g GE Energy Services	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY.***	**LOU-GED-151X1225DF01PC03**

Test Procedure for Wind Pitch (1.5MW) Converter

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	Roger Johnson	12/05/2011
B	Changed header to reflect 151X1225 number, added ECO 1215458 requirement and spelled out in 6.3 where repairs continue on, also added step 7.1, statement about proper labeling.	C. Wade	4/14/2012
C	Added visual inspection step 6.1.2 below closing blue cover	C. Wade	5/5/2012
D	Edited the SOW to Rev 5	C. Wade	4/16/2013
E	Corrected grammar and syntax and revised verbal semantics for clarity and consistency. Highlighted certain phrases to provide emphasis to those aspects. Removed unintentional redundancy. Reformatted the illustrative style of certain portions of the test for sake of clearer understanding and easier identifications. This revision came to fruition based on in-depth discussions with both Roger Johnson and Frank Howard.	Cristyn Edlin	9/5/13
F	Re-wrote instruction to clarify requirements. Simplified some steps, added additional steps for balance verification, labeling, and for safety. Relabeled work instruction from LOU-GED-151X1225DF01PCxx to LOU-GED-151X1225DF01PC03. Archived old copy	R. Johnson & C. Wade	9/18/2013

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
Roger Johnson	C. Edlin	R. Johnson	Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
12/5/2011	9/5/2013	9/18/2013	12/30/2011

1. SCOPE

1.1 This is a functional testing procedure for a Pitch Converter PC02 and PC03.

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 Check 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 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	H190000	1.5MW Pitch Converter tester
1		HP3478A Meter or equivalent
1		Heat Gun

6. TESTING PROCESS

6.1 Setup

6.1.1 Before testing, remove the blue cover and perform the "Statement of Work" (SOW) for 151X1225DF01PC02. Click on following hyperlink - SoW for remanufacturing 151X1225DF01PC02_Rev0 5.doc

6.1.2 **Leave blue cover off of unit until test is completed. The 4 capacitor's (C34, C35, C44, & C60) solder joints will be pre-inspected by any QA inspector, work-leader, or QA Representative. Once approved, that inspector will then initial board with magic marker at corner of RAE/RAF board by C110.**

6.1.3 **ALL GROUNDS ARE CONNECTED TOGETHER.**

6.1.4 Verify all switches on the test fixture are off (turned toward the left).

6.1.5 Install the UUT into the (1.5MW) 151X1225DF01PC02 tester.

6.1.6 Connect the DB cables to the two terminal posts on the back of the UUT.

6.1.7 Connect the load cables to T2 and A1.

6.1.8 Connect the power cables to the NEG and POS terminals.

6.1.9 **If you are using the extension cable harness**, connect the plugs into their correspondingly labeled connections on the back of the test fixture.

6.1.10 **If you are using the extension cable harness**, install the Plexiglas shield onto the UUT.

6.1.11 Connect the logic plug to the UUT.

6.1.12 Connect the ground wire from the logic plug to the heat sink.

6.1.13 Plug the 120VAC from tester to wall outlet, provides power to tester & PC.

6.1.14 Connect the HP 3478A Multimeter to the DMM banana jacks on the tester.

6.1.15 Connect the tester's master power supply to the 3 phase 25Hp AC /25HP DC – 480VAC output.

6.2 Testing Procedure for Repairs and ECO 1215458

Special Note: The HP Digital meter always supersedes the GE Sentry software.

6.2.1 Turn on computer and monitor, select GE Sentry software.

6.2.2 Verify that the rotatory switch is in the S2 position. Note: All rotary switch settings throughout this procedure are measured and read on the meter.

6.2.3 Set meter to measure OHMS (2 wire ohms).

6.2.4 Verify the following settings on the rotatory Switch. **Special Note: If any of these steps fail – stop and repair unit.**

6.2.4.1 S2 - Greater than 0.2 OHMS

6.2.4.2 A1 - Greater than 500 ohms

6.2.4.3 T2 - Greater than 500 ohms

6.2.4.4 S4 - Greater than 0.2 OHMS

6.2.4.5 S1 - Greater than 0.2 OHMS

6.2.4.6 S3 - Greater than 0.2 OHMS

6.2.4.7 PCT (reference only measurement) - in the MEG OHMS range

6.2.4.8 NCT (reference only measurement) - in the MEG OHMS range

6.2.4.9 CAP- 200 OHMS (+/- 5%) bleeder resistor (THIS RESISTOR IS CONNECTED IN PARRALLEL WITH A CAPACITOR. DEPENDING ON HOW CHARGED THE CAPACITOR IS, THE RESISTANCE WILL START WITH A LOW READING AND INCREASE TO APPROX 200 OHMS. THIS RESISTOR IS INSTALLED IN THE TEST FIXTURE.)

6.2.4.10 ENA - 15 KOHMS (+/- 5%).

6.2.5 Set the meter to measure DC volts. Insure meter is in auto mode.

6.2.6 Power ON the 480VAC panel.

6.2.7 Turn on the MASTER POWER switch.

6.2.8 The TDK-Lambda DC power supply should have come up. Now adjust the output to 80VDC at 20 amps. To adjust the settings, press the “prev/” button and it will display the settings. Turn the dials to accordingly while the “prev/” LED is illuminated.

6.2.9 Verify the FOLD led is on. This will shut down the DC supply if the UUT is shorted.

6.2.10 To enable the DC power supply, press the OUT button.

6.2.11 Release the E-STOP button.

6.2.12 Turn on the UUT POWER switch.

6.2.13 Turn on the LOAD ENABLE switch.

6.2.14 Verify the following settings on the rotatory Switch.

6.2.14.1 S2 - 0VDC (+/- 1volt)

6.2.14.2 A1 - don't care (this reading does not matter at this time)

6.2.14.3 T2 - don't care (this reading does not matter at this time)

6.2.14.4 S4 - 0 VDC (+/- 1volt)

6.2.14.5 S1 - shall measure between 2mV to 4.5mV

6.2.14.6 S3 - less than 0.5 mV

6.2.14.7 PCT - don't care (this reading does not matter at this time)

6.2.14.8 NCT - don't care (this reading does not matter at this time)

6.2.14.9 CAP - 80VDC (+/-5VDC) (This voltage is set from the TDK-Lambda DC power supply in the test fixture and is adjusted by the tech.)

