Remote Stall Motor Controller (RSMC) User Guide

Revision v2.3 01/16/2026

Introduction

The RSMC is designed to provide the control functions needed for local or remote operation of a turnout for various styles of turnout motors. The RSMC provides LED outputs with onboard current limiting resistors for route and switch lock status.

Revision History

v2.1   07/07/2017   CC
v1.4   06/08/2015   CC
v1.3   04/17/2015   CC
v1.2   12/26/2014   CC
v1.1   04/16/2014   CC
v1.0   01/29/2014   CC
V2.2   01/01/2025   SN
V2.3   01/16/2026   SN

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1. SYSTEM OVERVIEW

The Remote Stall Motor Controller (RSMC) is designed to operate with stall motor style turnout motors (Tortoise, Switchmaster), switch turnout motors (MP1/MP4/MP5/MP10, Fulgurex)

The ITC has the following features:
- 8 position motor pads for a .156" Molex connector, .156" edge connector, or .100" (2.54mm)
- Stall motor power input, 9-12 Vdc
- Throw input port
- Turnout position feedback output
- Route LED ports, Normal/Reverse (Common Cathode, Sourcing)
- Frog power routing using external switch contacts (Tortoise, Switchmaster™)

Pads for connection to a Tortoise stall motor are .156" for Molex™. The pad spacing also mates to a standard 8 position .156" edge connector. Right angle or straight header pins can be soldered directly to the Tortoise edge connector and mate to a Molex connector on the ITC.

