INSPECTION

See Figure 1-31. Measure primary chain tension through the inspection cover opening. Adjust primary chains not meeting vertical free play specifications.

1. See Figure 1-31. Remove two fasteners with captive washers and primary chain inspection cover with gasket from primary cover.
2. See Figure 1-32. Check primary chain tension by measuring vertical free play.
   a. Measure vertical free play through chain inspection cover opening.
   b. Rotate engine to move primary chain to a different position on sprockets.
   c. Measure vertical free play several times, each time with primary chain moved so that the measurement is taken with sprockets rotated to the tightest chain position.
3. The tightest measurement taken in Step 2 must be within the specifications listed in Table 1-9. If necessary, adjust as described under 1.10 PRIMARY CHAIN in ADJUSTMENT.

NOTE

The initial primary chain vertical free play specification used at the assembly plant is 1/4-1/2 in. (6.4-12.7 mm) with a cold engine. The 1/4 in. (6.4 mm) minimum is only allowed at the absolute tightest point in the drive, as measured with specialized factory equipment. If a chain has less than 1/4 in. (6.4 mm) vertical free play (with a cold engine), adjust free play to the "field" specification of 3/8-1/2 in. (9.5-12.7 mm). The looser specification will avoid overtightening, which might otherwise occur during adjustment using "non-factory" equipment and methods.

4. See Figure 1-31. Install primary chain inspection cover and **new** gasket to primary cover using two fasteners with captive washers. Tighten fasteners to 84-108 **in-lbs** (10-12 Nm).

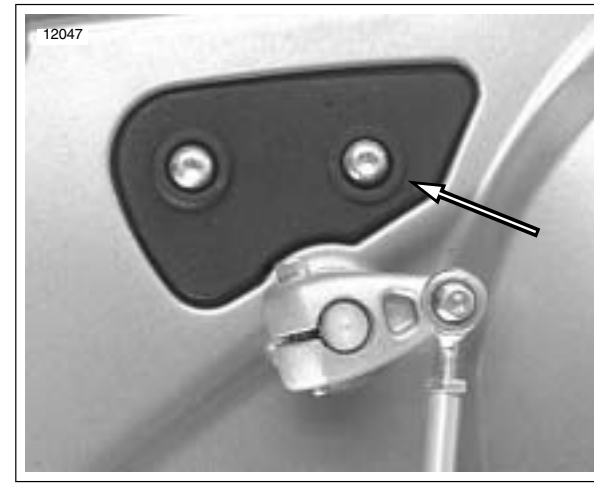


Figure 1-31. Primary Chain Inspection Cover

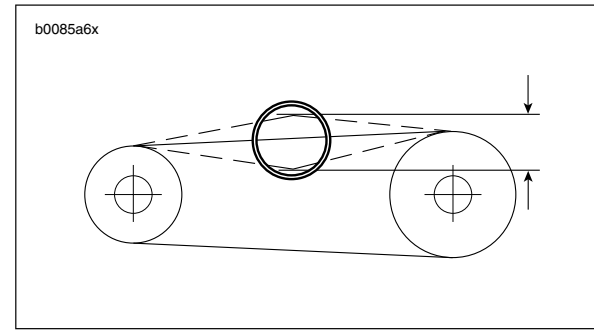


Figure 1-32. Measuring Primary Chain Free Play

Table 1-9. Primary Chain Free Play

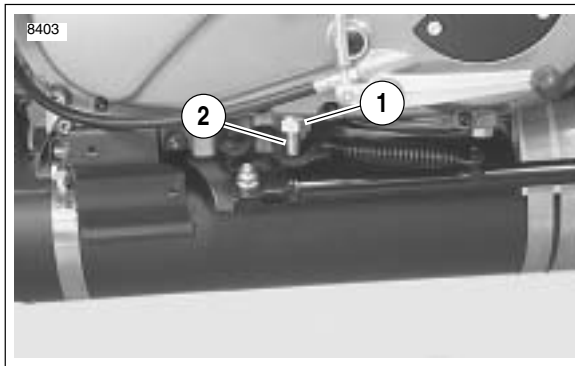
ENGINE TEMPERATURE	in.	mm
Cold	3/8-1/2	9.5-12.7
Hot (normal running temperature)	1/4-3/8	6.4-9.5

ADJUSTMENT

NOTE

If vertical free play cannot be set within the limits specified, then primary chain and/or chain adjuster are worn beyond adjustment limits. Replace parts as necessary. See 6.5 PRIMARY CHAIN.

1. See Figure 1-33. Loosen locknut (1).
2. Turn adjusting fastener (2):
   a. Clockwise (inward) to reduce free play.
   b. Counterclockwise (outward) to increase free play.
3. Tighten locknut (1) to 20-25 ft-lbs (27-34 Nm).



1. Locknut
2. Adjusting Fastener

Figure 1-33. Chain Tension Adjusting Fastener

SUSPENSION DAMPING ADJUSTMENTS 1.11

GENERAL

⚠WARNING

Before evaluating and adjusting suspension settings, check the motorcycle's tires. Be sure tires are properly inflated, balanced and have adequate tread. Inspect your tires regularly and see a Buell dealer for replacements. Riding with excessively worn, unbalanced or underinflated tires can adversely affect stability and handling, which could result in death or serious injury. (00114a)

Make all suspension adjustments in one or two click increments. Adjusting more than one or two clicks at a time may cause you to skip the best adjustment. Test ride after each adjustment. When an adjustment makes no difference, return to the previous adjustment and try a different approach.

If both preload adjustments are correct, and you have the rebound and compression damping set at the factory recommended points, the motorcycle should handle and ride properly. If you wish to fine tune these settings they can be changed according to the following procedures.

NOTE

Evaluating and changing the rebound and compression damping is a very subjective process. Many variables affect motorcycle handling under different circumstances. Approach all changes carefully and consult Table 1-10.

FINE TUNING SUSPENSION: BUELL MODELS

The settings are the best balance of handling, ride, and stability. Suspension can be changed to accommodate rider preferences for ride quality and handling for road conditions and load changes.

NOTES

- *Do not continue to repeat the steps involved with the following settings beyond those which are listed.*
- *Adjust suspension to the recommendation if possible, but never force adjusters beyond the mechanical stops.*

⚠WARNING

Do not operate motorcycle with loose, worn or damaged steering or suspension systems. Contact a Buell dealer for repairs. Loose, worn or damaged steering or suspension components can adversely affect stability and handling, which could result in death or serious injury. (00113a)

Changes in Load

Changes in the load carried requires changes in the preload setting(s). Carrying less weight than was used for setting up the suspension requires decreasing the amount of preload. Increasing the load carried requires adding more preload.

⚠WARNING

Do not exceed the motorcycle Gross Vehicle Weight Rating (GVWR). Exceeding the GVWR can affect stability and handling, which could result in death or serious injury. (00016a)

- GVWR is the sum of the weight of the motorcycle, accessories, and the maximum weight of the rider, passenger and cargo that can be safely carried.
- The GVWR is shown on the information plate, located on the frame steering head.

Ride Quality Enhancement

The stock settings are designed to offer sufficient chassis control, but some may choose to enhance ride comfort over rougher road conditions or for long rides. Adjusting the compression setting will reduce both high and low speed damping.

1. Adjust suspension for rider weight. Refer to Table 1-10.
2. Increase ride quality by reducing front and rear compression damping by turning adjuster counterclockwise 1/4-1 turn.
3. If additional ride quality is desired, reduce front preload by turning adjuster counterclockwise until an additional line is visible and also reduce rear preload 1 position.
4. If maximum ride quality is desired, decrease front and rear rebound damping by turning adjusters counterclockwise by 1/4-1/2 turn.

Enchanced Steering Quickness

The response to steering input (quickness) may be enhanced by adjusting the vehicles front/rear ride height. This adjustment effectively decreases the vehicles rake angle. This is achieved by adjusting the preload to increase front sag and reduce rear sag.

1. Adjust suspension for rider weight. Refer to Table 1-10.
2. Reduce steering effort by increasing the rear preload one position.
3. If more enhanced steering and cornering control is desired, reduce front preload by turning adjuster counterclockwise until an additional line is visible.
4. If additional enhanced steering and cornering control is desired, increase rear compression damping by turning adjuster clockwise by 1/4-1/2 turn.
5. If maximum enhanced steering and cornering control is desired, increase front rebound damping by turning adjuster clockwise 1/4 turn.

Chassis Control/Handling Enhancement

To provide more road surface feedback on smoother road conditions, increase compression and rebound settings.

1. Adjust suspension for rider weight. Refer to Table 1-10.
2. Increase chassis/handling control by increasing front and rear compression damping by turning adjuster clockwise by 1/2-1 1/2 turns.
3. If maximum chassis control/handling control is desired, increase front and rear rebound damping by turning adjuster clockwise by 1/4-1/2 turn.

Cold Weather Riding Less Than 65° F (18° C)

The viscosity of the suspension fluid increases as the temperature decreases. As the fluid viscosity increases so does the damping. It is recommended to compensate for the varying fluid viscosity by readjusting the damping adjuster positions when operating outside the normal ambient temperature range of 65-95° F (18-35° C).

1. Adjust suspension for rider weight. Refer to Table 1-10.
2. Reduce front and rear compression damping and rebound damping by turning adjuster counterclockwise 1/4-1/2 turn.

