IDENTIFICATION

PRODUCT CODE:	MAINDEC-08-DHRKC-C-D
PRODUCT NAME:	RK8E DATA RELIABILITY PROGRAM
DATE CREATED:	JULY 16, 1973
MAINTAINER:	DIAGNOSTIC GROUP
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1. ABSTRACT

THE RK8E DATA RELIABILITY PROGRAM IS DESIGNED PRIMARILY AS AN ACCEPTANCE TEST TO VERIFY DISK DATA TRANSFERS WITHIN THE DISK SYSTEM.

THE "ACCEPT MODE" OF OPERATION VERIFIES THE CAPABILITY OF TRANSFERRING A TOTAL 3 X 10(9) BITS OF DATA TO AND FROM EACH INDIVIDUAL DISK DRIVE ON THE DISK SYSTEM.

THE "MANUAL INTERVENTION MODE" IS AVAILABLE AS A HARDWARE DEBUGGING AID TO ALLOW THE OPERATOR TO SELECT DATA PATTERNS, TRANSFER LENGTHS, AND ADDRESSING.

2. REQUIREMENTS

2.1 HARDWARE

A. PDP-8/E, 8/F, OR 8/M COMPUTER OR OTHER FAMILY OF 8 COMPATIBLE COMPUTER WITH NECCESSARY DW8E BUS ADAPTER.

B. AT LEAST 4K OF READ/WRITE MEMORY

C. ASR-33 TELETYPE OR EQUIVALENT

D. RK8E DISK CONTROL

E. RK05 DISK DRIVE(S)

2.2 PROGRAM STORAGE

THE PROGRAM OCCUPIES OR UTILIZES LOCATION 0000 TO LOCATION 7577 OF FIELD 0. ALL EXTENDED MEMORY LOCATIONS, IF AVAILABLE, ARE UTILIZED FOR TESTING.

2.3 PRELIMINARY PROGRAMS

THIS PROGRAM REQUIRES A FORMATTED CARTRIDGE ON ALL DRIVES TO BE TESTED.

ALL BASIC AND EXTENDED MEMORY DIAGNOSTICS, THE RK8E DISKLESS CONTROL TEST, THE RK8E DRIVE CONTROL TEST, AND THE RK8E DISK FORMATTER PROGRAM SHOULD BE RUN IF THIS TEST FAILS TO OPERATE CORRECTLY.

2.4 EXECUTION TIME

THE PROGRAM EXECUTION TIME (I.E. PASSING 3 X 10(9) BITS OF DATA ON A DISK DRIVE), IS APROX. 3 HOURS PER DISK DRIVE ON A 4K MEMORY SYSTEM OR APROX. 2.5 HOURS PER DISK DRIVE ON SYSTEMS WITH EXTENDED MEMORY.

3. SWITCH REGISTER SETTINGS

SWR0=1	LOOP ON WRITE SEQUENCE.
SWR1=1	LOOP ON READ SEQUENCE.
SWR2=1	INHIBIT ALL ERROR TYPEOUTS
SWR3=1	TYPE "STATUS=COMPLETE" REPORT.
SWR4=1	PROGRAM STOP OR HALT.
SWR5=1	DRIVE DISCONNECT AFTER PASS COMPLETION.
SWR6=1	PERFORM ONLY "OVERLAP SEEKS", DO NOT EXECUTE DATA BREAKS.

4. OPERATOR AND/OR PROGRAM ACTION

4.1 STANDARD TEST PROCEDURE

A. START AS SPECIFIED THROUGH OUT THIS DOCUMENTATION IS KEY CLEAR AND THEN KEY CONTINUE ON PDP8/E, PDP8/M, AND PDP8/F COMPUTERS.

B. LOAD THE PROGRAM INTO MEMORY FIELD 2 USING THE STANDARD BINARY LOADER TECHNIQUE.

C. IF IT IS DESIRED TO CHANGE THE IOT CODES WITHIN THE PROGRAM, FOLLOW THE PROCEDURE IN SECTION 4.5.

D. RUN THE ACCEPTANCE MODE OF DATA RELIABILITY WITH ALL DRIVES AND MEMORY AVAILABLE BY FOLLOWING THE PROCEDURE IN SECTION 4.3.

E. THE MANUAL INTERVENTION MODE, SECTION 4.4, MAY BE USED FOR TROUBLE SHOOTING, IF DESIRED.

F. IF POSSIBLE SWR4=1 SHOULD ALWAYS BE USED TO STOP THE PROGRAM.

G. IF THE PROGRAM HAS BEEN STOPPED DUE TO SWR4=1, THE PROGRAM CAN BE RESTARTED, AND THE INITIAL STARTUP QUESTIONS BYPASSED, BY USING 0202 AS THE RESTART ADDRESS.

H. FOR THE ABSOLUTE LOCATIONS OF ALL KNOWN HALTS IN THIS PROGRAM, ACCESS PAGE 1 OF THE PROGRAM LISTING.

4.2 RK05 DRIVE CARTRIDGE MOUNTING PROCEDURE

THE FOLLOWING IS THE CORRECT CARTRIDGE MOUNTING PROCEDURE FOR THE RK05 DISK DRIVE. ANY DEVIATION ENCOUNTERED DURING THIS PROCEDURE WILL BE CONSIDERED AN ERROR CONDITION.

A. SET SWITCH LABELED "RUN/LOAD" TO THE "LOAD" POSITION.

B. TURN AC POWER TO DISK DRIVE ON.

C. VERIFY THAT THE LIGHT LABELED "PWR" IS ON.

D. WAIT FOR THE LIGHT LABELED "LOAD" TO COME ON.

E. VERIFY THAT THE LIGHTS LABELED "RDY", "ON CYL", "FAULT", "WT", AND "RD" ARE OFF.

F. OPEN ACCESS DOOR.

G. INSERT CARTRIDGE.

H. CLOSE ACCESS DOOR.

I. SET SWITCH LABELED "RUN/LOAD" TO THE "RUN" POSITION.

J. WAIT FOR THE LIGHTS LABELED "RDY" AND "ON CYL" TO COME ON.

K. TOGGLE SWITCH LABELED "WT PROT" AND VERIFY THAT THE LIGHT LABELED "WT PROT" GOES ON AND OFF.

L. TOGGLE SWITCH LABELED "WT PROT" UNTIL THE LIGHT LABELED "WT PROT" IS OFF.

M. VERIFY THAT LIGHTS LABELED "FAULT", "WT", "RD", AND "LOAD" ARE OFF.

4.3 RK8E DATA RELIABILITY (ACCEPT MODE)

A. MAKE READY ALL DRIVES TO BE TESTED USING THE RK25 DRIVE CARTRIDGE MOUNTING PROCEDURE SECTION 4.2.

B. SET SWITCH LABELED "RUN/LOAD" TO THE "LOAD" POSITION ON ALL DRIVES NOT BEING TESTED.

C. VERIFY THAT AC POWER IS ON, ON ALL DRIVES NOT BEING TESTED.

D. SET THE SWITCH REGISTER TO 0200 AND PRESS LOAD ADDRESS.

E. SET THE SWITCH REGISTER TO 0000 AND PRESS START.

F. THE OPERATOR MAY SET SWR5=1 IF IT IS DESIRED TO HAVE THE PROGRAM AUTOMATICALLY DISCONNECT EACH DISK DRIVE AS EACH MAKE THEIR PASS COMPLETION. (NOTE: IF SWR5=0, ALL DISK DRIVES WILL CONTINUE TO RUN AFTER THEIR PASS COMPLETION)

G. THE TTY WILL PRINT THE FOLLOWING PROGRAM NAME AND QUESTION.

```
RK8E DATA RELIABILITY
AMOUNT OF EXTENDED R/W MEMORY (0-7)?
```

THE OPERATOR SHOULD THEN TYPE THE AMOUNT OF EXTENDED READ/WRITE MEMORY BANKS NUMBERED SEQUENCIALLY FROM BANK 2, AS INDICATED BY THE TTY QUESTION.

H. THE TTY WILL PRINT THE FOLLOWING QUESTION(S), ASKING THE DESIRED DISK DRIVE(S) TO BE USED IN TESTING.

```
EXERCISE DISK0?  DISK1?  DISK2?  DISK3?
```

FOR THE QUESTION(S) ABOVE, TYPE Y FOR YES, IF IT IS DESIRED TO TEST THE DISK DRIVE IN QUESTION, OTHERWISE, TYPE N FOR NO.

I. THE TTY WILL PRINT THE FOLLOWING QUESTION.

```
ACCEPT MODE?
```

THE OPERATOR SHOULD THEN TYPE Y FOR YES TO RUN THE ACCEPTANCE MODE OF OPERATION.

J. THE TTY WILL PRINT THE FOLLOWING QUESTION.

```
ARE YOU SURE?
```

IF THE OPERATOR IS CERTAIN OF THE AMOUNT OF MEMORY, THE DISK DRIVE(S) SELECTED, AND THE MODE OF OPERATION, TYPE Y FOR YES. TYPING N FOR NO WILL RESULT IN A REPEAT OF ALL MESSAGES AND QUESTIONS ENCOUNTERED THUS FAR.

K. THE PROGRAM SHOULD START TESTING THE DISK DRIVE(S) AND MEMORY SELECTED.

L. THE "STATUS=COMPLETE" TYPEOUT SHOULD OCCUR UPON PASS COMPLETION OF EACH DISK DRIVE. ALL OTHER TYPEOUTS OR HALTS WILL BE CONSIDERED AS AN ERROR CONDITION. SEE SECTION 5.5 FOR "STATUS=COMPLETE" TYPEOUT.

M. A SUCCESSFUL PASS COMPLETE ON A DISK DRIVE WILL BE CONSIDERED AS NO "HARD" ERRORS AND NO MORE THAN ONE (1) "SOFT" ERROR PER PASS COMPLETE.

N. IF ANY ERRORS DO OCCUR, THE OPERATOR SHOULD ACCESS SECTION 5 IN THIS DOCUMENTATION.

4.4 RK8E DATA RELIBILITY (MANUAL INTERVENTION MODE)

THE MANUAL INTERVENTION MODE IS AVAILABLE AS A TROUBLE SHOOTING AID AND SHOULD ONLY BE USED FOR SUCH PURPOSES, IF DESIRED.

A. MAKE READY ALL DISK DRIVES TO BE TESTED USING THE RK05 DRIVE CARTRIDGE MOUNTING PROCEDURE SETION 4.2.

B. SET SWITCH LABELED "RUN/LOAD" TO THE "LOAD" POSITION ON ALL DRIVES NOT BEING TESTED.

C. VERIFY THAT AC POWER IS ON, ON ALL DRIVES NOT BEING TESTED.

D. SET THE SWITCH REGISTER TO 0200 AND PRESS LOAD ADDRESS.

E. SET THE SWITCH REGISTER TO 0000 AND PRESS START.

F. THE TTY WILL PRINT THE FOLLOWING PROGRAM NAME AND QUESTION.

```
RK8E DATA RELIABILITY
AMOUNT OF EXTENDED R/W MEMORY (0=7)?
```

THE OPERATOR SHOULD THEN TYPE THE AMOUNT OF EXTENDED READ/WRITE MEMORY BANKS NUMBERED SEQUENCIALLY FROM BANK 0, AS INDICATED BY THE TTY QUESTION.

G. THE TTY WILL PRINT THE FOLLOWING QUESTION(S), ASKING THE DESIRED DISK DRIVE(S) TO BE USED IN TESTING.

```
EXERCISE DISK0?  DISK1?  DISK2?  DISK3?
```

FOR THE QUESTION(S) ABOVE, TYPE Y FOR YES, IF IT IS DESIRED TO TEST THE DISK DRIVE IN QUESTION, OTHERWISE, TYPE N FOR NO.

H. THE TTY WILL PRINT THE FOLLOWING QUESTION,

ACCEPT MODE?

THE OPERATOR SHOULD THEN TYPE N FOR NO TO RUN THE MANUAL INTERVENTION MODE OF OPERATION.

I. THE TTY WILL THEN PRINT THE FOLLOWING QUESTION, ASKING IF THE OPERATOR DESIRES TO SELECT A CONSTANT MEMORY FIELD, RATHER THAN THE NORMAL RANDOM FIELD SELECTION.

FIELD?

IF THE OPERATOR DESIRES TO SELECT A CONSTANT FIELD, TYPE Y FOR YES, OTHERWISE, TYPE N FOR NO. IF Y WAS TYPED THE TTY WILL SPACE OUT ONCE AND WAIT FOR THE OPERATOR TO TYPE THE DESIRED FIELD IN OCTAL (Ø=7).

J. THE TTY WILL PRINT THE FOLLOWING QUESTION, ASKING IF THE OPERATOR DESIRES TO SELECT A CONSTANT TRACK, RATHER THAN THE NORMAL RANDOM TRACK SELECTION.

TRACK?

IF THE OPERATOR DESIRES TO SELECT A CONSTANT TRACK, TYPE Y FOR YES, OTHERWISE, N FOR NO. IF Y WAS TYPED, THE TTY WILL SPACE OUT ONCE AND WAIT FOR THE OPERATOR TO INPUT THE DESIRED TRACK ADDRESS (ØØØ=14537).

K. THE TTY WILL PRINT THE FOLLOWING QUESTION, ASKING IF THE OPERATOR DESIRES TO SELECT HALF BLOCK OR FULL BLOCK TRANSFERS, RATHER THAN THE NORMAL RANDOM SELECTION.

BLOCK LENGTH?

IF THE OPERATOR DESIRES TO CHANGE THE BLOCK LENGTH, TYPE Y FOR YES, OTHERWISE, N FOR NO. IF Y WAS TYPED THE TTY WILL SPACE OUT ONCE AND WAIT FOR THE OPERATOR TO TYPE THE BLOCK LENGTH DESIRED (Ø=256 WORD BLOCK OR 1=128 WORD BLOCK).

L. THE TTY WILL PRINT THE FOLLOWING QUESTION, ASKING IF THE OPERATOR DESIRES TO SELECT A CONSTANT NUMBER OF SECTORS TO BE TRANSFERED, RATHER THAN THE NORMAL RANDOM SECTOR SELECTION.

EXTRA SECTORS?

IF THE OPERATOR DESIRES TO SELECT A CONSTANT AMOUNT OF SECTORS, TYPE Y FOR YES, OTHERWISE, N FOR NO. IF Y WAS TYPED THE TTY WILL SPACE OUT ONCE, AND WAIT FOR THE OPERATOR TO TYPE IN THE EXTRA SECTORS DESIRED (Ø=17). (NOTE: IF THE FIELD AND THE BLOCK LENGTH PREVIOUSLY SELECTED WAS Ø, THE AMOUNT OF EXTRA SECTORS WILL BE LIMITED TO Ø7, OTHERWISE THE MAXIMUM AMOUNT IS LIMITED TO 17.)

M. IF A CONSTANT TRACK WAS NOT SELECTED, AS MENTION ABOVE, THE TTY WILL PRINT THE FOLLOWING QUESTION, ASKING IF THE OPERATOR DESIRES TO SELECT AN INCREMENT SEEK SEQUENCE, RATHER THAN THE NORMAL RANDOM SEQUENCE.

SEQUENCE?

IF THE OPERATOR DESIRES TO SELECT SEQUENCIAL SEEK SEQUENCE, TYPE Y FOR YES, OTHERWISE, N FOR NO.

N. THE TTY WILL PRINT THE FOLLOWING QUESTION, ASKING IF THE OPERATOR DESIRES TO SELECT A DATA PATTERN, RATHER THAN NORMAL RANDOM DATA SELECTION.

DATA?

IF THE OPERATOR DESIRES TO SELECT A DATA PATTERN, TYPE Y FOR YES, OTHERWISE, N FOR NO. IF Y WAS TYPED, THE TTY WILL DO A "CRLF" AND WAIT FOR THE OPERATOR TO TYPE IN 12 OCTAL DATA WORDS TO BE USED IN TESTING.

P. THE TTY WILL PRINT THE FOLLOWING QUESTION.

ARE YOU SURE?

IF THE OPERATOR IS CERTAIN OF THE INFORMATION SELECTED, TYPE Y FOR YES. TYPING N FOR NO WILL RESULT IN A REPEAT OF ALL MESSAGES AND QUESTIONS ENCOUNTERED THUS FAR.

R. THE PROGRAM SHOULD START EXECUTING THE OPERATIONS SELECTED.

S. IF ERRORS ARE ENCOUNTERED, ACCESS SECTION 5 IN THIS DOCUMENTATION.

4.5 CHANGE PROGRAM DEVICE IOT CODES

THE PROGRAM NORMALLY RECOGNIZES DEVICE IOT CODE X74X', TO CHANGE THE DEVICE IOT CODES WITHIN THE PROGRAM:

A. SET THE SWITCH REGISTER TO 0201 AND PRESS LOAD ADDRESS.

B. SET THE SWITCH REGISTER TO 0000, SET SWITCH REGISTER BITS 3-8 TO THE DESIRED DEVICE IOT CODE, AND PRESS START.

C. THE PROGRAM WILL CHANGE THE DEVICE IOT CODES WITHIN THE PROGRAM AND THEN HALT.

D. THE REGULAR TESTS CAN THEN BE RUN (SEE SECTIONS 4.3 OR 4.4)

5. ERRORS

5.1 USEFUL INFORMATION

ALL STATUS ERRORS WILL BE REPORTED AS STATUS ERRORS, ALL DATA ERRORS WILL BE REPORTED AS DISK DATA ERRORS.

WHEN DATA IS BEING READ OFF THE DISK AND A CRC ERROR OCCURRES THE PROGRAM WILL REPORT THE ERROR AS A READ STATUS ERROR, THE PROGRAM WILL THEN CHECK THE DATA READ FOR DATA ERRORS, IF DATA ERRORS EXIST THEY WILL BE REPORTED AS DISK DATA ERRORS.

5.2 ERROR HALTS

ERROR HALTS FOR WHICH THERE ARE NO ERROR TYPEOUTS ARE LISTED AND DEFINED AS FOLLOWS.

