g GE Energy	**Functional Testing Specification**
Parts & Repair Operations ***Louisville, KY***	**LOU-GEF-NCB0x** **Numerical Control Station Boards**

Test Procedure for NCB01, NCB02 & NCB03 Printed Circuit Boards

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PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
Rick Diercks			Charlie Wade
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Functional test procedure for NCB01/2/3 Printed Circuit Boards

1. SCOPE

1.1 This is a functional test procedure for testing the NCB01, NCB02 and NCB03 printed circuit boards. The process applies only to these boards model number 44A719308-101 and 44A719343-101.

2. STANDARDS OF QUALITY

2.1 Refer to the current revision of the IPC-A-610 standard for workmanship standards.

3. APPLICABLE DOCUMENTS

3.1 The following document(s) shall form part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue shall apply.

3.1.1	**44C719648**	Elementary
3.1.2	**44C719661**	Elementary
3.1.3	**GEK-25382**	Maintenance & Troubleshooting
3.1.4	**GEK-25381**	Startup & Adjustments
3.1.5	**GEK-25391**	System Diagrams
3.1.6	**GIT-200**	**TAB12** Diagnostic Software

4. ENGINEERING REQUIREMENTS

4.1 Description

4.1.1 The purpose of the NCB01-3 boards is to service the control station Keyboard, to control the CRT display, to communication with external devices locally via one serial port and one parallel port and to communicate with the rest of the NC system via second serial port.

4.2 Equipment Cleaning

4.2.1 Equipment should be clean and free of debris prior to applying power unless performing an initial check. Refer to the local documented procedures for cleaning guidelines.

4.3 Equipment Inspection

4.3.1 Equipment should be visually inspected for any defects prior to applying power. This inspection should include the following as a minimum:

- **4.3.1.1** Wires broken or cracked
- **4.3.1.2** Terminal strips / connectors broken or cracked
- **4.3.1.3** Loose wires
- **4.3.1.4** Components visually damaged
- **4.3.1.5** Capacitors leaking
- **4.3.1.6** Solder joints damaged or cold
- **4.3.1.7** Circuit board burned or de-laminated
- **4.3.1.8** Printed wire runs burned or damaged

5. EQUIPMENT REQUIRED

5.1 The following equipment is required to perform the process requirements. Equipment may be substituted provided that all accuracy's and test ratios are equivalent or better.

Qty	Reference #	Description
1	GE MC2000 Bench Control	2000 Bench Test Control
1	Factory Service Diagnostics	Resides on Bubble Board MB1:
1	7.59MC Software	Resides on Bubble Board MB3:
1	MC2000 PWM Drive Control	2000 Control with Axis Cart or motors
1	Fluke 77 or equivalent	Multimeter
1	NCB0x Test connectors	Loopback port Test connector

6. TESTING PROCESS

6.1 Diagnostic Test

6.1.1 Install NCB Test Connector in PL1

6.1.2 Install board to be tested in MC2000 Bench Control

6.1.3 Turn on MC2000 Power Switch.

6.1.4 Turn control on by depressing green "Control On" push button on the NCS Station. If the LED on the NCB does not come on, stop the testing and begin your troubleshooting.

6.1.5 "Power Up Diagnostics" should be displayed on screen, followed by "System Loading", which will be followed by "Mark Century 2000 Service Diagnostics Initialization" & "Make any Keyboard entry for manual/menu mode".

6.1.6 Press any key and Factory Diagnostic Screen will be displayed.

6.1.7 To select a heading on the menu page, use the cursor control up or down arrow key.

6.1.8 Go to manual testing of the NCB01-3 by selecting "NC Control Station Test" Test and pressing enter or return. You need to go through the following tests.

NC Extended Diagnostic Test
Port B Loopback Test
Potentiometer Test
NCS CRT Test

6.1.9 This should help determine what area has failed on the NCB01-3 card. Only after board has passed all tests should you continue on.

6.1.10 Go to diagnostic page and select "Execute Automatic Test Cycle", Push Enter.

6.1.11 Enter test name "NCS", Push Enter.

6.1.12 Enter number of test cycles as 1 to 20, Push Enter.

6.1.13 The following headings will appear on the CRT and "Working" will appear under the headings: "NCCS TEST PORT B"
6.1.14 If all the tests pass, control will come back to "Factory Test Diagnostics" page. Skip next section and go to section 6.2.
6.1.15 If test fails, then "Failure in Error Log" will be displayed.
6.1.16 Depress any key to continue to main menu.
6.1.17 Select "Error Log Options", press enter.
6.1.18 Select "Display Error Log", press enter.
6.1.19 Scroll through Error Log with the Down key until "fail" appears in log.
6.1.20 Record test name for all failures present in Error Log.
6.1.21 When all failures are recorded, depress Cancel.
6.1.22 Select "Erase Error Log", and push enter.
6.1.23 Press "Cancel" to return to main menu. Shut down control and troubleshoot card.

6.2 MB03 7.59MC Test.

6.2.1 Before turning on control be sure proper boards have been inserted into the logic rack and CPU switch is in the middle position.
6.2.2 If everything is ready turn on control, pressing "ON".
6.2.3 It will take a minute or so for control to boot up. Once done the CRT should display a banner page for 7.59MC control. All LEDs should be lit on all board.

6.3 Part Program Test

6.3.1 Once control is up and on line with the 7.59MC application, Turn on axis cart and enable drives.
6.3.2 Press Control On again, this will lock in drives from control.
6.3.3 Tested MCB02 inputs Test High Jog and Low Jog; Tested Incr. Feed, Ref. Zero, GND, Zero, and Set Zero.
6.3.4 Run Part Program: Select "INDEX" on the white keys at the top of the keyboard. This should cause the control to display two or three part programs, select "MCLOOP Program" with the gray buttons, and then press POSN, one of the white keys. This should take you back to the position page.
6.3.5 Press "Auto" and then "Cycle Start" and drive should begin to move and will continue until they are interrupted by pressing "Cancel or Clear" or removing power. Run Part Program Test for 6 hours.
6.3.6 When complete power down control.

6.4 ******TEST COMPLET***