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1. ABSTRACT

THE RK8E DRIVE CONTROL TEST IS DESIGNED FOR THE PURPOSE
OF CHECKOUT OF THE RK8E DISK CONTROL LOGIC REQUIRING
THE USE OF THE DISK DRIVE(S).

IN GENERAL, THE TEST IS AN INSTRUCTION TEST TO
VERIFY BASIC OPERATION OF THE SEEK ONLY, RESTORE, WRITE
DATA, READ DATA, WRITE ALL, AND READ ALL FUNCTIONS
WITH ALL DRIVES ON THE CONTROL. SIMPLE COMPLEMENT
DATA PATTERNS OF 2525 + 5252, 5252 + 2525, AND
0000 + 7777 ARE USED TO VERIFY ADDRESSING AND DATA
TRANSFERS TO AND FROM EACH INDIVIDUAL DRIVE.

A MANUAL INTERVENTION TEST IS ALSO INCLUDED (SEE SECTION
5.7), TO ALLOW THE OPERATOR TO SELECT DATA PATTERNS AND
COMMAND FUNCTIONS VIA THE SWITCH REGISTER.

CONSIDERING NO ERROR CONDITIONS, THE DRIVES THAT HAVE RUN
THIS TEST ARE FORMATTED, IF THE PROGRAM WAS STOPPED AT END
OF PROGRAM PASS COMPLETION BY SWR9=1.

2. REQUIREMENTS

2.1 HARDWARE

A. PDP-8/A, B/F, B/F, OR B/M COMPUTER OR OTHER FAMILY OF A
COMPATIBLE COMPUTER WITH NECESSARY OWSE BUS ADAPTER.

B. AT LEAST 8K OF READ/WRITE MEMORY. AT LEAST 8K OF MEMORY IS
NEEDED FOR OPERATION OF THE CONSOLE PACKAGE.

C. ASR-33 TELETYPewriter OR EQUIVALENT

D. RK8E DISK CONTROL

E. RK05J OR RK05F DISK DRIVE(S)

F. UNFORMATTED OR FORMATTED 2200 BPI-1600 SECTOR PACK(S)

2.2 STORAGE

THE PROGRAM OCCUPIES OR UTILIZES LOCATIONS 0000 TO
LOCATION 7577 OF FIELD 0 AND LOCATIONS 0 TO 1377 OF
FIELD 1.

3. PRELIMINARY PROGRAMS

ALL BASIC AND EXTENDED MEMORY DIAGNOSTICS AND THE RK8E
DISKLESS CONTROL TEST SHOULD BE RUN PRIOR TO THIS TEST.

4. SWITCH REGISTER SETTINGS

------------------------
SWR0=1
Scope loop on error, after an error halt at location "ERHLT9" raising this switch and pressing key continue will result in a scope loop on the current failing test if the test continues to fail, the error timeout and the error halt at location "ERHLT9" will be inhibited. The tty bell will ring indicating an error if SWR2=0.

SWR1=1
Scope loop on current non-failing test. Raising this switch causes the program to loop on the current test if the test is working correctly. May be used in conjunction with SWR0=1 for intermittent problems.

SWR2=1
Inhibit bell on scope loop, when in a scope loop due to SWR0=1, raising this switch inhibits the scope loop error bell.

SWR4=1
Stop program or halt switch. Raising this switch will result in a program stop upon completion of the next non-failing test. If possible, this switch should always be used to stop the program.

SWR5=1
Inhibit the recoverable error halt after a recoverable error timeout. After an error halt at location "ERHLT9", raising this switch and pressing key continue will inhibit all future recoverable error halts. If SWR1=0, the program will proceed to next test after each error timeout. If SWR1=1, the program will proceed back to the same or current failing test.

SWR6=1
Recalibrate in scope loops, raising this switch will result in a disk recalibration when in a scope loop due to SWR0=1, SWR1=1, or when SWR5=1.

SWR7=1
Program wait loop for disk in scope loops, raising this switch will result in a program wait loop for approx. 500 ms when in a scope loop due to SWR0=1, SWR1=1, or when SWR5=1. In some cases, this may be useful for waiting for the disk movement to complete if control or drive errors occur, before repeating the test again. In some cases, failure to wait may cause additional errors.

SWR8=1
Get all registers after the recoverable error halt "ERHLT9", after an error halt at location "ERHLT9", raising this switch and pressing key continue results in an error timeout of the actual contents of
SOFTWARE 1

PROGRAM MALT OR STOP AT END OF PROGRAM PASS COMPLETION.

SOFTWARE 11

DISK DRIVE(S) TO TEST, WHEN RUNNING THE CHECK WRITE PROTECT TEST SECTION 5.4, THE CHECK WRITE PROTECT TEST SECTION 5.5, THE MANUAL FUNCTIONS SECTION 5.6, AND THE THE SEEK FROM SWITCHES SECTION 5.8, THESE SWITCHES INDICATE THE DRIVE NUMBER TO SELECT.

