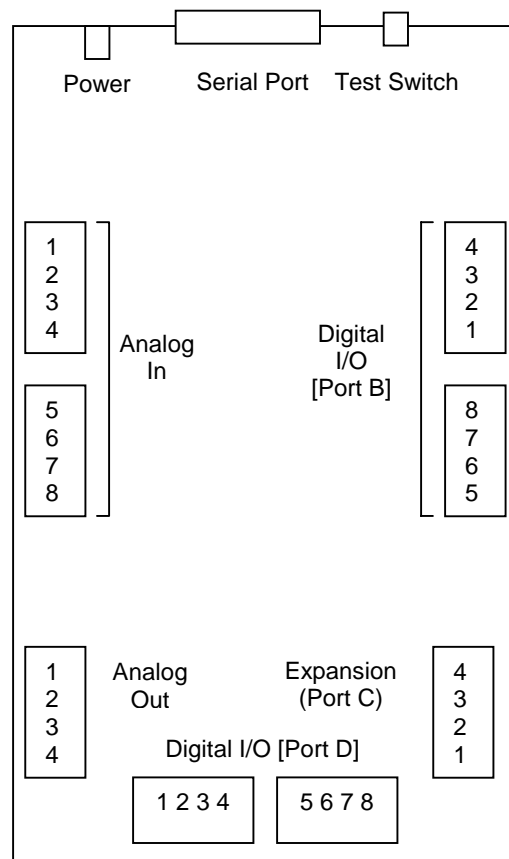# TNG-4 Connectivity

Notes:

1. The system may work under some circumstances with power drawn from the serial port; otherwise use the AC adapter.

2. Not shown are the power pin (5V) and ground pin on each 6-pin modular jack. In each case, the 5V line is at the left when facing the connector and ground is at the right. For example, on the analog out jack, the ground pin is below pin 4 and the power pin is above pin 1. This can be verified with a modular cable that has bare wires at one end and a digital multimeter. It is a good idea to verify this. In particular, if you are trying to get by without external power, check if the power is 5.0V, where it should be; otherwise the system is running below its specification (the microcontroller at the heart of TNG-4 can operate with power down to 4.5V but we don't recommend working below the approx. 5V value of the voltage regulator).

3. Port B lines, when used as inputs, have internal weak pull-ups that hold them at logical high (approx. 5V). Shorting a line to ground produces a logical low. One can also apply 0V or 5V to each input line.

4. Port D lines lack pull-ups and thus simple switch closures are not appropriate as they are for port B. One can accommodate switches provided that pull-ups are included in the external circuitry. Other, one should apply logical signals (0V or 5V) to each input line.