g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY.***	**LOU-GED-DS3800NHFA**

Test Procedure for DS3800NHFA & DS3800NHFB control cards

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	*Jeffrey D. Barton*	*6/26/2002*
B	Verified test, updated headers	J. Madden	2/22/2006
C	Added Special Note in section 6.1.1, 6.1.2, and 4.1.1 on SRAs, and changed header.	C. Wade	2/23/2010
D	Updated test to reflect new fixturing and added tech notes	R. Johnson	5/27/2010
E	Change Test Fixture asset number from H033633 to H188852	C. Edlin	1/28/2013

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
Jeffrey D. Barton	J. Madden	R. Johnson	Robert Duvall
DATE	**DATE**	**DATE**	**DATE**
6/26/02	2/22/2006	5/27/2010	06/27/02

Functional test procedure for: DS3800NHFA

1. SCOPE

1.1 This is a functional testing procedure for a DS3800NHFA & DS3800NHFB chopper supply control 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 DS3800NHFASH0-SH7

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 or cracked
4.2.1.2 Terminal strips / connectors broken or cracked
4.2.1.3 Loose wires
4.2.1.4 Components visually damaged
4.2.1.5 Capacitors leaking
4.2.1.6 Solder joints damaged or cold
4.2.1.7 Circuit board burned or de-laminated
4.2.1.8 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	H188852	TEST FIXTURE
3		Fluke 85 DMM or equivalent

6. TESTING PROCESS

6.1 Special Note

6.1.1 To cut down on repair time, change out the following components, C11, C12, Q19, & Q20. We have found the transistors have been leaking causing excessive time in troubleshooting.

6.1.2 U1 has to be SG3524BN to work in the circuit.

6.2 Setup

6.2.1.1 Verify test fixture has NGTE and NGSE test cards installed on the front of test fixture.

6.2.1.2 Verify fiber optics is connected to NGSE card and all power cables are connected.

6.2.1.3 Configure switches as such:

6.2.1.4 E-STOP Disengaged, fans should be ON.

6.2.1.5 Power switch is in OFF position.

6.2.1.6 Load in OFF position.

6.2.1.7 Chopper Supply in ON position.

6.2.1.8 DC Supply in OFF position.

6.2.1.9 Fiber Optic in ON position.

6.2.2 Install UUT in Slot #1 on test fixture.

6.2.3 Plug in connectors:

6.2.3.1 JA to UUT:

6.2.3.2 JB to UUT:

6.2.3.3 JC to UUT:

6.2.4 **DS3800NHFB cards only**.

6.2.4.1 Plug in off board load resistors (15 ohms) to R16A to R16B

6.2.4.2 Plug in off board load resistors (7.5 ohms) to R13A to R13B

6.2.4.3 Plug in off board load resistors (250 ohms) to R46A to R45A

6.2.5 Fully adjust R20 CCW.

6.2.6 Fully adjust R19 CW.

6.2.7 Connect DMM1 across TP10 (positive lead) and TP1 (negative lead).

6.2.8 Connect DMM2 across TP5 (positive lead) and TP1 (negative lead).

6.2.9 Connect DMM3 across Load Filter Cap at top of Test Rack.

6.3 Testing Procedure

6.3.1 Apply power by turning on the power switch.

6.3.2 IMOK LED should be ON and FAULT LED should be OFF.

6.3.3 Verify DMM1 reads +15VDC (+/- 1.5V) on TP10.

6.3.4 Verify DMM2 reads 120VDC on TP5.

6.3.5 Verify DMM3 reads approx 150VDC (+/- 5v).

6.3.6 Remove DMM1 from TP10 and connect it to positive side of C2.

6.3.7 Verify DMM1 reads +5VDC (4.95V to 5.05V) range +/- 1%. This voltage VREF is the output of U1 pin 16, trimmed to +/- 1%.

