYFL           ;SEE IF RETRY TIME
2247  005522  001401                          BEQ     3$              ;IF NOT: BR
2248  005524  000207                          RTS     PC              ;ELSE RETURN
2249  005526  005737  000706          3$:     TST     SERFL           ;SEE IF WRITE ERROR
2250  005532  001446                          BEQ     W5              ;IF NOT: BR
2251  005534  013704  000674                  MOV     UNP,R4
2252  005540  005264  001064                  INC     WTER1(R4)       ;BUMP WRITE ERROR
2253  005544  005037  000706                  CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2254  005550  032777  000020  173032          BIT     #20,@SWR        ;SEE IF RETRY
2255  005556  001434                          BEQ     W5              ;IF NOT: BR
2256  005560  013703  000722                  MOV     ERSAV,R3
2257  005564  042703  102720                  BIC     #102720,R3      ;MASK UNRECOVERABLE ERROR
2258  005570  001407                          BEQ     W4              ;IF SO: BR
2259  005572  004737  022012                  JSR     PC,PAPRT        ;PRINT HEADER
2260  005576  000004  025331                  TYPE,MSG78              ;TYPE MSG
2261  005602  004737  010754                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2262  005606  000420                          BR      W5
2263  005610  013704  000674          W4:     MOV     UNP,R4
2264  005614  005264  001044                  INC     RTY1(R4)        ;BUMP RETRY CNTR
2265  005620  032777  002000  172762          BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2266  005626  001002                          BNE     W4A             ;IF NOT: BR
2267  005630  000004  025101                  TYPE,MSG64              ;TYPE MSG
2268  005634  005037  000702          W4A:    CLR     RTCNT           ;CLEAR RETRY NUMBER
2269  005640  005037  000700                  CLR     RPCNT           ;CLEAR REPEAT COUNTER
2270  005644  004737  006166                  JSR     PC,WRTY         ;GO RETRY WRITE ERROR
2271  005650  005037  000712          W5:     CLR     RTYFL           ;CLEAR RETRY COUNTER
2272  005654  005300                          DEC     R0              ;SEE IF DONE ALL
2273  005656  001245                          BNE     W0              ;IF NOT: BR
2274  005660  005737  000564          W6:     TST     TMEX            ;SEE IF TM
2275  005664  001522                          BEQ     WEX             ;IF NOT: BR
2276  005666  005237  000676                  INC     TMFLG           ;SET TM FLAG
2277  005672  012737  025012  000652  WTM:    MOV     #MSG54,EMADDR   ;POINT TO TM ERROR MSG
2278  005700  012737  000026  000672          MOV     #26,MTC1        ;SET TM OP CODE
2279  005706  005077  172604                  CLR     @FC             ;LOAD FRAME COUNTER
2280  005712  012777  026344  172574          MOV     #WDATA,@BA      ;LOAD BUS ADDRESS
2281  005720  012737  005732  000662          MOV     #WTM0,RTRN      ;SAVE RETURN ADDRESS
2282  005726  000137  020372                  JMP     TAPG            ;WRITE TM
2283  005732  032777  010000  172650  WTM0:   BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERRORS
2284  005740  001074                          BNE     WEX
2285  005742  032777  000004  172552          BIT     #4,@DS          ;SEE IF TM STATUS
2286  005750  001011                          BNE     WTM1            ;IF SO: BR
2287  005752  012737  026344  020224          MOV     #WDATA,CADER    ;SET EXPT BUS ADDRESS
2288  005760  012737  000001  020232          MOV     #1,DRVER        ;INDICATE ERROR
2289  005766  004737  017352                  JSR     PC,ERPT         ;PRINT TM ERROR
2290  005772  000404                          BR      WTM2
2291  005774  012703  026344          WTM1:   MOV     #WDATA,R3       ;SET EXPT ADDRESS
2292  006000  004737  016614                  JSR     PC,ER2          ;GO CHECK FOR OTHER ERRORS
2293  006004  005737  000712          WTM2:   TST     RTYFL           ;SEE IF RETRY
2294  006010  001401                          BEQ     WTM3            ;IF NOT: BR
2295  006012  000207                          RTS     PC              ;ELSE RETURN TO RETRY ROUTINE
2296  006014  005737  000706          WTM3:   TST     SERFL           ;SEE IF WRITE ERROR
2297  006020  001444                          BEQ     WEX             ;IF NOT: BR
2298  006022  013704  000674                  MOV     UNP,R4
2299  006026  005264  001064                  INC     WTER1(R4)       ;BUMP WRITE ERROR
2300  006032  032777  000020  172550          BIT     #20,@SWR        ;SEE IF SHOULD RETRY
2301  006040  001434                          BEQ     WEX             ;IF NOT: BR
```

```
 2302  006042  013703  000722                  MOV     ERSAV,R3
 2303  006046  042703  102720                  BIC     #102720,R3      ;MASK UNRECOVERABLE ERROR
 2304  006052  001407                          BEQ     WTM4            ;IF SO: BR
 2305  006054  004737  022012                  JSR     PC,PAPRT        ;PRINT HEADER
 2306  006060  000004  025331                  TYPE,MSG78              ;TYPE MSG
 2307  006064  004737  010754                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
 2308  006070  000420                          BR      WEX
 2309  006072  005037  000700          WTM4:   CLR     RPCNT           ;CLEAR REPEAT CNTR
 2310  006076  013704  000674                  MOV     UNP,R4
 2311  006102  005264  001044                  INC     RTYI(R4)        ;BUMP RETRY CNTR
 2312  006106  005037  000702                  CLR     RTCNT           ;CLEAR RETRY CNTR
 2313  006112  032777  002000  172470          BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
 2314  006120  001002                          BNE     WTM4A           ;IF NOT: BR
 2315  006122  000004  025101                  TYPE,MSG64              ;TYPE MSG
 2316  006126  004737  006166          WTM4A:  JSR     PC,WRTY         ;GO DO RETRY
 2317  006132  005037  000712          WEX:    CLR     RTYFL           ;CLEAR RETRY FLAG
 2318  006136  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
 2319  006142  005737  000660                  TST     EOTREC          ;BRANCH IF NOT AT EOT
 2320  006146  100006                          BPL     WRWX
 2321  006150  032777  000014  172432  WRW:    BIT     #14,@SWR        ;BRANCH IF EITHER READ ENABLED
 2322  006156  001002                          BNE     WRWX
 2323  006160  000137  004154                  JMP     REOT            ;ELSE REWIND
 2324  006164  000207                  WRWX:   RTS     PC              ;EXIT
```

```
 2325                                   ;*************************
 2326                                   ;WRITE ERROR RETRY
 2327                                   ;
 2328                                   ;*************************
 2329
 2330  006166  012737  000001  000712  WRTY:   MOV     #1,RTYFL        ;SET RETRY FLAG
 2331  006174  004737  006554          WRTY0:  JSR     PC,WRTSB        ;GO SPACE REVERSE FOR REPEAT
 2332  006200  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
 2333  006204  001003                          BNE     WRTYTM          ;IF SO: BR
 2334  006206  004737  005372                  JSR     PC,WO           ;REWRITE RECORD
 2335  006212  000402                          BR      WRTYR           ;GO ON
 2336  006214  004737  005672          WRTYTM: JSR     PC,WTM          ;GO WRITE TAPE MARK AGAIN
 2337  006220  005737  000706          WRTYR:  TST     SERFL           ;REWRITE GOOD
 2338  006224  001022                          BNE     WRTY2           ;IF NOT: BR
 2339  006226  005237  000700                  INC     RPCNT           ;BUMP REPEAT COUNTER
 2340  006232  022737  000004  000700        CMP     #4,RPCNT        ;SEE IF FOUR GOOD REPEATS
 2341  006240  001355                          BNE     WRTY0           ;IF NOT: REPEAT
 2342  006242  032777  002000  172340        BIT     #2000,@SWR      ;SEE IF PRINT
 2343  006250  001007                          BNE     WRTY1           ;IF NOT: BR
 2344  006252  000004  025514                  TYPE,MSG105             ;TYPE MSG
 2345  006256  000004  025123                  TYPE,MSG65              ;TYPE MSG
 2346  006262  013703  000702                  MOV     RTCNT,R3
 2347  006266  104400                          TYPOCT                  ;PRINT RETRY NUMBER
 2348  006270  000207          WRTY1:  RTS     PC              ;RESUME TESTING
 2349  006272  013703  000722          WRTY2:  MOV     ERSAV,R3        ;GET ER
 2350  006276  005037  000650                  CLR     TEMP3           ;CLEAR RECOVERABLE ERROR INDICATOR
 2351  006302  042703  102720                  BIC     #102720,R3      ;MASK RECOVERABLE BITS
 2352  006306  001412                          BEQ     WRTY2A          ;IF RECOVERABLE: BR
 2353  006310  004737  022012                  JSR     PC,PAPRT        ;PRINT HEADER
 2354  006314  000004  025331                  TYPE,MSG78              ;TYPE MSG
 2355  006320  004737  010754                  JSR     PC,NRTP         ;PRINT ER
 2356  006324  012737  000001  000650        MOV     #1,TEMP3        ;SET FLAG
 2357  006332  000406                          BR      WRTY2B
 2358  006334  032777  002000  172246  WRTY2A: BIT     #2000,@SWR      ;SEE IF PRINT
 2359  006342  001022                          BNE     WRTY3           ;IF NOT: BR
 2360  006344  000004  025724                  TYPE,MSG110             ;TYPE MSG
 2361  006350  000004  025123          WRTY2B: TYPE,MSG65              ;TYPE MSG
 2362  006354  013703  000702                  MOV     RTCNT,R3
 2363  006360  104400                          TYPOCT                  ;PRINT RETRY NUMBER
 2364  006362  000004  025746                  TYPE,MSG111             ;TYPE MSG
 2365  006366  013703  000700                  MOV     RPCNT,R3
 2366  006372  104400                          TYPOCT                  ;PRINT REPEAT NUMBER
 2367  006374  005737  000650                  TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
 2368  006400  001403                          BEQ     WRTY3           ;IF NOT: BR
 2369  006402  005037  000650                  CLR     TEMP3           ;CLEAR FLAG
 2370  006406  000207                          RTS     PC              ;EXIT
 2371  006410  005737  000702          WRTY3:  TST     RTCNT           ;SEE IF FIRST RETRY
 2372  006414  001004                          BNE     WRTY3A          ;IF NOT: BR
 2373  006416  013704  000674                  MOV     UNP,R4
 2374  006422  005364  001064                  DEC     WTER1(R4)       ;DECREMENT WRITE ERROR CNTR
 2375  006426  013704  000674          WRTY3A: MOV     UNP,R4          ;GET UNIT NUMBER
 2376  006432  016437  001024  000730        MOV     BTADDR(R4),BTPT ;GET ADDRESS OF UNIT BAD TAPE CNTR
 2377  006440  017704  172264                  MOV     @BTPT,R4        ;GET COUNTER
 2378  006444  005724                          TST     (R4)+           ;SET POINTER OFFSET
 2379  006446  010477  172256                  MOV     R4,@BTPT
 2380  006452  013703  000730                  MOV     BTPT,R3
```

```
2381  006456  060304                        ADD     R3,R4           ;SET ABSOLUTE POINTER
2382  006460  013714  000654                MOV     BLCNTR,(R4)     ;SET BLOCK NUMBER
2383  006464  062704  000040                ADD     #40,R4          ;ADD RCNT OFFSET
2384  006470  013714  000554                MOV     RCNT,(R4)
2385  006474  160014                        SUB     R0,(R4)         ;SET RECORD NUMBER
2386  006476  005214                        INC     (R4)            ;CORRECT RECORD NUMBER
2387  006500  022777  000040  172222        CMP     #40,@BTPT       ;SEE IF TOO MANY BAD SPOTS
2388  006506  001002                        BNE     WRTY4           ;IF NOT: BR
2389  006510  000137  006772                JMP     BTOV            ;ELSE GO TO BAD TAPE OVERFLOW
2390  006514  005237  000702        WRTY4:  INC     RTCNT           ;BUMP RETRY COUNTER
2391  006520  022737  000004  000702        CMP     #4,RTCNT        ;SEE IF DONE 4 RETRIES
2392  006526  001410                        BEQ     WRTY5           ;IF SO: BR
2393  006530  013704  000674                MOV     UNP,R4
2394  006534  005264  001044                INC     RTY1(R4)        ;BUMP RETRY COUNTER
2395  006540  005237  000732                INC     ERTFL           ;SET ERASE FLAG
2396  006544  000137  006174                JMP     WRTY0           ;DO NEXT RETRY
2397  006550  000137  007176        WRTY5:  JMP     BTUR            ;ELSE GO TO BAD TAPE UNRECOVERABLE
2398
2399                                        ;WRITE RETRY BACKSPACE-ERASE SUBROUTINE**********
2400
2401  006554  005037  000706        WRTSB:  CLR     SERFL           ;CLEAR FLAG
2402  006560  013737  000600  000666        MOV     TSTAL,STAL
2403  006566  004737  011654                JSR     PC,STALL        ;DO TURN AROUND DELAY
2404  006572  012737  025134  000652        MOV     #MSG66,EMADDR   ;SET ERROR CODE
2405  006600  012777  177777  171710        MOV     #-1,@FC         ;SET TO BACKSPACE 1 RECORD
2406  006606  012703  032352                MOV     #RDATA,R3       ;SET EXPECTED BA
2407  006612  010377  171676                MOV     R3,@BA
2408  006616  012737  000032  000672        MOV     #32,MTC1        ;SET BACK SPACE OP CODE
2409  006624  012737  006636  000662        MOV     #1$,RTRN        ;SET RETURN PC
2410  006632  000137  020372                JMP     TAPG            ;EXECUTE BACKSPACE COMMAND
2411  006636  004737  016614          1$:   JSR     PC,ER2          ;CHECK ERRORS
2412  006642  004737  011654                JSR     PC,STALL        ;STALL
2413  006646  005737  000706                TST     SERFL           ;SEE IF ERROR
2414  006652  001406                        BEQ     WRTSB1          ;IF NOT: BR
2415  006654  012737  000002  000724  WRTSB0: MOV     #2,BTFLG        ;SET FLAG
2416  006662  022626                        CMP     (SP)+,(SP)+     ;RESET STACK
2417  006664  000137  004154                JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2418  006670  005737  000732        WRTSB1: TST     ERTFL           ;SEE IF SHOULD ERASE
2419  006674  001001                        BNE     WRTSB2          ;IF SO: BR
2420  006676  000207                        RTS     PC              ;RETURN
2421  006700  005037  000732        WRTSB2: CLR     ERTFL           ;CLEAR ERASE FLAG
2422  006704  005037  000700                CLR     RPCNT           ;CLEAR REPEAT CNTR
2423  006710  005037  000706                CLR     SERFL           ;CLEAR FLAG
2424  006714  012737  025146  000652        MOV     #MSG67,EMADDR   ;SET ERROR CODE
2425  006722  005077  171570                CLR     @FC             ;CLEAR FRAME COUNT
2426  006726  012737  000024  000672        MOV     #24,MTC1        ;SET ERASE OP-CODE
2427  006734  012703  026344                MOV     #WDATA,R3       ;SET EXPECTED BA
2428  006740  010377  171550                MOV     R3,@BA
2429  006744  012737  006756  000662        MOV     #1$,RTRN        ;SET RETURN ADDRESS
2430  006752  000137  020372                JMP     TAPG            ;GO ERASE
2431  006756  004737  016614          1$:   JSR     PC,ER2          ;GO CHECK ERRORS
2432  006762  005737  000706                TST     SERFL           ;SEE IF ERROR
2433  006766  001740                        BEQ     WRTSB1          ;IF NOT: BR
2434  006770  000731                        BR      WRTSB0
2435
2436                                        ;BAD TAPE OVERFLOW SUBROUTINE**********
```

```
2437
2438  006772  005037  000712          BTOV:   CLR     RTYFL           ;CLEAR RETRY FLAG
2439  006776  012737  000001  000724          MOV     #1,BTFLG        ;SET BAD TAPE OVERFLOW FLAG
2440  007004  005726                          TST     (SP)+           ;++B ADJUST STACK PTR
2441  007006  000137  004154                  JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2442  007012  013701  000730          BTOV0:  MOV     BTPT,R1         ;SET TABLE POINTER
2443  007016  005721                          TST     (R1)+
2444  007020  005000                          CLR     R0
2445  007022  010003                  BTOV1:  MOV     R0,R3
2446  007024  000241                          CLC
2447  007026  006003                          ROR     R3              ;R3=R3/2 FOR CORRECT NUMBER
2448  007030  104400                          TYPOCT                  ;PRINT ENTRY NUMBER
2449  007032  000004  023610                  TYPE,MSG13+1                    ;TYPE MSG
2450  007036  011103                          MOV     (R1),R3
2451  007040  104400                          TYPOCT                  ;PRINT BLOCK NUMBER
2452  007042  000004  023615                  TYPE,MSG14              ;TYPE MSG
2453  007046  062701  000040                  ADD     #40,R1          ;SET POINTER OFFSET FOR RECOED NUMBER
2454  007052  012103                          MOV     (R1)+,R3
2455  007054  104400                          TYPOCT                  ;PRINT RECORD NUMBER
2456  007056  162701  000040                  SUB     #40,R1          ;RESET POINTER FOR BLOCK NUMBER
2457  007062  005720                          TST     (R0)+
2458  007064  020077  171640                  CMP     R0,@BTPT        ;SEE IF DONE
2459  007070  001403                          BEQ     BTOV2           ;IF SO: BR
2460  007072  000004  024155                  TYPE,MSG28              ;TYPE '<CR><LF>'
2461  007076  000751                          BR      BTOV1           ;CONTINUE
2462  007100  005737  000726          BTOV2:  TST     BTSTF           ;SEE IF STAT ONLY PRINT
2463  007104  001007                          BNE     BTOVX           ;IF SO: BR
2464  007106  012703  000041                  MOV     #41,R3          ;SET SIZE OF TABLE
2465  007112  013704  000730                  MOV     BTPT,R4         ;SET POINTER
2466  007116  005024                  BTOV3:  CLR     (R4)+           ;CLEAR TABLE
2467  007120  005303                          DEC     R3              ;SEE IF DONE
2468  007122  001375                          BNE     BTOV3           ;IF NOT: BR
2469  007124  000207                  BTOVX:  RTS     PC              ;RETURN
2470
```

```
2471
2472                                        ;BAD TAPE STATISTIC PRINT********
2473
2474  007126  000004  024155        BTPRT:  TYPE,MSG28              ;TYPE '<CR><LF>'
2475  007132  013704  000674                MOV     UNP,R4
2476  007136  016437  001024  000730        MOV     BTADDR(R4),BTPT ;SET TABLE POINTER
2477  007144  017703  171560                MOV     @BTPT,R3
2478  007150  000241                        CLC
2479  007152  006003                        ROR     R3              ;CORRECT NUMBER
2480  007154  104400                        TYPOCT                  ;PRINT NUMBER OF BAD SPOTS
2481  007156  000004  025760                TYPE,MSG112             ;TYPE MSG
2482  007162  005777  171542                TST     @BTPT           ;SEE IF ANY BAD SPOTS
2483  007166  001001                        BNE     BTPRT1          ;IF SO: BR
2484  007170  000207                        RTS     PC              ;ELSE RETURN
2485  007172  000137  007012        BTPRT1: JMP     BTOV0           ;PRINT STATS
2486
2487                                        ;BAD TAPE UNRECOVERABLE SUBROUTINE**********
2488
2489  007176  004737  022012        BTUR:   JSR     PC,PAPRT        ;PRINT HEADER
2490  007202  000004  025613                TYPE,MSG107             ;TYPE MSG
2491  007206  000207                        RTS     PC              ;RESUME TESTING
2492
```

```
2493                                    ;*********************************************************
2494                                    ;READ SEQUENCER:
2495                                    ;
2496                                    ;THIS ROUTINE IS USED TO DETERMINE THE SEQUENCE
2497                                    ;IN WHICH READ TAPE OPERATIONS ARE TO BE PERFORMED.
2498                                    ;THIS IS NECESSARY WHEN THE UNIT BEING TESTED IS
2499                                    ;CAPABLE OF READING DATA IN BOTH THE FORWARD AND
2500                                    ;REVERSE DIRECTIONS.  CONSOLE SWITCHES ONE (1), TWO (2),
2501                                    ;AND THREE (3) ARE USED TO DETERMINE THE READ SEQUENCE.
2502                                    ;CONSOLE SWITCH ONE (1) DETERMINES WHETHER TO READ
2503                                    ;THE BLOCK OF DATA FORWARD FIRST OR REVERSE FIRST.
2504                                    ;SWITCH TWO (2) DISALLOWS READING IN THE REVERSE
2505                                    ;DIRECTION AND SWITCH THREE (3) DISALLOWS READING IN
2506                                    ;THE FORWARD DIRECTION.
2507                                    ;*********************************************************
2508
2509  007210  005037  000562        RSEQ:   CLR     RDCMD
2510  007214  017704  171370                MOV     @SWR,R4         ;READ SWITCHES
2511  007220  042704  177763                BIC     #177763,R4      ;MASK READ BITS & SEE IF BOTH READS
2512  007224  001004                        BNE     RSR             ;IF NOT: BR
2513  007226  032777  000002  171354        BIT     #2,@SWR         ;SEE IF READ REVERSE FIRST
2514  007234  001041                        BNE     RSFR            ;IF NOT: BR
2515  007236  032777  000004  171344  RSR:  BIT     #4,@SWR         ;SEE IF SHOULD READ REVERSE
2516  007244  001005                        BNE     RSF             ;IF NOT: BR
2517  007246  012737  000001  000562        MOV     #1,RDCMD        ;LOAD READ REVERSE COMMAND
2518  007254  004737  007464                JSR     PC,READ         ;GO READ REVERSE
2519  007260  032777  000010  171322  RSF:  BIT     #10,@SWR        ;SEE IF SHOULD READ FORWARD
2520  007266  001066                        BNE     RSEX            ;IF NOT: BR
2521  007270  005737  000562                TST     RDCMD   ;SEE IF HAVE READ REVERSE
2522  007274  001406                        BEQ     RSF0            ;IF NOT: BR
2523  007276  013737  000600  000666        MOV     TSTAL,STAL
2524  007304  004737  011654                JSR     PC,STALL        ;DO READ STALL
2525  007310  000406                        BR      RSF1
2526  007312  032777  000001  171270  RSF0: BIT     #1,@SWR         ;SEE IF WRITE
2527  007320  001002                        BNE     RSF1            ;IF NOT: BR
2528  007322  004737  011402                JSR     PC,BKSP         ;GO BACKSPACE
2529  007326  005037  000562        RSF1:   CLR     RDCMD           ;LOAD READ FORWARD COMMAND
2530  007332  004737  007464                JSR     PC,READ         ;GO READ
2531  007336  000442                        BR      RSEX            ;GO TO EXIT
2532
2533  007340  012737  000001  000562  RSFR: MOV     #1,RDCMD
2534  007346  032777  000010  171234        BIT     #10,@SWR        ;SEE IF SHOULD READ FORWARD
2535  007354  001012                        BNE     RSFR1           ;IF NOT: BR
2536  007356  032777  000001  171224        BIT     #1,@SWR         ;SEE IF WRITE
2537  007364  001002                        BNE     RSFR0           ;IF NOT: BR
2538  007366  004737  011402                JSR     PC,BKSP         ;GO BACKSPACE TO START
2539  007372  005037  000562        RSFR0:  CLR     RDCMD           ;LOAD READ FORWARD COMMAND
2540  007376  004737  007464                JSR     PC,READ         ;GO READ FORWARD
2541  007402  032777  000004  171200  RSFR1: BIT     #4,@SWR         ;SEE IF SHOULD READ REVERSE
2542  007410  001015                        BNE     RSEX            ;IF NOT: BR
2543  007412  005737  000562                TST     RDCMD
2544  007416  001005                        BNE     RSFR2           ;IF READ REVERSE: BR
2545  007420  013737  000600  000666        MOV     TSTAL,STAL      ;DO READ STALL
2546  007426  004737  011654                JSR     PC,STALL
2547  007432  012737  000001  000562  RSFR2: MOV     #1,RDCMD        ;LOAD READ REVERSE
2548  007440  004737  007464                JSR     PC,READ         ;GO READ REVERSE
```

```
 2549  007444  005037  000562          RSEX:   CLR     RDCMD
 2550  007450  005737  000660                  TST     EOTREC          ;BRANCH IF EOT NOT REACHED
 2551  007454  001402                          BEQ     RSFRX
 2552  007456  000137  004154                  JMP     REOT            ;REWIND AND REPORT STATS
 2553  007462  000207                  RSFRX:  RTS     PC              ;EXIT
 2554
```

```
2555                                    ;*********************************************************
2556                                    ;READ ROUTINE:
2557                                    ;
2558                                    ;THIS ROUTINE PERFORMS THE READ OPERATION DETERMINED
2559                                    ;BY THE READ SEQUENCE ROUTINE ONE RECORD AT A TIME.
2560                                    ;AT THE END OF EACH READ OPERATION THE STATUS REGISTER
2561                                    ;IS SCANNED FOR EITHER END OF TAPE OR BEGINNING OF TAPE.
2562                                    ;IF EOT WAS REACHED, CONTROL WILL BE PASSED TO
2563                                    ;THE EOT SUBROUTINE TO REWIND THE UNIT AND FLAG IT
2564                                    ;UNAVAILABLE UNTIL ALL UNITS HAVE REACHED EOT.
2565                                    ;IF BOT WAS REACHED AN ERROR IS PRINTED AND THE
2566                                    ;PROGRAM WILL HALT.  TESTING MAY BE RESUMED BY PRESSING
2567                                    ;THE CONTINUE SWITCH.
2568                                    ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE
2569                                    ;READ ROUTINE EXPECTS THE FIRST RECORD OF A
2570                                    ;READ REVERSE TO BE A TM, AND THE LAST RECORD
2571                                    ;OF A READ FORWARD TO BE A TM.  REMEMBER
2572                                    ;THAT THE TM ADDS ONE (1) TO THE TOTAL NUMBER
2573                                    ;OF RECORDS IN A BLOCK.
2574                                    ;CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13) DETERMINE WHETHER
2575                                    ;OR NOT TO CHECK FOR STATUS ERRORS (11) OR DATA ERRORS (13).
2576                                    ;CONSOLE SWITCH FIVE (5) IS USED TO CAUSE A CONTINUOUS
2577                                    ;READ AND SPACE (FORWARD OR REVERSE) OF THE CURRENT
2578                                    ;RECORD ON TAPE (YOZZLE).
2579                                    ;*********************************************************
2580
2581  007464  013700  000554       READ:  MOV     RCNT,R0          ;LOAD REC CNTR
2582  007470  005737  000660              TST     EOTREC           ;SEE IF EOT
2583  007474  100012                      BPL     RDA              ;IF NOT: BR
2584  007476  005737  000562              TST     RDCMD            ;SEE IF READ FORWARD
2585  007502  001407                      BEQ     RDA              ;IF SO: BR
2586  007504  042737  100000  000660      BIC     #100000,EOTREC   ;CLEAR FLAG
2587  007512  013703  000660              MOV     EOTREC,R3        ;GET MODIFIED RECORD COUNT
2588  007516  160300                      SUB     R3,R0            ;SET RECORD AT
2589  007520  005200                      INC     R0               ;SET TO PROPER NUMBER OF RECORDS
2590  007522  012737  023553  000652 RDA:  MOV     #MSG6,EMADDR     ;SET ERROR MSG ADDRESS
2591  007530  005037  000676              CLR     TMFLG
2592  007534  005737  000562              TST     RDCMD
2593  007540  001406                      BEQ     RD0              ;IF READ FORWARD: BR
2594  007542  005737  000564              TST     TMEX             ;SEE IF TM
2595  007546  001403                      BEQ     RD0              ;IF NOT: BR
2596  007550  005237  000676              INC     TMFLG            ;SET TM FLAG
2597  007554  005200                      INC     R0
2598  007556  013777  000556  170732 RD0:  MOV     FMCNT,@FC        ;LOAD CHAR CNTR
2599  007564  012777  032352  170722      MOV     #RDATA,@BA       ;LOAD DATA ADDR
2600  007572  005737  000562              TST     RDCMD            ;SEE IF READ REVERSE
2601  007576  001417                      BEQ     RD1A             ;IF NOT: BR
2602  007600  013703  000556              MOV     FMCNT,R3
2603  007604  005103                      COM     R3
2604  007606  032737  000020  000552      BIT     #20,UDES         ;SEE IF CORE DUMP
2605  007614  001402                      BEQ     RD1              ;IF NOT: BR
2606  007616  000241                      CLC
2607  007620  006003                      ROR     R3               ;R3 = FC/2
2608  007622  060377  170666       RD1:  ADD     R3,@BA           ;SET REVERSE BUS ADDRESS
2609  007626  012737  000076  000672      MOV     #76,MTC1         ;SET READ REVERSE
2610  007634  000403                      BR      RD1B
```

