Installing hard-wired DCC-SOUND in older, non-sound ready locomotives with Scale Sound Systems Drop-in Speaker Systems

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This guide covers performing a hard-wired DCC-Sound installation using a Scale Sound Systems drop-in speaker system in older, non-sound ready locomotives. The locomotive at hand is an HO Atlas Classic GP38 that is DCC-ready, though not sound-ready. Note that while this is a “Classic” model, early Atlas “Master” locomotives that were not sound-ready used the exact same frame. The principles used in this guide will generally work for many hard-wired DCC-Sound installations. While some are timid about performing a hard-wired DCC-Sound install, the process is really quite easy and only takes a couple hours to complete.

You may note that your factory PCB has an 8 or 9 pin DCC socket. While you could simply plug the decoder in, wire the two speaker wires to a speaker you *might* manage to fit somewhere and ensure that the locomotive’s bulbs or LEDs are compatible with the decoder’s function output voltage, the installation overall will be a compromise. Why? I present three main reasons.

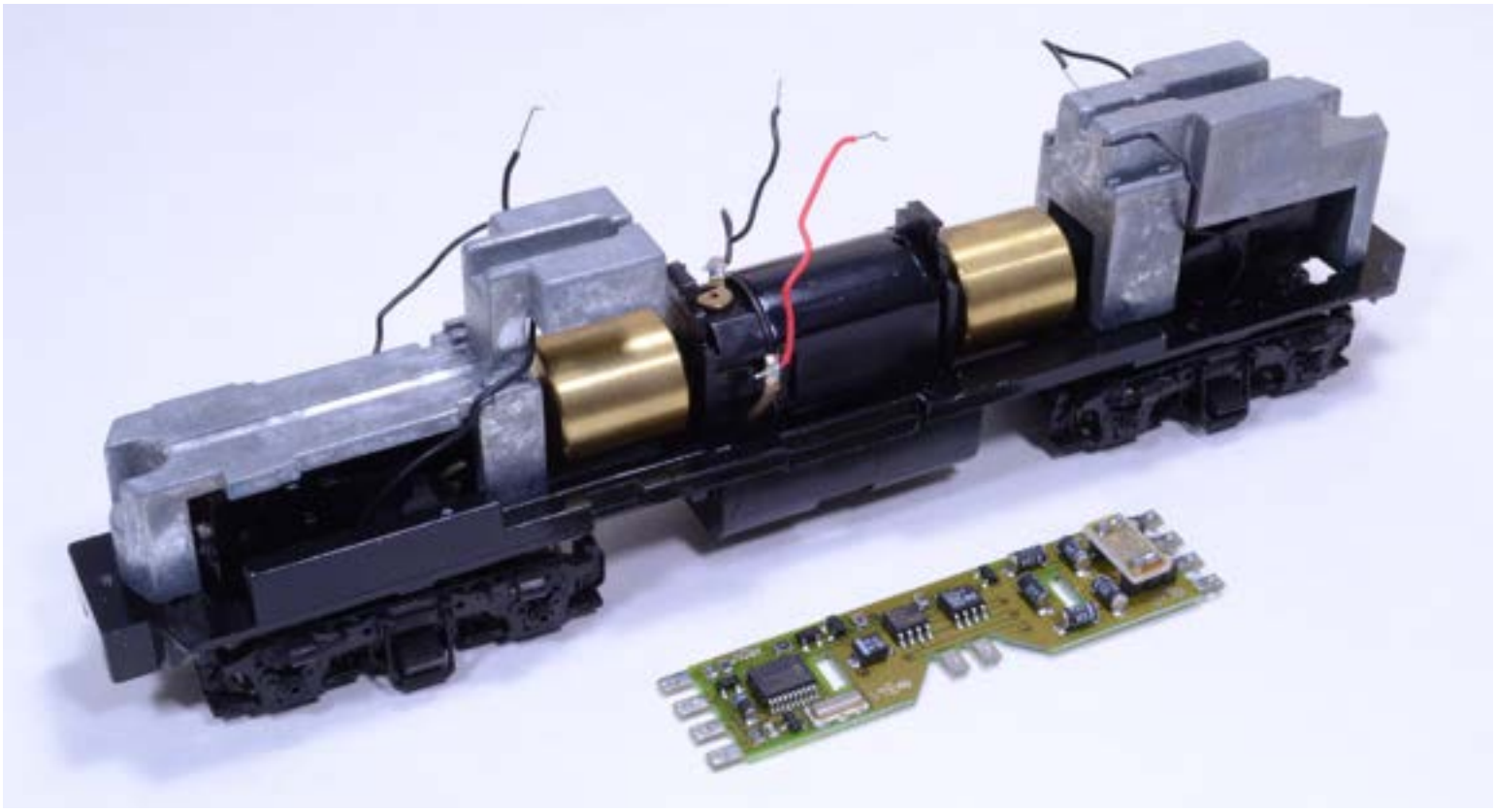
By removing the factory PCB, often referred to as the “mother board”, you eliminate the added circuitry and failure points between the decoder and the track/motor. I have seen locomotive PCBs fail numerous times, from new-out-of-the-box to a short time afterward.

Secondly, room is scarce in these older, non-sound ready locomotives, so eliminating the PCB gives us more space for a better speaker system and some kind of stay-alive capacitor, if desired, without modifying the frame or removing any weight.

Finally, by removing the PCB, we can assure that our function outputs are perfectly matched to the LEDs or bulbs we wish to install. The factory PCB light resistors, if even present, may not be the ideal resistance for our function outputs and/or light sources.

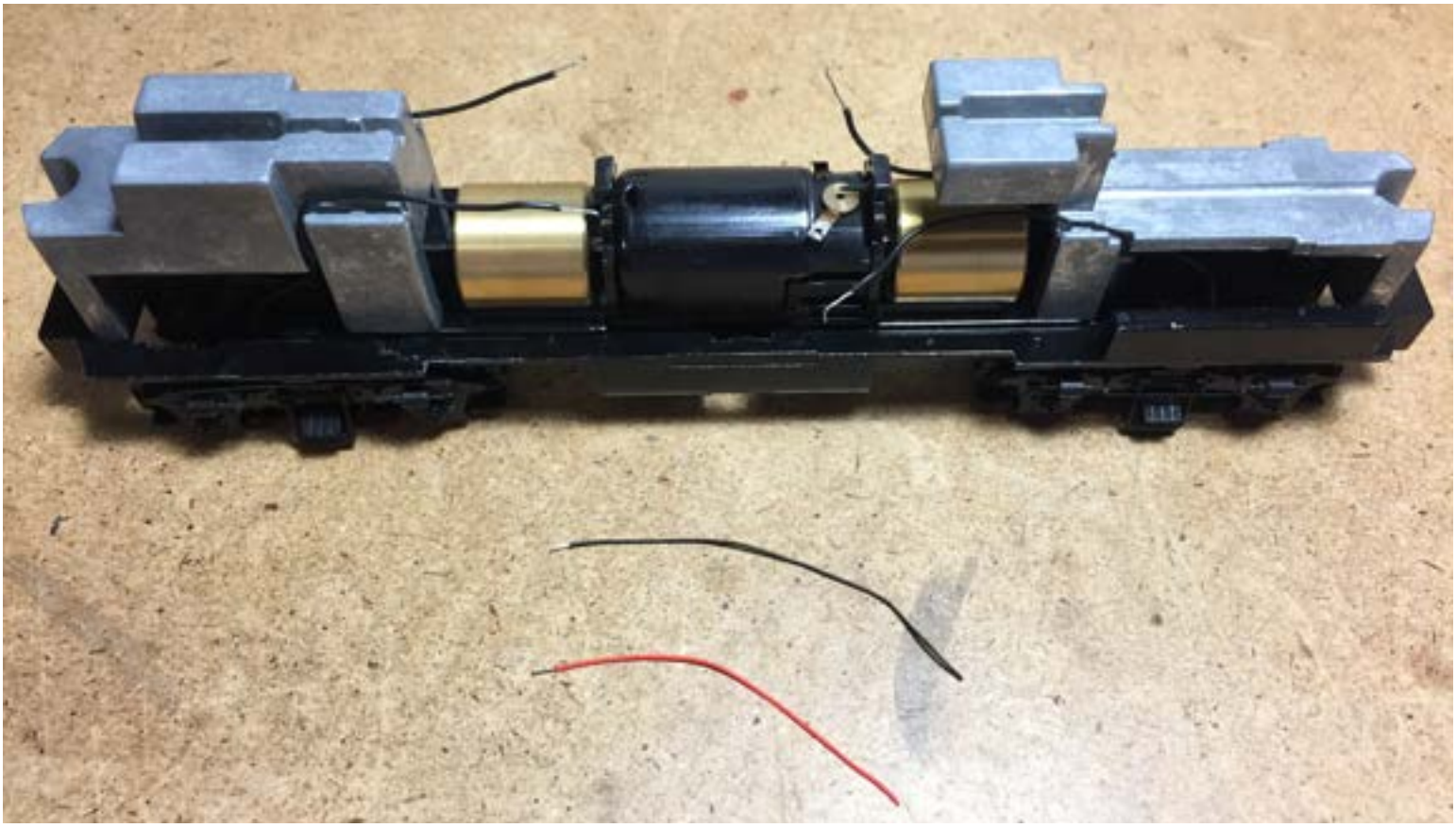
I should note that since the introduction of the Nix Trainz Decoder Buddy 21-pin motherboard in 2019, I have used these near-exclusively in all of my installs. There are many benefits to the 21-pin format and the Nix Trainz boards are the best on the market. They work wonderfully in these older Atlas diesels. That said, there are still some instances a hard-wired decoder install is the only option (even though this model is not one of those instances).

So lets dive in and turn a nice, older model into a great running and sounding locomotive!

