The Jack Wabbit Quad™

A Unique, Intelligent Stationery Decoder, Four outputs, for Any Type of Turnout Motor

Designed by Larry Maier, Instructions by Don Fiehmann & Frank Verrico

US Patent 7,810,760 and 7,810,761

Compatible with All Types of Turn-Out Motors, Stall Motors, Snap Coils, Servos and all Others!

The Jack Wabbit™ is a Quad version of our popular Hare and Wabbit Intelligent Accessory Decoders. The Jack Wabbit has four fully functional intelligent decoders on one printed circuit board. The four decoders operate independently and each one has all of the advanced features and much more, compared to the Hare and Wabbits

Jack Wabbit Quad: 4 Outputs on one Stationary Decoder:

- ***Auto Throw™:*** **Automatically throws points when a train is approaching against the points.**
- ***Auto Throw™ Timer:*** **Provides for timing the auto throw function to prevent two trains from colliding.**
- ***Auto Return™:*** **Automatically returns the points after a preset interval for any/all operational events.**
- ***Smart Route™:*** **Sets up to 13 routes by simple address programming in addition to the primary address.**
- ***Dispatcher Over-Ride™:*** **Allows the Dispatcher to lock out any or all other switch commands.**
- ***Lock Block Protection™:*** **Overrides the Jack WABBITS operation if a designated block is occupied.**
- ***Locked Route Control™:*** **Provides for only one route direction response for a Throw or Clear command.**
- ***Smart Default Ops™:*** **Programmed power up response to either power off position, throw, or clear.**
- ***Operate Switch Signals*** **or Panel LED Indicators by direct LED connections.**
- ***Manual Pushbutton or Toggle Switch:*** **Allows button or toggle switch manual control of the points.**
- ***DCC Reset:*** **CV 63=42, Sets any or all Addresses and CVs to original factory default values.**
- ***Reset Decoder by Jumper:*** **Jumper selection resets entire Jack Wabbit to factory default Address and CV's.**
- ***Direct Current Ops:*** **The Jack Wabbit will operate on DC using the Manual Push Button Control Option.**
- ***Semaphore/Gate Ops:*** **Uses a stall motor and Auto Throw for triggered control of a semaphore or crossing.**
- ***Automates Reverse Loop Turnouts*** **Using Auto Throw feature.**
- ***Feed Back, Turnout Position Reporting to:*** **Digitrax LocoNet, Lenz ExpressNet and NCE Cab Bus**
  Optional Direct Interface to loconet

Section **Information** **Page**

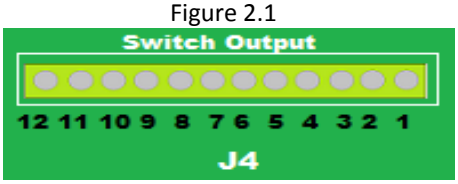
A. Quick Start: *You can proceed directly to Step (1)-(3), below for a "Quick Test" of Operation. This will show how simple it is to install the Jack Wabbit and operate on DC/ DCC!*

1) **Connect DCC Power to screw terminals, 1 and 2 of J1, (Terminal Block is marked J1 and "AUTO THROW" on the circuit board). These terminals are labeled "DCC 1 and DCC 2" on the circuit board. You can also use 10-16 volts D.C., (28 VDC Max.) to power the Jack Wabbit, This would let you operate your switch motors with the momentary push button switches and can also be used if you are using the optional LocoNet interface (Note: the LocoNet interface will also work if you power the Jack Wabbit from DCC).**
   Caution, connecting power to other terminals will damage the Jack Wabbit!

2) **Connect J4 (marked "SWITCH OUTPUT" on the circuit board) screw terminals 1 and 3 to 1st Tortoise™. J4 pin 1 will be positive relative to J4 pin 3 when the Jack Wabbit state is Clear. Use screw terminals 4 and 6 for the 2nd Tortoise™. Connect screw terminals 7 and 9 to the 3rd Tortoise, and screw terminals 10 and 12 to the 4th Tortoise™. Use the accompanying Tortoise™ diagram to wire pins 1 and 8 of each Tortoise™ to the J4 terminals mentioned above. Note that the pin order in the diagram below assumes that J4 is positioned in the upper left corner relative to the user.**

3) **Test your DCC setup by operating, use primary default address, (1), (2), (3), and (4) for this test.**

Figure 2.1



View is as Shown on Jack Wabbit Drawing Below.

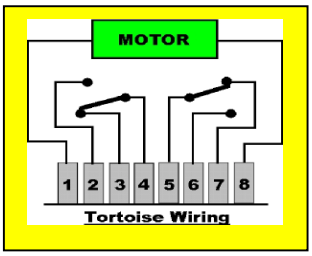
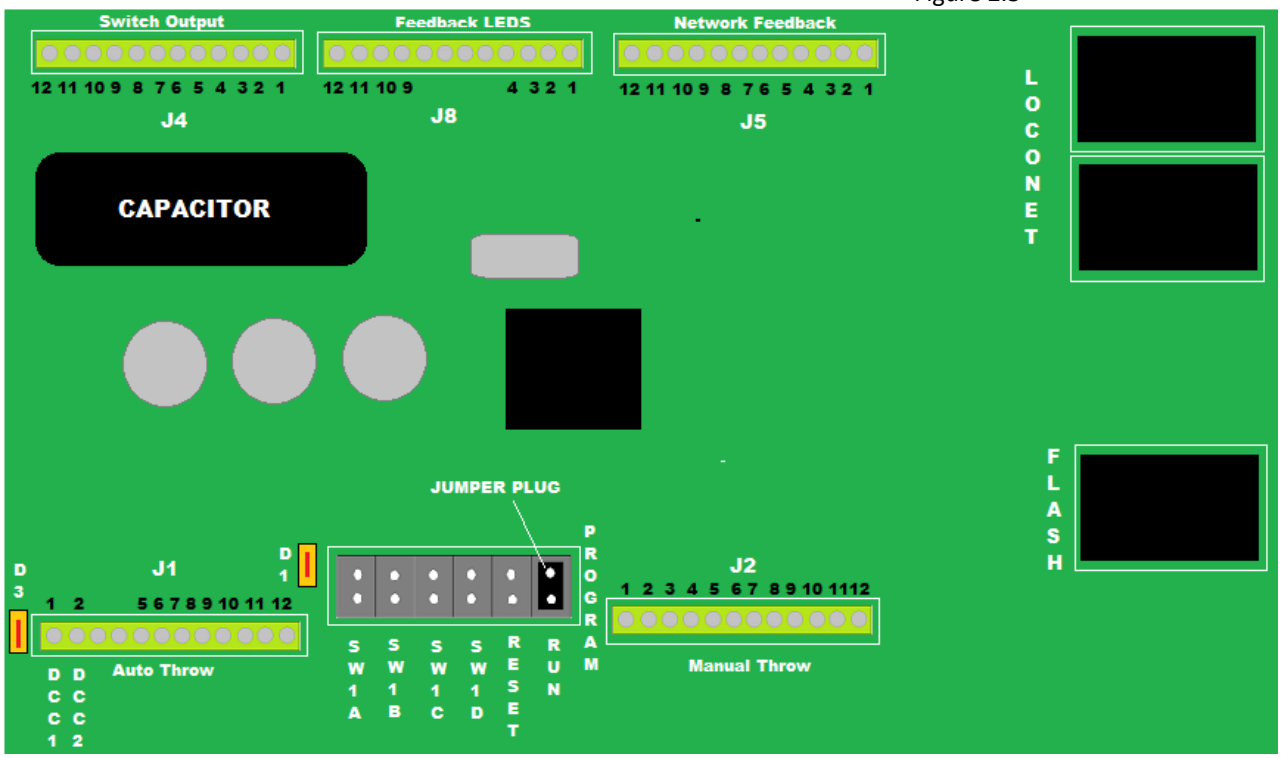


Figure 2.2

Digitrax users should review the configuration of the Digitrax DCS-100/200 prior to operating and or programming. It is important that the DCS-100/200 have the switching (Turnout) control enabled to operate Stationery Decoders. Confirm that (Option Switch) OPS#27 is "t"

B. The Jack Wabbit at a Glance:

Figure 2.3



Note: Screw Terminals without numbers are not used.

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Important Note: If you are using any type of coil switch motor on any of the Jack Wabbit outputs, CV 79 for the associated output MUST be set to 1 PRIOR to connecting snap coils. CV79=1 changes the output from continuous to momentary to prevent damage to the switch machine coils. From the factory the Jack Wabbit is configured for Tortoise™ type slow-motion switch motors and provides a continuous output. See programming section on p.15

1. **Diode D3**- Is the pilot/power LED. This will glow red when power is connected to screw terminals J1-1 and J1-2 (DCC 1 and DCC 2).

2. **Diode D1**- Is the program LED. The Led will flash indicating the software revision when first entering the program mode (see programming section) then go out. The LED will flash red one time if programming data is successfully stored. If D1 does not flash, the Jack Wabbit did not receive valid programming data.

3. **Loconet Plug Ports**- These are present only if the optional LocoNet interface is used.

4. **Flash Plug Port-** factory use only. This port allows us to upgrade the Jack Wabbit software as new features become available. Do not connect anything to this port (J3).

5. **Program Pins with Jumper Plug**- Jumper plug should be on the "Run" pins during normal use. Only move the plug to other pins when DCC system power is turned off. Each of the four decoder outputs (A, B, C, and D) need to be programmed separately (one at a time). Turn off DCC system power, then move the jumper to the pair of pins that correspond to the decoder outputs (SW1A, SW1B, SW1C, or SW1D) that you want to program. See section E: **Setting Address and Programming CVs**. Refer to the CV chart, and pay particular attention to any special programming instructions that apply to your specific DCC system. J4-(1,2,3) are SW1A, J4-(4,5,6) are SW1B, J4-(7,8,9) are SW1C, and J4-(10,11,12) are SW1D.

6. **Screw Terminals J4/Switch Outputs**- There are 12 screw terminals: 4 groups of 3 screws. Terminals 1, 2, and 3 are for decoder output "A". Terminals 4, 5, and 6 are for decoder output "B". Terminals 7, 8, and 9 are for decoder output "C". Terminals 10, 11, and 12 are for decoder output "D". For **Tortoise™** type switch motors, and other 2 wire switch motors (including Kato two wire switch machines) use the **1st** and **3rd** terminals of each group. For example: **Tortoise™** switch motor #1 on decoder output "A", gets hooked up to J4 terminals 1 and 3. **Tortoise™** switch motor #2 on decoder output "B" gets hooked up to J4 terminals 4 and 6, etc. The middle screw terminal of each group is a "common". This common is for 3 wire switch motors such as Peco and Atlas™ Twin Coil machines. The coil common wire is connected to the common (middle) terminal of each switch output. The remaining two wires are connected to the remaining two output connections for each group of switch outputs. The highest number terminal in each group (3, 6, 9,12) will turn on momentarily when the associated decoder is given a Clear command**.**

7. **Screw Terminals J2/Manual Throw, (Section C2)**- There are 12 screw terminals: 4 groups of 3 screws. Terminals 1, 2, and 3 are for decoder output "A". Terminals 4, 5, and 6 are for decoder output "B". Terminals 7, 8, and 9 are for decoder output "C". Terminals 10, 11, and 12 are for decoder output "D". The center terminals of each group, (2, 5, 8, and 11), are the manual switch common terminals for each group. A momentary connection from the common to one of the other two terminals will activate the associated turnout. The lower terminal numbers (1, 4, 7, 10) will issue a **Clear** command. The highest number in the group (3, 6, 9, 12) will issue a **Throw** command to the associated turnout. If you set up a Dispatcher's panel, you should use on-off-on three position switches. In the on position, dispatch mode is enabled, which will inhibit all other Jack Wabbit functions. The center off position allows operation without a dispatcher using normal Jack Wabbit functions. If you are NOT using the dispatch mode, you **MUST** use momentary contact switches. You can use either a momentary-off-momentary toggle switch, or a pair of normally open push buttons.

