Universal Model Train Wireless Remote Controls

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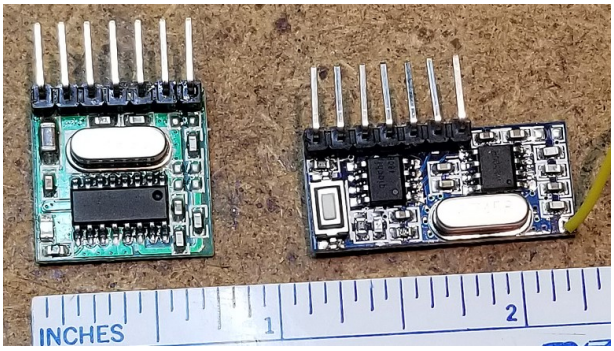
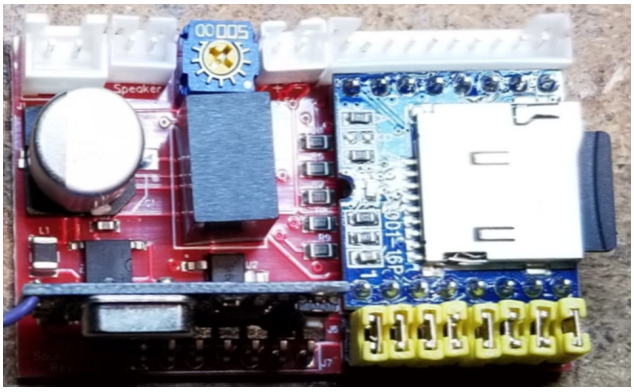
A family of boards to perform a wide variety of remote control functions. All of these boards use commonly available 1527 learning code 4-channel receivers and transmitters shown below. In addition, a 433 MHz 1527LC 4-button key-fob remote will control any of the receiver modules as well. All the boards have been designed with model train control and voltage requirements in mind.



The 1527 learning code receivers used have a number of different operating modes. They can operate in momentary output, latched toggle mode, or interlocked mode. When these modes are combined with the operation modes of the four channel transmitter described below, tremendous flexibility in operational control can be achieved. Each receiver can respond to multiple remotes, and each remote can trigger a different output mode of the receiver.

An obvious issue with the 1527 learning code transmitter/receiver boards is they aren't Plug-n-Play for model train applications. Specifically, they lack a compatible power supply as well as the input and output conditioning circuits for use in the model train environment. With that in mind, the boards described below add the power conditioning, signal conditioning, and additional output modes to the basic transmitter and receiver modules.

In addition to the modules described in this document, the same transmitter modules are also compatible with a companion sound module. The **MP3 Universal Sound Module** can be triggered using either of the transmitter options described below. This allows you to add custom multi-channel sounds to your projects.



4-Channel Transmitters

The remote control family of boards includes a pair of 4 channel transmitters. The first is the familiar 4-button keyfob transmitter; it's compatible with all the receiver modules.

The second transmitter module is designed to directly interface electrically with model train applications. the above illustrated 4-channel transmitter board provides power and interface logic for a wide range of uses. Each of the four inputs to the board are optically isolated and will accept any trigger voltage from 1.5 volts to 18 volts AC or DC to trigger a transmit channel. The on-board power supply accepts AC or DC power from 6 volts to 18 volts to power the internal logic and OEM 4-channel transmitter board. The transmitter module has the ability to program different modes for the first two channels of the transmission. Four different jumper selectable options are provided; these change the behavior of the first two channels. In addition, this behavior is microprocessor based so it's possible in the future to enhance/change the behavior if a more desirable behavior is desired in the future.

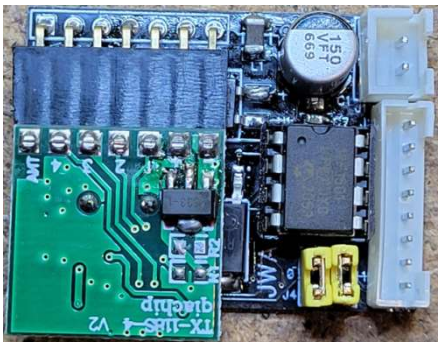
Jumper options are:

- Pass-thru: Output active as long as input trigger active.
- Leading edge momentary: Out active for 100ms on trigger leading edge.
- Leading/trailing edge momentary: Output active for 100ms on trigger leading edge, again on trigger trailing edge.
- Two channel interlock: Output active on channel #1 for 100ms on trigger leading edge, output active on channel #2 for 100ms on trigger trailing edge. Channel #2 input is ignored.

