

**DataGeneral**

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**TECHNICAL  
STATEMENT**

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TEXT LISTING

068-000099-05

PROGRAM

4K VIDEO DISPLAY TEST

TEXT TAPE

097-000099-05

ABSTRACT

THE NOVA 6012 VIDEO DISPLAY DIAGNOSTIC PROGRAM CONTAINS FIVE SEPARATE TEST PROGRAMS DESIGNED TO FACILITATE CHECK OUT AND EVALUATION OF THE OPERATION OF THE 6012 DISPLAY.

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0001 .MAIN MACRO REV 06.30 11:48:27 02/15/79 10002 .MAIN

NOVA 6012 DISPLAY DIAGNOSTIC (4K)

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NAME: 4VDST.TX PART NUMBER: 097-000099
DESCRIPTION: 4K VIDEO DISPLAY TEST
REVISION HISTORY:
REV. DATE
00 05/17/73
01 09/06/74
02 10/04/74
03 06/20/75
04 12/12/75
05 04/30/76
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ABSTRACT
THE NOVA 6012 VIDEO DISPLAY DIAGNOSTIC PROGRAM CONTAINS FIVE SEPARATE TEST PROGRAMS DESIGNED TO FACILITATE CHECKOUT AND EVALUATION OF THE OPERATION OF THE 6012 DISPLAY. THE MAIN TEST PROGRAM IS THE 6012 DIAGNOSTIC WHICH PROVIDES A SEQUENCE OF AUTOMATIC TESTS. THE OTHER AUTOMATIC TEST PROGRAM IS THE VISUAL DISPLAY TEST WHICH CONTINUOUSLY FILL THE SCREEN WITH REPEATING SEQUENCES OF THE CHARACTER SET. CHARACTERS ARE ROTATED IN ORDER OF APPEARANCE AS EACH FRAME OF CHARACTERS IS WRITTEN. THE OTHER THREE TESTS UNDER MANUAL CONTROL ARE: A VISUAL DISPLAY OF A FULL SCREEN OF A SINGLE CHARACTER FROM THE CHARACTER SET, CHARACTER ECHO IN THE (PAGE) BUFFER MODE, AND FINALLY CHARACTER ECHO IN THE ROLL MODE, AND THIS DIAGNOSTIC IS A FOREGROUND/BACKGROUND TYPE. COMMUNICATION WITH THE DISPLAY IS INITIATED BY THE INPUT AND OUTPUT ROUTINES IN THE FOREGROUND AND IS HANDLED TO COMPLETION IN THE FOREGROUND UNDER INTERRUPT CONTROL. THIS MEANS THAT THE FIRST CHARACTER TO BE TRANSMITTED TO THE SCREEN FROM THE ASSIGNED BUFFER IS SENT OUT VIA THE OUTPUT ROUTINE AFTER WHICH CONTROL IS TURNED OVER TO THE INTERRUPT HANDLER TO COMPLETE THE TRANSMISSION. DATA TRANSMITTED FROM THE SCREEN TO THE CPU IS HANDLED THE SAME WAY EXCEPT USING THE INPUT ROUTINE TO INITIATE THE TRANSFER.

PREREQUISITES
IMPORTANT
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\* THIS TEST CAN ONLY BE RUN WITH THE
\* "BUFFERED, PAGE, ROLL" SWITCH SET TO \*
\* THE PAGE POSITION. \*
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THE NOVA 6012 DISPLAY MAY BE DRIVEN BY ANY DATA GENERAL TYPE ASYNCHRONOUS INTERFACE ASSEMBLY; SUCH AS TYPE 4010, OR TYPE 4060. A SEQUENCE OF AT LEAST TWO SUCCESSFUL PASSES THROUGH THE DIAGNOSTIC PROGRAM FOR THE PARTICULAR INTERFACE INSTALLED IS A MANDATORY PREREQUISITE FOR THIS PROGRAM. PERFORM ALL SPECIFIED TESTS AND PROCEDURES FOR THE INTERFACE ASSEMBLY AND VERIFY THAT THE INTERFACE IS FULLY OPERATIONAL BEFORE PERFORMING THE PROCEDURES AND TESTS COMPRISING THE 6012 DIAGNOSTIC.
BILATERAL BAUD REQUIREMENT
IT IS NECESSARY TO VERIFY THAT THE DISPLAY AND THE INTERFACE ARE SET TO OPERATE AT THE

