

Equipment Needed:

- Potentiostat test kit consisting of (2) sets of “dummy” electrode resistors, 10 ohm and 1 ohm.
- 4 ½ digit DMM
- Stopwatch

Test Procedure:

1. Visually inspect the following:
 - ✓ Solder joints on front panel and power entry module.
 - ✓ Proper alignment of current converter knobs.
 - ✓ Toggle switches are correct type and are tight.
 - ✓ Power supply is wired properly. Resistance across power cord should be about 10 ohms when power entry module is set for 120 VAC, about 40 ohms when set for 240 VAC.
2. With ohmmeter, check the following resistances:
 - C8(+) to C8(-), approx. 2.5K – 5K ohms
 - C8(+) to C9(-), approx. 5K – 11K ohms
 - C9(+) to C9(-), approx. 2.5K – 5K ohms
3. Make sure power entry module is set for 120 VAC. Connect power cord to powerstat set for 0 VAC. With the power switch on, slowly increase AC voltage to 120V while monitoring +15 VDC at C8(+) and –15 VDC at C9(-), (+/- 5%).
4. Disconnect AC power and change power entry module to 240 VAC. Plug non-isolated 120 to 240 converter into the powerstat and into unit being tested. Slowly increase AC to 240V while monitoring +15 VDC and – 15 VDC. When done, set unit back to 120 VAC for the remainder of test.
5. Measure the DC voltage from earth ground to common (black jacks) on the front panel. If the reading is greater than 0.1 VDC, find cause. Generally the problem is a cut-through insulator on a power transistor.
6. Allow a 10 minute warm-up period. With meter at pin 3 of the UPPER limit pot, offset switch to (+), adjust TP1 for 10.000VDC. Move offset switch to (-) and adjust TP5 for –10.000VDC.
7. Check all digital panel pots for accuracy (gnd to wiper).
 - (2) limit pots and (2) offset pots, +/- 50mv max.
 - Sweep Rate pot +/- 5mv (adjust TP4 for 1.00VDC at pin 3, switch set to 999.9)
8. Set AUTO to ZERO, ELECTRODES to “dummy”, SWEEP RATE switch to 0-999.9mv/sec, and CURRENT CONVERTERS to 1ma/volt.

ISSUED BY: Jerry Smith	APPROVED BY: Bruce Denniston	
Page 1 of 4	DATE: 11/16/02	REV: 1

Sweep Generator

9. Connect meter to SWEEP jack. Adjust TP3 (zero) for 0.0000 +/- 0.1mv.
10. Set SWEEP RATE pot to 9999, UPPER pot to +0400, LOWER pot to -0400, STOP AT LIMIT switch to (UPPER), then switch AUTO to "on". Allow meter reading to settle and note this reading (if no voltage appears, toggle STOP AT LIMIT switch once). Move STOP AT LIMIT switch to (LOWER), allow meter to settle, and note this reading. The absolute value of both readings should be equal. If the positive value is lower than the negative, adjust TP6 CW. Repeat this until absolute values are equal (approx. 0.4000VDC)
11. Set SWEEP RATE switch to 0-99.99mv/sec. Set STOP AT LIMIT to the middle, LOWER pot to 0000, and UPPER pot to +0500. Set AUTO to "on". Observe LED4 and LED5 and adjust TP2 till they switch every 5 seconds (use stopwatch). TP2 CW will shorten time.
12. Set SWEEP RATE switch to 0-999.9mv/sec. Set LOWER pot to 0000 and UPPER pot to +1000. Observe LED4 and LED5 and adjust TP4 till they switch every 1 second. TP4 CW will shorten time.
13. Check the operation of the MANUAL switch. Set AUTO to "hold". The voltage at the SWEEP jack should remain constant. If the MANUAL switch is moved to "up", the SWEEP voltage should move in the positive direction. If the MANUAL switch is moved to "down" the SWEEP voltage should move in the negative direction.

