

# *Trek Suspension Service Manual*

**MOGUL BLACK DIAMOND  
SUSPENSION FORK**

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# **TREK<sup>®</sup>USA**

# MOGUL BLACK DIAMOND SUSPENSION FORK

## OIL CHANGE

### ASSEMBLY

#### CLEAN ALL PARTS

1. Place bicycle upright.
2. Pour about 20cc. of clean fork oil into the stanchion.
3. Gently compress and rebound the fork to cycle the oil through the slider and valves.
4. Repeat the draining procedures and remove the oil again.
5. Place the bicycle upright.
6. Thoroughly clean the parts you have removed from the fork.

#### FILL WITH OIL (See *Mogul Black Diamond Tuning Tips*, page 9)

1. Stroke the stanchion up and down in the slider while slowly adding oil to the stanchion. Stroking lets trapped air move to the top of the stanchion.

Oil Type: Trek Suspension Fork Oil

Viscosity: 5, 10, or 20 Wt.

Oil Volume: 71cc

Oil Height: With the stanchion fully **compressed**,  
2 1/8 inch (54mm) from top of stanchion

#### INSTALL AIR SEAL ASSEMBLY

1. Remove the damping adjuster by pushing it through the air seal assembly with your fingers (Fig. 6). Remove both O-rings from the air seal assembly.
2. Apply a thin layer of Teflon grease to a new O-ring and install it onto the damping adjuster. Make sure the "D" shaped adjusting axle (Fig. 7) and the pin inside the bottom of the damping adjuster line up correctly. Install the damping adjuster (Fig. 9).
3. Apply a thin layer of Teflon grease to a new O-ring and install it onto the air seal assembly. Make sure the pin on the damping adjuster does not hit the damping stop (Fig. 6) as you press the air seal assembly over the damping adjuster. Do not press further than contact with the adjusting axle. Note: Used O-rings may be scratched, which could cause pressure loss.
4. Align the flats on the inside of the damping dial with the corresponding flats of the damping adjuster and temporarily install the damping dial without any other parts. Rotate the damping adjuster several turns counter-clockwise and then clockwise until it stops. Remove the damping dial.
5. Install a new stanchion snapping.
6. Inflate the stanchion to 20-30 PSI (1.3-2 bars).

#### INSTALL DAMPING DIAL

1. Apply a thin coat of Teflon grease to the outside and bottom of the damping dial, and to the two springs and balls of the detent system (Fig. 3). Note: It is not necessary to replace the O-ring on the damping dial.
2. Insert one spring and then one ball into each hole in the top of the air seal assembly.
3. Slide the damping dial into the stanchion, aligning the flats of the dial with the corresponding flats of the damping adjuster.
4. Place the snapping guide over the schraeder valve (Fig. 10). Use the narrow end of the snapping driver to install a new snapping (Fig. 11).
5. Ensure that the damping dial is held firmly in place.

REPEAT ALL THESE STEPS FOR THE OTHER FORK LEG.

#### INFLATE THE FORK *After completing these procedures for both fork legs:*

1. Adjust the air pressure and damping as described in the Trek Suspension Fork Owner's Manual Supplement.
2. Install the air valve caps.