INTER1	NO DISK INTERRUPT
INTER2	UNDEFINED INTERRUPT
ERHLT2	SKIP TRAP FOR IOT "DCLR"
ERHLT3	SKIP TRAP FOR IOT "DLAG"
ERHLT4	SKIP TRAP FOR IOT "DLCA"
ERHLT5	SKIP TRAP FOR IOT "DRST"
ERHLT6	SKIP TRAP FOR IOT "DLDC"
ERHLT7	SKIP TRAP FOR IOT "DMAN"
BADHLT	CHECKSUM FAILED BUT WORD-BY-WORD COMPARE WORKED
NODSKS	NO DISKS AVAILABLE TO RUN
KHLT	PROGRAM WILL ONLY RUN IN FIELD 0

FOR THE ABSOLUTE LOCATIONS OF THE HALTS LISTED ABOVE, ACCESS PAGE 1 OF THE PROGRAM LISTING.

5.3 ERROR TYPEOUTS

WHEN AN ERROR OCCURRES THE PROGRAM WILL PRINT AN "ERROR HEADER" WHICH WILL SPECIFY THE PARTICULAR TYPE OF ERROR FOUND AT THE TIME OF THE FAILURE.

POSSIBLE "ERROR HEADERS" ARE AS FOLLOWS.

SEEK STATUS ERROR
WRITE STATUS ERROR
READ STATUS ERROR
DISK DATA ERROR
RECALIBRATE STATUS ERROR

AFTER THE "ERROR HEADER" MENTIONED ABOVE IS TYPED, THE PROGRAM WILL PRINT THE FOLLOWING ERROR INFORMATION FOUND AT THE TIME OF THE FAILURE, PERTAINING TO THE FAILURE, POSSIBLE TYPEOUTS ARE AS FOLLOWS.

PC: PROGRAM LOCATION OF THE ACTUAL FAILURE.

ST: CONTENTS OF THE STATUS REGISTER.

CM: SOFTWARE COMMAND REGISTER.

MM: ACTUAL CONTENTS OF THE COMMAND REGISTER READ IN MAINTENANCE MODE.

IA: INITIAL SOFTWARE DISK ADDRESS REGISTER OR THE CYLINDER, SURFACE, AND SECTOR BITS.

DA: FINAL SOFTWARE DISK ADDRESS REGISTER OR THE CYLINDER, SURFACE, AND SECTOR BITS.

SS: ACTUAL CONTENTS OF THE SURFACE AND SECTOR REGISTER READ IN MAINTENANCE MODE.

CA: SOFTWARE INITIAL CURRENT ADDRESS

WC: SOFTWARE INITIAL WORD COUNT

FW: SOFTWARE FINAL WORD COUNT

AS: SECTOR IN ERROR ON THE PARTICULAR CYLINDER AND SURFACE IN QUESTION.

WA: WORD ADDRESS WITHIN THE SECTOR IN ERROR

AD: BREAK ADDRESS OF DATA BREAK IN COMPUTER.

DG: EXPECTED DATA

DB: DATA FOUND DURING DATA BREAK.

5.4 ERROR RECOVERY AND ERROR DISCONNECT

WHEN A READ, WRITE, OR DISK DATA ERROR OCCURRES(SEE SECTION 5.3), THE PROGRAM WILL TRY TO REPEAT THE FAILING SEQUENCE THREE (3) TIMES. IF THE ERROR HAS OCCURRED FOUR (4) TIMES SIMULTAINIOUSLY, THE ERROR WILL BE CONSIDERED AS A NON-RECOVERABLE ERROR, THE "ERROR HEADER" WILL BE CHANGED TO INDICATE "NON-RECOVERABLE" ERROR, ANOTHER DISK ADDRESS WILL BE SELECTED FOR TESTING, AND THE CURRENT DRIVE WILL BE SENT ON A "SEEK" TO THE ADDRESS SELECTED. IF A SOFT ERROR SHOULD OCCUR ON A TRACK, THE PROGRAM WILL RETRY THE READ SEQUENCE (64) TIMES BEFORE SELECTING ANOTHER TRACK FOR TESTING.

POSSIBLE NON-RECOVERALBLE ERROR HEADERS ARE AS FOLLOWS,

```
NON-RECOVERABLE READ STATUS ERROR
NON-RECOVERABLE WRITE STATUS ERROR
NON-RECOVERABLE DISK DATA ERROR
```

IF A "SEEK" ERROR SHOULD OCCUR TO THE NEW ADDRESS, THE DISK IN QUESTION WILL THEN BE RECALIBRATED (RESTORED TO CYLINDER 0), IF THE RECALIBRATE SEQUENCE FAILS, THE DISK DRIVE IN ERROR WILL BE DISCONNECTED BY THE PROGRAM AND NO LONGER BE TESTED.

THE FOLLOWING "DISCONNECT" AND "STATUS-COMPLETE" TYPEOUTS SHOULD OCCUR.

```
RECALIBRATE ERROR DISCONNECT!
DISK X DISCONNECTED!
DSK HARD SOFT COMP
 X  2030 0010 0001
 X  2240 5670 0001
```

IF ALL DISKS ON THE SYSTEM HAVE BEEN DISCONNECTED DO TO RECALIBRATE ERRORS THE FOLLOWING TYPEOUT WILL OCCUR AND THE PROGRAM WILL HALT.

```
DISK SYSTEM SHUT DOWN, NO DISKS TO RUN!
```

5.5 STATUS-COMPLETE TYPEOUT AND PASS COMPLETE DISCONNECT

ALL ERRORS AND PASS COMPLETES ARE TALLIED BY THE PROGRAM PER DISK DRIVE.

THE FOLLOWING IS AN EXAMPLE OF THE "STATUS-COMPLETE" TYPEOUT THAT WILL OCCUR WHEN S-R3=1 INDICATING TYPE THIS REPORT, A PASS COMPLETE OCCURRES ON A DRIVE UNDER TEST, OR A DRIVE IS DISCONNECTED DO TO A RECALIBRATE ERROR.

```
DSK HARD SOFT COMP
 X  XXXX XXXX XXXX
 X  XXXX XXXX XXXX
 X  XXXX XXXX XXXX
 X  XXXX XXXX XXXX
```

THE TYPEOUT AS MENTIONED ABOVE IS DESCRIBED AS FOLLOWS,

DSK — DISK DRIVE IN QUESTION.

HARD — ALL ERRORS OTHER THAN THAT DEFINED AS A SOFT ERROR.

SOFT — A CRC STATUS ERROR WITH ONE (1) BAD DATA WORD PER READ TRANSFER.

COMP — PASS COMPLETES. <3 X 10(9) BITS>

IF SWR5=1 INDICATING "DISCONNECT ON PASS COMPLETION", AND A DISK DRIVE UNDER TEST MAKES A PASS COMPLETION, THE FOLLOWING TYPEOUT WILL OCCUR AND THE DRIVE WILL BE DISCONNECTED.

```
DISK X PASS COMPLETE!
DISK X DISCONNECTED!
DSK HARD SOFT COMP
 X  XXXX XXXX XXXX
 X  XXXX XXXX XXXX
```

IF SWR5=0 INDICATING DON'T "DISCONNECT ON PASS COMPLETION", AND A DISK DRIVE UNDER TEST MAKES A PASS COMPLETION, THE FOLLOWING TYPEOUT WILL OCCUR AND THE DRIVE WILL CONTINUE TO RUN.

```
DISK X PASS COMPLETE!
DSK HARD SOFT COMP
 X  XXXX XXXX XXXX
 X  XXXX XXXX XXXX
```

IF SWR5=1 AND ALL DRIVES HAVE MADE THEIR PASS COMPLETION AND HAVE BEEN DISCONNECTED, THE FOLLOWING TYPEOUT WILL OCCUR AND THE COMPUTER WILL HALT.

```
DISK SYSTEM SHUT DOWN, NO DISKS TO RUN!
```

5.6 TYPICAL ERROR TYPEOUTS

THE FOLLOWING IS AN EXAMPLE OF AN "ERROR HEADER" AND ERROR TYPEOUT THAT COULD HAVE OCCURRED ON A WRITE STATUS ERROR. (NOTE CRC IN THE STATUS INDICATOR "ST1")

```
WRITE STATUS ERROR
PC:2371 ST:4010 CM:4000 MM:4000 IA:0001 DA:0002
SS:0002 CA:3600 WC:7000 FW:0000
```

THE FOLLOWING IS AN EXAMPLE OF AN ERROR TYPEOUT THAT COULD HAVE OCCURRED IF THE STATUS REGISTER FAILED ON A SEEK ONLY FUNCTION.

```
SEEK STATUS ERROR
PC:2076 ST:4002 CM:3000 MM:3000 DA:4007 SS:0007
```

THE FOLLOWING IS A TYPICAL EXAMPLE OF AN "ERROR HEADER" AND ERROR TYPEOUT THAT COULD HAVE OCCURRED ON A DISK DATA ERROR. (NOTE: ADDITION DATA ERRORS IN BUFFER)

```
DISK DATA ERROR
PC:1674 ST:4210 CM:1432 MM:1432 IA:1035 DA:1021
SS:0021 CA:0001 WC:5000 FW:7400
AS:0215 WA:0007 AD:0012 DG:0537 DB:0536
AS:0215 WA:0077 AD:0100 DG:7777 DB:7776
AS:0216 WA:0002 AD:0403 DG:6167 DB:6166
```

6. RESTRICTIONS

ALL DISK DRIVES SHOULD BE SET TO THE LOAD POSITION THAT ARE NOT BEING TESTED.

7. TROUBLE SHOOTING INFORMATION

IOT	FUNCTION
6741 DSKP	"SKIP" SKIP IF TRANSFER DONE FLAG OR ERROR FLAG IS SET.
6742 DCLR	"CLEAR" FUNCTION IS REGULATED BY AC BITS 10 AND 11, THE AC IS THEN CLEARED.

AC10	AC11	
0	0	CLEAR THE AC AND STATUS REGISTER.
0	1	CLEAR THE AC, CONTROL, AND MAJOR REGISTERS. THIS INSTRUCTION WILL STOP THE CONTROL EVEN IF IT IS WRITING A HEADER. THIS IS THE ONLY INSTRUCTION THAT CLEARS MAINTENANCE MODE.
1	0	CLEAR AC, RECALIBRATE DISK DRIVE, AND CLEAR STATUS REGISTER.

6743 DLAS — "LOAD DISK ADDRESS AND GO" LOAD THE DISK CYLINDER, SURFACE, AND SECTOR FROM THE AC, CLEAR THE AC, AND DO THE COMMAND IN THE COMMAND REGISTER.

AC	
0-6	CYLINDER
7	SURFACE (1=UPPER) (0=LOWER)
8-11	SECTOR

6744 DLCA — "LOAD CURRENT ADDRESS" LOAD THE CURRENT ADDRESS FROM AC, THE AC IS THEN CLEARED.

AC	
2-11	CURRENT ADDRESS

6745 DRST — "READ STATUS" CLEAR THE AC AND READ THE CONTENTS OF THE STATUS REGISTER INTO THE AC.

```
AC
**

0                       TRANSFER DONE
1                       READY TO SEEK, READ, OR WRITE.
2                       NOT USED
3                       SEEK FAIL
4                       DISK FILE READY
5                       CONTROL BUSY ERROR
6                       TIME OUT ERROR
7                       WRITE LOCK ERROR
8                       CRC ERROR
9                       DATA RATE ERROR
10                      DRIVE STATUS ERROR
11                      CYLINDER ADDRESS ERROR

6746 DLDC               "LOAD COMMAND" LOAD THE COMMAND
                        REGISTER FROM AC, CLEAR THE AC,
                        AND CLEAR THE STATUS REGISTER.

AC
**

0+2+0                   READ DATA
0+2+1                   READ ALL
0+2+2                   WRITE LOCK
0+2+3                   SEEK ONLY
0+2+4                   WRITE DATA
0+2+5                   WRITE ALL
0+2+6                   NOT USED
0+2+7                   NOT USED
3                       ENABLE INTERRUPT
4                       ENABLE SET TRANSFER DONE ON SEEK DONE
5                       HALF BLOCK 128 WORDS
6                       EXTENDED MEMORY ADDRESS
7                       EXTENDED MEMORY ADDRESS
8                       EXTENDED MEMORY ADDRESS
9                       UNIT SELECT
10                      UNIT SELECT
11                      EXTENDED CYLINDER ADDRESS

6747 DMAN               "MAINTENANCE IOT" LOAD THE
                        MAINTENANCE REGISTER FROM THE AC. THE
                        FUNCTION IS REGULATED BY THE AC BITS.
                        MAINTENANCE MODE CAN ONLY BE CLEARED
                        BY DCLR "CLEAR CONTROL".
```

AC	
0	ENTER MAINTENANCE MODE
1	ENABLE SHIFT TO LOWER BUFFER
2	AC BIT 10, CRC REGISTER, AND THE LOWER DATA BUFFER ARE CONNECTED AS A SHIFT REGISTER, AC BIT 10 DATA SHIFTS TO THE CRC, THE CRC SHIFTS TO THE LOWER DATA BUFFER.
3	SHIFT COMMAND REGISTER TO THE LOWER DATA BUFFER.
4	SHIFT THE SURFACE AND SECTOR REGISTER TO THE LOWER DATA BUFFER.
5	SHIFT AC 10 DATA TO THE UPPER DATA BUFFER. THE UPPER BUFFER SHOULD SINK IN THE SILO WHEN FULL.
6	ONE SINGLE CYCLE BREAK REQUEST, DIRECTION IS REGULATED BY FUNCTION IN THE COMMAND REGISTER.
7	CLEAR AC THEN READ THE LOWER DATA BUFFER TO THE AC.
8	NOT USED.
9	NOT USED.
10	USED AS DATA WITH OTHER BITS IN THE MAINTENANCE MODE.
11	NOT USED

8. PROGRAM DESCRIPTION (ACCEPT MODE)

THE FOLLOWING IS BRIEF DESCRIPTION OF THE STEPS TAKEN BY THE PROGRAM WHEN RUNNING THE ACCEPT MODE.

A. ALL DISKS SELECTED ARE FIRST RECALIBRATED, THEN SENT ON AN OVERLAP SEEK TO A RANDOM TRACK, THE TRACKS SELECTED ARE SAVED BY THE PROGRAM FOR FUTURE USE.

B. A RANDOM FIELD IS GENERATED, IF FIELD GENERATED IS A NON-EXISTING FIELD, THE MAXIMUM FIELD AVAILABLE WILL BE USED.

C. A RANDOM BLOCK LENGTH IS GENERATED (128 OR 256 WORD SECTORS).

D. A RANDOM AMOUNT OF SEQUENCIAL SECTORS TO TRANSFER IS GENERATED. IF THE FIELD PREVIOUSLY SELECTED WAS AN EXTENDED FIELD OR IF HALF BLOCK TRANSFERS WERE SELECTED (128 WORD SECTORS), THE AMOUNT OF SECTORS WILL BE LIMITED TO 17(8), IF THE FIELD SELECTED WAS FIELD 0 AND IF FULL BLOCK TRANSFERS WERE SELECTED(256 WORD SECTORS), THE AMOUNT OF SECTORS WILL BE LIMITED TO 7(8).

E. A RANDOM STARTING SECTOR WILL BE GENERATED, THE RANDOM AMOUNT OF EXTRA SECTORS PREVIOUSLY GENERATED WILL BE ADDED TO THIS STARTING SECTOR, DETERMINING THE ACTUAL LENGTH OF THE DATA TRANSFER, IF THE STARTING SECTOR WAS 14 AND THE AMOUNT OF EXTRA SECTORS WAS 6, SECTORS 14, 15, 16, 17, 00, 01, AND 02 WILL BE USED FOR TRANSFERING DATA.

F. AN INITIAL SOFTWARE WORD COUNT WILL BE CALCULATED.

G. AN INITIAL RANDOM CURRENT ADDRESS WILL BE GENERATED, IF THE FIELD PREVIOUSLY GENERATED WAS FIELD 0, THE CURRENT ADDRESS WILL BE LIMITED WITHIN THE END OF THE PROGRAM +4000 LOCATIONS.

H. THE BUFFER SELECTED WILL BE FILLED WITH RANDOM DATA, CHECKSUMMED, AND THE CHECKSUM SAVED, (NOTE: BUFFER IS DEPENDENT ON FIELD, WORD COUNT, BLOCK LENGTH, AND CURRENT ADDRESS PREVIOUSLY SELECTED.)

I. THE PROGRAM WILL THEN POLE THE DISK DRIVES PREVIOUSLY SENT ON OVERLAP SEEK OPERATIONS.

J. DATA WILL BE WRITTEN ON THE FIRST DISK DRIVE TO COMPLETE THE SEEK OPERATION USING THE RANDOM PARAMETERS GENERATED ABOVE, AS DATA IS WRITTEN, A BACK GROUND PROGRAM WILL CLEAR THE BUFFER AREA ALREADY WRITTEN ON THE DISK.

K. WHEN THE WRITE AND CLEAR IS COMPLETE, DATA WILL BE READ OFF THE CURRENT DRIVE INTO THE BUFFER AREA, AS DATA IS READ, A BACK GROUND PROGRAM WILL CHECKSUM THE BUFFER INFORMATION ALREADY READ OFF THE DISK.

L. WHEN THE READ AND CHECKSUM IS COMPLETE, THE CHECKSUM FOUND WILL BE COMPARED TO THE CHECKSUM SAVED PREVIOUS TO THE WRITE OPERATION, IF CHECKSUMS DO NOT COMPARE OR IF A CRC ERROR HAS OCCURRED, A WORD BY WORD COMPARE WILL BE MADE TO DETERMINE AND TYPE OUT THE BAD DATA FOUND.

