g	GE Energy	**Functional Testing Specification**
	Parts & Repair Services *Louisville, KY*	**LOU-GED-DS200SDCCG4**

Test Procedure for a Turbine Control Card

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release – Combination of previous SDCC tests along with additional Mark V functional test for G4A and G5A models. References to the older procedure LOU-GED-DS200SDCC-G were made.	C. Wade	1/14/2014
B	Added MW readings check on the PREVOTE screen, section 6.3.6	J. Barton/C. Wade	2/18/2014
C			
D			
E			
F			
G			

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
C. Wade			*Charlie Wade*
DATE	DATE	DATE	DATE
1/14/2014			1/15/2014

1. SCOPE

1.1 This is a functional testing procedure for a Mark V Turbine Control 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 **GEH-6005 for DS200 style cards**

    3.1.2 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	H033758 or H033762	Drive Test Fixture (For DS200 style cards)
1	H190115	HMI Computer for Mark V Turbine
1	H190117	Mark V Turbine System

6. TESTING PROCESS

6.1 Setup

6.1.1 Visually inspect U7 & U77 on UUT and if made by Samsung, then replace.

6.1.2 Remove DCC card from drive.

6.1.3 Install latest firmware version available (Firmware versions can be identified on the Salem MRP system).

6.1.4 Install EEPROM U9 from test board.

6.1.5 Set all the jumpers on the UUT in the 1-2 position except for JP1 which needs to be in the 2-3 position.

6.1.6 Install board into drive ***DO NOT APPLY POWER***

6.1.7 On Control Panel measure from COM to all red test jacks and verify no shorts are on the power supplies. If any shorts or readings less than 10 ohms are found, correct before powering up the drive.

6.2 Initial Testing Procedure (DC2000 Drive)

6.2.1 Apply power by pulling out the E-Stop button while watching the LCC display.

6.2.2 Verify LCC display reads "INITIALIZATION" then "MS 0%   I 0%".

6.2.3 Power supply verification.

    6.2.3.1 Check power supply voltage at Control Panel and verify the following;

        +5VDC +/- 0.25

        +15VDC +/- 0.5

        -15VDC +/- 0.5

        +24VDC + 25-28

        -24VDC – 25-28

6.2.4 Adjust the REFP-63 control through it's range from 00 to 99 to verify DAC1and DAC2 panel meters go from 0-125%.

6.2.5 Adjust the FDBP-69 control through a range from 00 to 99 to verify IMET1, IMET2, IMET3 and IMET4 panel meters go from 0-125%.

6.2.6 Execute Test 12 "SCR Test".

6.2.7 This can be done by entering the following in on the programmer; ([set], [drv], [7], [7], [Enter], [Reset], [Reset], [Test], [1], [2], [Enter].

6.2.8 This should place the drive in DIAGNOSTIC mode and the LCC should display "Cell Test Passed"

6.2.9 Press RESET on the Control Panel, which should take you out of DIAGNOSTIC MODE.

6.2.10 On Control Panel press IN 1-8, yellow lamps above IN 1-8 PB will change to red.

6.2.11 On Control Panel press CI 1-8, yellow lamps above CI 1-8 PB will change to red.

6.2.12 Push RUN switch up on Control Panel to enter run mode.

6.2.13 Verify MACPL 1-2 illuminates on control panel.

6.2.14 Increase and decrease REFP-63 (RUN REF) control through it's range. The motor should increase and decrease in speed and the LCC display MS % should match the REFP-63 switch reading on control panel (+/-5%).

6.2.15 Set REFP-63 (RUN REF) switch to 10.

6.2.16 The LCC display should read MS 10%   I 12% (+/-2%)

6.2.17 Push POL (REVERSE) switch on Control Panel up to reverse motor direction.

6.2.18 The LCC display should now show a negative reading of MS -10%   I -12%. (+/-2%)

6.2.19 Push POL (REVERSE) switch on Control Panel down to exit reverse mode.

6.2.20 Push RUN switch down on Control Panel to exit run mode.

6.2.21 Push JOG switch up on Control Panel to enter jog mode.

6.2.22 Increase and decrease FDBP-69 (JOG REF) control. Motor should increase and decrease in speed and LCC display MS % will match FDBP-69 control reading(+/-10%).

