

# 38 – SUSPENSION FORKS AND REAR SHOCKS

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## ABOUT THIS CHAPTER

This chapter is about suspension forks and shock units used on suspension frames. After some general information, there are sections for the following specific types of equipment.

**CANE CREEK REAR SHOCKS**  
**MANITOU MACH 5 FORKS**  
**MANITOU MACH 5 SX EFC OIL DAMPERS**  
**MANITOU '98-'00 SX & XVERT FORKS**  
**MARZOCCHI '99-'00 FORKS-**  
**COIL & OIL-DAMPER TYPES**  
**MARZOCCHI '97-'00 FORKS-**  
**COIL & ADJUSTABLE OIL TYPES**  
**MARZOCCHI '99-'00 FORKS-AIR SPRUNG TYPES**  
**RISSE ASTRO-5 REAR SHOCK**  
**RISSE TERMINATOR REAR SHOCK**  
**ROCKSHOX '97-'99 INDY & JETT FORKS**  
**ROCKSHOX '99-'00 JETT HYDRACOIL FORKS**  
**ROCKSHOX '97-'99 JUDY CARTRIDGE FORKS**  
**ROCKSHOX '99-'00 JUDY HYDRACOIL FORKS**  
**ROCKSHOX '98 SID FORKS**  
**ROCKSHOX '99-'00 SID CARTRIDGE FORKS**  
**ROCK SHOX DELUXE REAR SHOCK**  
**ROCK SHOX SUPER DELUXE REAR SHOCK**  
**RST '98 MOZO FORKS**  
**WHITE BROTHERS FORKS**

Each of the listed sections includes complete information on service procedures and tuning considerations. The **GENERAL INFORMATION** section that begins this chapter covers generic terminology, prerequisites, indications, tool choices, time and difficulty ratings for suspension service, and complications that may occur. The final section in the chapter is **TUNING DATA REPORT**, presented in a generic format for reporting to the customer the “before and after” conditions of the suspension.

## GENERAL INFORMATION

### TERMINOLOGY

**Suspension:** A device that permits a wheel to travel up and down independently of the rest of the bicycle.

**Suspension fork:** A bicycle fork that incorporates a suspension device.

**Rear shock:** The spring and/or damper unit that provides suspension to a pivoting structure attached to the rear of a frame.

**Air/oil suspension:** A suspension system that uses an air spring and oil for damping.

**Elastomer/oil suspension:** A suspension system that uses an elastomer spring and oil for damping.

**Spring/oil suspension:** A suspension system that uses a metal coil spring and oil for damping.

**Damping:** A function that modifies the rate of suspension compression or rebound.

**Oil damping:** A system that uses the resistance to oil flow through holes in a valve to provide a means to alter the rate of suspension compression or rebound.

**Friction damping:** A system that uses the resistance of friction caused by bushings, seals, elastomers, and friction rings to provide a means to alter the rate of suspension compression or rebound.

**Compression damping:** Restriction of the rate that the suspension compresses under load.

**Rebound damping:** Restriction of the rate that the suspension rebounds when load is relieved.

**Compression:** The phase of the suspension operation in which the wheel travels up, or travels closer, to the frame.

**Rebound:** The phase of the suspension operation in which the wheel returns to its original position, following completion of the compression phase. When a suspension rebounds, it is extending its length.

**Travel:** The amount that the wheel moves between the most compressed and most extended states of the suspension.

**Stanchion tube:** The suspension-fork tube fixed to the fork crown. It remains stationary during the operation of the suspension. The comparable part on rear suspensions is the piston.

**Piston:** The part of a rear-suspension spring/damper that slides back and forth inside the main body of the suspension unit. In most cases, the comparable part on a suspension fork is the stanchion tube.

**Slider:** The tube of a suspension fork that remains fixed to the wheel. It slides up and down on the stanchion as the suspension operates. The comparable part on a rear shock is the cylinder.

**Cylinder:** The part of a rear shock in which the piston slides. It may also be called *shock body*.

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**Fork crown:** The component that joins the stanchion tubes to the fork column.

**Stanchion clamp:** The portion of the fork crown that clamps around the top of the stanchion tube.

**Slider brace:** An arch that joins the two sliders together. It may also serve as a mount for the cable-housing stop for the front brake. It is sometimes called a *brake arch*, or *fork brace*.

**Pivot stud:** The stud on which the brake caliper arm (usually a cantilever brake) is mounted to. Pivot studs are mounted to the slider, and often help retain the slider brace.

**Dropout:** The end of the slider where the wheel attaches.

**Elastomer spring:** A spring made from a rubber-like substance; when an elastomer spring is compressed, it tends to return to its original length vigorously. Elastomers have some potential to provide damping by converting dynamic energy to heat energy as they heat up from repeated compression. *Elastomer spring* will often be shortened to *elastomer*.

**MCU elastomer:** This stands for **m**icro-**c**ellular urethane elastomer. Micro-cellular urethane is full of tiny air cells that act like springs when the elastomer is compressed.

**Durometer:** A method of describing the firmness of an elastomer spring. High-durometer elastomers are stiffer.

**Bumper:** An other word for an elastomer spring.

**Pre-load:** A condition of compressing an elastomer before the operating loads are put on the suspension, so that it provides a stiffer spring rate.

**Spring rate:** The rate at which the resistance of a spring increases as it is compressed.

**Top-out bumper:** A rubber or elastomer device that absorbs the small shock that occurs when the load is taken off a suspension so that it is allowed to rebound to its limit (also called *rebound bumper*).

**Bottom-out bumper:** A rubber or elastomer device that absorbs the shock that occurs when a suspension is compressed to its limit.

**Stiction:** The tendency of parts that slide against each other to remain stuck together until adequate force is expended to cause them to begin moving in relation to each other.

**Air spring:** An enclosed body of air that shrinks in volume as the suspension is compressed. This reduction in size acts like a spring, because the air has a tendency to try to return to its original volume.

**Valve:** A mechanism that controls the flow of oil between a stanchion and slider, or between a piston and cylinder.

**Hydraulic oil:** A fluid that is used in some suspension designs to provide damping. It is usually a mineral oil with special characteristics that determine how it reacts when exposed to compressed air, how it changes viscosity when its temperature changes, and how it moves through valves.

**Oil weight:** A description of the relative viscosity of an oil, such as hydraulic oil. Oils with low weight numbers (5w or 10w) flow through valves with less resistance; oils with high weight numbers (15w or 20w) flow through valves with more resistance.

**Viscosity:** A description of how a liquid flows. Liquids with high viscosity are thicker and flow less easily or quickly than liquids with low viscosity.

**Bushing:** A cylindrical sleeve that acts as a bearing.

**Seal:** A stiff neoprene-rubber ring sometimes reinforced with a metal washer that fits tightly between two components in order to prevent escape of oil or air pressure.

**O-ring:** A soft, flexible neoprene-rubber ring with a round cross-section, that is used for sealing and retention.

**Wiper seal:** A neoprene-rubber seal that keeps dirt out, but is not designed to keep in oil or air pressure.

**Dust boot:** A soft, flexible sleeve (usually with an accordion-like shape) that covers the portion of the stanchion tube that goes in and out of the slider. *Dust boot* may be shortened to *boot*.

**Internal snap-ring:** A metal ring with a gap that allows compression. The outer perimeter of the ring is a smooth circle, and the ends have two tabs (on the inner perimeter) with holes that are engaged by a snap-ring plier for purposes of removing and installing the ring. Internal snap-rings sit in grooves on the inside of cylinders.

**External snap-ring:** A metal ring with a gap in it that allows expansion; the inner perimeter of the ring is a smooth circle, and the ends have two tabs (on the outer perimeter) with holes that are engaged by snap-ring pliers for purposes of removing and installing the ring. Internal snap-rings sit in grooves on the outside of cylinders.

**C-clip:** A metal ring with a wide gap that allows expansion; the outer perimeter of the ring is a smooth circle, and the ends have two tabs (on the inner perimeter) that engage the groove in which the C-clip sits. C-clips sit in grooves on the outside of cylinders. C-clips are unlike external snap-rings in that they push

on and off the side of the cylinder on which they are mounted. External snap-rings are expanded by a tool called a snap-ring plier so that they can be slipped on and off the end of the cylinder.

**E-clip:** Like a c-clip, but with a third tab on the inner perimeter directly opposite the gap in the clip.

**Circlip:** Like an internal snap-ring, but with no holes for a snap-ring plier to engage. The end of the ring needs to be deflected radially towards the center, so that it can be pried out of its slot.

**Détente:** An indentation that causes a rotating adjuster to stop at fixed increments. It usually operates by means of a spring-loaded ball bearing pressing into the détente.

## PREREQUISITES

### *For oil change for an air/oil fork*

There are no prerequisites for performing an oil change in most air/oil-suspension forks except wheel removal and installation.

### *For suspension-fork overhaul*

Wheel removal and brake service are always required. It is optional, but recommended, to remove the fork from the frame, which requires headset overhaul and stem removal and installation.

### *For service of rear shocks*

There are usually no prerequisites for any type of service that can be performed on a rear-suspension spring/damper.

## INDICATIONS

### *Oil maintenance*

Suspension systems that use oil for damping purposes need periodic oil changes. Oil breaks down and becomes contaminated. Performance and durability can be improved by periodic oil changes. Oil systems are temperature-range sensitive, so it may be necessary to put in lighter-weight oils for cold weather, and heavier-weight oils for hot weather.

### *Air pressure maintenance*

Air/oil systems can bleed air slowly even when the seals have not lost their integrity. Periodic pressurization is needed, but probably not as often as for a tire.

### *Seal maintenance*

Seals wear out and periodically need replacement. If seals are not maintained, then they may fail and cause air pressure loss or oil loss in and air/oil-suspension system.

### *Bushing maintenance*

Bushings are the bearings between a fork stanchion tube and a fork slider. When bushings wear they should be replaced. Worn bushings cause slop between the stanchion and slider, and cause stiction by allowing the stanchion to misalign with the slider when the fork is fully extended.

### *Dirt and lubrication maintenance*

Dirt contaminates a suspension as the stanchion or piston goes in or out of the slider or cylinder. Dirt increases wear and friction, so suspensions should be cleaned periodically. Greases are used to reduce friction and enhance seals. Eventually, however, grease dissolves and breaks down. Periodic regreasing of bushings, elastomers, and seals improves durability, maintains seal integrity, and reduces stiction.

### *Symptoms indicating need of seal replacement*

If an air/oil system fails to hold air pressure for a reasonable time, or leaks oil at the seal, then seal replacement is needed.

### *Symptoms indicating need of bushing replacement*

If the bike exhibits symptoms of a loose headset (but the headset is not loose), then the bushings between the stanchions and sliders in the fork are probably worn out. Clunking sounds when hitting bumps, or applying the brake, knocking sensations, or a feeling of sloppiness in the handling all may indicate worn bushings.

### *Symptoms indicating need of general overhaul*

In addition to the presence of symptoms indicating need for seal or bushing replacement, problems with excess stiction or failure of the suspension mechanism to compress or rebound properly, indicate that the suspension should be fully serviced.

## TIME AND DIFFICULTY

An oil change on an air/oil fork is a 15 minute job of little difficulty. A complete service of an air/oil fork is a 50 minute job of moderate difficulty. A complete service of an air/oil rear shock is a 25–35 minute job of moderate difficulty. A complete service of an elastomer fork is a 15–20 minute job of little difficulty.

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### TOOL CHOICES

Table 38-1 is a list of all the suspension-specific tools required to perform *all* of procedures in this chapter. If a tool's use is limited to a specific brand or model, it is indicated in the **Fits and considerations** column.

**SUSPENSION TOOLS** (table 38-1)

Tool	Fits and considerations
RockShox 70100	Kit for servicing many RockShox models, and useful in many applications for non-RockShox suspensions (includes: stanchion-clamping blocks #70101, seal and bushing installer #70103, seal and bushing puller #70113, valve-body tool #70105, and dropout vise blocks #70107)
RockShox 70106	Bushing-removal tool for Quadra 5, 21, and 21R
RockShox 70108	Bushing-installation tool for Quadra 5, 21, and 21R
RockShox 70113	Friction-ring installer for original (1993) Quadra
RockShox 70118	Bushing-removal tool for Judy fork
RockShox 70119	Bushing-installation tool for Judy fork
RockShox 70142	Judy damper-cartridge-service tool kit
RockShox 70165	Kit for servicing Deluxe and Super Deluxe rear shocks
RockShox 59309	Pump required for pressurizing Deluxe and Super Deluxe rear shocks
Risse bullet tool	For installing seal head on Risse Genesis and Elroy rear shocks
12mm Allen wrench	For Marzocchi Zokes fork
United Bicycle Tool RS-109	Needle-type pump with 60psi capacity, bleeder valve, and gauge for pressurizing Rock Shox air/oil systems
United Bicycle Tool RS-300R	Needle-type pump with 300psi capacity, bleeder valve, and gauge for pressurizing Risse air/oil systems without Schrader valve
United Bicycle Tool RS-300S	Schrader-valve pump with 300psi capacity, bleeder valve, and gauge for pressurizing forks with recessed Schrader valve
Amp vise blocks	Split block of aluminum with split holes for clamping to various diameters of Amp damper shafts
Marzocchi 104	For threading onto Schrader valve to pull air cap out of stanchion on various Marzocchi air/oil suspensions
6"section of 3/8" round bar stock	For servicing Amp and Risse shocks, available at hardware store
6"section of 5/16" round bar stock	For servicing Amp and Risse shocks, available at hardware store
Bicycle Research 1-1/8" frame block	Used for holding Risse piston in vise
Sport-ball inflation needle	Use for depressurizing air chambers, must be type that has hole in end, not hole on side of tip (wrong type will damage air seal)
Bulb syringe (automotive battery type)	Useful for adjusting oil level in air/oil forks
United Bicycle Tool CV-521	Reversible snap-ring pliers with assorted tips in a variety of angles and thickness

## COMPLICATIONS

### ***Difficult seal removal on air/oil forks***

Seals are deliberately a very tight fit. Most forks with seals require some sort of puller, but some manufacturers expect the mechanic to use brute force. These methods are inconsistent, messy, and potentially dangerous.

### ***Air contamination in rear shocks***

Certain units are designed to have no air in the chamber where there is oil. The presence of air may be noisy, or it may interfere with the passage of oil through tiny valve holes. Furthermore, air can introduce a spring effect. Special care is required to get the unit assembled without air getting inside, and in some cases it is required to perform the assembly while the whole unit is submerged in the same hydraulic fluid that is going inside the unit.

### ***Frozen bolts in bottom of slider***

A number of products put bolts down in the bottom of the slider, where moisture from condensation collects. This can lead to corrosion developing on threads, and very difficult bolt removal. Persistence and penetrating oil are the only solutions.

### ***Stripped threads in fork crowns and sliders***

Very soft materials, such as aluminum and magnesium, are used in certain sliders and fork crowns. Female threads in these parts strip easily when bolts are over-tightened. Use Loctite to eliminate the need for higher torques, and *always* use torque wrenches.

### ***Unreplaceable bushings***

Some poorly-designed forks rely on bushings that are a permanent part of the slider or the stanchion tube. The only way to replace these bushings is to replace the slider or stanchion, which is usually impractical (due to price or availability).

### ***Wear on impractical-to-replace parts***

Some forks are designed so that the bushings slide up and down against the inside surface of an aluminum or magnesium slider. These softer materials wear out easily; replacement is usually impractical (due to price or availability). Stanchion tubes on air/oil forks can fail in two ways: the surface may become nicked or scratched so that seal integrity is lost, or the stanchions may become bent from excessive load.

### ***Clip failure***

The snap-rings, c-clips, e-clips, and circlips used in suspensions are delicate; expansion or compression is required to install them, and they are easily damaged.

If they are slightly deformed, they may appear to be secure, but may fail during use. There is sometimes a great deal of load placed on these clips. Most clips have asymmetrical faces; one face has sharp corners on the edges, and the other has more rounded corners on the edges. As a rule, always install these clips so that the sharper-edged side faces away from the direction of the load (or pressure) that is against the item being retained by the clip.

### ***Hydraulic-fluid toxicity***

The fluids used in oil-damped systems may be toxic. Minimize your exposure and wear rubber gloves while working with these units.

## OIL-VISCOSITY TESTING

Viscosity testing is needed for two reasons. First, there is no way to know what oil is being removed from a suspension without testing. If the original oil is unknown, then there is no way to know what might be suitable as a replacement. Second, manufacturer's ratings of their own oils are often unreliable. By testing, it is possible to know how different oils compare.

### ***Viscosity testing of suspension fluid***

The viscosity of shock fork fluid has a large impact on the performance of the fork. The following fluid-viscosity table (page 38-6), and fluid viscosity-test procedure (page 38-6), can help the mechanic estimate the current relative viscosity of a shock fork fluid.

When a shock fork is disassembled, most mechanics simply remove the old fluid and dump it in the recycling barrel. The new fluid selected may be quite different than the old fluid. This will, of course, affect the handling in a way which may or may not be desired by the customer. It is possible to determine the approximate viscosity of the old fluid, then compare it to known viscosities of popular brands. It is likely that the old fluid is dirty. This particulate matter may, in fact, have changed the viscosity of the fluid. However, because the dirty fluid is what the customer was most currently using, it is still appropriate to test the old fluid. Remember that the test rates the "effective viscosity" of the old fluid, not necessarily its original viscosity.

### ***Needed testing equipment***

Clear "Bic" pens (the Bic Classic Stic, model #MSP10). These are plastic, and are somewhat fragile, so purchase several. Older and used pens are often warped and deformed, so purchase new pens.

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Stop watch accurate to one tenth of a second.  
Magnet strong enough to hold a ball bearing through the plastic.

A 3/16" ball bearing.

A vise or other devices that will hold the pen steady and vertical during the testing. Again, the pens are plastic, so take care in how you hold it.

The Bic Classic Stic pen needs some modification.

Use a drop of super-glue to cover the side-hole. Remove the top cap.

Remove the pen tip and pull the ink tube off of the pen tip. The ink tube is not needed for the test.

Reinstall pen tip.

Put a rubber-coated strap clamp (that fits tubing the size of the pen) around the pen, then secure the clamp with a nut and bolt. Grasping the bolt and nut in the vise will be the way the pen will be held upright.

Mark the "starting line" for the test with a permanent marker or a scribe line. The starting line for the ball bearing is the middle of the U in the phrase, "Made in USA." This is 5mm from the top.

### Viscosity-test procedure

1. [ ] Secure pen vertically in vise.
2. [ ] Fill to top with fluid to be tested.
3. [ ] Inspect for air bubbles; allow oil to sit if bubbles are present.
4. [ ] Place 3/16" ball bearing on a magnet.
5. [ ] Place ball in top of pen, then force it off magnet with your finger while holding magnet close to pen top (magnet will hold bearing inside pen, at top).
6. [ ] Position center of bearing at middle of U in USA, or at marked line.

7. [ ] Pull magnet away and start timer simultaneously.

8. [ ] Stop timer when ball stops at bottom.

9. [ ] Repeat at least three times, to see if results are consistent. Record time here: \_\_\_secs.

10. [ ] See table 38-2 for data for common bicycle-suspension fluids, and compare result in step 9 to determine what fluid might be comparable.

Upon completing the test, remove the pen tip and drain the fluid. Clean inside the pen with a mineral spirit solvent. Do not use acetone or other solvents that harm plastics. Dry the inside with compressed air, then install the tip.

### Hydraulic-fluid viscosity

Table 38-2 can be used to compare the relative viscosity of popular brands of bicycle hydraulic fluids. Viscosity is a nominal measurement of the degree to which a fluid resists flow under applied force. The popular measurement of this property is referred to as a fluid's *weight*. The more a fluid resists flow, the more the assigned *weight*. Manufacturers are not necessarily consistent with one another regarding their assigned weights, but they tend to be consistent within their own product line. For example, one manufacturer's 5 *weight* can have a higher viscosity than another manufacturer's 5 *weight*.

Table 38-2 (below) is based on the preceding test of fluid viscosity (see preceding procedure). Note that the table is only a measure of a fluid's relative viscosity, and is not intended to be a statement on its quality. The exact viscosity may also differ between different shipments from the same manufacturer.

COMMON BICYCLE-SUSPENSION FLUIDS (table 38-2)

Brand	Weight or Designation	Time at 72° (in seconds)	Time at 45° (in seconds)	% change 72° to 45°
Englund	blue 5w	5	9	80%
Finish Line	2.5w	6	8	33%
RockShox	5w	7	18	128%
Englund	purple (approx. 7w)	7	13	85%
Finish Line	5w	9	17	88%
Englund	red (approx. 10.5 w)	11	21	91%
Finish Line	10w	13	28	115
RockShox	8w	14	36	157%
Pedro's	no designation	15	32	133%
Englund	gold (approx. 12.5 w)	18	39	117%
Finish Line	20w	22	60	172%

## CANE CREEK REAR SHOCKS

### ABOUT THIS SECTION

This section applies to the following models: AD-4, AD-5, AD-8, and AD-10. Procedurally, there is virtually no difference between the AD-4 and AD-5, and there is also virtually no difference between the AD-8 and AD-10. There are small technique differences between the 4 or 5 and the 8 or 10, but one procedure with notations about the differences follows.

### TOOLS

There are no special tools provided by the manufacturer for working on these shocks. The AD-4 and AD-8 have a large ring that is unthreaded by hand that can be difficult to break loose. Wrapping a large rubber band around the ring, such as the rubber band that comes in Aheadset packages, improves grip. A section of inner tube also works, but not quite as well.

### FULL SHOCK SERVICE

Services include cleaning and lubrication, replacement of seals when air leaks develop, and changing the valving for tuning purposes (AD-4 and AD-5 only).

#### Disassembly

1. [ ] Depress valve plunger to deflate shock.
2. [ ] *AD-8 and AD-10 only:* Loosen compression and rebound adjusters to just short of point O-rings are revealed.
3. [ ] Clamp body eyelet carefully into soft jaws in vise (use rag to protect finish).
4. [ ] Wrap wide rubber band around black ring at top of body to improve grip, then turn ring counterclockwise to unthread.
5. [ ] Pull up on shaft to remove shaft/piston assembly from shock body.
6. [ ] Clamp eyelet end of shaft assembly in the soft jaws in vise (protect finish with rag).
7. [ ] Use pin spanner (Park SPA-1) to unthread piston.
8. [ ] *AD-8 and AD-10 only:* Remove compression cylinder and compression washer from inside of shaft assembly, and record compression washer thickness here: \_\_\_\_\_
9. [ ] *AD-4 and AD-8:* Pull seal head off shaft, then inspect and remove damaged seals and O-rings.  
*AD-5 and AD-10:* Pull lockring off shaft assembly, then pull seal bushing off shaft assembly. Inspect and remove damaged seals and O-rings from lockring and seal bushing.

10. [ ] *AD-4 and AD-5 only:* Pull up on white plastic plug to remove it from volume adjusting plate.  
*AD-8 and AD-10 only:* Pull on aluminum adjuster rod to remove it from volume adjusting plate.
11. [ ] Remove shaft from vise, then insert rubber-tipped blow gun into hole in volume adjusting plate and use compressed air to force out plate. *Note: Be prepared for plate and two small plastic adjusting ramps to fly out of shaft!*
12. [ ] *AD-8 and AD-10 only:* Inspect inside shaft for valve adjuster ramps that may have remained in shaft during step 11.
13. [ ] Inspect and remove damaged O-rings from volume adjusting plate.
14. [ ] Remove compression and rebound adjusters fully. O-rings will provide light resistance to removal after threads are disengaged.
15. [ ] Use 8mm socket to remove valve nut from bottom face of piston.
16. [ ] Remove washer, then remove compression valve shim and record thickness here: \_\_\_\_\_

#### Cleaning

17. [ ] Clean all parts with mild detergent and dry with compressed air and/or lint-free rag.

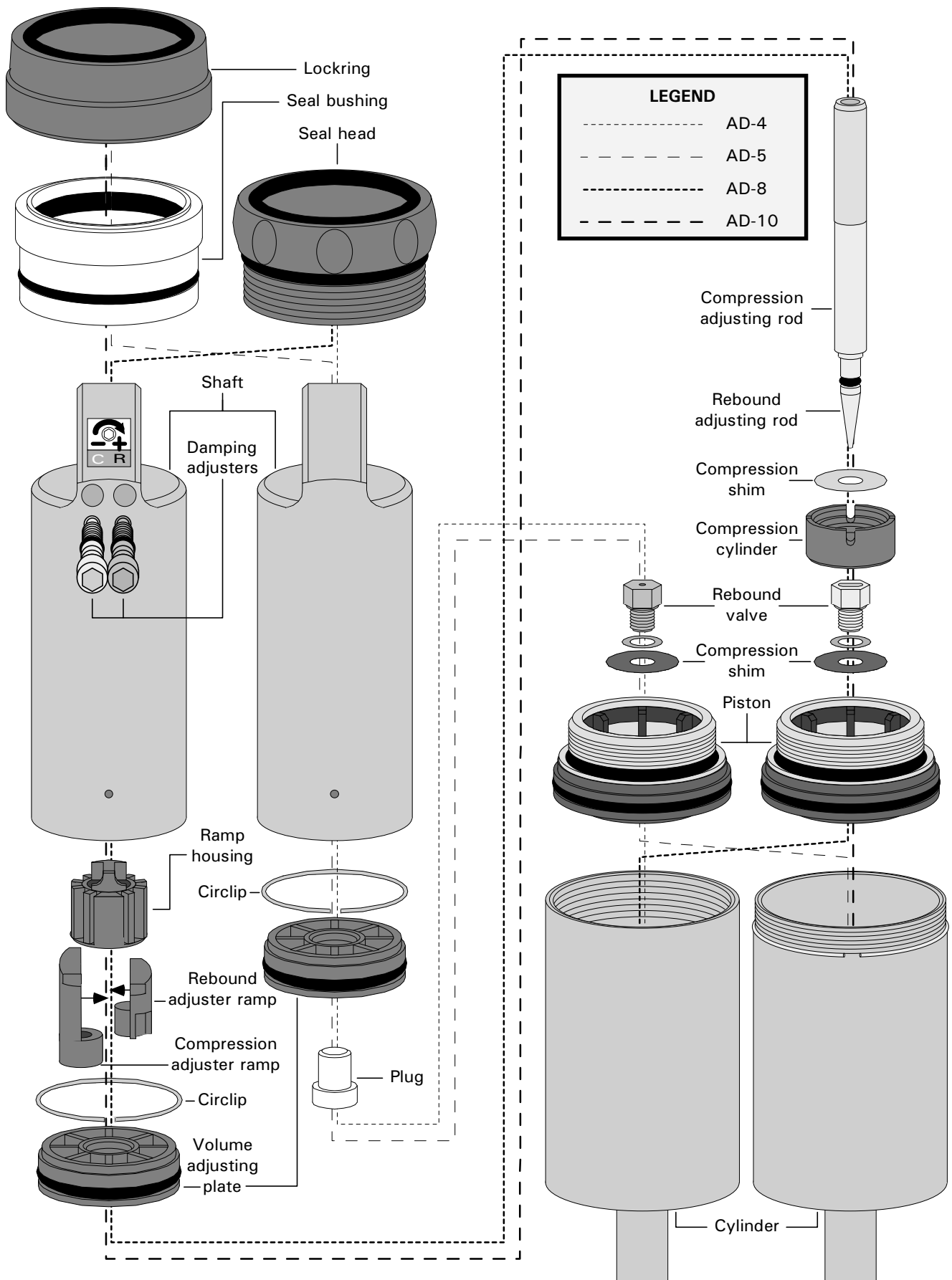
#### Volume adjustment

18. [ ] If it is desired to change volume to change spring rate, carefully remove circlip inside shaft and move to higher groove to increase spring rate, or lower groove to decrease spring rate.

#### Assembly

19. [ ] Replace all damaged O-rings and seals that were removed, then grease all O-rings.
20. [ ] Install compression shim, small washer, and then valve nut into piston.
21. [ ] *AD-4 and AD-8 only:* Slide seal head onto closed end of shaft, threaded-end first.  
*AD-5 and AD-10 only:* Install seal bushing (small end first) over closed end of shaft, then install lockring (knurled-end first) over closed end of shaft.
22. [ ] Secure eyelet end of shaft into vise (open end up).
23. [ ] *AD-8 and AD-10 only:* Inspect ramp housing inside shaft unit. It must be aligned with its center divider parallel to axis of holes for adjuster bolts. Push one adjuster bolt into its hole to see if tip of bolt appears inside ramp housing. If not, try rotating ramp housing 180°.

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38.1 Cane Creek AD-4, AD-5, AD-8, and AD-10 shocks.



In the next step, when the bolts with O-rings are inserted into the holes in the shaft, it is difficult not to damage the O-rings by catching them on the lips of the holes. Use a small chamfering tool to chamfer the holes and it will be no problem.

24. [ ] **AD-8 and AD-10 only:** Thread silver adjusting screw into hole marked “C,” and black adjusting screw into hole marked “R,” taking care not to deform or tear O-rings. Thread in bolts just until first calibration mark on smooth bolt shaft reaches the top of hole.
25. [ ] **AD-4 and AD-5 only:** Insert white plug into volume adjusting plate.  
**AD-8 and AD-10 only:** Grease blunt end of adjuster-rod assembly, mate valve adjuster ramps together, then install ramp assembly onto blunt end of adjuster-rod assembly. Insert assembly into ramp housing inside shaft so that slope of ramps face toward holes for valve adjusters.
26. [ ] Insert volume-adjusting plate into shaft, smooth-face up, until it seats fully.
27. [ ] **AD-8 and AD-10 only:** Place compression valve shim on top of valve adjusting rod, then place compression cylinder (notched end first) on top of compression valve shim.
28. [ ] Thread in and secure piston.
29. [ ] Grease inside of shock body with recommended grease, then carefully slide over piston.
30. [ ] Turn shock over and carefully grasp body eyelet in vise.
31. [ ] **AD-4 and AD-8 only:** Thread seal head into shock body as far as it will go (wrap with rubber band to improve grip).  
**AD-5 and AD-10 only:** Slide bushing seal as far as it will go into body, then slide locking over seal bushing and thread it onto body (until locking covers half of wire clip at end of body threads).
32. [ ] Inflate shock. Cover with soapy water to check for leaks.

## TUNING OPTIONS

### *Air pressure*

A simple formula can be used to determine an appropriate pressure for the shock, depending on the rider’s weight: rider’s weight (in pounds) plus 10 equals pressure (in psi). If the rider finds the suspension bottoms out too frequently, the pressure should be increased. If the rider finds the suspension is too stiff, pressure should be reduced. Adjustments should be used in five-pound increments.

### *Air volume*

These shocks have a volume adjusting plate in the shaft section of the shock. Changing the volume changes how progressive the spring is. For example, with the plate adjusted to reduce volume, even if the starting pressure is constant, it will take more force to compress the suspension fully. The suspension will be progressively more stiff the more it is compressed and less likely to bottom on big hits. Conversely, if the plate is adjusted to increase volume, even if the starting pressure is constant, it will take less force to compress the suspension fully. The suspension will be less stiff when it is compressed the same amount and the ride will be softer.

### *Compression and rebound adjusters*

The AD-8 and AD-10 have external adjusters for compression and rebound damping. They are clearly marked. The rider should determine the optimal settings by using simple trial and error. The AD-4 and AD-5 have no external adjustment, but rebound damping can be adjusted by means of replacing the valve nut with one with a different size orifice, and compression damping is adjusted by changing a valve shim washer inside the shock.

### *AD-4 and AD-5 compression shim washers*

Cane Creek makes available a tuning kit with an assortment of thickness of compression shim washers. Changing the compression washer is the only way to change the compression damping on the AD-4 and AD-5. The washer(s) should be changed on the AD-8 and AD-10 only if the external adjuster cannot be loosened or tightened enough to achieve the desired amount of damping. All models have a compression washer that is removed in step #16 (of the preceding procedure) from beneath the valve nut. Another compression washer is the washer removed in step #9 (AD-8 and AD-10 only).

Three washers are available with thickness measurements of .10mm, .15mm, and .20mm. These increments are large, so in most cases a change of one step up or down should be the most attempted at first.

### *AD-4 and AD-5 valve orifice diameter*

The tuning kit also includes three sizes of valve nuts, with orifice diameters of .56mm, .61mm, and .66mm. These are used to adjust the rebound damping on the AD-4 and AD-5 only. Smaller orifice size creates greater damping. To identify the size of the installed valve or the replacement valve, look for a number stamped on the side of the valve. The number “6” indicates the smallest size, “7” the middle size, and “8”

## 38 – SUSPENSION FORKS AND REAR SHOCKS

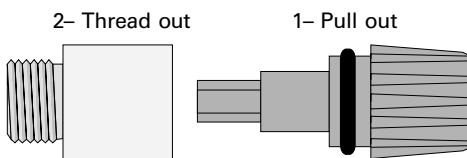
the largest size. Unfortunately, early production runs of the shocks and the tune-up kits had unmarked valves. In this case, the only way to identify the size is by purchasing very rare drill bits in wire sizes #71 and #73. If the #71 fits in the hole, then it is the largest. If the #71 doesn't fit, but the #73 does fit, it is the middle size. If neither fits, then it is the smallest size. These inexpensive drill bits are available from Grainger Industrial Supply ([www.grainger.com](http://www.grainger.com)) and are part nos. 1F945 and 1F950.

### MANITOU MACH 5 FORKS

This section covers three models of forks: Comp, Pro XC, and SX. They are functionally identical, except that the SX model has an oil damper in the left leg. Servicing the SX oil damper is included in the **MANITOU EFC/MACH 5 SX OIL DAMPERS** section.

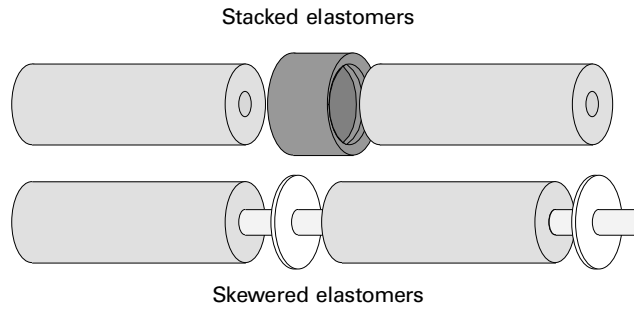
### DISASSEMBLY

1. [ ] *SX model only:* Count number of turns it takes to turn each adjuster knob at top of stanchion to most counterclockwise position, then record here: Turns on left: \_\_\_\_\_  
Turns on right: \_\_\_\_\_
2. [ ] *SX model only:* Count number of turns it takes to turn each adjuster knob at bottom of left slider to most counterclockwise position, then record here: \_\_\_\_\_
3. [ ] Disconnect front-brake cable.
4. [ ] Jiggle sliders to feel for free play that indicates bushings are worn.
5. [ ] *Comp & Pro XC (either leg), & SX (right leg):* Remove bolts on bottom ends of sliders.  
*SX left leg only:* Pull or pry knob out of cylinder at bottom of left slider, then use 8mm Allen wrench to unthread cylinder.



38.2 *SX left leg damper-adjuster assembly.*

6. [ ] Turn stanchion caps counterclockwise, to remove elastomer stacks from top of stanchion tubes.



38.3 *Stacked elastomers (Comp and Pro XC) and skewered elastomers (SX) assemblies.*

7. [ ] Note sequence of washers and elastomers in skewer stacks.

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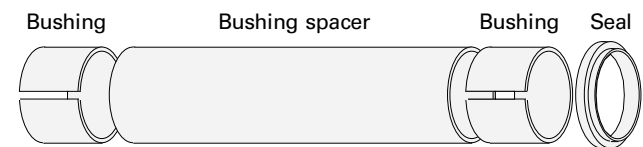


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8. [ ] Remove elastomers and washers from skewer shafts (or from top caps).
9. [ ] Pull slider assembly off ends of stanchions.
10. [ ] Pull dust boots off of stanchions.
11. [ ] Use 1/8" slotted screwdriver to deflect end of circlip in top of slider inward, then pry circlip out of slider.
12. [ ] Lift wiper seals out of tops of sliders.
13. [ ] Pull top bushings out of tops of sliders.
14. [ ] Pull bushing spacers out of sliders.

