OHLINS OVERHAUL

Making shock tuning—the hard way—a little easier

Every time in the last year or so that we've tested a Husky or a Can-Am, we've waxed poetic about the Ohlins twin shocks bolted to their backsides. The few times we've wanted to make changes in the damping characteristics of the shocks, however, their lack of external adjustability has brought us up short; we've become pretty spoiled by the range of adjustment offered these days on Japanese dirt bikes.


1

Ohlins *can* be adjusted; make no mistake. It just takes a concerted effort to pull them apart, figure out which valving springs to replace to get the desired damping change, and bolt them all back together.

We had to climb into the Ohlins we had on the world-famous Plain Wrap Motocrosser in order to dial the damping to fit the A-Trak unit on the swingarm. While we were ripping the shocks apart, we thought we'd set a photographer loose to record the blessed event; what follows is a run-through of the procedure for rebuilding the shocks. We know the procedure may be too difficult for some backyard mechanics, and there are a few special tools you'll need to do the job right. If you're serious about dialing in your shocks, though, the time and effort spent will be worthwhile.

First, depressurize the shock (that means let the nitrogen out). Once the shock is depressurized, don't yield to the temptation to stroke it back and forth; you could mess up the floating piston in the reservoir if you do.

With the shock in a soft-jawed vise (or the special Husky shock-holding tool shown in the photos), carefully tap the aluminum cap up and out of the shock body. It's a press fit, but it should come out with just a couple of properly aimed wallops with a chisel.

Next (photo 1), using the lever on the Husky tool (or any reasonable facsimile you can cobble from old Greeves parts), push down on the bearing that is now exposed. When the bearing is down, use a small screwdriver to carefully pry the No. 1 circlip out of its groove in the body, and pull it out. Our rebuild instructor, Pete Steinbrecher, who also happens to be a Husky factory motocross tuner, has his own hand-carved screwdriver he uses for circlips; it's been sharpened to fit under the clips more easily and rounded off to avoid scratching the tender aluminum shock body. When the circlip is out, pull up on the bearing, sliding it as far as possible up the shaft. The next items to pull out are the rubber seals (photo 2); be careful not to scratch them as you ease them up the shaft. A clothespin will hold the removed parts high enough on the shaft to give you working room.

Here's where the second special tool comes in (photo 3). It's a T-handled arrangement with a threaded rod on one end, and it looks like a cross between a wheel spoke and a corkscrew. You use it to move the piston around in the reservoir body. Just screw it into the hole in the top of the piston, and pull the piston up to the top of the reservoir; this sucks most of the oil out of the shock body and into the reservoir.

To get the No. 2 circlip out, you have to tap down the metal stop washer two to four millimeters to give yourself room to work (photo 4). Be gentle; this isn't a Buick spring shackle you're banging on. With the washer down, pry the circlip up and out, being very careful to avoid scratching the inside of the shock body.

Now the shaft assembly is pulled up and out, using a rolling motion to free the metal stop washer from the body. Some washers stick; the trick is to empty the oil from the shock, then gently heat the body until it expands enough to free the washer. (Use a propane torch with caution.)

