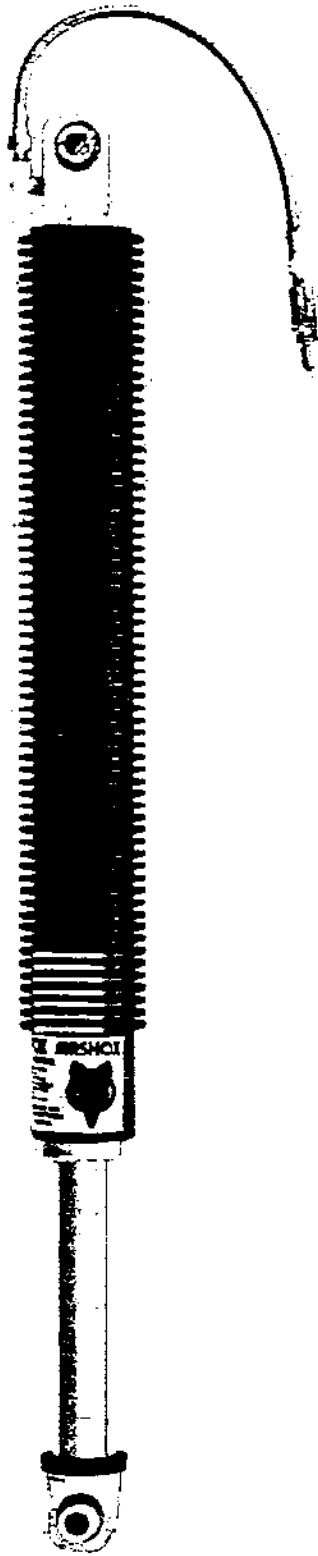


Owners Manual



# FOX MONO AIRSHOCK

DESIGNED AND MANUFACTURED  
by **BOB FOX**

PATENT  
PENDING

## INTRODUCTION

Congratulations! You now own the finest shock absorber ever produced for the Yamaha monoshock system.

The FOX MONO AIRSHOCK is designed for the 1977-78 Yamaha YZ series. It fits the YZ 125D/125E, 250D/250E and 400D/400E models. With the "E" model swingarms, it produces eleven inches (11") of rear wheel travel. Twelve inches of travel is possible with a simple internal modification. However, this is not recommended unless more front travel (10½"+) is acquired.

The shock will also fit the 1977-78 IT Enduro series (IT175D/175E, 250D/250E, 400D/400E). It is advised that fork travel equal to the YZ models be obtained before using the shock.

Having been tested in countless races, including the AMA MX Nationals, the FOX MONO AIRSHOCK has proven performance, reliability, and durability. Now Yamaha riders have a shock absorber available to rival the latest equipment used by the Team Yamaha factory riders.

To ensure that you get the maximum performance that this shock is designed for, take the time to read this Owner's Manual carefully. Read it now, before you go riding for the first time!

If you have any questions, comments, or problems, drop us a note.

Good luck and good racing,

A handwritten signature in black ink that reads "Bob Fox". The signature is stylized with a large, looped "B" and a cursive "Fox".

Bob Fox

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## HOW TO USE THIS MANUAL

First, read Section I. This gives complete installation instructions and tips. Don't skip anything here . . . everything is important!

Then read Section II. This explains pressurizing procedures and tips. It also has a chart showing pressures to use. Don't skip anything . . . everything is important!

Section III discusses tuning. This will help you get the shock dialed-in to your personal preferences. Read it now and also have it handy for reference the first time you go riding.

Section IV covers maintenance. Not essential to read this until you've had the shock for a month or so. However, it's a good idea to *skim* over it now, so you're familiar with what it covers.

Section V shows the parts list.

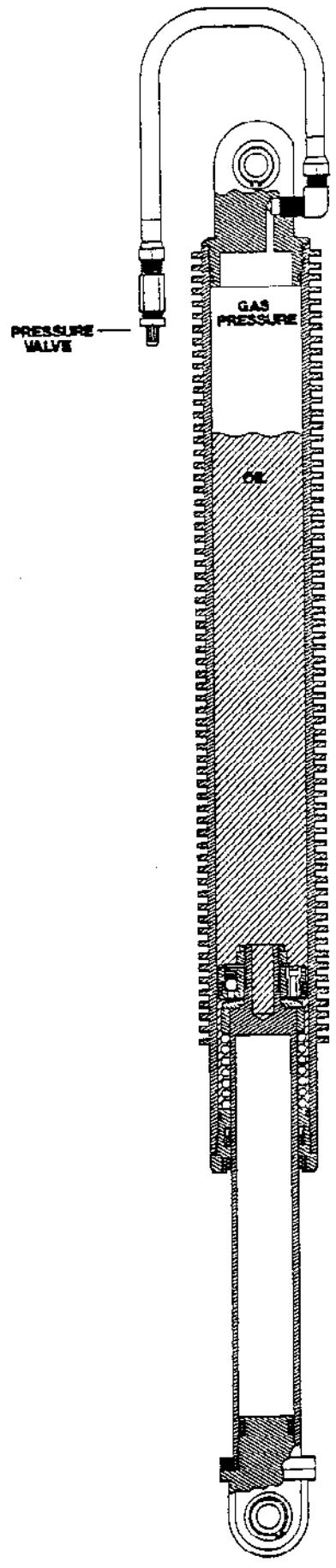
Section VI covers disassembly. Not necessary to read this in detail until later when you want to take the shock apart. However, *skimming* thru it now is a good idea. This section also describes the twelve inch travel modification.

Section VII covers troubleshooting. Check this if you are having any problems.

Section VIII presents a quiz. After you've read the whole manual, test yourself with this quiz.

