

Water Level Controller cum Motor Protector

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Nowadays, usage of overhead tank (OHT) with an electrically operated water pump is a common sight. The pump, being a costly item, should be protected against damage due to high and low voltages. People find it very inconvenient to switch off the pump even when their OHT starts overflowing, specially when they are busy or it is raining. This circuit provides a solution for all such problems. The main features of this circuit are:

1. Low and high voltage cut-off
2. Automatic switching off of motor when overhead tank is full
3. Use of convenient push-to-on buttons for switching on and switching off of motor.

The heart of the circuit is IC CD4011, which has four inverter gates. When the circuit gets 12V power supply,

capacitor C1 pulls input of N1 low, and this causes the output of N2 to go low. This state is latched by resistor R1 and transistor T1 is biased to cut-off state, and hence both relay RL1 and motor M are in off state.

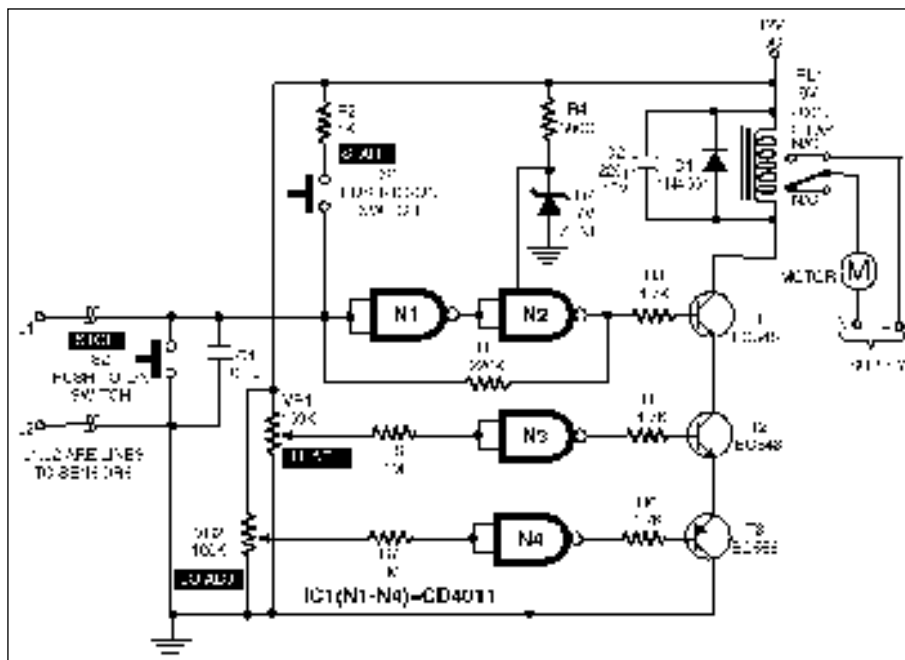
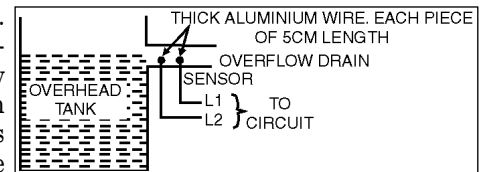
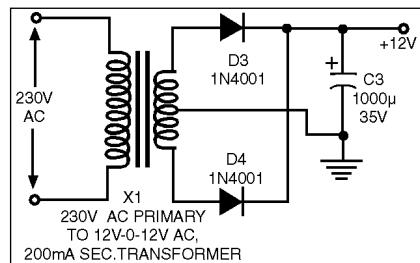
When we push switch S1 momentarily, the input of inverter gate N1 becomes high and output of gate N2 also becomes high. As a result, transistor T1 turns on and both relay RL1 and motor are activated (provided transistors T2 and T3 are forward biased). When water level in OHT touches the sensors, input of N1 become low, which turns relay RL1 off and the motor stops. The motor can be turned off manually also by pushing switch S2 at any time. Transistors T2 and T3 are both forward biased if the line voltage is within certain low and high voltage

limits, as explained below.

When the voltage level rises above a pre-determined value, input to gate N3 becomes high and its output become low, which turns off transistor T2 and also the relay. When the voltage level drops below a pre-determined value, output of gate N4 becomes high, which turns off transistor T3 and relay RL1. Thus when the mains AC voltage (or the DC voltage sample derived from mains) is above or below certain limits, which could damage the pump motor, the supply to the motor is cut-off.

D2 provides a constant DC voltage to IC1.

For setting the low voltage cut-off,



adjust potmeter VR2 in such a way that when supply voltage goes below 190V, output of N4 goes high. Similarly, for setting the high voltage cut-off, adjust potmeter VR1 in such a way that when supply voltage goes above 250V, output of N3 goes low. The high and low cut-off voltages can be changed according to the requirement for a given motor.

Two wires are needed to connect the circuit to the sensors which are fitted in the OHT. Sensors must be fitted as shown in figure. A simple power supply circuit is also shown here. The circuit can be assembled on a general-purpose PCB and housed in an eliminator case which is easily available in the market. Use good-quality insulated wire to connect sensor to the circuit.