
 <div> <div>GE Energy</div> <div> Parts & Repair Services Louisville, KY </div> </div>		<div>Functional Testing Specification</div> <div>LOU-GED-DS3820NGDB</div>	
<div>Test Procedure for a DS3820NGDB</div>			
DOCUMENT REVISION STATUS: Determined by the last entry in the "REV" and "DATE" column			
REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	S. Cash	7-9-2008
B	Clarified several steps.	P. Kelley	11/23/2010
C	Converted factory scanned pages to regular text and clarified some steps.	P. Kelley	12/10/2010
D	Clarified several steps 6.4.4.37 thru 6.4.4.45	P. Kelley	12/13/2010
E	Added step 6.4.5	C. Wade	4/27/2011
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PREPARED BY Scott Cash	REVIEWED BY Paul Kelley	REVIEWED BY	QUALITY APPROVAL 
DATE 7-9-2008	DATE 12/13/2010	DATE	DATE 7/10/2008

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1. SCOPE

1.1 This is a functional testing procedure for a DS3820NGDB 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 See board's electronic folder for more information.

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 site specific SRA's 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's and test ratios are equivalent or better.

Qty	Reference #	Description
1		Fluke 87 DMM (or Equivalent)
1		Digital Oscilloscope
1	H188961	Test fixture
		115VAC Variac
1	H188964	Control Box

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6. TESTING PROCESS

6.1 Setup

- 6.1.1 Connect the test fixture and control box together.
- 6.1.2 On the control box set RT Resistor switch to open, SW1 & SW2 to open, ON/OFF switch to OFF.
- 6.1.3 Plug the ac cord from the control box into the variac, turn the variac on and set to 110 on the dial.

6.2 Testing and Calibration

6.3 **Note: During this test some indicators and relays will go on and off that are not specifically referred to in the test at that time. Ignore these and only be concerned with the specific ones being referred to.**

- 6.3.1 On the control box set the ON/OFF switch to ON and with the DMM monitoring AC VOLTAGE adjust to 115VAC +/- 1 V with the variac.
- 6.3.2 The test fixture front panel green ON indicator should light as well as LEDs 2 and 4 on the control box.

6.4 Power Supplies

- 6.4.1 Check the following test points on the cards indicated with respect to the black connector on the control box under METER.
- 6.4.2 NGDC:
 - 6.4.2.1 Check for 5.0 +/- .2 V at TP5.
- 6.4.3 NGDD:
 - 6.4.3.1 Check for 5.0 +/- .2 V at TP12.
 - 6.4.3.2 Check for 15.0 +/- .05 V at TP11. Adjust with R3 if necessary. Seal pot.
 - 6.4.3.3 Check for -15 +/- .4 V at TP14.
 - 6.4.3.4 Check for 25 +/- 2 V at TP13.
- 6.4.4 For NGDC and NGDD:
 - 6.4.4.1 Verify that AC VOLTAGE on the control box is 115VAC +/- 1V and readjust if necessary.
 - 6.4.4.2 Connect a digital scope to TP2 on the NGDC board with the common of the scope to the black METER connection on the control box.
 - 6.4.4.3 Verify the waveform in FIGURE 2.
 - 6.4.4.4 Turn the RT RESISTOR switch on the control box to 500 and close SW2.

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6.4.4.5 Verify the AC VOLTAGE on the control box is 115VAC +/- 1V and adjust if necessary.

6.4.4.6 Using the DMM read TP1 on the NGDD and adjust R1 on the NGDD for a high of 4.7 +/- .01 VDC. (will switch positive and negative, adjust when positive).

6.4.4.7 Connect both leads of the DMM to the meter connections on the control box (pos to red).

6.4.4.8 Adjust R6 on the NGDD for a high of 5.0 +/- .1 VDC. (when positive)

6.4.5 Reference Voltage

6.4.5.1 Adjust R7 so that the voltage at TP26 is 5.85 +/-0.01 volts. (The voltage at U26 pin 7 should be -5.85 +/- 0.05 volts, for reference only). This step is important and will throw you off if voltage is not set correctly.

6.4.6 Trip Set Point

6.4.6.1 Set R4 and R5 on the NGDD board to fully CCW.

6.4.6.2 Press the TEST/RESET button on the front of the test fixture half way in and release. After at least 5 seconds the FAULT light on the front panel should be off.

6.4.6.3 On the NGDD connect the DMM to TP2 and slowly adjust R4 CW until the voltage on TP2 drops below 1V (will then toggle slowly between < 1V to > 4V).

6.4.6.4 Verify that the FAULT light on the front of the fixture is on.

6.4.6.5 Verify LEDs 1 and 3 on the control box are on.

6.4.6.6 Verify that on the NGDD the voltage at TP24 is 4.7 +/- .15 V.

6.4.6.7 Switch RT RESISTOR on the control box to 2.5K.

6.4.6.8 On the NGDD turn R4 slowly CW until the voltage on TP2 drops below 1V (will then toggle slowly between < 1V to > 4V).

