g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU-GED-IS200TRESH1A**

Test Procedure for an IS200TRESH1A Relay Protection Card

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release, bench test	J. Francis	1/6/2012
B	Archive original test, converted instruction to functionally test H1A models (125VDC) of this card.	J. Francis	4/14/2014
C			
D			

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
J. Francis	J. Francis	R. Johnson	Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
1/6/2012	4/14/2014	5/5/2014	6/11/2014

1. SCOPE

1.1 This is a functional testing procedure for an **IS200TRESH1** MARK Vie Relay Protection 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 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, 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	H188922	Mark Vle Simplex Test Rack with computer
1		Fluke 87 DMM (or equivalent)

6. TESTING PROCESS

6.1 Static Checks

6.1.1 Using Fluke 87 DMM (or equivalent) set for Resistance function, verify the following connections, with expected results, in the table below:

From:	To:	Expected Results:
JA1-4	JX1-4	<2 ohm
JA1-4	JY1-4	<2 ohm
JA1-4	JZ1-4	<2 ohm
JA1-7	JX1-7	45 KOhms -/+ 450 Ohms
JA1-7	JY1-7	45 KOhms -/+ 450 Ohms
JA1-7	JZ1-7	45 KOhms -/+ 450 Ohms
JA1-10	JX1-10	45 KOhms -/+ 450 Ohms
JA1-10	JY1-10	45 KOhms -/+ 450 Ohms
JA1-10	JZ1-10	45 KOhms -/+ 450 Ohms
JA1-11	JX1-11	<2 ohm
JA1-11	JY1-11	<2 ohm
JA1-11	JZ1-11	<2 ohm
JA1-12	JX1-12	<2 ohm
JA1-12	JY1-12	<2 ohm
JA1-12	JZ1-12	<2 ohm
JA1-14	JX1-14	<2 ohm
JA1-14	JY1-14	<2 ohm
JA1-14	JZ1-14	<2 ohm
JA1-15	JX1-15	987 Kohms -/+ 10 KOhms
JA1-15	JY1-15	987 Kohms -/+ 10 KOhms
JA1-15	JZ1-15	987 Kohms -/+ 10 KOhms
JA1-16	JX1-16	<2 ohm
JA1-17	JX1-17	<2 ohm
JA1-19	JX1-19	<2 ohm
JA1-19	JY1-19	<2 ohm
JA1-19	JZ1-19	<2 ohm
JA1-23	JX1-23	20 Kohms -/+ 250 Ohms
JA1-23	JY1-23	20 Kohms -/+ 250 Ohms
JA1-23	JZ1-23	20 Kohms -/+ 250 Ohms
JA1-25	JX1-25	45 KOhms -/+ 450 Ohms

JA1-25	JY1-25	45 KOhms -/+ 450 Ohms
JA1-25	JZ1-25	45 KOhms -/+ 450 Ohms
JA1-26	JX1-26	45 KOhms -/+ 450 Ohms
JA1-26	JY1-26	45 KOhms -/+ 450 Ohms
JA1-26	JZ1-26	45 KOhms -/+ 450 Ohms
JA1-28	JX1-28	45 KOhms -/+ 450 Ohms
JA1-28	JY1-28	45 KOhms -/+ 450 Ohms
JA1-28	JZ1-28	45 KOhms -/+ 450 Ohms
JA1-29	JX1-29	<2 ohm
JA1-29	JY1-29	<2 ohm
JA1-29	JZ1-29	<2 ohm
JA1-30	JX1-30	<2 ohm
JA1-30	JY1-30	<2 ohm
JA1-30	JZ1-30	<2 ohm
JA1-31	JX1-31	<2 ohm
JA1-31	JY1-31	<2 ohm
JA1-31	JZ1-31	<2 ohm
JA1-32	JX1-32	<2 ohm
JA1-32	JY1-32	<2 ohm
JA1-32	JZ-132	<2 ohm
JA1-33	JX1-33	<2 ohm
JA1-34	JX1-34	<2 ohm
JA1-35	JX1-35	<2 ohm
JA1-36	JX1-36	<2 ohm
JA1-37	JX1-37	<2 ohm

6.2 Testing Procedure

Note: The following tests assume you are familiar with using ToolboxST. You will need to perform downloads at least twice for UUT to be setup fully. You should also wait for approximately 3 minutes in between downloads for rack and UUT to reboot.

