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#GEN - 11/14/2002

GENERAL SHOCK MOUNTING AND ADJUSTMENT TIPS

Thank you for choosing works Performance shock absorbers. These simple instructions and helpful installation tips will enable you to enjoy maximum performance for years to come.

GENERAL INFORMATION

Works Performance shocks are made in two basic types-- with reservoirs or without. Shocks without reservoirs are gas emulsion shocks and should be mounted with the body up in order to function properly. Gas shocks with either integral or hose mounted reservoirs are generally installed body up to lessen the unsprung weight but will operate perfectly in any position.

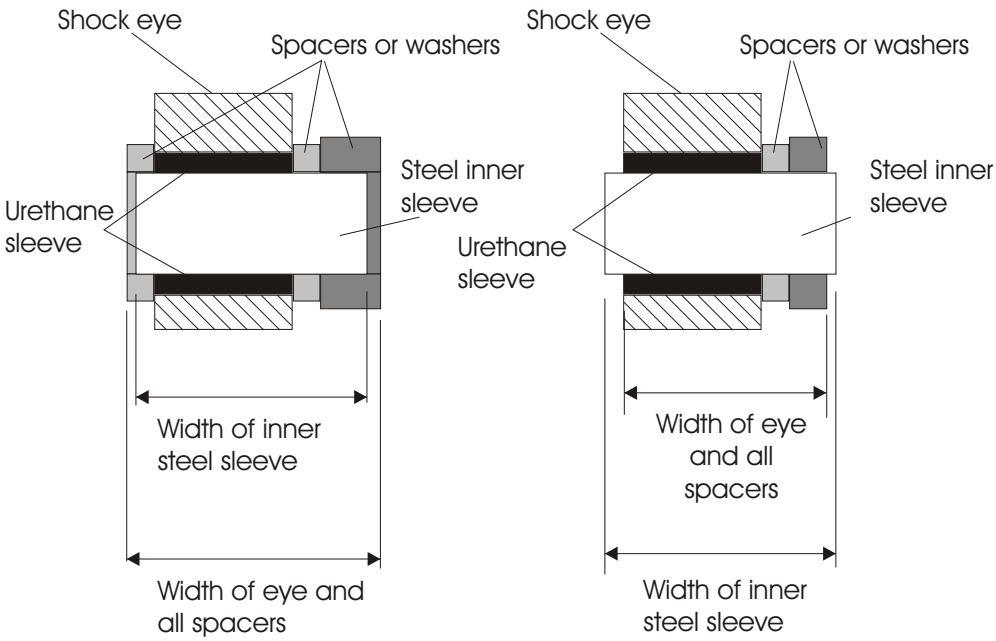
WARNING! THESE SHOCKS ARE NITROGEN PRESSURIZED UP TO 250 PSI! THE FILL VALVE IS NOT USER SERVICEABLE. POINT VALVE AWAY FROM FACE AND DEPRESSURIZE BEFORE DISASSEMBLING.

CAUTION: These shocks are pressurized to 250 psi nitrogen. This pressure is not an adjustable feature of the shock. Unless there is a leak, the shock should not normally lose pressure. If the shock damping becomes soft or mushy (after an extended period of time or number of miles) the shock may need to be serviced, which includes shock oil and a nitrogen charge. In this situation, re-pressurizing the shock alone may not improve the action of the shock. The shock should be returned to Works Performance Products, Inc., or to a qualified shop that has the appropriate tools, training and nitrogen handling equipment.

MOUNTING

Ninety-nine percent of our shocks will bolt right on without requiring any modifications. However, since motorcycles vary greatly, it is imperative that you examine your particular motorcycle for any interference with the shocks throughout the suspension movement. Please note that generally, the shocks will gain clearance between the frame and swingarm on the pivot side and lose clearance on the rear fender side as the suspension compresses. Refer to the illustrations on the following pages as a guide to proper mounting.

Pay particular attention to the area behind the top shock mount. Specifically: the frame, side panels, exhaust pipes, brake caliper, helmet lock, chain guide, etc. It may be necessary to grind a small amount of metal from frame



CAUTION: When installing shocks on custom vehicles, do not allow the total thickness of the spacers and washers to exceed the width of the inner steel sleeve. There must be clearance between the eye/spacer “sandwich” to allow the shock eye to rotate and move freely. Conversely, do not reduce this clearance by grinding the inner sleeve to narrow the mounting set.

