

Casey Jones S Scale 4-4-0 Revival

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The American Flyer S Scale locomotives of the 4-4-0 American Class of Steam Locomotives were often referred to as "Casey Jones" after the legendary railroad engineer. Casey died in a train crash in 1900. This locomotive was not his assigned engine and not involved in the crash. The locomotive he drove in that incident was a 4-6-0, #382. Nevertheless the Gilbert Co. made 5 of these 4-4-0 models plus 3 variations in the 1960s. The most common models the L2001 and L2002 were very basic, unlit versions with an open frame pullmor type motor. These models only moved in the forward direction and therefore were cheaper than models with reversing E units. They are readily available on Ebay for \$15-45. Upgraded versions included 21165, 21166 which feature E units to enable reversing of the locomotive and finally the # 21168 model which included headlights, smoke, chuff sounds and knuckle couplers. These were produced from 1962-1963.

Some have road names including Burlington Route, SR, and Erie. These American Flyer locomotives operated on an AC (Alternating Current) controller imparting track pickup current to the open frame motor. This Project involves upgrading these models to operate in Direct Current (DC mode) and reverse by using the train controller rather than an on board E unit if present. The E unit can be removed. A lighting feature is also presented.

1) Conversion to DC Operation.

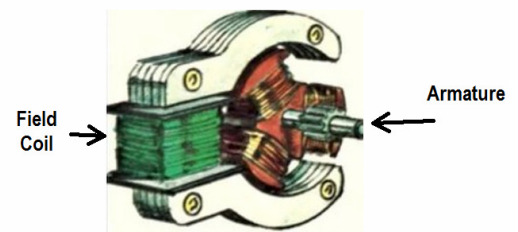
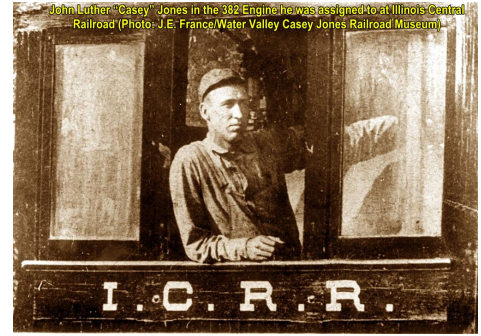
Through the use of a Bridge Rectifier and modification of the electrical wiring circuit it is possible to convert this model to DC operation with reverse via the controller. **Once converted however it should not be used with an AC controller/transformer.**

The motor is controlled by two electrical fields, one in the field coil and the second on the armature. They are connected in series from the armature to the field coil and then to ground. When current direction changes in one it also changes in the other. If we restrict the current direction in one but allow it to change in the other we can effect a change of direction of the motor and hence the locomotive.

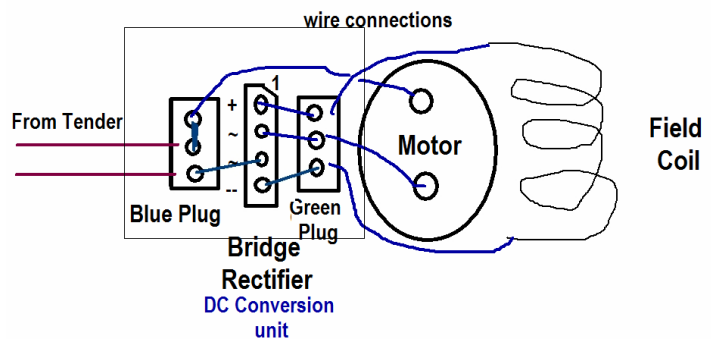
A bridge rectifier which restricts current out flow to one direction no matter what the input direction will accomplish this.

The circuit is set up as follows

It is made from two 3 pin terminal plugs, one Blue for input of power from the tender and one green for connections to the Bridge Rectifier and the field coil. When the controller is turned forward power goes from the tender to the middle terminal of the blue plug then via the top terminal out to the motor. It passes through the motor, out the other side and back to the BR ~ port. The Positive side of the BR sends



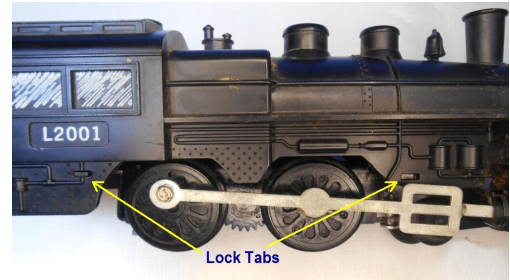
The Pullmor Open Motor



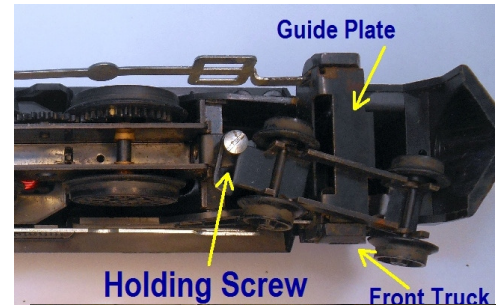
unidirectional current to the field coil which passes back to the -- negative side of the BR which connects to ~ lead of the BR and then back to negative on the track. When power is reversed the motor is reversed but the field coil current remains the same direction allowing for the motor to reverse. This method can be used for O scale locomotives as well.

