

Detailing and Improving a Plastic Steam Locomotive

My Experience Trying Some New Things...

George Van Duyne

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How I got from this...



To This...



My Background

- Simple scratchbuilding, not a kitbasher....
- Built two Bowser steam locos with detail parts
- Upgraded detail on not one but two(!) Athearn boxcars
- Installed decoders in my older steam locos
- This project came about because I wanted an 0-6-0 but I'm too cheap to pay for used P2K or brass model
 - Money saved per hour work = \$0.18
- This was planned to resemble a prototype, not be an exact, award winning model.
- I thought this might be an “interesting” project.... outside my comfort zone and a bit beyond what I know
 - Boy Howdy, that's an understatement

The Locomotive

- Bachmann USRA 0-6-0
 - “Trainset” locomotive
 - Low definition cast on detail
 - Valve gear somewhat “heavy” in appearance
 - Mechanism is decent
 - Split frame design
 - Runs quite well despite no flywheel
 - It’s inexpensive



The Work

- Electrical Upgrades
 - Surprise! Tender has plastic wheels
 - Change wheelsets with P2K 33" turned metal wheels
 - Add wheel wipers for all wheel pickup
 - Install decoder in tender
 - Remove smoke unit
 - Upgrade headlights (done as part of boiler and tender detail phase)
- Hey, that's not really a coupler, dummy!
 - Remove pilot and dummy coupler
 - Make new frame extension from sheet metal
 - Attach pilot and Kadee coupler to new frame extension
- Boiler and Tender Detail
 - Remove cast on piping and appliances
 - Build new appliance subassemblies from brass parts and wire
 - Install new detail
- Paint, decal and weather

What I used

- Tools:

- Modeling knife with #11 & #17 blades
- Razor saw
- Dremel with cutoff wheel
- Sandpaper and sanding sticks
- Modeling putty
- Glues – CA, plastic cement, tacky glue, Pliobond
- Needle nose pliers – large and small
- Small metal shears
- Pin vise and drills
- Taps 2-56, 0-80, 00-90
- Heat gun

- Dial caliper and micrometer
- Soldering station

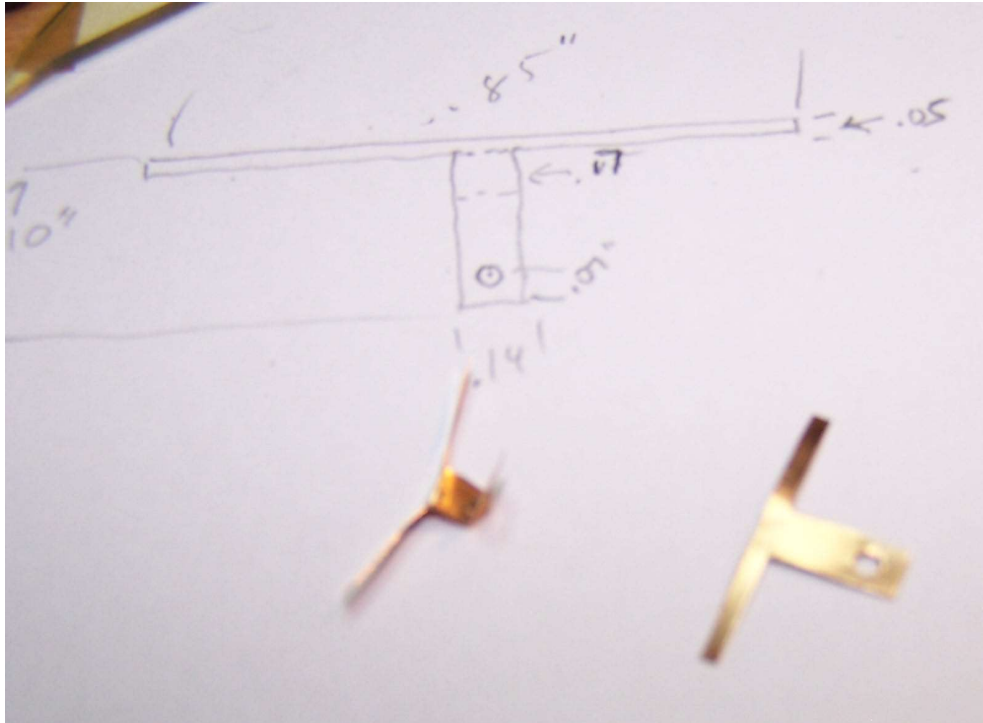
- Supplies

- Detail parts predominantly cast brass Cal-Scale. List at end of presentation
- Wire,
 - brass in .020" and .028",
 - copper #20, (.032")
 - steel alloy in .010", .013"
- Phosphor bronze sheet, .003"
- Sheet aluminum, .020"
- Miniature electrical connectors
- #30 wire & shrink tubing
- Solder, flux, solder remover braid

Some Prototypes



Tender Wheels and Pickups

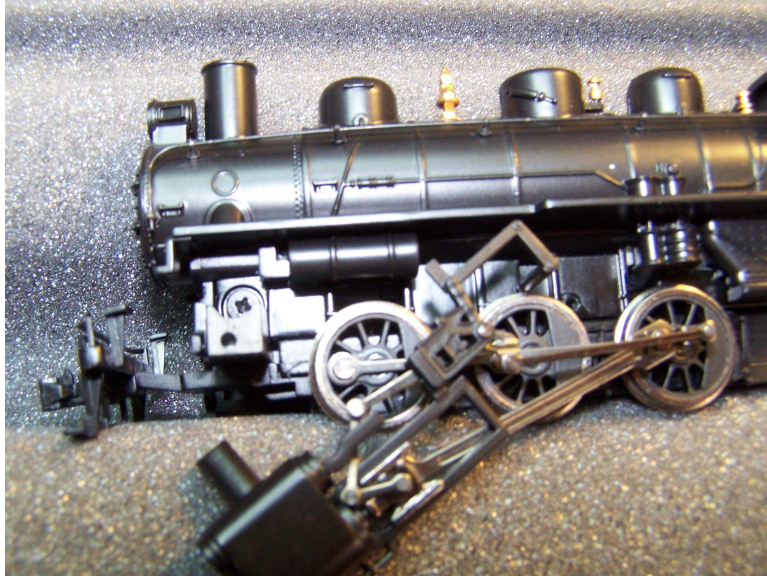


- Opted for wipers on wheel treads for 8 wheel pickup
- Measure trucks for size of wipers
- Cut out with small shears from 0.003" phosphor bronze
- Drill clearance holes for 0-80 screws
- Fold to shape
- Solder wires to wipers