In some cases, the lower bushing may fall out of the slider effortlessly. If it does not, a custom bushing remover can be fabricated by grinding the threaded end of a spoke to a fine point and bending about 1/2" of the threaded end over, at a 90° angle. The pointed tip of the spoke can then be used to snag the bottom edge of the lower bushing.

15. [ ] Pull lower bushings out of sliders with custom bushing puller.



38.4 *Wiper seal and bushing assembly.*

**NOTE:** To service damper of SX left leg, go to **MANITOU MACH 5 SX OIL DAMPERS** section (page 38-12) now.

16. [ ] *Comp and Pro XC only:* Pull keeper plate out of slot in black shaft that is protruding from end of stanchion tube.
17. [ ] *Comp & Pro XC (either leg), & SX (right leg):* Pull bumper(s) off black shaft.

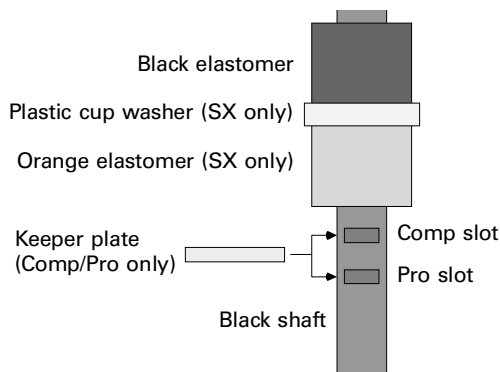
18. [ ] Turn stanchion over to remove black shaft.
19. [ ] Repeat steps 11–18 for other leg.

### CLEANING AND INSPECTION

20. [ ] Clean all parts with non-abrasive cleansers. Avoid chemicals that might violate plastic and rubber parts.
21. [ ] Inspect bushings for variable thickness, indicating wear.
22. [ ] Inspect seal for nicks, tears, or cracking.
23. [ ] Inspect elastomers for cracks or other deterioration.

### ASSEMBLY

24. [ ] *Comp & Pro XC (either leg), & SX (right leg):* Drop black shaft into stanchion, then make sure shaft sticks out hole in bottom of stanchion tube.
25. [ ] Grease elastomer stacks, then assemble elastomers to skewer or between separator washers.
26. [ ] Drop elastomer stacks and top caps into stanchions and thread in top caps.
27. [ ] *Comp & Pro XC (either leg), & SX (right leg):* Slide greased bumper(s) onto black shaft, until just past slots in shaft.



38.5 Shaft-bumper arrangements on Comp, Pro XC, and SX shafts.

28. [ ] *Comp and Pro XC only:* Slide keeper plate into slots in black shaft (upper slot for Comp, lower slot for Pro XC).
29. [ ] Slide dust boots onto stanchion tubes.
30. [ ] Grease bushings and bushing spacers inside and out.
31. [ ] Insert bushing, bushing spacer, then bushing into each slider.
32. [ ] Seat wiper seals (conical-ends up) into sliders.
33. [ ] Place circlips over wiper seals.
34. [ ] Install slider assembly onto ends of stanchions and push up fully.

35. [ ] *Comp & Pro XC (either leg), & SX (right leg):* Treat mounting-bolt threads with Loctite 222, then gently secure mounting bolt into bottom end of slider.  
*SX left leg only:* Treat threads of large sleeve nut with Loctite 222, thread large sleeve nut into bottom of slider, then insert adjuster knob on bottom of slider.
36. [ ] *SX left leg only:* Turn adjuster knob at bottom of slider fully counterclockwise, then clockwise number of turns indicated in step 2.
37. [ ] *SX only:* Turn adjuster knobs on tops of stanchions fully counterclockwise.
38. [ ] *SX only:* Turn adjusters clockwise number of turns recorded in step 1.

### SECURING STANCHION TUBE IN FORK CROWN

**NOTE:** The following procedure applies only to models that have one 6mm bolt in the crown that is inward of each of the stanchion tubes. The following torques do not apply to the original Manitou forks, which had two bolts in the crown between the fork column and each stanchion tube, or to Manitou models that have two bolts outward of each stanchion.

1. [ ] Remove crown bolts.
2. [ ] Adjust height of stanchion tube so top is no lower than top of fork crown, and no higher than the maximum-height mark on the stanchion tube. (In the absence of a maximum-height mark, position top of stanchion tube flush with top of fork crown.)
3. [ ] Treat bolts with Loctite 242.
4. [ ] Torque mounting bolts 110–130in-lbs (27–33lbs@4").

### TUNING OPTIONS

#### Changing elastomers

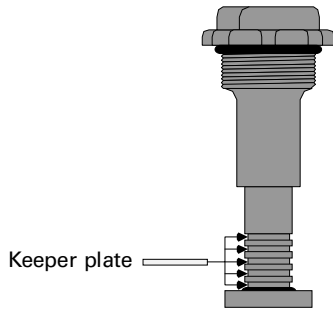
A variety of elastomers with different durometers are available for these forks. Stiffer durometer elastomers will give the fork greater resistance to compression and offer faster rebound. The different elastomers can be combined in any way (both legs should match), as long as the original elastomer stack length is maintained.

#### Adjusting Comp and Pro XC pre-load

The adjuster knobs at the tops of the stanchions must be threaded out of the stanchions to adjust the pre-load. Once the knobs are out, the plunger on the bottom of the knob can be pulled out. The clip can be

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moved to different slots to change the pre-load. When the clip is moved further up, the pre-load is increased, and decreased when the clip is moved further down.



**38.6** To change the pre-load adjustment on the Comp and Pro XC models, move the keeper plate to a different slot.

### Adjusting SX pre-load

The adjuster knobs at the tops of the sliders can be turned to change the effective spring stiffness. Turning the knobs clockwise increases spring stiffness and turning the knobs counterclockwise decreases spring stiffness.

### Adjusting damping on Manitou SX left leg

The adjusting knob on the bottom of the left slider primarily adjusts rebound damping but compression damping will be increased slightly whenever rebound damping is increased significantly. Turning the knob counterclockwise decreases rebound damping and turning the knob clockwise increases rebound damping.

See **MANITOU MACH 5 SX OIL DAMPERS** (immediately following this section) for damper service.

### Changing oil in damper in SX left leg

Oil weight affects the damping rate. The weight of the oil affects both the compression and rebound damping. Heavier-weight oils increase the damping effect (retarding compression and rebound); lighter-weight oils decrease the damping effect (speeding up compression and rebound).

Oil weight also might be varied to compensate for weather conditions, with very light-weight oils being used for extreme-cold conditions.

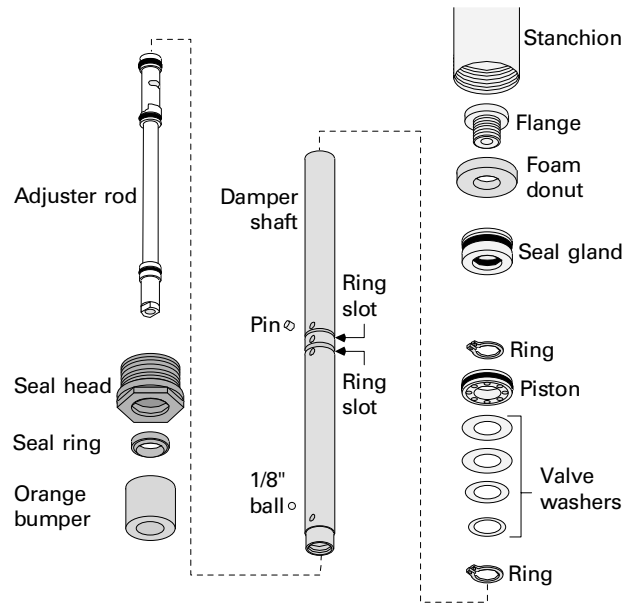
See **MANITOU MACH 5 SX OIL DAMPERS** (immediately following this section) for damper service.

## MANITOU MACH 5 SX OIL DAMPERS

The oil damper is built into the left stanchion tube on SX models. The damper can be replaced as a whole by replacing the stanchion, or the damper can be serviced by disassembling the stanchion assembly.

### DISASSEMBLY

1. [ ] Use **DISASSEMBLY** steps 1–15 of **MANITOU MACH 5 FORKS** (page 38-10) to access oil damper.
2. [ ] Remove left stanchion assembly from fork crown.
3. [ ] Prepare to catch ball bearing that is trapped under elastomer on end of shaft, then carefully remove elastomer from shaft.
4. [ ] With stanchion held upside down, carefully unthread seal-head with large hex fitting on bottom end of stanchion, then pull seal-head a few millimeters away from stanchion.



**38.7** Blow-up of EFC and Mach 5 SX oil damper.

5. [ ] Turn stanchion over so that oil will drain into catch pan.
6. [ ] Carefully pull seal-head off end of shaft.
7. [ ] With end of stanchion still pointing into catch pan, pump shaft fully in and out to pump oil out of stanchion.

**NOTE:** If changing oil only, go to step 32 now. Do not go to step 8 unless in possession of a rebuild kit.

8. [ ] Insert long rod into top of stanchion tube, then push remaining parts out bottom of stanchion.

9. [ ] Holding shaft securely by bottom 25mm (in fashion that will not mar shaft), use 5mm Allen wrench to unscrew flange from top end of shaft.
  10. [ ] Pull foam donut and seal gland off top end of shaft.
  11. [ ] Remove O-ring from outside of seal gland, then seal ring from inside of seal gland.
- For the remaining steps, it is important to differentiate between the top and bottom of the shaft. The bottom end has a diameter reduction for the last 7mm and also has a hole in the shaft about 12mm from the end.
12. [ ] Being careful not to scratch shaft, remove external snap-ring from topside of piston/valve assembly at center of shaft.
  13. [ ] Remove small metal washer, plastic washer, two large metal washers, and then piston.
  14. [ ] Remove O-ring from outside of piston.
  15. [ ] Find pin that was covered by piston, then tap shaft on soft surface so that pin will fall out; pushing plastic adjuster rod inside shaft one way or other can relieve load on pin, so that it will fall out.
  16. [ ] Pushing from top end of shaft, push adjuster rod out bottom end of shaft.
  17. [ ] Remove three O-rings from adjuster rod.
  18. [ ] Remove O-ring from outside of threaded stanchion seal-head, then seal ring from inside of seal-head.

### CLEANING AND INSPECTION

19. [ ] Clean all parts with mild detergent and water, then dry thoroughly with compressed air. *Avoid leaving solvents or lint from rags on, or in, any part!*
20. [ ] Inspect shaft for scratches or gouges on portions of shaft that move through O-rings in seal gland and seal-head.

### ASSEMBLY

21. [ ] Thoroughly grease all O-rings and seal rings.
22. [ ] Install O-ring (outside) and seal ring (inside) of threaded seal-head.
23. [ ] Install 3 O-rings on adjuster rod.
24. [ ] Install O-ring (outside) and seal ring (inside) of seal gland.
25. [ ] Install O-ring on outside of piston.
26. [ ] Slide onto top end of shaft in order: piston, two large metal washers, plastic washer, then small metal washer.
27. [ ] Carefully slide external snap-ring over top end of shaft, then seat in groove above washer(s).
28. [ ] Slide foam donut over top end of shaft.

29. [ ] Find face of seal gland that internal seal ring is closest to, then carefully slide seal gland (with that face first) over top end of shaft.
30. [ ] Holding shaft securely by bottom 25mm (in fashion that will not mar shaft), use 5mm Allen wrench to secure flange into top end of shaft.
31. [ ] Taking care to not damage seal-gland O-ring on threads in end of stanchion, insert shaft/piston assembly into end of stanchion (flanged-end first), then bottom shaft fully into stanchion.
32. [ ] Holding stanchion tube upside down, carefully fill stanchion with 2.5w, high-quality, suspension oil.
33. [ ] Without moving shaft to its limit in either direction, slowly pump shaft up and down, several times to pump air out of system.
34. [ ] When bubbles have dissipated from top of oil, add more oil until level is 2–3mm below end of stanchion.
35. [ ] Look at bottom face of seal-head to find location of bleed hole.
36. [ ] Keeping track of location of bleed hole, carefully slide stanchion seal-head over end of shaft until threads of seal-head contact threads in end of stanchion.
37. [ ] Wrap rag around stanchion, then thread stanchion onto seal-head while holding seal-head stationary, until seal-head is engaged a few threads.
38. [ ] Tip stanchion in direction that will keep bleed hole on high side, until stanchion is leaning at about 45°.
39. [ ] Holding seal-head stationary, thread stanchion on to seal-head until O-ring just contacts end of stanchion.

In the following step, great care is needed to prevent the O-ring from becoming trapped between the seal-head flange and the end of the stanchion. As the seal-head is threading in, the oil coming out the bleed hole tends to force the O-ring out of its groove. Backing the seal-head out slightly after threading it in a little encourages the O-ring to settle back down into the groove of the seal-head. *Important! If at any time it appears that the O-ring is being squeezed between the seal-head flange and the end of the stanchion, remove the seal-head and start over again!*

40. [ ] Thread seal-head in tiny amount, back out slightly less, in again, out slightly less again (repeatedly), until flange on seal-head is seated against end of stanchion.
41. [ ] Secure seal-head to 35–50in-lbs.
42. [ ] Turn adjuster rod in end of shaft fully counterclockwise.

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43. [ ] Pull shaft out of stanchion to its limit.
44. [ ] Place ball bearing in its socket 12mm from end of shaft, then slip bumper over shaft to retain bearing.
45. [ ] Place upper end of stanchion fully into fork crown, then secure bolt in fork crown to 110–130in-lbs.

### TUNING OPTIONS

#### ***Adjusting damping on Mach 5 SX left leg***

The adjusting knob on the bottom of the left slider primarily adjusts rebound damping but compression damping will be increased slightly whenever rebound damping is increased significantly. Turning the knob counterclockwise decreases rebound damping and turning the knob clockwise increases rebound damping.

#### ***Damper oil change in Mach 5 SX left leg***

Oil weight affects the damping rate. The weight of the oil affects both the compression and rebound damping. Heavier-weight oils increase the damping effect (retarding compression and rebound); lighter-weight oils decrease the damping effect (speeding up compression and rebound).

Oil weight also might be varied to compensate for weather conditions, with very light-weight oils being used for extreme-cold conditions.

## ***MANITOU '98–'00 SX & XVERT FORKS***

### ABOUT THIS SECTION

This section covers a wide range of Manitou SX and XVert models from 1998 through 2000 models. This section does not cover the air-sprung 2000 Mars models, which were not available at the time of this writing. This section does not cover the 1999 Spyder or 2000 Magnum models. The covered 2000 models can be distinguished from the covered 1998 and 1999 models by looking for the “preload” adjuster, which is on the right side on the 2000 models. These 2000 models are essentially the same fork to service as the earlier ones, with one significant exception. In 1998 and 1999, all the models had a spring assembly in the right leg and a hydraulic damper in the left leg. For the 2000 models, this is reversed. This section covers full fork service, including bushing replacement.

The bushing removal and installation procedure utilizes the following tools. The removal tool can be easily modified to improve its function. The modifications are described at the point in the procedure where the use of the tool is described. These bushing tools were introduced in 2000, but are similar to the older tools (remover #85-3892 and installer #38-3893).

Answer Products #85-3909 bushing remover

Answer Products #85-3911 bushing installer

Other tools needed are:

Modified 24mm socket ground on end to eliminate internal bevel to improve purchase.

Modified 27mm socket ground on end to eliminate internal bevel to improve purchase.

### FULL FORK SERVICE

This section covers a wide range of Manitou models from 1997 through 2000 models, as long as they feature TPC damping. All the covered models should have a decal that indicates it is a TPC model.

#### ***Slider-assembly removal***

1. [ ] Pull plastic adjuster knob from bottom of left leg (right leg if 2000 model).
2. [ ] Remove bolt that adjuster was removed from with 8mm Allen wrench.
3. [ ] Remove second bottom bolt with 4mm Allen wrench, then remove bushing (if any).
4. [ ] Pull slider assembly off stanchion tubes, then remove boots from stanchions.

#### ***Spring-stack and plunger-shaft removal***

5. [ ] Count number of turns to turn pre-load adjuster on top of sprung leg fully counterclockwise and record here: \_\_\_\_\_ turns
6. [ ] Unthread cap with pre-load adjuster with fingers (27mm wrench if equipped with flats), then remove spring-stack assembly.
7. [ ] Remove elastomer stack from shaft on spring side and note sequence of elastomers and spacers.
8. [ ] Push plunger shaft out top end of stanchion where spring was removed. A spoke or similar long, skinny object may be necessary to push shaft fully out.
9. [ ] Remove accordion-like top-out bumper from shaft by pulling it off bottom end of shaft.

#### ***Damper removal***

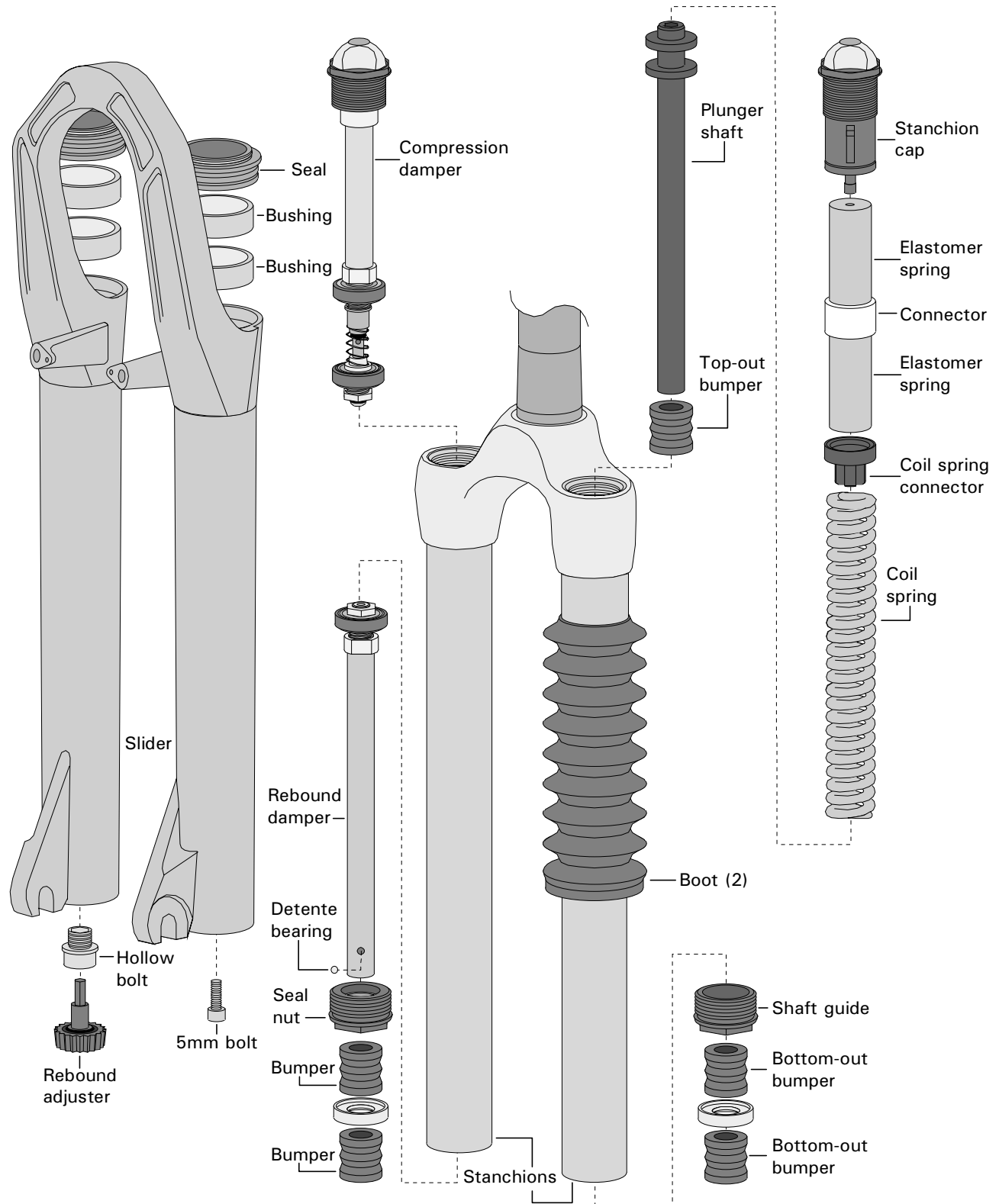
Dampers are removed to facilitate cleaning and inspection. Damper-valve disassembly is not necessary, and is not supported by separate parts from the manufacturer.

10. [ ] With fork upright, unthread top cap and slowly remove damper piston to avoid spilling oil.

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11. [ ] Carefully turn fork over to drain oil from stanchion into waste receptacle.
12. [ ] Be prepared to catch small ball bearing trapped under bumper on rebound-damper shaft, then remove bumper(s) from end of shaft, noting sequence if multiple.

13. [ ] Push rebound-damper shaft almost fully into seal nut on bottom of stanchion.
14. [ ] Use 24mm or 27mm socket to remove seal nut, then pull damper piston out bottom of stanchion.
15. [ ] Pull seal nut off end of rebound-damper shaft.



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16. [ ] Use rebound-damper adjuster knob to fully unthread adjuster shaft, then pull adjuster out bottom of damper shaft. *Note: Adjuster shaft has needle tip that will be damaged if something is inserted thorough top of damper to push out adjuster!*

### **Seal and bushing removal**

The pre-2000 bushing remover is a relatively crude tool that relies on awkward yanking to remove the bushings. With a few simple modifications, it can be made to work on a threading principal, instead of by yanking on it. The 2000 tool comes with a slide-hammer system that is superior to the yanking approach, but it, too, can be made to work on a threading principal.

There are four additional parts needed for the modification. They include a pressed headset cup from a bike with a 1" fork diameter; a threaded race or locknut (type without a metal lip) from the same-sized headset; an old quill stem with a 22.2mm quill diameter (extra-tall preferred); and a 100mm section of steel frame tubing with outside diameter of 1-1/8". For purposes of simplicity, the following procedure will call these four pieces, in respective order, the "cup," the "locknut," the "stem," and the "short tube."

The remover tool (#85-309) itself has several pieces, which are described below with the names that are used in the procedure:

Tube with lip on one end and threads on other – "column"

Aluminum knurled cylinder – "handle"

Short cylinder split along its length – "expander"

7-1/2" tube – "long tube"

Steel knurled cylinder on acme-threaded shaft – "slide hammer" (2000 and later model only)

The version of the tool introduced in 2000 has two of everything above, except the slider hammer. The smaller-diameter version of each item is for Magnum model forks only. There are three sizes of expanders. The smallest is for Magnum forks, the medium is for SX and Spyder forks, and the largest is for X-Vert forks.

**NOTE: Steps 17–24 work for the 2000 model tool in its stock configuration. If using modified tool, skip to alternate step 17 (following step 24).**

17. [ ] Pry seals out of top ends of sliders.  
18. [ ] Install largest expander (tapered-end first) on larger column, then install long tube.  
19. [ ] Assemble slide hammer assembly to handle, then thread handle onto column.  
20. [ ] Insert column into slider, then use slide hammer to push expander through first bushing.

21. [ ] Holding handle, push long tube down column to force expander to end of column.  
22. [ ] Turn assembly upside down and use slide hammer to pull bushing from slider.  
23. [ ] Repeat steps 18–22 for remaining bushings.  
24. [ ] Proceed to step 32.

**NOTE: Alternate steps 17–31 work if remover has been modified to work on a threading principle.**

17. [ ] Pry seals out of top ends of sliders.  
18. [ ] Clamp handlebar-clamp end of stem securely in vise so that quill of stem is above vise and horizontal.  
19. [ ] Using rubber mallet, make sure expander is compressed so that it is a close fit to diameter of top end of column.  
20. [ ] Slide expander (tapered-end first) down column just to point column fattens.  
21. [ ] Place long tube over column, thread locknut on just until it reaches long column, then slide column assembly onto stem several inches and secure stem-binder bolt.  
22. [ ] Place slider over end of column assembly until bushing contacts expander.  
23. [ ] Push slider until expander is forced through top bushing.  
24. [ ] Thread locknut to end of threads.  
25. [ ] Pull firmly on slider assembly until expander is felt to bottom against lip at end of column, remove assembly from stem, then remove locknut and long tube from column.  
26. [ ] Place cup (cupped-side first) and long tube over column, then thread on locknut. Make sure cup is seated over lip on top of slider.  
27. [ ] Install column back onto stem and secure, tighten locknut until bushing pulls out, then remove slider assembly.  
28. [ ] Loosen locknut completely, slide loose pieces up to locknut, then close adjustable wrench onto flats filed onto column lip. Tap on wrench to drive expander off fat part of column.  
29. [ ] Remove all tools and pieces, leaving stem in vise.  
30. [ ] Repeat steps 19–29 for lower bushing, using short tube instead of long tube in step 26.  
31. [ ] Repeat bushing removal for other leg.

### **Cleaning and inspection**

32. [ ] Clean all parts with mild detergent and dry with lint-free rag and compressed air. *Avoid using solvents to prevent damage to plastic and rubber parts!*  
33. [ ] Check all O-rings and rubber seals for tears or nicks and replace as needed.  
34. [ ] Inspect stanchion tubes for bends and wear marks.



35. [ ] Inspect bushings for wear. Cream-colored plastic coating in bushings will be partially missing, exposing metal base material if bushings are worn out.
36. [ ] Inspect rebound damper shaft for scratches or wear marks.

### ***Bushing and seal installation***

The 2000 model installation tool (#85-3911) has several pieces, which are described below with the names that are used in the procedure (pre-2000 tool has fewer pieces and fits fewer models):

- 12" threaded rod – “shaft”
- Three multi-stepped cylinders, each measuring 25.5mm, 28.5mm, or 30mm diameter at second-largest point – “installation mandrills”
- One two-step cylinder – “sizing mandrill”
- Fifteen donut-shaped rings – “sizing donuts”
- A 25.4mm O.D. cylinder, 17mm long – “17mm spacer”
- Two long sleeves, 5-3/8" and 3-5/8" long sleeve respectively – “depth gauges”
- Two 3" long sleeves (one small and one large diameter) – “upper sleeves”
- Two round plates with slot – “slotted plates”
- Knurled steel cylinder with hole in one end – “weight”

The sizing donuts consist of three sets. The 1.003–1.006 set is for Magnum forks only, and is used with the smallest mandrill. The 1.128 through 1.131 set is for all forks with 28.5mm O.D. stanchions and are used only with the medium mandrill. The 1.186 through 1.191 set is for forks with 30.0mm O.D. stanchions, and are used only with the large mandrill. Only two sizing donuts are used at one time, and these should always be consecutive sizes. For example, 1.128 and 1.129 can be used together but 1.128 and 1.130 cannot be used together.

Once the correct set is selected for the model being serviced, always start installation with the smallest pair, which provides the tightest fit to the stanchions. If the fit proves too tight, then use the next larger pair on the mandrill, instead.

37. [ ] Assemble bushing-installer parts in following order to one end of shaft:
- nut
  - installation mandrill (large-diameter-end first)
  - smallest sizing donut (of correct set)
  - 17mm spacer
  - second-smallest sizing donut (of correct set)
  - washer
  - nut
38. [ ] Secure nuts together, with assembly fully at one end of shaft, then install third nut on other end of shaft just until it is fully engaged.

39. [ ] Place smaller O.D. bushing over sizing donuts and onto mandrill, then place depth gauge (marked-end up) over other end of shaft. Put 3-4 drops of Loctite 680 on bushing.
40. [ ] Insert assembly into slider, then tap on top of shaft with weight until maximum mark is within 1" of top of slider tube.
41. [ ] Remove depth gauge and place slotted plate over shaft and against end of slider (flat-face up). *Note: Small slotted plate fits Magnum only.*
42. [ ] Tighten nut until both sizing donuts pull through bushing, then remove tools.
43. [ ] Test fit stanchion in bushing and decide whether fit is too tight. If too tight, replace installation mandrill with sizing mandrill, reassemble tool with 3rd then 2nd largest donuts and repeat procedure. When satisfied with fit, reinstall installation mandrill with smaller then larger sizing donuts finally used.
44. [ ] Place larger O.D. bushing over sizing donuts and onto installation mandrill. Put 3-4 drops of Loctite 680 on bushing.
45. [ ] Insert assembly into slider, then tap on top of shaft with weight until nut on top of mandrill is only partially above top of slider.
46. [ ] Place upper sleeve and slotted plate over shaft and against end of slider (flat-face up). *Note: Use smaller-diameter upper sleeve and slotted plate for Magnum model only.*
47. [ ] Tighten nut until both sizing donuts pull through bushing, then remove tools.
48. [ ] Tap seals into tops of sliders.

### ***Slider installation***

49. [ ] Install boots onto stanchion tubes.
50. [ ] Install adjuster rod into rebound damper, making sure threads engage and it is fully threaded in, then install seal nut (threaded-end first) onto rebound-damper shaft.
51. [ ] Thread rebound damper into left stanchion (right stanchion if 2000 model).
52. [ ] Install bumper(s) and spacer (if any) that were removed from rebound-damper shaft to just past small hole in side of shaft.
53. [ ] Insert 1/8" bearing into hole in side of rebound-damper shaft, then pull bushing(s) down until bearing is covered.
54. [ ] Install top-out bumper onto plunger shaft, then insert 6mm Allen bit on long extension(s) and guide plunger shaft down stanchion and out hole at bottom.
55. [ ] Install bottom-out bumpers onto shaft.
56. [ ] Grease stanchion tubes and bushings, then carefully guide slider assembly onto stanchions just until bottoms of shafts contact bottoms of sliders.

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- 57. [ ] Treat bottom bolts with Loctite 242, insert bolts (and bushing, if any) through holes in bottoms of sliders, then thread bolts into shafts.
- 58. [ ] Stabilizing plunger shaft with 6mm bit socket on the extension(s), secure small bolt to 25–30in-lbs.
- 59. [ ] Secure large bottom bolt to 25–30in-lbs with 8mm bit socket.
- 60. [ ] Insert plastic adjuster knob into large bolt.

### ***Spring and compression-damper installation***

- 61. [ ] Thoroughly grease spring elastomer and coils, insert spring assembly into side with small bolt at bottom, then secure top caps with wrench flats to 20–30in-lbs (no wrench flats–finger tight).

Answer Products recommends over ten different oil-level ranges for the forks covered in this section. Many of these recommended ranges overlap, so the following four recommended ranges are all within the manufacturer's recommendations, but may not be as wide a range as the manufacturer's recommendations. Furthermore, the manufacturer cautions strongly against too much or too little oil, and oil level can be difficult to measure, so these more conservative ranges reduce the risk of ending up with an unacceptable oil level.

'00 XVert, '00 XVert DC	80–85mm
'99 XVert TI and all other double-crown XVerts	205–225mm
'98 XVert TI	130–175mm
Other single-crown XVerts except XVert TI, all SX's	95–105mm

- 59. [ ] Fill stanchion with 5wt suspension fluid to appropriate level.
- 60. [ ] Carefully insert compression damper, then thread in and secure top caps with wrench flats to 20–30in-lbs (no wrench flats–finger tight).

## TUNING OPTIONS

### ***Compression damping***

On some models, compression damping is externally adjustable. There is a clearly-marked adjusting knob on top of the left top cap, if this is the case. It is on the opposite side from the knob marked “preload.”

On models that are not externally adjustable, the compression damper may be internally adjustable. The compression damper is the top damper piston. It can be removed without any other fork disassembly. Be careful of overflowing oil that will occur if the damper

is removed too quickly. Once removed, locate the small Allen set screw in the side of the top end of the piston assembly. Tightening the screw increases the damping, and loosening the screw reduces the damping. Use one-turn increment adjustments. If there is no set screw, the model has no compression adjustment.

In some cases, it is possible to disassemble the valving on the compression piston, and in other cases the nut has been permanently bonded. In addition to this complication to customizing the valving, there is the fact that the manufacturer has been very poor at supporting customization with individual valve parts. Add to these problems the fact that understanding and evaluating changes in valving is too esoteric for the vast majority of mechanics, and the practicality of customizing the valving is close to none. If the ability to adjust valving by the means provided by the manufacturer was inadequate, this would be a problem, but the built-in adjustability has a very broad range of performance.

### ***Rebound damping***

The rebound damper is the lower damper piston in the left leg. It is externally adjustable by turning the adjuster knob on the bottom of the left leg. Turning the knob clockwise increases the rebound damping, and counterclockwise reduces the damping. The knob moves in 1/6 turn clicks so that it is possible to track the amount of adjustment. From fully clockwise to fully counterclockwise is about 40–42 clicks, or up to seven full turns.

Although it is theoretically possible to disassemble the valving on the rebound damper, the same complications that make it impractical to customize the compression damper apply to the rebound damper.

### ***Spring pre-load adjustment***

The spring system has adjustable pre-load. When the knob is turned clockwise the spring is stiffened, and when it is turned counterclockwise the spring is softened. The pre-load adjustment is used to set the desired sag. The manufacturer does not provide recommended sag guidelines, but sag is typically set in a range from 10–20% of total travel.

### ***Spring-tuning kits***

Spring-tuning kits are available in a range of spring stiffness. If the fork has inadequate sag when the pre-load is fully loose, or the fork never bottoms under any of the conditions the rider experiences, then a softer spring kit is called for. If the fork has too much sag no matter how much the pre-load is tightened, or bottoms frequently when ridden, then a firmer spring kit is called for.

## MARZOCCHI '99-'00 FORKS- COIL & OIL-DAMPER TYPES

### ABOUT THIS SECTION

Marzocchi made three basic types of forks during this period. The most basic type is a simple coil spring with non-adjustable oil damping, which is covered in this section. This type is identified by the lack of any slotted rods protruding from the top caps and the lack of air valves (on front or back of top end of slider tubes, or hidden under a plastic cap on top of the stanchion cap). Another type has coil springs, but adjustable oil damping. These are covered in **MARZOCCHI '97-'00 FORKS-COIL & ADJUSTABLE OIL TYPES** (page 38-22). The third type has air springs and oil damping. These are covered in **MARZOCCHI '99-'00 FORKS-AIR SPRUNG TYPES** (page 38-26).

The forks covered in this section include many models (listed below), but have a few minor variations (regarding service techniques). One variation is distinguished by external pre-load adjusting knobs. Another variation is distinguished by pre-load adjusters hidden under rubber caps on top of the stanchion top caps. The models and the type of pre-load adjuster used are:

Year and model	Pre-load adjuster
'00 Z3 BAM 80	external
'99 & '00 Z1 Dropoff	external
'00 Z3 QR 20	external
'99 & '00 Jr T & Jr T QR 20	external
'99 Z3 Light, Z3 Long Travel	external
'99 Z4 Alloy	hidden
'00 Z3.5 & Z3 M80	hidden
'00 Z5 QR 20 Spring	hidden

Some of the models, regardless of the pre-load adjuster type, have removable stanchions, and some have stanchions permanently fixed in the fork crown. The presence of two bolts in the crown at the top of each stanchion indicates the stanchions are removable. Some models have one additional difference. Most of the other models have a stanchion top cap that threads into the stanchion, but a few models have a top cap that inserts into the stanchion and is retained by an internal circlip.

All of these variations are covered in the following procedure. It can be difficult to correctly identify the year and model of fork being worked on, but when there are variations and alternate procedures are provided, by reading all the alternate pro-

cedures and examining the features on the fork, it should be possible to determine which alternate procedure is appropriate.

### TOOLS

Marzocchi makes two tools for servicing this fork, specifically for bushing and seal removal and installation. These are the Slider Protector #536003AB and the Seal Press #R5068. In addition, two sizes of sockets are needed for the top caps. Due to the low profile of the wrench flats on the top caps, it is necessary to custom grind the ends of the sockets to eliminate any internal bevel. The socket sizes are 21mm and 26mm.

