

SEMI-EXPANDING CARBURETOR

In April 1933 a new, semi-expanding type carburetor was introduced, starting with chassis # 102MY. It featured a completely revised carburetor body and a very large air cleaner mounted alongside the inlet manifold. Significant changes were also made to the mechanical controls. The whole assembly is visibly very different from the carburetor arrangement included in the Pocher kits.

This twenty-nine page note dimensions and outlines the building of a 1/8th scale version of this semi-expanding carburetor. The note is divided into five sections; carburetor body, inlet manifold, air cleaner, mechanical controls and photographs of the installed model.

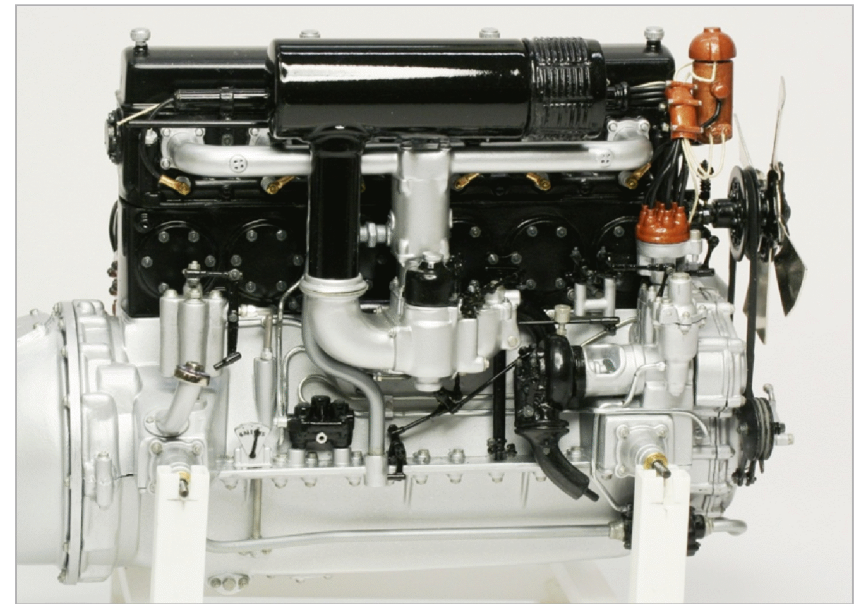
Construction of this carburetor is significantly more involved than the addition of the controls outlined in Vol. 1 of my engine build notes. If you need help, or you find errors or inconsistencies please let me know. I can be reached at haddockjr@aol.com.

One side note; Rolls-Royce introduced the larger 28 (Imp.) gallon fuel tank (the one in the Pocher kit) after this carburetor, in July 1933. So, to be historically accurate, the 28 gallon tank included in the Pocher kit should always be matched with this semi-expanding carburetor.

Prototype



Model



ROLLS-ROYCE PHANTOM II SCRATCH BUILT COMPONENTS & MODIFICATIONS

SEMI-EXPANDING CARBURETOR

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May 2011

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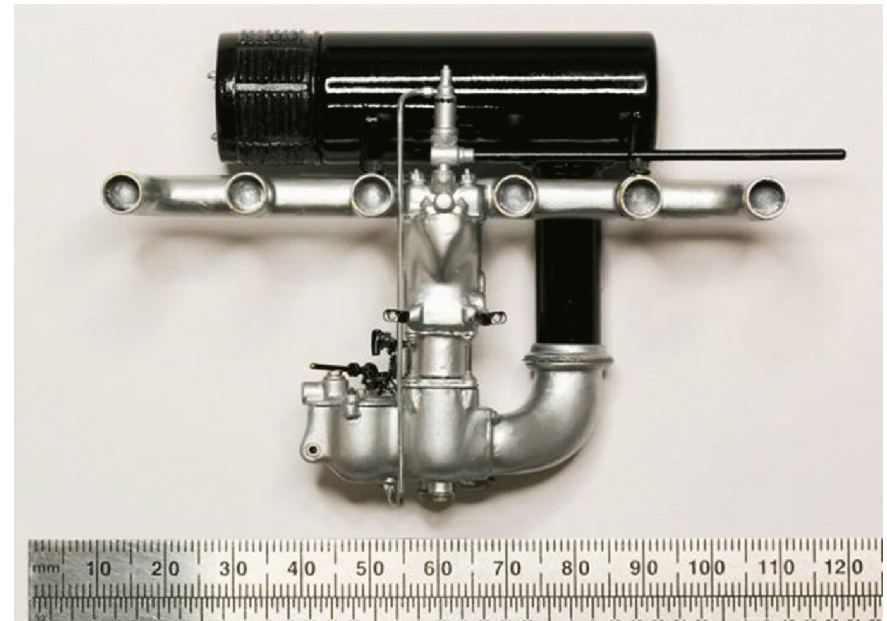
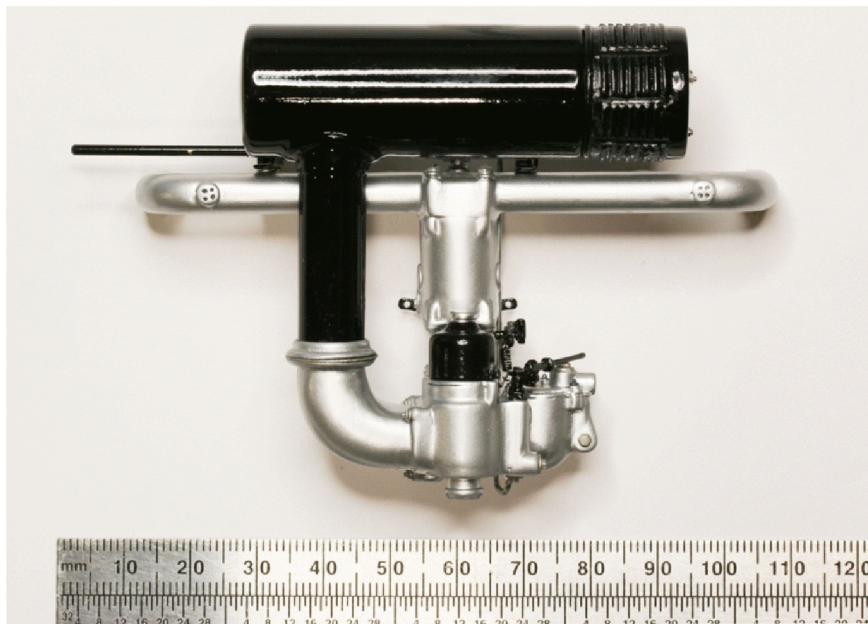
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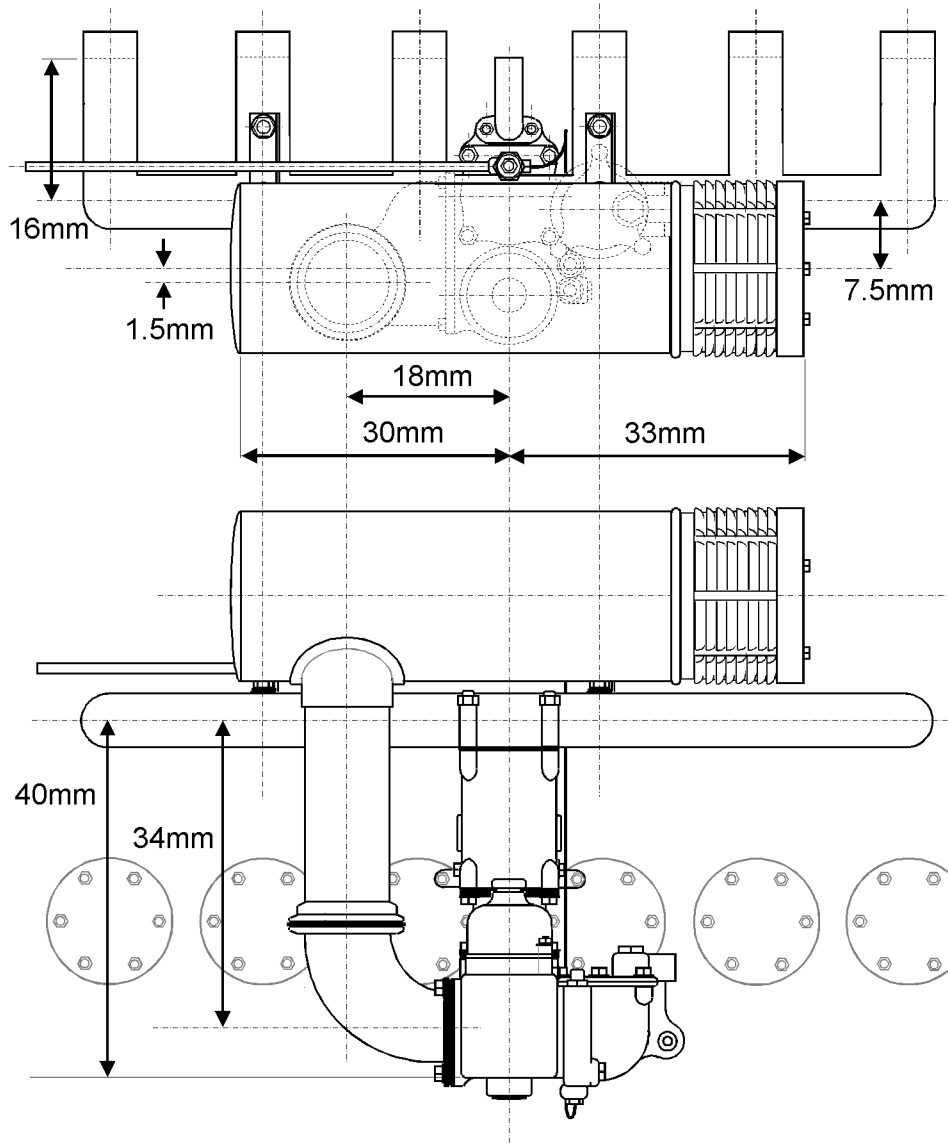
SEMI-EXPANDING CARBURETOR PROFILES

These two photographic profiles of the completed model carburetor will provide some idea of the overall size. The inlet manifold is from the Pocher kit, but highly modified. Everything else is scratch built.



Note: The rulers are only guides. More accurate dimensions follow on the next page.

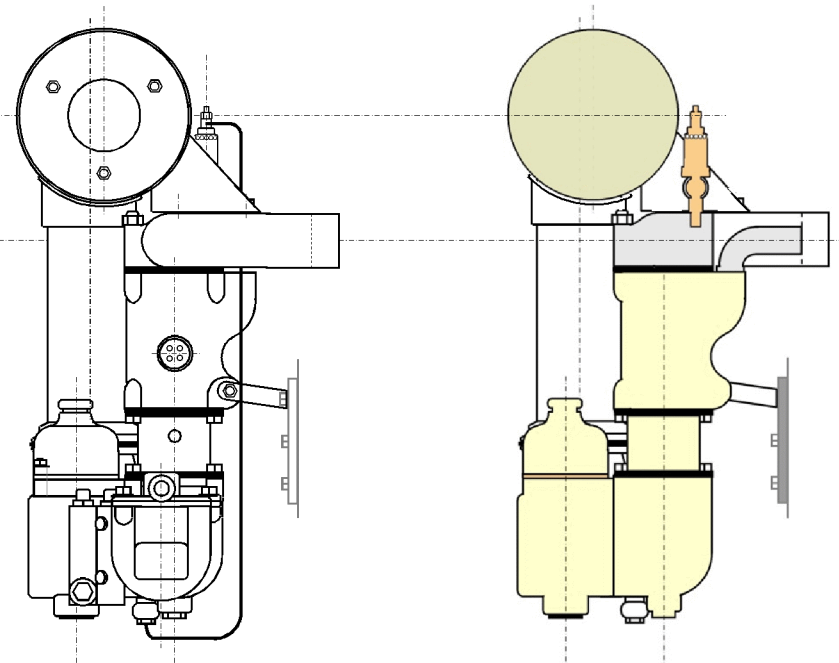
SEMI-EXPANDING CARBURETOR DRAWING



The outline drawings on this page are based on the completed model. To minimize clutter, none of the controls and only a few overall dimensions are shown here. However, the drawings are to scale. More detail will be provided on subsequent pages.

Scale 0 10 20 30 40 50 mm

Simplified section thru centerline of carburetor tower

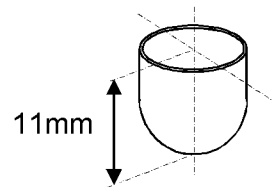


CARBURETOR BODY - 1

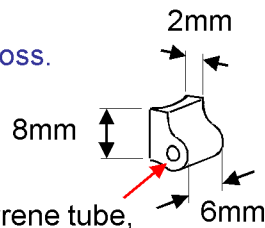
The build sequence began with the carburetor body ...

Float Chamber

Sleeve 7/16" (11mm) OD tube to fill in end. Round end as shown.

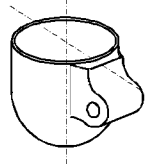


Make front boss.



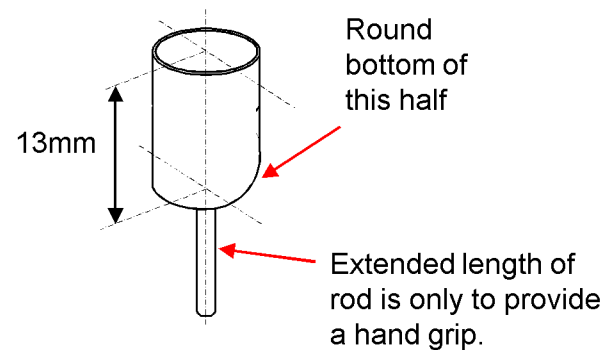
1/8" OD styrene tube, sleeve with 1/16" OD brass tube

Glue chamber and boss together.