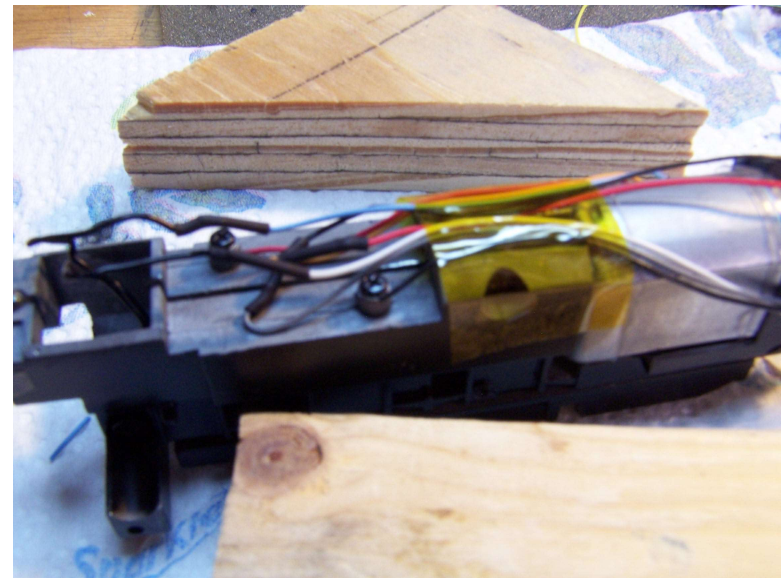
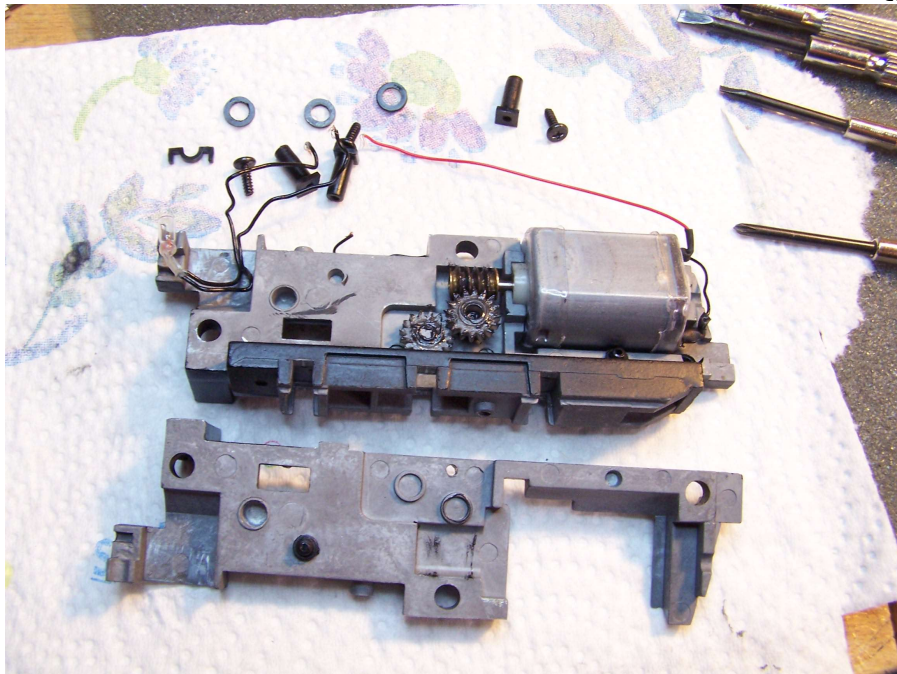
- Drill holes in trucks for 0-80 tap
- Tap holes in trucks
- Assemble wiper to trucks
- Install wheelsets. Don't destroy wipers in the process.
- Adjust wiper tension on wheels
- Wires will be routed through holes drilled in tender floor on opposite side from wiper to allow freedom to rotate.



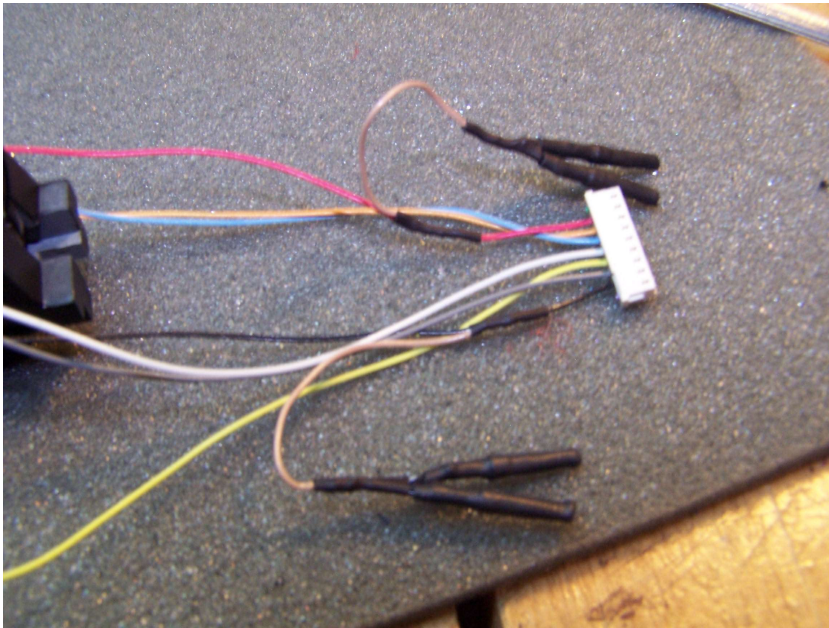
Wire Decoder to Locomotive



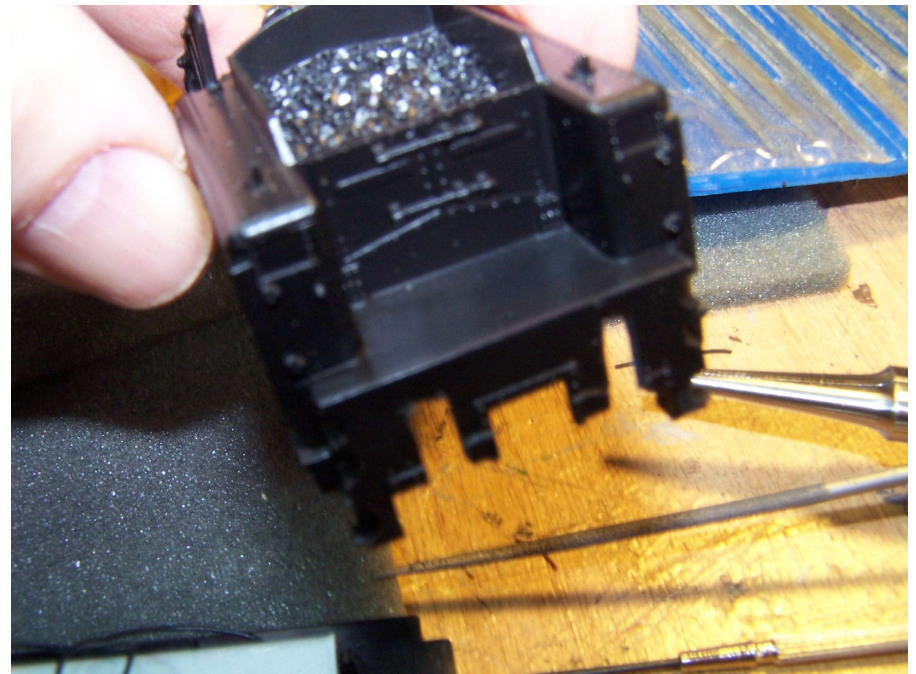
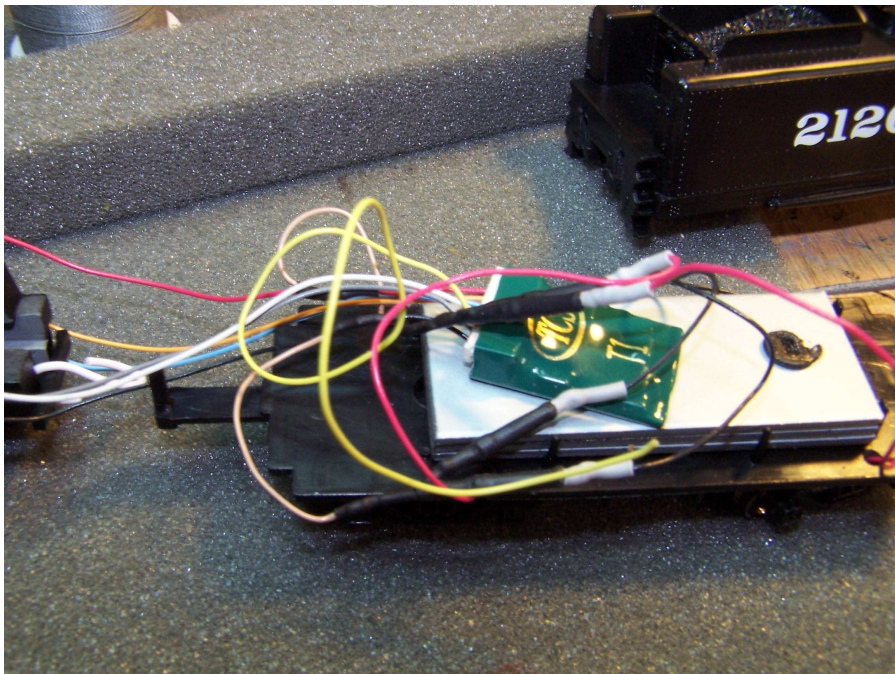
- Disassembly:
 - Youtube is a great resource
 - Boiler clips to metal frame at front of this loco
 - Cylinders slide out sideways
- Split frame taken apart to remove smoke unit
- Wires from 9-pin decoder harness run across top of frame and connected as appropriate.
- 3 wires run down each side of motor – will exit at back of cab.
- Notches cut in back of cab for wire pass-through to tender.



