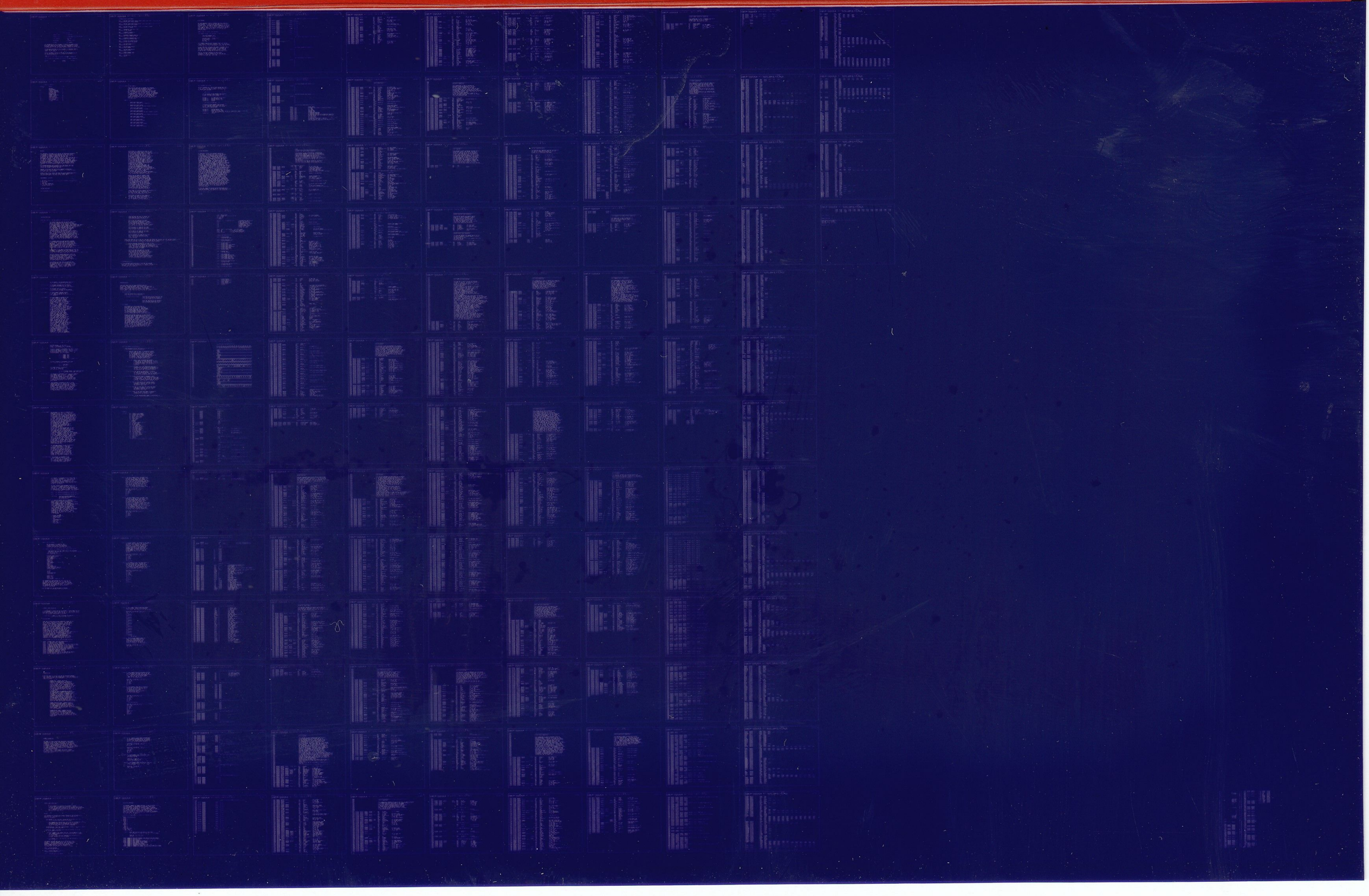
TM02/TU16

RELIABILITY
CZTUAH0

AH-9448H-MC

FICHE 1 OF 1

JUL 1978
digital
MADE IN USA



```
.REM    %
```

IDENTIFICATION

PRODUCT CODE:	AC-9447H-MC
PRODUCT TITLE:	CZTUAH0 TM02-TU16/TE16 RELIAB
DATE CREATED:	JUNE 1978
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	R.B. BARNES

TABLE OF CONTENTS

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(TM02 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 TM02) 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

```
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).
```

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.

8. 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

```
(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)
(020000)0=PRINT ALL ERRORS

SW9:    1=REWIND ALL AVAILABLE TAPES
(010000)0=DO NOT REWIND

SW8:    1=GENERATE RANDOM DATA
(004000)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
```

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 = 1) OR RESTART WITH THE FIRST AVAILABLE UNIT (AUTO CONT = 0).

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

%

```
1347                                    .LIST   BIN,LOC,SEQ
1348                                    .TITLE CZTUAH0 TM02-TU16/TE16 RELIAB
1349                                    ;ZZ - CZTUAH0
1350                                    ;21 APRIL 76
1351                                    ;R. BARNES
1352
1353                                    ;REVISED (++G) J.G.ADAMS MAY 1977       1)INTERMITTENT PGM FAILURE
1354                                    ;++G                                    ON BAD TAPE OVERFLOW
1355                                    ;++G                                    2)TAPE RUNAWAY AT EOT
1356                                    ;++G                                    3)ERRONEOUS ERROR TYPEOUT
1357                                    ;++G                                    4)CHANGED MISC INST'S TO
1358                                    ;++G                                    CONSERVE MEMORY USAGE.
1359                                    ;++G                                    5)ADDED ACT11 HOOKS
1360                                    ;++G                                    6)FIXED TTY INPUT
1361
1362                                    .MCALL  .$ACT11,.$EOP,$CHAIN    ;++G ACT11 HOOKS
1363                                    .NLIST  MC              ;++G DO NOT LIST MACRO CALLS
1364                                    .LIST   ME              ;++G LIST MACRO EXPANSIONS
1365                                    .ENABLE ABS,AMA         ;++G ENABLE ABS AND MODE '37'
1366
1367
1368                                    ;CONSOLE SWITCHES************
1369
1370                                    ;SW15: 1=STOP ON ERROR
1371                                    ;       0=CONTINUE ON ERROR
1372
1373                                    ;SW14: 1=PRINT READ/WRITE STATS
1374                                    ;       0=DO NOT PRINT STATS
1375
1376                                    ;SW13: 1=DO NOT CHECK DATA
1377                                    ;       0=CHECK DATA
1378                                    ;SW12: 1=DO NOT CHECK WRITE ERRORS
1379                                    ;       0=CHECK WRITE ERRORS
1380                                    ;SW11: 1=DO NOT CHECK READ ERRORS
1381                                    ;       0=CHECK READ ERRORS
1382                                    ;SW10: 1=DO NOT PRINT ERRORS
1383                                    ;       0=PRINT ERRORS
1384
1385                                    ;SW9:  1=REWIND TAPE
1386                                    ;       0=DO NOT REWIND
1387
1388                                    ;SW8:  1=USE RANDOM DATA
1389                                    ;       0=USE FIXED DATA PATTERN
1390                                    ;SW7:  1=USE RANDOM CHARACTER COUNT
1391                                    ;       0=USE FIXED CHAR COUNT
1392                                    ;SW6:  1=USE RANDOM RECORD COUNT
1393                                    ;       0=USE FIXED RECORD COUNT
1394
1395                                    ;SW5:  1=YOZZLE ON CURRENT RECORD
1396                                    ;       0=DO NOT YOZZLE
1397
1398                                    ;SW4:  1=DO BOTH READ AND WRITE RETRIES
1399                                    ;       0=INHIBIT RETRIES
1400
1401                                    ;SW3:  1=DO NOT READ FORWARD
```

```
1402                                    ;        0=READ FORWARD
1403                                    ;SW2:  1=DO NOT READ REVERSE
1404                                    ;        0=READ REVERSE
1405                                    ;SW1:  1=READ FORWARD FIRST
1406                                    ;        0=READ REVERSE FIRST
1407                                    ;SW0:  1=DO NOT WRITE
1408                                    ;        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 ;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
```

```
1455                                    ;REGISTER EQUIVS************
1456
1457            000000                  R0=%0
1458            000001                  R1=%1
1459            000002                  R2=%2
1460            000003                  R3=%3
1461            000004                  R4=%4
1462            000005                  R5=%5
1463            000006                  SP=%6
1464            000007                  PC=%7
1465            000240                  NOP=240
1466
1467                                    ;TRAP CATCHERS***********
1468            000030                  .=30
1469  000030    024670                  TRAP30
1470            000032                  .=32
1471  000032    000340                  340
1472
1473
1474                                ;ACT11 HOOK ***********
1475            000034                  $SVPC=.                 ;SAVE CURRENT LOCATION CTR
1476            000046                  .=46
1477  000046    005116                  .WORD   $ENDAD          ;SET LOCATION 46
1478            000052                  .=52
1479  000052    000000                  .WORD   0               ;SET LOCATION 52 = 0
1480            000034                  .=$SVPC                 ;RESTORE LOCATION CTR
1481
1482
1483                                    ;TTY INTERRUPT VECTOR**********
1484            000060                  .=60
1485  000060    021630                  TTINT                   ;TTY INTERRUPT HANDLER ADDRESS
1486  000062    000000                  0
1487
1488
1489                                    ;SOFTWARE SWITCH REGISTER LOC. 176**********
1490
1491            000176                  .=176
1492  000176    000000                  SWREG:  0               ;SOFTWARE SWITCH REGISTER
1493
1494                                    ;START ADDRESS**********
1495
1496            000200                  .=200
1497  000200    000137  003026          JMP     START           ;ENTER PARAMETERS VIA TTY
1498
1499            000204                  .=204
1500  000204    000137  003152          JMP     STARTC          ;USE FIXED PARAMETERS; HOLD DATA
1501
1502            000210                  .=210
1503  000210    005037  015150          CLR     RDFL
1504  000214    000137  003160          JMP     STARTA          ;USE FIXED PARAMETERS; NEW DATA
1505
1506                                    ;MAG TAPE INTERRUPT VECTOR**********
1507
1508            000224                  .=224
1509  000224    021714                  MTINT                   ;MAG TAPE INTERRUPT HANDLER ADDRESS
1510  000226    000340                  340
```

```
 1511
 1512                                   ;AUTO SEQUENCE START**********
 1513
 1514           000240                  .=240
 1515  000240   005237  000734          INC     ASEQF           ;SET AUTO SEQUENCE FLAG
 1516  000244   000137  003136          JMP     STAUT           ;GO TO START OF AUTO SEQUENCE
```

```
1517                                        ;SHORT CONVERSATION RESTART********
1518
1519            000300                      .=300
1520  000300    005237  014150              INC     SCVFL                   ;SET SHORT CONVERSATION FLAG
1521  000304    000137  003026              JMP     START                   ;ENTER SHORT PARAMETER LIST
1522
1523            000510                      .=510
1524                                        ;TU16/TE16 REGISTER EQUIVS**********
1525
1526  000510    172440              C1:     172440
1527  000512    172442              WC:     172442
1528  000514    172444              BA:     172444
1529  000516    172446              FC:     172446
1530  000520    172450              CS:     172450
1531  000522    172452              DS:     172452
1532  000524    172454              ER:     172454
1533  000526    172456              AS:     172456
1534  000530    172460              CC:     172460
1535  000532    172462              DB:     172462
1536  000534    172464              MR:     172464
1537  000536    172466              DT:     172466
1538  000540    172470              SN:     172470
1539  000542    172472              C2:     172472
1540
1541                                        ;CONSTANTS**********
1542
1543  000544    172440              REGS:   172440          ;STARTING REGISTER ADDRESS (CS1)
1544  000546    000224              VECT:   224             ;VECTOR ADDRESS (RH INTERRUPT)
1545  000550    000000              DVN:    0               ;DRIVE NUMBER
1546  000552    000000              UDES:   0               ;UNIT DESCRIPTION (PARITY,DENSITY,UNIT,FORMAT)
1547  000554    000100              RCNT:   100             ;RECORD COUNTER
1548  000556    177600              FMCNT:  177600          ;NUMBER OF CHAR (4 - 4000) OCTAL IN TWOS COMPLEMENT
1549  000560    000001              PATRN:  1               ;DATA PATTERN SELECTOR (0 - 15) OCTAL
1550  000562    000002              RDCMD:  2               ;READ COMMAND
1551  000564    000000              TMEX:   0               ;TAPE MARK FLAG: 1=TM 0=NO TM
1552  000566    000000              INTRF:  0               ;INTERCHANGE READ 1=YES 0=NO
1553  000570    000000              SPFLG:  0               ;SINGLE PASS 1=YES 0=NO
1554  000572    000001              RSTAL:  1               ;READ STALL
1555  000574    000001              WSTAL:  1               ;WRITE STALL
1556  000576    000001              TSTAL:  1               ;TURN AROUND STAL
1557  000600    002000              YSTAL:  2000            ;YOZZLE STAL
1558  000602    000010              RETRY:  10              ;READ RETRY NUMBER
1559  000604    177776              PSW:    177776          ;PROCESSOR STATUS
1560  000606    177570              SWR:    177570          ;CONSOLE SWITCHES
1561  000610    177560              TKS:    177560          ;TTY READ STATUS REGISTER
1562  000612    177562              TKB:    177562          ;TTY READ BUFFER
1563  000614    177564              TPS:    177564          ;TTY PUNCH STATUS REGISTER
1564  000616    177566              TPB:    177566          ;TTY PUNCH OUTPUT REGISTER
1565  000620    177550              PRS:    177550          ;H/S READER STATUS REGISTER
1566  000622    177552              PRB:    177552          ;H/S READER BUFFER
1567  000624    153624              RANBAS: 153624          ;RANDOM NUMBER GENERATOR BASE
1568  000626    032561              RANSAV: 032561          ;RANDOM NUMBER BUFFER
1569  000630    000000              RCSAV:  0               ;RECORD COUNT SAVE
1570  000632    000000              FCSAV:  0               ;FRAME COUNT SAVE
```

```
1571
1572                                    ;FLAGS AND COUNTERS**********
1573
1574  000634  000000          TINF:   0       ;TTY ENTERY FLAG
1575  000636  000000          TOB:    0       ;TTY OUTPUT BUFFER
1576  000640  000000          TIB:    0       ;TTY INPUT BUFFER
1577  000642  000000          TEMP1:  0       ;TEMP STORAGE
1578  000644  000000          TEMP2:  0       ;TEMP STORAGE
1579  000646  000000          TEMP3:  0       ;TEMP STORAGE
1580  000650  000000          NRZOF:  0       ;NRZ ONLY FLAG
1581  000652  000000          EMADDR: 0       ;ERROR MSG ADDRESS STORAGE
1582  000654  000000          BLCNTR: 0       ;BLOCK COUNTER
1583  000656  000000          BBC:    0       ;BAD RECORD COUNTER
1584  000660  000000          EOTREC: 0       ;EOT FLAG
1585  000662  000000          RTRN:   0       ;INTERRUUPT RETURN STORAGE
1586  000664  000000          HDRFL:  0       ;HEADER FLAG
1587  000666  000000          STAL:   0       ;DELAY STORAGE
1588  000670  000000          PFLG:   0       ;PRINT FLAG
1589  000672  000000          MTC1:   0       ;MAG TAPE CONT REGISTER BUFFER
1590  000674  000000          UNP:    0       ;UNIT TABLE POINTER
1591  000676  000000          TMFLG:  0       ;TAPE MARK FLAG
1592  000700  000000          RPCNT:  0       ;REPEAT COUNTER
1593  000702  000000          RTCNT:  0       ;RETRY COUNTER
1594  000704  000000          DERFL:  0       ;DATA ERROR FLAG
1595  000706  000000          SERFL:  0       ;STATUS ERROR FLAG
1596  000710  000000          BCNT:   0       ;BIT COUNTER
1597  000712  000000          RTYFL:  0       ;RETRY FLAG
1598  000714  000000          UPS:    0       ;UNIT POINTER SAVE
1599  000716  000000          BDPP:   0       ;BITS DROPPED POINTER
1600  000720  000000          BPKP:   0       ;BITS PICKED POINTER
1601  000722  000000          ERSAV:  0       ;ERROR SAVE LOC
1602  000724  000000          BTFLG:  0       ;BAD TAPE FLAG
1603  000726  000000          BTSTF:  0       ;STATISTIC PRINT FLAG
1604  000730  000000          BTPT:   0       ;BAD TAPE POINTER
1605  000732  000000          ERTFL:  0       ;ERASE FLAG
1606  000734  000000          ASEQF:  0       ;AUTO SEQ FLAG
1607  000736  000000          ADRVN:  0       ;UTO SEQ DRIVE NUMBER
1608  000740  000000          ABLCNT: 0       ;AUTO BLOCK COUNTER
1609  000742  000000          ASEQCF: 0       ;AUTO SEQ CONTINUOUS FLAG
1610  000744  000000          EOPB1:  0       ;EOP FLAG
```

```
1611
1612                                    ;UNIT ORDER AND DESCRIPTION TABLE **********
1613
1614  000746  000000          UN1:    0               ;THIS TABLE IS LOADED
1615  000750  000000          UN2:    0               ;WITH UNIT NUMBERS AND
1616  000752  000000          UN3:    0               ;THEIR DESCRIPTIONS IN
1617  000754  000000          UN4:    0               ;THE ORDER THAT THEY
1618  000756  000000          UN5:    0               ;WILL BE TESTED
1619  000760  000000          UN6:    0
1620  000762  000000          UN7:    0
1621  000764  000000          UN8:    0
1622  000766  177777          UNX:    -1
1623
1624                                    ;UNIT DROPS AND PICKS POINTERS*********
1625
1626  000770  001210          PIK1:   BP00
1627  000772  001230          PIK2:   BP10
1628  000774  001250          PIK3:   BP20
1629  000776  001270          PIK4:   BP30
1630  001000  001310          PIK5:   BP40
1631  001002  001330          PIK6:   BP50
1632  001004  001350          PIK7:   BP60
1633  001006  001370          PIK8:   BP70
1634  001010  001410          DRP1:   BD00
1635  001012  001430          DRP2:   BD10
1636  001014  001450          DRP3:   BD20
1637  001016  001470          DRP4:   BD30
1638  001020  001510          DRP5:   BD40
1639  001022  001530          DRP6:   BD50
1640  001024  001550          DRP7:   BD60
1641  001026  001570          DRP8:   BD70
1642
1643                                    ;UNIT BAD TAPE POINTERS**********
1644
1645  001030  001610          BTADDR: BT00
1646  001032  001714                  BT01
1647  001034  002020                  BT02
1648  001036  002124                  BT03
1649  001040  002230                  BT04
1650  001042  002334                  BT05
1651  001044  002440                  BT06
1652  001046  002544                  BT07
1653
1654                                    ;UNIT WRITE RETRY COUNTER**********
1655
1656  001050  000000          RTY1:   0
1657  001052  000000          RTY2:   0
1658  001054  000000          RTY3:   0
1659  001056  000000          RTY4:   0
1660  001060  000000          RTY5:   0
1661  001062  000000          RTY6:   0
1662  001064  000000          RTY7:   0
1663  001066  000000          RTY8:   0
1664
1665                                    ;UNIT WRITE ERRORS**********
1666
```

```
1667  001070  000000                WTER1:  0
1668  001072  000000                WTER2:  0
1669  001074  000000                WTER3:  0
1670  001076  000000                WTER4:  0
1671  001100  000000                WTER5:  0
1672  001102  000000                WTER6:  0
1673  001104  000000                WTER7:  0
1674  001106  000000                WTER8:  0
1675
1676                                      ;UNIT READ FORWARD ERRORS**********
1677
1678  001110  000000                RDER1:  0
1679  001112  000000                RDER2:  0
1680  001114  000000                RDER3:  0
1681  001116  000000                RDER4:  0
1682  001120  000000                RDER5:  0
1683  001122  000000                RDER6:  0
1684  001124  000000                RDER7:  0
1685  001126  000000                RDER8:  0
1686
1687                                      ;UNIT DATA ERRORS FORWARD**********
1688
1689  001130  000000                DATER1: 0
1690  001132  000000                        0
1691  001134  000000                        0
1692  001136  000000                        0
1693  001140  000000                        0
1694  001142  000000                        0
1695  001144  000000                        0
1696  001146  000000                        0
1697
1698                                      ;UNIT READ REVERSE ERRORS**********
1699
1700  001150  000000              RDERR1: 0
1701  001152  000000                      0
1702  001154  000000                      0
1703  001156  000000                      0
1704  001160  000000                      0
1705  001162  000000                      0
1706  001164  000000                      0
1707  001166  000000                      0
1708
1709                                      ;UNIT DATA ERRORS REVERSE**********
1710
1711  001170  000000              DEREV1: 0
1712  001172  000000                      0
1713  001174  000000                      0
1714  001176  000000                      0
1715  001200  000000                      0
1716  001202  000000                      0
1717  001204  000000                      0
1718  001206  000000                      0
```

```
                                        ;DROPS + PICKS PER CHANNEL PER UNIT**********
                                BP00:   0
                                        .=.+16
001230  000000                  BP10:   0
                                        .=.+16
001250  000000                  BP20:   0
                                        .=.+16
001270  000000                  BP30:   0
                                        .=.+16
001310  000000                  BP40:   0
                                        .=.+16
001330  000000                  BP50:   0
                                        .=.+16
001350  000000                  BP60:   0
                                        .=.+16
001370  000000                  BP70:   0
                                        .=.+16
001410  000000                  BD00:   0
                                        .=.+16
001430  000000                  BD10:   0
                                        .=.+16
001450  000000                  BD20:   0
                                        .=.+16
001470  000000                  BD30:   0
                                        .=.+16
001510  000000                  BD40:   0
                                        .=.+16
001530  000000                  BD50:   0
                                        .=.+16
001550  000000                  BD60:   0
                                        .=.+16
001570  000000                  BD70:   0
                                        .=.+16
001610
```

```
1755
1756                                        ;UNIT BAD TAPE COUNTER:16 PER SLAVE**********
1757
1758  001610  000000                BT00:   0
1759          001714                        .=.+102
1760  001714  000000                BT01:   0
1761          002020                        .=.+102
1762  002020  000000                BT02:   0
1763          002124                        .=.+102
1764  002124  000000                BT03:   0
1765          002230                        .=.+102
1766  002230  000000                BT04:   0
1767          002334                        .=.+102
1768  002334  000000                BT05:   0
1769          002440                        .=.+102
1770  002440  000000                BT06:   0
1771          002544                        .=.+102
1772  002544  000000                BT07:   0
1773          002650                        .=.+102
1774
1775                                        ;UNIT END OF TAPE COUNTERS 1 PER SLAVE*******
1776
1777  002650  000000                EOTC0:  0
1778  002652  000000                        0
1779  002654  000000                        0
1780  002656  000000                        0
1781  002660  000000                        0
1782  002662  000000                        0
1783  002664  000000                        0
1784  002666  000000                        0
1785
1786                                        ;UNIT READ FORWARD SOFT ERROR*******
1787
1788  002670  000000                RFSOFT: 0
1789  002672  000000                        0
1790  002674  000000                        0
1791  002676  000000                        0
1792  002700  000000                        0
1793  002702  000000                        0
1794  002704  000000                        0
1795  002706  000000                        0
1796
1797                                        ;UNIT READ REVERSE SOFT ERROR*******
1798
1799  002710  000000                RRSOFT: 0
1800  002712  000000                        0
1801  002714  000000                        0
1802  002716  000000                        0
1803  002720  000000                        0
1804  002722  000000                        0
1805  002724  000000                        0
1806  002726  000000                        0
1807
```

```
1808
1809                                    ;UNIT READ FORWARD HARD ERROR*******
1810
1811  002730  000000            RFHARD: 0
1812  002732  000000                    0
1813  002734  000000                    0
1814  002736  000000                    0
1815  002740  000000                    0
1816  002742  000000                    0
1817  002744  000000                    0
1818  002746  000000                    0
1819
1820                                    ;UNIT READ REVERSE HARD ERROR*******
1821
1822  002750  000000            RRHARD: 0
1823  002752  000000                    0
1824  002754  000000                    0
1825  002756  000000                    0
1826  002760  000000                    0
1827  002762  000000                    0
1828  002764  000000                    0
1829  002766  000000                    0
1830
1831                                    ;DATA PATTERN GENERATORS************
1832
1833  002770  002770            DATBL:  .                       ;ENTRY TABLE
1834  002772  014412            DATA0:  DAT0                    ;EXTERNAL INPUT FROM H/S READER(SEE MAINDEC-11-DZTUF)
1835  002774  014556            DATA1:  DAT1                    ;ALL ONES
1836  002776  014576            DATA2:  DAT2                    ;ALL ZEROS
1837  003000  014602            DATA3:  DAT3                    ;WALKING ONE
1838  003002  014626            DATA4:  DAT4                    ;WALKING ZERO
1839  003004  014636            DATA5:  DAT5                    ;ALTERNATING ONE/ZERO
1840  003006  014644            DATA6:  DAT6                    ;ALTERNATING ZERO/ONE
1841  003010  014652            DATA7:  DAT7                    ;ALTERNATING ONE/ZERO IN ALTERNATING CHARACTERS
1842  003012  014700            DATA10: DAT10                   ;WALKING ONE/ALL ONE IN ALTERNATING CHARACTERS
1843  003014  014730            DATA11: DAT11                   ;ALL BITS 0-377
1844  003016  014750            DATA12: DAT12                   ;ALL BITS 377-0
1845  003020  014772            DATA13: DAT13                   ;ALTERNATING CHARACTERS  0 AND 377
1846  003022  015002            DATA14: DAT14                   ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARACTERS
1847  003024  015032            DATA15: DAT15                   ;AUTO SEQUENCE PATTERN 0,0,-1,-1,-1,0,0
1848
```

```
                                        .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  005116  000042          CMP     #$ENDAD,@#42    ;;BRANCH IF LOADED VIA ACT11 CHAIN MODE
003050  001404                          BEQ     50$
003052  005737  000042                  TST     @#42            ;;BRANCH IF IN DUMP MODE
003056  001413                          BEQ     52$
003060  000406                          BR      51$
003062  012737  000176  000606  50$:    MOV     #SWREG,SWR      ;;INVOKE SOFTWARE SWR
003070  012777  100000  175510          MOV     #100000,@SWR    ;;HALT ON ERROR
003076  005237  003040          51$:    INC     CHNFLG          ;;SET CHNFLG = CHAIN MODE
003102  000137  003126                  JMP     3$              ;;GO TO CHAIN ADDRESS
003106                          52$:
003106  122737  000006  000041          CMPB    #6,@#41         ;++G BRANCH IF NOT LOADED VIA TMDP
003114  001010                          BNE     STAUT
003116  012704  027365                  MOV     #MSG120,R4
003122  104000                          TTOUTT                  ;++G ADVISE USER TO REMOVE TMDP
003124  000404                          BR      STAUT           ;++G
003126  005237  000734          3$:     INC     ASEQF           ;++G SET AUTO SEQUENCE FLAG
003132  000137  003262                  JMP     SUSWR           ;CHECK AND SET UP HRD/SOFT SWITCH REG ++ C.W

                                ;START 240 **********
003136  012737  000001  000634  STAUT:  MOV     #1,TINF         ;SET TTY ENTRY FLAG
003144  005037  015150                  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                  START0: CLR     (R0)+           ;CLEAR FLAGS AND COUNTERS
```

```
 1905  003176  005301                          DEC     R1
 1906  003200  001375                          BNE     START0
 1907  003202  012706  000500                  MOV     #500,SP         ;SET STACK POINTER
 1908  003206  004737  004372                  JSR     PC,RANSET       ;GO RESET RANDOM BASE
 1909  003212  012700  001050                  MOV     #RTY1,R0
 1910  003216  012701  000750                  MOV     #750,R1
 1911  003222  005020                  STARTF: CLR     (R0)+           ;CLEAR STATISTIC COUNTERS
 1912  003224  005301                          DEC     R1
 1913  003226  001375                          BNE     STARTF
 1914  003230  012737  177777  014406          MOV     #-1,PATS        ;PRESET PATTERN
 1915  003236  005037  000744                  CLR     EOPB1
 1916  003242  012737  000001  000654  STARTE: MOV     #1,BLCNTR       ;PRESET BLOCK COUNTER
 1917  003250  012706  000500          STARTD: MOV     #500,SP
 1918  003254  012777  000340  175322          MOV     #340,@PSW
 1919  003262  013746  000006          SUSWR:  MOV     @#6,-(SP)               ;SAVE VECTORS
 1920  003266  013746  000004                  MOV     @#4,-(SP)
 1921  003272  012737  003312  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
 1922  003300  022777  177777  175300          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
 1923  003306  001402                          BEQ     2$
 1924  003310  000404                          BR      3$
 1925  003312  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
 1926  003314  012737  000176  000606  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
 1927  003322  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
 1928  003326  012637  000006                  MOV     (SP)+,@#6
 1929  003332  022737  000176  000606          CMP     #SWREG,SWR              ;IS SWREG SELECTED
 1930  003340  001020                          BNE     4$
 1931  003342  005737  000744                  TST     EOPB1
 1932  003346  001015                          BNE     4$
 1933  003350  005037  000744                  CLR     EOPB1
 1934  003354  022737  005116  000042          CMP     #$ENDAD,@#42    ;ACT MODE? ++ C.W
 1935  003362  001402                          BEQ     6$              ;BRANCH - IF YES ++ C.W
 1936  003364  004737  024452                  JSR     PC,CNTLU        ;CHECK FOR CONTROL G
 1937  003370  005737  000734          6$:     TST     ASEQF           ;AUTO SEQ MODE? ++ C.W
 1938  003374  001402                          BEQ     4$              ;BRANCH - IF NO ++ C.W
 1939  003376  000137  022016                  JMP     ASEQ0           ;GO DO AUTO SEQ ++ C.W
 1940  003402  004737  012400          4$:     JSR     PC,TINP         ;GO GET PARAMETERS FROM TTY
 1941  003406  012777  000040  175104          MOV     #40,@CS         ;INITIALIZE
 1942  003414  005000                  STAUTO: CLR     R0              ;POINT TO FIRST ENTRY
 1943  003416  022760  177777  000746  1$:     CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
 1944  003424  001406                          BEQ     2$
 1945  003426  042760  100000  000746          BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
 1946  003434  062700  000002                  ADD     #2,R0           ;POINT TO NEXT UNIT ENTRY
 1947  003440  000766                          BR      1$              ;++G CONTINUE CLEARING
 1948  003442  013703  005156          2$:     MOV     REOTC,R3
 1949  003446  000303                          SWAB    R3
 1950  003450  110337  005156                  MOVB    R3,REOTC        ;RESTORE EOT CNTR
 1951  003454  012777  000100  175126  START1: MOV     #100,@TKS       ;SET TTY INTERRUPT ENABLE
 1952  003462  013700  000674                  MOV     UNP,R0          ;R0 = UNIT TABLE POINTER
 1953  003466  022760  177777  000746  STAR1A: CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
 1954  003474  001404                          BEQ     STAR1B          ;IF LAST UNIT IN STRING: BR
 1955  003476  016037  000746  000552          MOV     UN1(R0),UDES    ;LOAD NEXT UNIT DESCRIPTION
 1956  003504  000446                          BR      START4          ;++G
 1957  003506  005237  000654          STAR1B: INC     BLCNTR          ;BUMP BLOCK COUNTER
 1958  003512  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
 1959  003516  001411                          BEQ     STAR1C          ;IF NOT: BR
 1960  003520  023737  000654  000740          CMP     BLCNTR,ABLCNT   ;SEE IF DONE SEQ
```

```
1961  003526  001005                        BNE     STAR1C          ;IF NOT: BR
1962  003530  005037  000654                CLR     BLCNTR          ;RESET BLOCK CNTR
1963  003534  005037  000674                CLR     UNP             ;RESET UNIT POINTER
1964  003540  000207                        RTS     PC              ;RETURN TO AUTO SEQ
1965
1966  003542  005037  000674        STAR1C: CLR     UNP
1967  003546  005000                        CLR     R0
1968  003550  016037  000746  000552        MOV     UN1(R0),UDES    ;LOAD FIRST UNIT DESCRIPTION
1969  003556  105777  175024                TSTB    @SWR            ;++G BRANCH IF NOT RANDOM RECORD
1970  003562  100003                        BPL     START2          ;++G SIZE REQUESTED.
1971  003564  001402                        BEQ     START2          ;IF NOT: BR
1972  003566  004737  012314                JSR     PC,CCNTR        ;GO GENERATE RANDOM RECORD SIZE
1973  003572  032777  000400  175006  START2: BIT     #400,@SWR       ;SEE IF RANDOM DATA
1974  003600  001402                        BEQ     START3          ;IF NOT: BR
1975  003602  004737  015102                JSR     PC,DATR         ;GO GENERATE RANDOM DATA
1976  003606  032777  000100  174772  START3: BIT     #100,@SWR       ;SEE IF RANDOM RECORD COUNT
1977  003614  001402                        BEQ     START4          ;IF NOT: BR
1978  003616  004737  012354                JSR     PC,RCNTR        ;GO GENERATE RANDOM RECORD COUNT
1979  003622  005760  000746        START4: TST     UN1(R0)         ;++G BRANCH IF NOT AT EOT
1980  003626  100002                        BPL     STAR40          ;IF NOT: BR
1981  003630  000137  004360                JMP     START7          ;ELSE GO TO NEXT UNIT
1982  003634  013777  000550  174656  STAR40: MOV     DVN,@CS         ;SET DRIVE NUMBER
1983  003642  013777  000552  174672        MOV     UDES,@C2        ;SET UNIT NUMBER
1984  003650  105777  174646                TSTB    @DS             ;++G BRANCH IF UNIT AVAIL
1985  003654  100412                        BMI     STAR4A
1986  003656  005337  000666                DEC     STAL
1987  003662  001357                        BNE     START4          ;AWAIT TUR
1988  003664  004737  022730                JSR     PC,PAPRT        ;PRINT HEADER
1989  003670  012704  026066                MOV     #MSG49,R4
1990  003674  104000                        TTOUTT  ;PRINT NOT AVAIL
1991  003676  104006                        STOPP                   ;STOP
1992  003700  000750                        BR      START4          ;++G RETRY
1993  003702  013746  000552        STAR4A: MOV     UDES,-(SP)      ;GET UNIT DESCRIPTION
1994  003706  042716  175400                BIC     #175400,(SP)    ;++G CLEAR ALL BUT FORMAT BITS
1995                                        ;CMP    #1700,(SP)+     ;++G BRANCH IF NRZ
1996  003712  032726  002000                BIT     #2000,(SP)+     ;++H BRANCH IF NZR
1997  003716  001406                        BEQ     1$              ;++G
1998  003720  032777  000040  174574        BIT     #40,@DS         ;++G BRANCH IF SLAVE IN PE FORMAT
1999  003726  001002                        BNE     1$              ;++G
2000  003730  000137  004360                JMP     START7          ;++G GO TO NEXT UNIT
2001  003734  004737  014200        1$:     JSR     PC,DSUP         ;GO SET UP WRITE DATA
2002  003740  004737  005160                JSR     PC,RWND         ;REWIND
2003  003744  004737  005522                JSR     PC,WRITE        ;WRITE
2004  003750  013737  000576  000666        MOV     TSTAL,STAL      ;SET TURN AROUND DELAY
2005  003756  004737  012304                JSR     PC,STALL                ;DELAY
2006  003762  004737  007414                JSR     PC,RSEQ         ;GO TO READ SEQUENCER
2007  003766  013737  000576  000666        MOV     TSTAL,STAL      ;SET TURN AROUND DELAY
2008  003774  004737  012304                JSR     PC,STALL        ;DELAY
2009  004000  032777  040000  174600        BIT     #40000,@SWR     ;SEE IF SHOULD PRINT STATISTICS
2010  004006  001541                        BEQ     START5          ;IF NOT: BR
2011  004010  012700  000001                MOV     #1,R0           ;SET RECORD COUNTER TO 1
2012  004014  004737  022730                JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
2013  004020  004737  004030                JSR     PC,STP          ;GO PRINT STATS
2014  004024  000137  004276                JMP     STPX
2015  004030  004737  017250        STP:    JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
2016  004034  012704  026301                MOV     #MSG65,R4
```

```
2017  004040  104000                TTOUTT  ;PRINT RETRY TOTAL
2018  004042  013704  000674        MOV     UNP,R4
2019  004046  016403  001050        MOV     RTY1(R4),R3
2020  004052  104002                OCTPP                   ;PRINT RETRIES
2021  004054  012704  026452        MOV     #MSG73,R4
2022  004060  104000                TTOUTT                  ;PRINT WRITE ERROR TAG
2023  004062  013704  000674        MOV     UNP,R4
2024  004066  016403  001070        MOV     WTER1(R4),R3
2025  004072  104002                OCTPP                   ;PRINT WRITE ERRORS
2026  004074  012704  026441        MOV     #MSG72,R4
2027  004100  104000                TTOUTT                  ;PRINT READ FORWARD ERROR TAG
2028  004102  013704  000674        MOV     UNP,R4
2029  004106  016403  001110        MOV     RDER1(R4),R3
2030  004112  104002                OCTPP                   ;PRINT READ FORWARD ERRORS
2031  004114  012704  027247        MOV     #MSG113,R4
2032  004120  104000                TTOUTT                  ;PRINT SOFT TAG
2033  004122  013704  000674        MOV     UNP,R4
2034  004126  016403  002670        MOV     RFSOFT(R4),R3
2035  004132  104002                OCTPP                   ;PRINT FORWARD SOFT ERRORS
2036  004134  012704  027260        MOV     #MSG114,R4
2037  004140  104000                TTOUTT                  ;PRINT HARD TAG
2038  004142  013704  000674        MOV     UNP,R4
2039  004146  016403  002730        MOV     RFHARD(R4),R3
2040  004152  104002                OCTPP                   ;PRINT HARD FORWARE ERRORS
2041  004154  012704  026532        MOV     #MSG77,R4
2042  004160  104000                TTOUTT                  ;PRINT DATA ERROR FORWARD TAG
2043  004162  013704  000674        MOV     UNP,R4
2044  004166  016403  001130        MOV     DATER1(R4),R3
2045  004172  104002                OCTPP                   ;PRINT DATA ERROR FORWARD NUMBER
2046  004174  012704  026335        MOV     #MSG68,R4
2047  004200  104000                TTOUTT                  ;PRINT READ ERROR REVERSE TAG
2048  004202  013704  000674        MOV     UNP,R4
2049  004206  016403  001150        MOV     RDERR1(R4),R3
2050  004212  104002                OCTPP                   ;PRINT REVESE ERROR NUMBER
2051  004214  012704  027247        MOV     #MSG113,R4
2052  004220  104000                TTOUTT                  ;PRINT SOFT TAG
2053  004222  013704  000674        MOV     UNP,R4
2054  004226  016403  002710        MOV     RRSOFT(R4),R3
2055  004232  104002                OCTPP                   ;PRINT REVERSE SOFT ERROR
2056  004234  012704  027260        MOV     #MSG114,R4
2057  004240  104000                TTOUTT                  ;PRINT HARD TAG
2058  004242  013704  000674        MOV     UNP,R4
2059  004246  016403  002750        MOV     RRHARD(R4),R3
2060  004252  104002                OCTPP
2061  004254  012704  026521        MOV     #MSG76,R4
2062  004260  104000                TTOUTT                  ;PRINT DATA ERROR REVERSE TAG
2063  004262  013704  000674        MOV     UNP,R4
2064  004266  016403  001170        MOV     DEREV1(R4),R3
2065  004272  104002                OCTPP                   ;PRINT DATA REVERSE ERROR NUMBER
2066  004274  000207                RTS     PC              ;RETURN
2067  004276  005237  000726  STPX:  INC     BTSTF           ;SET STAT ONLY PRINT
2068  004302  004737  007324        JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
2069  004306  005037  000726        CLR     BTSTF           ;CLEAR FLAG
2070  004312  017700  174270  START5: MOV   @SWR,R0         ;LOAD SWR
2071  004316  042700  177762        BIC     #177762,R0      ;MASK READ/WRITE SWITCHES
2072  004322  022700  000015        CMP     #15,R0          ;SEE IF HAVE READ OR WRITE
```

```
2073  004326  001417                          BEQ     START8          ;IF NOT: BR
2074  004330  105777  174166          START6: TSTB    @DS             ;++G BRANCH IF HAVE UNIT READY
2075  004334  100411                          BMI     START7          ;++G
2076  004336  005337  000666                  DEC     STAL
2077  004342  001372                          BNE     START6          ;DELAY FOR TUR
2078  004344  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
2079  004350  012704  026066                  MOV     #MSG49,R4
2080  004354  104000                          TTOUTT                  ;PRINT NOT AVAIL
2081  004356  104006                          STOPP                           ;STOP
2082  004360  062737  000002  000674  START7: ADD     #2,UNP          ;POINT TO NEXT UNIT
2083  004366  000137  003454          START8: JMP     START1          ;CONTINUE
2084
2085                                          ;RANDOM BASE RESET**********
2086
2087  004372  012737  153624  000624  RANSET: MOV     #153624,RANBAS  ;RESET BASE
2088  004400  012737  032561  000626          MOV     #32561,RANSAV   ;RESET BUFFER
2089  004406  013737  000630  000554          MOV     RCSAV,RCNT      ;RESET RECORD COUNT
2090  004414  013737  000632  000556          MOV     FCSAV,FMCNT     ;RESET FRAME COUNT
2091  004422  000207                          RTS     PC
2092
```

