TAPEDATA

IDENTIFICATION

PRODUCT CODE:	MAINDEC-12-D3FB-D
PRODUCT NAME:	PDP-12 TAPE DATA TEST
DATE CREATED:	NOVEMBER,1 197Ø
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	WALTER MANTER

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1. ABSTRACT

The tape data test is designed to:

A) Test tape read and write ability in both pause and no pause mode.

B) Test read-write amplifier recovery.

C) Test a worst case read-write condition.

D) Provide a long read-write scope loop over blocks 0-777 using WRI and RDE instructions.

E) Provide scope loops on all tests

2. REQUIREMENTS

2.1 Equipment

A) A standard PDP-12

B) A TC-12, PDP-12 linc-tape controller

C) A ASR-33 teletype on equivàlent

2.2 Preliminary Programs

Tape Data test should be preceded by tape control test parts I and II and followed by tape Exerciser test.

2.3 Storage

This program uses instructions field 2 and data field 3 of core. (locations 4ØØØ to 7777)

3. LOADING PROCEDURE

3.1 Method

This program must be loaded with the binary loader.

A) Set the teletype reader switch to FREE.

B) Open the teletype reader and insert the program tape so that the arrows on the tape are visible to and pointing toward the operàtor.

C) Close the reader and set the reader switch to START

D) Set the teletype front panel switch to ON LINE

E) Set the LEFT switches to 7777.

F) Set the RIGHT switches to 4ØØØ.

G) Set the MODE switch to 8 mode.

H) Depress I/O preset

I) Depress START LS

J) When the program tape has been read the ACCUMULATOR must be ØØØØ. If it is not, a read in error has occurred and one might try reloading the binary loader.

K) Remove the program tape from the reader

4. STARTING PROCEDURE

The setting of the LEFT, RIGHT and SENSE switches for normal operation is all switches Ø.

A) Set the mode switch to L-MODE

B) Depress I/O Preset.

C) Depress START 2Ø

Mount tape ?
Unit # ? 1

The program is running; consult the listing for test descriptions.

5. CONTROL SWITCH SETTINGS

5.1 Sense Switch Settings

A) SNS Ø = 1 Ignore any error

B) SNS 1 = 1 Loop on particular test

C) SNS 2 = 1 Loop on Write portion of test

D) SNS 3 = 1 Loop on read portion of test

E) SNS 4 = Ø Fixed data pattern (left and right switches)

F) SNS 4 = 1 Random Data pattern (left and right switches not both zero)

G) SNS 5 = 1 long Scope loop test

Takes 5+20 ; rings bell

5.2 Left and Right Switches

Control fixed data pattern and determine starting point of ramdom data pattern.

6. ERRORS

6.1 Error Halts

Correct interperation of error halts must be done utilizing the program listing. All error halts are documented and easily interperated in the program listing.

6.2 Error Printouts

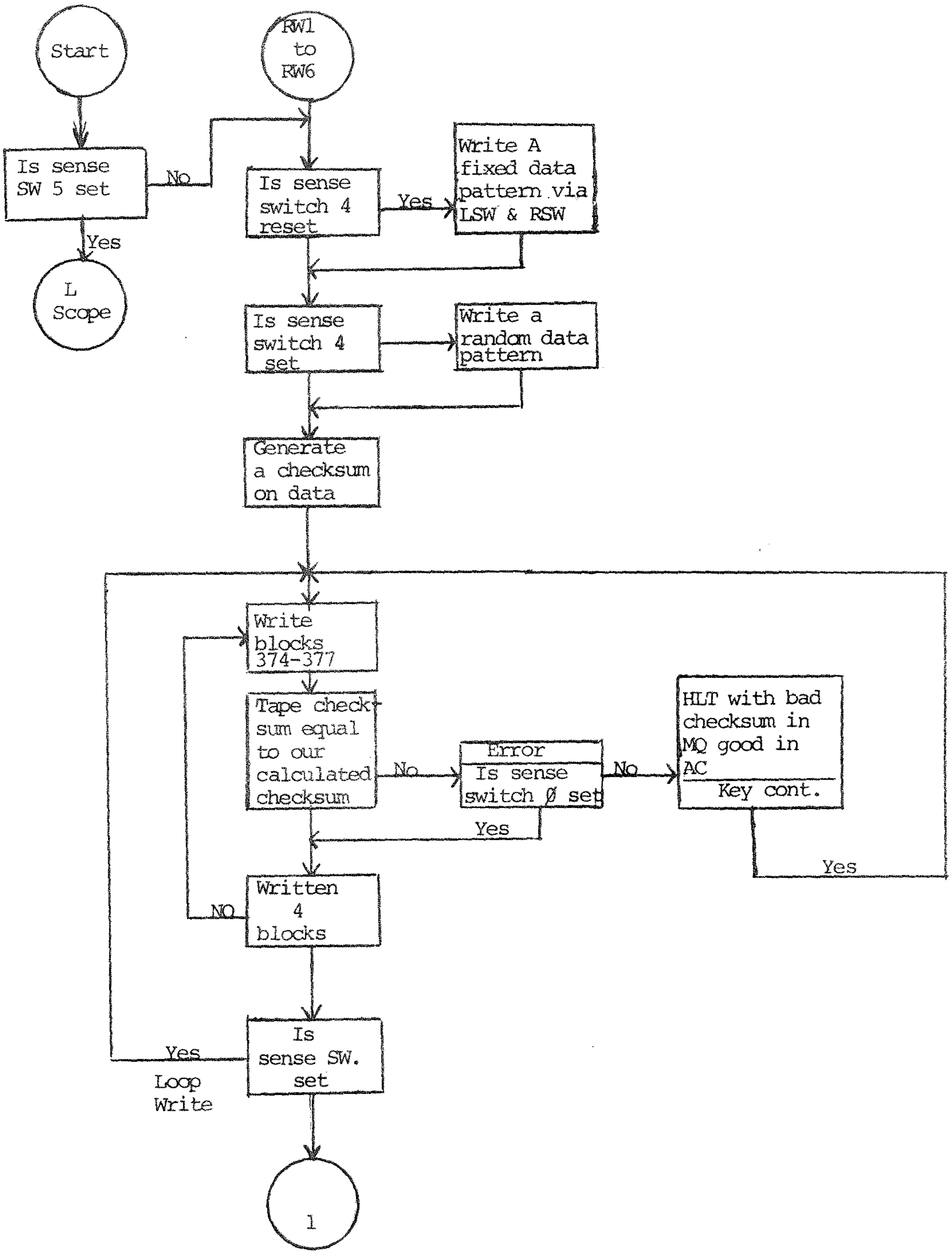
None

6.3 Error Recovery

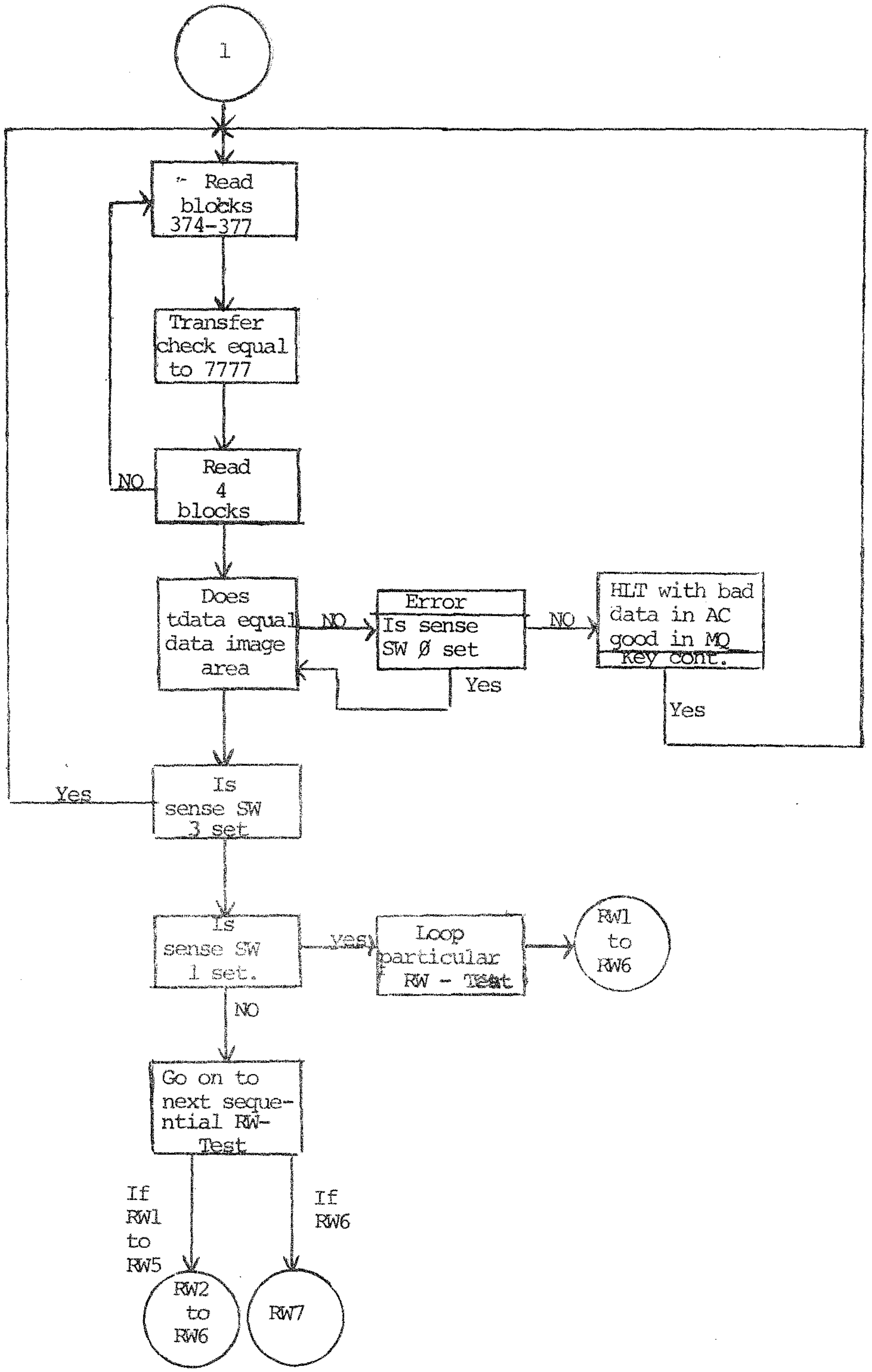
A) KEY CONTINUE puts you back in the main program at the start of test which failed.

B) If SENSE SWITCH Ø is set (depressed) the error is ignored and program continues in normal sequence.