```
2611  007636  012737  000070  000672  RD1A:   MOV     #70,MTC1        ;SET READ FORWARD
2612  007644  012737  007656  000662  RD1B:   MOV     #RD2,RTRN       ;SET INTERRUPT RETURN ADDRESS
2613  007652  000137  020372                  JMP     TAPG            ;GO EXECUTE TAPE COMMAND
2614  007656  005737  000562          RD2:    TST     RDCMD           ;IGNORE EOT IF READ REVERSE
2615  007662  001014                          BNE     RD3
2616  007664  032777  002000  170630          BIT     #2000,@DS       ;SEE IF EOT
2617  007672  001410                          BEQ     RD3             ;IF NOT: BR
2618  007674  005737  000676                  TST     TMFLG           ;SEE IF TM
2619  007700  001005                          BNE     RD3             ;IF SO: BR
2620  007702  010037  000660                  MOV     R0,EOTREC       ;GET # OF RECORDS LEFT IN BLOCK TO READ
2621  007706  052737  100000  000660          BIS     #100000,EOTREC  ;SET EOT FLAG
2622  007714  032777  000002  170600  RD3:    BIT     #2,@DS          ;SEE IF AT LOAD POINT
2623  007722  001407                          BEQ     RD4             ;IF NOT: BR
2624  007724  004737  022012                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
2625  007730  000004  023713                  TYPE,MSG22              ;TYPE MSG
2626  007734  000000                          HALT
2627  007736  000137  003144                  JMP     START@          ;RESTART
2628  007742  032777  004000  170640  RD4:    BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
2629  007750  001116                          BNE     RD5             ;IF NOT: BR
2630  007752  005737  000676                  TST     TMFLG
2631  007756  001470                          BEQ     RD4B            ;IF NO TM EXPT: BR
2632  007760  032777  000004  170534          BIT     #4,@DS
2633  007766  001023                          BNE     RD4A            ;IF TM RECVD: BR
2634  007770  012737  032352  020224          MOV     #RDATA,CADER    ;SAVE EXPT BUS ADDRESS
2635  007776  012737  000002  020232          MOV     #2,DRVER        ;SET TM STATUS ERROR FLAG
2636  010004  004737  017352                  JSR     PC,ERPT         ;GO PRINT TM ERROR
2637  010010  013704  000674                  MOV     UNP,R4
2638  010014  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
2639  010020  001403                          BEQ     1$              ;IF NOT: BR
2640  010022  005264  001144                  INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
2641  010026  000500                          BR      RD6
2642  010030  005264  001104          1$:     INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
2643  010034  000475                          BR      RD6
2644  010036  012703  032352          RD4A:   MOV     #RDATA,R3
2645  010042  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
2646  010046  001007                          BNE     RD4A0           ;IF SO: BR
2647  010050  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
2648  010056  001025                          BNE     RD4A2           ;IF SO: BR
2649  010060  062703  000002                  ADD     #2,R3
2650  010064  000422                          BR      RD4A2
2651  010066  013704  000556          RD4A0:  MOV     FMCNT,R4
2652  010072  005104                          COM     R4
2653  010074  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2654  010102  001402                          BEQ     RD4A1           ;IF NOT: BR
2655  010104  000241                          CLC
2656  010106  006004                          ROR     R4              ;SET TO FC/2
2657  010110  060403          RD4A1:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2658  010112  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2659  010116  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
2660  010124  001002                          BNE     RD4A2           ;IF SO: BR
2661  010126  162703  000002                  SUB     #2,R3
2662  010132  004737  016614          RD4A2:  JSR     PC,ER2
2663  010136  000402                          BR      RD4C
2664  010140  004737  016522          RD4B:   JSR     PC,ERCHK        ;GO CHECK ERRORS
2665  010144  005737  000706          RD4C:   TST     SERFL
2666  010150  001416                          BEQ     RD5             ;IF NO ERROR: BR
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 2667  010152  013704  000674                    MOV     UNP,R4
 2668  010156  005737  000562                    TST     RDCMD           ;SEE IF READ REVERSE
 2669  010162  001003                            BNE     RD4D            ;IF SO: BR
 2670  010164  005264  001104                    INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
 2671  010170  000402                            BR      RD4E
 2672  010172  005264  001144            RD4D:   INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
 2673  010176  004737  010374            RD4E:   JSR     PC,RDRTY        ;GO RETRY
 2674  010202  005037  000712                    CLR     RTYFL           ;CLEAR RETRY FLAG
 2675  010206  032777  020000  170374    RD5:    BIT     #20000,@SWR     ;SEE IF SHOULD DO DATA CHECK
 2676  010214  001005                            BNE     RD6             ;IF NOT; BR
 2677  010216  005737  000676                    TST     TMFLG
 2678  010222  001002                            BNE     RD6
 2679  010224  004737  014750                    JSR     PC,DCHK         ;GO CHECK DATA
 2680  010230  005037  000706            RD6:    CLR     SERFL           ;CLEAR STATUS ERROR FLAG
 2681  010234  004737  013614                    JSR     PC,DS3          ;CLEAR BUFFER
 2682  010240  032777  000040  170342            BIT     #40,@SWR        ;SEE IF SHOULD YOZZLE
 2683  010246  001402                            BEQ     RD7             ;IF NOT: BR
 2684  010250  004737  010770                    JSR     PC,YOZ          ;ELSE GO YOZZLE
 2685  010254  013737  000574  000666    RD7:    MOV     RSTAL,STAL      ;SET DELAY
 2686  010262  004737  011654                    JSR     PC,STALL        ;STALL
 2687  010266  005737  000562                    TST     RDCMD           ;SEE IF READ REVERSE
 2688  010272  001403                            BEQ     RD7A            ;IF NOT: BR
 2689  010274  005037  000676                    CLR     TMFLG           ;CLEAR TAPE MARK FLAG
 2690  010300  000405                            BR      RD10
 2691  010302  005737  000660            RD7A:   TST     EOTREC          ;SEE IF EOT FOUND
 2692  010306  100002                            BPL     RD10            ;IF NOT: BR
 2693  010310  012700  000001                    MOV     #1,R0           ;SET TO EOT
 2694  010314  005300                    RD10:   DEC     R0
 2695  010316  001402                            BEQ     RD11            ;IF DONE ALL: BR
 2696  010320  000137  007556                    JMP     RD0
 2697  010324  005737  000562            RD11:   TST     RDCMD           ;SEE IF READ REVERSE
 2698  010330  001016                            BNE     RDEX            ;IF SO: BR
 2699  010332  005737  000660                    TST     EOTREC          ;SEE IF FOUND EOT
 2700  010336  100413                            BMI     RDEX            ;IF SO: BR
 2701  010340  005737  000564                    TST     TMEX            ;SEE IF TM EXPECTED
 2702  010344  001410                            BEQ     RDEX            ;IF NOT: BR
 2703  010346  005737  000676                    TST     TMFLG           ;SEE IF TM FOUND
 2704  010352  001005                            BNE     RDEX            ;IF SO: BR
 2705  010354  005237  000676                    INC     TMFLG           ;ELSE SET FLAG
 2706  010360  005200                            INC     R0              ;SET RECORD COUNT TO ONE
 2707  010362  000137  007556                    JMP     RD0             ;GO READ TM
 2708  010366  005037  000676            RDEX:   CLR     TMFLG
 2709  010372  000207                    RDX:    RTS     PC              ;EXIT
```

```
2710                                    ;*****************************************************
2711                                    ;READ ERROR RETRY SUBROUTINE:
2712                                    ;
2713                                    ;THIS SUBROUTINE WILL RETRY ALL DATA RELATED
2714                                    ;READ ERRORS UP TO EIGHT (8) TIMES.  IF ALL
2715                                    ;FOUR RETRIES ARE BAD, IT IS CONSIDERED
2716                                    ;A HARD ERROR.  IF ANY ARE GOOD, IT IS A
2717                                    ;SOFT ERROR.  RETRIES MAY BE INHIBITED
2718                                    ;VIA SWITCH FOUR (SW4=0: INHIBIT RETRIES)
2719                                    ;*****************************************************
2720
2721  010374  032777  000020  170206  RDRTY:  BIT     #20,@SWR        ;SEE IF RETRY INHIBITED
2722  010402  001001                   BNE     RDRT0           ;IF NOT: BR
2723  010404  000207                   RTS     PC              ;ELSE RETURN
2724
2725  010406  013703  000722          RDRT0:  MOV     ERSAV,R3
2726  010412  022703  100000                   CMP     #100000,R3      ;++B BRANCH IF OTHER THAN CORRECTED READ ERROR
2727  010416  001011                   BNE     1$              ;++B
2728  010420  032777  000040  170074           BIT     #40,@DS         ;++B BRANCH IF NRZ
2729  010426  001405                   BEQ     1$              ;++B
2730  010430  005037  000706                   CLR     SERFL           ;++B CLEAR ERROR FLAG
2731  010434  000004  026304                   TYPE,MSG124             ;++B TYPE 'CORRECTED PE DATA ERROR'
2732  010440  000447                   BR      RDRT2           ;++B INC SOFT COUNTS
2733  010442  042703  102720          1$:     BIC     #102720,R3      ;MARK NON-RECOVERABLE ERROR BITS
2734  010446  001407                   BEQ     RDRT1           ;IF NOT: BR
2735  010450  004737  022012                   JSR     PC,PAPRT        ;PRINT HEADER
2736  010454  000004  025371                   TYPE,MSG79              ;TYPE MSG
2737  010460  004737  010754                   JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE ERROR
2738  010464  000207                   RTS     PC              ;RETURN
2739  010466  032777  002000  170114  RDRT1:  BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2740  010474  001002                   BNE     RDRT1B          ;IF SO: BR
2741  010476  000004  025101                   TYPE,MSG64              ;TYPE MSG
2742  010502  005037  000702          RDRT1B: CLR     RTCNT           ;CLEAR RETRY COUNTER
2743  010506  005037  000706          RDRTG:  CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2744  010512  012737  000002  000712           MOV     #2,RTYFL        ;SET READ RETRY FLAG
2745  010520  004737  010770                   JSR     PC,YOZ          ;GO TO YOZZLE TO RETRY READ
2746  010524  005737  000706                   TST     SERFL           ;SEE IF RETRY ERROR
2747  010530  001026                   BNE     RDRT5           ;IF SO: BR
2748  010532  032777  002000  170050           BIT     #2000,@SWR
2749  010540  001007                   BNE     RDRT2
2750  010542  000004  025514                   TYPE,MSG105             ;TYPE MSG
2751  010546  000004  025123                   TYPE,MSG65              ;TYPE MSG
2752  010552  013703  000702                   MOV     RTCNT,R3
2753  010556  104400                   TYPOCT                  ;PRINT RETRY NUMBER
2754  010560  013704  000674          RDRT2:  MOV     UNP,R4
2755  010564  005737  000562                   TST     RDCMD           ;SEE IF READ REVERSE
2756  010570  001003                   BNE     RDRT3           ;IF SO: BR
2757  010572  005264  002664                   INC     RFSOFT(R4)      ;ELSO BUMP FORWARD SOFT ERROR COUNTER
2758  010576  000402                   BR      RDRT4
2759  010600  005264  002704          RDRT3:  INC     RRSOFT(R4)      ;BUMP ERRORS SOFT CNTR
2760  010604  000207                   RDRT4:  RTS     PC              ;RETURN
2761  010606  013703  000722          RDRT5:  MOV     ERSAV,R3        ;GET ER
2762  010612  005037  000650                   CLR     TEMP3           ;CLEAR RECOVERABLE ERROR INDICATOR
2763  010616  042703  102720                   BIC     #102720,R3      ;MASK RECOVERABLE BITS
2764  010622  001412                   BEQ     RDRT5A          ;IF RECOVERABLE: BR
2765  010624  004737  022012                   JSR     PC,FAPRT        ;PRINT HEADER
```

```
2766  010630  000004  025371                    TYPE,MSG79              ;TYPE MSG
2767  010634  004737  010754                    JSR     PC,NRTP         ;PRINT ER
2768  010640  012737  000001  000650            MOV     #1,TEMP3        ;SET FLAG
2769  010646  000404                            BR      RDRT5B
2770  010650  032777  002000  167732  RDRT5A:   BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2771  010656  001013                            BNE     RDRT6           ;IF SO: BR
2772  010660  000004  025123          RDRT5B:   TYPE,MSG65              ;TYPE MSG
2773  010664  013703  000702                    MOV     RTCNT,R3
2774  010670  104400                            TYPOCT                  ;PRINT RETRY NUMBER
2775  010672  005737  000650                    TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
2776  010676  001403                            BEQ     RDRT6           ;IF NOT: BR
2777  010700  005037  000650                    CLR     TEMP3           ;CLEAR FLAG
2778  010704  000207                            RTS     PC              ;EXIT
2779  010706  005237  000702          RDRT6:    INC     RTCNT
2780  010712  023737  000702  000604            CMP     RTCNT,RETRY     ;SEE IF DONE 8 RETRIES
2781  010720  001272                            BNE     RDRTG           ;IF NOT: BR
2782  010722  000004  026023                    TYPE,MSG115             ;TYPE MSG
2783  010726  013704  000674                    MOV     UNP,R4
2784  010732  005737  000562                    TST     RDCMD           ;SEE IF READ REVERSE
2785  010736  001003                            BNE     RDRT7           ;IF SO: BR
2786  010740  005264  002724                    INC     RFHARD(R4)      ;BUMP FORWARD HARD ERROR CNTR
2787  010744  000402                            BR      RDRTX
2788  010746  005264  002744          RDRT7:    INC     RRHARD(R4)      ;BUMP REVERSE HARD ERROR CNTR
2789  010752  000207                  RDRTX:    RTS     PC              ;RETURN
2790
2791  010754  013703  000722          NRTP:     MOV     ERSAV,R3        ;GET ER REGISTER
2792  010760  104400                            TYPOCT                  ;PRINT ER
2793  010762  004737  020250                    JSR     PC,FRPRT        ;PRINT F OR R
2794  010766  000207                            RTS     PC              ;RETURN
2795                                            ;*******************************************************
2796                                            ;YOZZLE SUBROUTINE:
2797                                            ;
2798                                            ;THIS SUBROUTINE, ENTERED VIA SWITCH FIVE (5), IS USED TO PERFORM
2799                                            ;A CONTINUOUS READ AND SPACE OVER OF THE CURRENT RECORD ON TAPE.
2800                                            ;FULL STATUS AND DATA CHECKING MAY BE PERFORMED
2801                                            ;OR NOT VIA CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13).
2802                                            ;A SOFTWARE DELAY IS PERFORMED BETWEEN EACH READ
2803                                            ;AND SPACE OPERATION AND MAY BE VARIED BY TYPING
2804                                            ;CNTRL C ON THE TTY AND ENTERING A VALUE IN RESPONSE
2805                                            ;TO THE PRINTED REQUEST.
2806                                            ;*******************************************************
2807
2808  010770  013737  000602  000666  YOZ:     MOV     YSTAL,STAL
2809  010776  004737  011654                    JSR     PC,STALL        ;DO YOZZLE STALL
2810  011002  012777  177777  167506  YOZ0:    MOV     #-1,@FC         ;SET TO 1 RECORD SPACING
2811  011010  005737  000562                    TST     RDCMD           ;SEE IF READ REVERSE
2812  011014  001404                            BEQ     YOZA            ;IF NOT: BR
2813  011016  112737  000030  000672            MOVB    #30,MTC1        ;SET TO SPACE FORWARD
2814  011024  000403                            BR      YOZB
2815  011026  112737  000032  000672  YOZA:     MOVB    #32,MTC1        ;SET TO SPACE REVERSE
2816  011034  012737  011054  000662  YOZB:     MOV     #YOZC,RTRN      ;SET RETURN ADDRESS
2817  011042  012737  177775  000666            MOV     #177775,STAL    ;SET TIME MULTIPLIER
2818  011050  000137  020372                    JMP     TAPG            ;GO YOZZLE
2819  011054  005737  000676          YOZC:     TST     TMFLG           ;SEE IF TM
2820  011060  001404                            BEQ     1$              ;IF NOT: BR
2821  011062  012737  040000  000666            MOV     #40000,STAL     ;SET TM STALL
```

```
2822  011070  000403                          BR      2$
2823  011072  013737  000602  000666  1$:     MOV     YSTAL,STAL
2824  011100  004737  011654          2$:     JSR     PC,STALL        ;DO YOZZLE STALL
2825  011104  012777  032352  167402          MOV     #RDATA,@BA      ;SET BUS ADDRESS
2826  011112  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
2827  011116  001416                          BEQ     YOZC1           ;IF NOT: BR
2828  011120  013703  000556                  MOV     FMCNT,R3
2829  011124  005103                          COM     R3
2830  011126  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2831  011134  001401                          BEQ     YOZC0           ;IF NOT: BR
2832  011136  006203                          ASR     R3              ;R3 = FC/2
2833  011140  060377  167350          YOZC0:  ADD     R3,@BA          ;SET REVERSE BUS ADDRESS
2834  011144  012737  000076  000672          MOV     #76,MTC1        ;SET READ REVERSE
2835  011152  000403                          BR      YOZC2
2836  011154  012737  000070  000672  YOZC1:  MOV     #70,MTC1        ;SET READ FORWARD
2837  011162  013777  000556  167326  YOZC2:  MOV     FMCNT,@FC       ;SET CHARACTER COUNT
2838  011170  012737  011202  000662          MOV     #YOZD,RTRN      ;SET RETURN ADDRESS
2839  011176  000137  020372                  JMP     TAPG            ;GO READ
2840  011202  032777  004000  167400  YOZD:   BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
2841  011210  001047                          BNE     YOZE            ;IF NOT: BR
2842  011212  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
2843  011216  001442                          BEQ     YOZD1           ;IF NOT: BR
2844  011220  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
2845  011224  001425                          BEQ     YOZD0           ;IF NOT: BR
2846  011226  012703  032352                  MOV     #RDATA,R3
2847  011232  013704  000556                  MOV     FMCNT,R4
2848  011236  005104                          COM     R4
2849  011240  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2850  011246  001401                          BEQ     YOZD4           ;IF NOT: BR
2851  011250  006204                          ASR     R4              ;SET TO FC/2
2852  011252  060403                  YOZD4:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2853  011254  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2854  011260  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2855  011266  001001                          BNE     YOZD2           ;IF SO: BR
2856  011270  005743                          TST     -(R3)           ;SET EXPT BA
2857  011272  004737  016614          YOZD2:  JSR     PC,ER2          ;GO CHECK ERRORS
2858  011276  000430                          BR      YOZF
2859  011300  012703  032352          YOZD0:  MOV     #RDATA,R3
2860  011304  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2861  011312  001001                          BNE     YOZD3           ;IF SO: BR
2862  011314  005723                          TST     (R3)+           ;SET EXPT BA
2863  011316  004737  016614          YOZD3:  JSR     PC,ER2          ;GO CHECK ERRORS
2864  011322  000416                          BR      YOZF
2865  011324  004737  016522          YOZD1:  JSR     PC,ERCHK        ;ELSE GO CHECK ERRORS
2866  011330  005737  000712          YOZE:   TST     RTYFL           ;SEE IF RETRY
2867  011334  001013                          BNE     YOZG            ;IF SO: BR
2868  011336  032777  020000  167244          BIT     #20000,@SWR     ;SEE IF SHOULD CHECK DATA
2869  011344  001005                          BNE     YOZF            ;IF NOT: BR
2870  011346  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK
2871  011352  001002                          BNE     YOZF            ;IF SO: BR
2872  011354  004737  014750                  JSR     PC,DCHK         ;ELSE GO CHECK DATA
2873  011360  004737  013614          YOZF:   JSR     PC,DS3          ;GO CLEAR DATA AREA
2874  011364  032777  000040  167216  YOZG:   BIT     #40,@SWR        ;SEE IF SHOULD CONTINUE YOZZLE
2875  011372  001402                          BEQ     YOZH            ;IF NOT: BR
2876  011374  000137  011002                  JMP     YOZ0
2877  011400  000207                  YOZH:   RTS     PC              ;EXIT
```

```
2878                                    ;*********************************************************
2879                                    ;BACKSPACE SUBROUTINE:
2880                                    ;
2881                                    ;THIS SUBROUTINE IS USED TO PERFORM THE
2882                                    ;BACKSPACE OPERATION REQUIRED BY THE READ
2883                                    ;ROUTINE FOR READ FORWARD AFTER WRITING.
2884                                    ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE SPACE
2885                                    ;ROUTINE ASSUMES THAT THE TM WILL BE FIRST WHEN
2886                                    ;BACKSPACING.  THEREFORE TWO OPERATIONS ARE REQUIRED
2887                                    ;TO SPACE OVER A BLOCK.  FIRST SPACE OVER THE TM, THEN
2888                                    ;SPACE OVER THE DATA RECORDS.
2889                                    ;A CHECK FOR RECORD COUNT ZERO IS MADE AT THE
2890                                    ;END OF THE SPACE OPERATION TO ASSURE THAT PROPER
2891                                    ;TAPE POSITIONING WAS DONE.
2892                                    ;*********************************************************
2893
2894  011402  013737  000600  000666  BKSP:   MOV     TSTAL,STAL
2895  011410  004737  011654                  JSR     PC,STALL        ;DO TURN AROUND STALL
2896  011414  012737  023602  000652          MOV     #MSG10,EMADDR
2897  011422  012703  032352                  MOV     #RDATA,R3       ;SET EXPECTED BA
2898  011426  010377  167062                  MOV     R3,@BA
2899  011432  005737  000564                  TST     TMEX            ;SEE IF TM
2900  011436  001436                          BEQ     B0              ;IF NOT: BR
2901  011440  012777  177777  167050          MOV     #-1,@FC
2902  011446  012737  000032  000672          MOV     #32,MTC1
2903  011454  012737  011466  000662          MOV     #1$,RTRN
2904  011462  000137  020372                  JMP     TAPG            ;SPACE TO TM
2905  011466  032777  010000  167114  1$:     BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERROR
2906, 011474  001017                          BNE     B0              ;IF NOT: BR
2907  011476  012737  025021  000652          MOV     #MSG55,EMADDR
2908  011504  032777  000004  167010          BIT     #4,@DS          ;SEE IF TM
2909  011512  001006                          BNE     2$              ;IF SO: BR
2910  011514  012737  032352  020224          MOV     #RDATA,CADER
2911  011522  004737  017352                  JSR     PC,ERPT         ;PRINT ERROR
2912  011526  000402                          BR      B0
2913  011530  004737  016614          2$:     JSR     PC,ER2
2914  011534  013700  000554          B0:     MOV     RCNT,R0
2915  011540  005737  000660                  TST     EOTREC          ;BRANCH IF EOT NOT DETECTED
2916  011544  100007                          BPL     1$
2917  011546  042737  100000  000660          BIC     #100000,EOTREC  ;CLEAR EOT INDICATOR
2918  011554  013703  000660                  MOV     EOTREC,R3       ;GET # OF RECORDS LEFT IN BLOCK
2919  011560  160300                          SUB     R3,R0           ;FORM # OF RECORDS TO BACK SPACE
2920  011562  005200                          INC     R0
2921  011564  012737  023602  000652  1$:     MOV     #MSG10,EMADDR   ;SET ERROR MESG ADDRESS
2922  011572  012737  011630  000662          MOV     #2$,RTRN        ;SET RETURN PC
2923  011600  012777  177777  166710          MOV     #-1,@FC         ;SET TO BACKSPACE 1 RECORD
2924  011606  012703  032352                  MOV     #RDATA,R3       ;SET EXPECTED BA
2925  011612  010377  166676                  MOV     R3,@BA
2926  011616  012737  000032  000672          MOV     #32,MTC1        ;SET SPACE REVERSE
2927  011624  000137  020372                  JMP     TAPG            ;GO DO SPACE
2928  011630  004737  016614          2$:     JSR     PC,ER2
2929  011634  013737  000600  000666          MOV     TSTAL,STAL      ;DO STALL
2930  011642  004737  011654                  JSR     PC,STALL        ;STALL
2931  011646  005300                          DEC     R0              ;DECREMENT # OF RECORD TO BACKSPACE
2932  011650  001345                          BNE     1$
2933  011652  000207                          RTS     PC              ;EXIT
```

```
                                        ;*********************************************************
                                        ;STALL ROUTINE:
                                        ;
                                        ;THIS ROUTINE IS USED TO PROVIDE SOFTWARE DELAYS
                                        ;DURING READ, WRITE, TURN AROUND, AND YOZZLE.
                                        ;THE DELAY TIMES MAY BE SET BY THE OPERATOR AT
                                        ;INITIAL START FROM 200(8) OR MAY BE MODIFIED
                                        ;AT ANY TIME BY ENTERING CNTRL C ON THE TTY AND
                                        ;INSERTING NEW VALUES IN RESPONSE TO THE REQUEST.
                                        ;THE READ STALL AND THE WRITE STALL ARE DELAYS
                                        ;EXECUTED BETWEEN EACH RECORD OF THE DATA BLOCK.
                                        ;THE TURN AROUND STALL IS EXECUTED EACH TIME
                                        ;THE DIRECTION OF TAPE MOVEMENT IS CHANGED AND
                                        ;ALSO EACH TIME THE TAPE OPERATION CHANGES FROM
                                        ;WRITE TO READ OR READ TO WRITE. THE YOZZLE
                                        ;STALL IS EXECUTED ONLY DURING THE YOZZLE ROUTINE.
                                        ;*********************************************************

011654  005337  000666        STALL:  DEC     STAL
011660  001375                        BNE     STALL           ;DELAY
011662  000207                        RTS     PC              ;EXIT
```

```
2955
2956                                    ;*****************************************************
2957                                    ;RANDOM CHARACTER COUNT GENERATOR:
2958                                    ;
2959                                    ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH
2960                                    ;SEVEN (7) IS USED TO GENERATE A RANDOM
2961                                    ;CHARACTER COUNT FOR EACH DATA BLOCK.
2962                                    ;ALL RECORDS WITHIN A GIVEN BLOCK WILL BE
2963                                    ;THE SAME, BUT EACH BLOCK WILL VARY.
2964                                    ;THE LIMITS ARE TWENTY (20) TO FOUR THOUSAND
2965                                    ;(4000) OCTAL CHARACTERS PER RECORD.
2966                                    ;*****************************************************
2967
2968  011664  012701  177760          CCNTR: MOV     #-20,R1          ;SET HIGH LIMIT
2969  011670  012702  175000                 MOV     #-3000,R2        ;SET LOW LIMIT
2970  011674  004737  022314                 JSR     PC,RANG          ;GO GENERATE NUMBER
2971  011700  042737  000001  000630         BIC     #1,RANSAV
2972  011706  013737  000630  000556         MOV     RANSAV,FMCNT     ;SET CHAR COUNT
2973  011714  012737  177777  013652         MOV     #-1,PATS         ;PRESET DATA PATTERN
2974  011722  000207                         RTS     PC               ;EXIT
2975
2976                                    ;*****************************************************
2977                                    ;RANDOM RECORD COUNT GENERATOR:
2978                                    ;
2979                                    ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH SIX (6)
2980                                    ;IS USED TO GENERATE A RANDOM NUMBER OF RECORDS
2981                                    ;FOR EACH BLOCK OF DATA.
2982                                    ;THE LIMITS ARE ONE (1) TO FIVE HUNDRED (500) OCTAL
2983                                    ;RECORDS PER BLOCK.
2984                                    ;*****************************************************
2985
2986  011724  012702  000001          RCNTR: MOV     #1,R2            ;SET LOW LIMIT
2987  011730  012701  000500                 MOV     #500,R1          ;SET HIGH LIMIT
2988  011734  004737  022314                 JSR     PC,RANG          ;GO GENERATE NUMBER
2989  011740  013737  000630  000554         MOV     RANSAV,RCNT      ;SET RECORD COUNT
2990  011746  000207                         RTS     PC               ;EXIT
2991
2992
```

```
                                ;*********************************************************
                                ;TEST CONDITION ENTRY ROUTINE:
                                ;
                                ;THIS ROUTINE IS USED TO ALLOW THE OPERATOR
                                ;TO ENTER, AT THE TTY, THE NECESSARY PARAMETERS
                                ;TO RUN THE PROGRAM AS HE WISHES.  THE
                                ;ROUTINE IS ONLY ENTERED UPON INITIAL STARTING
                                ;FROM LOCATION 200(8).
                                ;THE MAIN PURPOSE OF THIS ROUTINE IS TO ESTABLISH
                                ;A TABLE OF DEVICES TO BE TESTED.  THIS TABLE
                                ;CONSISTS OF AN ENTRY FOR EACH OF ONE (1) TO
                                ;EIGHT (8) DEVICES.  EACH ENTRY CONTAINS THE
                                ;SLAVE NUMBER, DENSITY, PARITY, AND
                                ;FORMAT.  THE INFORMATION IS ENTERED
                                ;IN RESPONSE TO PRINTED REQUESTS AT THE TTY.
                                ;SLAVES MAY BE ENTERED IN ANY ORDER.  EACH
                                ;PARAMETER IS CHECKED FOR LEGALITY BEFORE BEING
                                ;SET INTO THE TABLE.
                                ;THE DRIVE NUMBER REQUEST WILL ALSO CHECK THE MASSBUS
                                ;FOR THE PRESENCE OF THE REQUESTED DRIVE.  IF IT IS NOT FOUND,
                                ;A NON-EXIST DRIVE MESSAGE WILL BE PRINTED AND ANOTHER DRIVE
                                ;REQUEST MADE.  WHEN THE DRIVE IS FOUND, THE RESPONSE IS STORED
                                ;AND CONTROL PASSED TO THE SLAVE SELECT ROUTINE.
                                ;THE SLAVE SELECT ROUTINE ALSO CHECKS FOR THE PRESENCE OF THE
                                ;SLAVE.  IF IT IS NOT PRESENT, A MESSAGE IS PRINTED AND ANOTHER
                                ;REQUEST IS ISSUED.  WHEN THE SELECTED SLAVE IS FOUND TO BE
                                ;PRESENT, A MESSAGE IS PRINTED IF IT IS A 7 CHANNEL DRIVE
                                ;TO ASSIST IN SELECTING DENSITY, PARITY, AND FORMAT.
                                ;UPON COMPLETION OF THE DEVICE TABLE, REQUESTS
                                ;ARE PRINTED FOR ENTRY OF THE NUMBER OF CHARACTERS
                                ;PER RECORD AND THE NUMBER OF RECORDS PER BLOCK.  THE
                                ;NEXT REQUEST IS FOR A PATTERN NUMBER TO BE USED
                                ;FOR WRITING AND CHECKING OF READ DATA.
                                ;FOLLOWING THE PATTERN REQUEST IS THE TAPE MARK OPTION.
                                ;RESPONDING TO THE REQUEST (TM=) WITH A ONE (1)
                                ;WILL CAUSE THE PROGRAM TO WRITE A TM AT THE
                                ;END OF EACH DATA BLOCK AND TO EXPECT THE
                                ;TM TO BE DETECTED IN EITHER READ FORWARD AND REVERSE
                                ;OR DURING SPACE OPERATION.  A RESPONSE OF ZERO (TM=0)
                                ;DISALLOWS WRITTING OF THE TM AND CAUSES THE READ
                                ;AND SPACE ROUTINES TO EXPECT NO TM TO BE PRESENT.
                                ;THE LAST REQUESTS ARE FOR ENTRY OF THE DESIRED
                                ;WRITE, READ, AND TURN AROUND STALLS.
                                ;*********************************************************