**ALWAYS FOLLOW THE INSPECTION AND ADJUSTMENT DIRECTIONS IN THE TREK SUSPENSION FORK OWNER'S MANUAL SUPPLEMENT.**

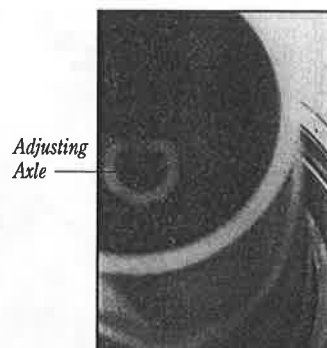


Fig. 8



Fig. 9

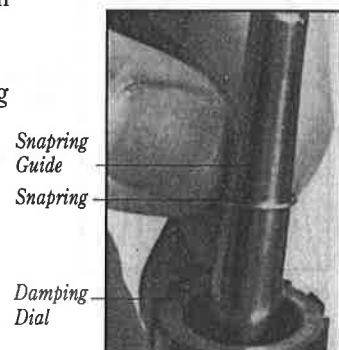


Fig. 10

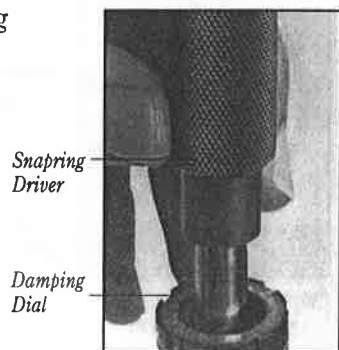
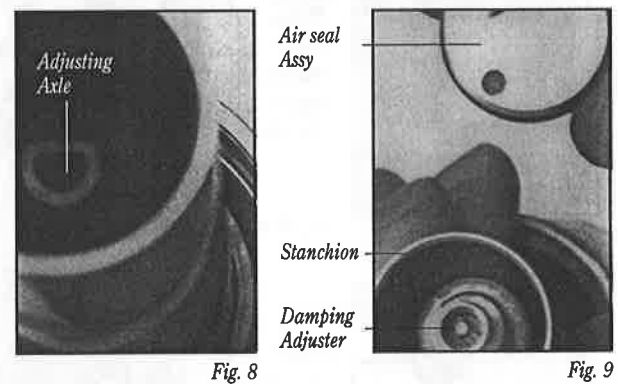
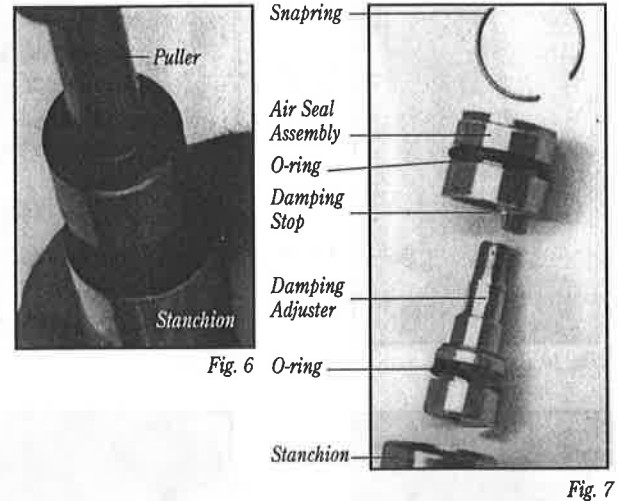


Fig. 11

# MOGUL BLACK DIAMOND SUSPENSION FORK

## REBUILD

2. Remove the damping adjuster by pushing it through the air seal assembly with your fingers (Fig. 7). Install the damping adjuster into the stanchion (Fig. 9). Make sure the pin inside the bottom of the damping adjuster lines up with the "D" shape of the damping adjusting axle (Fig. 8). Press the air seal assembly over the damping adjuster. Re-install the snapping to hold the air seal assembly in place.
3. Seat the air seal assembly against the snapping by compressing the fork leg.
4. Remove any air left in the stanchion by depressing the schraeder valve while compressing the fork leg slowly. Stop when oil shows at the schraeder valve.
5. Remove the wiper.
6. Remove the circlip from above the seal (Fig. 10) with circlip pliers.
7. Stand the fork upright on the floor over absorbent material such as a shop rag.
8. Wrap the area around the seal with an absorbent cloth. Use a lever (2x4 piece of wood for an example) to press the stanchion into the slider (Fig. 11). As soon as the seal lifts, stop pushing on the stanchion to prevent excess oil from escaping the fork. Protect the fork tip and stanchion top when pressing with lever.
9. Remove the seal (Fig. 12).



### REMOVE THE OIL

1. Remove the snapping at the top of the stanchion again. Do not compress the fork leg because oil will exit the fork.
2. Attach the puller to the schraeder valve and remove the air seal assembly.
3. Wrap the absorbent cloth around the seal area again. Turn the fork leg upside down and drain the oil from the stanchion into a container.
4. Pump the slider up and down on the stanchion and drain any remaining oil out of the fork. Remove the support washer.

### REMOVE STANCHION

1. Insert the puller into the stanchion, making sure that the adjusting axle is inside the puller. Place the stanchion snapping over the shoulder of the puller into the snapping groove.
2. Slide the broad end of the slide hammer over the puller and stanchion.
3. Hold the puller to support the stanchion. Use the slide hammer to drive the slider off the stanchion (Fig.13).

### CAUTION: Do not drop the fork parts.

4. Remove the snapping and puller from the stanchion.
5. Remove the topout elastomer and slider bushing (Fig. 14).
6. Remove the stanchion bushing snapping and the stanchion bushing (Fig. 15).

