g GE Energy	**Functional Testing Specification**
Inspection & Repair Services ***Louisville, KY***	**LOU-GEF-PWC02**

Test Procedure for PWC02 Interface Card

DOCUMENT REVISION STATUS: Determined by the last entry in the "REV" and "DATE" column

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	Rick Diercks	09/09/2008
B			
C			

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
Rick Diercks			Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
09/09/2008			9/9/2008

Functional test procedure for PWC02 Interface card

1. SCOPE

1.1 This specification provides the Engineering Requirements for testing PWC02 card. The process applies only to control cards model number44A719311-G02

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	**44C719623**	Board Schematics
3.1.5	**GIT-200**	**TAB12** Diagnostic Software

4. ENGINEERING REQUIREMENTS

4.1 Description

4.1.1 The purpose of the Power Controller Card is used to control the logic rack power supply using relay logic. Interface circuits are provided for customer interlocks and power in the MC2000 logic rack.

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	+24VDC Power Supply	Power Supply
1	PWC Relay Confidence Box	Test Box
1	2000CNC Extender Card	Extender Board
1	PWC-4PL Test Plug	Led Test Plug test
1	Heat Gun	For heating Component

6. TESTING PROCESS

6.1 Relay Bench Test
6.2 Test all ten relays on PWC02 Board.
6.3 Apply +24V to each relay coil (refer to Board Schematics Page 1)
- **6.3.1** Connect +24V leads to Coil (across Diode or Cap) turn on power Supply.
- **6.3.2** With OHM Meter test relay's contacts open and close states (should be under 1 Ohm).
- **6.3.3** After testing all ten relays the relay bench test is complete.

6.4 Set-Up Procedure
- **6.4.1** Inspect Simulator
  - **6.4.1.1** Ensure the logic rack contains all necessary boards.
  - **6.4.1.2** Ensure the MCS and the NCS data cables are connected to IOC-2PL & 3PL.
- **6.4.2** Insert the board under test (BUT)
  - **6.4.2.1** Plug the 2000 CNC extender card into the first slot from the right (adjacent to the power supply).
  - **6.4.2.2** Plug the BUT into the 2000 CNC extender card.
  - **6.4.2.3** Plug the NCS power cable into PWC-1PL.
  - **6.4.2.4** Plug the MCS power cable into PWC-2PL.
  - **6.4.2.5** Plug the power supply cable into PWC-3PL.
  - **6.4.2.6** Plug the PWC test plug into PWC-4PL.
  - **6.4.2.7** Connect the voltmeter "+" to 2PL-11 and the voltmeter "-" to 2PL-8.
  - **6.4.2.8** Plug the PWC relay confidence box into PWC-5PL and to the berth 24V power supply.

6.5 Test Procedure

6.5.1 Power up the logic rack.

6.5.1.1 Depress green "ON" button on the NCS. The green "ON" button, the PWC on-board LED (green), the 4PL LED (red), and the "CORA" LED on the PWC relay confidence box should light. The red "OFF" button should go off. If any of these things do not occur, the PWC card has failed!

6.5.1.2 After approximately 7 seconds "Power up Diagnostics" will appear. Power sup diagnostics should finish after 3-60 seconds. At this time all LEDs except the DIOs should be lit.

6.5.1.3 "System Loading" will be displayed following "Power up Diagnostics" and should finish in approx 20 seconds.

6.5.1.4 Wait for the following messages to appear. "Mark Century 2000 Service Diagnostics Initialization" then "Make any Keyboard Entry for Manual/Menu Mode". At this time the DIO LEDs should light.

6.5.2 Run the automatic test cycle.

6.5.2.1 Select "Execute Automatic Test Cycle" (ATC).

6.5.2.2 Enter "PWC".

6.5.2.3 Enter the number of repetitions (usually 1).

NOTE: Once the ATC starts, the name of the test being executed will be displayed on the CRT. Observe the CRT, watching for the tests shown below and perform the checks associated with each.

6.5.2.4 MCS Test Lamp: when this test begins, watch for all of the MCS lamps to flash. This ensures the PWC is supplying power to the MCS.

6.5.2.5 Axis Test BCast: when this test begins, watch for "RR" and "LR_PFR" LEDs on the PWC relay confidence box to light. Also watch for them to go off when this test completes. This ensures the integrity of the customer's relays.

6.5.2.6 DIO Test Automatic: when this test begins, watch for the 4PL LED to blink one time. If any other failures occur during this test, they will be logged into the error log.. This test ensures the PWCI/O diagnostic relays are working.

6.5.2.7 PWC Test Digital: if any failures occur during this test, they will be logged into the error log. The test ensures the integrity of the "PWC Status" and "Parity Check" circuits.

6.5.3 Check for ATC failures.

6.5.3.1 "Main Menu" is displayed following the ATC/

6.5.3.1.1 There are no ATC failures.

6.5.3.2 "Failures in Error Log" is displayed following the ATC.

6.5.3.2.1 Select "Error Log Options".

6.5.3.2.2 Select "Display Error Log".

6.5.3.2.3 Using the cursor controls keys, scan the error log and note any failures.

6.5.4 Perform Over-Temperature test.

6.5.4.1 Select "Additional Test/Options Menu".

6.5.4.2 Select "Power Controller Test".

6.5.4.3 Select "PWC Overtemp Test (Manual)".

6.5.4.3.1 Observe the instructions on the CRT and watch for the following voltages on the voltmeter:

6.5.4.3.1.1 When the "Over Temperature" message appears, the voltage should be between 3.25 & 3.35 volts.

6.5.4.3.1.2 When the unit shuts off, the voltage should be between 3.29 and 3.41 volts

6.5.4.3.2 Wait 5 seconds.

6.5.4.4 Depress the green "ON" button on the NCS. The green "ON" button, the PWC on-board LED (green), the 4PL LED (red), and the "CORA" LED on the PWC relay confidence box should light. The red "OFF" button should go off. If any of these things do not occur, the PWC card has failed!

6.6 MB03 7.59MC Test.

6.6.1 Before turning on control be sure proper boards have been inserted into the logic rack and CPU switch is in the middle position.

6.6.2 If everything is ready turn on control, pressing "ON".

6.6.3 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.

6.7 Part Program Test

6.7.1 Once control is up and on line with the 7.59MC application, Turn on axis cart and enable drives.

6.7.1.1 Press Control On again, this will lock in drives from control.

6.7.1.2 Tested MCB02 inputs Test High Jog and Low Jog; Tested Incr. Feed, Ref. Zero, Ground Zero, and Ste Zero.

6.7.2 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.

6.7.2.1 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.

6.7.2.2 When complete power down control.

6.8 ******TEST COMPLETE ******