TM02/TU16

DATA RELIABILITY PROGRAM

MD-11-DZTUA-G

EP-DZTUA-G-DL-B

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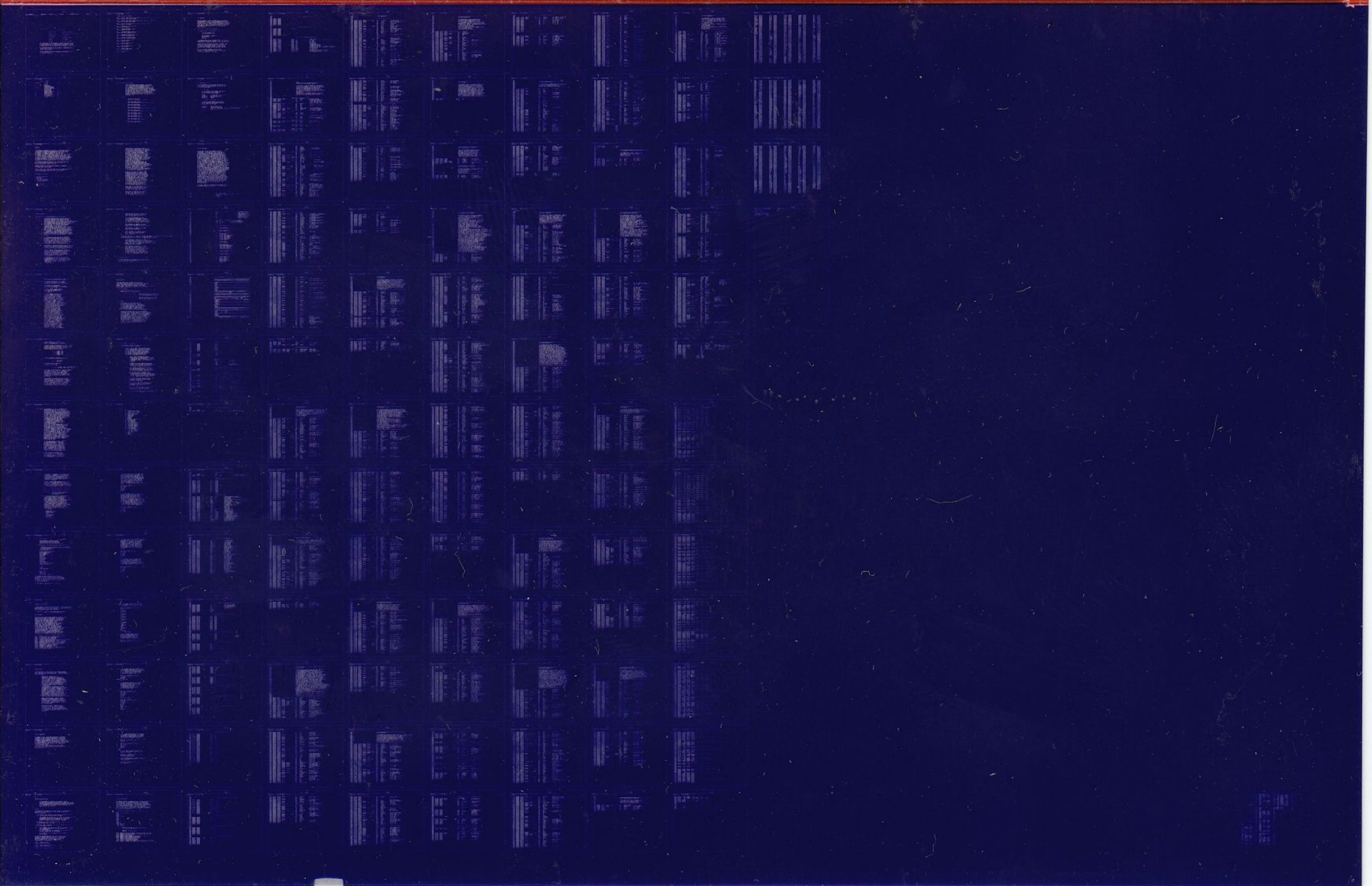

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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZTUA-G-D
PRODUCT TITLE:	TM02-TU16/TE16 DATA RELIBILITY PROGRAM
DATE CREATED:	21 JUNE 1977
MAINTAINER:	DIAGNOSTIC GROUP
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REVISED:	MAY 1977 J.G.ADAMS

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1. ABSTRACT

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 ANY TAPE DRIVE THAT CAN BE OPERATED ON A MASSBUS THROUGH THE TM02 MAG TAPE CONTROLLER. ANY TYPE OF TAPE DRIVE; NRZI,PE,7 OR 9 TRACK MAY BE USED. ANY NUMBER OF DRIVES, SINGLE OR MULTIDRIVE SYSTEMS, UP TO 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 TM02.

HOWEVER; THE RH AND TM02 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 TM02.

2. REQUIREMENTS (HARDWARE)

A. ANY PDP-11 PROCESSOR - WITH OR WITHOUT HARDWARE SWITCH REGISTER
B. 8K OF CORE
C. TELETYPE
D. TM02 TAPE CONTROLLER
E. 1 TO 8 MAG TAPE DRIVES
F. MASSBUS CONTROLLER

3. LOADING PROCEDURE

USE STANDARD PROCEDURE FOR LOADING BINARY TAPES

4. STARTING PROCEDURE

THERE ARE FOUR (4) STARTING ADDRESSES THAT MAY BE USED:

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(TMO2 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 WILL BE RETAINED.

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 ZERO.

D. 240(8): THIS IS A SPECIAL ADDRESS WHICH WILL CAUSE THE PROGRAM TO EXECUTE A PREDETERMINED TEST PLAN 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. SEE ALSO SECTION 11 FOR DETAILS.

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 INTERCHANGE READ.

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 TMO2) 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
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. 0 = 200BPI, NRZ1
B. 1 = 556BPI, NRZI
C. 2 = 800BPI, NRZI
D. 3 = 800BPI, NRZI
E. 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)

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.

PATTERN NUMBER: THIS RESPONSE IS A TWO (2) CHARACTER OCTAL
NUMBER WITHIN THE LIMITS OF 0 THRU 15(8).
THE NUMBER 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.

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. AS EACH PARAMETER REQUEST (PATTERN NUMBER, RECORD 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:

        ***SWR=XXXXXX NEW= WILL BE TYPED FIRST IF THE SOFTWARE
           REGISTER IS SELECTED(REFER TO SECTION 8 FOR OPERATOR OPTIONS).
        TU16 TAPE DRIVE TEST
        ENTER CONDITIONS IN OCTAL

        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) 7 CHAN SN: 0022
        DENSITY=(2)
        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); THE SOFTWARE SWITCH REGISTER IS INVOKED WITH A SWITCH SETTING OF 100000 (HALT ON ERROR SET). NO OPERATOR INTERVENTION IS REQUIRED.

** EXCEPTION: IF LOADED VIA TMDP CHAIN MODE THE PROGRAM WILL NOT TEST SLAVE 0 ON THE FIRST AVAILABLE DRIVE.

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 C 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 CAN BE CHANGED
BY TYPING A CNTRL C WHILE DOING A YOZZLE. A YOZZLE STALL
REQUEST WILL BE PRINTED AND SHOULD BE RESPONDED TO WITH
THE DESIRED VALUE.

B. CONSOLE SWITCH SETTINGS

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

CONTROL:

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

1) TYPE CONTROL G <↑G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

   A) THIS PROGRAM WILL PROCESS THE <↑G> EITHER IN FLAG MODE OR INTERRUPT DEPENDING ON WHERE IN THE PROGRAM THE <↑G> IS EXCEPTED. THE PROGRAM WILL SERVICE THE INTERRUPT ONLY WHEN THE PRIORTY IS LOWERED TO ALLOW THE TTY TO INTERRUPT.

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

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

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

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

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
(100000)0=CONTINUE ON ERROR

SW14: 1=PRINT READ/WRITE STATISTICS
(040000)0=DO NOT PRINT STATS

SW13: 1=DO NOT CHECK DATA ERRORS

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(020000)0=CHECK DATA ERRORS

SW12:    1=DO NOT CHECK WRITE STATUS ERRORS (NOR CLEAR THEM IF THEY DO OCCUR)
(010000)0=CHECK WRITE STATUS ERRORS

SW11:    1=DO NOT CHECK READ STATUS ERRORS (NOR CLEAR THEM IF THEY DO OCCUR)
(004000)0=CHECK READ STATUS ERRORS

SW10:    1=DO NOT PRINT ANY ERRORS (EXCEPT CATASTROPHIC ERRORS)
(002000)0=PRINT ALL ERRORS

SW9:     1=REWIND ALL AVAILABLE TAPES
(001000)0=DO NOT REWIND

SW8:     1=GENERATE RANDOM DATA
(000400)0=USED FIXED DATA

SW7:     1=GENERATE RANDOM CHARACTER COUNT
000200)0=USE FIXED CHARACTER COUNT

SW6:     1=GENERATE RANDOM RECORD COUNT
(000100)0=USED FIXED RECORD COUNT

SW5:     1=YOZZLE ON CURRENT RECORD
(000040)0=DO NOT YOZZLE ON RECORD

SW4:     1=DO WRITE/READ RETRIES
(000020)0=DO NOT RETRY

SW3:     1=DO NOT READ FORWARD
(000010)0=READ FORWARD

SW2:     1=DO NOT READ REVERSE
(000004)0=READ REVERSE

SW1:     1=READ FORWARD FIRST
(000002)0=READ REVERSE FIRST

SW0:     1=DO NOT WRITE
(000001)0=WRITE
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SWITCH EXPLANATION AND EXAMPLES:

SW0-3: THESE SWITCHES ARE USED TO CONTROL THE SEQUENCE OF MAG TAPE OPERATIONS PREFORMED ON EACH AVAILABLE UNIT. THE BLOCK OF DATA DESCRIBED THROUGH THE RESPONSES TO TELETYPE REQUESTS AT INITIAL START WILL BE EITHER WRITTEN OR READ FROM EACH AVAILABLE UNIT IN THE ORDER THAT THEY WERE ENTERED. THE SEQUENCE OF OPERATIONS IS CALLED A CYCLE, AND WILL BE PERFORMED CONTINUOUSLY UNTIL STOPPED BY THE OPERATOR. WHEN END OF TAPE IS REACHED, THE UNIT WILL BE REWOUND AND FLAGGED AS UNAVAILABLE FOR TEST UNTIL ALL UNITS HAVE REACH EOT, AT WHICH TIME TESTING IS RESUMED ON ALL AVAILABLE UNITS.

EXAMPLES: 0-3

A. SW0=0,SW1=0,SW2=1,SW3=1
   WRITE ONLY X RECORDS OF Y CHARACTERS

B. SW0=0,SW1=0,SW2=1,SW3=0
   WRITE THEN BACKSPACE AND READ FORWARD X RECORDS

C. SW0=0,SW1=0,SW2=0,SW3=1
   WRITE THEN READ REVERSE X RECORDS.

D. SW0=0,SW1=0,SW2=0,SW3=0
   WRITE THEN READ REVERSE AND READ FORWARD X RECORDS

E. SW0=0,SW1=1,SW2=0,SW3=0
   WRITE THEN BACKSPACE AND READ FORWARD THEN REVERSE

F. SW0=1,SW1=0,SW2=1,SW3=0
   READ TAPE FORWARD X RECORDS

G. SW0=1,SW1=0,SW2=0,SW3=1
   READ TAPE REVERSE X RECORDS

H. SW0=1,SW1=0,SW2=0,SW3=0
   READ TAPE REVERSE THEN FORWARD

I. SW0=1,SW1=1,SW2=0,SW3=0
   READ TAPE FORWARD THEN REVERSE

SW4: SWITCH FOUR (4), WHEN SET TO A ONE (1), WILL CAUSE ANY DATA RELATED ERROR TO BE RETRIED. THE WRITE RETRY SCHEME CONSISTS OF REWRITING THE RECORD IN THE SAME SPOT ON TAPE FOUR (4) TIMES. IF ALL FOUR (4) REPEATS ARE SUCCESSFUL, THE RECORD IS CONSIDERED AS RECOVERED, AND A TAPE WRITE ERROR IS LOGGED. IF ANY OF THE FOUR (4) REPEATS IS UNSUCESSFUL, A SKIP ERASE IS DONE, A SUPECTED BAD TAPE SPOT IS LOGGED AT THIS BLOCK AND RECORD NUMBER, AND A SECOND RETRY OF FOUR REPEATS IS DONE. IF AFTER FOUR (4) RETRIES, THE RECORD CANNOT BE RECOVERED A NOTIFICATION IS PRINTED, AND TESTING IS RESUMED ON THE NEXT RECORD.
IF 20(8) BAD TAPE SPOTS ARE FOUND, THE SLAVE WILL BE REWOUND AND REMOVED FROM TESTING WITH AN APPROPRIATE MESSAGE PRINTED.
THE READ RETRY SCHEME CONSISTS OF REREADING THE RECORD UP TO EIGHT TIMES. IF ALL EIGHT REREADS ARE BAD, IT IS A HARD ERROR. IF ANY REREAD IS SUCCESSFUL, THIS IS A SOFT ERROR.
IF THE ORIGINAL ERROR IS OF THE NON-RETRYABLE TYPE (IE: ILF,RMR,ILR,NEF,CBUSPE), THE RETRY SCHEME IS NOT ENTERED AND A MESSAGE IS PRINTED.

SW5: SWITCH FIVE (5) WHEN SET DURING A READ FORWARD OR REVERSE WILL CAUSE THE TAPE TO CONTINUOUSLY READ THE CURRENT RECORD BY SPACING EITHER FORWARD OR REVERSE AND REREADING THAT RECORD. THIS TAPE MOVEMENT IS CALLED YOZZLING. THERE IS A SOFTWARE DELAY EXECUTED BETWEEN EACH SPACE/READ OF THE RECORD AND IT MAY BE VARIED BY TYPING CONTROL C ON THE TELETYPE DURING THE EXECUTION OF THE YOZZLE AND RESPONDING TO THE PRINTED REQUEST WITH A SIX (6) DIGIT VALUE. THE YOZZLE STALL IS PRESET TO A VALUE OF 3000 IN THE PROGRAM TO PREVENT EXCESSIVE TAPE WEAR, BUT MAY BE SET TO ANY VALUE THROUGH THE TELETYPE.

SW6-8: THESE THREE (3) SWITCHES CONTROL THE RANDOMIZATION OF DATA AND BLOCK SIZE AND MAY BE SET AND RESET AT ANY TIME. THE ACTUAL CHANGE WILL TAKE PLACE BETWEEN BLOCK CYCLES.

SW9: SWITCH NINE (9) WHEN SET WILL CAUSE ALL AVAILABLE TAPE UNITS TO BE REWOUND AT THE END OF THE CURRENT BLOCK CYCLE. TESTING WILL BE RESUMED AT A BLOCK COUNT OF ONE (1) WHEN ALL UNITS HAVE REACHED BOT.

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, BUT THEY ARE NOT CLEARED EITHER.
***THEREFOR USE CAUTION TO ASSURE THAT OPERATIONS ARE NOT UNEXECUTED DUE TO UNCLEARED ERRORS.
****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.

*****PROGRAM HALTS*****

***IF THE SOFTWARE SWITCH REGISTER IS USED AND THE PROGRAM HALTS THEN THE OPERATOR CAN PRESS A <↑G> CONTROL G BEFORE HITTING CONTINUE. THIS WILL ALLOW THE OPERATOR TO ENTER DATA INTO THE SOFTWARE SWITCH REGISTER.

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 TM02 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 TM02 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.

D. EXAMPLES:

GLOSSARY:

BN = CURRENT BLOCK NUMBER
RN = CURRENT RECORD NUMBER
RS = RECORD SIZE, IN FRAMES
WE = WRITE STATUS ERROR
RE = READ STATUS ERROR
SE = SPACE ERROR
TM = TAPE MARK
F = FORWARD
R = REVERSE
CS1 = RH/TU16 CONTROL REGISTER
WC = RH WORD COUNT
BA = RH BUS ADDRESS
FC = TU16 FRAME COUNT
CS2 = RH CONTROLLER STATUS
DS = TU16 DRIVE STATUS
ER = TU16 ERROR REGISTER
AS = ATTENTION SUMMARY
CK = TU16 CHECK CHARACTER
DB = RH DATA BUFFER
MR = TU16 MAINTENENCE REGISTER
DT = TU16 DRIVE TYPE
SN = TU16 SERIAL NUMBER
TC = TU16 TEST CONTROL
*F = DATA FORMAT
*P = PARITY
*D = DENSITY
*PATRN = DATA PATTERN NUMBER (R = RANDOM)

```
EXAMPLE 1: IN THIS EXAMPLE SLAVE 1 ON TM02 0 WAS
        OPERATING AT 1600 BPI IN ODD PARITY USING
        THE NINE CHANNEL NORMAL DATA FORMAT.  A
        WRITE STATUS ERROR WAS DETECTED.  THE BAD
        STATUS INDICATES THAT AN UNCORRECTABLE DATA
        ERROR (BIT 6 OF ER) AND A PE FORMAT ERROR
        (BIT 7 OF ER) OCCURED DURING THE WRITE
        OPERATION OF THE SIXTH (6) RECORD OF THE
        FIFTY (50) RECORDS IN BLOCK (2).  THE
        SIZE OF THE RECORD WAS TWO HUNDRED (200)
        FRAMES.  THE CHECK CHARACTER REFLECTS THE BAD TRACK.

        DRIVE NO. 0 *SLAVE NO. 1 *D 4 *P 0 *F 14 *PATRN 1
        *BN 2 *RN 6-50 *RS = 200 *WE
        CS1 144260
        CS2 100
        DS 150640
        ER 300
        WC 0
        CK 4

EXAMPLE 2: IN THIS EXAMPLE SLAVE 3 ON TM02 1 WAS
        OPERATING AT 800 BPI IN EVEN PARITY USING
        THE NINE CHANNEL NORMAL DATA FORMAT.  A
        READ STATUS ERROR WAS DETECTED DURING
        THE REVERSE READ OF THE TENTH (10)
        RECORD OF THE 25 RECORDS IN THIS BLOCK (12).
        THE SIZE OF THE RECORD IS TWENTY (20) FRAMES.
        THE PRINTOUT INDICATES THE DETECTION OF A
        VERTICAL PARITY ERROR (VPE: BIT 6 OF ER) AND A
        CYCLIC REDUNDENCY ERROR (CRC: BIT 15 OF ER).
        THE CRC CHARACTER, AS RECEIVED, IS NOT
        AS EXPECTED AND IS PRINTED SHOWING BOTH
        THE ACTUAL (FIRST) AND THE EXPECTED (LAST).

        DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 3
        *BN 12 *RN 10-25 *RS 20 *RE R
        CS1 144276
        CS2 100
        DS 150600
        ER 100100
        WC 0
        CRC 767-777
```

EXAMPLE 3: IN THIS EXAMPLE, THE HEADER IS THE SAME AS
IN EXAMPLE TWO (2) EXCEPT THAT THE ERROR TYPE
REFLECTS A READ ERROR IN THE FORWARD
DIRECTION. IT IS NORMAL FOR THE SYSTEM
TO DETECT AN ERROR IN THE FORWARD AND
REVERSE DIRECTION AT THE SAME RECORD.
REMEMBER THAT IN REVERSE OPERATIONS THE
RECORD NUMBER IS COUNTED DOWN SO THAT
RECORD NUMBER TEN (10) WILL SHOWN IN
THE PROPER POSITION IN BOTH FORWARD AND
REVERSE.

```
DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 2
*BN 12 *RN 10-25 *RS 20 *RE F
CS1 144270
CS2 100
DS 150600
ER 100100
WC 0
CRC 767-777
```

EXAMPLE 4: IN EXAMPLES 2 AND 3 THE READ OPERATION
RESULTED IN BAD STATUS, HOWEVER THE
DATA ASSOCIATED WITH THE OPERATION WAS
NOT BAD (OR WAS NOT CHECKED: SW 13=1).
THIS EXAMPLE (4) SHOWS A PRINTOUT REFLECTING
A READ STATUS ERROR ACCOMPANIED BY BAD
DATA IN CHARACTERS FOUR (4) AND SIX (6).

```
DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 2
*BN 12 *RN 10-25 *RS 20 *RE F
CS1 144270
CS2 100
DS 150600
ER 100100
WC 0
CRC 767-777
CN 4
G 11111111
B 10111111
CN 6
G 11111111
B 10111111
```

```
        EXAMPLE 5: THIS EXAMPLE SHOWS A READ DATA ERROR
                WHICH OCCURRED, WITHOUT AN ACCOMPANING
                STATUS ERROR, WHICH RESULTED IN A BAD RECORD.

                DRIVE NO. 3 *SLAVE NO. 1 *D 4 *P 0*F 14 *PATRN R
                *BN 100 *RN 66-200 *RS 2000 *DE F
                CN 0
                G 11111111
                B 00000000
                CN 1
                G 11111111
                B 00000000
                CN 2
                G 11111111
                B 00000000
                CN 3
                G 11111111
                B 00000000
                CN 4
                G 11111111
                B 00000000
                CN 5
                G 11111111
                B 00000000
                CN 6
                G 11111111
                B 00000000
                CN 7
                G 11111111
                B 00000000
                        BAD RECORD

        EXAMPLE 6: THE FOLLOWING EXAMPLE SHOWS THE
                RESULT OF A SPACE OPERATION THAT
                SHOULD HAVE SPACED REVERSE OVER
                AN ENTIRE 100 RECORD BLOCK BUT
                WHICH TERMINATED AT THE END OF 40
                RECORDS.  LEAVING A POSITION ERROR OF 40

                DRIVE NO. 2 *SLAVE NO. 6 *D 2 *P 0 *F 14
                *BN 3 *RN 100-100 *RS 1000 *SE R
                ERR AMT 40
```

EXAMPLE 7: THIS EXAMPLE REFLECTS AN ERROR DETECTED
WHILE WRITING A TAPE MARK (TM) AT THE END
OF THE CURRENT DATA BLOCK PER OPTION RESPONSE
TM=1. NOTE THAT THE TM RECORD NUMBER
IS ONE GREATER THAN THE TOTAL NUMBER OF DATA
RECORDS IN THE CURRENT BLOCK.

```
DRIVE NO. 1 *SLAVE NO. 1 *D 2 *P 0 *F 14
*BN 67 *RN 101-100 *RS 36 *WE TM
CS1 144226
CS2 300
DS 150604
ER 1000
WC 0
```

EXAMPLE 8: THIS EXAMPLE SHOWS TWO (2) PRINTOUTS
REFLECTING A WRITE RETRY WHICH WAS NOT
SUCCESSFUL THE FIRST TIME, BUT WHICH
DID RECOVER ON THE SECOND.
THE UNSUCCESSFUL RETRY IS LOGGED AS
A SUSPECTED BAD TAPE SPOT BY ITS
BLOCK AND RECORD NUMBER.

```
DRIVE NO. 0 *SLAVE NO. 2 *D 4 *P 0 *F 14 *PATRN 6
*BN 2 *RN 12-20 *RS 667 *WE
CS1 144260
CS2 100
DS 150640
ER 100
WC 0
***ORIGINAL ERROR***

DRIVE NO. 0 SLAVE NO. 2 *D 4 *P 0 *F 14 *PATRN 6
*BN 2 *RN 12-20 *RS 667 *WE
CS1 144260
CS2 100
DS 150640
ER 100
WC 0
SUSPECT BAD TAPE
RETRY: 0
REPT: 0
RECOVERED
RETRY: 1
```

```
EXAMPLE 9: IF , DURING A WRITE RETRY THE BACKSPACE
        OR THE ERASE OPERATION RESULT IN AN ERROR,
        THE ERROR WILL BE PRINTED AND THE PROGRAM
        HALTED.  THIS EXAMPLE SHOWS THE ERROR PRINT
        FOR A SPACE AND AN ERASE (2 EXAMPLES)

        DRIVE NO. 1 *SLAVE NO. 1 *D 3 *P 0 *F 14
        BN 12 *RN 8-64 *RS 500 *SE RTRY
        ERR AMT 1

        DRIVE NO. 1 *SLAVE NO. 1 *D 3 *P 0 *F 14
        *BN 12 *RN 8-64 *RS 500 *ERASE
        CS1 144224
        CS2 100
        DS 150600
        ER 400
        WC 0

EXAMPLE 10: THIS EXAMPLE SHOWS THE PRINTOUT FROM
        A REWIND OPERATION WHICH DOES NOT HAVE
        BOT SET AT THE END.

        DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 0 *F 14
        *BN 66 *RN 15-20 *RS 1000
        NOT BOT ON REWIND: HALT

EXAMPLE 11: THIS EXAMPLE SHOWS THE PRINTOUT MADE WHEN
        THERE IS NO INTERRUPT RETURNED AT THE END
        OF AN OPERATION.

        DRIVE NO. 7 *SLAVE NO. 7 *D 2 *P 1 *F 14
        *BN 1 *RN 25-26 *RS 1200
        NO INTERRUPT
```

10. STATISTICS PRINTOUT

THE PROGRAM, THROUGH ITS ERROR CHECKING, IS ABLE TO GATHER CERTAIN
STATISTICS ABOUT THE PERFORMANCE OF EACH UNIT UNDER TEST.
THIS INFORMATION IS PRINTED OUT WHENEVER A UNIT IS REWOUND
FROM END OF TAPE, OR BECAUSE IT IS TO BE REMOVED FROM TESTING
DUE TO SOME CATASTROPHIC ERROR. (POSITION LOST, BAD TAPE OVERFLOW)
THE STATISTICS MAY BE PRINTED AT ANY TIME BY SETTING
SWITCH 14 TO A ONE (1). THIS PRESENTS A PICTURE OF PERFORMANCE
UP TO THIS TIME. THE STATISTICS WILL BE CLEARED UPON REWIND OF THE
UNIT; BUT NOT BY SETTING SW 14.

STATISTICS PRINT EXAMPLE (A HEADER WILL PRECEED THE STATS)

```
DROPS: 0 3 0 0 0 6 45 0
PICKS: 1 0 0 0 0 0 0 2
RETRY: 1
WTERR: 2
REFWD: 3
 SOFT: 2
 HARD: 1
DEFWD: 0
REREV: 4
 SOFT: 1
 HARD: 3
DEREV: 0
2 BAD TAPE SPOTS
0 *BN 1 *RN 2
1 *BN 15 *RN 100
```

** NOTE ** DROPS AND PICKS REFLECT CORE BIT POSITIONS.
THE FOLLOWING IS A TABLE OF CORE BITS TO TRACK NUMBER.

```
TRACK NO. 7 6 5 3 9 1 8 2
CORE BIT  7 6 5 4 3 2 1 0
```

```
DROPS: NUMBER OF DATA BITS DROPPED: PER CORE BIT(SEE NOTE ABOVE)
PICKS: NUMBER OF DATA BITS PICKED UP: PER CORE BIT(SEE NOTE ABOVE)
RETRY: NUMBER OF WRITE RETRIES
WTERR: NUMBER OF WRITE ERRORS NOT ASSOCIATED WITH BAD TAPE
REFWD: NUMBER OF READ FORWARD STATUS ERRORS
REREV: NUMBER OF READ REVERSE STATUS ERRORS
 SOFT: NUMBER OF RECOVERED READ ERRORS
 HARD: NUMBER OF UNRECOVERED READ ERRORS
DEFWD: NUMBER OF FORWARD DATA ERRORS WITH NO ASSOCIATED STATUS ERROR
DEREV: NUMBER OF REVERSE DATA ERRORS WITH NO ASSOCIATED STATUS ERROR
```

11. AUTO SEQUENCE

THE AUTO SEQUENCE (START AT ADDRESS 240) WILL EXECUTE A PREDETERMINED TEST PLAN ON ALL AVAILABLE SLAVES ON EACH AVAILABLE TM02. 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:

```
        TU16 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 TM02 AND ITS SLAVES ARE FOUND, A DIVIDER LINE OF ASTERICKS WILL BE PRINTED FOLLOWED BY A PRINTOUT OF THE TM02 AND ITS SLAVES BEING TESTED. AS EACH TM02 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 CHARACTERS, 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.

13. LISTING

%

```
                        .LIST   BIN,LOC,SEQ
                        .TITLE TM02-TU16/TE16 DATA RELIABILITY PROGRAM
                        ;MAINDEC-11-DZTUA-G-D                ;++G
                        ;21 APRIL 76
                        ;R. BARNES
```

```
                        ;REVISED (++G) J.G.ADAMS MAY 1977       1)INTERMITTENT PGM FAILURE
                        ;++G                                    ON BAD TAPE OVERFLOW
                        ;++G                                    2)TAPE RUNAWAY AT EOT
                        ;++G                                    3)ERRONEOUS ERROR TYPEOUT
                        ;++G                                    4)CHANGED MISC INST'S TO
                        ;++G                                    CONSERVE MEMORY USAGE.
                        ;++G                                    5)ADDED ACT11 HOOKS
                        ;++G                                    6)FIXED TTY INPUT

                        .MCALL  .$ACT11,.$EOP,$CHAIN    ;++G ACT11 HOOKS
                        .NLIST  MC                      ;++G DO NOT LIST MACRO CALLS
                        .LIST   ME                      ;++G LIST MACRO EXPANSIONS
                        .ENABLE ABS,AMA                 ;++G ENABLE ABS AND MODE '37'


                        ;CONSOLE SWITCHES************

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

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

                        ;SW13: 1=DO NOT CHECK DATA
                        ;       0=CHECK DATA
                        ;SW12: 1=DO NOT CHECK WRITE ERRORS
                        ;       0=CHECK WRITE ERRORS
                        ;SW11: 1=DO NOT CHECK READ ERRORS
                        ;       0=CHECK READ ERRORS
                        ;SW10: 1=DO NOT PRINT ERRORS
                        ;       0=PRINT ERRORS

                        ;SW9:  1=REWIND TAPE
                        ;       0=DO NOT REWIND

                        ;SW8:  1=USE RANDOM DATA
                        ;       0=USE FIXED DATA PATTERN
                        ;SW7:  1=USE RANDOM CHARACTER COUNT
                        ;       0=USE FIXED CHAR COUNT
                        ;SW6:  1=USE RANDOM RECORD COUNT
                        ;       0=USE FIXED RECORD COUNT

                        ;SW5:  1=YOZZLE ON CURRENT RECORD
                        ;       0=DO NOT YOZZLE

                        ;SW4:  1=DO BOTH READ AND WRITE RETRIES
                        ;       0=INHIBIT RETRIES

                        ;SW3:  1=DO NOT READ FORWARD
                        ;       0=READ FORWARD
                        ;SW2:  1=DO NOT READ REVERSE
                        ;       0=READ REVERSE
                        ;SW1:  1=READ FORWARD FIRST
                        ;       0=READ REVERSE FIRST
                        ;SW0:  1=DO NOT WRITE
                        ;       0=WRITE
```