# MOGUL BLACK DIAMOND SUSPENSION FORK

## REBUILD

2. Apply Teflon grease to the outside of the seal. Press the seal into the slider with the narrow end of the slide hammer.
3. Install the 35mm circlip into the slider. Make sure the circlip is in the deep groove several millimeters inside the slider and not only under the wiper attachment lip (Fig. 20).
4. Install the wiper.

### FILL WITH OIL

(see *Mogul Black Diamond Tuning Tips*, page 9)

1. Stroke the stanchion up and down in the slider while slowly adding oil to the stanchion. Stroking lets trapped air move to the top of the stanchion.

Oil Type: Trek Suspension Fork Oil

Viscosity: 5, 10, or 20 Wt.

Oil Volume: 71cc

Oil Height: With the stanchion fully **compressed**,  
2 1/8 inch (54mm) from top of stanchion

### INSTALL AIR SEAL ASSEMBLY

1. Remove the damping adjuster from the air seal assembly (Fig. 21). Remove both O-rings.
2. Apply a thin layer of Teflon grease to a new O-ring and install onto the damping adjuster. Make sure the "D" shaped adjusting axle and the pin inside the damping adjuster line up correctly, and install the damping adjuster. Place the thin washer between the damping adjuster and air seal assembly.
3. Apply a thin layer of Teflon grease to a new O-ring and install it onto the air seal assembly. Make sure the pin on the damping adjuster does not hit the damping stop (Fig. 21) as you press the air seal assembly over the damping adjuster. Do not press further than contact with the adjusting axle. Note: Used O-rings may be scratched, which could cause pressure loss.
4. Align the flats of the damping dial with the corresponding flats of the damping adjuster, and temporarily install the damping dial (without any other parts). Use the damping dial to rotate the damping adjuster several turns counter-clockwise. Then turn the adjuster clockwise until it stops. Remove the damping dial.
5. Install a new stanchion snapping.
6. Inflate the stanchion to 20-30 psi (1.3-2 bar).

### INSTALL DAMPING DIAL

1. Apply a thin coat of Teflon grease to the outside and bottom of the damping dial, and to the two springs and balls of the detent system. Note: it is not necessary to replace the O-ring on the damping dial.



Fig. 17

Slide  
Hammer

Slider

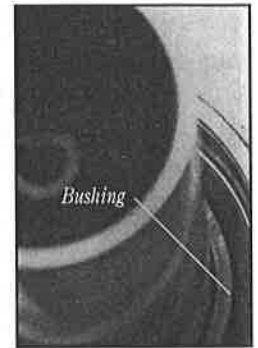


Fig. 18

Bushing



Fig. 19

Wiper Lip  
Snapping  
Groove  
Installation  
Cap  
Seal

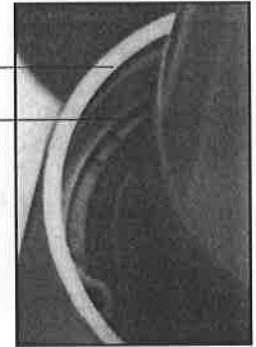


Fig. 20

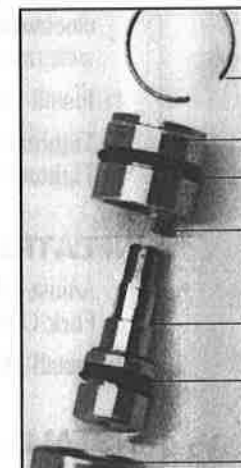


Fig. 21

Snapping  
Air Seal  
Assy.  
O-ring  
Damping  
Stop  
Damping  
Adjuster  
O-ring  
Stanchion

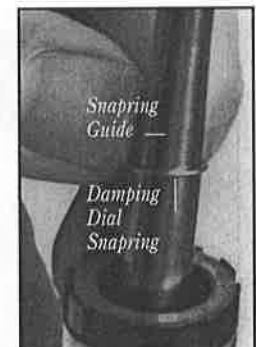


Fig. 22

Snapping  
Guide  
Damping  
Dial  
Snapping

# MOGUL BLACK DIAMOND SUSPENSION FORK

## TUNING TIPS

### DECREASING THE RESISTANCE OF THE DAMPING DIAL

To make the damping adjuster turn more easily, one of the detent systems can be removed.

