

About our DCC columnist



Bruce Petrarca is a well-known expert on all things DCC.

[Click here](#) to learn more about Bruce.

DCC Impulses: N-scale Decoder Installations

An Extravaganza for a Smaller Scale



From theory to the real world!

I have developed a lot of theory over the first half-dozen columns. Now is time to show you all how I applied it. This month we will jump into the world of non-sound N-scale installations. I've assembled photos and notes from the decade that I owned Litchfield Station. After each example, I'll explain how I would tackle that loco today.

Whenever I read anything about DCC, I pick up ideas. Personally, I model in HO and Fn3 (1:20.3 scale, narrow gauge). However, I've used concepts from many other scales. There is something for every DCC operator somewhere in this month's column.

Also this month, I'm introducing a new section, "SMP from Mr. DCC." SMP comes from the Amtrak world for Standard Maintenance Procedure. Here I plan to offer a quick tip each month for you all. It may be something that many folks know. However, if just one person benefits from it, I will have succeeded! Check the sidebar in this and future columns for this

new feature. This month deals with an issue that torments many Digitrax system users.

Let's get going!

I find that recently-designed N-scale locos are some of the easiest to put a decoder into. Why? Because, in many cases, the engineering has been done for you. But, there are some engineering blunders, too.

These will not be step-by-step installation guides, but rather, an example of how things have successfully been done. Once you know your final target, you can frequently find step-by-step guides on the web.

I list these examples alphabetically. You will find references to materials, supplies and techniques that were mentioned in prior columns. If something doesn't make sense, look at prior columns. You do have all the issues of MRH saved on at least one of your computers, don't you? You can build a complete library of all the MRH issues for free right now. Just go to the web site (model-railroad-hobbyist.com/magazine/back-issues) and download the back issues.

In several of these installations, I mention LED lights. I covered preparing them and even had a video (www.youtube.com/watch?v=SI5YVGzGWUs) in last



Figure 1: N scale Athearn F59PH with Lenz Silver Mini decoder.

month's column (mrhmag.com/magazine/mrh-2012-03-mar/dcc_impulses).

N scale Athearn F59PH

The Coaster loco shown in figure 1 (previous page) used a Lenz Silver Mini decoder for light and motor control. The trick was to find the correct places on the Athearn board to connect the decoder and cut the necessary traces.

I traced the LED, resistor, rail and motor connections visually on the board. I then used a hobby cut-off wheel or hobby knife to slice the copper traces without cutting through the board.

Next I wired a Lenz Silver Mini decoder as if it were a conventional

installation, just using the circuit board for support and for connecting points. The decoder was held to the top of the board with Kapton tape.

If I were to do this installation today, I would use the Lenz Silver Mini or TCS M1 decoder. Their precise motor control makes this model a smooth runner.

N scale early Atlas GP-7

Figure 2 shows a classic example from the pre-DCC era. Most of the Atlas diesels from the 1990s were built this way. There was no place in this design for a traditional decoder. I had to completely disassemble the loco and rebuild it from the ground up.

I installed a Lenz LE077XF decoder into a frame modified by Aztec (www.aztectrains.com/dccframes.html).

Aztec exchanges your frame for one that it has in stock already machined such that it will isolate the motor and provide clearance for decoder mounting.

I completely disassembled the loco and sent the frame halves to Aztec. While I was waiting for the machined frame parts to be sent back, I cleaned and lubed the motor, gear train and trucks.

When the new frames arrived, I rebuilt the loco and wired the decoder. Aztec's detailed instructions led me to modify the Atlas light board and to cut the decoder leads to the proper length. I stuck the decoder down with carpet tape as shown in figure 2. I prepared an LED and attached it for the rear light.

Many Atlas and Kato diesel locos were similarly designed and can be converted this way.

If I were to do this installation today, I would use a TCS CN series decoder as shown in the Atlas RS-3 installation later in this column.

