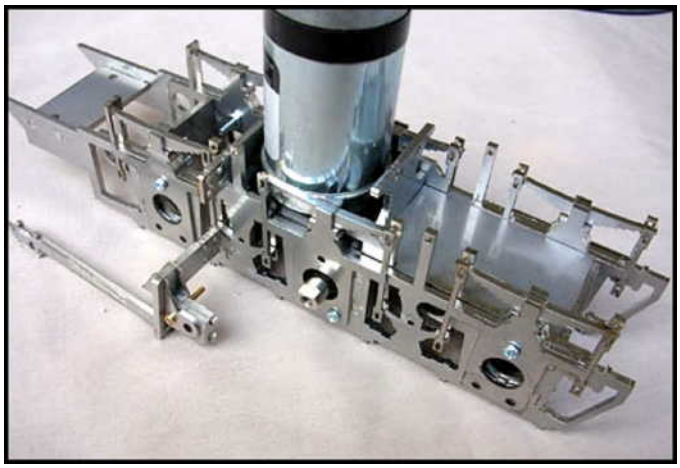


MLS MasterClass 2002

Build a 2-6-6T / 0-6-6T Mason Bogie
An Adventure in 1:20.3

By David Fletcher & Phil Jensen

Chapter 6 - A Laser Cut Steel Chassis

A commercial snap together chassis

Construction - Supplement

Choices, Choices, Choices!

After all the long wait for the BBT chassis to come out, the world kinda changed on us in many ways! One of the good things that has occurred in the mean time is, through the exercise of this scratch building class the development of a snap together Laser Cut Chassis has evolved.

The development of this alternate chassis was helped along the way a great deal by the introduction of the new Hartland Locomotive Works (HLW) modular gearbox and "mid-sized" drive wheels. These mid-size wheels make for a nice 36" driver in 1:20.3 scale, while the gearbox and motor can be slipped into just about any kind of chassis! The motor is a high quality unit too, toward the quality of the Pitman. We used these motors and gearboxes in the MLS CP Huntington Mini-class, and we can use the same stuff in our own Mason chassis. The options for a Hartland based chassis is as follows:

For the Laser Cut Stainless steel chassis, these are the parts to order from Hartland Trains:

Large modular motor and gearbox assembly with black mounting plate.

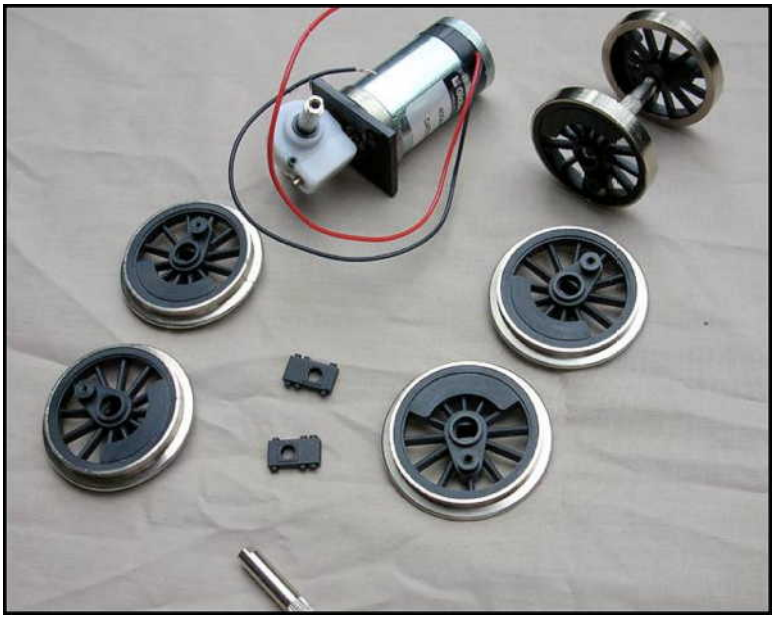
4 - flanged mid-size wheels.
2 - blind mid-sized wheels
4 - short crank pins.
2 - modular wiper assemblies (4 wipers in total in two pairs).

Please call our Hero and Friend, Phil Jensen at Hartland Trains for the parts listed above. Explain also that it is for the Laser Cut Mason Bogie Chassis as this will help him to help you.

Call Phil only on Tues or Thurs, 8am-1pm Central time: (402) 571 2933, or Fax (402) 573 -7274

We are also very thankful to Phil for allowing us to use these Hartland parts in our projects once again, and also indebted to him for the concept shown below and to the prototype chassis he built here. This article is really the work of Phil Jensen.

Here is a sampling of the parts:



Lets Build It!

Follow the PDF's for this frame and pilot truck concepts. Download this set here:

Download DIY chassis templates:
<<Laserchas-PDFs.zip>>

Overview: Custom Stainless Steel, Laser Cut Chassis Assembly

This is a short overview of the assembly of the snap together laser cut chassis that was developed as part of this class on an experimental basis. The experiment was highly successful, and therefore should interest be high to folks who have not organised a chassis for their Mason from BBT or any other source. So long as we have a minimum of 20 total orders, we can cut more of these detailed chassis.

The frame is snap together and comes complete with crosshead guides, reverse link cradles and side rods. The chassis is designed to work with the Hartland larger Modular gearbox, mid sized 36" wheels and Hartland wipers. Please contact Phil Jensen at Hartland parts to order the motor/gearbox, 4 flanged mid sized wheels and 2 blind mid sized wheels and 4 modular electrical wipers. Together with the laser cut valve set, this kit comprises a total Mason locomotive chassis. You will also require 6 bronze bearings for 1/4" axles.

Please note the following for assembly:

1. Hartland wheels required are the mid-sized wheel (used on their mogul, you will need 4 flanged and 2 blind sets, plus two plain axles. You will need to grind off 2mm from the rear hub of each wheel as shown in the pictures, or the wheels won't go onto the frame all the way (they'll be way out of gauge!). The 2mm removed from the back of the wheel makes up for the 2mm thick flange on the bronze bearings installed in the frame.
2. The Hartland motor block is a self-contained unit, which comes with a 3mm thick black base plate. You will need to grind out a notch in the forward edge of the base plate for it to clip into the chassis properly, as shown in the photos. There is a stainless steel bearing plate provided with this kit, for use by live steamers; this plate is used instead of the motor. However guys building electric Masons wont need this plate, but you can use it as a guide as to the shape of the notch to be cut out of the Hartland base plate.
3. The reverse link assembly shown in these pictures are the reverse links provided in the original Mason valve gear kit. PLEASE, PLEASE make sure when you grind the two grooves in each reverse link that you DONOT grove the both of them the same way. Choose which will be the RH and which will be the LH side... then groove them as a mirror image of each other. If you groove them both on the same side, you will end up with two that go on one side of the loco and none for the other side. They are to be mirrored when bending them. The grooves can be filed by hand, or as I did, use a cutting wheel in a Dremel. Cut the grooves to about 50%depth. Go slow, don't over do it, and don't cut the things off altogether! When bending the tabs on the reverse links to a 'U' shape, take care to not bend the reverse link face. You want that to remain flat. Support the face of the reverse link with bull nose pliers and bend the tab from there.
4. A notch needs to be cut into the flange of the bronze bearing, which corresponds with a tab in the frame journals. The notch prevents the bearing from spinning around and destroying itself as is so common on Bachmann locos (where the brass bearings are never anchored).

