

**This Presentation given to the
Mid-South Division regular meeting
of the
Southeastern Region
of the
National Model Railroad Association
On May 7, 2022
by Douglas Eagan
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Adding a Decoder to a Walthers Proto 1000 F-M Erie-Built Locomotive

(Walthers Item 31688 Formerly Life-Like)

By Doug Eagan
Mid South Division, NMRA



**Santa Fe only had
one ABA set of
Fairbanks-Morse
“Erie-Built” #90**

**They were
numbered
90L, 90A
& 90C**





Walthers
Package

Out
of the
Box



Project Goal:

Convert Walthers Loco from DC to DCC with Sound

- Add a DCC + Sound Decoder
- Add a Speaker with an Enclosure
- Convert to LED Headlight (if needed)
- Add four Ground/Truck Lights
- Add a Rear Backup Light (Red per ATSF Specs)
- Add Number Board Lights
- Service Engine as Needed

Items Needed for this Installation:

Decoder:

SoundTraxx Tsunami2 (TSU-PNP8

P/N 885816 Baldwin & Other Diesels)



The image shows the retail packaging for the SoundTraxx Tsunami2 Digital Sound Decoder. The box is white with a purple and blue wave graphic at the top. The product name 'Tsunami2' is written in a stylized purple font. Below the name, the model 'MODEL TSU-PNP8' and 'Digital Sound Decoder' are printed. A yellow box on the right side of the packaging says 'New 8 Function' and 'Now equipped with 8 function outputs'. A list of features is provided, including 16-bit digital sound, 74 x 17 x 5mm universal format, 2A motor stall current, over 50 sound effects with selectable reverb, functioning engine, train, and dynamic brakes, reactive dynamic digital exhaust, 8 function outputs with over 20 hyperlight effects, hyperdrive2 advanced motor control, and 1.5V power supply for microbulbs. A list of 26 functions (F3-F26) is also provided, such as Short Airhorn, Dynamic Brake, RPM+/Engine Startup, etc. A photograph of the decoder board is shown at the bottom right. At the bottom of the box, it says 'Complete service and warranty information is available in the "Support" section of our website.'

Tsunami²

MODEL TSU-PNP8
Digital Sound Decoder

P.N. 885816 BALDWIN & OTHERS DIESEL

- 16-bit Digital Sound for EMD Prototypes
- 74 x 17 x 5mm Universal Format
- 2A Motor Stall Current
- Over 50 Sound Effects with Selectable Reverb
- Functioning Engine, Train and Dynamic Brakes
- Reactive Dynamic Digital Exhaust™
- 8 Function Outputs with over 20 Hyperlight™ Effects
- Hyperdrive²™ Advanced Motor Control
- 1.5V Power Supply for Microbulbs

New
8 Function

Now equipped
with 8 function
outputs

F3 = Short Airhorn	F18 = General Service
F4 = Dynamic Brake	F19 = Straight-to-Idle
F5 = RPM+/Engine Startup	F20 = Steam Gen./Auxiliary HEP Gen.
F6 = RPM-/Engine Shutdown	F21 = Sander Valve
F7 = Dimmer	F22 = Cab Chatter
F8 = Mute	F23 = "All Aboard"/Coach Doors
F9 = Grade-Crossing Signal	F24 = FX3 Function Output
F10 = Straight-to-Eight	F25 = FX4 Function Output
F11 = Independent/Train Brake	F26 = FX5 Function Output
F12 = Brake Select	
F13 = Couple/Uncouple	
F14 = Switching	

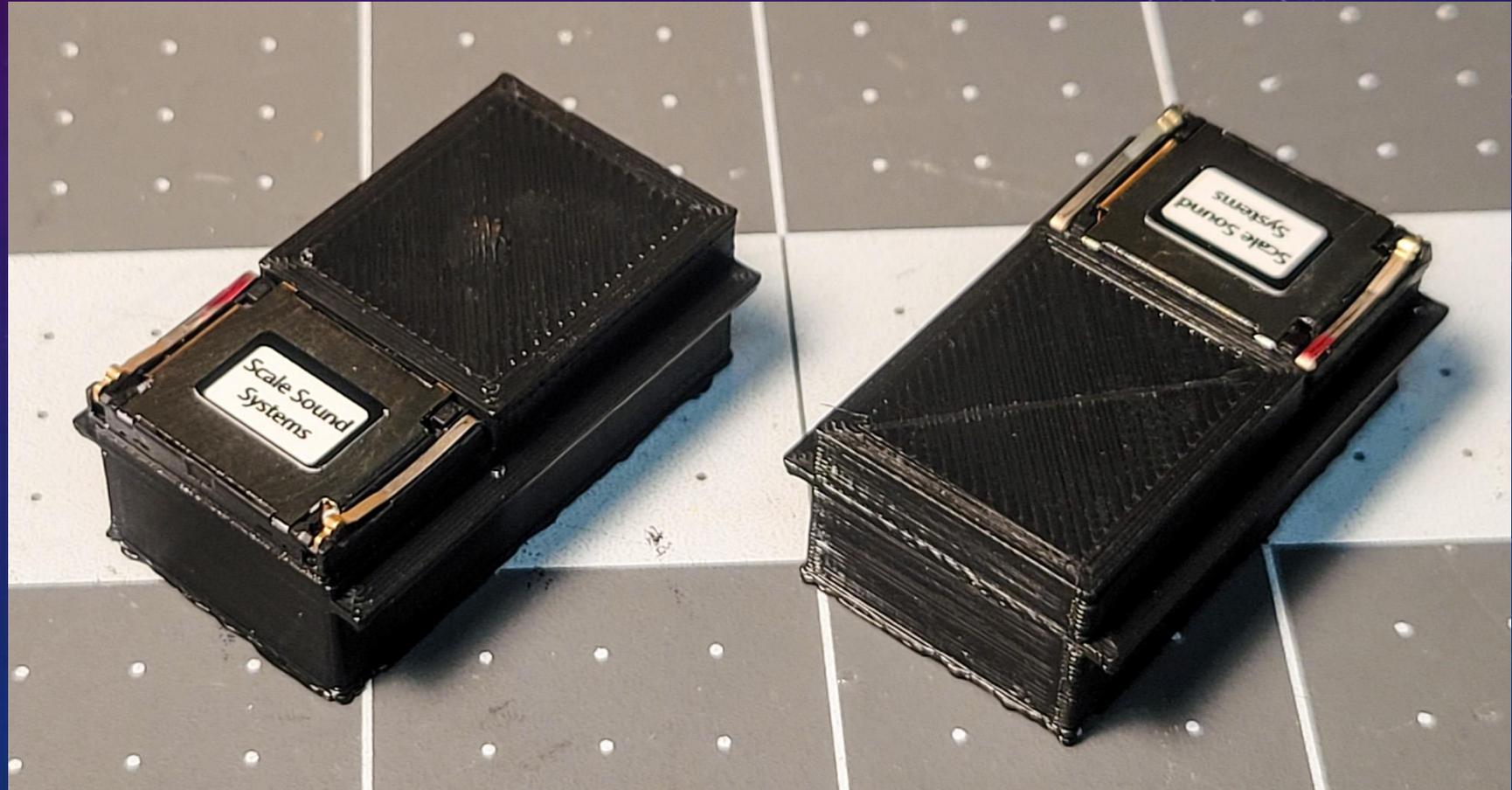
Note: Our Flex-Map key, making it easy to use the SoundTraxx Digital Sound Decoder.