```
                        ;TU16/TE16 REGISTER BITS**********

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

```
                                        ;REGISTER EQUIVS************

                    000000              R0=%0
                    000001              R1=%1
                    000002              R2=%2
                    000003              R3=%3
                    000004              R4=%4
                    000005              R5=%5
                    000006              SP=%6
                    000007              PC=%7
                    000240              NOP=240

                                        ;TRAP CATCHERS***********
                    000030              .=30
000030  024622                          TRAP3D
                    000032              .=32
000032  000340                          340

                                    ;ACT11 HOOK ***********
                    000034              $SVPC=.                 ;SAVE CURRENT LOCATION CTR
                    000046              .=46
000046  005072                          .WORD   $ENDAD          ;SET LOCATION 46
                    000052              .=52
000052  000000                          .WORD   0               ;SET LOCATION 52 = 0
                    000034              .=$SVPC                 ;RESTORE LOCATION CTR


                                        ;TTY INTERRUPT VECTOR**********
                    000060              .=60
000060  021602                          TTINT                   ;TTY INTERRUPT HANDLER ADDRESS
000062  000000                          0

                                        ;SOFTWARE SWITCH REGISTER LOC. 176**********

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

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

                    000200              .=200
000200  000137  003026      JMP     START           ;ENTER PARAMETERS VIA TTY

                    000204              .=204
000204  000137  003152      JMP     STARTC          ;USE FIXED PARAMETERS; HOLD DATA

                    000210              .=210
000210  005037  015122      CLR     RDFL
000214  000137  003160      JMP     STARTA          ;USE FIXED PARAMETERS; NEW DATA

                                        ;MAG TAPE INTERRUPT VECTOR**********

                    000224              .=224
000224  021666                          MTINT                   ;MAG TAPE INTERRUPT HANDLER ADDRESS
000226  000340                          340
```

```

                                        ;AUTO SEQUENCE START**********

                000240                  .=240
000240  005237  000734                  INC     ASEQF           ;SET AUTO SEQUENCE FLAG
000244  000137  003136                  JMP     STAUT           ;GO TO START OF AUTO SEQUENCE
```

```
                                        ;SHORT CONVERSATION RESTART********

                 000300                 .=300
000300  005237  014122                  INC     SCVFL                   ;SET SHORT CONVERSATION FLAG
000304  000137  003026                  JMP     START                   ;ENTER SHORT PARAMETER LIST

                 000510                 .=510
                                        ;TU16/TE16 REGISTER EQUIVS**********

000510  172440                  C1:     172440
000512  172442                  WC:     172442
000514  172444                  BA:     172444
000516  172446                  FC:     172446
000520  172450                  CS:     172450
000522  172452                  DS:     172452
000524  172454                  ER:     172454
000526  172456                  AS:     172456
000530  172460                  CC:     172460
000532  172462                  DB:     172462
000534  172464                  MR:     172464
000536  172466                  DT:     172466
000540  172470                  SN:     172470
000542  172472                  C2:     172472

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

000544  172440          REGS:   172440          ;STARTING REGISTER ADDRESS (CS1)
000546  000224          VECT:   224             ;VECTOR ADDRESS (RH INTERRUPT)
000550  000000          DVN:    0               ;DRIVE NUMBER
000552  000000          UDES:   0               ;UNIT DESCRIPTION (PARITY,DENSITY,UNIT,FORMAT)
000554  000100          RCNT:   100             ;RECORD COUNTER
000556  177600          FMCNT:  177600          ;NUMBER OF CHAR (4 - 4000) OCTAL IN TWOS COMPLEMENT
000560  000001          PATRN:  1               ;DATA PATTERN SELECTOR (0 - 15) OCTAL
000562  000002          RDCMD:  2               ;READ COMMAND
000564  000000          TMEX:   0               ;TAPE MARK FLAG: 1=TM 0=NO TM
000566  000000          INTRF:  0               ;INTERCHANGE READ 1=YES 0=NO
000570  000000          SPFLG:  0               ;SINGLE PASS 1=YES 0=NO
000572  000001          RSTAL:  1               ;READ STALL
000574  000001          WSTAL:  1               ;WRITE STALL
000576  000001          TSTAL:  1               ;TURN AROUND STAL
000600  002000          YSTAL:  2000            ;YOZZLE STAL
000602  000010          RETRY:  10              ;READ RETRY NUMBER
000604  177776          PSW:    177776          ;PROCESSOR STATUS
000606  177570          SWR:    177570          ;CONSOLE SWITCHES
000610  177560          TKS:    177560          ;TTY READ STATUS REGISTER
000612  177562          TKB:    177562          ;TTY READ BUFFER
000614  177564          TPS:    177564          ;TTY PUNCH STATUS REGISTER
000616  177566          TPB:    177566          ;TTY PUNCH OUTPUT REGISTER
000620  177550          PRS:    177550          ;H/S READER STATUS REGISTER
000622  177552          PRB:    177552          ;H/S READER BUFFER
000624  153624          RANBAS: 153624          ;RANDOM NUMBER GENERATOR BASE
000626  032561          RANSAV: 032561          ;RANDOM NUMBER BUFFER
000630  000000          RCSAV:  0               ;RECORD COUNT SAVE
000632  000000          FCSAV:  0               ;FRAME COUNT SAVE
```

```
1562
1563                                    ;FLAGS AND COUNTERS**********
1564
1565  000634  000000    TINF:   0       ;TTY ENTERY FLAG
1566  000636  000000    TOB:    0       ;TTY OUTPUT BUFFER
1567  000640  000000    TIB:    0       ;TTY INPUT BUFFER
1568  000642  000000    TEMP1:  0       ;TEMP STORAGE
1569  000644  000000    TEMP2:  0       ;TEMP STORAGE
1570  000646  000000    TEMP3:  0       ;TEMP STORAGE
1571  000650  000000    NRZOF:  0       ;NRZ ONLY FLAG
1572  000652  000000    EMADDR: 0       ;ERROR MSG ADDRESS STORAGE
1573  000654  000000    BLCNTR: 0       ;BLOCK COUNTER
1574  000656  000000    BBC:    0       ;BAD RECORD COUNTER
1575  000660  000000    EOTREC: 0       ;EOT FLAG
1576  000662  000000    RTRN:   0       ;INTERRUUPT RETURN STORAGE
1577  000664  000000    HDRFL:  0       ;HEADER FLAG
1578  000666  000000    STAL:   0       ;DELAY STORAGE
1579  000670  000000    PFLG:   0       ;PRINT FLAG
1580  000672  000000    MTC1:   0       ;MAG TAPE CONT REGISTER BUFFER
1581  000674  000000    UNP:    0       ;UNIT TABLE POINTER
1582  000676  000000    TMFLG:  0       ;TAPE MARK FLAG
1583  000700  000000    RPCNT:  0       ;REPEAT COUNTER
1584  000702  000000    RTCNT:  0       ;RETRY COUNTER
1585  000704  000000    DERFL:  0       ;DATA ERROR FLAG
1586  000706  000000    SERFL:  0       ;STATUS ERROR FLAG
1587  000710  000000    BCNT:   0       ;BIT COUNTER
1588  000712  000000    RTYFL:  0       ;RETRY FLAG
1589  000714  000000    UPS:    0       ;UNIT POINTER SAVE
1590  000716  000000    BDPP:   0       ;BITS DROPPED POINTER
1591  000720  000000    BPKP:   0       ;BITS PICKED POINTER
1592  000722  000000    ERSAV:  0       ;ERROR SAVE LOC
1593  000724  000000    BTFLG:  0       ;BAD TAPE FLAG
1594  000726  000000    BTSTF:  0       ;STATISTIC PRINT FLAG
1595  000730  000000    BTPT:   0       ;BAD TAPE POINTER
1596  000732  000000    ERTFL:  0       ;ERASE FLAG
1597  000734  000000    ASEQF:  0       ;AUTO SEQ FLAG
1598  000736  000000    ADRVN:  0       ;JTO SEQ DRIVE NUMBER
1599  000740  000000    ABLCNT: 0       ;AUTO BLOCK COUNTER
1600  000742  000001    ASEQCF: 1       ;AUTO SEQ CONTINUOUS FLAG
1601  000744  000000    EOPB1:  0       ;EOP FLAG
```

```
1602
1603                                    ;UNIT ORDER AND DESCRIPTION TABLE **********
1604
1605  000746  000000            UN1:    0               ;THIS TABLE IS LOADED
1606  000750  000000            UN2:    0               ;WITH UNIT NUMBERS AND
1607  000752  000000            UN3:    0               ;THEIR DESCRIPTIONS IN
1608  000754  000000            UN4:    0               ;THE ORDER THAT THEY
1609  000756  000000            UN5:    0               ;WILL BE TESTED
1610  000760  000000            UN6:    0
1611  000762  000000            UN7:    0
1612  000764  000000            UN8:    0
1613  000766  177777            UNX:    -1
1614
1615                                    ;UNIT DROPS AND PICKS POINTERS*********
1616
1617  000770  001210            PIK1:   BP00
1618  000772  001230            PIK2:   BP10
1619  000774  001250            PIK3:   BP20
1620  000776  001270            PIK4:   BP30
1621  001000  001310            PIK5:   BP40
1622  001002  001330            PIK6:   BP50
1623  001004  001350            PIK7:   BP60
1624  001006  001370            PIK8:   BP70
1625  001010  001410            DRP1:   BD00
1626  001012  001430            DRP2:   BD10
1627  001014  001450            DRP3:   BD20
1628  001016  001470            DRP4:   BD30
1629  001020  001510            DRP5:   BD40
1630  001022  001530            DRP6:   BD50
1631  001024  001550            DRP7:   BD60
1632  001026  001570            DRP8:   BD70
1633
1634                                    ;UNIT BAD TAPE POINTERS**********
1635
1636  001030  001610            BTADDR: BT00
1637  001032  001714                    BT01
1638  001034  002020                    BT02
1639  001036  002124                    BT03
1640  001040  002230                    BT04
1641  001042  002334                    BT05
1642  001044  002440                    BT06
1643  001046  002544                    BT07
1644
1645                                    ;UNIT WRITE RETRY COUNTER**********
1646
1647  001050  000000            RTY1:   0
1648  001052  000000            RTY2:   0
1649  001054  000000            RTY3:   0
1650  001056  000000            RTY4:   0
1651  001060  000000            RTY5:   0
1652  001062  000000            RTY6:   0
1653  001064  000000            RTY7:   0
1654  001066  000000            RTY8:   0
1655
1656                                    ;UNIT WRITE ERRORS**********
1657
```

```
001070  000000          WTER1:  0
001072  000000          WTER2:  0
001074  000000          WTER3:  0
001076  000000          WTER4:  0
001100  000000          WTER5:  0
001102  000000          WTER6:  0
001104  000000          WTER7:  0
001106  000000          WTER8:  0

                                ;UNIT READ FORWARD ERRORS**********

001110  000000          RDER1:  0
001112  000000          RDER2:  0
001114  000000          RDER3:  0
001116  000000          RDER4:  0
001120  000000          RDER5:  0
001122  000000          RDER6:  0
001124  000000          RDER7:  0
001126  000000          RDER8:  0

                                ;UNIT DATA ERRORS FORWARD**********

001130  000000          DATER1: 0
001132  000000                  0
001134  000000                  0
001136  000000                  0
001140  000000                  0
001142  000000                  0
001144  000000                  0
001146  000000                  0

                                ;UNIT READ REVERSE ERRORS**********

001150  000000          RDERR1: 0
001152  000000                  0
001154  000000                  0
001156  000000                  0
001160  000000                  0
001162  000000                  0
001164  000000                  0
001166  000000                  0

                                ;UNIT DATA ERRORS REVERSE**********

001170  000000          DEREV1: 0
001172  000000                  0
001174  000000                  0
001176  000000                  0
001200  000000                  0
001202  000000                  0
001204  000000                  0
001206  000000                  0
```

```
1710                                        ;DROPS + PICKS PER CHANNEL PER UNIT**********
1711
1712  001210  000000                BP00:   0
1713          001230                        .=.+16
1714  001230  000000                BP10:   0
1715          001250                        .=.+16
1716  001250  000000                BP20:   0
1717          001270                        .=.+16
1718  001270  000000                BP30:   0
1719          001310                        .=.+16
1720  001310  000000                BP40:   0
1721          001330                        .=.+16
1722  001330  000000                BP50:   0
1723          001350                        .=.+16
1724  001350  000000                BP60:   0
1725          001370                        .=.+16
1726  001370  000000                BP70:   0
1727          001410                        .=.+16
1728  001410  000000                BD00:   0
1729          001430                        .=.+16
1730  001430  000000                BD10:   0
1731          001450                        .=.+16
1732  001450  000000                BD20:   0
1733          001470                        .=.+16
1734  001470  000000                BD30:   0
1735          001510                        .=.+16
1736  001510  000000                BD40:   0
1737          001530                        .=.+16
1738  001530  000000                BD50:   0
1739          001550                        .=.+16
1740  001550  000000                BD60:   0
1741          001570                        .=.+16
1742  001570  000000                BD70:   0
1743          001610                        .=.+16
1744
1745
```

```
1746
1747                                        ;UNIT BAD TAPE COUNTER:16 PER SLAVE**********
1748
1749  001610  000000                BT00:   0
1750          001714                        .=.+102
1751  001714  000000                BT01:   0
1752          002020                        .=.+102
1753  002020  000000                BT02:   0
1754          002124                        .=.+102
1755  002124  000000                BT03:   0
1756          002230                        .=.+102
1757  002230  000000                BT04:   0
1758          002334                        .=.+102
1759  002334  000000                BT05:   0
1760          002440                        .=.+102
1761  002440  000000                BT06:   0
1762          002544                        .=.+102
1763  002544  000000                BT07:   0
1764          002650                        .=.+102
1765
1766                                        ;UNIT END OF TAPE COUNTERS 1 PER SLAVE*******
1767
1768  002650  000000                EOTC0:  0
1769  002652  000000                        0
1770  002654  000000                        0
1771  002656  000000                        0
1772  002660  000000                        0
1773  002662  000000                        0
1774  002664  000000                        0
1775  002666  000000                        0
1776
1777                                        ;UNIT READ FORWARD SOFT ERROR*******
1778
1779  002670  000000                RFSOFT: 0
1780  002672  000000                        0
1781  002674  000000                        0
1782  002676  000000                        0
1783  002700  000000                        0
1784  002702  000000                        0
1785  002704  000000                        0
1786  002706  000000                        0
1787
1788                                        ;UNIT READ REVERSE SOFT ERROR*******
1789
1790  002710  000000                RRSOFT: 0
1791  002712  000000                        0
1792  002714  000000                        0
1793  002716  000000                        0
1794  002720  000000                        0
1795  002722  000000                        0
1796  002724  000000                        0
1797  002726  000000                        0
1798
```

```
1799
1800                                        ;UNIT READ FORWARD HARD ERROR*******
1801
1802   002730  000000              RFHARD: 0
1803   002732  000000                      0
1804   002734  000000                      0
1805   002736  000000                      0
1806   002740  000000                      0
1807   002742  000000                      0
1808   002744  000000                      0
1809   002746  000000                      0
1810
1811                                        ;UNIT READ REVERSE HARD ERROR*******
1812
1813   002750  000000              RRHARD: 0
1814   002752  000000                      0
1815   002754  000000                      0
1816   002756  000000                      0
1817   002760  000000                      0
1818   002762  000000                      0
1819   002764  000000                      0
1820   002766  000000                      0
1821
1823                                        ;DATA PATTERN GENERATORS************
1823
1824   002770  002770              DATBL:  .                       ;ENTRY TABLE
1825   002772  014364              DATA0:  DAT0                    ;EXTERNAL INPUT FROM H/S READER(SEE MAINDEC-11-DZTUF)
1826   002774  014530              DATA1:  DAT1                    ;ALL ONES
1827   002776  014550              DATA2:  DAT2                    ;ALL ZEROS
1828   003000  014554              DATA3:  DAT3                    ;WALKING ONE
1829   003002  014600              DATA4:  DAT4                    ;WALKING ZERO
1830   003004  014610              DATA5:  DAT5                    ;ALTERNATING ONE/ZERO
1831   003006  014616              DATA6:  DAT6                    ;ALTERNATING ZERO/ONE
1832   003010  014624              DATA7:  DAT7                    ;ALTERNATING ONE/ZERO IN ALTERNATING CHARACTERS
1833   003012  014652              DATA10: DAT10                   ;WALKING ONE/ALL ONE IN ALTERNATING CHARACTERS
1834   003014  014702              DATA11: DAT11                   ;ALL BITS 0-377
1835   003016  014722              DATA12: DAT12                   ;ALL BITS 377-0
1836   003020  014744              DATA13: DAT13                   ;ALTERNATING CHARACTERS  0 AND 377
1837   003022  014754              DATA14: DAT14                   ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARACTERS
1838   003024  015004              DATA15: DAT15                   ;AUTO SEQUENCE PATTERN 0,0,-1,-1,-1,0,0
1839
```

```
                                        .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 **********
003026  012706  000500          START:  MOV     #500,SP         ;++G SET STACK PTR
003032  005037  000734                  CLR     ASEQF           ;CLEAR AUTO SEQUENCE FLAG
003036  005027                          CLR     (PC)+           ;;CLEAR CHAIN INDICATOR
003040  000000                  CHNFLG: .WORD   0               ;;CHAIN MODE INDICATOR
                                                                ;;1/0 = CHAIN/NOT CHAIN MODE
003042  022737  005072  000042          CMP     #SENDAD,@#42    ;;BRANCH IF LOADED VIA ACT11 CHAIN MODE
003050  001404                          BEQ     50$
003052  005737  000042                  TST     @#42            ;;BRANCH IF IN DUMP MODE
003056  001413                          BEQ     52$
003060  000406                          BR      51$
003062  012737  000176  000506  50$:    MOV     #SWREG,SWR      ;;INVOKE SOFTWARE SWR
003070  012777  100000  175510          MOV     #100000,@SWR    ;;WITH HALT ON ERROR SET
003076  005237  003040          51$:    INC     CHNFLG          ;;SET CHNFLG = CHAIN MODE
003102  000137  003126                  JMP     3$              ;;GO TO CHAIN ADDRESS
003106                          52$:
003106  122737  000006  000041          CMPB    #6,@#41         ;++G BRANCH IF NOT LOADED VIA TMDP
003114  001010                          BNE     STAUT
003116  012704  027340                  MOV     #MSG120,R4
003122  104000                          TTOUTT                  ;++G ADVISE USER TO REMOVE TMDP
003124  000404                          BR      STAUT           ;++G
003126  005237  000734          3$:     INC     ASEQF           ;++G SET AUTO SEQUENCE FLAG
003132  000137  021770                  JMP     ASEQO           ;++G GO TO AUTO SEQUENCER

                                ;START 240 **********
003136  012737  000001  000634  STAUT:  MOV     #1,TINF         ;SET TTY ENTRY FLAG
003144  005037  015122                  CLR     RDFL            ;CLEAR RANDOM DATA FLAG
003150  000405                          BR      STARTB          ;++G

                                ;START 204 **********
003152  005037  000634          STARTC: CLR     TINF            ;CLEAR TTY INPUT FLAG
003156  000434                          BR      STARTD          ;++G

                                ;START 210 **********
003160  005037  000634          STARTA: CLR     TINF            ;CLEAR TTY ENTRY FLAG
003164  012700  000636          STARTB: MOV     #TOB,R0
003170  012701  000037                  MOV     #37,R1
003174  005020                  STARTO: CLR     (R0)+           ;CLEAR FLAGS AND COUNTERS
```

```
 1896  003176  005301                          DEC     R1
 1897  003200  001375                          BNE     STARTD
 1898  003202  012706  000500                  MOV     #500,SP         ;SET STACK POINTER
 1899  003206  004737  004350                  JSR     PC,RANSET       ;GO RESET RANDOM BASE
 1900  003212  012700  001050                  MOV     #RTY1,R0
 1901  003216  012701  000750                  MOV     #750,R1
 1902  003222  005020                  STARTF: CLR     (R0)+           ;CLEAR STATISTIC COUNTERS
 1903  003224  005301                          DEC     R1
 1904  003226  001375                          BNE     STARTF
 1905  003230  012737  177777  014360          MOV     #-1,PATS        ;PRESET PATTERN
 1906  003236  005037  000744                  CLR     EOPB1
 1907  003242  012737  000001  000654  STARTE: MOV     #1,BLCNTR       ;PRESET BLOCK COUNTER
 1908  003250  012706  000500          STARTD: MOV     #500,SP
 1909  003254  012777  000340  175322          MOV     #340,@PSW
 1910  003262  013746  000006          SUSWR:  MOV     @#6,-(SP)               ;SAVE VECTORS
 1911  003266  013746  000004                  MOV     @#4,-(SP)
 1912  003272  012737  003312  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
 1913  003300  022777  177777  175300          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
 1914  003306  001402                          BEQ     2$
 1915  003310  000404                          BR      3$
 1916  003312  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
 1917  003314  012737  000176  000606  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
 1918  003322  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
 1919  003326  012637  000006                  MOV     (SP)+,@#6
 1920  003332  022737  000176  000606          CMP     #SWREG,SWR              ;IS SWREG SELECTED
 1921  003340  001007                          BNE     4$
 1922  003342  005737  000744                  TST     EOPB1
 1923  003346  001004                          BNE     4$
 1924  003350  005037  000744                  CLR     EOPB1
 1925  003354  004737  024404                  JSR     PC,CNTLU                ;CHECK FOR CONTROL G
 1926  003360  004737  012352          4$:     JSR     PC,TINP         ;GO GET PARAMETERS FROM TTY
 1927  003364  012777  000040  175126          MOV     #40,@CS         ;INITIALIZE
 1928  003372  005000          STAUTO: CLR     R0              ;POINT TO FIRST ENTRY
 1929  003374  022760  177777  000746  1$:     CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
 1930  003402  001406                          BEQ     2$
 1931  003404  042760  100000  000746          BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
 1932  003412  062700  000002                  ADD     #2,R0           ;POINT TO NEXT UNIT ENTRY
 1933  003416  000766                          BR      1$              ;++G CONTINUE CLEARING
 1934  003420  013703  005130          2$:     MOV     REOTC,R3
 1935  003424  000303                          SWAB    R3
 1936  003426  110337  005130                  MOVB    R3,REOTC        ;RESTORE EOT CNTR
 1937  003432  012777  000100  175150  START1: MOV     #100,@TKS       ;SET TTY INTERRUPT ENABLE
 1938  003440  013700  000674                  MOV     UNP,R0          ;R0 = UNIT TABLE POINTER
 1939  003444  022760  177777  000746  STAR1A: CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
 1940  003452  001404                          BEQ     STAR1B          ;IF LAST UNIT IN STRING: BR
 1941  003454  016037  000746  000552          MOV     UN1(R0),UDES    ;LOAD NEXT UNIT DESCRIPTION
 1942  003462  000446                          BR      START4          ;++G
 1943  003464  005237  000654          STAR1B: INC     BLCNTR          ;BUMP BLOCK COUNTER
 1944  003470  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
 1945  003474  001411                          BEQ     STAR1C          ;IF NOT: BR
 1946  003476  023737  000654  000740          CMP     BLCNTR,ABLCNT   ;SEE IF DONE SEQ
 1947  003504  001005                          BNE     STAR1C          ;IF NOT: BR
 1948  003506  005037  000654                  CLR     BLCNTR          ;RESET BLOCK CNTR
 1949  003512  005037  000674                  CLR     UNP             ;RESET UNIT POINTER
 1950  003516  000207                          RTS     PC              ;RETURN TO AUTO SEQ
 1951
```

```
 1952  003520  005037  000674          STAR1C: CLR     UNP
 1953  003524  005000                          CLR     R0
 1954  003526  016037  000746  000552          MOV     UN1(R0),UDES    ;LOAD FIRST UNIT DESCRIPTION
 1955  003534  105777  175046                  TSTB    @SWR            ;++G BRANCH IF NOT RANDOM RECORD
 1956  003540  100003                          BPL     START2          ;++G SIZE REQUESTED.
 1957  003542  001402                          BEQ     START2          ;IF NOT: BR
 1958  003544  004737  012266                  JSR     PC,CCNTR        ;GO GENERATE RANDOM RECORD SIZE
 1959  003550  032777  000400  175030  START2: BIT     #400,@SWR       ;SEE IF RANDOM DATA
 1960  003556  001402                          BEQ     START3          ;IF NOT: BR
 1961  003560  004737  015054                  JSR     PC,DATR         ;GO GENERATE RANDOM DATA
 1962  003564  032777  000100  175014  START3: BIT     #100,@SWR       ;SEE IF RANDOM RECORD COUNT
 1963  003572  001402                          BEQ     START4          ;IF NOT: BR
 1964  003574  004737  012326                  JSR     PC,RCNTR        ;GO GENERATE RANDOM RECORD COUNT
 1965  003600  005760  000746          START4: TST     UN1(R0)         ;++G BRANCH IF NOT AT EOT
 1966  003604  100002                          BPL     STAR40          ;IF NOT: BR
 1967  003606  000137  004336                  JMP     START7          ;ELSE GO TO NEXT UNIT
 1968  003612  013777  000550  174700  STAR40: MOV     DVN,@CS         ;SET DRIVE NUMBER
 1969  003620  013777  000552  174714          MOV     UDES,@C2        ;SET UNIT NUMBER
 1970  003626  105777  174670                  TSTB    @DS             ;++G BRANCH IF UNIT AVAIL
 1971  003632  100412                          BMI     STAR4A
 1972  003634  005337  000666                  DEC     STALL
 1973  003640  001357                          BNE     START4          ;AWAIT TUR
 1974  003642  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
 1975  003646  012704  026041                  MOV     #MSG49,R4
 1976  003652  104000                          TTOUTT  ;PRINT NOT AVAIL
 1977  003654  104006                          STOPP                   ;STOP
 1978  003656  000750                          BR      START4          ;++G RETRY
 1979  003660  013746  000552  STAR4A: MOV     UDES,-(SP)      ;GET UNIT DESCRIPTION
 1980  003664  042716  175400                  BIC     #175400,(SP)    ;++G CLEAR ALL BUT FORMAT BITS
 1981  003670  022726  001700                  CMP     #1700,(SP)+     ;++G BRANCH IF NRZ
 1982  003674  001406                          BEQ     1$              ;++G
 1983  003676  032777  000040  174616          BIT     #40,@DS         ;++G BRANCH IF SLAVE IN PE FORMAT
 1984  003704  001002                          BNE     1$              ;++G
 1985  003706  000137  004336                  JMP     START7          ;++G GO TO NEXT UNIT
 1986  003712  004737  014152          1$:     JSR     PC,DSUP         ;GO SET UP WRITE DATA
 1987  003716  004737  005132                  JSR     PC,RWND         ;REWIND
 1988  003722  004737  005474                  JSR     PC,WRITE        ;WRITE
 1989  003726  013737  000576  000666          MOV     TSTAL,STALL     ;SET TURN AROUND DELAY
 1990  003734  004737  012256                  JSR     PC,STALL                ;DELAY
 1991  003740  004737  007366                  JSR     PC,RSEQ         ;GO TO READ SEQUENCER
 1992  003744  013737  000576  000666          MOV     TSTAL,STALL     ;SET TURN AROUND DELAY
 1993  003752  004737  012256                  JSR     PC,STALL        ;DELAY
 1994  003756  032777  040000  174622          BIT     #40000,@SWR     ;SEE IF SHOULD PRINT STATISTICS
 1995  003764  001541                          BEQ     START5          ;IF NOT: BR
 1996  003766  012700  000001                  MOV     #1,R0           ;SET RECORD COUNTER TO 1
 1997  003772  004737  022662                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
 1998  003776  004737  004006                  JSR     PC,STP          ;GO PRINT STATS
 1999  004002  000137  004254                  JMP     STPX
 2000  004006  004737  017222          STP:    JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
 2001  004012  012704  026254                  MOV     #MSG65,R4
 2002  004016  104000                          TTOUTT  ;PRINT RETRY TOTAL
 2003  004020  013704  000674                  MOV     UNP,R4
 2004  004024  016403  001050                  MOV     RTY1(R4),R3
 2005  004030  104002                          OCTPP                   ;PRINT RETRIES
 2006  004032  012704  026425                  MOV     #MSG73,R4
 2007  004036  104000                          TTOUTT                  ;PRINT WRITE ERROR TAG
```