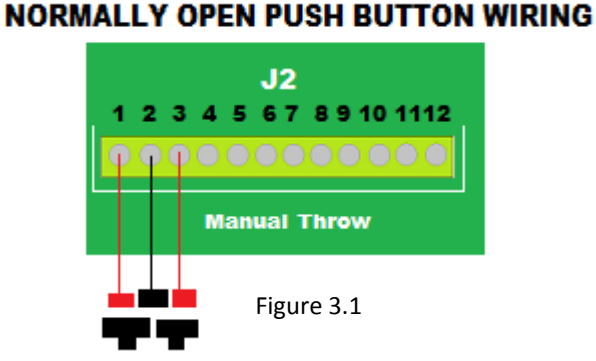


Figure 3.1

8. **Screw Terminals J1/ Power-In-** Screw terminals J1 and J2 are marked DCC 1 and DCC 2, these are your terminals for input power to the Jack Wabbit. You can use DCC power, DC power (10-16 volts, 28 VDC max; polarity does not matter), or AC power (7-12 VAC, 20VAC max). Unless you use DCC power, however, you will not be able to operate your turnouts using DCC commands or use the auto-throw feature.
   Note: DC power is useful if you still have non-decoder equipped locos and switch between DCC and analog DC using a DPDT toggle switch to run trains. This set up will let you operate your switch motors using momentary push button switches without rewiring your switch motors to operate off a conventional analog DC train controller.
9. **Screw Terminals J1/ Auto Throw-** J1 screw terminals 5-12 are for use with the Patented Auto Throw feature built into the Jack Wabbit. J1 screw terminals 3-4 (not marked) are not used. Auto Throw is enabled by wiring trigger rails (isolated lengths of track located in the two frog rails of the turnout) to the Auto Throw inputs. J1-(5, 7, 9, 11) are from the **Clear** frog trigger rail of SWA, SWB, SWC, and SWD (in order) while J1-(6, 8, 10, 12) are from the **Throw** frog trigger rails for these same turnouts. See section C3 on wiring your switch motors for this feature.
10. **Screw Terminals J8/Feedback LEDS-** J8 screw terminals marked 1-4 are Switch A to D current limited LED +5V. Screw terminals marked 9-12 are LED return common. You can use any +5V/return pair for any turnout, but you should only have one turnout associated with each +5V/return pair.
11. **Screw Terminals J5/Network Feedback-** J5 provides two isolated outputs per switch. One output turns on when the points are Clear and the other output turns on when the points are in the Throw position. The outputs are designed to pull down a load to the Common terminal, which is the standard used by most discrete input devices. These outputs can be used in several different ways. They can provide discrete position data to a discrete input device [i.e. NCE AIU], or they can be used to operate LEDs in conjunction with the J8 power and return outputs. They are optically isolated, so they can be connected to other systems without fear of causing a short circuit. Where multiple uses of these outputs are required, additional external circuitry may be needed.

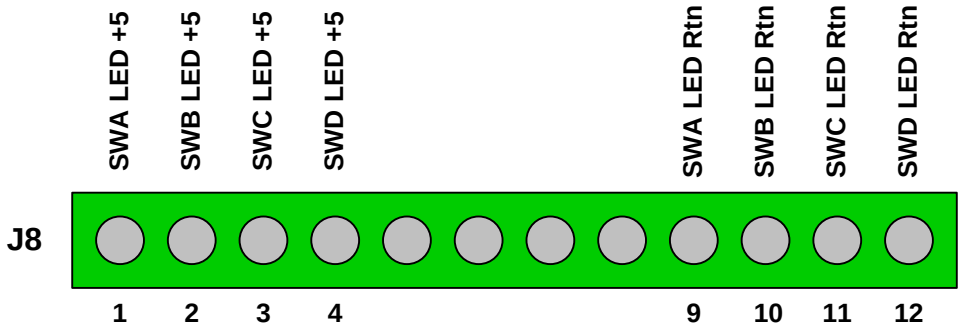


Figure 4.1

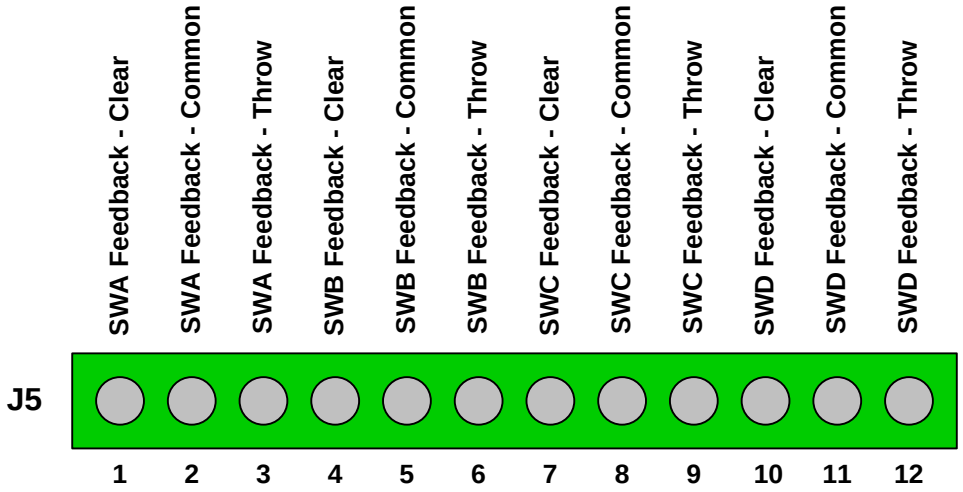


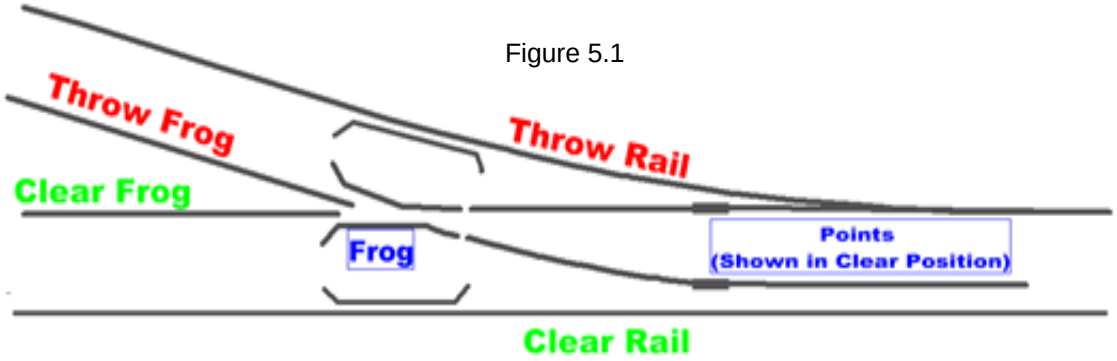
Figure 4.2

C1. Basic: Run on DCC using only DCC Throttle Control:

Before starting you need to understand the terms we use to describe the various aspects of the turnout. See the diagram below for the definition of the terms we will use in describing the Jack Wabbit setup.

A) Switch Position: When the points of the switch are in the position shown below, the train will go straight through the turnout. We say the train is taking the **Clear** route. If the points move to the other position, the train will take the **Diverging** route, and we say the points are in the **Throw** position. Once you have a turnout connected to the Jack Wabbit, momentarily connect the Manual Clear for that turnout to the associated switch common. This will set the Jack Wabbit to a **Clear** output for that turnout. Verify that the points are in the Clear position. If they are not, then swap the lowest number and highest number pins of the associated Jack Wabbit output (e.g. 1-3, 4-6, 7-9, 10-12). Now repeat the manual Clear command. The points should be in the correct position for a train to take the **Clear** route through the turnout.

Figure 5.1



B) Frog power: You will need to determine whether or not you need to power the frog. If so, you will need to route power through electrical contacts associated with your switch motor. If you are using Auto Throw, you will need to power the Clear trigger rail when the points are Clear and power the Throw trigger rail when the points are **Throw**. Diagrams below will show you how to do this.

C) Turnout Address: What accessory address do you want to use for each of the four turnouts? If you are using the LocoNet option, the address of SWD must be evenly divisible by 4. If this number is N, then SWC address must be N-1, SWB address must be N-2, and SWA address must be N-3 (i.e. SWA=37, SWB=38, SWC=39, SWD=40). If you are not using the LocoNet option, you can assign any address you want to any of the four decoders as long as you are within the range of 1 – 2044. Default addresses starting at SWA are 1, 2, 3, 4. All route addresses are defaulted to 2044.

D) Switch Positions and CV64:CV64 sets the position of the points when you turn on power. If CV64=0, the Jack Wabbit will set the points to the same position they were in when you last shut down your layout. If CV64=2, the points will ALWAYS go to Clear at power up. If CV64=3, the points will ALWAYS go the Throw at power up.

E) DCC Turnout Control
The table below shows the correlation between our definition of the position of the turnout points and the commands used by the various DCC systems to achieve that position:

System	Clear	Throw
Digitrax	**c** or Closed	**t** or Thrown
Lenz	**+**	**-**
MRC	**ON**	**OFF**
NCE	Normal/ON/	Reverse/OFF/

Table 5.2

C2. Basic + Panel/Signal Indicator LEDS and Manual Control

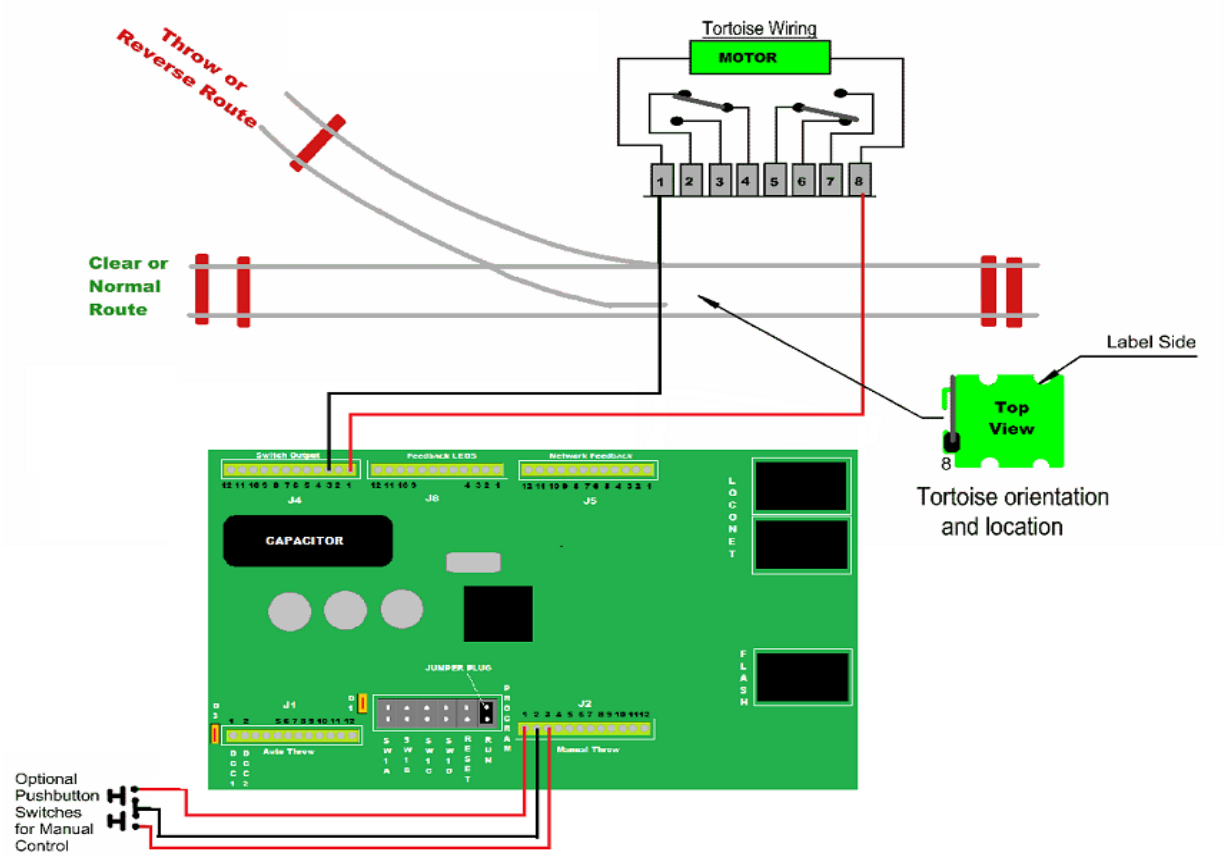


Figure 6.1

Switch Position Indication:

LEDs can be used to indicate the switch position for control panels or signals. Use either a single bi-color red/green LED or two LEDs wired back to back.