Complete service and warranty information is available in the "Support" section of our website.

Items Needed for this Installation: (cont.)

Speaker with Enclosure:

Scale Sound Systems Rectify Series enclosure with sugar cube type speaker for Life-Like* Proto 1000 Erie-Builts



* Same as Walthers Proto 1000
Walthers purchased Life-Like

Items Needed for this Installation: (cont.)

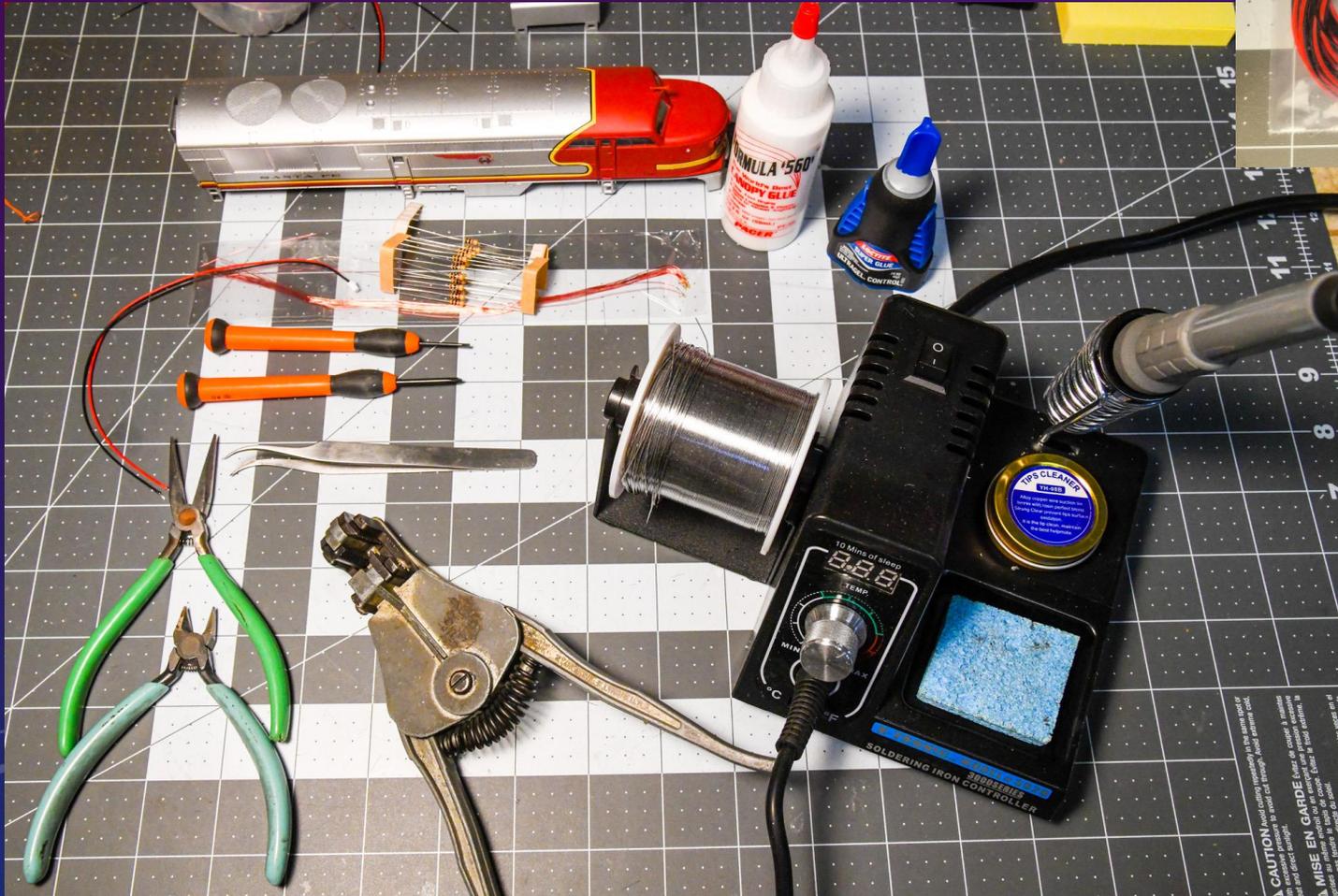
LED's:

- **For Trucks, Number Boards, Headlight & Backup Light (0402 Wired LED's plus Resistors)**
- **Backup Light Housing (Details West #BL-162 Pyle Type Backup Lights)**
- **30 ga. Hookup Wire in DCC Spec Colors (SoundTraxx) & Heat Shrink Tubing**



Items Needed for this Installation: (cont.)