6.2.1 Turn “OFF” Rack Power located at front right side of test rack. Be sure that 125 VDC is disconnected from test rack before removing TRES card.

6.2.2 Remove test card (GOLD card) from test rack and install Unit Under Test (UUT) into test rack.

6.2.3 Ensure that the “Contact Inputs 1 – 7” switch at the top of the yellow TRES panel is “CLOSED” (down). The ETR relays will not engage if the switch is not “CLOSED”.

6.2.4 Reapply 125 VDC to test rack after installing TRES to be tested.

6.2.5 Turn "ON" Rack Power switch. Wait for test rack to fully boot, approximately 3 minutes.

6.2.6 Wait for test rack to boot completely before continuing. This will be by waiting for the ETR Relays (1 through 3) to engage, which will turn the "TRIP" LED's off and turn the "RUN" LED's on in the yellow TRES panel just to the left of the keyboard.

6.2.7 Open **ToolboxST** and open "**LVLTMR01**" by double-clicking on it and click the "ONLINE" button in the toolbar.

6.2.8 From the menu, Download Controller Setup by going to **Device->Download->Download Wizard.** Follow instructions in dialog boxes that follow. All of the devices should show "EQUAL", so no downloading should be required.

Note: The following portions of the test assume you are familiar with using ToolboxST. You will need to perform downloads at least twice for UUT to be setup fully. You should also wait for approximately 3 minutes in between downloads for rack and UUT to reboot.

6.2.9 At this time all of the K4CL LED, located just above the controller, should not be illuminated.

6.2.10 Verify that the PPRO PAC Module's LED's are scrolling with no red indicators, both of the LINK LED's and the Power LED are GREEN, and that the TX/RX LED's are flashing AMBER.

6.2.11 Highlight the "HARDWARE" tab. Then highlight the "PPRO" icon under the "DISTRIBUTED I/O" icon. This should display the "SUMMARY" screen for the SPRO and TRES cards.

6.2.12 Verify that the Pulse Rate 1-3 are at 60 Hz. You may need to adjust the frequency generator, located just above the yellow TRES panel, a little to get this to be accurate.

6.2.13 Verify that the "bus_pt" and "gen_pt" are approximately the same, 117 VAC.

6.2.13.1 Turn "OFF" the yellow "BUS" switch on the front of the test rack above the monitor. Verify that the "bus_pt" point in the summary screen goes to 0 VAC, while the "gen_pt" point stays at 117 VAC. Turn "ON" the yellow "BUS" switch and verify that the "bus_pt" returns to 117 VAC.

6.2.13.2 Turn "OFF" the yellow "GEN" switch on the front of the test rack above the monitor. Verify that the "gen_pt" point in the summary screen goes to 0 VAC, while the "bus_pt" point stays at 117 VAC. Turn "ON" the yellow "GEN" switch and verify that the "gen_pt" returns to 117 VAC.

6.2.13.3 Verify that all 7 of the Contact Input points are "TRUE".

6.2.13.4 Verify that K1, K2, K3, and K25A Relay feedback points are “TRUE”.

6.2.13.5 Verify that K4CL relay feedback point is “FALSE”.

6.2.13.6 On the yellow TRES panel, “OPEN” the “Contact Inputs 1- 7” switch by moving it to the middle/up position. This will cause a “TRIP” for the unit.

