



# FROM PREWAR *to the digital age*

How to add Lionel's TMCC and RailSounds to an old streamliner

story by Neil Besouloff

**C**OMMAND-CONTROL TECHNOLOGY is the present and the future of the toy train hobby. With conversion kits, that same technology can co-exist with the past. CTT's staff decided to push the limits of the word "past" by installing Lionel's TrainMaster Command Control and RailSounds kits into an American Flyer O gauge Zephyr. This three-car Zephyr set, built by the American Flyer Manufacturing Co. in 1934 (it predates Flyer's sale to the A.C. Gilbert Co.), features an unusual sand-cast aluminum body, but its all-in-one motor and drive mechanism are quite similar to most prewar locomotives. Also, the Zephyr's open-frame motor isn't especially different from open-frame motors found in postwar Lionel locomotives.

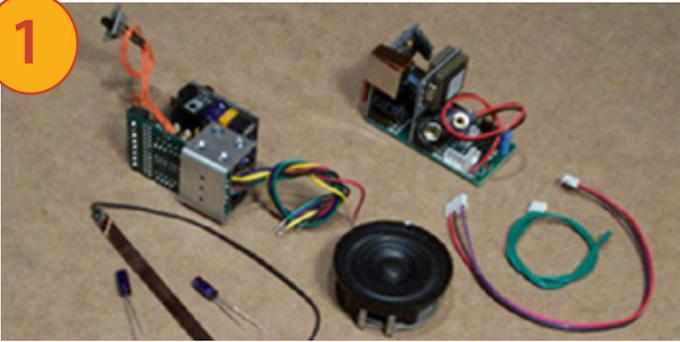
Both the TMCC and RailSounds kits I received from Digital Dynamics came with clearly written instruction manuals. While the real Pioneer Zephyr used a Winton engine, Lionel

limits RailSounds kits to Alco, General Electric, and Electro-Motive sounds. I chose an early Alco sound system for this Zephyr. Together, the kits (AC/DC DLX for AC motors with RailSounds 4.0 for Alco FA/PA) cost about \$160.

From an electrical standpoint, adding TMCC and RailSounds to this prewar train was easy. Much more difficult were finding mounting space for the circuit boards and speaker and then deciding where to place all the new wiring.

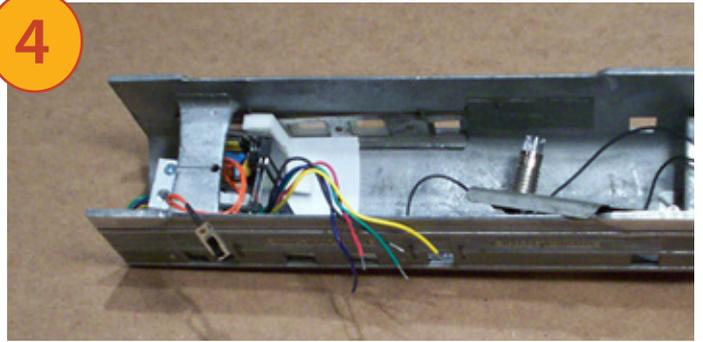
This particular Zephyr's original motor-and-drive mechanism was lost long ago. What you see in the photos is an age-appropriate but incorrect American Flyer mechanism, complete with two colors of wheels. While adding TMCC and a sound system to a prewar locomotive may be blasphemy to some hobbyists, it makes operation of the Zephyr more fun, and that's what toy trains are all about. Follow along to see how the installation works. **CTT**

1



**Here are all the** components that must fit into the *Zephyr*: the TMCC board set at left (the orange wires connect to the run/program switch), an antenna, two capacitors, a speaker, the RailSounds boards at right, and a red-and-black electrical tether to connect two cars in case everything couldn't fit into the power car (which turned out to be the case).

