

“Yak Reload 2010”

Dan McCoach

This is the second “installment” of two documenting the rebuild of a Quique (QQ) 102” Yak. “Picking up” where I ended the first installment, I said we would cover the following in the second installment:

Next Yak documentation installment:

- Wing Modifications (required to go from four wing servos to two wing servos)
- Engine install
- Final weights
- Final thoughts

Regarding the wing modifications, as hinted at in the first installment, I made the weight-conscious decision to go with only two 5995 servos (one per wing, vs. four servos http://www.servocity.com/html/hsr-5995tg_ultra_torque.html). In order to do that, I decided to create a new mount for the single servo(s) – a new mount centered on each aileron (as a result I am not using the existing mounts because they are at the outer edges of the ailerons). Consequently, I remove the existing hard-points (chisel them out with a screw driver to remove their weight). Please see the photos below:



Next I opened the covering next to the chosen-centered rib and build “off of” that rib to make a new servo box. The final job is to insert new hard-points into the aileron appropriately off-set from the servo-arm center for proper mechanical throw and mechanical “advantage” at full deflection (i.e. the right off-set). To make the hard-point, I use a $\frac{3}{4}$ ” hardwood dowel cut off at angles to match the aileron taper and epoxy them in-place. The dowel is epoxied in “up-against” the leading edge of the aileron for support, and I make the hole in the sheet-cover “just big enough” so that the dowel is

“Yak Reload 2010”

Dan McCoach

“squeezed in” and is further supported by the aileron sheet-covering (just as strong as the factory-built hard-points).

The result is about a total twelve ounces saved!!! (Between both of the wings including the two servos not used.) The final result of the completed wings looks like this:



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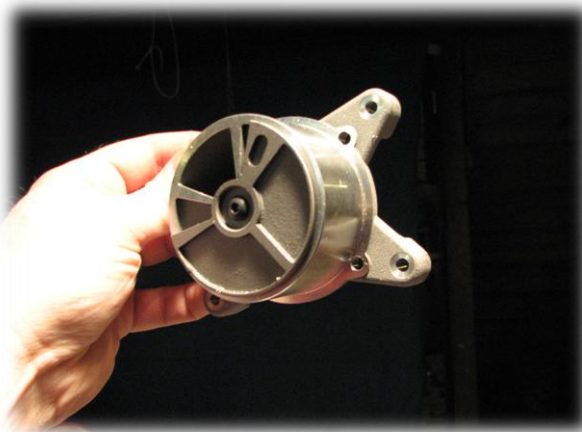
“Yak Reload 2010”

Dan McCoach

Regarding the ZDZ-Super 80, I had a “bear of a time” with the rebuild due to the crash damage, and the change in parts by ZDZ since the issue of my Super 80 (I think this one is a 2006 or 2007 year-model). Here is what occurred:

- The new back plate and rotary pump is a slightly different design from the old one – the carb. diaphragm breather hole is moved – and the carb. mount holes are no longer 3mm, they are now 5mm (so I had to get new screws).
- The old carb was a Tilloston (made in Ireland) – I had to replace the Tilloston because I bent the adjustment screws in the crash. However, you can’t get parts any longer for Tilloston’s. The new carb. used by ZDZ is Walbro (US made) – So, I had to order a new Walbro carb., but Troy Built Models (now handling ZDZ-USA) didn’t have any – so I had to go a lawnmower shop in Ohio (internet search) as one of the few suppliers to have the right-size Walbro carbs. (I guess everyone buys carbs. in the spring!!)
- I also took the entire engine apart and cleaned the piston-head and exhaust port and compression ring – this is what the disassembled ZDZ looks like:

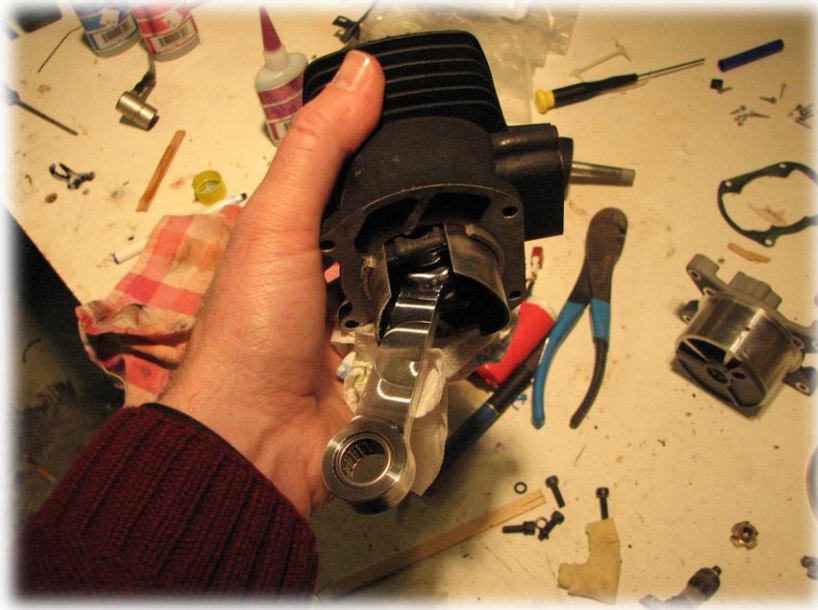
New back-plate shown below (on left with the case on the right – cylinder block and head removed). The “rotary-valve design” for air induction through the carb. is visible here – it is a rotating-plate that is actuated by a pin at the bottom of the piston-arm (as the piston arm goes ‘round the counter-weight with each revolution of the crank-shaft, the pin also rotates the “valve” or the cover you see below). Putting the back plate on the crank-case is a bit of a trick because 1) it is a very tight-tolerance fit, 2) you have to use high-temp gasket seal on it, and 3) you have to line up the piston-arm to engage the pump-slot properly and very carefully (or very bad things will happen when you start it).



“Yak Reload 2010”

Dan McCoach

Removing the piston from the block:



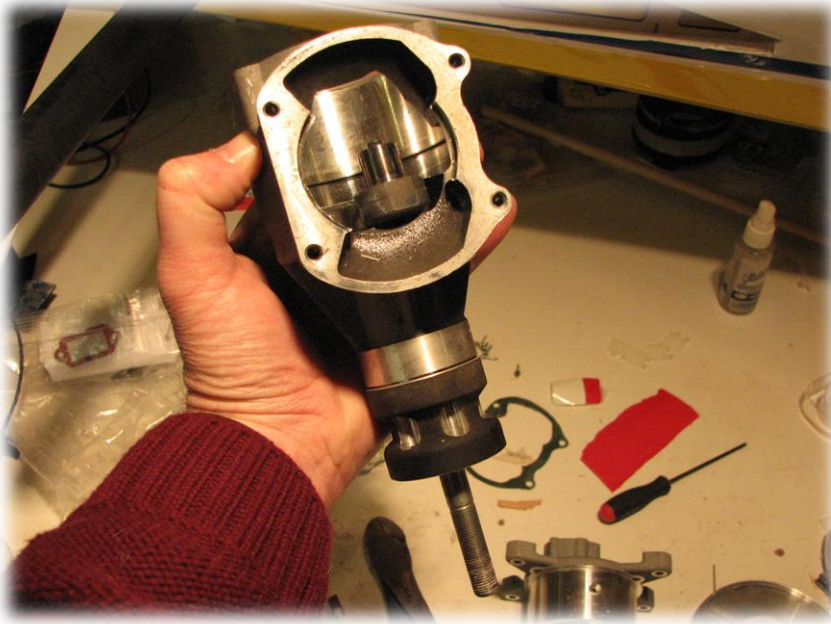
Piston (which I de-carboned and de-gunked) – the ring is visible and came out for de-gunking too:



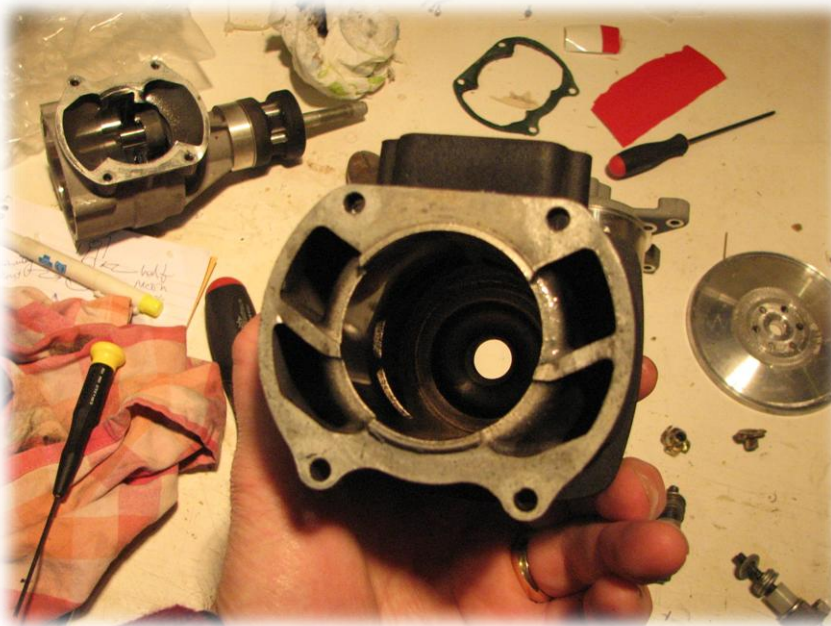
“Yak Reload 2010”