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

004424  013777  000552  174110  REOT:   MOV     UDES,@C2        ;LOAD COMMAND REGISTER
004432  012777  000011  174050          MOV     #11,@C1         ;DRIVE CLEAR
004440  105777  174056          1$:     TSTB    @DS             ;++G WAIT FOR DRIVE READY
004444  100375                          BPL     1$              ;AWAIT DRY
004446  012777  000007  174034          MOV     #7,@C1          ;START REWIND
004454  005737  000724                  TST     BTFLG           ;SEE IF BAD TAPE OVERFLOW REWIND
004460  001004                          BNE     REOT1A          ;IF SO: BR
004462  013700  000660                  MOV     EOTREC,R0
004466  042700  100000                  BIC     #100000,R0      ;SET RECORD NUMBER OF EOT
004472  005037  000660          REOT1A: CLR     EOTREC          ;++G CLEAR EOT IND & REC CTR
004476  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
004502  022737  000002  000724          CMP     #2,BTFLG        ;SEE IF POSITION ERROR
004510  001003                          BNE     REOT1B          ;IF NOT: BR
004512  012704  027140                  MOV     #MSG109,R4      ;SET POSITION ERROR MSG
004516  000406                          BR      REOT1F
004520  022737  000001  000724  REOT1B: CMP     #1,BTFLG        ;SEE IF BAD TAPE OVERFLOW
004526  001004                          BNE     REOT1C          ;IF NOT: BR
004530  012704  026751                  MOV     #MSG106,R4      ;SET BAD TAPE OVERFLOW MSG
004534  104000          REOT1F: TTOUTT                          ;PRINT REWIND REASON
004536  000412                          BR      REOT1E
004540  012704  025120          REOT1C: MOV     #MSG20,R4       ;SET EOT MSG
004544  104000          REOT1D: TTOUTT                          ;PRINT MSG
004546  013704  000674                  MOV     UNP,R4
004552  005264  002650                  INC     EOTC0(R4)       ;BUMP CNTR
004556  016403  002650                  MOV     EOTC0(R4),R3
004562  104002                          OCTPP                   ;PRINT EOT CNTR
004564  012704  026776          REOT1E: MOV     #MSG16A,R4
004570  104000                          TTOUTT                  ;PRINT RESTART MSG
004572  005037  000724                  CLR     BTFLG           ;CLEAR BAD TAPE FLAG
004576  004737  004030                  JSR     PC,STP          ;PRINT STATS
004602  004737  007324                  JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
004606  105777  173710          REOT2:  TSTB    @DS             ;++G BRANCH IF UNIT IS READY
004612  100414                          BMI     REOT2A
004614  005337  000666                  DEC     STAL
004620  001372                          BNE     REOT2           ;WAIT DRY
004622  012737  024761  000652          MOV     #MSG6,EMADDR
004630  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
004634  012704  026243                  MOV     #MSG60,R4
004640  104000                          TTOUTT                  ;PRINT NO DRIVE READY
004642  104006                          STOPP
004644  105337  005156          REOT2A: DECB    REOTC           ;SEE IF LAST UNIT TO REACH EOT
004650  001410                          BEQ     REOT3           ;IF SO: BR
004652  013700  000674                  MOV     UNP,R0
004656  052760  100000  000746          BIS     #100000,UN1(R0) ;SET EOT FLAG
```

```
2149  004664  005726                          TST     (SP)+           ;RESET STACK POINTER
2150  004666  000137  004360                  JMP     START7          ;GO TO NEXT UNIT
2151  004672  000337  005156          REOT3:  SWAB    REOTC
2152  004676  013700  005156                  MOV     REOTC,R0
2153  004702  000337  005156                  SWAB    REOTC
2154  004706  110037  005156                  MOVB    R0,REOTC        ;RESTORE EOT UNIT COUNTER
2155  004712  005037  000674                  CLR     UNP
2156  004716  013700  000674                  MOV     UNP,R0          ;POINT TO FIRST UNIT
2157  004722  016037  000746  000552  REOT4:  MOV     UN1(R0),UDES    ;LOAD UNIT DESCRIPTION
2158  004730  013777  000552  173604          MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2159  004736  032777  020000  173556  REOT5:  BIT     #20000,@DS
2160  004744  001374                          BNE     REOT5           ;AWAIT PIP RESET
2161  004746  032777  000002  173546          BIT     #2,@DS          ;SEE IF HAVE BOT
2162  004754  001012                          BNE     REOT6           ;IF SO: BR
2163  004756  012700  000001                  MOV     #1,R0
2164  004762  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
2165  004766  012704  026034                  MOV     #MSG48,R4
2166  004772  104000                          TTOUTT                  ;PRINT BOT ERROR
2167  004774  104006                          STOPP
2168  004776  013700  000674                  MOV     UNP,R0
2169  005002  042760  100000  000746  REOT6:  BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
2170  005010  062737  000002  000674          ADD     #2,UNP
2171  005016  013700  000674                  MOV     UNP,R0          ;POINT TO NEXT UNIT
2172  005022  022760  177777  000746          CMP     #-1,UN1(R0)     ;++G BRANCH IF NOT LAST UNIT
2173  005030  001334                          BNE     REOT4           ;++
2174  005032  005037  000674          REOT7:  CLR     UNP             ;CLEAR UNIT POINTER
2175  005036  005037  000634                  CLR     TINF            ;CLEAR TTY INPUT FLAG
2176  005042  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
2177  005046  001402                          BEQ     REOTX           ;IF NOT: BR
2178  005050  005726                          TST     (SP)+           ;RESET STACK POINTER
2179  005052  000412                          BR      TEND            ;GO DO END OF PASS ++ C.W
2180
2181  005054  004737  004372          REOTX:  JSR     PC,RANSET       ;GO RESET RANDOM BASE
2182  005060  012737  177777  014406          MOV     #-1,PATS        ;PRESET PATTERN
2183  005066  005037  015150                  CLR     RDFL            ;CLEAR RANDOM FLAG
2184  005072  005737  000570                  TST     SPFLG           ;SEE IF SINGLE PASS
2185  005076  001420                          BEQ     REOTXX          ;IF NOT: BR
2186  005100  012704  026644          TEND:   MOV     #MSG100,R4
2187  005104  104000                          TTOUTT                  ;PRINT END OF PASS
2188  005106  013700  000042                  MOV     @#42,R0         ;GET ACT11 RETURN ADDRESS
2189  005112  001405                          BEQ     HERE            ;BRANCH IF NOT ACT11
2190  005114  000005                          RESET
2191  005116  004710          $ENDAD: JSR     PC,(R0)
2192  005120  000240                          NOP
2193  005122  000240                          NOP
2194  005124  000240                          NOP
2195  005126  005737  000734          HERE:   TST     ASEQF           ;AUTO MODE? ++ C.W
2196  005132  001401                          BEQ     1$              ;BRANCH - IF NO ++ C.W
2197  005134  000207                          RTS     PC              ;RETURN TO AUTO SEQ ++ C.W
2198  005136  104006          1$:     STOPP
2199  005140  012704  026644          REOTXX: MOV     #MSG100,R4      ;GET END OF PASS MESSAGE ++ C.W
2200  005144  104000                          TTOUTT                  ;PRINT MESSAGE ++ C.W
2201  005146  005237  000744                  INC     EOPB1
2202  005152  000137  003242                  JMP     STARTE          ;RESTART AT BLOCK NUMBER ONE
2203  005156  000000          REOTC:  0                               ;EOT UNIT COUNTER
```

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

005160  032777  001000  173420  RWND:   BIT     #1000,@SWR      ;SEE IF SHOULD REWIND
005166  001001                          BNE     RWNDA           ;IF SO: BR
005170  000207                          RTS     PC              ;ELSE EXIT
005172  013737  000674  000714  RWNDA:  MOV     UNP,UPS         ;SAVE UNIT POINTER
005200  005037  000674                  CLR     UNP             ;CLEAR POINTER
005204  005037  000660                  CLR     EOTREC          ;CLEAR EDT FLAG
005210  000337  005156                  SWAB    REOTC
005214  013700  005156                  MOV     REOTC,R0
005220  000337  005156                  SWAB    REOTC
005224  110037  005156                  MOVB    R0,REOTC        ;RESTORE EOT UNIT COUNTER
005230  013700  000674          RWND0:  MOV     UNP,R0          ;POINT TO UNIT ENTRY
005234  022760  177777  000746          CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
005242  001445                          BEQ     RWND2           ;IF SO: BR
005244  005760  000746                  TST     UN1(R0)         ;++G BRANCH IF ALREADY REWINDING
005250  100433                          BMI     RWND1A          ;++G
005252  016037  000746  000552          MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
005260  013777  000552  173254          MOV     UDES,@C2        ;LOAD COMMAND REGISTER
005266  012777  000011  173214          MOV     #11,@C1         ;DRIVE CLEAR
005274  012777  000007  173206          MOV     #7,@C1          ;START REWIND
005302  105777  173214          RWND1:  TSTB    @DS             ;++G WAIT FOR DRIVE READY
005306  100414                          BMI     RWND1A          ;IF DRY: BR
005310  005337  000666                  DEC     STAL
005314  001372                          BNE     RWND1           ;AWAIT DRY
005316  012737  024761  000652          MOV     #MSG6,EMADDR
005324  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
005330  012704  026364                  MOV     #MSG70,R4
005334  104000                          TTOUTT                  ;PRINT NO DRIVE READY
005336  104006                          STOPP
005340  042760  100000  000746  RWND1A: BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
005346  062737  000002  000674          ADD     #2,UNP          ;BUMP POINTER
005354  000725                          BR      RWND0           ;++G DO NEXT UNIT
005356  005037  000674          RWND2:  CLR     UNP             ;CLEAR POINTER
005362  013700  000674          RWND3:  MOV     UNP,R0          ;POINT TO UNIT ENTRY
005366  022760  177777  000746          CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
005374  001436                          BEQ     RWNDX           ;IF SO: BR
005376  016037  000746  000552          MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
005404  013777  000552  173130          MOV     UDES,@C2        ;LOAD COMMAND REGISTER
005412  032777  020000  173102  RWND4:  BIT     #20000,@DS
005420  001374                          BNE     RWND4           ;AWAIT PIP RESET
005422  032777  000002  173072          BIT     #2,@DS          ;SEE IF HAVE BOT
005430  001407                          BEQ     RWND6           ;IF NOT: BR
005432  062737  000002  000674  RWND5:  ADD     #2,UNP          ;BUMP POINTER
005440  012777  000011  173042          MOV     #11,@C1         ;DRIVE CLEAR
005446  000745                          BR      RWND3           ;++G DO NEXT UNIT
005450  012700  000001          RWND6:  MOV     #1,R0
005454  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
005460  012704  026034                  MOV     #MSG48,R4
```

```
 2260  005464  104000                          TTOUTT                  ;PRINT NO BOT
 2261  005466  104006                          STOPP
 2262  005470  000760                          BR      RWND5           ;++G DO NEXT UNIT
 2263  005472  013737  000714  000674  RWNDX:  MOV     UPS,UNP         ;RESTORE UNIT POINTER
 2264  005500  013700  000674                  MOV     UNP,R0
 2265  005504  016037  000746  000552          MOV     UN1(R0),UDES    ;RESET UNIT DESCRIPTION
 2266  005512  013777  000552  173022          MOV     UDES,@C2
 2267  005520  000207                          RTS     PC              ;RETURN TO TEST
 2268
```

```
2269                                    ;*********************************************************
2270                                    ;WRITE ROUTINE:
2271                                    ;
2272                                    ;THIS ROUTINE IS USED TO WRITE ONTO TAPE THE BLOCK
2273                                    ;OF DATA DESCRIBED BY THE OPERATOR AND SET UP
2274                                    ;IN THE SEQUENCE FORMATTER.  THE TAPE UNIT TO BE USED
2275                                    ;HAS BEEN ASSIGNED BY THE SEQUENCE FORMATTER AND
2276                                    ;ITS PARAMETERS SET IN A UNIT DESCRIPTION WORD.
2277                                    ;AS EACH RECORD OF THE BLOCK IS WRITTEN, IT IS CHECKED
2278                                    ;FOR STATUS ERRORS, WORD COUNT ZERO, AND CORRECT CURRENT
2279                                    ;MEMORY ADDRESS.  IF THE WRITE OPERATION RESULTS IN
2280                                    ;ANY ERROR CONDITION, A WRITE RETRY OF THAT OPERATION
2281                                    ;MAY BE DONE BY SETTING SWITCH FOUR (4) TO A ONE (1).
2282                                    ;THE RETRY CONSISTS OF A BACKSPACE, ERASE FORWARD, AND
2283                                    ;REWRITE OF THE RECORD.  (SEE WRITE RETRY SUBROUTINE)
2284                                    ;AFTER ALL DATA RECORDS IN THE BLOCK HAVE BEEN
2285                                    ;WRITTEN, THE WRITE ROUTINE WILL EXECUTE A WRITE
2286                                    ;TAPE MARK COMMAND IF THE TTY RESPONSE TM=1 WAS
2287                                    ;MADE AT INITIAL START.  THE TM IS COUNTED AS TOTAL
2288                                    ;DATA RECORDS PLUS ONE (IE: IF 100 DATA RECORDS; TM=RECORD 101)
2289                                    ;IF THE WRITE OPERATION (DATA OR TM) CAUSES THE SELECTED SLAVE
2290                                    ;TO REACH END OF TAPE (EOT) AND THERE IS TO BE NO READING DONE,
2291                                    ;(SW2 AND SW3 SET TO A 1) THEN THE SLAVE IS REWOUND AND
2292                                    ;FLAGGED AS UNAVAILABLE FOR TESTING UNTIL ALL SLAVES HAVE
2293                                    ;REACHED EOT AND BEEN REWOUND AT WHICH TIME TESTING IS
2294                                    ;RESUMED ON ALL AVAILABLE SLAVES.
2295                                    ;WRITE RETRY MAY BE ALLOWED VIA CONSOLE SWITCH FOUR (4).
2296                                    ;ERROR CHECKING MAY BE DISALLOWED VIA CONSOLE SWITCH
2297                                    ;TWELVE (12).
2298                                    ;WRITING TO TAPE MAY BE DISALLOWED VIA CONSOLE SWITCH
2299                                    ;ZERO (0).
2300                                    ;*********************************************************
2301
2302  005522  032777  000001  173056  WRITE:  BIT     #1,@SWR          ;SEE IF SHOULD WRITE
2303  005530  001402                          BEQ     WRTE
2304  005532  000137  006320                  JMP     WEX              ;IF NOT: BR
2305  005536  013700  000554          WRTE:   MOV     RCNT,R0          ;R0=RECORD COUNT
2306  005542  012737  024754  000652  W0:     MOV     #MSG5,EMADDR     ;SET ERROR MSG ADDRESS
2307  005550  013777  000556  172740          MOV     FMCNT,@FC        ;LOAD CHAR COUNT
2308  005556  012777  027456  172730          MOV     #WDATA,@BA       ;SET DATA ADDR
2309  005564  112737  000060  000672          MOVB    #60,MTC1         ;SET WRITE OP COMMAND
2310  005572  012737  005604  000662          MOV     #W1,RTRN         ;SET RETURN ADDRESS
2311  005600  000137  021216                  JMP     TAPG             ;GO EXECUTE COMMAND
2312  005604  032777  002000  172710  W1:     BIT     #2000,@DS        ;SEE IF EOT
2313  005612  001414                          BEQ     W2               ;IF NOT AT EOT: BR
2314  005614  005737  000660                  TST     EOTREC           ;++G BRANCH IF WRITTEN PAST EOT
2315  005620  100411                          BMI     W2               ;++G
2316  005622  010037  000660                  MOV     R0,EOTREC        ;SAVE EOT RECORD NUMBER
2317  005626  052737  100000  000660          BIS     #100000,EOTREC   ;++G SET EOT FLAG
2318  005634  005337  000660                  DEC     EOTREC           ;++G ADJUST RECORD COUNT
2319  005640  012700  000002                  MOV     #2,R0            ;++G SET R0 TO WRITE 1 MORE RECORD
2320  005644  032777  010000  172734  W2:     BIT     #10000,@SWR      ;SEE IF SHOULD CHECK ERRORS
2321  005652  001002                          BNE     W3               ;IF NOT: BR
2322  005654  004737  017406                  JSR     PC,ERCHK         ;GO CHECK ERRORS
2323  005660  013737  000574  000666  W3:     MOV     WSTAL,STAL       ;SET DELAY
2324  005666  004737  012304                  JSR     PC,STALL         ;DELAY
```

```
2325  005672  005737  000712                TST     RTYFL           ;SEE IF RETRY TIME
2326  005676  001401                        BEQ     W3A             ;IF NOT: BR
2327  005700  000207                        RTS     PC              ;ELSE RETURN
2328  005702  005737  000706        W3A:    TST     SERFL           ;SEE IF WRITE ERROR
2329  005706  001450                        BEQ     W5              ;IF NOT: BR
2330  005710  013704  000674                MOV     UNP,R4
2331  005714  005264  001070                INC     WTER1(R4)       ;BUMP WRITE ERROR
2332  005720  005037  000706                CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2333  005724  032777  000020  172654        BIT     #20,@SWR        ;SEE IF RETRY
2334  005732  001436                        BEQ     W5              ;IF NOT: BR
2335  005734  013703  000722                MOV     ERSAV,R3
2336  005740  042703  102700                BIC     #102700,R3      ;MASK UNRECOVERABLE ERROR
2337  005744  001410                        BEQ     W4              ;IF SO: BR
2338  005746  004737  022730                JSR     PC,PAPRT        ;PRINT HEADER
2339  005752  012704  026543                MOV     #MSG78,R4
2340  005756  104000                        TTOUTT                  ;PRINT NON-RETRYABLE ERROR TAG
2341  005760  004737  011260                JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2342  005764  000421                        BR      W5
2343  005766  013704  000674        W4:     MOV     UNP,R4
2344  005772  005264  001050                INC     RTY1(R4)        ;BUMP RETRY CNTR
2345  005776  032777  002000  172602        BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2346  006004  001003                        BNE     W4A             ;IF NOT: BR
2347  006006  012704  026257                MOV     #MSG64,R4
2348  006012  104000                        TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2349  006014  005037  000702        W4A:    CLR     RTCNT           ;CLEAR RETRY NUMBER
2350  006020  005037  000700                CLR     RPCNT           ;CLEAR REPEAT COUNTER
2351  006024  004737  006362                JSR     PC,WRTY         ;GO RETRY WRITE ERROR
2352  006030  005037  000712        W5:     CLR     RTYFL           ;CLEAR RETRY COUNTER
2353  006034  005300                        DEC     R0              ;SEE IF DONE ALL
2354  006036  001241                        BNE     W0              ;IF NOT: BR
2355  006040  005737  000564        W6:     TST     TMEX            ;SEE IF TM
2356  006044  001525                        BEQ     WEX             ;IF NOT: BR
2357  006046  005237  000676                INC     TMFLG           ;SET TM FLAG
2358  006052  012737  026164  000652  WTM:   MOV     #MSG54,EMADDR   ;POINT TO TM ERROR MSG
2359  006060  012737  000026  000672        MOV     #26,MTC1        ;SET TM OP CODE
2360  006066  012777  000000  172422        MOV     #0,@FC          ;LOAD FRAME COUNTER
2361  006074  012777  027456  172412        MOV     #WDATA,@BA      ;LOAD BUS ADDRESS
2362  006102  012737  006114  000662        MOV     #WTM0,RTRN      ;SAVE RETURN ADDRESS
2363  006110  000137  021216                JMP     TAPG            ;WRITE TM
2364  006114  032777  010000  172464  WTM0:  BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERRORS
2365  006122  001076                        BNE     WEX
2366  006124  032777  000004  172370        BIT     #4,@DS          ;SEE IF TM STATUS
2367  006132  001011                        BNE     WTM1            ;IF SO: BR
2368  006134  012737  027456  021132        MOV     #WDATA,CADER    ;SET EXPT BUS ADDRESS
2369  006142  012737  000001  021140        MOV     #1,DRVER        ;INDICATE ERROR
2370  006150  004737  020234                JSR     PC,ERPT         ;PRINT TM ERROR
2371  006154  000404                        BR      WTM2
2372  006156  012703  027456        WTM1:   MOV     #WDATA,R3       ;SET EXPT ADDRESS
2373  006162  004737  017504                JSR     PC,ER2          ;GO CHECK FOR OTHER ERRORS
2374  006166  005737  000712        WTM2:   TST     RTYFL           ;SEE IF RETRY
2375  006172  001401                        BEQ     WTM3            ;IF NOT: BR
2376  006174  000207                        RTS     PC              ;ELSE RETURN TO RETRY ROUTINE
2377  006176  005737  000706        WTM3:   TST     SERFL           ;SEE IF WRITE ERROR
2378  006202  001446                        BEQ     WEX             ;IF NOT: BR
2379  006204  013704  000674                MOV     UNP,R4
2380  006210  005264  001070                INC     WTER1(R4)       ;BUMP WRITE ERROR
```

```
2381  006214  032777  000020  172364          BIT     #20,@SWR        ;SEE IF SHOULD RETRY
2382  006222  001436                          BEQ     WEX             ;IF NOT: BR
2383  006224  013703  000722                  MOV     ERSAV,R3
2384  006230  042703  102700                  BIC     #102700,R3      ;MASK UNRECOVERABLE ERROR
2385  006234  001410                          BEQ     WTM4            ;IF SO: BR
2386  006236  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
2387  006242  012704  026543                  MOV     #MSG78,R4
2388  006246  104000                          TTOUTT                  ;PRINT UNRETRYABLE TAG
2389  006250  004737  011260                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2390  006254  000421                          BR      WEX
2391  006256  005037  000700          WTM4:   CLR     RPCNT           ;CLEAR REPEAT CNTR
2392  006262  013704  000674                  MOV     UNP,R4
2393  006266  005264  001050                  INC     RTY1(R4)        ;BUMP RETRY CNTR
2394  006272  005037  000702                  CLR     RTCNT           ;CLEAR RETRY CNTR
2395  006276  032777  002000  172302          BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2396  006304  001003                          BNE     WTM4A           ;IF NOT: BR
2397  006306  012704  026257                  MOV     #MSG64,R4
2398  006312  104000                          TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2399  006314  004737  006362          WTM4A:  JSR     PC,WRTY         ;GO DO RETRY
2400  006320  005037  000712          WEX:    CLR     RTYFL           ;CLEAR RETRY FLAG
2401  006324  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
2402  006330  005737  000660                  TST     EOTREC          ;++G BRANCH IF NOT AT EOT
2403  006334  100011                          BPL     WRWX            ;++G
2404  006336  017703  172244          WRW:    MOV     @SWR,R3
2405  006342  042703  177763                  BIC     #177763,R3
2406  006346  022703  000014                  CMP     #14,R3          ;SEE IF WRITE ONLY
2407  006352  001002                          BNE     WRWX            ;IF NOT: BR
2408  006354  000137  004424                  JMP     REOT            ;ELSE REWIND
2409  006360  000207          WRWX:   RTS     PC              ;EXIT
```

```
2410                                    ;*************************
2411                                    ;WRITE ERROR RETRY
2412                                    ;
2413                                    ;*************************
2414
2415  006362  012737  000001  000712  WRTY:   MOV     #1,RTYFL        ;SET RETRY FLAG
2416  006370  004737  006764          WRTY0:  JSR     PC,WRTSB        ;GO SPACE REVERSE FOR REPEAT
2417  006374  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
2418  006400  001003                          BNE     WRTYTM          ;IF SO: BR
2419  006402  004737  005542                  JSR     PC,WO           ;REWRITE RECORD
2420  006406  000402                          BR      WRTYR           ;GO ON
2421  006410  004737  006052          WRTYTM: JSR     PC,WTM          ;GO WRITE TAPE MARK AGAIN
2422  006414  005737  000706          WRTYR:  TST     SERFL           ;REWRITE GOOD
2423  006420  001024                          BNE     WRTY2           ;IF NOT: BR
2424  006422  005237  000700                  INC     RPCNT           ;BUMP REPEAT COUNTER
2425  006426  022737  000004  000700        CMP     #4,RPCNT        ;SEE IF FOUR GOOD REPEATS
2426  006434  001355                          BNE     WRTY0           ;IF NOT: REPEAT
2427  006436  032777  002000  172142        BIT     #2000,@SWR      ;SEE IF PRINT
2428  006444  001011                          BNE     WRTY1           ;IF NOT: BR
2429  006446  012704  026736                  MOV     #MSG105,R4
2430  006452  104000                          TTOUTT                  ;PRINT RECOVERED MESSAGE
2431  006454  012704  026301                  MOV     #MSG65,R4
2432  006460  104000                          TTOUTT                  ;PRINT RETRY TAG
2433  006462  013703  000702                  MOV     RTCNT,R3
2434  006466  104002                          OCTPP                   ;PRINT RETRY NUMBER
2435  006470  000207          WRTY1:  RTS     PC                      ;RESUME TESTING
2436  006472  005037  000646          WRTY2:  CLR     TEMP3           ;++G CLEAR RECOVERABLE ERROR FLAG
2437  006476  013703  000722                  MOV     ERSAV,R3        ;GET ER
2438  006502  042703  102700                  BIC     #102700,R3      ;MASK RECOVERABLE BITS
2439  006506  001413                          BEQ     WRTY2A          ;IF RECOVERABLE: BR
2440  006510  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
2441  006514  012704  026543                  MOV     #MSG78,R4
2442  006520  104000                          TTOUTT                  ;PRINT NON-RECOVERABLE MSG
2443  006522  004737  011260                  JSR     PC,NRTP         ;PRINT ER
2444  006526  012737  000001  000646        MOV     #1,TEMP3        ;SET FLAG
2445  006534  000407                          BR      WRTY2B
2446  006536  032777  002000  172042  WRTY2A: BIT     #2000,@SWR      ;SEE IF PRINT
2447  006544  001025                          BNE     WRTY3           ;IF NOT: BR
2448  006546  012704  027172                  MOV     #MSG110,R4
2449  006552  104000                          TTOUTT                  ;PRINT BAD TAPE SUSPECT
2450  006554  012704  026301          WRTY2B: MOV     #MSG65,R4
2451  006560  104000                          TTOUTT                  ;PRINT RETRY TAG
2452  006562  013703  000702                  MOV     RTCNT,R3
2453  006566  104002                          OCTPP                   ;PRINT RETRY NUMBER
2454  006570  012704  027214                  MOV     #MSG111,R4
2455  006574  104000                          TTOUTT                  ;PRINT REPEAT TAG
2456  006576  013703  000700                  MOV     RPCNT,R3
2457  006602  104002                          OCTPP                   ;PRINT REPEAT NUMBER
2458  006604  005737  000646                  TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
2459  006610  001403                          BEQ     WRTY3           ;IF NOT: BR
2460  006612  005037  000646                  CLR     TEMP3           ;CLEAR FLAG
2461  006616  000207                          RTS     PC              ;EXIT
2462  006620  005737  000702          WRTY3:  TST     RTCNT           ;SEE IF FIRST RETRY
2463  006624  001004                          BNE     WRTY3A          ;IF NOT: BR
2464  006626  013704  000674                  MOV     UNP,R4
2465  006632  005364  001070                  DEC     WTER1(R4)       ;DECREMENT WRITE ERROR CNTR
```

```
2466  006636  013704  000674          WRTY3A: MOV     UNP,R4          ;GET UNIT NUMBER
2467  006642  016437  001030  000730          MOV     BTADDR(R4),BTPT ;GET ADDRESS OF UNIT BAD TAPE CNTR
2468  006650  017704  172054                  MOV     @BTPT,R4        ;GET COUNTER
2469  006654  005724                          TST     (R4)+           ;SET POINTER OFFSET
2470  006656  010477  172046                  MOV     R4,@BTPT
2471  006662  013703  000730                  MOV     BTPT,R3
2472  006666  060304                          ADD     R3,R4           ;SET ABSOLUTE POINTER
2473  006670  013714  000654                  MOV     BLCNTR,(R4)     ;SET BLOCK NUMBER
2474  006674  062704  000040                  ADD     #40,R4          ;ADD RCNT OFFSET
2475  006700  013714  000554                  MOV     RCNT,(R4)
2476  006704  160014                          SUB     R0,(R4)         ;SET RECORD NUMBER
2477  006706  005214                          INC     (R4)            ;CORRECT RECORD NUMBER
2478  006710  022777  000040  172012          CMP     #40,@BTPT       ;SEE IF TOO MANY BAD SPOTS
2479  006716  001002                          BNE     WRTY4           ;IF NOT: BR
2480  006720  000137  007160                  JMP     BTOV            ;ELSE GO TO BAD TAPE OVERFLOW
2481  006724  005237  000702          WRTY4:  INC     RTCNT           ;BUMP RETRY COUNTER
2482  006730  022737  000004  000702          CMP     #4,RTCNT        ;SEE IF DONE 4 RETRIES
2483  006736  001410                          BEQ     WRTY5           ;IF SO: BR
2484  006740  013704  000674                  MOV     UNP,R4
2485  006744  005264  001050                  INC     RTY1(R4)        ;BUMP RETRY COUNTER
2486  006750  005237  000732                  INC     ERTFL           ;SET ERASE FLAG
2487  006754  000137  006370                  JMP     WRTY0           ;DO NEXT RETRY
2488  006760  000137  007400          WRTY5:  JMP     BTUR            ;ELSE GO TO BAD TAPE UNRECOVERABLE
2489
2490                                  ;WRITE RETRY BACKSPACE-ERASE SUBROUTINE**********
2491
2492  006764  005037  000706          WRTSB:  CLR     SERFL           ;CLEAR FLAG
2493  006770  013737  000576  000666          MOV     TSTAL,STAL
2494  006776  004737  012304                  JSR     PC,STALL        ;DO TURN AROUND DELAY
2495  007002  012737  026312  000652          MOV     #MSG66,EMADDR   ;SET ERROR CODE
2496  007010  012777  177777  171500          MOV     #-1,@FC         ;SET TO BACKSPACE 1 RECORD
2497  007016  012777  033464  171470          MOV     #RDATA,@BA      ;SET BA
2498  007024  004737  012234                  JSR     PC,BKRT         ;GO BACKSPACE
2499  007030  005737  000706                  TST     SERFL           ;SEE IF ERROR
2500  007034  001406                          BEQ     WRTSB1          ;IF NOT: BR
2501  007036  012737  000002  000724  WRTSB0: MOV     #2,BTFLG        ;SET FLAG
2502  007044  022626                          CMP     (SP)+,(SP)+     ;RESET STACK
2503  007046  000137  004424                  JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2504  007052  005737  000732          WRTSB1: TST     ERTFL           ;SEE IF SHOULD ERASE
2505  007056  001001                          BNE     WRTSB2          ;IF SO: BR
2506  007060  000207                          RTS     PC              ;RETURN
2507  007062  005037  000732          WRTSB2: CLR     ERTFL           ;CLEAR ERASE FLAG
2508  007066  005037  000700                  CLR     RPCNT           ;CLEAR REPEAT CNTR
2509  007072  005037  000706                  CLR     SERFL           ;CLEAR FLAG
2510  007076  012737  026325  000652          MOV     #MSG67,EMADDR   ;SET ERROR CODE
2511  007104  005077  171406                  CLR     @FC             ;CLEAR FRAME COUNT
2512  007110  012737  000024  000672          MOV     #24,MTC1        ;SET ERASE OP-CODE
2513  007116  012777  027456  171370          MOV     #WDATA,@BA      ;SET BA
2514  007124  012737  007136  000662          MOV     #WRTSB3,RTRN    ;SET RETURN ADDRESS
2515  007132  000137  021216                  JMP     TAPG            ;GO ERASE
2516  007136  012703  027456          WRTSB3: MOV     #WDATA,R3       ;SET EXPT BA
2517  007142  004737  017504                  JSR     PC,ER2          ;GO CHECK ERRORS
2518  007146  005737  000706                  TST     SERFL           ;SEE IF ERROR
2519  007152  001737                          BEQ     WRTSB1          ;IF NOT: BR
2520  007154  000137  007036                  JMP     WRTSB0
2521
```

```
2522                                    ;BAD TAPE OVERFLOW SUBROUTINE**********
2523
2524  007160  005037  000712      BTOV:   CLR     RTYFL           ;CLEAR RETRY FLAG
2525  007164  012737  000001 000724      MOV     #1,BTFLG        ;SET BAD TAPE OVERFLOW FLAG
2526  007172  005726                    TST     (SP)+           ;++G ADJUST STACK
2527  007174  000137  004424            JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2528  007200  013701  000730      BTOV0:  MOV     BTPT,R1         ;SET TABLE POINTER
2529  007204  005721                    TST     (R1)+
2530  007206  005000                    CLR     R0
2531  007210  010003      BTOV1:  MOV     R0,R3
2532  007212  000241                    CLC
2533  007214  006003                    ROR     R3              ;R3=R3/2 FOR CORRECT NUMBER
2534  007216  104002                    OCTPP                   ;PRINT ENTRY NUMBER
2535  007220  012704  025046            MOV     #MSG13,R4
2536  007224  105724                    TSTB    (R4)+           ;SKIP CR/LF
2537  007226  104000                    TTOUTT                  ;PRINT BLOCK NUMBER TAG
2538  007230  011103                    MOV     (R1),R3
2539  007232  104002                    OCTPP                   ;PRINT BLOCK NUMBER
2540  007234  012704  025054            MOV     #MSG14,R4
2541  007240  104000                    TTOUTT                  ;PRINT RECORD NUMBER TAG
2542  007242  062701  000040            ADD     #40,R1          ;SET POINTER OFFSET FOR RECOED NUMBER
2543  007246  012103                    MOV     (R1)+,R3
2544  007250  104002                    OCTPP                   ;PRINT RECORD NUMBER
2545  007252  162701  000040            SUB     #40,R1          ;RESET POINTER FOR BLOCK NUMBER
2546  007256  005720                    TST     (R0)+
2547  007260  020077  171444            CMP     R0,@BTPT        ;SEE IF DONE
2548  007264  001404                    BEQ     BTOV2           ;IF SO: BR
2549  007266  012704  025377            MOV     #MSG28,R4
2550  007272  104000                    TTOUTT                  ;DO CR/LF
2551  007274  000745                    BR      BTOV1           ;CONTINUE
2552  007276  005737  000726      BTOV2:  TST     BTSTF           ;SEE IF STAT ONLY PRINT
2553  007302  001007                    BNE     BTOVX           ;IF SO: BR
2554  007304  012703  000041            MOV     #41,R3          ;SET SIZE OF TABLE
2555  007310  013704  000730            MOV     BTPT,R4         ;SET POINTER
2556  007314  005024      BTOV3:  CLR     (R4)+           ;CLEAR TABLE
2557  007316  005303                    DEC     R3              ;SEE IF DONE
2558  007320  001375                    BNE     BTOV3           ;IF NOT: BR
2559  007322  000207      BTOVX:  RTS     PC              ;RETURN
2560
```

```
2561
2562                                    ;BAD TAPE STATISTIC PRINT********
2563
2564  007324  012704  025377      BTPRT:  MOV     #MSG28,R4
2565  007330  104000                      TTOUTT                  ;DO CR/LF
2566  007332  013704  000674              MOV     UNP,R4
2567  007336  016437  001030  000730      MOV     BTADDR(R4),BTPT ;SET TABLE POINTER
2568  007344  017703  171360              MOV     @BTPT,R3
2569  007350  000241                      CLC
2570  007352  006003                      ROR     R3              ;CORRECT NUMBER
2571  007354  104002                      OCTPP                   ;PRINT NUMBER OF BAD SPOTS
2572  007356  012704  027226              MOV     #MSG112,R4
2573  007362  104000                      TTOUTT                  ;PRINT BAD TAPE TAG
2574  007364  005777  171340              TST     @BTPT           ;SEE IF ANY BAD SPOTS
2575  007370  001001                      BNE     BTPRT1          ;IF SO: BR
2576  007372  000207                      RTS     PC              ;ELSE RETURN
2577  007374  000137  007200      BTPRT1: JMP     BTOV0           ;PRINT STATS
2578
2579                                    ;BAD TAPE UNRECOVERABLE SUBROUTINE**********
2580
2581  007400  004737  022730      BTUR:   JSR     PC,PAPRT        ;PRINT HEADER
2582  007404  012704  027041              MOV     #MSG107,R4
2583  007410  104000                      TTOUTT                  ;PRINT UNRECOVERABLE BAD SPOT MSG
2584  007412  000207                      RTS     PC              ;RESUME TESTING
2585
```

```
                                        ;*********************************************************
                                        ;READ SEQUENCER:
                                        ;
                                        ;THIS ROUTINE IS USED TO DETERMINE THE SEQUENCE
                                        ;IN WHICH READ TAPE OPERATIONS ARE TO BE PERFORMED.
                                        ;THIS IS NECESSARY WHEN THE UNIT BEING TESTED IS
                                        ;CAPABLE OF READING DATA IN BOTH THE FORWARD AND
                                        ;REVERSE DIRECTIONS.  CONSOLE SWITCHES ONE (1), TWO (2),
                                        ;AND THREE (3) ARE USED TO DETERMINE THE READ SEQUENCE.
                                        ;CONSOLE SWITCH ONE (1) DETERMINES WHETHER TO READ
                                        ;THE BLOCK OF DATA FORWARD FIRST OR REVERSE FIRST.
                                        ;SWITCH TWO (2) DISALLOWS READING IN THE REVERSE
                                        ;DIRECTION AND SWITCH THREE (3) DISALLOWS READING IN
                                        ;THE FORWARD DIRECTION.
                                        ;*********************************************************

007414  012737  000002  000562  RSEQ:   MOV     #2,RDCMD
007422  017704  171160                  MOV     @SWR,R4         ;READ SWITCHES
007426  042704  177763                  BIC     #177763,R4      ;MASK READ BITS
007432  005704                          TST     R4              ;SEE IF BOTH READS
007434  001004                          BNE     RSR             ;IF NOT: BR
007436  032777  000002  171142          BIT     #2,@SWR         ;SEE IF READ REVERSE FIRST
007444  001051                          BNE     RSFR            ;IF NOT: BR
007446  032777  000004  171132  RSR:    BIT     #4,@SWR         ;SEE IF SHOULD READ REVERSE
007454  001005                          BNE     RSF             ;IF NOT: BR
007456  012737  010000  000562          MOV     #10000,RDCMD    ;LOAD READ REVERSE COMMAND
007464  004737  007732                  JSR     PC,READ         ;GO READ REVERSE
007470  032777  000010  171110  RSF:    BIT     #10,@SWR        ;SEE IF SHOULD READ FORWARD
007476  001026                          BNE     RSEX            ;IF NOT: BR
007500  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF HAVE READ REVERSE
007506  001407                          BEQ     RSF0            ;IF NOT: BR
007510  013737  000576  000666          MOV     TSTAL,STAL
007516  004737  012304                  JSR     PC,STALL        ;DO READ STALL
007522  000137  007542                  JMP     RSF1
007526  032777  000001  171052  RSF0:   BIT     #1,@SWR         ;SEE IF WRITE
007534  001002                          BNE     RSF1            ;IF NOT: BR
007536  004737  012056                  JSR     PC,BKSP         ;GO BACKSPACE
007542  012737  000002  000562  RSF1:   MOV     #2,RDCMD        ;LOAD READ FORWARD COMMAND
007550  004737  007732                  JSR     PC,READ         ;GO READ
007554  005737  000660          RSEX:   TST     EOTREC          ;++G BRANCH IF NOT AT EOT
007560  100002                          BPL     1$              ;++G
007562  000137  004424                  JMP     REOT            ;++G ELSE GO REWIND
007566  000207                  1$:     RTS     PC              ;++G EXIT

007570  012737  010000  000562  RSFR:   MOV     #10000,RDCMD
007576  032777  000010  171002          BIT     #10,@SWR        ;SEE IF SHOULD READ FORWARD
007604  001013                          BNE     RSFR1           ;IF NOT: BR
007606  032777  000001  170772          BIT     #1,@SWR         ;SEE IF WRITE
007614  001002                          BNE     RSFR0           ;IF NOT: BR
007616  004737  012056                  JSR     PC,BKSP         ;GO BACKSPACE TO START
007622  012737  000002  000562  RSFR0:  MOV     #2,RDCMD        ;LOAD READ FORWARD COMMAND
007630  004737  007732                  JSR     PC,READ         ;GO READ FORWARD
007634  032777  000004  170744  RSFR1:  BIT     #4,@SWR         ;SEE IF SHOULD READ REVERSE
007642  001344                          BNE     RSEX            ;IF NOT: BR
007644  032737  010000  000562          BIT     #10000,RDCMD
007652  001005                          BNE     RSFR2           ;IF READ REVERSE: BR
```

```
 2642  007654  013737  000576  000666          MOV     TSTAL,STAL      ;DO READ STALL
 2643  007662  004737  012304                  JSR     PC,STALL
 2644  007666  012737  010000  000562  RSFR2:  MOV     #10000,RDCMD    ;LOAD READ REVERSE
 2645  007674  004737  007732                  JSR     PC,READ         ;GO READ REVERSE
 2646  007700  005737  000660                  TST     EOTREC          ;SEE IF AT END OF TAPE
 2647  007704  100011                          BPL     RSFRX           ;++G IF NOT: BR
 2648  007706  163737  000554  000660          SUB     RCNT,EOTREC
 2649  007714  005437  000660                  NEG     EOTREC          ;SET TO PROPER RECORD NUMBER
 2650  007720  005237  000660                  INC     EOTREC
 2651  007724  000137  004424                  JMP     REOT            ;ELSE GO TO REWIND
 2652  007730  000207                  RSFRX:  RTS     PC              ;EXIT
 2653
```

```
2654                                    ;*********************************************************
2655                                    ;READ ROUTINE:
2656                                    ;
2657                                    ;THIS ROUTINE PERFORMS THE READ OPERATION DETERMINED
2658                                    ;BY THE READ SEQUENCE ROUTINE ONE RECORD AT A TIME.
2659                                    ;AT THE END OF EACH READ OPERATION THE STATUS REGISTER
2660                                    ;IS SCANNED FOR EITHER END OF TAPE OR BEGINNING OF TAPE.
2661                                    ;IF EOT WAS REACHED, CONTROL WILL BE PASSED TO
2662                                    ;THE EOT SUBROUTINE TO REWIND THE UNIT AND FLAG IT
2663                                    ;UNAVAILABLE UNTIL ALL UNITS HAVE REACHED EOT.
2664                                    ;IF BOT WAS REACHED AN ERROR IS PRINTED AND THE
2665                                    ;PROGRAM WILL HALT.  TESTING MAY BE RESUMED BY PRESSING
2666                                    ;THE CONTINUE SWITCH.
2667                                    ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE
2668                                    ;READ ROUTINE EXPECTS THE FIRST RECORD OF A
2669                                    ;READ REVERSE TO BE A TM, AND THE LAST RECORD
2670                                    ;OF A READ FORWARD TO BE A TM.  REMEMBER
2671                                    ;THAT THE TM ADDS ONE (1) TO THE TOTAL NUMBER
2672                                    ;OF RECORDS IN A BLOCK.
2673                                    ;CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13) DETERMINE WHETHER
2674                                    ;OR NOT TO CHECK FOR STATUS ERRORS (11) OR DATA ERRORS (13),
2675                                    ;CONSOLE SWITCH FIVE (5) IS USED TO CAUSE A CONTINUOUS
2676                                    ;READ AND SPACE (FORWARD OR REVERSE) OF THE CURRENT
2677                                    ;RECORD ON TAPE (YOZZLE).
2678                                    ;*********************************************************
2679
2680  007732  013700  000554       READ:  MOV     RCNT,R0          ;LOAD REC CNTR
2681  007736  005737  000660              TST     EOTREC           ;SEE IF EOT
2682  007742  100013                      BPL     RDA              ;IF NOT: BR
2683  007744  032737  010000  000562      BIT     #10000,RDCMD     ;SEE IF READ FORWARD
2684  007752  001407                      BEQ     RDA              ;IF SO: BR
2685  007754  042737  100000  000660      BIC     #100000,EOTREC   ;CLEAR FLAG
2686  007762  013703  000660              MOV     EOTREC,R3        ;GET MODIFIED RECORD COUNT
2687  007766  160300                      SUB     R3,R0            ;SET RECORD AT
2688  007770  005200                      INC     R0               ;SET TO PROPER NUMBER OF RECORDS
2689  007772  012737  024761  000652  RDA:  MOV     #MSG6,EMADDR     ;SET ERROR MSG ADDRESS
2690  010000  005037  000676              CLR     TMFLG
2691  010004  032737  010000  000562      BIT     #10000,RDCMD
2692  010012  001406                      BEQ     RD0              ;IF READ FORWARD: BR
2693  010014  005737  000564              TST     TMEX             ;SEE IF TM
2694  010020  001403                      BEQ     RD0              ;IF NOT: BR
2695  010022  005237  000676              INC     TMFLG            ;SET TM FLAG
2696  010026  005200                      INC     R0
2697  010030  013777  000556  170460  RD0:  MOV     FMCNT,@FC        ;LOAD CHAR CNTR
2698  010036  012777  033464  170450      MOV     #RDATA,@BA       ;LOAD DATA ADDR
2699  010044  032737  010000  000562      BIT     #10000,RDCMD     ;SEE IF READ REVERSE
2700  010052  001417                      BEQ     RD1A             ;IF NOT: BR
2701  010054  013703  000556              MOV     FMCNT,R3
2702  010060  005103                      COM     R3
2703  010062  032737  000020  000552      BIT     #20,UDES         ;SEE IF CORE DUMP
2704  010070  001402                      BEQ     RD1              ;IF NOT: BR
2705  010072  000241                      CLC
2706  010074  006003                      ROR     R3               ;R3 = FC/2
2707  010076  060377  170412       RD1:   ADD     R3,@BA           ;SET REVERSE BUS ADDRESS
2708  010102  012737  000076  000672      MOV     #76,MTC1         ;SET READ REVERSE
2709  010110  000403                      BR      RD1B
```

```
2710  010112  012737  000070  000672  RD1A:   MOV     #70,MTC1        ;SET READ FORWARD
2711  010120  012737  010132  000662  RD1B:   MOV     #RD2,RTRN       ;SET INTERRUPT RETURN ADDRESS
2712  010126  000137  021216          RD1D:   JMP     TAPG            ;GO EXECUTE TAPE COMMAND
2713  010132  032737  010000  000562  RD2:    BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2714  010140  001024                          BNE     RD3             ;IF SO: BR
2715  010142  032777  000020  170352          BIT     #20,@DS
2716  010150  001404                          BEQ     RD2B            ;AWAIT SWDN
2717  010152  032777  000020  170342  RD2A:   BIT     #20,@DS
2718  010160  001374                          BNE     RD2A            ;AWAIT TUR
2719  010162  032777  002000  170332  RD2B:   BIT     #2000,@DS       ;SEE IF EOT
2720  010170  001410                          BEQ     RD3             ;IF NOT: BR
2721  010172  005737  000676                  TST     TMFLG           ;SEE IF TM
2722  010176  001005                          BNE     RD3             ;IF SO: BR
2723  010200  010037  000660                  MOV     R0,EOTREC
2724  010204  052737  100000  000660          BIS     #100000,EOTREC  ;SET EOT FLAG
2725  010212  032777  000002  170302  RD3:    BIT     #2,@DS          ;SEE IF AT LOAD POINT
2726  010220  001410                          BEQ     RD4             ;IF NOT: BR
2727  010222  004737  022730                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
2728  010226  012704  025160                  MOV     #MSG22,R4
2729  010232  104000                          TTOUTT                  ;PRINT BOT ERROR
2730  010234  104006                          STOPP
2731  010236  000137  003160                  JMP     STARTA          ;RESTART
2732  010242  032777  004000  170336  RD4:    BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
2733  010250  001121                          BNE     RD5             ;IF NOT: BR
2734  010252  005737  000676                  TST     TMFLG
2735  010256  001472                          BEQ     RD4B            ;IF NO TM EXPT: BR
2736  010260  032777  000004  170234          BIT     #4,@DS
2737  010266  001024                          BNE     RD4A            ;IF TM RECVD: BR
2738  010270  012737  033464  021132          MOV     #RDATA,CADER    ;SAVE EXPT BUS ADDRESS
2739  010276  012737  000002  021140          MOV     #2,DRVER        ;SET TM STATUS ERROR FLAG
2740  010304  004737  020234                  JSR     PC,ERPT         ;GO PRINT TM ERROR
2741  010310  013704  000674                  MOV     UNP,R4
2742  010314  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2743  010322  001403                          BEQ     1$              ;IF NOT: BR
2744  010324  005264  001150                  INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
2745  010330  000502                          BR      RD6
2746  010332  005264  001110          1$:     INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
2747  010336  000477                          BR      RD6
2748  010340  012703  033464          RD4A:   MOV     #RDATA,R3
2749  010344  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2750  010352  001007                          BNE     RD4A0           ;IF SO: BR
2751  010354  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
2752  010362  001025                          BNE     RD4A2           ;IF SO: BR
2753  010364  062703  000002                  ADD     #2,R3
2754  010370  000422                          BR      RD4A2
2755  010372  013704  000556          RD4A0:  MOV     FMCNT,R4
2756  010376  005104                          COM     R4
2757  010400  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2758  010406  001402                          BEQ     RD4A1           ;IF NOT: BR
2759  010410  000241                          CLC
2760  010412  006004                          ROR     R4              ;SET TO FC/2
2761  010414  060403          RD4A1:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2762  010416  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2763  010422  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
2764  010430  001002                          BNE     RD4A2           ;IF SO: BR
2765  010432  162703  000002                  SUB     #2,R3
```

```
2766  010436  004737  017504          RD4A2:  JSR     PC,ER2
2767  010442  000402                  BR      RD4C
2768  010444  004737  017406          RD4B:   JSR     PC,ERCHK        ;GO CHECK ERRORS
2769  010450  005737  000706          RD4C:   TST     SERFL
2770  010454  001417                  BEQ     RD5             ;IF NO ERROR: BR
2771  010456  013704  000674                  MOV     UNP,R4
2772  010462  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2773  010470  001003                  BNE     RD4D            ;IF SO: BR
2774  010472  005264  001110                  INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
2775  010476  000402                  BR      RD4E
2776  010500  005264  001150          RD4D:   INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
2777  010504  004737  010706          RD4E:   JSR     PC,RDRTY        ;GO RETRY
2778  010510  005037  000712                  CLR     RTYFL           ;CLEAR RETRY FLAG
2779  010514  032777  020000  170064  RD5:    BIT     #20000,@SWR     ;SEE IF SHOULD DO DATA CHECK
2780  010522  001005                  BNE     RD6             ;IF NOT; BR
2781  010524  005737  000676                  TST     TMFLG
2782  010530  001002                  BNE     RD6
2783  010532  004737  015544                  JSR     PC,DCHK         ;GO CHECK DATA
2784  010536  005037  000706          RD6:    CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2785  010542  004737  014352                  JSR     PC,DS3          ;CLEAR BUFFER
2786  010546  032777  000040  170032          BIT     #40,@SWR        ;SEE IF SHOULD YOZZLE
2787  010554  001402                  BEQ     RD7             ;IF NOT: BR
2788  010556  004737  011274                  JSR     PC,YOZ          ;ELSE GO YOZZLE
2789  010562  013737  000572  000666  RD7:    MOV     RSTAL,STAL      ;SET DELAY
2790  010570  004737  012304                  JSR     PC,STALL        ;STALL
2791  010574  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2792  010602  001403                  BEQ     RD7A            ;IF NOT: BR
2793  010604  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
2794  010610  000405                  BR      RD10
2795  010612  005737  000660          RD7A:   TST     EOTREC          ;SEE IF EOT FOUND
2796  010616  100002                  BPL     RD10            ;IF NOT: BR
2797  010620  012700  000001                  MOV     #1,R0           ;SET TO EOT
2798  010624  005300                  RD10:   DEC     R0
2799  010626  001402                  BEQ     RD11            ;IF DONE ALL: BR
2800  010630  000137  010030                  JMP     RD0
2801  010634  032737  010000  000562  RD11:   BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2802  010642  001016                  BNE     RDEX            ;IF SO: BR
2803  010644  005737  000660                  TST     EOTREC          ;SEE IF FOUND EOT
2804  010650  100413                  BMI     RDEX            ;IF SO: BR
2805  010652  005737  000564                  TST     TMEX            ;SEE IF TM EXPECTED
2806  010656  001410                  BEQ     RDEX            ;IF NOT: BR
2807  010660  005737  000676                  TST     TMFLG           ;SEE IF TM FOUND
2808  010664  001005                  BNE     RDEX            ;IF SO: BR
2809  010666  005237  000676                  INC     TMFLG           ;ELSE SET FLAG
2810  010672  005200                  INC     R0              ;SET RECORD COUNT TO ONE
2811  010674  000137  010030                  JMP     RD0             ;GO READ TM
2812  010700  005037  000676          RDEX:   CLR     TMFLG
2813  010704  000207                  RDX:    RTS     PC              ;EXIT
```

```
2814                                    ;*********************************************************
2815                                    ;READ ERROR RETRY SUBROUTINE:
2816                                    ;
2817                                    ;THIS SUBROUTINE WILL RETRY ALL DATA RELATED
2818                                    ;READ ERRORS UP TO EIGHT (8) TIMES.  IF ALL
2819                                    ;FOUR RETRIES ARE BAD, IT IS CONSIDERED
2820                                    ;A HARD ERROR.  IF ANY ARE GOOD, IT IS A
2821                                    ;SOFT ERROR.  RETRIES MAY BE INHIBITED
2822                                    ;VIA SWITCH FOUR (SW4=0: INHIBIT RETRIES)
2823                                    ;*********************************************************
2824
2825  010706  032777  000020  167672  RDRTY:  BIT     #20,@SWR        ;SEE IF RETRY INHIBITED
2826  010714  001001                   BNE     RDRT0           ;IF NOT: BR
2827  010716  000207                   RTS     PC              ;ELSE RETURN
2828  010720  013703  000722          RDRT0:  MOV     ERSAV,R3
2829  010724  042703  102700                  BIC     #102700,R3      ;MARK NON-RECOVERABLE ERROR BITS
2830  010730  001410                   BEQ     RDRT1           ;IF NOT: BR
2831  010732  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
2832  010736  012704  026604                  MOV     #MSG79,R4
2833  010742  104000                   TTOUTT                  ;PRINT NON-RECOVERABLE MESSAGE
2834  010744  004737  011260                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE ERROR
2835  010750  000207          RDRT1A: RTS     PC              ;RETURN
2836  010752  032777  002000  167626  RDRT1:  BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2837  010760  001003                   BNE     RDRT1B          ;IF SO: BR
2838  010762  012704  026257                  MOV     #MSG64,R4
2839  010766  104000                   TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2840  010770  005037  000702          RDRT1B: CLR     RTCNT           ;CLEAR RETRY COUNTER
2841  010774  005037  000706          RDRTG:  CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2842  011000  012737  000002  000712          MOV     #2,RTYFL        ;SET READ RETRY FLAG
2843  011006  004737  011274                  JSR     PC,YOZ          ;GO TO YOZZLE TO RETRY READ
2844  011012  005737  000706                  TST     SERFL           ;SEE IF RETRY ERROR
2845  011016  001031                   BNE     RDRT5           ;IF SO: BR
2846  011020  032777  002000  167560          BIT     #2000,@SWR
2847  011026  001011                   BNE     RDRT2
2848  011030  012704  026736                  MOV     #MSG105,R4
2849  011034  104000                   TTOUTT                  ;PRINT RECOVERED MESSAGE
2850  011036  012704  026301                  MOV     #MSG65,R4
2851  011042  104000                   TTOUTT                  ;PRINT RETRY TAG
2852  011044  013703  000702                  MOV     RTCNT,R3
2853  011050  104002                   OCTPP                   ;PRINT RETRY NUMBER
2854  011052  013704  000674          RDRT2:  MOV     UNP,R4
2855  011056  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2856  011064  001003                   BNE     RDRT3           ;IF SO: BR
2857  011066  005264  002670                  INC     RFSOFT(R4)      ;ELSO BUMP FORWARD SOFT ERROR COUNTER
2858  011072  000402                   BR      RDRT4
2859  011074  005264  002710          RDRT3:  INC     RRSOFT(R4)      ;BUMP ERRORS SOFT CNTR
2860  011100  000207          RDRT4:  RTS     PC              ;RETURN
2861  011102  005037  000646          RDRT5:  CLR     TEMP3           ;++G CLEAR RECOVERABLE ERROR INDICATOR
2862  011106  013703  000722                  MOV     ERSAV,R3        ;GET ER
2863  011112  042703  102700                  BIC     #102700,R3      ;MASK RECOVERABLE BITS
2864  011116  001413                   BEQ     RDRT5A          ;IF RECOVERABLE: BR
2865  011120  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
2866  011124  012704  026604                  MOV     #MSG79,R4
2867  011130  104000                   TTOUTT                  ;PRINT NON-RECOVERABLE MSG
2868  011132  004737  011260                  JSR     PC,NRTP         ;PRINT ER
2869  011136  012737  000001  000646          MOV     #1,TEMP3        ;SET FLAG
```

```
2870  011144  000404                          BR      RDRT5B
2871  011146  032777  002000  167432  RDRT5A: BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2872  011154  001014                          BNE     RDRT6           ;IF SO: BR
2873  011156  012704  026301          RDRT5B: MOV     #MSG65,R4
2874  011162  104000                          TTOUTT                  ;PRINT RETRY TAG
2875  011164  013703  000702                  MOV     RTCNT,R3
2876  011170  104002                          OCTPP                   ;PRINT RETRY NUMBER
2877  011172  005737  000646                  TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
2878  011176  001403                          BEQ     RDRT6           ;IF NOT: BR
2879  011200  005037  000646                  CLR     TEMP3           ;CLEAR FLAG
2880  011204  000207                          RTS     PC              ;EXIT
2881  011206  005237  000702          RDRT6:  INC     RTCNT
2882  011212  023737  000702  000602          CMP     RTCNT,RETRY     ;SEE IF DONE 8 RETRIES
2883  011220  001265                          BNE     RDRTG           ;IF NOT: BR
2884  011222  012704  027271                  MOV     #MSG115,R4
2885  011226  104000                          TTOUTT                  ;PRINT HARD ERROR MESSAGE
2886  011230  013704  000674                  MOV     UNP,R4
2887  011234  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2888  011242  001003                          BNE     RDRT7           ;IF SO: BR
2889  011244  005264  002730                  INC     RFHARD(R4)      ;BUMP FORWARD HARD ERROR CNTR
2890  011250  000402                          BR      RDRTX
2891  011252  005264  002750          RDRT7:  INC     RRHARD(R4)      ;BUMP REVERSE HARD ERROR CNTR
2892  011256  000207                  RDRTX:  RTS     PC              ;RETURN
2893
2894  011260  013703  000722          NRTP:   MOV     ERSAV,R3        ;GET ER REGISTER
2895  011264  104002                          OCTPP                   ;PRINT ER
2896  011266  004737  021156                  JSR     PC,FRPRT        ;PRINT F OR R
2897  011272  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.
                                        ;*********************************************************

011274  012777  000001  167306  YOZ:    MOV     #1,@TKS         ;SET TTY ENABLE
011302  013737  000600  000666          MOV     YSTAL,STAL
011310  004737  012304                  JSR     PC,STALL        ;DO YOZZLE STALL
011314  012777  177777  167174  YOZ0:   MOV     #-1,@FC         ;SET TO 1 RECORD SPACING
011322  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011330  001404                          BEQ     YOZA            ;IF NOT: BR
011332  112737  000030  000672          MOVB    #30,MTC1        ;SET TO SPACE FORWARD
011340  000403                          BR      YOZB
011342  112737  000032  000672  YOZA:   MOVB    #32,MTC1        ;SET TO SPACE REVERSE
011350  012737  011370  000662  YOZB:   MOV     #YOZC,RTRN      ;SET RETURN ADDRESS
011356  012737  177775  000666          MOV     #177775,STAL    ;SET TIME MULTIPLIER
011364  000137  021216                  JMP     TAPG            ;GO YOZZLE
011370  005737  000676          YOZC:   TST     TMFLG           ;SEE IF TM
011374  001404                          BEQ     1$              ;IF NOT: BR
011376  012737  040000  000666          MOV     #40000,STAL     ;SET TM STALL
011404  000403                          BR      2$
011406  013737  000600  000666  1$:     MOV     YSTAL,STAL
011414  004737  012304          2$:     JSR     PC,STALL        ;DO YOZZLE STALL
011420  012777  033464  167066          MOV     #RDATA,@BA      ;SET BUS ADDRESS
011426  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011434  001417                          BEQ     YOZC1           ;IF NOT: BR
011436  013703  000556                  MOV     FMCNT,R3
011442  005103                          COM     R3
011444  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
011452  001402                          BEQ     YOZC0           ;IF NOT: BR
011454  000241                          CLC
011456  006003                          ROR     R3              ;R3 = FC/2
011460  060377  167030          YOZC0:  ADD     R3,@BA          ;SET REVERSE BUS ADDRESS
011464  012737  000076  000672          MOV     #76,MTC1        ;SET READ REVERSE
011472  000403                          BR      YOZC2
011474  012737  000070  000672  YOZC1:  MOV     #70,MTC1        ;SET READ FORWARD
011502  013777  000556  167006  YOZC2:  MOV     FMCNT,@FC       ;SET CHARACTER COUNT
011510  012737  011522  000662          MOV     #YOZD,RTRN      ;SET RETURN ADDRESS
011516  000137  021216                  JMP     TAPG            ;GO READ
011522  032777  004000  167056  YOZD:   BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
011530  001051                          BNE     YOZE            ;IF NOT: BR
011532  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
011536  001444                          BEQ     YOZD1           ;IF NOT: BR
011540  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011546  001426                          BEQ     YOZD0           ;IF NOT: BR
011550  012703  033464                  MOV     #RDATA,R3
011554  013704  000556                  MOV     FMCNT,R4
011560  005104                          COM     R4
```

```
2954  011562  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2955  011570  001402                          BEQ     YOZD4           ;IF NOT: BR
2956  011572  000241                          CLC
2957  011574  006004                          ROR     R4              ;SET TO FC/2
2958  011576  060403                  YOZD4:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2959  011600  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2960  011604  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2961  011612  001001                          BNE     YOZD2           ;IF SO: BR
2962  011614  005743                          TST     -(R3)           ;SET EXPT BA
2963  011616  004737  017504          YOZD2:  JSR     PC,ER2          ;GO CHECK ERRORS
2964  011622  000430                          BR      YOZF
2965  011624  012703  033464          YOZD0:  MOV     #RDATA,R3
2966  011630  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2967  011636  001001                          BNE     YOZD3           ;IF SO: BR
2968  011640  005723                          TST     (R3)+           ;SET EXPT BA
2969  011642  004737  017504          YOZD3:  JSR     PC,ER2          ;GO CHECK ERRORS
2970  011646  000416                          BR      YOZF
2971  011650  004737  017406          YOZD1:  JSR     PC,ERCHK        ;ELSE GO CHECK ERRORS
2972  011654  032777  020000  166724  YOZE:   BIT     #20000,@SWR     ;SEE IF SHOULD CHECK DATA
2973  011662  001010                          BNE     YOZF            ;IF NOT: BR
2974  011664  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK
2975  011670  001005                          BNE     YOZF            ;IF SO: BR
2976  011672  005737  000712                  TST     RTYFL           ;SEE IF RETRY
2977  011676  001004                          BNE     YOZF0           ;IF SO: BR
2978  011700  004737  015544                  JSR     PC,DCHK         ;ELSE GO CHECK DATA
2979  011704  004737  014352          YOZF:   JSR     PC,DS3          ;GO CLEAR DATA AREA
2980  011710  105777  166674          YOZF0:  TSTB    @TKS            ;SEE IF HAVE NEW STALL VALUE
2981  011714  100032                          BPL     YOZG            ;IF NOT: BR
2982  011716  122777  000203  166666          CMPB    #203,@TKB       ;SEE IF CONT C
2983  011724  001026                          BNE     YOZG            ;IF NOT: BR
2984  011726  012704  025761                  MOV     #MSG44,R4
2985  011732  104000                          TTOUTT                  ;PRINT YSTALL REQUEST
2986  011734  013703  000600                  MOV     YSTAL,R3
2987  011740  104002                          OCTPP                   ;PRINT PRESENT STALL
2988  011742  010037  000646                  MOV     R0,TEMP3        ;SAVE R0(REC CNT)
2989  011746  012705  000600                  MOV     #YSTAL,R5       ;SET ADDRESS OF YSTL
2990  011752  012701  000006                  MOV     #6,R1           ;SET NUMBER OF CHAR TO INPUT
2991  011756  012702  177777                  MOV     #-1,R2          ;SET MAXIMUM LIMIT
2992  011762  012703  002000                  MOV     #2000,R3        ;SET MINIMUM LIMIT
2993  011766  004737  023346                  JSR     PC,TTR          ;GO GET VALUE
2994  011772  013700  000646                  MOV     TEMP3,R0        ;RESTORE R0(REC CNTR)
2995  011776  000137  011274                  JMP     YOZ             ;RESTART YOZZLE
2996  012002  122777  000207  166602  YOZG:   CMPB    #207,@TKB       ;CHECK FOR CNTL G
2997  012010  001010                          BNE     YOZI
2998  012012  022737  000176  000606          CMP     #SWREG,SWR      ;IS SWREG SELECTED
2999  012020  001004                          BNE     YOZI
3000  012022  005077  166564                  CLR     @TKB            ;CLEAR CNTL G OUT OF BUFFER
3001  012026  004737  024444                  JSR     PC,CNTG         ;GO CHANGE SWREG
3002  012032  032777  000040  166546  YOZI:   BIT     #40,@SWR        ;SEE IF SHOULD CONTINUE YOZZLE
3003  012040  001402                          BEQ     YOZH            ;IF NOT: BR
3004  012042  000137  011314                  JMP     YOZO
3005  012046  012777  000100  166534  YOZH:   MOV     #100,@TKS       ;SET TTY INTERRUPT ENABLE
3006  012054  000207                          RTS     PC              ;EXIT
3007
```

