TAM VALLEY DEPOT
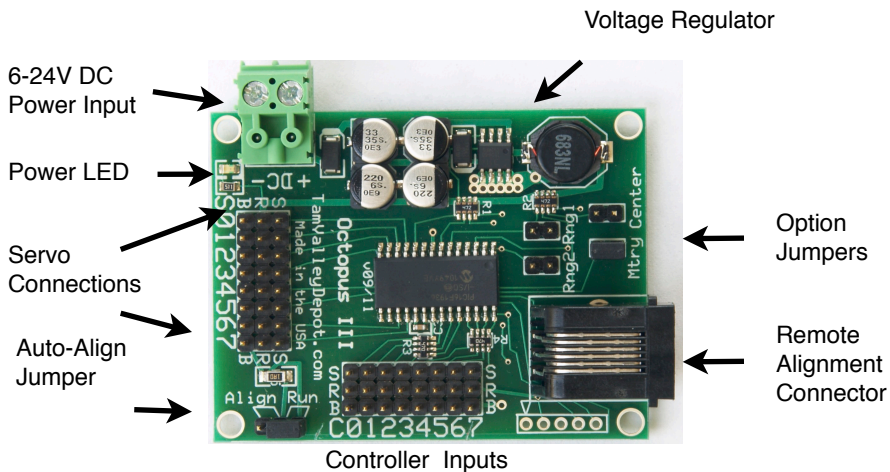*Great Electronics for Great Model Railroads*

Octopus III
Servo Driver Manual

Overview
The Octopus Servo Driver will control 8 turnouts manually by flipping a switch or with a pushbutton using R/C servos. It is also possible to control the Octopus with active low logic (the type used by the majority of model railroad control circuits). The Octopus uses R/C airplane servos which are ready available and inexpensive. These instructions explain how to install the servos to control turnouts, however, you can control other devices such as semaphores, crossing gates and so forth.

Voltage Regulator

6-24V DC Power Input

Power LED

Servo Connections

Auto-Align Jumper

Option Jumpers

Remote Alignment Connector

Controller Inputs

Installation
Install the board by placing it near the turnouts you want to control and the fascia where you want to mount the switches. The inputs are more susceptible to noise than the outputs, so keep the input wires shorter (less than 2 feet if possible) and allow the servo wires be longer in considering the placement.

Mount the board with a couple of wood screws through the mounting holes, or use double sided tape. In some cases you may just want to leave the board floating and tack down the wires around the board to keep it in place. *Make sure to keep the board away from conductive surfaces such as metal that could short the board. You can kill the board if let a hot wire touch the wrong part of the board.*

Make certain the voltage regulator is free to ventilate the excess heat. If the regulator gets too hot (~85C) it will shut down until it cools back down. The regulator will be warm in normal operation.

Power - Connect the board to a DC power supply in the range of 6 to 24 volts. The power supply should be rated 1 Amp or better. Budget 0.12 A (120 mA) per servo.

The power inputs are polarity protected by a diode and will only work in the correct orientation. The power LED will light when power is correctly applied to the board. If you are going to use the board with a signaling system, make sure there is a common ground or, even better, use the same power supply.

Servos
Plug the servos in to the bank of servo connection pins. Servos have three wires, the power leads are usually black and red, and the third, the signal lead is white, yellow or orange depending upon the brand. Plug the servos in so that the signal lead is inboard on the pins marked "S" and the black wire is towards the edge of the board on the row of pins marked "B". If you do it incorrectly, it won't hurt anything, but the servo won't move. Please see the website for more information on mounting servos for driving turnouts. Also see the article in the July 2009 issue of Model-Railroad-Hobbyist online e-zine. There is a link to the article on the front page of the Tam Valley Depot website.

Servo Extensions - If the wire is too short to reach the board after installation, servo extenders in various lengths are available form Tam Valley Depot or at your local R/C hobby shop. Alternatively you can splice in extra lengths of wire. The servos draw little current so that any wire 26 gauge and above will work well. How many extensions can you add? In a test I was able to add 15 feet of 26 gauge extensions and the servos still worked well - at 20 feet the servos stopped working. A heavier gauge wire should allow longer extensions, although I haven't made any tests.

Control Inputs
The **Mtry** jumper is used to tell the board if momentary switches or toggle switches are being used. Make sure the jumper is correctly set or you will get unusual results.

Fascia Controllers - The Octopus can use the same fascia controllers as the Quad servo decoder. Put on the **Mtry** jumper for proper operation.

Toggles - The switch needs to be arranged so that it is open in one position and closed in the other (i.e. just like a light switch). You can use toggles, relays or lever switches for this. If you use a DPDT toggle, then the other side of the switch can be used to switch the frog polarity.

Momentary pushbutton - You can use a pushbutton (NO type) for the input. Each time the button is pushed, the turnout will change. Put the **Mtry** jumper on when using these. You can use several pushbuttons in parallel to have two or more stations controlling one turnout. You can use a Y cable with the fascia controllers to have two input stations both with indicator LEDS.

Note: When considering where to mount the board it is better to have long servo leads than long control leads due to noise issues. Also do not bundle control wires together - keep them separated by a 1/4" or more to avoid crosstalk

Centering the Servos
To aid in installation the servos can be driven to their center position. Place a jumper across the **Center** pins and the all 8 servos will move to their center positions. The servos will stay centered until the jumper is removed.

