



GE Energy

## Functional Testing Specification

Parts & Repair Services  
Louisville, KY

LOU-GED-DS200CTEG1Axx

### Test Procedure for a DS200CTEG1Axx Mark V Trip Module card.

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<b>DATE</b> 10/31/2013	<b>DATE</b>	<b>DATE</b>	<b>DATE</b> 10/31/2013

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## 1. SCOPE

1.1 This is a functional testing procedure for a DS200CTEG1Axx Mark V Trip Module 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
2	*	Fluke 87 DMM (or Equivalent)
1	*	Tenma Dual Output Power Supply (or equivalent)
1	*	125VDC Power Supply
*	*	TCTE Box (on shelves with test fixtures by Frank)

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## 6. TESTING PROCESS


### 6.1 Testing Procedure

#### 6.1.1 Setup


- 6.1.1.1 Apply power to the Tenma Dual output power supply. Adjust one output to +24VDC  $\pm$  0.2VDC, and the second output to +VDC  $\pm$  0.2 VDC. Note which output is which for setup purposes.
- 6.1.1.2 Set current limit to approximately 25%, or one-third of a turn clockwise from 0%, or fully counter-clockwise position, for both outputs.
- 6.1.1.3 Remove power from Tenma Dual output power supply at this time.
- 6.1.1.4 Connect both Tenma Dual output power supply negative outputs together. This will be called "Common".
- 6.1.1.5 Connect 50 pin cable labeled "TCTE PWR CABLE" (in TCTE Box) header to JLZ.
- 6.1.1.6 Connect 50 pin cable labeled "TCTE PWR CABLE" yellow banana plug to +24VDC power supply (positive output).
- 6.1.1.7 Connect 50 pin cable labeled "TCTE PWR CABLE" orange banana plug to 24VDC return (negative output).
- 6.1.1.8 Connect 50 pin cable labeled "TCTE PWR CABLE" grey banana plug to +5VDC power supply (positive output).
- 6.1.1.9 Connect +125VDC Power Supply positive output to connector J7W pin 1, connector JM pins 3 and 6, and to connector JN pins 2, 3, and 5. Do not apply power at this time.
- 6.1.1.10 Connect 125VDC Power Supply negative output to connector J7W pin 2 and to connector JN pins 1 and 6. Do not apply power at this time.
- 6.1.1.11 Place jumper JP1 to position 2 – 3 (**ON**).

#### 6.1.2 Initial Power Checks

- 6.1.2.1 Apply power to the Tenma Dual output power supply at this time. Do not apply power to the 125VDC Power Supply at this time.
- 6.1.2.2 Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC  $\pm$  0.2 VDC across Capacitor C1, positive lead of DMM connected to positive (+) side of C1 and negative lead of DMM connected to negative (-) side of C1.
- 6.1.2.3 Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC  $\pm$  0.2 VDC across Capacitor C2, positive lead of DMM connected to positive (+) side of C2 and negative lead of DMM connected to negative (-) side of C2

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- 6.1.2.4** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC +/- 0.2 VDC across Connector JT1, positive lead of DMM connected to connector JT1 pin 1 and negative lead of DMM connected to connector JT1-2.
- 6.1.2.5** Removed power from Tenma Dual output power supply at this time.
- 6.1.2.6** Remove 50 pin cable labeled "TCTE PWR CABLE" header from JLZ.
- 6.1.2.7** Connect 50 pin cable labeled "TCTE PWR CABLE" header to JLY.
- 6.1.2.8** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC +/- 0.2 VDC across Capacitor C1, positive lead of DMM connected to positive (+) side of C1 and negative lead of DMM connected to negative (-) side of C1.
- 6.1.2.9** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC +/- 0.2 VDC across Capacitor C2, positive lead of DMM connected to positive (+) side of C2 and negative lead of DMM connected to negative (-) side of C2
- 6.1.2.10** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC +/- 0.2 VDC across Connector JT1, positive lead of DMM connected to connector JT1 pin 1 and negative lead of DMM connected to connector JT1-2.
- 6.1.2.11** Removed power from Tenma Dual output power supply at this time.
- 6.1.2.12** Remove 50 pin cable labeled "TCTE PWR CABLE" header from JLY.
- 6.1.2.13** Connect 50 pin cable labeled "TCTE PWR CABLE" header to JLX.
- 6.1.2.14** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC +/- 0.2 VDC across Capacitor C1, positive lead of DMM connected to positive (+) side of C1 and negative lead of DMM connected to negative (-) side of C1.
- 6.1.2.15** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC +/- 0.2 VDC across Capacitor C2, positive lead of DMM connected to positive (+) side of C2 and negative lead of DMM connected to negative (-) side of C2
- 6.1.2.16** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC +/- 0.2 VDC across Connector JT1, positive lead of DMM connected to connector JT1 pin 1 and negative lead of DMM connected to connector JT1-2.
- 6.1.2.17** Leave power applied to Tenma Dual output supply and connected to JLX.
- 6.1.2.18** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC +/- 0.2 VDC with positive lead of DMM connected to connector JLX pin 45 and negative lead of DMM connected to connector JLX pin 47.