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

012056  013737  000576  000666  BKSP:   MOV     TSTAL,STAL
012064  004737  012304                  JSR     PC,STALL        ;DO TURN AROUND STALL
012070  012737  025011  000652          MOV     #MSG10,EMADDR
012076  012777  033464  166410          MOV     #RDATA,@BA
012104  005737  000564                  TST     TMEX            ;SEE IF TM
012110  001440                          BEQ     B0              ;IF NOT: BR
012112  012777  177777  166376          MOV     #-1,@FC
012120  012737  000032  000672          MOV     #32,MTC1
012126  012737  012140  000662          MOV     #BKTM,RTRN
012134  000137  021216                  JMP     TAPG            ;SPACE TO TM
012140  032777  010000  166440  BKTM:   BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERROR
012146  001021                          BNE     B0              ;IF NOT: BR
012150  012737  026173  000652          MOV     #MSG55,EMADDR
012156  032777  000004  166336          BIT     #4,@DS          ;SEE IF TM
012164  001006                          BNE     BKTM0           ;IF SO: BR
012166  012737  033464  021132          MOV     #RDATA,CADER
012174  004737  020234                  JSR     PC,ERPT         ;PRINT ERROR
012200  000404                          BR      B0
012202  012703  033464          BKTM0:  MOV     #RDATA,R3
012206  004737  017504                  JSR     PC,ER2
012212  013700  000554          B0:     MOV     RCNT,R0
012216  005100                          COM     R0              ;BUILD SPACE AMOUNT
012220  005200                          INC     R0
012222  012737  025011  000652          MOV     #MSG10,EMADDR   ;SET ERROR MESG ADDRESS
012230  010077  166262                  MOV     R0,@FC
012234  012737  000032  000672  BKRT:   MOV     #32,MTC1        ;SET SPACE REVERSE
012242  012737  012260  000662          MOV     #B1,RTRN        ;SET RETURN ADDRESS
012250  010037  000666                  MOV     R0,STAL         ;SET INTERRUPT TIME MULTIPLIER
012254  000137  021216                  JMP     TAPG            ;GO DO SPACE
012260  012703  033464          B1:     MOV     #RDATA,R3
012264  004737  017504                  JSR     PC,ER2
012270  013737  000576  000666  B2:     MOV     TSTAL,STAL      ;DO STALL
012276  004737  012304                  JSR     PC,STALL        ;STALL
012302  000207                          RTS     PC              ;EXIT
```

```
3060
3061                                    ;*********************************************************
3062                                    ;STALL ROUTINE:
3063                                    ;
3064                                    ;THIS ROUTINE IS USED TO PROVIDE SOFTWARE DELAYS
3065                                    ;DURING READ, WRITE, TURN AROUND, AND YOZZLE.
3066                                    ;THE DELAY TIMES MAY BE SET BY THE OPERATOR AT
3067                                    ;INITIAL START FROM 200(8) OR MAY BE MODIFIED
3068                                    ;AT ANY TIME BY ENTERING CNTRL C ON THE TTY AND
3069                                    ;INSERTING NEW VALUES IN RESPONSE TO THE REQUEST.
3070                                    ;THE READ STALL AND THE WRITE STALL ARE DELAYS
3071                                    ;EXECUTED BETWEEN EACH RECORD OF THE DATA BLOCK.
3072                                    ;THE TURN AROUND STALL IS EXECUTED EACH TIME
3073                                    ;THE DIRECTION OF TAPE MOVEMENT IS CHANGED AND
3074                                    ;ALSO EACH TIME THE TAPE OPERATION CHANGES FROM
3075                                    ;WRITE TO READ OR READ TO WRITE. THE YOZZLE
3076                                    ;STALL IS EXECUTED ONLY DURING THE YOZZLE ROUTINE.
3077                                    ;*********************************************************
3078
3079  012304  005337  000666    STALL:  DEC     STAL
3080  012310  001375                    BNE     STALL           ;DELAY
3081  012312  000207                    RTS     PC              ;EXIT
```

```
3082
3083                                    ;*******************************************************
3084                                    ;RANDOM CHARACTER COUNT GENERATOR:
3085                                    ;
3086                                    ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH
3087                                    ;SEVEN (7) IS USED TO GENERATE A RANDOM
3088                                    ;CHARACTER COUNT FOR EACH DATA BLOCK.
3089                                    ;ALL RECORDS WITHIN A GIVEN BLOCK WILL BE
3090                                    ;THE SAME, BUT EACH BLOCK WILL VARY.
3091                                    ;THE LIMITS ARE TWENTY (20) TO FOUR THOUSAND
3092                                    ;(4000) OCTAL CHARACTERS PER RECORD.
3093                                    ;*******************************************************
3094
3095  012314  012701  177760       CCNTR:  MOV     #-20,R1         ;SET HIGH LIMIT
3096  012320  012702  174000               MOV     #-4000,R2       ;SET LOW LIMIT
3097  012324  004737  023314               JSR     PC,RANG         ;GO GENERATE NUMBER
3098  012330  042737  000001  000626       BIC     #1,RANSAV
3099  012336  013737  000626  000556       MOV     RANSAV,FMCNT    ;SET CHAR COUNT
3100  012344  012737  177777  014406       MOV     #-1,PATS        ;PRESET DATA PATTERN
3101  012352  000207                       RTS     PC              ;EXIT
3102
3103                                    ;*******************************************************
3104                                    ;RANDOM RECORD COUNT GENERATOR:
3105                                    ;
3106                                    ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH SIX (6)
3107                                    ;IS USED TO GENERATE A RANDOM NUMBER OF RECORDS
3108                                    ;FOR EACH BLOCK OF DATA.
3109                                    ;THE LIMITS ARE ONE (1) TO FIVE HUNDRED (500) OCTAL
3110                                    ;RECORDS PER BLOCK.
3111                                    ;*******************************************************
3112
3113  012354  012702  000001       RCNTR:  MOV     #1,R2           ;SET LOW LIMIT
3114  012360  012701  000500               MOV     #500,R1         ;SET HIGH LIMIT
3115  012364  004737  023314               JSR     PC,RANG         ;GO GENERATE NUMBER
3116  012370  013737  000626  000554       MOV     RANSAV,RCNT     ;SET RECORD COUNT
3117  012376  000207                       RTS     PC              ;EXIT
3118
3119
```