6.2.14.10 ENA - 0 VDC (+/- 1volt) (Off)

6.2.15 Turn off the LOAD ENABLE switch.

6.2.16 Turn on the 12mA switch (This is the ZERO torque command.)

6.2.17 Turn on the UUT ENABLE switch. (The enable relay inside the test fixture should audibly click one time, the TDK-Lambda should begin sourcing current and the meter should read 12VDC (+/- 1volt) with the rotary switch in the "ENA" position.) **NOTE: Units can time out with no torque command applied. If the UUT will not enable, the relay will either click twice in a NEAR-simultaneous, rapid succession OR the relay will not click at all. In either of these events, keep the UUT ENABLE and 12mA switches turned on and let the UUT rest in that state for five minutes. After the UUT has rested in that state for five minutes, cycle the UUT ENABLE switch.**

6.2.18 Verify the following settings on the rotatory Switch.

6.2.18.1 S2 - 0VDC (+/- 1volt)

6.2.18.2 A1 - don't care (this reading does not matter at this time)

6.2.18.3 T2 - don't care (this reading does not matter at this time)

6.2.18.4 S4 - don't care (this reading does not matter at this time)

6.2.18.5 S1 - shall measure between 2mV to 4.5mV

6.2.18.6 S3 - shall measure less than 10 mV

6.2.18.7 PCT - don't care (this reading does not matter at this time)

6.2.18.8 NCT - don't care (this reading does not matter at this time)

6.2.18.9 CAP - 80VDC (This voltage is set from the TDK-Lambda DC power supply in the test fixture and is adjusted by the tech.)

6.2.18.10 ENA - 12VDC (+/- 1volt) (On)

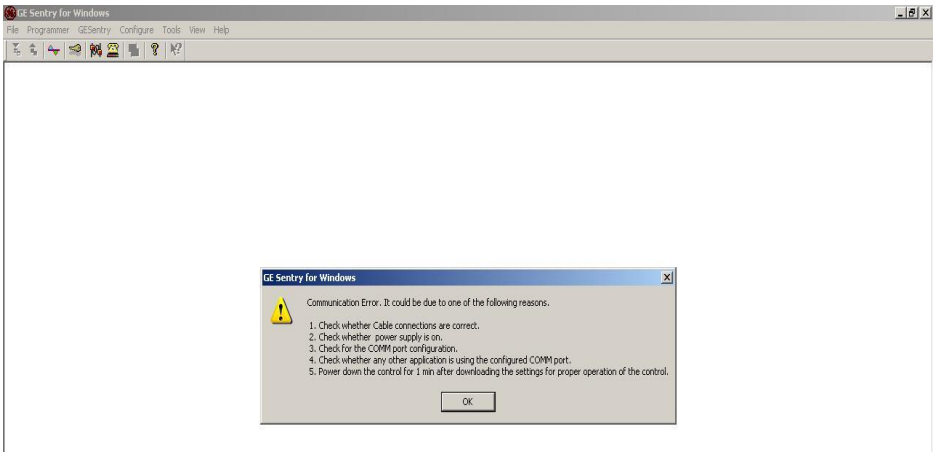
6.2.19 Turn off the UUT ENABLE switch.

6.2.20 Turn off the 12mA switch.

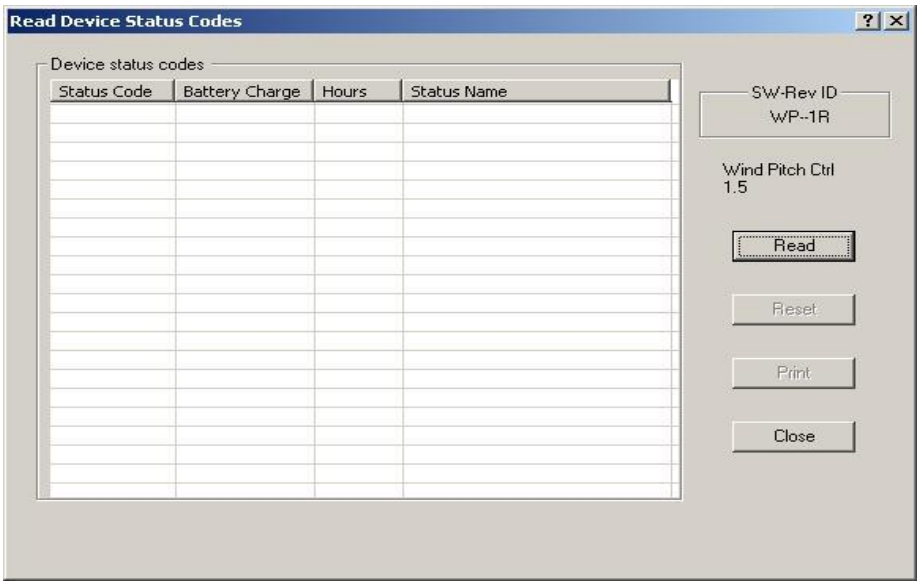
6.2.21 Open the “GE Sentry for Windows” program. Click on “Tools”.

6.2.22 In the “Tools” dropdown menu, click “read device status codes”.

6.2.23 If communications are NOT ok, you will see the following communications error popup box.



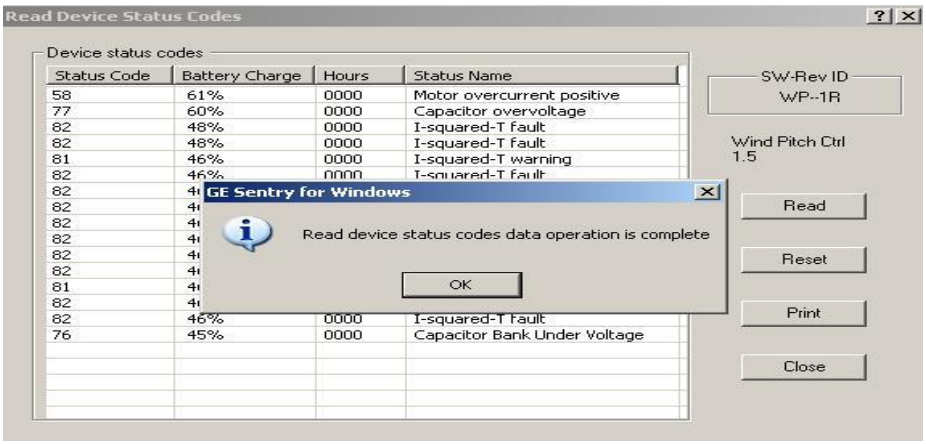
6.2.24 If communications ARE ok, you will see the following Device Status Codes box.



