IDENTIFICATION

PRODUCT CODE: DEC-8E-EUZC-D

PRODUCT NAME: TD8-E DECTAPE FORMATTER

DATE CREATED: DECEMBER 7, 1971

MAINTAINER: DIAGNOSTIC PROGRAMMING GROUP

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1. ABSTRACT

THE TD8-E DECTAPE FORMATTER PROGRAM RECORDS THE TIMING AND MARK TRACKS ON A DECTAPE MOUNTED ON THE TU56 DECTAPE TRANSPORT.

THE PROGRAM INTERACTS WITH THE OPERATOR VIA THE TELETYPE TO OBTAIN THE NECESSARY DATA FOR EACH SET OF DECTAPES TO BE FORMATTED. AS SOON AS ONE SET OF TAPES IS FORMATTED, THE PROGRAM IS READY TO FORMAT ANOTHER SET.

THREE FULL PASSES ARE REQUIRED TO COMPLETELY FORMAT EACH DECTAPE, AND UP TO TWO DECTAPES MAY BE FORMATTED AT A TIME (UNITS 0 AND 1 WITH A TD8-E; IOT CODE OF 677X). UPON COMPLETION OF A CYCLE, NEW TAPES MAY BE MOUNTED AND FORMATTED AS THE LAST, WITH A MINIMUM OF OPERATOR-PROGRAM COMMUNICATION. ONE TAPE EXCLUDING TAPE SETUP TIME, REQUIRES THREE MINUTES FROM START TO FINISH.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-8E, TELETYPE, TD8-E (IOT CODE 677X), AND A TU56 DECTAPE TRANSPORT.

2.2 STORAGE

THIS PROGRAM USES LOCATIONS 0000-3400. THE LOADERS MUST BE STORED IN THE LAST MEMORY PAGE.

2.3 PRELIMINARY PROGRAMS

ALL BASIC PDP-8E DIAGNOSTIC PROGRAMS AND MAINDEC-8E-D3A(N) SHOULD HAVE BEEN SUCCESSFULLY RUN.

3. LOADING PROCEDURE

LOAD THE PROGRAM INTO FIELD 0 USING THE STANDARD BINARY LOADER.

4. STARTING PROCEDURE

4.1 STARTING ADDRESS

SET SWITCH REGISTER TO 0200 AND PRESS LOAD ADDRESS. NOW PRESS CLEAR AND THEN CONTINUE. "UNIT" IS PRINTED ON THE TELETYPE.

MOUNT THE DECTAPES TO BE MARKED ONTO THE TAPE TRANSPORTS, WITH JUST ENOUGH TURNS OF TAPE ON THE RIGHT HAND REEL OF EACH TRANSPORT TO PROVIDE A GRIP. MAKE SURE THAT NO TWO TAPE UNITS ARE SET TO THE SAME UNIT NUMBER. SET THE SWITCH ON THE TD8-E TO WITH POSITION, FOR EACH TRANSPORT TO BE USED, SET THE WRITE ENABLED-WRITE LOCK SWITCH TO WRITE ENABLED, AND THE REMOTE-OFF-LOCAL SWITCH TO REMOTE.

4.2 OPERATING PROCEDURE

THE PROGRAM AND OPERATOR NOW CONVERSE. THE PRINTOUT "UNIT?" IS ASKING WHICH DECTAPE UNITS WILL BE USED. THE OPERATOR TYPES ONE OR TWO UNIT NUMBERS, CORRESPONDING TO THE DECTAPE UNITS UPON WHICH HE HAS MOUNTED TAPES. FOR INSTANCE, IF THE OPERATOR HAS MOUNTED TAPES ON UNITS 0 AND 1, HE WOULD TYPE 0 1↵ (WHERE ↵ SIGNIFIES CARRIAGE RETURN). SPACES ARE IGNORED, SO IT MAKES NO DIFFERENCE IF THE OPERATOR TYPES SPACES BETWEEN THE UNIT NUMBERS. ONLY ONE SPECIFICATION OF A UNIT IS SIGNIFICANT, I.E. TYPING 000111 HAS THE SAME EFFECT AS TYPING 01.

ONCE THE OPERATOR HAS SPECIFIED THE UNITS HE WISHES TO USE, THE PROGRAM TYPES "FORMAT?". THE OPERATOR RESPONDS BY TYPING MARK OR MARK XXXX↵. IF HE TYPES MARK↵, THE PROGRAM ASSUMES 201 WORDS 2702 BLOCKS (STANDARD PDP-8 FORMAT). OTHERWISE XXXX IS ACCEPTED AS A DECIMAL NUMBER OF WORDS PER BLOCK AND MUST BE DIVISIBLE BY 3. NOTE THAT TYPING MARK 384 WILL CAUSE THE PROGRAM TO GENERATE A STANDARD PDP-10 FORMAT DECTAPES (1102(8) BLOCKS OF 600 WORDS, WHICH IS EQUIVALENT TO 1102(8) BLOCKS OF 200 WORDS WHERE EACH WORD IS 36 BITS RATHER THAN 12 BITS).

THE PROGRAM NOW TYPES "XXXX WORDS, YYYY BLOCKS OK? (YES OR NO)." THIS SERVES AS A FINAL CHECK FOR BLOCK COUNT. XXXX AND YYYY ARE OCTAL VALUES REPRESENTING THE FINAL OUTCOME OF A FORMULA SOLVED BY THE PROGRAM, DETERMINING THE NUMBER OF BLOCKS THAT MAY BE WRITTEN ON A DECTAPE KNOWING THE NUMBER OF WORDS. IF A NO ANSWER IS GIVEN, THE PROGRAM REVERTS TO "FORMAT?". OTHERWISE (IF YES), THE PROGRAM TYPES OUT "SET SWITCH TO WTM". THEN THE OPERATOR HITS CARRIAGE RETURN ON THE TELETYPE AND THE TAPE ON FIRST UNIT SPECIFIED BEGINS TO MOVE IF THE SWITCH IS SET.

ONCE ALL OF THE TAPES SPECIFIED HAVE BEEN MARKED, THE PRINOUT "SET SWITCH TO OFF" APPEARS. THEN THE OPERATOR RESETS THE WTM SWITCH TO OFF, AND STRIKES THE RETURN KEY ON THE TELETYPE, STARTING THE SECOND PASS. NOTE THAT DURING THE SECOND PASS WITH MULTIPLE DECTAPE UNITS, AS SOON AS ONE TAPE STOPS AND THE NEXT TAPE STARTS, THE FIRST TAPE IS COMPLETED AND MAY BE REPLACED WITH A FRESH TAPE IN PREPARATION FOR RECYCLING.

THE PROGRAM CONTINUES BY ITSELF UNTIL COMPLETED, AT WHICH TIME THE "FORMAT" PRINTOUT OCCURS. TYPING "SAME↵" REPEATS THE ENTIRE PROCESS WITH THE ORIGINAL CONSTANTS. THE NEW DECTAPES MUST BE MOUNTED AND READY TO WRITE TIMING AND MARK TRACKS BEFORE A CARRIAGE RETURN IS HIT ON THE TELETYPE AFTER THE TYPEOUT "SET SWITCH TO WTM". ALSO, IN RESPONSE TO "DIRECT?", TYPING "RDR↵" CAUSES THE PRINTOUT OF THE UNIT NUMBER OF THE DECTAPE AND THE LAST 22 BLOCK NUMBERS; "RDF↵" CAUSES THE PRINTOUT OF THE UNIT NUMBER AND THE FIRST 22 BLOCK NUMBERS; AND "RESTART↵" RETURNS THE PROGRAM TO "UNIT?". UNIT NUMBERS ARE PRINTED AS "000N" WHERE N IS THE UNIT NUMBER.

FOLLOWING ARE SEVERAL EXAMPLES OF SUCCESSFUL OPERATION. THE UNDERLINED STATEMENTS ARE PRINTED BY THE PROGRAM. ALL OPERATOR RESPONSES SHOULD BE FOLLOWED BY A CARRIAGE RETURN.

A. CREATE A STANDARD PDP-8 TAPE ON UNIT 1

<u>UNIT? 1</u>
<u>FORMAT? MARK</u>
<u>0201 WORDS, 2702 BLOCKS, OK? (YES OR NO)</u>

YES
SET SWITCH TO WTM
SET SWITCH TO OFF
FORMAT?

8. CREATE 4 STANDARD PDP-10 FORMAT TAPES, TWO AT A TIME ON UNITS 0-1
UNIT? 01
FORMAT? MARK 384
0600 WORDS, 1102 BLOCKS OK? (YES OR NO)
YES
SET SWITCH TO WTM
SET SWITCH TO OFF
FORMAT? SAME
SET SWITCH TO WTM
SET SWITCH TO OFF
FORMAT?

4.3 ERRORS

4.3.1 ERRORS TYPED TO "UNIT" AND "FORMAT" REVERT BACK TO "UNIT?" OR "FORMAT?"

4.3.2 ERROR MESSAGES FOR RESPONSE TO MARK XXXX

NOT DECIMAL	A CHARACTER IN XXXX IS NOT 0-9
NOT DIVISIBLE BY 3	XXXX CANNOT BE DIVIDED EVENLY BY 3
TOO MANY WORDS	THE NUMBER OF WORDS PLUS 15 EXCEEDS 7777(8).
TOO MANY BLOCKS	THE NUMBER OF BLOCKS GENERATED BY XXXX EXCEEDS 7777

4.3.3 ERROR MESSAGES FOR RESPONSE TO "SET SWITCH TO WTM".

1. SETUP? INDICATES AN ERROR IN THE DECTAPE SETUP (SEE SECTION 4.1 FOR DECTAPE SETUP) ONE OF THE UNITS SPECIFIED IS IN WRITE LOCK POSITION, NOT SELECTED, OR THE WRITE FLIP-FLOP IS UNABLE TO BE SET, OR THERE MAY BE A TIMING ERROR. (AFTER MESSAGE REVERT BACK TO "UNIT"

2. SWITCH NOT SET TO WTM OR SINGLE LINE FLAG FAILED TO SET
SET SWITCH TO WTM.

THIS TYPE OUT SAYS THAT EITHER THE SWITCH ON THE M868 MODULE IS NOT SET TO THE WTM POSITION OR THE TIMING GENERATOR FOR WRITING THE MARK AND TIMING TRACKS IS NOT SETTING THE SINGLE LINE FLAG.

RECOVERY:

IF THE SWITCH WAS NOT SET TO WTM POSITION SET THE SWITCH AND HIT CARRIAGE RETURN ON THE TELETYPE.

IF THE SWITCH WAS SET TO WTM POSITION AND THIS TYPE OUT OCCURRED, TRY AGAIN OR EXAMINE THE TIMING GENERATOR CIRCUIT.

4.3.4 ERROR MESSAGES FOR MARKING AND VERIFYING A TAPE

```
PC      XXXX    MARK TRACK ERROR PHASE Y
PC      XXXX    BLOCK NUMBER ERROR PHASE Y
PC      XXXX    DATA ERROR PHASE Y
PC      XXXX    CHECKSUM ERROR PHASE Y
PC      XXXX    TIMING ERROR PHASE Y
PC      XXXX    WRITE ERROR PHASE Y

XXXX EQUALS THE PROGRAM COUNTER AT TIME OF THE FAILURE.
Y EQUALS THE PASS WHICH IT WAS IN.  (SEE SECTION 4.4)
```

4.4 RECOVERY

ALTHOUGH AN ERROR SHOULD CAUSE DOUBT CONCERNING THE ENTIRE PROCESS, A RESTART MAY BE MADE (EXCEPT IN PHASE 0) BY TYPING "RETRY↵" RETRY CAUSES THE PROGRAM TO GO BACK TO PHASE 1, TYPE "RESTART↵" TO RETURN TO "UNIT?"

```
PHASE 0:        WRITE TIMING AND MARK TRACK FORWARD
PHASE 1:        READS MARK TRACK REVERSE
PHASE 2:        WRITE DATA, FORWARD BLOCK AND REVERSE BLOCK NUMBERS FORWARD AND WRITES THE CHECKSUMS
PHASE 3:        DISPLAYS BLOCK NUMBERS IN AC REVERSE
PHASE 4:        READS DATA, FORWARD BLOCK AND REVERSE BLOCK NUMBERS FORWARD AND CALCULATES THE CHECKSUM
PHASE 5:        READS REVERSE BLOCK NUMBERS IN REVERSE
```

THE ENTIRE PROGRAM MAY BE RESTARTED AT 0200 ANY TIME.

5. DETAILS OF OPERATION AND STORAGE

THE PROGRAM WRITES TIMING AND MARK TRACK ON A DECTAPE FORWARD WITH WTM SWITCH SET. THEN IT READS THE MARK TRACK IN THE REVERSE DIRECTION WITH THE SWITCH SET TO OFF. THE PROGRAM CHECKS ALL OF THE MARK TRACK ONCE IT IS IN SYNC. (SEE FLOW FIGURE 1) WHEN IT FINISHES READING THE MARK TRACK REVERSE, IT BOUNCES OFF THE END ZONE AND STARTS WRITING ZEROES TO THE FIRST BLOCK MARK. THE PROGRAM IS NOW IN SYNC. THE PROGRAM NOW CONTINUES WRITING FORWARD BLOCK NUMBERS, REVERSE CHECKSUM, DATA, CHECKSUM, AND REVERSE BLOCK NUMBERS FOR THE REST OF TAPE. WHEN IT SEES THE END ZONE, IT TURNS AROUND AND STARTS DISPLAYING THE REVERSE BLOCK NUMBER IN THE ACCUMULATOR UNTIL IT HITS THE END ZONE AGAIN. NOW THE TAPE TURNS AROUND AND STARTS READING AND COMPARING ALL FORWARD BLOCK NUMBERS, REVERSE CHECKSUM, ALL DATA, CHECKSUM AND REVERSE BLOCK NUMBERS THAT WAS WRITTEN IN PHASE 2. THIS COMPARISON IS DONE ON ALL BLOCKS UNTIL THE END ZONE IS REACHED. THE TAPE TURNS AROUND IN THE END ZONE AND STARTS LOOKING FOR REVERSE BLOCK NUMBERS AND COMPARING THEM ALL THE WAY DOWN TAPE TO THE END ZONE. THE FORMATTING IS NOW COMPLETE, THE TAPE STOPS, AND "FORMAT" IS TYPED OUT WAITING FOR NEW DIRECTIONS.

