Arizona Copper Co. (Coronado RR) Engine #2

The last Porter steam locomotive – an 0-4-0T, of course.

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HISTORY:

The H. K. Porter company, founded in Pittsburgh in 1866, manufactured light-duty industrial and contractor railway locomotives, eventually becoming the largest producer of industrial locomotives in the U.S.A. and shipping them all over the world. Porter built mostly steam locomotives, but they also built some powered by gasoline and diesel engines, and some that ran on compressed air. Many these were small enough to be operated by only one person. (See http://en.wikipedia.org/wiki/H._K._Porter,_Inc for a more complete history of H. K. Porter, Inc. and an overview of their products.) The very first Porter was an 0-4-0T, and the four-driver saddle-tanker - quality-built in large numbers for hundreds of contractors and industrial customers - made the Porter reputation.

GENERAL – READ FIRST:

- This is a craftsman kit consisting primarily of "lost wax" brass castings. These are produced by casting a wax duplicate of the original patterns in a rubber mold, "investing" this wax part in plaster, then casting the final part in molten brass. The process of removing the wax from the first rubber mold and investing it in the plaster can lead to slight bending of thin parts, or loss of some very thin edges. Since most of the kit involves multiple parts on sprus, an entire spru will NOT be rejected for small flaws. It is assumed the modeler will have the skill to fill these small flaws. There are also anomalies that may be credited to the technical design process called “screw up.” These provide you, the modeler, with the opportunity of investing some “sweat equity” in the finished product by filing away some brass to correct these anomalies.
- You can use side cutters to remove small parts from small feeders on a spru or tree, but a jeweler's saw is best for parts which have two or more feeders to the casting (to avoid distorting the casting) or for large sections of a spru. Use a 6" Mill Bastard file to clean up the casting and remove any last traces of the brass feeders or tree. I SUGGEST YOU NOT USE A MOTOR TOOL FOR THIS AS YOU MAY END UP DAMAGING THE PARTS.
- This is a “bare-bones” kit consisting of brass and plastic castings, brass pins, wire, and stainless steel etchings; the modeler must supply the remaining required parts as enumerated in these instructions, including the power unit, couplers, glazing and headlight lens material, decals, and SMLED lighting components.
- There are a few holes the modeler must drill and some requiring tapping for 00-90 screws. Work slowly using a pin vice or other hand-held manual drill, or a precision drill press. I suggest you NOT use a Dremel or other hand-held power tool - you will only break drill bits, and these are very hard to remove if broken off in the hole.
- The castings are designed for assembly using screws, solder or glue, as described in the step-by-step instructions. (Soldering is not necessary, but produces a stronger model.)
- Additional parts and materials required to complete this kit:
  - Searails PowerMAX 6.5mm gauge motor truck: http://searails.com/powermaxproducts/powermax.html
  - Searails PowerMAX 6.5mm gauge pre-drilled and pre-quartered drivers: http://www.searails.com/powermaxproducts/wheelsets.html
  - Micro Trains Line couplers: MTL-002 02 021 (905) for knuckle couplers; 001 02 060 for link-and-pin couplers.
  - N’gineering “nano” SMLED lamps: N-2038-2 “Incandescent”: http://ngineering.com/lightng.htm (if you decide to install operating lights)
  - N’gineering 3K surface mount resistor NA3011: http://ngineering.com/accessories.htm (if you decide to install operating lights)
- Before you start construction, make the following decisions & selections:
  - DC or DCC (for DCC, a Lenz Silver Mini decoder is recommended)
  - Lights (see above for recommended parts)
  - Shotgun or diamond stack

SUGGESTED TOOLS & MATERIALS:

- ☐ #75, #76 and #80 drills
- ☐ flat file - Nicholson 6" Mill Bastard
- ☐ small files - Micro Mark #83180
- ☐ set of reamers (broaches) - Micro Mark #26108
- ☐ small screw driver
- ☐ ball-ended pin-vise (for drilling and tapping holes) - Micro Mark #80743 or Model Expo #HAN734
- ☐ tweezers
- ☐ Micro Trains Line Nn3/Z Coupler Height Gauge
- ☐ soldering iron (15-25w)
- ☐ finger-nail clippers or Xuron flush rail cutters
- ☐ countersink
- ☐ modeling knife and Xacto #11 blades
- ☐ paint brushes and airbrush
- ☐ Floquil Weathered Black, apple green paint/ Diosol thinner, Rust-All, and Hobby Black or Blacken-It
- ☐ glue - CA for brass, watch crystal glue for glazing
- ☐ Decals - Republic Locomotive Works