5. OPERATOR AND/OR PROGRAM ACTION

5.1 STANDARD TEST PROCEDURE

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

B. LOAD THE PROGRAM INTO 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 5.8.

D. RUN THE DRIVE CONTROL TEST WITH ALL DRIVES ON THE DISK SYSTEM (SEE SECTION 5.3).

E. THE PROGRAM EXECUTION TIME IS APPROX. 30 MINUTES PER DISK DRIVE.

F. RUN THE WRITE PROTECT CHECK TESTS ON ALL DRIVES ON THE DISK SYSTEM BY FOLLOWING THE PROCEDURES IN SECTIONS 5.5 AND 5.6.

G. MANUAL FUNCTIONS, SECTION 5.7, MAY BE USED FOR TROUBLE SHOOTING, IF DESIRED.

H. SEEK FROM SWITCHES, SECTION 5.9, MAY BE USED FOR TROUBLE SHOOTING, IF DESIRED.

I. IF THE PROGRAM WAS STOPPED BY SOFTWARE 1 OR BY "ERMT", ADDRESS 0210 CAN BE USED TO RESTART THE PROGRAM AT THE LAST SUBTEST EXECUTED. (NOTE: WATCH YOUR SWITCH SETTINGS.)

5.2 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 AS AN ERROR CONDITION.

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

B. TURN AC POWER TO DISK DRIVE ON.
C. VERIFY THAT LIGHT LABELED "PWR" IS ON.
D. WAIT FOR LIGHT LABELED "LOAD" TO COME ON.
E. VERIFY THAT 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" GOES OFF.
M. VERIFY THAT LIGHTS LABELED "FAULT", "WT", "RD", AND "LOAD" ARE OFF.

5.3 DRIVE CONTROL TEST

A. MAKE READY THE DISK DRIVE TO BE TESTED USING THE RK85 DRIVE CARTRIDGE MOUNTING PROCEDURE SECTION 5.2.
B. SET SWITCH LABELED "RUN/LOAD" TO THE "LOAD" POSITION ON ALL DRIVES NOT BEING TESTED.
C. VERIFY THAT AC POWER TO ALL DRIVES IS ON.
D. SET THE SWITCH REGISTER TO 0200 AND PRESS LOAD ADDRESS.
E. SET THE SWITCH REGISTER TO 0000.
F. PRESS CLEAR AND THEN CONTINUE.
G. THE TTY WILL RESPOND WITH THE FOLLOWING MESSAGE QUESTIONING THE OPERATOR ON THE DISK DRIVES TO TEST. THE RESPONSE SHOULD BE Y FOR YES OR N FOR NO:

RK85 DRIVE CONTROL TEST
TEST [Y=YES OR N=NO];
DISK0? DISK1? DISK2? DISK3?

AFTER THE QUESTIONS ARE ANSWERED THE PROGRAM WILL BEGIN TESTING THE DRIVES SPECIFIED.
H. THE PROGRAM SHOULD PRINT THE FOLLOWING MESSAGE AT THE COMPLETION OF EACH PASS:

"RK85 DRIVE CONTROL TEST PASS COMPLETE"
I. ALWAYS USE SWRG=1 FOR STOPPING THE TEST.
J. IF IT IS DESIRED TO HAVE THE PROGRAM HALT OR STOP AT END OF PROGRAM PASS COMPLETION SET SW9#1.

K. ANY HALTS OR TYPEOUTS OTHER THAN THE PASS COMPLETE TYPEOUT OR END OF TEST HALT MENTIONED ABOVE WILL BE CONSIDERED AN ERROR CONDITION. IN ALL CASES ACCESS "ERRORS" SECTION 6 IN THIS DOCUMENTATION.

L. FOR THE ABSOLUTE LOCATIONS OF ALL KNOWN HALTS ACCESS PAGE 1-22 OF THE PROGRAM LISTING.

5.4 CHECK WRITE PROTECT (MANUAL)

A. RUN THE DRIVE CONTROL TEST WITH ALL DRIVES ON THE CONTROL BEFORE RUNNING THIS "WRITE PROTECT" PORTION.
B. MAKE READY A DRIVE TO TEST USING THE RKAS DRIVE CARTRIDGE MOUNTING PROCEDURE SECTION 5.2.
C. SET SWITCH LABELED "RUN/LOAD" TO THE "LOAD" POSITION ON ALL OTHER DRIVES.
D. VERIFY THAT AC POWER TO ALL DRIVES IS ON.
E. VERIFY THAT THE LIGHT LABELED "WT PROT" IS "OFF" ON THE CURRENT DRIVE UNDER TEST.
F. SET THE SWITCH REGISTER TO 0206 AND PRESS LOAD ADDRESS.
G. SET THE SWITCH REGISTER TO 0200.
H. SET SW12#11 TO THE CURRENT DRIVE NUMBER UNDER TEST.
I. PRESS START AND THE COMPUTER SHOULD HALT AT LOCATION "MPHLT1".
J. PRESS SWITCH LABELED "WT PROT" TO TURN "WRITE PROTECT" AND THE LIGHT LABELED "WT PROT" ON.
K. PRESS KEY CONTINUE AND THE COMPUTER SHOULD HALT AT LOCATION "MPHLT2" INDICATING A SUCCESSFUL TEST.

