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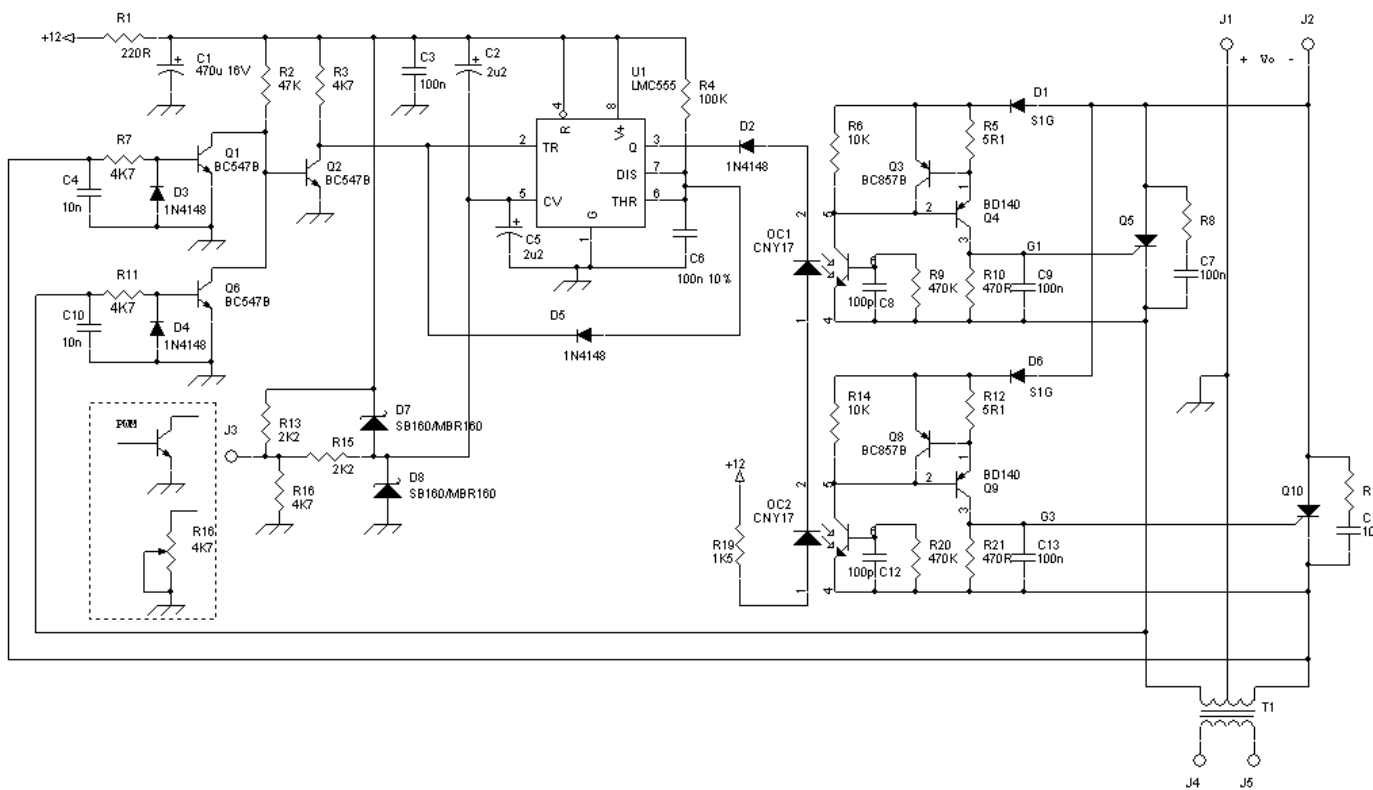
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THYRISTOR PHASE CONTROLLER USING A 555

The enclosed schematic shows how a 555 i.c. can be used as a very effective thyristor phase controller.

The example shown was designed to control the current in a galvanic bath from 0 to 50A, at low voltage (7 to 24 V input a.c., depending on the application).



Q1, Q6 and Q2 deliver a negative synchronising pulse to the 555 when the voltage passes through 0. Then the output of the 555 goes high, turning on the thyristors. If the control voltage is high enough (8 V in this design), the threshold pin never reaches the level of the control voltage during the cycle and the thyristors remain off. If the control voltage is 0, the 555 comparator connected to the threshold pin resets the 555 flip-flop immediately and the thyristor which has the adequate voltage polarity is fired during all the supply cycle. Control voltages between 8 and 0 V control the firing of the thyristors between 0 and 180° of the half cycle.

The circuit was designed to be operated from a microprocessor controller, using PWM with an open collector transistor as shown to the left of J3. But it can also be controlled manually by using a potentiometer in the place of R16, as shown also to the left of J3.

The use of two capacitors C2, C5 to filter the PWM control voltage allows to pull this high at startup, avoiding a spurious turn on of the thyristors.

Q2 discharges C6 through D5 when the control voltage is high and no pulse is available to recharge it through the 555.

R4 and C6 are calculated for 50Hz. For 60Hz operation, reduce R4 to 62K.

The gate circuits use current sources to be able to supply a constant current over all the cycle. The main core of the phase controller can be easily adapted to other kind of gate circuits.

Many units using this circuits are already in operation with excellent results.