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2008  004040  013704  000674          MOV     UNP,R4
2009  004044  016403  001070          MOV     WTER1(R4),R3
2010  004050  104002                  OCTPP                   ;PRINT WRITE ERRORS
2011  004052  012704  026414          MOV     #MSG72,R4
2012  004056  104000                  TTOUTT                  ;PRINT READ FORWARD ERROR TAG
2013  004060  013704  000674          MOV     UNP,R4
2014  004064  016403  001110          MOV     RDER1(R4),R3
2015  004070  104002                  OCTPP                   ;PRINT READ FORWARD ERRORS
2016  004072  012704  027222          MOV     #MSG113,R4
2017  004076  104000                  TTOUTT                  ;PRINT SOFT TAG
2018  004100  013704  000674          MOV     UNP,R4
2019  004104  016403  002670          MOV     RFSOFT(R4),R3
2020  004110  104002                  OCTPP                   ;PRINT FORWARD SOFT ERRORS
2021  004112  012704  027233          MOV     #MSG114,R4
2022  004116  104000                  TTOUTT                  ;PRINT HARD TAG
2023  004120  013704  000674          MOV     UNP,R4
2024  004124  016403  002730          MOV     RFHARD(R4),R3
2025  004130  104002                  OCTPP                   ;PRINT HARD FORWARE ERRORS
2026  004132  012704  026505          MOV     #MSG77,R4
2027  004136  104000                  TTOUTT                  ;PRINT DATA ERROR FORWARD TAG
2028  004140  013704  000674          MOV     UNP,R4
2029  004144  016403  001130          MOV     DATER1(R4),R3
2030  004150  104002                  OCTPP                   ;PRINT DATA ERROR FORWARD NUMBER
2031  004152  012704  026310          MOV     #MSG68,R4
2032  004156  104000                  TTOUTT                  ;PRINT READ ERROR REVERSE TAG
2033  004160  013704  000674          MOV     UNP,R4
2034  004164  016403  001150          MOV     RDERR1(R4),R3
2035  004170  104002                  OCTPP                   ;PRINT REVESE ERROR NUMBER
2036  004172  012704  027222          MOV     #MSG113,R4
2037  004176  104000                  TTOUTT                  ;PRINT SOFT TAG
2038  004200  013704  000674          MOV     UNP,R4
2039  004204  016403  002710          MOV     RRSOFT(R4),R3
2040  004210  104002                  OCTPP                   ;PRINT REVERSE SOFT ERROR
2041  004212  012704  027233          MOV     #MSG114,R4
2042  004216  104000                  TTOUTT                  ;PRINT HARD TAG
2043  004220  013704  000674          MOV     UNP,R4
2044  004224  016403  002750          MOV     RRHARD(R4),R3
2045  004230  104002                  OCTPP
2046  004232  012704  026474          MOV     #MSG76,R4
2047  004236  104000                  TTOUTT                  ;PRINT DATA ERROR REVERSE TAG
2048  004240  013704  000674          MOV     UNP,R4
2049  004244  016403  001170          MOV     DEREV1(R4),R3
2050  004250  104002                  OCTPP                   ;PRINT DATA REVERSE ERROR NUMBER
2051  004252  000207                  RTS     PC              ;RETURN
2052  004254  005237  000726  STPX:   INC     BTSTF           ;SET STAT ONLY PRINT
2053  004260  004737  007276          JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
2054  004264  005037  000726          CLR     BTSTF           ;CLEAR FLAG
2055  004270  017700  174312  START5: MOV     @SWR,R0         ;LOAD SWR
2056  004274  042700  177762          BIC     #177762,R0      ;MASK READ/WRITE SWITCHES
2057  004300  022700  000015          CMP     #15,R0          ;SEE IF HAVE READ OR WRITE
2058  004304  001417                  BEQ     START8          ;IF NOT: BR
2059  004306  105777  174210  START6: TSTB    @DS             ;++G BRANCH IF HAVE UNIT READY
2060  004312  100411                  BMI     START7          ;++G
2061  004314  005337  000666          DEC     STAL
2062  004320  001372                  BNE     START6          ;DELAY FOR TUR
2063  004322  004737  022662          JSR     PC,PAPRT        ;PRINT HEADER
```

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 2064  004326  012704  026041                    MOV     #MSG49,R4
 2065  004332  104000                            TTOUTT                  ;PRINT NOT AVAIL
 2066  004334  104006                            STOPP                           ;STOP
 2067  004336  062737  000002  000674  START7:   ADD     #2,UNP          ;POINT TO NEXT UNIT
 2068  004344  000137  003432        START8:   JMP     START1          ;CONTINUE
 2069
 2070                                            ;RANDOM BASE RESET**********
 2071
 2072  004350  012737  153624  000624  RANSET:  MOV     #153624,RANBAS  ;RESET BASE
 2073  004356  012737  032561  000626            MOV     #32561,RANSAV   ;RESET BUFFER
 2074  004364  013737  000630  000554            MOV     RCSAV,RCNT      ;RESET RECORD COUNT
 2075  004372  013737  000632  000556            MOV     FCSAV,FMCNT     ;RESET FRAME COUNT
 2076  004400  000207                            RTS     PC
 2077
```

```
                                        ;*********************************************************
                                        ;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.
                                        ;*********************************************************

004402  013777  000552  174132  REOT:   MOV     UDES,@C2        ;LOAD COMMAND REGISTER
004410  012777  000011  174072          MOV     #11,@C1         ;DRIVE CLEAR
004416  105777  174100          1$:     TSTB    @DS             ;++G WAIT FOR DRIVE READY
004422  100375                          BPL     1$              ;AWAIT DRY
004424  012777  000007  174056          MOV     #7,@C1          ;START REWIND
004432  005737  000724                  TST     BTFLG           ;SEE IF BAD TAPE OVERFLOW REWIND
004436  001004                          BNE     REOT1A          ;IF SO: BR
004440  013700  000660                  MOV     EOTREC,R0
004444  042700  100000                  BIC     #100000,R0      ;SET RECORD NUMBER OF EOT
004450  005037  000660          REOT1A: CLR     EOTREC          ;++G CLEAR EOT IND & REC CTR
004454  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
004460  022737  000002  000724          CMP     #2,BTFLG        ;SEE IF POSITION ERROR
004466  001003                          BNE     REOT1B          ;IF NOT: BR
004470  012704  027113                  MOV     #MSG109,R4      ;SET POSITION ERROR MSG
004474  000406                          BR      REOT1F
004476  022737  000001  000724  REOT1B: CMP     #1,BTFLG        ;SEE IF BAD TAPE OVERFLOW
004504  001004                          BNE     REOT1C          ;IF NOT: BR
004506  012704  026724                  MOV     #MSG106,R4      ;SET BAD TAPE OVERFLOW MSG
004512  104000          REOT1F: TTOUTT                          ;PRINT REWIND REASON
004514  000412                          BR      REOT1E
004516  012704  025052          REOT1C: MOV     #MSG20,R4       ;SET EOT MSG
004522  104000          REOT1D: TTOUTT                          ;PRINT MSG
004524  013704  000674                  MOV     UNP,R4
004530  005264  002650                  INC     EOTCO(R4)       ;BUMP CNTR
004534  016403  002650                  MOV     EOTCO(R4),R3
004540  104002                          OCTPP                   ;PRINT EOT CNTR
004542  012704  026751          REOT1E: MOV     #MSG16A,R4
004546  104000                          TTOUTT                  ;PRINT RESTART MSG
004550  005037  000724                  CLR     BTFLG           ;CLEAR BAD TAPE FLAG
004554  004737  004006                  JSR     PC,STP          ;PRINT STATS
004560  004737  007276                  JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
004564  105777  173732          REOT2:  TSTB    @DS             ;++G BRANCH IF UNIT IS READY
004570  100414                          BMI     REOT2A
004572  005337  000666                  DEC     STAL
004576  001372                          BNE     REOT2           ;WAIT DRY
004600  012737  024713  000652          MOV     #MSG6,EMADDR
004606  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
004612  012704  026216                  MOV     #MSG60,R4
004616  104000                          TTOUTT                  ;PRINT NO DRIVE READY
004620  104006                          STOPP
004622  105337  005130          REOT2A: DECB    REOTC           ;SEE IF LAST UNIT TO REACH EOT
004626  001410                          BEQ     REOT3           ;IF SO: BR
004630  013700  000674                  MOV     UNP,R0
004634  052760  100000  000746          BIS     #100000,UN1(R0) ;SET EOT FLAG
```

```
2134  004642  005726                          TST     (SP)+           ;RESET STACK POINTER
2135  004644  000137  004336                  JMP     START7          ;GO TO NEXT UNIT
2136  004650  000337  005130          REOT3:  SWAB    REOTC
2137  004654  013700  005130                  MOV     REOTC,R0
2138  004660  000337  005130                  SWAB    REOTC
2139  004664  110037  005130                  MOVB    R0,REOTC        ;RESTORE EOT UNIT COUNTER
2140  004670  005037  000674                  CLR     UNP
2141  004674  013700  000674                  MOV     UNP,R0          ;POINT TO FIRST UNIT
2142  004700  016037  000746  000552  REOT4:  MOV     UN1(R0),UDES    ;LOAD UNIT DESCRIPTION
2143  004706  013777  000552  173626          MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2144  004714  032777  020000  173600  REOT5:  BIT     #20000,@DS
2145  004722  001374                          BNE     REOT5           ;AWAIT PIP RESET
2146  004724  032777  000002  173570          BIT     #2,@DS          ;SEE IF HAVE BOT
2147  004732  001012                          BNE     REOT6           ;IF SO: BR
2148  004734  012700  000001                  MOV     #1,R0
2149  004740  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
2150  004744  012704  026007                  MOV     #MSG48,R4
2151  004750  104000                          TTOUTT                  ;PRINT BOT ERROR
2152  004752  104006                          STOPP
2153  004754  013700  000674                  MOV     UNP,R0
2154  004760  042760  100000  000746  REOT6:  BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
2155  004766  062737  000002  000674          ADD     #2,UNP
2156  004774  013700  000674                  MOV     UNP,R0          ;POINT TO NEXT UNIT
2157  005000  022760  177777  000746          CMP     #-1,UN1(R0)     ;++G BRANCH IF NOT LAST UNIT
2158  005006  005037  000674          REOT7:  CLR     UNP             ;CLEAR UNIT POINTER
2159  005012  005037  000634                  CLR     TINF            ;CLEAR TTY INPUT FLAG
2160  005016  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
2161  005022  001402                          BEQ     REOTX           ;IF NOT: BR
2162  005024  005726                          TST     (SP)+           ;RESET STACK POINTER
2163  005026  000207                          RTS     PC              ;RETURN TO AUTO SEQ
2164
2165  005030  004737  004350          REOTX:  JSR     PC,RANSET       ;GO RESET RANDOM BASE
2166  005034  012737  177777  014360          MOV     #-1,PATS        ;PRESET PATTERN
2167  005042  005037  015122                  CLR     RDFL            ;CLEAR RANDOM FLAG
2168  005046  005737  000570                  TST     SPFLG           ;SEE IF SINGLE PASS
2169  005052  001422                          BEQ     REOTXX          ;IF NOT: BR
2170  005054  012704  026617          TEND:   MOV     #MSG100,R4
2171  005060  104000                          TTOUTT                  ;PRINT END OF PASS
2172  005062  013700  000042                  MOV     @#42,R0         ;GET ACT11 RETURN ADDRESS
2173  005066  001405                          BEQ     HERE            ;BRANCH IF NOT ACT11
2174  005070  000005                          RESET
2175  005072  004710                  $ENDAD: JSR     PC,(R0)
2176  005074  000240                          NOP
2177  005076  000240                          NOP
2178  005100  000240                          NOP
2179  005102  000240                  HERE:   NOP
2180  005104  005737  003040                  TST     CHNFLG          ;++G BRANCH IF NOT CHAIN MODE
2181  005110  001402                          BEQ     1$
2182  005112  000137  021770                  JMP     ASEQ0           ;++G RETURN TO AUTO SEQUENCER
2183  005116  104006                  1$:     STOPP
2184  005120  005237  000744          REOTXX: INC     EOPB1
2185  005124  000137  003242                  JMP     START           ;RESTART AT BLOCK NUMBER ONE
2186  005130  000000                  REOTC:  0                       ;EOT UNIT COUNTER
```

```
2187                                    ;*********************************************************
2188                                    ;REWIND ALL AVAIL TAPES:
2189                                    ;
2190                                    ;THIS ROUTINE; ENTERED VIA CONSOLE SWITCH NINE (9),
2191                                    ;WILL REWIND ALL AVAILABLE TAPES TO BOT NO MATTER
2192                                    ;WHERE THEY ARE CURRENTLY POSITIONED AND RESUME TESTING
2193                                    ;ON THE CURRENTLY SELECTED UNIT.
2194                                    ;*********************************************************
2195
2196  005132  032777  001000  173446  RWND:   BIT     #1000,@SWR      ;SEE IF SHOULD REWIND
2197  005140  001001                    BNE     RWNDA           ;IF SO: BR
2198  005142  000207                    RTS     PC              ;ELSE EXIT
2199  005144  013737  000674  000714  RWNDA:  MOV     UNP,UPS         ;SAVE UNIT POINTER
2200  005152  005037  000674            CLR     UNP             ;CLEAR POINTER
2201  005156  005037  000660            CLR     EOTREC          ;CLEAR EOT FLAG
2202  005162  000337  005130            SWAB    REOTC
2203  005166  013700  005130            MOV     REOTC,R0
2204  005172  000337  005130            SWAB    REOTC
2205  005176  110037  005130            MOVB    R0,REOTC        ;RESTORE EOT UNIT COUNTER
2206  005202  013700  000674  RWNDO:   MOV     UNP,R0          ;POINT TO UNIT ENTRY
2207  005206  022760  177777  000746    CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
2208  005214  001445                    BEQ     RWND2           ;IF SO: BR
2209  005216  005760  000746            TST     UN1(R0)         ;++G BRANCH IF ALREADY REWINDING
2210  005222  100433                    BMI     RWND1A          ;++G
2211  005224  016037  000746  000552    MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
2212  005232  013777  000552  173302    MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2213  005240  012777  000011  173242    MOV     #11,@C1         ;DRIVE CLEAR
2214  005246  012777  000007  173234    MOV     #7,@C1          ;START REWIND
2215  005254  105777  173242  RWND1:   TSTB    @DS             ;++G WAIT FOR DRIVE READY
2216  005260  100414                    BMI     RWND1A          ;IF DRY: BR
2217  005262  005337  000666            DEC     STAL
2218  005266  001372                    BNE     RWND1           ;AWAIT DRY
2219  005270  012737  024713  000652    MOV     #MSG6,EMADDR
2220  005276  004737  022662            JSR     PC,PAPRT        ;PRINT HEADER
2221  005302  012704  026337            MOV     #MSG70,R4
2222  005306  104000                    TTOUTT                  ;PRINT NO DRIVE READY
2223  005310  104006                    STOPP
2224  005312  042760  100000  000746  RWND1A: BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
2225  005320  062737  000002  000674            ADD     #2,UNP          ;BUMP POINTER
2226  005326  000725                    BR      RWNDO           ;++G DO NEXT UNIT
2227  005330  005037  000674  RWND2:   CLR     UNP             ;CLEAR POINTER
2228  005334  013700  000674  RWND3:   MOV     UNP,R0          ;POINT TO UNIT ENTRY
2229  005340  022760  177777  000746    CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
2230  005346  001436                    BEQ     RWNDX           ;IF SO: BR
2231  005350  016037  000746  000552    MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
2232  005356  013777  000552  173156    MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2233  005364  032777  020000  173130  RWND4:  BIT     #20000,@DS
2234  005372  001374                    BNE     RWND4           ;AWAIT PIP RESET
2235  005374  032777  000002  173120            BIT     #2,@DS          ;SEE IF HAVE BOT
2236  005402  001407                    BEQ     RWND6           ;IF NOT: BR
2237  005404  062737  000002  000674  RWND5:   ADD     #2,UNP          ;BUMP POINTER
2238  005412  012777  000011  173070            MOV     #11,@C1         ;DRIVE CLEAR
2239  005420  000745                    BR      RWND3           ;++G DO NEXT UNIT
2240  005422  012700  000001  RWND6:   MOV     #1,R0
2241  005426  004737  022662            JSR     PC,PAPRT        ;PRINT HEADER
2242  005432  012704  026007            MOV     #MSG48,R4
```

```
 2243  005436  104000                          TTOUTT                  ;PRINT NO BOT
 2244  005440  104006                          STOPP
 2245  005442  000760                          BR      RWND5           ;++G DO NEXT UNIT
 2246  005444  013737  000714  000674  RWNDX:  MOV     UPS,UNP         ;RESTORE UNIT POINTER
 2247  005452  013700  000674                  MOV     UNP,R0
 2248  005456  016037  000746  000552          MOV     UN1(R0),UDES    ;RESET UNIT DESCRIPTION
 2249  005464  013777  000552  173050          MOV     UDES,@C2
 2250  005472  000207                          RTS     PC              ;RETURN TO TEST
 2251
```

```
2252                    ;*******************************************************
2253                    ;WRITE ROUTINE:
2254                    ;
2255                    ;THIS ROUTINE IS USED TO WRITE ONTO TAPE THE BLOCK
2256                    ;OF DATA DESCRIBED BY THE OPERATOR AND SET UP
2257                    ;IN THE SEQUENCE FORMATTER.  THE TAPE UNIT TO BE USED
2258                    ;HAS BEEN ASSIGNED BY THE SEQUENCE FORMATTER AND
2259                    ;ITS PARAMETERS SET IN A UNIT DESCRIPTION WORD.
2260                    ;AS EACH RECORD OF THE BLOCK IS WRITTEN, IT IS CHECKED
2261                    ;FOR STATUS ERRORS, WORD COUNT ZERO, AND CORRECT CURRENT
2262                    ;MEMORY ADDRESS.  IF THE WRITE OPERATION RESULTS IN
2263                    ;ANY ERROR CONDITION, A WRITE RETRY OF THAT OPERATION
2264                    ;MAY BE DONE BY SETTING SWITCH FOUR (4) TO A ONE (1).
2265                    ;THE RETRY CONSISTS OF A BACKSPACE, ERASE FORWARD, AND
2266                    ;REWRITE OF THE RECORD.  (SEE WRITE RETRY SUBROUTINE)
2267                    ;AFTER ALL DATA RECORDS IN THE BLOCK HAVE BEEN
2268                    ;WRITTEN, THE WRITE ROUTINE WILL EXECUTE A WRITE
2269                    ;TAPE MARK COMMAND IF THE TTY RESPONSE TM=1 WAS
2270                    ;MADE AT INITIAL START.  THE TM IS COUNTED AS TOTAL
2271                    ;DATA RECORDS PLUS ONE (IE: IF 100 DATA RECORDS; TM=RECORD 101)
2272                    ;IF THE WRITE OPERATION (DATA OR TM) CAUSES THE SELECTED SLAVE
2273                    ;TO REACH END OF TAPE (EOT) AND THERE IS TO BE NO READING DONE,
2274                    ;(SW2 AND SW3 SET TO A 1) THEN THE SLAVE IS REWOUND AND
2275                    ;FLAGGED AS UNAVAILABLE FOR TESTING UNTIL ALL SLAVES HAVE
2276                    ;REACHED EOT AND BEEN REWOUND AT WHICH TIME TESTING IS
2277                    ;RESUMED ON ALL AVAILABLE SLAVES.
2278                    ;WRITE RETRY MAY BE ALLOWED VIA CONSOLE SWITCH FOUR (4).
2279                    ;ERROR CHECKING MAY BE DISALLOWED VIA CONSOLE SWITCH
2280                    ;TWELVE (12).
2281                    ;WRITING TO TAPE MAY BE DISALLOWED VIA CONSOLE SWITCH
2282                    ;ZERO (0).
2283                    ;*******************************************************
2284
2285 005474 032777 000001 173104 WRITE:  BIT     #1,@SWR         ;SEE IF SHOULD WRITE
2286 005502 001402                     BEQ     WRTE
2287 005504 000137 006272              JMP     WEX             ;IF NOT: BR
2288 005510 013700 000554      WRTE:   MOV     RCNT,R0         ;R0=RECORD COUNT
2289 005514 012737 024706 000652 W0:   MOV     #MSG$,EMADDR    ;SET ERROR MSG ADDRESS
2290 005522 013777 000556 172766       MOV     FMCNT,@FC       ;LOAD CHAR COUNT
2291 005530 012777 027430 172756       MOV     #WDATA,@BA      ;SET DATA ADDR
2292 005536 112737 000060 000672       MOVB    #60,MTC1        ;SET WRITE OP COMMAND
2293 005544 012737 005556 000662       MOV     #W1,RTRN        ;SET RETURN ADDRESS
2294 005552 000137 021170              JMP     TAPG            ;GO EXECUTE COMMAND
2295 005556 032777 002000 172736 W1:   BIT     #2000,@DS       ;SEE IF EOT
2296 005564 001414                     BEQ     W2              ;IF NOT AT EOT: BR
2297 005566 005737 000660              TST     EOTREC          ;++G BRANCH IF WRITTEN PAST EOT
2298 005572 100411                     BMI     W2              ;++G
2299 005574 010037 000660              MOV     R0,EOTREC       ;SAVE EOT RECORD NUMBER
2300 005600 052737 100000 000660       BIS     #100000,EOTREC  ;++G SET EOT FLAG
2301 005606 005337 000660              DEC     EOTREC          ;++G ADJUST RECORD COUNT
2302 005612 012700 000002              MOV     #2,R0           ;++G SET R0 TO WRITE 1 MORE RECORD
2303 005616 032777 010000 172762 W2:   BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERRORS
2304 005624 001002                     BNE     W3              ;IF NOT: BR
2305 005626 004737 017360              JSR     PC,ERCHK        ;GO CHECK ERRORS
2306 005632 013737 000574 000666 W3:   MOV     WSTAL,STAL      ;SET DELAY
2307 005640 004737 012256              JSR     PC,STALL        ;DELAY
```

```
2308  005644  005737  000712              TST     RTYFL           ;SEE IF RETRY TIME
2309  005650  001401                      BEQ     W3A             ;IF NOT: BR
2310  005652  000207                      RTS     PC              ;ELSE RETURN
2311  005654  005737  000706      W3A:    TST     SERFL           ;SEE IF WRITE ERROR
2312  005660  001450                      BEQ     W5              ;IF NOT: BR
2313  005662  013704  000674              MOV     UNP,R4
2314  005666  005264  001070              INC     WTER1(R4)       ;BUMP WRITE ERROR
2315  005672  005037  000706              CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2316  005676  032777  000020  172702      BIT     #20,@SWR        ;SEE IF RETRY
2317  005704  001436                      BEQ     W5              ;IF NOT: BR
2318  005706  013703  000722              MOV     ERSAV,R3
2319  005712  042703  102700              BIC     #102700,R3      ;MASK UNRECOVERABLE ERROR
2320  005716  001410                      BEQ     W4              ;IF SO: BR
2321  005720  004737  022662              JSR     PC,PAPRT        ;PRINT HEADER
2322  005724  012704  026516              MOV     #MSG78,R4
2323  005730  104000                      TTOUTT                  ;PRINT NON-RETRYABLE ERROR TAG
2324  005732  004737  011232              JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2325  005736  000421                      BR      W5
2326  005740  013704  000674      W4:     MOV     UNP,R4
2327  005744  005264  001050              INC     RTY1(R4)        ;BUMP RETRY CNTR
2328  005750  032777  002000  172630      BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2329  005756  001003                      BNE     W4A             ;IF NOT: BR
2330  005760  012704  026232              MOV     #MSG64,R4
2331  005764  104000                      TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2332  005766  005037  000702      W4A:    CLR     RTCNT           ;CLEAR RETRY NUMBER
2333  005772  005037  000700              CLR     RPCNT           ;CLEAR REPEAT COUNTER
2334  005776  004737  006334              JSR     PC,WRTY         ;GO RETRY WRITE ERROR
2335  006002  005037  000712      W5:     CLR     RTYFL           ;CLEAR RETRY COUNTER
2336  006006  005300                      DEC     R0              ;SEE IF DONE ALL
2337  006010  001241                      BNE     W0              ;IF NOT: BR
2338  006012  005737  000564      W6:     TST     TMEX            ;SEE IF TM
2339  006016  001525                      BEQ     WEX             ;IF NOT: BR
2340  006020  005237  000676              INC     TMFLG           ;SET TM FLAG
2341  006024  012737  026137  000652  WTM:  MOV     #MSG54,EMADDR   ;POINT TO TM ERROR MSG
2342  006032  012737  000026  000672      MOV     #26,MTC1        ;SET TM OP CODE
2343  006040  012777  000000  172450      MOV     #0,@FC          ;LOAD FRAME COUNTER
2344  006046  012777  027430  172440      MOV     #WDATA,@BA      ;LOAD BUS ADDRESS
2345  006054  012737  006066  000662      MOV     #WTM0,RTRN      ;SAVE RETURN ADDRESS
2346  006062  000137  021170              JMP     TAPG            ;WRITE TM
2347  006066  032777  010000  172512  WTM0:  BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERRORS
2348  006074  001076                      BNE     WEX
2349  006076  032777  000004  172416      BIT     #4,@DS          ;SEE IF TM STATUS
2350  006104  001011                      BNE     WTM1            ;IF SO: BR
2351  006106  012737  027430  021104      MOV     #WDATA,CADER    ;SET EXPT BUS ADDRESS
2352  006114  012737  000001  021112      MOV     #1,DRVER        ;INDICATE ERROR
2353  006122  004737  020206              JSR     PC,ERPT         ;PRINT TM ERROR
2354  006126  000404                      BR      WTM2
2355  006130  012703  027430      WTM1:   MOV     #WDATA,R3       ;SET EXPT ADDRESS
2356  006134  004737  017456              JSR     PC,ER2          ;GO CHECK FOR OTHER ERRORS
2357  006140  005737  000712      WTM2:   TST     RTYFL           ;SEE IF RETRY
2358  006144  001401                      BEQ     WTM3            ;IF NOT: BR
2359  006146  000207                      RTS     PC              ;ELSE RETURN TO RETRY ROUTINE
2360  006150  005737  000706      WTM3:   TST     SERFL           ;SEE IF WRITE ERROR
2361  006154  001446                      BEQ     WEX             ;IF NOT: BR
2362  006156  013704  000674              MOV     UNP,R4
2363  006162  005264  001070              INC     WTER1(R4)       ;BUMP WRITE ERROR
```

```
2364  006166  032777  000020  172412          BIT     #20,@SWR        ;SEE IF SHOULD RETRY
2365  006174  001436                          BEQ     WEX             ;IF NOT: BR
2366  006176  013703  000722                  MOV     ERSAV,R3
2367  006202  042703  102700                  BIC     #102700,R3      ;MASK UNRECOVERABLE ERROR
2368  006206  001410                          BEQ     WTM4            ;IF SO: BR
2369  006210  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
2370  006214  012704  026516                  MOV     #MSG78,R4
2371  006220  104000                          TTOUTT                  ;PRINT UNRETRYABLE TAG
2372  006222  004737  011232                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2373  006226  000421                          BR      WEX
2374  006230  005037  000700          WTM4:   CLR     RPCNT           ;CLEAR REPEAT CNTR
2375  006234  013704  000674                  MOV     UNP,R4
2376  006240  005264  001050                  INC     RTY1(R4)        ;BUMP RETRY CNTR
2377  006244  005037  000702                  CLR     RTCNT           ;CLEAR RETRY CNTR
2378  006250  032777  002000  172330          BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2379  006256  001003                          BNE     WTM4A           ;IF NOT: BR
2380  006260  012704  026232                  MOV     #MSG64,R4
2381  006264  104000                          TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2382  006266  004737  006334          WTM4A:  JSR     PC,WRTY         ;GO DO RETRY
2383  006272  005037  000712          WEX:    CLR     RTYFL           ;CLEAR RETRY FLAG
2384  006276  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
2385  006302  005737  000660                  TST     EOTREC          ;++G BRANCH IF NOT AT EOT
2386  006306  100011                          BPL     WRWX            ;++G
2387  006310  017703  172272          WRW:    MOV     @SWR,R3
2388  006314  042703  177763                  BIC     #177763,R3
2389  006320  022703  000014                  CMP     #14,R3          ;SEE IF WRITE ONLY
2390  006324  001002                          BNE     WRWX            ;IF NOT: BR
2391  006326  000137  004402                  JMP     REOT            ;ELSE REWIND
2392  006332  000207                  WRWX:   RTS     PC              ;EXIT
```

```
                                        ;*************************
                                        ;WRITE ERROR RETRY
                                        ;
                                        ;*************************
006334  012737  000001  000712  WRTY:   MOV     #1,RTYFL        ;SET RETRY FLAG
006342  004737  006736          WRTYO:  JSR     PC,WRTSB        ;GO SPACE REVERSE FOR REPEAT
006346  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
006352  001003                          BNE     WRTYTM          ;IF SO: BR
006354  004737  005514                  JSR     PC,WO           ;REWRITE RECORD
006360  000402                          BR      WRTYR           ;GO ON
006362  004737  006024          WRTYTM: JSR     PC,WTM          ;GO WRITE TAPE MARK AGAIN
006366  005737  000706          WRTYR:  TST     SERFL           ;REWRITE GOOD
006372  001024                          BNE     WRTY2           ;IF NOT: BR
006374  005237  000700                  INC     RPCNT           ;BUMP REPEAT COUNTER
006400  022737  000004  000700          CMP     #4,RPCNT        ;SEE IF FOUR GOOD REPEATS
006406  001355                          BNE     WRTYO           ;IF NOT: REPEAT
006410  032777  002000  172170          BIT     #2000,@SWR      ;SEE IF PRINT
006416  001011                          BNE     WRTY1           ;IF NOT: BR
006420  012704  026711                  MOV     #MSG105,R4
006424  104000                          TTOUTT                  ;PRINT RECOVERED MESSAGE
006426  012704  026254                  MOV     #MSG65,R4
006432  104000                          TTOUTT                  ;PRINT RETRY TAG
006434  013703  000702                  MOV     RTCNT,R3
006440  104002                          OCTPP                   ;PRINT RETRY NUMBER
006442  000207          WRTY1:  RTS     PC                      ;RESUME TESTING
006444  005037  000646  WRTY2:  CLR     TEMP3           ;++G CLEAR RECOVERABLE ERROR FLAG
006450  013703  000722          MOV     ERSAV,R3        ;GET ER
006454  042703  102700          BIC     #102700,R3      ;MASK RECOVERABLE BITS
006460  001413                  BEQ     WRTY2A          ;IF RECOVERABLE: BR
006462  004737  022662          JSR     PC,PAPRT        ;PRINT HEADER
006466  012704  026516          MOV     #MSG78,R4
006472  104000                  TTOUTT                  ;PRINT NON-RECOVERABLE MSG
006474  004737  011232          JSR     PC,NRTP         ;PRINT ER
006500  012737  000001  000646  MOV     #1,TEMP3        ;SET FLAG
006506  000407                  BR      WRTY2B
006510  032777  002000  172070  WRTY2A: BIT     #2000,@SWR      ;SEE IF PRINT
006516  001025                  BNE     WRTY3           ;IF NOT: BR
006520  012704  027145          MOV     #MSG110,R4
006524  104000                  TTOUTT                  ;PRINT BAD TAPE SUSPECT
006526  012704  026254  WRTY2B: MOV     #MSG65,R4
006532  104000                  TTOUTT                  ;PRINT RETRY TAG
006534  013703  000702          MOV     RTCNT,R3
006540  104002                  OCTPP                   ;PRINT RETRY NUMBER
006542  012704  027167          MOV     #MSG111,R4
006546  104000                  TTOUTT                  ;PRINT REPEAT TAG
006550  013703  000700          MOV     RPCNT,R3
006554  104002                  OCTPP                   ;PRINT REPEAT NUMBER
006556  005737  000646          TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
006562  001403                  BEQ     WRTY3           ;IF NOT: BR
006564  005037  000646          CLR     TEMP3           ;CLEAR FLAG
006570  000207                  RTS     PC              ;EXIT
006572  005737  000702  WRTY3:  TST     RTCNT           ;SEE IF FIRST RETRY
006576  001004                  BNE     WRTY3A          ;IF NOT: BR
006600  013704  000674          MOV     UNP,R4
006604  005364  001070          DEC     WTER1(R4)       ;DECREMENT WRITE ERROR CNTR
```

```
2449  006610  013704  000674          WRTY3A: MOV     UNP,R4          ;GET UNIT NUMBER
2450  006614  016437  001030  000730          MOV     BTADDR(R4),BTPT ;GET ADDRESS OF UNIT BAD TAPE CNTR
2451  006622  017704  172102                  MOV     @BTPT,R4        ;GET COUNTER
2452  006626  005724                          TST     (R4)+           ;SET POINTER OFFSET
2453  006630  010477  172074                  MOV     R4,@BTPT
2454  006634  013703  000730                  MOV     BTPT,R3
2455  006640  060304                          ADD     R3,R4           ;SET ABSOLUTE POINTER
2456  006642  013714  000654                  MOV     BLCNTR,(R4)     ;SET BLOCK NUMBER
2457  006646  062704  000040                  ADD     #40,R4          ;ADD RCNT OFFSET
2458  006652  013714  000554                  MOV     RCNT,(R4)
2459  006656  160014                          SUB     R0,(R4)         ;SET RECORD NUMBER
2460  006660  005214                          INC     (R4)            ;CORRECT RECORD NUMBER
2461  006662  022777  000040  172040          CMP     #40,@BTPT       ;SEE IF TOO MANY BAD SPOTS
2462  006670  001002                          BNE     WRTY4           ;IF NOT: BR
2463  006672  000137  007132                  JMP     BTOV            ;ELSE GO TO BAD TAPE OVERFLOW
2464  006676  005237  000702          WRTY4:  INC     RTCNT           ;BUMP RETRY COUNTER
2465  006702  022737  000004  000702          CMP     #4,RTCNT        ;SEE IF DONE 4 RETRIES
2466  006710  001410                          BEQ     WRTY5           ;IF SO: BR
2467  006712  013704  000674                  MOV     UNP,R4
2468  006716  005264  001050                  INC     RTY1(R4)        ;BUMP RETRY COUNTER
2469  006722  005237  000732                  INC     ERTFL           ;SET ERASE FLAG
2470  006726  000137  006342                  JMP     WRTY0           ;DO NEXT RETRY
2471  006732  000137  007352          WRTY5:  JMP     BTUR            ;ELSE GO TO BAD TAPE UNRECOVERABLE
2472
2473                                          ;WRITE RETRY BACKSPACE-ERASE SUBROUTINE**********
2474
2475  006736  005037  000706          WRTSB:  CLR     SERFL           ;CLEAR FLAG
2476  006742  013737  000576  000666          MOV     TSTAL,STAL
2477  006750  004737  012256                  JSR     PC,STALL        ;DO TURN AROUND DELAY
2478  006754  012737  026265  000652          MOV     #MSG66,EMADDR   ;SET ERROR CODE
2479  006762  012777  177777  171526          MOV     #-1,@FC         ;SET TO BACKSPACE 1 RECORD
2480  006770  012777  033436  171516          MOV     #RDATA,@BA      ;SET BA
2481  006776  004737  012206                  JSR     PC,BKRT         ;GO BACKSPACE
2482  007002  005737  000706                  TST     SERFL           ;SEE IF ERROR
2483  007006  001406                          BEQ     WRTSB1          ;IF NOT: BR
2484  007010  012737  000002  000724  WRTSB0: MOV     #2,BTFLG        ;SET FLAG
2485  007016  022626                          CMP     (SP)+,(SP)+     ;RESET STACK
2486  007020  000137  004402                  JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2487  007024  005737  000732          WRTSB1: TST     ERTFL           ;SEE IF SHOULD ERASE
2488  007030  001001                          BNE     WRTSB2          ;IF SO: BR
2489  007032  000207                          RTS     PC              ;RETURN
2490  007034  005037  000732          WRTSB2: CLR     ERTFL           ;CLEAR ERASE FLAG
2491  007040  005037  000700                  CLR     RPCNT           ;CLEAR REPEAT CNTR
2492  007044  005037  000706                  CLR     SERFL           ;CLEAR FLAG
2493  007050  012737  026300  000652          MOV     #MSG67,EMADDR   ;SET ERROR CODE
2494  007056  005077  171434                  CLR     @FC             ;CLEAR FRAME COUNT
2495  007062  012737  000024  000672          MOV     #24,MTC1        ;SET ERASE OP-CODE
2496  007070  012777  027430  171416          MOV     #WDATA,@BA      ;SET BA
2497  007076  012737  007110  000662          MOV     #WRTSB3,RTRN    ;SET RETURN ADDRESS
2498  007104  000137  021170                  JMP     TAPG            ;GO ERASE
2499  007110  012703  027430          WRTSB3: MOV     #WDATA,R3       ;SET EXPT BA
2500  007114  004737  017456                  JSR     PC,ER2          ;GO CHECK ERRORS
2501  007120  005737  000706                  TST     SERFL           ;SEE IF ERROR
2502  007124  001737                          BEQ     WRTSB1          ;IF NOT: BR
2503  007126  000137  007010                  JMP     WRTSB0
2504
```

```
2505                                            ;BAD TAPE OVERFLOW SUBROUTINE**********
2506
2507  007132  005037  000712          BTOV:     CLR     RTYFL           ;CLEAR RETRY FLAG
2508  007136  012737  000001  000724            MOV     #1,BTFLG        ;SET BAD TAPE OVERFLOW FLAG
2509  007144  005726                            TST     (SP)+           ;++G ADJUST STACK
2510  007146  000137  004402                    JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2511  007152  013701  000730          BTOVD:    MOV     BTPT,R1         ;SET TABLE POINTER
2512  007156  005721                            TST     (R1)+
2513  007160  005000                            CLR     R0
2514  007162  010003          BTOV1:    MOV     R0,R3
2515  007164  000241                            CLC
2516  007166  006003                            ROR     R3              ;R3=R3/2 FOR CORRECT NUMBER
2517  007170  104002                            OCTPP                   ;PRINT ENTRY NUMBER
2518  007172  012704  025000                    MOV     #MSG13,R4
2519  007176  105724                            TSTB    (R4)+           ;SKIP CR/LF
2520  007200  104000                            TTOUTT                  ;PRINT BLOCK NUMBER TAG
2521  007202  011103                            MOV     (R1),R3
2522  007204  104002                            OCTPP                   ;PRINT BLOCK NUMBER
2523  007206  012704  025006                    MOV     #MSG14,R4
2524  007212  104000                            TTOUTT                  ;PRINT RECORD NUMBER TAG
2525  007214  062701  000040                    ADD     #40,R1          ;SET POINTER OFFSET FOR RECOED NUMBER
2526  007220  012103                            MOV     (R1)+,R3
2527  007222  104002                            OCTPP                   ;PRINT RECORD NUMBER
2528  007224  162701  000040                    SUB     #40,R1          ;RESET POINTER FOR BLOCK NUMBER
2529  007230  005720                            TST     (R0)+
2530  007232  020077  171472                    CMP     R0,@BTPT        ;SEE IF DONE
2531  007236  001404                            BEQ     BTOV2           ;IF SO: BR
2532  007240  012704  025331                    MOV     #MSG28,R4
2533  007244  104000                            TTOUTT                  ;DO CR/LF
2534  007246  000745                            BR      BTOV1           ;CONTINUE
2535  007250  005737  000726          BTOV2:    TST     BTSTF           ;SEE IF STAT ONLY PRINT
2536  007254  001007                            BNE     BTOVX           ;IF SO: BR
2537  007256  012703  000041                    MOV     #41,R3          ;SET SIZE OF TABLE
2538  007262  013704  000730                    MOV     BTPT,R4         ;SET POINTER
2539  007266  005024          BTOV3:    CLR     (R4)+           ;CLEAR TABLE
2540  007270  005303                            DEC     R3              ;SEE IF DONE
2541  007272  001375                            BNE     BTOV3           ;IF NOT: BR
2542  007274  000207          BTOVX:    RTS     PC              ;RETURN
2543
```

```
2544
2545                                        ;BAD TAPE STATISTIC PRINT********
2546
2547  007276  012704  025331        BTPRT:  MOV     #MSG28,R4
2548  007302  104000                        TTOUTT                  ;DO CR/LF
2549  007304  013704  000674                MOV     UNP,R4
2550  007310  016437  001030  000730        MOV     BTADDR(R4),BTPT ;SET TABLE POINTER
2551  007316  017703  171406                MOV     @BTPT,R3
2552  007322  000241                        CLC
2553  007324  006003                        ROR     R3              ;CORRECT NUMBER
2554  007326  104002                        OCTPP                   ;PRINT NUMBER OF BAD SPOTS
2555  007330  012704  027201                MOV     #MSG112,R4
2556  007334  104000                        TTOUTT                  ;PRINT BAD TAPE TAG
2557  007336  005777  171366                TST     @BTPT           ;SEE IF ANY BAD SPOTS
2558  007342  001001                        BNE     BTPRT1          ;IF SO: BR
2559  007344  000207                        RTS     PC              ;ELSE RETURN
2560  007346  000137  007152        BTPRT1: JMP     BTOVO           ;PRINT STATS
2561
2562                                        ;BAD TAPE UNRECOVERABLE SUBROUTINE**********
2563
2564  007352  004737  022662        BTUR:   JSR     PC,PAPRT        ;PRINT HEADER
2565  007356  012704  027014                MOV     #MSG107,R4
2566  007362  104000                        TTOUTT                  ;PRINT UNRECOVERABLE BAD SPOT MSG
2567  007364  000207                        RTS     PC              ;RESUME TESTING
2568
```

```
2569                            ;*********************************************************
2570                            ;READ SEQUENCER:
2571                            ;
2572                            ;THIS ROUTINE IS USED TO DETERMINE THE SEQUENCE
2573                            ;IN WHICH READ TAPE OPERATIONS ARE TO BE PERFORMED.
2574                            ;THIS IS NECESSARY WHEN THE UNIT BEING TESTED IS
2575                            ;CAPABLE OF READING DATA IN BOTH THE FORWARD AND
2576                            ;REVERSE DIRECTIONS.  CONSOLE SWITCHES ONE (1), TWO (2),
2577                            ;AND THREE (3) ARE USED TO DETERMINE THE READ SEQUENCE.
2578                            ;CONSOLE SWITCH ONE (1) DETERMINES WHETHER TO READ
2579                            ;THE BLOCK OF DATA FORWARD FIRST OR REVERSE FIRST.
2580                            ;SWITCH TWO (2) DISALLOWS READING IN THE REVERSE
2581                            ;DIRECTION AND SWITCH THREE (3) DISALLOWS READING IN
2582                            ;THE FORWARD DIRECTION.
2583                            ;*********************************************************
2584
2585  007366  012737  000002  000562  RSEQ:   MOV     #2,RDCMD
2586  007374  017704  171206                  MOV     @SWR,R4         ;READ SWITCHES
2587  007400  042704  177763                  BIC     #177763,R4      ;MASK READ BITS
2588  007404  005704                          TST     R4              ;SEE IF BOTH READS
2589  007406  001004                          BNE     RSR             ;IF NOT: BR
2590  007410  032777  000002  171170          BIT     #2,@SWR         ;SEE IF READ REVERSE FIRST
2591  007416  001051                          BNE     RSFR            ;IF NOT: BR
2592  007420  032777  000004  171160  RSR:    BIT     #4,@SWR         ;SEE IF SHOULD READ REVERSE
2593  007426  001005                          BNE     RSF             ;IF NOT: BR
2594  007430  012737  010000  000562          MOV     #10000,RDCMD    ;LOAD READ REVERSE COMMAND
2595  007436  004737  007704                  JSR     PC,READ         ;GO READ REVERSE
2596  007442  032777  000010  171136  RSF:    BIT     #10,@SWR        ;SEE IF SHOULD READ FORWARD
2597  007450  001026                          BNE     RSEX            ;IF NOT: BR
2598  007452  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF HAVE READ REVERSE
2599  007460  001407                          BEQ     RSF0            ;IF NOT: BR
2600  007462  013737  000576  000666          MOV     TSTAL,STAL
2601  007470  004737  012256                  JSR     PC,STALL        ;DO READ STALL
2602  007474  000137  007514                  JMP     RSF1
2603  007500  032777  000001  171100  RSF0:   BIT     #1,@SWR         ;SEE IF WRITE
2604  007506  001002                          BNE     RSF1            ;IF NOT: BR
2605  007510  004737  012030                  JSR     PC,BKSP         ;GO BACKSPACE
2606  007514  012737  000002  000562  RSF1:   MOV     #2,RDCMD        ;LOAD READ FORWARD COMMAND
2607  007522  004737  007704                  JSR     PC,READ         ;GO READ
2608  007526  005737  000660          RSEX:   TST     EOTREC          ;++G BRANCH IF NOT AT EOT
2609  007532  100002                          BPL     1$              ;++G
2610  007534  000137  004402                  JMP     REOT            ;++G ELSE GO REWIND
2611  007540  000207                  1$:     RTS     PC              ;++G EXIT
2612
2613  007542  012737  010000  000562  RSFR:   MOV     #10000,RDCMD
2614  007550  032777  000010  171030          BIT     #10,@SWR        ;SEE IF SHOULD READ FORWARD
2615  007556  001013                          BNE     RSFR1           ;IF NOT: BR
2616  007560  032777  000001  171020          BIT     #1,@SWR         ;SEE IF WRITE
2617  007566  001002                          BNE     RSFR0           ;IF NOT: BR
2618  007570  004737  012030                  JSR     PC,BKSP         ;GO BACKSPACE TO START
2619  007574  012737  000002  000562  RSFR0:  MOV     #2,RDCMD        ;LOAD READ FORWARD COMMAND
2620  007602  004737  007704                  JSR     PC,READ         ;GO READ FORWARD
2621  007606  032777  000004  170772  RSFR1:  BIT     #4,@SWR         ;SEE IF SHOULD READ REVERSE
2622  007614  001344                          BNE     RSEX            ;IF NOT: BR
2623  007616  032737  010000  000562          BIT     #10000,RDCMD
2624  007624  001005                          BNE     RSFR2           ;IF READ REVERSE: BR
```

```
 2625  007626  013737  000576  000666          MOV     TSTAL,STAL      ;DO READ STALL
 2626  007634  004737  012256                  JSR     PC,STALL
 2627  007640  012737  010000  000562  RSFR2:  MOV     #10000,RDCMD    ;LOAD READ REVERSE
 2628  007646  004737  007704                  JSR     PC,READ         ;GO READ REVERSE
 2629  007652  005737  000660                  TST     EOTREC          ;SEE IF AT END OF TAPE
 2630  007656  100011                          BPL     RSFRX           ;++G IF NOT: BR
 2631  007660  163737  000554  000660          SUB     RCNT,EOTREC
 2632  007666  005437  000660                  NEG     EOTREC          ;SET TO PROPER RECORD NUMBER
 2633  007672  005237  000660                  INC     EOTREC
 2634  007676  000137  004402                  JMP     REOT            ;ELSE GO TO REWIND
 2635  007702  000207          RSFRX:  RTS     PC              ;EXIT
 2636
```

```
                                        ;*********************************************************
                                        ;READ ROUTINE:
                                        ;
                                        ;THIS ROUTINE PERFORMS THE READ OPERATION DETERMINED
                                        ;BY THE READ SEQUENCE ROUTINE ONE RECORD AT A TIME.
                                        ;AT THE END OF EACH READ OPERATION THE STATUS REGISTER
                                        ;IS SCANNED FOR EITHER END OF TAPE OR BEGINNING OF TAPE.
                                        ;IF EOT WAS REACHED, CONTROL WILL BE PASSED TO
                                        ;THE EOT SUBROUTINE TO REWIND THE UNIT AND FLAG IT
                                        ;UNAVAILABLE UNTIL ALL UNITS HAVE REACHED EOT.
                                        ;IF BOT WAS REACHED AN ERROR IS PRINTED AND THE
                                        ;PROGRAM WILL HALT.  TESTING MAY BE RESUMED BY PRESSING
                                        ;THE CONTINUE SWITCH.
                                        ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE
                                        ;READ ROUTINE EXPECTS THE FIRST RECORD OF A
                                        ;READ REVERSE TO BE A TM, AND THE LAST RECORD
                                        ;OF A READ FORWARD TO BE A TM.  REMEMBER
                                        ;THAT THE TM ADDS ONE (1) TO THE TOTAL NUMBER
                                        ;OF RECORDS IN A BLOCK.
                                        ;CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13) DETERMINE WHETHER
                                        ;OR NOT TO CHECK FOR STATUS ERRORS (11) OR DATA ERRORS (13),
                                        ;CONSOLE SWITCH FIVE (5) IS USED TO CAUSE A CONTINUOUS
                                        ;READ AND SPACE (FORWARD OR REVERSE) OF THE CURRENT
                                        ;RECORD ON TAPE (YOZZLE).
                                        ;*********************************************************

007704  013700  000554          READ:   MOV     RCNT,R0         ;LOAD REC CNTR
007710  005737  000660                  TST     EOTREC          ;SEE IF EOT
007714  100013                          BPL     RDA             ;IF NOT: BR
007716  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ FORWARD
007724  001407                          BEQ     RDA             ;IF SO: BR
007726  042737  100000  000660          BIC     #100000,EOTREC  ;CLEAR FLAG
007734  013703  000660                  MOV     EOTREC,R3       ;GET MODIFIED RECORD COUNT
007740  160300                          SUB     R3,R0           ;SET RECORD AT
007742  005200                          INC     R0              ;SET TO PROPER NUMBER OF RECORDS
007744  012737  024713  000652  RDA:    MOV     #MSG6,EMADDR    ;SET ERROR MSG ADDRESS
007752  005037  000676                  CLR     TMFLG
007756  032737  010000  000562          BIT     #10000,RDCMD
007764  001406                          BEQ     RDO             ;IF READ FORWARD: BR
007766  005737  000564                  TST     TMEX            ;SEE IF TM
007772  001403                          BEQ     RDO             ;IF NOT: BR
007774  005237  000676                  INC     TMFLG           ;SET TM FLAG
010000  005200                          INC     R0
010002  013777  000556  170506  RDO:    MOV     FMCNT,@FC       ;LOAD CHAR CNTR
010010  012777  033436  170476          MOV     #RDATA,@BA      ;LOAD DATA ADDR
010016  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
010024  001417                          BEQ     RD1A            ;IF NOT: BR
010026  013703  000556                  MOV     FMCNT,R3
010032  005103                          COM     R3
010034  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
010042  001402                          BEQ     RD1             ;IF NOT: BR
010044  000241                          CLC
010046  006003                          ROR     R3              ;R3 = FC/2
010050  060377  170440          RD1:    ADD     R3,@BA          ;SET REVERSE BUS ADDRESS
010054  012737  000076  000672          MOV     #76,MTC1        ;SET READ REVERSE
010062  000403                          BR      RD1B
```

```
 2693  010064  012737  000070  000672  RD1A:   MOV     #70,MTC1        ;SET READ FORWARD
 2694  010072  012737  010104  000662  RD1B:   MOV     #RD2,RTRN       ;SET INTERRUPT RETURN ADDRESS
 2695  010100  000137  021170          RD1D:   JMP     TAPG            ;GO EXECUTE TAPE COMMAND
 2696  010104  032737  010000  000562  RD2:    BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2697  010112  001024                          BNE     RD3             ;IF SO: BR
 2698  010114  032777  000020  170400          BIT     #20,@DS
 2699  010122  001404                          BEQ     RD2B            ;AWAIT SWDN
 2700  010124  032777  000020  170370  RD2A:   BIT     #20,@DS
 2701  010132  001374                          BNE     RD2A            ;AWAIT TUR
 2702  010134  032777  002000  170360  RD2B:   BIT     #2000,@DS       ;SEE IF EOT
 2703  010142  001410                          BEQ     RD3             ;IF NOT: BR
 2704  010144  005737  000676                  TST     TMFLG           ;SEE IF TM
 2705  010150  001005                          BNE     RD3             ;IF SO: BR
 2706  010152  010037  000660                  MOV     R0,EOTREC
 2707  010156  052737  100000  000660          BIS     #100000,EOTREC  ;SET EOT FLAG
 2708  010164  032777  000002  170330  RD3:    BIT     #2,@DS          ;SEE IF AT LOAD POINT
 2709  010172  001410                          BEQ     RD4             ;IF NOT: BR
 2710  010174  004737  022662                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
 2711  010200  012704  025112                  MOV     #MSG22,R4
 2712  010204  104000                          TTOUTT                  ;PRINT BOT ERROR
 2713  010206  104006                          STOPP
 2714  010210  000137  003160                  JMP     STARTA          ;RESTART
 2715  010214  032777  004000  170364  RD4:    BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
 2716  010222  001121                          BNE     RD5             ;IF NOT: BR
 2717  010224  005737  000676                  TST     TMFLG
 2718  010230  001472                          BEQ     RD4B            ;IF NO TM EXPT: BR
 2719  010232  032777  000004  170262          BIT     #4,@DS
 2720  010240  001024                          BNE     RD4A            ;IF TM RECVD: BR
 2721  010242  012737  033436  021104          MOV     #RDATA,CADER    ;SAVE EXPT BUS ADDRESS
 2722  010250  012737  000002  021112          MOV     #2,DRVER        ;SET TM STATUS ERROR FLAG
 2723  010256  004737  020206                  JSR     PC,ERPT         ;GO PRINT TM ERROR
 2724  010262  013704  000674                  MOV     UNP,R4
 2725  010266  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2726  010274  001403                          BEQ     1$              ;IF NOT: BR
 2727  010276  005264  001150                  INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
 2728  010302  000502                          BR      RD6
 2729  010304  005264  001110          1$:     INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
 2730  010310  000477                          BR      RD6
 2731  010312  012703  033436          RD4A:   MOV     #RDATA,R3
 2732  010316  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2733  010324  001007                          BNE     RD4AD           ;IF SO: BR
 2734  010326  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
 2735  010334  001025                          BNE     RD4A2           ;IF SO: BR
 2736  010336  062703  000002                  ADD     #2,R3
 2737  010342  000422                          BR      RD4A2
 2738  010344  013704  000556          RD4AD:  MOV     FMCNT,R4
 2739  010350  005104                          COM     R4
 2740  010352  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
 2741  010360  001402                          BEQ     RD4A1           ;IF NOT: BR
 2742  010362  000241                          CLC
 2743  010364  006004                          ROR     R4              ;SET TO FC/2
 2744  010366  060403          RD4A1:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
 2745  010370  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
 2746  010374  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
 2747  010402  001002                          BNE     RD4A2           ;IF SO: BR
 2748  010404  162703  000002                  SUB     #2,R3
```