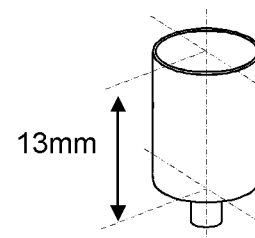


Valve Bodies

Sleeve a 7/16" tube to fill one end down to 5/32" ID. Round one half of that end. Insert 5/32" tube and leave 2" protruding as a handle.

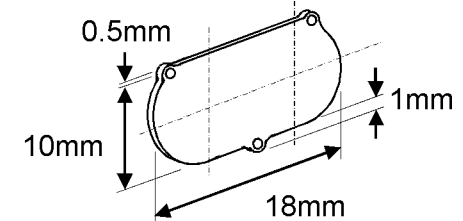


Sleeve out another 7/16" tube to accept a 7/32" tube.



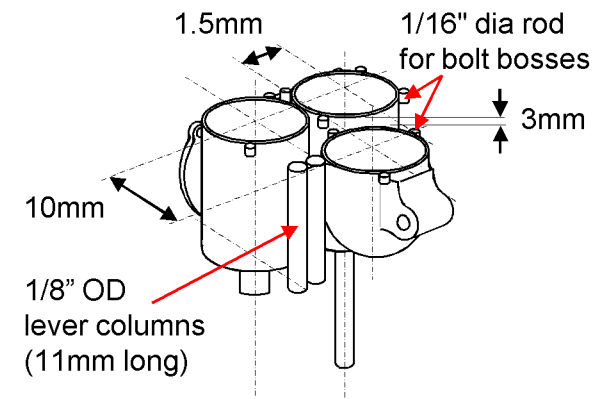
Rear Flange

Make rear flange plate from 0.030" styrene sheet.



Initial Carb Body Assembly

Glue bodies and rear flange plate together so bottom of flange matches bottom of bodies. Glue lever columns in place. Mill out slots to position each of nine bolt bosses and glue them in place.

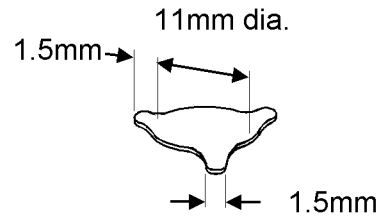


Fill all body gaps with putty & file smooth

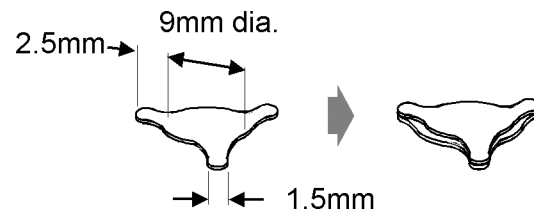
CARBURETOR BODY - 2

Float Chamber Cover Plate

Make base plate from .040" styrene sheet.
Match flanges to bosses on float chamber body



Make cover plate from .040" styrene sheet.
Match flanges to base plate.

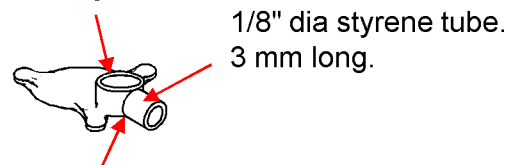


Round edges of cover plate and glue to base plate.



Add fuel supply bosses to cover plate.

5/32" dia styrene tube.
2.5 mm high

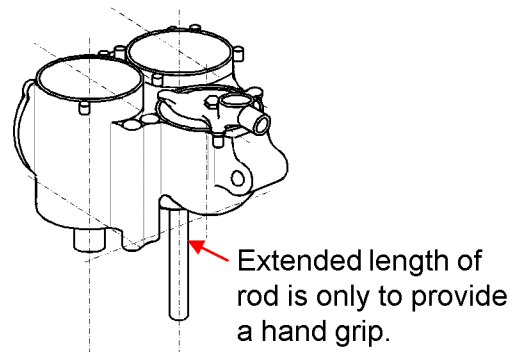


Position outer edge of tube on
outer edge of cover plate

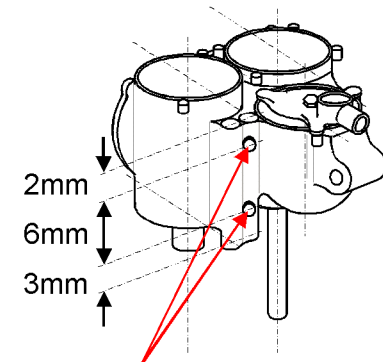
Add 00-90 bolt head to center of cover
plate.



Add cover plate to assembly

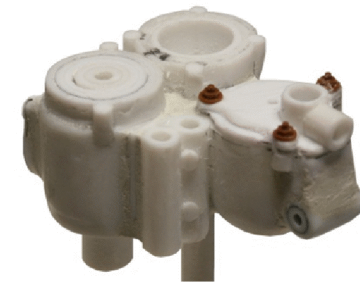


Add bosses to lever column



Make bosses from 1/8" dia rod

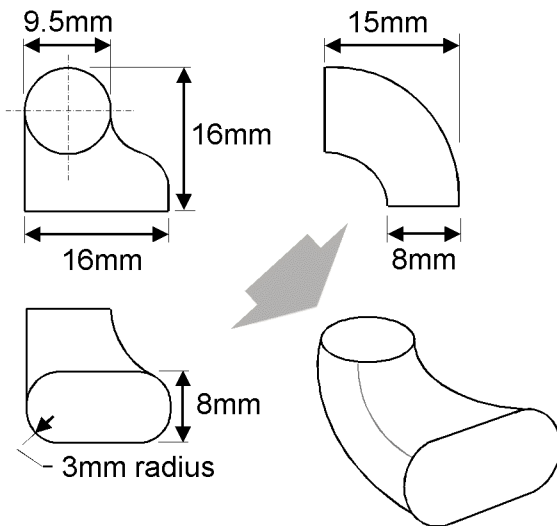
Under Construction



CARBURETOR INTAKE PLENUM

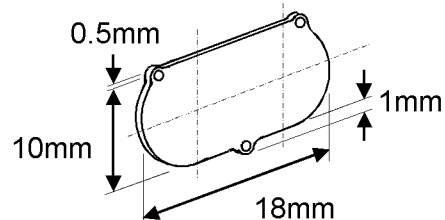
Air Inlet Plenum

Cement together eight, .080" thick sheets, 16mm x 16mm. Carve out plenum.



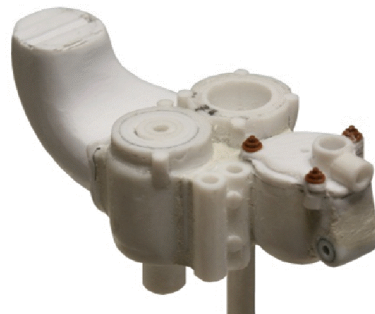
Rear Flange

Make plenum flange from 0.030" sheet. Match to flange on the carburetor body.



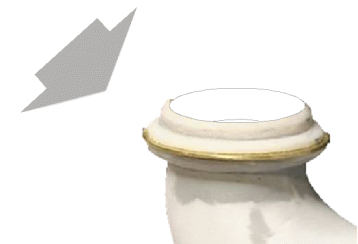
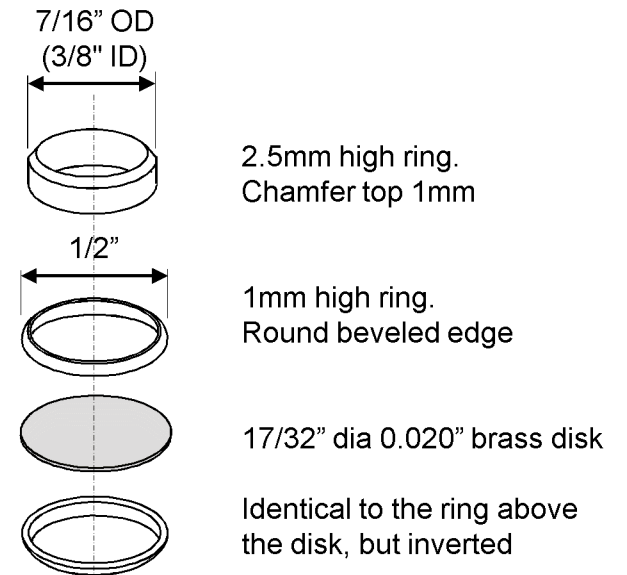
Cement flange to plenum body.
Peg inlet plenum to carburetor base.

Under Construction



Flange: Plenum to Vertical

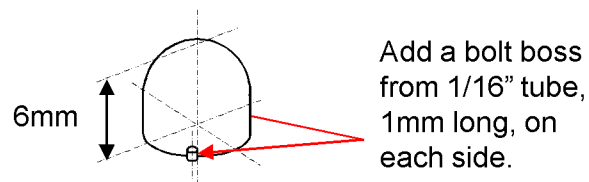
Shape top end of the plenum to 3/8" diameter. Make three rings from styrene tube and a disc from brass as shown below.



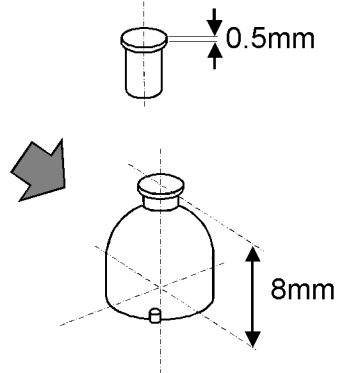
CARBURETOR BODY - 3

Needle Chamber Cover

Make cover from 3/16" rod. Round top to form bell shape.

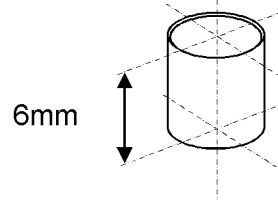


Make top knob from 3/32" styrene rod, and 5/32" styrene sleeve



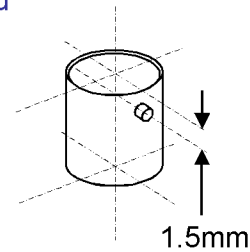
Butterfly Tower

Make carburetor central tower core from 5/16" tube

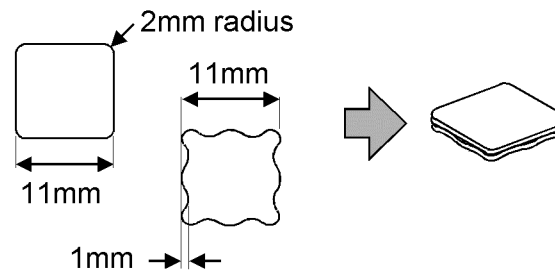


Butterfly Tower ... continued

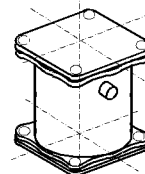
Insert 1/16" OD brass tube in side wall for control arm:



Make each top and bottom flange from two square pieces, .020" thick:

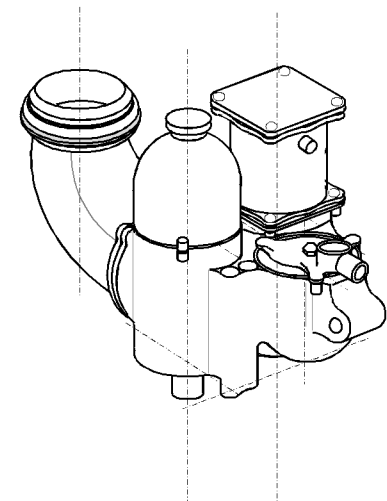


Assemble core and flanges, drill holes in corners for 1mm studs and nuts



Peg, this tower to the carburetor base. Do not glue, this will allow for some final adjustments to be made

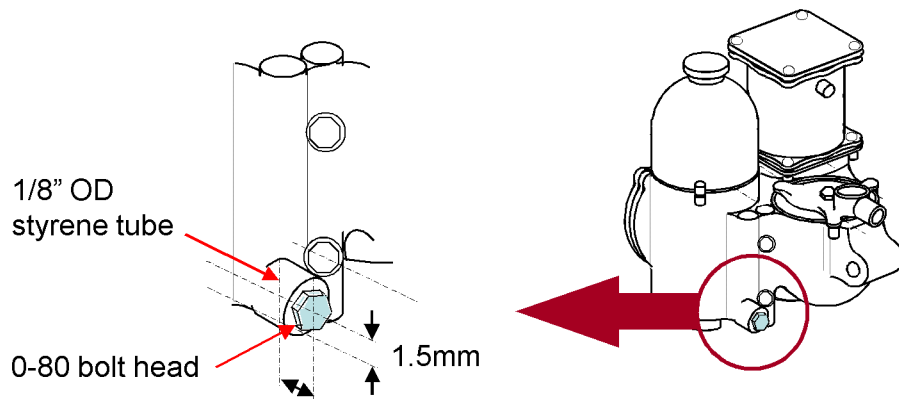
Assembly



CARBURETOR BODY - 4

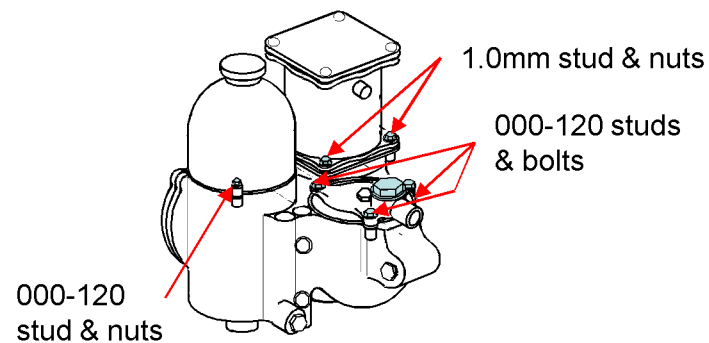
Side Boss and Bolt Head

Add side boss and bolt head to base of lever column



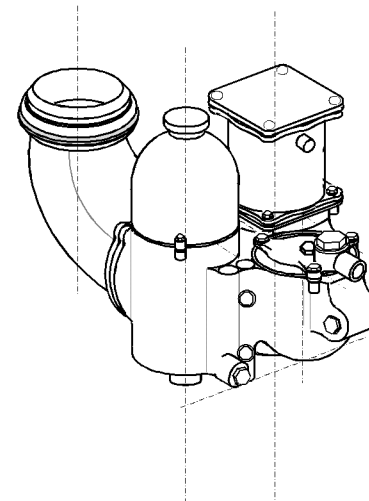
Cover and Tower Hardware

Finish the covers and tower by adding bolts, studs and nuts

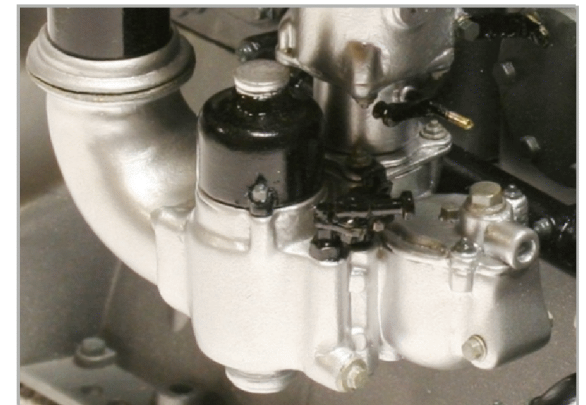


Assembly

The carburetor assembly should now look like this ...