Pads for connection to .100" (2.54mm) screw terminal blocks or other .100" spaced connectors are parallel connected to the .156" pads.
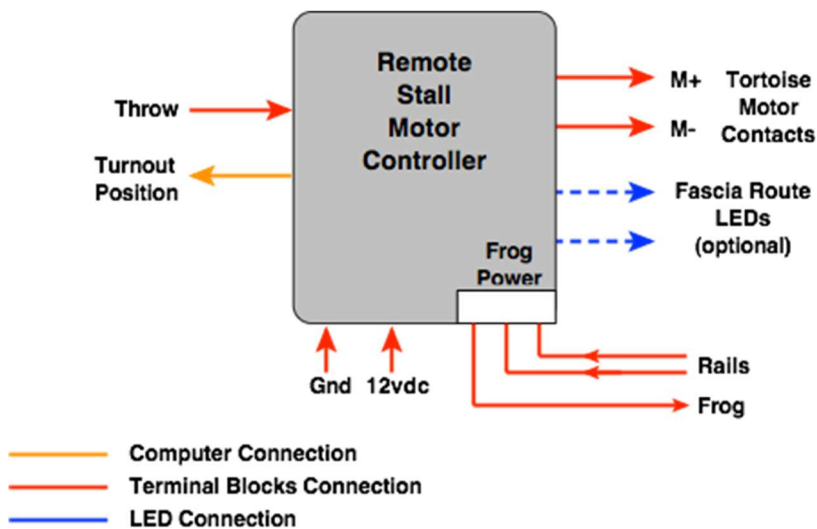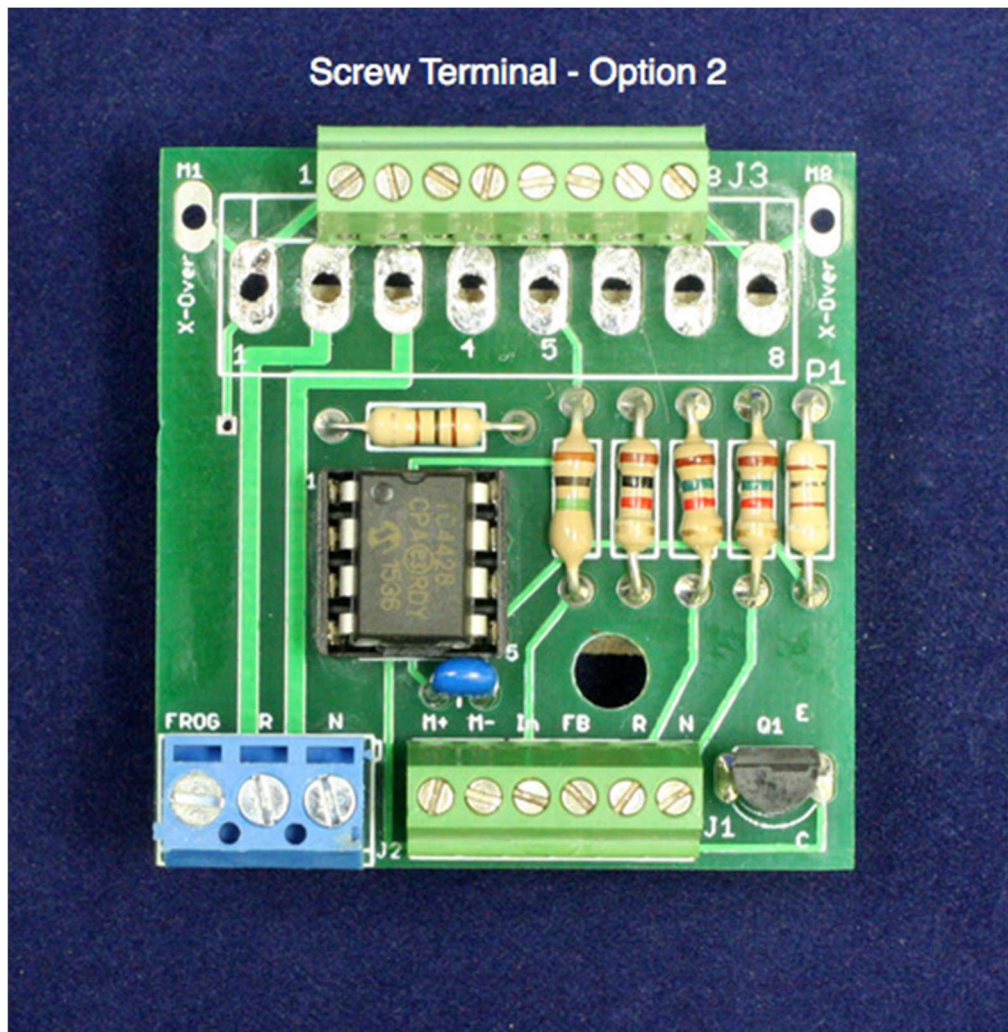

Figure 1- RSMC Block Diagram

Figure 2- Remote Stall Motor Controller Component Locations (note input designations over J1)
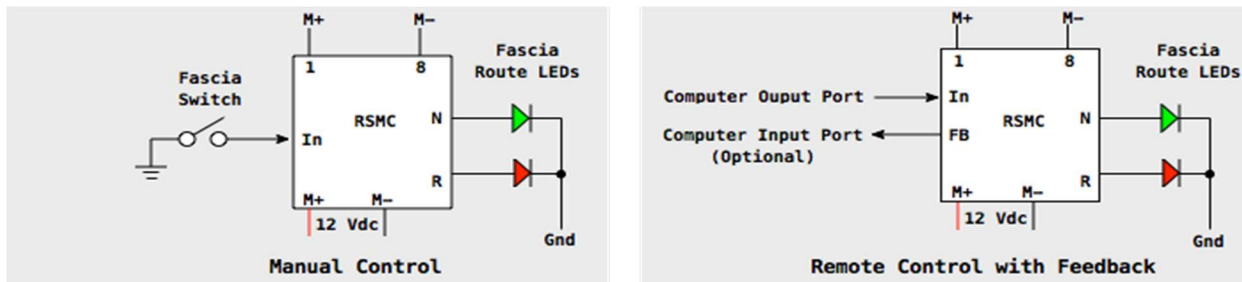
2. CONNECTION EXAMPLES

Figure 3- RSMC Connection Examples

3. CONTROL PORTS - INPUT AND OUTPUT

The RSMC has one input port and one output port used for controlling a turnout motor. Each input is intended to provide an equivalent control line, which may be found in prototype turnout control installations.