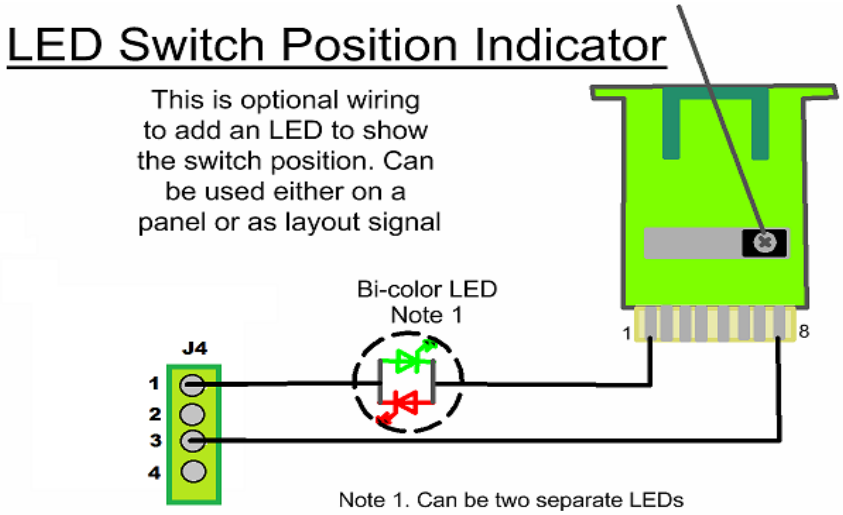


Figure 6.2

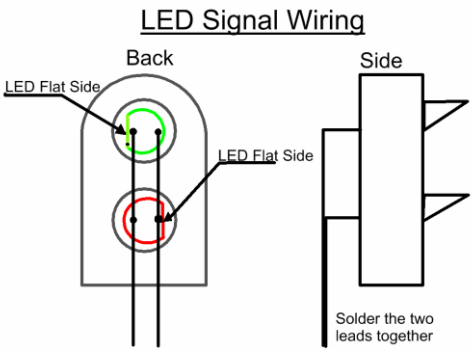


Figure 6.3

C3. Implement Auto Throw:

The 1st diagram below shows the turnout set for the clear route. For the Jack Wabbit to know the existing position of a switch, feedback is needed via the Tortoise contacts. The Jack Wabbit is triggered to change positions when a wheel makes a connection between the gap of the **Trigger Rails** and the powered rails. When a connection occurs on the **Clear** route **(Green Line)** nothing happens as DCC power is fed through contacts and applies power to the trigger rail.

If a wheel contacts the trigger rail on the **Throw** route **Red Trigger Rail**, there is no power from the Tortoise contacts and the connection caused by the wheel on the throw route **(Red Line)** applies DCC power to the other trigger rail input to the Jack Wabbit. This means that power is on BOTH of the trigger rail inputs at the same time. When DCC power is applied to both of the Jack Wabbit's trigger rail connections at the same time the Jack Wabbit throws the switch. Once the switch is thrown, DCC power is only applied to the other trigger input. The Jack Wabbit has many programmable features that use Auto-Throw to provide a range of unique automation options. See pg. 16-20.

Jack Wabbit Wiring for Electro Frog: Diagram 7.1

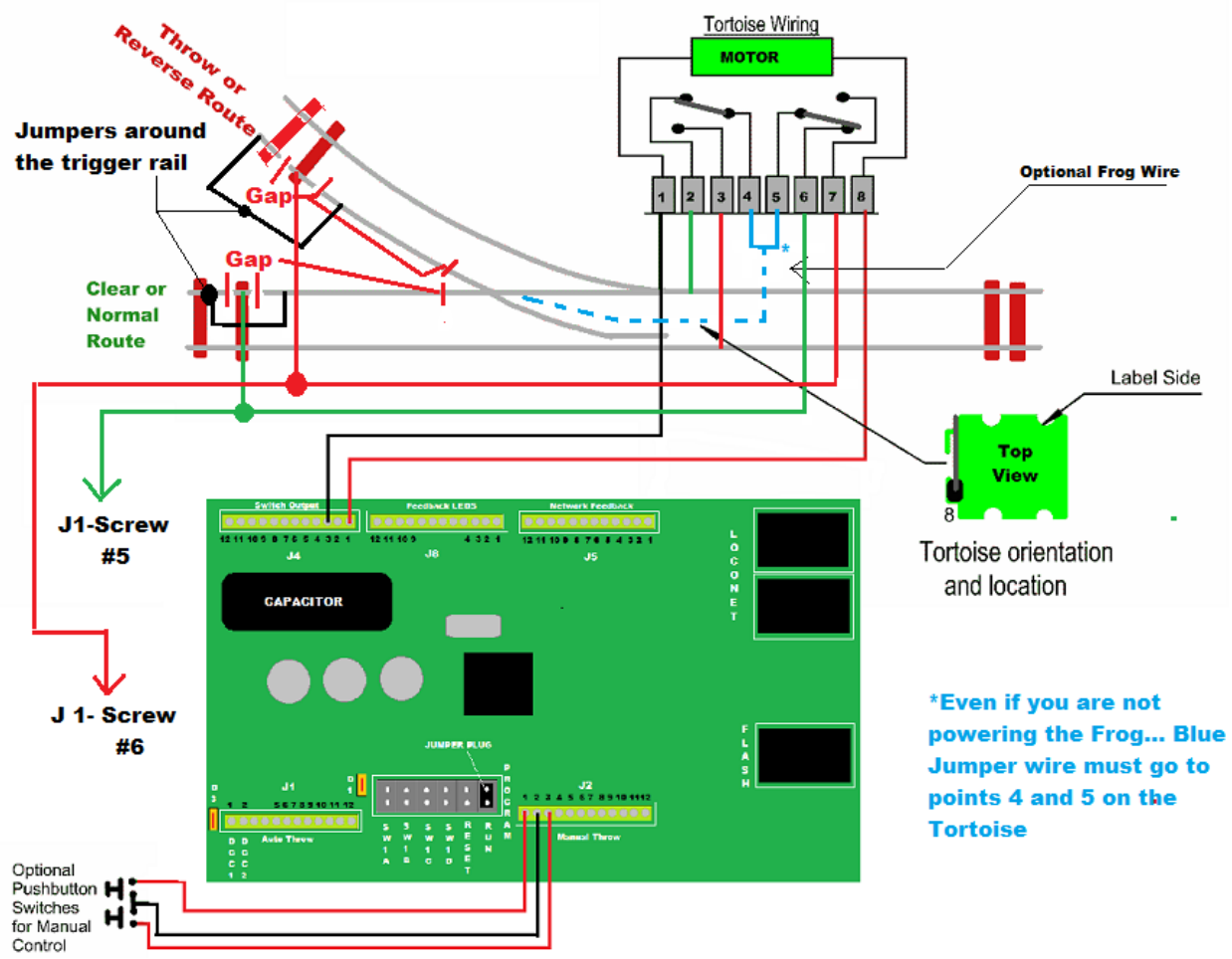


Figure 7.1

The *Trigger Rail* is made by using a rotary tool with a fine cut off blade or a fine back saw and cutting thru the rail to make a small isolated rail section. The length of the isolated rail section can vary as you choose. An insulfrog generally requires a single cut or insulator and an electrofrog requires two. The insulfrog itself creates the 1st gap, therefore, either one or both frog rails can become Trigger Rails. See diagram 8.1 for Auto-Throw options.

While *Auto Throw* is designed to protect your layout from accidents caused by an incorrectly positioned switch, it can also be used to operate signals or crossing gates controlled by a Tortoise. To do this, follow the normal instructions for Auto Throw except place the off trigger rail (off when the signal/gate is in the inactive position) in the approach track to the signal/gate. Place the on trigger rail (on when the signal/gate is inactive) where you want the train to trigger the signal/gate back to the inactive state. When the train approaches the inactive signal/gate and hits the off trigger rail, Auto Throw will change the position of the Tortoise. Now the trailing side trigger rail is off. When the train clears the signal/gate and hits the trailing trigger rail, Auto Throw will again activate and return the signal/gate to the inactive condition

Diagram 8.1

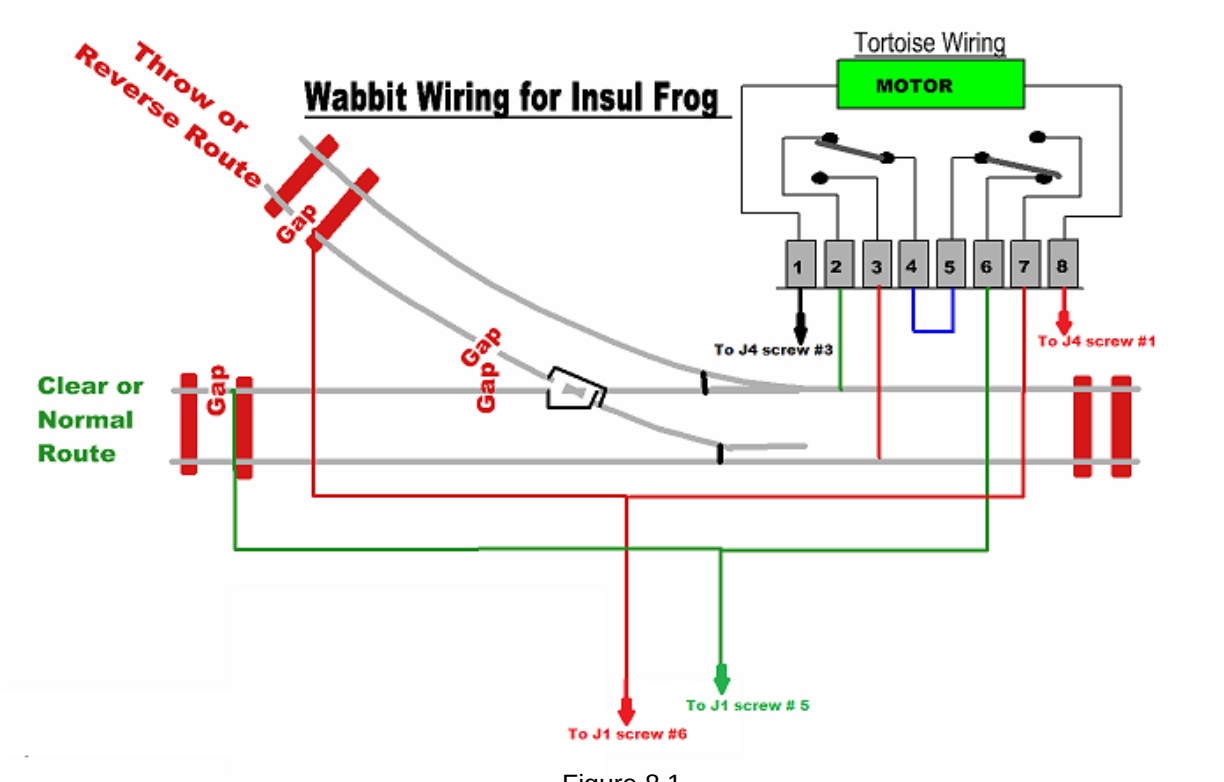


Figure 8.1

Note: Wiring going to the Jack Wabbit for an Insul Frog is the same as the above diagram for an Electro Frog.

1) Wiring for the next 3 consecutive Switch Motors follow the above wiring diagram for cutting track trigger gaps, wiring frog (optional), and wire attachment points to the **Tortoise™.**
2) Switch Motor # 2: Tortoise™ pins 1 and 8 go to Jack Wabbit J4 screw terminals 4 and 6. Tortoise™ pins 6 and 7 go to Jack Wabbit J1 screw terminals 7 and 8.
3) Switch Motor # 3: Tortoise™ pins 1 and 8 go to Jack Wabbit J4 screw terminals 7 and 9. Tortoise™ pins 6 and 7 go to Jack Wabbit J1 screw terminals 9 and 10.
4) Switch Motor # 4: Tortoise™ pins 1 and 8 go to Jack Wabbit J4 screw terminals 10 and 12. Tortoise™ pins 6 and 7 go to Jack Wabbit J1 screw terminals 11 and 12.
5) If you are using snap coil turnout motors instead of the Tortoise, your wiring for Auto Throw is the same as above except that the contacts must be provided by your switch motor instead of the Tortoise, and the connections to the switch motor itself use either two or three wires, as appropriate, to J4.

D1. Wiring, Connections and Special Features:

Wiring Hints: Most of the wire used with the Jack Wabbit can be 20 to 26 gauge.