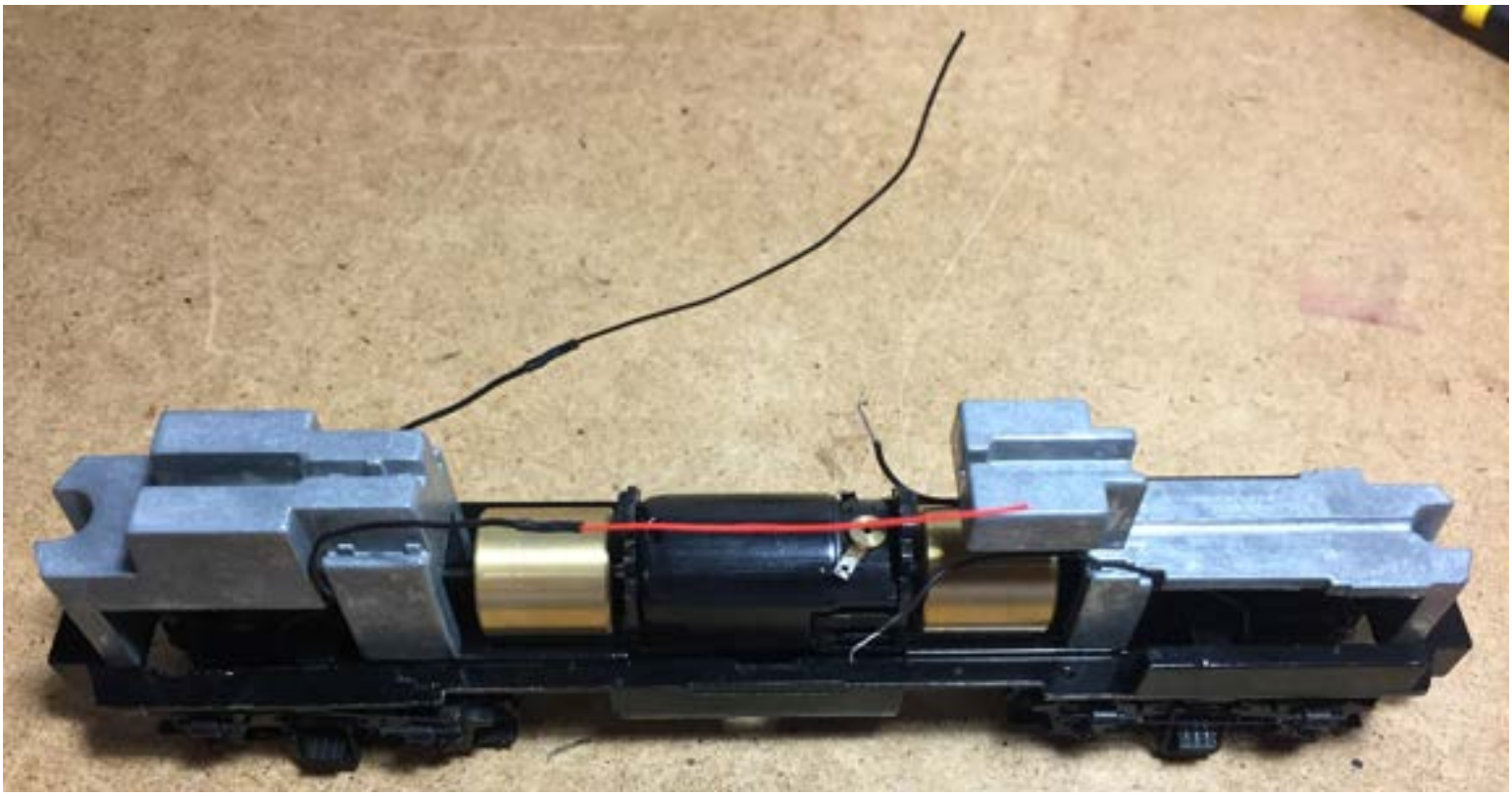


We first remove the shell. This will vary from model to model. In the case of this Atlas GP38, the shell was an incredibly tight fit! Careful use of a small, flat-bladed screw driver was needed to poke down into the trucks to loosen the shell tabs. Much wiggling and fiddling of the shell in one hand while the other held the fuel tank began to loosen the fit. After working it to and fro, the shell finally slid off. Thankfully, no damage incurred!

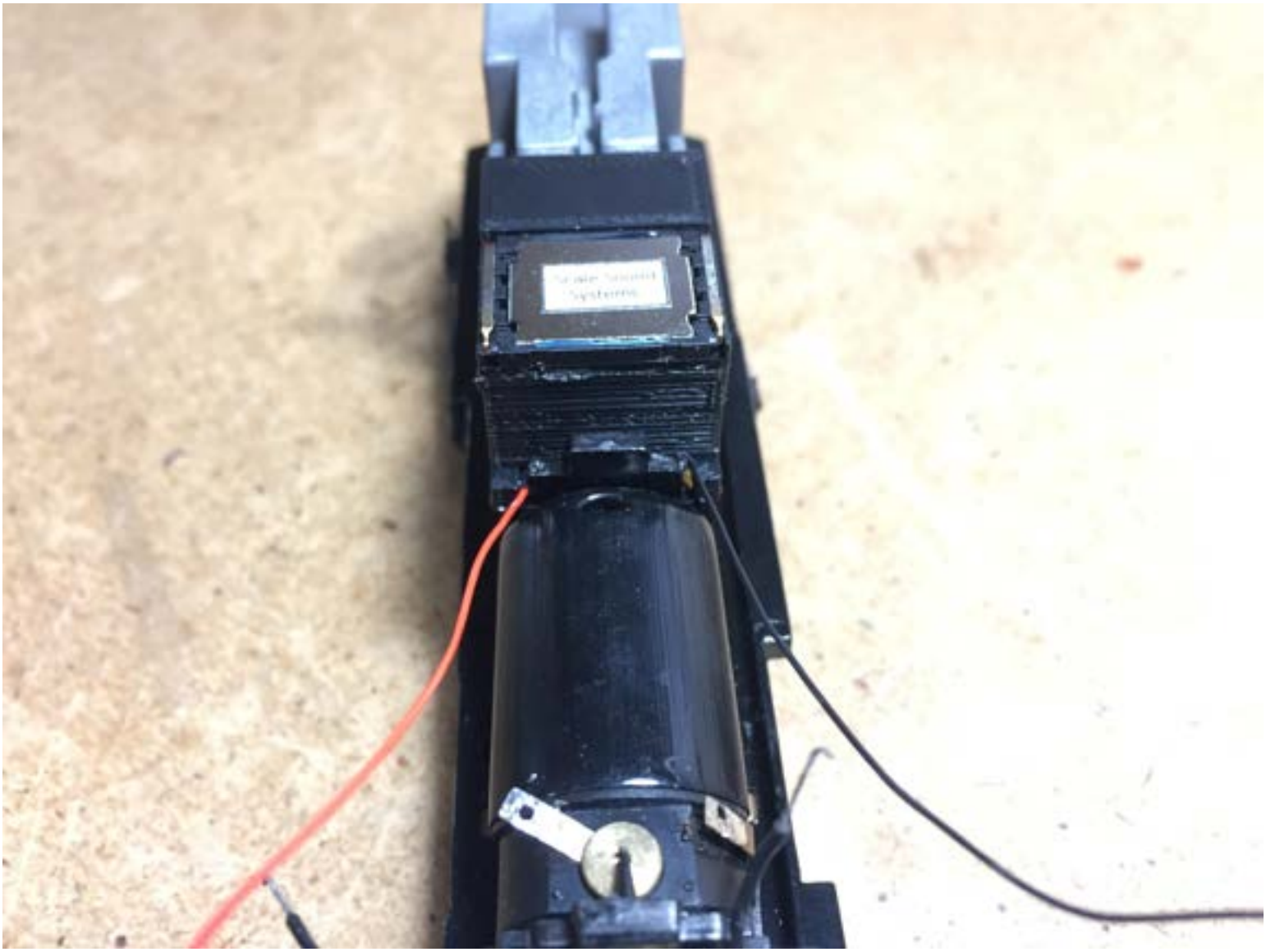
Once the shell is removed, the factory PCB is taken out. In this case, plastic clips held all the wires to the PCB, which was mounted to the motor via two clips. Free all of the wires and pop the PCB off.