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3. SAME BAUD RATE. VERIFY AND NOTE  
THE OPERATIONAL BAUD RATE OF THE INTERFACE  
CONTROLLER(4010 OR 4060). REMOVE THE DISPLAY  
HOUSING COVER AND VERIFY THAT THE BAUD RATE  
SELECTION SWITCH IS SET TO SELECT THE CORRESP-  
ONDING BAUD RATE.

3. MACHINE REQUIREMENTS  
3.1 NOVA(EXCEPT MICRO) OR ECLIPSE PROCESSOR  
3.2 4K READ/WRITE MEMORY  
3.3 EITHER A TYPE 4060 OR 4010 I/O INTERFACE

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3.4 (1) 6012 DISPLAY  
3.5 SEE "HOW TO USE THE NOVA  
COMPUTERS" REFERENCE MANUAL FOR A  
DESCRIPTION OF THE INFORMATION BIT  
OPTIONS OF THE 4010 AND 4060 INTERFACE.

4. SWITCH SETTINGS  
STARTING ADDRESSES  
4.1 000002= 6012 DIAGNOSTIC - AUTOMATIC  
4.2 TESTS  
4.3 000003= VISUAL DISPLAY TEST - FULL SCREEN  
DISPLAY OF EACH CHARACTER IN CHARACTER  
SET, SEQUENCED UNDER MANUAL CONTROL.  
4.4 000004= VISUAL DISPLAY TEST-ROTATING  
CHARACTER SET.  
4.5 000005= CHARACTER ECHO TEST IN THE  
(PAGE) BUFFER MODE.  
4.6 000006= CHARACTER ECHO IN ROLL MODE.  
4.7 000007= CHANGE INTERFACE DEVICE CODE.  
4.8 000010= READ (DISPLAY) CHARACTER SCOPE LOOP.  
4.9 000011= WRITE(DISPLAY) CHARACTER SCOPE LOOP.  
4.10 000014= RELOAD OPERATION PARAMETERS DATA  
INTO THE PROGRAM.

4.11 DISCRETE SWITCH SELECTIONS  
SWITCH 1(1)= PROCEED FROM THE ERROR LOOP.  
SWITCH 7(1)= DO NOT HALT ON ERROR - ROTATING  
CHARACTER SET. LOOP UNCONDITIONALLY  
FOR CURRENT TEST IN AUTO TEST  
MODE.  
SWITCH 8(1)= NO HALT ON TIMEOUT - ROTATING  
CHARACTER SET

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DIAGNOSTIC OPERATING PROCEDURE  
VERIFY THAT THE INTERFACE IS INSTALLED PROPERLY  
AND ALL THE EXTERNAL CONNECTIONS BETWEEN THE  
COMPUTER AND THE DISPLAY CHASSIS ARE PROPERLY  
SECURED. LOAD THE PROGRAM VIA THE BINARY LOADER  
OR DIAGNOSTIC OPERATING SYSTEM(AUTOMATIC START AT LOC 2).  
SET THE SWITCHES TO 00002 AND PRESS START  
IF LOADED BY BINARY LOADER.

IF THIS IS THE INITIAL PASS OF THE PROGRAM (AFTER  
BEING LOADED) THE PROGRAM WILL REQUIRE THESE  
FOLLOWING DATA: A) THE STATE OF THE PARITY SELECT  
JUMPERS(LOCATED INSIDE THE DISPLAY CHASSIS),  
SELECTING EITHER ODD, EVEN, OR NO PARITY(MARKED), B)THE  
TYPE # OF THE INTERFACE ASSEMBLY INSTALLED  
IN THE COMPUTER WHICH WILL BE DRIVING THE DISPLAY,  
C)THE DEVICE CODE # OF THE INTERFACE ASSEMBLY,  
AND FINALLY D)THE # OF THE LINE OR CHANNEL  
THAT THE DISPLAY IS CONNECTED TO(NOT  
APPLICABLE IF TYPE 4010 INTERFACE ASSEMBLY  
IS INSTALLED).