Lighter wire will work, but it is harder to use in the Jack Wabbit connectors. The only exceptions are the frog wires. These are the only wires that carry much current. The frog wires would be better at 18 to 20 gauge. Remove about 3/8 inch of the insulation when inserting into the Jack Wabbit connectors. Stranded wire works better than solid.

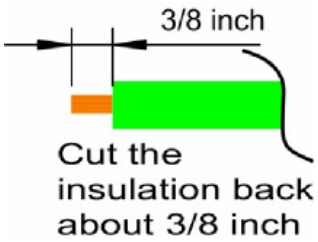


Figure 8.2

It is easier to wire Jack Wabbit connections on the bench before installing it on the layout. Cut wires a bit longer than needed and then cut to length when installing. If you use the 8 pin edge connectors for the Tortoise, the Jack Wabbit can be connected to a spare Tortoise and tested before installing. The spare Tortoise can also be used to hold the connector when soldering wires to the connector. Wiring before installing also makes programming easier and also allows you to run tests. Using wires of different colors, ribbon cable, or using tags on the wires can help identify wire locations when installing on the layout.

Wiring Suggestions:

The photo below shows one way to setup the Jack Wabbit for a bench test. The Specially designed Connectors on the Tortoise are available from your dealer, p/n: Tort-Conn.

Ensure that the contacts in the Connector align with the contact surfaces of the Tortoise. The wiring shown below is 22 gauge. Note the two Peco solenoid machines and the LocoNet ports at the J7 & J9 terminals. The Bicolor LED wired to the NETWORK FEEDBACK indicates turnout position green/red

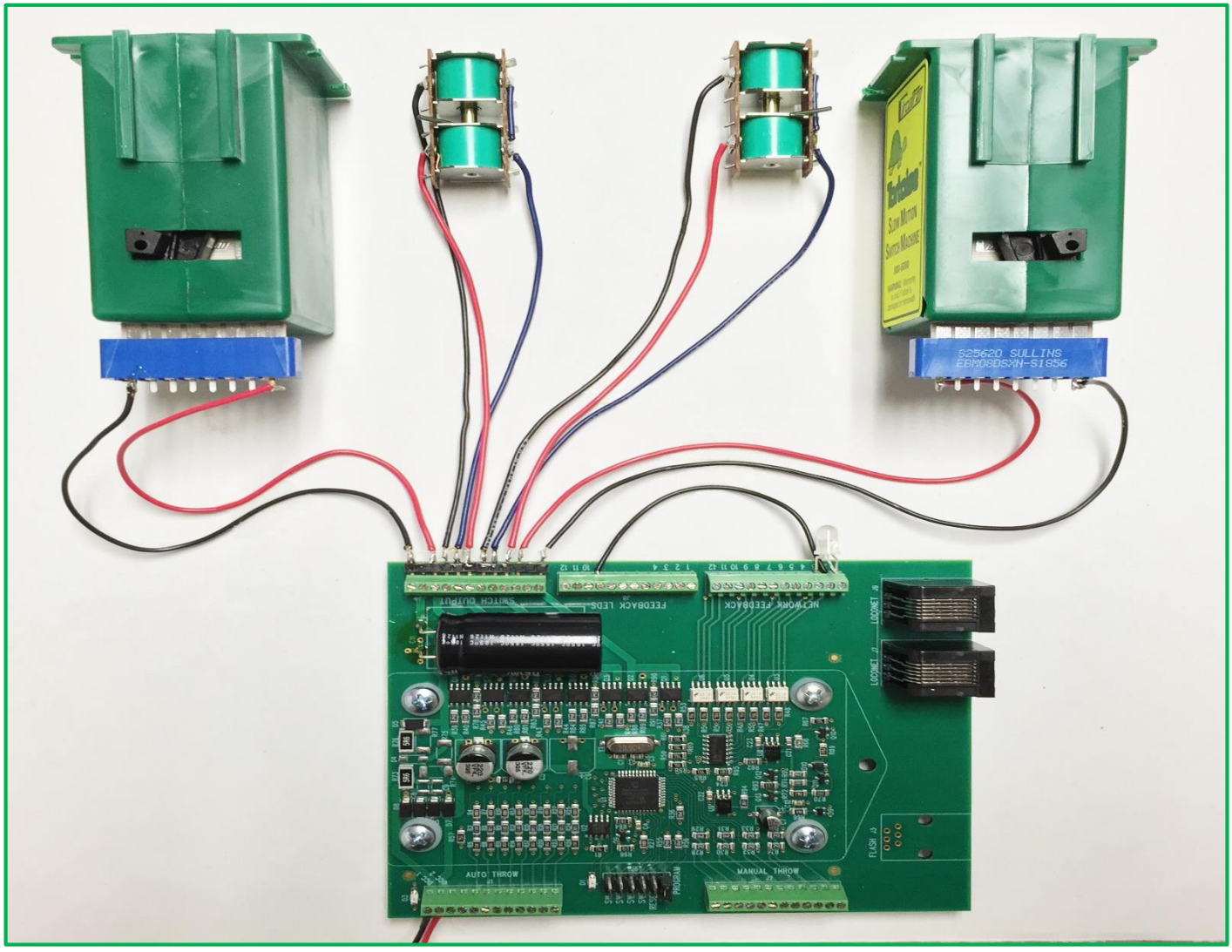


Figure 9.1

D2. Lock Block Protection:

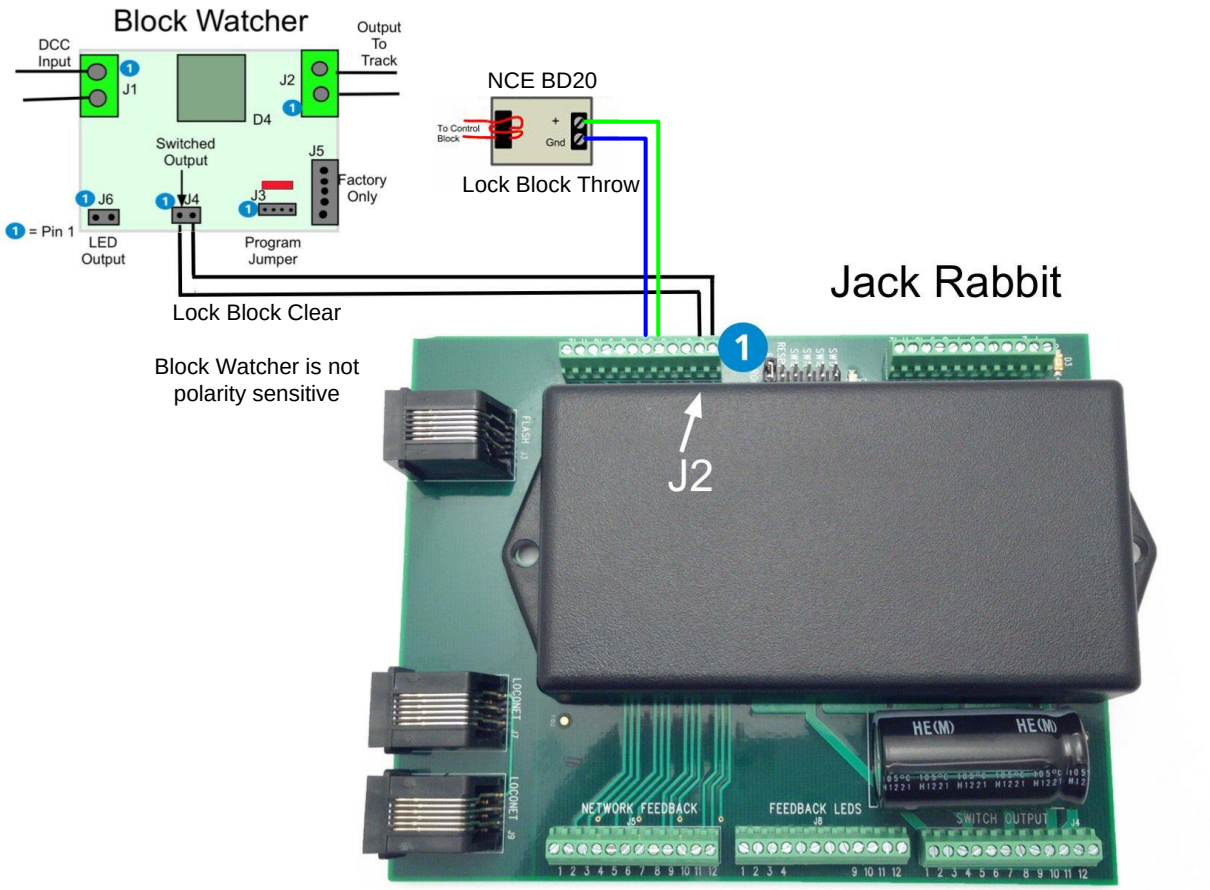


Figure 10.1

Under some conditions, you may want to prevent auto-throw or some other Jack Wabbit function when a train is occupying a track block.

1. A train from a diverging route is inhibited from tripping the auto-throw if a train is occupying the mainline near the switch. This prevents the lower priority train from moving the points under the mainline train.
2. This function can be accomplished by using a block detector with an open collector output. A suitable device is the NCE BD-20 or the DCC Specialties Block Watcher, although any unit with an open collector output that is isolated from the track power can be used. The ground of the output is connected to Jack Wabbit J2 pin 1. The open collector is connected to Jack Wabbit J2 pin 2 (example for SWA).
3. Any time a train occupies the detected block; the Jack Wabbit will enter the Dispatch Mode and move the switch points to the Clear position. In the Dispatch Mode, CV66 specifies which functions are inhibited. Setting bit 0 inhibits DCC operation and bit 1 inhibits auto-throw. The default is that all functions are inhibited during the Dispatch Mode. While the connections shown will force the switch to clear when the block is occupied, moving the wire from J2 pin 1 to J2 pin 3 will force the points to the Throw position when the block is occupied with the same Dispatch Mode lockouts as for the wiring shown. Note: For CV66, DCC inhibit has a value of 1, and Auto Throw has a value of 2. Use these values to inhibit one or the other function. CV66=3 will inhibit BOTH functions.

The diagram above assumes the dispatcher's switch is in the center off position, indicating that the dispatcher is not in control. If the dispatcher's switch is active, then the dispatcher's switch will control the position of the points if the block is unoccupied when the dispatch switch is operated. Subsequent occupancy will not change the switch position. Triggering the block detector while the dispatcher's switch is active may result in any attached signal lights turning off then on, but the position of the points will follow the dispatcher's switch. If you don't want any interaction between the block detector and the dispatcher's switch, simply use a switch (or a set of switch contacts on the dispatcher's switch) to open one lead of the block detector when the dispatcher's switch is active.

If you connect the block detector such that the ground goes to BOTH J2-1 and J2-3 with the positive lead connected to J2-2 (SWA example), when the block is occupied, the switch points will not move, but the Dispatch Mode will be active and the CV66 will determine which Jack Wabbit functions are inhibited. This is useful if a train is stopped on a turnout (e.g. in a station) and you want to ensure that the points can't be thrown under the train.