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gussets, trim side panels or possibly turn the shock body around to point the nitrogen fill valve in the opposite direction .

Some shocks use flanged mounting bushings to keep them from sliding off the mounting studs. In other cases, a washer may be provided to fit opposite the flange to positively locate the shocks in both directions. In any case, you should never be able to see the urethane bushing over an outside retaining washer. Should your shocks be equipped with spherical ("Heim") bearings, it is unnecessary to tighten the bolts any more than 15 foot pounds of torque. Use Loctite or other thread locking compounds and/or self locking nuts.

When installing remote reservoirs, use rubber blocks between the frame and the reservoirs. Position the reservoirs in such a way as to allow a bend in the hoses so that they are never pulled taut as the suspension moves through its travel.

If the shocks are not lined up, add washers if necessary to space them appropriately. On some of the shocks with side spacers (aluminum washers that fit over the bushing) they can be swapped to improve the offset. It is possible that changing the side spacers on the body end (if so equipped) can help with the alignment. Take some time with this because it will pay off in ride comfort.

NOTE: The shock bushings are designed to have a certain side-to-side "float" to keep them from binding. As a result, do not grind or file the inner or outer edges of the bushings to make them narrower. The amount of "float" in the bushing set is necessary to ensure smooth operation of the damper assembly. If the shock eyes are tightened metal-to-metal (the outer faces of the eyes to the flanges or washers), this will lead to a harsh, stiff or choppy ride and premature seal leakage.

Once you are satisfied with the alignment, sparingly apply a thread locking compound to the threads on the shock mounting fasteners and tighten them to the appropriate torque. Over-tightening the fasteners can damage the bushings and cause the shock to bind. This results in harsh, choppy performance and premature seal failure.

PRE-LOAD ADJUSTMENT—

On some Works shocks a threaded pre-load is standard. This allows the adjustment of the ride height of the motorcycle. The pre-load is changed by turning a threaded nut down towards the spring (higher ride height) or up away from the spring (lower ride height). The nut is a right-hand thread. It is used primarily to set the ride height for solo riding, as the ARS would be employed when adding a passenger or extra weight.

CHECKING RIDE HEIGHT—

1. With the bike unloaded on the side stand and the shock fully extended, have an assistant measure from a point at the axle (center point) to a point on the frame, fender or bodywork directly above it. Record this measurement.

2. With the bike off the stand and the rider in the seat, bounce on the suspension and let the bike settle. Have the assistant measure from the same two points. Subtract the second measurement from the first.

3. For models equipped with the stock length shock, the difference should be between 1 inch (minimum) and 1-1/2 inches (maximum). (Short shocks can range from 1/2 inch to 3/4 inch.) the amount of settle, or "sag" is a function of the wheel travel. It should only be between 1/4 and 1/3 of the total travel.

4. If the difference is less than the minimum, reduce the spring pre-

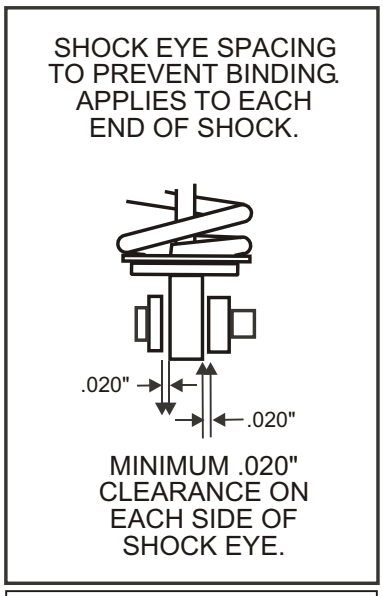

Fig. 1. Standard urethane bushing side clearance.