### **WARNING**

Failure to follow the instructions in this manual  
could cause damage to the shock, your bike, your body,  
or "all of the above"!



## SECTION I

### INSTALLATION

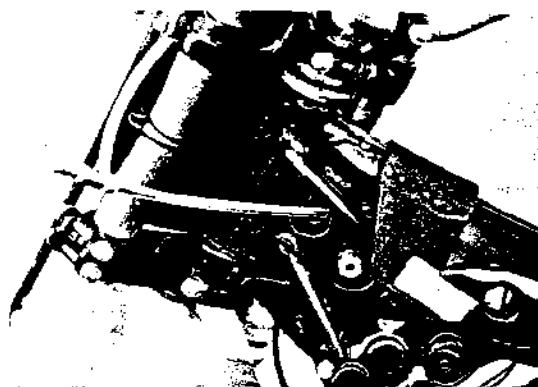
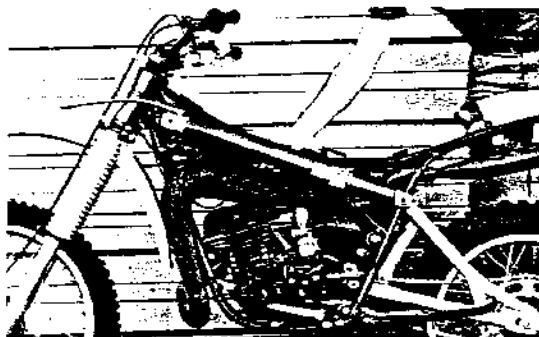
**Note:** The shock is shipped depressurized. Because of an internal spring, the shaft will not extend fully until pressurized.

1. Always install "shaft-end down" . . . that is, with the shaft pointing toward the rear of the bike and the big end with hose up front. (Reason: the shock will have no damping if installed the other way). The shock should be placed with the hose on the upper side of the body. It will be necessary to drill a hole through the frame. This will allow the pressure hose to exit the shock cavity and be accessible for pressurization.

2. **Pressure hose hole locations.** The pressure hose should exit the shock cavity on the left side just in front of the tank. The hole location is different for the YZ 125 than the YZ 250/400 models.

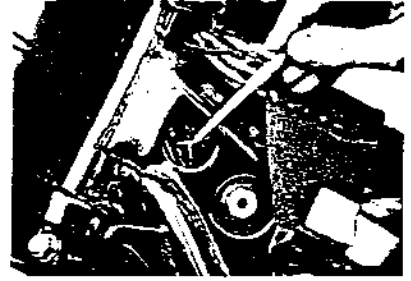
Yamaha YZ125D/125E: The ideal location for the hole is 2-3/8 inches above and one inch forward of the front shock mount pin. This should place the hole in an area below the steering head gusset and above the pressed out section containing the shock mount pin.

Yamaha YZ250D/250E/400D/D00E: Place the hole in the center of the circular cutout directly ahead of the front shock mount pin.



Drilling procedure:

- a. Mark the hole location as outlined above. Place the tank on the bike to make sure the hose will be in the correct position.



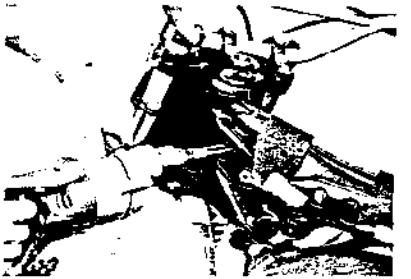
- b. Centerpunch at the desired point and drill a pilot hole (approx. 1/8").



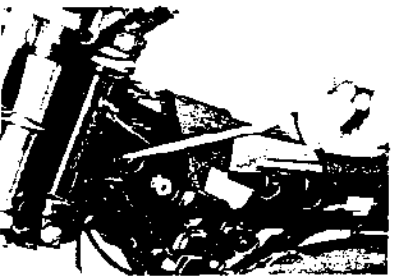
- c. Drill large hole. Use approximately 3/4" drill bit. This will require at least a 1/2" drill.



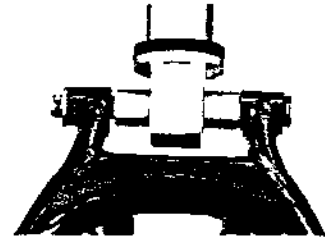
- d. If possible use a 7/16" to 1" tapered reamer to egg shape the the hole larger.



- e. File rough edges clean.



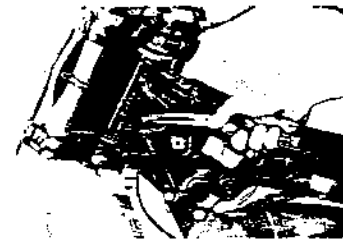
3. **Check swingarm mount clearance.** Before pressurizing the shock or installing the front mount pin, place the depressurized shock in the swingarm mount. The rear pin should enter freely and the shaft cap should have at least 0.1" clearance from the swingarm. If necessary, carefully file the shaft cap to gain the necessary clearance. Note: Yamaha rear pin rubbers are not shown in this photo.



4. **Use the stock Yamaha rear pin rubbers.** The rear shock bushing is designed to utilize the stock Yamaha rear pin rubbers (part no. 1W1-22128).

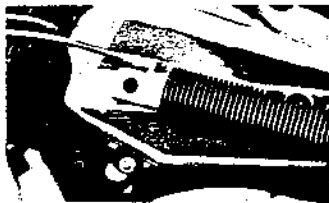
5. **Installation procedure.** Place the motorcycle on a stand so the swingarm is extended fully. Remove the seat and the gas tank.

- a. Place the shock in the tunnel and slowly push it forward until the pressure valve can be seen through the hole you have drilled.
- b. Using long nose pliers, carefully work the valve and hose out through the hole. Be patient and take care not to damage the valve. Position the shock as necessary for the hose to come through.