6.2.25 Click the “Read” button to see a list of status codes (error codes) that is stored in the unit’s EEPROM. This may help find an error with the unit.

6.2.26 Click “ok” on the popup box.

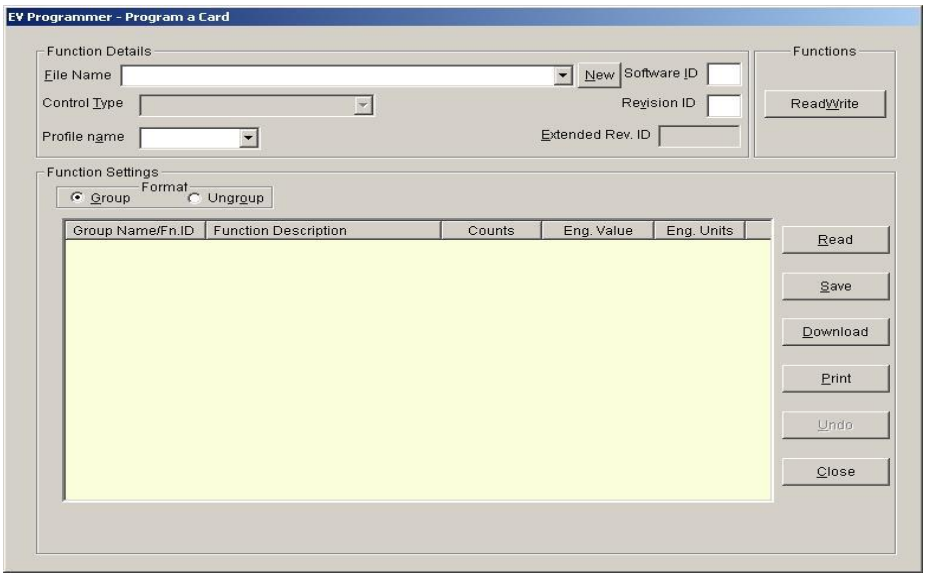
6.2.27 Do not reset the status codes at this time. Close this page.



6.2.28 Click on “Programmer”.

6.2.29 In the “Programmer” dropdown menu, click on “Function Settings”. This will open the EV programmer. NOTE: With this program, the UUT ENABLE switch must be off to read and write data to the UUT.

6.2.30 When the EV programmer opens you will see the following programmer page with the “Function Settings” box empty.



6.2.31 Click “Read” to upload the EEPROM settings that are currently stored in the UUT.

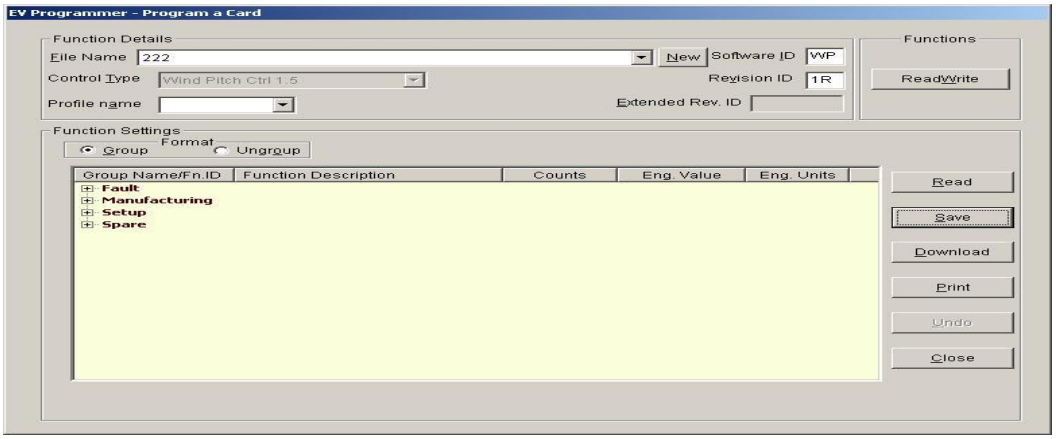
6.2.32 Click “ok” on the popup box.

6.2.33 Click “Save”.

6.2.34 Type the S/N of the UUT as the name of the file you are saving. Example: 11GE1001167.

6.2.35 Click “ok”. If you need the factory defaults at any time during the test, the new file that you just saved can be opened and downloaded to the controller to reset it back to the original data.

6.2.36 Now the software will have the program uploaded and you will see the following programmer page with the “Function Settings” box populated.



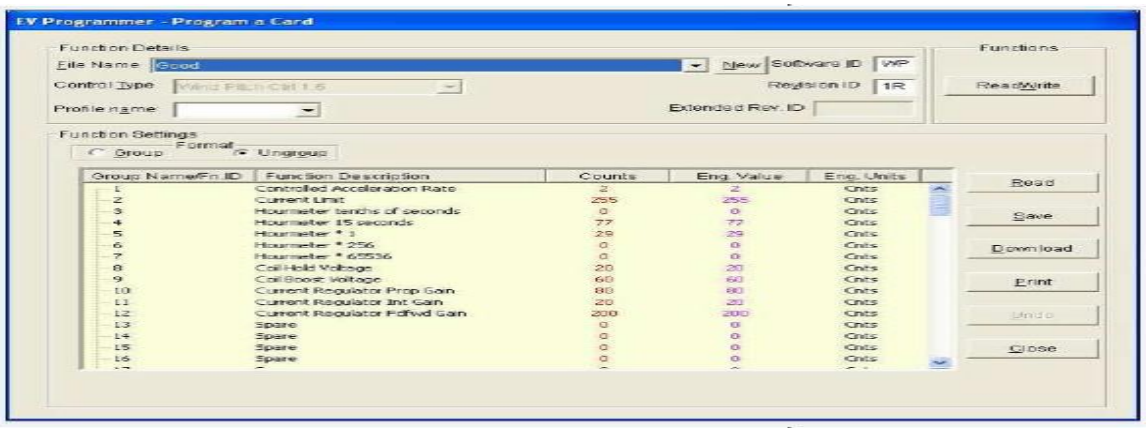
6.2.37 The “Fault” menu has a listing of all the fault codes stored in the UUT.

