

## PCRC Daughtercard Tuning Instructions

Use the following instructions if it has been determined that Daughtercard tuning is necessary for your particular system. Tuning involves changing Daughtercard components R2 and C2 by using an RC decade box to experimentally determine what values to replace the existing components with. An error waveform is injected onto the Local Control Board (LCB) and the R and C values from the decade box are adjusted until the waveform is as desired using the oscilloscope to monitor the output waveform. The tuning process must be performed using an actual working system. See the System Setup Diagram below and note that the PC and serial connection to the LCB are not required for the tuning process. It is recommended that this entire procedure be reviewed prior to attempting the tuning process. The following equipment is necessary for the tuning process:

**Local Control Board (LCB)** Manufactured by BiRa Systems

**Precision Current Regulator Controller (PCRC)**, with Daughtercard both manufactured by BiRa Systems

**Oscilloscope** (2 channel 100 MHz Bandwidth or greater recommended)

**RC Decade Box** (IET Model RCS-500 or equivalent)

**Waveform/Function Generator** (capable of producing a stable 5 HZ 5V squarewave)

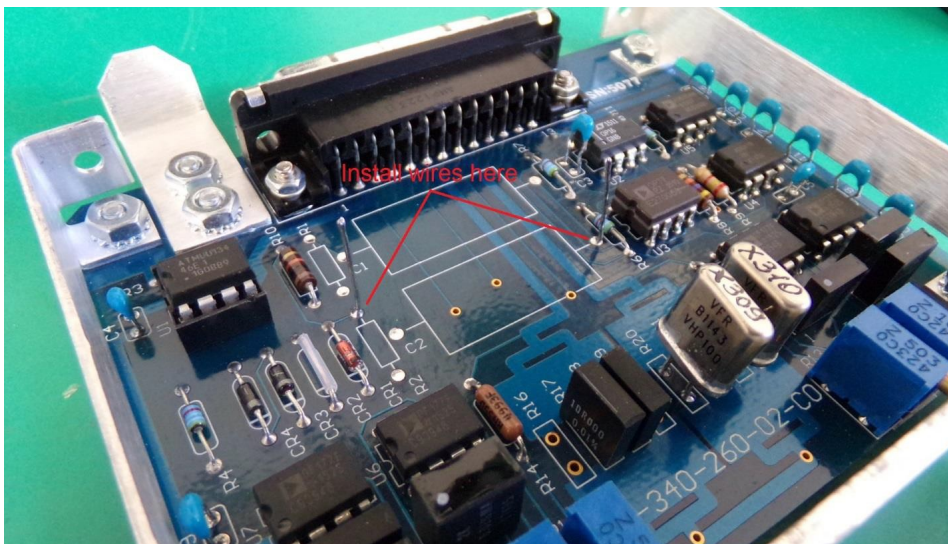
**Power Supply, DCCT, and Load** (connected as shown in System Setup Diagram)

**Soldering Equipment** (For removing and installing Daughtercard components by qualified personnel)

**Connection Cables** (DB9 M-F from PCRC to DCCT. DB37 M-M (Local Control Board to PCRC) BNC, QTY of 3, Load cables)

Use the following instructions for setting up the equipment needed for the tuning process. Use the System Setup Diagram shown below, as a guide to configure the setup. Begin with everything in the system powered off.

- 1) With the PCRC powered off, remove the Daughtercard from the PCRC by loosening the captive screws on the Daughtercard and pulling the black handle of the Daughtercard straight out.
- 2) With the Daughtercard removed from the PCRC, components R2 and C2 must be de-soldered from the module and replaced with wires in the locations shown in Figure 1.



**Figure 1**

- 3) On the front panel of the PCRC remove just the one screw above the 'Local Control' connector. With the screw removed, the top cover of the PCRC can now be removed by pushing the top cover slightly forward and then up. The Daughtercard should now be installed back into the PCRC.
- 4) Configure the RC decade box as shown in Figure 2. Note that a jumper must be installed between the Resistance and Capacitance side as shown in the figure. Note also that the settings are at 10K  $\Omega$  and 1uF. Using a shielded cable like the one shown in the photo has been proven to produce a clean waveform.



Figure 2

- 5) With the decade box configured, attach the two leads as shown below in Figure 3, with the R side lead and the C side lead attached to the appropriate wires on the daughtercard attached in step 2.