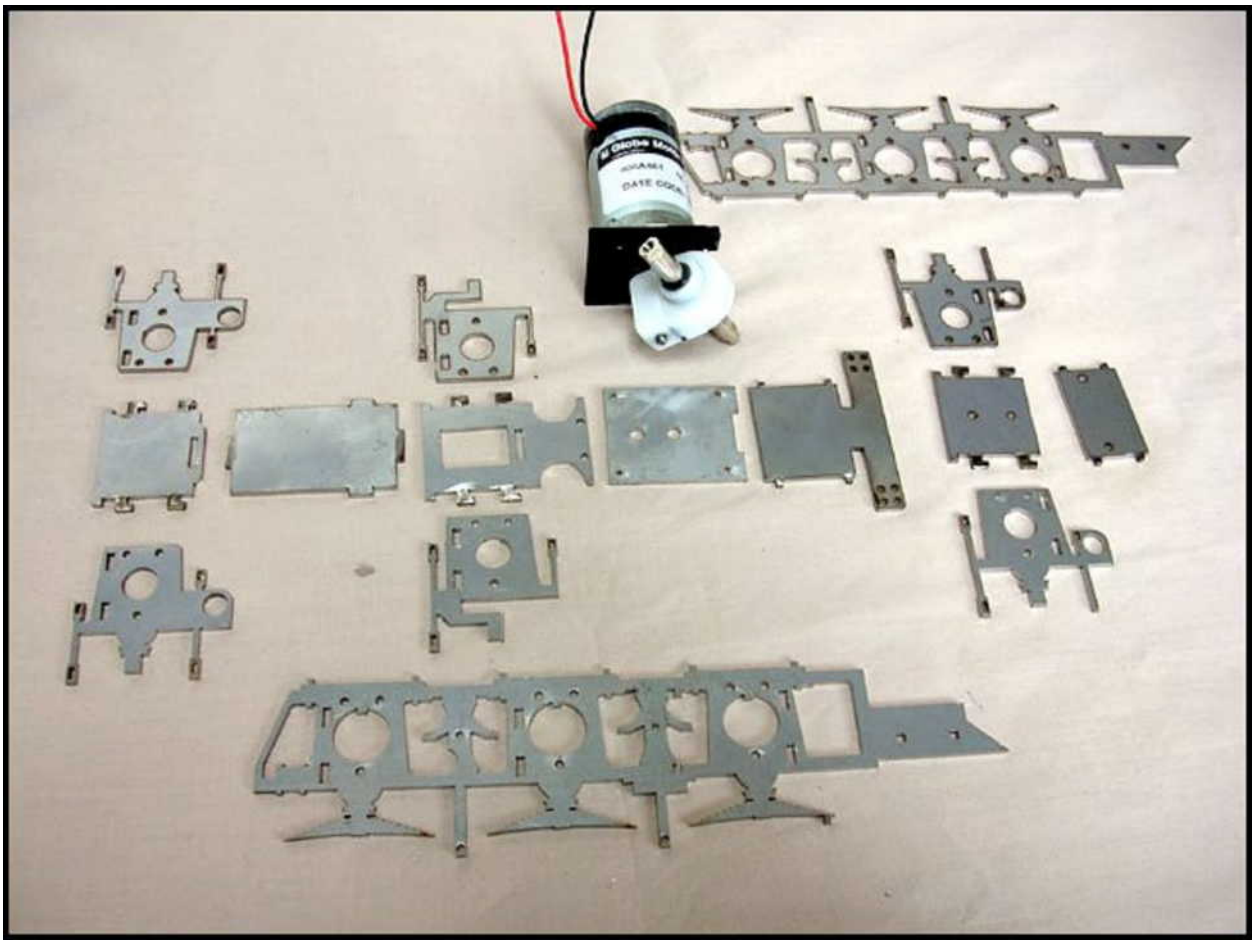
   Note that the body of the bearings are quite long... you will need to cut off a section of the bearing body for the middle axle only, otherwise the ends of the bearings will hit the gearbox and not slide into the frame in all the way.

   If using the Jim and Rich's Mason wheels, with the BBT plastic wheel centres, you will need to turn the bearings around such that the flange is facing to the inside of the frame, not the outside as shown in these pictures. You will also need to trim down the length of the bearing body. The problem is that the BBT plastic wheel centres project too far to the rear of the wheel, and we can't get the wheel onto the frame to the correct gauge if you have the bearing flange on the outside.

   For live steam, I would not recommend having BBT do anything to the wheels other than insert the crank pins. The plastic insulating centres he uses may not do well under the heat and oil of live steam (I don't know so maybe check this out). I would simply find a suitable axle and heat shrink the wheels onto these axles, with no plastic centres. You may want to investigate this further... I just don't know if the plastic centres is a good idea or not. Regardless, you may need to modify the bronze bearings to suit the wheel, axle size and installation to keep gauge, or indeed get someone to turn new bearings to the new axle size.

5. The crosshead guides and reverse link unit will bolt onto the special spacer in front of the motor, however it is not to be a direct bolt on. You will need to install 7.4mm of packing between the support yoke in the frame and the reverse link/guide unit outside the frame. The link/guide unit is mounted to the rear of the support. It is done this way because we cannot run the support yoke in the correct place, or it binds with where the motor is to go!! Thus we move the support yoke forward of the motor, and install packers either side to move the outer parts of the reverse link cradles/crosshead guides back to their correct position. The exact length of the packers is dependant on the positioning of the cylinder/pilot assembly from Chapter 2 of the class. The packers may require adjustment as you assemble the entire chassis with cylinders and valve gear.
6. Hartland makes the electrical contact/plunger sets as shown in the photos Buy two sets, and install as shown. You will need to use some Evergreen tubing around the ends of the wiper kits to insulate them from the frame.

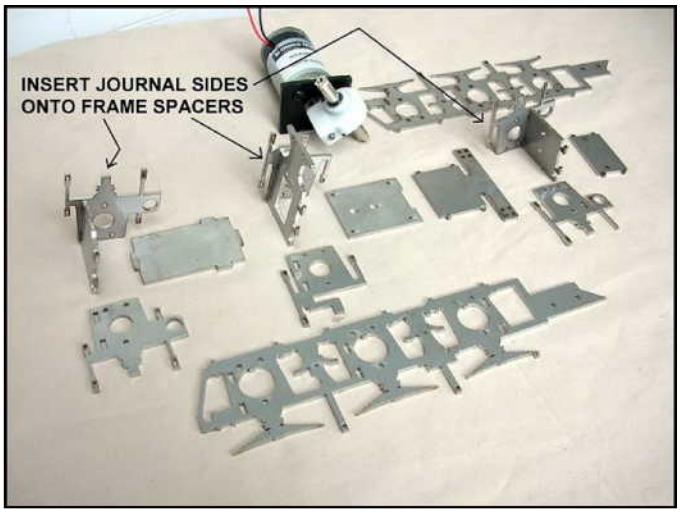
OK, lets go through it!

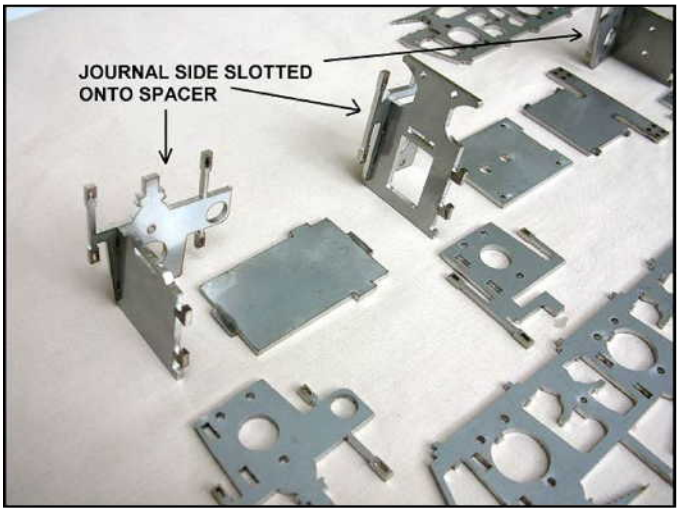


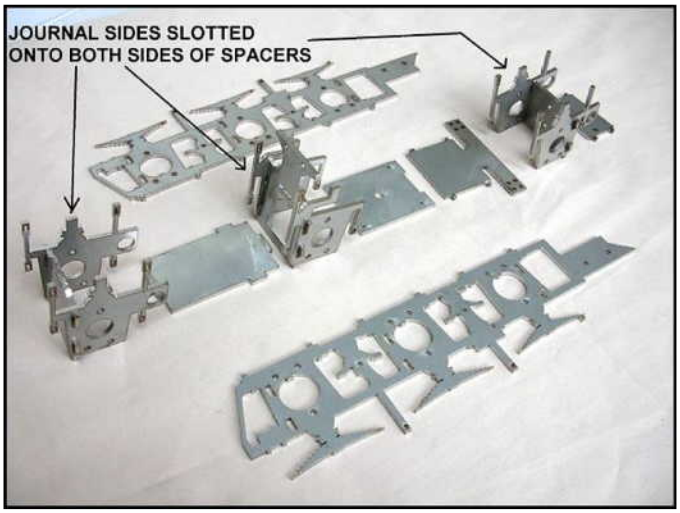
The laser cut parts laid out, including the Hartland motor/gearbox.