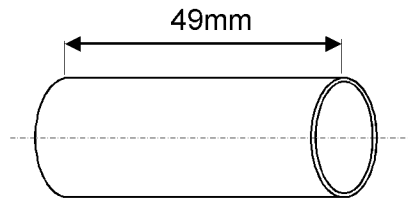
Partly Finished Model



AIR CLEANER

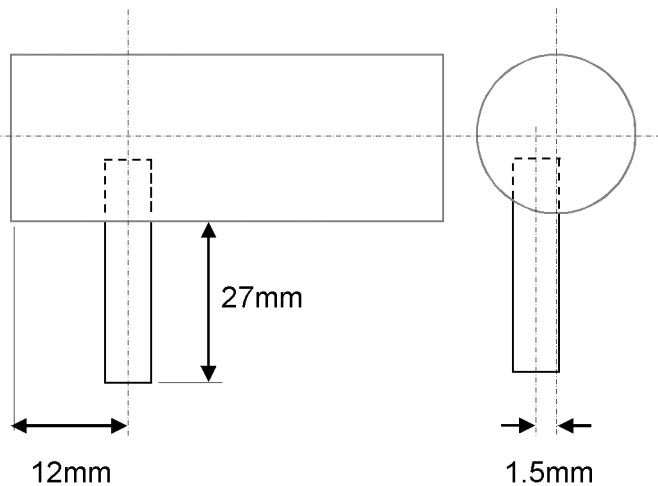
Air Cleaner Body

Cut body and end from 3/4" brass tube.



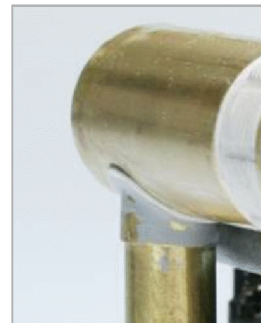
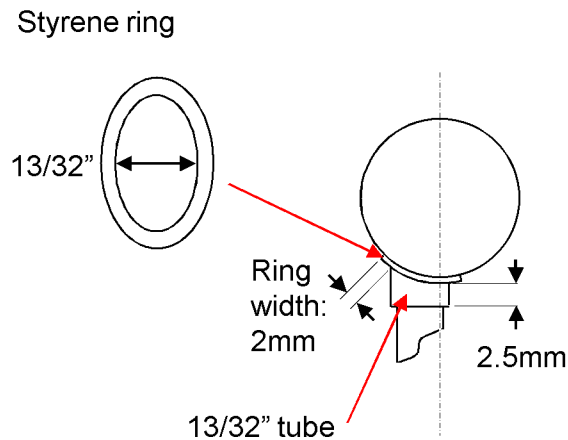
Inlet Pipe

Cut inlet pipe from 3/8" brass tube. Make sure the pipe is an easy fit with the flange on the plenum. Drill hole in air cleaner body and solder vertical pipe in place.

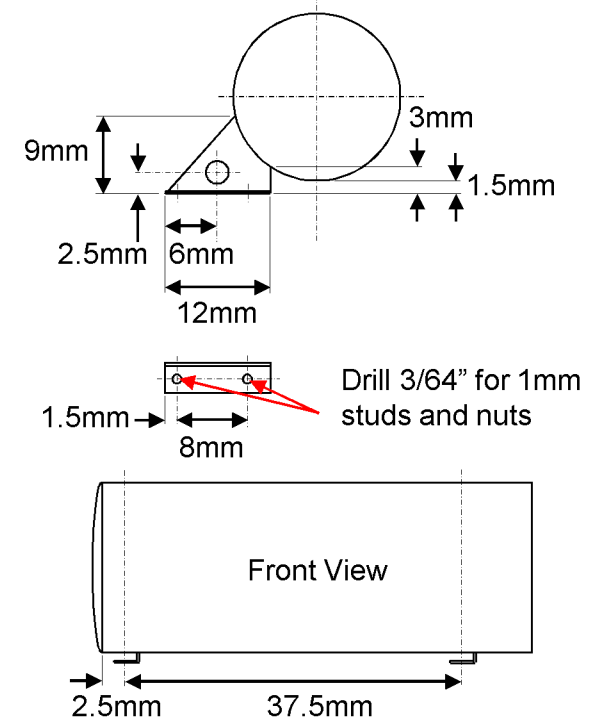


Mating Collar

Make the collar from a 13/32" OD brass sleeve and a 0.020" thick oval styrene ring.



Air Cleaner Support Brackets

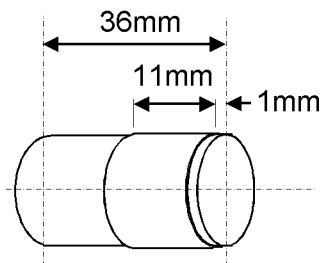


AIR CLEANER & INLET PIPE

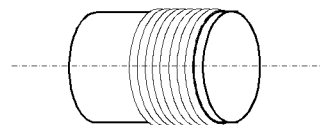
Louvers

Cut a length of 23/32" OD brass tube to 36mm. The rear end of the tube will nest inside the 3/4" air cleaner tube.

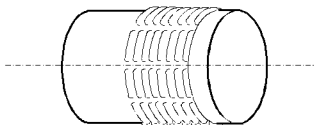
Glue a 11mm wide strip of 0.020" styrene sheet around this tube.



Begin forming the louvers by gluing eight 1mm quarter-round strips around the 0.020" sheet.

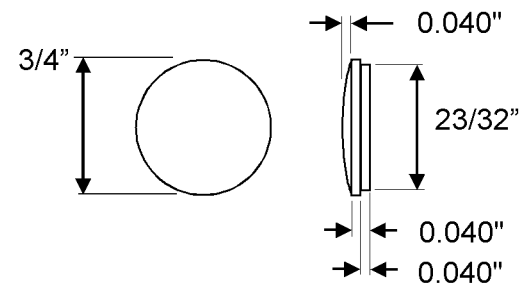


Cut 1mm wide slots to represent louver webs.

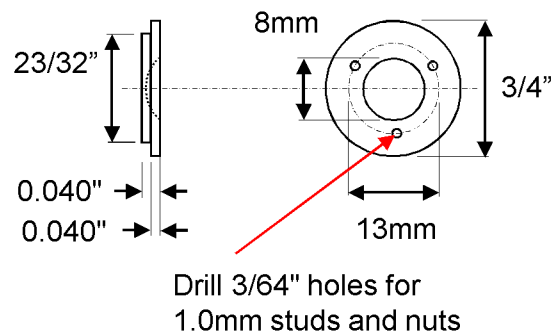


Main Tube End Cap

Make the end from shaped styrene sheets



Louver End Cap

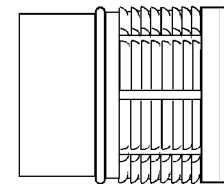


Louver End Cap Spacer

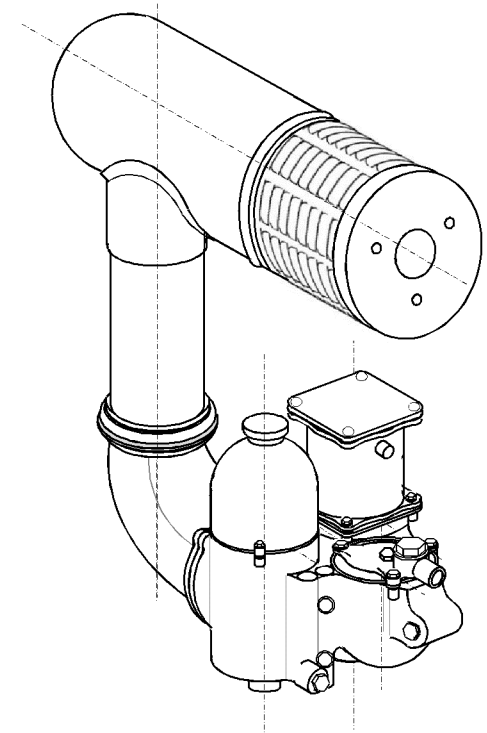
Brass ring, 3/4" diameter, 2mm wide



Louver Assembly - Side View



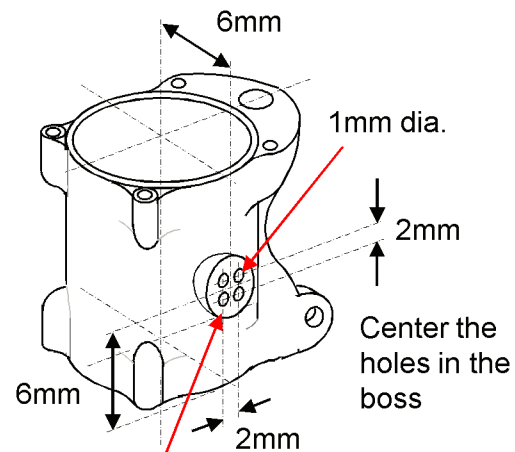
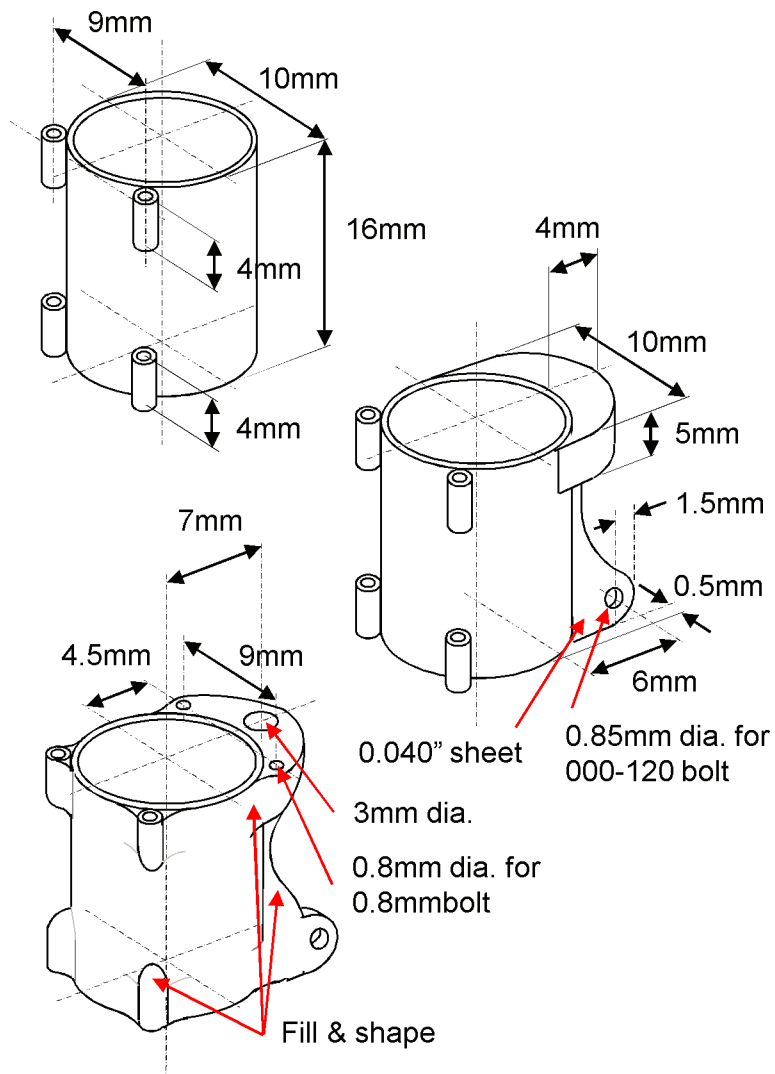
Carburetor Assembly So Far



CARBURETOR BUTTERFLY TOWER

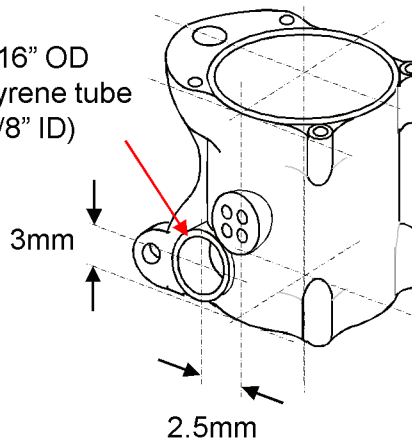
Main Tower

Use the following sequence to make the butterfly tower ...