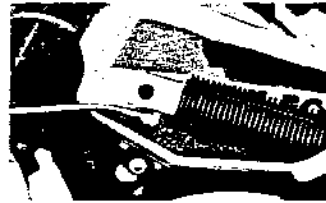


- c. Install the front pin. Make sure the pressure hose is positioned on top. Slowly push the shock in until the front mount lines up. If you encounter any interference, the shock is probably slightly cocked and must be turned straight.

Right



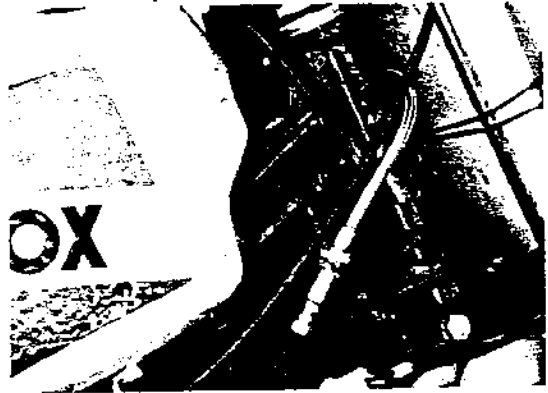
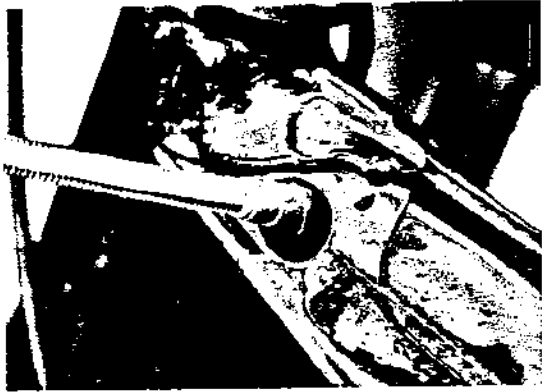
Wrong



- d. Pressurize the shock. Position the pressure valve as high as possible. Carefully pressurize the shock to about 150 psi. This will extend the shaft so the rear pin can be inserted.
  - e. Install the rear pin. Use the stock Yamaha mounting rubbers.
6. **Check for interference.** While this is an optional step, it is recommended for any accessory swingarm used.
    - a. Depressurize the shock. With the pressure valve positioned as high as possible, depressurize the shock SLOWLY. (Reason: if done fast or with the pressure valve low, oil will escape with the air.) Open the air valve for a second, then stop for a second. Repeat as required. Due to the internal spring, the shaft will contract inward as the pressure drops.
    - b. Check for interference with the airbox. (A problem with some accessory swingarms.) Completely bottom-out the shock and check for clearance of the swingarm tube near the airbox.
    - c. Check tire/fender clearance. If the tire rubs the fender with the shock fully compressed, travel can be reduced by adding extra rubber bumpers (part no. 99-5180). One extra bumper will reduce stroke about one-quarter inch (1/4").



7. **Protect the pressure hose.** At the point where the pressure hose exits the frame, wrap the hose with heavy tape or install a rubber grommet. After pressurizing, secure the pressure hose. If possible, wrap the hose around the steering stem and secure to the cable bracket. Check for interference with the cables and number plate mounts by turning bars lock to lock.



## SECTION II

### PRESSURIZING

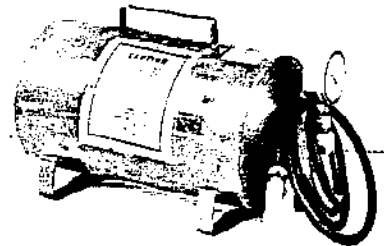
#### EQUIPMENT NEEDED

Pressurize with either nitrogen or air. **WARNING:** Never use other gases such as acetylene or oxygen which you may have for welding! This could be dangerous! You will need one of the following items to pressurize:

- a. Nitrogen tank and regulator. This is the ideal setup.  
Regulator should go up to about 300 psi (21 kg/cm<sup>2</sup>).  
Available at welding supply shops for about \$80 to \$100 complete. Nitrogen refills cost only a few dollars, are rarely needed.

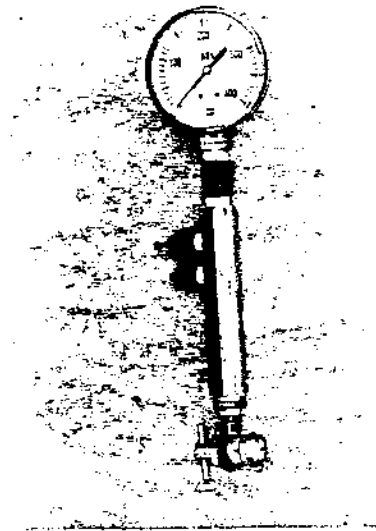


- b. Portable air tank. A good setup should be rated for 250 psi or more. Sold at auto supply stores and sometimes Army Surplus.



## PRESSURE GAUGE

A *special* pressure gauge is needed for checking and adjusting pressure. Most standard gauges sold in bicycle shops, auto parts stores, etc., will not work . . . *they leak pressure when connecting and disconnecting.* This happens because their deflator pin opens up the valve core before a good seal is made between the valve and the gauge. A lot of pressure can escape in the fraction of a second it takes before gasket contact is made and the connection seals off.



Moto-X Fox offers a pressure gauge specifically designed for the Mono Airshock. It has a 0-400 psi gauge, with a special connector to eliminate pressure loss. See Section V for ordering information.