Table 1-10. Recommended Suspension Settings for Rider Weight

RIDER AND CARGO WEIGHT		FRONT FORK			REAR SHOCK		
LB.	KG	PRELOAD # OF LINES	*COMPRESSION	*REBOUND	Turns in from Minimum**	*COMPRESSION	*REBOUND
Less than 170	77	6	1 1/4	1 3/4	4	2	1 3/4
170-200	77-91	5	1	1 5/8	8	1 3/4	1 1/4
200-230	91-104	5	1	1 5/8	12	1 1/2	1
230-260	104-118	4	1	1 1/2	16	1 1/4	7/8
260-290	118-132	4	3/4	1 1/2	20 (max)	1	3/4
290-320	132-145	3	3/4	1 1/4	20 (max)	3/4	5/8
320-GVWR	145-GVWR	3	3/4	1 1/4	20 (max)	1/2	1/2

* All damping adjustments are turns out from maximum.

**Note: The rear preload knob has a click every 1/2 turn. For example: 4 turns from minimum would be 8 clicks. 5 turns (10 clicks) will move it one reference line.

SUSPENSION ADJUSTMENTS

⚠WARNING

Both forks should display the same number of alignment lines. Forks that are not properly aligned can lead to loss of control, which could result in death or serious injury. (00124a)

The recommended rebound and compression damping settings for various road and riding conditions are given in Table 1-10.

Setting Front Fork Preload

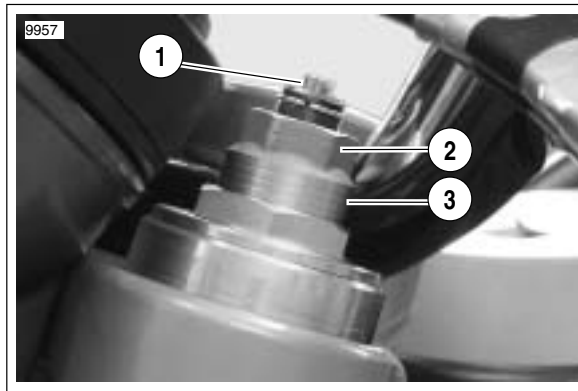
1. Check number of lines (3) to be showing for your load condition. Refer to Table 1-10.
2. See Figure 1-34. Adjust preload by turning the adjuster nut (2) with a wrench.

Setting Front Fork Rebound Damping

1. See Figure 1-34. Using a screwdriver, turn the slotted dial (1) clockwise until it stops. This is the maximum rebound damping setting.
2. Then turn the dial counterclockwise the recommended amount specified in Table 1-10.

Setting Front Fork Compression Damping

1. See Figure 1-35. Using a screwdriver, turn the slotted dial clockwise until it stops. This is the maximum compression damping setting.
2. Then turn the dial counterclockwise the recommended amount specified in Table 1-10.



1. **Rebound adjuster screw**
2. **Preload adjuster nut**
3. **Four lines visible**

Figure 1-34. Front Fork Preload And Rebound Adjuster

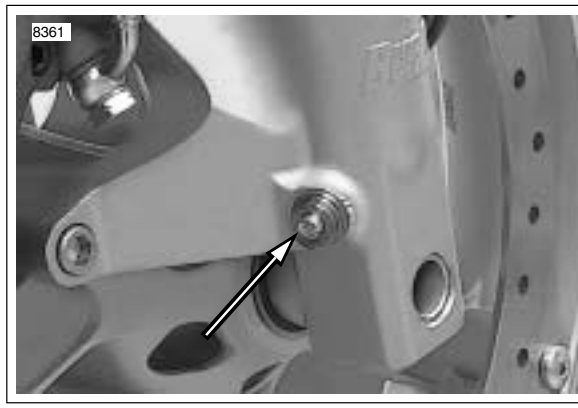


Figure 1-35. Front Fork Compression Damping Adjuster

Set Rear Shock Preload

NOTES

- *See Figure 1-36. Adjust the preload by turning the preload adjuster knob located on the left side of the vehicle according to Table 1-10.*
- *Rotate adjuster clockwise to increase preload.*
- *Rotate adjuster counter clockwise to decrease preload.*

Set Rear Shock Rebound Damping

1. See Figure 1-37. Using a screwdriver, turn the slotted rebound adjustment dial clockwise until it stops. This is the maximum rebound damping setting.
2. Then turn the dial counterclockwise the number of turns recommended in Table 1-10.

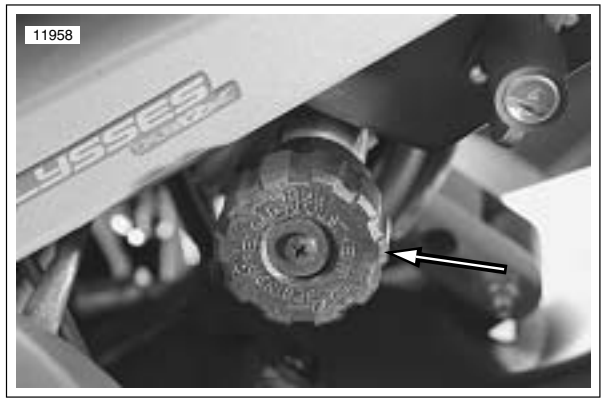


Figure 1-36. Rear Shock Preload Adjuster

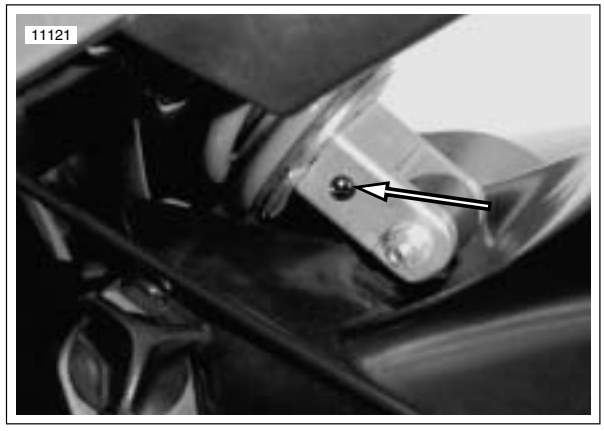


Figure 1-37. Rear Shock Rebound Adjustment Dial

Setting Rear Shock Compression Damping

1. See Figure 1-38. Using a screwdriver, turn the slotted dial clockwise until it stops. This is the maximum compression damping setting.
2. Turn the dial counterclockwise the number of turns from maximum specified in Table 1-10.

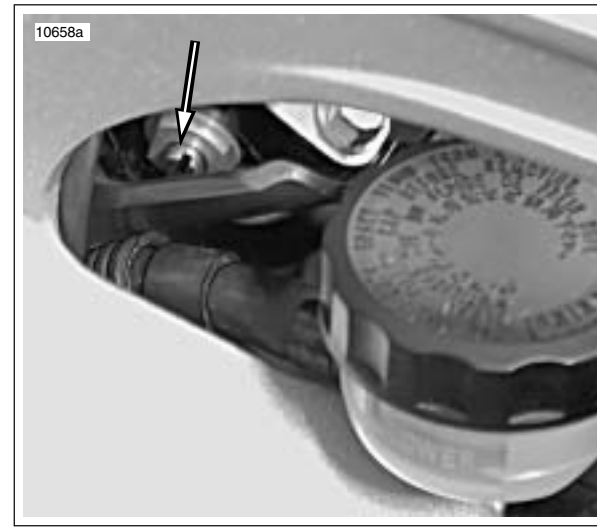


Figure 1-38. Rear Shock Compression Adjuster

STEERING HEAD BEARINGS 1.12

GENERAL

The steering head bearings are sealed, angular contact bearings and do not require additional lubrication.

Check steering head bearing resistance:

- At every 5000 mile (8000 km) service interval.
- When storing or removing the motorcycle for the season.

INSPECTION

NOTES

- *Check that throttle cables do not bind when measuring bearing resistance.*
- *Steering head bearings are sealed and do not require additional lubrication.*
- *Steering head bearing resistance is not adjustable. Replace bearings that do not meet resistance specifications.*

1. Detach clutch cable at handlebar.
2. Place a scissor jack under jacking point and raise front wheel off ground. For location of jacking point see 2.32 EXHAUST SYSTEM.

⚠WARNING

Steering must be smooth and free with no binding or interference. Do not operate motorcycle with loose, worn or damaged steering or suspension systems. Contact a Buell dealer for repairs. Loose, worn or damaged steering or suspension components can adversely affect stability and handling, which could result in death or serious injury. (00113a)

3. Check steering stem bearings for notches by turning front wheel full right and then left. Repeat if necessary.
4. Next place wheel facing straight ahead and grabbing both fork sides at the bottom move front-end forward and back to check for steering head play.
5. To inspect for correct steering head resistance turn front wheel all the way to the right.
6. See Figure 1-39. Hook a spring scale into the hole in the front axle. With scale 90 degrees from fork leg, pull front wheel to center position.
   a. The desired resistance to pull front wheel to center is between 1-7 lbs (0.5-3.2 kg).
   b. If steering head resistance measurement is not within specification, see DETERMINING PROPER RESISTANCE.
7. When adjustment is complete, attach clutch cable and adjust. See 1.8 CLUTCH.

