



# Mogul Black Diamond / Extreme Tuning

## ADJUST THE DAMPING

The performance of oil damped suspension systems can be modified by changing the amount of damping. Damping refers to anything that slows the compression or rebound of a spring. The easiest way to change the damping is to change the viscosity of the oil. Trek Mogul suspension forks come with 10 Wt. oil.

When considering the best weight (viscosity) of oil, there are three main considerations:

	5 Wt.	10 Wt.	20 Wt.
Size of rider	< 130 lbs.	120-220 lbs.	>200 lbs.
Speed	slower	average	fast
Temperature	< 32°	32-100°	>100°

The weight of the rider is important because more weight means more impact energy.

The speed is important because greater speeds mean higher impact energy. Speed should also be thought of as the speed of the slider as the wheel moves over bumps. In other words, bigger bumps also mean higher impact energy.

Particularly cold temperatures are important because oil viscosity is effected by temperature. The 1994 Mogul uses a synthetic type oil, which is less effected by temperature than other oils.

One point to remember about shocks- there is a difference between "suspension" and "shock absorption". A spring provides suspension without actually absorbing any shock by storing energy, and then releasing it. Hydraulic damping is the most effective way of actually absorbing some impact energy by changing the impact energy to heat (frictional) energy. If you reduce or add damping, total impact energy absorption of the fork will also change.

## ADJUST THE SPRING RATE (PROGRESSIVENESS)

As the volume of an air chamber is compressed, the pressure in that chamber goes up. When we refer to the rate at which the pressure increases, we talk about how *progressive* the spring is.

The factors which control how progressive your fork is include the volume of air and the percentage of volume change during compression of the fork. Let's look at an example: If an air chamber is 4" long and it is compressed by 1", the pressure will increase by a third. If an air chamber is 2" long, and it is compressed by 1", the pressure will double!

With this principle in mind, it is possible to alter the progressive rate of the air spring in your suspension fork. By adding oil (decreasing the air volume) you will have a more progressive system. This system will feel firmer, and rebound more quickly.

By decreasing oil volume, you get a less progressive spring that will travel more with smaller impacts, but will rebound more slowly, assuming the same preload with both settings. For a more detailed discussion on these ideas, please refer to the 1994 Trek Retail Technical manual section on Suspension, pages 30-35.

*Note: When changing oil volumes, do not vary oil depth by more than 15 mm from Trek specifications.*

## Interchangeability List

The following parts are not interchangeable from the 1993 Black Diamond

Fork crown

Brake arch

Stanchion, slider, or fork leg

Air seal assembly, damping adjuster, or damping adjuster seal- **unless you replace all three together**

