

PDP - 15
DECTAPE

IDENTIFICATION

PRODUCT CODE: DEC-9A-EUFC-D
PRODUCT NAME: DECTAPE FORMAT GENERATOR
DATE CREATED: JANUARY 1, 1971
MAINTAINER: DIAGNOSTIC PROGRAMMING GROUP
AUTHOR: EDWARE P. STEINBERGER

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ABSTRACT

The DECTAPE FORMAT GENERATOR FOR PDP-9/15 is a program to allow the creation of mark and timing tracks, block numbers, and an initial data pattern on a reel of virgin DECTape. Any block size greater than 4 and divisible by 2 (up to 6866) may be specified. Any number of blocks greater than 1 may be specified as long as there is sufficient room on tape. Normally, standard format is written on tape (256 words per block, 578 blocks, numbered 000000 to 001101 (octal)). All communication between the operator and the computer is done via the Teletype.

2. PRELIMINARY REQUIREMENTS

2.1 Storage

This program uses all of 8K memory for program or as a buffer area to contain information written on a read from DECTape, if non-standard format is specified. Otherwise, only 4K of memory is used to store and run the program.

2.2 Equipment

Requires standard PDP-9 or 15 computer with TC02-TC15 DECTape Control Unit and at least one ~~TU55/TU56~~ DECTape Transport.

3. LOADING PROCEDURE

The program is loaded from paper tape using the Macro-D tape loading procedure.

1. Place tape in reader with blank tape over the read diodes.
2. Set the ADDRESS Switches to 17700. (17720)
3. Depress I/O RESET; set BANK MODE to a 1 (PDP-15)
4. Depress READ IN key.
5. Program will load and start itself.

4. STARTING PROCEDURE

The program, when loaded as discussed in section 3 is self-starting. However, if it is desired to restart the program, set 00100 in the ADDRESS switches, depress STOP, I/O RESET, then START.

5. OPERATING PROCEDURE

Upon starting, the program will type out its name:

DECTAPE FORMAT GENERATOR - PDP-9, TC02, TU55

Then it will start to interrogate the operator to ascertain his desires.

- a. The first question asked the operator is to allow him to indicate on which transport he desires to mark tapes:

MARK TAPE ON UNIT

He responds by typing the decimal number (digit) of the proper transport and then any non-numerical character.

- b. The second question determines whether standard or non-standard format is to be written:

DO YOU DESIRE STANDARD FORMAT (256 WORDS, 578 BLOCKS)?

(TYPE Y-YES, N-NO)

If standard format is to be written, the operator types Y; if non-standard format, he types N.

- c. Typing N in step b or f causes a series of questions to be asked to determine proper block size quantity:

HOW MANY BLOCKS?
HOW MANY DATA WORDS?

Checks are made to assure that the answers provided are legitimate:

NUMBER OF BLOCKS MUST BE 2 OR MORE.
BLOCK FORMAT REQUIRES 4 OR MORE DATA WORDS.
NUMBER OF DATA WORDS MUST BE EVEN.
TAPE IS NOT LONG ENOUGH.
8K OF MEMORY CAN'T CONTAIN THIS SIZE BLOCK.

- d. The program will then type out operating instructions to allow the operator to ready the unit to mark tape:*

SET SWITCH LABELED WRTM-NORMAL-RDMK TO WRTM AND ENABLE.
WRITE ON SPECIFIED UNIT THEN STRIKE A KEY ON THE
KEYBOARD.
AFTER MOUNTING A VIRGIN TAPE AND TAKING 2 WRAPS ON
TAKEUP REEL.

A check is made to assure that the directions have been properly followed and, if not, an error message is typed out:

SELECT ERROR, CHECK FOR THESE CONDITIONS:

WRITE NOT ENABLED
NON EXISTENT UNIT
MULTIPLY EXISTENT UNIT
SWITCH NOT IN WRTM POSITION

* This printout may be suppressed by setting AC switch 0 to 1 (up)

- e. After making one pass down the tape to write the mark track, further instructions are typed to the operator:*

SET SWITCH LABELED WRTM-NORMAL-RDMK TO NORMAL, THEN
STRIKE A KEY ON THE KEYBOARD.

If the tape has run off the reel, it should be remounted before the key is struck.

- f. Three more passes will be made on the tape to complete the marking and vigin pattern procedure, after which time the end of the tape will be allowed to run off the takeup reel and the format of the tape will be typed out:

DONE! TAPE HAS MMMMM BLOCKS (OCT) EACH NNNNNN WORDS
(OCT) LONG

The operator will then be asked if he wishes to mark another tape to this format:

DO YOU DESIRE TO MARK ANOTHER TAPE TO THIS FORMAT
(TYPE Y-YES N-NO)?

If the operator types Y the program returns to step d, if he types N the program returns to step c.

5.1 Details of Operation

- a. First the name of the program is printed on the teleprinter.
- b. The operator is asked to indicate the number of the transport to be used to mark tape. This number is checked to make sure that it is between 1 and 8. It is then moved into the proper bit position for combination into control words for the DECTape control.
- c. The operator is asked if standard format is desired. If it is, the program proceeds to step f. If standard format is not desired, the program proceeds to step d.
- d. The operator is asked to type in the number of blocks to be written on tape. A check is made that at least 2 were specified.
- e. The operator is asked to type in the number of data words per block. The number is checked to make sure it is at least 4. It is then checked to make sure it is even, then that it is not too large (attempt to overflow 8K of memory). Then check is performed to make sure that the number of marks required to be written on tape (number of blocks times number of data words+10, plus expand codes, plus end zones) is not too large. The program then goes to step g.
- f. Constants are then set up for the number of blocks and data words (standard format).
- g. Unless suppressed by ACS 0=1, operating instructions are printed on the teleprinter to instruct him as to what he should do after which time checks are made to assure that he has done as instructed.

* This printout may be suppressed by setting AC switch 0 to 1 (up).

- h. The DECTape control is then instructed to Write Timing and Mark Track and word count and current address are initialized so that 8192 reverse end zones are written on tape. Word count and current address are again initialized, this time for 199 expand codes.
- i. Word count and current address are again initialized after which time the buffer area of memory is filled with the mark track pattern for one block of tape. This pattern consists of 1 expand code, 1 forward block mark, 1 reverse guard, 4 lock, (N-4) data marks, 4 prefinal, 1 guard, 1 reverse block mark, and 1 expand code. This pattern is written on tape for as many times as the number of blocks specified.
- j. After initializing word count and current address, 199 expand codes, then 8192 forward end zones are written on tape. After this is completed the transport is stopped.
- k. Unless suppressed by ACS 0=1, the operator is told to set the switch on the maintenance control panel back to NORMAL after which time a check is made to make sure this is done.
- l. The DECTape control is then put in Search Continuous Reverse and is caused to search backwards 2 blocks. It is then put in Write All Continuous (forward) and the complement obverse of the last block number on tape is written into every mark until the tape unit shuts down in end zone. The DECTape control is then put in Search Normal Reverse until the first reverse block mark is found at which time it is put in Write All Continuous (reverse) and all the blocks are written to contain their block numbers (both forward and reverse) and a properly checksummed data pattern, all of which is generated and stored in memory. This is done until the tape unit shuts down in reverse end zone (beginning of tape).
- m. The DECTape control is then put in Search Normal (forward) and the block numbers for all blocks are checked in the forward direction. Upon encountering the last block number, the control is put in Write All Continuous (forward) and the last block is re-patterned in the forward direction. The program then waits for the tape unit to shut down in end zone.
- n. The reverse block numbers and data pattern are then checked in the reverse direction by alternating the DECTape control between Search Normal (reverse) to pick up block numbers, and Read Normal (reverse) to read the data pattern. After all blocks have been checked, the reel of DECTape is allowed to run off its end.
- o. The operator is then informed via the teleprinter of the format written on tape (number of blocks and data words) after which time he is asked if he wishes to mark tape to the same format. If he answers "Yes", the program proceeds to step g. If he answers "No", the program proceeds to step c.

6. ERRORS

6.1 Error Messages

Most error message prints are due to operator error, either in typing in information or status conditions of the DECTape control or tape drive. These are discussed in the appropriate paragraph in section 4. The errors discussed in this section pertain to program or hardware problems.

6.2 Unexpected Error Flag

If an unexpected error flag (hardware error) occurs, some of the following typeouts will occur (the header will always be present):

THE FOLLOWING UNEXPECTED ERRORS WERE ENCOUNTERED:

MARK TRACK ERROR
END ZONE ERROR
SELECT ERROR
PARITY ERROR
TIMING ERROR

These errors are non-recoverable. The program must be restarted at 00100 to resume marking tapes.

6.3 Too Many Blocks Written

If for some unknown reason the number of blocks specified to be written on tape does not agree with the number of blocks actually written on tape (and is less) the following error typeout will occur:

TO MANY BLOCKS WRITTEN, PROGRAM ERROR - RELOAD

This error is non-recoverable. To resume marking tapes, load program into computer as in section 3.

6.4 Wrong Block Number

If during the check of block numbers, the sequence of numbers is unexpectedly broken, the following error typeout will occur:

BLOCK NUMBER SEQUENCE BROKEN

The program will attempt to recover from this error by rewriting the block numbers and virgin data pattern. If this error occurs again, the program should be reloaded into memory as in section 3, or a DECTape maintenance diagnostic should be run on the DECTape transport and control.

