

## Notes on building and installing an AeroVee 2200 in a Staaken Flitzer Z21

I've noticed that quite a number of builders are considering installing the AeroVee 2200 in their Flitzers. So with this in mind I thought it would be helpful if Rupert and I jotted down our experiences, in both building and installing the engine in G-ERIW.

These notes are offered as an addition to the comprehensive instructions supplied by Aero V and are in no way intended to replace them.

### Engine assembly

#### TOOLS

The AeroV is a simple engine to build needing in the main only the tools found in the average home mechanics tool kit. Although for tightening the prop driver and flywheel nuts you will need a 30 & 36 mm socket. The latter is only in  $\frac{3}{4}$ " square drive and both will usually have to be sourced from a specialist tool supplier.

You will also need a torque wrench capable of 230 ft/lbf. If your torque wrench is old, or of a doubtful origin, get it recalibrated. It only cost a few pounds and will be returned with a certificate of calibration. (Good for showing to your inspector). If you need to know where to get it calibrated, call into your local tyre shop. They all use torque wrenches on wheel nuts nowadays and have to get them regularly calibrated, so should be able to point you in the right direction.

#### STARTER MOTOR

The first problem we encountered concerned the starter motor. Assembled as per the instruction manual it fouls the flitzer's upper engine mounting tubes.

Fortunately the engine adaptor plate can be reversed, placing the starter on the right hand side. To enable the starter motor to operate on this side; a hole is required in the bell-housing flange to allow the gear on the starter motor to project through. The flange is quite thin and a suitable hole can be easily drilled with a hole saw.



BACKPLATE REVERSED TO PLATE STARTER MOTOR ON R.H. SIDE

## PUSH ROD TUBES

The push rod tubes must have the thinnest plating known to man, as rust appeared on them in no time. At the fifty hour engine check, we took the opportunity to fit after-market stainless steel units. My advice would be to discard the ones that are supplied with the kit and fit the stainless ones. They are available from most mail order companies selling Beetle spares.

## SHRINK FITTED ITEMS

The timing gears and prop drive require heating to 400 F. (204C). We found we could achieve this in the average domestic oven, although I'd recommend de-greasing the items first or you'll stink the kitchen out and find yourself grounded for weeks!

## CRANK SHAFT END FLOAT

Aero V describes a method of checking and setting the crankshaft end float using feeler gauges. We obtained the use of a 'Clock Gauge' (Dial Indicator), which made the job much more straight- forward and allowed a final check to be made after the flywheel had been tightened.

The shim set that was supplied with the engine kit did not contain any thin shims, making it impossible to obtain the correct end float. It was probably an oversight by Aero V, but it is worth checking as we were left to source some thin shims from a local Beetle specialist.

## ENGINE BREATHER

An anodised aluminium blanking plate with a moulded rubber elbow is supplied to blank off where the original dynamo mounting/oil filler bracket fitted and is designed to act as the engine breather.

Unfortunately it does not allow, nor does Aero V mention, the fitting of the louvered baffle plate that originally fitted between the crankcase and the dynamo-mounting bracket, although one is supplied in the gasket set.

Without this baffle plate we found that the underside of the aircraft quickly became covered in oil blowing out of the breather.

We over-came the problem by machining a 'top hat' shaped blanking cover, as shown in photo 2, which then allowed the louvered baffle to be fitted. The inside of the new cover also contains an additional baffle and a stainless gauze filter. Rupert reports "no further oil loss from the crankcase breather".



HOME MADE CRANKCASE BREATHER COVER

## OIL COOLER

The Aero V is designed to have a remote mounted oil cooler. We were unable to find a suitable unit that would fit nicely between the exhaust pipes and the front undercarriage leg, so fitted a standard V.W. oil cooler with a Great Plains adaptor. Rupert added a couple of holes in the upper cowling to direct air through the cooler and even on the hottest of British summer days the oil temperature stayed out of the red.