## PRESSURIZING PROCEDURE

1. **Have shock extended.** Have bike on stand with shock extended as far as possible. *Do not start to pressurize with shock collapsed.* (Reason: with shock collapsed, the oil level is near the pressure valve, and some oil may squirt out as you pressurize.)
2. **Readjust pressure setting after riding.** Stop after riding 1 or 2 minutes and readjust pressure. *It will have gone down about 15%.* This is normal. It is not due to a leak. You only have to do this *the first time* you pressurize the shock. It is *not required again* unless you completely depressurize the shock . . . for example when you change oil.

## PRESSURIZING TIPS

- a. Best method is to overpressurize somewhat, then adjust pressure downward with the pressure gauge.
- b. After hard riding, allow about 60 seconds before checking or adjusting pressure. (This lets oil foam at top of shock settle, thus preventing a small oil loss when you open valve.)
- c. If shock is off bike and you want to depressurize, make sure the shock is vertical with the hose up. Hold the pressure valve as high as possible to eliminate oil loss.
- d. Do not trust regulator settings or pump gauge readings for setting pressures. *This is not accurate!* Even if the regulator or pump gauge itself is accurate, there is usually a pressure loss as you disconnect. Do your final checking and adjusting with the Moto-X Fox 0-400 psi gauge or similar high-quality gauge.

## RECOMMENDED PRESSURES

See Table 1. These pressures will give best performance for a "typical" rider on a "typical" MX track. Start here, then experiment to suit track conditions and your particular riding style. Most riders will find that the best pressure for them will be very close to the recommended pressure . . . not more than 10 or 15 psi higher or lower.

Table 1. Fox Mono Airshock Pressure Recommendations (psi)  
For Yamaha YZ D and E Models

RIDER WEIGHT*	ENGINE DISPLACEMENT		
	125cc	250cc	400cc
120 lbs	152 psi	160 psi	166 psi
130 lbs	158	166	172
140 lbs	164	172	178
150 lbs	170	178	184
160 lbs	176	184	190
170 lbs	182	190	196
180 lbs	188	196	202
190 lbs	194	202	208
200 lbs	200	208	214
210 lbs	206	214	220
220 lbs	212	220	226

\* Add approximately 15 lbs for weight of riding equipment.

### IF TABLE 1 DOESN'T COVER YOU . . .

Table 1 covers rider weights from 120 to 220 lbs., giving pressure recommendations for the YZ motocross models. If you or your bike don't fit the chart, calculate a recommended pressure as follows:

- Step 1:** Multiply your bike weight by 0.40 (40%).
- Step 2:** Multiply your Rider Weight by 0.60 (60%).
- Step 3:** Add the numbers from Steps 1 and 2. This number is your recommended pressure.

**Example:** Your bike is an IT400, and weighs 260 lbs. You weigh 240 lbs. Since Table 1 doesn't cover this, compute as follows:

- Step 1: 260 times 0.40 = 104
- Step 2: 240 times 0.60 = 144
- Step 3: 104 plus 144 = 248

Your recommended pressure is 248 psi.

## SECTION III

### TUNING

Pressure, damping, and oil quantity can be tuned to suit individual riding styles and tracks. The most important is pressure . . . be sure to experiment to find the pressure that works best for you!

#### TUNING PRESSURE

Start at the recommended pressure, then experiment. Learn how your bike feels with different pressures.

**Test for full travel.** Slide the rubber bumper on the shaft up about an inch. Now do a few fast laps on a rough course, using your favorite pressure setting. If the rubber bumper did not get pushed back to the end of the shaft, you did not get full travel. Try lowering the pressure 10 psi, then re-test. If still not getting full travel, lower the pressure again. Readjustment of the oil quantity may be necessary if full travel is not obtained.

**Temperature effects.** With a pro rider on a rough course, shock temperature will get 100° to 120° hotter than ambient. On a 70° day, shock temperature will get up to 170° to 190°F. This causes the internal pressure to increase about 10%. **COMPENSATE FOR THIS BY SETTING THE PRESSURE SO THAT THE SHOCK IS A LITTLE SOFT FOR THE FIRST LAP, BUT FEELS ABOUT RIGHT AFTER 2 OR 3 LAPS.** If the shock is set "perfect" for the first lap or so, then it will be too stiff for the whole rest of the race.

#### TUNING DAMPING

Rebound damping is controlled by a jet and a pop-off valve. Both of these are in the piston.

The jet controls damping at slow shaft speeds (small bumps). The pop-off valve opens at faster shaft speeds (large bumps), to provide a secondary oil flow path. This prevents the shocks from "pumping down" over a series of large bumps.

Damping can be fine-tuned by changing the jet orifice diameter and/or the pop-off valve spring. Most riders, however, should not do this . . . damping will be correct for most riders as set at the factory. However, if you do want to experiment, here are some guidelines:

1. Experiment with jet size first. Drilled out Holley carburetor main jets are used. These are available at most auto parts stores, or from the Moto-X Fox (see Section V). The following Table shows the standard jet orifice size used for production, as well as the maximum and minimum sizes recommended for experimenting. When experimenting, try the recommended smaller or larger jet size first. Use standard number drills to drill the Holley jets to the desired size. For example, a standard #31 drill is used to drill out the 0.120 jet.

MIN. JET DIA.	REC. SMALLER	STD. JET DIA.	REC. LARGER	MAX. JET DIA.
.116	.120	.125	.128	.136

2. If you want to experiment with the pop-off valve spring, consult the chart below.

SOFT	STD.	FIRM
#3.6	#4.0	#4.4

**Note:** These are spring numbers, not part numbers . . . to order, see Section V for corresponding part numbers.

### TUNING OIL QUANTITY

Correct oil quantity is vital for good shock performance. Too much oil and you won't get full travel. Too little oil and you'll be bottoming-out hard.

The Fox Mono Airshock is supplied with the "Standard Fill" (see Maintenance) quantity of Bel-Ray LT-100. This quantity is ideal for most riders.