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                .TITLE FORMAT
                .ABS
/DECTAPE      FORMAT GENERATOR = PDP-9 TC02 TU55
/TAPE 1
                .LOC      100
00100            BEGIN      LEM
00100      707704            JMS CRLF                              /TYPE CR, LF
00101      101174            LAW MESS1
00102      761276            JMS MESSAGE                      /TYPEOUT FIRST MESSAGE
00103      101144            LAW MESS2
00104      761326            JMS MESSAGE                      /TYPE OUT SECOND MESSAGE
00105      101144            KRB                              /CLEAR KEYBOARD FLAG
00106      700312            JMS DBCV                         /GO TO DEC TO BIN ROUTINE
00107      101227            DAC UNIT                        /RETURN WITH UNIT NUMBER
00110      042461            TAD M9
00111      342420            SMA                              /IS IT LESS THAN 9?
00112      740100            JMP OVER                        /NO
00113      601272            LAC UNIT
00114      202461            SNA:CLL /IS IT NOT 0?
00115      745200            JMP OVER                        /NO
00116      601272            RTR                             /YES, MOVE IT
00117      742020            RTR                             /4 RIGHT
00120      742020
00121      042461            DAC UNIT                        /AND STORE AWAY
00122                        JMS CRLF                        /CR, LF
00123                        LAW MESS3
00124                        JMS MESSAGE                      /TYPE 3RD MESSAGE
00125                        JMS GET /GET CHARACTER KEYED
00126      542462            SAD YYY /WAS IT Y?
00127                        JMP STAND                       /YES
00130      542431            SAD NNN /WAS IT N?
00131                        JMP TMESS4=1                    /YES
00132      760277            LAW 277 /IT WAS NEITHER
00133                        JMS TYPE                        /TYPE "?"
00134                        JMP TMESS3                      /AND ASK AGAIN
00135                        JMS CRLF                        /CR-LF
00136                        TMESS4      LAW MESS4
00137                        JMS MESSAGE                      /TYPE OUT NEXT MESSAGE
00140                        JMS DBCV                        /CALL DEC TO BIN
00141                        DAC BLOCKS                      /STORE NUMBER OF BLOCKS
00142                        TAD FOURTH+3
00143                        SMA                              /MAKE SURE AT LEAST 2 BLOCKS
00144                        JMP ,+4
00145                        LAW MESS24                      /NOT 2 OR MORE
00146                        JMS MESSAGE
00147                        JMP TMESS4
00150                        JMS CRLF                        /CR,LF
00151                        TMESS5      LAW MESS5
00152                        JMS MESSAGE                      /TYPE OUT NEXT MESSAGE
00153                        JMS DBCV                        /CALL DEC TO BIN AGAIN
00154                        DAC DATAS                       /STORE NUMBER OF DATA WORDS
00155                        TAD MINUS4
00156                        SMA                              /IS IT AT LEAST 4
00157                        JMP ,+4 /YES
00160                        TMESS6      LAW MESS6                        /NO TYPE OUT ERROR
00161                        JMS MESSAGE                      /MESSAGE

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00162	600151	JMP TMESS5	/ASK QUESTION AGAIN
00163	202416	LAC DATAS	
00164	740020	RAR	
00165	742400	SNL	/IS NUMBER DIVISIBLE BY 2?
00166	600172	JMP ,+4	/YES
00167	761462	LAW MESS7	/NO, TYPE OUT
00170	101144	JMS MESSAGE	/ERROR MESSAGE
00171	600151	JMP TMESS5	/ASK AGAIN
00172	202404	LAC AA	
00173	744000	CLL	
00174	342416	TAD DATAS	
00175	740400	SNL	/IS NUMBER OF DATAWORD TOO LARGE?
00176	600202	JMP ,+4	/NO
00177	762332	LAW MESS25	/YES, TYPE OUT
00200	101144	JMS MESSAGE	/ERROR MESSAGE
00201	600151	JMP TMESS5	/TRY AGAIN
00202	202416	LAC DATAS	/THIS
00203	342456	TAD TEN	/LITTLE
00204	740001	CMA	/BIT
00205	342434	TAD ONE	
00206	042414	DAC CNTR1	/OF
00207	754000	CLA:CLL	/CODING
00210	342407	TAD BLOCKS	/MULTIPLIES
00211	442414	ISE CNTR1	/BLOCK NUMBER
00212	600210	JMP ,=2	/TIMES DATA WORD*10
00213	741400	SZL	
00214	600220	JMP ,+4	
00215	342463	TAD MAGCON	/ADD THIS TO (=) MAX NUMBER OF MARKS
00216	740400	SNL	/TOO MANY?
00217	600230	JMP NEXT	/NO
00220	761504	LAW MESS8	/YES, TYPE OUT
00221	101144	JMS MESSAGE	/ERROR MESSAGE
00222	600136	JMP TMESS4	/GO WAY BACK
00223	101174	JMS CRLF	
00224	202411	LAC CONST1	
00225	042407	DAC BLOCKS	/SET UP BLOCKS
00226	202412	LAC CONST2	
00227	042416	DAC DATAS	/AND DATAS
00230	101174	JMS CRLF	
00231	750004	LAS	
00232	741100	SPA	
00233	600236	JMP ,+3	
00234	761521	LAW MESS9	
00235	101144	JMS MESSAGE	/TYPE OUT NEXT MESSAGE
00236	700312	KRB	/CLEAR KEYBOARD FLAG
00237	101202	JMS GET	/WAIT FOR KEY STRIKE
00240	202461	LAC UNIT	
00241	242377	XOR WMT	
00242	242400	XOR STOPGO	/FORM UNIT, WMT, STOP
00243	707545	707545	/CLEAR AND LOAD "A
00244	740000	NOP	/WAIT FOR XSA DELAY
00245	740000	NOP	
00246	740000	NOP	
00247	740000	NOP	
00250	740000	NOP	

00251 740000
 00252 707561
 00253 600263
 00254 707572
 00255 502424
 00256 741200
 00257 601044
 00260 761654
 00261 101144
 00262 600230

 00263 202377
 00264 242461
 00265 707545
 00266 760000
 00267 040030
 00270 202362
 00271 042466
 00272 202465
 00273 040031
 00274 200030
 00275 740200
 00276 600272
 00277 707544
 00300 777471
 00301 040030
 00302 202363
 00303 042466
 00304 202465
 00305 040031
 00306 200030
 00307 740200
 00310 600304
 00311 707544
 00312 202407
 00313 740001
 00314 342434
 00315 042450
 00316 042413
 00317 202465
 00320 040031
 00321 040010
 00322 202416
 00323 342456
 00324 740001
 00325 342434
 00326 042447
 00327 040030
 00330 202363
 00331 060010
 00332 202364
 00333 060010
 00334 222365
 00335 060010
 00336 202366

NOP
 707561 /ERROR CONDITION? (E,F)
 JMP FIRST /NO, PROCEED TO MAIN PROGRAM
 707572 /YES, READ STATUS B
 AND MASK2
 SNA /SELECT ERROR
 JMP ERROR1 /NO
 LAW MESS10 /YES
 JMS MESSAGE /TYPE OUT ERROR MESSAGE
 JMP NEXT
 /ROUTINE TO WRITE MARK TRACK
 FIRST LAC WTMT /LOAD AC WITH WTMT FWD GO CONT
 XOR UNIT /COMBINE UNIT NUMBER
 707545 /CLEAR AND LOAD "A"
 LAW
 DAC WC /SET WC TO = 8192 (DEC)
 LAC REVEND
 DAC BUFFER /SET BUFFER TO "55"
 LAC BUFFER=1
 DAC CA /SET CA TO "BUFFER=1"
 LAC WC /GET WC
 SZA /IS IT 0?
 JMP ,=4 /NO, RESET CA
 707544 /YES, CLEAR DTF (DONE REV,END)
 LAW =307
 DAC WC /SET WC TO =199 (DEC)
 LAC EXPAND
 DAC BUFFER /SET BUFFER TO "25"
 LAC BUFFER=1
 DAC CA /SET CA TO BUFFER=1
 LAC WC /GET WC
 SZA /IS IT 0?
 JMP ,=4 /NO, RESET CA
 707544 /YES, CLEAR DTF (DONE EXPAND)
 SECOND LAC BLOCKS /GET NUMBER OF BLOCKS
 CMA
 TAD ONE /TAKE 2'S COMPLEMENT
 DAC SAVE1 /SAVE
 DAC CNTR /AND STORE IN COUNTER
 LAC BUFFER=1
 DAC CA /SET CA TO BUFFER=1
 DAC 10 /ALSO 10
 LAC DATAS /GET NUMBER OF DATA WORDS
 TAD TEN /ADD 10
 CMA
 TAD ONE /2'S COMPLEMENT
 DAC SAVE /SAVE
 DAC WC /AND STORE IN WC
 LAC EXPAND
 DAC* 10 /STORE EXPAND CODE IN BUFFER
 LAC MARK
 DAC* 10 /STORE MARK
 LAC REVGRD
 DAC* 10 /STORE REVERSE GUARD
 LAC LOCK