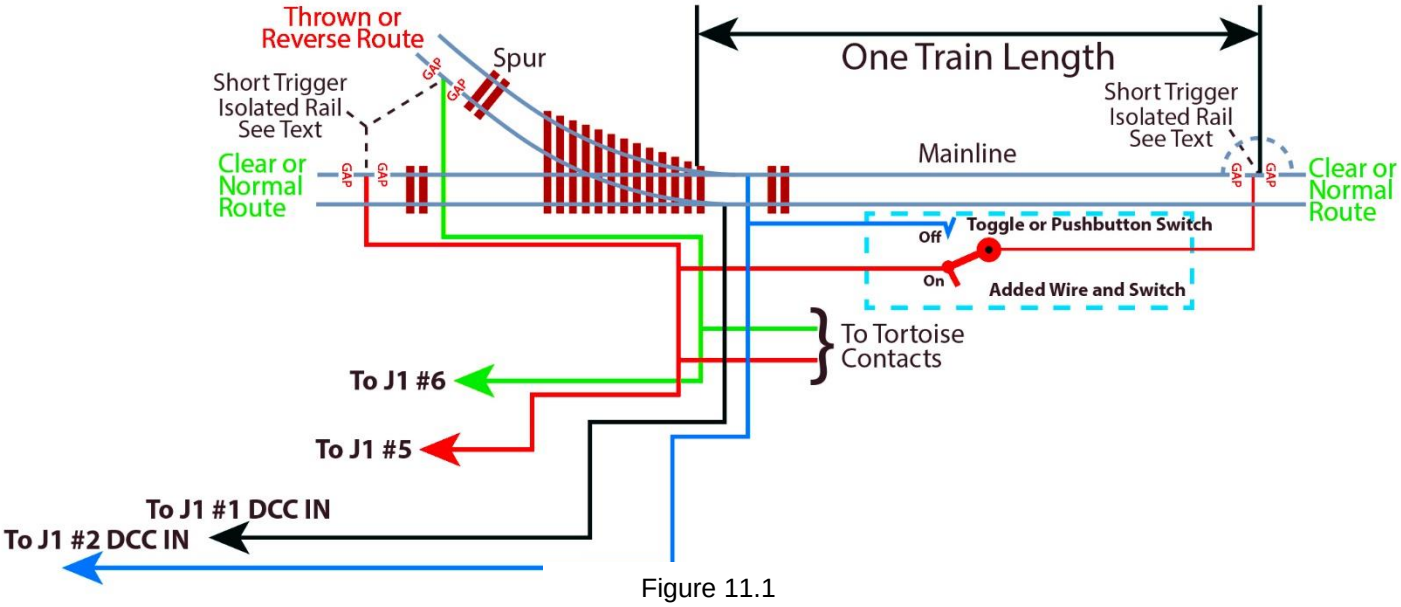


Figure 11.1

Auto Entry Direction into a Reverse Loop or Align Spur Using Auto Throw

Diagram 11.1 shows how to extend the clear trigger rail ahead of the switch into a reverse loop. When the train approaches, it will always trigger the clear route, resulting in a consistent entry direction into the reverse loop. The distance must be at least the train length, otherwise the switch will auto throw under the train leaving the reverse loop. If you cannot get a long enough distance between the switch and the incoming trigger rail, you can use the auto throw timer to inhibit the auto throw function for a specified number of seconds after the train enters the reverse loop. In this way, the auto throw can be disabled after lining the points for the entry into the reverse loop. As long as it remains disabled until the train clears the points, auto throw will not throw the points under the exiting train. This method can also be used to always align a spur with the main to prevent unexpected freight deliveries if a switch is accidentally left aligned with the spur. To access the spur, the switch is thrown after the train clears the main line trigger rail one train length from the switch.

D3. Using Auto Throw with Layout Block Detectors Present:

The Jack Wabbit does draw some power from the block in which it is connected. Some block detectors may sense this current and identify the block as occupied even when it is clear. The following figures show how to maintain proper block detection operation with the Jack Wabbit installed and configured for auto throw. This is the same as the previous Auto Throw figures except for the source of power for the Jack Wabbit. You can also use the DCC Specialties Block Watcher which will allow you to compensate for the extra current draw.

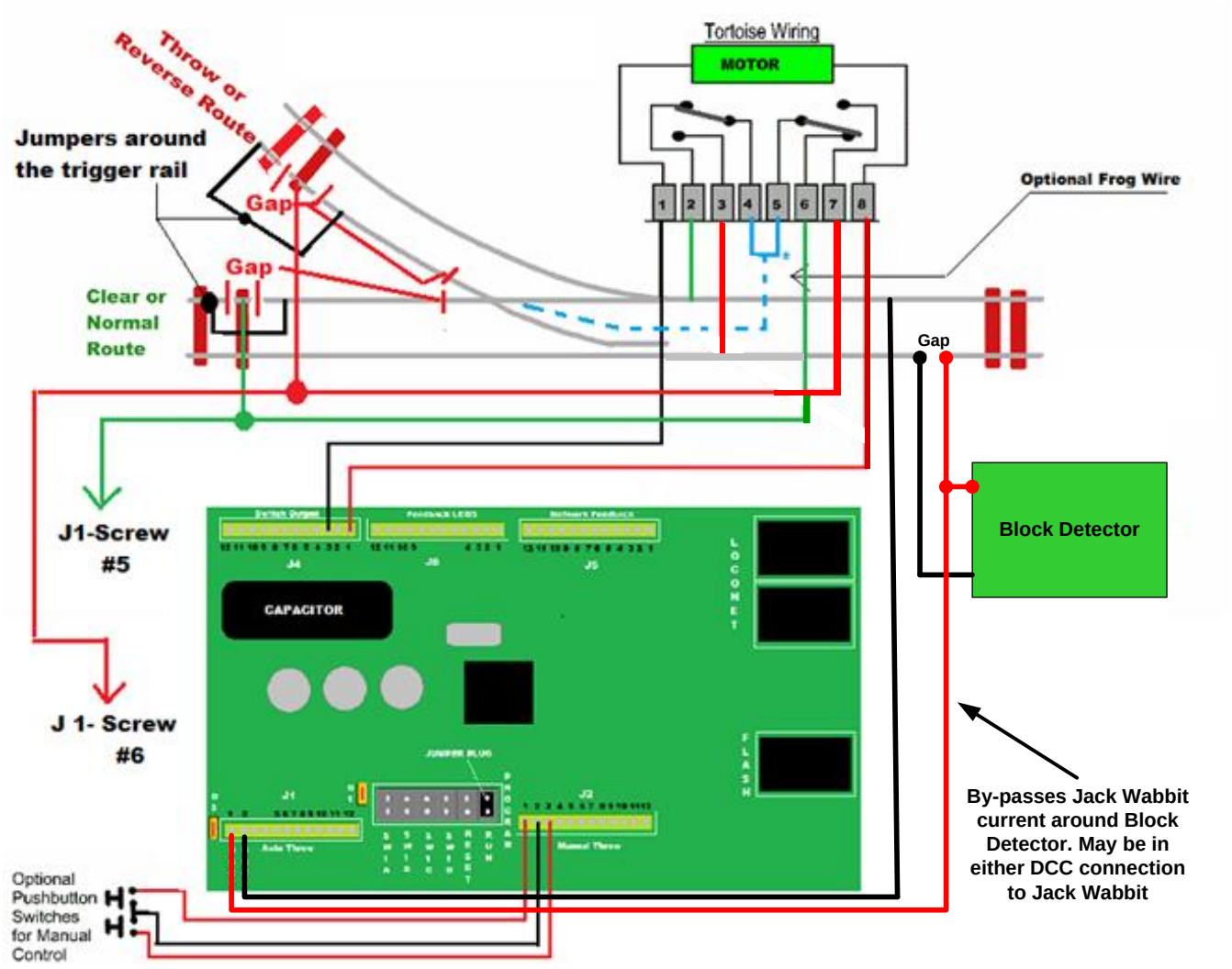


Figure 12.1

Extending Auto Throw Trigger Rail Distances:

In some track configurations (see figure below), it is difficult to separate the trigger rails from the switch points. The following diagram shows one possible solution. This gives the switch points more time to move before a train enters the switch. At 60 scale miles per hour, your train will move about 2 feet in the time it takes the Tortoise to completely move the points from one position to the other.

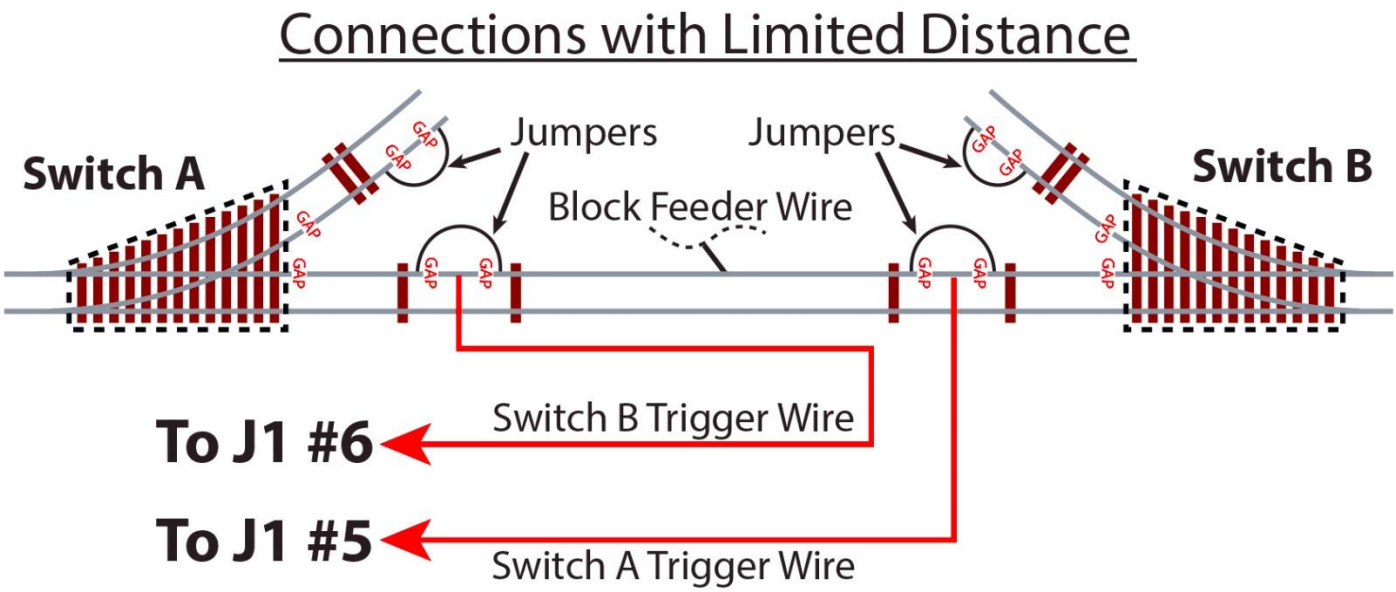


Figure 13.1

Auto Throw with Auto Reversing:

In order to successfully use the Jack Wabbit on the end of a reverse loop it is recommended that you have the **Trigger Rails not directly adjacent** to the reversing section. Having a short section of track powered from outside of the reversing section ensures that the auto-reversing module will work properly and the Jack Wabbit will not short out due to the Reverser not having swapped the polarity in time. This arrangement does take up more space, but it ensures that the Jack Wabbit and the Auto-Reverser will not interfere with one another. It is important that all trigger rails be powered from the associated switch clear or throw rail and that intervening rails be the same polarity as the trigger rails. Otherwise, auto throw may not work or you may end up with a short circuit.

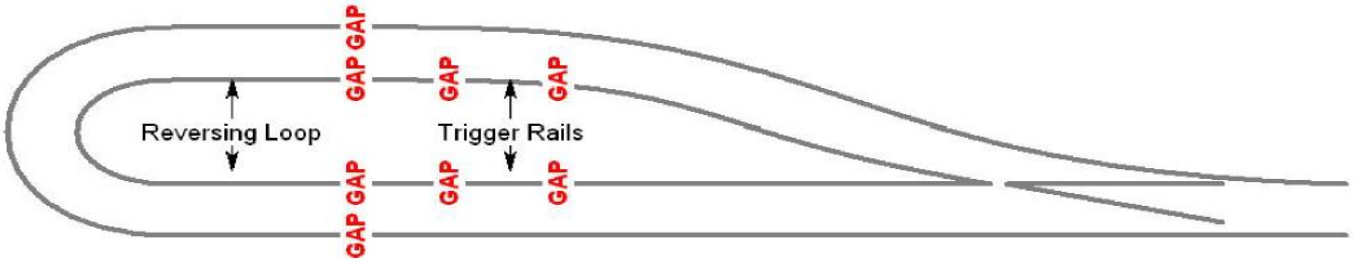


Figure 13.2

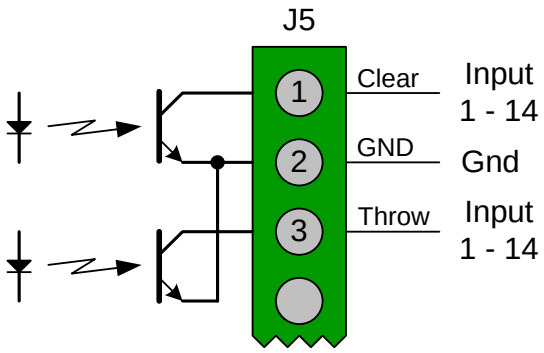
D4. Feedback:

If you use computer interface to control a layout, the computer needs to know the position of the switches. If a computer issues a command to the switch, it knows the switch position. But with the Auto-Throw feature and/or the pushbutton switches, the switch position can be changed without a command from the computer. This is why position feedback is needed to report up to date information back to the computer. Each DCC system has its own way of sampling the position information. There are two opto isolator outputs for each Jack Wabbit output, one for the **Clear** and the other for the **Throw** position.