To test for correct oil quantity, pull the rubber shaft bumper up about an inch on the shaft. Now do a few fast laps on a rough course, using your favorite pressure setting. One of three things will happen:

"A": You don't get full travel. The rubber bumper does not get pushed back to the end of the shaft.

"B": The shock bottoms-out hard. The bumper is at the end of the shaft.

"C": Just right. You got full travel and did not bottom-out hard.

For Condition "A" you should remove some oil. How much?? . . . Use this rule: *Remove 5cc oil from the shock for every quarter inch you are short of full travel.* For example, if you are ½ inch short of full travel, remove 10cc from the shock. Test again and you should get full travel.

For Condition "B" you should add some oil. How much?? . . . Use this rule: *Add 5cc oil to the shock, then test again.* If the shock still bottoms-out hard, add 5cc more. It should never be necessary to add more than 10cc extra.

## HOW TO ADD OIL.

1. Depressurize shock carefully and slowly to prevent loss of oil. Make sure bike is on a stand to prevent the shock from completely collapsing, causing oil to squirt out.
2. Remove valve core from pressure valve (keep as high as possible).
3. Squirt oil into shock thru the pressure valve. Use an eyedropper. *Measure quantity accurately!* You can do this using a small graduated cylinder (available at camera shops . . . under darkroom supplies), or by precalibrating your eyedropper so you know how much it holds.
4. Reinstall valve core and repressurize.

**Caution:** Use care to keep dirt out of the valve core when doing this. After pressurizing, check for good valve core seal by using "saliva test" on end of valve. Look for bubbles.

## HOW TO REMOVE OIL.

1. Take shock off bike.
2. Depressurize carefully and slowly to prevent loss of oil.
3. With the hose end *down*, push in the pressure valve stem and drain off the desired amount of oil into a measuring device. Use a small graduated cylinder.

**Note:** Do this carefully! Do not accidentally let too much oil out!

4. Reinstall shock on bike and repressurize.

## ALTERNATE METHOD (to avoid removal of shock):

1. Depressurize shock carefully and slowly to prevent loss of oil.
2. Elevate rear of bike so that hose end of the shock is lower than the shaft end. The best way to do this is to lay the bike down on the ground and then put a small wooden box or milk carton under the side of the rear wheel.
3. With the hose end down, push in the pressure valve stem and drain off the desired amount of oil into a measuring device. Use a small graduated cylinder.

**Note:** Do this carefully! Do not accidentally let too much oil out!

4. Put stand under bike (so shock is not collapsed) and repressurize.

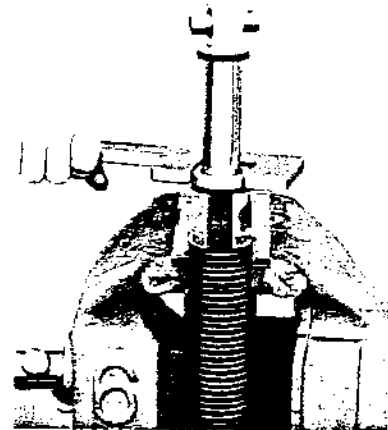
## SECTION IV

### MAINTENANCE

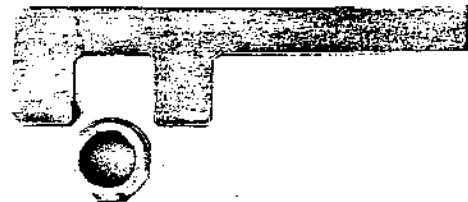
Change oil about once a month. This assumes you are racing every weekend. Use Bel-Ray LT-100 only.

#### HOW TO CHANGE OIL.

1. Completely depressurize shock. **WARNING: NEVER ATTEMPT DISASSEMBLY WITH SHOCK PRESSURIZED!!!**
2. Unscrew bronze shaft bearing. Place shock in vise vertically by clamping on the milled flats provided. Use large smooth-jawed wrench or special wrench available from Moto-X Fox. Be sure wrench has very snug fit on bearing flats . . . if wrench is loose, it could deform or round flats.

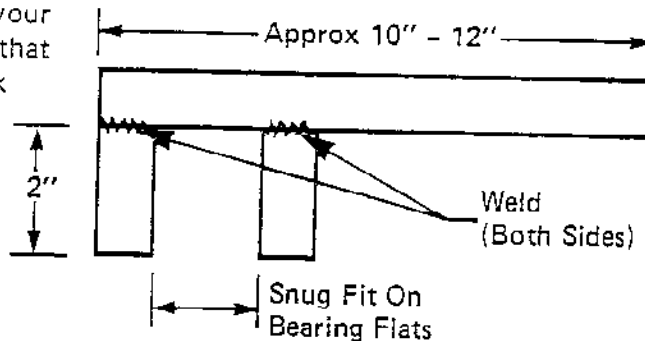


The Moto-X Fox Bearing Wrench:  
(P/N 99-5320)



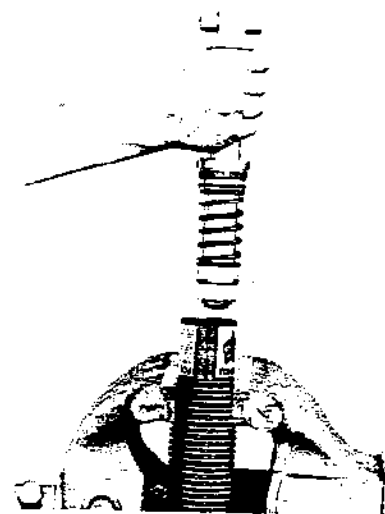


If you have access to welding equipment, make your own wrench per the sketch at the right. Be sure that wrench fits very snugly across bearing flats. Tack weld and check fit before final weld.