M. THE CURRENT DRIVE WILL BE SENT OUT ON AN OVERLAP SEEK OPERATION AND THE TRACK SAVED.

N. STEPS B-M WILL BE REPEATED AND THE DRIVE POLE WILL BE STARTED AT THE CURRENT DRIVE +1.

O. FOR ALL POSSIBLE ERRORS, SEE SECTION 5 IN THIS DOCUMENT.

9. PROGRAM LISTING

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                        /
                        /RK8E DATA RELIABILITY PROGRAM
                        /
                        /COPYRIGHT (C) 1972*1973, DIGITAL EQUIP. CORP., MAYNARD, MASS.
                        /
                        /ALL KNOWN HALTS
                        /
 0220  1403    ERHLT2                          /SKIP TRAP DCLR
 0221  2563    ERHLT3                          /SKIP TRAP DLAG
 0222  2555    ERHLT4                          /SKIP TRAP DLCA
 0223  2546    ERHLT5                          /SKIP TRAP DRST
 0224  2732    ERHLT6                          /SKIP TRAP DLDC
 0225  1407    ERHLT7                          /SKIP TRAP DMAN
 0226  3127    INTER1                          /NO DISK INTERRUPT
 0227  2307    INTER2                          /UNDEFINED INTERRUPT
 0210  2225    KHLT                            /PROGRAM WILL ONLY RUN IN FIELD 0
 0211  2671    NODSKS                          /NO DISKS AVAILABLE TO RUN
 0212  2236    STPHLT                          /PROGRAM STOP FROM SWR4*1
 0213  2753    CHNHLT                          /ICT CHANGE HALT
 0214  1710    BADHLT                          /COMPUTER MUST BE DOWN, CHECKSUM FAILED
                                               /BUT WORD*BY*WORD COMPARE WORKED.
                        /
       6741     DSKP=6741                       /SKIP ON TRANSFER DONE OR ERROR
       6742     DCLR=6742                       /CLEAR DISK CONTROL LOGIC
       6743     DLAG=6743                       /LOAD ADDRESS AND GO
       6744     DLCA=6744                       /LOAD CURRENT ADDRESS
       6745     DRST=6745                       /READ STATUS REGISTER
       6746     DLDC=6746                       /LOAD COMMAND REGISTER
       6747     DMAN=6747                       /LOAD MAINTENANCE
                        /
       4421     RANDAT=JMS I    XRNWRD
       4422     DISCON=JMS I    XDUMP
       4423     SPACE=JMS I     XSPAC
       4424     ONEIN=JMS I     XOCT1
       4425     FORIN=JMS I     XOCT4
       4426     SETGEN=JMS I    XSTGEN
       4427     SETFLD=JMS I    XSTFLD
       4431     YESNO=JMS I     XCHKYN
       4432     SELCHK=JMS I    XCKPOT
       4432     SEEK=JMS I      XSKOUT
       4433     RANGEN=JMS I    XRNDOM
       4435     RESRAN=JMS I    XRSRAN
       4434     DISKGO=JMS I    XDSKGO
       4436     RECAL=JMS I     XRESTR
       4437     RECEIVE=JMS I   XWAIT
       4441     ERROR=JMS I     XERRO
       4442     RDSTAT=JMS I    XRDST
       4446     LOADD=JMS I     XLDAD
       4443     DSKSKP=JMS I    XSDKP
       4444     LDCMD=JMS I     XLDCM
       4445     LDCUR=JMS I     XLDCA
       4453     CLRALL=JMS I    XCLDR
       4447     LDMAN=JMS I     XLDMN
       4451     PRNTER=JMS I    XPRN
```



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       4452     DCTEL=JMS I     XFRDCT
       4443     TYPE=JMS I      XPRINT
       4453     CRLF=JMS I      XCRLF
       4420     GENDAT=JMS I    XGNDAT
                        /
       0000     *0
                        /
 0000  0000             0                       /INTERRUPT SERVICE RETURN
 0001  5001             5001                    /DCA SAVAC  SAVE AC AT INT.
 0002  0002             0002                    /RAL  SHIFT LINK AT TIME OF INT.
 0003  0003             0003                    /DCA SVLNK  SAVE LINK AT TIME OF INT.
 0004  0004             0004                    /JMP I 0   RETURN TO INT. SERVICE
 0005  0005             0005                    /RETURN POINTER
                        /
       0010     *10
                        /
 0010  0000     AUTO10, 0
                        /
 0011  0000     AUTO11, 0
                        /
 0012  0000     AUTO12, 0
                        /
                        /
 0013  0020     K0020,  0020
 0014  0043     K0042,  0042
 0015  0100     K0100,  0100
 0016  0200     K0200,  0200
                        /
       0020     *20
                        /
 0020  1741     XGNDAT, GNDAT
 0021  2600     XRNWRD, RNWRD
 0022  2627     XDUMP,  DUMP
 0023  1554     XSPAC,  SPAC
 0024  2403     XOCT1,  OCT1
 0025  2430     XOCT4,  OCT4
 0026  1755     XSTGEN, STGEN
 0027  2673     XSTFLD, STFLD
 0030  2150     XCKPOT, CHKPOT
 0031  2127     XCHKYN, CHKYN
 0032  2033     XSKOUT, SEKOUT
 0033  1737     XRNDOM, RNDOM
 0034  2202     XDSKGO, DSKGO
 0035  1763     XRSRAN, RSRAN
 0036  3047     XRESTR, RESTOR
 0037  2112     XWAIT,  WAIT
 0040  2622     XPRINT, PRINT
 0041  1223     XERRO,  ERRO
 0042  2543     XRDST,  RDST
 0043  2723     XSDKP,  SDKP
 0044  2725     XLDCM,  LDCM
 0045  2552     XLDCA,  LDCA
 0046  2556     XLDAD,  LDAD
 0047  1404     XLDMN,  LDMN
 0050  1402     XCLDR,  CLDR
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0051  1516    XPRN,   PRN
0052  1474    XFROCT, FROCT
0053  1462    XCRLF,  CRLF
0054  2103    XGETAC, GETAC
0055  0000    AMOUNT, 0
0056  0003    K0003,  0003
0057  0004    K0004,  0004
0060  0006    K0006,  0006
0061  0007    K0007,  0007
0062  0010    K0010,  0010
0063  0017    K0017,  0017
0064  0070    K0070,  0070
0065  0260    K0260,  0260
0066  0240    K0240,  0240
0067  0316    K0316,  0316
0070  0331    K0331,  0331
0071  0277    K0277,  0277
0072  0400    K0400,  0400
0073  4000    K4000,  4000
0074  1000    K1000,  1000
0075  1777    K1777,  1777
0076  2000    K2000,  2000
0077  3000    K3000,  3000
0100  6000    K6000,  6000
0101  7700    K7700,  7700
0102  7760    K7760,  7760
0103  7761    K7761,  7761
0104  0077    K0077,  0077
0105  6201    KCDF,   CDF
0106  7400    K7400,  7400
              /
              DECIMAL
              /
0107  7764    M12,    -12
              /
              OCTAL
              /
0110  7774    M4,     -4
0111  7773    M5,     -5
              /
0112  0000    TRASH1, 0
0113  0000    TRASH2, 0
0114  0000    TRASH3, 0
0115  0000    UPDATE, 0
0116  0000    POLDSK, 0
0117  0000    OPRTAL, 0
0120  0007    BUFTAL, 7
0121  0000    PCREG,  0
0122  0000    STREG,  0
0123  0000    CMREG,  0
0124  0000    MMREG,  0
0125  0000    INTDA,  0
0126  0000    DAREG,  0
0127  0000    SSREG,  0
0130  0000    CAREG,  0
```



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0131  0000    WCREG,  0
0132  0000    FWREG,  0
0133  0000    ASREG,  0
0134  0000    WAREG,  0
0135  0000    ADREG,  0
0136  0000    DCREG,  0
0137  0000    DBREG,  0
0140  0000    INTCH,  0
0141  0000    STATRY, 0
0142  0000    DATTRY, 0
0143  0000    CHKSAV, 0
0144  0000    FNDSUM, 0
0145  0000    MAXFLD, 0
0146  7607    MAXTIM, 7607
0147  3240    MAXTRK, 3240
0150  3600    BGNBUF, STRBUF
0151  0000    CONSEC, 0
              /
0152  3563    DATPOT, DAT1
0153  3522    TIMPOT, DBTM1
0154  3527    STAPOT, DBHRD-3
0155  3553    DSKPOT, DSK0A
0156  3557    RUNPOT, DSK00
              /
0157  0000    CRCFLG, 0
0160  0000    DATFLG, 0
0161  0000    SPFLD,  0
0162  0000    SPTRK1, 0
0163  0000    SPTRK2, 0
0164  0000    SPSEC,  0
0165  0000    SPBLK,  0
0166  0000    ERFLG,  0
0167  0000    SEKSW,  0
0170  0000    SAVAC,  0
0171  0000    SVLNK,  0
0172  0000    RELOAD, 0
0173  0000    FIRTIM, 0
0174  0000    CLRBAK, 0
              /
      0200    .=200
              /
0200  5203    BGN,    JMP     .+3                     /TO REGULAR TEST
0201  5777'           JMP     CHANG                   /CHANGE IOT ROUTINE
0202  5776'           JMP     STRSTP                  /RESTART
0203  6224            RIF
0204  7440            SZA
0205  7402    KHLT,   HLT                             /FIELD 0????
0206  1105            TAD     KCDF                    /WILL ONLY RUN IN FIELD 0????
0207  3210            DCA     .+1
0210  7402            HLT                             /MAKE DF=IF
0211  1365            TAD     ADDCA
0212  3001            DCA     1                       /SETUP AC DCA
0213  1246            TAD     KROT
0214  3002            DCA     2                       /SETUP ROTATE LINK
0215  1364            TAD     LNKDCA
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0216  3003            DCA     3               /SETUP SAVE LINK
0217  1363            TAD     K5405
0220  3004            DCA     4               /SETUP JMP RETURN
0221  1366            TAD     BRKRET
0222  3005            DCA     5               /RETURN POINTER
                /
0223  1101    STRTEX, TAD     K7720
0224  3112            DCA     TRASH1          /CLEAR COUNTER
0225  1775/           TAD     RANJMS
0226  3774/           DCA     SWDAT           /SET INSTRUCTION SWITCH
0227  7340            CLA CLL CMA
0230  1153            TAD     TIMPOT
0231  3210            DCA     AUTO10          /LOCATION POINTER
0232  3410            DCA I   AUTO10          /CLEAR
0233  2112            ISZ     TRASH1
0234  5232            JMP     .-2             /MORE TO CLEAR
0235  3160            DCA     DATFLG
                /
0236  4453            CRLF
0237  4451            PRNTER                  /PRINT "RK8E DATA RELIABILITY"
0240  3310            MES1
0241  4451            PRNTER                  /PRINT "AMOUNT OF MEMORY"
0242  3344            MES5
0243  4424            ONEIN                   /RECEIVE ONE OCTAL
0244  0070            0070                    /LIMITS
0245  5241            JMP     .-4             /INPUT ERROR
0246  7004    KROT,   RAL
0247  7026            RTL
0250  7040            CMA
0251  3145            DCA     MAXFLD          /COMPLEMENT
0252  4451    ALLAGN, PRNTER                  /MAXIMUM FIELD POINTER
0253  3323            MES2                    /PRINT "EXERCISE"
0254  3112            DCA     TRASH1
0255  1110            TAD     M4
0256  3113            DCA     TRASH2
0257  3055            DCA     AMOUNT          /A FEW POINTERS
0260  1112    NEXT,   TAD     TRASH1
0261  1156            TAD     RUNPOT
0262  3114            DCA     TRASH3          /SAVE RUN POINTER
0263  7340            CLA CLL CMA
0264  4451            PRNTER                  /PRINT " DISK#"
0265  3332            MES3
0266  1265            TAD     K0260
0267  1112            TAD     TRASH1          /ADD IN DISK NUMBER
0270  4447            TYPE                    /TYPE DISK NUMBER
0271  1271            TAD     K0277
0272  4443            TYPE                    /TYPE ?
0273  4437            RECEIV                  /RECEIVE KEY INPUT
0274  4431            YESNO                   /WAS IT YES OR NO
0275  5252            JMP     ALLAGN          /NEITHER
0276  5301            JMP     .+3             /WAS A NO
0277  2055            ISZ     AMOUNT          /AMOUNT OF DISK FOUND
0300  7340            CLA CLL CMA             /AC TO 7777 FOR EXISTING DISK
0301  3114            DCA I   TRASH3          /SETUP RUN POINTER
0302  2112            ISZ     TRASH1
```



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0303  2113            ISZ     TRASH2
0304  5260            JMP     NEXT            /ASK ABOUT NEXT DISK
                /
0305  1055            TAD     AMOUNT          /GET AMOUNT FOUND
0306  7650            SNA CLA                 /ARE ANY FOUND
0307  5223            JMP     STRTEX          /OPERATOR ERROR NO DISK INPUT
0310  4451            PRNTER                  /PRINT "ACCEPT MODE?"
0311  3366            MES6
0312  4437            RECEIV                  /RECEIVE INPUT
0313  4431            YESNO                   /YES OR NO????
0314  5310            JMP     .+4             /NEITHER ALL AGAIN
0315  7610            SKP CLA                 /MANUAL TEST
0316  5773/           JMP     ASKSUR          /ASK "ARE YOU SURE"
                /
0317  4451    MANUAL, PRNTER                  /PRINT "FIELD?"
0320  3407            MES8
0321  4437            RECEIV                  /RECEIVE Y OR N
0322  4431            YESNO                   /CHECK FOR Y OR N
0323  5317            JMP     MANUAL          /NEITHER Y OR N
0324  5342            JMP     ASKNX1          /WAS A N, ASK ABOUT NEXT
0325  4423            SPACE                   /SPACE OUT ONE
0326  4424            ONEIN                   /GET 1 OCTAL
0327  0070            0070                    /LIMITS
0330  5317            JMP     MANUAL          /INPUT ERROR ASK AGAIN
0331  7004            CLL RAL
0332  7006            RTL
0333  3161            DCA     SPFLD           /SAVE INPUT
0334  1161            TAD     SPFLD
0335  1145            TAD     MAXFLD          /COMPARE TO MAXIMUM
0336  7700            SMA CLA                 /0,X,?
0337  5317            JMP     MANUAL          /INPUT ERROR
0340  7340            CLA CLL CMA
0341  3772/           DCA     FLDFLG          /SETUP FIELD FLAG
                /
0342  4451    ASKNX1, PRNTER                  /PRINT "TRACK?"
0343  3413            MES9
0344  4437            RECEIV                  /RECEIVE Y OR N
0345  4431            YESNO                   /CHECK FOR Y OR N
0346  5342            JMP     ASKNX1          /ERROR, ASK AGAIN
0347  5771/           JMP     ASKNX2          /N, ASK ABOUT NEXT
0350  4423            SPACE
0351  4424            ONEIN                   /RECEIVE 1 IN OCTAL
0352  0010            0010                    /LIMITS
0353  5342            JMP     ASKNX1          /ERROR, ASK AGAIN
0354  3162            DCA     SPTRK1          /SAVE EXTENDED TRACK BIT
0355  4425            FORIN                   /RECEIVE FOUR IN OCTAL
0356  5342            JMP     ASKNX1          /ERROR, ASK AGAIN
0357  3163            DCA     SPTRK2          /SAVE CYL., SURFACE, AND SECTOR
0360  7340            CLA CLL CMA
0361  3773/           DCA     TRKFLG          /SETUP TRACK FLAG
0362  5771/           JMP     ASKNX2          /ASK ABOUT NEXT
                /
0363  5405    K5405,  5405
0364  3171    LNKDCA, DCA     SVLNK
0365  3170    ACDCA,  DCA     SAVAC
```

```
0366  2300    BRKRET, RETURN
              /
0370  3547
0371  7400
0372  3546
0373  3520
0374  2601
0375  0554
0376  2003
0377  2733
      0400    PAGE
              /
0400  4451    ASKNX2, PRNTER                          /PRINT "BLOCK LENGTH?"
0401  3427            MES11
0402  4437            RECEIV                          /RECEIVE INPUT
0403  4431            YESNO                           /CHECK FOR Y OR N
0404  5200            JMP     ASKNX2                  /ERROR, ASK AGAIN
0405  5217            JMP     ASKNX3                  /N, ASK ABOUT NEXT
0406  4423            SPACE                           /Y, SPACE OUT 1
0407  4424            ONEIN                           /RECEIVE 1 IN OCTAL
0410  0010            0010                            /LIMITS
0411  5200            JMP     ASKNX2                  /ERROR, ASK AGAIN
0412  7640            SZA CLA                         /SET HALF BLOCK?
0413  7340            CLA CLL CMA                     /YES
0414  3165            DCA     SPBLK                   /SETUP BLOCK NUMBER
0415  7340            CLA CLL CMA
0416  3777'           DCA     HLFFLG                  /SETUP BLOCK FLAG
              /
0417  4451    ASKNX3, PRNTER                          /PRINT "EXTRA SECTORS?
0420  3417            MES10
0421  4437            RECEIV                          /RECEIVE INPUT
0422  4431            YESNO                           /CHECK FOR Y OR N
0423  5217            JMP     ASKNX3                  /INPUT ERROR
0424  5256            JMP     ASKNX4                  /N, ASK ABOUT NEXT
0425  4423            SPACE                           /SPACE OUT 1
0426  4424            ONEIN                           /RECEIVE 1 IN OCTAL
0427  0010            0010                            /LIMITS
0430  5217            JMP     ASKNX3                  /ERROR, ASK AGAIN
0431  7104            CLL RAL
0432  7006            RTL
0433  3164            DCA     SPSEC                   /SAVE IT
0434  4424            ONEIN                           /RECEIVE 1 IN OCTAL
0435  0070            0070                            /LIMITS
0436  5217            JMP     ASKNX3                  /INPUT ERROR, ASK AGAIN
0437  1164            TAD     SPSEC                   /ADD IN LAST
0440  3164            DCA     SPSEC                   /SAVE ALL
0441  1165            TAD     SPBLK
0442  7640            SZA CLA                         /BLOCK LENGTH 0????
0443  5246            JMP     .+3                     /NO LIMIT IS 17.
0444  1161            TAD     SPFLD
0445  7640            SZA CLA                         /FIELD 0?????
0446  1062            TAD     K0010                   /LIMIT IS 17.
0447  1061            TAD     K0007
0450  7140            CLL CMA
0451  1164            TAD     SPSEC                   /COMPARE SECTOR INPUT!
```



