

IDENTIFICATION

Product Code: MAINDEC-08-D8SC-D

Product Name: DM01 Exerciser

Date Created: March 26, 1971

Maintainer: Diagnostic Group

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ABSTRACT

The DM01 Exerciser is a program written to exercise the DM01 Data Break Multiplexer to assure that it can properly interlace data breaks from several peripheral devices to the PDP-8 computer. It does this by exercising several data break devices simultaneously.

2. REQUIREMENTS

2.1 Equipment

Family-of-8 Computer and
DM01 Data Break Multiplexer, plus at least one of the following

TC01 DECTape and/or

TC58 MAGtape and/or

338 Display and/or

Extended Memory and/or

RM08 Drum or

DF32 Disk or

RF08 Disk

2.2 Storage

The program occupies all of the lowest 4K of the computer's memory and uses some of this area and areas in other memory banks (if available) for data storage.

2.3 Preliminary Programs

The appropriate diagnostic programs for the data break devices.

3. LOADING PROCEDURE

3.1 Method

The program is loaded, using the "standard binary loader" technique, into memory bank 0.

4. STARTING PROCEDURE

4.1 Control Switch Settings

The following is a table of AC Switch settings and their action on the program.

<u>AC Switch</u>	<u>Set As</u>	<u>Action on Program</u>
0	1	Don't halt on hardware errors
	0	Halt on hardware errors
1	1	Don't halt on data errors
	0	Halt on data errors
2	1	Don't print hardware errors
	0	Print hardware errors
3	1	Don't print data errors
	0	Print data errors
4	1	Look at ACS5 for disk/drum transfer direction
	0	Ignore ACS5
5	1	Write
	0	Read
6	1	Suppress DECTape exercising
	0	None
7	1	Suppress MAGtape exercising
	0	None
8	1	Suppress disk/drum exercising
	0	None
9	1	
	0	
10	1	
	0	
11	1	Freeze memory field
	0	None

4.2 Starting Addresses

There are two starting addresses for the program.

- a. Start at location 00200 when the program is initially read into memory, to allow the program to interrogate the operator.
- b. Restart at location 00201 to avoid re-interrogating the operator about computer configuration.

4.3 Starting Procedure

Start the program using the following starting procedure, and ignoring those steps not applicable to computer configuration.

- a. Load program into memory bank 0 using the "standard binary loader."
- b. Mount onto a DECtape transport a reel of DECtape which has the standard mark and timing track format (2702 blocks, 201 words each). Set the transport selector to 8, set switch to WRITE ENABLE, set switch to REMOTE.
- c. Mount onto a MAGtape transport a reel of MAGtape which is certified to operate at 800 bpi with the "write-lock" ring in (able to write). Set the transport selector to 0 and ON LINE.
- d. Set up the DF32, disk 0, so that the upper 16K may be written on (not write-lock).
- e. Set up RF08, disk 0, so that uppermost locations may be written on (not write-lock) (256K).
- f. Set up RM08 drum so that track 77, sectors 50 to 77 may be written on (not write-lock).
- g. Set up 338 Display so that it can be operated by the 8.
- h. Set ACS to 00200.
- i. Depress LOAD ADDRESS.
- j. Set ACS per Section 4.1 (normal setting is 0000).
- k. Depress START.
- l. Answer questions asked by program with "Y" for Yes, "N" for No, and number of extra memory banks (between 1 and 7) (if applicable).
- m. After interrogation is complete, program will start exercising the devices whose answers are "Yes" and the DM01.

5. OPERATING PROCEDURE

5.1 Operational Switch Settings

See Section 4.1

5.2 Subroutine Abstracts

None

5.3 Program and/or Operator Action

After setting up the I/O devices and answering the questions asked by the program, the operator need perform no other action unless an error occurs. If a particular device consistently has errors, it may be "turned off" by setting to 1 its ACS (see Section 4.1, ACS 6-8).

6. ERRORS

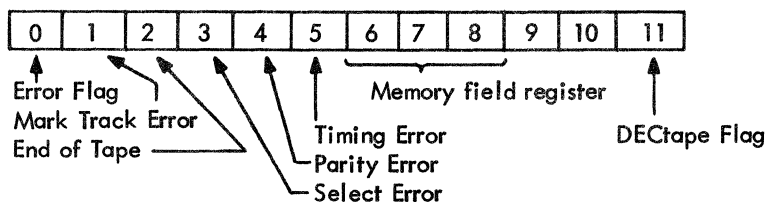
6.1 Error Typeouts

Since all error typeouts occur with the program interrupt facility off, a DECTape timing error will generally occur if any non-DECTape error has been typed out. Normally, the DECTape timing error can be ignored under these circumstances.

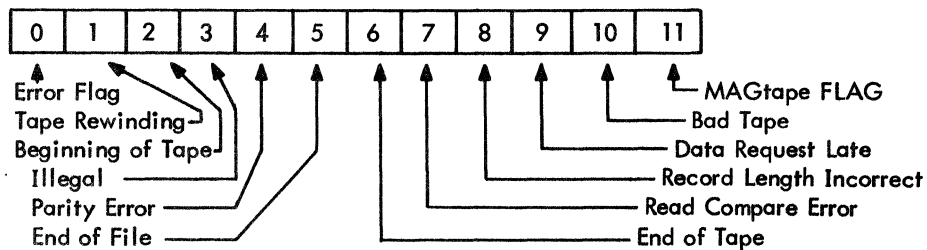
6.1.1 Hardware Errors

Hardware errors cause an error status typeout for the device in error. Shown below are the error status bits for the various devices.

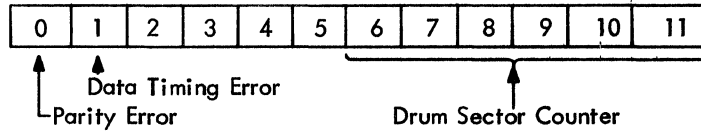
6.1.1.1 DECTape Error Status (TC01) -



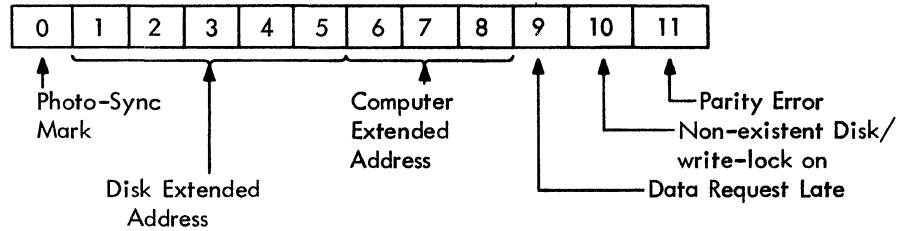
6.1.1.2 MAGtape Error Status (TC-58) -



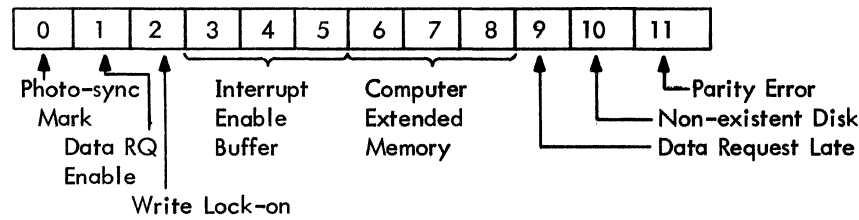
6.1.1.3 Drum Error Status (RM08) -



6.1.1.4 Disk Error Status (DF32) -



6.1.1.5 Disk Error Status (RF08) -



6.1.2 Data Errors

Data error typeouts present the following information:

- a. Offending Device (DECtape, MAGtape, DISK/DRUM)
- b. Memory Field in which error occurred
- c. Address of "Good" Data ("GADD")
- d. Good Data ("GDAT")
- e. Address of "Bad" Data ("BADD")
- f. Bad Data ("BDAT")

6.2 Error Halts

Each error, which has an error typeout, also has an error halt.

9.3 DECtape Exercising

The exercising of DECtape follows this procedure:

- a. Six hundred (octal) words are obtained from a random number generator and are stored in an output buffer in memory (some memory bank). This is done with PI off.
- b. The block to be sought for writing is incremented by 3. It is initially 0.
- c. The data is written on DECtape into the selected block (and the two following). While this is taking place, the PI facility is turned on to allow interrupts from any I/O devices in use.
- d. After the data is written, the information is read back from the selected block (S) into an input buffer in the same memory bank data was written from. This takes place with PI on.
- e. The data written is compared with the data read to see if any errors occurred. This is done with the PI on. Any discrepancies will be reported on the teletype (unless suppressed) and will cause error halts (unless suppressed).
- f. A new data field is selected for data transfer for DECtape. The program then returns to Step a (above).

9.4 MAGtape Exercising

The exercising of MAGtape follows this procedure:

- a. Six hundred (octal) words are obtained from a random number generator and are stored in an output buffer in memory (some memory bank). This is done with the PI on.
- b. The data is written on MAGtape in an area not previously written on by this program. While this is taking place, the PI facility is turned on to allow interrupts from any I/O devices in use.
- c. After the data is written, the information is read back into an input buffer in the same memory bank data was written from. This is accomplished by rewinding the MAGtape to "BOT," spacing forward as many records as necessary to get to the data, then reading it into memory. This is done with the PI on.
- d. The data written is compared with the data read to see if any errors occurred. This is done with the PI on. Any discrepancies will be reported on the Teletype and will cause error halts.
- e. The data on MAGtape is then "Read Compared" against the data in memory. This is done with the PI on. Any discrepancies will result in the hardware error "Read Compare Error".
- f. A new data field is selected for data transfer for MAGtape. The program then returns to Step a (above).

9.5 Disk/Drum Exercising

The exercising of disk/drum follows this procedure:

- a. Six hundred (octal) words are obtained from a random number generator and are stored in an output buffer in memory (some memory bank). This is done with PI on.
- b. The data is written on the disk/drum into the highest 601 (octal) locations (on disk/drum 0) (265K). While this is taking place, the PI facility is on.

6.3 Error Recovery

To recover from an error halt, depress CONTINUE. If it was a data error, the program will continue until another data error is found for the device, or until all the data has been checked. If it was a hardware error, the program will attempt to perform the function again, except a non-existent disk error which is not recoverable.

7. RESTRICTIONS

7.1 Starting Restrictions

None

7.2 Operating Restrictions

None

8. MISCELLANEOUS

8.1 Execution Time

Not applicable. Since this is an exerciser program, it does not stop on its own accord, except for errors.

9. PROGRAM DESCRIPTION

9.1 Interrogation

The first function that is performed by the program is interrogation. The operator is questioned by the program to determine what peripherals are to be exercised.

9.2 Initialization

Next, initialization takes place. Random memory fields (if applicable) are selected for the devices being tested. The DECTape is initialized by causing it to move to the end zone at the beginning of tape. The MAGtape is initialized by causing it to rewind to the beginning of tape; tests are also made at this time to assure that the tape control is ready and that the tape transport is also ready (and exists). A two word transfer is made to disk or one sector to the drum to initialize it. The 338 Display is set up to execute a display program.

c. After the data is written, the information is read back into an input buffer in the same memory bank data was written from. This takes place with the PI on.

d. The data written is compared with the data read to see if any errors occurred. This is done with PI on. Any discrepancies will be reported on the Teletype and will cause error halts.

e. A new data field is selected for data transfer for disk/drum. The program then returns to Step a (above).

If a hardware error occurs during any function of a peripheral, that function will usually be attempted repeatedly until it is successful, or the operator intervenes.

9.6 Data Buffers Memory Map

The following locations in each memory bank being used for data transfer are used as buffer areas.

DECtape Output Buffer	3200 - 3777
MAGtape Output Buffer	4000 - 4577
Disk/Drum Output Buffer	4600 - 5377
DECtape Input Buffer	5400 - 6177
MAGtape Input Buffer	6200 - 6777
Disk/Drum Input Buffer	7000 - 7577

9.7 Display Exercising

The exercising of the display is handled quite simply. The 338 is initialized by clearing the "initial conditions", and the break field is set to 0. The display address register is then set to the starting address of the display program. The display program, which is written in 338 display instructions, causes a square, with corners at 100,100; 100,1700, 1700, 1700. 100; to be displayed in vector mode. Diagnosis of display errors is visual.