OPTIONAL:

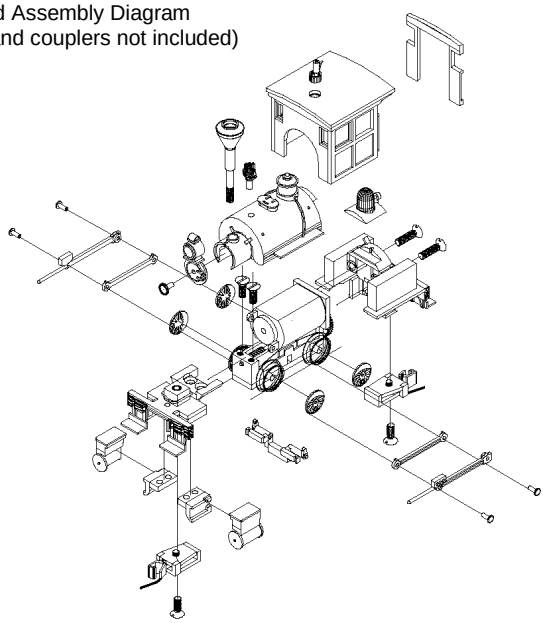
- ☐ LaBelle engineer
- ☐ miscellaneous details: re-rail frog, screw jacks, saws and peevies, shovels, chain, etc. – Republic Locomotive Works

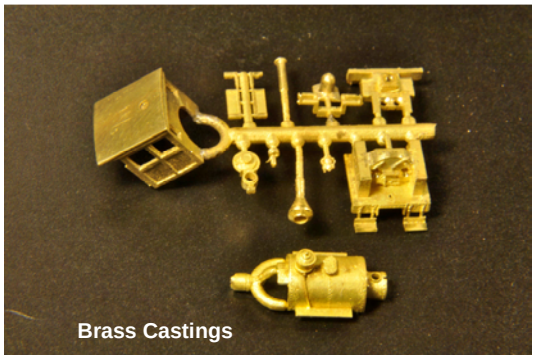
WARNING: Pursuant to California Health and Safety Code section 25249.6, the manufacturer and distributor of this product warns you that this product may contain substances known by the state of California to cause cancer, birth defects and/or reproductive toxicity.

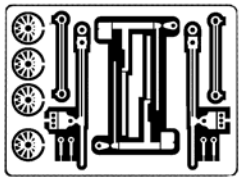
PARTS PREPARATION:

1. Cut parts from brass spru with care, using side cutters or a jeweler's saw.
2. File mating surfaces smooth.
3. Test fit parts; file the parts as required to allow the sides to fit properly
4. If required for proper fit to motor, remove material from inside boiler casting using a motor tool.
5. Examine castings and straighten where necessary
6. Recommended: blacken brass castings in Blacken-It or Hobby-Black; soak castings in clear water after blackening to remove any chemical

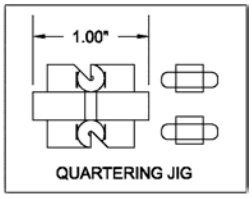
Exploded Assembly Diagram
(PowerMAX and couplers not included)





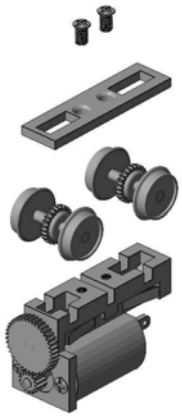


Etch Fret



Quartering Jig

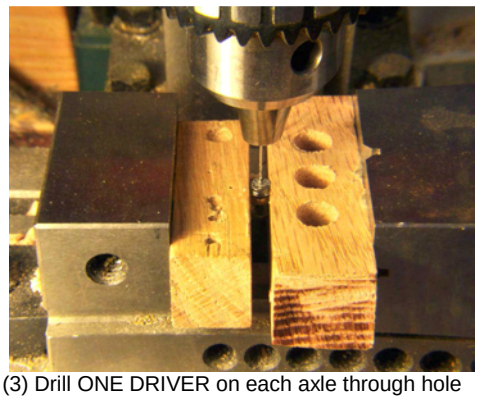
Also included: crank pins, screws, brass wire



