

TEXT LISTING

068-001058-01

PROGRAM

6095 UNOVA MOVING HEAD DISK  
DIAGNOSTIC

TEXT TAPE

097-001058-01

ABSTRACT

THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE UNOVA 6095 MOVING HEAD DISK CONTROLLERS AND DRIVES. THE DEVICE CODE MAY BE 0-76 OCTAL WITH THE DEFAULT BEING 33.

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; 1. PROGRAM NAME: UNCOD.SR, UNOVA 6095 MOVING HEAD DISK
; SYSTEM DIAGNOSTIC

; 2. REVISION HISTORY: SEE SOURCE (.SR)

; 3. MACHINE REQUIREMENTS:
; 1. UNOVA FAMILY CENTRAL PROCESSOR
; 2. MINIMUM OF 8K READ/WRITE MEMORY
; 3. DGC UNOVA 6095 MOVING HEAD DISK SYSTEM
; 4. TELETYPE OR CRT AND CONTROL

; 4. TEST REQUIREMENTS: N/A

; 5. SUMMARY:
; THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE
; UNOVA 6095 MOVING HEAD DISK CONTROLLERS,
; AND DRIVES.
; THE DEVICE CODE MAY BE 0-76 OCTAL WITH THE
; DEFAULT BEING 33

; 6. RESTRICTIONS:
; THIS PROGRAM HAS NO HARDWARE RESTRICTIONS.

; 7. PROGRAM DESCRIPTION/THEORY OF OPERATION:
; - BUSY, DONE, I/O BUS SELECT LOGIC
; - DIS, DOB, DIC, DDC, DATA PATHS AND
;   REGISTERS
; - CLEAR OF THE CA AND DISK ADDRESS
; - CLEAR OF CA AND DISK ADDRESS REGISTERS
; - DISK SELECT LOGIC
; - START, BUSY, CLEAR LOGIC
; - RECALIBRATE, ATTN, INTERRUPT LOGIC
; - INTERRUPT DISABLE, INTA LOGIC
; - THAT SEEKS TO CYL'S 0,252,525,410. CAN AT
;   LEAST BE EXECUTED.
; - READY/SELECT LOGIC

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; NAME: UNCOD.TX          PART NUMBER: 097-001058
; DESCRIPTION: UNOVA 6095 MOVING HEAD DISK DIAGNOSTIC
; REVISION HISTORY:
; REV.          DATE
; 00           04/07/78
; 01           08/30/79
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- THAT THE CA REGISTER INCREMENTS PROPERLY  
VIA DCH REQUESTS  
- THAT A WRITE CAN BE EXECUTED  
- SEND, CLEAR LOGIC  
- THAT SEEK/WRITE OPERATIONS CAN BE EXECUTED  
- WRITES TO DIFFERENT HDSECTORS  
- MULTI-SECTOR WRITES (4,8,16,32)  
- THE INCREMENT HEAD LOGIC  
- END OF CYLINDER, ILLEGAL CYLINDER (POSITIONER FAULT)

- THAT A READ MAY BE EXECUTED  
- 8 SECTOR WRITE/READ OPERATIONS (9 DIFFERENT  
DATA PATTERNS) AT CYL'S 0,200,,400. WITH FULL  
CORE COMPARE  
- WRITE CYL# TO HEAD 0,SECTOR 0 OF ALL CYLINDERS  
- WRITE HEAD # TO SECTOR 0 OF ALL HEADS ON CYL 0  
- WRITE SECTOR # TO ALL SECTORS OF HEAD 0,CYL 0  
- EACH OF THE ABOVE OPERATIONS IS FOLLOWED  
BY A CORRESPONDING READ/CHECK OPERATION TO VERIFY  
DISK ADDRESSING LOGIC.

