g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU-GED-IS200TBTC-A**

Test Procedure for a Mark VI Thermocouple Terminal Board

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	John Madden	5-19-08
B	Reviewed By L. Groves	C. Wade	5/21/2009
C			

© COPYRIGHT GENERAL ELECTRIC COMPANY
Hard copies are uncontrolled and are for reference only.
PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
John Madden	Lloyd Groves		Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
May 19, 2008	5/21/2009		5/19/2008

1. SCOPE

1.1 This is a functional testing procedure for a Thermocouple 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\TBTCH

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		Tenma dual power supply
1		Function Generator (Tenma 72-5010 recommended)

© COPYRIGHT GENERAL ELECTRIC COMPANY
Hard copies are uncontrolled and are for reference only.
PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

6. TESTING PROCESS

6.1 Setup

6.1.1 Setup is described in each step.

Note: A good visual check of these boards will reveal a majority of problems before testing. The majority of the boards you test that have a problem will most likely be Legacy boards that never shipped to a customer from Salem, but were rejected and sent here first. They will most likely have assembly problems that can be spotted visually.

6.2 Testing Procedure

6.2.1 **ID Chips:** The first thing to do is check the ID chips. Take the unit over to the CHIP ID reader PC, and follows the instructions given the on the main menu. If you find you have a particular revision that hasn't been added to the menu, see Monte Starling, John Madden, of Robert Duval for help adding it to the menu.

6.2.2 **Cold Junctions:** This card has two AD592 Cold Junction devices located under TB1 & TB2. These are there to give a temperature reference to the Mark VI system. Cold junctions are not RTD's, but rather they regulate current via temperature for a given voltage, in this case 5Vdc. They are tested quite simply, according to the manufacturer's instructions: Apply 5Vdc in series with a 1K-ohm resistor, and read the voltage across the resistor. If room temperature in the repair lab is between 70 & 74 degrees Fahrenheit, then you should read 290-300mVdc across your resistor.

Cold Junction	Positive	Negative	MVdc across 1K-ohm resistor
U2	JA1-16	JA1-15	290-300mVdc
U3	JB1-16	JB1-15	290-300mVdc

6.2.3 **Filter networks:** The rest of the board is quite simple. These circuits are simple filter networks to remove noise from thermocouple signals. To test them, use a function generator to apply a low frequency signal and sweep it up to a higher frequency, observing the signal attenuation as the frequency rises. At the time of writing of this test, the Tenma 72-5010 generator is easiest to use because of its frequency dial. While the test is written with this particular piece of equipment in mind, any function generator will do. With generator set to max voltage (8Vac), and 2Khz (10Khz button selected and .2 on the dial), read the output. It should be close to the input voltage. Sweep frequency up to 20KHz (2.0 on the dial), and the output voltage should drop by roughly half, or 3.5 to 4Vac. See table below:

© COPYRIGHT GENERAL ELECTRIC COMPANY
Hard copies are uncontrolled and are for reference only.
PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

8Vac input (TB block)	Output (JA or JB connector)
TB1-1 & 2	JA1-4 & 3
TB1-3 & 4	JA1-23 & 22
TB1-5 & 6	JA1-6 & 5
TB1-7 & 8	JA1-25 & 24
TB1-9 & 10	JA1-8 & 7
TB1-11 & 12	JA1-27 & 26
TB1-13 & 14	JA1-10 & 9
TB1-15 & 16	JA1-29 & 28
TB1-17 & 18	JA1-12 & 11
TB1-19 & 20	JA1-31 & 30
TB1-21 & 22	JA1-14 & 13
TB1-23 & 24	JA1-33 & 32
TB2-25 & 26	JB1-4 & 3
TB2-27 & 28	JB1-23 & 22
TB2-29 & 30	JB1-6 & 5
TB2-31 & 32	JB1-25 & 24
TB2-33 & 34	JB1-8 & 7
TB2-35 & 36	JB1-27 & 26
TB2-37 & 38	JB1-10 & 9
TB2-39 & 40	JB1-29 & 28
TB2-41 & 42	JB1-12 & 11
TB2-43 & 44	JB1-31 & 30
TB2-45 & 46	JB1-14 & 13
TB2-47 & 48	JB1-33 & 32

6.3 Post Testing Burn-in **Required** **___ Yes _X_ No**

6.4 ***TEST COMPLETE ***

© COPYRIGHT GENERAL ELECTRIC COMPANY
Hard copies are uncontrolled and are for reference only.
PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

7. NOTES

7.1

8. ATTACHMENTS

8.1

© COPYRIGHT GENERAL ELECTRIC COMPANY
Hard copies are uncontrolled and are for reference only.
PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.