/DMØ1 EXERCISER - TAPE 1

/IOT DEFINITIONS

/DRUM

6603 DRCR=6603
6605 DRCW=6605
6611 DRCF=6611
6612 DREF=6612
6615 DRTS=6615
6621 DRSE=6621
6622 DRSC=6622
6624 DRCN=6624
6612 DRES=6612
6624 DRFS=6624

/DISC

6601 DCMA=6601
6603 DMAR=6603
6605 DMAW=6605
6611 DCEA=6611
6612 DSAC=6612
6615 DEAL=6615
6616 DEAC=6616
6621 DFSE=6621
6622 DFSC=6622
6626 DMAC=6626
6611 DCIM=6611
6615 DIML=6615
6616 DIMA=6616
6643 DXAL=6643

/TCØ1

6761 DTRA=6761
6762 DTCA=6762
6764 DTXA=6764
6766 DTLA=6766
6771 DTSF=6771
6772 DTRB=6772
6774 DTLB=6774

/TC58

6701 MTSF=6701
6711 MTCR=6711
6721 MTTR=6721
6712 MTAF=6712
6714 MTCM=6714
6716 MTLC=6716
6706 MTRS=6706
6722 MTGO=6722

/EXTENDED MEMORY

6201 CDF=6201
6202 CIF=6202
6214 RDF=6214
6224 RIF=6224
6234 RIB=6234

6244 RMF=6244

/DISPATCH TO PI SCAN FLAG ROUTINE

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0001 0001 *1
0001 5402     JMP I .+1
0002 2600     SCAN

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/POINTERS, GOBS OF POINTERS

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0003 2321     PNTR1, MESSAGE
0004 2254     PNTR2, INPUT
0005 2400     PNTR3, RANGEN
0006 2554     PNTR4, GET
0007 2726     PNTR5, DDDATA+6

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0020 0000     DTFELD, 0           /DECTAPE EXTENDED MEMORY FIELD
0021 0000     MTFELD, 0           /MAGTAPE EXTENDED MEMORY FIELD
0022 0000     DDFELD, 0          /DISC OR DRUM EXTENDED MEMORY FIELD
0023 2630     PNTR6, EXIT
0024 2654     PNTR7, RAND3
0025 2720     PNTR8, DDDATA
0026 1501     PNTR9, RF08WR
0027 1461     PNTR10, RF08RD
0030 1416     PNTR11, RM08WR
0031 1400     PNTR12, RM08RD
0032 2643     PNTR13, DDFLAG
0033 0735     PNTR14, DF32WR
0034 0755     PNTR15, DF32RD
0035 2637     PNTR16, DTFLAG
0036 2112     PNTR17, SPCFWD
0037 2641     PNTR18, MTFLAG
0040 1240     PNTR19, REWIND
0041 1255     PNTR20, MTERR
0042 2444     PNTR21, RAND1
0043 1067     PNTR22, DTRITE
0044 1047     PNTR23, DTREAD
0045 2277     PNTR24, PRINT
0046 2645     PNTR25, TYPE
0047 1266     PNTR32, MTWAIT
0050 2363     PNTR33, CRLF
0051 0600     PNTR34, DECTAP
0052 0610     PNTR35, MAGTAP
0053 0627     PNTR36, RM08
0054 0644     PNTR38, DF32
0055 0662     PNTR39, RF08
0056 2634     PNTR40, MEMORY
0057 1331     PNTR41, DTSAVE
0060 1343     PNTR42, DTREST
0061 0345     PNTR48, NODISC
0062 0365     PNTR49, DIS338

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0063 3000     PMESS1, MESS01
0064 1565     PMESS2, MESS02
0065 2171     PMESS3, MESS03

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0066	2371	PMESS4,	MESS04
0067	1770	PMESS6,	MESS06
0070	2565	PMESS7,	MESS07
0071	3040	PMESS8,	MESS08
0072	3046	PMESS9,	MESS09
0073	3055	PMES10,	MESS10
0074	3132	PMES15,	MESS15

0075	7750	K7750,	7750	/WC - DISC
0076	7751	K7751,	7751	/CA - DISC
0077	7752	K7752,	7752	/WC - TC58
0100	7753	K7753,	7753	/CA - TC58
0101	7754	K7754,	7754	/WC - TC01
0102	7755	K7755,	7755	/CA - TC01

0103	0400	K0400,	400	/REVERSE DIRECTION (DECTAPE)
0104	0200	K0200,	200	/GO, STOP (DECTAPE)
0105	7200	K7200,	7200	/-600 (SIZE OF DATA TRANSFERS)
0106	3177	BUFF1,	3177	/(DECTAPE OUTPUT BUFFER) -1
0107	5377	BUFF4,	5377	/(DECTAPE INPUT BUFFER) -1
0110	0014	K0014,	14	/REWIND, ENABLE (MAGTAPE)
0111	0177	BUFF5,	0177	/(MAGTAPE INPUT BUFFER) -1
0112	3777	BUFF2,	3777	/(MAG TAPE OUTPUT BUFFER) -1
0113	6777	BUFF6,	6777	/(DISC OR DRUM INPUT BUFFER) -1
0114	4577	BUFF3,	4577	/(DISC OR DRUM OUTPUT BUFFER) -1
0115	7775	M0003,	-3	/MINUS 3
0116	7462	M0316,	-316	/MINUS N
0117	7447	M0331,	-331	/MINUS Y
0120	5100	M2700,	-2700	/HIGHEST DECTAPE BLOCK TO BE USED
0121	7774	M0004,	-4	
0122	3000	K3000,	3000	/24 RM08 DRUM SECTORS
0123	0070	K0070,	70	/MASK FOR MEMORY FIELD BITS
0124	0040	K0040,	40	/MASK FOR DECTAPE SUPPRESSION
0125	0240	K0240,	240	/SPACE
0126	0215	K0215,	215	/CR
0127	0212	K0212,	212	/LF
0130	0007	K0007,	7	
0131	7740	M0040,	-40	/-(SPACE)
0132	0100	K0100,	100	
0133	7610	SKIP,	SKP CLA	/MAGIC INSTRUCTION
0134	0020	K0020,	20	/MASK FOR MAG TAPE SUPPRESSION
0135	0010	K0010,	10	/MASK FOR DISC OR DRUM SUPPRESSION
0136	1000	K1000,	1000	/MASK FOR TC58 BOT

0107	0700	DISCEA,	700	/DISC EXTENDED ADDRESS (DF 32)
0140	7177	DISCAD,	7177	/DISC ADDRESS
0141	7750	DRUMAD,	7750	/DRUM ADDRESS (RM08)
0142	0077	TRACK,	77	/DISC EXTENDED ADDRESS (RF08)
0143	0500	INTERN,	500	/INTERRUPT ENABLES (RF08)
0144	0000	AC,	0	/AC AT PI
0145	0000	LINK,	0	/LINK AT PI
0146	0000	DTSTAT,	0	/DECTAPE STATUS
0147	0000	MTSTAT,	0	/MAG TAPE STATUS

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0150 0000 RECORD, 0 /NUMBER OF RECORDS WRITTEN ON MAG TAPE
0151 0000 DDSTAT, 0 /DRUM OR DISC STATUS
0152 0000 DRMSEC, 0 /DRUM SECTOR COUNTER
0153 0000 CHAR, 0 /CHARACTER FROM KEYBOARD
0154 5451 JMPDEC, JMP I PNTR34 /JUMP TO DECTAPE STARTER
0155 5452 JMPMAG, JMP I PNTR35 /JUMP TO MAGTAPE STARTER
0156 5453 JMPRM8, JMP I PNTR36 /JUMP TO RM08 STARTER
0157 5454 JMPD32, JMP I PNTR38 /JUMP TO DF32 STARTER
0160 5455 JMPR08, JMP I PNTR39 /JUMP TO RF08 STARTER
0161 5462 JMP338, JMP I PNTR49
0162 0000 FELD, 0 /NUMBER OF EXTENDED MEMORY FIELDS
0163 1600 DTPNTR, DTEXER /POINTER TO DECTAPE EXERCISOR
0164 2000 MTPNTR, MTEXER /POINTER TO MAGTAPE EXERCISER
0165 0510 RM08PR, RM08EX /POINTER TO RM08 DRUM EXERCISER
0166 0526 DF32PR, DF32EX /POINTER TO DF32 DISC EXERCISE
0167 0517 RF08PR, RF08EX /POINTER TO RF08 DISC EXERCISER
0170 0000 DTCNTR, 0 /DECTAPE LOOP COUNTER
0171 0000 TEMP, 0 /TEMP STORAGE
0172 0000 TEMP1, 0
0173 0000 MTCNTR, 0 /MAGTAPE LOOP COUNTER
0174 0000 DDCNTR, 0 /DISC OR DRUM COUNTER
0175 0000 LOOK, 0 /BLOCK LOOKED FOR

0200 0200 *200
0200 5207 START, JMP INTERR /INTERROGATE OPERATOR
0201 0000 0 /((DECTAPE) THESE AND'S MAY BE REPLACED
0202 0000 0 /((MAGTAPE) BY JUMPS
0203 0000 0 /((DISC OR DRUM) IF THESE DEVICES ARE AVAILABLE
0204 0000 0 /((338 DISPLAY)
0205 6001 ION /TURN ON PI
0206 5206 JMP /IDLE HERE WHEN THERE IS NOTHING BETTER TO DO

/INTERROGATE THE OPERATOR ABOUT MACHINE CONFIGURATION
0207 7200 INTERR, CLA /INITIALIZE STARTER JUMPS TO AND 0
0210 3201 DCA START+1
0211 3202 DCA START+2
0212 3203 DCA START+3
0213 3204 DCA START+4
0214 1063 TAD PMESS1
0215 4403 JMS I PNTR1 /TYPE OUT HEADER
0216 1064 ASK1, TAD PMESS2
0217 4403 JMS I PNTR1 /ASK OPERATOR ABOUT DECTAPE
0220 4327 JMS TEST
0221 5225 JMP ASK2
0222 5216 JMP ASK1
0223 1154 TAD JMPDEC
0224 3201 DCA START+1
0225 1066 ASK2, TAD PMESS4
0226 4403 JMS I PNTR1 /ASK OPERATOR ABOUT MAGTAPE
0227 4327 JMS TEST
0230 5234 JMP ASK3
0231 5225 JMP ASK2
0232 1155 TAD JMPMAG
0233 3202 DCA START+2

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0234	1065	ASK3,	TAD PMESS3	
0235	4403		JMS I PNTR1	/ASK OPERATOR ABOUT M08
0236	4327		JMS TEST	
0237	5243		JMP ASK4	
0240	5234		JMP ASK3	
0241	1161		TAD JMP338	
0242	3204		DCA START+4	
0243	1067	ASK4,	TAD PMESS6	
0244	4403		JMS I PNTR1	/ASK OPERATOR ABOUT M08
0245	4327		JMS TEST	
0246	5253		JMP ASK5	
0247	5243		JMP ASK4	
0250	1156		TAD JMPRMB	
0251	3203		DCA START+3	
0252	5272		JMP ASK7	
0253	1070	ASK5,	TAD PMESS7	
0254	4403		JMS I PNTR1	/ASK OPERATOR ABOUT DF32
0255	4327		JMS TEST	
0256	5263		JMP ASK6	
0257	5253		JMP ASK5	
0260	1157		TAD JMPD32	
0261	3203		DCA START+3	
0262	5272		JMP ASK7	
0263	1071	ASK6,	TAD PMESS8	
0264	4403		JMS I PNTR1	/ASK OPERATOR ABOUT RF08
0265	4327		JMS TEST	
0266	5272		JMP ASK7	
0267	5263		JMP ASK6	
0270	1160		TAD JMPR08	
0271	3203		DCA START+3	
0272	1072	ASK7,	TAD PMESS9	
0273	4403		JMS I PNTR1	/ASK OPERATOR ABOUT EXTENDED MEMORY
0274	4327		JMS TEST	
0275	5303		JMP .+6	
0276	5272		JMP ASK7	
0277	1073		TAD PMES10	
0300	4403		JMS I PNTR1	/ASK HOW MUCH
0301	4404		JMS I PNTR2	
0302	5277		JMP .-3	
0303	7104		RAL CLL	/POSITION BITS
0304	7006		RTL	
0305	3162		DCA FELD	/STORE NUMBER OF EXTRA MEMORY BANKS
0306	4450		JMS I PNTR33	/CR-LF
/LOAD EXTENDED MEMORY FIELDS FOR				
/DECTAPE, MAGTAPE, AND DISC/DRUM				
0307	1134		TAD K0020	
0310	3000		DCA 0	
0311	1115		TAD M0003	
0312	3010		DCA 10	
0313	4405		JMS I PNTR3	
0314	0123		AND K0070	