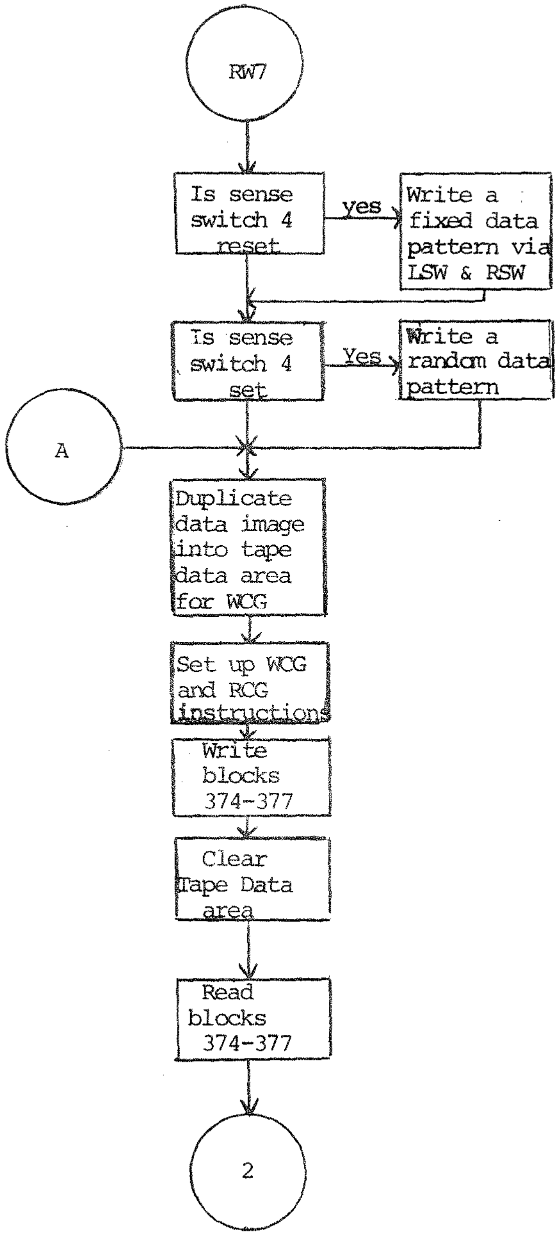
FLOW CHARTS FOR TAPE DATA TEST

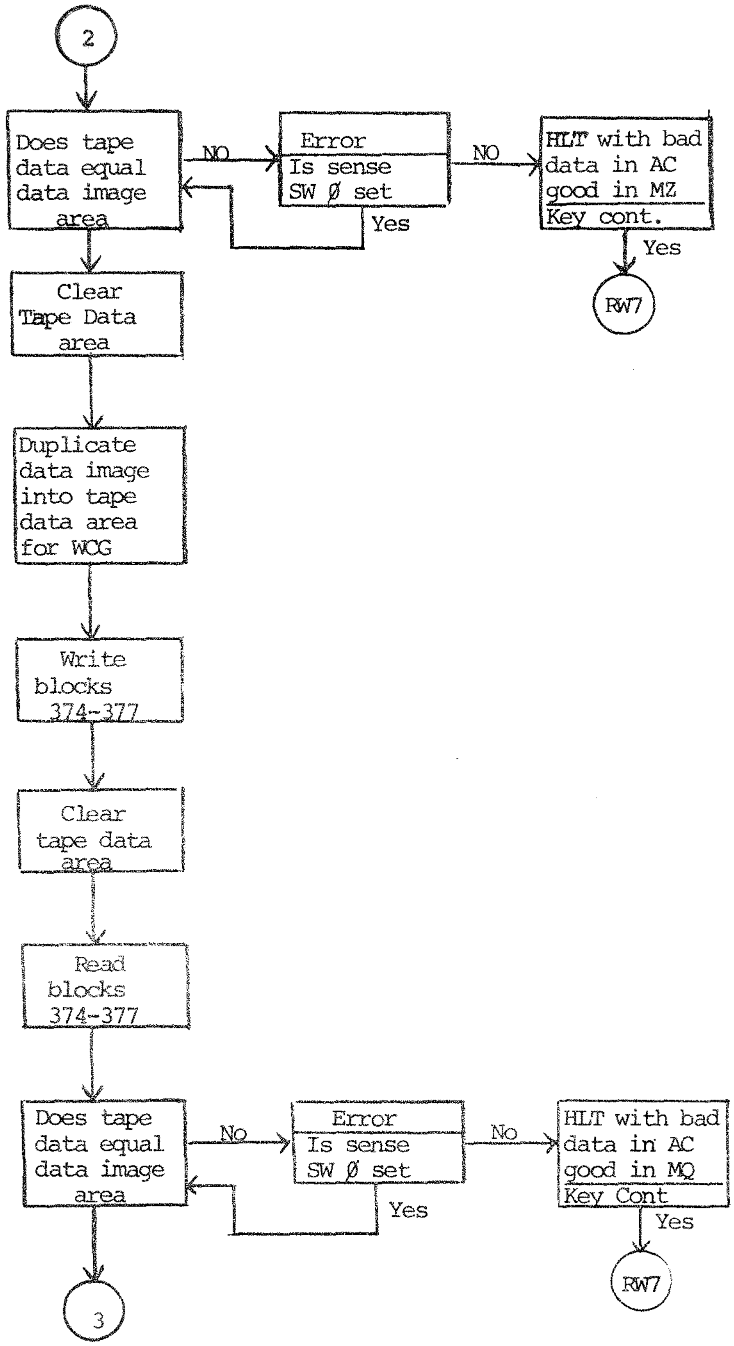


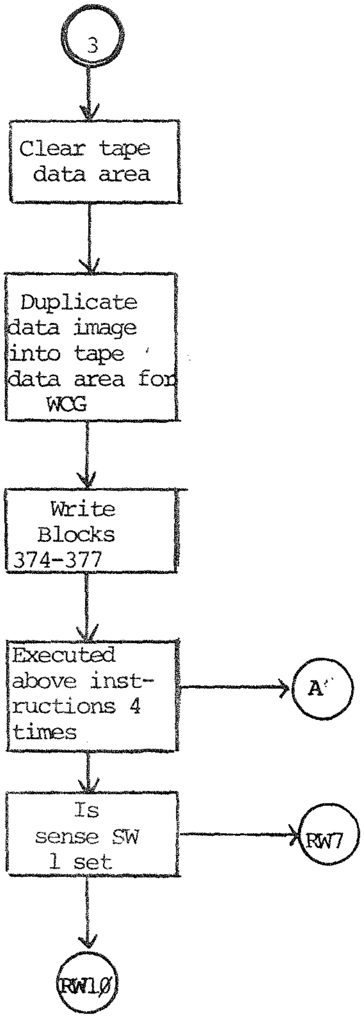
A

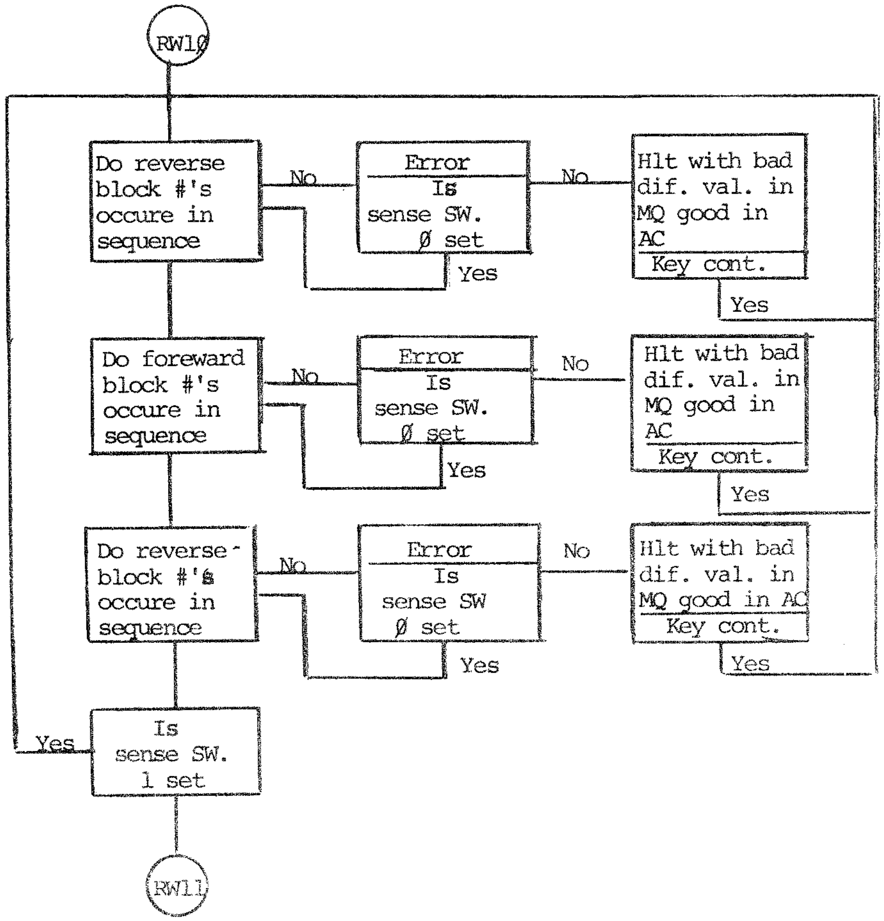

1
Read blocks 374-377
Transfer check equal to 7777
Read 4 blocks
NO
Does tdata equal data image area
NO
Error
Is sense SW Ø set
Yes
NO
HLT with bad data in AC good in MQ
Key cont.
Yes
Is sense SW 3 set
Yes
Is sense SW 1 set.
Yes
Loop particular RW - Test
RW1 to RW6
NO
Go on to next sequential RW-Test
If RW1 to RW5
If RW6
RW2 to RW6
RW7

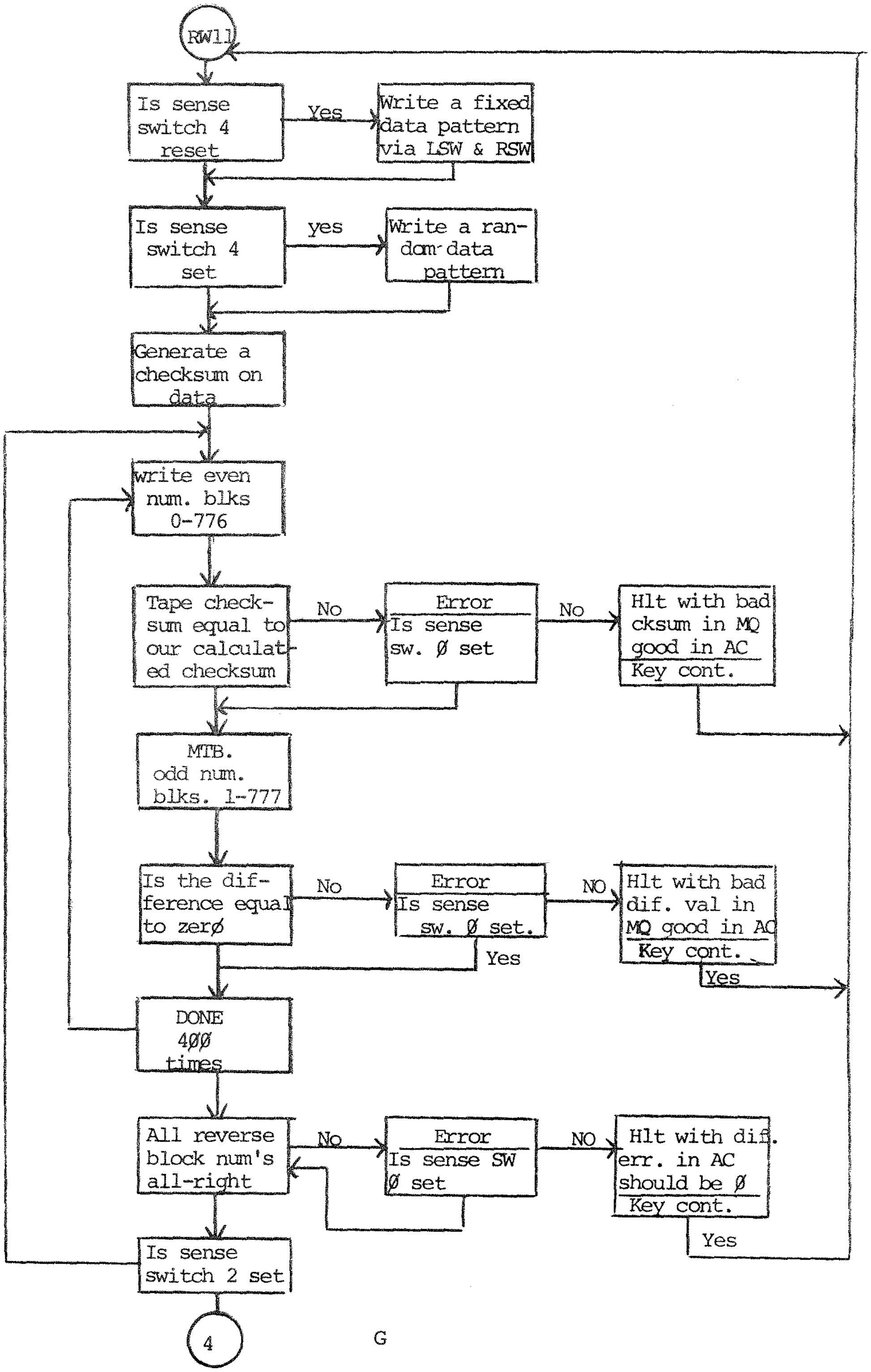
B

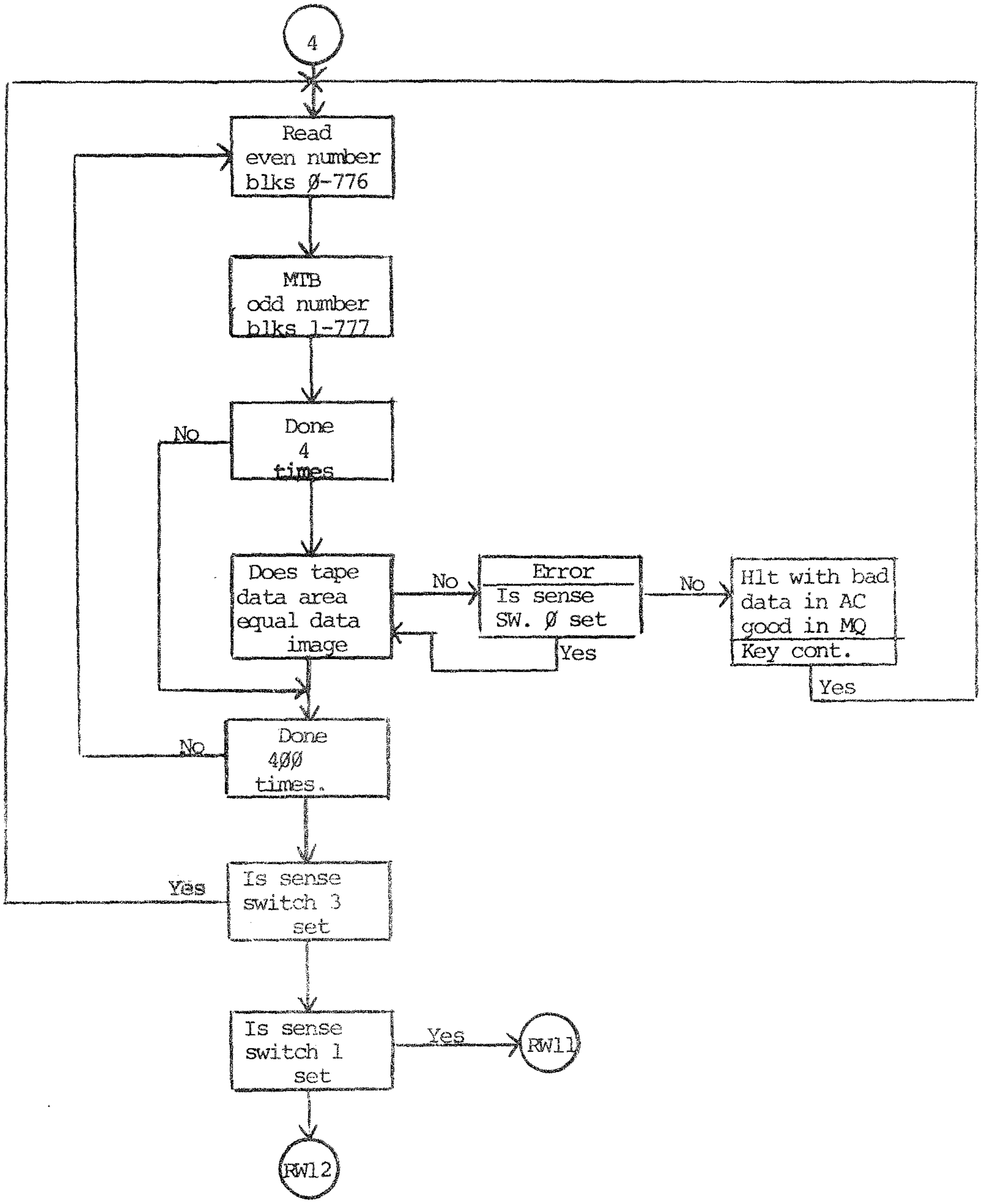

RW7
Is sense switch 4 reset
yes
Write a fixed data pattern via LSW & RSW
Is sense switch 4 set
Yes
Write a random data pattern
A
Duplicate data image into tape data area for WCG
Set up WCG and RCG instructions
Write blocks 374-377
Clear Tape Data area
Read blocks 374-377
2