RockShox Dropout Vise Blocks #70107 are very useful for securing the sliders in the vise with minimal chance of cosmetic or structural damage. The dropout vise blocks only work on models that fit a standard quick-release hub. An alternative is to put a dummy axle set into the dropouts, clamp the axle set directly into the vise jaws, then attach the fork to the axle set. One more alternative is to use a fork mount such as those used for securing a bike in the bed of a pickup truck.

### FULL FORK SERVICE

#### *Top-cap and spring removal*

- [ ] Remove brake calipers and cable system from fork.
- [ ] **External pre-load models:** Counting number of turns, turn pre-load adjuster knobs fully in “-” direction and record number of turns here: right \_\_\_\_\_ left \_\_\_\_\_  
**Hidden pre-load models:** Remove rubber cap (if any), or unthread cap with 4mm Allen fitting from stanchion cap, then use 4mm Allen to turn pre-load adjuster. Counting number of turns, turn pre-load adjuster fully counterclockwise (until it reaches top of stanchion cap) and record number of turns here: right \_\_\_\_\_ left \_\_\_\_\_
- [ ] **All external pre-load models except '00 Z3 BAM 80:** Remove circlips from grooves in stanchion caps (just above top of fork crown).
- [ ] **Models with removable stanchions:** Remove crown bolts, then remove stanchions from crown.
- [ ] **'00 Z5 only:** Depress top cap slightly, then remove internal snap-ring. **Caution—spring may eject top cap suddenly. Do not stand directly over stanchion!**

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6. [ ] *If stanchions have been removed and top caps are still in place:* Clamp stanchion tube in bike-stand clamp, then unthread stanchion cap from stanchion.  
*All others:* Unthread stanchion caps.
7. [ ] Remove aluminum sleeves (if any), washers, and springs from inside of stanchions.
8. [ ] Carefully drain old oil into waste receptacles, pumping stanchions to drain out oil.

### ***Slider and plunger removal***

9. [ ] Place RockShox dropout vise blocks on dropout, and secure in vise so that access hole on bottom of slider is accessible.
10. [ ] Use 15mm socket on extension to break loose bolt inside access hole in bottom of slider.
11. [ ] While pulling continuously on stanchion, continue to loosen 15mm bolt until stanchion separates from slider.
12. [ ] Remove bolt from bottom of slider.
13. [ ] Repeat previous three steps for other side.
14. [ ] Remove aluminum caps from bottoms of plunger rods (caps may have fallen off inside stanchions).
15. [ ] Remove snap-rings from bottoms of stanchions, then pull out plunger-rod assemblies.
16. [ ] Remove valve sleeves, plastic washers, stop rings, and top-out springs from shafts.
17. [ ] Remove split rings from piston heads on plunger rods.

***NOTE:*** Do not proceed with further disassembly unless inspection or symptoms have indicated need for seal replacement or bushing replacement. If either item is removed, it must be replaced with a new one.

### ***Seal and bushing removal***

18. [ ] If necessary, re-clamp slider in dropout vise blocks so top end of slider is accessible.
19. [ ] Pry out dust seals, then use screwdriver or seal pick to pry out triple-dip clip that retains seal in slider.
20. [ ] Place slider protector over top of slider, and use large flat screwdriver to pry out seal (be careful not to get screwdriver under washer that is just below seal, pry as though you were trying to lift seal through slot in protector).
21. [ ] Lift large washer out of slider.
22. [ ] Using seal pick with 90° bend, lift bushing out by catching tip of seal pick under lip of bushing at slot in bushing.

### ***Cleaning and inspection***

23. [ ] Using mild detergent, thoroughly clean and dry all parts, making sure there is no cleanser or lint left on parts.
24. [ ] Inspect all O-rings for nicks and tears.

### ***Bushing and seal installation***

***NOTE:*** If bushings and seals were not removed, skip to step 32.

25. [ ] With slider clamped upright in dropout vise blocks, carefully slide thoroughly-oiled bushing into slider so that slot in bushing ends up on side of slider.
26. [ ] Place large steel washer over bushing
27. [ ] Place thoroughly greased seal (lip side up) onto seal installer then tap seal into slider until bottomed.
28. [ ] Place triple-dip clip into slot above seal.
29. [ ] Check carefully that triple-dip clip is fully seated in groove inside slider.
30. [ ] Repeat steps 25–29 for other side.
31. [ ] Place dust seal(s) onto seal installer and install into slider(s).

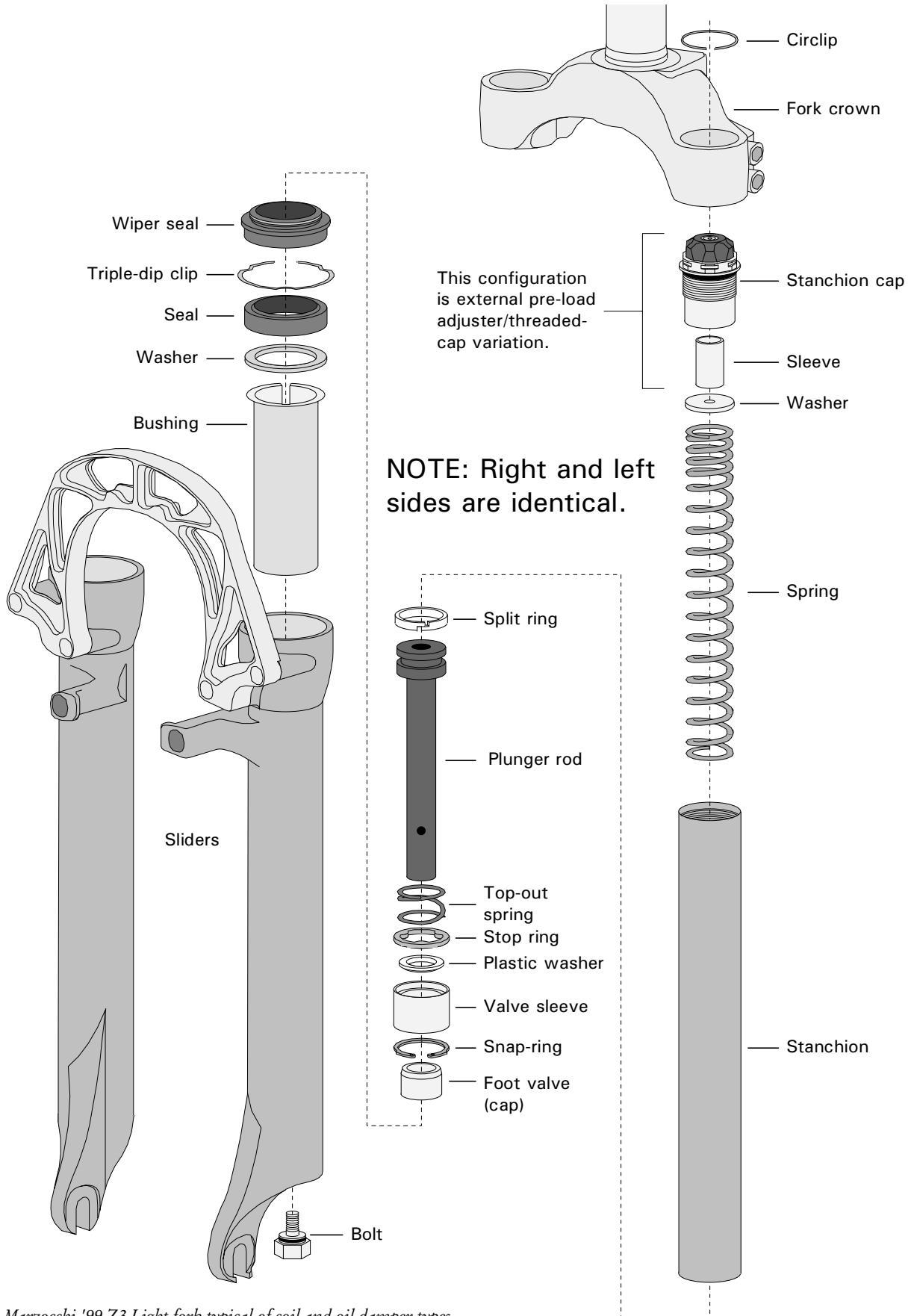
### ***Plunger and slider installation***

32. [ ] Install split rings into grooves in piston heads on top ends of plunger rods.
33. [ ] Install onto plunger rods in order: short top-out springs, metal stop plate (with three tabs on inner perimeter), plastic washer (lip-face first), then valve sleeve (cupped-face first).
34. [ ] Insert plunger assemblies into stanchions, install snap-rings into stanchions (sharp-edged-faces out), then install aluminum caps onto ends of shafts.
35. [ ] Insert 15mm-head bolt in socket, and check whether any portion of bolt more than the wrench flats is inside socket. If too much bolt is in socket, wad some tissue paper to fill socket until no more than wrench flats are in socket.
36. [ ] Clamp slider in dropout vise blocks so that slider is upright and hole on bottom of slider is accessible to 15mm socket on extension.
37. [ ] Use socket on extension to hold bolt in access hole on bottom of slider in place.
38. [ ] Install stanchions into sliders.
39. [ ] Using foot-long 7/8" dowel or similar device, exert downward pressure on plunger unit while turning extension to engage 15mm bolt. Maintaining downward pressure on plunger unit, tighten nut to 80in-lbs.
40. [ ] Repeat steps 36–39 for other side.

### ***Oil, spring, and top-cap installation***

41. [ ] Pull stanchions fully up.

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38.9 Marzocchi '99 Z3 Light fork typical of coil and oil-damper types.

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42. [ ] Fill each stanchion with recommended amount 7.5wt non-foaming oil.

Model	Volume
'99 Z3 Light & Z3 Long Travel	65cc
'99 Z4 model	65cc
'99 Z3 M80& '00 Z3 BAM 80	85cc
'00 Z3.5 & Z1 Dropoff 100mm	90cc
'00 Z1 Dropoff 130mm, Z3 OR 20	95cc
'99 Z1 Dropoff	100cc
'00 Z5 QR 20 Spring	100cc
'99 Jr T	160cc
'00 Jr T's	175cc

43. [ ] Place long compression springs into stanchions, then place aluminum washers and sleeves on top of springs.

44. [ ] *Models with unthreaded stanchion caps:* Insert top cap until groove for snap-ring is exposed, then insert snap-ring (sharp-edged-face up).

*Models with threaded stanchion caps:* Hand thread stanchion caps fully into stanchions until cap lips contact tops of stanchions.

45. [ ] *Models with removable stanchions:* Secure each stanchion into bike-stand clamp, and secure each stanchion cap to 105in-lbs.

**NOTE:** When tightening a pair of clamp bolts, always go back and forth between bolts until both are stationary at the recommended torque!

46. [ ] *Models with removable stanchions:* Insert stanchions into fork crown fully, then secure stanchion clamp bolts to 70in-lbs.

47. [ ] '00 Z3 BAM 80 only: Secure stanchion caps to 105in-lbs.

48. [ ] *Models with external pre-load adjuster:* Engage circlips in grooves in stanchion caps.

49. [ ] *Models with external pre-load adjuster:* Turn pre-load adjuster rings fully in “-” direction, then back number of turns indicated in step 2. *Models with hidden pre-load adjuster:* Turn pre-load adjuster rings fully counterclockwise, then clockwise number of turns indicated in step 2. Install covers over pre-load adjusters.

50. [ ] Re-attach brake system and install wheel.

51. [ ] Check torque on crown bolts at base of fork column. Recommended torque is 70in-lbs.

## TUNING OPTIONS

### *Spring pre-load*

The pre-load on the springs is adjustable. Pre-load should be adjusted to achieve the desired amount of sag. Pre-load in both legs should be adjusted equally.

Sag guidelines are not provided by the manufacturer, but when the rider sits stationary on the bike, the fork should compress about 10–20% of its total travel. More sag improves comfort, and less sag suits high-performance or competitive riding.

On the models with external pre-load adjusting knobs, the knobs are turned fully counterclockwise (except '98 models) to maximize sag, and fully clockwise to minimize sag. On the models with hidden pre-load adjusters, a rubber cap must be pried out, or an aluminum cap threaded out, then the adjuster is turned with a 4mm Allen wrench. The direction of adjustment is the same on the external and hidden adjusters.

### *Damping adjustments*

These forks do not have adjustable damping. The non-adjustable oil dampers are rebound dampers only. The only way to change the rebound damping response is by changing the oil weight. As always, using a heavier-weight oil increases damping, and a lighter-weight oil reduces damping. The standard weight for these forks is 7.5wt. The design of the damping units makes it critical that a non-foaming suspension fluid is used.

## **MARZOCCHI '97-'00 FORKS-COIL & ADJUSTABLE OIL TYPES**

Marzocchi made three basic types of forks during this period. The most basic type is a simple coil spring with non-adjustable oil damping, which is covered in **MARZOCCHI '99-'00 FORKS-COIL & OIL-DAMPER TYPES** (page 38-19). Another type, covered in this section, has coil springs but adjustable oil damping. One or two slotted rods protruding out the top caps identifies a fork as belonging to this type (except Mr. T, which can be identified by decals). The third type has air springs and oil damping. These are covered in **MARZOCCHI '99-'00 FORKS-AIR SPRUNG TYPES** (page 38-26).

The forks covered in this section include many models (listed below), but have a few minor variations (regarding service techniques). One variety has two adjustable oil dampers. These have two slotted rods protruding from the top caps. Another variety has one adjustable oil damper. This variety has one slotted rod protruding from the top caps.

Year and model	Adjustable dampers
'97-'98 Z2	one
'99 Z2 Alloy, Atom Bomb	one
'99 Z2 BAM	one
'00 Z2 Atom 80	one
'97-'98 Z1 & Mr. T	two
'99 Z1 Alloy & Z1 BAM	two
'99 Z1 QR20	two
'99 Z1 Dual Slalom	two
'99-'00 Mr. T	two
'99-'00 Monster T	two
'00 Z1 CR & Z1 QR 20	two

All of the models above, except the '00 Z2 Atom 80, have removable stanchions. The presence of two bolts in the crown at the top of each stanchion indicates the stanchions are removable. The Mr. T and Monster T models are similar to the other models covered in the following procedure, but have enough differences that the following procedures can only be used as a general guideline. Covering the variations for the Mr. T and Monster would make the following procedure too complex.

The one or two adjustable damper varieties and the removable or non-removable stanchion varieties are covered in the following procedure. It can be difficult to correctly identify the year and model of fork being worked on, but when there are variations and alternate procedures are provided, by reading all the alternate procedures and examining the features on the fork, it should be possible to determine which alternate procedure is appropriate.

## TOOLS

Marzocchi makes two tools for servicing these forks, specifically for bushing and seal removal and installation. These are the Slider Protector #536003AB and the Seal Press #R5068. In addition, two sizes of sockets are needed for the top caps. Due to the low profile of the wrench flats on the top caps, it is necessary to custom grind the ends of the sockets to eliminate any internal bevel. The socket sizes are 21mm and 26mm.

RockShox Dropout Vise Blocks #70107 are very useful for securing the sliders in the vise with minimal chance of cosmetic or structural damage. The dropout vise blocks only work on models that fit a standard quick-release hub. An alternative is to put a dummy axle set into the dropouts, clamp the axle set directly into the vise jaws, then attach the fork to the axle set. One more alternative is to use a fork mount such as those used for securing a bike in the bed of a pickup truck.

## FULL FORK SERVICE

### *Top-cap and spring removal*

- [ ] Remove brake calipers and cable system from fork.
- [ ] Counting number of turns, turn pre-load adjuster rings fully counterclockwise and record number of turns here:  
right \_\_\_\_\_ left \_\_\_\_\_
- [ ] Counting number of turns, turn rebound damping adjuster fully in “-” direction and record number of turns here: \_\_\_\_\_
- [ ] *Removable stanchion models only:* Remove circlips from grooves in stanchion caps (just above top of fork crown).
- [ ] *Removable stanchion models only:* Remove crown bolts, then remove stanchions from crown.
- [ ] Use 1.5mm Allen wrench to loosen set screws in perimeters of pre-load adjuster rings, and pull rings off.
- [ ] Carefully remove e-clips from studs on top of stanchion caps.
- [ ] *'00 Z2 Atom 80 only:* Use socket to unthread stanchion caps.
- [ ] All except *'00 Z2 Atom 80:* Clamp stanchion tube in bike-stand clamp, then unthread stanchion cap from stanchion. (Single-damper models only: on left side, stanchion cap assembly comes out all at once – push stud out of cap. Single damper right side and both sides of double damper models: cap will come out alone, leaving adjuster rod in place.)
- [ ] Unthread pre-load adjusting cylinders clockwise off tops of studs.
- [ ] Push stanchions down, then remove plastic washers and springs from inside of stanchions.

### *Slider and plunger removal*

- [ ] Carefully drain old oil into waste receptacles, pumping stanchions and damping adjuster rod as necessary to drain out oil.
- [ ] Place RockShox dropout vise blocks on dropout, and secure in vise so that access hole on bottom of slider is accessible.
- [ ] Use 15mm socket on extension to break loose nut inside access hole in bottom of slider.
- [ ] While pulling continuously on stanchion, continue to loosen 15mm nut until stanchion separates from slider. (Right side, damper and top-out spring are free to fall out; left side, plunger and top-out spring are free to fall out.)
- [ ] Repeat previous two steps for other side.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

### ***Seal and bushing removal***

**NOTE:** Do not proceed with further disassembly unless inspection or symptoms have indicated need for seal replacement or bushing replacement. If either item is removed, it must be replaced with a new one.

17. [ ] If necessary, re-clamp slider in dropout vise blocks so top end of slider is accessible.
18. [ ] Pry out dust seals, then use screwdriver or seal pick to pry out triple-dip clip that retains seal in slider.
19. [ ] Place slider protector over top of slider, and use large flat screwdriver to pry out seal (be careful not to get screwdriver under washer that is just below seal, pry as though you were trying to lift seal through slot in protector).
20. [ ] Lift large washer out of slider.
21. [ ] Using seal pick with 90° bend, lift bushing out by catching tip of seal pick under lip of bushing at slot in bushing.

### ***Cleaning and inspection***

22. [ ] Using mild detergent, thoroughly clean and dry all parts, making sure there is no cleanser or lint left on parts.
23. [ ] Inspect all O-rings for nicks and tears.

### ***Bushing and seal installation***

**NOTE:** If bushing and seal were not removed, skip to step 30.

24. [ ] With slider clamped upright in dropout vise blocks, carefully slide thoroughly-oiled bushing into slider so that slot in bushing ends up on side of slider.
25. [ ] Place large steel washer over bushing.
26. [ ] Place thoroughly greased seal (lip-side up) onto seal installer and tap seal into slider until bottomed.
27. [ ] Place triple-dip clip into slot above seal.
28. [ ] Check carefully that triple-dip clip is fully seated in groove inside slider.
29. [ ] Repeat steps 24–28 for other side.
30. [ ] Place dust seal(s) onto seal installer and install into slider(s).

### ***Plunger and slider installation***

31. [ ] Install stanchions (threaded-ends up) into sliders.
32. [ ] Install short top-out springs into stanchions.
33. [ ] Clamp slider in dropout vise blocks so that slider is upright and hole on bottom of slider is accessible to 15mm socket on extension.

34. [ ] Use socket on extension to hold nut in access hole on bottom of slider in place, then drop plunger (left side of single-damped models) or damper unit (all others) into stanchion so coarse-threaded stud (of either) is pointing down. **Note:** Double-cartridge '00 models have different left and right cartridges. Cartridge with multiple holes at bottom end of cylinder is left-hand cartridge.

35. [ ] **Side without adjustable damper:** Using foot-long 7/8" dowel or similar device, exert downward pressure on plunger unit while turning extension to engage 15mm nut. Maintaining downward pressure on plunger unit, tighten nut to 105in-lbs.  
**Side(s) with adjustable damper:** Maintaining downward pressure on adjuster rod, tighten nut to 105in-lbs.

36. [ ] Repeat steps 33–35 for other side.

### ***Oil, spring, and top-cap installation***

37. [ ] Pull stanchions up fully, then fill each stanchion with appropriate amount of 7.5wt oil:

Model	Volume Lt./Rt.
'97-'98 Z2	85/75cc
'99 Z2 Atom Bomb & Z2 Alloy	85/75cc
'99 Z2 BAM & '00 Atom 80	100/900cc
'97-'98 Z1 & Mr. T	90/90cc
'99 Z1 Alloy	96/96cc
'99 Z1 BAM & Z1 Dual Slalom	100/100cc
'99-'00 Z1 QR 20	100/100cc
'99 Mr. T	160/160cc
'00 Mr. T QR 20	170/170cc
'99-'00 Monster T	380/380cc

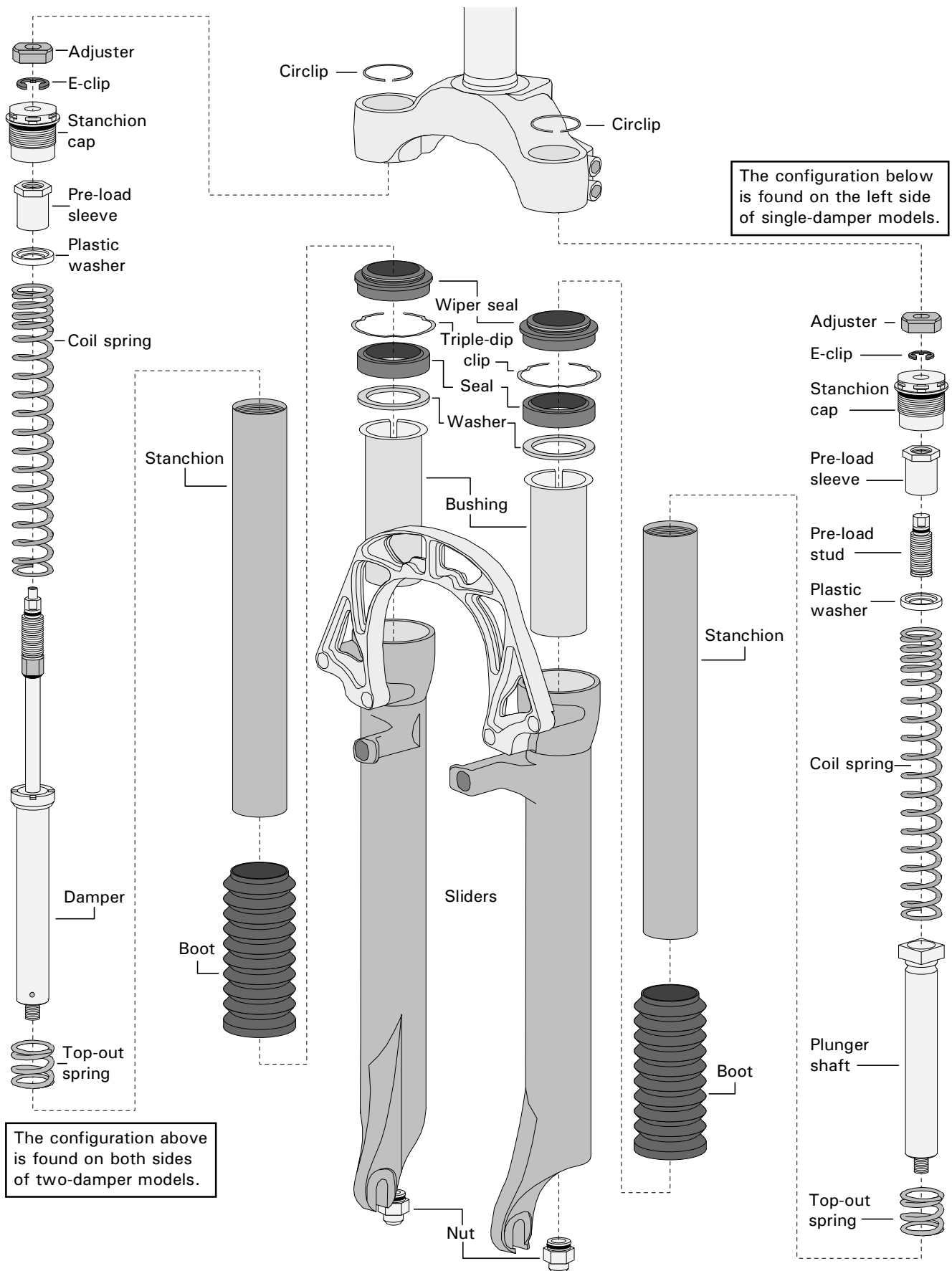
38. [ ] Push stanchions down, then carefully pump damper-unit rod(s) up and down repeatedly to pump air out, and oil into, damper.
39. [ ] Place long compression springs into stanchions, then place plastic washers (cavity-face up) on top of springs.

**NOTE:** In the next four steps, the right-side version of each step is done at the fork assembly, but the left-side version is done with parts that are not yet part of the fork assembly. The left-side versions only apply to single-adjustable damper models. Double adjustable models use right-side versions on both sides.

40. [ ] Thread pre-load adjuster cylinder (round-end first) onto stud that goes through stanchion cap, until four threads are exposed beyond hex-end of cylinder.
41. [ ] Slide stanchion cap(s) onto pre-load adjuster cylinders until caps snap into place and expose e-clip slot on stud (above top of cap).
42. [ ] Put e-clips into slots in studs.



# 38 – SUSPENSION FORKS AND REAR SHOCKS



The configuration above is found on both sides of two-damper models.

The configuration below is found on the left side of single-damper models.

38.10 Marzocchi '99 Z2 fork typical of coil and adjustable-oil types.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

43. [ ] Place pre-load adjuster rings on flats of stud, then secure setscrews with 1.5mm Allen.
44. [ ] Pull stanchions up, then hand thread stanchion caps fully into stanchions until cap lips contact tops of stanchions.
45. [ ] *All except '00 Z2 Atom 80:* Secure each stanchion into bike-stand clamp, and secure each stanchion cap to 105in-lbs.  
*Only '00 Z2 Atom 80:* Secure each stanchion cap to 105in-lbs.
46. [ ] Slide boots (if any) over stanchions and engage boots to lips on dust seals.

### **Stanchion installation and final setup**

**NOTE:** When tightening a pair of clamp bolts, always go back and forth between bolts until both are stationary at the recommended torque!

47. [ ] *All except '00 Z2 Atom 80:* Insert stanchions into fork crown fully, then secure stanchion clamp bolts to 70in-lbs.
48. [ ] *All except '00 Z2 Atom 80:* Engage circlips in grooves in stanchion caps.
49. [ ] Re-attach brake system and install wheel.
50. [ ] Turn pre-load adjuster rings fully counter-clockwise, then clockwise number of turns indicated in step 2.
51. [ ] Turn rebound damper adjuster fully counter-clockwise, then clockwise number of turns indicated in step 3.
52. [ ] Check torque on crown bolts at base of fork column. Recommended torque is 70in-lbs.

## TUNING OPTIONS

### **Spring pre-load adjustment**

The pre-load on the springs is adjustable. Pre-load should be adjusted to achieve the desired amount of sag. Pre-load in both legs should be adjusted equally. The manufacturer does not provide sag guidelines, but when the rider sits stationary on the bike, the fork should compress about 10–20% of its total travel. More sag improves comfort, and less sag suits high-performance or competitive riding.

On the models with external pre-load adjusting knobs, the knobs are turned fully in the “–” direction to maximize sag, and fully the opposite way to minimize sag. On the models with hidden pre-load adjusters, a rubber cap must be pried out, or an aluminum cap threaded out, then the adjuster is turned with a 4mm Allen wrench. The direction of adjustment is the same on the external and hidden adjusters.

### **Damping adjustments**

Depending on the model year, these forks have different degrees of adjustable damping.

With 1997 and 1998 models, single and dual adjustable cartridge models are both adjustable for rebound damping by turning the adjuster rod(s). Clockwise increases rebound damping. The only way to change compression damping is by changing oil weight. The stock oil is 7.5wt non-foaming oil. Changing the oil weight also changes the potential amount of rebound damping.

With 1999 models, single and dual adjustable cartridge models are adjustable for compression and rebound by turning the adjusting rod(s). Clockwise adjustments increase rebound and compression damping simultaneously.

With 2000 models, single adjustable cartridge models are adjustable for rebound only. Compression damping can only be changed by changing oil weight, which also affects the potential amount of rebound damping. For this model year only, dual adjustable cartridge models have compression damping adjustment in the left cartridge and rebound damping adjustment in the right cartridge. Turning either adjuster clockwise increases the damping.

## **MARZOCCHI '99–'00 FORKS-AIR-SPRUNG TYPES**

Marzocchi made three basic types of forks during this period. The most basic type is a simple coil spring with non-adjustable oil damping, which is covered in **MARZOCCHI '99–'00 FORKS-COIL & OIL-DAMPER TYPES** (page 38-19). Another type has coil springs but adjustable oil damping. One or two slotted rods protruding out the top caps identifies a fork as belonging to this type. These are covered in **MARZOCCHI '97–'00 FORKS-COIL & ADJUSTABLE OIL TYPES** (page 38-22). The third type, covered in this section, has air springs and oil damping. For identification purposes, look for a standard air valve in one of three locations: on the front of the slider adjacent to the brake-pivot stud, on the back of the fork directly behind the brake-pivot stud, or under a three-pronged cap in the top cap on each stanchion.

The forks covered in this section include many models (listed below), but have a few minor variations (regarding service techniques). One variety has adjustable oil dampers. These have the air valve on the front

or back of the sliders. The other variety has non-adjustable oil dampers. This variety has the air valves inside the top caps.

Year and model	Adjustable dampers
'99 Z5 Alloy	no
'99 Z2 Superfly	yes
'00 Z5 QR 20	no
'00 Z5 Flylight Air	no
'00 Z5 Flylight 100	no
'00 Z4 Flylight Air	no
'00 Z2 X Fly QR 20	yes
'00 Z2 X Fly	yes
'00 Z1 X Fly	yes

Several of these models, have removable stanchions. The presence of two bolts in the crown at the top of each stanchion indicates the stanchions are removable. Other models have stanchions that are an integral part of the fork crown. These differences in stanchion configuration occur with no correlation to other differences. Additionally, some of the models have stanchion caps that thread in, and others are threadless and retained by a snap-ring. When alternate procedures exist for all these variations, the following terms will be used:

*Adjustable and non-adjustable dampers*  
*Integral and non-integral stanchions*  
*Threaded and unthreaded stanchion caps*  
*Front, back, and top air valves*

All varieties are covered in the following procedure. It can be difficult to correctly identify the year and model of fork being worked on, but when there are variations and alternate procedures are provided, by reading all the alternate procedures and examining the features on the fork, it should be possible to determine which alternate procedure is appropriate.

## TOOLS

Marzocchi makes five tools for servicing these forks, two of which are specifically for bushing and seal removal and installation. These are the Slider Protector #536003AB and the Seal Press #R5068. The third Marzocchi tool is a Seal Guide #R5082CD, which is used in servicing the adjustable-damper models. The fourth tool, pump #R4002, is essential for inflating models with front or top air valves. The fifth tool, Stanchion Cap Puller #R5008BZ, is used to remove unthreaded stanchion caps.

In addition, two sizes of sockets are needed for the top caps. Due to the low profile of the wrench flats on the top caps, it is necessary to custom grind the ends of the sockets to eliminate any internal bevel. The socket sizes are 21mm and 26mm.

RockShox Dropout Vise Blocks #70107 are very useful for securing the sliders in the vise with minimal chance of cosmetic or structural damage. The dropout vise blocks only work on models that fit a standard quick-release hub. An alternative is to put a dummy axle set into the dropouts, clamp the axle set directly into the vise jaws, then attach the fork to the axle set. One more alternative is to use a fork mount such as those used for securing a bike in the bed of a pickup truck.

## FULL FORK SERVICE

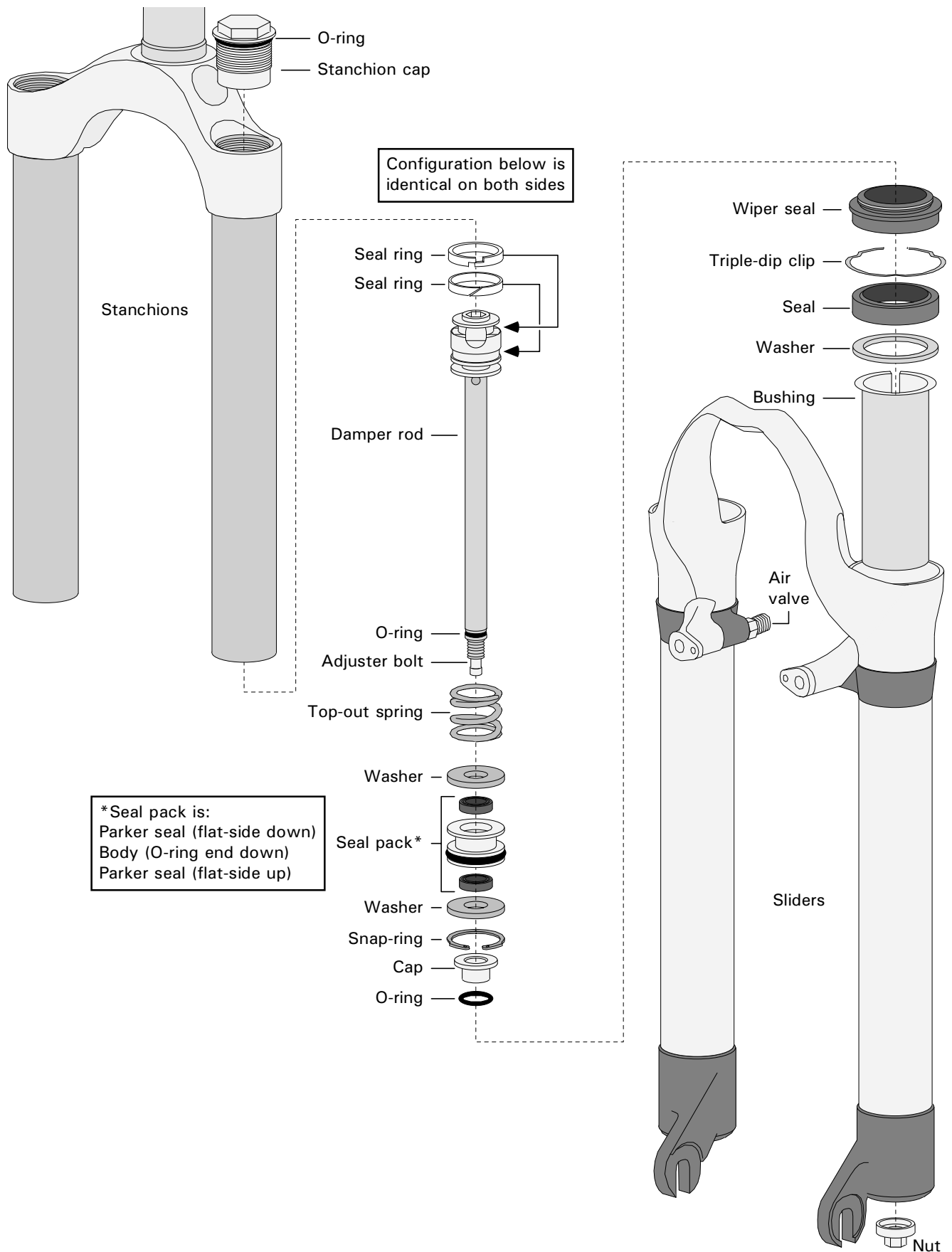
### *Top-cap and oil removal*

- [ ] Remove brake calipers and cable system from fork.
- [ ] Find and uncap air valves. Deflate fork completely.
- [ ] **Removable stanchion models with threaded stanchion caps:** Remove circlips from stanchion caps, unthread crown bolts, remove stanchions from crown, then clamp each stanchion in bike-stand clamp to hold while unthreading stanchion caps with custom 26mm socket.  
**Removable stanchion models with unthreaded stanchion caps:** Depress stanchion caps several millimeters, pry out circlips from stanchions, thread cap puller onto valve threads, then pull on tool to remove cap(s).  
**Integral stanchion models:** Use custom 21mm socket to unthread stanchion caps from stanchions.
- [ ] Carefully drain old oil into waste receptacles, pumping stanchions to drain out oil.

