

CHAPTER 20
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Remote Activated Door and Appliance Operating System

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INTRODUCTION

A remote-controlled door and appliance operating mechanism was designed using 2-of-7 tone encoding and decoding. This system uses a pulse/tone repertory dialer as the remote control to generate the tone. A DTMF receiver detects and decodes the transmitted tones. This system generates 12 tone pairs for independent control of any combination of 12 appliances and doors.

SUMMARY OF IMPACT

This device permits a wheelchair-confined individual to open, close, lock and unlock a door, as well as to turn appliances on and off with the use of a hand-held remote-control unit.

TECHNICAL DESCRIPTION

This device has been designed, without a specific client in mind, at the suggestion of the Wyoming Independent Living Rehabilitation Center, Casper, WY.

Figure 20.1 is a circuit diagram of the hand-held remote controller, which is operated from a 9-V battery. The tone pair generated when once of the 12 control channels is selected is broadcast by the loudspeaker. A sensitive omnidirectional microphone in the receiver unit (Figures 20.2 & 20.3) captures the control signal to provide an input to its associated DTMF receiver. The output from the receiver unit controls a

relay, which in turn controls the line voltage applied to an appliance or the voltage applied to a door-operating mechanism. When this system is used for door operation, the door must be equipped with a standard electrical strike unit and a low-force mechanical closer (dashpot). Figure 20.4 shows the strike circuit. A 120-VAC reversible gearhead motor attached to a flexible cable opens the door; closure is achieved by reversing the motor rotation in conjunction with the dashpot to take up cable slack. The motor, cable, and cable-feed pulleys are mounted on a wooden plate that is placed on the floor next to the wall away from the traffic path (Figures 20.5-20.7). Each receiver unit is set to respond to only 1 of the 12 possible codes, thus control errors are avoided. Use of tone-pairs prevents false activation by extraneous acoustic signals and noise. Each door controller or wall adapter unit for appliance control is powered from the 120-VAC power mains.

The materials cost for the remote control unit was \$39, and \$35 for each wall adapter unit for appliance control. The parts cost for the door-operating unit was approximately \$110 including the electric strike mechanism. The parts cost estimate to outfit an apartment with one door controller, 11 appliance wall adapters, and 1 remote control unit is \$550.

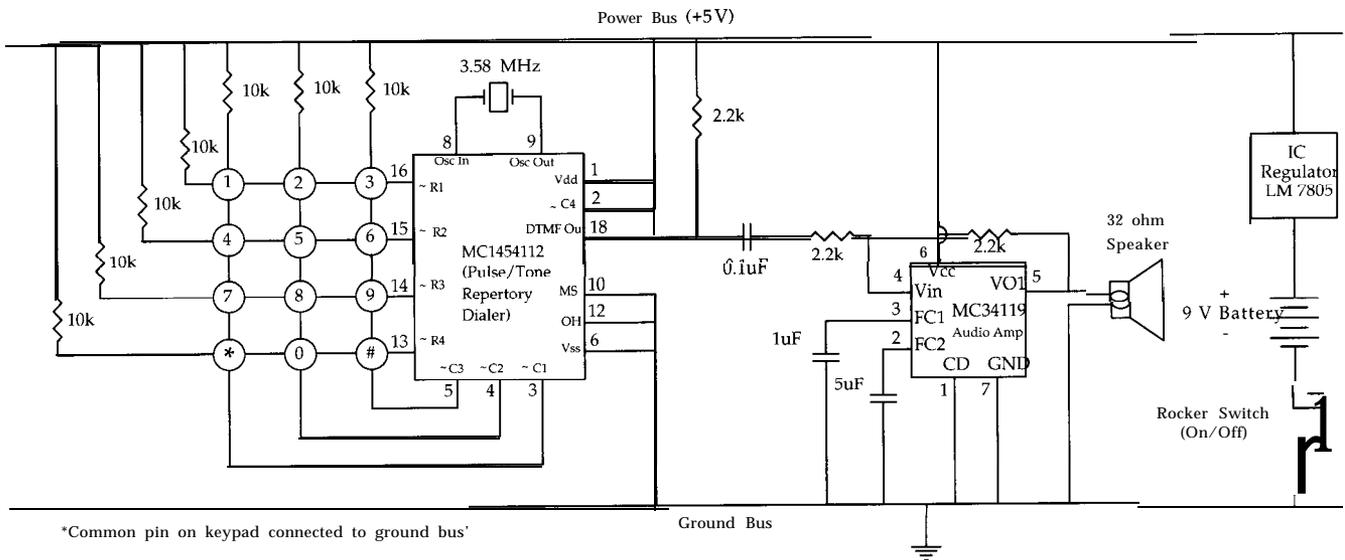


Figure 20.1. Remote Control.