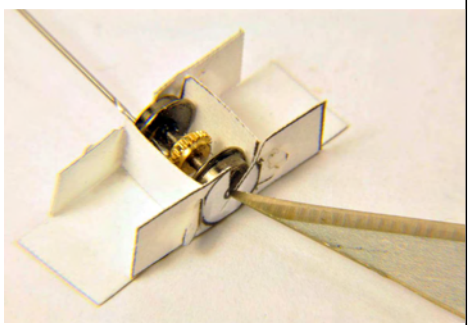
(1) Place PowerMAX chassis upside down in vice and remove bottom cover-pate and driver sets. (Suggest you replace cover plate to avoid losing the plate or screws.)

NOTE: DISASSEMBLY OF THE POWERMAX MAY VOID THE MFGR. WARRANTY

(2) Cut driver center from etch, , file away tab, ream the crank-pin hole to clear a #75 drill, then glue in recess in drivers; if you did NOT purchase the pre-drilled, pre-quartered driver sets from PowerMAX, ONLY GLUE CENTER IN ONE WHEEL PER AXLE and follow instructions (3), (4) and (5)

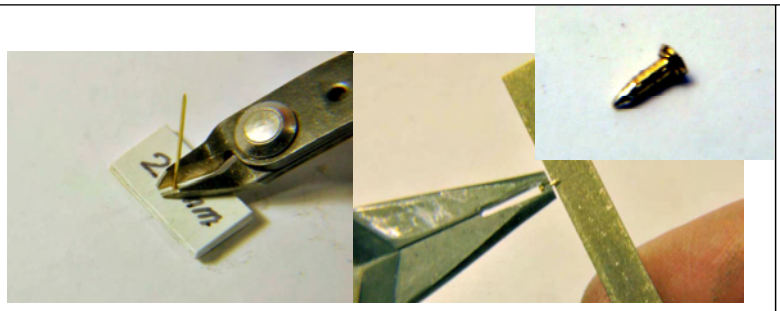


(3) Drill ONE DRIVER on each axle through hole in etched center with No. 76 (.5mm) drill. This can be done with pin vice, working slowly, or precision drill press as above; note the wheels are held between wood blocks.

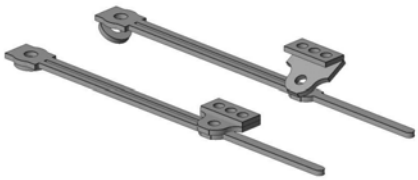


(4) Assemble included quartering jig; insert a No. 76 drill in drilled hole, place the axle in the quartering jig, and scribe the opposite driver for the crank pin center line; glue etched driver center in place aligning holes then drill crank pin hole as above.

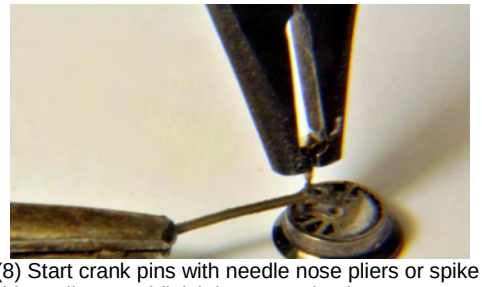
(5) File burrs off back of drivers after drilling crank holes.
Suggest painting driver centers at this point and allowing to thoroughly dry (24 hours minimum.)



(6) Cranks pins are to be made from brass “silk” pins trimmed to length through a .080” jig, then files to create a tapered end.(CNC-machined crank pins are available from Searails.)

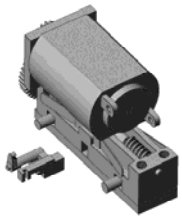


(7) Cut rods from etch fret. Carefully fold main rods and crosshead as shown above, and bond with CA adhesive. Trim 1mm from end of piston rod and file smooth and rounded. Coat back of crosshead with CA to prevent shorts. Ream crank pin holes if required.

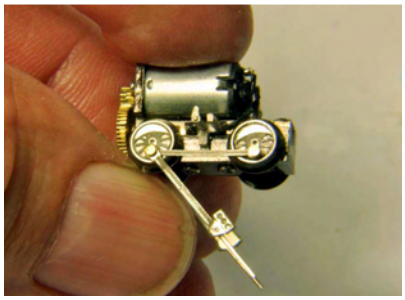


(8) Start crank pins with needle nose pliers or spike driver pliers, and finish by squeezing between smooth-jawed pliers taking care not to compress too tightly. Suggest attaching both side rods to front axle first.