### *Slider and damper removal*

- [ ] **Adjustable-damper models:** Find 2.5mm Allen fitting inside 10mm nut in bottom end of sliders, then turn fully counterclockwise, counting turns:  
 \_\_\_\_\_ turns counterclockwise on right  
 \_\_\_\_\_ turns counterclockwise on left
- [ ] **'99 Z5 Alloy only:** Use 17mm socket on extension to break loose bolts inside access hole in bottom of slider.  
**Adjustable-damper models:** Use 10mm socket on extension to break loose nuts inside access hole in bottom of slider.  
**Non-adjustable-damper models:** Use 15mm socket on extension to break loose nuts inside access hole in bottom of slider.
- [ ] While pulling continuously on slider, continue to loosen nuts or bolts until sliders separate from stanchions.

# 38 – SUSPENSION FORKS AND REAR SHOCKS



38.11 Marzocchi '00 Z2 X-Fly fork typical of air-sprung types.

8. [ ] *Adjustable-damper models:* Remove caps from ends of plunger rods. If caps are not on rods, push rods from below out tops of sliders.  
*Non-adjustable-damper models:* Remove foot valves from ends of plunger rods.
9. [ ] *Adjustable-damper models only:* Inspect caps for external O-rings. If O-rings are missing, inspect inside sliders and remove O-rings.
10. [ ] *Adjustable-damper models:* Remove snap-rings from bottoms of stanchions, then carefully pull out plunger-rod assemblies.  
*Non-adjustable-damper models:* Remove damper assemblies from tops of stanchions.
11. [ ] *Adjustable-damper models:* Remove washer, seal pack, washer, then top-out springs from shafts.  
*Non-adjustable-damper models:* Remove top-out springs from bottoms of shafts.
12. [ ] Remove split rings from piston heads on plunger shafts.

### **Seal and bushing removal**

*NOTE: Do not proceed with further disassembly unless inspection or symptoms have indicated need for seal replacement or bushing replacement. If either item is removed, it must be replaced with a new one.*

13. [ ] Clamp slider in RockShox dropout vise blocks so top end of slider is accessible.
14. [ ] Pry out dust seals, then use screwdriver or seal pick to pry out triple-dip clip that retains seal in slider.
15. [ ] Place slider protector over top of slider, and use large flat screwdriver to pry out seal (be careful not to get screwdriver under washer that is just below seal, pry as though you were trying to lift seal through slot in protector).
16. [ ] Lift large washer out of slider.
17. [ ] Using seal pick with 90° bend, lift bushing out by catching tip of seal pick under lip of bushing at slot in bushing.

### **Cleaning and inspection**

18. [ ] Using mild detergent, thoroughly clean and dry all parts, making sure there is no cleanser or lint left on parts.
19. [ ] Inspect all O-rings and seals for nicks and tears.
20. [ ] If air pressure has been leaking, remove and replace seals in seal pack and O-rings on top caps and air valves.

### **Bushing and seal installation**

*NOTE: If bushings and seals were not removed, skip to step 29.*

21. [ ] Grease all O-rings, seals, and plastic split rings.

22. [ ] With slider clamped upright in dropout vise blocks, carefully slide thoroughly-oiled bushing into slider so that slot in bushing ends up on side of slider.
23. [ ] Place large steel washer over bushing.
24. [ ] Place thoroughly greased seal (lip side up) onto seal installer then tap seal into slider until bottomed.
25. [ ] Place triple-dip clip into slot above seal.
26. [ ] Check carefully that triple-dip clip is fully seated in groove inside slider.
27. [ ] Repeat steps 22–26 for other side.
28. [ ] Place dust seal(s) onto seal installer and install into slider(s).

### **Damper assembly and installation**

29. [ ] *Adjustable-damper models only:* With 3mm Allen wrench engaged to head of adjuster rod (through top of piston), use 2.5mm Allen wrench to check that bolt on bottom end of adjuster rod is secure. If not, remove bolt and reinstall with Loctite 242.
30. [ ] Install split rings into grooves in piston heads on top ends of plunger rods. *Note: On adjustable-damper models, stepped-split ring goes in top groove and diagonal-split ring goes in next groove.*
31. [ ] *Adjustable-damper models:* Install onto plunger rods in order: short top-out springs, washer, seal-guide tool #R5028CD, seal pack (O-ring-end last), then second washer. Remove seal-guide tool.  
*Non-adjustable-damper models:* Install top-out springs onto bottoms of shafts.
32. [ ] *Adjustable-damper models:* Insert plunger assemblies into stanchions, then install snap-rings into stanchions (sharp-edged-face out).  
*Non-adjustable-damper models:* Install damper shafts through tops of stanchions, then install foot valves on ends of shafts.
33. [ ] *Adjustable-damper models only:* Install caps onto shafts, then install O-rings onto caps.

### **Slider installation**

34. [ ] Install boots (if any) onto stanchions, then carefully push slider assembly onto stanchions only 2-3".
35. [ ] *Adjustable-damper models:* Turn fork upside down, then inject 7cc of 7.5wt oil into each hole in bottoms of sliders, then push slider assembly further onto stanchions until shafts protrude from holes.  
*Non-adjustable damper models:* Turn fork upside down, then push sliders on until ends of shaft assemblies contact ends of sliders.

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36. [ ] *Adjustable-damper models:* Use dowel or similar tool through tops of stanchions to seat shaft assemblies fully, insert 10mm nut in socket on extension, then engage nut to shaft protruding from hole in bottom of slider. Repeat for other side.

*Non-adjustable damper models:* Use dowel or similar tool through tops of stanchions to maintain pressure on tops of damper assemblies, then place nut/bolt in socket on extension and engage nut/bolt to ends of shafts.

37. [ ] *Adjustable-damper models:* Torque 10mm nuts to 105in-lbs. If necessary, use 8mm bit socket on extension from top of stanchion to keep shaft(s) from turning.

*'99 Z5 Alloy only:* Torque 17mm bolts to 80in-lbs. If necessary, use dowel through top of stanchion to keep shaft(s) from turning.

*Non-adjustable-damper models:* Torque 15mm nuts to 105in-lbs. If necessary, use dowel through top of stanchion to keep shaft(s) from turning.

### **Oil filling and final setup**

38. [ ] *Adjustable-damper models only:* Use 2.5mm Allen wrench to loosen adjuster in bottom of each slider fully counterclockwise.

39. [ ] Turn fork over, push sliders fully down, then fill each stanchion with an appropriate volume of 7.5wt non-foaming oil.

Model	Volume
'99 Z2 Superfly	50cc
'99 Z5 Alloy	65cc
'00 Z2 X Fly & X Fly QR 20	60cc
'00 Z1 X Fly	75cc
'00 Z4 Flylight Air	85cc
'00 Z3 Flylight 100	100cc
'00 Z5 QR 20 & Z5 Flylight Air	110cc

40. [ ] *Threaded stanchion-cap models:* If non-integral stanchions, clamp stanchion(s) into bike-stand clamp. All: Thread in stanchion caps and secure to 105in-lbs.

*Unthreaded stanchion-cap models:* Press stanchion caps in until several millimeters below circlip grooves inside stanchions, seat circlips into grooves, then use cap puller to pull stanchion caps up to circlips.

41. [ ] Use pump to pressurize each leg to 35–45psi (factory standard). Install valve caps.

42. [ ] *Adjustable-damper models only:* Restore damping adjuster settings recorded in step 5.

**NOTE:** When tightening a pair of clamp bolts, always go back and forth between bolts until both are stationary at the recommended torque!

43. [ ] *Non-integral stanchion models:* Secure stanchion-clamp bolts to 70in-lbs.

44. [ ] Check for clamp bolts at base of fork column. Secure to 70in-lbs if two-bolt type.

## TUNING OPTIONS

### **Sag adjustment**

These forks have air springs, and sag is adjusted by changing the air pressure. Depending on the model, the factory standard pressure is 35–45psi. There is no factory guidelines for desired sag, so use a general guideline of pressurizing the fork so that the sag is 10–20% of the total travel. More sag creates higher comfort, and less sag creates higher performance for competitive riding.

### **Damping adjustments, adjustable models**

A 2.5mm Allen wrench is inserted into a fitting accessed through the bottom of the slider. Clockwise adjustment increases rebound damping. The only way to change compression damping is by changing oil weight. The stock oil is 7.5wt non-foaming oil. Changing the oil weight also changes the potential amount of rebound damping.

### **Non-adjustable models damping models**

These forks do not have adjustable damping. The non-adjustable oil dampers are rebound dampers only. The only way to change the rebound damping response is by changing the oil weight. As always, using heavier-weight oil increases damping, and lighter-weight oil reduces damping. The standard weight for these forks is 7.5wt. The design of the damping units makes it critical that a non-foaming suspension fluid is used.

## RISSE ASTRO-5 REAR SHOCK

### ABOUT THIS SECTION

This section is specifically about the Risse Astro-5 rear shock. It is similar to the earlier Genesis models, with the exception of an external hydraulic damper that has been added.

### TOOLS

Four specialized Risse tools are required:

Combo Bearing Wrench	#20621
1-1/8" Shaft Clamp	#20224
1-1/8" Bullet Tool	#20355
1-1/8" Blowout Body	#20659

## FULL SHOCK SERVICE

### *Shock removal*

1. [ ] Use Schrader-valve pressure gauge to record pressure in shock: \_\_\_ psi.
2. [ ] Depress plunger in valve, put weight on bike to fully compress shock, then release valve plunger.
3. [ ] Remove shafts through body eyelet and shaft eyelet, then remove shock.

### *Shaft removal*

4. [ ] Place 5/16" steel rod horizontally in vise, then place body eyelet on rod.
5. [ ] Orient shock so that shaft points up, then use Combo Bearing Wrench to unthread seal-head from end of shock body.
6. [ ] Place 3/8" steel rod into shaft eyelet; while holding body upright with one hand, pull upward on rod to remove shaft assembly (oil may spill).
7. [ ] Remove body from 5/16" shaft, then pour oil into empty waste receptacle to be properly recycled later.
8. [ ] Test viscosity of oil from waste receptacle using test from OIL-VISCOSITY TESTING (page 38-5). Approximate weight of fluid is: \_\_\_\_\_

*NOTE: If changing fluid only, proceed to step 52.*

### *Shaft-eyelet and seal-head removal*

9. [ ] Clean piston-end of shaft with alcohol, then place 1–1/8" Shaft Clamp around cleaned portion of shaft.
10. [ ] Secure 1–1/8" Shaft Clamp in vise, so that eyelet end of shaft is up.
11. [ ] Use rod (diameter should match eyelet hole) to turn shaft eyelet counterclockwise. (If removal is very difficult, heat shaft with propane torch, applying constant pressure while applying heat, and moving heat to avoid concentration.)
12. [ ] Clean eyelet threads of any old Loctite.

### *Valve disassembly and floating-piston removal*

13. [ ] Turn shaft/Shaft-Clamp assembly over in vise, so that piston-end of shaft is up.
14. [ ] With 17mm wrench, remove nut on end of piston.

15. [ ] Maintaining order and orientation, remove rebound shims from top side of piston and record their dimensions here:

I.D.	O.D.	Thickness
_____	_____	_____
_____	_____	_____
_____	_____	_____

### *Removal of adjustable damper*

21. [ ] Use 2mm Allen to unscrew 8 bolts that hold adjustable damper to body.
22. [ ] Watching carefully for the spring/bearing détente mechanism that is under the "R" end of the assembly, lift the assembly off the shock cylinder.
23. [ ] Remove détente spring from hole in cylinder, remove O-rings from oval grooves in cylinder, remove 3/32" détente bearing from bottom face of "R" end of damper unit, pull both ends of damper unit off shaft, then remove O-rings from both end pieces of damper unit.

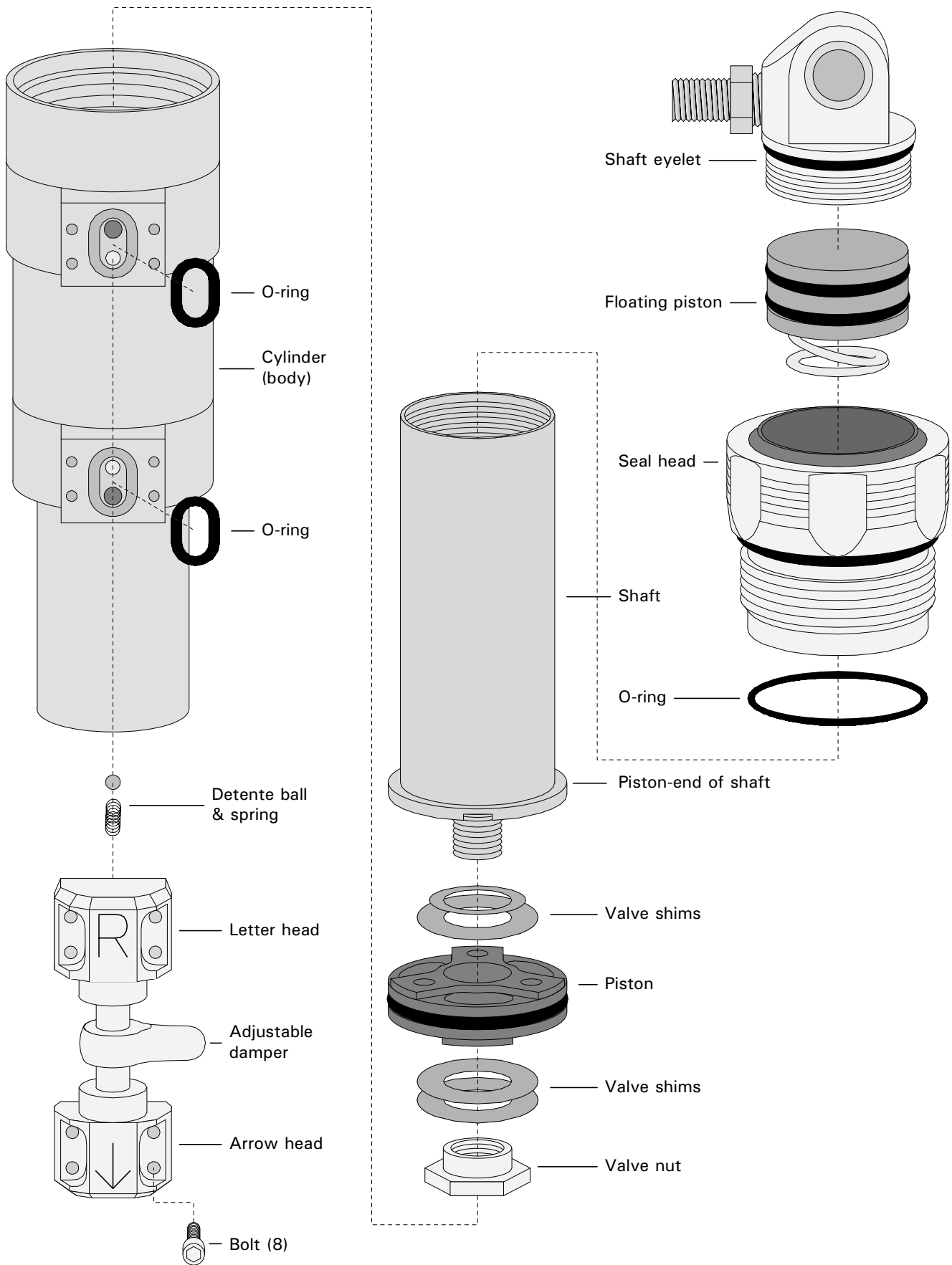
### *O-ring and seal removal*

24. [ ] Remove O-ring from inside and outside of seal-head.
25. [ ] Remove wiper seal from end of seal-head.
- 26 [ ] Remove O-ring from shaft eyelet.
27. [ ] Remove O-rings from floating piston.

### *Cleaning and inspection*

28. [ ] Clean all parts with mild detergent and water, then dry thoroughly with compressed air. *Avoid leaving solvents or lint from rags on, or in, any part!*
29. [ ] Inspect valve shims (thin washers) for chipping or cracks
30. [ ] Inspect O-rings and seals for tears, nicks, and cracks.

# 38 – SUSPENSION FORKS AND REAR SHOCKS



38.12 Risse Astro-5 rear shock.



### ***O-ring installation and floating-piston assembly***

- 31. [ ] Grease all O-rings and wiper seal.
- 32. [ ] Install wiper seal (conical-lip out), in end of seal-head.
- 33. [ ] Install O-rings on floating piston, and inside and outside of seal-head.

### ***Shaft assembly***

- 34. [ ] Put 1–1/8" Shaft Clamp around piston-end of shaft, then clamp radius blocks into vise with piston end pointing up.
- 35. [ ] Install shim stack that was below piston onto end of shaft in reverse order of removal.
- 36. [ ] Install piston (face with bigger 3-leg protrusion facing up).
- 37. [ ] Install shim stack that was above piston onto end of shaft.
- 38. [ ] Apply Loctite #242 to threads of nut, then thread nut onto stud (slightly snug).
- 39. [ ] Hold piston stationary and rotate nut until flats on nut align centered to legs on top face of piston.
- 40. [ ] Torque nut to 70–80in-lbs, making sure nut flats maintain orientation to piston legs.
- 41. [ ] Turn shaft/Shaft-Clamp assembly over in vise, then clamp securely.
- 42. [ ] Insert air piston (spring-end first) fully into piston shaft.
- 43. [ ] Install 1–1/8" Bullet Tool in end of shaft.
- 44. [ ] Install remaining O-ring over tool and onto shaft.
- 45. [ ] Install seal-head (threaded-end first) over tool and onto shaft, then remove tool.
- 46. [ ] Apply Loctite 242 on threads of shaft eyelet, then secure shaft eyelet to 100in-lbs.

### ***Damper adjuster assembly***

- 47. [ ] Install O-rings into adjuster-rod damper blocks, and O-rings into oval grooves in shock cylinder.
- 48. [ ] Insert orifice-end of adjuster rod into "R" block.
- 49. [ ] Insert détente bearing and spring into small hole in back face of "R" block.
- 50. [ ] Holding damper unit with bottom face facing up, position shock body over damper unit with open end of body pointing the same way as R-block end of damper unit, then mate together so détente spring inserts into spring hole (smaller hole) in mounting surface for damper unit.
- 51. [ ] Insert and tighten eight bolts that hold damper to shock cylinder.

### ***Oil filling and assembly***

- 52. [ ] Attach pump to air valve, then pressurize to pressure recorded in step 1.
- 53. [ ] Remove shaft assembly from vise (if appropriate).
- 54. [ ] Push O-rings and seal-head to piston-end of shaft assembly.
- 55. [ ] Place shock body upright in vise, and fill with 5wt oil.
- 56. [ ] Manually thread seal-head as far as possible into shock body.
- 57. [ ] Place 5/16" steel rod horizontally in vise, then place body eyelet onto rod.
- 58. [ ] Check that O-ring under seal-head flange has disappeared inside shock body.
- 59. [ ] Use Combo Bearing Wrench to secure seal-head into to end of shock body to torque of 240in-lbs (24lbs@10").
- 60. [ ] Install shock into bike.
- 61. [ ] Test shock by sitting in saddle and bouncing. Rear suspension should have damping. No sound of air in valving should be present. Listen for unusual noises, such as "gurgling" or "sucking" noise, which would indicate presence of air.

## **TUNING OPTIONS**

### ***Air pressure***

Typical pressure is from 150–200psi. Increasing air pressure increases spring stiffness, which reduces rate of compression and increases rate of rebound while decreasing air pressure decreases spring stiffness, which increases rate of compression and decreases rate of rebound. Air pressure should be adjusted to create the desired amount of static sag. With the rider on the bike, the shock should compress 5%–20% of its total compression for cross-country riding, or 30%–40% for downhill riding.

### ***Damping adjustment***

Turning the damper-adjusting lever switches the damper unit through five progressive orifices settings. The rebound and compression damping are both simultaneously affected.

# RISSE TERMINATOR REAR SHOCK

## ABOUT THIS SECTION

This section is specifically about the Risse Terminator rear shock.

## TOOLS

Four specialized Risse tools are required:

Combo Bearing Wrench	#20621
1-1/2" Shaft Clamp	#20222
1-1/2" Bullet Tool	#20242
1-1/2" Blowoff Body	#20658

## FULL SHOCK SERVICE

### Shock removal

1. [ ] Use Schrader valve pressure gauge to record pressure in shock: \_\_\_psi.
2. [ ] Depress plunger in valve, put weight on bike to fully compress shock, then release valve plunger.
3. [ ] Remove shafts through body eyelet and shaft eyelet, then remove shock.

### Shaft removal

4. [ ] Carefully grasp body eyelets in soft jaws in vise, with rag to protect finish.
5. [ ] Use Combo Bearing Wrench to unthread seal-head from end of shock body.
6. [ ] Place 3/8" steel rod into shaft eyelet and pull upward on rod to remove shaft assembly (oil may spill).
7. [ ] Remove body from vise, then pour oil into empty waste receptacle to be properly recycled later.
8. [ ] Test viscosity of oil from waste receptacle using test from OIL-VISCOSITY TESTING (page 38-5). Approximate weight of fluid is: \_\_\_\_\_

*NOTE: If changing fluid only, proceed to step 52.*

### Shaft-eyelet and seal-head removal

9. [ ] Clean piston-end of shaft with alcohol, then place 1-1/2" Shaft Clamp around cleaned portion of shaft.
10. [ ] Secure Shaft Clamp in vise, so that eyelet end of shaft is up.

11. [ ] Use rod (diameter should match eyelet hole) to turn shaft eyelet counterclockwise. (If removal is very difficult, heat shaft with propane torch, applying constant pressure while applying heat, and moving heat to avoid concentration.)
12. [ ] Clean eyelet threads of any old Loctite.

### Valve disassembly and floating-piston removal

13. [ ] Turn shaft/ Shaft-Clamp assembly over in vise, so that piston-end of shaft is up.
14. [ ] With 17mm wrench, remove nut on end of piston.
15. [ ] Maintaining order and orientation, remove rebound shims from top side of piston and record their dimensions here:

I.D.	O.D.	Thickness
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(stock configuration below)

12.7mm	27.9mm	.30mm
12.7mm	34.3mm	.20mm
12.7mm	34.3mm	.20mm
12.7mm	34.3mm	.20mm

16. [ ] Noting orientation, remove piston.
17. [ ] Maintaining order and orientation, remove compression shims from below piston and record their dimensions here:

I.D.	O.D.	Thickness
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(stock configuration below)

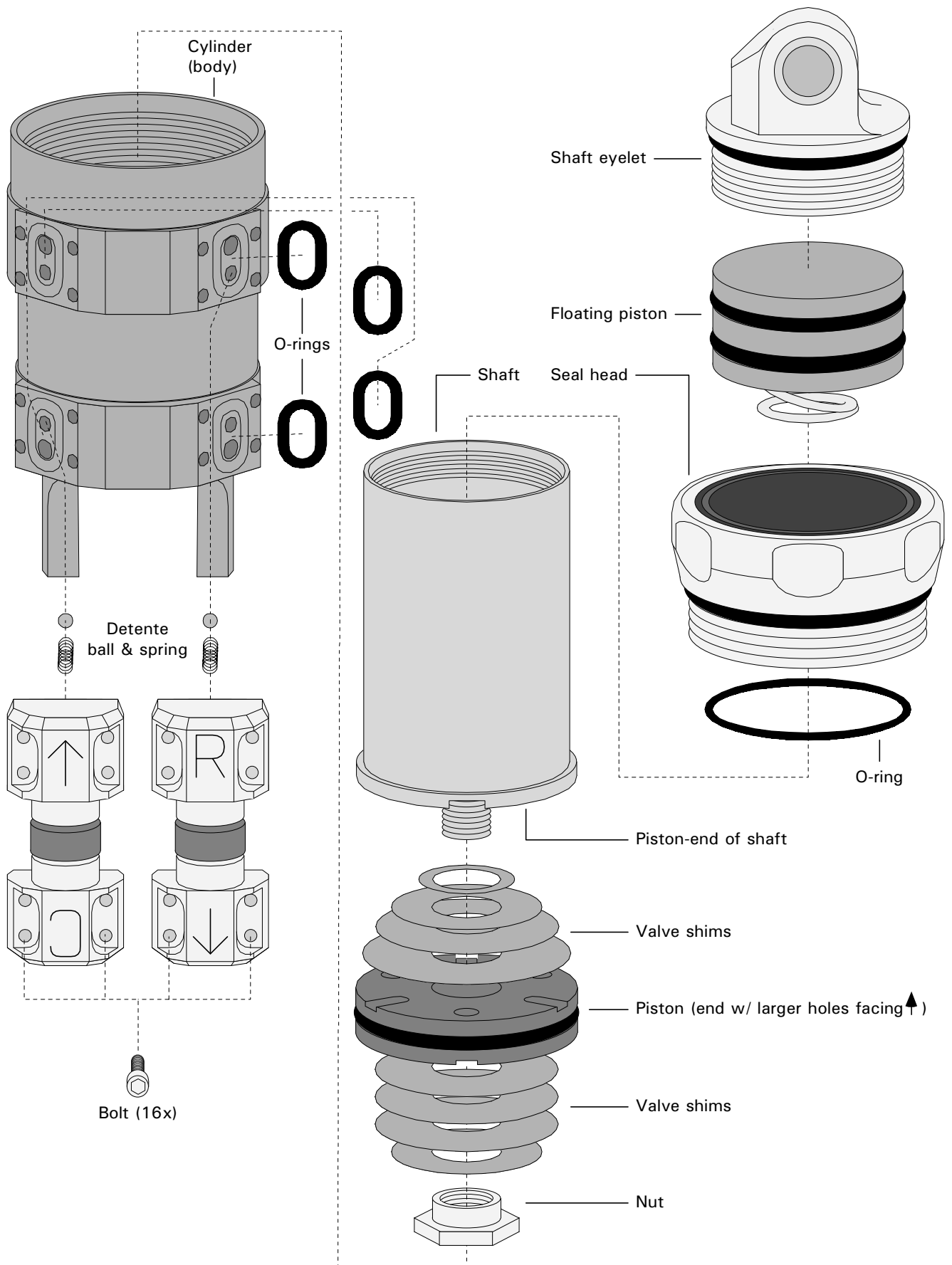
12.7mm	38.7mm	.25mm
12.7mm	34.3mm	.16mm
12.7mm	27.9mm	.16mm
12.7mm	17.8mm	.30mm

18. [ ] Push seal head fully to piston end of shaft, then thread Blowout Body onto seal head. Inflate Blowout Body to eject floating piston.
19. [ ] Remove Blowout Body, then remove seal-head from shaft.
20. [ ] Remove O-ring from shaft.

### Removal of adjustable dampers

21. [ ] Use 2mm Allen to unscrew 8 bolts that hold rebound adjustable damper (marked "R") to body, noting R end points to open end of body, then repeat for compression adjustable damper (marked "C"), noting that C end points to closed end of body.

# 38 – SUSPENSION FORKS AND REAR SHOCKS



38.13 Risse Terminator rear shock.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

22. [ ] Watching carefully for the spring/bearing détente mechanism that is under the R or C end of the assembly, lift the assembly off the shock cylinder.
23. [ ] Remove détente springs from holes in cylinder, remove O-rings from oval grooves in cylinder, remove 3/32" détente bearing from bottom face of R and C ends of damper units, pull both ends of damper units off adjustment shafts, then remove O-rings from both end pieces of damper units. Remove 3/16" ball bearing and spring from inside the blocks with the engraved arrow.

### ***O-ring and seal removal***

24. [ ] Remove O-ring from inside and outside of seal-head.
25. [ ] Remove wiper seal from end of seal-head.
- 26 [ ] Remove O-ring from shaft eyelet.
27. [ ] Remove O-rings from floating piston.

### ***Cleaning and inspection***

28. [ ] Clean all parts with mild detergent and water, then dry thoroughly with compressed air. *Avoid leaving solvents or lint from rags on, or in, any part!*
29. [ ] Inspect valve shims (thin washers) for chipping or cracks
30. [ ] Inspect O-rings and seals for tears, nicks, and cracks.

### ***O-ring installation and floating-piston assembly***

31. [ ] Grease all O-rings and wiper seal.
32. [ ] Install wiper seal (conical-lip out) in end of seal-head.
33. [ ] Install O-rings on floating piston, and inside and outside of seal-head.

### ***Shaft assembly***

34. [ ] Put Shaft Clamp around piston-end of shaft, then clamp tool into vise with piston end pointing up.
35. [ ] Install shim stack that was below piston onto end of shaft in reverse order of removal.
36. [ ] Install piston. Side with smaller-diameter valve holes in flat surface faces up.
37. [ ] Install shim stack that was above piston onto end of shaft.
38. [ ] Apply Loctite #242 to threads of nut, then thread nut onto stud (slightly snug).
39. [ ] Torque nut to 70–80in-lbs (12–13lbs@6").
40. [ ] Turn shaft/ Shaft-Clamp assembly over in vise, then clamp securely.
41. [ ] Insert air piston, spring-end first, fully into piston shaft.
42. [ ] Install 1–1/2" Bullet Tool in end of shaft.

43. [ ] Install remaining O-ring over tool and onto shaft.
44. [ ] Install seal-head (threaded-end first) over tool and onto shaft, then remove tool.
45. [ ] Apply Loctite 242 on threads of shaft eyelet, then secure shaft eyelet to 100in-lbs (17lbs@6").

### ***Damper-adjuster assembly***

During normal disassembly, there is no reason to remove or loosen the adjusting rings on the adjusting rods. If the rings have been loosened, then it is possible the numbers on the rings are not in correspondence with the correct-size orifices. When the adjuster ring is correctly positioned and you are seeing the "1," you should simultaneously be seeing the smallest orifice through the next-to-largest orifice.

46. [ ] Install O-rings into adjuster-rod damper blocks, and O-rings into oval grooves in shock cylinder.
47. [ ] Insert orifice-end of adjuster rods into R and C blocks, insert spring and 3/16" ball bearing into each "arrow" block, then insert remaining end of each adjuster rod into each arrow block.
48. [ ] Insert détente bearings and springs into small holes in back faces of R and C blocks.

The Terminator shock has a rebound damper and a compression damper. Either can be installed facing either way, but only one way allows the dampers to function in the correct way. When correctly installed, the arrow on the rebound damper points toward the body eyelet and the arrow on the compression damper points away from the body eyelet. Simply put, the arrows point the way the body moves during rebound and compression strokes.

49. [ ] Holding damper unit with bottom face facing up, position shock body over damper unit with eyelet end of body pointing the same way as arrow end of "R" damper unit, then mate together so détente spring inserts into spring hole (smaller hole) in mounting surface for damper unit.
50. [ ] Insert and tighten eight bolts that hold damper to shock cylinder.
51. [ ] Repeat previous two steps for compression damper unit, but install so arrow end points away from eyelet end of body.

### ***Oil filling and assembly***

52. [ ] Attach pump to air valve, then pressurize to pressure recorded in step 1.
53. [ ] Remove shaft assembly from vise (if appropriate).
54. [ ] Push O-rings and seal-head to piston-end of shaft assembly.

55. [ ] Place shock body upright in vise, and fill with 5wt oil.
56. [ ] Manually thread seal-head as far as possible into shock body.
57. [ ] Check that O-ring under seal-head flange has disappeared inside shock body.
58. [ ] Use Combo Bearing Wrench to secure seal-head into to end of shock body to torque of 240in-lbs (24lbs@10").
59. [ ] Install shock into bike.
60. [ ] Test shock by sitting in saddle and bouncing. Rear suspension should have damping. No sound of air in valving should be present. Listen for unusual noises, such as "gurgling" or "sucking" noise, which would indicate presence of air.

## TUNING OPTIONS

### *Air pressure*

Typical pressure is from 150–200psi. Increasing air pressure increases spring stiffness, which reduces rate of compression and increases rate of rebound while decreasing air pressure decreases spring stiffness, which increases rate of compression and decreases rate of rebound. Air pressure should be adjusted to create the desired amount of static sag. With the rider on the bike, the shock should compress 5%–20% of its total compression for cross-country riding, or 30%–40% for downhill riding.

### *Damping adjustment*

Turning each numbered damper-adjusting ring adjusts the damper unit through five progressive orifice settings, corresponding to the numbers on the rings. The rebound and compression damping are completely independent.

## ***ROCKSHOX '97–'99 INDY & JETT FORKS***

### ABOUT THIS SECTION

This section covers RockShox Indy model forks from 1997 and 1998, including the S, C, SL, and XC models. In addition, the 1999 RockShox Jett C, 1999 Jett T2, and 2000 Jett XC can be serviced using these instructions. These are all similar to each other and are described with one procedure, with notes regarding the minor differences.

## TOOL CHOICES

See table 38–3 for tool requirements. All the tools in the table are required for the job.

### INDY & JETT FORK TOOLS

(table 38-3)

Tool	Fits and considerations
6mm Allen bit socket	minimum 4" bit length
Ratchet extension	6" may be adequate, longer is recommended
RockShox 70096	Judy/Quadra/Indy bushing remover
RockShox 70098	Quadra/Indy/Jett bushing installer
UBT AL-11912B	22mm socket custom ground for optimal purchase

## FULL SERVICE

### *Spring-stack removal*

1. [ ] Leave fork in bike, but release front brake cable from brake lever.
2. [ ] Count number of turns require to loosen spring pre-load knobs fully counterclockwise and record here: left \_\_\_\_\_ right \_\_\_\_\_
3. [ ] Use 22mm socket to unthread plastic caps in tops of stanchions, then remove cap/spring-stack assemblies. ('99 Indy C and '00 Jett XC have spring stack only in right side.)

### *Slider removal*

4. [ ] Compress fork completely.
5. [ ] Use ratchet drive, extension, and 6mm bit socket to unthread plunger bolts down in bottom of stanchions.
6. [ ] Remove wheel from fork.
7. [ ] Slide slider assembly off bottom of stanchion tubes.
8. [ ] Pour oil from sliders into waste receptacle.
9. [ ] Attach small O-rings or rubber bands to plunger bolts exposed below bottoms of plungers, so that bolts cannot escape into plungers.

### *Friction-damper removal (SL model only)*

10. [ ] Use snap-ring pliers to remove internal snap rings at bottoms of stanchions.
11. [ ] Use extension with bit socket to push or tap plunger assemblies out bottoms of stanchions.
12. [ ] Remove friction dampers from ends of plungers.
13. [ ] Remove O-rings from friction dampers.

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### ***Seal and bushing removal***

14. [ ] Remove boots and wiper seals from tops of slider tubes (insert screwdriver through seal and pry up on inside bottom edge of seal).
- NOTE: Before removing lower bushings, it is recommended to measure depth from top of slider to top edge of lower bushing.*
15. [ ] Place upright on top of slightly open vise jaws RockShox Seal Separator (large-end up), and place sleeve from RockShox Bushing Remover (small-end up) on top of Seal Separator.
16. [ ] Holding slider upside down, insert RockShox Bushing Remover with 28mm-long extractor plate up into one side of slider and engage plate against back of first bushing.
17. [ ] With tool still engaged to bushing, drop end of tool through sleeve, Seal Separator, and vise jaws until slider seats on sleeve, then firmly secure vise on Bushing Remover handle.
18. [ ] Hold one cylinder of Seal Separator stationary and rotate other cylinder to pull bushing out.
19. [ ] Repeat previous three previous steps for other bushing, then repeat for both bushings in other side.
20. [ ] Using a spoke or seal pick, fish bottom-out bumpers out of sliders.

### ***Cleaning and inspection***

21. [ ] Clean all parts with mild detergent and thoroughly dry with compressed air and/or lint-free rag.
22. [ ] Inspect wiper seals for nicks or tears.
23. [ ] Inspect and replace all elastomer and coil springs that do not meet RockShox specifications.

### ***Seal and bushing installation***

24. [ ] Install bottom-out bumpers in sliders so conical ends face down.
25. [ ] Thoroughly grease all replacement bushings with Judy Butter or equivalent non-lithium grease.
26. [ ] Place in order on Bushing Installer: 25mm sleeve, 85mm sleeve #110-02265-00 marked "98 Indy," and lower (smaller O.D.) bushing. Note: '97 Indy uses 78mm sleeve #70196 instead of 85mm sleeve.
27. [ ] Insert assembly into fork and tap with plastic mallet until assembly is fully bottomed, then remove tools.