```
3120
3121                            ;*********************************************************
3122                            ;TEST CONDITION ENTRY ROUTINE:
3123                            ;
3124                            ;THIS ROUTINE IS USED TO ALLOW THE OPERATOR
3125                            ;TO ENTER, AT THE TTY, THE NECESSARY PARAMETERS
3126                            ;TO RUN THE PROGRAM AS HE WISHES.  THE
3127                            ;ROUTINE IS ONLY ENTERED UPON INITIAL STARTING
3128                            ;FROM LOCATION 200(8).
3129                            ;THE MAIN PURPOSE OF THIS ROUTINE IS TO ESTABLISH
3130                            ;A TABLE OF DEVICES TO BE TESTED.  THIS TABLE
3131                            ;CONSISTS OF AN ENTRY FOR EACH OF ONE (1) TO
3132                            ;EIGHT (8) DEVICES.  EACH ENTRY CONTAINS THE
3133                            ;SLAVE NUMBER, DENSITY, PARITY, AND
3134                            ;FORMAT.  THE INFORMATION IS ENTERED
3135                            ;IN RESPONSE TO PRINTED REQUESTS AT THE TTY.
3136                            ;SLAVES MAY BE ENTERED IN ANY ORDER.  EACH
3137                            ;PARAMETER IS CHECKED FOR LEGALITY BEFORE BEING
3138                            ;SET INTO THE TABLE.
3139                            ;THE DRIVE NUMBER REQUEST WILL ALSO CHECK THE MASSBUS
3140                            ;FOR THE PRESENCE OF THE REQUESTED DRIVE.  IF IT IS NOT FOUND,
3141                            ;A NON-EXIST DRIVE MESSAGE WILL BE PRINTED AND ANOTHER DRIVE
3142                            ;REQUEST MADE.  WHEN THE DRIVE IS FOUND, THE RESPONSE IS STORED
3143                            ;AND CONTROL PASSED TO THE SLAVE SELECT ROUTINE.
3144                            ;THE SLAVE SELECT ROUTINE ALSO CHECKS FOR THE PRESENCE OF THE
3145                            ;SLAVE.  IF IT IS NOT PRESENT, A MESSAGE IS PRINTED AND ANOTHER
3146                            ;REQUEST IS ISSUED.  WHEN THE SELECTED SLAVE IS FOUND TO BE
3147                            ;PRESENT, A MESSAGE IS PRINTED IF IT IS A 7 CHANNEL DRIVE
3148                            ;TO ASSIST IN SELECTING DENSITY, PARITY, AND FORMAT.
3149                            ;UPON COMPLETION OF THE DEVICE TABLE, REQUESTS
3150                            ;ARE PRINTED FOR ENTRY OF THE NUMBER OF CHARACTERS
3151                            ;PER RECORD AND THE NUMBER OF RECORDS PER BLOCK.  THE
3152                            ;NEXT REQUEST IS FOR A PATTERN NUMBER TO BE USED
3153                            ;FOR WRITING AND CHECKING OF READ DATA.
3154                            ;FOLLOWING THE PATTERN REQUEST IS THE TAPE MARK OPTION.
3155                            ;RESPONDING TO THE REQUEST (TM=) WITH A ONE (1)
3156                            ;WILL CAUSE THE PROGRAM TO WRITE A TM AT THE
3157                            ;END OF EACH DATA BLOCK AND TO EXPECT THE
3158                            ;TM TO BE DETECTED IN EITHER READ FORWARD AND REVERSE
3159                            ;OR DURING SPACE OPERATION.  A RESPONSE OF ZERO (TM=0)
3160                            ;DISALLOWS WRITTING OF THE TM AND CAUSES THE READ
3161                            ;AND SPACE ROUTINES TO EXPECT NO TM TO BE PRESENT.
3162                            ;THE LAST REQUESTS ARE FOR ENTRY OF THE DESIRED
3163                            ;WRITE, READ, AND TURN AROUND STALLS.
3164                            ;*********************************************************
3165
3166  012400  005737  000634   TINP:   TST     TINF            ;SEE IF SHOULD INPUT FROM TTY
3167  012404  001001                   BNE     TINPA           ;IF SO: BR
3168  012406  000207                   RTS     PC              ;EXIT
3169  012410  005037  000674   TINPA:  CLR     UNP             ;CLEAR TABLE POINTER
3170  012414  005037  005156           CLR     REOTC           ;CLEAR EOT UNIT COUNTER
3171  012420  012700  000010           MOV     #10,R0          ;SET SIZE OF TABLE
3172  012424  012701  000746           MOV     #UN1,R1         ;SET START OF TABLE
3173  012430  005021           TINPB:  CLR     (R1)+           ;CLEAR TABLE
3174  012432  005300                   DEC     R0              ;SEE IF DONE
3175  012434  001375                   BNE     TINPB           ;IF NOT: BR
```

```
3176  012436  012704  025453                  MOV     #MSG31,R4
3177  012442  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
3178  012446  001402                          BEQ     TINPB1          ;IF NOT: BR
3179  012450  012704  025401                  MOV     #MSG30,R4       ;SET AUTO SEQ HDR
3180  012454  104000              TINPB1:     TTOUTT                  ;PRINT PROGRAM NAME
3181  012456  005737  014150                  TST     SCVFL           ;SEE IF SHORT CONVERSATION
3182  012462  001067                          BNE     TINPC           ;IF SO: BR
3183  012464  012704  026463                  MOV     #MSG74,R4
3184  012470  104000                          TTOUTT                  ;REQUEST STARTING REGISTER ADDRESS
3185  012472  013703  000544                  MOV     REGS,R3
3186  012476  104002                          OCTPP                   ;PRINT CURRENT REG START
3187  012500  012705  000544                  MOV     #REGS,R5        ;SAVE ADDRESS LOCATION
3188  012504  012701  000006                  MOV     #6,R1           ;SET SIZE OF ENTRY
3189  012510  012702  176400                  MOV     #176400,R2      ;SET UPPER LIMIT
3190  012514  012703  172300                  MOV     #172300,R3      ;SET LOWER LIMIT
3191  012520  004737  023346                  JSR     PC,TTR          ;GO GET RESPONSE
3192  012524  012704  026506                  MOV     #MSG75,R4
3193  012530  104000                          TTOUTT                  ;GO REQUEST VECTOR ADDRESS
3194  012532  013703  000546                  MOV     VECT,R3
3195  012536  104002                          OCTPP                   ;PRINT CURRENT VECTOR
3196  012540  012705  000546                  MOV     #VECT,R5        ;SET SAVE LOCATION
3197  012544  012701  000003                  MOV     #3,R1           ;SET SIZE OF ENTRY
3198  012550  012702  000224                  MOV     #224,R2         ;SET UPPER LIMIT
3199  012554  012703  000150                  MOV     #150,R3         ;SET LOWER LIMIT
3200  012560  004737  023346                  JSR     PC,TTR          ;GO GET RESPONSE
3201  012564  013700  000546                  MOV     VECT,R0         ;GET VECTOR ADDRESS
3202  012570  012720  021714                  MOV     #MTINT,(R0)+    ;LOAD VECTOR WITH HANDLER ADDRESS
3203  012574  012710  000340                  MOV     #340,(R0)       ;LOAD PRIORITY LEVEL
3204  012600  013700  000544                  MOV     REGS,R0         ;GET STARTING REGISTER ADDRESS
3205  012604  012701  000016                  MOV     #16,R1          ;SET NUMBER OF REGISTERS
3206  012610  012702  000510                  MOV     #C1,R2          ;GET FIRST ADDRESS LOCATION
3207  012614  010022              TINPB0:     MOV     R0,(R2)+        ;BUILD TABLE OF ADDRESSES
3208  012616  062700  000002                  ADD     #2,R0           ;BUMP ADDRESS
3209  012622  005301                          DEC     R1              ;SEE IF DONE
3210  012624  001373                          BNE     TINPB0          ;IF NOT: BR
3211  012626  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
3212  012632  001403                          BEQ     TINPC           ;IF NOT: BR
3213  012634  005726                          TST     (SP)+           ;RESET STACK POINTER
3214  012636  000137  021732                  JMP     ASEQ            ;GO TO AUTO SEQUENCE
3215  012642  012777  000040  165650  TINPC:  MOV     #40,@CS         ;INITIALIZE
3216  012650  012704  026127                  MOV     #MSG52,R4
3217  012654  104000                          TTOUTT                  ;REQUEST DRIVE NUMBER
3218  012656  012705  000550                  MOV     #DVN,R5         ;GET ADDRESS
3219  012662  012701  000001                  MOV     #1,R1           ;SET SIZE OF RESPONSE
3220  012666  012702  000007                  MOV     #7,R2           ;SET UPPER LIMIT
3221  012672  012703  000000                  MOV     #0,R3           ;SET LOWER LIMIT
3222  012676  004737  023346                  JSR     PC,TTR          ;GO GET DRIVE NUMBER
3223  012702  013777  000550  165610          MOV     DVN,@CS
3224  012710  005777  165574                  TST     @C1             ;ACCESS DRIVE
3225  012714  032777  010000  165576          BIT     #10000,@CS      ;SEE IF NED
3226  012722  001411                          BEQ     TINP0           ;IF NOT: BR
3227  012724  012704  026420                  MOV     #MSG71,R4
3228  012730  104000                          TTOUTT                  ;PRINT NED
3229  012732  013704  000510                  MOV     C1,R4
3230  012736  005204                          INC     R4
3231  012740  152714  000100                  BISB    #100,(R4)       ;CLEAR TRE
```

```
3232  012744  000736                        BR      TINPC           ;++G RETRY DVN
3233  012746  012704  025515        TINP0:  MOV     #MSG32,R4
3234  012752  104000                        TTOUTT                  ;PRINT UNIT NUMBER REQUEST
3235  012754  005037  000644                CLR     TEMP2           ;CLEAR BUFFER
3236  012760  012705  000644                MOV     #TEMP2,R5       ;SET UNIT DESCRIPTION BUFFER ADDRESS
3237  012764  012701  000001                MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3238  012770  012702  000007                MOV     #7,R2           ;SET MAXIMUM LIMIT
3239  012774  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
3240  013000  004737  023346                JSR     PC,TTR          ;GO GET UNIT NUMBER
3241  013004  005737  000642                TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3242  013010  001013                        BNE     TINP0B          ;IF SO: BR
3243  013012  005737  000674                TST     UNP             ;SEE IF FIRST ENTRY
3244  013016  001001                        BNE     TINP0A          ;IF NOT: BR
3245  013020  000752                        BR      TINP0           ;++G ELSE RETRY
3246  013022  013700  000674        TINP0A: MOV     UNP,R0
3247  013026  012760  177777  000746        MOV     #-1,UN1(R0)     ;SET END UNIT TABLE
3248  013034  000137  013424                JMP     TINP2C          ;GO GET RECORD COUNT
3249  013040  013700  000674        TINP0B: MOV     UNP,R0
3250  013044  042760  000007  000746        BIC     #7,UN1(R0)      ;CLEAR UNIT NUMBER
3251  013052  004737  014164                JSR     PC,TPOS1        ;GO LOAD UNIT NUMBER TO PROPER POSITION
3252  013056  012777  000040  165434        MOV     #40,@CS
3253  013064  013777  000550  165426        MOV     DVN,@CS
3254  013072  016077  000746  165442        MOV     UN1(R0),@C2     ;LOAD UNIT NUMBER
3255  013100  032777  002000  165430 TINP0C: BIT     #2000,@DT       ;SEE  IF SLAVE PRESENT
3256  013106  001005                        BNE     TINP0D          ;IF SO: BR
3257  013110  012704  026206                MOV     #MSG57,R4
3258  013114  104000                        TTOUTT                  ;PRINT NON-EXIST SLAVE
3259  013116  000137  012746                JMP     TINP0           ;REDO
3260  013122  022777  142011  165406 TINP0D: CMP     #142011,@DT     ;++G SEE IF 9TRK TM02,TU16/TE16
3261  013130  001406                        BEQ     TINP0E          ;IF SO: BR
3262  013132  012704  026102                MOV     #MSG50,R4       ;ILLEGAL DRIVE TYPE
3263  013136  104000                        TTOUTT                  ;GO PRINT
3264  013140  017703  165372                MOV     @DT,R3
3265  013144  104002                        OCTPP                   ;PRINT DRIVE TYPE REGISTER
3266  013146  012704  025003        TINP0E: MOV     #MSG9,R4
3267  013152  104000                        TTOUTT                  ;PRINT SERIAL NUMBER TAG
3268  013154  017703  165360                MOV     @SN,R3
3269  013160  004737  024272                JSR     PC,SNPT         ;PRINT SERIAL NUMBER
3270  013164  012704  025536        TINP1:  MOV     #MSG33,R4
3271  013170  104000                        TTOUTT                  ;PRINT DENSITY REQUEST
3272  013172  005037  000644                CLR     TEMP2           ;CLEAR BUFFER
3273  013176  012701  000001                MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3274  013202  012702  000007                MOV     #7,R2           ;SET MAXIMUM LIMIT
3275  013206  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
3276  013212  004737  023346                JSR     PC,TTR          ;GO GET DENSITY
3277  013216  005737  000642                TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3278  013222  001407                        BEQ     TINP2           ;IF NOT: BR
3279  013224  042737  003400  000552        BIC     #3400,UDES      ;ELSE CLEAR OLD PARAMETER
3280  013232  012703  000010                MOV     #10,R3          ;SET POSITION FACTOR
3281  013236  004737  014152                JSR     PC,TPOS         ;GO LOAD DENSITY INTO PROPER POSITION
3282  013242  012704  025552        TINP2:  MOV     #MSG34,R4
3283  013246  104000                        TTOUTT                  ;PRINT PARITY REQUEST
3284  013250  005037  000644                CLR     TEMP2           ;CLR BUFFER
3285  013254  012701  000001                MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3286  013260  012702  000001                MOV     #1,R2           ;SET MAXIMUM LIMIT
3287  013264  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
```

```
3288  013270  004737  023346                  JSR     PC,TTR          ;GO INPUT PARITY
3289  013274  005737  000642                  TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3290  013300  001407                          BEQ     TINP2A          ;IF NOT: BR
3291  013302  042737  000010  000552          BIC     #10,UDES        ;ELSE CLEAR OLD PARAMETER
3292  013310  012703  000003                  MOV     #3,R3           ;SET POSITION FACTOR
3293  013314  004737  014152                  JSR     PC,TPOS         ;GO LOAD PARITY TO PROPER POSITION
3294  013320  012704  026151          TINP2A: MOV     #MSG53,R4
3295  013324  104000                          TTOUTT                  ;REQUEST FORMAT
3296  013326  005037  000644                  CLR     TEMP2
3297  013332  012701  000002                  MOV     #2,R1
3298  013336  012702  000016                  MOV     #16,R2
3299  013342  012703  000014                  MOV     #14,R3
3300  013346  004737  023346                  JSR     PC,TTR          ;GO GET FORMAT
3301  013352  005737  000642                  TST     TEMP1           ;SEE IF NEW PARAMETER
3302  013356  001407                          BEQ     TINP2B          ;IF NOT: BR
3303  013360  042737  000170  000552          BIC     #170,UDES
3304  013366  012703  000004                  MOV     #4,R3
3305  013372  004737  014152                  JSR     PC,TPOS
3306  013376  005237  005156          TINP2B: INC     REOTC           ;BUMP EOT UNIT COUNTER
3307  013402  022737  000016  000674          CMP     #16,UNP         ;SEE IF DONE UNITS
3308  013410  001405                          BEQ     TINP2C          ;IF SO: BR
3309  013412  062737  000002  000674          ADD     #2,UNP          ;POINT TO NEXT UNIT
3310  013420  000137  012746                  JMP     TINP0           ;ELSE LOOK FOR NEXT UNIT
3311  013424  005037  000674          TINP2C: CLR     UNP             ;CLEAR UNIT POINTER
3312  013430  013700  005156                  MOV     REOTC,R0
3313  013434  000337  005156                  SWAB    REOTC
3314  013440  110037  005156                  MOVB    R0,REOTC        ;SET UNIT EOT COUNTER
3315  013444  012704  025565          TINP3:  MOV     #MSG35,R4
3316  013450  104000                          TTOUTT                  ;PRINT RECORD COUNT REQUEST
3317  013452  013703  000554                  MOV     RCNT,R3
3318  013456  104002                          OCTPP                   ;PRINT RECORD COUNT
3319  013460  012705  000554                  MOV     #RCNT,R5        ;SET RECORD COUNT ADDRESS
3320  013464  012701  000006                  MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3321  013470  012702  177777                  MOV     #-1,R2          ;SET MAXIMUM LIMIT
3322  013474  012703  000001                  MOV     #1,R3           ;SET MINIMUM LIMIT
3323  013500  004737  023346                  JSR     PC,TTR          ;GO GET RECORD COUNT
3324  013504  013737  000554  000630          MOV     RCNT,RCSAV      ;SAVE RECORD COUNT
3325  013512  012704  025606                  MOV     #MSG36,R4
3326  013516  104000                          TTOUTT                  ;PRINT CHARACTER COUNT REQUEST
3327  013520  005437  000556                  NEG     FMCNT
3328  013524  013703  000556                  MOV     FMCNT,R3
3329  013530  104002                          OCTPP                   ;PRINT CHAR COUNT
3330  013532  012705  000556                  MOV     #FMCNT,R5       ;SET CHARACTER COUNT ADDRESS
3331  013536  012701  000006                  MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3332  013542  012702  004000                  MOV     #4000,R2        ;SET MAXIMUM LIMIT
3333  013546  012703  000004                  MOV     #4,R3           ;SET MINIMUM LIMIT
3334  013552  004737  023346                  JSR     PC,TTR          ;GO GET CHARACTER COUNT
3335  013556  005437  000556                  NEG     FMCNT           ;SET TO TWO'S COMPLIMENT
3336  013562  013737  000556  000632          MOV     FMCNT,FCSAV     ;SAVE FRAME COUNT
3337  013570  012704  025632                  MOV     #MSG37,R4       ;PRINT PATTERN NUMBER REQUEST
3338  013574  104000                          TTOUTT
3339  013576  013703  000560                  MOV     PATRN,R3
3340  013602  104002                          OCTPP                   ;PRINT PATTERN
3341  013604  005037  014554                  CLR     DOFL            ;CLEAR EXTERNAL DATA FLAG
3342  013610  012705  000560                  MOV     #PATRN,R5       ;SET PATTERN NUMBER ADDRESS
3343  013614  012701  000002                  MOV     #2,R1           ;SET NUMBER OF CHARACTERS TO INPUT
```

```
3344  013620  012702  000015                MOV     #15,R2          ;SET MAXIMUM LIMIT
3345  013624  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
3346  013630  004737  023346                JSR     PC,TTR          ;GO GET PATTERN NUMBER
3347  013634  012704  026346                MOV     #MSG69,R4
3348  013640  104000                        TTOUTT                  ;REQUEST TM
3349  013642  013703  000564                MOV     TMEX,R3
3350  013646  104002                        OCTPP                   ;PRINT CURRENT TM FLAG SETTING
3351  013650  012705  000564                MOV     #TMEX,R5        ;GET TM FLAG ADDRESS
3352  013654  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3353  013660  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
3354  013664  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3355  013670  004737  023346                JSR     PC,TTR          ;TM 1=YES
3356  013674  012704  025133                MOV     #MSG21,R4
3357  013700  104000                        TTOUTT                  ;REQUEST INTERCHANGE READ
3358  013702  013703  000566                MOV     INTRF,R3
3359  013706  104002                        OCTPP                   ;PRINT CURRENT SETTING
3360  013710  012705  000566                MOV     #INTRF,R5       ;GET FLAG ADDRESS
3361  013714  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3362  013720  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
3363  013724  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3364  013730  004737  023346                JSR     PC,TTR          ;GO GET RESPONSE
3365  013734  012704  025655                MOV     #MSG38,R4
3366  013740  104000                        TTOUTT                  ;REQUEST SINGLE PASS
3367  013742  013703  000570                MOV     SPFLG,R3
3368  013746  104002                        OCTPP                   ;PRINT CURRENT SETTING
3369  013750  012705  000570                MOV     #SPFLG,R5       ;SET ADDRESS OF FLAG
3370  013754  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3371  013760  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
3372  013764  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3373  013770  004737  023346                JSR     PC,TTR          ;GO GET RESPONSE
3374  013774  005737  014150        TINP4:  TST     SCVFL           ;SEE IF SHORT CONVERSATION
3375  014000  001060                        BNE     TINPX           ;IF SO: BR
3376  014002  012704  025675                MOV     #MSG40,R4
3377  014006  104000                        TTOUTT                  ;PRINT READ STALL REQUEST
3378  014010  013703  000572                MOV     RSTAL,R3
3379  014014  104002                        OCTPP                   ;PRINT READ STALL
3380  014016  012705  000572                MOV     #RSTAL,R5       ;SET READ STALL ADDRESS
3381  014022  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3382  014026  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3383  014032  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3384  014036  004737  023346                JSR     PC,TTR          ;GO GET READ STALL
3385  014042  012704  025723                MOV     #MSG41,R4
3386  014046  104000                        TTOUTT                  ;PRINT WRITE STALL REQUEST
3387  014050  013703  000574                MOV     WSTAL,R3
3388  014054  104002                        OCTPP                   ;PRINT READ STALL
3389  014056  012705  000574                MOV     #WSTAL,R5       ;SET WRITE STALL ADDRESS
3390  014062  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3391  014066  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3392  014072  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3393  014076  004737  023346                JSR     PC,TTR          ;GO GET WRITE STALL
3394  014102  012704  025735                MOV     #MSG42,R4
3395  014106  104000                        TTOUTT                  ;PRINT TURN AROUND STALL REQUEST
3396  014110  013703  000576                MOV     TSTAL,R3
3397  014114  104002                        OCTPP                   ;PRINT TA STALL
3398  014116  012705  000576                MOV     #TSTAL,R5       ;SET TURN AROUND STALL ADDRESS
3399  014122  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
```

```
3400  014126  012702  177777              MOV     #-1,R2          ;SET MAXIMUM LIMIT
3401  014132  012703  000001              MOV     #1,R3           ;SET MINIMUM LIMIT
3402  014136  004737  023346              JSR     PC,TTR          ;GO GET TURN AROUND STALL
3403  014142  005037  014150      TINPX:  CLR     SCVFL           ;CLEAR SHORT CONVERSATION FLAG
3404  014146  000207                      RTS     PC              ;EXIT
3405  014150  000000              SCVFL:  0                       ;SHORT CONVERSATION FLAG
3406
3407                                      ;UNIT DESCRIPTION POSITIONING SUBROUTINE**********
3408
3409  014152  000241              TPOS:   CLC
3410  014154  006137  000644              ROL     TEMP2           ;POSITION CHARACTER
3411  014160  005303                      DEC     R3              ;SEE IF DONE
3412  014162  001373                      BNE     TPOS            ;IF NOT: BR
3413  014164  013700  000674      TPOS1:  MOV     UNP,R0          ;LOAD UNIT POINTER
3414  014170  053760  000644  000746      BIS     TEMP2,UN1(R0)   ;LOAD CHARACTER INTO UN1(R0)
3415  014176  000207                      RTS     PC              ;EXIT
3416
```

```
3417
3418                                    ;*******************************************************
3419                                    ;DATA SETUP ROUTINE:
3420                                    ;
3421                                    ;THIS ROUTINE IS USED TO GENERATE INTO THE ENTIRE
3422                                    ;WRITE BUFFER (4000 OCTAL CHARACTERS) THE DATA PATTERN
3423                                    ;SELECTED BY THE OPERATOR.  THERE ARE 15 (8) FIXED
3424                                    ;DATA PATTERNS AVAILABLE AND ONE SELECTION (DATA PATTERN 0)
3425                                    ;WHICH WILL READ ANY PATTERN PRESENTED AT THE
3426                                    ;HIGH SPEED PAPER TAPE READER.  THIS TAPE MUST BE PREPARED
3427                                    ;BY USING THE PROGRAM CALLED DTC. (MAINDEC-11-DZTUF-A-D)
3428                                    ;RANDOM DATA MAY ALSO BE USED VIA CONSOLE
3429                                    ;SWITCH EIGHT (8).
3430                                    ;THIS ROUTINE IS ALSO USED TO CLEAR OUT THE
3431                                    ;READ BUFFER (4000 OCTAL CHARACTERS) BEFORE EACH
3432                                    ;RECORD IS READ.
3433                                    ;*******************************************************
3434
3435  014200  005737  015150        DSUP:   TST     RDFL            ;SEE IF DID RANDOM DATA
3436  014204  001044                        BNE     DS1             ;++G F SO BRANCH
3437  014206  005737  000734        DS0:    TST     ASEQF           ;SEE IF AUTO SEQ
3438  014212  001406                        BEQ     DS0C            ;IF NOT: BR
3439  014214  005737  000560                TST     PATRN           ;SEE IF AUTO RANDOM
3440  014220  100003                        BPL     DS0C            ;IF NOT: BR
3441  014222  004737  015102                JSR     PC,DATR         ;ELSE GO GENERATE RANDOM DATA
3442  014226  000207                        RTS     PC              ;RETURN
3443  014230  023737  000560  014406  DS0C:  CMP     PATRN,PATS      ;SEE IF NEW PATTERN
3444  014236  001014                        BNE     DS0A            ;IF SO: BR
3445  014240  013703  000552                MOV     UDES,R3         ;GET UNIT DESCRIPTION
3446  014244  042703  177767                BIC     #177767,R3      ;MASK EVEN PARITY
3447  014250  023703  014410                CMP     PARS,R3         ;SEE IF SAME AS LAST TIME
3448  014254  001404                        BEQ     DS0B            ;IF SO: BR
3449  014256  010337  014410                MOV     R3,PARS         ;SAVE PARITY
3450  014262  004737  015152                JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
3451  014266  000207                DS0B:   RTS     PC
3452  014270  012703  027456        DS0A:   MOV     #WDATA,R3       ;R3 = ADDRS OF WRITE BUFFER
3453  014274  013701  000560                MOV     PATRN,R1        ;R1 = PATTERN SELECTOR
3454  014300  010137  014406                MOV     R1,PATS
3455  014304  062701  000001                ADD     #1,R1           ;BUMP POINTER
3456  014310  006301                        ASL     R1              ;++G MAKE PATTERN SELECTOR EVEN
3457  014312  004771  002770                JSR     PC,@DATBL(R1)   ;GO GENERATE PATTERN
3458  014316  032777  010000  164212  DS1:    BIT     #10000,@DT      ;SEE IF 7 CH
3459  014324  001410                        BEQ     DS2A            ;IF NOT: BR
3460  014326  012702  002002                MOV     #2002,R2        ;SET BUFFER SIZE
3461  014332  012701  027456                MOV     #WDATA,R1       ;SET START OF BUFFER
3462  014336  042721  140300        DS2:    BIC     #140300,(R1)+   ;MASK FOR 7 CH
3463  014342  005302                        DEC     R2              ;SEE IF DONE
3464  014344  001374                        BNE     DS2             ;IF NOT: BR
3465  014346  004737  015152        DS2A:   JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
3466  014352  012702  002000        DS3:    MOV     #2000,R2        ;R2=BUFFER SIZE
3467  014356  012701  033464                MOV     #RDATA,R1       ;R1=READ DATA START
3468  014362  005021                DS4:    CLR     (R1)+           ;CLEAR BUFFER
3469  014364  005302                        DEC     R2              ;SEE IF DONE ALL
3470  014366  001375                        BNE     DS4             ;IF NOT: BR
3471  014370  013737  000552  014410        MOV     UDES,PARS       ;GET UNIT DESCRIPTION
3472  014376  042737  177767  014410        BIC     #177767,PARS    ;MASK PARITY
```

```
3473  014404  000207                          RTS     PC              ;EXIT
3474  014406  177777                  PATS:   -1                      ;PATTERN NUMBER SAVE
3475  014410  000000                  PARS:   0
3476
3477                                          ;EXTERNAL DATA INPUT FROM H/S READER (256 CHARACTER MAXIMUM)
3478
3479  014412  005737  014554          DAT0:   TST     DOFL            ;++G BRANCH IF EXTERNAL INPUT
3480  014416  001401                          BEQ     1$              ;++G
3481  014420  000207                          RTS     PC              ;++G RETURN
3482  014422  012737  000001  014554  1$:     MOV     #1,DOFL         ;SET EXTERNAL FLAG
3483  014430  005077  164166                  CLR     @PRB            ;CLEAR READER BUFFER
3484  014434  005077  164160                  CLR     @PRS            ;CLEAR READER STATUS
3485  014440  005037  000642                  CLR     TEMP1           ;CLEAR FOR USE AS CHARACTER FLAG
3486  014444  052777  000001  164146  DAT0A:  BIS     #1,@PRS         ;START READER
3487  014452  105777  164142          DAT0B:  TSTB    @PRS            ;++G SEE IF DONE
3488  014456  100375                          BPL     DAT0B           ;++B
3489  014460  005001                          CLR     R1              ;CLEAR SAVE LOCATION
3490  014462  117701  164134                  MOVB    @PRB,R1         ;SAVE CHARACTER
3491  014466  005737  000642                  TST     TEMP1           ;SEE IF HAVE FOUND START CHARACTER
3492  014472  001011                          BNE     DAT0C           ;IF SO : BR
3493  014474  105701                          TSTB    R1              ;SEE IF CHARACTER IS 0
3494  014476  001762                          BEQ     DAT0A           ;IF SO : BR
3495  014500  012737  000001  000642          MOV     #1,TEMP1        ;ELSE SET CHARACTER FOUND FLAG
3496  014506  010137  000644                  MOV     R1,TEMP2        ;SAVE DATA SIZE
3497  014512  010102                          MOV     R1,R2           ;SAVE DATA SIZE
3498  014514  000753                          BR      DAT0A           ;++G GO GET FIRST DATA CHAR
3499  014516  110123                  DAT0C:  MOVB    R1,(R3)+        ;LOAD BUFFER
3500  014520  005302                          DEC     R2              ;SEE IF READ ALL
3501  014522  001350                          BNE     DAT0A           ;IF NOT : BR
3502  014524  012701  027456          DAT0D:  MOV     #WDATA,R1       ;R1 = START OF WRITE BUFFER
3503  014530  013702  000644                  MOV     TEMP2,R2        ;R2 = SIZE OF DATA FIELD
3504  014534  112123                  DAT0E:  MOVB    (R1)+,(R3)+     ;REPEAT LOAD OF DATA FIELD
3505  014536  022703  033464                  CMP     #RDATA,R3       ;SEE IF DONE
3506  014542  003001                          BGT     DAT0F           ;IF NOT: BR
3507  014544  000207                          RTS     PC              ;++G RETURN
3508  014546  005302                  DAT0F:  DEC     R2              ;SEE IF AT END OF DATA FIELD
3509  014550  001371                          BNE     DAT0E           ;IF NOT : BR
3510  014552  000764                          BR      DAT0D           ;++G ELSE RESTART FILL
3511  014554  000000                  DOFL:   0                       ;EXTERNAL DATA FLAG=1 IF ALREADY DONE
3512
```

```
3513                                    ;ALL ONES**********
3514
3515  014556  012701  177777    DAT1:   MOV     #-1,R1          ;R1=DATA
3516  014562  012702  002002    DAT1A:  MOV     #2002,R2        ;R2=WORD COUNT +2
3517  014566  010123            DAT1B:  MOV     R1,(R3)+        ;LOAD BUFFER
3518  014570  005302                    DEC     R2              ;SEE IF DONE
3519  014572  001375                    BNE     DAT1B           ;IF NOT: BR
3520  014574  000207                    RTS     PC              ;++G RETURN
3521
3522                                    ;ALL ZEROS**********
3523
3524  014576  005001            DAT2:   CLR     R1              ;R1=DATA
3525  014600  000770                    BR      DAT1A           ;++G LOAD BUFFER
3526
3527                                    ;WALKING ONE**********
3528
3529  014602  012701  000001    DAT3:   MOV     #1,R1           ;R1=DATA
3530  014606  000241                    CLC
3531  014610  012702  004004    DAT3A:  MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3532  014614  110123            DAT3B:  MOVB    R1,(R3)+        ;LOAD BUFFER
3533  014616  106101                    ROLB    R1              ;SET NEXT CHARACTER
3534  014620  005302                    DEC     R2              ;SEE IF DONE
3535  014622  001374                    BNE     DAT3B           ;IF NOT: BR
3536  014624  000207                    RTS     PC              ;++G RETURN
3537
3538                                    ;WALKING ZERO**********
3539
3540  014626  012701  000376    DAT4:   MOV     #376,R1         ;R1=START OF DATA
3541  014632  000261                    SEC
3542  014634  000765                    BR      DAT3A           ;++G LOAD BUFFER
3543
3544                                    ;ALTERNATING ONE/ZERO**********
3545
3546
3547  014636  012701  052525    DAT5:   MOV     #52525,R1       ;R1=DATA
3548  014642  000747                    BR      DAT1A           ;++G LOAD BUFFER
3549
3550                                    ;ALTERNATING ZERO/ONE**********
3551
3552  014644  012701  125252    DAT6:   MOV     #125252,R1      ;R1=DATA
3553  014650  000744                    BR      DAT1A           ;++G LOAD BUFFER
3554
3555                                    ;ONE/ZERO IN ALTERNATING WORDS**********
3556
3557  014652  012701  125252    DAT7:   MOV     #125252,R1      ;SET WORD 1
3558  014656  012702  052525            MOV     #52525,R2       ;SET WORD 2
3559  014662  012704  001002            MOV     #1002,R4        ;SET NUMBER OF ENTRIES
3560  014666  010123            DAT7A:  MOV     R1,(R3)+        ;LOAD WORD 1
3561  014670  010223                    MOV     R2,(R3)+        ;LOAD WORD 2
3562  014672  005304                    DEC     R4              ;SEE IF DONE
3563  014674  001374                    BNE     DAT7A           ;IF NOT: BR
3564  014676  000207                    RTS     PC              ;++G RETURN
3565
```

```
3566                                    ;WALKING ONE/ALL ONE IN ALTERNATING CHARS****
3567
3568  014700  012702  002002    DAT10:  MOV     #2002,R2        ;SET BUFFER SIZE
3569  014704  012701  000001            MOV     #1,R1           ;SET WALK BASE
3570  014710  000241                    CLC
3571  014712  012713  177400    DAT10A: MOV     #177400,(R3)    ;LOAD ALL ONE BYTE
3572  014716  050123                    BIS     R1,(R3)+        ;LOAD WALK BYTE
3573  014720  106101                    ROLB    R1              ;WALK ONE
3574  014722  005302                    DEC     R2
3575  014724  001372                    BNE     DAT10A          ;DO FULL BUFFER
3576  014726  000207                    RTS     PC              ;++G RETURN
3577
3578                                    ;ALL BITS 0-377**********
3579
3580  014730  005001    DAT11:  CLR     R1              ;R1=STARTING DATA
3581  014732  012702  004004            MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3582  014736  110123    DAT11A: MOVB    R1,(R3)+        ;LOAD BUFFER
3583  014740  105201                    INCB    R1              ;BUMP DATA
3584  014742  005302                    DEC     R2              ;SEE IF DONE
3585  014744  001374                    BNE     DAT11A          ;IF NOT: BR
3586  014746  000207                    RTS     PC              ;++G RETURN
3587
3588                                    ;ALL BITS 377-0**********
3589
3590  014750  012701  000377    DAT12:  MOV     #377,R1         ;R1=STARTING DATA
3591  014754  012702  004004            MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3592  014760  110123    DAT12A: MOVB    R1,(R3)+        ;LOAD BUFFER
3593  014762  105301                    DECB    R1              ;BUMP DATA
3594  014764  005302                    DEC     R2              ;SEE IF DONE
3595  014766  001374                    BNE     DAT12A          ;IF NOT: BR
3596  014770  000207                    RTS     PC              ;++G RETURN
3597
3598                                    ;ALTERNATING CHARACTERS 0 AND 377**********
3599
3600  014772  012701  000377    DAT13:  MOV     #377,R1         ;R1 = DATA
3601  014776  000137  014562            JMP     DAT1A           ;LOAD BUFFER
3602
3603                                    ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARS******
3604
3605  015002  012702  002002    DAT14:  MOV     #2002,R2        ;SET BUFFER SIZE
3606  015006  012701  000376            MOV     #376,R1         ;SET WALK BASE
3607  015012  000261                    SEC
3608  015014  010113    DAT14A: MOV     R1,(R3)         ;LOAD WALK BYTE
3609  015016  042723  177400            BIC     #177400,(R3)+   ;CLEAR HIGH BYTE
3610  015022  106101                    ROLB    R1              ;WALK ZERO BIT
3611  015024  005302                    DEC     R2
3612  015026  001372                    BNE     DAT14A          ;FILL BUFFER
3613  015030  000207                    RTS     PC              ;++G RETURN
3614
```

```
3615                                        ;AUTO SEQUENCE PATTERN*********
3616
3617  015032  012702  000200        DAT15:  MOV     #200,R2         ;SET NUMBER OF ENTRIES
3618  015036  012701  015062        DAT15A: MOV     #APATS,R1       ;SET START OF PATTERN
3619  015042  012704  000010                MOV     #10,R4          ;SET SIZE OF PATTERN
3620  015046  012123                DAT15B: MOV     (R1)+,(R3)+     ;FILL BUFFER
3621  015050  005304                        DEC     R4              ;SEE IF DONE PATTERN
3622  015052  001375                        BNE     DAT15B          ;IF NOT: BR
3623  015054  005302                        DEC     R2              ;SEE IF DONE BUFER
3624  015056  001367                        BNE     DAT15A          ;IF NOT: BR
3625  015060  000207                        RTS     PC              ;++G RETURN
3626  015062  000000                APATS:  0
3627  015064  177400                        177400
3628  015066  000377                        377
3629  015070  000000                        0
3630  015072  177777                        -1
3631  015074  000377                        377
3632  015076  177400                        177400
3633  015100  177777                        -1
3634
3635                                        ;RANDOM DATA GENERATOR SUBROUTINE**********
3636
3637  015102  013704  000556        DATR:   MOV     FMCNT,R4        ;SET NUMBER OF FRAMES
3638  015106  012703  027456                MOV     #WDATA,R3       ;SET ADDRESS OF START OF BUFFER
3639  015112  012701  177777                MOV     #-1,R1          ;SET HIGH LIMIT
3640  015116  005002                        CLR     R2              ;SET LOW LIMIT
3641  015120  004737  023314        DATR0:  JSR     PC,RANG         ;GO GENERATE NUMBER
3642  015124  013723  000626                MOV     RANSAV,(R3)+    ;LOAD BUFFER
3643  015130  005204                        INC     R4              ;SEE IF DONE WHOLE BUFFER
3644  015132  001372                        BNE     DATR0           ;IF NOT: BR
3645  015134  004737  014316                JSR     PC,DS1          ;GO CHECK FOR 7 CH
3646  015140  012737  000001  015150        MOV     #1,RDFL         ;SET RANDOM DATA FLAG
3647  015146  000207                        RTS     PC              ;EXIT
3648  015150  000000                RDFL:   0                       ;RANDOM DATA SELECT FLAG
```