HOW to install the DC Conversion unit.

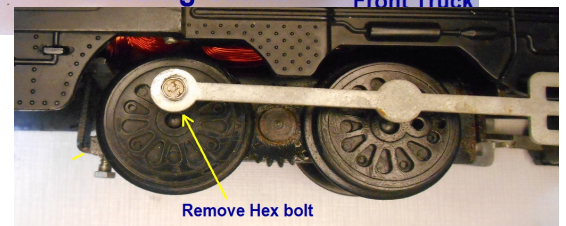
The first step is to disassemble the cab from the motor. This can be tricky because of the way the motor is held in the shell. Tabs on the chassis shown here insert into holding slots in the plastic shell, one under the cabin and other in front of the Driving Wheels. Cutting a slot to the rear tab will be described to facilitate future repairs.



Remove the screw holding the front truck and remove the truck from the Guide Plate. It is not necessary to remove the guide plate. If you do make sure you note the orientation for re-assembling. This plate also holds the driving rods in place.

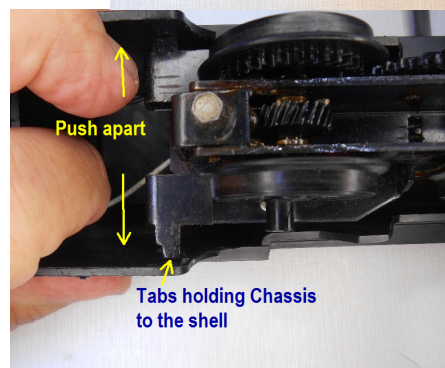
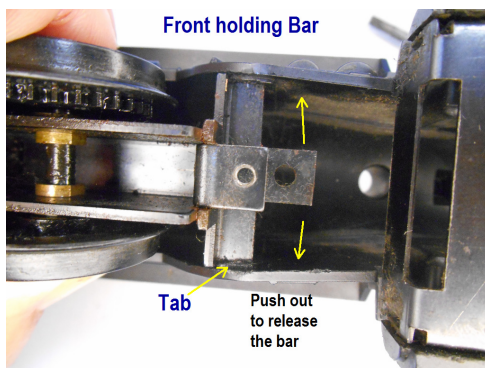
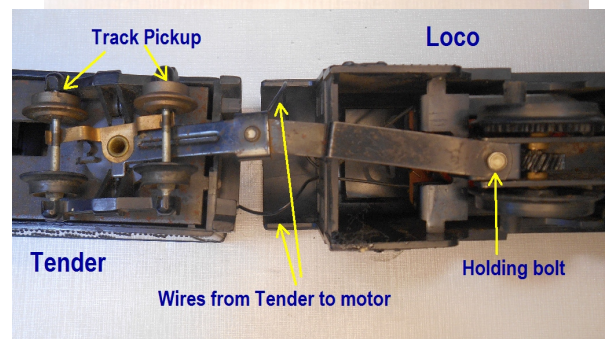


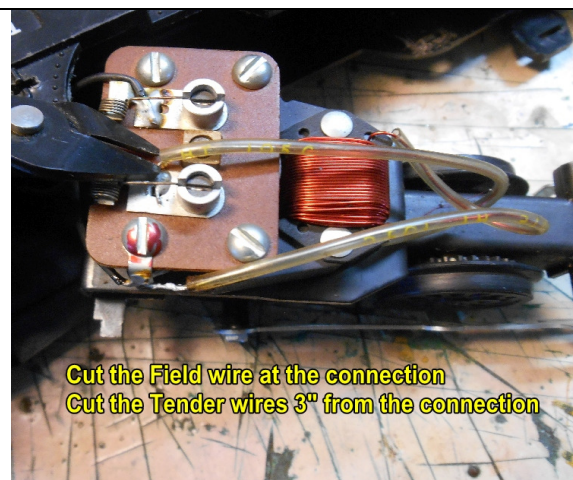
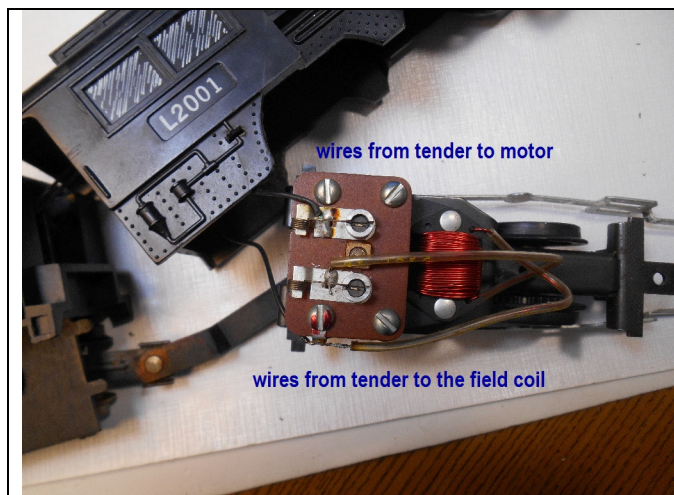
The driving rods should be removed by unscrewing the 3/16" hex bolt at the rear of each driving rod. Again note the orientation of the rods as they fit into the piston on the Guide Plate. Removing the rods is necessary for testing the motor.



