



cannondale



2002 X440s OWNER'S MANUAL



P/N 951-5002032

Safety Alerts

- **FAILURE TO FOLLOW THE WARNINGS CONTAINED IN THIS MANUAL CAN RESULT IN SERIOUS INJURY OR DEATH.**
- **Keep this Owner's Manual in a safe place.**

MESSAGES WITH THE SAFETY ALERT SYMBOL

- **Pay special attention to all messages preceded by the Safety Alert Symbol.**
It means: ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED.

 DANGER	Indicates that severe personal injury or death WILL result if instructions are not followed.
 WARNING	Indicates a potential hazard that COULD result in serious injury or death.

CAUTION

Indicates a potential hazard could result in vehicle damage if instructions are not followed.

NOTE : Provides helpful information

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Important Information

We strongly suggest that you do the following before operating the vehicle:

- **READ and UNDERSTAND this Owner's Manual.**
- **Perform the Pre-Ride Inspection found in this manual.**
- **Wear appropriate protective gear - approved full faced helmet, gloves, boots, long-sleeve shirt, pants). Consider specially designed protective off-road vehicle riding apparel.**

ABOUT THIS MANUAL

The purpose of this manual is to provide the owner with important safety, service, maintenance, and tuning information, and should be thoroughly read before operating or working on the vehicle.

This manual is divided into sections which contain easy-to-follow procedures which are reasonably straight-forward. Anyone with the mechanical ability and the proper tools should be able to perform them. Each procedure is accompanied by illustrations and photos to aid in proper vehicle operation, basic maintenance, tuning, etc.

- **Read and understand the entire procedure before performing any work. If you are unfamiliar with or doubt your own abilities to complete a procedure as described, have an authorized Cannondale motorsports dealer service your vehicle.**

Please keep your Owner's Manual in a safe and convenient place, and consider it an integral part of your vehicle.

For detailed servicing information refer to the Service Manual for your vehicle or contact an authorized Cannondale motorsports dealer for a list of available publications. If this manual is lost or damaged, contact an authorized Cannondale motorsports dealer for a replacement.

LIMITATIONS

Meticulous engineering and aggressive product designs represent the spirit of innovation - always a driving force at Cannondale. All information, illustrations, and specifications in this manual are based on the latest product information

available at the time of publication. Cannondale Corporation reserves the right to make changes at any time, without notice.

This vehicle has U.S. and International patents pending.
Cannondale Motorsports
Cannondale Corporation

EXPERIENCED RIDERS ONLY

- **This vehicle is not for beginners.**

All Cannondale motorsports products are designed for use by trained and experienced riders only. All are very high performance, competition sport machines and should only be operated by licensed competition riders in excellent physical condition, who are well-trained and experienced in the operation of high performance competition vehicles.

GOOD JUDGEMENT

There is always a risk involved when riding a vehicle; however, making sure you and the vehicle are in the best condition possible will ensure a great riding experience. Use sound judgement when riding.

Never ride under the influence of alcohol, medication, or drugs. Doing so will greatly reduce your ability to properly operate this vehicle and could lead to an accident, injury, and/or death. If you are taking medications prescribed by your doctor, consult him/her before riding.

MODIFICATIONS

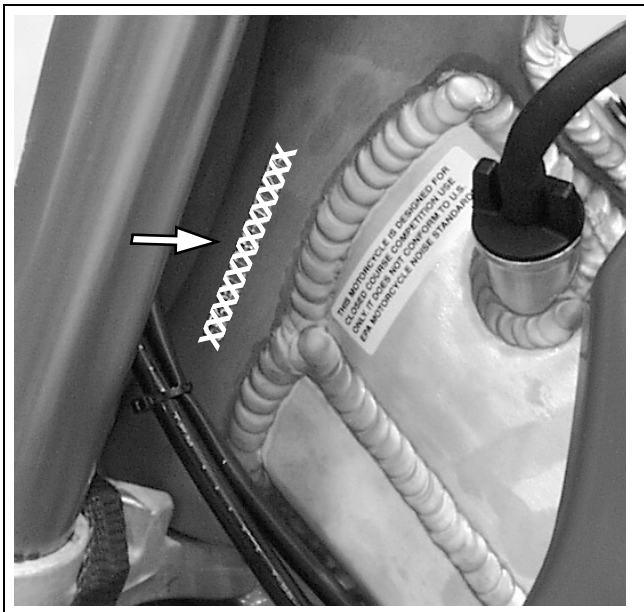
We recommend that you do not substitute parts, change or modify your vehicle. Such changes could seriously impair your vehicle's handling, stability, and braking, making it unsafe to ride and causing serious injury and/or vehicle damage.

NO PASSENGERS

Do not overload this vehicle or carry passengers. Doing so could seriously impair your vehicle's handling, stability, and braking, making it unsafe to ride which could result in damage to the vehicle or serious injury or death to the operator and/or passenger.

VEHICLE IDENTIFICATION NUMBER (VIN)

The vehicle identification number (VIN) is located on the left side of the steering head.



Record your vehicle's ID number here:



ENGINE SERIAL NUMBER

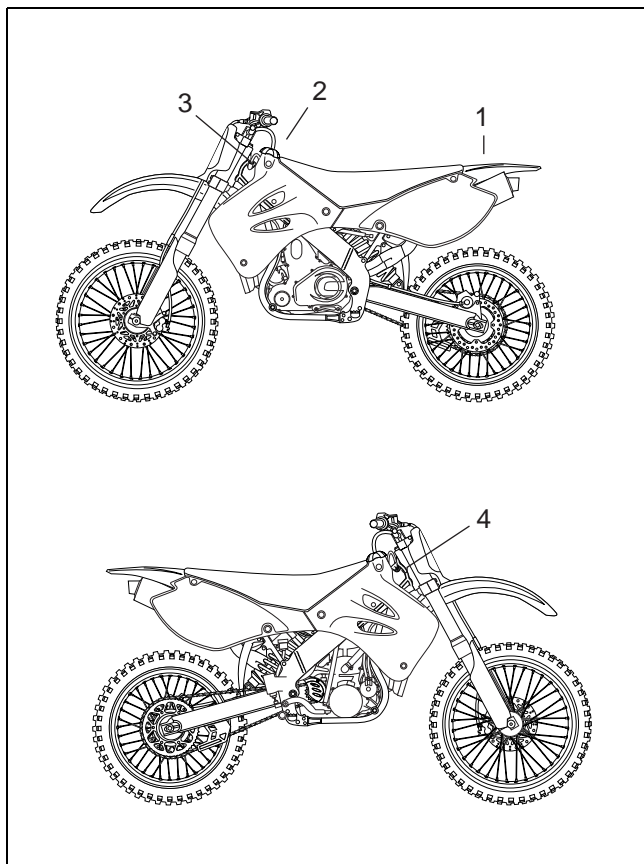
The engine serial number is etched/stamped into the engine crankcase.



Record your vehicle's ID number here:




LABEL LOCATIONS



See illustration on following page for examples of the numbered labels above.

LABELS

(1)

 **WARNING**

- **BEFORE OPERATING THIS VEHICLE, READ THE OWNER'S MANUAL AND ALL SAFETY LABELS.**
- **NEVER CARRY A PASSENGER.** Risk of losing control increases if you carry a passenger. Personal injury or death may result.
- **NEVER OPERATE THIS VEHICLE ON PUBLIC ROADS.** Personal injury or death may occur from a collision with another vehicle on the road.
- **ALWAYS WEAR AN APPROVED HELMET WHEN OPERATING THIS VEHICLE.** Eye protection and protective clothing are also recommended to avoid personal injury.
- **EXPERIENCED RIDERS ONLY.**

5000266

Disclaimer: In accepting delivery of this motorcycle, the buyer or transferee acknowledges that he has thoroughly inspected the motorcycle and further agrees to accept the motorcycle as is with all defects or faults, concealed or obvious. He further agrees that no warranties attach, express or implied, including any warranty of merchantability or fitness for any particular purpose. The buyer or transferee indemnifies and holds harmless Cannondale, its agents and employees for any failure of performance, cost of service, or repair. The buyer further acknowledges that this motorcycle is not intended for use on public streets, roads, highways, or trails under public jurisdiction and that use on such may violate state and federal law.

5001262

(2)

 **CAUTION**

PREMIUM UNLEADED GASOLINE ONLY

5000265

(3)

THIS MOTORCYCLE IS DESIGNED FOR CLOSED COURSE COMPETITION USE ONLY. IT DOES NOT CONFORM TO U.S. EPA MOTORCYCLE NOISE STANDARDS.

5000418


(4)

Mfd. by **Cannondale Corporation**

This vehicle is designed and manufactured for competition use only. It does not conform to Federal Motor Vehicle Safety Standards and operation on public streets, roads, and highways is illegal. State laws prohibit operation of this vehicle except in an organized racing or competitive event upon a closed course which is conducted under the auspices of a recognized sanctioning body or by permit issued by the local governmental authority having jurisdiction. First determine that operation is legal.

U.S. and International patents pending.
Type: Motorcycle

5000430

 **WARNING**

Heat treated aluminum frame. Welding, drilling, or modifying in any way may cause failure that could result in loss of control and cause serious injury or death. Inspect frame periodically for cracks.

DO NOT RIDE OR REPAIR A CRACKED FRAME.

5001371

1. General
2. Fuel
3. EPA noise
4. Frame

Pre-Ride Inspection



WARNING

POTENTIAL HAZARD

Failure to inspect vehicle before operating.

WHAT CAN HAPPEN

Increases the possibility of equipment failure resulting in a accident where you can be seriously injured or killed.

HOW TO AVOID THE HAZARD

Always inspect before operating.

Always follow the inspection and maintenance procedures found in this Owner's Manual.

Have an authorized Cannondale Motorsports Dealer inspect your vehicle at least every 25 hours of riding.

SUSPENSION

fork legs (wear, damage, settings, oil leaks)
rear shock (wear, damage, settings, oil leaks)

WHEELS

wheels (damage)
spokes (correct tension, damage)

TIRES

physical. . . (tread conditions, wear, damage, punctures, tears)
pressure (correct, regulate if necessary)

BODY PANELS

seat (damage, installed correctly)
plastics (secure, damage)

FASTENERS

bolts, fasteners (tightened to the specified torque)

PRE-RIDE CHECKLIST

FLUIDS

brake fluid (level correct)
coolant (level correct)
engine oil (level correct)
transmission oil (level correct)
Fuel cap tightened securely
Inspect vehicle for leaks and repair if necessary.