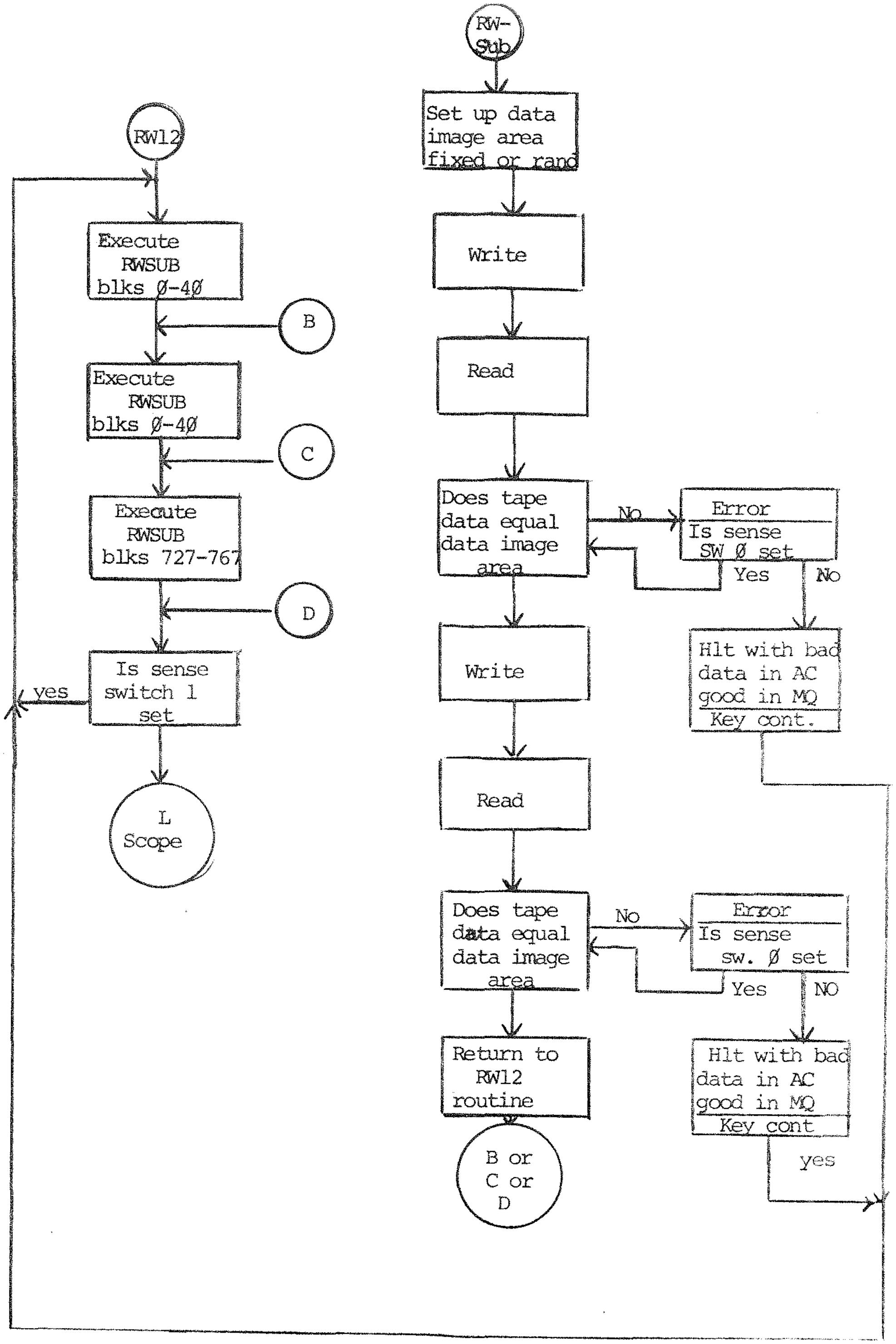

2
Does tape data equal data image area
NO
Error
Is sense SW Ø set
Yes
NO
HLT with bad data in AC good in MZ
Key cont.
Yes
RW7
Clear Tape Data area
Duplicate data image into tape data area for WCG
Write blocks 374-377
Clear tape data area
Read blocks 374-377
Does tape data equal data image area
No
Error
Is sense SW Ø set
Yes
No
HLT with bad data in AC good in MQ
Key Cont
Yes
RW7
3

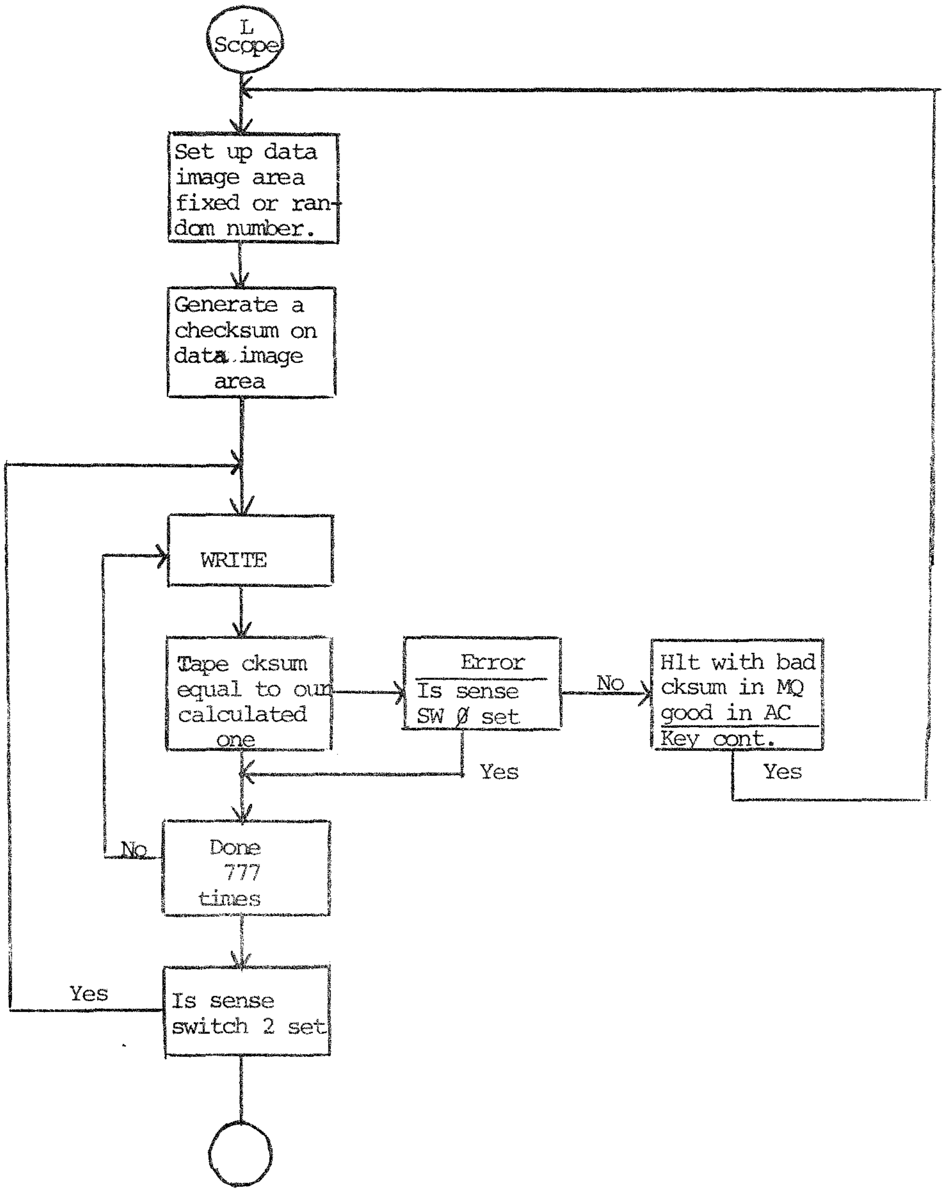

3
Clear tape data area
Duplicate data image into tape data area for WCG
Write Blocks 374-377
Executed above instructions 4 times
A
Is sense SW 1 set
RW7
RW1Ø


RW1Ø
Do reverse block #'s occure in sequence
No
Yes
Error
Is sense SW. Ø set
No
Yes
Hlt with bad dif. val. in MQ good in AC
Key cont.
Yes
Do foreward block #'s occure in sequence
No
Yes
Error
Is sense SW. Ø set
No
Yes
Hlt with bad dif. val. in MQ good in AC
Key cont.
Yes
Do reverse block #'s occure in sequence
No
Yes
Error
Is sense SW Ø set
No
Yes
Hlt with bad dif. val. in MQ good in AC
Key cont.
Yes
Yes
Is sense SW. 1 set
RW11


RW11
Is sense switch 4 reset
Yes
Write a fixed data pattern via LSW & RSW
Is sense switch 4 set
yes
Write a random data pattern
Generate a checksum on data
write even num. blks 0-776
Tape checksum equal to our calculated checksum
No
Error
Is sense sw. Ø set
No
Hlt with bad cksum in MQ good in AC
Key cont.
MTB.
odd num. blks. 1-777
Is the difference equal to zerØ
No
Error
Is sense sw. Ø set.
Yes
NO
Hlt with bad dif. val in MQ good in AC
Key cont.
Yes
DONE
4ØØ times
All reverse block num's all-right
No
Error
Is sense SW Ø set
NO
Hlt with dif. err. in AC should be Ø
Key cont.
Yes
Is sense switch 2 set
4

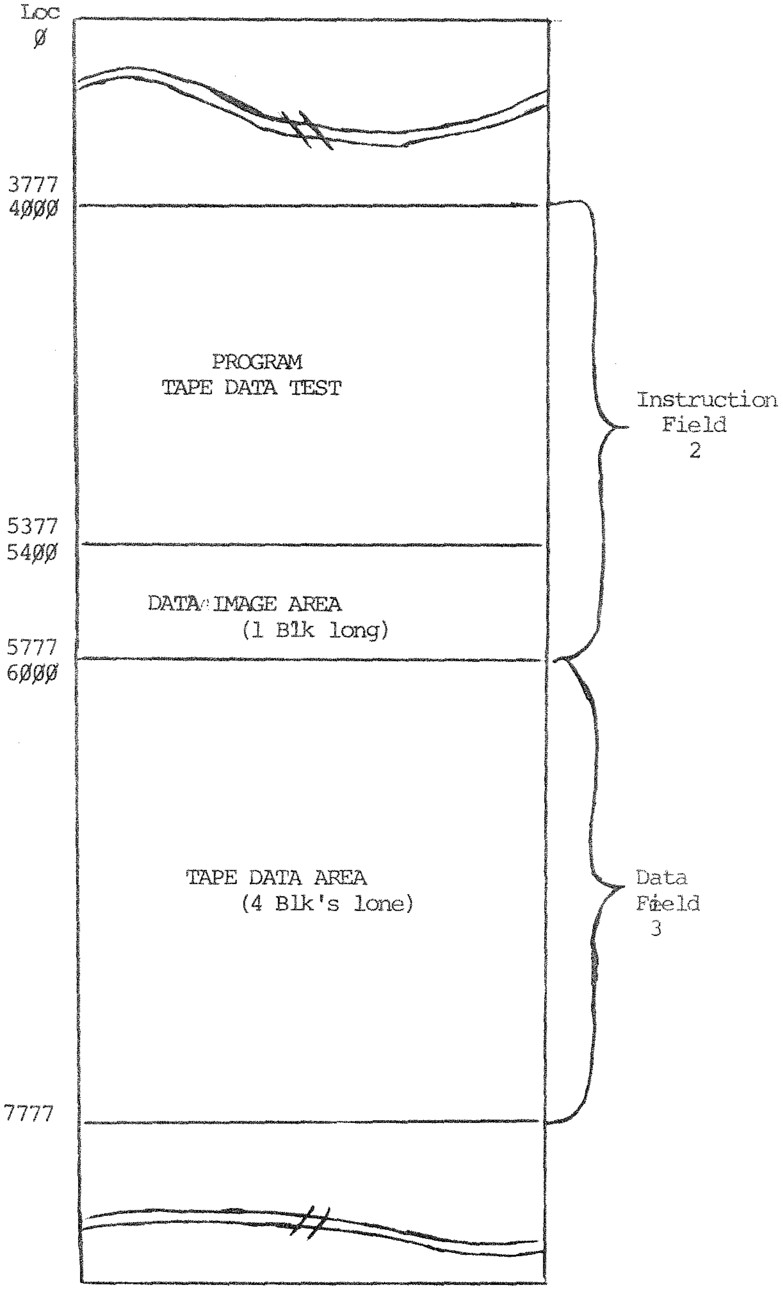

4
Read even number blks Ø-776
MTB odd number blks 1-777
Done 4 times
No
Does tape data area equal data image
No
Error
Is sense SW. Ø set
Yes
No
Hlt with bad data in AC good in MQ
Key cont.
Yes
Done 4ØØ times.
No
Is sense switch 3 set
Yes
Is sense switch 1 set
Yes
RW11
RW12