THE NUMBER OF BLOCK FRAMES TO BE WRITTEN IS A FUNCTION OF THE NUMBER OF WORDS PER BLOCK
THE FORMULA

$$\text{BLOCKS PER TAPE} = [(212080)/(NW+15)]-2$$

WHERE NW EQUALS THE NUMBER OF WORDS TO BE WRITTEN, IS USED BY THE PROGRAM TO COMPUTE THE NUMBER OF BLOCKS, BUT IS ADJUSTED BY THE PROGRAM TO PROVIDE THE STANDARD PDP-8 FORMAT OF 129(10) (12-BIT) WORDS, 1474(10) BLOCKS, AND STANDARD PDP-10 FORMAT OF 128(10) (36-BIT) WORDS, 578(10) BLOCKS.

5.1 THEORY

THE WRITING OF THE MARK TRACK IS DONE THROUGH AC BITS 0, 3, 6 AND 9. THE FOLLOWING DESCRIPTION IS HOW THE MARK TRACK IS WRITTEN.

A. INSTALL THE TAPE WITH ENOUGH TURNS TO CREATE A PULL. THE REVERSE END ZONE REQUIRES A SEQUENCE OF THREE DATA WORDS FOR ITS PATTERN.

```
4044
0440
4404
```

IN THE MARK TRACK THE WORDS APPEAR AS 101101101101 (5555(8)). THE REVERSE END ZONE SHOULD COVER ABOUT 10 FEET OF TAPE. WRITE THE ABOVE THREE WORDS 4096(10) TIMES.

B. WRITE THE BELOW THREE WORDS (SEE C) OF EXPAND CODE 99 TIMES.

C. EXPAND CODE. THREE WORDS OF EXPAND CODE SHOULD IMMEDIATELY FOLLOW EACH BLOCK.

```
0404
0404
0404
```

IN THE MARK TRACK THE WORDS APPEAR AS 010101010101 (2525(8)).

D. THE FORWARD BLOCK MARK AND REVERSE GUARD REQUIRE THREE WORDS.

```
0404
4004
4040
```

WHICH APPEAR ON THE MARK TRACK AS 010110011010 (2632(8)).

E. THE LOCK MARK, REVERSE CHECKSUM, REVERSE FINAL, REVERSE PREFINAL CONSIST OF SIX PDP-8 MEMORY WORDS.

```
0040
0000
4000
0040
0000
4000
```

THESE WORDS APPEAR ON THE MARK TRACK AS 001000001000001000001000 (10101010(8))

F. MARK TRACK CODE FOR DATA IS GENERATED BY

```
4440
0044
4000
```

THESE THREE WORDS APPEAR AS 111000111000 (7070(8)) AND ARE REPEATED 41(10) TIMES FOR A 129 WORD BLOCK.

G. THE PREFINAL, FINAL, CHECKSUM, AND REVERSE LOCK CONSIST OF SIX PDP-8 WORDS.

```
4440
```

4444
4044
4440
4444
4044

THESE WORDS APPEAR ON THE MARK TRACK AS 1110111̄1̄1̄0̄1̄1̄1̄1̄0̄1̄1̄1̄1011 (73737373(8)).

H. THE GUARD AND REVERSE BLOCK MARK CONSIST OF THREE WORDS

4040
0440
0404

WHICH APPEAR AS 10̄1001̄00101 (5145(8)).

I. GENERATE 2̄702(8) BLOCK PATTERNS. REPEAT C THROUGH H. 2̄702(8) TIMES.

J. 100 EXPAND CODES (SEE C.)

K. THE END ZONE PATTERN CONSIST OF THREE WORDS.

0400
4004
0040

WHICH APPEARS ON THE MARK TRACK AS 010010010010 (2222(8)). REPEAT THESE 3 WORDS 4096(1̄0) TIMES. SEE FIGURE 2 FOR A DIAGRAM OF THE MARK TRACK AND DATA TRACKS.

Figure 1 Reading of the Mark Track

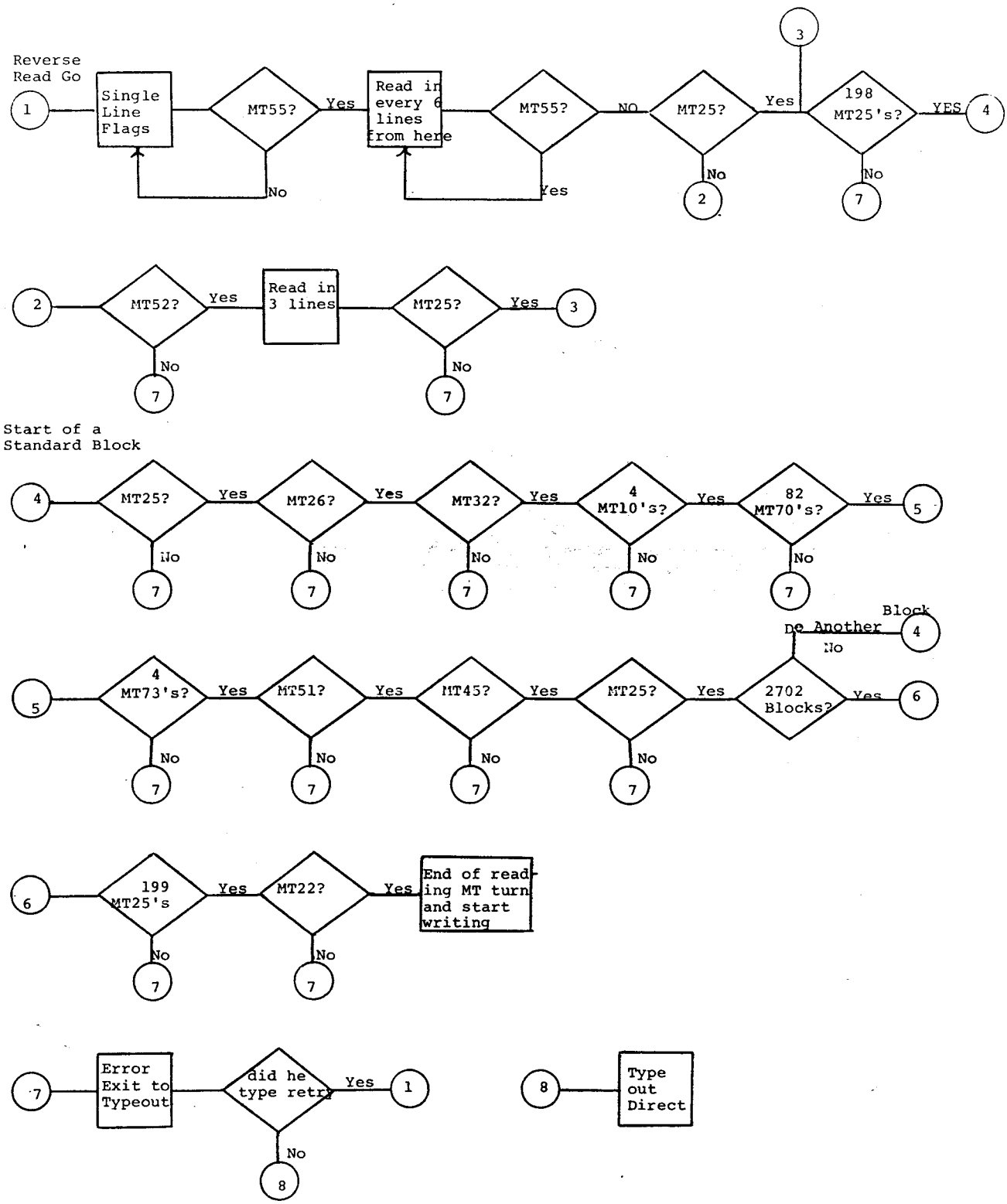

Figure 2 Mark Track and Data Track

Mark Track Name	End Zone						Expand Code						Forward Block Number						Reverse Guard						Lock Mark						Reverse Checksum					
Mark Track Code	1	ø	1	1	ø	1	ø	1	ø	1	ø	1	ø	1	ø	1	1	ø	ø	1	1	ø	1	ø	ø	ø	1	ø	ø	ø	ø	ø	1	ø	ø	ø
Data Track ø															ø	ø	ø	ø																ø	ø	
Data Track 1															ø	ø	ø	ø																ø	ø	
Data Track 2															ø	ø	ø	ø																ø	ø	
Line Flag	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6

Mark Track Name	Reverse Final						Reverse Prefinal						Data						Data						Prefinal						Final					
Mark Track Code	ø	ø	1	ø	ø	ø	ø	ø	1	ø	ø	ø	1	1	1	ø	ø	ø	1	1	1	ø	ø	ø	1	1	1	ø	1	1	1	1	1	ø	1	1
Data Track ø	ø	ø							-																										ø	ø
Data Track 1	ø	ø					1	2	9		D	A	T	A		W	O	R	D	S		P	D	P	-	8		F	O	R	M	A	T		ø	ø
Data Track 2	ø	ø																																	ø	ø
Line Flag	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6