Disconnect the bolt holding the Tender connection drawbar. The two wires coming from the tender to the motor are soldered to the pickup connections in the tender.

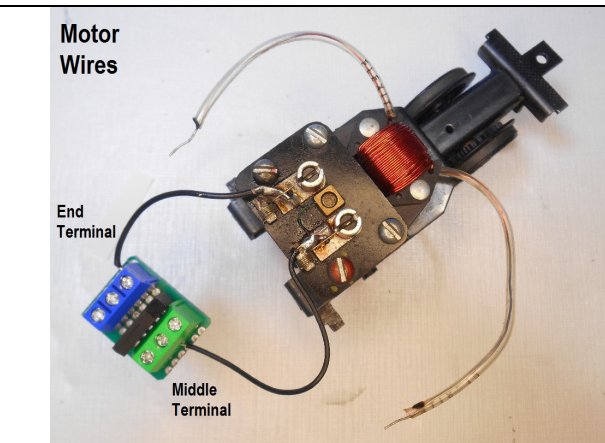
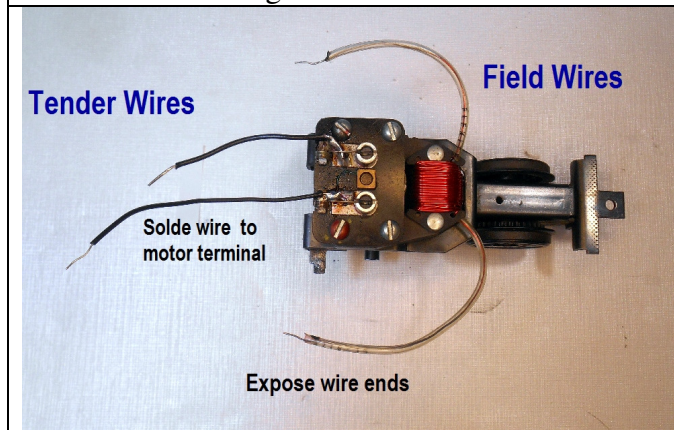
To remove the motor spread the shell apart to release the tabs holding the motor in place. This must be done carefully to avoid breaking the plastic though it is fairly strong. Release the tabs in the front first then from the tabs in the cabin.





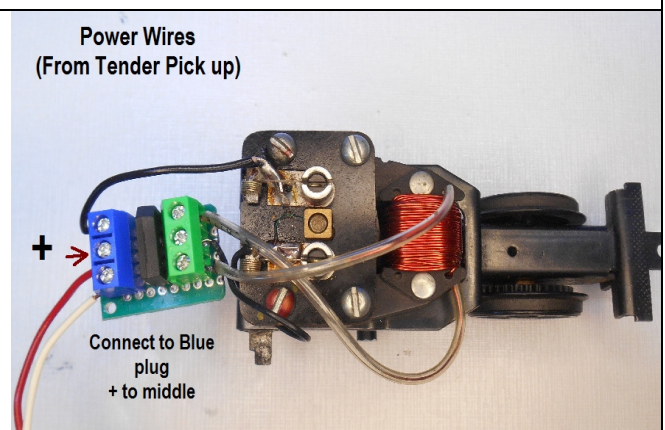
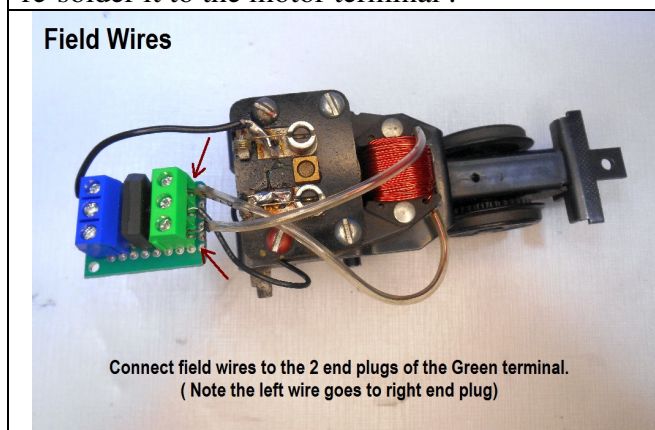
The motor with drive wheels can be removed from the shell. Note the wires from the tender go to one motor terminal and to a grounding screw marked here in red. The field wires go from the other motor terminal and back to ground. This is an "in series" arrangement.

Cut both wires from the tender about 3" from the connections to the motor and ground. Trim and tin the ends of these wires. Cut the Field coil wires at the terminal and ground connection. This is solid wire. Expose about 1/2" at the cut end for connection to the BR circuit board



Desolder the tender wire to the Ground Screw and re-solder it to the motor terminal .