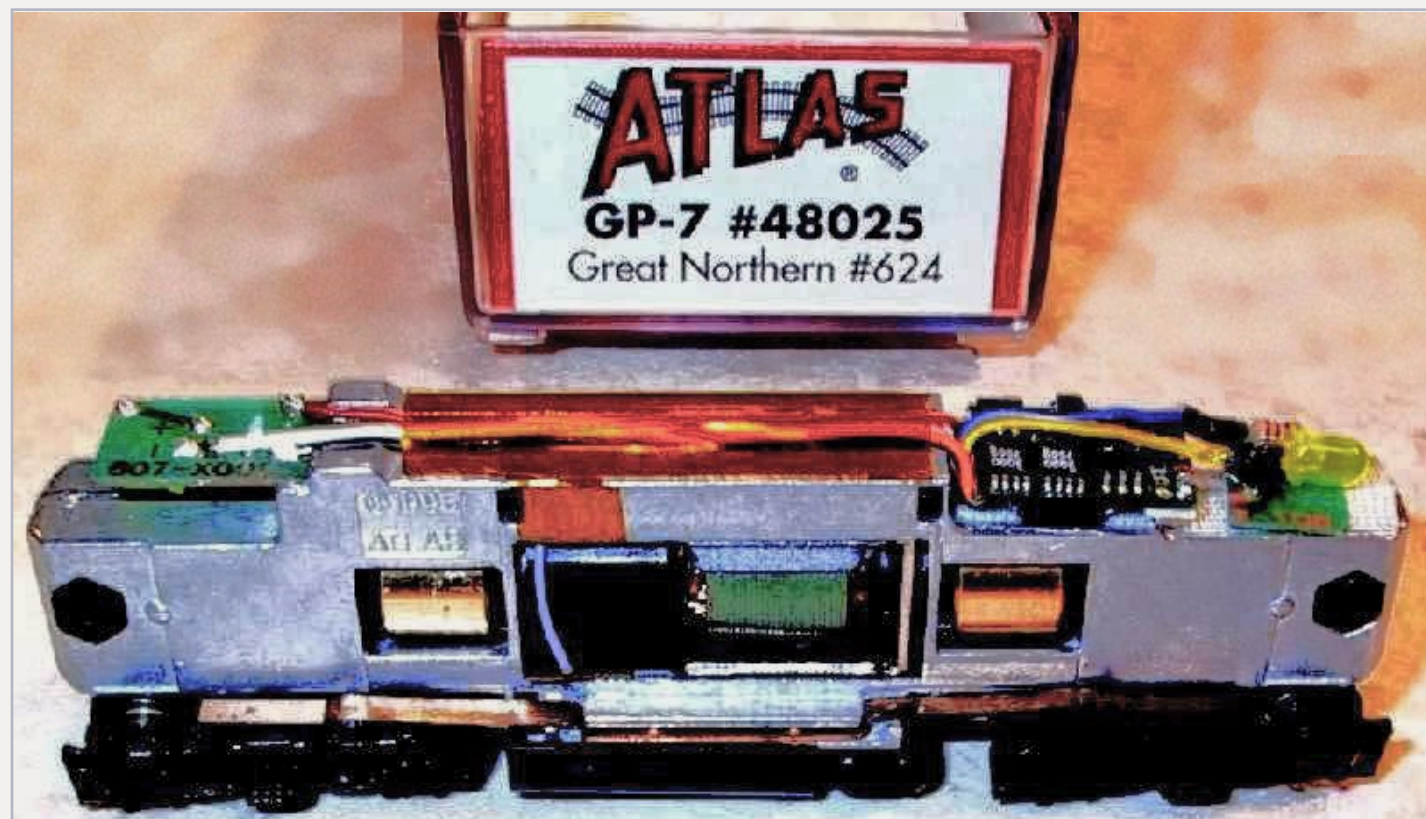


Figure 2: N scale early Atlas GP-7.

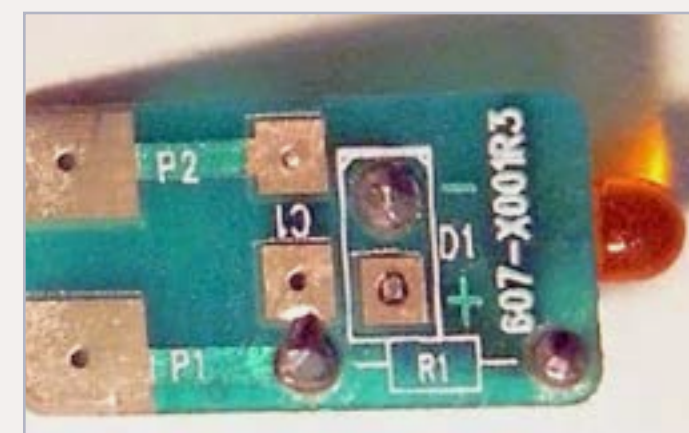


Figure 3: Unmodified Atlas N scale light board.

N scale Atlas GP-38

Towards the end of the millennium, loco manufacturers became more "DCC aware." Figure 4 shows an Atlas offering from that era. It was designed with a one-piece light board running the length of the loco with motor power distribution on that board. Decoder manufacturers began building decoders in the same format as direct replacements for these one-piece light boards.

I removed the factory light board and installed a Digitrax DN163A0 decoder, following the instructions.

However, the motor contact strips frequently make intermittent contact with the decoder. The symptoms range from an inability to program the loco to spotty motor performance.

I fixed the contact issue by hard-wiring the motor. Figure 5 highlights where I cut off the motor contact strips and soldered 2951 wires to them (see DCC Impulses, January 2012). I covered the joints with shrink tubing and soldered the wires



Figure 4: N scale Atlas GP-38.

to the motor contact pads. Not wanting to pinch these new wires between the decoder and the frame, I kept them short. I made sure that the wires didn't chafe on the (electrically hot) frame halves. The resulting short would have been a disaster for the decoder!

Newer Atlas and Kato diesel locos are designed pretty much this way and have lots of decoders designed for them.

This loco ran so well that I purchased a similar GP-38 in Santa Fe livery, installed a TCS decoder in it and used it as a N-scale demonstrator at Litchfield Station.

If I were to do this installation today, I would use one of the many loco-specific decoders available from different vendors.