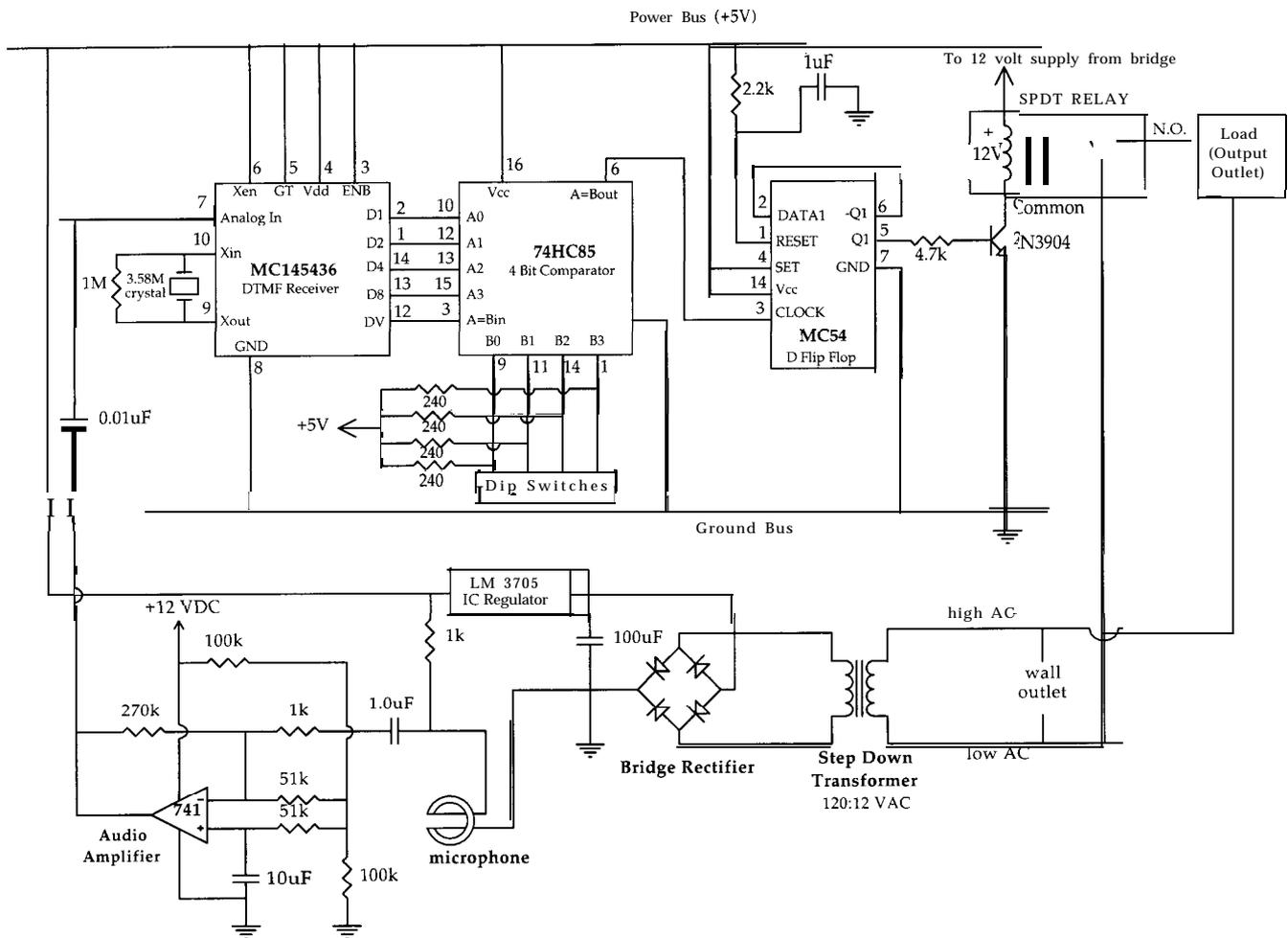


Figure 20.2. Wall Adapter.