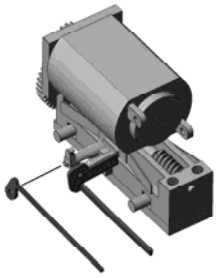
(9) Partially assembled driver set on left, and completed assembly on right; note rods have been painted with Humbrol “Polished Steel” (Model Masters has similar color.)



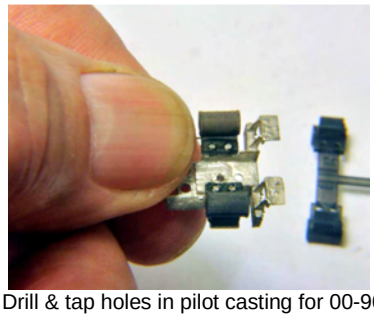
(10) Fit support for crosshead guide and valve linkage into slot in PowerMAX chassis; this is easiest if you cut it in half and press in from each side; file if necessary to achieve snug fit. Lock in place with SMALL drop of CA.



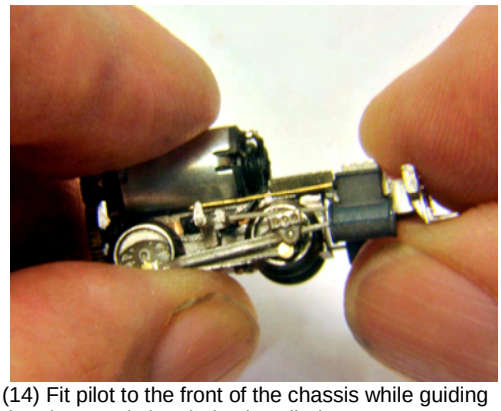
(11) Install the driver assembly in the chassis; take care not to displace the wheel wipers.



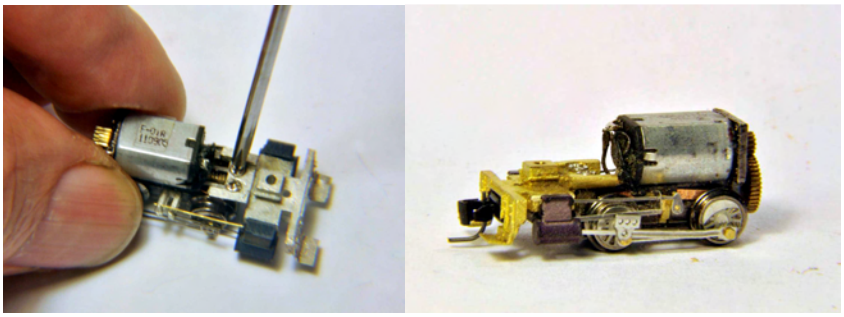
(12) Remove parts from etch fret, fold and install the crosshead guide and valve rod, running rod through hole in crosshead guide support; ream hole if necessary. (Wheels omitted for clarity.) (Note: alternatively do this after front pilot installed.)



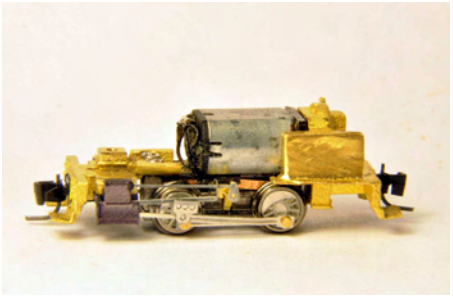
(13) Drill & tap holes in pilot casting for 00-90 screws for stack and coupler; clean out inside of piston rod cavity with needle; ream holes in plastic cylinder casting to fit the pins on the bottom of the pilot casting, then glue in place.



(14) Fit pilot to the front of the chassis while guiding the piston rods into holes in cylinders



(15) Attach pilot to chassis with the two screws supplied with the chassis; check visually to make sure aligned with chassis center line; attach coupler and check for height. Test to verify everything runs smoothly. If piston rod and main rod binds, remove pilot and trim a little more off piston rod.