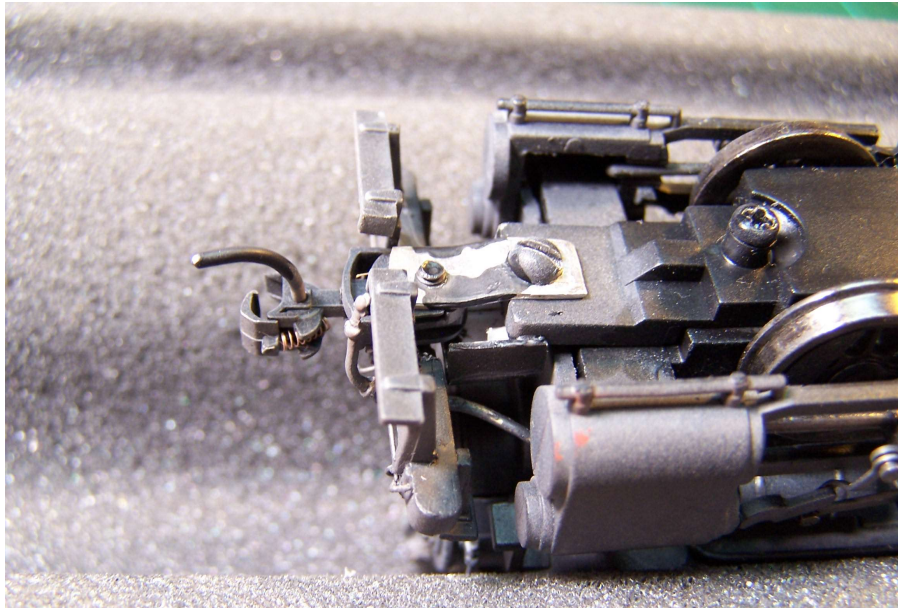
Decoder Installed in Tender



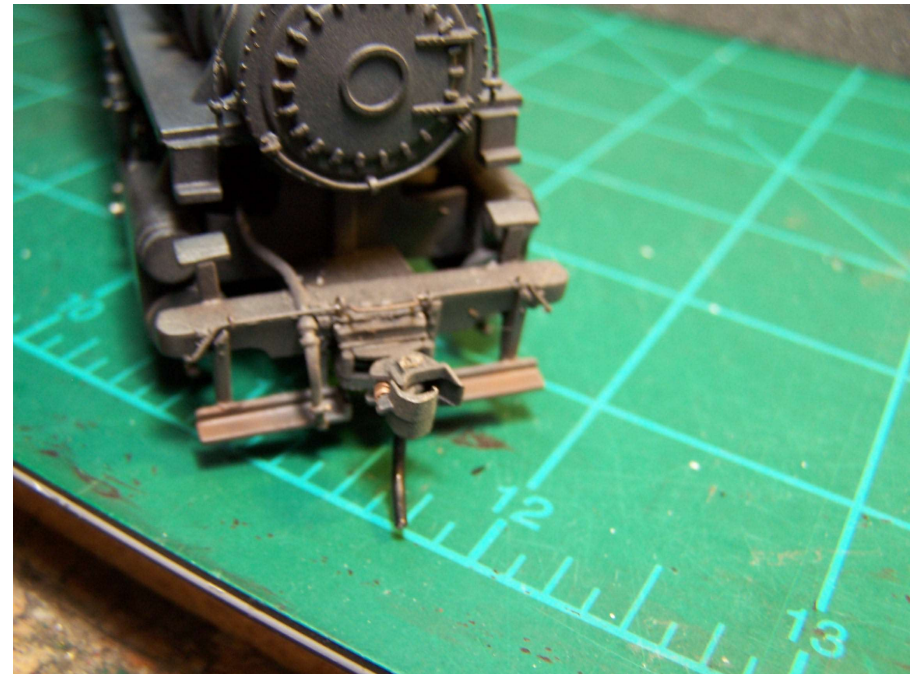
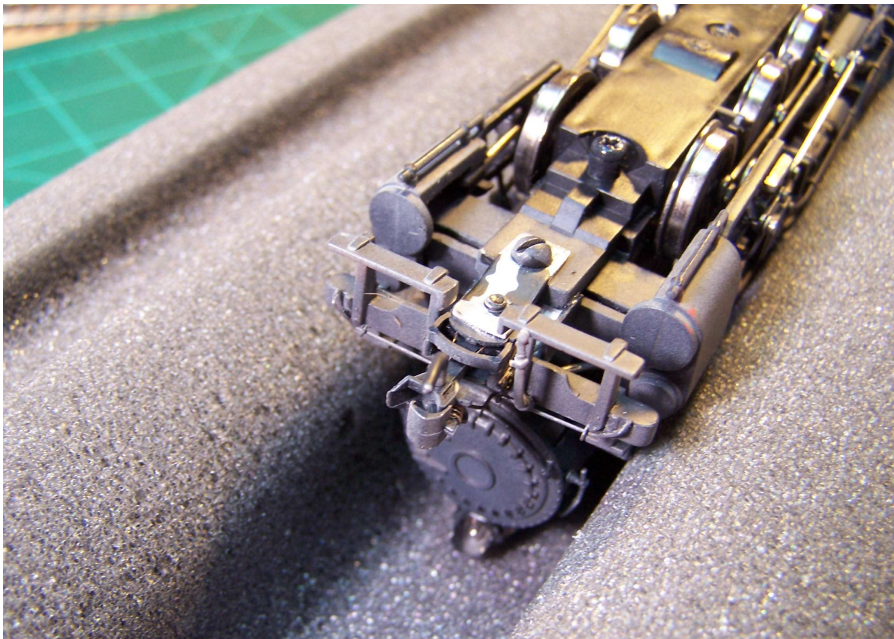
- Female connectors wired to track leads (Non-standard wire color – I was out of red and black)
- Male connectors wired to truck leads
- Notches cut in tender front for wires from locomotive – 3 wires per side.
- Wires taped to side of motor with Kapton tape
- Wires bundled together with thread and painted black to resemble hoses.