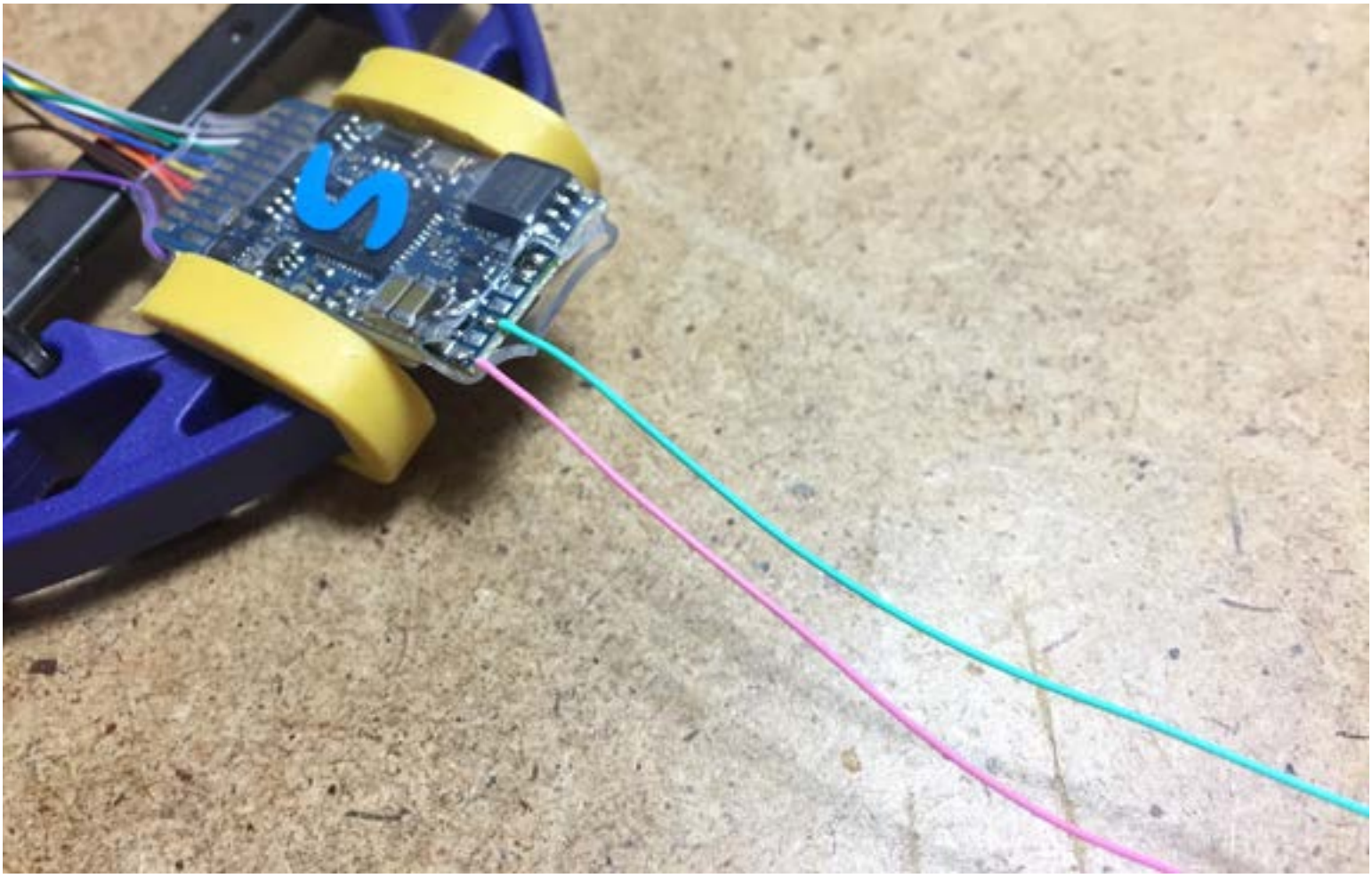
Straiten and trim the four truck pickup wires to equal lengths and strip & tin the ends with solder. Completely remove the factory wires from the two motor contacts. Cut two pieces of wire, one red and one black, to a length that will connect each pair of truck pickup wires. Strip and tin one end of each wire.



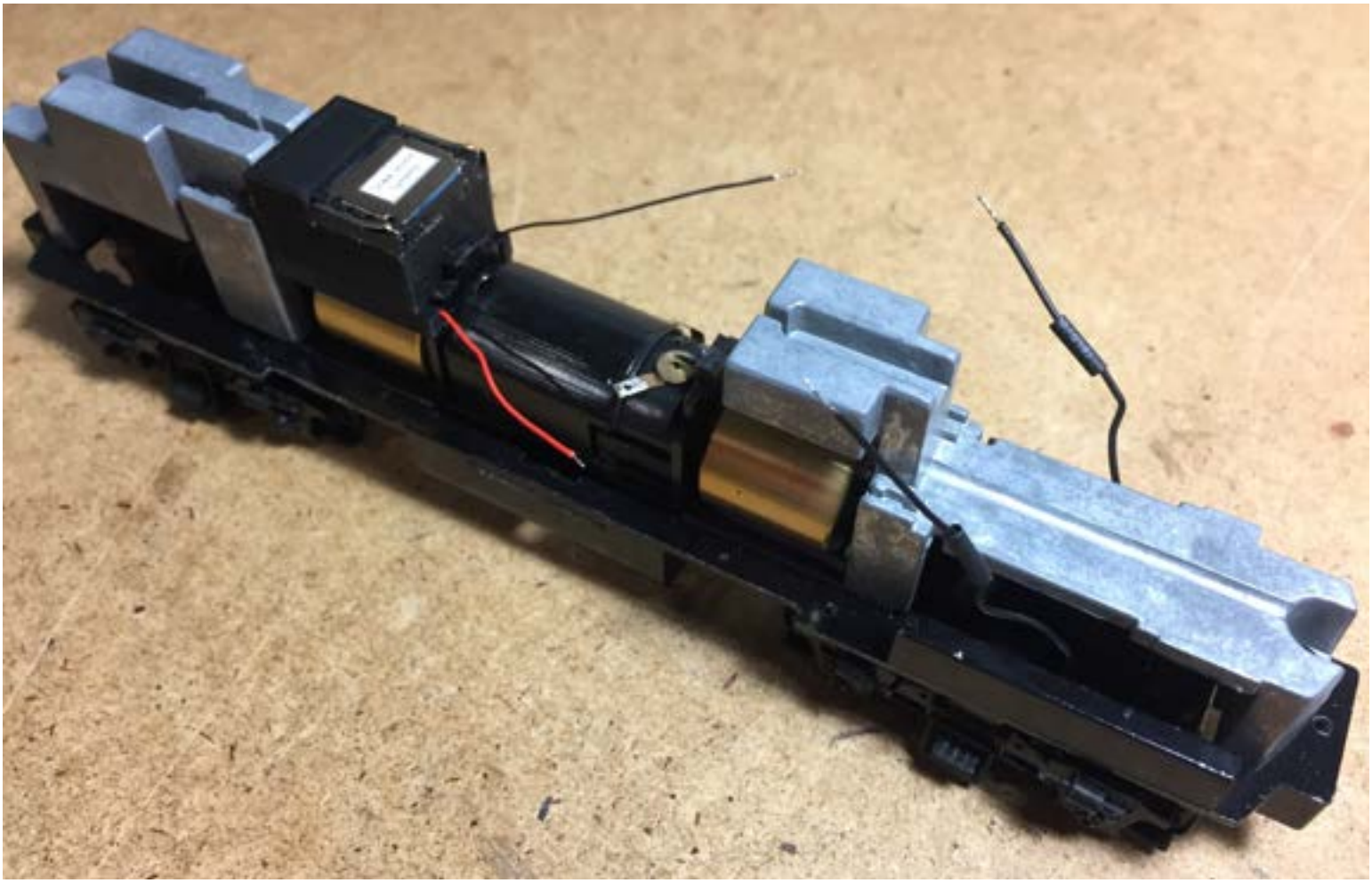
Solder the black wire to the rear-left truck wire and the red wire to the rear-right truck wire. Slide some small diameter heat shrink over the joint and shrink it down.



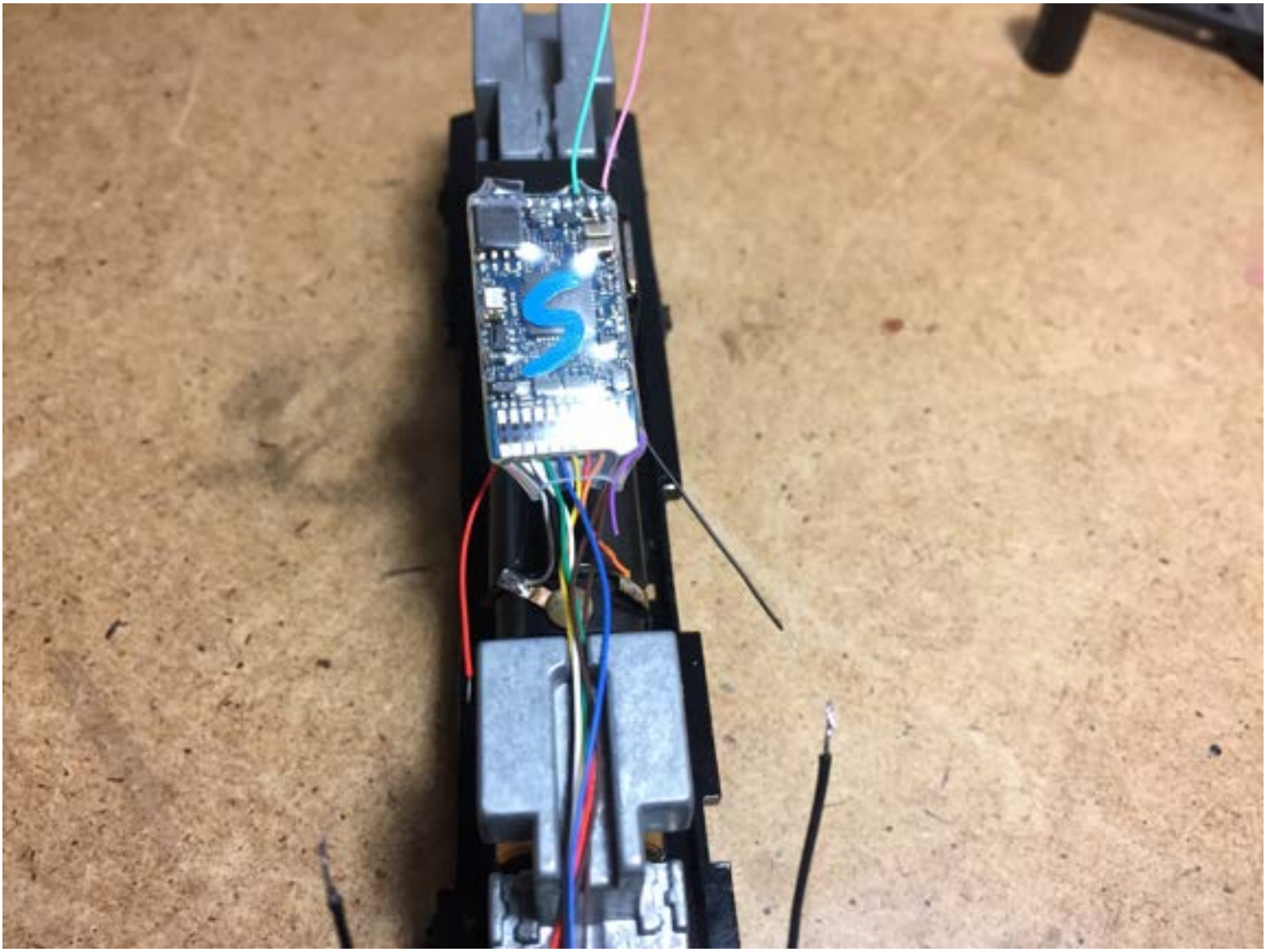
Dress both rear truck pickup wires against the end motor clip and slide the Scale Sound Systems Drop-in speaker into place. The speaker will be a snug fit between the weight and the motor clip, with the speaker's front "feet" resting on the motor leaving just enough of a gap to route the rear truck pickup wires through (unless you're using thick wire). If you need a wider gap here, use a knife or file to trim some material from the sides of the motor clip. Be sure that the truck wires have enough slack to be loose enough for free truck movement, but not so much slack that the free wire could bind on the flywheel.