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0452  7630            SZL CLA                         /IN LIMITS???
0453  5217            JMP     ASKNX3                  /NO, INPUT ERROR
0454  7340            CLA CLL CMA
0455  3776'           DCA     SECFLG                  /SETUP SECTOR FLAG
              /
0456  1776'   /ASKNX4, TAD     TRKFLG                  /GET TRACK FLAG
0457  7640            SZA CLA                         /ARE IT SET?
0460  5271            JMP     ASKNX5                  /NO, ASK ABOUT SEQUENCE
0461  4451            PRNTER                          /PRINT " SEQUENCE?"
0462  3436            MES12
0463  4437            RECEIV                          /RECEIVE INPUT
0464  4431            YESNO                           /Y OR N
0465  5256            JMP     ASKNX4                  /ERROR, ASK AGAIN
0466  5271            JMP     ASKNX5                  /N, ASK ABOUT NEXT
0467  7340            CLA CLL CMA
0470  3774'           DCA     SEQFLG                  /SETUP SEQUENCE FLAG
              /
0471  4451    ASKNX5, PRNTER                          /PRINT "DATA?"
0472  3443            MES13
0473  1354            TAD     RANJMS
0474  3773'           DCA     SWDAT                   /SET INSTRUCTION SWITCH
0475  4437            RECEIV                          /RECEIVE INPUT
0476  4431            YESNO                           /Y OR N
0477  5271            JMP     ASKNX5                  /ERROR, ASK AGAIN
0500  5320            JMP     ASKSUR                  /ASK "ARE YOU SURE"
0501  1340            TAD     KSKP
0502  3773'           DCA     SWDAT                   /SET INSTRUCTION SWITCH
0503  1107            TAD     K22
0504  3112            DCA     TRASH1                  /SETUP WORD COUNTER
0505  7340            CLA CLL CMA
0506  1152            TAD     DATPOT                  /GET POT POINTER
0507  3010            DCA     AUTO10
0510  4453            CRLF
0511  4425            FORIN                           /RECEIVE 4 IN OCTAL
0512  5271            JMP     ASKNX5                  /INPUT ERROR, ASK AGAIN
0513  3410            DCA I   AUTO10                  /SAVE DATA
0514  2112            ISZ     TRASH1                  /UPDATE COUNTER
0515  5313            JMP     .-5                     /GET NEXT
0516  7340            CLA CLL CMA
0517  3160            DCA     DATFLG                  /SETUP DATA FLAG
0520  4451    ASKSUR, PRNTER                          /PRINT "ARE YOU SURE"
0521  3446            MES14
0522  4437            RECEIV                          /GET INPUT
0523  4431            YESNO                           /Y OR N
0524  5320            JMP     ASKSUR                  /INPUT ERROR
0525  5772'           JMP     STRTEX                  /ALL AGAIN
              /
              /
              /SEND EXISTING DRIVES TO A RANDOM TRACK
              /AND SAVE THE TRACK ADDRESS
              /
0526  3112    STRSEK, DCA     TRASH1
0527  1755            TAD     AMOUNT
0530  7041            CIA
0531  3113            DCA     TRASH2                  /SOME POINTERS
```

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0532  1112  /XTSEK, TAD     TRASH1
0533  7431          SELCHK
0534  5352          JMP     NTSEK           /CHECK RUN POINTER
0535  1112  RESET,  TAD     TRASH1          /WAS A ZERO DON'T RUN
0536  7104          CLL RAL
0537  4436          RECAL                   /RECALIBRATE DRIVE
0540  7610  KSKP,   SKP CLA                 /RECALIBRATE IS O.K.
0541  5347          JMP     NTSEK +3        /DUMPED BUT MORE AVAILABLE
0542  1112          TAD     TRASH1
0543  7104          CLL RAL
0544  4432          SEEK                    /SEEK ONLY A RANDOM TRACK
0545  7610          SKP CLA
0546  5335          JMP     RESET           /ERROR, TRY TO RECALIBRATE
0547  2113          ISZ     TRASH2          /UPDATE POINTER
0550  7610          SKP CLA
0551  5771          JMP     RUN             /MORE TO SEND OUT
0552  2112  NTSEK,  ISZ     TRASH1          /START RANDOM DATA
0553  5332          JMP     NXTSEK          /SEND OUT NEXT EXISTING DISK
              /
0554  4420  RANJMS, GENDAT
              /
0571  0600
0572  0223
0573  2601
0574  3552
0575  3547
0576  3553
0577  3551
      0600  PAGE
              /
              /RUNNER FOR RANDOM DATA
              /
0600  3166  RUN,    DCA     ERFLG           /CLEAR ERROR POINTER
0601  7604          LAS
0602  0014          AND     K0040           /MASK SWITCH 6
0603  3167          DCA     SEKSW           /LATCH
0604  1167          TAD     SEKSW
0605  7640          SZA CLA                 /SEEK ONLY SET????
0606  5777          JMP     POLNEX          /YES, SEEK ONLY
0607  1776          TAD     FLDFLG          /GET FIELD FLAG
0610  7650          SNA CLA                 /WAS IT SET?
0611  5214          JMP     .+3             /NO, USE RANDOM FIELD
0612  1161          TAD     SPFLD           /YES, GET OPERATOR FIELD
0613  5233          JMP     RNFLD           /GO
0614  7301          CLA CLL IAC
0615  1145          TAD     MAXFLD          /GET MAXIMUM FIELD POINTER
0616  7650          SNA CLA                 /ANY FIELDS THERE
0617  5233          JMP     RNFLD           /NO EXTENDED FIELDS TO USE
0620  4433          RANGEN                  /YES, GET A RANDOM FIELD
0621  0064          AND     K0077           /MASK
0622  7450          SNA
0623  5233          JMP     RNFLD           /COULD BE 0
0624  3140          DCA     INTCM           /WAS DON'T HAVE TO CHECK LIMITS
0625  1140          TAD     INTCM           /SAVE FIELD FOUND
0626  1145          TAD     MAXFLD          /ADD IN MAXIMUM FIELD POINTER
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0627  7710          SPA CLA
0630  5234          JMP     RNFLD +1        /IN LIMITS????
0631  1145          TAD     MAXFLD          /YES, USE IT
0632  7040          CMA                     /NO, USE MAXIMUM IN THE MACHINE
0633  3140  RNFLD,  DCA     INTCM
0634  1775          TAD     MLFFLG          /GET BLOCK FLAG
0635  7650          SNA CLA                 /WAS IT SET????
0636  4433          RANGEN                  /NO, USE RANDOM
0637  1165          TAD     SPBLK
0640  0015          AND     K0130           /MASK
0641  1140          TAD     INTCM
0642  3140          DCA     INTCM           /INITIAL HALF BLOCK BIT ****
0643  1140          TAD     INTCM
0644  0015          AND     K0100           /MASK
0645  7640          SZA CLA                 /HALF BLOCK SET????
0646  1016          TAD     K0200           /YES, SETUP WC POINTER
0647  1176          TAD     K7402
0650  3113          DCA     TRASH2          /WC BUILDER
0651  1113          TAD     TRASH2
0652  7041          CIA
0653  3115          DCA     UPDATE          /UPDATER FOR FWREG
0654  1140          TAD     INTCM
0655  0360          AND     A0170           /MASK FIELD BITS
0656  7640          SZA CLA                 /WERE THERE ANY
0657  1062          TAD     K0210           /YES
0660  1061          TAD     K0007           /MAKE MAXIMUM SECTOR POINTER
0661  3112          DCA     TRASH1          /SAVE IT
0662  1774          TAD     SECFLG          /GET SECTOR FLAG
0663  7650          SNA CLA                 /WAS IT SET????
0664  4433          RANGEN                  /USE RANDOM
0665  1164          TAD     SPSEC           /GET OPERATOR INPUT
0666  0112          AND     TRASH1          /MASK OUT
0667  3151          DCA     CONSEC          /SAVE
0670  1151          TAD     CONSEC
0671  7040          CMA
0672  3112          DCA     TRASH1          /CONSECUTIVE TO DO
0673  1773          TAD     TRKFLG          /GET TRACK FLAG
0674  7650          SNA CLA                 /WAS IT SET????
0675  4433          RANGEN                  /USE RANDOM
0676  1163          TAD     SPTRK2          /GET INPUT
0677  0063          AND     K0017           /MASK
0700  3114          DCA     TRASH3          /STARTING SECTOR
0701  1113          TAD     TRASH2          /COMPUTE INITIAL WC
0702  2112          ISZ     TRASH1
0703  5301          JMP     .+2             /UPDATE BY BUILDER
0704  3131          DCA     WCREG           /INITIAL WORD COUNT ****
0705  4433          RANGEN                  /GENERATE RANDOM CA
0706  3130          DCA     CAREG           /SAVE IT
0707  1140          TAD     INTCM
0710  0004          AND     K0070           /MASK FIELD BITS
0711  7640          SZA CLA                 /EXTENDED FIELD????
0712  5330          JMP     FILLER          /INITIAL CA O.K.****
0713  1153          TAD     BGNBUF
0714  7140          CMA CLL
0715  1130          TAD     CAREG
```

```
 0716  7600          CLA CLL
 0717  1336          JMS     I R                     /GET NEXT TALLY VALUE
 0720  1131          TAD     .-OREG                  /GET WORD COUNT
 0721  7041          CIA
 0722  1130          TAD     CAREG                   /ADD IN CA
 0723  1016          TAD     K0200
 0724  7630          SZL CLA                         /WITHIN BOUNDS????
 0725  5330          JMP     FILLER                  /YES, INITIAL CA O.K.****
 0726  1150  CONCUR, TAD     BGNBUF                  /NO, USE PROGRAM +1
 0727  3130          DCA     CAREG                   /SAVE IT
                     /
                     /ROUTINE TO FILL AND CHECK SUM BUFFER
                     /
 0730  4426  FILLER, SETGEN                          /SETUP AND SAVE GENERATER
 0731  1110          TAD     M4
 0732  3141          DCA     STATRY                  /SETUP TRY COUNTER
 0733  4427  REFILL, SETFLD                          /FIELD + BUFTAL + AUTO 11 + 12
 0734  3335          DCA     .+1                     /FIELD TO BUFFER IN AC
 0735  7402          HLT                             /CDF TO BUFFER
 0736  3143          DCA     CHKSAV                  /START WITH 0
 0737  4421  NEWRD,  RANDAY                          /GENERATE DATA
 0740  3112          DCA     TRASH1                  /SAVE OUTPUT WORD
 0741  1112          TAD     TRASH1                  /GET BACK WORD
 0742  3411          DCA I   AUTO11                  /STORE IN BUFFER
 0743  7100          CLL
 0744  1112          TAD     TRASH1                  /GET BACK WORD
 0745  1143          TAD     CHKSAV                  /ADD IN LAST
 0746  7430          SZL                             /LINK SET?
 0747  7001          IAC                             /ADD IT IN
 0750  3143          DCA     CHKSAV                  /SAVE FOR NEXT
 0751  2120          ISZ     BUFTAL                  /UPDATE BUFFER TALLY
 0752  5337          JMP     NEWRD                   /MORE WORDS TO GO
 0753  6201          CDF     0
 0754  1166          TAD     ERFLG
 0755  7650          SNA CLA                         /ERROR FLAG SET????
 0756  5777'         JMP     POLNEX                  /POLE DRIVES
 0757  5772'         JMP     REWRT                   /YES, MUST BE A WRITE ERROR
                     /
 0760  2170  A0170,  3170
                     /
 0772  1255
 0773  3547
 0774  3550
 0775  3551
 0776  3546
 0777  1000
       1000          PAGE
                     /
                     /ROUTINE TO POLE DRIVES
                     /
 1000  2116  POLNEX, ISZ     POLDSK                  /UPDATE POLE POINTER
 1001  7000          NOP
 1002  1116  SAMPOL, TAD     POLDSK                  /GET POINTER
 1003  4432          SELCHK                          /CHECK RUN POINTER
 1004  5200          JMP     POLNEX                  /TRY NEXT DRIVE
```



```
 1005  1116          TAD     POLDSK                  /GET POINTER
 1006  0003          AND     K0003                   /MASK
 1007  7104          CLL RAL                         /MAKE FILE # BITS
 1010  4444          LCMD                            /SET UNIBUS MAP REGISTER
 1011  4442          RDSTAT                          /READ STATUS REGISTER
 1012  1100          TAD     K6000
 1013  7450          SNA                             /WAS DRIVE BUSY
 1014  5200          JMP     POLNEX                  /YES, TRY NEXT DRIVE
 1015  1076          TAD     K2000                   /NO, THEN IT MUST BE DONE
 1016  7650          SNA CLA                         /WAS IT DONE ?
 1017  5236          JMP     GOTIT                   /YES, DONE
 1020  3157          DCA     CRCFLG                  /CLEAR CRC ERROR POINTER
 1021  4441          ERROR                           /ERROR ON DRIVE POLE
 1022  0003          0003                            /HEADER POINTER
 1023  7340          7340                            /MESSAGE POINTER
 1024  1116  BDREC,  TAD     POLDSK                  /LAST DRIVE USED
 1025  7104          CLL RAL
 1026  4436          RECAL                           /RECALIBRATE DISK
 1027  7610          SKP CLA                         /RECALIBRATE O.K.
 1030  5200          JMP     POLNEX                  /DUMPED, BUT MORE AVAILABLE
 1031  1116          TAD     POLDSK                  /GET DISK NO.
 1032  7104          CLL RAL
 1033  4432          SEEK                            /SEEK A RANDOM TRACK
 1034  5222          JMP     POLNEX                  /ENTER POLE DISKS
 1035  5224          JMP     BDREC                   /ERROR, RECALIBRATE
                     /
 1036  1116  GOTIT,  TAD     POLDSK                  /GET POINTER
 1037  0038          AND     K0003                   /MASK
 1040  1155          TAD     DSKPOT                  /GET DISK ADDRESS POINTER
 1041  3112          DCA     TRASH1
 1042  1512          TAD I   TRASH1                  /GET DISK ADDRESS
 1043  0061          AND     K0007                   /MASK DRIVE + EXTENDED BIT
 1044  1140          TAD     INTCM                   /ADD IN COMMAND
 1045  3142          DCA     INTCM                   /DRIVE NUMBER + EXTENDED BIT ***
 1046  1167          TAD     SEKSW                   /GET SEEK SWITCH LATCH
 1047  7640          SZA CLA                         /LOOP ON SEEK ONLYS????
 1050  5350          JMP     RESEEK                  /YES!!!!
 1051  1512          TAD I   TRASH1                  /GET DISK ADDRESS
 1052  0132          AND     K7760                   /MASK OFF TRACK
 1053  1114          TAD     TRASH3                  /ADD IN STARTING SECTOR
 1054  3125          DCA     INTDA                   /INITIAL DISK ADDRESS ****
 1055  3157  REWRT,  DCA     CRCFLG                  /CLEAR CRC CLAG
 1056  4434          DISKGO                          /GO WRITE
 1057  4400          4400                            /WRITE DATA POINTER
 1060  5272          JMP     GOREAD                  /WRITE O.K.
 1061  7340          CLA CLL CMA
 1062  3166          DCA     ERFLG                   /SET WRITE ERROR FLAG
 1063  4435          RESRAN                          /RESET GENERATOR
 1064  2141          ISZ     STATRY                  /UPDATE WRITE RE-TRY
 1065  5777'         JMP     REFILL                  /TRY AGAIN
 1066  7604          LAS                             /GET SWITCH 0
 1067  7720  TRYTIM, SMA CLA                         /LOOP ON WRITE????
 1070  5350          JMP     RESEEK                  /NO, TRY TO SEEK IT
 1071  5776'         JMP     REFILL -2               /TRY WRITE AGAIN
 1072  7604  GOREAD, LAS                     /GET SWITCH 0
```

```
1093  7777          CMA CLA                         /LOOP SWITCH SET????
1094  5113          JMP     .-1                     /NO
1095  7041          CLA CLL CMA
1096  3166          DCA     ERFLG                   /SET ERROR FLAG
1097  4435          RESRAN                          /RESET DATA GENERATOR
1100  5776'         JMP     REFILL +2
1101  1267  REREAD, TAD     TRYTIM
1102  3366          DCA     TRYCNT                  /SETUP FOR SOFT ERROR RETRY
1103  3166          DCA     ERFLG                   /CLEAR ERROR FLAG
1104  1110          TAD     M4
1105  3141          DCA     STATRY                  /SETUP TRY COUNTER
1106  1110          TAD     M4
1107  3142          DCA     DATTRY                  /SETUP TRY COUNTER
1110  3157  RDTRY,  DCA     CRCFLG                  /CLEAR CRC FLAG
1111  4434          DISKGO                          /READ DATA
1112  0400          0400                            /READ DATA POINTER
1113  7610          SKP CLA                         /DATA READ O.K.
1114  5322          JMP     RDSTA                   /STATUS ERROR
1115  4775'         JMS     DTCHK                   /CHECK DATA
1116  5336          JMP     SEKGO                   /DATA O.K.
1117  2142          ISZ     DATTRY                  /UPDATE READ RE-TRY
1120  5310          JMP     RDTRY                   /TRY AGAIN
1121  5335          JMP     SEKGO +1                /TRY TO SEEK IT
1122  1122  RDSTA,  TAD     STREG                   /GET STATUS READ
1123  0062          AND     K0010                   /MASK CRC
1124  7450          SNA                             /CRC ERROR????
1125  5332          JMP     UPTRY +1                /NO, TRY READ AGAIN
1126  3157          DCA     CRCFLG                  /CLEAR CRC FLAG
1127  4775'         JMS     DTCHK                   /CHECK DATA
1130  7617          SKP CLA                         /IS A HARD ERROR?
1131  7341          CLA CLL CMA
1132  3166          DCA     ERFLG                   /SETUP FOR 64 RETRYS
1133  2141  UPTRY,  ISZ     STATRY                  /UPDATE TRY POINTER
1134  5310          JMP     RDTRY                   /TRY AGAIN
1135  3166          DCA     ERFLG                   /IS A HARD ERROR
1136  4774'  SEKGO,  JMS     CKTIM                   /CHECK TIME POINTERS
1137  1166          TAD     ERFLG
1140  7650          SNA CLA                         /IS IT 64 RETRYS FOR SOFT ERROR?
1141  5344          JMP     .+3                     /NO DON'T BOTHER
1142  2366          ISZ     TRYCNT                  /YES, UPDATE RETRY COUNTER
1143  5304          JMP     REREAD +3               /TRY AGAIN
1144  7604          LAS                             /GET SWITCH 1
1145  7104          CLL RAL
1146  7710          SPA CLA                         /LOOP????
1147  5301          JMP     REREAD                  /YES, LOOP
1150  3166  RESEEK, DCA     ERFLG                   /CLEAR ERROR FLAG
1151  7604          LAS
1152  0072          AND     K0400                   /MASK
1153  7650          SNA CLA                         /TYPE STATUS REPORT????
1154  5357          JMP     .+3                     /NO
1155  4453          CRLF
1156  4773'         JMS     TPSTA                   /YES
1157  1123          TAD     CMREG                   /GET  DRIVE NUMBER
1160  4432          SEEK                            /SEEK A RANDOM TRACK
1161  5772'         JMP     RUN                     /DO NEXT DRIVE
```



```
1162  1123          TAD     CMREG
1163  4436          RECAL                           /RECALIBRATE DRIVE
1164  5357          JMP     .+3                     /TRY, SEEK AGAIN
1165  5772'         JMP     RUN                     /DUMPED, BUT MORE AVAILABLE
                    /
1166  0000  TRYCNT, 0
                    /
1172  0000
1173  3000
1174  2450
1175  1000
1176  0731
1177  3733
      1200          PAGE
                    /
                    /SUBROUTINE FOR ERROR TYPEOUTS.
                    /
1200  0000  ERRO,   0
1201  7001          IAC                             /UPDATE AC FLAG
1202  3364          DCA     PCNTR2                  /SAVE AC FLAG
1203  1356          TAD     K7771
1204  3363          DCA     PCNTR3                  /LINE COUNTER
1205  1123          TAD     CMREG                   /GET LAST COMMAND
1206  0060          AND     K0006                   /MASK DRIVE NUMBER
1207  7270          CLL CML CMA RAR
1210  3363          DCA     PCNTR1                  /SETUP COUNTER
1211  1056          TAD     K0003
1212  2363          ISZ     PCNTR1
1213  5211          JMP     .-2                     /COMPUTE WAY TO BUFFER
1214  1154          TAD     STAPOT
1215  3363          DCA     PCNTR1                  /POINTER TO BUFFER
1216  1157          TAD     CRCFLG                  /GET CRC FLAG
1217  7650          SNA CLA                         /CRC ERROR????
1220  5232          JMP     NOCRC                   /NO WAY
1221  3157          DCA     CRCFLG                  /CLEAR CRC ERROR POINTER
1222  7001          IAC
1223  1141          TAD     STATRY
1224  7650          SNA CLA                         /LAST TIME CRC????
1225  5236          JMP     NONCRC                  /YES!!!!
1226  7340          CLA CLL CMA
1227  1763          TAD I   PCNTR1                  /REDUCE HARD ERROR COUNT
1230  3763          DCA I   PCNTR1
1231  2363          ISZ     PCNTR1                  /YES, UPDATE POINTER
1232  7340  NOCRC,  CLA CLL CMA
1233  2763          ISZ I   PCNTR1                  /UPDATE ERROR COUNT
1234  7610          SKP CLA
1235  3763          DCA I   PCNTR1                  /HOLD AT 7777
1236  7604  NONCRC, LAS
1237  7106          CLL RTL
1240  7710          SPA CLA                         /INHIBIT ERRORS????
1241  5342          JMP     ERROEX                  /YES
1242  1620  DOHEAD, TAD I   ERRO                    /GET TEXT POINTER
1243  7640          SZA CLA                         /DATA ERROR?
1244  5247          JMP     .+3                     /NO WAY
1245  4760          JMS I   PRNDAT                  /PRINT ONLY DATA
```

```
1246  5342            JMP     ERROEX                  /EXIT
1247  4777/           JMS     RCMSS                   /READ COMMAND AND SURFACE
1250  4453            CRLF
1251  4453            CRLF
1252  1364            TAD     PCNTR2                  /GET NON-RECOV. FLAG
1253  7640            SZA CLA                         /WAS IT SET
1254  5260            JMP     .+4                     /NO DON'T TYPE IT
1255  7340            CLA CLL CMA
1256  4451            PRNTER                          /PRINT "NON-RECOVERABLE "
1257  3333            MES4
1260  1600            TAD I   ERRO
1261  3776/           DCA     SDKP
1262  1776/           TAD     SDKP
1263  1366            TAD     HEDTAD                  /MAKE ERROR HEADER TAD
1264  3265            DCA     .+1
1265  7402            HLT                             /MODIFIED HEADER TAD
1266  3271            DCA     .+3
1267  7340            CLA CLL CMA
1270  4451            PRNTER                          /PRINT HEADER
1271  7402            HLT
1272  7340            CLA CLL CMA
1273  4451            PRNTER                          /PRINT "ERROR"
1274  3334            MES0
1275  4453            CRLF
1276  1200            TAD     ERRO
1277  3121            DCA     PCREG                   /SAVE PC
1320  2200            ISZ     ERRO
1321  1600            TAD I   ERRO
1322  3355            DCA     ESAVE
1323  2200            ISZ     ERRO                    /UPDATE FOR RETURN
1324  1361            TAD     XTEXT
1325  3364            DCA     PCNTR2
1326  1362            TAD     XREG
1327  3010            DCA     AUTO10
1330  1357            TAD     K7764
1331  3363            DCA     PCNTR1                  /COUNTER FOR    # OF HEADS
1332  1355  STRAUT,   TAD     ESAVE                   /GET TEXT POINTER
1333  7500            SMA
1334  5347            JMP     NOTEX                   /NOT THIS ONE
1335  7124            CLL RAL
1336  3355            DCA     ESAVE
1337  2365            ISZ     PCNTR3                  /UPDATE LINE FILL COUNTER
1340  7610            SKP CLA                         /NO CRLF
1341  4453            CRLF
1342  1364            TAD     PCNTR2                  /GET TEXT MESSAGE POINTER
1343  2364            ISZ     PCNTR2
1344  2364            ISZ     PCNTR2
1345  3330            DCA     .+3                     /STORE FOR PRNTER
1346  7340            CLA CLL CMA
1347  4451            PRNTER                          /PRINT XXI
1350  7402            HLT                             /MODIFIED TEXT POINTER
1351  1410            TAD I   AUTO10
1352  4452            OCTEL                           /PRINT FOUR OCTAL
1353  2363  AGAIN,    ISZ     PCNTR1
1354  5312            JMP     STRAUT                  /CHECK FOR NEXT XXI
```