Brake boss

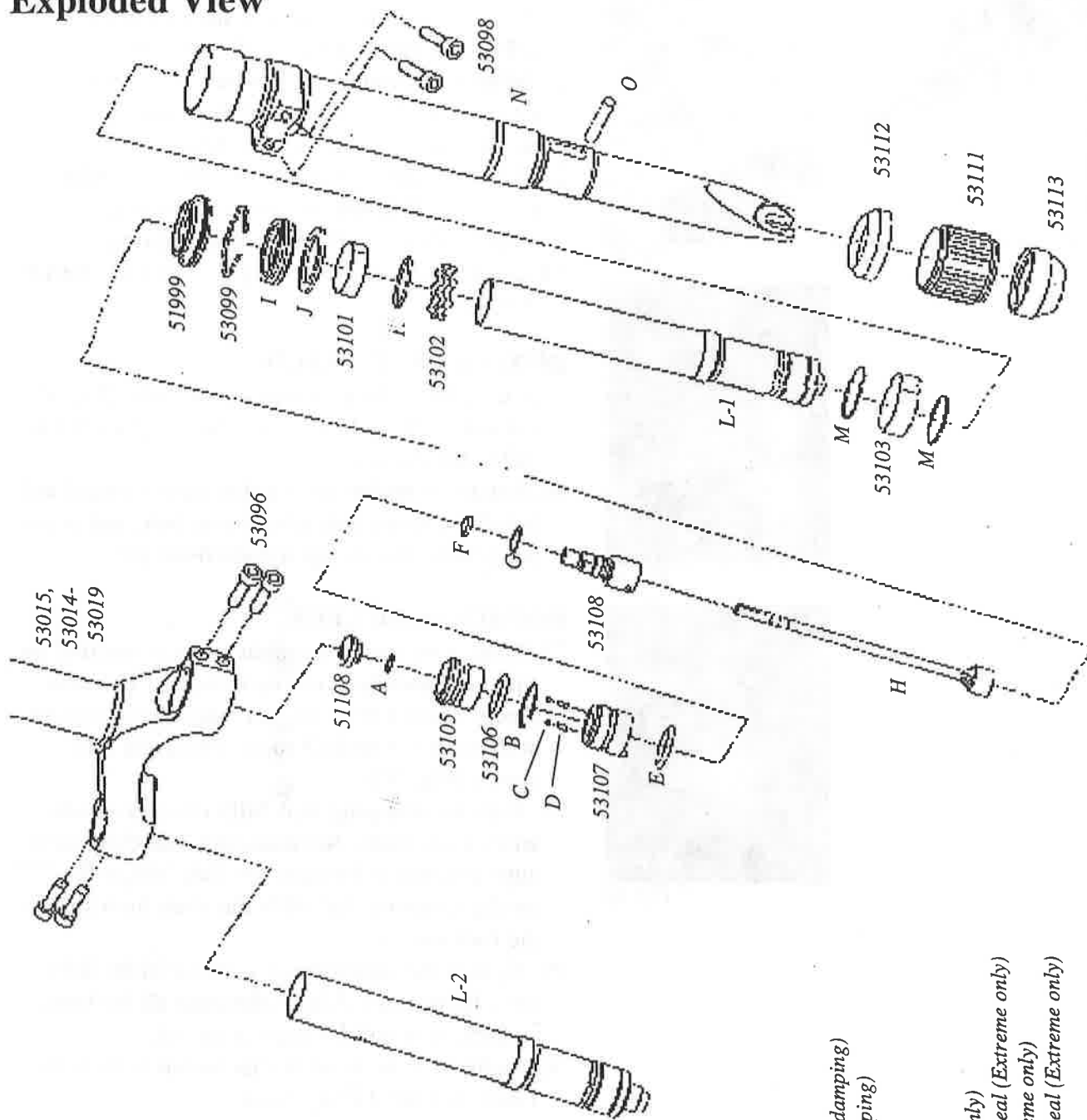
Brake arch attachment bolt

38 mm snapping

Upper and lower air adjustment dust seal (Extreme)

Air volume adjustment collar (Extreme)

# Mogul Black Diamond and Extreme Exploded View



## Part numbers and names

53015, 53014-53019	Fork crown
53096	Crown pinch bolts
51108	Air valve cap
A	Damping dial snapping
53105	Damping dial
53106	Damping dial O-ring
B	Stanchion snapping
C	Detent balls
D	Detent springs
53107	Air seal assembly
E	Air seal assembly O-ring
F	Damping adjuster seal
G	Damping adjuster washer
53108	Damping adjuster
H	Damping adjuster axle
51999	Wiper
53099	38 mm snapping
I	Seal
J	Support washer
53101	Slider bushing
K	Topout O-ring
53102	Topout elastomer
L-1	Stanchion (adjustable compression damping)
L-2	Stanchion (adjustable rebound damping)
M	Stanchion bushing snapping
53103	Stanchion bushing
N	Slider
O	Air volume adjuster pin (Extreme only)
53112	Upper air volume adjustment dust seal (Extreme only)
53111	Air volume adjustment collar (Extreme only)
53113	Lower air volume adjustment dust seal (Extreme only)
53098	Brake arch attachment bolts

# Mogul Black Diamond / Extreme Assembly

## FILL WITH OIL

11. 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.