Mark Track Name	Checksum						Reverse Lock						Guard						Reverse Block Number						Expand Code						End Zone					
Mark Track Code	1	1	1	ø	1	1	1	1	1	0	1	1	1	0	1	0	0	1	1	0	0	1	0	1	0	1	ø	1	0	1	0	1	0	0	1	0
Data Track ø	1	1																	1	1	1	1	1	1	1	1	1	1	1	1						
Data Track 1	1	1																	1	1	1	1	1	1	1	1	1	1	1	1						
Data Track 2	1	1																	1	1	1	1	1	1	1	1	1	1	1	1						
Line Flag	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6

```
                        /TD8E DECTAPE FORMATTER COPYRIGHT 1971
                        /DIGITAL EQUIPMENT CORP.
                        /MAYNARD , MASS



                0010            X1=10
                0011            X2=11
                        /SYMBOL TABLE AUGMENTATION

                6771            SDSS=6771
                6772            SDST=6772
                6773            SDSQ=6773
                6774            SDLC=6774
                6775            SDLD=6775
                6776            SDRC=6776
                6777            SDRD=6777

                0000            .0
0000    0000                    0
0001    5001            JMP     1       /HLT PROGRAM GOT INTERRUPTED SOMEHOW
0002    0002                    2
0003    0003                    3
0004    0000                    0
0005    0000                    0
                        /WORKING LOCATIONS

                0020            .20

0020    0000    W1,     0000
0021    0000    W2,     0000
0022    0000    W3,     0000
0023    0000    W4,     0000
0024    0000    W5,     0000
0025    0000    W6,     0000
0026    0000    BLOCKS, 0000
0027    0000    DTA,    0000
0030    0000    PHASE,  0000
0031    0000    TOTAL,  0000
0032    0000    VAR1,   0000
0033    0000    VAR2,   0000
                        /CONSTANTS

0034    0017    C0017,  0017
0035    0070    C0070,  0070
0036    0077    C0077,  0077
0037    0007    C0007,  0007
```

```
0040  3700    C0700,  0700
0041  0203    C203,   0203
0042  0201    C201,   0201
0043  0260    C260,   0260
0044  0261    C261,   0261
0045  0270    C270,   0270
0046  0271    C271,   0271
0047  0277    C277,   0277
0050  1620    C1620,  1620
0051  7000    C7000,  7000
0052  7700    C7700,  7700
0053  7714    C7714,  7714
0054  7761    C7761,  7761
0055  0215    CRCOD,  0215
0056  0313    LETK,   0313
0057  0212    LFCOD,  0212
0060  7776    M2,     -2
0061  7775    M3,     -3
0062  7772    M6,     -6
0063  7771    M7,     -7
0064  7764    M14,    -14
0065  7634    M144,   -144
0066  0240    SPCOD,  0240

0067  3377    BADD,   BUFFER-1
0070  3400    BFR,    BUFFER
0071  0312    COMPAR, COMPRE
0072  1055    IT,     INIT1
0073  0400    QU1,    Q1
0074  0410    QU2,    Q2
0075  0422    QU3,    Q3
0076  0434    QU4,    Q4
0077  0454    MESS,   MES
0100  1000    STX,    START
0101  0336    TYOCT,  TYCT
0102  0202    TYPE,   MESAGE
0103  0260    TYPIN,  TYPN
0104  0600    WAIT,   STALL
0105  0000    WC,     0
0106  0000    MTR,    0
0107  3120    SLRDRC, SRDRC
0110  0000    DATRD,  0
0111  7723    M55,    -55
0112  7753    M25,    -25
0113  7752    M26,    -26
0114  7746    M32,    -32
0115  7770    M10,    -10
0116  7710    M70,    -70
0117  7705    M73,    -73
0120  7727    M51,    -51
0121  7733    M45,    -45
0122  7756    M22,    -22
0123  7635    M143,   -143
0124  7726    M52,    -52
```

```
0125  7747    M31,    -31
0126  7472    M306,   -306
0127  0000    CNT,    0
0130  7774    M4,     -4
0131  7471    M307,   -307
0132  3000    SSDSQT, SDSQT
0133  3027    SA3LNS, A3LNS
0134  3056    SCEXPC, CEXPC
0135  0077    MSK77,  0077
0136  3133    NUD,    NUDTA
0137  0000    BLK,    0
0140  0000    REVBLK, 0
0141  3070    BCXOR,  SBCXOR
0142  0000    CHKSUM, 0
0143  0000    SBWORD, 0


                /TYPE THE CHARACTER IN THE AC ON THE KEYBOARD PRINTER

0144  0000    RSEND,  0000
0145  6046            TLS             /LOAD AND PRINT, CLEAR FLAG
0146  6041            TSF             /WAIT FOR CONFIRMATION
0147  5146            JMP     .-1     /ENDLESSLY
0150  6042            TCF             /CLEAR THE FLAG ANYWAY
0151  5544            JMP I RSEND

                /PRINT A "?" ON THE KEYBOARD TYPER

0152  0153    QU,     .+1
0153  6002            IOF
0154  7300            CLA     CLL     /C(AC)+C(L)=0
0155  1047            TAD     C277    /"?"
0156  4144            JMS     RSEND   /TYPE THE CHARACTER
0157  5560            JMP I   .+1     /RESTART
0160  1061            INIT

                /DECTAPE CONTROL WORDS

0161  1400    DT1400, 1400
0162  0400    DT0400, 0400
0163  2000    DT2000, 2000
0164  3000    DT3000, 3000
0165  1000    DT1000, 1000

0166  3155    BINCO,  BINCON
0167  0724    SELTIM, ZTIM
0170  0657    MARKER, ZMKTK
0171  0613    BLKERR, ZBLK
0172  0637    DATERR, ZDATA
0173  0702    CHKERR, ZPAR
0174  1400    DOMARK, STMK
```

```
                0200    *200    /PAGE 1
                        /TYPE CANNED MESSAGES.....
                        /THANKS TO DIGITAL 8-18-U
0200    5601            JMP  I  .+1
0201    0515            PATCH

0202    0000    MESAGE, 0
0203    6002            IOF
0204    7240            CLA   CMA       /SET C(AC)=-1
0205    1202            TAD   MESAGE    /ADD LOCATION
0206    3010            DCA   10        /AUTO INDEX REGISTER
0207    1410            TAD I 10        /FETCH FIRST WORD
0210    3221            DCA   MSRGHT    /SAVE IT
0211    1221            TAD   MSRGHT
0212    7012            RTR
0213    7012            RTR             /ROTATE 6 BITS TO THE RIGHT
0214    7012            RTR
0215    4222            JMS   TYPECH    /TYPE IT
0216    1221            TAD   MSRGHT    /GET DATA AGAIN
0217    4222            JMS   TYPECH    /TYPE RIGHT HALF
0220    5207            JMP   MESAGE+5  /CONTINUE
0221    0000    MSRGHT, 0               /TEMPORARY STORAGE
0222    0000    TYPECH, 0               /TYPE CHARACTER IN C(AC)6-11
0223    0036            AND   C0077
0224    7450            SNA             /IS IT END OF MESSAGE?
0225    5410            JMP I 10        /YES: EXIT
0226    1253            TAD   M40       /SUBTRACT 40
0227    7500            SMA             /<40?
0230    5233            JMP   .+3       /NO
0231    1254            TAD   C340      /YES: ADD 300
0232    5246            JMP   MTP       /TO CODES <40
0233    1061            TAD   M3        /SUBTRACT 3
0234    7440            SZA             /IS IT ZERO?
0235    5240            JMP   .+3       /NO
0236    1255            TAD   C212      /YES: CODE 43 IS
0237    5246            JMP   MTP       /LINE-FEED (212)
0240    1060            TAD   M2        /SUBTRACT 2
0241    7440            SZA             /IS IT ZERO?
0242    5245            JMP   .+3       /NO
0243    1256            TAD   C215      /YES: CODE 45 IS
0244    5246            JMP   MTP       /CARRIAGE RETURN (215)
0245    1257            TAD   C245      /ADD 200 TO OTHERS >40
0246    6046    MTP,    TLS             /TRANSMIT CHARACTER
0247    6041            TSF             /WAIT FOR THE FLAG
0250    5247            JMP   .-1       /NOT SET YET
0251    7200            CLA             /SET: CLEAR C(AC)
0252    5622            JMP I TYPECH    /RETURN

                        /CONSTANTS

0253    7740    M40,    -40
0254    0340    C340,   340
0255    0212    C212,   212
```

```
0256  0215    C215,   215
0257  0245    C245,   245

              /ROUTINE WAITS UNTILL A COMPLETE MESSAGE HAS BEEN ENTERED
              /SIGNIFIED BY A CR.

0260  0000    TYPN,   0
0261  6002            IOF
0262  6032            KCC             /CLEAR AC, KEYBOARD FLAG
0263  1067            TAD   BADD      /GET BUFFER ADDRESS
0264  3020            DCA   W1        /STORE FOR THE CHARACTER STRING

              /READ AND RESPOND WITH THE CHARACTER

0265  2020    NTYRTN, ISZ   W1        /NORMAL RETURN, INCREMENT BUFFER
0266  6031            KSF             /WAIT FOR KEYBOARD
0267  5266            JMP   .-1       /FLAG TO RAISE
0270  6036            KRB             /GOT FLAG, RESET IT, GET CHARACTER
0271  4144            JMS   RSEND     /SEND CHARACTER BACK
0272  3420            DCA I W1        /LOAD CHARACTER INTO BUFFER AREA

              /IF CHARACTER IS A SPACE, IGNORE IT

0273  1420            TAD I W1        /CHARACTER INTO THE AC
0274  7041            CIA             /SUBTRACT FROM SPACE CODE (240)
0275  1066            TAD   SPCOD     /COMPLETE COMPARISON
0276  7650            SNA   CLA       /WAS IT A SPACE?
0277  5266            JMP   NTYRTN+1  /YES: DO NOT INCREMENT BUFFER

              /IF CHARACTER IS A CR, EXIT FROM ROUTINE

0300  1420            TAD I W1        /CHARACTER TO AC
0301  7041            CIA             /SET AC TO SUBTRACT CR (215)
0302  1055            TAD   CRCOD     /COMPLETE COMPARISON
0303  7640            SZA   CLA       /WAS IT CR?
0304  5265            JMP   NTYRTN    /NO: INCREMENT BUFFER & WAIT

              /CARRIAGE RETURN FOUND, EXIT FROM ROUTINE

0305  1057            TAD   LFCOD     /GIVE KEYBOARD LINE FEED
0306  4144            JMS   RSEND     /EXECUTE LINE FEED
0307  7300            CLA   CLL       /EXIT WITH C(ACC) & AND C(L)=0
0310  6002            IOF
0311  5660            JMP I TYPN      /RETURN TO CALL

              /COMPARE A STRING OF CHARACTERS IN "BUFFER"
              /TO A CHARACTER STRING AFTER A JMS IN ASCII

0312  0000    COMPRE, 0
0313  7240            CLA   CMA       /C(AC)=7777
0314  1312            TAD   COMPRE    /SUBTRACT 1 FOR INDEX REG I
0315  3010            DCA   I0        /AUTO INDEX 1 SET TO CMA STRING
0316  1067            TAD   BADD      /AUTO INDEX 2 SET TO BUFFER-1
0317  3011            DCA   I1        /LOAD X2
```

```
                        /COMPARE CHARACTERS TILL ONE DOESN'T COMPARE OR TILL
                        /A 0 IS FOUND IN X1. IF OK, RETURN TO TWO PLUS THE
                        /ZERO, IF BAD ONE PLUS

0320  1410                      TAD I X1        /CHARACTER FROM PROGRAM
0321  7041                      CIA             /TO SUBTRACT FROM
0322  1411                      TAD I X2        /CHARACTER IN BUFFER
0323  7640                      SZA   CLA       /COMPARE?
0324  5332                      JMP   CERR      /NO:RESYNC FOR NON COMPARE EXIT
0325  1410                      TAD I X1        /YES: CHECK FOR GOOD EXIT
0326  7440                      SZA             /IF 0, EXIT GOOD
0327  5321                      JMP   .-6       /NO: TEST NEXT CHARACTER
0330  2010                      ISZ   X1        /+1 TO X1(TOTAL 2 FROM THE 0)
0331  5410                      JMP I X1        /+1 TO X1, EXIT

                        /ERROR FOUND, RESYNC AND EXIT NO COMPARE

0332  1410  CERR,               TAD I X1        /CHARACTER FROM PROGRAM
0333  7640                      SZA   CLA       /IS THIS EXIT KEY? (0000)
0334  5332                      JMP   .-2       /NO: GET NEXT
0335  5410                      JMP I X1        /YES: EXIT, NOT COMPARE

                        /TYPE ONE FOUR CHARACTER OCTAL WORD GIVEN TO THE
                        /ROUTINE VIA C(ACC), C(ACC)=0 ON EXIT

0336  0000  TYCT,        0
0337  3376                      DCA   TW1       /STORE WORD GIVEN
0340  1376                      TAD   TW1       /TO C(ACC) AGAIN
0341  7012                      RTR
0342  7012                      RTR             /6 BITS RIGHT
0343  7012                      RTR
0344  3373                      DCA   TYCTI+2   /SAVE ROTATED VALUE, 1ST TWO
0345  1373                      TAD   TYCTI+2   /TO C(ACC) AGAIN
0346  0037                      AND   C0007     /ISOLATE SECOND CHARACTER
0347  1377                      TAD   C6060     /CONVERT TO ASCII
0350  3372                      DCA   TYCTI+1   /STORE AS FIRST PARTIAL 2
0351  1373                      TAD   TYCTI+2   /ROTATED VALUE STORED ABOVE
0352  7006                      RTL
0353  7004                      RAL             /3 BITS LEFT
0354  0040                      AND   C0700     /ISOLATE FIRST CHARACTER
0355  1372                      TAD   TYCTI+1   /CONVERT 1ST TO ASCII
0356  3372                      DCA   TYCTI+1   /1ST AND 2ND CHARACTERS READY
0357  1376                      TAD   TW1       /ORIGIONAL WORD
0360  0037                      AND   C0007     /ISOLATE 4TH CHARACTER
0361  1377                      TAD   C6060     /CONVERT 4 TH TO ASCII
0362  3373                      DCA   TYCTI+2   /STORE 4TH FOR A MOMENT
0363  1376                      TAD   TW1       /ORIGIONAL WORD
0364  7006                      RTL
0365  7004                      RAL             /POSITION IT 3RD CHARACTER
0366  0040                      AND   C0700     /ISOLATE 3RD CHARACTER
0367  1373                      TAD   TYCTI+2   /CONVERT TO ASCII
0370  3373                      DCA   TYCTI+2   /CONVERSION COMPLETE
0371  4502  TYCTI,       JMS I TYPE      /TYPE THE FOUR CHARACTERS
0372  0000                      0               /FIRST 2
0373  0000                      0               /SECOND 2
```

```
0374  0000          0               /KILL KEY
0375  5736          JMP I TYCT      /EXIT FROM ROUTINE

                /SOME CONSTANTS FOR THE ROUTINE

0376  0000    TW1,  0000
0377  6060    C6060,  6060

      0400      *400
                /VARIOUS ERROR MESSAGES
                /"NOT DECIMAL"

0400  4502    Q1,   JMS I TYPE
0401  1617          1617  /NO
0402  2440          2440  /T
0403  0405          0405  /DE
0404  0311          0311  /CI
0405  1501          1501  /MA
0406  1400          1400  /L
0407  5247          JMP   QUX

                /"TO MANY WORDS"

0410  4502    Q2,   JMS I TYPE
0411  2417          2417  /TO
0412  1740          1740    /O
0413  1501          1501    /MA
0414  1631          1631    /NY
0415  4027          4027    / W
0416  1722          1722    /OR
0417  0423          0423    /DS
0420  0000          0000    /00
0421  5247          JMP   QUX

                /"TO MANY BLOCKS"

0422  4502    Q3,   JMS I TYPE
0423  2417          2417  /TO
0424  1740          1740    /O
0425  1501          1501    /MA
0426  1631          1631    /NY
0427  4002          4002    / B
0430  1417          1417    /LO
0431  0313          0313    /CK
0432  2300          2300    /S0
0433  5247          JMP   QUX

                /"NOT DIVISIBLE BY 3"
0434  4502    Q4,   JMS I TYPE
0435  1617          1617  /NO
0436  2440          2440  /T
0437  0411          0411  /DI
0440  2611          2611  /VI
0441  2311          2311  /SI
0442  0214          0214  /BL
```

```
0443  0540            0540  /E
0444  2231            0231  /BY
0445  4063            4063  / 3
0446  0000            0000  /00
0447  4502    OUX,    JMS I TYPE
0450  4345            4345  /CR+LF
0451  0000            0000  /END
0452  5653            JMP I .+1
0453  1061            INIT

                      /THE CODING BELOW CREATES THE BLOCK NUMBER
                      /CONVERSION PRIOR TO THE TAPE WRITE.

0454  0000    MES,    0
0455  3023            DCA     W4      /SAVE WORD
0456  7100            CLL
0457  1023            TAD     W4
0460  7052            CMA     RTR
0461  7012            RTR
0462  0051            AND     C7000
0463  3306            DCA     V1
0464  1023            TAD     W4
0465  7046            CMA     RTL
0466  7004            RAL
0467  0040            AND     C0700
0470  3307            DCA     V2
0471  1023            TAD     W4
0472  7052            CMA     RTR
0473  7010            RAR
0474  0035            AND     C0070
0475  3313            DCA     V3
0476  1023            TAD     W4
0477  7046            CMA     RTL
0500  7006            RTL
0501  0037            AND     C0007
0502  1306            TAD     V1
0503  1307            TAD     V2
0504  1313            TAD     V3
0505  5654            JMP  I  MES

0506  0000    V1,     0000
0507  0000    V2,     0000
0510  7777            7777
0511  7700            7700
0512  0000            0000
0513  0000    V3,     0000
0514  0000            0000

0515  7200    PATCH,  CLA
0516  1322            TAD     .+4
0517  3001            DCA     1
0520  5721            JMP  I  .+1