RW12
Execute RWSUB blks Ø-4Ø
B
Execute RWSUB blks Ø-4Ø
C
Execute RWSUB blks 727-767
D
Is sense switch 1 set
yes
L Scope
RW-Sub
Set up data image area fixed or rand
Write
Read
Does tape data equal data image area
No
Error
Is sense SW Ø set
Yes
No
Hlt with bad data in AC good in MQ
Key cont.
Write
Read
Does tape data equal data image area
No
Error
Is sense sw. Ø set
Yes
NO
Hlt with bad data in AC good in MQ
Key cont
yes
Return to RW12 routine
B or C or D



L Scope
Set up data image area fixed or random number.
Generate a checksum on data image area
WRITE
Tape cksum equal to our calculated one
Error
Is sense SW Ø set
No
Yes
Hlt with bad cksum in MQ good in AC
Key cont.
Yes
No
Done 777 times
Yes
Is sense switch 2 set

APPENDIX A
MEMORY MAP



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            *20
                    *20

            /TDATA - TAPE DATA TEST   MAINDEC 12-D3FA-A
            /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP.,MAYNARD, MASS.
            /MAINTAINER - DIAGNOSTIC GROOP
            /AUTHOR - WALTER MANTER
            /
            /TDATA1 TESTS:
            /   TAPE READ AND WRITE ABILITY IN BOTH PAUSE AND NO PAUSE MODES
            /   WRITE-READ AMPLIFIER RECOVERY
            /   WORST CASE READ-WRITE CONDITIONS
            /   LONG READ-WRITE SCOPE LOOP OVER BLOCKS Ø TO 777
            /
            /SCOPE LOOPS ARE PROVIDED VIA THE SENSE SWITCHES FOR ALL TESTS
            /
            /SENSE SWITCH SETTINGS ARE:
            /   SNS Ø = 1  IGNORE ANY ERROR
            /   SNS 1 = 1  LOOP ON PARTICULAR TEST
            /   SNS 2 = 1  LOOP ON WRITE PORTION OF TEST
            /   SNS 3 = 1  LOOP ON READ PORTION OF TEST
            /   SNS 4 = 1  FIXED DATA PATTERN (LEFT AND RIGHT SWITCHES)
            /   SNS 4 = Ø  RANDOM DATA PATTERN
            /   SNS 5 = 1  LONG SCOPE LOOP TEST
            /
            /
            /NOTE: THIS PROGRAM WRITES OVER BLOCKS Ø TO 777 (USE A SCRATCH TAPE)
            /
            /START LOCATION 2Ø


                    LMODE

                    *2Ø

ØØ2Ø  Ø465  START,  SNS I 5         /IS SNS SW 5 SET
ØØ21  6676          JMP LSCOPE      /YES-GO TO LONG SCOPE LOOP ROUTINE






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                /RW1 TESTS WRI AND RDE TAPE INSTRUCTIONS IN PAUSE MODE
                /WITH THE I BIT (7) SET LEAVING TAPE MOVING IN THE DIRECTION
                /IT WAS MOVING AT COMPLETION OF TAPE INSTRUCTION
                /USES BLOCKS 374-377


ØØ22  ØØ11  RW1,    CLR             /CLEAR
ØØ23  ØØØ1          AXO             /EXTENDED OPERATIONS BUFFER
ØØ24  6752          JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
ØØ25  7Ø33          JMP GCKSUM      /GENERATE CHECKSUM FOR DATA IMAGE AREA
ØØ26  ØØ11  T2,     CLR
ØØ27  3373          ADD C3374       /SET UP WRI FROM DATA IMAGE TO TAPE
ØØ3Ø  4Ø34          STC X2
ØØ31  ØØ61          SET I 1         /WANT TO WRITE 4 BKS
ØØ32  7773          -4
ØØ33  Ø736          WRI I U         /WRITE
ØØ34  ØØØØ  X2,     Ø
ØØ35  ØØØ3          TAC             /TAC TO AC
ØØ36  144Ø          SAE             /IS IT EQUAL TO
ØØ37  1Ø44          CKSUM           /OUR CALCULATED CHECKSUM
ØØ4Ø  7271          JMP E2          /NO-ERROR
ØØ41  1ØØØ          LDA             /UPDATE TBLK
ØØ42  ØØ34          X2
ØØ43  3367          ADD C1          /BY A COUNT OF 1
ØØ44  4Ø34          STC X2
ØØ45  Ø221          XSK I 1         /WRITTEN 4 BLOCKS
ØØ46  6Ø33          JMP X2-1        /NO-DO IT AGAIN
ØØ47  Ø462          SNS I 2         /SNS SW 2 SET
ØØ5Ø  6Ø26          JMP T2          /YES-LOOP ON WRI
ØØ51  ØØ11  T3,     CLR
ØØ52  3374          ADD C4374       /SET UP RDE FROM TAPE TO TDATA AREA
ØØ53  4Ø57          STC X3
ØØ54  ØØ61          SET I 1         /WANT TO RDE 4 BLKS
ØØ55  7773          -4
ØØ56  Ø732          RDE I U         /READ
ØØ57  ØØØØ  X3,     Ø
ØØ6Ø  146Ø          SAE I           /IS THE TRANSFER CHECK
ØØ61  7777          7777            /EQUAL TO 7777
ØØ62  73ØØ          JMP E3          /NO-ERROR
ØØ63  1ØØØ          LDA             /UPDATE MBLK AND TBLK
ØØ64  ØØ57          X3
ØØ65  3372          ADD C1ØØ1       /BY A COUNT OF 1
ØØ66  4Ø57          STC X3
ØØ67  Ø221          XSK I 1         /READ 4 BLOCKS
ØØ7Ø  6Ø56          JMP X3-1        /NO-DO AGAIN
ØØ71  7141          JMP CMPR        /COMPARE TDATA AREA WITH DATA IMAGE AREA
ØØ72  Ø463          SNS I 3         /SNS SW 3 SET
ØØ73  6Ø51          JMP T3          /YES-LOOP RDE
ØØ74  Ø461          SNS I 1         /SNS SW 1 SET
ØØ75  6Ø22          JMP RW1         /YES-LOOP READ-WRITE TEST



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            /RW2 TESTS WRI AND RDE INSTRUCTIONS    PAUSE MODE
            /WITH THE I BIT (7) RESET
            /DETERMINES IF INSTRUCTIONS DECODE AND EXECUTE
            /USES BLOCK 374


0076  6752  RW2,    JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0077  7033          JMP GCKSUM      /GENERATE CHECKSUM FOR DATA IMAGE AREA
0100  0011  T4,     CLR
0101  0716          WRI U           /WRITE
0102  3374          3374
0103  0003          TAC             /TAC TO AC
0104  1440          SAE             /IS IT EQUAL TO
0105  1044          CKSUM           /OUR CALCULATED CHECKSUM
0106  7304          JMP E4          /NO-ERROR
0107  0462          SNS I 2         /SNS SW 2 SET
0110  6100          JMP T4          /YES-LOOP ON WRI
0111  0011  T5,     CLR
0112  0712          RDE U           /READ
0113  4374          4374
0114  1460          SAE I           /IS THE TRANSFER CHECK
0115  7777          7777            /EQUAL TO 7777
0116  7313          JMP E5          /NO-ERROR
0117  7136          JMP CMPR1       /COMPARE TAPE DATA WITH DATA IMAGE AREA
0120  0463          SNS I 3         /SNS SW 3 SET
0121  6111          JMP T5          /YES-LOOP RDE
0122  0461          SNS I 1         /SNS SW 1 SET
0123  6076          JMP RW2         /YES-LOOP READ-WRITE TEST



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                /RW3 TESTS WRI AND RDE INSTRUCTIONS IN NO PAUSE MODE
                /WITH THE I BIT (7) SET LEAVING TAPE MOVING IN THE DIRECTION
                /IT WAS GOING AT COMPLETION OF THE INSTRUCTION
                /USES BLOCKS 374-377


Ø124  1Ø2Ø      RW3,    LDA I           /SET BIT 8 IN AC
Ø125  ØØ1Ø              1Ø
Ø126  ØØØ1              AXO             /AC TO EXTENDED OPERATIONS BUFFER SETTING NO PAUSE MODE
Ø127  6752              JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
Ø13Ø  7Ø33              JMP GCKSUM      /GENERATE CHECKSUM FOR DATA IMAGE AREA
Ø131  ØØ11      T6,     CLR
Ø132  3373              ADD C3374       /SET UP SECOND WORD OF WRI INST
Ø133  4137              STC X6
Ø134  ØØ61              SET I 1         /WANT TO WRITE 4 BLOCKS
Ø135  7773              -4
Ø136  Ø736              WRI I U         /WRITE
Ø137  ØØØØ      X6,     Ø
Ø14Ø  ØØ21              XOA             /EXTENDED OPERATIONS BUFFER TO AC
Ø141  156Ø              BCL I           /MASK
Ø142  7767              7767            /ALL BUT NO PAUSE BIT
Ø143  Ø45Ø              AZE             /SKIP IF NO PAUSE MODE
Ø144  ØØØØ              HLT             /ERROR-NO PAUSE NOT SET
Ø145  Ø416              STD             /SKIP ON TAPE DONE
Ø146  6145              JMP .-1         /NOT DONE WAIT
Ø147  ØØØ3              TAC             /TAC TO AC
Ø15Ø  144Ø              SAE             /IS IT EQUAL TO OUR CALCULATED CHECKSUM
Ø151  1Ø44              CKSUM
Ø152  7317              JMP E6          /NO-ERROR
Ø153  1ØØØ              LDA             /UPDATE TBLK
Ø154  Ø137              X6
Ø155  3367              ADD C1          /BY A COUNT OF 1
Ø156  4137              STC X6
Ø157  Ø221              XSK I 1         /WRITTEN 4 BLOCKS
Ø16Ø  6136              JMP X6-1        /NO-DO IT AGAIN
Ø161  Ø462              SNS I 2         /SNS SW 2 SET
Ø162  6131              JMP T6          /YES-LOOP WRI


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0163  0011  T7,    CLR
0164  3374         ADD C4374      /SET UP SECOND WORD OF RDE INST
0165  4171         STC X7
0166  0061         SET I 1        /WANT TO READ 4 BLKS
0167  7773         -4
0170  0732         RDE I U        /READ
0171  0000  X7,    0
0172  1020         LDA I          /BIT 5 IN AC ON
0173  0100         100
0174  0500         IOB            /TEST EXECUTION OF 8 MODE IOT
0175  6151         6151           /SKIP ON TAPE DONE FLIP FLOP SET
0176  6174         JMP .-2
0177  0003         TAC            /TAC TO AC
0200  1460         SAE I          /IS THE TRANSFER CHECK
0201  7777         7777           /EQUAL TO 7777
0202  7326         JMP E7         /NO-ERROR
0203  1000         LDA            /UPDATE MBLK AND TBLK
0204  0171         X7
0205  3372         ADD C1001      /BY A COUNT OF 1
0206  4171         STC X7
0207  0221         XSK I 1        /READ 4 BLOCKS
0210  6170         JMP X7-1       /NO-DO IT AGAIN
0211  7141         JMP CMPR       /COMPARE TAPE DATA WITH DATA IMAGE AREA
0212  0463         SNS I 3        /SNS SW 3 SET
0213  6163         JMP T7         /YES-LOOP READ TEST
0214  0461         SNS I 1        /SNS SW 1 SET
0215  6124         JMP RW3        /YES-LOOP WRITE-READ TEST



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            /RW4 TESTS WRC AND RDC INSTRUCTIONS IN PAUSE MODE
            /WITH THE I BIT (7) SET LEAVING TAPE MOVING IN THE DIRECTION
            /IT WAS MOVING AT COMPLETION OF TAPE INSTRUCTION
            /USES BLOCKS 374-377