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 2749  010410  004737  017456          RD4A2:  JSR     PC,ER2
 2750  010414  000402                  RD4C    BR      RD4C
 2751  010416  004737  017360          RD4B:   JSR     PC,ERCHK        ;GO CHECK ERRORS
 2752  010422  005737  000706          RD4C:   TST     SERFL
 2753  010426  001417                          BEQ     RD5             ;IF NO ERROR: BR
 2754  010430  013704  000674                  MOV     UNP,R4
 2755  010434  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2756  010442  001003                          BNE     RD4D            ;IF SO: BR
 2757  010444  005264  001110                  INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
 2758  010450  000402                          BR      RD4E
 2759  010452  005264  001150          RD4D:   INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
 2760  010456  004737  010660          RD4E:   JSR     PC,RDRTY        ;GO RETRY
 2761  010462  005037  000712                  CLR     RTYFL           ;CLEAR RETRY FLAG
 2762  010466  032777  020000  170112  RD5:    BIT     #20000,@SWR     ;SEE IF SHOULD DO DATA CHECK
 2763  010474  001005                          BNE     RD6             ;IF NOT; BR
 2764  010476  005737  000676                  TST     TMFLG
 2765  010502  001002                          BNE     RD6
 2766  010504  004737  015516                  JSR     PC,DCHK         ;GO CHECK DATA
 2767  010510  005037  000706          RD6:    CLR     SERFL           ;CLEAR STATUS ERROR FLAG
 2768  010514  004737  014324                  JSR     PC,DS3          ;CLEAR BUFFER
 2769  010520  032777  000040  170060          BIT     #40,@SWR        ;SEE IF SHOULD YOZZLE
 2770  010526  001402                          BEQ     RD7             ;IF NOT: BR
 2771  010530  004737  011246                  JSR     PC,YOZ          ;ELSE GO YOZZLE
 2772  010534  013737  000572  000666  RD7:    MOV     RSTAL,STAL      ;SET DELAY
 2773  010542  004737  012256                  JSR     PC,STALL        ;STALL
 2774  010546  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2775  010554  001403                          BEQ     RD7A            ;IF NOT: BR
 2776  010556  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
 2777  010562  000405                          BR      RD10
 2778  010564  005737  000660          RD7A:   TST     EOTREC          ;SEE IF EOT FOUND
 2779  010570  100002                          BPL     RD10            ;IF NOT: BR
 2780  010572  012700  000001                  MOV     #1,R0           ;SET TO EOT
 2781  010576  005300                  RD10:   DEC     R0
 2782  010600  001402                          BEQ     RD11            ;IF DONE ALL: BR
 2783  010602  000137  010002                  JMP     RD0
 2784  010606  032737  010000  000562  RD11:   BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2785  010614  001016                          BNE     RDEX            ;IF SO: BR
 2786  010616  005737  000660                  TST     EOTREC          ;SEE IF FOUND EOT
 2787  010622  100413                          BMI     RDEX            ;IF SO: BR
 2788  010624  005737  000564                  TST     TMEX            ;SEE IF TM EXPECTED
 2789  010630  001410                          BEQ     RDEX            ;IF NOT: BR
 2790  010632  005737  000676                  TST     TMFLG           ;SEE IF TM FOUND
 2791  010636  001005                          BNE     RDEX            ;IF SO: BR
 2792  010640  005237  000676                  INC     TMFLG           ;ELSE SET FLAG
 2793  010644  005200                          INC     R0              ;SET RECORD COUNT TO ONE
 2794  010646  000137  010002                  JMP     RD0             ;GO READ TM
 2795  010652  005037  000676          RDEX:   CLR     TMFLG
 2796  010656  000207                  RDX:    RTS     PC              ;EXIT
```

```
2797                                    ;*********************************************************
2798                                    ;READ ERROR RETRY SUBROUTINE:
2799                                    ;
2800                                    ;THIS SUBROUTINE WILL RETRY ALL DATA RELATED
2801                                    ;READ ERRORS UP TO EIGHT (8) TIMES.  IF ALL
2802                                    ;FOUR RETRIES ARE BAD, IT IS CONSIDERED
2803                                    ;A HARD ERROR.  IF ANY ARE GOOD, IT IS A
2804                                    ;SOFT ERROR.  RETRIES MAY BE INHIBITED
2805                                    ;VIA SWITCH FOUR (SW4=0: INHIBIT RETRIES)
2806                                    ;*********************************************************
2807
2808  010660  032777  000020  167720  RDRTY:  BIT     #20,@SWR        ;SEE IF RETRY INHIBITED
2809  010666  001001                   BNE     RDRT0           ;IF NOT: BR
2810  010670  000207                   RTS     PC              ;ELSE RETURN
2811  010672  013703  000722          RDRT0:  MOV     ERSAV,R3
2812  010676  042703  102700                  BIC     #102700,R3      ;MARK NON-RECOVERABLE ERROR BITS
2813  010702  001410                   BEQ     RDRT1           ;IF NOT: BR
2814  010704  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
2815  010710  012704  026557                  MOV     #MSG79,R4
2816  010714  104000                           TTOUTT                  ;PRINT NON-RECOVERABLE MESSAGE
2817  010716  004737  011232                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE ERROR
2818  010722  000207           RDRT1A: RTS     PC              ;RETURN
2819  010724  032777  002000  167654  RDRT1:  BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2820  010732  001003                   BNE     RDRT1B          ;IF SO: BR
2821  010734  012704  026232                  MOV     #MSG64,R4
2822  010740  104000                           TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2823  010742  005037  000702          RDRT1B: CLR     RTCNT           ;CLEAR RETRY COUNTER
2824  010746  005037  000706          RDRTG:  CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2825  010752  012737  000002  000712          MOV     #2,RTYFL        ;SET READ RETRY FLAG
2826  010760  004737  011246                  JSR     PC,YOZ          ;GO TO YOZZLE TO RETRY READ
2827  010764  005737  000706                  TST     SERFL           ;SEE IF RETRY ERROR
2828  010770  001031                   BNE     RDRT5           ;IF SO: BR
2829  010772  032777  002000  167606          BIT     #2000,@SWR
2830  011000  001011                   BNE     RDRT2
2831  011002  012704  026711                  MOV     #MSG105,R4
2832  011006  104000                           TTOUTT                  ;PRINT RECOVERED MESSAGE
2833  011010  012704  026254                  MOV     #MSG65,R4
2834  011014  104000                           TTOUTT                  ;PRINT RETRY TAG
2835  011016  013703  000702                  MOV     RTCNT,R3
2836  011022  104002                           OCTPP                   ;PRINT RETRY NUMBER
2837  011024  013704  000674          RDRT2:  MOV     UNP,R4
2838  011030  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2839  011036  001003                   BNE     RDRT3           ;IF SO: BR
2840  011040  005264  002670                  INC     RFSOFT(R4)      ;ELSO BUMP FORWARD SOFT ERROR COUNTER
2841  011044  000402                   BR      RDRT4
2842  011046  005264  002710          RDRT3:  INC     RRSOFT(R4)      ;BUMP ERRORS SOFT CNTR
2843  011052  000207           RDRT4:  RTS     PC              ;RETURN
2844  011054  005037  000646          RDRT5:  CLR     TEMP3           ;++G CLEAR RECOVERABLE ERROR INDICATOR
2845  011060  013703  000722                  MOV     ERSAV,R3        ;GET ER
2846  011064  042703  102700                  BIC     #102700,R3      ;MASK RECOVERABLE BITS
2847  011070  001413                   BEQ     RDRT5A          ;IF RECOVERABLE: BR
2848  011072  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
2849  011076  012704  026557                  MOV     #MSG79,R4
2850  011102  104000                           TTOUTT                  ;PRINT NON-RECOVERABLE MSG
2851  011104  004737  011232                  JSR     PC,NRTP         ;PRINT ER
2852  011110  012737  000001  000646          MOV     #1,TEMP3        ;SET FLAG
```

```
2853  011116  000404                          BR      RDRT5B
2854  011120  032777  002000  167460  RDRT5A: BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2855  011126  001014                          BNE     RDRT6           ;IF SO: BR
2856  011130  012704  026254          RDRT5B: MOV     #MSG65,R4
2857  011134  104000                          TTOUTT                  ;PRINT RETRY TAG
2858  011136  013703  000702                  MOV     RTCNT,R3
2859  011142  104002                          OCTPP                   ;PRINT RETRY NUMBER
2860  011144  005737  000646                  TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
2861  011150  001403                          BEQ     RDRT6           ;IF NOT: BR
2862  011152  005037  000646                  CLR     TEMP3           ;CLEAR FLAG
2863  011156  000207                          RTS     PC              ;EXIT
2864  011160  005237  000702          RDRT6:  INC     RTCNT
2865  011164  023737  000702  000602          CMP     RTCNT,RETRY     ;SEE IF DONE 8 RETRIES
2866  011172  001265                          BNE     RDRTG           ;IF NOT: BR
2867  011174  012704  027244                  MOV     #MSG115,R4
2868  011200  104000                          TTOUTT                  ;PRINT HARD ERROR MESSAGE
2869  011202  013704  000674                  MOV     UNP,R4
2870  011206  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2871  011214  001003                          BNE     RDRT7           ;IF SO: BR
2872  011216  005264  002730                  INC     RFHARD(R4)      ;BUMP FORWARD HARD ERROR CNTR
2873  011222  000402                          BR      RDRTX
2874  011224  005264  002750          RDRT7:  INC     RRHARD(R4)      ;BUMP REVERSE HARD ERROR CNTR
2875  011230  000207                  RDRTX:  RTS     PC              ;RETURN
2876
2877  011232  013703  000722          NRTP:   MOV     ERSAV,R3        ;GET ER REGISTER
2878  011236  104002                          OCTPP                   ;PRINT ER
2879  011240  004737  021130                  JSR     PC,FRPRT        ;PRINT F OR R
2880  011244  000207                          RTS     PC              ;RETURN
```

```
                                        ;*********************************************************
                                        ;YOZZLE SUBROUTINE:
                                        ;
                                        ;THIS SUBROUTINE, ENTERED VIA SWITCH FIVE (5), IS USED TO PERFORM
                                        ;A CONTINUOUS READ AND SPACE OVER OF THE CURRENT RECORD ON TAPE.
                                        ;FULL STATUS AND DATA CHECKING MAY BE PERFORMED
                                        ;OR NOT VIA CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13).
                                        ;A SOFTWARE DELAY IS PERFORMED BETWEEN EACH READ
                                        ;AND SPACE OPERATION AND MAY BE VARIED BY TYPING
                                        ;CNTRL C ON THE TTY AND ENTERING A VALUE IN RESPONSE
                                        ;TO THE PRINTED REQUEST.
                                        ;*********************************************************
011246  012777  000001  167334  YOZ:    MOV     #1,@TKS         ;SET TTY ENABLE
011254  013737  000600  000666          MOV     YSTAL,STAL
011262  004737  012256                  JSR     PC,STALL        ;DO YOZZLE STALL
011266  012777  177777  167222  YOZO:   MOV     #-1,@FC         ;SET TO 1 RECORD SPACING
011274  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011302  001404                          BEQ     YOZA            ;IF NOT: BR
011304  112737  000030  000672          MOVB    #30,MTC1        ;SET TO SPACE FORWARD
011312  000403                          BR      YOZB
011314  112737  000032  000672  YOZA:   MOVB    #32,MTC1        ;SET TO SPACE REVERSE
011322  012737  011342  000662  YOZB:   MOV     #YOZC,RTRN      ;SET RETURN ADDRESS
011330  012737  177775  000666          MOV     #177775,STAL    ;SET TIME MULTIPLIER
011336  000137  021170                  JMP     TAPG            ;GO YOZZLE
011342  005737  000676          YOZC:   TST     TMFLG           ;SEE IF TM
011346  001404                          BEQ     1$              ;IF NOT: BR
011350  012737  040000  000666          MOV     #40000,STAL     ;SET TM STALL
011356  000403                          BR      2$
011360  013737  000600  000666  1$:     MOV     YSTAL,STAL
011366  004737  012256          2$:     JSR     PC,STALL        ;DO YOZZLE STALL
011372  012777  033436  167114          MOV     #RDATA,@BA      ;SET BUS ADDRESS
011400  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011406  001417                          BEQ     YOZC1           ;IF NOT: BR
011410  013703  000556                  MOV     FMCNT,R3
011414  005103                          COM     R3
011416  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
011424  001402                          BEQ     YOZCO           ;IF NOT: BR
011426  000241                          CLC
011430  006003                          ROR     R3              ;R3 = FC/2
011432  060377  167056          YOZCO:  ADD     R3,@BA          ;SET REVERSE BUS ADDRESS
011436  012737  000076  000672          MOV     #76,MTC1        ;SET READ REVERSE
011444  000403                          BR      YOZC2
011446  012737  000070  000672  YOZC1:  MOV     #70,MTC1        ;SET READ FORWARD
011454  013777  000556  167034  YOZC2:  MOV     FMCNT,@FC       ;SET CHARACTER COUNT
011462  012737  011474  000662          MOV     #YOZD,RTRN      ;SET RETURN ADDRESS
011470  000137  021170                  JMP     TAPG            ;GO READ
011474  032777  004000  167104  YOZD:   BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
011502  001051                          BNE     YOZE            ;IF NOT: BR
011504  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
011510  001444                          BEQ     YOZD1           ;IF NOT: BR
011512  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011520  001426                          BEQ     YOZDO           ;IF NOT: BR
011522  012703  033436                  MOV     #RDATA,R3
011526  013704  000556                  MOV     FMCNT,R4
011532  005104                          COM     R4
```

```
2937  011534  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2938  011542  001402                          BEQ     YOZD4           ;IF NOT: BR
2939  011544  000241                          CLC
2940  011546  006004                          ROR     R4              ;SET TO FC/2
2941  011550  060403                  YOZD4:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2942  011552  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2943  011556  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2944  011564  001001                          BNE     YOZD2           ;IF SO: BR
2945  011566  005743                          TST     -(R3)           ;SET EXPT BA
2946  011570  004737  017456          YOZD2:  JSR     PC,ER2          ;GO CHECK ERRORS
2947  011574  000430                          BR      YOZF
2948  011576  012703  033436          YOZD0:  MOV     #RDATA,R3
2949  011602  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2950  011610  001001                          BNE     YOZD3           ;IF SO: BR
2951  011612  005723                          TST     (R3)+           ;SET EXPT BA
2952  011614  004737  017456          YOZD3:  JSR     PC,ER2          ;GO CHECK ERRORS
2953  011620  000416                          BR      YOZF
2954  011622  004737  017360          YOZD1:  JSR     PC,ERCHK        ;ELSE GO CHECK ERRORS
2955  011626  032777  020000  166752  YOZE:   BIT     #20000,@SWR     ;SEE IF SHOULD CHECK DATA
2956  011634  001010                          BNE     YOZF            ;IF NOT: BR
2957  011636  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK
2958  011642  001005                          BNE     YOZF            ;IF SO: BR
2959  011644  005737  000712                  TST     RTYFL           ;SEE IF RETRY
2960  011650  001004                          BNE     YOZFO           ;IF SO: BR
2961  011652  004737  015516                  JSR     PC,DCHK         ;ELSE GO CHECK DATA
2962  011656  004737  014324          YOZF:   JSR     PC,DS3          ;GO CLEAR DATA AREA
2963  011662  105777  166722          YOZFO:  TSTB    @TKS            ;SEE IF HAVE NEW STALL VALUE
2964  011666  100032                          BPL     YOZG            ;IF NOT: BR
2965  011670  122777  000203  166714          CMPB    #203,@TKB       ;SEE IF CONT C
2966  011676  001026                          BNE     YOZG            ;IF NOT: BR
2967  011700  012704  025734                  MOV     #MSG44,R4
2968  011704  104000                          TTOUTT                  ;PRINT YSTALL REQUEST
2969  011706  013703  000600                  MOV     YSTAL,R3
2970  011712  104002                          OCTPP                   ;PRINT PRESENT STALL
2971  011714  010037  000646                  MOV     R0,TEMP3        ;SAVE R0(REC CNT)
2972  011720  012705  000600                  MOV     #YSTAL,R5       ;SET ADDRESS OF YSTL
2973  011724  012701  000006                  MOV     #6,R1           ;SET NUMBER OF CHAR TO INPUT
2974  011730  012702  177777                  MOV     #-1,R2          ;SET MAXIMUM LIMIT
2975  011734  012703  002000                  MOV     #2000,R3        ;SET MINIMUM LIMIT
2976  011740  004737  023300                  JSR     PC,TTR          ;GO GET VALUE
2977  011744  013700  000646                  MOV     TEMP3,R0        ;RESTORE R0(REC CNTR)
2978  011750  000137  011246                  JMP     YOZ             ;RESTART YOZZLE
2979  011754  122777  000207  166630  YOZG:   CMPB    #207,@TKB       ;CHECK FOR CNTL G
2980  011762  001010                          BNE     YOZI
2981  011764  022737  000176  000606          CMP     #SWREG,SWR      ;IS SWREG SELECTED
2982  011772  001004                          BNE     YOZI
2983  011774  005077  166612                  CLR     @TKB            ;CLEAR CNTL G OUT OF BUFFER
2984  012000  004737  024376                  JSR     PC,CNTG         ;GO CHANGE SWREG
2985  012004  032777  000040  166574  YOZI:   BIT     #40,@SWR        ;SEE IF SHOULD CONTINUE YOZZLE
2986  012012  001402                          BEQ     YOZH            ;IF NOT: BR
2987  012014  000137  011266                  JMP     YOZO
2988  012020  012777  000100  166562  YOZH:   MOV     #100,@TKS       ;SET TTY INTERRUPT ENABLE
2989  012026  000207                          RTS     PC              ;EXIT
2990
```

```
                                                   ;*******************************************************
                                                   ;BACKSPACE SUBROUTINE:
                                                   ;
                                                   ;THIS SUBROUTINE IS USED TO PERFORM THE
                                                   ;BACKSPACE OPERATION REQUIRED BY THE READ
                                                   ;ROUTINE FOR READ FORWARD AFTER WRITING.
                                                   ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE SPACE
                                                   ;ROUTINE ASSUMES THAT THE TM WILL BE FIRST WHEN
                                                   ;BACKSPACING.  THEREFORE TWO OPERATIONS ARE REQUIRED
                                                   ;TO SPACE OVER A BLOCK.  FIRST SPACE OVER THE TM, THEN
                                                   ;SPACE OVER THE DATA RECORDS.
                                                   ;A CHECK FOR RECORD COUNT ZERO IS MADE AT THE
                                                   ;END OF THE SPACE OPERATION TO ASSURE THAT PROPER
                                                   ;TAPE POSITIONING WAS DONE.
                                                   ;*******************************************************

012030  013737  000576  000666  BKSP:   MOV     TSTAL,STAL
012036  004737  012256                  JSR     PC,STALL                ;DO TURN AROUND STALL
012042  012737  024743  000652          MOV     #MSG10,EMADDR
012050  012777  033436  166436          MOV     #RDATA,@BA
012056  005737  000564                  TST     TMEX                    ;SEE IF TM
012062  001440                          BEQ     B0                      ;IF NOT: BR
012064  012777  177777  166424          MOV     #-1,@FC
012072  012737  000032  000672          MOV     #32,MTC1
012100  012737  012112  000662          MOV     #BKTM,RTRN
012106  000137  021170                  JMP     TAPG                    ;SPACE TO TM
012112  032777  010000  166466  BKTM:   BIT     #10000,@SWR             ;SEE IF SHOULD CHECK ERROR
012120  001021                          BNE     B0                      ;IF NOT: BR
012122  012737  026146  000652          MOV     #MSG55,EMADDR
012130  032777  000004  166364          BIT     #4,@DS                  ;SEE IF TM
012136  001006                          BNE     BKTM0                   ;IF SO: BR
012140  012737  033436  021104          MOV     #RDATA,CADER
012146  004737  020206                  JSR     PC,ERPT                 ;PRINT ERROR
012152  000404                          BR      B0
012154  012703  033436          BKTM0:  MOV     #RDATA,R3
012160  004737  017456                  JSR     PC,ER2
012164  013700  000554          B0:     MOV     RCNT,R0
012170  005100                          COM     R0                      ;BUILD SPACE AMOUNT
012172  005200                          INC     R0
012174  012737  024743  000652          MOV     #MSG10,EMADDR           ;SET ERROR MESG ADDRESS
012202  010077  166310                  MOV     R0,@FC
012206  012737  000032  000672  BKRT:   MOV     #32,MTC1                ;SET SPACE REVERSE
012214  012737  012232  000662          MOV     #B1,RTRN                ;SET RETURN ADDRESS
012222  010037  000666                  MOV     R0,STAL                 ;SET INTERRUPT TIME MULTIPLIER
012226  000137  021170                  JMP     TAPG                    ;GO DO SPACE
012232  012703  033436          B1:     MOV     #RDATA,R3
012236  004737  017456                  JSR     PC,ER2
012242  013737  000576  000666  B2:     MOV     TSTAL,STAL              ;DO STALL
012250  004737  012256                  JSR     PC,STALL                ;STALL
012254  000207                          RTS     PC                      ;EXIT
```

```
 3043
 3044                                   ;*********************************************************
 3045                                   ;STALL ROUTINE:
 3046                                   ;
 3047                                   ;THIS ROUTINE IS USED TO PROVIDE SOFTWARE DELAYS
 3048                                   ;DURING READ, WRITE, TURN AROUND, AND YOZZLE.
 3049                                   ;THE DELAY TIMES MAY BE SET BY THE OPERATOR AT
 3050                                   ;INITIAL START FROM 200(8) OR MAY BE MODIFIED
 3051                                   ;AT ANY TIME BY ENTERING CNTRL C ON THE TTY AND
 3052                                   ;INSERTING NEW VALUES IN RESPONSE TO THE REQUEST.
 3053                                   ;THE READ STALL AND THE WRITE STALL ARE DELAYS
 3054                                   ;EXECUTED BETWEEN EACH RECORD OF THE DATA BLOCK.
 3055                                   ;THE TURN AROUND STALL IS EXECUTED EACH TIME
 3056                                   ;THE DIRECTION OF TAPE MOVEMENT IS CHANGED AND
 3057                                   ;ALSO EACH TIME THE TAPE OPERATION CHANGES FROM
 3058                                   ;WRITE TO READ OR READ TO WRITE. THE YOZZLE
 3059                                   ;STALL IS EXECUTED ONLY DURING THE YOZZLE ROUTINE.
 3060                                   ;*********************************************************
 3061
 3062  012256  005337  000666  STALL:   DEC     STAL
 3063  012262  001375                   BNE     STALL           ;DELAY
 3064  012264  000207                   RTS     PC              ;EXIT
```

```
                                        ;*********************************************************
                                        ;RANDOM CHARACTER COUNT GENERATOR:
                                        ;
                                        ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH
                                        ;SEVEN (7) IS USED TO GENERATE A RANDOM
                                        ;CHARACTER COUNT FOR EACH DATA BLOCK.
                                        ;ALL RECORDS WITHIN A GIVEN BLOCK WILL BE
                                        ;THE SAME, BUT EACH BLOCK WILL VARY.
                                        ;THE LIMITS ARE TWENTY (20) TO FOUR THOUSAND
                                        ;(4000) OCTAL CHARACTERS PER RECORD.
                                        ;*********************************************************
012266  012701  177760          CCNTR:  MOV     #-20,R1         ;SET HIGH LIMIT
012272  012702  174000                  MOV     #-4000,R2       ;SET LOW LIMIT
012276  004737  023246                  JSR     PC,RANG         ;GO GENERATE NUMBER
012302  042737  000001  000626          BIC     #1,RANSAV
012310  013737  000626  000556          MOV     RANSAV,FMCNT    ;SET CHAR COUNT
012316  012737  177777  014360          MOV     #-1,PATS        ;PRESET DATA PATTERN
012324  000207                          RTS     PC              ;EXIT
                                        ;*********************************************************
                                        ;RANDOM RECORD COUNT GENERATOR:
                                        ;
                                        ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH SIX (6)
                                        ;IS USED TO GENERATE A RANDOM NUMBER OF RECORDS
                                        ;FOR EACH BLOCK OF DATA.
                                        ;THE LIMITS ARE ONE (1) TO FIVE HUNDRED (500) OCTAL
                                        ;RECORDS PER BLOCK.
                                        ;*********************************************************
012326  012702  000001          RCNTR:  MOV     #1,R2           ;SET LOW LIMIT
012332  012701  000500                  MOV     #500,R1         ;SET HIGH LIMIT
012336  004737  023246                  JSR     PC,RANG         ;GO GENERATE NUMBER
012342  013737  000626  000554          MOV     RANSAV,RCNT     ;SET RECORD COUNT
012350  000207                          RTS     PC              ;EXIT
```

```
                        ;*********************************************************
                        ;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.
                        ;*********************************************************

012352  005737  000634  TINP:   TST     TINF            ;SEE IF SHOULD INPUT FROM TTY
012356  001001                  BNE     TINPA           ;IF SO: BR
012360  000207                  RTS     PC              ;EXIT
012362  005037  000674  TINPA:  CLR     UNP             ;CLEAR TABLE POINTER
012366  005037  005130          CLR     REOTC           ;CLEAR EOT UNIT COUNTER
012372  012700  000010          MOV     #10,R0          ;SET SIZE OF TABLE
012376  012701  000746          MOV     #UN1,R1         ;SET START OF TABLE
012402  005021          TINPB:  CLR     (R1)+           ;CLEAR TABLE
012404  005300                  DEC     R0              ;SEE IF DONE
012406  001375                  BNE     TINPB           ;IF NOT: BR
```

```
3159  012410  012704  025405                MOV     #MSG31,R4
3160  012414  005737  000734                TST     ASEQF           ;SEE IF AUTO SEQ
3161  012420  001402                        BEQ     TINPB1          ;IF NOT: BR
3162  012422  012704  025333                MOV     #MSG30,R4       ;SET AUTO SEQ HDR
3163  012426  104000          TINPB1:       TTOUTT                  ;PRINT PROGRAM NAME
3164  012430  005737  014122                TST     SCVFL           ;SEE IF SHORT CONVERSATION
3165  012434  001067                        BNE     TINPC           ;IF SO: BR
3166  012436  012704  026436                MOV     #MSG74,R4
3167  012442  104000                        TTOUTT                  ;REQUEST STARTING REGISTER ADDRESS
3168  012444  013703  000544                MOV     REGS,R3
3169  012450  104002                        OCTPP                   ;PRINT CURRENT REG START
3170  012452  012705  000544                MOV     #REGS,R5        ;SAVE ADDRESS LOCATION
3171  012456  012701  000006                MOV     #6,R1           ;SET SIZE OF ENTRY
3172  012462  012702  176400                MOV     #176400,R2      ;SET UPPER LIMIT
3173  012466  012703  172300                MOV     #172300,R3      ;SET LOWER LIMIT
3174  012472  004737  023300                JSR     PC,TTR          ;GO GET RESPONSE
3175  012476  012704  026461                MOV     #MSG75,R4
3176  012502  104000                        TTOUTT                  ;GO REQUEST VECTOR ADDRESS
3177  012504  013703  000546                MOV     VECT,R3
3178  012510  104002                        OCTPP                   ;PRINT CURRENT VECTOR
3179  012512  012705  000546                MOV     #VECT,R5        ;SET SAVE LOCATION
3180  012516  012701  000003                MOV     #3,R1           ;SET SIZE OF ENTRY
3181  012522  012702  000224                MOV     #224,R2         ;SET UPPER LIMIT
3182  012526  012703  000150                MOV     #150,R3         ;SET LOWER LIMIT
3183  012532  004737  023300                JSR     PC,TTR          ;GO GET RESPONSE
3184  012536  013700  000546                MOV     VECT,R0         ;GET VECTOR ADDRESS
3185  012542  012720  021666                MOV     #MTINT,(R0)+    ;LOAD VECTOR WITH HANDLER ADDRESS
3186  012546  012710  000340                MOV     #340,(R0)       ;LOAD PRIORITY LEVEL
3187  012552  013700  000544                MOV     REGS,R0         ;GET STARTING REGISTER ADDRESS
3188  012556  012701  000016                MOV     #16,R1          ;SET NUMBER OF REGISTERS
3189  012562  012702  000510                MOV     #C1,R2          ;GET FIRST ADDRESS LOCATION
3190  012566  010022          TINPB0:       MOV     R0,(R2)+        ;BUILD TABLE OF ADDRESSES
3191  012570  062700  000002                ADD     #2,R0           ;BUMP ADDRESS
3192  012574  005301                        DEC     R1              ;SEE IF DONE
3193  012576  001373                        BNE     TINPB0          ;IF NOT: BR
3194  012600  005737  000734                TST     ASEQF           ;SEE IF AUTO SEQ
3195  012604  001403                        BEQ     TINPC           ;IF NOT: BR
3196  012606  005726                        TST     (SP)+           ;RESET STACK POINTER
3197  012610  000137  021704                JMP     ASEQ            ;GO TO AUTO SEQUENCE
3198  012614  012777  000040  165676 TINPC: MOV     $.0,@CS         ;INITIALIZE
3199  012622  012704  026102                MOV     #MSG52,R4
3200  012626  104000                        TTOUTT                  ;REQUEST DRIVE NUMBER
3201  012630  012705  000550                MOV     #DVN,R5         ;GET ADDRESS
3202  012634  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3203  012640  012702  000007                MOV     #7,R2           ;SET UPPER LIMIT
3204  012644  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3205  012650  004737  023300                JSR     PC,TTR          ;GO GET DRIVE NUMBER
3206  012654  013777  000550  165636        MOV     DVN,@CS
3207  012662  005777  165622                TST     @C1             ;ACCESS DRIVE
3208  012666  032777  010000  165624        BIT     #10000,@CS      ;SEE IF NED
3209  012674  001411                        BEQ     TINP0           ;IF NOT: BR
3210  012676  012704  026373                MOV     #MSG71,R4
3211  012702  104000                        TTOUTT                  ;PRINT NED
3212  012704  013704  000510                MOV     C1,R4
3213  012710  005204                        INC     R4
3214  012712  152714  000100                BISB    #100,(R4)       ;CLEAR TRE
```

```
3215  012716  000736                        BR      TINPC           ;++G RETRY DVN
3216  012720  012704  025470        TINPG:  MOV     #MSG32,R4
3217  012724  104000                        TTOUTT                  ;PRINT UNIT NUMBER REQUEST
3218  012726  005037  000644                CLR     TEMP2           ;CLEAR BUFFER
3219  012732  012705  000644                MOV     #TEMP2,R5       ;SET UNIT DESCRIPTION BUFFER ADDRESS
3220  012736  012701  000001                MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3221  012742  012702  000007                MOV     #7,R2           ;SET MAXIMUM LIMIT
3222  012746  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
3223  012752  004737  023300                JSR     PC,TTR          ;GO GET UNIT NUMBER
3224  012756  005737  000642                TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3225  012762  001013                        BNE     TINP0B          ;IF SO: BR
3226  012764  005737  000674                TST     UNP             ;SEE IF FIRST ENTRY
3227  012770  001001                        BNE     TINP0A          ;IF NOT: BR
3228  012772  000752                        BR      TINP0           ;++G ELSE RETRY
3229  012774  013700  000674        TINP0A: MOV     UNP,R0
3230  013000  012760  177777  000746        MOV     #-1,UN1(R0)     ;SET END UNIT TABLE
3231  013006  000137  013376                JMP     TINP2C          ;GO GET RECORD COUNT
3232  013012  013700  000674        TINP0B: MOV     UNP,R0
3233  013016  042760  000007  000746        BIC     #7,UN1(R0)      ;CLEAR UNIT NUMBER
3234  013024  004737  014136                JSR     PC,TPOS1        ;GO LOAD UNIT NUMBER TO PROPER POSITION
3235  013030  012777  000040  165462        MOV     #40,@CS
3236  013036  013777  000550  165454        MOV     DVN,@CS
3237  013044  016077  000746  165470        MOV     UN1(R0),@C2     ;LOAD UNIT NUMBER
3238  013052  032777  002000  165456 TINP0C: BIT     #2000,@DT       ;SEE  IF SLAVE PRESENT
3239  013060  001005                        BNE     TINP0D          ;IF SO: BR
3240  013062  012704  026161                MOV     #MSG57,R4
3241  013066  104000                        TTOUTT                  ;PRINT NON-EXIST SLAVE
3242  013070  000137  012720                JMP     TINP0           ;REDO
3243  013074  022777  142011  165434 TINP0D: CMP     #142011,@DT     ;++G SEE IF 9TRK TM02,TU16/TE16
3244  013102  001406                        BEQ     TINP0E          ;IF SO: BR
3245  013104  012704  026055                MOV     #MSG50,R4       ;ILLEGAL DRIVE TYPE
3246  013110  104000                        TTOUTT                  ;GO PRINT
3247  013112  017703  165420                MOV     @DT,R3
3248  013116  104002                        OCTPP                   ;PRINT DRIVE TYPE REGISTER
3249  013120  012704  024735        TINP0E: MOV     #MSG9,R4
3250  013124  104000                        TTOUTT                  ;PRINT SERIAL NUMBER TAG
3251  013126  017703  165406                MOV     @SN,R3
3252  013132  004737  024224                JSR     PC,$NPT         ;PRINT SERIAL NUMBER
3253  013136  012704  025511        TINP1:  MOV     #MSG33,R4
3254  013142  104000                        TTOUTT                  ;PRINT DENSITY REQUEST
3255  013144  005037  000644                CLR     TEMP2           ;CLEAR BUFFER
3256  013150  012701  000001                MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3257  013154  012702  000007                MOV     #7,R2           ;SET MAXIMUM LIMIT
3258  013160  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
3259  013164  004737  023300                JSR     PC,TTR          ;GO GET DENSITY
3260  013170  005737  000642                TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3261  013174  001407                        BEQ     TINP2           ;IF NOT: BR
3262  013176  042737  003400  000552        BIC     #3400,UDES      ;ELSE CLEAR OLD PARAMETER
3263  013204  012703  000010                MOV     #10,R3          ;SET POSITION FACTOR
3264  013210  004737  014124                JSR     PC,TPOS         ;GO LOAD DENSITY INTO PROPER POSITION
3265  013214  012704  025525        TINP2:  MOV     #MSG34,R4
3266  013220  104000                        TTOUTT                  ;PRINT PARITY REQUEST
3267  013222  005037  000644                CLR     TEMP2           ;CLR BUFFER
3268  013226  012701  000001                MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3269  013232  012702  000001                MOV     #1,R2           ;SET MAXIMUM LIMIT
3270  013236  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
```