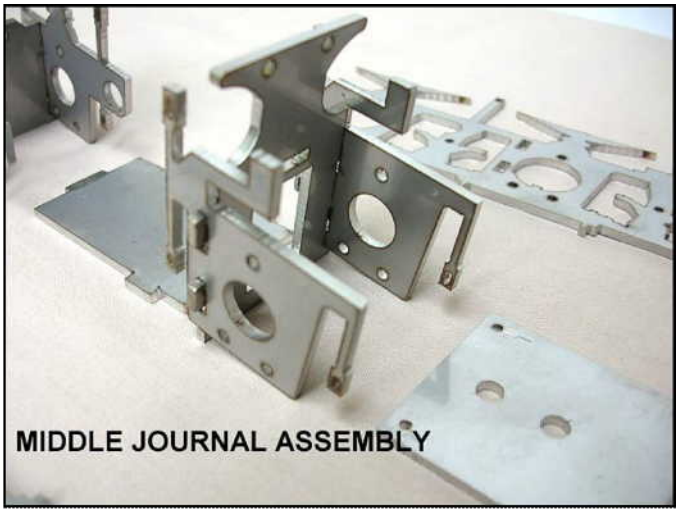
Step 1: Journal sides and frame spacers.

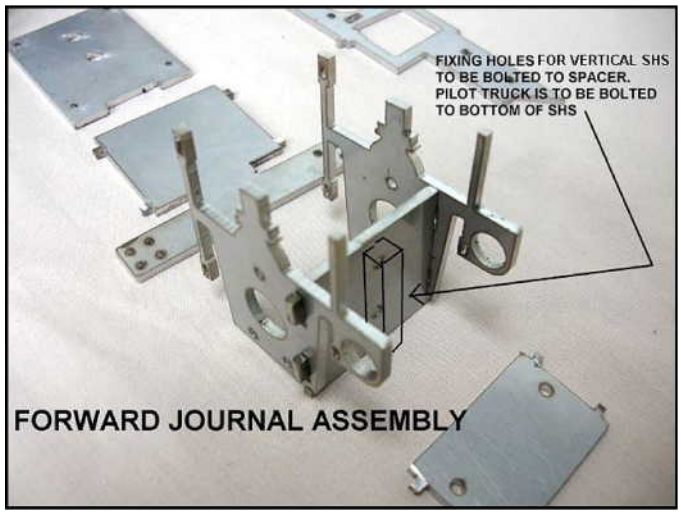
Slide inner journal plates onto three spacers.

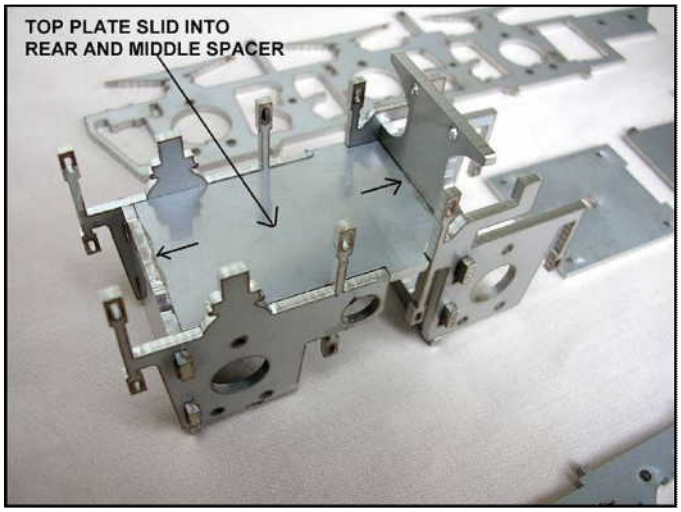


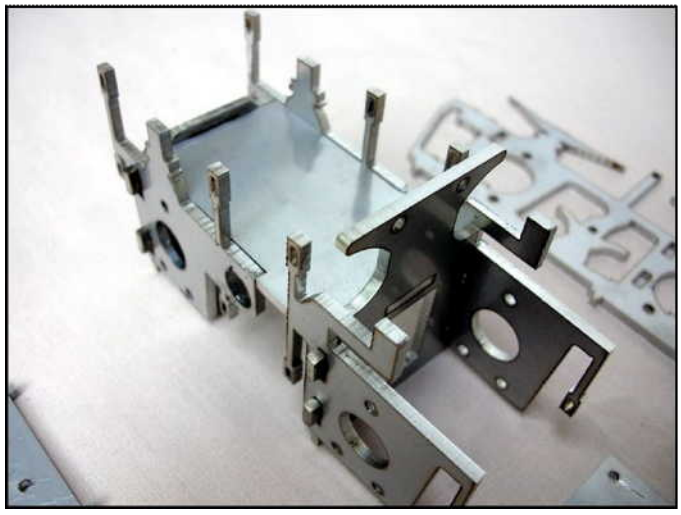


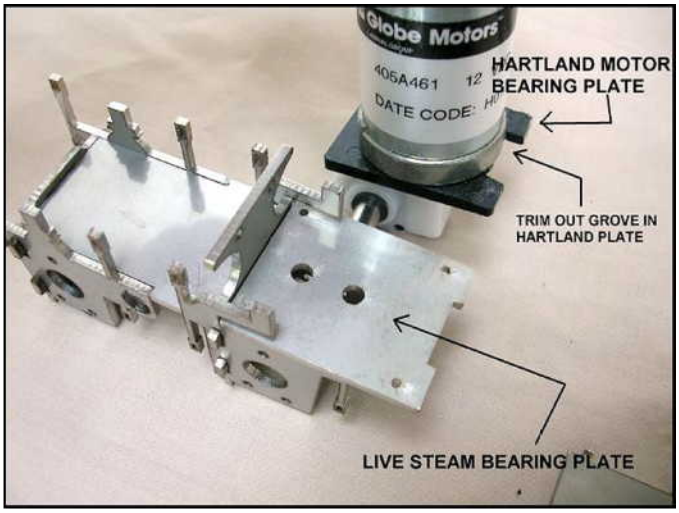


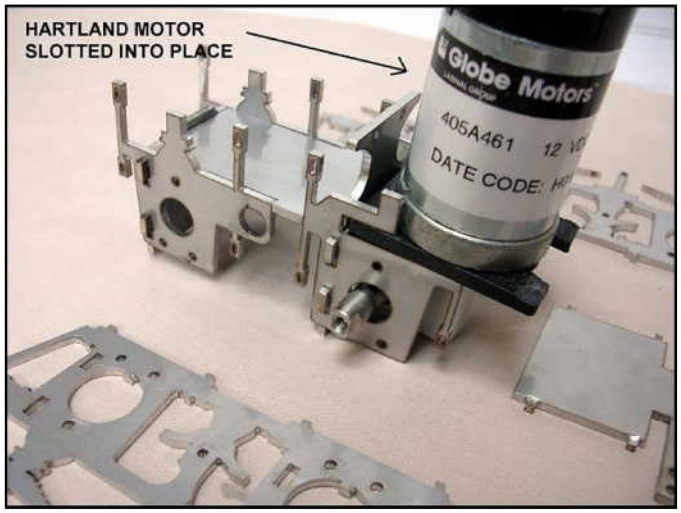

MIDDLE JOURNAL ASSEMBLY

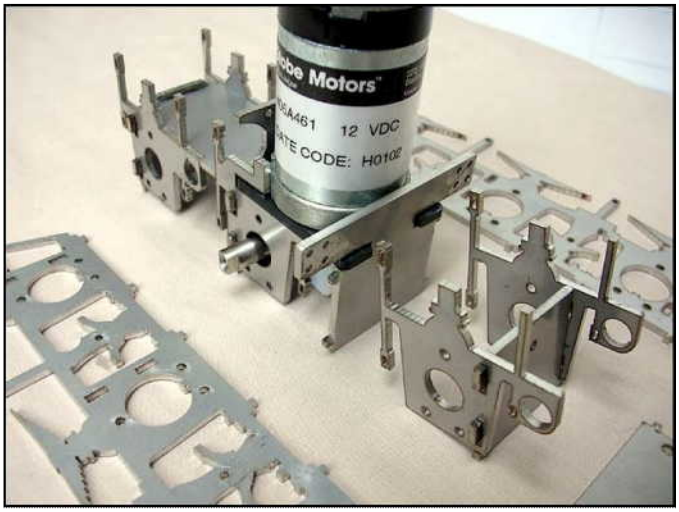

FIXING HOLES FOR VERTICAL SHS
TO BE BOLTED TO SPACER.
PILOT TRUCK IS TO BE BOLTED
TO BOTTOM OF SHS
FORWARD JOURNAL ASSEMBLY