6.2.23 Push JOG switch down on Control Panel to exit jog mode.

6.2.24 Push RUN switch up to enter run mode.

6.2.25 Push XSTOP switch down; motor will brake to a stop.

6.2.26 LCC display should show the flashing error message "ST   17__XSTOP".

6.2.27 Push XSTOP switch up to remove XSTOP input.

6.2.28 Push RUN switch down to exit run mode.

6.2.29 Push the RESET button un the UUT to unlatch the XSTOP condition.

6.2.30 After initialization, push RUN switch up, motor will restart.

6.2.31 Press CTLN 42/44 push button switch on Control Panel which should cause the motor to stop and cause the flashing error message "ST   29__CNTRL ON" on the LCC display.

6.2.32 Push RUN switch down to exit run mode.

6.2.33 Press RESET on the UUT to unlatch the Fault 29 condition.

6.2.34 Using the trend recorder in GE TOOLBOX software view the analog input levels on the PC screen. Verify the table below by changing the value of the ANALOG INPUTS control on the Control Panel.

NOTE: If this test will not run the serial port on the drive is bad!!

Analog Inputs Control	VAR\P1 10% tol	VAR\P2 10% tol	VAR\P3 10% tol	VAR\P4 10% tol	VAR\ASPO 10% tol	VAR\DVM 10% tol	VAR\SPA1 20% tol	VAR\SPA2 20% tol	VAR\V3 VCOVAR 20% tol	VAR\V4 VCOVAR 20% tol
10	71	71	71	71	71	7	71	71	52	52
20	117	117	117	117	117	12	117	117	117	117
30	156	156	156	156	156	15	156	156	137	137
40	194	194	194	194	194	19	194	194	174	174
50	236	236	236	236	236	23	236	236	216	216
60	286	286	286	286	286	28	286	286	280	280
70	351	351	351	351	351	35	351	351	330	330
80	442	442	442	442	442	44	442	442	421	421
90	511	511	511	511	511	51	511	511	562	562

6.2.35 Exit from Trend Recorder on the PC.

6.2.36 Set REFP-63 control for 03 on Control Panel

6.2.37 Run Test 11

6.2.38 This can be done by entering the following in on the programmer; ([set], [drv], [7], [7], [Enter], [Reset], [Reset], [Test], [1], [1], [Enter].

6.2.39 Push RUN up, motor will start.

6.2.40 With POL up LCC display will count down.

6.2.41 With POL down LCC display will count up.

6.2.42 Push RUN down, motor will stop.

6.2.43 Press RESET on Control Panel.

6.2.44 Set FDBP-69 control to 10 on the Control Panel.

6.2.45 To verify communication first check on IOS to see which test you are using, TEST TYPE will have either DLAN or ARCNET.

6.2.46 Press and hold JOG#_ pushbutton on IOS that matches drive you are using to test Drive should start and IOS will display in SPEED#_ the drives speed.

6.2.47 You have just tested only one of the communication tests.You must test both DLAN and ARCNET.

6.2.48   If IOS TEST TYPE is DLAN you need to load IOS with ARCNET.

6.2.49   If IOS TEST TYPE is ARCNET you need to load IOS with DLAN.

6.2.50   Refer to LOADING INSTRUCTION to test software in IOS.

6.2.51   Press and hold JOG#_ pushbutton on IOS that matches drive you are using to test

Drive should start and IOS will display in SPEED#_ the drives speed.

6.2.52   Use the DMM to check for +14.25 - 15 VDC from EIV1 to COM on the control panel.

6.2.53   Use the DMM to check for +25 - 27 VDC from MSRF to COM on the control panel.

6.2.54   Verify the 1FAPL light on the control panel is illuminated.

6.2.55   ***DC2000 Drive Test Complete*****

6.3   **Functional Test Mark V Turbine Control (Communicating to Mark V System)**

6.3.1   **Removal of existing SDCC/SLCC card.**

6.3.1.1   Installing the replacement DS200SDCC/SLCC into Mark V Turbine System

**6.3.1.2**   Remove Power to Respective Core:
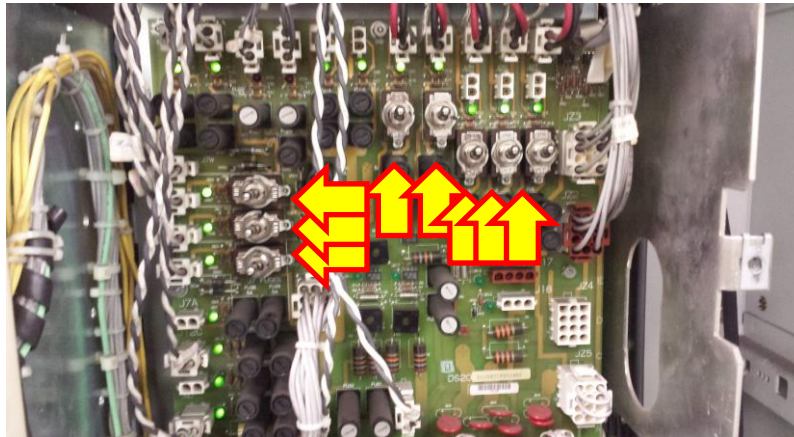
6.3.1.3   Before attempting to remove the SDCC/SLCC verify that the power has been removed from the related core in the panel via the TCPD. (If it is a dead PS this may have been overlooked and power to core MAY STILL BE PRESENT!)