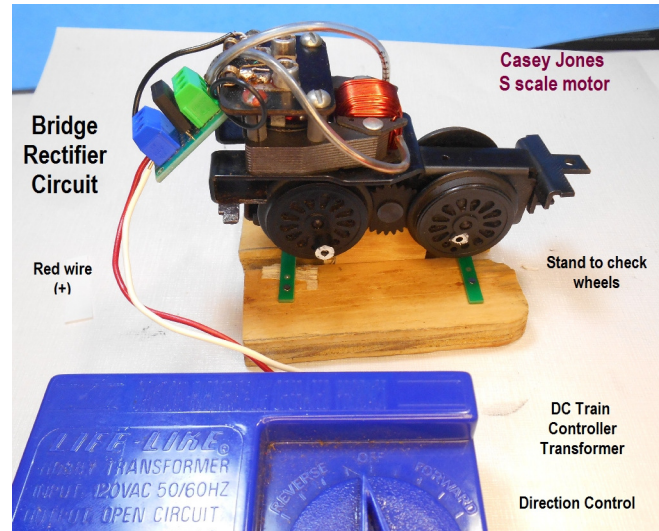
Connect the wires from the motor poles to the terminals on the BR board as shown here & below .



Connect the field wires to the green end plugs. If using a HO DC controller connect the coil wires to the green plug as shown here.

Connect the power from the track pick up to the blue terminal. The Positive pickup wire goes to the middle plug.

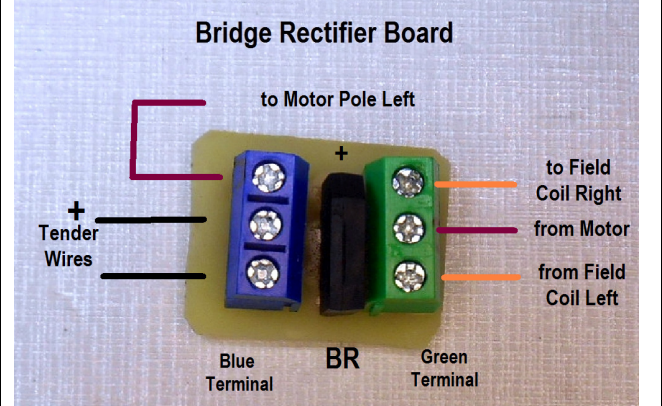
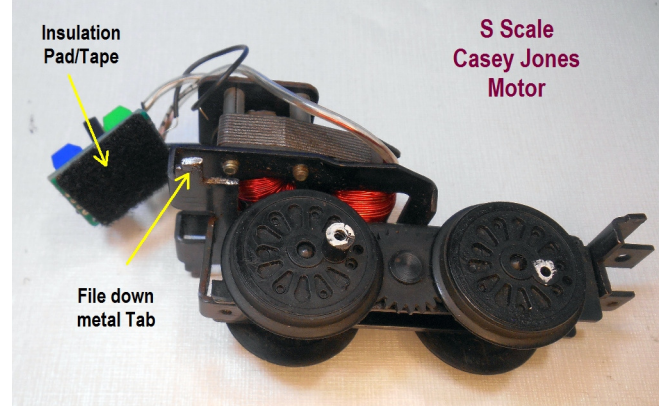
Testing the Circuit



Rig up a means by which the wheels can spin when power is applied. Connect the controller's variable DC wires to the Power IN terminals on the Blue Plug. The (+) positive wire is connected to the middle plug of the blue terminal.

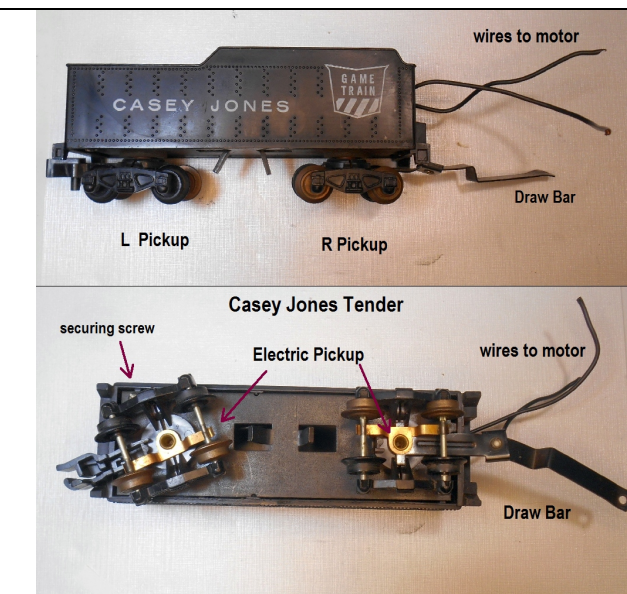
Turn the controller to FORWARD and the wheels should spin in the forward direction . Turn to REVERSE and wheels should spin in reverse. If they operate opposite reconnect the Field coil wires.

A dab of white marker on the wheels helps observation of the wheel rotations. If all works well disconnect the controller.

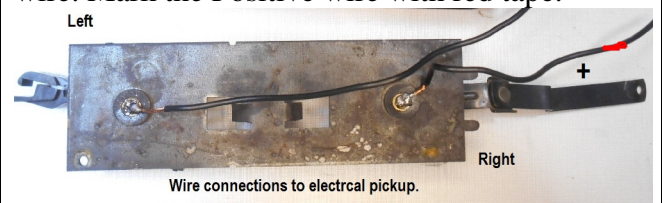


Attach a piece of insulation tape or pad to the undersurface of the board to avoid contact with metal. Make sure all connections are tight .