0521  1000            START
0522  7402            HLT
```

```
                0600    *600

0600    7000    STALL,  0
0601    7200            CLA
0602    1412            TAD I 12        /WORD TO BE WRITTEN
0603    6773            SDSQ            /WAIT FOR QUADLINE FLAG
0604    5203            JMP .-1
0605    6775            SDLD            /LOAD DATA REGISTERS
0606    6772            SDST            /CHECK FOR TIMING ERROR
0607    7410            SKP
0610    4567            JMS  I  SELTIM          /TIMING ERROR
0611    7200            CLA
0612    5600            JMP I STALL     /GO GET NEXT WORD


                /WAIT TILL WORD COUNT REGISTER GOES TO ZERO
                /BLOCK NUMBER ERROR
0613    0000    ZBLK,   0
0614    7200            CLA
0615    1027            TAD     DTA
0616    6774            SDLC            /STOP MOVEMENT OF TAPE
0617    4502            JMS  I  TYPE
0620    2003            2003            /PC
0621    4000            4000            /END
0622    7240            CLA     CMA
0623    1213            TAD     ZBLK
0624    4501            JMS  I  TYOCT
0625    4502            JMS  I  TYPE
0626    4040            4040            /DOUBLE SPACE
0627    0214            0214            /BL
0630    1703            1703            /OC
0631    1340            1340            /K
0632    1625            1625            /NU
0633    1502            1502            /MB
0634    0522            0522            /ER
0635    4000            4000            /END
0636    5344            JMP     ZCOM

                /DATA ERRORS
0637    0000    ZDATA,  0
0640    7200            CLA
0641    1027            TAD     DTA
0642    6774            SDLC            /STOP THE TAPE
0643    4502            JMS  I  TYPE
0644    2003            2003
0645    4000            4000
0646    7240            CLA     CMA
0647    1237            TAD     ZDATA
0650    4501            JMS  I  TYOCT
0651    4502            JMS  I  TYPE
0652    4040            4040
0653    0401            0401            /DA
0654    2401            2401            /TA
0655    4000            4000            /END
```

```
0656  5344          JMP     ŽCOM

                    /MARK TRACK ERROR

0657  0000    ŽMKTK,  0
0660  7200            CLA
0661  1027            TAD     DTA
0662  6774            SDLC                /STOP THE TAPE
0663  4502            JMS  I  TYPE
0664  2003            2003                /PC
0665  4000            4000                /END
0666  7240            CLA     CMA
0667  1257            TAD     ŽMKTK
0670  4501            JMS  I  TYOCT
0671  4502            JMS I TYPE
0672  4040            4040
0673  1501            1501    /MA
0674  2213            2213    /RK
0675  4024            4024    / T
0676  2201            2201    /RA
0677  0313            0313    /CK
0700  4000            4000    / 0
0701  5344            JMP     ŽCOM

                    /PARITY ERROR

0702  0000    ŽPAR,   0
0703  7200            CLA
0704  1027            TAD     DTA
0705  6774            SDLC                /STOP THE TAPE
0706  4502            JMS  I  TYPE
0707  2003            2003                /PC
0710  4000            4000                /END
0711  7240            CLA     CMA
0712  1302            TAD     ŽPAR
0713  4501            JMS  I  TYOCT
0714  4502            JMS I TYPE
0715  4040            4040
0716  0310            0310                /CH
0717  0503            0503                /EC
0720  1323            1323                /KS
0721  2515            2515                /UM
0722  4000            4000                /0
0723  5344            JMP     ŽCOM

                    /TIMING ERROR

0724  0000    ŽTIM,   0
0725  7200            CLA
0726  1027            TAD     DTA
0727  6774            SDLC                /STOP THE TAPE
0730  4502            JMS  I  TYPE
0731  2003            2003
0732  4000            4000
```

```
0733  7240            CLA     CMA
0734  1324            TAD     ZTIM
0735  4501          I TYOCT
0736  4502          I TYPE
0737  4040            4040
0740  2411            2411    /TI
0741  1511            1511    /MI
0742  1607            1607    /NG
0743  4000            4000    / 0

                /TYPE "ERROR PHASE X"

0744  1030    ZCOM,   TAD     PHASE     /WHAT PHASE OF OPERATION
0745  1363            TAD     PFORM     /WAS THE MACHINE IN
0746  3356            DCA     TFORM     /WHEN ERROR OCCURED
0747  4502            JMS I TYPE
0750  0522            0522    /ER
0751  2217            2217    /RO
0752  2240            2240    /R
0753  2010            2010    /PH
0754  0123            0123    /AS
0755  0540            0540    /E
0756  4060    TFORM,  4060    / X
0757  4543            4543    /CR+LF
0760  0000            0000    /END
0761  5762            JMP  I  .+1
0762  2726            RETRY
0763  4060    PFORM,  4060


                /HERE STARTS THIS PROGRAM, IT WILL ASK THE
                /OPERATOR FOR  DRIVE NUMBERS, THEN ASK HIM FOR
                /A DIRECTION ON WHAT TO DO WITH THE DRIVES.

                /THE SEQUENCE FOR MARKING A TAPE WOULD APPEAR AS:


                /UNIT? (0 OR 1 OR 0 1)
                /FORMAT? (MARK 1215)
                /2277 WORDS, 0256 BLOCKS,OK? YES OR NO
                /(YES)


                /THAT DATA IN PARENTHESIS IS TYPED BY THE OPERATOR
                /(HE DOESN'T TYPE THE PARENTHESIS)
                /IF HE HAD ANSWERED NO, "FORMAT?" WOULD BE TYPED OUT.
                /IF THE DRIVE WAS WRONG, HE WOULD TYPE RESTART.
                /IF HE HAD TYPED "MARK" IN RESPONSE TO "FORMAT?" THE
                /TAPE WOULD BE MARKED WITH THE STANDARD PDP-8 CONFIGURATION.
                /IF HE HAD TYPED "MARK 384" THE TAPE WOULD
                /BE MARKED WITH THE STANDARD PDP-10 CONFIGURATION
                /NOTE: THE WORD AND BLOCK NUMBERS ARE TYPED IN OCTAL
                /IF A MISTAKE OCCURS ON THE OPERATORS PART (WITH REFERANCE
                /TO BLOCK + WORD SIZE) HE WILL BE TOLD ABOUT IT
```

```
                1000    *1000

                        /MAKE A CALL FOR THE DECTAPE NUMBERS TO BE
                        /WORKED.

1000  4502      START,  JMS I TYPE      /SET UP TYPER
1001  4543              4543  /CR+LF
1002  4300              4300  /LF+END

1003  4502      TYQU,   JMS I TYPE      /"UNIT?"
1004  2516              2516    /UN
1005  1124              1124    /IT
1006  7740              7740    /?
1007  0000              0000    /END

                        /WAIT FOR A REPLY

1010  4503              JMS I TYPIN     /GET NUMBERS
1011  1067              TAD     BADD    /INITIALIZE POINTER (BFR)
1012  7001              IAC             /(BADD=BUFFER-1, SO BUMP THE AC)
1013  3070              DCA     BFR     /TO START OF INPUT BUFFER
1014  3374              DCA     DCTR    /INITIALIZE DTA COUNTER TO 0
1015  3346              DCA     CRFLAG  /CLEAR FLAG SO CR NOT ACCEPTIBLE
1016  1055      CRCHK,  TAD     CRCOD   /GET CODE FOR CAR. RETN
1017  7041              CIA             /NEGATE IT
1020  1470              TAD I   BFR     /SEE IF NEXT CHAR. IN
1021  7450              SNA             /BUFFER IS CAR. RETN.
1022  5244              JMP     OKCR    /YES: SEE IF C.R. LEGAL HERE
1023  3346              DCA     CRFLAG  /NO: SO C.R. IS LEGAL NOW
1024  1043      VALCHK, TAD     C260    /SEE IF # IS LESS THAN
1025  7041              CIA             /ASCII 0 (260)
1026  1470              TAD I BFR       /SUBTRACT BUFFER DATA
1027  7710              SPA   CLA       /IS IT LESS THAN ASII 0?
1030  5203              JMP   TYQU      /YES: TELL OUTSIDE WORLD
1031  1044              TAD   C261      /NO: SEE IF GREATER THAN
1032  7040              CMA             /ASC II 1 (261)
1033  1470              TAD I BFR       /SUBTRACT BUFFER DATA
1034  7700              SMA   CLA       /GREATER THAN ASCII 7?
1035  5203              JMP   TYQU      /YES: TELL OUTSIDE WORLD
1036  1470              TAD I BFR       /NO: ACCEPT BUFFER
1037  7012              RTR
1040  0051              AND   C7000     /ISOLATE DTA
1041  4347              JMS     REPEAT  /GO CHECK FOR REPEATED DTA AND STORE #
1042  2070              ISZ     BFR     /INCREMENT INPUT BUF. PTR.
1043  5216              JMP     CRCHK   /GO LOOK AT NEXT CHAR.

                        /THIS SECTION CHECKS TO SEE IF THERE HAS BEEN ANY
                        /VALID INPUT ONCE A CARRIAGE RETURN IS SEEN
1044  7200      OKCR,   CLA             /CLEAR AC
```

```
1045  1346            TAD     CRFLAG  /LOAD CR FLAG; 0 MEANS NO GOOD
1046  7650            SNA     CLA
1047  5200            JMP     START   /0: NO VALID INPUT; RESTART
1050  1374            TAD     DCTR    /NOT 0: SO HAVE VALID INPUT
1051  1376            TAD     DBUFAD  /CALCULATE END OF DTA LIST +1
1052  3375            DCA     DBUFPT  /STORE IT IN BUFFER POINTER, THEN
1053  7040            CMA             /COMPLEMENT THE AC AND
1054  3775            DCA I   DBUFPT  /TERMINATE DTA LIST WITH 7777
1055  7200    INIT1,  CLA             /CLEAR AC IF COME THRU LOC IT
1056  1376            TAD     DBUFAD  /AND RESET LIST POINTER
1057  3375            DCA     DBUFPT  /TO START OF LIST
1060  4745            JMS I   GETDTA  /GO GET A DTA NUMBER

                /INFORM THE OPERATOR THAT THE PROGRAM IS SET TO START
                /TYPE "FORMAT" AND WAIT FOR THE REPLY

1061  4502    INIT,   JMS I TYPE      /MESSAGE OUT
1062  0617            0617            /FO
1063  2215            2215            /RM
1064  0124            0124            /AT
1065  7740            7740    /?
1066  0000            0000    /END
1067  4503            JMS I TYPIN     /WAIT FOR A REPLY
1070  4471            JMS I COMPAR    /DID HE TYPE "MARK"?
1071  0315            0315    /M
1072  0301            0301    /A
1073  0322            0322    /R
1074  0313            0313    /K
1075  0000            0000    /END
1076  5301            JMP     .+3
1077  5700            JMP I   .+1
1100  1200            MARK            /TO MARK A TAPE

                /SEE IF HE TYPED "RDR" (READ AND TYPE FIRST 12
                /BLOCK NUMBERS IN REVERSE).

1101  4471            JMS I COMPAR
1102  0322            0322    /R
1103  0304            0304    /D
1104  0322            0322    /R
1105  0000            0000    /0
1106  5311            JMP     .+3
1107  5710            JMP I   .+1
1110  2677            RDR             /TYPE BLOCKS

                /SEE IF HE TYPED "RDF" (READ AND TYPE FIRST 12
                /BLOCK NUMBERS FORWARD).

1111  4471            JMS I COMPAR
1112  0322            0322    /R
1113  0304            0304    /D
1114  0306            0306    /F
1115  0000            0000    /0
1116  5321            JMP     .+3
1117  5720            JMP I   .+1
```

```
1120  2600            RDFA            /TYPE BLOCKS

                /SEE IF HE TYPED "SAME" (MEANING MARK A TAPE
                /USING THE SAME CONSTANTS AS BEFORE).

1121  4471            JMS I COMPAR
1122  0323            0323  /S
1123  0301            0301  /A
1124  0315            0315  /M
1125  0305            0305  /E
1126  0000            0000  /0
1127  5332            JMP   .+3
1130  5731            JMP I .+1
1131  3200            SWCHK           /TO MARK AS BEFORE

                /SEE IF HE TYPED "RESTART"

1132  4471            JMS I COMPAR
1133  0322            0322  /R
1134  0305            0305  /E
1135  0323            0323  /S
1136  0324            0324  /T
1137  0301            0301  /A
1140  0322            0322  /R
1141  0324            0324  /T
1142  0000            0000  /0
1143  4152            JMS   QU        /MUST BE NONSENSE
1144  5200            JMP     START   /START ALL OVER
1145  3133    GETDTA, NUDTA           /POINTER TO ROUTINE TO SWITCH UNITS
1146  0000    CRFLAG, 0               /=0, CR NO GOOD; NOT 0, CR IS OK

                /SUBROUTINE TO CHECK FOR REPEATED DTA NUMBERS
                /DTA # TO COMPARE TO LIST IS IN AC ON ENTRY--THIS
                /ROUTINE STORES THE DTA # IF IT IS NEW AND IGNORES IT
                /IF IT IS NOT-CALL BY JMS REPEAT WITH DTA # IN AC
1147  0000    REPEAT, 0
1150  3377            DCA     DNUM    /TEM STORAGE FOR NEW DTA #
1151  1376            TAD     DBUFAD  /INITIALIZE POINTER (DBUFPT)
1152  3375            DCA     DBUFPT  /TO START OF DTA LIST
1153  1374            TAD     DCTR    /LOAD NUM. OF DTAS STORED
1154  7040            CMA             /COMPLEMENT IT
1155  3373            DCA     COMCTR  /STORE IN COMPARE COUNTER
1156  2373    COMCHK, ISZ     COMCTR  /DONE WITH ALL COMPARES?
1157  5364            JMP     DOCOMP  /NO; GO DO COMPARE
1160  1377            TAD     DNUM    /YES; STORE NEW DTA#
1161  3775            DCA I   DBUFPT  /AT END OF LIST
1162  2374            ISZ     DCTR    /INCR. # OF DTAS STORED
1163  5747            JMP I   REPEAT  /RETURN

                /THIS SECTION DOES THE ACTUAL COMPARISON BETWEEN
                /THE DTA# PASSED TO THE ROUTINE AND A NUMBER ON THE LIST

1164  1775    DOCOMP, TAD I   DBUFPT  /GET NEXT DTA NUMBER FROM LIST
1165  7041            CIA             /NEGATE IT
1166  1377            TAD     DNUM    /ADD IN DTA NUMBER PASSED
```

```
1167  7650          SNA     CLA     /ARE THEY THE SAME?
1170  5747          JMP I   REPEAT  /YES: RETURN
1171  2375          ISZ     DBUFPT  /NO: INCREMENT LIST POINTER
1172  5356          JMP     COMCHK  /SEE IF DONE ALL COMPARES
                    /
                    /
1173  0000    COMCTR, 0             /COUNTER FOR # OF LIST COMPARISONS TO BE DONE
1174  0000    DCTR,   0             /COUNTER FOR # OF DTAS IN LIST
1175  0000    DBUFPT, 0             /POINTER TO CURRENT POSITION IN DTA LIST
1176  3162    DBUFAD, DTABUF        /START OF DTA NUM, LIST
1177  0000    DNUM,   0             /TEM STORAGE FOR DTA #
                    /
                    /
                    PAUSE

      1200          *1200
                    /MARK WAS TYPED IN, IF W1=1 IS NOT A "K",ASSUME THAT
                    /A NUMBER WAS TYPED IN, AND VERIFY THIS, IF W1=1 IS
                    /A "K", ASSUME STANDARD FORMAT,(W1=LAST ENTRY INTO THE BUFFER)

1200  1566    MARK,   TAD  I   BINCO  /ADDRESS OF FIRST BINARY
1201  3024            DCA    W5       /CONSTANT FOR DEC TO BIN
1202  3031            DCA    TOTAL    /WILL BE BINARY EQUIVILANT

                    /SAVE C(X1) FOR DECREMENT THROUGH BUFFER

1203  7240    DNC,    CLA    CMA      /DECREMENT BUFFER ADDRESS
1204  1020            TAD    W1       /ADDRESS BY 1
1205  3020            DCA    W1       /W1=SWEEP ADDRESS

                    /LOOK FOR END OF PROCESSING BY LOOKING FOR A "K" IN BUFFER

1206  1056            TAD    LETK     /LETTER ASCII "K"
1207  7041            CIA             /SUBTRACT FROM CHARACTER
1210  1420            TAD I  W1       /IN BUFFER
1211  7650            SNA    CLA      /EQUAL?
1212  5244            JMP    DIV3     /YES: SEE IF DIVISIBLE BY 3

                    /VERIFY THIS CHARACTER AS BEING OF DECIMAL ORIGIN

1213  1043            TAD    C260     /ASCII FOR 0
1214  7041            CIA             /TO SEE IF CHARACTER
1215  1420            TAD I  W1       /IS LESS THAN 260
1216  7710            SPA    CLA      /IS IT?
1217  5473            JMP I  GU1      /YES: NOT DECIMAL CHARACTER
1220  1046            TAD    C271     /ASCII FOR 9
1221  7040            CMA             /TO SEE IF GREATER THAN
1222  1420            TAD I  W1       /9
1223  7700            SMA    CLA      /IS IT?
1224  5473            JMP I  GU1      /NOT A DECIMAL CHARACTER

                    /CHARACTER IS DECIMAL, NOW CONVERT IT TO BINARY
                    /REMEMBER POSITION OF CHARACTER IN BUFFER MAY BE
                    /10,100,1000.
```

```
1225  1420            TAD I W1        /ISOLATE THE NUMBER
1226  0034            AND   C0017     /FOR PROPER CONVERSION
1227  7450            SNA             /IF 0, NO BINARY CONVERSION NEEDED
1230  5242            JMP   IBS       /YES! 0: INCREMENT BINARY CONVERSION

                /NOT 0, SET UP CONVERSION LOOP