BRAKES

Front/rear brakes (proper function)
Front/rear pads (damage, wear)
Front/rear discs (damage, wear)

THROTTLE

lever freeplay. (as specified in all steering positions)
proper operation . . . (smooth and returns to idle (closed)
position across the entire
steering range)

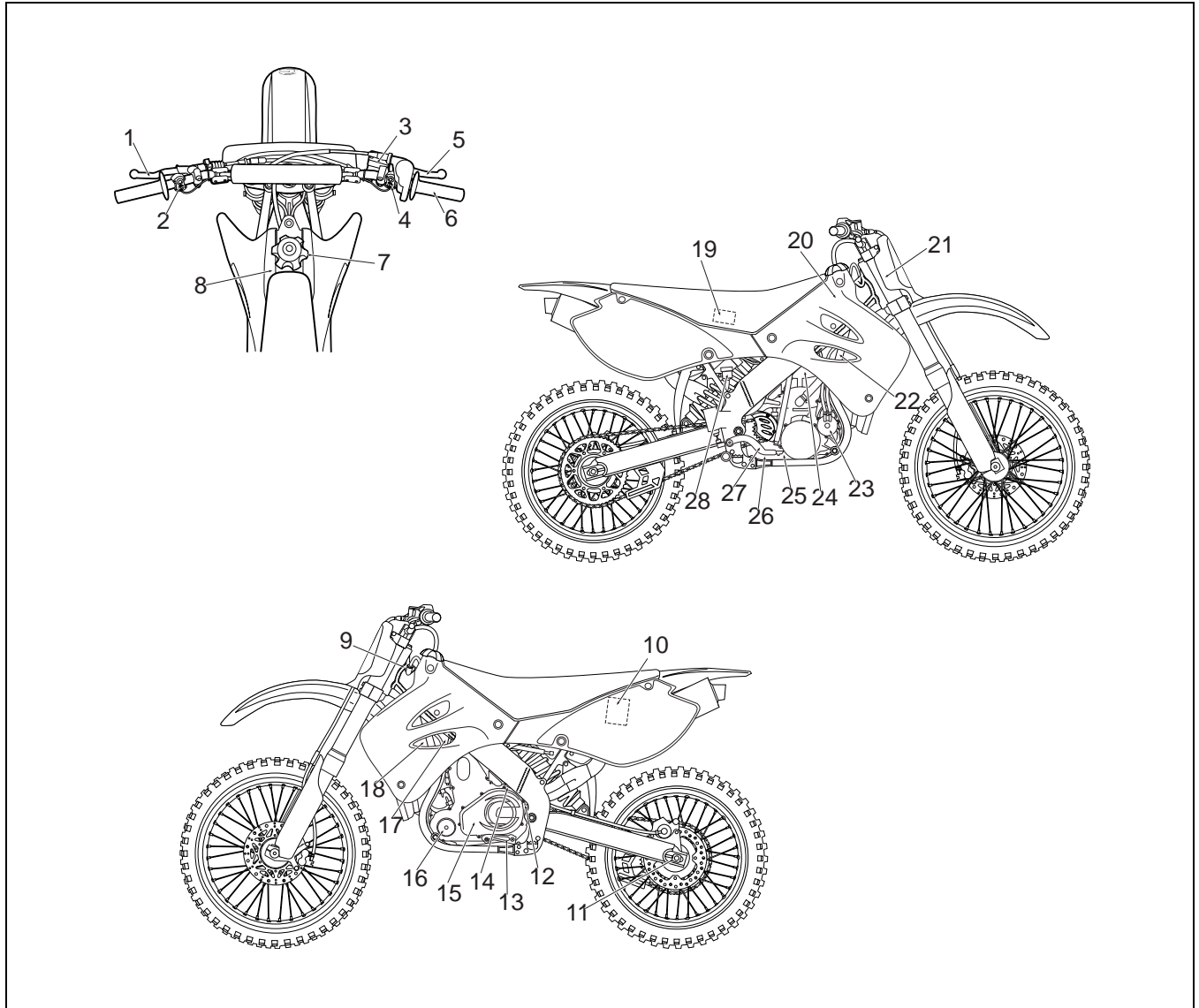
CLUTCH

clutch lever freeplay (as specified)
actuating arm (correct position)

DRIVE

sprocket conditions (damage, wear)
chain condition (damage, wear, stretch limit)
chain sag (as specified)
clean and lubricate the chain
chain rollers . (cracks, excessive wear, or other damage)
chain guide block (cracks, excessive wear, or other
damage)
swingarm buffer (cracks, excessive wear, or other
damage)

Component Locations



1. Clutch lever
2. Engine stop button
3. Front brake master cylinder
4. Engine start button
5. Front brake lever
6. Throttle
7. Fuel tank cap
8. Fuel tank
9. Engine oil fill
10. Battery
11. Drive chain adjusters
12. Engine oil drain (frame)

13. Shift lever
14. Transmission oil fill
15. Clutch
16. Engine oil filter
17. Idle adjusting screw
18. Radiator
19. Engine Control Module (ECM)
20. Airbox filter
21. Main air filter
22. Fuel injectors
23. Starter clutch cover
24. Water pump

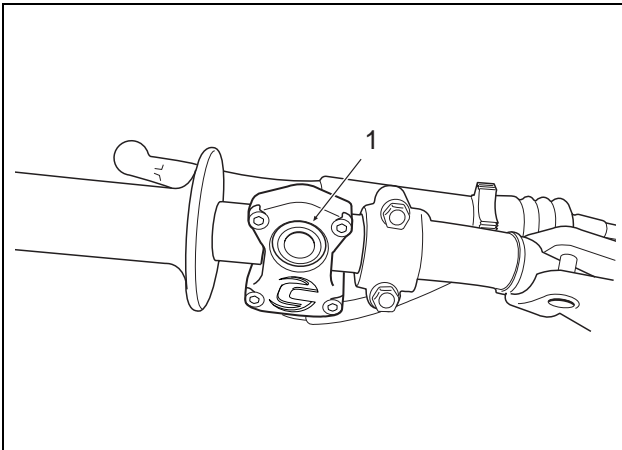
25. Engine oil crankcase drain
26. Transmission oil drain
27. Brake pedal
28. Rear brake reservoir

Controls

ENGINE STOP BUTTON

The engine stop button is located on the left handlebar. The button is (RED) in color. Push it to stop the engine. Make sure this button functions properly before you begin riding.

NOTE : The stop button is normally a closed circuit switch. If the stop switch is damaged or the wires are frayed or torn, (circuit open) the engine may not start.

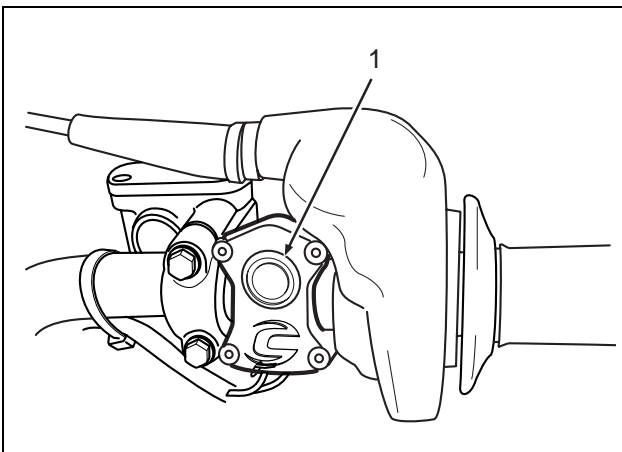


1. Engine stop button

ENGINE START BUTTON

The engine start button is located on the right handlebar and is (GREEN) in color. Pressing it activates the starter motor.

NOTE : When using the button, hold it for no more than 2-3 seconds at a time.

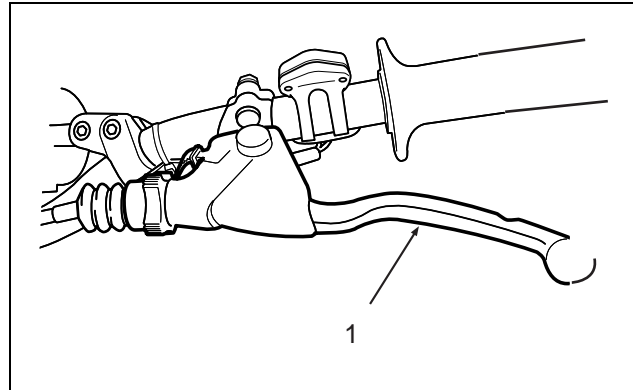


1. Engine start button

CLUTCH LEVER

The clutch lever is located on the left handlebar. Pull the lever to disengage the clutch. Release the lever to engage the clutch. The lever should be pulled quickly when disengaging and slowly when engaging.

NOTE : When starting it is recommended that you shift the transmission into neutral and pull in the clutch lever to increase the starter's efficiency.

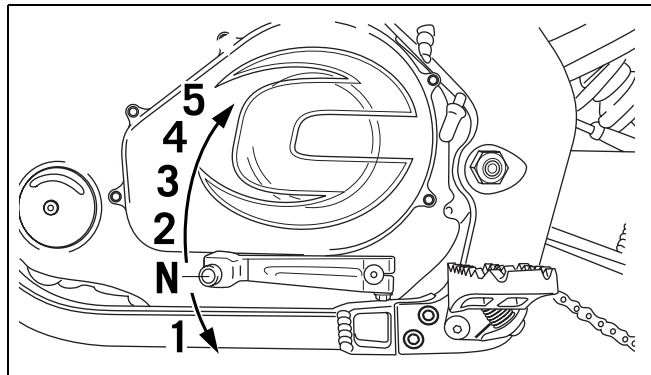


1. Clutch lever

SHIFT LEVER

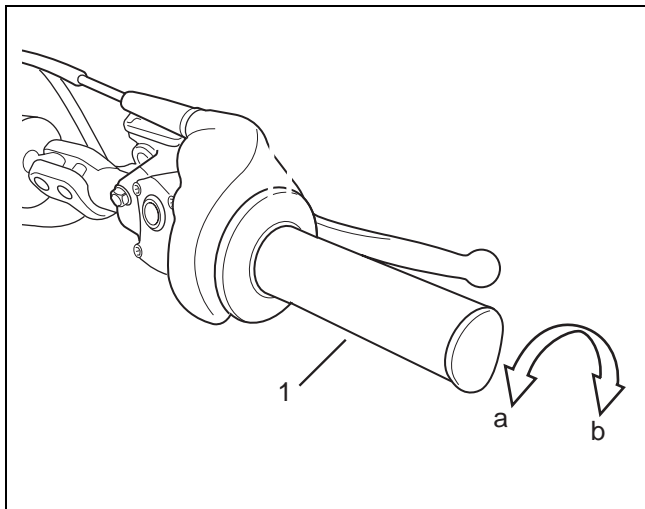
The shift lever is located on the left side of the engine.

