MODEL TRAIN SERVOMOTOR CONTROLLER KIT

The Model Train Servo Motor controller Kit (MTSMK) is a low cost solution for controlling an inexpensive servomotor. A servomotor is a gear driven motor with a lever arm attached to it. It rotates less than one revolution (about 180 degrees) and is controlled by a microcontroller (a small computer chip). Using some mechanical linkage, it is easy to move object(s) on your layout. The MTSMK has a number of control features that will allow you to adjust and program the movement of the servo so it will work in a variety of situations on your train layout.

The MTSMK has an Enable input (See below). Grounding this input line will cause the MTSMK to start working. When the blue colored jumper is installed the input line gets grounded and the MTSMK starts working.

When the Enable is grounded you can control the following:
1. The rotation of the motor;
2. The cycling of back and forth motion;
3. The starting and ending positions.

This is a very useful board if you want any sort of movement on your layout using a servomotor. The SG90 and the HiTec HS-311 are good examples.

HARDWARE

A servomotor connects to the controller board with a 3-conductor cable. In the picture above the cable is 9 inches in length. It would connect to the BRY pins below.
A potentiometer (or volume control type adjustment) is used to set the servomotor’s position. It is also used to set the rotational speed when the servomotor is moving.

A diagram is shown below:

![SERVO BOARD CONTROLLER DIAGRAM](image)

**POWER SUPPLY**

The Power Supply is a plug-in wall-wart type supply. The output voltage is 5 volts.

**OPERATION**

There are two modes of operation: Manual and Automatic. The mode is selected by inserting or removing a blue shorting jumper (MAN / AUTO). Manual mode has the jumper installed. In Manual mode, turning the potentiometer (pot) would cause a corresponding rotational movement of the servo. The position of the servo would reflect the position of the pot.

A sample application would be to mount an HO crane on the shaft of the servomotor. You could rotate the crane back and forth. The crane will move slightly more than 180 degrees (½ turn).

The Enable input (above) could also connect to a push-button switch. The Enable works essentially as the ON/OFF switch for the controller.

In **Automatic** mode the servo would move between a preset minimum and a preset maximum position.

To the left, the black arm represents the movement of the servo’s lever arm. It can rotate from 0 degrees to 180 degrees (or about ½ turn).

If you put the controller in Manual mode, then using the pot, you can rotate the arm to where you would like to set the min and max rotational positions.
When the desired min position is reached, press the Min button for 3 seconds. Likewise when the desired max position is reached press the Max button for 3 seconds. When either button is pressed, the lever position is stored in EEPROM memory in the controller. When you put the controller in Automatic mode the servomotor will rotate between the min and max positions.

Also when in Automatic mode the pot will control the speed of the rotational movement. If the pot is turned counterclockwise, the motor will rotate faster. The servomotor cycles between the minimum and maximum positions.

When the Single / Continuous jumper is removed, CONT is selected and the motor will continuously move back and forth. In SIN (jumper installed) the motor moves to the max position when enabled. When disabled the motor moves to the min position.

In all modes the Enable jumper will turn the motor on/off. In the Automatic mode the Enable would move the arm CW when low (to the max position) and CCW when high (to the min position). CW means clockwise and CCW means counterclockwise.

The controller can be operated in either mode.

Some pictures of the controller board.
SERVOMOTOR

The kit’s servomotor is an SG90. This motor while being inexpensive is a very capable servomotor.

Servomotors connect to the controller with a 3-wire cable. The wires are color-coded. The SG90 uses BLACK-RED-WHITE.

The SG90 connects to the B R Y pins on the controller board. The white wire connects to the Y pin.

The black wire is ground or negative. The red wire is +5 volts or positive. The white wire is the control wire. A control signal is sent to the servomotor through this wire.

There are always three wires. Sometimes the color of the control wire varies. For instance the HiTec HS-311 uses BLACK-RED-YELLOW. In this case the control wire is yellow.

The important thing is to make sure the servomotor gets connected to the controller board correctly.

There are also a number of screws, levers and wheels included to help integrate the servomotor into your animation project.

NOTES