11. Damping guideline

***In the** CART championship the Öhlins TT44 is the favourite! Almost 80% of the teams are using the Öhlins design and the results speak for themselves.*

It is not our intention in this chapter to cover all questions about how to adjust the dampers for different damper-related handling problems. However, we offer some basic rules that can help you setting up the car.

***Note:** If your racecar has handling problems, determine first if it is damper-related or not.*

Because dampers have in recent years proved to have such a profound influence on handling, some race engineers have got into the habit of tuning the dampers first before making "aero" or mechanical adjustments. As damper manufacturers we are flattered, but there are limits to the problems that can be solved by damping adjustments. In all cases, if a problem can be improved by aero or mechanical changes it is wise to make those changes first.

Working method

To make improvements, it is important to understand the function of the dampers and then through testing learn how the dampers influence the handling of your car. When making adjustments, keep notes, make adjustments one at a time and in small steps. Always pay attention to changes in conditions like tire wear, track temperatures, time of day, etc. At the end of the test session, go back, if possible, to the starting set up to double check that an improvement has actually been achieved.

We recommend limiting changes of the low speed adjusters to steps of no more than 5 clicks at the time. Too large a change can jump right over the optimum setting and sometimes result in similar handling as the original setting. We normally recommend changes of 2 to 3 clicks. When you are near the optimum setting the driver can detect one click in either direction. When both compression and rebound are near optimum a final adjustment might require a trade of one less rebound click for one more compression click or the reverse.

Damping changes

A logical reason for opening only the compression low speed adjuster could be a desire to reduce harshness or to slow down turn-in or to search for more mechanical grip. The limits to how far the low speed adjusters can be opened are the side effects like instability, bottoming, lazy turn-in, not enough roll support, braking problems or loss of grip.

Opening the low speed rebound adjuster usually results in more grip, especially in the rear during power-down conditions.

Compelling reasons for raising the knee might be to compensate for a rocker ratio change that moves the damper slower. This rocker condition will require more damping at lower speeds and a higher knee will provide it. Another reason might be that after optimizing the low speed adjuster for harshness the knee is delayed enough in the speed spectrum to warrant raising the knee for additional support. The opposite of these examples should also be considered. Lowering the knee can reduce harshness.

Raising the knee height by increasing the preload can be an effective way to control the underside rake angle, in either the front or rear.

The more pronounced knee you, have the more feedback the driver will get. There is often a trade off between feedback and grip/traction.
Negative preload (both compression and rebound) often helps under low grip conditions.

Reducing the compression slope might be called for on bumpy street courses if your car has difficulty absorbing bumps causing harshness.

You might want to increase the compression slope if the car bottoms easily or if roll support seems inadequate. This could also be advantageous on bumpy circuits where bumps cause big chassis movements. ☐