28. [ ] Place in order on Bushing Installer: 25mm sleeve and upper bushing.
29. [ ] Insert assembly into fork and tap with plastic mallet until assembly is fully bottomed, then remove tools.
30. [ ] Repeat steps 26–29 for other side.
31. [ ] Grease wiper seals, then place wiper seals in top ends of sliders and tap into place with plastic mallet.

### ***Friction-damper installation (SL model only)***

32. [ ] Grease and install O-rings into friction dampers.
33. [ ] Slide top-out bumpers half-way down plunger shafts if bumpers have been forced over flange-ends of plungers.
34. [ ] Install friction dampers onto ends of plungers so that end of damper with groove in outer perimeter goes on first.
35. [ ] Wiggle and push plungers into stanchions.
36. [ ] Use 15mm socket or 7/8" PVC pipe to seat friction dampers just beyond snap-ring grooves.
37. [ ] Use snap-ring pliers to install internal snap-rings (sharp-edged-face out) into bottoms of stanchions.

### ***Slider assembly***

38. [ ] Remove rubber bands or O-rings from plunger bolts, then prep plunger-bolt threads with Loctite 242.
39. [ ] Check alignment of conical bottom-out bumpers in bottoms of sliders, then use spoke to align flat as necessary (conical-side down).
40. [ ] Put 5wt oil in each slider (15cc in XC, or 10cc in S, C, SL, and Jett T2).
41. [ ] Grease bushings, and fill pockets in wiper seals with Judy Butter or similar grease.
42. [ ] Use fingers to check if wiper seals are deformed at bottom edge, and pull wiper seals out just enough to eliminate deformity (if found).
43. [ ] Place slider assembly onto stanchions and compress fully.
44. [ ] Use extension and bit socket to engage plunger bolts into sliders.
45. [ ] Use torque wrench to tighten plunger bolts to 80in-lbs.
46. [ ] Pull sliders down fully, then engage bottoms of dust boots to wiper seals.

### Spring-stack installation

47. [ ] Grease elastomer and/or coil springs.
48. [ ] Insert cap/spring-stacks into stanchions, and secure caps to 30in-lbs. ('99 Indy C and '00 Jett XC have spring stack only in right side.)
49. [ ] Restore pre-load settings.
50. [ ] Install wheel in fork.
51. [ ] Connect brake cable.

### Crown-bolt security

52. [ ] Check crown bolt torque (if any). RockShox recommended torque is 60in-lbs.

## TUNING OPTIONS

### Sag and pre-load adjustment

RockShox recommends 7–10mm of sag for 72mm-travel models, 5–8mm of sag for 60mm-travel models, 3–5mm for 48mm-travel models. Adjust the pre-load adjusters (up to 5 full turns from loosest to tightest) to achieve sag in the recommended range. Check sag by measuring the change in distance from the top of the slider tube to the bottom of the crown after the rider

gets on the bike. If it is not possible to achieve the recommended sag with the existing springs, then consider changing springs.

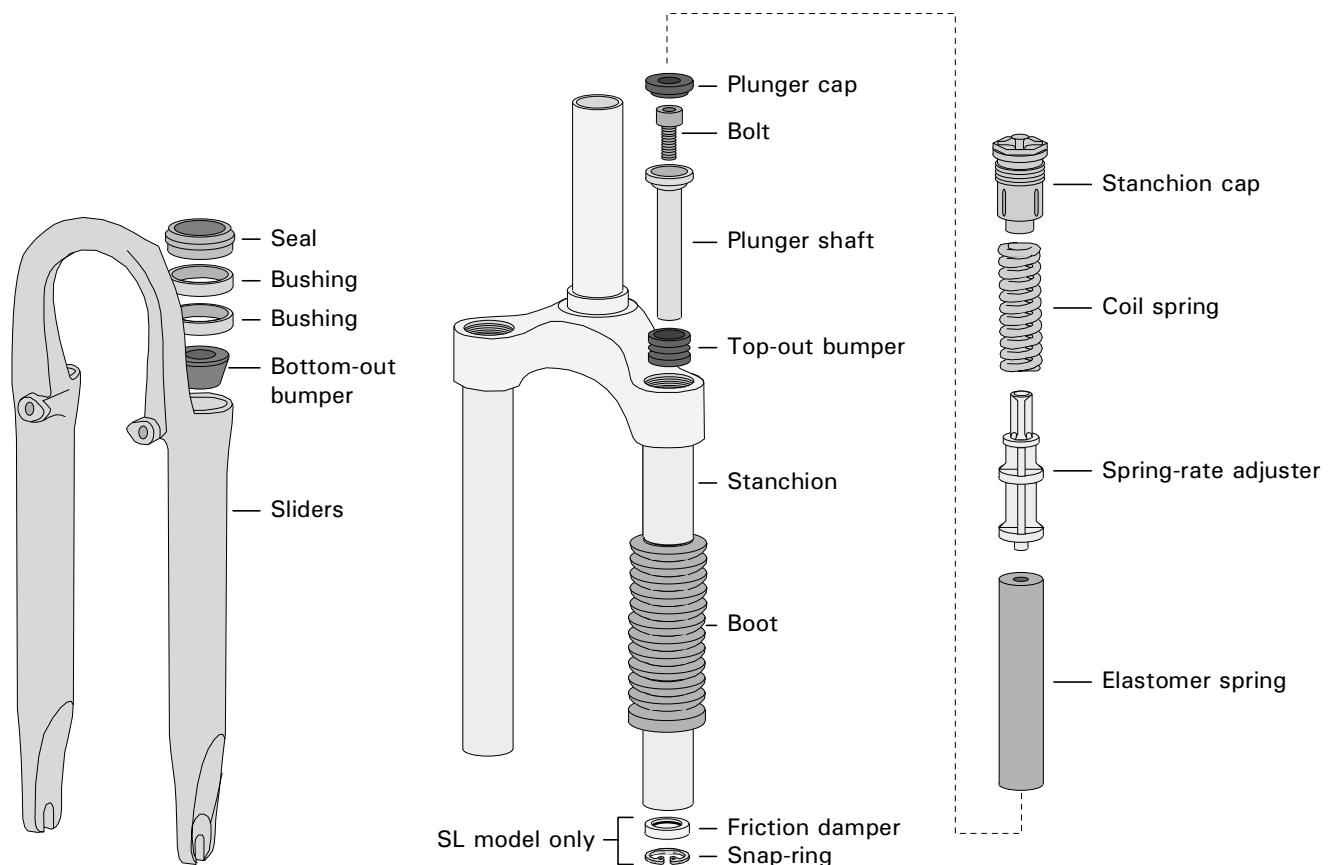
### Spring-rate adjustment

Spring rate can be changed two ways. The spring-rate adjusters can be changed, and the coil springs can be changed. The spring-rate adjuster is the plastic stud that inserts into the coil spring. When the length of the stud is changed, the point at which the coil spring is fully compressed is changed. This, in turn, changes the point of fork compression when only the elastomer part of the spring set continues to compress. The spring-rate adjuster kit (#59136) contains different-length adjusters. A shorter length of stud makes the spring system softer, and a longer length of stud makes the spring system stiffer.

Coil springs are available in four degrees of firmness. These are soft (red, #110-000591-00), medium (yellow, #110-000592-00), firm (green, #59141), and extra firm (purple, #59139).

### Travel adjustment

Travel kit #59123 converts '97-'98 Indy XC/SL and '98 Indy C to 75mm of travel.



# ROCKSHOX '99-'00 JETT HYDRACOIL FORKS

## ABOUT THIS SECTION

This section covers service of several 1999 and 2000 Jett forks including '99 Jett XC, '00 Jett Race, and '00 Jett SL models. The '99 Jett C, '99 Jett T2 and '00 Jett XC models are comparable to the 1998 Indy model for service purposes (see page 38-37). The '00 Jett is completely different from other Jett models, but is briefly covered at the end of this section (page 38-42). Complete service techniques, including bushing replacement, are included. RockShox recommends an oil change, complete cleaning, and lubrication every 100 hours of use or one year, whichever comes first. Bushing replacement should be done when the fork develops obvious play between the stanchions and sliders.

## TOOL CHOICES

For all services other than bushing replacement, the following specialized tools are required:

- United Bicycle Tool AL-11912B (22mm socket already custom ground for optimal purchase)
- 24mm socket (must be custom ground to eliminate internal bevel for optimal purchase).
- 6mm Allen bit socket with >6" bit length

It may be difficult to find an appropriate 6mm bit socket. A Proto 4990-6MXL is slightly too short, but the bit can be replaced with a 160mm section cut from an extra-long Allen wrench, such as a Bondhus T-handle 6mm.

For busing replacement, specialized tools from RockShox are required. The same tools work on numerous other models of RockShox forks. The required tools are:

- Bushing Remover #70096
- Bushing Installer #70098
- Seal Separator #70113

## FULL SERVICE

### *Spring-stack removal*

1. [ ] Turn spring adjuster fully counterclockwise, counting number of turns on each side:  
 No. of turns on right: \_\_\_\_\_  
 No. of turns on left: \_\_\_\_\_
2. [ ] Use 22mm or 24mm socket to unthread spring caps on each side, then remove caps.

3. [ ] Remove plastic spring spacer and spring from each side, then turn fork over to remove plastic spring retainer. Note: Oil will pour out, and fork may need to be tapped with plastic mallet before spring retainers will drop out.

### *Slider and plunger/damper removal*

4. [ ] Use 6mm Allen bit on 8" ratchet extension to unthread bolts in bottoms of stanchions.
5. [ ] Pull slider and boots off stanchions.
6. [ ] Turn fork over to remove plunger assembly and damper assembly from each stanchion.

### *Seal and bushing removal*

7. [ ] Remove boots and wiper seals from tops of slider tubes (insert screwdriver through seal and pry up on inside bottom edge of seal).

**NOTE:** Before removing lower bushings, it is recommended to measure depth from top of slider to top edge of lower bushing.

8. [ ] Place upright on top of slightly open vise jaws RockShox Seal Separator (large-end up), and place sleeve from RockShox Bushing Remover (small-end up) on top of Seal Separator.
9. [ ] Holding slider upside down, insert RockShox Bushing Remover with 28mm long remove plate up into one side of slider and engage plate against back of first bushing.
10. [ ] With tool still engaged to bushing, drop end of tool through sleeve, Seal Separator, and vise jaws until slider seats on sleeve, then firmly secure vise on Bushing Remover handle.
11. [ ] Hold one cylinder of Seal Separator stationary and rotate other cylinder to pull bushing out.
12. [ ] Repeat previous three previous steps for other bushing, then both bushings in other side.
13. [ ] Using a spoke or seal pick, fish bottom-out bumpers out of sliders.

### *Cleaning and inspection*

14. [ ] Clean all parts with mild detergent and thoroughly dry with compressed air and/or lint-free rag.
15. [ ] Inspect wiper seals and damper-shaft glide ring for nicks or tears.
16. [ ] Measure coil springs and replace if length is 156mm or less.
17. [ ] Measure top-out springs and replace if length is 22mm or less.

### *Seal and bushing installation*

18. [ ] Install bottom-out bumpers in sliders so conical ends face down.



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19. [ ] Thoroughly grease all replacement bushings with Judy Butter or equivalent grease.
20. [ ] Place in order on Bushing Installer: 25mm sleeve, 85mm sleeve (#110-02265-00 marked "98 Indy"), and lower (smaller O.D.) bushing.
21. [ ] Insert assembly into fork and tap with plastic mallet until assembly is fully bottomed, then remove tools.
22. [ ] Place in order on Bushing Installer: 25mm sleeve and upper bushing.
23. [ ] Insert assembly into fork and tap with plastic mallet until assembly is fully bottomed, then remove tools.
24. [ ] Repeat steps 20–23 for other side.
25. [ ] Grease wiper seals, then place wiper seals in top ends of sliders and tap into place with plastic mallet.

### ***Slider and plunger/damper installation***

26. [ ] Slide boots onto stanchions
27. [ ] Grease bushings, and fill pockets in wiper seals with Judy Butter or similar grease.
28. [ ] Guide slider assembly onto stanchions.

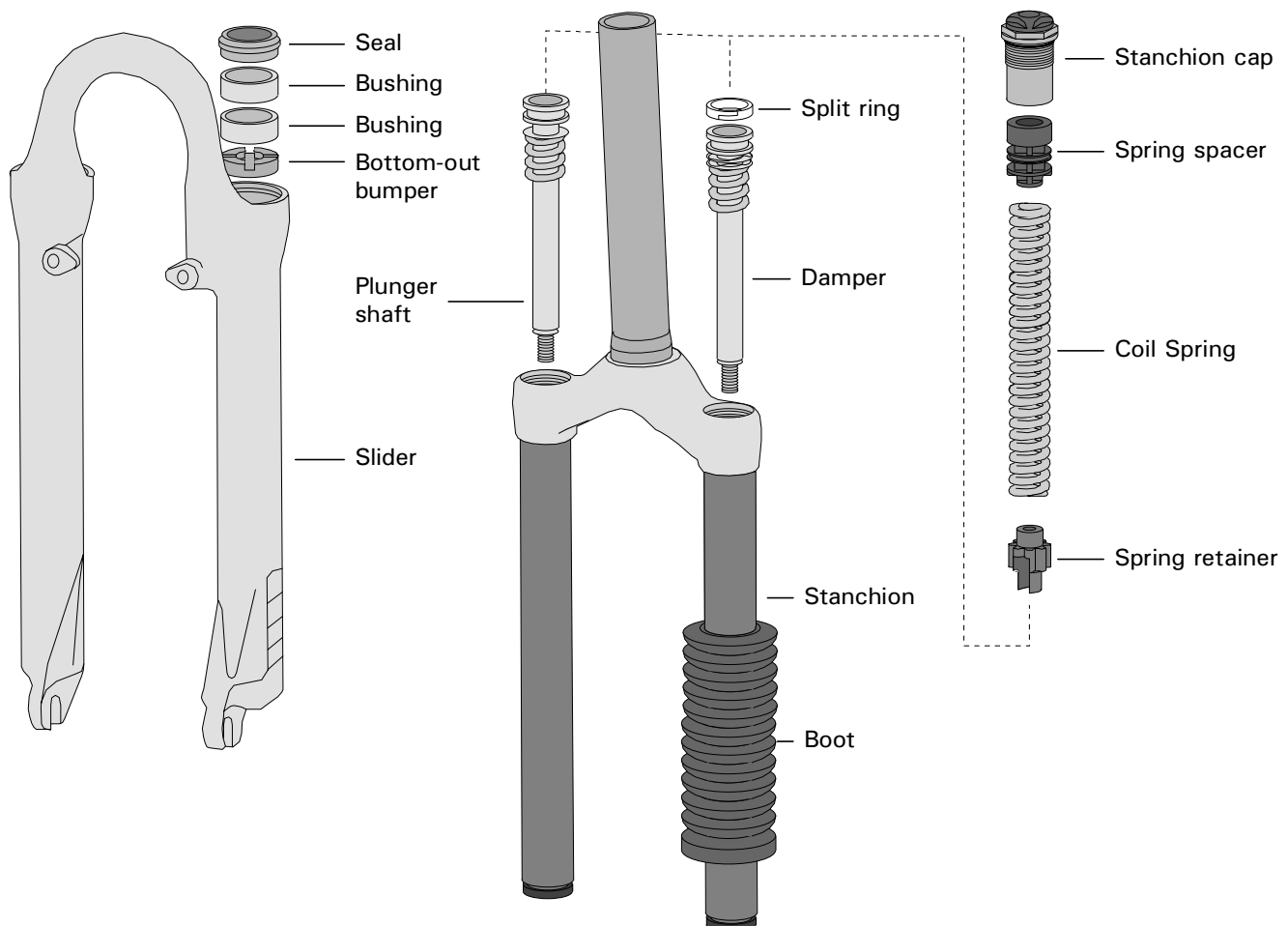
29. [ ] Put a drop of Loctite 242 on threads of bolts at bottom of damper shaft and plunger shaft.
30. [ ] Drop damper shaft into left stanchion and plunger rod into other stanchion.
31. [ ] Secure both bolts to 80in-lbs.
32. [ ] Attach boots to wiper seals.

### ***Spring-stack installation***

33. [ ] Install spring retainers into each stanchion (short-end up).
34. [ ] Pour 85cc's of RockShox Extra Light (5wt) oil into each stanchion.
35. [ ] Grease spring coils thoroughly and install in stanchions.
36. [ ] Install spring spacers in stanchions (large-diameter-ends up).
37. [ ] Thread top caps into stanchions and torque to 30in-lbs.
38. [ ] Reset spring preload on each top-cap adjuster.

### ***Crown-bolt security***

39. [ ] Check crown bolt torque (if any). RockShox recommended torque is 60in-lbs.



## TUNING OPTIONS

### *Sag and pre-load adjustment*

RockShox recommends 12–16mm of sag for 63mm travel models, and 14–18mm of sag for 75mm travel models. Adjust the pre-load adjusters (up to 5 full turns from loosest to tightest) to achieve sag in the recommended range. Check sag by measuring the change in distance from the top of the slider tube to the bottom of the crown after the rider gets on the bike. If it is not possible to achieve the recommended sag with the existing springs, then consider changing springs. The soft (yellow), medium (red), and firm (black) springs can be used in various mixtures to achieve the desired spring rate. RockShox recommends a progression of soft-soft (100–150lb. rider), soft-medium (125–175lb. rider), medium-medium (150–200lb. rider), medium-firm (175–225lb. rider), and firm-firm (200–250lb. rider). For hard riding on extreme terrain, consider the rider to be of a higher weight classification.

### *Rebound damping*

The damping valve of this fork affects rebound only. The valving is not intended to be adjusted, but RockShox recommends switching to 15wt oil if rebound damping is insufficient.

### *Travel adjustment*

Travel kits are available to convert between 63mm and 75mm travel ranges. The travel kit includes plungers, springs, and spring spacers.

## '00 JETT

The '00 Jett can be distinguished by the fact that it has forward-offset dropouts just like other 2000 Jett models, but unlike these other models there are no pre-load adjusters on top of the legs, and there are small bolts on the bottoms of the legs.

The fork is an extremely basic OEM model, and the only service possible is to disassemble it and clean it. Unthreading the 24mm top caps enables the springs to be removed, cleaned, and greased. Unthreading the bottom bolts enables removal of the slider assembly, so that the bushings and stanchions can be cleaned and greased.

## ROCKSHOX '97-'99 JUDY CARTRIDGE FORKS

### ABOUT THIS SECTION

This section covers a variety of models and years of RockShox Judy forks, including:

1997 C, XC, DH, SL

1998 T2, XC, SL, XL

1999 SL, XL

The model names can be found on the forks, but not the years. Depending on the model year, slightly different procedures are required. Observing decal styles can help identify the model year. The 1997 models have a 6" tall decal that wraps almost all the way around each slider tube and extends from just below the swell to just above the start of the dropout. All wording is horizontal. The 1998 models have a similar decal, but it is shorter (3.5") and stops about halfway down to the start of the dropouts. The 1999 models have decals that do not wrap around the slider tubes, but are on the outer face of the sliders only, with the model name written vertically on the decal.

Several levels of service of this fork are possible, including only replacement of the spring stacks, only replacement of the damper cartridge, complete cleaning and lubrication, or complete overhaul including bushing replacement. The following procedure is written for a complete overhaul, including bushing replacement, but by skipping unnecessary steps. As written, the procedure can be used for any lesser degree of service.

### TOOL CHOICES

Several specialized or customized tools are required to service these forks. With the exception of the tools listed for overhauling the 1997 damper cartridge, all the tools work on virtually all of the models.

Tool	Considerations and fit
UBT AL-11912B	22mm socket custom ground for optimal purchase
20cc syringe	Oral type, available at pet stores
RockShox 70096	Judy/Quadra/Indy bushing remover
RockShox 70113	Seal Separator
RockShox 70119	Judy Bushing Installer Kit
RockShox 70142	1997 Cartridge Tool Kit

## FORK SERVICE

The fork can be serviced while installed on the bike, but the brake calipers or disc brake need to be removed from the slider assembly.

### *Spring-stack removal*

1. [ ] Turn pre-load adjusters fully counterclockwise and record number of turns here:  
Right side: \_\_\_\_\_ turns  
Left side: \_\_\_\_\_ turns
2. [ ] Carefully use 22mm socket to unthread top caps from tops of stanchions. *Note: customized socket required in addition to careful maintenance of alignment of socket to avoid damaging flats of soft plastic top cap!*

In the next step, the spring stacks are removed. The various configurations of the spring stacks constitute one of the two big difference areas between all of these models. All 1997 models and the 1998 T2 have (from top down) a coil spring, a plastic spacer(s), and an elastomer spring. The remaining 1998 models and the 1999 SL model have (from top down) a short coil spring, a plastic spacer (or connector), then a longer coil spring. The 1998 XL has an additional aluminum spacer rod (with two plastic end plates) below the spring stacks. The 1999 SL and XL have (from top down) a plastic spacer and then one very long coil spring.

3. [ ] Turn fork upside down to remove spring stacks, or spring stacks and spacer rods.

### *Slider removal*

4. [ ] Pull out plastic adjuster knob (if any) from bottom end of one slider. *Note: 1999 XL and SL have a metal adjuster knob retained by a Phillips screw. Remove screw and knob at this time.*
5. [ ] Unthread both bolts at bottoms of sliders about three full turns. *Note: 1999 XL and SL have a nut instead of a bolt – unthread just until shaft protruding from nut no longer protrudes.*
6. [ ] Turn fork upright and position over receptacle for waste oils (no oil in 1997 models).
7. [ ] Use plastic mallet to tap on both bolts (or bolt and nut) until heads are back against sliders, then finish unthreading bolts (or nut).
7. [ ] Pull sliders downward about one inch to allow oil to drain, then remove sliders and boots from stanchions.
8. [ ] Separate boots from sliders, then turn sliders upside down to allow rest of oil to drain.

### *Neutral-shaft removal and disassembly*

9. [ ] Depending on model, remove conical bumper from one or both shafts extending from bottoms of stanchions.
10. [ ] Operate both shafts extending from bottoms of stanchions to determine which is the neutral shaft (it offers no resistance) and which is damper (resistance is felt). *Note: T2 has two neutral shafts and DH has two dampers!*
11. [ ] Remove snap-ring from bottom of stanchion with neutral shaft (both on T2). *Note: On some models, watch for wavy washer that comes out when snap-ring is removed.*
12. [ ] Insert 7/8" dowel or similar shaft through top of stanchion to push out neutral-shaft assembly.
13. [ ] *1997 and 1998 models only:* Remove plastic end plate from the top of neutral-shaft assembly and then remove upper shaft guide.
14. [ ] *1997 and 1998 models:* From bottom of neutral shaft, remove: lower shaft guide, conical bumper, then washer(s). *1999 models:* From bottom of neutral shaft, remove: shaft guide, shaft-guide retaining ring, top-out spring (elastomer), top-out spring guide, upper shaft guide (with O-ring), then pin.

### *Cartridge removal*

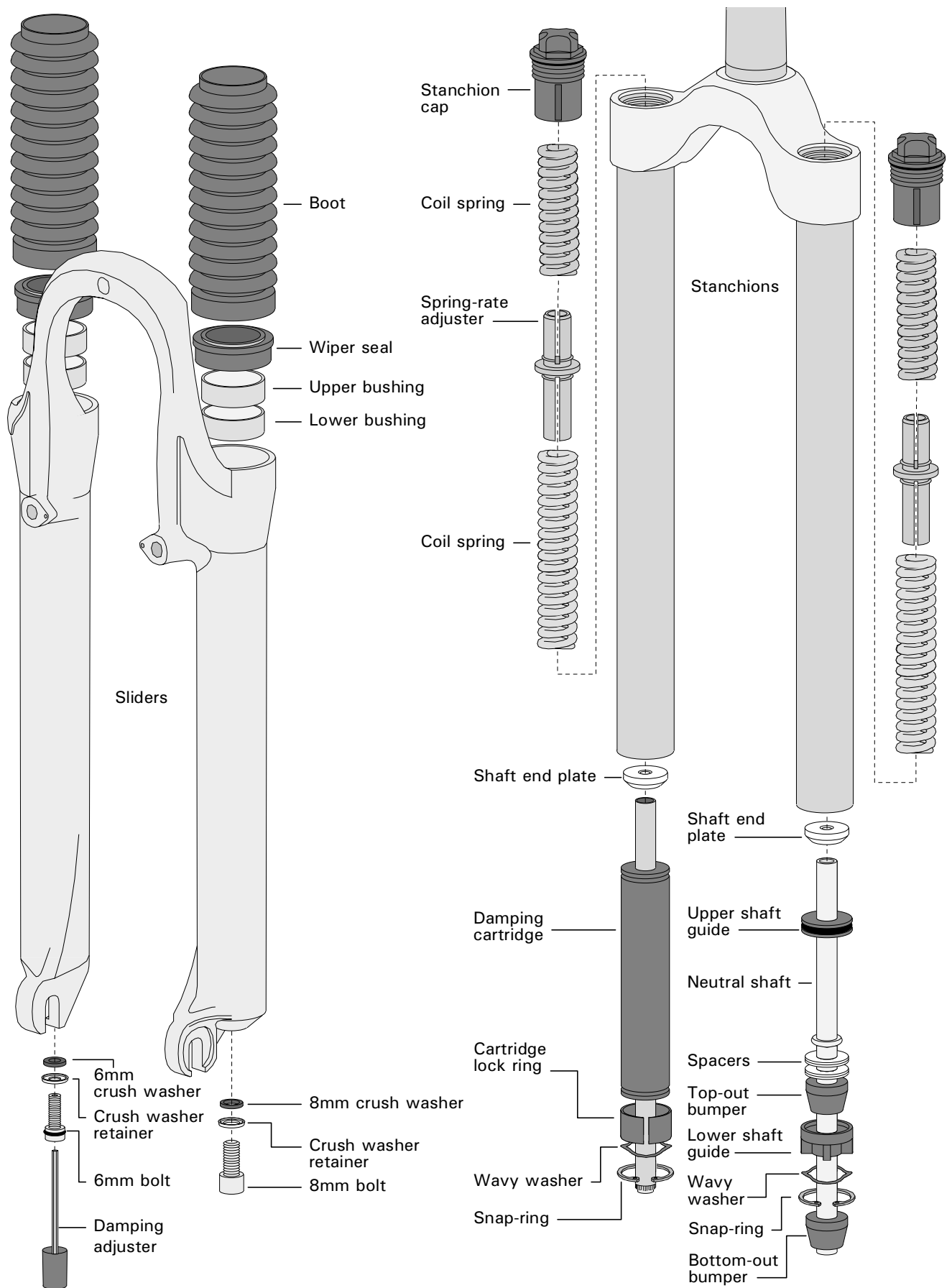
15. [ ] Remove snap-ring from bottom of stanchion, then remove wavy washer (if any).
16. [ ] Pull on cartridge shaft to remove cartridge from stanchion.
17. [ ] Remove shaft end plate from top end of cartridge shaft.
18. [ ] *1997 models:* Remove cartridge washer from bottom end of cartridge shaft.

### *Seal and upper-bushing removal*

Bushing wear can be determined in two ways. After removing the seals in step #19, insert the stanchions into the sliders again and check for any fore-and-aft play. Obvious looseness is caused by worn bushings. Alternatively, before removing the bushings, clean them thoroughly and inspect their condition with the aid of a flashlight. Good bushings have a gray coating. Worn bushings have a metallic gold or bronze appearance where the coating has worn away.

19. [ ] Insert screwdriver into seal on top of slider, then pry seal out. *Note: 1997 models, also remove seal spacers positioned on top of upper bushings.*
20. [ ] Place Seal Separator upright on slightly open vise jaws with large-diameter end up.

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38.16 RockShox '98 Judy (cartridge type).

21. [ ] Install 30mm-long extractor plate onto extractor tool, push slider onto end of extractor tool until upper bushing clears extractor plate, then pull out on slider until extractor plate catches on edge of upper bushing.
22. [ ] Guide handle of extractor down through Seal Separator and vise jaws until top of slider tube rests on Seal Separator, then firmly secure extractor handle in vise. *Note: Vise may need to be repositioned to enable end of tool to clear bench.*
23. [ ] Hold large cylinder of Seal Separator stationary and rotate other cylinder to pull bushing out.
24. [ ] Remove slider, then pull extractor tool out of Seal Separator and retrieve bushing.
25. [ ] Repeat procedure for upper bushing in other slider tube.

### **Lower bushing removal**

26. [ ] On top of slightly open vise jaws, place RockShox Seal Separator (large-end up), and place sleeve from RockShox Bushing Remover (small-end up) on top of Seal Separator.
27. [ ] Holding slider upside down, insert RockShox Bushing Remover with 30mm-long remover plate up into one side of slider and engage plate against back of first bushing.
28. [ ] With tool still engaged to bushing, drop end of tool through sleeve, Seal Separator, and vise jaws until slider seats on sleeve, then firmly secure vise on Bushing Remover handle.
29. [ ] Hold one cylinder of Seal Separator stationary and rotate other cylinder to pull bushing out.
30. [ ] Repeat previous three previous steps for other lower bushing.
31. [ ] Using a spoke or seal pick, fish bottom-out bumpers out of sliders.

### **Cartridge overhaul or replacement**

Only the 1997 forks came with a cartridge that can be overhauled. It is possible that a 1997 fork has already had the cartridge replaced with a newer model that cannot be overhauled. Look at both ends of the cartridge body for an internal snap-ring, which indicates it is a 1997 cartridge.

With all 1998 and 1999 cartridges, replacement is the only option. It may also be more economical to replace the 1997 cartridge instead of overhauling it. Check with RockShox technical support for upgrade options to newer improved cartridges.

32. [ ] Push cartridge shaft to limit both ways and inspect both ends of shaft for wear marks that indicated need of replacement.

33. [ ] While pushing and pulling cartridge shaft, listen for gurgling sounds that indicate air in cartridge, which is reason for replacement or overhaul.
34. [ ] Thoroughly clean outside of cartridge, then pump shaft repeatedly. Look for oil seepage at both ends of cartridge, indicating need of replacement or overhaul.

### **Cartridge-service procedure**

*NOTE: Skip this procedure if cartridge is being replaced or there are no problems indicated in steps 32-34.*

35. [ ] Firmly grasping shaft with fingers, use Allen key (3mm, occasionally 2mm) to turn adjuster rod (if any) in lower end of shaft fully clockwise (counting turns), and record number of turns here: \_\_\_\_\_.
36. [ ] Unthread adjuster rod (if any) from shaft.
37. [ ] If adjuster rod has been removed, point lower end of shaft into waste-oil receptacle and pump damper unit repeatedly until oil has been pumped out.
38. [ ] Place Cartridge-Body Fixture on bench (small-I.D.-end up) then place lower end of cartridge body centered on end of fixture.
39. [ ] Gently tap on shaft with plastic mallet to ease seal out end of cartridge body. Increase effort gradually if light tapping is insufficient.
40. [ ] Remove cartridge body from top of Cartridge-Body Fixture, then carefully drain remaining oil into receptacle while withdrawing shaft assembly from cartridge body.
41. [ ] Remove seal, aluminum washer, and top-out O-ring from lower end of shaft.
42. [ ] Remove internal snap-ring from end of cartridge body.
43. [ ] Place cartridge body into large-I.D. end of Cartridge-Body Fixture, then support other end of fixture on bench.
44. [ ] Insert Upper-Seal Installer tool into cartridge body, then tap vigorously on tool to drive out plastic shaft guide and upper seal.
45. [ ] Inspect shaft for nicks and scratches (replace if any).
46. [ ] Inspect glide ring on piston for nicks and scratches (replace if any). Inspect that glide ring floats freely.
47. [ ] Clean all parts with a lint-free rag.
48. [ ] Install internal snap-ring in groove in upper end of cartridge body, making sure face of snap-ring with sharp edges faces out of cartridge body.
49. [ ] Coat new upper seal with Judy Butter (or non-lithium Teflon grease) inside and out.
50. [ ] Place seal (cavity-side first) onto shaft of Upper-Seal Installer tool.

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51. [ ] Place plastic shaft guide (cavity side, if any, first) onto shaft of Upper-Seal Installer tool.
52. [ ] Coat inside of cartridge body with light coating of hydraulic oil that will be used to fill damper unit.
53. [ ] With Upper-Seal Installer tool standing up on bench, slide cartridge body over seal/tool assembly.
54. [ ] Place Cartridge-Body Fixture over cartridge body, then tap on end of fixture with plastic mallet to seat seal and plastic shaft guide into cartridge body.
55. [ ] Remove tools from cartridge body, then install Shaft-Guide tool through seal so small end of tool is inside cartridge body.
56. [ ] Place Cartridge-Body Fixture on bench (large-I.D.-end up) then place cartridge body into fixture.
57. [ ] Fill cartridge body halfway with oil.
58. [ ] Insert shaft assembly (end with no internal thread) into cartridge body until end of shaft engages end of Shaft-Guide tool.
59. [ ] Press shaft assembly into cartridge until Shaft-Guide tool is heard to drop to bench. Then seat shaft assembly fully into cartridge.
60. [ ] Fill cartridge body two-thirds full with oil.
61. [ ] Taking care not to pull shaft out of seal, pump shaft up and down several times to work oil into, and air bubbles out of, valve mechanism.
62. [ ] Slide top-out O-ring, then aluminum washer, over end of shaft and submerge both into the oil.
63. [ ] Fill cartridge body with oil to within 5mm of the top and let sit undisturbed for five minutes so air can dissipate from oil.
64. [ ] Fill cavity side of new bottom seal with grease, and grease outside of seal.
65. [ ] If adjusting rod was not removed from shaft, place a short section of fishing line through hole in seal.
66. [ ] Place seal (cavity-side first) over end of shaft (making sure line, if any, stays in place), then engage seal to cartridge body (making sure line is not trapped between seal and cartridge body).
67. [ ] Place conical washer (conical-face out) over shaft and against face of seal.
68. [ ] Place cavity end of Lower-Seal Installer tool over washer and seal.
69. [ ] With tool covered with rag to catch excess oil that might spurt out, tap plastic mallet against Lower-Seal Installer tool to seat seal fully into cartridge body, then remove Lower-Seal Installer tool.
70. [ ] If adjuster rod has been removed, replace adjuster-rod O-ring with a new, greased O-ring.

71. [ ] If installing adjuster rod, fill shaft with oil.
72. [ ] If fishing line was used when installing seal, remove line now.
73. [ ] Grasping shaft firmly with fingers, thread adjusting rod into shaft until fully bottomed.
74. [ ] Turn adjusting rod out by number of turns recorded in step 35.

### ***Bushing and seal installation***

75. [ ] Secure Judy Bushing Installer base upright in vise, with vertical post positioned out past end of vise jaws.

The Judy Bushing Installer tool comes with four long sleeves of various lengths. Originally, these sleeves were intended for setting the correct lower-bushing height for different models. Because travel can be changed on any model, RockShox now recommends using the red (128mm) sleeve only, which sets the lower bushing at the correct height regardless of model or travel configuration.
76. [ ] Place red (128mm) sleeve on tool shaft, then place smaller-diameter bushing (O.D. 30.5mm) on tool shaft.
77. [ ] Place one slider tube over tool shaft, insert small end of driving tool into hole in end of slider, then tap on driving tool until bushing is fully seated.
78. [ ] Remove slider and repeat previous two steps for other slider tube.
79. [ ] Remove red sleeve and place short (10mm) sleeve on tool shaft, then place larger-diameter bushing (O.D. 31.0mm) on tool shaft.
80. [ ] Place one slider tube over tool shaft, insert small end of driving tool into hole in end of slider, then tap on driving tool until top edge of bushing is even with second shoulder from top of slider. *Note: It is possible to insert bushing too far, with top edge below second shoulder. During installation, stop and inspect depth repeatedly!*
81. [ ] Remove slider and repeat previous two steps for other slider tube.
82. [ ] Insert bottom-out bumpers into slider tubes and push both down until they are below lower bushings.
83. [ ] Insert seal spacers (1997 models only) and seals into top end of each slider tube, then tap with mallet until each is fully seated and level.
84. [ ] Thoroughly grease all bushings and pockets inside seals with Judy Butter grease.