6.3.1.4   Locate the respective Core power switch on the TCPD and turn off power to the P core

6.3.1.5   After verifying the POWER has been removed via the TCPD. Remove the KEYPAD from the SLCC by releasing the 2 retaining clips at the top of the KEYPAD and the 2 at the bottom.
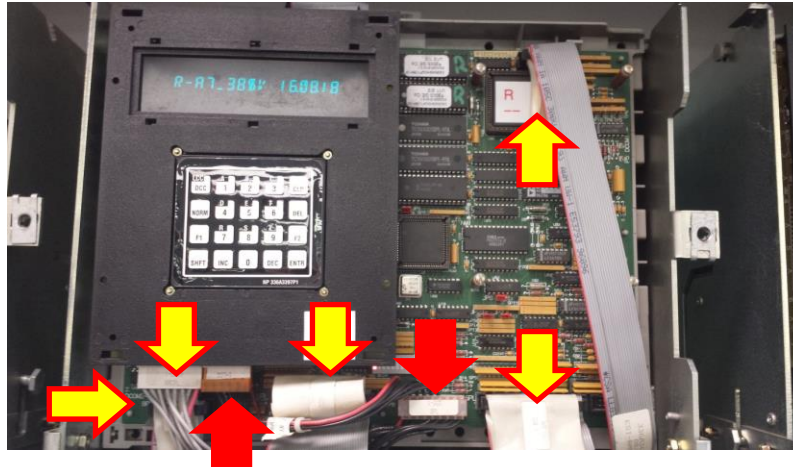
6.3.1.6 Remove the POWER INPUT Connectors to the SDCC/SLCC FIRST! (Indicated by the RED ARROW's above)

6.3.1.7 Disconnect remaining: Connectors, and Ribbon Cables. There is one ribbon cable that is connected to both the SDCC and the SLCC that is ALSO connected to other card's located behind the SLCC/SDCC card tray. It is necessary to disconnect the ribbon cable from the OTHER cards indicated by YELLOW arrows. (see below)
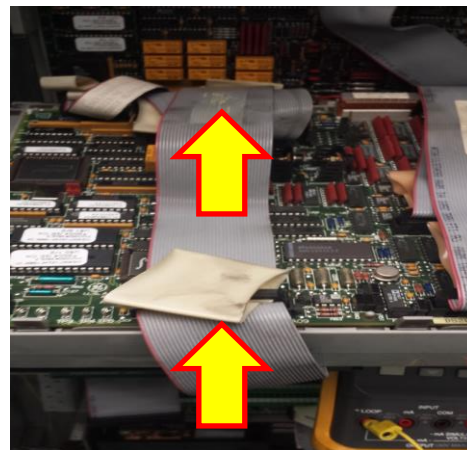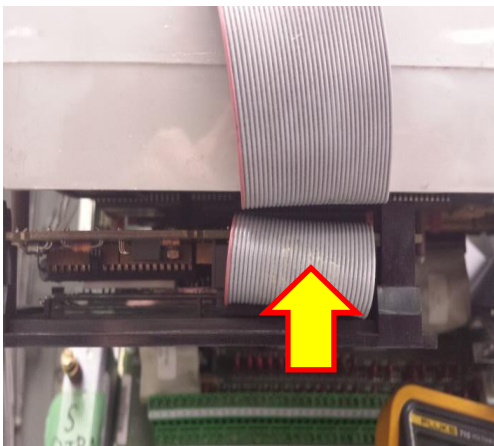

6.3.1.8 Remove the SDCC/SLCC and the single ribbon cable attached to the SLCC/SDCC by releasing the 6 retaining clips on the card tray, 3 located on the physical top of the card and 3 on the bottom.