011750  005737  000636        TINP:   TST     TINF            ;SEE IF SHOULD INPUT FROM TTY
011754  001002                        BNE     1$              ;IF SO: BR
011756  000137  013270                JMP     TINP4           ;GET SWITCHES
011762  005037  000674        1$:     CLR     UNP             ;CLEAR TABLE POINTER
011766  005037  004730                CLR     REOTC           ;CLEAR EOT UNIT COUNTER
011772  012737  024231  012016        MOV     #MSG31,41$      ;GET TITLE MSG
012000  005737  000734                TST     ASEQF           ;SEE IF AUTO SEQ
012004  001403                        BEQ     4$              ;IF NOT: BR
012006  012737  024157  012016        MOV     #MSG30,41$      ;SET AUTO SEQ HDR
012014  000004                4$:     TYPE                    ;TYPE MSG
```

```
 3049  012016  000000                  41$:    .WORD   0               ;ADDRESS OF APPROPRIATE TITLE MSG
 3050  012020  105077  177772                  CLRB    @41$            ;DO NOT TYPE TITLE ON RESTART
 3051  012024  000004  024313                  TYPE,MSG31A             ;TYPE INSTRUCTIONS
 3052  012030  105037  024313                  CLRB    MSG31A          ;DO NOT TYPE STARTUP INSTRUCTIONS ON RESTART
 3053  012034  005737  013444                  TST     SCVFL           ;SEE IF SHORT CONVERSATION
 3054  012040  001065                          BNE     6$              ;IF SO: BR
 3055  012042  000004  025245                  TYPE,MSG74              ;REQUEST REGISTER START
 3056  012046  013703  000544                  MOV     REGS,R3
 3057  012052  104400                          TYPOCT                  ;PRINT CURRENT REG START
 3058  012054  012705  000544                  MOV     #REGS,R5        ;SAVE ADDRESS LOCATION
 3059  012060  012701  000007                  MOV     #7,R1           ;SET SIZE OF ENTRY
 3060  012064  012702  176400                  MOV     #176400,R2      ;SET UPPER LIMIT
 3061  012070  012703  172300                  MOV     #172300,R3      ;SET LOWER LIMIT
 3062  012074  004737  022476                  JSR     PC,TTR          ;GO GET RESPONSE
 3063
 3064  012100  000004  025270                  TYPE,MSG75              ;REQUEST INTERRUPT VECTOR ADDRESS
 3065  012104  013703  000546                  MOV     VECT,R3
 3066  012110  104400                          TYPOCT                  ;PRINT CURRENT VECTOR
 3067  012112  012705  000546                  MOV     #VECT,R5        ;SET SAVE LOCATION
 3068  012116  012701  000004                  MOV     #4,R1           ;SET SIZE OF ENTRY
 3069  012122  012702  000224                  MOV     #224,R2         ;SET UPPER LIMIT
 3070  012126  012703  000150                  MOV     #150,R3         ;SET LOWER LIMIT
 3071  012132  004737  022476                  JSR     PC,TTR          ;GO GET RESPONSE
 3072  012136  013700  000546                  MOV     VECT,R0         ;GET VECTOR ADDRESS
 3073  012142  012720  021160                  MOV     #MTINT,(R0)+    ;LOAD VECTOR WITH HANDLER ADDRESS
 3074  012146  012710  000340                  MOV     #340,(R0)       ;LOAD PRIORITY LEVEL
 3075  012152  013700  000544                  MOV     REGS,R0         ;GET STARTING REGISTER ADDRESS
 3076  012156  012701  000016                  MOV     #16,R1          ;SET NUMBER OF REGISTERS
 3077  012162  012702  000510                  MOV     #C1,R2          ;GET FIRST ADDRESS LOCATION
 3078  012166  010022                  5$:     MOV     R0,(R2)+        ;BUILD TABLE OF ADDRESSES
 3079  012170  062700  000002                  ADD     #2,R0           ;BUMP ADDRESS
 3080  012174  005301                          DEC     R1              ;SEE IF DONE
 3081  012176  001373                          BNE     5$              ;IF NOT: BR
 3082  012200  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
 3083  012204  001403                          BEQ     6$              ;IF NOT: BR
 3084  012206  005726                          TST     (SP)+           ;RESET STACK POINTER
 3085  012210  000137  021176                  JMP     ASEQ            ;GO TO AUTO SEQUENCE
 3086
 3087  012214  012777  000040  166276  6$:     MOV     #40,@CS         ;INITIALIZE
 3088  012222  000004  024756                  TYPE,MSG52A             ;REQUEST DRIVE (TM03) #
 3089  012226  012705  000550                  MOV     #DVN,R5         ;GET ADDRESS
 3090  012232  012701  000002                  MOV     #2,R1           ;SET SIZE OF RESPONSE
 3091  012236  012702  000007                  MOV     #7,R2           ;SET UPPER LIMIT
 3092  012242  012703  000000                  MOV     #0,R3           ;SET LOWER LIMIT
 3093  012246  004737  022476                  JSR     PC,TTR          ;GO GET DRIVE NUMBER
 3094  012252  013777  000550  166240          MOV     DVN,@CS
 3095  012260  005777  166224                  TST     @C1             ;ACCESS DRIVE
 3096  012264  032777  010000  166226          BIT     #10000,@CS      ;SEE IF NED
 3097  012272  001403                          BEQ     TINP0           ;IF NOT: BR
 3098  012274  000004  025202                  TYPE,MSG71              ;TYPE 'NON-EXISTANT DRIVE'
 3099  012300  000745                          BR      6$              ;RETRY DVN
 3100
 3101  012302  012705  000646          TINP0:  MOV     #TEMP2,R5       ;SET ADDRESS FOR RESPONSE
 3102  012306  000004  024400                  TYPE,MSG32              ;REQUEST SLAVE (TE16,TU77) #
 3103  012312  005037  000646                  CLR     TEMP2           ;CLEAR BUFFER
 3104  012316  012701  000002                  MOV     #2,R1           ;SET NUMBER OF CHARACTERS TO INPUT
```

```
3105  012322  012702  000007                  MOV     #7,R2           ;SET MAXIMUM LIMIT
3106  012326  012703  000000                  MOV     #0,R3           ;SET MINIMUM LIMIT
3107  012332  004737  022476                  JSR     PC,TTR          ;GO GET UNIT NUMBER
3108  012336  005737  000644                  TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3109  012342  001010                          BNE     TINP0B          ;IF SO: BR
3110  012344  013700  000674                  MOV     UNP,R0
3111  012350  001754                          BEQ     TINP0           ;BRANCH IF FIRST ENTRY
3112  012352  012760  177777  000742          MOV     #-1,UN1(R0)     ;SET END UNIT TABLE
3113  012360  000137  012700                  JMP     TINP2C          ;GO GET RECORD COUNT
3114  012364  013700  000674          TINP0B: MOV     UNP,R0
3115  012370  011560  000742                  MOV     (R5),UN1(R0)    ;SET NEW SLAVE #
3116  012374  012777  000040  166116          MOV     #40,@CS         ;DO A MASS BUS CLEAR
3117  012402  013777  000550  166110          MOV     DVN,@CS         ;LOAD DRIVE #
3118  012410  016077  000742  166124          MOV     UN1(R0),@TC     ;LOAD SLAVE NUMBER
3119  012416  032777  002000  166112          BIT     #2000,@DT       ;SEE  IF SLAVE PRESENT
3120  012424  001003                          BNE     TINP0D          ;IF SO: BR
3121  012426  000004  025034                  TYPE,MSG57              ;TYPE NON-EXISTANT SLAVE'
3122  012432  000723                          BR      TINP0           ;REDO
3123  012434  017703  166076          TINP0D: MOV     @DT,R3          ;GET CONTENTS OF DT REG
3124  012440  042703  000007                  BIC     #7,R3           ;CLEAR DRIVE TYPE #
3125  012444  022703  142050                  CMP     #142050,R3      ;SEE IF 9TRK TM03
3126  012450  001407                          BEQ     TINP0E          ;IF SO: BR
3127  012452  000004  024727                  TYPE,MSG50              ;TYPE 'ILLEGAL DRIVE TYPE'
3128  012456  017703  166054                  MOV     @DT,R3
3129  012462  042703  000007                  BIC     #7,R3           ;CLEAR SLAVE #
3130  012466  104400                          TYPOCT                  ;PRINT DRIVE TYPE REGISTER
3131  012470  004737  023362          TINP0E: JSR     PC,SNPT         ;PRINT SERIAL NUMBER
3132
3133  012474  000004  024413          TINP1:  TYPE,MSG33              ;REQUEST DENSITY
3134  012500  005037  000646                  CLR     TEMP2           ;CLEAR BUFFER
3135  012504  012701  000002                  MOV     #2,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3136  012510  012702  000004                  MOV     #4,R2           ;SET MAXIMUM LIMIT
3137  012514  012703  000003                  MOV     #3,R3           ;SET MINIMUM LIMIT
3138  012520  004737  022476                  JSR     PC,TTR          ;GO GET DENSITY
3139  012524  012703  000010                  MOV     #10,R3          ;SET POSITION FACTOR
3140  012530  004737  013446                  JSR     PC,TPOS         ;GO LOAD DENSITY INTO PROPER POSITION
3141
3142  012534  000315          TINP2:  SWAB    (R5)                    ;IF DENSITY
3143  012536  022715  000004                  CMP     #4,(R5)         ;IS 1600BPI
3144  012542  001415                          BEQ     1$              ;THEN SKIP PARITY REQUEST
3145  012544  000004  024426                  TYPE,MSG34              ;REQUEST PARITY
3146  012550  005037  000646                  CLR     TEMP2           ;CLR BFR
3147  012554  012701  000002                  MOV     #2,R1           ;SET NUMBER OF CHAR. TO INPUT
3148  012560  012702  000001                  MOV     #1,R2           ;SET HIGH LIMIT
3149  012564  012703  000000                  MOV     #0,R3           ;SET LOW LIMIT
3150  012570  004737  022476                  JSR     PC,TTR          ;GO INPUT PARITY
3151  012574  000402                          BR      2$              ;SKIP 1600 BPI PAROTY SETTING
3152  012576  012715  000000          1$:     MOV     #0,(R5)         ;SET ODD PARITY FOR 1600 BPI
3153  012602  012703  000003          2$:     MOV     #3,R3           ;SET POSITION FACTOR
3154  012606  004737  013446                  JSR     PC,TPOS         ;GO POSITION PARITY
3155
3156  012612  000004  025000          TINP2A: TYPE,MSG53              ;REQUEST FORMAT
3157  012616  005037  000646                  CLR     TEMP2
3158  012622  012701  000003                  MOV     #3,R1
3159  012626  012702  000017                  MOV     #17,R2
3160  012632  012703  000000                  MOV     #0,R3
```

```
 3161  012636  004737  022476                 JSR     PC,TTR          ;GO GET FORMAT
 3162  012642  012703  000004                 MOV     #4,R3
 3163  012646  004737  013446                 JSR     PC,TPOS
 3164  012652  005237  004730       TINP2B:   INC     REOTC           ;BUMP EOT UNIT COUNTER
 3165  012656  022737  000016  000674         CMP     #16,UNP         ;SEE IF DONE UNITS
 3166  012664  001405                         BEQ     TINP2C          ;IF SO: BR
 3167  012666  062737  000002  000674         ADD     #2,UNP          ;POINT TO NEXT UNIT
 3168  012674  000137  012302                 JMP     TINP0           ;ELSE LOOK FOR NEXT UNIT
 3169
 3170
 3171  012700  005037  000674       TINP2C:   CLR     UNP             ;CLEAR UNIT POINTER
 3172  012704  113737  004730  004731         MOVB    REOTC,REOTC+1   ;SET # OF UNITS TO TEST
 3173
 3174  012712  000004  024440       TINP3:    TYPE,MSG35              ;REQUEST RECORDS PER BLOCK
 3175  012716  013703  000554                 MOV     RCNT,R3
 3176  012722  104400                         TYPOCT                  ;PRINT RECORD COUNT
 3177  012724  012705  000554                 MOV     #RCNT,R5        ;SET RECORD COUNT ADDRESS
 3178  012730  012701  000007                 MOV     #7,R1           ;SET NUMBER OF CHARACTERS TO INPUT
 3179  012734  012702  177777                 MOV     #177777,R2      ;SET MAXIMUM LIMIT
 3180  012740  012703  000001                 MOV     #1,R3           ;SET MINIMUM LIMIT
 3181  012744  004737  022476                 JSR     PC,TTR          ;GO GET RECORD COUNT
 3182  012750  013737  000554  000632         MOV     RCNT,RCSAV      ;SAVE RECORD COUNT
 3183
 3184  012756  000004  024460                 TYPE,MSG36              ;REQUEST CHARACTERS PER RECORD
 3185  012762  005437  000556                 NEG     FMCNT
 3186  012766  013703  000556                 MOV     FMCNT,R3
 3187  012772  104400                         TYPOCT                  ;PRINT CHAR COUNT
 3188  012774  012705  000556                 MOV     #FMCNT,R5       ;SET CHARACTER COUNT ADDRESS
 3189  013000  012701  000007                 MOV     #7,R1           ;SET NUMBER OF CHARACTERS TO INPUT
 3190  013004  012702  004000                 MOV     #4000,R2        ;SET MAXIMUM LIMIT
 3191  013010  012703  000004                 MOV     #4,R3           ;SET MINIMUM LIMIT
 3192  013014  004737  022476                 JSR     PC,TTR          ;GO GET CHARACTER COUNT
 3193  013020  005437  000556                 NEG     FMCNT           ;SET TO TWO'S COMPLIMENT
 3194  013024  013737  000556  000634         MOV     FMCNT,FCSAV     ;SAVE FRAME COUNT
 3195
 3196  013032  000004  024476                 TYPE,MSG37              ;REQUEST PATTERN #
 3197  013036  013703  000560                 MOV     PATRN,R3
 3198  013042  104400                         TYPOCT                  ;PRINT PATTERN
 3199  013044  005037  014014                 CLR     DOFL            ;CLEAR EXTERNAL DATA FLAG
 3200  013050  012705  000560                 MOV     #PATRN,R5       ;SET PATTERN NUMBER ADDRESS
 3201  013054  012701  000003                 MOV     #3,R1           ;SET NUMBER OF CHARACTERS TO INPUT
 3202  013060  012702  000015                 MOV     #15,R2          ;SET MAXIMUM LIMIT
 3203  013064  012703  000000                 MOV     #0,R3           ;SET MINIMUM LIMIT
 3204  013070  004737  022476                 JSR     PC,TTR          ;GO GET PATTERN NUMBER
 3205
 3206  013074  000004  025166                 TYPE,MSG69              ;REQUEST TAPE MARK
 3207  013100  013703  000564                 MOV     TMEX,R3
 3208  013104  104400                         TYPOCT                  ;PRINT CURRENT TM FLAG SETTING
 3209  013106  012705  000564                 MOV     #TMEX,R5        ;GET TM FLAG ADDRESS
 3210  013112  012701  000002                 MOV     #2,R1           ;SET SIZE OF RESPONSE
 3211  013116  012702  000001                 MOV     #1,R2           ;SET UPPER LIMIT
 3212  013122  012703  000000                 MOV     #0,R3           ;SET LOWER LIMIT
 3213  013126  004737  022476                 JSR     PC,TTR          ;TM 1=YES
 3214
 3215  013132  000004  023670                 TYPE,MSG21              ;REQUEST INTERCHANGE READ
 3216  013136  013703  000570                 MOV     INTRF,R3
```

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3217  013142  104400                    TYPOCT                  ;PRINT CURRENT SETTING
3218  013144  012705  000570            MOV     #INTRF,R5       ;GET FLAG ADDRESS
3219  013150  012701  000002            MOV     #2,R1           ;SET SIZE OF RESPONSE
3220  013154  012702  000001            MOV     #1,R2           ;SET UPPER LIMIT
3221  013160  012703  000000            MOV     #0,R3           ;SET LOWER LIMIT
3222  013164  004737  022476            JSR     PC,TTR          ;GO GET RESPONSE
3223
3224  013170  000004  024513            TYPE,MSG38              ;REQUEST SINGLE PASS
3225  013174  013703  000572            MOV     SPFLG,R3
3226  013200  104400                    TYPOCT                  ;PRINT CURRENT SETTING
3227  013202  012705  000572            MOV     #SPFLG,R5       ;SET ADDRESS OF FLAG
3228  013206  012701  000002            MOV     #2,R1           ;SET SIZE OF RESPONSE
3229  013212  012702  000001            MOV     #1,R2           ;SET UPPER LIMIT
3230  013216  012703  000000            MOV     #0,R3           ;SET LOWER LIMIT
3231  013222  004737  022476            JSR     PC,TTR          ;GO GET RESPONSE
3232
3233  013226  000004  024531    TINP3A: TYPE,MSG39              ;REQUEST CRC CORRECTION
3234  013232  013703  000566            MOV     CRCC,R3
3235  013236  104400                    TYPOCT
3236  013240  012705  000566            MOV     #CRCC,R5
3237  013244  012701  000002            MOV     #2,R1
3238  013250  012702  000001            MOV     #1,R2
3239  013254  012703  000000            MOV     #0,R3
3240  013260  004737  022476            JSR     PC,TTR
3241  013264  004737  022346            JSR     PC,GTSWR        ;GET SWITCHES
3242  013270  005737  013444    TINP4:  TST     SCVFL           ;BRANCH IF SHORT CONVERSATION
3243  013274  001060                    BNE     TINPX
3244  013276  005737  000636    1$:     TST     TINF            ;BRANCH IF NO TTY INPUT
3245  013302  001455                    BEQ     TINPX
3246  013304  000004  024567            TYPE,MSG40              ;REQUEST READ STALL
3247  013310  013703  000574            MOV     RSTAL,R3
3248  013314  104400                    TYPOCT                  ,PRINT READ STALL
3249  013316  012705  000574            MOV     #RSTAL,R5       ;SET READ STALL ADDRESS
3250  013322  012701  000007            MOV     #7,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3251  013326  012702  177777            MOV     #-1,R2          ;SET MAXIMUM LIMIT
3252  013332  012703  000001            MOV     #1,R3           ;SET MINIMUM LIMIT
3253  013336  004737  022476            JSR     PC,TTR          ;GO GET READ STALL
3254
3255  013342  000004  024616            TYPE,MSG41              ;REQUEST WRITE STALL
3256  013346  013703  000576            MOV     WSTAL,R3
3257  013352  104400                    TYPOCT                  ;PRINT READ STALL
3258  013354  012705  000576            MOV     #WSTAL,R5       ;SET WRITE STALL ADDRESS
3259  013360  012701  000007            MOV     #7,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3260  013364  012702  177777            MOV     #-1,R2          ;SET MAXIMUM LIMIT
3261  013370  012703  000001            MOV     #1,R3           ;SET MINIMUM LIMIT
3262  013374  004737  022476            JSR     PC,TTR          ;GO GET WRITE STALL
3263
3264  013400  000004  024627            TYPE,MSG42              ;REQUEST TURN AROUND STALL
3265  013404  013703  000600            MOV     TSTAL,R3
3266  013410  104400                    TYPOCT                  ;PRINT TA STALL
3267  013412  012705  000600            MOV     #TSTAL,R5       ;SET TURN AROUND STALL ADDRESS
3268  013416  012701  000007            MOV     #7,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3269  013422  012702  177777            MOV     #-1,R2          ;SET MAXIMUM LIMIT
3270  013426  012703  000001            MOV     #1,R3           ;SET MINIMUM LIMIT
3271  013432  004737  022476            JSR     PC,TTR          ;GO GET TURN AROUND STALL
3272  013436  005037  013444    TINPX:  CLR     SCVFL           ;CLEAR SHORT CONVERSATION FLAG
```

```
3273  013442  000207                          RTS     PC              ;EXIT
3274  013444  000000                  SCVFL:  0                       ;SHORT CONVERSATION FLAG
3275
3276                                          ;UNIT DESCRIPTION POSITIONING SUBROUTINE**********
3277
3278  013446  006337  000646          TPOS:   ASL     TEMP2           ;POSITION CHARACTER
3279  013452  005303                          DEC     R3              ;SEE IF DONE
3280  013454  001374                          BNE     TPOS            ;IF NOT: BR
3281  013456  013700  000674                  MOV     UNP,R0          ;LOAD UNIT POINTER
3282  013462  053760  000646  000742          BIS     TEMP2,UN1(R0)   ;LOAD CHARACTER INTO UN1(R0)
3283  013470  000207                          RTS     PC              ;EXIT
3284
```

```
3285
3286                                    ;*******************************************************
3287                                    ;DATA SETUP ROUTINE:
3288                                    ;
3289                                    ;THIS ROUTINE IS USED TO GENERATE INTO THE ENTIRE
3290                                    ;WRITE BUFFER (4000 OCTAL CHARACTERS) THE DATA PATTERN
3291                                    ;SELECTED BY THE OPERATOR.  THERE ARE 15 (8) FIXED
3292                                    ;DATA PATTERNS AVAILABLE AND ONE SELECTION (DATA PATTERN 0)
3293                                    ;WHICH WILL READ ANY PATTERN PRESENTED AT THE
3294                                    ;HIGH SPEED PAPER TAPE READER.  THIS TAPE MUST BE PREPARED
3295                                    ;BY USING THE PROGRAM CALLED DTC. (MAINDEC-11-DZTUF-A-D)
3296                                    ;RANDOM DATA MAY ALSO BE USED VIA CONSOLE
3297                                    ;SWITCH EIGHT (8).
3298                                    ;THIS ROUTINE IS ALSO USED TO CLEAR OUT THE
3299                                    ;READ BUFFER (4000 OCTAL CHARACTERS) BEFORE EACH
3300                                    ;RECORD IS READ.
3301                                    ;*******************************************************
3302
3303  013472  005737  014404        DSUP:   TST     RDFL            ;SEE IF DID RANDOM DATA
3304  013476  001044                        BNE     DS2A            ;IF NOT: BR
3305  013500  005737  000734        DS0:    TST     ASEQF           ;SEE IF AUTO SEQ
3306  013504  001406                        BEQ     DS0C            ;IF NOT: BR
3307  013506  005737  000560                TST     PATRN           ;SEE IF AUTO RANDOM
3308  013512  100003                        BPL     DS0C            ;IF NOT: BR
3309  013514  004737  014342                JSR     PC,DATR         ;ELSE GO GENERATE RANDOM DATA
3310                           ;            RTS     PC              ;++B DELETED
3311  013520  000433                        BR      DS2A            ;++B GENERATE EXPECTED LRC/CRC & CLEAR READ BFR
3312  013522  023737  000560  013652  DS0C:   CMP     PATRN,PATS      ;SEE IF NEW PATTERN
3313  013530  001014                        BNE     DS0A            ;IF SO: BR
3314  013532  013703  000552                MOV     UDES,R3         ;GET UNIT DESCRIPTION
3315  013536  042703  177767                BIC     #177767,R3      ;MASK EVEN PARITY
3316  013542  023703  013654                CMP     PARS,R3         ;SEE IF SAME AS LAST TIME
3317  013546  001404                        BEQ     DS0B            ;IF SO: BR
3318  013550  010337  013654                MOV     R3,PARS         ;SAVE PARITY
3319  013554  004737  014406                JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
3320  013560  000207                DS0B:   RTS     PC
3321  013562  012703  026344        DS0A:   MOV     #WDATA,R3       ;R3 = ADDRS OF WRITE BUFFER
3322  013566  013701  000560                MOV     PATRN,R1        ;R1 = PATTERN SELECTOR
3323  013572  010137  013652                MOV     R1,PATS
3324  013576  062701  000001                ADD     #1,R1           ;BUMP POINTER
3325  013602  006301                        ASL     R1              ;MAKE PATTERN SELECTOR EVEN
3326  013604  004771  002764                JSR     PC,@DATBL(R1)   ;GO GENERATE PATTERN
3327  013610  004737  014406        DS2A:   JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
3328  013614  013702  000556        DS3:    MOV     FMCNT,R2        ;R2=BUFFER SIZE
3329  013620  006202                        ASR     R2              ;R2=FRAME CNT/2
3330  013622  012701  032352                MOV     #RDATA,R1       ;R1=READ DATA START
3331  013626  005021                DS4:    CLR     (R1)+           ;CLEAR BUFFER
3332  013630  005202                        INC     R2              ;SEE IF DONE ALL
3333  013632  001375                        BNE     DS4             ;IF NOT: BR
3334  013634  013737  000552  013654        MOV     UDES,PARS       ;GET UNIT DESCRIPTION
3335  013642  042737  177767  013654        BIC     #177767,PARS    ;MASK PARITY
3336  013650  000207                        RTS     PC              ;EXIT
3337  013652  177777                PATS:   -1                      ;PATTERN NUMBER SAVE
3338  013654  000000                PARS:   0
3339
3340
```

```
3341
3342                                        ;EXTERNAL DATA INPUT FROM H/S READER (256 CHARACTER MAXIMUM)
3343
3344  013656  005737  014014          DATO:   TST     DOFL            ;BRANCH IF SHOULD DO EXTERNAL INPUT
3345  013662  001401                          BEQ     1$
3346  013664  000207                          RTS     PC              ;++B RETURN
3347  013666  012737  000001  014014  1$:     MOV     #1,DOFL         ;SET EXTERNAL FLAG
3348  013674  005077  164722                  CLR     @PRS            ;CLEAR READER STATUS
3349  013700  005037  000644                  CLR     TEMP1           ;CLEAR FOR USE AS CHARACTER FLAG
3350  013704  052777  000001  164710  DATOA:  BIS     #1,@PRS         ;START READER
3351  013712  105777  164704          DATOB:  TSTB    @PRS            ;SEE IF DONE
3352  013716  100375                          BPL     DATOB           ;IF NOT : BR
3353  013720  005001                          CLR     R1              ;CLEAR SAVE LOCATION
3354  013722  117701  164676                  MOVB    @PRB,R1         ;SAVE CHARACTER
3355  013726  005737  000644                  TST     TEMP1           ;SEE IF HAVE FOUND START CHARACTER
3356  013732  001011                          BNE     DATOC           ;IF SO : BR
3357  013734  105701                          TSTB    R1              ;SEE IF CHARACTER IS 0
3358  013736  001762                          BEQ     DATOA           ;IF SO : BR
3359  013740  012737  000001  000644          MOV     #1,TEMP1        ;ELSE SET CHARACTER FOUND FLAG
3360  013746  010137  000646                  MOV     R1,TEMP2        ;SAVE DATA SIZE
3361  013752  010102                          MOV     R1,R2           ;SAVE DATA SIZE
3362  013754  000753                          BR      DATOA           ;GO GET FIRST DATA CHAR
3363  013756  110123          DATOC:  MOVB    R1,(R3)+        ;LOAD BUFFER
3364  013760  005302                          DEC     R2              ;SEE IF READ ALL
3365  013762  001350                          BNE     DATOA           ;IF NOT : BR
3366  013764  012701  026344          DATOD:  MOV     #WDATA,R1       ;R1 = START OF WRITE BUFFER
3367  013770  013702  000646                  MOV     TEMP2,R2        ;R2 = SIZE OF DATA FIELD
3368  013774  112123          DATOE:  MOVB    (R1)+,(R3)+     ;REPEAT LOAD OF DATA FIELD
3369  013776  022703  032352                  CMP     #RDATA,R3       ;SEE IF DONE
3370  014002  003001                          BGT     DATOF           ;IF NOT: BR
3371  014004  000207                          RTS     PC              ;++B RETURN
3372  014006  005302          DATOF:  DEC     R2              ;SEE IF AT END OF DATA FIELD
3373  014010  001371                          BNE     DATOE           ;IF NOT : BR
3374  014012  000764                          BR      DATOD           ;ELSE RESTART FILL
3375  014014  000000          DOFL:   0                               ;EXTERNAL DATA FLAG=1 IF ALREADY DONE
3376
```

```
3377                                        ;ALL ONES**********
3378
3379  014016  012701  177777      DAT1:     MOV     #-1,R1          ;R1=DATA
3380  014022  012702  002002      DAT1A:    MOV     #2002,R2        ;R2=WORD COUNT +2
3381  014026  010123              1$:       MOV     R1,(R3)+        ;LOAD BUFFER
3382  014030  005302                        DEC     R2              ;SEE IF DONE
3383  014032  001375                        BNE     1$              ;IF NOT: BR
3384  014034  000207                        RTS     PC
3385
3386                                        ;ALL ZEROS**********
3387
3388  014036  005001              DAT2:     CLR     R1              ;R1=DATA
3389  014040  000770                        BR      DAT1A           ;LOAD BUFFER
3390
3391                                        ;WALKING ONE**********
3392
3393  014042  012701  000001      DAT3:     MOV     #1,R1           ;R1=DATA
3394  014046  000241                        CLC
3395  014050  012702  004004      DAT3A:    MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3396  014054  110123              1$:       MOVB    R1,(R3)+        ;LOAD BUFFER
3397  014056  106101                        ROLB    R1              ;SET NEXT CHARACTER
3398  014060  005302                        DEC     R2              ;SEE IF DONE
3399  014062  001374                        BNE     1$              ;IF NOT: BR
3400  014064  000207                        RTS     PC
3401
3402                                        ;WALKING ZERO**********
3403
3404  014066  012701  000376      DAT4:     MOV     #376,R1         ;R1=START OF DATA
3405  014072  000261                        SEC
3406  014074  000765                        BR      DAT3A           ;LOAD BUFFER
3407
3408                                        ;ALTERNATING ONE/ZERO**********
3409
3410
3411  014076  012701  052525      DAT5:     MOV     #52525,R1       ;R1=DATA
3412  014102  000747                        BR      DAT1A           ;LOAD BUFFER
3413
3414                                        ;ALTERNATING ZERO/ONE**********
3415
3416  014104  012701  125252      DAT6:     MOV     #125252,R1      ;R1=DATA
3417  014110  000744                        BR      DAT1A           ;LOAD BUFFER
3418
3419                                        ;ONE/ZERO IN ALTERNATING WORDS**********
3420
3421  014112  012701  125252      DAT7:     MOV     #125252,R1      ;SET WORD 1
3422  014116  012702  052525                MOV     #52525,R2       ;SET WORD 2
3423  014122  012704  001002                MOV     #1002,R4        ;SET NUMBER OF ENTRIES
3424  014126  010123              1$:       MOV     R1,(R3)+        ;LOAD WORD 1
3425  014130  010223                        MOV     R2,(R3)+        ;LOAD WORD 2
3426  014132  005304                        DEC     R4              ;SEE IF DONE
3427  014134  001374                        BNE     1$              ;IF NOT: BR
3428  014136  000207                        RTS     PC
3429
```

```
3430                                        ;WALKING ONE/ALL ONE IN ALTERNATING CHARS****
3431
3432  014140  012702  002002        DAT10:  MOV     #2002,R2        ;SET BUFFER SIZE
3433  014144  012701  000001                MOV     #1,R1           ;SET WALK BASE
3434  014150  000241                        CLC
3435  014152  012713  177400        1$:     MOV     #177400,(R3)    ;LOAD ALL ONE BYTE
3436  014156  050123                        BIS     R1,(R3)+        ;LOAD WALK BYTE
3437  014160  106101                        ROLB    R1              ;WALK ONE
3438  014162  005302                        DEC     R2
3439  014164  001372                        BNE     1$              ;DO FULL BUFFER
3440  014166  000207                        RTS     PC
3441
3442                                        ;ALL BITS 0-377*********
3443
3444  014170  005001                DAT11:  CLR     R1              ;R1=STARTING DATA
3445  014172  012702  004004                MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3446  014176  1;0123                1$:     MOVB    R1,(R3)+        ;LOAD BUFFER
3447  014200  105201                        INCB    R1              ;BUMP DATA
3448  014202  005302                        DEC     R2              ;SEE IF DONE
3449  014204  001374                        BNE     1$              ;IF NOT: BR
3450  014206  000207                        RTS     PC              ;RETURN
3451
3452                                        ;ALL BITS 377-0*********
3453
3454  014210  012701  000377        DAT12:  MOV     #377,R1         ;R1=STARTING DATA
3455  014214  012702  004004                MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3456  014220  110123                1$:     MOVB    R1,(R3)+        ;LOAD BUFFER
3457  014222  105301                        DECB    R1              ;BUMP DATA
3458  014224  005302                        DEC     R2              ;SEE IF DONE
3459  014226  001374                        BNE     1$              ;IF NOT: BR
3460  014230  000207                        RTS     PC              ;RETURN
3461
3462                                        ;ALTERNATING CHARACTERS 0 AND 377**********
3463
3464  014232  012701  000377        DAT13:  MOV     #377,R1         ;R1 = DATA
3465  014236  000137  014022                JMP     DAT1A           ;LOAD BUFFER
3466
3467                                        ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARS******
3468
3469  014242  012702  002002        DAT14:  MOV     #2002,R2        ;SET BUFFER SIZE
3470  014246  012701  000376                MOV     #376,R1         ;SET WALK BASE
3471  014252  000261                        SEC
3472  014254  010113                1$:     MOV     R1,(R3)         ;LOAD WALK BYTE
3473  014256  042723  177400                BIC     #177400,(R3)+   ;CLEAR HIGH BYTE
3474  014262  106101                        ROLB    R1              ;WALK ZERO BIT
3475  014264  005302                        DEC     R2
3476  014266  001372                        BNE     1$              ;FILL BUFFER
3477  014270  000207                        RTS     PC              ;RETURN
3478
```

```
                                        ;AUTO SEQUENCE PATTERN*********

3481  014272  012702  000200    DAT15:  MOV     #200,R2         ;SET NUMBER OF ENTRIES
3482  014276  012701  014322    1$:     MOV     #APATS,R1       ;SET START OF PATTERN
3483  014302  012704  000010            MOV     #10,R4          ;SET SIZE OF PATTERN
3484  014306  012123            2$:     MOV     (R1)+,(R3)+     ;FILL BUFFER
3485  014310  005304                    DEC     R4              ;SEE IF DONE PATTERN
3486  014312  001375                    BNE     2$              ;IF NOT: BR
3487  014314  005302                    DEC     R2              ;SEE IF DONE BUFER
3488  014316  001367                    BNE     1$              ;IF NOT: BR
3489  014320  000207                    RTS     PC              ;RETURN
3490
3491  014322  000000            APATS:  0
3492  014324  177400                    177400
3493  014326  000377                    377
3494  014330  000000                    0
3495  014332  177777                    -1
3496  014334  000377                    377
3497  014336  177400                    177400
3498  014340  177777                    -1
3499
3500                                    ;RANDOM DATA GENERATOR SUBROUTINE**********
3501
3502  014342  013704  000556    DATR:   MOV     FMCNT,R4        ;SET NUMBER OF FRAMES
3503  014346  012703  026344            MOV     #WDATA,R3       ;SET ADDRESS OF START OF BUFFER
3504  014352  012701  177777            MOV     #-1,R1          ;SET HIGH LIMIT
3505  014356  005002                    CLR     R2              ;SET LOW LIMIT
3506  014360  004737  022314    1$:     JSR     PC,RANG         ;GO GENERATE NUMBER
3507  014364  013723  000630            MOV     RANSAV,(R3)+    ;LOAD BUFFER
3508  014370  005204                    INC     R4              ;SEE IF DONE WHOLE BUFFER
3509  014372  001372                    BNE     1$              ;IF NOT: BR
3510  014374  012737  000001  014404    MOV     #1,RDFL         ;SET RANDOM DATA FLAG
3511  014402  000207                    RTS     PC              ;EXIT
3512  014404  000000            RDFL:   0                       ;RANDOM DATA SELECT FLAG
```

```
3513
3514                                    ;*************************************************************
3515                                    ;CRC/LRC CHARACTER BUILD;
3516                                    ;
3517                                    ;THIS ROUTINE WILL CONSTRUCT AND SAVE THE EXPECTED
3518                                    ;CRC AND LRC CHARACTERS ACCORDING TO DATA AND
3519                                    ;RECORD SIZE IF OPERATING IN NRZ MODE
3520                                    ;*************************************************************
3521
3522  014406  013700  000556   CRCLRC: MOV     FMCNT,R0        ;SET RECORD SIZE
3523  014412  005400                   NEG     R0
3524  014414  012701  026344           MOV     #WDATA,R1       ;SET START OF BUFFER
3525  014420  005037  014742           CLR     XORS
3526  014424  111104           CL0:    MOVB    (R1),R4         ;GET CHARACTER
3527  014426  004737  014614           JSR     PC,CLP          ;GO GET PARITY OF CHARACTER
3528  014432  004737  014716           JSR     PC,XOR          ;XOR CHARACTER
3529  014436  000241                   CLC
3530  014440  006004                   ROR     R4              ;ROTATE 1 RIGHT
3531  014442  103014                   BCC     CL2             ;IF NO CARRY: BR
3532  014444  052704  000400           BIS     #400,R4         ;SET BIT NINE
3533  014450  000241                   CLC
3534  014452  010405           CL1:    MOV     R4,R5           ;SAVE CHARACTER
3535  014454  042705  177703           BIC     #177703,R5
3536  014460  005105                   COM     R5
3537  014462  042705  177703           BIC     #177703,R5
3538  014466  042704  000074           BIC     #74,R4
3539  014472  050504                   BIS     R5,R4           ;COMPLIMENT BITS 2,3,4,5
3540  014474  010437  014742   CL2:    MOV     R4,XORS
3541  014500  005300                   DEC     R0
3542  014502  001350                   BNE     CL0             ;BRANCH IF NOT LAST CHAR
3543  014504  013704  014742   CLLAST: MOV     XORS,R4
3544  014510  005137  014742           COM     XORS
3545  014514  042737  177050  014742   BIC     #177050,XORS
3546  014522  042704  177727           BIC     #177727,R4      ;COMPLIMENT ALL BUT BITS 3&5
3547  014526  050437  014742           BIS     R4,XORS
3548  014532  013737  014742  014744   MOV     XORS,EXCRC      ;SAVE EXPECTED CRC
3549  014540  013700  000556           MOV     FMCNT,R0
3550  014544  005400                   NEG     R0
3551  014546  012701  026344           MOV     #WDATA,R1       ;DO EXPT LRC
3552  014552  005037  014742           CLR     XORS
3553  014556  111104           CL3:    MOVB    (R1),R4
3554  014560  004737  014614           JSR     PC,CLP          ;GET PARITY
3555  014564  004737  014716           JSR     PC,XOR          ;XOR CHARACTER
3556  014570  005300                   DEC     R0
3557  014572  001371                   BNE     CL3             ;DO ALL FOR LRC
3558  014574  013704  014744           MOV     EXCRC,R4
3559  014600  004737  014716           JSR     PC,XOR          ;XOR CRC TO DATA
3560  014604  013737  014742  014746   MOV     XORS,EXLRC      ;SAVE EXPT LRC
3561  014612  000207                   RTS     PC              ;RETURN
3562  014614  005704           CLP:    TST     R4              ;SEE IF 0 CHAR
3563  014616  001010                   BNE     CLPE            ;IF NOT: BR
3564  014620  032737  000010  000552   BIT     #10,UDES        ;SEE IF EVEN PARITY
3565  014626  001404                   BEQ     CLPE            ;IF NOT: BR
3566  014630  012704  000420           MOV     #420,R4         ;SET 0 CHAR EVEN PARITY
3567  014634  005201                   INC     R1              ;BUMP POINTER
3568  014636  000207                   RTS     PC              ;RETURN
```

```
3569  014640  005046                    CLPE:   CLR     -(SP)           ;CLEAR WORLING SPACE ON STACK
3570  014642  106304                    1$:     ASLB    R4              ;SHIFT DATA
3571  014644  005516                            ADC     (SP)            ;ADDUP # OF 1 BITS
3572  014646  105704                            TSTB    R4              ;BRANCH IF ALL 0''S LEFT
3573  014650  001374                            BNE     1$
3574  014652  112104                            MOVB    (R1)+,R4
3575  014654  042704  177400                    BIC     #177400,R4
3576  014660  106026                            RORB    (SP)+           ;BRANCH IF ODD # OF 1 BITS
3577  014662  103405                            BCS     CLP2
3578  014664  032737  000010  000552            BIT     #10,UDES        ;SEE IF SHOULD BE EVEN PARITY
3579  014672  001406                            BEQ     CLP3            ;IF NOT: BR
3580  014674  000207                            RTS     PC              ;ELSE EXIT
3581  014676  032737  000010  000552  CLP2:     BIT     #10,UDES        ;SEE IF SHOULD BE ODD PARITY
3582  014704  001001                            BNE     CLP3            ;IF NOT: BR
3583  014706  000207                            RTS     PC              ;ELSE EXIT
3584  014710  052704  000400            CLP3:   BIS     #400,R4         ;SET PARITY BIT
3585  014714  000207                            RTS     PC
3586
3587  014716  010446                    XOR:    MOV     R4,-(SP)
3588  014720  043716  014742                    BIC     XORS,(SP)
3589  014724  040437  014742                    BIC     R4,XORS         ;XOR SUBROUTINE: R4 WITH XORS
3590  014730  052637  014742                    BIS     (SP)+,XORS
3591  014734  013704  014742                    MOV     XORS,R4
3592  014740  000207                            RTS     PC
3593
3594  014742  000000                    XORS:   0                       ;XOR SAVE
3595  014744  000000                    EXCRC:  0                       ;EXPECTED CRC
3596  014746  000000                    EXLRC:  0                       ;EXPECTED LRC
3597
```

```
3598
3599                                    ;*********************************************************
3600                                    ;DATA CHECK SUBROUTINE:
3601                                    ;
3602                                    ;THIS SUBROUTINE IS USED TO COMPARE EACH CHARACTER
3603                                    ;OF DATA READ FROM TAPE WITH THE EXPECTED CHARACTER.
3604                                    ;ANY ERROR DETECTED WILL CAUSE CONTROL TO BE
3605                                    ;PASSED TO AN ERROR PRINT SUBROUTINE AND A
3606                                    ;SUBROUTINE TO ACCUMULATE THE NUMBER OF BITS
3607                                    ;DROPPED AND PICKED UP FROM EACH CHARACTER.
3608                                    ;THE NUMBER OF READ ERRORS IS ALSO ACCUMULATED.
3609                                    ;DATA CHECKING MAY BE TERMINATED BY USE OF
3610                                    ;CONSOLE SWITCH THIRTEEN (13).
3611                                    ;*********************************************************
3612
3613  014750  005037  000656        DCHK:   CLR     BBC             ;CLEAR BAD RECORD CNTR
3614  014754  005037  000704                CLR     DERFL           ;CLEAR DATA ERROR FLAG
3615  014760  013705  000556                MOV     FMCNT,R5        ;LOAD CHAR COUNT
3616  014764  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
3617  014772  001401                        BEQ     DCHK0           ;IF NOT: BR
3618  014774  006205                        ASR     R5              ;R5 = FC/2
3619  014776  012701  026344        DCHK0:  MOV     #WDATA,R1       ;SET WRITE DATA ADDR
3620  015002  012702  032352                MOV     #RDATA,R2       ;SET READ DATA ADDR
3621  015006  032737  000010  000552        BIT     #10,UDES        ;SEE IF EVEN PARITY
3622  015014  001430                        BEQ     DF0C0           ;IF NOT: BR
3623  015016  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP PARITY
3624  015024  001024                        BNE     DF0C0           ;IF SO: BR
3625  015026  032737  002000  000552        BIT     #2000,UDES      ;SEE IF PE MODE
3626  015034  001020                        BNE     DF0C0           ;IF SO: BR
3627  015036  105711                DF0F:   TSTB    (R1)            ;SEE IF 0 CHAR
3628  015040  001404                        BEQ     DF0D            ;IF SO: BR
3629  015042  005201                        INC     R1              ;BUMP POINTER
3630  015044  005205                DF0E:   INC     R5              ;SEE IF DONE
3631  015046  001373                        BNE     DF0F            ;IF NOT: BR
3632  015050  000406                        BR      DF0C            ;ELSE CONTINUE
3633  015052  112721  000020        DF0D:   MOVB    #20,(R1)+       ;SET 20 IN PLACE OF 0
3634  015056  012737  177777  013652        MOV     #-1,PATS        ;SET PATTERN GENERATE FLAG
3635  015064  000767                        BR      DF0E
3636  015066  013705  000556        DF0C:   MOV     FMCNT,R5        ;RESET CHAR CNT
3637  015072  012701  026344                MOV     #WDATA,R1       ;RESET DATA ADDRESS
3638  015076  005737  000562        DF0C0:  TST     RDCMD           ;SEE IF READ REVERSE
3639  015102  001462                        BEQ     DF0             ;IF NOT: BR
3640  015104  013704  000556        DF0B:   MOV     FMCNT,R4        ;GET FRAME COUNT
3641  015110  005404                        NEG     R4              ;SET TO WHOLE NUMBER
3642  015112  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
3643  015120  001402                        BEQ     DF0B0           ;IF NOT: BR
3644  015122  000241                        CLC
3645  015124  006004                        ROR     R4              ;SET TO FC/2
3646  015126  060401                DF0B0:  ADD     R4,R1           ;POINT TO START OF WRITE DATA
3647  015130  060402                        ADD     R4,R2           ;POINT TO START OF READ DATA
3648  015132  032737  000001  000556        BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
3649  015140  001401                        BEQ     DF0A            ;IF NOT: BR
3650  015142  105722                        TSTB    (R2)+           ;BUMP POINTER
3651  015144  032737  000020  000552  DF0A: BIT     #20,UDES        ;SEE IF CORE DUMP
3652  015152  001431                        BEQ     DF0A4           ;IF NOT: BR
3653  015154  000241                        CLC
```

