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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TABLE OF CONTENTS

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 NECESSARY RK8E BUS ADAPTER.

B. AT LEAST 4K OF READ/WRITE MEMORY

C. ASR-33 TELETYPE OR EQUIVALENT

D. RK8E DISK CONTROL

E. RK8S DISK DRIVE(S)

2.2 PROGRAM STORAGE

THE PROGRAM OCCUPIES OR UTILIZES LOCATION 0003 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.
SWR9=1	DRIVE DISCONNECT AFTER PASS COMPLETION.
SWR10=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 IN KEY CLEAR AND THEN KEY CONTINUE ON PDP8/L, PDP8/M, AND PDP8/F COMPUTERS.

B. LOAD THE PROGRAM INTO MEMORY FIELD 0 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 RK05 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 7200 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=2, 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 RKBE 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 #200 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.

```
RKBE DATA RELIABILITY
AMOUNT OF EXTENDED R/W MEMORY (2-7)?
```

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

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 (0-7).

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 (0002-1453?).

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 (0=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 (0-17), (NOTE: IF THE FIELD AND THE BLOCK LENGTH PREVIOUSLY SELECTED WAS 0, THE AMOUNT OF EXTRA SECTORS WILL BE LIMITED TO 07, 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 0200, 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 "DLCAP
ERHLT5	SKIP TRAP FOR IOT "DRST"
ERHLT6	SKIP TRAP FOR IOT "DLDCY
ERHLT7	SKIP TRAP FOR IOT "DMAGM
DADHLT	CHECKSUM FAILED BUT WORD-BY-WORD COMPARE WORKED
NODSKS	NO DISKS AVAILABLE TO RUN
FHLT	PROGRAM WILL ONLY RUN IN FIELD 2

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.

SY: CONTENTS OF THE STATUS REGISTER.

CW: 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 SIMULTANIOUSLY, 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 -ARE SOFT COMP
 X  .000  0713  0021
 X  .284  9679  2771
```

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 ST1=4010 CM=4000 MM=4007 DA=2201 DA=0002
SS=0422 CA=3600 WC=7002 FW=2002
```

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=2476 ST1=4002 CM=3700 MM=3600 DA=4207 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 ST1=4210 CM=1432 MM=1432 DA=1035 DA=1021
SS=2221 CA=0001 WC=5001 FW=7400
AS=0015 WA=0027 AD=2214 DG=2537 DS=0536
AS=2215 WA=0277 AD=0107 DG=2777 DS=2776
AS=2015 WA=0277 AD=0423 DG=6167 DS=6166
```

6. RESTRICTIONS

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

7. PROGRAM OPERATING INFORMATION

OCT	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.

AC12	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		
0-5		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		
7-11		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

6744 DLCA               "LOAD COMMAND" LOAD THE COMMAND
                        REGISTER FROM AC, CLEAR THE AC,
                        AND CLEAR THE STATUS REGISTER.

60
<>

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 CLOCK (125 KCPS)
6                       EXTENDED MEMORY ADDRESS
7                       EXTENDED MEMORY ADDRESS
8                       EXTENDED MEMORY ADDRESS
9                       UNIT SELECT
10-12                   UNIT SELECT
13-17                   EXTENDED CYLINDER ADDRESS

6747 DMAC               "MAINTENANCE ICT" 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

5. 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

```
                /
                /RK8E DATA RELIABILITY PROGRAM
                /
                /COPYRIGHT (C) 1972-1973, DIGITAL EQUIP, CORP., MAYNARD, MASS.
                /
                /ALL KNOWN HALTS
                /
0200  1423      ERHLT2                          /SKIP TRAP DCLR
0201  2563      ERHLT3                          /SKIP TRAP DLAG
0202  2595      ERHLT4                          /SKIP TRAP DLCA
0203  2546      ERHLT5                          /SKIP TRAP DRST
0204  2732      ERHLT6                          /SKIP TRAP DLDC
0205  1427      ERHLT7                          /SKIP TRAP DMAN
0206  3127      INTER1                          /NO DISK INTERRUPT
0207  2307      INTER2                          /UNDEFINED INTERRUPT
0210  3605      KHLT                            /PROGRAM WILL ONLY RUN IN FIELD 0
0211  2671      NODSKS                          /NO DISKS AVAILABLE TO RUN
0212  2736      STPHLT                          /PROGRAM STOP FROM SWR4=1
0213  2753      CHNHLT                          /IOT CHANGE HALT
0214  1712      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      RECEIV=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
      4450      CLRALL=JMS I    XCLDR
      4447      LDMAN=JMS I     XLDMN
      4451      PRNTER=JMS I    XPRN
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/ PAL10 V142 16-JUL-73 17:42 PAGE 1-1

```
      4452      OCTEL=JMS I     XPROCT
      4460      TYPE=JMS I      XPRINT
      4453      CRLF=JMS I      XCRLF
      4420      GENDAT=JMS I    XGNDAT
                /
      0000      *0
                /
0000  0000              0                       /INTERRUPT SERVICE RETURN
0001  3701              3701                    /DCA SAVAC  SAVE AC AT INT.
0002  7022              7022                    /RAL  SHIFT LINK AT TIME OF INT.
0003  3033              3033                    /DCA SVLNK  SAVE LINK AT TIME OF INT.
0004  5404              5404                    /JMP I 5    RETURN TO INT. SERVICE
0005  0005              0005                    /RETURN POINTER
                /
      0010      *10
                /
0010  0000      AUTO10, 0
                /
0011  0000      AUTO11, 0
                /
0012  0000      AUTO12, 0
                /
                /
0013  0000      K0000,  0000
0014  0040      K0040,  0040
0015  0100      K0100,  0100
0016  0200      K0200,  0200
                /
      0020      *20
                /
0020  1741      XGNDAT, GNDAT
0021  2000      XRNWRD, RNWRD
0022  2427      XDUMP,  DUMP
0023  1554      XSPAC,  SPAC
0024  2401      XOCT1,  OCT1
0025  2432      XOCT4,  OCT4
0026  1755      XSTGEN, STGEN
0027  2573      XSTFLD, STFLD
0030  2150      XCKPOT, CKPOT
0031  2127      XCHKYN, CHKYN
0032  2031      XSKOUT, SEKOUT
0033  1747      XRNDOM, RNDOM
0034  2222      XDSKGO, DSKGO
0035  1763      XRSRAN, RSRAN
0036  3147      XRESTR, RESTOR
0037  2412      XWAIT,  WAIT
0040  2427      XPRINT, PRINT
0041  1323      XERRO,  ERRO
0042  2343      XRDST,  RDST
0043  2722      XSDKP,  SDKP
0044  2725      XLDCM,  LDCM
0045  2552      XLDCA,  LDCA
0046  2556      XLDAD,  LDAD
0047  1424      XLDMN,  LDMN
0050  1400      XCLDR,  CLDR
```

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0151  1516    XPRV,   PRV
0152  1474    XFRDCT, FRDCT
0153  1462    XUPONE, UPONE
0154  2123    XGETAC, GETAC
0155  7235    AMOUNT, 0
0156  0003    K0003,  0003
0157  0004    K0004,  0004
0158  0006    K0006,  0006
0159  0007    K0007,  0007
0160  0010    K0010,  0010
0161  0017    K0017,  0017
0162  0020    K0020,  0020
0163  0260    K0260,  0260
0164  0240    K0240,  0240
0165  0316    K0316,  0316
0166  0331    K0331,  0331
0167  0377    K0377,  0377
0170  0432    K0432,  0432
0171  4000    K4000,  4000
0172  1200    K1200,  1200
0173  1777    K1777,  1777
0174  2000    K2000,  2000
0175  3000    K3000,  3000
0176  6000    K6000,  6000
0177  7700    K7700,  7700
0200  7760    K7760,  7760
0201  7761    K7761,  7761
0202  0077    K0077,  0077
0203  6201    KCDF,   CDF
0204  7400    K9400,  7400
              /
              DECIMAL
              /
0205  7764    M12,    -12
              /
              OCTAL
              /
0206  7774    M4,     -4
0207  7773    M5,     -5
              /
0210  0200    TRASH1, 0
0211  0200    TRASH2, 0
0212  0000    TRASH3, 0
0213  0200    UPDATE, 0
0214  0000    POLDSK, 0
0215  0000    OPRTAL, 0
0216  0000    GUPTAL, 0
0217  0000    PCREG,  0
0220  0000    STREG,  0
0221  0000    CHREG,  0
0222  0000    HRREG,  0
0223  0000    INTDA,  0
0224  0000    DAREG,  0
0225  0000    SSREG,  0
0226  0000    DAREG,  0
```