NOTE: IF THE DEVICE CODE OF THE 4010  
MODULE IS OTHER THAN 10 OR 11 OR THE  
4060 IS OTHER THAN 30, THE PROCEDURE LISTED  
IN SECTION 10 HAS TO BE DONE FIRST TO  
CHANGE THE DEVICE CODES BEFORE STARTING  
AT LOC 2.

THE PROGRAM WILL HALT AFTER AN INITIAL START  
AT LOC. 2,3, 4, FOR 5 IF THE SPECIFICATION DATA  
HAS NOT BEEN ENTERED. ENTER THE FIRST WORD OF  
THE REQUIRED DATA INTO THE COMPUTER CONSOLE  
SWITCHES USING THE FORMAT SHOWN BELOW....

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AFTER THE SWITCHES HAVE BEEN SET UP  
PRESS CONTINUE. THE PROGRAM WILL  
HALT AGAIN FOR THE BAUD RATE INPUT DATA,  
ENTER THE BAUD RATE INTO THE COMPUTER  
CONSOLE SWITCHES 10 THRU 15. THE STATES  
OF SWITCHES 0 THRU 9 ARE NOT USED BY THE  
PROGRAM AND ARE "DON'T CARE STATES".  
EXAMINE THE TABLE BELOW AND ENTER  
THE INTERFACE ASSEMBLY. IF THE BAUD RATE  
OF ANY PARTICULAR INTERFACE ASSEMBLY  
IS NOT LISTED, USE THE SWITCH DATA OF  
THE BAUD RATE LISTED THAT IS CLOSEST IN VALUE.

BAUD	BITS	0-9	10	11	12	13	14	15
110	X-X	0	0	0	0	0	0	0
150	X-X	0	0	0	0	0	0	1
300	X-X	0	0	0	0	1	0	0
600	X-X	0	0	0	0	1	1	0
1200	X-X	0	0	0	1	0	0	0
1800	X-X	0	0	0	1	0	1	0
2400	X-X	0	0	0	1	1	0	0
3600	X-X	0	0	0	1	1	1	1
4800	X-X	0	0	1	0	0	0	0
7200	X-X	0	0	1	0	0	1	1

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0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
X X P P I I I I I I D D D D

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WHERE: P= PARITY; 1 FOR ODD, 2 FOR EVEN, 0 FOR  
NO PARITY (MARKED,MSB=1)  
X= NOT USED (DON'T CARE STATES)  
I= LAST 2 OCTAL DIGITS OF INTERFACE TYPE#  
SUCH AS 10 FOR TYPE# 4010.  
D= 2 DEVICE CODE OCTAL DIGITS (EVEN #  
DEVICE CODE IF INTERFACE IS A 4010).





