

IDENTIFICATION

PRODUCT CODE: DEC-8E-EUZC-D
PRODUCT NAME: TDS-E DECTAPE FORMATTER
DATE CREATED: DECEMBER 7, 1971
MAINTAINER: DIAGNOSTIC PROGRAMMING GROUP
AUTHOR: BRUCE HANSEN

COPYRIGHT©
DIGITAL EQUIPMENT
CORPORATION

1971

COPYRIGHT 1971
DIGITAL EQUIPMENT CORPORATION

1. ABSTRACT

THE TDB-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 TDB-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, TDB-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-03A(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 TDB-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.

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 PRINTOUT "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
UNIT? 1
FORMAT? MARK
0201 WORDS, 2702 BLOCKS, OK? (YES OR NO)

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
NOT DIVISIBLE BY 3
TOO MANY WORDS
TOO MANY BLOCKS

A CHARACTER IN XXXX IS NOT 0-9
XXXX CANNOT BE DIVIDED EVENLY BY 3
THE NUMBER OF WORDS PLUS 15 EXCEEDS 7777(8).
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)
 RECOVERY

4.4

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 W/M 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

$$\text{BLOCKS PER TAPE} = \lfloor (212000) / (NW+15) \rfloor + 2$$

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 111011111011111011111011
(73737373(8)).

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

4040
0440
0404

WHICH APPEAR AS 101001100101 (5145(8)).

I. GENERATE 2702(8) BLOCK PATTERNS. REPEAT C THROUGH H. 2702(8)
TIMES.

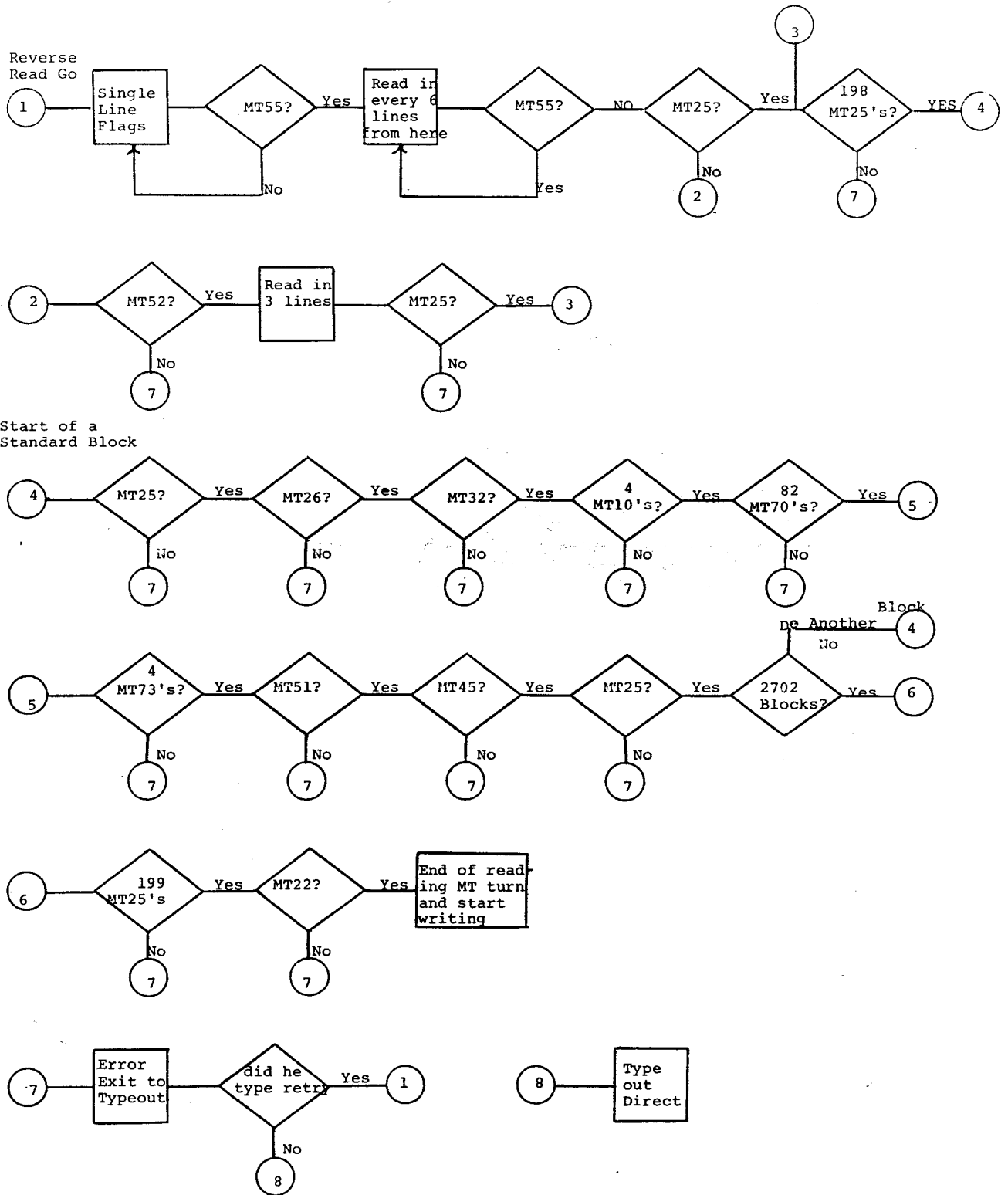
J. 100 EXPAND CODES (SEE C.)