Throw In - (Input) This input controls the operation of the turnout from a local source like as fascia toggle switch. A Low input will throw the turnout to the opposite position.

Turnout Position (Feedback) - (Output) This output reflects the last commanded position of the turnout. This output is normally connected to a computer input port for monitoring by control software. A High state indicates the Normal route is selected, a Low state, the Reverse route is selected. The position of a turnout within a signaled section is normally used to set the correct signal aspect in ABS/CTC environments.

Route LEDs - The RSMC provides direct drive for status LEDs. The M+ input voltage is routed through one set of contacts in the Tortoise. The LED outputs are internally routed through the external switch contacts. Normally, the LEDs are mounted on fascia panels. Two signals are provided which are intended to drive fascia mounted LEDS to indicate which route (Normal/Reverse) is active. Limiting resistors are provided onboard for the LEDs.

4. TURNOUT MOTOR CONNECTIONS

Connection to a turnout motor is through the 8-position connector, J1 or J2. Pin 1 and Pin 8 are the motor voltage outputs. The RSMC reverses the polarity of the output pins based on the state of the onboard throw signal. Various types of turnout motors can be interfaced to the ITC.

4.1. Circuitron Tortoise®/Switchmaster® Stall Motor

Direct connection to stall motor style turnout motors. Changing the motor voltage polarity changes direction of throw bar.

### 4.2. Tortoise Switch Motor Connector

Direct connection to a Tortoise stall motor is done through the .156" pads. The pads can have a .156" female Molex connector or an 8-position card edge connector. A right angle Molex male connector can be easily soldered to the edge finger pads on the Tortoise stall motor.

If hardwired connections to a turnout motor is desired, a set of .100" (2.54 mm) spaced pads are

provided for a screw terminal block, male header pins, or direct solder. These pads are connected to the .156" pads.

Pins 2,3 and 4 are connected to the Frog power connector.
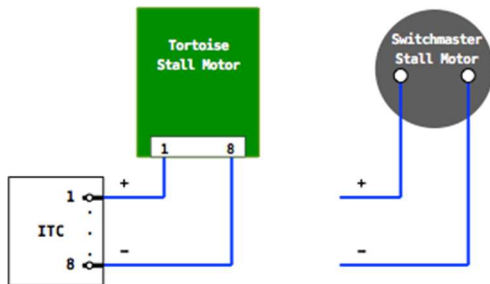
Figure 4- Stall Motor Connections
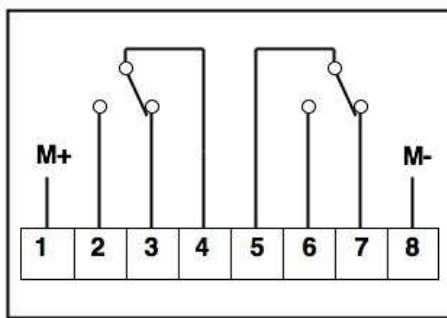
Figure 5- Tortoise Pin Assignments

4.3. MP1/MP4/MP5/MP10 Connection

The MP series motors by MTB are end stop style turnout motors.