<b>Oil Type:</b>	Trek Suspension Fork Oil Viscosity: 5, 10, or 20 Wt.
<b>Oil Volume:</b>	Black Diamond 65 cc Extreme 70 cc
<b>Oil Height:</b>	With the stanchion fully <u>compressed</u> Black Diamond 43 mm (1.7 in.) Extreme 49 mm (1.9 in.) (with air volume adjusters set at 2)

## INSTALL AIR SEAL ASSEMBLY

12. Remove the damping adjuster from the air seal assembly (Fig. 25). Remove the O-ring and seal.
13. Apply a thin layer of Teflon grease to a new seal and install onto the damping adjuster. The seal is flared, and the wider bottom of the seal is grooved.
14. Make sure the 'D' shaped adjusting axle (Fig. 26) and the pin inside the damping adjuster (Fig. 25) line up correctly, and install the damping adjuster. Grease the thin washer and place it between the damping adjuster and air seal assembly.
15. Apply a thin layer of Teflon grease to a new O-ring and install it onto the air seal assembly (Fig. 25).

*Note: Used O-rings or seals may be scratched, which could cause pressure loss.*

16. Press the air seal assembly over the damping adjuster. Make sure the pin on the damping adjuster does not hit the damping stop (Fig. 26). Do not press further than contact with the adjusting axle.
17. 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.
18. Install a new stanchion snapping.
19. Inflate the stanchion to 20-30 psi (1.3-2 bar).

## INSTALL DAMPING DIAL

20. Apply a thin coat of Teflon grease to the outside and bottom of the damping dial, to the 2 springs and 2 balls of the detent system (Fig. 27), and to the damping dial O-ring. Note: It is not necessary to replace the O-ring on the damping dial.



Fig. 25

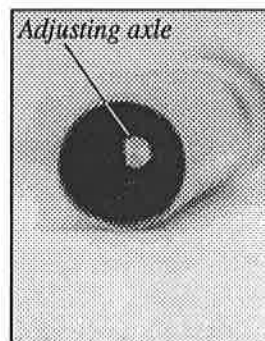


Fig. 26

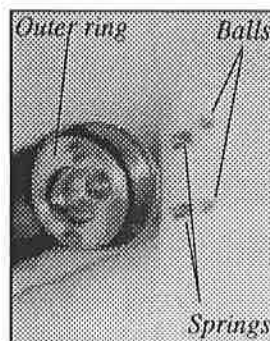


Fig. 27

# Mogul Black Diamond / Extreme Disassembly

## INSPECTION

31. Make sure there are no dents, scratches, or other wear marks on the stanchion. Any damage to the chrome stanchion surface may allow leakage at the seal. Damaged or worn stanchions should be replaced with a new fork leg.
32. Check that there are no dents in the slider.  
Dents in the slider could interfere with bushing movement and restrict the movement of the slider. Damaged sliders should be replaced with a new fork leg.
33. Do not disassemble the valving mechanism in the end of the stanchion (Fig. 18). This part is pressed in and is not serviceable. If the valve is damaged, the entire fork leg must be replaced.



Fig. 18

# Mogul Black Diamond / Extreme Disassembly

## REMOVE BRAKES AND BRAKE ARCH

1. Remove the brakes and brake arch attachment bolts (Fig. 1). Remove the brake arch.

## REMOVE FORK LEGS

2. Remove the crown pinch bolts (Fig. 1).
3. Grasp the sliders with both hands and pull downwards while pushing and pulling the fork legs (Fig. 2).

## REMOVE AIR VALVE ASSEMBLY

4. Make sure the air is at the top of each fork leg by compressing and rebounding the fork leg while in an upright position.
5. Remove the air valve cap (Fig 3).
6. Set the damping dial at maximum (4).
7. Press down on the top of the damping dial and remove the small snapping at the base of the schraeder valve (Fig. 4).
8. Pull the damping dial out of the stanchion. Remove the 2 small balls and 2 springs (Fig. 5).
9. Release all the air from the stanchion.
10. Place the wide end of the damping dial snapping driver on the outer ring surrounding the schraeder valve (Fig. 5). Push down about 1/8 inch (3 mm) into the stanchion, just until the snapping is visible (Fig. 6). There is an adjusting axle underneath which will not allow pushing any farther (Fig. 7).
11. Remove the stanchion snapping (Fig. 8).
12. Thread the puller onto the schraeder valve and pull the assembly out of the stanchion (Fig. 9).

