

**THEORY OF OPERATION AND
CIRCUIT DESCRIPTION
MODEL 976-315LM
REMOTE TOUCHCODE TRANSMITTER**

(Please refer to enclosed schematic drawing: 195D1631)

The model 976-315LM transmitter uses a 4-digit number entered on a numeric keypad to determine the code that will be transmitted. The sequence of operation is to press 4 digits on the keypad, then press and hold the “ENTER” button (within 10 seconds of entering the last digit of the code) to operate the desired receiving device (usually a garage door opener). RF transmission begins when the “ENTER” button is pressed and continues until the button is released or 52 seconds elapses, whichever comes first.

The transmitter consists of a low power RF oscillator (Q1 and related parts), a digital encoder (U1 and related parts), a voltage regulator (Q3 and related parts), and a keypad having buttons labeled “0” through “9” and “ENTER”.

Operation is initiated by pressing any one of the buttons on the keypad. This turns on transistor Q4 through diodes D7, D8 or D9, which supplies current to zener diode D5. The voltage developed across D5 provides bias to the voltage regulator circuitry of Q3. The regulator applies 5V to the VCC input of U1, which causes the microprocessor to begin operation by turning on Q6, which acts to keep the voltage regulator on when the button is released.

After 4 numeric buttons have been pressed, activation of the “ENTER” button will cause a digital PWM signal to appear at pin 17 of U1. This signal drives and modulates the RF oscillator.

The RF oscillator is of the grounded base type. C1, C2, C11, C12, L3, and L2 set the oscillator’s center frequency to 315 MHz. C3 provides positive feedback. R2 and R3 establish DC bias conditions.

In order to preserve battery life, U1 turns Q6 off when operation has ended. Turn-off occurs 20 seconds after the last RF transmission.

LED's, D1-D3 and D11-D13, provide back illumination to the keypad.