```
0227  0000    MQREG,  0
0230  0000    FWPCG,  0
0231  0000    ASREG,  0
0232  0000    AAREG,  0
0233  0000    ADREG,  0
0234  0000    DCREG,  0
0235  0000    DRHEG,  0
0236  0000    INTCH,  0
0237  0000    STATRY, 0
0240  0000    DATTRY, 0
0241  0000    CHASAV, 0
0242  0000    FNDSUM, 0
0243  0000    MAXFLG, 0
0244  7607    MAXTIM, 7607
0245  3240    MAXTRK, 3240
0246  3000    MONBUF, STRBUF
0247  0000    CONSEG, 0
              /
0250  3563    DATPOT, DAT1
0251  3522    TIMPOT, DSTM1
0252  3527    STAPOT, DSKRD -3
0253  3533    DSKPOT, DSK0A
0254  3557    RUNPOT, DSK00
              /
0255  0000    DRQFLG, 0
0256  0000    DATFLG, 0
0257  0000    SPZLG,  0
0260  0000    SPTRK1, 0
0261  0000    SPTRK2, 0
0262  0000    SPSEC,  0
0263  0000    SPBLK,  0
0264  0000    ERFLG,  0
0265  0000    SERSW,  0
0266  0000    SAVAC,  0
0267  0000    SVLEN,  0
0270  0000    RELOAD, 0
0271  0000    FIRTIM, 0
0272  0000    CLRBAK, 0
              /
      4200    .=200
              /
0200  5203    BGN,    JMP     .+3                     /TO REGULAR TEST
0201  5777'           JMP     CHANG                   /CHANGE IOT ROUTINE
0202  5776'           JMP     STRSTP                  /RESTART
0203  6224            CLF
0204  7442            SZA                             /FIELD 77777
0205  7402    XHLT,   HLT                             /WILL ONLY RUN IN FIELD 77777
0206  1100            TAD     KCDF
0207  3213            DCA     .+6
0210  7402            HLT                             /MAKE DF#1F
0211  1305            TAD     ALDCA
0212  3001            DCA     1                       /SETUP AC DCA
0213  1246            TAD     KROT
0214  3002            DCA     2                       /SETUP ROTATE LINK
0215  1364            TAD     LAKDCA
```

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 0216  3003          DCA     3                       /SETUP SAVE LINK
 0217  1363          TAD     K5485
 0220  3004          DCA     4                       /SETUP JMP RETURN
 0221  1366          TAD     ARKRET
 0222  3005          DCA     5                       /RETURN POINTER
                /
 0223  1101  STRTEX, TAD     K7720
 0224  3112          DCA     TRASH1                  /CLEAR COUNTER
 0225  1775          TAD     RANJMS
 0226  3774          DCA     SNDAT           /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 MARGE DATA RELIABILITY=
 0240  3310          MES1
 0241  4451          PRNTER                          /PRINT "AMOUNT OF MEMORY="
 0242  3344          MES5
 0243  4404          GNCIN                           /RECEIVE ONE OCTAL
 0244  0270          R3YB                            /LIMITS
 0245  5241          JMP     .-4                     /INPUT ERROR
 0246  7004  KROT,   RAL
 0247  7606          RTL
 0250  7040          CMA
 0251  3145          DCA     MAXFLD                  /COMPLEMENT
 0252  4451  ALLAGN, PRNTER                          /MAXIMUM FIELD POINTER
 0253  3323          MES2                            /PRINT "EXERCISE="
 0254  3112          DCA     TRASH2
 0255  1110          TAD     K4
 0256  3113          DCA     TRASH2
 0257  3155          DCA     AMOUNT                  /A FEW POINTERS
 0260  1113  NEXT,   TAD     TRASH1
 0261  1156          TAD     RUNPOT
 0262  3114          DCA     TRASH3                  /SAVE RUN POINTER
 0263  7343          CLA CLL CMA
 0264  4451          PRNTER                          /PRINT " DISK="
 0265  3332          MES3
 0266  1765          TAD     K0260
 0267  1112          TAD     TRASH1                  /ADD IN DISK NUMBER
 0270  4447          TYPE                            /TYPE DISK NUMBER
 0271  1671          TAD     K0277
 0272  4445          TYPE                            /TYPE Y
 0273  4437          RECEIV                          /RECEIVE KEY INPUT
 0274  4451          YESNO                           /WAS IT YES OR NO
 0275  5252          JMP     ALLAGN                  /NEITHER
 0276  5301          JMP     .+3                     /WAS A NO
 0277  7055          SZA     AMOUNT                  /AMOUNT OF DISK FOUND
 0300  7340          CLA CLL CMA                     /AC TO 7777 FOR EXISTING DISK
 0301  3514          DCA I   TRASH3                  /SETUP RUN POINTER
 0302  2112          ISZ     TRASH1
```



```
 0303  2113          ISZ     TRASH2
 0304  5260          JMP     NEXT                    /ASK ABOUT NEXT DISK
                /
 0305  1155          TAD     AMOUNT                  /GET AMOUNT FOUND
 0306  7652          SNA CLA                         /ARE ANY FOUND
 0307  5023          JMP     STRTEX                  /OPERATOR ERROR NO DISK INPUT
 0310  4451          PRNTER                          /PRINT "ACCEPT MODE?"
 0311  3346          MES6
 0312  4437          RECEIV                          /RECEIVE INPUT
 0313  4431          YESNO                           /YES OR NO????
 0314  5241          JMP     .+4                     /NEITHER ALL AGAIN
 0315  7652          SKP CLA                         /MANUAL TEST
 0316  5273          JMP     ASKSUR                  /ASK "ARE YOU SURE"
                /
 0317  4451  MANUAL, PRNTER                          /PRINT "FIELD="
 0320  3307          MES5
 0321  4437          RECEIV                          /RECEIVE Y OR N
 0322  4431          YESNO                           /CHECK FOR Y OR N
 0323  5027          JMP     MANUAL                  /NEITHER Y OR N
 0324  5062          JMP     ASKNX1                  /WAS A N, ASK ABOUT NEXT
 0325  4423          SPACE                           /SPACE OUT ONE
 0326  4404          GNCIN                           /GET 1 OCTAL
 0327  0270          R3YB                            /LIMITS
 0330  5027          JMP     MANUAL                  /INPUT ERROR ASK AGAIN
 0331  7004          CLL RAL
 0332  7706          RTL
 0333  3161          DCA     SPFLD                   /SAVE INPUT
 0334  1161          TAD     SPFLD
 0335  1145          TAD     MAXFLD                  /COMPARE TO MAXIMUM
 0336  7700          SMA CLA                         /0,-1,2
 0337  5027          JMP     MANUAL                  /INPUT ERROR
 0340  7340          CLA CLL CMA
 0341  3772          DCA     FLOFLG                  /SETUP FIELD FLAG
                /
 0342  4451  ASKNX1, PRNTER                          /PRINT "TRACK?"
 0343  3313          MES4
 0344  4437          RECEIV                          /RECEIVE Y OR N
 0345  4431          YESNO                           /CHECK FOR Y OR N
 0346  5342          JMP     ASKNX1                  /ERROR, ASK AGAIN
 0347  5772          JMP     ASKNX2                  /N, ASK ABOUT NEXT
 0350  4423          SPACE
 0351  4404          GNCIN                           /RECEIVE 1 IN OCTAL
 0352  7600          R3YB                            /LIMITS
 0353  5347          JMP     .-4                     /ERROR, ASK AGAIN
 0354  3160          DCA     SPTRK1                  /SAVE EXTENDED TRACK BIT
 0355  4404          GNCIN                           /RECEIVE FOUR IN OCTAL
 0356  5242          JMP     ASKNX1                  /ERROR, ASK AGAIN
 0357  3163          DCA     SPTRK2                  /SAVE CYL., SURFACE, AND SECTOR
 0360  7340          CLA CLL CMA
 0361  3772          DCA     TRKFLG                  /SETUP TRACK FLAG
 0362  5771          JMP     ASKNX2                  /ASK ABOUT NEXT
                /
 0363  5405  K5485,  5405
 0364  3171  LNKDCA, DCA     SVLNK
 0365  3170  ACDCA,  DCA     SAVAC
```