- ADDRESS CHECK LOGIC BY ALTERING  
THE FORMAT ON CYL 0,HEAD 0,SECTOR 0, 1 BIT AT A  
TIME AND MONITORING THE RESULTS AFTER A WRITE.  
THE FORMAT IS SET TO NORMAL AFTER COMPLETION OF  
THESE TESTS.  
# SEE SWPAK 12 OPTION #

- PERFORMS RANDOM SEEKING. EACH SEEK IS FOLLOWED BY A  
READ TO HEAD 0,SECTOR 0

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8. OPERATING MODES/SWITCH SETTINGS:

8.1 SWITCH SETTINGS

LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS  
(NOT SYSTEM CONFIGURATION). WHILE RUNNING UNDER DTOS,  
THIS LOCATION WILL BE LOADED BY THE MONITOR  
HOWEVER UNDER STAND ALONE AND PROGRAM LOAD MODES THIS  
LOCATION WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED  
BY THE OPERATOR. IN ANY CASE THE OPTIONS CAN BE CHANGED  
OR VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC.  
8.5

8.2 SWITCH OPTIONS

DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION  
"SWREG" IS AS FOLLOWS:

| BIT   | OCTAL VALUE | BINARY VALUE | INTERPRETATION   |
|-------|-------------|--------------|--|
| 1     | 40000       | 1            | LOOP ON ERROR<br>SKIP LOOPING ON ERROR   |
| 2     | 20000       | 0            | PRINT TO CONSOLE<br>ABORT PRINT OUT TO CONSOLE   |
| 3     | 10000       | 0            | DO NOT PRINT % FAILURE<br>PRINT % FAILURE  |
| 5     | 02000       | 1            | DO NOT PRINT ON THE LINE PRINTER<br>PRINT ON THE LINE PRINTER  |
| 6     | 01000       | 1            | DO NOT HALT ON ERROR<br>HALT ON ERROR  |
| 7     | 00400       | 1            | DO NOT PRINT SUMMARY AND/OR<br>PASSING OF EACH SUBTEST<br>PRINT SUMMARY AND/OR<br>PASSING OF EACH SUBTEST    |
| 12(C) | 00010       | 1            | N/A<br>PROGRAM WILL EXIT TO ODT WHEN<br>NOT IN TESTS T57,58 WHICH ALTER<br>FORMAT. SWITCH IS ZEROED ON EXIT. |
| 13(D) | 00004       | 1            | N/A<br>RECALIBRATE DURING SCOPE LOOP   |



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? 10. PROGRAM OUTPUT/ERROR DESCRIPTION:
? WHEN AN ERROR IS DETECTED THE PROGRAM PRINTS THE ERROR
? PC AS WELL AS AC'S 0,1, AND 2 AT THE POINT OF ERROR,
? PLUS AN OPTION PRINTOUT. THE PROGRAM THEN
? GOES INTO A SCOPE LOOP BETWEEN THE ENTRIES TO
? SETUP AND LOOP ALLOWING THE OPERATOR TO SET SWPAK.
? IN GENERAL THE ERROR PC WILL POINT TO A CALL ERROR.
?
? THE OPTION PRINTOUT WILL BE OF ONE OF THE FOLLOWING FORMATS:
?
? A. STANDALONE CONTROLLER TEST FAILURES-
? FAILING MODULE = DISK CONTROLLER
?
? B. STATUS ERRORS
? MODE UNIT # DATA
? STARTING DISK ADDRESS # SECTOR #
? CYL # HEAD #
? ACI(STATUS) SHOULD =ACO
? DESCRIPTIONS OF FAILING STATUS BITS
? PROBABLE FAILING MODULES -(AS PER EACH FAILING BIT)
?
? C. MEMORY/DISK ADDRESS ERROR
? MODE UNIT # DATA
? STARTING DISK ADDRESS # SECTOR #
? CYL # HEAD #
? ENDING MEMORY/DISK ADDRESS ERROR
? ACI(MA/DA) SHOULD =ACO
?
? D. INTERRUPT TIMEOUT
? MODE UNIT # DATA
? STARTING DISK ADDRESS # SECTOR #
? CYL # HEAD #
? INTERRUPT TIMEOUT
?
? ADDITIONAL TEST SIGNIFICANCE CAN BE FOUND IN THE PROGRAM
? LISTING, ALTHOUGH IT IS HOPED THAT A NEED FOR THE
? LISTING WILL BE MINIMAL. SWPAK(SWREG) WILL PROVIDE
? ALL CONTROL OVER TEST LOOP OPTIONS AND PRINTOUTS.