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 3654  015156  132742  000001                BITB    #1,-(R2)        ;SEE IF BIT 0 = 1
 3655  015162  001401                        BEQ     DF0A0           ;IF NOT: BR
 3656  015164  000261                        SEC
 3657  015166  106012              DF0A0:    RORB    (R2)
 3658  015170  000241                        CLC
 3659  015172  132712  000001                BITB    #1,(R2)
 3660  015176  001401                        BEQ     DF0A1
 3661  015200  000261                        SEC
 3662  015202  106012              DF0A1:    RORB    (R2)            ;POSITION BITS FOR REVERSE CORE DUMP
 3663  015204  000241                        CLC
 3664  015206  132712  000001                BITB    #1,(R2)
 3665  015212  001401                        BEQ     DF0A2
 3666  015214  000261                        SEC
 3667  015216  106012              DF0A2:    RORB    (R2)
 3668  015220  000241                        CLC
 3669  015222  132712  000001                BITB    #1,(R2)
 3670  015226  001401                        BEQ     DF0A3
 3671  015230  000261                        SEC
 3672  015232  106012              DF0A3:    RORB    (R2)
 3673  015234  005202                        INC     R2              ;RESET POINTER
 3674  015236  124142              DF0A4:    CMPB    -(R1),-(R2)     ;TEST DATA CHARACTER
 3675  015240  001010                        BNE     DF1             ;IF NOT GOOD: BR
 3676  015242  105037  000656                CLRB    BBC             ;CLEAR BAD RECORD COUNTER
 3677  015246  000411                        BR      DF2
 3678  015250  122122              DF0:      CMPB    (R1)+,(R2)+     ;CHECK DATA
 3679  015252  001003                        BNE     DF1             ;IF BAD: BR
 3680  015254  105037  000656                CLRB    BBC             ;CLEAR BAD RECORD CNTR
 3681  015260  000404                        BR      DF2
 3682  015262  004737  016020      DF1:      JSR     PC,DRPKF        ;GO GET DROPS AND PICKS
 3683  015266  004737  015354                JSR     PC,DERR         ;GO DO PRINT
 3684  015272  005205              DF2:      INC     R5              ;BUMP CHAR CNTR
 3685  015274  001404                        BEQ     DF3             ;IF DONE ALL: BR
 3686  015276  005737  000562                TST     RDCMD           ;SEE IF READ REVERSE
 3687  015302  001762                        BEQ     DF0             ;IF NOT: BR
 3688  015304  000717                        BR      DF0A            ;ELSE CONTINUE READ REV
 3689  015306  005037  000664      DF3:      CLR     HDRFL           ;CLEAR HEADER FLAG
 3690  015312  005737  000704                TST     DERFL           ;SEE IF HAD DATA ERROR
 3691  015316  001415                        BEQ     DFX             ;IF NOT: BR
 3692  015320  005737  000706                TST     SERFL
 3693  015324  001012                        BNE     DFX             ;IF NOT DATA ERROR ONLY: BR
 3694  015326  013704  000674                MOV     UNP,R4
 3695  015332  005737  000562                TST     RDCMD           ;SEE IF READ REVERSE
 3696  015336  001003                        BNE     DF4             ;IF SO: BR
 3697  015340  005264  001124                INC     DATER1(R4)      ;BUMP DATA ERROR FORWARD COUNTER
 3698  015344  000402                        BR      DFX
 3699  015346  005264  001164      DF4:      INC     DEREV1(R4)      ;BUMP REVERSE DATA ERROR
 3700  015352  000207              DFX:      RTS     PC              ;EXIT
 3701
```

```
3702
3703                                    ;*********************************************************
3704                                    ;DATA ERROR SUBROUTINE:
3705                                    ;
3706                                    ;THIS SUBROUTINE IS USED TO PRINT OUT ANY
3707                                    ;ERRORS FOUND DURING THE DATA CHECK.
3708                                    ;EACH CHARACTER FOUND BAD WILL BE PRINTED
3709                                    ;IN BIT FORMAT ALONG WITH ITS EXPECTED CHARACTER.
3710                                    ;AN ERROR HEADER CONSISTING OF THE UNIT NUMBER,
3711                                    ;BLOCK NUMBER, RECORD NUMBER, SIZE OF RECORD, AND
3712                                    ;ERROR TYPE (READ FORWARD, READ REVERSE, WRITE, ETC)
3713                                    ;IS PRINTED ONLY ONCE FOR EACH RECORD FOUND BAD.
3714                                    ;A COUNT IS MADE OF THE NUMBER OF SUCCESSIVE BAD
3715                                    ;CHARACTERS, AND IF TEN (10) SUCCESSIVE BAD CHARACTERS
3716                                    ;ARE FOUND IN A SINGLE RECORD, A MESSAGE INDICATING
3717                                    ;A BAD RECORD CONDITION IS PRINTED AND THE NEXT
3718                                    ;TWENTY (20) CHARACTERS ARE SKIPPED BEFORE CHECKING
3719                                    ;IS RESUMED.  IF THE BAD RECORD CONDITION IS FOUND
3720                                    ;THREE TIMES IN A RECORD, ALL REMAINING DATA IS
3721                                    ;SKIPPED EXCEPT THE FINAL TEN (10) CHARACTERS.
3722                                    ;THIS SKIPPING IS OF COURSE ONLY POSSIBLE IN
3723                                    ;RECORDS WHICH CONTAIN A SUFFICIENT NUMBER OF CHARACTERS.
3724                                    ;PRINTING OF ERRORS MAY BE DISALLOWED AT ANY TIME
3725                                    ;BY SETTING CONSOLE SWITCH TEN (10) TO A ONE.
3726                                    ;THE OPERATOR MAY CAUSE THE PROGRAM TO HALT ON ANY ERROR
3727                                    ;BY SETTING CONSOLE SWITCH FIFTEEN (15) TO A ONE.
3728                                    ;*********************************************************
3729
3730  015354  032777  002000  163226  DERR:   BIT     #2000,@SWR      ;BRANCH IF NO ERROR
3731  015362  001057                          BNE     DERR4           ;PRINTOUT DESIRED
3732  015364  005237  000670          DERR0:  INC     PFLG            ;SET PRINT FLAG
3733  015370  005737  000664                  TST     HDRFL           ;SEE IF HAVE PRINTED HEADER
3734  015374  001006                          BNE     DERR0A          ;IF SO: BR
3735  015376  004737  022012                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
3736  015402  000004  023522                  TYPE,MSG1               ;TYPE DATA ERROR TAG '*DE'
3737  015406  004737  020250                  JSR     PC,FRPRT        ;PRINT F OR R
3738  015412  000004  023541          DERR0A: TYPE,MSG4               ;TYPE CHAR # TAG 'CN'
3739  015416  010203                          MOV     R2,R3
3740  015420  162703  032352                  SUB     #RDATA,R3       ;POINT TO CHAR
3741  015424  005303                          DEC     R3
3742  015426  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
3743  015432  001402                          BEQ     DERR0B          ;IF NOT: BR
3744  015434  010503                          MOV     R5,R3           ;GET CHAR NUMBER
3745  015436  005103                          COM     R3
3746  015440  104400          DERR0B: TYPOCT                          ;PRINT CHAR NUMBER
3747  015442  000004  023527                  TYPE,MSG2               ;TYPE GOOD CHAR TAG 'G'
3748  015446  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
3749  015452  001402                          BEQ     DERR0C          ;IF NOT: BR
3750  015454  111103                          MOVB    (R1),R3         ;GET CHAR
3751  015456  000401                          BR      DERR0D
3752  015460  114103          DERR0C: MOVB    -(R1),R3        ;LOAD EXPECTED DATA
3753  015462  004737  023304  DERR0D: JSR     PC,DOUT         ;GO PRINT CHAR
3754  015466  000004  023534                  TYPE,MSG3               ;TYPE BAD CHARACTER TAG 'B'
3755  015472  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
3756  015476  001402                          BEQ     DERR1           ;IF NOT: BR
3757  015500  111203                          MOVB    (R2),R3         ;GET CHAR
```

```
3758  015502  000401                          BR      DERR2
3759  015504  114203                  DERR1:  MOVB    -(R2),R3
3760  015506  004737  023304          DERR2:  JSR     PC,DOUT         ;PRINT BAD CHAR
3761  015512  005737  000562                  TST     RDCMD           ;BRANCH IF READ
3762  015516  001001                          BNE     DERR4           ;REVERSE
3763  015520  122122                  DERR3:  CMPB    (R1)+,(R2)+     ;RESET POINTERS
3764  015522  105237  000656          DERR4:  INCB    BBC             ;BUMP BAD RECORD CNTR
3765  015526  122737  000010  000656          CMPB    #10,BBC         ;SEE IF BLD BTH
3766  015534  001107                          BNE     DEREX           ;IF NOT: BR
3767  015536  032777  002000  163044          BIT     #2000,@SWR      ;SEE IF PRINT INHIBIT
3768  015544  001002                          BNE     1$              ;IF SO: BR
3769  015546  000004  023622                  TYPE,MSG15              ;TYPE 'BAD RECORD'
3770  015552  105037  000656          1$:     CLRB    BBC             ;RESET BAD RECORD CNTR
3771  015556  105237  000657                  INCB    BBC+1           ;BUMP AMOUNT
3772  015562  122737  000003  000657          CMPB    #3,BBC+1        ;SEE IF HAD 3 BLD BTHS
3773  015570  101047                          BHI     DERR4B          ;IF NOT: BR
3774  015572  022705  177767                  CMP     #177767,R5      ;SEE IF ON LAST EIGHT CHARS
3775  015576  101464                          BLOS    DERR6           ;IF SO: BR
3776  015600  012705  177767                  MOV     #177767,R5      ;SET CHAR CNTR TO 8
3777  015604  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
3778  015610  001416                          BEQ     DERR4A          ;IF NOT: BR
3779  015612  012701  026344                  MOV     #WDATA,R1       ;GET START OF BUFFER
3780  015616  012702  032352                  MOV     #RDATA,R2       ;GET START OF BUFFER
3781  015622  062701  000010                  ADD     #10,R1
3782  015626  062702  000010                  ADD     #10,R2          ;POINT TO START +10
3783  015632  032737  000001  000556          BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
3784  015640  001445                          BEQ     DEREX           ;IF NOT: BR
3785  015642  105722                          TSTB    (R2)+           ;BUMP POINTER
3786  015644  000443                          BR      DEREX
3787  015646  013737  000556  000644  DERR4A: MOV     FMCNT,TEMP1     ;LOAD CHAR COUNT
3788  015654  005437  000644                  NEG     TEMP1           ;++B
3789  015660  162737  000010  000644          SUB     #10,TEMP1       ;POINT TO BUFFER -8
3790  015666  013701  000644                  MOV     TEMP1,R1        ;POINT TO NEXT CHAR
3791  015672  062701  026344                  ADD     #WDATA,R1       ;POINT TO NEXT WRITE CHAR
3792  015676  013702  000644                  MOV     TEMP1,R2        ;POINT TO END OF READ DATA -8 FORWARD
3793  015702  062702  032352                  ADD     #RDATA,R2       ;POINT TO NEXT CHAR
3794  015706  000422                          BR      DEREX           ;EXIT
3795  015710  062705  000024          DERR4B: ADD     #24,R5          ;SKIP 20 CHARS
3796  015714  103415                          BCS     DERR6           ;IF EXCEED RECORD SIZE: BR
3797  015716  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
3798  015722  001405                          BEQ     DERR5           ;IF NOT: BR
3799  015724  162701  000024                  SUB     #24,R1
3800  015730  162702  000024                  SUB     #24,R2          ;RESET POINTERS
3801  015734  000407                          BR      DEREX
3802  015736  062701  000024          DERR5:  ADD     #24,R1          ;SKIP 20 CHARS
3803  015742  062702  000024                  ADD     #24,R2          ;SKIP FORWARD 20 CHARS
3804  015746  000402                          BR      DEREX
3805  015750  012705  177777          DERR6:  MOV     #-1,R5          ;SET TO EOR
3806  015754  005777  162630          DEREX:  TST     @SWR            ;BRANCH IF NOT HALT ON ERROR
3807  015760  100012                          BPL     DEREX1
3808  015762  000000                          HALT
3809  015764  005737  000670                  TST     PFLG            ;SEE IF PRINTED
3810  015770  001006                          BNE     DEREX1          ;IF SO: BR
3811  015772  032777  002000  162610          BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
3812  016000  001002                          BNE     DEREX1          ;IF NOT: BR
3813  016002  000137  015364                  JMP     DERR0           ;ELSE PRINT
```

```
  3814  016006  005037  000670          DEREX1: CLR     PFLG            ;CLEAR FLAG
  3815  016012  005237  000704                  INC     DERFL           ;BUMP DATA ERROR FLAG
  3816  016016  000207                          RTS     PC              ;RETURN
  3817
```