1231  7141            CLL   CIA       /NUMBER OF ADDITIONS
1232  3023            DCA   W4        /TO NEGATIVE FOR ISZ
1233  1424            TAD I W5        /BINARY POSITION TO C(ACC)
1234  1031            TAD   TOTAL     /ADD TO PRESENT TOTAL
1235  7430            SZL             /CHECK ON TO MANY WORDS
1236  5474            JMP I QU2       /TO MANY WORDS CALLED FOR
1237  3031            DCA   TOTAL     /KEEP RUNNING SUM
1240  2023            ISZ   W4        /LAST ADDITION?
1241  5233            JMP   .-6       /NO: ADD AGAIN

                /FINAL ADDITION FOR THIS POSITION COMPLETED

1242  2024    IBS,    ISZ   W5        /NEXT POSITION
1243  5203            JMP   DNC       /DO NEXT CHARACTER

                /LAST CHARACTER COMPLETED, SEE IF DIVISIBLE BY 3
                /IF NOT A NORMAL INPUT

1244  1031    DIV3,   TAD   TOTAL     /GET TOTAL WORDS
1245  7450            SNA             /IF TOTAL 0, NORMAL INPUT
1246  1042            TAD   C201      /129 OCT. THIS TEST REDUNDANT
1247  1034            TAD   C0017     /ADD CONSTANT 15 TO TOTAL
1250  3031            DCA   TOTAL     /FOR FUTURE CONSIDERATIONS
1251  3032            DCA   VAR1      /# OF WORDS/3 FOR MARK TRACK WRITING
1252  1031            TAD   TOTAL     /RESTORE IN THE ACC
1253  7100            CLL             /TO DIVIDE BY 3, LINK KEEPS OVERFLOW
1254  1061            TAD   M3        /SUBTRACT 3
1255  2032            ISZ   VAR1      /ON EACH DIVISION, KEEP RUNNING SUM
1256  7440            SZA             /IF AC = 0,NO REMAINDER
1257  7420            SNL             /WHEN LINC GOES TO 0, DIVISION ENDED
1260  7410            SKP             /NOW SEE IF IT DIVIDED EVENLY
1261  5253            JMP   .-6       /SUBTRACT 3 MORE
1262  7640            SZA   CLA       /IF 0,OK, OTHERWISE ERROR
1263  5476            JMP I QU4       /NOT DIVISIBLE BY 3

                /CORRECT "VAR1" ( THE NUMBER OF WORDS/3) FOR THE +15
                /ADDED JUST ABOVE AND AN INHERANT +2 DUE TO MARK TRACK
                /CONFIGURATION TO BE WRITTEN.

1264  1063            TAD   M7        /SUBTRACT 7 FROM PHONY SETUP
1265  1032            TAD   VAR1      /GIVING THE NUMBER OF TIMES
1266  7041            CIA             /TO BE USED LATER IN A ISZ
1267  3032            DCA   VAR1      /DATA MARK WILL BE WRITTEN

                /COMPUTE A VALUE FOR TOTAL NUMBER OF BLOCKS
                /RECORD SIZE + 15 INTO 636160 OCT.

1270  1053            TAD   C7714     /EXTENDED 64 VALUE. SETS AC#2
```

```
1271  3020            DCA   W1          /SET FOR 640000
1272  4755            JMS I FORM10      /PATCH TO CHECK FOR STD.10 FORMAT
1273  1050            TAD   C1620       /VERNIER ADJUSTMENT FOR FORMULA
1274  7100            CLL               /ACC#2 CARRY FUNCTION
1275  1031            TAD   TOTAL       /WORD COUNT
1276  2026            ISZ   BLOCKS      /+1 TO BLOCK.COUNT
1277  7410            SKP
1300  5475            JMP I QU3         /TO MANY BLOCKS CALLED FOR
1301  7420            SNL               /CARRY INTO ACC#2?
1302  5275            JMP   .-5         /NO: CONTINUE COUNT
1303  2020            ISZ   W1          /YES: FULLY DIVIDED?
1304  5274            JMP   .-10        /NO: CONTINUE PROCESS
1305  7300            CLA   CLL         /C(ACC)+ C(L)=0
1306  1026    F10RTN, TAD   BLOCKS      /FOR MARK TRACK (COME HERE FR F10PAT IF 10 FRMT)
1307  7040            CMA               /WRITING
1310  3033            DCA   VAR2        /SEE MARK WRITE

                /VALUES FOR BLOCK AND RECORD SIZE HAVE BEEN
                /COMPUTED, TELL OUTSIDE WORLD AND GET THE OK.

1311  1031            TAD   TOTAL       /SUBTRACT 15 FROM TOTAL
1312  1054            TAD   C7761       /WORDS FOOLING OPERATOR
1313  3031            DCA   TOTAL       /CORRECTED FOR TAPE WRITING
1314  1031            TAD   TOTAL       /FOR OCTAL TYPEOUT
1315  4501            JMS I TYOCT       /TYPE OCTAL WORDS
1316  4502            JMS I TYPE        /TYPE MESSAGE
1317  4027            4027  /W
1320  1722            1722  /OR
1321  0423            0423  /DS
1322  5400            5400  /, END
1323  1026            TAD   BLOCKS      /TYPE OUT BLOCK #S
1324  7001            IAC               /TO FOOL THE OPERATOR
1325  4501            JMS I TYOCT       /IN OCTAL
1326  4502            JMS I TYPE        /TYPE MESSAGES
1327  4002            4002  /B
1330  1417            1417  /LO
1331  0313            0313  /CK
1332  2356            2356  /S,
1333  1713            1713  /OK
1334  7733            7733  /?(
1335  3105            3105  /YE
1336  2340            2340  /S
1337  1722            1722  /OR
1340  4016            4016  /N
1341  1735            1735  /O)
1342  4543            4543  /CR+LF
1343  0000            0000  /END
1344  4503            JMS I TYPIN       /WAIT FOR REPLY

                /SEE IF A YES OR NO ANSWER WAS GIVEN

1345  4471            JMS I COMPAR
1346  0331              /Y
1347  0305              /E
1350  0323              /S
```

```
1351  2000          0000   /END
1352  5472          JMP I IT

1353  5754          JMP  I  .+1
1354  3220          SWCHK
1355  1556    FORM10, F10PAT


      1400    *1400
              /SET THE TAPE INTO MOTION, ALL VARIABLES ARE SET.

              /WRITE TIMING AND MARK TRACK

1400  7200    STMK,   CLA
1401  3030          DCA     PHASE
1402  1161          TAD   DT1400    /FWD, WRITE, GO
1403  1027          TAD   DTA       /GET UNIT NUMBER
1404  6774          SDLC            /LOAD COMMAND REGISTER
1405  1033          TAD   VAR2      /TO MAKE A RESTART FOR THE SAME
1406  3025          DCA   W6        /OPTION POSSIBLE

              /WRITE ABOUT 10 FEET OF END ZONE
1407  3020          DCA   W1
1410  1310    CEZ,    TAD   REZ       /ADDRESS OF DATA
1411  4270          JMS   SETUP
1412  2020          ISZ   W1
1413  5210          JMP   CEZ       /NOT END FOOTAGE
1414  1065          TAD   M144      /OK WRITE INTERBLOCK SYNC
1415  3020          DCA   W1
1416  4222          JMS   INBLSY
1417  2020          ISZ   W1
1420  5216          JMP   .-2
1421  5230          JMP   WDZ

              /WRITE INTERBLOCK SYNC
1422  0000    INBLSY, 0
1423  1032          TAD   VAR1      /RESET THE WORDS
1424  3024          DCA   W5
1425  1314          TAD   IBZ       /ADDRESS OF DATA
1426  4270          JMS   SETUP     /GO OUT AND WRITE I
1427  5622          JMP I INBLSY    /GO DO AGAIN

              /WRITE FORWARD BLOCKMARK AND REVERSE GUARD
1430  1320    WDZ,    TAD   FBM       /ADDRESS OF PATTERN
1431  4270          JMS   SETUP

              /WRITE LOCKMARK, REVERSE CHECKSUM, REV FINAL, REV PREFINAL
1432  1324    LRCFP,  TAD   WLMRF
1433  4300          JMS   SETUP1

              /WRITE THE DATA TRACK
1434  1333    DTRK,   TAD   DZ        /ADDRESS OF PATTERN
1435  4270          JMS   SETUP
1436  2024          ISZ   W5
1437  5234          JMP   DTRK      /NOW WRITE DATA MARK TRACK AGAIN
```

```
                        /WRITE PREFINAL, FINAL, CHECKSUM, AND REVERSE LOCK
1440  1337    PFCRC,    TAD   FEZ       /ADDRESS OF DATA
1441  4300              JMS   SETUP1

                        /WRITE GUARD REVERSE BLOCK
1442  1346    GRB,      TAD   GRZ
1443  4270              JMS   SETUP

                        /THIS COMPLETES 1 BLOCK, GO BACK AND WRITE THE REST
1444  4222              JMS   INBLSY    /WRITE INTERBLOCK SYNC
1445  2025              ISZ   W6        /TOTAL NUMBER OF BLOCKS
1446  5230              JMP   WDZ       /WRITTEN? NO!

                        /ALL DATA BLOCKS WRITTEN NOW WRITE BUFFER ZONE OF INTERBLOCK SYNC
1447  1123              TAD   M143      /198 EXPAND CODES AT END OF BLOCKS
1450  3020              DCA   W1
1451  4222              JMS   INBLSY
1452  2020              ISZ   W1
1453  5251              JMP   .-2

                        /FINISHED BLOCK WRITTING, WRITE ANOTHER 10(1) OF END ZONES
1454  3020              DCA   W1
1455  1352    WEZF,     TAD   EZM
1456  4270              JMS   SETUP
1457  2020              ISZ   W1
1460  5255              JMP   WEZF
1461  6772              SDST
1462  7610              SKP     CLA
1463  4567              JMS   I SELTIM          /TIMING ERROR
1464  1373              TAD     C1
1465  3030              DCA     PHASE
1466  5667              JMP I .+1
1467  1600              MWTM

1470  0000    SETUP,    0
1471  3012              DCA   I2        /WORD TO BE WRITTEN ON MARK TRACK
1472  1061              TAD   M3
1473  3105              DCA   WC
1474  4504              JMS I WAIT
1475  2105              ISZ   WC
1476  5274              JMP   .-2
1477  5670              JMP I SETUP

1500  0000    SETUP1,   0
1501  3012              DCA   I2
1502  1062              TAD   M6
1503  3105              DCA   WC
1504  4504              JMS I WAIT
1505  2105              ISZ   WC
1506  5304              JMP   .-2
1507  5700              JMP I SETUP1

                /THESE ARE THE DATA CONFIGURATIONS FOR THE MARK TRACK
```

```
                        /REVERSE END ZONE

1510  1510      REZ,    .
1511  4044              4044    /ON TAPE AS 5555 (OCT)
1512  0440              0440
1513  4404              4404

                        /INTERBLOCK SYNC

1514  1514      IBZ,    .
1515  0404              0404    /ON TAPE AS 2525 (OCT)
1516  0404              0404
1517  0404              0404

                        /FORWARD BLOCK MARK AND REVERSE GUARD

1520  1520      FBM,    .
1521  0404              0404    /ON TAPE AS 2632 (OCT)
1522  4004              4004
1523  4040              4040

                        /LOCK MARK, REVERSE CHECKSUM, REVERSE FINAL
                        /AND REVERSE PREFINAL

1524  1524      WLMRF,  .
1525  0040              0040    /ON TAPE AS 10101010 (OCT)
1526  0000              0000
1527  4000              4000
1530  0040              0040
1531  0000              0000
1532  4000              4000

                        /DATA MARK

1533  1533      DZ,     .
1534  4440              4440    /ON TAPE AS 7070 (OCT)
1535  0044              0044
1536  4000              4000

                        /PREFINAL, FINAL, FWD CHECKSUM, AND REVERSE LOCK

1537  1537      FEZ,    .
1540  4440              4440    /ON TAPE AS 73737373 (OCT)
1541  4444              4444
1542  4044              4044
1543  4440              4440
1544  4444              4444
1545  4044              4044

                        /FORWARD GUARD AND REVERSE BLOCK NUMBER

1546  1546      GRZ,    .
1547  4040              4040    /ON TAPE AS 5145 (OCT)
1550  0440              0440
```

```
1551  0404          0404

                    /FORWARD END ZONE

1552  1552    EZM,  .
1553  0400          0400    /ON TAPE AS 2222 (OCT)
1554  4004          4004
1555  0040          0040
                    /SUBROUTINE TO SEE IF USER TYPED MARK 384
                    /TO SPECIFY STANDARD PDP-10 FORMAT
1556  0000    F10PAT, 0
1557  3026          DCA     BLOCKS  /CLEAR LOC, BLOCKS IN CASE NOT 10-FORMAT
1560  1031          TAD     TOTAL   /AND GET NUMBER TYPED BY USER
1561  1371          TAD     M617    /WAS IT 384?
1562  7640          SZA     CLA
1563  5756          JMP I   F10PAT  /NO-RETURN
1564  3020          DCA     W1      /YES-CLEAR W1 FOR WAIT LOOP
1565  1372          TAD     C1101   /AND ADJUST BLOCK TOTAL FOR
1566  3026          DCA     BLOCKS  /1102(OCTAL) BLOCKS.
1567  5770          JMP I   .+1
1570  1306    F10BAK, F10RTN
1571  7161    M617,   -617
1572  1101    C1101,  1101

1573  0001    C1,     0001
      1600          #1600
                    /THE MARK TRACK HAS BEEN WRITTEN, AND TAPE IS
                    /MOVING FORWARD IN THE FORWARD END ZONE. STOP
                    /THE TAPE AND SEE IF THERE ARE ANY TAPES LEFT TO
                    /MARK--IF SO GO DO THEM, ELSE TELL OPERATOR TO THROW THE
                    /"OFF/WTM" SWITCH TO "OFF"
                    /HE WILL THEN CONTINUE AFTER THIS ACTION


                    /KILL WRITE,STOP TAPE

1600  7200    MWTM,   CLA
1601  1027          TAD     DTA     /UNIT
1602  6774          SDLC
1603  4777'         JMS     NUDTA
1604  5574          JMP  I  DOMARK

                    /MESSAGE TO THE OPERATOR
1605  4502    OFF,    JMS I   TYPE
1606  2305          2305            /SE
1607  2440          2440            /T
1610  2327          2327            /SW
1611  1124          1124            /IT
1612  0310          0310            /CH
1613  4024          4024            /T
1614  1740          1740            /O
1615  1706          1706            /OF
1616  0600          0600            /F
1617  4503          JMS  I  TYPIN   /WAIT FOR CR
1620  5621          JMP  I  .+1
```

```
1621  3327            SWOFF           /CHECK TO MAKE SURE THAT SWITCH IS OFF
                      /REVERSE TAPE AND READ MARK TRACK
1622  1164  PSER,     TAD     DT3000  /REVERSE GO
1623  1027            TAD     DTA             /UNIT
1624  6774            SDLC            /LOAD COMMAND REGISTER
1625  3020            DCA     W1      /STALL ROUTINE TO GET UP TO SPEED
1626  6773            SDSQ
1627  5226            JMP     .-1
1630  6776            SDRC
1631  2020            ISZ     W1
1632  5226            JMP     .-4
1633  6773            SDSQ            /SKIP ON QUAD LINE IF SET AFTER WAIT ROUTINE
1634  7410            SKP
1635  5240            JMP     .+3     /FLAG WAS SET
1636  6771            SDSS            /READ IN A LINE OF TAPE
1637  5236            JMP     .-1
1640  6776            SDRC            /READ THE COMMAND REGISTER
1641  6772            SDST            /CHECK FOR A TIMING ERROR
1642  7410            SKP
1643  4567            JMS  I  SELTIM          /TIMING ERROR
1644  0135            AND     MSK77   /CHECK TO SEE IF TAPE IS STILL IN END ZONE
1645  1111            TAD     M55
1646  7640            SZA     CLA
1647  5236            JMP     .-11    /NOT A 55 YET
1650  4532            JMS  I  SSDSQT  /YES,READ IN SOME MORE
1651  1111            TAD     M55     /IS IT END ZONE
1652  7650            SNA     CLA
1653  5250            JMP     .-3     /STILL IN END ZONE
1654  1106            TAD     MTR     /GET THE MARK TRACK
1655  1112            TAD     M25     /IS IT EXPAND CODE
1656  7640            SZA     CLA
1657  4534            JMS  I  SCEXPC  /NOT YET,CHECK FOR A 52,AND ADVANCE 3 LINES
1660  7200            CLA             /YES IT IS EXPAND CODE
1661  1126            TAD     M306    /SET UP FOR 198 EXPAND CODES
1662  3127            DCA     CNT
1663  4532            JMS  I  SSDSQT  /THE TAPE SHOULD BE IN SYNC NOW
1664  1112            TAD     M25     /READ THE REST OF EXPAND CODE
1665  7640            SZA     CLA
1666  4570            JMS  I  MARKER  /MARK TRACK ERROR
1667  2127            ISZ     CNT     /INCREMENT COUNTER
1670  5263            JMP     .-5
1671  1033            TAD     VAR2    /NUMBER OF BLOCKS
1672  3025            DCA     W6
1673  4532  RSTBLK,  JMS  I  SSDSQT  /START OF A STANDARD BLOCK
1674  1112            TAD     M25     /FIRST EXPAND CODE AT BEGINNING
1675  7640            SZA     CLA     /OF BLOCK
1676  4570            JMS  I  MARKER  /MARK TRACK ERROR
1677  4532            JMS  I  SSDSQT  /READ MARK BLOCK NUMBER
1700  1113            TAD     M26
1701  7640            SZA     CLA
1702  4570            JMS  I  MARKER  /MARK TRACK ERROR
1703  4532            JMS  I  SSDSQT  /READ MARK GUARD
1704  1114            TAD     M32
1705  7640            SZA     CLA
1706  4570            JMS  I  MARKER  /MARK TRACK ERROR
```

```
1727  1130          TAD     M4
1710  3127          DCA     CNT
1711  4532          JMS  I  SSDSQT  /READ L,CK,F,PF
1712  1115          TAD     M10
1713  7640          SZA     CLA
1714  4570          JMS  I  MARKER  /MARK TRACK ERROR
1715  2127          ISZ     CNT
1716  5311          JMP     .-5
1717  7300          CLA     CLL
1720  1032          TAD     VAR1
1721  7004          RAL
1722  3024          DCA     W5      /NUMBER OF DATA MARKS
1723  4532          JMS  I  SSDSQT  /READ DATA MARKS
1724  1116          TAD     M70
1725  7640          SZA     CLA