**Neutral-shaft installation**

85. [ ] **1997 and 1998 models:** Install to bottom (threaded) end of neutral shaft in order: washer(s), conical bumper (large-end first), then lower shaft guide (cupped-face first). *Note: T2 model right-side neutral shaft order is: washer, conical bumper (fat-end first), then shaft guide (cupped-face last). T2 left side has no washer or conical bumper, but shaft guide goes cupped-face first.*
86. [ ] **1999 models:** Install to bottom (threaded) end of neutral shaft in order: pin, upper shaft guide (with O-ring), top-out spring (elastomer), top-out spring guide, shaft guide retaining ring, then shaft guide.
87. [ ] **Only 1997 and 1998 models:** Install upper shaft-guide assembly then plastic end plate to top of neutral-shaft.
88. [ ] Insert neutral-shaft assembly into left slider (right side if 1997 model), install wavy washer (only if model has two), then install snap-ring so face with sharp edges faces out. T2 model, repeat for second side.
89. [ ] **1998 models only:** Install conical bumper large-end first on neutral shaft.

**Cartridge installation**

90. [ ] Install end plate on top (unthreaded) end of shaft, then install conical cartridge washer (1997 only) flat-face first onto lower end of cartridge shaft.
91. [ ] Insert cartridge into stanchion, insert wavy washer (if any), then install snap-ring so face with sharp edges faces out. *Note: T2 and 1998 models with 63mm travel, install conical bumper large-end first on cartridge shaft.*

**Slider installation**

92. [ ] Pull both neutral shaft and damper shaft fully out of stanchions.
93. [ ] Place boots on stanchion tubes, then carefully push slider assembly partially onto stanchions, using gentle rocking motion until alignment is achieved and sliders move up easily. Stop before bottoms of sliders engage either shaft.
94. [ ] **1998 and 1999 models:** Position fork so bottoms of sliders are higher than fork crown, then pour 10cc of 5wt shock oil (non seal-swelling) into each slider tube through holes for bottom bolts.
95. [ ] Push sliders on just far enough to see ends of shafts engaging holes in bottoms of slider tubes. Use small tool to align shafts to holes, if necessary.

96. [ ] Install new crush washers to shaft bolts/nuts (except 1997 models), prepare bolt/nut threads with Loctite 242, then engage bolts/nuts to neutral and damper shafts.
97. [ ] Secure bolts/nuts to 50in-lbs.
98. [ ] **1998 only:** Insert adjuster knob through shaft bolt into damper shaft.  
**1999 only:** Slide adjuster knob over shaft nut on damper shaft, then install small screw to retain knob.

**Spring-stack and top-cap installation**

99. [ ] Thoroughly grease springs, then insert into tops of stanchions in following orders:  
**1997 and T2:** elastomer, spacers, then coil  
**1998:** long coil, spacer, then short coil  
**1998 XL:** spacer rod with end plates, long coil, spacer, then short coil.  
**1999:** coil spring, then plastic spacer.
100. [ ] Carefully thread in top-cap assembly, then secure to 30in-lbs.
101. [ ] Restore pre-load setting from step 1.
102. [ ] Engage boots to seals on top of sliders.

**TUNING OPTIONS****Pre-load adjustment**

One tuning option for this fork is to adjust the pre-load adjusting knobs to add or subtract pre-load on the springs. Greater pre-load on the springs makes the fork stiffer, which increases resistance to compression and increases rebound speed. Less pre-load on the springs makes the fork softer, reducing resistance to compression and decreasing rebound speed.

The fork should sag when the rider's weight is on it. Sag helps keep the tire in contact with the ground on rough terrain, when rolling over dips or holes. The pre-load should be adjusted to create the correct amount of sag, when the rider sits on the bike. RockShox's recommended sag amounts are:

- Fork with 100mm travel: 18–25mm sag
- Fork with 80mm travel: 13–20mm sag
- Fork with 63mm travel: 7–15mm sag

**Changing springs**

Springs should be changed if the sag cannot be set within the desired range by changing the pre-load adjustment. Even if sag can be set, if the fork bottoms out too frequently, stiffer springs are needed and if the fork never bottoms out on the most severe bumps, softer springs are needed.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

There are three different spring systems used in these models: Type 2 springs (a combination of elastomer and coil springs), Type 3 springs (a combination of two coil springs), and Single Coil ('99 XL only).

**Type 2 springs:** The progressiveness of the spring can be modified by changing the Spring Rate Adjuster, which is a plastic stud that fits into the coil spring. Different lengths of studs affect how soon the coil spring compresses fully, which results in additional compression of the elastomer spring. The Spring Rate Adjusters are color-coded. They come as a kit (part #59136 for '97 models, and part #110-001414-00 for the '98 T2 model).

Soft: beige

Medium: black

Hard: gray

The coil springs are available in several varieties, which are:

Soft: red (#110-000591-00)

Medium: yellow (#110-00592-00)

Firm: green (#59141)

Extra firm: purple (#59139)

**Type 3 springs:** This spring type is a combination of two coil springs. All four coils can be independently changed to fine tune the overall spring strength. The shorter (top) spring is the primary spring, and the longer (bottom) spring is the secondary spring. In the following list for 63mm and 80mm travel models, the first part number is the primary spring, and the second part number is the secondary spring.

Xtra soft: silver (nos. 44460-01 & 44459-01)

Soft: yellow (nos. 44460-02 & 44459-02)

Medium: red (nos. 44460-03 & 44459-03)

Firm: black (nos. 44460-04 & 44459-04)

The following list for the 100mm travel '99 SL model has only one part number because there is only one spring length.

Xtra soft: silver (#110-000333-00)

Soft: yellow (#110-000333-01)

Medium: red (#110-000333-02)

Firm: black (#110-000333-03)

**Single Coil springs:** This variety of spring is found only in the '99 XL model. The following varieties of springs are available.

Soft: yellow (#510-001379-02)

Medium: red (#510-001379-03)

Firm: black (#510-001379-04)

### ***Cartridge damping-rate adjustment***

If the damper cartridge has adjustable compression damping, there will be a hollow bolt at the bottom end of one, or both, of the sliders. A 2mm Allen

wrench can be inserted through the hollow bolt to turn the adjuster. Always start by turning the adjuster fully clockwise (increases damping), counting turns. From this point, the adjustment can be turned up to two full turns counterclockwise (reducing damping). *Caution: Turning the adjuster rod too far counterclockwise will cause an oil-seal failure on some models!*

The DH fork that comes with two damping cartridges has adjustable compression damping (described above) in the left leg, and adjustable rebound damping in the right leg. There are four full turns of adjustment available from fully clockwise; clockwise increases damping, and counterclockwise reduces damping.

The models that come with the C3 cartridge will have a 23mm-long aluminum adjusting knob in the bottom of the right leg. With the knob pushed fully in, turning it clockwise increases rebound damping and counterclockwise reduces rebound damping. With the knob pulled fully out, turning it clockwise increases compression damping and counterclockwise reduces compression damping. Always return the knob to the pushed-in position after completing adjustment of the compression damping.

### ***Oil viscosity***

In the 1997 models with serviceable cartridges, RockShox recommends 5wt or 8wt oil. Lighter-weight oils reduce compression and rebound damping. Heavier-weight oils increase compression and rebound damping. It may also be preferable to use lighter oils in extremely cold conditions.

### ***Travel adjustment***

Changing travel requires a travel kit, which consists of a damper cartridge and different spacers for the springs. Due to extra stress on the fork crown, only XL and XLC models should be increased to 100mm of travel. There is no kit to reduce travel to 63mm. The following kits are available:

1997 Judy models: 80mm, #59126

1998 T2 model: 80mm, #110-000611-00

1998 XC/SL models: 80mm, #110-000607-00

1998 XL/XLC models: 100mm, #110-000608-00

1999 SL model: 80mm, #110-002062-00



# ROCKSHOX '99-'00 JUDY HYDRACOIL FORKS

## ABOUT THIS SECTION

This section covers service of several 1999 and 2000 Judy forks including '99 Judy C, XC, 100, and XLC and '00 Judy XC, SL, Race, and XL models. The '00 Judy XC, SL, Race, and XL are "All-Travel" models, which require slightly different procedures, which are specified at various points. This section does not cover the 1999 Judy XL and SL, which are covered in **ROCKSHOX '97-'99 JUDY CARTRIDGE FORKS** (page 38-42). Complete service techniques, including bushing replacement, are included. RockShox recommends an oil change, complete cleaning, and lubrication every 100 hours of use or one year, whichever comes first. Bushing replacement should be done when the fork develops obvious play between the stanchions and sliders.

## TOOL CHOICES

For all services other than bushing replacement, the following specialized tools are required:

- United Bicycle Tool AL-11912B (22mm socket already custom ground for optimal purchase)
- 24mm socket (must be custom ground to eliminate internal bevel for optimal purchase).

## FULL FORK SERVICE

### Spring-stack removal

1. [ ] Turn spring adjuster fully counterclockwise, counting number of turns on each side:  
No. of turns on right: \_\_\_\_\_  
No. of turns on left: \_\_\_\_\_
2. [ ] Use 22mm or 24mm socket to unthread spring caps on each side, then remove caps.
3. [ ] Remove plastic spring spacer (if any) and spring from each side, then turn fork over to remove plastic spring retainers. Note: Oil will pour out, and fork may need to be tapped with plastic mallet before spring retainers will drop out.

### Slider and plunger/damper removal

4. [ ] Use 5mm Allen wrench to partially unthread bolts in bottoms of sliders, tap on bolt heads with plastic mallet until heads are back against sliders, then remove bolts.
5. [ ] Pull slider and boots off stanchions.

6. [ ] *All except '00 SL, Race, and XL:* Turn fork over and push plunger and damper out tops of stanchions. Only '00 XC, remove plastic All-Travel spacers from shafts.  
*Only '00 SL, Race, and XL:* Remove snap-rings from bottoms of stanchions and pull plunger and damper out bottoms of stanchions.
7. [ ] *Only '00 SL, Race, and XL:* Remove shaft guide (Homer Valve), brass washer, then plastic All-Travel spacers from bottoms of shafts.

### Seal and bushing removal

Seal and bushing removal is identical to forks covered in **ROCKSHOX '97-'99 JUDY FORKS**. See page 38-43.

### Cleaning and inspection

8. [ ] Clean all parts with mild detergent and thoroughly dry with compressed air and/or lint-free rag.
9. [ ] Inspect wiper seals and damper-shaft guide ring for nicks or tears.
10. [ ] Measure coil springs and replace if length is unacceptable (too short).
 

Models	Unacceptable
All-Travel models	≤200mm
Other 63/80mm models	≤156mm
Other 100mm travel models	≤220mm
All negative springs	≤22mm

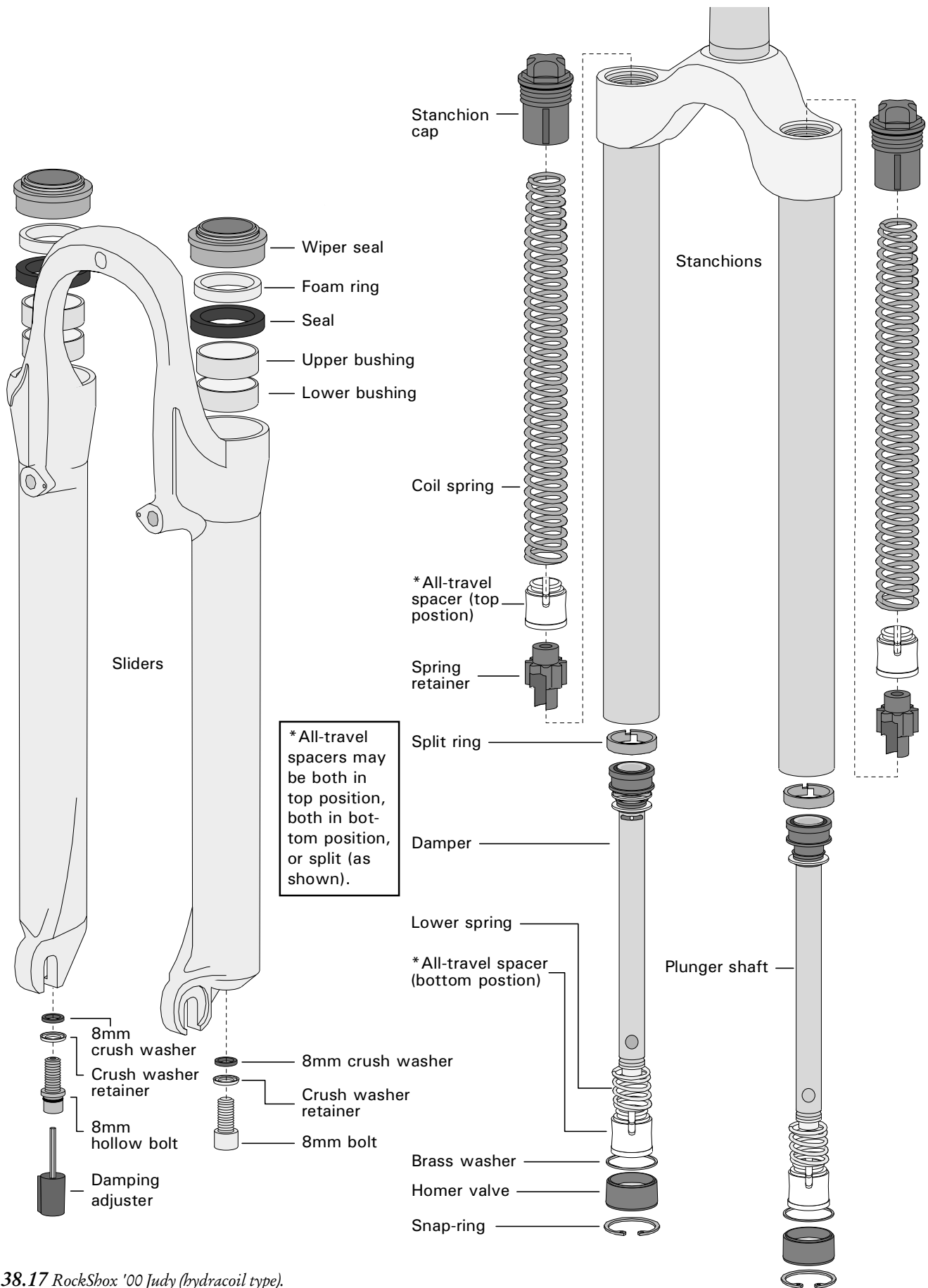
### Seal and bushing installation

With the exception of models with All-Travel spacers, seal and bushing installation is identical to forks covered in **ROCKSHOX '97-'99 JUDY FORKS** (page 38-46). With those models that use All-Travel spacers, the only difference is the sleeve used to set the depth of the lower bushing. For All-Travel models, use sleeve 140-002860-00 (131mm) instead of the red sleeve recommended in the procedure.

### Slider and plunger/damper installation

11. [ ] *All-Travel models only:* Install All-Travel spacers on damper and plunger shafts with small-diameter ends up. Use following guide to create desired amount of travel.
  - 63mm travel: two spacers per shaft
  - 80mm travel: one spacer per shaft
  - 100mm travel: no spacers on shafts*Note: Any remaining spacers go on bottoms of main springs!*
12. [ ] *Only '00 SL, Race, and XL:* Install brass washer, then Homer Valve (cupped-end first) onto damper and plunger shafts.

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38.17 RockShox '00 Judy (hydraulic type).

13. [ ] *All except '00 SL, Race, and XL:* Drop damper shaft into right stanchion and plunger shaft into other stanchion. Shafts should protrude from stanchions.  
*Only '00 SL, Race, and XL:* Insert damper-shaft assembly in bottom of right stanchion and plunger-shaft assembly in left stanchion, then install snap-rings (sharp-edged-face out) into each stanchion.
14. [ ] Slide boots onto stanchions
15. [ ] Grease bushings, and fill pockets in wiper seals with Judy Butter or similar non-lithium grease.
16. [ ] Guide slider assembly onto stanchions.
17. [ ] Replace crush washers on bottom bolts.
18. [ ] Put drop of Loctite 242 on threads of bolts, insert bolts into bottoms of sliders (hollow bolt, if any, on right), then thread bolts into shafts.
19. [ ] Secure both bolts to 60in-lbs.
20. [ ] Install adjuster knob (if any) into right-side bottom bolt, turn fully clockwise (1/4 turn range of motion possible), then remove knob and re-install so indicator points at “+” on decal.
21. [ ] Attach boots to wiper seals.

### **Spring-stack installation**

22. [ ] Pour correct amount of RockShox Extra Light (5wt) oil into each stanchion. Recommended oil volumes are:
- | Judy models          | Volume |
|----------------------|--------|
| '99 C                | 115cc  |
| '99 XC and 100       | 110cc  |
| '00 SL, Race, and XL | 120cc  |
| '99 & '00 XLC        | 130cc  |
23. [ ] Install spring retainers into each stanchion (short-end up).
24. [ ] *All-Travel models only:* Install correct number of spacers to bottoms of springs. Use following guide to create desired amount of travel.  
63mm travel: no spacers on springs  
80mm travel: one spacer per spring  
100mm travel: two spacers on springs  
*Note: There should be no remaining spacers!*
25. [ ] Grease spring coils thoroughly and install in stanchions.
26. [ ] Install spring spacers (if any) in stanchions (large-diameter ends up).
27. [ ] Thread top caps into stanchions and torque plastic caps to 40in-lbs, or aluminum caps to 50in-lbs.
28. [ ] Reset spring pre-load on each top-cap adjuster.

### **Crown-bolt security**

29. [ ] Check crown-bolt torque (if any). RockShox recommended torque is 90in-lbs.

## TUNING OPTIONS

### **Sag and pre-load adjustment**

RockShox recommends the following amounts of sag, depending on the maximum travel of the fork.

63mm travel	7–15mm sag
80mm travel	13–20mm sag
100mm travel	18–25mm sag

Adjust the pre-load adjusters (up to 5 full turns from loosest to tightest) to achieve sag in the recommended range. Check sag by measuring the change in distance from the top of the slider tube to the bottom of the crown after the rider gets on the bike. If it is not possible to achieve the recommended sag with the existing springs, then consider changing springs. The extra soft (silver), soft (yellow), medium (red), and firm (black) springs can be used in various mixtures to achieve the desired spring rate. RockShox recommends these combinations: soft-soft (for 100–150lb. rider), soft-medium (for 125–175lb. rider), medium-medium (for 150–200lb. rider), medium-firm (for 175–225lb. rider), and firm-firm (for 200–250lb. rider). For hard riding on extreme terrain, consider the rider to be of a higher-weight classification.

### **Changing spring rates**

Springs with different firmness are available for '99 and '00 HydraCoil Judy forks. For the '99 Judy C and XC models, three spring kits are available: soft (yellow, #110-002056-01), medium (red, #110-002056-03), and firm (black, #110-002056-05). For the '99 Judy 100, 100mm XL, and XLC models, three spring kits are available: soft (yellow, #110-002056-02), medium (red, #110-002056-04), and firm (black, #110-002056-06). For the '00 Judy models, four spring kits are available: extra-soft (silver, #100-004473-00), soft (yellow, #100-004774-00), medium (red, #100-004775-00), and extra-firm (black, #100-004776-00).

### **Rebound damping**

*All except '00 SL, Race, and XL:* The damping valve of these model forks affects rebound only. The valving is not intended to be adjusted, but RockShox recommends switching to 15wt oil if rebound damping is inadequate.

*Only '00 SL, Race, and XL:* The damping valve of these model forks affects rebound only. The valving is adjustable by means of the knob on the bottom of the right leg, which has a range of adjustment of slightly less than 90°. Turn the knob towards the “+” mark to increase rebound damping. RockShox recommends switching to 15wt oil if rebound damping is insufficient with the knob turned all the way to the “+” mark.

### ***Travel adjustment***

*All-Travel models only (2000):* As described in the procedure in this section, these models can be set up as 63mm, 80mm, or 100mm travel, depending on the location of the All-Travel spacers. There are two spacers in each leg, which can be switched between being on the shafts below the top-out springs, or being positioned below the main springs. The correct spacer locations are:

- 63mm travel    two below each top-out spring
- 80mm travel    one below each spring
- 100mm travel   two below each main spring

*All other models (1999):* Travel kits are available to convert from 63mm to 80mm, and from 80mm to 100mm. The XLC is the only model that can be set up with 100mm travel. The travel kit includes plunger and damper shafts, springs, and spring spacers.

## **ROCKSHOX '98 SID FORKS**

### **ABOUT THIS SECTION**

This section covers RockShox 1998 SID fork service, including bushing removal and replacement. The 1998 SID forks can be distinguished by looking at the RockShox decals. If the decals have a black background, the fork is a 1998 model. If the decals are missing, inspect the bolt heads at the bottom of the slider tubes. If the bolt heads are titanium and have six 2mm diameter holes drilled in each head, the fork is a 1998 SID. If neither the decals or bolt heads confirm the SID fork is a 1998 model, then the fork is a later model, in which case see **ROCKSHOX '99-'00 SID FORKS** (page 38-56).

### **TOOL CHOICES**

This fork requires several tools that are used to service other RockShox forks, but no tools that are unique to servicing only the SID fork. For bushing replacement, the same tools are required that are used with Judy forks. This includes the Universal Bushing Removal Tool #70096, the Judy Bushing Installer #70119, and the RockShox Seal Separator #70113.

### **FULL FORK SERVICE**

#### ***Top-cap and slider-assembly removal***

1. [ ] Remove front wheel, and disconnect brake cable from brake lever.

2. [ ] Remove Phillips screws in stanchion caps (note small O-rings under screw heads).
3. [ ] Grease RockShox inflation needle, and insert into stanchion caps to release air pressure from both sides of fork.
4. [ ] Use 22mm socket or adjustable wrench to unthread stanchion caps (note O-rings under cap flanges).
5. [ ] Turn fork over to drain oil out tops of stanchions.  
**NOTE: Observe Allen fittings accessible inside each stanchion tube. The 8mm Allen fitting adjusts spring rate. 2mm Allen fitting inside the 8mm Allen fitting adjusts damping.**
6. [ ] Use 8mm Allen to unthread titanium bolts at bottoms of sliders 4 full turns.
7. [ ] Gently tap on bolt heads until heads are seated against sliders again, then finish removing bolts.
8. [ ] Turn fork over and drain oil out bottoms of sliders.
9. [ ] Pull sliders off stanchion tubes, then remove boots from stanchion tubes.

#### ***Cartridge and neutral-shaft removal***

10. [ ] Remove internal snap-rings from bottom ends of stanchions, then remove wavy washers.
11. [ ] Thread bolts back into damper shaft and neutral shaft.

**NOTE: Remove neutral shaft for cleaning and lubrication, negative-spring adjustment, replacement of piston rings if air pressure is being lost, or to change top-out bumper spacers.**

**NOTE: Remove damper cartridge for cleaning and lubrication of piston rings, replacement of piston rings, adjustment of negative spring, or replacement of damper cartridge.**

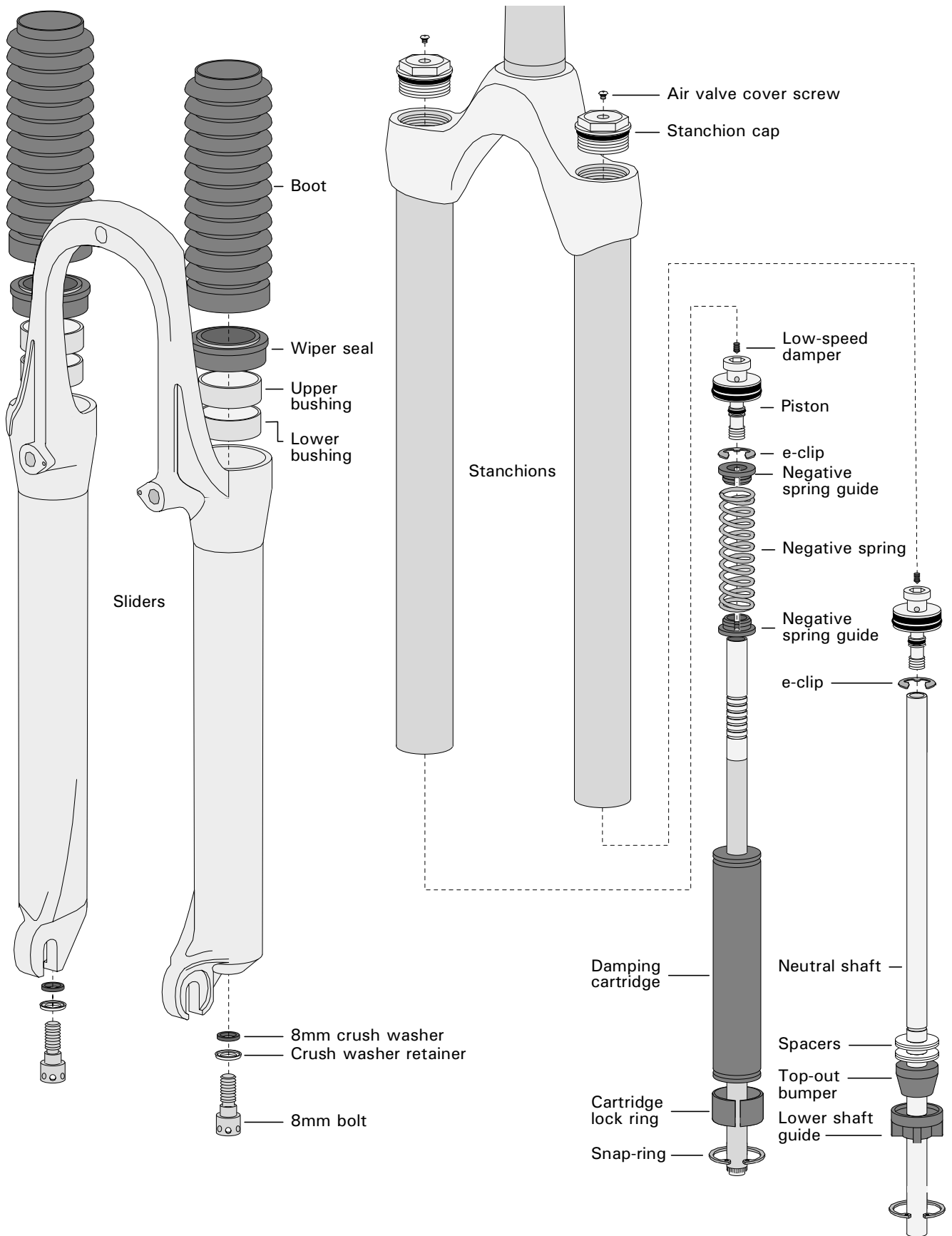
12. [ ] Insert spoke through holes in bolt heads, and pull on spoke to remove damper cartridge and/or neutral shaft assembly from stanchion tubes.
13. [ ] If adjusting negative spring, move e-clip on damper shaft down to increase negative-spring force, or up to reduce. (Negative spring can be removed entirely by unthreading piston, then removing e-clip and spring.)
14. [ ] With 8mm Allen, remove pistons from tops of shafts. Remove shaft guide, bumper, and washers from bottom of neutral shaft.

**NOTE: If not servicing bushings, go to step 27.**

#### ***Seal and upper-bushing removal***

Bushing wear can be determined in two ways. After removing the seals in step #15, insert the stanchions into the sliders again and check for any fore-and-aft play. Obvious looseness is caused by worn bushings. Alternatively, before removing the bushings, clean

# 38 – SUSPENSION FORKS AND REAR SHOCKS



38.18 RockShox '98 SID.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

them thoroughly and inspect their condition with the aid of a flashlight. Good bushings have a gray coating. Worn bushings are metallic gold or bronze in appearance where the coating has worn away.

15. [ ] Insert screwdriver into seal on top of slider, then pry seal out.
16. [ ] Place Seal Separator upright on slightly open vise jaws with large-diameter end up.
17. [ ] Install 30mm-long extractor plate onto extractor tool, push slider onto end of extractor tool until upper bushing clears extractor plate, then pull out on slider until extractor plate catches on edge of upper bushing.
18. [ ] Guide handle of extractor down through Seal Separator and vise jaws until top of slider tube rests on Seal Separator, then firmly secure extractor handle in vise. *Note: Vise may need to be repositioned to enable end of tool to clear bench.*
19. [ ] Hold large cylinder of Seal Separator stationary and rotate other cylinder to pull bushing.
20. [ ] Remove slider, then pull extractor tool out of Seal Separator and retrieve bushing.
21. [ ] Repeat procedure for upper bushing in other slider tube.

### ***Lower-bushing removal***

22. [ ] Place RockShox Seal Separator (large-end up) on top of slightly open vise jaws then place sleeve from RockShox Bushing Remover (small-end up) on top of Seal Separator.
23. [ ] Holding slider upside down, insert RockShox Bushing Remover with 30mm-long remover plate up into one side of slider and engage plate against back of first bushing.
24. [ ] With tool still engaged to bushing, drop end of tool through sleeve, Seal Separator, and vise jaws until slider seats on sleeve, then firmly secure vise on Bushing Remover handle.
25. [ ] Hold one cylinder of Seal Separator stationary and rotate other cylinder to pull bushing.
26. [ ] Repeat previous three previous steps for other lower bushing out.

### ***Cleaning and inspection***

1998 damper cartridges cannot be overhauled. Replacement is the only option.

27. [ ] Use mild detergent to thoroughly clean all parts. Dry with lint-free rag and/or compressed air. Avoid solvents, which may damage seals and other non-metallic parts.
28. [ ] Inspect all rubber O-rings and glide rings for nicks and tears, and replace as necessary.
29. [ ] Replace crush washer on each shaft bolt.

30. [ ] Push cartridge shaft to limit both ways and inspect both ends of shaft for wear marks that indicated need of replacement.
31. [ ] While pushing and pulling cartridge shaft, listen for gurgling sounds that indicate air in cartridge, which is reason for replacement.
32. [ ] Thoroughly clean outside of cartridge, then pump shaft repeatedly. Look for oil seepage at both ends of cartridge, indicating need of replacement.
33. [ ] Inspect stanchion tubes for bends, scratches, or heavy wear.
34. [ ] Inspect fork crown for cracks.

### ***Bushing and seal installation***

35. [ ] Secure Judy Bushing Installer base upright in vise, with vertical post positioned out past end of vise jaws.

The Judy Bushing Installer tool comes with four long sleeves of various lengths. Originally, these sleeves were intended for setting the correct lower-bushing height for different models. Because travel can be changed on any model, RockShox now recommends using the red (128mm) sleeve only, which sets the lower bushing at the correct height regardless of model or travel configuration.

36. [ ] Place red (128mm) sleeve on tool shaft, then place smaller-diameter bushing (O.D. 30.5mm) on tool shaft.
37. [ ] Place one slider tube over tool shaft, insert small end of driving tool into hole in end of slider, then tap on driving tool until bushing is fully seated.
38. [ ] Remove slider and repeat previous two steps for other slider tube.
39. [ ] Remove red sleeve and place short (10mm) sleeve on tool shaft, then place larger-diameter bushing (O.D. 31.0mm) on tool shaft.
40. [ ] Place one slider tube over tool shaft, insert small end of driving tool into hole in end of slider, then tap on driving tool until top edge of bushing is even with second shoulder from top of slider. *Note: It is possible to insert bushing too far, with top edge below second shoulder. During installation, stop and inspect depth repeatedly!*
41. [ ] Remove slider and repeat previous two steps for other slider tube.
42. [ ] Insert bottom-out bumpers into slider tubes and push both down until they are below lower bushings.
43. [ ] Insert seals into top end of each slider tube, then tap with mallet until each is fully seated and level.
44. [ ] Thoroughly grease all bushings and pockets inside seals with Judy Butter grease.

***Cartridge and neutral-shaft installation***

45. [ ] Replace worn or damaged O-rings, glide rings (on pistons), or seals.
46. [ ] Thread pistons fully into tops of shafts, but do not secure.
47. [ ] Install in order onto bottom of neutral shaft: plastic washers, conical bumper (large-diameter-end first), then shaft guide (cupped-face first).
48. [ ] Grease shaft and piston of damper cartridge assembly, then slide piston-end first into right-side stanchion.
49. [ ] Use 7/8" O.D. PVC pipe or similar cylinder to gently seat cartridge body just beyond snapping groove, then install snap-ring.
50. [ ] Pull damper shaft out as far as negative spring will allow.
51. [ ] Grease neutral shaft piston rings and top-out bumper.
52. [ ] Slide neutral shaft into left leg, engage snap-ring, then pull shaft out until even with damper shaft.

***Slider assembly and top-cap installation***

53. [ ] Install boots on stanchions.
54. [ ] Use Judy Butter or equivalent grease to grease stanchion tubes, bushings in sliders, and pockets in inner perimeters of wiper seals.
55. [ ] With bike/fork upright, put 5cc of oil in each stanchion tube, then install top caps to 35–40in-lbs each.
56. [ ] Put 5cc of oil in each slider tube and swirl around to coat inside of tubes.
57. [ ] Place sliders onto stanchions until just short of point shafts will be compressed.
58. [ ] Invert fork/bike, then pour 15cc of oil into bolt hole at bottom of each slider.
59. [ ] Treat both bottom bolts with Loctite 242.
60. [ ] Press sliders on fully, then engage bolts through holes in bottoms of sliders into neutral shaft and damper shaft and torque to 50in-lbs.
61. [ ] Use pump with RockShox inflation needle to pressurize both stanchions to desired pressure.
62. [ ] Install Phillips screws in stanchion caps.
63. [ ] Install wheel and reattach brake cable.

**TUNING OPTIONS*****Air-spring pressure***

The fork should sag when the rider's weight is on it. Sag helps keep the tire in contact with the ground on rough terrain, when rolling over dips or holes. The air pressure should be adjusted to create the correct amount of sag, when the rider sits on the bike. The recommended sag for this fork is between 3mm and

8mm. The air pressure should be adjusted to create this amount of sag. RockShox recommends the following depending on rider weight:

< 130lbs	40psi
120–150lbs	50psi
140–170lbs	60psi
160–190lbs	70psi
> 180lbs	80psi

The rider's style affects the necessary pressure, as well. This is why the weight ranges in the list overlap somewhat. For example, a less aggressive 165lb rider might do best with the 60psi recommendation, but a more aggressive 165lb rider might do best with the 70psi recommendation. If air pressure cannot be maintained, seals may need replacement, or there may be a problem with the low-speed damping adjusters. See the following section ***Low-speed-damping adjustment***.

***Changing air-spring volume***

The air springs get more progressive if the volume is reduced. A more progressive spring gets more resistant to compression at a given point in the travel than a less progressive spring. To adjust the volume, the springs must be depressurized and the top caps removed. A long 8mm Allen wrench can be used to adjust the piston height at the bottom of the air chamber. First, turn the wrench clockwise, counting the number of turns until it stops, to determine the current position. From the fully bottomed position, the pistons can be turned up to five full turns counterclockwise. It is critical to start by finding the bottom, because there is no stop to prevent loosening the pistons more than five full turns, which will cause the air chamber to not maintain pressure.

The pistons do not have to be adjusted equally, so maximum volume is with both turned fully clockwise. A medium adjustment is with both up 2.5 turns, or with one fully down and the other up five full turns. A minimum volume is with both turned five full turns up (counterclockwise).

***Cartridge damping-rate adjustment***

The damping cartridge is not adjustable, but three damping cartridges are available: soft (#20882-001), medium (#20882-002), and firm (#20882-003). RockShox recommends switching to the firm cartridge if 70psi or more is the best air pressure for the rider, but the fork acts too quick (too lightly damped) at this pressure. Conversely, the soft cartridge is recommended if the correct pressure for the rider is 50psi or less, but at that pressure the fork seems too heavily damped (sluggish).