Interfacing to NCE Cab Bus, Digitrax LocoNet, and Lenz XpressNet

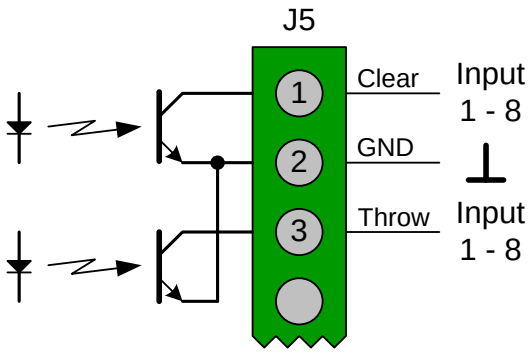
If you are interfacing to the Digitrax LocoNet, the LocoNet version of the Jack Wabbit connects directly to your LocoNet. Simply connect your LocoNet cable to J7 and the continuing cable to J9. If you are using LocoNet, you will need to supply power to the Jack Wabbit. You can use an AC or DC power source with a nominal value of 12 volts (9V minimum 20V maximum), or you can connect the Jack Wabbit to the DCC bus to supply it with power. Regardless of the power source, the power is connected to J1-1 and J1-2. For DC power, the positive lead is connected to J1-1.

For other DCC systems, the Jack Wabbit has optional outputs that allow you to convey the Clear or Thrown status of the Jack Wabbit to your NCE Cab Bus or Lenz XpressNet. These connections are made via hardware available from the respective system manufacturers. The diagrams below show you these connections. Follow your manufacturer's directions for use of the data.



Switch Position Indication For NCE AIU

Figure 14.1



Switch Position Indication For Lenz LR101

Figure 14.2

Interfacing to Fascia or Signal LEDs

You can use J5 in conjunction with J8 to operate LEDs located on the layout fascia or in track signals. J8 screw terminals 1, 2, 3, and 4 have a common +5 volt supply with individual current limiting resistors for direct connection to LEDs. J8 screw terminals 9, 10, 11, and 12 connected to the +5 volt return. For example, use a green (Clear) and red (Throw) LED to show the status (Clear or Throw) of an output (A, B, C, or D). Wire the SWA set of LEDs to J8-(1, 9) as shown in the drawing below. Similarly, connect SWB to J8-(2, 10), SWC to J8-(3,11) and the SWD pair to J8-(4,12). See Section 11 on page 4 for specific J5 and J8 pin identification.

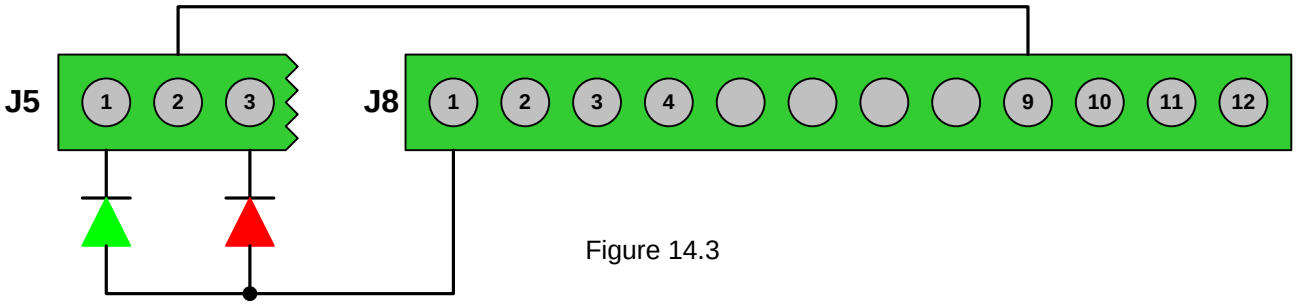


Figure 14.3

LED Connections for SWA

E1. Setting Address, Programming CV's and Reset:

1. **Do Not Use The Program Track to Program The Jack Wabbit**

2. The Jack Wabbit's addresses are **SET** by moving the program jumper as described in Section E1, p.16 and issuing Accessory Commands [operating the turn-out by using your DCC Throttle]. See Pg. 22-23 for Sequential Programming Instructions for Setting the Address and Programming CV's.

3. **Configuration CV's are Programmed in Ops Mode, "on the main", also by moving the programming jumper as described in Section F, p.17**

4. **It is important to remember that Addresses are Set and CV's are Programmed!**

Special Programming Instructions:

Specific DCC Systems need to follow specific programming sequences to reliably program the **Jack Wabbit. See also Pg. 22-23**

NCE and MRC: Do not use the Accessory Programming Mode, only use Ops Mode for CV's see also Pg. 22-23. **Note that the accessory address range 1017-1020 cannot be programmed by default (see the Digitrax section). If you want to use these Accessory Addresses, simply set CV78 to 1 and they will be enabled.**

Digitrax: See also *Pg. 22-23*

The Digitrax Command Station sends out accessory addresses 1017 to 1020 every time that power is turned on whether manually or automatically. The Jack Wabbit blocks these address so that they can't program the Jack Wabbit. This means that these addresses are not available. For most Digitrax users, this is not a problem since they are out of the throttle's accessory address range. If you need these addresses for an automation system, they can be enabled by setting CV78 to 1. If you set CV78, be careful since you can accidentally program these addresses into the Jack Wabbit without knowing it. You should also review your manual with respect to OPS#27. This OPS can be used to turn off all accessory commands (usually for use with computer control). However, if it is set to the wrong position, you will not be able to send any accessory commands and the Jack Wabbit will not work. The correct position of OPS#27 is Thrown (t or OPTN on the DT400 throttle).

Lenz: See also *Pg. 22-23*

The Lenz system sends repeat accessory commands as long as you hold down the 1 or 4 command key. This ensures that the accessory decoder sees the message, but can result in the same address stored multiple times while programming the ***Jack Wabbit*** The solution is simple. Hold the 1 or 4 key down for only a short time. Once you see D1 flash indicating an address has been stored, release the control key. If you see multiple flashes, you have stored the same address more than once. Since the ***Jack Wabbit*** will flash D1 each time you send it an accessory address, you can easily get a feel for the timing involved. In the normal operating mode (not programming mode), select an accessory address that has not been programmed into the ***Jack Wabbit.*** Send an accessory command to this address and hold down the 1 or 4 control key. D1 will flash each time the command station repeats the accessory address. This will give you a feel for how long to hold the control key while you are programming to avoid multiple address storage. Note that the accessory address range 1017-1020 cannot be programmed by default (see the Digitrax section). If you want to use these Accessory Addresses, simply set CV78 to 1 and they will be enabled. **Note that the accessory address range 1017-1020 cannot be programmed by default (see the Digitrax section). If you want to use these Accessory Addresses, simply set CV78 to 1 and they will be enabled.**

E1. Setting Address, Programming CV's & Reset (Continued):

The figure to the right shows the location of the program jumpers on the Jack Wabbit. When the jumper plug is in the run position, the Jack Wabbit will operate normally.

1) To program the **Jack Wabbit Switch A**, remove power, move the jumper so that it connects **SWA pins** (terminal numbers are indicated on the board), and then restore power.

2) To program the **Jack Wabbit Switch B**, remove power, move the jumper so that it connects **SWB pins**, and then restore power.

3) Follow the above steps for the remaining two outputs, SWC and SWD.

Note the Digitrax caution on pg. 15!

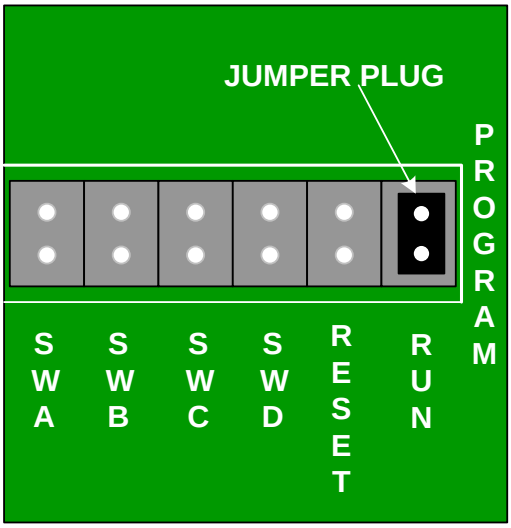


Figure 16.1

When The Jack Wabbit is in the programming mode, it will remain so until power is removed and the jumper is returned to the **Run pins** and power is restored.

To RESET all sections of the Jack Wabbit to all factory defaults, remove power, place the jumper so that it connects the RESET Pins, and restore power. Wait until D1 stops flashing. Remove power and place the jumper so that it connects the RUN pins.

In the programming mode, you can Set Address/ Routes, and Program CV's values. Below are the specific CVs that can be programmed, acceptable values to program, and what each value does.

Setting Addresses: Do not use Ops Mode.

The default primary address of the ***Jack Wabbit*** is (1), (2), (3), and (4). The default Smart Route address of all 13 routes is 2044. This means that out of the box, the Jack Wabbit should respond to addresses 1, 2, 3, 4 and 2044. Upon moving the Jumper to enter the address setting mode CV63 is automatically set to 0 so that it is pointing to the primary address of the ***Jack Wabbit.*** The next accessory address issued by the Command Station via your throttle will be stored as the primary address. To issue an accessory address you must select the address on your throttle then issue a clear or throw command (see your throttle directions for specific instructions on controlling accessories). You may continue issuing accessory addresses up to a total of 14 (one primary and 13 **Smart Routes).** Once you have issued the maximum number of accessory addresses (14 total), the Jack Wabbit will no longer store addresses, even if more are received. In the programming mode you will see the LED D1 flash briefly each time an accessory address is issued. This indicates that the address has been correctly received and stored. While the primary address of the ***Jack Wabbit*** is always the first address, the other addresses for **Smart Routes** can be issued in any order. You do not have to enter **Smart Route™** addresses in any particular order, but you need to record the position in which you entered each address so that you can set the associated switch direction CV correctly. There are no provisions to read back values in CVs. If you want to set a specific route address without having to step through the primary and all the other route addresses, simply set CV63 to point to the address (0 through 13) that you want to program and then issue an accessory command at the desired address. By default, only 2 route addresses are enabled. If you want to enable more route addresses, simply set the number of routes you want active in CV74.

E2. Jack Wabbit CV Chart

CV NUMBER	CV DESCRIPTION	CV VALUE
49	PRIMARY ADDDRESS	Always 0, Do Not Change
50	ROUTE 1 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
51	ROUTE 2 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
52	ROUTE 3 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
53	ROUTE 4 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
54	ROUTE 5 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
55	ROUTE 6 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
56	ROUTE 7 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
57	ROUTE 8 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
58	ROUTE 9 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
59	ROUTE 10 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
60	ROUTE 11 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
61	ROUTE 12 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
62	ROUTE 13 ADDRESS POINT DIRECTION	0=DCC/1=REV. DCC/2=ALWAYS THROW/3=ALWAYS CLEAR
63	POINTS TO INITIAL ADDRESS DURING PROGRAMMING	42=switch section reset to factory values
64	SWITCH POSITION AT POWER ON	0=OFF/2=CLEAR/3=THROW
65	RESERVED	N/A
66	INHIBIT AUTO THROW DURING DISPATCH MODE	0=NO DISABLE/1=DCC DISABLE/2=AUTOTHROW DISABLE
67	LENGTH OF TIME DISABLE AUTO THROW AFTER AUTO THROW EVENT	IN SECONDS
68	RESERVED	N/A
69	ENABLES AUTO RETURN	1=DCC/2=AUTO/4=MANUAL
70	AUTO RETURN DELAY	IN SECONDS - 5 TO 255/15 SECONDS IS DEFAULT
71	RESERVED	N/A
72	PUSH BUTTON LOCKOUT ENABLE	0=NO LOCKOUT/1=LOCKOUT ENABLED/173=PROGRAM LOCKOUT ADDRESS (ADDRESS DEFAULT = 2041)
73	PUSH BUTTON LOCKOUT CONTROL (CV VALUE IS SET BY ACCESSORY COMMAND)	THROW=MANUAL INPUTS WORK/CLEAR=MANUAL INPUTS DO NOT WORK
74	NUMBER OF ROUTES ENABLED	0-13/DEFAULT VALUE= 2
75	RESERVED	N/A
76	RESERVED	N/A
77	RESERVED	N/A
78	ENABLE ACCESSORY ADDRESSES 1017-1020	0=1017-1020 DISABLED; ANY OTHER VALUE=ENABLED
79	TORTOISE OR COIL MACHINE TYPE	0=TORTOISE (CONTINUOUS ON)/1=COIL (PULSED ON)
80	LOCONET ADDRESS MSB	SET AUTOMATICALLY FROM PRIMARY ADDRESS
81	LOCONET ADDRESS LSB	SET AUTOMATICALLY FROM PRIMARY ADDRESS

Table 17.1

F. Programming CVs: Using Ops Mode **(see CV Chart Above).**

CVs 50 to 81 are also programmed by moving the Jack Wabbit's programming jumper as discussed above. These CVs are programmed using the **Program-on-the-Main** (POM or OPS mode) function of your command station. Follow your command station instructions for entering the Program-on-the-Main mode. Once in the OPS mode, the Command Station will ask for an address of the "engine" to be programmed. Since the ***Jack Wabbit*** is an accessory decoder, it does not use mobile decoder (engine) addresses, so enter any value for the address since it is not used by the ***Jack Wabbit***. Pick any address that is not currently in use on the layout. A good choice might be 9999, or 9984 for Digitrax. The Command station will then ask for which CV to program. Enter the CV number (50 to 81) to be programmed. Then enter the value to be programmed into the CV.

