

### **Signal Conditioning Unit (SCU) Description:**

The SCU provides power to the LED and converts the raw signal from the LED to a programmable pulse output. The SCU has several external controls and indicators. A green POWER indicator is lit whenever power is available to the SCU. A red EVENT indicator lights whenever a trigger is received from the LED. A GAIN control is normally set to “HI” but allows the sensitivity to be reduced for increased noise immunity. A TEST/RESET switch is used to test the SCU in absence of a signal from the LED, and to reset the SCU when in the manual reset mode. Inside the SCU there are several jumpers which are accessed by removing the four screws from the connector panel and sliding the enclosure forward an inch or two. The AUTO/MAN jumper in the “AUTO” position allows the SCU to automatically reset after each event. In the “MAN” position the SCU is in the manual reset mode and must be reset after each event by pressing the TEST/RESET switch. In the manual reset mode the TEST/RESET switch will alternately set and reset the EVENT indicator. In the auto mode the TEST/RESET switch will generate a self-resetting EVENT. The POS/NEG jumper allows selection of either a positive pulse or a negative closure for the SCU output. A four-position jumper selects the amplitude of the positive output pulse for 1, 5, 12, or 15 volts into a 50 ohm load. Unloaded outputs will be about 10% higher. The duration of the output pulse is 5 milliseconds. The SCU has a captive ¼-20 nut for tripod mounting. The SCU will not be harmed by a continuous short circuit on the output.

**Signal Conditioning Unit (SCU) Operation: Refer** to the SCU Component Location and Schematic on Page 6)

The power input is reverse polarity protected by Diodes D1 and D2. D1 supplies power to regulator U1 which provides 5VDC power to the logic circuitry. D2 supplies power through current limiting resistor R6 to capacitor C2 which provides power to the output pulse driver transistor Q3. A fixed resistor R20 and a potentiometer P1 provide a variable resistance of 1K to 11K ohms from the 5VDC supply to BNC connector CON1. The voltage at CON1 is normally near 5VDC even when supplying a small amount of power to a connected device such as the LED. When the voltage at CON1 is pulled low by an input, the Schmidt trigger U2 detects the input and sets flip-flops U3. The first flip-flop lights the red Event indicator LED2. The Event indicator lights until reset by the Test/Reset switch SW1 in Manual Mode, or for about 0.5 second in the Automatic Mode. Mode Selection is made by jumper J1. The Test/Reset switch also simulates an input. The second flip-flop resets after 5 milliseconds to provide a pulse to the output driver. Positive or negative outputs are selected by jumper J3. If a negative (closure) output is selected the output connector CON2 is pulled low by an open collector transistor Q1. If a positive output is selected, the level of the output pulse on CON2 is controlled by a voltage divider comprised of R12 and R1, R2, R3, or R4 as selected by a four position jumper J2. The pulse from the voltage divider is amplified about 4X by transistors Q1 and Q3 with feedback through resistors R8 and R9 to provide regulated output pulses of 1, 5, 12, or 15 volts of 5 milliseconds duration. The capacitive discharge design of the output driver allows a low impedance output capable of driving 50 ohm loads but limits current during protracted short circuit conditions.

**SCU Component Location and Schematic:**