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  0366  2300    BRKRET, RETURN
                /
  0370  3547
  0371  7400
  0372  3546
  0373  0520
  0374  2601
  0375  0554
  0376  2203
  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  3437            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  1775'   ASKNX4, TAD     TRKFLG                  /GET TRACK FLAG
  0457  7640            SZA CLA                         /[illegible] IT SET?
  0460  5271            JMP     ASKNX5                  /[illegible] SEQUENCE
  0461  4451            PRNTER                          /[illegible]"
  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  1342            TAD     KSKP
  0502  3773'           DCA     SWDAT                   /SET INSTRUCTION SWITCH
  0503  1127            TAD     K10                     
  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     .-3                     /GET NEXT
  0516  7340            CLA CLL CMA
  0517  3167            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  1255            TAD     AMOUNT
  0530  7041            CIA
  0531  3113            DCA     TRASH2                  /SOME POINTERS
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```
 0532  1112   NXTSEK, TAD     TRASH1
 0533  [illegible]    ELCHK                         /CHECK RUN POINTER
 0534  [illegible]    JMP     [illegible]           /WAS A ZERO DON'T RUN
 0535  1112   RESET,  TAD     TRASH1
 0536  7104           CLL RAL
 0537  4434           RECAL                         /RECALIBRATE DRIVE
 0540  7612   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                       /MORE TO SEND OUT
 0551  5771'          JMP     RUN                   /START RANDOM DATA
 0552  2112   NTSEK,  ISZ     TRASH1
 0553  5332           JMP     NXTSEK                /SEND OUT NEXT EXISTING DISK
              /
 0554  4420   RANJMS, GENDAT
              /
 0571  0600
 0572  0200
 0573  0601
 0574  3552
 0575  3547
 0576  3550
 0577  3551
       0600   PAGE
              /
              /RUNNER FOR RANDOM DATA
              /
 0600  3166   RUN,    DCA     ERFLG                 /CLEAR ERROR POINTER
 0601  7604           LAS
 0602  0214           AND     K0040                 /MASK SWITCH 6
 0603  3167           DCA     SEKSW                 /LATCH
 0604  1167           TAD     SEKSW
 0605  7642           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  1165           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  0254           AND     K0277                 /MASK
 0622  7450           SNA                           /COULD BE 0
 0623  5233           JMP     RNFLD                 /WAS DON'T HAVE TO CHECK LIMITS
 0624  3140           DCA     INTCM                 /SAVE FIELD FOUND
 0625  1142           TAD     INTCM
 0626  1145           TAD     MAXFLD                /ADD IN MAXIMUM FIELD POINTER
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 0627  7710           SPA CLA                       /IN LIMITS????
 0630  5234           JMP     RNFLD +1              /YES, USE IT
 0631  1145           TAD     MAXFLD                /NO, USE MAXIMUM IN THE MACHINE
 0632  7040           CMA
 0633  3142   RNFLD,  DCA     INTCM
 0634  1775'          TAD     BUFFLG                /GET BLOCK FLAG
 0635  7650           SNA CLA                       /WAS IT SET????
 0636  4433           RANGEN                        /NO, USE RANDOM
 0637  1165           TAD     SPBLK
 0640  0215           AND     K0133                 /MASK
 0641  1140           TAD     INTCM
 0642  3140           DCA     INTCM                 /INITIAL HALF BLOCK BIT ****
 0643  1140           TAD     INTCM
 0644  0213           AND     K0100                 /MASK
 0645  7640           SZA CLA                       /HALF BLOCK SET????
 0646  1016           TAD     K0200                 /YES, SETUP WC POINTER
 0647  1176           TAD     K7400
 0650  3113           DCA     TRASH2                /WC BUILDER
 0651  1113           TAD     TRASH2
 0652  7041           CIA
 0653  3115           DCA     UPDATE                /UPDATER FOR FWREG
 0654  1142           TAD     INTCM
 0655  0360           AND     K0170                 /MASK FIELD BITS
 0656  7640           SZA CLA                       /WERE THERE ANY
 0657  1062           TAD     K0010                 /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  0050           AND     K0017                 /MASK
 0700  3114           DCA     TRASH3                /STARTING SECTOR
 0701  1113           TAD     TRASH2                /COMPUTE INITIAL WC
 0702  2112           ISZ     TRASH1
 0703  5301           JMP     .-2
 0704  3131           DCA     WCREG                 /UPDATE BY BUILDER
 0705  4433           RANGEN                        /INITIAL WORD COUNT ****
 0706  3130           DCA     CAREG                 /GENERATE RANDOM CA
 0707  1142           TAD     INTCM                 /SAVE IT
 0710  0264           AND     K0070                 /MASK FIELD BITS
 0711  7640           SZA CLA                       /EXTENDED FIELD????
 0712  5330           JMP     FILLER                /INITIAL CA O.K.****
 0713  1150           TAD     BGNBUF
 0714  7140           CMA CLL
 0715  1130           TAD     CAREG
```

5

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/       PAL10   V142    16-JUL-73       17:42   PAGE 1-10

        [illegible]          [illegible]CLA                        [illegible]
        [illegible]          [illegible]                           [illegible] VALUE
        2720    1131         TAD      WCREG                        /GET WORD COUNT
        2721    7041         CIA
        2722    1130         TAD      CAREG                        /ADD IN CA
        2723    1016         TAD      K0200
        2724    7630         SZL CLA                               /WITHIN BOUNDS????
        2725    5330         JMP      FILLER                       /YES, INITIAL CA O.K.****
        2726    1150    CONCUR, TAD   RGNBUF                       /NO, USE PROGRAM +1
        2727    3130         DCA      CAREG                        /SAVE IT
                        /
                        /ROUTINE TO FILL AND CHECK SUM BUFFER
                        /
        2730    4425    FILLER, SETGEN                             /SETUP AND SAVE GENERATER
        2731    1110         TAD      M4
        2732    3141         DCA      STATRY                       /SETUP TRY COUNTER
        2733    4427    REFILL, SETFLD                             /FIELD + BUFTAL + AUTO 11 + 12
        2734    3335         DCA      .+1                          /FIELD TO BUFFER IN AC
        2735    7402         HLT                                   /CDF TO BUFFER
        2736    3143         DCA      CHKSAV                       [illegible]
        2737    4421    NEWRD,  RANDAT                             [illegible]
        2740    3112         DCA      TRASH1                       /SAVE OUTPUT WORD
        2741    1112         TAD      TRASH1                       /GET BACK WORD
        2742    3411         DCA I    AUTO11                       /STORE IN BUFFER
        2743    7100         CLL
        2744    1112         TAD      TRASH1                       /GET BACK WORD
        2745    1143         TAD      CHKSAV                       /ADD IN LAST
        2746    7430         SZL                                   /LINK [illegible]
        2747    7201         IAC                                   /ADD IT [illegible]
        2750    3143         DCA      CHKSAV                       /SAVE FOR NEXT
        2751    2120         ISZ      BUFTAL                       /UPDATE BUFFER TALLY
        2752    5337         JMP      NEWRD                        /MORE WORDS TO GO
        2753    6201         CDF      0
        2754    1136         TAD      ERFLG
        2755    7650         SNA CLA                               /ERROR FLAG SET????
        2756    5777'        JMP      POLNEX                       /POLE DRIVES
        2757    5772'        JMP      REWRT                        /YES, MUST BE A WRITE ERROR
                        /
        2760    0170    A0170,  0170
                        /
        2772    1255
        2773    3547
        2774    3550
        2775    3551
        2776    3546
        2777    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    4430         SELCHK                                /CHECK RUN POINTER
        1004    5200         JMP      POLNEX                       /TRY NEXT DRIVE
```

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/       PAL10   V142    16-JUL-73       17:42   PAGE 1-11

        [illegible]          TAD      POLDSK                       /GET POINTER
        [illegible]          AND      K0003                        [illegible]
        1007    [illegible]  CLL RAL                               [illegible]
        1010    4444         [illegible]                           [illegible]
        1011    4442         RDSTAT                                /[illegible] 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    0023         0023                                  /HEADER POINTER
        1023    7540         7540                                  /MESSAGE POINTER
        1024    1116    BORED,  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    5200         JMP      POLNEX                       /[illegible] POLE DISKS
        1035    5224         JMP      BORED                        /[illegible] RECALIBRATE
                        /
        1036    1116    GOTIT,  TAD   POLDSK                       /GET POINTER
        1037    0255         AND      K0003                        /MASK
        1040    1155         TAD      DSKPOT                       /GET DISK ADDRESS POINTER
        1041    3112         DCA      TRASH1
        1042    1512         TAD I    TRASH1                       /GET DISK ADDRESS
        1043    0361         AND      K0037                        /MASK DRIVE + EXTENDED BIT
        1044    1142         TAD      INTCM                        /ADD IN COMMAND
        1045    3142         DCA      INTCM                        /DRIVE NUMBER + EXTENDED BIT ***
        1046    1167         TAD      SEKSW                        /GET SEEK SWITCH LATCH
        1047    7642         SZA CLA                               /LOOP ON SEEK ONLY????
        1050    5350         JMP      RESEEK                       /YES!!!!
        1051    1512         TAD I    TRASH1                       /GET DISK ADDRESS
        1052    0122         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 FLAG
        1056    4434         DISKGO                                /GO WRITE
        1057    4422         4410                                  /WRITE DATA POINTER
        1060    5272         JMP      GOREAD                       /WRITE O.K.
        1061    7340         CLA CLL CMA
        1062    3136         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 2
```

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1073  7220           SMA CLA                /DID SWITCH 0????
1074  5301           JMP       REREAD       /NO
1075  7240           CLA CLL CMA
1076  3166           DCA       ERFLG        /SET ERROR FLAG
1077  4435           RESRAN                 /RESET DATA GENERATOR
1100  5776'          JMP       REFILL +2
1101  1367   REREAD, TAD       TRYTIM
1102  3366           DCA       TRYCNT       /SETUP FOR DIFF. SEEK 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  2400           2400                   /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       SEKGD        /DATA O.K.
1117  2142           ISZ       DATTRY       /UPDATE READ RE-TRY
1120  5310           JMP       RDTRY        /TRY AGAIN
1121  5335           JMP       SEKGD +1     /TRY TO SEEK IT
1122  1122   RDSTA,  TAD       STREG        /GET STATUS READ
1123  0162           AND       K0012        /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  7610           SKP CLA                /IS A HARD ERROR!
1131  7040           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'  SEKGD,  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  0172           AND       K0400        /MASK
1153  7650           SNA CLA                /TYPE STATUS REPORT????
1154  5157           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
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1162  1123           TAD       CMREG
1163  4433           RECAL                  /RECALIBRATE DRIVE
1164  5357           JMP       .-5          /TRY, SEEK AGAIN
1165  5772'          JMP       RUN          /DUMPED, NOT MORE AVAILABLE
                     /
1166  0000   TRYCNT, 0
                     /
1172  0000
1173  3000
1174  2450
1175  1000
1176  7731
1177  7733
      1200   PAGE
             /
             /SUBROUTINE FOR ERROR TYPEOUTS.
             /
1200  0000   ERRO,   0
1201  7001           IAC                    /UPDATE AC FLAG
1202  3364           DCA       PCNTR2       /SAVE AC FLAG
1203  1355           TAD       K7775
1204  3365           DCA       PCNTR3       /LINE COUNTER
1205  1123           TAD       CMREG        /GET LAST COMMAND
1206  0060           AND       K0006        /MASK DRIVE NUMBER
1207  7070           CLL CML CMA RAR
1210  3363           DCA       PCNTR1       /SETUP COUNTER
1211  1356           TAD       K0203
1212  2363           ISZ       PCNTR1
1213  5211           JMP       .-2          /COMPUTE WAY TO BUFFER
1214  1154           TAD       STARPT
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  7040           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  7410           SKP CLA
1235  3763           DCA I     PCNTR1       /HOLD AT 7777
1236  7604   NONCRC, LAS
1237  7006           CLL RTL
1240  7710           SPA CLA                /INHIBIT ERRORS????
1241  5342           JMP       ERRCEX       /YES
1242  1200   DOHEAD, TAD I     ERRO         /GET TEXT POINTER
1243  7540           SMA CLA                /DATA ERROR?
1244  5247           JMP       .+3          /NO WAY
1245  4762           JMS I     PRNDAT       /PRINT ONLY DATA
```