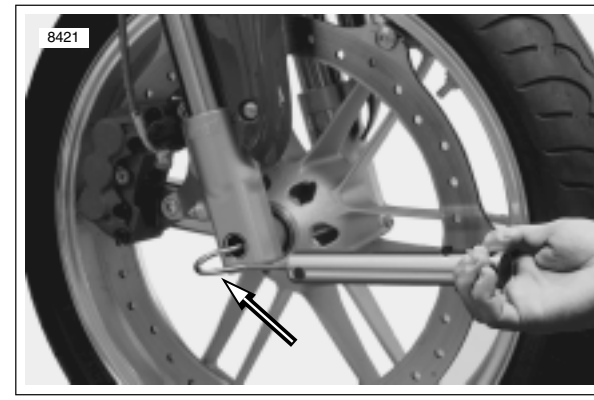


Figure 1-39. Measuring Steering Head Bearing Resistance (Typical)

DETERMINING PROPER RESISTANCE

1. Detach clutch cable at handlebar and ensure that throttle cables do not bind before measuring steering head bearing resistance.
2. Remove steering stem pinch fastener at upper triple clamp.
3. Loosen steering stem capnut and back off several turns.
4. Remove lower triple clamp pinch fasteners, two per side.
5. Tighten steering stem capnut to 38-42 ft-lbs (52-57 Nm).
6. Turn front wheel all the way to the right.
7. See Figure 1-39. Hook a spring scale into the hole in the front axle. With scale 90 degrees from fork leg, pull front wheel to center position.
8. The desired resistance is between 1-7 lbs (0.5-3.2 kg).

NOTE

If the correct specification cannot be achieved, the steering head bearings must be replaced. See 2.18 STEERING HEAD BEARINGS.

9. Once correct steering head resistance has been verified, apply LOCTITE 271 to steering stem pinch bolt, install and tighten to 20-22 ft-lbs (27-30 Nm).
10. Apply LOCTITE 271 to lower triple clamp fasteners, install and tighten to 20-22 ft-lbs (27-30 Nm).
11. When adjustment is complete, attach clutch cable and adjust. See 1.8 CLUTCH.
12. Remove scissor jack.

INSPECTION

Check spark plugs:

- Replace every 10,000 mile (16,000 km) service interval.
- Use only Harley-Davidson 10R12A spark plugs.

1. Remove left side air scoop to access front cylinder spark plug. See 2.40 AIR SCOOPS.
2. Disconnect spark plug wire from front spark plug.
3. Using a 5/8 in. box end wrench and 5/8 in. spark plug socket, remove front spark plug.
4. Remove seat. See 2.45 SEAT.
5. Remove airbox assembly. See 4.44 AIR CLEANER ASSEMBLY.
6. Disconnect spark plug wire from rear spark plug (use automotive spark plug boot remover/installer if required).
7. Using a 5/8 in. wobble socket and 12 in. extension, remove rear spark plug.
8. See Figure 1-40. Compare your observations of the plug deposits with the descriptions provided below.

    a. A wet, black and shiny deposit on plug base, electrodes and ceramic insulator tip indicates an oil fouled plug. The condition may be caused by one or more of the following: worn pistons, worn piston rings, worn valves, worn valve guides, worn valve seals, a weak battery or a faulty ignition system.

    b. A dry, fluffy or sooty black deposit indicates an air-fuel mixture that is too rich and/or engine idling for excessive periods.

    c. A light brown, glassy deposit indicates an overheated plug. This condition may be accompanied by cracks in the insulator or by erosion of the electrodes and is caused by an air-fuel mixture that is too lean, a hot-running engine, valves not seating or improper ignition timing. The glassy deposit on the spark plug is a conductor when hot and may cause high-speed misfiring. A plug with eroded electrodes, heavy deposits or a cracked insulator must be replaced.

    d. A plug with a white, yellow, tan or rusty brown powdery deposit indicates balanced combustion. Clean off spark plug deposits at regular intervals.

Figure 1-40. Typical Spark Plug Deposits

⚠WARNING

Compressed air can pierce the skin and flying debris from compressed air could cause serious eye injury. Wear safety glasses when working with compressed air. Never use your hand to check for air leaks or to determine air flow rates. (00061a)

9. If the plugs require cleaning between tune-ups and replacement plugs are not available, proceed as follows:
   a. Degrease firing end of spark plug using ELECTRICAL CONTACT CLEANER. Dry plug with compressed air.
   b. Use a thin file to flatten spark plug electrodes. A spark plug with sharp edges on its electrodes requires 25-40% less firing voltage than one with rounded edges.
10. If the plugs cannot be cleaned, replace with 10R12A spark plugs.
11. Check electrode gap with a wire-type feeler gauge. Gap should be 0.035 in. (0.9 mm).
12. Apply LOCTITE ANTI-SEIZE to threads of spark plugs. Install and tighten spark plugs to 12-18 ft-lbs (16-24 Nm).

NOTES

- *Start threading rear spark plug with 3/8" fuel hose being careful not to cross thread spark plug.*
- *Start front spark plug with fingers.*
- *An extension may be needed to push on rear spark plug boot to ensure it is seated properly.*

13. Connect spark plug wires. Verify that wires are securely connected to coil and spark plugs. See 7.4 SPARK PLUG CABLES.
14. Install left side air scoop. See 2.40 AIR SCOOPS.
15. Install airbox assembly. See 4.44 AIR CLEANER ASSEMBLY.

⚠WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

16. Install seat. See 2.45 SEAT.

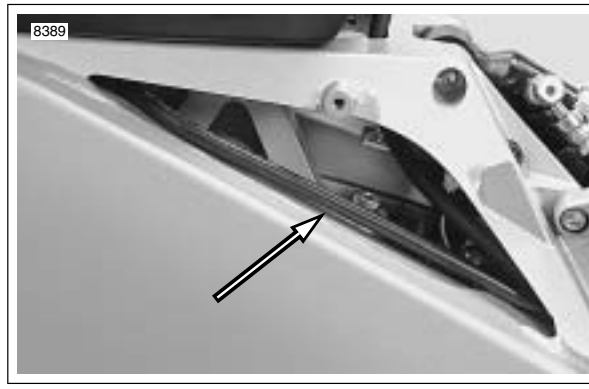


Figure 1-41. Rear Spark Plug Access

AIR CLEANER FILTER 1.14

REMOVAL

CAUTION

Install air filter before running engine. Failure to do so can draw debris into the engine and could result in engine damage. (00207a)

Check air cleaner filter element:

- Inspect at the 1000 mile (1600 km) service interval and at every 5000 mile (8000 km) service interval thereafter.
- Replace at every 20,000 mile (32,000 km) service interval.

NOTES

- *Inspect and replace air cleaner filter element more often if the motorcycle is run in a dusty environment.*
- *Do not cover or restrict the air intake screen. Certain tank bags or accessories may cover or restrict the air intake screen. This may reduce power and performance.*

1. Remove seat. See 2.45 SEAT.
2. Remove four fasteners, nylon washers and intake cover assembly. See 2.39 INTAKE COVER ASSEMBLY.
3. See Figure 1-43. Remove fuel vent tube (3) from vapor valve at front of air cleaner cover and groove on top of air cleaner cover (1).
4. Unlatch six latching tabs (6) and remove air cleaner cover from baseplate.
5. See Figure 1-44. Remove the filter element (1) from baseplate (2). Inspect and replace if necessary.

CAUTION

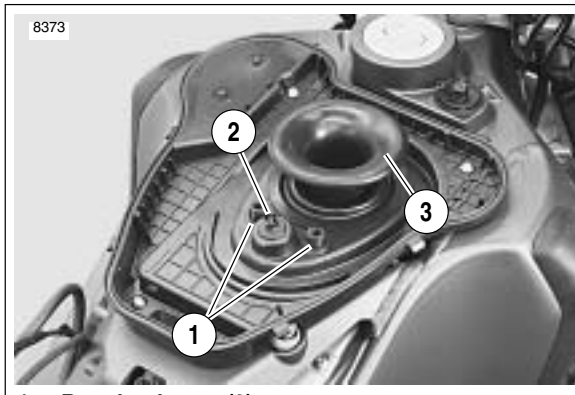
See Figure 1-44. Cover the velocity stack so nothing can drop into the motor.

CLEANING AND INSPECTION

⚠WARNING

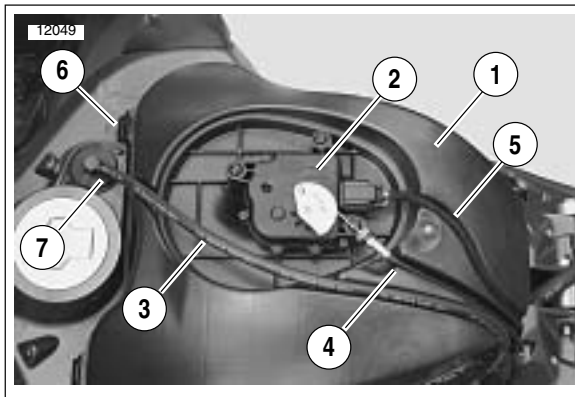
Do not use gasoline or solvents to clean filter element. Flammable cleaning agents can cause an intake system fire, which could result in death or serious injury. (00101a)

1. Check filter element. Hold filter element up to strong light source. The element can be considered sufficiently clean if light is uniformly visible through the element.
2. Thoroughly clean baseplate and inside of air cleaner cover.
3. See Figure 1-42. Make sure two crankcase breather hoses (1) and intake air sensor (2) are captured in baseplate behind velocity stack (3).