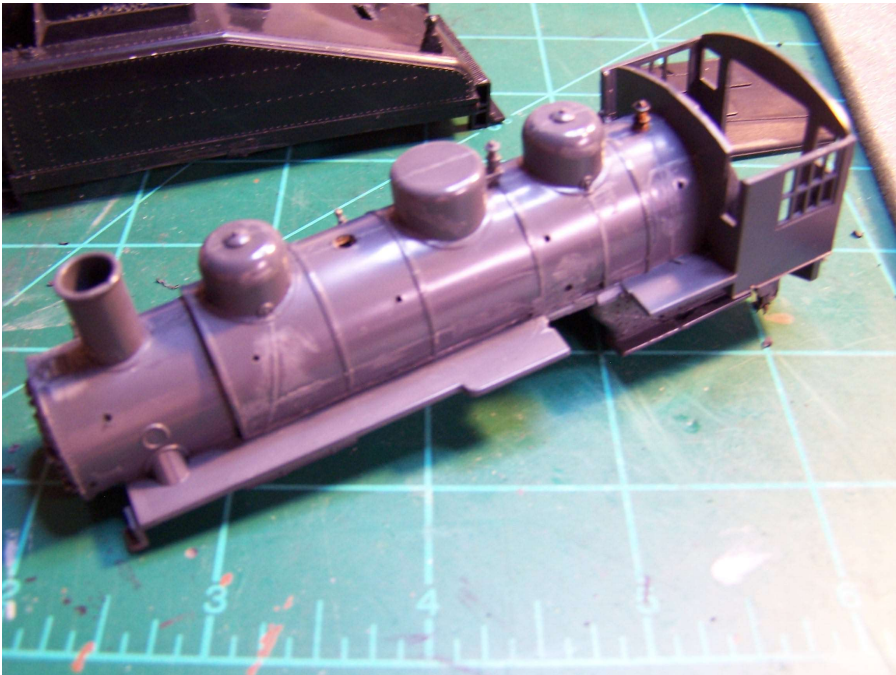
Front Pilot and Coupler



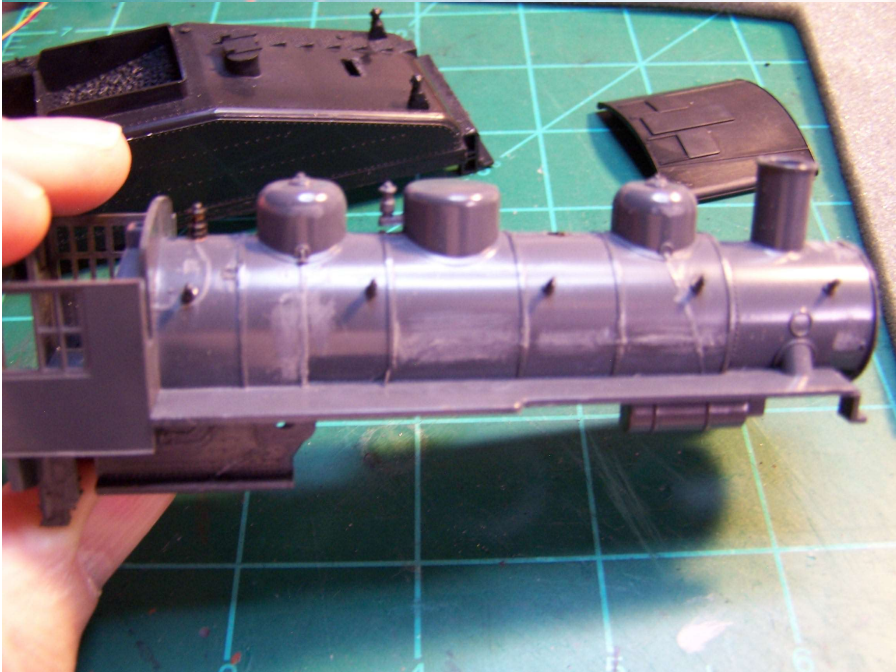
- Frame cut off at cylinders
- Pilot removed from frame, dummy coupler removed
- Frame extension made from .020" aluminum sheet, secured to frame with 2-56 screw, bent similar to original frame.
- Kadee #30 series with underset shank installed, secured with 2-56 screw
- Pilot glued to new frame with Pliobond
- Styrene channel covers aluminum piece
- In detail phase, air hose and uncoupler lever added



On to the Detail Parts



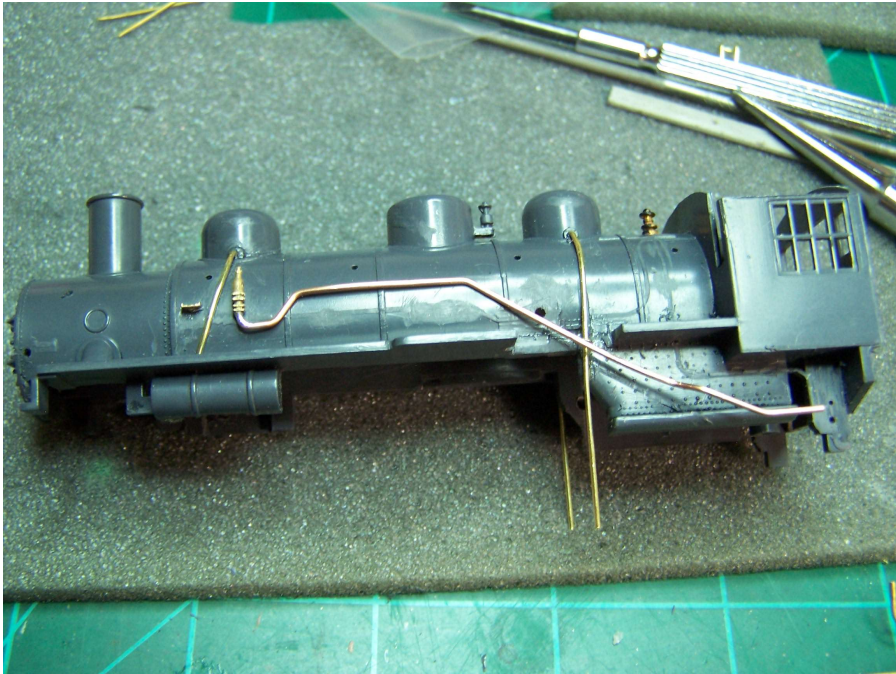
- Strip paint with 91% Iso. alcohol
- Remove handrails and tender backup light and set aside
- Cut off plastic handrail from tender (if it has not broken already!)
- Remove cab roof
- Remove whistle, generator, bell, headlight,
- Shave off piping detail with #17 blade and sanding sticks
- Remove compressor and power reverse with Dremel cutoff wheel, pliers, cutters, razor saw, and whatever else is needed.
- Fill hole where bell was with styrene piece
- Fill any gouges with modeling putty and sand



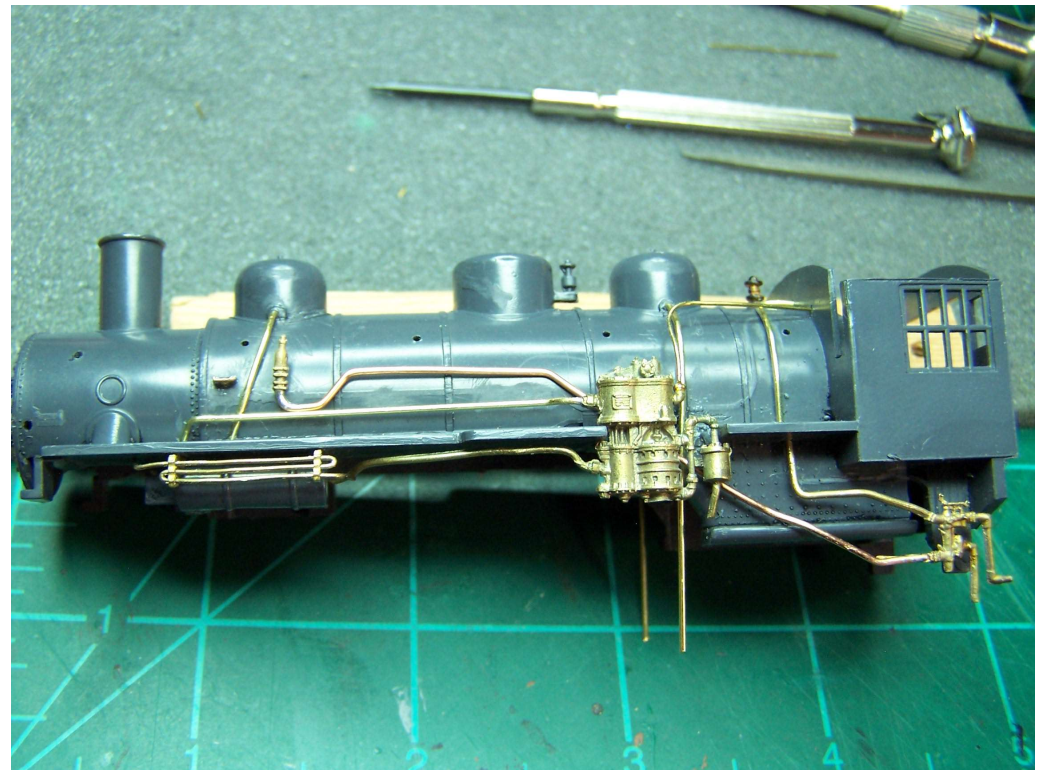
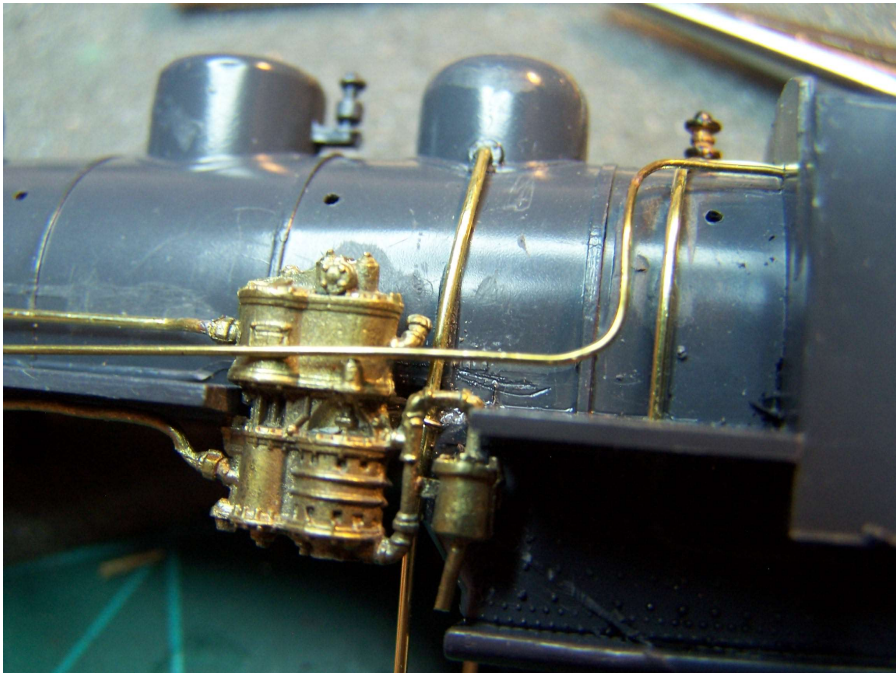
Heat Treatment of Brass Castings