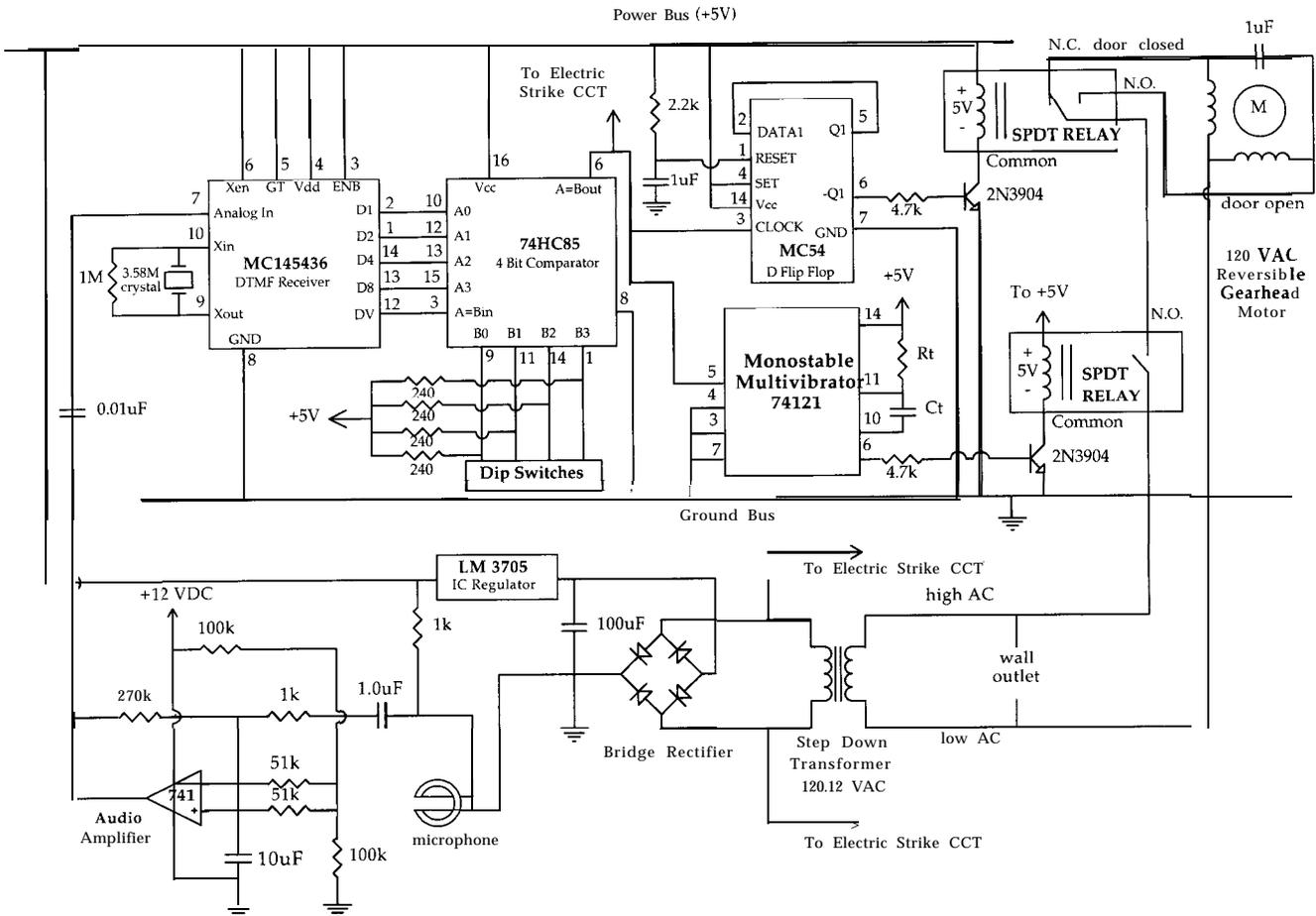


Figure 20.3. Door Opening mechanism [without electric Strike Circuit].