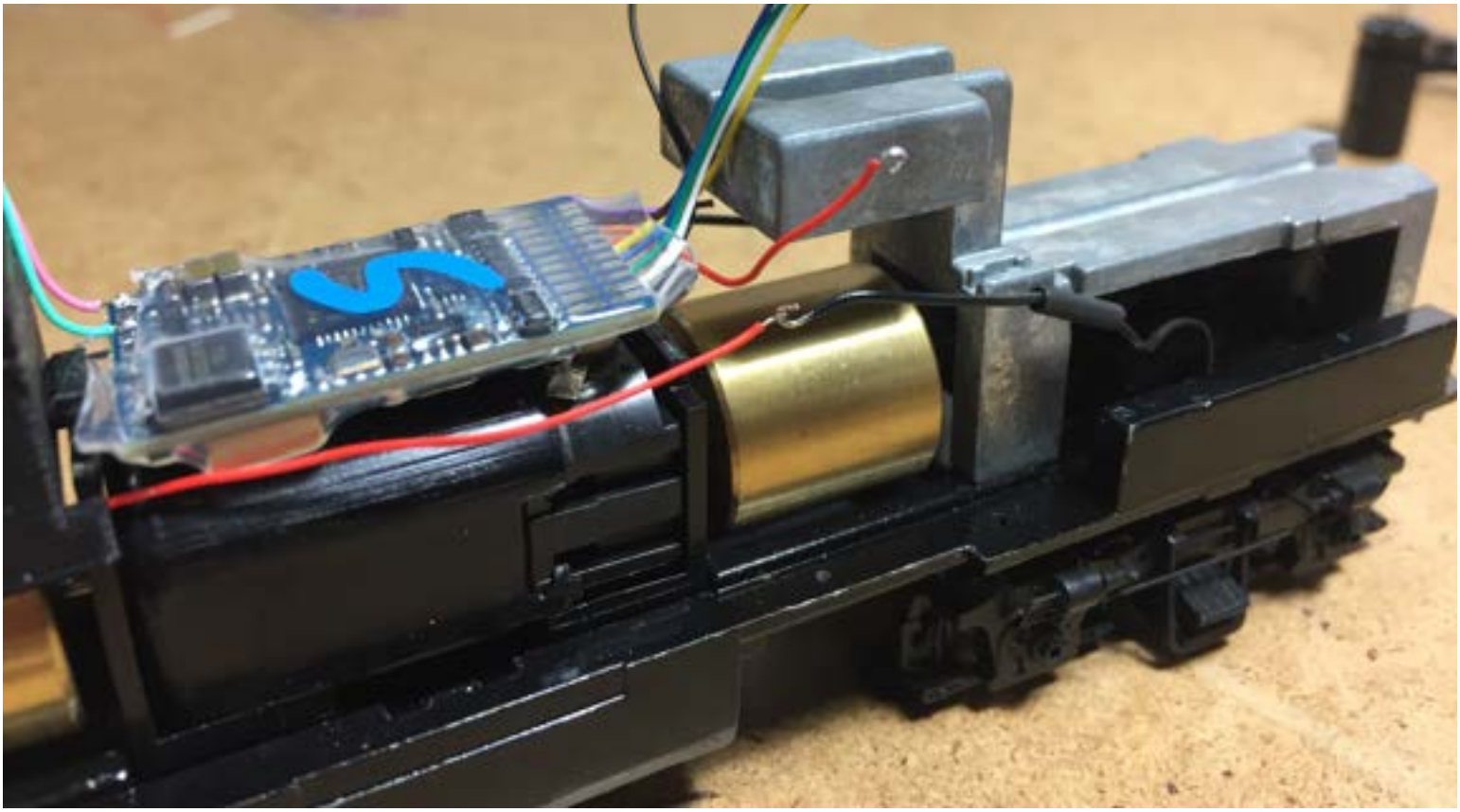
Before we move onto the front truck pickup wires, we need to prepare the decoder. If you plan to use the decoder as-is, skip this particular step. For me, I will be installing a stay-alive capacitor and thus need to attach those wires to the Loksound Select decoder I'm installing. As shown above, I carefully sliced part of the heat shrink away from the solder pads and removed the AUX 5 & 6 wires since I wouldn't be using those lighting functions. I then repurposed those wires as the stay-alive capacitor positive & negative wires and soldered them to the corresponding pads: pink for positive and turquoise for negative.



With the decoder ready to install, slide two pieces of heat shrink over the front truck pickup wires.

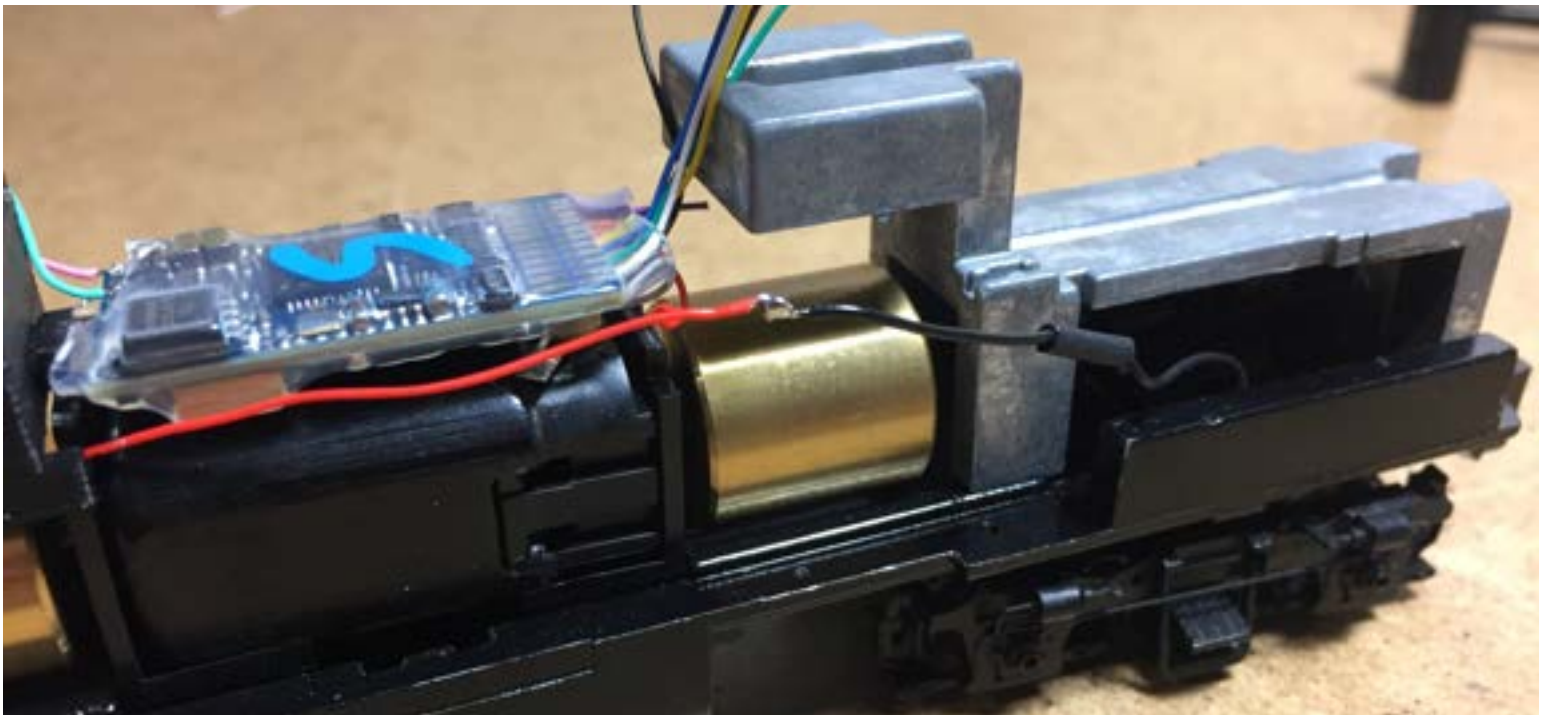


Trim the decoder's orange & gray motor wires to a short length, tin the ends and solder to the motor contacts. I have found that in most instances, the orange decoder wire goes to the bottom motor contact, gray to the top contact. If you're unsure, you can temporarily solder the front truck pickup wires to the decoder red/black track wires and test the locomotive's direction.