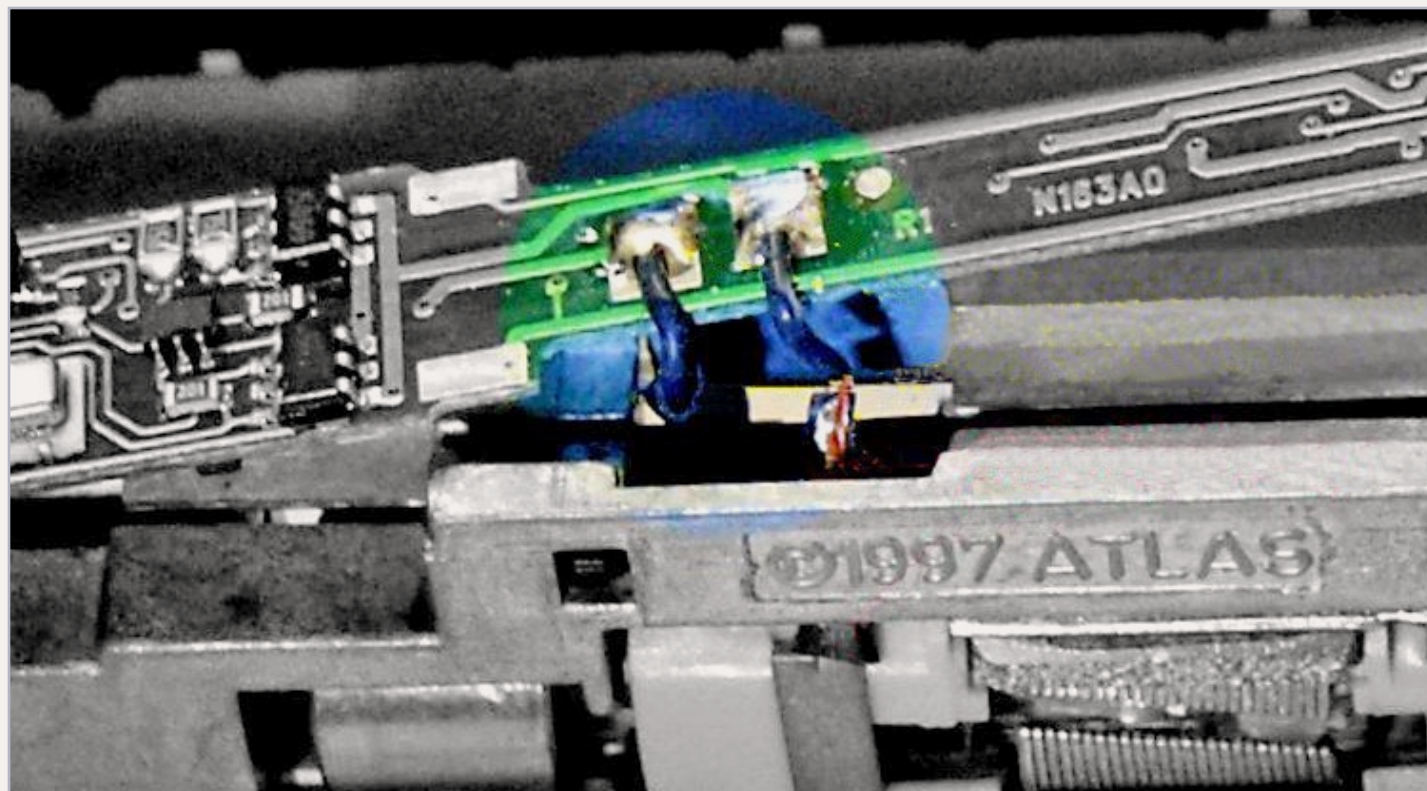


Figure 5: Added motor wires for increased reliability in Atlas N scale locos.

N scale Atlas RS-3

As electronic components got smaller, TCS designed decoders in two pieces to replace the light boards in the 1990s vintage locos.

Figure 6 is a photo of a TCS CN decoder installed in an Atlas RS-3. The wires between the two boards are NOT DCC connections. They are the (usually internal) connections that are part of the decoder. Having this wiring between the two boards allows the decoder circuitry to be split between the boards, allowing for locos of various lengths and providing ease of installation. Each half board has its own LED for the head or rear light.

Following the directions packed with the decoder, I removed the stock light boards, isolated the motor, and mounted the decoder boards in the

loco. I then cut the wires to length and soldered them where directed by TCS.

If I were to do this installation today, I would do it exactly the same way.

N scale Bachman 2-8-0

Bachmann built its N-scale 2-8-0 Consolidation with DCC in mind. It is a split-frame design with the motor connected to the frame halves on top, rather than using an internal contact-tab design.

The frame has a space specifically designed for the decoder. It is filled with a small piece of weight as it comes from Bachmann.

I removed the small weight from the loco and used the plastic tray that is left to hold (and insulate) the decoder. I then removed the wires from the frame tabs to isolate the motor. The decoder orange and gray wires were connected to the motor and insulated with shrink tubing.

The black and red decoder wires need to be connected to the frame halves. I found that the push-on clip supplied with the loco didn't hold the decoder wires as solidly to the frame halves as I'd like. The metal of the frame won't take solder. I tried many things to secure the wires to the contact posts: the supplied clips, added screws, etc., before I settled on wrapping the wires

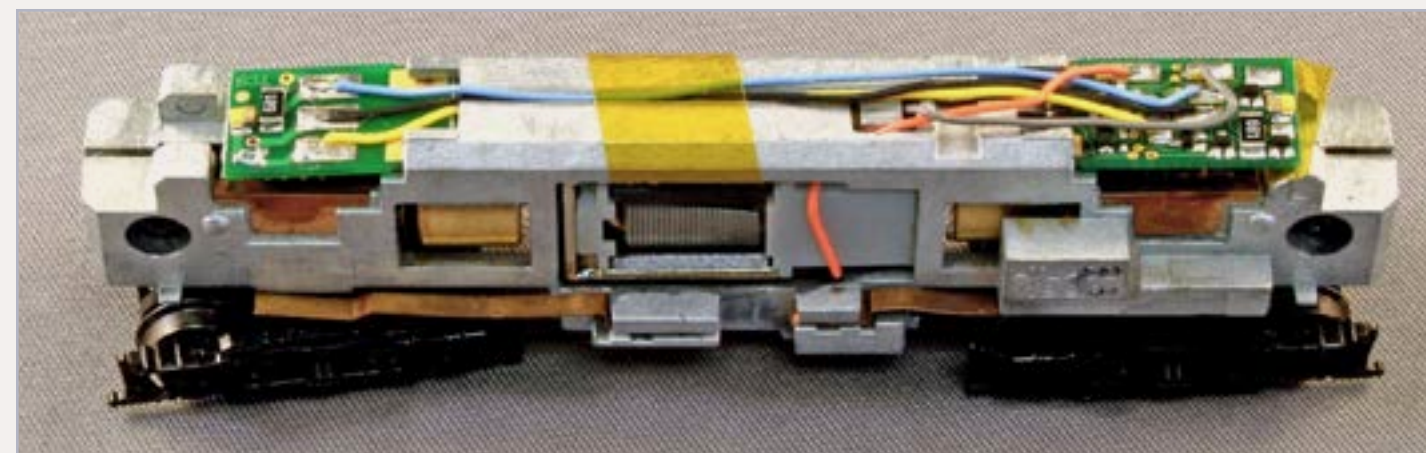


Figure 6: N scale Atlas RS-3.



Figure 7: N scale Bachmann 2-8-0.

around the tabs and securing them with silver epoxy.

The loco shown in figure 7 had a Lenz Mini Gold decoder installed with a golden-white LED wired to the decoder for the headlight.

If I were to do this installation today, I would do it exactly the same way. The Lenz Mini Gold fits perfectly.

N scale Bachman F7A

In prior columns, I've discussed split-frame locos. The Bachmann F7A shown in figure 8 is a prime example.

I disassembled the loco and machined relief to isolate the motor from the frame halves – see figure 9. When I did the loco pictured, I did not yet own a milling machine, so all the

“machining” was done with a Dremel motor tool or by sanding.

A shelf was machined into the rear of the loco to provide clearance for the LE0521W Lenz decoder, predecessor of the Lenz Mini Gold.

The incandescent headlight was wired to the blue and white decoder leads.