M. IF ANY ERRORS ARE ENCOUNTERED OR IF IT IS DESIRED TO TRY THE TEST AGAIN, REPEAT STEPS A-K.

N. FOR POSSIBLE ERROR TYPEOUTS ACCESS SECTION 6 IN THIS DOCUMENTATION. (NOTE: NO SCOPES LOOPS ARE AVAILABLE FOR THIS TEST.)

O. THE "CHECK WRITE PROTECT PROCEDURE" AS DESCRIBED ABOVE SHOULD BE RUN TWICE WITH ALL DRIVES ON THE CONTROL.

5.5 CHECK WRITE PROTECT (PROGRAM CONTROL)

A. RUN THE DRIVE CONTROL TEST WITH ALL DRIVES ON THE CONTROL BEFORE RUNNING THIS "WRITE PROTECT" PORTION.
H. MAKE READY A DRIVE TO TEST USING THE RK05 DRIVE CARTRIDGE MOUNTING PROCEDURE SECTION 5.2.

C. SET SWITCH LABELED "RUN/LOAD" TO THE "LOAD" POSITION ON ALL OTHER DRIVES.

D. VERIFY THAT AC POWER TO ALL DRIVES IS ON.

E. VERIFY THAT THE LIGHT LABELED "WT PROT" IS OFF ON THE CURRENT DRIVE UNDER TEST.

F. SET THE SWITCH REGISTER TO 020A AND PRESS LOAD ADDRESS.

G. SET THE SWITCH REGISTER TO 0000.

H. SET SW10=11 TO THE CURRENT DRIVE NUMBER UNDER TEST.

I. PRESS START AND THE COMPUTER SHOULD HALT AT LOCATION "APMLT1" INDICATING A SUCCESSFUL TEST.

J. VERIFY THAT THE WRITE PROTECT LIGHT LABELED "WT PROT" IS ON ON THE CURRENT DRIVE.

L. IF ANY ERRORS ARE ENCOUNTERED OR IF IT IS DESIRED TO TRY THE TEST AGAIN, REPEAT STEPS A-J.

M. FOR POSSIBLE ERROR TYPEDOUTS ACCESS SECTION B IN THIS DOCUMENTATION. (NOTE: NO SCOPE LOOPS ARE AVAILABLE FOR THIS TEST.)

N. THE "CHECK WRITE PROTECT PROCEDURE" AS DESCRIBED ABOVE SHOULD BE RUN TWICE WITH ALL DRIVES ON THE CONTROL.

5.6 MANUAL FUNCTIONS (FOR TROUBLE SHOOTING ONLY)
-----------------------------

THE MANUAL FUNCTIONS ENABLE THE OPERATOR TO SELECT FUNCTIONS, DISK ADDRESS, AND DATA PATTERNS VIA THE SWITCH REGISTER. THIS IS NOT PART OF THE STANDARD TEST PROCEDURE AND SHOULD ONLY BE USED FOR TROUBLE SHOOTING IF DESIRED.

A. SET THE SWITCH REGISTER TO 020A AND PRESS LOAD ADDRESS.

B. SET THE SWITCH REGISTER TO THE DESIRED FUNCTION TO BE LOADED INTO THE COMMAND REGISTER. (SEE SECTION B.)

C. PRESS START AND THE COMPUTER SHOULD HALT.

D. SET THE SWITCH REGISTER TO THE DESIRED DISK ADDRESS TO BE LOADED INTO THE CYLINDER, SURFACE, AND SECTOR REGISTER. (SEE SECTION B.)

E. PRESS START AND THE COMPUTER SHOULD HALT.
F. Set the switch register to the complement type data pattern to be written on or read from the disk depending on the function previously loaded into the command register. (Note: A setting of 0000 will result in a complement data pattern of 0000 + 7777, a setting of 2525 will result in a complement data pattern of 2525 + 2525.)

G. Press start and the computer should halt.

H. Set the switch register to 0000, press start, and the function selected will be executed.

I. If possible, always use SWR#1 for stopping program.

J. In case of errors or desired loops, use the regular switch register settings (Section 4.)

K. If a write all or the write data function was selected, the data pattern selected will be written on the disk address selected.

L. If a read all or read data function was selected, the data will be read off the disk address selected and compared against the data pattern selected.