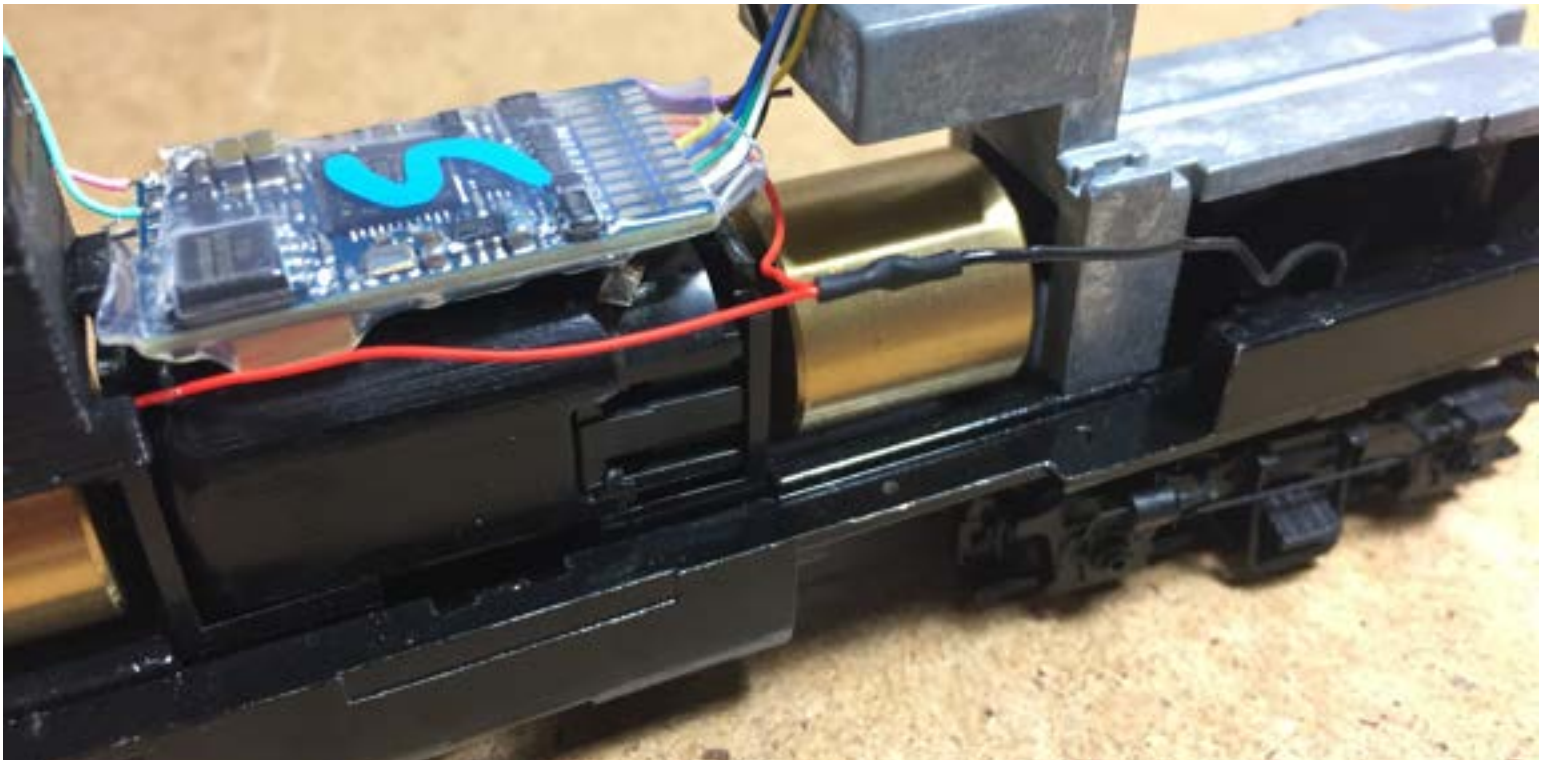


With the motor contacts now soldered, use a bit of double sided foam tape to secure the decoder to the top of the motor. As you can see, it's a very nice fit!

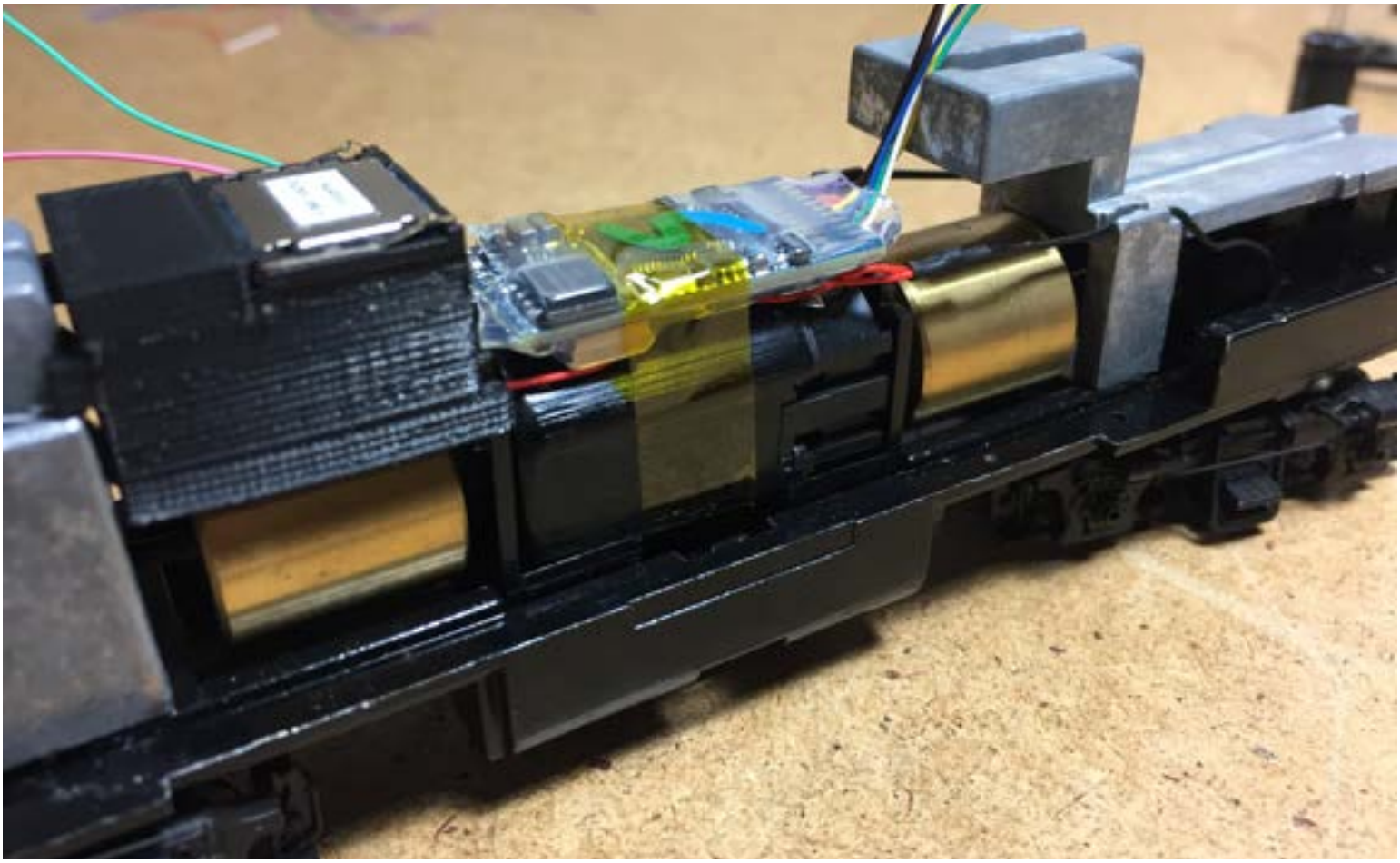
Next, create small hooks in the tinned front truck pickup wires, in the tinned red/black wires coming from the rear truck pickups and in the trimmed and tinned red/black decoder wires.



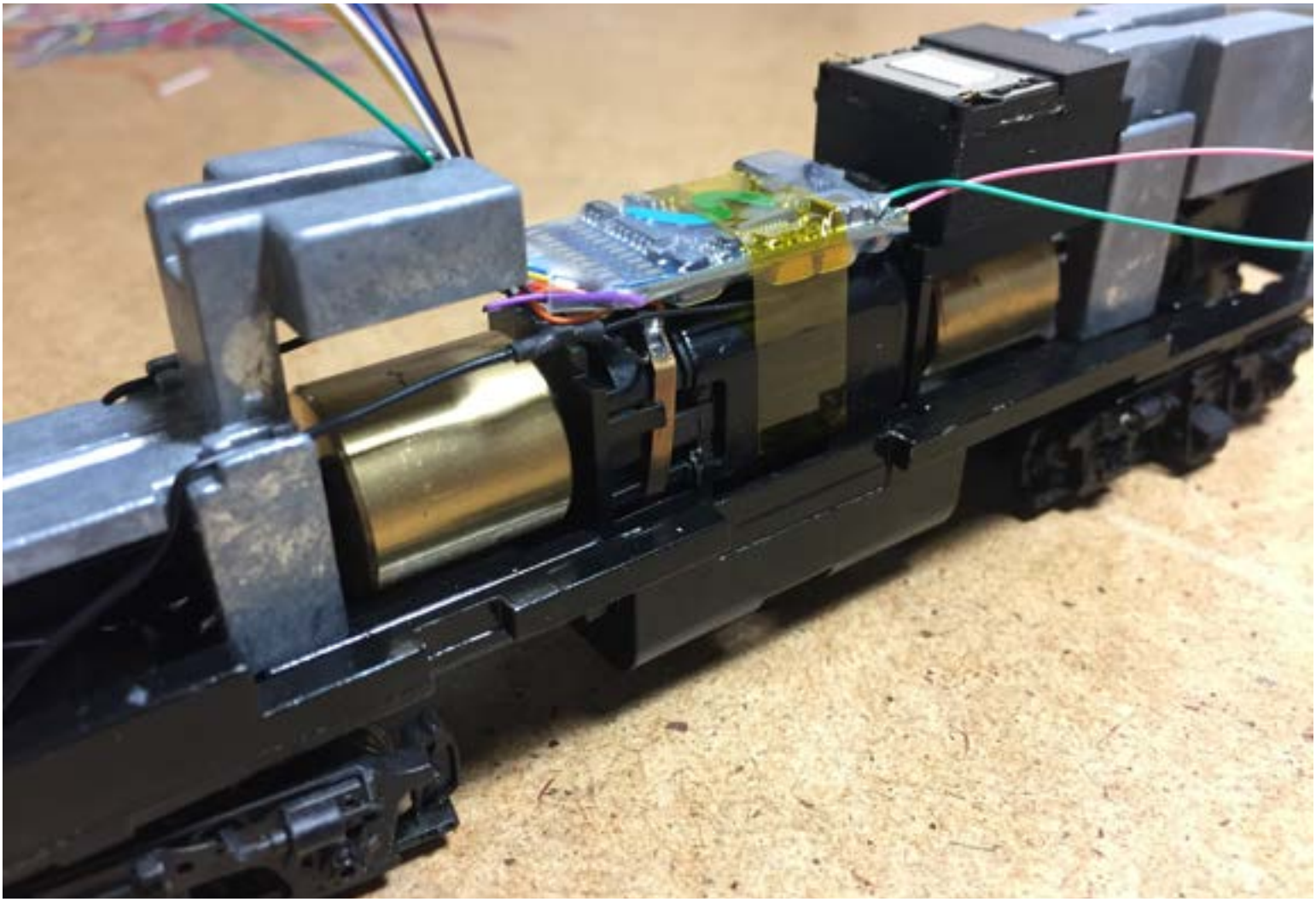
Now hook the rear truck pickup wires to the front truck pickup wires. Also hook the red/black decoder wires to the front truck pickup wires. Use tweezers to needle-nose pliers to crimp the hooks so they're small and tightly holding all the wires together. Solder together.