If I were to do this installation today, I would do it basically the same way. Many small N or Z decoders will fit into the available space. I'd use a decoder with good BEMF motor control like the Lenz or the TCS M1. The smaller the decoder, the less machining would be needed.

N scale Con Cor GS-4

Here is a good example of a great idea gone awry. Con-Cor saw the coming

need for DCC compatible locos and had Digitrax design a decoder and loco board combination.

The Digitrax DZ125PS was born to fit in the tender with the loco board that Digitrax designed. Alas, Con-Cor didn't wire the head and rear lights to the board.

This leaves the installer with the choice of ripping out the Digitrax

designed board and installing almost any N or Z scale decoder, or wiring the lights to the board and plugging in a decoder.

Choosing the latter, I wired the headlight to the board in the tender, using 2951 wire between units and white wire inside the loco (to conform to DCC color code). The rear light was wired to the board inside the tender. A

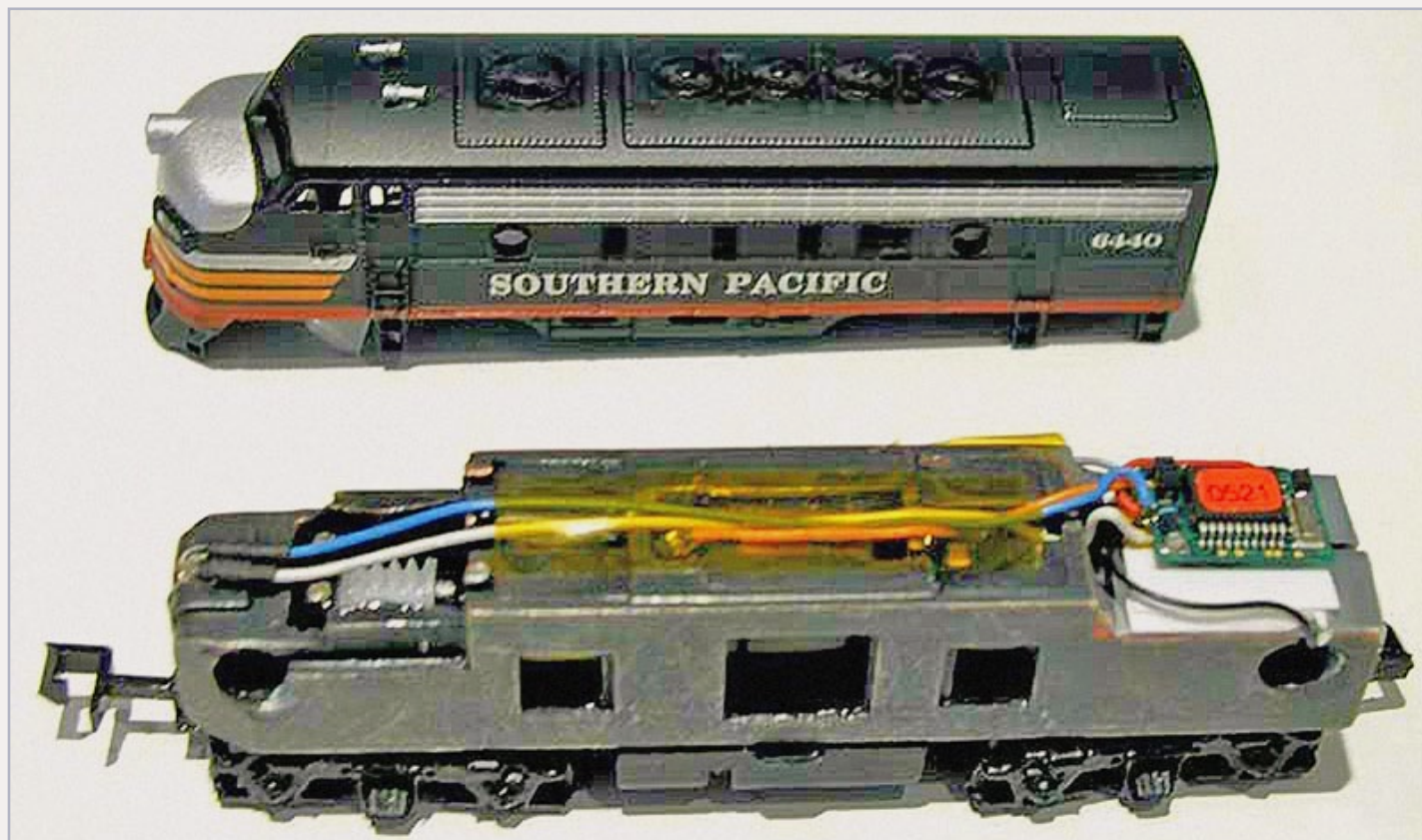


Figure 8: N scale Bachman F7A.