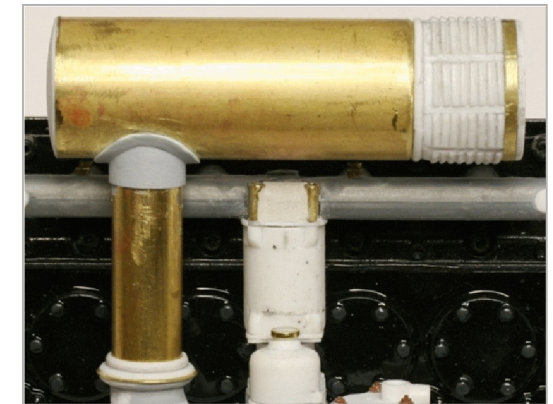


3/16" OD styrene rod

3/16" OD styrene tube (1/8" ID)



Under Construction



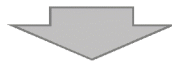
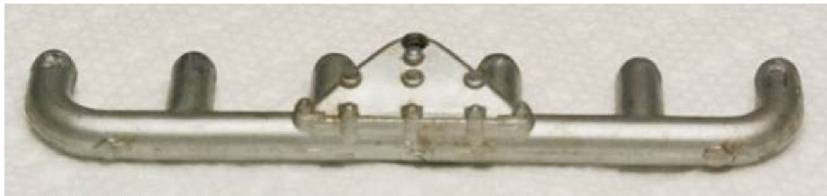
Model



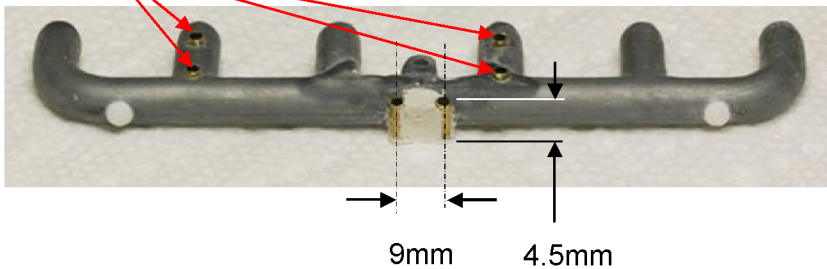
INLET MANIFOLD - 1

Inlet Manifold

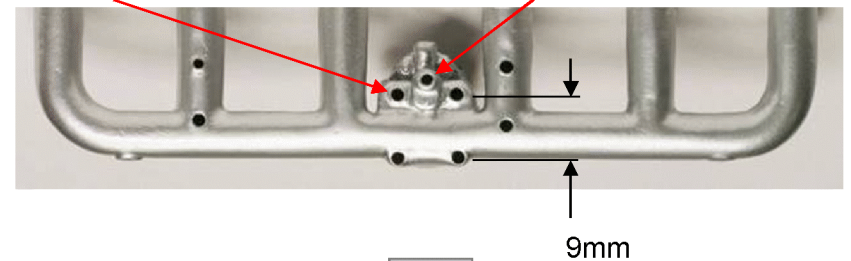
Remove top of Pocher manifold, as shown below:



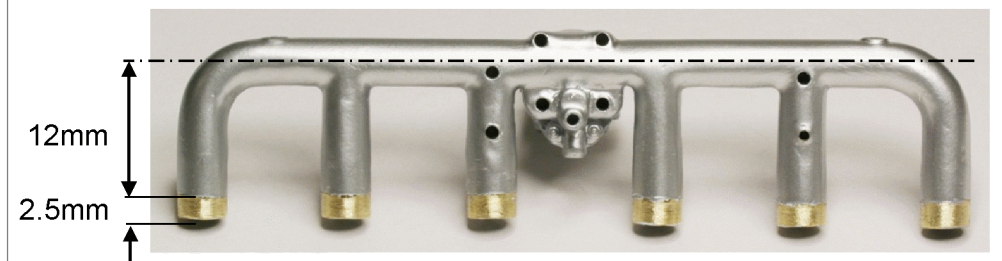
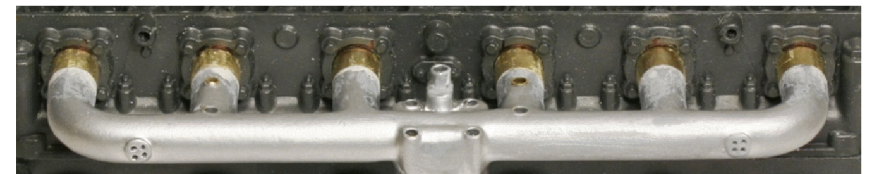
Glue 1/16" dia. brass tubes to front of manifold. Fill out with Squadron putty. Drill four holes for air cleaner brackets and insert 1/16" dia. tubes.



Add material to center of manifold to make platforms for the inner bolts and for the starting carburetor base



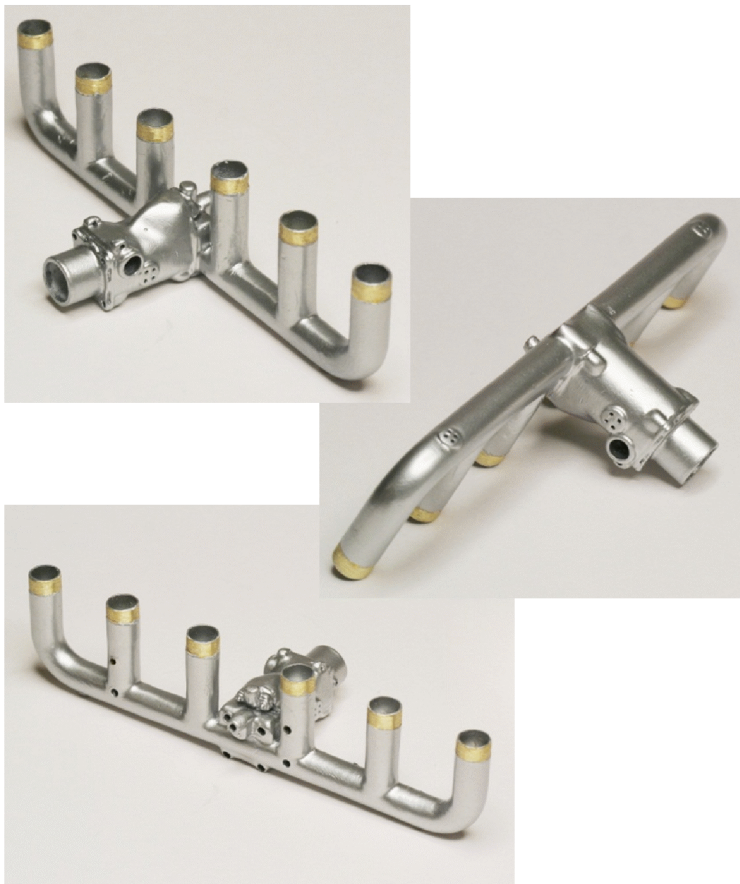
Use 3/16" OD brass tubes to extend overall length of manifold arms by 6mm.



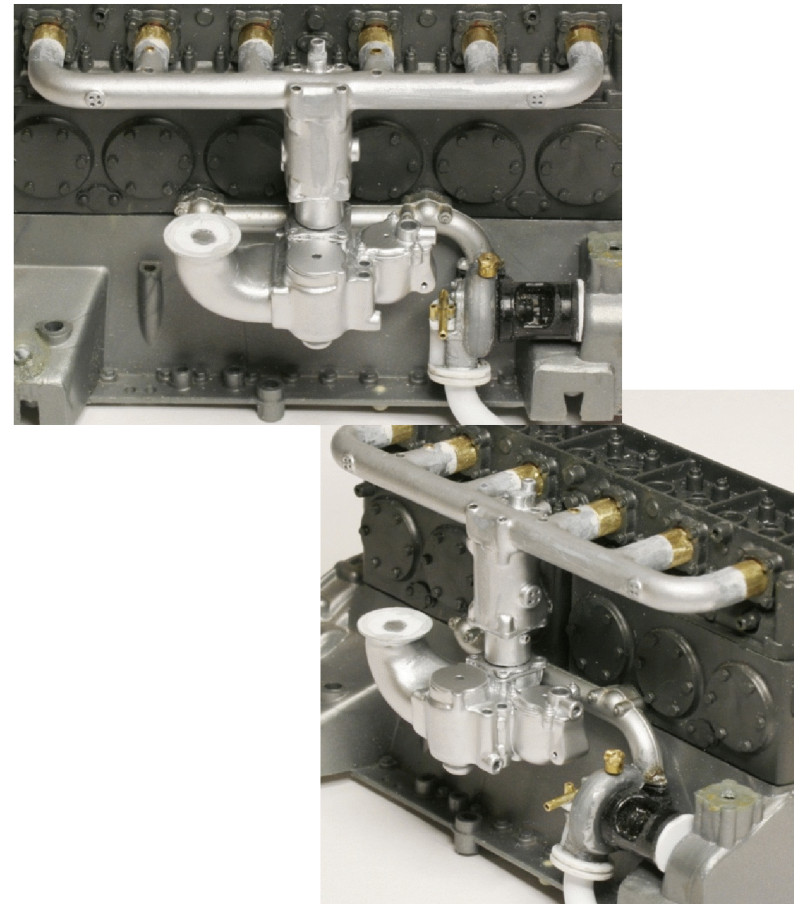
INLET MANIFOLD - 2

Next ...

Marry the tower to the manifold ...

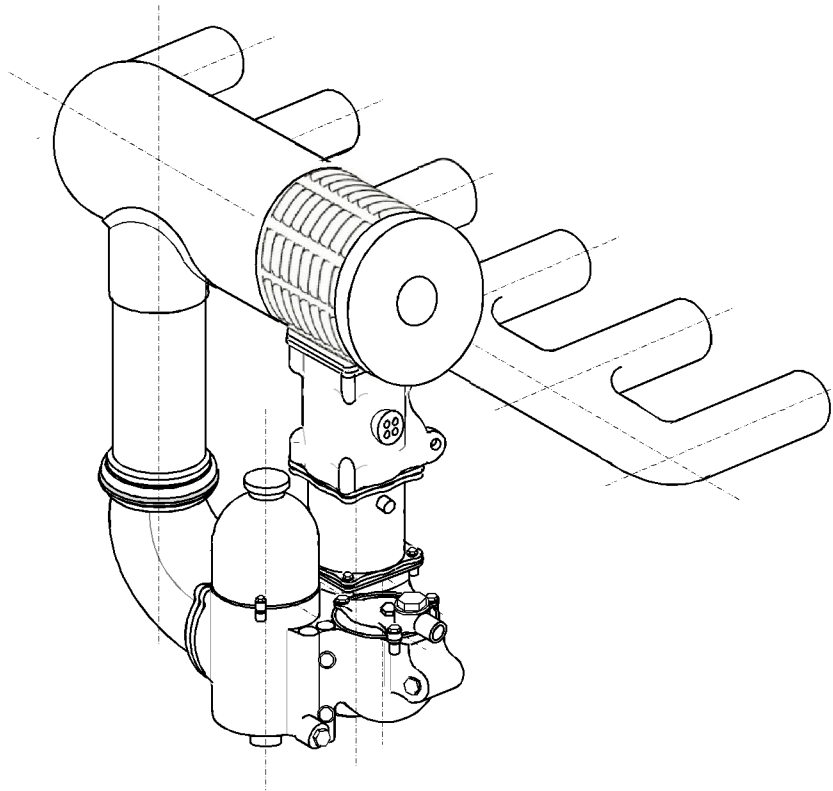


Then assemble the tower and manifold to the rest of the carburetor body. Confirm the fit of the carburetor & manifold. The tower should be vertical and should just clear the water manifold.