1. Turn the damping dial to its maximum position.
  2. Note the position of the dial relative to the fork crown slot.
  3. Remove the damping dial, as shown in the rebuild instructions.
  4. Remove one of the balls and its spring. This will reduce the click force by one half and allow the dial to turn more easily.
  5. Reinstall the damping dial in its previous position (a new snapping is recommended).
- Note: Keep the spring and ball in case the customer decides that they want more resistance in the damping adjustment at a later date.

### ADJUST THE DAMPING

Damping refers to anything that slows the compression or rebound of a spring. Compression damping, along with the spring of the system, resists movement of the system during impact. Rebound damping works against the spring as it returns the suspension system to its normal position.

Damping is usually accomplished through friction, whether it comes from the friction within pivot points, hysteresis (molecular friction within an elastomer), or by channelling oil through a valving system. The amount of friction in a damping system depends on the thickness (viscosity) of oil used. When considering the best weight (viscosity) of oil, there are three main considerations:

Oil Weight (ISO)	5	10	20
Size of rider	< 130 lbs.	120-220 lbs.	>200 lbs.
Speed of rider	slower	average	fast
Roughness of terrain	smoother	average	big bumps
Temperature	< 32°	32-100°	>100°

The weight of the rider is important because more weight means more impact energy. The speed (including speed of the sliders when hitting larger bumps in rougher terrain) is important because greater speeds mean higher impact energy. Particularly cold temperatures are important because oil viscosity is effected by temperature.

One point to remember about shocks- there is a difference between "suspension" and "shock absorbtion". A spring provides suspension without actually absorbing any shock. Hydraulic damping is the most effective way of actually absorbing impact energy. If you reduce or add damping, total energy absorbtion will change.

### ADJUSTING THE SPRING RATE (PROGRESSIVENESS)

When an air chamber is compressed, the pressure in that chamber goes up. The rate at which the pressure increases, we talk about how progressive the spring is. To control this progressiveness is the volume of air, and the percentage of change. Example: If an air chamber is 4" long and it is compressed by 1", the pressure will double. If an air chamber is 2" long, and it is compressed by 1", the pressure will double.

In mind, it is possible to alter the progressive rate of the air spring in your fork. By adding oil (decreasing the air volume) you will have a more progressive system. The fork will compress, rebound more quickly, given the same initial air pressure. If you remove the oil, you get a less progressive spring that will travel more with smaller bumps and rebound more slowly. Always, do not vary oil depth by more than 15mm from Trek specifications.

# MOGUL BLACK DIAMOND SUSPENSION FORK

## PARTS LIST

### FORK CROWNS, STEERERS, AND PARTS

#### 1" Cro-Moly Steerers

- 51087 Crown steerer, 150mm length
- 51088 Crown and steerer, 171mm length
- 51089 Crown and steerer, 206mm length
- 51090 Crown and steerer, 255mm length, unthreaded

#### 1 1/8" Cro-Moly Steerers

- 51091 Crown and steerer, 150mm length
- 51092 Crown and steerer, 171mm length
- 51093 Crown and steerer, 206mm length
- 51094 Crown and steerer, 255mm length, unthreaded
- 51096 Crown and steerer, 210mm length

#### 1 1/8" Alloy Steerers

- 51095 Crown and steerer, 255mm length, unthreaded

#### Parts

- 52007 Crown pinch bolt with washer (20/pkg)

### BRAKE ARCH PARTS

- 51992 Brake cable housing stop, black
- 51993 Brake cable housing stop, silver
- 51098 Arch, black
- 51099 Arch, silver
- 51097 Brake cable housing stop allen head bolt
- 52056 Brake cable housing stop washer
- 51106 Brake stud, '93

### ACCESSORIES

- 51100 Boots, black, pair
- 51101 Boots, clear, pair
- 51109 Inflator

### FORK BLADES

- 51102 Mogul, left
- 51103 Mogul, right
- 51104 Mogul Black Diamond, left
- 51105 Mogul Black Diamond, right

### KITS

- 51995 Master
- 51996 Rebuild/Overhaul
- 51997 Oil Change
- 52050 5 Wt. (ISO), blue, 8 oz.
- 52051 10 Wt. (ISO), clear, 8 oz.
- 52052 20 Wt. (ISO), red, 8 oz.
- 52053 5 Wt. (ISO), blue, 1 gal.
- 52054 10 Wt. (ISO), clear, 1 gal.
- 52055 20 Wt. (ISO), red, 1 gal.