6.3.1.9 Disassemble the SDCC/SLCC assembly by removing the 4 screws at each corner of the SLCC.
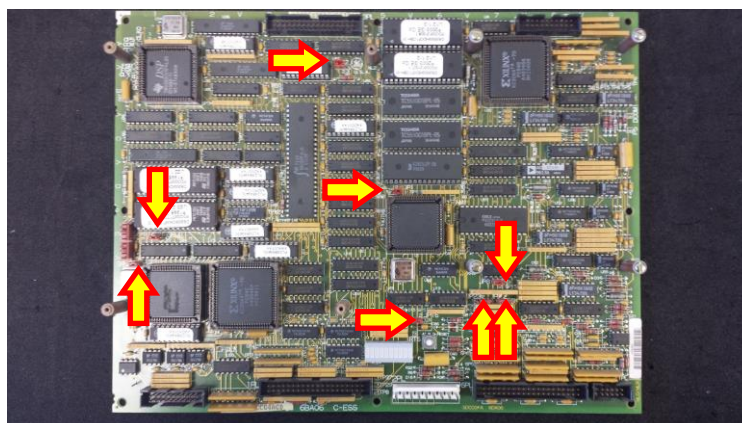
6.3.2   Setup of new SDCC card.

6.3.2.1   Place OLD and NEW SDCC side by side. Locate EPROM Puller sent with Revitalization Kit labeled TOOL KIT. Remove the 4 EPROM's, one at a time from the OLD SDCC and carefully reinsert them into the NEW SDCC.
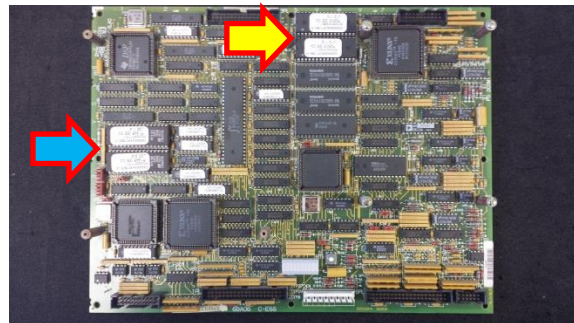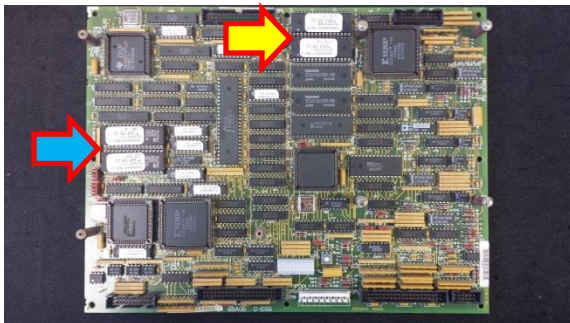
6.3.2.2   Verify the EPROM PIN 1 is correctly orientated with in PIN 1 of the socket. Easily identified by EPROM's orientation notch. (Indicated by YELLOW arrow).

6.3.2.3   Verify all EPROMS on SLCC-(2) and SDCC-4; be sure EPROM pins are not bent under the EPROM or over the socket.

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**LOU-GED-DS200SDCCG4
REV. A**

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Page 9 of 17

6.3.2.4 Set jumpers to match the OLD SDCC. (Indicated by YELLOW arrow above).
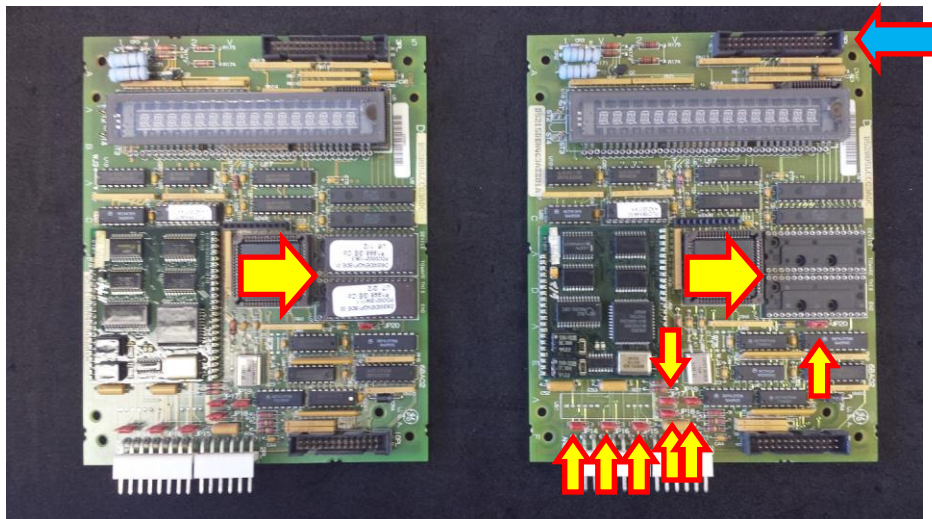
6.3.3   Setup of new SLCC card.