If you make a mistake, don't worry, just go back and program the CV to the desired value. If you are hopelessly lost, set CV63 to 42 and you can start over again with factory default values for the switch that you are programming. You may **Set Address** values and **Program CV** values in any order. For CVs use the OPS mode programming, and for addresses, use normal train running mode and issue accessory addresses. Exit the Program-on-the-Main (OPS) mode to restore the command station to normal operation. Once you have finished programming the Jack Wabbit, remove power from the unit and return the programming jumper to the normal operation position.

Implement Smart Route feature: See Setting Addresses above. Any un-programmed Smart Route turnouts will respond to Accessory Address 2044. The ***Jack Wabbit*** has a normal DCC address that can be programmed with a DCC system. Added to this are 13 additional addresses for each turnout that can be used to setup **Routes** with a feature called **Smart Routes™ .** This allows setting up multiple switch machines with the same address so you can send out one command and have as many switches operate as needed to set a route. If you are setting up multiple machines you should also determine the addresses for the routes that include this switch. If you do not have any routes setup yet, these route numbers can be programmed later. Along with the route number you will need to know which way to position the switch points, See CV Chart Pg. 19.

If you are adding Smart Route addresses to one of the decoder switch sections (A,B,C, or D) after you initially programmed the primary address and then exited programming make sure to input the primary address again **first**, before adding the smart route addresses or else your primary address will become the first Smart Route address you enter. When you enter the programming mode, the Jack Wabbit **ALWAYS** starts with the primary address.

Caution: Smart Routes implementation is controlled by CV74. CV74=number of Smart Route addresses to enable. The Jack Wabbit only looks for enabled Smart Route addresses. The default number of enabled Smart Route addresses is 2 (primary address and two routes). The maximum value is 13.

CV50 to CV62 are used to indicate the **Clear** or **Thrown** Point Positions for the **Smart Route** turnouts. They will accept values of **0** (default), **1**, **2**, or **3**. A value of **0** will cause the points at the Smart Route address to move in the same direction of the DCC Accessory Command. A value of **1** will cause the points to move in the opposite direction of the Smart Route address DCC Accessory Command. A value of **2** will cause the points to always go the **Thrown** position regardless of the commanded direction of the DCC Accessory Command. A value of **3** will cause the points to always go to the **Clear** position regardless of the direction of the DCC Accessory Command. This allows you to have Routes that either can be activated in both directions, or you can have a route that throws only in one direction to eliminate the need to remember which route takes which command. Note that if you are using the feature (Locked Route Control), you will need to use the primary address of the Jack Wabbit to change the points from the route commanded position or you must define a different route that moves the points to the opposite position. *To visualize this assume that your route is set to activate on the **Clear** Command. Any turnouts in the route that would require a **Thrown** position would be the Reverse of the **Clear** Command and require the **Switch Position** CV for that route to be programmed to **1 or 2. See Steps below***

1. Select the desired ***Smart Route*** address.
2. Select the command you want to use to activate the ***Smart Route*** *(i.e.* clear or throw)
3. For each turnout in the ***Smart Route,*** decide if you want the switch position to follow the route command or reverse the route command to form the desired ***Smart Route.*** In this case, you set the associated route CV (e.g. CV50 for the first route) to 0 (follow the command) or 1 (move opposite to the command).
4. For each turnout in the ***Smart Route,*** decide if you want to use the command or simply ignore the command and always move to a defined position. In this case, you set the associated CV (e.g. 50 for the first route) to 2 (always move to the Throw position for this address) or 3 (always move to the Clear position for this route address).

Address Setting CV63 has two functions. It is used indirectly to set the **Primary** address and the **13** route addresses during Address Setting. It is also used in CV programming to reset all addresses and CVs to their factory default values. It defaults to 0 when you move the program jumper to enter the address setting mode and automatically advances from 0 to 13 as the route addresses are entered by Accessory Commands. A value of 0 points to the primary address and 1 to 13 points to the **Smart Route** addresses. If you have already programmed some route addresses and don't want to disturb them, then set CV63 to point to the next available address that you want to program and you can access it directly. See the CV Chart in back for more details. Programming CV63 to a value of 42 will reset the ***Jack Wabbit*** to factory default settings, **but only for the switch section (A, B, C, or D) that you are programming (RESET** will do the same thing for **ALL** Jack Wabbit sections).

CV64 Smart Default sets the position of the switch points when power is turned on/off. It will accept values of **0** (default), **2**, and **3**. A value of **0** will cause the ***Jack Wabbit*** to ensure that the points are in the same position as the last point movement command before power was removed from the layout. Note that auto throw is a commanded position, so an Auto Throw event could leave the points in an unexpected position at power off. A value of **2** will cause the Jack Wabbit always to move to the **Clear** position when power is applied. A value of **3** will cause the Jack Wabbit always to move to the **Thrown** position when power is applied.

CV69 (Auto Return Enable) and (CV70 Auto Return Delay) CV69 returns the points to their "home" position after a fixed time interval from a commanded point movement. Auto Return is controlled by two CVs. **CV69** is the **Auto Return Enable** control. It determines which command functions will activate Auto Return. **CV69=1** enables Auto **Return** after a DCC command, **CV69=2** enables Auto Return after an Auto Throw, and **CV69=4** enables Auto Return after a manual pushbutton operation. You can enable multiple Auto Returns by adding the individual numbers together to get the final CV value (e.g. **CV69=7** will enable Auto Return after any movement of the points). **CV70** sets the **Auto Return Delay** time between the start of the point movement and the time that the Jack Wabbit automatically returns the points to the "home" position. The value to enter into the CV is the desired delay in seconds. Values of **5** – **255** are valid, the default is **15**. There is a minimum value because you can't "home" the points before they finish moving. The "home" position for Auto Return is determined by the value in CV64. If CV64=0 (the default value), then Auto Return will always ensure that the points are Clear CV70 seconds after any command enabled by CV69. If you have set CV64=2 (points Clear at power on), Auto Return will use points Clear as the "home" point position. If CV64=3 (points Throw at power on), Auto Return will use the points Throw position for "home".

CV66 Dispatcher Override is for disabling DCC commands or **Auto-Throw.** When **Dispatcher Over-Ride™** has been activated, you may select which functions are inhibited during the Dispatch Mode. This is controlled by CV66. A value of **1** will inhibit DCC operation during Dispatch Mode, and **2** will inhibit Auto Throw during Dispatch Mode. For multiple inhibits, simply add the individual values together (i.e. a value of 3 will inhibit all functions during dispatch mode – this is the default). If you have a control function enabled during Dispatch Mode and it moves the points (e.g. Auto Throw), the points will be out of position with respect to the Dispatcher switch. The points will remain in the new position until the Dispatcher disables and then re-enables the dispatch switch (e.g. center the switch and then set it to the desired position). The points can also be moved to the opposite position and then returned to the desired position.

CV67 Auto Throw Timer allows you to set a variable time after an auto throw event during which the auto-throw function is inhibited. This feature is designed for situations in which a train could bridge two auto throw trigger sections (or an approaching train could move the points under a train already occupying the switch). The first auto throw would align the points correctly, but the second one could throw the points under the train causing a wreck. The auto throw inhibit allows you to set a variable time from **0 to 255** seconds after the points have moved in response to an auto throw trigger during which neither trigger rail will activate the auto throw function. At the end of the programmed time period, auto throw is enabled and operates normally. Valid values for CV67 are **0** (default) through **255**. **0** will allow auto throw to function any time the auto throw is enabled (see CV66). Any other value is the time in seconds that auto throw is inhibited after auto throw has moved the points.

CV71 Manual Operating Mode determines how the Jack Wabbit responds to a manual switch command (J2 inputs). If CV71=1, then a switch closure on either manual input will cause the points to move to the opposite position. A single push button can be used to control the point position. If it is in the wrong position, a push of a single button will move it to the correct position. All other values of CV71 will operate in the normal manner as described on page 3.

CV's 72 and 73 control the Push Button Lockout (PBL) feature of the Jack Wabbit. The PBL feature allows all of the manual control inputs to the Jack Wabbit to be enabled or disabled with a single DCC command so that a visitor cannot cause an unexpected dispatch of one of the operating trains. PBL is, by default, disabled. To enable the PBL function, set CV72=1. This DOES NOT cause the manual input functions to be inhibited, it simply allows the use of the PBL feature. Once CV72 is set to 1, the PBL feature can be used to enable/disable the manual controls. A Clear command sent to Accessory Address 2041 will lock out all manual control inputs for the turnout whose CV72 is set to 1. You can set CV72 for each turnout to 1, and then issue a single Clear command to Accessory Address 2041. This will lockout all manual controls on all of the Jack Wabbit turnouts. You can even do this across multiple Jack Wabbits such that ALL controls on the layout are locked with a single command. Conversely, a Throw command issued to address 2041 will unlock all of the enabled manual controls. If you would like to change the default control address for PBL, you set CV72=173. Next, issue an Accessory Command (**Clear** or **Throw**) to the address you want to use. After you change the address, by default, PBL will be disabled. To enable it, simply follow the instructions above, but use the new address to control the enable/disable function.

CV78 Accessory Address Inhibit disables the ability to set the Accessory Address of the switch to a value from 1017 to 1020 when equal to 0 (default). Any other value will enable the 1017-1020 Accessory Address range. This prevents Digitrax systems from automatically programming an Accessory Address that the throttle can't access.

CV79 Output Control sets the output logic to work with either a stall motor switch machine (e.g. Tortoise) or a coil operated switch machine (e.g. Kato or Peco). CV79=0 will keep the output on continuously after a position command. CV79=1 will momentarily turn the new position output on, but after approximately 0.2 seconds will turn it off again. When CV79 is set to 1, the Jack Wabbit will also provide recharge time for the output capacitor so that each switch will receive full drive value. As a result, if all switches are commanded to a new position at one time, the points of the switches will move one at a time in sequence with approximately two seconds between each movement.

G. Forms for Address and Configuration Assignments:

Be sure to keep a record of the setting for the Jack Wabbit. You may remember them today, but it is easy to forget. If this is in a club there should be a record as reference for other members. There is also a PDF online at **DCCSpecialties.com.**

Chart for Switch Address Location or Turnout _____ Date ____

Route Address	Address Number	Smart Route Command Clear or Thrown	Follow or Reverse Smart Route Command, Always Thrown, or Always Clear	CV Value	CV	CV Values used
Primary			N/A		49	1-255
#1					50	0,1,2,3
#2					51	0,1,2,3
#3					52	0,1,2,3
#4					53	0,1,2,3
#5					54	0,1,2,3
#6					55	0,1,2,3
#7					56	0,1,2,3
#8					57	0,1,2,3
#9					58	0,1,2,3
#10					59	0,1,2,3
#11					60	0,1,2,3
#12					61	0,1,2,3
#13					62	0,1,2,3
Pointer and Reset					63	0-28,42
Power up Position (Smart Default)					64	0,2,3
Reserved					65	N/A
Dispatcher Over-Ride (Auto-Throw Lock-Out)					66	0,1,2,4
Auto Throw Timer (auto throw inhibit time)					67	0-255
Semaphore OPS mode					69	0,1
Auto Return Enable					69	0,1,2,4,8
Auto Return Delay					70	0-255
Reserved					71	N/A

Table 20.1

Caution: Smart Routes can only be implemented by programming cv74. By default, cv74 will allow 2 Smart Routes, but it can be set to any number from 1-13. Setting cv74=0 will disable Smart Routes and is recommended for layouts using computer control.