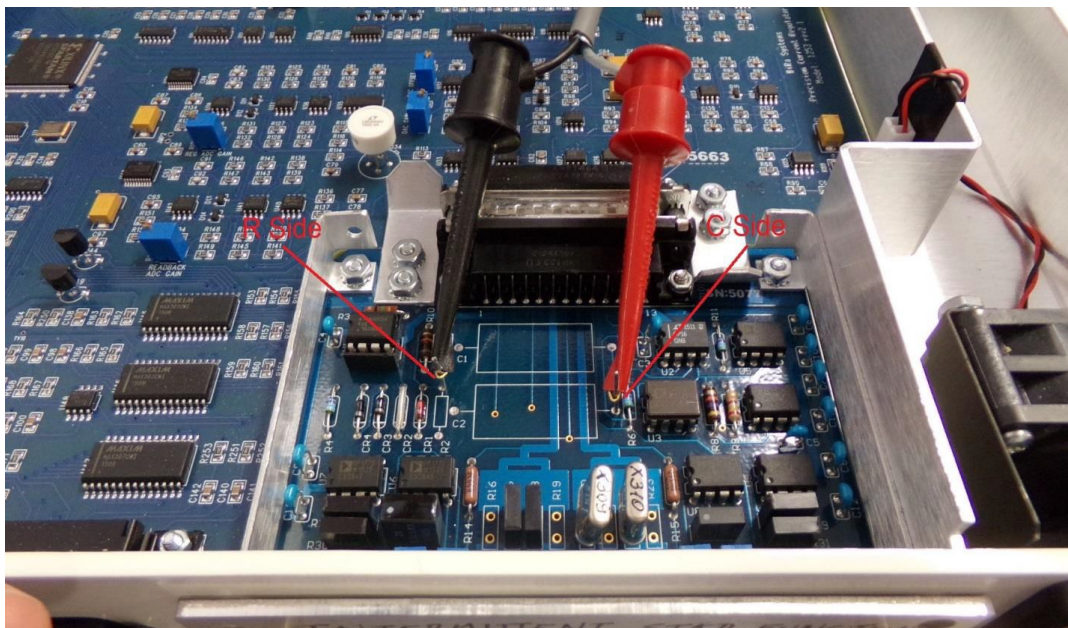
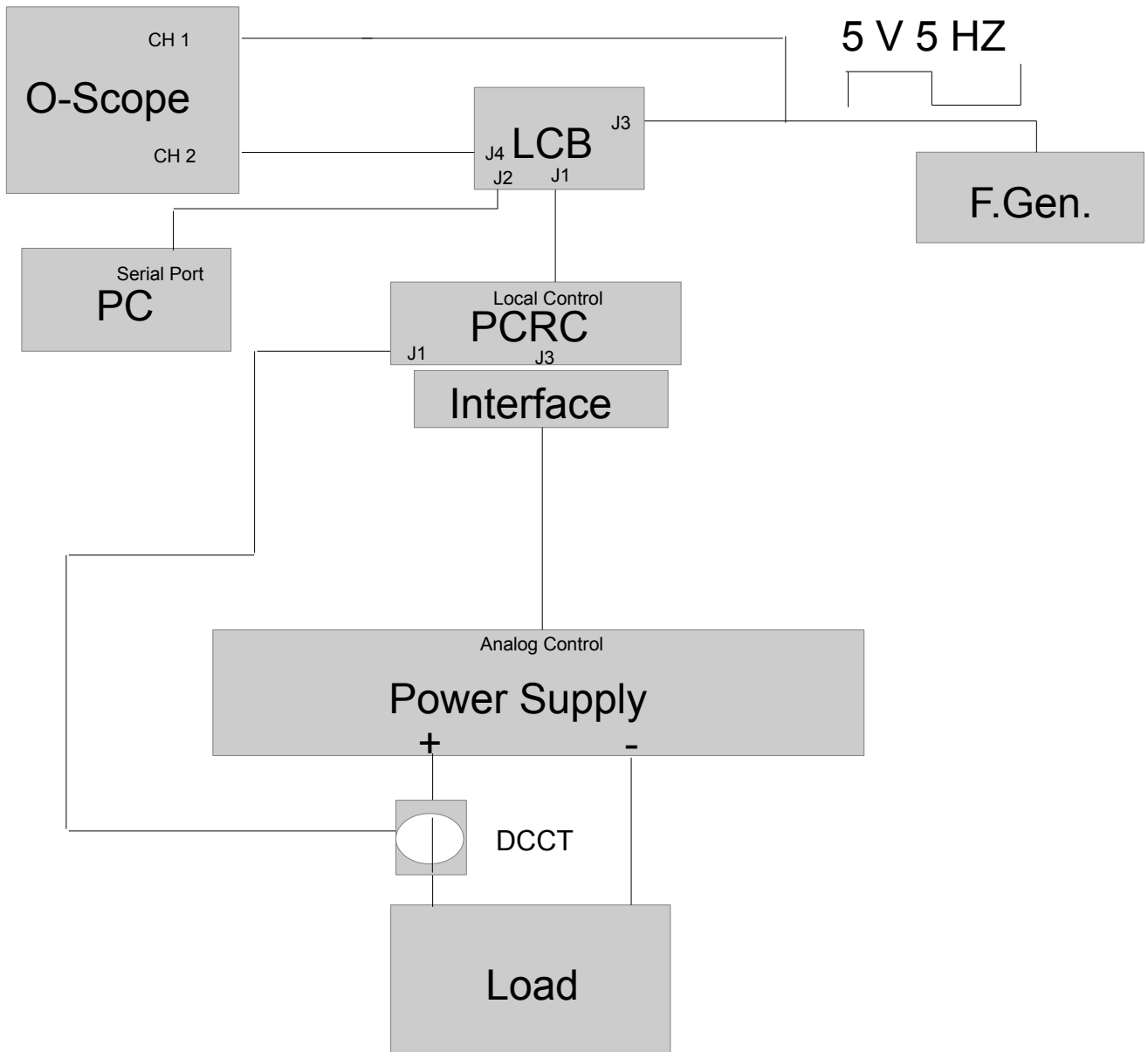