6.3.3.1 Place OLD and NEW SLCC are side by side. Remove the 2 EPROM's, one at a time from the OLD SDCC and carefully reinsert them into the NEW SLCC.
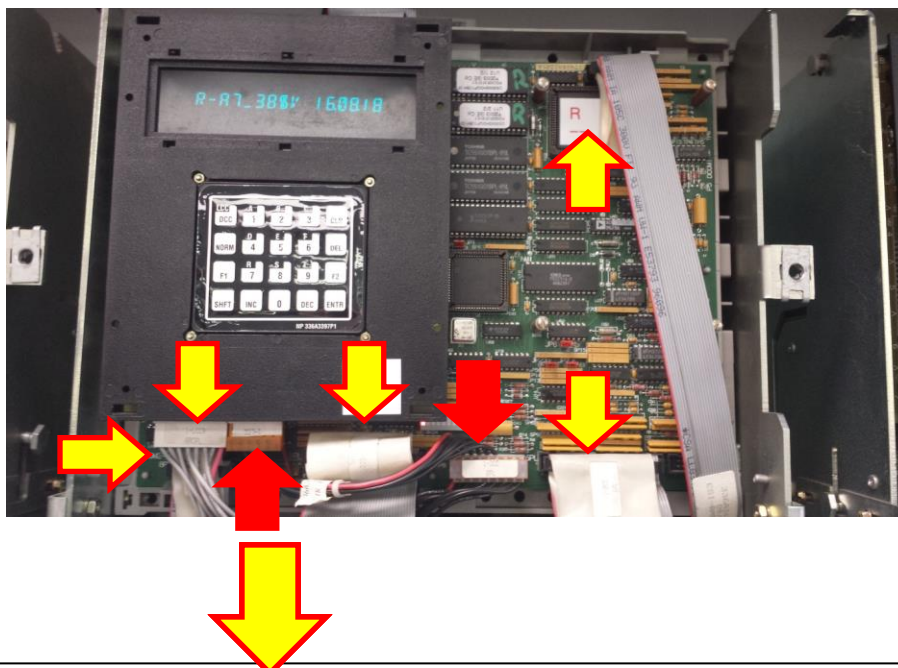
6.3.3.2 Compare ALL jumpers from the OLD SLCC to the NEW SLCC.

6.3.3.3 Reassemble BOTH the SDCC and SLCC with the removed screws.

6.3.3.4 Note: Install the ribbon cable removed with the SDCC/SLCC on to the SDCC first and then attach the SLCC to the SDCC, see blue arrow for location.
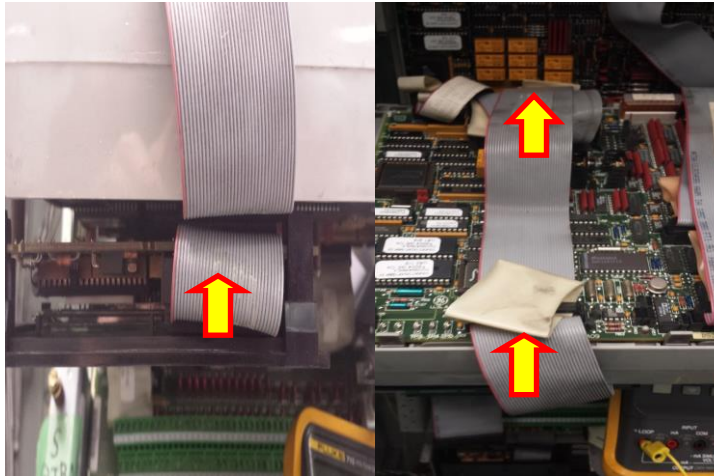

6.3.4   Installation of the new SDCC/SLCC assembly

6.3.4.1 Install the SDCC/SLCC by securing it with the 6 retaining clips on the card tray, 3 located on the physical top of the card and 3 on the physical bottom.

6.3.4.2 Connect remaining cables; Chassis Ground and Ribbon Cables including the one that disconnected from the boards in trays behind the SDCC/SLCC. (see below)

6.3.4.3 Install KEYPAD

6.3.4.4 Recheck ALL connectors to verify none are misaligned (off one pin), partially connected or orientated 180 degrees of what it should be. Close card tray.