Potentiostat

14. Set MODE to "pot" ("pot" LED should be on) and AUTO to "zero". Set K1 and K2 OFFSET VOLTAGE pots to 0000 and associated switches to "off", K1 and K2 SWEEP VOLTAGE to "off", and K1 and K2 CURRENT CONVERTERS to 1ma/V.
15. Check for 0.0000VDC +/- 0.5mv at IC1 pin 6.
16. Check for 0.0000VDC +/-0.5mv at IC6 pin 6.
17. Set ELECTRODES to "normal" (O.L. LED should come on). Connect a jumper from REF jack to circuit common.
 - Adjust (TP10) for 0.0000vdc +/-0.1mv at IC4 pin 6
 - Check for 0.0000VDC +/- 0.5mv at IC5 pin 6
 - Check for 0.0000VDC +/- 0.5mv at IC7 pin 6
18. Remove ground from REF jack. Connect REF jack to CE jack. OVERLOAD LED should go out (if not switch from "normal" to "dummy" then back).
 - Check for 0.0000V at E1 jack.
19. Remove REF to CE jumper. Connect 10 ohm to external test resistors to ELECTRODE jacks CE, K1 and REF (leave K2 open). Set K1 and K2 CURRENT CONVERTER switches to 10ma/V.
 - Check for 0.0000VDC +/-0.5mv at E1 jack.
 - Connect meter to right side of R108. Adjust TP18 for 0.0000V
 - Connect meter to I1 output jack and check for 0.0000V.

RDE5 Calibration Procedure		AFRDE5-T	
Page 2 of 4	DATE: 11/16/02	REV: 1	

20. Connect K2 jack to the circuit common.
 Adjust TP16 for 0.0000VDC +/- 0.1mv at IC9 pin 6.
 Adjust TP15 for 0.0000VDC +/- 0.1mv at IC4 pin 6.
 Repeat until both voltages measure zero.
 Check for 0.0000VDC +/- 0.5mv at E2.
21. Remove circuit common connection at K2. Connect external resistor (10 ohm) to K2 jack.
 Check for 0.0000VDC +/- 1.5mv at I2
 Check for 0.0000VDC +/- 1.5mv at I1-I2
 Check for 0.0000VDC +/- 2.5mv at IC3 pin 6.

Offsets, OL, and Sweep

22. Set ELECTRODES to “dummy”, K1 and K2 OFFSET VOLTAGE pots to 0100, and K1 and K2 SWEEP VOLTAGE switches to “off”. With meter at I1 and CURRENT CONVERTER at 20mv/V, a positive K1 offset should read +0.0050V +/- 0.5mv and a negative K1 offset should read -0.0050 +/- 0.5mv. TP18 may be adjusted slightly if needed.
23. Check all the K1 CURRENT CONVERTER settings for proper voltage and + to – balance. Voltages should change with each setting in a 1, 2, 5 sequence. At 5ua/V setting and lower, OFFSET VOLTAGE pot must be set at 0010. At 0.5ua/V and lower, OFFSET VOLTAGE pot must be set for 0001.
24. Check the O.L. LED operation. Set the OFFSET VOLTAGE pot to +0100 and the CURRENT CONVERTER to 10ua/V. I1 jack should be about 10VDC. Increase OFFSET VOLTAGE by 1mv increments until O.L. LED comes on. This should occur when I1 jack is between 10.2VDC and 11.2VDC. Repeat for negative offset voltage.
25. Set K1 CURRENT CONVERTER to 20ma/V and OFFSET VOLTAGE pot to 0100. Switch the K2 CURRENT CONVERTER through all the settings (+ and – offset) and toggle the K2 SWEEP VOLTAGE switch “on” and “off”. The output of I1 and E1 should not be affected.
26. Repeat steps 22 thru 25 for K2.
27. Connect 10 ohm external test resistors to CE, K1, K2 and REF jacks. Set CURRENT CONVERTERS to 20ma/V, K1 and K2 OFFSET VOLTAGE pots to 1000. Check voltages at E1, I1, E2, and I2. E1, E2 = 1VDC I1, I2 = 5VDC (SWEEP Voltages “off”). Check with offset switches in (+) and (-) positions.
28. Check for interaction with DMM at I2. Switch K1 OFFSET VOLTAGE from (+) and (-). Voltage at I2 should not change more than 10mv.
29. Calibrate panel meter to match DMM. Choose a medium voltage (4 or 5 V). Adjustment pot on the back of the panel meter.
30. Connect the 1 ohm external test resistors to the CE, K1, K2, and REF jacks. Set ELECTRODES to “normal”, MODE to “pot”, K1 and K2 CURRENT CONVERTER switches to 100ma/V, and K1 and K2 OFFSET VOLTAGE pots to 1000. Check voltages across the 1 ohm resistors at K1 and K2 (K1=K2= 1VDC). Check voltages at E1, I1, E2, and I2. (E1, E2 = 1VDC I1, I2 = 10VDC)

