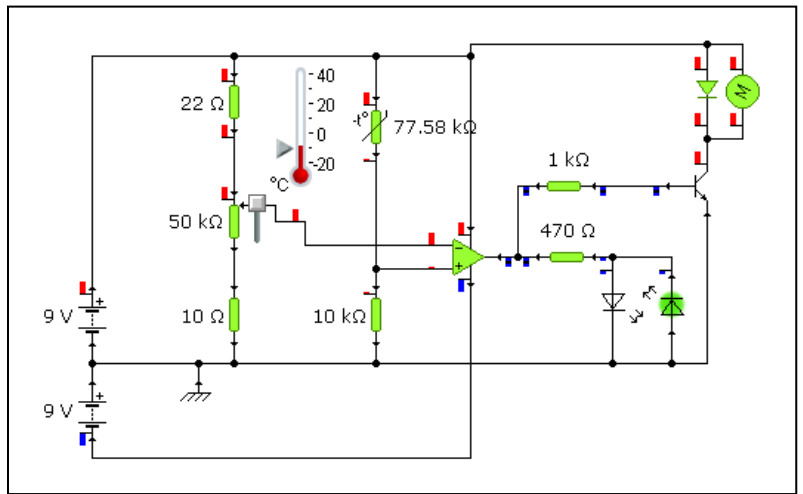


Circuit Construction – Op-Amp Comparator Project

The circuit diagram on the right is the circuit for your project, it is called an op-amp comparator circuit, it is called a comparator circuit as it compares its 2 inputs, inverting and non-inverting, if the voltage at the non-inverting input is bigger the output goes to +9V and if the inverting input voltage is bigger the output goes to -9V, this has the effect of changing the LED that is lit, it also turns the motor on and off.

The example shown uses a thermistor but the circuit can also use an LDR for light level sensing or a moisture sensor. The thermistor could also be swapped with the 10k resistor in the potential divider.



Circuit example, see below for a schematic

Construction of circuit

You will need to collect the following equipment before you start soldering your circuit:

- Soldering iron and stand
- Damp sponge
- Solder wire
- Side cutters
- Pliers
- Components:
 - Q1 – BFY51 transistor
 - C1, C2 – 10uF capacitor*
 - D1 – 1N4007 diode**
 - IC1 – IC holder and 741, CA3140 op-amp IC
 - R1, R2 – 0R*
 - R3, R4 – This is the potential divider and what is used will depend on what the circuit is being used for, e.g. light/dark sensing, hot/cold sensing
 - R5 – 1k resistor (brown, black, red)**
 - R6 – 470R resistor (yellow, violet, brown)
 - Ref – 1k preset resistor*
 - Power switch
 - Bat – Battery clips, a 3 way terminal block may be used, this circuit uses a dual supply so 2 battery clips are needed
 - CT2 – Output, a terminal block should be used here, your output can be inserted into the terminal block
 - LEDs – The LEDs used will depend on your project outcome

If a higher quality finish is required then use 5mm 2 way terminal blocks, these will add extra cost

* These components can be varied

** These components can be left out

This project PCB has been designed with maximum flexibility in mind and how it is constructed will depend on what it is you are aiming to achieve with it, for example a teacher or lecturer completing a project with a number of students will probably use it in a different way to a hobbyist with a specific task in mind. The circuit has a drive circuit that utilises a BFY51 transistor but if it is not required it is quite acceptable to leave this section out. If a buzzer is required a PCB mount buzzer can be inserted into the component marked CT2, a shorting link or 0R resistor will need to be used to connect pin 6 of the op-amp timer to the buzzer. This should be soldered between the lower part of R5 and the lower part of D1. The circuit has space for 2 LEDs but 1 can be left out as required and if an output is being used then they both may be left out. If an output is being used, for example a DC motor then this should be inserted into the terminal block marked **CT2**, a back EMF diode has been included. To allow the level at which the comparator changes state to be varied the circuit uses a variable resistor – Ref, this can either be PCB mount or an external panel mount type. There are 2 fixed resistors – R1, R2 – that placed with the Ref resistor, if they are not required use 0R. How the circuit is constructed is very much dependent on what it is being used for.

Procedure for construction

1. Solder the resistors into your PCB, take care to insert the correct resistor into the correct place, if in doubt ask your teacher. When soldering be sure to heat the area sufficiently but not too much as it will damage the PCB.
2. Solder the remainder of the PCB mounting components in place.
3. Solder your power switch in place
4. Solder your battery clips in place
5. Solder your LEDs into the PCB, if you have attached flying leads insert these, be sure to get the LED the correct way around, remember the long and short legs...

The order in which you solder and what you solder is dependent on your final outcome, always start with the lowest profile components, for example the resistors.

Please visit our website

www.rkeducation.co.uk

If you have any comments or queries please email us at

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Op-Amp Comparator Project Schematic - www.rkeducation.co.uk