1726  4570          JMS  I  MARKER          /MARK TRACK ERROR
1727  2024          ISZ     W5      /COUNT FOR NUMBER OF BLOCKS
1730  5323          JMP     .-5
1731  1130          TAD     M4
1732  3127          DCA     CNT
1733  4532          JMS  I  SSDSQT  /READ PF,F,CK,L
1734  1117          TAD     M73
1735  7640          SZA     CLA
1736  4570          JMS  I  MARKER  /MARK TRACK ERROR
1737  2127          ISZ     CNT
1740  5333          JMP     .-5
1741  4532          JMS  I  SSDSQT  /READ REVERSE GUARD
1742  1120          TAD     M51
1743  7640          SZA     CLA
1744  4570          JMS  I  MARKER

1745  4532          JMS  I  SSDSQT  /READ BLOCK NUMBER
1746  1121          TAD     M45
1747  7640          SZA     CLA
1750  4570          JMS  I  MARKER  /MARK TRACK ERROR
1751  4532          JMS  I  SSDSQT  /READ EXPAND CODE
1752  1112          TAD     M25
1753  7640          SZA     CLA
1754  4570          JMS  I  MARKER  /END OF ONE BLOCK,MARK TRACK ERROR

1755  2025          ISZ     W6      /FINISHED ALL BLOCKS
1756  5273          JMP     RSTBLK  /NO;DO OTHER BLOCKS
1757  1131          TAD     M307    /SET UP FOR INTERBLOCK SYNC AT END OF TAPE
1760  3127          DCA     CNT
1761  4532          JMS  I  SSDSQT  /CHECK FOR 199 EXPAND CODES
1762  1112          TAD     M25
1763  7640          SZA     CLA
1764  4570          JMS  I  MARKER  /MARK TRACK ERROR
1765  2127          ISZ     CNT
1766  5361          JMP     .-5
1767  4532          JMS  I  SSDSQT
1770  1122          TAD     M22
1771  7640          SZA     CLA
1772  4570          JMS  I  MARKER
1773  1027          TAD     DTA
```

```
1774  6774            SDLC
1775  5776            JMP  I  .+1
1776  2000    WDBLKN, DBLKN   /GO OUT TO WRITE DATA AND BLOCK NUMBERS FORWARD


1777  3133
      2000    *2000
2000  1356    DBLKN,  TAD     C2
2001  3030            DCA     PHASE
2002  1033            TAD     VAR2    /NUMBER OF BLOCKS

2003  3025            DCA     W6
2004  3137            DCA     BLK     /INITIAL BLOCK IS 0
2005  1137            TAD     BLK
2006  4477            JMS  I  MESS    /COMPUTE THE COMP OBVERSE OF REV BLK
2007  3140            DCA     REVBLK
2010  6775            SDLD
2011  1161            TAD     DT1400  /FORWARD,WRITE,GO
2012  1027            TAD     DTA     /UNIT
2013  6774            SDLC            /LOAD THE COMMAND REGISTER
2014  6776            SDRC            /CHECK TO MAKE SURE WRITE IS SET
2015  7006            RTL
2016  7004            RAL
2017  7700            SMA     CLA
2020  4357            JMS     WLO     /WRITE FAILED TO SET
2021  1062            TAD     M6
2022  3127            DCA     CNT
2023  6773            SDSQ            /ROUTINE TO GET UP TO SPEED
2024  5223            JMP     .-1
2025  6775            SDLD
2026  2127            ISZ     CNT
2027  5223            JMP     .-4
2030  6775            SDLD
2031  6772            SDST
2032  7410            SKP
2033  4567            JMS  I  SELTIM          /TIMING ERROR
2034  6771    LINE,   SDSS            /WRITE ALL ZEROES TO THE FIRST BLOCK
2035  5234            JMP     .-1
2036  6775            SDLD            /LOAD THE DATA BUFFER
2037  6776            SDRC
2040  6772            SDST
2041  7410            SKP
2042  4567            JMS  I  SELTIM          /TIMING ERROR
2043  0135            AND     MSK77
2044  3106            DCA     MTR
2045  1106            TAD     MTR
2046  1113            TAD     M26
2047  7640            SZA     CLA
2050  5234            JMP     LINE
2051  6775            SDLD
2052  6772            SDST
2053  7410            SKP
2054  4567            JMS  I  SELTIM          /TIMING ERROR
2055  5265            JMP     WDOBLK  /GO AND WRITE REVERSE GUARD
2056  7300    WDBLK,  CLA CLL         /BEGINNING OF BLOCK,WRITE DATA AND BLOCK NUMBER
```

```
2057  4346            JMS     W4L     /WRITE EIGHT LINES
2060  4346            JMS     W4L     /END OF EXPAND CODE,BEGINNING OF BLK NUMBER
2061  1137            TAD     BLK     /GET FORWARD BLOCK NUMBER
2062  4346            JMS     W4L     /WRITE IT
2063  7200            CLA
2064  4346            JMS     W4L     /WRITE FIRST WORD OF REV GUARD
2065  7200    WDOBLK, CLA
2066  4346            JMS     W4L     /SECOND WORD OF REVERSE GUARD
2067  4346            JMS     W4L
2070  4346            JMS     W4L     /FIRST WORD OF REVERSE CHECKSUM
2071  1031    WDATA,  TAD     TOTAL   /NUMBER OF DATA WORDS TO BE WRITTEN
2072  7041            CIA
2073  3024            DCA     W5      /SET UP COUNTER
2074  4346            JMS     W4L
2075  2024            ISZ     W5      /INCREMENT COUNTER
2076  5274            JMP     .-2
2077  7300            CLA     CLL
2100  1135            TAD     MSK77   /COME BACK TO WRITE LAST WORD AND CHECKSUM
2101  4346            JMS     W4L
2102  7200            CLA
2103  4346            JMS     W4L     /FINISH CHECKSUM
2104  4346            JMS     W4L     /FIRST WORD OF REVERSE LOCK
2105  4346            JMS     W4L     /LAST WORD OF RL, AND HALF OF GUARD
2106  4346            JMS     W4L     /REST OF GUARD
2107  1140            TAD     REVBLK  /GET REVERSE BLOCK NUMBER
2110  4346            JMS     W4L
2111  7240            CLA     CMA
2112  4346            JMS     W4L     /END OF BLOCK NUMBER AND HALF OF EXPAND CODE
2113  4346            JMS     W4L     /END OF EXPAND CODE
2114  2137            ISZ     BLK
2115  7200            CLA
2116  1137            TAD     BLK
2117  4477            JMS  I  MESS    /COMPUTE NEW BLK NUMBER
2120  3140            DCA     REVBLK
2121  6772            SDST
2122  7410            SKP
2123  4567            JMS  I  SELTIM          /TIMING ERROR
2124  2025            ISZ     W6      /IS IT DONE WRITING BLK AND DATA
2125  5256            JMP     WDBLK   /NO
2126  6773            SDSQ
2127  5326            JMP     .-1
2130  6777            SDRD
2131  7200            CLA
2132  1165            TAD     DTI000  /SEARCH FOR END ZONE
2133  1027            TAD     DTA     /GET UNIT
2134  6774            SDLC            /LOAD THE COMMAND REG
2135  6771            SDSS
2136  5335            JMP     .-1
2137  6776            SDRC
2140  0135            AND     MSK77
2141  1122            TAD     M22
2142  7640            SZA     CLA
2143  5335            JMP     .+6
2144  5745            JMP  I  .+1
2145  2400            DBLOCK
```

```
2146  0000    W4L,    0
2147  6773            SDSQ
2150  5347            JMP     .-1     /SKIP ON QUAD LINE FLAG
2151  6775            SDLD            /LOAD THE DATA BUFFER
2152  6772            SDST            /CHECK FOR A TIMING ERROR
2153  7410            SKP
2154  4567            JMS  I  SELTIM          /TIMING ERROR
2155  5746            JMP  I  W4L

2156  0002    C2,     0002

2157  0000    WLO,    0
2160  1027            TAD     DTA     /STOP THE TAPE
2161  6774            SDLC            /LOAD THE COMMAND REGISTER
2162  4502            JMS  I  TYPE
2163  2003            2003            /PC
2164  4000            4000            /END
2165  7240            CLA     CMA
2166  1357            TAD     WLO
2167  4501            JMS  I  TYOCT
2170  4502            JMS  I  TYPE
2171  4040            4040
2172  2722            2722            /WR
2173  1124            1124            /IT
2174  0540            0540            /E
2175  0000            0000            /END
2176  5777            JMP  I  .+1
2177  0744            ZCOM


      2200    *2200
2200  1372    BLCSD,  TAD     C4
2201  3030            DCA     PHASE
2202  7300            CLA     CLL
2203  1033            TAD     VAR2
2204  3025            DCA     W6      /SET UP FOR THE NUMBER OF BLOCKS
2205  3137            DCA     BLK     /SET BLK TO 0
2206  1165            TAD     D.1000  /FORWARD READ
2207  1027            TAD     DTA     /UNIT
2210  6774            SDLC            /LOAD THE COMMAND REG
2211  1137            TAD     BLK
2212  4477            JMS  I  MESS    /CALCULATE THE COMPLEMENT OBVERSE
2213  3140            DCA     REVBLK
2214  6772            SDST
2215  7410            SKP
2216  4567            JMS  I  SELTIM          /TIMING ERROR
2217  1062            TAD     M6      /WAIT TO GET UP TO SPEED
2220  3127            DCA     CNT     /SET UP COUNTER
2221  6773            SDSQ            /SKIP ON A QUAD LINE FLAG
2222  5221            JMP     .-1
2223  6777            SDRD            /READ THE DATA BUFFER TO CLEAR FLAG
2224  2127            ISZ     CNT
2225  5221            JMP     .-4
```

```
2226  7200            CLA
2227  3142  BLCSDA,   DCA     CHKSUM
2230  4507            JMS  I  SLRDRC  /READ A SINGLE LINE AT A TIME
2231  1113            TAD     M26
2232  7640            SZA     CLA     /IS IT BLOCK MARK
2233  5777'           JMP     SRDRC+4 /NO,GO BACK
2234  6772            SDST
2235  7410            SKP
2236  4567            JMS  I  SELTIM          /TIMING ERROR
2237  1110            TAD     DATRD
2240  7041            CIA
2241  1137            TAD     BLK
2242  7640            SZA     CLA
2243  4571            JMS  I  BLKERR  /BLK NUMBER ERROR
2244  4532            JMS  I  SSDSQT  /READ GUARD
2245  4532            JMS  I  SSDSQT  /READ REVERSE LOCK
2246  4532            JMS  I  SSDSQT  /READ CHECKSUM
2247  6777            SDRD            /READ THE DATA BUFFER
2250  6772            SDST
2251  7410            SKP
2252  4567            JMS  I  SELTIM          /TIMING ERROR
2253  0135            AND     MSK77
2254  4541            JMS  I  BCXOR   /GO OUT TO CHECKSUM ROUTINE
2255  1031  RDATA,    TAD     TOTAL   /NUMBER OF WORDS PER BLOCK
2256  7041            CIA
2257  3024            DCA     W5      /SET UP COUNTER
2260  6773            SDSQ
2261  5260            JMP     .-1
2262  6777            SDRD            /READ THE DATA BUFFER
2263  6772            SDST
2264  7410            SKP
2265  4567            JMS  I  SELTIM          /TIMING ERROR
2266  3110            DCA     DATRD
2267  1110            TAD     DATRD   /SAVE THE DATA WORD
2270  7640            SZA     CLA
2271  4572            JMS  I  DATERR  /DATA ERROR
2272  1110            TAD     DATRD
2273  4541            JMS  I  BCXOR
2274  6772            SDST            /CHECK FOR A TIMING ERROR
2275  7410            SKP
2276  4567            JMS  I  SELTIM          /TIMING ERROR
2277  2024            ISZ     W5
2300  5260            JMP     RDATA+3
2301  6773            SDSQ            /READ REVERSE CHECKSUM
2302  5301            JMP     .-1
2303  6777            SDRD            /READ IT IN
2304  6772            SDST
2305  7410            SKP
2306  4567            JMS  I  SELTIM          /TIMING ERROR
2307  0052            AND     C7700
2310  4541            JMS  I  BCXOR   /CHECK CHECK SUM
2311  1142            TAD     CHKSUM
2312  0135            AND     MSK77
2313  7001            IAC
2314  1052            TAD     C7700
```

```
2315  7640          SZA     CLA
2316  4573          JMS  I  CHKERR  /CHECKSUM ERROR
2317  6772          SDST
2320  7410          SKP
2321  4567          JMS  I  SELTIM          /TIMING ERROR
2322  4507          JMS  I  SLRDRC  /ADVANCE A SINGLE LINE FLAG
2323  1135          TAD     M31     /LOOK FOR REV BLK NUMBER
2324  7640          SZA     CLA
2325  5777          JMP     SRDRC+4
2326  6772          SDST
2327  7410          SKP
2330  4567          JMS  I  SELTIM          /TIMING ERROR
2331  1110          TAD     DATRD
2332  7041          CIA
2333  1140          TAD     REVBLK  /COMPARE BLOCK READ WITH ONE COMPUTED
2334  7640          SZA     CLA
2335  4571          JMS  I  BLKERR  /BLOCK NUMBER ERROR
2336  6773          SDSQ
2337  5336          JMP     .-1
2340  6777          SDRD
2341  6772          SDST
2342  7410          SKP
2343  4567          JMS  I  SELTIM          /TIMING ERROR
2344  7300          CLA     CLL
2345  2137          ISZ     BLK
2346  1137          TAD     BLK
2347  4477          JMS  I  MESS
2350  3140          DCA     REVBLK
2351  6772          SDST
2352  7410          SKP
2353  4567          JMS  I SELTIM           /TIMING ERROR
2354  2025          ISZ     W6
2355  5227          JMP     BLCSDA
2356  1165          TAD     DTI000
2357  1027          TAD     DTA
2360  6774          SDLC
2361  6771          SDSS
2362  5361          JMP     .-1
2363  6776          SDRC
2364  0135          AND     MSK77
2365  1122          TAD     M22
2366  7640          SZA     CLA
2367  5361          JMP     .-6
2370  5771          JMP  I  .-1
2371  2442          RDBLKS

2372  0004    C4,   0004

2377  3124
      2400    *2400
2400  1240    DBLOCK, TAD     C3
2401  3030            DCA     PHASE
2402  7300            CLA     CLL
2403  3235            DCA     DISBLK
2404  1164            TAD     DT3000  /REVERSE,GO
```

```
2405  1027            TAD     DTA             /UNIT
2406  6774            SDLC                    /LOAD THE COMMAND REGISTER
2407  7300            CLA     CLL
2410  6771    DISLUP, SDSS
2411  5210            JMP     .-1
2412  7300            CLA     CLL
2413  6777            SDRD
2414  3236            DCA     DISDAT  /SAVE THE DATA BUFFER
2415  6776            SDRC
2416  0135            AND     MSK77   /MASK OUT THE MARK TRACK
2417  1113            TAD     M26     /CHECK FOR BLOCK NUMBER
2420  7440            SZA
2421  5226            JMP     DISEND  /NOT BLK MARK,CHECK FOR END ZONE
2422  1236            TAD     DISDAT  /DISPLAY THE NUMBER IN THE AC
2423  2235            ISZ     DISBLK
2424  5223            JMP     .-1
2425  5210            JMP     DISLUP  /GO SEARCH FOR THE NEXT BLOCK
2426  1237    DISEND, TAD     FOUR    /IS IT END ZONE
2427  7640            SZA     CLA
2430  5210            JMP     DISLUP  /NO,GO GET NEXT LINE
2431  1027            TAD     DTA     /STOP GET READY TO READ
2432  6774            SDLC            /LOAD THE COMMAND REGISTER
2433  5634            JMP  I  .+1
2434  2200            BLCSD
2435  0000    DISBLK, 0
2436  0000    DISDAT, 0
2437  0004    FOUR,   4
2440  0003    C3,     0003
2441  0005    C5,     0005

2442  1241    RDBLKS, TAD     C5
2443  3030            DCA     PHASE
2444  1033            TAD     VAR2
2445  3024            DCA     W5      /SET UP FOR NUMBER OF BLOCKS
2446  7001            IAC
2447  1033            TAD     VAR2
2450  3025            DCA     W6      /SET UP TO CHECK BLK REVERSE
2451  1164            TAD     D3000   /READ REVERSE GO
2452  1027            TAD     DTA     /UNIT
2453  6774            SDLC            /LOAD THE COMMAND REGISTER
2454  1062            TAD     M6
2455  3127            DCA     CNT
2456  6771            SDSS
2457  5256            JMP     .-1
2460  6776            SDRC
2461  7200            CLA
2462  2127            ISZ     CNT
2463  5256            JMP     .-5
2464  6771    RDBLK,  SDSS
2465  5264            JMP     .-1
2466  6777            SDRD            /READ THE DATA BUFFER AND STORE IT AWAY
2467  3127            DCA     CNT
2470  6776            SDRC
2471  0135            AND     MSK77
2472  1113            TAD     M26
```

```
2473  7640          SZA     CLA     /IS IT BLOCK NUMBER
2474  5264          JMP     RDBLK
2475  1127          TAD     CNT
2476  1025          TAD     W6
2477  7640          SZA     CLA
2500  4571          JMS  I  BLKERR  /BLOCK NUMBER ERROR
2501  7001          IAC
2502  1025          TAD     W6      /INCREMENT A NUMBER FOR COMPARE COUNTER
2503  3025          DCA     W6
2504  2024          ISZ     W5      /INCREMENT BLK COUNTER
2505  5264          JMP     RDBLK
2506  6771          SDSS
2507  5306          JMP     .-1
2510  6776          SDRC
2511  0135          AND     MSK77
2512  1122          TAD     M22
2513  7640          SZA     CLA
2514  5306          JMP     .+6
2515  1027          TAD     DTA
2516  6774          SDLC            /LOAD THE COMMAND REGISTER WITH UNIT STOP
2517  7001          IAC
2520  3030          DCA     PHASE
2521  4777'         JMS     NUDTA
2522  5776'         JMP     PSER
2523  5724          JMP  I  .+1
2524  1061          INIT            /END GO BACK TO DIRECT

2576  1622
2577  3133
      2600    *2600

2600  7300    RDFA,   CLA     CLL