```
3649
3650                                    ;*************************************************************
3651                                    ;CRC/LRC CHARACTER BUILD;
3652                                    ;
3653                                    ;THIS ROUTINE WILL CONSTRUCT AND SAVE THE EXPECTED
3654                                    ;CRC AND LRC CHARACTERS ACCORDING TO DATA AND
3655                                    ;RECORD SIZE IF OPERATING IN NRZ MODE
3656                                    ;*************************************************************
3657
3658  015152  013700  000556      CRCLRC: MOV     FMCNT,R0        ;SET RECORD SIZE
3659  015156  005400                      NEG     R0
3660  015160  012701  027456              MOV     #WDATA,R1       ;SET START OF BUFFER
3661  015164  005037  015534              CLR     XORS
3662  015170  111104              CL0:    MOVB    (R1),R4         ;GET CHARACTER
3663  015172  004737  015362              JSR     PC,CLP          ;GO GET PARITY OF CHARACTER
3664  015176  004737  015510              JSR     PC,XOR          ;XOR CHARACTER
3665  015202  000241                      CLC
3666  015204  006004                      ROR     R4              ;ROTATE 1 RIGHT
3667  015206  103014                      BCC     CL2             ;IF NO CARRY: BR
3668  015210  052704  000400              BIS     #400,R4         ;SET BIT NINE
3669  015214  000241                      CLC
3670  015216  010405              CL1:    MOV     R4,R5           ;SAVE CHARACTER
3671  015220  042705  177703              BIC     #177703,R5
3672  015224  005105                      COM     R5
3673  015226  042705  177703              BIC     #177703,R5
3674  015232  042704  000074              BIC     #74,R4
3675  015236  050504                      BIS     R5,R4           ;COMPLIMENT BITS 2,3,4,5
3676  015240  010437  015534      CL2:    MOV     R4,XORS
3677  015244  005300                      DEC     R0
3678  015246  001401                      BEQ     CLLAST          ;IF LAST CHARACTER: BR
3679  015250  000747                      BR      CL0             ;++G GET NEXT
3680  015252  013704  015534      CLLAST: MOV     XORS,R4
3681  015256  005137  015534              COM     XORS
3682  015262  042737  177050  015534      BIC     #177050,XORS
3683  015270  042704  177727              BIC     #177727,R4      ;COMPLIMENT ALL BUT BITS 3&5
3684  015274  050437  015534              BIS     R4,XORS
3685  015300  013737  015534  015536      MOV     XORS,EXCRC      ;SAVE EXPECTED CRC
3686  015306  013700  000556              MOV     FMCNT,R0
3687  015312  005400                      NEG     R0
3688  015314  012701  027456              MOV     #WDATA,R1       ;DO EXPT LRC
3689  015320  005037  015534              CLR     XORS
3690  015324  111104              CL3:    MOVB    (R1),R4
3691  015326  004737  015362              JSR     PC,CLP          ;GET PARITY
3692  015332  004737  015510              JSR     PC,XOR          ;XOR CHARACTER
3693  015336  005300                      DEC     R0
3694  015340  001371                      BNE     CL3             ;DO ALL FOR LRC
3695  015342  013704  015536              MOV     EXCRC,R4
3696  015346  004737  015510              JSR     PC,XOR          ;XOR CRC TO DATA
3697  015352  013737  015534  015540      MOV     XORS,EXLRC      ;SAVE EXPT LRC
3698  015360  000207                      RTS     PC              ;RETURN
3699  015362  005704              CLP:    TST     R4              ;SEE IF 0 CHAR
3700  015364  001010                      BNE     CLPE            ;IF NOT: BR
3701  015366  032737  000010  000552      BIT     #10,UDES        ;SEE IF EVEN PARITY
3702  015374  001404                      BEQ     CLPE            ;IF NOT: BR
3703  015376  012704  000420              MOV     #420,R4         ;SET 0 CHAR EVEN PARITY
3704  015402  005201                      INC     R1              ;BUMP POINTER
```

```
3705  015404  000207                          RTS     PC              ;RETURN
3706  015406  005037  015542          CLPE:   CLR     PARCNT          ;CLEAR BIT COUNTER
3707  015412  012703  000010                  MOV     #10,R3          ;SET NUMBER OF BITS
3708  015416  032704  000001          CLP0:   BIT     #1,R4           ;SEE IF ONE BIT
3709  015422  001402                          BEQ     CLP1            ;IF NOT: BR
3710  015424  005237  015542                  INC     PARCNT          ;BUMP COUNTER
3711  015430  000241                  CLP1:   CLC
3712  015432  006004                          ROR     R4              ;ROTATE TO NEXT BIT
3713  015434  005303                          DEC     R3
3714  015436  001367                          BNE     CLP0            ;CONTINUE FOR ALL BITS
3715  015440  112104                          MOVB    (R1)+,R4
3716  015442  042704  177400                  BIC     #177400,R4
3717  015446  032737  000001  015542          BIT     #1,PARCNT       ;SEE IF ODD NUMBER OF ONE BITS
3718  015454  001005                          BNE     CLP2            ;IF SO: BR
3719  015456  032737  000010  000552          BIT     #10,UDES        ;SEE IF SHOULD BE EVEN PARITY
3720  015464  001406                          BEQ     CLP3            ;IF NOT: BR
3721  015466  000207                          RTS     PC              ;ELSE EXIT
3722  015470  032737  000010  000552  CLP2:   BIT     #10,UDES        ;SEE IF SHOULD BE ODD PARITY
3723  015476  001001                          BNE     CLP3            ;IF NOT: BR
3724  015500  000207                          RTS     PC              ;ELSE EXIT
3725  015502  052704  000400          CLP3:   BIS     #400,R4         ;SET PARITY BIT
3726  015506  000207                          RTS     PC
3727  015510  010446                  XOR:    MOV     R4,-(SP)
3728  015512  043716  015534                  BIC     XORS,(SP)
3729  015516  040437  015534                  BIC     R4,XORS         ;XOR SUBROUTINE: R4 WITH XORS
3730  015522  052637  015534                  BIS     (SP)+,XORS
3731  015526  013704  015534                  MOV     XORS,R4
3732  015532  000207                          RTS     PC
3733
3734  015534  000000          XORS:   0               ;XOR SAVE
3735  015536  000000          EXCRC:  0               ;EXPECTED CRC
3736  015540  000000          EXLRC:  0               ;EXPECTED LRC
3737  015542  000000          PARCNT: 0               ;PARITY COUNTER
3738
```

```
3739
3740                                    ;*********************************************************
3741                                    ;DATA CHECK SUBROUTINE:
3742                                    ;
3743                                    ;THIS SUBROUTINE IS USED TO COMPARE EACH CHARACTER
3744                                    ;OF DATA READ FROM TAPE WITH THE EXPECTED CHARACTER.
3745                                    ;ANY ERROR DETECTED WILL CAUSE CONTROL TO BE
3746                                    ;PASSED TO AN ERROR PRINT SUBROUTINE AND A
3747                                    ;SUBROUTINE TO ACCUMULATE THE NUMBER OF BITS
3748                                    ;DROPPED AND PICKED UP FROM EACH CHARACTER.
3749                                    ;THE NUMBER OF READ ERRORS IS ALSO ACCUMULATED.
3750                                    ;DATA CHECKING MAY BE TERMINATED BY USE OF
3751                                    ;CONSOLE SWITCH THIRTEEN (13).
3752                                    ;*********************************************************
3753
3754  015544  005037  000656       DCHK:   CLR     BBC             ;CLEAR BAD RECORD CNTR
3755  015550  005037  000704               CLR     DERFL           ;CLEAR DATA ERROR FLAG
3756  015554  013705  000556               MOV     FMCNT,R5        ;LOAD CHAR COUNT
3757  015560  032737  000020  000552       BIT     #20,UDES        ;SEE IF CORE DUMP
3758  015566  001402                       BEQ     DCHK0           ;IF NOT: BR
3759  015570  000261                       SEC
3760  015572  006005                       ROR     R5              ;R5 = FC/2
3761  015574  012701  027456       DCHK0:  MOV     #WDATA,R1       ;SET WRITE DATA ADDR
3762  015600  012702  033464               MOV     #RDATA,R2       ;SET READ DATA ADDR
3763  015604  032737  000010  000552       BIT     #10,UDES        ;SEE IF EVEN PARITY
3764  015612  001430                       BEQ     DF0C0           ;IF NOT: BR
3765  015614  032737  000020  000552       BIT     #20,UDES        ;SEE IF CORE DUMP PARITY
3766  015622  001024                       BNE     DF0C0           ;IF SO: BR
3767  015624  032737  002000  000552       BIT     #2000,UDES      ;SEE IF PE MODE
3768  015632  001020                       BNE     DF0C0           ;IF SO: BR
3769  015634  105711               DF0F:   TSTB    (R1)            ;SEE IF 0 CHAR
3770  015636  001404                       BEQ     DF0D            ;IF SO: BR
3771  015640  005201                       INC     R1              ;BUMP POINTER
3772  015642  005205               DF0E:   INC     R5              ;SEE IF DONE
3773  015644  001373                       BNE     DF0F            ;IF NOT: BR
3774  015646  000406                       BR      DF0C            ;ELSE CONTINUE
3775  015650  112721  000020       DF0D:   MOVB    #20,(R1)+       ;SET 20 IN PLACE OF 0
3776  015654  012737  177777  014406       MOV     #-1,PATS        ;SET PATTERN GENERATE FLAG
3777  015662  000767                       BR      DF0E
3778  015664  013705  000556       DF0C:   MOV     FMCNT,R5        ;RESET CHAR CNT
3779  015670  012701  027456               MOV     #WDATA,R1       ;RESET DATA ADDRESS
3780  015674  032737  010000  000562 DF0C0: BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3781  015702  001462                       BEQ     DF0             ;IF NOT: BR
3782  015704  013704  000556       DF0B:   MOV     FMCNT,R4        ;GET FRAME COUNT
3783  015710  005404                       NEG     R4              ;SET TO WHOLE NUMBER
3784  015712  032737  000020  000552       BIT     #20,UDES        ;SEE IF CORE DUMP
3785  015720  001402                       BEQ     DF0B0           ;IF NOT: BR
3786  015722  000241                       CLC
3787  015724  006004                       ROR     R4              ;SET TO FC/2
3788  015726  060401               DF0B0:  ADD     R4,R1           ;POINT TO START OF WRITE DATA
3789  015730  060402                       ADD     R4,R2           ;POINT TO START OF READ DATA
3790  015732  032737  000001  000556       BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
3791  015740  001401                       BEQ     DF0A            ;IF NOT: BR
3792  015742  105722                       TSTB    (R2)+           ;BUMP POINTER
3793  015744  032737  000020  000552 DF0A:  BIT     #20,UDES        ;SEE IF CORE DUMP
3794  015752  001431                       BEQ     DF0A4           ;IF NOT: BR
```

```
3795  015754  000241                          CLC
3796  015756  132742  000001                  BITB    #1,-(R2)        ;SEE IF BIT 0 = 1
3797  015762  001401                          BEQ     DF0A0           ;IF NOT: BR
3798  015764  000261                          SEC
3799  015766  106012                  DF0A0:  RORB    (R2)
3800  015770  000241                          CLC
3801  015772  132712  000001                  BITB    #1,(R2)
3802  015776  001401                          BEQ     DF0A1
3803  016000  000261                          SEC
3804  016002  106012                  DF0A1:  RORB    (R2)            ;POSITION BITS FOR REVERSE CORE DUMP
3805  016004  000241                          CLC
3806  016006  132712  000001                  BITB    #1,(R2)
3807  016012  001401                          BEQ     DF0A2
3808  016014  000261                          SEC
3809  016016  106012                  DF0A2:  RORB    (R2)
3810  016020  000241                          CLC
3811  016022  132712  000001                  BITB    #1,(R2)
3812  016026  001401                          BEQ     DF0A3
3813  016030  000261                          SEC
3814  016032  106012                  DF0A3:  RORB    (R2)
3815  016034  005202                          INC     R2              ;RESET POINTER
3816  016036  124142                  DF0A4:  CMPB    -(R1),-(R2)     ;TEST DATA CHARACTER
3817  016040  001010                          BNE     DF1             ;IF NOT GOOD: BR
3818  016042  105037  000656                  CLRB    BBC             ;CLEAR BAD RECORD COUNTER
3819  016046  000411                          BR      DF2
3820  016050  122122                  DF0:    CMPB    (R1)+,(R2)+     ;CHECK DATA
3821  016052  001003                          BNE     DF1             ;IF BAD: BR
3822  016054  105037  000656                  CLRB    BBC             ;CLEAR BAD RECORD CNTR
3823  016060  000404                          BR      DF2
3824  016062  004737  016666          DF1:    JSR     PC,DRPKF        ;GO GET DROPS AND PICKS
3825  016066  004737  016160                  JSR     PC,DERR         ;GO DO PRINT
3826  016072  005205                  DF2:    INC     R5              ;BUMP CHAR CNTR
3827  016074  001405                          BEQ     DF3             ;IF DONE ALL: BR
3828  016076  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3829  016104  001761                          BEQ     DF0             ;IF NOT: BR
3830  016106  000716                          BR      DF0A            ;ELSE CONTINUE READ REV
3831  016110  005037  000664          DF3:    CLR     HDRFL           ;CLEAR HEADER FLAG
3832  016114  005737  000704                  TST     DERFL           ;SEE IF HAD DATA ERROR
3833  016120  001416                          BEQ     DFX             ;IF NOT: BR
3834  016122  005737  000706                  TST     SERFL
3835  016126  001013                          BNE     DFX             ;IF NOT DATA ERROR ONLY: BR
3836  016130  013704  000674                  MOV     UNP,R4
3837  016134  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3838  016142  001003                          BNE     DF4             ;IF SO: BR
3839  016144  005264  001130                  INC     DATER1(R4)      ;BUMP DATA ERROR FORWARD COUNTER
3840  016150  000402                          BR      DFX
3841  016152  005264  001170          DF4:    INC     DEREV1(R4)      ;BUMP REVERSE DATA ERROR
3842  016156  000207                  DFX:    RTS     PC              ;EXIT
3843
```

```
3844
3845                                    ;*********************************************************
3846                                    ;DATA ERROR SUBROUTINE:
3847                                    ;
3848                                    ;THIS SUBROUTINE IS USED TO PRINT OUT ANY
3849                                    ;ERRORS FOUND DURING THE DATA CHECK.
3850                                    ;EACH CHARACTER FOUND BAD WILL BE PRINTED
3851                                    ;IN BIT FORMAT ALONG WITH ITS EXPECTED CHARACTER.
3852                                    ;AN ERROR HEADER CONSISTING OF THE UNIT NUMBER,
3853                                    ;BLOCK NUMBER, RECORD NUMBER, SIZE OF RECORD, AND
3854                                    ;ERROR TYPE (READ FORWARD, READ REVERSE, WRITE, ETC)
3855                                    ;IS PRINTED ONLY ONCE FOR EACH RECORD FOUND BAD.
3856                                    ;A COUNT IS MADE OF THE NUMBER OF SUCCESSIVE BAD
3857                                    ;CHARACTERS, AND IF TEN (10) SUCCESSIVE BAD CHARACTERS
3858                                    ;ARE FOUND IN A SINGLE RECORD, A MESSAGE INDICATING
3859                                    ;A BAD RECORD CONDITION IS PRINTED AND THE NEXT
3860                                    ;TWENTY (20) CHARACTERS ARE SKIPPED BEFORE CHECKING
3861                                    ;IS RESUMED.  IF THE BAD RECORD CONDITION IS FOUND
3862                                    ;THREE TIMES IN A RECORD, ALL REMAINING DATA IS
3863                                    ;SKIPPED EXCEPT THE FINAL TEN (10) CHARACTERS.
3864                                    ;THIS SKIPPING IS OF COURSE ONLY POSSIBLE IN
3865                                    ;RECORDS WHICH CONTAIN A SUFFICIENT NUMBER OF CHARACTERS.
3866                                    ;PRINTING OF ERRORS MAY BE DISALLOWED AT ANY TIME
3867                                    ;BY SETTING CONSOLE SWITCH TEN (10) TO A ONE.
3868                                    ;THE OPERATOR MAY CAUSE THE PROGRAM TO HALT ON ANY ERROR
3869                                    ;BY SETTING CONSOLE SWITCH FIFTEEN (15) TO A ONE.
3870                                    ;*********************************************************
3871
3872  016160  032777  002000  162420  DERR:   BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
3873  016166  001067                   BNE     DERR4           ;++G BRANCH IF NOT
3874  016170  005237  000670           DERR0:  INC     PFLG            ;SET PRINT FLAG
3875  016174  005737  000664           TST     HDRFL           ;SEE IF HAVE PRINTED HEADER
3876  016200  001007                   BNE     DERR0A          ;IF SO: BR
3877  016202  004737  022730           JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
3878  016206  012704  024730           MOV     #MSG1,R4        ;LOAD ERROR MSG ADDR
3879  016212  104000                   TTOUTT                  ;PRINT ERROR
3880  016214  004737  021156           JSR     PC,FRPRT        ;PRINT F OR R
3881  016220  012704  024747           DERR0A: MOV     #MSG4,R4
3882  016224  104000                   TTOUTT                  ;PRINT CHAR NO. HEADER
3883  016226  010203                   MOV     R2,R3
3884  016230  162703  033464           SUB     #RDATA,R3       ;POINT TO CHAR
3885  016234  005303                   DEC     R3
3886  016236  032737  010000  000562   BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3887  016244  001402                   BEQ     DERR0B          ;IF NOT: BR
3888  016246  010503                   MOV     R5,R3           ;GET CHAR NUMBER
3889  016250  005103                   COM     R3
3890  016252  104002           DERR0B: OCTPP                   ;PRINT CHAR NUMBER
3891  016254  012704  024735           MOV     #MSG2,R4
3892  016260  104000                   TTOUTT                  ;PRINT EXPECTED DATA
3893  016262  032737  010000  000562   BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3894  016270  001402                   BEQ     DERR0C          ;IF NOT: BR
3895  016272  111103                   MOVB    (R1),R3         ;GET CHAR
3896  016274  000401                   BR      DERR0D
3897  016276  114103           DERR0C: MOVB    -(R1),R3        ;LOAD EXPECTED DATA
3898  016300  004737  024160           DERR0D: JSR     PC,DOUT         ;GO PRINT CHAR
3899  016304  012704  024742           MOV     #MSG3,R4
```

```
3900  016310  104000                          TTOUTT                  ;PRINT RECIEVED DATA
3901  016312  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3902  016320  001402                          BEQ     DERR1           ;IF NOT: BR
3903  016322  111203                          MOVB    (R2),R3         ;GET CHAR
3904  016324  000401                          BR      DERR2
3905  016326  114203                  DERR1:  MOVB    -(R2),R3
3906  016330  004737  024160          DERR2:  JSR     PC,DOUT         ;PRINT BAD CHAR
3907  016334  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3908  016342  001001                          BNE     DERR4           ;++G BRANCH IF NOT
3909  016344  122122                  DERR3:  CMPB    (R1)+,(R2)+     ;RESET POINTERS
3910  016346  105237  000656          DERR4:  INCB    BBC             ;BUMP BAD RECORD CNTR
3911  016352  122737  000010  000656          CMPB    #10,BBC         ;SEE IF BLD BTH
3912  016360  001120                          BNE     DEREX           ;IF NOT: BR
3913  016362  032777  002000  162216          BIT     #2000,@SWR      ;SEE IF PRINT INHIBIT
3914  016370  001003                          BNE     1$              ;IF SO: BR
3915  016372  012704  025061                  MOV     #MSG15,R4
3916  016376  104000                          TTOUTT                  ;PRINT BLD BTH
3917  016400  105037  000656          1$:     CLRB    BBC             ;RESET BAD RECORD CNTR
3918  016404  000337  000656                  SWAB    BBC             ;POSITION BLD BTH AMOUNT
3919  016410  105237  000656                  INCB    BBC             ;BUMP AMOUNT
3920  016414  122737  000003  000656          CMPB    #3,BBC          ;SEE IF HAD 3 BLD BTHS
3921  016422  101052                          BHI     DERR4B          ;IF NOT: BR
3922  016424  000337  000656                  SWAB    BBC             ;REPOSITION BBC
3923  016430  022705  177767                  CMP     #177767,R5      ;SEE IF ON LAST EIGHT CHARS
3924  016434  101470                          BLOS    DERR6           ;IF SO: BR
3925  016436  012705  177767                  MOV     #177767,R5      ;SET CHAR CNTR TO 8
3926  016442  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3927  016450  001416                          BEQ     DERR4A          ;IF NOT: BR
3928  016452  012701  027456                  MOV     #WDATA,R1       ;GET START OF BUFFER
3929  016456  012702  033464                  MOV     #RDATA,R2       ;GET START OF BUFFER
3930  016462  062701  000010                  ADD     #10,R1
3931  016466  062702  000010                  ADD     #10,R2          ;POINT TO START +10
3932  016472  032737  000001  000556          BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
3933  016500  001450                          BEQ     DEREX           ;IF NOT: BR
3934  016502  105722                          TSTB    (R2)+           ;BUMP POINTER
3935  016504  000446                          BR      DEREX
3936  016506  013737  000556  000642  DERR4A: MOV     FMCNT,TEMP1     ;LOAD CHAR COUNT
3937  016514  005437  000642                  NEG     TEMP1           ;++G FORM TWO'S COMPLEMENT
3938  016520  162737  000010  000642          SUB     #10,TEMP1       ;POINT TO BUFFER -8
3939  016526  013701  000642                  MOV     TEMP1,R1        ;POINT TO NEXT CHAR
3940  016532  062701  027456                  ADD     #WDATA,R1       ;POINT TO NEXT WRITE CHAR
3941  016536  013702  000642                  MOV     TEMP1,R2        ;POINT TO END OF READ DATA -8 FORWARD
3942  016542  062702  033464                  ADD     #RDATA,R2       ;POINT TO NEXT CHAR
3943  016546  000425                          BR      DEREX           ;EXIT
3944  016550  000337  000656          DERR4B: SWAB    BBC             ;REPOSITION BBC
3945  016554  062705  000024                  ADD     #24,R5          ;SKIP 20 CHARS
3946  016560  103416                          BCS     DERR6           ;IF EXCEED RECORD SIZE: BR
3947  016562  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3948  016570  001405                          BEQ     DERR5           ;IF NOT: BR
3949  016572  162701  000024                  SUB     #24,R1
3950  016576  162702  000024                  SUB     #24,R2          ;RESET POINTERS
3951  016602  000407                          BR      DEREX
3952  016604  062701  000024          DERR5:  ADD     #24,R1          ;SKIP 20 CHARS
3953  016610  062702  000024                  ADD     #24,R2          ;SKIP FORWARD 20 CHARS
3954  016614  000402                          BR      DEREX
3955  016616  012705  177777          DERR6:  MOV     #-1,R5          ;SET TO EOR
```

```
3956  016622  005777  161760          DEREX:  TST     @SWR            ;++G BRANCH IF CONTINUE ON ERROR
3957  016626  100012                          BPL     DEREX1          ;++G
3958  016630  104006                          STOPP
3959  016632  005737  000670                  TST     PFLG            ;SEE IF PRINTED
3960  016636  001006                          BNE     DEREX1          ;IF SO: BR
3961  016640  032777  002000  161740          BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
3962  016646  001002                          BNE     DEREX1          ;IF NOT: BR
3963  016650  000137  016170                  JMP     DERR0           ;ELSE PRINT
3964  016654  005037  000670          DEREX1: CLR     PFLG            ;CLEAR FLAG
3965  016660  005237  000704                  INC     DERFL           ;BUMP DATA ERROR FLAG
3966  016664  000207                          RTS     PC              ;RETURN
3967
```

```
3968
3969                                    ;*********************************************************
3970                                    ;DROPS AND PICKS SUBROUTINE:
3971                                    ;
3972                                    ;THIS SUBROUTINE IS USED TO ACCUMULATE FROM
3973                                    ;EACH BAD DATA CHARACTER FOUND THE NUMBER
3974                                    ;OF BITS WHICH WERE EITHER DROPPED OR PICKED UP.
3975                                    ;TWO COUNTERS PER SLAVE ARE USED TO ACCUMULATE THIS
3976                                    ;INFORMATION AND CAN STORE UP TO 32K DROPS
3977                                    ;OR PICKS BEFORE OVERFLOWING.  IF OVERFLOW IS
3978                                    ;ABOUT TO OCCUR, THESE ACCUMULATORS ARE
3979                                    ;PRINTED IN OCTAL AND RESET TO ZERO.
3980                                    ;THE CONTENTS OF THE ACCUMULATORS MAY BE
3981                                    ;DISPLAYED AT ANY TIME BY SETTING CONSOLE
3982                                    ;SWITCH FOURTEEN TO A ONE (1). THE PRINTOUT WILL OCCUR
3983                                    ;AT THE END OF THE CURRENT BLOCK CYCLE.
3984                                    ;*********************************************************
3985
3986  016666  005037  000642       DRPKF:  CLR     TEMP1
3987  016672  005037  000644               CLR     TEMP2
3988  016676  005037  000646               CLR     TEMP3
3989  016702  111137  000642               MOVB    (R1),TEMP1      ;LOAD GOOD CHAR
3990  016706  111237  000644               MOVB    (R2),TEMP2      ;LOAD BAD CHAR
3991  016712  013704  000674               MOV     UNP,R4
3992  016716  016437  000770  000720       MOV     PIK1(R4),BPKP
3993  016724  016437  001010  000716       MOV     DRP1(R4),BDPP
3994  016732  032737  010000  000562       BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3995  016740  001005                       BNE     DRPK            ;IF SO: BR
3996  016742  124142                       CMPB    -(R1),-(R2)     ;POINT TO CHAR
3997  016744  112137  000642               MOVB    (R1)+,TEMP1     ;LOAD GOOD CHAR
3998  016750  112237  000644               MOVB    (R2)+,TEMP2     ;LOAD BAD CHAR
3999  016754  004737  016766       DRPK:   JSR     PC,DROP         ;GET DROPS
4000  016760  004737  017204               JSR     PC,PICK         ;GET PICKS
4001  016764  000207                       RTS     PC              ;EXIT
4002  016766  113703  000642       DROP:   MOVB    TEMP1,R3        ;R3 = GOOD CHAR
4003  016772  113704  000644               MOVB    TEMP2,R4        ;R4 = BAD CHAR
4004  016776  140403               DPC:    BICB    R4,R3           ;GET DROPS/PICKS
4005  017000  001001                       BNE     DPCG            ;IF SOME: BR
4006  017002  000207                       RTS     PC              ;RETURN
4007  017004  012737  000010  000710 DPCG:   MOV     #10,BCNT        ;SET NUMBER TO CHECK
4008  017012  132703  000001       DPC0:   BITB    #1,R3           ;SEE IF DROPPED OR PICKED THIS BIT
4009  017016  001455                       BEQ     DPC2            ;IF NOT: BR
4010  017020  105737  000646               TSTB    TEMP3           ;SEE IF ON PICKS
4011  017024  001016                       BNE     DPC1            ;IF SO: BR
4012  017026  005277  161664               INC     @BDPP           ;BUMP DROP CNTR
4013  017032  005777  161660               TST     @BDPP
4014  017036  100045                       BPL     DPC2            ;IF NO OVERFLOW: BR
4015  017040  032777  002000  161540       BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
4016  017046  001402                       BEQ     DPC0A           ;IF SO: BR
4017  017050  004737  022730               JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4018  017054  004737  017250       DPC0A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
4019  017060  000415                       BR      DPC2A
4020  017062  005277  161632       DPC1:   INC     @BPKP           ;BUMP PICK CNTR
4021  017066  005777  161626               TST     @BPKP           ;SEE IF OVERFLOW
4022  017072  100027                       BPL     DPC2            ;IF NOT: BR
4023  017074  032777  002000  161504       BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
```

```
4024  017102  001402                        BEQ     DPC1A           ;IF SO: BR
4025  017104  004737  022730                JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4026  017110  004737  017250        DPC1A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
4027  017114  013704  000674        DPC2A:  MOV     UNP,R4
4028  017120  016403  001010                MOV     DRP1(R4),R3     ;SET DROP POINTER
4029  017124  016404  000770                MOV     PIK1(R4),R4     ;SET PICK POINTER
4030  017130  012737  000010  000710        MOV     #10,BCNT        ;SET NUMBER OF BITS
4031  017136  005023                DPC2B:  CLR     (R3)+           ;CLEAR DROPS
4032  017140  005024                        CLR     (R4)+           ;CLEAR PICK
4033  017142  005337  000710                DEC     BCNT            ;SEE IF DONE
4034  017146  001373                        BNE     DPC2B           ;IF NOT: BR
4035  017150  000207                        RTS     PC              ;EXIT
4036  017152  000241                DPC2:   CLC
4037  017154  106003                        RORB    R3              ;GET NEXT BIT
4038  017156  005337  000710                DEC     BCNT            ;SEE IF DONE
4039  017162  001407                        BEQ     DPC3
4040  017164  062737  000002  000720        ADD     #2,BPKP
4041  017172  062737  000002  000716        ADD     #2,BDPP
4042  017200  000704                        BR      DPC0            ;++G CONTINUE
4043  017202  000207                DPC3:   RTS     PC              ;RETURN
4044  017204  013704  000674        PICK:   MOV     UNP,R4          ;GET UNIT POINTER
4045  017210  016437  000770  000720        MOV     PIK1(R4),BPKP   ;SET PICK POINTER
4046  017216  016437  001010  000716        MOV     DRP1(R4),BDPP   ;SET DROP POINTER
4047  017224  113704  000642                MOVB    TEMP1,R4        ;R4 = GOOD CHAR
4048  017230  113703  000644                MOVB    TEMP2,R3        ;R3 = BAD CHAR
4049  017234  112737  000001  000646        MOVB    #1,TEMP3        ;SET PICK FLAG
4050  017242  004737  016776                JSR     PC,DPC          ;GO CHECK PICKS
4051  017246  000207                        RTS     PC              ;EXIT
4052  017250  012704  025355        DPPRT:  MOV     #MSG26,R4
4053  017254  104000                        TTOUTT                  ;PRINT DROP HEADER
4054  017256  013704  000674                MOV     UNP,R4
4055  017262  016437  001010  000716        MOV     DRP1(R4),BDPP   ;SET DROP POINTER
4056  017270  016437  000770  000720        MOV     PIK1(R4),BPKP   ;SET PICK POINTER
4057  017276  062737  000016  000716        ADD     #16,BDPP
4058  017304  062737  000016  000720        ADD     #16,BPKP
4059  017312  012737  000010  000710        MOV     #10,BCNT        ;SET NUMBER TO PRINT
4060  017320  017703  161372        DPPRT0: MOV     @BDPP,R3
4061  017324  104002                        OCTPP                   ;PRINT DROPS
4062  017326  005337  000710                DEC     BCNT            ;SEE IF DONE
4063  017332  001404                        BEQ     DPPRT1          ;IF NOT: BR
4064  017334  162737  000002  000716        SUB     #2,BDPP         ;BUMP POINTER
4065  017342  000766                        BR      DPPRT0          ;CONTINUE FOR ALL 8 BITS
4066  017344  012737  000010  000710  DPPRT1: MOV     #10,BCNT        ;SET NUMBER TO PRINT
4067  017352  012704  025366                MOV     #MSG27,R4
4068  017356  104000                        TTOUTT                  ;PRINT PICK HEADER
4069  017360  017703  161334        DPPRT2: MOV     @BPKP,R3
4070  017364  104002                        OCTPP                   ;PRINT PICKS
4071  017366  005337  000710                DEC     BCNT            ;SEE IF DONE
4072  017372  001404                        BEQ     DPPRTX          ;IF SO: BR
4073  017374  162737  000002  000720        SUB     #2,BPKP         ;BUMP POINTER
4074  017402  000766                        BR      DPPRT2          ;CONTINUE FOR ALL 8 BITS
4075  017404  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.
                                        ;*********************************************************

017406  013703  000556        ERCHK:  MOV     FMCNT,R3        ;GET FRAME COUNT
017412  032703  000001                BIT     #1,R3           ;SEE IF ODD
017416  001401                        BEQ     ER0             ;IF NOT: BR
017420  005303                        DEC     R3              ;BUMP COUNT
017422  005403                ER0:    NEG     R3
017424  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
017432  001402                        BEQ     ER0B            ;IF NOT: BR
017434  000241                        CLC
017436  006003                        ROR     R3              ;SET TO FC/2
017440  032737  000010  000672  ER0B:  BIT     #10,MTC1        ;SEE IF WRITE OP
017446  001414                        BEQ     ER1             ;IF SO: BR
017450  032737  010000  000562        BIT     #10000,RDCMD
017456  001405                        BEQ     ER0A
017460  012703  033464                MOV     #RDATA,R3
017464  162703  000002                SUB     #2,R3           ;SET POINTER
017470  000405                        BR      ER2
017472  062703  033464        ER0A:   ADD     #RDATA,R3       ;BUILD EXPT READ ADDRESS
017476  000402                        BR      ER2
017500  062703  027456        ER1:    ADD     #WDATA,R3       ;BUILD EXPT WRITE ADDRESS
017504  010337  021132        ER2:    MOV     R3,CADER        ;SAVE ADDRESS
017510  012704  000007                MOV     #7,R4
017514  012701  021134                MOV     #BAER,R1
017520  005021                ER2A0:  CLR     (R1)+           ;CLEAR FLAGS
017522  005304                        DEC     R4
017524  001375                        BNE     ER2A0
017526  020377  160762                CMP     R3,@BA          ;SEE IF ADDRESS OK
017532  001402                        BEQ     ER2A1           ;IF SO: BR
017534  005237  021134                INC     BAER            ;SET BUS ADDRESS ERROR
017540  032737  000010  000672  ER2A1:  BIT     #10,MTC1        ;SEE IF WRITE OPER
017546  001006                        BNE     ER2B            ;IF NOT: BR
017550  005777  160742        ER2A:   TST     @FC             ;SEE IF FC=0
```

```
4132  017554  001441                          BEQ     ER3             ;IF SO: BR
4133  017556  005237  021142                  INC     FCER            ;SET FC ERROR
4134  017562  000436                          BR      ER3             ;++G
4135  017564  032737  000040  000672  ER2B:   BIT     #40,MTC1        ;SEE IF SPACE OPER
4136  017572  001766                          BEQ     ER2A            ;IF SO: BR
4137  017574  005737  000676                  TST     TMFLG           ;SEE IF TM TIME
4138  017600  001011                          BNE     ER2D            ;IF SO: BR
4139  017602  013703  000556                  MOV     FMCNT,R3
4140  017606  005403                          NEG     R3              ;R3 = EXPT RECORD SIZE
4141  017610  020377  160702          ER2C:   CMP     R3,@FC          ;SEE IF FC = EXPT
4142  017614  001421                          BEQ     ER3             ;IF SO: BR
4143  017616  005237  021142                  INC     FCER            ;SET FC ERROR FLAG
4144  017622  000416                          BR      ER3             ;++G
4145  017624  032737  002000  000552  ER2D:   BIT     #2000,UDES      ;SEE IF PE
4146  017632  001346                          BNE     ER2A            ;IF SO: BR
4147  017634  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
4148  017642  001003                          BNE     ER2E            ;IF SO: BR
4149  017644  012703  000002                  MOV     #2,R3
4150  017650  000757                          BR      ER2C            ;LOOK FOR EXPT = 2
4151  017652  012703  000001          ER2E:   MOV     #1,R3
4152  017656  000754                          BR      ER2C            ;GO CHECK FC FOR TM
4153  017660  032777  160000  160622  ER3:    BIT     #160000,@C1     ;SEE IF COUNT ERROR
4154  017666  001441                          BEQ     ER4
4155  017670  017703  160624                  MOV     @CS,R3          ;GET CONT STATUS REG
4156  017674  042703  000307                  BIC     #307,R3         ;MASK OUT IR,OR,UNIT NO.
4157  017700  005703                          TST     R3              ;SEE IF ANY OTHER ERRORS
4158  017702  001407                          BEQ     ER3A            ;IF NOT: BR
4159  017704  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4160  017710  001426                          BEQ     ER3B            ;IF NOT: BR
4161  017712  042703  001000                  BIC     #1000,R3        ;MASK MISSED TRANS
4162  017716  005703                          TST     R3              ;SEE IF ANY OTHER ERRORS
4163  017720  001022                          BNE     ER3B            ;IF SO: BR
4164  017722  032777  060000  160560  ER3A:   BIT     #60000,@C1      ;SEE IF EITHER TRE OR MCPE
4165  017730  001420                          BEQ     ER4             ;IF NOT: BR
4166  017732  005737  000676                  TST     TMFLG           ;SEE IF TM TIME
4167  017736  001413                          BEQ     ER3B            ;IF NOT: BR
4168  017740  017703  160560                  MOV     @ER,R3          ;GET ERROR REGISTER
4169  017744  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
4170  017752  001402                          BEQ     ER3A1           ;IF NOT: BR
4171  017754  042703  000100                  BIC     #100,R3         ;MASK PAR
4172  017760  042703  001000          ER3A1:  BIC     #1000,R3        ;MASK FCE
4173  017764  001402                          BEQ     ER4             ;IF NO ERRORS EXCEPT FCE: BR
4174  017766  005237  021136          ER3B:   INC     CONER           ;SET CONT ERROR FLAG
4175  017772  032777  040000  160522  ER4:    BIT     #40000,@DS      ;SEE IF DRIVE ERROR
4176  020000  001420                          BEQ     ER6             ;IF NOT: BR
4177  020002  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4178  020006  001413                          BEQ     ER4A            ;IF NOT: BR
4179  020010  017703  160510                  MOV     @ER,R3          ;GET ER
4180  020014  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
4181  020022  001402                          BEQ     ER4A1           ;IF NOT: BR
4182  020024  042703  000100                  BIC     #100,R3         ;MASK PAR
4183  020030  042703  001000          ER4A1:  BIC     #1000,R3        ;MASK OUT FCE
4184  020034  001402                          BEQ     ER6             ;++G & BR IF NO OTHER ERR BITS ARE SET
4185  020036  005237  021140          ER4A:   INC     DRVER           ;SET DRIVER ERROR FLAG
4186  020042  032737  002000  000552  ER6:    BIT     #2000,UDES
4187  020050  001071                          BNE     ERPT            ;IF IN PE MODE: BR
```