6.3.4.5 Restore power to core via the TCPD

6.3.4.6 Verify that the core boots and condition is at least A4 via the SLCC display.

6.3.4.7 Set up SDCC/SLCC to which core it will be configured. (i.e. R, S or T) by using KEYPAD.

6.3.4.8 Press LCC/DCC

    6.3.4.8.1 ---- 186 MONITOR ---- should display on SLCC

    6.3.4.8.2 Press INC

    6.3.4.8.3 Press ENTER

6.3.4.9 HOLD the SHIFT key down as you select which core the SDCC/SLCC will be assigned; R, S or T by pressing the associated key on the KEYPAD, (Above is example of "D" core).

    6.3.4.9.1 Press ENTER

    6.3.4.9.2 ---- OK FINE---- should display on the SLCC display for a short period.

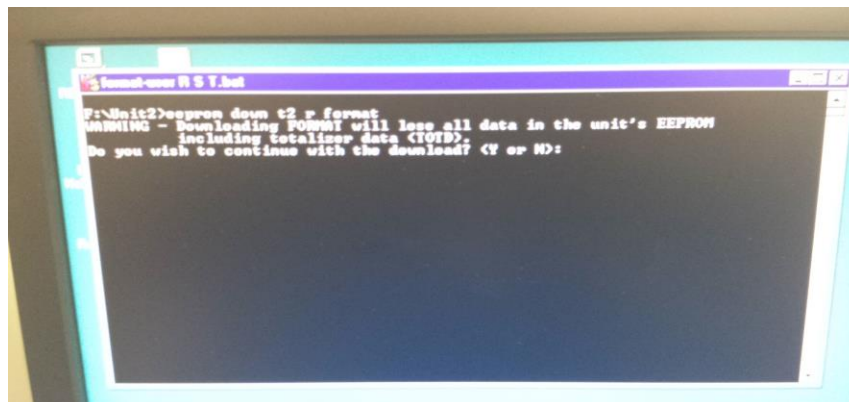   **6.3.4.9.3** Reboot/Reset this core, by pressing the manual reset button above the 2PLconnector.

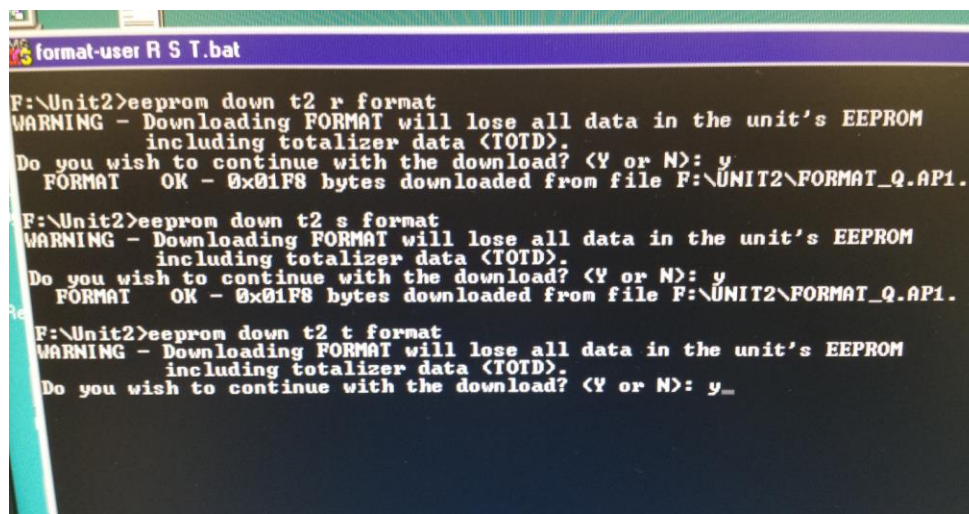**6.3.4.10** On the Desktop of the GAS HMI computer.
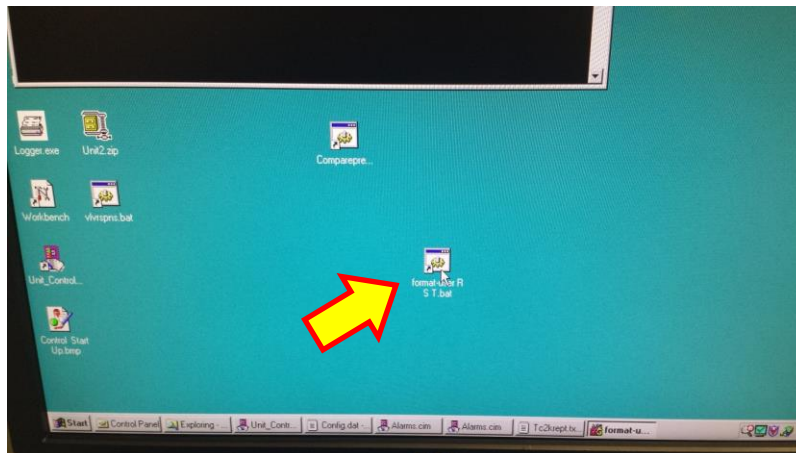
6.3.4.11 Double click in the icon shortcut "format-user R S T.bat".

