g GE Energy	**Functional Testing Specification**
Inspection & Repair Services ***Louisville, KY***	**LOU-GEF-AIO01**

Test Procedure for AIO01 and AIO02 Analog I/O Cards

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Functional test procedure for AIO01 and AIO02 Analog I/O cards

1. SCOPE

1.1 This specification provides the Engineering Requirements for testing AIO01 44A719329-101 and AIO02 44A719329-102 Printed Circuit Cards.

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	**GEK-25382**	Maintenance & Troubleshooting
3.1.2	**GEK-25381**	Startup & Adjustments
3.1.3	**GEK-25391**	System Diagrams
3.1.4	**44C719639**	Board Schematics
3.1.5	**GIT-200**	**TAB12** Diagnostic Software
3.1.6	**44A722222-DOC**	**Design Specification**

4. ENGINEERING REQUIREMENTS

4.1 Description

4.1.1 The Analog I/O Board in used in the MC2000 CNC it's intended to be an intelligent general-purpose analog input and output board. It interfaces with the System Bus and shares memory the system CPU.

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	HP 3478A	Multimeter
1	AIO Loopback Cable	1PL to 3PL Test cable
1	AIO Test Plugs	Test plugs for 1PL and 2PL
1	6V with 5.1 zener regulator	5.1 DCV Test Battery
1	AIOL1 Board	AIO Test Card
2	9V and 1.5V Battery	Test batteries
2	Jumper Cable	Test Jumpers

6. TESTING PROCESS

6.1 Diagnostic/Calibration Test

6.1.1 Connect 1Pl and 2PL Test Plugs to card.

6.1.2 Use a Card Extender, 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 AIO 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 Select Additional test/option menu

6.1.8.1 Select ANALOG I/O TEST

Special Note: Only these tests can be done.

6.1.8.2 "1. AIO Status and input.

6.1.8.3 "2. AIO Power-up Reset.

6.1.8.4 "3. External Loopback Test.

6.2 Calibration

6.2.1 Select AIO Status and input

6.2.2 Connect using jumper wires 6V Test battery to pos. to 1PL-1 common to 1PL-3.

6.2.3 Pot P1: Adjust so that pin 3 (com) and pin 4 (pos) on U11 reads 40.0mV.

6.2.4 Pot P2: Adjust P2 until 2PL-3 (pos) is 0.000V (balances circuit) use common at –C4 for ground reference.

6.2.5 Pot P3: Adjust so that pin 6 (Pos) of DAC (U33) and –C4 (COM) reads 9.9766V.

6.2.6 Pot P4: Adjust so that screens read +5.1V.

*****Pot 4 is Positive Voltage Calibration. Pot P5 is Negative Voltage Calibration. P4 and P5 interact with one other. You will have to go back and forth adjusting both pots until you read +5.1V and –5.1V on screen**

6.2.7 Pot P5: Reverse the polarity of the incoming voltage and adjust P5 so that the screen reads –5.1V.

6.2.8 Repeat calibration of P4 and P5 until the Positive and Negative 5.1 Volts match. After both Voltages are calibrated for +5.1V and –5.1V the Calibration of AIO Board is compete. Remove Voltage input from 1PL. Depress Return to go back to main AIO Test Screen.

6.3 AIO Diagnostic Tests

6.3.1 Select Power-up Reset. And test 1 time. If it Passes go on to next test.

6.3.2 Remove 1PL test plug and connect Loopback cable to 1PL and 3PL.

6.3.3 Select AIO External Loopback Test and Test 1 time. If passes go on to next test.

6.3.4 Shut down MC2000 Control and remove Loopback cable and 2PL Test Plug.

6.3.5 Install Test Card AIL01 to IAO 1PL, 2PL and 3PL.

6.3.6 Turn control on by depressing green “Control On” push button on the NCS Station. If the LED on the AIO does not come on, stop the testing and begin your troubleshooting.

6.3.7 “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”.

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

6.3.9 Select “Execute Automatic Test Cycle”.

6.3.10 Enter name (no. cmd extensions) of test to be executed will be displayed type in AIO and test 5-10 times.

6.3.11 Shut down MC2000 Bench Control.

6.4 ******TEST COMPLETE ******