6.4.6.9 The voltage at TP1 should be 3.55 +/- .15V (when positive).

6.4.6.10 Turn R4 fully CCW.

6.4.6.11 Switch RT RESISTOR to 2K.

6.4.6.12 Turn R4 slowly CW until TP2 drops below 1V.

6.4.6.13 Verify the voltage at TP1 is 3.8 +/- .15V (when positive). And -3.8 +/- .15V (when negative).

6.4.6.14 Switch RT RESISTOR to 2.5K.

6.4.6.15 Push the TEST/RESET half way in on the test fixture front panel and release.

6.4.6.16 Verify the ALARM light on the front panel is off.

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- 6.4.6.17** Put a DMM on TP20 of the NGDD board and slowly turn R5 CW until the voltage on TP20 drops below 1V.
- 6.4.6.18** After at least 10 seconds verify the ALARM light on the test fixture front panel is on.
- 6.4.6.19** Verify the voltage at TP25 of the NGDD board is 3.55 +/- .15 volts (when most positive).
- 6.4.6.20** Switch RT RESISTOR to 12.5K.
- 6.4.6.21** Push the TEST/RESET half way in on the test fixture front panel and release.
- 6.4.6.22** Turn R5 slowly CW until TP20 drops below 1V (will then toggle slowly between < 1V to > 4V).
- 6.4.6.23** The voltage at TP1 should be 1.7 +/- .15 V (when positive).
- 6.4.6.24** Switch RT RESISTOR to 5K.
- 6.4.6.25** Turn R5 fully CCW.
- 6.4.6.26** Put a DMM on TP20 of the NGDD board and slowly turn R5 CW until the voltage on TP20 drops below 1V (will then toggle slowly between < 1V to > 4V).
- 6.4.6.27** With the DMM measuring AC HZ at TP5 on the NGDD board adjust R2 for a reading of 869 HZ +/- 3 HZ.
- 6.4.6.28** Move the DMM to TP6 and verify that the frequency is between 3.22 HZ to 3.57 HZ.
- 6.4.6.29** With 2 channels of the oscilloscope on TP2 and TP7 of the NGDD card, press the TEST/RESET button all the way in and hold while observing the oscilloscope. This should cause the signal on TP2 and TP7 to go low. Verify that the time between when the two test points drop low is 2 to 2.5 seconds. If not then adjust R2 to obtain the proper time. You may have to press and release the button several times to get a good reading.
- 6.4.6.30** Open SW2. SW1 should also be open at this point. Press the TEST/RESET button all the way in and hold for at least a minute while observing the lights on the test fixture front panel. The yellow POS and NEG test lights should alternate back and forth at least twice during this period. While the light is switching from one to the other the ALARM and FAULT lights should go out. After the switch to POS or NEG has been made the ALARM and FAULT lights should light. You should see this switching pattern at least twice during this one minute period.

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6.4.6.31 Press the TEST/RESET button all the way in and hold for a least 30 seconds while observing the LEDs on the control box. LEDs 1 and 3 should not light and LEDs 2 and 4 should always be on during this period.

6.4.6.32 Close SW1. Press the TEST/RESET button all the way in and hold for a least 30 seconds and verify that the ALARM and FAULT lights on the front panel do not come on during this period.

6.4.6.33 Switch the RT RESISTOR to 2K and close SW2. on the control box.

6.4.6.34 Verify that on the test fixture front panel, only the ON light is on. The other 4 (FAULT, ALARM, POS, NEG) on the front panel should be off. LEDs 2 and 4 on the control box should be on.

6.4.6.35 Open SW1 and SW2.

6.4.6.36 Connect the DMM to TP2 on the **NGDC** board.

6.4.6.37 Press the TEST/RESET button all the way in. Verify that when the POS light on the front panel is on, the DMM indicates TP2 on the NGDC board is negative. Verify that when the NEG light on the front panel is on, the DMM indicates TP2 is positive.