- 2-Pin JST 1.25 Plug & Socket – Wired
- Small Hand Tools & Solder Station
- Cleaning & Lubricating Supplies

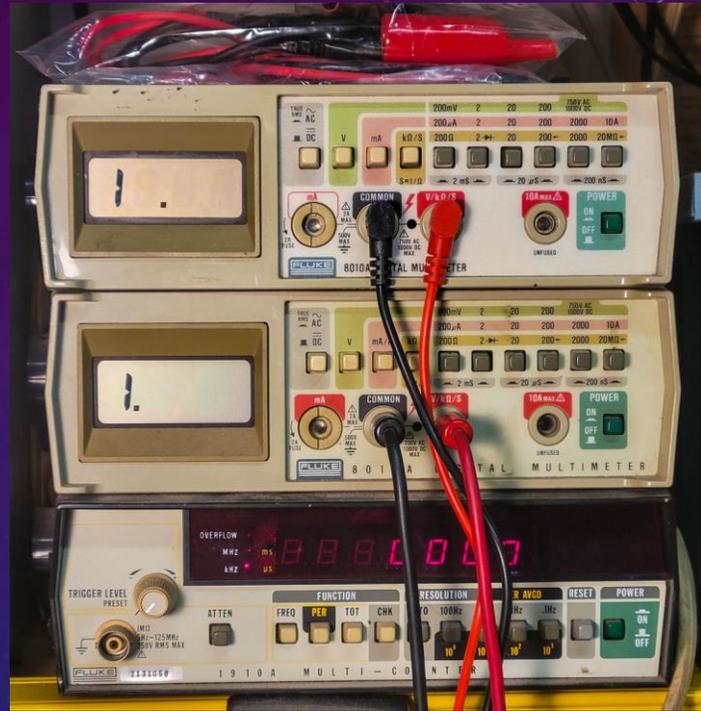


SHOWN: Jewelers slot & phillips screw drivers, curved tweezers, needle-nose pliers, wire cutter, wire stripper, Formula 500 Canopy Glue, Loctite Ultragel Super Glue, Variable Temperature Soldering Station, JST 1.25 Plugs/Sockets, Labelle Lubricants

NOT SHOWN: Resistance Decade Box, Power Supply, Digital Multimeters, Miscellaneous Test Leads

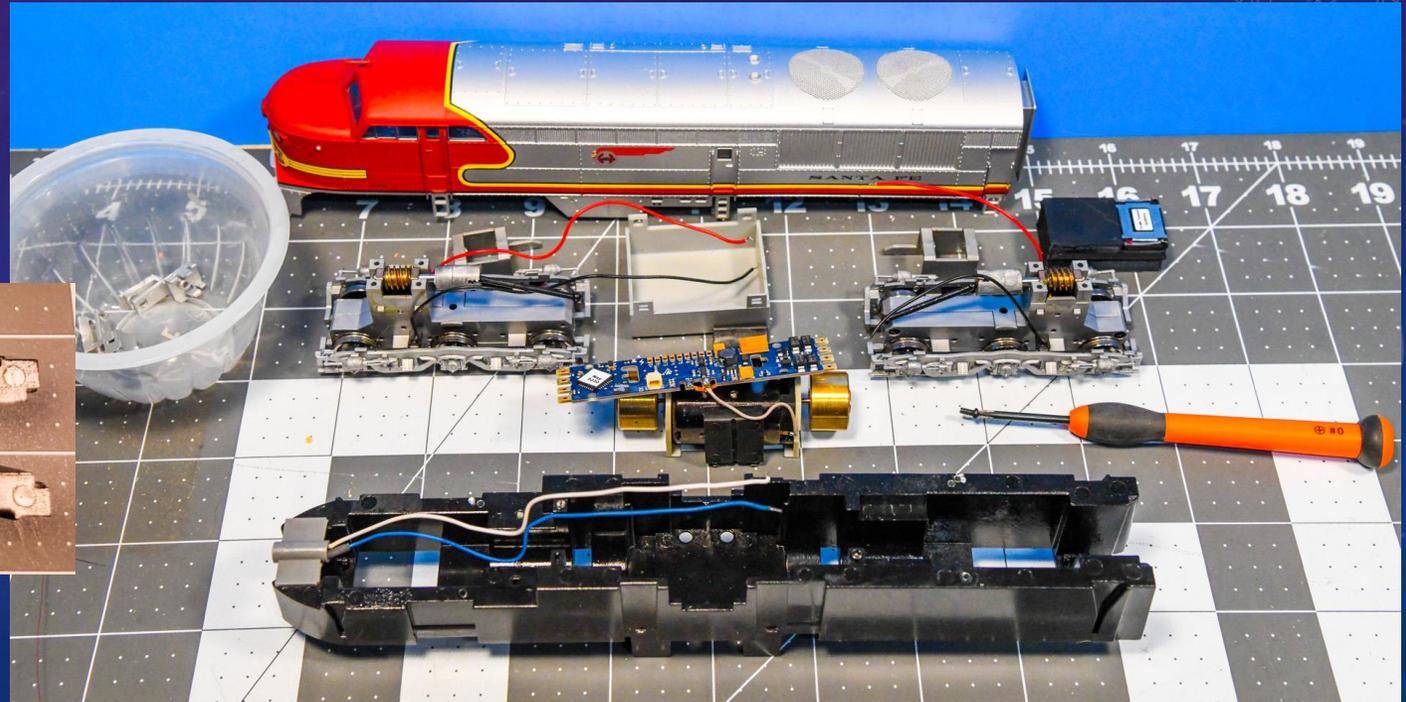
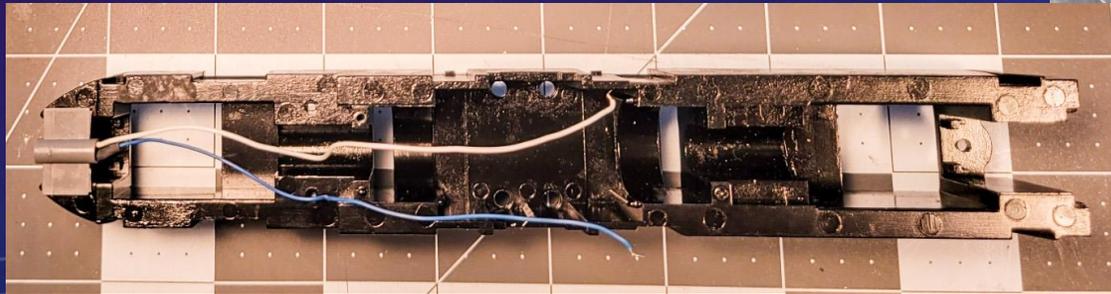
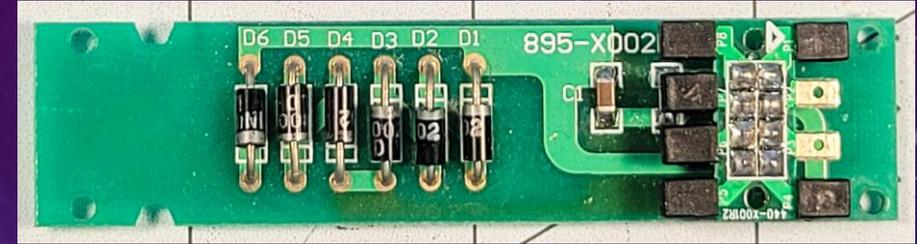
Before Starting the Installation:

- Evaluate the Loco on DC
 - Running & Stall Current (using DMM's)
- Note any Deficiencies
 - Slightly jerky at very low speeds
- Determine what Resistor size(s) give the desired LED light levels
 - Using 14V PS + Decade Box + DMM's



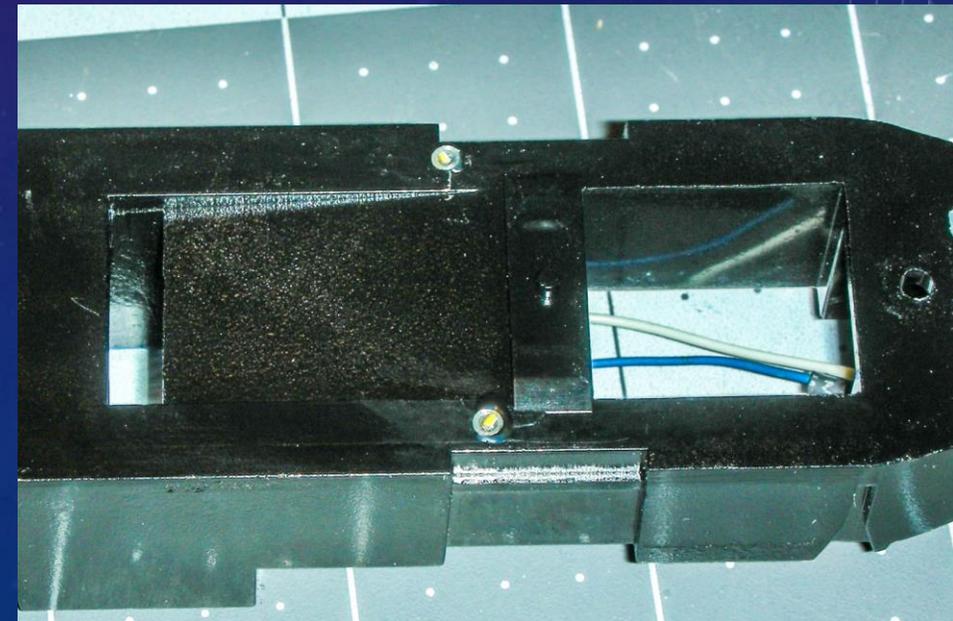
Starting the Installation by Disassembly:

- **Locomotive Disassembly** (stripping the frame)
- **Remove Couplers** (front & rear)
- **Remove Body Shell**
- **Remove Wire Caps from 8-pin jumper to free wires**
- **Remove the Light Board** (keep the screws)
- **Remove the Truck Gear Covers to free the Trucks**
- **Remove the Fuel Tank**
- **Remove the Motor**