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0315 3400      DCA I 0
0316 1162      TAD FELD
0317 7041      CIA
0320 1400      TAD I 0
0321 7740      SMA SZA CLA
0322 5313      JMP .-7
0323 2000      ISZ 0
0324 2010      ISZ 10
0325 5313      JMP .-12
0326 5201      JMP START+1
0327 0000      TEST, 0
0330 6032      KCC
0331 4406      JMS I PNTR4
0332 3153      DCA CHAR
0333 1153      TAD CHAR
0334 1116      TAD M0316
0335 7650      SNA CLA          /N-N0?
0336 5727      JMP I TEST        /YES
0337 2327      ISZ TEST        /NO, INCREMENT
0340 1153      TAD CHAR
0341 1117      TAD M0331
0342 7650      SNA CLA          /Y-YES?
0343 2327      ISZ TEST        /YES, INCREMENT
0344 5727      JMP I TEST        /THEN EXIT

/PROCESS POTENTIAL NON-EXISTANT DISC ERROR
0345 7200      NODISC, CLA
0346 6616      DEAC          /READ DISC STATUS
0347 7000      NOP
0350 3151      DCA DDSTAT
0351 1151      TAD DDSTAT
0352 7012      RTR
0353 7620      SNL CLA          /NON-EXISTANT DISC ERROR?
0354 5423      JMP I PNTR6        /NO,EXIT
0355 1364      TAD PME11A      /YES, TYPE OUT HEADER
0356 4403      JMS I PNTR1
0357 1151      TAD DDSTAT
0360 4445      JMS I PNTR24      /TYPE OUT STATUS WORD
0361 4450      JMS I PNTR33      /CR-LF
0362 7402      HLT          /STOP
0363 5362      JMP .-1          /NON-RECOVERABLE ERROR-RESTART
0364 3062      PME11A, MESS11
/338 DISPLAY STARTER ROUTINE
0365 7200      DIS338, CLA
0366 6145      6145          /SET DISPLAY INITIAL CONDIITIONS TO 0
0367 7330      CLA CLL CML RAR      /SET AC TO 4000
0370 6155      6155          /CLEAR BREAK FIELD REGISTER
0371 7200      CLA
0372 1376      TAD .+4          /GET STARTING ADDRESS OF 338 PROGRAM
0373 6165      6165          /LOAD DAC
0374 7200      CLA
0375 5205      JMP START+5
0376 3161      PRO338

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0400 *400
/DISC OR DRUM EXERCISER

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0400 7200 DDEXER, CLA
0401 6601 6601 /CLEAR EF AND DONE
0402 1133 TAD SKIP
0403 3407 DCA I PNTR5
0404 7604 LAS
0405 0135 AND K0010
0406 7640 SZA CLA /SUPPRESS DISK OR DRUM?
0407 5423 JMP I PNTR6 /YES, EXIT
0410 7604 LAS
0411 0104 AND K0200
0412 7640 SZA CLA /BIT 4 SET?
0413 5365 JMP DDLOOP /YES
0414 4335 JMS DDSAVE /SAVE PI STUFF
0415 6001 ION
0416 1105 TAD K7200
0417 3015 DCA 15
0420 1114 TAD BUFF3
0421 3014 DCA 14
0422 1230 TAD .+6
0423 1022 TAD DDFELD
0424 3226 DCA .+2
0425 4424 JMS I PNTR7
0426 6201 CDF
0427 3414 DCA I 14 /STORE DATA IN OUTPUT BUFFER
0430 6201 CDF
0431 2015 ISE 15 /DONE
0432 5225 JMP .-5 /NO
0433 6002 IOF
0434 4347 JMS DDREST /RESTORE PI STUFF

```

```

0435 5235 DDRITE, JMP . /WRITE DATA ONTO DISC OR DRUM
0436 6601 6601 /CLEAR FLAGS
0437 7604 LAS
0440 0135 AND K0010
0441 7640 SZA CLA /SUPPRESS DISC OR DRUM?
0442 5423 JMP I PNTR6 /YES, EXIT
0443 5243 DDREAD, JMP . /READ DATA FROM DISC OR DRUM
0444 6601 6601 /CLEAR FLAGS
0445 4335 JMS DDSAVE /SAVE PI STUFF
0446 6001 ION /TURN ON INTERRUPT
0447 1114 TAD BUFF3 /OUTPUT BUFFER
0450 3014 DCA 14
0451 1113 TAD BUFF6 /INPUT BUFFER
0452 3015 DCA 15
0453 1105 TAD K7200 /COUNT
0454 3174 DCA DDCNTR
0455 1264 TAD .+7
0456 1022 TAD DDFELD
0457 3260 DCA .+1
0460 6201 CDF
0461 1414 TAD I 14 /COMPARE DATA OUT WITH DATA IN

```

0462	7041	CIA	
0463	1415	TAD I 15	
0464	6201	COF	
0465	7440	SZA	/GOOD?
0466	4425	JMS I PNTR8	/NO, DATA ERROR
0467	2174	ISZ DDCNTR	/DONE?
0470	5260	JMP .-10	/NO
0471	7604	LAS	
0472	7010	RAR	
0473	7630	SZL CLA	/CHANGE MEMORY FIELD?
0474	5305	JMP .+11	/NO
0475	4424	JMS I PNTR7	/YES
0476	0123	AND K0070	
0477	3022	DCA DDFELD	
0500	1162	TAD FELD	
0501	7041	CIA	
0502	1022	TAD DDFELD	
0503	7740	SMA SZA CLA	
0504	5275	JMP .-7	
0505	6002	IOF	
0506	4347	JMS DREST	/RESTORE PI STUFF
0507	5200	JMP DDEXER	

/RM08 DRUM EXERCISER SETUP ROUTINE

0510	1315	RM08EX, TAD RM08RI	
0511	3235	DCA DDRITE	
0512	1316	TAD RM08RE	
0513	3243	DCA DDREAD	
0514	5200	JMP DDEXER	
0515	4430	-RM08RI, JMS I PNTR11	
0516	4431	RM08RE, JMS I PNTR12	
/RF08 DISC EXERCISER SETUP ROUTINE			
0517	1324	RF08EX, TAD RF08RI	
0520	3235	DCA DDRITE	
0521	1325	TAD RF08RE	
0522	3243	DCA DDREAD	
0523	5200	JMP DDEXER	
0524	4426	RF08RI, JMS I PNTR9	
0525	4427	RF08RE, JMS I PNTR10	

/DF32 DISC EXERCISER SETUP ROUTINE

0526	1333	DF32EX, TAD DF32RI	
0527	3235	DCA DDRITE	
0530	1334	TAD DF32RE	
0531	3243	DCA DDREAD	
0532	5200	JMP DDEXER	
0533	4433	DF32RI, JMS I PNTR14	
0534	4434	DF32RE, JMS I PNTR15	

```

/DISC-DRUM SAVE SUBROUTINE
0535 0000  DDSAVE, 0
0536 1144      TAD AC          /SAVE AC
0537 3361      DCA DDAC
0540 1145      TAD LINK        /LINK
0541 3362      DCA DDLINK
0542 1456      TAD I PNTR40    /MEMORY FIELD
0543 3363      DCA DDIB
0544 1000      TAD 0          /AND LOC 0
0545 3364      DCA DDPC
0546 5735      JMP I DDSAVE

/DISC-DRUM RESTORE SUBROUTINE
0547 0000  DDREST, 0
0550 1361      TAD DDAC        /RESTORE SAVED AC
0551 3144      DCA AC
0552 1362      TAD DDLINK     /LINK
0553 3145      DCA LINK
0554 1363      TAD DDIB      /MEMORY FIELD
0555 3456      DCA I PNTR40
0556 1364      TAD DDPC      /AND LOC 0
0557 3000      DCA 0
0560 5747      JMP I DDREST

0561 0000  DDAC, 0
0562 0000  DDLINK, 0
0563 0000  DDIB, 0
0564 0000  DDPC, 0

/DISC-DRUM LOOP ROUTINE
0565 7604  DDLOOP, LAS
0566 0132      AND K0100
0567 7640      SZA CLA        /LOOP ON READ?
0570 5373      JMP .+3       /NO, WRITE
0571 1243      TAD DDREAD    /YES, READ
0572 7410      SKP
0573 1235      TAD DDRITE
0574 3375      DCA .+1
0575 7402      HLT          /JMS INSTRUCTION IS STORED HERE
0576 5200      JMP DDEXER

0600      *600
/DECTAPE STARTER ROUTINE
0600 7200  DECTAP, CLA
0601 3175      DCA LOOK      /ZERO BLOCK SPECIFIER
0602 1376      TAD K0604
0603 6766      DTLA        /LOAD "A" WITH "GO, REVERSE, MOVE, ENABLE, CLEAR"
0604 1163      TAD DTPNTR
0605 3435      DCA I PNTR16 /SET UP RETURN FROM P.I.
0606 5607      JMP I .+1
0607 0202      START+2

```

/MAGTAPE STARTER ROUTINE

```

0610 7200 MAGTAP, CLA
0611 3150 DCA RECORD /CLEAR RECORD COUNT
0612 1110 TAD K0014
0613 6711 MTCR /SKIP IF MAG TAPE CONTROL READY
0614 7402 MTHLT1, HLT
0615 6716 MTLR /LOAD COMMAND REGISTER WITH "REWIND, ENABLE"
0616 6721 MTTR /SKIP IF MAG TAPE UNIT READY
0617 7402 MTHLT2, HLT
0620 7200 CLA
0621 6722 MTGO /GO
0622 1164 TAD MTPNTR
0623 3437 DCA I PNTR18
0624 5625 JMP I ,+1
0625 0203 START+3

```

/RM08 DRUM STARTER ROUTINE

```

0626 0204 RM08, START+4
0627 7201 CLA IAC
0630 6624 DRFS /LOAD SECTOR COUNTER TO 1
0631 1114 TAD BUFF3
0632 6605 DRCW /LOAD CORE ADDRESS, WRITE
0633 1141 TAD DRUMAD
0634 6615 DRTS /LOAD DRUM ADDRESS, INITIATE XFER
0635 1165 TAD RM08PR
0636 3432 DCA I PNTR13
0637 1105 TAD K7200
0640 3704 DCA I PNTR46
0641 1705 TAD I PNTR47
0642 3703 DCA I PNTR45
0643 5626 JMP I RM08-1

```

/DF32 DISC STARTER ROUTINE

```

0644 7244 DF32, CLA CMA RAL
0645 3475 DCA I K7750 /SET UP W.C.
0646 1114 TAD BUFF3
0647 3476 DCA I K7751 /SET UP C.A.
0650 1137 TAD DISCEA
0651 6615 DEAL /LOAD CONTROL WITH DISC EXTENDED ADDRESS
0652 7200 CLA
0653 1140 TAD DISCAD
0654 6605 DMAW /LOAD DISC ADDRESS AND WRITE
0655 1166 TAD DF32PR
0656 3432 DCA I PNTR13
0657 1306 TAD JMPCON
0660 3704 DCA I PNTR46
0661 5241 JMP RM08+12

```

/RF08 DISC STARTER ROUTINE

```

0662 7244 RF08, CLA CMA RAL
0663 3475 DCA I K7750 /SET UP WC
0664 1114 TAD BUFF3
0665 3476 DCA I K7751 /SET UP CA
0666 1143 TAD INTERN
0667 6615 DIML /SET UP INTERRUPT ENABLES
0670 1142 TAD TRACK
0671 6643 DXAL /LOAD DISC EXTENDED ADDRESS
0672 1140 TAD DISCAD /LOAD DISC ADDRESS AND WRITE
0673 6605 DMAW
0674 1167 TAD RF08PR
0675 3432 DCA I PNTR13
0676 1133 TAD SKIP /SET UP SKIP CHAIN
0677 3703 DCA I PNTR45
0700 1705 TAD I PNTR47
0701 3704 DCA I PNTR46
0702 5626 JMP I RM08-1 /RETURN TO START+4
0703 2626 PNTR45, EXIT-2
0704 2627 PNTR46, EXIT-1
0705 2624 PNTR47, EXIT-4