NOTE : The transmission is commonly referred to as a "one down, four up" transmission. Neutral is located between first and second gears.



THROTTLE

The throttle lever is located on the right handlebar and controls acceleration and deceleration of the engine. To accelerate, turn the grip toward you. To decelerate, turn the grip away from you.



WARNING

POTENTIAL HAZARD

(1) Malfunctioning throttle

(2) Incorrect freeplay

WHAT CAN HAPPEN

(1) The throttle must return to the closed position when you release it. If it sticks you can lose the ability to accelerate and decelerate the engine which could result in an accident where you could be seriously injured or killed.

(2) The throttle freeplay must be maintained as specified, otherwise the engine speed could increase when the handlebars are turned or when the throttle is slightly grasped. Either situation could result in an unexpected acceleration of the engine where you could be seriously injured or killed.

HOW TO AVOID THE HAZARD

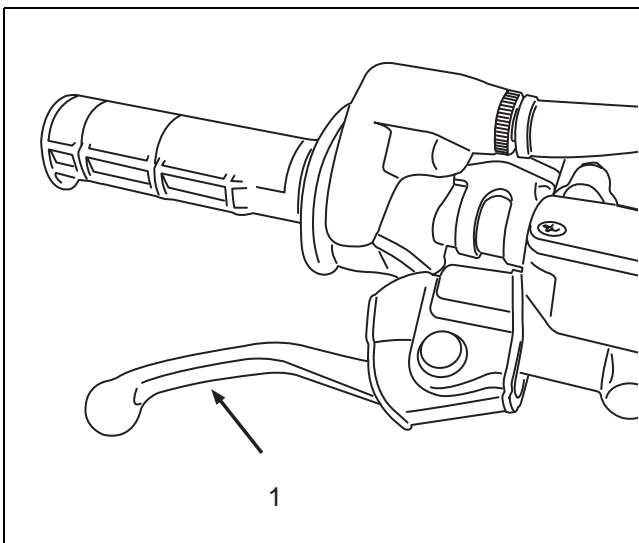
(1) Test the operation of the throttle before each ride. Make sure it operates smoothly (with no sticking or binding) in all steering positions. It should return automatically to the closed position when released.

(2) Make sure the throttle freeplay is adjusted as specified. See "throttle Freeplay" starting on page 38.

(1 & 2) If the throttle malfunctions or you can not adjust the throttle to the specified freeplay, do not ride the vehicle. Contact an authorized Cannondale motorsports for servicing.

FRONT BRAKE LEVER

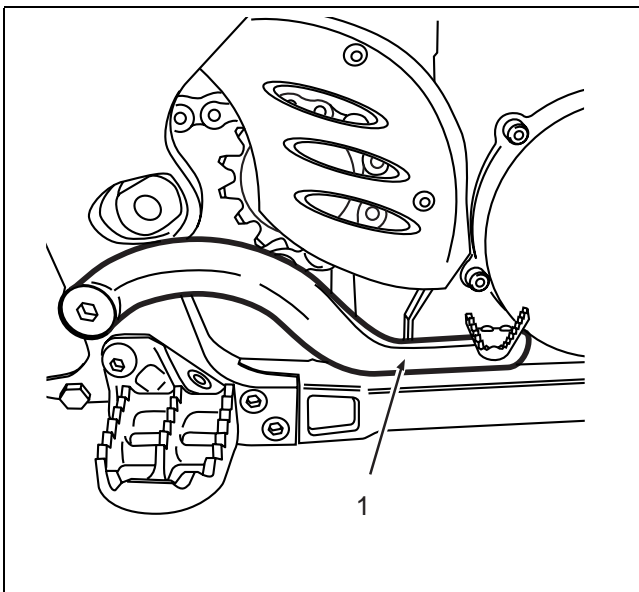
The front brake lever is located on the right handlebar. Pull the lever toward you to activate the front brake.



1. Front brake lever

REAR BRAKE PEDAL

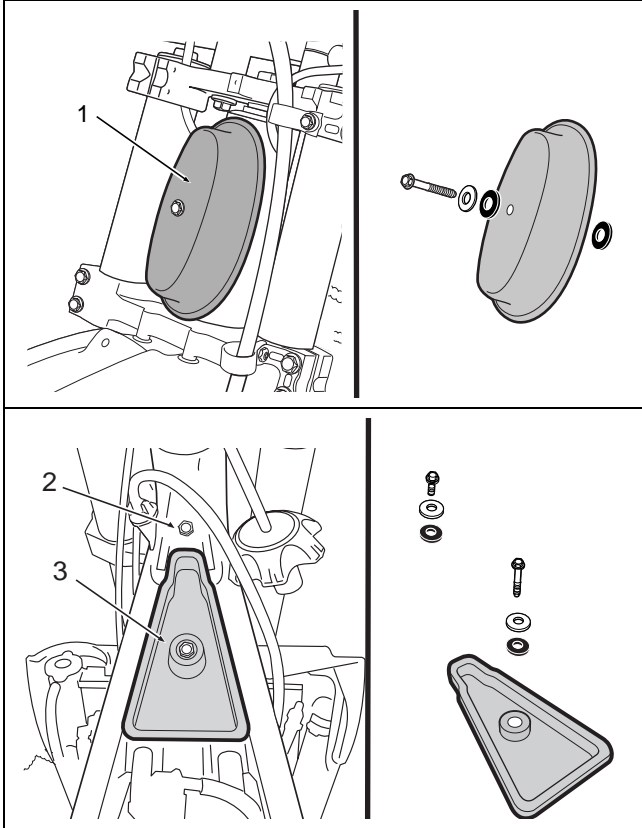
The rear brake pedal is located on the right side of the vehicle. Press it firmly to apply the rear brake.



1. Rear brake pedal

AIR FILTER CLEANING PLUGS

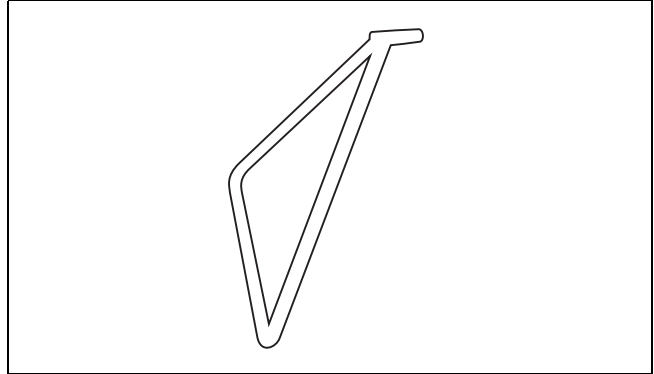
The air filter cleaning plugs are provided with your vehicle and must be installed when washing/cleaning the motorcycle. These plugs will help guard against water and other contaminants entering the engine. Make sure the sealing foam on the plug is in good condition. See the cleaning section of this manual for how to install the plugs properly.



1. **Steering head plug**
2. **Fuel tank bolt hole plug**
3. **Airbox plug**

SIDE STAND

The side stand is used to support the vehicle when not in use. It is only designed to support the weight of the vehicle; do not apply extra weight when using it (e.g., leaning on the bike). Be sure to remove it before starting out.



Operating

This section explains basic operating and riding methods (i.e., starting, stopping, and shifting). If after reading this manual or at anytime you have any questions regarding how to operate the vehicle, contact an authorized Cannondale motorsports dealer for assistance.



WARNING

POTENTIAL HAZARD

Failure to inspect vehicle before operating.

WHAT CAN HAPPEN

Increases the possibility of equipment failure resulting in an accident where you can be seriously injured or killed.

HOW TO AVOID THE HAZARD

Always inspect before operating.
Always follow the inspection and maintenance procedures found in this Owner's Manual.
Have an authorized Cannondale Motorsports Dealer inspect your vehicle at least after every 25 hours of use.

CAUTION

Allow the engine to reach operating temperature before riding.

This vehicle does not have a cooling fan. Airflow across the radiator is maintained during riding. If the vehicle runs without airflow, the engine can overheat and be severely damaged. The time it would take to overheat will depend on the weather conditions. Do not allow your vehicle to idle for more than 3 minutes without airflow across the radiator.

STARTING



DANGER

POTENTIAL HAZARD

Running the engine indoors.
Breathing exhaust gases

WHAT CAN HAPPEN

Running the engine indoors will expose you to dangerous exhaust gases. Breathing carbon monoxide gas leads to poisoning, asphyxiation, and death. This will happen rapidly and without notice.

HOW TO AVOID THE HAZARD

Never operate the vehicle indoors even for brief periods.

BATTERY (FULLY CHARGED)

- Make sure the battery is at full charge. Why? If the battery voltage drops while you are using the starter motor, the voltage could drop and the power relay of the ECU will shut the ECU off. When this happens, the engine will turn over but not start.

COLD STARTING - (MC1000)

NOTE : MC1000 equipped unit utilize an idle air control valve which automatically adjust throttle air bypass for cold starts. Do not open the throttle when cold starting.

1. Shift transmission into NEUTRAL and pull-in and hold in the clutch lever.
2. Press and hold the engine start button for no more than 2 to 3 seconds at a time.

When the engine fires release the button and slowly release the clutch lever.

STARTING A WARM ENGINE

When starting an engine after it has reached operating temperature, do not open the throttle. This will make starting very difficult and possibly foul the spark plug.

SHIFTING GEARS

WARNING

POTENTIAL HAZARD

Shifting to a lower gear at high speeds.

WHAT CAN HAPPEN

Tires can lose traction and cause an accident.

HOW TO AVOID THE HAZARD

Do not down shift at high speeds.

CAUTION

When shifting gears, press the shift lever firmly to make sure the gears engagement is complete.

Careless shifting can result in incomplete gear engagement and can cause the transmission to jump out of gear. This can severely damage the engine.

1. To engage first gear from NEUTRAL, pull in the clutch lever and push down on the shift lever.
2. Release the shift lever.
3. Open the throttle a little and slowly let out the clutch lever.
4. To shift into a higher gear, pull in the clutch lever, push the shift lever up to the next gear, release the shift lever, then release the clutch lever.
5. To shift into a lower gear, pull in the clutch lever, push down on the shift lever and release - then release the clutch lever.

BRAKING

WARNING

POTENTIAL HAZARD(S)

(1) Using the brakes improperly.