6.2.13.7 Verify that all 3 “TRIP” LED’s are illuminated on the yellow TRES panel.

6.2.13.8 Verify that all 7 of the Contact Input points are “FALSE”.

6.2.13.9 Verify that K1, K2, K3, and K25A Relay feedback points are “FALSE”.

6.2.13.10 Verify that K4CL relay feedback point is “TRUE”.

6.2.13.11 Verify that the LED inside of the K4CL relay is on.

6.2.13.12 Verify on the PPRO PAC Module that the LED’s are not scrolling, the “RUN” LED is red, the ATTN LED is flashing RED, and all other LED’s are normal.

6.2.14 On the yellow TRES panel, “CLOSE” the “Contact Inputs 1- 7” switch by moving it to the down position.

6.2.14.1 Verify that all 7 of the Contact Input points return to “TRUE”.

6.2.15 Cycle power to the test rack.

6.2.15.1 Bring ToolboxST online.

6.2.15.2 Verify that all 7 of the Contact Input points are “TRUE”.

6.2.15.3 Verify that K1, K2, K3, and K25A Relay feedback points are “TRUE”.

6.2.15.4 Verify that K4CL relay feedback point is “FALSE”.

6.2.15.5 Wait for test rack to boot completely before continuing. This will be by waiting for the ETR Relays (1 through 3) to engage, which will turn the “TRIP” LED’s off and turn the “RUN” LED’s on in the yellow TRES panel

6.2.15.6 Verify that the PPRO PAC Module’s LED’s are scrolling with no red indicators, both of the LINK LED’s and the Power LED are GREEN, and that the TX/RX LED’s are flashing AMBER.

6.2.16 Adjust the Frequency generator, located just above the yellow TRES panel, from 60 Hz to 84 Hz.

6.2.16.1 Verify the ETR 1-3 “TRIP” LED’s come on.

6.2.16.2 Verify on the PPRO PAC Module that the LED’s are not scrolling, the “RUN” LED is red, the ATTN LED is flashing RED, and all other LED’s are normal.

6.2.17 Adjust the Frequency generator back to 60 Hz.

6.2.17.1 Verify that the ETR 1-3 “RUN” LED’s come back on.

6.2.17.2 Verify that the PPRO PAC Module's LED's are scrolling with no red indicators, both of the LINK LED's and the Power LED are GREEN, and that the TX/RX LED's are flashing AMBER.

6.2.17.3 Verify the K4CL relay LED is "OFF".

6.2.18 Adjust the Frequency generator to 600 Hz.

6.2.18.1 Verify that all 3 of the ETR 1-3 "TRIP" LED's are "ON".

6.2.18.2 Verify that the K4CL relay LED is "ON".

6.2.18.3 Verify on the PPRO PAC Module that the LED's are not scrolling, the "RUN" LED is red, the ATTN LED is flashing RED, the OSPD LED is red, the WDOG LED is red, and all other LED's are normal.

6.2.18.4 Adjust the Frequency generator back to 60 Hz.

6.2.19 Cycle power to the test rack.

6.2.19.1 Bring ToolboxST online.

6.2.19.2 Verify that all 7 of the Contact Input points are "TRUE".

6.2.19.3 Verify that K1, K2, K3, and K25A Relay feedback points are "TRUE".

6.2.19.4 Verify that K4CL relay feedback point is "FALSE".

6.2.19.5 Wait for test rack to boot completely before continuing. This will be by waiting for the ETR Relays (1 through 3) to engage, which will turn the "TRIP" LED's off and turn the "RUN" LED's on in the yellow TRES panel

6.2.19.6 Verify that the PPRO PAC Module's LED's are scrolling with no red indicators, both of the LINK LED's and the Power LED are GREEN, and that the TX/RX LED's are flashing AMBER.

6.2.20 Let unit run online for at least 48 hours.

6.2.21 After testing has been completed successfully, remove UUT, reinstall GOLD card, and verify successfully operation in ToolboxST.

6.3 ***TEST COMPLETE ***

7. NOTES

7.1 Live View screens will be forthcoming and tests will be amended as needed.

8. ATTACHMENTS

8.1 None at this time.