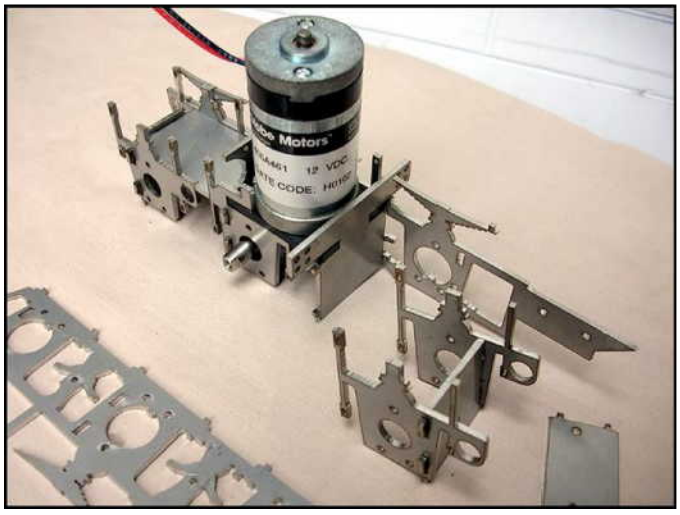

TOP PLATE SLID INTO
REAR AND MIDDLE SPACER

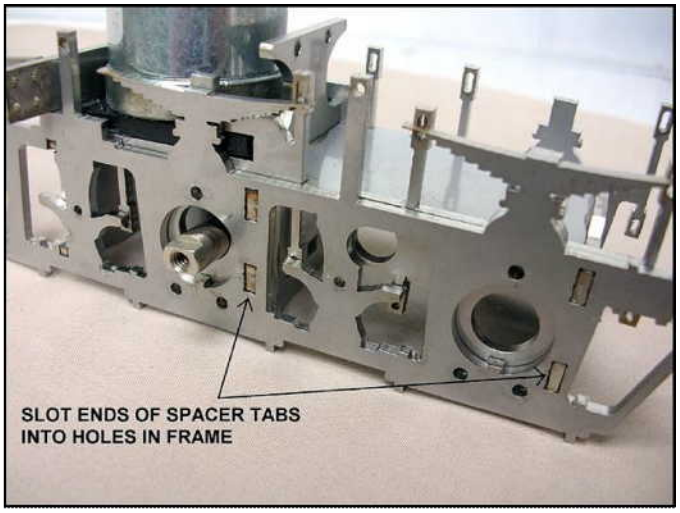


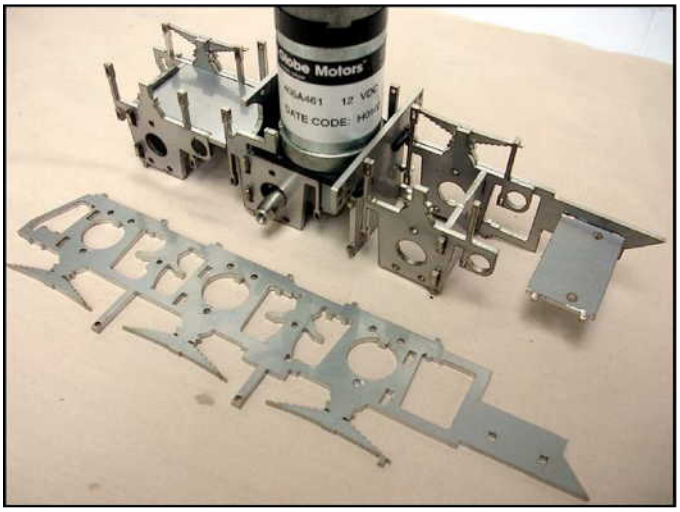

Globe Motors
405A461 12
DATE CODE:
HARTLAND MOTOR
BEARING PLATE
TRIM OUT GROVE IN
HARTLAND PLATE
LIVE STEAM BEARING PLATE

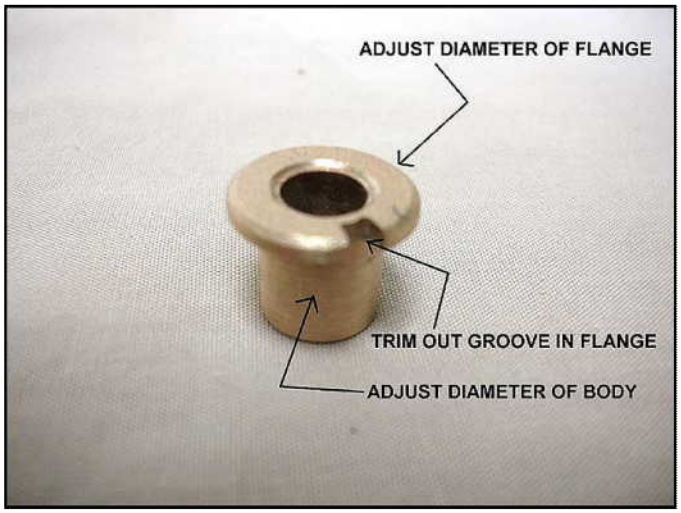

HARTLAND MOTOR
SLOTTED INTO PLACE
Globe Motors
405A461 12 VDC
DATE CODE:

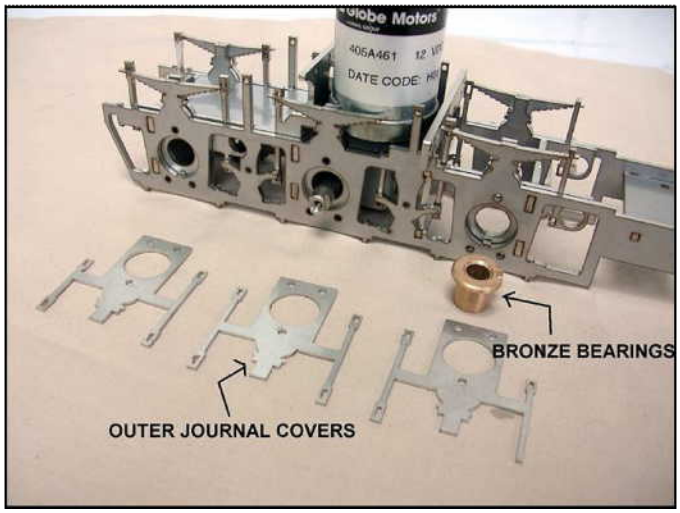

Globe Motors
12 VDC

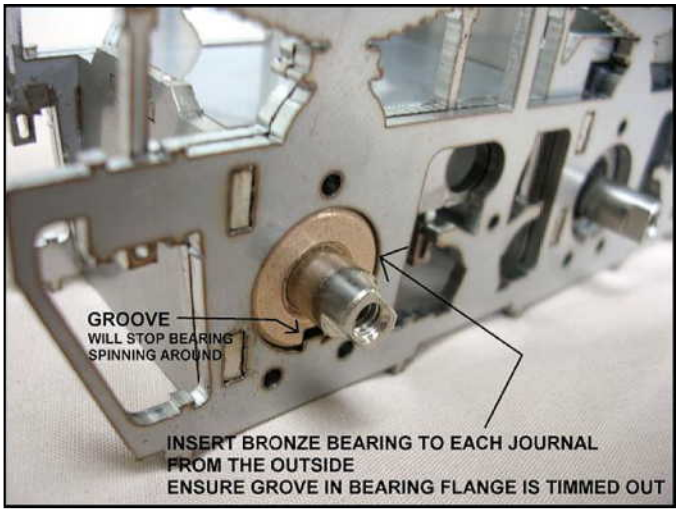

Globe Motors
12 VDC

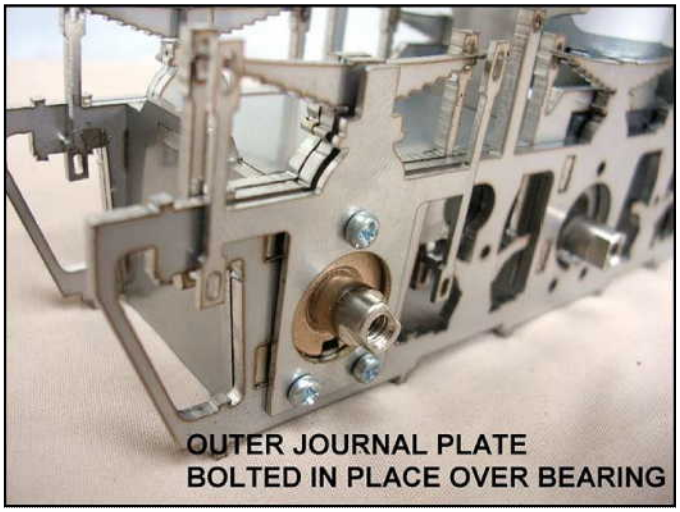

SLOT ENDS OF SPACER TABS
INTO HOLES IN FRAME

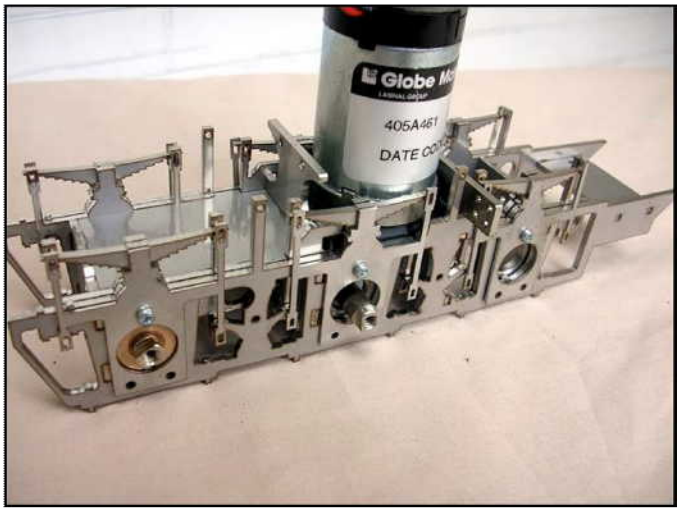

Globe Motors


ADJUST DIAMETER OF FLANGE
TRIM OUT GROOVE IN FLANGE
ADJUST DIAMETER OF BODY

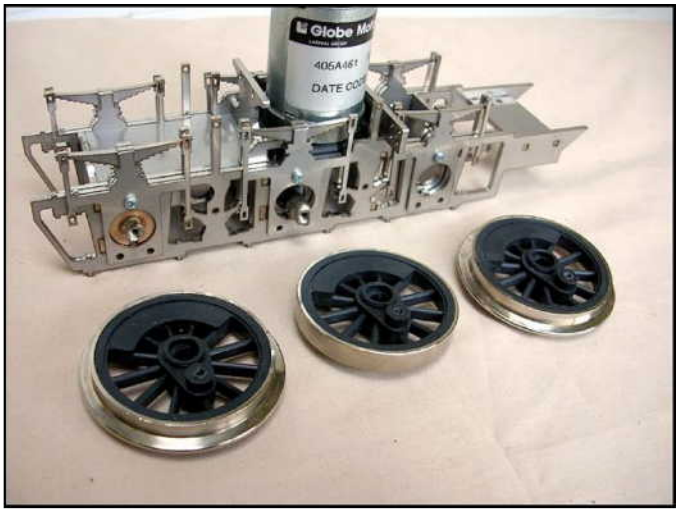

Globe Motors
405A461
DATE CODE:
BRONZE BEARINGS
OUTER JOURNAL COVERS

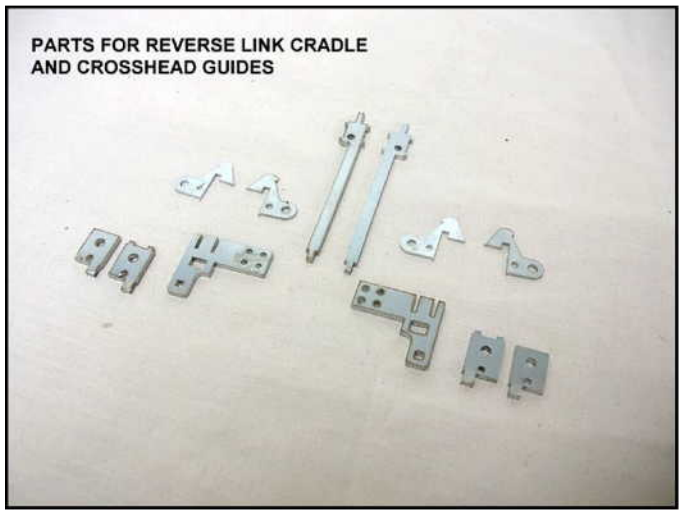

GROOVE
WILL STOP BEARING
SPINNING AROUND
INSERT BRONZE BEARING TO EACH JOURNAL
FROM THE OUTSIDE
ENSURE GROVE IN BEARING FLANGE IS TIMMED OUT