00337 260210
 20347 260210
 20341 260210
 20342 260210
 20343 202416
 20344 342434
 20345 741202
 20346 600356
 20347 740001
 20350 342434
 20351 242414
 20352 202367
 20353 260010
 20354 442414
 20355 600353
 20356 202370
 20357 260010
 20360 260010
 20361 260010
 20362 260010
 20363 202371
 20364 260010
 20365 202372
 20366 260010
 20367 202363
 20370 260010
 20371 200030
 20372 740200
 20373 600371
 20374 707544
 20375 202465
 20376 240031
 20377 202447
 20400 240030
 20401 442413
 20402 600371
 20403 777471
 20404 240030
 20405 202363
 20406 242466
 20407 202465
 20410 240031
 20411 200030
 20412 740200
 20413 600407
 20414 707544
 20415 762000
 20416 240030
 20417 202373
 20420 242466
 20421 202465
 20422 240031
 20423 200030
 20424 740200
 20425 600421

THIRD

DAC* 10 /STORE LOCK,
 DAC* 10 /REVERSE CHECK,
 DAC* 10 /REVERSE FINAL,
 DAC* 10 /AND REVERSE PREFINAL
 LAC DATAS
 TAD MINUS4
 SNA
 JMP ,+10
 CMA
 TAD ONE
 DAC CNTR1 /SET UP COUNTER FOR N=4 DATA WORDS
 LAC DATAH
 DAC* 10 /STORE N=4 DATA MARKS
 ISZ CNTR1
 JMP , -2
 LAC PREFIN
 DAC* 10 /STORE PREFINAL,
 DAC* 10 /FINAL,
 DAC* 10 /CHECK,
 DAC* 10 /AND REVERSE LOCK
 LAC GUARD
 DAC* 10 /STORE GUARD
 LAC REVMRK
 DAC* 10 /STORE REVERSE MARK
 LAC EXPAND
 DAC* 10 /STORE EXPAND
 LAC WC
 SZA /HAS WHOLE BLOCK BEEN TRANSFERRED?
 JMP ,=2 /NO
 707544 /YES, CLEAR DTF (DONE WITH THIS BLOCK)
 LAC BUFFER=1 /AND SET UP FOR BLOCK AGAIN
 DAC CA
 LAC SAVE
 DAC WC
 ISZ CNTR /WRITTEN ALL BLOCKS?
 JMP ,=11 /NO
 LAW =307 /YES, SET UP FOR 199 EXPANDS
 DAC WC
 LAC EXPAND
 DAC BUFFER /SET BUFFER TO "25"
 LAC BUFFER=1
 DAC CA /SET CA
 LAC WC /GET WC
 SZA /IS IT 0?
 JMP ,=4 /NO, RESET CA
 707544 /YES, CLEAR DTF (DONE EXPAND)
 LAW
 DAC WC /SET WC TO =8192(DEC)
 LAC END
 DAC BUFFER /SET BUFFER TO "22"
 LAC BUFFER=1
 DAC CA /SET CA TO BUFFER-1
 LAC WC /GET WC
 SZA /IS IT 0?
 JMP ,=4 /NO

00426 202377
 00427 707544
 00430 700312
 00431 750004
 00432 741100
 00433 600436
 00434 761757
 00435 101144
 00436 101200
 00437 202461
 00440 707545
 00441 740000
 00442 740000
 00443 740000
 00444 740000
 00445 740000
 00446 740000
 00447 707561
 00450 741000
 00451 600430

00452 202376
 00453 242461
 00454 707545
 00455 202464
 00456 040031
 00457 777776
 00460 040030
 00461 200030
 00462 741200
 00463 600467
 00464 707561
 00465 600461
 00466 600452
 00467 202375
 00470 242461
 00471 707545
 00472 140030
 00473 750001
 00474 342407
 00475 042452
 00476 101115
 00477 042451
 00500 042466
 00501 202465
 00502 040031
 00503 707561
 00504 600501
 00505 707572
 00506 502423
 00507 741200
 00510 601044
 00511 202376
 00512 242402

LAC WTMT /YES, THEN
 707544 /STOP TAPE
 TMES11 KRB /CLEAR KEYBOARD OF EXTRANEIOUS CHARACTERS
 LAS
 SPA
 JMP ,+3
 LAW MESS11
 JMS MESSAGE /TYPE OUT NEXT MESSAGE
 JMS GET /WAIT FOR A KEY TO BE STRUCK
 LAC UNIT
 707545 /CLEAR AND LOAD "A" WITH MOVE
 NOP /WAIT FOR XSA DELAY
 NOP
 NOP
 NOP
 NOP
 NOP
 707561 /ERROR FLAG?
 SKP /NO
 JMP TMES11 /YES, TYPE MESSAGE AGAIN
 /ROUTINE TO WRITE LAST BLOCK NUMBER IN REVERSE MARK
 /THEN ALL BLOCK MARKS AND A VIRGIN PATTERN IN REVERSE DIRECTION
 FOURTH LAC RESERC /LOAD AC WITH SEARCH, CONTINUOUS GO, REVERSE
 XOR UNIT /COMBINE WITH UNIT NUMBER
 707545 /CLEAR AND LOAD "A"
 LAC BUFFER=2
 DAC CA /SET CA TO BUFFER
 LAW =2
 DAC WC /SET WC TO =2
 LAC WC
 SNA /WAIT FOR WC = 0
 JMP ,+4
 707561 /ERROR FLAG?
 JMP ,+4 /NO
 JMP FOURTH /YES, START AGAIN
 LAC FWDWAC /LOAD AC WITH WRITE ALL, FWD, GO, CONT.
 XOR UNIT /COMBINE WITH UNIT NUMBER
 707545 /CLEAR AND LOAD "A"
 DZM WC /ZERO WC
 CLA:CHA
 YAD BLOCKS /COMPUTE LAST BLOCK NUMBER
 DAC SAVE3
 JMS CALQL8 /FIND COMPLEMENT OVERSE
 DAC SAVE2
 DAC BUFFER /STORE IN BUFFER
 LAC BUFFER=1
 DAC CA /SET CA TO BUFFER=1
 707561 /WAIT FOR ERROR FLAG
 JMP ,=3
 707572 /READ STATUS "B"
 AND MASK1
 SNA /END ZONE?
 JMP ERROR1 /NO
 LAC RESERC /YES, LOAD SEARCH REV GO CONTINUOUS
 XOR NORCON /MAKE NORMAL

00513	242461	XOR UNIT /COMBINE WITH UNIT
00514	707545	707545 /CLEAR AND LOAD "A"
00515	202464	LAC BUFFER=2
00516	040031	DAC CA /SET CA TO BUFFER
00517	707601	707601
00520	600517	JMP ,-1 /WAIT FOR DTF
00521	707552	707552 /READ "A"
00522	502443	AND POINT+3
00523	707544	707544 /CLEAR FUNCTION BITS
00524	202401	LAC WAC /LOAD AC WITH WRITE ALL CONT
00525	707544	707544 /TRANSFER INTO "A"
00526	202465	LAC BUFFER=1
00527	040010	DAC 10 /SET UP 10
00530	342460	TAD THREE
00531	040031	DAC CA /AND CA
00532	202447	LAC SAVE
00533	342460	TAD THREE
00534	040030	DAC WC /SET WC TO 2 LESS THAN USUAL
00535	160010	DZM* 10 /SET UP EXPAND
00536	750001	CLA!CMA
00537	342407	TAD BLOCKS
00540	060010	DAC* 10 /SETUP BLOCK NUMBER INTO BUFFER+1
00541	202416	LAC DATAS
00542	342457	TAD TWO
00543	740001	CMA
00544	042414	DAC CNTR1 /SET UP COUNTER FOR # OF 0'S
00545	160010	DZM* 10 / (DATA WORDS*3) IN MEMORY
00546	442414	ISZ CNTR1 /AND THEN STORE IN BUFFER
00547	600545	JMP ,=2
00550	750001	CLA!CMA
00551	060010	DAC* 10 /SET UP REVERSE CHECKSUM
00552	160010	DZM* 10 /SET UP LOCK
00553	160010	DZM* 10 /SET UP REVERSE GUARD
00554	202451	LAC SAVE2
00555	060010	DAC* 10 /STORE COMP, OBERSE IN BLOCK MARK
00556	750001	CLA!CMA
00557	060010	DAC* 10 /SETUP EXPAND
00560	202450	LAC SAVE1
00561	042413	DAC CNTR /SET UP BLOCKS COUNTER
00562	750001	CLA!CMA
00563	340010	TAD 10
00564	042435	DAC PNTR /SET UP PNTR FOR BLOCK NUMBER
00565	200030	LAC WC /WAIT FOR BLOCK TO FINISH
00566	741200	SNA
00567	600573	JMP ,+4
00570	707561	707561
00571	600565	JMP ,-4
00572	601044	JMP ERROR1
00573	707544	707544 /CLEAR DTF
00574	222465	LAC BUFFER=1
00575	040031	DAC CA /SETUP CA
00576	202447	LAC SAVE
00577	040030	DAC WC /AND WC
00600	750001	CLA!CMA
00601	342452	TAD SAVES /COMPUTE NUMBER OF CURRENT BLOCK

HERE1

00602 042452
 00603 042467
 00604 101115
 00605 062435
 00606 442413
 00607 607565
 00610 222402
 00611 707544
 00612 707552
 00613 502443
 00614 707544
 00615 202403
 00616 707544
 00617 202464
 00620 040031
 00621 707601
 00622 741000
 00623 601106
 00624 707561
 00625 600621
 00626 707572
 00627 502423
 00630 741200
 00631 601044