M. If a seek only function was selected, a seek only will be executed to the disk address selected.

N. If a write lock function was the selected the disk drive selected will be write locked.

5.7 Change program device IOT codes

The program normally recognizes device IOT code 2190. To change the device IOT codes within the program:

A. Set the switch register to 0245 and press load address.

B. Set the switch register to 0000, set switch register bits 3-6 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. Pressing key continue at this time will result in a start of the program at location 0200 (see Sections 5.3 or 5.4 for operation instructions).

5.8 Seek from switch (for RK05 alignment)

The following function was requested by field service to aid in RK05 alignment, the program will seek only between addresses from switch register.

A. Set the switch register to 4000 and press load address.

B. Set the switch register to 2000.
C. SET SWR=11 TO THE DRIVE NUMBER AND EXTENDED CYLINDER
   BIT OF THE FIRST SEEK ADDRESS (BITS 9-10 TO DRIVE NUMBER
   AND BIT 11 TO EXTENDED CYLINDER).

D. SET SWR=7 TO THE REMAINDER OF THE CYLINDER BITS
   AND THE SURFACE OF THE FIRST SEEK ADDRESS.

E. PRESS START AND THE COMPUTER SHOULD HALT.

F. SET THE SWITCH REGISTER TO 0000.

G. SET SWR=11 TO THE DRIVE NUMBER AND EXTENDED CYLINDER
   BIT OF THE SECOND SEEK ADDRESS (BITS 9-10 TO THE DRIVE
   NUMBER AND BIT 11 TO THE EXTENDED CYLINDER).

H. SET SWR=7 TO THE CYLINDER BITS AND SURFACE OF THE
   SECOND SEEK ADDRESS.

I. PRESS START AND THE DRIVE SHOULD SEEK BETWEEN THE
   ADDRESSES SPECIFIED BY THE SWITCH REGISTER.

J. THE SECOND SEEK ADDRESS CAN BE CHANGED AT ANY TIME
   BY SIMPLY CHANGING THE SWITCH REGISTER TO SELECT A
   NEW ADDRESS.

K. CARE SHOULD BE TAKEN TO NOT SELECT A NON-EXISTENT
   DISK DRIVE OR NON-EXISTENT CYLINDER.

L. NO ERROR CHECKING IS DONE DURING THIS SURTEST.

M. IT IS POSSIBLE TO SEEK TO A CONSTANT ADDRESS BY MAKING
   THE FIRST AND SECOND ADDRESS EQUAL.

6. ERRORS

6.1 USEFUL ERROR INFORMATION

IN THE DRIVE CONTROL TEST, THE DISK SKIP IOT IS FIRST
CHECKED AND TIMED-OUT USING AN "ISZ" TIME LOOP. IF THE
SKIP IOT FAILS, AN ERROR TIMEOUT AND ERROR WALT SHOULD
OCCUR. ONCE PROVEN TO WORK, THE IOT IS NOT TIMED-OUT.
THE PROGRAM MAY HANG-UP IF THE SKIP IOT FAILS INTERMIT-
TENTLY. (NOTE: THE MANUAL FUNCTIONS, SECTION 5.7, ALWAYS
TIMES OUT THE SKIP IOT TO PREVENT HANGING UP.

ALL ERRORS FOUND WHEN RUNNING THIS TEST SHOULD BE
CORRECTED BEFORE PROCEEDING ON IN THE TEST.

WHEN AN OPERATOR ENCOUNTERS AN ERROR WHEN RUNNING THIS
TEST HE SHOULD, IN ALL CASES, READ THE ERROR TIMEOUT
INFORMATION, NOTE THE LOCATION OF THE FAILURE, READ
ALL THE INFORMATION UNDER ERRORS IN THIS DOCUMENTATION,
AND THEN ACCESS THE PROGRAM LISTING FOR FURTHER
INFORMATION.
THE Absolute Location of all known halts can be found a complement type data pattern (i.e., 2525 + 5252, 5252 + 2525, or 0000 + 7777) is always used in this test when data is written and then checked. In some cases, all 0's is used in checking CRC and status registers; however, the data is not checked.

The program uses the same program buffer for writing and reading data. The buffer is setup before a write function and cleared before the data is read and checked. The buffer occupies the current field from the end of the program +400 locations.

Before data is written on the disk, the first two words of the buffer are set to the absolute disk address. The first word of the buffer (bits 9=11) is set to the drive number and the extended cylinder bit, the second word to the 12 remainder cylinder, surface, and sector bits, also the buffer +1 is set to the data word of "1234", and the write then read, the words are checked for correct values, indicating that the information was written on and read from the same place on the disk and that the data break stopped correctly. When an error exists with the words as stated previously, the operator should realize that the problem is most likely addressing and sometimes data errors.

When data is being read off the disk and a CRC error occurs the program will then check the data read for data errors, if no data errors exist the CRC error found will be reported as a status register error, if data errors are found the data errors will be reported as disk data errors and the CRC status error indicated in the "STI". (See section 6.4 for error headers and typeouts).