```
3818
3819                                    ;*********************************************************
3820                                    ;DROPS AND PICKS SUBROUTINE:
3821                                    ;
3822                                    ;THIS SUBROUTINE IS USED TO ACCUMULATE FROM
3823                                    ;EACH BAD DATA CHARACTER FOUND THE NUMBER
3824                                    ;OF BITS WHICH WERE EITHER DROPPED OR PICKED UP.
3825                                    ;TWO COUNTERS PER SLAVE ARE USED TO ACCUMULATE THIS
3826                                    ;INFORMATION AND CAN STORE UP TO 32K DROPS
3827                                    ;OR PICKS BEFORE OVERFLOWING.  IF OVERFLOW IS
3828                                    ;ABOUT TO OCCUR, THESE ACCUMULATORS ARE
3829                                    ;PRINTED IN OCTAL AND RESET TO ZERO.
3830                                    ;THE CONTENTS OF THE ACCUMULATORS MAY BE
3831                                    ;DISPLAYED AT ANY TIME BY SETTING CONSOLE
3832                                    ;SWITCH FOURTEEN TO A ONE (1). THE PRINTOUT WILL OCCUR
3833                                    ;AT THE END OF THE CURRENT BLOCK CYCLE.
3834                                    ;*********************************************************
3835
3836  016020  005037  000644        DRPKF:  CLR     TEMP1
3837  016024  005037  000646                CLR     TEMP2
3838  016030  005037  000650                CLR     TEMP3
3839  016034  111137  000644                MOVB    (R1),TEMP1      ;LOAD GOOD CHAR
3840  016040  111237  000646                MOVB    (R2),TEMP2      ;LOAD BAD CHAR
3841  016044  013704  000674                MOV     UNP,R4
3842  016050  016437  000764  000720        MOV     PIK1(R4),BPKP
3843  016056  016437  001004  000716        MOV     DRP1(R4),BDPP
3844  016064  005737  000562                TST     RDCMD           ;SEE IF READ REVERSE
3845  016070  001005                        BNE     DRPK            ;IF SO: BR
3846  016072  124142                        CMPB    -(R1),-(R2)     ;POINT TO CHAR
3847  016074  112137  000644                MOVB    (R1)+,TEMP1     ;LOAD GOOD CHAR
3848  016100  112237  000646                MOVB    (R2)+,TEMP2     ;LOAD BAD CHAR
3849  016104  004737  016116        DRPK:   JSR     PC,DROP         ;GET DROPS
3850  016110  004737  016324                JSR     PC,PICK         ;GET PICKS
3851  016114  000207                        RTS     PC              ;EXIT
3852
3853  016116  113703  000644        DROP:   MOVB    TEMP1,R3        ;R3 = GOOD CHAR
3854  016122  113704  000646                MOVB    TEMP2,R4        ;R4 = BAD CHAR
3855  016126  140403                DPC:    BICB    R4,R3           ;GET DROPS/PICKS
3856  016130  001001                        BNE     DPCG            ;IF SOME: BR
3857  016132  000207                        RTS     PC              ;RETURN
3858  016134  012737  000010  000710  DPCG:  MOV     #10,BCNT        ;SET NUMBER TO CHECK
3859  016142  132703  000001        DPC0:   BITB    #1,R3           ;SEE IF DROPPED OR PICKED THIS BIT
3860  016146  001451                        BEQ     DPC2            ;IF NOT: BR
3861  016150  105737  000650                TSTB    TEMP3           ;SEE IF ON PICKS
3862  016154  001014                        BNE     DPC1            ;IF SO: BR
3863  016156  005277  162534                INC     @BDPP           ;BUMP DROP CNTR
3864  016162  100043                        BPL     DPC2            ;IF NO OVERFLOW: BR
3865  016164  032777  002000  162416        BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
3866  016172  001402                        BEQ     DPC0A           ;IF SO: BR
3867  016174  004737  022012                JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
3868  016200  004737  016370        DPC0A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
3869  016204  000413                        BR      DPC2A
3870  016206  005277  162506        DPC1:   INC     @BPKP           ;BUMP PICK CNTR
3871  016212  100027                        BPL     DPC2            ;& BR IF NO OVERFLOW
3872  016214  032777  002000  162366        BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
3873  016222  001402                        BEQ     DPC1A           ;IF SO: BR
```

```
3874  016224  004737  022012                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
3875  016230  004737  016370          DPC1A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
3876  016234  013704  000674          DPC2A:  MOV     UNP,R4
3877  016240  016403  001004                  MOV     DRP1(R4),R3     ;SET DROP POINTER
3878  016244  016404  000764                  MOV     PIK1(R4),R4     ;SET PICK POINTER
3879  016250  012737  000010  000710          MOV     #10,BCNT        ;SET NUMBER OF BITS
3880  016256  005023                  DPC2B:  CLR     (R3)+           ;CLEAR DROPS
3881  016260  005024                          CLR     (R4)+           ;CLEAR PICK
3882  016262  005337  000710                  DEC     BCNT            ;SEE IF DONE
3883  016266  001373                          BNE     DPC2B           ;IF NOT: BR
3884  016270  000207                          RTS     PC              ;EXIT
3885  016272  000241                  DPC2:   CLC
3886  016274  106003                          RORB    R3              ;GET NEXT BIT
3887  016276  005337  000710                  DEC     BCNT            ;SEE IF DONE
3888  016302  001407                          BEQ     DPC3
3889  016304  062737  000002  000720          ADD     #2,BPKP
3890  016312  062737  000002  000716          ADD     #2,BDPP
3891  016320  000710                          BR      DPC0            ;CONTINUE
3892  016322  000207                  DPC3:   RTS     PC              ;RETURN
3893  016324  013704  000674          PICK:   MOV     UNP,R4          ;GET UNIT POINTER
3894  016330  016437  000764  000720          MOV     PIK1(R4),BPKP   ;SET PICK POINTER
3895  016336  016437  001004  000716          MOV     DRP1(R4),BDPP   ;SET DROP POINTER
3896  016344  113704  000644                  MOVB    TEMP1,R4        ;R4 = GOOD CHAR
3897  016350  113703  000646                  MOVB    TEMP2,R3        ;R3 = BAD CHAR
3898  016354  112737  000001  000650          MOVB    #1,TEMP3        ;SET PICK FLAG
3899  016362  004737  016126                  JSR     PC,DPC          ;GO CHECK PICKS
3900  016366  000207                          RTS     PC              ;EXIT
3901  016370  000004  024133          DPPRT:  TYPE,MSG26              ;TYPE 'DROPS'
3902  016374  013704  000674                  MOV     UNP,R4
3903  016400  016437  001004  000716          MOV     DRP1(R4),BDPP   ;SET DROP POINTER
3904  016406  016437  000764  000720          MOV     PIK1(R4),BPKP   ;SET PICK POINTER
3905  016414  062737  000016  000716          ADD     #16,BDPP
3906  016422  062737  000016  000720          ADD     #16,BPKP
3907  016430  012737  000010  000710          MOV     #10,BCNT        ;SET NUMBER TO PRINT
3908  016436  017703  162254          DPPRT0: MOV     @BDPP,R3
3909  016442  104400                          TYPOCT                  ;PRINT DROPS
3910  016444  005337  000710                  DEC     BCNT            ;SEE IF DONE
3911  016450  001404                          BEQ     DPPRT1          ;IF NOT: BR
3912  016452  162737  000002  000716          SUB     #2,BDPP         ;BUMP POINTER
3913  016460  000766                          BR      DPPRT0          ;CONTINUE FOR ALL 8 BITS
3914  016462  012737  000010  000710  DPPRT1: MOV     #10,BCNT        ;SET NUMBER TO PRINT
3915  016470  000004  024144                  TYPE,MSG27              ;TYPE 'PICKS'
3916  016474  017703  162220          DPPRT2: MOV     @BPKP,R3
3917  016500  104400                          TYPOCT                  ;PRINT PICKS
3918  016502  005337  000710                  DEC     BCNT            ;SEE IF DONE
3919  016506  001404                          BEQ     DPPRTX          ;IF SO: BR
3920  016510  162737  000002  000720          SUB     #2,BPKP         ;BUMP POINTER
3921  016516  000766                          BR      DPPRT2          ;CONTINUE FOR ALL 8 BITS
3922  016520  000207                  DPPRTX: RTS     PC              ;RETURN
```

```
                                        ;*********************************************************
                                        ;STATUS CHECK SUBROUTINE:
                                        ;
                                        ;THIS SUBROUTINE IS USED TO PERFORM A CHECK OF
                                        ;BOTH THE MASSBUS CONTROLLER (RH11) AND THE TAPE
                                        ;CONTROLLER (TM02).  THE RH11 IS CHECKED FOR ERRORS
                                        ;AS REFLECTED IN REGISTERS CS1 AND CS2 AND ALSO THAT
                                        ;THE BUS ADDRESS (BA) AND WORD COUNT (WC) ARE
                                        ;CORRECT.  THE TM02 IS CHECKED FOR DRIVE STATIS (DS),
                                        ;DRIVE ERRORS (ER), AND PROPER FRAME COUNT.  THE SPECIAL
                                        ;CHECK CHARACTERS (CRC+LRC) ARE ALSO CHECKED WHEN
                                        ;APPROPIATE (IE: NRZ READ OR WRITE).  CERTAIN TYPES
                                        ;OF DRIVE ERRORS IN PE OPERATION WILL BE ACCOMPANIED
                                        ;BY THE DISPLAY OF THE DEAD TRACK REGISTER (CC).  THESE
                                        ;TYPES ARE ER BITS 15,10,7,6.  THE PRINTOUTS OF BAD
                                        ;CRC,LRC,FC, AND BA WILL SHOW BOTH THE EXPECTED AND
                                        ;RECEIVED VALUES (IE: EXPT-RCVD).  ONLY THOSE REGISTERS
                                        ;WHICH ARE IN ERROR WILL BE PRINTED AND ALL PRINTOUTS
                                        ;ARE IN OCTAL FORMAT WITH NO LEADING ZEROS.  AS IN
                                        ;DATA ERRORS, STATUS ERRORS ARE PRECEEDED BY HEADER
                                        ;DESCRIBING THE HARDWARE UNDER TEST, THE BLOCKING
                                        ;INFORMATION, AND THE ERROR TYPE.
                                        ;*********************************************************

016522  013703  000556        ERCHK:  MOV     FMCNT,R3        ;GET FRAME COUNT
016526  032703  000001                BIT     #1,R3           ;SEE IF ODD
016532  001401                        BEQ     1$              ;IF NOT: BR
016534  005303                        DEC     R3              ;BUMP COUNT
016536  005403                1$:     NEG     R3
016540  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
016546  001401                        BEQ     2$              ;IF NOT: BR
016550  006203                        ASR     R3              ;SET TO FC/2
016552  032737  000010  000672  2$:   BIT     #10,MTC1        ;SEE IF WRITE OP
016560  001413                        BEQ     4$              ;IF SO: BR
016562  005737  000562                TST     RDCMD
016566  001405                        BEQ     3$
016570  012703  032352                MOV     #RDATA,R3
016574  162703  000002                SUB     #2,R3           ;SET POINTER
016600  000405                        BR      ER2
016602  062703  032352          3$:   ADD     #RDATA,R3       ;BUILD EXPT READ ADDRESS
016606  000402                        BR      ER2
016610  062703  026344          4$:   ADD     #WDATA,R3       ;BUILD EXPT WRITE ADDRESS

016614  032777  040000  161702  ER2:   BIT     #40000,@ER      ;BRANCH IF NOT UNSAFE
016622  001403                        BEQ     1$
016624  005726                        TST     (SP)+           ;ADJUST STACK
016626  000137  020312                JMP     OFFLINE         ;GO MARK UNIT OFFLINE
016632  010337  020224          1$:   MOV     R3,CADER        ;SAVE ADDRESS
016636  012704  000007                MOV     #7,R4
016642  012701  020226                MOV     #BAER,R1
016646  005021                2$:     CLR     (R1)+           ;CLEAR FLAGS
016650  005304                        DEC     R4
016652  001375                        BNE     2$
016654  020377  161634                CMP     R3,@BA          ;SEE IF ADDRESS OK
016660  001402                        BEQ     3$              ;IF SO: BR
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```
 3979  016662  005237  020226                 INC     BAER            ;SET BUS ADDRESS ERROR
 3980  016666  032737  000010  000672  3$:    BIT     #10,@TC1        ;SEE IF WRITE OPER
 3981  016674  001006                         BNE     5$              ;IF NOT: BR
 3982  016676  005777  161614          4$:    TST     @FC             ;SEE IF FC=0
 3983  016702  001440                         BEQ     ER3             ;IF SO: BR
 3984  016704  005237  020234                 INC     FCER            ;SET FC ERROR
 3985  016710  000435                         BR      ER3
 3986  016712  032737  000040  000672  5$:    BIT     #40,@TC1        ;SEE IF SPACE OPER
 3987  016720  001766                         BEQ     4$              ;IF SO: BR
 3988  016722  005737  000676                 TST     TMFLG           ;SEE IF TM TIME
 3989  016726  001011                         BNE     7$              ;IF SO: BR
 3990  016730  013703  000556                 MOV     FMCNT,R3
 3991  016734  005403                         NEG     R3              ;R3 = EXPT RECORD SIZE
 3992  016736  020377  161554          6$:    CMP     R3,@FC          ;SEE IF FC = EXPT
 3993  016742  001420                         BEQ     ER3             ;IF SO: BR
 3994  016744  005237  020234                 INC     FCER            ;SET FC ERROR FLAG
 3995  016750  000415                         BR      ER3
 3996  016752  032737  002000  000552  7$:    BIT     #2000,UDES      ;SEE IF PE
 3997  016760  001346                         BNE     4$              ;IF SO: BR
 3998  016762  005737  000562                 TST     RDCMD           ;SEE IF READ REVERSE
 3999  016766  001003                         BNE     8$              ;IF SO: BR
 4000  016770  012703  000002                 MOV     #2,R3
 4001  016774  000760                         BR      6$              ;LOOK FOR EXPT = 2
 4002  016776  012703  000001          8$:    MOV     #1,R3
 4003  017002  000755                         BR      6$              ;GO CHECK FC FOR TM
 4004
 4005  017004  032777  160000  161476  ER3:   BIT     #160000,@C1     ;SEE IF COUNT ERROR
 4006  017012  001437                         BEQ     ER4
 4007  017014  017703  161500                 MOV     @CS,R3          ;GET CONT STATUS REG
 4008  017020  042703  000307                 BIC     #307,R3         ;MASK OUT IR,OR,UNIT NO. & SEE IF OTHER ERRORS
 4009  017024  001406                         BEQ     1$              ;IF NOT: BR
 4010  017026  005737  000676                 TST     TMFLG           ;SEE IF TAPE MARK TIME
 4011  017032  001425                         BEQ     3$              ;IF NOT: BR
 4012  017034  042703  001000                 BIC     #1000,R3        ;MASK MISSED TRANS & BR IF OTHER ERRORS
 4013  017040  001022                         BNE     3$
 4014  017042  032777  060000  161440  1$:    BIT     #60000,@C1      ;SEE IF EITHER TRE OR MCPE
 4015  017050  001420                         BEQ     ER4             ;IF NOT: BR
 4016  017052  005737  000676                 TST     TMFLG           ;SEE IF TM TIME
 4017  017056  001413                         BEQ     3$              ;IF NOT: BR
 4018  017060  017703  161440                 MOV     @ER,R3          ;GET ERROR REGISTER
 4019  017064  032737  000010  000552         BIT     #10,UDES        ;SEE IF EVEN PARITY
 4020  017072  001402                         BEQ     2$              ;IF NOT: BR
 4021  017074  042703  000100                 BIC     #100,R3         ;MASK PAR
 4022  017100  042703  001000          2$:    BIC     #1000,R3        ;MASK FCE
 4023  017104  001402                         BEQ     ER4             ;IF NO ERRORS EXCEPT FCE: BR
 4024  017106  005237  020230          3$:    INC     CONER           ;SET CONT ERROR FLAG
 4025
 4026  017112  032777  040000  161402  ER4:   BIT     #40000,@DS      ;SEE IF DRIVE ERROR
 4027  017120  001420                         BEQ     ER6             ;IF NOT: BR
 4028  017122  005737  000676                 TST     TMFLG           ;SEE IF TAPE MARK TIME
 4029  017126  001413                         BEQ     2$              ;IF NOT: BR
 4030  017130  017703  161370                 MOV     @ER,R3          ;GET ER
 4031  017134  032737  000010  000552         BIT     #10,UDES        ;SEE IF EVEN PARITY
 4032  017142  001402                         BEQ     1$              ;IF NOT: BR
 4033  017144  042703  000100                 BIC     #100,R3         ;MASK PAR
 4034  017150  042703  001000          1$:    BIC     #1000,R3        ;MASK OUT FCE & BRANCH IF
```

```
 4035  017154  001402                          BEQ     ER6             ;NO OTHER ERRORS
 4036  017156  005237  020232          2$:     INC     DRVER           ;SET DRIVER ERROR FLAG
 4037
 4038  017162  013737  014744  020246  ER6:    MOV     EXCRC,CRCSV     ;SAVE EXPECTED CRC
 4039  017170  013737  014746  020244          MOV     EXLRC,LRCSV     ;AND EXPECTED LRC
 4040  017176  032737  002000  000552          BIT     #2000,UDES
 4041  017204  001062                          BNE     ERPT            ;IF IN PE MODE: BR
 4042  017206  032777  020000  161374          BIT     #20000,@SWR     ;SEE IF NO DATA CHECK
 4043  017214  001056                          BNE     ERPT            ;IF NOT: BR (ALLOW READ OF UNKNOWN TAPES)
 4044  017216  032737  000040  000672          BIT     #40,MTC1        ;SEE IF WRITE OR READ OP
 4045  017224  001452                          BEQ     ERPT            ;IF NOT: BR
 4046  017226  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
 4047  017232  001405                          BEQ     1$              ;IF NOT: BR
 4048  017234  005037  014744                  CLR     EXCRC
 4049  017240  012737  000023  014746          MOV     #23,EXLRC       ;SET CRC/LRC FOR TM
 4050  017246  032737  000060  000552  1$:     BIT     #60,UDES        ;SEE IF FORMAT 14
 4051  017254  001036                          BNE     ERPT            ;IF NOT: BR
 4052  017256  017703  161246                  MOV     @CC,R3          ;GET CRC CHARACTER
 4053  017262  042703  177000                  BIC     #177000,R3
 4054  017266  023703  014744                  CMP     EXCRC,R3
 4055  017272  001402                          BEQ     2$              ;IF CRC GOOD: BR
 4056  017274  005237  020240                  INC     CRCER           ;SET ERROR FLAG
 4057  017300  017703  161230          2$:     MOV     @MR,R3          ;GET LRC
 4058  017304  000303                          SWAB    R3
 4059  017306  005703                          TST     R3
 4060  017310  100002                          BPL     3$
 4061  017312  052703  000400                  BIS     #400,R3
 4062  017316  042703  177000          3$:     BIC     #177000,R3
 4063  017322  023703  014746                  CMP     EXLRC,R3
 4064  017326  001411                          BEQ     ERPT            ;IF LRC GOOD: BR
 4065  017330  010337  020242                  MOV     R3,ACTLRC       ;SAVE ACTUAL LRC
 4066  017334  005237  020236                  INC     LRCER           ;SET LRC ERROR FLAG
 4067  017340  005737  000562                  TST     RDCMD           ;SEE IF READ REVERSE
 4068  017344  001402                          BEQ     ERPT            ;IF NOT: BR
 4069  017346  005037  020236                  CLR     LRCER           ;ELSE CLEAR LRC ERROR
 4070  017352  012703  000006          ERPT:   MOV     #6,R3
 4071  017356  005037  000706                  CLR     SERFL           ;CLEAR ERROR FLAG
 4072  017362  005037  000722                  CLR     ERSAV
 4073  017366  012704  020226                  MOV     #BAER,R4
 4074  017372  005724                  ERPTT:  TST     (R4)+           ;SEE IF ANY ERROR
 4075  017374  001004                          BNE     ERPTG           ;IF SO: BR
 4076  017376  005303                          DEC     R3
 4077  017400  001374                          BNE     ERPTT
 4078  017402  000137  020170                  JMP     ERPX1
 4079  017406  005237  000706          ERPTG:  INC     SERFL           ;SET ERROR FLAG
 4080  017412  017737  161106  000722          MOV     @ER,ERSAV       ;SAVE ERROR REGISTER
 4081  017420  032777  002000  161162          BIT     #2000,@SWR      ;SEE IF PRINT
 4082  017426  001420                          BEQ     ERPTO           ;IF SO: BR
 4083  017430  022737  000002  000712          CMP     #2,RTYFL        ;SEE IF READ RETRY
 4084  017436  001006                          BNE     ERPTG1          ;IF NOT: BR
 4085  017440  013703  000702                  MOV     RTCNT,R3
 4086  017444  005203                          INC     R3              ;BUMP RETRY COUNT
 4087  017446  020337  000604                  CMP     R3,RETRY        ;SEE IF LAST RETRY
 4088  017452  001406                          BEQ     ERPTO           ;IF SO: BR
 4089  017454  022737  000002  020232  ERPTG1: CMP     #2,DRVER        ;SEE IF TM STATUS ERROR
 4090  017462  001402                          BEQ     ERPTO           ;IF SO: BR
```

```
017464 000137 020050                JMP     ERPX0
017470 005237 000670        ERPT0:  INC     PFLG
017474 004737 022012                JSR     PC,PAPRT        ;PRINT HEADER
017500 013737 000652 017510         MOV     EMADDR,1$       ;GET ADDRESS OF ERROR MSG HEADER
017506 000004                       TYPE
017510 000000               1$:     .WORD   0               ;ADDRESS OF ERROR MESSAGE HEADER
017512 004737 020250                JSR     PC,FRPRT        ;PRINT F OR R
017516 005737 000676                TST     TMFLG
017522 001406                       BEQ     ERPT1
017524 022737 025012 000652         CMP     #MSG54,EMADDR
017532 001402                       BEQ     ERPT1
017534 000004 025030                TYPE,MSG56              ;TYPE 'TM'
017540 005737 020230        ERPT1:  TST     CONER
017544 001412                       BEQ     ERPT2           ;IF NO CONT ERROR: BR
017546 000004 023737                TYPE,MSG23              ;TYPE'CS1'
017552 017703 160732                MOV     @C1,R3
017556 104400                       TYPOCT                  ;PRINT CONTROL 1
017560 000004 023764                TYPE,MSG23D             ;TYPE CS TAG
017564 017703 160730                MOV     @CS,R3
017570 104400                       TYPOCT                  ;PRINT CONT STATUS
017572 005737 020232        ERPT2:  TST     DRVER
017576 001412                       BEQ     ERPT3           ;IF SO DRIVE ERROR: BR
017600 000004 023772                TYPE,MSG23E             ;TYPE DS TAG
017604 017703 160712                MOV     @DS,R3
017610 104400                       TYPOCT                  ;PRINT DRIVE STATUS
017612 000004 023777                TYPE,MSG23F             ;TYPE ER TAG
017616 017703 160702                MOV     @ER,R3
017622 104400                       TYPOCT                  ;PRINT DRIVE ERROR
017624 005737 020226        ERPT3:  TST     BAER
017630 001412                       BEQ     ERPT4           ;IF NO BA ERROR: BR
017632 000004 023752                TYPE,MSG23B             ;TYPE BA TAG
017636 017703 160652                MOV     @BA,R3
017642 104400                       TYPOCT                  ;PRINT BUS ADDRESS
017644 000004 023520                TYPE,DASH
017650 013703 020224                MOV     CADER,R3
017654 104400                       TYPOCT                  ;PRINT EXPT BUS ADDRESS
017656 005737 020234        ERPT4:  TST     FCER
017662 001405                       BEQ     ERPT5           ;IF NO FC ERROR: BR
017664 000004 023757                TYPE,MSG23C             ;TYPE FC TAG
017670 017703 160622                MOV     @FC,R3
017674 104400                       TYPOCT                  ;PRINT FRAME COUNT
017676 000004 023745        ERPT5:  TYPE,MSG23A             ;TYPE WC TAG
017702 017703 160604                MOV     @WC,R3
017706 104400                       TYPOCT                  ;PRINT WORD COUNT
017710 005737 020240                TST     CRCER
017714 001414                       BEQ     ERPT5A          ;IF NO CRC ERROR: BR
017716 000004 025055                TYPE,MSG58              ;TYPE CRC TAG
017722 017703 160602                MOV     @CC,R3
017726 042703 177000                BIC     #177000,R3
017732 104400                       TYPOCT                  ;PRINT ACTUAL CRC
017734 000004 023520                TYPE,DASH
017740 013703 014744                MOV     EXCRC,R3
017744 104400                       TYPOCT                  ;PRINT EXPECTED CRC
017746 005737 020236        ERPT5A: TST     LRCER
017752 001412                       BEQ     ERPT6           ;IF NO LRC ERROR: BR
017754 000004 025063                TYPE,MSG59              ;TYPE LRC ERR TAG
```

```
 4147  017760  013703  020242                    MOV     ACTLRC,R3
 4148  017764  104400                            TYPOCT                          ;PRINT ACTUAL LRC
 4149  017766  000004  023520                    TYPE,DASH
 4150  017772  013703  014746                    MOV     EXLRC,R3
 4151  017776  104400                            TYPOCT                          ;PRINT EXPECTED LRC
 4152  020000  005737  020232          ERPT6:    TST     DRVER
 4153  020004  001420                            BEQ     ERPT7                   ;IF NO DRIVE ERROR: BR
 4154  020006  032737  002000  000552            BIT     #2000,UDES
 4155  020014  001414                            BEQ     ERPT7                   ;IF NO PE: BR
 4156  020016  017704  160502                    MOV     @ER,R4
 4157  020022  042704  075477                    BIC     #75477,R4               ;MASK OUT ALL BUT BITS 15,10,7,6
 4158  020026  001407                            BEQ     ERPT7                   ;IF NO CONDITIONALS SET: BR
 4159  020030  000004  024011                    TYPE,MSG23H                     ;TYPE CC TAG
 4160  020034  017703  160470                    MOV     @CC,R3
 4161  020040  042703  177000                    BIC     #177000,R3              ;MASK CC
 4162  020044  104400                            TYPOCT                          ;PRINT CHECK CHARACTERS
 4163  020046  000240                  ERPT7:    NOP
 4164  020050  005777  160534          ERPX0:    TST     @SWR                    ;BRANCH IF NOT HALT ON ERROR
 4165  020054  100012                            BPL     ERPX
 4166  020056  000000                            HALT
 4167  020060  005737  000670                    TST     PFLG                    ;SEE IF HAVE PRINTED
 4168  020064  001006                            BNE     ERPX                    ;IF SO: BR
 4169  020066  032777  002000  160514            BIT     #2000,@SWR              ;SEE IF SHOULD PRINT
 4170  020074  001002                            BNE     ERPX                    ;IF NOT: BR
 4171  020076  000137  017470                    JMP     ERPTO                   ;PRINT ERROR
 4172  020102  005037  000670          ERPX:     CLR     PFLG
 4173  020106  005737  000566                    TST     CRCC                    ;BRANCH IF CRC ERROR
 4174  020112  001007                            BNE     1$                      ;CORRECTION DESIRED
 4175  020114  012777  000040  160376            MOV     #40,@CS                 ;ELSE INIT
 4176  020122  013777  000550  160370            MOV     DVN,@CS                 ;RESET DRIVE NUMBER
 4177  020130  000414                            BR      2$
 4178  020132  012777  000011  160350  1$:       MOV     #11,@C1                 ;DRIVE CLEAR
 4179  020140  017704  160362                    MOV     @AS,R4
 4180  020144  010477  160356                    MOV     R4,@AS                  ;CLEAR AS
 4181  020150  013704  000510                    MOV     C1,R4
 4182  020154  005204                            INC     R4
 4183  020156  152714  000100                    BISB    #100,(R4)               ;RESET TRE
 4184  020162  013777  000552  160352  2$:       MOV     UDES,@TC                ;RESET TC
 4185  020170  032737  000040  000672  ERPX1:    BIT     #40,MTC1
 4186  020176  001411                            BEQ     ERPX2                   ;IF NOT READ/WRITE OP: BR
 4187  020200  005737  000676                    TST     TMFLG
 4188  020204  001406                            BEQ     ERPX2                   ;IF NOT TM TIME: BR
 4189  020206  013737  020246  014744            MOV     CRCSV,EXCRC             ;RESTORE CRC
 4190  020214  013737  020244  014746            MOV     LRCSV,EXLRC             ;RESTORE LRC
 4191  020222  000207                  ERPX2:    RTS     PC                      ;EXIT
 4192  020224  000000                  CADER:    0                               ;EXPT ADDRESS SAVE
 4193  020226  000000                  BAER:     0
 4194  020230  000000                  CONER:    0
 4195  020232  000000                  DRVER:    0
 4196  020234  000000                  FCER:     0
 4197  020236  000000                  LRCER:    0
 4198  020240  000000                  CRCER:    0
 4199  020242  000000                  ACTLRC:   0
 4200  020244  000000                  LRCSV:    0
 4201  020246  000000                  CRCSV:    0
 4202
```

```
                                        ;*********************************************************
                                        ;F FOR FORWARD/R FOR REVERSE PRINT SUBROUTINE:
                                        ;
                                        ;THIS SUBROUTINE IS USED TO PRINT OUT THE
                                        ;TAPE DIRECTION USED WHEN ANY ERROR IS
                                        ;DETECTED IN STATUS OF READ OR WRITE, DATA, OR
                                        ;SPACING OPERATIONS.
                                        ;*********************************************************

020250  032737  000010  000672  FRPRT:  BIT     #10,MTC1        ;SEE IF WRITE COMMAND
020256  001414                          BEQ     3$              ;IF SO: BR
020260  012737  023655  020306          MOV     #MSG17,2$       ;PRSET MESSAGE TO READ REVERSE
020266  032737  000002  000672          BIT     #2,MTC1         ;BRANCH IF REVERSE
020274  001003                          BNE     1$
020276  012737  023652  020306          MOV     #MSG16,2$       ;SET FORWARD MESSAGE
020304  000004                  1$:     TYPE                    ;TYPE MSG
020306  000000                  2$:     .WORD   0
020310  000207                  3$:     RTS     PC              ;EXIT

                                        ;ROUTINE TO MARK UNIT OFF LINE

020312  013701  000674          OFFLINE:MOV     UNP,R1  ;GET UNIT POINTER
020316  052761  040000  000742          BIS     #40000,UN1(R1)  ;MARK UNIT OFF LINE
020324  000004  024061                  TYPE,MSG25              ;TYPE 'SLAVE UNSAFE-NO FURTHER TESTING ON SLAVE
020330  005737  000734                  TST     ASEQF           ;BRANCH IF NOT IN AUTO SEQUENCE
020334  001406                          BEQ     1$
020336  000004  026246                  TYPE,MSG123             ;TYPE 'AUTO-SEQ TEST WILL RESTART
020342  012706  000500                  MOV     #500,SP         ;RESET STACK PTR
020346  000137  021226                  JMP     ASEQ0           ;RESTART AUTO-SEQ
020352  105337  004731          1$:     DECB    REOTC+1         ;DECREMENT UNITS TO TEST CTR
020356  001003                          BNE     2$
020360  000004  026210                  TYPE,MSG122             ;TYPE 'NO UNITS LEFT TO TEST: HALT'
020364  000000                          HALT
020366  000137  004154          2$:     JMP     REOT