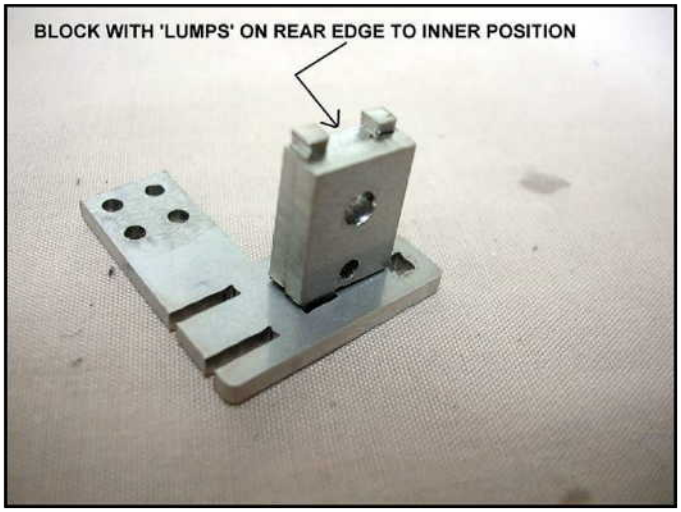

OUTER JOURNAL PLATE
BOLTED IN PLACE OVER BEARING

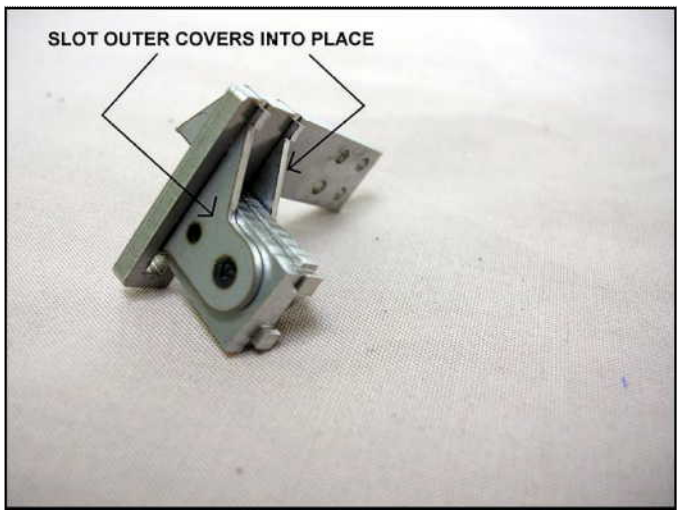

405A461

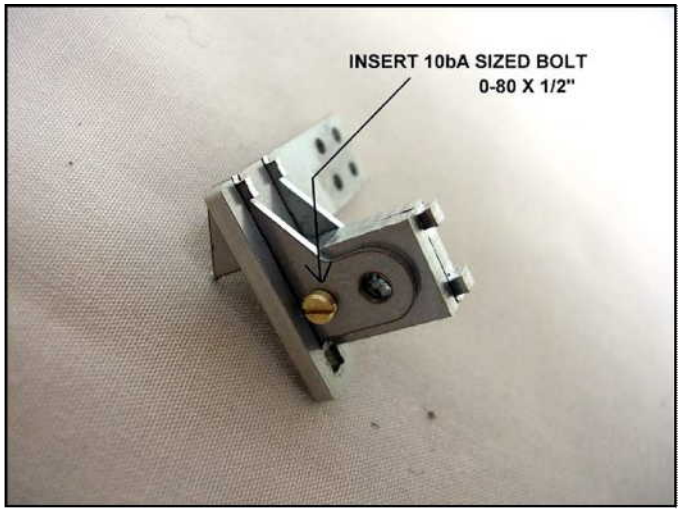

TRIM OFF APPROX 2mm FROM BACK OF WHEEL HUB

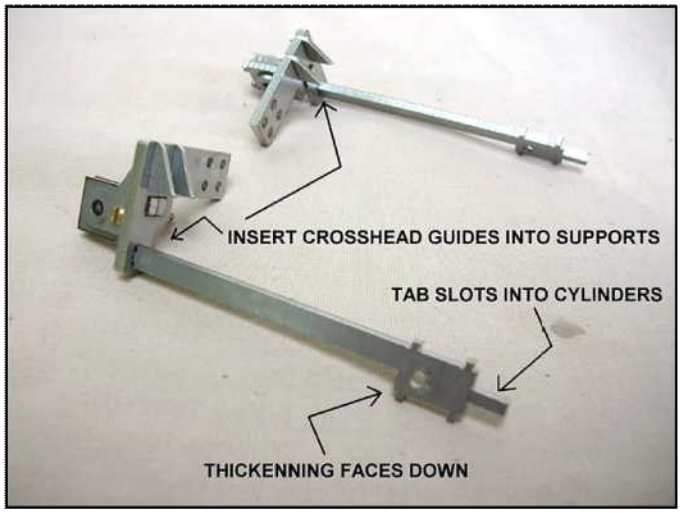


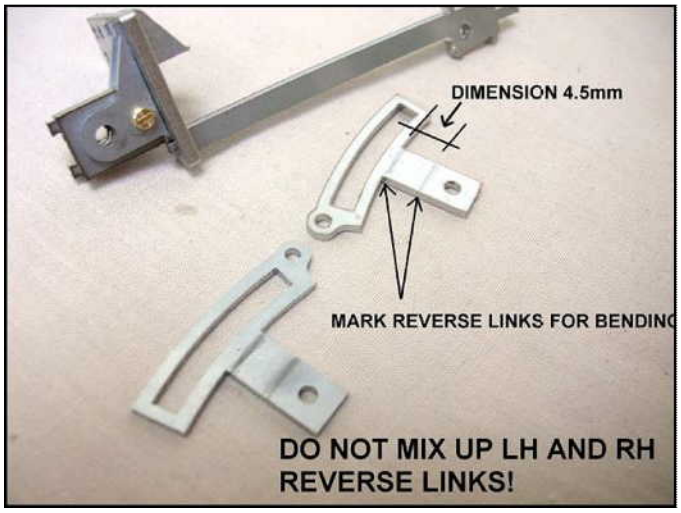

PARTS FOR REVERSE LINK CRADLE
AND CROSSHEAD GUIDES

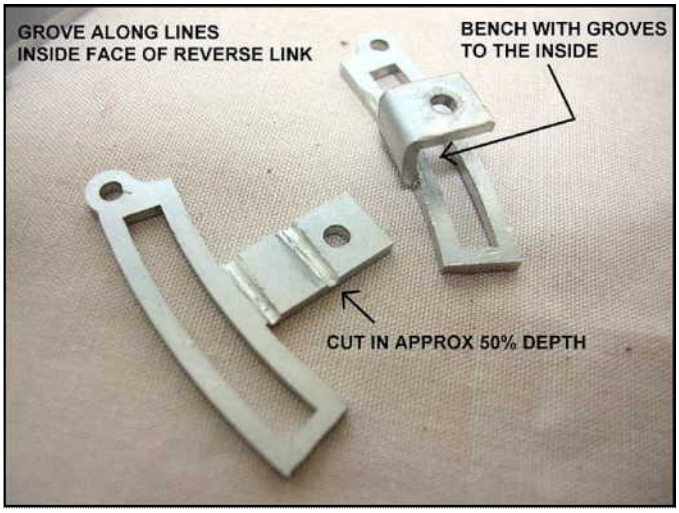

BLOCK WITH 'LUMPS' ON REAR EDGE TO INNER POSITION


SLOT OUTER COVERS INTO PLACE


INSERT 10bA SIZED BOLT
0-80 X 1/2"

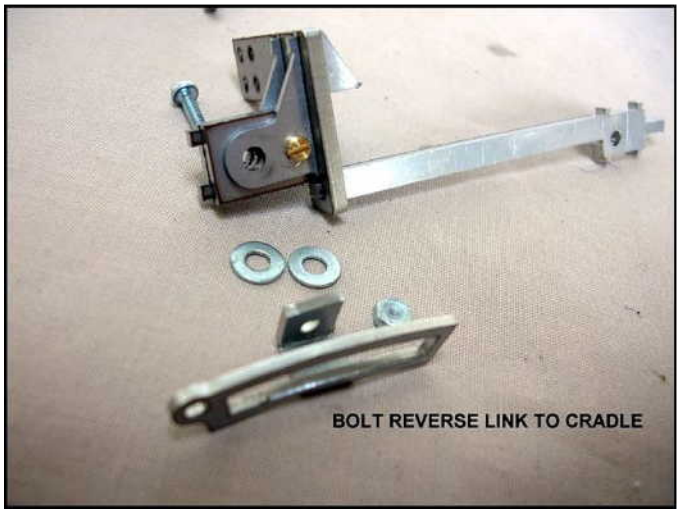

INSERT CROSSHEAD GUIDES INTO SUPPORTS
TAB SLOTS INTO CYLINDERS
THICKENNING FACES DOWN

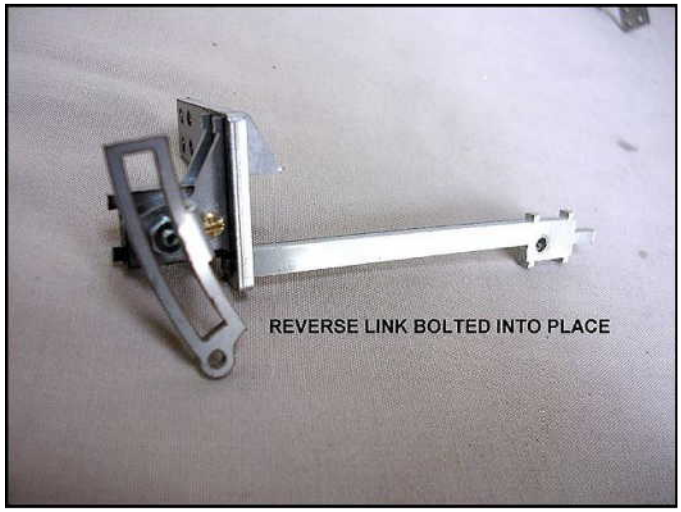

DIMENSION 4.5mm
MARK REVERSE LINKS FOR BENDING
DO NOT MIX UP LH AND RH
REVERSE LINKS!