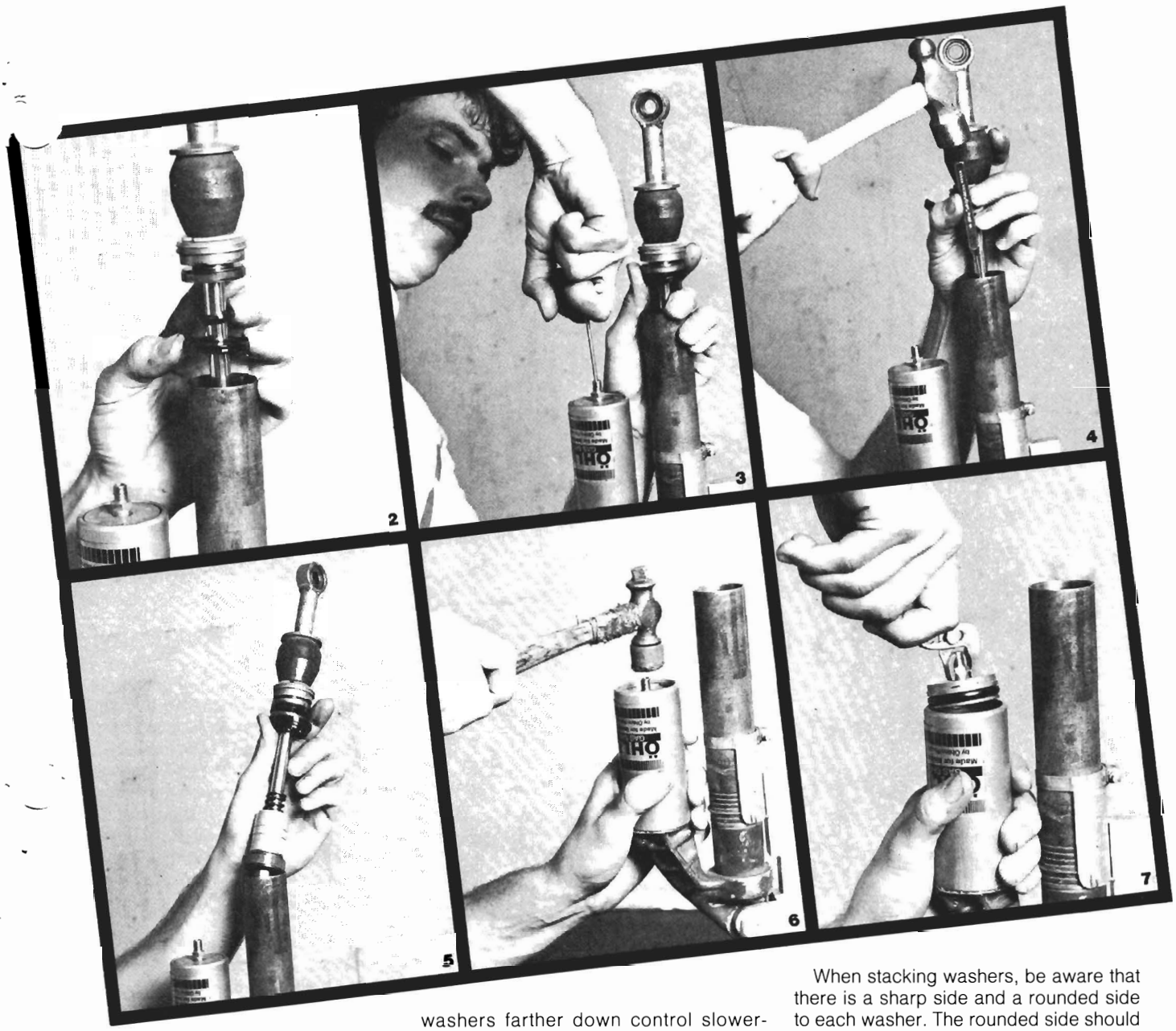
The No. 3 circlip can now be removed. Use a long screwdriver to pop it out of the body. Be persistent, but remember that you'll be honing out every scratch you make in the soft aluminum. With the washer free and hoisted up out of the hole, you've got to fish for the last rubber stop bumper. The hot trick is to use some kind of small hook tool to snare it at the bottom of the shock body and haul it up. With the rubber bumper out, the whole shaft assembly is free, and you can pull it right out of the body (photo 5).

The reservoir is next. First, tap down the top of the reservoir gently to uncover the circlip that holds the top down (photo 6). Remove the top, using a pair of pliers to yank it out (photo 7).

If the damping settings are the way you like them, leave the shaft assembly alone and concentrate on honing the inside of the reservoir and the main shock body. If the reservoir has any significant burrs or scratches, a 1⅝-inch dingleball hone (like the ones used to break the glaze on engine cylinders) will set things straight—just don't get carried away and hone out your reservoir until it's paper thin. If you don't have a hone, 320-grit sandpaper will do.

Check the sealing ring on the shaft assembly. (It's the copper-colored plastic strip that wraps around the piston.) If it's got any nicks or scratches in it, they were caused by burrs in the inside of the shock body; you have to find and eliminate them. During reassembly, if you don't have an extra sealing ring on hand, you can simply flip the original over to expose the smooth, good side. Sealing rings are quite cheap, however, so it makes sense

PHOTOS BILL JENNARO



to pop for new ones.

This is a good time to clean up the body assembly so it can dry out while you work on the shaft assembly. Drain the oil, clean out the tube with solvent, then repeat with contact cleaner. Swab the inside of the tube with a clean paper towel to make sure you've got all the mung out.

Set up a clean, well lighted place for the washers and other doodads that are now slung onto the shaft. You'll have to lay out all the pieces, in order and right side up, as you remove them from the shaft if you have any expectations of getting them back on in the right order (photo 8). Check the locking ability of the nut at the top of the shaft as you spin it off (photo 9); if it doesn't lock tightly, you're going to need another.

The eight stacked washers on the top of the piston control the various stages of rebound damping; the smallest-diameter washers at the top control rebound damping at high shaft speeds, and the washers farther down control slower-speed damping. Most tuning is done with the biggest, slowest-speed washers because they control rebound damping in the area used most of the time while riding; high-speed rebound damping will seldom need to be changed. The washers act as variable valves that restrict the passage of oil; the farther they flex, the more oil slips by, reducing the damping. As the biggest washer flexes, it contacts the next, smaller-diameter washer in the stack; the farther the first washer flexes, the more resistance is put on it, thereby causing it to flex at a progressively greater rate. By varying the diameter and thickness of the washers, it's possible to fine-tune the damping characteristics to suit almost any application. If you need more damping at a particular part of the rebound stroke, use a thicker washer in the appropriate place in the stack. A larger-diameter washer will make higher-speed damping come into effect sooner, and a thicker washer will make the transition more abrupt when it comes.