2601  1164            TAD     DT3000  /REVERSE READ GO
2602  1027            TAD     DTA     /GET UNIT
2603  6774            SDLC            /LOAD THE COMMAND REGISTER
2604  6771            SDSS            /SKIP ON A SINGLE LINE FLAG
2605  5204            JMP     .-1
2606  6776            SDRC            /READ THE COMMAND REGISTER
2607  0135            AND     MSK77
2610  1122            TAD     M22     /IS IT END ZONE
2611  7640            SZA     CLA     /YES
2612  5204            JMP     .-6     /NO GO BACK AND LOOK AGAIN
2613  1165            TAD     DT1000  /FORWARD READ GO
2614  1027            TAD     DTA     /UNIT
2615  6774            SDLC            /LOAD THE COMMAND REGISTER
2616  1062            TAD     M6
2617  3127            DCA     CNT
2620  6771            SDSS
2621  5220            JMP     .-1
2622  6776            SDRC
2623  7200            CLA
2624  2127            ISZ     CNT
2625  5220            JMP     .-5
2626  1113    RDFA1,  TAD     M26
2627  3022            DCA     W3      /SET UP COUNTER TO READ 22 BLOCKS
```

```
2630  1067            TAD     BADD    /SET UP BUFFER ADDRESS
2631  3011            DCA     X2
2632  6771            SDSS            /GO SINGLE LINE FLAGS
2633  5232            JMP     .-1
2634  6777            SDRD            /READ THE DATA BUFFER
2635  3127            DCA     CNT
2636  6776            SDRC            /READ THE COMMAND REGISTER
2637  0135            AND     MSK77
2640  1113            TAD     M26     /SEARCH FOR BLOCK NUMBER
2641  7640            SZA     CLA
2642  5232            JMP     RDFA1+4 /NOT BLOCK NUMBER YET GO BACK AGAIN
2643  1127            TAD     CNT     /OK BLK NUMBER STORE IT AWAY
2644  3411            DCA  I  X2
2645  2022            ISZ     W3      /INCREMENT COUNTER
2646  5232            JMP     RDFA1+4 /NOT 22 BLOCKS YET
2647  1027            TAD     DTA
2650  6774            SDLC            /STOP THE DTA

                /TYPE OUT BLOCK NUMBERS AND DTA UNIT#

2651  4502            JMS  I  TYPE
2652  0424            0424            /DT
2653  0140            0140            /A
2654  0000            0000            /END
2655  1027            TAD     DTA     /GET UNIT NUMBER
2656  7006            RTL
2657  4501            JMS  I  TYOCT   /AND TYPE IT OUT
2660  4502            JMS  I  TYPE
2661  4345            4345            /CR&LF
2662  0000            0000            /END
2663  1113            TAD     M26     /WILL TYPE ALL
2664  3020            DCA     W1      /22 WORDS
2665  1067            TAD     BADD    /ADDRESS OF BLOCK
2666  3011            DCA     X2      /NUMBERS TO INDEX
2667  1411            TAD  I  X2      /FIRST OR NEXT BLOCK
2670  4501            JMS  I  TYOCT   /TYPE IT OUT
2671  4502            JMS  I  TYPE    /CR&LF
2672  4345            4345            /CR&LF
2673  0000            0000            /END
2674  2020            ISZ     W1      /COMPLETE
2675  5267            JMP     .+6
2676  5472            JMP  I  IT      /GO ASK FOR FORMAT

2677  7300    RDR,    CLA     CLL
2700  1165            TAD     DTI000  /FORWARD READ GO
2701  1027            TAD     DTA     /UNIT
2702  6774            SDLC            /LOAD THE COMMAND REGISTER
2703  6771            SDSS            /SKIP ON A SINGLE LINE FLAG
2704  5303            JMP     .-1
2705  6776            SDRC            /READ THE COMMAND REGISTER
2706  0135            AND     MSK77
2707  1122            TAD     M22     /CHECK FOR END ZONE
2710  7640            SZA     CLA
2711  5303            JMP     .-6     /NOT YET GO BACK
2712  1164            TAD     DT3000  /REVERSE READ GO
```

```
2713  1027            TAD     DTA     /UNIT
2714  6774            SDLC            /LOAD THE COMMAND REGISTER
2715  1062            TAD     M6
2716  3127            DCA     CNT
2717  6771            SDSS
2720  5317            JMP     .-1
2721  6776            SDRC
2722  7200            CLA
2723  2127            ISZ     CNT
2724  5317            JMP     .-5
2725  5226            JMP     RDFA1   /STORE NUMBERS IN REVERSE

2726  4503    RETRY,  JMS  I  TYPIN
2727  4471            JMS  I  COMPAR
2730  0322            0322            /R
2731  0305            0305            /E
2732  0324            0324            /T
2733  0322            0322            /R
2734  0331            0331            /Y
2735  0000            0000            /END
2736  5472            JMP  I  IT      /GUESS HE DOESN'T WANT TO TRY AGAIN
2737  7200            CLA
2740  1165            TAD     DTI000  /FORWARD READ GO
2741  1027            TAD     DTA     /UNIT
2742  6774            SDLC            /LOAD THE COMMAND REGISTER
2743  1062            TAD     M6
2744  3127            DCA     CNT     /WAIT 6 LINES
2745  6771            SDSS
2746  5345            JMP     .-1
2747  6776            SDRC            /READ THE COMMAND REGISTER
2750  2127            ISZ     CNT
2751  5345            JMP     .-4
2752  6771            SDSS
2753  5352            JMP     .-1
2754  6776            SDRC
2755  0135            AND     MSK77
2756  1122            TAD     M22
2757  7640            SZA     CLA
2760  5352            JMP     .-6
2761  1164            TAD     DT3000
2762  1027            TAD     DTA
2763  6774            SDLC
2764  7201            CLA     IAC
2765  3030            DCA     PHASE
2766  5767            JMP  I  .+1
2767  1633            PSER+11

      3000    *3000

3000  0000    SDSQT,  0
3001  6773            SDSQ            /ADVANCE SIX LINES
3002  5201            JMP     .-1     /SKIP ON QUAD LINE FLAG
3003  6776            SDRC            /READ COMMAND REGISTER
```

```
3024  6772            SDST
3025  7410            SKP
3026  4567            JMS  I  SELTIM          /TIMING ERROR
3027  6771            SDSS
3030  5207            JMP     .-1     /SKIP ON SINGLE LINE FLAG
3031  6776            SDRC
3032  6772            SDST
3033  7410            SKP
3034  4567            JMS  I  SELTIM          /TIMING ERROR
3035  6771            SDSS
3036  5215            JMP     .-1
3037  6776            SDRC            /READ THE COMMAND REGISTER
3040  6772            SDST
3041  7410            SKP
3042  4567            JMS  I  SELTIM          /TIMING ERROR
3043  0135            AND     MSK77   /SAVE THE MARK TRACK LAST 6 BITS
3044  3106            DCA     MTR
3045  1106            TAD     MTR
3046  5600            JMP  I  SDSQT

3047  0000    A3LNS,  0               /ADVANCE THREE LINES
3050  6771            SDSS
3051  5250            JMP     .-1     /SKIP ON SINGLE LINE FLAG
3052  6776            SDRC
3053  6772            SDST
3054  7410            SKP
3055  4567            JMS  I  SELTIM          /TIMING ERROR
3056  6771            SDSS
3057  5256            JMP     .-1
3060  6776            SDRC
3061  6772            SDST
3062  7410            SKP
3063  4567            JMS  I  SELTIM          /TIMING ERROR
3064  6771            SDSS
3065  5264            JMP     .-1
3066  6776            SDRC
3067  6772            SDST
3070  7410            SKP
3071  4567            JMS  I  SELTIM          /TIMING ERROR
3072  0135            AND     MSK77
3073  3106            DCA     MTR
3074  1106            TAD     MTR
3075  5647            JMP  I  A3LNS

3076  0000    CEXPC,  0
3077  1106            TAD     MTR
3100  1124            TAD     M52
3101  7640            SZA     CLA
3102  4570            JMS  I  MARKER  /MARK TRACK ERROR
3103  4247            JMS     A3LNS   /READ THREE MORE LINES
3104  1112            TAD     M25     /IS IT 25 NOW
3105  7640            SZA     CLA
3106  4570            JMS  I  MARKER  /NO ,MARK TRACK ERROR
3107  5676            JMP  I  CEXPC   /YES!!IT IS EXPAND CODE NUMBER 1
```

```
                        /SIXBIT COMPLEMENT XOR SUBROUTINE
                        /SUBROUTINE IS ENTERED WITH DATA WORD TO BE XORED IN AC
                        /TWO SIX-BIT COMPLEMENT XORS WILL TAKE PLACE TO LOC CHKSUM
                        /WITH THE RESULT IN CHKSUM

3070  0000  SBCXOR, 0
3071  7040          CMA             /COMPLEMENT WORD
3072  3143          DCA     SBWORD  /AND SAV
3073  1143          TAD     SBWORD
3074  0142          AND     CHKSUM
3075  7041          CIA
3076  7104          CLL     RAL
3077  1143          TAD     SBWORD
3100  1142          TAD     CHKSUM
3101  3142          DCA     CHKSUM
3102  1143          TAD     SBWORD
3103  7112          RTR CLL;RTR;RTR
3104  7012
3105  7012
3106  3143          DCA     SBWORD
3107  1143          TAD     SBWORD
3110  0142          AND     CHKSUM
3111  7041          CIA
3112  7104          CLL     RAL
3113  1143          TAD     SBWORD
3114  1142          TAD     CHKSUM
3115  0135          AND     MSK77
3116  3142          DCA     CHKSUM
3117  5670          JMP  I  SBCXOR

3120  0000  SRDRC,  0
3121  6773          SDSQ
3122  7410          SKP
3123  5326          JMP     .+3
3124  6771          SDSS
3125  5324          JMP     .-1
3126  6777          SDRD
3127  3110          DCA     DATRD
3130  6776          SDRC
3131  0135          AND     MSK77
3132  5720          JMP  I  SRDRC

3133  0000  NUDTA,  0
3134  1754          TAD  I  LSTPT   /GET CURRENT VALUE OF DATA LIST PTR
3135  3353          DCA     TBUFPT  /STORE IT AS TEM,BUF,PTR
3136  1753          TAD  I  TBUFPT  /GET A DTA # FROM THE LIST
3137  0037          AND     C0007
3140  7640          SZA     CLA     /IS IT A 7777
3141  5346          JMP     LSTEND  /YES END OF LIST
3142  1753          TAD  I  TBUFPT  /NO;GET IT BACK
3143  3027          DCA     DTA
3144  2754          ISZ  I  LSTPT   /INCREMENT LIST POINTER
3145  5733          JMP  I  NUDTA   /RETURN
                    /COME HERE AT END OF LIST TO RESET POINTERS AND RETURN TO CALL+2
3146  2333  LSTEND, ISZ     NUDTA   /INCREMENT RETURN POINTER
```

```
3147  1752            TAD  I  STRTPT  /GET ADR OF START OF LIST
3150  3754            DCA  I  LSTPT
3151  5334            JMP     NUDTA+1 /GO GET FIRST DTA# AND RETURN
3152  1176    STRTPT, DBUFAD  /POINTER TO START OF DATA LIST
3153  0000    TBUFPT, 0               /TEM STORAGE FOR BOT PTR
3154  1175    LSTPT,  DBUFPT          /POINTER TO CURRENT VALUE OF DTA LIST PTR

              /CONSTANTS FOR FORMULA TRANSLATION SECTION
3155  3156    BINCON, .+1
3156  0001            0001
3157  0012            0012
3160  0144            0144
3161  1750            1750
3162  0000    DTABUF, 0



      3200    *3200
              /CHECK SWITCH TO SEE IF SET TO WTM POSITION
3200  4502    SWCHK,  JMS  I  TYPE            /TYPE OUT MESSAGE
3201  2305            2305                    /SE
3202  2440            2440                    /T
3203  2327            2327                    /SW
3204  1124            1124                    /IT
3205  0310            0310                    /CH
3206  4024            4024                    /T
3207  1740            1740                    /O
3210  2724            2724                    /WT
3211  1500            1500                    /M
3212  4503            JMS  I  TYPIN           /WAIT FOR CR
3213  7200            CLA
3214  3256            DCA     CNTERL
3215  6775            SDLD                    /CLEAR SINGLE AND QUAD FLAGS
3216  6771            SDSS
3217  7410            SKP
3220  5224            JMP     .+4
3221  2256            ISZ     CNTERL
3222  5216            JMP     .+4
3223  5267            JMP     SWCHER          /ERROR,TYPE ERROR MESSAGE AND GO TO SWCHK
              /SEE IF THE DRIVE IS OK
3224  6774    RSTSM,  SDLC            /LOAD CR TO CLEAR TIMEING ERROR
3225  6775            SDLD                    /LOAD DATA BUFFER TO CLEAR S Q FLAGS
3226  1162            TAD     DT0400          /SET WRITE
3227  1027            TAD     DTA             /GET UNIT
3230  3257            DCA     SAV             /STORE IT AWAY
3231  1257            TAD     SAV
3232  6771            SDSS
3233  5232            JMP     .-1
3234  6774            SDLC
3235  1257            TAD     SAV
3236  6774            SDLC                    /LOAD THE TRANSPORT
3237  6776            SDRC                    /READ THE COMMAND REGISTER AND CHECK IT
3240  7006            RTL
3241  7004            RAL
```

```
3242  7520          SMA                     /CHECK WRITE TO BE SET
3243  5260          JMP     ERCHK           /WRITE IS NOT SET
3244  7004          RAL                     /CHECK WLO
3245  7510          SPA
3246  5260          JMP     ERCHK           /WLO
3247  7004          RAL                     /CHECK SELECT AND TIMING ERROR
3250  7710          SPA     CLA
3251  5260          JMP     ERCHK           /SELECT OR TIMING ERROR
3252  4777'         JMS     NUDTA           /CHECK OTHER DRIVE IF ANY
3253  5213          JMP     RSTSM-11        /CHECK OTHER DRIVE
3254  5655          JMP  I  .+1
3255  1400          STMK
3256  0000  CNTERL, 0
3257  0000  SAV,    0

3260  4502  ERCHK,  JMS  I  TYPE            /INCORRECT SETUP
3261  2305           2305                   /SE
3262  2425           2425                   /TU
3263  2077           2077                   /P
3264  0000           0000                   /END
3265  5666           JMP  I  .+1
3266  1000           START

3267  4502  SWCHER, JMS  I  TYPE
3270  2327           2327                   /SW
3271  1124           1124                   /IT
3272  0310           0310                   /CH
3273  4016           4016                   /N
3274  1724           1724                   /OT
3275  4023           4023                   /S
3276  0524           0524                   /ET
3277  4024           4024                   /T
3300  1740           1740                   /O
3301  2724           2724                   /WT
3302  1540           1540                   /M
3303  1722           1722                   /OR
3304  4023           4023                   /S
3305  1116           1116                   /IN
3306  0714           0714                   /GL
3307  0540           0540                   /E
3310  1411           1411                   /LI
3311  1605           1605                   /NE
3312  4006           4006                   /F
3313  1401           1401                   /LA
3314  0740           0740                   /G
3315  0601           0601                   /FA
3316  1114           1114                   /IL
3317  0504           0504                   /ED
3320  4024           4024                   /T
3321  1740           1740                   /O
3322  2305           2305                   /SE
3323  2440           2440                   /T
3324  4543           4543                   /CR LF
3325  0000           0000                   /END
3326  5200           JMP     SWCHK
```

```
3327  7200    SWOFF,  CLA
3330  3256            DCA     CNTERL
3331  6775            SDLD                    /CLEAR ANY FLAGS THAT ARE SET
3332  6771            SDSS
3333  7410            SKP
3334  5776'           JMP     OFF             /FLAG SHOULDN'T BE SET
3335  2256            ISZ     CNTERL
3336  5332            JMP     .-4
3337  7200            CLA
3340  5741            JMP  I  .+1
3341  1622            PSER


3376  1605
3377  3133
      3400      *3400
                /INPUT BUFFER FOR TELETYPE THIS MUST BE AT THE END OF PROGRAM

3400  0000      BUFFER, 0

                $
```

```
0000  11111100  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11100000  00000000  00000000  00000000  00000000  00000000

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000000


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100001

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111000  00000000  00000000  00000000  00000000  00000011

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000000


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000000

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11000000  00000000  00000000  00000011

3400  10000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
3500  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

3600
3700
```

```
4200
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