### ***Low-speed-damping adjustment***

RockShox no longer feels the low-speed damping adjustment is effective, and may be a source of air-pressure leaks. RockShox recommends installing the low-speed damping screws with Loctite 242 and tightening each fully. If pressure loss continues, remove the piston heads from the neutral and damper shafts and seal the holes in the threaded studs on the bottom ends of the pistons. Alternatively, put rubber plugs under the low-speed damping adjuster screws.

### ***Negative-spring adjustments***

There are two possible adjustments to the negative spring. The negative-spring pre-load can be adjusted, and there are two strengths of springs available.

The negative spring serves to counteract the inherently high main-spring pre-load that exists with air-sprung forks. With the fork pre-load too high, the fork tends to not react to small bumps. Increasing negative-spring pre-load decreases the fork pre-load.

The negative-spring is on the damper shaft. When the damper is removed, the e-clip on top of the negative spring can be moved into one of several grooves. The fork has the most pre-load when the spring is removed, and the least pre-load when the e-clip is in the lowest groove. Each groove changes the spring rate by 4 lb-in.

The stock spring is the light spring. Light riders (under 130lbs) may need the heavy spring (#510-00689-00).

## ***ROCKSHOX '99–'00 SID CARTRIDGE FORKS***

### **ABOUT THIS SECTION**

This section is specific to RockShox SID forks made in 1999 and 2000. For the 2000 models, this section only applies to the Race, SL, and XL models. The 2000 SID XC and 100 are a different design and are not available at the time of this writing. The 1999 and 2000 models this section does apply to are distinguished by the C3 cartridge adjuster knob on the bottom of the left leg. This 23mm-long aluminum knob can be pulled down another few millimeters to change between compression and rebound damping adjustment. Decals that say “C3 Dual Adjust” further identify the models this section applies to. See ***ROCKSHOX '98 SID FORK*** (page 38-52) for the 1998 model, which is signifi-

cantly different. The lack of the adjuster knob and the large RockShox decals with a black background distinguish 1998 models.

## **TOOLS**

Servicing this fork requires one specialized tool that is unique to this model, the RockShox Cartridge Sleeve Retainer Tool #140-001905-00. For sake of brevity, the following procedure will refer to this tool simply as the “cartridge driver.” This fork needs one other tool common to several RockShox forks for removing the caps at the tops of the legs, the United Bicycle Tool AL-11912B (custom-ground 22mm socket for fitting low-profile wrench flats). The standard RockShox pump is adequate for inflation, with the addition of a 1999 Sid valve adapter.

For bushing replacement, the same tools are required that are used with Judy forks. This includes the Universal Bushing Removal Tool #70096, the Judy Bushing Installer #70119, and the RockShox Seal Separator #70113.

## **FULL FORK SERVICE**

### ***Slider removal***

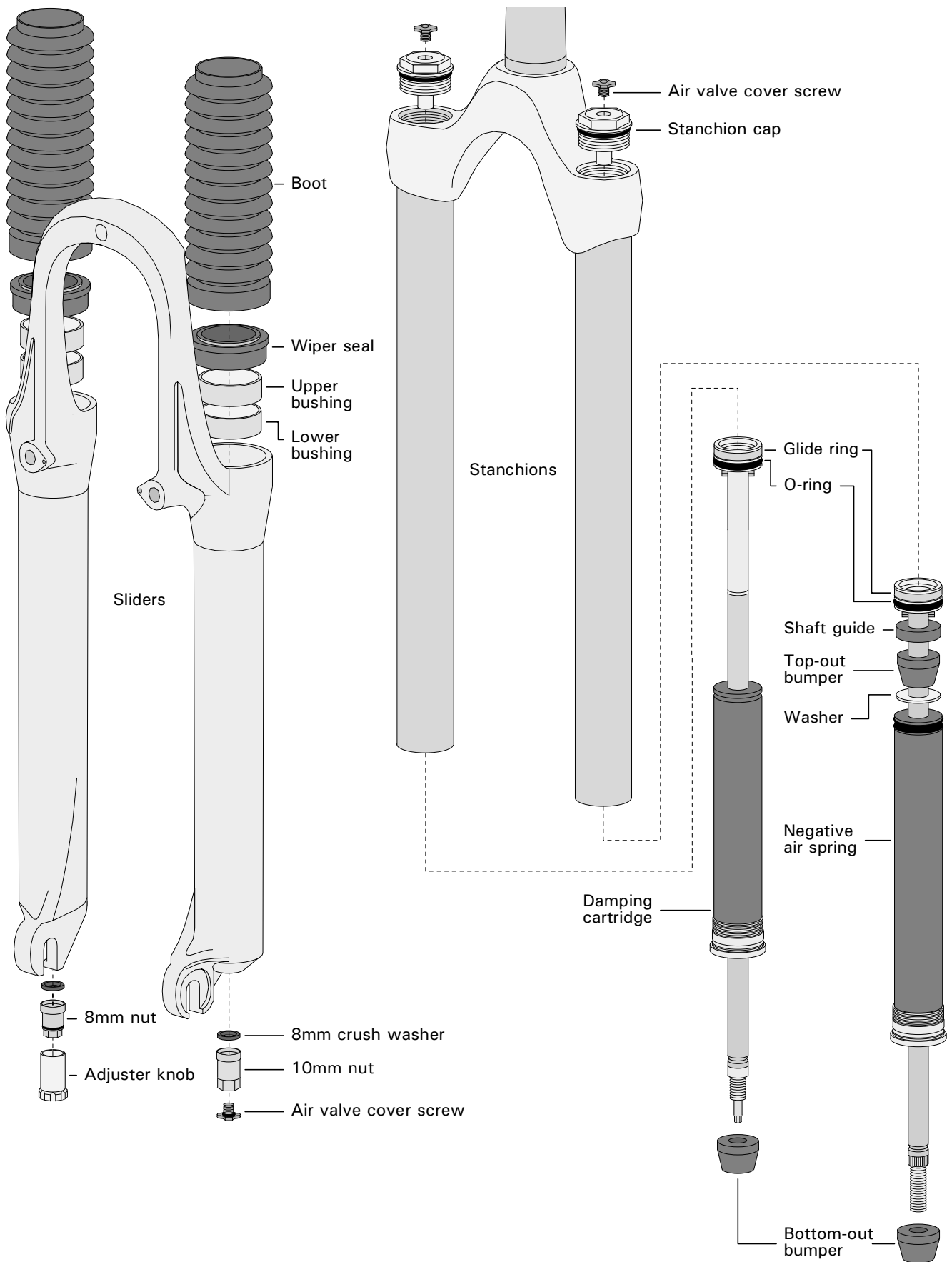
1. [ ] Remove plastic valve caps from top and bottom of left leg and top of right leg.
2. [ ] Push in adjuster knob on bottom of right leg, unscrew Phillips screw, then remove adjuster knob.
3. [ ] Depressurize air valve in bottom of left leg.
4. [ ] Unthread 8mm nut on bottom of right leg just until hex-shaped adjuster rod no longer protrudes.
5. [ ] Unthread 10mm nut on bottom of left leg about 5mm.
6. [ ] Depressurize both air valves at tops of legs.
7. [ ] Use 22mm socket to remove both air cap assemblies from tops of legs.
8. [ ] Tap on nuts at bottoms of legs with plastic mallet until nuts are against sliders, then unthread both nuts completely. *Note: Be prepared for oil to drain out holes at bottoms of sliders!*
9. [ ] Pull slider assembly of bottoms of stanchions, then remove boots. Drain remaining oil from sliders.

### ***Cartridge and negative spring disassembly***

There are two cartridges in the stanchions of the fork. The left cartridge is a negative air spring and the right cartridge is a hydraulic damper. The damper car-



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38.19 RockShox '99 SID.

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tridge is non-serviceable, but is removed for cleaning, inspection, and replacement of the glide ring and O-ring at the top of the damper shaft.

10. [ ] Pull conical bottom-out bumpers off cartridge shafts.
11. [ ] Push both cartridge shafts fully in. It is necessary to open air valve in left shaft to release air pressure.
12. [ ] Use cartridge driver to turn both cartridges clockwise until completely unthreaded, then pull on cartridge shafts to remove cartridges.
13. [ ] Carefully remove blue glide ring and black O-ring from top end of each cartridge shaft.
14. [ ] Pull cylinder off bottom of negative-spring assembly, then remove washer, conical top-out bumper, and plastic plate.

### ***Seal and upper-bushing removal***

Bushing wear can be determined in two ways. After removing the seals in step #15, insert the stanchions into the sliders again and check for any fore-and-aft play. Obvious looseness is caused by worn bushings. Alternatively, before removing the bushings, clean them thoroughly and inspect their condition with the aid of a flashlight. Good bushings have a gray coating. Worn bushings have a metallic gold or bronze appearance where the coating has worn away.

15. [ ] Insert screwdriver into seal on top of slider, then pry seal out.
16. [ ] Place Seal Separator upright on slightly open vise jaws with large-diameter end up.
17. [ ] Install 30mm-long extractor plate onto extractor tool, push slider onto end of extractor tool until upper bushing clears extractor plate, then pull out on slider until extractor plate catches on edge of upper bushing.
18. [ ] Guide handle of extractor down through Seal Separator and vise jaws until top of slider tube rests on Seal Separator, then firmly secure extractor handle in vise. *Note: Vise may need to be repositioned to enable end of tool to clear bench.*
19. [ ] Hold large cylinder of Seal Separator stationary and rotate other cylinder to pull bushing out.
20. [ ] Remove slider, then pull extractor tool out of Seal Separator and retrieve bushing.
21. [ ] Repeat procedure for upper bushing in other slider tube.

### ***Lower bushing removal***

22. [ ] Place RockShox Seal Separator (large-end up on top of slightly open vise jaws then place sleeve from RockShox Bushing Remover (small-end up) on top of Seal Separator.

23. [ ] Holding slider upside down, insert RockShox Bushing Remover with 30mm-long remover plate up into one side of slider and engage plate against back of first bushing.
24. [ ] With tool still engaged to bushing, drop end of tool through sleeve, Seal Separator, and vise jaws until slider seats on sleeve, then firmly secure vise on Bushing Remover handle.
25. [ ] Hold one cylinder of Seal Separator stationary and rotate other cylinder to pull bushing.
26. [ ] Repeat previous three previous steps for other lower bushing.

### ***Cleaning and inspection***

1999 and 2000 damper cartridges cannot be overhauled. Replacement is the only option.

27. [ ] Use mild detergent to thoroughly clean all parts. Dry with lint-free rag and/or compressed air. Avoid solvents, which may damage seals and other non-metallic parts.
28. [ ] Inspect all rubber O-rings and glide rings for nicks and tears, and replace as necessary.
29. [ ] Replace crush washer on each shaft nut.
30. [ ] Push cartridge shaft to limit both ways and inspect both ends of shaft for wear marks that indicated need of replacement.
31. [ ] While pushing and pulling cartridge shaft, listen for gurgling sounds that indicate air in cartridge, which is reason for replacement.
32. [ ] Thoroughly clean outside of cartridge, then pump shaft repeatedly. Look for oil seepage at both ends of cartridge, indicating need of replacement.
33. [ ] Inspect stanchion tubes for bends, scratches, or heavy wear.
34. [ ] Inspect fork crown for cracks.

### ***Bushing and seal installation***

35. [ ] Secure Judy Bushing Installer base upright in vise, with vertical post positioned out past end of vise jaws.

The Judy Bushing Installer tool comes with four long sleeves of various lengths. Originally, these sleeves were intended for setting the correct lower-bushing height for different models. Because travel can be changed on any model, RockShox now recommends using the red (128mm) sleeve only, which sets the lower bushing at the correct height regardless of model or travel configuration.

36. [ ] Place red (128mm) sleeve on tool shaft, then place smaller-diameter bushing (O.D. 30.5mm) on tool shaft.
37. [ ] Place one slider tube over tool shaft, insert small end of driving tool into hole in end of slider, then tap on driving tool until bushing is fully seated.

38. [ ] Remove slider and repeat previous two steps for other slider tube.
39. [ ] Remove red sleeve and place short (10mm) sleeve on tool shaft, then place larger-diameter bushing (O.D. 31.0mm) on tool shaft.
40. [ ] Place one slider tube over tool shaft, insert small end of driving tool into hole in end of slider, then tap on driving tool until top edge of bushing is even with second shoulder from top of slider. *Note: It is possible to insert bushing too far, with top edge below second shoulder. During installation, stop and inspect depth repeatedly!*
41. [ ] Remove slider and repeat previous two steps for other slider tube.
42. [ ] Insert bottom-out bumpers into slider tubes and push both down until they are below lower bushings.
43. [ ] Insert seals into top end of each slider tube, then tap with mallet until each is fully seated and level.
44. [ ] Thoroughly grease all bushings and pockets inside seals with Judy Butter grease.

### ***Cartridge assembly and installation***

45. [ ] Install O-Ring then blue glide ring in grooves in pistons at tops of each cartridge shaft.
46. [ ] Install plastic plate, conical bumper (large-end first), washer, then negative-spring cylinder (unthreaded-end first) onto negative-spring shaft. Leave cylinder at bottom end of shaft.
47. [ ] Grease piston assemblies with Judy Butter grease.
48. [ ] Carefully insert damper cartridge into right stanchion tube, then engage cartridge threads counterclockwise to stanchion-tube threads. Secure cartridge with cartridge driver to 20in-lbs.
49. [ ] Carefully insert negative-spring assembly into left stanchion tube, then engage cartridge threads counterclockwise to stanchion-tube threads. Secure cartridge with cartridge driver to 20in-lbs.
50. [ ] Pull shafts fully out of cartridges. Air valve in neutral spring needs to be opened while pulling on neutral shaft.
51. [ ] Install conical bumpers onto shafts (large-diameter-ends first).
52. [ ] Install top-cap assemblies into tops of stanchions and secure to 35–40in-lbs.

In the next step, the main springs are inflated to 100psi each. This is the maximum recommended pressure. Individual riders will usually use a lower pressure. The 100psi pressure is to test the pressure integ-

rity of the main springs, and to provide resistance to the cartridge shafts, which facilitates securing the nuts to the bottoms of the cartridge shafts.

53. [ ] Install RockShox SID pump in each top cap and inflate to 100psi.

### ***Slider installation***

54. [ ] Place boots on stanchion tubes, then carefully push slider assembly partially onto stanchions, using gentle rocking motion until alignment is achieved and sliders move up easily. Stop before bottoms of sliders engage either shaft.
55. [ ] Position fork so bottoms of sliders are higher than fork crown, then pour 10cc of 15wt shock oil (non seal-swelling) into each slider tube through holes for bottom bolts.
56. [ ] Push sliders on until shafts protrude through sliders.
57. [ ] Prepare nut threads with Loctite 242, then engage nuts to neutral and damper shafts.
58. [ ] Secure bolts/nuts to 50in-lbs.
59. [ ] Slide adjuster knob over shaft nut on damper shaft, then install small screw to retain knob.
60. [ ] Engage boots to seals on top of sliders.

### ***Spring inflation***

54. [ ] Refer to following table (or use rider preferences). First inflate main springs, then inflate negative spring to desired pressures.
55. [ ] Install valve caps in all three air-spring valves.

#### **SID AIR-SPRING PRESSURES**

Rider weight	Main	Negative-XC	Negative-racing
< 120lbs	30–40psi	30–40psi	25–30psi
120–140lbs	40–50psi	40–50psi	30–45psi
140–160lbs	50–60psi	50–60psi	40–55psi
160–180lbs	55–65psi	55–65psi	50–60psi
> 180lbs	65–75psi	65–75psi	55–65psi

***Important: To prevent pressure loss, never exceed 100psi in main springs or negative spring!***

## **TUNING OPTIONS**

### ***Damping adjustment***

The damper has an adjusting knob at the bottom of the right leg. With the knob pushed fully in, turning it clockwise increases rebound damping and counterclockwise reduces rebound damping. With the knob pulled fully out, turning it clockwise increases compression damping and counterclockwise reduces compression damping. Always return the knob to the pushed-in position after completing adjustment of the compression damping.

### ***Sag adjustment***

RockShox recommends setting sag at 20% of total travel for cross-country riding (recreational) or 10% of total travel for racing. Sag is adjusted by balancing the main spring and negative-spring pressures. If the sag is correct, but the fork bottoms too easily on bumps, increase all pressures proportionally. If the sag is correct but the fork never bottoms on severe bumps, decrease all pressures proportionally. Changing negative-spring pressure independently of main-spring pressure will also affect responsiveness to small bumps. More negative-spring pressure increases responsiveness to small bumps.

### ***Travel adjustment***

On the 1999 models, travel can be adjusted only by replacing the cartridge. The 2000 models come with an All Spacer Kit, which are spacers that can be repositioned to change the travel.

### ***Adjusting main-spring progressiveness***

Changing the volume of the main-spring air chambers varies the progressiveness of the spring. Less volume creates more progressiveness. A more progressive spring gets more resistant to compression at the same amount of travel. RockShox has spacers available that are added to the bottoms of the top caps that reduce the volume of the main-spring air chamber.

## **ROCKSHOX DELUXE REAR SHOCK**

This shock is a air/oil shock with an external coil spring. It is available in several lengths of travel and with several different spring ratings. Some versions have a floating piston that separates the air and oil in the shock body, but others have no piston for this purpose. The service of all these variations is so similar that the following procedure is adequate for all of them.

There is another model, called the Super Deluxe, that is significantly different. Instead of a uniform-diameter shock body, the Super Deluxe body gets substantially fatter at the end that is not inside the spring. There is a section called **ROCKSHOX SUPER DELUXE REAR SHOCK** (page 38-64) that should be used for servicing this type.

This procedure requires several tools that are included in the RockShox 70106 tool kit. The tool kit is designed for other models as well, so some tools in the kit will not be used in this procedure. In some cases, there may be two tools that are very similar,

except for slight differences in dimension. The individual tools are unmarked, so make sure that the tool you select seems dimensionally appropriate for the procedure being performed.

## **SHOCK AND SPRING REMOVAL**

### ***Shock removal***

The compressed spring length needs to be measured, so that the customer's pre-load setting can be restored.

1. [ ] **Measure length of spring between red adjuster ring and silver stop plate: \_\_\_\_\_ mm**
2. [ ] **Turn red adjuster ring fully away from spring, until spring moves easily between plates.**

The shock unit may mount to the frame in a variety of ways, depending on the design of the frame. Usually, there will be a bolt and nut through the shock eyelets, or their will be a stud with retaining clips on each end.

3. [ ] **Remove shafts that go through both shock eyes, then remove shock from bike.**

### ***Spring removal***

1. [ ] **Thread red spring-adjuster ring off end of shock.**
2. [ ] **Slide spring off shock unit.**

## **OIL CHANGE/SHOCK DISASSEMBLY**

**NOTE: Perform complete SHOCK AND SPRING REMOVAL procedures before proceeding further.**

### ***Body-eyelet-bushing removal***

There is an air valve hidden by the bushing located inside the eyelet on the end of the shock body. The bushing must be removed to depressurize the shock.

1. [ ] **Place flat face of body eyelet on top of vise, with vise jaws open enough to permit eyelet bushing to clear.**

The bushing tool used in the next step is a cylinder with different diameter reductions at each end.

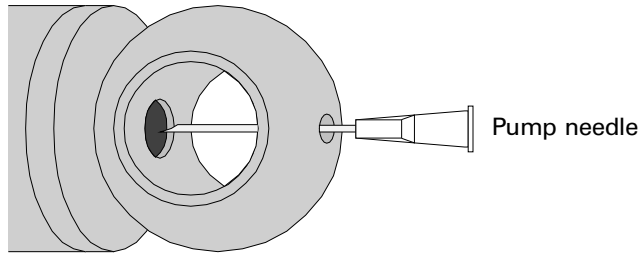
2. [ ] **Place large-diameter end of bushing tool against bushing, then tap on bushing tool with plastic mallet to drive out bushing.**

### ***Depressurization***

1. [ ] **Remove needle from pump, by unscrewing first brass fitting at base of needle.**

The pump needle needs to be removed from the pump for depressurization. The needle has a sharp tip that punctures the air valve (the puncture self seals when the needle is removed). Goggles are needed because hydraulic fluid can spray out the end of the needle at high speed.

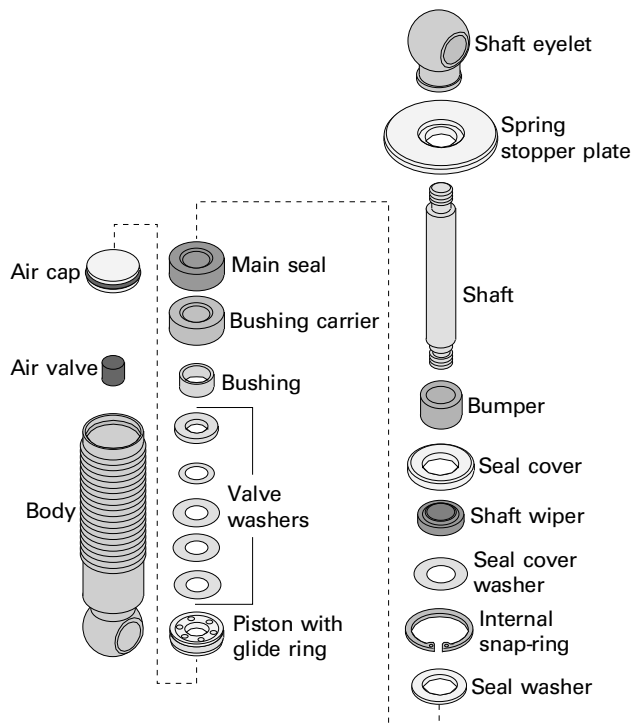
2. [ ] Wearing safety goggles to prevent getting hydraulic fluid in your eyes, insert needle through small hole in end of body eyelet, then into air valve that was covered by eyelet bushing.



38.20 Depressurizing the shock.

3. [ ] Remove needle.

### **Shaft-assembly removal, and oil draining**



38.21 Blow-up of Deluxe shock.

4. [ ] Clamp faces of body eyelet in vise soft jaws.
5. [ ] Hold drift or screwdriver against bottom edge of seal cover (on top end of body), then tap on tool with hammer to remove seal cover from body.
6. [ ] Place shaft-clamping blocks around shaft, then firmly secure shaft-clamping blocks in vise.

7. [ ] Place rag over flats of shaft eyelet to protect finish.
8. [ ] Grasp flats of eyelet securely in large adjustable-wrench jaws.
9. [ ] Turn wrench counterclockwise to unthread eyelet from shaft.
10. [ ] Remove spring-stopper plate and bumper.
11. [ ] Remove shaft from shaft-clamping blocks.
12. [ ] Remove seal cover, shaft wiper, and seal-cover washer from end of shock.
13. [ ] Use snap-ring pliers to remove internal snap-ring from inside shock body.
14. [ ] Clamp body-eyelet flats in soft jaws in vise.
15. [ ] Thread shaft eyelet back onto shaft.
16. [ ] Wearing safety goggles, insert round bar through shaft eyelet; using rocking/pulling motion to pull shaft assembly out of shock body (oil will spill).
17. [ ] Remove shock body from vise, then carefully drain oil into waste receptacle for later recycling.

**NOTE: If performing oil change only, go to step 40.**

18. [ ] Inset 2mm spoke through small hole in end of body eyelet, then push air valve and floating piston (piston not in all models) out open end of body.
19. [ ] Remove seal washer and seal from shaft.
20. [ ] Remove bushing carrier and bushing from shaft.

**NOTE: Remaining parts on piston assembly are unnecessary to remove, except to change, add, or subtract washers.**

## CLEANING AND INSPECTION

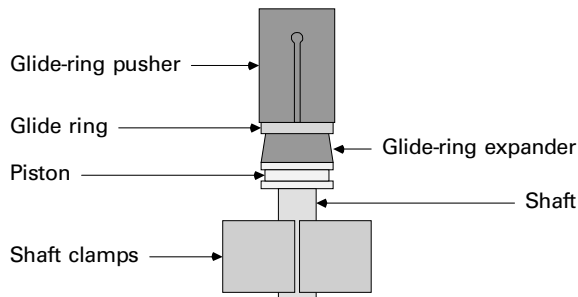
21. [ ] Clean all parts with mild detergent and water, then dry thoroughly with compressed air. **Avoid leaving solvents or lint from rags on, or in, any part!**
22. [ ] Inspect shaft for scratches or nicks that will compromise oil seal.
23. [ ] Inspect inside of threaded tube for nicks or scratches that will compromise oil seal.
24. [ ] Inspect glide ring on piston for nicks or scratches, and remove now if damaged.
25. [ ] Inspect bushing in bushing carrier for wear, and check for loose fit between bushing and shaft (use large end of bushing tool to drive bushing out of carrier if bushing is worn).

## 38 – SUSPENSION FORKS AND REAR SHOCKS

### ASSEMBLY

**NOTE:** If glide ring was not removed, go to step 30.

#### Glide-ring installation



38.22 Setup for glide-ring installation.

26. [ ] Place shaft (piston-end up) in shaft vise block, then clamp *very* securely in vise.
27. [ ] Install new glide ring onto piston.

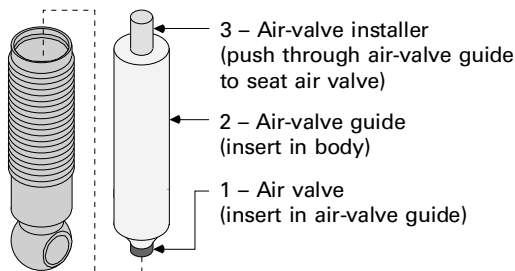
#### Bushing installation

**NOTE:** Go to step 30 if bushing was not removed from bushing carrier.

28. [ ] Place new bushing on small end of bushing tool.
29. [ ] Place bushing carrier on flat surface, position bushing and bushing tool over hole in bushing carrier, then use plastic mallet to drive in bushing.

#### Body assembly and preparation

30. [ ] Grease all O-rings and seals with light-weight, high-quality grease, then grease all seal-mounting points.
31. [ ] Insert lightly-greased air valve in recess in conical end of air-valve tool.
32. [ ] Place air-valve tool into shock body.
33. [ ] Insert rod into air-valve tool, then press on rod to install air valve (remove tools).



38.23 Setup for installing air valve.

**NOTE:** Models without floating piston, go to step 40.

34. [ ] Place O-ring on floating piston.

35. [ ] Insert inflation needle through end of body eyelet, then puncture air valve as close to center as possible.
36. [ ] Insert floating piston (cavity-side up) into body.
37. [ ] **Models with 1.25" travel only:** With fine marker, mark line on air valve installer 53.34–53.84mm from flat end of tool.  
**Models with 1.50" travel only:** With fine marker, mark line on air valve installer 58.17–58.67mm from flat end of tool.
38. [ ] Insert flat end of air-valve tool into shock body until line is even with end of shock body.
39. [ ] Remove needle from air valve.
40. [ ] Fill body with oil until top of oil is between 24.13mm and 24.64mm below top of body.
41. [ ] Let bubbles rise and dissipate from oil for at least 5 minutes.

#### Shaft-unit and seal installation

42. [ ] Install bushing carrier and bushing over end of shaft.

In the next step, a tool called a glide-ring sizer is installed over the glide ring and left in place for at least one minute. The glide-ring sizer is a cylinder that slips over the glide ring and compresses it. The material the glide ring is made of has “short-term memory.” This memory allows the material to remain shrunk for a short while once the glide-ring sizer is removed. This enables the glide ring to fit more easily into the shock body. Once there, the glide-ring expands to fit closely along the inside of the shock.

The tool kit includes a glide-ring sizer for this shock, and a different one for the Super Deluxe model. The correct glide-ring sizer will fit somewhat snugly over the glide ring.

43. [ ] Install glide-ring-sizer tool over glide ring, and leave together at least 1 minute.
44. [ ] Remove glide-ring sizer from shaft assembly, then immediately insert piston-end of shaft assembly slowly into body, until top of piston is just below surface of oil (oil will spill).
45. [ ] Let bubbles rise and dissipate from oil for at least 5 minutes.
46. [ ] Grease seal inside and out.

In the next step, a tool called a bullet is used. The bullet is called a bullet because it looks just like a bullet. It enables the seal to slide onto the shaft without the soft inner lip of the seal catching on the sharp edge at the top of the shaft. The tool kit includes a bullet for this shock, and a different version for the Super Deluxe model. The correct bullet will closely match the diameter of the shaft.

## 47. [ ] Place bullet on end of shaft.

When installing the seal in the body, a small amount of air will end up trapped in the seal cavity. This has no effect on a shock that does not have a floating piston, but introduces air to the wrong side of the piston for those shocks that do have a floating piston. This unwanted air can be prevented by filling the seal cavity with a lightweight grease.

## 48. [ ] Install seal (cavity-side first) over bullet and onto shaft, then remove bullet.

## 49. [ ] Press bushing carrier and seal into body, using seal-press tool.

## 50. [ ] Install seal washer, then install seal-retaining clip (face of clip with sharper edges should face out of body).

## 51. [ ] Install seal-cover washer onto shaft.

## 52. [ ] Install shaft wiper and seal cover onto shaft.

## 53. [ ] Seat seal cover onto end of body with seal press (tap lightly with plastic mallet).

## 54. [ ] Install needle on pump, then insert needle into air valve.

## 55. [ ] Wearing safety glasses, pressurize to 175psi, then remove pump.

## 56. [ ] Inspect for leaks at all seams and seals.

***Body eyelet bushing replacement***

## 57. [ ] Place new bushing on small-diameter end of bushing tool.

## 58. [ ] Supporting eyelet face on flat surface, place bushing-tool/bushing on top face of eyelet, then use plastic mallet to tap bushing into eyelet.

***Shaft eyelet installation***

## 59. [ ] Place shaft vise blocks around shaft, then firmly secure shaft vise blocks in vise.

## 60. [ ] Install bottom-out bumper and silver spring-stopper plate onto end of shaft.

## 61. [ ] Put one drop of Loctite 271 in threads inside shaft eyelet.

## 62. [ ] Thread shaft eyelet onto shaft.

## 63. [ ] Place rag over shaft eyelet flats to protect finish.

## 64. [ ] Secure large adjustable wrench to shaft eyelet flats, then secure to 100in-lbs (17lbs@6").

**SPRING AND SHOCK INSTALLATION**

## 1. [ ] Slide spring over body end of shock.

## 2. [ ] Thread spring-adjuster ring onto shock body.

## 3. [ ] Install shock on bike.

4. [ ] Turn red spring-adjuster ring to restore measurement recorded in **SHOCK AND SPRING REMOVAL** (step 1), unless this requires more than 8 full turns after spring compression begins.**EYELET-BUSHING REPLACEMENT**

## 1. [ ] Place flat face of eyelet on top of vise, with vise jaws open enough to permit eyelet bushing to clear.

## 2. [ ] Place large-diameter end of bushing tool against bushing, then tap on bushing tool with plastic mallet to drive out bushing.

## 3. [ ] Place new bushing on small-diameter end of bushing tool.

## 4. [ ] Supporting eyelet face on flat surface, place bushing-tool/bushing on top face of eyelet, then use plastic mallet to tap bushing into eyelet.

**TUNING OPTIONS*****Spring pre-load***

RockShox recommends compressing spring length by no more than 8 full turns of the spring-adjuster ring. Compressing the spring increases the resistance to compression and increases the speed of rebounding. If the 8-full-turn adjustment does not stiffen the spring adequately, or if the spring is too stiff at the lowest pre-load setting, consider using a different spring.

***Different springs***

RockShox makes springs rated from 500 to 800 lbs. Higher ratings mean the spring is stiffer. Stiffer springs resist compression more, and rebound more quickly.

***Air pressure and type of gas***

The recommended gas pressure is 175psi.

***Changing oil weight***

RockShox recommends 5w oil, but anything from 2.5w to 15w may be used. The heavier-weight the oil, the more damping will occur.

***Changing valving***

The shim washers on top of the piston controls the rate of compression damping. Increasing the stack of washers will increase damping rate, while reducing the stack will reduce damping rate.

## ROCKSHOX SUPER DELUXE REAR SHOCK

This shock is a air/oil shock with an external coil spring. It is available in several lengths of travel and with several different spring ratings. The service of all these variations is similar enough so that the following procedure applies to all of them.

Another model, the Deluxe, is significantly different. Instead of a shock body that gets substantially fatter at the end that is not inside the spring, the Deluxe body is a uniform diameter throughout. There is a section called **ROCKSHOX DELUXE REAR SHOCK** that should be used for servicing this type (page 38-60).

This procedure requires several tools that are included in the RockShox 70106 tool kit. The tool kit is designed for other models as well, so some tools in the kit will not be used in this procedure. In some cases, there may be two tools that are very similar except for slight differences in dimension. The individual tools are unmarked, so make sure that the tool you select seems dimensionally appropriate for the procedure being performed. On some versions, when the spring pre-load adjuster is loosened fully, there is enough slack to remove the spring keeper plate. On the shortest-travel model, however, an extra tool is needed to compress the spring further in order to remove the spring keeper plate.

## SHOCK AND SPRING REMOVAL

### Shock removal

The compressed spring length needs to be measured so that the customer's pre-load setting can be restored.

1. [ ] Measure length of spring between red adjuster ring and silver stop plate: \_\_\_\_\_ mm
2. [ ] Turn red adjuster ring fully away from spring.

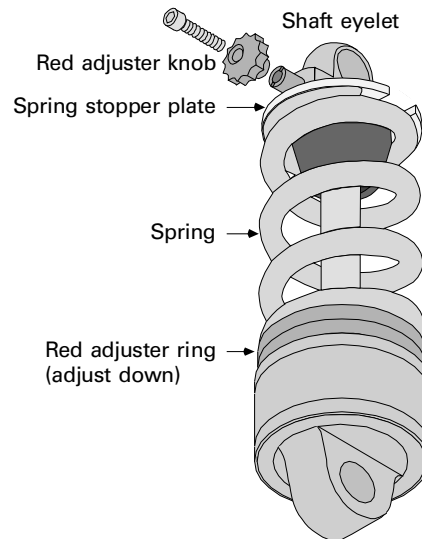
The shock unit may mount to the frame in a variety of ways, depending on the design of the frame. Usually, there will be a bolt and nut through the shock eyelets, or there will be a stud with retaining clips on each end.

3. [ ] Remove shafts that go through both shock eyes, then remove shock from bike.

### Spring removal

4. [ ] Turn red damper-adjusting knob fully counterclockwise, counting turns: \_\_\_\_\_.
5. [ ] Holding red damper-adjusting knob stationary, use 2mm Allen wrench to unthread bolt from center of knob, then remove knob.
6. [ ] Use thin slotted screwdriver to turn damper-adjusting shaft fully clockwise (so spring will clear when removed).

7. [ ] Use spring-compression tool to compress spring (if spring does not develop slop when red adjusting ring is fully loosened).
8. [ ] Slip silver spring stop plate off shaft.
9. [ ] Slide spring off shock unit.
10. [ ] Use thin slotted screwdriver to turn damper-adjusting shaft fully counterclockwise (so damping will be reduced to make piston removal easier).
11. [ ] Thread ring off of threaded tube, leaving it in space between shaft eyelet & threaded tube.



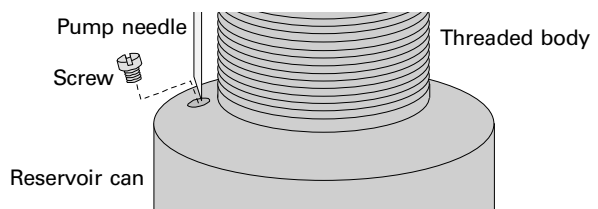
38.24 Spring removal on Super Deluxe shock.

## OIL CHANGE/SHOCK DISASSEMBLY

**NOTE: Perform complete SHOCK AND SPRING REMOVAL procedures before proceeding further.**

### Depressurization

The pump needle needs to be removed from the pump for depressurization. The needle has a sharp tip that punctures the air valve (the puncture self seals when the needle is removed). Goggles are needed because hydraulic fluid can spray out the end of the needle at high speed.