Figure 3



**System Setup Diagram**

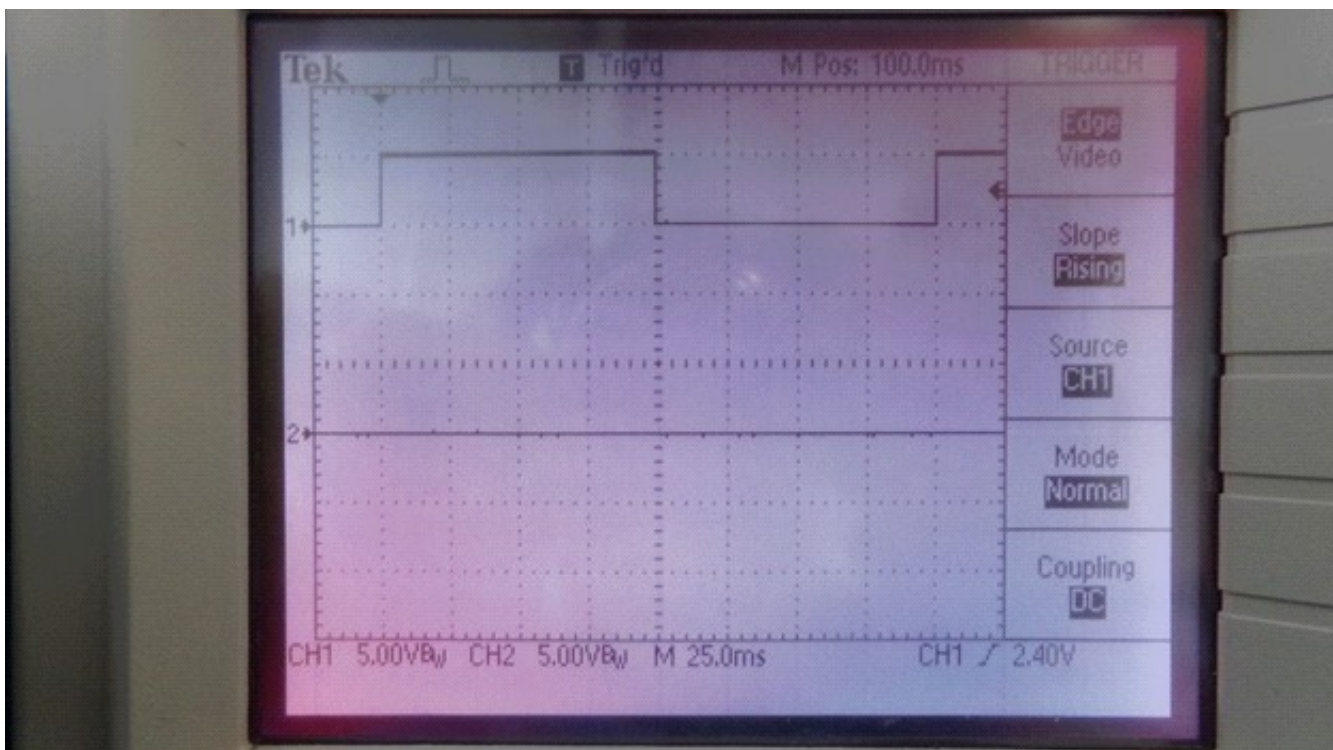


Use the instructions below to properly tune the Daughtercard to the User's power supply and load. **This Tuning Procedure may be done with the system powered up if ALL toggle switches (S1, S2, S3, S4) on the Local Control Board are in the DOWN position. The power supply output should be turned off (disabled).**

The power supply will be controlled with the Local Control Board only (see Local Control Board below in Figure 7), it will **NOT** be controlled by software!!

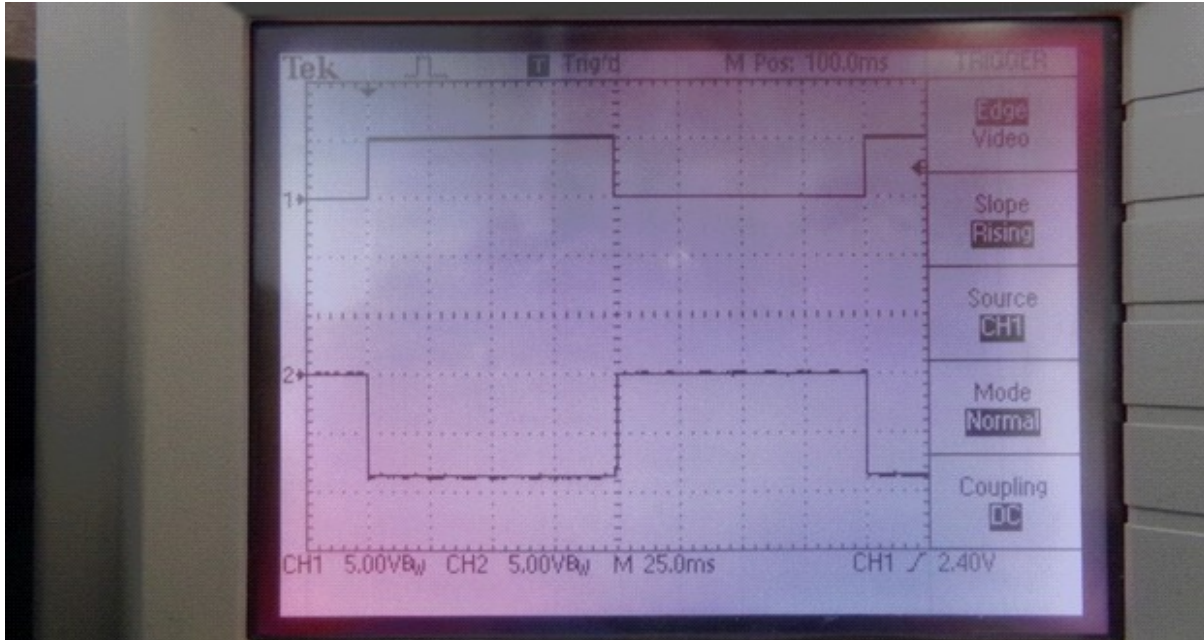
In all oscpe figures, channel 1 is AC REF IN and channel 2 is ERROR OUT.

- 1) Connect the Local Control Board (LCB) to the LOCAL CONTROL connector on the front of the EPSC using a DB37 M-M Cable. All of the LCB toggle switches must be in the down position.
- 2) Set a function generator to output a 5V, 5Hz square wave.
- 3) Connect the output of the function generator to the AC REF IN connector (J3) of the LCB, and to an oscilloscope. Verify with the oscilloscope that the signal is 5V, 5Hz as shown in Figure 4 Ch. 1.
- 4) Connect the ERROR OUT signal from J4 of the LCB to another channel of the oscilloscope.
- 5) At this time, all LEDs on the LCB will be OFF. The oscilloscope display should look like Figure 4.



