Quik-Flag System

Circuit description:

The Quik-Flag System is a wireless light system for mobile home transporters. The lights on the back of the mobile home are mounted on an aluminum frame which fastens to the mobile home with either a hook on the roof or screws into the corner of the building. It contains [a] lights (LED type), [b] a battery pack, and [c] a radio receiver and microprocessor.

The matching transmitter is mounted on the truck with wires running to the various lights—brake, strobes, running lights, turn signals (L and R). When any of these wires is pulled to 12VDC by turning on the light associated with it, the transmitter sends a brief coded burst of data to the receiver, which decodes the data and turns on the light. When the light on the truck is turned back off, another coded burst is sent to the receiver. The transmitter never does continuous broadcasting.

The coding scheme is a 7-byte string consisting of a 2-byte header, a 3-byte address, and 2 bytes of data to select which lights are on.

The data is sent at 4800 baud, with small delays between bytes to keep the overall average transmission power level down.

Each data string is sent 3 times for security.

The transmitter circuit consists of :
[a]A level converter and power pickoff section that converts the 12VDC levels of input into 5VDC inverted signals to the microprocessor. It also sends some of the power to a large capacitor which stores it for powering the turn-off data burst when the light is turned off.
[b] The voltage regulation section. The 12VDC stored on the capacitor is regulated first to 5VDC for the microprocessor, then sent through a further regulator for the 3VDC needed on the transmitter module.
[c] The microprocessor, a Microchip PIC15F88, running at 20MHz, crystal controlled.
[d] The radio module, a Linx -LR series transmitter. The frequency is 418MHz, OOK modulation. A single resistor controls the power output. (For testing, this resistor has been replaced with a trim pot, which will be replaced with the correct value of fixed resistor in production.)
[e] The antenna. It is bolted into the case with a pipe fitting so that it cannot be replaced with another type of antenna. It is a ¼-wave whip.

The receiver consists of:
[a] The ¼ wave whip antenna, removable.
[b] The Linx -LR receiver module.
[c] The PIC16F88 microprocessor. It runs at 20MHz, crystal controlled.
[d] The power regulator. It takes the 12VDC from the battery pack and converts it to 5VDC for the microprocessor. The Linx receiver is powered through a series resistor to

drop it to about 3VDC.
[e] The output driver transistors. These 3 power transistors control the actual lights. They will be PWM controlled to run the brake light at running-light brightness.
[f] The battery charger circuit. It consists of a buck/boost regulator, current limited, controlled by the microprocessor. Any charging voltage from 7 to 18 is permitted.

When charging voltage is present, the receiver unit ignores the radio signals, and turns off all the lights. When the charging voltage is removed, it flashes the lights in a pattern representing the battery condition.

When the receiver picks up a signal, it checks it for the correct address , and verifies that the “normal” and “inverted” bytes match each other. If not, it discards the entire data string. If it is accurate, it sets the lights in the proper pattern to match the data.

A single jumper on the board determines whether the board is a left-hand or right-hand controller.

A magnetic switch on the board, activated through the case with a magnet, allows the receiver's address to be changed to match the transmitter.