- Cast brass parts can be brittle
- The pipes that are part of the casting can break if bent too much
- Directions in Bowser kits said heat treating will soften the metal so it can be bent
- Heat to it starts to show some red, then drop in water to quench
 - A few degrees beyond that point can melt the brass
- Use a torch if you have one, but a 1200 watt heat gun will also work for these small parts, sufficient for this project.
- Many of the pipes cast into the part are too short and will be cut off anyway.

Build Boiler Detail Assemblies

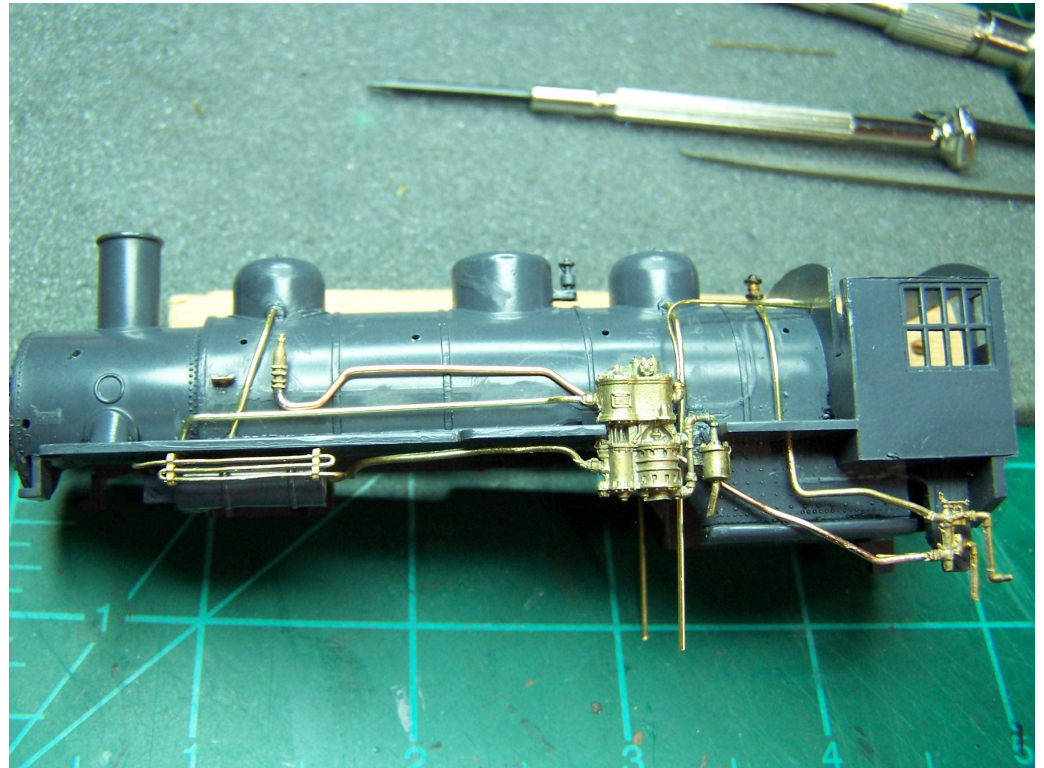
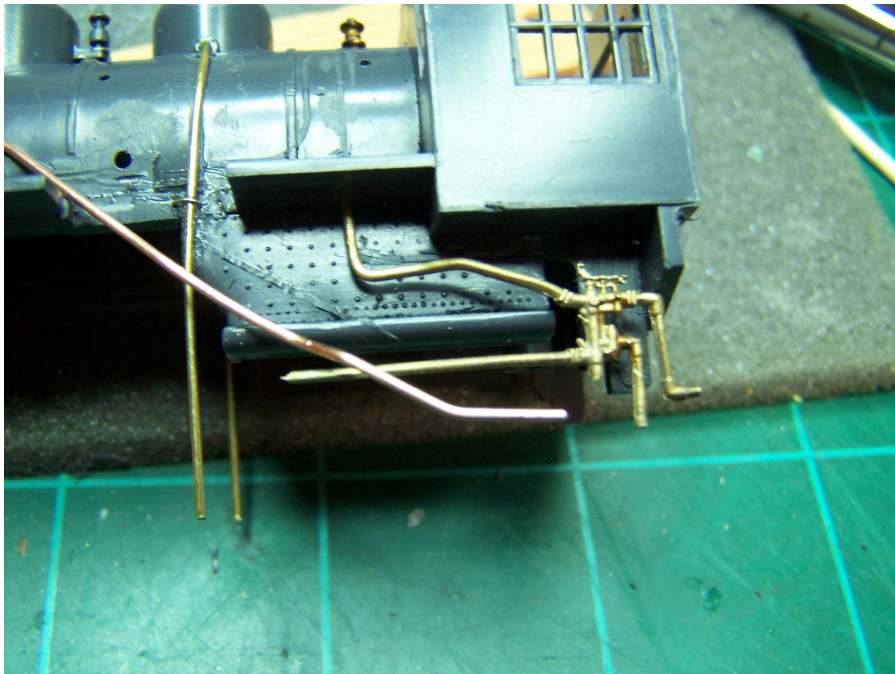
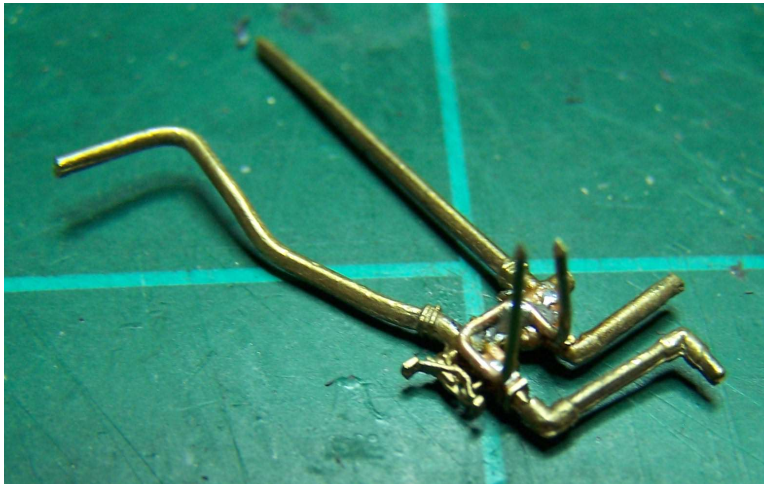


- Lots of trial and error
- Sander pipes first, bent from .028 brass wire, holes drilled with pin vise.
- Left side check valve was next, cutting off cast on short piping, drill hole and soldering 20 ga. copper wire
 - Strip insulation from wire, clamp one end in bench vise, other end in vise grip pliers and pull to straighten
- Air pump required cutting off cast on pipes, drill small holes, solder new brass wire to pump.