DAC SAVE3
 DAC BUFFER+1 /AND STORE IN APPROPRIATE PLACE
 JMS CALQLB /FORM COMPLEMENT OBERSE
 DAC+ PNTR /AND STORE IT
 ISZ CNTR /HAVE ALL BLOCKS BEEN PATTERNED?
 JMP HERE1 /NO
 LAC NORCON
 707544 /CLEAR CONTINUOUS
 707552 /READ "A"
 AND POINT+3
 707544 /CLEAR FUNCTION REGISTER
 LAC SERNOM /LOAD AC WITH SEARCH NORMAL
 707544 /XOR INTO "A"
 LAC BUFFER=2
 DAC CA /SET UP CA
 707601 /SKIP IF BLOCK MARK FOUND
 SKP /NO DTF, CHECK ERROR FLAG
 JMP ERROR2 /DTF, ERROR
 707561 /SKIP ON ERROR FLAG
 JMP ,=4 /NO FLAGS, CHECK ALL AGAIN
 707572 /READ STATUS "B"
 AND MASK1
 SNA /IS DECTAPE IN END ZONE?
 JMP ERROR1 /NO, ERROR

/ROUTINE TO CHECK FORWARD BLOCK MARKS AND
 /REWRITE LAST BLOCK
 FIFTH

00632 202450
 00633 042413
 00634 142417
 00635 202403
 00636 242400
 00637 242461
 00640 707545
 00641 202464
 00642 040031
 00643 140030
 00644 707601
 00645 600644
 00646 707554
 00647 202466
 00650 542417
 00651 741000
 00652 601112
 00653 442417
 00654 442413
 00655 600644
 00656 707552
 00657 502443
 00660 707544
 00661 202401
 00662 707544
 00663 202455
 00664 040010
 00665 342462
 00666 040031

LAC SAVE1
 DAC CNTR /SET COUNTER TO * NUMBER OF BLOCKS
 D2M EXPECT /ZERO EXPECTED BLOCK NUMBER
 LAC SERNOM /LOAD AC WITH SEARCH NORMAL
 XOR STOPGO /XOR GO
 XOR UNIT /COMBINE WITH UNIT
 707545 /CLEAR AND LOAD "A"
 LAC BUFFER=2
 DAC CA /SET UP CA
 D2M WC /AND WC
 HERE2 707601 /WAIT FOR DTF
 JMP ,=1
 707554 /CLEAR IT
 LAC BUFFER /GET BLOCK NUMBER
 SAD EXPECT /COMPARE AGAINST EXPECTED
 SKP /OK
 JMP ERROR3 /ERROR
 ISZ EXPECT /SET UP EXPECT FOR NEXT
 ISZ CNTR /WILL THERE BE A NEXT?
 JMP HERE2 /YES
 707552 /NO, READ "A"
 AND POINT+3
 707544 /CLEAR FUNCTION BITS
 LAC WAC /LOAD AC WITH WRITE ALL CONT
 707544 /TRANSFER INTO "A"
 LAC BUFFER=1
 DAC 10 /SET UP 10
 TAD THREE
 DAC CA /AND CA

00667 202447
 00670 342461
 00671 142232
 00672 160010
 00673 750001
 00674 342407
 00675 060010
 00676 202416
 00677 342457
 00700 740001
 00701 042414
 00702 750001
 00703 060010
 00704 442414
 00705 600703
 00706 160010
 00707 060010
 00710 060010
 00711 342407
 00712 101115
 00713 060010
 00714 160010
 00715 200030
 00716 741200
 00717 600723
 00720 707561
 00721 600715
 00722 601044
 00723 707552
 00724 502443
 00725 707554
 00726 707561
 00727 600726
 00730 707572
 00731 502423
 00732 741200
 00733 601044
 00734 750001
 00735 342407
 00736 042417
 00737 202461
 00740 242400
 00741 242424
 00742 707545
 00743 707552
 00744 502443
 00745 727544
 00746 202403
 00747 727544
 00750 202464
 00751 040031
 00752 727601
 00753 600752
 00754 202466

LAC SAVE
 TAD THREE
 DAC WC /SET UP WC
 OZM* 10 /SET UP EXPAND (NOT NEEDED)
 CLA: CMA
 TAD BLOCKS
 DAC* 10 /SET UP FORWARD BLOCK MARK
 LAC DATAS
 TAD TWO
 CMA
 DAC CNTR1 /SET UP COUNTER FOR # OF 1'S
 CLA: CMA / (DATAWORDS*3) IN MEMORY
 DAC* 10 /AND THEN STORE IN BUFFER
 ISZ CNTR1
 JMP ,+2
 OZM* 10 /SET UP CHECKSUM
 DAC* 10 /REVERSE LOCK
 DAC* 10 /GUARD
 TAD BLOCKS
 JMS CALQLB /FORM COMP, OBVERSE
 DAC* 10 /STORE IN REV, MARK
 OZM* 10 /SET UP EXPAND
 LAC WC /WAIT FOR BLOCK TO BE WRITTEN
 SNA
 JMP ,+4
 707561
 JMP ,+4
 JMP ERROR1
 707552 /READ "A"
 AND POINT+3
 707554 /CLEAR FUNCTION REGISTER
 707561 /WAIT FOR ERROR FLAG
 JMP ,+1
 707572 /READ STATUS "B"
 AND MASK1
 SNA /IS DECTAPE IN END ZONE?
 JMP ERROR1 /NO, ERROR
 /ROUTINE TO CHECK REVERSE BLOCK MARK AND READ DATA BACKWARDS
 SIXTH CLA: CMA
 TAD BLOCKS /CREATE HIGHEST BLOCK NUMBER
 DAC EXPECT /AND STORE IN EXPECT
 LAC UNIT /FORM WORD
 XOR STOPGO /TO SELECT UNIT
 XOR MASK2 /AND GO REVERSE
 707545 /CLEAR AND LOAD "A"
 707552 /READ "A"
 AND POINT+3
 707544 /CLEAR FUNCTION REGISTER
 LAC SERNOM /LOAD AC WITH SEARCH NORMAL
 727544 /XOR INTO "A"
 LAC BUFFER=2
 DAC CA /SET UP CA
 707601 /WAIT FOR DTF
 JMP ,+1
 LAC BUFFER /GET BLOCK NUMBER
 HERE3

20755 542417
 20756 741000
 20757 601112
 20760 707552
 00761 502443
 00762 707544
 00763 202374
 00764 707544
 00765 202465
 00766 040031
 00767 140030
 00770 707601
 00771 600770
 00772 707561
 00773 741000
 00774 601044
 00775 750001
 00776 342417
 00777 042417
 01000 740001
 01001 750200
 01002 600743
 01003 202461
 01004 740001
 01005 502445
 01006 707545

 01007 762210
 01010 101144
 01011 202407
 01012 101207
 01013 202461
 01014 242424
 01015 707545
 01016 760240
 01017 101166
 01020 762221
 01021 101144
 01022 202416
 01023 101207
 01024 760240
 01025 101166
 01026 762232
 01027 101144
 01030 762243
 01031 101144
 01032 700312
 01033 101202
 01034 542462
 01035 602230
 01036 542431
 01037 602122
 01040 760277
 01041 101166
 01042 101174

SAD EXPECT /COMPARE AGAINST EXPECTED
 SKP /SAME ALL OK
 JMP ERROR3 /DIFFERENT, ERROR
 707552 /READ "A"
 AND POINT+3
 707544 /CLEAR FUNCTION REGISTER
 LAC REDNOM /LOAD AC WITH READ NORMAL
 707544 /XOR INTO "A"
 LAC BUFFER=1
 DAC CA /SET UP CA
 DZM WC /ZERO WC
 707601 /DECTAPE FLAG?
 JMP ,=1 /NO
 707561 /ERROR FLAG?
 SKP /NO, ALL OK
 JMP ERROR1 /YES, ERROR
 CLAICMA /DECREMENT EXPECT
 TAD EXPECT
 DAC EXPECT
 CMA
 SEAICLA /HAS EXPECT GONE TO =0?
 JMP HERE3 /NO, REPEAT FOR NEXT BLOCK
 LAC UNIT /YES
 CMA
 AND POINT+5
 707545 /DESELECT UNIT
 /ROUTINE TO INQUIRE OF OPERATORS INTENTIONS
 LAST LAW MESS20
 JMS MESSAGE /TYPE OUT MESSAGE
 LAC BLOCKS
 JMS TYP0UT /TYPE OUT NUMBER OF BLOCKS
 LAC UNIT
 XOR MASK2
 707545 /STOP DRIVE
 LAW 240
 JMS TYPE
 LAW MESS21
 JMS MESSAGE /TYPE OUT MESSAGE
 LAC DATAS
 JMS TYP0UT /TYPE OUT NUMBER OF DATA WORDS
 LAW 240
 JMS TYPE
 LAW MESS22
 JMS MESSAGE /TYPE OUT MESSAGE
 TMES23 LAW MESS23
 JMS MESSAGE /TYPE OUT MESSAGE
 KRB
 JMS GET /GET TYPED CHARACTER
 SAD YYY /WAS IT Y
 JMP NEXT /YES
 SAD NNN /NO, WAS IT N
 JMP TMESS3 /YES
 LAW 277 /NO
 JMS TYPE /TYPE (?)
 JMS CRLF /CR=LF