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1246  5342           JMP     ERRDEX          /EXIT
1247  4777           JMS     RDMSS           /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  3324           MES2
1275  4453           CRLF
1276  1200           TAD     ERRO
1277  3121           DCA     PCREG           /SAVE PC
1300  2200           ISZ     ERRO
1301  1600           TAD I   ERRO
1302  3355           DCA     ESAVE
1303  2200           ISZ     ERRO            /UPDATE P.C. RETURN
1304  1361           TAD     XTEXT
1305  3364           DCA     PCNTR2
1306  1362           TAD     XREG
1307  3010           DCA     AUTO10
1310  1357           TAD     K7764
1311  3363           DCA     PCNTR1          /COUNTER FOR    # OF HEADS
1312  1355   STRAUT, TAD     ESAVE           /GET TEXT POINTER
1313  7500           SMA
1314  5347           JMP     NOTEX           /NOT THIS ONE
1315  7104           CLL RAL
1316  3355           DCA     ESAVE
1317  2365           ISZ     PCNTR3          /UPDATE LINE FILL COUNTER
1320  7610           SKP CLA                 /NO CRLF
1321  4453           CRLF
1322  1364           TAD     PCNTR2          /GET TEXT MESSAGE POINTER
1323  2364           ISZ     PCNTR2
1324  2364           ISZ     PCNTR2
1325  3330           DCA     .+3             /STORE FOR PRNTER
1326  7340           CLA CLL CMA
1327  4451           PRNTER                  /PRINT XX:
1330  7402           HLT                     /MODIFIED TEXT POINTER
1331  1410           TAD I   AUTO10
1332  4452           OCTEL                   /PRINT FOUR OCTAL
1333  2363   AGAIN,  ISZ     PCNTR1
1334  5312           JMP     STRAUT          /CHECK FOR NEXT XX:
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1335  1776           TAD     SDKP
1336  1111           TAD     MS
1337  7650           SNA CLA                 /FIRST DATA ERROR?
1340  4760           JMS I   PRNDAT          /YES, PRINT DATA
1341  5344           JMP     .+3
1342  2200   ERRDEX, ISZ     ERRO
1343  2200           ISZ     ERRO            /UPDATE FOR RETURN
1344  7301           CLA CLL IAC             /ENABLE CLEAR CONTROL
1345  4450           CLRALL                  /CLEAR CONTROL
1346  5600           JMP I   ERRO            /EXIT
1347  7104   NOTEX,  CLL RAL
1350  3355           DCA     ESAVE
1351  2364           ISZ     PCNTR2
1352  2364           ISZ     PCNTR2
1353  2010           ISZ     AUTO10
1354  5333           JMP     AGAIN
             /
1355  0000   ESAVE,  0
1356  7771   K7771,  7771
1357  7764   K7764,  7764
1360  3133   PRNDAT, TYPDAT
1361  3224   XTEXT,  TEXPC
1362  0120   XREG,   PCREG -1
1363  0000   PCNTR1, 0
1364  0000   PCNTR2, 0
1365  0000   PCNTR3, 0
1366  1366   HEDTAD, TAD     HEDTAD
1367  3240           ERTX1
1370  3250           ERTX2
1371  3257           ERTX3
1372  3265           ERTX4
1373  3277           ERTX5
             /
1376  2723
1377  1410
      1400   PAGE
             /
             /SUBROUTINE TO ISSUE "DCLR" CLEAR IOT
             /
1400  0000   CLDR,   0
1401  6742   IOT2,   DCLR                    /DCLR "CLEAR IOT"
1402  5600           JMP I   CLDR            /EXIT
1403  7402   ERHLT2, HLT                     /SKIP TRAP
             /
             /ROUTINE TO LOAD MAINTENANCE REGISTER
             /
1404  0000   LDMN,   0
1405  6747   IOT7,   DMAN                    /MAINTENANCE IOT
1406  5604           JMP I   LDMN            /EXIT
1407  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  1020          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  5222          JMP     .-6
1427  7300          CLA CLL
1430  1327          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     K0022           /ENABLE READ LOWER BUFFER
1442  4447          LDMAN                   /LOAD MAINTENANCE
1443  3124          DCA     MAREG           /SAVE CLAM AND READ
1444  1327          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  1016          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  5610          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
```



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1473  0212  K0212,  0212
                /
                /ROUTINE TO PRINT FOUR OCTAL
                /
1474  0000  FROCT,  0
1475  7006          RTL
1476  7006          RTL
1477  7260          DCA     UPONE
1500  1140          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  0101          AND     K7700
1527  7650          SNA
1530  5352          JMP     EXIT
1531  7002          BSW
1532  7022          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  1101          TAD     K3740
1545  7502          SMA
1546  1360          TAD     K4120
1547  4423          SPACE                   /SPACE OUT 1
1550  2274          ISZ     FROCT
1551  5324          JMP     MRPRN           /MORE TO PRINT
1552  7300  EXIT,   CLA CLL
```

9

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1553  5716          JMP I   PRN
                    /
                    /ROUTINE TO SPACE OUT 1
                    /
1554  7000  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  7202  DTCHK,  0
1601  1157          TAD     CRCFLG                  /GET CRC ERROR FLAG
1602  7640          SZA CLA                         /CRC ERROR SET????
1603  5212          JMP     .+RDCHK                 /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  RDCHK,  DCA I   XERRO                   /SETUP CHECKSUM ERROR FLAG
1613  1123          TAD     CWREG
1614  0015          AND     K0100
1615  7640          SZA CLA                         /HALF WL OK SET??
1616  1216          TAD     K0200                   /YES!
1617  1106          TAD     K7400
1620  3113          DCA     TRASH2
1621  1113          TAD     *TRASH2
1622  7040          CMA
1623  3316          DCA     HSKER
1624  7342          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                          /SET AUTO11 + BUFFAL + FIELD
1631  3246          DCA     SDCDF                   /SAVE FIELD CDF
1632  1113          TAD     TRASH2
1633  3383          DCA     *SRAN
1634  1125          TAD     INTCA
1635  3355          DCA     STGEN
1636  1363  DTR1,   TAD     *SRAN
1637  0316          AND     HSKER
1640  3134          DCA     *WREG
1641  1355          TAD     STGEN
1642  0063          AND     K0017
1643  3133          DCA     *SREG
1644  4425          RANDOM                          /GENERATE DATA
1645  3136          DCA     DGREG                   /SAVE GOOD DATA POINTER
1646  7422  SDCDF,  HLT/CDF                         /CDF TO BUFFER FIELD
```



```
1647  1411          TAD I   AUTO11                  /GET BAD DATA WORD
1650  6201          CDF     0                       /FROM DF
1651  3137          DCA     DBREG                   /SAVE BAD WORD
1652  1411          TAD     AUTO11                  /GET ADDRESS
1653  3135          DCA     ADREG                   /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     NTHRKS                  /NO, JUST ADDRESS AND DATA
1663  1157          TAD     CRCFLG
1664  7640          SZA CLA                         /CRC ERROR????
1665  5272          JMP     .+5                     /YES, YOU GOT IT
1666  1242          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  5200          JMP     .+5
1700  2355          ISZ     STGEN
1701  7002          NOP
1702  1113          TAD     TRASH2
1703  3383          DCA     RSRAN
1704  2122          ISZ     BUFFAL                  /UPDATE BUFFER TALLY
1705  5236          JMP     DTR1                    /MORE WORDS TO CHECK
1706  2041          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  5312          JMP     .+1                     /FAILED +ORD-BY-+ORD COMPARE WORKED,
1712  4441  NTHRKS, ERROR                           /OTHER ERRORS IN BUFFER
1713  0020          0020
1714  7020          2220
1715  5276          JMP     NOERR                   /CHECK REST OF BUFFER
                    /
1716  2222  HSKER,  0
                    /
                    /ROUTINE TO GENERATE RANDOM NUMBERS
                    /
1717  7220  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 1075                      TAD     RAD1
1734 1076                      TAD     RAD2
1735 1077                      TAD     RAD3
1736 3777                      DCA     RAD3
1737 1077                      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 3771                      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 5670              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 0243                      AND     K0006                   /MASK DRIVE NUMBER
2002 3312                      DCA     WAIT                    /SAVE POINTER
2003 7604              STPSTP, LAS
2004 0244                      AND     K2000                   /MASK
2005 7640                      SZA CLA                         /PROGRAM STOP????
2006 7402              STPHLT, HLT                             /PROGRAM STOP ON SWITCH 4
2007 3157                      DCA     CRCFLG                  /CLEAR CRC ERROR POINTER
2010 1312              RESEK,  TAD     WAIT
2011 7110                      CLL RAR
2012 1155                      TAD     DSKPOT                  /GET ADDRESS SAVE POINTER
2013 3027                      DCA     CHKYN                   /SAVE MADE POINTER
2014 1777'                     TAD     TRKFLG                  /GET TRACK FLAG
2015 7650                      SNA CLA                         /WAS IT SET??
2016 5023                      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 5256                      JMP     DSKOUT +2               /DO IT
2023 1776'                     TAD     SEQFLG                  /GET SEQUENCE FLAG
2024 7650                      SNA CLA                         /WAS IT SET??
2025 5033                      JMP     .+6                     /NO, USE RANDOM
2026 1427                      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 0127                      AND     K7761                   /MASK OFF
2035 1050                      TAD     WAIT                    /ADD IN DRIVE NUMBER
2036 3427                      DCA I   CHKYN                   /SAVE MADE ADDRESS
2037 1427                      TAD I   CHKYN
2040 7110                      CLL RAR
2041 7620                      SZL CLA                         /WAS IT SET
2042 5256                      JMP     DSKOUT                  /NO, DON'T CHECK LIMITS
2043 1147                      TAD     MAXTRK                  /ADD IN FUDGE FACTOR
2044 1427                      TAD I   CHKYN                   /GET ADDRESS FOUND
2045 7630                      SZL CLA                         /IN LIMITS?
2046 5056                      JMP     DSKOUT                  /YES, O.K.
2047 1776'                     TAD     SEQFLG                  /GET SEQUENCE FLAG
2050 7640                      SZA CLA                         /WAS IT SET????
2051 5254                      JMP     DSKOUT +2               /NO
2052 1427                      TAD I   CHKYN                   /NO
2053 0102                      AND     K7760                   /MASK
2054 1312                      TAD     WAIT                    /ADD IN DRIVE NUMBER
2055 3427                      DCA I   CHKYN                   /SAVE IT NOW
2056 1427              DSKOUT, TAD I   CHKYN                   /GET ADDRESS
2057 0261                      AND     K0207                   /MASK DRIVE NUMBER + EXTENDED
2060 1477                      TAD     K2003                   /FUNCTION SEEK ONLY
2061 4444                      LDCMD                           /LOAD COMMAND
2062 1427                      TAD I   CHKYN                   /GET ADDRESS
2063 0102                      AND     K7760
2064 4440                      LDADD                           /LOAD DISK ADDRESS + GO
2065 4443                      DSKSKP                          /WAIT FOR DONE FLAG
```

