



# **Model Railroad Turnout Control Module (TC-1)**

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## **User Manual**

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**Revision 1.00**

## Introduction

Thank you for purchasing this Ring Engineering product. We hope you find this product to be a great addition to your model railroad layout.




Please read all warnings and instructions before installation and use. For the latest information including the latest revision of this manual please visit our Internet site at [www.RingEngineering.com](http://www.RingEngineering.com).

The TC-1 is an Turnout Controller Module that you can add to your model railroad layout to control turnouts (Switch Tracks) and other products by using a RailPro controller such as the HC-3 handheld controller with color touchscreen.

<b>Introduction.....</b>	<b>2</b>
<b>Warnings.....</b>	<b>2</b>
<b>Direct Radio+NET.....</b>	<b>3</b>
<b>Installation.....</b>	<b>3</b>
<b>Passwords.....</b>	<b>9</b>
<b>Adjustments.....</b>	<b>9</b>
<b>Advanced Adjustments.....</b>	<b>10</b>
<b>Status Indicator Light.....</b>	<b>10</b>
<b>Reset Switch.....</b>	<b>10</b>
<b>Warranty .....</b>	<b>11</b>
<b>FCC Statement .....</b>	<b>11</b>

Notification: Ring Engineering believes that our TC-1 module is compatible with most HO Scale turnouts. However, it is not practical for Ring Engineering to test our module with all available turnouts. Further, we cannot control the manufacturing or specification changes from other manufacturers. It is your responsibility to determine if our module is suitable for your application. Ring Engineering is not responsible for any damage that may occur to your equipment from using our TC-1 module.

## Warnings

-  **WARNING:** This product is not recommended for persons under fourteen (14) years of age.
-  **WARNING:** Only Power a TC-1 with a RailPro PWR-56 Power Supply. Excessive voltage or improper voltage can cause a fire.
-  **WARNING:** Only connect products that can handle the voltage of the power supply that is connected. Connecting products that are not rated for at least the voltage of the connected power supply may cause a fire.

- ⚠ WARNING:** Improperly connected products may cause a fire.
- ⚠ WARNING:** Never connect AC power supplies to the TC-1.
- ⚠ WARNING:** There are no user serviceable parts inside. Return to Ring Engineering for repair.
- ⚠ WARNING:** This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).
- ⚠ WARNING:** Temperature: Operating 32F to 80F, Storage 0F - 110F
- ⚠ WARNING:** Operate and store in dry environment only.  
Relative Humidity: Operating 20% to 90% non-condensing, Storage 10% to 95% non-condensing



## Direct Radio+NET

This product is equipped with Direct Radio+NET. Direct Radio+NET is a custom designed RF transceiver to allow this product to have high-speed, two-way communication that is very easy to setup and use.

## Installation

### Step 1 – Mount your TC-1

Position the TC-1 near the products that you plan to wire to the TC-1 under your layout. Use at least 2 screws and mount the TC-1. If only using two screws, be sure the screws are located in opposite corners. The red arrows below identify mounting holes.



## Step 2 – Connect the Power

Be sure the power supply you are going to connect to the TC-1 is turned off. Then connect power supply to the “Power In” terminals labeled ‘P1’ and ‘P2’ with 16-gauge wire.



**Only connect a Ring Engineering approved power supply to the proper power input connections such as the PWR-56. Maximum voltage is 16 Volts DC. A power supply with excessive voltage or improper voltage can cause a fire.**

**NOTE:** The TC-1 is not polarity sensitive. You can connect either power supply wire to the ‘P1’ or ‘P2’ connectors.

The TC-1 is equipped with spring-loaded terminals for fast and secure connections that do not require a tool. To connect a wire to the TC-1 terminals, first strip 3/8 of an inch (about 2/3 the length of the terminal block) of insulation off the wire. Then press the orange push button over the contact that you want to connect a wire to. Insert the wire into the round hole under the orange push button. Be sure the wire goes all the way to the back of the terminal block while holding down on the orange push button. When you feel the wire touch the back of the terminal block, release the orange button to secure the wire into the terminal block. Give the wire a tug to be sure it is securely connected.

Wire Gauge  
Minimum #30  
Maximum #16

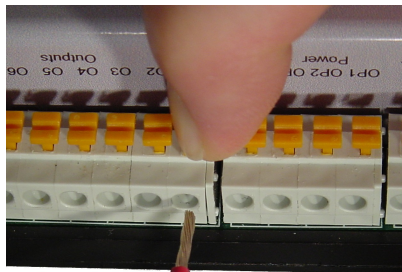


Figure 3.