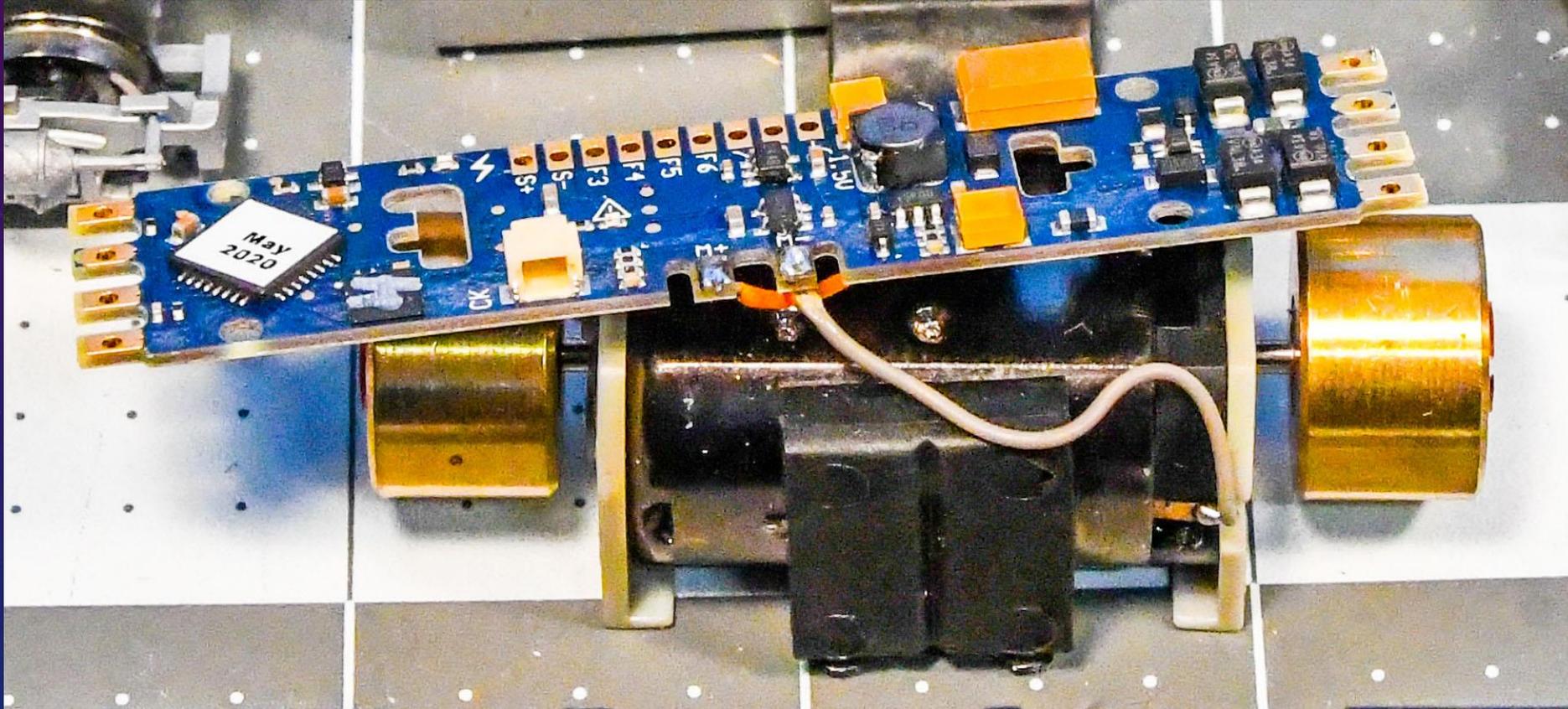
Preparing the Frame:

- **Mark the Locations for the Ground/Truck Lights**
- **Use a Punch on the above locations as a drill starter guide**
- **Drill the four holes for the LED's (#52 drill bit)**
- **Test the LED's to verify they work (before and after gluing)**
- **Slide the LED's in the holes until just short of being flush**
- **Put Canopy Glue in the hole on the LED to lock it in place**
- **Put Canopy Glue in the hole where the wires exit to lock in place**
- **Clean the Truck Gears and Wheels**
- **Lube the Trucks (Labelle 106 Plastic Compatible Grease with PTFE (Teflon))**