INLET MANIFOLD - 3

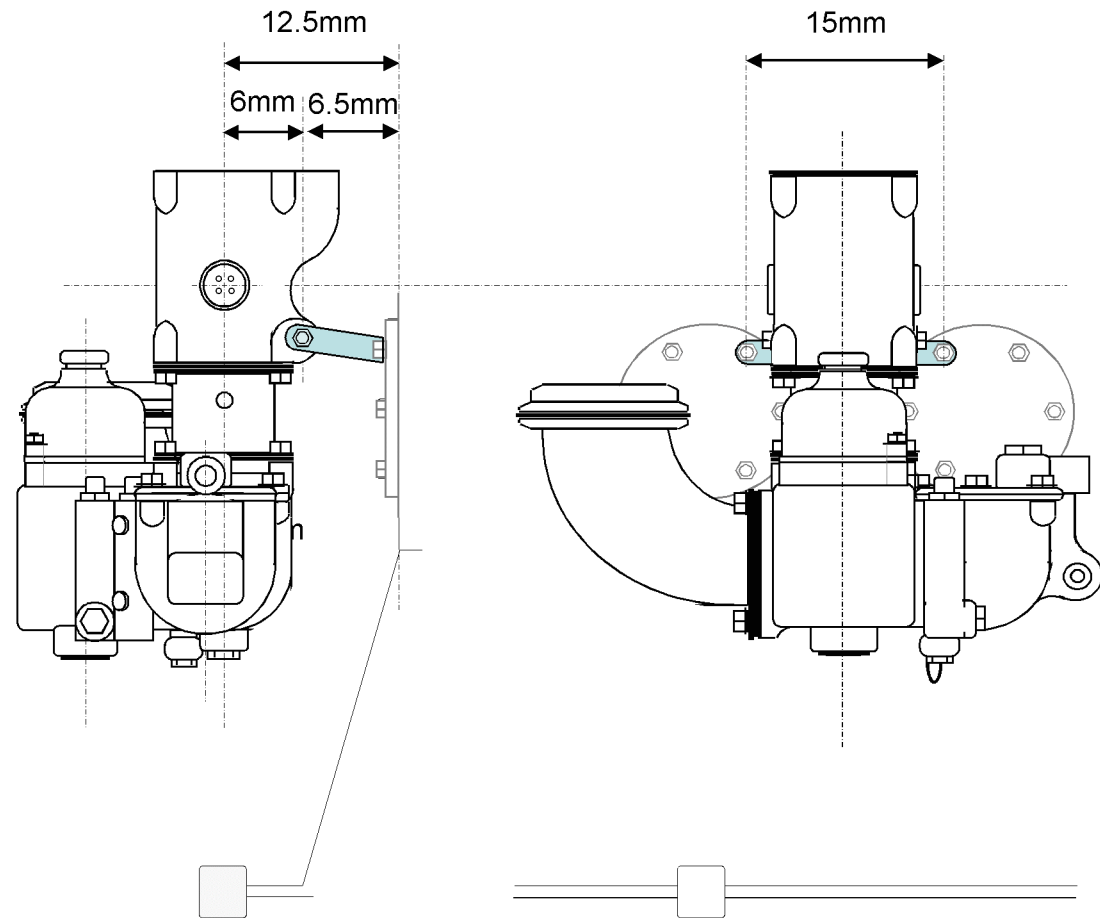
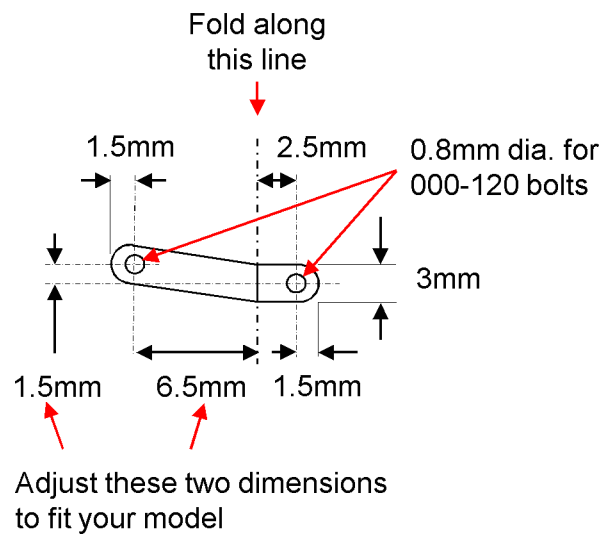
Add the air cleaner and fasten the air cleaner support brackets to the top of the manifold. The air cleaner should be parallel to the manifold. The pipe between the air cleaner and plenum should be vertical and the carburetor tower should be vertical.



CARBURETOR SUPPORT BRACKETS

The carburetor is supported in place by the manifold and two support brackets attached to the side of the carburetor tower.

Make the left and right support brackets from 0.020" brass sheet. You may need to adjust the size of these brackets to ensure the tower is vertical when attached to the engine. Keep in mind that the water manifold has to fit between the carburetor body and the side of the engine.

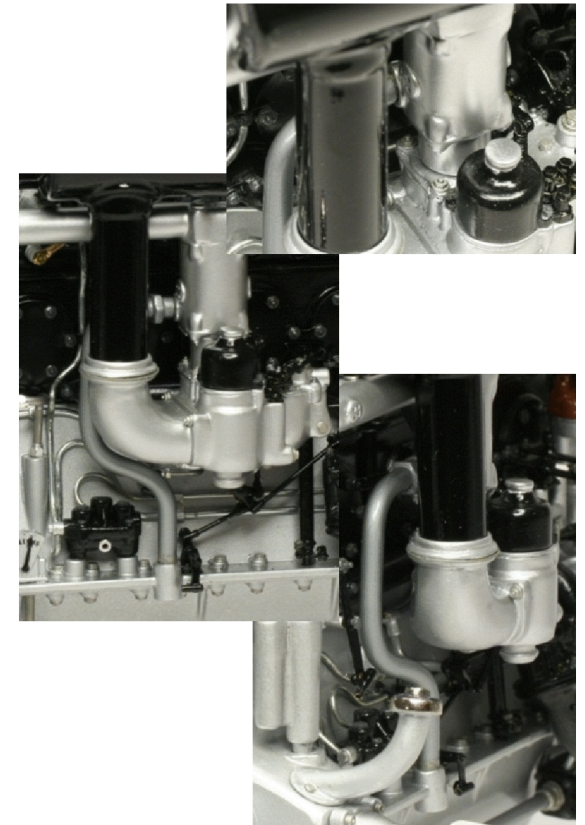
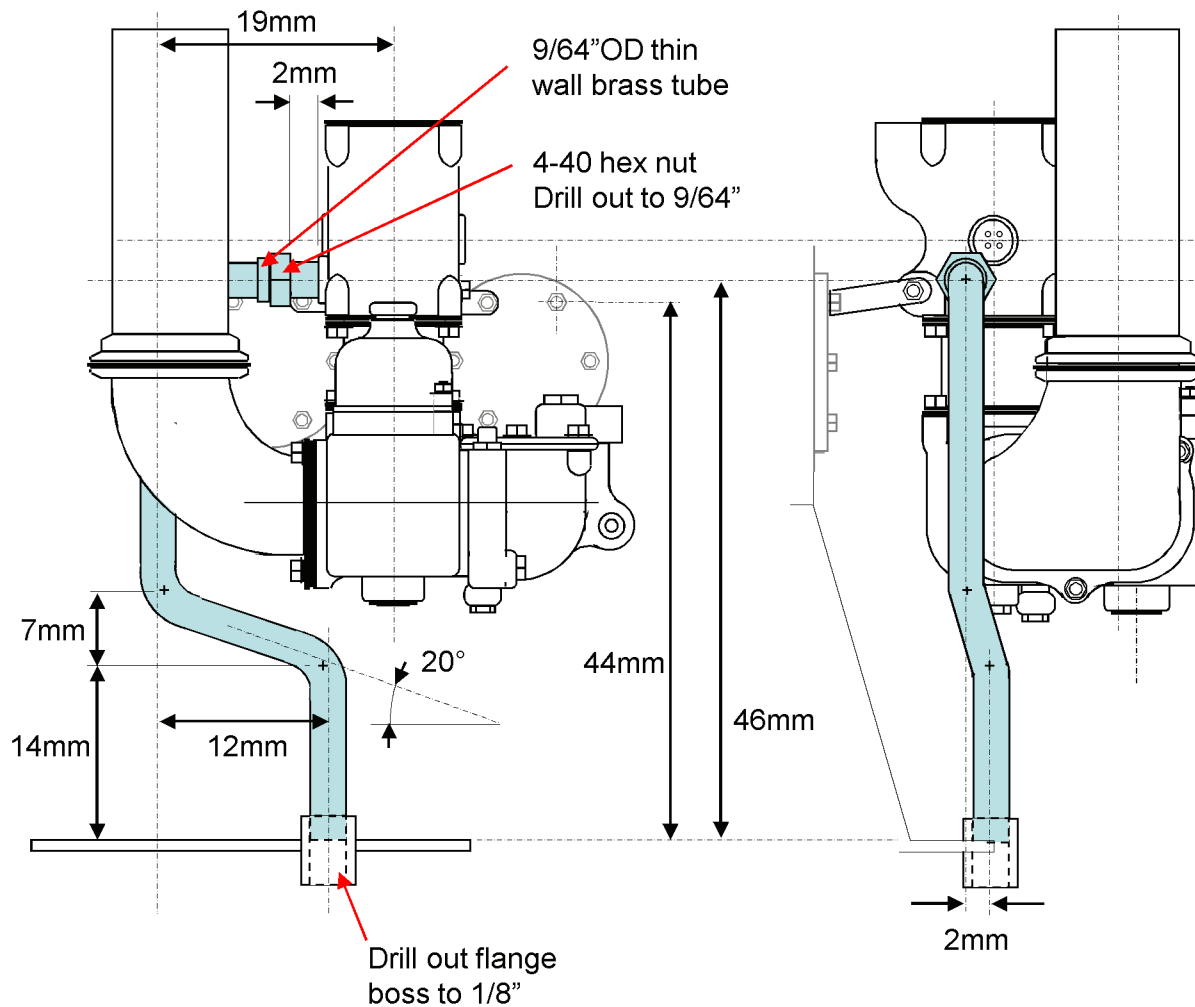


EXHAUST HEATED THROTTLE PIPE

A Pocher exhaust heated throttle pipe needs to be replaced.

Make the new pipe from 1/8" diameter brass rod.

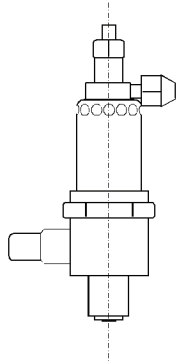
The pipe needs to clear the air cleaner plenum and mate with the new, higher, inlet on the carburetor tower.



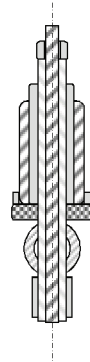
STARTING CARBURETOR

The Pocher version of the Starting Carburetor is a pretty good approximation. However, it lacks detail and, more importantly, doesn't provide for the fuel line or the control rod. Here's a more accurate alternative:

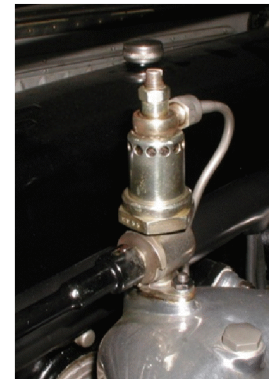
External View



Cross Section



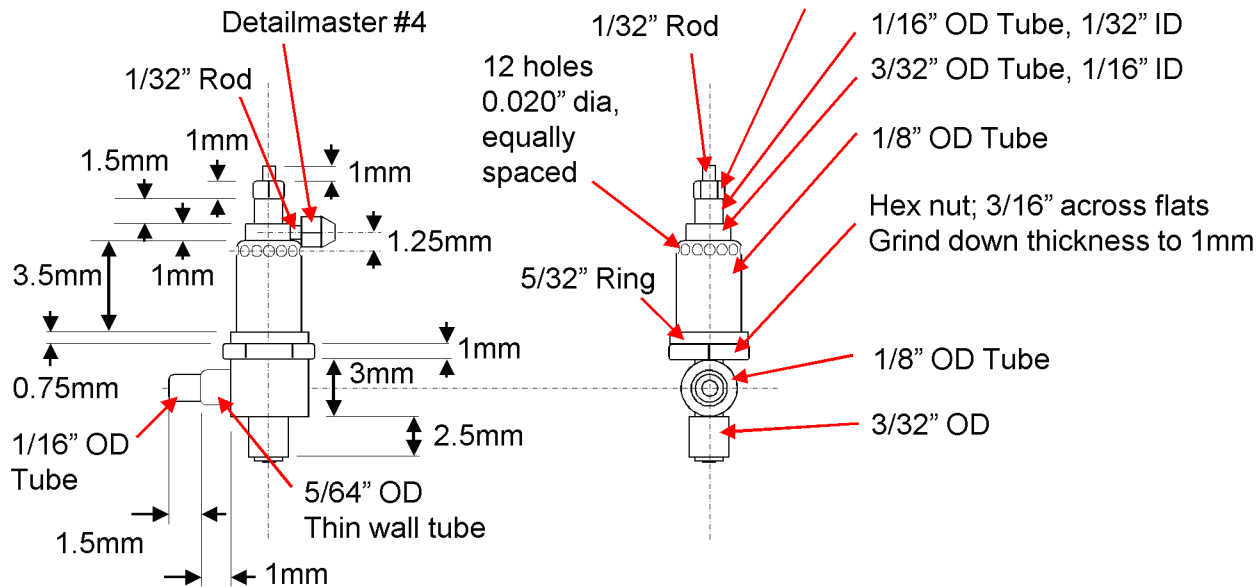
Prototype (Earlier generation of main carburetor)