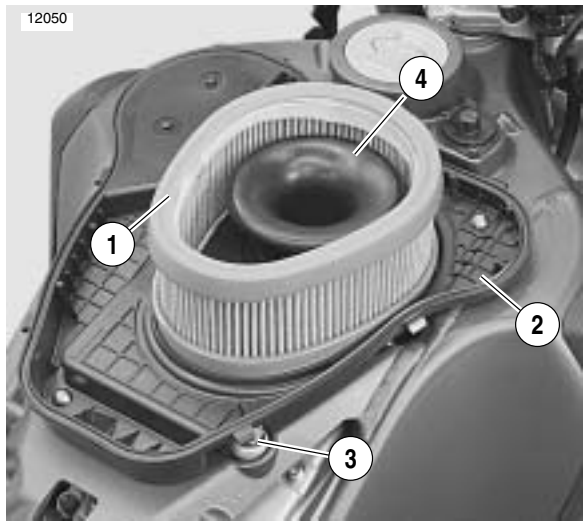
1. **Breather hoses (2)**
2. **Intake air sensor**
3. **Velocity stack**

Figure 1-42. Air Cleaner Baseplate Assembly



1. **Air cleaner cover**
2. **Actuator (interactive exhaust)**
3. **Fuel vent tube**
4. **Cable (interactive exhaust)**
5. **Harness (interactive exhaust)**
6. **Air cleaner cover latch tabs**
7. **Vapor valve**

Figure 1-43. Air Cleaner Cover, Fuel Vent Tube and Fuel Vapor Valve



1. **Filter element**
2. **Baseplate assembly**
3. **Air cleaner cover latch tabs (6)**
4. **Velocity stack**

Figure 1-44. Installed Air Cleaner Filter Element

INSTALLATION

1. See Figure 1-44. Place filter element (1) on baseplate (2).
2. Position air cleaner cover over baseplate. Make sure air filter remains correctly positioned.
3. Install air cleaner cover by latching six latch tabs (3) to baseplate.
4. Position actuator cable and harness in grooves on air cleaner cover.
5. See Figure 1-43. Position fuel vent tube (3) in groove on top of air cleaner cover and connect to fuel vent valve (7). Secure vent tube to vent valve with **new** cable strap.
6. Install intake cover assembly with four fasteners and nylon washers. Tighten fasteners to 12-36 **in-lbs** (1.3-4 Nm).

⚠WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

7. Install seat. See 2.45 SEAT.

THROTTLE CABLE AND IDLE SPEED ADJUSTMENT 1.15

THROTTLE CABLE

⚠WARNING

Throttle cables must not pull tight when handlebars are turned fully to left or right fork stops. Be sure wires and throttle cables are clear of fork stops at steering head so they will not be pinched when fork is turned against stops. Steering must be smooth and free with no binding or interference. Anything interfering with steering system operation may cause loss of vehicle control, which could result in death or serious injury.

NOTE

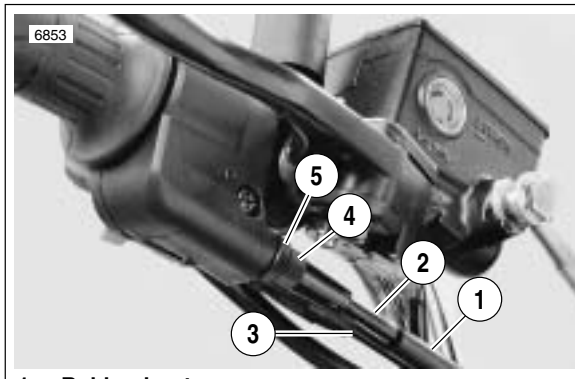
If replacing the idle adjustment cable it will be necessary to apply anti-seize to the threads before installing to the throttle body assembly.

Check throttle cable adjustment:

- Before every ride.
- At every scheduled service interval.

With engine running, turn handlebars through full range of travel. If engine speed changes during this maneuver, turn engine OFF and adjust throttle cables as follows:

1. If removing the throttle cable, remove the air cleaner cover, filter and baseplate. See 4.44 AIR CLEANER ASSEMBLY.
2. Remove left air scoop. See 2.40 AIR SCOOPS.
3. See Figure 1-45. Loosen cable adjuster lock (5) on each.
4. Turn adjusters (4) in direction which will shorten cable housings to minimum length.
5. Point front wheel straight ahead. Twist throttle control grip to fully open position; hold in position.
6. Turn adjuster on throttle control cable (2) until throttle cam stop touches stop plate. Tighten cable adjuster lock on throttle control cable adjuster; release throttle control grip.
7. Turn handlebars fully to right. Turn adjuster on idle control cable (3) until end of cable housing just touches the cable guide.
8. Twist and release throttle control grip a few times. Throttle plate must return to idle position each time throttle grip is released. If this is not the case, turn adjuster on idle control cable (shortening cable housing) until throttle control functions properly.
9. Tighten cable adjuster lock on idle control cable. Recheck operation of throttle control.
10. Install left air scoop. See 2.40 AIR SCOOPS.
11. If it was necessary to remove airbox, baseplate and intake cover assembly, install at this time. See 4.44 AIR CLEANER ASSEMBLY.
12. Recheck engine slow idle speed; adjust if required.



1. **Rubber boot**
2. **Throttle control cable**
3. **Idle control cable**
4. **Cable adjuster**
5. **Cable adjuster lock**

Figure 1-45. Throttle Control Cables

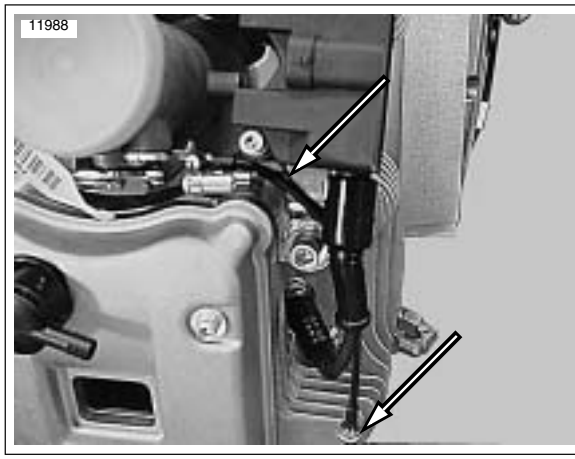


Figure 1-46. Idle Adjuster (behind left fork)

IDLE SPEED

NOTE

See Figure 1-46. Run vehicle until engine temperature is 320 °F (160° C). Regular idle speed is 1050 - 1150 RPM. Set idle speed using idle adjuster. Turn adjuster clockwise to increase idle speed or counterclockwise to decrease idle speed.

INTERACTIVE EXHAUST CABLE 1.16

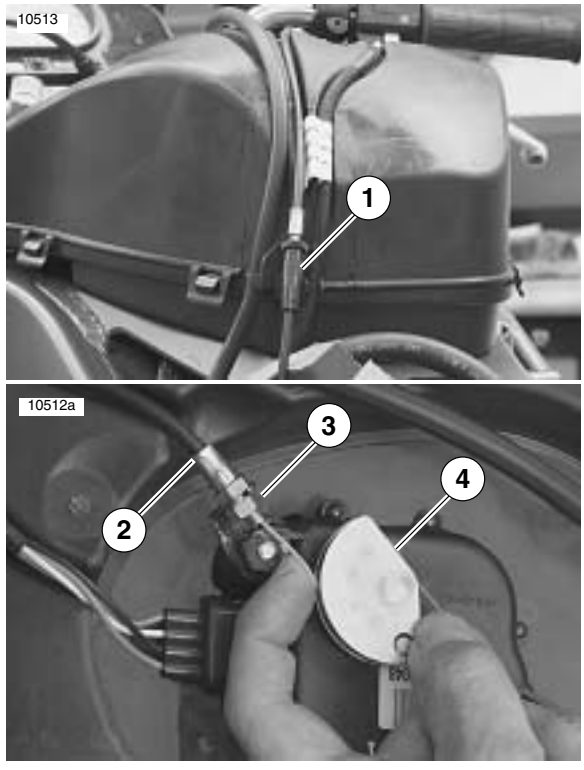
ADJUSTMENT

1. Remove four fasteners, nylon washers and intake cover assembly. See 2.39 INTAKE COVER ASSEMBLY.

NOTE

When the ignition/light switch is turned off with the interactive exhaust valve in motion, the valve will stop partially open which will cause an inaccurate adjustment. For a description of the inactive exhaust operation, see 7.6 INTERACTIVE EXHAUST SYSTEM.

2. To close the valve in the muffler, cycle the actuator:
   a. Hold the throttle wide open.
   b. Turn the engine cut-off switch to RUN.
   c. Turn the ignition/light key switch ON.
   d. Watch the actuator cycle close/open/close.



1. **Adjuster**
2. **Interactive exhaust cable**
3. **Jam nut**
4. **Cable wheel**

Figure 1-47. Interactive Exhaust Cable (Typical)

3. See Figure 1-47. Loosen jam nut (3).
4. Remove cable (2) from bracket and cable wheel (4).

NOTE

For the next step in the procedure it will be necessary to obtain a permanent marker.

5. Using a pair of pliers, fully open the exhaust valve in the muffler by pulling the cable core by the ferule that was disconnected from the cable wheel in the previous step until resistance is felt. Be careful not to damage the cable core.
6. Mark the cable core with the marker all the way around where it comes out of the housing.
7. Release the cable core and reattach the cable to the cable wheel and bracket.
8. Tighten jam nut.

CAUTION

Do not overtighten jam nut on interactive exhaust cable.

