



GE Energy

## Functional Testing Specification

*Parts & Repair Operations  
Louisville, KY*

**LOU-GEF-IC600xx941/2/3x-A  
Analog Output Card**

### Test Procedure for an IC600xx941/2/3x boards

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## 1. SCOPE

1.1 This is a functional testing procedure for a Series Six Analog Output card.

## 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-83526**

## 4. ENGINEERING REQUIREMENTS

### 4.1 Equipment Cleaning

4.1.1 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.

### 4.2 Equipment Inspection

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

4.2.1.1 Wires: broken, cracked, or loosely connected

4.2.1.2 Terminal strips / Connectors: broken or cracked

4.2.1.3 Components: visually damaged

4.2.1.4 Capacitors: bloated or leaking

4.2.1.5 Solder joints: damaged or cold

4.2.1.6 Circuit board: burned or de-laminated

4.2.1.7 Printed wire runs / Traces: 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 and test ratios are equivalent or better.

Qty	Reference #	Description
1		Series Six CPU-1 Local rack
1		Series Six Calibration Interface Box
1		Series Six Work-Master Computer set up with the "Logic Master 6" system.
1		Fluke 8840a Bench-Top Multi-Meter

## 6. SETUP PROCESS

- 6.1** Using the orientation of the berg jumpers found on each card, each of the three card types can be converted from one to another. However, for the purpose of this test procedure, each card should be set up and tested according to the card type indicated within the model # (i.e. 941, 942, 943).
- 6.2** The following chart shows the orientation of the berg jumpers and the output ranges for each card type.

Card Type	Output Range	Channel one	Channel two	Channel three	Channel four
xx941	0V to 10V	30-31 27-28 41-42	23-24 20-21 38-39	16-17 13-14 35-36	9-10 6-7 32-33
xx942	-10V to 10V	29-30 25-27 42-43	22-23 18-20 39-40	15-16 11-13 36-37	8-9 4-6 33-34
xx943	4mA to 20mA	30-31 26-27 41-42	23-24 19-20 38-39	16-17 12-13 35-36	9-10 5-6 32-33
4mA to 20mA output range only: For common external source, connect 2-3 For internal loop supply, connect 1-2.					

**Chart 1**

- 6.3** Proper addressing is acquired through the use of dipswitches, which are located on the back plane of the rack.
- 6.4** The columns of the chart below indicate the dipswitch positions for the proper addressing of each card type and the address # of those positions.

Switch #	xx941	xx942	xx943
7	Opened	Opened	Opened
6	Closed	Closed	Closed
5	Opened	Opened	Opened
4	Closed	Closed	Closed
3	Closed	Closed	Opened
2	Closed	Opened	Closed
1	Closed	Closed	Closed
Address # >>	641	657	673

**Chart 2**

- 6.5** Using the keystroke ALT-1, ensure that the Work-Master is "offline".
- 6.6** Connect the data cable from the Work-Master to the top connector of the I/O Control card of the CPU-1 MAIN rack.
- 6.7** Ensure that SW1 on the Calibration Interface Box is set to Output.

## 7. TEST PROCESS

- 7.1 Ensure power to the CPU-1 LOCAL rack is off.
- 7.2 After berg jumpers and dipswitches are set properly according to charts 1 and 2 of section 6, insert card into the configured slot of the rack.
- 7.3 Connect the output calibration connector to the exposed edge of the card.
- 7.4 Connect the multi-meter, via banana-plug leads, to the meter output of the Calibration Interface Box.
- 7.5 Using the STOP/RUN key switch on the CPU-1 MAIN rack, place the CPU-1 MAIN rack in STOP mode.
- 7.6 Turn the power to the CPU-1 LOCAL rack on.
- 7.7 Place the CPU-1 MAIN rack in RUN mode.
- 7.8 Verify that the power LED of the card under test becomes lit.
- 7.9 On the Calibration Interface Box, press the button, which corresponds to the output range of the card type in accordance with Chart 1 in section 6.
- 7.10 From the LM6 “supervisor menu”, press “F1” to display the CPU-1 program.
- 7.11 Within the program display screen, perform a search for the address, which corresponds to the card type in accordance with chart 2 in section 6.
  - 7.11.1 Press “backspace” (backspace = output).
  - 7.11.2 Type the address #. **Note:** Since the # keys in the keypad to the right of the keyboard do not function with the LM6 system, use the # keys above the letter keys.
  - 7.11.3 Press “F2” for the search function.
  - 7.11.4 Press “F1” to begin the search. The CPU-1 program should display the output address.
- 7.12 Using the keystroke ALT-1, switch the Work-Master to “online”.
- 7.13 The following chart shows the correlation between the digital inputs, which get displayed by the Work-Master screen and the output voltages, which get displayed by the multi-meter.

CARD TYPE	LOW END		HIGH END	
	Digital Input	Output Voltage	Digital Input	Output Voltage
xx941	X000	0.0000V	XFFF	9.9976V
xx942	X800	-10.0000V	X7FF	9.9951V
xx943	X000	1.0000V	XFFF	4.9990V

X = Channel # minus 1 in hexadecimal format.

**Chart 3**

- 7.14 The following chart represents the output section keypad of the Calibration Interface Box.

Output 1	Low	0V – 10V
Output 2	Mid	-10V – 10V
Output 3	High	1V – 5V
Output 4	Enter	

**Chart 4**

**7.15** Using the output section keypad, set up the outputs for calibration and ensure that the digital inputs correlate with the output voltages according to chart 3.

**7.16** The following chart shows the keystrokes used to setup the low end, middle and high end.

<b>Low End</b>		
<b>Output</b>	<b>End</b>	<b>Enter</b>
Output 1 >	Low >	Enter
Output 2 >	Low >	Enter
Output 3 >	Low >	Enter
Output 4 >	Low >	Enter
<b>Middle</b>		
Output 1 >	Middle >	Enter
Output 2 >	Middle >	Enter
Output 3 >	Middle >	Enter
Output 4 >	Middle >	Enter
<b>High End</b>		
Output 1 >	High >	Enter
Output 2 >	High >	Enter
Output 3 >	High >	Enter
Output 4 >	High >	Enter

**Chart 5**

**7.17** Set up each output for calibration of the same end.

**7.18** SW2 switches which output the multi-meter reads. Using SW2, read each of the voltages displayed on the multi-meter to find the voltage, which reads closest to the output voltage indicated in chart 3 in accordance to the correlated digital input.

**7.19** Each card has potentiometers for adjusting the high and low ends per channel, plus potentiometers for adjusting the MASTER high and low ends.

**7.20** Using the potentiometers on the card, adjust the output voltages of the 3 channels, which are furthest from the respective output voltages indicated in chart 3, as close as possible to the channel, which is already adjusted the closest.

**7.21** Repeat steps 7.15 – 7.20 for both the High End and the Low End.

**7.22** Using the keystroke ALT-1, switch the Work-Master to “offline”.

**7.23** Place the CPU-1 MAIN rack in STOP mode.

**7.24** Turn the power to the CPU-1 LOCAL rack off.

**7.25 \*\*\*TEST COMPLETE\*\*\***

## **8. NOTES**

## **9. ATTACHMENTS**