4238
```

```
                                ;*********************************************************
                                ;TAPE COMMAND EXECUTE SUBROUTINE:
                                ;
                                ;THIS SUBROUTINE IS USED TO EXECUTE THE
                                ;MAG TAPE COMMAND DESCRIBED BY THE READ
                                ;OR WRITE ROUTINE.  THE FINAL COMMAND IS
                                ;SENT TO THE DEVICE REGISTER ALONG WITH THE
                                ;INTERRUPT ENABLE AND GO BITS.
                                ;ONCE THE COMMAND IS ISSUED, AN INTERRUPT
                                ;TIMER IS STARTED AND IF NO INTERRUPT IS RETURNED
                                ;BEFORE TIME OUT OCCURS, AN ERROR WILL BE
                                ;PRINTED AND THE PROGRAM STOPPED.  TESTING MAY
                                ;BE RESUMED BY PRESSING THE CONTINUE SWITCH.
                                ;TWO INTERRUPT HANDLERS ARE USED, ONE FOR MAG TAPE
                                ;AND ANOTHER FOR TELETYPE (TTY).
                                ;UPON RECEIPT OF A MAG TAPE INTERRUPT, HOUSEKEEPING
                                ;IS PERFORMED AND CONTROL RETURNED TO THE CALLING
                                ;ROUTINE (READ,WRITE,ETC).
                                ;RECEIPT OF A TTY INTERRUPT WILL CAUSE THE
                                ;PROGRAM TO CHECK FOR ENTRY OF A CNTRL C CHARACTER.
                                ;IF NOT CNTRL C, THEN CONTINUATION OF WAIT FOR MAG
                                ;TAPE INTERRUPT IS RETURNED.  IF, HOWEVER, THE TTY
                                ;INTERRUPT WAS CAUSED BY ENTRY OF A CNTRL C,
                                ;THEN AT THIS TIME REQUESTS FOR NEW STALL VALUES
                                ;ARE PRINTED AND THE RESPONSES ENTERED.  RESUMPTION
                                ;OF TAPE INTERRUPT WAIT IS THEN RESUMED.
                                ;*********************************************************

020372  005037  000644          TAPG:   CLR     TEMP1
020376  013777  000550  160114          MOV     DVN,@CS         ;SET DRIVE NO.
020404  032777  040000  160112  1$:     BIT     #40000,@ER      ;SEE IF UNIT SAFE
020412  001402                          BEQ     TAPG3           ;IF SO: BR
020414  000137  020312                  JMP     OFFLINE         ;GO MARK UNIT OFF-LINE
020420  032777  020000  160074  TAPG3:  BIT     #20000,@DS      ;SEE IF PIP RESET
020426  001410                          BEQ     TAPG3F          ;IF SO: BR
020430  004737  022012                  JSR     PC,PAPRT        ;PRINT HEADER
020434  000004  026044                  TYPE,MSG116             ;TYPE MSG
020440  032777  020000  160054  1$:     BIT     #20000,@DS
020446  001374                          BNE     1$              ;AWAIT PIP RESET
020450  022737  000026  000672  TAPG3F: CMP     #26,MTC1        ;SEE IF WRITE TM
020456  001003                          BNE     TAPG3A          ;IF NOT: BR
020460  012704  177777                  MOV     #-1,R4          ;ELSE SET FC FOR -1
020464  000406                          BR      TAPG3B
020466  013704  000556  TAPG3A: MOV     FMCNT,R4
020472  032704  000001                  BIT     #1,R4
020476  001401                          BEQ     TAPG3B
020500  005304                          DEC     R4
020502  000261          TAPG3B: SEC
020504  006004                          ROR     R4              ;SET WC = FC/2 FOR NORMAL FORMAT
020506  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP FORMAT
020514  001402                          BEQ     TAPG3C          ;IF NOT: BR
020516  000261                          SEC
020520  006004                          ROR     R4              ;SET WC = FC/4 FOR CORE DUMP
020522  010477  157764  TAPG3C: MOV     R4,@WC          ;SET WORD COUNT
020526  012777  000011  157754          MOV     #11,@C1         ;DRIVE CLEAR
```

```
 4295  020534  017777  157756  157754          MOV     @FC,@FC         ;RESET FC LOADED
 4296  020542  005737  000570                  TST     INTRF           ;SEE IF INTERCHANGE READ
 4297  020546  001407                          BEQ     TAPG3D          ;IF NOT: BR
 4298  020550  032737  000040  000672          BIT     #40,MTC1        ;SEE IF READ OP
 4299  020556  001403                          BEQ     TAPG3D          ;IF NOT: BR
 4300  020560  012777  000003  157746          MOV     #3,@MR          ;SET INTERCHANGE READ MAINT. MODE
 4301  020566  013704  000672          TAPG3D: MOV     MTC1,R4         ;GET COMMAND
 4302  020572  042704  177707                  BIC     #177707,R4      ;MASK OP CODE
 4303  020576  022704  000030                  CMP     #30,R4          ;SEE IF SPACE OP CODE
 4304  020602  001403                          BEQ     TAPG3E          ;IF SO: BR
 4305  020604  012737  177740  000666          MOV     #-40,STAL       ;SET INTERRUPT DELAY MULT TO 40
 4306  020612  052737  000101  000672  TAPG3E: BIS     #101,MTC1       ;SET INTERRUPT ENABLE AND GO
 4307  020620  000240                          NOP
 4308  020622  013777  000672  157660          MOV     MTC1,@C1        ;EXECUTE COMMAND
 4309  020630  005077  157752                  CLR     @PSW            ;CLEAR PRIORITY
 4310  020634  005037  000644                  CLR     TEMP1
 4311  020640  005237  000644          TAPG4:  INC     TEMP1           ;SEE IF HAVE TIMED OUT
 4312  020644  001375                          BNE     TAPG4           ;IF NOT: BR
 4313  020646  005237  000666                  INC     STAL
 4314  020652  001372                          BNE     TAPG4           ;DO TIME DELAY MULTIPLIER
 4315  020654  012777  000340  157724  TAPG5:  MOV     #340,@PSW       ;RESET PRIORITY
 4316  020662  032777  002000  157720          BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
 4317  020670  001013                          BNE     TAPG6           ;IF NOT: BR
 4318  020672  004737  022012                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
 4319  020676  013737  000652  020706          MOV     EMADDR,1$
 4320  020704  000004                          TYPE                    ;TYPE MSG
 4321  020706  000000                  1$:     .WORD   0
 4322  020710  004737  020250                  JSR     PC,FRPRT        ;PRINT F OR R
 4323  020714  000004  024042                  TYPE,MSG24              ;TYPE 'NO INTERRUPT'
 4324  020720  005777  157664          TAPG6:  TST     @SWR            ;BRANCH IF NOT HALT ON ERROR
 4325  020724  100001                          BPL     TAPG7
 4326  020726  000000                          HALT
 4327  020730  000137  021162          TAPG7:  JMP     MTINTA          ;RETURN TO CALLING ROUTINE
 4328
```

```
 4329
 4330                                          ;TTY INTERRUPT HANDLER
 4331  020734  017746  157654          TTINT:  MOV     @TKB,-(SP)      ;GET CHARACTER
 4332  020740  042716  000200                  BIC     #200,(SP)       ;STRIP PARITY BIT
 4333  020744  122716  000003                  CMPB    #3,(SP)         ;BRANCH IF NOT ^C
 4334  020750  001005                          BNE     1$
 4335  020752  000005                          RESET                   ;RESET ALL I/O
 4336  020754  005077  157626                  CLR     @PSW            ;CLEAR PSW
 4337  020760  000137  000200                  JMP     @#200           ;RESTART PROGRAM
 4338  020764  122716  000001          1$:     CMPB    #1,(SP)         ;BRANCH IF NOT ^A
 4339  020770  001015                          BNE     2$
 4340  020772  022737  000176  000610          CMP     #SWREG,SWR      ;BRANCH IF HARDWARE SWR IS INVOKED
 4341  021000  001014                          BNE     3$
 4342  021002  012737  177570  000610          MOV     #177570,SWR     ;INVOKE HARWARE SWR
 4343  021010  004737  022432                  JSR     PC,.SAVE        ;SAVE REGISTERS ON THE STACK
 4344  021014  000004  026162                  TYPE,MSG121             ;TYPE 'HARDWARE SWR IN USE'
 4345  021020  004737  022454                  JSR     PC,.RESTORE     ;RESTORE REGISTERS
 4346  021024  022716  000007          2$:     CMP     #7,(SP)         ;BRANCH IF NOT ^G
 4347  021030  001005                          BNE     4$
 4348  021032  012737  000176  000610  3$:     MOV     #SWREG,SWR      ;INVOKE SOFTWARE SWR
 4349  021040  004737  022346                  JSR     PC,GTSWR        ;GET SWITCHES
 4350  021044  022716  000002          4$:     CMP     #2,(SP)         ;BRANCH IF NOT ^B
 4351  021050  001041                          BNE     6$
 4352  021052  004737  022432                  JSR     PC,.SAVE        ;SAVE REGISTERS ON THE STACK
 4353  021056  005237  013444                  INC     SCVFL           ;SET FLAG
 4354  021062  004737  013226                  JSR     PC,TINP3A       ;GO CHECK CRC CORRECTION
 4355  021066  032777  000040  157514          BIT     #40,@SWR        ;BRANCH IF NOT YOZZLING
 4356  021074  001425                          BEQ     5$
 4357  021076  000004  024652                  TYPE,MSG44              ;REQUEST NEW YOZZLE STALL
 4358  021102  013703  000602                  MOV     YSTAL,R3
 4359  021106  104400                          TYPOCT                  ;PRINT PRESENT STALL
 4360  021110  012705  000602                  MOV     #YSTAL,R5       ;SET ADDRESS OF YSTL
 4361  021114  012701  000007                  MOV     #7,R1           ;SET NUMBER OF CHAR TO INPUT
 4362  021120  012702  177777                  MOV     #-1,R2          ;SET MAXIMUM LIMIT
 4363  021124  012703  002000                  MOV     #2000,R3        ;SET MINIMUM LIMIT
 4364  021130  004737  022476                  JSR     PC,TTR          ;GO GET VALUE
 4365  021134  004737  022454                  JSR     PC,.RESTORE     ;RESTORE REGISTERS
 4366  021140  005726                          TST     (SP)+           ;POP CHARACTER OF THE STACK
 4367  021142  012716  010770                  MOV     #YOZ,(SP)       ;RETURN TO 'YOZ'
 4368  021146  000002                          RTI                     ;RETURN TO YOZ
 4369  021150  004737  022454          5$:     JSR     PC,.RESTORE
 4370  021154  005726                  6$:     TST     (SP)+           ;POP CHARACTER OFF THE STACK
 4371  021156  000002                          RTI                     ;RETURN
 4372
 4373                                          ;MAG TAPE INTERRUPT HANDLER
 4374  021160  000240                  MTINT:  NOP
 4375  021162  042777  000037  157344  MTINTA: BIC     #37,@MR         ;CLEAR MAINT MODE
 4376  021170  013716  000662                  MOV     RTRN,(SP)       ;SET RETURN TO (RTRN)
 4377  021174  000002                          RTI                     ;RETURN
```

```
                                        ;**********************************
                                        ;AUTO SEQUENCE
                                        ;
                                        ;THIS ROUTINE ,ENTERED VIA STARTING ADDRESS 240
                                        ;WILL EXERCISE ALL AVAI_ABLE SLAVES ON ALL AVAILABLE
                                        ;DRIVES IN BOTH PE AND NRZ ACCORDING TO THE PRESELECTED
                                        ;TEST PLAN. IF NRZ ONLY, PE TESTING WILL NOT BE ATTEMPTED.
                                        ;**********************************

021176  000004  025477        ASEQ:   TYPE,MSG104             ;REQUEST 'AUTO CONT'
021202  012705  000740                MOV     #ASEQCF,R5      ;SET ADDRESS OF ENTRY
021206  012701  000002                MOV     #2,R1           ;SET SIZE OF ENTRY
021212  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
021216  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
021222  004737  022476                JSR     PC,TTR          ;GO GET INPUT
021226  005037  000550        ASEQ0:  CLR     DVN             ;SET DRIVE # 0
021232  004737  021340        ASEQ1:  JSR     PC,HRDS         ;GO SELECT HARDWARE CONFIGURATION
021236  000004  025447                TYPE,MSG101             ;TYPE '******...***'
021242  000004  024756                TYPE,MSG52A             ;TYPE 'DRIVE (TM03) = '
021246  013703  000550                MOV     DVN,R3
021252  104400                        TYPOCT                  ;PRINT DRIVE #
021254  000004  026335                TYPE,SPACE
021260  000004  024400                TYPE,MSG32              ;TYPE ' SLAVE # = '
021264  012700  000742                MOV     #UN1,R0         ;POINT TO START OF SLAVE TABLE
021270  012003                1$:     MOV     (R0)+,R3
021272  100402                        BMI     2$
021274  104400                        TYPOCT                  ;PRINT SLAVE TABLE
021276  000774                        BR      1$              ;DO ALL
021300  004737  021524        2$:     JSR     PC,AMOD1        ;GO DO MODE 1(NRZ)
021304  004737  021656                JSR     PC,AMOD2        ;GO DO MODE 2(PE)
021310  022737  000007  000550 ASEQ4:  CMP     #7,DVN          ;SEE IF DONE ALL DRIVES
021316  001403                        BEQ     ASEQX           ;IF SO: BR
021320  005237  000550                INC     DVN             ;BUMP DRIVE NUMBER
021324  000742                        BR      ASEQ1           ;CONTINUE
021326  005737  000740        ASEQX:  TST     ASEQCF          ;SEE IF CONTINUOUS AUTO SEQ
021332  001335                        BNE     ASEQ0           ;++B CONTINUE TESTING
021334  000137  004662                JMP     TEND
```

```
4415
4416                                        ;SUBROUTINE TO SELECT AUTO SEQUENCE HARDWARE********
4417
4418  021340  005037  004730        HRDS:   CLR     REOTC           ;CLEAR EOT UNIT CNTR
4419  021344  012777  000040  157146        MOV     #40,@CS         ;INIT
4420  021352  013777  000550  157140        MOV     DVN,@CS         ;SET DRIVE
4421  021360  005777  157124                TST     @C1             ;ACCESS DRIVE
4422  021364  032777  010000  157126        BIT     #10000,@CS      ;TEST FOR NON-EXISTANT DRIVE
4423  021372  001403                        BEQ     2$              ;IF DRIVE AVAIL: BR
4424  021374  005726                1$:     TST     (SP)+           ;RESET STACK POINTER
4425  021376  000137  021310                JMP     ASEQ4           ;GO SEE IF TRIED ALL DRIVES
4426  021402  017700  157130        2$:     MOV     @DT,R0          ;++B GET CONTENTS OF DRIVE TYPE REG
4427  021406  042700  002007                BIC     #2007,R0        ;++B CLEAR SPR AND SPEED BITS
4428  021412  022700  140050                CMP     #140050,R0      ;++B BRANCH IF NOT TM03 MAGTAPE DRIVE
4429  021416  001366                        BNE     1$
4430  021420  005000                        CLR     R0
4431  021422  012701  000742                MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4432  021426  005737  003034                TST     CHNFLG          ;BRANCH IF NOT IN CHAIN MODE
4433  021432  001410                        BEQ     3$
4434  021434  122737  000006  000041        CMPB    #6,@#41         ;BRANCH IF NOT LOADED VIA TMDP
4435  021442  001004                        BNE     3$
4436  021444  005737  000550                TST     DVN             ;BRANCH IF NOT DRIVE 0
4437  021450  001001                        BNE     3$
4438  021452  005200                        INC     R0              ;DO NOT TEST SLAVE 0
4439  021454  010077  157062        3$:     MOV     R0,@TC          ;SELECT SLAVE
4440  021460  032777  010000  157034        BIT     #10000,@DS      ;SEE IF SLAVE AVAIL FOR TEST(MOL)
4441  021466  001404                        BEQ     4$              ;IF NOT: BR
4442  021470  062737  000401  004730        ADD     #401,REOTC      ;INCREMENT UNITS TO TEST COUNT
4443  021476  010021                        MOV     R0,(R1)+        ;LOAD SLAVE # INTO SLAVE TABLE
4444  021500  005200                4$:     INC     R0              ;STEP TO NEXT SLAVE
4445  021502  022700  000010                CMP     #10,R0          ;BRANCH IF ALL SLAVE NOT DONE
4446  021506  001362                        BNE     3$
4447  021510  005737  004730        5$:     TST     REOTC           ;SEE IF FOUND ANY SLAVES
4448  021514  001727                        BEQ     1$              ;IF NOT: BR
4449  021516  012711  177777                MOV     #-1,(R1)        ;TERMINATE SLAVE TABLE
4450  021522  000207                        RTS     PC              ;RETURN TO SEQ
```

```
4451
4452                                        ;SUBROUTINE TO SELECT NRZ AUTO TEST MODE**********
4453
4454  021524  005037  000654        AMOD1:  CLR     BLCNTR          ;ASSURE BLOCK COUNTER IS 0
4455  021530  012701  000742                MOV     #UN1,R1         ;GET START OF SLAVE TABLE
4456  021534  052721  001700        1$:     BIS     #1700,(R1)+     ;SET ALL SLAVE TO NRZ,NORM,ODD
4457  021540  022711  177777                CMP     #-1,(R1)        ;LOOP UNTIL REACED END OF TABLE
4458  021544  001373                        BNE     1$
4459  021546  004737  004744                JSR     PC,RWNDA        ;GO REWIND ALL AVAIL SLAVES
4460  021552  012737  000006  000736        MOV     #6,ABLCNT       ;SET NUMBER OF BLOCKS FOR MODE 1
4461  021560  012737  174000  000556        MOV     #-4000,FMCNT    ;SET FC = 4000
4462  021566  012737  000100  000554        MOV     #100,RCNT       ;SET REC CNTR = 100
4463  021574  012737  000001  000560        MOV     #1,PATRN        ;SELECT PATTERN 1
4464  021602  005037  000564                CLR     TMEX            ;ASSURE NO TMK
4465  021606  005037  000570                CLR     INTRF           ;ASSURE NORMAL READ
4466  021612  004737  003352                JSR     PC,STAUTO       ;GO DO AUTO MODE 1
4467  021616  012737  000010  000560        MOV     #10,PATRN       ;SELECT PATTERN 10
4468  021624  004737  003352                JSR     PC,STAUTO       ;GO DO PATTERN 10
4469  021630  012737  000014  000560        MOV     #14,PATRN       ;SELECT PATTERN 14
4470  021636  004737  003352                JSR     PC,STAUTO
4471  021642  012737  177777  000560  3$:   MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
4472  021650  004737  003352                JSR     PC,STAUTO
4473  021654  000207                        RTS     PC              ;RETURN TO SEQ
```

```
4474
4475                                        ;SUBROUTINE TO SELECT PE AUTO TEST MODE**********
4476
4477  021656  005037  000654          AMOD2:  CLR     BLCNTR          ;CLEAR BLOCK CNTR
4478  021662  012701  000742                  MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4479  021666  042711  001700          1$:     BIC     #1700,(R1)      ;CLEAR NRZ
4480  021672  052721  002300                  BIS     #2300,(R1)+     ;SET TO PE NORM, ODD
4481  021676  022711  177777                  CMP     #-1,(R1)        ;LOOP UNTIL END OF TABLE
4482  021702  001371                          BNE     1$
4483  021704  004737  004744                  JSR     PC,RWNDA        ;REWIND ALL SLAVES
4484  021710  012737  000006  000736          MOV     #6,ABLCNT       ;SET AUTO BLOCK COUNT
4485  021716  012737  174000  000556          MOV     #-4000,FMCNT    ;SET FC = 4000
4486  021724  012737  000100  000554          MOV     #100,RCNT       ;SET REC CNTR TO 100
4487  021732  012737  000010  000560          MOV     #10,PATRN       ;SELECT PATTERN 10
4488  021740  004737  003352                  JSR     PC,STAUTO       ;GO DO AUTO SEQ
4489  021744  012737  000014  000560          MOV     #14,PATRN       ;SELECT PATTERN 14
4490  021752  004737  003352                  JSR     PC,STAUTO
4491  021756  012737  000015  000560          MOV     #15,PATRN       ;SELECT PATTERN 15
4492  021764  004737  003352                  JSR     PC,STAUTO
4493  021770  012737  177777  000736          MOV     #-1,ABLCNT      ;FORCE TO END OF TAPE
4494  021776  012737  177777  000560          MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
4495  022004  004737  003352                  JSR     PC,STAUTO
4496  022010  000207                  3$:     RTS     PC              ;RETURN TO SEQ
4497
4498
```

```
 4499
 4500                                   ;*******************************************************
 4501                                   ;ERROR HEADER PRINT SUBROUTINE:
 4502                                   ;
 4503                                   ;THIS ROUTINE IS USED TO PRINT OUT A HEADER
 4504                                   ;WITH EACH ERROR MESSAGE.  THE PRINT IS IN TWO
 4505                                   ;LINES AND CONTAINS THE FOLLOWING INFORMATION.
 4506                                   ;LINE 1:  DRIVE NO. SLAVE NO. DENSITY PARITY FORMAT
 4507                                   ;LINE 2:  CURRENT BLOCK NUMBER, RECORD NUMBER IN
 4508                                   ;WHICH THE ERROR OCCURED PLUS THE TOTAL NUMBER
 4509                                   ;OF RECORDS IN THIS BLOCK, THE RECORD SIZE (NUMBER
 4510                                   ;OF CHARACTERS), AND THE ERROR TYPE (READ,WRITE, SPACE, ETC)
 4511                                   ;PLUS THE TAPE DIRECTION (FORWARD OR REVERSE).
 4512                                   ;ALL NUMBERS ARE IN OCTAL.
 4513                                   ;*******************************************************
 4514
 4515  022012  000004  024754  PAPRT:  TYPE,MSG52              ;TYPE 'DRIVE # = '
 4516  022016  013703  000550          MOV     DVN,R3
 4517  022022  104400                  TYPOCT                  ;PRINT DRIVE NUMBER
 4518  022024  000004  024400          TYPE,MSG32              ;TYPE 'SLAVE # = '
 4519  022030  013703  000552          MOV     UDES,R3
 4520  022034  042703  177770          BIC     #177770,R3
 4521  022040  104400                  TYPOCT                  ;PRINT SLAVE NUMBER
 4522  022042  000004  023522          TYPE,MSG1               ;TYPE DENSITY TAG  '*DE'
 4523  022046  013703  000552          MOV     UDES,R3
 4524  022052  000303                  SWAB    R3
 4525  022054  042703  177770          BIC     #177770,R3
 4526  022060  104400                  TYPOCT                  ;PRINT DENSITY
 4527  022062  000004  025071          TYPE,MSG61              ;TYPE PARITY TAG '*P'
 4528  022066  005003                  CLR     R3
 4529  022070  032737  000010  000552  BIT     #10,UDES
 4530  022076  001401                  BEQ     PAPRT0
 4531  022100  005203                  INC     R3              ;SET PARITY INDICATOR = EVEN
 4532  022102  104400          PAPRT0: TYPOCT                  ;PRINT PARITY BIT STATE
 4533  022104  000004  025075          TYPE,MSG62              ;TYPE FORMAT TAG '*F'
 4534  022110  013703  000552          MOV     UDES,R3
 4535  022114  006003                  ROR     R3
 4536  022116  006003                  ROR     R3
 4537  022120  006003                  ROR     R3              ;POSTION FORMAT BITS
 4538  022122  006003                  ROR     R3
 4539  022124  042703  177760          BIC     #177760,R3
 4540  022130  104400                  TYPOCT                  ;PRINT FORMAT
 4541  022132  000004  023565          TYPE,MSG8               ;TYPE PATTERN # TAG '*PATRN'
 4542  022136  005737  000560          TST     PATRN           ;BRANCH IF NOT RANDOM PATTERN
 4543  022142  100003                  BPL     PAPRTC
 4544  022144  000004  023655  PAPRTA: TYPE,MSG17              ;TYPE 'R' FOR RANDOM
 4545  022150  000403                  BR      PAPRTD
 4546  022152  013703  000560  PAPRTC: MOV     PATRN,R3
 4547  022156  104400                  TYPOCT                  ;PRINT PATRN NUMBER
 4548  022160  000004  023607  PAPRTD: TYPE,MSG13              ;TYPE BLOCK # TAG '*BN'
 4549  022164  013703  000654          MOV     BLCNTR,R3
 4550  022170  104400                  TYPOCT                  ;PRINT NUMBER
 4551  022172  000004  023615          TYPE,MSG14              ;TYPE RECORD # TAG '*RN'
 4552  022176  010003                  MOV     R0,R3           ;GET # OF RECORDS LEFT TO PROCESS
 4553  022200  032737  000010  000672  BIT     #10,MTC1        ;SEE IF WRITE OPERATION
 4554  022206  001416                  BEQ     PAPRT1          ;IF SO: BR
```

```
 4555  022210  022737  000030  000672          CMP     #30,MTC1        ;BRANCH IF SPACE FORWARD
 4556  022216  001412                          BEQ     PAPRT1
 4557  022220  005737  000562                  TST     RDCMD           ;BRANCH IF READ FORWARD
 4558  022224  001407                          BEQ     PAPRT1
 4559  022226  022737  000032  000672          CMP     #32,MTC1        ;BRANCH IF NOT SPACE REVERSE
 4560  022234  001007                          BNE     PAPRT3
 4561  022236  005737  000712                  TST     RTYFL           ;BRANCH IF NOT RETRYING
 4562  022242  001404                          BEQ     PAPRT3
 4563  022244  013703  000554          PAPRT1: MOV     RCNT,R3         ;GET # OF RECORDS TO PROCESS
 4564  022250  160003                  PAPRTY: SUB     R0,R3           ;FORM RECORD NUMBER
 4565  022252  005203                          INC     R3              ;++MP ADJUST RECORD NUMBER IN FORWARD DIRECTION
 4566  022254  104400                  PAPRT3: TYPOCT                  ;PRINT RECORD NUMBER
 4567  022256  000004  023520                  TYPE,DASH               ;TYPE A DASH '-'
 4568  022262  013703  000554                  MOV     RCNT,R3
 4569  022266  104400                          TYPOCT                  ;PRINT RECORD COUNT
 4570  022270  000004  023560                  TYPE,MSG7               ;TYPE RECORD SIZE TAG '*RS'
 4571  022274  013703  000556                  MOV     FMCNT,R3        ;GET CHARACTER COUNT
 4572  022300  005403                          NEG     R3              ;FORM TWO'S COMPLEMENT
 4573  022302  104400                          TYPOCT                  ;PRINT RECORD SIZE
 4574  022304  012737  000001  000664          MOV     #1,HDRFL        ;SET HEADER FLAG
 4575  022312  000207                          RTS     PC              ;RETURN
 4576
```

```
4577
4578                                    ;*******************************************************
4579                                    ;RANDOM NUMBER GENERATOR SUBROUTINE:
4580                                    ;
4581                                    ;THIS SUBROUTINE IS USED TO GENERATE THE RANDOM
4582                                    ;NUMBERS REQUIRED FOR USE AS RANDOM DATA,
4583                                    ;RECORD COUNT, AND CHARACTER COUNT.
4584                                    ;*******************************************************
4585
4586  022314  063737  000630  000626  RANG:   ADD     RANSAV,RANBAS
4587  022322  063737  000626  000630          ADD     RANBAS,RANSAV   ;GET NEW NUMBER
4588  022330  023701  000630                  CMP     RANSAV,R1       ;SEE IF NUMBER TOO BIG
4589  022334  101367                          BHI     RANG            ;IF SO: BR
4590  022336  020237  000630                  CMP     R2,RANSAV       ;SEE IF NUMBER TOO SMALL
4591  022342  101364                          BHI     RANG            ;IF SO: BR
4592  022344  000207                          RTS     PC              ;EXIT
4593
4594                                  ;SUBROUTINE TO GET NEW SOFTWARE SWR
4595
4596  022346  022737  000176  000610  GTSWR:  CMP     #SWREG,SWR      ;BRANCH IF SOFTWARE SWR
4597  022354  001025                          BNE     1$              ;NOT INVOKED
4598  022356  004737  022432                  JSR     PC,..SAVE       ;SAVE REGISTERS ON THE STACK
4599  022362  000004  023500                  TYPE,$MSWR
4600  022366  017703  156216                  MOV     @SWR,R3         ;GET CURRENT SWR
4601  022372  104400                          TYPOCT
4602  022374  000004  023510                  TYPE,$MNEW              ;REQUEST NEW SWR SETTING
4603  022400  013705  000610                  MOV     SWR,R5          ;TTR ROUTINE RETURNS VALUE TO (R5)
4604  022404  012701  000007                  MOV     #7,R1           ;LIMIT RESPONSE TO 7 CHARS
4605  022410  012702  177777                  MOV     #177777,R2      ;BETWEEN 0 AND 177777
4606  022414  012703  000000                  MOV     #0,R3
4607  022420  004737  022476                  JSR     PC,TTR          ;GET RESPONSE
4608  022424  004737  022454                  JSR     PC,..RESTORE    ;RESTORE REGISTERS
4609  022430  000207                  1$:     RTS     PC              ;RETURN
4610
4611                                  ;;ROUTINE TO SAVE REGISTERS ON THE STACK
4612  022432  010546                  ..SAVE: MOV     %5,-(SP)        ;;R5 IS SAVED AT 12(SP)
4613  022434  010446                          MOV     %4,-(SP)        ;;R4 IS SAVED AT 10(SP)
4614  022436  010346                          MOV     %3,-(SP)        ;;R3 IS SAVED AT 6(SP)
4615  022440  010246                          MOV     %2,-(SP)        ;;R2 IS SAVED AT 4(SP)
4616  022442  010146                          MOV     %1,-(SP)        ;;R1 IS SAVED AT 2(SP)
4617  022444  010046                          MOV     %0,-(SP)        ;;R0 IS SAVED AT (SP)
4618  022446  016646  000014                  MOV     14(SP),-(SP)    ;;PUSH RETURN PC ON THE STACK
4619  022452  000207                          RTS     PC              ;;RETURN TO CALLER
4620
4621                                  ;;ROUTINE TO RESTORE REGISTERS SAVED ON THE STACK
4622  022454  012666  000014          ..RESTORE:MOV   (SP)+,14(SP)    ;;STORE RETURN PC ON STACK
4623  022460  012600                          MOV     (SP)+,%0
4624  022462  012601                          MOV     (SP)+,%1
4625  022464  012602                          MOV     (SP)+,%2
4626  022466  012603                          MOV     (SP)+,%3
4627  022470  012604                          MOV     (SP)+,%4
4628  022472  012605                          MOV     (SP)+,%5
4629  022474  000207                          RTS     PC              ;;RETURN
4630
```