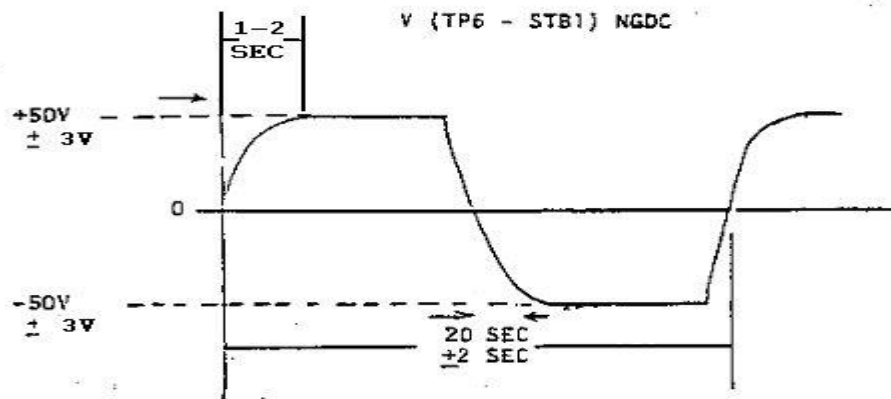


FIGURE2
WAVEFORM OF NGDC OSCILLATOR OUTPUT

TEST COMPLETE

7. NOTES

7.1 None at this time.

8. ATTACHMENTS

8.1 None at this time.

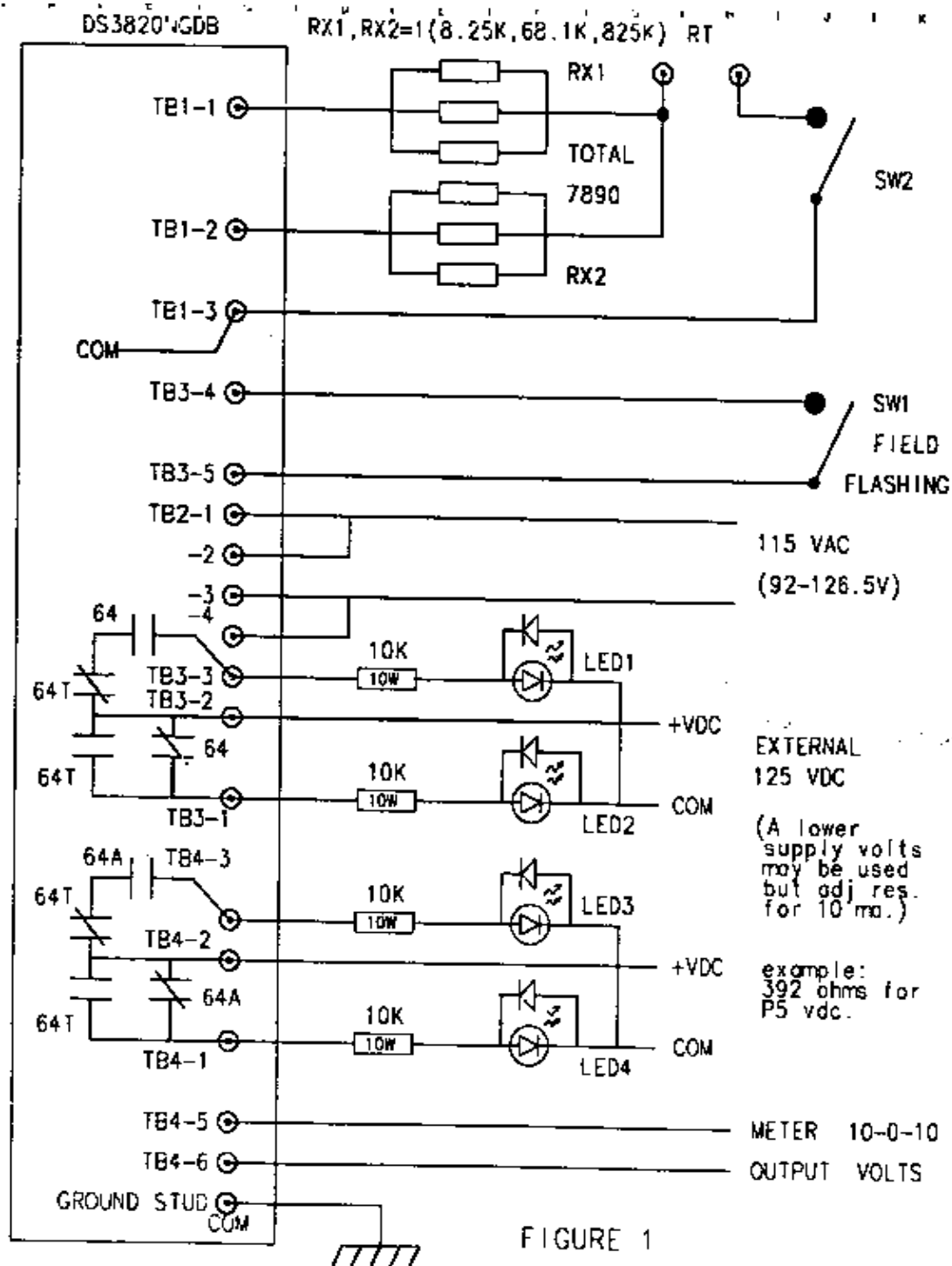


FIGURE 1

Control Box Circuit