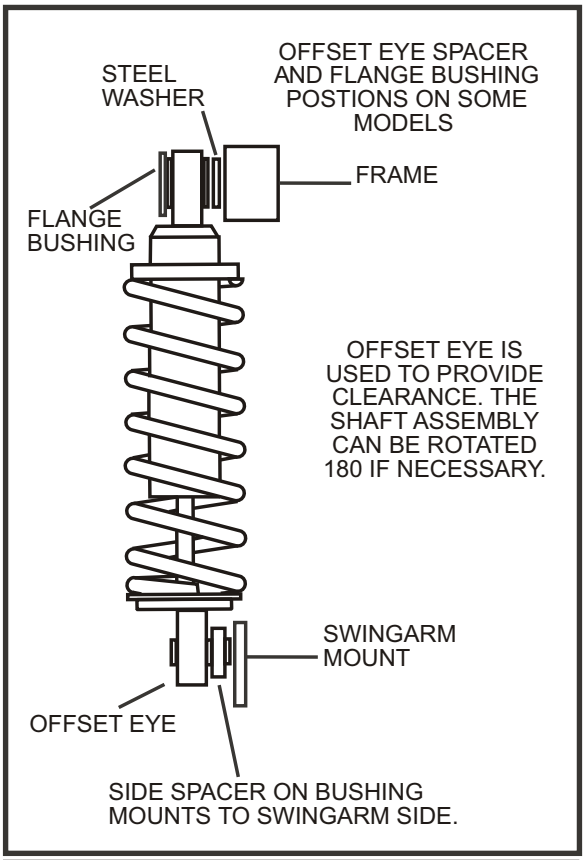

Fig. 2. Typical offset eye or side spacer offset mounting illustration. See Page 2 for shock alignment situations.

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CHANNEL STYLE SWINGARMS

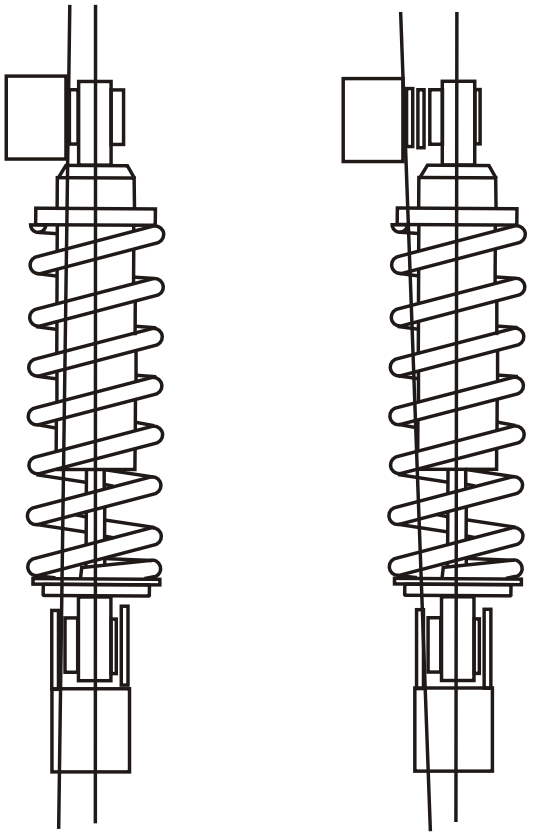

ILLUSTRATION INDICATING USE OF WASHERS OR SPACER PLACEMENT TO CURE MISALIGNMENT.

OVERHUNG OR SIDE MOUNT SWINGARMS

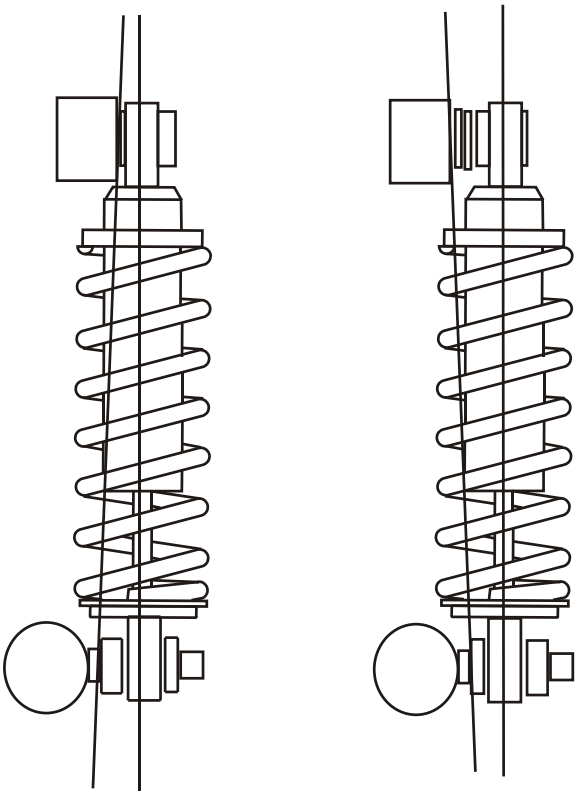

ILLUSTRATION INDICATING USE OF WASHERS OR SPACER PLACEMENT TO CURE MISALIGNMENT.

load. Measure the distance again starting with Step 2. Adjust again if necessary.

