

HomeLink® With a Remote Switchboard

Description of Operation

HomeLink® with a remote switchboard consists of two modules: user interface (switchboard) mounted inside the passenger compartment, and the RF portion (HomeLink® transmitter) mounted outside the passenger compartment. The two modules communicate over a one-wire bus. JCI is not responsible for design, manufacturing, or routing of the wire harness between the two modules.

The HomeLink® transmitter is a radio frequency transceiver device whose primary function is to determine both frequency and bit code format of typical garage door remote control devices and identically re-transmit them to the original garage door opener receiver. The on-board microcontroller maintains the operational frequency band as 288MHz to 420MHz, excluding forbidden bands of 240 to 285, 322 to 335.4 and 399.9 to 410 MHz by at least 1 MHz spacing.

The “training” operation is performed by scanning the legal frequencies with a single conversion superheterodyne receiver, looking for valid garage door opener bit code formats. After the training sequence, the frequency, bit code and attenuator setting is stored in non-volatile memory (NVM).

On subsequent power ups, the NVM data is recalled. The VCO is set on the desired RF carrier frequency. The antenna is coarse tuned by sweeping twice around the expected tuning point. It is fine-tuned with 9 pulses of 210 uS with 11 mS off. The voltage controlled oscillator (VCO) is then modulated with the appropriate garage door opener bit code from the NVM.

In addition to being frequency and data format adaptive, the Homelink® transmitter is also RF amplitude adaptive. During the training sequence, the duty factor of the incoming bit code format is evaluated by the microcontroller determining the greatest amount of on-time in a 100 mS window. The duty factor is then used to adjust the output power in a range of 80% (1.9 dB) to a maximum limit of 30% (10.5 dB) duty cycle. A 9-bit attenuator is adjusted by a closed loop power control algorithm in the microcontroller.