Anvilus RC Mini Relay Controller

Board m_070901, Manual 070901

The RC mini relay controller (MRC) provides direction control for two DC motors using a single RC joystick. It reads two standard RC servo signals with a PIC 12F629 microprocessor, and provides right-left mixing to drive four off-board SPDT relays for forward/off/reverse direction control. Alternately, it can be programmed without mixing to independently drive relays for two DC motors or four solenoids.

OVERVIEW

Option M (mixing) - RC throttle T and steering S channels are mixed for right and left motors
- standard full-skid steering for two DC motors from a single joystick
- 12V or 24V operation
- 150mA drivers for four relays
- relay drivers are optically isolated from RC signals
- relays shut down if RC signal is lost
- 20 msec delay on motor reversal

Option S (straight) - T and S channels are independent
- can control two DC motors or four solenoids or combinations thereof

Option P (pulse) - T and S channels are independent
- S channel provides 100 msec pulses when toggled

QUICK START

1) READ AND LEARN power on/off sequences listed below
2) Mount printed circuit board
3) Relay connections (RF, RR, LF, LR, GND) using pigtail wires on right edge of board
4) Servo cable connections (S,T) to RC receiver
5) Follow power on sequence
6) Have fun

PRINTED CIRCUIT BOARD

The top surface of the printed circuit board (PCB) is shown in Figure 1. The PCB is 0.5 by 1.6 inches.

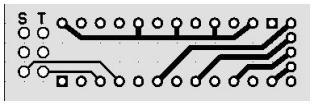


Figure 1 - Top surface of PCB (full size)

T AND S CONTROLS

The MRC is connected to an RC receiver using standard servo cables. Servo cables are soldered to the PCB near the left end. For Option M , throttle T and steering S channels are mixed for full-skid steering. For Options S and P, channels T and S are not mixed.

OPTION M - MIXING

Full-skid mixing for forward/off/reverse control of two DC motors provides about 33% dead band in the center of joystick travel. Motors will rotate at full speed forward, full speed reverse or full stop as shown in Table A1 in Appendix A.

Throttle T and steering S channels control drivers for two SPDT relays for the left motor and two SPDT relays for the right motor as shown in Figure 2. The MRC is rated for 12V or 24V operation.

