

Chapter IV

CONTROLLER CONSTRUCTION

4.1 Controller Parts

The controller is divided into two parts as follows :

- (1) Power supply unit
- (2) Control unit

4.2 Power Supply Unit

The power supply unit of the controller can be divided into two parts :

4.2.1 Rectifier with filter

The circuit of the rectifier and filter is shown in Figure 4.1 . The 220 VAC voltage is stepped down to 10.5 - 0 - 10.5 VAC by a step-down transformer. The step-down voltage is full wave rectified by two diodes and filtered by low-pass RC pi-filter. The output voltage at point A is 13.0 VDC .

4.2.2 Voltage regulator

The adjustable output-voltage regulator is shown in Figure 4.2 . Because of the very small voltage in the control unit and the accuracy of the controller, it needs a good voltage regulator. With the input voltage of 13.0 VDC

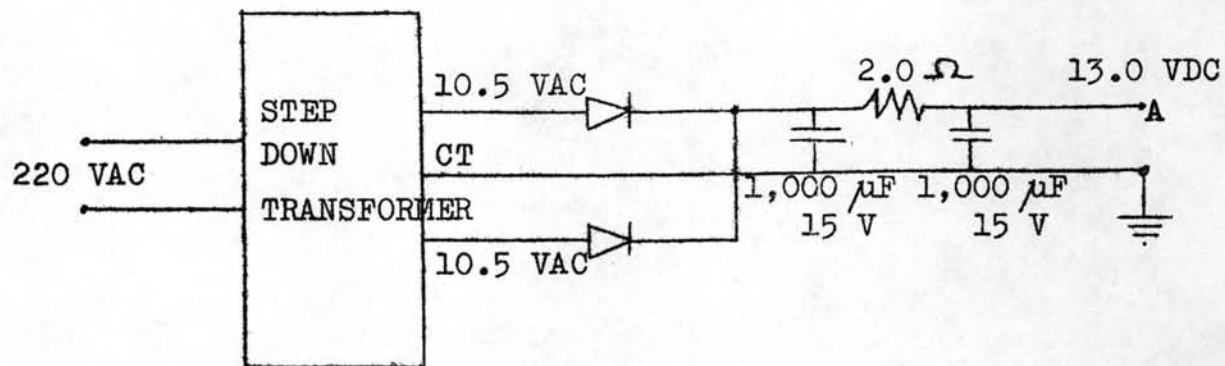


FIGURE 4.1

RECTIFIER WITH FILTER CIRCUIT.

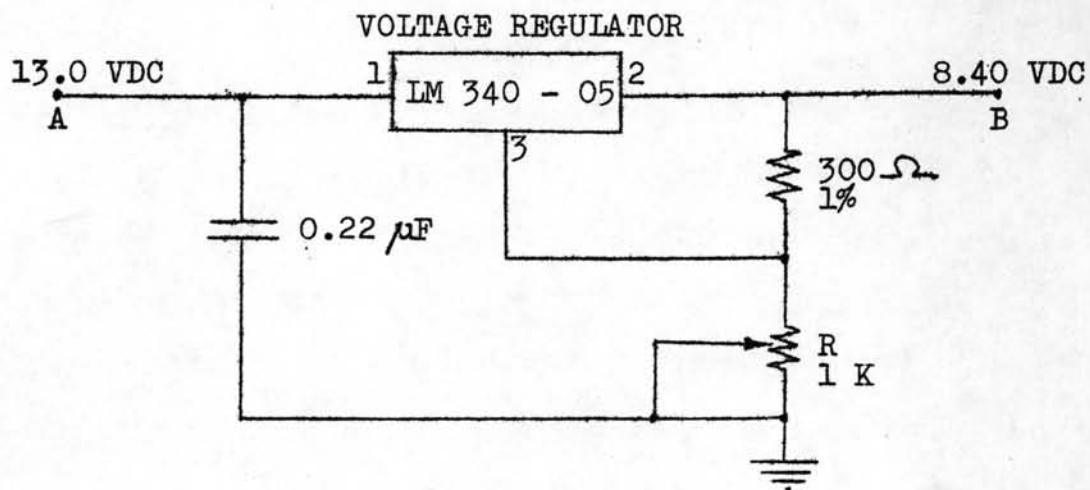


FIGURE 4.2

ADJUSTABLE OUTPUT-VOLTAGE REGULATOR.

at point A, the output voltage at point B is adjusted to a value of 8.40 VDC by means of the resistance R .