5. If the difference is more than the maximum, increase the spring pre-load. Measure the distance again starting with Step 2. Adjust again if necessary.

Note: If the ride height is too low, the shock will bottom unnecessarily, resulting in a harsh ride. If the ride height is too high, the shock will “top out” too easily when rebounding from a bump or under hard deceleration.

MULTI-RATE SPRINGS AND THE ARS SYSTEM

Depending on each application, single-, dual- or triple-rate springs are available. Dual-rate springs are just that-- a spring set with two separate rates. This is done with a short spring stacked on a longer spring. As both springs compress they produce a soft, or initial, rate. The spring set will maintain this initial rate until the short spring stops compressing. At that point, the spring rate "crosses over" to the stiffer, or final, rate. This multi-rate system allows a soft initial rate for comfort on small bumps, but has the capability of soaking up the big pot-holes and other on or off road hazards.

ARS stands for Adjustable Rate Suspension. ARS is standard on some dual-rate spring street bike shocks and some utility ATV shocks. The ARS system allows the rider to increase or decrease the load-carrying capacity of the shocks without changing the pre-load of the springs. Depending on the application and spring set, the rider can increase the load capacity of the shocks up to 50 percent. This allows the shocks to be correct for solo riding, but still handle the increased weight of a passenger and/or load. ARS can also be employed during solo riding to stiffen the rates for aggressive riding, or for riding on rough, broken pavement.

The ARS system consists of an indexing lever and a stepped cup that contains the short spring of the dual-rate. The position of the lever in relation to the steps in the cup determines how long the spring set remains on the soft, or initial, spring

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rate. On most ARS applications,four positions can be selected from full stiff to full soft. Indexing is done in a matter of seconds by rotating the lever or the cup by hand. Indexing the cup to the lever is usually preferable to avoid interference with passenger or bags. Adjustment of the ARS system should only be made while the motorcycle is unloaded to reduce the load on the springs.

NOTE: It is important to make sure that a step in the cup is positioned directly over the tang on the lever. This will prevent damage to the cup and/or lever that can be caused by making partial contact between the tang and a step.

TUNING TIPS—The “softest” setting on the ARS does not mean that the ride will be the most comfortable at that setting. It means that this is the softest spring setting which would be employed on smooth roads and with a solo rider. Excessive suspension bottoming caused by rough roads or by the addition of a passenger or bags will cause a harsh ride when the shock is adjusted to this setting. To eliminate this bottoming, adjust the ARS to the stiffer positions for a more comfortable ride. Hence, sometimes “stiffer is softer.”