Dan McCoach

Top of the case here:



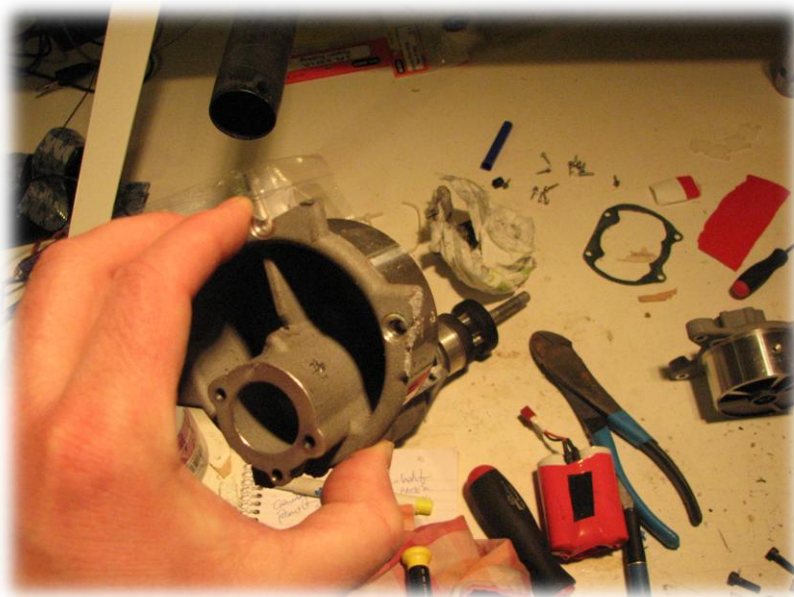
Top of the cylinder head here – ports clearly visible (crank-case in the background left):



“Yak Reload 2010”

Dan McCoach

Busted back-plate (carb.-mount side) shown here and new back-plate/pump in the background (on the right at the frame-edge):



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“Yak Reload 2010”

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OK, well, I had a problem with my documentation – the camera I used to document most of this “second installment” of the motor re-build and other assembly on the Yak was lost (by me – took it on a gig, and I think I left it there at the bar). So, I am making a bit of a jump to this spot (sorry).

Here is the final product – all dressed up with nowhere to go (rainy and cold on the weekend of March, 27 and 28 when I finished her).

(See “Final Thoughts” after these pictures):



“Yak Reload 2010”

Dan McCoach



“Yak Reload 2010”

Dan McCoach

In this shot you can see the baffling and covering I did on the cowl to direct the air over the ZDZ 80 cylinder-head – in this configuration, and with this motor (the super 80), cooling is very important – motor heat climbs very quickly to levels that will damage the motor (without proper cooling) – I have one of those little “infra-red”, heat sensors that I carry to the field to check temps. after most flights. In fact, based on my experience with my prior Yak, I may have to open this cowl more, but I want to make a mild and short first flight to check temps before I decide (during the quick test-run on the ground at home, I was at 225F in no time):



Final thoughts:

- AUW will be just below 25lb -- which I am excited about.
- Also, be sure on your own projects to watch servo travel AND SPEED between ailerons for consistency – Here is what I learned: I thought I detected one servo slower than the other, but after a careful measure, I discovered I had one side’s aileron-pin longer than another, and, therefore I had a higher travel percent

“Yak Reload 2010”

Dan McCoach

programmed on the longer side which means one servo was traveling farther than the other yet I had the same END-POINT measure side-to-side. (i.e. Even “end-point” travel side-to-side, but uneven SPEED side-to-side – this would have resulted in uneven or “waking” axial rolls). LESSON – MEASURE!!! -- Arm and linkage lengths for consistency!! Don’t just use end-point measures.

- Also – Loctite ALL critical-hold screws (such as servo arms, engine mounts, cowl-mounts, etc. Believe they vibrate open without Loctite.)

Thanks – and see you at the field soon!!!!