```
3271  013242  004737  023300                JSR     PC,TTR          ;GO INPUT PARITY
3272  013246  005737  000642                TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3273  013252  001407                        BEQ     TINP2A          ;IF NOT: BR
3274  013254  042737  000010  000552        BIC     #10,UDES        ;ELSE CLEAR OLD PARAMETER
3275  013262  012703  000003                MOV     #3,R3           ;SET POSITION FACTOR
3276  013266  004737  014124                JSR     PC,TPOS         ;GO LOAD PARITY TO PROPER POSITION
3277  013272  012704  026124        TINP2A: MOV     #MSG53,R4
3278  013276  104000                        TTOUTT                  ;REQUEST FORMAT
3279  013300  005037  000644                CLR     TEMP2
3280  013304  012701  000002                MOV     #2,R1
3281  013310  012702  000016                MOV     #16,R2
3282  013314  012703  000014                MOV     #14,R3
3283  013320  004737  023300                JSR     PC,TTR          ;GO GET FORMAT
3284  013324  005737  000642                TST     TEMP1           ;SEE IF NEW PARAMETER
3285  013330  001407                        BEQ     TINP2B          ;IF NOT: BR
3286  013332  042737  000170  000552        BIC     #170,UDES
3287  013340  012703  000004                MOV     #4,R3
3288  013344  004737  014124                JSR     PC,TPOS
3289  013350  005237  005130        TINP2B: INC     REOTC           ;BUMP EOT UNIT COUNTER
3290  013354  022737  000016  000674        CMP     #16,UNP         ;SEE IF DONE UNITS
3291  013362  001405                        BEQ     TINP2C          ;IF SO: BR
3292  013364  062737  000002  000674        ADD     #2,UNP          ;POINT TO NEXT UNIT
3293  013372  000137  012720                JMP     TINPO           ;ELSE LOOK FOR NEXT UNIT
3294  013376  005037  000674        TINP2C: CLR     UNP             ;CLEAR UNIT POINTER
3295  013402  013700  005130                MOV     REOTC,R0
3296  013406  000337  005130                SWAB    REOTC
3297  013412  110037  005130                MOVB    R0,REOTC        ;SET UNIT EOT COUNTER
3298  013416  012704  025540        TINP3:  MOV     #MSG35,R4
3299  013422  104000                        TTOUTT                  ;PRINT RECORD COUNT REQUEST
3300  013424  013703  000554                MOV     RCNT,R3
3301  013430  104002                        OCTPP                   ;PRINT RECORD COUNT
3302  013432  012705  000554                MOV     #RCNT,R5        ;SET RECORD COUNT ADDRESS
3303  013436  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3304  013442  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3305  013446  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3306  013452  004737  023300                JSR     PC,TTR          ;GO GET RECORD COUNT
3307  013456  013737  000554  000630        MOV     RCNT,RCSAV      ;SAVE RECORD COUNT
3308  013464  012704  025561                MOV     #MSG36,R4
3309  013470  104000                        TTOUTT                  ;PRINT CHARACTER COUNT REQUEST
3310  013472  005437  000556                NEG     FMCNT
3311  013476  013703  000556                MOV     FMCNT,R3
3312  013502  104002                        OCTPP                   ;PRINT CHAR COUNT
3313  013504  012705  000556                MOV     #FMCNT,R5       ;SET CHARACTER COUNT ADDRESS
3314  013510  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3315  013514  012702  004000                MOV     #4000,R2        ;SET MAXIMUM LIMIT
3316  013520  012703  000004                MOV     #4,R3           ;SET MINIMUM LIMIT
3317  013524  004737  023300                JSR     PC,TTR          ;GO GET CHARACTER COUNT
3318  013530  005437  000556                NEG     FMCNT           ;SET TO TWO'S COMPLIMENT
3319  013534  013737  000556  000632        MOV     FMCNT,FCSAV     ;SAVE FRAME COUNT
3320  013542  012704  025605                MOV     #MSG37,R4       ;PRINT PATTERN NUMBER REQUEST
3321  013546  104000                        TTOUTT
3322  013550  013703  000560                MOV     PATRN,R3
3323  013554  104002                        OCTPP                   ;PRINT PATTERN
3324  013556  005037  014526                CLR     DOFL            ;CLEAR EXTERNAL DATA FLAG
3325  013562  012705  000560                MOV     #PATRN,R5       ;SET PATTERN NUMBER ADDRESS
3326  013566  012701  000002                MOV     #2,R1           ;SET NUMBER OF CHARACTERS TO INPUT
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 3327  013572  012702  000015          MOV     #15,R2          ;SET MAXIMUM LIMIT
 3328  013576  012703  000000          MOV     #0,R3           ;SET MINIMUM LIMIT
 3329  013602  004737  023300          JSR     PC,TTR          ;GO GET PATTERN NUMBER
 3330  013606  012704  026321          MOV     #MSG69,R4
 3331  013612  104000                  TTOUTT                  ;REQUEST TM
 3332  013614  013703  000564          MOV     TMEX,R3
 3333  013620  104002                  OCTPP                   ;PRINT CURRENT TM FLAG SETTING
 3334  013622  012705  000564          MOV     #TMEX,R5        ;GET TM FLAG ADDRESS
 3335  013626  012701  000001          MOV     #1,R1           ;SET SIZE OF RESPONSE
 3336  013632  012702  000001          MOV     #1,R2           ;SET UPPER LIMIT
 3337  013636  012703  000000          MOV     #0,R3           ;SET LOWER LIMIT
 3338  013642  004737  023300          JSR     PC,TTR          ;TM 1=YES
 3339  013646  012704  025065          MOV     #MSG21,R4
 3340  013652  104000                  TTOUTT                  ;REQUEST INTERCHANGE READ
 3341  013654  013703  000566          MOV     INTRF,R3
 3342  013660  104002                  OCTPP                   ;PRINT CURRENT SETTING
 3343  013662  012705  000566          MOV     #INTRF,R5       ;GET FLAG ADDRESS
 3344  013666  012701  000001          MOV     #1,R1           ;SET SIZE OF RESPONSE
 3345  013672  012702  000001          MOV     #1,R2           ;SET UPPER LIMIT
 3346  013676  012703  000000          MOV     #0,R3           ;SET LOWER LIMIT
 3347  013702  004737  023300          JSR     PC,TTR          ;GO GET RESPONSE
 3348  013706  012704  025630          MOV     #MSG38,R4
 3349  013712  104000                  TTOUTT                  ;REQUEST SINGLE PASS
 3350  013714  013703  000570          MOV     SPFLG,R3
 3351  013720  104002                  OCTPP                   ;PRINT CURRENT SETTING
 3352  013722  012705  000570          MOV     #SPFLG,R5       ;SET ADDRESS OF FLAG
 3353  013726  012701  000001          MOV     #1,R1           ;SET SIZE OF RESPONSE
 3354  013732  012702  000001          MOV     #1,R2           ;SET UPPER LIMIT
 3355  013736  012703  000000          MOV     #0,R3           ;SET LOWER LIMIT
 3356  013742  004737  023300          JSR     PC,TTR          ;GO GET RESPONSE
 3357  013746  005737  014122  TINP4:  TST     SCVFL           ;SEE IF SHORT CONVERSATION
 3358  013752  001060                  BNE     TINPX           ;IF SO: BR
 3359  013754  012704  025650          MOV     #MSG40,R4
 3360  013760  104000                  TTOUTT                  ;PRINT READ STALL REQUEST
 3361  013762  013703  000572          MOV     RSTAL,R3
 3362  013766  104002                  OCTPP                   ;PRINT READ STALL
 3363  013770  012705  000572          MOV     #RSTAL,R5       ;SET READ STALL ADDRESS
 3364  013774  012701  000006          MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
 3365  014000  012702  177777          MOV     #-1,R2          ;SET MAXIMUM LIMIT
 3366  014004  012703  000001          MOV     #1,R3           ;SET MINIMUM LIMIT
 3367  014010  004737  023300          JSR     PC,TTR          ;GO GET READ STALL
 3368  014014  012704  025676          MOV     #MSG41,R4
 3369  014020  104000                  TTOUTT                  ;PRINT WRITE STALL REQUEST
 3370  014022  013703  000574          MOV     WSTAL,R3
 3371  014026  104002                  OCTPP                   ;PRINT READ STALL
 3372  014030  012705  000574          MOV     #WSTAL,R5       ;SET WRITE STALL ADDRESS
 3373  014034  012701  000006          MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
 3374  014040  012702  177777          MOV     #-1,R2          ;SET MAXIMUM LIMIT
 3375  014044  012703  000001          MOV     #1,R3           ;SET MINIMUM LIMIT
 3376  014050  004737  023300          JSR     PC,TTR          ;GO GET WRITE STALL
 3377  014054  012704  025710          MOV     #MSG42,R4
 3378  014060  104000                  TTOUTT                  ;PRINT TURN AROUND STALL REQUEST
 3379  014062  013703  000576          MOV     TSTAL,R3
 3380  014066  104002                  OCTPP                   ;PRINT TA STALL
 3381  014070  012705  000576          MOV     #TSTAL,R5       ;SET TURN AROUND STALL ADDRESS
 3382  014074  012701  000006          MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
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3383  014100  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3384  014104  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3385  014110  004737  023300                JSR     PC,TTR          ;GO GET TURN AROUND STALL
3386  014114  005037  014122        TINPX:  CLR     SCVFL           ;CLEAR SHORT CONVERSATION FLAG
3387  014120  000207                        RTS     PC              ;EXIT
3388  014122  000000                SCVFL:  0                       ;SHORT CONVERSATION FLAG
3389
3390                                        ;UNIT DESCRIPTION POSITIONING SUBROUTINE**********
3391
3392  014124  000241                TPOS:   CLC
3393  014126  006137  000644                ROL     TEMP2           ;POSITION CHARACTER
3394  014132  005303                        DEC     R3              ;SEE IF DONE
3395  014134  001373                        BNE     TPOS            ;IF NOT: BR
3396  014136  013700  000674        TPOS1:  MOV     UNP,R0          ;LOAD UNIT POINTER
3397  014142  053760  000644  000746        BIS     TEMP2,UN1(R0)   ;LOAD CHARACTER INTO UN1(R0)
3398  014150  000207                        RTS     PC              ;EXIT
3399
```

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                                        ;*********************************************************
                                        ;DATA SETUP ROUTINE:
                                        ;
                                        ;THIS ROUTINE IS USED TO GENERATE INTO THE ENTIRE
                                        ;WRITE BUFFER (4000 OCTAL CHARACTERS) THE DATA PATTERN
                                        ;SELECTED BY THE OPERATOR.  THERE ARE 15 (8) FIXED
                                        ;DATA PATTERNS AVAILABLE AND ONE SELECTION (DATA PATTERN 0)
                                        ;WHICH WILL READ ANY PATTERN PRESENTED AT THE
                                        ;HIGH SPEED PAPER TAPE READER.  THIS TAPE MUST BE PREPARED
                                        ;BY USING THE PROGRAM CALLED DTC. (MAINDEC-11-DZTUF-A-D)
                                        ;RANDOM DATA MAY ALSO BE USED VIA CONSOLE
                                        ;SWITCH EIGHT (8).
                                        ;THIS ROUTINE IS ALSO USED TO CLEAR OUT THE
                                        ;READ BUFFER (4000 OCTAL CHARACTERS) BEFORE EACH
                                        ;RECORD IS READ.
                                        ;*********************************************************

014152  005737  015122          DSUP:   TST     RDFL            ;SEE IF DID RANDOM DATA
014156  001044                  DSO:    BNE     DS1             ;++G F SO BRANCH
014160  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
014164  001406                          BEQ     DSOC            ;IF NOT: BR
014166  005737  000560                  TST     PATRN           ;SEE IF AUTO RANDOM
014172  100003                          BPL     DSOC            ;IF NOT: BR
014174  004737  015054                  JSR     PC,DATR         ;ELSE GO GENERATE RANDOM DATA
014200  000207                          RTS     PC              ;RETURN
014202  023737  000560  014360  DSOC:   CMP     PATRN,PATS      ;SEE IF NEW PATTERN
014210  001014                          BNE     DSOA            ;IF SO: BR
014212  013703  000552                  MOV     UDES,R3         ;GET UNIT DESCRIPTION
014216  042703  177767                  BIC     #177767,R3      ;MASK EVEN PARITY
014222  023703  014362                  CMP     PARS,R3         ;SEE IF SAME AS LAST TIME
014226  001404                          BEQ     DSOB            ;IF SO: BR
014230  010337  014362                  MOV     R3,PARS         ;SAVE PARITY
014234  004737  015124                  JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
014240  000207                  DSOB:   RTS     PC
014242  012703  027430          DSOA:   MOV     #WDATA,R3       ;R3 = ADDRS OF WRITE BUFFER
014246  013701  000560                  MOV     PATRN,R1        ;R1 = PATTERN SELECTOR
014252  010137  014360                  MOV     R1,PATS
014256  062701  000001                  ADD     #1,R1           ;BUMP POINTER
014262  006301                          ASL     R1              ;++G MAKE PATTERN SELECTOR EVEN
014264  004771  002770                  JSR     PC,@DATBL(R1)   ;GO GENERATE PATTERN
014270  032777  010000  164240  DS1:    BIT     #10000,@DT      ;SEE IF 7 CH
014276  001410                          BEQ     DS2A            ;IF NOT: BR
014300  012702  002002                  MOV     #2002,R2        ;SET BUFFER SIZE
014304  012701  027430                  MOV     #WDATA,R1       ;SET START OF BUFFER
014310  042721  140300          DS2:    BIC     #140300,(R1)+   ;MASK FOR 7 CH
014314  005302                          DEC     R2              ;SEE IF DONE
014316  001374                          BNE     DS2             ;IF NOT: BR
014320  004737  015124          DS2A:   JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
014324  012702  002000          DS3:    MOV     #2000,R2        ;R2=BUFFER SIZE
014330  012701  033436                  MOV     #RDATA,R1       ;R1=READ DATA START
014334  005021                  DS4:    CLR     (R1)+           ;CLEAR BUFFER
014336  005302                          DEC     R2              ;SEE IF DONE ALL
014340  001375                          BNE     DS4             ;IF NOT: BR
014342  013737  000552  014362          MOV     UDES,PARS       ;GET UNIT DESCRIPTION
014350  042737  177767  014362          BIC     #177767,PARS    ;MASK PARITY
```

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3456  014356  000207                        RTS     PC              ;EXIT
3457  014360  177777              PATS:     -1                      ;PATTERN NUMBER SAVE
3458  014362  000000              PARS:     0
3459
3460                                        ;EXTERNAL DATA INPUT FROM H/S READER (256 CHARACTER MAXIMUM)
3461
3462  014364  005737  014526      DATO:     TST     DOFL            ;++G BRANCH IF EXTERNAL INPUT
3463  014370  001401                        BEQ     1$              ;++G
3464  014372  000207                        RTS     PC              ;++G RETURN
3465  014374  012737  000001  014526  1$:   MOV     #1,DOFL         ;SET EXTERNAL FLAG
3466  014402  005077  164214              CLR     @PRB            ;CLEAR READER BUFFER
3467  014406  005077  164206              CLR     @PRS            ;CLEAR READER STATUS
3468  014412  005037  000642              CLR     TEMP1           ;CLEAR FOR USE AS CHARACTER FLAG
3469  014416  052777  000001  164174  DATOA:    BIS     #1,@PRS         ;START READER
3470  014424  105777  164170      DATOB:    TSTB    @PRS            ;++G SEE IF DONE
3471  014430  100375                        BPL     DATOB           ;++B
3472  014432  005001                        CLR     R1              ;CLEAR SAVE LOCATION
3473  014434  117701  164162              MOVB    @PRB,R1         ;SAVE CHARACTER
3474  014440  005737  000642              TST     TEMP1           ;SEE IF HAVE FOUND START CHARACTER
3475  014444  001011                        BNE     DATOC           ;IF SO : BR
3476  014446  105701                        TSTB    R1              ;SEE IF CHARACTER IS 0
3477  014450  001762                        BEQ     DATOA           ;IF SO : BR
3478  014452  012737  000001  000642       MOV     #1,TEMP1        ;ELSE SET CHARACTER FOUND FLAG
3479  014460  010137  000644              MOV     R1,TEMP2        ;SAVE DATA SIZE
3480  014464  010102                        MOV     R1,R2           ;SAVE DATA SIZE
3481  014466  000753                        BR      DATOA           ;++G GO GET FIRST DATA CHAR
3482  014470  110123              DATOC:    MOVB    R1,(R3)+        ;LOAD BUFFER
3483  014472  005302                        DEC     R2              ;SEE IF READ ALL
3484  014474  001350                        BNE     DATOA           ;IF NOT : BR
3485  014476  012701  027430      DATOD:    MOV     #WDATA,R1       ;R1 = START OF WRITE BUFFER
3486  014502  013702  000644              MOV     TEMP2,R2        ;R2 = SIZE OF DATA FIELD
3487  014506  112123              DATOE:    MOVB    (R1)+,(R3)+     ;REPEAT LOAD OF DATA FIELD
3488  014510  022703  033436              CMP     #RDATA,R3       ;SEE IF DONE
3489  014514  003001                        BGT     DATOF           ;IF NOT: BR
3490  014516  000207                        RTS     PC              ;++G RETURN
3491  014520  005302              DATOF:    DEC     R2              ;SEE IF AT END OF DATA FIELD
3492  014522  001371                        BNE     DATOE           ;IF NOT : BR
3493  014524  000764                        BR      DATOD           ;++G ELSE RESTART FILL
3494  014526  000000              DOFL:     0                       ;EXTERNAL DATA FLAG=1 IF ALREADY DONE
3495
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3496                                    ;ALL ONES**********
3497
3498  014530  012701  177777    DAT1:   MOV     #-1,R1          ;R1=DATA
3499  014534  012702  002002    DAT1A:  MOV     #2002,R2        ;R2=WORD COUNT +2
3500  014540  010123              DAT1B:  MOV     R1,(R3)+        ;LOAD BUFFER
3501  014542  005302                      DEC     R2              ;SEE IF DONE
3502  014544  001375                      BNE     DAT1B           ;IF NOT: BR
3503  014546  000207                      RTS     PC              ;++G RETURN
3504
3505                                    ;ALL ZEROS**********
3506
3507  014550  005001    DAT2:   CLR     R1              ;R1=DATA
3508  014552  000770            BR      DAT1A           ;++G LOAD BUFFER
3509
3510                                    ;WALKING ONE**********
3511
3512  014554  012701  000001    DAT3:   MOV     #1,R1           ;R1=DATA
3513  014560  000241            CLC
3514  014562  012702  004004    DAT3A:  MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3515  014566  110123              DAT3B:  MOVB    R1,(R3)+        ;LOAD BUFFER
3516  014570  106101                      ROLB    R1              ;SET NEXT CHARACTER
3517  014572  005302                      DEC     R2              ;SEE IF DONE
3518  014574  001374                      BNE     DAT3B           ;IF NOT: BR
3519  014576  000207                      RTS     PC              ;++G RETURN
3520
3521                                    ;WALKING ZERO**********
3522
3523  014600  012701  000376    DAT4:   MOV     #376,R1         ;R1=START OF DATA
3524  014604  000261            SEC
3525  014606  000765            BR      DAT3A           ;++G LOAD BUFFER
3526
3527                                    ;ALTERNATING ONE/ZERO**********
3528
3529
3530  014610  012701  052525    DAT5:   MOV     #52525,R1       ;R1=DATA
3531  014614  000747            BR      DAT1A           ;++G LOAD BUFFER
3532
3533                                    ;ALTERNATING ZERO/ONE**********
3534
3535  014616  012701  125252    DAT6:   MOV     #125252,R1      ;R1=DATA
3536  014622  000744            BR      DAT1A           ;++G LOAD BUFFER
3537
3538                                    ;ONE/ZERO IN ALTERNATING WORDS**********
3539
3540  014624  012701  125252    DAT7:   MOV     #125252,R1      ;SET WORD 1
3541  014630  012702  052525            MOV     #52525,R2       ;SET WORD 2
3542  014634  012704  001002            MOV     #1002,R4        ;SET NUMBER OF ENTRIES
3543  014640  010123              DAT7A:  MOV     R1,(R3)+        ;LOAD WORD 1
3544  014642  010223                      MOV     R2,(R3)+        ;LOAD WORD 2
3545  014644  005304                      DEC     R4              ;SEE IF DONE
3546  014646  001374                      BNE     DAT7A           ;IF NOT: BR
3547  014650  000207                      RTS     PC              ;++G RETURN
3548
```

```
3549                                            ;WALKING ONE/ALL ONE IN ALTERNATING CHARS****
3550
3551  014652  012702  002002        DAT10:    MOV     #2002,R2          ;SET BUFFER SIZE
3552  014656  012701  000001                  MOV     #1,R1             ;SET WALK BASE
3553  014662  000241                           CLC
3554  014664  012713  177400        DAT10A:   MOV     #177400,(R3)      ;LOAD ALL ONE BYTE
3555  014670  050123                           BIS     R1,(R3)+          ;LOAD WALK BYTE
3556  014672  106101                           ROLB    R1                ;WALK ONE
3557  014674  005302                           DEC     R2
3558  014676  001372                           BNE     DAT10A            ;DO FULL BUFFER
3559  014700  000207                           RTS     PC                ;++G RETURN
3560
3561                                            ;ALL BITS 0-377**********
3562
3563  014702  005001        DAT11:    CLR     R1                ;R1=STARTING DATA
3564  014704  012702  004004                  MOV     #4004,R2          ;R2=CHARACTER COUNT+4
3565  014710  110123        DAT11A:   MOVB    R1,(R3)+          ;LOAD BUFFER
3566  014712  105201                           INCB    R1                ;BUMP DATA
3567  014714  005302                           DEC     R2                ;SEE IF DONE
3568  014716  001374                           BNE     DAT11A            ;IF NOT: BR
3569  014720  000207                           RTS     PC                ;++G RETURN
3570
3571                                            ;ALL BITS 377-0**********
3572
3573  014722  012701  000377        DAT12:    MOV     #377,R1           ;R1=STARTING DATA
3574  014726  012702  004004                  MOV     #4004,R2          ;R2=CHARACTER COUNT+4
3575  014732  110123        DAT12A:   MOVB    R1,(R3)+          ;LOAD BUFFER
3576  014734  105301                           DECB    R1                ;BUMP DATA
3577  014736  005302                           DEC     R2                ;SEE IF DONE
3578  014740  001374                           BNE     DAT12A            ;IF NOT: BR
3579  014742  000207                           RTS     PC                ;++G RETURN
3580
3581                                            ;ALTERNATING CHARACTERS 0 AND 377**********
3582
3583  014744  012701  000377        DAT13:    MOV     #377,R1           ;R1 = DATA
3584  014750  000137  014534                  JMP     DAT1A             ;LOAD BUFFER
3585
3586                                            ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARS******
3587
3588  014754  012702  002002        DAT14:    MOV     #2002,R2          ;SET BUFFER SIZE
3589  014760  012701  000376                  MOV     #376,R1           ;SET WALK BASE
3590  014764  000261                           SEC
3591  014766  010113        DAT14A:   MOV     R1,(R3)           ;LOAD WALK BYTE
3592  014770  042723  177400                  BIC     #177400,(R3)+     ;CLEAR HIGH BYTE
3593  014774  106101                           ROLB    R1                ;WALK ZERO BIT
3594  014776  005302                           DEC     R2
3595  015000  001372                           BNE     DAT14A            ;FILL BUFFER
3596  015002  000207                           RTS     PC                ;++G RETURN
3597
```

```
                                        ;AUTO SEQUENCE PATTERN*********
                                        
015004  012702  000200    DAT15:  MOV     #200,R2         ;SET NUMBER OF ENTRIES
015010  012701  015034    DAT15A: MOV     #APATS,R1       ;SET START OF PATTERN
015014  012704  000010            MOV     #10,R4          ;SET SIZE OF PATTERN
015020  012123            DAT15B: MOV     (R1)+,(R3)+     ;FILL BUFFER
015022  005304                    DEC     R4              ;SEE IF DONE PATTERN
015024  001375                    BNE     DAT15B          ;IF NOT: BR
015026  005302                    DEC     R2              ;SEE IF DONE BUFER
015030  001367                    BNE     DAT15A          ;IF NOT: BR
015032  000207                    RTS     PC              ;++G RETURN
015034  000000    APATS:  0
015036  177400            177400
015040  000377            377
015042  000000            0
015044  177777            -1
015046  000377            377
015050  177400            177400
015052  177777            -1
                                        
                                        ;RANDOM DATA GENERATOR SUBROUTINE**********
                                        
015054  013704  000556    DATR:   MOV     FMCNT,R4        ;SET NUMBER OF FRAMES
015060  012703  027430            MOV     #WDATA,R3       ;SET ADDRESS OF START OF BUFFER
015064  012701  177777            MOV     #-1,R1          ;SET HIGH LIMIT
015070  005002                    CLR     R2              ;SET LOW LIMIT
015072  004737  023246    DATRO:  JSR     PC,RANG         ;GO GENERATE NUMBER
015076  013723  000626            MOV     RANSAV,(R3)+    ;LOAD BUFFER
015102  005204                    INC     R4              ;SEE IF DONE WHOLE BUFFER
015104  001372                    BNE     DATRO           ;IF NOT: BR
015106  004737  014270            JSR     PC,DS1          ;GO CHECK FOR 7 CH
015112  012737  000001  015122    MOV     #1,RDFL         ;SET RANDOM DATA FLAG
015120  000207                    RTS     PC              ;EXIT
015122  000000    RDFL:   0               ;RANDOM DATA SELECT FLAG
```

```
                                        ;*************************************************************
                                        ;CRC/LRC CHARACTER BUILD;
                                        ;
                                        ;THIS ROUTINE WILL CONSTRUCT AND SAVE THE EXPECTED
                                        ;CRC AND LRC CHARACTERS ACCORDING TO DATA AND
                                        ;RECORD SIZE IF OPERATING IN NRZ MODE
                                        ;*************************************************************

015124  013700  000556        CRCLRC: MOV     FMCNT,R0        ;SET RECORD SIZE
015130  005400                        NEG     R0
015132  012701  027430                MOV     #WDATA,R1       ;SET START OF BUFFER
015136  005037  015506                CLR     XORS
015142  111104                CLO:    MOVB    (R1),R4         ;GET CHARACTER
015144  004737  015334                JSR     PC,CLP          ;GO GET PARITY OF CHARACTER
015150  004737  015462                JSR     PC,XOR          ;XOR CHARACTER
015154  000241                        CLC
015156  006004                        ROR     R4              ;ROTATE 1 RIGHT
015160  103014                        BCC     CL2             ;IF NO CARRY: BR
015162  052704  000400                BIS     #400,R4         ;SET BIT NINE
015166  000241                        CLC
015170  010405                CL1:    MOV     R4,R5           ;SAVE CHARACTER
015172  042705  177703                BIC     #177703,R5
015176  005105                        COM     R5
015200  042705  177703                BIC     #177703,R5
015204  042704  000074                BIC     #74,R4
015210  050504                        BIS     R5,R4           ;COMPLIMENT BITS 2,3,4,5
015212  010437  015506        CL2:    MOV     R4,XORS
015216  005300                        DEC     R0
015220  001401                        BEQ     CLLAST          ;IF LAST CHARACTER: BR
015222  000747                        BR      CLO             ;++G GET NEXT
015224  013704  015506        CLLAST: MOV     XORS,R4
015230  005137  015506                COM     XORS
015234  042737  177050  015506        BIC     #177050,XORS
015242  042704  177727                BIC     #177727,R4      ;COMPLIMENT ALL BUT BITS 3&5
015246  050437  015506                BIS     R4,XORS
015252  013737  015506  015510        MOV     XORS,EXCRC      ;SAVE EXPECTED CRC
015260  013700  000556                MOV     FMCNT,R0
015264  005400                        NEG     R0
015266  012701  027430                MOV     #WDATA,R1       ;DO EXPT LRC
015272  005037  015506                CLR     XORS
015276  111104                CL3:    MOVB    (R1),R4
015300  004737  015334                JSR     PC,CLP          ;GET PARITY
015304  004737  015462                JSR     PC,XOR          ;XOR CHARACTER
015310  005300                        DEC     R0
015312  001371                        BNE     CL3             ;DO ALL FOR LRC
015314  013704  015510                MOV     EXCRC,R4
015320  004737  015462                JSR     PC,XOR          ;XOR CRC TO DATA
015324  013737  015506  015512        MOV     XORS,EXLRC      ;SAVE EXPT LRC
015332  000207                        RTS     PC              ;RETURN
015334  005704                CLP:    TST     R4              ;SEE IF 0 CHAR
015336  001010                        BNE     CLPE            ;IF NOT: BR
015340  032737  000010  000552        BIT     #10,UDES        ;SEE IF EVEN PARITY
015346  001404                        BEQ     CLPE            ;IF NOT: BR
015350  012704  000420                MOV     #420,R4         ;SET 0 CHAR EVEN PARITY
015354  005201                        INC     R1              ;BUMP POINTER
```

```
3688  015356  000207                        RTS     PC              ;RETURN
3689  015360  005037  015514          CLPE: CLR     PARCNT          ;CLEAR BIT COUNTER
3690  015364  012703  000010                MOV     #10,R3          ;SET NUMBER OF BITS
3691  015370  032704  000001          CLP0: BIT     #1,R4           ;SEE IF ONE BIT
3692  015374  001402                        BEQ     CLP1            ;IF NOT: BR
3693  015376  005237  015514                INC     PARCNT          ;BUMP COUNTER
3694  015402  000241                  CLP1: CLC
3695  015404  006004                        ROR     R4              ;ROTATE TO NEXT BIT
3696  015406  005303                        DEC     R3
3697  015410  001367                        BNE     CLP0            ;CONTINUE FOR ALL BITS
3698  015412  112104                        MOVB    (R1)+,R4
3699  015414  042704  177400                BIC     #177400,R4
3700  015420  032737  000001  015514        BIT     #1,PARCNT       ;SEE IF ODD NUMBER OF ONE BITS
3701  015426  001005                        BNE     CLP2            ;IF SO: BR
3702  015430  032737  000010  000552        BIT     #10,UDES        ;SEE IF SHOULD BE EVEN PARITY
3703  015436  001406                        BEQ     CLP3            ;IF NOT: BR
3704  015440  000207                        RTS     PC              ;ELSE EXIT
3705  015442  032737  000010  000552  CLP2: BIT     #10,UDES        ;SEE IF SHOULD BE ODD PARITY
3706  015450  001001                        BNE     CLP3            ;IF NOT: BR
3707  015452  000207                        RTS     PC              ;ELSE EXIT
3708  015454  052704  000400          CLP3: BIS     #400,R4         ;SET PARITY BIT
3709  015460  000207                        RTS     PC
3710  015462  010446                  XOR:  MOV     R4,-(SP)
3711  015464  043716  015506                BIC     XORS,(SP)
3712  015470  040437  015506                BIC     R4,XORS         ;XOR SUBROUTINE: R4 WITH XORS
3713  015474  052637  015506                BIS     (SP)+,XORS
3714  015500  013704  015506                MOV     XORS,R4
3715  015504  000207                        RTS     PC
3716
3717  015506  000000                  XORS: 0                       ;XOR SAVE
3718  015510  000000                  EXCRC: 0                      ;EXPECTED CRC
3719  015512  000000                  EXLRC: 0                      ;EXPECTED LRC
3720  015514  000000                  PARCNT: 0                     ;PARITY COUNTER
3721
```

```
                                                ;*****************************************************
                                                ;DATA CHECK SUBROUTINE:
                                                ;
                                                ;THIS SUBROUTINE IS USED TO COMPARE EACH CHARACTER
                                                ;OF DATA READ FROM TAPE WITH THE EXPECTED CHARACTER.
                                                ;ANY ERROR DETECTED WILL CAUSE CONTROL TO BE
                                                ;PASSED TO AN ERROR PRINT SUBROUTINE AND A
                                                ;SUBROUTINE TO ACCUMULATE THE NUMBER OF BITS
                                                ;DROPPED AND PICKED UP FROM EACH CHARACTER.
                                                ;THE NUMBER OF READ ERRORS IS ALSO ACCUMULATED.
                                                ;DATA CHECKING MAY BE TERMINATED BY USE OF
                                                ;CONSOLE SWITCH THIRTEEN (13).
                                                ;*****************************************************

015516  005037  000656          DCHK:   CLR     BBC             ;CLEAR BAD RECORD CNTR
015522  005037  000704                  CLR     DERFL           ;CLEAR DATA ERROR FLAG
015526  013705  000556                  MOV     FMCNT,R5        ;LOAD CHAR COUNT
015532  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
015540  001402                          BEQ     DCHK0           ;IF NOT: BR
015542  000261                          SEC
015544  006005                          ROR     R5              ;R5 = FC/2
015546  012701  027430          DCHK0:  MOV     #WDATA,R1       ;SET WRITE DATA ADDR
015552  012702  033436                  MOV     #RDATA,R2       ;SET READ DATA ADDR
015556  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
015564  001430                          BEQ     DFOC0           ;IF NOT: BR
015566  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP PARITY
015574  001024                          BNE     DFOC0           ;IF SO: BR
015576  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE MODE
015604  001020                          BNE     DFOC0           ;IF SO: BR
015606  105711                  DFOF:   TSTB    (R1)            ;SEE IF 0 CHAR
015610  001404                          BEQ     DFOD            ;IF SO: BR
015612  005201                          INC     R1              ;BUMP POINTER
015614  005205                  DFOE:   INC     R5              ;SEE IF DONE
015616  001373                          BNE     DFOF            ;IF NOT: BR
015620  000406                          BR      DFOC            ;ELSE CONTINUE
015622  112721  000020          DFOD:   MOVB    #20,(R1)+       ;SET 20 IN PLACE OF 0
015626  012737  177777  014360          MOV     #-1,PATS        ;SET PATTERN GENERATE FLAG
015634  000767                          BR      DFOE
015636  013705  000556          DFOC:   MOV     FMCNT,R5        ;RESET CHAR CNT
015642  012701  027430                  MOV     #WDATA,R1       ;RESET DATA ADDRESS
015646  032737  010000  000562  DFOC0:  BIT     #10000,RDCMD    ;SEE IF READ REVERSE
015654  001462                          BEQ     DFO             ;IF NOT: BR
015656  013704  000556          DFOB:   MOV     FMCNT,R4        ;GET FRAME COUNT
015662  005404                          NEG     R4              ;SET TO WHOLE NUMBER
015664  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
015672  001402                          BEQ     DFOB0           ;IF NOT: BR
015674  000241                          CLC
015676  006004                          ROR     R4              ;SET TO FC/2
015700  060401                  DFOB0:  ADD     R4,R1           ;POINT TO START OF WRITE DATA
015702  060402                          ADD     R4,R2           ;POINT TO START OF READ DATA
015704  032737  000001  000556          BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
015712  001401                          BEQ     DFOA            ;IF NOT: BR
015714  105722                          TSTB    (R2)+           ;BUMP POINTER
015716  032737  000020  000552  DFOA:   BIT     #20,UDES        ;SEE IF CORE DUMP
015724  001431                          BEQ     DFOA4           ;IF NOT: BR
```