(2) Wet brake system (e.g. discs, pads)

WHAT CAN HAPPEN

(1) If you apply the brakes too quickly or suddenly the wheels may slide or skid possibly causing you to lose control resulting in an accident where you could be seriously injured or killed.

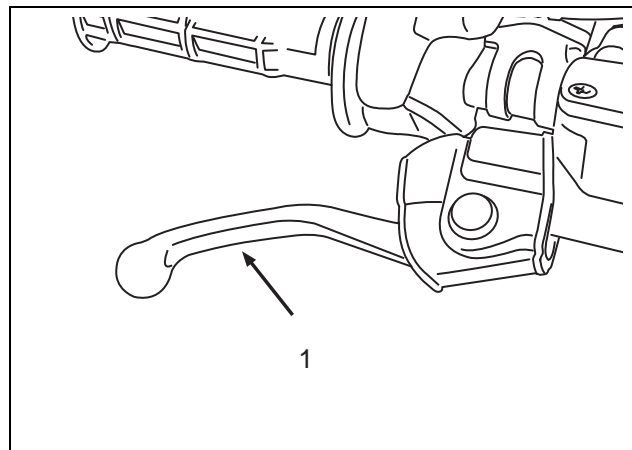
(2) Wet brakes do not provide the stopping power needed and therefore are extremely dangerous.

HOW TO AVOID THE HAZARD

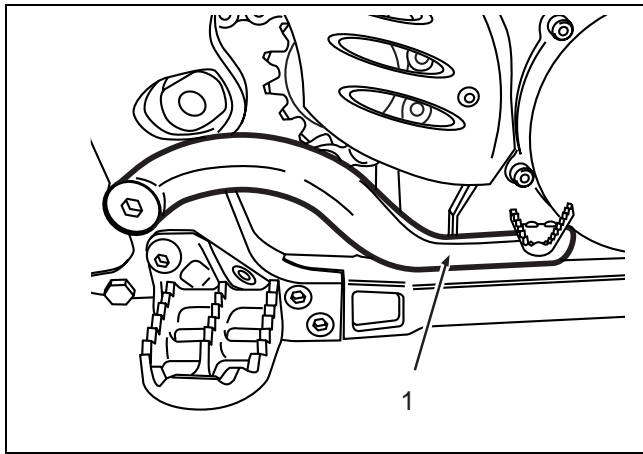
(1) Apply the front and rear brakes evenly and gradually. Always consider the surface of the terrain you are riding on and how it will affect your braking ability. Concentrate on applying both brakes as hard as possible without skidding. Shift down or fully disengage the clutch as necessary to keep the engine from stalling.

(2) In wet conditions test the brake operation frequently. When riding in wet conditions, ride the vehicle at slow speeds and apply the brakes several times until they are dry and at full power. Before riding the vehicle make sure the brakes and controls (e.g., brake lever, brake pedal, clutch lever, engine stop switch, and throttle) operate properly.

To brake, close the throttle completely with the clutch engaged (except when shifting gears) so the engine will help slow down the vehicle. Apply the front and rear brakes evenly.



1. Front brake lever



1. Rear brake pedal

STOPPING

When stopping the vehicle, pull in the clutch lever while completely closing the throttle, shift the transmission into neutral, and press the engine stop switch with your thumb.

AFTER YOU RIDE

1. After riding the vehicle, clean it thoroughly and allow it to dry, and then inspect the entire vehicle for damage or loose fasteners.
2. Repair or tighten any damaged or loose components and lubricate the vehicle.
3. If the vehicle is damaged, it is recommended that you put tape over the start button to remind you to not start the vehicle. Also, attach a piece of paper to the handlebar with the problem written on it.

Fluids

CAUTION

Avoid spilling brake fluid on painted, plastic or rubber parts; damage can result. Place a shop towel or rag over these parts when servicing the brake system. Any wipe up spills immediately.

BRAKE

SERVICE : Brake, fluid type, DOT #4

WARNING

POTENTIAL HAZARD(S)

(1) Eye and skin injury, death if swallowed.

(2) Not using the specified, mixing different types (or brands) of, and using unsealed containers of brake fluid.

(3) Inadequate brake fluid levels.

WHAT CAN HAPPEN

(1) Brake fluid is a hazardous substance. It can cause injury to your eyes or skin if you touch it. If swallowed it can cause death.

(2) Using unspecified brake fluid can damage the brake system leaving you without brakes. A container of brake fluid once unsealed can begin to absorb moisture from the atmosphere - if used in the brake system, the moisture will reduce braking force. You could lose your brakes and have an accident resulting in injury or death.

(3) Low brake fluid can allow air to enter the system and this will reduce braking power. Again, you could have an accident and be seriously injured or killed.

HOW TO AVOID THE HAZARD

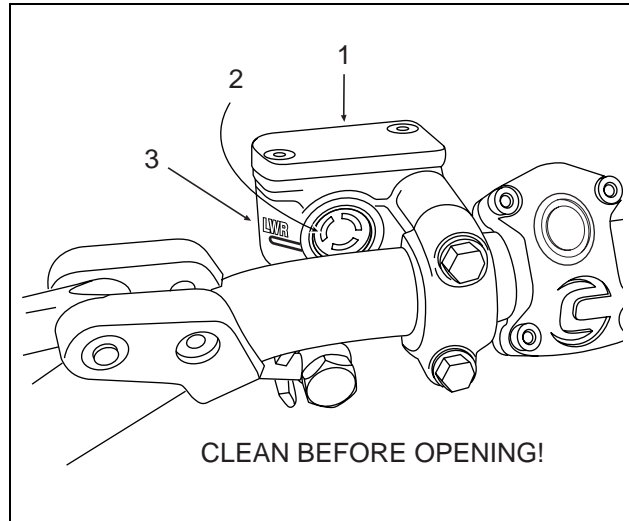
(1) Always wear eye and hand protection when working with brake fluid. Keep brake fluid out of the reach of children and animals. If ingested contact a doctor immediately.

(2) Always use DOT 4 brake fluid from a sealed container. Don't mix fluids or use opened fluids. Have the system drained and refilled by an authorized Cannondale Motorsports dealer if you suspect fluids have been mixed accidentally.

(3) Check for proper brake operation and fluid level before riding the vehicle.

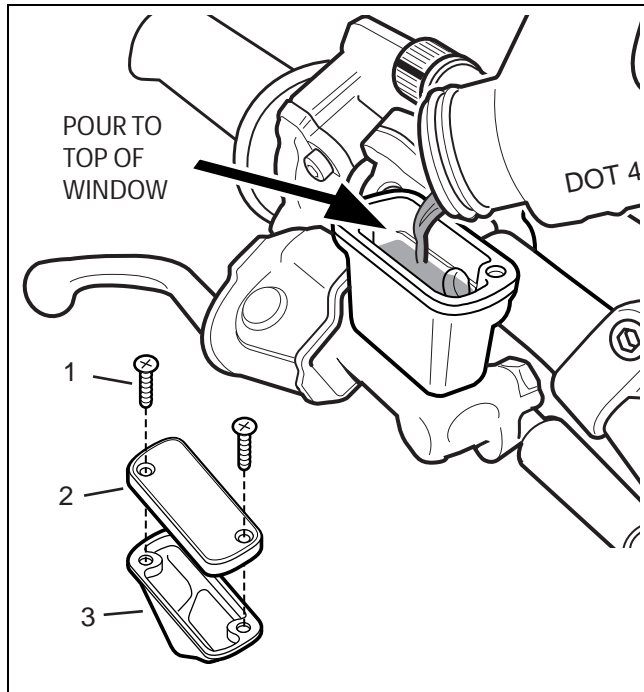
FRONT BRAKE

1. To check the front system, start by leveling the top of the master cylinder (mounted on the right handlebar).



1. Master cylinder
 2. Site window
 3. 'LWR' mark
2. Inspect the fluid level through the site glass. If the fluid level is below the 'LWR' mark, add the specified brake fluid until the fluid is at the top of the window.
 3. To add fluid, remove the screws, cover and diaphragm from the master cylinder. Pour DOT#4 brake fluid from a sealed container into the reservoir. Pour only until the fluid level rises to the top of the site window and no higher. If you fill above the window

fluid will spill when you re-install the diaphragm and cover.



1. Front brake master cylinder cover screws
2. Front brake master cylinder cover
3. Diaphragm

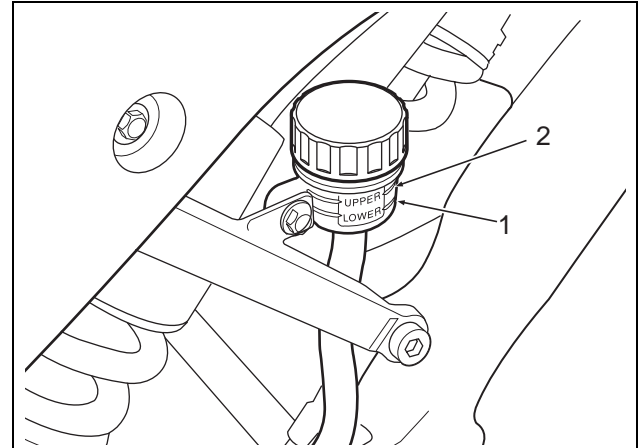
4. Reinstall the front brake master cylinder diaphragm and cover. Tighten front master cylinder cover screws to the specified torque.

**TORQUE : Brake, master cylinder, front, cover screws
1.9 N•m (1.4 lbf•ft)**

REAR BRAKE

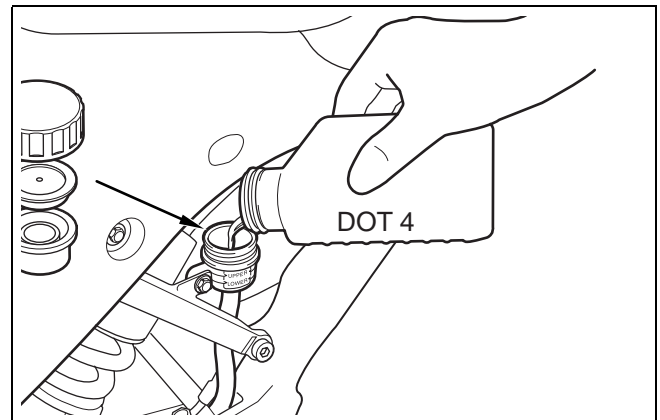
1. To check the rear system, level the rear brake master cylinder reservoir. The fluid level should be above the 'LOWER' mark.

2. If the fluid level is below the 'UPPER' mark, add specified brake fluid until it reaches the 'UPPER' mark.



1. 'LOWER' mark
2. 'UPPER' mark

NOTE : Do not fill the brake master cylinder above the 'UPPER' mark or the fluid will overflow when the diaphragm is installed.



