Hints ‘n Tips

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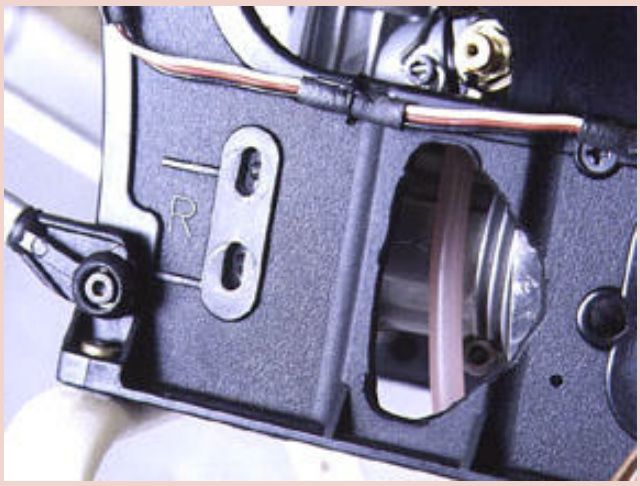
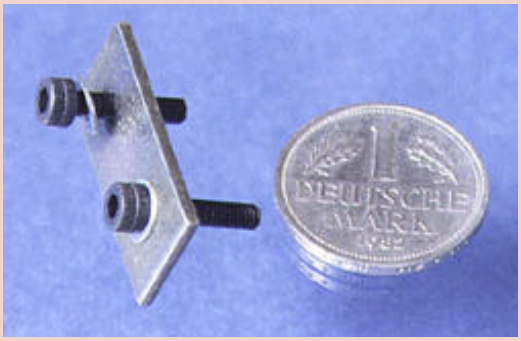
ZXX - Final preparations for flight

This month I'm going to cover some of the detail work that I have performed on the ZXX to finally prepare it for flying. I guess it might seem to some of you that I take extraordinary care over some very simple items, but my experiences tell me that if something can go wrong it will, so I try to imagine what might fail in service and how I can prevent that occurring. Re-building after a bad crash takes longer than putting a new one together; time spent now could save a lot more later.

I don't put the ZXX through that many contortions in the air, but the model is certainly required to fly inverted, roll and loop - sometimes I'm even able to manage this deliberately. The `G' forces that this imposes can be quite severe, so loose wiring, fuel tubing or any other item has to be properly secured. I'm running a modified Irvine 36 on a short pipe and 12% Nitro too, so the airframe has to withstand above average power. One weak point is the engine mount area in the plastic sideframes. Over the months the screws can bed into the plastic, subjected as it is to regular heating, and crush the slots closed. This makes engine alignment more difficult, so it's necessary to open out the slots again, easily done with a mini power drill and a 3mm drill, just run it up and down the slot.

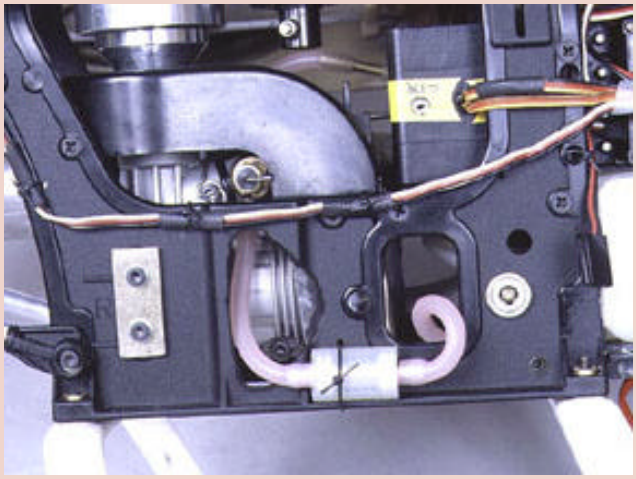


I also made some simple load spreading plates which stop the problem completely, shown in the picture here against a 1 DM piece. The other picture shows them in place. It's very important on the ZXX to get the engine aligned accurately with the clutch, and the very slight fore/aft movement that results from this minor modification is usually all that is needed. Conversely, when the screws are gripped by the tight slots, getting the motor aligned seems to be much more difficult.



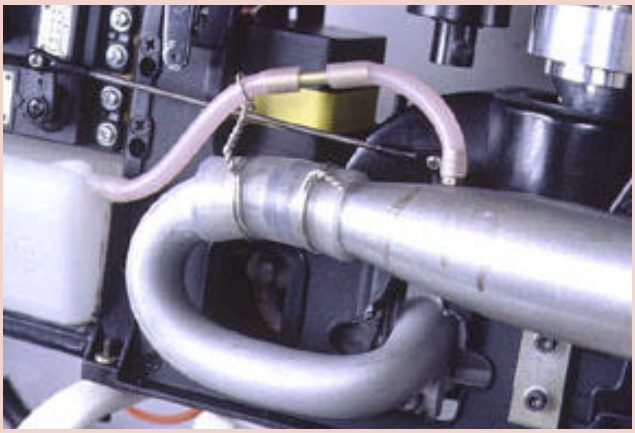
Earlier I mentioned the importance of securing loose or potentially loose items properly. In the case of the fuel line, that which carries the lifeblood to the engine, it's also important to ensure that it can't chafe against any sort of projection which might cut it. The modern thick walled tubing is much better that the older stuff, which seemed to tear very easily when nicked, so provided it is not running over any sharp edges (a sideframe from an Ergo 30 springs to mind...) it will usually be Ok. The

fuel filter that I happen to have fitted to the Shuttle is quite bulky so to avoid it rubbing against any other parts I have sleeved it in a piece of silicon tube (exhaust sized), and tied it to the side of the frame.

