

Chapter Four

Hardware Design

4.1. Overview:

The System uses DTMF technology of the mobile phone ste. It is dividing into two sections : (i) remote section (ii) local control section.

4.2. Hardware description

The hardware components for design are:

- A. One IC MT 8870
- B. 4 relays
- C. 4 diodes,7 resistances
- D. 4 controlled device
- E. Tow mobile phones
- F. Crystal oscillator
- G. Tow Capacitors 1 μ f
- H. 220V. AC source

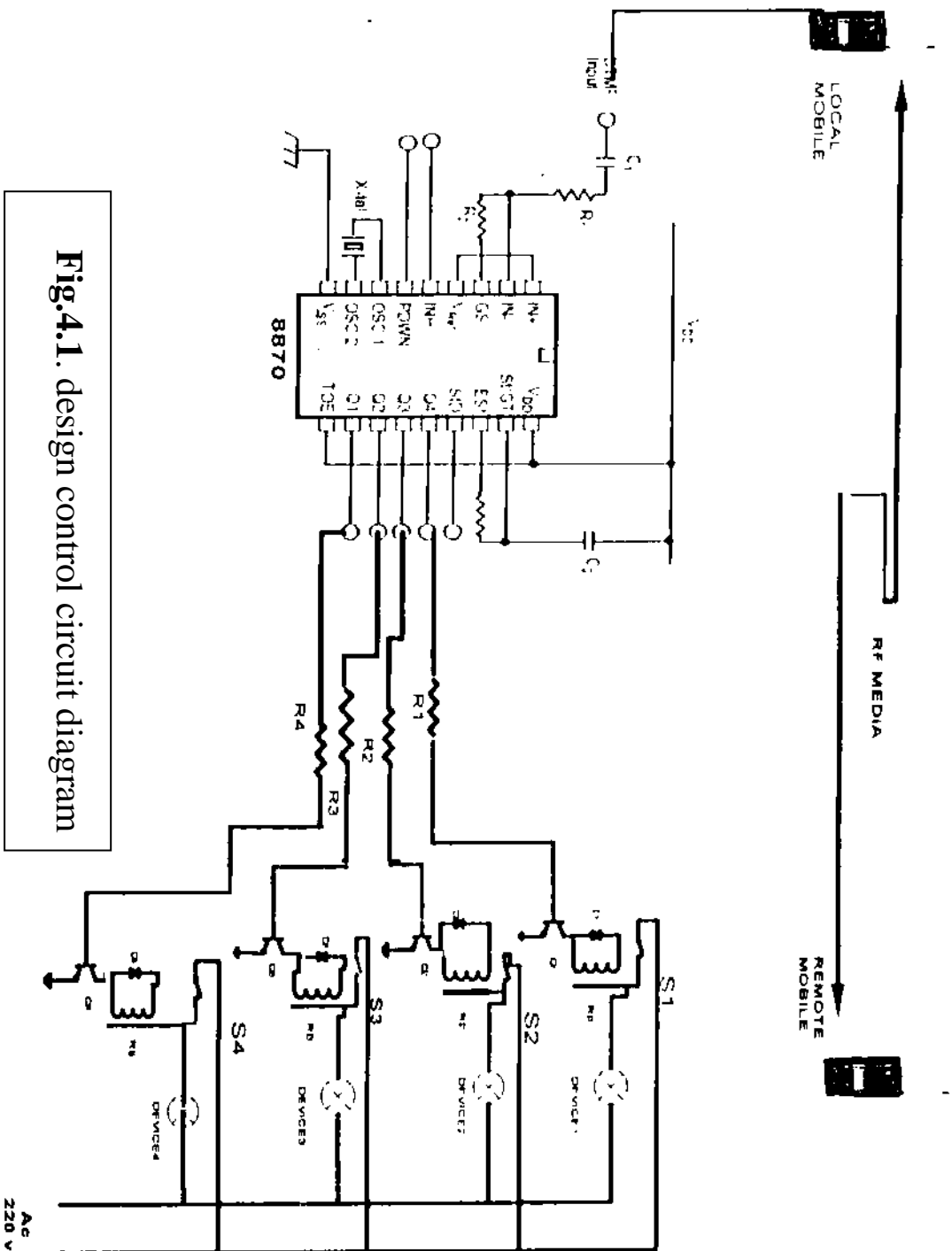


Fig.4.1. design control circuit diagram

4.3. The hardware circuit Diagram Connections

The circuit diagram in the figure 4.1 is explained the connection of the components with each other such as:

4.3.1. The IC MT 887 connections

Pins 2,3 to incoming tone from mobile

Pins Q1-Q4 to relay driver circuit

Pins 7-8 to crystal oscillator

Pins 5-6, 9 to ground

4.3.2. Relay driver circuit connections

Consist of following:

- A. 4 resistor RI -R4 connected to transistor T1 -T4
- B. 4 transistors TI -T4 connected to RLY I -RLY4
- C. 4 relay RLY 1 -RLY4 connected to S1-S4
- D. 4 switches S1-S4 connected to controlled device1- controlled device 4.
- E. 4 diodes D1-D4 connected to transistors collector T1 - T4

4.4 General circuit construction:

To fire the connection between mobile and controlled devices we are selected the circuit diagram in figure 4.1 which is consisted of the components described above; this system is divided into two sections Remote Section and Local Control Section.

4.4.1. Remote Section

It is nothing than remote mobile telephone set which is present with the user in remote place. This may be your workspace (office/ school). Signals are sent through this mobile phone using the mobile network in order to do remote control action.

4.4.2. Local Control Section

This is another part of a control system through which you can control the appliances. This contains one mobile telephone set and the designed control Circuit Unit. The appliances to be controlled must be connected to mobile telephone through designed control circuit unit. Control unit is kept with a sufficient backup of power Source.

Local Control Section consists of 8870 IC to convert DTMF to BCD (binary coded decimal) out put, and relay driver circuits which take the BCD output as in put to drive the relays for controlling specific connected devices for remote control.

4.5. Working of designed control circuit:

Here is a circuit of a remote control unit which makes use of the radio frequency signals to control various electrical appliances. This remote control unit has 4 channels which can be easily extended to 12. This circuit differs from similar circuits in view of its simplicity and a totally different concept of generating the control signals. Usually remote control circuits

make use of infrared light to transmit control signals. Their use is thus limited to a very confined area and line-of-sight. However, this circuit makes use of radio frequency to transmit the control signals and hence it can be used for control from almost anywhere in the house. Here DTMF (dual-tone multi frequency) signals (used in telephones to dial the digits) is used as the control codes. This DTMF signal is connected to a DTMF-to-BCD converter whose BCD Output is used to switch-on and switch-off various electrical appliances (4 in this case). A DTMF-to-BCD converter and circuit relay switch. The received DTMF tones are fed to the dedicated MT8870 IC which is a DTMF-to-BCD converter. This IC when fed with the DFMF tones gives corresponding BCD output, for example: when digit 1 is pressed, the output is 0001 and when digit 2 is pressed the output is 0010. when digit 3 is pressed the output is 0011 and when digit 4 is pressed the output is 0100. This IC also requires a 3.58MHz crystal for its operation. The tone input is connected to its pin 2 and the BCD outputs are taken from pins 11 to 14 respectively. These outputs are fed to 4 individual. Relay circuit driver which have been converted into switches to toggle electrical devices on\off. Whenever a digit is pressed, the IC MT8870 decodes it and gives a clock pulse which is used to feed the corresponding relay circuit driver to the alternate state. [lie relay circuit driver output is used to drive a relay which in turn can latch or unlatch any electrical appliance.

4.5.1. Working of IC MT8870:

IC MT8870 serves as DTMF decoder. This IC takes DTMF signal coming via mobile telephone and converts that signal into respective BCD number. The MT8870 is a full DTMF Receiver that integrates both band split filter and decoder functions into a single 18-pin DIP. Its filter section uses switched capacitor technology for both the high and low group filters and for dial tone rejection. Its decoder uses digital counting techniques to detect and decode all 16 DTMF tone pairs into a 4-bit code. External component count is minimized by provision of an on-chip differential input amplifier, clock generator, and latched tri-state interface bus. Minimal external components required include a low-cost 3.579545 MHz crystal, a timing resistor, and a timing capacitor. The MT-8870-02 can also inhibit the decoding of fourth column digits.