RDE5 Calibration Procedure		AFRDE5-T
Page 3 of 4	DATE: 11/16/02	REV: 1

31. Set ELECTRODES to “dummy”, UPPER LIMIT pot to 0500, STOP AT LIMIT to (UPPER), AUTO to “on”, K1 OFFSET VOLTAGE pot to 0000, and K1 CURRENT CONVERTER to 1ma/V (Voltage at SWEEP jack should be 0.5 VDC). Connect meter to E1. Turn on K1 SWEEP VOLTAGE switch. Meter should read 0.5VDC. Connect a jumper from the SWEEP jack to the K1 IN jack. Meter should read 1.0VDC. Turn off the K1 SWEEP VOLTAGE switch. Meter should read 0.5VDC.
32. Repeat step 31 for the K2 section.
33. Remove the sweep jumper. Set the MODE switch to GAL, K1 OFFSET VOLTAGE pot to 0100, SWEEP VOLTAGE switch to “off”. The GAL LED should come “on”. Connect meter to I1. Change the CURRENT CONVERTER switch between 0.5ma/V and 10ma/V. Meter should remain the same (about 0.100VDC). Connect meter to E1 and repeat the above switching. The meter should change from 0.05V to 1.0V in a 1, 2, 5 sequence.

I1 – I2

34. Set MODE to “pot”, K1 and K2 CURRENT CONVERTER switches to 1ma/V, and K1 and K2 OFFSET VOLTAGE pots to 0100. Connect meter to I1 – I2 jack. Voltage at I1 – I2 jack should be the algebraic difference between the voltages at the I1 and I2 jacks. Check for all combinations of the OFFSET VOLTAGE (+) and (-) switches.

Burn-in

Burn in unit over night at ambient temperature.

Set ELECTRODES to “dummy” STOP AT LIMIT at center MODE to “pot”
 UPPER pot to +3000 LOWER pot to –3000 AUTO switch “on”
 K1 and K2 SWEEP VOLTAGE switches “on” CURRENT CONVERTER switches to 1ma/V
 K1 OFFSET VOLTAGE pot to +0100 K2 OFFSET VOLTAGE pot to –0100

Post Burn-in

After Burn-in, the PCB should be conformal coated. Thermal compound should now be applied to the power transistor heat sink when installing PCB. Then repeat the above calibration procedure (steps 5-34).

Final Inspection

Prior to shipping perform the following tasks: Tighten the transistor heat sink screws. Measure the resistance from earth ground to common, on a 10M ohm scale. If the resistance is less than 10M, find the source of the problem (sil pads on power transistors most common). Tighten terminal block screws, screws on all hardware mounted on the enclosure, and all enclosure screws. Check for any solder splashes on the PCB and front panel. Make sure the rear compensation wires are going to the right pin header. Check for loose particles in the bottom of the enclosure. Serialize unit and record in log book. Fill out potentiostat checklist.

RDE5 Calibration Procedure		AFRDE5-T	
Page 4 of 4	DATE: 11/16/02	REV: 1	