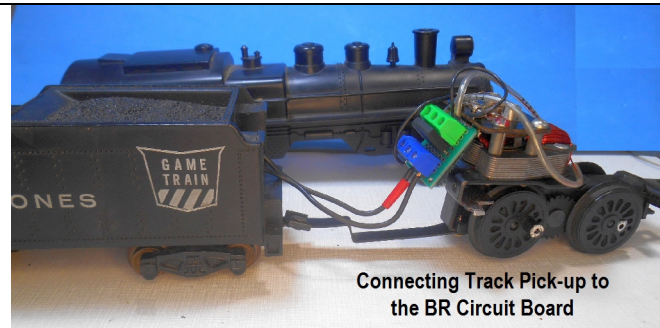
The Bridge Rectifier Circuit shown here shows the connections for the power wires from the Tender (black), to and from the Armature Motor (red) and to and from the Field Coil (orange).



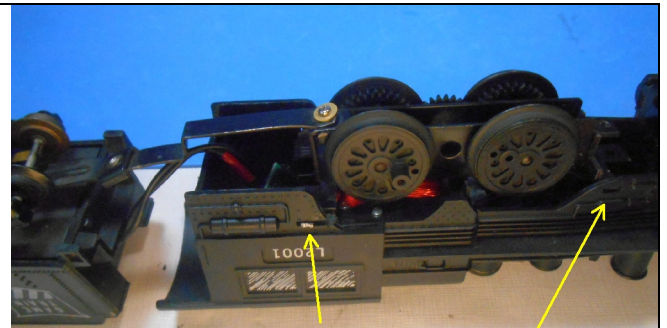
The Tender can be disassembled to check or replace the wire connections with the pickup wheels on the trucks. Remove the single holding screw in rear of the tender. Identify which track rail the pickup wheels and wire feed from. In order to use a DC controller made for HO scale the rail on the right with the locomotive moving forward from left to right is set as the Positive wire. Mark the Positive wire with red tape.



Reassemble



Connecting Track Pick-up to the BR Circuit Board



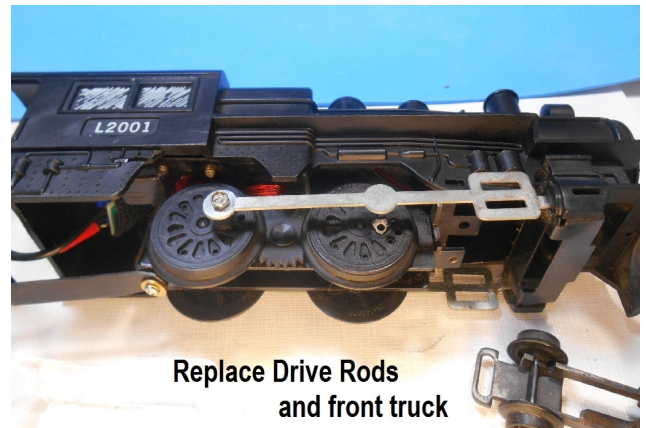
Insert the motor into the shell slots.

Re-assemble the Tender shell to the base frame. Connect the wires from the Tender to the appropriate terminals on the Blue Plug. Reconnect the drawbar to the locomotive .

Insert the Motor with driver wheels chassis back into the shell with the Bridge Rectifier board hanging behind the motor and inserted into the cabin. Line up the front and back tabs.



Groove cut with Dremel



Replace Drive Rods and front truck

One modification for the rear tabs is to cut a slot in front of the existing opening using a Dremel cutting disc so that the metal tabs slide into place.

Slide the Driving rod into the piston slot first, then attach the rod to the rear driving wheel. Slide the front bogie wheels into the guide plate and reattach with the screw.



Bridge Rectifier Circuit Board



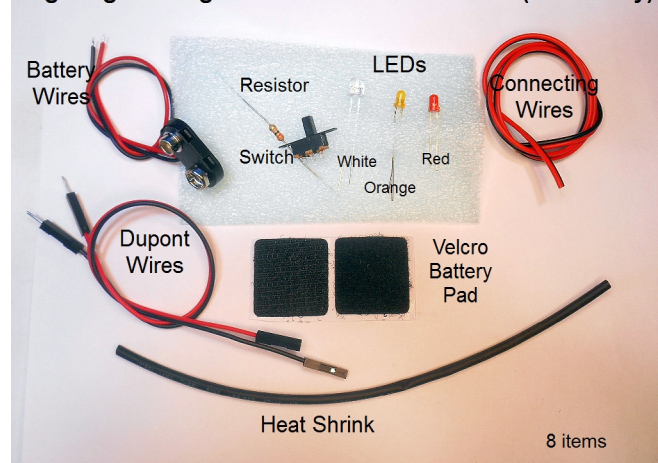
Insulation Backing

The locomotive is ready for the track. Depending on the variable DC controller the locomotive should move forward and backward based on the direction setting on the controller.

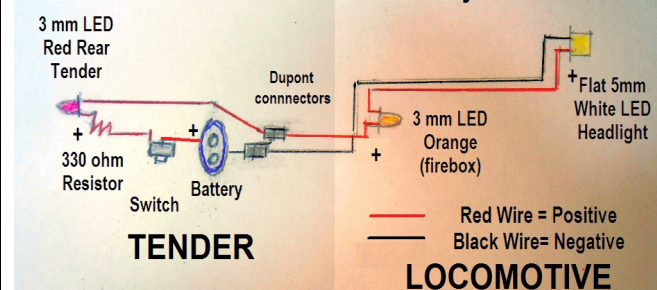
The Bridge Rectifier Board is available at our website modeltrainsounds.com for this project. See Project 27 for details. A Lighting kit for the locomotive is also available.