6.3.8 Adjust R20 CW for 165VDC on DMM3.

6.3.9 Slowly adjust R19 CCW just till 165VDC starts to drop on DMM3, then turn back CW till 165VDC is re-achieved.

6.3.10 Turn off POWER SWITCH.

6.3.11 Removed DMM1 and set it to measure Frequency, connect it to P1.

6.3.12 Turn on POWER SWITCH.

6.3.13 Verify P1 measures (744Hz to 822Hz) Theoretical value = 783Hz +/- 5%.

6.3.14 While DMM1 is connected to P1 the Unit under test should shut down within 30 SEC. (DC SUPPLY AND LOAD ARE OFF WITH THIS TEST)

6.3.15 Remove DMM1 from P1 and connect it to TP4.

6.3.16 Cycle POWER SWITCH to reset to shutdown circuit.

6.3.17 Verify DMM1 measures (371Hz to 411Hz) Theoretical value = 391Hz +/- 5%.

6.3.18 Remove DMM1 and connect it to TP2.

6.3.19 Switch the DC SUPPLY on.

6.3.20 Switch on the LOAD.

6.3.21 Verify DMM1 reads 13Kz (12000 to 14000).

6.3.22 Verify DMM2 reads 100VDC on TP5. (TP5 Voltage should not vary)

6.3.23 Verify DMM3 reads 163VDC adjusted with no load.

6.3.24 Now adjust R20 to 165.3VDC and R19 to limit to 165.0VDC with load connected.

6.3.25 Let UUT burn-in for 1 hour.

6.3.26 TO SHUTDOWN TEST STATION.

6.3.27 Switch OFF the DC power supply. Allow the DC SUPPLY analog meter to drop to ZERO.

6.3.28 Switch OFF the LOAD.

6.3.29 Switch OFF the POWER SWITCH.

6.3.30 Allow the fans to run for 10 min. for cooling before the E-STOP is engaged.

6.3.31 **LET UUT STAND FOR 2 MINUTE AFTER TEST DUE TO C13 BEING CHARGED TO >350VDC AND HEAT SINKS BEING HOT AND POWER RESISTORS WILL BE HOT ALSO.**

6.4 ***TEST COMPLETE ***

7. **TECH NOTES:**

7.1 Suggest unit be powered up on bench to test voltages and measure freq output of U2.

7.2 Hookup as follows on bench:

7.2.1 TP10 - 14.2 VDC

7.2.2 Cathode of Zener CR2 – 2.5 VDC

7.2.3 R11 on side next to Neon light – 4.3 VDC (adjustable for inverting and non-inverting levels)

7.2.4 TP1 – GND

7.2.5 Connect 5VDC to R116 side next to U4 to override shutdown and connect GND to TP1.

7.2.6 Momentarily connect 5VDC to test pin P4 and CR32 should go off.

7.3 Check frequency of U2 pin 3 (555 output) – optimum freq is 785Hz. Card may work up to 806Hz, but not suggested. **Recommend capacitors C11 and C12 be replaced on all units with Polyester Foil(Paper Capacitor) precision capacitor.**

7.3.1 Salem board measured 840Hz – caused board to go into shutdown as soon as R20 was adjusted towards 165VDC. Fix was to replace R30 and R31 with known good (within tolerance) resistors. Replaced C12 with Polyester Foil (Paper capacitor).

7.4 Unit will adjust but shutdown at approx. 160VDC /unit buzz (hum) will vary.

7.4.1 Replaced Transistor Q19, **Q20** (*seems to be a highly problematic area*), and Q21-68A7746P1 and problem was resolved. These Transistors checked good with the DMM and Huntron in circuit and out of circuit. Apparently one of these Transistors was leaking or breaking down.

7.4.2 Can use Huntron ProTrack I to check these two transistors, out of circuit. A normal Q19 transistor biased on at 17 – 18 V across emitter and collector. A defective Q19 transistor biased on at 7 –8 V across emitter and collector.

7.5 If unit will not adjust or unit goes into shutdown as R20 is adjusted (stuck at 153VDC).

7.5.1 Replaced IC U1, problem was resolved.

7.5.1.1 U1 must be a **SG3524BN**, the **SG3524N** will not work.

7.6 U6 voltages for unit in shutdown are as follows:

7.6.1 Pins 1, 2, 6, and 5 - 5VDC

7.6.2 Pins 3 and 4 – 0VDC

7.6.3 CR32 is on

7.6.4 When unit is not in shutdown, Pin 3 is 5VDC and CR32 is off.

7.7 Check top of Q1 for (P108 line) 108VDC.

7.7.1 When R20 is fully CCW the voltage on Q1 (top) will be 123VDC.

7.7.2 As R20 is adjusted to achieve 165VDC, Q1 voltage should start dropping to 108VDC. (note: freq on U2 should be 785Hz.)

