

Description of Kangaroo Products Company Transmitter

Model TX600-845C

FCC ID OVPTX600-845C

Form 731 Confirmation Number EA96737

The transmitter is a handheld device used to control a motorized golf caddie, used exclusively on golf courses. A companion receiver is mounted on the caddie and receives four commands from the transmitter: stop, go, turn left, and turn right.

Please refer to the schematic and block diagram of the transmitter. The transmitter is controlled by a Microchip PIC series microprocessor running on a 3.58MHz ceramic resonator, U3 on the schematic. Radio transmission is accomplished through the use of a Linx Technologies module, model number TXM-900-HP-II, U1 on the schematic. This module tunes eight channels, binary selectable using three digital logic inputs:

903.37MHz  
906.37MHz  
907.87MHz  
909.37MHz  
912.37MHz  
915.37MHz  
919.87MHz  
921.37MHz

The transmitter module uses direct FM modulation with an occupied bandwidth of 32KHz.

The microprocessor controls two of the three channel selection lines directly, with the third being set using a solder jumper on the circuit board. The microprocessor also controls the powerdown status of the transmitter module and sends data serially to the module for modulation and transmission.

The antenna used by the transmitter is a 1/4 wave length of #18 gauge copper wire, and is not user accessible. It is soldered to the circuit board.

A 9V battery is connected to J5. The transmitter is normally not powered until the user presses a key on the four button keypad, connected to J2. Then, P-channel FET Q1 turns on and supplies power to the transmitter circuitry while a key is pressed and for up to three seconds thereafter. This delay is provided by R17 and C9. U6 is a voltage regulator providing five volts to the rest of the circuitry.

Comparator U5 provides low battery indication and power on reset functions for the microprocessor. This prevents transmissions when the battery voltage falls below 6 volts.

The LED D3 is flashed to indicate to the user that a key has been pressed or released, and whether the battery voltage is low. The function of the LED is under software control.

Device U4 is a serial EEPROM memory used to store device configuration parameters such as the radio channel and communications code.

Connector J4 is used for production test and configuration and is not connected in normal operation.

The transmitter transmits a data burst consisting of 32 bits, each bit being 366 microseconds in duration. The bits are modulated using a 1/3-2/3 duty cycle technique. Thus, the minimum pulse width is 122 microseconds, and the maximum is 244 microseconds. As long as the user holds a key active, the transmitter sends data bursts at approximately 164ms intervals, with a pseudorandom variation of +/-64 milliseconds. When the user releases the key, the transmissions stop.

The block diagram contains notations on several signals which have clock or repetitive signals. The highest frequency used (apart from the Linx Technoligies module) is 3.58MHz, the resonator on the microprocessor. The next highest clock frequency is approximately 50KHz, used sporadically on the serial bus connected to the serial EEPROM memory. The next highest frequency signal is the communicated data stream, at about 2800 bits per second.

The Linx Technoligies module uses a 12MHz reference crystal oscillator and a 902-928MHz VCO as part of its frequency synthesizer.