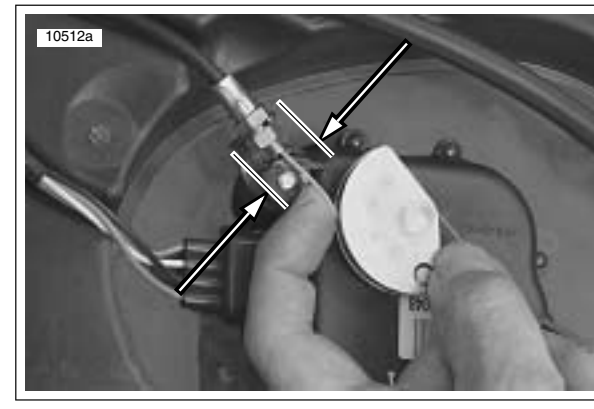


Figure 1-48. Checking For 1/8 in. (3.2 mm) Maximum Free Play In Either Direction For Proper Adjustment

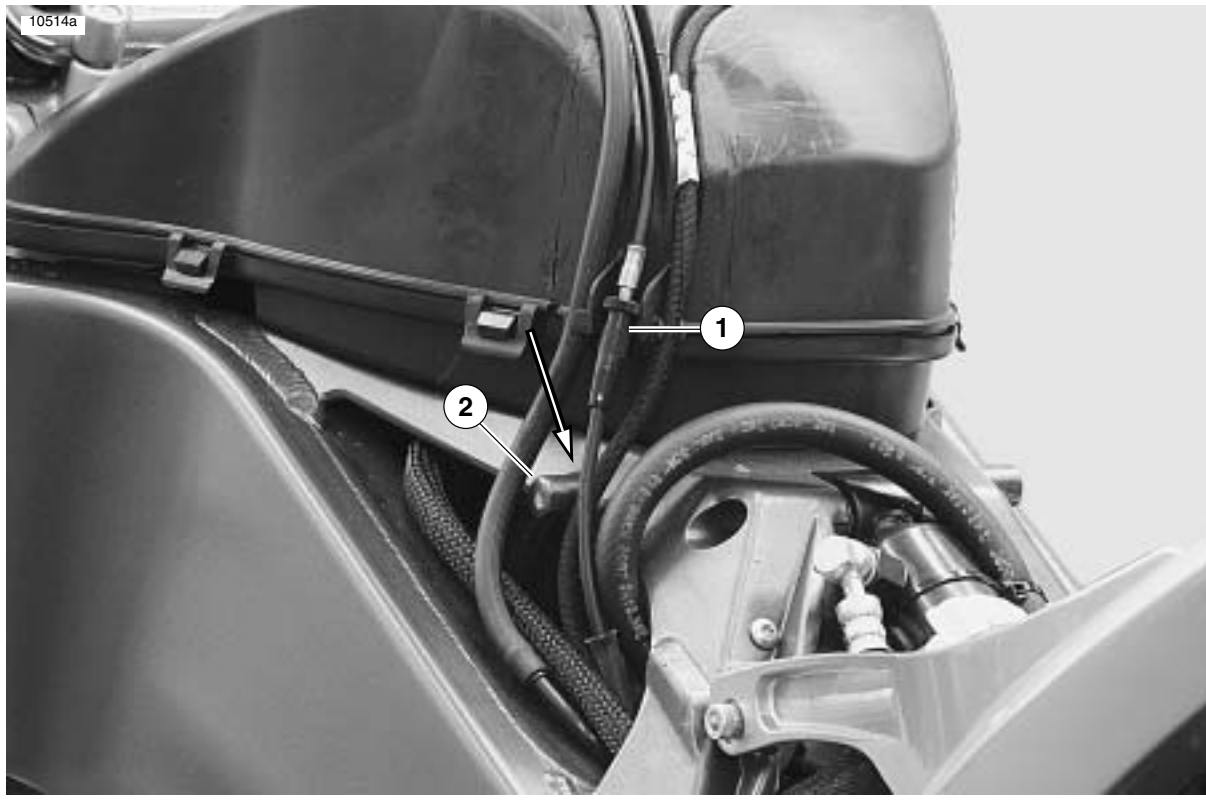
9. See Figure 1-48. Adjust interactive exhaust cable as follows:
   a. See Figure 1-47. Move cable with your fingers from side to side. There should be no more than 1/8 in. (3.2 mm) side play in cable in either direction with 1/4 in. (6.4 mm) maximum overall side play.
   b. Adjust cable as needed using cable adjuster (1).
10. Cycle the actuator to verify cable and valve operation:
   a. Hold the throttle wide open.
   b. Turn the engine cut-off switch to RUN.
   c. Turn the ignition/light key switch ON.
   d. Watch the actuator cycle close/open/close.

CAUTION

DO NOT start vehicle in this mode.

NOTE

In this mode the exhaust valve in the interactive muffler should cycle from the closed position to the wide open position and back to the closed. When the exhaust valve moves to the open position, you should see the mark on the cable core made previously. This ensures the system is working properly. If you do not see the mark, verify previous cable adjustment.



1. **Interactive exhaust cable**
2. **Frame lug**

Figure 1-49. Correct Cable Routing Behind Frame Lug (Typical)

11. See Figure 1-49. Verify that the interactive exhaust cable (1) is routed behind the frame lug (2) before installing air intake cover.

CAUTION

If cable is routed in front of the frame lug it will cause the muffler valve to stay open not allowing it to work properly.

12. Install air intake cover. See 2.39 INTAKE COVER ASSEMBLY.

INSPECTION

Check ignition timing after each removal of the cam position sensor.

CHECKING STATIC TIMING

⚠CAUTION

Always wear proper eye protection when drilling. Flying debris may result in minor or moderate injury.

CAUTION

Carefully drill hole, applying minimum pressure to drill out timer plate cover rivets. Applying too much pressure will damage cam position sensor and/or timer plate and cover.

NOTES

- *It is not necessary to remove the spark plug to determine TDC compression stroke of the front cylinder in the following procedure.*
- *Do not remove the timing inspection cover to check the static timing. If timing must be corrected, the inspection plate will then be removed.*

1. Raise rear wheel using a lift or jacking point. Tie down motorcycle for additional support.
2. Remove timing inspection plug.
3. Place transmission in 5th gear.
4. Connect Digital Technician to data port on motorcycle and select the Static Timing procedure screen.
5. Turn on ignition and move handlebar stop switch to the run position. Listen for fuel pump cycling to confirm ignition is active.
6. Turn or gently bump the flywheel in a forward direction using the rear wheel. Position the flywheel TDC mark at the very left edge of the inspection hole.
7. If the engine is coming up on the compression stroke for the FRONT (correct) cylinder, the screen will be displaying LOW - 0 volts with timing mark at left edge of window.
8. Gently bump flywheel forward in tiny increments.
9. See Figure 1-51. If the static timing is correct, the screen will switch to HIGH - 5 volts at the precise moment the timing mark exactly centers in the inspection window.
10. If engine is coming up on the compression stroke for the REAR (incorrect) cylinder, the screen will be displaying HIGH - 5 volts as timing mark is just coming into view at left edge of window and will switch to LOW - 0 volts at same point as the timing mark continues through the window. (If this is observed, turn flywheel forward one revolution to bring engine to compression stroke for front cylinder.)

NOTES

- *If timing mark check point is overshot, bump flywheel backwards till TDC mark is at left edge of inspection window and repeat test bumping flywheel in forward (normal) direction.*
- *Never confirm timing while bumping flywheel backwards. This will give you an incorrect reading.*

11. If timing is correct, install timing inspection plug and tighten to 120-180 **in-lbs** (14-20 Nm). If timing is not correct, see ADJUST TIMING in this section.

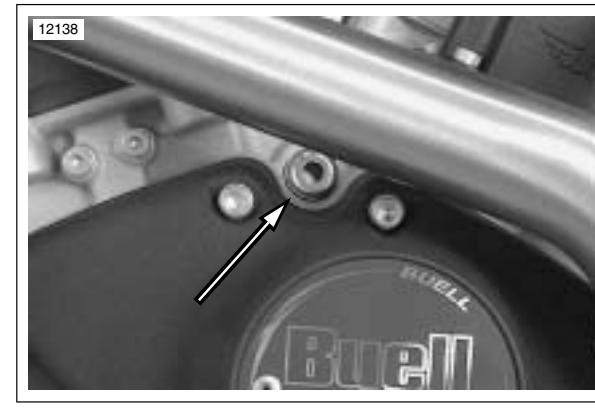


Figure 1-50. Timing Plug

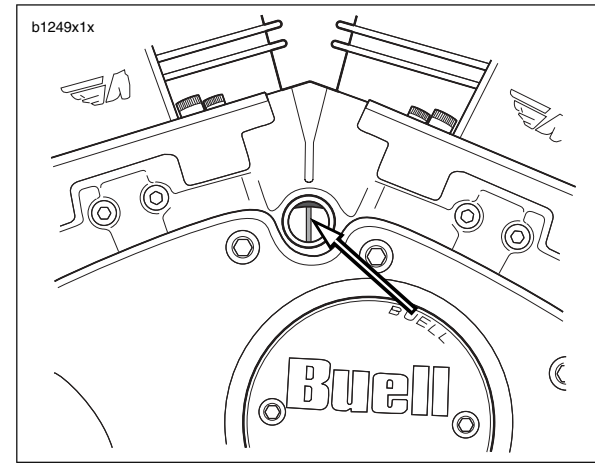


Figure 1-51. Correct Timing

ADJUST TIMING

1. See Figure 1-52. Remove timing plate cover.
   a. Drill rivets holding the timing plate cover.
   b. Using a hook, remove timing plate cover.
   c. Loosen sensor assembly fasteners.
2. See Figure 1-54. If timing is advanced (mark appears on left side of window) rotate timing plate counterclockwise.
3. Check timing. See CHECKING STATIC TIMING.
4. See Figure 1-55. If timing is retarded (mark appears on right side of window) rotate timing plate clockwise.
5. Tighten sensor assembly fasteners to 15-30 **in-lbs** (1.7-3.4 Nm).
6. Recheck timing.