```
2168  5265          JMP     .+1
2167  4442          RDSTAT                          /READ STATUS
2170  7532          SMA                             /DONE FLAG SET????
2171  5273          JMP     SEKER                   /SEEK ERROR, NO DONE FLAG
2172  7273          AND     K1777                   /MASK OTHER ERROR BITS
2173  7650          SNA CLA                         /ANY SET????
2174  5301          JMP     SEKEX                   /NO, EXIT
2175  4441  SEKER,  ERROR                           /PRINT ERROR
2176  0033          0033                            /HEADER POINTER
2177  7542          7542                            /MESSAGE POINTER
2200  2220          ISZ     SEKOUT                  /UPDATE FOR RETURN
2201  4452  SEKEX,  CLRALL                          /CLEAR STATUS
2202  5600          JMP I   SEKOUT
                    /
                    /ROUTINE TO GET AC
                    /
2203  0000  GETAC,  0
2204  1171          TAD     SVLNK
2205  7110          CLL RAR
2206  1170          TAD     SAVAC
2207  5703          JMP I   GETAC
                    /
                    /ROUTINE TO WAIT FOR KEY FROM OPERATOR
                    /
2210  0000  WAIT,   0
2211  7300          CLA CLL
2212  6032          KCC
2213  6031          KSF
2214  5313          JMP .-1
2215  6036          KRS
2216  2325          AND     K177
2217  1326          TAD     K200
2220  6046          TLS
2221  6041          TSF
2222  5321          JMP .-1
2223  6042          TCF
2224  5710          JMP I   WAIT                    /EXIT
                    /
2225  0177  K177,   0177
2226  0200  K200,   0200
                    /
                    /ROUTINE TO CHECK FOR YES OR NO
                    /
2227  0000  CHKYN,  0
2230  3350          DCA     WAIT                    /SAVE POINTER
2231  1327          TAD     CHKYN                   /GET PC STORED
2232  3352          DCA     CHKPOT                  /SAVE IT
2233  1310          TAD     WAIT
2234  2327          ISZ     CHKYN
2235  7041          CIA
2236  1267          TAD     K0316
2237  7650          SNA CLA                         /WAS IT A NO
2240  5727          JMP I   CHKYN                   /YES
2241  1350          TAD     WAIT
2242  2327          ISZ     CHKYN
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2243  7041          CIA
2244  1273          TAD     K0331
2245  7650          SNA CLA                         /WAS IT A YES
2246  5727          JMP I   CHKYN                   /YES
2247  5752          JMP I   CHKPOT                  /WAS NEITHER
                    /
                    /ROUTINE TO CHECK DISK RUN POINTERS
                    /
2250  0000  CHKPOT, 0
2251  0056          AND     K0003
2252  1256          TAD     RUNPOT
2253  3310          DCA     WAIT
2254  1710          TAD I   WAIT                    /GET RUN POINTER
2255  7640          SZA CLA                         /RUN THIS DRIVE
2256  2350          ISZ     CHKPOT                  /NO
2257  5750          JMP I   CHKPOT                  /EXIT
                    /
2176  3552
2177  3547
      2200  PAGE
                    /
                    /ROUTINE TO WRITE OR READ SECTORS SELECTED
                    /
2200  0000  DSKGO,  0
2201  7340          CLA CLL CMA
2202  3172          DCA     RELOAD                  /SETUP FIRST TIME POINTER
2203  7340          CLA CLL CMA
2204  3173          DCA     FIRTIM                  /SETUP FIRST TIME POINTER
2205  1133          TAD     CAREG                   /GET INITIAL CURRENT ADDRESS
2206  6445          LDCUR                           /LOAD CURRENT ADDRESS
2207  1134          TAD     WCREG
2210  3132          DCA     FWREG                   /SETUP FINAL WC
2211  1125          TAD     SNTSA                   /GET INITIAL STARTING SECTOR
2212  3112          DCA     TRASN1                  /SAVE
2213  1129          TAD     SNTDA                   /GET DISK ADDRESS
2214  0262          AND     K7760                   /MASK
2215  3123          DCA     TRASN2                  /SAVE
2216  1142          TAD     INTCM                   /GET INITIAL COMMAND
2217  1532          TAD I   DSKGO                   /GET READ OR WRITE
2220  6444          LDCMD                           /LOAD COMMAND
2221  1112          TAD     TRASN1                  /SECTOR TO GO
2222  0263          AND     K0017                   /MASK
2223  1113          TAD     TRASN2                  /ADD TO TRACK
2224  6446          LDADD                           /LOAD AND GO
2225  6001          ION                             /TURN INTERRUPT ON
                    /
                    /ROUTINE TO CLEAR OR CHECK SUM BUFFER IN BACK GROUND
                    /
2226  5777  GOBAK,  DCA     TIMER2                  /CLEAR LONG TIMER
2227  3144          DCA     FNDSUM                  /CLEAR SUM CHECK
2230  4427          DSTFLD                          /GET FIELD TO BUFFER
2231  3252          DCA     CHNODF                  /SAVE DCF
2232  1173          TAD     FIRTIM
2233  7652          SNA CLA                         /TIME TO GO
2234  5237          JMP     STRWRK                  /YES!!!!
```

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PAL12   V142    16-JUL-73        17:42   PAGE 1-24

  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  1122          TAD     BUFTAL
  2251  3122          DCA     BUFTAL               /UPDATE BUFFER TALLY
  2252  7402  CHNCDF, HLT                          /CDF TO BUFFER FIELD
  2253  1123          TAD     CHREG
  2254  7700          SMA CLA                      /READ OR WRITE
  2255  5262          JMP     WASRD                /WAS A READ!!
  2256  3411  GOCLR,  DCA I   AUTO11               /WAS A WRITE, CLEAR BUFFER
  2257  2174          ISZ     CLRBAK               /UPDATE TALLY
  2260  5256          JMP     GOCLR                /MORE TO CLEAR
  2261  5272          JMP     WRKDON               /DONE WITH SOME
  2262  1144  WASRD,  TAD     FNDSUM
  2263  7100  GOCHK,  CLL
  2264  1411          TAD I   AUTO11               /GET WORD
  2265  7430          SZL
  2266  7001          IAC
  2267  2174          ISZ     CLRBAK               /UPDATE CLEAR POINTER
  2270  5263          JMP     GOCHK                /MORE TO CHECKSUM
  2271  3144          DCA     FNDSUM               /SAVE IT
  2272  6201  WRKDON, CDF     0
  2273  1122          TAD     BUFTAL
  2274  7650          SNA CLA                      /LAST WORD DONE????
  2275  5376          JMP     DSKEX                /EXIT
  2276  4776          JMS     TIME                 /TIME AND WAIT
  2277  5237          JMP     STRWRK               /WAIT FOR INT, OR DONE!!!!
              /
              /INTERRUPT SERVICE
              /
  2300  6741  RETURN, DSKP                         /DISK SKIP IOT
  2301  7610          SKP CLA                      /NOT THE DISK
  2302  5316          JMP     DSKRET               /GO DISK
  2303  6031          KSF                          /CHECK READER FLAG
  2304  7610          SKP CLA                      /NOT READER
  2305  5312          JMP     KEYRET               /WAS THE READER
  2306  6041          TSF                          /CHECK PUNCH FLAG
  2307  7402  INTER2, HLT                          /UNDEFINED INTERRUPT
  2310  6042          TCF                          /WAS PUNCH, CLEAR FLAG
  2311  5353          JMP     RETRN                /RETURN
  2312  6034  KEYRET, KRS                          /GET INPUT
  2313  6046          TLS                          /PRINT IT
  2314  6032          KCC                          /WAS CLEAR READER FLAG
  2315  5353          JMP     RETRN                /RETURN TO DISK
  2316  3173  DSKRET, DCA     FIRTYM               /CLEAR TIME POINTER
  2317  2112          ISZ     TRASH1               /UPDATE SECTOR
  2320  7000          NOP
```

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PAL12   V142    16-JUL-73        17:42   PAGE 1-25