6.2.38 The “Manufacturing” menu shows the S/N and date of manufacture that is stored in the UUT.

6.2.39 Verify that the data in the “Manufacturing” menu matches the information on the label of the UUT. Using example J12032119, the display should read something like the following; the last six digits will show up and the manufacturing date; example 01/02/2012

Serial#1	03
Serial#2	21
Serial#3	19
Date MM	01
Date DD	02
Date YY	20
Date yy	12

6.2.40 The “Setup” and “Spare” menus have the factory defaults that are stored in the UUT.



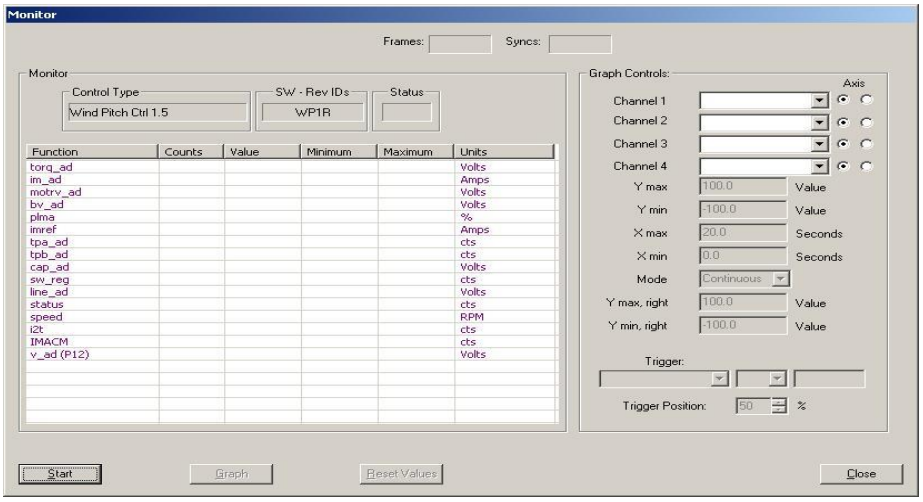
6.2.41 The defaults that are in the “Setup” menu at this time, with the WP1P and WP1R units are...

Controlled Acceleration Rate - 2
Current Limit - 255
Coil Hold Voltage - 20
Coil Boost Voltage - 60
Current Regulator Prop Gain - 80
Current Regulator Int Gain - 20
Current Regulator Fdfwd Gain - 200

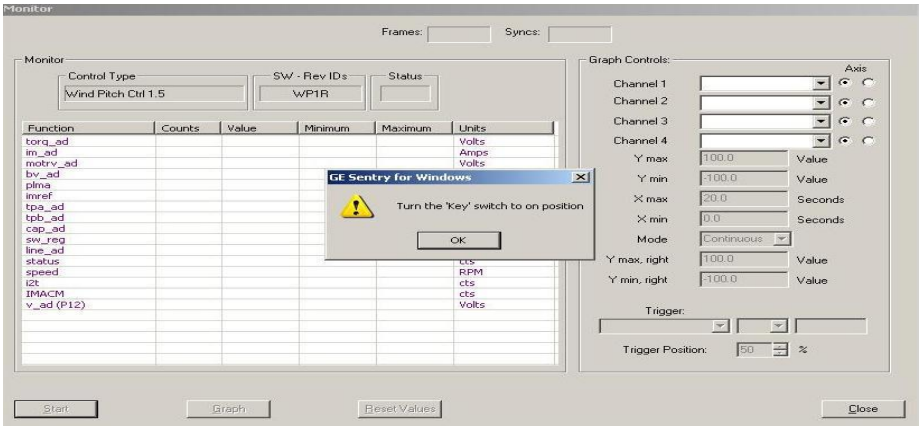
6.2.42 Now that the factory defaults are saved, the EV Programmer can be closed.

6.2.43 Click on “GE Sentry”.

6.2.44 In the “GE Sentry” dropdown menu, click on “Monitor”. This will open the following monitor screen.



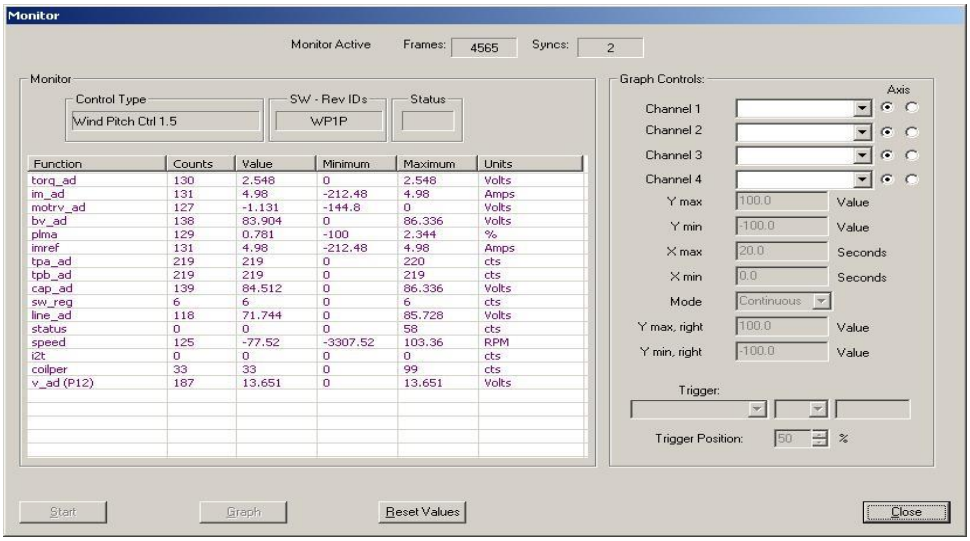
6.2.45 Click “Start”.



6.2.46 The popup box states “Turn the Key switch to on position”. The “Key” switch that the popup box refers to is the “UUT ENABLE” switch on the front of the test fixture. Click “ok”.