**Figure 4**

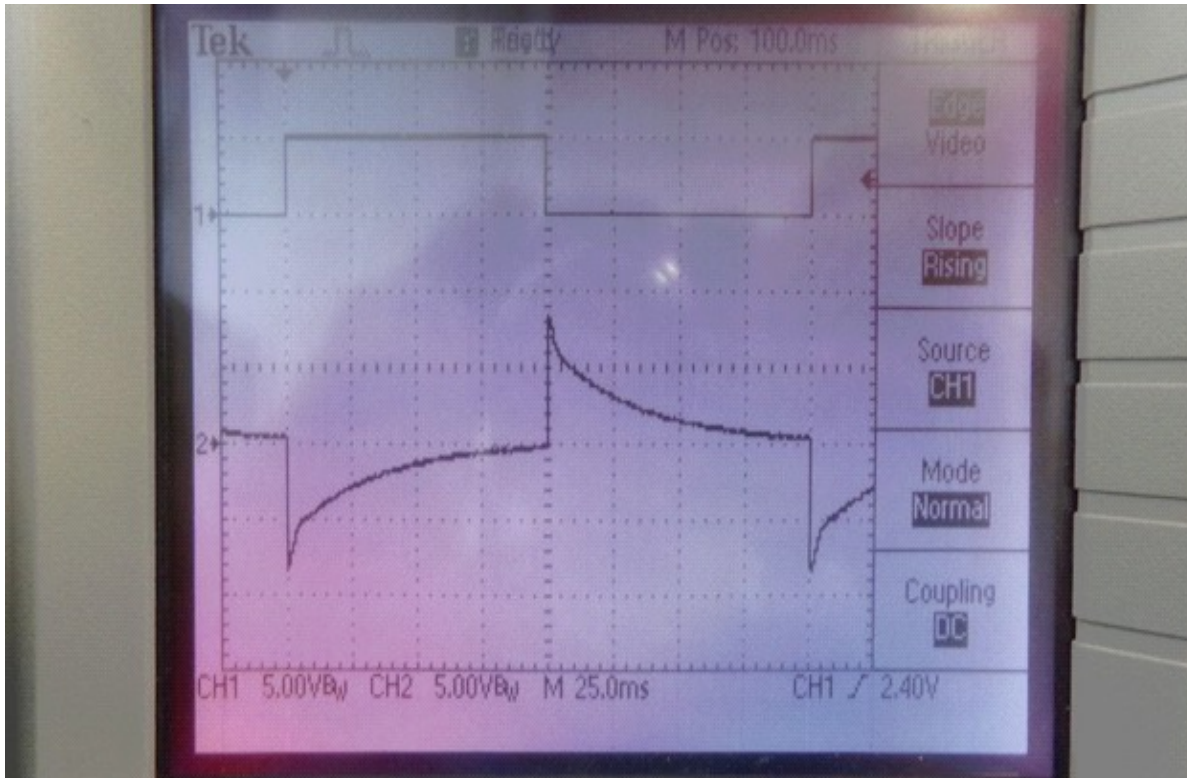
- 6) Make sure that that the variable resistor on the LCB (R47) is set to fully counter clockwise.
- 7) Set the LCB ON/OFF switch (S1) to the UP position. The SYSTEM READY (D1) and REF ZERO (D25) LEDs should be on. The oscilloscope display should look like Figure 5:



**Figure 5**

- 8) Set the LCB LOCAL MODE switch (S2) to the UP position. The SYSTEM READY (D1), REF ZERO (D25), and LOCAL MODE (D3) LEDs should be on. The oscilloscope display should still look like Figure 5.
- 9) Press the LCB push button PS ON (S6) switch. The SYSTEM READY (D1), REF ZERO (D25), LOCAL MODE (D3), POWER SUPPLY ON (D2), FAULT LATCH ON (D17) and PS ON STATUS (D22) LEDs should be on. The oscilloscope display should still look like Figure 5. The power supply output should now be ON.
- 10) Slowly rotate the variable resistor (R47) clockwise until the REF ZERO (D25) turns OFF. While adjusting R47, the ERROR OUT signal on the oscilloscope will shift up until the power supply starts to output current. When the power supply starts to output current, the ERROR OUT signal will be centered around ground and its shape will change.

