

TUNED PIPE TROUBLES

Having trouble with your tuned pipe? Jim Fox offers some advice.

One of the most frequently asked questions in my shop, particularly from Heim helicopter owners, is "What length should my tuned pipe be?" Well, I'm afraid that there is no quick answer as it all depends on the rpm you are using.

First, then, find out what rpm your engine is doing. Heim helicopters run at about 10:1 engine to head ratio and other helicopters at different revs, but an easy way to check what your helicopter is doing is to mark the clutch bell and then rotate the head backwards for one turn, counting the number of times the clutch bell rotates.

even though the rotor heads are doing the same rpm.

Tuned pipes work like a musical instrument, the higher the note the shorter the length or in the case of an engine, the higher the rpm the shorter the tuned length of the exhaust pipe. Now, I say the "tuned length" because a tune pipe depends on the internal shape to determine the length. OPS aircraft pipes come with a handy little chart which tells you the length from the glow plug to the widest point of the pipe!

e.g. for 10cc engines
19 to 20,000 rpm

Exhausts which are on the outside of a model can often be run a little shorter than ones which are in a fuselage owing to the fact that the pipe in a fuselage runs hotter and affects the speed at which the exhaust gases move. So if you have the pipe in a fuselage try to make sure you have adequate cooling for it, as a pipe that is running hot gives a similar effect to one that is too short.

I also get asked about glow plugs. Many people are unsure which plug to use. Unfortunately there are no set figures for the correct type of plug. If you could change plugs and test

the rpm while the machine was in flight, you would find as a general rule that if you use a tuned pipe you will have to use a cool-rated plug. (Engines and tuned pipes being what they are, I hasten to say before I am inundated with letters and 'phone calls, that there will always be the odd exception to this rule.) The use of a cool-rated plug is necessary because the extra fuel and air obtained with a tuned pipe raises the compression of the engine. As anyone with a car knows, if the timing of an engine is advanced then it knocks, commonly known as "pinking". A similar thing hap-



A Robbe Avantgarde belonging to Jim's flying buddy, John Sowersby. This model also has an OPS pipe but this time it's fed by a Super Tigre .61, also a successful marriage. One of the nice things about the OPS pipe is that all the 'crud' is blown down and away from the model, a much more refined way of doing things.

Our author Jim Fox and his Heim Lockheed 286. This model features an OPS tuned pipe and Heim Flexi-manifold mated to a Redshift .61 engine. This combination got Jim 4th place at this year's National Championships.



Then if you beg, borrow or buy a tachometer you will be able to work out from your head rpm the speed of your engine, i.e. if the head rpm tachos at 1700 and the clutch bell rotates 10 times for each rotation of the head, then you have a 10 to 1 ratio; so if your head rpm is 1700 with a 10:1 ratio your engine is doing 17,000 rpm, and with an 8:1 ratio it would only be doing 13600 rpm. As you can see from the chart given below, there is about a 6cm difference (2 $\frac{3}{8}$ " in pipe length, so a Kalt 60 EX at 8:1 would need a longer pipe length than a Heim at 10:1,

rpm	length
18 to 19,000 rpm	28.5cm
17 to 18,000 rpm	30.0cm
16 to 17,000 rpm	31.5cm
15 to 16,000 rpm	32.5cm
14 to 15,000 rpm	34.0cm
13 to 14,000 rpm	36.0cm
	38.5cm

Now as you can see, this is quite easy to measure using a piece of string to measure round the curve of the manifold to the widest point of the pipe. If you are unsure, make it an inch longer, as too short a pipe means overheating, melted plugs, critical mixture adjustments and possibly a ruined engine.



pens with model engines. We can advance the timing of a model engine by using a hot plug and retard it by using a cooler plug. So if you are using a pipe do not use a hot plug as this will advance the timing by too much. It may well be adequate for hovering but once the throttle is opened it will probably start knocking. I have no hard and fast proof for the following theory but often wonder of this is partly to blame for the many con rod and bearing failures that I've seen and heard of in the past few years. As an example, Enya No. 3 plugs are great for engines with

PROBLEM

Very quiet, no power

Noisy engine, uncontrollable revs in the hover, melts plugs, mixture critical.