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**6.1.2.19** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC  $\pm$  0.2 VDC with positive lead of DMM connected to connector JLX pin 46 and negative lead of DMM connected to connector JLX pin 47.

**6.1.2.20** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC  $\pm$  0.2 VDC with positive lead of DMM connected to connector JLY pin 45 and negative lead of DMM connected to connector JLY pin 47.

**6.1.2.21** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC  $\pm$  0.2 VDC with positive lead of DMM connected to connector JLY pin 46 and negative lead of DMM connected to connector JLY pin 47.

**6.1.2.22** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC  $\pm$  0.2 VDC with positive lead of DMM connected to connector JLZ pin 45 and negative lead of DMM connected to connector JLZ pin 47.

**6.1.2.23** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +4.4VDC  $\pm$  0.2 VDC with positive lead of DMM connected to connector JLZ pin 46 and negative lead of DMM connected to connector JLZ pin 47.

**6.1.2.24** Using Fluke 87 DMM (or Equivalent), set for DC Volts function, check for +23.4VDC  $\pm$  0.2 VDC with positive lead of DMM connected to connector JN pin 12 and negative lead of DMM connected to connector JLX pin 47.

### **6.1.3 Active Testing**

**6.1.3.1** Connect the Fluke 87 DMM (or Equivalent), set for DC Volts function, negative meter lead to the 24 VDC return (Common).


**6.1.3.2** Using the Fluke 87 DMM (or Equivalent), set for DC Volts function, positive meter lead check for +3.5VDC  $\pm$  0.3 VDC on connectors JLX, JLY, and JLZ pins 22, 23, 24, 25, and 36 of each connector.

**6.1.3.3** Apply power to the 125VDC Power Supply.


**6.1.3.4** Using the Fluke 87 DMM (or Equivalent), set for DC Volts function, positive meter lead check for 0VDC on connectors JLX, JLY, and JLZ pins 22, 23, 24, and 25 of each connector.

**6.1.3.5** Connect a 10K Ohm resistor in series with the positive +5VDC output of the Tenma Dual output power supply 5 Volt Fixed output to the positive meter lead on the Fluke 87 DMM (or Equivalent), set for DC Volts function (pull-up resistor). This will be used to check the operation of all of the Opto-Couplers.

**6.1.3.6** Connect the 5VDC return (negative) of the Tenma Dual output power supply 5 Volt Fixed output to the 24 VDC return (Common), if not connected.

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- 6.1.3.7** Connect the Fluke 87 DMM (or Equivalent), set for DC Volts function, negative meter lead to the 24 VDC return (Common).
- 6.1.3.8** With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 34 and pin 35 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.9** Apply power to the 125VDC Power supply at this time.
- 6.1.3.10** With power to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 34 and pin 35 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.11** With power to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 30 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.12** With power to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 32 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.13** With power to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 33 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.14** With power to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 21 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.15** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 31 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.16** Remove power to the 125VDC Power Supply.
- 6.1.3.17** With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 30 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.18** With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 32 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.19** With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 33 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).

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- 6.1.3.20** Remove +125VDC Power Supply positive output from connector JM pin 3 and connect to connector JN pin 4.
- 6.1.3.21** Using the table listed below **step 6.1.3.14** of this test procedure, check the points listed following the same procedure as called out in **steps 6.1.3.9** through **steps 6.1.3.14** of this test procedure. Also, it should be noted that the last 6 items listed do not change logic states when 125VDC is applied to unit.
- 6.1.3.22** *With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 3 on each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).*
- 6.1.3.23** *With power applied to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 3 on each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).*
- 6.1.3.24** *Connect connector JLY pin 39 to common.*
- 6.1.3.25** *With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin3 on each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).*
- 6.1.3.26** *Remove power to the 125VDC Power Supply.*
- 6.1.3.27** *Remove connector JLY pin 39 from common.*