01043	601031	JMP TMES23 /TRY AGAIN
01044	762232	/UNEXPECTED ERROR FLAG TYPE OUT ROUTINE
01045	101144	ERROR1 LAW MESS12
01046	707572	JMS MESSAGE /TYPE OUT MESSAGE HEADER
01047	740010	707572 /READ "B"
01050	740100	RAL
01051	601054	SMA /MARK TRACK ERROR?
01052	762065	JMP ,+3 /NO
01053	101144	LAW MESS13 /YES
01054	707572	JMS MESSAGE
01055	742010	707572 /READ "B"
01056	740100	RTL
01057	601062	SMA /END ZONE ERROR?
01060	762077	JMP ,+3 /NO
01061	101144	LAW MESS14 /YES
01062	707572	JMS MESSAGE
01063	502424	707572 /READ "B"
01064	741200	AND MASK2
01065	601070	SNA /SELECT ERROR?
01066	762110	JMP ,+3 /NO
01067	101144	LAW MESS15 /YES
01070	707572	JMS MESSAGE
01071	502425	707572 /READ "B"
01072	741200	AND MASK3
01073	601076	SNA /PARITY ERROR?
01074	762120	JMP ,+3 /NO
01075	101144	LAW MESS16 /YES
01076	707572	JMS MESSAGE
01077	502426	707572 /READ "B"
01100	741200	AND MASK4
01101	601104	SNA /TIMING ERROR?
01102	762130	JMP ,+3 /NO
01103	101144	LAW MESS17 /YES
01104	740040	JMS MESSAGE
01105	601104	XX
01106	762140	JMP ,=1
01107	101144	/TOO MANY BLOCKS WRITTEN ERROR ROUTINE
01110	740040	ERROR2 LAW MESS18
01111	601110	JMS MESSAGE /TYPE OUT ERROR MESSAGE
01112	762170	XX /AND STOP
01113	101144	JMP ,=1
01114	602467	/WRONG BLOCK NUMBER ERROR ROUTINE
01115	000000	ERROR3 LAW MESS19
01116	744001	JMS MESSAGE /TYPE OUT ERROR MESSAGE
01117	042432	JMP FOURTH+15 /REPEAT VIRGIN PATTERN
01120	142433	/CALCULATE 18 BIT COMPLEMENT OBVERSE
01121	777772	CALQLB 0
01122	042453	CMA!CLL
01123	002410	DAC NUMBER
01124	042436	D2M OBVERS
01125	002432	LAW -6
		DAC TALLY
		LAC CPOINT
		DAC PNTR1
		LAC NUMBER

01126	741200	SKP
01127	742017	LOOP RTL
01130	742017	RTL
01131	742017	RTL
01132	442432	DAC NUMBER
01133	522436	AND* PNTR1
01134	242433	XOR OBVERS
01135	242433	DAC OBVERS
01136	442436	ISZ PNTR1
01137	202432	LAC NUMBER
01140	442453	ISZ TALLY
01141	601127	JMP LOOP
01142	202433	LAC OBVERS
01143	621115	JMP* CALQL8
		/MESSAGE PRINT SUBROUTINE
01144	000000	MESSAGE 0
01145	502427	AND MASK5
01146	042437	DAC PNTR2
01147	222437	LAC* PNTR2
01150	742020	RTR
01151	742020	RTR
01152	742020	RTR
01153	742020	RTR
01154	740020	RAR
01155	101166	JMS TYPE
01156	542446	SAD RUBOUT
01157	621144	JMP* MESSAGE
01160	222437	LAC* PNTR2
01161	101166	JMS TYPE
01162	542446	SAD RUBOUT
01163	621144	JMP* MESSAGE
01164	442437	ISZ PNTR2
01165	601147	JMP MESSAGE*3
		/TYPE SUBROUTINE
01166	000020	TYPE 0
01167	502446	AND RUBOUT
01170	700406	TL5
01171	700401	TSF
01172	501171	JMP , -1
01173	621166	JMP* TYPE
		/CRLF SUBROUTINE
01174	000020	CRLF 0
01175	760215	LAW 215
01176	101166	JMS TYPE
01177	760212	LAW 212
01200	101166	JMS TYPE
01201	621174	JMP* CRLF
01202	000000	GET 0
01203	700301	KSF
01204	501203	JMP , -1
01205	700312	KRB
01206	621202	JMP* GET
		/OCTAL TYPEOUT SUBROUTINE
01207	100000	TYPEOUT 0
01210	442454	DAC TEMP

01211 777772
 01212 042415
 01213 202454
 01214 744010
 01215 740010
 01216 742010
 01217 042454
 01220 502440
 01221 242406
 01222 101166
 01223 202454
 01224 442415
 01225 601215
 01226 621207

01227 000000
 01230 142405
 01231 101202
 01232 042454
 01233 342422
 01234 741100
 01235 601267
 01236 342421
 01237 740100
 01240 601267
 01241 202454
 01242 242406
 01243 042454
 01244 202405
 01245 744010
 01246 741400
 01247 601272
 01250 042455
 01251 740010
 01252 741400
 01253 601272
 01254 740010
 01255 741400
 01256 601272
 01257 342455
 01260 741400
 01261 601272
 01262 342454
 01263 741400
 01264 601272
 01265 042405
 01266 601231
 01267 101174
 01277 202405
 01271 621227
 01272 762277
 01273 101166
 01274 101174
 01275 601230

LAW -6
 DAC CNTR2
 LAC TEMP
 RAL:CLL
 RAL
 RTL
 DAC TEMP
 AND POINT
 XOR ASKII
 JMS TYPE
 LAC TEMP
 ISB CNTR2
 JMP ,=10
 JMP* TYP0UT
 /DECIMAL TO BINARY INPUT ROUTINE
 OBCV 0
 DEM ANSWER /ZERO ANSWER
 JMS GET /GET A CHARACTER
 TEST DAC TEMP /SAVE IT
 TAD M260 /SUBTRACT 260
 SPA /IS CHAR > 260
 JMP DONE /NO, DONE
 TAD M12 /SUBTRACT 12
 SMA /CHAR < 271
 JMP DONE /NO, DONE
 LAC TEMP /GET CHARACTER
 XOR ASKII /MASK OFF ASCII CODE
 DAC TEMP /STORE BACK IN TEMP
 MP10 LAC ANSWER /GET PARTIAL ANSWER
 RAL:CLL /MULTIPLY X 2
 SZL /OVERFLOW?
 JMP OVER /YES
 DAC TEM1 /NO, STORE
 RAL /X 2 AGAIN
 SZL /OVERFLOW?
 JMP OVER /YES
 RAL /NO, X 2 AGAIN
 SZL /OVERFLOW?
 JMP OVER /YES
 TAD TEM1 /ADD ANSWER X 2
 SZL /OVERFLOW?
 JMP OVER /YES
 TAD TEMP /NO, ADD NEW NUMBER
 SZL /OVERFLOW?
 JMP OVER /YES
 DAC ANSWER /NO
 JMP TEST=1 /GO BACK FOR NEXT CHARACTER
 DONE JMS CRLF
 LAC ANSWER /GET ANSWER
 JMP* OBCV /EXIT
 OVER LAW 277
 JMS TYPE /TYPE "?"
 JMS CRLF
 JMP OBCV+1 /START AGAIN
 /TAPE 2

/DECTAPE FORMAT GENERATOR - PDP-9, TC02, TU55

/MESSAGES

01276	324325	MESS1	304325	/D,E
01277	303324		303324	/C,T
01300	301320		301320	/A,P
01301	305240		305240	/E,SP
01302	306317		306317	/F,O
01303	322315		322315	/R,M
01304	301324		301324	/A,T
01305	240307		240307	/SP,G
01306	305316		305316	/E,N
01307	305322		305322	/E,R
01310	301324		301324	/A,T
01311	317322		317322	/O,R
01312	255320		255320	/=,P
01313	304320		304320	/D,P
01314	255271		255271	/=,9
01315	254240		254240	/,,SP
01316	324303		324303	/T,C
01317	260262		260262	/0,2
01320	254240		254240	/,,SP
01321	324325		324325	/T,U
01322	265265		265265	/5,5
01323	215212		215212	/CR,LF
01324	212212		212212	/LF,LF
01325	212377		212377	/LF,R,O,
01326	315301	MESS2	315301	/M,A
01327	322313		322313	/R,K
01330	240324		240324	/SP,T
01331	301320		301320	/A,P
01332	305240		305240	/E,SP
01333	317316		317316	/O,N
01334	240325		240325	/SP,U
01335	316311		316311	/N,I
01336	324240		324240	/T,SP
01337	240377		240377	/SP,R,O,
01340	304317	MESS3	304317	/D,O
01341	240331		240331	/SP,Y
01342	317325		317325	/O,U
01343	240304		240304	/SP,D
01344	305323		305323	/E,S
01345	311322		311322	/I,H
01346	305240		305240	/E,SP
01347	323324		323324	/S,T
01350	301316		301316	/A,N
01351	304301		304301	/D,A
01352	322304		322304	/R,D
01353	240376		240376	/SP,F
01354	317322		317322	/O,R
01355	315301		315301	/M,A
01356	324240		324240	/T,SP
01357	250262		250262	/I,2
01360	265266		265266	/5,0
01361	240327		240327	/SP,W
01362	317322		317322	/O,R