  2321  1115          TAD     UPDATE
  2322  1132          TAD     FWREG
  2323  3132          DCA     FWREG                /UPDATE WORD COUNT
  2324  6745  STATUS, DRST
  2325  3122          DCA     STREG                /READ STATUS
  2326  1122          TAD     STREG                /SAVE READ FOR PRINTER
  2327  1073          TAD     K4000
  2330  7640          SZA CLA
  2331  5357          JMP     STATER               /ONLY DONE FLAG
  2332  6742  CLRSTA, DCLR                         /STATUS ERROR
  2333  1132          TAD     FWREG                /CLEAR STATUS
  2334  7640          SZA CLA
  2335  5341          JMP     GOAGN                /LAST TRANSFER
  2336  4454          JMS I   XGETAC               /MORE TO TRANSFER
  2337  6244          RMF                          /GET AC AND LINK
  2340  5400          JMP I   0                    /RESTORE FIELDS
  2341  2172  GOAGN,  ISZ     RELOAD               /RETURN
  2342  5347          JMP     NEXSEC               /CLEAR FIRST TIME POINTER
  2343  1074          TAD     K1222                /NOT FIRST TIME
  2344  1603          TAD I   DSKGO                /GET ALL FLAG
  2345  1140          TAD     INTCM                /GET READ OR WRITE
  2346  4444          LOCMD                        /ADD IN INITIAL
  2347  1112  NEXSEC, TAD     TRASH1               /RELOAD COMMAND REGISTER
  2350  0063          AND     K0017                /GET SECTOR TO DO
  2351  1113          TAD     TRASH2               /MASK OFF
  2352  4445          LOADGO                       /ADD IN TRACK
  2353  4456  RETRN,  JMS I   XGETAC               /LOAD AND GO TO DISK
  2354  6244          RMF                          /GET AC AND LINK
  2355  6001          ION                          /RESTORE FIELDS
  2356  5400          JMP I   0                    /TURN INTERRUPT ON
  2357  1123  STATER, TAD     CHREG                /EXIT
  2360  7710          SPA CLA                      /GET LAST COMMAND
  2361  7001          IAC                          /WRITE OR READ
  2362  [illegible]   [illegible]                  /WRITE
  2363  [illegible]   DCA     .+6
  2364  7201          CLA CLL IAC                  /MODIFY HEADER POINTER
  2365  1162          TAD     STATRY               /AC TO 1
  2366  7650          SNA CLA                      /GET THE POINTER
  2367  7240          [illegible] CMA              /TIME TO STOP??????
  2370  [illegible]   ERROR                        /YES, SET UNRECOVERABLE FLAG
  2371  [illegible]   2003                         /PRINT MESSAGE
  2372  7774          7774                         /MODIFIED HEADER POINTER
  2373  2200          ISZ     DSKGO                /MESSAGE POINTER
  2374  2020  DSKEX,  TAD     DSKGO                /UPDATE FOR ERROR
  2375  5602          JMP I   DSKGO
              /                                    /EXIT
  2376  0122
  2377  7532
        2400          PAGE
              /
              /ROUTINE TO GET ONE IN OCTAL
              /
  2470  0000  OCT4,   0
  2471  4437          RECEIV                       /RECEIVE
  2472  3365          DCA     ISAVE1               /SAVE IT
```

```
2403  1680          TAD I   OCT1                    /GET LIMITS
2404  7061          AND     K0377                   /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  1680          TAD I   OCT1                    /GET LIMITS
2413  7064          AND     K0370                   /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  7061          AND     K0007                   /MASK
2425  2280          ISZ     OCT1
2426  2280  INERR,  ISZ     OCT1
2427  5603          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     CHREG                   /GET CURRENT DRIVE NUMBER
2452  0062          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  7321          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  7622          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     K0024
2475  3365          DCA     ISAVE1                  /SECOND TIME POINTER
2476  2765          ISZ I   ISAVE1                  /UPDATE IT
2477  1765          TAD I   ISAVE1                  /GET COUNT
2500  1146          TAD     MAXFIM                  /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  7410          SKP CLA
2517  3766          DCA I   ISAVE2                  /HOLD AT 7777
2520  4453          CRLF
2521  4451          PRNTER                          /PRINT "DISK"
2522  3547          MES17
2523  1123          TAD     CHREG                   /GET LAST COMMAND
2524  0060          AND     K0006                   /MASK
2525  7110          CLL RAR
2526  1265          TAD     K0260
2527  4442          TYPE                            /TYPE DISK NO.
2530  7340          CLA CLL CMA
2531  4451          PRNTER                          /PRINT "PASS COMPLETE"
2532  3512          MES18
2533  7604          LAS
2534  0015          AND     K0100                   /MASK
2535  7650          SNA CLA                         /PASS COMPLETE DISCONNECT????
2536  5341          JMP     .+3                     /NO WAIT!!!
2537  4422          DISCON                          /DUMP DRIVE
2540  5779          JMP     RUN                     /MORE TO TEST!!!!
2541  4774          JMS     I PST4                  /STATUS=COMPLETE TYPEOUT
2542  5650          JMP I   CKTIM                   /EXIT
                    /
                    /SUBROUTINE TO READ STATUS REGISTER
                    /
2543  0000  RDST,   0
2544  6745  IOT5,   DRST                          /READ STATUS IOT
2545  7412          SKP
2546  7402  ERHLT5, HLT                   /SKIP TRAP
2547  3122          DCA     STREG                   /SAVE RESULTS
```

```
2550 1122            TAD     STRCG
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       LOAD,   0
2557 3126            DCA     DAREG
2560 1126            TAD     DAREG
2561 6743       IOT3,   DLAG                         /LOAD DISK ADDRESS REGISTER
2562 5756            JMP I   LOAD                    /EXIT
2563 7402       ERHLT3, HLT                          /SKIP TRAP
                /
2564 3531       CMPPOT, D2CMP +3
2565 0000       ISAVE1, 0
2566 0000       ISAVE2, 0
2567 0000       ISAVE3, 0
                /
2574 3600
2575 7620
2576 5772
2577 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 1107            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 3527            MES17
2632 1123            TAD     CMREG                   /GET LAST COMMAND
2633 0060            AND     K0006
2634 7110            CLL RAR
2635 3200            DCA     RNWRD                   /SAVE
2636 1200            TAD     RNWRD                   /GET DISK NUMBER
2637 1065            TAD     A200K
2640 4442            TYPE                            /TYPE DISK NUMBER
2641 7340            CLA CLL CMA
2642 4451            PRNTER                          /PRINT "DISCONNECTED!"
2643 3455            MES15
2644 4777            JMS     POSTA                   /TYPE STATUS REPORT
2645 1200            TAD     RNWRD
2646 1156            TAD     RUNPOT
2647 3200            DCA     RNWRD                   /SAVE POINTER ADDRESS
2650 3600            DCA I   RNWRD                   /CLEAN RUN POINTER
2651 3200            DCA     RNWRD
2652 1112            TAD     M4
2653 3220            DCA     PRINT                   /CHECK FOR MORE POINTER
2654 1200            TAD     RNWRD
2655 4436            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 [illegible] & BUFFER TALLY
                /
2673 0000       STFLD,  0
2674 7041            CIA
2675 1131            TAD     [illegible]
2676 3120            DCA     BUFTAL
2677 7340            CLA CLL CMA
2700 1130            TAD     CARTG                   /GET INITIAL CA
2701 3011            DCA     AUTO11                  /SAVE
2702 1160            TAD     DATFLG                  /GET DATA FLAG
```

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/       PAL10   V142    16-JUL-73       17:42   PAGE 1-30

2723  7652          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  3212          DCA     AUTO12                  /SETUP SPECIAL AUTO INDEX
2732  1148          TAD     INTCH                   /GET LAST COMMAND
2733  0264          AND     K0072                   /MASK FIELD BITS
2734  1105          TAD     KCDF                    /MAKE BUFFER CDF
2735  3203          DCA     RECDF                   /SETUP SPECIAL CDF
2736  1205          TAD     RECDF                   /GET BACK CDF
2737  5673          JMP I   STFLD                   /EXIT, FIELD IN AC
                    /
                    /SUBROUTINE TO ISSUE "DSKP" DISK SKIP IOT
                    /
2740  2220  SDKP,   2
2741  6741  IOT2,   DSKP                           /DISK SKIP IOT
2742  7410          SKP                             /DID NOT SKIP
2743  2220          ISZ     SDKP
2744  5720          JMP I   SDKP                    /EXIT
                    /
                    /SUBROUTINE TO LOAD COMMAND REGISTER
                    /
2745  2222  LDCM,   2
2746  3123          DCA     CMREG
2747  1123          TAD     CMREG
2750  6746  IOT6,   DLDC                           /LOAD COMMAND REGISTER
2751  5745          JMP .   LDCM                    /EXIT
2752  7402  CMHLT6, HLT                             /SKIP TRAP
                    /
                    /ROUTINE TO CHANGE DEVICE IOT CODES
                    /
2753  7624  CHANG,  LAS                             /GET SWITCHES
2754  0265          AND     A6772                   /MASK S-0
2755  3222          DCA     LDCM                    /SAVE DESIRED CODE
2756  1360          TAD     CHNPOT                  /POINTER
2757  3312          DCA     TRASH1                  /ADDRESS POINTER
2760  1357          TAD     CCNTR1                  /AMOUNT TO DO
2761  3113          DCA     TRASH2                  /SETUP COUNTER
2762  1512  CHANGR, TAD I   TRASH1                  /GET ADDRESS POINTER
2763  3114          DCA     TRASH3                  /SAVE ADDRESS
2764  1514          TAD I   TRASH3                  /GET OLD CODE
2765  0256          AND     A7707                   /MASK OFF OLD CODE
2766  1325          TAD     LDCM                    /ADD IN DESIRED CODE
2767  3516          DCA I   TRASH3                  /RESTORE
2770  2112          ISZ     TRASH1                  /UPDATE POINTER
2771  2113          ISZ     TRASH2                  /UPDATE CHANGE COUNTER
2772  5242          JMP     CHANGR                  /MORE TO CHANGE
2773  7402  CHNHLT, HLT                             /ALL DEVICE IOT CODES CHANGED
2774  5353          JMP     .-1
                    /
2775  2770  A6772,  2770
2776  7607  A7707,  7607
2777  7760  CCNTR1, 7760
```