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? 11. DEBUG HELP:
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? 11A.0 SUBROUTINES AND CALLS:
?
? CHECK DATA SUBROUTINE
? CALL JSR @I.CK
? ADDRESS OF DATA BUFFER 1
? ADDRESS OF DATA BUFFER 2
? # OF WORDS
? ERROR RETURN
? NORMAL RETURN
?
? GENERATE N SECTORS OF DATA
? CALL JSR @I.GEN
? ADDRESS OF DATA GEN ROUTINE
? DATA BUFFER ADDRESS
? # OF SECTORS
? RETURN
?
? I/O START ROUTINES
?
? START RECALIBRATE
? JSR @I.REC
?
? START READ
? JSR @I.RD
? DOC WORD
? BUFFER ADDRESS
? ADDR
? RETURN
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? START WRITE
? JSR @I.WR
? DOC WORD
? BUFFER ADDRESS
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:CALL JSR @I.FMT
:      N
:      DOC WORD
:      BUFFER ADDRESS
:
:STATUS CHECK ROUTINES
:
:CALL JSR @I.SA
:      ERROR RETURN
:      NORMAL RETURN
:
:CALL JSR @I.CA
:      ERROR RETURN
:      NORMAL RETURN
:
:CALL JSR @I.CC
:      ERROR RETURN
:      NORMAL RETURN
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:CALL JSR @I.EA
:      ERROR RETURN
:      NORMAL RETURN
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:CALL JSR @I.MA
:      ERROR RETURN
:      NORMAL RETURN
:
:CALL JSR @I.NT
:      ERROR RETURN
:      NORMAL RETURN
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:CALL JSR @I.SK
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:      NORMAL RETURN
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:CTAL DEBUG TOOL (OOT)
:
: THIS DIAGNOSTIC IS EQUIPPED WITH A BUILT IN ODT WHICH CAN
: BE ACCESSED BY HITTING CONTROL 0 (*0) AT ANY TIME DURING
: THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARA-
: METERS).
: ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE
: NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.
:
: CONVENTIONS AND SYMBOLS
: THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
: ? POUND WITH A "2"
: @ ODT IS READY AND AT YOUR SERVICE.
:
: COMMAND STRUCTURE
: AN ODT COMMAND HAS THE FOLLOWING FORMAT:
: (ARGUMENT)(COMMAND)
: AN ARGUMENT MAY BE ONE OF THE FOLLOWING:
: "EXP" AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS
: SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEAD=
: ING ZEROS NEED NOT BE TYPED.
: "ADR" AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT
: THAT BIT 0 IS NEGLECTED.
: A COMMAND IS A SINGLE TELETYPE CHARACTER
:
: ODT COMMANDS
: THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE
: USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES:
: INTERNAL CPU CELLS AND MEMORY LOCATIONS.
:
: OPENING INTERNAL CELLS
: THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF
: THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN
: 0 AND 7
: 0-3 FOR ACCUMULATORS 0-3
: 4 FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
: THE EVENT OF A "P" COMMAND.
: 5 CPU AND TIO STATUS
: BIT INTERPRETATION
: 15 STATUS OF TIO DONE FLAG
: 14 STATUS OF INTERRUPTS (IOW FLAG)
: 13 STATUS OF CARRY BIT
: 6 ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF
: ANY)
: 7 INSTRUCTION AT THE BREAK POINT LOCATION
:
: OTHER COMMANDS TO OPEN CELLS ARE:
: "ADR"/ OPEN THE CELL AND PRINT ITS CONTENTS
: / OPEN THE CELL CURRENTLY POINTED TO BY THE POINTER
: AND PRINT ITS CONTENTS.
: *+ADR"/ ADD "ADR" TO THE POINTER, OPEN THE CELL
: *-ADR"/ AND PRINT ITS CONTENTS.
: /-ADR"/ SUBTRACT "ADR" FROM THE POINTER, OPEN
: THE CELL AND PRINT ITS CONTENTS.
: "CR" THE RETURN KEY IS USED TO CLOSE THE OPEN CELL
: WITH OR WITHOUT MODIFICATION.