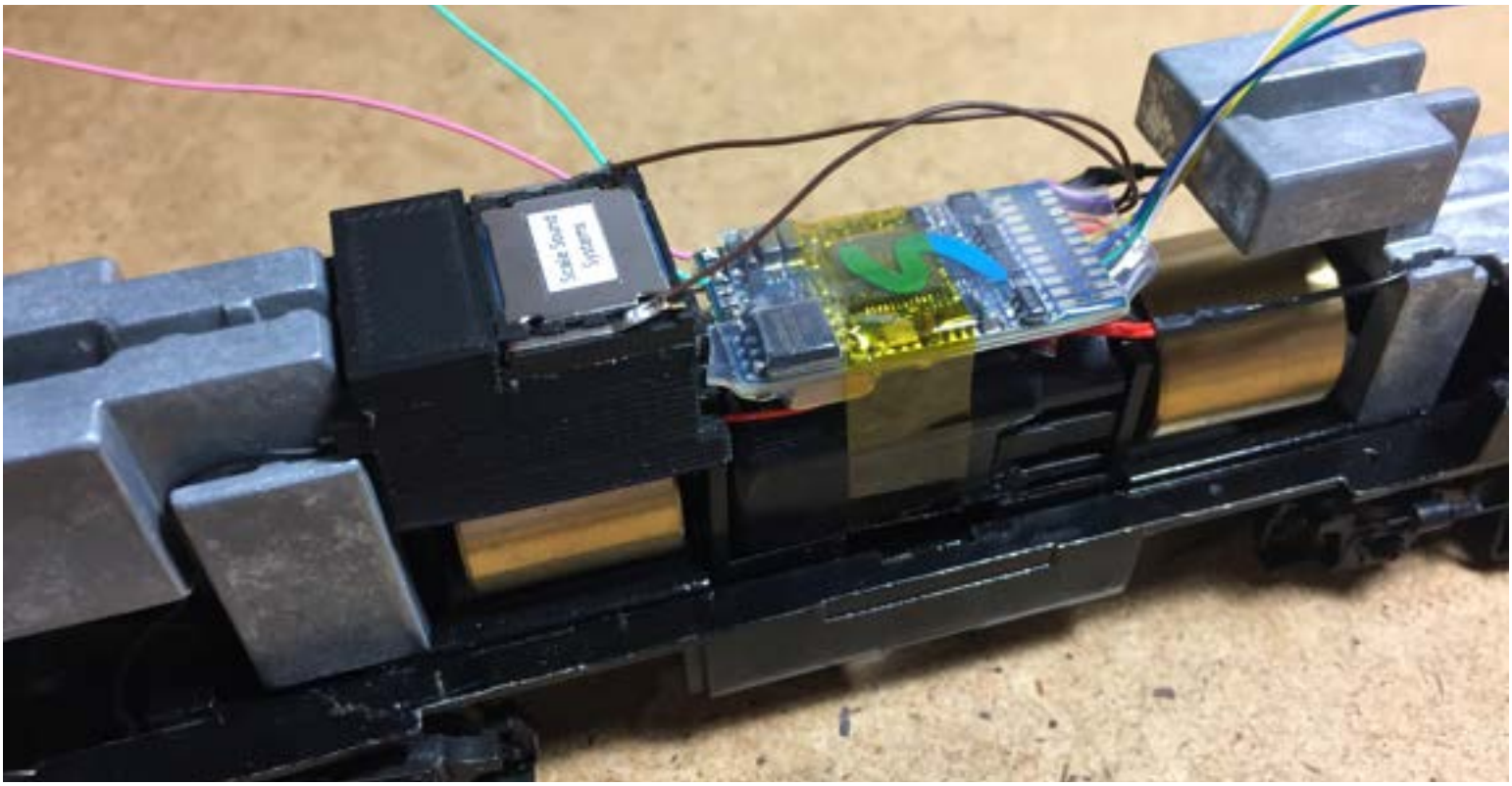
Slide the previously installed heat shrink down over the joint and shrink it down. Nice and neat!



With the red/black pickup wires all finished, I taped over the decoder and those wires with Kapton, securing everything in place and keeping it tidy. Test the locomotive for motor control and direction now. Be sure that the loose speaker and function wires do not touch each other or anything else! A brief short here could destroy the decoder! Realize that when testing, there will likely be a delay in movement after throttling up, as the prime mover is rev-ing up before the motor starts turning - you're just not hearing it yet! Don't let that alarm you.

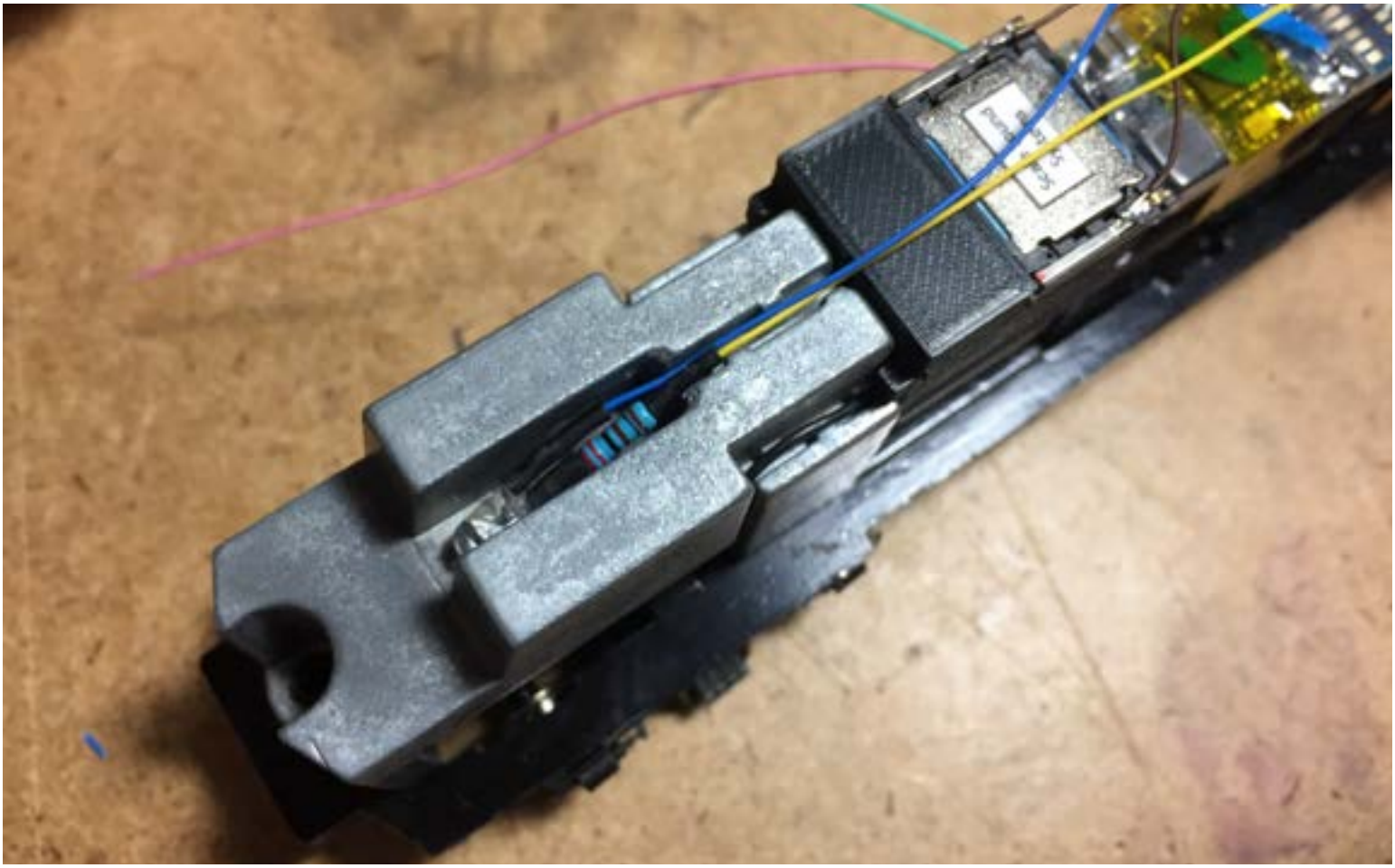


A dressed and taped view of the left/conductor’s side.