```
4188  020052  032777  020000  160526          BIT     #20000,@SWR     ;SEE IF NO DATA CHECK
4189  020060  001065                          BNE     ERPT            ;IF NOT: BR (ALLOW READ OF UNKNOWN TAPES)
4190  020062  032737  000040  000672          BIT     #40,MTC1        ;SEE IF WRITE OR READ OP
4191  020070  001461                          BEQ     ERPT            ;IF NOT: BR
4192  020072  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4193  020076  001413                          BEQ     ER6A            ;IF NOT: BR
4194  020100  013737  015536  021154          MOV     EXCRC,CRCSV     ;SAVE CRC
4195  020106  013737  015540  021152          MOV     EXLRC,LRCSV     ;SAVE LRC
4196  020114  005037  015536                  CLR     EXCRC
4197  020120  012737  000023  015540          MOV     #23,EXLRC       ;SET CRC/LRC FOR TM
4198  020126  032737  000060  000552  ER6A:   BIT     #60,UDES        ;SEE IF FORMAT 14
4199  020134  001037                          BNE     ERPT            ;IF NOT: BR
4200  020136  017703  160366                  MOV     @CC,R3          ;GET CRC CHARACTER
4201  020142  042703  177000                  BIC     #177000,R3
4202  020146  023703  015536                  CMP     EXCRC,R3
4203  020152  001402                          BEQ     ER7             ;IF CRC GOOD: BR
4204  020154  005237  021146                  INC     CRCER           ;SET ERROR FLAG
4205  020160  017703  160350          ER7:    MOV     @MR,R3          ;GET LRC
4206  020164  000303                          SWAB    R3
4207  020166  005703                          TST     R3
4208  020170  100002                          BPL     ER10
4209  020172  052703  000400                  BIS     #400,R3
4210  020176  042703  177000          ER10:   BIC     #177000,R3
4211  020202  023703  015540                  CMP     EXLRC,R3
4212  020206  001412                          BEQ     ERPT            ;IF LRC GOOD: BR
4213  020210  010337  021150                  MOV     R3,ACTLRC       ;SAVE ACTUAL LRC
4214  020214  005237  021144                  INC     LRCER           ;SET LRC ERROR FLAG
4215  020220  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
4216  020226  001402                          BEQ     ERPT            ;IF NOT: BR
4217  020230  005037  021144                  CLR     LRCER           ;ELSE CLEAR LRC ERROR
4218  020234  012703  000006          ERPT:   MOV     #6,R3
4219  020240  005037  000706                  CLR     SERFL           ;CLEAR ERROR FLAG
4220  020244  005037  000722                  CLR     ERSAV
4221  020250  012704  021134                  MOV     #BAER,R4
4222  020254  005724                  ERPTT:  TST     (R4)+           ;SEE IF ANY ERROR
4223  020256  001004                          BNE     ERPTG           ;IF SO: BR
4224  020260  005303                          DEC     R3
4225  020262  001374                          BNE     ERPTT
4226  020264  000137  021076                  JMP     ERPX1
4227  020270  005237  000706          ERPTG:  INC     SERFL           ;SET ERROR FLAG
4228  020274  017737  160224  000722          MOV     @ER,ERSAV       ;SAVE ERROR REGISTER
4229  020302  032777  002000  160276          BIT     #2000,@SWR      ;SEE IF PRINT
4230  020310  001420                          BEQ     ERPT0           ;IF SO: BR
4231  020312  022737  000002  000712          CMP     #2,RTYFL        ;SEE IF READ RETRY
4232  020320  001006                          BNE     ERPTG1          ;IF NOT: BR
4233  020322  013703  000702                  MOV     RTCNT,R3
4234  020326  005203                          INC     R3              ;BUMP RETRY COUNT
4235  020330  020337  000602                  CMP     R3,RETRY        ;SEE IF LAST RETRY
4236  020334  001406                          BEQ     ERPT0           ;IF SO: BR
4237  020336  022737  000002  021140  ERPTG1: CMP     #2,DRVER        ;SEE IF TM STATUS ERROR
4238  020344  001402                          BEQ     ERPT0           ;IF SO: BR
4239  020346  000137  021000                  JMP     ERPX0
4240  020352  005237  000670          ERPT0:  INC     PFLG
4241  020356  004737  022730                  JSR     PC,PAPRT        ;PRINT HEADER
4242  020362  013704  000652                  MOV     EMADDR,R4
4243  020366  104000                          TTOUTT                  ;PRINT ERROR TYPE
```

```
4244  020370  004737  021156                  JSR     PC,FRPRT        ;PRINT F OR R
4245  020374  005737  000676                  TST     TMFLG
4246  020400  001407                          BEQ     ERPT1
4247  020402  022737  026164  000652          CMP     #MSG54,EMADDR
4248  020410  001403                          BEQ     ERPT1
4249  020412  012704  026202                  MOV     #MSG56,R4       ;PRINT TM
4250  020416  104000                          TTOUTT
4251  020420  005737  021136          ERPT1:  TST     CONER
4252  020424  001414                          BEQ     ERPT2           ;IF NO CONT ERROR: BR
4253  020426  012704  025205                  MOV     #MSG23,R4
4254  020432  104000                          TTOUTT                  ;PRINT C1 TAG
4255  020434  017703  160050                  MOV     @C1,R3
4256  020440  104002                          OCTPP                   ;PRINT CONTROL 1
4257  020442  012704  025232                  MOV     #MSG23D,R4      ;PRINT CS TAG
4258  020446  104000                          TTOUTT
4259  020450  017703  160044                  MOV     @CS,R3
4260  020454  104002                          OCTPP                   ;PRINT CONT STATUS
4261  020456  005737  021140          ERPT2:  TST     DRVER
4262  020462  001414                          BEQ     ERPT3           ;IF SO DRIVE ERROR: BR
4263  020464  012704  025240                  MOV     #MSG23E,R4
4264  020470  104000                          TTOUTT                  ;PRINT DS TAG
4265  020472  017703  160024                  MOV     @DS,R3
4266  020476  104002                          OCTPP                   ;PRINT DRIVE STATUS
4267  020500  012704  025245                  MOV     #MSG23F,R4
4268  020504  104000                          TTOUTT                  ;PRINT ER TAG
4269  020506  017703  160012                  MOV     @ER,R3
4270  020512  104002                          OCTPP                   ;PRINT DRIVE ERROR
4271  020514  005737  021134          ERPT3:  TST     BAER
4272  020520  001416                          BEQ     ERPT4           ;IF NO BA ERROR: BR
4273  020522  012704  025220                  MOV     #MSG23B,R4
4274  020526  104000                          TTOUTT                  ;PRINT BA TAG
4275  020530  017703  157760                  MOV     @BA,R3
4276  020534  104002                          OCTPP                   ;PRINT BUS ADDRESS
4277  020536  012737  000255  000636          MOV     #255,TOB
4278  020544  004737  023662                  JSR     PC,TOG          ;PRINT /
4279  020550  013703  021132                  MOV     CADER,R3
4280  020554  104002                          OCTPP                   ;PRINT EXPT BUS ADDRESS
4281  020556  005737  021142          ERPT4:  TST     FCER
4282  020562  001406                          BEQ     ERPT5           ;IF NO FC ERROR: BR
4283  020564  012704  025225                  MOV     #MSG23C,R4
4284  020570  104000                          TTOUTT                  ;PRINT FC TAG
4285  020572  017703  157720                  MOV     @FC,R3
4286  020576  104002                          OCTPP                   ;PRINT FRAME COUNT
4287  020600  012704  025213          ERPT5:  MOV     #MSG23A,R4
4288  020604  104000                          TTOUTT                  ;PRINT WC TAG
4289  020606  017703  157700                  MOV     @WC,R3
4290  020612  104002                          OCTPP                   ;PRINT WORD COUNT
4291  020614  005737  021146                  TST     CRCER
4292  020620  001420                          BEQ     ERPT5A          ;IF NO CRC ERROR: BR
4293  020622  012704  026227                  MOV     #MSG58,R4
4294  020626  104000                          TTOUTT                  ;PRINT CRC TAG
4295  020630  017703  157674                  MOV     @CC,R3
4296  020634  042703  177000                  BIC     #177000,R3
4297  020640  104002                          OCTPP                   ;PRINT ACTUAL CRC
4298  020642  012737  000255  000636          MOV     #255,TOB
4299  020650  004737  023662                  JSR     PC,TOG
```

```
4300  020654  013703  015536                MOV     EXCRC,R3
4301  020660  104002                        OCTPP                   ;PRINT EXPECTED CRC
4302  020662  005737  021144        ERPT5A: TST     LRCER
4303  020666  001416                        BEQ     ERPT6           ;IF NO LRC ERROR: BR
4304  020670  012704  026235                MOV     #MSG59,R4
4305  020674  104000                        TTOUTT                  ;PRINT LRC TAG
4306  020676  013703  021150                MOV     ACTLRC,R3
4307  020702  104002                        OCTPP                   ;PRINT ACTUAL LRC
4308  020704  012737  000255  000636        MOV     #255,TOB
4309  020712  004737  023662                JSR     PC,TOG
4310  020716  013703  015540                MOV     EXLRC,R3
4311  020722  104002                        OCTPP                   ;PRINT EXPECTED LRC
4312  020724  005737  021140        ERPT6:  TST     DRVER
4313  020730  001422                        BEQ     ERPT7           ;IF NO DRIVE ERROR: BR
4314  020732  032737  002000  000552        BIT     #2000,UDES
4315  020740  001416                        BEQ     ERPT7           ;IF NO PE: BR
4316  020742  017704  157556                MOV     @ER,R4
4317  020746  042704  075477                BIC     #75477,R4       ;MASK OUT ALL BUT BITS 15,10,7,6
4318  020752  005704                        TST     R4
4319  020754  001410                        BEQ     ERPT7           ;IF NO CONDITIONALS SET: BR
4320  020756  012704  025257                MOV     #MSG23H,R4
4321  020762  104000                        TTOUTT                  ;PRINT CC TAG
4322  020764  017703  157540                MOV     @CC,R3
4323  020770  042703  177000                BIC     #177000,R3      ;MASK CC
4324  020774  104002                        OCTPP                   ;PRINT CHECK CHARACTERS
4325  020776  000240        ERPT7:  NOP
4326  021000  032777  100000  157600 ERPX0:  BIT     #100000,@SWR    ;SEE IF STOP ON ERROR
4327  021006  001412                        BEQ     ERPX            ;IF NOT: BR
4328  021010  104006                        STOPP
4329  021012  005737  000670                TST     PFLG            ;SEE IF HAVE PRINTED
4330  021016  001006                        BNE     ERPX            ;IF SO: BR
4331  021020  032777  002000  157560        BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
4332  021026  001002                        BNE     ERPX            ;IF NOT: BR
4333  021030  000137  020352                JMP     ERPTO           ;PRINT ERROR
4334  021034  005037  000670        ERPX:   CLR     PFLG
4335  021040  012777  000011  157442        MOV     #11,@C1         ;DRIVE CLEAR
4336  021046  017704  157454                MOV     @AS,R4
4337  021052  010477  157450                MOV     R4,@AS          ;CLEAR AS
4338  021056  013704  000510                MOV     C1,R4
4339  021062  005204                        INC     R4
4340  021064  152714  000100                BISB    #100,(R4)       ;RESET TRE
4341  021070  013777  000552  157444        MOV     UDES,@C2        ;RESET TC
4342  021076  032737  000040  000672 ERPX1:  BIT     #40,MTC1
4343  021104  001411                        BEQ     ERPX2           ;IF NOT READ/WRITE OP: BR
4344  021106  005737  000676                TST     TMFLG
4345  021112  001406                        BEQ     ERPX2           ;IF NOT TM TIME: BR
4346  021114  013737  021154  015536        MOV     CRCSV,EXCRC     ;RESTORE CRC
4347  021122  013737  021152  015540        MOV     LRCSV,EXLRC     ;RESTORE LRC
4348  021130  000207        ERPX2:  RTS     PC                      ;EXIT
4349  021132  000000        CADER:  0                               ;EXPT ADDRESS SAVE
4350  021134  000000        BAER:   0
4351  021136  000000        CONER:  0
4352  021140  000000        DRVER:  0
4353  021142  000000        FCER:   0
4354  021144  000000        LRCER:  0
4355  021146  000000        CRCER:  0
```

```
4356  021150  000000                    ACTLRC: 0
4357  021152  000000                    LRCSV:  0
4358  021154  000000                    CRCSV:  0
4359
4360                                    ;*********************************************************
4361                                    ;F FOR FORWARD/R FOR REVERSE PRINT SUBROUTINE:
4362                                    ;
4363                                    ;THIS SUBROUTINE IS USED TO PRINT OUT THE
4364                                    ;TAPE DIRECTION USED WHEN ANY ERROR IS
4365                                    ;DETECTED IN STATUS OF READ OR WRITE, DATA, OR
4366                                    ;SPACING OPERATIONS.
4367                                    ;*********************************************************
4368
4369  021156  032737  000010  000672  FRPRT:  BIT     #10,MTC1        ;SEE IF WRITE COMMAND
4370  021164  001413                          BEQ     FREX            ;IF SO: BR
4371  021166  032737  000002  000672          BIT     #2,MTC1         ;SEE IF REVERSE
4372  021174  001404                          BEQ     FRO             ;IF NOT: BR
4373  021176  012704  025115                  MOV     #MSG17,R4
4374  021202  104000                          TTOUTT                  ;PRINT R
4375  021204  000403                          BR      FREX
4376  021206  012704  025112          FRO:    MOV     #MSG16,R4
4377  021212  104000                          TTOUTT                  ;PRINT F
4378  021214  000207                  FREX:   RTS     PC              ;EXIT
4379
```

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

021216  005037  000642          TAPG:   CLR     TEMP1
021222  013777  000550  157270          MOV     DVN,@CS         ;SET DRIVE NO.
021230  032777  010000  157264  TAPG0:  BIT     #10000,@DS      ;SEE IF HAVE MOL
021236  001026                        BNE     TAPG3           ;IF SO: BR
021240  005237  000642                INC     TEMP1           ;SEE IF TIMED OUT
021244  001371                        BNE     TAPG0           ;WAIT FOR READY
021246  004737  022730                JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
021252  032737  000010  000672        BIT     #10,MTC1        ;SEE IF WRITE OP
021260  001004                        BNE     TAPG1           ;IF NOT: BR
021262  012704  024754                MOV     #MSG5,R4
021266  104000                        TTOUTT                  ;PRINT WRITE ERR
021270  000405                        BR      TAPG2
021272  012704  024761          TAPG1:  MOV     #MSG6,R4
021276  104000                        TTOUTT                  ;PRINT READ ERR
021300  004737  021156                JSR     PC,FRPRT        ;PRINT F OR R
021304  012704  025335          TAPG2:  MOV     #MSG25,R4
021310  104000                        TTOUTT                  ;PRINT NO MOL ERR
021312  104006                        STOPP
021314  032777  020000  157200  TAPG3:  BIT     #20000,@DS      ;SEE IF PIP RESET
021322  001411                        BEQ     TAPG3F          ;IF SO: BR
021324  004737  022730                JSR     PC,PAPRT        ;PRINT HEADER
021330  012704  027314                MOV     #MSG116,R4
021334  104000                        TTOUTT                  ;PRINT REWINDING MESSAGE
021336  032777  020000  157156  1$:    BIT     #20000,@DS
021344  001374                        BNE     1$              ;AWAIT PIP RESET
021346  022737  000026  000672  TAPG3F: CMP     #26,MTC1        ;SEE IF WRITE TM
021354  001003                        BNE     TAPG3A          ;IF NOT: BR
```

```
4436  021356  012704  177777                MOV     #-1,R4          ;ELSE SET FC FOR -1
4437  021362  000406                       BR      TAPG3B
4438  021364  013704  000556       TAPG3A: MOV     FMCNT,R4
4439  021370  032704  000001               BIT     #1,R4
4440  021374  001401                       BEQ     TAPG3B
4441  021376  005304                       DEC     R4
4442  021400  000261               TAPG3B: SEC
4443  021402  006004                       ROR     R4              ;SET WC = FC/2 FOR NORMAL FORMAT
4444  021404  032737  000020  000552       BIT     #20,UDES        ;SEE IF CORE DUMP FORMAT
4445  021412  001402                       BEQ     TAPG3C          ;IF NOT: BR
4446  021414  000261                       SEC
4447  021416  006004                       ROR     R4              ;SET WC = FC/4 FOR CORE DUMP
4448  021420  010477  157066       TAPG3C: MOV     R4,@WC          ;SET WORD COUNT
4449  021424  012777  000011  157056       MOV     #11,@C1         ;DRIVE CLEAR
4450  021432  017777  157060  157056       MOV     @FC,@FC         ;RESET FC LOADED
4451  021440  005737  000566               TST     INTRF           ;SEE IF INTERCHANGE READ
4452  021444  001407                       BEQ     TAPG3D          ;IF NOT: BR
4453  021446  032737  000040  000672       BIT     #40,MTC1        ;SEE IF READ OP
4454  021454  001403                       BEQ     TAPG3D          ;IF NOT: BR
4455  021456  012777  000003  157050       MOV     #3,@MR          ;SET INTERCHANGE READ MAINT. MODE
4456  021464  013704  000672       TAPG3D: MOV     MTC1,R4         ;GET COMMAND
4457  021470  042704  177707               BIC     #177707,R4      ;MASK OP CODE
4458  021474  022704  000030               CMP     #30,R4          ;SEE IF SPACE OP CODE
4459  021500  001403                       BEQ     TAPG3E          ;IF SO: BR
4460  021502  012737  177740  000666       MOV     #-40,STAL       ;SET INTERRUPT DELAY MULT TO 40
4461  021510  052737  000101  000672TAPG3E: BIS     #101,MTC1       ;SET INTERRUPT ENABLE AND GO
4462  021516  000240                       NOP
4463  021520  013777  000672  156762       MOV     MTC1,@C1        ;EXECUTE COMMAND
4464  021526  005077  157052               CLR     @PSW            ;CLEAR PRIORITY
4465  021532  005037  000642               CLR     TEMP1
4466  021536  005237  000642       TAPG4:  INC     TEMP1           ;SEE IF HAVE TIMED OUT
4467  021542  001375                       BNE     TAPG4           ;IF NOT: BR
4468  021544  005237  000666               INC     STAL
4469  021550  001372                       BNE     TAPG4           ;DO TIME DELAY MULTIPLIER
4470  021552  012777  000340  157024TAPG5:  MOV     #340,@PSW       ;RESET PRIORITY
4471  021560  032777  002000  157020       BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
4472  021566  001012                       BNE     TAPG6           ;IF NOT: BR
4473  021570  004737  022730               JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4474  021574  013704  000652               MOV     EMADDR,R4
4475  021600  104000                       TTOUTT                  ;PRINT ERROR OP
4476  021602  004737  021156               JSR     PC,FRPRT        ;PRINT F OR R
4477  021606  012704  025315               MOV     #MSG24,R4
4478  021612  104000                       TTOUTT                  ;PRINT NO INTERRUPT
4479  021614  005777  156766       TAPG6:  TST     @SWR            ;++G BRANCH IF CONTINUE ON ERROR
4480  021620  100001                       BPL     TAPG7
4481  021622  104006                       STOPP
4482  021624  000137  021716       TAPG7:  JMP     MTINTA          ;RETURN TO CALLING ROUTINE
4483
```

```
4484
4485                                    ;TTY INTERRUPT HANDLER**********
4486
4487  021630  012777  000340  156746  TTINT:  MOV     #340,@PSW       ;RESET PSW
4488  021636  017746  156750                  MOV     @TKB,-(SP)      ;++G GET CHARACTER
4489  021642  042716  000200                  BIC     #200,(SP)       ;++G STRIP PARITY BIT
4490  021646  122716  000003                  CMPB    #3,(SP)         ;++G SEE IF CONT C
4491  021652  001412                          BEQ     TTINTO          ;IF SO: BR
4492  021654  122716  000007                  CMPB    #7,(SP)         ;++G CHECK FOR CNTL G
4493  021660  001013                          BNE     RETURN
4494  021662  022737  000176  000606          CMP     #SWREG,SWR      ;IS SOFTWARE SWITCH REGISTER USED
4495  021670  001007                          BNE     RETURN          ;NO, GET OUT
4496  021672  004737  024444                  JSR     PC,CNTG         ;GO CHANGE SWREG
4497  021676  000404                          BR      RETURN          ;+;G GO TO EXIT
4498
4499  021700  010046                  TTINTO: MOV     R0,-(SP)        ;++G SAVE R0(REC CNTR)
4500  021702  004737  013774                  JSR     PC,TINP4        ;GO GET STALL VALUES
4501  021706  012600                          MOV     (SP)+,R0        ;++G RESTORE R0(REC CNTR)
4502  021710  005726                  RETURN: TST     (SP)+           ;++G POP CHAR OFF STACK
4503  021712  000002                          RTI                     ;RETURN
4504
4505                                    ;MAG TAPE INTERRUPT HANDLER**********
4506
4507  021714  000240                  MTINT:  NOP
4508  021716  042777  000037  156610  MTINTA: BIC     #37,@MR         ;CLEAR MAINT MODE
4509  021724  013716  000662                  MOV     RTRN,(SP)       ;++G GET RETURN ADDRESS
4510  021730  000002                          RTI                     ;++G RETURN
```

```
4511                                    ;************************************
4512                                    ;AUTO SEQUENCE
4513                                    ;
4514                                    ;THIS ROUTINE ,ENTERED VIA STARTING ADDRESS 240
4515                                    ;WILL EXERCISE ALL AVAILABLE SLAVES ON ALL AVAILABLE
4516                                    ;DRIVES IN BOTH PE AND NRZ ACCORDING TO THE PRESELECTED
4517                                    ;TEST PLAN. IF NRZ ONLY, PE TESTING WILL NOT BE ATTEMPTED.
4518                                    ;************************************
4519
4520  021732  012704  027124       ASEQ:   MOV     #MSG108,R4
4521  021736  104000                       TTOUTT                  ;PRINT NRZ ONLY REQUEST
4522  021740  012705  000650               MOV     #NRZOF,R5       ;SET ADDRESS OF FLAG
4523  021744  012701  000001               MOV     #1,R1           ;SET SIZE OF ENTRY
4524  021750  012702  000001               MOV     #1,R2           ;SET UPPER LIMIT
4525  021754  012703  000000               MOV     #0,R3           ;SET LOWER LIMIT
4526  021760  004737  023346               JSR     PC,TTR          ;GO GET RESPONSE
4527  021764  012704  026721               MOV     #MSG104,R4
4528  021770  104000                       TTOUTT                  ;REQUEST CONT OR NOT
4529  021772  012705  000742               MOV     #ASEQCF,R5      ;SET ADDRESS OF ENTRY
4530  021776  012701  000001               MOV     #1,R1           ;SET SIZE OF ENTRY
4531  022002  012702  000001               MOV     #1,R2           ;SET UPPER LIMIT
4532  022006  012703  000000               MOV     #0,R3           ;SET LOWER LIMIT
4533  022012  004737  023346               JSR     PC,TTR          ;GO GET INPUT
4534  022016  005037  000736       ASEQ0:  CLR     ADRVN           ;CLEAR DRV NUM
4535  022022  004737  022154       ASEQ1:  JSR     PC,HRDS         ;GO SELECT HARDWARE CONFIGURATION
4536  022026  005737  000042               TST     @#42            ;AUTO MODE? ++ C.W
4537  022032  001404                       BEQ     1$              ;BRANCH - IF NO ++ C.W
4538  022034  012737  000001  000742       MOV     #1,ASEQCF       ;SET AUTO SEQ FLAG ++ C.W
4539  022042  000414                       BR      2$              ;DO AUTO SEQ TESTS ++ C.W
4540  022044  012704  026665       1$:     MOV     #MSG101,R4
4541  022050  104000                       TTOUTT                  ;PRINT DIVIDER
4542  022052  012704  026701               MOV     #MSG102,R4
4543  022056  104000                       TTOUTT                  ;PRINT TM02 NUMBER
4544  022060  013703  000736               MOV     ADRVN,R3
4545  022064  104002                       OCTPP                   ;PRINT TM02
4546  022066  012704  026710               MOV     #MSG103,R4
4547  022072  104000                       TTOUTT                  ;PRINT SLAVE HDR
4548  022074  012700  000746       2$:     MOV     #UN1,R0         ;POINT TO START OF SLAVE TABLE
4549  022100  005710               ASEQ2:  TST     (R0)            ;SEE IF END
4550  022102  100403                       BMI     ASEQ3           ;IF SO: BR
4551  022104  012003                       MOV     (R0)+,R3
4552  022106  104002                       OCTPP                   ;PRINT SLAVE TABLE
4553  022110  000773                       BR      ASEQ2           ;DO ALL
4554  022112  004737  022360       ASEQ3:  JSR     PC,AMOD1        ;GO DO MODE 1(NRZ)
4555  022116  004737  022554               JSR     PC,AMOD2        ;GO DO MODE 2(PE)
4556  022122  022737  000007  000736 ASEQ4:  CMP     #7,ADRVN        ;SEE IF DONE ALL DRIVES
4557  022130  001403                       BEQ     ASEQX           ;IF SO: BR
4558  022132  005237  000736               INC     ADRVN           ;BUMP DRIVE NUMBER
4559  022136  000731                       BR      ASEQ1           ;CONTINUE
4560  022140  005737  000742       ASEQX:  TST     ASEQCF          ;CONTINUOUS AUTO SEQUENCE? ++ C.W
4561  022144  001402                       BEQ     1$              ;BRANCH - IF NO ++ C.W
4562  022146  000137  005100               JMP     TEND            ;DO ACT END OF PASS ++ C.W
4563  022152  000000               1$:     HALT
```

```
4564
4565                                    ;SUBROUTINE TO SELECT AUTO SEQUENCE HARDWARE********
4566
4567  022154  005037  005156        HRDS:   CLR     REOTC           ;CLEAR EOT UNIT CNTR
4568  022160  005037  000642                CLR     TEMP1
4569  022164  012777  000040  156326        MOV     #40,@CS         ;INIT
4570  022172  013777  000736  156320        MOV     ADRVN,@CS       ;SET DRIVE
4571  022200  017701  156332                MOV     @DT,R1          ;READ DRIVE TYPE
4572  022204  032777  010000  156306        BIT     #10000,@CS      ;TEST FOR NON-EXISTANT DRIVE
4573  022212  001403                        BEQ     HRDS1           ;IF DRIVE AVAIL: BR
4574  022214  005726                HRDS0:  TST     (SP)+           ;RESET STACK POINTER
4575  022216  000137  022122                JMP     ASEQ4           ;GO SEE IF TRIED ALL DRIVES
4576  022222  042701  002007        HRDS1:  BIC     #2007,R1        ;MASK SLAVE TYPE
4577  022226  022701  140010                CMP     #140010,R1      ;++G SEE IF TU16/TE16 TAPE
4578  022232  001370                        BNE     HRDS0           ;IF NOT: BR
4579  022234  005000                        CLR     R0
4580  022236  012701  000746                MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4581  022242  005737  003040                TST     CHNFLG          ;++G BRANCH IF NOT IN CHAIN MODE
4582  022246  001410                        BEQ     HRDS2
4583  022250  122737  000006  000041        CMPB    #6,@#41         ;++G BRANCH IF NOT LOADED VIA TMDP
4584  022256  001004                        BNE     HRDS2
4585  022260  005737  000736                TST     ADRVN           ;++G BRANCH IF NOT DRIVE 0
4586  022264  001001                        BNE     HRDS2           ;++G
4587  022266  005200                        INC     R0              ;++G DO NOT TEST DRIVE 0 SLAVE 0
4588                                                                ;++G IF TMDP CHAIN
4589  022270  010077  156246        HRDS2:  MOV     R0,@C2          ;SELECT SLAVE
4590  022274  032777  010000  156220        BIT     #10000,@DS      ;SEE IF SLAVE AVAIL FOR TEST(MOL)
4591  022302  001403                        BEQ     HRDS3           ;IF NOT: BR
4592  022304  005237  000642                INC     TEMP1           ;SET SLAVE FOUND FLAG
4593  022310  010021                        MOV     R0,(R1)+        ;LOAD SLAVE TABLE
4594  022312  022700  000007        HRDS3:  CMP     #7,R0           ;SEE IF DONE ALL SLAVES
4595  022316  001402                        BEQ     HRDS4           ;IF SO: BR
4596  022320  005200                        INC     R0              ;ELSE BUMP SLAVE NUMBER
4597  022322  000762                        BR      HRDS2           ;CONTINUE SELECTION
4598  022324  005737  000642        HRDS4:  TST     TEMP1           ;SEE IF FOUND ANY SLAVES
4599  022330  001731                        BEQ     HRDS0           ;IF NOT: BR
4600  022332  013737  000642  005156        MOV     TEMP1,REOTC     ;SET NUMBER OF UNITS
4601  022340  000337  000642                SWAB    TEMP1
4602  022344  053737  000642  005156        BIS     TEMP1,REOTC     ;SET EOT CNTR
4603  022352  012711  177777                MOV     #-1,(R1)        ;TERMINATE SLAVE TABLE
4604  022356  000207                        RTS     PC              ;RETURN TO SEQ
```

```
4605
4606                                    ;SUBROUTINE TO SELECT NRZ AUTO TEST MODE**********
4607
4608  022360  005037  000654        AMOD1:  CLR     BLCNTR          ;ASSURE BLOCK COUNTER IS 0
4609  022364  012701  000746                MOV     #UN1,R1         ;GET START OF SLAVE TABLE
4610  022370  052721  001700        AMOD1A: BIS     #1700,(R1)+     ;SET ALL SLAVE TO NRZ,NORM,ODD
4611  022374  005111                        COM     (R1)
4612  022376  001402                        BEQ     AMOD1B          ;IF FILLED ALL SLAVES: BR
4613  022400  005111                        COM     (R1)
4614  022402  000772                        BR      AMOD1A          ;ELSE DO ALL
4615  022404  005111                AMOD1B: COM     (R1)
4616  022406  004737  005172                JSR     PC,RWNDA        ;GO REWIND ALL AVAIL SLAVES
4617  022412  012737  000006  000740        MOV     #6,ABLCNT       ;SET NUMBER OF BLOCKS FOR MODE 1
4618  022420  012737  174000  000556        MOV     #-4000,FMCNT    ;SET FC = 4000
4619  022426  012737  000100  000554        MOV     #100,RCNT       ;SET REC CNTR = 100
4620  022434  013737  000736  000550        MOV     ADRVN,DVN       ;SELECT DRIVE
4621  022442  012737  000001  000560        MOV     #1,PATRN        ;SELECT PATTERN 1
4622  022450  005037  000564                CLR     TMEX            ;ASSURE NO TMK
4623  022454  005037  000566                CLR     INTRF           ;ASSURE NORMAL READ
4624  022460  004737  003414                JSR     PC,STAUTO       ;GO DO AUTO MODE 1
4625  022464  012737  000010  000560        MOV     #10,PATRN       ;SELECT PATTERN 10
4626  022472  004737  003414                JSR     PC,STAUTO       ;GO DO PATTERN 10
4627  022476  012737  000014  000560        MOV     #14,PATRN       ;SELECT PATTERN 14
4628  022504  004737  003414                JSR     PC,STAUTO
4629  022510  005737  000650                TST     NRZOF           ;SEE IF NRZ ONLY
4630  022514  001411                        BEQ     AMOD1C          ;IF NOT: BR
4631  022516  012737  177777  000740        MOV     #-1,ABLCNT      ;FORCE TO EOT
4632  022524  012737  153624  000624        MOV     #153624,RANBAS
4633  022532  012737  032561  000626        MOV     #32561,RANSAV   ;RESET RANDOM DATA BASE
4634  022540  012737  177777  000560AMOD1C:  MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
4635  022546  004737  003414                JSR     PC,STAUTO
4636  022552  000207                        RTS     PC              ;RETURN TO SEQ
```

```
4637
4638                                    ;SUBROUTINE TO SELECT PE AUTO TEST MODE**********
4639
4640  022554  005737  003040          AMOD2:  TST     CHNFLG          ;++G BRANCH IF IN CHAIN MODE
4641  022560  001003                          BNE     1$              ;++G
4642  022562  005737  000650                  TST     NRZOF           ;SEE IF NRZ ONLY
4643  022566  001057                          BNE     AMOD2X          ;IF SO: BR
4644  022570  005037  000654          1$:     CLR     BLCNTR          ;CLEAR BLOCK CNTR
4645  022574  012701  000746                  MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4646  022600  042711  001700          AMOD2A: BIC     #1700,(R1)      ;CLEAR NRZ
4647  022604  052721  002300                  BIS     #2300,(R1)+     ;SET TO PE NORM, ODD
4648  022610  005111                          COM     (R1)            ;SEE IF END OF TABLE
4649  022612  001402                          BEQ     AMOD2B          ;IF SO: BR
4650  022614  005111                          COM     (R1)
4651  022616  000770                          BR      AMOD2A          ;CONTINUE
4652  022620  005111                  AMOD2B: COM     (R1)
4653  022622  004737  005172                  JSR     PC,RWNDA        ;REWIND ALL SLAVES
4654  022626  012737  000006  000740          MOV     #6,ABLCNT       ;SET AUTO BLOCK COUNT
4655  022634  012737  174000  000556          MOV     #-4000,FMCNT    ;SET FC = 4000
4656  022642  012737  000100  000554          MOV     #100,RCNT       ;SET REC CNTR TO 100
4657  022650  012737  000010  000560          MOV     #10,PATRN       ;SELECT PATTERN 10
4658  022656  004737  003414                  JSR     PC,STAUTO       ;GO DO AUTO SEQ
4659  022662  012737  000014  000560          MOV     #14,PATRN       ;SELECT PATTERN 14
4660  022670  004737  003414                  JSR     PC,STAUTO
4661  022674  012737  000015  000560          MOV     #15,PATRN       ;SELECT PATTERN 15
4662  022702  004737  003414                  JSR     PC,STAUTO
4663  022706  012737  177777  000740          MOV     #-1,ABLCNT      ;FORCE TO END OF TAPE
4664  022714  012737  177777  000560          MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
4665  022722  004737  003414                  JSR     PC,STAUTO
4666  022726  000207                  AMOD2X: RTS     PC              ;RETURN TO SEQ
4667
4668
```

```
4669
4670                            ;*********************************************************
4671                            ;ERROR HEADER PRINT SUBROUTINE:
4672                            ;
4673                            ;THIS ROUTINE IS USED TO PRINT OUT A HEADER
4674                            ;WITH EACH ERROR MESSAGE.  THE PRINT IS IN TWO
4675                            ;LINES AND CONTAINS THE FOLLOWING INFORMATION.
4676                            ;LINE 1:  DRIVE NO. SLAVE NO. DENSITY PARITY FORMAT
4677                            ;LINE 2:  CURRENT BLOCK NUMBER, RECORD NUMBER IN
4678                            ;WHICH THE ERROR OCCURED PLUS THE TOTAL NUMBER
4679                            ;OF RECORDS IN THIS BLOCK, THE RECORD SIZE (NUMBER
4680                            ;OF CHARACTERS), AND THE ERROR TYPE (READ,WRITE, SPACE, ETC)
4681                            ;PLUS THE TAPE DIRECTION (FORWARD OR REVERSE).
4682                            ;ALL NUMBERS ARE IN OCTAL.
4683                            ;*********************************************************
4684
4685  022730  012704  025032        PAPRT:  MOV     #MSG12,R4
4686  022734  104000                        TTOUTT                  ;PRINT DRIVE HEADER
4687  022736  013703  000550                MOV     DVN,R3
4688  022742  104002                        OCTPP                   ;PRINT DRIVE NUMBER
4689  022744  012704  025016                MOV     #MSG11,R4
4690  022750  104000                        TTOUTT                  ;PRINT UNIT HEADER
4691  022752  013703  000552                MOV     UDES,R3
4692  022756  042703  177770                BIC     #177770,R3
4693  022762  104002                        OCTPP                   ;PRINT UNIT NUMBER
4694  022764  012704  026243                MOV     #MSG60,R4
4695  022770  104000                        TTOUTT                  ;PRINT DENSITY TAG
4696  022772  013703  000552                MOV     UDES,R3
4697  022776  000303                        SWAB    R3
4698  023000  042703  177770                BIC     #177770,R3
4699  023004  104002                        OCTPP                   ;PRINT DENSITY
4700  023006  012704  026247                MOV     #MSG61,R4
4701  023012  104000                        TTOUTT                  ;PRINT PARITY TAG
4702  023014  005003                        CLR     R3
4703  023016  032737  000010  000552        BIT     #10,UDES
4704  023024  001402                        BEQ     PAPRT0
4705  023026  012703  000001                MOV     #1,R3
4706  023032  104002                PAPRT0: OCTPP                   ;PRINT PARITY
4707  023034  012704  026253                MOV     #MSG62,R4
4708  023040  104000                        TTOUTT                  ;PRINT FORMAT TAG
4709  023042  013703  000552                MOV     UDES,R3
4710  023046  000241                        CLC
4711  023050  006003                        ROR     R3
4712  023052  006003                        ROR     R3
4713  023054  006003                        ROR     R3              ;PONTION FORMAT
4714  023056  006003                        ROR     R3
4715  023060  042703  177760                BIC     #177760,R3
4716  023064  104002                        OCTPP                   ;PRINT FORMAT
4717  023066  012704  024773                MOV     #MSG8,R4
4718  023072  104000                        TTOUTT                  ;PRINT PATRN TAG
4719  023074  032777  000400  155504        BIT     #400,@SWR       ;SEE IF RANDOM DATA
4720  023102  001406                        BEQ     PAPRTB          ;IF NOT: BR
4721  023104  012737  000122  000636  PAPRTA: MOV     #122,TOB
4722  023112  004737  023662                JSR     PC,TOG          ;PRINT R
4723  023116  000411                        BR      PAPRTD
4724  023120  005737  000734        PAPRTB: TST     ASEQF           ;SEE IF AUTO SEQ
```

```
4725  023124  001403                          BEQ     PAPRTC          ;IF NOT: BR
4726  023126  005737  000560                  TST     PATRN           ;SEE IF AUTO RANDOM
4727  023132  100764                          BMI     PAPRTA          ;IF SO: BR
4728  023134  013703  000560          PAPRTC: MOV     PATRN,R3
4729  023140  104002                          OCTPP                   ;PRINT PATRN NUMBER
4730  023142  012704  025046          PAPRTD: MOV     #MSG13,R4
4731  023146  104000                          TTOUTT                  ;PRINT BLOCK NO. HEADER
4732  023150  013703  000654                  MOV     BLCNTR,R3
4733  023154  104002                          OCTPP                   ;PRINT NUMBER
4734  023156  012704  025054                  MOV     #MSG14,R4
4735  023162  104000                          TTOUTT                  ;PRINT REC NO. HEADER
4736  023164  010003                          MOV     R0,R3
4737  023166  032737  000010  000672          BIT     #10,MTC1        ;SEE IF WRITE OPERATION
4738  023174  001404                          BEQ     PAPRT1          ;IF SO: BR
4739  023176  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
4740  023204  001016                          BNE     PAPRT3          ;IF SO: BR
4741  023206  013703  000554          PAPRT1: MOV     RCNT,R3
4742  023212  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4743  023216  001010                          BNE     PAPRT2          ;IF SO: BR
4744  023220  022737  012260  000662          CMP     #B1,RTRN
4745  023226  001003                          BNE     PAPRTY          ;IF NOT BACK SPACE: BR
4746  023230  005737  000712                  TST     RTYFL
4747  023234  001402                          BEQ     PAPRT3          ;IF NOT RETRY: BR
4748  023236  160003          PAPRTY: SUB     R0,R3           ;GET RECORD NUMBER
4749  023240  005203          PAPRT2: INC     R3
4750  023242  104002          PAPRT3: OCTPP                   ;PRINT RECORD NUMBER
4751  023244  012737  000055  000636          MOV     #55,TOB         ;LOAD DASH (-)
4752  023252  004737  023662                  JSR     PC,TOG          ;PRINT DASH (-)
4753  023256  013703  000554                  MOV     RCNT,R3
4754  023262  104002                          OCTPP                   ;PRINT RECORD COUNT
4755  023264  012704  024766                  MOV     #MSG7,R4
4756  023270  104000                          TTOUTT                  ;PRINT RECORD SIZE HEADER
4757  023272  013703  000556                  MOV     FMCNT,R3        ;GET CHARACTER COUNT
4758  023276  005303                          DEC     R3
4759  023300  005103                          COM     R3              ;REMOVE TWOS COMPLEMENT
4760  023302  104002                          OCTPP                   ;PRINT RECORD SIZE
4761  023304  012737  000001  000664          MOV     #1,HDRFL        ;SET HEADER FLAG
4762  023312  000207                          RTS     PC              ;RETURN
4763
```

```
 4764
 4765                                   ;*********************************************************
 4766                                   ;RANDOM NUMBER GENERATOR SUBROUTINE:
 4767                                   ;
 4768                                   ;THIS SUBROUTINE IS USED TO GENERATE THE RANDOM
 4769                                   ;NUMBERS REQUIRED FOR USE AS RANDOM DATA,
 4770                                   ;RECORD COUNT, AND CHARACTER COUNT.
 4771                                   ;*********************************************************
 4772
 4773  023314  063737  000626  000624  RANG:  ADD     RANSAV,RANBAS
 4774  023322  063737  000624  000626         ADD     RANBAS,RANSAV   ;GET NEW NUMBER
 4775  023330  023701  000626                 CMP     RANSAV,R1       ;SEE IF NUMBER TOO BIG
 4776  023334  101367                         BHI     RANG            ;IF SO: BR
 4777  023336  020237  000626                 CMP     R2,RANSAV       ;SEE IF NUMBER TOO SMALL
 4778  023342  101364                         BHI     RANG            ;IF SO: BR
 4779  023344  000207                         RTS     PC              ;EXIT
 4780
```