STANDARD V.W. OIL COOLER  
WITH GREAT PLANES ADAPTOR

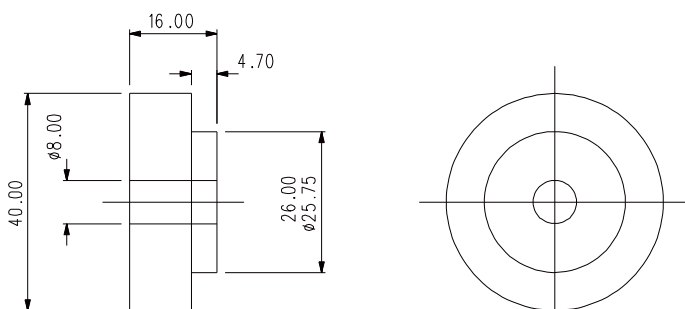
HOLES IN UPPER COWLING TO ALLOW  
AIR FLOW TO OIL COOLER

## INSTALATION

### ENGINE MOUNTING

The Aero V adaptor plate is fitted with top hat shaped, rubber-mounting bushes. They are made from quite a soft rubber, with a hole that is a very slack fit on the 5/16" engine mounting bolts. The first engine runs showed that the mounting was far too soft, allowing the engine to shake badly at tick over. To overcome the problem we machined four alloy bushes, from 1/2" diam bar, with a 5/16" bore and an overall length of 39mm. When fitted they gave a better location for the mounting bolts, which were then able to be tightened up solid, whilst at the same time maintaining the correct degree of compression on the bushes.

Whilst initially this mod worked well, the rubber bushes, before the end of the first season's flying had started to break up, so we replaced them with bushes made from nylon, since when, we've had no further problems.



NYLON ENGINE MOUNTING BUSH

## INDUCTION MANIFOLD

The induction manifold supplied with the kit is designed to pass behind the engine with the aero carb mounted vertical on the end. With the limited amount of space available between the engine and the firewall it was decided to mount the carb under the engine. To facilitate this, the manifold was extended backwards, so it now passes between the engine mounting tubes and the fire-wall and a 90° bend and a carb mounting flange, incorporating an 'O' ring seal, was welded to the 'Y' junction.

To support the weight of the manifold and carb a 16 SWG bracket was fabricated. This locates on the rear crankcase bolts and bolts to a lug welded onto the manifold.

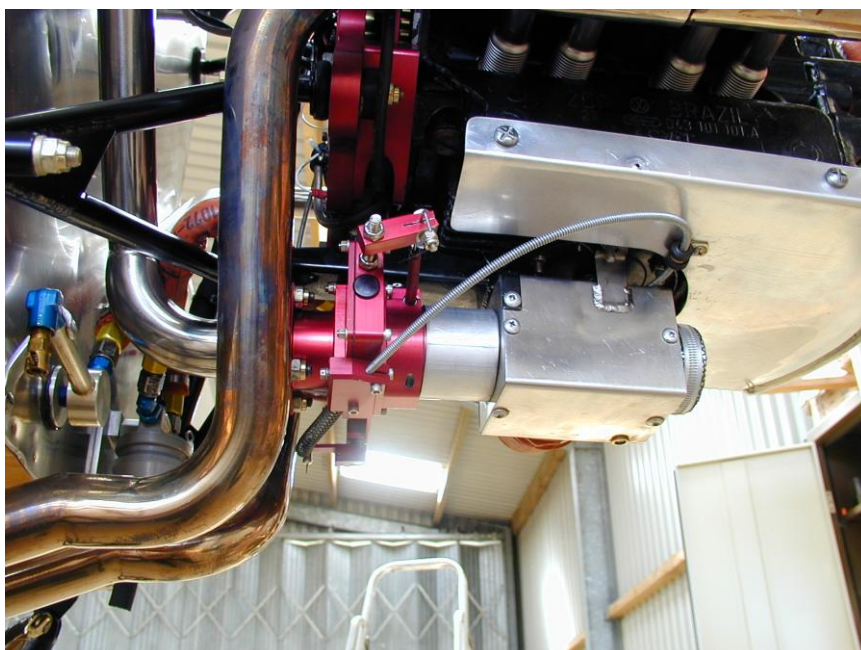
I've drawings of the manifold flange and carb support bracket if they anyone wants a copy.