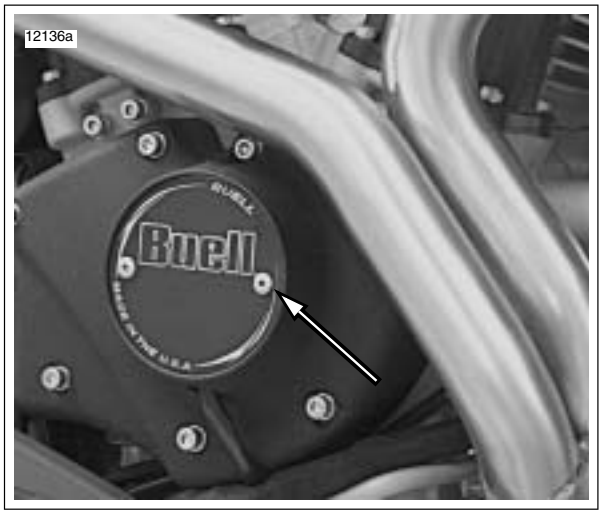


Figure 1-52. Timer Cover

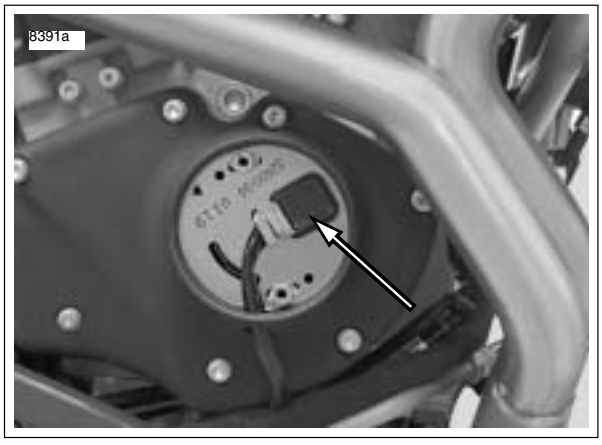


Figure 1-53. Cam Position Sensor

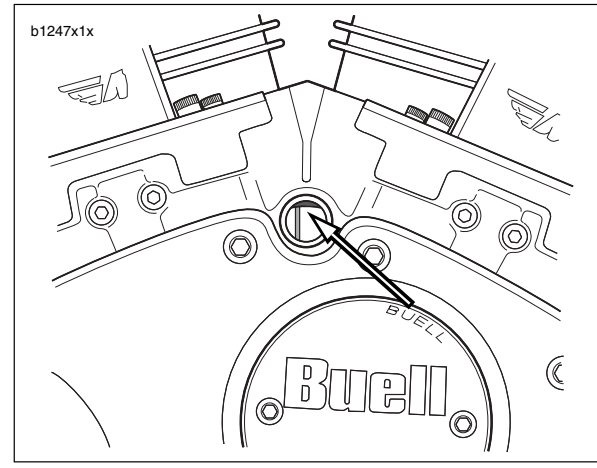


Figure 1-54. Advanced Timing

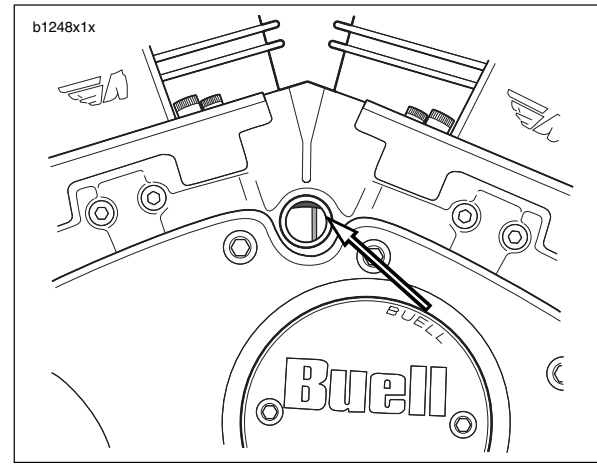


Figure 1-55. Retard Timing

INSPECTION

⚠WARNING

Do not modify ignition/light switch wiring to circumvent the automatic-on headlight feature. High visibility is an important consideration for motorcycle riders. Failure to have headlight on at all times could cause an accident, resulting in death or serious injury.

Check headlights for proper alignment:

- When the new owner takes delivery of the motorcycle.
- When there is a change in load (adding luggage, etc.).

1. In a location with low light, draw a horizontal line on a screen or wall that measures 34-36 in. (86-91 cm) above floor.
2. See Figure 1-56. Position motorcycle 25 ft (7.6 m) away from a screen or wall by measuring the distance from the front axle to the screen/wall.
3. Verify correct front and rear tire pressure. See 1.7 TIRES AND WHEELS.
4. Load vehicle with rider/passenger/cargo/accessories. Weight will compress vehicle suspension slightly.
5. Stand motorcycle upright with headlights aimed straight forward.
6. Check LOW beam (right lens) for alignment.
   a. See Figure 1-57. Turn ignition switch to IGN. Set handlebar headlight switch to LOW beam position.
   b. Check that the correct pattern of light is a double rectangular pattern and is aligned with the horizontal line as shown in Figure 1-56.
   c. Adjust headlight alignment. See ADJUSTMENT which follows.
7. Check HIGH beam (left) for alignment.
   a. See Figure 1-57. Set handlebar headlight switch to HIGH beam position.

NOTE

Low beam lamp will not stay illuminated when high beam is activated.

   b. Check that the correct pattern of light is a circular pattern and is centered on the horizontal line as shown in Figure 1-56.
   c. Adjust headlight alignment. See ADJUSTMENT section.

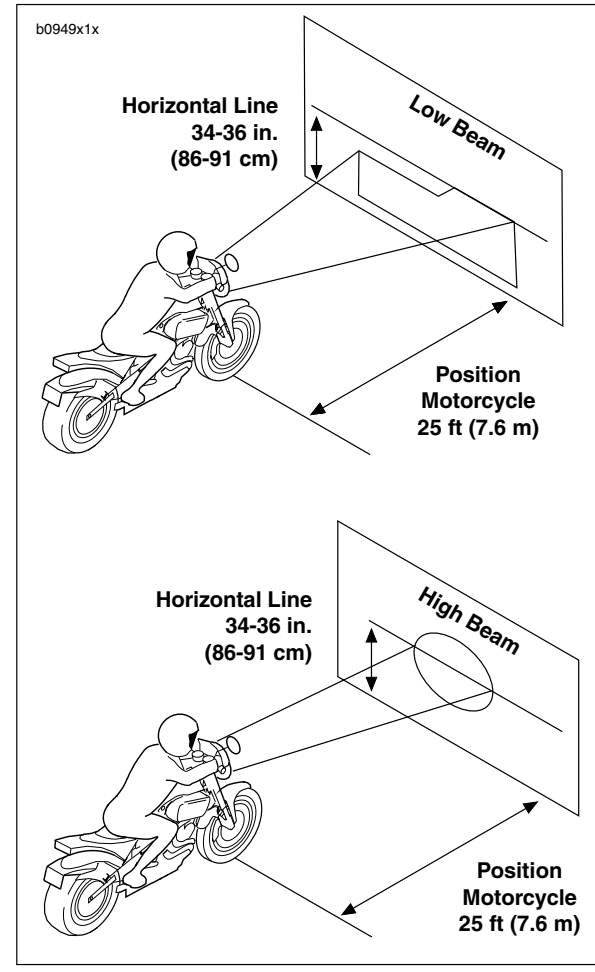
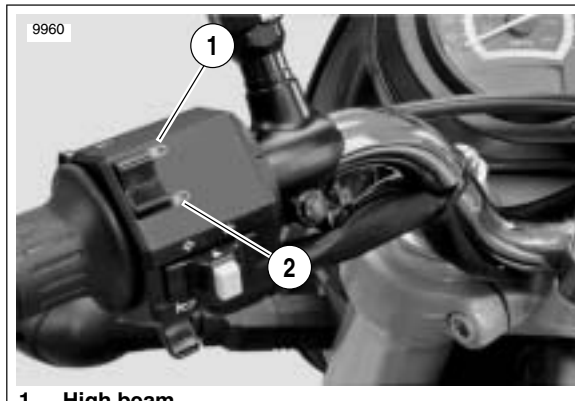


Figure 1-56. Checking Headlight Alignment



1. **High beam**
2. **Low beam**

Figure 1-57. Headlight Switch

ADJUSTMENT

Horizontal Alignment

See Figure 1-58. Loosen fasteners on right and left side of headlight housing to adjust the horizontal alignment.

Vertical Alignment

See Figure 1-59. Loosen fastener on the bottom of headlight housing to adjust the vertical alignment.