The absolute address locations of the data buffer

---

6.2 Non-recoverable error halts

---

Non-recoverable error halts for which there are no typeouts or scope loops are listed and defined as follows:

ERMLT1 UNDEFINED INTERRUPT
ERMLT2 SKIP TRAP FOR IOT "DCLR"
ERMLT3 SKIP TRAP FOR IOT "DLAG"
ERMLT4 SKIP TRAP FOR IOT "DLCA"
ERMLT5 SKIP TRAP FOR IOT "DRST"
ERMLT6 SKIP TRAP FOR IOT "DLOC"
ERMLT7 SKIP TRAP FOR IOT "DMAN"

---

6.3 Recoverable error halt

---
ALL RECOVERABLE ERRORS, FOR WHICH THERE ARE LOOP LOOPS
AND ERROR TYPES WAYS, SHOULD RESULT IN AN ERROR MALT AT
LOCATION "EPHLT9".

EPHLT9 RECOVERABLE ERROR MALT, READ INFORMATION
TYPEOUT ON TTY AND ACCESS PROGRAM
LISTING AND DOCUMENTATION.

6.4 ERROR TYPEOUTS

WHEN A RECOVERABLE ERROR OCCURS THE PROGRAM WILL
PRINT AN "ERROR HEADER" WHICH WILL SPECIFY THE
PARTICULAR REGISTER OR TYPE OF ERROR FOUND
AT THE TIME OF THE FAILURE.

POSSIBLE "ERROR HEADERS" ARE AS FOLLOWS:

STATUS REGISTER ERROR
COMMAND REGISTER ERROR
DISK ADDRESS REGISTER ERROR
DISK DATA ERROR
CRC REGISTER ERROR
DATA REGISTER ERROR
DISK SKIP ERROR
DISK INTERRUPT ERROR

AFTER THE "ERROR HEADER" MENTONED 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:

PC1 PROGRAM LOCATION OF THE ACTUAL FAILURE.
GD1 REFERS TO THE DATA EXPECTED IN THE REGISTOR
OR TYPE OF TEST SPECIFIED IN THE "ERROR HEADER".
CR1 CONTENTS OF THE CRC REGISTER.
ST1 CONTENTS OF THE STATUS REGISTER.
DB1 CONTENTS OF THE LOWER DATA REGISTER.
CM1 CONTENTS OF THE COMMAND REGISTER.
DA1 CONTENTS OF THE DISK ADDRESS REGISTER OR
THE CYLINDER, SURFACE, AND SECTOR RITS.
CA1 CONTENTS OF THE INITIAL CURRENT ADDRESS
AD1 BREAK ADDRESS OF DATA BREAK IN COMPUTER.
DT1 DATA FOUND DURING DATA BREAK.

THE "GD1" INFORMATION TYPED OUT POINTS TO THE DATA
EXPECTED IN THE REGISTER OR TYPE OF ERROR TYPED OUT
IN THE "ERROR HEADER".
THE ERROR INFORMATION INDICATOR SUGGESTED BY THE "ERROR HEADER" (I.E., DA FOR DISK ADDRESS ERROR, CM1 FOR COMMAND REGISTER ERROR, CR1 FOR CRC REGISTER ERROR, ETC.), IS THE ACTUAL CONTENTS OF THAT PARTICULAR REGISTER. ERROR INFORMATION OTHER THAN THAT SUGGESTED BY THE ERROR HEADER IS THE SOFTWARE VALUE LOADED INTO THAT REGISTER PRIOR TO THE FAILURE.

TO TYPE THE ACTUAL CONTENTS OF THE REGISTERS, SET SWR8#1 AFTER AN ERROR HALT AT LOCATION "ERHLT0", AND PRESS KEY CONTINUE. THE CONTENTS OF THE CRC, STATUS, LOWER DATA, COMMAND, AND SURFACE AND SECTOR REGISTERS WILL THEN BE TYPED.

6.5

SCOPE LOOPS

----------------

THERE ARE SCOPE LOOPS AVAILABLE FOR ALL ERRORS RESULTING IN AN ERROR HALT AT LOCATION "ERHLT0".

TO ENTER SCOPE LOOP, INHIBIT ERROR TYPEOUT, AND INHIBIT ERROR HALT, AFTER AN ERROR HALT AT "ERHLT0", SET SWR8#1 TO INDICATE SCOPE LOOP AND PRESS KEY CONTINUE.

IF THE SCOPE LOOP IS WORKING CORRECTLY AND THE TEST IS STILL FAILING, THE TTY BELL SHOULD RING INDICATING AN ERROR, THEN SET SWR2#1 TO INHIBIT THE TTY ERROR BELL.

SWR1#1 MAY HAVE TO BE USED IN SCOPE LOOPS IN CONJUNCTION WITH SWR8#1, IF THE CURRENT TEST IS WORKING INTERMITTENTLY.