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1355  1776/           TAD     SDKP
1356  1111            TAD     M5
1357  7650            SNA CLA                         /FIRST DATA ERROR?
1360  4760            JMS I   PRNDAT                  /YES, PRINT DATA
1361  5344            JMP     .+3
1362  2200  ERROEX,   ISZ     ERRO
1363  2200            ISZ     ERRO                    /UPDATE FOR RETURN
1364  7301            CLA CLL IAC                     /ENABLE CLEAR CONTROL
1365  4450            CLRALL                          /CLEAR CONTROL
1366  5600            JMP I   ERRO                    /EXIT
1367  7124  NOTEX,    CLL RAL
1370  3355            DCA     ESAVE
1371  2364            ISZ     PCNTR2
1372  2364            ISZ     PCNTR2
1373  2010            ISZ     AUTO10
1374  5333            JMP     AGAIN
                      /
1375  0000  ESAVE,    0
1376  7771  K7771,    7771
1377  7764  K7764,    7764
1400  3133  PRNDAT,   TYPDAT
1401  3204  XTEXT,    TEXPC
1402  2120  XREG,     PCREG +1
1403  0000  PCNTR1,   0
1404  0000  PCNTR2,   0
1405  0000  PCNTR3,   0
1406  1366  HEDTAD,   TAD     HEDTAD
1407  7040            ERTX1
1410  1254            ERTX2
1411  3257            ERTX3
1412  3265            ERTX4
1413  3277            ERTX5
                      /
1414  2720
1415  1410
      1422  PAGE
                      /
                      /SUBROUTINE TO ISSUE "DCLR" CLEAR IOT
                      /
1420  0000  CLOR,     0
1421  6742  IOT2,     DCLR                            /DCLR "CLEAR IOT"
1422  5620            JMP I   CLOR                    /EXIT
1423  7402  ERHLT2,   HLT                             /SKIP TRAP
                      /
                      /ROUTINE TO LOAD MAINTENANCE REGISTER
                      /
1424  7000  LDMN,     7
1425  6747  IOT7,     DMAN                            /MAINTENANCE IOT
1426  5624            JMP I   LDMN                    /EXIT
1427  7402  ERHLT7,   HLT                             /SKIP TRAP
                      /
                      /ROUTINE TO CLEAR THE BUFFERS OUT, THEN
                      /READ THE COMMAND REGISTER AND THE SURFACE
                      /AND SECTOR REGISTER.
                      /
```

```
1410  0000  RCMSS,  0
1411  1110          TAD     M4
1412  3274          DCA     FROCT                   /SETUP FOUR READ COUNTER
1413  4445          LDCUR                           /LOAD CURRENT ADDRESS
1414  7332          CLA CLL CML RAR                 /ENABLE SET MAINTENANCE
1415  4447          LDMAN                           /LOAD MAINTENANCE
1416  7332          CLA CLL CML RTR
1417  4447          LDMAN                           /BREAK IF LAST BREAK WAS READ
1420  7332          CLA CLL CML RTR
1421  4447          LDMAN                           /LOAD MAINTENANCE
1422  7300          CLA CLL
1423  1013          TAD     K0020                   /ENABLE READ BUFFER
1424  4447          LDMAN                           /READ AND CLEAR BUFFER
1425  2274          ISZ     FROCT                   /UPDATE COUNTER
1426  5227          JMP     .-6
1427  7300          CLA CLL
1430  1107          TAD     M12
1431  3274          DCA     FROCT                   /SETUP BIT COUNTER
1432  7332          CLA CLL CML RTR                 /ENABLE SET DB4=1
1433  4447          LDMAN                           /LOAD MAINTENANCE
1434  7012          RTR                             /ENABLE SHIFT COMMAND
1435  4447          LDMAN                           /LOAD MAINTENANCE
1436  2274          ISZ     FROCT                   /UPDATE BIT COUNTER
1437  5235          JMP     .-2                     /MORE BITS TO SHIFT
1440  7300          CLA CLL
1441  1013          TAD     K0023                   /ENABLE READ LOWER BUFFER
1442  4447          LDMAN                           /LOAD MAINTENANCE
1443  3124          DCA     MRREG                   /SAVE COMMAND READ
1444  1127          TAD     M12
1445  3274          DCA     FROCT                   /SETUP COUNTER
1446  7332          CLA CLL CML RTR                 /ENABLE SET DB4=1
1447  4447          LDMAN                           /LOAD MAINTENANCE
1450  7300          CLA CLL
1451  1216          TAD     K0200                   /ENABLE SHIFT SURFACE AND SECTOR
1452  4447          LDMAN                           /LOAD MAINTENANCE
1453  2274          ISZ     FROCT                   /UPDATE BIT COUNTER
1454  5252          JMP     .-2                     /MORE BITS TO GO
1455  7300          CLA CLL
1456  1013          TAD     K0020                   /ENABLE READ LOWER BUFFER
1457  4447          LDMAN                           /LOAD MAINTENANCE
1460  3127          DCA     SSREG                   /SAVE SURFACE AND SECTOR
1461  5613          JMP I   RCMSS                   /EXIT
                /
                /ROUTINE TO DO CRLF
                /
1462  0000  UPONE,  0
1463  7300          CLA CLL
1464  1272          TAD     K0215
1465  4440          TYPE
1466  1273          TAD     K0212
1467  4440          TYPE
1470  4440          TYPE
1471  5662          JMP I   UPONE
                /
1472  0215  K0215,  0215
```



```
1473  0212  K0212,  0212
                /
                /ROUTINE TO PRINT FOUR OCTAL
                /
1474  0000  FROCT,  0
1475  7006          RTL
1476  7006          RTL
1477  3262          DCA     UPONE
1500  1110          TAD     M4
1501  3316          DCA     PRN
1502  1262          TAD     UPONE
1503  0061          AND     K0007
1504  1065          TAD     K0260
1505  4440          TYPE
1506  1262          TAD     UPONE
1507  7006          RTL
1510  7004          RAL
1511  3262          DCA     UPONE
1512  2316          ISZ     PRN
1513  5302          JMP     .-11
1514  4423          SPACE
1515  5674          JMP I   FROCT
                /
                /SUBROUTINE TO PRINT TEXT
                /
1516  0000  PRN,    0
1517  7650          SNA CLA                         /TYPE CRLF
1520  4453          CRLF                            /YES!!!!
1521  1716          TAD I   PRN                     /GET POINTER

1522  2316          ISZ     PRN
1523  3274          DCA     FROCT
1524  7300  MRPRN,  CLA CLL
1525  1674          TAD I   FROCT
1526  7101          AND     K7700
1527  7450          SNA
1530  5332          JMP     EXIT
1531  7500          SMA
1532  7020          CML
1533  7001          IAC
1534  7012          RTR
1535  7012          RTR
1536  7012          RTR
1537  4440          TYPE
1540  1674          TAD I   FROCT
1541  0104          AND     K0077
1542  7450          SNA
1543  5352          JMP     EXIT
1544  1361          TAD     K3740
1545  7500          SMA
1546  1360          TAD     K4100
1547  4423          SPACE                           /SPACE OUT 1
1550  2274          ISZ     FROCT
1551  5324          JMP     MRPRN                   /MORE TO PRINT
1552  7300  EXIT,   CLA CLL
```

```
1553  5716          JMP I   PRN
                    /
                    /ROUTINE TO SPACE OUT 1
                    /
1554  0000  SPAC,   0
1555  1066          TAD     K0240
1556  4440          TYPE
1557  5754          JMP I   SPAC
                    /
1560  4100  K4100,  4100
1561  3740  K3740,  3740
                    /
      1600  PAGE
                    /
                    /ROUTINE TO CHECK DATA READ
                    /
1600  0000  DTCHK,  0
1601  1157          TAD     CRCFLG          /GET CRC ERROR FLAG
1602  7640          SZA CLA                 /CRC ERROR SET????
1603  5212          JMP     WRDCHK          /YES, THEN WORD BY WORD CHECK
1604  1144          TAD     FNDSUM          /GET CHECK SUM FOUND
1605  7041          CIA
1606  1143          TAD     CHKSAV          /COMPARE TO GOOD VALUE SAVED
1607  7650          SNA CLA                 /WERE THEY THE SAME
1610  5600          JMP I   DTCHK           /YES, DATA O.K.
1611  7342          CLA CLL CMA
1612  3441  WRDCHK, DCA I   XERRO           /SETUP CHECKSUM ERROR FLAG
1613  1123          TAD     CHREG
1614  0015          AND     K0100
1615  7640          SZA CLA                 /HALF BLOCK SET??
1616  1016          TAD     K0200           /YES!
1617  1106          TAD     K7400
1620  3113          DCA     TRASH2
1621  1113          TAD     TRASH2
1622  7040          CMA
1623  3316          DCA     MSKER
1624  7340          CLA CLL CMA
1625  3144          DCA     FNDSUM          /SET FIRST TIME FLAG
1626  4435          RESRAN                  /NO, SETUP RANDOM GENERATOR
1627  1132          TAD     FWREG           /GET FINAL WC
1630  4427          SETFLD                  /GET AUTO11 + BUFFAL + FIELD
1631  3246          DCA     GOCDF           /SAVE FIELD CDF
1632  1113          TAD     TRASH2
1633  3363          DCA     RSRAN
1634  1125          TAD     INTDA
1635  3355          DCA     STGEN
1636  1363  DTR1,   TAD     RSRAN
1637  0316          AND     MSKER
1640  3134          DCA     WAREG
1641  1355          TAD     STGEN
1642  0063          AND     K0017
1643  3133          DCA     ASREG
1644  4421          RANDAT                  /GENERATE DATA
1645  3136          DCA     DGREG           /SAVE GOOD DATA POINTER
1646  7422  GOCDF,  HLT/CDF                 /CDF TO BUFFER FIELD
```



```
1647  1411          TAD I   AUTO11          /GET BAD DATA WORD
1650  6201          CDF     0               /HOME DF
1651  3137          DCA     DBREG           /SAVE BAD WORD
1652  1011          TAD     AUTO11          /GET ADDRESS
1653  3135          DCA     AREG            /SAVE FOR PRINTER
1654  1137          TAD     DBREG           /GET DATA READ
1655  7041          CIA
1656  1136          TAD     DGREG           /COMPARE TO GOOD VALUE
1657  7650          SNA CLA                 /WERE THEY THE SAME
1660  5276          JMP     NOERR           /YES, NO ERROR
1661  2144          ISZ     FNDSUM          /FIRST TIME PRINT????
1662  5312          JMP     NTWRKS          /NO, JUST ADDRESS AND DATA
1663  1157          TAD     CRCFLG
1664  7640          SZA CLA                 /CRC ERROR????
1665  5272          JMP     .+5             /YES, YOU GOT IT
1666  1142          TAD     DATTRY          /NO
1667  7001          IAC                     /UPDATE
1670  7650          SNA CLA                 /TIME TO SET NON-RECOVERABLE
1671  7340          CLA CLL CMA             /YES, SET IT
1672  2200          ISZ     DTCHK           /UPDATE FOR ERROR RETURN
1673  4441          ERROR                   /ERROR DATA
1674  0005          0005                    /POINTER
1675  7774          7774                    /POINTER
1676  2363  NOERR,  ISZ     RSRAN
1677  5304          JMP     .+5
1700  2355          ISZ     STGEN
1701  7002          NOP
1702  1113          TAD     TRASH2
1703  3363          DCA     RSRAN
1704  2122          ISZ     BUFFAL          /UPDATE BUFFER TALLY
1705  5236          JMP     DTR1            /MORE WORDS TO CHECK
1706  2641          ISZ I   XERRO           /CHECK FOR COMPUTER ERROR?
1707  5600          JMP I   DTCHK           /ALL O.K.
1710  7402  BADHLT, HLT                     /COMPUTER MUST BE DOWN, CHECKSUM
1711  5310          JMP     .-1             /FAILED WORD-BY-WORD COMPARE WORKED,
1712  4441  NTWRKS, ERROR                   /OTHER ERRORS IN BUFFER
1713  0200          0200
1714  0000          0000
1715  5276          JMP     NOERR           /CHECK REST OF BUFFER
                    /
1716  0000  MSKER,  0
                    /
                    /ROUTINE TO GENERATE RANDOM NUMBERS
                    /
1717  0000  RANDOM, 0
1720  7301          CLA CLL IAC
1721  1375          TAD     RAD1
1722  1376          TAD     RAD2
1723  1377          TAD     RAD3
1724  3375          DCA     RAD1
1725  7004          RAL
1726  1375          TAD     RAD1
1727  1376          TAD     RAD2
1730  1377          TAD     RAD3
1731  3376          DCA     RAD2
```