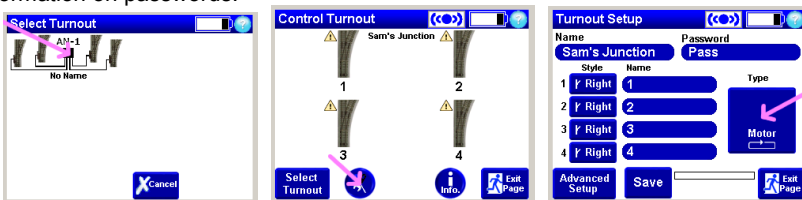
### Step 3 – “Find Product” on your Controlling Device

Power up the TC-1 and press the “Find Product” button on your controlling device such as the HC-3 handheld controller. See your controlling devices manual for more information.



### Step 4 – Configure the TC-1 for the Type of Switch

Configure the TC-1 for the type of switch you are going to be connecting. Depending on the type of switch machine you are going to connect to the TC-1 either select a switch type of “Motor Operated”, “3-Wire Snap” or “2-Wire Snap”. On the controlling device, go to the turnouts section and select the new turnout module. Press the adjustments button to see the switch type. At this time you may also want to give this newly detected product a name and a password. See the password section for more information on passwords.



**You must select the proper type of switch before connecting any switches.**

**IMPORTANT:** Be sure to save the settings after you select the proper type of switch.

### Step 5 – Connect the Switches



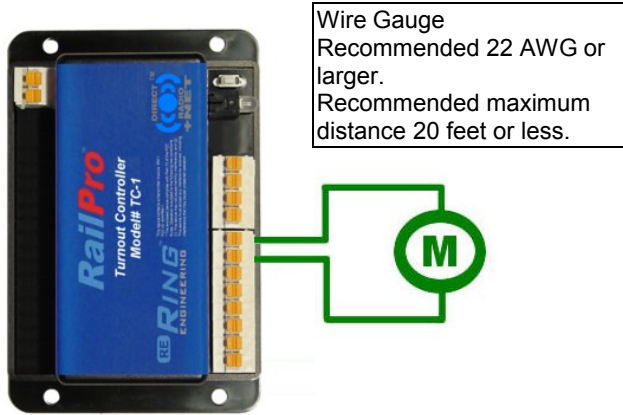
**Be sure the power is turned off before connecting any wires to the TC-1.**

There are three sections below showing how to connect three different types of switches: Type 1 Motor Operated (slow motion switches) Type 2 Snap 3-Wire, and Type 3 Snap 2 wire. Only one type of switch can be wired to a TC-1. See the section below for the type of switches you will be connecting.

**NOTE:** Ring Engineering highly recommends using motor operated switches instead of snap type switches. Snap type switches can take 100 times the power needed to operate a switch compared to a motor operated switch.

**Switch Type 1- Connect Motor Operated (slow motion switches)**

Connect Motor Operated switches as shown in figure below.



(Only 'Switch 1' connections are shown)

You can connect up to 4 motor operated switches to the TC-1. See table 1 below for the proper terminals to connect the 4 switches to.

Switch	Terminals	
Switch 1	O1	O2
Switch 2	O3	O4
Switch 3	O5	O6
Switch 4	O7	O8

Table 1

**NOTE:** If the switch is displayed in the turn position on the screen and the switch being controlled is in the straight position (operating backward) then reverse the wiring on that switch to correct the problem. For example if Switch 2 is operating backward, change wire from O3 to O4 position and wire from O4 to O3 position.

## Switch Type 2 - Connect 3-Wire Snap Switches

Connect 3-Wire Snap switches as shown below.



Wire Gauge
16 AWG 20 feet or less
18 AWG 12 feet or less
20 AWG 8 feet or less
22 AWG 4 feet or less

(Only 'Switch 1' connections are shown)

You can connect up to four 3-wire snap switches to the TC-1. See table 2 below for the proper terminals to connect the 4 switches.