```
015726  000241                              CLC
015730  132742  000001                      BITB    #1,-(R2)        ;SEE IF BIT 0 = 1
015734  001401                              BEQ     DF0A0           ;IF NOT: BR
015736  000261                              SEC
015740  106012                      DF0A0:  RORB    (R2)
015742  000241                              CLC
015744  132712  000001                      BITB    #1,(R2)
015750  001401                              BEQ     DF0A1
015752  000261                              SEC
015754  106012                      DF0A1:  RORB    (R2)            ;POSITION BITS FOR REVERSE CORE DUMP
015756  000241                              CLC
015760  132712  000001                      BITB    #1,(R2)
015764  001401                              BEQ     DF0A2
015766  000261                              SEC
015770  106012                      DF0A2:  RORB    (R2)
015772  000241                              CLC
015774  132712  000001                      BITB    #1,(R2)
016000  001401                              BEQ     DF0A3
016002  000261                              SEC
016004  106012                      DF0A3:  RORB    (R2)
016006  005202                              INC     R2              ;RESET POINTER
016010  124142                      DF0A4:  CMPB    -(R1),-(R2)     ;TEST DATA CHARACTER
016012  001010                              BNE     DF1             ;IF NOT GOOD: BR
016014  105037  000656                      CLRB    BBC             ;CLEAR BAD RECORD COUNTER
016020  000411                              BR      DF2
016022  122122                      DF0:    CMPB    (R1)+,(R2)+     ;CHECK DATA
016024  001003                              BNE     DF1             ;IF BAD: BR
016026  105037  000656                      CLRB    BBC             ;CLEAR BAD RECORD CNTR
016032  000404                              BR      DF2
016034  004737  016640              DF1:    JSR     PC,DRPKF        ;GO GET DROPS AND PICKS
016040  004737  016132                      JSR     PC,DERR         ;GO DO PRINT
016044  005205                      DF2:    INC     R5              ;BUMP CHAR CNTR
016046  001405                              BEQ     DF3             ;IF DONE ALL: BR
016050  032737  010000  000562              BIT     #10000,RDCMD    ;SEE IF READ REVERSE
016056  001761                              BEQ     DF0             ;IF NOT: BR
016060  000716                              BR      DF0A            ;ELSE CONTINUE READ REV
016062  005037  000664              DF3:    CLR     HDRFL           ;CLEAR HEADER FLAG
016066  005737  000704                      TST     DERFL           ;SEE IF HAD DATA ERROR
016072  001416                              BEQ     DFX             ;IF NOT: BR
016074  005737  000706                      TST     SERFL
016100  001013                              BNE     DFX             ;IF NOT DATA ERROR ONLY: BR
016102  013704  000674                      MOV     UNP,R4
016106  032737  010000  000562              BIT     #10000,RDCMD    ;SEE IF READ REVERSE
016114  001003                              BNE     DF4             ;IF SO: BR
016116  005264  001130                      INC     DATER1(R4)      ;BUMP DATA ERROR FORWARD COUNTER
016122  000402                              BR      DFX
016124  005264  001170              DF4:    INC     DEREV1(R4)      ;BUMP REVERSE DATA ERROR
016130  000207                      DFX:    RTS     PC              ;EXIT
```

```
3827
3828                    ;*********************************************************
3829                    ;DATA ERROR SUBROUTINE:
3830                    ;
3831                    ;THIS SUBROUTINE IS USED TO PRINT OUT ANY
3832                    ;ERRORS FOUND DURING THE DATA CHECK.
3833                    ;EACH CHARACTER FOUND BAD WILL BE PRINTED
3834                    ;IN BIT FORMAT ALONG WITH ITS EXPECTED CHARACTER.
3835                    ;AN ERROR HEADER CONSISTING OF THE UNIT NUMBER,
3836                    ;BLOCK NUMBER, RECORD NUMBER, SIZE OF RECORD, AND
3837                    ;ERROR TYPE (READ FORWARD, READ REVERSE, WRITE, ETC)
3838                    ;IS PRINTED ONLY ONCE FOR EACH RECORD FOUND BAD.
3839                    ;A COUNT IS MADE OF THE NUMBER OF SUCCESSIVE BAD
3840                    ;CHARACTERS, AND IF TEN (10) SUCCESSIVE BAD CHARACTERS
3841                    ;ARE FOUND IN A SINGLE RECORD, A MESSAGE INDICATING
3842                    ;A BAD RECORD CONDITION IS PRINTED AND THE NEXT
3843                    ;TWENTY (20) CHARACTERS ARE SKIPPED BEFORE CHECKING
3844                    ;IS RESUMED.  IF THE BAD RECORD CONDITION IS FOUND
3845                    ;THREE TIMES IN A RECORD, ALL REMAINING DATA IS
3846                    ;SKIPPED EXCEPT THE FINAL TEN (10) CHARACTERS.
3847                    ;THIS SKIPPING IS OF COURSE ONLY POSSIBLE IN
3848                    ;RECORDS WHICH CONTAIN A SUFFICIENT NUMBER OF CHARACTERS.
3849                    ;PRINTING OF ERRORS MAY BE DISALLOWED AT ANY TIME
3850                    ;BY SETTING CONSOLE SWITCH TEN (10) TO A ONE.
3851                    ;THE OPERATOR MAY CAUSE THE PROGRAM TO HALT ON ANY ERROR
3852                    ;BY SETTING CONSOLE SWITCH FIFTEEN (15) TO A ONE.
3853                    ;*********************************************************
3854
3855  016132  032777  002000  162446  DERR:   BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
3856  016140  001067                   BNE     DERR4           ;++G BRANCH IF NOT
3857  016142  005237  000670          DERRO:  INC     PFLG            ;SET PRINT FLAG
3858  016146  005737  000664          TST     HDRFL           ;SEE IF HAVE PRINTED HEADER
3859  016152  001007                   BNE     DERROA          ;IF SO: BR
3860  016154  004737  022662          JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
3861  016160  012704  024662          MOV     #MSG1,R4        ;LOAD ERROR MSG ADDR
3862  016164  104000                   TTOUTT                  ;PRINT ERROR
3863  016166  004737  021130          JSR     PC,FRPRT        ;PRINT F OR R
3864  016172  012704  024701          DERROA: MOV     #MSG4,R4
3865  016176  104000                   TTOUTT                  ;PRINT CHAR NO. HEADER
3866  016200  010203                   MOV     R2,R3
3867  016202  162703  033436          SUB     #RDATA,R3       ;POINT TO CHAR
3868  016206  005303                   DEC     R3
3869  016210  032737  010000  000562  BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3870  016216  001402                   BEQ     DERROB          ;IF NOT: BR
3871  016220  010503                   MOV     R5,R3           ;GET CHAR NUMBER
3872  016222  005103                   COM     R3
3873  016224  104002          DERROB: OCTPP                   ;PRINT CHAR NUMBER
3874  016226  012704  024667          MOV     #MSG2,R4
3875  016232  104000                   TTOUTT                  ;PRINT EXPECTED DATA
3876  016234  032737  010000  000562  BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3877  016242  001402                   BEQ     DERROC          ;IF NOT: BR
3878  016244  111103                   MOVB    (R1),R3         ;GET CHAR
3879  016246  000401                   BR      DERROD
3880  016250  114103          DERROC: MOVB    -(R1),R3        ;LOAD EXPECTED DATA
3881  016252  004737  024112  DERROD: JSR     PC,DOUT         ;GO PRINT CHAR
3882  016256  012704  024674          MOV     #MSG3,R4
```

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 3883  016262  104000                        TTOUTT                  ;PRINT RECIEVED DATA
 3884  016264  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 3885  016272  001402                        BEQ     DERR1           ;IF NOT: BR
 3886  016274  111203                        MOVB    (R2),R3         ;GET CHAR
 3887  016276  000401                        BR      DERR2
 3888  016300  114203              DERR1:    MOVB    -(R2),R3
 3889  016302  004737  024112      DERR2:    JSR     PC,DOUT         ;PRINT BAD CHAR
 3890  016306  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 3891  016314  001001                        BNE     DERR4           ;++G BRANCH IF NOT
 3892  016316  122122              DERR3:    CMPB    (R1)+,(R2)+     ;RESET POINTERS
 3893  016320  105237  000656      DERR4:    INCB    BBC             ;BUMP BAD RECORD CNTR
 3894  016324  122737  000010  000656        CMPB    #10,BBC         ;SEE IF BLD BTH
 3895  016332  001120                        BNE     DEREX           ;IF NOT: BR
 3896  016334  032777  002000  162244        BIT     #2000,@SWR      ;SEE IF PRINT INHIBIT
 3897  016342  001003                        BNE     1$              ;IF SO: BR
 3898  016344  012704  025013                MOV     #MSG15,R4
 3899  016350  104000                        TTOUTT                  ;PRINT BLD BTH
 3900  016352  105037  000656      1$:       CLRB    BBC             ;RESET BAD RECORD CNTR
 3901  016356  000337  000656              SWAB    BBC             ;POSITION BLD BTH AMOUNT
 3902  016362  105237  000656              INCB    BBC             ;BUMP AMOUNT
 3903  016366  122737  000003  000656        CMPB    #3,BBC          ;SEE IF HAD 3 BLD BTHS
 3904  016374  101052                        BHI     DERR4B          ;IF NOT: BR
 3905  016376  000337  000656              SWAB    BBC             ;REPOSITION BBC
 3906  016402  022705  177767              CMP     #177767,R5      ;SEE IF ON LAST EIGHT CHARS
 3907  016406  101470                        BLOS    DERR6           ;IF SO: BR
 3908  016410  012705  177767              MOV     #177767,R5      ;SET CHAR CNTR TO 8
 3909  016414  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 3910  016422  001416                        BEQ     DERR4A          ;IF NOT: BR
 3911  016424  012701  027430              MOV     #WDATA,R1       ;GET START OF BUFFER
 3912  016430  012702  033436              MOV     #RDATA,R2       ;GET START OF BUFFER
 3913  016434  062701  000010              ADD     #10,R1
 3914  016440  062702  000010              ADD     #10,R2          ;POINT TO START +10
 3915  016444  032737  000001  000556        BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
 3916  016452  001450                        BEQ     DEREX           ;IF NOT: BR
 3917  016454  105722                        TSTB    (R2)+           ;BUMP POINTER
 3918  016456  000446                        BR      DEREX
 3919  016460  013737  000556  000642  DERR4A: MOV     FMCNT,TEMP1     ;LOAD CHAR COUNT
 3920  016466  005437  000642              NEG     TEMP1           ;++G FORM TWO'S COMPLEMENT
 3921  016472  162737  000010  000642        SUB     #10,TEMP1       ;POINT TO BUFFER -8
 3922  016500  013701  000642              MOV     TEMP1,R1        ;POINT TO NEXT CHAR
 3923  016504  062701  027430              ADD     #WDATA,R1       ;POINT TO NEXT WRITE CHAR
 3924  016510  013702  000642              MOV     TEMP1,R2        ;POINT TO END OF READ DATA -8 FORWARD
 3925  016514  062702  033436              ADD     #RDATA,R2       ;POINT TO NEXT CHAR
 3926  016520  000425                        BR      DEREX           ;EXIT
 3927  016522  000337  000656      DERR4B:   SWAB    BBC             ;REPOSITION BBC
 3928  016526  062705  000024              ADD     #24,R5          ;SKIP 20 CHARS
 3929  016532  103416                        BCS     DERR6           ;IF EXCEED RECORD SIZE: BR
 3930  016534  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 3931  016542  001405                        BEQ     DERR5           ;IF NOT: BR
 3932  016544  162701  000024              SUB     #24,R1
 3933  016550  162702  000024              SUB     #24,R2          ;RESET POINTERS
 3934  016554  000407                        BR      DEREX
 3935  016556  062701  000024      DERR5:    ADD     #24,R1          ;SKIP 20 CHARS
 3936  016562  062702  000024              ADD     #24,R2          ;SKIP FORWARD 20 CHARS
 3937  016566  000402                        BR      DEREX
 3938  016570  012705  177777      DERR6:    MOV     #-1,R5          ;SET TO EOR
```

```
 3939  016574  005777  162006          DEREX:  TST     @SWR            ;++G BRANCH IF CONTINUE ON ERROR
 3940  016600  100012                          BPL     DEREX1          ;++G
 3941  016602  104006                          STOPP
 3942  016604  005737  000670                  TST     PFLG            ;SEE IF PRINTED
 3943  016610  001006                          BNE     DEREX1          ;IF SO: BR
 3944  016612  032777  002000  161766          BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
 3945  016620  001002                          BNE     DEREX1          ;IF NOT: BR
 3946  016622  000137  016142                  JMP     DERRO           ;ELSE PRINT
 3947  016626  005037  000670          DEREX1: CLR     PFLG            ;CLEAR FLAG
 3948  016632  005237  000704                  INC     DERFL           ;BUMP DATA ERROR FLAG
 3949  016636  000207                          RTS     PC              ;RETURN
 3950
```

```
                                        ;*********************************************************
                                        ;DROPS AND PICKS SUBROUTINE:
                                        ;
                                        ;THIS SUBROUTINE IS USED TO ACCUMULATE FROM
                                        ;EACH BAD DATA CHARACTER FOUND THE NUMBER
                                        ;OF BITS WHICH WERE EITHER DROPPED OR PICKED UP.
                                        ;TWO COUNTERS PER SLAVE ARE USED TO ACCUMULATE THIS
                                        ;INFORMATION AND CAN STORE UP TO 32K DROPS
                                        ;OR PICKS BEFORE OVERFLOWING.  IF OVERFLOW IS
                                        ;ABOUT TO OCCUR, THESE ACCUMULATORS ARE
                                        ;PRINTED IN OCTAL AND RESET TO ZERO.
                                        ;THE CONTENTS OF THE ACCUMULATORS MAY BE
                                        ;DISPLAYED AT ANY TIME BY SETTING CONSOLE
                                        ;SWITCH FOURTEEN TO A ONE (1). THE PRINTOUT WILL OCCUR
                                        ;AT THE END OF THE CURRENT BLOCK CYCLE.
                                        ;*********************************************************

016640  005037  000642          DRPKF:  CLR     TEMP1
016644  005037  000644                  CLR     TEMP2
016650  005037  000646                  CLR     TEMP3
016654  111137  000642                  MOVB    (R1),TEMP1      ;LOAD GOOD CHAR
016660  111237  000644                  MOVB    (R2),TEMP2      ;LOAD BAD CHAR
016664  013704  000674                  MOV     UNP,R4
016670  016437  000770  000720          MOV     PIK1(R4),BPKP
016676  016437  001010  000716          MOV     DRP1(R4),BDPP
016704  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
016712  001005                          BNE     DRPK            ;IF SO: BR
016714  124142                          CMPB    -(R1),-(R2)     ;POINT TO CHAR
016716  112137  000642                  MOVB    (R1)+,TEMP1     ;LOAD GOOD CHAR
016722  112237  000644                  MOVB    (R2)+,TEMP2     ;LOAD BAD CHAR
016726  004737  016740          DRPK:   JSR     PC,DROP         ;GET DROPS
016732  004737  017156                  JSR     PC,PICK         ;GET PICKS
016736  000207                          RTS     PC              ;EXIT
016740  113703  000642          DROP:   MOVB    TEMP1,R3        ;R3 = GOOD CHAR
016744  113704  000644                  MOVB    TEMP2,R4        ;R4 = BAD CHAR
016750  140403                  DPC:    BICB    R4,R3           ;GET DROPS/PICKS
016752  001001                          BNE     DPCG            ;IF SOME: BR
016754  000207                          RTS     PC              ;RETURN
016756  012737  000010  000710  DPCG:   MOV     #10,BCNT        ;SET NUMBER TO CHECK
016764  132703  000001          DPC0:   BITB    #1,R3           ;SEE IF DROPPED OR PICKED THIS BIT
016770  001455                          BEQ     DPC2            ;IF NOT: BR
016772  105737  000646                  TSTB    TEMP3           ;SEE IF ON PICKS
016776  001016                          BNE     DPC1            ;IF SO: BR
017000  005277  161712                  INC     @BDPP           ;BUMP DROP CNTR
017004  005777  161706                  TST     @BDPP
017010  100045                          BPL     DPC2            ;IF NO OVERFLOW: BR
017012  032777  002000  161566          BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
017020  001402                          BEQ     DPC0A           ;IF SO: BR
017022  004737  022662                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
017026  004737  017222          DPC0A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
017032  000415                          BR      DPC2A
017034  005277  161660          DPC1:   INC     @BPKP           ;BUMP PICK CNTR
017040  005777  161654                  TST     @BPKP           ;SEE IF OVERFLOW
017044  100027                          BPL     DPC2            ;IF NOT: BR
017046  032777  002000  161532          BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
```

```
 4007  017054  001402                          BEQ     DPC1A           ;IF SO: BR
 4008  017056  004737  022662                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
 4009  017062  004737  017222          DPC1A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
 4010  017066  013704  000674          DPC2A:  MOV     UNP,R4
 4011  017072  016403  001010                  MOV     DRP1(R4),R3     ;SET DROP POINTER
 4012  017076  016404  000770                  MOV     PIK1(R4),R4     ;SET PICK POINTER
 4013  017102  012737  000010  000710          MOV     #10,BCNT        ;SET NUMBER OF BITS
 4014  017110  005023                  DPC2B:  CLR     (R3)+           ;CLEAR DROPS
 4015  017112  005024                          CLR     (R4)+           ;CLEAR PICK
 4016  017114  005337  000710                  DEC     BCNT            ;SEE IF DONE
 4017  017120  001373                          BNE     DPC2B           ;IF NOT: BR
 4018  017122  000207                          RTS     PC              ;EXIT
 4019  017124  000241                  DPC2:   CLC
 4020  017126  106003                          RORB    R3              ;GET NEXT BIT
 4021  017130  005337  000710                  DEC     BCNT            ;SEE IF DONE
 4022  017134  001407                          BEQ     DPC3
 4023  017136  062737  000002  000720          ADD     #2,BPKP
 4024  017144  062737  000002  000716          ADD     #2,BDPP
 4025  017152  000704                          BR      DPC0            ;++G CONTINUE
 4026  017154  000207                  DPC3:   RTS     PC              ;RETURN
 4027  017156  013704  000674          PICK:   MOV     UNP,R4          ;GET UNIT POINTER
 4028  017162  016437  000770  000720          MOV     PIK1(R4),BPKP   ;SET PICK POINTER
 4029  017170  016437  001010  000716          MOV     DRP1(R4),BDPP   ;SET DROP POINTER
 4030  017176  113704  000642                  MOVB    TEMP1,R4        ;R4 = GOOD CHAR
 4031  017202  113703  000644                  MOVB    TEMP2,R3        ;R3 = BAD CHAR
 4032  017206  112737  000001  000646          MOVB    #1,TEMP3        ;SET PICK FLAG
 4033  017214  004737  016750                  JSR     PC,DPC          ;GO CHECK PICKS
 4034  017220  000207                          RTS     PC              ;EXIT
 4035  017222  012704  025307          DPPRT:  MOV     #MSG26,R4
 4036  017226  104000                          TTOUTT                  ;PRINT DROP HEADER
 4037  017230  013704  000674                  MOV     UNP,R4
 4038  017234  016437  001010  000716          MOV     DRP1(R4),BDPP   ;SET DROP POINTER
 4039  017242  016437  000770  000720          MOV     PIK1(R4),BPKP   ;SET PICK POINTER
 4040  017250  062737  000016  000716          ADD     #16,BDPP
 4041  017256  062737  000016  000720          ADD     #16,BPKP
 4042  017264  012737  000010  000710          MOV     #10,BCNT        ;SET NUMBER TO PRINT
 4043  017272  017703  161420          DPPRT0: MOV     @BDPP,R3
 4044  017276  104002                          OCTPP                   ;PRINT DROPS
 4045  017300  005337  000710                  DEC     BCNT            ;SEE IF DONE
 4046  017304  001404                          BEQ     DPPRT1          ;IF NOT: BR
 4047  017306  162737  000002  000716          SUB     #2,BDPP         ;BUMP POINTER
 4048  017314  000766                          BR      DPPRT0          ;CONTINUE FOR ALL 8 BITS
 4049  017316  012737  000010  000710  DPPRT1: MOV     #10,BCNT        ;SET NUMBER TO PRINT
 4050  017324  012704  025320                  MOV     #MSG27,R4
 4051  017330  104000                          TTOUTT                  ;PRINT PICK HEADER
 4052  017332  017703  161362          DPPRT2: MOV     @BPKP,R3
 4053  017336  104002                          OCTPP                   ;PRINT PICKS
 4054  017340  005337  000710                  DEC     BCNT            ;SEE IF DONE
 4055  017344  001404                          BEQ     DPPRTX          ;IF SO: BR
 4056  017346  162737  000002  000720          SUB     #2,BPKP         ;BUMP POINTER
 4057  017354  000766                          BR      DPPRT2          ;CONTINUE FOR ALL 8 BITS
 4058  017356  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.
                                ;*********************************************************

017360  013703  000556        ERCHK:  MOV     FMCNT,R3        ;GET FRAME COUNT
017364  032703  000001                BIT     #1,R3           ;SEE IF ODD
017370  001401                        BEQ     ERO             ;IF NOT: BR
017372  005303                        DEC     R3              ;BUMP COUNT
017374  005403                ERO:    NEG     R3
017376  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
017404  001402                        BEQ     EROB            ;IF NOT: BR
017406  000241                        CLC
017410  006003                        ROR     R3              ;SET TO FC/2
017412  032737  000010  000672  EROB:  BIT     #10,MTC1        ;SEE IF WRITE OP
017420  001414                        BEQ     ER1             ;IF SO: BR
017422  032737  010000  000562        BIT     #10000,RDCMD
017430  001405                        BEQ     EROA
017432  012703  033436                MOV     #RDATA,R3
017436  162703  000002                SUB     #2,R3           ;SET POINTER
017442  000405                        BR      ER2
017444  062703  033436        EROA:   ADD     #RDATA,R3       ;BUILD EXPT READ ADDRESS
017450  000402                        BR      ER2
017452  062703  027430        ER1:    ADD     #WDATA,R3       ;BUILD EXPT WRITE ADDRESS
017456  010337  021104        ER2:    MOV     R3,CADER        ;SAVE ADDRESS
017462  012704  000007                MOV     #7,R4
017466  012701  021106                MOV     #BAER,R1
017472  005021                ER2A0:  CLR     (R1)+           ;CLEAR FLAGS
017474  005304                        DEC     R4
017476  001375                        BNE     ER2A0
017500  020377  161010                CMP     R3,@BA          ;SEE IF ADDRESS OK
017504  001402                        BEQ     ER2A1           ;IF SO: BR
017506  005237  021106                INC     BAER            ;SET BUS ADDRESS ERROR
017512  032737  000010  000672  ER2A1:  BIT     #10,MTC1        ;SEE IF WRITE OPER
017520  001006                        BNE     ER2B            ;IF NOT: BR
017522  005777  160770        ER2A:   TST     @FC             ;SEE IF FC=0
```

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4115  017526  001441                          BEQ     ER3             ;IF SO: BR
4116  017530  005237  021114                  INC     FCER            ;SET FC ERROR
4117  017534  000436                          BR      ER3             ;++G
4118  017536  032737  000040  000672  ER2B:   BIT     #40,MTC1        ;SEE IF SPACE OPER
4119  017544  001766                          BEQ     ER2A            ;IF SO: BR
4120  017546  005737  000676                  TST     TMFLG           ;SEE IF TM TIME
4121  017552  001011                          BNE     ER2D            ;IF SO: BR
4122  017554  013703  000556                  MOV     FMCNT,R3
4123  017560  005403                          NEG     R3              ;R3 = EXPT RECORD SIZE
4124  017562  020377  160730          ER2C:   CMP     R3,@FC          ;SEE IF FC = EXPT
4125  017566  001421                          BEQ     ER3             ;IF SO: BR
4126  017570  005237  021114                  INC     FCER            ;SET FC ERROR FLAG
4127  017574  000416                          BR      ER3             ;++G
4128  017576  032737  002000  000552  ER2D:   BIT     #2000,UDES      ;SEE IF PE
4129  017604  001346                          BNE     ER2A            ;IF SO: BR
4130  017606  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
4131  017614  001003                          BNE     ER2E            ;IF SO: BR
4132  017616  012703  000002                  MOV     #2,R3
4133  017622  000757                          BR      ER2C            ;LOOK FOR EXPT = 2
4134  017624  012703  000001          ER2E:   MOV     #1,R3
4135  017630  000754                          BR      ER2C            ;GO CHECK FC FOR TM
4136  017632  032777  160000  160650  ER3:    BIT     #160000,@C1     ;SEE IF COUNT ERROR
4137  017640  001441                          BEQ     ER4
4138  017642  017703  160652                  MOV     @CS,R3          ;GET CONT STATUS REG
4139  017646  042703  000307                  BIC     #307,R3         ;MASK OUT IR,OR,UNIT NO.
4140  017652  005703                          TST     R3              ;SEE IF ANY OTHER ERRORS
4141  017654  001407                          BEQ     ER3A            ;IF NOT: BR
4142  017656  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4143  017662  001426                          BEQ     ER3B            ;IF NOT: BR
4144  017664  042703  001000                  BIC     #1000,R3        ;MASK MISSED TRANS
4145  017670  005703                          TST     R3              ;SEE IF ANY OTHER ERRORS
4146  017672  001022                          BNE     ER3B            ;IF SO: BR
4147  017674  032777  060000  160606  ER3A:   BIT     #60000,@C1      ;SEE IF EITHER TRE OR MCPE
4148  017702  001420                          BEQ     ER4             ;IF NOT: BR
4149  017704  005737  000676                  TST     TMFLG           ;SEE IF TM TIME
4150  017710  001413                          BEQ     ER3B            ;IF NOT: BR
4151  017712  017703  160606                  MOV     @ER,R3          ;GET ERROR REGISTER
4152  017716  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
4153  017724  001402                          BEQ     ER3A1           ;IF NOT: BR
4154  017726  042703  000100                  BIC     #100,R3         ;MASK PAR
4155  017732  042703  001000          ER3A1:  BIC     #1000,R3        ;MASK FCE
4156  017736  001402                          BEQ     ER4             ;IF NO ERRORS EXCEPT FCE: BR
4157  017740  005237  021110          ER3B:   INC     CONER           ;SET CONT ERROR FLAG
4158  017744  032777  040000  160550  ER4:    BIT     #40000,@DS      ;SEE IF DRIVE ERROR
4159  017752  001420                          BEQ     ER6             ;IF NOT: BR
4160  017754  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4161  017760  001413                          BEQ     ER4A            ;IF NOT: BR
4162  017762  017703  160536                  MOV     @ER,R3          ;GET ER
4163  017766  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
4164  017774  001402                          BEQ     ER4A1           ;IF NOT: BR
4165  017776  042703  000100                  BIC     #100,R3         ;MASK PAR
4166  020002  042703  001000          ER4A1:  BIC     #1000,R3        ;MASK OUT FCE
4167  020006  001402                          BEQ     ER6             ;++G & BR IF NO OTHER ERR BITS ARE SET
4168  020010  005237  021112          ER4A:   INC     DRVER           ;SET DRIVER ERROR FLAG
4169  020014  032737  002000  000552  ER6:    BIT     #2000,UDES
4170  020022  001071                          BNE     ERPT            ;IF IN PE MODE: BR
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 4171  020024  032777  020000  160554          BIT     #20000,@SWR     ;SEE IF NO DATA CHECK
 4172  020032  001065                          BNE     ERPT            ;IF NOT: BR (ALLOW READ OF UNKNOWN TAPES)
 4173  020034  032737  000040  000672          BIT     #40,MTC1        ;SEE IF WRITE OR READ OP
 4174  020042  001461                          BEQ     ERPT            ;IF NOT: BR
 4175  020044  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
 4176  020050  001413                          BEQ     ER6A            ;IF NOT: BR
 4177  020052  013737  015510  021126          MOV     EXCRC,CRCSV     ;SAVE CRC
 4178  020060  013737  015512  021124          MOV     EXLRC,LRCSV     ;SAVE LRC
 4179  020066  005037  015510                  CLR     EXCRC
 4180  020072  012737  000023  015512          MOV     #23,EXLRC       ;SET CRC/LRC FOR TM
 4181  020100  032737  000060  000552  ER6A:   BIT     #60,UDES        ;SEE IF FORMAT 14
 4182  020106  001037                          BNE     ERPT            ;IF NOT: BR
 4183  020110  017703  160414                  MOV     @CC,R3          ;GET CRC CHARACTER
 4184  020114  042703  177000                  BIC     #177000,R3
 4185  020120  023703  015510                  CMP     EXCRC,R3
 4186  020124  001402                          BEQ     ER7             ;IF CRC GOOD: BR
 4187  020126  005237  021120                  INC     CRCER           ;SET ERROR FLAG
 4188  020132  017703  160376          ER7:    MOV     @MR,R3          ;GET LRC
 4189  020136  000303                          SWAB    R3
 4190  020140  005703                          TST     R3
 4191  020142  100002                          BPL     ER10
 4192  020144  052703  000400                  BIS     #400,R3
 4193  020150  042703  177000          ER10:   BIC     #177000,R3
 4194  020154  023703  015512                  CMP     EXLRC,R3
 4195  020160  001412                          BEQ     ERPT            ;IF LRC GOOD: BR
 4196  020162  010337  021122                  MOV     R3,ACTLRC       ;SAVE ACTUAL LRC
 4197  020166  005237  021116                  INC     LRCER           ;SET LRC ERROR FLAG
 4198  020172  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 4199  020200  001402                          BEQ     ERPT            ;IF NOT: BR
 4200  020202  005037  021116                  CLR     LRCER           ;ELSE CLEAR LRC ERROR
 4201  020206  012703  000006          ERPT:   MOV     #6,R3
 4202  020212  005037  000706                  CLR     SERFL           ;CLEAR ERROR FLAG
 4203  020216  005037  000722                  CLR     ERSAV
 4204  020222  012704  021106                  MOV     #BAER,R4
 4205  020226  005724                  ERPTT:  TST     (R4)+           ;SEE IF ANY ERROR
 4206  020230  001004                          BNE     ERPTG           ;IF SO: BR
 4207  020232  005303                          DEC     R3
 4208  020234  001374                          BNE     ERPTT
 4209  020236  000137  021050                  JMP     ERPX1
 4210  020242  005237  000706          ERPTG:  INC     SERFL           ;SET ERROR FLAG
 4211  020246  017737  160252  000722          MOV     @ER,ERSAV       ;SAVE ERROR REGISTER
 4212  020254  032777  002000  160324          BIT     #2000,@SWR      ;SEE IF PRINT
 4213  020262  001420                          BEQ     ERPTO           ;IF SO: BR
 4214  020264  022737  000002  000712          CMP     #2,RTYFL        ;SEE IF READ RETRY
 4215  020272  001006                          BNE     ERPTG1          ;IF NOT: BR
 4216  020274  013703  000702                  MOV     RTCNT,R3
 4217  020300  005203                          INC     R3              ;BUMP RETRY COUNT
 4218  020302  020337  000602                  CMP     R3,RETRY        ;SEE IF LAST RETRY
 4219  020306  001406                          BEQ     ERPTO           ;IF SO: BR
 4220  020310  022737  000002  021112  ERPTG1: CMP     #2,DRVER        ;SEE IF TM STATUS ERROR
 4221  020316  001402                          BEQ     ERPTO           ;IF SO: BR
 4222  020320  000137  020752                  JMP     ERPXO
 4223  020324  005237  000670          ERPTO:  INC     PFLG
 4224  020330  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
 4225  020334  013704  000652                  MOV     EMADDR,R4
 4226  020340  104000                          TTOUTT                  ;PRINT ERROR TYPE
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4227  020342  004737  021130                  JSR     PC,FRPRT        ;PRINT F OR R
4228  020346  005737  000676                  TST     TMFLG
4229  020352  001407                          BEQ     ERPT1
4230  020354  022737  026137  000652          CMP     #MSG54,EMADDR
4231  020362  001403                          BEQ     ERPT1
4232  020364  012704  026155                  MOV     #MSG56,R4       ;PRINT TM
4233  020370  104000                          TTOUTT
4234  020372  005737  021110          ERPT1:  TST     CONER
4235  020376  001414                          BEQ     ERPT2           ;IF NO CONT ERROR: BR
4236  020400  012704  025137                  MOV     #MSG23,R4
4237  020404  104000                          TTOUTT                  ;PRINT C1 TAG
4238  020406  017703  160076                  MOV     @C1,R3
4239  020412  104002                          OCTPP                   ;PRINT CONTROL 1
4240  020414  012704  025164                  MOV     #MSG23D,R4      ;PRINT CS TAG
4241  020420  104000                          TTOUTT
4242  020422  017703  160072                  MOV     @CS,R3
4243  020426  104002                          OCTPP                   ;PRINT CONT STATUS
4244  020430  005737  021112          ERPT2:  TST     DRVER
4245  020434  001414                          BEQ     ERPT3           ;IF SO DRIVE ERROR: BR
4246  020436  012704  025172                  MOV     #MSG23E,R4
4247  020442  104000                          TTOUTT                  ;PRINT DS TAG
4248  020444  017703  160052                  MOV     @DS,R3
4249  020450  104002                          OCTPP                   ;PRINT DRIVE STATUS
4250  020452  012704  025177                  MOV     #MSG23F,R4
4251  020456  104000                          TTOUTT                  ;PRINT ER TAG
4252  020460  017703  160040                  MOV     @ER,R3
4253  020464  104002                          OCTPP                   ;PRINT DRIVE ERROR
4254  020466  005737  021106          ERPT3:  TST     BAER
4255  020472  001416                          BEQ     ERPT4           ;IF NO BA ERROR: BR
4256  020474  012704  025152                  MOV     #MSG23B,R4
4257  020500  104000                          TTOUTT                  ;PRINT BA TAG
4258  020502  017703  160006                  MOV     @BA,R3
4259  020506  104002                          OCTPP                   ;PRINT BUS ADDRESS
4260  020510  012737  000255  000636          MOV     #255,TOB
4261  020516  004737  023614                  JSR     PC,TOG          ;PRINT /
4262  020522  013703  021104                  MOV     CADER,R3
4263  020526  104002                          OCTPP                   ;PRINT EXPT BUS ADDRESS
4264  020530  005737  021114          ERPT4:  TST     FCER
4265  020534  001406                          BEQ     ERPT5           ;IF NO FC ERROR: BR
4266  020536  012704  025157                  MOV     #MSG23C,R4
4267  020542  104000                          TTOUTT                  ;PRINT FC TAG
4268  020544  017703  157746                  MOV     @FC,R3
4269  020550  104002                          OCTPP                   ;PRINT FRAME COUNT
4270  020552  012704  025145          ERPT5:  MOV     #MSG23A,R4
4271  020556  104000                          TTOUTT                  ;PRINT WC TAG
4272  020560  017703  157726                  MOV     @WC,R3
4273  020564  104002                          OCTPP                   ;PRINT WORD COUNT
4274  020566  005737  021120                  TST     CRCER
4275  020572  001420                          BEQ     ERPT5A          ;IF NO CRC ERROR: BR
4276  020574  012704  026202                  MOV     #MSG58,R4
4277  020600  104000                          TTOUTT                  ;PRINT CRC TAG
4278  020602  017703  157722                  MOV     @CC,R3
4279  020606  042703  177000                  BIC     #177000,R3
4280  020612  104002                          OCTPP                   ;PRINT ACTUAL CRC
4281  020614  012737  000255  000636          MOV     #255,TOB
4282  020622  004737  023614                  JSR     PC,TOG
```

```
4283  020626  013703  015510                    MOV     EXCRC,R3
4284  020632  104002                            OCTPP                   ;PRINT EXPECTED CRC
4285  020634  005737  021116          ERPT5A:   TST     LRCER
4286  020640  001416                            BEQ     ERPT6           ;IF NO LRC ERROR: BR
4287  020642  012704  026210                    MOV     #MSG59,R4
4288  020646  104000                            TTOUTT                  ;PRINT LRC TAG
4289  020650  013703  021122                    MOV     ACTLRC,R3
4290  020654  104002                            OCTPP                   ;PRINT ACTUAL LRC
4291  020656  012737  000255  000636            MOV     #255,TOB
4292  020664  004737  023614                    JSR     PC,TOG
4293  020670  013703  015512                    MOV     EXLRC,R3
4294  020674  104002                            OCTPP                   ;PRINT EXPECTED LRC
4295  020676  005737  021112          ERPT6:    TST     DRVER
4296  020702  001422                            BEQ     ERPT7           ;IF NO DRIVE ERROR: BR
4297  020704  032737  002000  000552            BIT     #2000,UDES
4298  020712  001416                            BEQ     ERPT7           ;IF NO PE: BR
4299  020714  017704  157604                    MOV     @ER,R4
4300  020720  042704  075477                    BIC     #75477,R4       ;MASK OUT ALL BUT BITS 15,10,7,6
4301  020724  005704                            TST     R4
4302  020726  001410                            BEQ     ERPT7           ;IF NO CONDITIONALS SET: BR
4303  020730  012704  025211                    MOV     #MSG23H,R4
4304  020734  104000                            TTOUTT                  ;PRINT CC TAG
4305  020736  017703  157566                    MOV     @CC,R3
4306  020742  042703  177000                    BIC     #177000,R3      ;MASK CC
4307  020746  104002                            OCTPP                   ;PRINT CHECK CHARACTERS
4308  020750  000240          ERPT7:    NOP
4309  020752  032777  100000  157626  ERPX0:    BIT     #100000,@SWR    ;SEE IF STOP ON ERROR
4310  020760  001412                            BEQ     ERPX            ;IF NOT: BR
4311  020762  104006                            STOPP
4312  020764  005737  000670                    TST     PFLG            ;SEE IF HAVE PRINTED
4313  020770  001006                            BNE     ERPX            ;IF SO: BR
4314  020772  032777  002000  157606            BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
4315  021000  001002                            BNE     ERPX            ;IF NOT: BR
4316  021002  000137  020324                    JMP     ERPTO           ;PRINT ERROR
4317  021006  005037  000670          ERPX:     CLR     PFLG
4318  021012  012777  000011  157470            MOV     #11,@C1         ;DRIVE CLEAR
4319  021020  017704  157502                    MOV     @AS,R4
4320  021024  010477  157476                    MOV     R4,@AS          ;CLEAR AS
4321  021030  013704  000510                    MOV     C1,R4
4322  021034  005204                            INC     R4
4323  021036  152714  000100                    BISB    #100,(R4)       ;RESET TRE
4324  021042  013777  000552  157472            MOV     UDES,@C2        ;RESET TC
4325  021050  032737  000040  000672  ERPX1:    BIT     #40,MTC1
4326  021056  001411                            BEQ     ERPX2           ;IF NOT READ/WRITE OP: BR
4327  021060  005737  000676                    TST     TMFLG
4328  021064  001406                            BEQ     ERPX2           ;IF NOT TM TIME: BR
4329  021066  013737  021126  015510            MOV     CRCSV,EXCRC     ;RESTORE CRC
4330  021074  013737  021124  015512            MOV     LRCSV,EXLRC     ;RESTORE LRC
4331  021102  000207          ERPX2:    RTS     PC                      ;EXIT
4332  021104  000000          CADER:    0                               ;EXPT ADDRESS SAVE
4333  021106  000000          BAER:     0
4334  021110  000000          CONER:    0
4335  021112  000000          DRVER:    0
4336  021114  000000          FCER:     0
4337  021116  000000          LRCER:    0
4338  021120  000000          CRCER:    0
```