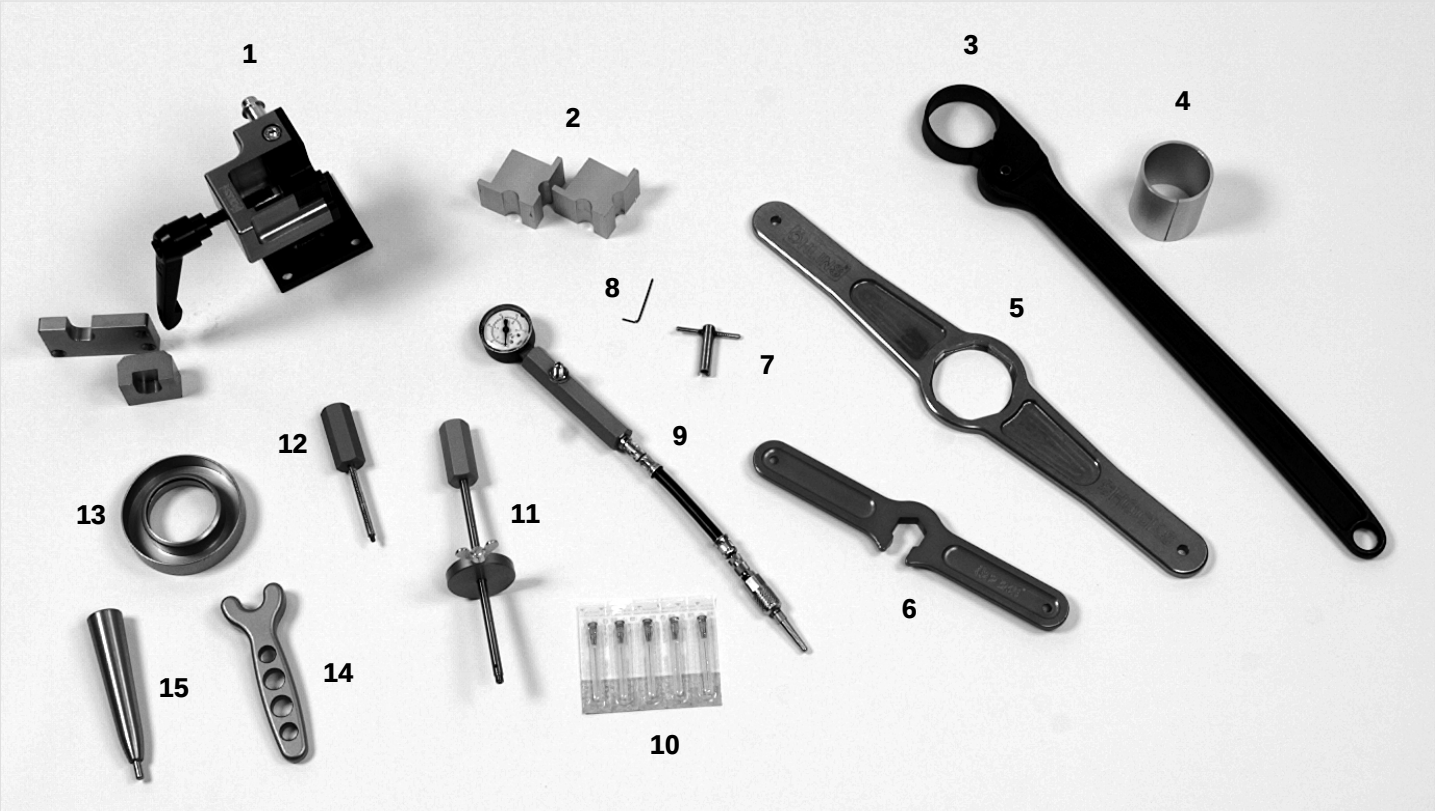
12. Work section

This chapter describes how to work with the TT44 damper. For the areas not described here, we recommend you to contact Öhlins or an Öhlins distributor. Two alternative methods for reshimming the main piston will be described.

The difference is in how to control the gas volume in the damper unit. The basic method is foolproof. However, as you gain confidence and can carry out the first method without needing to adjust the oil level afterwards, the floating piston can be positioned using an alternate technique. This alternate method can save time and is just as accurate.

The use of Öhlins original spare parts will guarantee maximum performance out of your dampers.

Also make sure that you have all the necessary tools before you start working on the dampers. ☐



Service tools, oil & grease

Pos.	Part #	Pcs.	Description	Type/remarks
1	00773-01	1	Vice	
2	00727-03	1	Jaws for piston shaft	
3	00738-01	1	Spanner for reservoir	
4	00737-04	1	Sleeve for reservoir	
5	01771-01	1	Wrench for lock nut (63 mm)	
6	01772-02	1	Wrench for lock nut (23 mm)	
	01772-01	1	Wrench for lock nut (23 mm), steel	
7	01764-01	1	Wrench for needle housing	
8	00254-02	1	Allen key for bleed knobs (1.3 mm)	
9	01781-01	1	Pressure gauge	
10	00778-01	1	Needle	
11	00720-02	1	Floating piston positioning tool	
12	00720-03	1	Disassembly tool for reservoir cap	
13	01776-01	1	Oil cup	
14	01761-01	1	Wrench for cylinder cap	
15	01762-01	1	Spring preloader	
16	01782-01	1	Tool box	
17	00745-15	1	Set of shims (0.15 mm)	
	00745-20	1	Set of shims (0.20 mm)	
	00745-25	1	Set of shims (0.25 mm)	
	00745-30	1	Set of shims (0.30 mm)	
18	00146-01	1	Öhlins red grease (100g)	
19	00147-01	1	Öhlins white grease (100g)	
20	00105-01	1	Öhlins damper oil (1 l)	