Connect Positive Meter Lead to:	Reading with 125VDC P/S OFF	Reading with 125VDC P/S ON	Energizing Relay GND Point	Reading with Energizing Relay GND Point Connected
JLX, JLY, JLZ pin 3	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JLY pin 39	+5 VDC (logic high)
JLX, JLY, JLZ pin 4	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JLX pin 39	+5 VDC (logic high)
JLX, JLY, JLZ pin 5	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JLZ pin 39	+5 VDC (logic high)
JLX, JLY, JLZ pin 6	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JLY pin 38	+5 VDC (logic high)
JLX, JLY, JLZ pin 7	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JLX pin 38	+5 VDC (logic high)
JLX, JLY, JLZ pin 8	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JLZ pin 38	+5 VDC (logic high)
JLX, JLY, JLZ pin 9	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JDR pin 3	+5 VDC (logic high)
JLX, JLY, JLZ pin 10	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JDS pin 3	+5 VDC (logic high)
JLX, JLY, JLZ pin11	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JDT pin 3	+5 VDC (logic high)
JLX, JLY, JLZ pin12	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JDR pin 4	+5 VDC (logic high)
JLX, JLY, JLZ pin13	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JDS pin 4	+5 VDC (logic high)
JLX, JLY, JLZ pin 14	+5VDC (logic high)	Less Than +0.8VDC (logic low)	JDT pin 4	+5 VDC (logic high)
JLX, JLY, JLZ pin 15	Less Than +0.8VDC (logic low)	Less Than +0.8VDC (logic low)	JDR pin 5	+5 VDC (logic high)
JLX, JLY, JLZ pin 16	Less Than +0.8VDC (logic low)	Less Than +0.8VDC (logic low)	JDS pin 5	+5 VDC (logic high)
JLX, JLY, JLZ pin 17	Less Than +0.8VDC (logic low)	Less Than +0.8VDC (logic low)	JDT pin 5	+5 VDC (logic high)
JLX, JLY, JLZ pin 18	Less Than +0.8VDC (logic low)	Less Than +0.8VDC (logic low)	JLX pin 41	+5 VDC (logic high)
JLX, JLY, JLZ pin 19	Less Than +0.8VDC (logic low)	Less Than +0.8VDC (logic low)	JLY pin 41	+5 VDC (logic high)
JLX, JLY, JLZ pin 20	Less Than +0.8VDC (logic low)	Less Than +0.8VDC (logic low)	JLZ pin 41	+5 VDC (logic high)

**6.1.3.28** With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connector JN pin 11 using the positive meter lead on the Fluke 87 DMM (or Equivalent).




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- 6.1.3.29** Connect connectors JLZ and JLX pin 48 to common.
- 6.1.3.30** Check for less than +0.8VDC (logic low) on connector JN pin11 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.31** Remove connector JLX pin 48 from common, leaving connector JLZ pin 48 connected to common.
- 6.1.3.32** Check for +5VDC (logic high) on connector JN pin11 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.33** Connect connector JLY pin 48 to common.
- 6.1.3.34** Check for less than +0.8VDC (logic low) on connector JN pin11 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.35** Remove connectors JLY and JLZ from common.
- 6.1.3.36** Check for +5VDC (logic high) on connector JN pin11 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.37** Remove positive meter lead from connector JN pin 11.
- 6.1.3.38** With no power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JDR, JDS, and JDT pin 13 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.39** Connect connectors JLZ and JLX pin 40 to common.
- 6.1.3.40** Check for less than +0.8VDC (logic low) on connectors JDR, JDS, and JDT pin 13 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.41** Remove connector JLX pin 40 from common, leaving connector JLZ pin 40 connected to common.
- 6.1.3.42** Check for +5VDC (logic high) on connectors JDR, JDS, and JDT pin 13 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.43** Connect connector JLY pin 40 to common.
- 6.1.3.44** Check for less than +0.8VDC (logic low) on connectors JDR, JDS, and JDT pin 13 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.45** Remove connectors JLY and JLZ pin 40 of each connector from common.
- 6.1.3.46** Check for +5VDC (logic high) on connector JN pin11 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.47** Remove positive meter lead from connectors JDR, JDS, and JDT pin 13.
- 6.1.3.48** Apply power to the 125VDC Power Supply at this time.

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- 6.1.3.49** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 30 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.50** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 31 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.51** Connect connector JDR pin 1 and connector JDS pin 1 to common.
- 6.1.3.52** Check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 30 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.53** Remove connector JDS pin 1 from common, leaving connector JDR pin 1 connected to common.
- 6.1.3.54** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 30 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.55** Connect connector JDT pin 1 to common.
- 6.1.3.56** Check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 30 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.57** Remove power from the 125VDC Power Supply at this time.
- 6.1.3.58** Remove connectors JDR and JDT pin 1 from common.
- 6.1.3.59** Apply power to the 125VDC Power Supply at this time.
- 6.1.3.60** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 31 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.61** With power to the 125VDC Power Supply, check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 21 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.62** Connect connector JDR pin 2 and connector JDS pin 2 to common.
- 6.1.3.63** Check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 31 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.64** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 21 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.65** Remove connector JDS pin 1 from common, leaving connector JDR pin 1 connected to common.