This board can be embedded in rolling stock for internal control of car functions from the locomotive. It can also be used with the Lionel SC2 or MTH AIU to trigger actions from the respective command system remotes. A suggested use might be to use the front coupler output on a steam engine to activate a peripheral function. A magnet on a wheel with a reed switch on rolling stock can trigger a function when you are moving. For locomotives, you can trigger functions based on motion in either direction by simply wiring a transmitter input directly to the motor power leads. If sensing in one direction of movement is desired, a diode added in series with the transmitter input will limit the triggering to a single direction of travel. For track location triggered actions, you can place a magnet next to the track and use a magnetic reed switch to trigger a transmit channel as your train goes by.

The uses are only limited by your imagination.

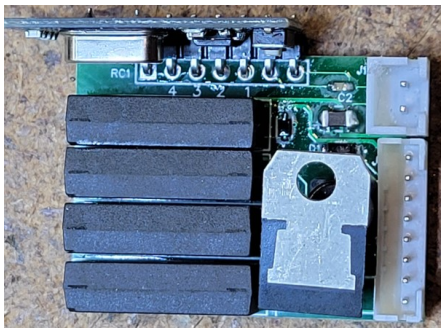
4-Button Keyfob Transmitter



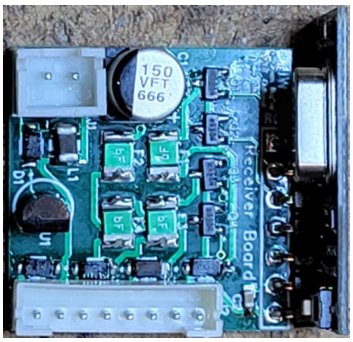
4-Channel Transmitter

4-Channel Relay Receivers

Next up, we need a way to receive this command, here's a pair of 4-channel receiver boards. The first one has four relays to allow total isolation of the switching from the board power. The relay based board is 1.1" x 1.45" and about .6" tall. Each of the relays has SPST contacts rated at .5 amps. The second board is a FET output based design that allows a more compact 1.1" x 1.0" design and will switch 250 milliamps of power referenced to input power ground. Both receiver boards use the 4-channel receiver module previously described.



4-Channel Relay Receiver

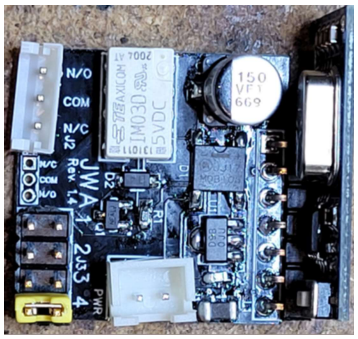


4-Channel FET Receiver

1-Channel Relay Receivers

What if you don't need 4 channels of control all in one location? Then you would want single channel receiver. Two options are available, a relay output board and a single channel FET output board. The outputs match the previously described four channel boards, just a smaller board with a single channel output. These also use the same 4-channel receiver previously described.

The one channel relay board switches up to five amps and has two Form-C sets of contacts. One set is brought out on a 3-pin connector; the second set is available as solder pads on the board. The one channel FET based board has a single switched output capable of driving 250 milliamps referenced to frame ground. This small board could be used for tasks like remote controlled lighting, etc. The relay board is 1 x 1.1 inches in size, and the FET based board is 1x0.7 inches in size. Overall height is 0.6 inches for either board.



1-Channel Relay Receiver

1-Channel FET Receiver

With the single channel board, we have a conundrum; the receiver we're using is a 4 channel receiver. That means we can't program individual buttons on the remote (or channels on the transmitter module) to separate the channels. Taking advantage of a feature of the 1527 learning code receivers, each of the single channel boards has a Channel jumper field. The appropriate jumper is added to the board to select which of the four receive channels will activate the output of the board. This allows you to have four of these boards all programmed for a single 4-channel transmitter. Each transmitter channel will activate only the board that has the channel output jumpers selecting that channel. Multiple receivers can be programmed to respond to the same transmitter, the net result is we have a single channel board that only consumes one of the channels of our transmitter's four channels.