01363	324323		304323	/D,S
01364	254240		254240	/,,SP
01365	265267		265267	/5,7
01366	270240		270240	/B,SP
01367	302314		302314	/B,L
01370	317303		317303	/O,C
01371	313323		313323	/K,S
01372	251277		251277	/),?
01373	215212		215212	/CR,LF
01374	240250		240250	/SP,(
01375	324331		324331	/T,Y
01376	320305		320305	/P,E
01377	240331		240331	/SP,Y
01400	255331		255331	/,Y
01401	305323		305323	/E,S
01402	254240		254240	/,,SP
01403	316255		316255	/N=
01404	316317		316317	/N,O
01405	251240		251240	/),SP
01406	240377		240377	/SP,R,O
01407	310317	MESS4	310317	/H,O
01410	327240		327240	/W,SP
01411	315301		315301	/M,A
01412	316331		316331	/N,Y
01413	240302		240302	/SP,B
01414	314317		314317	/L,O
01415	303313		303313	/CK
01416	323277		323277	/S,?
01417	240377		240377	/SP,R,O
01420	310317	MESS5	310317	/H,O
01421	327240		327240	/W,SP
01422	315301		315301	/M,A
01423	316331		316331	/N,Y
01424	240304		240304	/SP,D
01425	301324		301324	/A,T
01426	301240		301240	/A,SP
01427	327317		327317	/W,O
01430	322304		322304	/R,D
01431	323277		323277	/S,?
01432	240377		240377	/SP,R,O,
01433	302314	MESS6	302314	/B,L
01434	317303		317303	/O,C
01435	313240		313240	/K,SP
01436	306317		306317	/F,O
01437	322315		322315	/R,M
01440	301324		301324	/A,T
01441	240322		240322	/SP,R
01442	305321		305321	/E,Q
01443	325311		325311	/U,I
01444	322305		322305	/R,E
01445	323240		323240	/S,SP
01446	264240		264240	/4,SP
01447	317322		317322	/O,R
01450	240315		240315	/SP,M
01451	317322		317322	/O,R

ADDRESS	FORMAT	ADDRESS	FORMAT
01452	305240	305240	/E,SP
01453	324301	304321	/D,A
01454	324301	324321	/T,A
01455	240327	240327	/SP,W
01456	317322	317322	/O,R
01457	304323	304323	/D,S
01460	215212	215212	/CR,LF
01461	377000	377000	/R,O
01462	316325	MESS7 316325	/N,U
01463	315302	315302	/M,B
01464	305322	305322	/E,R
01465	240317	240317	/SP,O
01466	306240	306240	/F,SP
01467	304301	304301	/D,A
01470	324301	324301	/T,A
01471	240327	240327	/SP,W
01472	317322	317322	/O,R
01473	304323	304323	/D,S
01474	240315	240315	/SP,M
01475	325323	325323	/U,S
01476	324240	324240	/T,SP
01477	302305	302305	/B,E
01500	240305	240305	/SP,E
01501	326305	326305	/V,E
01502	316215	316215	/N,CR
01503	212377	212377	/LF,R,O.
01504	324301	MESS8 324301	/T,A
01505	320305	320305	/P,E
01506	240311	240311	/SP,I
01507	323240	323240	/S,SP
01510	316317	316317	/N,O
01511	324240	324240	/T,SP
01512	314317	314317	/L,O
01513	316307	316307	/N,G
01514	240305	240305	/SP,E
01515	316317	316317	/N,O
01516	325307	325307	/U,G
01517	310215	310215	/H,CR
01520	212377	212377	/LF,R,O.
01521	323305	MESS9 323305	/S,E
01522	324240	324240	/T,SP
01523	323327	323327	/S,W
01524	311324	311324	/I,T
01525	303310	303310	/C,H
01526	240314	240314	/SP,L
01527	301302	301302	/A,B
01530	305314	305314	/E,L
01531	305304	305304	/E,O
01532	240327	240327	/SP,W
01533	322324	322324	/R,T
01534	315255	315255	/M,-
01535	316317	316317	/N,O
01536	322315	322315	/R,M
01537	301314	301314	/A,L
01540	255322	255322	/R

01541	324315	304315	/D,M
01542	313240	313240	/K,SP
01543	240324	240324	/SP,T
01544	317240	317240	/O,SP
01545	327322	327322	/W,H
01546	324315	324315	/T,M
01547	240301	240301	/SP,A
01550	316304	316304	/N,D
01551	240305	240305	/SP,E
01552	316301	316301	/N,A
01553	302314	302314	/B,L
01554	305240	305240	/E,SP
01555	215212	215212	/CR,LF
01556	327322	327322	/W,R
01557	311324	311324	/I,T
01560	305240	305240	/E,SP
01561	317316	317316	/O,N
01562	240323	240323	/SP,S
01563	320305	320305	/P,E
01564	303311	303311	/C,I
01565	306311	306311	/F,I
01566	305304	305304	/E,U
01567	240325	240325	/SP,U
01570	316311	316311	/N,I
01571	324240	324240	/T,SP
01572	324310	324310	/T,H
01573	305316	305316	/E,N
01574	240323	240323	/SP,S
01575	324322	324322	/T,R
01576	311313	311313	/I,K
01577	305240	305240	/E,SP
01600	301240	301240	/A,SP
01601	313305	313305	/K,E
01602	331240	331240	/Y,SP
01603	317316	317316	/O,N
01604	240324	240324	/SP,T
01605	310305	310305	/H,E
01606	240313	240313	/SP,K
01607	305331	305331	/E,Y
01610	302317	302317	/B,O
01611	301322	301322	/A,R
01612	304215	304215	/D,CR
01613	212301	212301	/LF,A
01614	306324	306324	/F,T
01615	305322	305322	/E,R
01616	240315	240315	/SP,M
01617	317325	317325	/O,U
01620	316324	316324	/N,T
01621	311316	311316	/I,N
01622	307240	307240	/G,SP
01623	301240	301240	/A,SP
01624	326311	326311	/V,I
01625	322307	322307	/R,G
01626	311316	311316	/I,N
01627	240324	240324	/SP,T

01630	301320	301320	/A,P
01631	305240	305240	/E,SP
01632	301316	301316	/A,N
01633	304240	304240	/D,SP
01634	324301	324301	/T,A
01635	313311	313311	/K,I
01636	316307	316307	/N,G
01637	240262	240262	/SP,2
01640	240327	240327	/SP,W
01641	322301	322301	/R,A
01642	320323	320323	/P,S
01643	240317	240317	/SP,O
01644	316240	316240	/N,SP
01645	324301	324301	/T,A
01646	313305	313305	/K,E
01647	325320	325320	/U,P
01650	240322	240322	/SP,R
01651	305305	305305	/E,E
01652	314215	314215	/L,CR
01653	212377	212377	/LF,R,O
01654	323305	323305	/S,E
01655	314305	314305	/L,E
01656	303324	303324	/C,T
01657	240305	240305	/SP,E
01660	322322	322322	/R,R
01661	317322	317322	/O,R
01662	254240	254240	/,SP
01663	303310	303310	/C,H
01664	305303	305303	/E,C
01665	313240	313240	/K,SP
01666	306317	306317	/F,O
01667	322240	322240	/R,SP
01670	324310	324310	/T,H
01671	305323	305323	/E,S
01672	305240	305240	/E,SP
01673	303317	303317	/C,O
01674	316304	316304	/N,D
01675	311324	311324	/I,T
01676	311317	311317	/I,O
01677	316323	316323	/N,S
01700	272215	272215	/I,CR
01701	212327	212327	/LF,W
01702	322311	322311	/R,I
01703	324305	324305	/T,E
01704	240316	240316	/SP,N
01705	317324	317324	/O,T
01706	240305	240305	/SP,E
01707	316301	316301	/N,A
01710	302314	302314	/B,L
01711	305304	305304	/E,D
01712	215212	215212	/CR,LF
01713	316317	316317	/N,O
01714	316305	316305	/N,E
01715	330311	330311	/X,I
01716	323324	323324	/S,T

MESS10

01717	301316	301316	/A,S
01720	324240	324240	/T,SP
01721	325316	325316	/U,N
01722	311324	311324	/I,T
01723	215212	215212	/CR,LF
01724	315325	315325	/M,U
01725	314324	314324	/L,I
01726	311320	311320	/I,P
01727	314331	314331	/L,Y
01730	240305	240305	/SP,E
01731	330311	330311	/X,I
01732	323324	323324	/S,T
01733	301316	301316	/A,N
01734	324240	324240	/T,SP
01735	325316	325316	/U,N
01736	311324	311324	/I,T
01737	215212	215212	/CR,LF
01740	323327	323327	/S,W
01741	311324	311324	/I,T
01742	303310	303310	/C,H
01743	240316	240316	/SP,N
01744	317324	317324	/O,T
01745	240311	240311	/SP,I
01746	316240	316240	/N,SP
01747	327322	327322	/W,R
01750	315324	315324	/M,T
01751	240320	240320	/SP,P
01752	317323	317323	/O,S
01753	311324	311324	/I,T
01754	311317	311317	/I,O
01755	316215	316215	/N,CR
01756	212377	212377	/LF,R,O.
01757	323305	323305	/S,E
01760	324240	324240	/T,SP
01761	323327	323327	/S,W
01762	311324	311324	/I,T
01763	303310	303310	/C,H
01764	240314	240314	/SP,L
01765	301302	301302	/A,B
01766	305314	305314	/E,L
01767	305304	305304	/E,O
01770	240327	240327	/SP,W
01771	322324	322324	/R,T
01772	315255	315255	/M,=
01773	316317	316317	/N,O
01774	322315	322315	/R,M
01775	301314	301314	/A,L
01776	255322	255322	/=,R
01777	304315	304315	/O,M
02000	313240	313240	/K,SP
02001	324317	324317	/T,O
02002	240316	240316	/SP,N
02003	317322	317322	/O,R
02004	315301	315301	/M,A
02005	314254	314254	/L,.