1. Reservoir cap
2. Diaphragm plate
3. Diaphragm

3. Install reservoir diaphragm, diaphragm plate and cap.

COOLANT

SERVICE : Coolant, type
Anti-freeze Ethylene glycol with corrosion inhibitors for aluminum engines

SERVICE : Coolant, mixture ratio
1:1 (coolant/distilled water)

WARNING

POTENTIAL HAZARD(S)

(1) Scalding coolant sprayed onto YOU

(2) Serious eye or skin injury

WHAT CAN HAPPEN

(1) You can be severely burned by coolant sprayed out from under high pressure if the bottle is opened while the system is hot.

(2) Coolant is poisonous. If it gets in your eyes or contacts your skin the fluid can cause irritation or severe injury.

HOW TO AVOID THE HAZARD

(1) Wait for engine to cool before removing the cap or servicing the coolant system. Be sure to wear eye protection, a long-sleeve shirt, and hand protection (e.g. rubber gloves) when working with coolant.

(2) Always wear eye protection and protective clothing when working with any components of the cooling system. Keep coolant away from children and pets. Call a doctor immediately if coolant is swallowed and induce vomiting. Flush eyes and skin with water if coolant gets in eyes or comes into contact with skin.

CAUTION

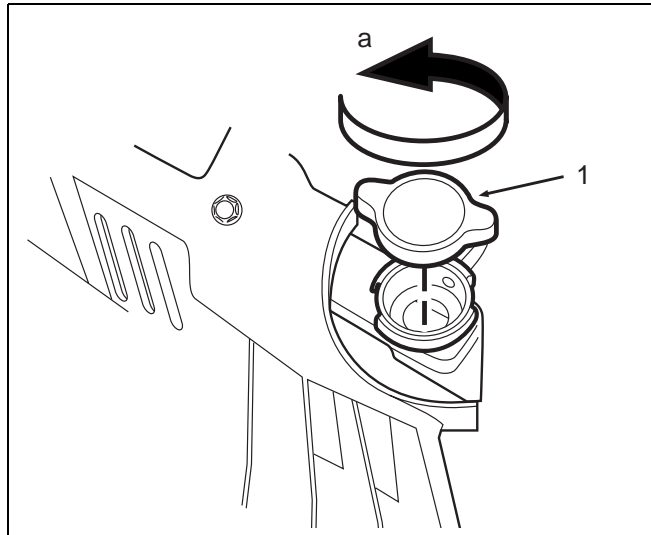
Operating the vehicle with a leaky or faulty cooling system can result in severe engine damage. Always use the specified coolant.

If the coolant level drops significantly, bleed the system after adding.

NOTE : We recommend that you bleed the coolant system each time you add fluid.

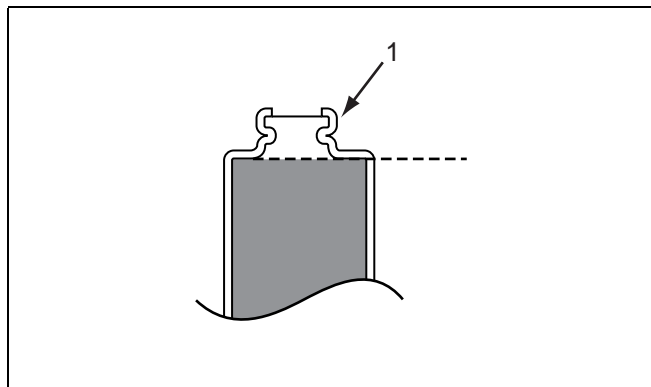
COOLANT LEVEL

1. To check the level, make sure the engine and radiator are cold.
2. Place a thick towel over the radiator cap.
3. Slowly turn the cap in direction (a) until you feel the cap reach the detent; this will allow any residual pressure to escape. Allow all pressure to escape before continuing.
Press down on the cap and keep turning it until it can be removed.



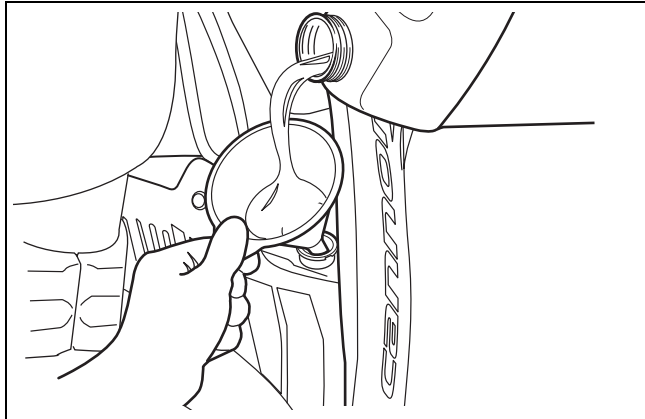
1. Radiator cap
- a. Loosening direction

4. Coolant level should be at the bottom of the filler neck. Add if necessary.



1. Filler neck

- To add, add the specified coolant at the radiator filler hole using a clean funnel. Wipe up any spilled coolant with a clean shop towel.



- Reinstall the radiator cap.
- Check the entire cooling system for leaks.
- If the coolant level drops after adding and no leaks are found, contact an authorized Cannondale Motorsports dealer for servicing.

BLEEDING THE COOLANT SYSTEM

DANGER

POTENTIAL HAZARD

Running the engine indoors.
Breathing exhaust gases

WHAT CAN HAPPEN

Running the engine indoors will expose you to dangerous exhaust gases. Breathing carbon monoxide gas leads to poisoning, asphyxiation, and death. This will happen rapidly and without notice.

HOW TO AVOID THE HAZARD

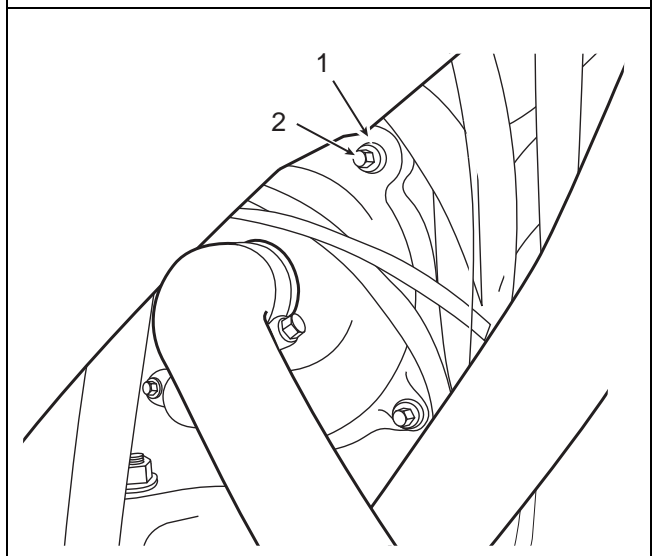
Never operate the vehicle indoors even for brief periods.

CAUTION

Do not over-tighten the bleed bolt and check the condition of the sealing washer. If it leaks, replace it.

- Make sure the engine and coolant system are cold.
- Place vehicle on a stand.
- Remove radiator cap.

- Loosen the bleed bolt on the water pump cover and allow any trapped air to escape. It is not necessary to remove the bolt.

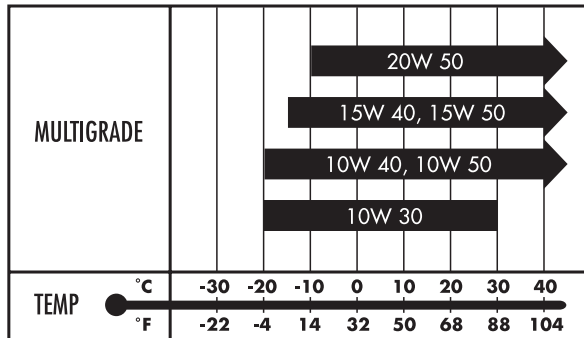


- Sealing washer
- Bleed bolt

- When no more air is coming out of the bolt hole; only coolant, tighten the bleed bolt. Add coolant at the radiator to bring to proper level if necessary.
- Reinstall the radiator cap.
- Start engine and allow to idle for three minutes and briefly touch the radiator. If the radiator is warm, the cooling system was bled properly. If the radiator is still cool, stop the engine. Repeat the bleed procedure and check again.

ENGINE OIL

SERVICE : Engine, oil recommended
Synthetic or semi-synthetic, 10W-40.



**SERVICE : Engine, oil, total quantity,
1.3 US qt. (1.2 L)**

SERVICE : Engine, oil, change, quantity (* see note below)
1 US quart (0.9 L)

⚠ WARNING

POTENTIAL HAZARD(S)

**Serious injury or irritation to the skin or eyes.
Death if swallowed.**

WHAT CAN HAPPEN

Engine oil is a hazardous substance. If it comes into contact with your skin or eyes you can suffer serious injury or irritation. If it is swallowed it can cause death.

HOW TO AVOID THE HAZARD

Wear hand protection and safety glasses when working with engine oil.

If you touch engine oil, wash it off immediately with soap and water.

Clean clothes or rags contaminated with engine oil.

If swallowed seek immediate medical attention.

KEEP ENGINE OIL AWAY FROM CHILDREN AND ANIMALS.

CAUTION

The correct oil level can only be checked after the engine has run for a 1 minute.

NOTE : * When adding engine oil following a change (i.e. drain of the spars, crankcase, filters removal and cleaning), small volumes of oil can remain within the spar reservoirs. Keep this fact in mind and be careful not to over fill the system. The change quantity specified here provides sufficient oil to operate engine safely so that level may be checked in the spar.

Be careful not to overfill the engine oil. Pour small amounts rechecking the level between pours. Place vehicle on a level surface.

CHECKING THE ENGINE OIL

⚠ DANGER

POTENTIAL HAZARD

Running the engine indoors. Breathing exhaust gases

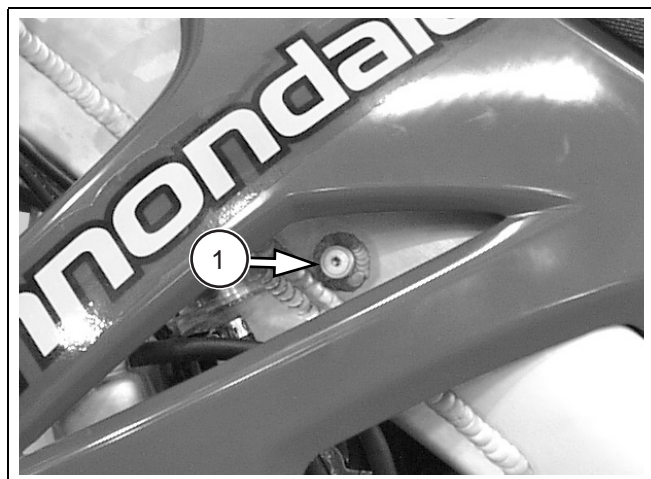
WHAT CAN HAPPEN

Running the engine indoors will expose you to dangerous exhaust gases. Breathing carbon monoxide gas leads to poisoning, asphyxiation, and death. This will happen rapidly and without notice.