H. Route Planning and Programming Example:

Shown below are three switches. In the first set, all switches are aligned to clear and allow travel on parallel mainline tracks. The second arrangement shows a route from the lower main, across the adjacent main, and onto a divergent route from the second main. The third arrangement shows a cross-over from one main to the other.

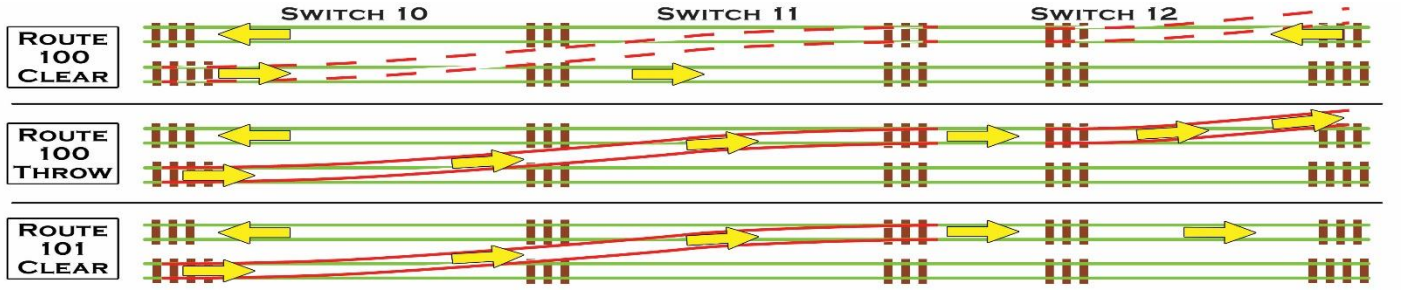


Figure 21.1

Assume the primary address of the left-most switch is 10, the middle primary address is 11, and the right-most switch primary address is 12. All three switch arrangements can be accessed by programming two routes. Assume the first route has address 100 and the second address 101. The programming tables for each switch are shown below.

Address	Programmed Address	Route Command	Follow or Reverse Command	Route/Switch Position CV	Programmed CV Value
Primary	12			49	
#1 Route	100	Clear	Follow	50	0
#2 Route	101	Throw	Reverse	61	1

Table 21.2

For each switch, the switch points will follow the accessory command any time that the primary address is accessed. To align the switches as shown in the first configuration, issue a Clear command to address 100.

Address	Programmed Address	Route Command	Follow or Reverse Command	Route/Switch Position CV	Programmed CV Value
Primary	10			49	
#1 Route	100	Clear	Follow	50	0
#2 Route	101	Throw	Follow	51	1

Address	Programmed Address	Route Command	Follow or Reverse Command	Route/Switch Position CV	Programmed CV Value
Primary	11			49	
#1 Route	100	Clear	Follow	50	0
#2 Route	101	Throw	Follow	51	1

Table 21.3

All three switches will align to the clear position. To align the switches as shown in the middle (second) configuration, issue a Throw command to address 100. All switches will move to the throw position. To align the switches as shown in the final (third) configuration, issue a Throw command to address 101. Switches primary address 10 and primary address 11 will move to the throw position, while switch primary address 12 will move to the clear position. Note that if a Clear command is issued to address 101, primary address 10 and primary address 11 will move to the clear position, while switch primary address 12 will move to the throw position. This may or may not be a useful route. This illustrates that you will normally set your routes to operate on either a Clear or Throw command, not both. The example for address 100 illustrates that under some conditions, both the route Throw and route Clear commands may be useful. At other times, only a throw or clear command may make sense.

I. Sequential Programming Instruction for Setting the Address and Programming CV's

Lenz: Using the LH100:

Setting Jack Wabbit Addresses:

1. Turn DCC power off.
2. Move Wabbit Jumper to Program Position.
3. Turn DCC power on.
4. Press "F5" key to select "SW" mode.
5. Enter the switch number to be set using the keypad, then press ENTER.
6. Press either the "+" or " – " key to set the address. Let LED blink once.
7. To enter another address press the "CI" key.
8. Repeat steps 5-7 until all addresses are set.
9. Press "ESC" key to return to normal.
10. Turn DCC power off.
11. Move Wabbit Jumper to Run Position.
12. Turn track power on.

Test the switch address setting using "SW" mode and the new switch address.

Programming Jack Wabbit CVs:

1. Turn DCC power off.
2. Move Wabbit Jumper to Program Position
3. Turn DCC power on.
4. Select a locomotive number with the keypad that is not used on your layout.
5. Press the "F" keys and the "+" or "– " key to select "PoM" mode then hit "Enter".
6. Press "+" or "–" until "CV" is displayed, press "Enter".
7. Key the desired CV number then press Enter"
8. Enter the CV value to change, press "Enter".
9. The display will show the CV number and value to be programmed.
10. Hit "Enter" to program the CV, note the LED on the Wabbit flashes when the key is released
11. Press "Esc" key to return to Step 7) or press "Esc" three times to exit CV programming
12. Turn power off and put the Program jumper into the Run position.
13. Turn DCC power on.

Test the Jack Wabbit using the switch commands.

MRC: Using the Prodigy Advance Cab:

Setting Jack Wabbit Addresses:

1. Turn DCC power off.
2. Move Wabbit Jumper to Program Position.
3. Turn DCC Power on.
4. Press ACCY key.
5. Enter the switch number to be set using the keypad, then press ENTER.
6. Press either 1 or 2 to set the address.
7. Repeat steps 4 thru 6 until all of the CV values are set.
8. Turn DCC Power off.
9. Move Wabbit Jumper to Run Position.
10. Turn DCC Power on.

Test the switch setting using the ACCY key.

Programming Jack Wabbit CVs:

1. Turn DCC Power off.
2. Move Wabbit Jumper to Program Position.
3. Turn DCC Power on.
4. Press LOCO to address a key in an unused locomotive number.
5. Press PROG key to enter PROG MAIN TRACKmode, press ENTER.
6. Continue to press ENTER until CV# is in the display.
7. Enter the CV number then ENTER.
8. Enter the value to be stored in the CV then press ENTER.
9. Repeat steps 8 and 9 until finished.
10. Press ENTER to return to normal operation.
11. Turn power off and put the Wabbit Program Jumper into the Run position.
12. Turn DCC power on.

Test the Jack-Wabbit using the ACCY key.

I. Sequential Programming Instruction for Setting the Address and Programming CV's (Cont.)

Digitrax: Using the DT-400/402:

Setting Jack Wabbit Addresses:

1. Turn DCC power off.
2. Move Jack Wabbit Jumper to Program Position
3. Turn DCC power on "PWR"+ " Y+"
4. Press "SWCH" key to enter Switch Mode
5. Select the switch number to be set using the keypad or RH knob.
6. Press either the "OPTN" or "CLOC" key to set address.
7. Repeat steps 6 and 7 until all addresses set.
8. Press "EXIT" key to return to LOCO mode.
9. Turn DCC power off "PWR" " N –".
10. Move Wabbit Jumper to Run Position
11. Turn track power on.

Test the switch address setting by using the "SWCH" key and switch addresses.

Programming Wabbit CVs:
(Do Setting Addresses First, See Above)

1. Turn DCC Power off.
2. Move Jack Wabbit Jumper to Program Position.
3. Turn DCC power on "PWR" " Y+"
4. Select an unused locomotive number with the keypad or RH knob.
5. Press "PROG " key until you get from Pg to Po.
6. Use LH throttle to set, dial the CV number and the RH throttle for the CV value.
7. Press, "ENTER".
8. Repeat steps 7 & 8 until all the CV values are set.
9. Press "EXIT".
10. Turn DCC Power off and return the Jack Wabbit Program Jumper to the "RUN" position.
11. Turn DCC Power on and test the Jack Wabbit.

Test the switch address setting by using the "SWCH" key and switch addresses.

NCE: Using the Pro Cab or Power Cab:

Setting Jack Wabbit Addresses:

1. Turn DCC Power off.
2. Move Jack Wabbit Jumper to Program Position.
3. Turn DCC Power on.
4. Press SELECT ACCY.
5. Then use the keypad to enter the new switch number.
6. Press ENTER then press either 1 or 2 to set the address.
7. Repeat steps 4 thru 6 until all of the switch addresses are set.
8. Turn DCC Power off.
9. Move Jack Wabbit Jumper to Run Position.
10. Turn DCC Power on

Test the switch setting using the SELECT ACCY key

Programming Wabbit CVs:

1. Turn DCC Power off.
2. Move Jack Wabbit Jumper to Program Position.
3. Turn DCC Power on.
4. Use SELECT LOCO to address an unused locomotive number.
5. Press PROG/ESC key to enter PROGRAM ON MAIN mode.
6. Key ENTER to select the unused locomotive number, then ENTER again.
7. Key 2 to enter PROG CV NUM
8. Enter CV number then ENTER.
9. Enter value to be stored then ENTER.
10. Repeat steps 8 and 9 until finished.
11. Press PROG/ESC to return to normal operation.
12. Turn power off and put the Jack Wabbit Program Jumper into the Run position.
13. Turn power on and test the Jack Wabbit.

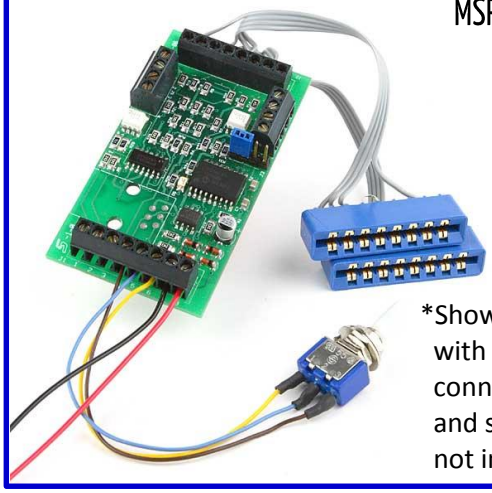
Test the Jack-Wabbit using the SELECT ACCY key.

Other Products in the DCC Specialties Family:

The Wabbit: The Jack Wabbit's Little Brother

- Operates 2 Stall Motor Type Switch Machines
- Patented Auto Throw™
- DCC & Manual Control
- Automates Reverse Loops
- Operates Semaphores

MSRP Starting at $31.95



*Shown wired with accessory connectors and switches not included.

The Hare: The Jack Wabbit's Cousin

- Patented Auto Throw™
- DCC & Manual Control
- With (Vers.2) or Without Feedback (Vers.1)
- Direct Connect
- Plug 'n Play

MSRP Starting at $32.95

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PSX1, PSX2, PSX3, PSX4:
Protect up to 4 DCC Power Districts!

PSX-AR:
Integrated DCC Circuit Breaker and Auto-Reverser!

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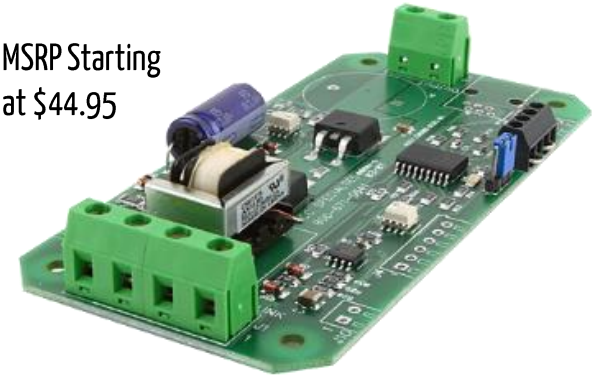

The RRampMeter

- Accurately measures DCC volts & amps
- Also measures AC and DC volts and amps
- Costs less than DVMs that cannot measure DCC
- Ver I, II, & III rated at 10 Amps
- Ver IV rated at 20 Amps
- Measures true RMS Volts/Amps, +/- 2%
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- No batteries required

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