6.3.4.12 It will open a Command Prompt window, see next page.

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**LOU-GED-DS200SDCCG4
REV. A**

GE Energy
Parts & Repair Services
Louisville, KY

Page 13 of 17

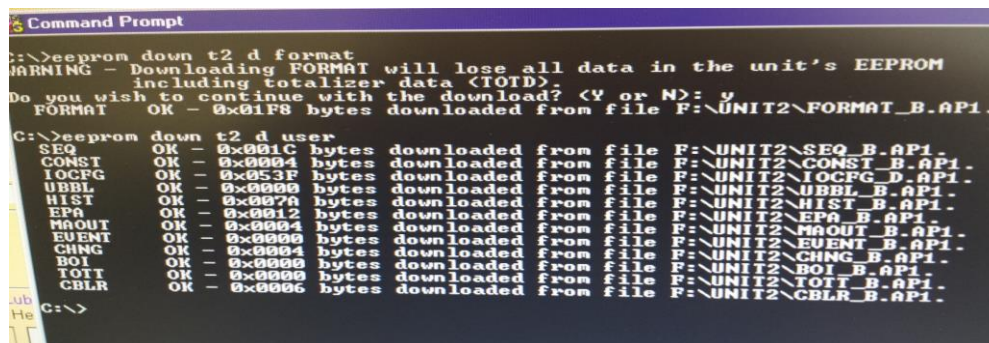**6.3.4.13** Type "Y" and press enter to format the "R" core.

6.3.4.14 Type "Y" and press enter to format the "S" core.

6.3.4.15 Type "Y" and press enter to format the "T" core.

6.3.4.16 The program will continue on its own and install ALL the "USER" files needed for the R/S/T cores and close by itself if successful.

6.3.4.16.1 Example below of the USER files downloaded to cores.

6.3.4.17 Reboot ALL R/S/T cores (by pressing manual reset button just above 2PL on all SDCCs) and verify they ALL come up to A7 status.

6.3.4.18 **Need data on the MW readings that are adjustable on the SDCC cards**.

6.3.5 **Burn-in Time.**

6.3.5.1 Burn-in time for Mark V cards normal repair

6.3.5.1.1 DS200SDCCG4A/G5A and DS200SLCCG3A - 1 hour minimum in Mark V rack.

6.3.5.2 Burn-in time for Mark V cards Revitalization Program

**6.3.5.2.1** DS200SDCCG4A/G5A and DS200SLCCG3A - 3 hour minimum in Mark V rack.

6.3.6 Verification of signals at row DWATT1 (Shown in MW on display) shown on the PREVOTE screen.

Special Note: In our IO.CFG file, Jeff has set the gain (IN) for 4mA to read 100MW, 20mA to read 500MW, and 0mA to read 0MW. Right now Jeff is trying to come up with a circuit that is wired into the panel instead using a milli-amp source. It may take a couple more weeks to wire in a permanent circuit with all the interruptions. Each example below should be checked in the positive and negative directions. With same input to all cards, they should have the same output response.