Model



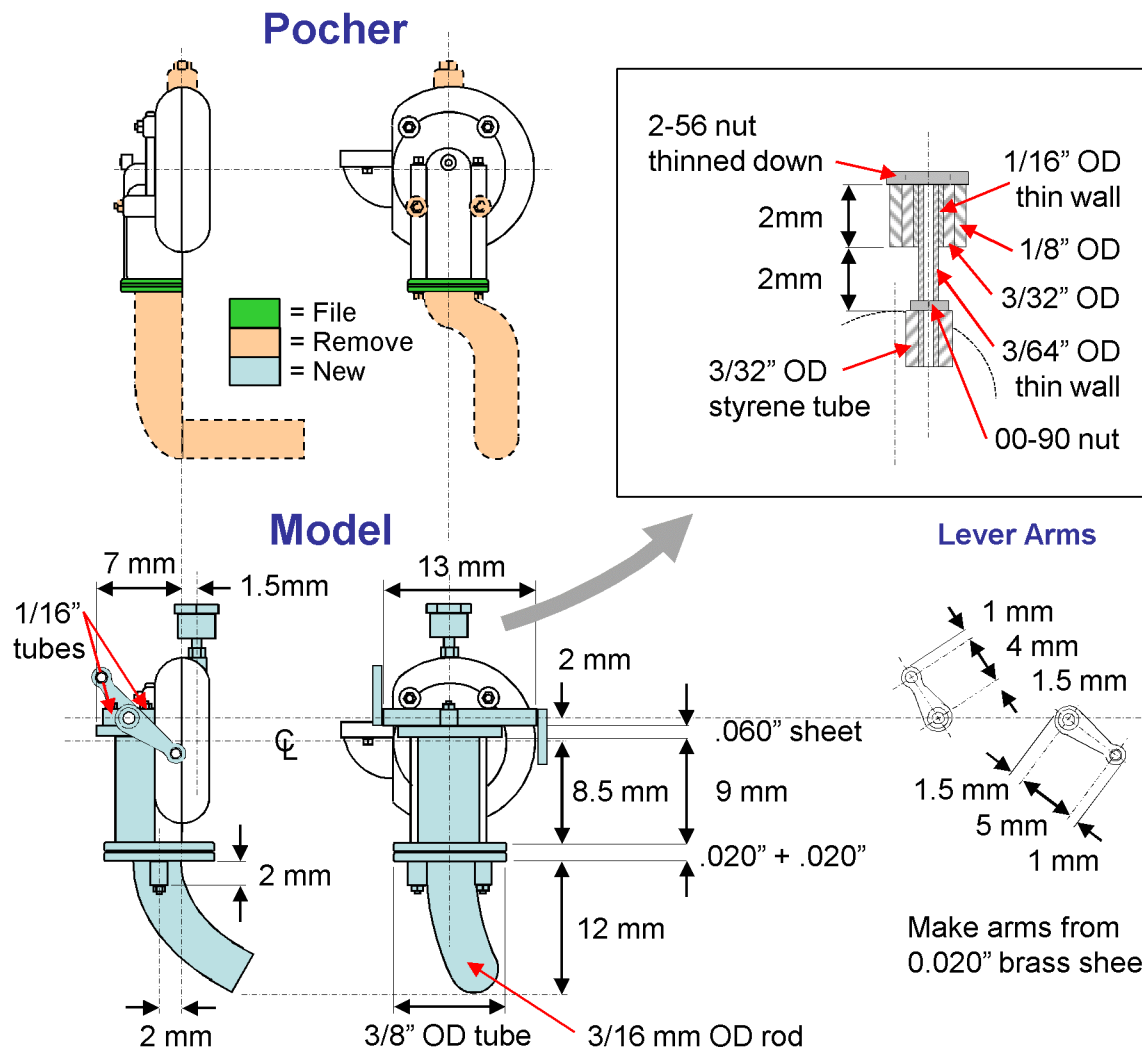
Dimensions & Parts



WATER PUMP MODIFICATIONS

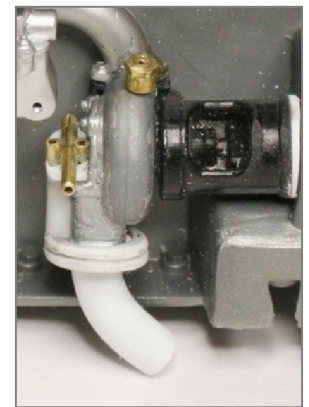
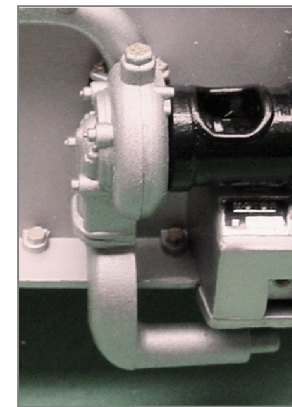
For this carburetor, the water pump has a control arm across its top. Here's how to modify the pump and also make it look more realistic.

Begin by removing the inlet pipe and relief valve from the Pocher pump. Then add the parts as shown.



Pocher

Under Construction



Model

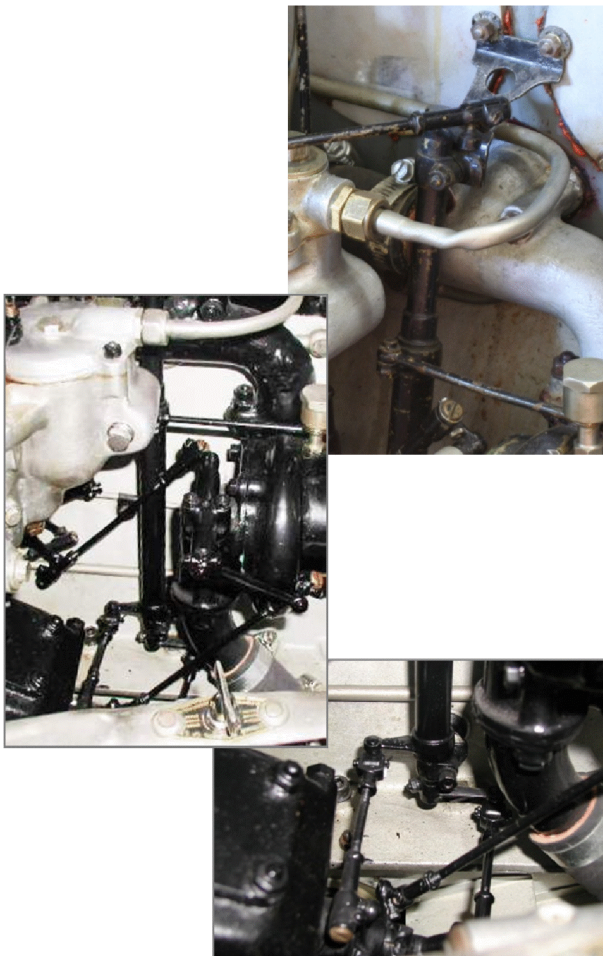
Prototype



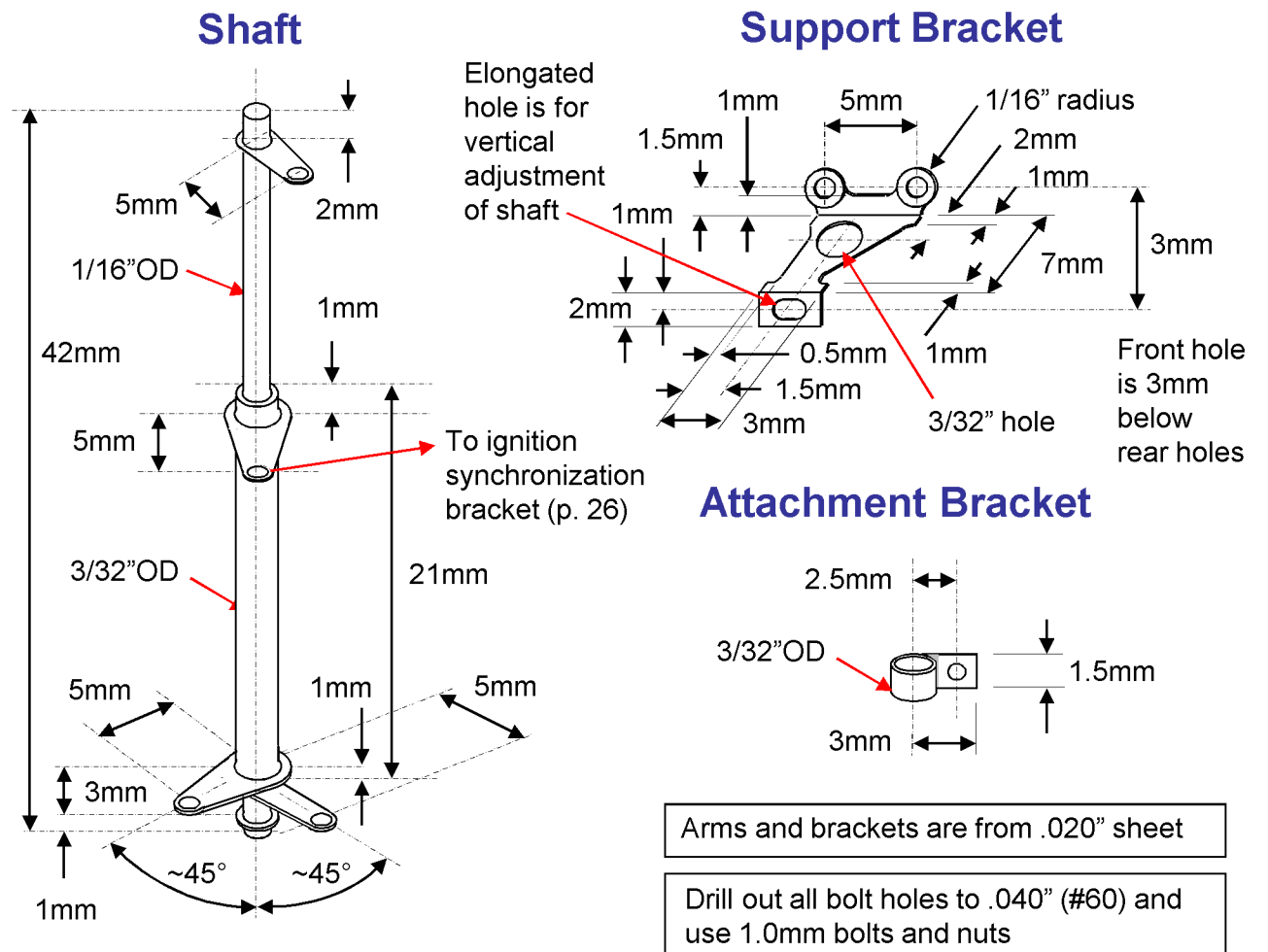
CONTROL SHAFT - 1

Once the carburetor has been modified and oil lines installed, the rest of the control system can be built. The control shaft provides the link between the controls on the steering column and the carburetor and ignition levers.

Prototypes



Details & Dimensions



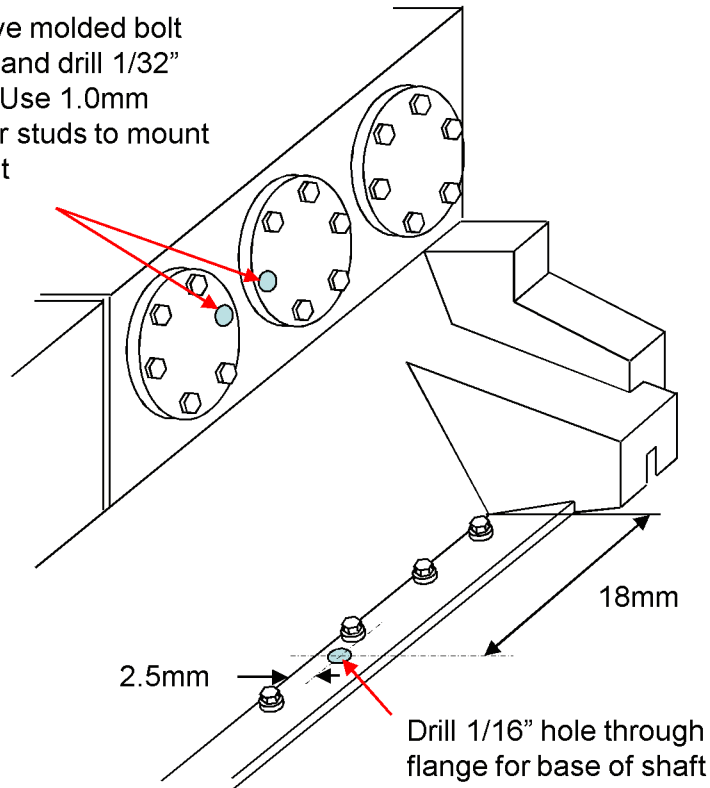
CONTROL SHAFT - 2

Positioning of the base of the shaft on the crankcase flange is important since there is very little room between the water pump, water manifold and the side of the carburetor.

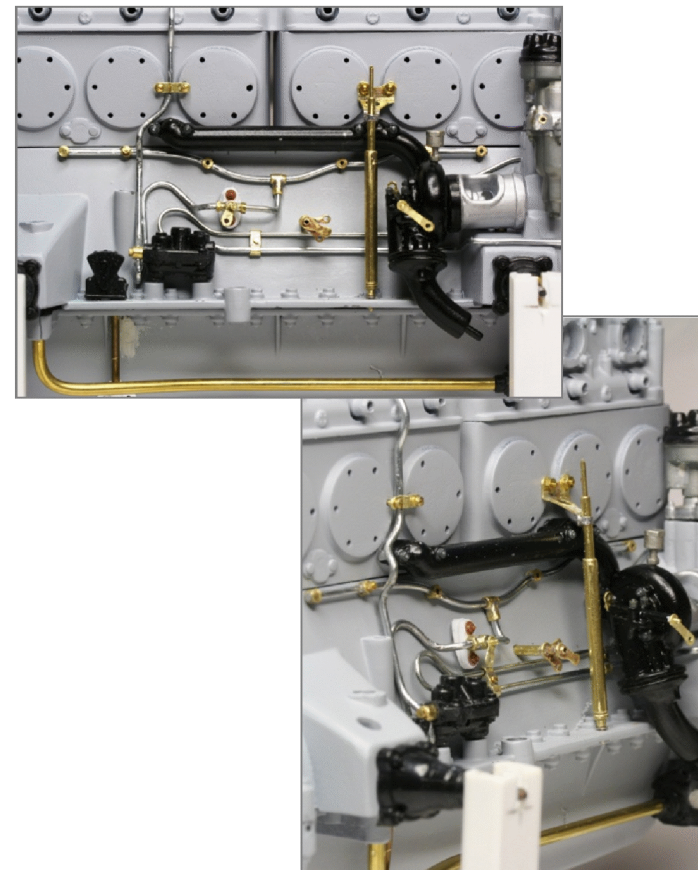
Remove the two bolt heads on the cylinder walls, then drill the hole in the crankcase flange. If necessary, adjust the position of the hole so that the shaft is at right angles to the flange. However, the shaft should lean in towards the engine.

