

## SDD-001 User Instructions

### ***SDD-001 – DCC enabled turnout driver for Tortoise™ switch machine***

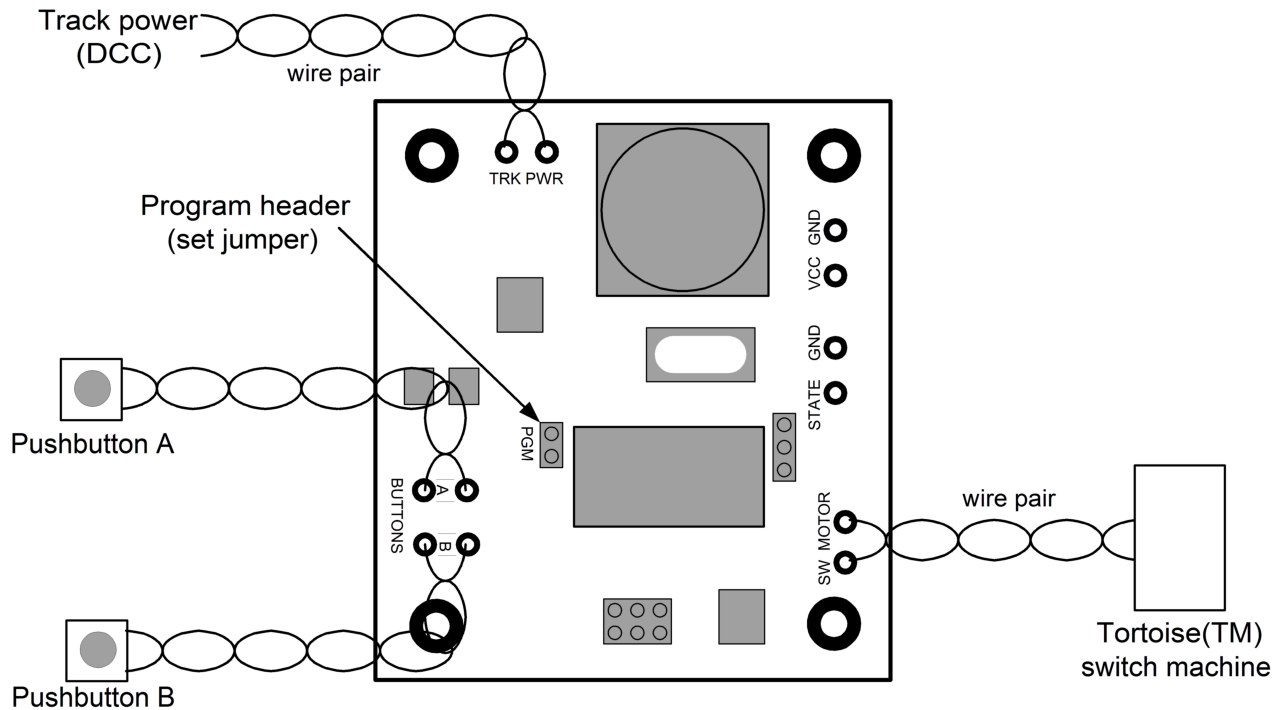
The SDD-001 drives a Tortoise(TM) slow motion switch machine. It is powered from the track, and also receives switch commands from the track via DCC. The turnout may also be activated using pushbuttons. The SDD-001 is ideal for use in a Free-mo module, where one pushbutton is required on each side of the module.

The SDD-001 comes in two variants:

- **SDD-001-N:** Only the circuit board itself. The user must provide external hardware (pushbuttons), and wire the unit into his layout himself. A wiring diagram is shown below.
- **SDD-001-W:** The circuit board is pre-wired with two pushbutton switches, a connector for the Tortoise(TM) switch, and a length of twisted pair wire for connection to a power source.

### **Mounting and wiring**

The SDD-001 may be mounted to your layout with ordinary #6 screws using the four mounting holes at the corners of the device.



SDD-001 wiring diagram (not to scale)

The unit is wired as shown in the diagram. The wires connecting to the PC board are indicated as

\* Tortoise(TM) is a trademark of Circuitron, Romeoville, IL, USA.

## SDD-001 User Instructions

twisted pair. If you are using the SDD-001-N, then you must solder the wires to the board yourself. If you are using the SDD-001-W, the board comes pre-wired with pushbuttons, a Tortoise(TM) card-edge connector, and a length of twisted pair wire for connection to a power source. If you use your own pushbuttons, they must be of the “normally off, momentary-contact” type. Some suggested components are shown in the table below, but you can use your own component choices instead.

Component	Suggested P/N (DigiKey)	Suggested P/N (Jameco)	Comment
Pushbutton	450-1110-ND	26623	Momentary contact, normally open. Choose either vendor as desired.
Tortoise connector	GEM08DSEN-ND		Optional – user may solder wires directly to Tortoise(TM).

## Programming

The SDD-001 supports the following CVs

CV	Purpose	R/W	Default value (decimal)	Comment
1	Address – low byte	Read/write		
2	Pushbutton lockout 1 = pushbutton active 0 = pushbutton disabled	Read/write	1	Only lowest bit is writable
7	Manufacturer revision number	Read only	1	
8	Manufacturer ID	Read only	94	
9	Address – high byte	Read/write		Only lowest three bits writable.
29	Decoder configuration	Read only	192	

We recommend you program the SDD-001 address using operations mode since it is easy. However, the SDD-001 also supports full service mode programming using the CVs above.