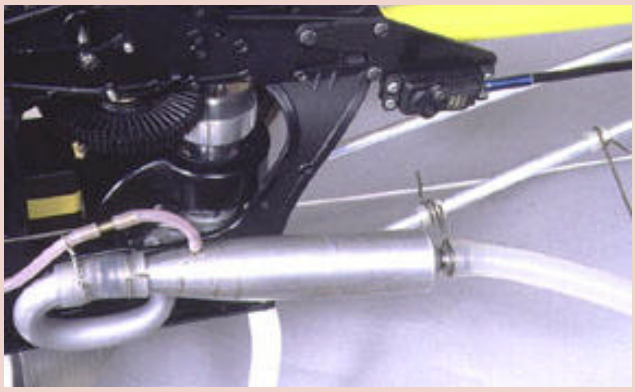


This picture also shows the extra cutout I have made in the RHS, which makes installation of the motor and silencer much easier. There is, after all, one in the left hand side for the exhaust system, so I couldn't see why the RHS shouldn't have a hole too!

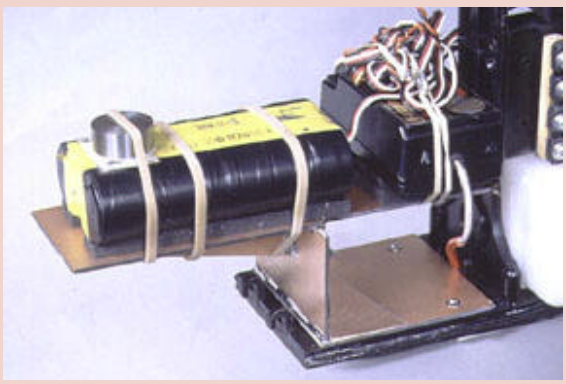
While we are on the small tube, the next picture shows the left side of the machine with the pressure line from the tank vent to the silencer nipple. As you can see, the tank vent points directly at the manifold, and the pressure line would degrade quickly if allowed to contact the very hot manifold. I use 18 SWG copper wire to bind the exhaust joiner silicon tube, and leaving the `tails' long provides enough to make a loop to constrain the vent tube. I always run this in two parts, by the way, as it makes it easy to separate the silencer from the machine without having to replace the whole pressure pipe which is inevitably stuck firm to the pressure nipple - no chance of a leak there after the first flight!



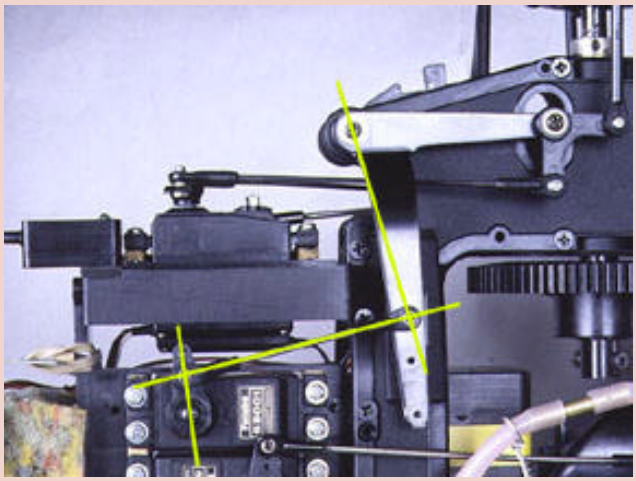
A slightly broader view of the silencer shows the flexible fittings that I've made for the pipe, not a particularly heavy one in this case. Because it's light, support at the front via the silicon joiner is more than enough, and the rear is mounted via silicon tube insulators and 16 SWG piano wire clips. There's also an extension to the outlet, in larger bore tube which fits over the smaller tube that the piano wire clip goes around. The larger bore - I hope - doesn't increase back pressure significantly, but a further piano wire clip holds this away from the machine and keeps 95% of the oil off the tail; I may have mentioned before that I hate oily helicopters...



Sometime ago I fitted a tail pushrod upgrade and this required a rear mounted servo. Unfortunately, this moves the balance point back a bit too far, so I had added about 65 grams of noseweight in the front of the canopy. Resolving to get rid of as much of this as possible, I fabricated an extension tray which fits right up into the nose of the canopy and carries the battery as far forward as possible. Even then I had to add a further 17 gm of noseweight (on top of the weight of the tray), but the overall weight came down a little to 3087 gms, about 6 pounds 13 ounces. I have my eyes on a super light carbon fibre tailboom, which may well mean I can remove quite a lot of the extra weight from the front - to increase performance add lightness... :-)



One other modification I made to the collective pitch linkage is pictured below. The ZXX collective pitch linkage is generally quite linear except for the first link from the servo to the large pitch arm. I'm not going to tread the regular ground of right angles, lines of action and linearity, suffice it to say that servo movement about the mid point (also zero degrees pitch, with the pitch arm horizontal) now gives equal throws at the head, as it should be.