0706 5461 JMPCON, JMP I PNTR48

```

/DF32 DISC WAIT FOR FLAG AND NO ERRORS SUBROUTINE

```

0707 0000 DF32WT, 0
0710 4432 JMS I PNTR13 /WAIT FOR DISC FLAG
0711 6621 DFSE /ANY ERRORS?
0712 7410 SKP /YES
0713 5707 JMP I DF32WT /NO
0714 7604 LAS
0715 7006 RTL
0716 7510 SPA /PRINT ERRORS?
0717 5331 JMP HALT4-2 /NO
0720 7200 CLA
0721 6616 DEAC /READ STATUS
0722 7000 NOP
0723 3151 DCA DDSTAT
0724 1375 TAD PMES11
0725 4403 JMS I PNTR1 /TYPE OUT HEADER
0726 1151 TAD DDSTAT
0727 4445 JMS I PNTR24 /TYPE OUT STATUS WORD
0730 4450 JMS I PNTR33 /CRLF
0731 7604 LAS
0732 7700 SMA CLA /HALT ON ERROR?
0733 7402 HALT4, HLT /YES
0734 5707 JMP I DF32WT /EXIT

```

/DF32 DISC WRITE SUBROUTINE

```

2735 0000 DF32WR, 0

```

```

0736 7200      CLA
0737 1105      TAD K7200
0740 3475      DCA I K7750      /SET UP W. C.
0741 1114      TAD BUFF3
0742 3476      DCA I K7751      /SET UP C.A.
0743 1022      TAD DDFELD      /COMBINE DISC CORE MEMORY FIELD
0744 1137      TAD DISCEA      /AND DISC EXTENDED ADDRESS
0745 6615      DEAL      /AND TRANSFER TO DISC CONTROL
0746 7200      CLA
0747 1140      TAD DISCAD
0750 6605      DMAW      /LOAD DISC ADDRESS AND WRITE
0751 4307      JMS DF32WT      /WAIT FOR DISC FLAG
0752 6621      DFSE      /ANY ERRORS
0753 5336      JMP DF32WR+1      /YES, REPEAT FUNCTION
0754 5735      JMP I DF32WR      /EXIT

```

/DF32 DISC READ SUBROUTINE

```

0755 0000      DF32RD, 0
0756 7200      CLA
0757 1105      TAD K7200
0760 3475      DCA I K7750      /SET UP WC
0761 1113      TAD BUFF6
0762 3476      DCA I K7751      /SET UP CA
0763 1022      TAD DDFELD      /COMBINE DISC CORE MEMORY FIELD
0764 1137      TAD DISCEA      /AND DISC EXTENDED ADDRESS
0765 6615      DEAL      /AND XFER TO DISC CONTROL
0766 7200      CLA
0767 1140      TAD DISCAD
0770 6603      DMAR      /LOAD DISC ADDRESS AND READ
0771 4307      JMS DF32WT      /WAIT FOR DISC FLAG
0772 6621      DFSE      /ANY ERRORS?
0773 5356      JMP DF32RD+1      /YES, REPEAT FUNCTION
0774 5755      JMP I DF32RD      /EXIT
0775 3062      PMES11, MESS11
0776 0604      K0604, 0604      /GO, REVERSE, MOVE, ENABLE

```

/DM01 - TAPE2

1000

*1000

/DECTAPE SEARCH ROUTINE

```

1000 0000      SEARCH, 0
1001 1346      TAD FOUND+1
1002 3502      DCA I K7755      /SET UP BLOCK NUMBER TO GO TO FOUND
1003 1355      TAD K0614      /SEARCH, NORM, REV, ENABLE
1004 6766      DTLA      /LOAD A
1005 6774      DTLB      /CLEAR B
1006 4435      JMS I PNTR16      /WAIT FOR DECTAPE FLAG
1007 6772      DTRB      /READ B
1010 7006      RTL
1011 7700      SMA CLA      /END ZONE?
1012 5216      JMP ,+4      /NO
1013 1354      TAD K0600      /YES, TURN
1014 6764      DTXA      /AROUND
1015 5206      JMP SEARCH+6

```

```

1016 6772      DTRB          /READ STATUS B
1017 7700      SMA CLA        /DECTAPE ERROR
1020 5223      JMP .+3          /NO
1021 4307      JMS DTWAIT     /YES, STOP TRANSPORT, ETC
1022 5203      JMP SEARCH+3   /TRY SEARCHING AGAIN
1023 6761      DTRA          /READ A
1024 7006      RTL          /MOVE DIRECTION
1025 7006      RTL          /BIT INTO LINK
1026 7200      CLA
1027 1345      TAD FOUND     /GET BLOCK NUMBER FOUND
1030 7041      CIA
1031 1175      TAD LOOK
1032 7450      SNA          /CURRENT BLOCK?
1033 5243      JMP LOC8ED    /YES, CHECK DIRECTION
1034 7041      CIA          /NO, TAKE 2'S COMPLEMENT
1035 7420      SNL          /LINK IS 1 IF BKWD AND NOT A, OR LOWER THAN BLOCK
1036 1352      TAD K0002     /ADD TWO TO ENABLE TURN AROUND
1037 7620      SNL CLA      /TURN AROUND (3 BEYOND)?
1040 1103      TAD K0400     /YES
1041 6764      DTXA         /CLEAR FLAG
1042 5206      JMP SEARCH+6  /WAIT FOR NEXT FLAG
1043 7620      LOC8ED, SNL CLA /FOUND BLOCK FORWARD?
1044 5241      JMP .-3      /NO
1045 6764      DTXA         /YES, CLEAR FLAGS
1046 5600      JMP I SEARCH  /EXIT

```

/DECTAPE READ SUBROUTINE

```

1047 0000      DTREAD, 0
1050 4200      JMS SEARCH    /SEARCH OUT BLOCK
1051 4337      JMS DTERR
1052 5250      JMP .-2
1053 1020      TAD DTFELD
1054 6774      DTLB         /LOAD MEMORY FIELD REGISTER
1055 1350      TAD K0130
1056 6764      DTXA         /CHANGE FROM SEARCH TO READ DATA CONT
1057 1105      TAD K7200
1060 3501      DCA I K7754   /SET UP WC
1061 1107      TAD BUFF4
1062 3502      DCA I K7755   /SET UP CA
1063 4307      JMS DTWAIT     /WAIT FOR DECTAPE FLAG
1064 4337      JMS DTERR     /ERRORS?
1065 5250      JMP DTREAD*1  /YES, REPEAT FUNCTION
1066 5647      JMP I DTREAD  /EXIT

```

/DECTAPE WRITE SUBROUTINE

```

1067 0000      DTRITE, 0
1070 4200      JMS SEARCH    /SEARCH OUT BLOCK
1071 4337      JMS DTERR
1072 5270      JMP .-2
1073 1020      TAD DTFELD
1074 6774      DTLB         /LOAD MEMORY FIELD REGISTER
1075 1351      TAD K0150
1076 6764      DTXA         /CHANGE FROM SEARCH TO WRITE DATA CONT.
1077 1105      TAD K7200

```

1100	3501	DCA I K7754	/SETUP WC
1101	1106	TAD BUFF1	
1102	3502	DCA I K7755	/SET UP CA
1103	4307	JMS DTWAIT	/WAIT FOR DECTAPE FLAG
1104	4337	JMS DTERR	/ERRORS?
1105	5270	JMP DTRITE+1	/YES REPEAT FUNCTION
1106	5667	JMP I DTRITE	/EXIT

/SUBROUTINE TO WAIT FOR DECTAPE FLAG AND NO ERRORS
/EXIT WITH TRANSPORT STOPPED

1107	0000	DTWAIT, 0	
1110	4435	JMS I PNTR16	/WAIT FOR SOME FLAG
1111	6761	DTRA	/READ STATUS A
1112	0104	AND K0200	
1113	1353	TAD K0003	
1114	6764	DTXA	/CLEAR GO
1115	6772	DTRB	
1116	7700	SMA CLA	/ERRORS?
1117	5707	JMP I DTWAIT	/NO
1120	7604	LAS	
1121	7006	RTL	
1122	7710	SPA CLA	/PRINT ERRORS?
1123	5333	JMP HALT1-2	/NO
1124	6772	DTRB	/READ STATUS
1125	3146	DCA DTSTAT	
1126	1347	TAD PMES12	
1127	4403	JMS I PNTR1	/TYPEOUT HEADER
1130	1146	TAD DTSTAT	
1131	4445	JMS I PNTR24	/TYPE OUT STATUS WORD

1132	4450	JMS I PNTR33	/CR-LF
1133	7604	LAS	
1134	7700	SMA CLA	/HALT ON ERROR?
1135	7402	HALT1, HLT	/YES
1136	5707	JMP I DTWAIT	

/DECTAPE ERROR ROUTINE, DON'T SKIP IF ANY ERROR

1137	0000	DTERR, 0	
1140	7200	CLA	
1141	6772	DTRB	
1142	7700	SMA CLA	
1143	2337	ISZ DTERR	
1144	5737	JMP I DTERR	
1145	0000	FOUND, 0	/BLOCK FOUND
1146	1145	.-1	
1147	3074	PMES12, MESS12	
1150	0130	K0130, 0130	/SEARCH TO READ DATA CONTINUOUS
1151	0150	K0150, 0150	/SEARCH TO WRITE DATA CONTINUOUS
1152	0002	K0002, 0002	
1153	0003	K0003, 0003	

1154	0600	K0600,	0600	/REVERSE, GO
1155	0614	K0614,	0614	/SEARCH, NORMAL, REV
1156	2403	MESS16,	2403	/T,C
1157	6570		6570	/5,8
1160	4004		4004	/SP,D
1161	0124		0124	/A,T
1162	0140		0140	/A,SP
1163	0522		0522	/E,R
1164	2217		2217	/R,D
1165	2240		2240	/R,SP
1166	1116		1116	/I,N
1167	4002		4002	/SP,B
1170	0116		0116	/A,N
1171	1340		1340	/K,SP
1172	4000		4000	/SP,END

1200

*1200

/MAGTAPE READ SUBROUTINE

1200	0000	MTREAD, 0	
1201	4240	JMS REWIND	/REWIND TAPE
1202	4436	JMS I PNTR17	/SPACE TO BEGINNING OF RECORD
1203	1356	TAD K0626	
1204	6716	MTLC	/LOAD CM WITH "ODD,7CH,READ,ENABLE,800" AND CLEAR FLAGS
1205	7200	CLA	
1206	1105	TAD K7200	
1207	3477	DCA I K7752	/SET UP WC
1210	1111	TAD BUFF5	
1211	3500	DCA I K7753	/SET UP CA
1212	1021	TAD MTFELD	
1213	6722	MTGO	/LOAD EXTENDED FIELD REGISTER, GO
1214	4266	JMS MTHWAIT	/WAIT FOR MT FLAG AND NO ERRORS
1215	4255	JMS MTERR	/ERRORS?
1216	5201	JMP MTREAD*1	/YES, REPEAT FUNCTION
1217	5600	JMP I MTREAD	/NO, EXIT

/MAGTAPE READ-COMPARE SUBROUTINE

1220	0000	RDCOMP, 0	
1221	4240	JMS REWIND	/REWIND TAPE
1222	4436	JMS I PNTR17	/SPACE TO BEGINNING OF RECORD
1223	1355	TAD K0636	
1224	6716	MTLC	/LOAD CM WITH "ODD,7CH,RD COMP,ENABLE800" AND CLEAR FLAGS
1225	7200	CLA	
1226	1105	TAD K7200	
1227	3477	DCA I K7752	/SET UP WC
1230	1112	TAD BUFF2	
1231	3500	DCA I K7753	/SET UP CA
1232	1021	TAD MTFELD	
1233	6722	MTGO	/LOAD EXTENDED FIELD REGISTER, GO
1234	4266	JMS MTHWAIT	/WAIT FOR MT FLAG AND NO ERRORS
1235	4255	JMS MTERR	/ERRORS?
1236	5221	JMP RDCOMP*1	/YES, REPEAT FUNCTION

1237 5620

JMP I RDCOMP /NO, EXIT

/MAGTAPE REWIND SUBROUTINE (ACTUALLY SPACE REVERSE)

```

1240 0000 REWIND, 0
1241 1254 TAD K0676
1242 6716 MTLCL /LOAD CM WITH "ODD,7CH,SPACE REVERSE,ENABLE,800" AND CLEAR FLAGS
1243 7200 CLA
1244 6722 MTGO /SET GO
1245 3477 DCA I K7752 /SET UP W.C.
1246 4266 JMS MTWAIT /WAIT FOR MT FLAG
1247 6706 MTRS /READ STATUS
1250 7006 RTL
1251 7700 SMA CLA /BOT?
1252 5241 JMP REWIND+1 /NO, TRY AGAIN
1253 5640 JMP I REWIND /YES, EXIT
1254 0676 K0676, 0676 /ODD,7CH,SPACE REVERSE,ENABLE,800

```

/MAG TAPE ERROR ROUTINE