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?7.6 VISUAL DISPLAY TEST - ROTATING CHARACTER SET.
?7.7 THE PURPOSE OF THIS SECTION OF THE VISUAL
?7.8 DISPLAY TEST IS TO PROVIDE AN AUTOMATIC FULL
SCREEN DISPLAY OF THE ENTIRE CHARACTER SET.
AS THE PROGRAM RUNS IT SHIFTS ALL CHARACTERS
DISPLAYED ONE CHARACTER POSITION.
SET THE CONSOLE SWITCHES TO 000004, AND PRESS
START. PROGRAM WILL RUN CONTINUOUSLY WITHOUT
OPERATOR INTERVENTION UNLESS INTERFACE SPECIFICATION
DATA HAS NOT BEEN ENTERED OR AN ERROR OCCURS.
CONSOLE SWITCH 7 IN 0 POSITION WILL
CAUSE A HALT ON DATA ERROR. ON A HALT EXAMINE THE
CONSOLE ADDRESS LIGHTS TO VERIFY THAT
IT IS A DATA ERROR. HALT, THEN EXAMINE
ACO FOR GOOD CHARACTER, AC1 = BAD CHARACTER
AND ACS FOR THE (OCTAL) NUMBER OF THE BAD CHARACTER
IN THE PRESENT FRAME. CONVERT THIS
OCTAL NUMBER (IN AC3) TO DECIMAL TO
DETERMINE ITS CHARACTER POSITION ON THE
DISPLAY SCREEN. CHECK THAT POSITION ON
ON THE SCREEN FOR AN OUT OF SEQUENCE
CHARACTER, SUCH AS 67898 WHERE THE
8 AFTER THE 9 GENERALLY INDICATES A DISPLAY MEMORY
ERROR. A LARGE NUMBER OF ERRORS WITH
NO APPARENT ERRORS DISPLAYED ON THE
SCREEN ARE GENERALLY TRANSMITTER LOGIC
ERRORS. EXAMINE THE ERROR PATTERN TO
DETERMINE BIT SHIFT OR BIT DROPOUT. FOR LONG
TERM RELIABILITY RUNS, SET SWITCH 7 TO A 1
TO ALLOW THE PROGRAM TO CONTINUE AUTOMATICALLY
AFTER AN ERROR. THE # OF ERRORS WILL BE
REPORTED UPON HITTING THE SPACE BAR TWICE.
CONSOLE SWITCH 8 IN THE 0 POSITION WILL
CAUSE A HALT ON A TIMEOUT ERROR.
EXAMINE THE "XMTFLG" LOCATION. IF
THIS LOCATION = -1, THE TIMEOUT OCCURRED
ON A PROCESSOR-TO-DISPLAY DATA TRANSFER.
IF XMTFLG = 0, THE TIMEOUT OCCURRED ON
A DISPLAY-TO-PROCESSOR DATA TRANSFER.
EXAMINE LOCATION "CHARS" FOR THE NUMBER
OF CHARACTERS LEFT TO BE TRANSFERRED. CONVERT
THIS NUMBER FROM OCTAL TO DECIMAL AND SUBTRACT 1
TO DETERMINE THE NUMBER (IN THE FRAME) OF THE
LAST CHARACTER TRANSFERRED.
SWITCH 8 IN THE 1 POSITION WILL ALLOW THE
PROGRAM TO CONTINUE AUTOMATICALLY AFTER AN
ERROR. ERROR REPORTING IS PROVIDED
IN THIS TEST, AND MAY BE ACCESSED
BY HITTING THE SPACE BAR TWICE WHEN THE DISPLAY
IS NOT CHANGING WITH A SCREEN FULL OF CHARACTERS.
AFTER THE REPORT HAS BEEN READ THE OPERATOR CAN
RESUME TESTING BY HITTING ANY DISPLAY KEY.

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?8. CHARACTER ECHO TEST PROCEDURE.
?8.1 SET THE "BUFFERED, PAGE, ROLL" SWITCH TO THE
"BUFFERED" POSITION.
?8.2 SET 000005 INTO THE CONSOLE SWITCHES AND PRESS
START.
?8.3 TYPE IN ENOUGH CHARACTERS TO FILL THE ENTIRE
BUFFER(AND SCREEN). MAKE SURE THE START AND END
PROTECT BITS ARE INSERTED INTO AT LEAST TWO
OF THE 24 LINES. HOME THE CURSOR & PRESS THE
CONTROL - N KEY ON THE DISPLAY KEYBOARD.
THIS PARTICULAR KEYING ACTION TRANSMITS THE
PAGE OF DATA TO THE COMPUTER.
?8.4 HOLDING THE DISPLAY XMIT KEY DOWN, TYPE THE E
KEY WITH NO COMMAS OR SPACES TO
ECHO THE DATA SENT TO THE COMPUTER.
VERIFY THAT THE BUFFERED PAGE (INCLUDING THE
PROTECTED BITS) ARE RETURNED TO THE SCREEN.
?8.5 TO CONTINUE TESTING REPEAT PARAGRAPHS
8.3 AND 8.4, THIS TIME USING BLINKING CHARACTERS
ALONG WITH PROTECT CHARACTERS.
?8.6 THE CHARACTER ECHO TEST MAY BE REPEATED
AS MANY TIMES AS DESIRED TO TEST THE ECHO
TRANSMISSION AND DISPLAY CHARACTERISTICS
OF PAGE DATA ASSEMBLED IN THE BUFFER MODE.
JUST REMEMBER TO TOGGLE THE "BUFFERED, PAGE
ROLL" SWITCH TO THE PROPER POSITION RELATIVE TO THE
FUNCTION BEING PERFORMED.
?8.7 NO PROGRAMMED ERROR MANAGEMENT IS PROVIDED IN
THE CHARACTER ECHO TEST.