4.3 Control Unit

The control unit of the controller can be divided into three parts :

4.3.1 Bridge

The designed thermistor bridge circuit is shown in Figure 4.3 . The capacitor C of 0.22 μ F is connected to filter out the noise. Without this capacitor, some noise will appear at the output of the voltage comparator. The selector switch is provided to extend the range of reference resistance of the bridge from 1 to 2.5 kilohms .

4.3.2 Relay driver

The designed relay driver is shown in Figure 4.4 . The load resistance R_L is adjusted so that the relay trips when the resistance of the thermistor being 600 ohms and the resistance of the reference leg of the bridge being 1 kilohm .

4.3.3 Relay

The designed relay is shown in Figure 4.5 . The resistor R_x is adjusted to limit the current passing through the relay coil and NPN transistor.

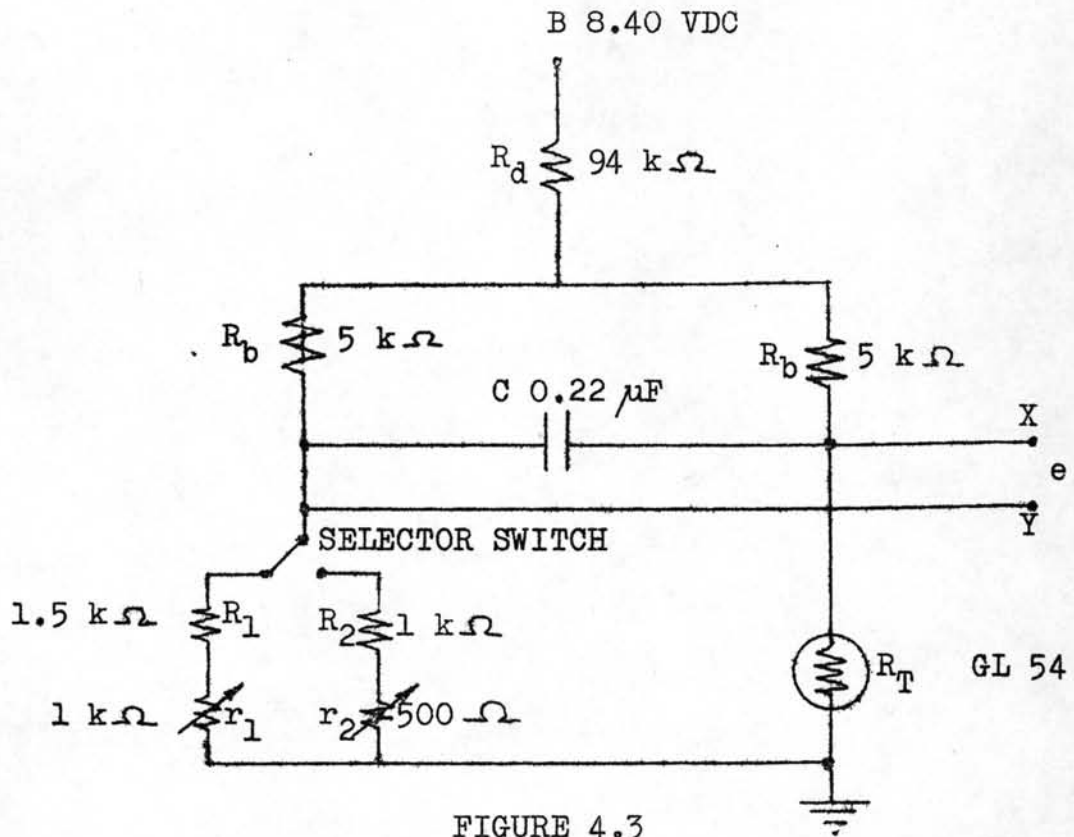


FIGURE 4.3

DESIGNED THERMISTOR BRIDGE CIRCUIT.