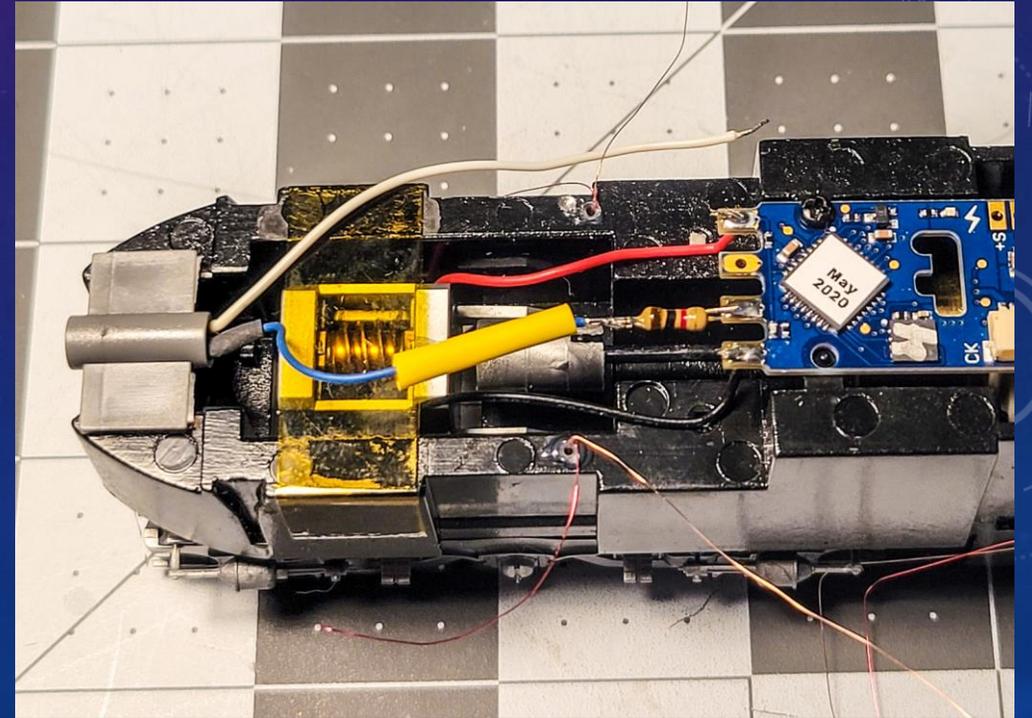
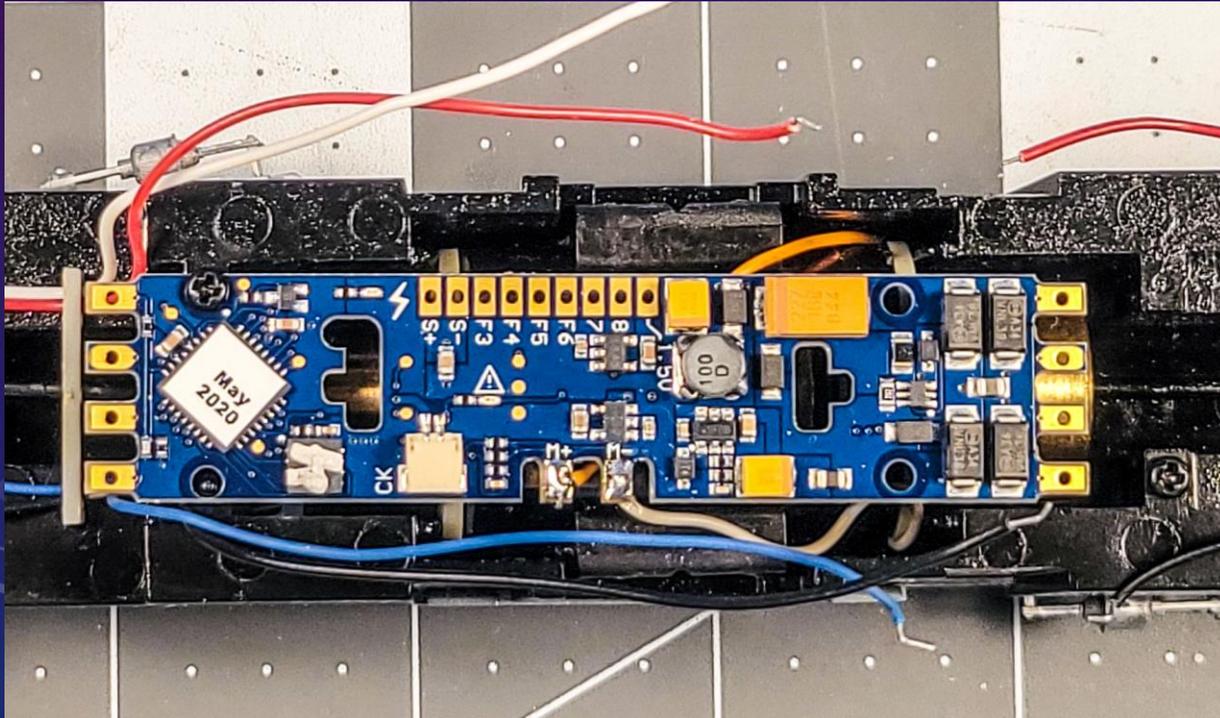
Prepare the Motor:

- Lube the Motor (Labelle 107 plastic compatible Oil)
- Solder the Motor Wires to the Decoder



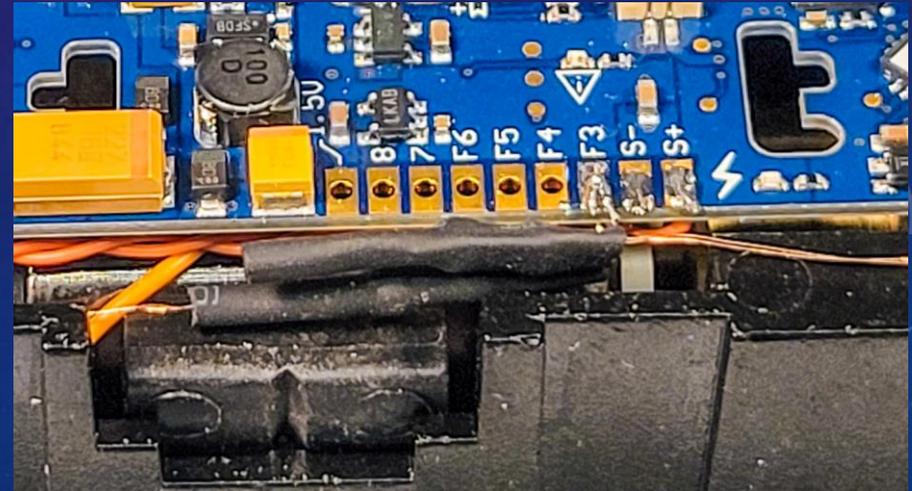
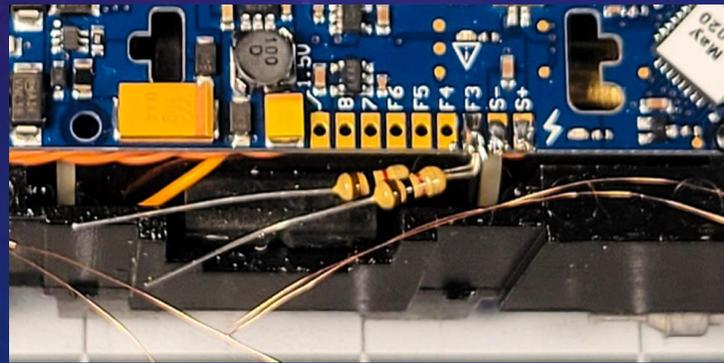
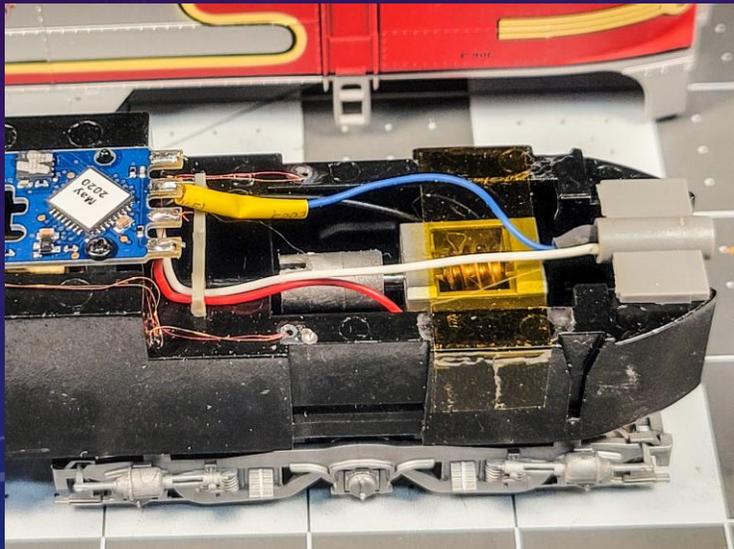
Begin Reassembly:

- Install the motor in the frame (Decoder is loose)
- Mount the Decoder to the frame (using saved screw)
- Reinstall the Trucks & Driveshafts
- Solder Front & Rear Track Leads to Front & Rear of Decoder
- Solder the Headlight Resistor to the Front HL Neg. Pad (1K ohm)
- Solder the HL Neg. lead to the HL Resistor with Heat Shrink Tubing



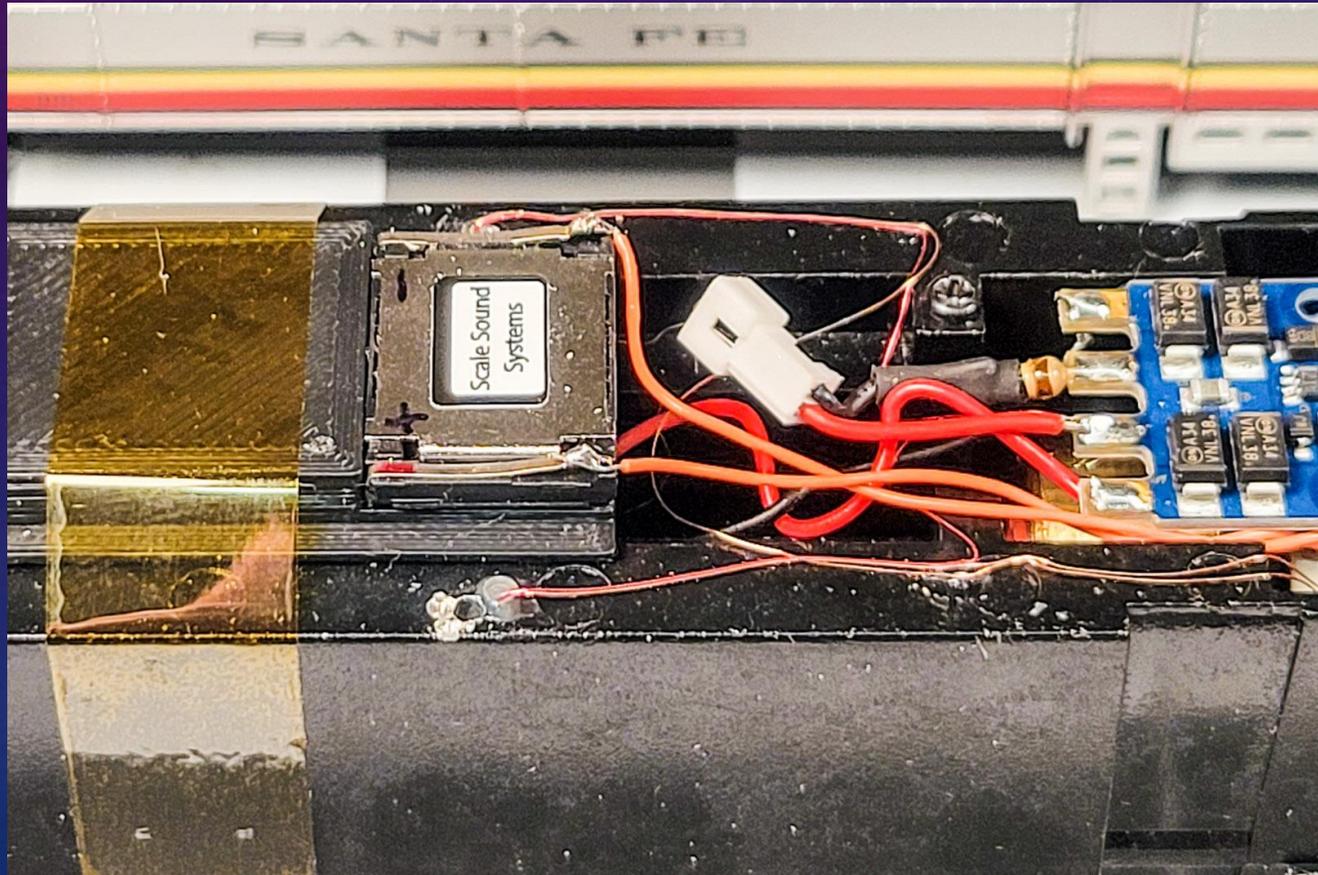
Begin Reassembly: (cont.)

