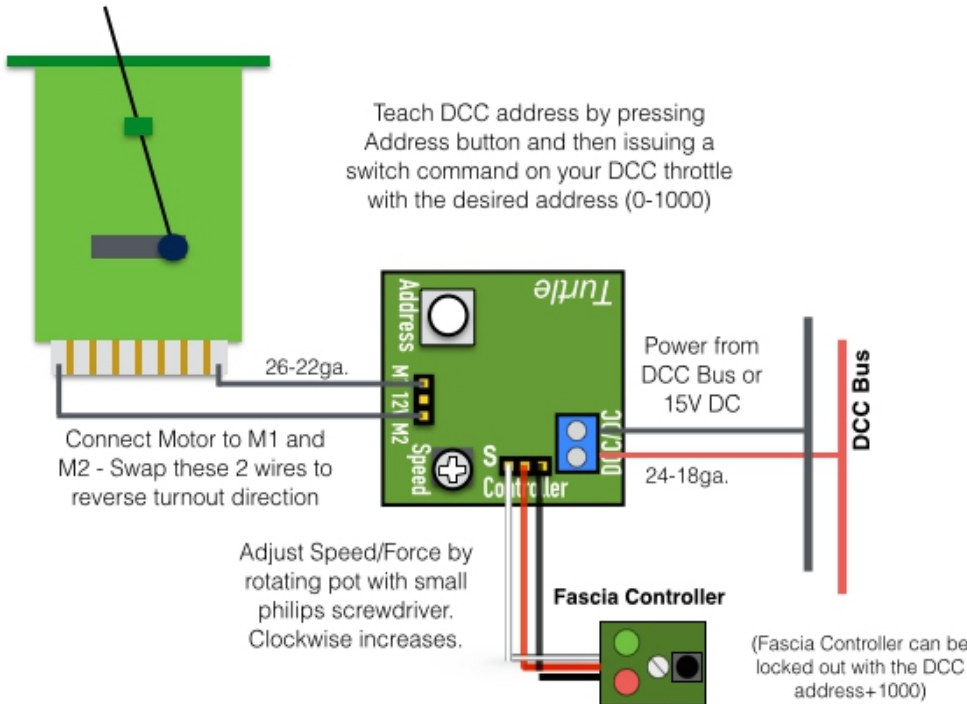


Tam Valley Depot Turtle Stall Motor Driver and DCC Decoder Manual v0.1

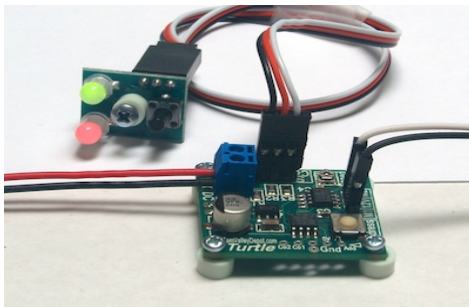
The Turtle is stall motor driver designed to run turnouts. It can be used with a number of popular stall motors including the Tortoise™, SwitchMaster™, the MP1, MP5, Cobalt™ as well just about any 3-12V geared motor. It uses the TVD Fascia Controller for local control and DCC for remote control. It can also be powered with DC if the DCC control is not needed.

Installation – Mount the Turtle on a wooden surface with the enclosed spacers and screws. Install the other components in the order, power(DCC or DC), fascia controller, and then lastly, motor. Even if you are not going to use a fascia controller in the final installation, is handy to have one fascia controller for initial setup. When the turnout is switching properly then set the DCC address.

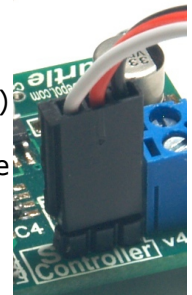
Power – The Turtle can be powered from a DCC bus. It will draw about 10 milliamps of power when setup. You can



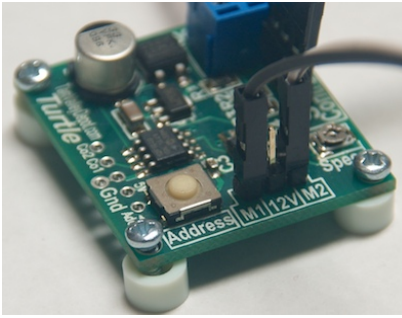
add a dozen or so to a DCC system without imposing too much load. If you are going to have a large number you might consider adding a booster to drive a DCC accessory bus. We make a suitable booster for this use, item DAB002. Power the booster with the 16V power option. If you do not want DCC control you can power your Turtles from a 12-16 volt DC power supply. Do not use an AC supply. Do not use an old "power pack". The maximum speed of the motor is determined by the voltage of the power – the filtering diodes on the board cause a loss of about 1.5 volts so this needs to be taken in to consideration. You can always lower the voltage with the Speed trim pot on the Turtle but you cannot raise it above the input voltage minus 1.5 volts, so err on the high side with your power.