Add Lighting (before reassembly)

Lighting Kit Large Scale Steam Locomotive (9V Battery)

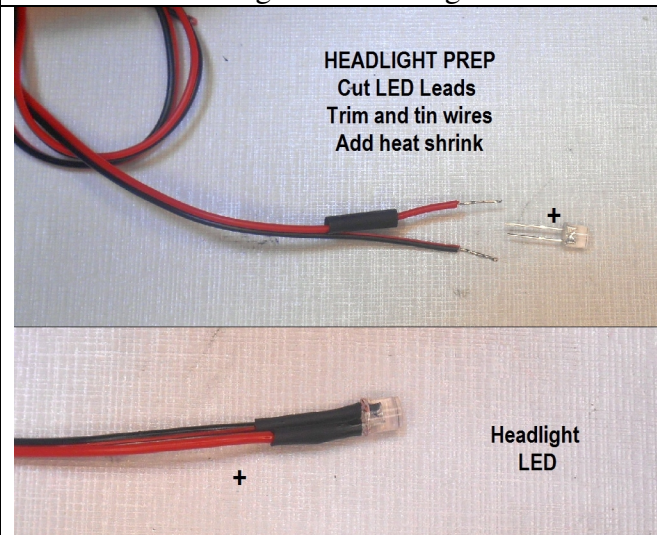
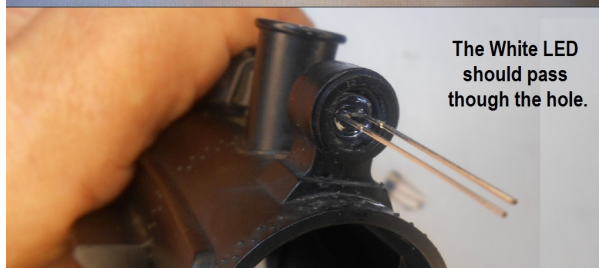


O/S Scale Steam Loco Battery Circuit



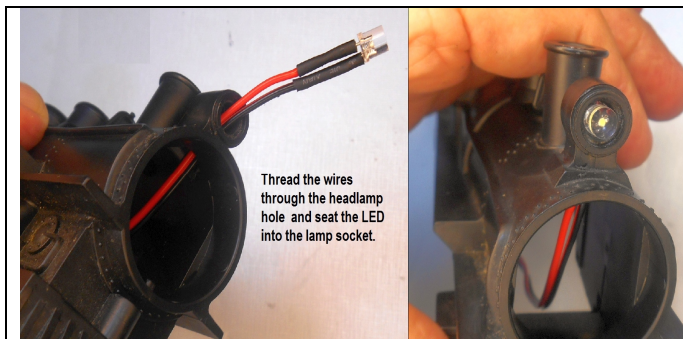
A lighting Kit that includes a 5mm soft white LED for the headlight, a 3mm Orange for Cabin (to simulate the firebox) and a 3 mm red for the rear of the Tender. Battery holder and switch.

The light circuit is installed with the shell and tender disassembled. The circuit is shown here with the lights set in series. The Positive (+) lead of each LED is longer than the negative lead.

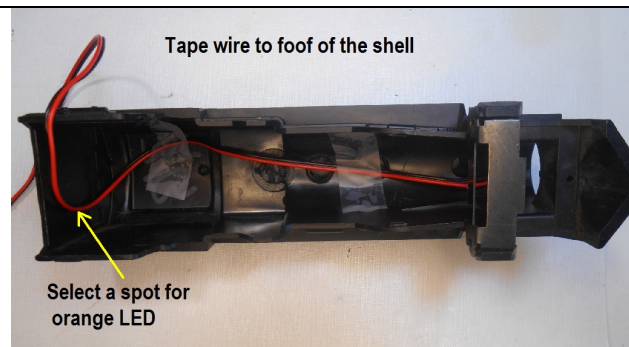


The Headlight lamp needs to have the opening wide enough to insert the LED body. Hand drill a 1/4" hole into the opening starting with a 7/64" drill bit.

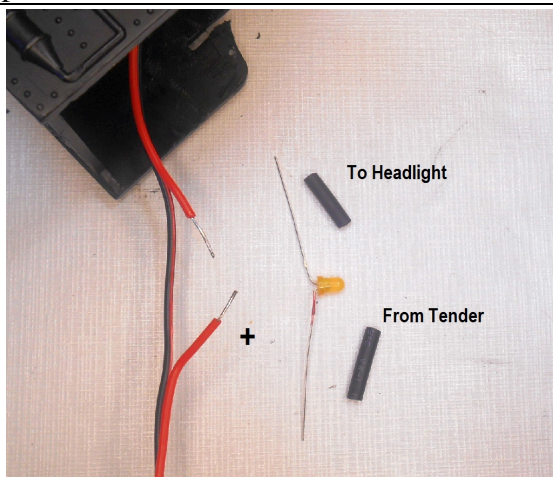
The head lamp is prepared using the 5mm soft white flat top LED. Split the ends of the connecting wire. Trim the ends and tin. Shorten the LED leads . Identify the (+) positive lead and solder it to the red wire with heat shrink cut to fit over the solder joint. Repeat by soldering the negative lead to the black wire. Heat shrink using a heat gun or lighter. Remove the Boiler cover to observe positioning of the LED.