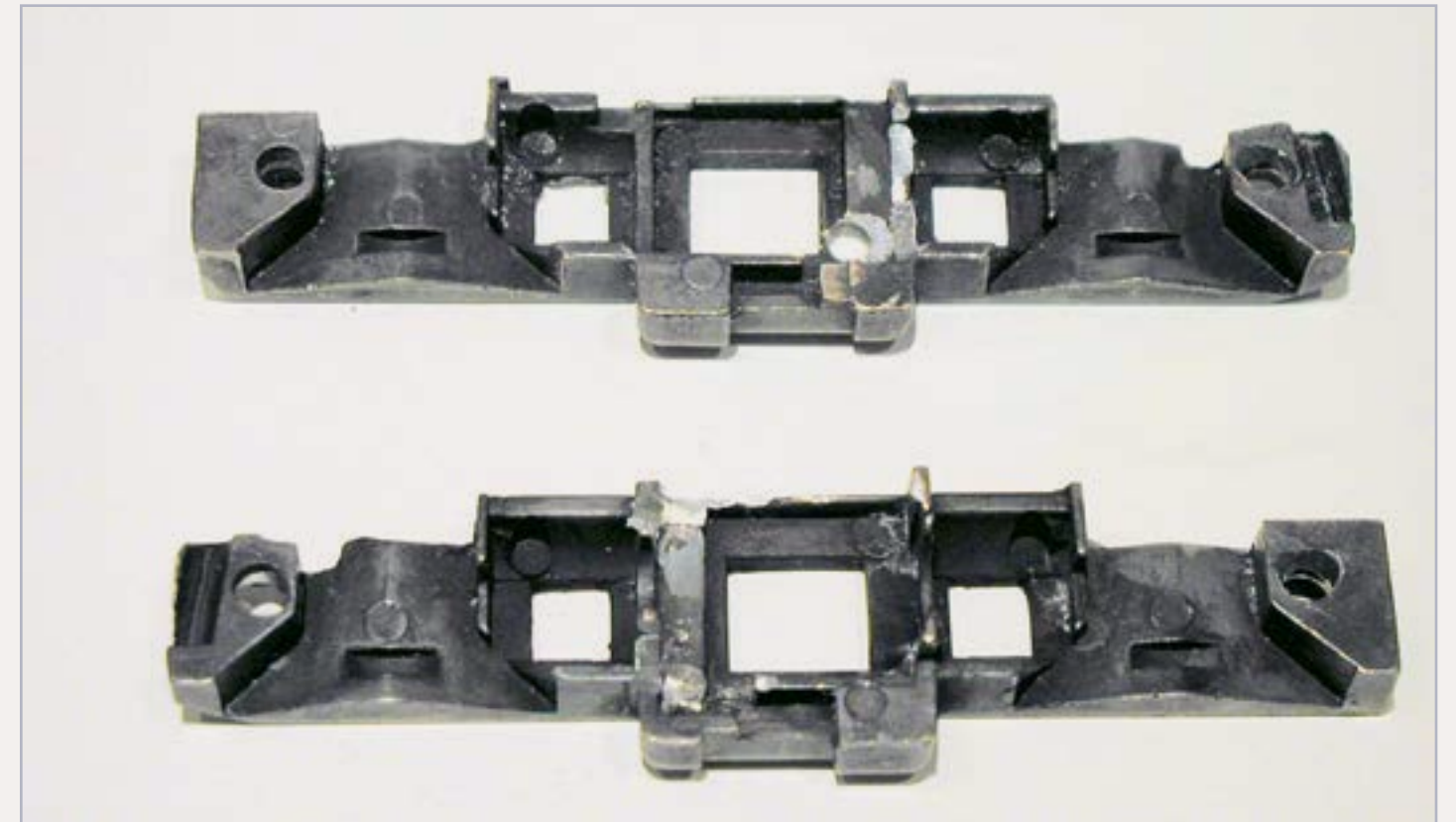


Figure 9: N Scale Bachmann F7A frame machining for DCC installation.

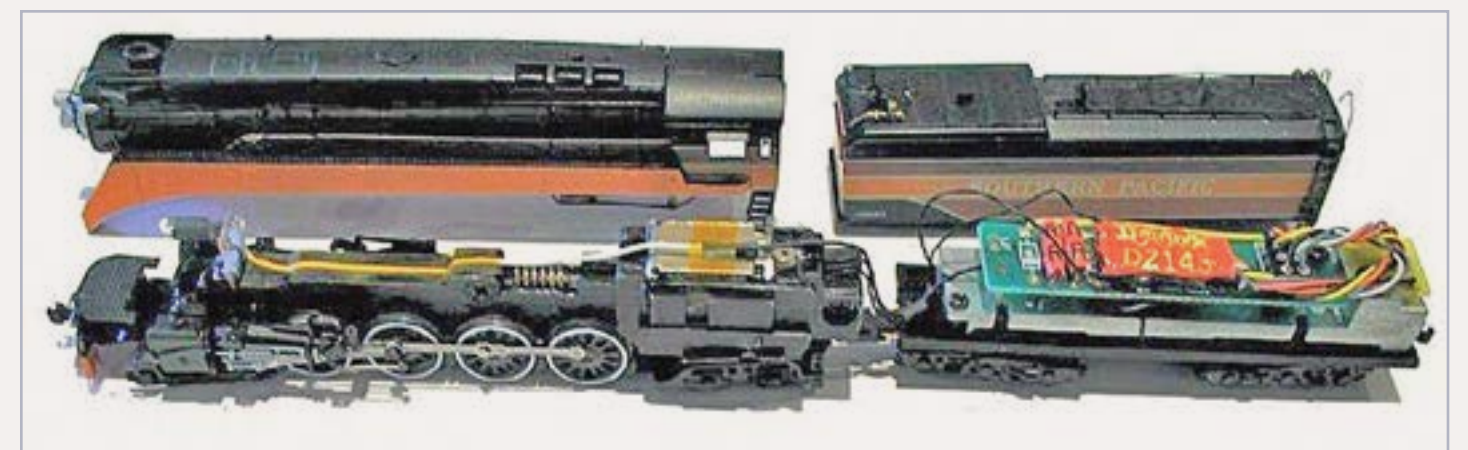


Figure 10: N Scale Con Cor GS-4.

Digitrax DZ143PS decoder was plugged in. Why that decoder? My customer wanted the BEMF motor control of the DZ143PS instead of the basic control provided by the DZ125PS.

If I were to do this installation today, I would do it basically the same way. Many small N or Z decoders with the NEM652 (8-pin) NMRA plug would fit into the available space. I'd use a decoder with good BEMF motor control like the DZ143PS or the TCS M1.

N scale Kato Mikado

Most Kato steam locos of the 1990s were DCC nightmares! Sorry, but I call 'em as I see 'em. The gorgeously

detailed Mikado, shown in figure 11, is one of the most popular.

There are two places for a decoder in this loco.

Some folks remove a bit of weight inside the boiler and put the decoder there. Advantage – no wires between the loco and tender. Disadvantage – removed weight reduces pulling power and most folks feel that this fella is a bit light to start with.

My choice was to put the decoder in the tender.

As usual, I spent about three hours disassembling the loco, isolating the motor, bringing 2951 wires to the

tender, installing a JST style connector in the tender and reassembling the loco.

I had to remove the weight in the tender to have room for the decoder. I also removed the copper pickup strips

and wired the decoder pickup to the tabs on the front truck. This way the power from the loco transfers to the front tender truck through the contacts in the drawbar. Separate wires connect to the rear tender truck.