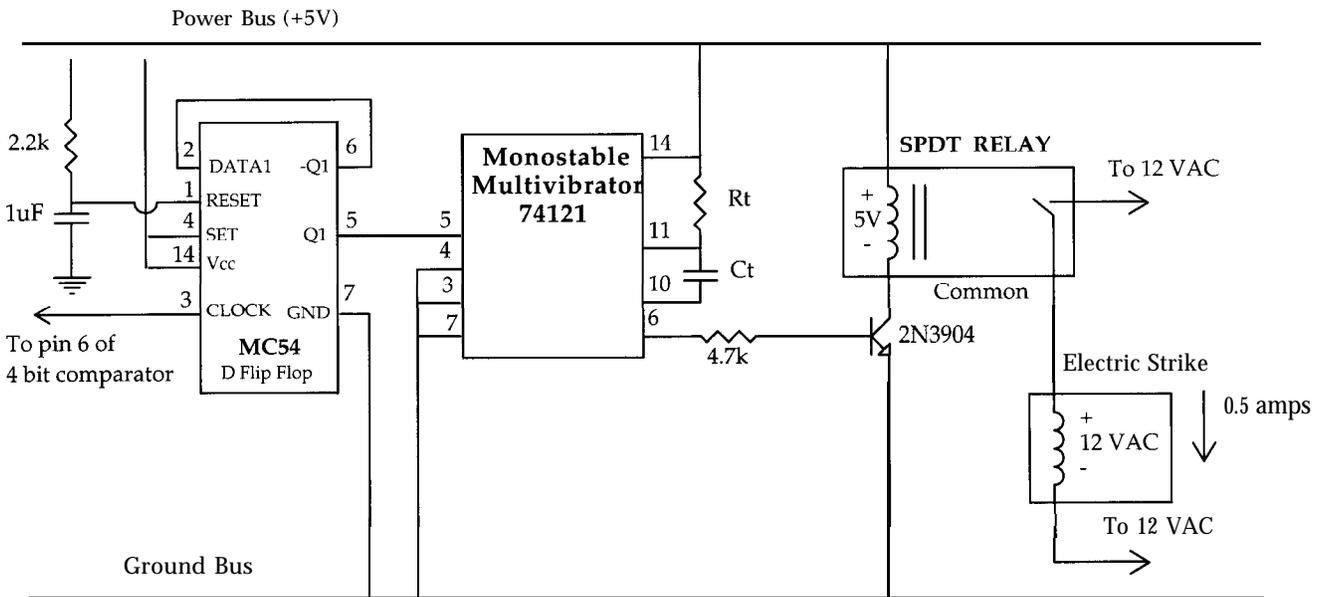


Figure 20.4. Electric Strike Circuit.

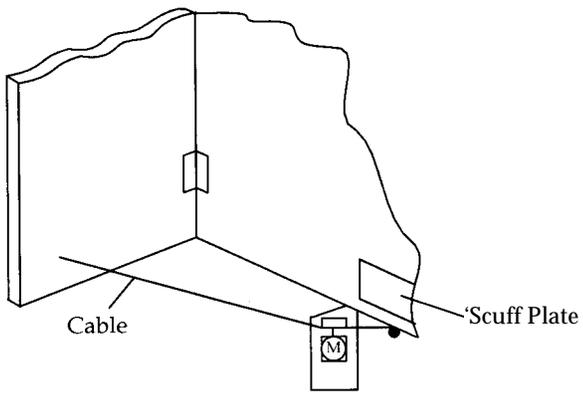


Figure 20.5 Mechanical Set-Up

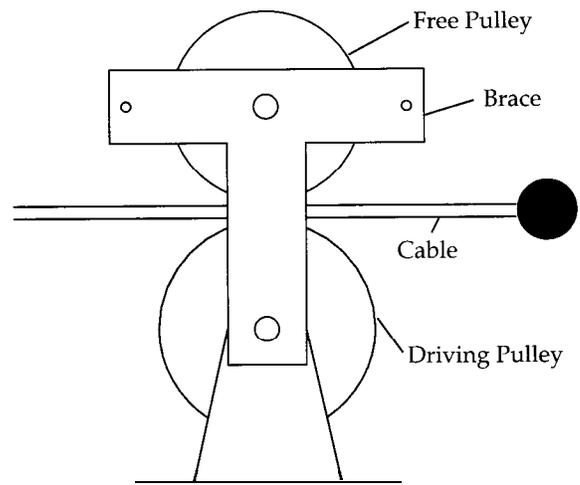


Figure 20.6 Dual Pulley System

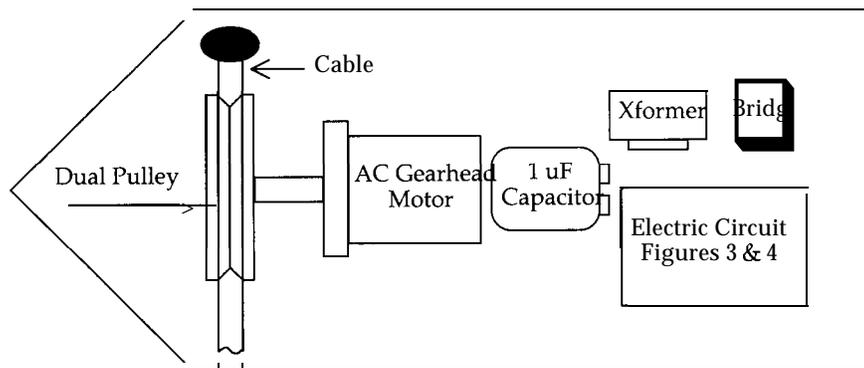


Figure 20.7 Overall System Design