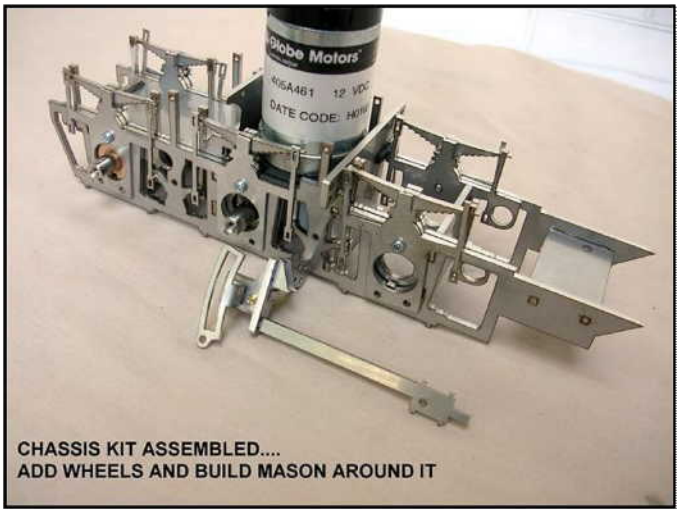

GROVE ALONG LINES
INSIDE FACE OF REVERSE LINK
BENCH WITH GROVES
TO THE INSIDE
CUT IN APPROX 50% DEPTH

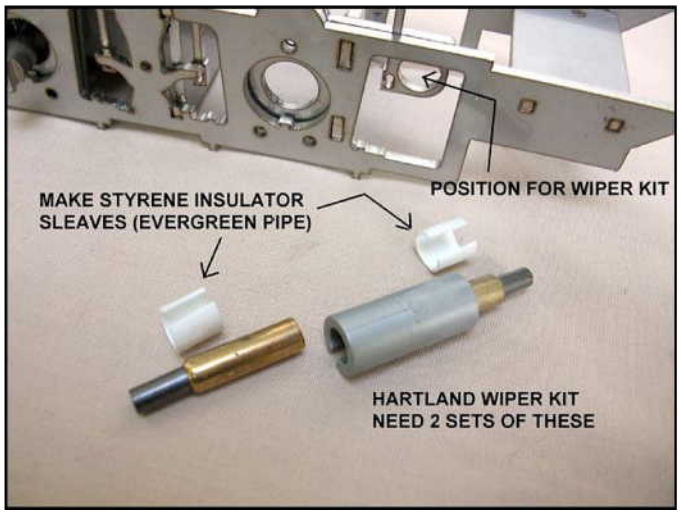

BENDING...BENDING

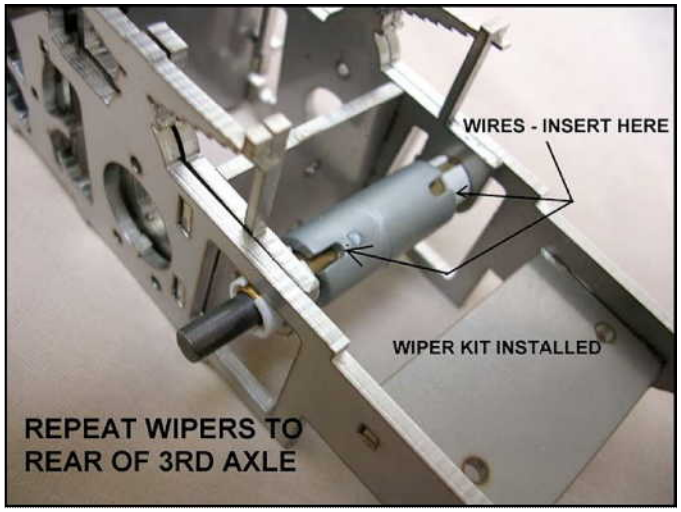

BENDING....BENDING!

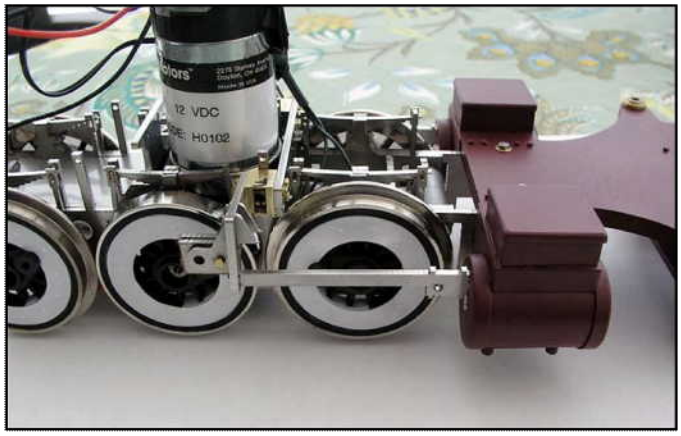

BOLT REVERSE LINK TO CRADLE


REVERSE LINK BOLTED INTO PLACE


Globe Motors
CHASSIS KIT ASSEMBLED....
ADD WHEELS AND BUILD MASON AROUND IT

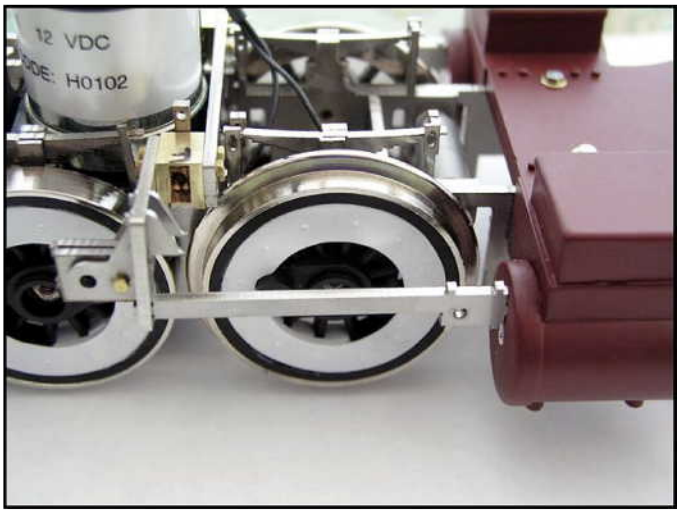

POSITION FOR WIPER KIT
MAKE STYRENE INSULATOR
SLEAVES (EVERGREEN PIPE)
HARTLAND WIPER KIT
NEED 2 SETS OF THESE





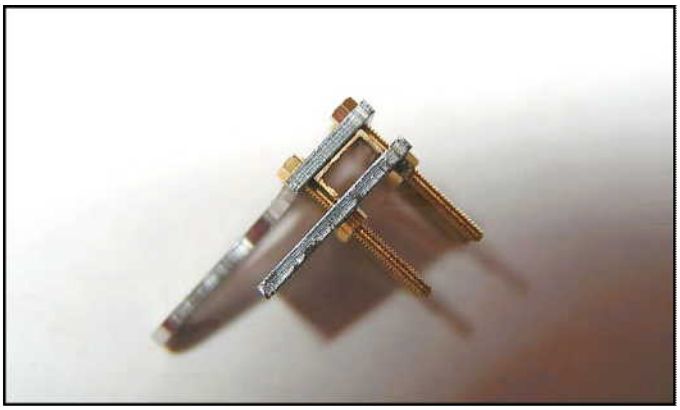
Beginning with the image to the left the next series of photos by Andy Bernat, as he assembles the chassis to working order: Note 7.4mm packer made from brass to space the crosshead guide supports to the correct location.

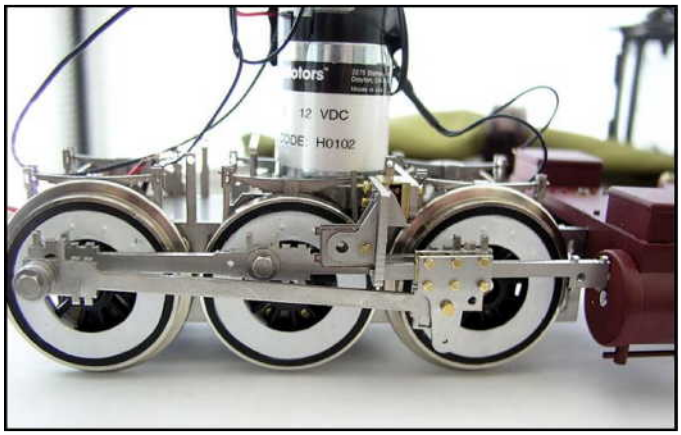
Here's a closer view of the crosshead guide support bracket packer.



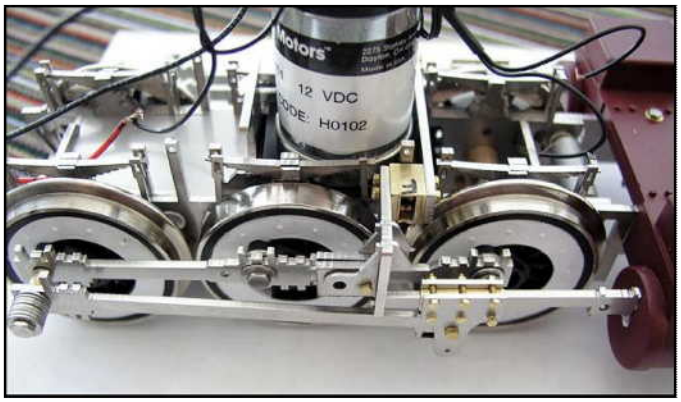
The brass SHS between the inner and outer crosshead plates is to be different from the standard MC2002 instructions above, as we are not using 3.2mm x 3.2mm Plastruct SHS. Instead the guide is 2mm thick, and 3.4mm deep. Use K&S brass tube 3/16" x 3/32" RHS. Grind out slots into the sides of the RHS allowing the bolts to pass across the RHS as seen to the left. This will hold the RHS from sliding out.