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(10) TIMES. SEE FIGURE 2 FOR A
DIAGRAM OF THE MARK TRACK AND DATA TRACKS.

Figure 1 Reading of the Mark Track



/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 SDRO=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 | 0700 | 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, | MESSAGE |
| 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, ZTMK

```

```

2200 *200 /PAGE 1
      /TYPE CANNED MESSAGES,....
      /THANKS TO DIGITAL 8-18-U
0220 5631 JMP I ,+1
0201 3515 PATCH

MESSAGE, 0
0203 6002 IOF
0204 7240 CLA CMA /SET C(AC)=1
0205 1202 TAD MESSAGE /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 MESSAGE+5 /CONTINUE
0221 0000 MSRGHT, 0 /TEMPORARY STORAGE
0222 0000 TYPECH, 0 /TYPE CHARACTER IN C(AC)0-11
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 TSP /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 SPC00 /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 CRC00 /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 LFC00 /GIVE KEYBOARD LINE FEED
 0306 4144 JMS RSEND /EXECUTE LINE FEED
 0307 7300 CLA CLL /EXIT WITH C(ACC) & AND C(L)00
 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 CHA 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 C0060      /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      /ORIGINAL WORD
0360 0037      AND C0007      /ISOLATE 4TH CHARACTER
0361 1377      TAD C0060      /CONVERT 4 TH TO ASCII
0362 3373      DCA TYCTI+2    /STORE 4TH FOR A MOMENT
0363 1376      TAD TW1      /ORIGINAL 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
  
```

3374 0000 0 /KILL KEY
3375 5736 JMP I TYCT /EXIT FROM ROUTINE

/SOME CONSTANTS FOR THE ROUTINE

3376 0000 TW1, 0000
3377 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 0231          0231 /BY
0445 4063          4063 / 3
0446 0000          0000 /00
0447 4502          0UX, 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 C0000
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 0000  STALL, 0
0601 7200      CLA
0602 1412      TAD I 12      /WORD TO BE WRITTEN
0603 6773      SOSQ      /WAIT FOR QUADLINE FLAG
0604 5203      JMP , -1
0605 6775      SOLD      /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      SOLC      /STOP MOVEMENT OF TAPE
0617 4502      JMS I TYPE
0620 2003      /PC
0621 4000      /END
0622 7240      CLA      CHA
0623 1213      TAD      ZBLK
0624 4501      JMS I TYOCT
0625 4502      JMS I TYPE
0626 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      /END
0636 5344      JMP      ZCOM
    
```

```

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

0656 5344 JMP ZCOM

/MARK TRACK ERROR

