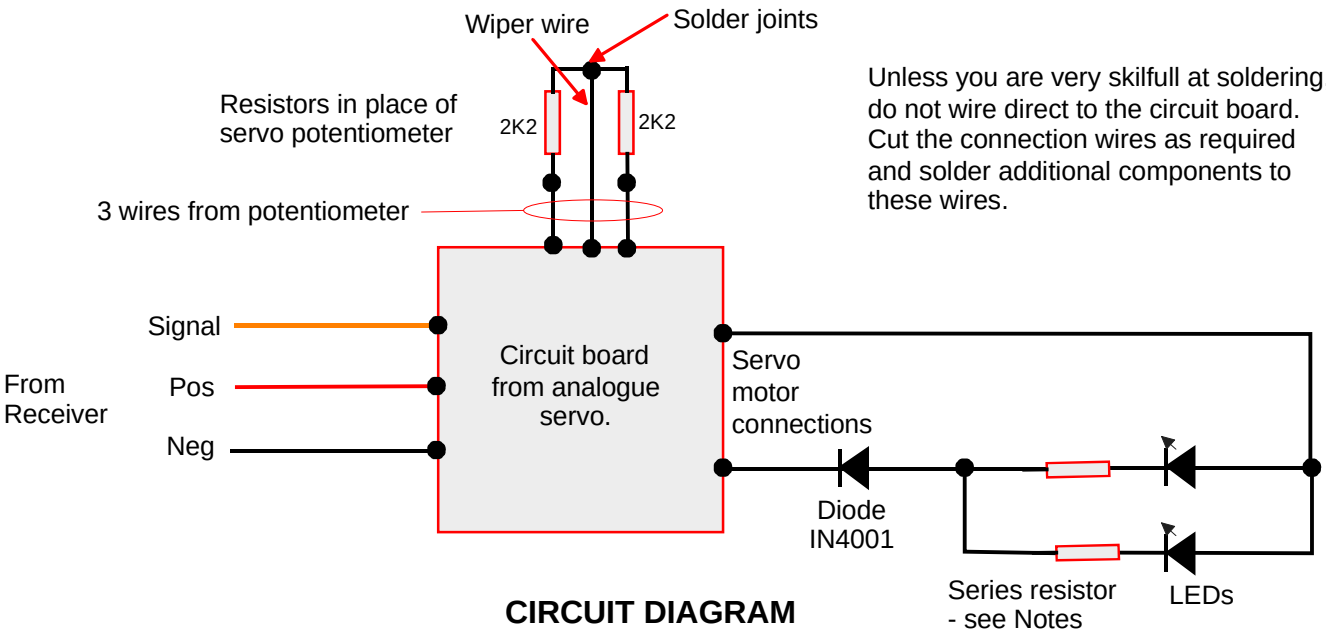
USING ANALOGUE SERVO CIRCUIT BOARDS TO SWITCH LEDs

This conversion will enable a circuit board removed from an analogue servo to switch LEDs etc under the control of a transmitter channel. Multiple LEDs can be switched, depending upon the power of the donor servo used.

There are commercial devices out there, but this recycles old servos with stripped gears that would otherwise end up in the bin. Additional components are easy to obtain from www.maplin.co.uk.



CIRCUIT DIAGRAM

Removing the circuit board

Undo and remove the four screws on the underside of the servo case, then pull the servo case apart. The circuit board is located in the lower section. Do not disconnect the three wires that plug into the receiver. Ease the circuit board out of the servo case and at the motor end, cut the two wires connecting the board to the motor. That leaves three wires to the potentiometer. Note which wire goes to the wiper arm, as this must connect between the two 2K2 resistors as shown in the circuit diagram. Cut the three wires off as close to the potentiometer as possible.

Calculating the LED series resistor:

To operate an LED from a given voltage, a resistor needs to be connected in series with it. The voltage in this case is the Receiver voltage driving the servos - normally 4.8 V (4 NiMh cell pack) or 6 V (5 NiMh cell pack).
To calculate the correct value of resistor use the formula:

$$R = (Vs - Vf) / If$$

Where Vs is the supply voltage (typically 4.8 or 6)
Vf is the forward voltage drop across the LED (specified by the manufacturer)
If is the maximum forward current through the LED, in Amps (again specified by the manufacturer).

Resistors are available in 'preferred values'. Choose the nearest available value resistor to the figure you get from the formula above.

Example:

For a typical LED (If = 20 mA and Vf = 2.5 V)
To operate from 4.8 V d.c. supply

$$R = (4.8 - 2.5) / 0.02 = 115 \text{ ohms.}$$

The nearest preferred value is 120 ohms, and in practice would be fine. Higher value resistors result in less (or no) light output. Lower values result in more light output but usuallly only for a short time!

Resistors rated at 0.6 W are generally suitable and available. To check, use the formula

$$P = I \times I \times R, \text{ where I is the current in Amps, and R the resistance in ohms.}$$

So for the above example, the resistor power rating must be greater than :

$$P = 0.02 \times 0.02 \times 120 = 0.0000192 \text{ W so a 0.6 W resistor will easily cope.}$$