MAT'L: Steel Bar  
Approx 3/8" Thick x 1" Wide

3. Remove shaft assembly.
4. Drain oil. Flush inside of body with solvent and wipe clean and dry. Hang shaft on nail or hook for about an hour to let all oil drip off.
5. Refill with LT-100. Use oil quantity shown in Table below. Measure oil quantity very accurately! Wait at least 60 sec. to allow oil to drain out of graduated cylinder into shock.
6. Reinstall shaft assembly. Remove all oil from the mating threads, then apply about 2 drops of Loctite to threads of bearing (*Do not* use more or you may never be able to get the bearing off again!) Tighten down with medium torque (about 40 ft-lbs).



**NOTE:** Extremely high torque is not good . . . this could deform or "round" the bearing flats. A new bearing would then be required. After reassembling shock (but before pressurizing), stroke shaft manually to be sure it still runs freely in the bearing. Very high friction would indicate a deformed bearing.

#### OIL REFILL QUANTITIES\*\*

Std. Fox Mono Airshock (w/spacer)	533 cc
Fox Mono Airshock modified for 12" travel (w/o spacer)	537 cc

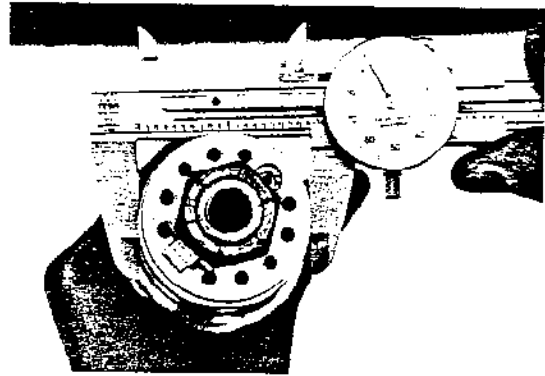
**\*\*NOTE:** If you changed from the Standard Oil Fill as discussed in Tuning Oil Quantity in the previous section, make the same change to the above quantities when refilling.



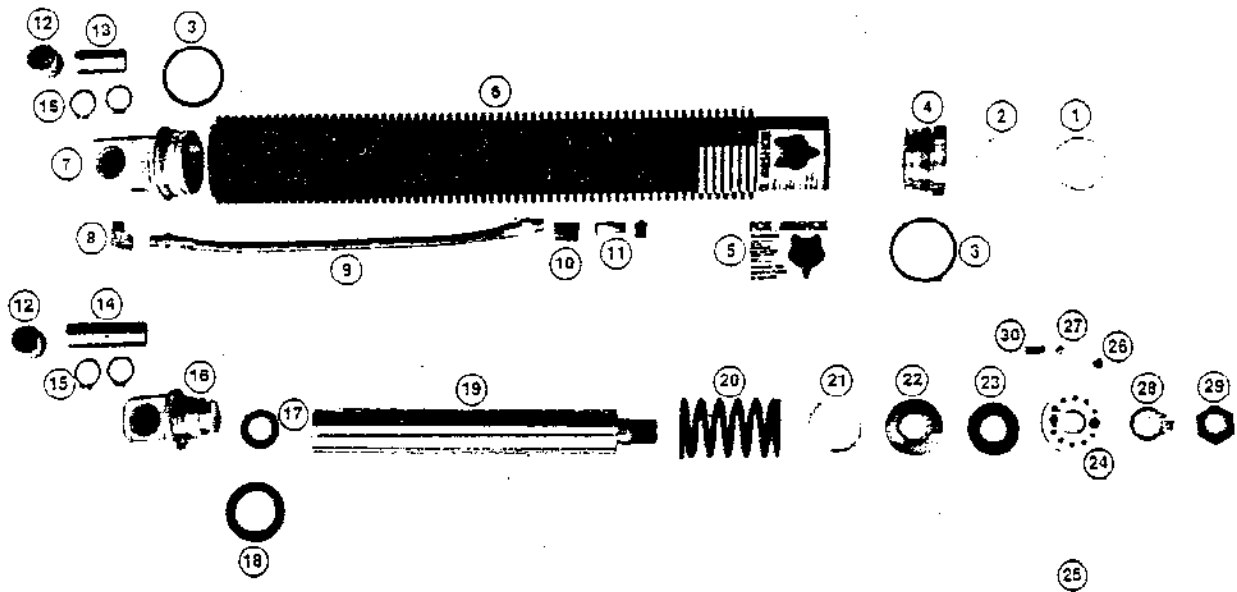
## INSPECTION

Inspect following items when changing oil:

- a. Visually inspect circular valve on shaft side of piston. This valve should seat flat on the piston. If valve is jammed open by dirt, remove piston and clean. Wet-sand piston with 400-grit sandpaper then reinstall.
- b. If you have calipers or a micrometer, check piston ring diameter. Replace ring if less than 1.883" diameter. (Ring will last at least 12 months under normal conditions.)