```
1732  7004            RAL
1733  1375            TAD     RAD1
1734  1376            TAD     RAD2
1735  1377            TAD     RAD3
1736  3377            DCA     RAD3
1737  1377            TAD     RAD3
1740  5717            JMP I   RANDOM                  /EXIT, RANDOM NUMBER IN AC
                      /
                      /GENERATOR FOR RANDOM DATA
                      /
1741  0000    GNDAT,  0
1742  7301            CLA CLL IAC
1743  1371            TAD     RAN1
1744  1372            TAD     RAN2
1745  7106            CLL RTL
1746  3371            DCA     RAN1
1747  1372            TAD     RAN2
1750  7012            RTR
1751  1371            TAD     RAN1
1752  3372            DCA     RAN2
1753  1372            TAD     RAN2
1754  5741            JMP I   GNDAT
                      /
                      /ROUTINE TO SAVE RANDOM GENERATOR
                      /
1755  0000    STGEN,  0
1756  1371            TAD     RAN1
1757  3373            DCA     SAV1
1760  1372            TAD     RAN2
1761  3374            DCA     SAV2
1762  5755            JMP I   STGEN
                      /
                      /ROUTINE TO RESET RANDOM GENERATOR
                      /
1763  0000    RSRAN,  0
1764  1373            TAD     SAV1
1765  3371            DCA     RAN1
1766  1374            TAD     SAV2
1767  3372            DCA     RAN2
1770  5763            JMP I   RSRAN
                      /
1771  1234    RAN1,   1234
1772  5670    RAN2,   5670
                      /
1773  0000    SAV1,   0
1774  0000    SAV2,   0
1775  1234    RAD1,   1234
1776  5672    RAD2,   5670
1777  4321    RAD3,   4321
                      /
                      /
      2000            PAGE
                      /
                      /ROUTINE TO SEND A DRIVE TO A RANDOM TRACK
                      /AND SAVE THE TRACK
```



```
                      /
2000  0000    SEKOUT, 0
2001  0003            AND     K0003                 /MASK DRIVE NUMBER
2002  3310            DCA     WAIT                  /SAVE POINTER
2003  7604    SYSTYP, LAS
2004  0010            AND     K0200                 /MASK
2005  7540            SZA CLA                       /PROGRAM STOP????
2006  7402    STPHLT, HLT                           /PROGRAM STOP ON SWITCH 6
2007  3157            DCA     CRCFLG                /CLEAR CRC ERROR POINTER
2010  1310    RESEK,  TAD     WAIT
2011  7110            CLL RAR
2012  1155            TAD     DSKPOT                /GET ADDRESS SAVE POINTER
2013  3327            DCA     CHKYN                 /SAVE MADE POINTER
2014  1777/           TAD     TRKFLG                /GET TRACK FLAG
2015  7650            SNA CLA                       /WAS IT SET??
2016  5223            JMP     .+5                   /NO, USE OTHER
2017  1163            TAD     SPTRK2                /GET OPERATOR TRACK
2020  0102            AND     K7760                 /MASK
2021  1162            TAD     SPTRK1                /GET OPERATOR TRACK
2022  5254            JMP     DSKOUT +2             /DO IT
2023  1776/           TAD     SEQFLG                /GET SEQUENCE FLAG
2024  7650            SNA CLA                       /WAS IT SET??
2025  5233            JMP     .+6                   /NO, USE RANDOM
2026  1727            TAD I   CHKYN                 /GET LAST USED
2027  1013            TAD     K0020                 /UPDATE
2030  7430            SZL                           /LINK SET?
2031  7001            IAC                           /YES, SET EXTENDED BIT
2032  7410            SKP                           /UPDATE AND CHECK BOUNDARIES
2033  4433            RANGEN                        /GENERATE RANDOM ADDRESS
2034  0103            AND     K7761                 /MASK OFF
2035  1310            TAD     WAIT                  /ADD IN DRIVE NUMBER
2036  3727            DCA I   CHKYN                 /SAVE MADE ADDRESS
2037  1727            TAD I   CHKYN
2040  7110            CLL RAR
2041  7622            SNL CLA                       /WAS IT SET
2042  5256            JMP     DSKOUT                /NO, DON'T CHECK LIMITS
2043  1147            TAD     MAXTRK                /ADD IN FUDGE FACTOR
2044  1727            TAD I   CHKYN                 /GET ADDRESS FOUND
2045  7630            SZL CLA                       /IN LIMITS?
2046  5256            JMP     DSKOUT                /YES, O.K.
2047  1776/           TAD     SEQFLG                /GET SEQUENCE FLAG
2050  7640            SZA CLA                       /WAS IT SET????
2051  5254            JMP     DSKOUT +2             /DO
2052  1727            TAD I   CHKYN                 /NO
2053  0102            AND     K7760                 /MASK
2054  1310            TAD     WAIT                  /ADD IN DRIVE NUMBER
2055  3727            DCA I   CHKYN                 /SAVE IT NOW
2056  1727    DSKOUT, TAD I   CHKYN                 /GET ADDRESS
2057  0361            AND     K0237                 /MASK DRIVE NUMBER + EXTENDED
2060  1377            TAD     K3000                 /FUNCTION SEEK ONLY
2061  4444            LDCMD                         /LOAD COMMAND
2062  1727            TAD I   CHKYN                 /GET ADDRESS
2063  0102            AND     K7760
2064  4446            LOADD                         /LOAD DISK ADDRESS + GO
2065  4443            DSKSKP                        /WAIT FOR DONE FLAG
```

```
2266  5265          JMP     .-1
2267  4442          RDSTAT                          /READ STATUS
2270  7530          SMA                             /DONE FLAG SET????
2271  5275          JMP     SEKER                   /SEEK ERROR, NO DONE FLAG
2272  0075          AND     K1777                   /MASK OTHER ERROR BITS
2273  7650          SNA CLA                         /ANY SET????
2274  5301          JMP     SEKEX                   /NO, EXIT
2275  4441  SEKER,  ERROR                           /PRINT ERROR
2276  0033          0033                            /HEADER POINTER
2277  7540          7540                            /MESSAGE POINTER
2300  2200          ISZ     SEKOUT                  /UPDATE FOR RETURN
2301  4452  SEKEX,  CLRALL                          /CLEAR STATUS
2302  5600          JMP I   SEKOUT
                    /
                    /ROUTINE TO GET AC
                    /
2303  0000  GETAC,  0
2304  1171          TAD     SVLNK
2305  7110          CLL RAR
2306  1170          TAD     SAVAC
2307  5703          JMP I   GETAC
                    /
                    /ROUTINE TO WAIT FOR KEY FROM OPERATOR
                    /
2310  0000  WAIT,   0
2311  7300          CLA CLL
2312  6032          KCC
2313  6031          KSF
2314  5313          JMP .-1
2315  6036          KRS
2316  7325          AND     K177
2317  1326          TAD     K200
2320  6046          TLS
2321  6041          TSF
2322  5321          JMP .-1
2323  6042          TCF
2324  5710          JMP I   WAIT                    /EXIT
                    /
2325  0177  K177,   0177
2326  0200  K200,   0200
                    /
                    /ROUTINE TO CHECK FOR YES OR NO
                    /
2327  0000  CHKYN,  0
2330  3310          DCA     WAIT                    /SAVE POINTER
2331  1327          TAD     CHKYN                   /GET PC STORED
2332  3350          DCA     CHKPOT                  /SAVE IT
2333  1310          TAD     WAIT
2334  2327          ISZ     CHKYN
2335  7041          CIA
2336  1067          TAD     K0316
2337  7650          SNA CLA                         /WAS IT A NO
2340  5727          JMP I   CHKYN                   /YES
2341  1310          TAD     WAIT
2342  2327          ISZ     CHKYN
```



```
2343  7041          CIA
2344  1070          TAD     K0331
2345  7650          SNA CLA                         /WAS IT A YES
2346  5727          JMP I   CHKYN                   /YES
2347  5750          JMP I   CHKPOT                  /WAS NEITHER
                    /
                    /ROUTINE TO CHECK DISK RUN POINTERS
                    /
2350  0000  CHKPOT, 0
2351  0056          AND     K0003
2352  1356          TAD     RUNPOT
2353  3310          DCA     WAIT
2354  1710          TAD I   WAIT                    /GET RUN POINTER
2355  7640          SZA CLA                         /RUN THIS DRIVE
2356  2350          ISZ     CHKPOT                  /NO
2357  5750          JMP I   CHKPOT                  /EXIT
                    /
2376  3552
2377  3547
      2200  PAGE
                    /
                    /ROUTINE TO WRITE OR READ SECTORS SELECTED
                    /
2200  0000  DSKGO,  0
2201  7340          CLA CLL CMA
2202  3172          DCA     RELGAD                  /SETUP FIRST TIME POINTER
2203  7340          CLA CLL CMA
2204  3173          DCA     FIRTIM                  /SETUP FIRST TIME POINTER
2205  1130          TAD     CAREG                   /GET INITIAL CURRENT ADDRESS
2206  4445          LDCUR                           /LOAD CURRENT ADDRESS
2207  1131          TAD     WCREG
2210  3132          DCA     FWREG                   /SETUP FINAL WC     .
2211  1125          TAD     INTDA                   /GET INITIAL STARTING SECTOR
2212  3112          DCA     TRASH1                  /SAVE
2213  1125          TAD     INTDA                   /GET DISK ADDRESS
2214  0102          AND     K776R                   /MASK
2215  3113          DCA     TRASH2                  /SAVE
2216  1142          TAD     INTCM                   /GET INITIAL COMMAND
2217  1600          TAD I   DSKGO                   /GET READ OR WRITE
2220  4444          LDCMD                           /LOAD COMMAND
2221  1112          TAD     TRASH1                  /SECTOR TO DO
2222  0063          AND     K0017                   /MASK
2223  1113          TAD     TRASH2                  /ADD TO TRACK
2224  4446          LDADD                           /LOAD AND GO
2225  6001          ION                             /TURN INTERRUPT ON
                    /
                    /ROUTINE TO CLEAR OR CHECK SUM BUFFER IN BACK GROUND
                    /
2226  3777  GOBAK,  DCA     TIMER2                  /CLEAR LONG TIMER
2227  3144          DCA     FNDSUM                  /CLEAR SUM CHECK
2230  4427          SETFLD                          /GET FIELD TO BUFFER
2231  3252          DCA     CHNCDF                  /SAVE CDF
2232  1173          TAD     FIRTIM
2233  7650          SNA CLA                         /TIME TO GO
2234  5237          JMP     STRWRK                  /YES!!!!
```

```
2235  4776/           JMS     TIME                    /WAIT FOR FIRST INTERRUPT
2236  5232            JMP     .-4                     /NOT HERE YET
2237  1122  STRWRK,   TAD     BUFTAL
2240  7041            CIA
2241  1132            TAD     FWREG                   /COMPARE TO SOFTWARE FINAL
2242  7450            SNA                             /WAIT FOR DISK????
2243  5272            JMP     WRKDON                  /YES!!!!
2244  7041            CIA
2245  3174            DCA     CLRBAK                  /SAVE DIFFERENCE
2246  1174            TAD     CLRBAK
2247  7041            CIA
2250  1120            TAD     BUFTAL
2251  3120            DCA     BUFTAL
2252  7432  CHNCDF,   HLT                             /UPDATE BUFFER TALLY
2253  1123            TAD     CHREG                   /CDF TO BUFFER FIELD
2254  7700            SMA CLA
2255  5262            JMP     WASRD                   /READ OR WRITE
2256  3411  GOCLR,    DCA I   AUTO11                  /WAS A READ!!
2257  2174            ISZ     CLRBAK                  /WAS A WRITE, CLEAR BUFFER
2260  5256            JMP     GOCLR                   /UPDATE TALLY
2261  5272            JMP     WRKDON                  /MORE TO CLEAR
2262  1144  WASRD,    TAD     FNDSUM                  /DONE WITH SOME
2263  7100  GOCHK,    CLL
2264  1411            TAD I   AUTO11
2265  7430            SZL                             /GET WORD
2266  7001            IAC
2267  2174            ISZ     CLRBAK
2270  5263            JMP     GOCHK                   /UPDATE CLEAR POINTER
2271  3144            DCA     FNDSUM                  /MORE TO CHECKSUM
2272  6231  WRKDON,   CDF     0                       /SAVE IT
2273  1120            TAD     BUFTAL
2274  7650            SNA CLA
2275  5374            JMP     DSKEX                   /LAST WORD DONE????
2276  4776/           JMS     TIME                    /EXIT
2277  5237            JMP     STRWRK                  /TIME AND WAIT
                                                      /WAIT FOR INT. OR DONE!!!!
                      /
                      /INTERRUPT SERVICE
                      /
2320  6741  RETURN,   DSKP
                      SKP CLA                         /DISK SKIP IOT
                      JMP     DSKRET                  /NOT THE DISK
                      KSF                             /GO DISK
                      SKP CLA                         /CHECK READER FLAG
                      JMP     KEYRET                  /NOT READER
                      TSF                             /WAS THE READER
2327  7422  INTER2,   HLT                             /CHECK PUNCH FLAG
                      TCF                             /UNDEFINED INTERRUPT
                      JMP     RETRN                   /WAS PUNCH, CLEAR FLAG
2332  6034  KEYRET,   KRS                             /RETURN
                      TLS                             /GET INPUT
                      KCC                             /PRINT IT
                      JMP     RETRN                   /WAS CLEAR READER FLAG
2336  3173  DSKRET,   DCA     FIRTIM                  /RETURN TO DISK
2337  2112            ISZ     TRASH1                  /CLEAR TIME POINTER
2340  7000            NOP                             /UPDATE SECTOR
```



```
2341  1115            TAD     UPDATE
2342  1132            TAD     FWREG
2343  3132            DCA     FWREG                   /UPDATE WORD COUNT
2344  6745  STATUS,   DRST
2345  3122            DCA     STREG                   /READ STATUS
2346  1122            TAD     STREG                   /SAVE READ FOR PRINTER
2347  1073            TAD     K4000
2350  7640            SZA CLA
2351  5357            JMP     STATER                  /ONLY DONE FLAG
2352  6742  CLRSTA,   DCLR                            /STATUS ERROR
2353  1132            TAD     FWREG                   /CLEAR STATUS
2354  7640            SZA CLA
2355  5341            JMP     GOAGN                   /LAST TRANSFER
2356  4454            JMS I   XGETAC                  /MORE TO TRANSFER
2357  6244            RMF                             /GET AC AND LINK
2360  5400            JMP I   0                       /RESTORE FIELDS
2361  2172  GOAGN,    ISZ     RELOAD                  /RETURN
2362  5347            JMP     NEXSEC                  /CLEAR FIRST TIME POINTER
2363  1074            TAD     K1000                   /NOT FIRST TIME
2364  1600            TAD I   DSKGO                   /GET ALL FLAG
2365  1160            TAD     INTCM                   /GET READ OR WRITE
2366  4444            LOCMD                           /ADD IN INITIAL
2367  1112  NEXSEC,   TAD     TRASH1                  /RELOAD COMMAND REGISTER
2370  0063            AND     K0017                   /GET SECTOR TO DO
2371  1113            TAD     TRASH2                  /MASK OFF
2372  4446            LOADD                           /ADD IN TRACK
2373  4454  RETRN,    JMS I   XGETAC                  /LOAD AND GO TO DISK
2374  6244            RMF                             /GET AC AND LINK
2375  6001            ION                             /RESTORE FIELDS
2376  5400            JMP I   0                       /TURN INTERRUPT ON
2377  1123  STATER,   TAD     CHREG                   /EXIT
2400  7710            SPA CLA                         /GET LAST COMMAND
2401  7001            IAC                             /WRITE OR READ
2402  7001            IAC                             /WRITE
2403  3372            DCA     .+6
2404  7002            CLA CLL IAC                     /MODIFY HEADER POINTER
2405  1345            TAD     STATRY                  /AC TO 1
2406  7650            SNA CLA                         /GET TRY POINTER
2407  7040            CLA CLL CMA                     /TIME TO SEE IT????
2410  4441            ERROR                           /YES, SET NON-RECOVERABLE FLAG
2411  0000            7000                            /PRINT MESSAGE
2412  7774            7774                            /MODIFIED HEADER POINTER
2413  2200            ISZ     DSKGO                   /MESSAGE POINTER
2414  2200  DSKEX,    ISZ     DSKGO                   /UPDATE FOR ERROR
2415  5600            JMP I   DSKGO                   /EXIT
                      /
2416  3122
2417  3132
      2600            PAGE
                      /
                      /ROUTINE TO GET ONE IN OCTAL
                      /
2600  0000  OCT1,     0
2601  4437            RECEIV
2602  3365            DCA     ISAVE1                  /RECEIVE
                                                      /SAVE IT
```