MESS11

02706	240324		240324	/SP,T
02707	310305		310305	/H,E
02710	316240		316240	/N,SP
02711	323324		323324	/S,T
02012	322311		322311	/R,I
02013	313305		313305	/K,E
02014	240301		240301	/SP,A
02015	240313		240313	/SP,K
02016	305331		305331	/E,Y
02017	240317		240317	/SP,O
02020	316240		316240	/N,SP
02021	215212		215212	/CR,LF
02022	324310		324310	/T,H
02023	305240		305240	/E,SP
02024	313305		313305	/K,E
02025	331302		331302	/Y,B
02026	317301		317301	/O,A
02027	322304		322304	/R,U
02030	215212		215212	/CR,LF
02031	377000		377000	/R,O
02032	215212	MESS12	215212	/CR,LF
02033	324310		324310	/T,H
02034	305240		305240	/E,SP
02035	306317		306317	/F,O
02036	314314		314314	/L,L
02037	317327		317327	/O,W
02040	311316		311316	/I,N
02041	307240		307240	/G,SP
02042	325316		325316	/U,N
02043	305330		305330	/E,X
02044	320305		320305	/P,E
02045	303324		303324	/C,T
02046	305304		305304	/E,D
02047	240305		240305	/SP,E
02050	322322		322322	/R,R
02051	317322		317322	/O,R
02052	323240		323240	/S,SP
02053	327305		327305	/W,E
02054	322305		322305	/R,E
02055	240305		240305	/SP,E
02056	316303		316303	/N,C
02057	317325		317325	/O,U
02060	316324		316324	/N,T
02061	305322		305322	/E,R
02062	305304		305304	/E,D
02063	272215		272215	/I,CR
02064	212377		212377	/LF,RO
02065	315301	MESS13	315301	/M,A
02066	322313		322313	/R,K
02067	240324		240324	/SP,T
02070	322301		322301	/R,A
02071	303313		303313	/C,K
02072	240305		240305	/SP,E
02073	322322		322322	/R,R
02074	317322		317322	/O,R

Line	Address	Label	Code	Comment
02075	215212		215212	/CR,LF
02076	377000		377000	/RO
02077	305315	MESS14	305316	/E,N
02102	304240		304240	/O,SP
02101	332317		332317	/Z,O
02102	316305		316305	/N,E
02103	240305		240305	/SP,E
02104	322322		322322	/R,R
02105	317322		317322	/O,R
02106	215212		215212	/CR,LF
02107	377000		377000	/R,O
02110	323305	MESS15	323305	/S,E
02111	314305		314305	/L,E
02112	303324		303324	/C,T
02113	240305		240305	/SP,E
02114	322322		322322	/R,R
02115	317322		317322	/O,R
02116	215212		215212	/CR,LF
02117	377000		377000	/R,O
02120	320301	MESS16	320301	/P,A
02121	322311		322311	/R,I
02122	324331		324331	/T,Y
02123	240305		240305	/SP,E
02124	322322		322322	/R,R
02125	317322		317322	/O,R
02126	215212		215212	/CR,LF
02127	377000		377000	/RO
02130	324311	MESS17	324311	/T,I
02131	315311		315311	/M,I
02132	316307		316307	/N,G
02133	240305		240305	/SP,E
02134	322322		322322	/R,R
02135	317322		317322	/O,R
02136	215212		215212	/CR,LF
02137	377000		377000	/RO
02140	324317	MESS18	324317	/T,O
02141	317240		317240	/O,SP
02142	315301		315301	/M,A
02143	316331		316331	/N,Y
02144	240302		240302	/SP,B
02145	314317		314317	/L,O
02146	303313		303313	/C,K
02147	323240		323240	/S,SP
02150	327322		327322	/W,R
02151	311324		311324	/I,I
02152	324305		324305	/T,E
02153	316254		316254	/N,I
02154	240320		240320	/SP,P
02155	322317		322317	/R,O
02156	307322		307322	/G,R
02157	301315		301315	/A,M
02160	240305		240305	/SP,E
02161	322322		322322	/R,R
02162	317322		317322	/O,R
02163	255322		255322	/R,R

FOR: AT	FORMAT	FORMAT
02164	305314	305314 /E,L
02165	317301	317301 /O,A
02166	304215	304215 /D,CR
02167	212377	212377 /LF,RO
02170	302314	MESS19 302314 /B,L
02171	317303	317303 /O,C
02172	313240	313240 /K,SP
02173	316325	316325 /N,U
02174	315302	315302 /M,B
02175	305322	305322 /E,R
02176	240323	240323 /SP,S
02177	305321	305321 /E,Q
02200	325305	325305 /U,E
02201	316303	316303 /N,C
02202	305240	305240 /E,SP
02203	302322	302322 /B,R
02204	317313	317313 /O,K
02205	305316	305316 /E,N
02206	215212	215212 /CR,LF
02207	377000	377000 /RO
02210	215212	MESS20 215212 /CR,LF
02211	304317	304317 /D,O
02212	316305	316305 /N,E
02213	241240	241240 /I,SP
02214	324301	324301 /T,A
02215	320305	320305 /P,E
02216	240310	240310 /SP,H
02217	301323	301323 /A,S
02220	240377	240377 /SP,RO
02221	302314	MESS21 302314 /B,L
02222	317303	317303 /O,C
02223	313323	313323 /K,S
02224	250317	250317 /I,O
02225	303324	303324 /C,T
02226	251240	251240 /I,SP
02227	305301	305301 /E,A
02230	303310	303310 /C,H
02231	240377	240377 /SP,RO
02232	327317	MESS22 327317 /W,O
02233	322304	322304 /R,D
02234	323250	323250 /S,I
02235	317303	317303 /O,C
02236	324251	324251 /T,I
02237	240314	240314 /SP,L
02240	317316	317316 /O,N
02241	307215	307215 /G,CR
02242	212377	212377 /LF,RO
02243	304317	MESS23 304317 /D,O
02244	240331	240331 /SP,Y
02245	317325	317325 /O,U
02246	240304	240304 /SP,D
02247	305323	305323 /E,S
02250	311322	311322 /I,N
02251	305240	305240 /E,SP
02252	324317	324317 /T,O

02253	240319	240315	/SP,M
02254	301322	301322	/A,R
02255	313240	313240	/K,SP
02256	301316	301316	/A,N
02257	317324	317324	/O,T
02260	310305	310305	/H,E
02261	322240	322240	/R,SP
02262	324301	324301	/T,A
02263	320305	320305	/P,E
02264	240324	240324	/SP,T
02265	317240	317240	/O,SP
02266	324310	324310	/T,H
02267	311323	311323	/I,S
02270	240306	240306	/SP,F
02271	317322	317322	/O,R
02272	315301	315301	/M,A
02273	324250	324250	/T,C
02274	324331	324331	/T,Y
02275	320305	320305	/P,E
02276	240331	240331	/SP,Y
02277	255331	255331	/M,Y
02300	305323	305323	/E,S
02301	240316	240316	/SP,N
02302	255316	255316	/M,N
02303	317251	317251	/O,I
02304	277215	277215	/T,CR
02305	212377	212377	/LF,RO
02306	215212	215212	/CR,LF
02307	316325	316325	/N,U
02310	315302	315302	/M,B
02311	305322	305322	/E,R
02312	240317	240317	/SP,O
02313	306240	306240	/F,SP
02314	302314	302314	/B,L
02315	317303	317303	/O,C
02316	313323	313323	/K,S
02317	240315	240315	/SP,M
02320	325323	325323	/U,S
02321	324240	324240	/T,SP
02322	302305	302305	/B,E
02323	240262	240262	/SP,2
02324	240317	240317	/SP,O
02325	322240	322240	/R,SP
02326	315317	315317	/M,O
02327	322305	322305	/R,E
02330	215212	215212	/CR,LF
02331	377000	377000	/RO
02332	215212	215212	/CR,LF
02333	270313	270313	/B,K
02334	240317	240317	/SP,C
02335	306240	306240	/F,SP
02336	315305	315305	/M,E
02337	315317	315317	/M,O
02340	322331	322331	/R,Y
02341	240303	240303	/SP,C

