

CCL METER APPLICATION NOTE

Printed Circuit Board (PCB) CCL Meter (Revision A)

The CCL Meter (Revision A) printed circuit board (PCB) implements the *AnaLog Services, Inc.* version of the old REMCO / SIE shooting casing collar locator (CCL) surface amplifier. This versatile circuit can be used for new panels, or can replace inferior shooting CCL surface amplifier circuits such as the one found in the old GO / GOI / MLS CDM 401 Collar Depth Module. This application note should be used in conjunction with the “CCL Meter” schematic.

The CCL Meter (Revision A) PCB includes a number of useful features not ordinarily found in other manufacturer’s CCL meter circuits. There is a provision to drive an LED indicator lamp, turret terminal connection points for all external wiring and for all selectable value resistors, incorporation of Paul Knight’s meter protection scheme, easy selection for use with either 100-0-100 or 500-0-500 microampere indicating meters, and more.

Power and Pilot Light Connections

The CCL Meter (Revision A) PCB is designed to be powered by the vehicle 12 volt battery. It can also be powered by a DC power supply in a portable panel, and from other voltage levels so long as the proper current limiting resistor (R-1) is used. It is philosophically desirable to limit current in any circuit that may be connected to the logging line when explosives are involved, even though most CCL surface amplifier circuits have multiple layers of protection.

R1 is usually 470 ohms if no pilot LED is used when powered by a vehicle 12 volt battery. If it is desired to use an LED indicator pilot light, then R1 is usually 200 ohms, and the LED resistor (R6) is usually 220 ohms when powered by a vehicle 12 volt battery. The idea is to limit current to the rest of the CCL meter circuit to around 25 or 30 milliamps.

1. Select proper values for current limiting resistors R1 and R6 as discussed above.
2. Connect the positive power supply lead to the turret terminal marked “+12”.
3. Connect the negative power supply lead (usually vehicle chassis ground) to the turret terminal marked “GND”.
4. When using an LED power indicator pilot light, connect the LED positive lead to the turret terminal marked “LED” and the LED negative lead to the turret terminal marked “GND” (when not using an LED power indicator pilot light, remember to appropriately increase the value of R1).



5. Connect the power switch to the two turret terminals marked “SW”; this arrangement places current limited voltage on the power switch (of particular importance when using a multi-pole switch to control the amplifier power and the selection of amplified and non-amplified modes with the same switch).
6. If no power switch is used, or if the switching is done on non-current limited “raw” power, then install a jumper at the “JP4” position between the two large capacitors near the bottom of the PCB.

Non-Polar Capacitor and Selector Switch Connections

A pair of 1000 microfarad capacitors is configured on the CCL Meter (Revision A) PCB to form a 500 microfarad non-polar capacitor. The two turret terminals marked “NP CAP” connect to these capacitors.

1. One of the two turret terminals marked “NP CAP” connects to the wiper on the five (5) kilohm potentiometer, and the other connects to the center terminal of the amplified / non-amplified selector switch.
2. The turret terminal marked “AMP” connects to the selector switch terminal that is made when said switch is in the “Amplified” position (if the power is controlled with the selector switch, this would be the position corresponding with “Power On”).
3. The turret terminal marked “MTR” connects to the non-amplified selector switch terminal (if the power is controlled with the selector switch, this would be the position corresponding with “Power Off”).

Paul Knight Meter Protection Circuit

The Paul Knight meter protection circuit will prolong the life of the microamp meter. The meter protection circuit can be enabled full time with the jumper at “JP3”, or can be switched on by taking the terminal at “MP” to ground.

1. If full time meter protection is desired (recommended), then install a jumper at the “JP3” position between the meter attachment holes inside the meter guard ring.
2. If it is desired to install a switch to enable and disable meter protection, then omit the jumper at “JP3” and connect a switch to the turret terminal marked “MP” taking the other switch terminal to the turret terminal marked “GND” (or the circuit equivalent thereto).
3. The unit can be operated without the meter protection circuit by simply omitting the jumper at “JP3” and not connecting to the turret terminal marked “MP”, but this is not recommended.



Meter Options

1. When using a 100-0-100 microamp meter, install a one (1) kilohm resistor at R5.
2. When using a 500-0-500 microamp meter, install a jumper at the "JP1" position at the top center area of the PCB.
3. If the CCL Meter (Revision A) PCB will not be mounted on the back of the meter, then a lead from the positive terminal of the meter is connected to the turret terminal marked "MTR" and a lead from the negative terminal of the meter is connected to the turret terminal marked "GND".

Emitter Resistor Options

In most cases it is recommended to use at least a ten (10) ohm resistor for R4. If the absolute maximum gain is desired, said emitter resistor may be omitted and a jumper installed at the "JP2" position.