Ø216  ØØ11  RW4,    CLR              /CLEAR THE
Ø217  ØØØ1          AXO              /EXTENDED OPERATIONS BUFFER
Ø22Ø  6752          JMP DATSET       /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
Ø221  ØØ11  T1Ø,    CLR
Ø222  3373          ADD C3374        /SET UP WRC FROM DATA IMAGE AREA TO TAPE
Ø223  4227          STC X1Ø
Ø224  ØØ61          SET I 1          /WANT TO WRITE 4 BLKS
Ø225  7773          -4
Ø226  Ø734          WRC I U          /WRITE
Ø227  ØØØØ  X1Ø,    Ø
Ø23Ø  1ØØØ          LDA              /UPDATE TBLK BY
Ø231  Ø227          X1Ø
Ø232  3367          ADD C1           /A COUNT OF 1
Ø233  4227          STC X1Ø
Ø234  Ø221          XSK I 1          /WRITTEN 4 BLOCKS
Ø235  6226          JMP X1Ø-1        /NO-DO IT AGAIN
Ø236  Ø462          SNS I 2          /SNS SW 2 SET
Ø237  6221          JMP T1Ø          /YES-LOOP WRC TEST
Ø24Ø  ØØ11  T11,    CLR
Ø241  3374          ADD C4374        /SET UP SECOND WORD OF RDE INST
Ø242  4246          STC X11
Ø243  ØØ61          SET I 1          /WANT TO READ 4 BLKS
Ø244  7773          -4
Ø245  Ø73Ø          RDC I U          /READ
Ø246  ØØØØ  X11,    Ø
Ø247  1ØØØ          LDA              /UPDATE MBLK AND TBLK BY
Ø25Ø  Ø246          X11
Ø251  3372          ADD C1ØØ1        /A COUNT OF 1
Ø252  4246          STC X11
Ø253  Ø221          XSK I 1          /READ 4 BLOCKS
Ø254  6245          JMP X11-1        /NO-DO IT AGAIN
Ø255  7141          JMP CMPR         /COMPARE TDATA AREA WITH DATA IMAGE AREA
Ø256  Ø463          SNS I 3          /SNS SW 3 SET
Ø257  624Ø          JMP T11          /YES-LOOP RDC TEST
Ø26Ø  Ø461          SNS I 1          /SNS SW 1 SET
Ø261  6216          JMP RW4          /YES-LOOP READ-WRITE TEST



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                        /RW5 TESTS WRC AND RDC INSTRUCTIONS   PAUSE MODE
                        /WITH THE I BIT (7) RESET ALLOWING TAPE TO ENTER TURNAROUND
                        /AT COMPLETION OF THE INSTRUCTION
                        /USES BLOCKS 374-377


        Ø262    6752    RW5,    JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
        Ø263    ØØ11    T12,    CLR
        Ø264    3373            ADD C3374       /SET UP SECOND WORD OF WRC INST
        Ø265    4271            STC X12
        Ø266    ØØ61            SET I 1         /WANT TO WRITE 4 BLKS
        Ø267    7773            -4
        Ø27Ø    Ø714            WRC U           /WRITE
        Ø271    ØØØØ    X12,    Ø
        Ø272    713Ø            JMP DELAY       /DELAY TO ALLOW TAPES TO ENTER TURNAROUND
        Ø273    1ØØØ            LDA             /UPDATE TBLK BY
        Ø274    Ø271            X12
        Ø275    3367            ADD C1          /A COUNT OF 1
        Ø276    4271            STC X12
        Ø277    Ø221            XSK I 1         /WRITTEN 4 BLOCKS
        Ø3ØØ    627Ø            JMP X12-1       /NO-DO IT AGAIN
        Ø3Ø1    Ø462            SNS I 2         /SNS SW 2 SET
        Ø3Ø2    6263            JMP T12         /YES-LOOP WRC TEST
        Ø3Ø3    ØØ11    T13,    CLR
        Ø3Ø4    3374            ADD C4374       /SET UP SECOND WORD OF RDC INST
        Ø3Ø5    4311            STC X13
        Ø3Ø6    ØØ61            SET I 1         /WANT TO READ 4 BLOCKS
        Ø3Ø7    7773            -4
        Ø31Ø    Ø71Ø            RDC U           /READ
        Ø311    ØØØØ    X13,    Ø
        Ø312    713Ø            JMP DELAY       /DELAY TO ALLOW TAPES TO ENTER TURNAROUND
        Ø313    1ØØØ            LDA             /UPDATE MBLK AND TBLK BY
        Ø314    Ø311            X13
        Ø315    3372            ADD C1ØØ1       /A COUNT OF 1
        Ø316    4311            STC X13
        Ø317    Ø221            XSK I 1         /READ 4 BLOCKS
        Ø32Ø    631Ø            JMP X13-1       /NO-DO IT AGAIN
        Ø321    7141            JMP CMPR        /COMPARE TAPE DATA WITH DATA IMAGE AREA
        Ø322    Ø463            SNS I 3         /SNS SW 3 SET
        Ø323    63Ø3            JMP T13         /YES-LOOP RDC TEST
        Ø324    Ø461            SNS I 1         /SNS SW 1 SET
        Ø325    6262            JMP RW5         /YES-LOOP READ-WRITE TEST



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                  /RW6 TESTS WRC AND RDC INSTRUCTIONS IN NO PAUSE MODE
                  /WITH THE I BIT (7) SET LEAVING TAPE MOVING IN THE DIRECTION
                  /IT WAS GOING AT COMPLETION OF THE INSTRUCTION
                  /USES BLOCKS 374-377



Ø326  1Ø2Ø  RW6,        LDA I           /SET BIT 8 IN THE AC
Ø327  ØØ1Ø              1Ø
Ø33Ø  ØØØ1              AXO             /AC TO EXTENDED OPERATIONS BUFFER SETTING NO PAUSE MODE
Ø331  6752              JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
Ø332  ØØ11  T14,        CLR
Ø333  3373              ADD C3374       /SET UP SECOND WORD OF WRC INST
Ø334  434Ø              STC X14
Ø335  ØØ61              SET I 1         /WANT TO WRITE 4 BLKS
Ø336  7773              -4
Ø337  Ø734              WRC I U         /WRITE
Ø34Ø  ØØØØ  X14,        Ø
Ø341  Ø416              STD             /SKIP IF TAPE DONE
Ø342  6341              JMP .-1         /WAIT
Ø343  1ØØØ              LDA             /UPDATE TBLK BY
Ø344  Ø34Ø              X14
Ø345  3367              ADD C1          /A COUNT OF 1
Ø346  434Ø              STC X14
Ø347  Ø221              XSK I 1         /WRITTEN 4 BLOCKS
Ø35Ø  6337              JMP X14-1       /NO-DO IT AGAIN
Ø351  Ø462              SNS I 2         /SNS SW 2 SET
Ø352  6332              JMP T14         /YES-LOOP WRC TEST
Ø353  ØØ11  T15,        CLR
Ø354  3374              ADD C4374       /SET UP SECOND WORD OF RDC INST
Ø355  4361              STC X15
Ø356  ØØ61              SET I 1         /WANT TO READ 4 BLOCKS
Ø357  7773              -4
Ø36Ø  Ø73Ø              RDC I U         /READ
Ø361  ØØØØ  X15,        Ø
Ø362  Ø416              STD             /SKIP ON TAPE DONE
Ø363  6362              JMP .-1         /WAIT
Ø364  1ØØØ              LDA             /UPDATE MBLK AND TBLK BY
Ø365  Ø361              X15
Ø366  3372              ADD C1ØØ1       /A COUNT OF 1
Ø367  4361              STC X15
Ø37Ø  Ø221              XSK I 1         /READ 4 BLOCKS
Ø371  636Ø              JMP X15-1       /NO-DO IT AGAIN
Ø372  7141              JMP CMPR        /COMPARE TAPE DATA WITH DATA IMAGE AREA
Ø373  Ø463              SNS I 3         /SNS SW 3 SET
Ø374  6353              JMP T15         /YES-LOOP RDC INST
Ø375  Ø461              SNS I 1         /SNS SW 1 SET
Ø376  6326              JMP RW6         /YES-LOOP READ-WRITE TEST



                  /7

                        EJECT
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                         /RW7 TESTS WCG AND RCG INSTRUCTIONS - NO PAUSE MODE
                         /WITH THE I BIT (7) SET LEAVING TAPE MOVING IN THE DIRECTION
                         /IT WAS GOING AT COMPLETION OF THE INSTRUCTION
                         /USES BLOCKS 374-377



0377  1020      RW7,      LDA I            /SET BIT 8 IN THE
0400  0010                10               /AC
0401  0001                AXO              /AC TO EXTENDED OPERATIONS BUFFER SETTING NO PAUSE MODE
0402  6752                JMP DATSET       /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0403  7107                JMP DUPDAT       /SET TAPE DATA AREA EQUAL TO DATA IMAGE AREA
0404  0061                SET I 1          /WANT TO EXECUTE TEST 4 TIMES
0405  7773                -4
0406  0735      T16,      WCG I U          /WRITE
0407  3374                3374
0410  0416                STD              /SKIP ON TAPE DONE
0411  6410                JMP .-1
0412  7075                JMP CLTDAT       /CLEAR OUT TAPE DATA AREA
0413  0731                RCG I U          /READ
0414  3374                3374
0415  0416                STD              /SKIP ON TAPE DONE
0416  6415                JMP .-1
0417  7141                JMP CMPR         /COMPARE DATA IMAGE AREA WITH TAPE DATA
0420  7063                JMP CLEAR        /CLEAR DATA IMAGE AREA
0421  7107                JMP DUPDAT       /DUPLICATE DATA IMAGE AREA INTO TAPE DATA AREA FOR WCG
0422  6424                JMP .+2          /SKIP THE NEXT INSTRUCTION
0423  6377                JMP RW7          /ERROR RETURN FROM COMPARE ROUTINE IF KEY CONTINUE IS HIT
0424  0735                WCG I U          /WRITE
0425  3374                3374
0426  0416                STD              /SKIP ON TAPE DONE
0427  6426                JMP .-1
0430  6752                JMP DATSET       /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0431  7107                JMP DUPDAT       /DUPLICATE DATA IMAGE AREA INTO TAPE DATA AREA
0432  0715                WCG U            /WRITE
0433  3374                3374
0434  0416                STD              /SKIP ON TAPE DONE
0435  6434                JMP .-1
0436  7075                JMP CLTDAT       /CLEAR OUT TAPE DATA AREA
0437  0711                RCG U            /READ
0440  3374                3374
0441  0416                STD              /SKIP ON TAPE DONE
0442  6441                JMP .-1
0443  7141                JMP CMPR         /COMPARE DATA IMAGE AREA WITH TAPE DATA
0444  7063                JMP CLEAR        /CLEAR OUT DATA IMAGE AREA
0445  7107                JMP DUPDAT       /DUPLICATE DATA IMAGE AREA INTO TAPE DATA AREA FOR WCG 4 BLKS LONG
0446  6450                JMP .+2          /SKIP NEXT INSTRUCTION
0447  6377                JMP RW7          /ERROR RET FROM COMPARE ROUTINE IF KEY CONTINUE HIT
0450  0715                WCG U            /WRITE
0451  3374                3374
0452  0416                STD              /SKIP ON TAPE DONE
0453  6452                JMP .-1
0454  0221                XSK I 1          /EXECUTED TEST 4 TIMES
0455  6406                JMP T16          /NO-DO IT AGAIN
0456  0461                SNS I 1          /IS SNS SW 1 SET
0457  6377                JMP RW7          /YES-LOOP READ WRITE TESTS AGAIN




                /8
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            /TEST BLOCK NUMBERS
            /CHECKS ALL FORWARD AND REVERSE BLOCK NUMBERS AND THE SEQUENCE THEY OCCUR IN
            /USES BLOCKS Ø-777


Ø46Ø  ØØ11  RW1Ø,   CLR             /CLEAR
Ø461  ØØØ1          AXO             /EXTENDED OPERATIONS BUFFER
Ø462  72Ø2          JMP REVBK       /CK REV BK NUMBERS TO Ø
Ø463  7233  T17,    JMP FWDBK       /CK FWD BK NUMBERS FROM APPROXIMATELY Ø TO 777
Ø464  72Ø2          JMP REVBK       /CK REV BK NUMBERS FROM APPROXIMATELY 777 TO Ø
Ø465  Ø461          SNS I 1         /SNS SW 1 SET
Ø466  6463          JMP T17         /YES-LOOP BLOCK NUMBER TEST


            /READ-WRITE AMPLIFIER RECOVERY TEST
            /WRITES A BLOCK THAN MOVES TOWARD THE NEXT BLOCK (MTB) ETC
            /USES BLOCKS Ø-777