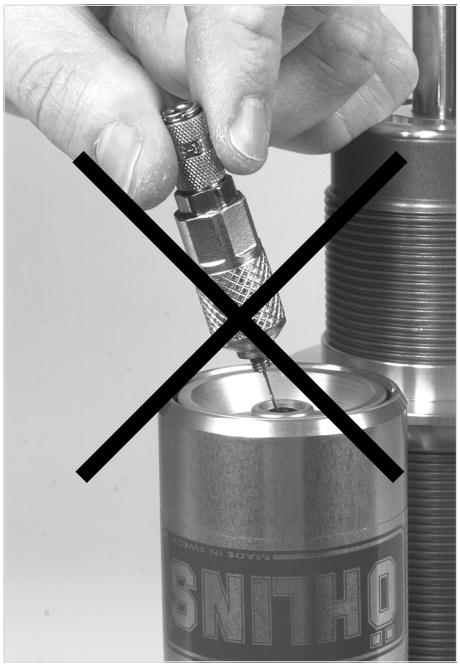
Main piston reshimming, basic method

Disassembly

Caution!

Before starting the reshimming procedure, it is of the utmost importance that the work area is completely clean and free from dust and dirt.

Contamination is the primary enemy of dampers. Do not use any shop rags around internal damper parts because lint will find its way inside the assembled damper. Öhlins recommends lint-free paper only.



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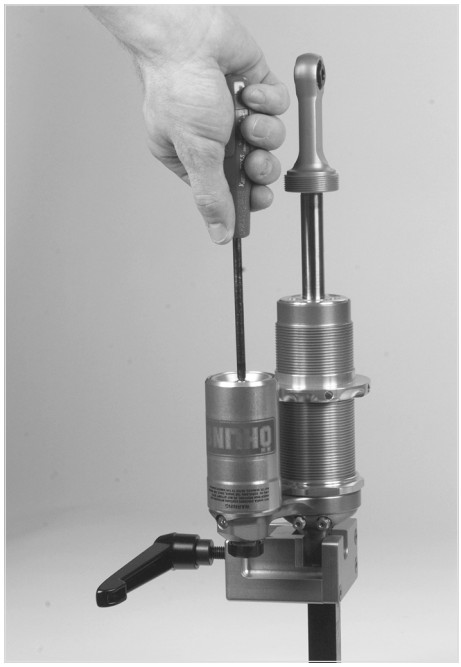


A

✓ Mount the body eye in a vice with soft jaws or use Öhlins vice (part # 00773-01).

✓ Remove the screw and O-ring from the reservoir end cap whether piggyback or remote style.

D

B

Use Öhlins needle system (part #01781-01) to depressurize the damper.

⚠ WARNING

Releasing high-pressure gas can be hazardous. Never perform any service until the gas pressure has been released from the damper.

✓ Make sure that the needle is undamaged by checking for burrs around the sharp tip.

✓ Apply some Öhlins red grease (part #00146-01) to the tip before inserting it into the rubber membrane in the reservoir end cap.

✓ Insert the needle near the center of the rubber and parallel with the axis of the reservoir.

E

Caution!

If the needle goes in part way and stops it means the needle was not parallel and has collided with the membrane housing. When this happens there is a risk that the tip of the needle will be damaged.

F

✓ Insert the special removal tool (part # 00720-03) by threading it into the reservoir end cap.

✓ Pull straight up with a slight wiggling motion to remove the cap.

✓ When the needle is successfully inserted, thread the needle housing into the reservoir end cap.