```

1255 0000 MTERR, 0
1256 6706 MTRS /READ STATUS
1257 7500 SMA /ERRORS?
1260 5263 JMP ,+3 /NO
1261 0136 AND K1000 /YES
1262 7640 SZA CLA /BOT?
1263 2255 ISZ MTERR /YES, NO ERROR
1264 7200 CLA
1265 5655 JMP I MTERR
/SUBROUTINE TO WAIT FOR MAGTAPE FLAG AND NO ERRORS
/EXIT WITH TRANSPORT STOPPING

```

```

1266 0000 MTWAIT, 0
1267 4437 JMS I PNTR18 /WAIT FOR MAGTAPE FLAG
1270 4255 JMS MTERR /READ MAGTAPE STATUS
1271 7410 SKP /ERRORS?
1272 5312 JMP HALT2+2 /NO
1273 7604 LAS
1274 7006 RTL
1275 7710 SPA CLA /PRINT ERRORS?
1276 5306 JMP HALT2-2 /NO
1277 6706 MTRS
1300 3147 DCA MTSTAT
1301 1326 TAD PMES13
1302 4403 JMS I PNTR1 /TYPE OUT HEADER
1303 1147 TAD MTSTAT
1304 4445 JMS I PNTR24 /TYPE OUT STATUS WORD

```

```

1305 4450 JMS I PNTR33 /CRLF
1306 7604 LAS
1307 7700 SMA CLA /HALT ON ERROR?
1310 7402 HALT2, HLT /YES

```

```

1311 5666      JMP I MTHWAIT
1312 6712      MTAF          /CLEAR FLAGS
1313 4727      JMS I PNTR43
1314 6001      ION
1315 6721      MTRR          /WAIT FOR
1316 5315      JMP ,-1       /TAPE TRANSPORT READY
1317 6002      IOF
1320 4730      JMS I PNTR44
1321 5666      JMP I MTHWAIT
1322 0000      DTAC, 0
1323 0000      DTLINK, 0
1324 0000      DTIB, 0
1325 0000      DTPC, 0
1326 3106      PMES13, MESS13
1327 2132      PNTR43, MTSAVE
1330 2144      PNTR44, MTREST

```

/DECTAPE SAVE SUBROUTINE

```

1331 0000      DTSAVE, 0
1332 1144      TAD AC          /SAVE AC
1333 3322      DCA DTAC
1334 1145      TAD LINK        /LINK
1335 3323      DCA DTLINK
1336 1456      TAD I PNTR40    /MEMORY FIELD
1337 3324      DCA DTIB
1340 1000      TAD 0           /AND LOC 0
1341 3325      DCA DTPC
1342 5731      JMP I DTSAVE

```

/DECTAPE RESTORE SUBROUTINE

```

1343 0000      DTREST, 0
1344 1322      TAD DTAC        /RESTORE SAVED AC
1345 3144      DCA AC
1346 1323      TAD DTLINK     /LINK
1347 3145      DCA LINK
1350 1324      TAD DTIB      /MEMORY FIELD
1351 3456      DCA I PNTR40
1352 1325      TAD DTPC      /AND LOC 0
1353 3000      DCA 0
1354 5743      JMP I DTREST

```

```

1355 0636      K0636, 0636    /ODD, 7CH READ COMPARE, ENABLE, 800
1356 0626      K0626, 0626    /ODD, 7CH, READ, ENABLE, 800
1357 0411      MESS17, 0411   /D,I
1360 2303      2303          /S,C
1361 4017      4017          /SP,0
1362 2240      2240          /R,SP
1363 0422      0422          /D,R
1364 2515      2515          /U,M
1365 4004      4004          /SP,D
1366 0124      0124          /A,T
1367 0140      0140          /A,SP
1370 0522      0522          /E,R

```

1371	2217	2217	/R,0
1372	2240	2240	/R,SP
1373	1116	1116	/I,N
1374	4002	4002	/SP,B
1375	0116	0116	/A,N
1376	1340	1340	/K,SP
1377	4000	4000	/SP,END

1400 *1400
/RM08 DRUM READ SUBROUTINE

1400	0000	RM08RD, 0	
1401	7200	CLA	
1402	1022	TAD DDFELD	/COMBINE MEMORY FIELD
1403	1122	TAD K3000	/AND NUMBER OF SECTORS
1404	6624	DRFS	/TO DRUM CONTROL
1405	7201	CLA IAC	
1406	1113	TAD BUFF6	
1407	6603	DRCR	/LOAD CORE MEMORY ADDRESS, READ
1410	1141	TAD DRUMAD	
1411	6615	DRTS	/LOAD DRUM ADDRESS REGISTER, INITIATE XFER
1412	4234	JMS DRUMWT	/WAIT FOR DONE FLAG AND NO ERRORS
1413	6621	DRSE	/ERRORS?
1414	5201	JMP RM08RD+1	/YES, REPEAT XFER
1415	5600	JMP I RM08RD	/NO

/RM08 DRUM WRITE SUBROUTINE

1416	0000	RM08WR, 0	
1417	7200	CLA	
1420	1022	TAD DDFELD	/COMBINE MEMORY FIELD
1421	1122	TAD K3000	/AND NUMBER OF SECTORS
1422	6624	DRFS	/TO CONTROL
1423	7201	CLA IAC	
1424	1114	TAD BUFF3	
1425	6605	DRCW	/LOAD CORE MEMORY ADDRESS, WRITE
1426	1141	TAD DRUMAD	
1427	6615	DRTS	/LOAD DRUM ADDRESS REGISTER, INITIATE XFER
1430	4234	JMS DRUMWT	/WAIT FOR DRUM FLAG AND NO ERRORS
1431	6621	DRSE	/ERRORS?
1432	5217	JMP RM08WR+1	/YES, REPEAT XFER
1433	5616	JMP I RM08WR	/NO

/DRUM WAIT FOR FLAG AND NO ERRORS SUBROUTINE

1434	0000	DRUMWT, 0	
1435	4432	JMS I PNTR13	/WAIT FOR DRUM FLAG
1436	6621	DRSE	/ANY ERRORS
1437	7410	SKP	
1440	5634	JMP I DRUMWT	/NO
1441	7604	LAS	/YES, PRINT ERRORS?
1442	7006	RTL	

```

1443 7510 SPA /PRINT ERRORS?
1444 5255 JMP HALT3-2
1445 7200 CLA
1446 6612 DREF /READ STATUS
1447 3151 DCA DDSTAT
1450 1363 TAD PMES14
1451 4403 JMS I PNTR1 /TYPE OUT HEADER
1452 1151 TAD DDSTAT

1453 4445 JMS I PNTR24 /TYPE OUT ERROR STATUS
1454 4450 JMS I PNTR33 /CRLF
1455 7604 LAS
1456 7700 SMA CLA /HALT ON ERROR?
1457 7402 HALT3, HLT /YES
1460 5634 JMP I DRUMWT

/RF08 DISC READ SUBROUTINE
RF08RD, 0
1461 0000 TAD K7200
1462 1105 DCA I K7750 /SET UP WC
1463 3475 TAD BUFF6
1464 1113 DCA I K7751 /SET UP CA
1465 3476 TAD DDFELD /COMBINE DISC CORE MEMORY FIELD
1466 1022 TAD INTERN /AND INTERRUPT ENABLES
1467 1143 DIML /AND TRANSFER TO DISC CONTROL
1470 6615 TAD TRACK
1471 1142 DXAL /LOAD DISC EXTENDED ADDRESS
1472 6643 TAD DISCAD
1473 1140 DMAR /LOAD DISC ADDRESS AND READ
1474 6603 JMS RF08WT /WAIT FOR DISC FLAG
1475 4321 DFSE /ANY ERRORS?
1476 6621 JMP I RF08RD /NO
1477 5661 JMP RF08RD+1 /YES, REPEAT FUNCTION
1500 5262

/RF08 DISC WRITE SUBROUTINE
RF08WR, 0
1501 0000 TAD K7200
1502 1105 DCA I K7750 /SET UP WC
1503 3475 TAD BUFF3
1504 1114 DCA I K7751 /SET UP CA
1505 3476 TAD DDFELD /COMBINE DISC CORE MEMORY FIELD
1506 1022 TAD INTERN /AND INTERRUPT ENABLES
1507 1143 DIML /AND TRANSFER TO DISC CONTROL
1510 6615 TAD TRACK
1511 1142 DXAL /LOAD DISC EXTENDED ADDRESS
1512 6643 TAD DISCAD
1513 1140 DMAW /LOAD DISC ADDRESS AND WRITE
1514 6605 JMS RF08WT /WAIT FOR DISC FLAG
1515 4321 DFSE /ANY ERRORS
1516 6621 JMP I RF08WR /NO
1517 5701 JMP RF08WR+1 /YES
1520 5302

```