Switch	Terminals		
Switch 1	OP1	O1	O2
Switch 2	OP2	O3	O4
Switch 3	OP3	O5	O6
Switch 4	OP4	O7	O8

Table 2



**Be sure the coil center tap wire is connected to the terminals labeled OP1 – OP4. Be sure the two non-center tap wires are connected to the terminals labeled O1 – O8. Only Outputs O1 – O8 have redundant power cutout to be sure sustained voltage is not applied to snap switches.**



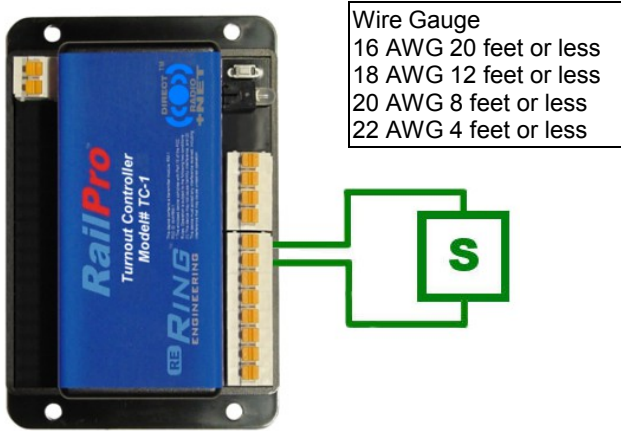
**Snap switch resistance measured from the center wire to either other wire must be between 3.6 and 20 Ohms. Never use a switch with more than 20 ohms unless it can have power applied continuously without damage.**

**NOTE:** If the switch is displayed in the turn position on the screen and the switch being controlled is in the straight position (operating backward) then reverse the wiring on that switch to correct the problem. For example if Switch 2 is operating backward, change wire from O3 to O4 position and wire from O4 to O3 position.

**TIP:** If you are not sure which wire is the center wire you can contact the switch manufacturer and ask them. Or you can use an electrical multimeter to find out. The two wires that read the highest resistances are not the center tap wire. A resistance measurement from the center tap to either of the two end wires should measure about half of the resistance as the resistance from one end wire to the other.

### Switch Type 3 - Connect 2-Wire Snap Switches

Connect 2-Wire Snap switches as shown below.



(Only 'Switch 1' connections are shown)

You can connect up to four 2 wire snap switches to the TC-1. See table 3 below for the proper terminals to connect the 4 switches to.

Switch	Terminals	
Switch 1	O1	O2
Switch 2	O3	O4
Switch 3	O5	O6
Switch 4	O7	O8

Table 3



**Be sure the wires are connected to the terminals labeled O1 – O8. Only Outputs O1 – O8 have redundant power cutout to be sure sustained voltage is not applied to snap switches.**



**Snap switch resistance must be between 3.6 and 20 Ohms. Never use a switch with more than 20 ohms unless it can have power applied continuously without damage.**

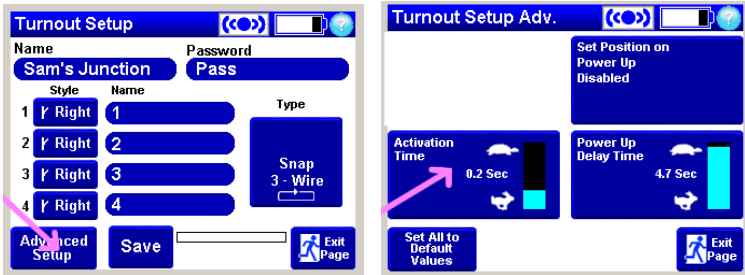
**NOTE:** If the switch is displayed in the turn position on the screen and the switch being controlled is in the straight position (operating backward) then reverse the wiring on that switch to correct the problem. For example if Switch 2 is operating backward, change wire from O3 to O4 position and wire from O4 to O3 position.

### Step 6 – Adjust TC-1 for best operation

The Activation Time adjustment sets the time the TC-1 will send power to the turnout to get the turnout to change positions. It is important that you adjust the Activation Time to only power the turnout just long enough to make the turnout move to a position dependably.



Operate a switch and notice if the switch makes a complete move from the turned position to the straight position and vice versa. If the switch does not make it all the way to the intended position, increase the Activation Time until it does. If the switch makes it all the way to the intended position, then decrease the Activation Time until it no longer makes the position. Then increase Activation Time a little so that each move to a position happens dependably. To adjust the Activation Time, on the controlling device go into the Adjustments for the TC-1, then go to the Advanced Setup.