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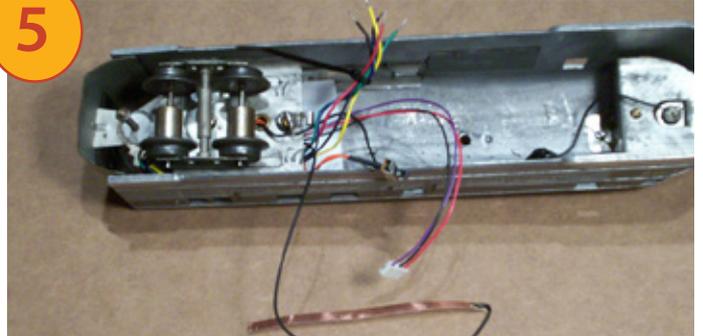
**After days of** test-fitting the TMCC boards in different locations, I decided to install them upside down above the brace at the rear of the shell. I used a scrap piece of plastic to insulate the underside of the metal roof (the plastic is white in the photo) and foam tape to hold the boards into place. I also made sure there was enough room at the rear of the shell for the *Zephyr's* vestibule to swivel to the left and right.

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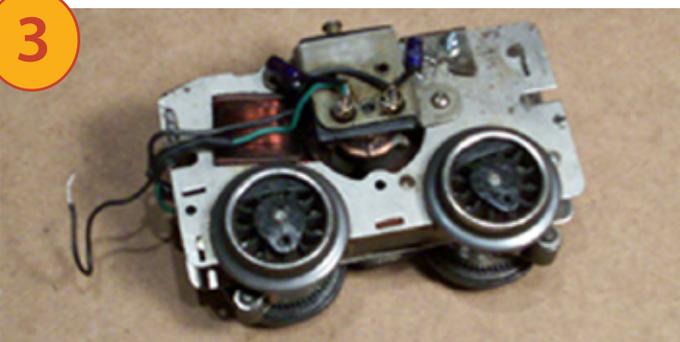
**When disassembled,** there seems to be plenty of room for the TMCC/RailSounds components. However, looks can be deceiving. The TMCC boards here are temporarily placed in the rear of the power car's shell. The motor-and-drive mechanism takes up most of the space in the center of the shell. A cast-in rear brace, sheet-metal light-bulb brackets, and stamped-metal vestibule eat up a lot of real estate on this model.

5



**I reattached the** trailing truck, a sheet-metal plate that holds a light bulb for interior illumination, and the vestibule. I swapped the light bulb for a new screw-base AC light-emitting diode mounted in a bulb socket (from Scott's Odds-n-Ends). I made this change because I was concerned that heat from the light bulb (it comes close to touching the TMCC boards) might damage the boards. I kept the *Zephyr's* original lighting circuit, but replaced all the bulbs with matching LEDs (rated at 12-14 volts), gambling that the LEDs will hang in there at TMCC's 18 volts.

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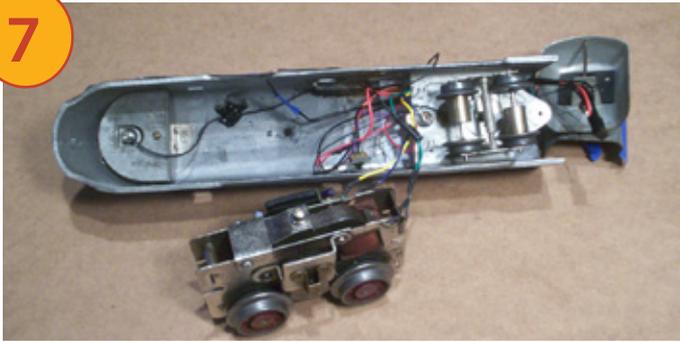
**I identified the brush,** field, pickup roller, and ground wires on the old Flyer motor-and-drive mechanism using a Lionel repair manual as a guide (there are no similar repair manuals for prewar Flyer trains). Then I drew my own wiring diagram so I wouldn't get confused. A capacitor (used to smooth the flow of electricity) must be connected to each of the motor brushes, which, for the *Zephyr*, turned out to be easy.

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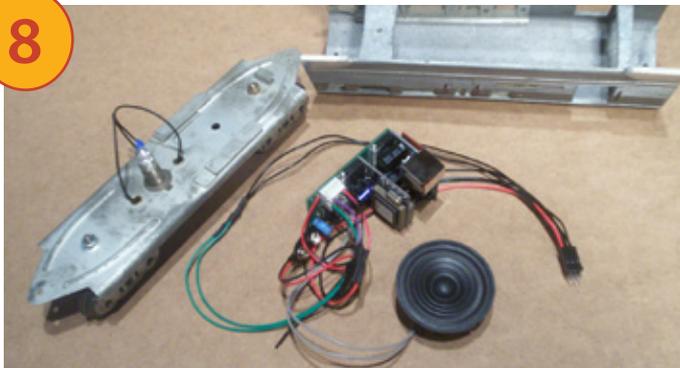
**Here's the *Zephyr*** after all the color-coded TMCC wiring has been soldered to the motor-and-drive mechanism according to the diagram in the instruction booklet. The shiny copper strip is the TMCC antenna. The unattached purple and pink wires next to the trailing truck will be cut and spliced into the tether connecting the power car to the RailSounds components in the baggage/coach car. The white plug fits into the RailSounds power board.

