FCC ID: LWNF21-2D

Chapter 6 Basic Operational Principle of Remote Controller

1. General

The basic operational principle of Radio Remote Controller utilizes a radio transmitter to transmit the control data, and a receiver to receive the control data from transmitter, decode the data, and generate control commands to control the motions of a crane (or other mechanical devices).

2. Operational principle of Transmitter unit

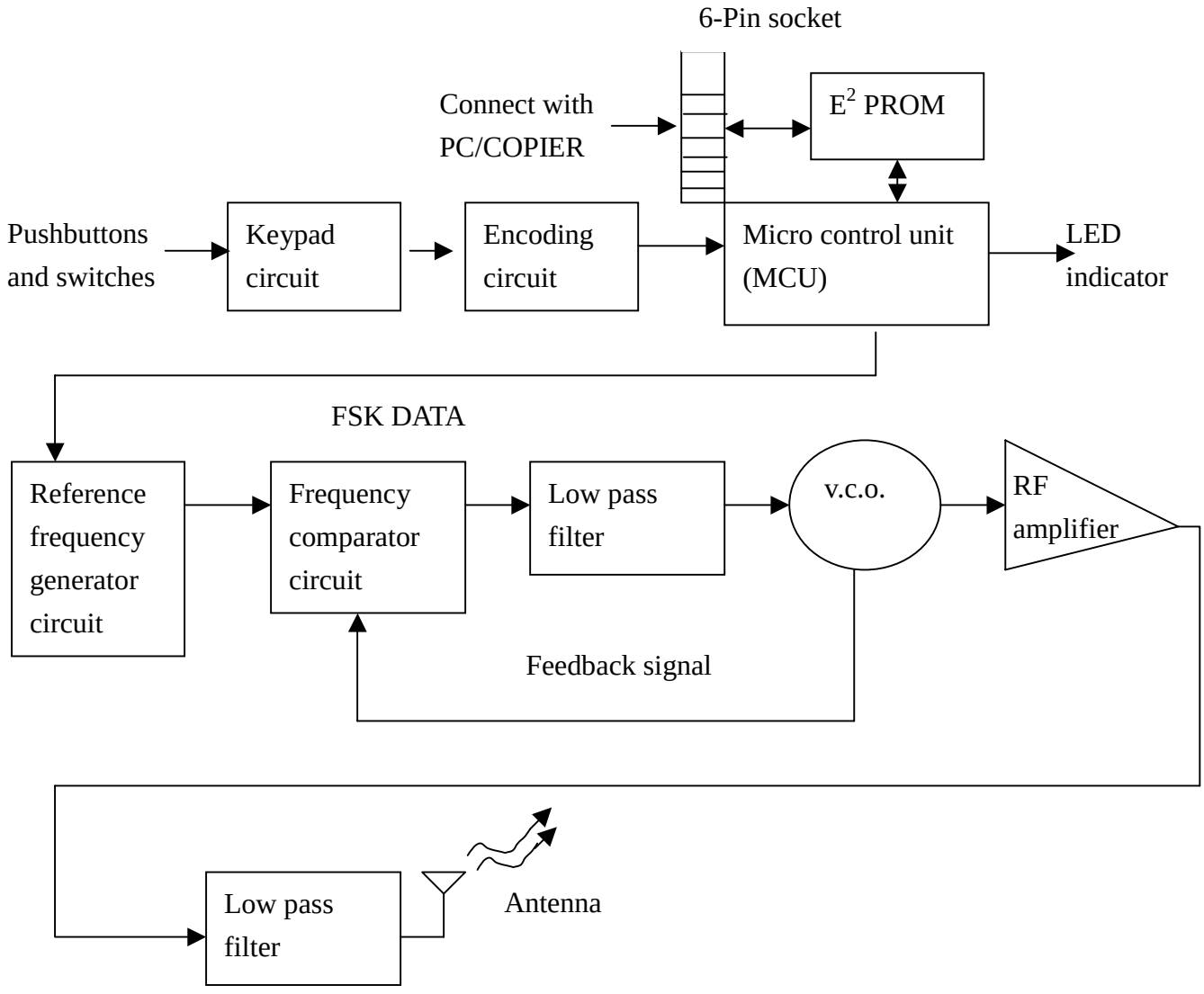

Fig.1 Transmitter's function block diagram

The micro control unit (MCU) is the heart of the transmitter. Except the MCU, the transmitter consists of four peripheral circuits containing keypad circuit, encoding circuit, electrically erasable programmable read only memory (E^2PROM) and TX-RF oscillating circuit.

When press buttons or turn switches on the transmitter, the keypad circuit senses and sends the correct data to the encoding circuit then to the MCU, and combine with "function setting", "ID codes" and "Hamming codes" become "control data" which will be swapped to TXFSK DATA via the encoding method of Manchester and send to TX-RF oscillating circuit.

To control reference frequency generator with TXFSK DATA and generate a modulation signal which will modulate voltage control oscillator (V.C.O.) and output a frequency modulation signal. This FM signal goes through TX-RF amplifier, low pass filter and then TX's antenna to generate a transmission signal.

In addition to TX-RF amplifier, at the same time, Voltage control oscillator (V.C.O.) will feedback to phase comparator circuit become "Phase Rocked Hoop". If temperature factor influence with V.C.O. and cause frequency shifting, then "Phase Rocked Hoop" will detect and generate a voltage control signal to control V.C.O. and calibrate its frequency shifting, and keep V.C.O. with a stable frequency output always.

