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in the WORKSHOP *with* STEVE POPE

Having stripped the HW97, **Steve** now looks at honing-up the main components ready for the re-build

Steve Pope heads up his own company, V-Mach, which specialises in bespoke tuning and custom work as well as the manufacture of performance parts for airguns. Former manager of the Webley-Venom Custom Shop – and son of Dave, co-founder of Venom Conversions which later became the world famous Venom Arms – Steve is considered one of the leading experts in his field.

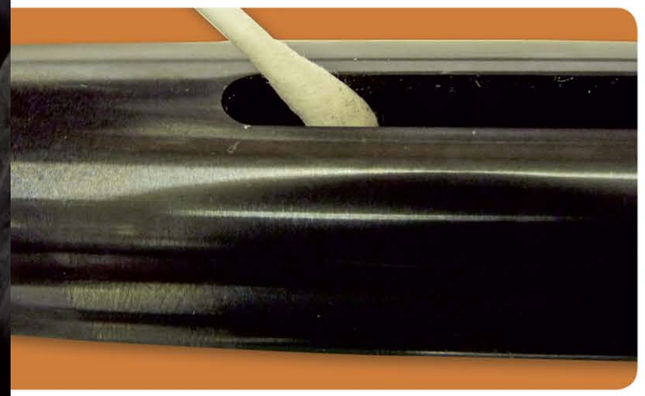
Last month, I began a new project – a tune-up of a Weihrauch HW97 underlever. With the rifle now completely stripped and de-greased, the first thing to do is hand-finish the slot in the HW's action body. Very little work is required on modern HWs; just a little wet and dry paper, about 400 grit, wrapped around a small flat file. This helps to eliminate any faint 'zipping' caused by contact with the cocking lever's linkage as it slides up and down during the cocking sequences. The area's masked off with tape to protect the blueing in case of a slip, but we don't remove much material – just enough to get a smooth finish. It's important, also, to make sure there are no sharp edges left on the underside of the slot.

Take a close look at the threaded section at the rear of the action. Occasionally, you'll need to remove a light curl of swarf from the threads. That checked and done, de-grease and dry the entire action.

You may recall that I'd found the piston rod – the section that engages the main trigger sear – to be running pretty 'true', so this wasn't the cause of the cocking noise I'd experienced. Rather than re-aligning the rod, I simply radiused and polished its end until it was smooth; it's not important to trigger engagement. I also polished the portion at the front and rear lightly, along with the piston slot, again for all-round smoothness.

After checking the hole in the trigger housing block, through which the piston rod traverses, I cleaned it with a boring bar – just a few thou' – in order to 'true it' a little and solve that very slight, but annoying, 'kick-through' feeling the gun was suffering from on cocking. A word of caution, though – never remove too much material here because it can allow the piston rod to deviate when cocked. In turn, this lack of support can effect safe sear engagement and give inconsistent trigger pulls.

The inner compression chamber had a nice recess to its leading, inside edge which allowed damage-free insertion of the piston seal, though I did



Left: *The cocking slot needs to be hand-finished to make it smooth*

Bottom left: *A boring bar was used to 'true' the hole in the trigger block, through which the piston rod traverses*

Below: *The inner compression chamber was radiused on its leading edge*

Above: *The piston (top), showing the fitted piston sleeve*

Top right: *The acetal spring guide (right) and 'top hat'. Both were machined to individually suit the spring and piston*

Bottom left: *Steve recommends a steel shim for lining the piston, with washers to protect the top hat*

Bottom right: *The new parachute-style piston head. Note its non-parallel sides*

radius it a bit smoother and mopped the light scuffing that was visible on the exterior of the chamber.

Next, I fitted a piston sleeve inside the piston. The sleeve serves two purposes. Firstly, it contains any lubrication that's been applied to the mainspring within the piston body and, secondly, it reduces the tolerances between the spring and the piston wall. This can improve firing sequences marginally, by reducing the possibility of resonance from the mainspring.

I've tried different materials here, and have seen some really inventive ideas in used rifles I've stripped over the years – but my advice is to use a good quality steel shim, of an engineering grade, as opposed to that of a beer can or a plastic fizzy pop bottle! Steel is strong, very uniform and smooth, and its springy properties help it stay firmly in contact with the inside of the piston – plus it presents a much better surface finish to the mainspring than the inside of the piston's wall. The flanged end is inserted first and a couple of pre-load washers retain the sleeve and protect the top hat from the shim steel's serrations. The open end of the sleeve is turned opposite to the slot in the piston body.

In the case of my HW97, the mainspring totalled 28.5 coils – a modest 224mm in length – made up of a 3.3mm wire with an inside diameter of .554in (14mm). From experience, I know this is usually enough to generate high-10 to low-11ft/lb power output in a .177 calibre rifle on initial assembly. Any fine adjustments can be made using washers or a pre-load spacer positioned over the rear spring guide. At this stage, though, the rifle will be tested with an un-lubricated mainspring to assess initial power levels and correct function.

The spring guides were machined from acetal rod, with the rear guide being a two-part construction of steel and synthetic. They're fabricated together to form a single piece, but the 'top hat' – the end bearing point that goes inside the piston – is pure acetal. The guides are tubes in this case – the design of the piston, which has a central cocking rod, dictates so. But strength isn't compromised as the rifle performs with minimal load at the UK power limits. If chrono tests show that I need to replace the mainspring, with (say) a 29-coil set-up, I'll probably re-make another guide set to fit the replacement spring.

On to the piston seal and, as with the previous Striker tune-up, I'm going to go for a new, parachute-style component. This seal's design is more power-efficient than the factory version. Its profile is more angular, so there's definite front lip contact and rear edge support, with less contact and friction than the parallel-sided, ex-works set-up. The new seal is also thinner in section by a few millimetres, which creates a little more swept volume for greater performance, without interfering with the cocking stroke. The new seal fit is not as tight as the factory seal; it begins to move with just over 4lb of load in its 'dry' state, which I reckon will drop to 3.75lb once correctly lubricated.

One of the things that becomes apparent when you've worked on lots of examples of this model is that response to tuning work is very predictable. The 97 rarely poses any problems, so after the trials and tribulations I experienced with the Striker, I was hoping for an easy one here!

Next issue, I'll look at lubrication and reassembly of the action, ready for final testing. ●