6.6

TYPICAL ERROR TYPEOUTS

-----------------------

THE FOLLOWING IS AN EXAMPLE OF AN "ERROR HEADER" AND TYPEOUT THAT COULD HAVE OCCURRED IF THE DISK SKIP IOT FAILED TO SKIP.

DISK SKIP ERROR
PC19267

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

DISK DATA ERROR
PC11161 GD15252 ST14910 CM11900 DA19101 CAl7008 AD17010 DT15250

THE FOLLOWING IS A TYPICAL ERROR THAT COULD HAVE OCCURRED WHILE READING THE CRC REGISTER.

CRC REGISTER ERROR
PC12246 GD1116047 CR1116046 CM11900 DA17777

THE FOLLOWING IS AN EXAMPLE OF AN ERROR TYPEOUT THAT COULD HAVE OCCURRED IF THE STATUS REGISTER FAILED. (NOTE IN THIS CASE THE OPERATOR INDICATED TO THE PROGRAM TO TYPE THE ACTUAL CONTENTS OF THE REGISTERS BY SETTING SWR8#1
AFTER THE ERROR HALT AT LOCATION "ERMLT9" AND PRESSING
KEY CONTINUE.

STATUE REGISTER ERROR
PG1100 GN1400 ST1200 CM1500 DA1000
CM1000 SMA1000 DR1200 CM1500 DA1000

7. RESTRUCTIONS
---------

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

ALL ERRORS SHOULD BE CORRECTED BEFORE PROCEEDING ON IN
THE PROGRAM.

8. TROUBLE SHOOTING INFORMATION
-----------------------------

IOT FUNCTION
--- --------

6741 DSKP "SKIP SKIP IF TRANSFER DONE FLAG
OR ERROR FLAG IS SET.

6742 DCLR "CLEAR FUNCTION IS REGULATED BY
AC BITS 10 AND 11. THE AC IS THEN
CLEARED.

AC13 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 DLAG "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
--

2=6 CYLINDER
7 SURFACE (1=UPPER) (2=LOWER)
8-11 SECTOR
"LOAD CURRENT ADDRESS" LOAD THE CURRENT ADDRESS FROM AC. THE AC IS THEN CLEARED.

AC

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

AC

TRANSFER DONE
READY TO SEEK, READ, OR WRITE.
NOT USED
SEEK FAIL
DISK FILE READY
CONTROL BUSY ERROR
TIME OUT ERROR
WRITE LOCK ERROR
CRC ERROR
DATA RATE ERROR
DRIVE STATUS ERROR
CYLINDER ADDRESS ERROR

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

AC

READ DATA
READ ALL
WRITE LOCK
SEEK ONLY
WRITE DATA
WRITE ALL
DISABLE INTERRUPT
DISABLE SET TRANSFER DONE ON SEEK DONE
HALF BLOCK 128 WORDS
EXTENDED MEMORY ADDRESS
EXTENDED MEMORY ADDRESS
EXTENDED MEMORY ADDRESS
UNIT SELECT
UNIT SELECT
EXTENDED CYLINDER ADDRESS

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

9.

PROGRAM DESCRIPTION

-----------

THE RK8E DRIVE CONTROL TEST VERIFIES BASIC FUNCTIONAL OPERATION
OF THE RK8E CONTROL LOGIC WITH THE RK8S DISK DRIVE(S). THE
PROGRAM IS COMPRISED OF MANY INDIVIDUAL SUREST WHICH
ARE AUTOMATICALLY RUN IN A SEQUENTIAL FLOW, ABOVE EACH SUBTEST,
IN THE LISTING, IS A BRIEF DESCRIPTION OF EACH SUBTEST.

WHEN SINGLE DRIVE TESTING, ONE PASS THROUGH ALL SUREST
(TST0-TST45) RESULTS IN A PASS COMPLETION. WHEN MULTI-DRIVE
TESTING, ONE PASS THROUGH ALL SUBTESTS(TST0-TST45) ON ALL
DRIVES AND THE RUNNING OF THE OVERLAP SEEK TESTS(OVRSLAP,
GRNKL, AND OVRRED) RESULTS IN A PASS COMPLETION.

CONSIDERING NO ERROR CONDITIONS, THE DRIVES THAT HAVE RUN
THIS TEST ARE FORMATTED, IF THE PROGRAM WAS STOPPED AT END
OF PROGRAM PASS COMPLETION BY SWR#1.

10.

CONSOLE PACKAGE ADDENDUM

----------

10.1.

DESCRIPTION

----------

THE CONSOLE PACKAGE HAS BEEN ADDED TO THIS DIAGNOSTIC TO ALLOW
THE PROGRAM TO RUN WITH NO HARDWARE SWITCH REGISTER AND TO
HAVE COMMUNICATIONS WITH THE DIAGNOSTIC VIA A TERMINAL. THE
DIAGNOSTIC CAN BE RUN IN TWO MODES WITH THE CONSOLE
10.2 RESTRICTIONS

1) RUNNING THE CONSOLE PACKAGE REQUIRES THAT THE PSEUDO SWITCH REGISTER BE USED.