```
A3LNS   3027        CRCOD   0055        M14     0064        QUX     0447
BADD    0067        CRFLAG  1146        M143    0123        RDATA   2255
BCXOR   0141        DATERR  0172        M144    0065        RDBLK   2464
BFR     0070        DATRD   0110        M2      0060        RDBLKS  2442
BINCO   0166        DBLKN   2000        M22     0122        RDFA    2630
BINCON  3155        DBLOCK  2400        M25     0112        RDFA1   2626
BLCSD   2200        DBUFAD  1176        M26     0113        RDR     2677
BLCSDA  2227        DBUFPT  1175        M3      0061        REPEAT  1147
BLK     0137        DCTR    1174        M306    0126        RETRY   2726
BLKERR  0171        DISBLK  2435        M307    0131        REVBLK  0140
BLOCKS  0026        DISDAT  2436        M31     0125        REZ     1510
BUFFER  3400        DISEND  2426        M32     0114        RSEND   0144
C0007   0037        DISLUP  2410        M4      0130        RSTBLK  1673
C0017   0034        DIV3    1244        M40     0253        RSTSM   3224
C0070   0035        DNC     1203        M45     0121        SA3LNS  0133
C0077   0036        DNUM    1177        M51     0120        SAV     3257
C0700   0040        DOCOMP  1164        M52     0124        SBCXOR  3070
C1      1573        DOMARK  0174        M55     0111        SBWORD  0143
C1101   1572        DT0400  0162        M6      0062        SCEXPC  0134
C1620   0050        DT1000  0165        M617    1571        SDLC    6774
C2      2156        DT1400  0161        M7      0063        SDLD    6775
C201    0042        DT2000  0163        M70     0116        SDRC    6776
C203    0041        DT3000  0164        M73     0117        SDRD    6777
C212    0255        DTA     0027        MARK    1200        SDSQ    6773
C215    0256        DTABUF  3162        MARKER  0170        SDSQT   3000
C245    0257        DTRK    1434        MES     0454        SDSS    6771
C260    0043        DZ      1533        MESAGE  0202        SDST    6772
C261    0044        ERCHK   3260        MESS    0077        SELTIM  0167
C270    0045        EZM     1552        MSK77   0135        SETUP   1470
C271    0046        F10BAK  1570        MSRGHT  0221        SETUP1  1500
C277    0047        F10PAT  1556        MTP     0246        SLRDRC  0107
C3      2440        F10RTN  1306        MTR     0106        SPCOD   0066
C340    0254        FBM     1520        MWTM    1600        SRDRC   3120
C4      2372        FEZ     1537        NTYRTN  0265        SSDSQT  0132
C5      2441        FORM10  1355        NUD     0136        STALL   0600
C6060   0377        FOUR    2437        NUDTA   3133        START   1000
C7000   0051        GETDTA  1145        OFF     1605        STMK    1400
C7700   0052        GRB     1442        OKCR    1044        STRTPT  3152
C7714   0053        GRZ     1546        PATCH   0515        STX     0100
C7761   0054        IBS     1242        PFCRC   1440        SWCHER  3267
CERR    0332        IBZ     1514        PFORM   0763        SWCHK   3200
CEXPC   3056        INBLSY  1422        PHASE   0030        SWOFF   3327
CEZ     1410        INIT    1061        PSER    1622        TBUFPT  3153
CHKERR  0173        INIT1   1055        Q1      0400        TFORM   0756
CHKSUM  0142        IT      0072        Q2      0410        TOTAL   0031
CNT     0127        LETK    0056        Q3      0422        TW1     0376
CNTERL  3256        LFCOD   0057        Q4      0434        TYCT    0336
COMCHK  1156        LINE    2034        QU      0152        TYCT1   0371
COMCTR  1173        LRCFP   1432        QU1     0073        TYOCT   0101
COMPAR  0071        LSTEND  3146        QU2     0074        TYPE    0102
COMPRE  0312        LSTPT   3154        QU3     0075        TYPECH  0222
CRCHK   1016        M10     0115        QU4     0076        TYPIN   0103
```

```
TYPN    0260
TYPU    1003
V1      0506
V2      0507
V3      0513
VALCHK  1024
VAR1    0032
VAR2    0033
W1      0020
W2      0021
W3      0022
W4      0023
W4L     2146
W5      0024
W6      0025
WAIT    0104
WC      0105
WDATA   2071
WDBLK   2056
WDBLKN  1776
WDOBLK  2065
WDZ     1430
WEZF    1455
WLMRF   1524
WLO     2157
X1      0010
X2      0011
ZBLK    0613
ZCOM    0744
ZDATA   0637
ZMKTK   0657
ZPAR    0702
ZTIM    0724
```

ERRORS DETECTED: 0

LINKS GENERATED: 7

RUN-TIME: 25 SECONDS

3K CORE USED