6.2.47 Turn on the UUT ENABLE switch.

6.2.48 Data should be displayed on the “Monitor” page.



6.2.49 Verify the following data in the "Value" column of the "Monitor" page.

Bv_ad	**80VDC** (+/- 5%) This is set by tech earlier in the test using the TDK Lambda DC power supply.
Tpa_ad	should fall within the range of **215 to 225**
Tpb_ad	should fall within the range of **215 to 225**
Cap_ad	**80VDC** (+/- 5%) This is set by tech earlier in the test using the TDK Lambda DC power supply.
Line_ad Approx.	**80VDC** (+/- 5%) Set by tech
Status	**14**
V_ad(p12)	**13 VDC** (+/- 1volt)

Note: When the 12mA switch is turned off (that means no torque command is applied), if "i2t" exceeds 165 counts, the unit will time out and "status" will become either 81 or 82. The 12mA switch will have to be turned on allowing i2t to decrease below 165, at this point the unit can be enabled.

6.2.50 Turn on the 12mA switch.

6.2.51 If the UUT is timed out, verify that "i2t" is decreasing.

6.2.52 Once the unit's "i2t" drops below **204**, cycle the UUT enable, then the unit will automatically re-enable when it hits **165**.

6.2.53 Once unit has re-enabled, verify the following data.

Torq_ad		should fall within the range of **2.509-2.548**
Im_ad		should fall within the range of **1.66-4.98 amps**.
Sw_reg	=	**6**
Line_ad	=	**68 Volts** (+/- 5%)
Status	=	**0**
V_ad(p12)	=	**13VDC** (+/- 1volt)

6.2.54 Turn off the UUT ENABLE switch.

6.2.55 Verify that the LOAD switch is on the "LO" position.

6.2.56 Turn on the FAN switch.

6.2.57 Turn on the LOAD ENABLE switch.

6.2.58 Turn on the UUT ENABLE switch.

6.2.59 Verify that status reads **0.**

6.2.60 The UUT should not be pulling higher current at this time.

Im_ad; - should fall within the range of **1.66-4.98 amps**.

6.2.61 Next is the torque command test.

6.2.62 If any of the following measurements fail, the UUT may need to be calibrated. The ranges and associated torque commands are highlighted for easy visibility. Phrases in parentheses (parentheses) are examples of how the equations correlate.

6.2.63 Verify the current for each torque command. This will be read from the TDK-Lambda current display. The corresponding switches and their respective positions per line are highlighted for easy visibility.

4mA = 10-15 amps.	Turn the 12mA off and the 4mA on simultaneously.
9mA = 10-15 amps.	Turn the 4mA off and the 9mA on simultaneously.
12mA = 0-2 amps.	Turn the 9mA off and the 12mA on simultaneously.
15mA = 10-15 amps.	Turn the 12mA off and the 15mA on simultaneously.
20mA = 10-15 amps.	Turn the 15mA off and the 20mA on simultaneously.
12mA = 0-2 amps.	Turn the 20mA off and the 12mA on simultaneously.

Note: If UUT pulls a much higher current, the unit will need repair.

6.2.64 Turn off the UUT ENABLE switch.

6.2.65 Adjust the TDK-Lambda output to 45 amps. (To adjust, press the “prev/” button and ensure that the “prev/” LED is illuminated.)

6.2.66 Turn the selector switch to the S2 position.

6.2.67 Now turn the LOAD switch to HI.

6.2.68 Verify that the 12mA and FAN switches are ON.

6.2.69 Turn on the UUT ENABLE switch.

Special Note: The HP Digital meter always supersedes the GE Sentry software.

6.2.70 Verify the meter measures 1 mV to -1mV. This is read on the Monitor under Im_ad value column, 1.66 to 4.98 amps. Note: (DMM measurement X 2000 = Current in the load = 1 X 2000 = 2 amps and -1 X 2000 = -2 amps load current)

6.2.71 Turn the 9mA on and the 12mA off simultaneously.

6.2.72 Verify that the meter measures 30mV to 35mV (nominal 32.5mV). This is read on the Monitor under Im_ad value column, -60 to -70 amps. (30mV X 2000= 60 amps and 35mV X 2000 = 70 amps).

6.2.73 Turn the 9mA off and the 12ma on simultaneously. This sets the unit back to ZERO torque.

6.2.74 Verify that the meter measures 1mV to -1mV. This is read on the Monitor under Im_ad value column, 1.66 to 4.98 amps.

6.2.75 Turn the 15mA on and the 12mA off simultaneously.

6.2.76 Verify that the meter measures -35mV to -29.5mV (nominal -32mV). This is read on the Monitor under Im_ad value column, 59 to 70 amps.

6.2.77 Turn the 15mA off and the 12mA on simultaneously.

6.2.78 Verify that the meter measures 1mV to -1mV.

6.2.79 Turn the 12mA off and the 4ma on simultaneously.

6.2.80 Verify that the meter measures 73.5mV to 76.5mV (nominal 75mV). This is read on the Monitor under Im_ad value column, -147 to -153 amps. **Note DVM reading, closer reading to 75mV the better.**

6.2.81 Turn the 4mA off and the 12mA on simultaneously.

6.2.82 Verify that the meter measures 1mV to -1mV. **Note DVM reading, closer reading to zero the better.**

6.2.83 Turn the 12mA off and the 20mA on simultaneously.

6.2.84 Verify that the meter measures -73.5mV to -76.5mV (nominal 75mV). This is read on the Monitor under Im_ad value column, 147 to 153 amps. **Note DVM reading, closer reading to 75mV the better.**

6.2.85 Turn the 20mA off and the 12mA on simultaneously.

6.2.86 Verify that the meter measures 1mV to -1mV.

6.2.87 Turn off the UUT ENABLE switch.

6.2.88 If the UUT passed the measurements taken with the LOAD on the HI setting, skip the calibration portion of this procedure.

6.2.89 If the UUT failed the measurements taken with the LOAD on the HI setting, continue to the calibration portion of this procedure. **The calibration portion of this test appears in the dark, red font and the section is bordered at the top and bottom. This is for easily, visible distinction between the testing and the calibration portions of this procedure.**

6.3 Calibration

6.3.1 There are three addresses in the EEPROM that are variables which control the output load current. Unit must be calibrated under "Hi Load".

EE117 = 12mA = Common Mode Offset. Scale = 0-7 and 250-255

EE118 = 4mA = Common Mode Gain. Scale = 1-16 and 240-255

EE119 = 20mA = Amplifier Offset. Scale = 1-20 and 241-255

6.3.2 Read the diagram in the notes section for a visualization of how each address correlates with each other.

6.3.3 To calibrate the UUT, close the "Monitor" page.

6.3.4 In the "Programmer" dropdown menu, click on "Function Settings". This will open the EV programmer. **NOTE: The UUT ENABLE switch must be off to read and write data to the UUT with this program**.