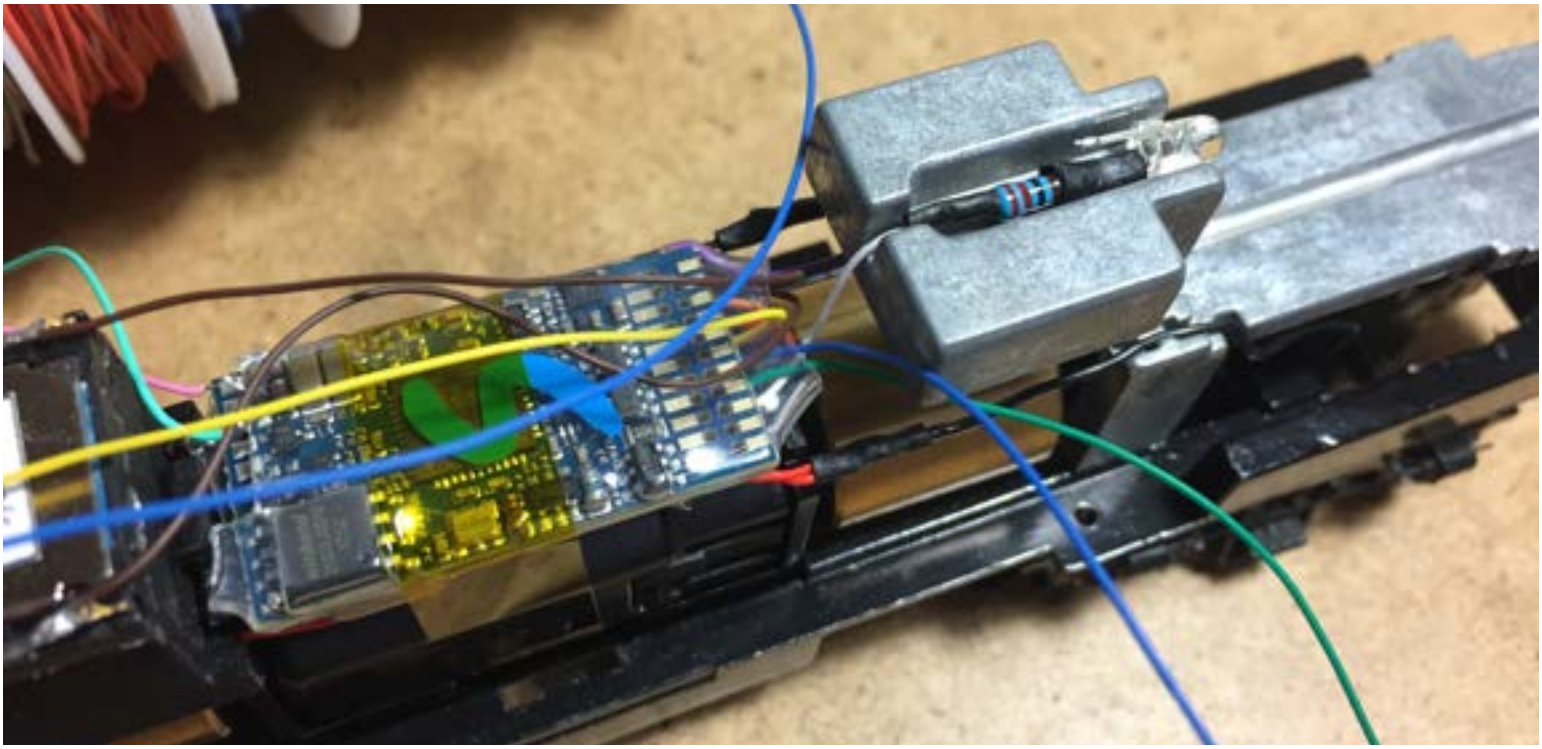


Leaving a little slack to dress the wires down, trim-tin-solder the speaker wires to the speaker contacts.

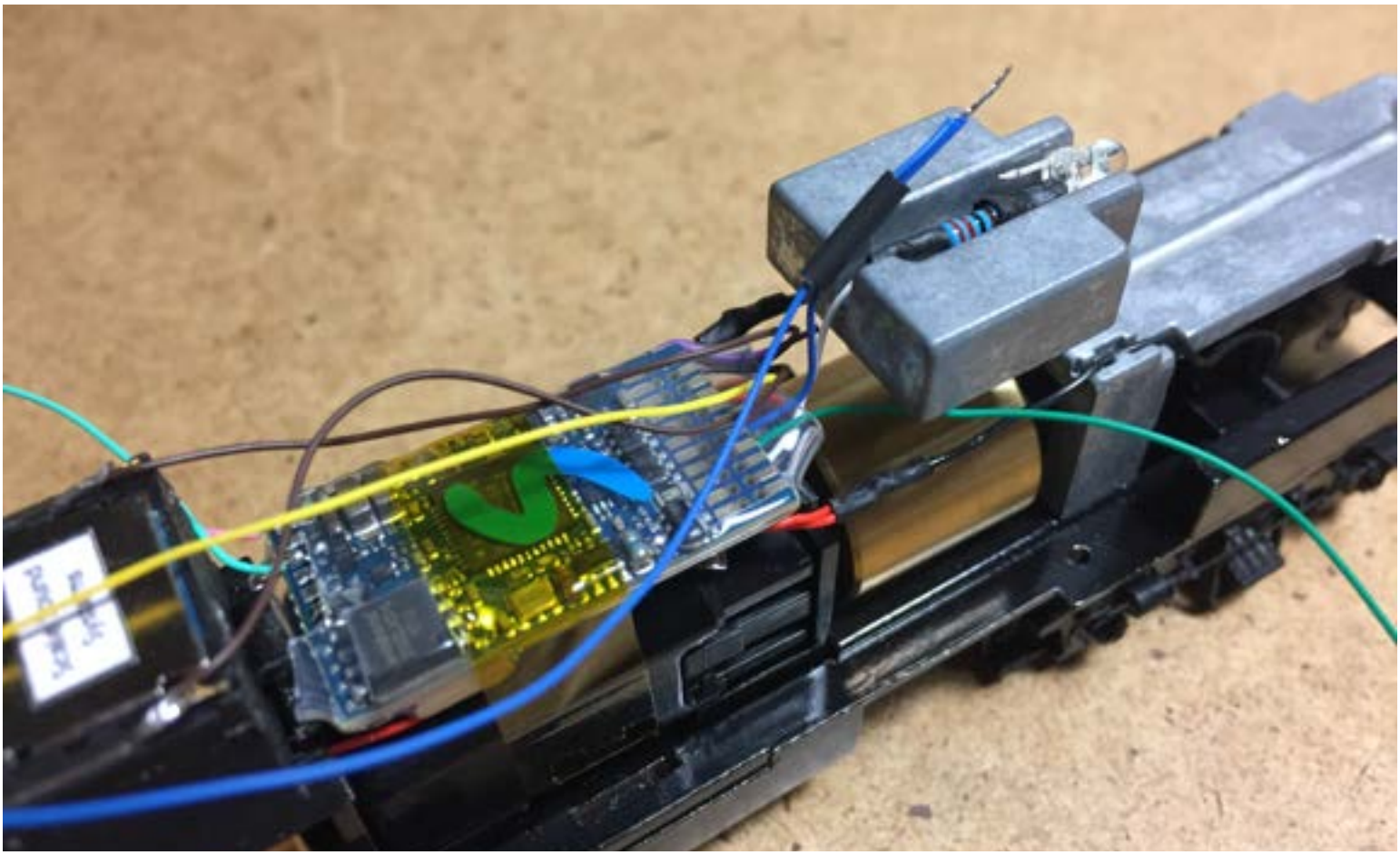
I’m using 3mm warm-white LEDs for the headlights. Trim the leads and solder a resistor to the LED’s cathode (or anode if you prefer). Here I am using a 2.2K ohm resistor and everything is trimmed so that the LED will fit behind the shell’s lightpipe and within the light cavity of the weight. Add heat shrink over the LED-resistor joint.



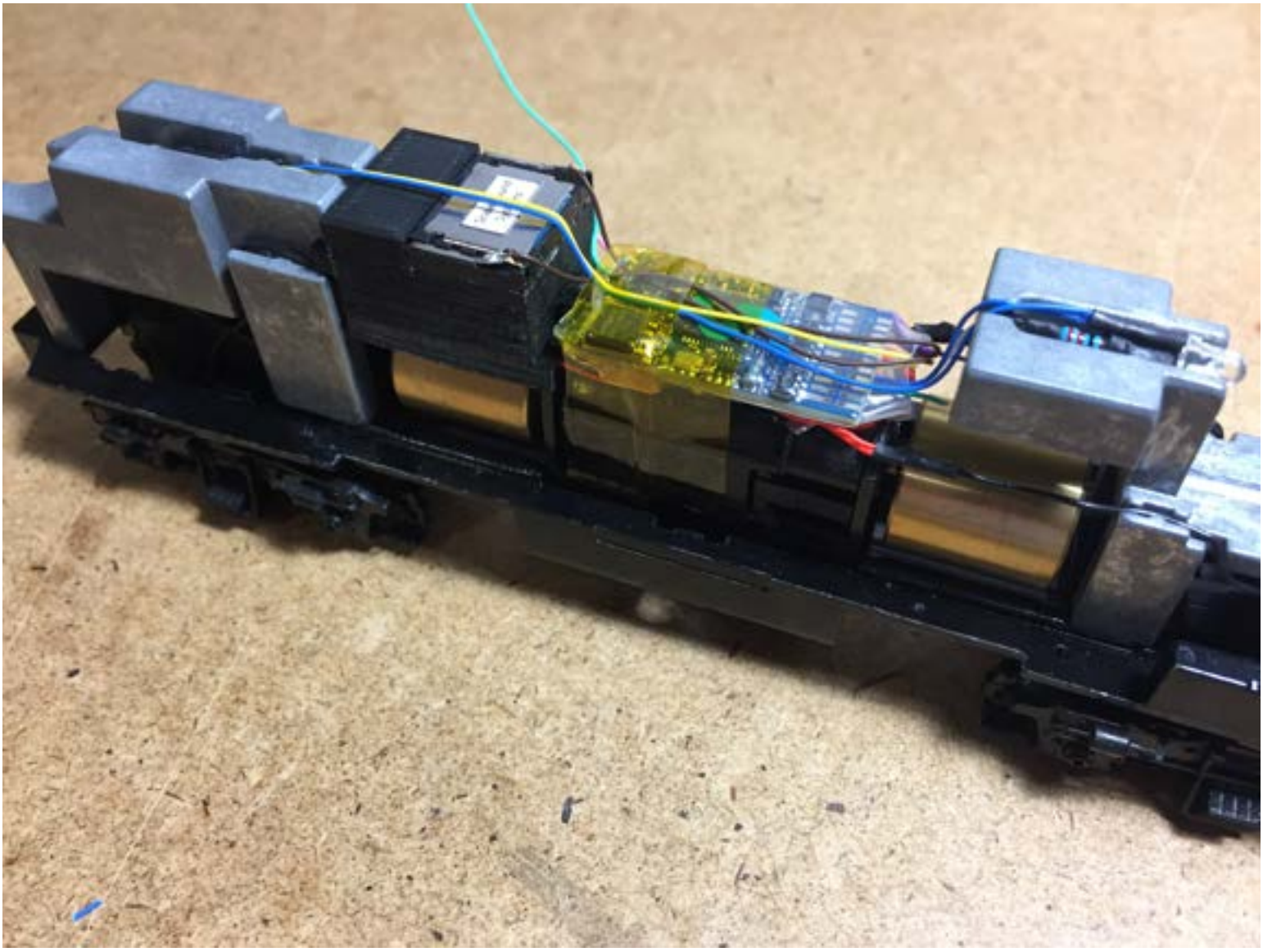
Solder the decoder’s yellow, rear headlight wire to the LED’s cathode and a 6” length of blue wire to the LEDs anode. Heat shrink all joints and slide the LED down into its cavity.