```
2403  1600          TAD I   OCT1                    /GET LIMITS
2404  0061          AND     K0007                   /MASK
2405  1065          TAD     K0260
2406  7141          CLL CIA
2407  1365          TAD     ISAVE1                  /GET INPUT
2410  7620          SNL CLA                         /IN LIMITS????
2411  5226          JMP     INERR                   /NO, ERROR EXIT
2412  1600          TAD I   OCT1                    /GET LIMITS
2413  0064          AND     K0070                   /MASK
2414  7110          CLL RAR
2415  7012          RTR
2416  1065          TAD     K0260
2417  7040          CMA
2420  1365          TAD     ISAVE1                  /GET INPUT
2421  7630          SZL CLA                         /IN LIMITS????
2422  5226          JMP     INERR                   /NO, ERROR
2423  1365          TAD     ISAVE1                  /GET INPUT
2424  0061          AND     K0007                   /MASK
2425  2200          ISZ     OCT1
2426  2200  INERR,  ISZ     OCT1
2427  5600          JMP I   OCT1                    /GOOD EXIT
                    /
                    /ROUTINE TO RECEIVE FOUR OCTAL
                    /
2430  0000  OCT4,   0
2431  1110          TAD     M4
2432  3366          DCA     ISAVE2                  /SETUP COUNTER
2433  3367          DCA     ISAVE3                  /START WITH 0
2434  4424          ONEIN                           /RECEIVE ONE OCTAL
2435  0070          0070                            /LIMITS
2436  5630          JMP I   OCT4                    /ERROR EXIT
2437  1367          TAD     ISAVE3                  /GET LAST
2440  2366          ISZ     ISAVE2                  /UPDATE COUNTER
2441  7410          SKP
2442  5246          JMP     .+4                     /EXIT
2443  7004          RAL
2444  7006          RTL
2445  5233          JMP     OCT4 +3
2446  2230          ISZ     OCT4
2447  5630          JMP I   OCT4                    /EXIT OCTAL IN AC
                    /
                    /ROUTINE TO UPDATE AND CHECK FOR PASS COMPLETE
                    /
2450  0000  CKTIM,  0
2451  1123          TAD     CMREG                   /GET CURRENT DRIVE NUMBER
2452  0260          AND     K0006                   /MASK
2453  7110          CLL RAR
2454  3366          DCA     ISAVE2                  /POINTER
2455  1366          TAD     ISAVE2
2456  1153          TAD     TIMPOT                  /GET TIME POINTER
2457  3365          DCA     ISAVE1                  /SAVE IT
2460  7301          CLA CLL IAC                     /ONE FOR 0
2461  1151          TAD     CONSEC                  /GET AMOUNT DONE
2462  1765          TAD I   ISAVE1                  /ADD IN AMOUNT COMPLETED SO FAR
2463  3765          DCA I   ISAVE1                  /SAVE IT
```



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2464  7620          SNL CLA                         /LINK UP????
2465  5650          JMP I   CKTIM                   /NO, EXIT
2466  4433          RANGEN                          /GET RANDOM NUMBER
2467  3777          DCA     RAN1                    /RE-PRIME GENERATOR
2470  4433          RANGEN                          /GET RANDOM NUMBER
2471  3776          DCA     RAN2                    /RE-PRIME GENERATOR
2472  7100          CLL
2473  1365          TAD     ISAVE1
2474  1057          TAD     K0004
2475  3365          DCA     ISAVE1                  /SECOND TIME POINTER
2476  2765          ISZ I   ISAVE1                  /UPDATE IT
2477  1765          TAD I   ISAVE1                  /GET COUNT
2500  1146          TAD     MAXTIM                  /ADD IN FUDGE FACTOR
2501  7620          SNL CLA                         /PASS COMPLETE????
2502  5650          JMP I   CKTIM                   /NO, EXIT
2503  3765          DCA I   ISAVE1                  /ZERO SECOUND COUNTER
2504  1366          TAD     ISAVE2
2505  7040          CMA
2506  3366          DCA     ISAVE2                  /SETUP COUNTER
2507  1364          TAD     CMPPOT                  /ADD IN POINTER
2510  1356          TAD     K0003
2511  2366          ISZ     ISAVE2                  /COMPUTE BUFFER
2512  5310          JMP     .+2
2513  3366          DCA     ISAVE2                  /SAVE ADDRESS POINTER
2514  7340          CLA CLL CMA
2515  2766          ISZ I   ISAVE2                  /UPDATE PASS COMPLETE POINTER
2516  7610          SKP CLA
2517  3766          DCA I   ISAVE2                  /HOLD AT 7777
2520  4453          CRLF
2521  4451          PRNTER                          /PRINT "DISK"
2522  3507          MES17
2523  1123          TAD     CMREG                   /GET LAST COMMAND
2524  0060          AND     K0006                   /MASK
2525  7110          CLL RAR
2526  1265          TAD     K0260
2527  4440          TYPE                            /TYPE DISK NO,
2530  7340          CLA CLL CMA
2531  4451          PRNTER                          /PRINT "PASS COMPLETE"
2532  3512          MES18
2533  7604          LAS
2534  0013          AND     K0100                   /MASK
2535  7650          SNA CLA                         /PASS COMPLETE DISCONNECT????
2536  5341          JMP     .+3                     /NO WAY!!!!
2537  4422          DISCON                          /DUMP DRIVE
2540  5775          JMP     RUN                     /MORE TO TEST!!!!
2541  4774          JMS     TPSTA                   /STATUS-COMPLETE TYPEOUT
2542  5650          JMP I   CKTIM                   /EXIT
                    /
                    /SUBROUTINE TO READ STATUS REGISTER
                    /
2543  0000  RDST,   0
2544  6745  IOTS,   DRST                            /READ STATUS IOT
2545  7410           SKP
2546  7402  ERHLTS, HLT                             /SKIP TRAP
2547  3122           DCA     STREG                   /SAVE RESULTS
```

```
2550  1122          TAD     STREG
2551  5743          JMP I   RDST                    /EXIT
                    /
                    /SUBROUTINE TO LOAD CURRENT ADDRESS REGISTER
                    /
2552  0000  LDCA,   0
2553  6744  IOT4,   DLCA                           /LOAD CURRENT ADDRESS IOT
2554  5752          JMP I   LDCA                    /EXIT

2555  7402  ERHLT4, HLT                    /SKIP TRAP
                    /
                    /SUBROUTINE TO LOAD TRACK ADDRESS REGISTER
                    /
2556  0000  LDAD,   0
2557  3126          DCA     DAREG
2560  1126          TAD     DAREG
2561  6743  IOT3,   DLAG                           /LOAD DISK ADDRESS REGISTER
2562  5756          JMP I   LDAD                    /EXIT
2563  7402  ERHLT3, HLT                            /SKIP TRAP
                    /
2564  3531  CMPPOT, DBCMP-3
2565  0000  ISAVE1, 0
2566  0000  ISAVE2, 0
2567  0000  ISAVE3, 0
                    /
2570  3000
2571  3600
2572  1772
2573  1771
      2600  PAGE
                    /
                    /ROUTINE TO GET RANDOM OR OPERATOR DATA
                    /
2600  0000  RNWRD,  0
2601  7402  SWDAT,  HLT                            /MODIFIED SWITCH
2602  5600          JMP I   RNWRD                   /EXIT
2603  6201          CDF     0                       /HOME CDF
2604  1412          TAD I   AUTO12                  /GET DATA
2605  7402  RECDF,  HLT                            /BUFFER CDF
2606  2117          ISZ     OPRTAL                  /UPDATE TALLY
2607  5600          JMP I   RNWRD                   /EXIT
2610  3220          DCA     PRINT                   /SAVE WORD
2611  1137          TAD     M12
2612  3117          DCA     OPRTAL                  /REPLACE TALLY
2613  7340          CLA CLL CMA
2614  1152          TAD     DATPOT
2615  3012          DCA     AUTO12                  /REPLACE AUTO INDEX
2616  1220          TAD     PRINT                   /GET SAVED WORD
2617  5600          JMP I   RNWRD                   /EXIT
                    /
                    /ROUTINE TO TYPE
                    /
2620  0000  PRINT,  0
2621  6046          TLS
```



```
2622  6041          TSF
2623  5222          JMP     .-1
2624  6042          TCF
2625  7200          CLA
2626  5620          JMP I   PRINT
                    /
                    /ROUTINE TO DUMP AND REPORT DISK STATUS
                    /
2627  0000  DUMP,   0
2630  4451          PRNTER                          /PRINT "DISK "
2631  3507          MES17
2632  1123          TAD     CMREG                   /GET LAST COMMAND
2633  0006          AND     K0006
2634  7110          CLL RAR
2635  3200          DCA     RNWRD                   /SAVE
2636  1200          TAD     RNWRD                   /GET DISK NUMBER
2637  1065          TAD     K0260
2640  4440          TYPE                            /TYPE DISK NUMBER
2641  7340          CLA CLL CMA
2642  4451          PRNTER                          /PRINT "DISCONNECTED!"
2643  3455          MES15
2644  4777          JMS     TPSTA                   /TYPE STATUS REPORT
2645  1200          TAD     RNWRD
2646  1156          TAD     RUNPOT
2647  3200          DCA     RNWRD                   /SAVE POINTER ADDRESS
2650  3600          DCA I   RNWRD                   /CLEAR RUN POINTER
2651  3200          DCA     RNWRD
2652  1110          TAD     M8
2653  3220          DCA     PRINT                   /CHECK FOR MORE POINTER
2654  1200          TAD     RNWRD
2655  4430          SELCHK                          /CHECK SELECT POINTERS
2656  7610          SKP CLA                         /DISK NOT HERE
2657  5627          JMP I   DUMP                    /MORE AVAILABLE
2660  2200          ISZ     RNWRD
2661  2220          ISZ     PRINT                   /UPDATE POINTERS
2662  5254          JMP     .-6
2663  4453          CRLF
2664  4451          PRNTER                          /PRINT "DISK"
2665  3507          MES17
2666  7340          CLA CLL CMA
2667  4451          PRNTER                          /PRINT "SYSTEM DOWN"
2670  3465          MES16
2671  7402  NODSKS, HLT                            /ERROR, NO DISK AVAILABLE
2672  5271          JMP     .-1
                    /
                    /ROUTINE TO SETUP FIELD TO BUFFER + AUTO11 + BUFFER TALLY
                    /
2673  0000  SYFLD,  0
2674  7041          CIA
2675  1131          TAD     MEREG
2676  3120          DCA     BUFTAL
2677  7340          CLA CLL CMA
2700  1130          TAD     CAREG                   /GET INITIAL CA
2701  3011          DCA     AUTO11                  /SAVE
2702  1160          TAD     DATFLG                  /GET DATA FLAG
```

```
2723  7650          SNA CLA                         /WAS IT SET????
2724  5312          JMP     .+6                     /NO, USE REGULAR
2725  1187          TAD     M12
2726  3117          DCA     OPRTAL                  /SETUP SPECIAL TALLY
2727  7340          CLA CLL CMA
2730  1152          TAD     DATPOT
2731  3012          DCA     AUTO12                  /SETUP SPECIAL AUTO INDEX
2732  1148          TAD     INTCH                   /GET LAST COMMAND
2733  0064          AND     K0072                   /MASK FIELD BITS
2734  1185          TAD     KCDF                    /MAKE BUFFER CDF
2735  3285          DCA     RECDF                   /SETUP SPECIAL CDF
2736  1285          TAD     RECDF                   /GET BACK CDF
2737  5673          JMP I   STFLD                   /EXIT, FIELD IN AC
                    /
                    /SUBROUTINE TO ISSUE "DSKP" DISK SKIP IOT
                    /
2720  0000          SDKP,   0
2721  6741          IOT1,   DSKP                    /DISK SKIP IOT
2722  7410            SKP                           /DID NOT SKIP
2723  2320            ISZ     SDKP
2724  5720            JMP I   SDKP                  /EXIT
                    /
                    /SUBROUTINE TO LOAD COMMAND REGISTER
                    /
2725  0000          LDCM,   0
2726  3123            DCA     CMREG
2727  1123            TAD     CMREG
2730  6746          IOT6,   DLDC                    /LOAD COMMAND REGISTER
2731  5725            JMP I   LDCM                  /EXIT
2732  7402          ERHLT6, HLT                     /SKIP TRAP
                    /
                    /ROUTINE TO CHANGE DEVICE IOT CODES
                    /
2733  7604          CHANG,  LAS                     /GET SWITCHES
2734  0355            AND     A0770                 /MASK 3-8
2735  3325            DCA     LDCM                  /SAVE DESIRED CODE
2736  1360            TAD     CHNPOT                /POINTER
2737  3112            DCA     TRASH1                /ADDRESS POINTER
2740  1357            TAD     CONTR1                /AMOUNT TO DO
2741  3113            DCA     TRASH2                /SETUP COUNTER
2742  1512          CHANGR, TAD I   TRASH1          /GET ADDRESS POINTER
2743  3114            DCA     TRASH3                /SAVE ADDRESS
2744  1514            TAD I   TRASH3                /GET OLD CODE
2745  0356            AND     A7007                 /MASK OFF OLD CODE
2746  1325            TAD     LDCM                  /ADD IN DESIRED CODE
2747  3514            DCA I   TRASH3                /RESTORE
2750  2112            ISZ     TRASH1                /UPDATE POINTER
2751  2113            ISZ     TRASH2                /UPDATE CHANGE COUNTER
2752  5342            JMP     CHANGR                /MORE TO CHANGE
2753  7402          CHNHLT, HLT                     /ALL DEVICE IOT CODES CHANGED
2754  5353            JMP     .-1
                    /
2755  0770          A0770,  0770
2756  7007          A7007,  7007
2757  7766          CONTR1, 7766
```



```
                    /
2760  2761          CHNPOT, CHNPOT +1
2761  2300                  RETURN
2762  2324                  STATUS
2763  2332                  CLRSTA
2764  2721                  IOT1
2765  1401                  IOT2
2766  2561                  IOT3
2767  2553                  IOT4
2770  2544                  IOT5
2771  2730                  IOT6
2772  1485                  IOT7
                    /
2777  3000
      3000          PAGE
                    /
                    /ROUTINE TO TYPE STATUS REPORT
                    /
3000  0000          TPSTA,  0
3001  4451            PRNTER                        /PRINT "DSK WARD SOFT COMP"
3002  3375            MES7
3003  1110            TAD     M4
3004  3242            DCA     TSAVE1                /MAXIMUM TO DO
3005  3243            DCA     TSAVE2
3006  3244            DCA     TSAVE3                /CLEAR SOME COUNTERS
3007  1243          CHKRES, TAD     TSAVE2
3010  1856            TAD     K0003
3011  3243            DCA     TSAVE2
3012  1243            TAD     TSAVE2
3013  1154            TAD     STAPOT
3014  3246            DCA     TSAVE5                /LOCATION OF DISK STATUS
3015  1244            TAD     TSAVE3
3016  4430            SELCHK                        /CHECK RUN POINTER
3017  5236            JMP     NOTSTA                /DISK NOT RUNNING
3020  4453            CRLF
3021  4423            SPACE                         /SPACE OUT ONE
3022  1244            TAD     TSAVE3                /GET DISK NO.
3023  1065            TAD     K0260
3024  4440            TYPE
3025  4423            SPACE                         /SPACE OUT ONE
3026  4423            SPACE                         /SPACE OUT ONE
3027  7346            CLA CLL CMA RTL
3030  3245            DCA     TSAVE4                /COUNTER FOR FOUR WORDS
3031  1646            TAD I   TSAVE5                /GET STATUS
3032  4452            OCTEL                         /TYPE IT
3033  2246            ISZ     TSAVE5
3034  2245            ISZ     TSAVE4
3035  5231            JMP     .-4
3036  2244          NOTSTA, ISZ     TSAVE3          /UPDATE DRIVE NUMBER
3037  2242            ISZ     TSAVE1
3040  5207            JMP     CHKRES                /MORE TO REPORT
3041  5633            JMP I   TPSTA                 /EXIT
                    /
3042  0000          TSAVE1, 0