6.3.6.1 With the 3 core inputs R, S, & T, they each vote separately so we need to watch them simultaneously in the PREVOTE screen. By watching the PREVOTE screen we can see ALL core readings and voting simultaneously. Any bad reading will be caught here. See the examples in the three following pictures. Check all cards for proper readings, use +/- 5% for tolerance.
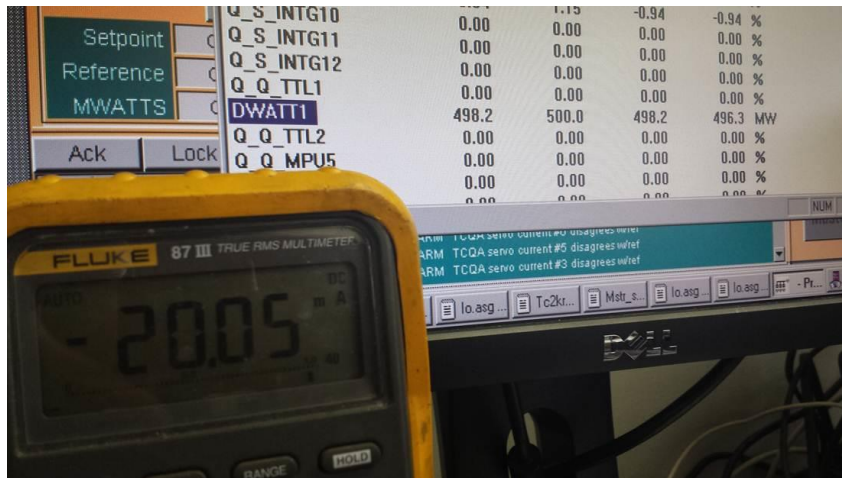
6.3.6.2 0mA Input
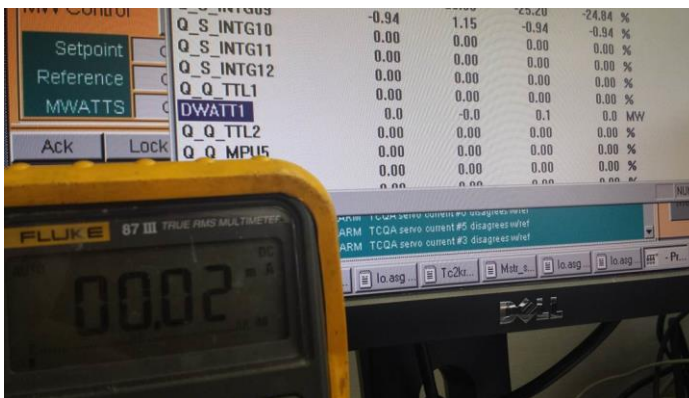
6.3.6.3

6.3.6.4 4mA or -4mA Input

6.3.6.5

6.3.6.6 20mA or -20mA Input


6.3.6.7

*6.4 ***Test Complete*****

7. **NOTES**

7.1 ECNDS200SDCCG5AHD - PWA G5 = G4 with U32 changed from 68A9821P3 to a 68A9821P4. The G5 card will not operate in G4 applications without a firmware change.

7.2 ECNDS200SDCCG4AHD – Remove U31 (68A9821P3) and replace it with 68A9821P4, do not change U32, U32 remains 68A9821P3. The 68A9821P3 (XC3064-70PC84C) is an obsolete part; this change assures that the P3 part is only used on the G4 card. The P4 part will not work on the G4 card without firmware changes.

7.3 ECNDS200SLCCG3AGH - The AFG card is functionally equivalent to the AGH unit. Salem obsoleted the card due to the display, but we have plenty of the displays for support.

8. ATTACHMENTS
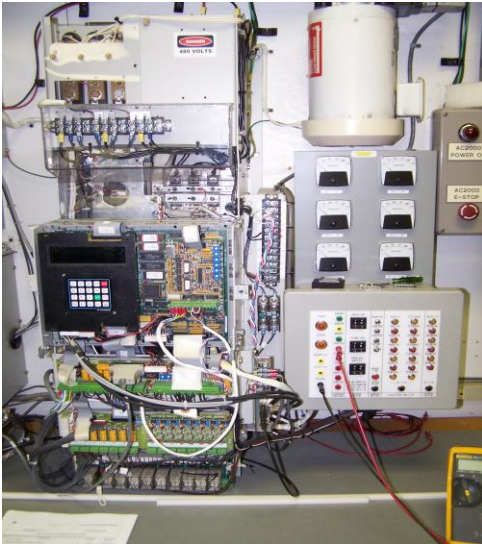
H033762 for testing DS200 Series Card
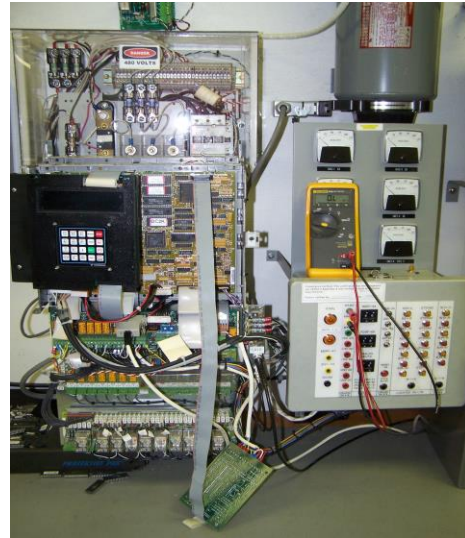
H033758 for testing DS200 Series Cards

H190117 Mark V Turbine Control