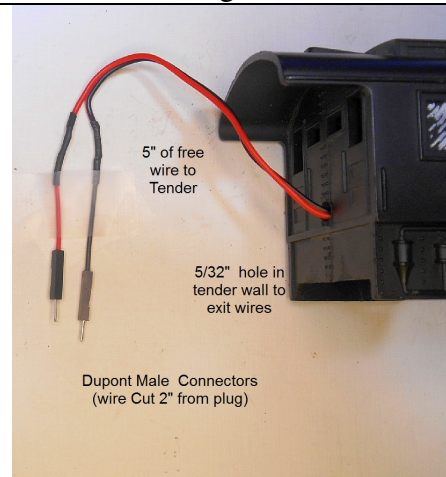
Thread the wire through the headlamp opening and bend the wires downward to seat the LED into the lamp socket



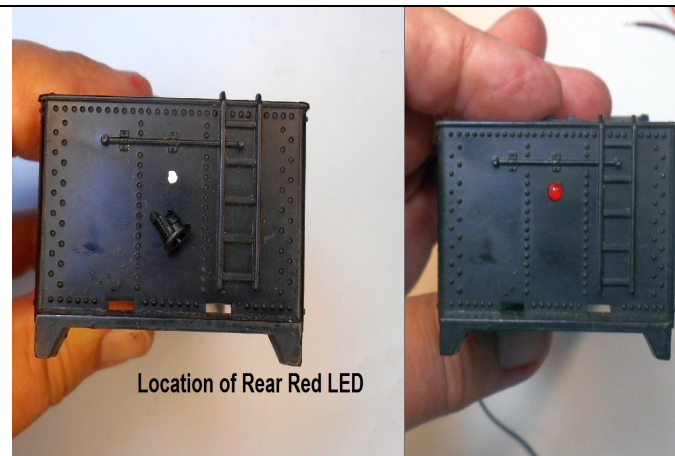
Tape the wire to the roof of the shell . Select a spot near the rear wall base just below the windows to add the orange LED.



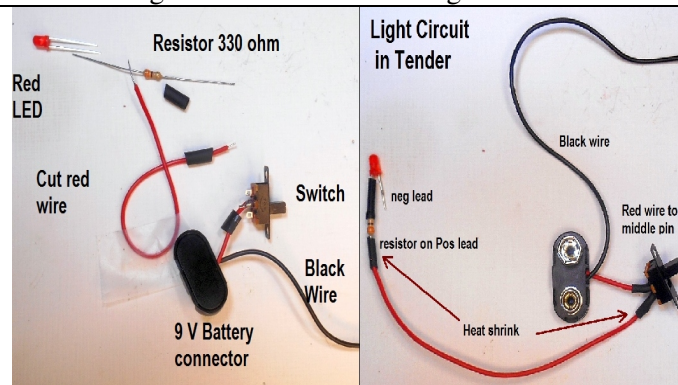
Split the wires, cut the red wire, trim and tin the ends and solder the orange LED to the wires using the heat shrink and maintaining polarity of the LED. Drill a hole into the back wall of the cabin 5/32" wide for wires to exit.



