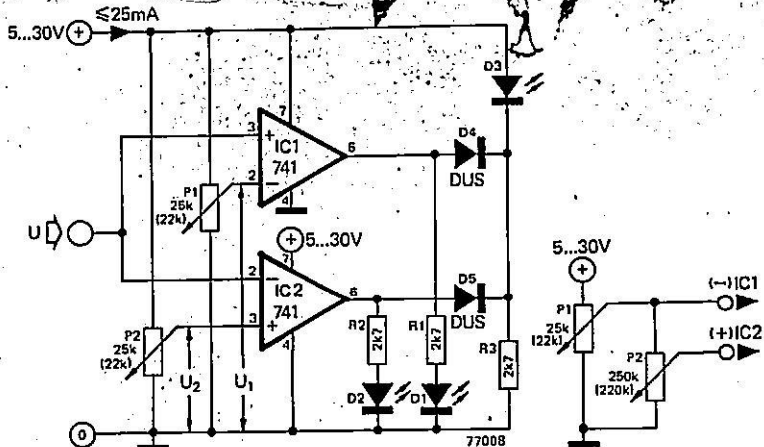


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tri-state voltage comparator

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This circuit will compare an unknown input voltage with two preset reference voltages and display the result on one of three LEDs. IC1 and IC2 function as comparators. If U is less than U_2 then the output of IC2 will be high and D2 will be lit. If U is greater than U_2 but less than U_1 then the outputs of IC1 and IC2 will both be low and D3 will be lit. If U is greater than U_1 then the output of IC1 will be high, IC2 will be low and D1 will be lit.

Of course, the foregoing assumes that U_1 is greater than U_2 . This can be achieved by correct adjustment of P1 and P2. Alternatively, to ensure that U_1 is always greater than U_2 P1 and P2 can be arranged as shown

with P2 deriving its supply from the slider of P1. Note that P2 is now 250 k. With this arrangement there will be some interaction between the two potentiometers.

The circuit makes an ideal battery state indicator for a car. P1 and P2 can be adjusted so that D2 lights if the battery voltage falls below say 11 V, D3 lights between 11 and 13 V and D1 lights above this.

Many types of op-amp IC will work in this circuit, but if a quad Norton op-amp such as LM3900 is used then a 100 k resistor should be placed in series with the + and - inputs of each op-amp.