```

/RF08 DISC WAIT FOR FLAG AND NO ERRORS SUBROUTINE
/(TRANSFERS CONTROL TO "DF32WT" IF ANY ERRORS)

```

1521	0000	RF08WT, 0	
1522	4432	JMS I PNTR13	/WAIT FOR DISC FLAG
1523	6621	DFSE	/ANY ERRORS?
1524	5721	JMP I RF08WT	/NO
1525	1321	TAD RF08WT	/YES
1526	3731	DCA I .+3	/SAVE "PC"
1527	5730	JMP I .+1	/TRANSFER CONTROL TO
1530	0714	DF32WT +5	/DDF32 ERROR TYPEOUT
1531	0707	DF32WT	

/MAGTAPE WRITE ROUTINE

1532	0000	MTRITE, 0	
1533	7200	CLA	
1534	1364	TAD K0746	
1535	6716	MTLC	/LOAD CM WITH "ODD,7CH,3 IN, GAP,WRITE,800" AND CLEAR FLAGS
1536	7200	CLA	
1537	1105	TAD K7200	
1540	3477	DCA I K7752	/SET UP WC
1541	1112	TAD BUFF2	
1542	3500	DCA I K7753	/SET UP CA
1543	1021	TAD MTFELD	
1544	6722	MTGO	/LOAD EXTENDED FIELD REGISTER, GO
1545	4447	JMS I PNTR32	/WAIT FOR MT FLAG AND NO ERRORS
1546	2150	ISE RECORD	/INCREMENT NUMBER OF RECORDS
1547	5352	JMP .+3	
1550	4440	JMS I PNTR19	/4096 RECORDS, REWIND TAPE
1551	5333	JMP MTRITE+1	/START OVER
1552	4441	JMS I PNTR20	/ANY ERRORS
1553	7410	SKP	
1554	5732	JMP I MTRITE	/NO, EXIT
1555	4440	JMS I PNTR19	/YES, REWIND TAPE
1556	4436	JMS I PNTR17	/SPACE FORWARD TO BEGINNING OF THIS RECORD
1557	7240	CLA CMA	
1560	1150	TAD RECORD	/DECREMENT RECORD COUNT
1561	3150	DCA RECORD	
1562	5334	JMP MTRITE+2	/TRY AGAIN
1563	3120	PMES14, MESS14	
1564	0746	K0746, 0746	/ODD, 7CH, WRITE, ENABLE, 800
1565	2403	MESS02, 2403	/T,C
1566	6061	6061	/0,1
1567	4004	4004	/SP,D
1570	0503	0503	/E,C
1571	2401	2401	/T,A
1572	2005	2005	/P,E
1573	7700	7700	/?,END

1600

*1600
/DECTAPE EXERCISER

1600	7200	DTEXER, CLA	
1601	6764	DTXA	/CLEAR EF AND DTF
1602	1133	TAD SKIP	

1603	3320	DCA DTDATA+6	
1604	7604	LAS	
1605	0124	AND K0040	
1606	7640	SZA CLA	/SUPPRESS DECTAPE?
1607	5423	JMP I PNTR6	/YES, EXIT
1610	4457	JMS I PNTR41	/SAVE PI STUFF
1611	6001	ION	
1612	1105	TAD K7200	
1613	3011	DCA 11	
1614	1106	TAD BUFF1	
1615	3010	DCA 10	
1616	1224	TAD .+6	
1617	1020	TAD DTFELD	
1620	3222	DCA .+2	
1621	4442	JMS I PNTR21	
1622	6201	CDF	
1623	3410	DCA I 10	/STORE DATA IN OUTPUT BUFFER
1624	6201	CDF	
1625	2011	ISZ 11	/DONE
1626	5221	JMP .-5	/NO
1627	1175	TAD LOOK	
1630	1311	TAD K0003A	/INCREMENT BLOCK BY 3
1631	3175	DCA LOOK	
1632	7300	CLA CLL	
1633	1175	TAD LOOK	
1634	1120	TAD M2700	
1635	7630	SZL CLA	
1636	5231	JMP .-5	
1637	6002	IOF	
1640	4460	JMS I PNTR42	/RESTORE PI STUFF
1641	4443	JMS I PNTR22	/WRITE DATA ONTO DECTAPE
1642	6764	DTXA	/CLEAR FLAGS
1643	4444	JMS I PNTR23	/READ DATA FROM DECTAPE
1644	1367	TAD K0004	/STOP TAPE, CLEAR ENABLE AND
1645	6764	DTXA	/CLEAR FLAGS
1646	4437	JMS I PNTR41	/SAVE PI STUFF
1647	6001	ION	/TURN ON INTERRUPT
1650	1106	TAD BUFF1	/OUTPUT BUFFER
1651	3010	DCA 10	
1652	1107	TAD BUFF4	/INPUT BUFFER
1653	3011	DCA 11	
1654	1105	TAD K7200	/COUNT
1655	3170	DCA DTCNTR	
1656	1265	TAD .+7	
1657	1020	TAD DTFELD	
1660	3261	DCA .+1	
1661	6201	CDF	
1662	1410	TAD I 10	/COMPARE DATA OUT WITH DATA IN
1663	7041	CIA	
1664	1411	TAD I 11	
1665	6201	CDF	
1666	7440	SZA	/GOOD?
1667	4312	JMS DTDATA	/NO, DATA ERROR

1670	2170	ISZ DTCNTR	/DONE?
1671	5261	JMP .-10	/NO
1672	6002	IOF	/YES
1673	4460	JMS I PNTR42	/RESTORE PI STUFF
1674	7604	LAS	
1675	7010	RAR	
1676	7630	SZL CLA	/CHANGE MEMORY FIELD?
1677	5200	JMP DTEXER	/NO
1700	4442	JMS I PNTR21	/YES
1701	0123	AND K0070	
1702	3020	DCA DTFELD	
1703	1162	TAD FELD	
1704	7041	CIA	
1705	1020	TAD DTFELD	
1706	7740	SMA SZA CLA	
1707	5300	JMP .-7	
1710	5200	JMP DTEXER	
1711	0003	K0003A, 3	

/DECTAPE DATA ERROR ROUTINE

1712	0000	DTDATA, 0	
1713	7604	LAS	
1714	0103	AND K0400	
1715	7640	SZA CLA	
1716	5361	JMP CHNGE1+1	
1717	6002	IOF	
1720	7610	SKP CLA	/OR CLA
1721	5335	JMP .+14	
1722	1366	TAD PMES10	
1723	4403	JMS I PNTR1	/TYPE OUT HEADER
1724	1020	TAD DTFELD	
1725	7110	RAR CLL	
1726	7012	RTR	
1727	4445	JMS I PNTR24	/AND DATA FIELD
1730	1074	TAD PMES15	
1731	4403	JMS I PNTR1	/TYPE OUT REST OF HEADER
1732	1105	TAD K7200	
1733	3320	DCA DTDATA+6	
1734	4450	JMS I PNTR33	
1735	1020	TAD DTFELD	
1736	1360	TAD CHNGE1	
1737	3340	DCA .+1	
1740	6201	CDF	
1741	1010	TAD 10	/PICK UP "GOOD" ADDRESS
1742	4445	JMS I PNTR24	
1743	1125	TAD K0240	
1744	4446	JMS I PNTR25	
1745	1571	TAD I TEMP	/PICK UP "GOOD" DATA
1746	4445	JMS I PNTR24	
1747	1125	TAD K0240	
1750	4446	JMS I PNTR25	
1751	1011	TAD 11	/PICK UP "BAD" ADDRESS
1752	4445	JMS I PNTR24	

1753	1125	TAD K0240	
1754	4446	JMS I PNTR25	
1755	1571	TAD I TEMP	/PICK UP "BAD" DATA
1756	4445	JMS I PNTR24	
1757	4450	JMS I PNTR33	
1760	6201	CHNGE1, CDF	
1761	7604	LAS	
1762	7004	RAL	
1763	7700	SMA CLA	/HALT ON ERROR?
1764	7402	HLT	/YES
1765	5712	JMP I DTDATA	
1766	3144	PMES18, MESS18	
1767	0004	K0004, 4	/ENABLE
1770	2215	MESS06, 2215	/R,M
1771	6070	6070	/0,8
1772	4004	4004	/SP,D
1773	2225	2225	/R,V
1774	1577	1577	/M,?
1775	0000	0	/END

/DM01 - TAPE 3

2000

*2000

/MAG TAPE EXERCISER

2000	7200	MTEXER, CLA	
2001	6712	MTAF	/CLEAR MTF AND EF
2002	1133	TAD SKIP	
2003	3762	DCA I PNTR26	
2004	7604	LAS	
2005	0134	AND K0020	
2006	7640	SZA CLA	/SUPPRESS MAGTAPE?
2007	5423	JMP I PNTR6	/YES, EXIT
2010	7604	LAS	
2011	0104	AND K0200	
2012	7640	SZA CLA	/BIT 4 SET?
2013	7000	NOP	/YES
2014	4332	JMS MTSAVE	/SAVE PI STUFF
2015	6001	ION	
2016	1105	TAD K7200	
2017	3013	DCA 13	
2020	1112	TAD BUFF2	
2021	3012	DCA 12	
2022	1230	TAD .+6	
2023	1021	TAD MTFELD	
2024	3226	DCA .+2	
2025	4763	JMS I PNTR27	
2026	6201	CDF	
2027	3412	DCA I 12	/STORE DATA IN OUTPUT BUFFER
2030	6201	CDF	
2031	2013	ISZ 13	/DONE?
2032	5225	JMP .-5	/NO
2033	6002	IOF	
2034	4344	JMS MTREST	/RESTORE PI STUFF

2035	4764	JMS I PNTR28	/WRITE DATA ONTO MAG TAPE
2036	6712	MTAF	/CLEAR FLAGS
2037	7604	LAS	
2040	0134	AND K0020	
2041	7640	SZA CLA	/SUPPRESS MAGTAPE?
2042	5423	JMP I PNTR6	/YES, EXIT
2043	4765	JMS I PNTR29	/READ DATA FROM MAGTAPE
2044	6712	MTAF	/CLEAR FLAGS
2045	4332	JMS MTSAVE	/SAVE PI STUFF
2046	6001	ION	/TURN ON INTERRUPT
2047	1112	TAD BUFF2	/OUTPUT BUFFER
2050	3012	DCA 12	
2051	1111	TAD BUFF5	/INPUT BUFFER
2052	3013	DCA 13	
2053	1105	TAD K7200	/COUNT
2054	3173	DCA MTCNTR	
2055	1264	TAD .+7	
2056	1021	TAD MTFELD	
2057	3260	DCA .+1	
2060	6201	CDF	
2061	1412	TAD I 12	/COMPARE DATA OUT WITH DATA IN
2062	7041	CIA	
2063	1413	TAD I 13	
2064	6201	CDF	
2065	7440	SZA	/GOOD?
2066	4767	JMS I PNTR31	/NO, DATA ERROR
2067	2173	ISZ MTCNTR	/DONE?
2070	5260	JMP .-10	/NO
2071	6002	IOF	/YES
2072	4344	JMS MTREST	/RESTORE PI STUFF
2073	4766	JMS I PNTR30	/READ COMPARE DATA
2074	6712	MTAF	/CLEAR MTF AND EF
2075	7604	LAS	
2076	7010	RAR	
2077	7630	SZL CLA	/CHANGE MEMORY FIELD?
2100	5200	JMP MTEXER	/NO
2101	4763	JMS I PNTR27	/YES
2102	0123	AND K0070	
2103	3021	DCA MTFELD	
2104	1162	TAD FELD	
2105	7041	CIA	
2106	1021	TAD MTFELD	
2107	7740	SMA SZA CLA	
2110	5301	JMP .-7	
2111	5200	JMP MTEXER	

/MAGTAPE SPACE FORWARD SUBROUTINE

2112	0000	SPCFWD, 0	
2113	1370	TAD K0666	
2114	6716	MTLC	/LOAD CM WITH "ODD,7CH, SPACE FORWARD, ENABLE, 800" AND CLEAR FLAGS
2115	7240	CLA CMA	

```

2116 1150 TAD RECORD
2117 7450 SNA
2120 5712 JMP I SPCFWD
2121 7041 CIA
2122 3477 DCA I K7752 /SET UP WC
2123 6722 MTGO /SET "GO",
2124 4447 JMS I PNTR32 /WAIT FOR MT FLAG AND NO ERRORS
2125 4441 JMS I PNTR20 /ERRORS
2126 7610 SKP CLA /YES
2127 5712 JMP I SPCFWD /NO
2130 4440 JMS I PNTR19 /REWIND TAPE, TRY AGAIN
2131 5313 JMP SPCFWD+1

```

/MAGTAPE SAVE SUBROUTINE

```

2132 0000 MTSAVE, 0
2133 1144 TAD AC /SAVE AC
2134 3356 DCA MTAC
2135 1145 TAD LINK /LINK
2136 3357 DCA MTLINK
2137 1456 TAD I PNTR40 /MEMORY FIELD
2140 3360 DCA MTIB
2141 1000 TAD 0 /AND LOC 0
2142 3361 DCA MTPC
2143 5732 JMP I MTSAVE

```

/MAGTAPE RESTORE SUBROUTINE