Ø467  6752  RW11,   JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
Ø47Ø  7Ø33          JMP GCKSUM      /GENERATE CHECKSUM FOR DATA IMAGE AREA
Ø471  1Ø2Ø  T2Ø,    LDA I           /FORMAT FOR SECOND WORD OF WRI INST
Ø472  3ØØØ          3ØØØ
Ø473  4477          STC X2Ø         /STORE IT
Ø474  ØØ61          SET I 1         /WANT TO WRI AND MOVE TOWARD BLOCK 4ØØ TIMES
Ø475  7377          -4ØØ
Ø476  Ø736          WRI I U         /WRITE
Ø477  ØØØØ  X2Ø,    Ø
Ø5ØØ  ØØØ3          TAC             /TAC TO AC
Ø5Ø1  144Ø          SAE             /IS IT EQUAL TO
Ø5Ø2  1Ø44          CKSUM           /OUR CALCULATED CHECKSUM
Ø5Ø3  7332          JMP E2Ø         /NØ-ERROR
Ø5Ø4  1ØØØ          LDA             /UPDATE X2Ø AND SET UP X2ØA
Ø5Ø5  Ø477          X2Ø
Ø5Ø6  3367          ADD C1          /UPDATE TBLK FOR MTB INST BY A COUNT OF 1
Ø5Ø7  1Ø4Ø          STA             /STORE IT
Ø51Ø  Ø514          X2ØA
Ø511  3367          ADD C1          /UPDATE TBLK FOR WRI INST BY COUNT OF 2
Ø512  4477          STC X2Ø
Ø513  Ø733          MTB I U         /MOVE TOWARD BLOCK
Ø514  ØØØØ  X2ØA,   Ø
Ø515  Ø45Ø          AZE             /IS THE DIFFERENCE VALUE ZERO
Ø516  7341          JMP E2ØA        /NO-ERROR
Ø517  Ø221          XSK I 1         /WRITTEN AND MTB 4ØØ TIMES
Ø52Ø  6476          JMP X2Ø-1       /NO-DO IT AGAIN
Ø521  72Ø2          JMP REVBK       /CK REV BK NUMBERS FROM APPROXIMATELY 777 TO Ø
Ø522  Ø462          SNS I 2         /SNS SW 2 SET
Ø523  6471          JMP T2Ø         /YES-LOOP WRITE MTB REV TEST



            /9

                    EJECT
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Ø524  1Ø2Ø  T21,    LDA I           /FORMAT FOR SECOND WORD OF RDE INST
Ø525  4ØØØ          4ØØØ
Ø526  4534          STC X21         /STORE IT
Ø527  ØØ61          SET I 1         /EXECUTE RDE AND MTB 4ØØ TIMES
Ø53Ø  7377          -4ØØ
Ø531  ØØ62          SET I 2         /AFTER 4 RDE INST CK DATA
Ø532  7773          -4
Ø533  Ø732          RDE I U         /READ
Ø534  ØØØØ  X21,    Ø
Ø535  1ØØØ          LDA
Ø536  Ø534          X21
Ø537  3367          ADD C1          /UPDATE TBLK OF 2 WORD OF MTB INST BY A COUNT OF 1
Ø54Ø  1Ø4Ø          STA
Ø541  Ø546          X21A
Ø542  11ØØ          ADA             /ALSO TBLK AND MBLK OF SECOND WORD OF RDC INST
Ø543  1372          C1ØØ1           /BY A COUNT OF 2AND 1 RESPECTIVELY
Ø544  4534          STC X21
Ø545  Ø733          MTB I U         /MOVE TOWARD BLOCK
Ø546  ØØØØ  X21A,   Ø
Ø547  Ø45Ø          AZE             /ARE WE THERE
Ø55Ø  7345          JMP E21A        /NO-ERROR
Ø551  Ø222          XSK I 2         /DONE 4 TIMES
Ø552  657Ø          JMP DONE        /NO-UPDATE EXECUTION CNTR
Ø553  7141          JMP CMPR        /YES-COMPARE DATA IMAGE AREA WITH TAPE DATA
Ø554  ØØ62          SET I 2         /SET UP NEXT COMPARE AFTER READING 4 MORE BLOCKS
Ø555  7773          -4
Ø556  656Ø          JMP .+2         /SKIP THE NEXT INSTRUCTION
Ø557  6467          JMP RW11        /ERROR RETURN FROM COMPARE ROUTINE IF KEY CONTINUE HIT
Ø56Ø  1ØØØ          LDA             /SET UP TBLK AND MBLK FOR NEXT 4 PASSES
Ø561  Ø534          X21
Ø562  337Ø          ADD C1M         /BY SUBTRACTING 1 FROM TBLK
Ø563  156Ø          BCL I           /AND CLEARING BITS Ø-2 OF AC <MBLK>
Ø564  7ØØØ          7ØØØ
Ø565  162Ø          BSE I           /SET MBLK EQUAL TO 4
Ø566  4ØØØ          4ØØØ
Ø567  4534          STC X21         /NOW DATA WILL BE READ FROM TAPE INTO START OF TAPE DATA AREA
Ø57Ø  Ø221  DONE,   XSK I 1         /ARE WE AT BLK 777 YET <FINISHED>
Ø571  6533          JMP X21-1       /NO-DO IT AGAIN
Ø572  Ø463          SNS I 3         /IS SNS SW 3 SET
Ø573  6524          JMP T21         /YES-LOOP READ AND MTB INSTRUCTIONS
Ø574  Ø461          SNS I 1         /IS SNS SW 1 SET
Ø575  6467          JMP RW11        /YES-LOOP WRITE READ TESTS



            /1Ø

                    EJECT
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                /A WORST CASE READ-WRITE TEST
                /USES BLOCKS 366-4Ø1, Ø-14, AND 75Ø-764


Ø576    6752    RW12,   JMP DATSET      /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
Ø577    ØØ61            SET I 1         /EXECUTE 14 TIMES
Ø6ØØ    7762            -15
Ø6Ø1    1Ø2Ø            LDA I           /SET UP WRC AND RDC INSTRUCTIONS (START AT BLK 366)
Ø6Ø2    3365            3365
Ø6Ø3    Ø221            XSK I 1         /EXECUTED RWSUB 14 TIMES
Ø6Ø4    6631            JMP RWSUB       /NO-EXECUTE READ WRITE SUBROUTINE AGAIN
Ø6Ø5    ØØ61            SET I 1         /EXECUTE 14 TIMES
Ø6Ø6    7762            -15
Ø6Ø7    1Ø2Ø            LDA I           /SET UP WRC AND RDC INSTRUCTIONS (START AT BLK 1)
Ø61Ø    3ØØØ            3ØØØ
Ø611    Ø221            XSK I 1         /EXECUTED RWSUB 14 TIMES
Ø612    6631            JMP RWSUB       /NO-EXECUTE READ WRITE SUBROUTINE AGAIN
Ø613    ØØ61            SET I 1         /EXECUTE 14 TIMES
Ø614    7762            -15
Ø615    1Ø2Ø            LDA I           /SET UP WRC AND RDC INSTRUCTIONS (START AT BLK 75Ø)
Ø616    3747            3747
Ø617    Ø221            XSK I 1         /EXECUTED RWSUB 14 TIMES
Ø62Ø    6631            JMP RWSUB       /NO EXECUTE READ WRITE SUBROUTINE AGAIN
Ø621    72Ø2            JMP REVBK       /CK REV BLK NUMBERS
Ø622    7233            JMP FWDBK       /CK FWD BLK NUMBERS
Ø623    Ø461            SNS I 1         /SNS SW 1 SET
Ø624    6576            JMP RW12        /YES-LOOP READ WRITE TEST
Ø625    1Ø2Ø            LDA I
Ø626    Ø2Ø7            2Ø7             /SET UP AC TO RING BELL IN TYPE ROUTINE
Ø627    7Ø56            JMP TYPE
Ø63Ø    6Ø2Ø            JMP START       /GO BACK TO BEGINNING OF PROGRAM AND START OVER



                /11

                        EJECT
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Ø631  3367  RWSUB,  ADD C1      /ADD 1 TO TBLK
Ø632  1Ø4Ø          STA         /STORE IN SECOND WORD OF FIRST WRC
Ø633  Ø657          X22
Ø634  3367          ADD C1      /ADD 1 TO TBLK
Ø635  1Ø4Ø          STA         /STORE IN SECOND WORD OF SECOND WRC
Ø636  Ø664          X22B
Ø637  1ØØØ          LDA         /LOAD SECOND WORD OF FIRST WRC INTO AC FOR
Ø64Ø  Ø657          X22         /MODIFICATION OF MBLK PORTION TO SET UP RDC INSTRUCTIONS
Ø641  156Ø          BCL I       /CLEAR OUT AC BITS Ø-2 LEAVING REST ALONE
Ø642  7ØØØ          7ØØØ
Ø643  162Ø          BSE I       /INSERT 4 IN BITS Ø-2 OF AC LEAVING REST ALONE
Ø644  4ØØØ          4ØØØ
Ø645  1Ø4Ø          STA         /STORE IN SECOND WORD OF FIRST RDC INSTRUCTION
Ø646  Ø661          X22A
Ø647  3367          ADD C1      /ADD 1 TO TBLK
Ø65Ø  467Ø          STC X22C    /STORE IN SECOND WORD OF SECOND RDC INSTRUCTION
Ø651  1ØØØ          LDA         /SET UP RET JUMP FROM READ WRITE SUBROUTINE
Ø652  ØØØØ          Ø
Ø653  112Ø          ADA I       /BY SUBTRACTING 2 FROM CONTENTS OF LOC Ø
Ø654  7775          7775
Ø655  4ØØ6          STC 6       /AND STORING IN LOCATION 6 FOR RETURN JUMP
Ø656  Ø734          WRC I U     /WRITE
Ø657  ØØØØ  X22,    Ø
Ø66Ø  Ø71Ø          RDC U       /READ
Ø661  ØØØØ  X22A,   Ø
Ø662  7136          JMP CMPR1   /COMPARE TAPE DATA WITH DATA IMAGE AREA 1 BLK AT A TIME
Ø663  Ø714          WRC U       /WRITE
Ø664  ØØØØ  X22B,   Ø
Ø665  6667          JMP .+2     /SKIP THE NEXT INSTRUCTION
Ø666  6576          JMP RW12    /ERROR RETURN FROM CMPR1 ROUTINE IF KEY CONTINUE HIT
Ø667  Ø73Ø          RDC I U     /READ
Ø67Ø  ØØØØ  X22C,   Ø
Ø671  7136          JMP CMPR1   /COMPARE TAPE DATA WITH DATA IMAGE 1 BLK AT A TIME
Ø672  1ØØØ          LDA         /SET UP INCREMENTING OF TBLK AT BEGINING OF
Ø673  Ø657          X22         /NEXT PASS THROUGH RWSUB IF NOT DONE
Ø674  6ØØ6          JMP 6       /RETURN TO MAIN PROGRAM
Ø675  6576          JMP RW12    /ERROR RETURN FROM CMPR1 IF KEY CONTINUE HIT



            /12

                    EJECT
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                  /PROVIDES LONG SCOPE LOOPS USING WRI AND RDE INST
                  /WRITES AND READS BLOCKS Ø-777


Ø676   ØØ11   LSCOPE, CLR                /CLEAR THE
Ø677   ØØØ1           AXO                /EXTENDED OPERATIONS BUFFER
Ø7ØØ   6752           JMP DATSET         /SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
Ø7Ø1   7Ø33           JMP GCKSUM         /GENERATE CHECKSUM FOR DATA IMAGE AREA
Ø7Ø2   ØØ61   T23,    SET I 1            /WANT TO WRITE 777 BLOCKS
Ø7Ø3   7ØØØ           -777
Ø7Ø4   1Ø2Ø           LDA I              /SET UP SECOND WORD OF WRI INST
Ø7Ø5   3ØØØ           3ØØØ
Ø7Ø6   471Ø           STC X23
Ø7Ø7   Ø736           WRI I U            /WRITE
Ø71Ø   ØØØØ   X23,    Ø
Ø711   ØØØ3           TAC                /TAC TO AC
Ø712   144Ø           SAE                /IS IT EQUAL TO
Ø713   1Ø44           CKSUM              /OUR CALCULATED CHECKSUM
Ø714   7354           JMP E23            /NO-ERROR
Ø715   1ØØØ           LDA                /UPDATE TBLK
Ø716   Ø71Ø           X23
Ø717   3367           ADD C1             /BY A COUNT OF 1
Ø72Ø   471Ø           STC X23
Ø721   Ø221           XSK I 1            /WRITTEN 777 BLOCKS
Ø722   67Ø7           JMP X23-1          /NO-DO IT AGAIN
Ø723   Ø462           SNS I 2            /SNS SW 2 SET
Ø724   67Ø2           JMP T23            /YES-LOOP ON WRI
Ø725   ØØ61   T24,    SET I 1            /WANT TO READ 777 BLKS
Ø726   7ØØØ           -777
Ø727   1Ø2Ø           LDA I              /SET UP SECOND WORD OF RDE INST
Ø73Ø   4ØØØ           4ØØØ
Ø731   4733           STC X24
Ø732   Ø732           RDE I U            /READ
Ø733   ØØØØ   X24,    Ø
Ø734   146Ø           SAE I              /IS THE TRANSFER CHECK
Ø735   7777           7777               /EQUAL TO 7777
Ø736   7363           JMP E24            /NO-ERROR
Ø737   1ØØØ           LDA                /UPDATE TBLK
Ø74Ø   Ø733           X24
Ø741   3367           ADD C1             /BY A COUNT OF 1
Ø742   4733           STC X24
Ø743   Ø221           XSK I 1            /READ 777 TIMES
Ø744   6732           JMP X24-1          /NO-DO IT AGAIN
Ø745   Ø463           SNS I 3            /SNS SW 3 SET
Ø746   6725           JMP T24            /YES-LOOP ON RDE INST
Ø747   Ø461           SNS I 1            /SNS SW 1 SET
Ø75Ø   6676           JMP LSCOPE         /YES-LOOP LONG SCOPE LOOP TEST
Ø751   6Ø2Ø           JMP START          /GO BACK TO BEGINNING OF PROGRAM