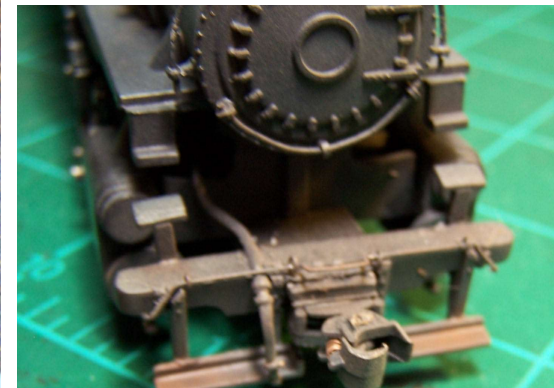
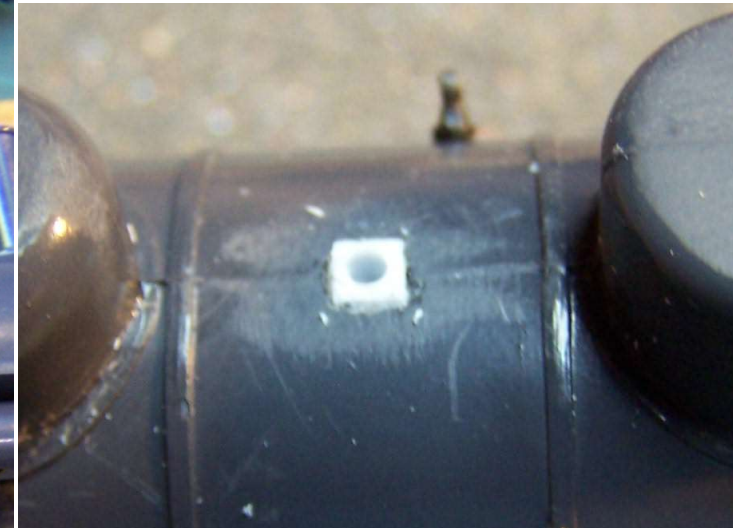
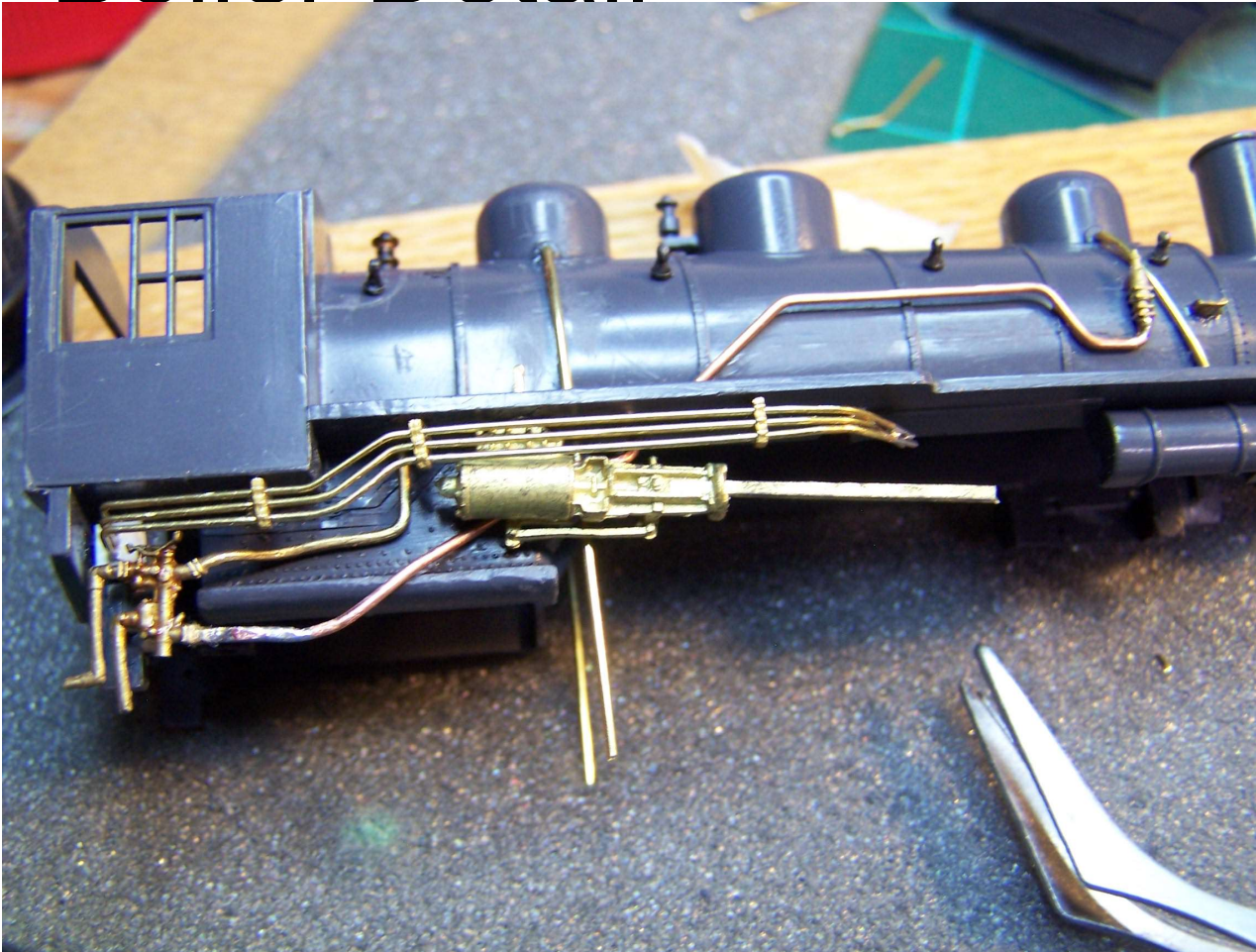
Boiler Detail - Injectors

- Brass wire (.020") soldered to back of injector to make mounting pins
- Upper steam inlet pipe bent and cut to fit into hole drilled in running board
- Discharge (lower) pipe and copper wire cut and filed to form a lap joint with copper wire and soldered.
 - note small wire retainer on sand pipe
- Steam inlet pipe above running board will be made of .028" brass wire – bend, cut, and fit into holes
- Air pump condensing pipes from .020" wire run through piping bracket castings.
- Note boiler step casting added both sides