```
 4339  021122  000000                    ACTLRC: 0
 4340  021124  000000                    LRCSV:  0
 4341  021126  000000                    CRCSV:  0
 4342
 4343                                    ;*********************************************************
 4344                                    ;F FOR FORWARD/R FOR REVERSE PRINT SUBROUTINE:
 4345                                    ;
 4346                                    ;THIS SUBROUTINE IS USED TO PRINT OUT THE
 4347                                    ;TAPE DIRECTION USED WHEN ANY ERROR IS
 4348                                    ;DETECTED IN STATUS OF READ OR WRITE, DATA, OR
 4349                                    ;SPACING OPERATIONS.
 4350                                    ;*********************************************************
 4351
 4352  021130  032737  000010  000672    FRPRT:  BIT     #10,MTC1        ;SEE IF WRITE COMMAND
 4353  021136  001413                            BEQ     FREX            ;IF SO: BR
 4354  021140  032737  000002  000672            BIT     #2,MTC1         ;SEE IF REVERSE
 4355  021146  001404                            BEQ     FRO             ;IF NOT: BR
 4356  021150  012704  025047                    MOV     #MSG17,R4
 4357  021154  104000                            TTOUTT                  ;PRINT R
 4358  021156  000403                            BR      FREX
 4359  021160  012704  025044            FRO:    MOV     #MSG16,R4
 4360  021164  104000                            TTOUTT                  ;PRINT F
 4361  021166  000207                    FREX:   RTS     PC              ;EXIT
 4362
```

```
                                        ;*****************************************************
                                        ;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.
                                        ;*****************************************************

021170  005037  000642          TAPG:   CLR     TEMP1
021174  013777  000550  157316          MOV     DVN,@CS         ;SET DRIVE NO.
021202  032777  010000  157312  TAPG0:  BIT     #10000,@DS      ;SEE IF HAVE MOL
021210  001026                          BNE     TAPG3           ;IF SO: BR
021212  005237  000642                  INC     TEMP1           ;SEE IF TIMED OUT
021216  001371                          BNE     TAPG0           ;WAIT FOR READY
021220  004737  022662                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
021224  032737  000010  000672          BIT     #10,MTC1        ;SEE IF WRITE OP
021232  001004                          BNE     TAPG1           ;IF NOT: BR
021234  012704  024706                  MOV     #MSG5,R4
021240  104000                          TTOUTT                  ;PRINT WRITE ERR
021242  000405                          BR      TAPG2
021244  012704  024713          TAPG1:  MOV     #MSG6,R4
021250  104000                          TTOUTT                  ;PRINT READ ERR
021252  004737  021130                  JSR     PC,FRPRT        ;PRINT F OR R
021256  012704  025267          TAPG2:  MOV     #MSG25,R4
021262  104000                          TTOUTT                  ;PRINT NO MOL ERR
021264  104006                          STOPP
021266  032777  020000  157226  TAPG3:  BIT     #20000,@DS      ;SEE IF PIP RESET
021274  001411                          BEQ     TAPG3F          ;IF SO: BR
021276  004737  022662                  JSR     PC,PAPRT        ;PRINT HEADER
021302  012704  027267                  MOV     #MSG116,R4
021306  104000                          TTOUTT                  ;PRINT REWINDING MESSAGE
021310  032777  020000  157204  1$:     BIT     #20000,@DS
021316  001374                          BNE     1$              ;AWAIT PIP RESET
021320  022737  000026  000672  TAPG3F: CMP     #26,MTC1        ;SEE IF WRITE TM
021326  001003                          BNE     TAPG3A          ;IF NOT: BR
```

```
 4419  021330  012704  177777                    MOV     #-1,R4          ;ELSE SET FC FOR -1
 4420  021334  000406                            BR      TAPG3B
 4421  021336  013704  000556          TAPG3A:   MOV     FMCNT,R4
 4422  021342  032704  000001                    BIT     #1,R4
 4423  021346  001401                            BEQ     TAPG3B
 4424  021350  005304                            DEC     R4
 4425  021352  000261          TAPG3B:   SEC
 4426  021354  006004                            ROR     R4              ;SET WC = FC/2 FOR NORMAL FORMAT
 4427  021356  032737  000020  000552            BIT     #20,UDES        ;SEE IF CORE DUMP FORMAT
 4428  021364  001402                            BEQ     TAPG3C          ;IF NOT: BR
 4429  021366  000261                            SEC
 4430  021370  006004                            ROR     R4              ;SET WC = FC/4 FOR CORE DUMP
 4431  021372  010477  157114          TAPG3C:   MOV     R4,@WC          ;SET WORD COUNT
 4432  021376  012777  000011  157104            MOV     #11,@C1         ;DRIVE CLEAR
 4433  021404  017777  157106  157104            MOV     @FC,@FC         ;RESET FC LOADED
 4434  021412  005737  000566                    TST     INTRF           ;SEE IF INTERCHANGE READ
 4435  021416  001407                            BEQ     TAPG3D          ;IF NOT: BR
 4436  021420  032737  000040  000672            BIT     #40,MTC1        ;SEE IF READ OP
 4437  021426  001403                            BEQ     TAPG3D          ;IF NOT: BR
 4438  021430  012777  000003  157076            MOV     #3,@MR          ;SET INTERCHANGE READ MAINT. MODE
 4439  021436  013704  000672          TAPG3D:   MOV     MTC1,R4         ;GET COMMAND
 4440  021442  042704  177707                    BIC     #177707,R4      ;MASK OP CODE
 4441  021446  022704  000030                    CMP     #30,R4          ;SEE IF SPACE OP CODE
 4442  021452  001403                            BEQ     TAPG3E          ;IF SO: BR
 4443  021454  012737  177740  000666            MOV     #-40,STAL       ;SET INTERRUPT DELAY MULT TO 40
 4444  021462  052737  000101  000672  TAPG3E:   BIS     #101,MTC1       ;SET INTERRUPT ENABLE AND GO
 4445  021470  000240                            NOP
 4446  021472  013777  000672  157010            MOV     MTC1,@C1        ;EXECUTE COMMAND
 4447  021500  005077  157100                    CLR     @PSW            ;CLEAR PRIORITY
 4448  021504  005037  000642                    CLR     TEMP1
 4449  021510  005237  000642          TAPG4:    INC     TEMP1           ;SEE IF HAVE TIMED OUT
 4450  021514  001375                            BNE     TAPG4           ;IF NOT: BR
 4451  021516  005237  000666                    INC     STAL
 4452  021522  001372                            BNE     TAPG4           ;DO TIME DELAY MULTIPLIER
 4453  021524  012777  000340  157052  TAPG5:    MOV     #340,@PSW       ;RESET PRIORITY
 4454  021532  032777  002000  157046            BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
 4455  021540  001012                            BNE     TAPG6           ;IF NOT: BR
 4456  021542  004737  022662                    JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
 4457  021546  013704  000652                    MOV     EMADDR,R4
 4458  021552  104000                            TTOUTT                  ;PRINT ERROR OP
 4459  021554  004737  021130                    JSR     PC,FRPRT        ;PRINT F OR R
 4460  021560  012704  025247                    MOV     #MSG24,R4
 4461  021564  104000                            TTOUTT                  ;PRINT NO INTERRUPT
 4462  021566  005777  157014          TAPG6:    TST     @SWR            ;++G BRANCH IF CONTINUE ON ERROR
 4463  021572  100001                            BPL     TAPG7
 4464  021574  104006                            STOPP
 4465  021576  000137  021670          TAPG7:    JMP     MTINTA          ;RETURN TO CALLING ROUTINE
 4466
```

```
 4467
 4468                                          ;TTY INTERRUPT HANDLER**********
 4469
 4470  021602  012777  000340  156774  TTINT:  MOV     #340,@PSW       ;RESET PSW
 4471  021610  017746  156776                  MOV     @TKB,-(SP)      ;++G GET CHARACTER
 4472  021614  042716  000200                  BIC     #200,(SP)       ;++G STRIP PARITY BIT
 4473  021620  122716  000003                  CMPB    #3,(SP)         ;++G SEE IF CONT C
 4474  021624  001412                          BEQ     TTINTO          ;IF SO: BR
 4475  021626  122716  000007                  CMPB    #7,(SP)         ;++G CHECK FOR CNTL G
 4476  021632  001013                          BNE     RETURN
 4477  021634  022737  000176  000606          CMP     #SWREG,SWR      ;IS SOFTWARE SWITCH REGISTER USED
 4478  021642  001007                          BNE     RETURN          ;NO, GET OUT
 4479  021644  004737  024376                  JSR     PC,CNTG         ;GO CHANGE SWREG
 4480  021650  000404                          BR      RETURN          ;+;G GO TO EXIT
 4481
 4482  021652  010046          TTINTO: MOV     R0,-(SP)        ;++G SAVE R0(REC CNTR)
 4483  021654  004737  013746                  JSR     PC,TINP4        ;GO GET STALL VALUES
 4484  021660  012600                          MOV     (SP)+,R0        ;++G RESTORE R0(REC CNTR)
 4485  021662  005726          RETURN: TST     (SP)+           ;++G POP CHAR OFF STACK
 4486  021664  000002                  RTI                     ;RETURN
 4487
 4488                                          ;MAG TAPE INTERRUPT HANDLER**********
 4489
 4490  021666  000240          MTINT:  NOP
 4491  021670  042777  000037  156636  MTINTA: BIC     #37,@MR         ;CLEAR MAINT MODE
 4492  021676  013716  000662                  MOV     RTRN,(SP)       ;++G GET RETURN ADDRESS
 4493  021702  000002                  RTI                     ;++G RETURN
```

```
 4494                                   ;************************************
 4495                                   ;AUTO SEQUENCE
 4496                                   ;
 4497                                   ;THIS ROUTINE ,ENTERED VIA STARTING ADDRESS 240
 4498                                   ;WILL EXERCISE ALL AVAILABLE SLAVES ON ALL AVAILABLE
 4499                                   ;DRIVES IN BOTH PE AND NRZ ACCORDING TO THE PRESELECTED
 4500                                   ;TEST PLAN. IF NRZ ONLY, PE TESTING WILL NOT BE ATTEMPTED.
 4501                                   ;************************************
 4502
 4503  021704  012704  027077  ASEQ:   MOV     #MSG108,R4
 4504  021710  104000                  TTOUTT                  ;PRINT NRZ ONLY REQUEST
 4505  021712  012705  000650          MOV     #NRZOF,R5       ;SET ADDRESS OF FLAG
 4506  021716  012701  000001          MOV     #1,R1           ;SET SIZE OF ENTRY
 4507  021722  012702  000001          MOV     #1,R2           ;SET UPPER LIMIT
 4508  021726  012703  000000          MOV     #0,R3           ;SET LOWER LIMIT
 4509  021732  004737  023300          JSR     PC,TTR          ;GO GET RESPONSE
 4510  021736  012704  026674          MOV     #MSG104,R4
 4511  021742  104000                  TTOUTT                  ;REQUEST CONT OR NOT
 4512  021744  012705  000742          MOV     #ASEQCF,R5      ;SET ADDRESS OF ENTRY
 4513  021750  012701  000001          MOV     #1,R1           ;SET SIZE OF ENTRY
 4514  021754  012702  000001          MOV     #1,R2           ;SET UPPER LIMIT
 4515  021760  012703  000000          MOV     #0,R3           ;SET LOWER LIMIT
 4516  021764  004737  023300          JSR     PC,TTR          ;GO GET INPUT
 4517  021770  005037  000736  ASEQ0:  CLR     ADRVN           ;CLEAR DRV NUM
 4518  021774  004737  022106  ASEQ1:  JSR     PC,HRDS         ;GO SELECT HARDWARE CONFIGURATION
 4519  022000  012704  026640          MOV     #MSG101,R4
 4520  022004  104000                  TTOUTT                  ;PRINT DIVIDER
 4521  022006  012704  026654          MOV     #MSG102,R4
 4522  022012  104000                  TTOUTT                  ;PRINT TM02 NUMBER
 4523  022014  013703  000736          MOV     ADRVN,R3
 4524  022020  104002                  OCTPP                   ;PRINT TM02
 4525  022022  012704  026663          MOV     #MSG103,R4
 4526  022026  104000                  TTOUTT                  ;PRINT SLAVE HDR
 4527  022030  012700  000746          MOV     #UN1,R0         ;POINT TO START OF SLAVE TABLE
 4528  022034  005710          ASEQ2:  TST     (R0)            ;SEE IF END
 4529  022036  100403                  BMI     ASEQ3           ;IF SO: BR
 4530  022040  012003                  MOV     (R0)+,R3
 4531  022042  104002                  OCTPP                   ;PRINT SLAVE TABLE
 4532  022044  000773                  BR      ASEQ2           ;DO ALL
 4533  022046  004737  022312  ASEQ3:  JSR     PC,AMOD1        ;GO DO MODE 1(NRZ)
 4534  022052  004737  022506          JSR     PC,AMOD2        ;GO DO MODE 2(PE)
 4535  022056  022737  000007  000736  ASEQ4:  CMP     #7,ADRVN        ;SEE IF DONE ALL DRIVES
 4536  022064  001403                  BEQ     ASEQX           ;IF SO: BR
 4537  022066  005237  000736          INC     ADRVN           ;BUMP DRIVE NUMBER
 4538  022072  000740                  BR      ASEQ1           ;CONTINUE
 4539  022074  005737  000742  ASEQX:  TST     ASEQCF          ;BRANCH IF CONTINUOUS AUTO SEQ
 4540  022100  001733                  BEQ     ASEQ0           ;++G CONTINUE TESTING
 4541  022102  000137  005054          JMP     TEND            ;++G GO TO END OF PASS
```

```
4542
4543                                    ;SUBROUTINE TO SELECT AUTO SEQUENCE HARDWARE********
4544
4545  022106  005037  005130        HRDS:   CLR     REOTC           ;CLEAR EOT UNIT CNTR
4546  022112  005037  000642                CLR     TEMP1
4547  022116  012777  000040  156374        MOV     #40,@CS         ;INIT
4548  022124  013777  000736  156366        MOV     ADRVN,@CS       ;SET DRIVE
4549  022132  017701  156400                MOV     @DT,R1          ;READ DRIVE TYPE
4550  022136  032777  010000  156354        BIT     #10000,@CS      ;TEST FOR NON-EXISTANT DRIVE
4551  022144  001403                        BEQ     HRDS1           ;IF DRIVE AVAIL: BR
4552  022146  005726                HRDS0:  TST     (SP)+           ;RESET STACK POINTER
4553  022150  000137  022056                JMP     ASEQ4           ;GO SEE IF TRIED ALL DRIVES
4554  022154  042701  002007        HRDS1:  BIC     #2007,R1        ;MASK SLAVE TYPE
4555  022160  022701  140010                CMP     #140010,R1      ;++G SEE IF TU16/TE16 TAPE
4556  022164  001370                        BNE     HRDS0           ;IF NOT: BR
4557  022166  005000                        CLR     R0
4558  022170  012701  000746                MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4559  022174  005737  003040                TST     CHNFLG          ;++G BRANCH IF NOT IN CHAIN MODE
4560  022200  001410                        BEQ     HRDS2
4561  022202  122737  000006  000041        CMPB    #6,@#41         ;++G BRANCH IF NOT LOADED VIA TMDP
4562  022210  001004                        BNE     HRDS2
4563  022212  005737  000736                TST     ADRVN           ;++G BRANCH IF NOT DRIVE 0
4564  022216  001001                        BNE     HRDS2           ;++G
4565  022220  005200                        INC     R0              ;++G DO NOT TEST DRIVE 0 SLAVE 0
4566                                                                ;++G IF TMDP CHAIN
4567  022222  010077  156314        HRDS2:  MOV     R0,@C2          ;SELECT SLAVE
4568  022226  032777  010000  156266        BIT     #10000,@DS      ;SEE IF SLAVE AVAIL FOR TEST(MOL)
4569  022234  001403                        BEQ     HRDS3           ;IF NOT: BR
4570  022236  005237  000642                INC     TEMP1           ;SET SLAVE FOUND FLAG
4571  022242  010021                        MOV     R0,(R1)+        ;LOAD SLAVE TABLE
4572  022244  022700  000007        HRDS3:  CMP     #7,R0           ;SEE IF DONE ALL SLAVES
4573  022250  001402                        BEQ     HRDS4           ;IF SO: BR
4574  022252  005200                        INC     R0              ;ELSE BUMP SLAVE NUMBER
4575  022254  000762                        BR      HRDS2           ;CONTINUE SELECTION
4576  022256  005737  000642        HRDS4:  TST     TEMP1           ;SEE IF FOUND ANY SLAVES
4577  022262  001731                        BEQ     HRDS0           ;IF NOT: BR
4578  022264  013737  000642  005130        MOV     TEMP1,REOTC     ;SET NUMBER OF UNITS
4579  022272  000337  000642                SWAB    TEMP1
4580  022276  053737  000642  005130        BIS     TEMP1,REOTC     ;SET EOT CNTR
4581  022304  012711  177777                MOV     #-1,(R1)        ;TERMINATE SLAVE TABLE
4582  022310  000207                        RTS     PC              ;RETURN TO SEQ
```

```
 4583
 4584                                   ;SUBROUTINE TO SELECT NRZ AUTO TEST MODE***********
 4585
 4586  022312  005037  000654          AMOD1:  CLR     BLCNTR          ;ASSURE BLOCK COUNTER IS 0
 4587  022316  012701  000746                  MOV     #UN1,R1         ;GET START OF SLAVE TABLE
 4588  022322  052721  001700          AMOD1A: BIS     #1700,(R1)+     ;SET ALL SLAVE TO NRZ,NORM,ODD
 4589  022326  005111                          COM     (R1)
 4590  022330  001402                          BEQ     AMOD1B          ;IF FILLED ALL SLAVES: BR
 4591  022332  005111                          COM     (R1)
 4592  022334  000772                          BR      AMOD1A          ;ELSE DO ALL
 4593  022336  005111                  AMOD1B: COM     (R1)
 4594  022340  004737  005144                  JSR     PC,RWNDA        ;GO REWIND ALL AVAIL SLAVES
 4595  022344  012737  000006  000740          MOV     #6,ABLCNT       ;SET NUMBER OF BLOCKS FOR MODE 1
 4596  022352  012737  174000  000556          MOV     #-4000,FMCNT    ;SET FC = 4000
 4597  022360  012737  000100  000554          MOV     #100,RCNT       ;SET REC CNTR = 100
 4598  022366  013737  000736  000550          MOV     ADRVN,DVN       ;SELECT DRIVE
 4599  022374  012737  000001  000560          MOV     #1,PATRN        ;SELECT PATTERN 1
 4600  022402  005037  000564                  CLR     TMEX            ;ASSURE NO TMK
 4601  022406  005037  000566                  CLR     INTRF           ;ASSURE NORMAL READ
 4602  022412  004737  003372                  JSR     PC,STAUTO       ;GO DO AUTO MODE 1
 4603  022416  012737  000010  000560          MOV     #10,PATRN       ;SELECT PATTERN 10
 4604  022424  004737  003372                  JSR     PC,STAUTO       ;GO DO PATTERN 10
 4605  022430  012737  000014  000560          MOV     #14,PATRN       ;SELECT PATTERN 14
 4606  022436  004737  003372                  JSR     PC,STAUTO
 4607  022442  005737  000650                  TST     NRZOF           ;SEE IF NRZ ONLY
 4608  022446  001411                          BEQ     AMOD1C          ;IF NOT: BR
 4609  022450  012737  177777  000740          MOV     #-1,ABLCNT      ;FORCE TO EOT
 4610  022456  012737  153624  000624          MOV     #153624,RANBAS
 4611  022464  012737  032561  000626          MOV     #32561,RANSAV   ;RESET RANDOM DATA BASE
 4612  022472  012737  177777  000560  AMOD1C: MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
 4613  022500  004737  003372                  JSR     PC,STAUTO
 4614  022504  000207                          RTS     PC              ;RETURN TO SEQ
```

```
4615
4616                                        ;SUBROUTINE TO SELECT PE AUTO TEST MODE**********
4617
4618  022506  005737  003040        AMOD2:  TST     CHNFLG          ;++G BRANCH IF IN CHAIN MODE
4619  022512  001003                        BNE     1$              ;++G
4620  022514  005737  000650                TST     NRZOF           ;SEE IF NRZ ONLY
4621  022520  001057                        BNE     AMOD2X          ;IF SO: BR
4622  022522  005037  000654        1$:     CLR     BLCNTR          ;CLEAR BLOCK CNTR
4623  022526  012701  000746                MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4624  022532  042711  001700        AMOD2A: BIC     #1700,(R1)      ;CLEAR NRZ
4625  022536  052721  002300                BIS     #2300,(R1)+     ;SET TO PE NORM, ODD
4626  022542  005111                        COM     (R1)            ;SEE IF END OF TABLE
4627  022544  001402                        BEQ     AMOD2B          ;IF SO: BR
4628  022546  005111                        COM     (R1)
4629  022550  000770                        BR      AMOD2A          ;CONTINUE
4630  022552  005111        AMOD2B: COM     (R1)
4631  022554  004737  005144                JSR     PC,RWNDA        ;REWIND ALL SLAVES
4632  022560  012737  000006  000740        MOV     #6,ABLCNT       ;SET AUTO BLOCK COUNT
4633  022566  012737  174000  000556        MOV     #-4000,FMCNT    ;SET FC = 4000
4634  022574  012737  000100  000554        MOV     #100,RCNT       ;SET REC CNTR TO 100
4635  022602  012737  000010  000560        MOV     #10,PATRN       ;SELECT PATTERN 10
4636  022610  004737  003372                JSR     PC,$TAUTO       ;GO DO AUTO SEQ
4637  022614  012737  000014  000560        MOV     #14,PATRN       ;SELECT PATTERN 14
4638  022622  004737  003372                JSR     PC,$TAUTO
4639  022626  012737  000015  000560        MOV     #15,PATRN       ;SELECT PATTERN 15
4640  022634  004737  003372                JSR     PC,$TAUTO
4641  022640  012737  177777  000740        MOV     #-1,ABLCNT      ;FORCE TO END OF TAPE
4642  022646  012737  177777  000560        MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
4643  022654  004737  003372                JSR     PC,$TAUTO
4644  022660  000207                AMOD2X: RTS     PC              ;RETURN TO SEQ
4645
4646
```

```
                                                ;*****************************************************
                                                ;ERROR HEADER PRINT SUBROUTINE:
                                                ;
                                                ;THIS ROUTINE IS USED TO PRINT OUT A HEADER
                                                ;WITH EACH ERROR MESSAGE.  THE PRINT IS IN TWO
                                                ;LINES AND CONTAINS THE FOLLOWING INFORMATION.
                                                ;LINE 1:  DRIVE NO. SLAVE NO. DENSITY PARITY FORMAT
                                                ;LINE 2:  CURRENT BLOCK NUMBER, RECORD NUMBER IN
                                                ;WHICH THE ERROR OCCURED PLUS THE TOTAL NUMBER
                                                ;OF RECORDS IN THIS BLOCK, THE RECORD SIZE (NUMBER
                                                ;OF CHARACTERS), AND THE ERROR TYPE (READ,WRITE, SPACE, ETC)
                                                ;PLUS THE TAPE DIRECTION (FORWARD OR REVERSE).
                                                ;ALL NUMBERS ARE IN OCTAL.
                                                ;*****************************************************

022662  012704  024764          PAPRT:  MOV     #MSG12,R4
022666  104000                          TTOUTT                          ;PRINT DRIVE HEADER
022670  013703  000550                  MOV     DVN,R3
022674  104002                          OCTPP                           ;PRINT DRIVE NUMBER
022676  012704  024750                  MOV     #MSG11,R4
022702  104000                          TTOUTT                          ;PRINT UNIT HEADER
022704  013703  000552                  MOV     UDES,R3
022710  042703  177770                  BIC     #177770,R3
022714  104002                          OCTPP                           ;PRINT UNIT NUMBER
022716  012704  026216                  MOV     #MSG60,R4
022722  104000                          TTOUTT                          ;PRINT DENSITY TAG
022724  013703  000552                  MOV     UDES,R3
022730  000303                          SWAB    R3
022732  042703  177770                  BIC     #177770,R3
022736  104002                          OCTPP                           ;PRINT DENSITY
022740  012704  026222                  MOV     #MSG61,R4
022744  104000                          TTOUTT                          ;PRINT PARITY TAG
022746  005003                          CLR     R3
022750  032737  000010  000552          BIT     #10,UDES
022756  001402                          BEQ     PAPRT0
022760  012703  000001                  MOV     #1,R3
022764  104002                  PAPRT0: OCTPP                           ;PRINT PARITY
022766  012704  026226                  MOV     #MSG62,R4
022772  104000                          TTOUTT                          ;PRINT FORMAT TAG
022774  013703  000552                  MOV     UDES,R3
023000  000241                          CLC
023002  006003                          ROR     R3
023004  006003                          ROR     R3
023006  006003                          ROR     R3                      ;PONTION FORMAT
023010  006003                          ROR     R3
023012  042703  177760                  BIC     #177760,R3
023016  104002                          OCTPP                           ;PRINT FORMAT
023020  012704  024725                  MOV     #MSG8,R4
023024  104000                          TTOUTT                          ;PRINT PATRN TAG
023026  032777  000400  155552          BIT     #400,@SWR               ;SEE IF RANDOM DATA
023034  001406                          BEQ     PAPRTB                  ;IF NOT: BR
023036  012737  000122  000636  PAPRTA: MOV     #122,TOB
023044  004737  023614                  JSR     PC,TOG                  ;PRINT R
023050  000411                          BR      PAPRTD
023052  005737  000734          PAPRTB: TST     ASEQF                   ;SEE IF AUTO SEQ
```

```
 4703  023056  001403                        BEQ     PAPRTC          ;IF NOT: BR
 4704  023060  005737  000560                TST     PATRN           ;SEE IF AUTO RANDOM
 4705  023064  100764                        BMI     PAPRTA          ;IF SO: BR
 4706  023066  013703  000560        PAPRTC: MOV     PATRN,R3
 4707  023072  104002                        OCTPP                   ;PRINT PATRN NUMBER
 4708  023074  012704  025000        PAPRTD: MOV     #MSG13,R4
 4709  023100  104000                        TTOUTT                  ;PRINT BLOCK NO. HEADER
 4710  023102  013703  000654                MOV     BLCNTR,R3
 4711  023106  104002                        OCTPP                   ;PRINT NUMBER
 4712  023110  012704  025006                MOV     #MSG14,R4
 4713  023114  104000                        TTOUTT                  ;PRINT REC NO. HEADER
 4714  023116  010003                        MOV     R0,R3
 4715  023120  032737  000010  000672        BIT     #10,MTC1        ;SEE IF WRITE OPERATION
 4716  023126  001404                        BEQ     PAPRT1          ;IF SO: BR
 4717  023130  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 4718  023136  001016                        BNE     PAPRT3          ;IF SO: BR
 4719  023140  013703  000554        PAPRT1: MOV     RCNT,R3
 4720  023144  005737  000676                TST     TMFLG           ;SEE IF TAPE MARK TIME
 4721  023150  001010                        BNE     PAPRT2          ;IF SO: BR
 4722  023152  022737  012232  000662        CMP     #81,RTRN
 4723  023160  001003                        BNE     PAPRTY          ;IF NOT BACK SPACE: BR
 4724  023162  005737  000712                TST     RTYFL
 4725  023166  001402                        BEQ     PAPRT3          ;IF NOT RETRY: BR
 4726  023170  160003        PAPRTY: SUB     R0,R3                   ;GET RECORD NUMBER
 4727  023172  005203        PAPRT2: INC     R3
 4728  023174  104002        PAPRT3: OCTPP                           ;PRINT RECORD NUMBER
 4729  023176  012737  000055  000636        MOV     #55,TOB         ;LOAD DASH (-)
 4730  023204  004737  023614                JSR     PC,TOG          ;PRINT DASH (-)
 4731  023210  013703  000554                MOV     RCNT,R3
 4732  023214  104002                        OCTPP                   ;PRINT RECORD COUNT
 4733  023216  012704  024720                MOV     #MSG7,R4
 4734  023222  104000                        TTOUTT                  ;PRINT RECORD SIZE HEADER
 4735  023224  013703  000556                MOV     FMCNT,R3        ;GET CHARACTER COUNT
 4736  023230  005303                        DEC     R3
 4737  023232  005103                        COM     R3              ;REMOVE TWOS COMPLEMENT
 4738  023234  104002                        OCTPP                   ;PRINT RECORD SIZE
 4739  023236  012737  000001  000664        MOV     #1,HDRFL        ;SET HEADER FLAG
 4740  023244  000207                        RTS     PC              ;RETURN
 4741
```