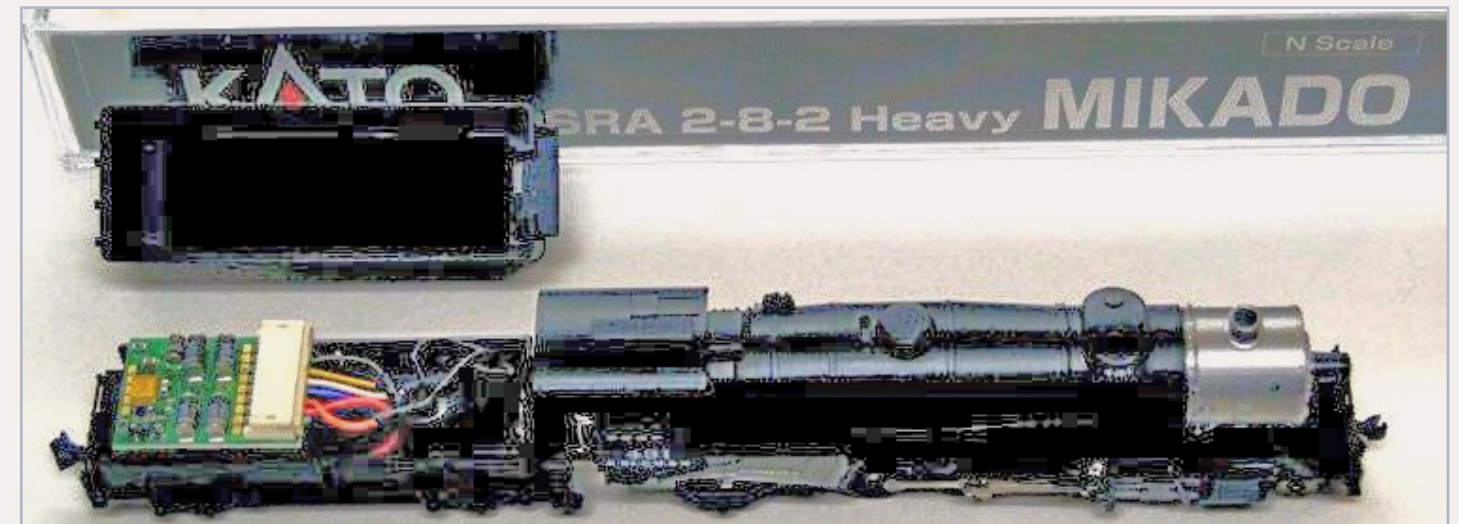


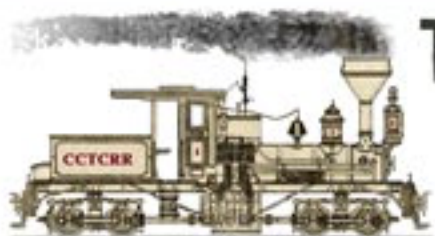
Figure 11: N scale Kato Mikado.

ADVERTISEMENT

**New
Innovation**

LUBRICATION FOR THE NEW MILLENNIUM...

NANO-OIL.COM 
Nano Technology Lubricants



THE SHAY FIXER

VISIT US AT...

SHAYFIXER.COM



Specializing in brass Pacific Fast Mail / United geared locomotives

"I use only the finest quality lubricants such as Nano-Oil ..."

-The Shay Fixer



StClaire

Made in U.S.A



**DRAMATICALLY
REDUCES LOCO
AMP DRAW ...**

**For more details
click here**



At this point I plugged a JST jumper board into the socket and completely tested the loco on DC. I took special care to make sure that the tender tracked around curves and through turnouts and was not being pulled off the track by the wires.

After test running, I removed the JST jumper board. Then I tested one more time to assure that I had isolated the motor from the rails. I then plugged in a JST HO decoder. In this case it was the Lenz Gold shown in figure 11.

If I were to do this installation today, I would do it basically the same way. Any JST decoder (usually HO scale) will probably fit in the tender. I'd use a decoder with good BEMF motor control like the Lenz Gold or the TCS T1.

N scale Life-Like 2-8-8-2

I was amazed by the Life-Like 2-8-8-2 loco when a customer asked me to install DCC in one; very well done and responsive. It was on par, in my opinion, with the Kato Mikado, but a whole lot easier to DCC.

In figure 12, you see the interior of the loco. The DCC installation does not require that you get into the tender. I actually did some of these with the (now extinct) SoundTraxx DSX sound-only decoder and a speaker in the tender.

Lighting – there was an incandescent bulb above the pilot, operating through a board in the smoke box. I removed the board and wired the