38.25 Wearing safety goggles, remove the screw and insert the pump needle through the air-valve rubber to depressurize the shock.

1. [ ] Remove needle from pump by unscrewing first brass fitting at base of needle.

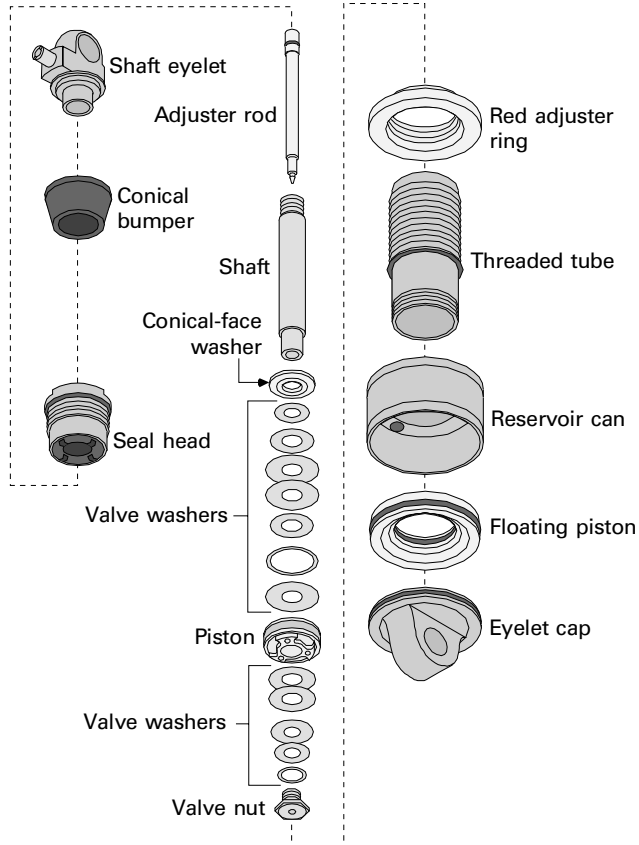


2. [ ] Unthread slotted screw fitting in face of reservoir (near base of threaded tube that red ring was threaded on).
3. [ ] Wearing safety goggles to prevent getting hydraulic fluid in your eyes, insert needle through hole brass screw came out of, to depressurize reservoir.
4. [ ] Remove needle.

### Shaft-assembly removal and oil draining

In the next step, and at several points throughout the remaining procedure, the shaft is placed in a pair of blocks with radius jaws that match the diameter of the shaft closely. The blocks are then placed in the vise, and the vise secured. The design of the shaft-clamping blocks ensures that the shaft will not be damaged by too much tightening of the vise, *but failure to tighten the vise enough will result in the shaft spinning in the vise clamping blocks, which could destroy the shaft!*

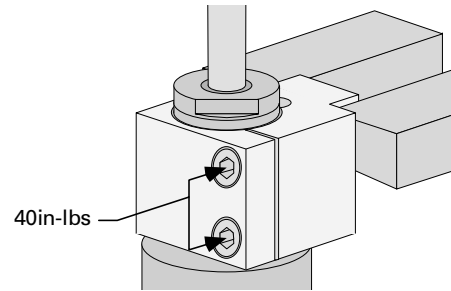
5. [ ] Grasp shaft securely in shaft-clamping blocks (in vise), eyelet end up.
6. [ ] Protect shaft eyelet flats with rag.
7. [ ] Grasp flats of eyelet securely in large adjustable-wrench jaws.
8. [ ] Turn wrench counterclockwise to unthread eyelet from shaft.
9. [ ] Remove conical bumper.



38.26 Blow-up of Super Deluxe shock.

10. [ ] Remove shaft from shaft-clamping blocks.
11. [ ] Thread red adjusting ring off threaded tube and slip adjusting ring off end of shaft.

In the next step, the threaded tube of the shock body is clamped in a special tool. Unlike the shaft-clamping tool, too much clamping force can cause damage. Too little clamping force can also cause damage. *It is strongly recommended to use a torque wrench!*



38.27 Clamp the threaded tube in the clamp, and the clamp into the vise.

12. [ ] Slide threaded-tube clamp over shaft and onto threaded tube, then secure bolts in clamp to 40in-lbs each. *Caution, too much or too little torque can destroy threaded tube!*
13. [ ] Secure tab of threaded-tube clamp in vise so that shaft points up.
14. [ ] Hand-thread shaft eyelet onto shaft.
15. [ ] Using 22mm open-end wrench (or well-snugged adjustable wrench), unthread seal-head (cap at end of threaded tube that has two wrench flats).
16. [ ] Once seal-head is unthreaded, insert non-metallic shaft through shaft eyelet, to pull shaft/seal-head assembly out of threaded tube.
17. [ ] Remove shaft eyelet from shaft.

### Reservoir/body disassembly

18. [ ] Remove threaded-tube clamp from vise, then carefully drain oil into waste receptacle for later recycling.
- NOTE: If performing oil change only, go to step 71.**
19. [ ] Turn tube-clamp over so reservoir can is on top, insert clamp in side of vise jaws, then secure vise.
  20. [ ] Place rag over flats of body eyelet to protect finish.
  21. [ ] Grasp flats of body eyelet snugly in large adjustable-wrench jaws, then turn wrench counterclockwise to unthread eyelet cap from threaded tube.
  22. [ ] *If can came off with can lid:* Hold reservoir can in one hand, then pull eyelet from end of can (pressure of O-ring keeps parts together).

## 38 – SUSPENSION FORKS AND REAR SHOCKS

23. [ ] *If can stayed on threaded tube:* Pull reservoir can carefully off threaded tube, being careful not do damage O-rings as they pull past threads on end of tube.
24. [ ] Pull the floating piston out the large-diameter end of the reservoir can.
25. [ ] Remove O-rings from inside and outside edges of floating piston.
26. [ ] Remove O-ring from edge of eyelet cap.
27. [ ] Remove O-ring from threaded tube.

### ***Piston/valve disassembly***

The disassembly procedure from this point forward assumes you have access to all seals, O-rings, and a replacement seal-head. It is not recommended to go further without the necessary parts on hand. It is also recommended to replace the seal-head, all the seals, and all the O-rings, each time a service is performed.

28. [ ] Slide seal head up against piston. Put shaft-clamping blocks around shaft, and secure clamping blocks in vise with high force; *it is critical that the shaft not spin in the clamping blocks in the next step!*
29. [ ] Use 10mm box wrench (or socket), to unthread nut on end of shaft.

In the next steps, a series of different washers (that were sandwiched between the just-removed bolt and the piston) need to be removed. The number and dimensions of the washers will vary, because these factors are what enable customization of the damping rate. There are several washers that are nearly identical. Critical variations might be as slight as .05mm. If unable to measure dimensions this precise (or if no valving changes will be made), carefully transfer the washers to a bundling tie, maintaining the order and orientation of the washers as they are removed. Keep them bundled together from the time of removal until the time of installation. There is a similar bundle of washers on the other side of the piston. It is critical to not confuse the two sets of washers.

30. [ ] Remove washers one at a time from above piston, measuring O.D. (outside diameter), thickness, and I.D. (inside diameter) of each washer as it comes off:

O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____

31. [ ] Remove piston only, noting which side faces up (if not symmetrical).

In the next steps, a different series of washers (below the piston location) need to be removed. The number and dimensions of the washers will vary, because these factors are what enable customization of the damping rate. There are several washers that are nearly identical. Critical variations might be as slight as .05mm. If unable to measure dimensions this precise (or if no valving changes will be made), carefully transfer the washers to a bundling tie, maintaining the order and orientation of the washers as they are removed. Keep them bundled together from the time of removal until the time of installation.

32. [ ] Remove washers and shims one at a time from below piston, measuring O.D., thickness, and I.D. of each washer as it comes off:

O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____
O.D. _____	Thickness _____	I.D. _____

33. [ ] Remove aluminum base-plate washer, noting which side faces up (if not symmetrical).
34. [ ] Inspect glide ring for nicks or scratches, and if damaged, remove glide-ring from outer perimeter of piston.

### ***Damping-adjuster-rod removal***

35. [ ] Push adjuster rod out end of shaft where eyelet was removed.
36. [ ] Remove O-ring from adjuster rod.

### ***Seal-head removal and disassembly***

Some early versions of RockShox service literature described disassembling the seal head. This is likely to damage the seal head, and is no longer recommended. If the bumper plate and washer (below the bumper plate) come out accidentally, it is not a problem. Removing the seal from the open end of the seal-head is when damage will occur.

37. [ ] Pull seal-head off end of shaft.
38. [ ] Note orientation of bumper plate, so that it can be reinstalled if it accidentally falls out.

**NOTE:** *If oil has been leaking from seal between seal head and shaft, RockShox requires replacing seal-head as a unit. Do not attempt further disassembly of seal-head.*

### CLEANING AND INSPECTION

39. [ ] Clean all parts with mild detergent and water, then dry thoroughly with compressed air. *Avoid leaving solvents or lint from rags on, or in, any part!*
40. [ ] Inspect shaft for scratches or nicks that will compromise oil seal.
41. [ ] Inspect inside and outside of threaded tube for nicks or scratches that will compromise oil or gas seal.
42. [ ] Inspect inside of reservoir can for nicks or scratches that will compromise gas seal.
43. [ ] If no gas hissed out of needle during depressurization step, air seal is bad; pry air seal out of can, grease new air seal, then push air seal back into can (until flush).

### ASSEMBLY

#### *Damping-adjuster-rod assembly*

44. [ ] Grease small O-ring, then install O-ring on adjuster rod.
45. [ ] Push adjuster rod into end of shaft where eyelet was removed.
46. [ ] Grasp shaft in shaft-clamping blocks in vise very securely (full-diameter end up).
47. [ ] Make sure red adjusting rod is threaded fully counterclockwise, then thread eyelet onto shaft.
48. [ ] Protect eyelet flats with rag.
49. [ ] Grasp eyelet flats snugly with adjustable wrench, then secure eyelet to shaft to 100in-lbs (17lbs@6").

#### *Seal-head assembly*

**NOTE:** Steps 51–52 are only required if bumper and bumper washer have accidentally come out of seal-head

50. [ ] Place seal-head assembly (flange-side down) on flat surface.
51. [ ] Install bumper washer into seal-head.
52. [ ] Install bumper (flat-face first) into seal-head.

#### *Shaft-unit assembly*

53. [ ] Place conical bumper on shaft (large-diameter end first) and fit onto eyelet, then clamp flats of shaft eyelet securely in soft jaws in vise (shaft pointing up).

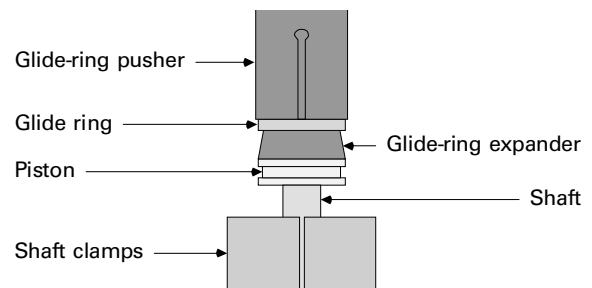
In the next step, a tool called a bullet is used. The bullet is called a bullet because it looks just like a bullet. It enables the seal to slide onto the shaft without the soft inner lip of the seal catching on the sharp edge at the top of the shaft. The tool kit includes a

bullet for this shock, and a different version for the Deluxe model. The correct bullet will closely match the diameter of the shaft.

54. [ ] Place shaft bullet on top of small-diameter end of shaft, then coat bullet & shaft with grease.
55. [ ] Place seal-head (flange-end first) over top of bullet.
56. [ ] Push seal-head assembly fully onto shaft.
57. [ ] Remove bullet from shaft.
58. [ ] Clean grease from outside and inside of shaft.
59. [ ] Install aluminum base-plate washer (conical-face, if any, up) on shaft.
60. [ ] Install washers listed in step 32 on shaft, in reverse order of list.
61. [ ] Install piston, 3-leg-protrusion face up.
62. [ ] Install washers listed in step 30 on shaft, in reverse order of list.
63. [ ] Treat shaft-bolt threads with one small drop of Loctite 242.
64. [ ] Thread shaft bolt into end of shaft, taking care to align shim washers so that shaft bolt inserts through all washers above piston.
65. [ ] Secure shaft bolt with 10mm box-end wrench or socket to 60in-lbs (20lbs@3").

**NOTE:** If glide ring was not removed, go to step 88.

#### *Glide-ring installation*



38.28 Installing the glide ring.

66. [ ] Place glide-ring expander on top of piston.
67. [ ] Install new glide ring onto tapered end of glide-ring expander.
68. [ ] Place large-I.D. end of glide-ring pusher over glide ring, then push glide ring down until glide ring snaps into groove in piston.
69. [ ] Remove glide-ring expander & glide-ring pusher.
70. [ ] Slide seal-head fully away from piston.
71. [ ] Pack top-out-bumper-end of seal head with light-weight grease to eliminate air pockets.

**NOTE:** If performing oil-change only, go to step 87.

In the next step, a tool called a glide-ring sizer is installed over the glide ring, then left in place for at least one minute. The glide-ring sizer is a cylinder that slips over the glide ring and compresses it. The material the glide ring is made of has “short-term memory.” This memory allows the material to remain shrunk

## 38 – SUSPENSION FORKS AND REAR SHOCKS

for a short while, once the glide-ring sizer is removed. This enables the glide ring to fit more easily into the shock body. Once there, the glide-ring expands to fit closely along the inside of the shock.

The tool kit includes a glide-ring sizer for this shock, and a different one for the Deluxe model. The correct glide-ring sizer will fit somewhat snugly over the glide ring.

72. [ ] Place large-I.D. end of glide-ring sizer over glide ring fully, then leave in place until ready to install shaft into shock body.

73. [ ] Remove shaft assembly from vise.

### ***Reservoir/body assembly***

74. [ ] Grease all O-rings with light-weight, high-quality grease, then grease all seal-mounting points.

75. [ ] Carefully slide O-ring over end of threaded tube, then seat seal in groove.

76. [ ] Install O-rings in inside and outside edges of floating piston that fits inside reservoir can.

77. [ ] Install O-ring in outer perimeter of eyelet cap cap.

78. [ ] Clamp flat tab of threaded-tube clamping tool in end of vise, so that short-threaded end of tube points up.

79. [ ] Slide small-I.D. end of reservoir can over end of threaded tube, until can is seated against shoulder on threaded tube.

80. [ ] Slide floating piston (cavity-side first, conical-face up) carefully over end of threaded tube, just until it clears threads on threaded tube.

81. [ ] Clean grease off tube threads.

82. [ ] Apply drop of Loctite 271 to tube threads.

83. [ ] Thread body-eyelet cap onto tube.

84. [ ] Place rag over body-eyelet-cap flats to protect finish.

85. [ ] Grasp flats securely with large adjustable wrench, then secure to 100–120in-lbs (17–20lbs@6").

86. [ ] Loosen bolts and remove body from threaded-tube clamp. Remove clamp from vise.

### ***Oil filling and final assembly***

87. [ ] Grasp flats of body eyelet in soft saws in vise.

88. [ ] Insert pump needle into air valve, then pressurize to 50psi (floating piston may seat with a "pop").

89. [ ] Thread red adjusting ring (flatter-face first) onto threaded tube.

90. [ ] Pour 5wt oil into threaded tube until oil level reaches bottom of threads inside threaded tube.

91. [ ] Let bubbles rise and dissipate from oil for at least 5 minutes.

92. [ ] Using thin slotted screwdriver, turn damping adjuster rod fully counterclockwise.

93. [ ] Remove glide-ring sizer from shaft assembly, then immediately insert piston-end of shaft assembly slowly into threaded tube, until top of piston is at least 1/2" below top of threaded tube (oil will spill). Stop before seal head reaches threaded tube.

94. [ ] Let bubbles rise and dissipate from oil for at least 5 minutes.

95. [ ] Holding piston/shaft assembly stationary, push seal-head down shaft and engage seal-head in threads of threaded tube (oil will spill).

96. [ ] Thread seal-head fully into threaded tube (oil will spill), then secure to 100–120in-lbs (17–20lbs@6").

97. [ ] Clean assembly of all excess oil.

98. [ ] Thread red adjuster ring off of threaded tube.

99. [ ] Insert needle in air valve and pressurize to 225psi (nitrogen preferred, air is acceptable).

100. [ ] Inspect for leaks at all seams and seals.

## SPRING AND SHOCK INSTALLATION

1. [ ] Thread red adjusting ring back onto threaded tube, then thread fully-down.

2. [ ] Turn red damper-adjusting shaft fully clockwise with thin slotted screwdriver.

3. [ ] Slide spring over shaft-end of shock.

4. [ ] Compress spring (if necessary) with spring-compression tool, then install silver spring keeper plate (recessed side facing towards eyelet) onto shaft.

5. [ ] Apply Loctite 222 to Allen bolt that retains damper-adjusting knob.

6. [ ] Attach damper-adjusting knob to damper-adjusting shaft, and secure by threading in adjusting-knob retaining bolt.

7. [ ] Turn damper-adjusting knob fully counterclockwise.

8. [ ] Turn damper-adjusting knob in, number of returns recorded in SHOCK AND SPRING REMOVAL (step 4).

9. [ ] Install shock on bike.

10. [ ] Turn red spring adjusting ring out to restore measurement recorded in SHOCK AND SPRING REMOVAL (step 1), unless this requires more than 8 full turns.

## EYELET-BUSHING REPLACEMENT

1. [ ] Place flat face of body eyelet or shaft eyelet on top of vise, with vise jaws open enough to permit shaft eyelet bushing to clear.

2. [ ] Use large-diameter end of bushing tool to drive bushing out of eyelet.

3. [ ] Place new bushing on small-diameter end of bushing tool.
4. [ ] Supporting eyelet face on flat surface, place bushing-tool/bushing on top face of eyelet, then use plastic mallet to tap bushing into eyelet.

## TUNING OPTIONS

### *Spring pre-load*

RockShox recommends compressing spring length by no more than 8 full turns of the spring-adjuster ring. Compressing the spring increases the resistance to compression and increases the speed of rebounding. If the 8-full-turn adjustment does not stiffen the spring adequately, or if the spring is too stiff at the lowest pre-load setting, consider using a different spring.

### *Different springs*

RockShox makes springs rated from 500 to 800 lbs. Higher ratings mean the spring is stiffer. Stiffer springs resist compression more, and rebound more quickly.

### *Gas pressure and type of gas*

The recommended gas pressure is 225psi. Nitrogen is recommended, but regular air can be used with only a small performance loss.

### *Changing damper setting*

The damper adjustment affects compression and rebound damping. Turning the damper-adjusting knob clockwise increases damping while turning the adjuster knob counterclockwise reduces damping. Increased damping slows the rate of compression or rebound.

### *Changing oil weight*

RockShox recommends 5w oil, but anything from 2.5w to 8w may be used. The heavier-weight the oil, the more damping will occur.

### *Changing valving*

The shim washers on either side of the piston controls the rate of damping. The washers between the shaft nut and piston control the rebound damping rate; the washers between the piston and the conical washer control the compression damping. Increasing a stack of washers will increase damping rate and reducing the stack will reduce damping rate.

## *RST '98 MOZO FORKS*

### ABOUT THIS SECTION

This supplement covers full service of 1998 RST Mozo XL, Mozo Pro, and Mozo Comp forks, including bushing replacement.

### TOOL CHOICES

RST provides a bushing remover and installer (Hot Karl tool) for remove bushings from the models that have pressed-in bushings.

### FULL FORK SERVICE

#### *Disassembly*

1. [ ] Remove front wheel and front brake.
  2. [ ] Remove slider brace from both sliders.
  3. [ ] Turn pre-load adjusters on stanchion caps fully counterclockwise, noting number of turns: \_\_\_\_\_
  4. [ ] Loosen stanchion clamp bolts slightly.
  5. [ ] With fingers, unthread stanchion-cap/spring-assemblies from stanchion tubes.
  6. [ ] Compress sliders completely.
- NOTE: Only the Mozo XL and Pro have air dampers in the stanchions. In all the following steps, models with no air-damper have a simple plunger shaft instead of a damper shaft with an air valve. For these models, substitute the word "plunger" for "damper," and ignore all references to the air valve.*
7. [ ] Insert 8mm Allen bit socket on 6" extension into 8mm fitting in top of damper shaft (inside stanchion).
  8. [ ] Holding extension stationary with ratchet wrench, use 4mm Allen wrench to unthread bolt at bottom of each slider.
  9. [ ] Pull sliders off bottom of stanchions.
  10. [ ] Pull bottom-out bumpers from damper shafts that extend from bottoms of stanchions.
  11. [ ] Remove internal snap-rings from bottom of stanchions.
  12. [ ] Pull firmly on damper shafts to remove from stanchions.
  13. [ ] Pull damper-shaft guides, then top-out bumpers from damper shafts.
  14. [ ] Insert 8mm Allen in fitting in head of damper shaft(s) to hold shaft while unthreading air-valve nut.
  15. [ ] Remove air valves from damper shafts.
  16. [ ] Inspect all O-rings for nicks and tears, and replace if damaged.

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*NOTE: The remaining disassembly steps should only be performed if replacing the bushings. If not replacing bushings, skip to step 29.*

17. [ ] Carefully pry dust wipers from top of sliders.

*NOTE: On the Mozo XL model, the bushings retained by a circlip) are not a press fit, and can be pulled out with a hooked seal pick or bent spoke, and inserted by hand. Use this hand technique for removal and installation, then skip to step 29.*

18. [ ] Unthread double-flatted plate from shaft of Hot Karl bushing remover, and drop plate into slider. It should pass through bushings and rest flat on top of spool spacer.

19. [ ] Unthread nut from tool shaft, then insert non-flatted end of shaft into slider and engage into threads of double-flatted plate. Make sure shaft is engaged with plate with threads to spare.

20. [ ] Slide large washer over tool shaft, then thread nut on until double-flatted plate snugs up against bottom of lower bushing.

21. [ ] Hold flats of tool shaft in soft jaws of vise. Tighten nut against washer while holding slider from rotating. After one inch of tightening against resistance, lower bushing will become loose, then several more inches of effortless tightening will be needed before tool begins to pull upper bushing out.

22. [ ] Remove tool, remove bushings from tool, then remove spool spacer from bottom of slider.

*NOTE: Repeat steps 18–22 for other slider.*

### **Assembly**

23. [ ] Put spool spacers (cavity-end up) into bottom of each slider.

24. [ ] Place smaller-diameter bushing on fat end of Hot Karl bushing installer, and insert tool and bushing into slider.

25. [ ] Tap on tool with plastic mallet until line in middle of sticker on tool is even with top of slider. Repeat for other slider.

26. [ ] Place larger-diameter bushing over small-diameter end of Hot Karl bushing installer until it seats against fattest part of tool, then insert tool into slider until tool passes through lower bushing.

27. [ ] Tap on tool with plastic mallet until top of bushing is even with shoulder that is approximately 10mm down from top of slider. Repeat for other slider.

28. [ ] Press dust wipers into tops of stanchions.

29. [ ] Clean and dry all parts, making sure they end up lint and solvent free.

30. [ ] Grease threads on damper-shaft heads.

31. [ ] Grease O-rings on air valves, then slide air valves onto damper shafts so that face with large slots faces away from shaft-head. (Reversing orientation of valve will decrease rebound damping and increase compression damping).

32. [ ] Hold damper shaft with 8mm Allen, then secure valve nut on shaft. Repeat for other side.

33. [ ] Grease top-out bumpers (shorter ones), and slide onto damper shafts flat-face first.

34. [ ] Grease shaft guides and slide onto damper shafts cavity-face first.

35. [ ] Insert air-damper assemblies into stanchions head-ends first.

36. [ ] Install internal snap-rings into bottom ends of stanchions.

37. [ ] Grease and install bottom-out bumper onto damper shafts, round-ends first.

38. [ ] Place sliders onto thoroughly-greased stanchions, and engage boots to dust wipers. Compress sliders fully.

39. [ ] Treat slider-securing bolts with Loctite 242.

40. [ ] Use 8mm Allen bit socket on ratchet with extension to hold damper shaft(s) from turning, then install slider-securing bolt(s) in bottom of slider(s) to 40in-lbs.

41. [ ] Grease spring assemblies (steel coil and elastomer stacks) that are attached to stanchion caps.

42. [ ] Install stanchion-cap/spring-assemblies fully into stanchions, then secure with fingers.

43. [ ] Pull down on stanchions until stanchion-cap flanges are against fork crown.

44. [ ] Secure stanchion-clamp bolts to 80in-lbs.

45. [ ] Check that fork-column-clamp bolts are secured to 80in-lbs.

46. [ ] Treat slider-brace-bolt threads and brake-pivot-stud threads with Loctite 242.

47. [ ] Install slider brace, then secure slider-brace bolts to 90in-lbs and brake pivot studs to 115in-lbs.

48. [ ] Install front wheel and attach front brake.

# WHITE BROTHERS FORKS

## ABOUT THIS SECTION

This section specifically covers the '97-'99 White Brothers SC70, SC90, DC90, DC110 and DC118 models, but can be used as a general guideline for servicing other models.

## TOOLS

White Brothers sells a tool kit (#97-713) for bushing replacement and cartridge overhaul. The tools are also available separately. The kit includes:

Cartridge Drift	97-707
Cartridge Bleed Tool	97-708
Cartridge Holder	97-700
Cartridge Bush & Seal Driver	97-709
Cartridge Upper Seal R&R Tool	97-710
Fork Bushing Install Tool	97-711
Fork Bushing Removal Tool	97-712

In the following procedure, the Cartridge Drift is called the “small drift,” the Cartridge Bush & Seal Driver is called the “medium drift,” and the Cartridge Upper Seal R&R Tool is called the “large drift.” Each of these tools is a cylinder with several steps in diameter. They also vary in length. The small drift is the short, skinny cylinder. The medium drift is the short, fat cylinder. The large drift is the long cylinder.

The Fork Bushing Removal Tool has a ring that is free to slide up and down the shaft of the tool (when a setscrew in its side is loosened). This ring is called the “depth ring” in the following procedure.

## FULL FORK SERVICE

### *Slider removal*

1. [ ] Remove brakes and front wheel.
2. [ ] Loosen bolts at bottoms of stanchions two full turns.
3. [ ] Tap on loosened bolts with plastic mallet until heads contact bottoms of sliders, then complete bolt removal.
4. [ ] Remove slider assembly.
5. [ ] Remove bolts from both ends of slider brace.

### *Top-cap and spring removal*

6. [ ] Turn pre-load adjusters fully counterclockwise, counting number of turns and record here: right: \_\_\_\_\_ left: \_\_\_\_\_
7. [ ] Unthread top caps.
8. [ ] *SC70 only:* Remove plastic spacers and spring caps from tops of springs.

9. [ ] Remove springs from tops of stanchions.

### *Neutral-shaft and cartridge removal*

10. [ ] Remove conical bumpers from shafts.
11. [ ] Unthread cartridge from bottom of left stanchion.
12. [ ] Turn stanchions upside down and remove neutral shaft.
13. [ ] Remove top caps from damper shaft and neutral shaft.
14. [ ] Remove top-out bumper from bottom end of neutral shaft.

### *Seal and bushing removal*

15. [ ] Remove circular coil spring from lips of seals.
16. [ ] Insert screwdriver into each seal, catching tip under bottom edge of seal, then pry out seal.
17. [ ] Remove foam ring(s).
18. [ ] Turn right stanchion over and shake out bottom-out spacer (large plastic spool).

Bushings should be cleaned and inspected before removal. The appearance of brass flecks or solid-metallic areas on the surfaces of the bushings indicates need for bushing replacement. Do not remove bushings unless intending to replace them.

19. [ ] Assemble Bushing Removal Tool parts in following sequence onto threaded shaft:  
Flat washer (conical-face first)  
Rectangular plate (flat-face first)  
Expander mechanism (large-end first)
20. [ ] Secure 1/3 of rectangular plate in vise so it sticks out end of vise and rest of tool hangs down past edge of bench.
21. [ ] Push slider onto bottom of tool until expander is heard or felt to snap clear of first bushing.
22. [ ] While holding onto slider, tighten tool shaft continuously until slider is free.
23. [ ] Remove expander and bushing from bottom of tool shaft and repeat bushing removal for lower bushing, then both in other slider.

### *Cartridge overhaul*

24. [ ] Place Cartridge Holder in vise, then place cartridge in Holder so end of shaft with flats points up, but do not secure vise.
25. [ ] Remove circlip (older models) or snap-ring (newer models) from top end of cartridge body, then turn cartridge body over in Cartridge Holder.
26. [ ] Position Cartridge Holder so split end of tool is half way into vise jaws.
27. [ ] Position cartridge in Holder so bottom of body is flush with bottom of Holder, then secure vise.
28. [ ] Place receptacle for waste oil below cartridge.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

29. [ ] Place small end of Cartridge Drift (small drift) in top of shaft, then slowly tap on tool to drive parts out bottom of cartridge. Be prepared to catch cartridge shaft.
30. [ ] Place small end of Cartridge Upper Seal R&R Tool (large drift) on top of cartridge, then carefully tap parts out bottom end of cartridge. Be prepared to catch parts.
31. [ ] Use 2mm Allen wrench to unthread adjuster rod off end of cartridge shaft, then remove O-ring from needle end of adjuster rod.
32. [ ] Remove plastic washers and seal from cartridge shaft.
33. [ ] Remove split ring from shaft piston.

### ***Cleaning and inspection***

34. [ ] Clean all parts with mild detergent and dry with lint-free rag and/or compressed air.
35. [ ] Inspect stanchion tubes for heavy wear marks or scratches.
36. [ ] Inspect lips of slider-tube seals for tears.
37. [ ] Inspect cartridge shaft for heavy wear marks or scratches.
38. [ ] Inspect inside cartridge body for heavy wear marks or scratches.
39. [ ] Inspect cartridge-seal lips for nicks or tears.

### ***Cartridge assembly***

40. [ ] With Cartridge Holder loosely supported in vise, install cartridge body in vise so end with circlip/snap-ring is down.
41. [ ] Place Delrin conical-face washer into cartridge body (conical-face first), then drive it to bottom of cartridge body with large end of large drift.
42. [ ] Grease cartridge seal and install (cupped-face up) into cartridge body, then seat fully with large end of large drift.
43. [ ] Place 2mm flat Delrin washer into cartridge body, then seat fully with large end of large drift.
44. [ ] Remove cartridge body from Holder, insert small end of small drift into seal until large end of drift is flush with conical washer, then put cartridge body (closed-end down) back into Holder.
45. [ ] Put split ring into groove in piston, then place shaft (round-end down) carefully on top of drift.
46. [ ] Fill cartridge body with 2.5wt oil to 1/2" from top of body.
47. [ ] Carefully push shaft down fully into cartridge body, making sure split ring does not catch on top edge of cartridge body. Small drift will fall to floor.
48. [ ] Thread Bleed Tool into top end of shaft, then pump shaft 1/2" up and down repeatedly.

49. [ ] Remove Bleed Tool, then fill cartridge body to top with additional oil. Let sit five minutes or until bubbles are gone.
50. [ ] Fill pocket in seal with light grease and grease outer perimeter of seal.
51. [ ] Place 8mm Delrin washer onto shaft, then use long end of Cartridge Bush & Seal Driver (medium drift) to seat washer to 12mm depth.
52. [ ] Place seal (cupped-side first) onto shaft and use short end of medium drift to seat seal to 5mm depth.
53. [ ] Place conical washer (flat-face first) into cartridge body, then install circlip/snap-ring.
54. [ ] Insert shaft end of bleed tool fully into cartridge shaft to purge shaft of excess oil.
55. [ ] Install new O-ring over pointed end of adjuster rod.
56. [ ] Thread adjuster rod into cartridge shaft until it bottoms. Stock settings from this point are:

SC70	2 turns out
SC90 & DC90	3 turns out
DC110 & DC118	4 turns out
57. [ ] Wipe excess oil off cartridge.

### ***Bushing installation***

58. [ ] Secure dropout of slider into vise with RockShox dropout vise blocks, or other method that will not mar dropout.
59. [ ] Loosen set screw on depth ring of Bushing Install tool, then position and secure ring with setscrew in upper dimple in tool shaft.
60. [ ] Place bushing on bottom end of tool and insert tool into slider, then tap on top of tool until depth ring contacts top of slider.
61. [ ] Remove tool and repeat for other slider.
62. [ ] Remove tool and set depth ring with setscrew in lower dimple on tool shaft, then repeat procedure for both upper bushings.

### ***Cartridge and neutral-shaft installation***

63. [ ] Place plastic conical caps on top ends of cartridge shaft and neutral shaft.
64. [ ] Thread cartridge body into bottom end of left stanchion and secure.
65. [ ] Slide smallest conical bumper (conical-end first) onto bottom end of neutral shaft, then insert neutral shaft into top end of right stanchion.
66. [ ] Pull damper and neutral shafts fully down, then place larger conical bumpers (conical-ends first) onto shafts.

### ***Spring and top-cap installation***

67. [ ] Grease springs and install into stanchions.
68. [ ] *SC70 only:* Insert discs into stanchions, then insert plastic sleeves.
69. [ ] Thread in top caps fully, then turn pre-load adjusters fully clockwise.



### ***Slider installation***

70. [ ] Drop bottom-out spacer (large plastic spool) into right slider.
71. [ ] Place round coil springs over lips of seals.
72. [ ] Grease seals thoroughly (use non-lithium grease) and place onto stanchions (lip-face first), making sure lips do not fold in.
73. [ ] Grease foam rings and place onto stanchions.
74. [ ] Thoroughly grease bushings (non-lithium grease).
75. [ ] Carefully guide right slider onto right stanchion, then carefully guide left slider onto left stanchion.
76. [ ] Attach slider brace to sliders.
77. [ ] Prep slider-brace bolts (anti-seize if bolts are titanium), then secure bolts to 50in-lbs.
78. [ ] Treat bottom bolts with Loctite 242, then insert into holes in bottoms of sliders (hollow bolt, if any, in left) and thread into bottoms of shafts. *Note, it may be necessary to use small hooked tool such as head of spoke to align shafts with holes!*
79. [ ] Compress fork fully, then secure bolts to 60in-lbs. *Note: If bolts will not secure, remove top cap and spring on side not being secured, compress again and secure side with spring.*
80. [ ] Slide foam rings down into tops of sliders.
81. [ ] Slide seals down into tops of sliders and seat seals fully.
82. [ ] Install adjuster knob, if any, in bottom of right-side slider.
83. [ ] Turn pre-load adjusters fully counterclockwise, then clockwise number of turns recorded in step 6.

## 38 – SUSPENSION FORKS AND REAR SHOCKS

### ***TUNING DATA REPORT***

The following information should be recorded whenever servicing a suspension unit for a customer. All of the information does not apply in every case. The information is recorded during performance of service procedures, but does not occur at uniform points in each procedure, so no step numbers are provided for where the information can be found.

Original damper setting: \_\_\_\_\_ #/turns

Current damper setting: \_\_\_\_\_ #/turns

Original air pressure: \_\_\_\_\_ psi

Current air pressure: \_\_\_\_\_ psi

Original oil level: \_\_\_\_\_ mm

Current oil level: \_\_\_\_\_ mm

Approximate weight of original suspension oil:

2.5w, 5w, 7.5w, 10w, 15w, 20w,

other: \_\_\_\_\_

Brand and weight of current suspension oil:

\_\_\_\_\_

Valving changes:

Spring pre-load YES NO Amt: \_\_\_\_\_ mm

Compression reed-valve washers:  
added/subtracted number? \_\_\_\_\_

thickness change? \_\_\_\_\_

Rebound reed-valve washers:

added/subtracted number? \_\_\_\_\_

thickness change? \_\_\_\_\_

Travel added YES NO Amount: \_\_\_\_\_ mm

Original spring pre-load setting: \_\_\_\_\_ #/turns

Current spring pre-load setting: \_\_\_\_\_ #/turns

Original elastomers and/or coil-spring rate:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Current elastomers and/or coil-spring rate:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_