                  /13

                          EJECT

                  /SENSE SWITCH 4 SELECTS EITHER A FIXED OR RANDOM DATA PATTERN


0752  0047        DATSET, SET 7           /SET UP RET JUMP FROM LOC 7 TO MAIN PROG
0753  0000                0
0754  0464                SNS I 4         /SNS SW 4 SET
0755  6760                JMP FXDAT       /YES-FIXED DATA PATTERN
0756  0444                SNS 4           /SNS SW 4 NOT SET
0757  6776                JMP RDAT        /RANDOM DATA PATTERN

                  /FIXED NUMBER GENERATOR
                  /STORES CONTENTS OF LEFT AND RIGHT SWITCHES ALTERNATLY
                  /INTO DATA IMAGE AREA (LOCATIONS 1400-1777 INST FIELD 2)


0760  0071        FXDAT,  SET I 11        /STARTING LOC OF DATA TABLE-1
0761  1377                DATA-1
0762  0073                SET I 13        /EXECUTE 400 TIMES (1 BLK)
0763  7377                -400
0764  0516        FXLOAD, RSW             /RIGHT SW TO AC
0765  1071                STA I 11        /INC AND STORE IN DATA TABLE
0766  0233                XSK I 13        /DONE 400 TIMES
0767  6771                JMP .+2         /NO-CONTINUE
0770  6007                JMP 7           /YES-RET TO MAIN PROG
0771  0517                LSW             /LEFT SW TO AC
0772  1071                STA I 11        /INC AND STORE IN DATA TABLE
0773  0233                XSK I 13        /DONE 400 TIMES
0774  6764                JMP FXLOAD      /NO-DO IT AGAIN
0775  6007                JMP 7           /YES-RET TO MAIN PROG



                  /14

                          EJECT
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                  /RANDOM NUMBER GENERATOR
                  /STORES RANDOM NUMBERS IN DATA IMAGE AREA (LOCATIONS 14ØØ-1777 INST FIELD 2)


Ø776  ØØ71  RDAT,   SET I 11        /STARTING LOC OF DATA TABLE-1
Ø777  1377          DATA-1
1ØØØ  ØØ73          SET I 13        /EXECUTE 4ØØ TIMES (1 BLK)
1ØØ1  7377          -4ØØ
1ØØ2  Ø516          RSW             /RIGHT SW TO AC
1ØØ3  Ø45Ø          AZE             /SKIP IF AC EQUALS ZERO
1ØØ4  7ØØ7          JMP .+3
1ØØ5  1Ø2Ø          LDA I           /AC IS ZERO ADD 11 TO IT
1ØØ6  ØØ11          11
1ØØ7  5Ø24          STC RNA         /STORE AC IN RANDOM NUMBER A
1Ø1Ø  Ø517          LSW             /LEFT SW TO AC
1Ø11  5Ø25          STC RNB         /STORE AC IN RANDOM NUMBER B
1Ø12  7Ø26  RLOAD,  JMP RADD        /ADD ROUTINE
1Ø13  5Ø24          STC RNA         /STORE IN RNA
1Ø14  Ø241          ROL 1           /ROT LINK INTO AC BIT 11
1Ø15  7Ø26          JMP RADD        /ADD ROUTINE
1Ø16  1Ø71          STA I 11        /INC AND STORE AC IN DATA TABLE
1Ø17  5Ø24          STC RNA         /STORE IN RNA
1Ø2Ø  Ø241          ROL 1           /ROT LINK INTO AC BIT 11
1Ø21  Ø233          XSK I 13        /DONE 4ØØ TIMES (DATA TABLE FULL)
1Ø22  7Ø12          JMP RLOAD       /NO-DO IT AGAIN
1Ø23  6ØØ7          JMP 7           /RET TO MAIN PROG
1Ø24  ØØØØ  RNA,    Ø               /RANDOM NUMBER A
1Ø25  ØØØØ  RNB,    Ø               /RANDOM NUMBER B

1Ø26  12ØØ  RADD,   LAM             /ADD RNA TO AC
1Ø27  1Ø24          RNA
1Ø3Ø  12ØØ          LAM             /ADD RNB TO AC
1Ø31  1Ø25          RNB
1Ø32  6ØØØ          JMP Ø           /RET TO RLOAD ROUTINE



                  /15

                    EJECT
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                        /GENERATES A CHECKSUM OF DATA IMAGE AREA (1 BK LONG)
                        /WHICH IS COMPARED WITH THE CONTENTS OF THE TAC ON A WRI INST
                        /THE CHECKSUM IS THE TWOS COMPLIMENT OF <DATA SUM PLUS 7777>


        1033  0073      GCKSUM, SET I 13        /EXECUTE 400 TIMES (1 BLOCK)
        1034  7377              -400
        1035  0071              SET I 11        /STARTING ADDRESS OF DATA TABLE-1
        1036  1377              DATA-1
        1037  0011              CLR             /AC INITIALLY CLEARED
        1040  5044              STC CKSUM       /ZERO LOC CKSUM
        1041  1031              LDA I 11        /INC AND LOAD AC FROM DATA TABLE
        1042  0006              DJR             /DISABLE JUMP RETURN SAVE
        1043  1220              LAM I           /2S COMPLIMENT ADD AC TO LOC CKSUM
        1044  0000      CKSUM,  0
        1045  0011              CLR             /CLEAR AC
        1046  1031              LDA I 11        /INC AND LOAD AC FROM DATA TABLE
        1047  0233              XSK I 13        /DONE 400 TIMES
        1050  7042              JMP CKSUM-2     /NO-DO IT AGAIN
        1051  0011              CLR             /CLEAR AC AND LINK
        1052  0017              COM             /COMPLIMENT THE AC
        1053  1200              LAM             /2S COMPLIMENT ADD AC
        1054  1044              CKSUM           /TO LOC CKSUM
        1055  6000              JMP 0           /RET TO MAIN PROG


                        /ROUTINE TO RING THE TTY BELL AT END OF TEST

        1056  0006      TYPE,   DJR             /DISABLE JUMP RETURN
        1057  0500              IOB             /EXECUTE 8 MODE INSTRUCTION
        1060  6046              6046            /AC TO TTY AND PUNCH BUFFER AND CLEAR FLAG
        1061  0011              CLR
        1062  6000              JMP 0           /RETURN TO MAIN PROGRAM



                        /16

                                EJECT
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                    /CLEARS OUT DATA IMAGE AREA (LOCATIONS 1400-1777 INST FIELD 2)
                    /BY STORING ZEROS


        1063  0071  CLEAR,  SET I 11         /STARTING ADDRESS OF DATA TABLE -1
        1064  1377          DATA-1
        1065  0073          SET I 13         /EXECUTE 400 TIMES (400 LOC IN DATA TABLE)
        1066  7377          -400
        1067  0011          CLR              /CLEAR AC
        1070  0006  CL,     DJR              /DISABLE JUMP RETURN
        1071  1071          STA I 11         /INC AND STORE AC IN DATA TABLE
        1072  0233          XSK I 13         /DONE 400 TIMES
        1073  7070          JMP CL           /NO-DO IT AGAIN
        1074  6000          JMP 0            /RET TO MAIN PROG

                    /CLEARS OUT TDATA AREA (LOCATIONS 2000-3777 DATA FIELD 3)
                    /BY STORING ZEROS


        1075  0072  CLTDAT, SET I 12         /STARTING ADDRESS OF TAPE DATA TABLE
        1076  3777          TDATA-1!2000
        1077  0073          SET I 13         /EXECUTE 2000 TIMES (2000 LOC IN TAPE DATA TABLE)
        1100  6000          -1777
        1101  0011          CLR              /CLEAR AC
        1102  0006          DJR              /DISABLE JUMP RETURN
        1103  1072          STA I 12         /INC AND STORE ZERO AC INTO TAPE DATA TABLE
        1104  0233          XSK I 13         /DONE 2000 TIMES
        1105  7102          JMP .-3          /NO-DO IT AGAIN
        1106  6000          JMP 0            /RET TO MAIN PROG



                    /17

                            EJECT

                    /WRITES DATA IMAGE AREA (LOCATIONS [illegible]-1777 INST FIELD 2)
                    /INTO TDATA AREA (LOCATIONS 2ØØØ-3777 DATA FIELD 3)
                    /FOR EXECUTION OF WCG INSTRUCTION


  11Ø7   ØØ47   DUPDAT, SET 7              /SET UP RET JUMP FROM LOC 7 TO MAIN PROG
  111Ø   ØØØØ           Ø
  1111   ØØ7Ø           SET I 1Ø           /DUPLICATE 4 BLOCKS
  1112   7773           -4
  1113   ØØ72           SET I 12           /STARTING LOC OF TAPE DATA TABLE-1
  1114   3777           TDATA-1!2ØØØ
  1115   ØØ71           SET I 11           /STARTING LOC OF DATA TABLE-1
  1116   1377           DATA-1
  1117   ØØ73           SET I 13           /EXECUTE 4ØØ TIMES (1 BLK)
  112Ø   7377           -4ØØ
  1121   1Ø31   DUP,    LDA I 11           /INC AND LOAD AC FROM DATA TABLE
  1122   1Ø72           STA I 12           /INC AND STORE IN TAPE DATA TABLE
  1123   Ø233           XSK I 13           /DONE 4ØØ TIMES
  1124   7121           JMP DUP            /NO-DO IT AGAIN
  1125   Ø23Ø           XSK I 1Ø           /DONE 4 BLOCKS
  1126   7115           JMP DUP-4          /NO-DO IT AGAIN
  1127   6ØØ7           JMP 7              /RET TO MAIN PROG


                    /DELAY ROUTINE PROVIDES A 6 TO 7 MS DELAY
                    /ALLOWING TAPES TO ENTER THE TURNAROUND STATE


  113Ø   ØØ11   DELAY,  CLR                /CLEAR THE AC
  1131   4Ø15           STC 15
  1132   ØØØ6           DJR                /DISABLE JUMP RETERN
  1133   Ø235           XSK I 15           /LOC 15 EQUAL 1777
  1134   7132           JMP .-2            /NO-DO IT AGAIN
  1135   6ØØØ           JMP Ø              /RETURN TO THE MAIN PROG



                    /18

                            EJECT
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                  /COMPARES DATA IMAGE OF DATA WRITTEN ON TAPE (LOCATIONS 14ØØ-1777 INST FIELD 2)
                  /WITH DATA READ FROM TAPE AND STORED IN TDATA AREA (LOCATIONS 2ØØØ-3777 DATA FIELD 3)
                  /CMPR1 ROUTINE IS USED ONLY BY RW2 AND RW12 ROUTINES OF THE MAIN PROGRAM
                  /CMPR1 ALTERATION COMPARES 1 BLOCK OF TAPE DATA WITH DATA IMAGE AREA


1136  1Ø2Ø  CMPR1,  LDA I            /SET UP A 1 BLOCK COMPARE
1137  7776          -1
114Ø  5144          STC CMPR+3       /BY CHANGING CONSTANT IN CMPR+3
1141  ØØ47  CMPR,   SET 7            /SET UP RET JUMP FROM LOC 7 TO MAIN PROGRAM
1142  ØØØØ          Ø
1143  ØØ7Ø          SET I 1Ø         /EXECUTE 4 TIMES UNLESS MODIFIED FOR 1 EXECUTION
1144  7773          -4
1145  ØØ72          SET I 12         /STARTING ADDRESS OF TAPE DATA TABLE-1
1146  3777          TDATA-1!2ØØØ
1147  ØØ71          SET I 11         /STARTING ADDRESS OF DATA IMAGE AREA-1
115Ø  1377          DATA-1
1151  ØØ73          SET I 13         /4ØØ MEMORY LOCATIONS EQUAL ONE TAPE BLK
1152  7377          -4ØØ
1153  ØØ11  TST,    CLR
1154  1Ø31          LDA I 11         /INC LOC 11 AND LOAD AC WITH ENTRY FROM DATA IMAGE AREA
1155  1472          SAE I 12         /INC LOC 12 AND COMPARE AC WITH CORRESPONDING ENTRY IN TAPE DATA TABLE
1156  7167          JMP ECMPR        /ERROR-ENTRIES OF BOTH TABLES NOT EQUAL
1157  Ø233          XSK I 13         /INC LOC 13 HAVE WE DONE IT 4ØØ TIMES
116Ø  7153          JMP TST          /NO-DO IT AGAIN
1161  Ø23Ø          XSK I 1Ø         /HAVE WE CHECKED ALL BLOCKS READ IN
1162  7147          JMP TST-4        /NO-DO IT AGAIN
1163  1Ø2Ø          LDA I            /SET LOC CMPR+3 BACK TO ORIGIONAL CONTENTS
1164  7773          -4               /AS IT MAY HAVE BEEN ALTERED
1165  5144          STC CMPR+3
1166  6ØØ7          JMP 7            /RETURN TO MAIN PROGRAM


                  /COMPARE ERROR ROUTINE
                  /EXAMINE LOC 7 TO DETERMINE WHICH ROUTINE IN THE MAIN PROG HAD THE COMPARE ERROR
                  /EXAMINE LOC 13 TO DETERMINE WHICH WORD IS INCORRECT
                  /EXAMINE LOC 1Ø TO DETERMINE WHICH BLOCK ERROR IS IN


