

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

CALIFORNIA INSTITUTE OF TECHNOLOGY

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| Test Procedure | T1500486-v2 | |
| TMDS Interface Chassis Test Procedure | | |
| B. Abbott | | |

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California Institute of Technology
LIGO Project – MS 18-33
Pasadena, CA 91125
Phone (626) 395-2129
Fax (626) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project – MS 20B-145
Cambridge, MA 01239
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

<http://www.ligo.caltech.edu/>

Performed by: _____
 Date: _____
 Chassis Serial Number: _____
 Board Serial Number: _____

1. Overview

The Test Mass Discharge System (TMDS) Interface Chassis (D1500152-v1) houses a TMDS Interface Board (D1500107-V2), a PSoC Board, a variable transformer, DC Power supply, and a Neon Sign Transformer. The function of this chassis is to Interface the user with an aLIGO, Surface Charge Control Ionizer (D1400331-v6), and allow control and readback of the ion production.

2. Test Equipment

- 2.1 DMM with high voltage probe
- 2.2 Power supply
- 2.3 9-pin Dsub Breakout board
- 2.4 Digital Multimeter (DMM)
- 2.5 Signal Generator
- 2.6 Oscilloscope

3. Preliminaries

- 3.1 Perform visual inspection of the Chassis to make sure nothing looks overtly broken.

4. Low Voltage Electrical Tests

- 4.1 **Unplug the wall plug, and turn off the “main Power” switch.** There should now be no 110V power going to the box. This makes the low-voltage portion of the testing safer, as no high-voltage is present inside the box.
- 4.2 Open the box cover, and disconnect the 3-pin power cable from P6 (“Power In”). Then disconnect the transformer wire from the “From Transformer” screw lug, T1.
- 4.3 Clip the un-powered +/- 15V Power Supply to the TMDS Interface Board either onto the P6 pins, or appropriate testpoints (+15V to TP7, GND to TP5, and -15V to TP10) then power it up, and record the pertinent results in the table below.

| Voltage | Current | Observed Current | Front panel +/-15V LEDs On? |
|---------|----------------|------------------|-----------------------------|
| +15V | 120mA +/- 20mA | mA | |
| -15V | 50mA +/- 20mA | mA | |

4.4 Electrometer connector and LCD Tests

4.4.1 Hook up the 9-pin Dsub Breakout board to the “To/From Electrometer connector on the front panel, and verify the correct voltages exist by filling in the table below:

| DSub Pin | Expected Voltage | Present? (Yes/No)? |
|----------|------------------|--------------------|
| Pin 4 | +15 (+/- 0.5V) | |
| Pin 9 | GND | |
| Pin 5 | -15 (+/- 0.5V) | |

4.4.2 Using an BNC cable with clipleads, connect the “Square Wave Out” BNC to pins 1(+) and 6(GND) of the DSub Breakout. Using an oscilloscope, read the square wave voltage between 1(+) and 6(GND), and adjust the “Sq. Wave Amplitude” knob until the scope reads a square wave that transitions between +4V and -4V. If the signal is imbalanced, turn the pot R11 on the board to make the positive and negative voltages the same absolute value, then continue adjusting the front panel knob until they are both (+ or -) 4V. Next observe the front panel LCD, and read the “P=” Voltage (The positive sample which is displayed in mV), the “N=” voltage (The negative sample that is displayed in mV), and the “SqV=” voltage (The output square wave voltage that is read in volts). Also, observe the “Electrometer Monitor” BNC with a DMM reading DCV, and read the positive value, and the negative value. Check if they are all within tolerances, and mark the results in the table below:

| Voltage | Expected | Observed Pass: (Yes/No)? |
|------------------------|-----------------------------|-----------------------------|
| P= | 4000 +/-150 | |
| N= | 4000 +/- 150 | |
| SqV= | 4.0 +/- 0.7V | |
| “Electrometer Monitor” | +4.0V and -4.0V +/- 0.2V | |

- 4.4.3** Using a signal generator, apply a 1Vp-p 60Hz (HiZ) sine wave to the “From Transformer” screw terminal on the board to GND. Read the LCD “I=” value, and also read the front panel monitor BNC with an RMS capable DMM in “VAC” mode. Check if they are within tolerances, and mark the results in the table below:

| Voltage | Expected | Observed Pass: (Yes/No)? |
|-----------------|-----------------|-----------------------------|
| I= | 2000uA +/- 80uA | |
| Front Panel BNC | 0.6V +/- 0.1V | |

5. High Voltage Electrical Tests

- 5.1** Reconnect the 3-pin power cable from P6 (“Power In”) and the transformer wire to the “From Transformer” screw lug, T1. Replace the cover, and screw on. Plug the wall 110V plug into the box, and make sure all of the dials are turned to their minimum level.
- 5.2** Turn on the “Main Power” switch. The “High Voltage Present” light should come on.
“High Voltage Present” light on? (Yes/No)_____
- 5.3** Insert the HV Probe into the “High Voltage Out” connector, taking care to keep the point of the probe centered, and away from the barrel of the connector. Clip the grounding clip around the outside of the SHV connector barrel (not on the lip, close to the probe).
- 5.4** Slowly turn up the “High Voltage Level” dial to the “40” mark. At this level, the DMM should read 1.600 Volts, indicating that the output is 1.6KV.
DMM Reading 1.6V +/- 0.2V?_____
- 5.5** Turn the HV back down to “0”, and turn off the chassis.