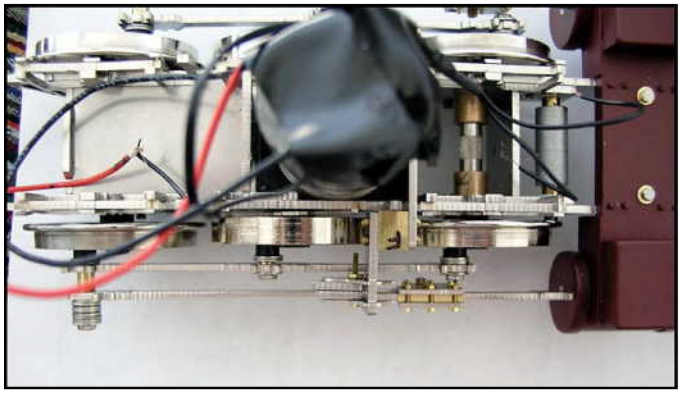
Remove one face of the RHS forming a channel, plant the crosshead plates to either side and insert the #00-90 bolts. Remember to grind off the nuts to the forward two bolts on the inside to allow the lead wheel crank to pass.

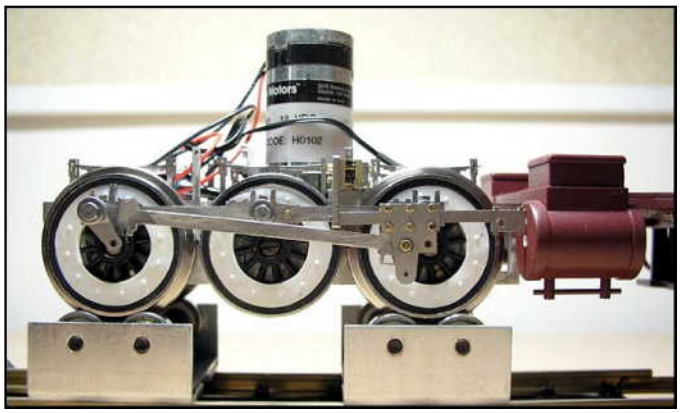




It would be a good idea to file out the holes in the side rods a little to remove the sharp edges inside the holes. These sharp edges may cut away at the crank pins!







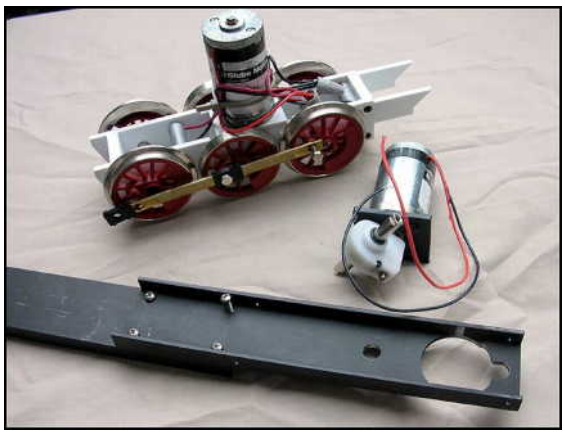
Making The Structural Frame:
To support the boiler/cab and support the pivoting chassis below.

This is one of the tougher parts of the class, and a real problem on the first 1:24 Mason I built. There is significant structural bending at the front wall of the cab, because the pivoting power truck does not support the loco in a structural way. Instead we need to make a structural frame above the chassis to support the boiler, and run through into the cab space to connect to the tender deck.

In the PDF set you will see the diagram of the Mason model with some structural frame length dimensions. Fundamentally, Chapters 1-5 are based on working with the BBT frame, and Barry at BBT not only provided an elegant structural methodology for the loco, but provided all the framing for the project with his BBT chassis. Time, however, has moved on and we have many builders who did not order the BBT, or missed out, and we must build a DIY structure for the loco, based on Barry's design so that the superstructure parts from Chapters 1-5 will all fit.

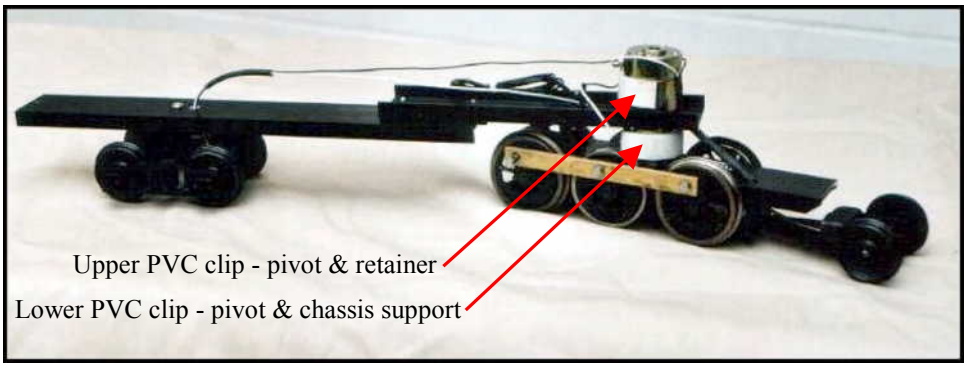
The frame is dead simple in principle: two lengths of 35mm x 9mm channel - that is 35mm wide, with 9mm vertical legs. The frame above the power truck has the legs of the C channel facing upward and a 30mm diameter hole cut in the frame for the motor to slide in to work as a bearing/pivot. The boiler/running boards just slide down onto this channel. A second longer channel is used under the tender deck. The two frames overlap each other in the cab/firebox area and are bolted together back-to-back, with the styrene tender deck sandwiched in between.

The channel frames that BBT provide are like this:



A 25mm PVC short pipe length cut on one side to form a 'C' shape is clamped around the motor above the frame to prevent the chassis from dropping out of the frame.

With the power truck, rear truck and support frame assembled with PVC clip around the motor top, the BBT assembly concept looks like this:



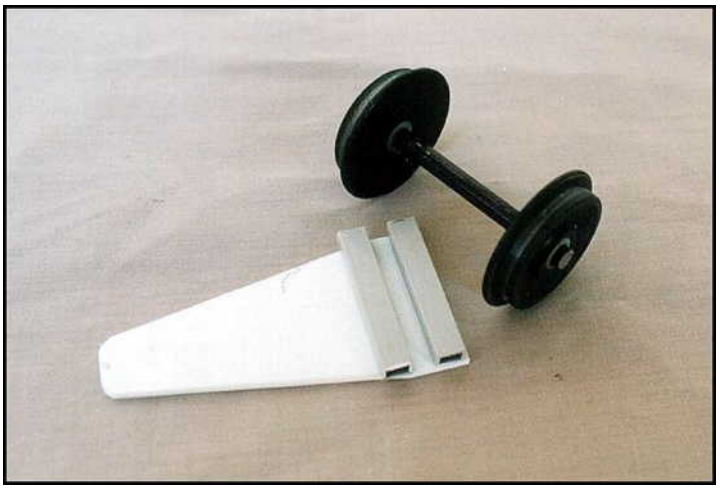
Note: Barry also initially used a PVC pipe clip between the chassis and frame as a bearing pad, but we changed it as part of the spring rigging design in chapter 2. The tender deck assembly from chapter 2 also needs to be sandwiched between the two frame channels, with the deck flat down on top of the rear channel.

We will need to replicate this channel idea for your superstructure elements to work. The 35x9mm channel that BBT uses is a custom extrusion, and will not be available in shops that stop aluminium sections. However a similar channel idea can be made using two lengths of 9mm equal angle, with a central plate of 2mm thick,31mm wide styrene added between the angles, forming the channel. A 2nd layer of 2mm styrene is sandwiched to the bottom of the spacer to enable the bottom of the channel to be smooth. Repeat the same method for the tender frame and bolt the two channels back to back per above. Use the PDF to work out the channel lengths, location of the 30mm hole for the Hartland motor pivot, and holes for the back to back bolting of the channels.

The Pilot Truck

The pilot truck is made following the PDF templates in the DIY chassis set. Use a Bachmann, or LGB metal wheelset as the pilot wheel, use two lengths of Plastruct ABS SHS either side of the axle, and then bolt the cover plate on.

The truck is assembled like this:



The pivot for the pilot truck will be a vertical 4.6mm x 4.6mm ABS Plastruct SHS mounted vertically on the front spacer of your chassis. Just bolt the SHS to the center front of the forward spacer. Then insert a bolt through the truck and screw into the hollow centre of the SHS.

The Tender Truck

Jens Lasch of Germany some time ago wrote up a short article on building your own tender truck for the Mason. We've included his article in this chapter, please refer to it if you want to make your own tender truck.

Also note that the BBT cast metal RTR tender truck will be available for sale on its own once the BBT chassis are rolling out.

In addition, we're looking at getting a laser cut styrene tender truck kit together, with the laser cutting being done by Rick Raively. Keep an eye open for that option.

From here on:
The instructions from the normal MasterClass Chapter 6 will see you through.

Good Luck!
David Fletcher