6.3.5 If you need to revert back to the factory defaults at any time during calibration, the new file that you saved earlier, which bares the S/N of the UUT as its file name, can be reopened and downloaded to the UUT to reset it back to the original factory settings.

6.3.6 Click the "Read/Write" button. The "Read/Write a Function Value" page should open.

6.3.7 Verify that "EEPROM" is selected in the top, left dropdown box.

6.3.8 Go to drop down box under "Number" field and arrow down to desired address.

6.3.9 Select address and enter data; see next page on yellow highlighted data.

Notes: If the UUT has had a card replaced, it will be best to start calibration with each address set at a scale value of "0". Otherwise try to stick close to the factory settings, adjusting in only small increments.

Only calibrate UUT on the HI load.

Adjusting EE117 will cause EE118 and EE119 values to shift.

Adjusting EE119 will cause EE118 to shift and may require a slight tweak to EE117.

Adjusting EE118 will only adjust itself.

6.3.10 Repeat all underlined steps for each address until the UUT passes all limits

6.3.11 Click the "Number" dropdown box to select an address.
The addresses to be adjusted / verified are EE117, EE118 and EE119.

6.3.12 To achieve the proper calibration limits, adjust the settings in the addresses in accordance with the following scales by typing the corresponding scale number in the "Counts or Value" editing field.

The scale for **EE117** is…
…7-6-5-4-3-2-1-0-255-254-253-252-251-250.

The scale for **EE118** is…
…16-15-14-13-12-11-10-9-8-7-6-5-4-3-2-1-0-255-254-253-252-251-250-249-248-247-246-245-244-243-242-241.

The scale for **EE119** is…
…**20-19-18-17-16-15-14-13-12-11-10-9-8-7-6-5-4-3-2-1-0-255-254-253-252-251-250-249-248-247-246-245-244-243-242-241.**

6.3.13 Type the scale number in the "Counts or Value" editing field, click "Write".

6.3.14 Write a chosen scale value to a selected address and turn on the UUT ENABLE switch to verify that the meter reads within proper calibration limits in accordance with the following list. Perform this step between each adjustment to verify all limits.

6.3.15 This list is derived from the equation "**mV measurement on the meter X 2000 = amps of load current"**.

Command switch:	mV measurement:	X 2000: =	load current:
4mA:	73.5mV to 76.5mV	=	147 to 153 Amps
9mA:	30mV to 35mV	=	60 to 70 Amps
12mA:	1mV to -1mV	=	2 to -2 Amps
15mA:	-29.5mV to -35mV	=	-59 to -70 Amps
20mA:	-73.5mV to -76.5mV	=	-147 to -153 Amps

6.3.16 Repeat all underlined steps for each address until the UUT passes all limits.

6.3.17 Turn on the 12mA switch. Ensure that all other torque command switches are off so that the unit is left with a ZERO torque command.

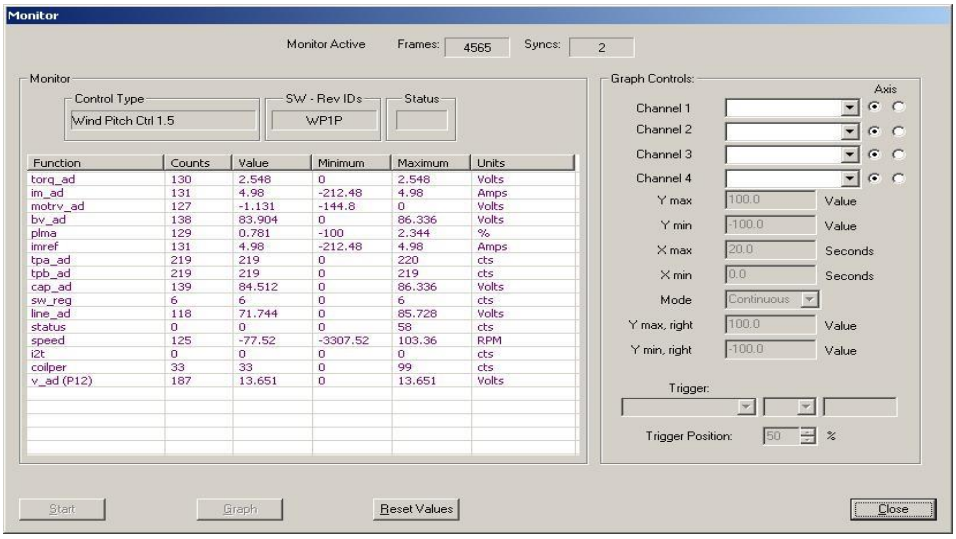
6.3.18 Turn off the UUT ENABLE switch.

6.3.19 Close the EV programmer.

6.3.20 In the “GE Sentry” dropdown menu, click on “Monitor”.

6.3.21 Click “Start”.

6.3.22 Click “ok” in the “Turn the Key switch to on position” popup box.



6.3.23 Turn on the UUT ENABLE switch.

6.3.24 Verify the following data in the “Value” column.

Torq_ad should fall within the range of **2.509-2.548**

Im_ad should fall within the range of **1.66-4.98** amps.

Status 0

Speed should fall within the range of **125 to 128** in the “Counts” column for a calibrated unit.

6.3.25 Verify the following readings on the DMM.

6.3.25.1 With switch 12mA on (4mA, 9mA, 15mA, 20mA are off) meter shall read between **1mV and -1mV**.

6.3.25.2 With switch 4mA on (12mA, 9mA, 15mA, 20mA are off) meter shall read between **73.5mV and 76.5mV**.

6.3.25.3 With switch 20mA on (4mA, 9mA, 15mA, 12mA are off) meter shall read between **73.5mV and 76.5mV**.

6.4 I-Squared-T, Warning/Fault, Code 81/82

6.4.1 Turn off 12mA switch and turn on 20mA switch simultaneously.

6.4.2 Verify that HP meter reads **-73.5mV to -76.5mV** and note im_ad measures within the range of **147** to **153** amps, in value column.

6.4.3 Verify that i2t increases.

6.4.4 Verify that when i2t reaches **165**, status changes to **81**.

6.4.5 Verify that when i2t reaches **205**, status changes to **82**, the UUT shuts down, the current drops to zero on meter and i2t begins decreasing.