**Your TC-1 is now ready to use!**

## Passwords

You can set a password in your TC-1. Further, it is recommended that you set a password in your TC-1 right after you receive it. When shipped from the factory, your TC-1's password is blank. When the password is blank, any RailPro controlling device can detect and control your TC-1. Since RailPro uses Direct Radio, it is possible to detect and control your TC-1 from over 100 ft away. In other words, it is possible for your neighbor to control your TC-1. However, if you put a password into your TC-1, then your neighbor will not be able to detect or control your TC-1.

**NOTE:** It is ok to give each RailPro Turnout Controller Module the same password.

## Adjustments

### Name

The reason to give your TC-1 a name is so you can tell it apart from another TC-1. If you had two or more TC-1's and did not name them, it would be difficult to tell which one you are going to control when you touch the picture of a TC-1 on your controlling device. You can give the TC-1 any name that you would like.

### Password

It is recommended that you give your TC-1 a password. Please read the Password section for more information.

### Turnout Type

There are three different types of turnouts the TC-1 can control: Type 1 Motor Operated (slow motion switches), Type 2 Snap 3-Wire, and Type 3 Snap 2-Wire. Only one type of turnout can be wired to an TC-1.

## Turnout Style

The turnout style allows you to choose a picture of a turnout like the one you are connecting to the TC-1 such as right hand or left hand turnout.

## Turnout Name

You can give any name you would like to each of the four turnouts so you can easily identify them for operation.

## Advanced Adjustments

### Activation Time

The Activation Time adjustment sets the time the TC-1 will send power to the turnout to get the turnout to change positions.

### Set Position on Power Up

If this option is enabled, the TC-1 will wait for the Power Up Delay Time then set the position of each switch to the last commanded position before the power was turned off.

### Power Up Delay Time

Is the amount of time the TC-1 will wait before it sets the positions of each switch after a power on. This is only used if the Set Position on Power Up is enabled. This is used so in a large system that all the turnouts do not try to move at the same time during power up. If all the turnouts moved at the same time, the power supply could be overloaded.

### Status Indicator Light

The indicator light will be green when the TC-1 is powered up and ready to be controlled. The indicator light is yellow while it is powering up. You will need to wait for the indicator light to turn green before using the TC-1. The indicator light will turn red if the TC-1 has faulted.

**TIP:** If the LED is red there will be a Caution Triangle on the HC TC-1 Control page. Press the Caution Triangle to take you to the Information page. On the Information page it will have text describing the fault. Press the fault text to bring up a list of possible causes and corrective action.

### Reset Switch

Will cause the TC-1 to reset. The reset switch should not be used for normal operation. The reset switch can be used in place of cycling power to reset an unknown password. When a controlling device asks you to cycle the power on the product to reset the password, you can simply press the reset switch instead of disconnecting the power wires.

## Warranty

### Limited One Year Warranty

Ring Engineering, Inc. (Ring Engineering) warrants that for a period of one year from the date of purchase, this product will be free from defects in material and workmanship. Ring Engineering, at its option, will repair or replace this product or any component of the product found to be defective during the warranty period. Replacement will be made with new or remanufactured product or component. If the product is no longer available, replacement may be made with a similar product of equal or greater value. This is your exclusive warranty.

This warranty is valid for the original retail purchaser from the date of initial retail purchase and is not transferable. Ring Engineering dealers, distributors, or retail stores selling Ring Engineering products do not have the right to alter, modify, or any way change the terms and conditions of this warranty.

The warranty does not cover normal wear of parts or damage resulting from negligent misuse of the product. Further, the warranty does not cover Acts of God, such as fire, flood, hurricanes, and tornadoes.

Ring Engineering shall not be liable for any incidental or consequential damages caused by the breach of any express or implied warranty or condition. Except to the extent prohibited by applicable law, any implied warranty of merchantability or fitness for a particular purpose is limited in duration to the duration of the above warranty. Ring Engineering disclaims all other warranties or conditions, express or implied statutory or otherwise. Some states or jurisdictions do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

This warranty is void if there was an attempt to repair the product, or the product was repaired by non-authorized Ring Engineering personnel.

To obtain warranty service contact Ring Engineering at:  
Email: [info@ringengineering.com](mailto:info@ringengineering.com)  
or Phone (219) 322-0279  
to get a return authorization and return instructions.

If your Ring Engineering product is not covered by warranty, or has been damaged, an estimate of repair costs or replacement costs will be provided to you for approval prior to servicing or replacement.

## FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.