7.8 Known symptoms of bad Q19-68A7745P1 and/or Q20-68A7363P1. **RECOMMEND that Q19-68A7745P1 and Q20-68A7363P1 be replaced all units.**

7.8.1 Complete shutdown of 160 VDC line and red fault led is on.

7.8.2 160 VDC line will adjust up to 155 – 160 VDC and then shutdown, red fault led will come on when unit shuts down.

7.8.3 Unit stuck at 123 VDC with no adjustment red fault led is off.

7.9 Suppression circuits faulty (no drive signals)

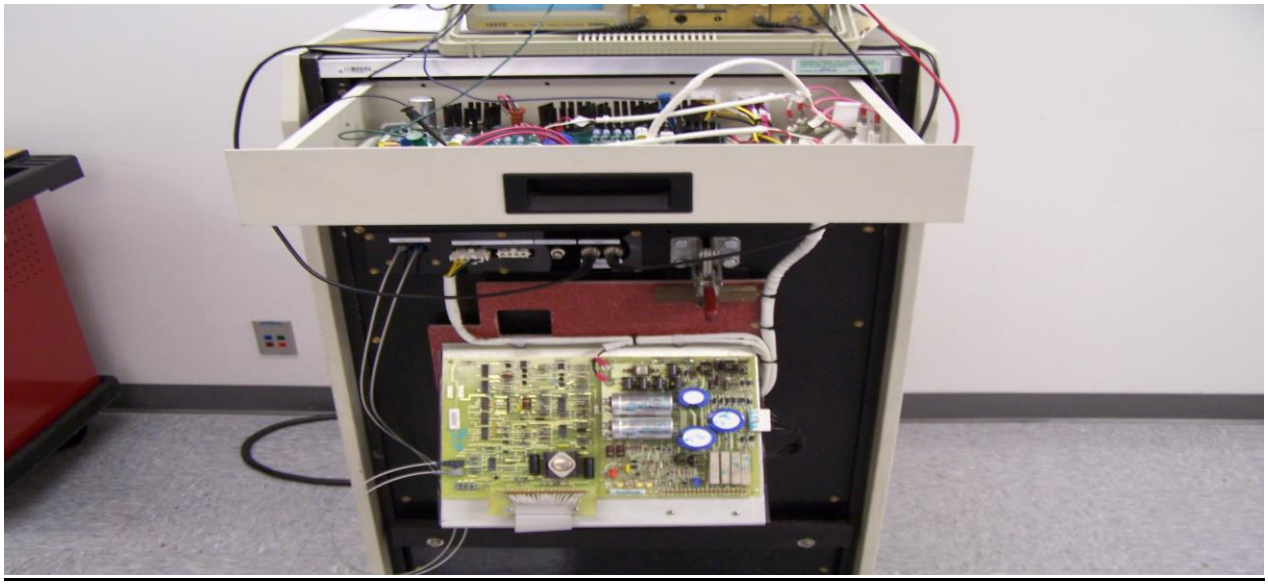
7.9.1 Found U6 defective holding card in shutdown / suppression.

7.10 Be careful when changing out the Fault LED, only use approved part.

7.11 The following are voltage readings taken on the bench with known good board powered-up and reset off for IC U1:

7.11.1 Pin-1 4.42VDC
7.11.2 Pin-2 4.6VDC
7.11.3 Pin-3 0.152VDC
7.11.4 Pin-4 0.0
7.11.5 Pin-5 0.0
7.11.6 Pin-6 3.793VDC
7.11.7 Pin-7 2.191VDC
7.11.8 Pin-8 0.0
7.11.9 Pin-9 0.0
7.11.10 Pin-10 0.169 VDC
7.11.11 Pin-11 0.0
7.11.12 Pin-12 0.467 VDC
7.11.13 Pin-13 14.13VDC
7.11.14 Pin-14 0.0
7.11.15 Pin-15 14.14VDC
7.11.16 Pin-16 5.03VDC

8. Attachments



Asset Number H188852