- Solder Headlight & Truck Lights + leads to Decoder front + pad
- Solder the Rear Truck Track Leads to the rear of the Decoder
- Solder the Speaker Wires to the S+ & S- pads
- Solder two 1K ohm Resistors to the F3 neg. pad for Truck Lights
- Solder the Front Truck Lights neg. to one of the Resistors (use heat shrink)
- Solder Rear Truck Lights negs to the other Resistor (use heat shrink)



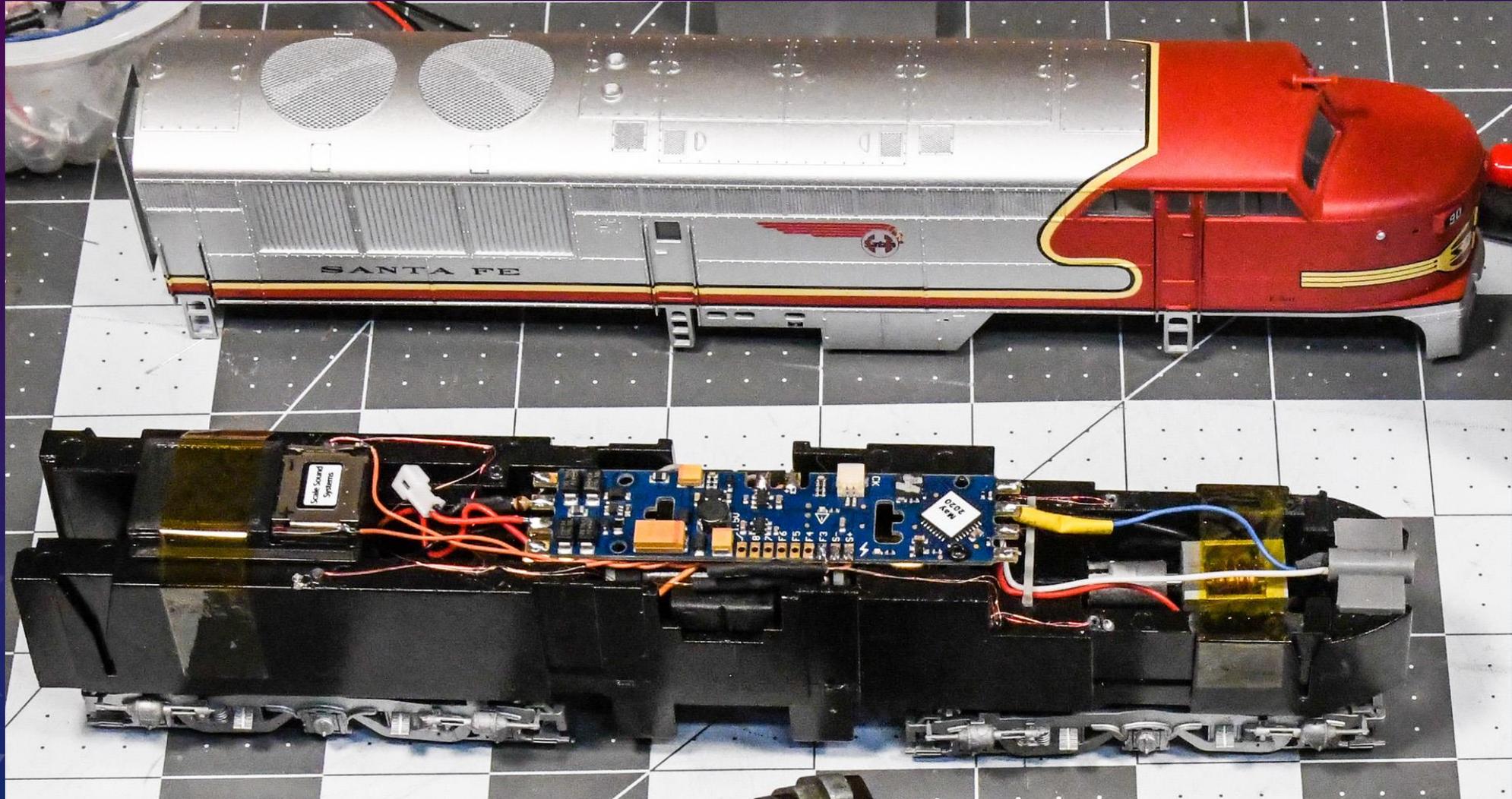
Begin Reassembly: (cont.)

- Solder the Backup Light Plug & Rear Truck Lights + to rear + pad
- Solder the Backup Light Resistor (1K ohm) to the Backup Light neg. pad
- Solder the Backup Light Plug neg. to the Backup Light Resistor (use heat shrink)
- Solder the Speaker Leads to the Speaker



Begin Reassembly: (cont.)

Completed Installation – Now on to the Programming Track!



Unfinished Work...

- **Number Boards were not open so couldn't do them now...**
- **Details West Backup Lights haven't arrived yet... hence the plug**
- **Possible super-detailing at a later date as there are several differences from the prototype**
 - **Santa Fe Passenger Diesels all had Two Headlights, one of which was either a Pyle Rotating or Mars Light (usually the top one)**
 - **Santa Fe #90 had Two Horns**
 - **Santa Fe #90 had Horizontal Grills over the F-M vertical ones**



Programming...

- **Create an entry in JMRI's DecoderPro (ATSF F-M 90L)**
- **Program the Road Number (90)**
- **Program the F-M Prime Mover (CV123 Value=6)**
- **Program the Horns (CV120) more research needed as I've been told two different ones**
- **Program the Bell (CV122 Values 28-31) personal preference here**
- **Program the Volume Levels of the different sounds**
- **Remap FX3 to ? (Creating a Standard for Operations per Stephen Priest MMA)**
this will require comparing the functions of all other locos to create the standard then programming all locos to the standard for ease of operations
- **Program DDE* and tons of other functions for Prime Mover & other sounds**
- **Speed Matching will be done when the other A unit and B unit are completed**
- **They will be permanently advanced-consisted as an ABA group**

* Dynamic Digital Exhaust feature of the Tsunami2 Decoders

Sample “Sugar Cube” Speakers
passed out are courtesy of

Streamlined Backshop

www.sbs4dcc.com

That's All Folks!