The main function of E^2PROM is to store function settings, ID codes etc. It can do function setting, or read the detail data from E^2PROM via 6-pin socket connecting with PC or Copier.

3. Operational principle of Receiver unit

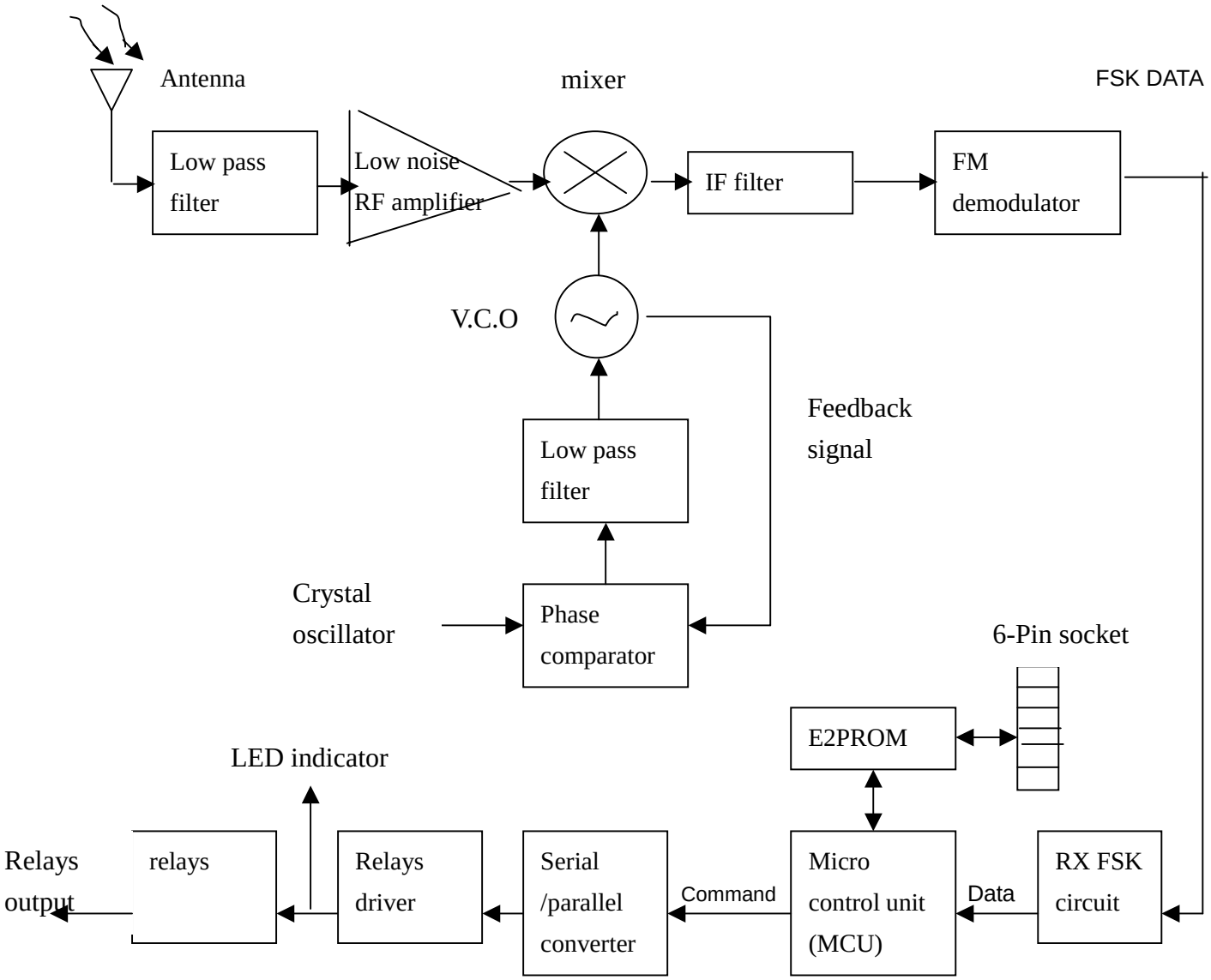

Fig.2 Receiver's function block diagram

The receiver unit consists of RF amplifier circuit, frequency mixing circuit, decoding circuit and relays driving circuit. RF signal (control data) from the transmitter are received by the receiver's antenna and go through low pass filter to filter noise , to amplify RF signal via "low noise RF amplifier" with characters of temperature compensation and high receiving gain, then send to mixer combining with local oscillator to generate IF signal. In order to obtain a stable IF signal, this system adopts "Phase Lock Loop" (PLL) and "Voltage Control Oscillator" (V.C.O.) to be a combined circuit as a local oscillator circuit. After demodulating, the IF signal output a low frequency of FSK DATA to RXFSK circuit which is used for detecting and correcting error to ensure the data sent to MCU is complete and correct.

The MCU has control data and proofread ID codes, Hamming codes etc., according to function setting in E^2PROM to generate corresponding control data to relays driving circuit. The control data from MCU is a serial/parallel transmission, so it shall go through "serial/parallel converter" and swap to respective control data sent to "relays driver" in order to conduct relays and the corresponding LED light.