



Tired of mousin' around with your handcar or motorized vehicle? Read how Joseph improved the electrical operation of his Lionel handcar by adding a charming little ore car that holds a reverse unit and more.

Halt handcar hang-ups

Add a trailer with a pick up roller and reverse unit for better on-track performance

by Joseph Rampolla | photos by the author and Jim Forbes

HANDCARS, on-track inspection trucks, and other maintenance-of-way vehicles are some of the most entertaining items Lionel has produced in recent years. While it's fun to watch these self-propelled units run, the simple mechanisms they employ are often to blame when the high-velocity action comes to a halt.

No matter how much time you spend cleaning and tweaking your trackwork, a

handcar can still easily stall as it passes over switches, crossings, or any other track section where the short center-rail wiper loses electrical contact. In addition, the vehicle's light weight, traction tire, and fixed wheel base can all contribute to spotty electrical contact.

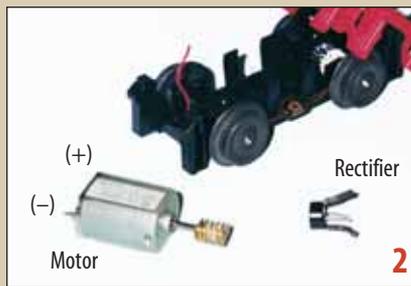
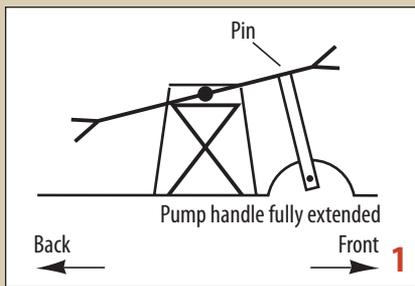
Add to this my frustration with the vehicle's forward-only direction of travel, and you'll begin to see how the excitement can quickly erode.

A trailer to the rescue

My first thought was to modify my Lionel no. 18433 Mickey and Minnie Mouse handcar, but a quick survey of the cramped mechanism revealed that there wasn't much I could do in such a limited space.

So I created more space.

I decided to add a Lionel no. 610-7202-054 four-wheel truck (minus coupler) with a Lionel no. 600-9050-150 cen-



ter-rail roller to carry current to the motor in my handcar. I wanted the resulting “trailer” to look as charming as the original, so I used the truck as a basis for a tiny ore car built from .060-inch sheet styrene. And wouldn’t you know it, the ore car also provided just enough space for me to add a Lionel no. 600-0103-001 electronic reverse unit and a lock-out switch.

Building an ore car for use with your handcar is an easy project with a wide margin for error, since slight irregularities in measuring and workmanship can help to enhance its rustic look. For an inspection pickup truck or other type of motorized unit, you could build a more realistic utility trailer or cart that’s large enough to conceal the reverse unit. Regardless how you design your trailer, be sure to keep its weight to a minimum.

Hot-wired handcar

Before you begin, be sure your handcar operates smoothly and the articulated figures pump up and down freely at their joints. When you’re finished testing the unit, stop the handcar with the front end of the pump handle in its most upward extended position (**diagram 1**). Disconnect both figures’ feet from the handcar.

Next, turn the handcar upside-down and gently pry off the handcar cover by inserting a small screwdriver under the black plastic tabs at the back end, opposite the gears. Although the handcar cover detaches from the frame, a small pin still holds the pump handle to the geared mechanism. It isn’t necessary to

completely remove the cover, but handle the two assemblies carefully.

With the cover raised, you can now identify the motor’s positive lead by the tiny plus (“+”) sign printed on the rectifier. The new reverse unit will provide the rectified current for the DC can-style motor, so you’ll need to remove the original rectifier. First, use a no. 2 pencil to label the positive lead with a plus (“+”) sign on the motor casing, then use wire cutters to snip off the rectifier and remove the motor completely from the frame (**diagram 2**).

Cut four, approximately 8-inch lengths of 24-gauge stranded wire, each of a different color.

By using a smaller gauge wire, you could easily double the wires from the

handcar leads. I did this to guarantee reliable performance and still maintain reliable connections. As you solder the wires to the motors’ leads, be sure to wear protective glasses (**diagram 3**).

Because the existing handcar wiring was a smaller gauge than I liked, I also soldered additional wires to the wheel pickups and center rail wiper. I finished the handcar soldering by covering each connection with a short length of PVC tubing (**diagram 4**).

Now that you have completed the wiring on the handcar, you’ll need to cut or drill out at least a 1/4-inch opening at the back end, just under Mickey’s feet. Insert the wires through this hole so you can connect them to the reverse unit later. I covered them with a sleeve of black PVC tubing to protect them from wearing against the handcar cover.