MT-8870 Operating functions include a band split filter that separates the high and low tones of the received pair, and a digital decoder that verifies both the frequency and duration of the received tones before passing the resulting 4-bit code to the output bus.

4.5.2. Power supply unit:

For the proper working of this local control section except the local telephone set it needs a permanent back up which gives a 12v back up continuously. This is achieved by using a 12v regulated power supply from a separate voltage source. This 12v source is connected to IC and relays.

4.5.3. Relay driver circuit:

To carry out the switching of any appliances or devices we commonly use the relays which are derived by specific circuit through the output of the Q's.

So it can be used this output to run the device or appliances. Therefore here relays were used which can handle a high voltage, and. The transistors were used to energize the relay coil. The transistor Q1-Q4 via a resistor. When the base voltage of the transistor is above 0.7v the emitter-base (EB) junction of the transistor forward biased as a result transistor goes to saturation region it is nothing but the switching ON the transistor. This internally switches on the relay by this the device is switched ON.

Chapter five

Results and discussion

5.1 Results :

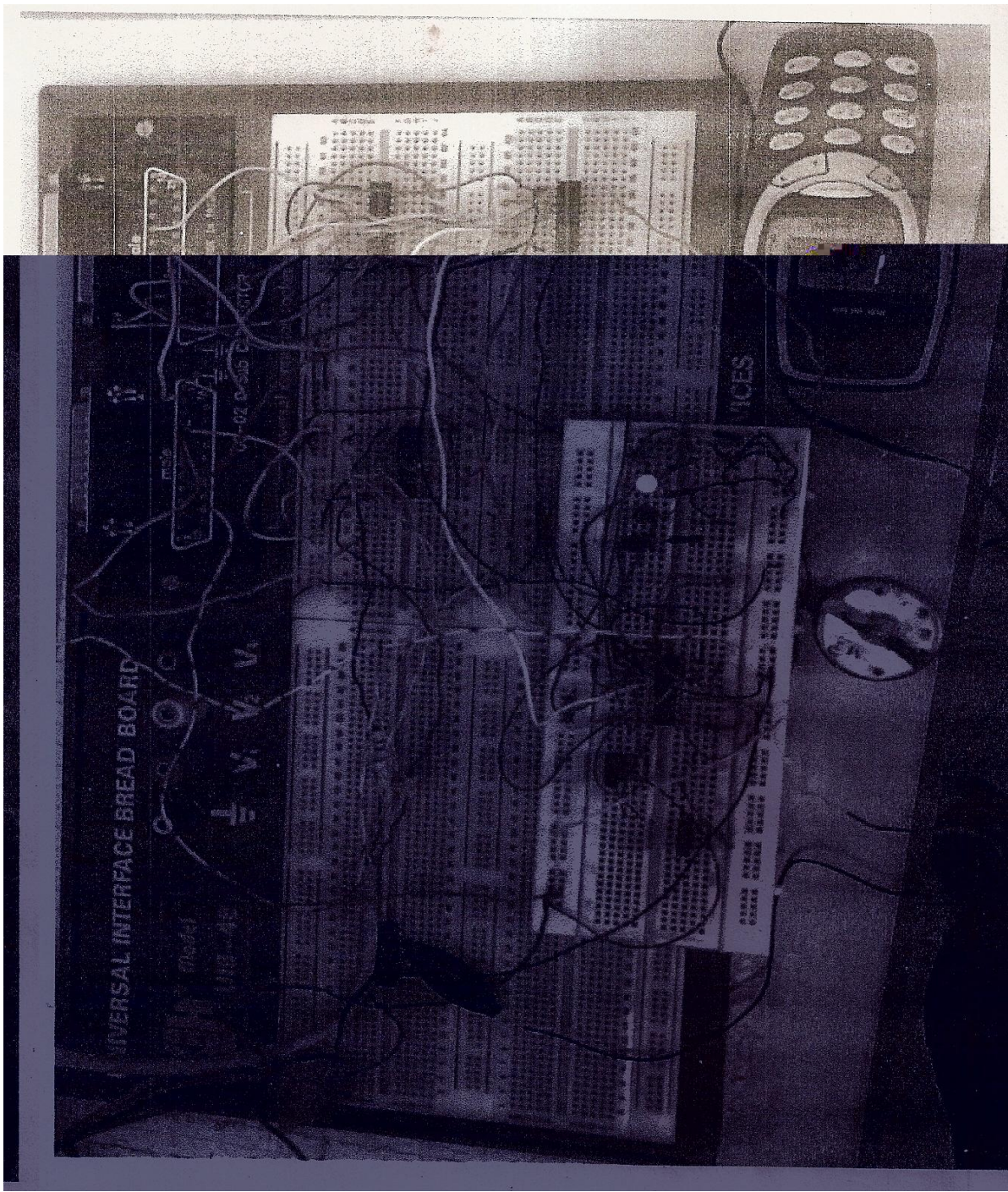
The results obtained by make a testing of the local control section , this is done by the following steps .

