Mini Potentiostat

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**Overview**

A picture containing electronics

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**Fig. 1 The minipotentiostat.** The yellow clip on lead is the reference, and the red is the counter. Bias is with respect to ground, so the current-to-voltage converter for the working electrode must share the same ground.

The mini potentiostat provides the counter electrode control from a reference electrode input. To complete the potentiostat, a current-to-voltage converter is needed for the working electrode. In the case of chip measurements, this will be provided by connecting the electrode under test to the virtual ground of the transconductance amplifiers. The amplifier power and reference bias come from a cable inside the 32 channel box that terminates in a mini-DIN connector (Fig. 2). A second DIN connector and cable is also provided for testing the potentiostat outside the 32 channel box. A lab dual power supply will be required in that case, set to + and – 2.5V. The rail voltages have been kept low using the LMP7221 op amps. This is done deliberately to limit the maximum counter electrode voltage. However, this means that potential control may noy be possible in high resistance solutions.

A close-up of a circuit board

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**Figure 2:** Din plug in 32 channel box, shown plugged into a DIN socket with the reference wire plugged in. Remove this socket and replace with the mini potentiostat for 3 electrode control

**The circuit**

The circuit consists of 2 ICs (Fig 2). IC1 is a unity-gain buffer to provide a high impedance input for the reference electrode. IC2 serves as a summing amplifier for the input bias and the reference electrode. *Note there is no feedback –* The 300pF capacitor is just for high frequency stability. *Feedback is provided via the electrochemical cell (response of the reference to the counter electrode potential) so the circuit will not function without the electrochemical cell connected.* This the electrochemical cell must be connected first **before the unit is switched on**. A low value resistor in the output line protects against shorts.

**Schematic**

Diagram, schematic

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