```

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

```

/PARITY ERROR

```

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

```

/TIMING ERROR

```

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

```

| | | | |
|------|------|-------|----------|
| 0733 | 7240 | CLA | CMA |
| 0734 | 1324 | TAD | ZTIM |
| 0735 | 4501 | JMS I | TYOCT |
| 0736 | 4502 | JMS 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 304" 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 REFERENCE
/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       /{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          VALCRK, 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 ASCII 0?
1030 5203          JMP   TYQU       /YES: TELL OUTSIDE WORLD
1031 1044          TAD   C261       /NO: SEE IF GREATER THAN
1032 7040          CMA           /ASCII 1 (261)
1033 1470          TAD I  BFR       /SUBTRACT BUFFER DATA
1034 7700          SMA   CLA        /GREATER THAN ASCII ??
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 5220      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      INITI, 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 2620 RDFA /TYPE BLOCKS
 /SEE IF HE TYPED "SAME" (MEANING MARK A TAPE
 /USING THE SAME CONSTANTS AS BEFORE),

1121 4471 JMS I COMPAR
 1122 7323 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 GU /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
 REPEAT, 0

1147 0000
 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 3000          COMCTR, 0   /COUNTER FOR # OF LIST COMPARISONS TO BE DONE
1174 3000          DCTR,  0   /COUNTER FOR # OF DTAS IN LIST
1175 3000          DBUFPT, 0   /POINTER TO CURRENT POSITION IN DTA LIST
1176 3162          DBUFAD, DTABUF /START OF DTA NUM, LIST
1177 3000          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 "R" 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 LINK 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 PRONY 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 | | 0331 /Y |
| 1347 | 0305 | | 0305 /E |
| 1350 | 0323 | | 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
    
```

```

1420 7200      STMK,  CLA
1421 3030      DCA      PHASE
1422 1161      TAD      DT1400 /FWD, WRITE, GO
1423 1027      TAD      DTA      /GET UNIT NUMBER
1424 6774      SDLC     /LOAD COMMAND REGISTER
1425 1033      TAD      VAR2    /TO MAKE A RESTART FOR THE SAME
1426 3025      DCA      W6      /OPTION POSSIBLE
    
```

/WRITE ABOUT 10 FEET OF END ZONE

```

1427 3020      DCA      W1
1428 1310      CEZ,    TAD      REZ      /ADDRESS OF DATA
1429 4270      JMS      SETUP
1430 2020      ISZ      W1
1431 5210      JMP      CEZ      /NOT END FOOTAGE
1432 1065      TAD      M144    /OK WRITE INTERBLOCK SYNC
1433 3020      DCA      W1
1434 4222      JMS      INBLSY
1435 2020      ISZ      W1
1436 5216      JMP      ,-2
1437 5230      JMP      WDZ
    
```

/WRITE INTERBLOCK SYNC

```

1422 2000      INBLSY, 0
1423 1032      TAD      VAR1    /RESET THE WORDS
1424 3024      DCA      W5
1425 1314      TAD      IBE      /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      FBH      /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
    
```

```

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

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

1444 4222 /THIS COMPLETES 1 BLOCK, GO BACK AND WRITE THE REST
1445 2025 JMS INBSY /WRITE INTERBLOCK SYNC
1446 5230 ISZ W6 /TOTAL NUMBER OF BLOCKS
JMP W0Z /WRITTEN? NO!

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

1454 3020 /FINISHED BLOCK WRITTING, WRITE ANOTHER (01) OF END ZONES
1455 1352 DCA W1
1456 4270 WEZF, TAD EZM
1457 2020 JMS SETUP
1460 5255 ISZ W1
1461 6772 JMP WEZF
1462 7610 SDST
1463 4567 SKP CLA
1464 1373 JMS I SELTIM /TIMING ERROR
1465 3030 TAD C1
1466 5667 DCA PHASE
1467 1600 JMP I ,+1
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 | PEZ, | . | |
| 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 LOG, 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 SEA 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 *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 MNTM, 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 /OP
 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
PSER,          TAD          DT3000 /REVERSE GO
                TAD          DTA          /UNIT
                SDLC        /LOAD COMMAND REGISTER
                DCA          W1          /STALL ROUTINE TO GET UP TO SPEED
                SDSQ
                JMP          ,=1
                SDRC
                ISZ          W1
                JMP          ,=4
                SDSQ        /SKIP ON QUAD LINE IF SET AFTER WAIT ROUTINE
                SKP
                JMP          ,+3        /FLAG WAS SET
                SDSS        /READ IN A LINE OF TAPE
                JMP          ,=1
                SDRC        /READ THE COMMAND REGISTER
                SDST        /CHECK FOR A TIMING ERROR
                SKP
                JMS          I SELTIM        /TIMING ERROR
                AND          MSK77        /CHECK TO SEE IF TAPE IS STILL IN END ZONE
                TAD          M55
                SZA          CLA
                JMP          ,=11        /NOT A 55 YET
                JMS          I SSDSQ        /YES, READ IN SOME MORE
                TAD          M55        /IS IT END ZONE
                SNA          CLA
                JMP          ,=3        /STILL IN END ZONE
                TAD          M1R        /GET THE MARK TRACK
                TAD          M25        /IS IT EXPAND CODE
                SZA          CLA
                JMS          I SCEXPC        /NOT YET, CHECK FOR A 52, AND ADVANCE 3 LINES
                CLA          /YES IT IS EXPAND CODE
                TAD          M306        /SET UP FOR 198 EXPAND CODES
                DCA          CNT
                JMS          I SSDSQ        /THE TAPE SHOULD BE IN SYNC NOW
                TAD          M25        /READ THE REST OF EXPAND CODE
                SZA          CLA
                JMS          I MARKER        /MARK TRACK ERROR
                ISZ          CNT        /INCREMENT COUNTER
                JMP          ,=5
                TAD          VAR2        /NUMBER OF BLOCKS
                DCA          W6
                RSTBLK, JMS          I SSDSQ        /START OF A STANDARD BLOCK
                TAD          M25        /FIRST EXPAND CODE AT BEGINNING
                SZA          CLA        /OF BLOCK
                JMS          I MARKER        /MARK TRACK ERROR
                JMS          I SSDSQ        /READ MARK BLOCK NUMBER
                TAD          M26
                SZA          CLA
                JMS          I MARKER        /MARK TRACK ERROR
                JMS          I SSDSQ        /READ MARK GUARD
                TAD          M32
                SZA          CLA
                JMS          I MARKER        /MARK TRACK ERROR
    
```