3043  0000          TSAVE2, 0
```

```
3044  0000  TSAVE3, 0
3045  0000  TSAVE4, 0
3046  0000  TSAVE5, 0
            /
            /ROUTINE TO RECALIBRATE SELECTED DRIVE
            /
3047  0000  RESTOR, 0
3050  0060        AND     K0006
3051  3200        DCA     TPSTA                   /SAVE DRIVE NUMBER
3052  1101        TAD     K7700
3053  3332        DCA     TIMER2                  /SETUP COUNTER
3054  2331        ISZ     TIMER1
3055  5254        JMP     .-1
3056  2332        ISZ     TIMER2                  /WAIT FOR DISK TO COOL OFF!
3057  5254        JMP     .-3
3060  3157        DCA     CRCFLG                  /CLEAR CRC ERROR POINTER
3061  1200        TAD     TPSTA                   /CURRENT DRIVE
3062  4444        LDCMD                           /LOAD COMMAND
3063  7326        CLA CLL CML RTL                 /ENABLE RECALIBRATE BIT
3064  4450        CLRALL                          /"RECALIBRATE"
3065  4443        DSKSKP                          /DISK SKIP IOT
3066  5265        JMP     .-1                     /WAIT FOR FIRST DONE FLAG
3067  4442        RDSTAT                          /READ STATUS
3070  7500        SMA                             /DONE FLAG SET????
3071  5307        JMP     RESERR                  /NO, ERROR
3072  0075        AND     K1777                   /MASK OTHER ERROR BITS
3073  7640        SZA CLA                         /ANY SET????
3074  5307        JMP     RESERR                  /YES, ERROR
3075  4453  RESTA, CLRALL                        /CLEAR STATUS
3076  1016        TAD     K0200                   /ENABLE SET SECOND DONE FLAG
3077  1200        TAD     TPSTA                   /ORIGINAL COMMAND
3100  4444        LDCMD                           /LOAD COMMAND
3101  4443        DSKSKP                          /DISK SKIP IOT
3102  5301        JMP     .-1                     /WAIT FOR SECOND DONE
3103  4442        RDSTAT                          /READ STATUS
3104  1073        TAD     K4000
3105  7650        SNA CLA                         /WAS IT ONLY DONE FLAG
3106  5647        JMP I   RESTOR                  /YES, RETURN
3107  7300  RESERR, CLA CLL
3110  4441        ERROR                           /ERROR
3111  0004        0004
3112  7540        7540
3113  4453        CRLF
3114  4453        CRLF
3115  4451        PRNTER                  /PRINT"RECALIBRATE ERROR DISCONNECT"
3116  3165        MES19
3117  4422        DISCON                          /DISCONNECT DISK
3120  2247        ISZ     RESTOR
3121  5647        JMP I   RESTOR                  /MORE DISK AVAILABLE
            /
            /ROUTINE TO TIME AND WAIT
            /
3122  0000  TIME,   0
3123  2331        ISZ     TIMER1
3124  5722        JMP I   TIME                    /EXIT
```



```
3125  2332        ISZ     TIMER2
3126  5722        JMP I   TIME                    /EXIT
3127  7402  INTER1, HLT                           /NO INTERRUPT OCCURRED, I GUESS!
3130  5327        JMP     .-1
            /
3131  0000  TIMER1, 0
3132  0000  TIMER2, 0
            /
            /ROUTINE TO TYPE OUT DATA INFORMATION
            /
3133  0000  TYPDAT, 0
3134  4451        PRNTER                          /PRINT "AS!"
3135  3230        TEXAS
3136  1133        TAD     ASREG
3137  4452        OCTEL
3140  7340        CLA CLL CMA
3141  4451        PRNTER                          /PRINT "WA!"
3142  3232        TEXWA
3143  1134        TAD     WAREG
3144  4452        OCTEL
3145  7340        CLA CLL CMA
3146  4451        PRNTER                          /PRINT "AD!"
3147  3234        TEXAD
3150  1135        TAD     ADREG
3151  4452        OCTEL
3152  7340        CLA CLL CMA
3153  4451        PRNTER                          /PRINT "DC!"
3154  3236        TEXDC
3155  1136        TAD     DCREG
3156  4452        OCTEL
3157  7340        CLA CLL CMA
3160  4451        PRNTER                          /PRINT "DB!"
3161  3240        TEXDB
3162  1137        TAD     DBREG
3163  4452        OCTEL
3164  5733        JMP I   TYPDAT
            /
3165  2205  MES19,  TEXT    "RECALIBRATE ERROR DISCONNECT!"
3166  0301
3167  1411
3170  0222
3171  0124
3172  2540
3173  0522
3174  2217
3175  2240
3176  2411
3177  2303
3200  1716
3201  1505
3202  7124
3203  4100
            /
3204  2303  TEXPC,  TEXT    "PC!"
3205  7200
```

```
3206  2324  TEXST,  TEXT    "ST1"
3207  7200
3210  0315  TEXCM,  TEXT    "CM1"
3211  7200
3212  1515  TEXHM,  TEXT    "HM1"
3213  7200
3214  1101  TEXIA,  TEXT    "IA1"
3215  7200
3216  0401  TEXDA,  TEXT    "DA1"
3217  7200
3220  2323  TEXSS,  TEXT    "SS1"
3221  7200
3222  0301  TEXCA,  TEXT    "CA1"
3223  7200
3224  2703  TEXWC,  TEXT    "WC1"
3225  7200
3226  0627  TEXFW,  TEXT    "FW1"
3227  7200
3230  0123  TEXAS,  TEXT    "AS1"
3231  7200
3232  2701  TEXWA,  TEXT    "WA1"
3233  7200
3234  0104  TEXAD,  TEXT    "AD1"
3235  7200
3236  0407  TEXDG,  TEXT    "DG1"
3237  7200
3240  0402  TEXDB,  TEXT    "DB1"
3241  7200
                /
3242  2205  ERTX1,  TEXT    "READ STATUS"
3243  0124
3244  4023
3245  2401
3246  2425
3247  2300
3250  2722  ERTX2,  TEXT    "WRITE STATUS"
3251  1124
3252  0540
3253  2324
3254  0124
3255  2523
3256  0200
3257  2305  ERTX3,  TEXT    "SEEK STATUS"
3260  0513
3261  4023
3262  2401
3263  2425
3264  2302
3265  2205  ERTX4,  TEXT    "RECALIBRATE STATUS"
3266  0301
3267  1411
3270  0222
3271  0124
3272  0540
3273  2324
```



```
3274  0124
3275  2523
3276  0200
3277  0411  ERTX5,  TEXT    "DISK DATA"
3300  2313
3301  4004
3302  0124
3303  0100
                /
3304  4005  MES0,   TEXT    " ERROR"
3305  2222
3306  1722
3307  0000
3310  2213  MES1,   TEXT "RK8E DATA RELIABILITY"
3311  7005
3312  4004
3313  0124
3314  0140
3315  2205
3316  1411
3317  0102
3320  1114
3321  1124
3322  3100
3323  0530  MES2,   TEXT "EXERCISE"
3324  0522
3325  0311
3326  2305
3327  0000
3330  4004  MES3,   TEXT " DISK"
3331  1123
3332  1300
3333  1617  MES4,   TEXT    "NON-RECOVERABLE "
3334  1655
3335  2205
3336  0317
3337  2605
3340  2201
3341  0214
3342  2540
3343  0000
3344  0115  MES5,   TEXT    "AMOUNT OF EXTENDED R/W MEMORY(2-7)?"
3345  1725
3346  1624
3347  4017
3350  0640
3351  0530
3352  2405
3353  1604
3354  0504
3355  4022
3356  5727
3357  4015
3360  0515
3361  1722
```

```
3362  3150
3363  6055
3364  6751
3365  7700
3366  0103    MES6,   TEXT    "ACCEPT MODE?"
3367  0305
3370  2024
3371  4015
3372  1706
3373  0577
3374  0000
3375  0423    MES7,   TEXT    "DSK HARD SOFT COMP"
3376  1340
3377  1201
3400  2204
3401  4023
3402  1706
3403  2440
3404  0317
3405  1520
3406  0200
3407  0611    MES8,   TEXT    "FIELD?"
3410  0514
3411  2477
3412  0200
3413  2422    MES9,   TEXT    "TRACK?"
3414  0103
3415  1377
3416  0000
3417  0533    MES10,  TEXT    "EXTRA SECTORS?"
3420  2422
3421  0140
3422  2305
3423  0324
3424  1722
3425  2377
3426  0000
3427  0214    MES11,  TEXT    "BLOCK LENGTH?"
3430  1703
3431  1340
3432  1405
3433  1607
3434  2410
3435  7700
3436  2305    MES12,  TEXT    "SEQUENCE?"
3437  2123
3440  0516
3441  0305
3442  7700
3443  0401    MES13,  TEXT    "DATA?"
3444  2401
3445  7700
3446  0122    MES14,  TEXT    "ARE YOU SURE?"
3447  0542
3450  3117
```



```
3451  2540
3452  2325
3453  2205
3454  7700
3455  4004    MES15,  TEXT    " DISCONNECTED!"
3456  1123
3457  0317
3460  1616
3461  0503
3462  2405
3463  0441
3464  0300
3465  2331    MES16,  TEXT    "SYSTEM SHUT DOWN, NO DISKS TO RUN!"
3466  2324
3467  0515
3470  4023
3471  1825
3472  2440
3473  0417
3474  2716
3475  5442
3476  1617
3477  4034
3500  1123
3501  1323
3502  4024
3503  1742
3504  2325
3505  1641
3506  0000
3507  0411    MES17,  TEXT    "DISK "
3510  2313
3511  4000
3512  4320    MES18,  TEXT    " PASS COMPLETE!"
3513  0123
3514  2342
3515  0517
3516  1523
3517  1425
3520  2425
3521  4200
              /
3522  0002    D0?M1,  0
3523  0000    D1?M1,  0
3524  0002    D2?M1,  0
3525  0002    D3?M1,  0
3526  0000    D0?M2,  0
3527  0002    D1?M2,  0
3530  0002    D2?M2,  0
3531  0002    D3?M2,  0
              /
3532  0002    D0HRD,  0
3533  0002    D0SOF,  0
3534  0002    D0CMP,  0
3535  0002    D1HRD,  0
```

```
/       PAL10   V142    16-JUL-73       17:42   PAGE 1-38

          3536  0000    D1SOF,  0
          3537  0000    D1CMP,  0
          3540  0000    D2HRD,  0
          3541  0000    D2SOF,  0
          3542  0000    D2CMP,  0
          3543  0000    D3HRD,  0
          3544  0000    D3SOF,  0
          3545  0000    D3CMP,  0
                        /
          3546  0000    FLDFLG, 0
          3547  0000    TRKFLG, 0
          3550  0000    SECFLG, 0
          3551  0000    HLFFLG, 0
          3552  0000    SEQFLG, 0
                        /
          3553  0000    DSK0A,  0
          3554  0000    DSK1A,  0
          3555  0000    DSK2A,  0
          3556  0000    DSK3A,  0
                        /
          3557  0000    DSK0B,  0
          3560  0000    DSK1B,  0
          3561  0000    DSK2B,  0
          3562  0000    DSK3B,  0
                        /
                        /PLACE FOR DATA IN MANUAL MODE
                        /
          3563  0000    DAT1,   0000
          3564  0000    DAT2,   0000
          3565  0000    DAT3,   0000
          3566  0000    DAT4,   0000
          3567  0000    DAT5,   0000
          3570  0000    DAT6,   0000
          3571  0000    DAT7,   0000
          3572  0000    DAT8,   0000
          3573  0000    DAT9,   0000
          3574  0000    DAT10,  0000
          3575  0000    DAT11,  0000
          3576  0000    DAT12,  0000
                        /
                3600    *3600
                        /
                3600    STRBUF=.
                        /
                        $$$$
```

```
/       PAL10   V142    16-JUL-73       17:42   PAGE 1-39

0000  11111100  11111110  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111110  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111000  00000000  11111111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00111111


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111110  00111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110011

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11000000  00000000

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


2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  00000000  00000011

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  00001111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100001


3300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

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
```



```
A3170   0760
A3770   2755
A7707   2756
ACDCA   0365
ADREG   0135
AGAIN   1333
ALLAGN  0252
AMOUNT  0055
ASKNX1  0342
ASKNX2  0400
ASKNX3  0417
ASKNX4  0456
ASKNX5  0471
ASKSUR  0520
ASREG   0133
AUTO10  0010
AUTO11  0011
AUTO12  0012
BADHLT  1710
BDREC   1024
BGN     2200
BGNBUF  0150
BRKRET  0366
BUFTAL  0120
CAREG   0130
CONTR1  2737
CHANG   2733
CHANGR  2742
CHKPOT  2150
CHKRES  3007
CHKSAV  0143
CHKYN   2127
CHNCDF  2252
CHNHLT  2753
CHNPOT  2760
CKYIN   2455
CLDR    1400
CLRALL  4450
CLRBAK  3174
CLRSTA  2332
CMPPOT  2564
CMREG   2123
CONCUR  0726
CONSEC  0151
CRCFLG  0157
CRLF    4453
D0CMP   3534
D0HRD   3532
D0SOF   3533
D0TM1   3522
D0TM2   3526
D1CMP   3537
D1HRD   3535
D1SOF   3536
D1TM1   3523
D1TM2   3527
D2CMP   3542
D2HRD   3540
D2SOF   3541
D2TM1   3524
D2TM2   3530
D3CMP   3548
D3HRD   3543
D3SOF   3544
D3TM1   3525
D3TM2   3531
DAREG   0126
DAT1    3563
DAT10   3574
DAT11   3575
DAT12   3576
DAT2    3564
DAT3    3565
DAT4    3566
DAT5    3567
DAT6    3570
DAT7    3571
DAT8    3572
DAT9    3573
DATFLG  0160
DATPOT  0152
DATTRY  0142
DBREG   0137
DCLR    6742
DDREG   0136
DISCON  4422
DISKGO  4434
DLAG    6743
DLOA    6744
DLSC    6746
DMAN    6747
DOHEAD  1242
DRST    6745
DSKPA   3553
DSKPB   3557
DSK1A   3554
DSK1B   3560
DSK2A   3555
DSK2B   3561
DSK3A   3556
DSK3B   3562
DSKEX   2374
DSKGO   2200
DSKOUT  2036
DSKP    6741
DSKPOT  2135
DSKRET  2316
DSKSKP  4443
DYCHK   1630
DYR1    1636
DUMP    2627
ERFLG   0156
ERHLT2  1403
ERHLT3  2963
ERHLT4  2555
ERHLT5  2546
ERHLT6  2732
ERHLT7  1407
ERRO    1200
ERRDEX  1342
ERRDP   4441
ERTXL   3240
ERTX2   3250
ERTX3   3257
ERTX4   3265
ERTX5   3277
ESAVE   1355
EXIT    1552
FILLER  2730
FIRTIM  0173
FLOFLG  3546
FNDSUM  0144
FORIN   4425
FROCY   1474
FWREC   0132
GENDAT  4428
GETAC   2103
GNDAT   1741
GOAGN   2341
GOBAK   2226
GOCDF   1646
GOCHK   2263
GOCLO   2256
GOREAD  1072
GOTIT   1236
HEDTAB  1366
HLFFLG  3551
INERR   2426
INTCH   0140
INTDA   0125
INTER1  3127
INTER2  2307
IOT1    2721
IOT2    1401
IOT3    2562
IOT4    2553
IOT5    2544
IOT6    2730
IOT7    1405
ISAVE1  2565
ISAVE2  2566
ISAVE3  2567
K0003   0056
K0004   0057
K0006   0060
K0007   0061
K0018   0062
K0019   0063
K0020   0013
K0043   0014
K0073   0064
K0077   0104
K0100   0015
K0200   0016
K0212   1473
K0215   1472
K0240   0066
K0260   0065
K0277   0071
K0316   0067
K0331   0070
K0402   0072
K1000   0074
K177    2125
K1777   0075
K200    2126
K2000   0076
K3000   0077
K3748   1561
K4000   0073
K4100   1560
K5405   0363
K6000   2100
K7422   2128
K7700   0101
K7760   0102
K7761   0103
K7764   1357
K7771   1356
KCDF    2125
KEYRET  2312
KHLT    2205
KROT    0246
KSKP    0540
LDAD    2556
LDADD   4446
LDCA    2552
LDCM    2729
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LDCMD	4444	PCNTR1	1363	SEKER	2075	TPSTA	3000
LOCUR	4445	PCNTR2	1364	SEKEX	2101	TRASH1	2112
LOMAN	4447	PCNTR3	1365	SEKGO	1136	TRASH2	2113
LOMN	1400	PCREG	2121	SEKOUT	2000	TRASH3	2114
LNKDCA	2364	POLDSK	2116	SEKSW	2147	TRKFLG	3547
M12	0107	POLNEX	1000	SELCHK	4430	TRYCNT	1166
M4	2112	PRINT	2620	SECFLG	3552	TRYTIM	1067
M5	2111	PRN	1516	SETFLD	4427	TSAVE1	3042
MANUAL	0317	PRNDAT	1360	SETGEN	4426	TSAVE2	3043
MAXFLD	0145	PRNTER	4451	SPAC	1554	TSAVE3	3044
MAXTIM	0146	RAD1	1775	SPACE	4423	TSAVE4	3045
MAXTRK	0147	RAD2	1776	SPBLK	2165	TSAVE5	3046
MES0	3304	RAD3	1777	SPFLD	2161	TYPDAT	3133
MES1	3310	RAN1	1771	SPSEC	2164	TYPE	4440
MES10	3417	RAN2	1772	SPTRK1	2162	UPDATE	0115
MES11	3427	RANDAT	4421	SPTRK2	2163	UPDNE	1462
MES12	3436	RANDOM	1717	SSREG	2127	UPTRY	1133
MES13	3443	RANGEN	4433	STAPDT	3154	WAIT	2110
MES14	3446	RANJMS	0554	STATER	2357	WAREG	0134
MES15	3453	RCMSS	1410	STATRY	2141	WASRO	2262
MES16	3465	RDST	2543	STATUS	2324	WCREG	0131
MES17	3507	RDSTA	1122	STFLD	2673	WRDCHK	1612
MES18	3512	RDSTAT	4442	STGEN	1755	WRKDON	2272
MES19	3165	RDTRY	1110	STPHLT	2006	XCHKYN	0031
MES2	3323	RECAL	4436	STRAUT	1312	XCKPDT	0030
MES3	3330	RECDF	2605	STRBUF	3600	XCLOR	0050
MES4	3033	RECEIV	4437	STREG	2122	XCRLF	0053
MES5	3344	REFILL	0733	STRSEK	2526	XDSKGO	0054
MES6	3366	RELOAD	2172	STRSTP	2003	XDUMP	0022
MES7	3375	REREAD	1101	STRTFX	2223	XERRO	0041
MES8	3407	RESEEK	1150	STRWRK	2237	XFRDCT	0052
MES9	3413	RESEK	2010	SVLNK	2171	XGETAC	0054
MMREG	2124	RESERR	3107	SWDAT	2601	XGNDAT	0020
MRPRN	1524	RESET	0535	TEXAD	3234	XLOAD	0046
MSKER	1716	RESRAN	4435	TEXAS	3230	XLOCA	0045
NEWRD	0737	RESTA	3075	TEXCA	3222	XLOCM	0044
NEXSEC	2347	RESTOR	3047	TEXCM	3218	XLOMN	0047
NEXT	0260	RETRN	2353	TEXDA	3216	XOCT1	0024
NODRC	1232	RETURN	2300	TEXDB	3240	XOCT4	0025
NODSKS	2671	REWRT	1055	TEXDC	3236	XPRINT	0040
NOERR	1676	RNFLD	0633	TEXFW	3226	XPRN	0051
NONCRC	1236	RNWRD	2600	TEXIA	3214	XRDST	0042
NOTEX	1347	RSRAN	1763	TEXMM	3212	XREG	1362
NOTSTA	3036	RUN	2600	TEXPC	3224	XRESTR	2036
NTSEK	0552	RUNPDT	0156	TEXSS	3220	XRNDOM	2033
NTWRKS	1712	SAMPDL	1002	TEXST	3226	XRNWRD	0021
NXTSEK	0532	SAV1	1773	TEXWA	3232	XRSRAN	2035
OCT1	2420	SAV2	1774	TEXWC	3224	XSDKP	0043
OCT4	2438	SAVAC	0170	TIME	3122	XSKOUT	2032
OCTEL	4452	SDKP	2720	TIMER1	3131	XSPAC	0023
ONEIN	4424	SECFLG	3550	TIMER2	3132	XSTFLD	0027
OPRTAL	0217	SEEK	4432	TIMPDT	2153	XSTGEN	0026

XTEXT	1361						
XWAIT	2037						
YESNO	4431						

ERRORS DETECTED: 0

LINKS GENERATED: 48

RUN-TIME: 12 SECONDS

3K CORE USED