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/       PAL10   V142    16-JUL-73       17:42   PAGE 1-31

                    /
2760  2761  CHNPOT, CHNPOT +1
2761  2000          RETURN
2762  6032          STATUS
2763  6032          CLRST4
2764  2701          IOT1
2765  1401          IOT2
2766  2561          IOT3
2767  2553          IOT4
2770  2544          IOT5
2771  2732          IOT6
2772  1405          IOT7
                    /
2773  3000
      3282          PAGE
                    /
                    /ROUTINE TO TYPE STATUS REPORT
                    /
3000  3000  TPSTA,   0
3001  4451          PRATER                          /PRINT "DSK HARD SOFT COMP"
3002  3375          MES7
3003  1118          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  4633          SELCHK                          /CHECK RUN POINTER
3017  5236          JMP     NOTSTA                  /DISK NOT RUNNING
3020  4453          CRLF
3021  4427          SPACE                           /SPACE OUT ONE
3022  1244          TAD     TSAVE3                  /GET DISK NO.
3023  1365          TAD     K0260
3024  4440          TYPE
3025  4427          SPACE                           /SPACE OUT ONE
3026  4427          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  4450          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  5600          JMP I   TPSTA                   /EXIT
                    /
3042  7635  TSAVE5, 0
3043  0000  TSAVE2, 0
```

```
3244  0002   TSAVE3, 2
3245  0002   TSAVE4, 2
3246  0002   TSAVE5, 0
             /
             /ROUTINE TO RECALIBRATE SELECTED DRIVE
             /
3247  0000   RESTOR, 0
3250  0060           AND     K0006
3251  3200           DCA     TPSTA           /SAVE DRIVE NUMBER
3252  1101           TAD     K7700
3253  3332           DCA     TIMER2          /SETUP COUNTER
3254  2331           ISZ     TIMER1
3255  5254           JMP     .-1
3256  2332           ISZ     TIMER2          /WAIT FOR DISK TO COOL OFF!
3257  5254           JMP     .-3
3260  3157           DCA     CRCFLG          /CLEAR CRC ERROR POINTER
3261  1200           TAD     TPSTA           /CURRENT DRIVE
3262  4444           LDCMD                   /LOAD COMMAND
3263  7326           CLA CLL CML RTL         /ENABLE RECALIBRATE BIT
3264  4450           CLRALL                  /"RECALIBRATE"
3265  4443           DSKSKP                  /DISK SKIP IOT
3266  5265           JMP     .-1             /WAIT FOR FIRST DONE FLAG
3267  4442           RDSTAT                  /READ STATUS
3270  7500           SMA                     /DONE FLAG SET????
3271  5307           JMP     RESERR          /NO, ERROR
3272  0075           AND     K1777           /MASK OTHER ERROR BITS
3273  7640           SZA CLA                 /ANY SET???
3274  5307           JMP     RESERR          /YES, ERROR
3275  4450   RESTA,  CLRALL                  /CLEAR IT ALL
3276  1010           TAD     K0200           /ENABLE BIT SECOND DONE FLAG
3277  1200           TAD     TPSTA           /ORIGINAL COMMAND
3120  4444           LDCMD                   /LOAD COMMAND
3121  4443           DSKSKP                  /DISK SKIP IOT
3122  5301           JMP     .-1             /WAIT FOR SECOND DONE
3123  4442           RDSTAT                  /READ STATUS
3124  1073           TAD     K4000
3125  7650           SNA CLA                 /WAS IT ONLY DONE FLAG
3126  5647           JMP I   RESTOR          /YES, RETURN
3127  7300   RESERR, CLA CLL
3110  4441           ERROR                   /ERROR
3111  0004           0004
3112  7540           7540
3113  4453           CRLF
3114  4453           CRLF
3115  4451           PRNTCR             /PRINT"RECALIBRATE ERROR DISCONNECT"
3116  3165           RES19
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           PRNTCR                  /PRINT "AS:"
3135  3232           TEXAS
3136  1135           TAD     ASREG
3137  4452           OCTEL
3140  7340           CLA CLL CMA
3141  4451           PRNTCR                  /PRINT "WA:"
3142  3232           TEXWA
3143  1134           TAD     WAREG
3144  4452           OCTEL
3145  7340           CLA CLL CMA
3146  4451           PRNTCR                  /PRINT "AD:"
3147  3236           TEXAD
3150  1135           TAD     ADREG
3151  4452           OCTEL
3152  7340           CLA CLL CMA
3153  4451           PRNTCR                  /PRINT "DC:"
3154  3234           TEXDS
3155  1136           TAD     DSREG
3156  4452           OCTEL
3157  7340           CLA CLL CMA
3160  4451           PRNTCR                  /PRINT "DB:"
3161  3240           TEXDB
3162  1137           TAD     DBREG
3163  4452           OCTEL
3164  5733           JMP I   TYPDAT
             /
3165  2205   RES19,  TEXT    "RECALIBRATE ERROR DISCONNECT"
3166  0301
3167  1411
3170  0222
3171  2124
3172  0540
3173  0522
3174  2217
3175  2240
3176  0411
3177  2303
3200  1716
3201  1605
3202  0324
3203  4100
             /
3204  2403   TEXPC,  TEXT    "PC:"
3205  7200
```

```
3226  2824  TEXST,  TEXT   "ST:"
3227  7222
3228  3015  TEXCH,  TEXT   "CH:"
3229  7200
3230  1513  TEXHM,  TEXT   "HM:"
3231  7200
3232  1101  TEXIA,  TEXT   "IA:"
3233  7200
3234  2401  TEXDA,  TEXT   "DA:"
3235  7200
3236  2323  TEXSS,  TEXT   "SS:"
3237  7222
3240  3301  TEXCA,  TEXT   "CA:"
3241  7203
3242  2703  TEXWC,  TEXT   "WC:"
3243  7200
3244  2627  TEXFW,  TEXT   "FW:"
3245  7202
3246  3123  TEXAS,  TEXT   "AS:"
3247  7200
3250  2701  TEXWA,  TEXT   "WA:"
3251  7200
3252  0104  TEXAD,  TEXT   "AD:"
3253  7200
3254  0407  TEXDG,  TEXT   "DG:"
3255  7202
3256  0402  TEXDB,  TEXT   "DB:"
3257  7200
              /
3260  2205  ERTX1,  TEXT   "READ STATUS"
3261  0104
3262  4823
3263  2401
3264  2425
3265  2302
3266  2722  ERTX2,  TEXT   "WRITE STATUS"
3267  2124
3270  0548
3271  2324
3272  2124
3273  2523
3274  0202
3275  2235  ERTX3,  TEXT   "SEEK STATUS"
3276  0513
3277  4723
3300  2401
3301  2425
3302  2302
3303  2205  ERTX4,  TEXT   "RECALIBRATE STATUS"
3304  2301
3305  1411
3306  0222
3307  2124
3310  2548
3311  2324
```



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3312  0124
3313  2523
3314  0308
3315  1411  ERTX5,  TEXT   "DISK DATA"
3316  2313
3317  4804
3320  0124
3321  0108
              /
3322  4805  MES0,   TEXT   " ERROR"
3323  2222
3324  1702
3325  0030
3326  2213  MES1,   TEXT "PROBE DATA RELIABILITY"
3327  7305
3330  4804
3331  0124
3332  0140
3333  2235
3334  1411
3335  0102
3336  1114
3337  0124
3340  0108
3341  0533  MES2,   TEXT "EXERCISE"
3342  2522
3343  0511
3344  2305
3345  2402
3346  4804  MES3,   TEXT " DISK"
3347  1123
3350  1308
3351  1517  MES4,   TEXT   "NON-RECOVERABLE "
3352  1505
3353  2235
3354  7317
3355  2635
3356  2221
3357  2214
3360  2540
3361  4840
3362  2116  MES5,   TEXT   "AMOUNT OF EXTENDED M/A MEMORY(8-7)?"
3363  1705
3364  1624
3365  4217
3366  3642
3367  2532
3370  2405
3371  1604
3372  0504
3373  4222
3374  5727
3375  4216
3376  2515
3377  1722
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PAL12   V142    16-JUL-73       17:42   PAGE 1-36

  3362  3650
  3363  6255
  3364  6751
  3365  7700
  3366  0123    MES6,   TEXT    "ACCEPT MODE?"
  3367  0305
  3370  2024
  3371  4015
  3372  1704
  3373  0577
  3374  0000
  3375  0423    MES7,   TEXT    "DSK HARD SOFT COMP"
  3376  1340
  3377  1001
  3400  2204
  3401  4023
  3402  1706
  3403  2440
  3404  0317
  3405  1520
  3406  0000
  3407  0611    MES8,   TEXT    "FIELD?"
  3410  0514
  3411  0477
  3412  0000
  3413  2422    MES9,   TEXT    "TRACK?"
  3414  0103
  3415  1377
  3416  0000
  3417  0530    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  2325    MES12,  TEXT    "SEQUENCE?"
  3437  2125
  3440  0516
  3441  0305
  3442  7700
  3443  0401    MES13,  TEXT    "DATA?"
  3444  2401
  3445  7700
  3446  0122    MES14,  TEXT    "ARE YOU SURE?"
  3447  0540
  3450  3117
```

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PAL12   V142    16-JUL-73       17:42   PAGE 1-37