The green lines should all be at right angles (90°) when the pitch arm is in the centre of the big slot in the top of the sideframes. The servo arm would be if I'd remembered to set the arm central before taking the picture...

Flight tests

Flying the ZXX after a 6 month break was a real pleasure. It's a delightful model to fly and has few vices. The tail is solid, though it's useful to have a fade out gyro to get excessively fast pirhouettes. I had a couple of sessions with the machine in very light wind conditions and autos are a one shot affair, there isn't much left at the bottom end for the flare - or `pull', as I believe it's called in full size. During the first session the head was clocked at just over 1900 rpm; this is probably too fast, but does indicate that the engine was pulling well as there was hardly any sag on climb out.

The model was a little pitchy in fast forward flight but I would be more inclined to put this down to general wear in the control systems rather than a fundamental problem with the ZXX itself, and I should remind you that I'm using the K&S Pink paddles. Even though they are on the front hole with girlie weights too, there are times when the paddles almost seem to lose control of the head. I have my eyes on some upgrade parts (one reason being that I'm helping with the marketing of Quick UK, so I have access to a fair range of Shuttle upgrade parts :-)) with a view to tightening up the head; doubtless you'll be reading about them in the coming months.

Towards the end of the first session the blades suddenly went out of track - by about 100mm (4") and only for half a second or thereabouts. I had this happen earlier in the season so clearly there was a problem brewing. This bent the feathering spindle and blade bolts, so I limped it around with the blades a few mm out of track and took it home in one piece after a very satisfying four flights; the first time I had been able to go flying for nearly 6 weeks!

Back the next day with a new spindle and blade bolts, the problem did not re-occur, though I took it a bit easy on the high speed flat dives to avoid this. I'll be doing some more investigation on this problem and will report further next month.

The Fuel Mixing Bottle

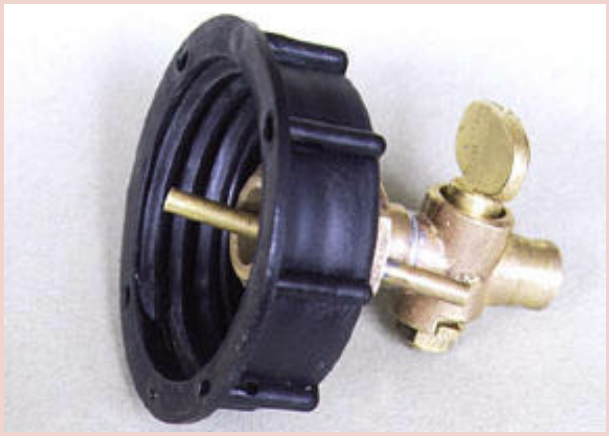
Yes, I know, you thought you'd heard the last of this. Sadly no, but we are nearing the end of the saga. Having chosen a suitable bottle in which to mix 5 gallons of fuel, then discovered that the cap wasn't fuelproof, then tried to make a new cap and failed, I finally got hold of an ex aviation fuel container with a good quality, fuelproof cap. Oh, Joy...

Well almost. It again may seem like an attention to detail bordering on the extreme, but for the fuel to drain out into the gallon bottle that goes with my flight box, there has to be a path for the air to go in - logical, eh? But I didn't want to drill any holes in the bottle as any fitting might leak and there's also the problem of fixing it from the inside through the only available hole (where the cap fits), about 70 mm diameter. Wouldn't it be much better to arrange the vent to go through the cap somehow?

However, I wanted to be sure that the vent would always pick up air rather than fuel, as this could cause problems with decanting the fuel, so I needed a float on the end of a piece of silicon tubing to carry the vent to the top of the fuel. The opposite of a clunk weight, in other words. I hit on the idea of using an old float from a car carburettor, shown overleaf in before and after form.

A float from an old Ford carburettor, above in it's original form and below, with the air vent pipe attached. So far it's worked well in use

I set the tap assembly up on the drill and drilled diagonally through the body to provide the vent. Since the tap is all metal this tube could then be soldered into the tap body, as shown below. The float is attached via about 450mm of tube and in tests so far it's never spurted out any fuel and the drain into the gallon bottle is nice and even.



More Hints and Tips next month; if you have any ideas which saved a model, save time or indeed money, send them to us and I'll included them in future articles.

And finally...

I do wish service departments would not bind up the receiver lead so tightly as shown here, even when it is uncoiled it's all twisted and kinked (suits the Editor, some might say...). Any electrical lead should be coiled to avoid unnecessary stress. It's not a major thing, but it's very irritating! :-)

Until next month may I wish you a very Happy Christmas and a successful and prosperous 1997.

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