Location

Remove molded bolt heads and drill 1/32" holes. Use 1.0mm bolts or studs to mount bracket

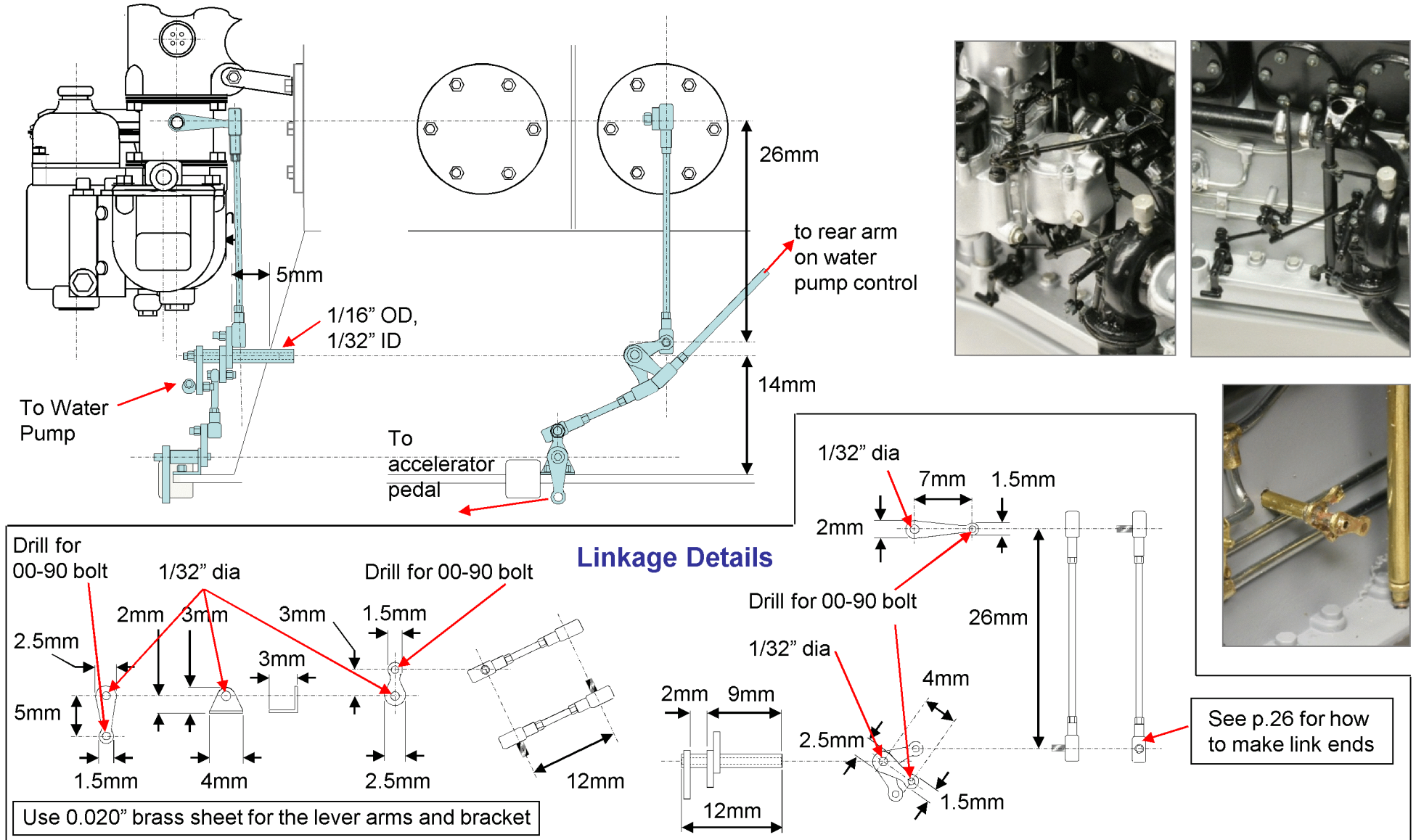


Under Construction



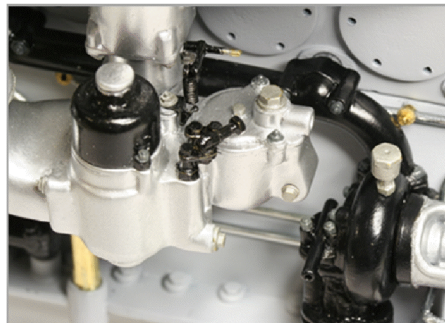
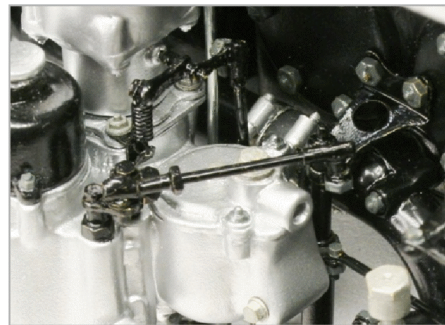
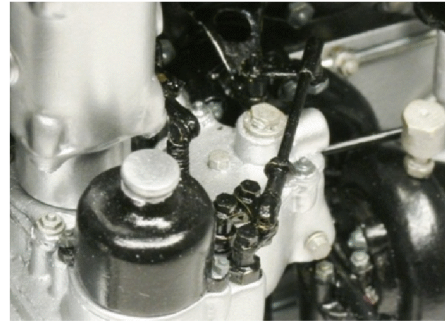
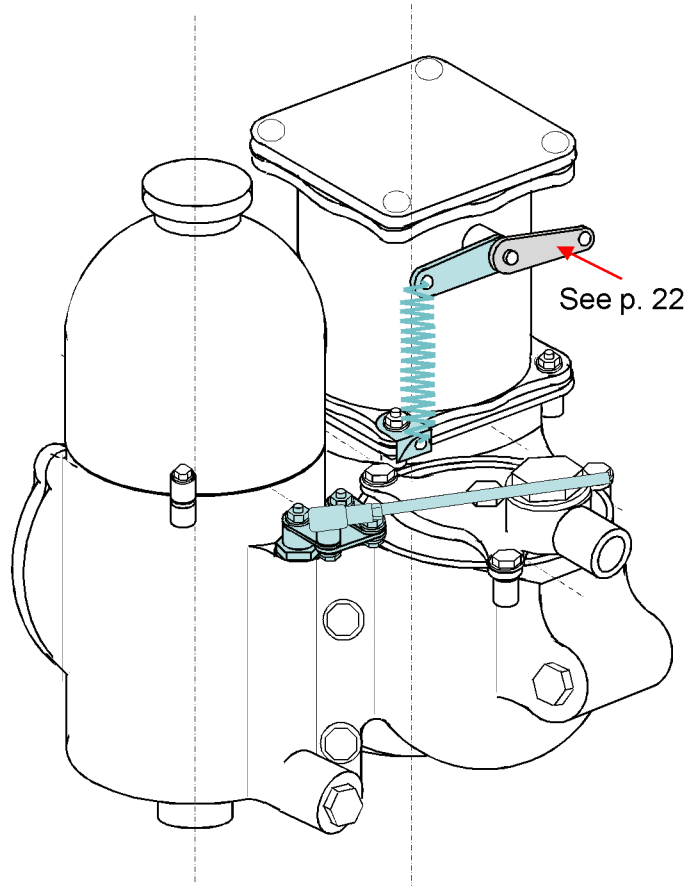
CARBURETOR BUTTERFLY VALVE LINKAGES

This is one of the more complex control linkage assemblies and should be installed before finally installing the carburetor...

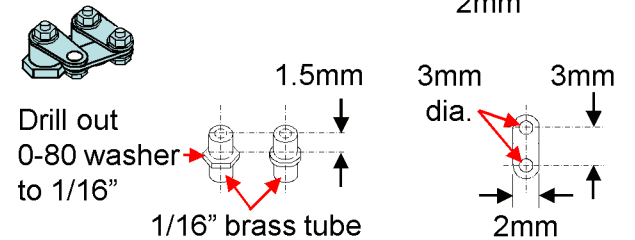
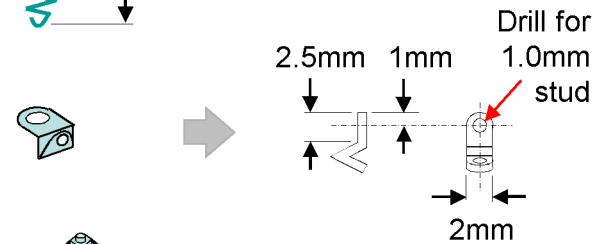
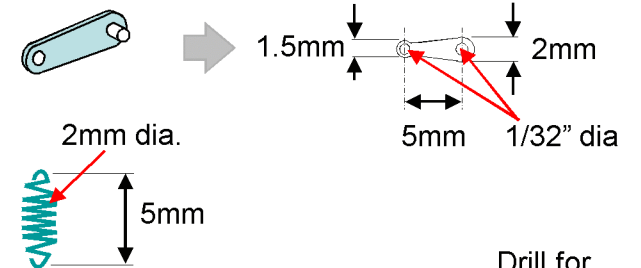


CARBURETOR CONTROL LINKAGES

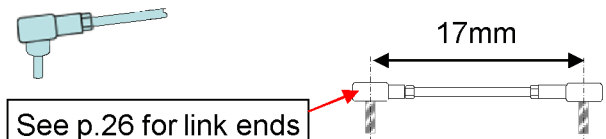
Make the linkage pieces according to the details in the inset ...



Linkage Details



Make 3 links

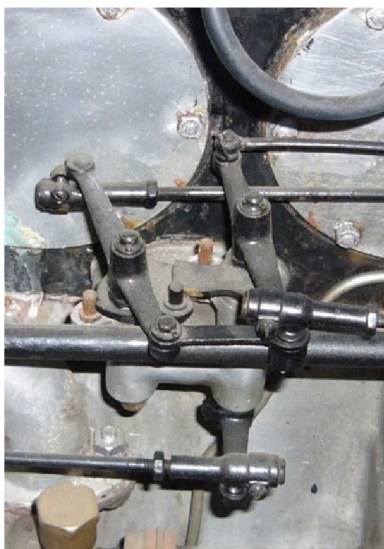


Use 0.020" brass sheet for brackets and arms

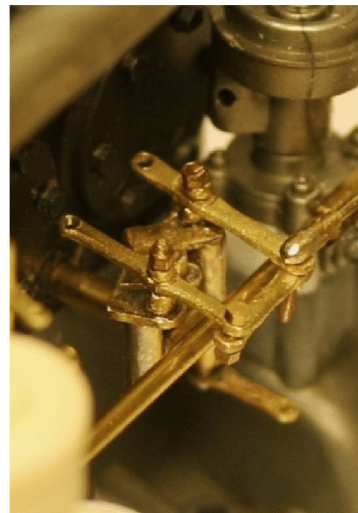
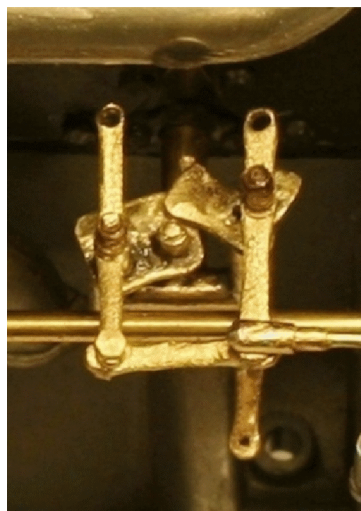
IGNITION SYNCHRONIZING CONTROL BRACKET - 1

The ignition synchronizing control bracket, (Rolls-Royce terminology) is one of the trickier components of the engine controls system to model. This two-page note provides details and dimensions. To improve realism, the two cam plates are included (but not the stops).