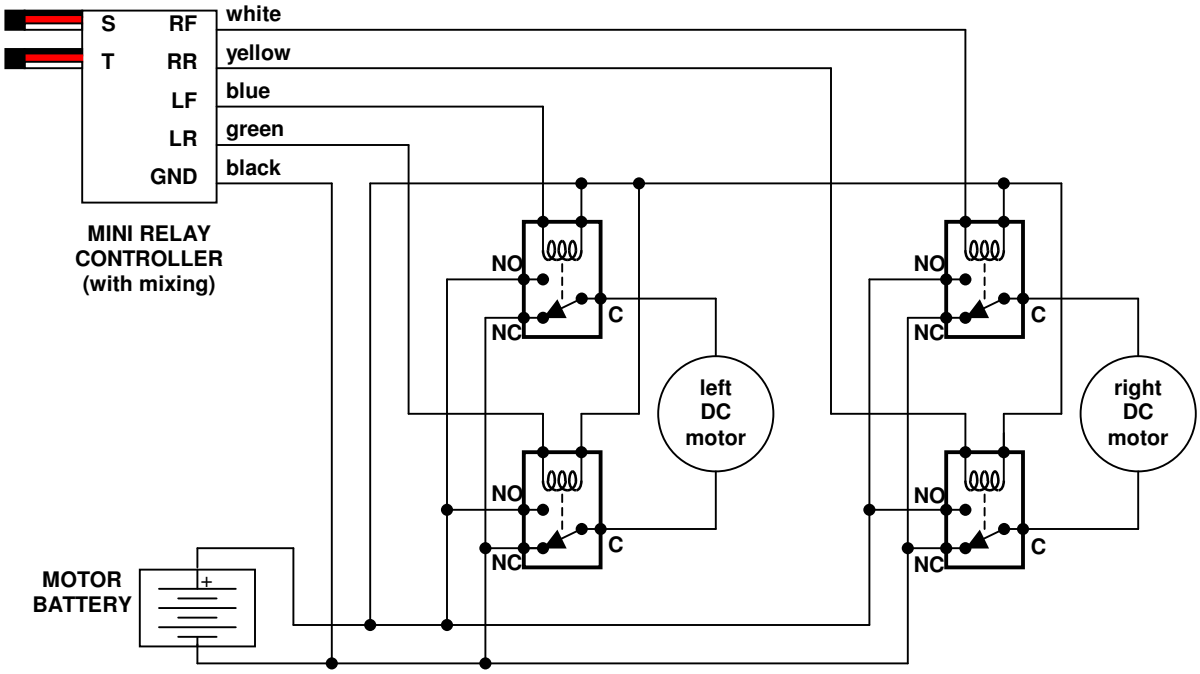


Figure 2 - Option M forward/off/reverse with mixing
(All battery connections should include appropriate kill switches and fuses.)

The user must provide four SPDT relays. An example circuit is shown in Appendix B.

Relay connections for right forward RF, right reverse RR, left forward LF, left reverse LR and ground GND are provided by short pigtails on the PCB. Each relay driver can sink 150 mA current.

24V relays are required for 24V operation using Figure 2. Using 12V relays with a 24V battery in Figure 2 will overload relay coils and MRC drivers. Figure C1 in Appendix C shows how to wire separate motor and coil batteries if desired.

Dual SPDT relays create a dead short across DC motors when not activated and provide inductive braking. Relays shut down for 20 msec delay when motors reverse to allow for relay make/break times and to prevent large voltage surges when motor currents suddenly switch direction. Relay outputs shut down if T or S servo signals are lost. Servo signals T and S are optically isolated from relay driver circuits.

OPTION S - STRAIGHT

Straight control provides about 33% dead band in the center of each joystick. Channels T and S channels are independent.

The T channel controls relay drivers LF and LR and the S channel independently controls drivers RF and RR as shown in Figure 3. Each channel can control:

forward/off/reverse of one DC motor,
on/off for two unidirectional DC motors,
on/off for two solenoids, or
on/off for one unidirectional DC motor and one solenoid.