  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  2323    MES16,  TEXT    "SYSTEM SHUT DOWN, NO DISKS TO RUN!"
  3465  2331
  3466  2324
  3467  0515
  3470  4023
  3471  1025
  3472  2440
  3473  2417
  3474  2716
  3475  5440
  3476  1617
  3477  4004
  3500  1123
  3501  1323
  3502  4024
  3503  1740
  3504  2225
  3505  1641
  3506  0000
  3507  0411    MES17,  TEXT    "DISK "
  3510  2313
  3511  4000
  3512  4020    MES18,  TEXT    " PASS COMPLETE!"
  3513  0123
  3514  2340
  3515  0317
  3516  1520
  3517  1405
  3520  2405
  3521  4100
                /
  3522  0000    D0TM1,  0
  3523  0000    D1TM1,  0
  3524  0000    D2TM1,  0
  3525  0000    D3TM1,  0
  3526  0000    D0TM2,  0
  3527  0000    D1TM2,  0
  3530  0000    D2TM2,  0
  3531  0000    D3TM2,  0
                /
  3532  0000    D0HRD,  0
  3533  0000    D0SOF,  0
  3534  0000    D0CMP,  0
  3535  0000    D1HRD,  0
```

1 9

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    3536 0000        [illegible]
    3537 [illegible] [illegible]
    3540 [illegible] [illegible]
    3541 [illegible] D2SOF,  0
    3542 0000        D2CHP,  0
    3543 0000        D3HRD,  0
    3544 0000        D3SOF,  0
    3545 0000        D3CHP,  0
                     /
    3546 0000        FLDFLG, 0
    3547 0000        TSKFLG, 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=.
                     /
                             $$$$
```


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	01111111
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	01111111
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	11100000	00000000
1600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2100	11111111	11111111	11111111	11111111	11111111	11111111	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
3000	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

A2177	2762
A0770	2755
A7727	2756
ACOCA	0365
ADREG	0135
AGAIN	1335
ALLAGN	2052
AMOUNT	2635
ASKNX1	0342
ASKNX2	0400
ASKNX3	0417
ASKNX4	0456
ASKNX5	0471
ASKSUB	0520
ASREG	2133
AUTO10	0010
AUTO11	0011
AUTO12	0012
BADHLT	1710
BDREC	1024
BGN	2202
BGNBUF	7150
BRKRET	2366
BUFTAL	0122
CAREG	2130
CONTR1	0757
CHANG	2733
CHANGR	2742
CHKPGT	2152
CHKRES	1307
CHKSAV	2143
CHKYN	2127
CHKCDF	2253
CHKHLT	2753
CHNPGT	0752
CKTIM	2455
CLCK	1403
CLRALL	4453
CLRBAR	2174
CLRSTA	2332
CMPPGT	2554
CMREG	2123
CONCUR	2726
CONSEC	0155
CROFLG	2157
CRLF	4433
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	3545
D3HRD	3543
D3SOF	3544
D3TM1	3525
D3TM2	3531
DAREG	2136
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	2265
DATPGT	2552
DATTRY	2142
DBREG	2137
DCLR	6742
DDREG	2136
DISCON	4402
[illegible]	[illegible]
DLAB	6743
DLDA	6744
[illegible]	6746
[illegible]	[illegible]
[illegible]	1242
DPST	3765
DSKBA	3553
DSKBF	3557
[illegible]	3554
[illegible]	3540
[illegible]	[illegible]
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[illegible]	3556
DSK3B	3562
DSKEY	2374
[illegible]	2200
DSKCNT	2056

DSKP	6741
[illegible]	[illegible]
DSKRET	2316
DSKSKP	4443
[illegible]	1432
[illegible]	1436
DUMP	2627
[illegible]	[illegible]
[illegible]	[illegible]
ERRLT3	2563
ERRLT4	2555
ERRLT5	2546
ERRLT6	2752
ERRLT7	1427
ERRO	1200
ERRORA	1042
ERROT	4441
ERTX1	3242
ERTX2	3252
ERTX3	3257
ERTX4	3265
ERTX5	3277
ESAVE	1355
EXIT	1552
FILLPS	2730
[illegible]	[illegible]
FLOFLG	3546
[illegible]	[illegible]
[illegible]	4475
[illegible]	1474
FWREG	2122
GENDAT	4420
GETAC	2173
[illegible]	[illegible]
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[illegible]	2225
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[illegible]	2236
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[illegible]	2425
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
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[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	2553

IOT5	2544
IOT6	2732
IOT7	1425
ISAVE1	2565
ISAVE2	2566
ISAVE3	2567
[illegible]	2056
[illegible]	2057
[illegible]	0060
K0207	2061
[illegible]	0362
[illegible]	2043
[illegible]	2013
[illegible]	2014
K0270	0064
K0277	0104
[illegible]	0015
[illegible]	0016
K0212	1473
K0215	1472
K0242	0066
K0262	0065
K0277	2071
[illegible]	2267
K0331	2070
K0400	2072
[illegible]	2074
K177	2125
K1777	0075
K200	2126
K2770	0076
K3400	0077
K3740	1361
K4000	2073
K4100	1302
[illegible]	0363
[illegible]	2100
K7400	2120
K7700	0101
K7760	0102
K7761	2103
K7764	1357
K7771	1356
KCDF	2125
KEYRET	2312
KHLT	2275
KROT	2246
KSKP	3540
LOAD	2556
LOADD	4446
LOCA	2552
LOCM	2725

21

LOCHD	4444	PONTR1	1363	SEKER	2075	TPSTA	3200
LOCUR	4445	PONTR2	1364	SEKEX	2101	TRASH1	0112
LOMAN	4447	PONTR3	1365	SEKGO	1136	TRASH2	0113
LOMN	1004	POREC	0121	SEKOUT	2202	TRASH3	0114
LNKDSA	3364	POLDSK	0116	SEKSW	0107	TRKFLG	3547
M12	0107	POLNEX	1000	SELCHK	4430	TRYCNT	1166
M4	0112	PRINT	2620	SECFLD	3552	TRYTIM	1067
M5	0111	PRN	1516	SETFLD	4427	TSAVE1	3042
MANUAL	0317	PRNDAY	1360	SETGEN	4426	TSAVE2	3043
MAXFLG	0145	PRNTER	4451	SPAC	1554	TSAVE3	3044
MAXTIM	0146	RA01	1775	SPACE	4423	TSAVE4	3045
MAXTRK	0147	RA02	1776	SPBLK	0165	TSAVE5	3046
MES0	3004	RA03	1777	SPFLG	0161	TYPDAY	3133
MES1	3312	RAN1	1771	SPSEC	0164	TYPE	4443
MES10	3417	RAN2	1772	SPTRK1	0162	UPDATE	0115
MES11	3427	RANDAT	4421	SPTRK2	0163	UPDNC	1462
MES12	3436	RANDOM	1717	SSREG	0127	UPTRY	1133
MES13	3443	RANGEN	4433	STAPOT	0154	WAIT	2112
MES14	3446	RANUMS	0554	STATER	2357	WAREG	0134
MES15	3455	RCMSS	1410	STATRY	0141	WASRD	2262
MES16	3465	RDST	2543	STATUS	2324	WDREG	0131
MES17	3507	RDSTA	1122	STFLD	2673	WRDCHK	1012
MES18	3512	RDSTAT	4442	STGEN	1755	WRKCON	2272
MES19	3165	RDTRY	1110	STPHLT	2006	XCHKYN	0231
MES2	3323	RECAL	4436	STRAUT	1312	XCKPOT	0230
MES3	3332	RECDP	2605	STRBUF	3600	XCLOR	0050
MES4	3333	RECEIV	4437	STREG	0122	XCRLF	0253
MES5	3344	REFILL	0733	STRSEK	0526	XDSKGO	0254
MES6	3356	RELOAD	0172	STRSTP	2203	XDUMP	0022
MES7	3375	REREAD	1121	STRTEX	0223	XERRO	0041
MES8	3407	RESEEK	1150	STRWAK	2237	XFRDCT	0052
MES9	3415	RESEK	2010	SVLNK	0171	XGETAC	0054
MMREG	0124	RESERR	3507	SWDAT	2601	XGNDAY	0272
MRPRN	1524	RESET	0535	TEXAD	3234	XLDAD	0046
MSKER	1716	RESRAN	4435	TEXAS	3233	XLDCA	0045
NEWRD	0737	RESTA	3275	TEXGA	3222	XLDCH	0044
NEXSEC	2347	RESTOR	3047	TEXCH	3210	XLDHN	0047
NEXT	2262	RETRN	2353	TEXD1	3216	XOCT1	0024
NOCRC	1232	RETURN	2300	TEXDP	3242	XOCT4	0025
NODSKS	2571	REWRT	1055	TEXDG	3236	XPRINT	0040
NOERR	1676	RNFLD	0633	TEXFL	3226	XPRN	0051
NONCRC	1236	RNWRD	2600	TEXIA	3214	XRDST	0042
NOTEX	1347	RSRAN	1763	TEXMP	3212	XREC	1362
NOTSTA	3036	RUN	2602	TEXPS	3204	XRESTR	0036
NTSEK	0552	RUNPOT	0155	TEXSS	3220	XRNCOM	0033
NTWRKS	1712	SAMPOL	1002	TEXET	3206	XRNWRD	0021
NXTSEK	2532	SAV1	1773	TEXWA	3232	XRSRAN	0035
OCT1	2423	SAV2	1774	TEXWC	3274	XSDKP	0043
OCT4	2432	SAVAC	3170	TIME	3122	XSKOUT	0032
OCTEL	4452	SDKP	2720	TIMER1	3131	XSPAC	0023
ONEIN	4424	SECFLG	3550	TIMER2	3132	XSTFLG	0027
OPRTAL	0117	SEEK	4432	TIMPOT	0153	XSTGEN	0026

XTEXT	3761
XWAIT	0237
YESNO	4431

ERRORS DETECTED: 0

LINKS GENERATED: 48

RUN-TIME: 12 SECONDS

3K CORE USED