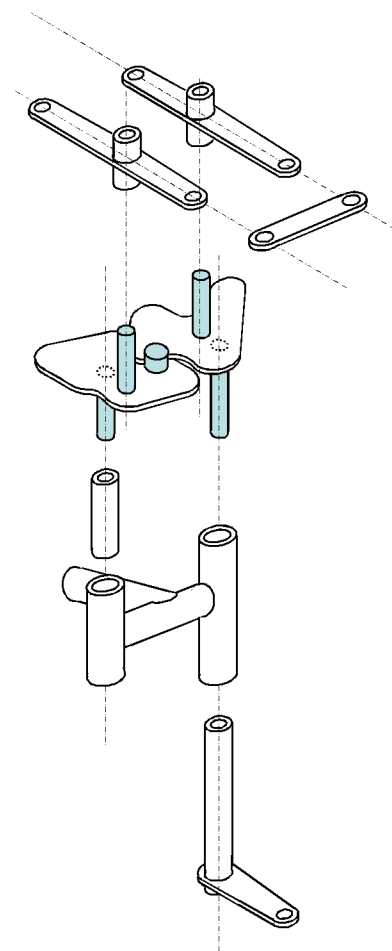
Prototype



Under Construction

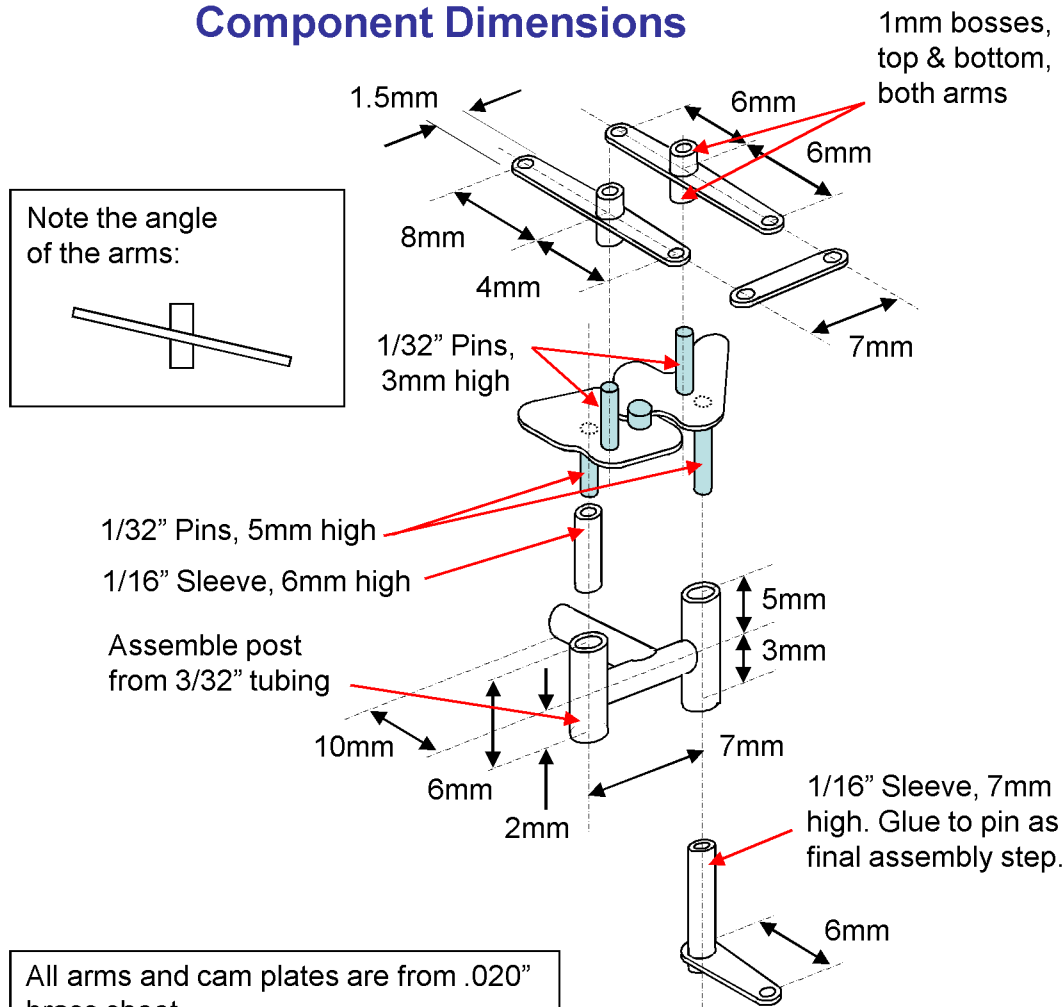


The Components



IGNITION SYNCHRONIZING CONTROL BRACKET - 2

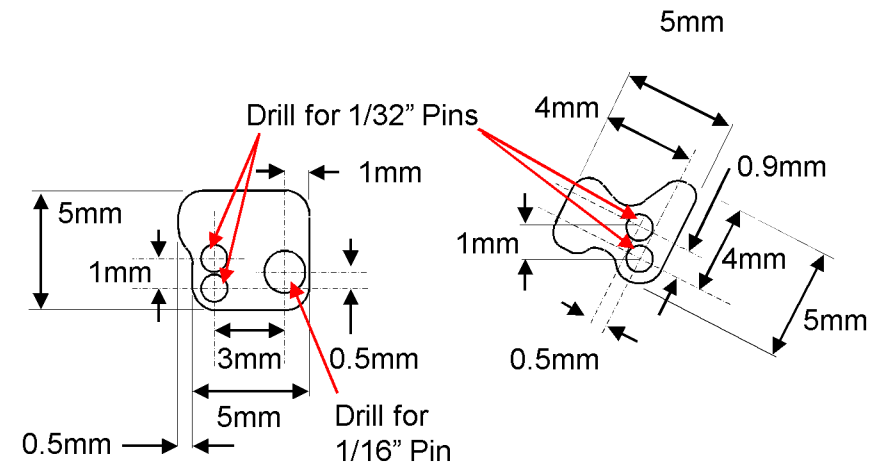
Component Dimensions



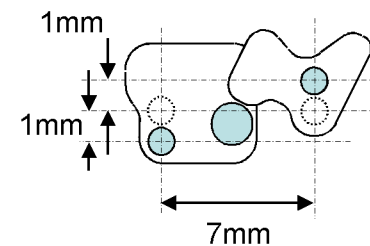
All arms and cam plates are from .020" brass sheet

Drill out all bolt holes to .040" (#60) and use 1.0mm bolts and nuts

Cam Plate Dimensions



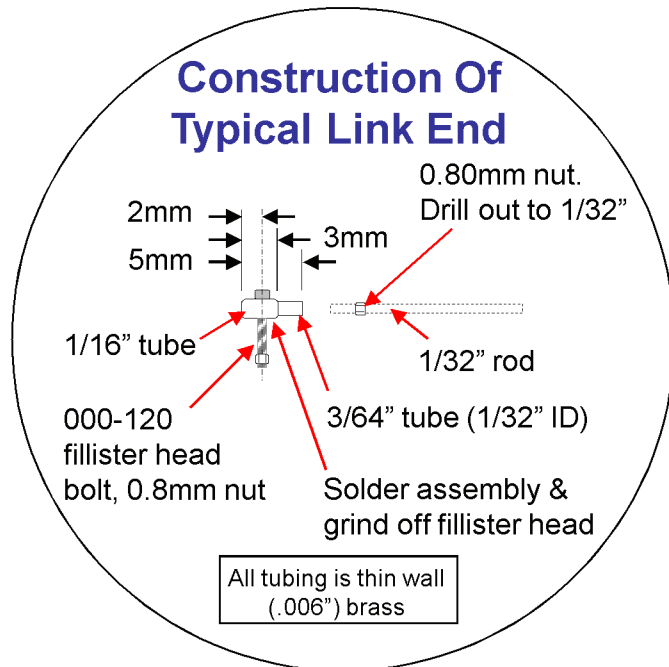
Cam Plate Arrangement



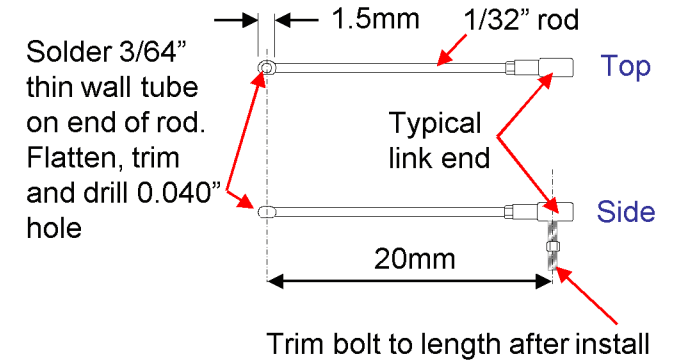
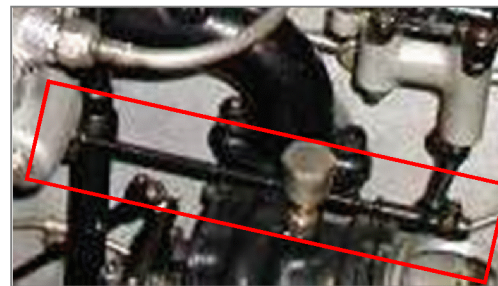
IGNITION CONTROL LINKS - 1

The following two pages describes and dimensions the various linkages between the carburetor, control shaft, ignition synchronizing bracket and governor.

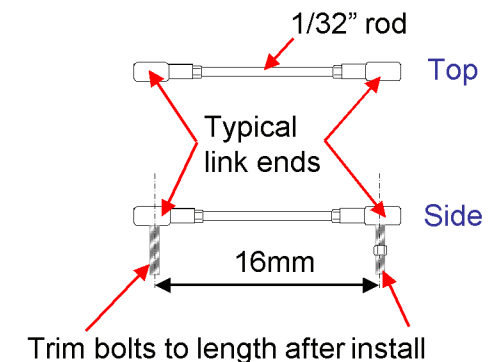
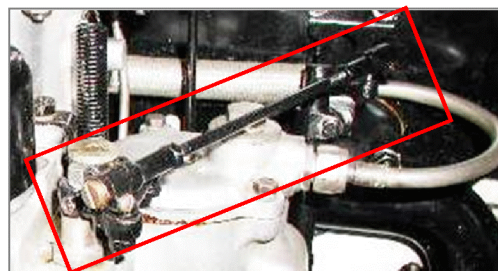
Construction Of Typical Link End



Ignition Synchronizing Bracket To Control Shaft

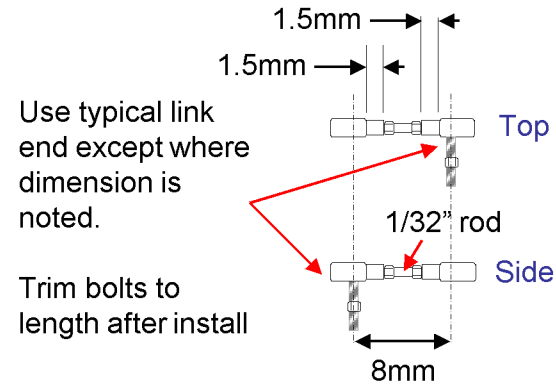
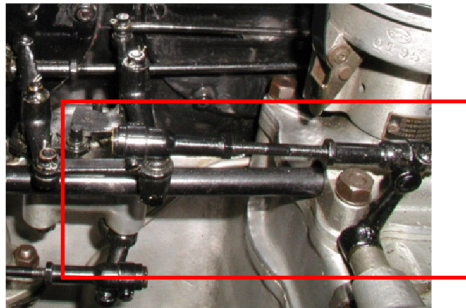


Control Shaft To Carburetor

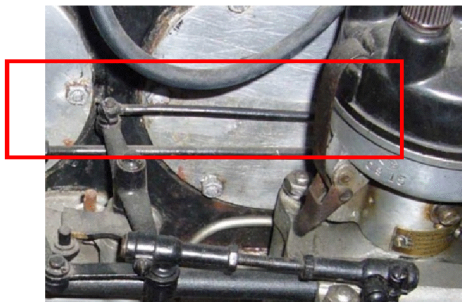


IGNITION CONTROL LINKS - 2

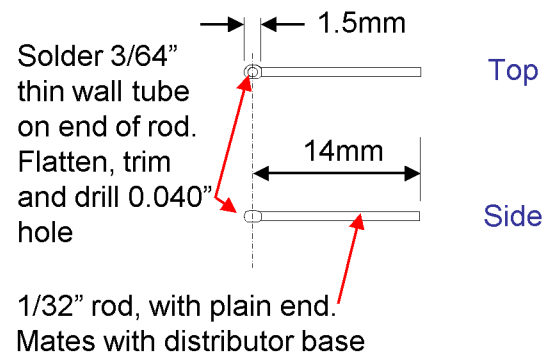
Synchronizing Bracket To Governor



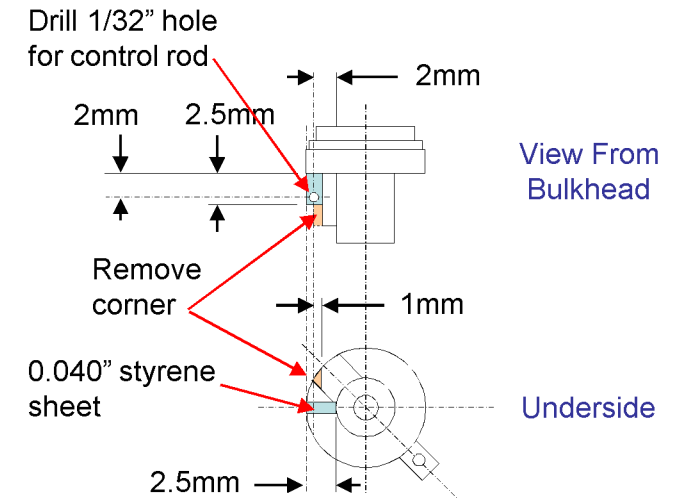
Synchronizing Bracket To Distributor



Control Rod

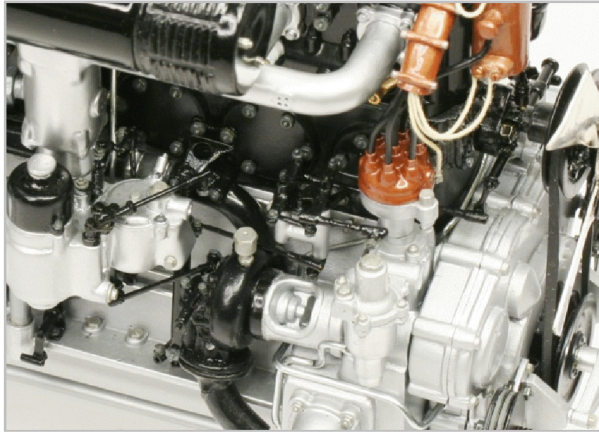


Distributor Base Modifications



SEMI-EXPANDING CARBURETOR MECHANICAL CONTROLS PHOTOS

These are the engine controls on the finished model ...



SEMI-EXPANDING CARBURETOR MODEL PHOTOS

And here's what your semi-expanding carburetor model will look like installed on the Rolls-Royce 1/8th scale engine.