Next, return the motor to the frame, making sure that the pump handle on the front end is once again in its most upward extended position. With the rectifier removed, there should be enough room inside the handcar for the added connections and wiring, but do check for anything that could interfere with the spring action of the center rail wiper or the moving wheels and gears.

Placing the front in first, carefully snap the cover back into place. Re-attach the figures’ feet and test that the unit is properly re-assembled by touching the two motor leads to a 9-volt battery. It’s important to note that with the rectifier removed, this test must be made with DC, not AC power. You can test for both forward and reverse operation by simply switching the wires between the two battery terminals.

Bringing up the rear

Begin the ore car construction by soldering 18- or 20-gauge wire to the pick-up roller assembly of the four-wheel passenger car truck. The ore car’s truck isn’t intended to pivot, so wire flexibility isn’t a concern here.

Following the dimensions in **diagram 5**, cut the ore car parts from the .060-inch sheet



styrene and assemble the pieces using plastic cement. I used thick styrene due to its stability and the ease in which detail can be added to it with a V-groove wood-carving tool and hobby knife. For more detail, you can add small brackets or running boards at the ends of the ore car to hold a lantern or shovel, as I did.

Attach the ore car to the truck using a small nut and bolt with a few dabs of cyanoacrylate adhesive (CA, or more commonly known as “super glue”) on the threads. Glue a few small pieces of styrene to the underside to keep the truck from pivoting and provide shims for the drawbar. Drill several 1/8-inch holes into the car bottom for the wiring, to enter the drawbar bolt, and to help ventilate the enclosed electrical components. Feed the wires into the car, then snap the pick up assembly into the truck. Cut a small opening in the back end of

the ore car to accommodate the lock-out switch. I used a DPDT (double pole, double throw) switch to lock-out the reverse unit, but other small slide switches will work, too.

Hanging on for the ride

Using the wire tether as the sole connection between the handcar and ore car would pull too much on the soldered connections. To create a drawbar, I used a 3-inch-long piece of wire coat hanger.

Use a pair of needle-nose pliers to form a loop on one end of the wire and a hook on the other (**diagram 6**). At the center of the back ledge of the handcar, drill a 1/8-inch hole to accept the drawbar hook. Next, fasten the loop end of the drawbar to the ore car using a small bolt and nuts, adding a washer against the styrene. Tighten the two nuts against each other. When the units are hooked

together, the drawbar should move freely at both ends.

Brains for the brawn

In addition to wanting more reliable operation, I also wanted my handcar to run in both forward and reverse direction. Adding an electronic reverse unit is an easy way to accomplish both objectives. The Lionel electronic reverse unit I added to my Mickey and Minnie handcar comes in the form of a 2 3/8-inch-long by 1 3/8-inch-wide by 3/8-inch-thick circuit board that already has six wires soldered in place.

To connect these wires, refer to **diagram 7**, which identifies the separate motor, pick up, and switch wires by their colors or circuit-board markings (W1 through W6). Before you make any connections, you may want to trim away any excess wire length to avoid overcrowding the interior cavity of the ore car.