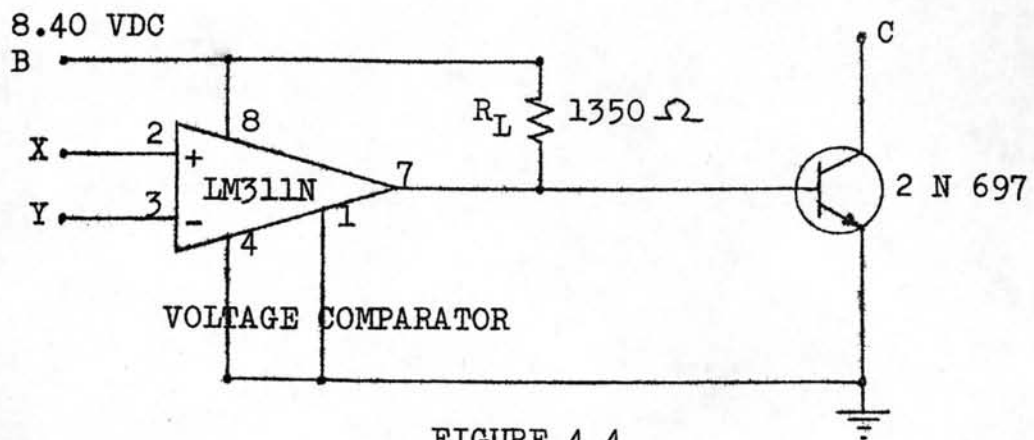


FIGURE 4.4

DESIGNED RELAY DRIVER.

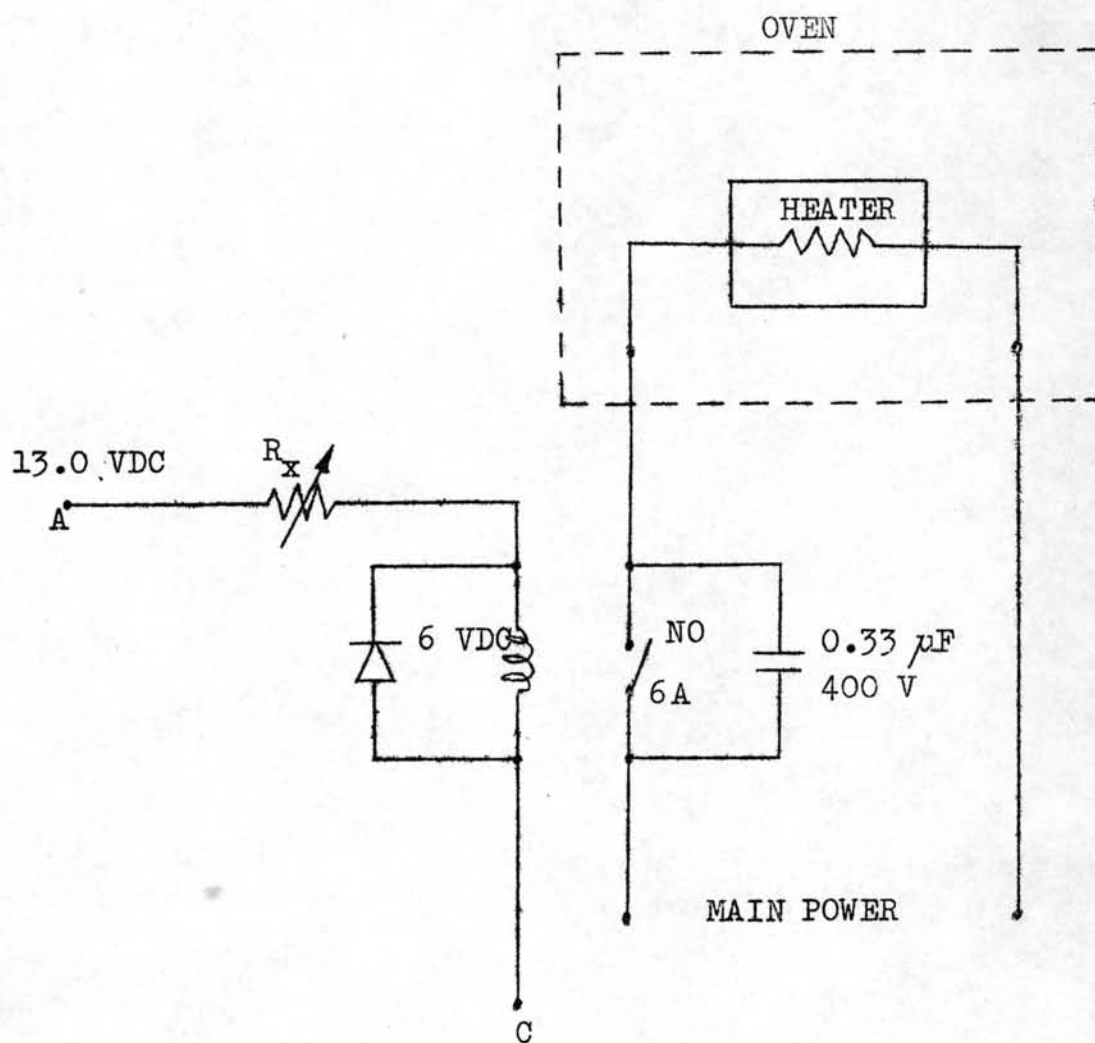


FIGURE 4.5
DESIGNED RELAY.