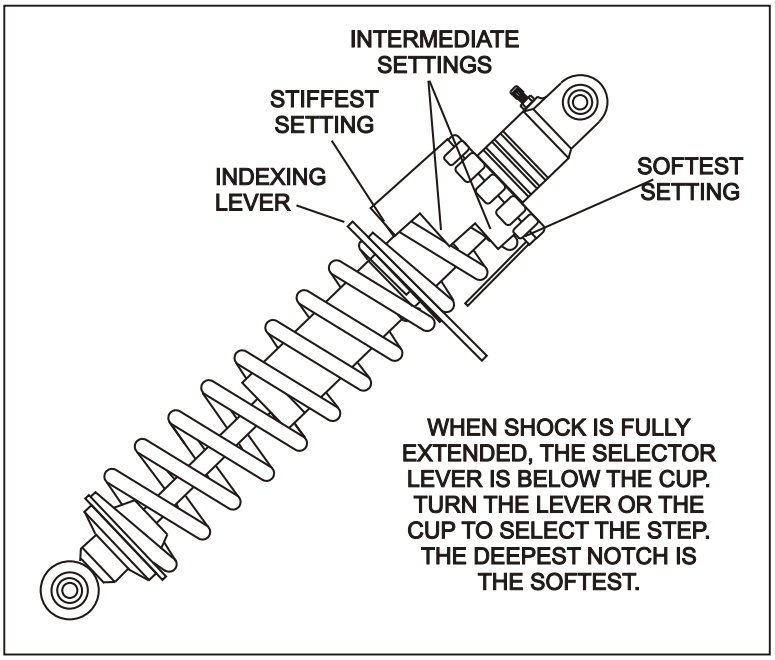

Fig. 3. Typical ARS assembly shown in the unloaded position. Make adjustments when the shock is fully extended so that the spring pressure on the lever is the least, and full access to the steps on the cup is available.

NITROGEN PRESSURES IN EMULSION SHOCKS

CAUTION: The pressure in these shocks cannot successfully be checked. Concerns with the gauge volume and the gas volume in the shock body create a situation where you cannot accurately determine what pressure was in the shock. In addition when the pressure is lowered (i.e. checking the pressure) the gas and some of the shock oil escapes into the gauge. It is possible to lose a large percentage of the shock oil by depressing the core of a charged shock to the atmosphere.

Please note that in order to check the pressure, some of the gas must escape and fill the gauge assembly. The volume of the gas pocket is about half the size of your thumb, so a very small volume change results in a large pressure drop. Because the gauges' volumes vary, it is not possible to deduce the actual pressure in the shock prior to attaching the gauge. Therefore it is imperative that any attempt to check pressure be accompanied by the capability of refilling the shock. In other words: If you don't have a nitrogen source handy, don't check the pressure!

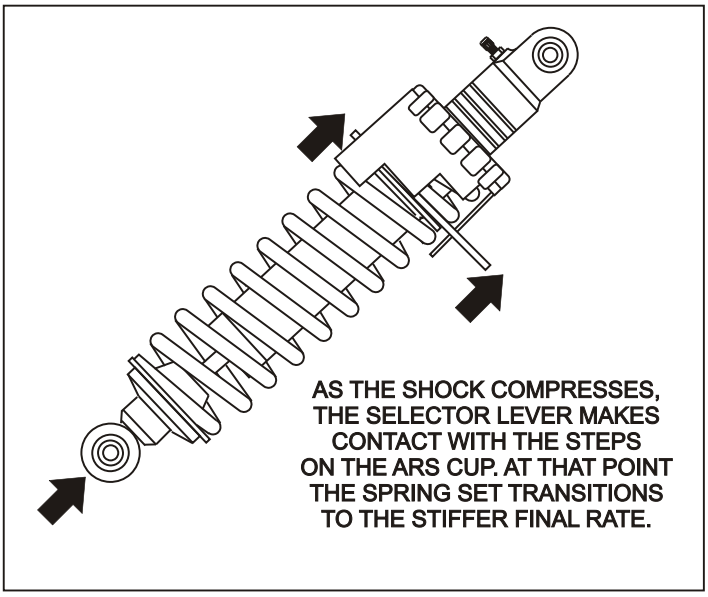

Fig. 4. ARS assembly shown in the loaded position. As the shock collapses, the selector lever moves towards the cup. The alignment of the lever and the cup determines the point at which the spring set goes from the soft initial rate to the stiffer final rate.

PRESSURIZING EMULSION SHOCKS

The pressure setting for Works gas shocks is 250 p.s.i. of dry nitrogen. To pressurize a shock with some residual pressure in it, bring the gauge manifold up to 250 p.s.i. and depress the core with the T-handle. This will either equalize the pressure or refill the shock without transferring oil from the shock into the gauge assembly.

The best gauges for this purpose screw on to the valve and incorporate a T-handled core depressor to isolate the shock from the gauge. This allows a leak-free separation once the desired pressure is reached. For simplified operation, an extra