**SECTION V**  
**PARTS LIST**



ITEM	PART #	DESCRIPTION	PRICE/QTY
1.	99-5010	Shaft Wiper	\$ 4.95 each
2.	99-5020	Shaft Seal	\$ 4.95 each
3.	99-5030	O-ring, Bearing and End Cap (Std. O-ring #2-131)	\$ 1.65 each
4.	99-5040	Shaft Bearing	\$19.95 each
5.	99-5050	Airshox Label	\$ .50 each
6.	99-5060	Body	\$124.00 each
7.	99-5070	Large End Cap	\$23.35 each
8.	99-5080	90 degree Fitting	\$ .95 each
9.	99-5090	Pressure Hose	\$ 8.40 each
10.	99-5100	Connector	\$ .75 each
11.	99-5110	Air Valve	\$ 1.50 each
12.	99-5120	Eyelet Bushings	\$ 3.80 each

ITEM	PART #	DESCRIPTION	PRICE/QTY
13.	99-5130	Large End Bushing	\$ 2.20 each
14.	99-5140	Shaft End Bushing	\$ 3.60 each
15.	99-5150	Bushing Snap Rings	\$ .95 set of 4
16.	99-5160	Shaft Cap	\$19.95 each
17.	99-5170	Shaft Cap O-ring (Std. O-ring #2-314)	\$ .75 each
18.	99-5180	Rubber Bumper	\$ .85 each
19.	99-5190	Shaft	\$41.65 each
20.	99-5200	Internal Spring	\$ 2.80 each
21.	99-5210	Spring Spacer	\$ 2.50 each
22.	99-5220	Top Out Plate	\$ 3.00 each
23.	99-5230	Valve (.012)	\$ .75 each
24.	99-5240	Piston	\$ 8.35 each
25.	99-5250	Piston Ring	\$ 7.50 each
26.	99-7116	Jet, .116" orifice	\$ 1.25 each
	99-7120	Jet, .120" orifice	\$ 1.25 each
	99-7125	Jet, .125" orifice (Std.)	\$ 1.25 each
	99-7128	Jet, .128" orifice	\$ 1.25 each
	99-7136	Jet, .136" orifice	\$ 1.25 each
27.	99-5270	1/4" Ball Valve	\$ .25 each
28.	99-5280	Spring Retaining Washer	\$ .50 each
29.	99-5290	Locknut	\$ 1.75 each
30.	99-7536	Spring, Rebound #3.6	\$ .75 each
	99-7540	Spring, Rebound #4.0 (Std.)	\$ .75 each
	99-7544	Spring, Rebound #4.4	\$ .75 each

#### MONO AIRSHOCK ACCESSORY ITEMS.

	99-5310	Owner's Manual	\$ 2.95 each
	99-5320	Shaft Bearing Wrench	\$ 8.95 each
	99-5330	Shaft Seal Installation Tool	\$ 6.95 each
	99-5340	Shaft Clamp, Split	\$ 9.95 each
	99-9500	Rebuild Kit (includes shaft seal, shaft wiper, bearing O-ring, seal installation tool)	\$14.95 per kit
	99-3400	Mono Pressure Gauge, 0-400 psi	\$39.50 each

## SECTION VI

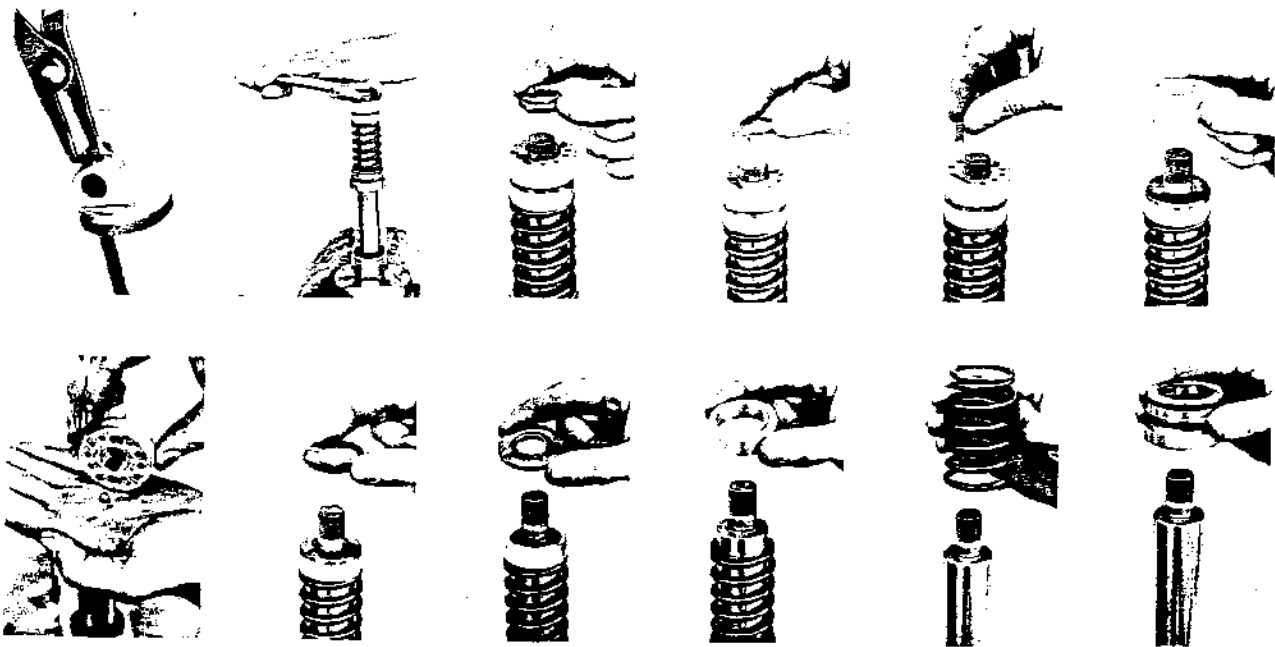
### DISASSEMBLY

The basic first step is removal of the shaft assembly, as described in Maintenance. Disassembly beyond that point will depend on the particular part(s) you want to get at.

#### REMOVING PISTON

Remove snap-ring and push out shaft end bushing. Place shaft cap in vise. Unscrew shaft lock nut. Remove spring retainer washer, being careful to prevent spring from jumping out and getting lost. Remove piston. Turn piston upside-down and ball valve will drop out. Do not lose ball valve.