When stacking washers, be aware that there is a sharp side and a rounded side to each washer. The rounded side should always face the side with the next bigger washer so the sharp edge doesn't have a chance to chafe—and possibly break—the next washer in line. If two washers of equal diameter touch each other, put the sharp edges back to back.

On the other side of the piston is the stack of washers that controls compression damping. The same basic rules apply here in damping tuning, but things are a little more complicated; there is a dizzying array of triangles, triangles with holes, and smaller-diameter washers interspersed among the whole mess. Don't get the washers out of order; it could take weeks to get everything sorted out again.

Still, thinner washers make for less damping; thicker washers give you more damping. If you were looking for less low-speed compression damping, for example, you might go to thinner No. 1 triangles and No. 2 washers, or perhaps use washers with more holes drilled in them. You (or your dealer) can order any washer in the Ohlins lineup that you think you

might need, and the prices are low enough so you can easily afford a good set of spare washers and shock parts.

Take your time when deciding on your damping changes, and don't go too far off in a wild direction; it might force you to rip your shocks apart again just to get things back to where they were in the first place.

The position of each triangle washer on the piston is critical for proper damping; if you let a washer slip out of position, your whole rebuild-and-tune job is out the window. First, you have to make sure the piston is right side up (photo 10) and that the last compression-damping washer (directly under the piston) has its holes arranged so you can see them all through the larger, siamesed holes at the top of the piston. If you can't see each of the holes, spin the compression-damping washer until you can, and don't let the piston drift out of position after you've got things lined up.

The rebound-damping triangle washer must also be oriented properly to get anything even faintly resembling correct damping. It must be situated so the points of the triangle cover the single holes in the top of the piston. When you tighten down the nut on the stack of washers, make very sure that nothing twists out of position; it takes a strong hand and a steady eye. Tighten the nut to 18 foot-pounds.

As you're stacking seals, bushings, and washers on the shaft, lubricate each of them with a moly type of grease; wheel bearing grease just won't do. Stack everything on the shaft the way it came off, of course, and be prepared to get covered with oil.

Use Ohlins shock oil; it's used by most of the factory teams in their non-Ohlins shocks, so Ohlins' chemists must be doing something right. The Ohlins oil is available at any Husky dealer, but if you can't get any, be sure to use good quality shock oil wtih a viscosity of 7.5. With the shock held upright, fill the reservoir slowly with oil, making sure you don't create any bubbles in the oil. If there *are* bubbles, let the shock sit for at least half an hour to let them rise to the top. Carefully skim off any bubbles that have risen to the top, grease the O-rings on the reservoir cap with molylube, and then slip the cap onto the reservoir at an angle, pushing it down slowly to avoid trapping any air underneath it.

Now remove between 50mm and 60mm of oil from the main shock body with a turkey baster or a large syringe. Removing the oil makes room for the shaft assembly; just lower it into the shock body. Slide the No. 3 circlip in the body, open end down, about half an inch past its groove. Then pull the piston up slowly; it should neatly force the circlip into its groove all by itself. Just make sure the clip is in the No. 3 slot, not the No. 2.

The next move is to install the rubber stop bumper in its place against the No. 3 circlip. You'll know you got it right when it squirts you with oil right in the eye.

Work in the No. 2 circlip next; make sure you hear it click into place before you go on to the next step. The larger rubber seal slides down next; check to see that there's oil covering it after it's in place. Now pull up the reservoir cap to fit against the circlip, and install the T-handled reservoir tool in the piston. Push down slowly on the piston with the tool, stopping every 10mm or so to siphon off the oil that will try to gush out of the top of the shock body. Stop when exactly 90mm of the piston tool has disappeared into the reservoir.

With the piston height set thusly, move the shock shaft up and down slowly about three-quarters of an inch to remove all the bubbles that may have sneaked into the oil. Do it for at least one minute after you see the last bubbles escape.

Now pull the shaft out of the body as far as it will go, and push the last, small, rubber seal into its resting place inside the bigger seal. It will be stubborn, so rock the shock shaft from side to side to help work the seal in. The seal is in far enough when its top edge is flush with the top of the bigger seal.

Siphon off any oil that may still be sitting on top of the seal, and then, using the trick Husky shock-holding tool, push down on the top of the bushing to give yourself room to slip in the No. 1 circlip.

If you were doing a complete rebuild, you should have replaced the sealing ring, the three circlips, the two top rubber seals, the top bushing, and the aluminum end cap.

If you use the old end cap, be sure it fits securely, and glue it in place with some red Loctite.

Pressurize the shock reservoir with nitrogen. The pressure will vary with the leverage ratio of the bike. Bikes that use a relatively conservative leverage ratio, like Huskys, can get away with 155 psi, but the bikes with the more radical ratios, like KTMs, can benefit from a little more pressure, say, 175 psi.

Whew. That's the story for dual-shock Ohlins; now there's no excuse for you to moan about the damping rates that car with your Ohlins-equipped machine. It's not the easiest procedure in the world, but look at it this way: when *all* the bike manufacturers come out with externally adjustable shocks, at least you'll know just how much work you're avoiding. *M*

PHOTOS: BILL JENNARO