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**The RailSounds wires** have been soldered to the tether (the female end of the tether is resting inside the disassembled vestibule). All the connections are insulated with heat-shrink tubing (except for one that I missed). After this photo was taken I finished assembling the power car and set it on a section of track to test the TMCC boards. With the antenna temporarily insulated and taped to the outside of the metal shell and the unconnected RailSounds wires taped out of the way, the *Zephyr* silently moved, responding nicely to CAB-1 commands.

8



**Once I was satisfied** with my TMCC installation, it was time to move on to RailSounds. These are the RailSounds components before they were placed into the *Zephyr's* baggage/coach car. The male end of the tether is already soldered to its appropriate connections. Since I have no plans to run this *Zephyr* in conventional-control mode, I did not install a 9-volt backup battery – I covered the battery socket with electric tape.

### Conversion tools

- Electric drill and small files (to cut and clean openings for tether)
- Electric tape and cloth friction tape
- Heat-shrink tubing
- Pencil-tip soldering iron
- Rosin-core solder
- Scrap sheet plastic
- Soldering paste
- Two-sided foam tape

### Sources for conversion supplies

**Digital Dynamics** • 48 E. Starrs Plain Rd., Danbury, CT 06810  
203-778-3599 • (Mon. - Fri. 4-8 p.m., closed Saturday), [digitdynam.com](http://digitdynam.com)

**Train America Studios** • 970 Windham Ct., Ste. 8, Boardman, OH  
44512, 330-533-7181 • [tastudios.com](http://tastudios.com)

**Scott's Odds-n-Ends** • 5701 N.W. 63rd Pl., Parkland, FL 33067  
954-345-5761 • [scottsodds-n-ends.com](http://scottsodds-n-ends.com)



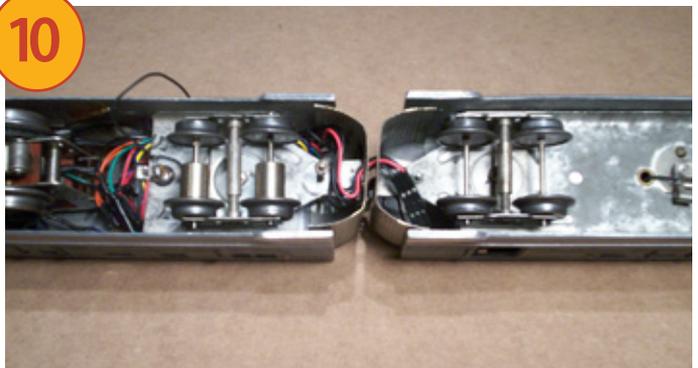
To purchase other electronic stories like this, go to [classictoytrains.com](http://classictoytrains.com) and scroll to "Information Station."

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**After installing the** RailSounds boards in the front of the baggage/coach car (again up against the roof of the shell), I took a deep breath and made the only non-reversible modification to my *Zephyr* – cutting oval-shaped holes in the two vestibules for the six-pin tether connecting the RailSounds and TMCC boards. The holes are at the lower edge of the vestibules (you can see the red wire).

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**Here's another look** at the six-pin tether that snakes from the power car at left to the baggage/coach car. After the photo was taken, I wrapped the wires in cloth friction tape to prevent chafing on the openings that I cut into the vestibules. The power car and baggage/coach car are easy enough to lift together with two hands, so the male and female ends of the tether will rarely be uncoupled.

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**The speaker for** RailSounds is tucked into the rear of the baggage/coach car. Not an ideal spot, but as you can see from the opening in the shell, there isn't much space to work with because of a high sheet-metal floor and a central-mounted bulb that illuminates the car. I used a cardboard tube to make a sound box (as per the instructions that came with the RailSounds installation kit) to improve audio quality. After that, I tested my installation, and the TMCC *Zephyr* was ready to roll.