✓ Attach the quick-connect hose without the gauge to vent the damper.

✓ Remove the needle housing and connector hose.

G

✓ Turn the bleed adjusters on the damper body to fully open and close the reservoir bleed.

The open rebound bleed will make it easier to remove the shaft-piston assembly from the body. The open compression bleed will make it easier to reinstall the assembly later on. The closed reservoir bleed will reduce the amount of oil leaking into the reservoir when installing and bleeding the piston.

✓ Push the reservoir end cap down with your fingers and remove the circlip.

This should be done by pushing the mid part of the circlip down into the reservoir so the sharp ends of the circlip swing up. If the sharp ends of the circlip are pushed down into the reservoir or if a tool is used, the inside wall of the reservoir may be damaged. This can cause a nitrogen leak.

If the reservoir end cap is stuck, install the removal tool (part # 00720-03) shown in the next photo and tap the end of it with a soft mallet. Once it is dislodged the circlip can be removed as described above.

H

✓ If the oil cup (part # 01776-01) is used to avoid spillage, slide it onto the top of the damper body now.

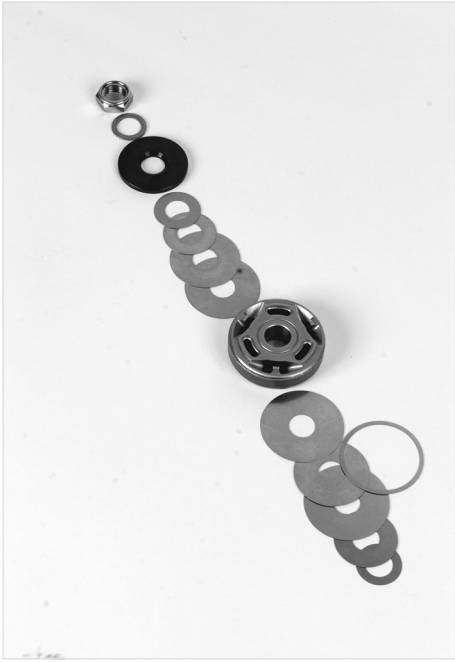
✓ By using Öhlins special wrench (part # 01761-01) unscrew the cylinder cap.

I

✓ Carefully pull the shaft assembly out of the body.

Do not pull too aggressively, as this will aerate the oil.

If the shaft assembly resists coming out of damper, you probably forgot to open the rebound bleed adjuster.



A

J

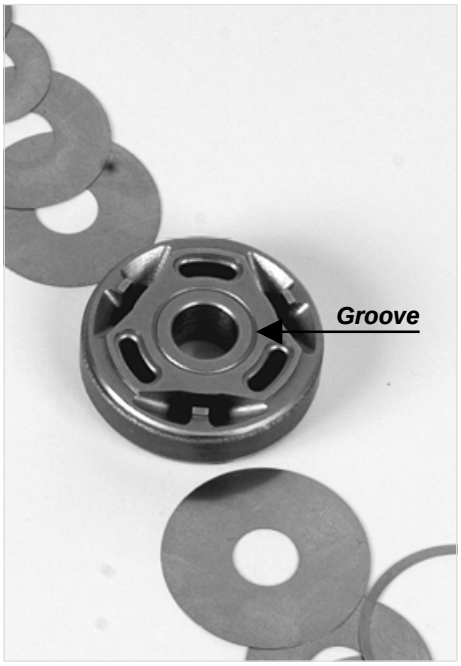
✓ Wipe the oil from the shaft assembly and mount it vertically in either the Öhlins vice or the special shaft jaws (part #00727-03).

If you remove the ball joint spacers the end eye can be clamped in a normal vice with soft jaws.

✓ Unscrew the nut from the end of the shaft with a 17 mm wrench.

✓ Remove the old rebound shims, piston and compression shims.

B



Assembly

Caution!

The face of one side of the piston has a circular groove machined into it to identify the side of the rebound stack. This side of the piston and the side of the rebound valve stop (part # 00519-02) with the large chamfer on the center hole should face towards the lock nut.

C