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"LF" LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING CELL.

"^" CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION AND OPEN THE PRECEDING CELL.

"/" CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND OPEN THE CELL POINTED TO BY ITS CONTENTS.

+"ADR"/" CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND OPEN THE CELL POINTED TO BY ITS CONTENTS + "ADR".

-"ADR"/" CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND OPEN THE CELL POINTED TO BY ITS CONTENTS - "ADR".

11B.3.2 MODIFICATION OF A CELL

ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF". IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EXPRESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. THE ADDRESS ITSELF OR AN EXPRESSION RELATIVE TO THE ADDRESS CAN BE DEPOSITED BY TYPING A "R" OR "A" FOLLOWED BY AN OCTAL EXPRESSION. A RUBOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.

11B.3.3 OTHER ODT COMMANDS

RUBOUT THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A CELL THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELL CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE KEY WAS PRESSED.

"ADR"B INSERT A BREAK POINT AT LOCATION "ADR". ONLY ONE BREAK POINT CAN BE INSERTED AND ANY ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL CAUSE IT TO BE DELETED.

U DELETE THE BREAK POINT IF ANY.

P RESTART THE EXECUTION OF THE PROGRAM AT LOCATION POINTED BY "A".

"ADR"R START EXECUTING THE PROGRAM AT "ADR" AFTER AN IO-RESET.

K KILL THE STRING TYPED SO FAR. THE ODT RESPONDS WITH A "2" AND THE OPEN CELL IS CLOSED WITHOUT MODIFICATION.

= PRINT THE OCTAL VALUE OF THE INPUT ONLY. THIS WILL CLOSE ANY OPEN CELLS WITHOUT MODIFICATION AND WILL NOT OPEN A CELL

NOTE: IN PROGRAMS WHICH RELOCATE THEMSELVES THE USER SHOULD PLACE BREAK POINTS ONLY IN THE ORIGINAL PROGRAM AREA. IF A BREAK POINT IS PLACED OUTSIDE THIS AREA THE RESULTS WILL BE UNPREDICTABLE.

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12. SPECIAL NOTES/SPECIAL FEATURES:

- TESTS F1-F2 ALTER THE FORMAT ON CYL 0, HD 0, SEC 0 FOR PURPOSES OF CHECKING THE ADDRESS CHECK AND BAD SECTOR LOGIC. SWPAK12 SHOULD BE SET TO 1 IN ORDER TO STOP PROGRAM WHEN NOT RUNNING THESE TESTS. IF SWPAK12 = 1 WHEN IN TESTS F1,F2, PROGRAM WILL CONTINUE UNTIL AFTER THESE TESTS ARE COMPLETED AND THEN HALT. IF THERE IS ANY CHANCE THE PROGRAM MAY HAVE TERMINATED IN THOSE TESTS, THE PROGRAM SHOULD BE RE-STARTED WITH SWPAK12 = 1.
- SOME SCORE LOOPS WILL REQUIRE A RECALIBRATE TO INITIALIZE THE DISK DRIVE FOLLOWING A FAILURE. SET SWPAK 13 = 1 TO INTRODUCE THE RECALIBRATE TO THE UNIT UNDER TEST.
- DISK PACKS ONLY USE DISK PACKS FORMATTED BY THE D6C DISK PACK FORMATTER PROGRAM. THE DIAGNOSTIC PROGRAM WILL WRITE OVER MOST OF THE DISK SURFACE.

13. RUN TIME:

1ST PASS -4:15 MINUTES

SUBSEQUENT PASSES -7:15 MINUTES

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\*\*00000 TOTAL ERRORS, 00000 PASS 1 ERRORS

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