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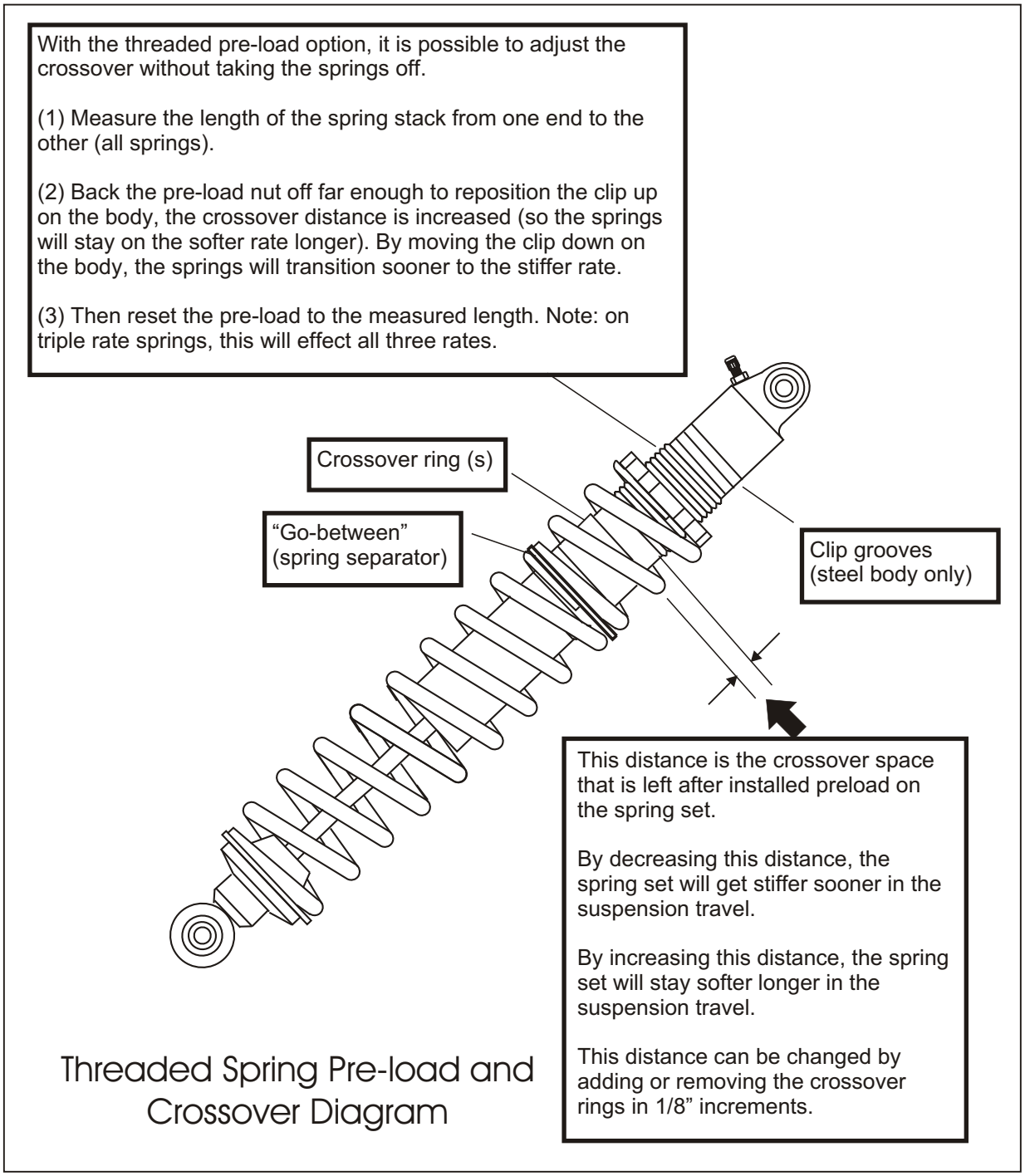

valve is provided for the filling apparatus, allowing pressure adjustment with the gauge in place. Works offers a suitable gauge and manifold set. Most motorcycle shops that deal with dirt bikes can pressurize the shock.

PRESSURIZING RESERVOIR SHOCKS

The pressure setting for most Works gas reservoir shocks is between 175 and 250 p.s.i. These shocks can be filled with nitrogen while on the vehicle as long as the shock if fully extended. Checking pressure in a reservoir type shock has similar concerns to the emulsion type shock, except that no oil loss would result. The bladder that contains the gas is only about the size of an average human thumb. As a result the pressure that fills the gauge assembly is a large percentage of the total gas volume, so that each time the pressure is checked there will be a substantial (as much as 75 p.s.i.) loss of pressure. So, pressure checks are not accurate, and will only result in a loss of pressure if a refill source is not available.