HOW TO AVOID THE HAZARD

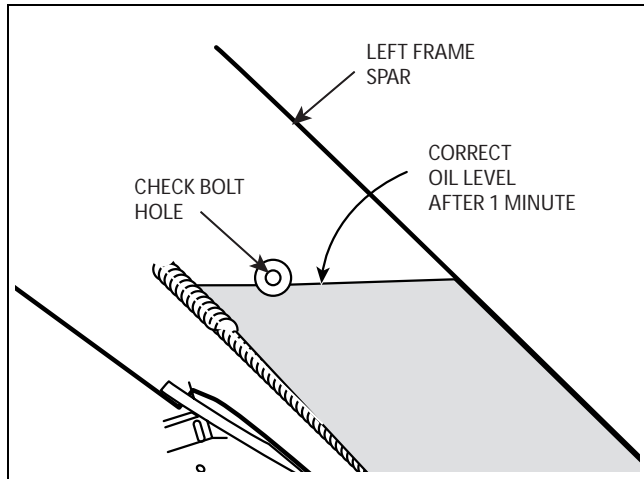
Never operate the vehicle indoors even for brief periods.

1. To check, place the vehicle on a stand so it is level.
2. Shift the transmission into NEUTRAL and start the vehicle. Allow to run for 1 minute at idle speed, then turn the engine off.
3. Remove the engine oil level check bolt.

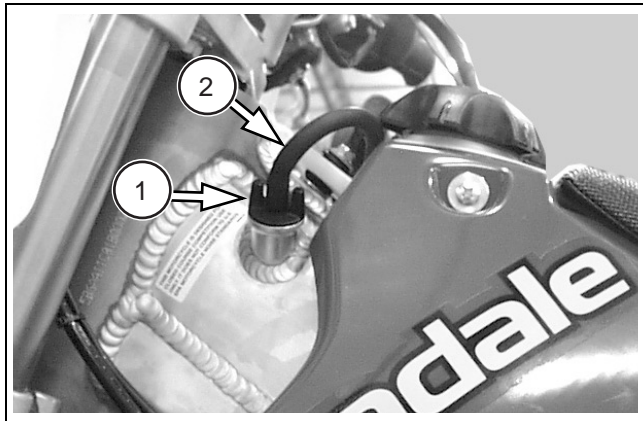


- 1. Engine oil level check bolt (left frame spar)**

- The engine oil level should be even with the bottom of the check hole. Add if necessary.



- To add, remove the filler cap on the left frame spar and pour the specified engine oil until the level reaches the bottom of the check hole. Pour slowly to allow the oil to flow throughout the spar.



- Engine oil filler cap (left frame spar)
- Vent hose

- Reinstall the check bolt.

TORQUE : Frame, engine oil spar check bolt
15.0 lbf•ft (20.3 N•m).

CHANGING THE ENGINE OIL

⚠ DANGER

POTENTIAL HAZARD

Running the engine indoors.
 Breathing exhaust gases

WHAT CAN HAPPEN

Running the engine indoors will expose you to dangerous exhaust gases. Breathing carbon monoxide gas leads to poisoning, asphyxiation, and death. This will happen rapidly and without notice.

HOW TO AVOID THE HAZARD

Never operate the vehicle indoors even for brief periods.

⚠ WARNING

POTENTIAL HAZARD

Blindness, eye injury,

WHAT CAN HAPPEN

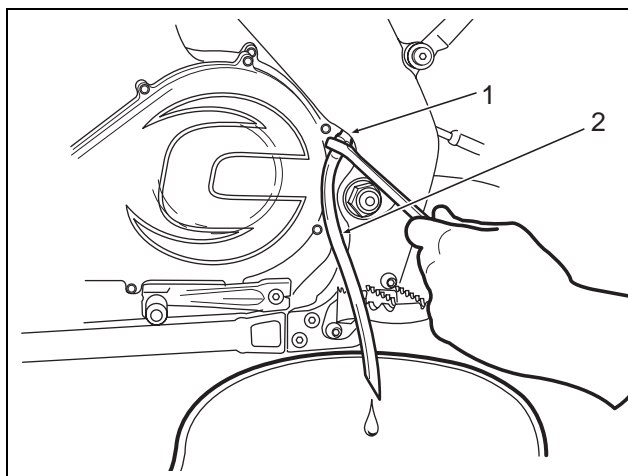
When cleaning the oil filters, objects propelled by compressed air can strike your eyes and cause serious injury or blindness.

HOW TO AVOID THE HAZARD

Wear safety glasses when working with compressed air.

- Place the vehicle on a stand.
- Start engine and allow to reach normal operating temperature 158°F (70°C).
- Turn the engine off.
- Place an oil pan under the left frame spar drain bolt.
- Connect a clear plastic hose to the engine oil drain bolt and loosen it
- Allow the contents of the spar to drain completely into an oil pan.

NOTE : Remove the spar oil filler cap to facilitate draining.

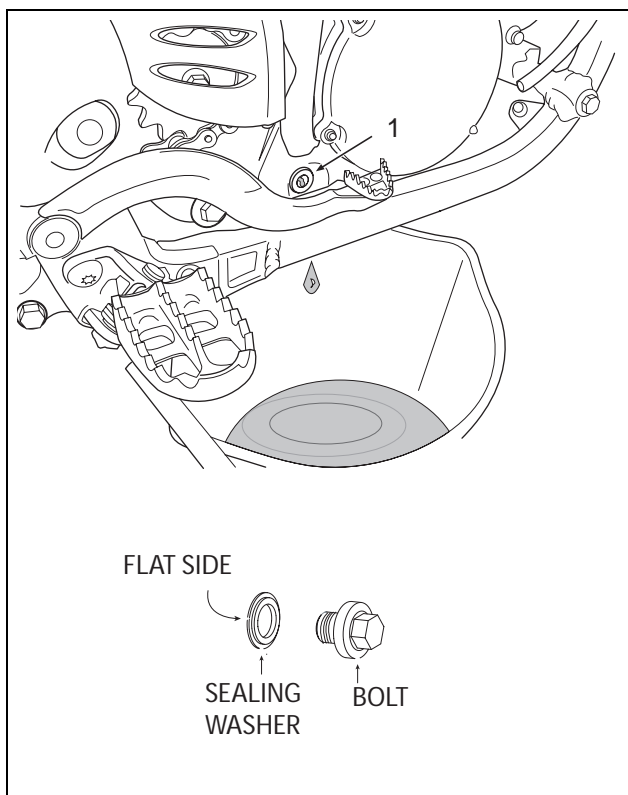


1. Engine oil drain plug (left spar)
2. Clear hose

7. Tighten the bolt.

TORQUE : Engine, engine oil drain bolt (left spar)
15.0 lbf•ft (20.3 N•m)

8. Place a container under engine oil crankcase drain bolt located on the right side of the engine and remove it and the sealing washer. Allow the oil to drain completely.



1. Bolt
2. Sealing washer

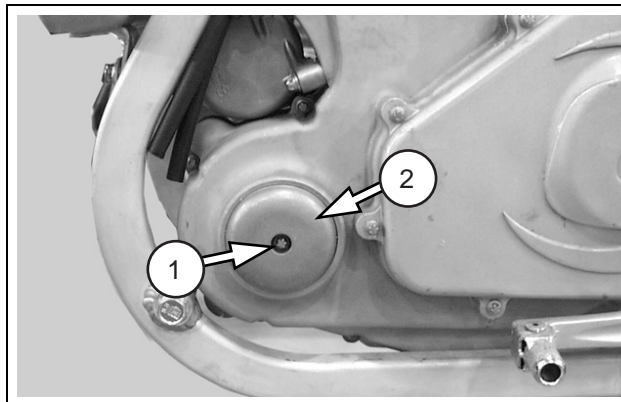
9. Apply anti-seize compound to the threads of the drain bolt. Then install the sealing washer onto the bolt so

that the flat side faces the crankcase and install. Tighten to the specified torque.

TORQUE : Engine, engine oil drain bolt (crankcase)
6.0 lbf•ft (8.1 N•m)

10. Now, place a container under engine oil filter cover and remove bolt and engine oil filter cover.

NOTE : Be sure to note the two cover O-rings as you remove the cover.

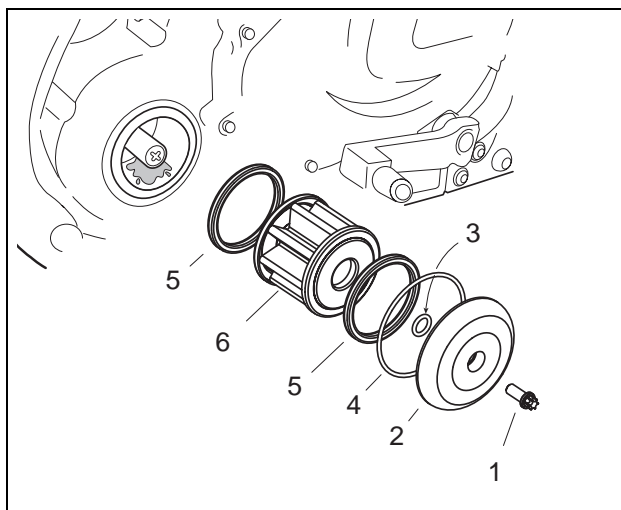


1. Filter cover bolt
2. Filter cover

11. Remove the seal, filter (screen) and seal from the filter housing.

12. Clean the filter using compressed air and clean the the filter housing cavity with a clean shop towel.

13. Inspect the seals and filter element for tears, cracks, and other damage. Replace new if damaged.



1. Bolt
2. Cover
3. O-ring (2-011)
4. O-ring (2-033)
5. Filter seal
6. Filter (screen)

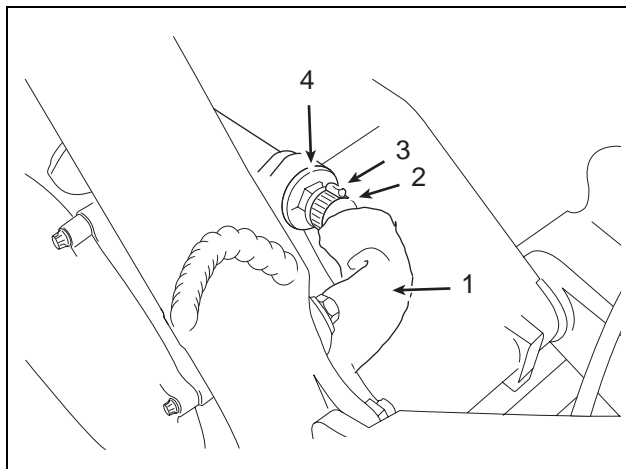
14. Apply a light coat of O-ring grease to the large and small cover O-rings and insert them back into the cover.
15. Use some O-ring grease to "stick" the filter seals so that they are centered on the filter. This will help assure that the seals remain in place when you insert the filter into the housing.
16. Install the cover and cover bolt.