EXTENSION TO INLET MANIFOLD    90° BEND ADDED TO INLET MANIFOLD

## AERO CARB

Check out the Aero V web site. They have introduced a couple of worthwhile mods. We also purchased the optional four hole-mounting flange which allowed the carb to be bolted direct to the flange on the inlet manifold. The photo shows the mounting flange and also, the cable runs to the carb.



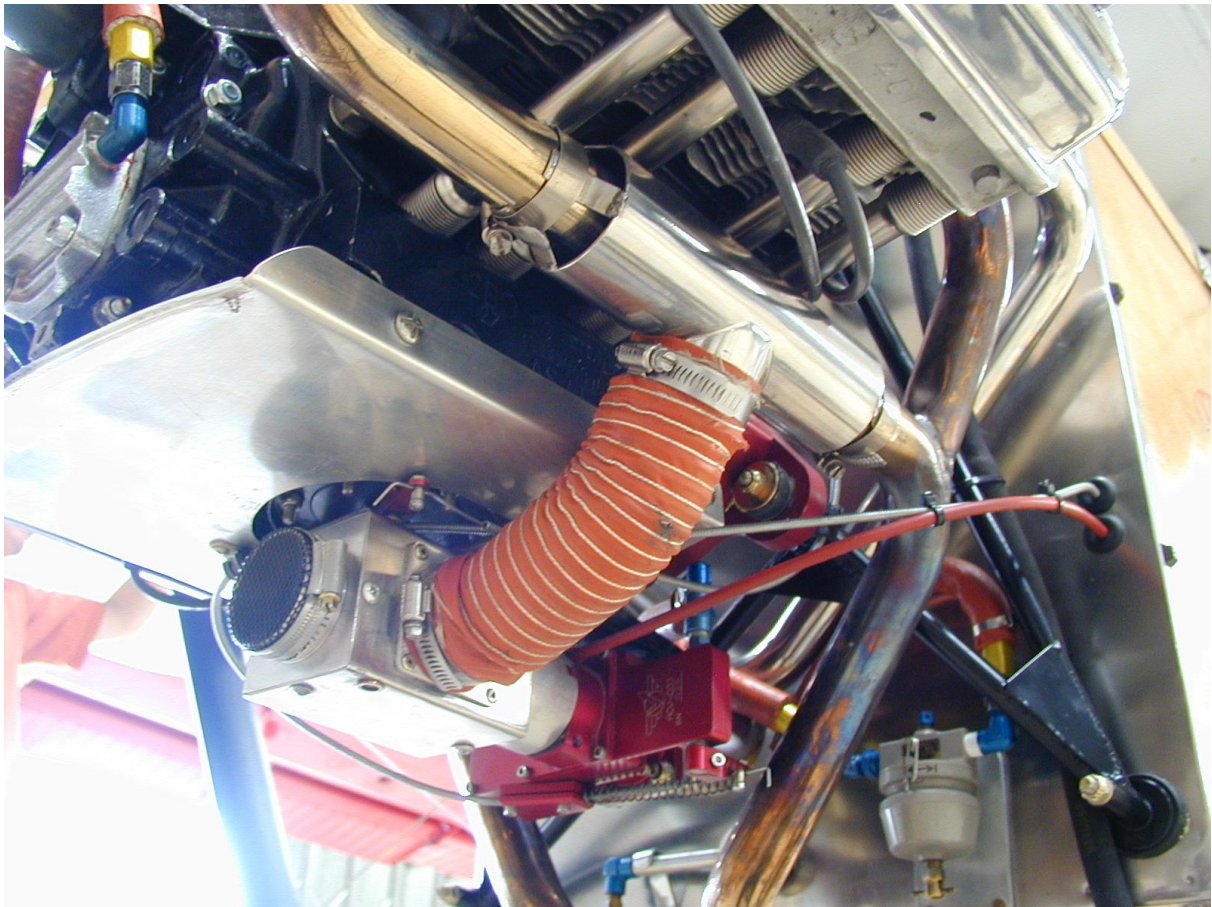
The mixture valve on the Aero Carb is a cone, which closes down onto a tapered seat. We found that it tended to 'stick' on its seating if the mixture lever was closed down hard and took quite a lot of force on the mixture lever to un-stick it. To overcome this we fitted a light spring to the mixture cable. We chose a spring that whilst not having enough force to overcome the static friction in the cable, was under enough tension, when the mixture valve was fully closed, to 'assist' in releasing the valve from its seat.