```

2144 0000 MTREST, 0
2145 1356 TAD MTAC /RESTORE SAVED AC
2146 3144 DCA AC
2147 1357 TAD MTLINK /LINK
2150 3145 DCA LINK
2151 1360 TAD MTIB /MEMORY FIELD
2152 3456 DCA I PNTR40
2153 1361 TAD MTPC /AND LOC 0
2154 3000 DCA 0
2155 5744 JMP I MTREST
2156 0000 MTAC, 0
2157 0000 MTLINK, 0
2160 0000 MTIB, 0
2161 0000 MTPC, 0
2162 2206 PNTR26, MTDATA+6
2163 2510 PNTR27, RAND2
2164 1532 PNTR28, MYRITE
2165 1200 PNTR29, MTREAD
2166 1220 PNTR30, RDCOMP
2167 2200 PNTR31, MTDATA
2170 0666 K0666, 0666 /ODD, 7CH, SPACE FWD, ENABLE, 800
2171 6363 MESS03, 6363 /3,3
2172 7040 7040 /8,SP
2173 0411 0411 /D,I
2174 2320 2320 /S,P
2175 1401 1401 /L,A
2176 3177 3177 /Y,?

```

2177 0000

0

/END

2200

*2200

/MAGTAPE DATA ERROR ROUTINE

2200 0000

MTDATA, 0

2201 7604

LAS

2202 0103

AND K0400

2203 7640

SZA CLA

2204 5247

JMP CHNGE2+1

2205 6002

IOF

2206 7610

SKP CLA

/OR CLA

2207 5223

JMP .+14

2210 1356

TAD PMES16

2211 4403

JMS I PNTR1

/TYPE OUT HEADER

2212 1021

TAD MTFELD

2213 7110

RAR CLL

2214 7012

RTR

2215 4445

JMS I PNTR24

/AND DATA FIELD

2216 1074

TAD PMES15

2217 4403

JMS I PNTR1

/TYPE OUT REST OF HEADER

2220 1105

TAD K7200

2221 3206

DCA MTDATA+6

2222 4450

JMS I PNTR33

2223 1021

TAD MTFELD

2224 1246

TAD CHNGE2

2225 3226

DCA .+1

2226 6201

CDF

2227 1012

TAD 12

/PICK UP "GOOD" ADDRESS

2230 4445

JMS I PNTR24

2231 1125

TAD K0240

2232 4446

JMS I PNTR25

2233 1571

TAD I TEMP

/PICK UP "GOOD" DATA

2234 4445

JMS I PNTR24

2235 1125

TAD K0240

2236 4446

JMS I PNTR25

2237 1013

TAD 13

/PICK UP "BAD" ADDRESS

2240 4445

JMS I PNTR24

2241 1125

TAD K0240

2242 4446

JMS I PNTR25

2243 1571

TAD I TEMP

/PICK UP "BAD" DATA

2244 4445

JMS I PNTR24

2245 4450

JMS I PNTR33

2246 6201

CHNGE2, CDF

2247 7604

LAS

2250 7004

RAL

2251 7700

SMA CLA

/HALT ON ERROR?

2252 7402

HLT

/YES

2253 5600

JMP I MTDATA

/INPUT FROM KEYBOARD AN OCTAL DIGIT, SKIP IF OK

2254 0000

INPUT, 0

2255	4406	JMS I PNTR4
2256	3153	DCA CHAR
2257	1153	TAD CHAR
2260	7041	CIA
2261	1360	TAD K0260
2262	7540	SMA SZA
2263	5273	JMP QUEST
2264	1135	TAD K0010
2265	7710	SPA CLA
2266	5273	JMP QUEST
2267	1153	TAD CHAR
2270	0130	AND K0007
2271	2254	ISZ INPUT
2272	5654	JMP I INPUT
2273	1357	QUEST, TAD K0277
2274	4446	JMS I PNTR25
2275	4450	JMS I PNTR33
2276	5654	JMP I INPUT

/OCTAL PRINT SUBROUTINE

2277	0000	PRINT, 0
2300	3171	DCA TEMP
2301	1121	TAD M0004
2302	3172	DCA TEMP1
2303	1171	TAD TEMP
2304	7104	RAL CLL
2305	7004	RAL
2306	7006	RTL
2307	3171	DCA TEMP
2310	1171	TAD TEMP
2311	0130	AND K0007
2312	1360	TAD K0260
2313	4446	JMS I PNTR25
2314	1171	TAD TEMP
2315	2172	ISZ TEMP1
2316	5305	JMP .-11
2317	7200	CLA
2320	5677	JMP I PRINT

/MESSAGE PRINT SUBROUTINE

2321	0000	MESSAGE, 0
2322	3171	DCA TEMP
2323	4450	JMS I PNTR33
2324	1571	TAD I TEMP
2325	0362	AND K7700
2326	7450	SNA
2327	5721	JMP I MESSAGE
2330	7110	RAR CLL
2331	7010	RAR
2332	7012	RTR
2333	7012	RTR
2334	4344	JMS POSIT

2335	1571	TAD I TEMP	
2336	0361	AND K0077	
2337	7450	SNA	
2340	5721	JMP I MESSAGE	
2341	4344	JMS POSIT	
2342	2171	ISZ TEMP	
2343	5324	JMP MESSAGE+3	
2344	0000	POSIT, 0	
2345	3172	DCA TEMP1	
2346	1172	TAD TEMP1	
2347	1131	TAD M0040	
2350	7710	SPA CLA	
2351	1132	TAD K0100	
2352	1104	TAD K0200	
2353	1172	TAD TEMP1	
2354	4446	JMS I PNTR25	
2355	5744	JMP I POSIT	
2356	1156	PMES16, MESS16	
2357	0277	K0277, 277	/"?"
2360	0260	K0260, 260	
2361	0077	K0077, 77	
2362	7700	K7700, 7700	
		/CARRIAGE RETURN-LINE FEED SUBROUTINE	
2363	0000	CRLF, 0	
2364	1126	TAD K0215	
2365	4446	JMS I PNTR25	
2366	1127	TAD K0212	
2367	4446	JMS I PNTR25	
2370	5763	JMP I CRLF	
2371	2403	MESS04, 2403	/T,C
2372	6570	6570	/5,8
2373	4015	4015	/SP,M
2374	0107	0107	/A,G
2375	2401	2401	/T,A
2376	2005	2005	/P,E
2377	7700	7700	/?END

2400

*2400
/RANDOM NUMBER GENERATOR

2400	0000	RANGEN, 0	
2401	7200	CLA	
2402	1242	TAD RANTND	
2403	1227	TAD RANDEX	
2404	7640	SZA CLA	
2405	5215	JMP RANTAD	
2406	1231	TAD RANTBL	
2407	3227	DCA RANDEX	
2410	1230	TAD RANCON	
2411	7104	CLL RAL	
2412	7430	SZL	
2413	7001	IAC	
2414	3230	DCA RANCON	
2415	1230	RANTAD, TAD RANCON	

2416	1627	TAD I	RANDEX
2417	3627	DCA I	RANDEX
2420	1243	TAD	RANSAV
2421	7010	RAR	
2422	1627	TAD I	RANDEX
2423	2227	ISZ	RANDEX
2424	3243	DCA	RANSAV
2425	1243	TAD	RANSAV
2426	5600	JMP I	RANGEN
2427	2442	RANDEX,	RANTND
2430	6543	RANCON,	6543
2431	2432	RANTBL,	,+1
2432	6543		6543
2433	3210		3210
2434	0765		0765
2435	5432		5432
2436	2107		2107
2437	7654		7654
2440	4321		4321
2441	1076		1076
2442	5336	RANTND,	-RANTND
2443	0000	RANSAV,	0
2444	0000	RAND1,	0
2445	7200	CLA	
2446	1306	TAD	,+40
2447	1273	TAD	,+24
2450	7640	SZA	CLA
2451	5261	JMP	,+10
2452	1275	TAD	,+23
2453	3273	DCA	,+20
2454	1274	TAD	,+20
2455	7104	CLL	RAL
2456	7430	SZL	
2457	7001	IAC	
2460	3274	DCA	,+14
2461	1274	TAD	,+13
2462	1673	TAD I	,+11
2463	3673	DCA I	,+10
2464	1277	TAD	,+13
2465	7010	RAR	
2466	1673	TAD I	,+5
2467	2273	ISZ	,+4
2470	3307	DCA	,+17
2471	1307	TAD	,+16
2472	5644	JMP I	, -26
2473	2506	,+13	
2474	6543	6543	
2475	2476	,+1	
2476	1076	1076	
2477	7654	7654	
2500	5432	5432	
2501	3210	3210	
2502	6543	6543	

2503	0765	0765
2504	2107	2107
2505	4321	4321
2506	5272	-.
2507	0000	0
2510	0000	RAND2, 0
2511	7200	CLA
2512	1352	TAD .+40
2513	1337	TAD .+24
2514	7640	SZA CLA
2515	9325	JMP .+10
2516	1341	TAD .+23
2517	3337	DCA .+20
2520	1340	TAD .+20
2521	7104	CLL RAL
2522	7430	SZL
2523	7001	IAC
2524	3340	DCA .+14
2525	1340	TAD .+13
2526	1737	TAD I .+11
2527	3737	DCA I .+10
2530	1343	TAD .+13
2531	7010	RAR
2532	1737	TAD I .+5
2533	2337	ISZ .+4
2534	3353	DCA .+17
2535	1353	TAD .+16
2536	5710	JMP I .-26
2537	2552	+.13
2540	6543	6543
2541	2542	+.1
2542	6543	6543
2543	0765	0765
2544	2107	2107
2545	4321	4321
2546	1076	1076
2547	7654	7654
2550	5432	5432
2551	3210	3210
2552	5226	-.
2553	0000	0
2554	0000	/GET SUBROUTINE
2555	6031	GET, 0
2556	5355	KSF
2557	6036	JMP .-1
2560	6046	KRB
2561	6041	TL5
2562	5361	TSF
2563	6042	JMP .-1
2564	5754	TCF
2565	0406	JMP I GET
2566	6362	MESS07, 0406
2567	4004	6362

/D,F
/3,2
/SP,D

2570 1123 /I.S
 2571 0377 /C.?
 2572 0000 /END

```

2600      2600      *2600
2600 3144      SCAN,   DCA AC
2601 7004      RAL
2602 3145      DCA LINK
2603 6234      RIB
2604 7104      RAL CLL
2605 7006      RTL
2606 0123      AND K0070
2607 1366      TAD CHNGE3
2610 3234      DCA MEMORY
2611 0031      KSF           /KEYBOARD FLAG?
2612 7410      SKP           /NO
2613 5230      JMP EXIT      /YES
2614 6771      DTSF          /DECTAPE FLAG?
2615 7410      SKP
2616 5637      JMP I DTFLAG   /YES
2617 6701      MTSF          /MAGTAPE FLAG?
2620 7410      SKP
2621 5641      JMP I MTFLAG   /YES
2622 6622      6622          /DISC OR DRUM DONE FLAG?
2623 7410      SKP
2624 5643      JMP I DDFLAG   /YES
2625 6621      6621          /DISC OR DRUM ERROR FLAG?
2626 7200      CLA           /YES
2627 7200      CLA           /OR YES, DEPENDING ON DISC OR DRUM TESTED
2630 6032      EXIT,      KCC           /CLEAR AC & KEYBOARDFLAG
2631 1145      TAD LINK      /RESTORE LINK & AC
2632 7110      RAR CLL
2633 1144      TAD AC
2634 6201      MEMORY,    CDF           /RESTORE MEMORY FIELDS
2635 6001      IDN           /TURN ON INTERRUPT
2636 5400      JMP I 0       /EXIT
    
