g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU-GED-IS200TPRO-A**

Test Procedure for an IS200TPRO: Terminal BD, Protective

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PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
John Madden			Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
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1. SCOPE

1.1 This is a functional testing procedure for a Mark VI Protective Terminal 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 N:\Design Folders\IS2\IS200T\TPRO

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 the local documented procedures 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		ID Chip reader PC
1		Tenma Dual Power Supply (or equivalent)
1		Tenma Function Generator (or equivalent)

6. TESTING PROCESS

6.1 Setup

6.1.1 Setup is defined in each test step.

Note: no special notes at this time

6.2 Testing Procedure

6.2.1 **ID Chip Read:** You must first take the unit over to the roll-around stand with the ID Chip reader PC on it. This stand has a dongle set up to plug into the correct pins of the JXx, JYx, & JZx connectors to read the data on the ID chips. You may need to update the info contained in these chips if it does not match the serial or model number printed on the board. *If for some reason the board does not have a serial number label, or someone has replaced it with one of our in-house six-digit R1xxxx number labels, you'll need to find out the correct serial number already on the chip(s) and print a correct barcode label to place on the board. You can do this by typing in a random number, and when the program kicks it back as incorrect you simply write down the correct number that it tells you, and exit the program using the F10 key. Once you have the correct label on the board, repeat this step using that correct number and it should pass.*

6.2.2 **Generator & Bus Monitor 120Vac Test:** *Be sure to adhere to NFPA 70E guidelines when conducting this test step.* This step is real simple: You're going to apply 120Vac across each of the two transformers on this board and look at their corresponding outputs. Using the following table, look for approximately 1.6Vac at the designated points while applying 120Vac:

Input	Output
TB1-1 & TB1-2 (T2)	JX1-3 & JX1-4
TB1-1 & TB1-2 (T2)	JY1-3 & JY1-4
TB1-1 & TB1-2 (T2)	JZ1-3 & JY1-4
TB1-3 & TB1-4 (T1)	JX1-7 & JX1-8
TB1-3 & TB1-4 (T1)	JY1-7 & JY1-8
TB1-3 & TB1-4 (T1)	JZ1-7 & JY1-8

6.2.3 Cold Junction (Temperature Sensor) Tests: The cold junction AD592 transducers (U7-9) on this card are located underneath TB1 & TB2. They provide an output current proportional to temperature. They're NOT thermocouples or RTDs. They are active components that vary their current output depending upon temperature. You simply need to connect them in a series circuit via a 5Vdc power supply and a 1K-ohm resistor. You will measure across the 1K-ohm resistor to read a voltage that is proportional to the transducer's temperature. Typically, with our shop staying between 70-74 degrees Fahrenheit, this voltage should read approximately 290-300mVdc. If you use the heat gun to raise the temperature (not necessary for this test), or if you've just taken the unit out of the oven, you should see the voltage reading go up. Follow the table below for connections:

Transducer	Positive	Negative
U7	JX1-30	JX1-31
U8	JY1-30	JY1-31
U9	JZ1-30	JZ1-31

6.2.4 Voltage Regulators: There are three voltage regulators that need to be checked: U10, U11 & U24. They are set at 24Vdc, and are supplied off of the P28W bus, which is simply all three P28 inputs "dioded" together. Any one of P28X (JX1-1), P28Y (JY1-1), or P28Z (JZ1-1) will power up the P28W bus, using JX1-2, JY1-2, or JZ1-2 as PCOM. With 28Vdc applied, using PCOM for your output com as well, you should read 24-25Vdc out at TB1-5, TB1-9, & TB1-11.

6.2.5 Static Resistance Checks: You will read several circuits to check resistances across them. During this test, use either JX1-2, JY1-2, or JZ1-2 for PCOM and JX5-2, JY5-2, or JZ5-2 for SCOM. Use the following table to make your checks:

From	To	Value (OHMS)
Jx1-16	Jx1-15	250
Jx1-16	TB1-12	250
Jx1-16	PCOM	Short
Jx1-15	TB1-12	Short
Jx1-15	SCOM	Open
Jx1-14	Jx1-13	250
Jx1-14	TB1-10	250
Jx1-14	PCOM	Short
Jx1-13	TB1-10	Short
Jx1-13	SCOM	Open
Jx1-12	PCOM	Short (*JP1B=RET*)
TB1-8	PCOM	Short (*JP1B=RET*)
Jx1-12	TB1-6	250
TB1-8	TB1-6	250
TB1-8	Jx1-11	250 (*JP1A=20MA)*
Jx1-11	SCOM	Open (*JP1A=20MA)*
TB1-7	Jx1-11	Short (*JP1A=VDC)*
TB1-7	SCOM	1M

6.2.6 Magnetic Pickup Inputs: These are basically transient suppression circuits for low voltage AC signals. The Tenma Function Generator was selected for this test because of its dial adjustment for frequency output. For the next 9 circuits, you'll be leaving the frequency at 60Hz, but for the final 9 circuits (next test step) you'll need the dial to sweep frequencies to get the desired output. For now, simply turn its output voltage up to maximum (8Vac) and set the frequency at 60Hz (100Hz range button selected and .6 on the dial). Each of the following 9 circuits should output approximately 1.2Vac. Leave everything hooked up before continuing to the next step. Use the following table for connections for this step:

Input	Output
TB2-48 & 47	JZ5-6 & 13
TB2-46 & 45	JZ5-3 & 11
TB2-44 & 43	JZ5-1 & 9
TB2-42 & 41	JY5-6 & 13
TB2-40 & 39	JY5-3 & 11
TB2-38 & 37	JY5-1 & 9
TB2-36 & 35	JX5-6 & 13
TB2-34 & 33	JX5-3 & 11
TB2-32 & 31	JX5-1 & 9

6.2.7 Thermocouple Inputs: These last 9 circuits have "pi" filters that cut the output down as you sweep into the higher frequencies. This is what you will test for. Keeping the input voltage 8Vac @ 60 Hz just as before, for each circuit you'll first switch the range on the generator from 100Hz to 10KHz. With the dial still set to .6, this should create 6KHz and cause the output to drop from 8Vac to approximately 6.8Vac. Now sweep the dial up to 2.0, which gives you 20KHz, and your output should drop to approximately 3.8Vac, using the connections listed in the table below:

Input	Output
TB2-30 & 29	JZ1-28 & 29
TB2-28 & 27	JZ1-26 & 27
TB2-26 & 25	JZ1-24 & 25
TB1-24 & 23	JY1-28 & 29
TB1-22 & 21	JY1-26 & 27
TB1-20 & 19	JY1-24 & 25
TB1-18 & 17	JX1-28 & 29
TB1-16 & 15	JX1-26 & 27
TB1-14 & 13	JX1-24 & 25

6.2.8 That's it…

6.3 Post Testing Burn-in Required ___ Yes _X_ No

Note: no special notes at this time

6.4 ***TEST COMPLETE ***

7. NOTES

7.1 None at this time.

8. ATTACHMENTS

8.1 None at this time.