MESS24

MESS25

02342	301316	301316	/A,N
02343	247324	247324	/I,T
02344	247303	240303	/SP,C
02345	317316	317316	/O,N
02346	324301	324301	/T,A
02347	311316	311316	/I,N
02350	240324	240324	/SP,T
02351	310311	310311	/H,I
02352	323240	323240	/S,SP
02353	323311	323311	/S,I
02354	332305	332305	/Z,E
02355	240302	240302	/SP,B
02356	314317	314317	/L,O
02357	303313	303313	/C,K
02360	240215	240215	/SP,CR
02361	212377	212377	/LF,RO
		/CONSTANTS AND VARIABLES	
		/WC AND CA DEFINITIONS	
	000030	WC#30	
	000031	CA#31	
		/MARK TRACK PATTERNS	
02362	404404	REVEND	404404 /55
02363	040404	EXPAND	040404 /25
02364	040440	MARK	040440 /26
02365	044040	REVGRD	044040 /32
02366	004000	LOCK	004000 /10
02367	444000	DATAM	444000 /70
02370	444044	PREFIN	444044 /73
02371	404004	GUARD	404004 /51
02372	400404	REVMRK	400404 /45
02373	040040	END	040040 /22
		/DECTAPE COMMAND	
02374	002000	REDNOM	002000 /READ DATA NORM
02375	035000	FWDWAC	035000 /WRITE ALL FWD GO CONT
02376	071000	RESERC	071000 /SEARCH REVERSE GO CONT
02377	036000	WTMT	036000 /WRITE T & MT FWD GO CONT
02400	020000	STOPGO	020000 /STOP OR GO
02401	015000	WAC	015000 /WRITE ALL CONTINUOUS
02402	010000	NORCON	010000 /NORMAL CONTINUOUS
02403	001000	SERNOM	001000 /SEARCH NORMAL
		/AASSORTED SUNDRY POINTERS, COUNTERS, CONSTANTS, VARIABLES, ETC.	
02404	762514	AA	-A+1 /NUMBER OF DATA WORDS MAX (=)
02405	000000	ANSWER	0 /ANSWER TO DEC TO BIN TYPEIN (DBCX)
02406	000260	ASKII	260 /MAGIC CONSTANT
02407	001102	BLOCKS	1102 /NUMBER OF BLOCKS
02410	002442	CPOINT	POINT
02411	001102	CONST1	1102 /570 DEC
02412	000400	CONST2	400 /256 DEC
02413	000000	CNTR	0 /BLOCKS COUNTER
02414	000000	CNTR1	0 /DATA WORD COUNTER
02415	000000	CNTR2	0 /COUNTER FOR OCTAL TYPEOUT
02416	000400	DATAS	400 /NUMBER OF DATA WORDS
02417	000000	EXPECT	0 /NUMBER OF BLOCK EXPECTED
02420	777767	M9	-1-11+1
02421	777766	M12	-1-12+1

02422	777521	M260	-1-260+1
02423	100000	MASK1	100000
02424	140000	MASK2	40000
02425	220000	MASK3	20000
02426	210000	MASK4	10000
02427	027777	MASK5	7777
02430	777774	MINUS4	-1-4+1
02431	000316	NNN	316
02432	000000	NUMBER	0 /NUMBER BEING OBSERVED
02433	000000	OBVERS	0 /COMP. OBVERSE CALCULATIONS
02434	000001	ONE	1
02435	000000	PNTR	0 /POINTER FOR STORAGE OF BLOCK NUMBER
02436	002440	PNTR1	POINT /POINTER FOR MASKS OF CALQLB
02437	000000	PNTR2	0 /POINTER FOR MESSAGE
02440	000007	POINT	7 /MASK FOR CALQLB
02441	000070		70
02442	000700		700
02443	007000		7000
02444	070000		70000
02445	700000		700000
02446	000377	RUBOUT	377
02447	000000	SAVE	0 /# OF MARKS PER BLOCK (-)
02450	000000	SAVE1	0 /# OF BLOCKS (-)
02451	000000	SAVE2	0 /COMP. OBVERSE OF LAST BLOCK
02452	000000	SAVE3	0 /# OF PARTICULAR BLOCK
02453	000000	TALLY	0 /COMP. OBVERSE COUNTER
02454	000000	TEMP	0 /STORAGE FOR TYPEOUT AND TYPIN
02455	000000	TEM1	0 /STORAGE FOR DBCV
02456	000012	TEN	12
02457	000002	TWO	2
02460	000003	THREE	3
02461	000000	UNIT	0 /UNIT NUMBER
02462	000331	YYY	331
02463	323553	MAGCON	323553 /MINUS 153,749(DEC)
			/BEGINNING OF BUFFER AREA
02464	002466		BUFFER
02465	002465		BUFFER=1
02466	000000	BUFFER	0
	015265		A=17763=BUFFER=10
	000100		,END BEGIN
			NO ERROR LINES

SIZE=02467

A	015265
AA	02404
ANSWER	02405
ASKII	02406
BEGIN	00100
BLOCKS	02407
BUFFER	02466
CA	000031
CALQL8	01115
CLOF	700004
CLON	700044
CLSF	700001
CNTR	02413
CNTR1	02414
CNTR2	02415
CONST1	02411
CONST2	02412
CPOINT	02410
CRLF	01174
DATAM	02367
DATAS	02416
DBCV	01227
DONE	01267
EEM	707702
END	02373
ERROR1	01044
ERROR2	01106
ERROR3	01112
EXPAND	02363
EXPECT	02417
FIFTH	00632
FIRST	00263
FOURTH	00452
FWDWAC	02375
GET	01202
GUARD	02371
HERE1	00965
HERE2	00644
HERE3	00743
KRB	700312
KSF	700301
LAST	01007
LEM	707704
LOCK	02366
LOOP	01127
MAGCON	02463
MARK	02364
MASK1	02423
MASK2	02424
MASK3	02425
MASK4	02426
MASK5	02427
MESSAGE	01144
MESS1	01276
MESS10	01654

MESS11	01757
MESS12	02032
MESS13	02065
MESS14	02077
MESS15	02110
MESS16	02120
MESS17	02130
MESS18	02140
MESS19	02170
MESS2	01326
MESS20	02210
MESS21	02221
MESS22	02232
MESS23	02243
MESS24	02306
MESS25	02332
MESS3	01340
MESS4	01407
MESS5	01420
MESS6	01433
MESS7	01462
MESS8	01504
MESS9	01521
MINUS4	02430
MP10	01244
M12	02421
M260	02422
M9	02420
NEXT	00230
NNN	02431
NORCON	02402
NUMBER	02432
OBVERS	02433
ONE	02434
OVER	01272
PCF	700202
PNTR	02435
PNTR1	02436
PNTR2	02437
POINT	02440
PREFIN	02370
PSA	700204
PSB	700244
PSF	700201
RCF	700102
REDNOM	02374
RESERC	02376
REVENO	02362
REVGRO	02365
REVMRK	02372
RRB	700112
RSA	700104
RSB	700144
RSF	700101
RUBOUT	02446

SAVE 02447
SAVE1 02450
SAVE2 22451
SAVE3 02452
SECOND 00312
SERNOM 02403
SIXTH 00734
STAND 00223
STOPGO 02400
TALLY 02453
TCF 700402
TEMP 02454
TEM1 02455
TEN 02456
TEST 01232
THIRD 00403
THREE 02460
TLS 700406
TMESS3 00122
TMESS4 00136
TMESS5 00151
TMESS6 00160
TMESS7 00167
TMESS8 00177
TMES11 00430
TMES23 01030
YSP 700401
TWO 02457
TYPE 01166
TYP0UT 01207
UNIT 02461
WAC 02401
WC 000030
WTMT 02377
YYY 02462

WC	00030
CA	00031
REGIN	00100
TMESS3	00122
TMESS4	00136
TMESS5	00151
TMESS6	00160
TMESS7	00167
TMESS8	00177
STAND	00223
NEXT	00230
FIRST	00263
SECOND	00312
THIRD	00403
TMES11	00430
FOURTH	00452
HERE1	00565
FIFTH	00632
HERE2	00644
SIXTH	00734
HERE3	00743
LAST	01007
TMES23	01030
ERROR1	01044
ERROR2	01106
ERROR3	01112
CALDL8	01115
LOOP	01127
MESSAGE	01144
TYPE	01166
CRLF	01174
GET	01202
TYPOUT	01207
DBCY	01227
TEST	01232
MP10	01244
DONE	01267
OVER	01272
MESS1	01276
MESS2	01326
MESS3	01347
MESS4	01407
MESS5	01420
MESS6	01433
MESS7	01462
MESS8	01504
MESS9	01521
MESS10	01654
MESS11	01757
MESS12	02032
MESS13	02065
MESS14	02077
MESS15	02110
MESS16	02120
MESS17	02130

MESS18	02147
MESS19	02172
MESS20	02210
MESS21	02221
MESS22	02232
MESS23	02243
MESS24	02306
MESS25	02332
REVENO	02362
EXPAND	02363
MARK	02364
REVGRD	02365
LOCK	02366
DATAM	02367
PREFIN	02370
GUARD	02371
REVMRK	02372
END	02373
REDNOM	02374
FWDWAC	02375
RESERC	02376
WTMT	02377
STOPGO	02400
WAC	02401
NORCON	02402
SERNOM	02403
AA	02404
ANSWER	02405
ASKII	02406
BLOCKS	02407
CPOINT	02410
CONST1	02411
CONST2	02412
CNTR	02413
CNTR1	02414
CNTR2	02415
DATAS	02416
EXPECT	02417
M9	02422
M12	02421
M260	02422
MASK1	02423
MASK2	02424
MASK3	02425
MASK4	02426
MASK5	02427
MINUS4	02430
NNN	02431
NUMBER	02432
OBVERS	02433
ONE	02434
PNTR	02435
PNTR1	02436
PNTR2	02437
POINT	02440

RUBOUT	02446
SAVE	02447
SAVE1	02450
SAVE2	02451
SAVE3	02452
TALLY	02453
TEMP	02454
TEM1	02455
TEN	02456
TWO	02457
THREE	02460
UNIT	02461
YYY	02462
MAGCON	02463
BUFFER	02466
A	015265
CLSF	700001
CLOF	700004
CLON	700044
RSF	700101
RCF	700102
RSA	700104
RRB	700112
RSB	700144
PSF	700201
PCF	700202
PSA	700204
PSB	700244
KSF	700301
KRB	700312
TSF	700401
TCF	700402
TLS	700406
EEM	707702
LEM	707704