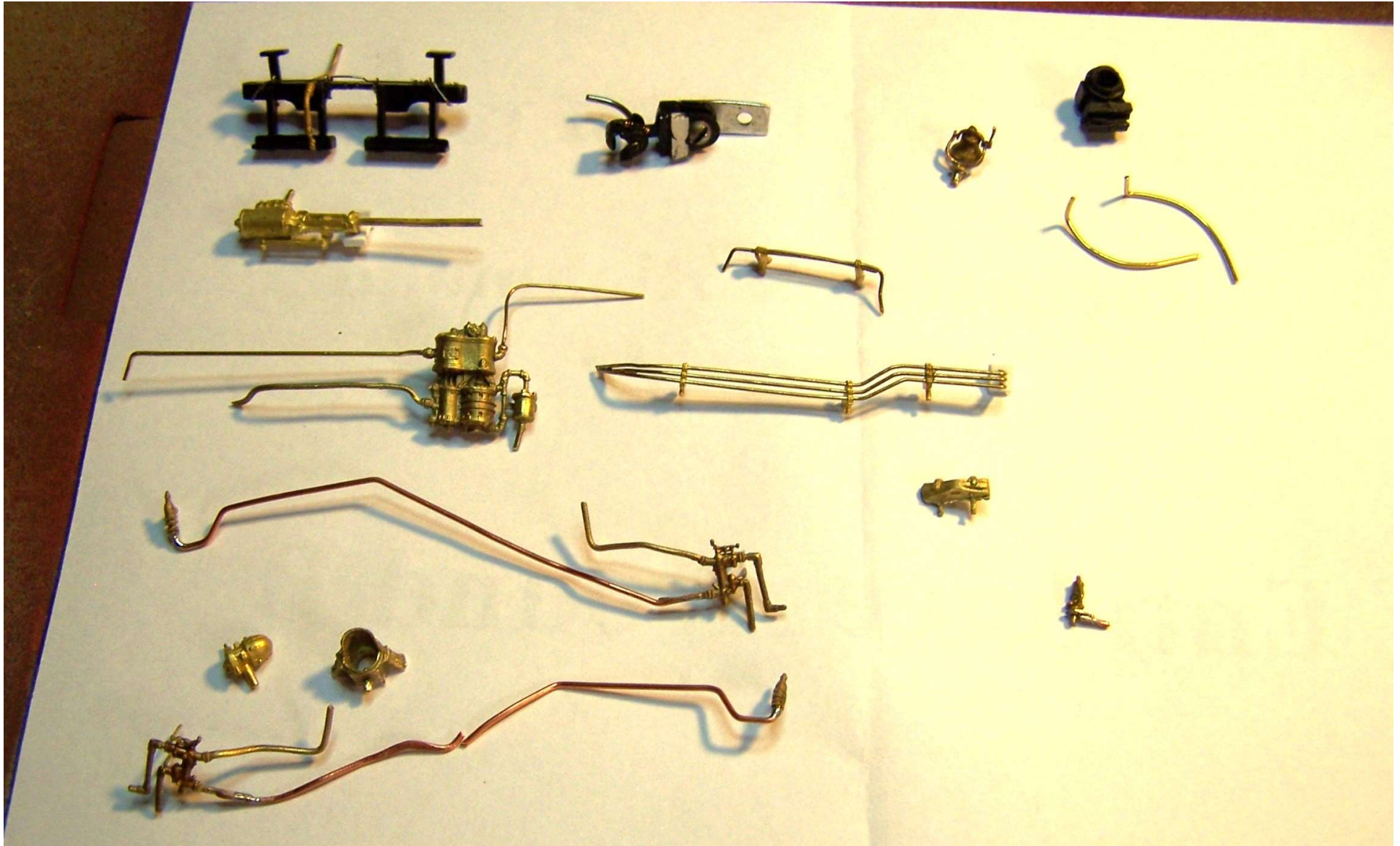
Boiler Detail

- Left side done, now do the right side
 - Actually, take a break first for maybe... two weeks



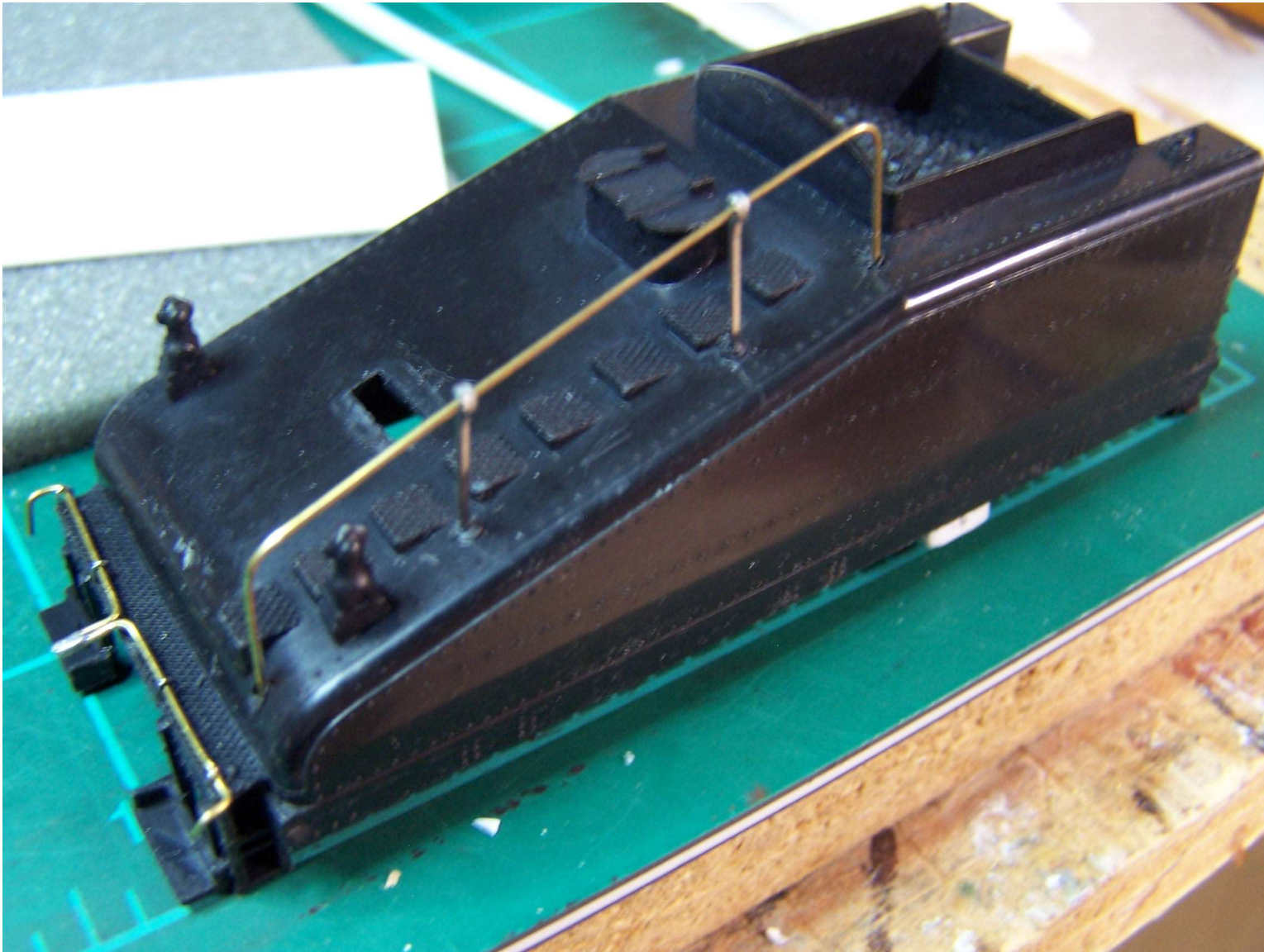
- Power reverse required a socket in underside of running board. Actuator sticks up thru running bd. A piece of .010" steel wire will run from it into cab.
- Injector discharge pipe on this side is two pieces fit into holes in running board
- Air plumbing from 3 pieces of .020" wire in triple pipe hangers. Rt end soldered to keep shape.
- Hangers fit into holes drilled in running board
- A small piece of styrene was drilled to accept the 3 wires and attached with CA, then glued to locomotive.
- Air tanks not replaced as these carry the clips that hold front of boiler to frame
- A piece of styrene was whittled down to fit in hole where original bell was installed
- Boiler front handrail - .020" wire and stanchions

His Bucket of Parts



- Generator and whistle installed in locations of original plastic pieces
- Headlight and backup light installation done as part of final assembly
- Not shown: Rear cab handrails formed from .013" steel

On to the Tender

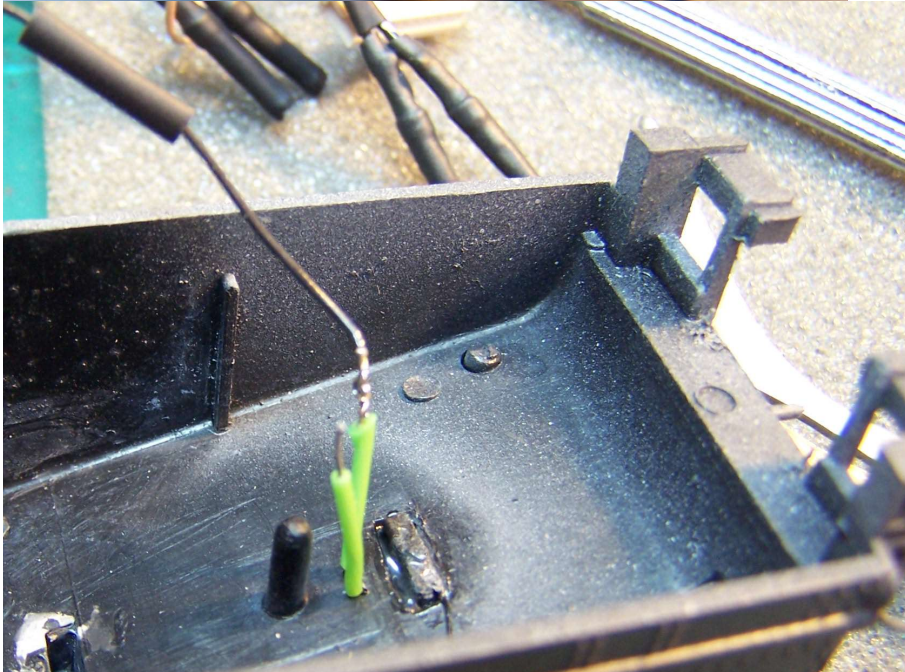


- New handrail and uncoupling lever of .020" wire in wire stanchions
- Styrene bracket glued under sill for re-railing frog
- Rectangular hole is from backup light which was drilled out for a bulb and re-used
- Push pole fabricated and installed after locomotive assembled