+12-15 VDC

GROUND

Logic Level
From Computer
Or Arduino

1N4001

Use 15V if you can do so without damaging anything else
On your 12V bus or use a boost converter
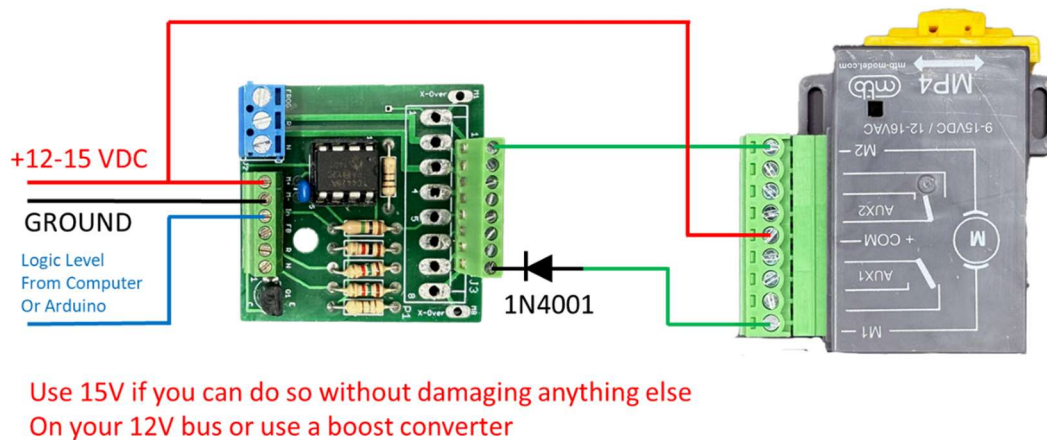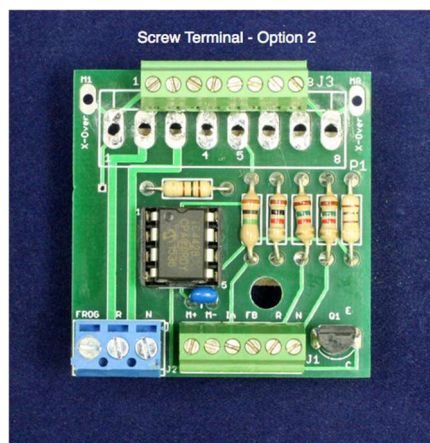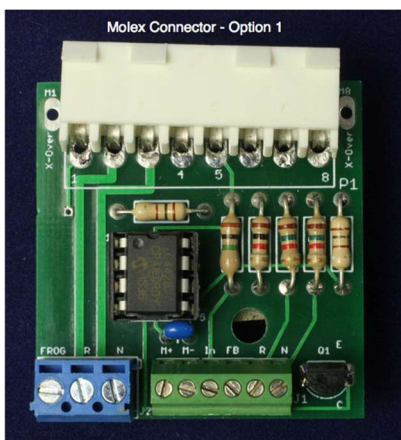
Figure 6- MP4/MP10 Connections

5. REVERSING MOTOR CONNECTIONS

If the turnout motor, on power up, does not align to the desired default route, flip the RSMC over when using the Molex connector, or rotate the RSMC 180 degrees if using the card edge connector, or swap the motor wires (pin 1 and 8) on the .100" output screw terminal block.
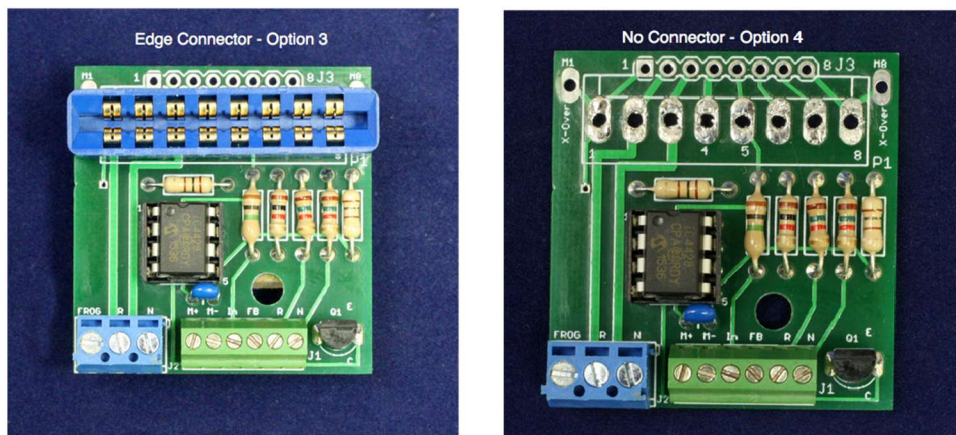
6. MOTOR CONNECTION OPTIONS