(16) Once chassis runs smoothly, remove screws holding motor to PowerMAX chassis and attach rear casting (after drilling & tapping for coupler mounting screw) with 1/4 x 00-90 screws, then test assembly again. (Note: countersink holes for screw so heads are flush with back-head.) Make sure casting clears gears; grind away materials if necessary.

(17) Test fit boiler casting to top of motor; flat inside top of casting should fit tight to the top part of the motor. Grind lightly on inside of curved portions until fit is acceptable.

(18) Select straight or diamond stack, and chase the threads on the bottom of the stack with a 00-90 die or fine razor saw until you can run the threaded portion into the threaded hole on the front pilot without forcing it. (Avoid forcing it and breaking off the stack in the hole.)

(19) Test fit smokebox front/headlight casting to front of smokebox; file to fit if necessary, then glue or solder in place. Test fit boiler to chassis to assure the square top of the steam chest fits up inside the smokebox.

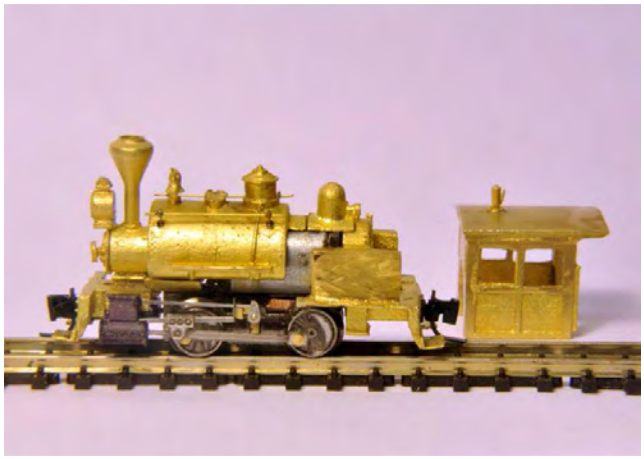
(20) If you are NOT installing DCC, with the boiler in place, glue the steam done to the top of the motor as shown in the photo.

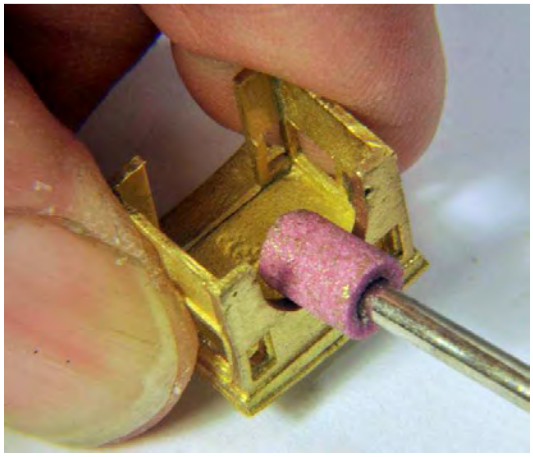
(21) If you are installing an operating headlight, proceed as follows:

- Solder two N-2038 SMLEDs together, anode to cathode, and solder on one pair of wires about 1.5" long.
- Run the wires through the headlight and down through the hole in the top lip of the smokebox.
- Solder one lead to one motor terminal (doesn't matter which) and the other to a 3K ohm resistor attached to the other motor terminal.
- Using 1/6" punch, punch out a disc of thin shim brass or thick aluminum foil and glue to the back of the headlight to close off hole.

(This will result in a headlight that stays on whether in forward or reverse.)

(22) Add bell, stanchions and handrails (cut from .012" brass wire).





(23) Test fit cab; the sides should sit level and tight to the lip of the cab floor. If not, grind away some of the front cab wall as shown above until the fit is satisfactory; cab should be a press-fit to the outside of the weights that are part of the rear pilot casting.

(24) The rear wall casting of the cab is too tall as cast; file about 1mm off the top, following the curve. Glue or solder in place in the back of the cab, then file the bottoms to flush with the sides. Glue whistle in place on roof.

FINISHING: It is suggested you remove the cab, rear pilot, and boiler assembly and airbrush these separate from the chassis; brush paint the front pilot and steam cylinders in place. Take care not to break the electrical wires to the lamps during this operation. OPTIONAL: Add engineer and fuel to cab as shown in photos on RLW Website.

For missing or replacement parts, contact
info@trknappmodelengineering.com

Do not return kit to Republic Locomotive Works;
return to T R Knapp Model Engineering