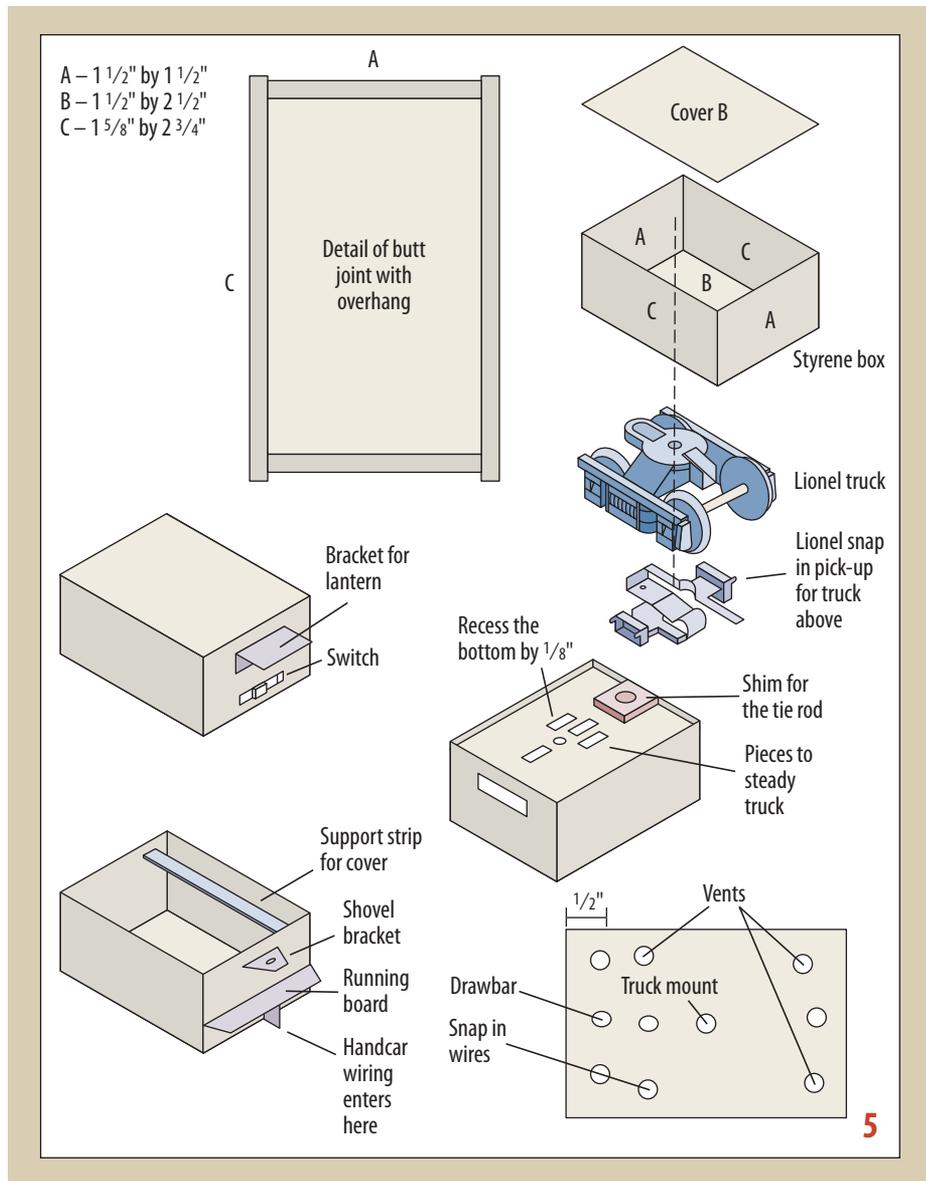
First, cut or drill two 1/8-inch openings – one just above the drawbar connection on the ore car and the other in a similar position at the back of the ore car.

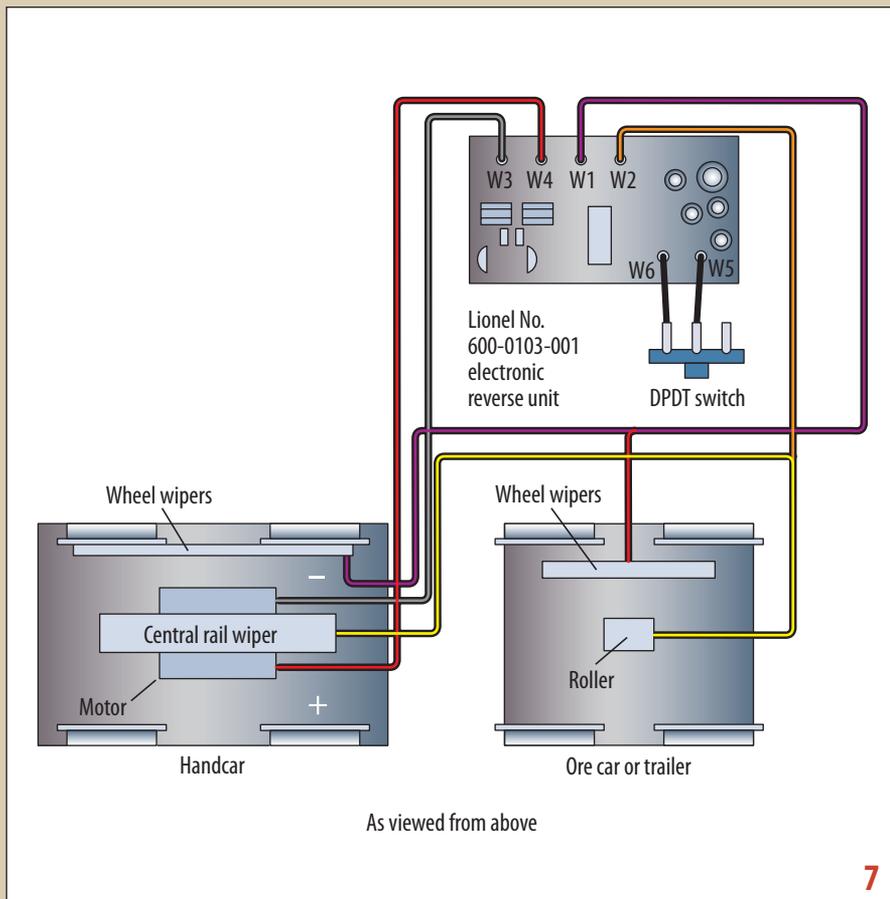
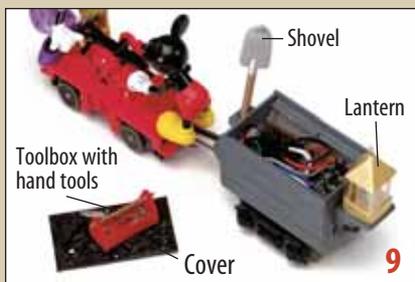
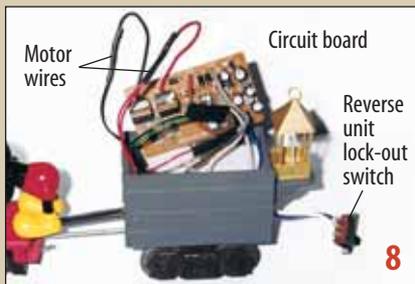
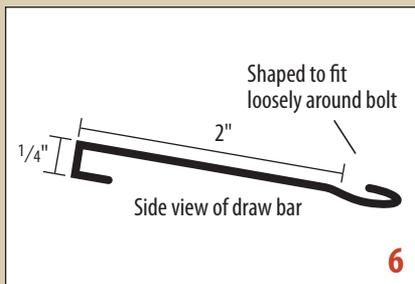
Now route the wires through the front hole and connect the motor’s negative lead (-) to the board’s black wire (W3) and the motor’s positive wire (+) to the board’s red wire (W4). Join the wires from the handcar’s center-rail wiper and ore car’s center roller and connect them to the gray wire (W2). Also join the wire from the handcar’s wheels to the remaining wire from the ore car’s wheel contacts and connect them to the brown wire (W1). Finally, solder the small switch leads to the blue and white wires (W6 and W5).