#### CARB HEAT BOX

The heat box, which can be seen in photos above and below, is a homemade unit and plugs directly onto the carb. Rupert's inspector, Rod, said it was, "Grossly over engineered", but Rupert reports that it works like a dream. I fabricated the casing from stainless with the rest being machined from alloy bar. The next time I make one (assuming there will be a next time!) I'll make the casing from aluminium to save some weight. In the 'cold' position it gives a straight through passage of air into the carb, is very compact and requires no extra bulges in the cowing to accommodate it. I have drawings available if any builder wants to copy it.

#### CARB HOT AIR COLLECTOR

I fabricated the hot air collector from two pieces of 2 ½" tube, only to find I could have purchased a suitable stainless 'T' from Radio Spares for about £30.00 and saved myself quite a few hours work.

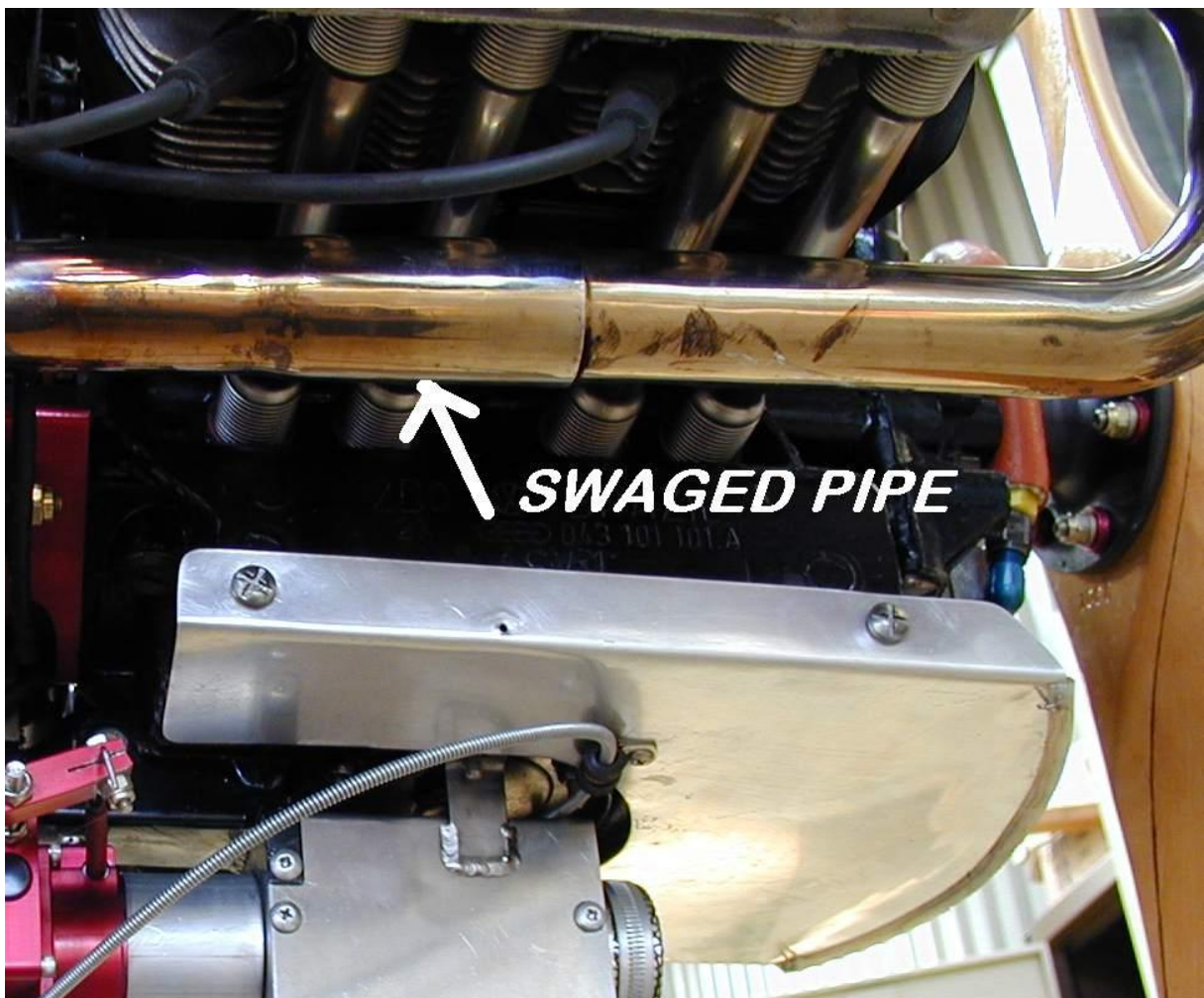


## EXHAUST SYSTEM

The exhaust system is fabricated from stainless tube and elbows, once again available from Radio Spares. Their web site is [rswww.com](http://rswww.com) and the part number for the 'T' piece is 265-4255 and for 1 1/2" elbows is 265-4110. They also sell straight tubing

When it came to welding up the exhaust system, Rupert made us a dummy firewall, laid it flat on the bench, and bolted the engine mounting to it and then the engine. Starting at the cylinder heads we cut and shut pieces of stainless tube and the elbows, so that the system cleared the engine mounting tubes and emerged under the dummy firewall.