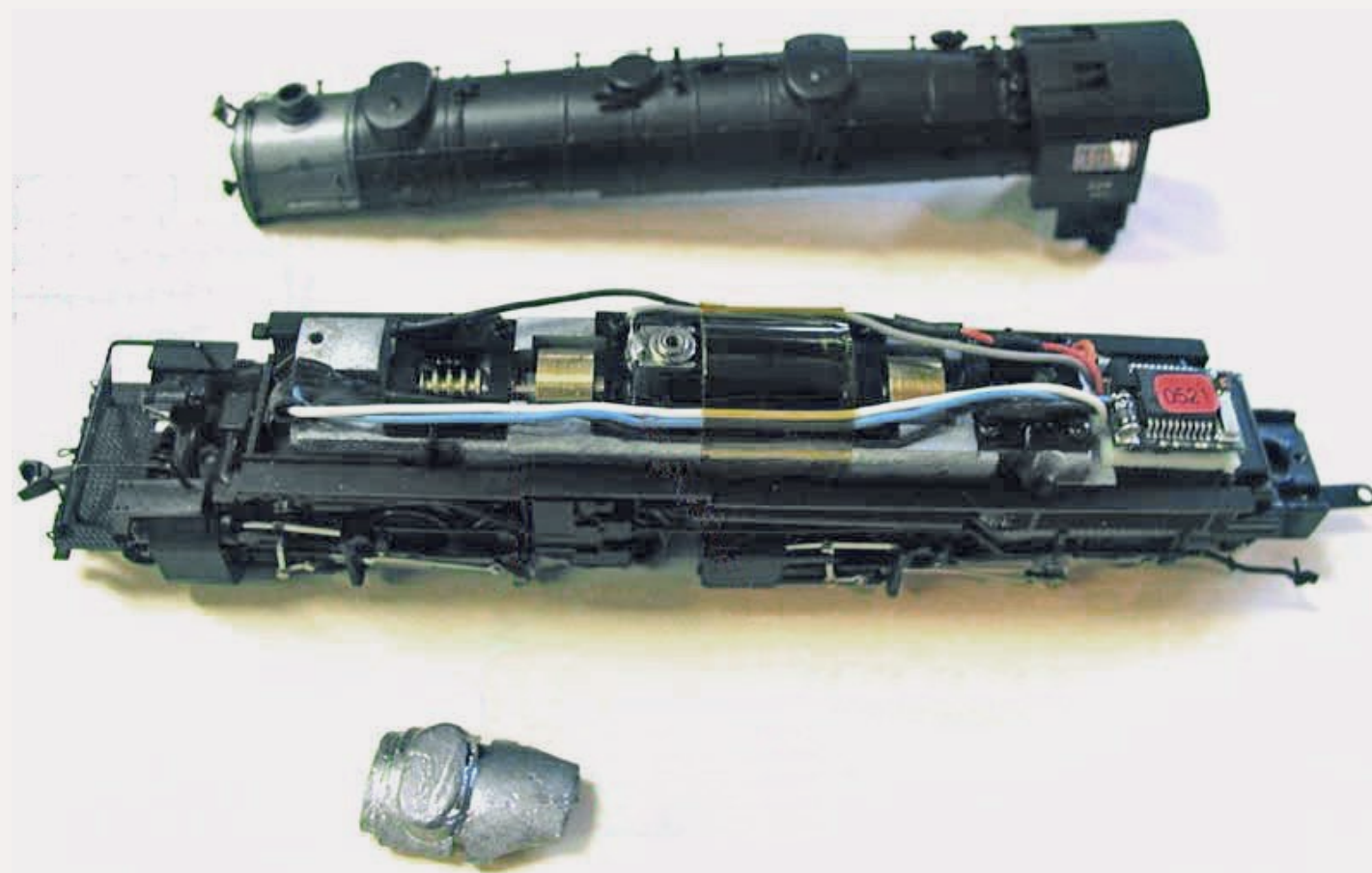


Figure 12: N scale Life-Like 2-8-8-2.

ADVERTISEMENT



Click here to watch our videos!







For more information visit our Internet site:
www.RingEngineering.com

ADVERTISEMENT

Get the Latest Model Railroad News, Tips, Reviews & Opinions

The SCOTTY MASON SHOW

S H O W
The Original Model Railroad Podcast

-Monthly Interviews

- Modeler's Spotlight: Top Modeler's Talk
- Narrow Gauge Modeling w/Chris Lane
- Contemporary Modeling w/ Mike Rose

-More Product Announcements & Reviews

 Our feed has changed! To get the latest shows, Please search Scotty Mason and subscribe to the new feed!

www.TheModelRailroadPodcast.com

Scott Mason Jimmy Simmons Mike Rose Joe Duckworth

[Visit RailPro website](#) [Tell a friend ...](#) [Contents](#) [Index](#)

Just Rolling By...

Make It REAL With Iwata Climb Aboard!



Visit...
www.iwata-medea.com
To Check Out Our Full Product Line!

*Models By... Alan Houtz,
North American Prototype Modelers*

A
D
V
E
R
T
I
S
E
M
E
N
T



Figure 13: N scale Life-Like GP-38.

bulb to the blue and white decoder wires with a 510-ohm ¼ watt resistor in one lead. I put the resistor where the board was.

Motor – The wires between the rails and the motor leads were disconnected and a Lenz LE0521W decoder, the predecessor of the Lenz Gold Mini, was wired to the appropriate places.

I applied Kapton tape to secure the wires and test fit the boiler shell. Once I got it to fit, I repositioned the small weight shown in figure 12 and screwed the boiler to the loco.

If I were to do this installation today, I would do it basically the same way. Many small N or Z decoders will fit into the available space. I'd use a decoder with good BEMF motor control like the Lenz or the TCS M1. The smaller the decoder, the easier the fit!

N scale Life-Like GP-38

Life-Like had a line of N-scale locos in the 1990s that were difficult to install DCC into. They required a bunch of work to isolate the motor and get ready for the decoder installation. They had plastic frames that almost warped when you looked at them.

Then Life-Like saw the light and started producing split-metal-frame diesels. However, they were not as popular as the Kato and Atlas offerings and the DCC manufacturers have been slow to offer loco-specific decoders for the Life-Like locos. There are some decoders designed for more popular diesels that will fit a few Life-Like offerings. See the decoder manufacturers' web sites for fitting suggestions.

The installation shown in figure 13 is another example similar to the

Athearn that started this month's column. I found the correct places on the factory light board and attached decoder wires and cut traces. I used a Lenz Silver Mini W decoder at the time.

If I were to do this installation today, I would do it basically the same way. Many small N or Z decoders will fit into the available space. I'd use a decoder with good BEMF motor control like the Lenz or the TCS M1. The smaller the decoder, the easier the fit.

N scale Model Power 4-6-2

Model Power built a bunch of different steam locos that were "DCC aware." They have wires pulled into the tender that comply with NMRA DCC color codes. Figure 14 shows their 4-6-2 loco.

I removed the tender shell and cut the connection between the red and the orange wires and the connection between the black and the gray wires. Then I connected the wires, matching color to the (older) Lenz LE1024 HO scale decoder.