6.4.6 Turn off 20mA switch and turn on 12mA switch simultaneously.

6.4.7 Once the unit drops below **204**, cycle the UUT enable, then the unit will automatically re-enable when it hits **165**.

6.4.8 Once unit has re-enabled, verify that status reads **0.**

6.4.9 Turn off 12mA switch and turn on 4mA switch simultaneously.

6.4.10 Verify that HP meter reads **73.5mV to 76.5mV** and im_ad measures within the range of -**147** to -**153** amps.

6.4.11 Verify that i2t increases.

6.4.12 Verify that when i2t reaches **165**, status changes to **81**.

6.4.13 Verify that when i2t reaches **205**, status changes to **82**, the UUT shuts down, the current drops to zero and i2t begins decreasing.

6.4.14 Turn off 4mA switch and turn on 12mA switch simultaneously.

6.4.15 Once the unit drops below **204**, cycle the UUT enable, then the unit will automatically re-enable when it hits **165**.

6.4.16 Once unit has re-enabled, verify that status reads **0.**

Special Note before moving on to next test: Warning Warning Warning

Steps 6.5 and 6.6 depend on the type of software revision on the main control card. It will either be a WP1P or a WP1R.

Step 6.5 is only for testing a WP1**P** control card.

Step 6.6 is only for testing a WP1**R** control card.

If you are in the GE Sentry monitor screen, the software revision ID will be displayed on screen, near top center.

6.5 Bulk capacitor pre-charge, SRO Code 51 for WP1P

Note: If UUT fails operation for WP1P, perform the corresponding, additional steps contained in the notes for their associated steps. Then perform the Bulk capacitor pre-charge testing for WP1R.

6.5.1 Turn off the UUT ENABLE switch.

6.5.2 Read section completely because things happen very fast and operator may miss before executing.

6.5.3 Turn the selector switch to CAP.

6.5.4 Turn off the LOAD ENABLE switch.

6.5.5 Turn on the UUT ENABLE switch.

6.5.6 Verify that status reads **0**.

6.5.7 Press the E-STOP button.

6.5.8 Turn off the 12mA switch.

6.5.9 Verify that the meter drops to 50VDC within a few seconds.

6.5.10 Turn on the 12mA switch. Note: If UUT failed operation for WP1P, then also turn on the LOAD ENABLE switch during this step.

6.5.11 Release the E-STOP button.

6.5.12 In regard to the next steps, once the UUT ENABLE switch gets cycled, the change in status can happen very quickly so you'll need to focus closely on the status reading during that time.

6.5.13 Cycle the UUT ENABLE switch.

6.5.14 Verify that status reads **51** until the meter reaches 69VDC and that status changes from **51** to **0**. Note: If UUT failed operation for WP1P, disregard this step.

6.5.15 Turn on the LOAD ENABLE switch. Note: If UUT failed operation for WP1P, then this step should have already been completed.

6.6 Bulk capacitor pre-charge, SRO Code 51 for WP1R

6.6.1 Turn off the UUT ENABLE switch.

6.6.2 Read section completely because things happen very fast and operator may miss before executing.

6.6.3 Turn the selector switch to CAP.

6.6.4 Turn on the UUT ENABLE switch.

6.6.5 Verify that status reads **0.**

6.6.6 Press the E-STOP button.

6.6.7 Turn off the 12mA switch.

6.6.8 Verify that the meter drops to 50VDC within a few seconds.

6.6.9 In regard to the next steps, once the UUT ENABLE switch gets cycled, the change in status can happen very quickly so you'll need to focus closely on the status reading during that time.

6.6.10 Cycle the UUT ENABLE switch.

6.6.11 Verify that status reads **51** until the meter reaches 69VDC and that status changes from **51** to **14**.

6.6.12 Release the E-STOP button.

6.6.13 Turn on the 12mA switch.

6.6.14 Verify that status reads **0.**

6.7 Contactor Coil Open, SRO Code 64

6.7.1 Press the E-STOP button.

6.7.2 Cycle the UUT ENABLE switch.

6.7.3 Verify that status reads **64**.

6.7.4 Release the E-STOP button.

6.7.5 Verify that status changes from **64** to **0**.

6.8 Capacitor Bank under voltage, SRO code 76

6.8.1 Decrease the output voltage of the TDK-Lambda to 40VDC. (To adjust, press the "prev/" button and ensure that the "prev/" LED is illuminated.)

6.8.2 Verify that status changes from **0** to **76**, when the TDK-Lambda output reaches 40VDC.

Special Note: Fault 27 may show up during these two steps 6.8 and 6.9. We believe it is a glitch, and since we cannot repeat this error consistently, it will only be noted at this time.

6.9 DC Link Voltage Low, SRO Code 15

6.9.1 Decrease the output voltage of the TDK-Lambda to 20VDC.

6.9.2 Cycle the UUT ENABLE switch.

6.9.3 Verify that status changes from **76** to **15.**

6.9.4 Increase the output voltage of the TDK-Lambda to 40VDC.

6.9.5 Verify that status changes from **15** to **0,** when the TDK-Lambda output reaches 42VDC.

6.9.6 Increase the output voltage of the TDK-Lambda to 80VDC.

6.10 Torque Reference High, SRO Code 13

6.10.1 Turn off the UUT ENABLE switch.

6.10.2 Turn off the 12mA switch and turn on the 20mA switch simultaneously.

6.10.3 Turn on the UUT ENABLE switch.

6.10.4 Verify that status reads **13**.

6.10.5 Turn off 20mA switch and turn on 12mA switch simultaneously.

6.10.6 Verify that status changes from **13** to **0.**

6.11 Torque Reference Low, SRO Code 14

6.11.1 Turn off the UUT ENABLE switch.

6.11.2 Turn off 12mA switch and turn on 4mA switch simultaneously.

6.11.3 Turn on the UUT ENABLE switch.

6.11.4 Verify that status reads **14.**

6.11.5 Turn off 4mA switch and turn on 12mA switch simultaneously.

6.11.6 Verify that status changes from **14** to **0.**

6.11.7 Turn off the UUT ENABLE switch.

6.11.8 Turn off the LOAD ENABLE switch.

6.12 Torque Reference Range High, Warning Code 22

6.12.1 Turn on the UUT ENABLE switch.

6.12.2 Turn off the 12mA switch.

6.12.3 Verify the following data.

Torq_ad = **0**

Status = **22**

6.12.4 Turn on the 12mA switch.

6.12.5 Verify the following data.

Torq_ad should fall within the range of **2.509-2.548**

Status = **0**

6.12.6 Turn off the 12mA switch.

6.13 Torque Reference Range High, Warning Code 21

6.13.1 Turn the 9mA and the 20mA **on** simultaneously.

6.13.2 Verify the following data.

Torq_ad = **4.998**

Status = **21**

6.13.3 Turn the 9mA and the 20mA **off** simultaneously.

6.13.4 Turn **on** the 12mA switch.

6.13.5 Verify the following data.

Torq_ad = should fall within the range of **2.509-2.548**

Status = **0**

6.14 Heat Sink Temperature, Warning/Fault, Code 40/41

6.14.1 There are two thermistors mounted on the sides of the aluminum heat sink. They can be identified by one pair of wires from the each of the two thermistors routed to the WPCC card on top.