```
                                        ;*********************************************************
                                        ;TTY ENTRY SUBROUTINE:
                                        ;
                                        ;THIS SUBROUTINE IS USED BY THE TEST CONDITION
                                        ;ENTRY ROUTINE TO READ THE RESPONSE ENTERED
                                        ;AT THE TTY AND CHECK THEM FOR LEGALITY AND
                                        ;LIMITS.  ALL RESPONSE MUST BE TYPED IN OCTAL
                                        ;(0-7) AND MUST FALL WITHIN THE LIMITS SET BY
                                        ;THE CALLING ROUTINE.
                                        ;IF AN ENTRY IS ILLEGAL OR OUTSIDE THE LIMITS,
                                        ;A QUESTION MARK IS TYPED (?) AND THE RESPONSE
                                        ;MAY BE REENTERED.
                                        ;ENTRIES MAY NOT EXCEED SIX (6) CHARACTERS AND
                                        ;MAY BE TERMINATED AT LESS THAN SIX BY TYPING A
                                        ;CARRIAGE RETURN
                                        ;*********************************************************

022476  010146              TTR:  MOV   R1,-(SP)        ;SAVE CHAR COUNT
022500  011601              10$:  MOV   (SP),R1         ;RESTORE CHAR COUNT (FOR ^U)
022502  005037  000644            CLR   TEMP1           ;CLEAR FIRST CHARACTER FLAG
022506  005000                    CLR   R0
022510  004737  022722      1$:   JSR   PC,TTIN         ;GO READ CHARACTER
022514  122737  000003  000642    CMPB  #3,TIB          ;BRANCH IF NOT ^C
022522  001003                    BNE   11$
022524  000005                    RESET
022526  000137  000200            JMP   @#200           ;RESTART AT 200
022532  122737  000015  000642 11$:  CMPB  #15,TIB      ;SEE IF CR
022540  001004                    BNE   2$              ;IF NOT: BR
022542  005737  000644            TST   TEMP1           ;SEE IF FIRST CHARACTER
022546  001455                    BEQ   9$              ;IF SO: BR
022550  000447                    BR    6$              ;ELSE GO LOAD VALUE
022552  122737  000025  000642 2$:   CMPB  #25,TIB      ;BRANCH IF NOT CONTROL U
022560  001003                    BNE   21$
022562  000004  024155            TYPE,MSG28            ;TYPE <CR><LF>
022566  000744                    BR    10$
022570  122737  000177  000642 21$:  CMPB  #177,TIB     ;BRANCH IF NOT 'RUBOUT'
022576  001010                    BNE   3$
022600  000241                    CLC                   ;REMOVE LAST CHARACTER
022602  006000                    ROR   R0
022604  006200                    ASR   R0
022606  006200                    ASR   R0
022610  000004  026112            TYPE,MSG118           ;TYPE '\'
022614  005201                    INC   R1              ;DEC CHAR RECEIVED COUNT
022616  000734                    BR    1$              ;GET NEXT CHARACTER
022620  122737  000060  000642 3$:   CMPB  #60,TIB      ;SEE IF CHAR IS LESS THAN 0
022626  101027                    BHI   TINER
022630  122737  000070  000642 4$:   CMPB  #70,TIB      ;SEE IF CHAR IS GREATER THAN 7
022636  101423                    BLOS  TINER
022640  005237  000644      5$:   INC   TEMP1           ;SET FIRST CHARACTER FLAG
022644  006300                    ASL   R0
022646  006300                    ASL   R0              ;SHIFT 3 LEFT
022650  006300                    ASL   R0
022652  042737  177770  000642    BIC   #177770,TIB     ;STRIP ASCII
022660  053700  000642            BIS   TIB,R0          ;LOAD CHARACTER
022664  005301                    DEC   R1              ;SEE IF DONE
022666  001310                    BNE   1$              ;IF NOT: BR
```

```
 4687  022670  020002                  6$:     CMP     R0,R2           ;SEE IF EXCEEDED MAXIMUM LIMIT
 4688  022672  101005                          BHI     TINER
 4689  022674  020300                  7$:     CMP     R3,R0           ;SEE IF BELOW MINIMUM LIMIT
 4690  022676  101003                          BHI     TINER
 4691  022700  010015                  8$:     MOV     R0,(R5)         ;LOAD VALUE
 4692  022702  005726                  9$:     TST     (SP)+           ;POP CHAR COUNT OFF STACK
 4693  022704  000207                          RTS     PC              ;EXIT
 4694
 4695  022706  000004  024646          TINER:  TYPE,#MSG43             ;TYPE '?'
 4696  022712  005726                          TST     (SP)+           ;POP CHAR COUNT OFF STACK
 4697  022714  162716  000020                  SUB     #20,(SP)        ;RESET SP TO START OF VALUE ROUTINE
 4698  022720  000207                          RTS     PC              ;REDO VALUE ENTRY
```

```
                                        ;TTY READ SUBROUTINE*********

022722  005277  155664        TTIN:   INC     @TKS
022726  105777  155660        1$:     TSTB    @TKS
022732  100375                        BPL     1$
022734  017737  155654  000642        MOV     @TKB,TIB
022742  042737  177600  000642        BIC     #177600,TIB     ;STRIP PARITY BIT
022750  022737  000015  000642        CMP     #15,TIB         ;BRANCH IF NOT <CR>
022756  001003                        BNE     2$
022760  000004  024155                TYPE,MSG28              ;TYPE '<CR><LF>
022764  000402                        BR      3$
022766  000004  000642        2$:     TYPE,TIB                ;ECHO CHARACTER
022772  000207                3$:     RTS     PC

                                        ;TTY OUTPUT SUBROUTINE***********

022774  010446                TTOUT:  MOV     R4,-(SP)        ;SAVE R4 ON THE STACK
022776  010346                        MOV     R3,-(SP)
023000  017604  000004                MOV     @4(SP),R4       ;GET ADDRESS OF MESSAGE TO TYPE
023004  062766  000002  000004        ADD     #2,4(SP)        ;ADJUST RETURN PC
023012  111437  000640        10$:    MOVB    (R4),TOB        ;GET A CHARACTER
023016  001431                        BEQ     3$              ;AND BRANCH IF END OF MSG
023020  122724  000045                CMPB    #45,(R4)+       ;BRANCH IF CRLF CHARACTER (%)
023024  001403                        BEQ     1$
023026  004737  023110                JSR     PC,TOG          ;ECHO CHARACTER
023032  000767                        BR      10$

023034  112737  000015  000640  1$:     MOVB    #15,TOB
023042  004737  023110                JSR     PC,TOG
023046  012703  000006                MOV     #6,R3
023052  005037  000640        2$:     CLR     TOB
023056  004737  023110                JSR     PC,TOG
023062  005303                        DEC     R3
023064  001372                        BNE     2$              ;DO FILLERS
023066  112737  000012  000640        MOVB    #12,TOB
023074  004737  023110                JSR     PC,TOG
023100  000744                        BR      10$
023102  012603                3$:     MOV     (SP)+,R3        ;RESTORE REGISTERS
023104  012604                        MOV     (SP)+,R4
023106  000002                        RTI                     :RETURN

023110  105777  155502        TOG:    TSTB    @TPS
023114  100375                        BPL     TOG
023116  113777  000640  155474        MOVB    TOB,@TPB
023124  000207                        RTS     PC              ;RETURN
```

```
                                        ;OCTAL OUTPUT SUBROUTINE***********
                                
023126  005037  023302          OCTP:   CLR     OFL             ;CLEAR FLAG FOR LEADING ZERO
023132  010304                          MOV     R3,R4           ;SEE IF NUMBER IS ZERO
023134  001003                          BNE     1$              ;IF NOT ZERO: BR
023136  000004  026337                  TYPE,DIGIT0
023142  000434                          BR      4$              ;SPACE AND EXIT
023144  100004                  1$:     BPL     3$              ;BRANCH IF MSD IS A '0'
023146  012704  000001                  MOV     #1,R4
023152  004737  023242                  JSR     PC,OCTPG        ;PRINT 1
023156  006004                  3$:     ROR     R4
023160  006004                          ROR     R4
023162  006004                          ROR     R4              ;POSITION DIGIT
023164  006004                          ROR     R4
023166  000304                          SWAB    R4
023170  004737  023242                  JSR     PC,OCTPG        ;PRINT DIGIT 2
023174  006004                          ROR     R4
023176  000304                          SWAB    R4
023200  004737  023242                  JSR     PC,OCTPG        ;PRINT DIGIT 3
023204  006104                          ROL     R4
023206  006104                          ROL     R4
023210  000304                          SWAB    R4
023212  004737  023242                  JSR     PC,OCTPG        ;PRINT DIGIT 4
023216  006004                          ROR     R4
023220  006004                          ROR     R4
023222  006004                          ROR     R4
023224  004737  023242                  JSR     PC,OCTPG        ;PRINT DIGIT 5
023230  004737  023242                  JSR     PC,OCTPG        ;PRINT DIGIT 6
023234  000004  026335          4$:     TYPE,SPACE              ;TYPE A SPACE
023240  000002                          RTI                     ;EXIT

023242  042704  177770          OCTPG:  BIC     #177770,R4
023246  001003                          BNE     1$
023250  005737  023302                  TST     OFL
023254  001410                          BEQ     2$
023256  005237  023302          1$:     INC     OFL
023262  052704  000260                  BIS     #260,R4
023266  010437  000640                  MOV     R4,TOB
023272  004737  023110                  JSR     PC,TOG
023276  010304                  2$:     MOV     R3,R4
023300  000207                          RTS     PC
023302  000000                  OFL:    0                       ;FIRST CHAR FLAG

                                        ;DATA CHARACTER OUTPUT SUBROUTINE***********

023304  012704  000010          DOUT:   MOV     #10,R4          ;SET NUMBER TO PRINT
023310  110346                          MOVB    R3,-(SP)        ;GET CHAR TO OUTPUT
023312  106316                  1$:     ASLB    (SP)            ;BRANCH IF BIT IS A ZERO
023314  103003                          BCC     2$
023316  000004  026341                  TYPE,DIGIT1
023322  000402                          BR      3$
023324  000004  026337          2$:     TYPE,DIGIT0
023330  005304                  3$:     DEC     R4
023332  001367                          BNE     1$
023334  005726                          TST     (SP)+           ;POP STACK
```

```
 4802  023336  000207                          RTS     PC
 4803
 4804  023340  113703  000651          DOUTD:  MOVB    TEMP3+1,R3
 4805  023344  004737  023304                  JSR     PC,DOUT
 4806  023350  013703  000650                  MOV     TEMP3,R3
 4807  023354  004737  023304                  JSR     PC,DOUT
 4808  023360  000207                          RTS     PC
 4809
 4810                                          ;TU16 SERIAL NUMBER PRINT SUBROUTINE*******
 4811
 4812  023362  017703  155152          SNPT:   MOV     @SN,R3          ;GET CONTENTS OF SERIAL # REG
 4813  023366  000004  023575                  TYPE,MSG9               ;TYPE SN TAG
 4814  023372  010304                          MOV     R3,R4
 4815  023374  000304                          SWAB    R4
 4816  023376  006004                          ROR     R4
 4817  023400  006004                          ROR     R4
 4818  023402  006004                          ROR     R4
 4819  023404  006004                          ROR     R4
 4820  023406  004737  023454                  JSR     PC,SNPG         ;PRINT FIRST DIGIT
 4821  023412  010304                          MOV     R3,R4
 4822  023414  000304                          SWAB    R4
 4823  023416  004737  023454                  JSR     PC,SNPG         ;PRINT SECOND DIGIT
 4824  023422  010304                          MOV     R3,R4
 4825  023424  006004                          ROR     R4
 4826  023426  006004                          ROR     R4
 4827  023430  006004                          ROR     R4
 4828  023432  006004                          ROR     R4
 4829  023434  004737  023454                  JSR     PC,SNPG         ;PRINT THIRD DIGIT
 4830  023440  010304                          MOV     R3,R4
 4831  023442  004737  023454                  JSR     PC,SNPG         ;PRINT FOURTH DIGIT
 4832  023446  000004  024155                  TYPE,MSG28              ;TYPE <CR><LF>
 4833  023452  000207                          RTS     PC              ;EXIT
 4834  023454  012737  000260  000640  SNPG:   MOV     #260,TOB        ;SET NUMBER BASE
 4835  023462  042704  177760                  BIC     #177760,R4      ;MASK NUMBER
 4836  023466  050437  000640                  BIS     R4,TOB          ;BUILD DIGIT
 4837  023472  004737  023110                  JSR     PC,TOG          ;GO TYPE
 4838  023476  000207                          RTS     PC              ;RETURN
 4839
```

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4840
4841                                        ;ERROR MESSAGES**********
4842
4843  023500  051445  051127  036440  $MSWR:  .ASCIZ  /%SWR = /
4844  023506  000040
4845  023510  047040  053505  036440  $MNEW:  .ASCIZ  / NEW = /
4846  023516  000040
4847  023520  000055                  DASH:   .ASCIZ  /-/
4848  023522  042052  020105     000  MSG1:   .ASCIZ  /*DE /
4849  023527     045  035507  000040  MSG2:   .ASCIZ  /%G; /
4850  023534  041045  020073     000  MSG3:   .ASCIZ  /%B; /
4851  023541     045  047103  000040  MSG4:   .ASCIZ  /%CN /
4852  023546  053452  020105     000  MSG5:   .ASCIZ  /*WE /
4853  023553     052  042522  000040  MSG6:   .ASCIZ  /*RE /
4854  023560  051052  020123     000  MSG7:   .ASCIZ  /*RS /
4855  023565     052  040520  051124  MSG8:   .ASCIZ  /*PATRN /
4856  023572  020116     000
4857  023575     123  035116  000040  MSG9:   .ASCIZ  /SN: /
4858  023602  051452  020105     000  MSG10:  .ASCIZ  /*SE /
4859  023607     045  041052  020116  MSG13:  .ASCIZ  /%*BN /
4860  023614     000
4861  023615     052  047122  000040  MSG14:  .ASCIZ  /*RN /
4862  023622  020045  020040  020040  MSG15:  .ASCIZ  /%          BAD RECORD%%/
4863  023630  020040  020040  041040
4864  023636  042101  051040  041505
4865  023644  051117  022504  000045
4866  023652  043040     000          MSG16:  .ASCIZ  / F/
4867  023655     040  000122          MSG17:  .ASCIZ  / R/
4868  023660  042440  052117  021440  MSG20:  .ASCIZ  / EOT # /
4869  023666  000040
4870  023670  047111  042524  041522  MSG21:  .ASCIZ  /INTERCHANGE READ? /
4871  023676  040510  043516  020105
4872  023704  042522  042101  020077
4873  023712     000
4874  023713     045  046111  042514  MSG22:  .ASCIZ  /%ILLEGAL BOT: HALT%/
4875  023720  040507  020114  047502
4876  023726  035124  044040  046101
4877  023734  022524     000
4878  023737     045  051503  020061  MSG23:  .ASCIZ  /%CS1 /
4879  023744     000
4880  023745     045  041527  000040  MSG23A: .ASCIZ  /%WC /
4881  023752  041045  020101     000  MSG23B: .ASCIZ  /%BA /
4882  023757     045  041506  000040  MSG23C: .ASCIZ  /%FC /
4883  023764  041445  031123  000040  MSG23D: .ASCIZ  /%CS2 /
4884  023772  042045  020123     000  MSG23E: .ASCIZ  /%DS /
4885  023777     045  051105  000040  MSG23F: .ASCIZ  /%ER /
4886  024004  040445  020123     000  MSG23G: .ASCIZ  /%AS /
4887  024011     045  045503  000040  MSG23H: .ASCIZ  /%CK /
4888  024016  042045  020102     000  MSG23I: .ASCIZ  /%DB /
4889  024023     045  051115  000040  MSG23J: .ASCIZ  /%MR /
4890  024030  042045  020124     000  MSG23K: .ASCIZ  /%DT /
4891  024035     045  041524  000040  MSG23L: .ASCIZ  /%TC /
4892  024042  047045  020117  047111  MSG24:  .ASCIZ  /%NO INTERRUPT%/
4893  024050  042524  051122  050125
4894  024056  022524     000
4895  024061     045  046123  053101  MSG25:  .ASCIZ  /%SLAVE UNSAFE-TEST DISCONTINUED ON SLAVE%/
```

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 4896  024066  020105  047125  040523
 4897  024074  042506  052055  051505
 4898  024102  020124  044504  041523
 4899  024110  047117  044524  052516
 4900  024116  042105  047440  020116
 4901  024124  046123  053101  022505
 4902  024132     000
 4903  024133     045  051104  050117  MSG26:  .ASCIZ  /%DROPS: /
 4904  024140  035123  000040
 4905  024144  050045  041511  051513  MSG27:  .ASCIZ  /%PICKS: /
 4906  024152  020072     000
 4907  024155     045     000          MSG28:  .ASCIZ  /%/
 4908  024157     045  052045  047515  MSG30:  .ASCIZ  '%%TM03-TE16/TU77 AUTO SEQUENCE (CZTEDCO)%';++B
 4909  024164  026463  042524  033061
 4910  024172  052057  033525  020067
 4911  024200  052501  047524  051440
 4912  024206  050505  042525  041516
 4913  024214  020105  041450  052132
 4914  024222  042105  030103  022451
 4915  024230     000
 4916  024231     045  052045  030115  MSG31:  .ASCIZ  '%%TM03-TE16/TU77 DATA RELIABILITY TEST (CZTEDCO)%';++B
 4917  024236  026463  042524  033061
 4918  024244  052057  033525  020067
 4919  024252  040504  040524  051040
 4920  024260  046105  040511  044502
 4921  024266  044514  054524  052040
 4922  024274  051505  020124  041450
 4923  024302  052132  042105  030103
 4924  024310  022451     000
 4925  024313     124  050131  020105  MSG31A: .ASCIZ  /TYPE <CR> TO TERMINATE ALL REQUESTS & ^C TO RESTART%/
 4926  024320  041474  037122  052040
 4927  024326  020117  042524  046522
 4928  024334  047111  052101  020105
 4929  024342  046101  020114  042522
 4930  024350  052521  051505  051524
 4931  024356  023040  057040  020103
 4932  024364  047524  051040  051505
 4933  024372  040524  052122  000045
 4934  024400  046123  053101  020105  MSG32:  .ASCIZ  /SLAVE # = /
 4935  024406  020043  020075     000
 4936  024413     104  047105  044523  MSG33:  .ASCIZ  /DENSITY = /
 4937  024420  054524  036440  000040
 4938  024426  040520  044522  054524  MSG34:  .ASCIZ  /PARITY = /
 4939  024434  036440  000040
 4940  024440  042522  047503  042122  MSG35:  .ASCIZ  /RECORD COUNT = /
 4941  024446  041440  052517  052116
 4942  024454  036440  000040
 4943  024460  044103  051101  041440  MSG36:  .ASCIZ  /CHAR COUNT = /
 4944  024466  052517  052116  036440
 4945  024474  000040
 4946  024476  040520  052124  051105  MSG37:  .ASCIZ  /PATTERN # = /
 4947  024504  020116  020043  020075
 4948  024512     000
 4949  024513     123  047111  046107  MSG38:  .ASCIZ  /SINGLE PASS? /
 4950  024520  020105  040520  051523
 4951  024526  020077     000
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 4952  024531     103  041522  041440  MSG39:  .ASCIZ  /CRC CORRECTION (YES=1,NO=0)? /
 4953  024536  051117  042522  052103
 4954  024544  047511  020116  054450
 4955  024552  051505  030475  047054
 4956  024560  036517  024460  020077
 4957  024566     000
 4958  024567     045  042445  052116  MSG40:  .ASCIZ  /%%ENTER STALLS%READ = /
 4959  024574  051105  051440  040524
 4960  024602  046114  022523  042522
 4961  024610  042101  036440  000040
 4962  024616  051127  052111  020105  MSG41:  .ASCIZ  /WRITE = /
 4963  024624  020075     000
 4964  024627     124  051125  020116  MSG42:  .ASCIZ  /TURN AROUND = /
 4965  024634  051101  052517  042116
 4966  024642  036440  000040
 4967  024646  037445  000045          MSG43:  .ASCIZ  /%?%/
 4968  024652  042445  052116  051105  MSG44:  .ASCIZ  /%ENTER YOZZLE STALL = /
 4969  024660  054440  055117  046132
 4970  024666  020105  052123  046101
 4971  024674  020114  020075     000
 4972  024701     045  051105  020122  MSG45:  .ASCIZ  /%ERR AMT /
 4973  024706  046501  020124     000
 4974  024713     045  047516  020124  MSG49:  .ASCIZ  /%NOT AVAIL /
 4975  024720  053101  044501  020114
 4976  024726     000
 4977  024727     045  046111  042514  MSG50:  .ASCIZ  /%ILLEGAL DRIVE TYPE /
 4978  024734  040507  020114  051104
 4979  024742  053111  020105  054524
 4980  024750  042520  000040
 4981  024754  022445          MSG52:  .ASCII  /%%/
 4982  024756  051104  053111  020105  MSG52A: .ASCIZ  /DRIVE (TM03) # = /
 4983  024764  052050  030115  024463
 4984  024772  021440  036440  000040
 4985  025000  047506  046522  052101  MSG53:  .ASCIZ  /FORMAT = /
 4986  025006  036440  000040
 4987  025012  053452  020105  046524  MSG54:  .ASCIZ  /*WE TM/
 4988  025020     000
 4989  025021     052  042523  052040  MSG55:  .ASCIZ  /*SE TM/
 4990  025026  000115
 4991  025030  052040  000115          MSG56:  .ASCIZ  / TM/
 4992  025034  047045  047117  042455  MSG57:  .ASCIZ  /%NON-EXIST SLAVE/
 4993  025042  044530  052123  051440
 4994  025050  040514  042526     000
 4995  025055     045  051103  020103  MSG58:  .ASCIZ  /%CRC /
 4996  025062     000
 4997  025063     045  051114  020103  MSG59:  .ASCIZ  /%LRC /
 4998  025070     000
 4999  025071     052  020120     000  MSG61:  .ASCIZ  /*P /
 5000  025075     052  020106     000  MSG62:  .ASCIZ  /*F /
 5001  025101     045  047452  044522  MSG64:  .ASCIZ  /%*ORIGINAL ERROR*/
 5002  025106  044507  040516  020114
 5003  025114  051105  047522  025122
 5004  025122     000
 5005  025123     045  042522  051124  MSG65:  .ASCIZ  /%RETRY: /
 5006  025130  035131  000040
 5007  025134  051452  020105  052122  MSG66:  .ASCIZ  /*SE RTRY /
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 5008  025142  054522  000040
 5009  025146  042452  040522  042523  MSG67:  .ASCIZ  /*ERASE/
 5010  025154     000
 5011  025155     045  042522  042522  MSG68:  .ASCIZ  /%REREV: /
 5012  025162  035126  000040
 5013  025166  040524  042520  046440  MSG69:  .ASCIZ  /TAPE MARK? /
 5014  025174  051101  037513  000040
 5015  025202  047045  047117  042455  MSG71:  .ASCIZ  /%NON-EXIST DRIVE/
 5016  025210  044530  052123  042040
 5017  025216  044522  042526     000
 5018  025223     045  042522  053506  MSG72:  .ASCIZ  /%REFWD: /
 5019  025230  035104  000040
 5020  025234  053445  042524  051122  MSG73:  .ASCIZ  /%WTERR: /
 5021  025242  020072     000
 5022  025245     045  042522  044507  MSG74:  .ASCIZ  /%REGISTER START = /
 5023  025252  052123  051105  051440
 5024  025260  040524  052122  036440
 5025  025266  000040
 5026  025270  042526  052103  051117  MSG75:  .ASCIZ  /VECTOR ADRS = /
 5027  025276  040440  051104  020123
 5028  025304  020075     000
 5029  025307     045  042504  042522  MSG76:  .ASCIZ  /%DEREV: /
 5030  025314  035126  000040
 5031  025320  042045  043105  042127  MSG77:  .ASCIZ  /%DFFWD: /
 5032  025326  020072     000
 5033  025331     045  047516  026516  MSG78:  .ASCIZ  /%NON-RETRYABLE WRITE ERROR: ER /
 5034  025336  042522  051124  040531
 5035  025344  046102  020105  051127
 5036  025352  052111  020105  051105
 5037  025360  047522  035122  042440
 5038  025366  020122     000
 5039  025371     045  047516  026516  MSG79:  .ASCIZ  /%NON-RETRYABLE READ ERROR: ER /
 5040  025376  042522  051124  040531
 5041  025404  046102  020105  042522
 5042  025412  042101  042440  051122
 5043  025420  051117  020072  051105
 5044  025426  000040
 5045  025430  042445  042116  047440  MSG100: .ASCIZ  /%END OF PASS %/
 5046  025436  020106  040520  051523
 5047  025444  022440     000
 5048  025447     045  025045  025052  MSG101: .ASCIZ  /%%********************%/
 5049  025454  025052  025052  025052
 5050  025462  025052  025052  025052
 5051  025470  025052  025052  022452
 5052  025476     000
 5053  025477     101  052125  020117  MSG104: .ASCIZ  /AUTO CONT.? /
 5054  025504  047503  052116  037456
 5055  025512  000040
 5056  025514  051045  041505  053117  MSG105: .ASCIZ  /%RECOVERED/
 5057  025522  051105  042105     000
 5058  025527     052  040502  020104  MSG106: .ASCIZ  /*BAD TAPE OVERFLOW/
 5059  025534  040524  042520  047440
 5060  025542  042526  043122  047514
 5061  025550  000127
 5062  025552  051045  053505  047111  MSG16A: .ASCIZ  /%REWIND TAPE; RESTART AT BLOCK 1/
 5063  025560  020104  040524  042520
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 5064  025566  020073  042522  052123
 5065  025574  051101  020124  052101
 5066  025602  041040  047514  045503
 5067  025610  030440     000
 5068  025613     045  047125  042522  MSG107: .ASCII  /%UNRECOVERABLE BAD SPOT/
 5069  025620  047503  042526  040522
 5070  025626  046102  020105  040502
 5071  025634  020104  050123  052117
 5072  025642  041045  042101  051040          .ASCIZ  /%BAD RECORD LEFT ON TAPE%/
 5073  025650  041505  051117  020104
 5074  025656  042514  052106  047440
 5075  025664  020116  040524  042520
 5076  025672  000045
 5077  025674  050052  051517  052111  MSG109: .ASCIZ  /*POSITION LOST IN RETRY/
 5078  025702  047511  020116  047514
 5079  025710  052123  044440  020116
 5080  025716  042522  051124  000131
 5081  025724  051445  051525  042520  MSG110: .ASCIZ  /%SUSPECT BAD TAPE/
 5082  025732  052103  041040  042101
 5083  025740  052040  050101  000105
 5084  025746  051045  050105  040505  MSG111: .ASCIZ  /%REPEAT: /
 5085  025754  035124  000040
 5086  025760  041040  042101  052040  MSG112: .ASCIZ  / BAD TAPE SPOTS%/
 5087  025766  050101  020105  050123
 5088  025774  052117  022523     000
 5089
 5090  026001     045  051440  043117  MSG113: .ASCIZ  /% SOFT: /
 5091  026006  035124  000040
 5092
 5093  026012  020045  040510  042122  MSG114: .ASCIZ  /% HARD. /
 5094  026020  020072     000
 5095
 5096  026023     045  040510  042122  MSG115: .ASCIZ  /%HARD READ ERROR/
 5097  026030  051040  040505  020104
 5098  026036  051105  047522  000122
 5099  026044  051445  040514  042526  MSG116: .ASCIZ  /%SLAVE REWINDING: WILL RESTART AT BOT/
 5100  026052  051040  053505  047111
 5101  026060  044504  043516  020072
 5102  026066  044527  046114  051040
 5103  026074  051505  040524  052122
 5104  026102  040440  020124  047502
 5105  026110  000124
 5106  026112  000134                  MSG118: .ASCIZ  /\/
 5107  026114  051045  046505  053117  MSG120: .ASCIZ  /%REMOVE TMDP FROM SLAVE TO BE TESTED%/
 5108  026122  020105  046524  050104
 5109  026130  043040  047522  020115
 5110  026136  046123  053101  020105
 5111  026144  047524  041040  020105
 5112  026152  042524  052123  042105
 5113  026160  000045
 5114  026162  044045  051101  053504  MSG121: .ASCIZ  /%HARDWARE SWR IN USE%/
 5115  026170  051101  020105  053523
 5116  026176  020122  047111  052440
 5117  026204  042523  000045
 5118  026210  047516  051440  040514  MSG122: .ASCIZ  /NO SLAVES LEFT TO TEST: HALT%/
 5119  026216  042526  020123  042514
```