## REMOVE THE SEAL

13. Fully extend the fork leg. Fill the stanchion with oil to 1 3/8 inch (35 mm) below the top of the stanchion.
14. Push the air valve through the air seal assembly with your fingers to remove the damping adjuster (Fig. 10). Also note the thin washer between the air seal assembly and damping adjuster. Install the damping adjuster into the stanchion, making sure the small pin inside the damping adjuster (Fig. 10) lines up with the "D" shape of the adjusting axle (Fig. 7). Press the air seal assembly over the damping adjuster. Re-install the stanchion snapping to hold the air seal assembly in place.
15. Re-seat the air seal assembly against the snapping by compressing the fork leg.



Fig. 1

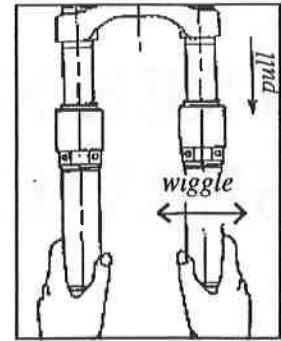


Fig. 2

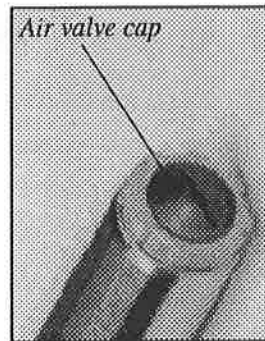


Fig. 3

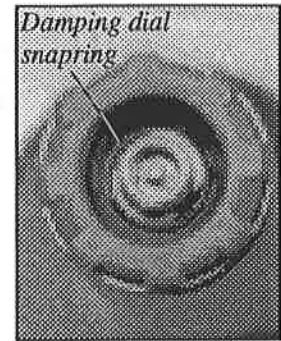


Fig. 4

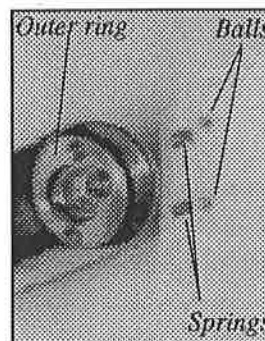


Fig. 5

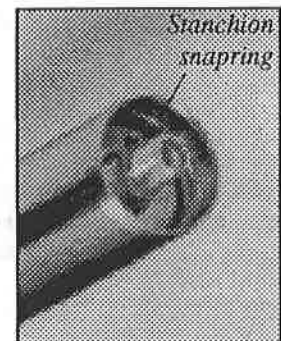


Fig. 6

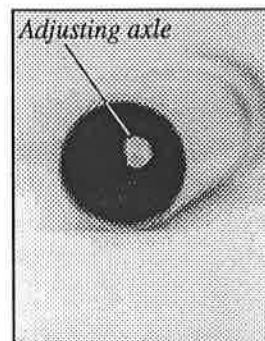


Fig. 7

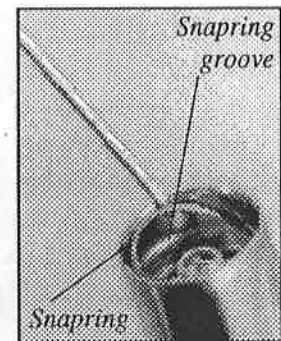


Fig. 8

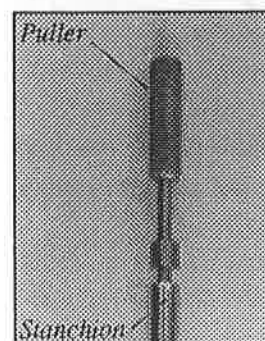


Fig. 9

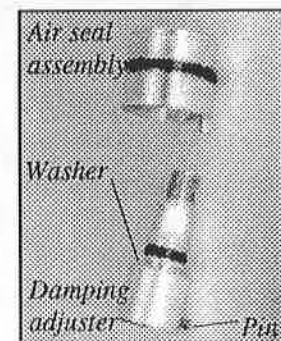


Fig. 10