CAUTION

Do not over-tighten the cover bolt. You will damage the threads of the filter housing. If the cover leaks, you may need to replace the cover O-rings or inspect the cover and housing mating surfaces for damage.

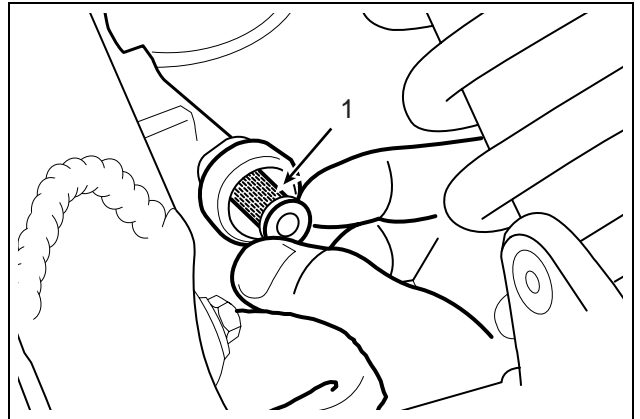
TORQUE : Engine, engine oil, filter cover bolt 3.3 lbf•ft (4.5 N•m)

17. Now, carefully work the heat shield back to expose the left spar return hose and clamp. Then, remove the clamp and the hose from the engine oil inlet fitting.



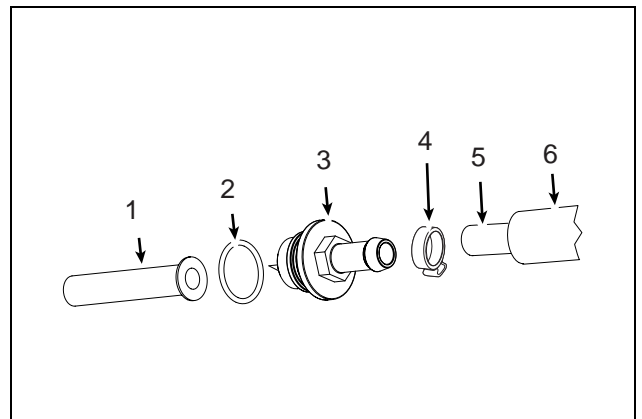
1. Heat shield
2. Spar return hose
3. Clamp
4. Inlet fitting

18. Loosen and remove the inlet fitting. Then, remove the inlet filter (screen) from the crankcase hole.



1. Inlet filter (screen)

19. Clean the screen using compressed air.
20. Inspect the inlet fitting, O-ring, and inlet screen for tears, cracks, and other damage. Replace any damaged part with a new one.
21. Reinstall the filter into the crankcase. Inspect the fitting O-ring and replace it with a new one if necessary.
22. Apply light coat of clean engine oil to the fitting O-ring install the fitting. Tighten it to the specified torque.



1. Screen
2. O-ring
3. Inlet fitting
4. Clamp
5. Spar return hose
6. Heat shield

TORQUE : Engine, engine oil inlet fitting 18.0 lbf•ft (25.0 N•m)

23. Reinstall the engine oil inlet hose and clamp onto the fitting.
24. Re-position the heat shield up to the clamp.

25. Now, remove the left spar oil filler cap and add the specified “engine oil change quantity” using a clean funnel.
Pour slowly allowing the oil to flow throughout the spar.



1. Engine oil filler hole (left frame spar)

26. Reinstall cap and run engine for 1 minute at idle speed to circulate the new oil.
27. Recheck the level as described in the engine oil checking procedure. Add oil as required to bring level to the bottom of the check bolt hole.

TRANSMISSION OIL

SERVICE : Transmission, oil, recommended type
80W or 85W

SERVICE : Transmission, oil, total quantity (dry fill)
0.74 US quart (0.7 L)

WARNING

POTENTIAL HAZARD(S)

Serious injury or irritation to the skin or eyes.
Death if swallowed.

WHAT CAN HAPPEN

Transmission oil is a hazardous substance. If it comes into contact with your skin or eyes you can suffer serious injury or irritation. If swallowed it can cause death.

HOW TO AVOID THE HAZARD

Wear hand protection and safety glasses when working with engine oil.

If you touch transmission oil, wash it off immediately with soap and water.

Clean clothes or rags contaminated with engine oil.

If swallowed seek immediate medical attention.

KEEP TRANSMISSION OIL AWAY FROM CHILDREN AND ANIMALS.

CAUTION

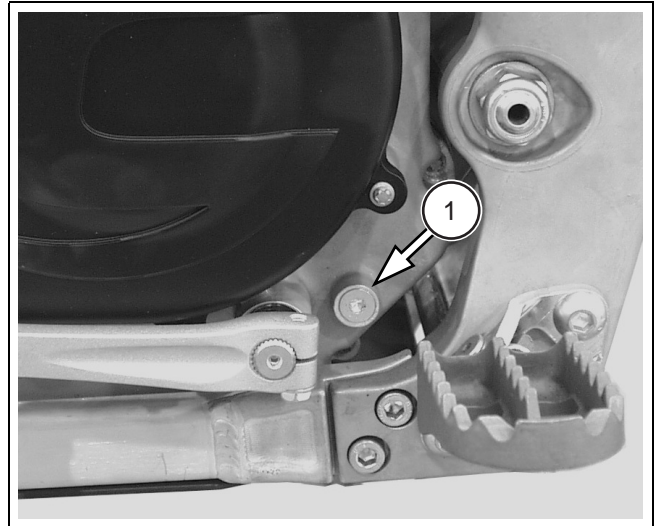
A low transmission oil level may result in severe engine damage. Check level before every ride.

Always use the specified transmission oil.

Always use a clean funnel when adding transmission oil

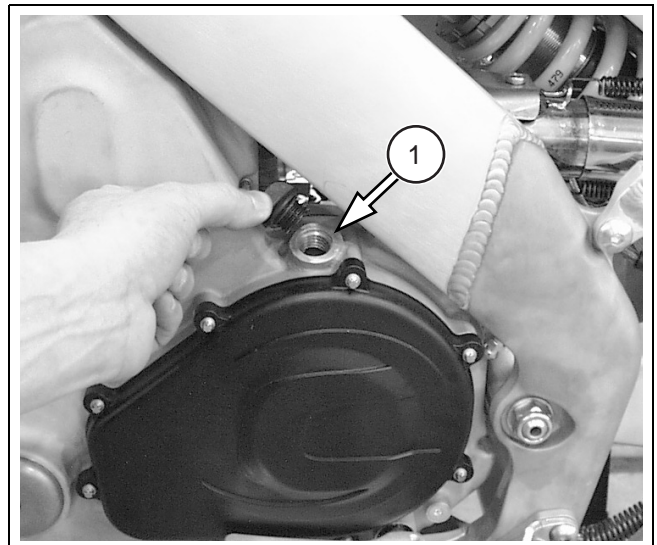
1. To check, make sure the engine is cold.
2. Place the vehicle on a stand so it is level and wait a few minutes until the transmission oil settles.
3. Place a few rags under the transmission oil level check bolt and remove it. The transmission oil level should be even with the bottom of the check hole. If the transmission oil level is low, install the check bolt,

and add small amounts slowly at the filler hole and recheck the level.



1. Check bolt
4. Install the transmission oil level check bolt.

TORQUE : Transmission, oil level check bolt
5.0 lbf•ft (6.8 N•m)



1. Transmission oil filler hole

CHANGING THE TRANSMISSION OIL

WARNING

POTENTIAL HAZARD

Blindness, eye injury,

WHAT CAN HAPPEN

When cleaning the oil filters, objects propelled by compressed air can strike your eyes and cause serious injury or blindness.

HOW TO AVOID THE HAZARD

Wear safety glasses when working with compressed air.

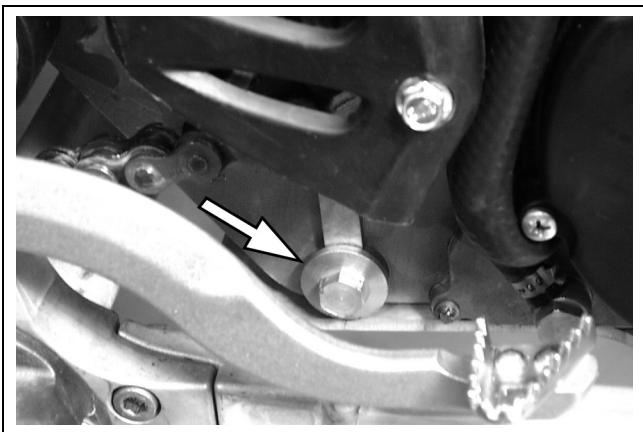
CAUTION

When re-installing the transmission oil filter, be sure to insert it into the drain bolt, then insert the pair into the crankcase hole together. This helps assure that the other end of the filter will locate into the back of the transmission oil pump (rear of cartridge plate inside gearbox cavity). If the filter does not locate into the plate hole, unfiltered oil can enter and damage the pump.

NOTE : The transmission drain bolt is located on the right side of the engine. The filter (screen) may not come out with the drain bolt. After the oil drains, use needle nose pliers to gently remove it from within the drain hole.

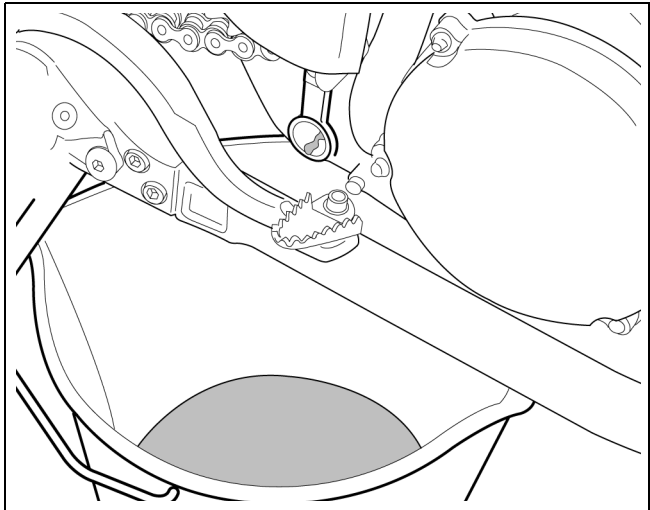
Take notice of the sealing washer on the bolt when you remove it.