Prepare the front headlight in the exact same manner. Solder the white decoder wire to its cathode.

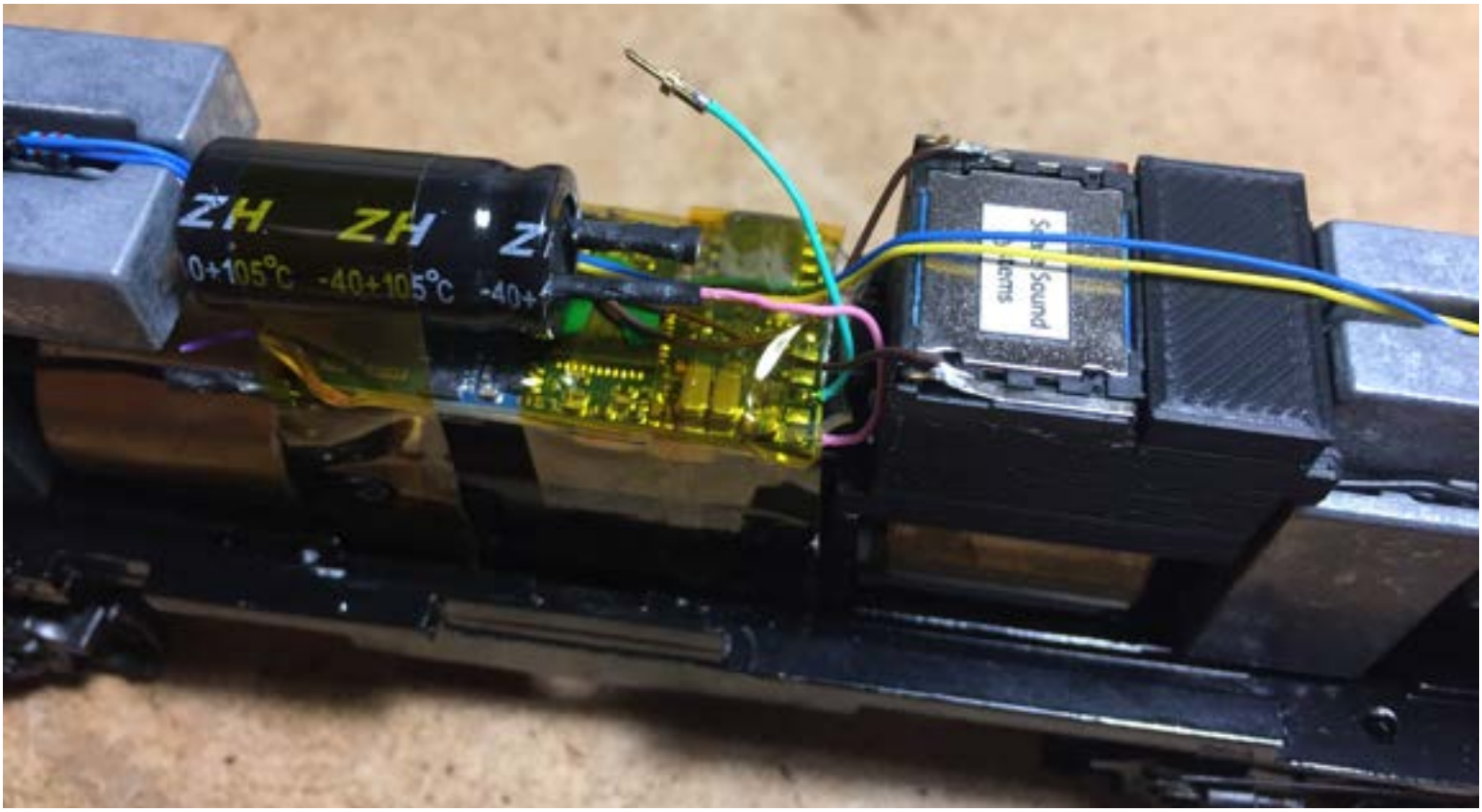


Trim the decoder’s blue common wire to length and trim the blue wire from the rear headlight, leaving slack to dress down over the speaker and across the decoder. Twist the two blue wires together and solder, then slide a piece of heat shrink down onto them.

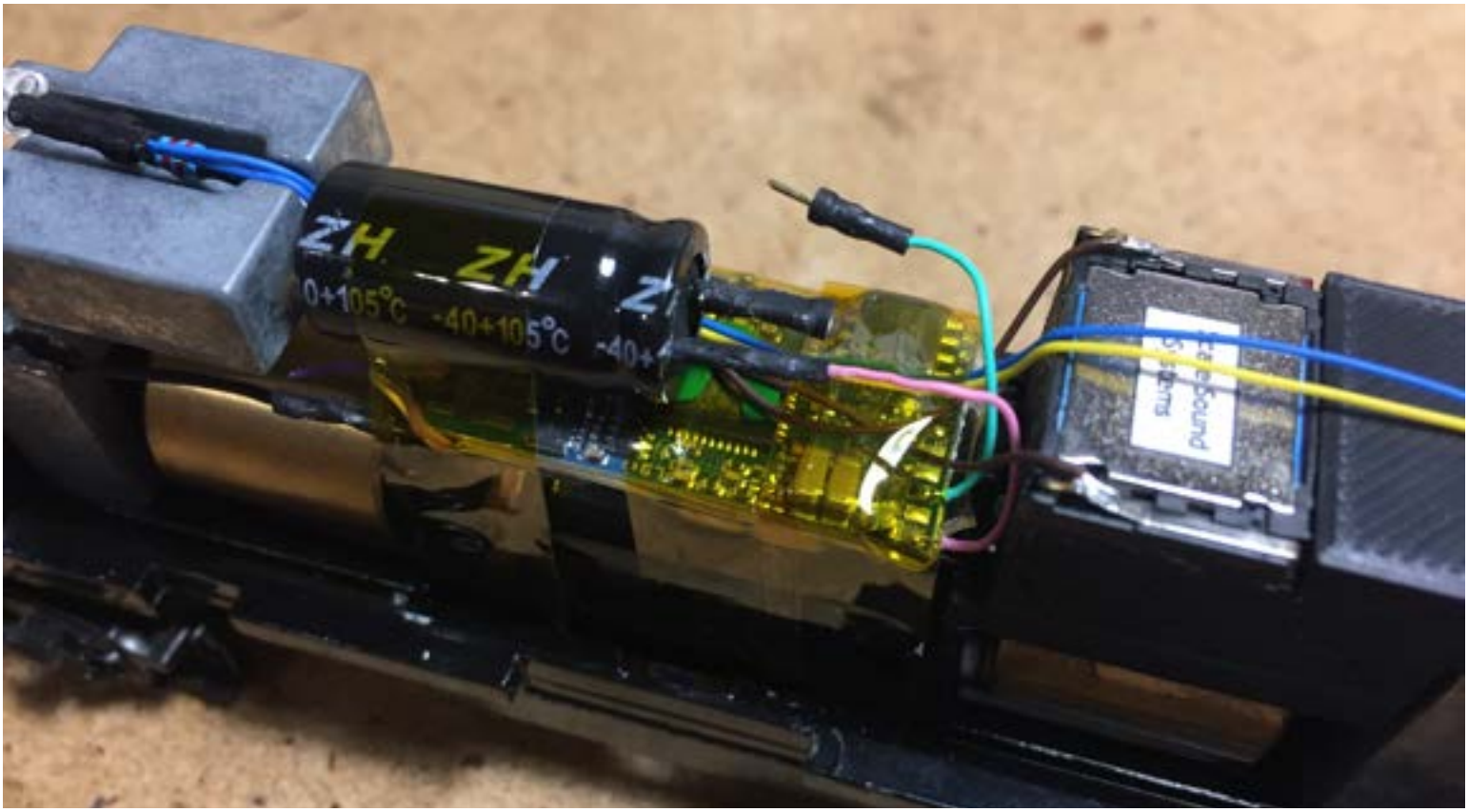


Solder the twisted paired blue wires to the front headlight LED anode, slip the heat shrink over the joint and shrink it down. Dress the rear headlight yellow/blue wire down over the top of the speaker and down along the decoder and tape in place with Kapton. Shown above is the installation at this point.

When installing any capacitor or stay-alive circuit that is not an ESU Powerpack, a quick-disconnect should be installed on one leg of the capacitor so that the capacitor can be bypassed when programming with a Lokprogrammer. Here, I've soldered a small socket to the negative leg of a 2200uF capacitor.



Slip some heat shrink over the socket/negative leg and shrink it down, leaving the end open. Solder the pin to the turquoise decoder wire we are using for the stay-alive negative connection. Slip a piece of heat shrink down the pink decoder wire we are using for the stay-alive positive connection, solder the wire to the capacitor's positive leg and heat shrink the joint down.



Slip a small piece of heat shrink over the pin joint and shrink it down. These pin & socket micro connectors are available as Soundtraxx #810058 or through www.scalesoundsystems.com.

And that's it! These four photos show the final installation. It is neat and tidy, with great looking LED lighting, the added reliability of a stay-alive and the amazing sound of a Scale Sound Systems speaker system!

No frame or shell modification or weight removal required!