Notice that I don't mention any light wires. Model Power didn't choose

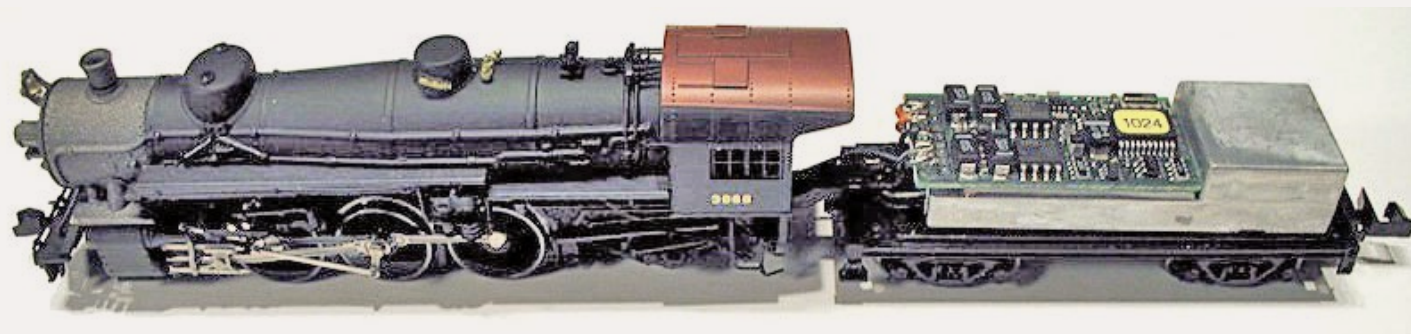


Figure 14: N-scale Model Power 4-6-2.

to bring the headlight wire into the tender. There are two choices. Leave the headlight wired to the track and always on. Or spend a lot of time disassembling the loco and bring the wire back to the tender. All my customers choose the "constantly on" version, so once I finished the wiring above, I was done.

Model Power made a nice-running, relatively inexpensive Mikado. While it is not as finely-detailed as the Kato Mikado discussed previously in this column, it is a much better DCC candidate. Guess you can't have it all in one loco.

If I were to do this installation today, I would do it basically the same way. Many HO decoders will fit into the available space. I'd use a decoder with good BEMF motor control like the Lenz Silver or the TCS T1.

Until next month . . . Have fun with your railroad and blow a whistle or blink a light for me!

If you like this column, be sure to click the link and rate it AWESOME! Thanks.

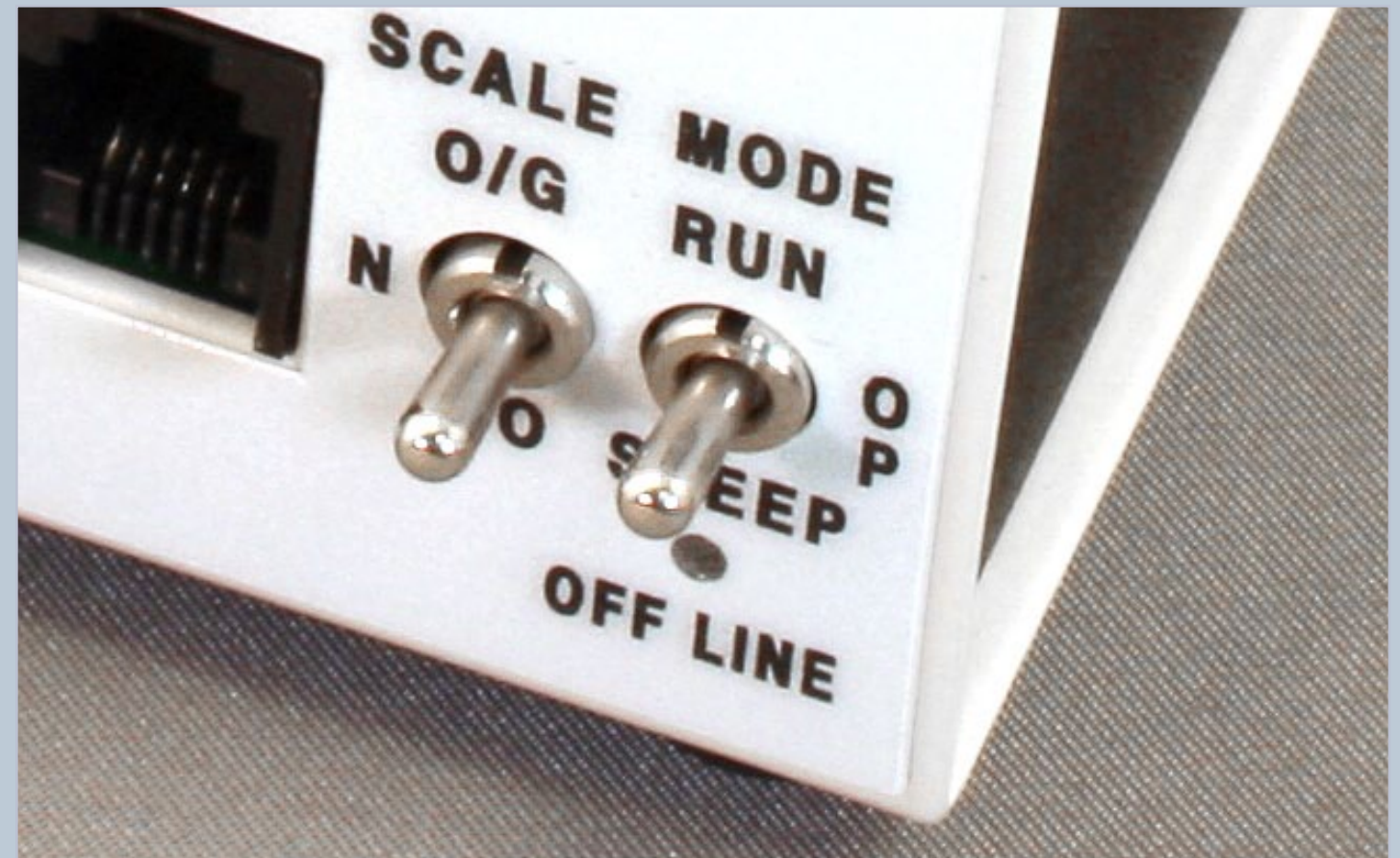


Figure 15: Digitrax DB150 MODE switch used to change OpSw settings – typical of all Digitrax system boxes.

SMP from Mr. DCC

Digitrax users, take notice! If you have a Super Chief or Super Empire Builder, you may find that your system wakes up grumpy. It needs buttons pressed to get track power on, or sometimes isn't recognized – you know! Not fun!

the track energized without human intervention. ■

Look in your manual (download one from the Digitrax.com site, if need be) for a section near the end on how to set option switches, usually section 26 or 28. Once you see how to set these option switches, use your DT series throttle to "throw" OpSw 33 and OpSw 34. When you apply power, your system will come up with