```
 4742
 4743                                   ;*********************************************************
 4744                                   ;RANDOM NUMBER GENERATOR SUBROUTINE:
 4745                                   ;
 4746                                   ;THIS SUBROUTINE IS USED TO GENERATE THE RANDOM
 4747                                   ;NUMBERS REQUIRED FOR USE AS RANDOM DATA,
 4748                                   ;RECORD COUNT, AND CHARACTER COUNT.
 4749                                   ;*********************************************************
 4750
 4751  023246  063737  000626  000624  RANG:  ADD     RANSAV,RANBAS
 4752  023254  063737  000624  000626         ADD     RANBAS,RANSAV   ;GET NEW NUMBER
 4753  023262  023701  000626                 CMP     RANSAV,R1       ;SEE IF NUMBER TOO BIG
 4754  023266  101367                         BHI     RANG            ;IF SO: BR
 4755  023270  020237  000626                 CMP     R2,RANSAV       ;SEE IF NUMBER TOO SMALL
 4756  023274  101364                         BHI     RANG            ;IF SO: BR
 4757  023276  000207                         RTS     PC              ;EXIT
 4758
```

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

023300  005037  000642        TTR:    CLR     TEMP1           ;CLEAR FIRST CHARACTER FLAG
023304  005000                        CLR     R0
023306  104010                TTR0:   TTINN                   ;GO READ CHARACTER
023310  122737  000015  000640        CMPB    #15,TIB         ;++G SEE IF CR
023316  001004                        BNE     TTR1            ;IF NOT: BR
023320  005737  000642                TST     TEMP1           ;SEE IF FIRST CHARACTER
023324  001436                        BEQ     TTR5            ;IF SO: BR
023326  000426                        BR      TTR2            ;++G ELSE GO LOAD VALUE
023330  122737  000060  000640  TTR1: CMPB    #60,TIB         ;++G SEE IF CHAR IS LESS THAN 0
023336  101401                        BLOS    TTR1A           ;IF NOT: BR
023340  000431                        BR      TINER           ;++G ELSE GO TO ERROR
023342  122737  000070  000640  TTR1A:CMPB    #70,TIB         ;++G SEE IF CHAR IS GREATER THAN 7
023350  101001                        BHI     TTR1B           ;IF NOT: BR
023352  000424                        BR      TINER           ;++G ELSE GO TO ERROR
023354  005237  000642        TTR1B:  INC     TEMP1           ;SET FIRST CHARACTER FLAG
023360  006300                        ASL     R0
023362  006300                        ASL     R0              ;SHIFT 3 LEFT
023364  006300                        ASL     R0
023366  042737  177770  000640        BIC     #177770,TIB     ;STRIP ASCII
023374  053700  000640                BIS     TIB,R0          ;LOAD CHARACTER
023400  005301                        DEC     R1              ;SEE IF DONE
023402  001341                        BNE     TTR0            ;IF NOT: BR
023404  020002                TTR2:   CMP     R0,R2           ;SEE IF EXCEEDED MAXIMUM LIMIT
023406  101401                        BLOS    TTR3            ;IF NOT: BR
023410  000405                        BR      TINER           ;++G ELSE GO TO ERROR
023412  020300                TTR3:   CMP     R3,R0           ;SEE IF BELOW MINIMUM LIMIT
023414  101401                        BLOS    TTR4            ;IF NOT: BR
023416  000402                        BR      TINER           ;++G ELSE GO TO ERROR
023420  010015                TTR4:   MOV     R0,(R5)         ;LOAD VALUE
023422  000207                TTR5:   RTS     PC              ;EXIT
023424  012704  025730        TINER:  MOV     #MSG43,R4
023430  104000                        TTOUTT                  ;PRINT?
023432  162716  000020                SUB     #20,(SP)        ;RESET SP TO START OF VALUE ROUTINE
023436  000207                        RTS     PC              ;REDO VALUE ENTRY
```

```
                                        ;TTY READ SUBROUTINE**********
                                
023440  005277  155144          TTIN:   INC     @TKS
023444  105777  155140          TTIN1:  TSTB    @TKS
023450  100375                  BPL     TTIN1
023452  017737  155134  000640          MOV     @TKB,TIB
023460  042737  000200  000640          BIC     #200,TIB        ;++G STRIP PARITY BIT
023466  105777  155122          TTIN2:  TSTB    @TPS
023472  100375                  BPL     TTIN2
023474  113777  000640  155114          MOVB    TIB,@TPB
023502  000207                  RTS     PC
                                
                                        ;TTY OUTPUT SUBROUTINE************
                                
023504  112437  000636          TTOUT:  MOVB    (R4)+,TOB
023510  122737  000043  000636          CMPB    #43,TOB
023516  001444                  BEQ     TEX
023520  122737  000045  000636          CMPB    #45,TOB
023526  001407                  BEQ     TCRLF
023530  122737  000041  000636          CMPB    #41,TOB
023536  001435                  BEQ     TBELL           ;DO BELL
023540  004737  023614                  JSR     PC,TOG
023544  000757                  BR      TTOUT
023546  112737  000015  000636  TCRLF:  MOVB    #15,TOB
023554  004737  023614                  JSR     PC,TOG
023560  012703  000006                  MOV     #6,R3
023564  005037  000636          TCRLFA: CLR     TOB
023570  004737  023614                  JSR     PC,TOG
023574  005303                  DEC     R3
023576  001372                  BNE     TCRLFA          ;DO FILLERS
023600  112737  000012  000636          MOVB    #12,TOB
023606  004737  023614                  JSR     PC,TOG
023612  000734                  BR      TTOUT
                                
023614  105777  154774          TOG:    TSTB    @TPS
023620  100375                  BPL     TOG
023622  113777  000636  154766          MOVB    TOB,@TPB
023630  000207                  TEX:    RTS     PC
023632  012703  000002          TBELL:  MOV     #2,R3
023636  012737  000007  000636  TBELA:  MOV     #7,TOB
023644  004737  023614                  JSR     PC,TOG
023650  005303                  DEC     R3
023652  001371                  BNE     TBELA
023654  000713                  BR      TTOUT
```

```
                                                ;OCTAL OUTPUT SUBROUTINE************

023656  005037  024110          OCTP:   CLR     OFL             ;CLEAR FLAG FOR LEADING ZERO
023662  000403                          BR      OCTPE1
023664  012737  000001  024110  OCTPE:  MOV     #1,OFL
023672  010304                  OCTPE1: MOV     R3,R4           ;SEE IF NUMBER IS ZERO
023674  001006                          BNE     OCTP0           ;IF NOT ZERO: BR
023676  005737  024110                  TST     OFL
023702  001003                          BNE     OCTP0
023704  004737  024070                  JSR     PC,OCTPG1       ;ELSE PRINT ZERO
023710  000450                          BR      OCTP3           ;++G SPACE AND EXIT
023712  032704  100000          OCTP0:  BIT     #100000,R4      ;SEE IF MSD = 1
023716  001406                          BEQ     OCTP1           ;IF NOT: BR
023720  012704  000001                  MOV     #1,R4
023724  004737  024046                  JSR     PC,OCTPG        ;PRINT 1
023730  000137  023742                  JMP     OCTP2
023734  005004                  OCTP1:  CLR     R4
023736  004737  024046                  JSR     PC,OCTPG        ;PRINT 0
023742  010304                  OCTP2:  MOV     R3,R4
023744  006004                          ROR     R4
023746  006004                          ROR     R4
023750  006004                          ROR     R4              ;POSITION DIGIT
023752  006004                          ROR     R4
023754  000304                          SWAB    R4
023756  004737  024046                  JSR     PC,OCTPG        ;PRINT DIGIT 2
023762  010304                          MOV     R3,R4
023764  006004                          ROR     R4
023766  000304                          SWAB    R4
023770  004737  024046                  JSR     PC,OCTPG        ;PRINT DIGIT 3
023774  010304                          MOV     R3,R4
023776  006104                          ROL     R4
024000  006104                          ROL     R4
024002  000304                          SWAB    R4
024004  004737  024046                  JSR     PC,OCTPG        ;PRINT DIGIT 4
024010  010304                          MOV     R3,R4
024012  006004                          ROR     R4
024014  006004                          ROR     R4
024016  006004                          ROR     R4
024020  004737  024046                  JSR     PC,OCTPG
024024  010304                          MOV     R3,R4
024026  004737  024046                  JSR     PC,OCTPG        ;PRINT DIGIT 5
024032  012737  000240  000636  OCTP3:  MOV     #240,TOB
024040  004737  023614                  JSR     PC,TOG          ;PRINT SPACE
024044  000207                          RTS     PC              ;EXIT
024046  042704  177770          OCTPG:  BIC     #177770,R4
024052  001004                          BNE     OCTPG0
024054  005737  024110                  TST     OFL
024060  001001                          BNE     OCTPG0
024062  000207                          RTS     PC
024064  005237  024110          OCTPG0: INC     OFL
024070  052704  000260          OCTPG1: BIS     #260,R4
024074  010437  000636                  MOV     R4,TOB
024100  004737  023614                  JSR     PC,TOG
024104  010304                          MOV     R3,R4
024106  000207                          RTS     PC
024110  000000                  OFL:    0                       ;FIRST CHAR FLAG
```

```
                                        ;DATA CHARACTER OUTPUT SUBROUTINE************
                                
024112  005037  000636        DOUT:   CLR     TOB
024116  012704  000010                MOV     #10,R4          ;SET NUMBER TO PRINT
024122  110337  000636                MOVB    R3,TOB
024126  105777  154462        DOUT1:  TSTB    @TPS
024132  100375                        BPL     DOUT1
024134  132737  000200  000636        BITB    #200,TOB
024142  105737  000636                TSTB    TOB             ;++G
024146  100004                        BPL     DOUT2           ;++G
024150  012777  000061  154440        MOV     #061,@TPB
024156  000403                        BR      DOUT3
024160  012777  000060  154430  DOUT2: MOV     #060,@TPB
024166  006137  000636        DOUT3:  ROL     TOB
024172  005304                        DEC     R4
024174  001354                        BNE     DOUT1
024176  000207                        RTS     PC
024200  013703  000646        DOUTD:  MOV     TEMP3,R3
024204  000303                        SWAB    R3
024206  004737  024112                JSR     PC,DOUT
024212  013703  000646                MOV     TEMP3,R3
024216  004737  024112                JSR     PC,DOUT
024222  000207                        RTS     PC
                                
                                        ;++G TU16/TE16 SERIAL NUMBER PRINT SUBROUTINE*******
                                
024224  010304        SNPT:   MOV     R3,R4
024226  000304                SWAB    R4
024230  006004                ROR     R4
024232  006004                ROR     R4
024234  006004                ROR     R4
024236  006004                ROR     R4
024240  004737  024302        JSR     PC,SNPG         ;PRINT FIRST DIGIT
024244  010304                MOV     R3,R4
024246  000304                SWAB    R4
024250  004737  024302        JSR     PC,SNPG         ;PRINT SECOND DIGIT
024254  010304                MOV     R3,R4
024256  006004                ROR     R4
024260  006004                ROR     R4
024262  006004                ROR     R4
024264  006004                ROR     R4
024266  004737  024302        JSR     PC,SNPG         ;PRINT THIRD DIGIT
024272  010304                MOV     R3,R4
024274  004737  024302        JSR     PC,SNPG         ;PRINT FOURTH DIGIT
024300  000207                RTS     PC              ;EXIT
024302  012737  000260  000636  SNPG:  MOV     #260,TOB        ;SET NUMBER BASE
024310  042704  177760                BIC     #177760,R4      ;MASK NUMBER
024314  050437  000636                BIS     R4,TOB          ;BUILD DIGIT
024320  004737  023614                JSR     PC,TOG          ;GO TYPE
024324  000207                RTS     PC              ;RETURN
                                
                                
                                        ;CHECK SWITCH REGISTER ROUTINE. CHECKS FOR ↑G TO ALLOW CHANGING
                                        ;OF LOC.176.
                                        ;CALL IS BY WAY OF CKSWR
```

```
                                        ;LOCATIONS USED:
                                TEMPST: .WORD   0
                                COUNT:  .WORD   0
                                RDSW:   .WORD   0
000606  CKSWR:  CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
                BNE     OUT                     ;NO, GET OUT
                TSTB    @TKS                    ;YES,WAIT FOR
                BPL     OUT                     ;READY, GET CHARACTER
                MOV     @TKB,TIB                ;AND STRIP OFF
000640          BIC     #177600,TIB             ;THE GARBAGE
000640          CMP     #7,TIB          ;IS IT A ^G>
                BNE     OUT
027403  CNTG:   MOV     #$CNTG,R4
                TTOUTT
027407  CNTLU:  MOV     #$MSWR,R4
                TTOUTT
                MOV     @SWR,R3
                JSR     PC,OCTPE
                MOV     #$MNEW,R4
                TTOUTT
024326  $READ:  CLR     TEMPST
024330          MOV     #7,COUNT
        1$:     TTINN                           ;GO  READ A CHARACTER
000640          CMPB    #25,TIB                 ;IS IT A ^U?
                BNE     2$                      ;BRANCH IF NOT
000753  3$:     BR CNTLU                        ;START OVER
000640  2$:     CMPB    #15,TIB                 ;IS IT A <CR>?
                BNE     4$                      ;BRANCH IF NOT
024332          MOV     #200,RDSW
027426          MOV     #MCRLF,R4
                TTOUTT
024330          CMP     #7,COUNT                ;WAS IT FIRST CHARACTER
                BNE     7$                      ;CHANGE SWR IF NOT FIRST ONE
                BR      OUT                     ;GET OUT
000640  4$:     CMPB    #60,TIB
                BGT     5$
000640          CMPB    #67,TIB
                BGE     6$
025730  5$:     MOV     #MSG43,R4
                TTOUTT
                BR      3$                      ;START OVER IF NOT LEGAL CHARACTER
024326  6$:     ASL     TEMPST
024326          ASL     TEMPST
024326          ASL     TEMPST
000640          BICB    #60,TIB                 ;GET NITTY-GRITTY
024326          BISB    TIB,TEMPST
024330          DEC     COUNT                   ;ONLY WANT 6   DIGITS
                BEQ     5$
                BR      1$
024326  153774  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
        OUT:    RTS     PC                      ;RETURN TO BODY OF PROGRAM
                ;HALT HANDLER**********

        STOP:   HALT
                CKSWRR                          ;CHECK FOR CONTROL G
                RTS     PC
```

```
 5025
 5026
 5027                                           ;TRAP HANDLER*************
 5028
 5029  024622  016677  000002  153754  TRAP30:  MOV     2(6),@PSW       ;ADJUST PSW
 5030  024630  011666  000002                   MOV     @SP,2(6)        ;PLACE RETURN ADDRESS OVER PSW
 5031  024634  162716  000002                   SUB     #2,@SP          ;SUB. 2 FROM RETURN ADDRESS
 5032  024640  013646                           MOV     @(6)+,-(6)
 5033  024642  062716  120650                   ADD     #TABLE-104000,@SP       ;GET SUBROUTINE STARTING ADDRESS
 5034  024646  013607                           MOV     @(SP)+,PC       ;GO TO SUBROUTINE
 5035  024650  023504                  TABLE:   TTOUT
 5036  024652  023656                           OCTP
 5037  024654  024334                           CKSWR
 5038  024656  024614                           STOP
 5039  024660  023440                           TTIN
 5040          104000                  TTOUTT=  104000
 5041          104002                  OCTPP=   104002
 5042          104004                  CKSWRR=  104004
 5043          104006                  STOPP=   104006
 5044          104010                  TTINN=   104010
 5045
```

```
                                        ;ERROR MESSAGES**********

024662  042052  020105     043  MSG1:   .ASCII  /*DE #/

024667     045  035507  021440  MSG2:   .ASCII  /%G; #/

024674  041045  020073     043  MSG3:   .ASCII  /%B; #/

024701     045  047103  021440  MSG4:   .ASCII  /%CN #/

024706  053452  020105     043  MSG5:   .ASCII  /*WE #/

024713     052  042522  021440  MSG6:   .ASCII  /*RE #/

024720  051052  020123     043  MSG7:   .ASCII  /*RS #/

024725     052  040520  051124  MSG8:   .ASCII  /*PATRN #/
024732  020116     043
024735     040  047123  020072  MSG9:   .ASCII  / SN: #/
024742     043
024743     052  042523  021440  MSG10:  .ASCII  /*SE #/

024750  051452  040514  042526  MSG11:  .ASCII  /*SLAVE NO. #/
024756  047040  027117  021440

024764  042045  044522  042526  MSG12:  .ASCII  /%DRIVE NO. #/
024772  047040  027117  021440

025000  025045  047102  021440  MSG13:  .ASCII  /%*BN #/

025006  051052  020116     043  MSG14:  .ASCII  /*RN #/

025013     045  020041  020040  MSG15:  .ASCII  /%!          BAD RECORD%%#/
025020  020040  020040  020040
025026  041040  042101  051040
025034  041505  051117  022504
025042  021445

025044  043040     043          MSG16:  .ASCII  / F#/

025047     040  021522          MSG17:  .ASCII  / R#/

025052  020041  047505  020124  MSG20:  .ASCII  /! EOT NO: #/
025060  047516  020072     043

025065     045  047111  042524  MSG21:  .ASCII  /%INTERCHANGE READ = #/
025072  041522  040510  043516
025100  020105  042522  042101
025106  036440  021440

025112  020445  046111  042514  MSG22:  .ASCII  /%!ILLEGAL BOT: HALT%#/
025120  040507  020114  047502
025126  035124  044040  046101
025134  022524     043
```

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025137     045  051503  020061  MSG23:   .ASCII  /%CS1 #/
025144     043
025145     045  041527  021440  MSG23A:  .ASCII  /%WC #/
025152  041045  020101     043  MSG23B:  .ASCII  /%BA #/
025157     045  041506  021440  MSG23C:  .ASCII  /%FC #/
025164  041445  031123  021440  MSG23D:  .ASCII  /%CS2 #/
025172  042045  020123     043  MSG23E:  .ASCII  /%DS #/
025177     045  051105  021440  MSG23F:  .ASCII  /%ER #/
025204  040445  020123     043  MSG23G:  .ASCII  /%AS #/
025211     045  045503  021440  MSG23H:  .ASCII  /%CK #/
025216  042045  020102     043  MSG23I:  .ASCII  /%DB #/
025223     045  051115  021440  MSG23J:  .ASCII  /%MR #/
025230  042045  020124     043  MSG23K:  .ASCII  /%DT #/
025235     045  041524  021440  MSG23L:  .ASCII  /%TC #/
025242  051445  020116     043  MSG23M:  .ASCII  /%SN #/
025247     045  047041  020117  MSG24:   .ASCII  /%!NO INTERRUPT%#/
025254  047111  042524  051122
025262  050125  022524     043
025267     045  047041  020117  MSG25:   .ASCII  /%!NO MOL: HALT%#/
025274  047515  035114  044040
025302  046101  022524     043
025307     045  051104  050117  MSG26:   .ASCII  /%DROPS: #/
025314  035123  021440
025320  050045  041511  051513  MSG27:   .ASCII  /%PICKS: #/
025326  020072     043
025331     045     043          MSG28:   .ASCII  /%#/
025333     045  052045  030115  MSG30:   .ASCII  '%%TM02-TU16/TE16 AUTO SEQUENCE (DZTUA-G)%#'     ;++G
025340  026462  052524  033061
025346  052057  030505  020066
025354  052501  047524  051440
025362  050505  042525  041516
025370  020105  042050  052132
025376  040525  043455  022451
025404     043
025405     045  052045  030115  MSG31:   .ASCII  '%%TM02-TU16/TE16 DATA RELIABILITY TEST (DZTUA-G)%%#';++G
025412  026462  052524  033061
025420  052057  030505  020066
```

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 5158  025426  040504  040524  051040
 5159  025434  046105  040511  044502
 5160  025442  044514  054524  052040
 5161  025450  051505  020124  042050
 5162  025456  052132  040525  043455
 5163  025464  022451  021445
 5164
 5165  025470  051445  040514  042526  MSG32:  .ASCII  /%SLAVE NUMBER = #/
 5166  025476  047040  046525  042502
 5167  025504  020122  020075     043
 5168
 5169  025511     045  042504  051516  MSG33:  .ASCII  /%DENSITY = #/
 5170  025516  052111  020131  020075
 5171  025524     043
 5172
 5173  025525     045  040520  044522  MSG34:  .ASCII  /%PARITY = #/
 5174  025532  054524  036440  021440
 5175
 5176  025540  051045  041505  051117  MSG35:  .ASCII  /%RECORD COUNT = #/
 5177  025546  020104  047503  047125
 5178  025554  020124  020075     043
 5179
 5180  025561     045  044103  051101  MSG36:  .ASCII  /%CHARACTER COUNT = #/
 5181  025566  041501  042524  020122
 5182  025574  047503  047125  020124
 5183  025602  020075     043
 5184
 5185  025605     045  040520  052124  MSG37:  .ASCII  /%PATTERN NUMBER = #/
 5186  025612  051105  020116  052516
 5187  025620  041115  051105  036440
 5188  025626  021440
 5189  025630  051445  047111  046107  MSG38:  .ASCII  /%SINGLE PASS = #/
 5190  025636  020105  040520  051523
 5191  025644  036440  021440
 5192  025650  042445  052116  051105  MSG40:  .ASCII  /%ENTER STALLS%READ = #/
 5193  025656  051440  040524  046114
 5194  025664  022523  042522  042101
 5195  025672  036440  021440
 5196
 5197  025676  053445  044522  042524  MSG41:  .ASCII  /%WRITE = #/
 5198  025704  036440  021440
 5199
 5200  025710  052045  051125  020116  MSG42:  .ASCII  /%TURN AROUND = #/
 5201  025716  051101  052517  042116
 5202  025724  036440  021440
 5203
 5204  025730  037445  021445          MSG43:  .ASCII  /%?%#/
 5205
 5206  025734  042445  052116  051105  MSG44:  .ASCII  /%ENTER YOZZLE STALL = #/
 5207  025742  054440  055117  046132
 5208  025750  020105  052123  046101
 5209  025756  020114  020075     043
 5210
 5211  025763     045  051105  020122  MSG45:  .ASCII  /%ERR AMT #/
 5212  025770  046501  020124     043
 5213
```

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 5214  025775     045  041506  021440  MSG46:  .ASCII  /%FC #/
 5215
 5216  026002  041445  020101     043  MSG47:  .ASCII  /%CA #/
 5217
 5218  026007     045  047041  020117  MSG48:  .ASCII  /%!NO BOT ON REWIND: HALT%#/
 5219  026014  047502  020124  047117
 5220  026022  051040  053505  047111
 5221  026030  035104  044040  046101
 5222  026036  022524     043
 5223
 5224  026041     040  047516  020124  MSG49:  .ASCII  / NOT AVAIL #/
 5225  026046  053101  044501  020114
 5226  026054     043
 5227  026055     040  046111  042514  MSG50:  .ASCII  / ILLEGAL DRIVE TYPE #/
 5228  026062  040507  020114  051104
 5229  026070  053111  020105  054524
 5230  026076  042520  021440
 5231  026102  022445  051104  053111  MSG52:  .ASCII  /%%DRIVE NUMBER = #/
 5232  026110  020105  052516  041115
 5233  026116  051105  036440  021440
 5234
 5235  026124  043045  051117  040515  MSG53:  .ASCII  /%FORMAT = #/
 5236  026132  020124  020075     043
 5237
 5238  026137     052  042527  052040  MSG54:  .ASCII  /*WE TM#/
 5239  026144  021515
 5240
 5241  026146  051452  020105  046524  MSG55:  .ASCII  /*SE TM#/
 5242  026154     043
 5243
 5244  026155     040  046524     043  MSG56:  .ASCII  / TM#/
 5245
 5246  026161     040  047516  026516  MSG57:  .ASCII  / NON-EXIST SLAVE#/
 5247  026166  054105  051511  020124
 5248  026174  046123  053101  021505
 5249  026202  041445  041522  021440  MSG58:  .ASCII  /%CRC #/
 5250  026210  046045  041522  021440  MSG59:  .ASCII  /%LRC #/
 5251  026216  042052  021440          MSG60:  .ASCII  /*D #/
 5252  026222  050052  021440          MSG61:  .ASCII  /*P #/
 5253  026226  043052  021440          MSG62:  .ASCII  /*F #/
 5254
 5255  026232  025045  051117  043511  MSG64:  .ASCII  /%*ORIGINAL ERROR*#/
 5256  026240  047111  046101  042440
 5257  026246  051122  051117  021452
 5258
 5259  026254  051045  052105  054522  MSG65:  .ASCII  /%RETRY: #/
 5260  026262  020072     043
 5261
 5262  026265     052  051441  020105  MSG66:  .ASCII  /*!SE RTRY #/
 5263  026272  052122  054522  021440
 5264
 5265  026300  020452  051105  051501  MSG67:  .ASCII  /*!ERASE#/
 5266  026306  021505
 5267
 5268  026310  051045  051105  053105  MSG68:  .ASCII  /%REREV: #/
 5269  026316  020072     043
```

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 5270  026321     045  040524  042520  MSG69:  .ASCII  /%TAPE MARK = #/
 5271  026326  046440  051101  020113
 5272  026334  020075     043
 5273
 5274  026337     045  047041  020117  MSG70:  .ASCII  /%!NO DRY FROM REWIND: HALT%#/
 5275  026344  051104  020131  051106
 5276  026352  046517  051040  053505
 5277  026360  047111  035104  044040
 5278  026366  046101  022524     043
 5279  026373     040  047516  026516  MSG71:  .ASCII  / NON-EXIST DRIVE#/
 5280  026400  054105  051511  020124
 5281  026406  051104  053111  021505
 5282  026414  051045  043105  042127  MSG72:  .ASCII  /%REFWD: #/
 5283  026422  020072     043
 5284  026425     045  052127  051105  MSG73:  .ASCII  /%WTERR: #/
 5285  026432  035122  021440
 5286  026436  051045  043505  051511  MSG74:  .ASCII  /%REGISTER START = #/
 5287  026444  042524  020122  052123
 5288  026452  051101  020124  020075
 5289  026460     043
 5290  026461     045  042526  052103  MSG75:  .ASCII  /%VECTOR = #/
 5291  026466  051117  036440  021440
 5292  026474  042045  051105  053105  MSG76:  .ASCII  /%DEREV: #/
 5293  026502  020072     043
 5294  026505     045  042504  053506  MSG77:  .ASCII  /%DEFWD: #/
 5295  026512  035104  021440
 5296  026516  020445  047516  026516  MSG78:  .ASCII  /%!NON-RETRYABLE WRITE ERROR: ER #/
 5297  026524  042522  051124  040531
 5298  026532  046102  020105  051127
 5299  026540  052111  020105  051105
 5300  026546  047522  035122  042440
 5301  026554  020122     043
 5302  026557     045  047041  047117  MSG79:  .ASCII  /%!NON-RETRYABLE READ ERROR: ER #/
 5303  026564  051055  052105  054522
 5304  026572  041101  042514  051040
 5305  026600  040505  020104  051105
 5306  026606  047522  035122  042440
 5307  026614  020122     043
 5308  026617     045  020441  047105  MSG100: .ASCII  /%!!END OF PASS %#/
 5309  026624  020104  043117  050040
 5310  026632  051501  020123  021445
 5311  026640  025045  025052  025052  MSG101: .ASCII  /%**********%#/
 5312  026646  025052  025052  021445
 5313  026654  052052  030115  020062  MSG102: .ASCII  /*TM02 #/
 5314  026662     043
 5315  026663     052  046123  053101  MSG103: .ASCII  /*SLAVES #/
 5316  026670  051505  021440
 5317  026674  040445  052125  020117  MSG104: .ASCII  /%AUTO CONT: #/
 5318  026702  047503  052116  020072
 5319  026710     043
 5320  026711     045  042522  047503  MSG105: .ASCII  /%RECOVERED#/
 5321  026716  042526  042522  021504
 5322  026724  020452  041041  042101  MSG106: .ASCII  /*!!BAD TAPE OVERFLOW#/
 5323  026732  052040  050101  020105
 5324  026740  053117  051105  046106
 5325  026746  053517     043
```

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 5326  026751     045  042522  044527  MSG16A: .ASCII  /%REWIND TAPE; RESTART AT BLOCK ONE#/
 5327  026756  042116  052040  050101
 5328  026764  035505  051040  051505
 5329  026772  040524  052122  040440
 5330  027000  020124  046102  041517
 5331  027006  020113  047117  021505
 5332  027014  020445  052441  051116  MSG107: .ASCII  /%!!UNRECOVERABLE BAD SPOT/
 5333  027022  041505  053117  051105
 5334  027030  041101  042514  041040
 5335  027036  042101  051440  047520
 5336  027044     124
 5337  027045     045  040502  020104          .ASCII  /%BAD RECORD LEFT ON TAPE%#/
 5338  027052  042522  047503  042122
 5339  027060  046040  043105  020124
 5340  027066  047117  052040  050101
 5341  027074  022505     043
 5342  027077     045  051116  020132  MSG108: .ASCII  /%NRZ ONLY: #/
 5343  027104  047117  054514  020072
 5344  027112     043
 5345  027113     052  020441  047520  MSG109: .ASCII  /*!!POSITION LOST IN RETRY#/
 5346  027120  044523  044524  047117
 5347  027126  046040  051517  020124
 5348  027134  047111  051040  052105
 5349  027142  054522     043
 5350  027145     045  052523  050123  MSG110: .ASCII  /%SUSPECT BAD TAPE#/
 5351  027152  041505  020124  040502
 5352  027160  020104  040524  042520
 5353  027166     043
 5354  027167     045  042522  042520  MSG111: .ASCII  /%REPEAT: #/
 5355  027174  052101  020072     043
 5356  027201     040  040502  020104  MSG112: .ASCII  / BAD TAPE SPOTS%#/
 5357  027206  040524  042520  051440
 5358  027214  047520  051524  021445
 5359
 5360  027222  020045  047523  052106  MSG113: .ASCII  /% SOFT: #/
 5361  027230  020072     043
 5362
 5363  027233     045  044040  051101  MSG114: .ASCII  /% HARD: #/
 5364  027240  035104  021440
 5365
 5366  027244  020445  044041  051101  MSG115: .ASCII  /%!!HARD READ ERROR#/
 5367  027252  020104  042522  042101
 5368  027260  042440  051122  051117
 5369  027266     043
 5370  027267     045  052441  044516  MSG116: .ASCII  /%!UNIT REWINDING: TEST WILL START AT BOT#/
 5371  027274  020124  042522  044527
 5372  027302  042116  047111  035107
 5373  027310  052040  051505  020124
 5374  027316  044527  046114  051440
 5375  027324  040524  052122  040440
 5376  027332  020124  047502  021524
 5377  027340  051045  046505  053117  MSG120: .ASCII  /%REMOVE TMDP FROM UNIT UNDER TEST%#/
 5378  027346  020105  046524  050104
 5379  027354  043040  047522  020115
 5380  027362  047125  052111  052440
 5381  027370  042116  051105  052040
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 5382  027376  051505  022524     043
 5383  027403     045  043536     043  $CNTG:  .ASCII  /%↑G#/
 5384  027407     045  053523  036522  $MSWR:  .ASCII  /%SWR= #/
 5385  027414  021440
 5386  027416  020040  042516  036527  $MNEW:  .ASCII  /  NEW= #/
 5387  027424  021440
 5388  027426  021445                  MCRLF:  .ASCII  /%#/
 5389
 5390                                          .EVEN
 5391  027430  000000                  WDATA:  0                       ;WRITE BUFFER
 5392
 5393          033436                          .=.+4004
 5394  033436  000000                  RDATA:  0                       ;READ BUFFER
 5395
 5396          000001                          .END
```

```
ABLCNT  000740
ACTLRC  021122
ADRVN   000736
AMOD1   022312
AMOD1A  022322
AMOD1B  022336
AMOD1C  022472
AMOD2   022506
AMOD2A  022532
AMOD2B  022552
AMOD2X  022660
APATS   015034
AS      000526
ASEQ    021704
ASEQCF  000742
ASEQF   000734
ASEQX   022074
ASEQ0   021770
ASEQ1   021774
ASEQ2   022034
ASEQ3   022046
ASEQ4   022056
BA      000514
BAER    021106
BBC     000656
BCNT    000710
BOPP    000716
BO00    001410
BO10    001430
BO20    001450
BO30    001470
BO40    001510
BO50    001530
BO60    001550
BO70    001570
BKRT    012206
BKSP    012030
BKTM    012112
BKTM0   012154
BLCNTR  000654
BPKP    000720
BP00    001210
BP10    001230
BP20    001250
BP30    001270
BP40    001310
BP50    001330
BP60    001350
BP70    001370
BTADDR  001030
BTFLG   000724
BTOV    007132
BTOVX   007274
BTOV0   007152
BTOV1   007162
BTOV2   007250
BTOV3   007266
BTPRT   007276
BTPRT1  007346
BTPT    000730
BTSTF   000726
BTUR    007352
BTO0    001610
BTO1    001714
BTO2    002020
BTO3    002124
BTO4    002230
BTO5    002334
BTO6    002440
BTO7    002544
B0      012164
B1      012232
B2      012242
CADER   021104
CC      000530
CCNTR   012266
CHNFLG  003040
CKSWR   024334
CKSWRR= 104004
CLLAST  015224
CLP     015334
CLPE    015360
CLPO    015370
CLP1    015402
CLP2    015442
CLP3    015454
CLO     015142
CL1     015170
CL2     015212
CL3     015276
CNTG    024376
CNTLU   024404
CONER   021110
COUNT   024330
CRCER   021120
CRCLRC  015124
CRCSV   021126
CS      000520
C1      000510
C2      000542
DATA0   002772
DATA1   002774
DATA10  003012
DATA11  003014
DATA12  003016
DATA13  003020
DATA14  003022
DATA15  003024
DATA2   002776
DATA3   003000
DATA4   003002
DATA5   003004
DATA6   003006
DATA7   003010
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DATER1  001130
DATR    015054
DATRO   015072
DATO    014364
DATOA   014416
DATOB   014424
DATOC   014470
DATOD   014476
DATOE   014506
DATOF   014520
DAT1    014530
DAT1A   014534
DAT1B   014540
DAT10   014652
DAT10A  014664
DAT11   014702
DAT11A  014710
DAT12   014722
DAT12A  014732
DAT13   014744
DAT14   014754
DAT14A  014766
DAT15   015004
DAT15A  015010
DAT15B  015020
DAT2    014550
DAT3    014554
DAT3A   014562
DAT3B   014566
DAT4    014600
DAT5    014610
DAT6    014616
DAT7    014624
DAT7A   014640
DB      000532
DCHK    015516
DCHKO   015546
DEREV1  001170
DEREX   016574
DEREX1  016626
DERFL   000704
DERR    016132
DERRO   016142
DERROA  016172
DERROB  016224
DERROC  016250
DERROD  016252
DERR1   016300
DERR2   016302
DERR3   016316
DERR4   016320
DERR4A  016460
DERR4B  016522
DERR5   016556
DERR6   016570
DFX     016130
DFO     016022
DFOA    015716
DFOAO   015740
DFOA1   015754
DFOA2   015770
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DFOA4   016010
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DFOBO   015700
DFOC    015636
DFOCO   015646
DFOD    015622
DFOE    015614
DFOF    015606
DF1     016034
DF2     016044
DF3     016062
DF4     016124
DOUT    024112
DOUTD   024200
DOUT1   024126
DOUT2   024160
DOUT3   024166
DPC     016750
DPCG    016756
DPCO    016764
DPCOA   017026
DPC1    017034
DPC1A   017062
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DPC2A   017066
DPC2B   017110
DPC3    017154
DPPRT   017222
DPPRTX  017356
DPPRTO  017272
DPPRT1  017316
DPPRT2  017332
DROP    016740
DRPK    016726
DRPKF   016640
DRP1    001010
DRP2    001012
DRP3    001014
DRP4    001016
DRP5    001020
DRP6    001022
DRP7    001024
DRP8    001026
DRVER   021112
DS      000522
DSUP    014152
DSO     014160
DSOA    014242
DSOB    014240
DSOC    014202
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DS2A    014320
DS3     014324
DS4     014334
DT      000536
DVN     000550
DOFL    014526
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EOTCO   002650
EOTREC  000660
ER      000524
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ERPT    020206
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ERPTT   020226
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ERPT2   020430
ERPT3   020466
ERPT4   020530
ERPT5   020552
ERPT5A  020634
ERPT6   020676
ERPT7   020750
ERPX    021006
ERPXO   020752
ERPX1   021050
ERPX2   021102
ERSAV   000722
ERTFL   000732
ERO     017374
EROA    017444
EROB    017412
ER1     017452
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ER2A0   017472
ER2A1   017512
ER2B    017536
ER2C    017562
ER2D    017576
ER2E    017624
ER3     017632
ER3A    017674
ER3A1   017732
ER3B    017740
ER4     017744
ER4A    020010
ER4A1   020002
ER6     020014
ER6A    020100
ER7     020132
EXCRC   015510
EXLRC   015512
FC      000516
FCER    021114
FCSAV   000632
FMCNT   000556
FREX    021166
FRPRT   021130
FRO     021160
HDRFL   000664
HERE    005102
HRDS    022106
HRDS0   022146
HRDS1   022154
HRDS2   022222
HRDS3   022244
HRDS4   022256
INTRF   000566
LRCER   021116
LRCSV   021124
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MR      000534
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MSG101  026640
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MSG103  026663
MSG104  026674
MSG105  026711
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MSG115  027244
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MSG15   025013
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MSG2    024667
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MSG21   025065
MSG22   025112
MSG23   025137
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MSG23C  025157
MSG23D  025164
MSG23E  025172
MSG23F  025177
MSG23G  025204
MSG23H  025211
MSG23I  025216
MSG23J  025223
MSG23K  025230
MSG23L  025235
MSG23M  025242
MSG24   025247
MSG25   025267
MSG26   025307
MSG27   025320
MSG28   025331
MSG3    024674
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MSG35   025540
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MSG46   025775
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MSG57   026161
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MSG6    024713
MSG60   026216
MSG61   026222
MSG62   026226
MSG64   026232
MSG65   026254
MSG66   026265
MSG67   026300
MSG68   026310
MSG69   026321
MSG7    024720
MSG70   026337
MSG71   026373
MSG72   026414
MSG73   026425
MSG74   026436
MSG75   026461
MSG76   026474
MSG77   026505
MSG78   026516
MSG79   026557
MSG8    024725
MSG9    024735
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MTINT   021666
MTINTA  021670
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NRTP    011232
NRZOF   000650
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OCTPE   023664
OCTPE1  023672
OCTPG   024046
OCTPGO  024064
OCTPG1  024070
OCTPP = 104002
OCTPO   023712
OCTP1   023734
OCTP2   023742
OCTP3   024032
OFL     024110
OUT     024612
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PAPRTA  023036
PAPRTB  023052
PAPRTC  023066
PAPRTD  023074
PAPRTY  023170
PAPRT0  022764
PAPRT1  023140
PAPRT2  023172
PAPRT3  023174
PARCNT  015514
PARS    014362
PATRN   000560
PATS    014360
PFLG    000670
PICK    017156
PIK1    000770
PIK2    000772
PIK3    000774
PIK4    000776
PIK5    001000
PIK6    001002
PIK7    001004
PIK8    001006
PRB     000622
PRS     000620
PSW     000604
RANBAS  000624
RANG    023246
RANSAV  000626
RANSET  004350
RCNT    000554
RCNTR   012326
RCSAV   000630
RDA     007744
RDATA   033436
RDCMD   000562
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RDER2   001112
RDER3   001114
RDER4   001116
RDER5   001120
RDER6   001122
RDER7   001124
RDER8   001126
RDEX    010652
RDFL    015122
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RDRTX   011230
RDRTY   010660
RDRT0   010672
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RDRT1B  010742
RDRT2   011024
RDRT3   011046
RDRT4   011052
RDRT5   011054
RDRT5A  011120
RDRT5B  011130
RDRT6   011160
RDRT7   011224
RDSW    024332
RDX     010656
RD0     010002
RD1     010050
RD1A    010064
RD1B    010072
RD1D    010100
RD10    010576
RD11    010606
RD2     010104
RD2A    010124
RD2B    010134
RD3     010164
RD4     010214
RD4A    010312
RD4A0   010344
RD4A1   010366
RD4A2   010410
RD4B    010416
RD4C    010422
RD4D    010452
RD4E    010456
RD5     010466
RD6     010510
RD7     010534
RD7A    010564
READ    007704
REGS    000544
REOT    004402
REOTC   005130
REOTX   005030
REOTXX  005120
REOT1A  004450
REOT1B  004476
REOT1C  004516
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RETRY   000602
RETURN  021662
RFHARD  002730
RFSOFT  002670
RPCNT   000700
RRHARD  002750
RRSOFT  002710
RSEQ    007366
RSEX    007526
RSF     007442
RSFR    007542
RSFRX   007702
RSFR0   007574
RSFR1   007606
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RSR     007420
RSTAL   000572
RTCNT   000702
RTRN    000662
RTYFL   000712
RTY1    001050
RTY2    001052
RTY3    001054
RTY4    001056
RTY5    001060
RTY6    001062
RTY7    001064
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RWND    005132
RWNDA   005144
RWNDX   005444
RWND0   005202
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RWND3   005334
RWND4   005364
RWND5   005404
RWND6   005422
SCVFL   014122
SERFL   000706
SN      000540
SNPG    024302
SNPT    024224
SPFLG   000570
STAL    000666
STALL   012256
START   003026
STARTA  003160
STARTB  003164
STARTC  003152
STARTD  003250
STARTE  003242
STARTF  003222
STARTO  003174
START1  003432
START2  003550
START3  003564
START4  003600
START5  004270
START6  004306
START7  004336
START8  004344
STAR1A  003444
STAR1B  003464
STAR1C  003520
STAR4A  003660
STAR40  003612
STAUT   003136
STAUTO  003372
STOP    024614
STOPP = 104006
STP     004006
STPX    004254
SUSWR   003262
SWR     000606
SWREG   000176
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TAPG1   021244
TAPG2   021256
TAPG3   021266
TAPG3A  021336
TAPG3B  021352
TAPG3C  021372
TAPG3D  021436
TAPG3E  021462
TAPG3F  021320
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TAPG5   021524
TAPG6   021566
TAPG7   021576
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TBELL   023632
TCRLF   023546
TCRLFA  023564
TEMPST  024326
TEMP1   000642
TEMP2   000644
TEMP3   000646
TEND    005054
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TINP0C  013052
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TINP2B  013350
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TINP3   013416
TINP4   013746
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TKS     000610
TMEX    000564
TMFLG   000676
TOB     000636
TOG     023614
TPB     000616
TPOS    014124
TPOS1   014136
TPS     000614
TRAP30  024622
TSTAL   000576
TTIN    023440
TTINN = 104010
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TTINT0  021652
TTIN1   023444
TTIN2   023466
TTOUT   023504
TTOUTT= 104000
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TTR1    023330
TTR1A   023342
TTR1B   023354
TTR2    023404
TTR3    023412
TTR4    023420
TTR5    023422
UDES    000552
UNP     000674
UNX     000766
UN1     000746
UN2     000750
UN3     000752
UN4     000754
UN5     000756
UN6     000760
UN7     000762
UN8     000764
UPS     000714
VECT    000546
WC      000512
WDATA   027430
WEX     006272
WRITE   005474
WRTE    005510
WRTSB   006736
WRTSB0  007010
WRTSB1  007024
WRTSB2  007034
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WRW     006310
WRWX    006332
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WTER4   001076
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WTER8   001106
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W2      005616
W3      005632
W3A     005654
W4      005740
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W5      006002
W6      006012
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XORS    015506
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YOZD1   011622
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YOZF    011656
YOZF0   011662
YOZG    011754
YOZH    012020
YOZI    012004
YOZO    011266
YSTAL   000600
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$ENDAD  005072
$MNEW   027416
$MSWR   027407
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$SVPC =  000034
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. ABS.  033440  000
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 ERRORS DETECTED:  0

 DZTUAG,DZTUAG/SOL=DZTUAG
 RUN-TIME:  5 10 .8 SECONDS
 RUN-TIME RATIO: 180/16=10.8
 CORE USED:  6K  (11 PAGES)
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F10