Figure 7- RSMC Configurations

7. STALL MOTOR INTERFACE

The RSMC drives the stall motor through a MOSFET chip connected to the motor voltage. When the Throw Input pin is grounded, the polarity to the Tortoise motor is reversed, and the motor moves to the opposite position. A SPST toggle switch, connected between the motor minus terminal and the Throw Input pin, is all that is need to operate the RSMC. On power up, the RSMC drives the Tortoise to a default position. If the power up route of the connected turnout is not what is desired, flip the RSMC and plug in upside down.

Note: Dc voltage input for the motor, must be connected to the +motor, -motor with the correct polarity.

Turnout position feedback is provided from the Position Feedback pin. This is an open collector output and is set low (zero) when the reverse switch contacts are active.

Route LEDs are driven by one set of internal contacts in the Tortoise. Common Cathode (sourcing) LED connections are supported. Stall motor voltage is routed from the external contacts through onboard limiting resistors to the terminal strip. Resistor values for R4/R5 can be selected to adjust the brightness of the LEDs. The route LEDs, if mounted on a fascia panel, will only light if the internal switch contacts mate correctly.

The other set of external switch contacts provide connections for routing power to an isolated turnout frog. Heavier traces are routed to a 3.5mm screw terminal for the frog connections.BILL OF MATERIALS

Description	Ref	Qty		
cpNode RSMC PCB	PCB1	1	MRCS	RSMC
TC4428A MOSFET	U1	1	Digikey	TC4428AEPA-ND
2N3904	Q1	1	Jameco	38360
Capacitor .01uF Mono	C1	1	Jameco	151116
Resistor 100 Ohm	R1,R2	2	Jameco	690620
Resistor 1M Ohm	R3	1	Jameco	691585
Resistor 1500 Ohm	R4,R5	2	Jameco	690902
Resistor 1000 Ohm	R6	1	Jameco	690865
DIP Socket 8 pin	TC4482	1	Jameco	112206
8 Pin .156" RA Female Header	P1	1	Digikey	WM13515-ND
8 pos Screw Terminal .100"	J3	0	Electronics Salon	GS019-2.54
8 Pos Card Edge Connector	J1 EdgeConn	0	Jim's Trains	JMT/TCONN
6 pos Screw Terminal .100"	J1	1	Electronics Salon	GS019-2.54
3 pos Screw Terminal 3.5mm	J2	1	Jameco	2094514

Figure 8- Bill of Materials

8. ASSEMBLY

[ ] All of the components are through-hole technology with wire leads. A useful tool is a lead bender for forming the leads at 90 degrees for easy insertion into the pad holes. Start with inserting the lower height components.

[ ] Install the IC socket for U1. Orient the socket with pin 1 shown on the silk screen.

[ ] Install resistor R3 (1 Meg ohms)

[ ] Install resistors R4,R5 (1500 ohms).   Select value to adjust LED brightness.

[ ] Install resistor R6 (1000 ohms)

[ ] Install the bypass capacitor C1 (.1uF)

[ ] Install transistor Q1, (2N3904). Orient the transistor to the silkscreen markings.

[ ] Install the 6 position, .100" screw terminal block, ST1 [ ] Install the 8 position, .156" Molex connector, J1 OR

[ ] Install the 8 position,.156" Edge Connector, J1 OR

[ ] Install the 8 position, .100" screw terminal block, J2

[ ] Install the 3 position, 3.5 mm screw terminal block, J3