Each side of the exhaust is in a front and rear section, joined by a 'slip fit' joint under the middle of the heads. We made up a simple swaging tool to produce the joint, the details of which I will explain in another article.



## IGNITION TIMING

The mag timing on the Aero V is fixed, whilst the timing for the secondary coil ignition is adjustable.

We set the timing of the coil as per the instruction book, but found even after 'tuning' the carb, that there was a noticeable rev drop when running on the coils, whilst running just on the mag produced almost no drop at all! Careful re-setting produced no improvement,

We contacted AeroV who advised us to advance the timing, treating their figure of 25° BTDC as a starting point. The adjustment is easily carried out, without the need for any dismantling and we very soon had it adjusted so there is almost no difference in drop between coils and mag. Also, Rupert is of the opinion that the head temperature came down a little as a consequence of having the coils more advanced.

When we came to run the engine for the first time, we tied the aircraft to the wheel of Rupert's Jeep and under the watchful eye of Rod the inspector, pressed the starter button and to our utter amazement it fired and started straight away. We adjusted the carb as per AeroVee's instructions, since when the engine always starts on the first push of the starter button, whether hot or cold.

We did find in the first 50 hours or so that the tappets had a tendency to tighten up, but since then the engine has settled down and the problem has disappeared.

So there you have it, the trials and tribulations of building and installing an Aero V 2200. We were delighted with the quality of the kit, also AeroVee's no nonsense manual made assembly straightforward.