2) ONCE RUNNING THE CONSOLE PACKAGE NONACTIVE AND NOW DESIRE TO RUN IT ACTIVE, ONE MUST RELOAD THE DIAGNOSTIC AND INITILIZE FOR A ACTIVE CONSOLE PACKAGE.

10.3 INITIALIZATION

FOR A ACTIVE CONSOLE PACKAGE

1.) SET LOCATION 21 BIT#0 TO INDICATE USE PSEUDO SWITCH REGISTER.

2.) SET LOCATION 22 BIT#1 TO INDICATE CONSOLE PACKAGE ACTIVE.

FOR A NON ACTIVE CONSOLE PACKAGE

1.) SET LOCATION 21 BIT#1 TO INDICATE NOT TO USE PSEUDO SWITCH REGISTER, BUT TO USE HARDWARE SWITCHES.

2.) SET LOCATION 22 BIT#0 TO INDICATE CONSOLE PACKAGE NOT ACTIVE.

10.4 CONTROL CHARACTERS

CONTROL CHARACTERS ARE USED TO GIVE THE OPERATOR THE ABILITY TO PERFORM THE FOLLOWING FUNCTIONS.

NOTE: THE PROGRAM WILL RESPOND TO THE CONTROL CHARACTER IN FIVE (5) SECONDS OR LESS.

CONTROL C

---------

THIS WILL START THE LOADER THAT IS IN LOCATION 7600.

CONTROL R

---------

THIS WILL RESTART THE PROGRAM AND REASK THE SWITCH REGISTER QUESTION AS DESCRIBED IN SECTION 10.6.
CONTROL E
-------
THIS WILL CONTINUE THE PROGRAM FROM
AN ERROR IF ALLOWED BY THE DIAGNOSTIC
OR FROM A WAITING STATEMENT.

CONTROL L
-------
THIS WILL SWITCH THE TERMINAL MESSAGES
FROM THE DISPLAY TO A LINE PRINTER.
TO RESTORE THE MESSAGES ON THE TERMINAL
CONTROL L MUST BE TYPED AGAIN. IF
NO PRINTER IS AVAILABLE AND CONTROL L
IS TYPED THE RESULT WILL BE THAT THE
CONSOLE PACKAGE WILL WAIT FOR CONTROL C OR R.
THE CONTROL L WILL OUTPUT TO THE LINE
PRINTER AND THE PROGRAM WILL
ATTEMPT TO CONTINUE AS IF A CONTROL E
WAS TYPED IN.

CONTROL O
-------
THIS WILL ALLOW THE ABILITY TO CHANGE
THE SWITCH REGISTER DURING PROGRAM
OPERATION. TYPING THIS CHARACTER WILL RESULT
IN AN INTERROGATION OF THE SWITCH REGISTER
QUESTION AS DESCRIBED IN SECTION 18.6.

CONTROL S
-------
THIS WILL STOP PROGRAM EXECUTION AND WAIT IN A
LOOP FOR A CONTINUE. THE ONLY WAY TO CONTINUE
WILL BE TO TYPE A CONTROL O, R OR C.
THIS IS A NONPRINTING CHARACTER.

CONTROL D
-------
THIS IS TO CONTINUE A PROGRAM AFTER A CONTROL
S IS TYPED. THIS IS A NONPRINTING CHARACTER.

10.5 WAITING MESSAGE
--------------------
THE WAITING MESSAGE IS USED TO ALLOW THE OPERATOR TIME
TO MAKE A DECISION AS TO WHAT CONTROL CHARACTER
TO TYPE. THIS MESSAGE MAY APPEAR AT THE END
OF PASS MESSAGE IF THE HALT ON PASS BIT IS SET. THE CONTROL
CHARACTER MAY NOW BE USED TO PERFORM THE NEEDED FUNCTION.

THE WAITING MESSAGE MAY BE PRINTED AFTER A ERROR MESSAGE
IF THE HALT ON ERROR BIT IS SET. HERE AGAIN THE CONTROL
CHARACTER MAY BE USED.
THE WAITING MESSAGE MAY BE PRINTED IF OPERATOR INTERVENTION
IS REQUIRED.

10.6 SWITCH REGISTER MESSAGE
-----------------------------
THIS MESSAGE IS USED TO SETUP THE PSEUDO SWITCH REGISTER
BEFORE PROGRAM EXECUTION TAKES PLACE. THE SWITCH REGISTER
IS SETUP WHEN THE FOURTH CHARACTER IS ENTERED OR A CARRIAGE
RETURN IS TYPED.
END OF PASS

An indication will be given when the diagnostic has made a successful pass. The print out will indicate the diagnostic maindeck number the word pass and a four digit pass number. A pass will be a time period rather than a program pass of the diagnostic. The time period will be in the range of one (1) to five (5) minutes. If the diagnostic makes a program pass in the 1 to 5 minute range then the pass count will be the same as the number of program passes. If the program makes a program pass in less than one minute then the pass count will not be the same as the pass counter. The pass counter will reflect more than one program pass.