1167  Ø46Ø  ECMPR,  SNS I Ø          /SNS SW Ø SET
117Ø  6ØØØ          JMP Ø            /YES-IGNORE ERROR-RET TO NEXT INST IN NORMAL SEQUENCE
1171  Ø314          ROR 14           /ROTATE CORRECT DATA INTO MQ
1172  1Ø12          LDA 12           /LOAD THE AC WITH THE INCORRECT DATA READ BACK FROM TAPE
1173  ØØØØ          HLT              /HALT-UNTIL KEY CONTINUE IS HIT
1174  1Ø2Ø          LDA I            /SET LOC CMPR+3 BACK TO ORIGIONAL CONTENTS
1175  7773          -4               /AS IT MAY HAVE BEEN ALTERED
1176  5144          STC CMPR+3
1177  2ØØ7          ADD 7            /ALTER RETERN JUMP IN LOC 7 BY ADDING
12ØØ  3371          ADD C3           /PLUS 3 AND
12Ø1  6ØØ7          JMP 7            /RETURN TO MAIN PROGRAM AND RE-EXECUTE TEST WHICH FAILED



                  /19

                          EJECT
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            /TESTS REVERSE BLOCK NUMBERS SEQUENTIALLY
            /IF TAPE POSITIONED AT BLOCK 777 THIS TEST
            /CHECKS REVERSE BLOCK NUMBERS 777-Ø


1202  ØØ47  REVBK,  SET 7           /SET UP RET JUMP FROM LOC 7
1203  ØØØØ          Ø
1204  Ø733          MTB I U         /MOVE TOWARD BLK Ø (GET TAPE MOVING IN RIGHT DIRECTION)
1205  ØØØØ          Ø
1206  Ø733          MTB I U         /MOVE TOWARD BLOCK Ø
1207  ØØØØ          Ø
121Ø  112Ø          ADA I           /ADD 1 TO DIFFERENCE BETWEEN FIRST TAPE BLOCK NUMBER ENCOUNTERED
1211  ØØØ1          1               /AND TBLK (DIFFERENCE IS LEFT IN AC AFTER MTB INST)
1212  1Ø6Ø          STA I           /STORE IN LOCATION REVTST
1213  ØØØØ  REVTST, Ø
1214  Ø733          MTB I U         /MOVE TOWARD BLK Ø
1215  ØØØØ          Ø
1216  144Ø          SAE             /IS THE DIFFERENCE EQUAL TO THE CONTENTS OF LOC REVTST
1217  1213          REVTST
122Ø  7224          JMP EREV        /NO-ERROR
1221  Ø45Ø          AZE             /ARE WE AT BLOCK Ø YET (DIFFERENCE EQUAL TO ZERO)
1222  721Ø          JMP REVTST-3    /NO-DO IT AGAIN
1223  6ØØ7          JMP 7           /RET TO MAIM PROGRAM



            /REVERSE BLOCK NUMBER ERROR
            /THE BLOCK NUMBERS DID NOT OCCURE IN SEQUENCE
            /DIFFERENCE=NUMBER OF BLOCKS BETWEEN PRESENT TAPE POSITION
            /AND THE BLOCK NUMBER YOU ARE MOVING TOWARD
            /MQ = INCORRECT DIFFERENCE
            /AC = CORRECT DIFFERENCE


1224  Ø46Ø  EREV,   SNS I Ø         /SNS SW Ø SET
1225  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO MAIN PROG IN NORMAL SEQUENCE
1226  Ø314          ROR 14          /PUT INCORRECT DIFFERENCE IN MQ REGISTER
1227  1ØØØ          LDA             /PUT CORRECT DIFFERENCE IN AC
123Ø  1213          REVTST
1231  ØØØØ          HLT             /HALT-UNTIL KEY CONT IS HIT
1232  6ØØ7          JMP 7           /RET TO MAIN PROGRAM AT START OF TEST WHICH FAILED


            /2Ø

                    EJECT
            /TESTS FOWARD BLOCK NUMBERS SEQUENTIALLY
            /IF TAPE POSITIONED AT BLOCK Ø THIS TEST
            /CHECKS FOWARD BLOCK NUMBERS Ø-777


1233  ØØ47  FWDBK,  SET 7           /SET UP RET JUMP FROM LOC 7
1234  ØØØØ          Ø
1235  Ø733          MTB I U         /MOVE TOWARD BLOCK 777 (GET TAPE MOVING IN RIGHT DIRECTION)
1236  Ø777          777
1237  Ø733          MTB I U         /MOVE TOWARD BLOCK 777
124Ø  Ø777          777
1241  112Ø          ADA I           /SUBTRACT 1 FROM DIFFERENCE BETWEEN
1242  7776          -1              /FIRST TAPE BLK NUMBER ENCOUNTERED AND TBLK
1243  1Ø6Ø          STA I           /STORE IN LOC FWDTST
1244  ØØØØ  FWDTST, Ø
1245  Ø733          MTB I U         /MOVE TOWARD BLOCK 777
1246  Ø777          777
1247  144Ø          SAE             /IS THE DIFFERENCE EQUAL TO THE CONTENTS OF LOC FWDTST
125Ø  1244          FWDTST
1251  7262          JMP EFWD        /NO ERROR
1252  146Ø          SAE I           /IS THE DIFFERENCE EQUAL TO 1
1253  ØØØ1          1
1254  7241          JMP FWDTST-3    /NO-DO IT AGAIN
1255  Ø733          MTB I U         /YES-THIS IS THE LAST MTB AS WE ARE AT BLK 776
1256  Ø777          777
1257  Ø45Ø          AZE             /AC ZERO (DIFFERENCE EQUAL TO ZERO)
126Ø  7262          JMP EFWD        /NO-ERROR
1261  6ØØ7          JMP 7           /RETURN TO MAIN PROGRAM



            /FOREWARD BLOCK NUMBER ERROR
            /THE BLOCK NUMBERS DID NOT OCCUR IN SEQUENCE
            /DIFFERENCE=NUMBER OF BLOCKS BETWEEN PRESENT TAPE POSITION
            /AND THE BLOCK NUMBER YOU ARE MOVING TOWARD
            /MQ = INCORRECT DIFFERENCE
            /AC = CORRECT DIFFERENCE



1262  Ø46Ø  EFWD,   SNS I Ø         /SNS SW Ø SET
1263  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND CONTINUE
1264  Ø314          ROR 14          /ROTATE INCORRECT DIFFERENCE INTO MQ REGISTER
1265  1ØØØ          LDA             /LOAD THE AC WITH THE DIFFERENCE
1266  1244          FWDTST
1267  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE HIT
127Ø  6ØØ7          JMP 7           /RET TO MAIN PROG AT START OF TEST WHICH FAILED


            /21

                    EJECT


                    /ERROR HALTS FROM MAIN PROGRAM
                    /SENSE SWITCH Ø IGNORS ERROR AND
                    /RETURNS YOU TO PROGRAM SEQUENCE
                    /LOCATION OF NEXT EXECUTABLE INSTRUCTION
                    /KEY CONTINUE RETURNS YOU TO THE MAIN PROGRAM
                    /AT THE START OF THE TEST WHICH FAILED
                    /E2 CORRESPONDS TO TEST T2  ETC


1271  Ø461  E2,     SNS I 1         /IS SNS Ø SET
1272  6ØØØ          JMP Ø           /YES-IGNORE ERROR RET TO NEXT INST IN PROG SEQUENCE
1273  Ø314          ROR 14          /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
1274  1ØØØ          LDA             /PUT THE CALCULATED CHECKSUM INTO THE AC REGISTER
1275  1Ø44          CKSUM
1276  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1277  6Ø26          JMP T2          /RET TO MAIN PROG AT START OF TEST WHICH FAILED

13ØØ  Ø46Ø  E3,     SNS I           /IS SENSE SW 1 SET
13Ø1  6ØØØ          JMP Ø           /YES-IGNORE ERROR RET TO NEXT INST IN PROG SEQUENCE
13Ø2  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
13Ø3  6Ø51          JMP T3          /RET TO MAIN PROG AT START OF TEST WHICH FAILED

13Ø4  Ø46Ø  E4,     SNS I Ø         /IS SNS SW Ø SET
13Ø5  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQUENCE
13Ø6  Ø314          ROR 14          /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
13Ø7  1ØØØ          LDA             /LOAD THE AC WITH THE CALCULATED CHECKSUM
131Ø  1Ø44          CKSUM
1311  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1312  61ØØ          JMP T4          /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1313  Ø46Ø  E5,     SNS I Ø         /IS SNS SW Ø SET
1314  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQ
1315  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1316  6111          JMP T5          /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1317  Ø46Ø  E6,     SNS I Ø         /IS SNS SW Ø SET
132Ø  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQ
1321  Ø314          ROR 14          /ROTATE THE BAD CHECKSUM INTO THE MQ REG
1322  1ØØØ          LDA             /LOAD THE AC WITH THE CALCULATED CHECKSUM
1323  1Ø44          CKSUM
1324  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1325  6131          JMP T6          /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1326  Ø46Ø  E7,     SNS I Ø         /IS SNS SW Ø SET
1327  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQUENCE
133Ø  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1331  6163          JMP T7          /RET TO MAIN PROG AT START OF TEST WHICH FAILED



                    /22

                    EJECT
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1332  Ø46Ø  E2Ø,    SNS I Ø         /IS SNS SW Ø SET
1333  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQUENCE
1334  Ø314          ROR 14          /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
1335  1ØØØ          LDA             /LOAD THE AC WITH THE CALCULATED CHECKSUM
1336  1Ø44          CKSUM
1337  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
134Ø  6471          JMP T2Ø         /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1341  Ø46Ø  E2ØA,   SNS I Ø         /IS SNS SW Ø SET
1342  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQ
1343  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1344  6471          JMP T2Ø         /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1345  Ø46Ø  E21A,   SNS I Ø         /IS SNS SW Ø SET
1346  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RETURN TO NEXT INST IN PROG SEQ
1347  Ø314          ROR 14          /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
135Ø  1ØØØ          LDA             /LOAD THE AC WITH THE CALCULATED CHECKSUM
1351  1Ø44          CKSUM
1352  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1353  6524          JMP T21         /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1354  Ø46Ø  E23,    SNS I Ø         /IS SNS SW Ø SET
1355  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQ
1356  Ø314          ROR 14          /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
1357  1ØØØ          LDA             /LOAD THE AC WITH THE CALCULATED CHECKSUM
136Ø  1Ø44          CKSUM
1361  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1362  67Ø2          JMP T23         /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1363  Ø46Ø  E24,    SNS I Ø         /IS SNS SW Ø SET
1364  6ØØØ          JMP Ø           /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQUENCE
1365  ØØØØ          HLT             /HALT-UNTIL KEY CONTINUE IS HIT
1366  6725          JMP T24         /RET TO MAIN PROG AT START OF TEST WHICH FAILED


            /23

                    EJECT
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```
CKSU    Ø44
CL      Ø7Ø
CLEAR  5Ø63
CLTDAT 5Ø75
CMPR   5141
CMPR1  5136
C1     5367
C1M    537Ø
C1ØØ1  5372
C3     5371
C3374  5373
C4374  5374
DATA   14ØØ
DATSET 4752
DELAY  513Ø
DONE   457Ø
DUP    5121
DUPDAT 51Ø7
ECMPR  5167
EFWD   5262
EREV   5224
E2     5271
E2Ø    5332
E2ØA   5341
E21A   5345
E23    5354
E24    5363
E3     53ØØ
E4     53Ø4
E5     5313
E6     5317
E7     5326
FWDBK  5233
FWDTST 5244
FXDAT  476Ø
FXLOAD 4764
GCKSUM 5Ø33
LSCOPE 4676
RADD   5Ø26
RDAT   4776
REVBK  52Ø2
REVTST 5213
RLOAD  5Ø12
RNA    5Ø24
RNB    5Ø25
-
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```
RWSUB  4631
RW1    4Ø22
RW1Ø   446Ø
RW11   4467
RW12   4576
RW2    4Ø76
RW3    4124
RW4    4216
RW5    4262
RW6    4326
RW7    4377
START  4Ø2Ø
TBLK   Ø374
TDATA  2ØØØ
TST    5153
TYPE   5Ø56
T1Ø    4221
T11    424Ø
T12    4263
T13    43Ø3
T14    4332
T15    4353
T16    44Ø6
T17    4463
T2     4Ø26
T2Ø    4471
T21    4524
T23    47Ø2
T24    4725
T3     4Ø51
T4     41ØØ
T5     4111
T6     4131
T7     4163
XOA    ØØ21
X1Ø    4227
X11    4246
X12    4271
X13    4311
X14    434Ø
X15    4361
X2     4Ø34
X2Ø    4477
X2ØA   4514
X21    4534
X21A   4546
X22    4657
X22A   4661
X22B   4664
X22C   467Ø
X23    471Ø
X24    4733
X3     4Ø57
X6     4137
X7     4171
```

```
ØØØ ERRORS
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                        /CONSTANTS USED IN PROGRAM


      1367  ØØØ1  C1,     1
      137Ø  7776  C1M,    7776
      1371  ØØØ3  C3,     3
      1372  1ØØ1  C1ØØ1,  1ØØ1
      1373  3374  C3374,  3374
      1374  4374  C4374,  4374
                          DATA=14ØØ
                          TDATA=2ØØØ
                          TBLK=374
                          XOA=21
```