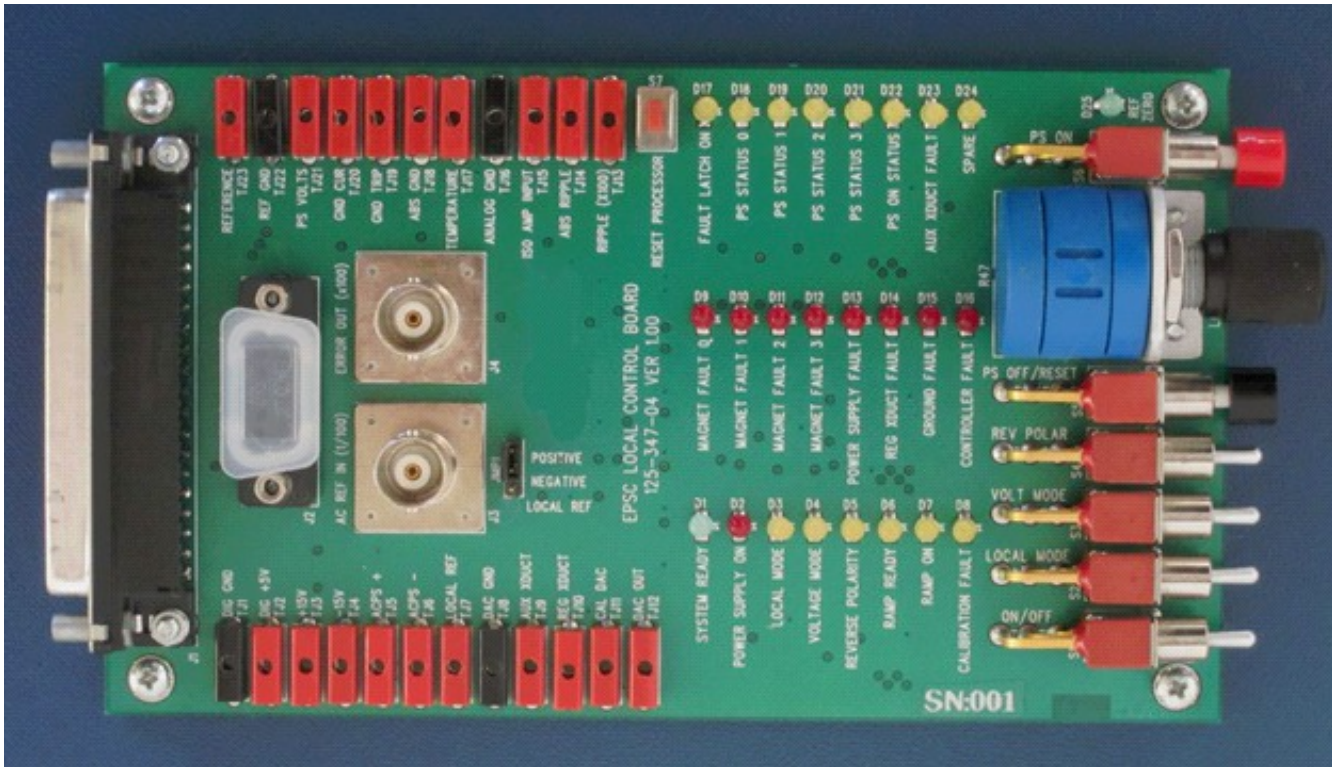
The oscilloscope display should look approximately like Figure 6:



**Figure 6**

- 11) The variable resistor may be rotated slowly clockwise to increase the current output further. As the current output is changed, the ERROR OUT signal will not change shape very much. The Ch. 2 waveform in Figure 6 is considered to be critically damped, which is the objective in the tuning process.
- 12) When the correct components for R2 and C2 have been established, it may be beneficial to repeat the process and confirm R2 and C2 are correct. Once the tuning process is complete, rotate R47 fully counter clockwise and turn the output of the supply off by pressing the S5 switch, PS Off/Reset. Power all of the equipment off and disconnect the RC decade box from the Daughtercard. Permanent components for R2 and C2 should now be installed based on the decade box values and commercially available values.





**Figure 7-** Local Control Board