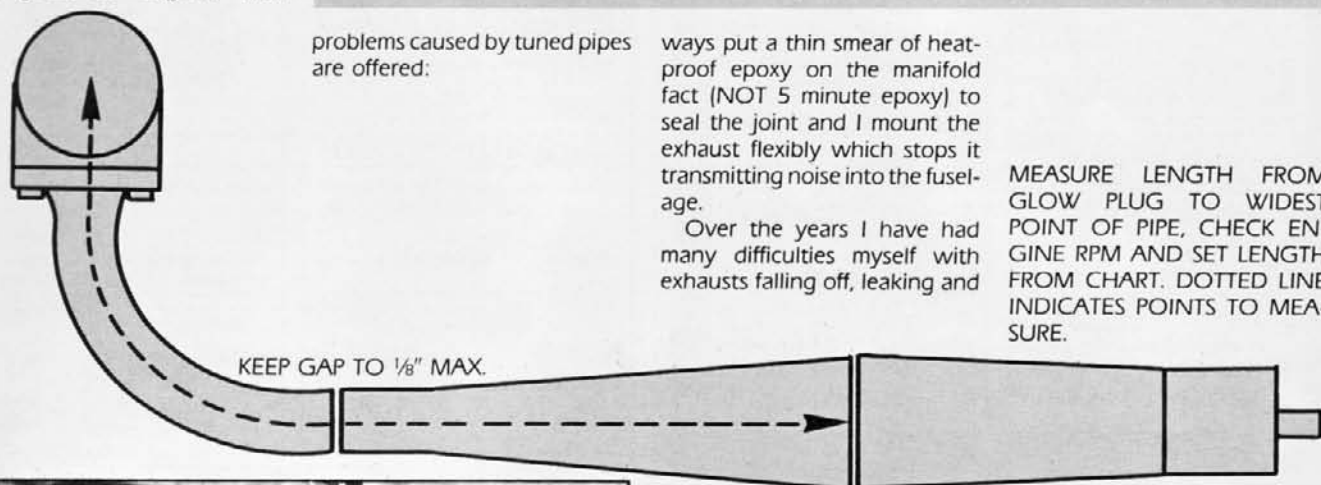
Silicon keeps melting on pipe to manifold joint.

REMEDY

1. Pipe too long—shorten
2. Pipe blocked up—clean or replace.

1. Pipe too short—lengthen.
2. Make sure pipe is not getting too hot.

Place a short length of PTFE tube under silicon tube to protect silicon from heat.



problems caused by tuned pipes are offered:

ways put a thin smear of heat-proof epoxy on the manifold fact (NOT 5 minute epoxy) to seal the joint and I mount the exhaust flexibly which stops it transmitting noise into the fuselage.

Over the years I have had many difficulties myself with exhausts falling off, leaking and

MEASURE LENGTH FROM GLOW PLUG TO WIDEST POINT OF PIPE, CHECK ENGINE RPM AND SET LENGTH FROM CHART. DOTTED LINE INDICATES POINTS TO MEASURE.



silencers but put one on a piped engine and at full throttle there is a noise like sausages frying. Fit an Enya No. 5 or 6 plug and this noise disappears, engine rpm increases and the mixture becomes less critical. OPS plugs also come in hot and cold varieties so it is worth while testing

Dave [I'm the fastest man in the world] Whitney, does things in his own way. He uses a Rossi .61 with a Rossi 'long' pipe—due to the engines wide porting—with a manifold of his own making. This obviously works well, it got him 5th place at the Nationals.

your engine with different plugs to find the best one for you. Use one with a thick element and a well-charged battery—many power panels will not light 5 and 6 amp plugs. I find that a 2 volt lead acid battery is completely satisfactory.

The following solutions to the One more point before I close. It is important to keep the system sealed. Leaking manifold joints, broken silicon and cracked manifolds not only blow fuel all over but upset the tuned effect of the exhaust which then loses power. I al-

John Wallington's Omega with a YS .61 and Hatori pipe and manifold. This is just about the neatest way of stowing all that plumbing aboard a pod/boom type of model. It's not only neat but quiet as well. Oh, and it got John 2nd place in the Nationals. (This is turning into a Nats report).

making the engine run oddly, and it's only by experimentation and following up other modelers' advice and suggestions that I've been able to cure most of them. So I hope that this article will in turn help you to understand and solve your tuned pipe problems. Good luck ☐

A good compromise is seen here on Lawrence Green's Heli-Star. It's Schluters tuned silencer. A good way of getting extra power, super quietness and an uncritical set up. No, Lawrence didn't enter the nationals.