| | | | | |
|------|------|-----|--------|--|
| 1707 | 1130 | TAD | M4 | |
| 1710 | 3127 | DCA | CNT | |
| 1711 | 4532 | JMS | I | SSDSOT /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 | SSDSOT /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 | SSDSOT /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 | SSDSOT /READ REVERSE GUARD |
| 1742 | 1120 | TAD | M51 | |
| 1743 | 7640 | SZA | CLA | |
| 1744 | 4570 | JMS | I | MARKER |
| 1745 | 4532 | JMS | I | SSDSOT /READ BLOCK NUMBER |
| 1746 | 1121 | TAD | M45 | |
| 1747 | 7640 | SZA | CLA | |
| 1750 | 4570 | JMS | I | MARKER /MARK TRACK ERROR |
| 1751 | 4532 | JMS | I | SSDSOT /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 | SSDSOT /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 | SSDSOT |
| 1770 | 1122 | TAD | M22 | |
| 1771 | 7640 | SZA | CLA | |
| 1772 | 4570 | JMS | I | MARKER |
| 1773 | 1027 | TAD | OTA | |


```

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

1777 3133
2000 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 SOLC /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 WDBLKN /GO AND WRITE REVERSE GUARD
2056 7300 WDBLKN, 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 | REVBK | /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 | REVBK | |
| 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 | SDRC | | |
| 2131 | 7200 | CLA | | |
| 2132 | 1165 | TAD | D1000 | /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 | SEA | 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 D1000 /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 REVBK
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          SDDSQT /READ GUARD
2245 4532          JMS I          SDDSQT /READ REVERSE LOCK
2246 4532          JMS I          SDDSQT /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 | 4587 | JMS | I | SLRDRC /ADVANCE A SINGLE LINE FLAG |
| 2323 | 1125 | 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 | REVBK | /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 | REVBK | |
| 2351 | 6772 | SDST | | |
| 2352 | 7410 | SKP | | |
| 2353 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 2354 | 2025 | ISZ | W6 | |
| 2355 | 5227 | JMP | BLCSDA | |
| 2356 | 1165 | TAD | DT1000 | |
| 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 | ROBLKS | | |
| 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, SOSS | | |
| 2411 | 5210 | JMP | .-1 | |
| 2412 | 7300 | CLA | CLL | |
| 2413 | 6777 | SDRC | | |
| 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 | .-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 | D13000 | /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, SOSS | | |
| 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 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      SDRD     /READ THE COMMAND REGISTER
2637 2135      AND      MSK77
2640 1113      TAD      M26      /SEARCH FOR BLOCK NUMBER
2641 7640      SZA      CLA
2642 5232      JMP      R0FA1+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      R0FA1+4 /NOT 22 BLOCKS YET
2647 1027      TAD      DTA
2650 6774      SOLC     /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      DT1000 /FORWARD READ GO
2701 1027      TAD      DTA      /UNIT
2702 6774      SOLC     /LOAD THE COMMAND REGISTER
2703 6771      SDSS     /SKIP ON A SINGLE LINE FLAG
2704 5303      JMP      .-1
2705 6776      SDRD     /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      DT1000 /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      SEA     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      SOSQ
3002 5201      JMP     .-1      /ADVANCE SIX LINES
3003 6776      SDRC     /SKIP ON QUAD LINE FLAG
                /READ COMMAND REGISTER