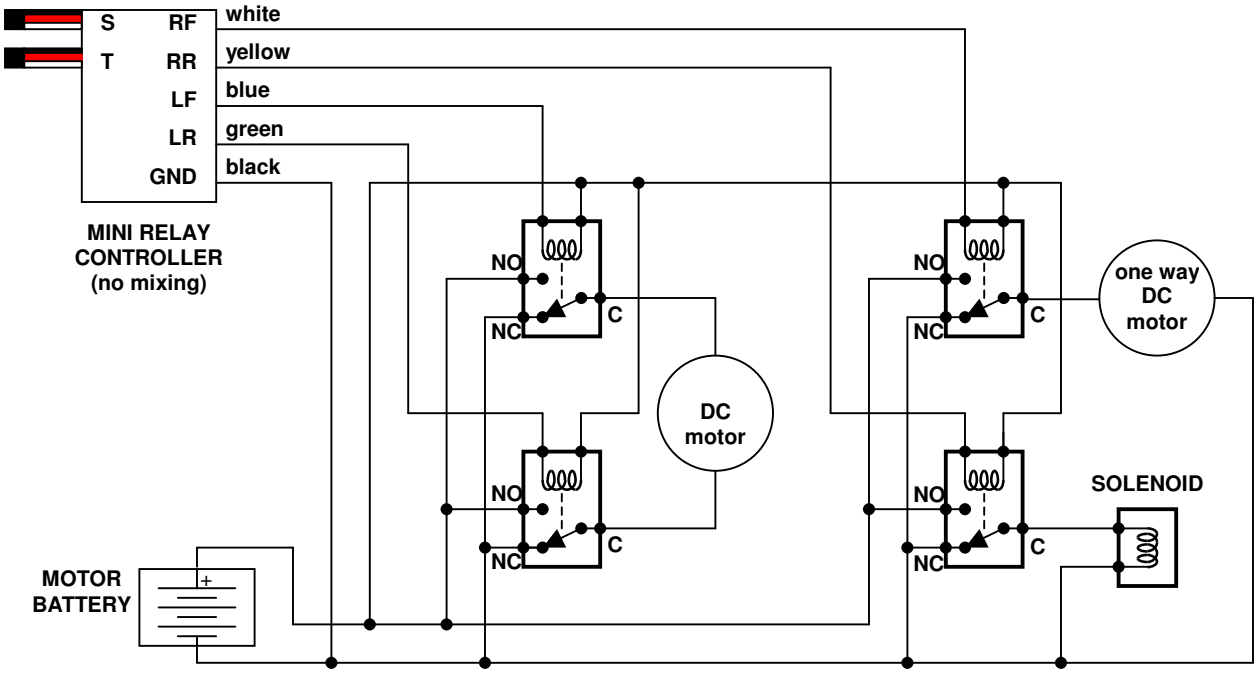


Figure 3 - Option S independent control of DC motors and solenoids
(All battery connections should include appropriate kill switches and fuses.)

The user must provide relays and sockets. Relay driver specifications are the same as Option M.

OPTION P - PULSE

For pulse control, channels T and S channels are independent. Channel T controls drivers LF and LR directly, and provides about 33% dead band in the center of joystick travel. Channel S controls drivers RF and RR but provides a 100 msec pulse for each when the channel is toggled.

The connections for Option P are the same as Option S.

POWER

Users MUST USE THE FOLLOWING SEQUENCES for activating and deactivating power to prevent potential problems caused by spurious RC signals when transmitters and receivers are turned on and off. This is standard practice for all RC systems.

POWER ON SEQUENCE
1) RC transmitter ON
2) RC receiver ON
3) Motor battery power ON

POWER OFF SEQUENCE
1) Motor battery power OFF
2) RC receiver OFF
3) RC transmitter OFF

CALIBRATION

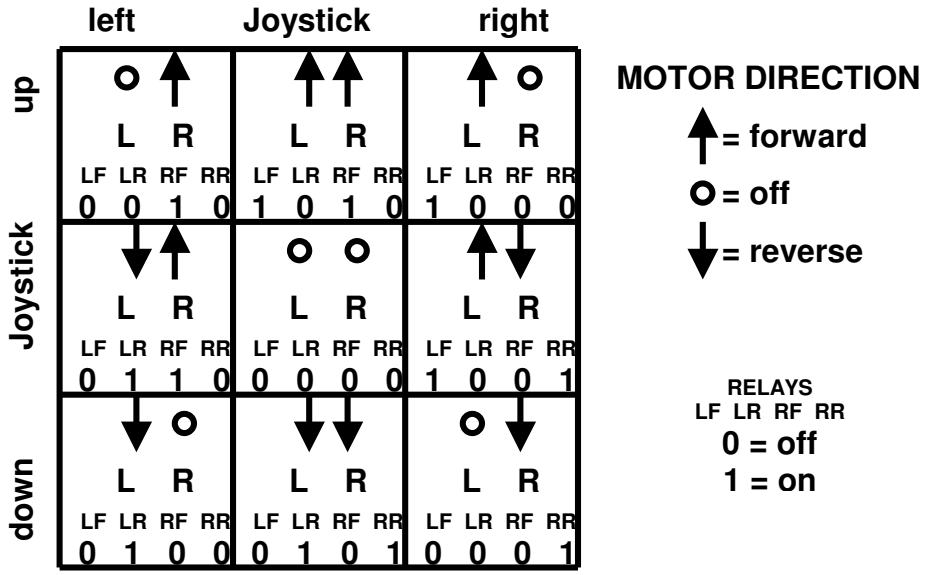
The MRC is calibrated at the factory for standard servo signals. It should not require excessive trim adjustments. The MRC cannot be calibrated by the user.