```
 5120  026224  052106  052040  020117
 5121  026232  042524  052123  020072
 5122  026240  040510  052114  000045
 5123  026246  040445  052125  026517  MSG123: .ASCIZ  /%AUTO-SEQ: TEST WILL RESTART%/
 5124  026254  042523  035121  052040
 5125  026262  051505  020124  044527
 5126  026270  046114  051040  051505
 5127  026276  040524  052122  000045
 5128  026304  041445  051117  042522  MSG124: .ASCIZ  /%CORRECTED PE DATA ERROR/
 5129  026312  052103  042105  050040
 5130  026320  020105  040504  040524
 5131  026326  042440  051122  051117
 5132  026334     000
 5133  026335     040     000          SPACE:  .ASCIZ  ' '
 5134  026337     060     000          DIGIT0: .ASCIZ  '0'
 5135  026341     061     000          DIGIT1: .ASCIZ  '1'
 5136
 5137          026344                       .EVEN
 5138  026344  000000                 WDATA:  0                       ;WRITE BUFFER
 5139
 5140          032352                       .=.+4004
 5141  032352  000000                 RDATA:  0                       ;READ BUFFER
 5142
 5143          000001                       .END
```

ABLCNT	000736	1561#	1906	4460*	4484*	4493*							
ACTLRC	020242	4065*	4147	4199#									
AMOD1	021524	4406	4454#										
AMOD2	021656	4407	4477#										
APATS	014322	3482	3491#										
AS	000526	1485#	4179	4180*									
ASEQ	021176	3085	4387#										
ASEQCF	000740	1562#	4388	4412									
ASEQF	000734	1467*	1560#	1824*	1840*	1904	2083	3045	3082	3305	4228		
ASEQX	021326	4409	4412#										
ASEQ0	021226	1842	2103	4232	4393#	4413							
ASEQ1	021232	4394#	4411										
ASEQ4	021310	4408#	4425										
BA	000514	1480#	2229*	2280*	2407*	2428*	2599*	2608*	2825*	2833*	2898*	2925*	3977	4122
BAER	020226	3973	3979*	4073	4119	4193#							
BBC	000656	1536#	3613*	3676*	3680*	3764*	3765	3770*	3771*	3772			
BCNT	000710	1549#	3858*	3879*	3882*	3887*	3907*	3910*	3914*	3918*			
BDPP	000716	1552#	3843*	3863*	3890*	3895*	3903*	3905*	3908	3912*			
BD00	001404	1586	1691#										
BD10	001424	1587	1693#										
BD20	001444	1588	1695#										
BD30	001464	1589	1697#										
BD40	001504	1590	1699#										
BD50	001524	1591	1701#										
BD60	001544	1592	1703#										
BD70	001564	1593	1705#										
BKSP	011402	2528	2538	2894#									
BLCNTR	000654	1535#	1873*	1903*	1906	1908*	2382	4454*	4477*	4549			
BPKP	000720	1553#	3842*	3870*	3889*	3894*	3904*	3906*	3916	3920*			
BP00	001204	1578	1675#										
BP10	001224	1579	1677#										
BP20	001244	1580	1679#										
BP30	001264	1581	1681#										
BP40	001304	1582	1683#										
BP50	001324	1583	1685#										
BP60	001344	1584	1687#										
BP70	001364	1585	1689#										
BTADDR	001024	1597#	2376	2476									
BTFLG	000724	1555#	2016	2022	2026	2038*	2415*	2439*					
BTOV	006772	2389	2438#										
BTOVX	007124	2463	2469#										
BTOV0	007012	2442#	2485										
BTOV1	007022	2445#	2461										
BTOV2	007100	2459	2462#										
BTOV3	007116	2466#	2468										
BTPRT	007126	1948	2040	2474#									
BTPRT1	007172	2483	2485#										
BTPT	000730	1557#	2376*	2377	2379*	2380	2387	2442	2458	2465	2476*	2477	2482
BTSTF	000726	1556#	1947*	1949*	2462								
BTUR	007176	2397	2489#										
BT00	001604	1597	1712#										
BT01	001710	1598	1714#										
BT02	002014	1599	1716#										
BT03	002120	1600	1718#										
BT04	002224	1601	1720#										
BT05	002330	1602	1722#										

```
BT06    002434          1603    1724#
BT07    002540          1604    1726#
BO      011534          2900    2906    2912    2914#
CADER   020224          2287*   2634*   2910*   3971*   4125    4192#
CC      000530          1486#   4052    4138    4160
CCNTR   011664          1916    2968#
CHNFLG  003034          1826#   1831*   1838    2101    4432
CLLAST  014504          3543#
CLP     014614          3527    3554    3562#
CLPE    014640          3563    3565    3569#
CLP2    014676          3577    3581#
CLP3    014710          3579    3582    3584#
CLO     014424          3526#   3542
CL1     014452          3534#
CL2     014474          3531    3540#
CL3     014556          3553#   3557
CONER   020230          4024*   4103    4194#
CRCC    000566          1504#   3234    3236    4173
CRCER   020240          4056*   4135    4198#
CRCLRC  014406          3319    3327    3522#
CRCSV   020246          4038*   4189    4201#
CS      000520          1482#   1889*   1925*   1926*   2172*   2173*   3087*   3094*   3096    3116*   3117*   4007    4109
                        4175*   4176*   4269*   4419*   4420*   4422
C1      000510          1478#   2012*   2015*   2067*   2070*   2130*   2131*   2154*   2183*   2188*   3077    3095    4005
                        4014    4106    4178*   4181    4294*   4308*   4421
DASH    023520          4124    4141    4149    4567    4847#
DATA0   002766          1790#
DATA1   002770          1791#
DATA10  003006          1798#
DATA11  003010          1799#
DATA12  003012          1800#
DATA13  003014          1801#
DATA14  003016          1802#
DATA15  003020          1803#
DATA2   002772          1792#
DATA3   002774          1793#
DATA4   002776          1794#
DATA5   003000          1795#
DATA6   003002          1796#
DATA7   003004          1797#
DATBL   002764          1789#   3326
DATER1  001124          1643#   1972    3697*
DATR    014342          1919    3309    3502#
DAT0    013656          1790    3344#
DAT0A   013704          3350#   3358    3362    3365
DAT0B   013712          3351#   3352
DAT0C   013756          3356    3363#
DAT0D   013764          3366#   3374
DAT0E   013774          3368#   3373
DAT0F   014006          3370    3372#
DAT1    014016          1791    3379#
DAT1A   014022          3380#   3389    3412    3417    3465
DAT10   014140          1798    3432#
DAT11   014170          1799    3444#
DAT12   014210          1800    3454#
DAT13   014232          1801    3464#
```

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DAT14   014242          1802    3469#
DAT15   014272          1803    3481#
DAT2    014036          1792    3388#
DAT3    014042          1793    3393#
DAT3A   014050          3395#   3406
DAT4    014066          1794    3404#
DAT5    014076          1795    3411#
DAT6    014104          1796    3416#
DAT7    014112          1797    3421#
DB      000532          1487#
DCHK    014750          2679    2872    3613#
DCHK0   014776          3617    3619#
DEREV1  001164          1665#   1984    3699*
DEREX   015754          3766    3784    3786    3794    3801    3804    3806#
DEREX1  016006          3807    3810    3812    3814#
DERFL   000704          1547#   3614*   3690    3815*
DERR    015354          3683    3730#
DERR0   015364          3732#   3813
DERR0A  015412          3734    3738#
DERR0B  015440          3743    3746#
DERR0C  015460          3749    3752#
DERR0D  015462          3751    3753#
DERR1   015504          3756    3759#
DERR2   015506          3758    3760#
DERR3   015520          3763#
DERR4   015522          3731    3762    3764#
DERR4A  015646          3778    3787#
DERR4B  015710          3773    3795#
DERR5   015736          3798    3802#
DERR6   015750          3775    3796    3805#
DFX     015352          3691    3693    3698    3700#
DF0     015250          3639    3678#   3687
DF0A    015144          3649    3651#   3688
DF0A0   015166          3655    3657#
DF0A1   015202          3660    3662#
DF0A2   015216          3665    3667#
DF0A3   015232          3670    3672#
DF0A4   015236          3652    3674#
DF0B    015104          3640#
DF0B0   015126          3643    3646#
DF0C    015066          3632    3636#
DF0C0   015076          3622    3624    3626    3638#
DF0D    015052          3628    3633#
DF0E    015044          3630#   3635
DF0F    015036          3627#   3631
DF1     015262          3675    3679    3682#
DF2     015272          3677    3681    3684#
DF3     015306          3685    3689#
DF4     015346          3696    3699#
DIGIT0  026337          4751    4798    5134#
DIGIT1  026341          4796    5135#
DOUT    023304          3753    3760    4792#   4805    4807
DOUTD   023340          4804#
DPC     016126          3855#   3899
DPCG    016134          3856    3858#
DPC0    016142          3859#   3891
```

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DPC0A   016200          3866    3868#
DPC1    016206          3862    3870#
DPC1A   016230          3873    3875#
DPC2    016272          3860    3864    3871    3885#
DPC2A   016234          3869    3876#
DPC2B   016256          3880#   3883
DPC3    016322          3888    3892#
DPPRT   016370          1954    3868    3875    3901#
DPPRTX  016520          3919    3922#
DPPRT0  016436          3908#   3913
DPPRT1  016462          3911    3914#
DPPRT2  016474          3916#   3921
DROP    016116          3849    3853#
DRPK    016104          3845    3849#
DRPKF   016020          3682    3836#
DRP1    001004          1586#   3843    3877    3895    3903
DRP2    001006          1587#
DRP3    001010          1588#
DRP4    001012          1589#
DRP5    001014          1590#
DRP6    001016          1591#
DRP7    001020          1592#
DRP8    001022          1593#
DRVER   020232          2288*   2635*   4036*   4089    4111    4152    4195#
DS      000522          1483#   1928    2013    2044    2063    2068    2071    2073    2132    2148    2150    2178    2181
                        2184    2186    2233    2285    2616    2622    2632    2728    2908    4026    4114    4273    4277
                        4440
DSUP    013472          1933    3303#
DS0     013500          3305#
DS0A    013562          3313    3321#
DS0B    013560          3317    3320#
DS0C    013522          3306    3308    3312#
DS2A    013610          3304    3311    3327#
DS3     013614          2681    2873    3328#
DS4     013626          3331#   3333
DT      000536          1489#   3119    3123    3128    4426
DVN     000550          1497#   1926    2173    3089    3094    3117    4176    4269    4393*   4397    4408    4410*   4420
                        4436    4516
DOFL    014014          3199*   3344    3347*   3375#
EMADDR  000652          1534#   2227*   2277*   2404*   2424*   2590*   2996*   2907*   2921*   4094    4100    4319
ENDFLG  000734          1559#   1856
ENDTBL  002764          1785#   1863
EOTC0   002644          1731#   2034*   2035
EOTREC  000660          1537#   2018    2020*   2121*   2235    2239*   2319    2550    2582    2586*   2587    2620*   2621*
                        2691    2699    2915    2917*   2918
ER      000524          1484#   3967    4018    4030    4080    4117    4156    4270
ERCHK   016522          2243    2664    2865    3948#
ERPT    017352          2289    2636    2911    4041    4043    4045    4051    4064    4068    4070#
ERPTG   017406          4075    4079#
ERPTG1  017454          4084    4089#
ERPTT   017372          4074#   4077
ERPT0   017470          4082    4088    4090    4092#   4171
ERPT1   017540          4099    4101    4103#
ERPT2   017572          4104    4111#
ERPT3   017624          4112    4119#
ERPT4   017656          4120    4127#
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ERPT5   017676          4128    4132#
ERPT5A  017746          4136    4144#
ERPT6   020000          4145    4152#
ERPT7   020046          4153    4155    4158    4163#
ERPX    020102          4165    4168    4170    4172#
ERPX0   020050          4091    4164#
ERPX1   020170          4078    4185#
ERPX2   020222          4186    4188    4191#
ERSAV   000722          1554#   2256    2302    2349    2725    2761    2791    4072*   4080*
ERTFL   000732          1558#   2395*   2418    2421*
ER2     016614          2292    2411    2431    2662    2857    2863    2913    2928    3962    3964    3967#
ER3     017004          3983    3985    3993    3995    4005#
ER4     017112          4006    4015    4023    4026#
ER6     017162          4027    4035    4038#
EXCRC   014744          3548*   3558    3595#   4038    4048*   4054    4142    4189*
EXLRC   014746          3560*   3596#   4039    4049*   4063    4150    4190*
FC      000516          1481#   2228*   2279*   2405*   2425*   2598*   2810*   2837*   2901*   2923*   3982    3992    4130
                        4295*
FCER    020234          3984*   3994*   4127    4196#
FCSAV   000634          1523#   1993    3194*
FMCNT   000556          1500#   1993*   2228    2598    2602    2651    2828    2837    2847    2972*   3185*   3186    3198
                        3193*   3194    3328    3502    3522    3549    3615    3636    3640    3648    3783    3787    3948
                        3990    4283    4461*   4485*   4571
FRPRT   020250          2793    3737    4097    4212#   4322
GTSWR   022346          3241    4349    4596#
HDRFL   000664          1539#   3689*   3733    4574*
HERE    004706          2094    2100#
HRDS    021340          4394    4418#
INIT    005236          1934    2171#
INTRF   000570          1505#   3216    3218    4296    4465*
LRCER   020236          4066*   4069*   4144    4197#
LRCSV   020244          4039*   4190    4200#
MR      000534          1488#   4057    4300*   4375*
MSG1    023522          3736    4522    4848#
MSG10   023602          2896    2921    4858#
MSG100  025430          2092    5045#
MSG101  025447          4395    5048#
MSG104  025477          4387    5053#
MSG105  025514          2344    2750    5056#
MSG106  025527          2028    5058#
MSG107  025613          2490    5068#
MSG109  025674          2024    5077#
MSG110  025724          2360    5081#
MSG111  025746          2364    5084#
MSG112  025760          2481    5086#
MSG113  026001          1965    1977    5090#
MSG114  026012          1968    1980    5093#
MSG115  026023          2782    5096#
MSG116  026044          4276    5099#
MSG118  026112          4672    5106#
MSG120  026114          1836    5107#
MSG121  026162          4344    5114#
MSG122  026210          4235    5118#
MSG123  026246          4230    5123#
MSG124  026304          2731    5128#
MSG13   023607          2449    4548    4859#
```

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MSG14   023615          2452    4551    4861#
MSG15   023622          3769    4862#
MSG16   023652          4217    4866#
MSG16A  025552          2037    5062#
MSG17   023655          4214    4544    4867#
MSG2    023527          3747    4849#
MSG20   023660          2032    4868#
MSG21   023670          3215    4870#
MSG22   023713          2625    4874#
MSG23   023737          4105    4878#
MSG23A  023745          4132    4880#
MSG23B  023752          4121    4881#
MSG23C  023757          4129    4882#
MSG23D  023764          4108    4883#
MSG23E  023772          4113    4884#
MSG23F  023777          4116    4885#
MSG23G  024004          4886#
MSG23H  024011          4159    4887#
MSG23I  024016          4888#
MSG23J  024023          4889#
MSG23K  024030          4890#
MSG23L  024035          4891#
MSG24   024042          4323    4892#
MSG25   024061          4227    4895#
MSG26   024133          3901    4903#
MSG27   024144          3915    4905#
MSG28   024155          2460    2474    4664    4709    4832    4907#
MSG3    023534          3754    4850#
MSG30   024157          1841    3047    4908#
MSG31   024231          3044    4916#
MSG31A  024313          3051    3052*   4925#
MSG32   024400          3102    4400    4518    4934#
MSG33   024413          3133    4936#
MSG34   024426          3145    4938#
MSG35   024440          3174    4940#
MSG36   024460          3184    4943#
MSG37   024476          3196    4946#
MSG38   024513          3224    4949#
MSG39   024531          3233    4952#
MSG4    023541          3738    4851#
MSG40   024567          3246    4958#
MSG41   024616          3255    4962#
MSG42   024627          3264    4964#
MSG43   024646          4695    4967#
MSG44   024652          4357    4968#
MSG45   024701          4972#
MSG49   024713          4974#
MSG5    023546          2227    4852#
MSG50   024727          3127    4977#
MSG52   024754          4515    4981#
MSG52A  024756          3088    4396    4982#
MSG53   025000          3156    4985#
MSG54   025012          2277    4100    4987#
MSG55   025021          2907    4989#
MSG56   025030          4102    4991#
MSG57   025034          3121    4992#
```

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MSG58   025055            4137   4995#
MSG59   025063            4146   4997#
MSG6    023553            2590   4853#
MSG61   025071            4527   4999#
MSG62   025075            4533   5000#
MSG64   025101            2267   2315   2741   5001#
MSG65   025123            1955   2345   2361   2751   2772   5005#
MSG66   025134            2404   5007#
MSG67   025146            2424   5009#
MSG68   025155            1974   5011#
MSG69   025166            3206   5013#
MSG7    023560            4570   4854#
MSG71   025202            3098   5015#
MSG72   025223            1962   5018#
MSG73   025234            1959   5020#
MSG74   025245            3055   5022#
MSG75   025270            3064   5026#
MSG76   025307            1983   5029#
MSG77   025320            1971   5031#
MSG78   025331            2260   2306   2354   5033#
MSG79   025371            2736   2766   5039#
MSG8    023565            4541   4855#
MSG9    023575            4813   4857#
MTC1    000672            1542#  2230*  2278*  2408*  2426*  2609*  2611*  2813*  2815*  2834*  2836*  2902*  2926*
                          3956   3980   3986   4044   4185   4212   4215   4279   4298   4301   4306*  4308   4553
                          4555   4559
MTINT   021160            1461   3073   4374#
MTINTA  021162            4327   4375#
NOP   = 000240            1414#
NRTP    010754            2261   2307   2355   2737   2767   2791#
OCTP    023126            1423   4748#
OCTPG   023242            4755   4761   4764   4768   4772   4773   4777#
OFFLIN  020312            1932   2048   2136   2152   3970   4225#  4272
OFL     023302            4748*  4779   4781*  4787#
PAPRT   022012            1945   2021   2259   2305   2353   2489   2624   2735   2765   3735   3867   3874   4093
                          4275   4318   4515#
PAPRTA  022144            4544#
PAPRTC  022152            4543   4546#
PAPRTD  022160            4545   4548#
PAPRTY  022250            4564#
PAPRT0  022102            4530   4532#
PAPRT1  022244            4554   4556   4558   4563#
PAPRT3  022254            4560   4562   4566#
PARS    013654            3316   3318*  3334*  3335*  3338#
PATRN   000560            1501#  3197   3200   3307   3312   3322   4463*  4467*  4469*  4471*  4487*  4489*  4491*
                          4494*  4542   4546
PATS    013652            1872*  2088*  2973*  3312   3323*  3337#  3634*
PFLG    000670            1541#  3732*  3809   3814*  4092*  4167   4172*
PICK    016324            3850   3893#
PIK1    000764            1578#  3842   3878   3894   3904
PIK2    000766            1579#
PIK3    000770            1580#
PIK4    000772            1581#
PIK5    000774            1582#
PIK6    000776            1583#
PIK7    001000            1584#
```

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P1K8    001002  1585#
PRB     000624  1519#  3354
PRS     000622  1518#  3348*  3350*  3351
PSW     000606  1512#  4309*  4315*  4336*
RANBAS  000626  1520#  1990*  4586*  4587
RANG    022314  2970   2988   3506   4586#  4589   4591
RANSAV  000630  1521#  1991*  2971*  2972   2989   3507   4586   4587*  4588   4590
RANSET  004122  1861   1990#  2087
RCNT    000554  1499#  1992*  2226   2384   2581   2914   2989*  3175   3177   3187   4462*  4486*  4563
                4568
RCNTR   011724  1922   2986#
RCSAV   000632  1522#  1992   3182*
RDA     007522  2583   2585   2590#
RDATA   032352  2406   2599   2634   2644   2825   2846   2859   2897   2910   2924   3330   3369   3620
                3740   3780   3793   3960   3963   5141#
RDCMD   000562  1502#  2509*  2517*  2521   2529*  2533*  2539*  2543   2547*  2549*  2584   2592   2600
                2614   2638   2645   2668   2687   2697   2755   2784   2811   2826   2844   3638   3686
                3695   3742   3748   3755   3761   3777   3797   3844   3958   3998   4067   4557
RDERR1  001144  1654#  1975   2640*  2672*
RDER1   001104  1632#  1963   2642*  2670*
RDER2   001106  1633#
RDER3   001110  1634#
RDER4   001112  1635#
RDER5   001114  1636#
RDER6   001116  1637#
RDER7   001120  1638#
RDER8   001122  1639#
RDEX    010366  2698   2700   2702   2704   2708#
RDFL    014404  1455*  1846*  2089*  3303   3510*  3512#
RDRTG   010506  2743#  2781
RDRTX   010752  2787   2789#
RDRTY   010374  2673   2721#
RDRT0   010406  2722   2725#
RDRT1   010466  2734   2739#
RDRT1B  010502  2740   2742#
RDRT2   010560  2732   2749   2754#
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RDRT7   010746  2785   2788#
RDX     010372  2709#
RD0     007556  2593   2595   2598#  2696   2707
RD1     007622  2605   2608#
RD1A    007636  2601   2611#
RD1B    007644  2610   2612#
RD10    010314  2690   2692   2694#
RD11    010324  2695   2697#
RD2     007656  2612   2614#
RD3     007714  2615   2617   2619   2622#
RD4     007742  2623   2628#
RD4A    010036  2633   2644#
RD4A0   010066  2646   2651#
RD4A1   010110  2654   2657#
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RD4B    010140  2631   2664#
RD4C    010144  2663   2665#
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RD4E    010176  2671   2673#
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RD6     010230  2641   2643   2676   2678   2680#
RD7     010254  2683   2685#
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REOTC   004730  1896*  2050*  2056*  2065*  2106#  2122*  3043*  3164*  3172*  4233*  4418*  4442*  4447
REOTX   004636  2084   2087#
REOTXX  004724  2091   2105#
REOT1C  004312  2027   2032#
REOT1E  004334  2031   2037#
REOT2   004354  2041#  2047
REOT2A  004410  2043   2045   2050#
REOT3   004436  2051   2056#
REOT4   004452  2059#  2080
REOT7   004614  2081#
RETRY   000604  1511#  2780   4087
RFHARD  002724  1765#  1969   2786*
RFSOFT  002664  1742#  1966   2757*
RPCNT   000700  1545#  2269*  2309*  2339*  2340   2365   2422*
RRHARD  002744  1776#  1981   2788*
RRSOFT  002704  1753#  1978   2759*
RSEQ    007210  1939   2509#
RSEX    007444  2520   2531   2542   2549#
RSF     007260  2516   2519#
RSFR    007340  2514   2533#
RSFRX   007462  2551   2553#
RSFR0   007372  2537   2539#
RSFR1   007402  2535   2541#
RSFR2   007432  2544   2547#
RSF0    007312  2522   2526#
RSF1    007326  2525   2527   2529#
RSR     007236  2512   2515#
RSTAL   000574  1507#  2685   3247   3249
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                4085
RTRN    000662  1538#  2231*  2281*  2409*  2429*  2612*  2816*  2838*  2903*  2922*  4376
RTYFL   000712  1550#  2246   2271*  2293   2317*  2330*  2438*  2674*  2744*  2866   4083   4561
RTY1    001044  1610#  1957   2264*  2311*  2394*
RTY2    001046  1611#
RTY3    001050  1612#
RTY4    001052  1613#
RTY5    001054  1614#
RTY6    001056  1615#
RTY7    001060  1616#
RTY8    001062  1617#
RWND    004732  1935   2116#
RWNDA   004744  2117   2119#  4459   4483
RWNDX   005210  2143   2157#
RWND0   004770  2123#  2139
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RWND2	005102	2125	2140#											
RWND3	005106	2141#	2155											
RWND5	005172	2146	2151	2153#										
SCVFL	013444	1472*	3053	3242	3272*	3274#	4353*							
SERFL	000706	1548#	2249	2253*	2296	2337	2401*	2413	2423*	2432	2665	2680*	2730*	2743*
		2746	3692	4071*	4079*									
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SNPG	023454	4820	4823	4829	4831	4834#								
SNPT	02336c	3131	4812#											
SPACE	026335	4399	4774	5133#										
SPFLG	000572	1506#	2090	3225	3227									
STAL	000666	1540#	1930*	1937*	1940*	2046*	2134*	2244*	2402*	2523*	2545*	2685*	2808*	2817*
		2821*	2823*	2894*	2929*	2952*	4305*	4313*						
STALL	011654	1938	1941	2245	2403	2412	2524	2546	2686	2809	2824	2895	2930	2952#
		2953												
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STARTA	003144	1456	1854#	2627										
STARTB	003150	1847	1855#											
STARTC	003136	1452	1850#											
STARTD	003250	1851	1874#											
STARTE	003242	1873#	2105											
START1	003406	1897#	1951											
START2	003522	1915	1917#											
START3	003536	1918	1920#											
START4	003552	1902	1921	1923#										
START7	003734	1924	1943	1950#	2055									
START8	003742	1951#												
STAR1A	003420	1899#												
STAR1B	003440	1900	1903#											
STAR1C	003474	1905	1907	1911#										
STAUT	003122	1468	1839	1845#										
STAUTO	003352	1890#	4466	4468	4470	4472	4488	4490	4492	4495				
STFLG	000640	1528#	1855	1856										
STP	003744	1946	1954#	2039										
STTBL	001044	1609#	1862	1863										
SWR	000610	1513#	1830*	1876	1880	1884*	1914	1917	1920	1942	2116	2223	2241	2254
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		2536	2541	2628	2675	2682	2721	2739	2748	2770	2840	2868	2874	2905
		3730	3767	3806	3811	3865	3872	4042	4081	4164	4169	4316	4324	4340
		4342*	4348*	4355	4596	4600	4603							
SWREG	000176	1445#	1830	1876	1884	4340	4348	4596						
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TAPG3A	020466	4280	4283#											
TAPG3B	020502	4282	4285	4287#										
TAPG3C	020522	4290	4293#											
TAPG3D	020566	4297	4299	4301#										
TAPG3E	020612	4304	4306#											
TAPG3F	J20450	4274	4279#											
TAPG4	020640	4311#	4312	4314										
TAPG5	020654	4315#												
TAPG6	020720	4317	4324#											
TAPG7	020730	4325	4327#											
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TEMP2	000646	1532#	3101	3103*	3134*	3146*	3157*	3278*	3282	3360*	3367	3837*	3840*	3848*
		3854	3897											
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		4806												
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TIB	000642	1530#	4653	4657	4662	4666	4675	4677	4683*	4684	4705*	4706*	4707	4711
TINER	022706	4676	4678	4688	4690	4695#								
TINF	000636	1527#	1845*	1850*	1854*	2082*	3039	3244						
TINP	011750	1888	3039#											
TINPX	013436	3243	3245	3272#										
TINPO	012302	3097	3101#	3111	3122	3168								
TINPOB	012364	3109	3114#											
TINPOD	012434	3120	3123#											
TINPOE	012470	3126	3131#											
TINP1	012474	3133#												
TINP2	012534	3142#												
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TINP3A	013226	3233#	4354											
TINP4	013270	3041	3242#											
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TOG	023110	4724	4728	4731	4735	4741#	4742	4784	4837					
TPB	000620	1517#	4743*											
TPOS	013446	3140	3154	3163	3278#	3280								
TPS	000616	1516#	4741											
TSTAL	000600	1509#	1937	1940	2402	2523	2545	2894	2929	3265	3267			
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TTINT	020734	1439	4331#											
TTOUT	022774	1418	4716#											
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		2029	2032	2037	2092	2260	2267	2306	2315	2344	2345	2354	2360	2361
		2364	2449	2452	2460	2474	2481	2490	2625	2731	2736	2741	2750	2751
		2766	2772	2782	3048	3051	3055	3064	3088	3098	3102	3121	3127	3133
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		4124	4129	4132	4137	4141	4146	4149	4159	4218	4227	4230	4235	4276
		4320	4323	4344	4357	4387	4395	4396	4399	4400	4515	4518	4522	4527
		4533	4541	4544	4548	4551	4567	4570	4599	4602	4664	4672	4695	4709
		4711	4751	4774	4796	4798	4813	4832						
TYPOCT=	104400	1425#	1958	1961	1964	1967	1970	1973	1976	1979	1982	1985	2036	2347
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		4110	4115	4118	4123	4126	4131	4134	4140	4143	4148	4151	4162	4359
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UDES	000552	1498#	1901*	1913*	1927	2008	2059*	2060	2128*	2129	2144*	2147	2159*	2160
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UNP     000674          1543#   1898    1909*   1911*   1950*   1956    2009    2033    2041    2052    2057*   2077*   2078
                        2081*   2119    2120*   2123    2138*   2140*   2141    2153*   2158*   2251    2263    2298    2310
                        2373    2375    2393    2475    2637    2667    2754    2783    3042*   3110    3114    3165    3167*
                        3171*   3281    3694    3841    3876    3893    3902    4225
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UN1     000742          1566#   1867    1891    1893*   1899    1901    1913    1923    2010    2042    2053*   2059    2061
                        2066*   2076*   2079    2124    2126    2128    2137*   2142    2144    2145    2159    3112*   3115*
                        3118    3282*   4226*   4401    4431    4455    4478
UN2     000744          1567#
UN3     000746          1568#
UN4     000750          1569#
UN5     000752          1570#
UN6     000754          1571#
UN7     000756          1572#
UN8     000760          1573#
UPS     000714          1551#   2119*   2157
VECT    000546          1496#   3065    3067    3072
WC      000512          1479#   4133    4293*
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WRTSB2  006700          2419    2421#
WRTY    006166          2270    2316    2330#
WRTYR   006220          2335    2337#
WRTYTM  006214          2333    2336#
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WRW     006150          2321#
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WTER7   001100          1627#
WTER8   001102          1628#
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YOZO	011002	2810#	2876											
YSTAL	000602	1510#	2808	2823	4358	4360								
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$MNEW	023510	4602	4845#											
$MSWR	023500	4599	4843#											
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		1466#	1471#	1475#	1676#	1678#	1680#	1682#	1684#	1686#	1688#	1690#	1692#	1694#
		1696#	1698#	1700#	1702#	1704#	1706#	1713#	1715#	1717#	1719#	1721#	1723#	1725#
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