When reinstalling piston, clean all oil from threads and apply several drops of Locktite to locknut. Tighten to about 40 ft-lbs. Exact torque is not critical. *However, do not apply extreme torque . . .* if extreme torque is used, the piston may be deformed and the valve will not seat properly! If in doubt about that, sand the piston on a flat surface with 400 grit sandpaper until the entire surface is level (especially the area near the I.D.).



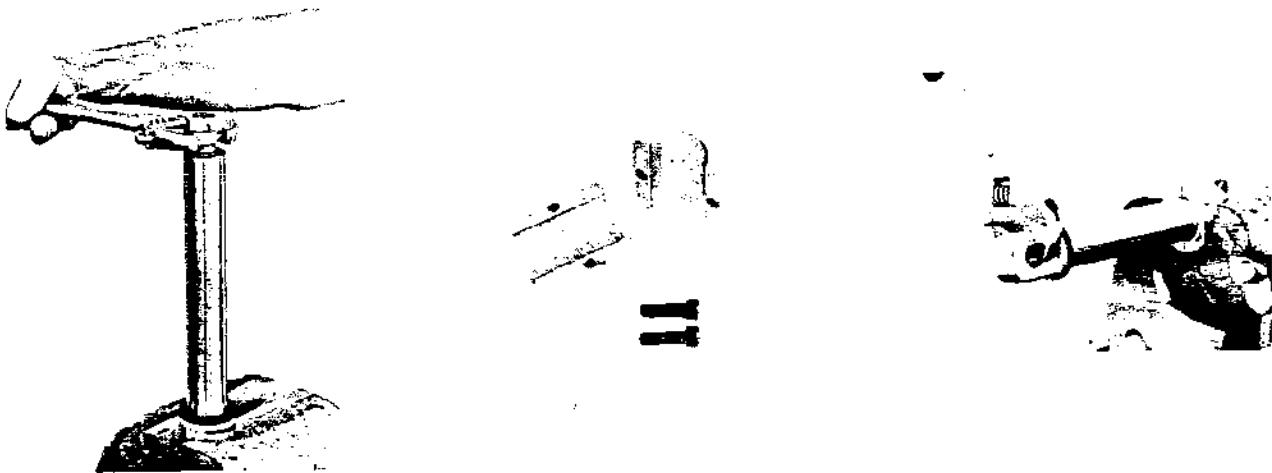
## CHANGING JET OR POP-OFF SPRING.

With locknut and spring retainer removed, jet or pop-off spring can be changed. If jet is removed, use a drop of Locktite when installing new one.

## REMOVING SHAFT END CAP.

Method A: "Double-nut" technique. This will work if cap is not too tight. *Do not* exceed 80 ft-lbs or you could damage the threads. You will need 2 plain 3/4" x 16 nuts. If cap does not break loose, use Method B.

Method B: Use Split Clamp (Part #99-5340). This is the best way. *Do not* clamp near cap end . . . apply clamp at piston end of shaft.



When reinstalling, these methods are not needed. The end cap and the piston locknut are tightened at the same time. Apply two drops (no more) of Locktite to the end cap threads. Tighten to about 40 ft-lbs.

**Note:** The O-ring on the shaft cap is not a pressure seal. It seals the inside of the shaft from dirt and corrosion.

## REMOVING LARGE END CAP

Place shock in vise by clamping on the milled flats provided. Unscrew cap with a crescent wrench. Removal should never be necessary unless O-ring fails.

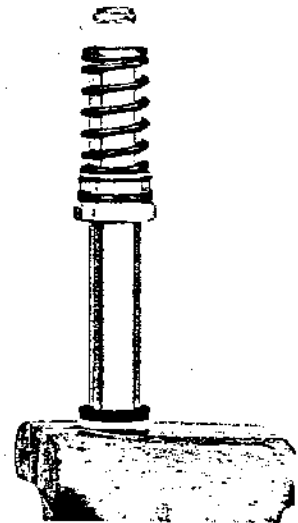
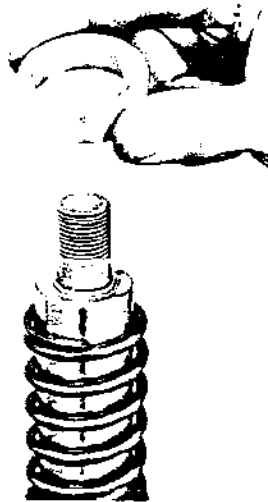
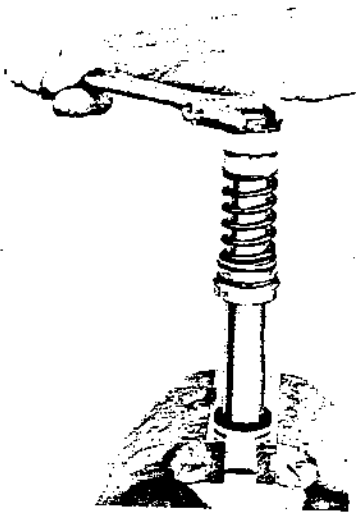
### **Note:**

- Apply light pressure only or you could deform the body.
- Never place either end of shock in vise . . . milled flats only!
- Do not use Locktite on threads when reinstalling . . . it tends to gall on aluminum against aluminum.



## TWELVE INCH TRAVEL MODIFICATION

Remove piston as described earlier. The spacer under the top out plate limits the travel to eleven inches. Remove this spacer and reassemble the shaft without it. The oil quantity must now be increased. Add 4 cc of oil. When changing the oil, the correct quantity is 537 cc.



## REPLACING SHAFT SEAL AND WIPER

1. Grasp wiper lip with small pliers and remove.
2. Pry seal out of groove with a small screwdriver. Moderate force is required, so use care not to stab yourself. It is easiest if bearing is flat on your workbench. Pry between seal lips.