Be sure to double check your wiring before testing, as a crossed wire could damage the reverse unit. Now set the handcar and ore car on a section of track and momentarily apply AC voltage. The handcar will operate if everything is connected properly. If there isn’t any motion, quickly cut the power and look for any crossed wires. The reverse unit can start up in the neutral position, so you may want to try a second attempt before re-wiring. Also, the small switch you attached serves as your reverse unit lock-out switch – be sure that it isn’t unintentionally set in a locked position.

Finishing the ore car

Once you’ve got your handcar operating properly, you can install the board and wires in the ore car. Begin by cutting out a piece of .060-inch styrene (or another thick, non-conductive material) to place under the circuit board. This piece keeps the underside of the board from contacting a nut, bolt, switch hous-





ILLUSTRATIONS BY THEO COBB

ing, or piercing a wire. Neatly arrange the circuit board and wiring inside the ore car, with the goal of maintaining adequate space between the components and the cover piece. Use CA glue to secure the small, lock-out switch in the hole you drilled at the back of the ore car (**diagram 8**).

Now that the circuit board is set into place, you'll want to cover it with a simulated ore load. Create the cover by gluing small pieces of foam packing material onto a clean, sanded piece of styrene. Once the foam material dries, drill several holes for ventilation and then paint the entire piece using water-based or latex black paint (solvent-based paint will dissolve the foam). While the paint dries, add two styrene strips to the interior of the car. These will keep the load above the circuit board and provide a surface to accept small mounting screws. Before priming and painting the ore car, lightly sand the surface and then clean the styrene with rubbing alcohol.

While the ore car will look fine with just a coat of paint, I finished off mine in a whimsical fashion that complements the Mickey and Minnie handcar theme.

I included a shovel, hand tools, a toolbox, and an illuminating dollhouse lantern to add visual interest (**diagram 9**).

Back to the hi-speed handcar hi-jinx

It's a real pleasure to gain full control of an operating handcar or motorized unit. If your handcar still stalls over switches or other track sections, make sure the unit is picking up voltage from the center rail wiper, the center roller of the trailer, and from all wheel-sets.

Check that the center wiper and roller are touching the track, and that their spring mechanisms move freely. If necessary, add weight to the ore car or the handcar to improve traction and contact with the rails. Additionally, you can also adjust the length of the drawbar to make sure that the handcar and trailing car don't both roll over dead track sections at the same time. Any of these fixes should get you back into the high-speed handcar hi-jinx in short order! **CTD**

PARTS

All Electronics

- LP-6 bulbs with wire leads, 14 volt @ 45 ma. 3-millimeter
- PVC 316 ³/₁₆-inch PVC tubing
- PVC-332 ³/₃₂-inch PVC tubing
- SSW-33 DPDT slide switch

Lionel

- 600-0103-001 electronic reverse unit (circuit board)
- 600-9050-150 pick up assembly
- 610-7202-054 plain truck

Miscellaneous materials

- cyanoacrylate adhesive (CA, or "Super Glue")
- 20-gauge, stranded electrical wire
- 24-gauge, stranded electrical wire
- liquid plastic cement
- .030-inch-thick sheet styrene
- .060-inch-thick sheet styrene
- small nuts
- small bolts
- small screws
- gray, water-based paint
- ⁵/₆₄-inch-diameter wire coat hanger