Fascia Controller - plug the fascia controller in such that the white wire (signal) is next to the S on the board. The other 2 wires are ground (black) and +5V (red). If you want to make your own controls you can refer to the wiring diagram on the other side. The Turtle actively drives the S line high or low depending on the turnout position. It can source or sink 20 mA to drive indicator LEDs. Every 10 ms the Turtle briefly releases the S line



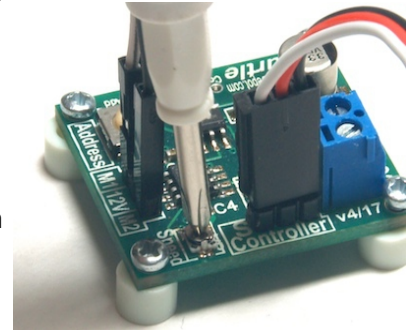
and an on board pullup resistor pulls it high. If the line is grounded for at least three 10 ms cycles then the Turtle will change state. Usually the grounding is by a pushbutton but it could be an external signal from another board such as an Arduino or CMRI board.



Motor – Most stall motor switch machines use 2 wires – connect these to M1 and M2. If the motor drives the switch in the wrong direction – that is, it does not agree with the fascia controller LED indication, then swap M1 and M2. A few switch machines, e.g. the MP1, require a third wire, 12V. Connect this to the middle post.

Motor Speed/Force – You can lower the speed of the motor with the trim pot on the board. Use a small Philips head screwdriver to turn the pot. Clockwise increases the speed and

raises the amount of force on the points, the other direction will lower the speed and the force on the points. This feature can be used to slow motors that are otherwise too strong to drive points. In this case you will want to set the speed to its lowest setting before you install the motor and then gradually raise it while toggling the fascia controller, until the motor has enough force to move the points.



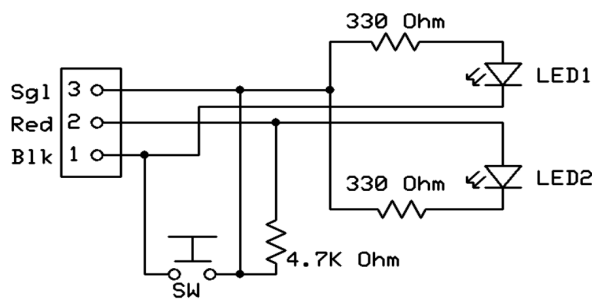
DCC Address – The address of the board as it comes from the factory will be 1. To change the address (1-1000), press the Address button to put the board in the *learning mode*. The fascia controller will flash to indicate learning mode. You do not need to hold the Address button down, just a brief press is needed (another press will exit the learning mode if you accidentally set it). While in learning mode, send an Accessory command (called Switch on Digitrax) in the range 1-1000 for either throw/reverse or close/normal depending on how the turnout is currently set. The Turtle will remember the address and the direction and then exit learning mode. Test the address by sending the opposite direction, throw or close, and check that the points move. **DO NOT connect the Turtle to a programming track - the Turtle has no ability to read or write CV's.**

Reset – to reset the address to 1, hold the address button down while turning on the power.

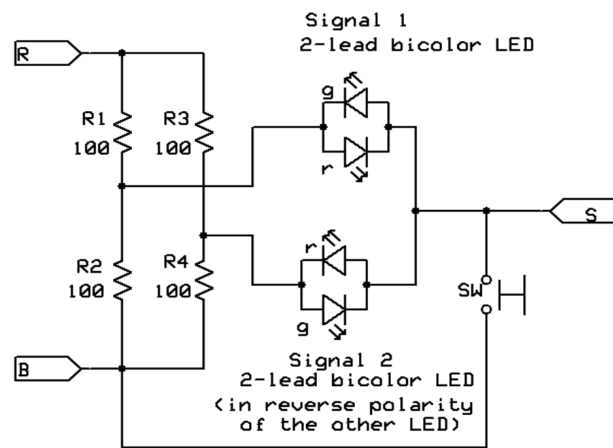
Local Lockout – The Turtle interprets the DCC address+1000 as a *Local Lockout*. Thus if the address of board is 3, 1003 is the Local Lockout address. If a Close/Normal is sent to the Turtle at the Local Lockout address, the fascia controller will be locked out. The output LEDs will be dimmed (or off) as an indicator. Sending a Throw/Reverse restores local control. This will allow a dispatcher to lock out local control. Typically this would be done using a control on a panel in a computer program such as JMRI.

DIY Fascia Controller Wiring

S/Sgl is signal wire, R/Red is +5V, B/Blk is ground. On the board these are in the order SRB. If you just want LEDs you can leave off the pushbutton switch (SW).



Fascia Controller Schematic for Single Color LEDs. 4.7K resistor is optional but will increase noise rejection.



Wiring diagram for bicolor 2-lead LED