```

/DECTAPE FLAG RETURN ADDRESS

```

2637 0000      DTFLAG, 0
2640 5230      JMP EXIT      /EXIT TO TURN P.I. ON
    
```

/MAGTAPE FLAG RETURN ADDRESS

```

2641 0000      MTFLAG, 0
2642 5230      JMP EXIT
    
```

/DISC OR DRUM FLAG RETURN ADDRESS

```

2643 0000      DDFLAG, 0
2644 5230      JMP EXIT
    
```

/TYPE SUBROUTINE

2645	0000	TYPE,	0
2646	6046		TLS
2647	6041		TSF
2650	5247		JMP .-1
2651	6042		YCF
2652	7200		CLA
2653	5645		JMP I TYPE

2654	0000	RAND3,	0
2655	7200		CLA
2656	1316		TAD .+40
2657	1303		TAD .+24
2660	7640		SZA CLA
2661	5271		JMP .+10
2662	1305		TAD .+23
2663	3303		DCA .+20
2664	1304		TAD .+20
2665	7104		CLL RAL
2666	7430		SZL
2667	7001		IAC
2670	3304		DCA .+14
2671	1304		TAD .+13
2672	1703		TAD I .+11
2673	3703		DCA I .+10
2674	1307		TAD .+13
2675	7010		RAR
2676	1703		TAD I .+5
2677	2303		ISZ .+4
2700	3317		DCA .+17
2701	1317		TAD .+16
2702	5654		JMP I .-26
2703	2716		.,+13
2704	6543		6543
2705	2706		.,+1
2706	2107		2107
2707	5432		5432
2710	7654		7654
2711	0765		0765
2712	4321		4321
2713	3210		3210
2714	1076		1076
2715	6543		6543
2716	5062		-.
2717	0000		0

/DISC OR DRUM DATA ERROR ROUTINE

2720	0000	DDDATA,	0
2721	7604		LAS
2722	0103		AND K0400
2723	7640		SZA CLA
2724	5367		JMP CHNGE3+1

2725	6002	IOF	
2726	7610	SKP CLA	/OR CLA
2727	5343	JMP .+14	
2730	1374	TAD PMES17	
2731	4403	JMS I PNTR1	/TYPE OUT HEADER
2732	1022	TAD DDFELD	
2733	7110	RAR CLL	
2734	7012	RTR	
2735	4445	JMS I PNTR24	/AND DATA FIELD
2736	1074	TAD PMES15	
2737	4403	JMS I PNTR1	/TYPE OUT REST OF HEADER
2740	1105	TAD K7200	
2741	3326	DCA DDDATA+6	
2742	4450	JMS I PNTR33	
2743	1022	TAD DDFELD	
2744	1366	TAD CHNGE3	
2745	3346	DCA .+1	
2746	6201	CDF	
2747	1014	TAD 14	/PICK UP "GOOD" ADDRESS
2750	4445	JMS I PNTR24	
2751	1125	TAD K0240	
2752	4446	JMS I PNTR25	
2753	1571	TAD I TEMP	/PICK UP "GOOD" DATA
2754	4445	JMS I PNTR24	
2755	1125	TAD K0240	
2756	4446	JMS I PNTR25	
2757	1015	TAD 15	/PICK UP "BAD" ADDRESS
2760	4445	JMS I PNTR24	
2761	1125	TAD K0240	
2762	4446	JMS I PNTR25	
2763	1571	TAD I TEMP	/PICK UP "BAD" DATA
2764	4445	JMS I PNTR24	
2765	4450	JMS I PNTR33	
2766	6201	CHNGE3, CDF	
2767	7604	LAS	
2770	7004	RAL	
2771	7700	SMA CLA	/HALT ON ERROR?
2772	7402	HLT	/YES
2773	5720	JMP I DDDATA	
2774	1357	PMES17, MESS17	

3000	0417	*3000	
3001	0523	MESS01, 0417	/D,O
3002	4024	0523	/E,S
3003	1005	4024	/SP,T
3004	4003	1005	/H,E
3005	1715	4003	/SP,C
3006	2025	1715	/O,M
3007	2405	2025	/P,U
3010	2240	2405	/T,E
3011	1001	2240	/R,SP
3012	2605	1001	/H,A
		2605	/V,E

3013	4024		4024	/SP,T
3014	1005		1005	/H,E
3015	4006		4006	/SP,F
3016	1714		1714	/O,L
3017	1417		1417	/L,O
3020	2711		2711	/W,I
3021	1607		1607	/N,G
3022	4004		4004	/SP,D
3023	0526		0526	/E,V
3024	1103		1103	/I,C
3025	0523		0523	/E,S
3026	4050		4050	/SP,(
3027	2431		2431	/T,Y
3030	2005		2005	/P,E
3031	4031		4031	/SP,Y
3032	5531		5531	/-,Y
3033	0523		0523	/E,S
3034	4016		4016	/SP,N
3035	5516		5516	/-,N
3036	1751		1751	/0,)
3037	0000		0	/END
3040	2206	MESS08,	2206	/R,F
3041	6070		6070	/0,8
3042	4004		4004	/SP,D
3043	1123		1123	/I,S
3044	0377		0377	/C,?
3045	0000		0	/END
3046	0530	MESS09,	0530	/E,X
3047	2422		2422	/T,R
3050	0140		0140	/A,SP
3051	1505		1505	/M,E
3052	1517		1517	/M,O
3053	2231		2231	/R,Y
3054	7700		7700	/?,END
3055	1017	MESS10,	1017	/H,O
3056	2740		2740	/W,SP
3057	1525		1525	/M,U
3060	0310		0310	/C,H
3061	7700		7700	/?,END
3062	0411	MESS11,	0411	/D,I
3063	2303		2303	/S,C
3064	4005		4005	/SP,E
3065	2222		2222	/R,R
3066	1722		1722	/O,R
3067	4023		4023	/SP,S
3070	2401		2401	/T,A
3071	2425		2425	/T,U
3072	2340		2340	/S,SP
3073	4000		4000	/SP,END
3074	2403	MESS12,	2403	/T,C
3075	6061		6061	/0,1

3076	4005	4005	/SP,E
3077	2222	2222	/R,R
3100	1722	1722	/O,R
3101	4023	4023	/SP,S
3102	2401	2401	/T,A
3103	2425	2425	/T,U
3104	2340	2340	/S,SP
3105	4000	4000	/SP,END
3106	2403	MESS13, 2403	/T,C
3107	6570	6570	/5,8
3110	4005	4005	/SP,E
3111	2222	2222	/R,R
3112	1722	1722	/O,R
3113	4023	4023	/SP,S
3114	2401	2401	/T,A
3115	2425	2425	/T,U
3116	2340	2340	/S,SP
3117	4000	4000	/SP,END
3120	0422	MESS14, 0422	/D,R
3121	2515	2515	/U,M
3122	4005	4005	/SP,E
3123	2222	2222	/R,R
3124	1722	1722	/O,R
3125	4023	4023	/SP,S
3126	2401	2401	/T,A
3127	2425	2425	/T,U
3130	2340	2340	/S,SP
3131	4000	4000	/SP,END
3132	0701	MESS15, 0701	/G,A
3133	0404	0404	/D,D
3134	4007	4007	/SP,G
3135	0401	0401	/D,A
3136	2440	2440	/T,SP
3137	0201	0201	/B,A
3140	0404	0404	/D,D
3141	4002	4002	/SP,B
3142	0401	0401	/D,A
3143	2400	2400	/T,END
3144	2403	MESS18, 2403	/T,C
3145	6061	6061	/0,1
3146	4004	4004	/SP,D
3147	0124	0124	/A,T
3150	0140	0140	/A,SP
3151	0522	0522	/E,R
3152	2217	2217	/R,O
3153	2240	2240	/R,SP
3154	1116	1116	/I,N
3155	4002	4002	/SP,B
3156	0116	0116	/A,N
3157	1340	1340	/K,SP
3160	4000	4000	/SP,END

3161 0414 PRO338, 414

/SET SCALE TO 1, INTENSITY TO 4

3162 1107
3163 0100
3164 4100
3165 1121
3166 4000
3167 1600
3170 5600
3171 0000
3172 4000
3173 3600
3174 7600
3175 4000
3176 2000
3177 3165

1107
100
4100
1121
4000
1600
5600
0
4000
3600
7600
4000
2000
PRO338+4

/ENTER POINT MODE AND DATA STATE, CLEAR COORD AND SECTORS
/SET Y=100
/SET X=100, ESCAPE
/ENTER VECTOR MODE AND DATA STATE
/DELTA Y=0, INTENSIFY
/DELTA X=1600
/DELTA Y=1600, INTENSIFY
/DELTA X=0
/DELTA Y=0, INTENSIFY
/DELTA X=-1600
/DELTA Y=-1600, INTENSIFY
/DELTA X=0, ESCAPE
/JMP I ,+1

5

0000	01111111	00000000	11111111	11111111	11111111	11111111	11111111	11111111
0100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111100
0200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111110
0400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111110
0600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111110
1000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11100000
1200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11110000
1600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111100
2000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11100000
2600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111000
3000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3200								
3300								
3400								
3500								
3600								
3700								

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

AC	0144	DIMA	6616	HALT2	1310	LINK	0145
ASK1	0216	DIML	6615	HALT3	1457	LOC8ED	1043
ASK2	0225	DIS338	0365	HALT4	0733	LOOK	0175
ASK3	0234	DISCAD	0140	INPUT	2254	M0003	0115
ASK4	0243	DISCEA	0137	INTERN	0143	M0004	0121
ASK5	0253	DMAC	6626	INTERR	0207	M0040	0131
ASK6	0263	DMAR	6603	JMP338	0161	M0316	0116
ASK7	0272	DMAW	6605	JMPCON	0706	M0331	0117
BUFF1	0106	DRCF	6611	JMPD32	0157	M2700	0120
BUFF2	0112	DRCN	6624	JMPDEC	0154	MAGTAP	0610
BUFF3	0114	DRCR	6603	JMPMAG	0155	MEMORY	2634
BUFF4	0107	DRCW	6605	JMPR08	0160	MESSAGE	2321
BUFF5	0111	DREF	6612	JMPRM8	0156	MESS01	3000
BUFF6	0113	DRES	6612	K0002	1152	MESS02	1565
CDF	6201	DRFS	6624	K0003	1153	MESS03	2171
CHAR	0153	DRMSEC	0152	K0003A	1711	MESS04	2371
CHNGE1	1760	DRSC	6622	K0004	1767	MESS06	1770
CHNGE2	2246	DRSE	6621	K0007	0130	MESS07	2565
CHNGE3	2766	DRTS	6615	K0010	0135	MESS08	3040
CIF	6202	DRUMAD	0141	K0014	0110	MESS09	3046
CRLF	2363	DRUMWT	1434	K0020	0134	MESS10	3055
DCEA	6611	DSAC	6612	K0040	0124	MESS11	3062
DCIM	6611	DTAC	1322	K0070	0123	MESS12	3074
DCMA	6601	DTCA	6762	K0077	2361	MESS13	3106
DDAC	0561	DTCNTR	0170	K0100	0132	MESS14	3120
DDCNTR	0174	DTDATA	1712	K0130	1150	MESS15	3132
DDDATA	2720	DTERR	1137	K0150	1151	MESS16	1156
DDEXER	0400	DTEXER	1600	K0200	0104	MESS17	1357
DDFELD	0022	DTFELD	0020	K0212	0127	MESS18	3144
DDFLAG	2643	DTFLAG	2637	K0215	0126	MTAC	2156
DDIB	0563	DTIB	1324	K0240	0125	MTAF	6712
DDLINK	0562	DTLA	6766	K0260	2360	MTCH	6714
DDLOOP	0565	DTLB	6774	K0277	2357	MTCNTR	0173
DDPC	0564	DTLINK	1323	K0400	0103	MTCR	6711
DDREAD	0443	DTPC	1325	K0600	1154	MTDATA	2200
DDREST	0547	DTPNTR	0163	K0604	0770	MTERR	1255
DDRITE	0435	DTRA	6761	K0614	1155	MTEXER	2000
DDSAVE	0535	DTRB	6772	K0626	1356	MTFELD	0021
DDSTAT	0151	DTREAD	1047	K0636	1355	MTFLAG	2641
DEAC	6616	DTREST	1343	K0666	2170	MTGO	6722
DEAL	6615	DTRITE	1067	K0676	1254	MTHLT1	0614
DECTAP	0600	DTSAVE	1331	K0746	1564	MTHLT2	0017
DF32	0644	DTSF	6771	K1000	0136	MTIB	0160
DF32EX	0526	DTSTAT	0146	K3000	0122	MTLC	6716
DF32PR	0166	DTWAIT	1107	K7200	0105	MTLINK	2107
DF32RD	0755	DTXA	6764	K7700	2362	MTPC	2111
DF32RE	0534	DXAL	6643	K7750	0075	MTPNTR	0164
DF32RI	0533	EXIT	2630	K7751	0076	MTREAD	1200
DF32WR	0735	FELD	0162	K7752	0077	MTREST	2144
DF32WT	0707	FOUND	1145	K7753	0100	MTRITE	1532
DFSC	6622	GET	2554	K7754	0101	MTRS	6706
DFSE	6621	HALT1	1135	K7755	0102	MTSAVE	2132

MTSF	6701	PNTR36	0053	RM08RI	0515
MTSTAT	0147	PNTR38	0054	RM08WR	1416
MTRR	6721	PNTR39	0055	RMF	6244
MTWAIT	1266	PNTR4	0006	SCAN	2600
NODISC	0345	PNTR40	0056	SEARCH	1000
PME11A	0364	PNTR41	0057	SKIP	0133
PMES10	0073	PNTR42	0060	SPCFWD	2112
PMES11	0775	PNTR43	1327	START	0200
PMES12	1147	PNTR44	1330	TEMP	0171
PMES13	1326	PNTR45	0703	TEMP1	0172
PMES14	1563	PNTR46	0704	TEST	0327
PMES15	0074	PNTR47	0705	TRACK	0142
PMES16	2356	PNTR48	0061	TYPE	2645
PMES17	2774	PNTR49	0062		
PMES18	1766	PNTR5	0007		
PMESS1	0063	PNTR6	0023		
PMESS2	0064	PNTR7	0024		
PMESS3	0065	PNTR8	0025		
PMESS4	0066	PNTR9	0026		
PMESS6	0067	POSIT	2344		
PMESS7	0070	PRINT	2277		
PMESS8	0071	PRO338	3161		
PMESS9	0072	QUEST	2273		
PNTR1	0003	RANCON	2430		
PNTR10	0027	RAND1	2444		
PNTR11	0030	RAND2	2510		
PNTR12	0031	RAND3	2654		
PNTR13	0032	RANDEX	2427		
PNTR14	0033	RANGEN	2400		
PNTR15	0034	RANSAV	2443		
PNTR16	0035	RANTAD	2415		
PNTR17	0036	RANTBL	2431		
PNTR18	0037	RANTND	2442		
PNTR19	0040	ROCOMP	1220		
PNTR2	0004	RDF	6214		
PNTR20	0041	RECORD	0150		
PNTR21	0042	REWIND	1240		
PNTR22	0043	RF08	0662		
PNTR23	0044	RF08EX	0517		
PNTR24	0045	RF08PR	0167		
PNTR25	0046	RF08RD	1461		
PNTR26	2162	RF08RE	0525		
PNTR27	2163	RF08RI	0524		
PNTR28	2164	RF08WR	1501		
PNTR29	2165	RF08WT	1521		
PNTR3	0005	RIB	6234		
PNTR30	2166	RIF	6224		
PNTR31	2167	RM08	0627		
PNTR32	0047	RM08EX	0510		
PNTR33	0050	RM08PR	0165		
PNTR34	0051	RM08RD	1400		
PNTR35	0052	RM08RE	0516		

EXERCISER = TAPE 1

PAL10

V141

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PAGE 1-40

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 16 SECONDS

3K CORE USED