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- 6.1.3.66** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 31 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.67** Connect connector JDT pin 1 to common.
- 6.1.3.68** Check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 31 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.69** Remove power from the 125VDC Power Supply at this time.
- 6.1.3.70** Remove connectors JDR and JDT pin 1 from common.
- 6.1.3.71** Apply power to the 125VDC Power Supply at this time.
- 6.1.3.72** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 31 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.73** Connect connector JLX pin 37 and connector JLY pin 37 to common.
- 6.1.3.74** Check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 31 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.75** Remove connector JLY pin 37 from common, leaving connector JLX pin 37 connected to common.
- 6.1.3.76** With power to the 125VDC Power Supply, check for +5VDC (logic high) on connectors JLX, JLY, and JLZ pin 31 of each connector using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.77** Connect connector JLZ pin 37 to common.
- 6.1.3.78** Check for less than +0.8VDC (logic low) on connectors JLX, JLY, and JLZ pin 31 using the positive meter lead on the Fluke 87 DMM (or Equivalent).
- 6.1.3.79** Remove power from the 125VDC Power Supply at this time.
- 6.1.3.80** Remove connectors JLX and JLZ pin 37 from common.
- 6.1.3.81** Connect one of the relays (in TCTE Box) coil to connector JM pin 5, and connect other end of the same relays' coil to connector JM – 1.
- 6.1.3.82** Connect the other relay (in TCTE Box) coil to connector JM pin 5, and connect other end of same relays' coil to connector JM pin 4.
- 6.1.3.83** Connect connectors JLX and JLY pin 39 to common.
- 6.1.3.84** Connect connectors JDR and JDS pin 3 to common.
- 6.1.3.85** Connect the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, to connector JLY pin 26. The negative lead of this meter should still be attached to common.

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- 6.1.3.86** Connect 2<sup>nd</sup> Fluke 87 DMM (or Equivalent) positive meter lead, without pull-up resistor connected to it, to connector JM pin 4.
- 6.1.3.87** Connect 2<sup>nd</sup> Fluke 87 DMM (or Equivalent) negative meter lead to connector JM pin 5.
- 6.1.3.88** The readings being noted are momentary on both DMM's, about 1 second in between transitions.
- 6.1.3.89** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 5 and 4 should transition from 0 VDC to 125 VDC momentarily, then return to 0 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 26 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low) momentarily, then return to +5 VDC (logic high).
- 6.1.3.90** Remove power from the 125VDC Power Supply.
- 6.1.3.91** Remove the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, from connector JLY pin 26 and connect it to JLX pin 26.
- 6.1.3.92** Remove connector JDS pin 3 from common.
- 6.1.3.93** Connect connector JDT pin 3 to common.
- 6.1.3.94** Remove connector JLY pin 39 from common.
- 6.1.3.95** Connect connector JLZ pin 39 to common.
- 6.1.3.96** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 5 and 4 should transition from 0 VDC to 125 VDC momentarily, then return to 0 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 26 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low) momentarily, then return to +5 VDC (logic high).
- 6.1.3.97** Remove power from the 125VDC Power Supply.
- 6.1.3.98** Remove the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, from connector JLX pin 26 and connect it to JLZ pin 26.
- 6.1.3.99** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 5 and 4 should transition from 0 VDC to 125 VDC momentarily, then return to 0 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 26 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low) momentarily, then return to +5 VDC (logic high).
- 6.1.3.100** Remove power from the 125VDC Power Supply.
- 6.1.3.101** Connect one of the relays (in TCTE Box) labeled "125" coil to connector JM pin 8, and connect other end of the same relays' coil to connector JM – 2.