6.14.2 Verify the following data.

tpa_ad = **220** +/- 10

tpb_ad = **220** +/- 10

6.14.3 With a heat gun, begin heating the thermistor that is nearest to the Battery + terminal of the UUT. This one corresponds to tp**a**_ad.

6.14.4 Verify that tpa_ad decreases and that status changes from **0** to **40** when tps_ad reaches **128** (95 degrees C) with the UUT remaining energized.

6.14.5 Continue heating and monitoring.

6.14.6 Verify that status changes from **40** to **41** and that the UUT de-energizes when tpa_ad reaches **121** (100 degrees C).

6.14.7 Allow the UUT to cool for about ten seconds.

6.14.8 Cycle the UUT ENABLE switch.

6.14.9 Verify that status reads **0**.

6.14.10 Repeat the "**Heat Sink Temperature"** test for the thermistor that is furthest from the Battery + terminal of the UUT. This one corresponds to tp**b**_ad.

6.15 DB Resistor Open or Missing, SRO Code 83

6.15.1 Turn off the UUT ENABLE switch.

6.15.2 Turn off the UUT POWER switch.

6.15.3 Ensure that the selector switch is still set to CAP.

6.15.4 Verify that the meter measures 0VDC.

6.15.5 If the connections you are using are the connections located on the top of the fixture, disconnect the DB resistor at the DB- terminal of the UUT and secure the connector away from the UUT with electrical insulation to prevent accidental contact.

6.15.6 If the connections you are using are via the extension harness, disconnect the DB resistor at the DB- & DB+ terminals at bottom rear of fixture.

6.15.7 Turn on the UUT POWER switch.

6.15.8 Close and restart the “Monitor” page.

6.15.9 Click “ok” in the “Turn the Key switch to on position” popup box.

6.15.10 Turn on the UUT ENABLE switch.

6.15.11 Verify the status reads **83**.

6.15.12 Turn off the UUT ENABLE switch.

6.15.13 Turn off the UUT POWER switch.

6.15.14 Verify that the meter measures 0VDC.

6.16 DB Resistor Device Shorted, SRO Code 84

6.16.1 Leaving the DB resistor disconnected, connect a jumper cable between the DB- and the NEG terminals of the UUT. Note: Do not run the UUT in this configuration for any longer than it takes to complete “**DB Resistor Device Shorted**” test.

6.16.2 Turn on the UUT POWER switch.

6.16.3 Close and restart the “Monitor” page.

6.16.4 Click “ok” in the “Turn the Key switch to on position” popup box.

6.16.5 Turn on the UUT ENABLE switch.

6.16.6 Verify the status reads **84**.

6.16.7 Turn off the UUT ENABLE switch.

6.16.8 Turn off the UUT POWER switch.

6.16.9 Verify that the meter measures 0VDC.

6.16.10 Disconnect both ends of the jumper cable.

6.16.11 Reconnect the DB resistor back to its respective terminal.

6.16.12 Turn on the UUT POWER switch.

6.16.13 Close and restart the “Monitor” page.

6.16.14 Click “ok” in the “Turn the Key switch to on position” popup box.

6.16.15 Turn on the UUT ENABLE switch.

6.16.16 Verify the status reads **0**.

6.16.17 Verify 13VDC (+/-1VDC), check monitor (V_ad(P12).

6.16.18 Turn off the UUT ENABLE switch.

6.16.19 Close the “Monitor” page.

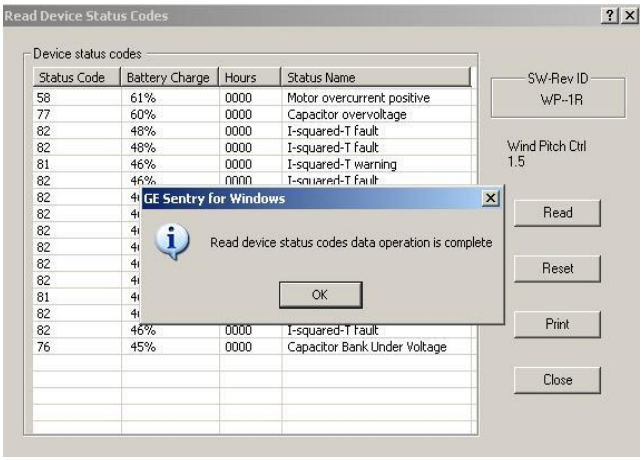
6.16.20 Click on “Tools”.

6.16.21 In the “Tools” dropdown menu, click “read device status codes”

6.16.22 Click the “Read” button.

6.16.23 Click “ok” in the popup box.

6.16.24 Verify the list of status codes



6.16.25 If the UUT has passed all testing, click “Reset”.

6.16.26 Once the “Devise Status Codes” page clears, a popup box will indicate that the reset was successful. Click “ok” in the popup box”.

6.16.27 Close the “Devise Status Codes” page.

6.17 ***End of test**

7. Notes

7.1 Be sure to label all field units in accordance with SoW for remanufacturing 151X1225DF01PC02_Rev0 5.doc. See page 8 & 9 of SOW.

7.1.1 New factory units shall be labeled 151X1225DF01PC0**3** and another label placed on the side cover marked 104W4708R003. Control circuit board labeled as RAF.

7.1.2 Repaired units should be labeled 151X1225DF01PC0**2**R03 and another label placed on the side cover marked 104W4708R003. Control circuit board labeled as RAF.

7.2 In this diagram: Adjusting this; "**>>>**"
Affects this; "**<<<**"