NOTE

- *Only loosen headlight alignment fasteners enough to adjust headlight. Once headlights are aligned, tighten fasteners to 48-72* ***in-lbs*** *(5-8 Nm).*
- *See Figure 1-59. The vertical headlight adjustment screw is located under the front upper fender.*

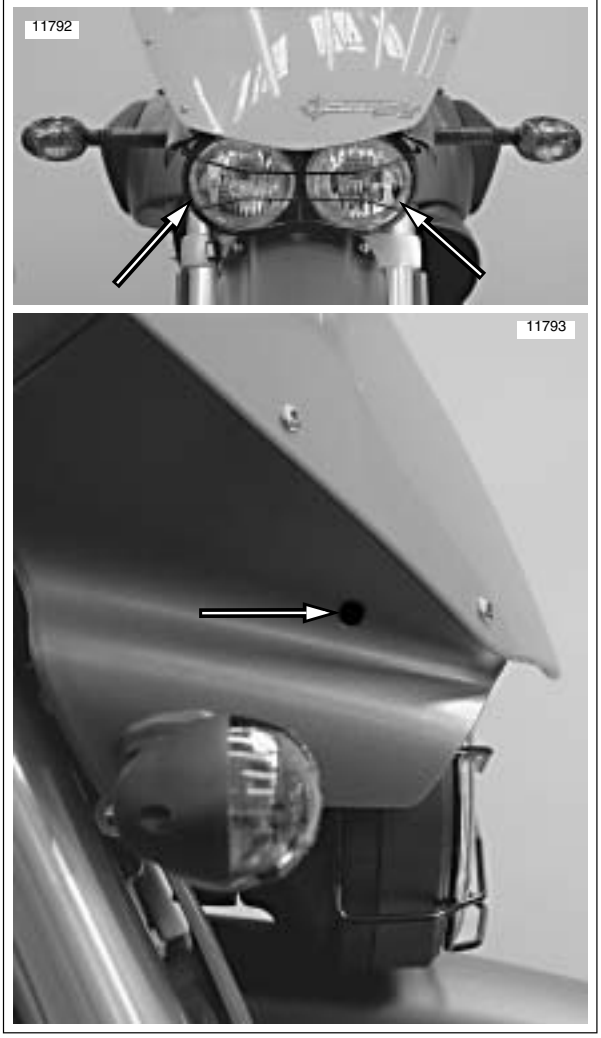


Figure 1-58. Horizontal Headlight Adjustment

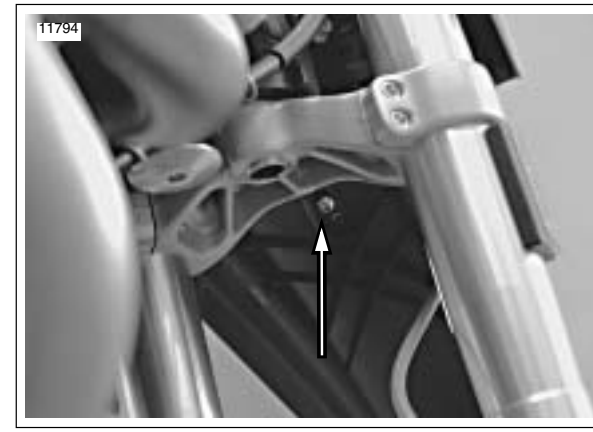


Figure 1-59. Vertical Headlight Adjustment Screw

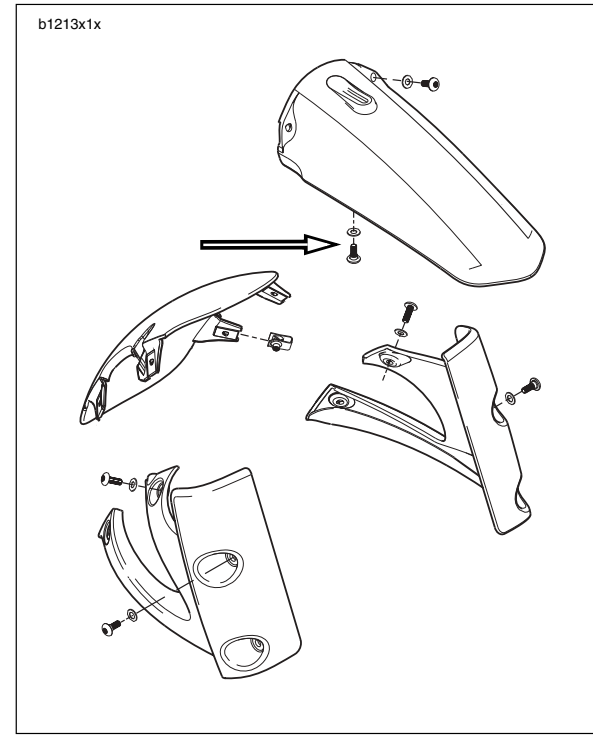


Figure 1-60. Front Fender Assembly
Vertical Headlight Adjustment Screw

ADJUSTMENT

NOTE

If closed throttle TP degree reading is not between 5.1° - 6.2 degrees, TPS should be re-calibrated. See ADJUSTMENT below.

1. Connect vehicle to Digital Technician.
2. Select calibrations screen/TPS Function.
3. Select Buell TPS zero tab.
4. Select TP volts on screen.
5. See Figure 1-61. Back off idle adjustment until TP volts stop decreasing and then continue to back out one full turn.
6. Open and **snap shut** throttle control grip 2-3 times.

NOTE

This is to ensure that the throttle plate is completely closed before beginning recalibration.

7. With ignition and run switch in the on position with engine off and throttle in the closed position press the TPS zero button at the bottom of the screen.
8. Select TPS zero button and perform TPS zero.

NOTE

When calibration is complete, dialogue box will appear on Digital Tech screen with message display "Command Sent Successfully". Press OK.

9. Turn idle adjustment cable screw clockwise until TPS degrees read 5.2°-5.6 *degrees*.
10. Run vehicle until engine temperature is at 320° F (160° C).
11. Set idle to 1050-1150 RPM.

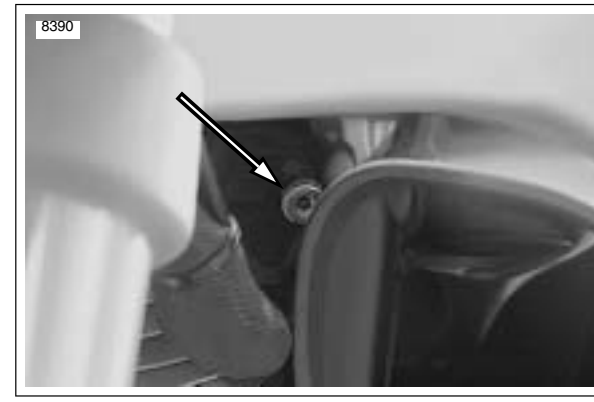


Figure 1-61. Idle Adjuster (behind left fork)

STORAGE 1.20

GENERAL

⚠WARNING

Do not store motorcycle with gasoline in tank within the home or garage where open flames, pilot lights, sparks or electric motors are present. Gasoline is extremely flammable and highly explosive, which could result in death or serious injury. (00003a)

If the motorcycle will not be operated for several months, such as during the winter season, there are several things which should be done to protect parts against corrosion, to preserve the battery and to prevent the buildup of gum and varnish in the fuel system.

1. Warm motorcycle to operating temperature. Perform an oil change and turn engine over to circulate the new oil.
2. Fill fuel tank and add a gasoline stabilizer. Use one of the commercially available gasoline stabilizers following the manufacturer's instructions. Run engine until treated gasoline has had a chance to reach fuel injectors.
3. Remove battery and charge as needed to maintain the correct voltage. See 1.4 BATTERY MAINTENANCE.
4. Remove the spark plugs, inject a few squirts of engine oil into each cylinder and crank the engine 5-6 revolutions. Reinstall spark plugs. See 1.13 SPARK PLUGS.
5. Adjust primary chain. See 1.10 PRIMARY CHAIN.
6. Check tire inflation. See 1.7 TIRES AND WHEELS. If the motorcycle will be stored for an extended period of time, securely support the motorcycle so that all weight is off the tires.

⚠WARNING

Be sure that brake fluid or other lubricants do not contact brake pads or discs. Such contact can adversely affect braking ability, which could cause loss of control, resulting in death or serious injury. (00290a)

7. Wash and polish molded-in-color, painted and chrome-plated surfaces.
8. If motorcycle is to be covered, use a material that will breathe, such as light canvas. Plastic materials that do not breathe promote the formation of condensation.

REMOVAL FROM STORAGE

⚠WARNING

The clutch failing to disengage can cause loss of control, which could result in death or serious injury. Prior to starting after extended periods of storage, place transmission in gear and push vehicle back and forth several times to assure proper clutch disengagement. (00075a)

1. Charge and install battery. See 1.4 BATTERY MAINTENANCE.
2. Remove and inspect spark plugs. Replace if necessary. See 1.13 SPARK PLUGS.
3. Inspect air filter element. Replace if necessary. See 1.14 AIR CLEANER FILTER.
4. If fuel tank was drained, fill fuel tank with fresh gasoline.
5. Start the engine and run until it reaches normal operating temperature. Check fluids and refill to proper levels if required.
   a. Check engine oil level. See 1.5 ENGINE LUBRICATION SYSTEM.
   b. Check transmission fluid level. See 1.8 CLUTCH.
6. Perform all of the checks in the PRE-RIDING CHECK LIST in the Owner's Manual.

GENERAL

The following check list can be helpful in locating most operating troubles. Refer to the appropriate sections in this Service Manual for detailed procedures.

ENGINE

Starter Motor Does Not Operate or Does Not Turn Engine Over

1. Engine stop switch in OFF position.
2. Ignition key switch not ON.
3. Discharged battery or loose or corroded connections. (Solenoid chatters.)
4. Starter control relay or solenoid not functioning.
5. Electric starter shaft pinion gear not engaging or overrunning clutch slipping.
6. Clutch lever not pulled in. Vehicle in gear.
7. Starter interlock circuit malfunction.

Engine Turns Over But Does Not Start

NOTE

See 4.11 ENGINE CRANKS BUT WILL NOT START for specific tests.

1. Fuel tank empty.
2. Discharged battery, loose or broken battery terminal connections.
3. Fouled spark plugs.
4. Loose or shorting spark plug cables or connections.
5. Ignition timing badly out of adjustment.
6. Loose wire connection at coil or battery connection or plug between ignition sensor and module. See Section 4.
7. Ignition coil not functioning.
8. Ignition module not functioning.
9. Ignition sensor not functioning.
10. Sticking or damaged valve or valves.
11. Engine oil too heavy (winter operation).
12. Ignition circuit interlock malfunction.
13. No output from the ECM. See dealer.
14. Inadequate fuel pressure in fuel lines (possible leak). See dealer.
15. Clogged fuel filter. See dealer.
16. Clogged fuel injectors. See dealer.
17. Tripped bank angle sensor. Turn key to OFF, wait 15 seconds, and then back to IGN again to start bike.
18. TP Sensor/fast idle screw not set properly. See dealer.
19. No output from CMP sensor. See dealer.
20. Inoperative fuel pump. See dealer.