1. Make sure that the installation of the local control Section is perfect every thing is ready and local control section is ready to receive signal from remote section.
2. Now make a call to your telephone set using a remote telephone set or mobile phone. The signal goes to telephone exchange and the exchange sends a ringing signal to your set through mobile phone.
3. The designed control circuit will be active and generates the output to controlled device through relays to be switched on/off.

5.2 Discussion

Figure 5.1 shows the designed circuit (control section) photo. Here an IC (Darlington Amplifier ULN 2003) is used in stead of the relay circuit driver . the IC give the same results of the relay circuit driver, it is simple and easy to use.

Fig. 5.1 Designed circuit photo



Chapter six

Conclusion and Recommendation

6.1 Conclusion

Recently there is an important need to use remote controls which is make the life of human comfortable. These control must be accurate, simple, and easy to use.

The main theme in this project is to control the devices using mobile phone. This is done by building an electronic decoder circuit which convert the DTMF signals to BSD codes, the characteristics of the circuit are:

- I . Circuit can control up to 4 devices. It may be any electric or electronic appliances or devices with simple to heavy appliances.
2. It makes accurate switching, any false switching of device are not done.
3. There is no risk for false switching.
4. To perform any operation through remote mobile phone. the user needs to dial to the local telephone to which the interfacing circuit is connected then the respective switch of the device is turned.
5. this circuit does not require any complex IC. So any one can construct this circuit. Because it does not need any programmable IC's or programming.

6. This system after detects the ringing signal from remote mobile with auto reply and help of control circuit automatically switches the device ON.

7. This system saves the money. This circuit switches off after 60 seconds.

8. Before changing the state of the device we can confirm the present status of the device.

6.2 Recommendation

By the early 2000s, the number of consumer electronic devices in most homes greatly increased, along with the number of remotes to control those devices. the designed circuit here can be serve as a type of remote control.

6.3 Future work :

The hardware design implemented in this thesis discrete component are used, a high technology hardware design can be utilizing an advanced integrated circuit.

6.4 Applications:

By using the basic idea of this project it can be also able to construct many useful systems.

6.4.1 PBEX

By using this project we can construct the personally branched telephone exchange. In many of the PBEX we seen in the offices require one operator to divert the incoming calls to the respective internal telephone line. Here it does not require any such operator to operate this exchange. The person from a remote section is only to press the extension number to get connected to the respective number. In this type of PBEX only 12 extensions can be used.

6.4.2 Control the light of advertising board:

In advertising board or sign board used for display the company product purpose at the road sides requires the focus light on the dusk time. To control the light of this sign board a person is needed to switch on the lights in the evening and switch off it in the morning time. By using this system we can control the light from a control room or by the cell phone of the marketing person.