### **Setting the address – operations mode**

Programming the SDD-001 address may be accomplished when the decoder is wired into your layout's track power. To set the address, do the following:

1. Make sure your layout is powered up, and the SDD-001 is receiving power. One of the two LEDs should be lit if the unit is receiving power. (It doesn't matter which LED is lit for this step.)
2. Place the black jumper on the two-pin header labeled PGM on the SDD-001. (This header is

**Manufactured in the USA by Electroniscript, inc.**

PO Box 406, Arlington, MA 02476

<http://www.electroniscript.com/>

## SDD-001 User Instructions

indicated in the above drawing.) This places the unit into “program mode”.

3. Using your throttle, send a command to throw or clear a turnout to the layout. Use the turnout address which you want to assign the SDD-001. The SDD-001 will recognize the switch command, and assign the address to itself. (It will not move the turnout in this step.)
4. Remove the jumper. It is convenient to hang the jumper off of *one* of the two header pins for storage, but do not leave the two header pins shorted by the jumper.
5. The SDD-001 will now respond to switch commands sent to the address you used in step 3.

The address you set is *non-volatile* – the SDD-001 will remember the address even when the power is off. If you want to change the address of the SDD-001, simply follow the above steps to give it a new address. We recommend that you physically write the address you set directly on the SDD-001 as a memory aid, or at least record the value in a visible location.

### **Setting the address – service mode**

Service mode involves communicating with the SDD-001 using your DCC system's programming track. In service mode, the SDD-001 supports CV read and write using **direct byte** mode. Communication with the SDD-001 in service mode is bidirectional – you may both read and write the CV values. We do not recommend setting the SDD-001 address in service mode because it involves a little bit of math, but if you feel intrepid here are the steps:

1. Wire the track power (TRK PWR) connections to your programming track. We recommend connecting alligator clips to the track power wires, and then connect to the programming track using the clips.
2. Compute the values of CV1 and CV9 which you wish to use for the turnout address. The turnout address is determined by this expression:

$$\text{addr} = 256 * \text{CV9} + \text{CV1}$$

Only the lowest three bits of CV9 are valid. That means CV9 can take values from 0 – 7. All 8 bits of CV1 are valid. In theory, the total number of valid turnout address is  $2^{11} = 2048$ . However, address 0 is forbidden since it corresponds to a broadcast message, leaving 2047 possible addresses.

3. Enter service programming mode on your throttle, and select **direct byte** programming mode.
4. Enter the values of CV1 and CV9 which you computed above.
5. After you have entered the values, try reading them back to verify that they have been successfully remembered.

The address you set is *non-volatile* – the SDD-001 will remember the address even when the power is off. Once the unit is programmed, we recommend that you physically write the address you set directly on the SDD-001 as a memory aid, or at least record the value in a visible location.

### **Pushbutton lockout**

By default, the SDD-001 may be activated by two pushbuttons connected to the device, as well as by

## SDD-001 User Instructions

switch commands sent via DCC. However, activation using the pushbuttons can be disabled (*locked-out*) under user control by writing a 0 into CV2. In this state, the turnout is still controllable using DCC. This might be useful in a situation where the layout is controlled exclusively by computer, or to prohibit inadvertent misalignment of a turnout by “wayward fingers” during a public show.

You may control the lockout by writing CV2 in either service or operations mode. Service mode writing of CV2 requires that you remove the SDD-001 from the mainline track, and connect it to your programming track. This is not convenient after the unit has been built into a layout. Therefore, the SDD-001 also supports writing CV2 using operations mode programming. Note that you must use *accessory decoder operations mode programming* to write CV2. (This programming mode is not supported by the Digitrax DT400/DT402 throttles as of this writing.)

If you have disabled the pushbuttons, you may also manually re-enable them without sending DCC commands using the following procedure:

1. Make sure your layout is powered up, and the SDD-001 is receiving power. One of the two LEDs should be lit if the unit is receiving power. (It doesn't matter which LED is lit for this step.)
2. Place the black jumper on the two-pin header labeled PGM on the SDD-001. (This header is indicated in the above drawing.) This places the unit into “program mode”.
3. Push either of the two pushbuttons connected to the SDD-001. This will clear the lockout, but will not activate the turnout.
4. Remove the jumper. It is convenient to hang the jumper off of *one* of the two header pins for storage, but do not leave the two header pins shorted by the jumper.
5. The SDD-001 will now respond to the pushbutton.

### Switch state

Two LEDs mounted on the board indicate the state of the SDD-001. One LED is red, the other is green. When the turnout is set in one direction the red LED lights. When the turnout is set in the other direction, the green LED lights.

If you are interested in monitoring the state of the switch from the SDD-001 electrically, the output pad labeled “STATE” on the board is a 5V TTL- compatible signal level which is either on (5V) or off (0v) depending upon the switch state. The ground pad labeled GND next to the STATE pad can be used as the signal return. Note: This is a TTL level signal. Do not use it to drive loads over 20mA.