NO WARRANTIES

Do not use this product in a health care or personal safety application. This product is provided without any express or implied warranty. Anvilus cannot be held responsible if your motor controller does not work for any reason. Anvilus cannot be held responsible if your motor controller damages any other devices. Anvilus cannot be held responsible for electrical or electromagnetic interference resulting from use of your motor controller. Anvilus cannot be held responsible for any personal injury, property damage or loss of profit resulting from use of your motor controller. Anvilus does not warrant the accuracy or completeness of any documentation. Anvilus may change documentation or the products described therein, at any time without notice. Anvilus makes no commitment to update documentation.

APPENDIX A - Joystick relay mixing

Table A1 - full-skid turns (bulldozer steering), motors can go in opposite directions



APPENDIX B - Example circuit

The circuit shown below costs less than $10 using components from:

MCM Electronics (http://www.mcminone.com/)

12V 30A SPDT automotive relay, #26-534, $0.99 (need 4)

double relay socket, #60-6935, $1.49 (need 2)

Radio Shack (http://www.radioshack.com/)

8 position terminal barrier strip, #274-670, $2.49 (need 1)

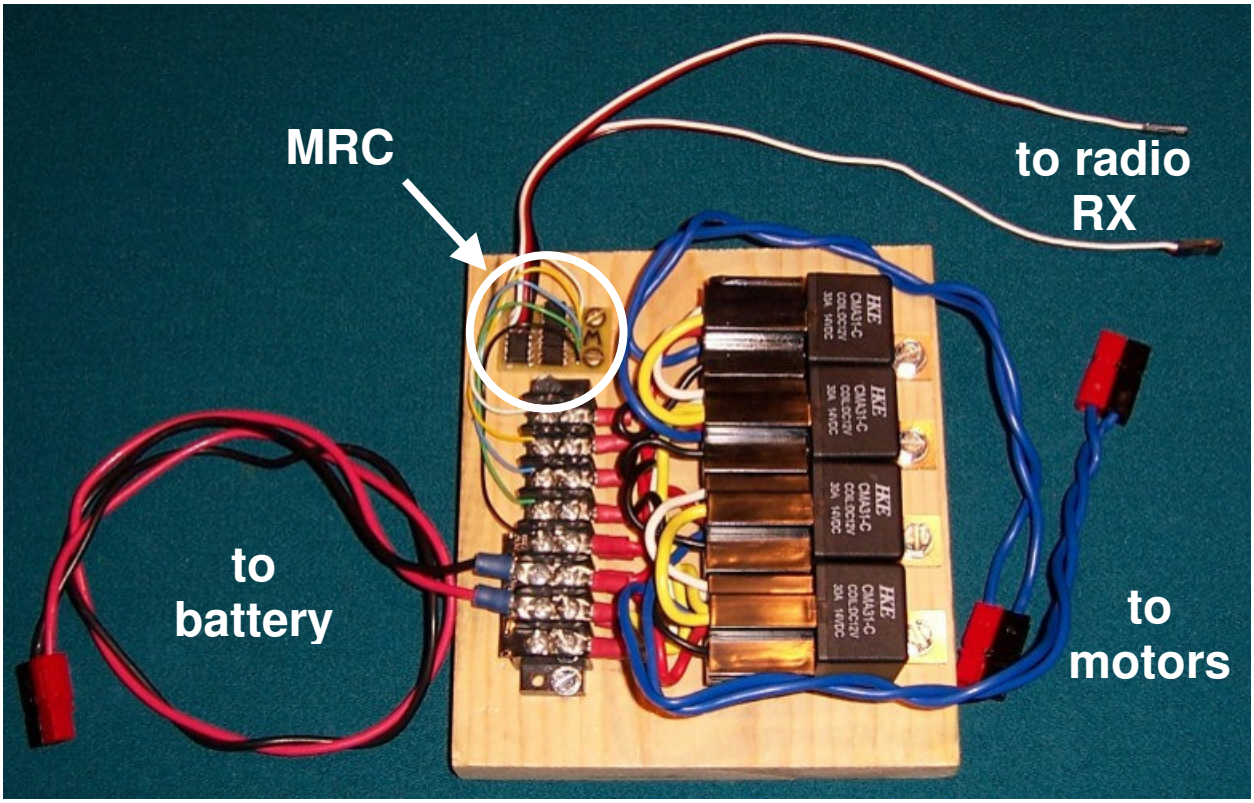


Figure B1 - Example relay circuit for Mini Relay Controller (MRC)

For MCM double relay sockets, wire color coding is:

blue - common 30 - to motors

black - coil 85 - to MRC

white - coil 86 - to battery positive

yellow - normally open 87 - to battery positive

red - normally closed 87a - to battery negative

APPENDIX C - Separate motor and coil batteries

The circuit shown below uses separate motor and coil batteries. This can allow 12V relays to control 24V motors.

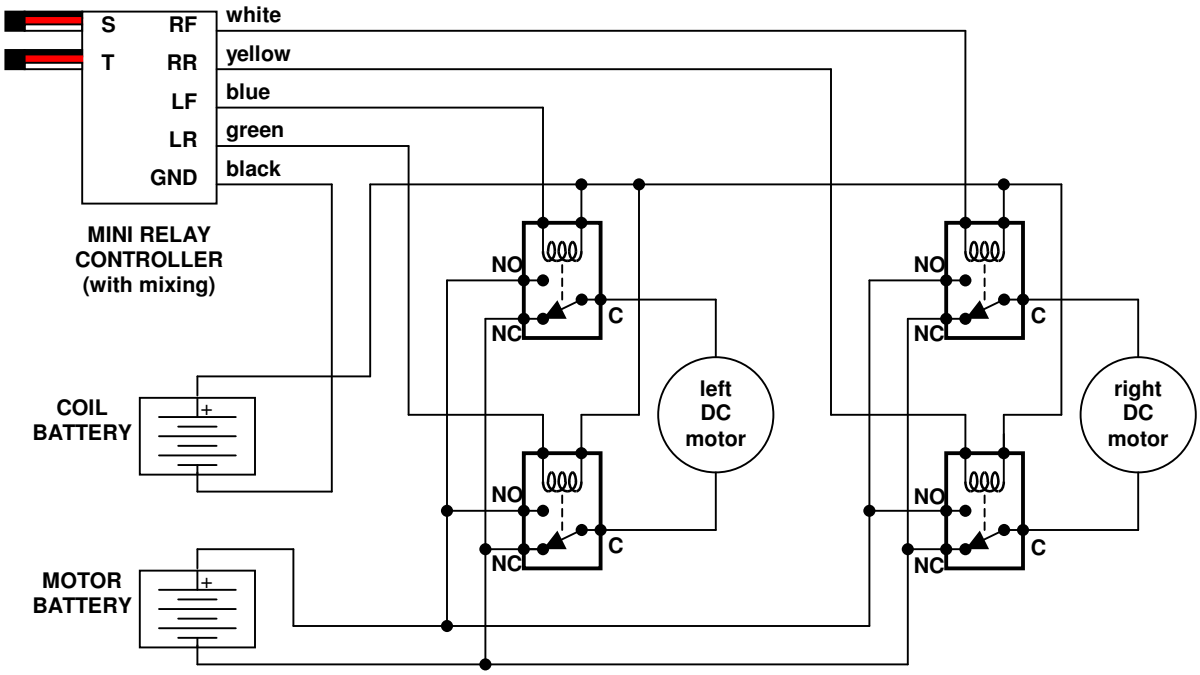


Figure C1 - Option M with separate motor and coil batteries
(All battery connections should include appropriate kill switches and fuses.)