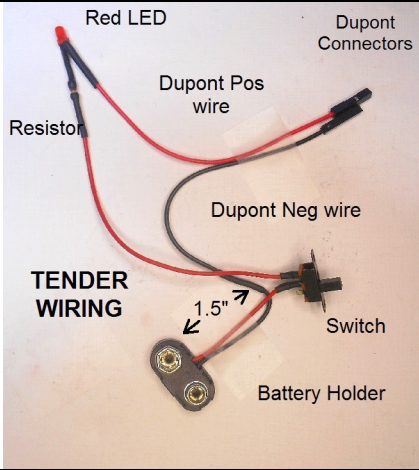
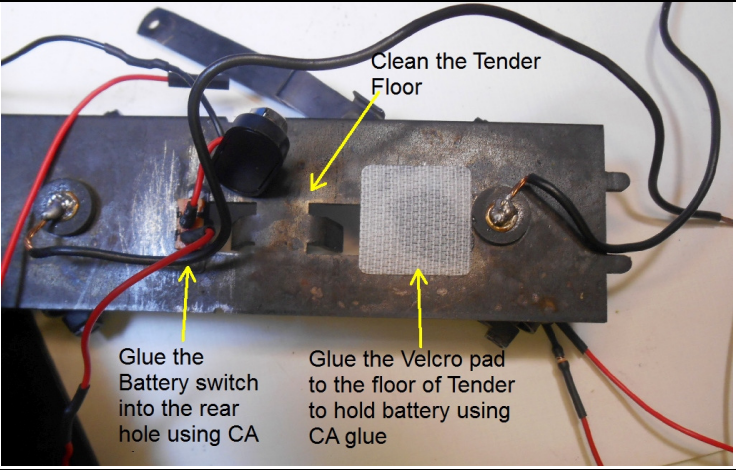
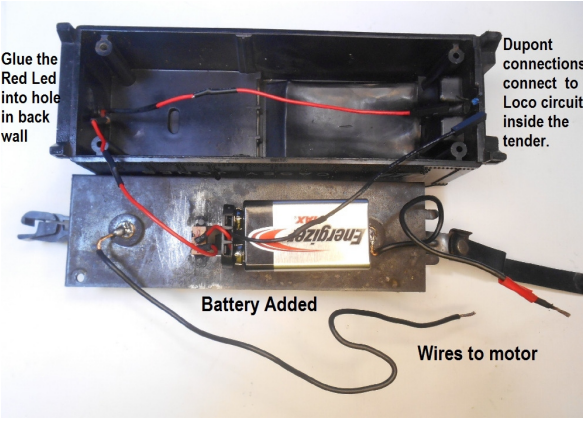
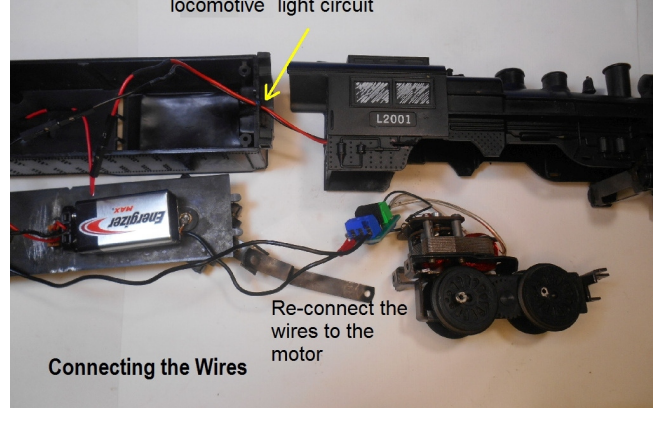
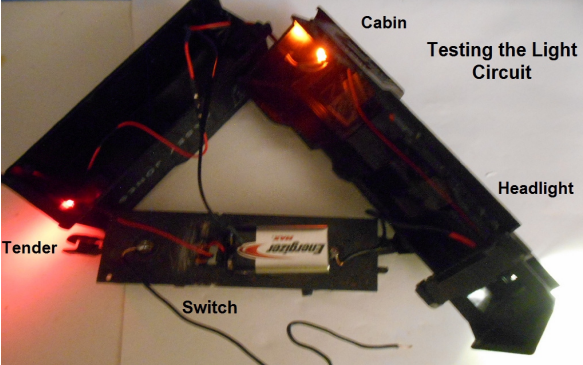
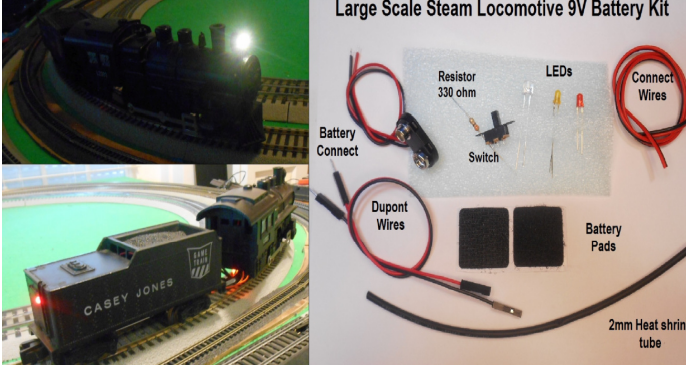
Cut the red/black wire from the locomotive so about 4 inches are exposed. Trim and tin the ends. Cut the wires from the Dupont wires male plugs about 1" from the plug. Add heat shrink and solder the wires together so that the free length is around 5"



Select a spot in the rear of the tender for the red LED. Drill a 1/8" hole the size to fit the LED once the circuit has been prepared. Start with a pilot 1/16th" drill bit.



Using the battery holder cut the red and black wires 1.5" from the connector, trim 1/8th" add heat shrink and solder the red wire to the middle pin. Solder remaining red wire to the outer pin. Solder the resistor to other end and then to the cut positive lead of the red LED. Use heat shrink on all solder joints

	
<p>Add the female connection plugs wires to the tender circuit. The red wire connects to the negative lead of the Red LED . The black wire connects to the black wire from the battery holder cut at the 1.5" from the holder.</p>	<p>The area around the rear holes in the floor of the tender should be cleaned and filed for the gluing of the switch. Use CA glue to attach the wings of the switch with the battery connector to the tender floor. The velcro pad (looped) portion should be CA glued to the floor just behind the front pickup. The adhesive backing will not hold the battery when upside-down.</p>
	
<p>The battery can be attached via the other pad. The 3mm Red LED can be glued into the hole in the rear of the tender shell. The wires with the Dupont female connections will connect to the wires from the locomotive.</p>	<p>A small hole 13/64 is drilled into the lower front wall of the tender allowing for the wires from the locomotive light circuit to enter the tender and connect to the Dupont connectors. Connect with exposed openings on the connectors aligned.</p>
	
<p>Test the lighting by turning on the switch. All 3 lights should be on. If not recheck all circuits.</p>	<p>Re-assemble the locomotive and tender and check operation on the track. The lighting kit is available at the website modeltrainsounds.com Project 27 b</p>