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- 6.1.3.102** Connect the other relay (in TCTE Box) labeled “125” coil to connector JM pin 8, and connect other end of same relays’ coil to connector JM pin 7.
- 6.1.3.103** Connect connectors JLX and JLY pin 38 to common.
- 6.1.3.104** Connect connectors JDR and JDS pin 4 to common.
- 6.1.3.105** Connect the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, to connector JLY pin 28. The negative lead of this meter should still be attached to common.
- 6.1.3.106** Connect 2<sup>nd</sup> Fluke 87 DMM (or Equivalent) positive meter lead, without pull-up resistor connected to it, to connector JM pin 7.
- 6.1.3.107** Connect 2<sup>nd</sup> Fluke 87 DMM (or Equivalent) negative meter lead to connector JM pin 8.
- 6.1.3.108** The readings being noted are momentary on both DMM’s, about 1 second in between transitions.
- 6.1.3.109** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM’s. DMM connected to connector JM pins 8 and 7 should transition from 0 VDC to 125 VDC momentarily, then return to 0 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 28 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low) momentarily, then return to +5 VDC (logic high).
- 6.1.3.110** Remove power from the 125VDC Power Supply.
- 6.1.3.111** Remove the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, from connector JLY pin 28 and connect it to JLX pin 28.
- 6.1.3.112** Remove connector JDS pin 4 from common.
- 6.1.3.113** Connect connector JDT pin 4 to common.
- 6.1.3.114** Remove connector JLY pin 38 from common.
- 6.1.3.115** Connect connector JLZ pin 38 to common.
- 6.1.3.116** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM’s. DMM connected to connector JM pins 8 and 7 should transition from 0 VDC to 125 VDC momentarily, then return to 0 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 28 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low) momentarily, then return to +5 VDC (logic high).
- 6.1.3.117** Remove power from the 125VDC Power Supply.
- 6.1.3.118** Remove the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, from connector JLX pin 28 and connect it to JLZ pin 28.

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- 6.1.3.119** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 8 and 7 should transition from 0 VDC to 125 VDC momentarily, then return to 0 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 28 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low) momentarily, then return to +5 VDC (logic high).
- 6.1.3.120** Remove power from the 125VDC Power Supply.
- 6.1.3.121** Connect the relay (in TCTE Box) labeled "24" coil to connector JM pin 10, and connect other end of same relays' coil to connector JM pin 9.
- 6.1.3.122** Connect connectors JLX and JLY pin 41 to common.
- 6.1.3.123** Connect connectors JDR and JDS pin 5 to common.
- 6.1.3.124** Connect the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, to connector JLY pin 27. The negative lead of this meter should still be attached to common.
- 6.1.3.125** Connect 2<sup>nd</sup> Fluke 87 DMM (or Equivalent) positive meter lead, without pull-up resistor connected to it, to connector JM pin 9.
- 6.1.3.126** Connect 2<sup>nd</sup> Fluke 87 DMM (or Equivalent) negative meter lead to connector JM pin 10.
- 6.1.3.127** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 9 and 10 should transition from 0 VDC to +24 VDC +/- 0.5 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 27 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low).
- 6.1.3.128** Remove power from the 125VDC Power Supply.
- 6.1.3.129** Remove the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, from connector JLY pin 27 and connect it to JLX pin 27.
- 6.1.3.130** Remove connector JDS pin 5 from common.
- 6.1.3.131** Connect connector JDT pin 5 to common.
- 6.1.3.132** Remove connector JLY pin 41 from common.
- 6.1.3.133** Connect connector JLZ pin 41 to common.
- 6.1.3.134** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 9 and 10 should transition from 0 VDC to +24 VDC +/- 0.5 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 27 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low).

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**6.1.3.135** Remove power from the 125VDC Power Supply.

**6.1.3.136** Remove the positive meter lead on the Fluke 87 DMM (or Equivalent), with pull-up resistor, from connector JLX pin 27 and connect it to JLZ pin 27.

**6.1.3.137** Apply power to the 125VDC Power Supply at this time and observe readings on both DMM's. DMM connected to connector JM pins 9 and 10 should transition from 0 VDC to +24 VDC +/- 0.5 VDC. The DMM, with pull-up resistor, attached to connector JLY pin 27 should transition from +5VDC (logic high) to less than +0.8 VDC (logic low).

**6.1.3.138** Remove power from the 125VDC Power Supply.

**6.1.3.139** Remove all power and connections from unit under test.

#### **6.1.4 Static Checks**

**6.1.4.1** Using Fluke 87 DMM (or Equivalent), set for Resistance (Ohms) function, check for continuity between the following points:

**6.1.4.1.1** From connector JN pin 7 to JDR, JDS, and JDT pin 14 of each connector.

**6.1.4.1.2** From connector JN pin 8 to JDR, JDS, and JDT pin 15 of each connector.

**6.1.4.1.3** From connector JN pin 9 to JDR, JDS, and JDT pin 16 of each connector.

#### **6.2 \*\*\*TEST COMPLETE\*\*\***

### **7. NOTES**

**7.1** Be sure to have a fan blowing across the 4 big ceramic resistors, located next to connector JDR, as they get hot during operations involving 125 VDC.

### **8. ATTACHMENTS**

**8.1** None at this time.