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

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;9.
ROLL MODE TEST PROCEDURE.

;9.1
; SET THE "BUFFERED, PAGE, ROLL" SWITCH TO THE BUFFERED
; POSITION. LOAD 000006 INTO THE CONSOLE SWITCHES AND
; START. THE PROGRAM WILL HALT. WHEN THE PROGRAM WAS
; STARTED, A CLEAR SCREEN COMMAND WAS ISSUED. VERIFY
; THAT THE SCREEN IS CLEAR, AND THE CURSOR IS IN THE
; HOME POSITION.

;9.2
; SET THE "BUFFERED, PAGE, ROLL" SWITCH TO THE "ROLL"
; POSITION. AT THE DISPLAY KEYBOARD, PRESS CONTROL-
; RESET KEYS. VERIFY CURSOR MOVES TO 1ST CHARACTER
; POSITION OF THE LAST LINE. PRESS CONTINUE AND TYPE
; IN EACH CHARACTER IN THE CHARACTER SET. VERIFY
; CHARACTERS TYPED ARE ECHOED BACK ON THE SCREEN.

;9.3
; AFTER A LINE IS TYPED A CR/LF MUST BE TYPED.
; VERIFY THAT A LINEFEED OCCURS
; AND CURSOR RETURNS TO THE 1ST CHARACTER POSITION
; OF THE LAST LINE AND THAT THE LINE JUST ENTERED
; ROLLS UP ONE LINE.

;9.4
; AFTER THE CHARACTER SET HAS BEEN TYPED AND ECHOED,
; HOLD DOWN ANY CHARACTER KEY, ALONG WITH THE REPT
; (REPEAT) KEY UNTIL THE SCREEN HAS BEEN FILLED WITH
; CHARACTERS. CONTINUE TYPING AND VERIFY THAT THE TOP
; LINE OF CHARACTERS ROLLS OFF THE SCREEN ON THE
; NEXT LINEFEED.

;10.
; TO CHANGE DEVICE CODES.....

;10.1
; LOAD 000007 INTO THE CONSOLE SWITCHES
; AND START. THE PROGRAM WILL HALT. LOAD THE 2 OCTAL
; DIGITS OF THE NEW DEVICE CODE INTO CONSOLE
; SWITCHES 10 THRU 15, AND PRESS CONTINUE.

;10.2
; THE PROGRAM WILL HALT WHEN CHANGES ARE COMPLETED
; AND CAN BE VERIFIED BY PRESSING CONTINUE AFTER THE
; HALT. IF THE PROGRAM ENTERS A JUMP LOOP, THE CODE
; CHANGES HAVE BEEN COMPLETED SUCCESSFULLY. IF AN
; IMMEDIATE HALT RESULTS FROM PRESSING CONTINUE, AN
; ERROR IN THE CONSOLE DATA INPUT VIA THE SWITCHES HAS
; BEEN DETECTED BY THE PROGRAM. UNDER THESE CONDITIONS
; RESTART AT LOCATION 7, AND REINSERT NEW DEVICE CODE
; INTO THE CONSOLE SWITCHES AGAIN.

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