Starts Hard

1. Spark plugs in bad condition, have improper gap or are partially fouled.
2. Wires are crossed.
3. ATC in stuck open.
4. Spark plug cables in bad condition and shorting.
5. Battery nearly discharged.
6. Loose wire connection at one of the battery terminals, at coil or at plug between ignition sensor and module.
7. Throttle controls not adjusted correctly.
8. Ignition coil not functioning.
9. Engine oil too heavy (winter operation).
10. Ignition not timed properly. See dealer.
11. Vapor vent valve plugged or fuel line closed off restricting fuel flow.
12. Water or dirt in fuel system.
13. Air leak at intake manifold.
14. Valves sticking.
15. TP Sensor and/or fast idle screw not set properly. See dealer.
16. Oxygen, IAT or ET sensors damaged or malfunctioning. See dealer.

Starts But Runs Irregularly or Misses

NOTE

See 4.15 MISFIRE for specific tests.

1. Spark plugs in bad condition or partially fouled.
2. Spark plug cables in bad condition and shorting.
3. Spark plug gap too close or too wide.
4. Ignition coil not functioning.
5. Ignition module not functioning.
6. Ignition sensor not functioning.
7. Battery nearly discharged.
8. Damaged wire or loose connection at battery terminals or coil.
9. Intermittent short circuit due to damaged wire insulation.
10. Water or dirt in fuel system and throttle body or filter.
11. Vapor vent valve plugged.
12. Throttle controls improperly adjusted.
13. Air leak at intake manifold or air filter.
14. Damaged intake or exhaust valve.
15. Weak or broken valve springs.
16. Incorrect valve timing.
17. Oxygen, IAT or ET sensors damaged or malfunctioning. See dealer.
18. TP Sensor not set properly. See dealer.
19. Fuel level too low. Add gasoline.
20. Inoperative fuel injector. See dealer.
21. Obstructed fuel tank vent valve or pinched vent tube. See dealer.
22. Air intake screen covered or restricted.

Spark Plug Fouls Repeatedly

1. Incorrect spark plug.
2. Piston rings badly worn or broken.
3. Valve stem seals worn or damaged.
4. Valve guides badly worn.
5. Sensors damaged.
6. Air intake screen covered or restricted.

Pre-Ignition or Detonation (Knocks or Pings)

1. Excessive carbon deposit on piston head or combustion chamber.
2. Incorrect heat range spark plug.
3. Spark plugs not firing.
4. Ignition timing advanced.
5. Fuel octane rating too low.
6. Intake manifold vacuum leak.

Overheating

1. Insufficient oil supply or oil not circulating.
2. Clogged or damaged fins on oil cooler.
3. Cooling fan not operating properly.
4. Leaking valves.
5. Heavy carbon deposit.
6. Ignition timing retarded.

Valve Train Noise

1. Hydraulic lifter not functioning properly.
2. Bent push rod.
3. Cam, cam gears or cam bushings worn.
4. Rocker arm binding on shaft.
5. Valve sticking in guide.

Excessive Vibration

1. Engine tie-bars loose, broken or improperly spaced.
2. Isolator mounting fasteners loose.
3. Broken frame.
4. Primary chain badly worn or links tight as a result of insufficient lubrication.
5. Wheels not aligned and/or tires worn.
6. Internal engine problem.
7. Wheels not balanced correctly.

ENGINE LUBRICATION SYSTEM

Oil Does Not Return To Oil Tank

1. Oil tank empty.
2. Return pump gears damaged.
3. Oil feed pump not functioning.
4. Restricted oil lines or fittings.

Engine Uses Too Much Oil or Smokes Excessively

1. Piston rings badly worn or broken.
2. Valve stem seals worn or damaged.
3. Valve guides worn.

Engine Leaks Oil From Cases, Push Rods, Hoses

1. Loose parts.
2. Imperfect seal at gaskets, push rod cover, washers, etc. To aid locating leaks, use BLACK LIGHT LEAK DETECTOR (Part No. HD-35457).
3. Restricted oil return line to tank.
4. Restricted breather passage(s) to air cleaner.

ELECTRICAL SYSTEM

Alternator Does Not Charge

1. Regulator-rectifier module not functioning.
2. Rectifier not grounded.
3. Engine ground wire loose or broken.
4. Loose or broken wires in charging circuit.
5. Stator not functioning.
6. Rotor not functioning.

Alternator Charge Rate Is Below Normal

1. Regulator-rectifier module not functioning.
2. Stator not functioning.
3. Rotor not functioning.
4. Weak battery.
5. Loose connections.

FUEL SYSTEM

Poor Fuel Economy

1. Oxygen sensor damaged or malfunctioning (bike running rich). See dealer.
2. Air intake screen covered or restricted.

TRANSMISSION

Shifts Hard

1. Clutch dragging slightly.
2. Shifter forks (inside transmission) damaged.
3. Corners worn off shifter clutch dogs (inside transmission).

Jumps Out of Gear

1. Shifter engaging parts (inside transmission) badly worn and rounded.
2. Shifter forks bent.
3. Damaged gears.

CLUTCH

Slips

1. Clutch controls improperly adjusted.
2. Worn friction plates.

Drags or Does Not Release

1. Clutch controls improperly adjusted.
2. Clutch plates excessively warped.

Chatters

1. Friction or steel plates worn, warped or dragging.

CHASSIS

Irregular/Inadequate Brake Action

1. Master cylinder low on fluid.
2. Brake line contains air bubbles or moisture.
3. Master or wheel cylinder piston worn.
4. Brake pads covered with grease or oil.
5. Brake pads badly worn to minimum lining thickness.
6. Brake rotor badly worn or warped.
7. Brake pads dragging or excessive braking (brake fades due to heat buildup).
8. Insufficient brake pedal or hand lever free play (brake drags).

Handling Irregularities

1. Tires improperly inflated. See 1.7 TIRES AND WHEELS. Do not overinflate.
2. Loose wheel axle. Tighten front axle to 39-41 ft-lbs (53-56 Nm). Tighten rear axle to 48-52 ft-lbs (65-70 Nm).
3. Excessive wheel hub bearing play.
4. Rims and tires out-of-true sideways (tire runout should not be more than 0.080 in. (2.03 mm)).
5. Rims and tires out-of-round or eccentric with hub (tire runout should not be more than 0.060 in. (1.5 mm)).
6. Irregular or peaked front tire tread wear.
7. Tire and wheel unbalanced or weights on wrong side of wheel. (Front wheel weights must be on the brake rotor side.)
8. Steering head bearings improperly tightened or worn. See 1.12 STEERING HEAD BEARINGS. Check for proper torque and replace worn bearings. See 2.17 FORK CLAMPS, UPPER AND LOWER.
9. Shock absorber or front forks not functioning normally due to incorrect adjustment. See 1.11 SUSPENSION DAMPING ADJUSTMENTS.
10. Heavy front end loading. Non-standard equipment on the front end (such as heavy radio receivers, extra lighting equipment or luggage) tends to cause unstable handling.

SUSPENSION

When making adjustments, remember there are two mediums in setting up a bike, geometry and suspension. Both components work together because suspension is a part of geometry. In order to solve handling problems, it is important to diagnose the problem's true nature.

Chattering, sliding or an uncomfortable feeling are suspension-related. Handling and a swinging fork are geometry-related, but often these unwanted characteristics can be solved by suspension adjustments.

The following tables list possible suspension and operating troubles and their probable causes.

Table 1-11. General Suspension Problems

TROUBLESHOOTING CONDITION	ADJUSTMENT SOLUTION
Bike wallows through turns. Feels loose or vague after bumps. Wheel tends to "pogo" after passing over a bump. This is noticeable by watching the bike continue to bounce as it travels over multiple bumps.	Increase rebound damping.
Wheel responds to bump, but doesn't return to ground quickly after bumps. This is more pronounced over a series of bumps and is often referred to as "packing down."	Reduce rebound damping.
The bike bottoms out or dips while cornering. Bike has excessive brake dive.	Increase compression damping.
Harsh ride particularly over washboard surfaces. Bumps kick through handlebars or seat. Suspension seems not to respond to bumps. This is evidenced by tire chattering (a movement with short stroke and high frequency) through corners or by jolting the rider over rough roads.	Reduce compression damping.

Table 1-12. Rear Suspension Problems

TROUBLESHOOTING CONDITION	ADJUSTMENT SOLUTION
"Pumping on the Rear" occurs when you are accelerating out of a corner. This problems occurs in two varieties. 1. The first type has a movement with a long stroke and a high frequency. 2. The second version has a movement with a short stroke and high frequency.	1. The shock is too soft. Increase compression damping. If the adjuster is already set to the maximum, add more preload to the spring (one turn maximum). 2. In this case the shock is too hard. Decrease compression damping.
Chattering during braking.	Decrease the compression damping. If the problem persists, decrease rebound damping for a faster rebound rate. Less spring preload may also help.
Lack of tire feedback.	The suspension is too soft. Increase compression damping.
Sliding during cornering. Sliding may occur going into the corner or accelerating out of the corner.	The suspension is too hard. Decrease compression damping.

Table 1-13. Front Suspension Problems

TROUBLESHOOTING CONDITION	ADJUSTMENT SOLUTION
Not absorbing bumps.	A good suspension is a balance between damping and track condition. Finding this balance requires exploring all possible compression settings.
Lack of tire feedback.	Increase compression damping.
Tire slides.	Decrease compression damping.