The number of program passes required for a pass message can be found in field 1 location 0246.

If a halt at end of pass is set then the pass message will be printed and a waiting statement will also be printed. A control character is needed to continue from this message. The format of the end of pass message is

NAME PASS 0001

ERRORS

The standard error reports as described in section 6 of this document will be used.

SWITCH REGISTER SETTINGS

The standard switch settings as described in section 4 of this document will be used.

PARAMETER CONTROL WORDS

The console package uses the locations 20 21 22 for the following purposes.

LOCATION 20
PSEUDO SWITCH REGISTER

LOCATION 21
HARDWARE IDENTIFIER 1

LOCATION 22
HARDWARE IDENTIFIER 2

LOCATION 0021

BIT OCTAL VALUE FUNCTION WHEN 0 FUNCTION WHEN 1

11
APT-8 HOOKS

11.1 DESCRIPTION

TWO INTERFACES HAVE BEEN PROVIDED WHICH ALLOW THIS DIAGNOSTIC TO RUN UNDER THE STANDARD APT-8 SYSTEM. THESE INTERFACES ARE:

1. TIMING INTERFACE
2. ERROR INTERFACE

EACH WILL BE EXPLAINED IN DETAIL.

11.2 SETUP

ONLY HARDWARE CONFIGURATION WORD 2, ADDRESS 22, NEED BE ESTABLISHED. THE FOLLOWING INFORMATION MUST BE INDICATED:

1. SINGLE OR MULTIPLE DRIVE TESTING,
2. DRIVE OR DRIVES TO BE TESTED,
3. DIAGNOSTIC RUNNING UNDER APT-8.

IF SINGLE DRIVE TESTING BIT 5 OF ADDRESS 22 MUST BE SET TO A ONE (1) WITH BIT 6=11 CONTAINING THE DRIVE TO BE TESTED.
IF MULTIPLE DRIVES ARE TO BE DONE BIT MUST BE SET TO A ZERO (0) AND BIT 6=11 CONTAINING THE HIGHEST NUMBER DRIVE TO BE TESTED. WHEN MULTIPLE DRIVE TESTING ONLY A SPECIFIC NUMBER OF DRIVES CAN BE INDICATED, THE PROGRAM ASSUMES THE DRIVES ARE TO BE DONE BEGINNING WITH DRIVE ZERO (0) AND FINISHING WITH THE HIGHEST DRIVE INDICATED. IF MULTIPLE DRIVES OTHER THAN CONSECUTIVELY NUMBERED DRIVES BEGINNING WITH DRIVE ZERO (0) ARE TO BE DONE, THEY MUST BE DONE AS SINGLE DRIVES AND TESTED INDEPENDENTLY.

THE PROGRAM ALLOWS ONLY DRIVES ZERO (0) THROUGH THREE (3) TO BE TESTED AT THIS TIME.

BIT ZERO OF ADDRESS 22 MUST BE SET TO A ONE TO INDICATE THAT THE PROGRAM WILL RUN UNDER APT-8.

NOTE: IT SHOULD BE NOTED AT THIS TIME THAT WHILE RUNNING UNDER APT-8 THE HARDWARE SWITCH REGISTER IS INOPERATIVE. ONLY THE HALT AND SINGLE STEP SWITCH WILL EFFECT THE PROGRAM RUN.
11.3 APT-8 INTERFACES

11.3.1 TIMING

APT-8 is notified of program run between 1.2 sec and 2.0 sec on a 1.2 microsecond memory cycle. This will allow the diagnostic to run without causing an APT-8 timeout error if the diagnostic is to be run on the slower MOS memory.

11.3.2 ERRORS

Only the error PC is reported to APT-8. System errors which cause a programmed halt cause a timeout error. If a programmed halt should occur, the error PC will appear in the AC on the device under test. Programmed halts are explained earlier in this document.

11.4 LOADING PRECAUTIONS

This program should be loaded in script mode indicating to APT that CRC or check sums are to be ignored.
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<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
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<td>Pcs</td>
<td>A description of Item A</td>
</tr>
<tr>
<td>Item B</td>
<td>50</td>
<td>Box</td>
<td>A description of Item B</td>
</tr>
<tr>
<td>Item C</td>
<td>200</td>
<td>Unit</td>
<td>A description of Item C</td>
</tr>
<tr>
<td>Item D</td>
<td>10</td>
<td>Pack</td>
<td>A description of Item D</td>
</tr>
</tbody>
</table>

**Note:**
- This table represents data from a sample of a document.