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

023346  005037  000642          TTR:    CLR     TEMP1           ;CLEAR FIRST CHARACTER FLAG
023352  005000                          CLR     R0
023354  104010                  TTR0:   TTINN                   ;GO READ CHARACTER
023356  122737  000015  000640          CMPB    #15,TIB         ;++G SEE IF CR
023364  001004                          BNE     TTR1            ;IF NOT: BR
023366  005737  000642                  TST     TEMP1           ;SEE IF FIRST CHARACTER
023372  001436                          BEQ     TTR5            ;IF SO: BR
023374  000426                          BR      TTR2            ;++G ELSE GO LOAD VALUE
023376  122737  000060  000640  TTR1:   CMPB    #60,TIB         ;++G SEE IF CHAR IS LESS THAN 0
023404  101401                          BLOS    TTR1A           ;IF NOT: BR
023406  000431                          BR      TINER           ;++G ELSE GO TO ERROR
023410  122737  000070  000640  TTR1A:  CMPB    #70,TIB         ;++G SEE IF CHAR IS GREATER THAN 7
023416  101001                          BHI     TTR1B           ;IF NOT: BR
023420  000424                          BR      TINER           ;++G ELSE GO TO ERROR
023422  005237  000642          TTR1B:  INC     TEMP1           ;SET FIRST CHARACTER FLAG
023426  006300                          ASL     R0
023430  006300                          ASL     R0              ;SHIFT 3 LEFT
023432  006300                          ASL     R0
023434  042737  177770  000640          BIC     #177770,TIB     ;STRIP ASCII
023442  053700  000640                  BIS     TIB,R0          ;LOAD CHARACTER
023446  005301                          DEC     R1              ;SEE IF DONE
023450  001341                          BNE     TTR0            ;IF NOT: BR
023452  020002                  TTR2:   CMP     R0,R2           ;SEE IF EXCEEDED MAXIMUM LIMIT
023454  101401                          BLOS    TTR3            ;IF NOT: BR
023456  000405                          BR      TINER           ;++G ELSE GO TO ERROR
023460  020300                  TTR3:   CMP     R3,R0           ;SEE IF BELOW MINIMUM LIMIT
023462  101401                          BLOS    TTR4            ;IF NOT: BR
023464  000402                          BR      TINER           ;++G ELSE GO TO ERROR
023466  010015                  TTR4:   MOV     R0,(R5)         ;LOAD VALUE
023470  000207                  TTR5:   RTS     PC              ;EXIT
023472  012704  025755          TINER:  MOV     #MSG43,R4
023476  104000                          TTOUTT                  ;PRINT?
023500  162716  000020                  SUB     #20,(SP)        ;RESET SP TO START OF VALUE ROUTINE
023504  000207                          RTS     PC              ;REDO VALUE ENTRY
```

```
4832
4833                                        ;TTY READ SUBROUTINE**********
4834
4835  023506  005277  155076          TTIN:   INC     @TKS
4836  023512  105777  155072          TTIN1:  TSTB    @TKS
4837  023516  100375                          BPL     TTIN1
4838  023520  017737  155066  000640          MOV     @TKB,TIB
4839  023526  042737  000200  000640          BIC     #200,TIB        ;++G STRIP PARITY BIT
4840  023534  105777  155054          TTIN2:  TSTB    @TPS
4841  023540  100375                          BPL     TTIN2
4842  023542  113777  000640  155046          MOVB    TIB,@TPB
4843  023550  000207                          RTS     PC
4844
4845                                        ;TTY OUTPUT SUBROUTINE************
4846
4847  023552  112437  000636          TTOUT:  MOVB    (R4)+,TOB
4848  023556  122737  000043  000636          CMPB    #43,TOB
4849  023564  001444                          BEQ     TEX
4850  023566  122737  000045  000636          CMPB    #45,TOB
4851  023574  001407                          BEQ     TCRLF
4852  023576  122737  000041  000636          CMPB    #41,TOB
4853  023604  001435                          BEQ     TBELL           ;DO BELL
4854  023606  004737  023662                  JSR     PC,TOG
4855  023612  000757                          BR      TTOUT
4856  023614  112737  000015  000636  TCRLF:  MOVB    #15,TOB
4857  023622  004737  023662                  JSR     PC,TOG
4858  023626  012703  000006                  MOV     #6,R3
4859  023632  005037  000636          TCRLFA: CLR     TOB
4860  023636  004737  023662                  JSR     PC,TOG
4861  023642  005303                          DEC     R3
4862  023644  001372                          BNE     TCRLFA          ;DO FILLERS
4863  023646  112737  000012  000636          MOVB    #12,TOB
4864  023654  004737  023662                  JSR     PC,TOG
4865  023660  000734                          BR      TTOUT
4866
4867  023662  105777  154726          TOG:    TSTB    @TPS
4868  023666  100375                          BPL     TOG
4869  023670  113777  000636  154720          MOVB    TOB,@TPB
4870  023676  000207                  TEX:    RTS     PC
4871  023700  012703  000002          TBELL:  MOV     #2,R3
4872  023704  012737  000007  000636  TBELA:  MOV     #7,TOB
4873  023712  004737  023662                  JSR     PC,TOG
4874  023716  005303                          DEC     R3
4875  023720  001371                          BNE     TBELA
4876  023722  000713                          BR      TTOUT
4877
4878
```

```
                                        ;OCTAL OUTPUT SUBROUTINE************
                                
023724  005037  024156          OCTP:   CLR     OFL             ;CLEAR FLAG FOR LEADING ZERO
023730  000403                          BR      OCTPE1
023732  012737  000001  024156  OCTPE:  MOV     #1,OFL
023740  010304                  OCTPE1: MOV     R3,R4           ;SEE IF NUMBER IS ZERO
023742  001006                          BNE     OCTP0           ;IF NOT ZERO: BR
023744  005737  024156                  TST     OFL
023750  001003                          BNE     OCTP0
023752  004737  024136                  JSR     PC,OCTPG1       ;ELSE PRINT ZERO
023756  000450                          BR      OCTP3           ;++G SPACE AND EXIT
023760  032704  100000          OCTP0:  BIT     #100000,R4      ;SEE IF MSD = 1
023764  001406                          BEQ     OCTP1           ;IF NOT: BR
023766  012704  000001                  MOV     #1,R4
023772  004737  024114                  JSR     PC,OCTPG        ;PRINT 1
023776  000137  024010                  JMP     OCTP2
024002  005004                  OCTP1:  CLR     R4
024004  004737  024114                  JSR     PC,OCTPG        ;PRINT 0
024010  010304                  OCTP2:  MOV     R3,R4
024012  006004                          ROR     R4
024014  006004                          ROR     R4
024016  006004                          ROR     R4              ;POSITION DIGIT
024020  006004                          ROR     R4
024022  000304                          SWAB    R4
024024  004737  024114                  JSR     PC,OCTPG        ;PRINT DIGIT 2
024030  010304                          MOV     R3,R4
024032  006004                          ROR     R4
024034  000304                          SWAB    R4
024036  004737  024114                  JSR     PC,OCTPG        ;PRINT DIGIT 3
024042  010304                          MOV     R3,R4
024044  006104                          ROL     R4
024046  006104                          ROL     R4
024050  000304                          SWAB    R4
024052  004737  024114                  JSR     PC,OCTPG        ;PRINT DIGIT 4
024056  010304                          MOV     R3,R4
024060  006004                          ROR     R4
024062  006004                          ROR     R4
024064  006004                          ROR     R4
024066  004737  024114                  JSR     PC,OCTPG
024072  010304                          MOV     R3,R4
024074  004737  024114                  JSR     PC,OCTPG        ;PRINT DIGIT 5
024100  012737  000240  000636  OCTP3:  MOV     #240,TOB
024106  004737  023662                  JSR     PC,TOG          ;PRINT SPACE
024112  000207                          RTS     PC              ;EXIT
024114  042704  177770          OCTPG:  BIC     #177770,R4
024120  001004                          BNE     OCTPG0
024122  005737  024156                  TST     OFL
024126  001001                          BNE     OCTPG0
024130  000207                          RTS     PC
024132  005237  024156          OCTPG0: INC     OFL
024136  052704  000260          OCTPG1: BIS     #260,R4
024142  010437  000636                  MOV     R4,TOB
024146  004737  023662                  JSR     PC,TOG
024152  010304                          MOV     R3,R4
024154  000207                          RTS     PC
024156  000000                  OFL:    0                       ;FIRST CHAR FLAG
```

```
                                        ;DATA CHARACTER OUTPUT SUBROUTINE************
024160  005037  000636          DOUT:   CLR     TOB
024164  012704  000010                  MOV     #10,R4          ;SET NUMBER TO PRINT
024170  110337  000636                  MOVB    R3,TOB
024174  105777  154414          DOUT1:  TSTB    @TPS
024200  100375                          BPL     DOUT1
024202  132737  000200  000636          BITB    #200,TOB
024210  105737  000636                  TSTB    TOB             ;++G
024214  100004                          BPL     DOUT2           ;++G
024216  012777  000061  154372          MOV     #061,@TPB
024224  000403                          BR      DOUT3
024226  012777  000060  154362  DOUT2:  MOV     #060,@TPB
024234  006137  000636          DOUT3:  ROL     TOB
024240  005304                          DEC     R4
024242  001354                          BNE     DOUT1
024244  000207                          RTS     PC
024246  013703  000646          DOUTD:  MOV     TEMP3,R3
024252  000303                          SWAB    R3
024254  004737  024160                  JSR     PC,DOUT
024260  013703  000646                  MOV     TEMP3,R3
024264  004737  024160                  JSR     PC,DOUT
024270  000207                          RTS     PC

                                        ;++G TU16/TE16 SERIAL NUMBER PRINT SUBROUTINE*******

024272  010304          SNPT:   MOV     R3,R4
024274  000304                  SWAB    R4
024276  006004                  ROR     R4
024300  006004                  ROR     R4
024302  006004                  ROR     R4
024304  006004                  ROR     R4
024306  004737  024350          JSR     PC,SNPG         ;PRINT FIRST DIGIT
024312  010304                  MOV     R3,R4
024314  000304                  SWAB    R4
024316  004737  024350          JSR     PC,SNPG         ;PRINT SECOND DIGIT
024322  010304                  MOV     R3,R4
024324  006004                  ROR     R4
024326  006004                  ROR     R4
024330  006004                  ROR     R4
024332  006004                  ROR     R4
024334  004737  024350          JSR     PC,SNPG         ;PRINT THIRD DIGIT
024340  010304                  MOV     R3,R4
024342  004737  024350          JSR     PC,SNPG         ;PRINT FOURTH DIGIT
024346  000207                  RTS     PC              ;EXIT
024350  012737  000260  000636  SNPG:   MOV     #260,TOB        ;SET NUMBER BASE
024356  042704  177760                  BIC     #177760,R4      ;MASK NUMBER
024362  050437  000636                  BIS     R4,TOB          ;BUILD DIGIT
024366  004737  023662                  JSR     PC,TOG          ;GO TYPE
024372  000207                          RTS     PC              ;RETURN


                                        ;CHECK SWITCH REGISTER ROUTINE. CHECKS FOR  G TO ALLOW CHANGING
                                        ;OF LOC.176.
                                        ;CALL IS BY WAY OF CKSWRR
```

```
4991                                        ;LOCATIONS USED:
4992  024374  000000                        TEMPST: .WORD   0
4993  024376  000000                        COUNT:  .WORD   0
4994  024400  000000                        RDSW:   .WORD   0
4995  024402  022737  000176  000606  CKSWR:  CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
4996  024410  001123                        BNE     OUT                     ;NO, GET OUT
4997  024412  105777  154172                TSTB    @TKS                    ;YES,WAIT FOR
4998  024416  100120                        BPL     OUT                     ;READY, GET CHARACTER
4999  024420  017737  154166  000640        MOV     @TKB,TIB                ;AND STRIP OFF
5000  024426  042737  177600  000640        BIC     #177600,TIB             ;THE GARBAGE
5001  024434  022737  000007  000640        CMP     #7,TIB          ;IS IT A < G>
5002  024442  001106                        BNE     OUT
5003  024444  012704  027430        CNTG:   MOV     #$CNTG,R4
5004  024450  104000                        TTOUTT
5005  024452  012704  027434        CNTLU:  MOV     #$MSWR,R4
5006  024456  104000                        TTOUTT
5007  024460  017703  154122                MOV     @SWR,R3
5008  024464  004737  023732                JSR     PC,OCTPE
5009  024470  012704  027443                MOV     #$MNEW,R4
5010  024474  104000                        TTOUTT
5011  024476  005037  024374        $READ:  CLR     TEMPST
5012  024502  012737  000007  024376        MOV     #7,COUNT
5013  024510  104010                1$:     TTINN                   ;GO  READ A CHARACTER
5014  024512  122737  000025  000640        CMPB    #25,TIB         ;IS IT A  U?
5015  024520  001001                        BNE     2$              ;BRANCH IF NOT
5016  024522  000753                3$:     BR CNTLU                ;START OVER
5017  024524  122737  000015  000640  2$:   CMPB    #15,TIB         ;IS IT A <CR>?
5018  024532  001013                        BNE     4$              ;BRANCH IF NOT
5019  024534  012737  000200  024400        MOV     #200,RDSW
5020  024542  012704  027453                MOV     #MCRLF,R4
5021  024546  104000                        TTOUTT
5022  024550  022737  000007  024376        CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
5023  024556  001035                        BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
5024  024560  000437                        BR      OUT             ;GET OUT
5025  024562  122737  000060  000640  4$:   CMPB    #60,TIB
5026  024570  003004                        BGT     5$
5027  024572  122737  000067  000640        CMPB    #67,TIB
5028  024600  002004                        BGE     6$
5029  024602  012704  025755        5$:     MOV     #MSG43,R4
5030  024606  104000                        TTOUTT
5031  024610  000744                        BR      3$              ;START OVER IF NOT LEGAL CHARACTER
5032  024612  006337  024374        6$:     ASL     TEMPST
5033  024616  006337  024374                ASL     TEMPST
5034  024622  006337  024374                ASL     TEMPST
5035  024626  142737  000060  000640        BICB    #60,TIB         ;GET NITTY-GRITTY
5036  024634  153737  000640  024374        BISB    TIB,TEMPST
5037  024642  005337  024376                DEC     COUNT           ;ONLY WANT 6   DIGITS
5038  024646  001755                        BEQ     5$
5039  024650  000717                        BR      1$
5040  024652  013777  024374  153726  7$:   MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
5041  024660  000207                OUT:    RTS     PC              ;RETURN TO BODY OF PROGRAM
5042                                        ;HALT HANDLER**********
5043
5044  024662  000000                STOP:   HALT
5045  024664  104004                        CKSWRR                  ;CHECK FOR CONTROL G
5046  024666  000207                        RTS     PC
```

```
 5047
 5048
 5049                                   ;TRAP HANDLER*************
 5050
 5051  024670  016677  000002  153706  TRAP30: MOV     2(6),@PSW       ;ADJUST PSW
 5052  024676  011666  000002                 MOV     @SP,2(6)        ;PLACE RETURN ADDRESS OVER PSW
 5053  024702  162716  000002                 SUB     #2,@SP          ;SUB. 2 FROM RETURN ADDRESS
 5054  024706  013646                         MOV     @(6)+,-(6)
 5055  024710  062716  120716                 ADD     #TABLE-104000,@SP       ;GET SUBROUTINE STARTING ADDRESS
 5056  024714  013607                         MOV     @(SP)+,PC       ;GO TO SUBROUTINE
 5057  024716  023552                 TABLE:  TTOUT
 5058  024720  023724                         OCTP
 5059  024722  024402                         CKSWR
 5060  024724  024662                         STOP
 5061  024726  023506                         TTIN
 5062          104000                 TTOUTT= 104000
 5063          104002                 OCTPP=  104002
 5064          104004                 CKSWRR= 104004
 5065          104006                 STOPP=  104006
 5066          104010                 TTINN=  104010
 5067
```

```
5068
5069                                        ;ERROR MESSAGES**********
5070
5071  024730  042052  020105     043  MSG1:   .ASCII  /*DE #/
5072
5073  024735     045  035507  021440  MSG2:   .ASCII  /%G; #/
5074
5075  024742  041045  020073     043  MSG3:   .ASCII  /%B; #/
5076
5077  024747     045  047103  021440  MSG4:   .ASCII  /%CN #/
5078
5079  024754  053452  020105     043  MSG5:   .ASCII  /*WE #/
5080
5081  024761     052  042522  021440  MSG6:   .ASCII  /*RE #/
5082
5083  024766  051052  020123     043  MSG7:   .ASCII  /*RS #/
5084
5085  024773     052  040520  051124  MSG8:   .ASCII  /*PATRN #/
5086  025000  020116     043
5087  025003     040  047123  020072  MSG9:   .ASCII  / SN: #/
5088  025010     043
5089  025011     052  042523  021440  MSG10:  .ASCII  /*SE #/
5090
5091  025016  051452  040514  042526  MSG11:  .ASCII  /*SLAVE NO. #/
5092  025024  047040  027117  021440
5093
5094  025032  042045  044522  042526  MSG12:  .ASCII  /%DRIVE NO. #/
5095  025040  047040  027117  021440
5096
5097  025046  025045  047102  021440  MSG13:  .ASCII  /%*BN #/
5098
5099  025054  051052  020116     043  MSG14:  .ASCII  /*RN #/
5100
5101  025061     045  020041  020040  MSG15:  .ASCII  /%!          BAD RECORD%%#/
5102  025066  020040  020040  020040
5103  025074  041040  042101  051040
5104  025102  041505  051117  022504
5105  025110  021445
5106
5107  025112  043040     043          MSG16:  .ASCII  / F#/
5108
5109  025115     040  021522          MSG17:  .ASCII  / R#/
5110
5111  025120  020041  047505  020124  MSG20:  .ASCII  /! EOT NO: #/
5112  025126  047516  020072     043
5113
5114
5115  025133     045  047111  042524  MSG21:  .ASCII  /%INTERCHANGE READ = #/
5116  025140  041522  040510  043516
5117  025146  020105  042522  042101
5118  025154  036440  021440
5119
5120  025160  020445  046111  042514  MSG22:  .ASCII  /%!ILLEGAL BOT: HALT%#/
5121  025166  040507  020114  047502
5122  025174  035124  044040  046101
5123  025202  022524     043
```

```
 5124
 5125  025205     045  051503  020061  MSG23:  .ASCII  /%CS1 #/
 5126  025212     043
 5127
 5128  025213     045  041527  021440  MSG23A: .ASCII  /%WC #/
 5129
 5130  025220  041045  020101     043  MSG23B: .ASCII  /%BA #/
 5131
 5132  025225     045  041506  021440  MSG23C: .ASCII  /%FC #/
 5133
 5134  025232  041445  031123  021440  MSG23D: .ASCII  /%CS2 #/
 5135
 5136  025240  042045  020123     043  MSG23E: .ASCII  /%DS #/
 5137
 5138  025245     045  051105  021440  MSG23F: .ASCII  /%ER #/
 5139
 5140  025252  040445  020123     043  MSG23G: .ASCII  /%AS #/
 5141
 5142  025257     045  045503  021440  MSG23H: .ASCII  /%CK #/
 5143
 5144  025264  042045  020102     043  MSG23I: .ASCII  /%DB #/
 5145
 5146  025271     045  051115  021440  MSG23J: .ASCII  /%MR #/
 5147
 5148  025276  042045  020124     043  MSG23K: .ASCII  /%DT #/
 5149
 5150  025303     045  041524  021440  MSG23L: .ASCII  /%TC #/
 5151
 5152  025310  051445  020116     043  MSG23M: .ASCII  /%SN #/
 5153
 5154  025315     045  047041  020117  MSG24:  .ASCII  /%!NO INTERRUPT%#/
 5155  025322  047111  042524  051122
 5156  025330  050125  022524     043
 5157
 5158  025335     045  047041  020117  MSG25:  .ASCII  /%!NO MOL: HALT%#/
 5159  025342  047515  035114  044040
 5160  025350  046101  022524     043
 5161
 5162  025355     045  051104  050117  MSG26:  .ASCII  /%DROPS: #/
 5163  025362  035123  021440
 5164
 5165  025366  050045  041511  051513  MSG27:  .ASCII  /%PICKS: #/
 5166  025374  020072     043
 5167
 5168  025377     045     043          MSG28:  .ASCII  /%#/
 5169  025401     045  052045  030115  MSG30:  .ASCII  '%%TM02-TU16/TE16 AUTO SEQUENCE (CZTUAH0)%#'    ;++G
 5170  025406  026462  052524  033061
 5171  025414  052057  030505  020066
 5172  025422  052501  047524  051440
 5173  025430  050505  042525  041516
 5174  025436  020105  041450  052132
 5175  025444  040525  030110  022451
 5176  025452     043
 5177  025453     045  041445  052132  MSG31:  .ASCII  '%%CZTUAH0 TM02-TU16/TE16 RELIAB%%#'
 5178  025460  040525  030110  052040
 5179  025466  030115  026462  052524
```

```
 5180  025474  033061  052057  030505
 5181  025502  020066  042522  044514
 5182  025510  041101  022445     043
 5183
 5184  025515     045  046123  053101  MSG32:  .ASCII  /%SLAVE NUMBER = #/
 5185  025522  020105  052516  041115
 5186  025530  051105  036440  021440
 5187
 5188  025536  042045  047105  044523  MSG33:  .ASCII  /%DENSITY = #/
 5189  025544  054524  036440  021440
 5190
 5191  025552  050045  051101  052111  MSG34:  .ASCII  /%PARITY = #/
 5192  025560  020131  020075     043
 5193
 5194  025565     045  042522  047503  MSG35:  .ASCII  /%RECORD COUNT = #/
 5195  025572  042122  041440  052517
 5196  025600  052116  036440  021440
 5197
 5198  025606  041445  040510  040522  MSG36:  .ASCII  /%CHARACTER COUNT = #/
 5199  025614  052103  051105  041440
 5200  025622  052517  052116  036440
 5201  025630  021440
 5202
 5203  025632  050045  052101  042524  MSG37:  .ASCII  /%PATTERN NUMBER = #/
 5204  025640  047122  047040  046525
 5205  025646  042502  020122  020075
 5206  025654     043
 5207  025655     045  044523  043516  MSG38:  .ASCII  /%SINGLE PASS = #/
 5208  025662  042514  050040  051501
 5209  025670  020123  020075     043
 5210  025675     045  047105  042524  MSG40:  .ASCII  /%ENTER STALLS%READ = #/
 5211  025702  020122  052123  046101
 5212  025710  051514  051045  040505
 5213  025716  020104  020075     043
 5214
 5215  025723     045  051127  052111  MSG41:  .ASCII  /%WRITE = #/
 5216  025730  020105  020075     043
 5217
 5218  025735     045  052524  047122  MSG42:  .ASCII  /%TURN AROUND = #/
 5219  025742  040440  047522  047125
 5220  025750  020104  020075     043
 5221
 5222  025755     045  022477     043  MSG43:  .ASCII  /%?%#/
 5223
 5224  025761     045  047105  042524  MSG44:  .ASCII  /%ENTER YOZZLE STALL = #/
 5225  025766  020122  047531  055132
 5226  025774  042514  051440  040524
 5227  026002  046114  036440  021440
 5228
 5229  026010  042445  051122  040440  MSG45:  .ASCII  /%ERR AMT #/
 5230  026016  052115  021440
 5231
 5232  026022  043045  020103     043  MSG46:  .ASCII  /%FC #/
 5233
 5234  026027     045  040503  021440  MSG47:  .ASCII  /%CA #/
 5235
```

```
 5236  026034  020445  047516  041040  MSG48:  .ASCII  /%!NO BOT ON REWIND: HALT%#/
 5237  026042  052117  047440  020116
 5238  026050  042522  044527  042116
 5239  026056  020072  040510  052114
 5240  026064  021445
 5241
 5242  026066  047040  052117  040440  MSG49:  .ASCII  / NOT AVAIL #/
 5243  026074  040526  046111  021440
 5244  026102  044440  046114  043505  MSG50:  .ASCII  / ILLEGAL DRIVE TYPE #/
 5245  026110  046101  042040  044522
 5246  026116  042526  052040  050131
 5247  026124  020105     043
 5248  026127     045  042045  044522  MSG52:  .ASCII  /%%DRIVE NUMBER = #/
 5249  026134  042526  047040  046525
 5250  026142  042502  020122  020075
 5251  026150     043
 5252
 5253  026151     045  047506  046522  MSG53:  .ASCII  /%FORMAT = #/
 5254  026156  052101  036440  021440
 5255
 5256  026164  053452  020105  046524  MSG54:  .ASCII  /*WE TM#/
 5257  026172     043
 5258
 5259  026173     052  042523  052040  MSG55:  .ASCII  /*SE TM#/
 5260  026200  021515
 5261
 5262  026202  052040  021515          MSG56:  .ASCII  / TM#/
 5263
 5264  026206  047040  047117  042455  MSG57:  .ASCII  / NON-EXIST SLAVE#/
 5265  026214  044530  052123  051440
 5266  026222  040514  042526     043
 5267  026227     045  051103  020103  MSG58:  .ASCII  /%CRC #/
 5268  026234     043
 5269  026235     045  051114  020103  MSG59:  .ASCII  /%LRC #/
 5270  026242     043
 5271  026243     052  020104     043  MSG60:  .ASCII  /*D #/
 5272  026247     052  020120     043  MSG61:  .ASCII  /*P #/
 5273  026253     052  020106     043  MSG62:  .ASCII  /*F #/
 5274
 5275  026257     045  047452  044522  MSG64:  .ASCII  /%*ORIGINAL ERROR*#/
 5276  026264  044507  040516  020114
 5277  026272  051105  047522  025122
 5278  026300     043
 5279
 5280  026301     045  042522  051124  MSG65:  .ASCII  /%RETRY: #/
 5281  026306  035131  021440
 5282
 5283  026312  020452  042523  051040  MSG66:  .ASCII  /*!SE RTRY #/
 5284  026320  051124  020131     043
 5285
 5286  026325     052  042441  040522  MSG67:  .ASCII  /*!ERASE#/
 5287  026332  042523     043
 5288
 5289  026335     045  042522  042522  MSG68:  .ASCII  /%REREV: #/
 5290  026342  035126  021440
 5291  026346  052045  050101  020105  MSG69:  .ASCII  /%TAPE MARK = #/
```

```
 5292  026354  040515  045522  036440
 5293  026362  021440
 5294
 5295  026364  020445  047516  042040  MSG70:  .ASCII  /%!NO DRY FROM REWIND: HALT%#/
 5296  026372  054522  043040  047522
 5297  026400  020115  042522  044527
 5298  026406  042116  020072  040510
 5299  026414  052114  021445
 5300  026420  047040  047117  042455  MSG71:  .ASCII  / NON-EXIST DRIVE#/
 5301  026426  044530  052123  042040
 5302  026434  044522  042526     043
 5303  026441     045  042522  053506  MSG72:  .ASCII  /%REFWD: #/
 5304  026446  035104  021440
 5305  026452  053445  042524  051122  MSG73:  .ASCII  /%WTERR: #/
 5306  026460  020072     043
 5307  026463     045  042522  044507  MSG74:  .ASCII  /%REGISTER START = #/
 5308  026470  052123  051105  051440
 5309  026476  040524  052122  036440
 5310  026504  021440
 5311  026506  053045  041505  047524  MSG75:  .ASCII  /%VECTOR = #/
 5312  026514  020122  020075     043
 5313  026521     045  042504  042522  MSG76:  .ASCII  /%DEREV: #/
 5314  026526  035126  021440
 5315  026532  042045  043105  042127  MSG77:  .ASCII  /%DEFWD: #/
 5316  026540  020072     043
 5317  026543     045  047041  047117  MSG78:  .ASCII  /%!NON-RETRYABLE WRITE ERROR: ER #/
 5318  026550  051055  052105  054522
 5319  026556  041101  042514  053440
 5320  026564  044522  042524  042440
 5321  026572  051122  051117  020072
 5322  026600  051105  021440
 5323  026604  020445  047516  026516  MSG79:  .ASCII  /%!NON-RETRYABLE READ ERROR: ER #/
 5324  026612  042522  051124  040531
 5325  026620  046102  020105  042522
 5326  026626  042101  042440  051122
 5327  026634  051117  020072  051105
 5328  026642  021440
 5329  026644  020445  042441  042116  MSG100: .ASCII  /%!!END OF PASS %#/
 5330  026652  047440  020106  040520
 5331  026660  051523  022440     043
 5332  026665     045  025052  025052  MSG101: .ASCII  /%*********%#/
 5333  026672  025052  025052  022452
 5334  026700     043
 5335  026701     052  046524  031060  MSG102: .ASCII  /*TM02 #/
 5336  026706  021440
 5337  026710  051452  040514  042526  MSG103: .ASCII  /*SLAVES #/
 5338  026716  020123     043
 5339  026721     045  052501  047524  MSG104: .ASCII  /%AUTO CONT: #/
 5340  026726  041440  047117  035124
 5341  026734  021440
 5342  026736  051045  041505  053117  MSG105: .ASCII  /%RECOVERED#/
 5343  026744  051105  042105     043
 5344  026751     052  020441  040502  MSG106: .ASCII  /*!!BAD TAPE OVERFLOW#/
 5345  026756  020104  040524  042520
 5346  026764  047440  042526  043122
 5347  026772  047514  021527
```

```
 5348  026776  051045  053505  047111  MSG16A: .ASCII  /%REWIND TAPE; RESTART AT BLOCK ONE#/
 5349  027004  020104  040524  042520
 5350  027012  020073  042522  052123
 5351  027020  051101  020124  052101
 5352  027026  041040  047514  045503
 5353  027034  047440  042516     043
 5354  027041     045  020441  047125  MSG107: .ASCII  /%!!UNRECOVERABLE BAD SPOT/
 5355  027046  042522  047503  042526
 5356  027054  040522  046102  020105
 5357  027062  040502  020104  050123
 5358  027070  052117
 5359  027072  041045  042101  051040          .ASCII  /%BAD RECORD LEFT ON TAPE%#/
 5360  027100  041505  051117  020104
 5361  027106  042514  052106  047440
 5362  027114  020116  040524  042520
 5363  027122  021445
 5364  027124  047045  055122  047440  MSG108: .ASCII  /%NRZ ONLY: #/
 5365  027132  046116  035131  021440
 5366  027140  020452  050041  051517  MSG109: .ASCII  /*!!POSITION LOST IN RETRY#/
 5367  027146  052111  047511  020116
 5368  027154  047514  052123  044440
 5369  027162  020116  042522  051124
 5370  027170  021531
 5371  027172  051445  051525  042520  MSG110: .ASCII  /%SUSPECT BAD TAPE#/
 5372  027200  052103  041040  042101
 5373  027206  052040  050101  021505
 5374  027214  051045  050105  040505  MSG111: .ASCII  /%REPEAT: #/
 5375  027222  035124  021440
 5376  027226  041040  042101  052040  MSG112: .ASCII  / BAD TAPE SPOTS%#/
 5377  027234  050101  020105  050123
 5378  027242  052117  022523     043
 5379
 5380  027247     045  051440  043117  MSG113: .ASCII  /% SOFT: #/
 5381  027254  035124  021440
 5382
 5383  027260  020045  040510  042122  MSG114: .ASCII  /% HARD: #/
 5384  027266  020072     043
 5385
 5386  027271     045  020441  040510  MSG115: .ASCII  /%!!HARD READ ERROR#/
 5387  027276  042122  051040  040505
 5388  027304  020104  051105  047522
 5389  027312  021522
 5390  027314  020445  047125  052111  MSG116: .ASCII  /%!UNIT REWINDING: TEST WILL START AT BOT#/
 5391  027322  051040  053505  047111
 5392  027330  044504  043516  020072
 5393  027336  042524  052123  053440
 5394  027344  046111  020114  052123
 5395  027352  051101  020124  052101
 5396  027360  041040  052117     043
 5397  027365     045  042522  047515  MSG120: .ASCII  /%REMOVE TMDP FROM UNIT UNDER TEST%#/
 5398  027372  042526  052040  042115
 5399  027400  020120  051106  046517
 5400  027406  052440  044516  020124
 5401  027414  047125  042504  020122
 5402  027422  042524  052123  021445
 5403  027430  057045  021507          $CNTG:  .ASCII  /% G#/
```

```
 5404  027434  051445  051127  020075  $MSWR:  .ASCII  /%SWR= #/
 5405  027442     043
 5406  027443     040  047040  053505  $MNEW:  .ASCII  /  NEW= #/
 5407  027450  020075     043
 5408  027453     045     043          MCRLF:  .ASCII  /%#/
 5409
 5410          027456                          .EVEN
 5411  027456  000000                  WDATA:  0                       ;WRITE BUFFER
 5412
 5413          033464                          .=.+4004
 5414  033464  000000                  RDATA:  0                       ;READ BUFFER
 5415
 5416          000001                          .END
```

```
ABLCNT  000740            1608#  1960   4617*  4631*  4654*  4663*
ACTLRC  021150            4213*  4306   4356#
ADRVN   000736            1607#  4534*  4544   4556   4558*  4570   4585   4620
AMOD1   022360            4554   4608#
AMOD1A  022370            4610#  4614
AMOD1B  022404            4612   4615#
AMOD1C  022540            4630   4634#
AMOD2   022554            4555   4640#
AMOD2A  022600            4646#  4651
AMOD2B  022620            4649   4652#
AMOD2X  022726            4643   4666#
APATS   015062            3618   3626#
AS      000526            1533#  4336   4337*
ASEQ    021732            3214   4520#
ASEQCF  000742            1609#  4529   4538*  4560
ASEQF   000734            1515*  1606#  1869*  1888*  1937   1958   2176   2195   3177   3211   3437   4724
ASEQX   022140            4557   4560#
ASEQ0   022016            1939   4534#
ASEQ1   022022            4535#  4559
ASEQ2   022100            4549#  4553
ASEQ3   022112            4550   4554#
ASEQ4   022122            4556#  4575
BA      000514            1528#  2308*  2361*  2497*  2513*  2698*  2707*  2929*  2938*  3028*  4126   4275
BAER    021134            4122   4128*  4221   4271   4350#
BBC     000656            1583#  3754*  3818*  3822*  3910*  3911   3917*  3918*  3919*  3920   3922*  3944*
BCNT    000710            1596#  4007*  4030*  4033*  4038*  4059*  4062*  4066*  4071*
BDPP    000716            1599#  3993*  4012*  4013   4041*  4046*  4055*  4057*  4060   4064*
BD00    001410            1634   1737#
BD10    001430            1635   1739#
BD20    001450            1636   1741#
BD30    001470            1637   1743#
BD40    001510            1638   1745#
BD50    001530            1639   1747#
BD60    001550            1640   1749#
BD70    001570            1641   1751#
BKRT    012234            2498   3050#
BKSP    012056            2622   2635   3025#
BKTM    012140            3033   3035#
BKTM0   012202            3039   3043#
BLCNTR  000654            1582#  1916*  1957*  1960   1962*  2473   4608*  4644*  4732
BPKP    000720            1600#  3992*  4020*  4021   4040*  4045*  4056*  4058*  4069   4073*
BP00    001210            1626   1721#
BP10    001230            1627   1723#
BP20    001250            1628   1725#
BP30    001270            1629   1727#
BP40    001310            1630   1729#
BP50    001330            1631   1731#
BP60    001350            1632   1733#
BP70    001370            1633   1735#
BTADDR  001030            1645#  2467   2567
BTFLG   000724            1602#  2110   2116   2120   2133*  2501*  2525*
BTOV    007160            2480   2524#
BTOVX   007322            2553   2559#
BTOV0   007200            2528#  2577
BTOV1   007210            2531#  2551
BTOV2   007276            2548   2552#
```