Lights

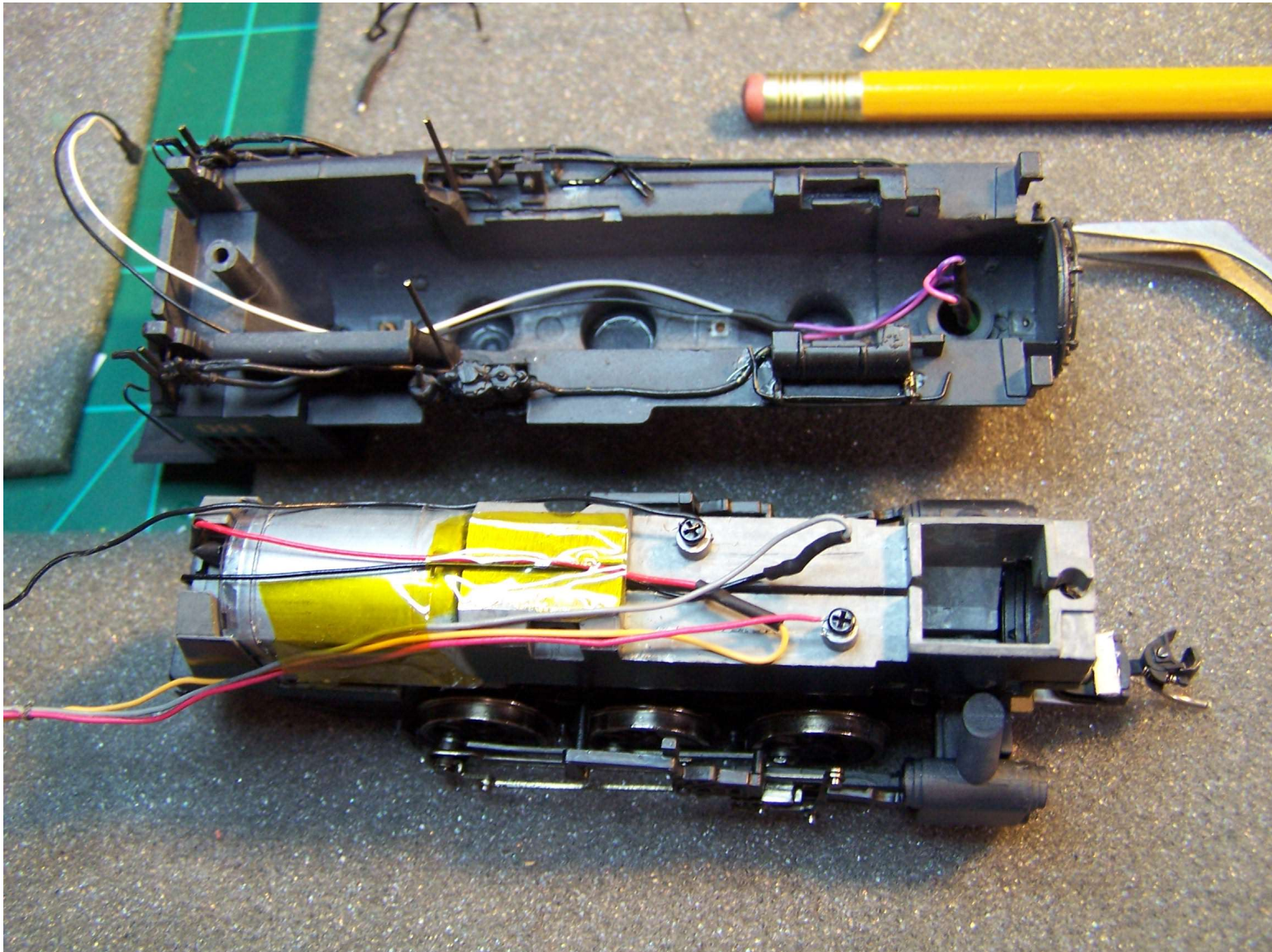


- Light fixtures were drilled out to accept 3mm T-1 bulb with wire leads
- Styrene .010" thick drilled for wire leads, glued to back of light fixture and trimmed to shape.
- Light bulb inserted into fixture with wires protruding out the back.
- Headlight wires run into holes drilled in base of stack, wired to small 2-conductor plug.
- Backup light wires bent down to run down back of light fixture into tender, wired to 2-conductor plug.
- Light fixtures brush painted separately before installation



Putting it Together

- Locomotive and detail parts were primed and painted before assembly, then painted again after assembly.
- Detail parts and assemblies attached with primarily CA, sometimes Pliobond

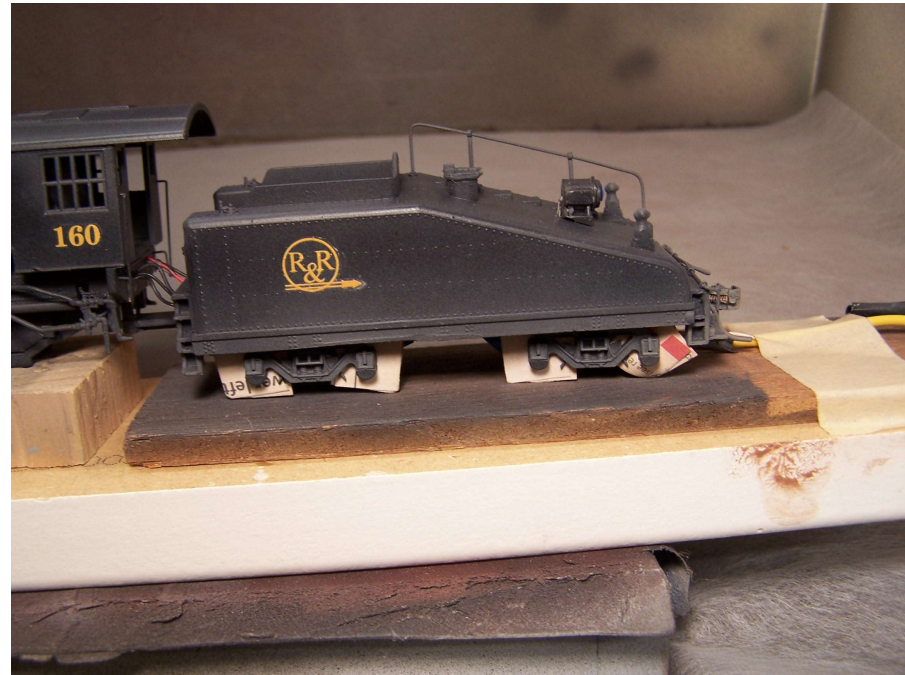


What my Workbench Looked Like at This Point



Putting it Together

- Pushpole on tender fabricated from a toothpick, .005" sheet brass, and straight pins
- Holes drilled in tender body to accept pin, brackets fit behind tender body.



Once Again the Final Product



List of Purchased Detail

All parts manufactured by Cal-Scale unless noted

- Steam Loco Air Compressor (Brass Casting) -- Cross Compound Standard Strainer w/Pipes
- Steam Engine Bell w/Bracket (Brass Casting) -- Standard Rope Pull Type
- Check Valves – Vertical
- Steam Loco Injectors (Brass Casting) -- Sellers Type S - Nonlifting
- Steam Loco Power Reverse (Brass Casting) -- Ragonnett B-1 Rear Lever
- Steam Loco Electrical Generators (Brass Castings) -- Turbo Style
- Steam Loco Headlight (Brass Castings) -- Standard w/Wing Style Numberboards
- Straight Whistle
- Steam Loco Piping Brackets (Brass Castings - Cored for .020" Wire) -- Three-Hole Style pkg(6)
- Steam Loco Piping Brackets (Brass Castings - Cored for .020" Wire) -- Two-Hole Style
- Rerail Frog -- Side Mount pkg(2)
- Formed-Metal Handrail Stanchions -- Long 7/8" 2.2cm pkg(35) (A-line product)
- Coupler Lift Bar pkg(2) -- 8 Eyelets & .012" Wire (A-Line product)