Automatically Aligning the Servos

Follow these steps to align the servos automatically.

- Connect the servo to the OctoIII before mounting it.
- Connect the Remote Alignment board with the flat cable.
- Put the **Run/Align** jumper on the OctoIII to the *Align* position.
- Put on the **Center** jumper
- Mount the servo such that the points are midway between the stock rails
- *Remove the **Center** jumper*
- On the Remote Alignment board:
- *Use **Next** to set the the same number as the servo on the remote.*
- Press **Next/Auto** for ~ 1 sec
- Choose the force level with the <--- and ---> buttons.
- Press **Next** briefly to start the alignment search
    The LED will flash rapidly for about 2 minutes while the servos are aligned
    (*To abort press **Next** briefly.*)
- If desired, swap the endpoints with a *brief* push of **Swap. (**This will be needed if your controller indicates Close when the turnout is actually Thrown.)

If the servos stop before the desired inputs, check that the points are free to move and that there are no obstructions to the actuating mechanism. *You can also redo the auto-alignment and increase the force on the points at the start of the alignment.* If the points have too much force on them try a lower number. It is best to use just enough force to reliably align the points but no more. If the servos make a grinding noise at the end of the throw then this is an indication to lower the auto-align force OR you can tweak the force manually (see Manual Alignment).

Manual Alignment

- Connect the servo to the OctoIII
- Connect the Remote Alignment board with the flat cable.
- Put the **Run/Align** jumper on the OctoIII to the *Run* position.
- Put on the **Center** jumper
- Mount the servo such that the points are midway between the stock rails
- Remove the **Center** jumper
- Put on the **Mtry** jumper
- On the Remote Alignment board:
- *Use **Next** to set the the same number as the servo on the remote.*
- Set the servo to Close or Thrown with **Cls/Thr** as desired (if the servo does not move check that the **Mtry** jumper is on). Thrown is indicated by a slow flashing of the LEDs.
- Press **Cls/Thr** for ~ 1 sec. The LEDs will start flashing rapidly.
- Press <--- and ---> repeatedly until the correct position is achieved.
- Pressing <--- and ---> at the same time will recenter the servo.
- Press **Next** briefly to save the position.
- Repeat for the second position of the servo after changing the servo position with **Cls/Thr**.

Remote Alignment Board

Speed - With the servo you want to adjust selected Hold the **Speed** (right) button. Press <- or -> to raise/lower the speed. The servo will move to show the new speed after each press. The left button saves the new speed.

Servo On/OFF - By default, the servos stay on all the time. Sometimes you might wish to have the servo turn off between movements to prevent it from drawing power. To do this use the remote aligner. With the servo to be changed selected, hold the Speed (right) button and press the **Next** button briefly). The LED will flash twice quickly to indicate the turnout will turn off between movments. (Note the LED will blink on/off slowly to indicate the servo is in the thrown position - the lock is 2 brief flashed followed by a long pause and quite distinct).

Range Jumpers

As an *alternate* to the auto-alignment and manual alignment of each servo the two range jumpers, **Rng1** and **Rng2** set the range of movement of the servos from about 10 degrees to approximately 70 degrees according to the table. If either of the jumpers is on *all* of the turnouts will use this range regardless of the auto-

R1	R2	Range
On	Off	+/- 17
Off	**On**	+/- 33
On	**On**	+/- 55

alignment values. However, using the range jumpers can be simple alternative to the alignment in many cases where all your servos can use the same throw. The illustration shows the jumpers On for **Rng1** and Off for **Rng2**.
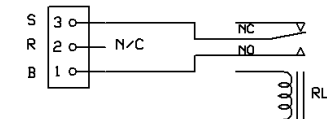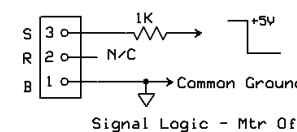
Factory Defaults Reset

To reset all the values to their original factory values, turn off the power to the board for at least 30 seconds. Connect the Remote Alignment board and then hold down the **Next** (left) button while turning the power back on. This will erase all the servo positions and set them back to just either side of centered.
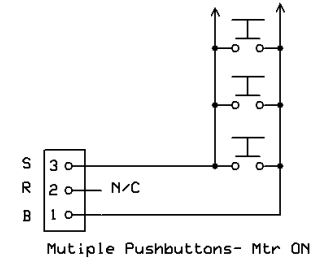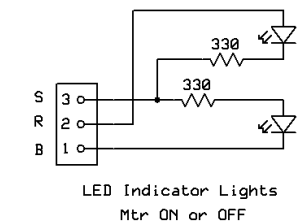
More Information and Help

Please feel free to contact us at

dmcree@tamvalleyrr.com.
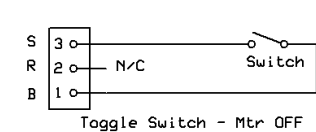
Toggle Switch - Mtr OFF

Mutiple Pushbuttons- Mtr ON

External Relay - Mtr Off

Signal Logic - Mtr Off

LED Indicator Lights
Mtr ON or OFF

Controller Wiring Suggestions