```
BTOV3   007314            2556#   2558
BTPRT   007324            2068    2135    2564#
BTPRT1  007374            2575    2577#
BTPT    000730            1604#   2467*   2468    2470*   2471    2478    2528    2547    2555    2567*   2568    2574
BTSTF   000726            1603#   2067*   2069*   2552
BTUR    007400            2488    2581#
BT00    001610            1645    1758#
BT01    001714            1646    1760#
BT02    002020            1647    1762#
BT03    002124            1648    1764#
BT04    002230            1649    1766#
BT05    002334            1650    1768#
BT06    002440            1651    1770#
BT07    002544            1652    1772#
B0      012212            3030    3036    3042    3045#
B1      012260            3051    3054#   4744
B2      012270            3056#
CADER   021132            2368*   2738*   3040*   4120*   4279    4349#
CC      000530            1534#   4200    4295    4322
CCNTR   012314            1972    3095#
CHNFLG  003040            1871#   1880*   4581    4640
CKSWR   024402            4995#   5059
CKSWRR= 104004            5045    5064#
CLLAST  015252            3678    3680#
CLP     015362            3663    3691    3699#
CLPE    015406            3700    3702    3706#
CLP0    015416            3708#   3714
CLP1    015430            3709    3711#
CLP2    015470            3718    3722#
CLP3    015502            3720    3723    3725#
CL0     015170            3662#   3679
CL1     015216            3670#
CL2     015240            3667    3676#
CL3     015324            3690#   3694
CNTG    024444            3001    4496    5003#
CNTLU   024452            1936    5005#   5016
CONER   021136            4174*   4251    4351#
COUNT   024376            4993#   5012*   5022    5037*
CRCER   021146            4204*   4291    4355#
CRCLRC  015152            3450    3465    3658#
CRCSV   021154            4194*   4346    4358#
CS      000520            1530#   1941*   1982*   3215*   3223*   3225    3252*   3253*   4155    4259    4410*   4569*   4570*
                          4572
C1      000510            1526#   2106*   2109*   2230*   2231*   2255*   3206    3224    3229    4153    4164    4255    4335*
                          4338    4449*   4463*
C2      000542            1539#   1983*   2105*   2158*   2229*   2249*   2266*   3254*   4341*   4589*
DATA0   002772            1834#
DATA1   002774            1835#
DATA10  003012            1842#
DATA11  003014            1843#
DATA12  003016            1844#
DATA13  003020            1845#
DATA14  003022            1846#
DATA15  003024            1847#
DATA2   002776            1836#
DATA3   003000            1837#
```

```
DATA4   003002          1838#
DATA5   003004          1839#
DATA6   003006          1840#
DATA7   003010          1841#
DATBL   002770          1833#   3457
DATER1  001130          1689#   2044    3839*
DATR    015102          1975    3441    3637#
DATR0   015120          3641#   3644
DAT0    014412          1834    3479#
DAT0A   014444          3486#   3494    3498    3501
DAT0B   014452          3487#   3488
DAT0C   014516          3492    3499#
DAT0D   014524          3502#   3510
DAT0E   014534          3504#   3509
DAT0F   014546          3506    3508#
DAT1    014556          1835    3515#
DAT1A   014562          3516#   3525    3548    3553    3601
DAT1B   014566          3517#   3519
DAT10   014700          1842    3568#
DAT10A  014712          3571#   3575
DAT11   014730          1843    3580#
DAT11A  014736          3582#   3585
DAT12   014750          1844    3590#
DAT12A  014760          3592#   3595
DAT13   014772          1845    3600#
DAT14   015002          1846    3605#
DAT14A  015014          3608#   3612
DAT15   015032          1847    3617#
DAT15A  015036          3618#   3624
DAT15B  015046          3620#   3622
DAT2    014576          1836    3524#
DAT3    014602          1837    3529#
DAT3A   014610          3531#   3542
DAT3B   014614          3532#   3535
DAT4    014626          1838    3540#
DAT5    014636          1839    3547#
DAT6    014644          1840    3552#
DAT7    014652          1841    3557#
DAT7A   014666          3560#   3563
DB      000532          1535#
DCHK    015544          2783    2978    3754#
DCHK0   015574          3758    3761#
DEREV1  001170          1711#   2064    3841*
DEREX   016622          3912    3933    3935    3943    3951    3954    3956#
DEREX1  016654          3957    3960    3962    3964#
DERFL   000704          1594#   3755*   3832    3965*
DERR    016160          3825    3872#
DERR0   016170          3874#   3963
DERR0A  016220          3876    3881#
DERR0B  016252          3887    3890#
DERR0C  016276          3894    3897#
DERR0D  016300          3896    3898#
DERR1   016326          3902    3905#
DERR2   016330          3904    3906#
DERR3   016344          3909#
DERR4   016346          3873    3908    3910#
```

```
DERR4A  016506            3927    3936#
DERR4B  016550            3921    3944#
DERR5   016604            3948    3952#
DERR6   016616            3924    3946    3955#
DFX     016156            3833    3835    3840    3842#
DF0     016050            3781    3820#   3829
DF0A    015744            3791    3793#   3830
DF0A0   015766            3797    3799#
DF0A1   016002            3802    3804#
DF0A2   016016            3807    3809#
DF0A3   016032            3812    3814#
DF0A4   016036            3794    3816#
DF0B    015704            3782#
DF0B0   015726            3785    3788#
DF0C    015664            3774    3778#
DF0C0   015674            3764    3766    3768    3780#
DF0D    015650            3770    3775#
DF0E    015642            3772#   3777
DF0F    015634            3769#   3773
DF1     016062            3817    3821    3824#
DF2     016072            3819    3823    3826#
DF3     016110            3827    3831#
DF4     016152            3838    3841#
DOUT    024160            3898    3906    4938#   4955    4957
DOUTD   024246            4953#
DOUT1   024174            4941#   4942    4951
DOUT2   024226            4945    4948#
DOUT3   024234            4947    4949#
DPC     016776            4004#   4050
DPCG    017004            4005    4007#
DPC0    017012            4008#   4042
DPC0A   017054            4016    4018#
DPC1    017062            4011    4020#
DPC1A   017110            4024    4026#
DPC2    017152            4009    4014    4022    4036#
DPC2A   017114            4019    4027#
DPC2B   017136            4031#   4034
DPC3    017202            4039    4043#
DPPRT   017250            2015    4018    4026    4052#
DPPRTX  017404            4072    4075#
DPPRT0  017320            4060#   4065
DPPRT1  017344            4063    4066#
DPPRT2  017360            4069#   4074
DROP    016766            3999    4002#
DRPK    016754            3995    3999#
DRPKF   016666            3824    3986#
DRP1    001010            1634#   3993    4028    4046    4055
DRP2    001012            1635#
DRP3    001014            1636#
DRP4    001016            1637#
DRP5    001020            1638#
DRP6    001022            1639#
DRP7    001024            1640#
DRP8    001026            1641#
DRVER   021140            2369*   2739*   4185*   4237    4261    4312    4352#
DS      000522            1531#   1984    1998    2074    2107    2136    2159    2161    2232    2250    2252    2312    2366
```

		2715	2717	2719	2725	2736	3038	4175	4265	4411	4427	4432	4590
DSUP	014200	2001	3435#										
DS0	014206	3437#											
DS0A	014270	3444	3452#										
DS0B	014266	3448	3451#										
DS0C	014230	3438	3440	3443#									
DS1	014316	3436	3458#	3645									
DS2	014336	3462#	3464										
DS2A	014346	3459	3465#										
DS3	014352	2785	2979	3466#									
DS4	014362	3468#	3470										
DT	000536	1537#	3255	3260	3264	3458	4571						
DVN	000550	1545#	1982	3218	3223	3253	4410	4620*	4687				
DOFL	014554	3341*	3479	3482*	3511#								
EMADDR	000652	1581#	2140*	2236*	2306*	2358*	2495*	2510*	2689*	3027*	3037*	3048*	4242
		4247	4474										
EOPB1	000744	1610#	1915*	1931	1933*	2201*							
EOTC0	002650	1777#	2128*	2129									
EOTREC	000660	1584#	2112	2114*	2218*	2314	2316*	2317*	2318*	2402	2625	2646	2648*
		2649*	2650*	2681	2685*	2686	2723*	2724*	2795	2803			
ER	000524	1532#	4168	4179	4228	4269	4316						
ERCHK	017406	2322	2768	2971	4101#								
ERPT	020234	2370	2740	3041	4187	4189	4191	4199	4212	4216	4218#		
ERPTG	020270	4223	4227#										
ERPTG1	020336	4232	4237#										
ERPTT	020254	4222#	4225										
ERPT0	020352	4230	4236	4238	4240#	4333							
ERPT1	020420	4246	4248	4251#									
ERPT2	020456	4252	4261#										
ERPT3	020514	4262	4271#										
ERPT4	020556	4272	4281#										
ERPT5	020600	4282	4287#										
ERPT5A	020662	4292	4302#										
ERPT6	020724	4303	4312#										
ERPT7	020776	4313	4315	4319	4325#								
ERPX	021034	4327	4330	4332	4334#								
ERPX0	021000	4239	4326#										
ERPX1	021076	4226	4342#										
ERPX2	021130	4343	4345	4348#									
ERSAV	000722	1601#	2335	2383	2437	2828	2862	2894	4220*	4228*			
ERTFL	000732	1605#	2486*	2504	2507*								
ER0	017422	4103	4105#										
ER0A	017472	4113	4117#										
ER0B	017440	4107	4110#										
ER1	017500	4111	4119#										
ER10	020176	4208	4210#										
ER2	017504	2373	2517	2766	2963	2969	3044	3055	4116	4118	4120#		
ER2A	017550	4131#	4136	4146									
ER2A0	017520	4123#	4125										
ER2A1	017540	4127	4129#										
ER2B	017564	4130	4135#										
ER2C	017610	4141#	4150	4152									
ER2D	017624	4138	4145#										
ER2E	017652	4148	4151#										
ER3	017660	4132	4134	4142	4144	4153#							
ER3A	017722	4158	4164#										

```
ER3A1   017760            4170    4172#
ER3B    017766            4160    4163    4167    4174#
ER4     017772            4154    4165    4173    4175#
ER4A    020036            4178    4185#
ER4A1   020030            4181    4183#
ER6     020042            4176    4184    4186#
ER6A    020126            4193    4198#
ER7     020160            4203    4205#
EXCRC   015536            3685*   3695    3735#   4194    4196*   4202    4300    4346*
EXLRC   015540            3697*   3736#   4195    4197*   4211    4310    4347*
FC      000516            1529#   2307*   2360*   2496*   2511*   2697*   2914*   2942*   3031*   3049*   4131    4141    4285
                          4450*
FCER    021142            4133*   4143*   4281    4353#
FCSAV   000632            1570#   2090    3336*
FMCNT   000556            1548#   2090*   2307    2697    2701    2755    2932    2942    2952    3099*   3327*   3328    3330
                          3335*   3336    3637    3658    3686    3756    3778    3782    3790    3932    3936    4101    4139
                          4438    4618*   4655*   4757
FREX    021214            4370    4375    4378#
FRPRT   021156            2896    3880    4244    4369#   4423    4476
FRO     021206            4372    4376#
HDRFL   000664            1586#   3831*   3875    4761*
HERE    005126            2189    2195#
HRDS    022154            4535    4567#
HRDS0   022214            4574#   4578    4599
HRDS1   022222            4573    4576#
HRDS2   022270            4582    4584    4586    4589#   4597
HRDS3   022312            4591    4594#
HRDS4   022324            4595    4598#
INTRF   000566            1552#   3358    3360    4451    4623*
LRCER   021144            4214*   4217*   4302    4354#
LRCSV   021152            4195*   4347    4357#
MCRLF   027453            5020    5408#
MR      000534            1536#   4205    4455*   4508*
MSG1    024730            3878    5071#
MSG10   025011            3027    3048    5089#
MSG100  026644            2186    2199    5329#
MSG101  026665            4540    5332#
MSG102  026701            4542    5335#
MSG103  026710            4546    5337#
MSG104  026721            4527    5339#
MSG105  026736            2429    2848    5342#
MSG106  026751            2122    5344#
MSG107  027041            2582    5354#
MSG108  027124            4520    5364#
MSG109  027140            2118    5366#
MSG11   025016            4689    5091#
MSG110  027172            2448    5371#
MSG111  027214            2454    5374#
MSG112  027226            2572    5376#
MSG113  027247            2031    2051    5380#
MSG114  027260            2036    2056    5383#
MSG115  027271            2884    5386#
MSG116  027314            4430    5390#
MSG12   025032            4685    5094#
MSG120  027365            1885    5397#
MSG13   025046            2535    4730    5097#
```

```
MSG14   025054            2540    4734    5099#
MSG15   025061            3915    5101#
MSG16   025112            4376    5107#
MSG16A  026776            2131    5348#
MSG17   025115            4373    5109#
MSG2    024735            3891    5073#
MSG20   025120            2125    5111#
MSG21   025133            3356    5115#
MSG22   025160            2728    5120#
MSG23   025205            4253    5125#
MSG23A  025213            4287    5128#
MSG23B  025220            4273    5130#
MSG23C  025225            4283    5132#
MSG23D  025232            4257    5134#
MSG23E  025240            4263    5136#
MSG23F  025245            4267    5138#
MSG23G  025252            5140#
MSG23H  025257            4320    5142#
MSG23I  025264            5144#
MSG23J  025271            5146#
MSG23K  025276            5148#
MSG23L  025303            5150#
MSG23M  025310            5152#
MSG24   025315            4477    5154#
MSG25   025335            4424    5158#
MSG26   025355            4052    5162#
MSG27   025366            4067    5165#
MSG28   025377            2549    2564    5168#
MSG3    024742            3899    5075#
MSG30   025401            3179    5169#
MSG31   025453            3176    5177#
MSG32   025515            3233    5184#
MSG33   025536            3270    5188#
MSG34   025552            3282    5191#
MSG35   025565            3315    5194#
MSG36   025606            3325    5198#
MSG37   025632            3337    5203#
MSG38   025655            3365    5207#
MSG4    024747            3881    5077#
MSG40   025675            3376    5210#
MSG41   025723            3385    5215#
MSG42   025735            3394    5218#
MSG43   025755            4828    5029    5222#
MSG44   025761            2984    5224#
MSG45   026010            5229#
MSG46   026022            5232#
MSG47   026027            5234#
MSG48   026034            2165    2259    5236#
MSG49   026066            1989    2079    5242#
MSG5    024754            2306    4418    5079#
MSG50   026102            3262    5244#
MSG52   026127            3216    5248#
MSG53   026151            3294    5253#
MSG54   026164            2358    4247    5256#
MSG55   026173            3037    5259#
MSG56   026202            4249    5262#
```

```
MSG57   026206          3257    5264#
MSG58   026227          4293    5267#
MSG59   026235          4304    5269#
MSG6    024761          2140    2236    2689    4421    5081#
MSG60   026243          2142    4694    5271#
MSG61   026247          4700    5272#
MSG62   026253          4707    5273#
MSG64   026257          2347    2397    2838    5275#
MSG65   026301          2016    2431    2450    2850    2873    5280#
MSG66   026312          2495    5283#
MSG67   026325          2510    5286#
MSG68   026335          2046    5289#
MSG69   026346          3347    5291#
MSG7    024766          4755    5083#
MSG70   026364          2238    5295#
MSG71   026420          3227    5300#
MSG72   026441          2026    5303#
MSG73   026452          2021    5305#
MSG74   026463          3183    5307#
MSG75   026506          3192    5311#
MSG76   026521          2061    5313#
MSG77   026532          2041    5315#
MSG78   026543          2339    2387    2441    5317#
MSG79   026604          2832    2866    5323#
MSG8    024773          4717    5085#
MSG9    025003          3266    5087#
MTC1    000672          1589#   2309*   2359*   2512*   2708*   2710*   2917*   2919*   2939*   2941*   3032*   3050*   4110
                        4129    4135    4190    4342    4369    4371    4416    4434    4453    4456    4461*   4463    4737
MTINT   021714          1509    3202    4507#
MTINTA  021716          4482    4508#
NOP   = 000240          1465#
NRTP    011260          2341    2389    2443    2834    2868    2894#
NRZOF   000650          1580#   4522    4629    4642
OCTP    023724          4881#   5058
OCTPE   023732          4883#   5008
OCTPE1  023740          4882    4884#
OCTPG   024114          4893    4896    4903    4907    4912    4917    4919    4923#
OCTPG0  024132          4924    4926    4928#
OCTPG1  024136          4888    4929#
OCTPP = 104002          2020    2025    2030    2035    2040    2045    2050    2055    2060    2065    2130    2434    2453
                        2457    2534    2539    2544    2571    2853    2876    2895    2987    3186    3195    3265    3318
                        3329    3340    3350    3359    3368    3379    3388    3397    3890    4061    4070    4256    4260
                        4266    4270    4276    4280    4286    4290    4297    4301    4307    4311    4324    4545    4552
                        4688    4693    4699    4706    4716    4729    4733    4750    4754    4760    5063#
OCTP0   023760          4885    4887    4890#
OCTP1   024002          4891    4895#
OCTP2   024010          4894    4897#
OCTP3   024100          4889    4920#
OFL     024156          4881*   4883*   4886    4925    4928*   4934#
OUT     024660          4996    4998    5002    5024    5041#
PAPRT   022730          1988    2012    2078    2115    2141    2164    2237    2258    2338    2386    2440    2581    2727
                        2831    2865    3877    4017    4025    4241    4415    4429    4473    4685#
PAPRTA  023104          4721#   4727
PAPRTB  023120          4720    4724#
PAPRTC  023134          4725    4728#
PAPRTD  023142          4723    4730#
```

```
PAPRTY  023236          4745    4748#
PAPRT0  023032          4704    4706#
PAPRT1  023206          4738    4741#
PAPRT2  023240          4743    4749#
PAPRT3  023242          4740    4747    4750#
PARCNT  015542          3706*   3710*   3717    3737#
PARS    014410          3447    3449*   3471*   3472*   3475#
PATRN   000560          1549#   3339    3342    3439    3443    3453    4621*   4625*   4627*   4634*   4657*   4659*   4661*
                        4664*   4726    4728
PATS    014406          1914*   2182*   3100*   3443    3454*   3474#   3776*
PFLG    000670          1588#   3874*   3959    3964*   4240*   4329    4334*
PICK    017204          4000    4044#
PIK1    000770          1626#   3992    4029    4045    4056
PIK2    000772          1627#
PIK3    000774          1628#
PIK4    000776          1629#
PIK5    001000          1630#
PIK6    001002          1631#
PIK7    001004          1632#
PIK8    001006          1633#
PRB     000622          1566#   3483*   3490
PRS     000620          1565#   3484*   3486*   3487
PSW     000604          1559#   1918*   4464*   4470*   4487*   5051*
RANBAS  000624          1567#   2087*   4632*   4773*   4774
RANG    023314          3097    3115    3641    4773#   4776    4778
RANSAV  000626          1568#   2088*   3098*   3099    3116    3642    4633*   4773    4774*   4775    4777
RANSET  004372          1908    2087#   2181
RCNT    000554          1547#   2089*   2305    2475    2648    2680    3045    3116*   3317    3319    3324    4619*   4656*
                        4741    4753
RCNTR   012354          1978    3113#
RCSAV   000630          1569#   2089    3324*
RDA     007772          2682    2684    2689#
RDATA   033464          2497    2698    2738    2748    2929    2951    2965    3028    3040    3043    3054    3467    3505
                        3762    3884    3929    3942    4114    4117    5414#
RDCMD   000562          1550#   2602*   2611*   2615    2623*   2630*   2636*   2640    2644*   2683    2691    2699    2713
                        2742    2749    2772    2791    2801    2855    2887    2915    2930    2949    3780    3828    3837
                        3886    3893    3901    3907    3926    3947    3994    4112    4147    4215    4739
RDERR1  001150          1700#   2049    2744*   2776*
RDER1   001110          1678#   2029    2746*   2774*
RDER2   001112          1679#
RDER3   001114          1680#
RDER4   001116          1681#
RDER5   001120          1682#
RDER6   001122          1683#
RDER7   001124          1684#
RDER8   001126          1685#
RDEX    010700          2802    2804    2806    2808    2812#
RDFL    015150          1503*   1893*   2183*   3435    3646*   3648#
RDRTG   010774          2841#   2883
RDRTX   011256          2890    2892#
RDRTY   010706          2777    2825#
RDRT0   010720          2826    2828#
RDRT1   010752          2830    2836#
RDRT1A  010750          2835#
RDRT1B  010770          2837    2840#
RDRT2   011052          2847    2854#
```

```
RDRT3   011074          2856    2859#
RDRT4   011100          2858    2860#
RDRT5   011102          2845    2861#
RDRT5A  011146          2864    2871#
RDRT5B  011156          2870    2873#
RDRT6   011206          2872    2878    2881#
RDRT7   011252          2888    2891#
RDSW    024400          4994#   5019*
RDX     010704          2813#
RD0     010030          2692    2694    2697#   2800    2811
RD1     010076          2704    2707#
RD1A    010112          2700    2710#
RD1B    010120          2709    2711#
RD1D    010126          2712#
RD10    010624          2794    2796    2798#
RD11    010634          2799    2801#
RD2     010132          2711    2713#
RD2A    010152          2717#   2718
RD2B    010162          2716    2719#
RD3     010212          2714    2720    2722    2725#
RD4     010242          2726    2732#
RD4A    010340          2737    2748#
RD4A0   010372          2750    2755#
RD4A1   010414          2758    2761#
RD4A2   010436          2752    2754    2764    2766#
RD4B    010444          2735    2768#
RD4C    010450          2767    2769#
RD4D    010500          2773    2776#
RD4E    010504          2775    2777#
RD5     010514          2733    2770    2779#
RD6     010536          2745    2747    2780    2782    2784#
RD7     010562          2787    2789#
RD7A    010612          2792    2795#
READ    007732          2612    2624    2637    2645    2680#
REGS    000544          1543#   3185    3187    3204
REOT    004424          2105#   2408    2503    2527    2627    2651
REOTC   005156          1948    1950*   2145*   2151*   2152    2153*   2154*   2203#   2219*   2220    2221*   2222*   3170*
                        3306*   3312    3313*   3314*   4567*   4600*   4602*
REOTX   005054          2177    2181#
REOTXX  005140          2185    2199#
REOT1A  004472          2111    2114#
REOT1B  004520          2117    2120#
REOT1C  004540          2121    2125#
REOT1D  004544          2126#
REOT1E  004564          2124    2131#
REOT1F  004534          2119    2123#
REOT2   004606          2136#   2139
REOT2A  004644          2137    2145#
REOT3   004672          2146    2151#
REOT4   004722          2157#   2173
REOT5   004736          2159#   2160
REOT6   005002          2162    2169#
REOT7   005032          2174#
RETRY   000602          1558#   2882    4235
RETURN  021710          4493    4495    4497    4502#
RFHARD  002730          1811#   2039    2889*
```

```
RFSOFT  002670  1788#  2034  2857*
RPCNT   000700  1592#  2350* 2391* 2424* 2425  2456  2508*
RRHARD  002750  1822#  2059  2891*
RRSOFT  002710  1799#  2054  2859*
RSEQ    007414  2006   2602#
RSEX    007554  2614   2625# 2639
RSF     007470  2610   2613#
RSFR    007570  2608   2630#
RSFRX   007730  2647   2652#
RSFR0   007622  2634   2636#
RSFR1   007634  2632   2638#
RSFR2   007666  2641   2644#
RSF0    007526  2616   2620#
RSF1    007542  2619   2621  2623#
RSR     007446  2606   2609#
RSTAL   000572  1554#  2789  3378  3380
RTCNT   000702  1593#  2349* 2394* 2433  2452  2462  2481* 2482  2840* 2852  2875  2881* 2882
                4233
RTRN    000662  1585#  2310* 2362* 2514* 2711* 2920* 2943* 3033* 3051* 4509  4744
RTYFL   000712  1597#  2325  2352* 2374  2400* 2415* 2524* 2778* 2842* 2976  4231  4746
RTY1    001050  1656#  1909  2019  2344* 2393* 2485*
RTY2    001052  1657#
RTY3    001054  1658#
RTY4    001056  1659#
RTY5    001060  1660#
RTY6    001062  1661#
RTY7    001064  1662#
RTY8    001066  1663#
RWND    005160  2002   2213#
RWNDA   005172  2214   2216# 4616  4653
RWNDX   005472  2247   2263#
RWND0   005230  2223#  2243
RWND1   005302  2232#  2235
RWND1A  005340  2227   2233  2241#
RWND2   005356  2225   2244#
RWND3   005362  2245#  2256
RWND4   005412  2250#  2251
RWND5   005432  2254#  2262
RWND6   005450  2253   2257#
SCVFL   014150  1520*  3181  3374  3403* 3405#
SERFL   000706  1595#  2328  2332* 2377  2422  2492* 2499  2509* 2518  2769  2784* 2841* 2844
                3834   4219* 4227*
SN      000540  1538#  3268
SNPG    024350  4968   4971  4977  4979  4981#
SNPT    024272  3269   4962#
SPFLG   000570  1553#  2184  3367  3369
STAL    000666  1587#  1986* 2004* 2007* 2076* 2138* 2234* 2323* 2493* 2617* 2642* 2789* 2912*
                2921*  2925* 2927* 3025* 3052* 3056* 3079* 4460* 4468*
STALL   012304  2005   2008  2324  2494  2618  2643  2790  2913  2928  3026  3057  3079# 3080
START   003026  1497   1521  1868#
STARTA  003160  1504   1901# 2731
STARTB  003164  1894   1902#
STARTC  003152  1500   1897#
STARTD  003250  1898   1917#
STARTE  003242  1916#  2202
STARTF  003222  1911#  1913
```

```
START0  003174          1904#   1906
START1  003454          1951#   2083
START2  003572          1970    1971    1973#
START3  003606          1974    1976#
START4  003622          1956    1977    1979#   1987    1992
START5  004312          2010    2070#
START6  004330          2074#   2077
START7  004360          1981    2000    2075    2082#   2150
START8  004366          2073    2083#
STAR1A  003466          1953#
STAR1B  003506          1954    1957#
STAR1C  003542          1959    1961    1966#
STAR4A  003702          1985    1993#
STAR40  003634          1980    1982#
STAUT   003136          1516    1884    1887    1892#
STAUTO  003414          1942#   4624    4626    4628    4635    4658    4660    4662    4665
STOP    024662          5044#   5060
STOPP = 104006          1991    2081    2144    2167    2198    2240    2261    2730    3958    4328    4426    4481    5065#
STP     004030          2013    2015#   2134
STPX    004276          2014    2067#
SUSWR   003262          1889    1919#
SWR     000606          1560#   1878*   1879*   1922    1926*   1929    1969    1973    1976    2009    2070    2213    2302
                        2320    2333    2345    2364    2381    2395    2404    2427    2446    2603    2607    2609    2613
                        2620    2631    2633    2638    2732    2779    2786    2825    2836    2846    2871    2945    2972
                        2998    3002    3035    3872    3913    3956    3961    4015    4023    4188    4229    4326    4331
                        4471    4479    4494    4719    4995    5007    5040*
SWREG   000176          1492#   1878    1926    1929    2998    4494    4995
TABLE   024716          5055    5057#
TAPG    021216          2311    2363    2515    2712    2922    2944    3034    3053    4409#
TAPG0   021230          4411#   4414
TAPG1   021272          4417    4421#
TAPG2   021304          4420    4424#
TAPG3   021314          4412    4427#
TAPG3A  021364          4435    4438#
TAPG3B  021400          4437    4440    4442#
TAPG3C  021420          4445    4448#
TAPG3D  021464          4452    4454    4456#
TAPG3E  021510          4459    4461#
TAPG3F  021346          4428    4434#
TAPG4   021536          4466#   4467    4469
TAPG5   021552          4470#
TAPG6   021614          4472    4479#
TAPG7   021624          4480    4482#
TBELA   023704          4872#   4875
TBELL   023700          4853    4871#
TCRLF   023614          4851    4856#
TCRLFA  023632          4859#   4862
TEMPST  024374          4992#   5011*   5032*   5033*   5034*   5036*   5040
TEMP1   000642          1577#   3241    3277    3289    3301    3485*   3491    3495*   3936*   3937*   3938*   3939    3941
                        3986*   3989*   3997*   4002    4047    4409*   4413*   4465*   4466*   4568*   4592*   4598    4600
                        4601*   4602    4798*   4803    4812*
TEMP2   000644          1578#   3235*   3236    3272*   3284*   3296*   3410*   3414    3496*   3503    3987*   3990*   3998*
                        4003    4048
TEMP3   000646          1579#   2436*   2444*   2458    2460*   2861*   2869*   2877    2879*   2988*   2994    3988*   4010
                        4049*   4953    4956
TEND    005100          2179    2186#   4562
```

```
TEX     023676          4849    4870#
TIB     000640          1576#   4801    4806    4809    4816*   4817    4838*   4839*   4842    4999*   5000*   5001    5014
                        5017    5025    5027    5035*   5036
TINER   023472          4808    4811    4822    4825    4828#
TINF    000634          1574#   1892*   1897*   1901*   2175*   3166
TINP    012400          1940    3166#
TINPA   012410          3167    3169#
TINPB   012430          3173#   3175
TINPB0  012614          3207#   3210
TINPB1  012454          3178    3180#
TINPC   012642          3182    3212    3215#   3232
TINPX   014142          3375    3403#
TINP0   012746          3226    3233#   3245    3259    3310
TINP0A  013022          3244    3246#
TINP0B  013040          3242    3249#
TINP0C  013100          3255#
TINP0D  013122          3256    3260#
TINP0E  013146          3261    3266#
TINP1   013164          3270#
TINP2   013242          3278    3282#
TINP2A  013320          3290    3294#
TINP2B  013376          3302    3306#
TINP2C  013424          3248    3308    3311#
TINP3   013444          3315#
TINP4   013774          3374#   4500
TKB     000612          1562#   2982    2996    3000*   4488    4838    4999
TKS     000610          1561#   1951*   2911*   2980    3005*   4835*   4836    4997
TMEX    000564          1551#   2355    2693    2805    3029    3349    3351    4622*
TMFLG   000676          1591#   2357*   2401*   2417    2690*   2695*   2721    2734    2781    2793*   2807    2809*   2812*
                        2923    2947    2974    4137    4159    4166    4177    4192    4245    4344    4742
TOB     000636          1575#   1902    4277*   4298*   4308*   4721*   4751*   4847*   4848    4850    4852    4856*   4859*
                        4863*   4869    4872*   4920*   4930*   4938*   4940*   4943    4944    4949*   4981*   4983*
TOG     023662          4278    4299    4309    4722    4752    4854    4857    4860    4864    4867#   4868    4873    4921
                        4931    4984
TPB     000616          1564#   4842*   4869*   4946*   4948*
TPOS    014152          3281    3293    3305    3409#   3412
TPOS1   014164          3251    3413#
TPS     000614          1563#   4840    4867    4941
TRAP30  024670          1469    5051#
TSTAL   000576          1556#   2004    2007    2493    2617    2642    3025    3056    3396    3398
TTIN    023506          4835#   5061
TTINN = 104010          4800    5013    5066#
TTINT   021630          1485    4487#
TTINT0  021700          4491    4499#
TTIN1   023512          4836#   4837
TTIN2   023534          4840#   4841
TTOUT   023552          4847#   4855    4865    4876    5057
TTOUTT= 104000          1886    1990    2017    2022    2027    2032    2037    2042    2047    2052    2057    2062    2080
                        2123    2126    2132    2143    2166    2187    2200    2239    2260    2340    2348    2388    2398
                        2430    2432    2442    2449    2451    2455    2537    2541    2550    2565    2573    2583    2729
                        2833    2839    2849    2851    2867    2874    2885    2985    3180    3184    3193    3217    3228
                        3234    3258    3263    3267    3271    3283    3295    3316    3326    3338    3348    3357    3366
                        3377    3386    3395    3879    3882    3892    3900    3916    4053    4068    4243    4250    4254
                        4258    4264    4268    4274    4284    4288    4294    4305    4321    4374    4377    4419    4422
                        4425    4431    4475    4478    4521    4528    4541    4543    4547    4686    4690    4695    4701
                        4708    4718    4731    4735    4756    4829    5004    5006    5010    5021    5030    5062#
```

```
TTR     023346  2993  3191  3200  3222  3240  3276  3288  3300  3323  3334  3346  3355  3364
                3373  3384  3393  3402  4526  4533  4798#
TTR0    023354  4800#  4819
TTR1    023376  4802  4806#
TTR1A   023410  4807  4809#
TTR1B   023422  4810  4812#
TTR2    023452  4805  4820#
TTR3    023460  4821  4823#
TTR4    023466  4824  4826#
TTR5    023470  4804  4827#
UDES    000552  1546#  1955*  1968*  1983  1993  2105  2157*  2158  2228*  2229  2248*  2249  2265*
                2266  2703  2751  2757  2763  2934  2954  2960  2966  3279*  3291*  3303*  3445
                3471  3701  3719  3722  3757  3763  3765  3767  3784  3793  4106  4145  4169
                4180  4186  4198  4314  4341  4444  4691  4696  4703  4709
UNP     000674  1590#  1952  1963*  1966*  2018  2023  2028  2033  2038  2043  2048  2053  2058
                2063  2082*  2127  2147  2155*  2156  2168  2170*  2171  2174*  2216  2217*  2223
                2242*  2244*  2245  2254*  2263*  2264  2330  2343  2379  2392  2464  2466  2484
                2566  2741  2771  2854  2886  3169*  3243  3246  3249  3307  3309*  3311*  3413
                3836  3991  4027  4044  4054
UNX     000766  1622#
UN1     000746  1614#  1943  1945*  1953  1955  1968  1979  2148*  2157  2169*  2172  2224  2226
                2228  2241*  2246  2248  2265  3172  3247*  3250*  3254  3414*  4548  4580  4609
                4645
UN2     000750  1615#
UN3     000752  1616#
UN4     000754  1617#
UN5     000756  1618#
UN6     000760  1619#
UN7     000762  1620#
UN8     000764  1621#
UPS     000714  1598#  2216*  2263
VECT    000546  1544#  3194  3196  3201
WC      000512  1527#  4289  4448*
WDATA   027456  2308  2361  2368  2372  2513  2516  3452  3461  3502  3638  3660  3688  3761
                3779  3928  3940  4119  5411#
WEX     006320  2304  2356  2365  2378  2382  2390  2400#
WRITE   005522  2003  2302#
WRTE    005536  2303  2305#
WRTSB   006764  2416  2492#
WRTSB0  007036  2501#  2520
WRTSB1  007052  2500  2504#  2519
WRTSB2  007062  2505  2507#
WRTSB3  007136  2514  2516#
WRTY    006362  2351  2399  2415#
WRTYR   006414  2420  2422#
WRTYTM  006410  2418  2421#
WRTY0   006370  2416#  2426  2487
WRTY1   006470  2428  2435#
WRTY2   006472  2423  2436#
WRTY2A  006536  2439  2446#
WRTY2B  006554  2445  2450#
WRTY3   006620  2447  2459  2462#
WRTY3A  006636  2463  2466#
WRTY4   006724  2479  2481#
WRTY5   006760  2483  2488#
WRW     006336  2404#
```

```
WRWX    006360          2403    2407    2409#
WSTAL   000574          1555#   2323    3387    3389
WTER1   001070          1667#   2024    2331*   2380*   2465*
WTER2   001072          1668#
WTER3   001074          1669#
WTER4   001076          1670#
WTER5   001100          1671#
WTER6   001102          1672#
WTER7   001104          1673#
WTER8   001106          1674#
WTM     006052          2358#   2421
WTM0    006114          2362    2364#
WTM1    006156          2367    2372#
WTM2    006166          2371    2374#
WTM3    006176          2375    2377#
WTM4    006256          2385    2391#
WTM4A   006314          2396    2399#
W0      005542          2306#   2354    2419
W1      005604          2310    2312#
W2      005644          2313    2315    2320#
W3      005660          2321    2323#
W3A     005702          2326    2328#
W4      005766          2337    2343#
W4A     006014          2346    2349#
W5      006030          2329    2334    2342    2352#
W6      006040          2355#
XOR     015510          3664    3692    3696    3727#
XORS    015534          3661*   3676*   3680    3681*   3682*   3684*   3685    3689*   3697    3728    3729*   3730*   3731
                        3734#
YOZ     011274          2788    2843    2911#   2995
YOZA    011342          2916    2919#
YOZB    011350          2918    2920#
YOZC    011370          2920    2923#
YOZC0   011460          2935    2938#
YOZC1   011474          2931    2941#
YOZC2   011502          2940    2942#
YOZD    011522          2943    2945#
YOZD0   011624          2950    2965#
YOZD1   011650          2948    2971#
YOZD2   011616          2961    2963#
YOZD3   011642          2967    2969#
YOZD4   011576          2955    2958#
YOZE    011654          2946    2972#
YOZF    011704          2964    2970    2973    2975    2979#
YOZF0   011710          2977    2980#
YOZG    012002          2981    2983    2996#
YOZH    012046          3003    3005#
YOZI    012032          2997    2999    3002#
YOZ0    011314          2914#   3004
YSTAL   000600          1557#   2912    2927    2986    2989
$CNTG   027430          5003    5403#
$ENDAD  005116          1477    1873    1934    2191#
$MNEW   027443          5009    5406#
$MSWR   027434          5005    5404#
$READ   024476          5011#
$SVPC = 000034          1475#   1480
```

```
.     = 033466          1468#   1470#   1475    1476#   1478#   1480#   1484#   1491#   1496#   1499#   1502#   1508#   1514#
                        1519#   1523#   1722#   1724#   1726#   1728#   1730#   1732#   1734#   1736#   1738#   1740#   1742#
                        1744#   1746#   1748#   1750#   1752#   1759#   1761#   1763#   1765#   1767#   1769#   1771#   1773#
                        1833    5410#   5413#

. ABS.  033466     000


 ERRORS DETECTED:  0

 DSKW:CZTUAH,DSKW:CZTUAH.SEQ/SOL/NL:TOC=CZTUAH.SML/ML,CZTUAH.P11
 RUN-TIME: 6 12 2 SECONDS
 RUN-TIME RATIO: 131/21=6.1
 CORE USED:  13K  (25 PAGES)

 DOCUMENT PAGES:  134
```