```

| | | | | |
|------|------|--------|-------|--|
| 3024 | 6772 | SDST | | |
| 3025 | 7410 | SKP | | |
| 3026 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 3027 | 6771 | SDSS | | |
| 3010 | 5227 | JMP | ,=1 | /SKIP ON SINGLE LINE FLAG |
| 3011 | 6776 | SDRC | | |
| 3012 | 6772 | SDST | | |
| 3013 | 7410 | SKP | | |
| 3014 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 3015 | 6771 | SDSS | | |
| 3016 | 5215 | JMP | ,=1 | |
| 3017 | 6776 | SDRC | | /READ THE COMMAND REGISTER |
| 3020 | 6772 | SDST | | |
| 3021 | 7410 | SKP | | |
| 3022 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 3023 | 0135 | AND | MSK77 | /SAVE THE MARK TRACK LAST 6 BITS |
| 3024 | 3106 | DCA | MTR | |
| 3025 | 1106 | TAD | MTR | |
| 3026 | 5600 | JMP | I | SDSQT |
| | | | | |
| 3027 | 0000 | A3LNS, | 0 | /ADVANCE THREE LINES |
| 3030 | 6771 | SDSS | | |
| 3031 | 5230 | JMP | ,=1 | /SKIP ON SINGLE LINE FLAG |
| 3032 | 6776 | SDRC | | |
| 3033 | 6772 | SDST | | |
| 3034 | 7410 | SKP | | |
| 3035 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 3036 | 6771 | SDSS | | |
| 3037 | 5236 | JMP | ,=1 | |
| 3040 | 6776 | SDRC | | |
| 3041 | 6772 | SDST | | |
| 3042 | 7410 | SKP | | |
| 3043 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 3044 | 6771 | SDSS | | |
| 3045 | 5244 | JMP | ,=1 | |
| 3046 | 6776 | SDRC | | |
| 3047 | 6772 | SDST | | |
| 3050 | 7410 | SKP | | |
| 3051 | 4567 | JMS | I | SELTIM /TIMING ERROR |
| 3052 | 0135 | AND | MSK77 | |
| 3053 | 3106 | DCA | MTR | |
| 3054 | 1106 | TAD | MTR | |
| 3055 | 5627 | JMP | I | A3LNS |
| | | | | |
| 3056 | 0000 | CEXP, | 0 | |
| 3057 | 1106 | TAD | MTR | |
| 3060 | 1124 | TAD | M52 | |
| 3061 | 7640 | SEA | CLA | |
| 3062 | 4570 | JMS | I | MARKER /MARK TRACK ERROR |
| 3063 | 4227 | JMS | A3LNS | /READ THREE MORE LINES |
| 3064 | 1112 | TAD | M25 | /IS IT 25 NOW |
| 3065 | 7640 | SEA | CLA | |
| 3066 | 4570 | JMS | I | MARKER /NO MARK TRACK ERROR |
| 3067 | 5656 | JMP | I | CEXP /YES!! IT IS EXPAND CODE NUMBER I |

/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 2000 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
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 CNTRL
3215 6775          SDLD /CLEAR SINGLE AND QUAD FLAGS
3216 6771          SDSS
3217 7410          SKP
3220 5224          JMP ,+4
3221 2256          ISZ CNTRL
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          SDRG /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 | 7074 | 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 CNTRL
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 CNTRL
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
$
```


4000
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 | DATRO | 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 | REVBK | 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 | RSTSH | 3224 |
| C0070 | 0035 | DNC | 1203 | M45 | 0121 | S3LNS | 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 | SOSQ | 6773 |
| C215 | 0256 | DTABUF | 3162 | MARKER | 0170 | SOSQT | 3000 |
| C245 | 0257 | DTRK | 1434 | MES | 0454 | SOS5 | 6771 |
| C260 | 0043 | DZ | 1533 | MESSAGE | 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 | 1320 | MWTM | 1600 | SRDRC | 3120 |
| C4 | 2372 | FEZ | 1537 | NTYRTN | 0265 | SSOSOT | 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 | STRPT | 3152 |
| C7714 | 0053 | GRZ | 1546 | PATCH | 0515 | STX | 0100 |
| C7761 | 0054 | IBS | 1242 | PFRC | 1440 | SWCHER | 3267 |
| CERR | 0332 | IBZ | 1514 | PFORM | 0763 | SWCHK | 3200 |
| CEXPC | 3056 | INBSY | 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 | 0132 | 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 | TYFIN | 0103 |

| | |
|--------|------|
| TYPN | 0260 |
| TYJU | 1003 |
| V1 | 2506 |
| V2 | 2507 |
| V3 | 2513 |
| 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 |
| WDOBK | 2065 |
| WQZ | 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