1. Place vehicle on a level surface.
2. Place a suitable container under transmission drain bolt and remove the bolt.

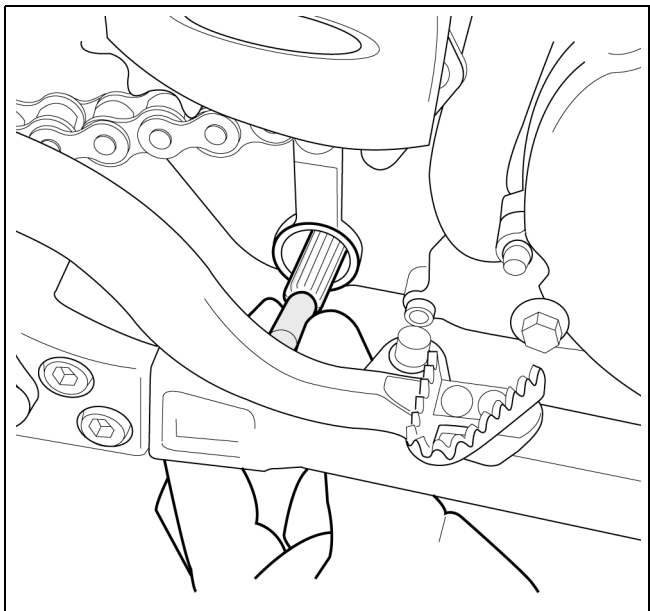


3. Allow the transmission oil to drain completely.

4. Lean the vehicle slightly to the right to ensure all oil is drained.

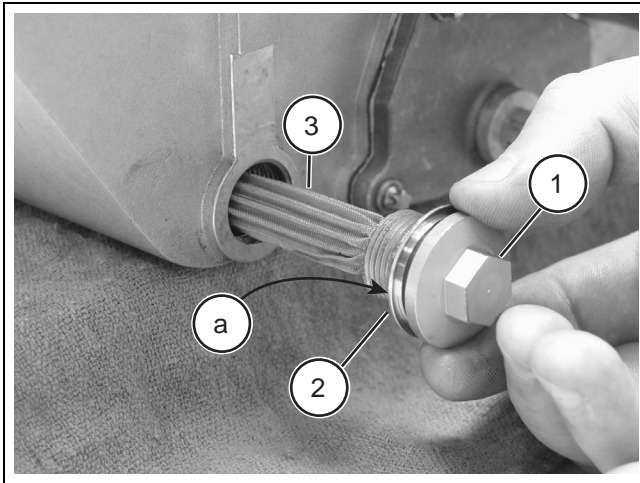


5. If the filter did not come out with the bolt, remove it carefully from the hole. Clean it using compressed air.



6. Inspect the filter for cracks, holes, tears, and other damage. Replace new if damaged.
7. Make sure the threads of the bolt and crankcase are clean.
8. Apply anti-seize compound to the threads of the transmission drain bolt (1). Then install the sealing washer (2) onto the bolt with the flat side (a) facing

the case. Insert the filter into the bolt, and install into the case.



- 1. Drain bolt
- 2. Sealing washer
- 3. Filter (screen)
- a. Sealing washer flat side

9. Tighten the bolt to the specified torque.

TORQUE : Transmission, oil, drain bolt
6.0 lbf•ft (8.1 N•m)

- 10. Add the specified transmission oil at the filler cap until oil level reaches the bottom of the check bolt hole. Pour slowly and allow time for the oil to flow throughout the case cavity.
- 11. Then, run the engine briefly (1-2 minutes) to circulate newly added oil and recheck the level. Add if necessary.

NOTE : The transmission oil level should always be at the bottom of the check bolt hole.

FUEL

SERVICE : Fuel, recommended fuel
Premium unleaded gasoline

SERVICE : Fuel, fuel tank capacity
2.1 US gal (8.0 L)

⚠ WARNING

POTENTIAL HAZARD(S)

(1) Fire or explosion

(2) Overfilling the fuel tank.

WHAT CAN HAPPEN

(1) Gasoline is extremely flammable. Handling it inappropriately or near cigarettes, flame, sparks, welders, or other sources of ignition can result in a fire or explosion where you can be seriously injured or killed.

(2) Fuel expands due to heat (e.g., engine, sun) and may overflow if the tank is overfilled, resulting in a fire

HOW TO AVOID THE HAZARD

(1) Only handle gasoline outdoors and away from cigarettes, flame, sparks, welders, or other sources of ignition.

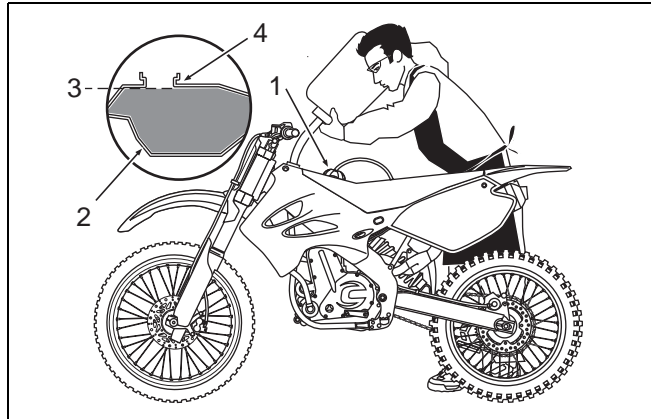
(2) Stop adding fuel when the fuel level reaches the bottom of the filler neck

CAUTION

If engine “knocking” or pinging occurs, use a different brand of gasoline or a higher octane rating.

Never experiment by using fuels other than the recommended type in this vehicle. Other fuels or additives not designed specifically for this vehicle can severely damage the engine and its supporting components (e.g. fuel system, sensors, tank, hoses, etc.)

3. After fueling, turn the fuel tank cap clockwise to tighten.



1. Fuel tank cap
 2. Fuel tank
 3. Fuel level
 4. Filler neck
4. Make sure the fuel cap breather hose is routed correctly.



1. To add fuel, remove the fuel tank cap by turning it counterclockwise.
2. Carefully fill the fuel tank with the recommended fuel until the fuel level reaches the bottom of the filler neck.

Maintenance and Adjustments

BREAK-IN

CAUTION

The break-in period for this vehicle is 1 hour. If not used carefully during this period, the vehicle may end up “broken down” instead of “broken in”.

Complete the Break-in column of the maintenance schedule in this section.

RIDING WHEN BREAKING-IN

Ride two 10-minute segments using no more than 1/2 throttle and wait for the engine to cool after each segment. Next, ride three 15-minute segments using no more than 3/4 throttle, again allowing the engine to cool between rides.

NOTE : During all rides, it is also important to shift gears often so that high rpms are avoided and the engine is not lugged.

SUSPENSION BREAK-IN

During the first hour, it is recommended to set the ride height (spring pre-load), but do not change the factory-set suspension settings to allow the fork legs and rear shock absorber to break-in, in order to work freely with a minimum of friction.

NOTE : The initial suspension impression (or “feel”) could be harsh or stiff, this will change after about 1 hour of use. Therefore, do not change the initial suspension settings until after the vehicle has been ridden for 1 hour.

SCHEDULE		OWNER				DEALER	
		Pre-Ride	Break-In (after 1 hour)	Every 5 hours	Every 10 Hours	Every 25 Hours ()	Once a year
Fuel	Fill to proper level	x					
	Replace inline filter			x			
	Adjust idling					x	
	Check throttle freeplay. Open the throttle fully and check for proper return to idle position.	x					
Transmission	Check transmission oil level	x	x	x			
	Change transmission oil and clean filter		x	x			
Engine	Check engine oil level	x					
	Change engine oil and clean filters		x	x			
	Check valve clearance					x	
Brakes	Check fluid level	x					
	Pad wear (replace pads as a set)	x					
	Check brake lever freeplay.	x					
	Check brake discs	x	x		x	x	
	Check brake pedal height		x		x		
	Change brake fluid						x
	Check brake system routing					x	
Coolant	Check level	x	x				
	Inspect the cooling system (radiator, hoses, radiator cap)					x	
Electrical	Inspect spark plug					x	
	Inspect vehicle for fluid leaks	x	x	x			
	Inspect all cable housings for wear or damage and repair or replace if necessary.	x					
	Check all electrical wiring and connections for correct routing, connections, and damage and adjust, repair, or replace if necessary.					x	
Fasteners	Visually inspect for loose or missing fasteners	x					
	Check all fasteners and tighten to the specified torque		x		x		
Clutch	Check clutch lever freeplay.	x	x				
	Check clutch arm position	x	x				
Air	Clean air filters	x	x	x			

SCHEDULE		OWNER				DEALER	
		Pre-Ride	Break-In (after 1 hour)	Every 5 hours	Every 10 Hours	Every 25 Hours ()	Once a year
Drive chain	Check drive chain for wear, damage, stretch	x	x	x			
	Check the drive chain freeplay	x					
	Clean and lubricate the drive chain	x					
	Inspect the drive sprockets for broken teeth, cracks, excessive wear			x			
	Inspect the drive chain rollers, guide block, and swingarm buffer for cracks, or excessive wear.				x		
Exhaust	Inspect the exhaust system for cracks, holes, leaks, or other damage					x	
Frame	Inspect the frame, subframe, and swingarm (and bearings) for damage and repair or replace if necessary.					x	
Steering	Check the steering head bearings for correct preload					x	
	Check the steering head for correct rotation from left to right steering stops and no interference from cables, hoses, and wiring, and adjust if necessary. Also, make sure the idle speed does not increase when turning the steering head.	x	x				
Suspension	Inspect the fork legs and rear shock absorber for signs of oil leakage and repair if necessary. Make sure the fork legs are evenly adjusted and adjust if necessary.	x	x				
Tires & wheels	Inspect the tires for cracks, tears, or other damage and replace if necessary. Check the tire pressure and regulate if necessary.	x	x				
	Inspect the wheels for damage	x	x				
	Check the spokes for correct tension or loose or damaged spokes and replace or tighten if necessary	x					
	Check the wheel alignment and adjust if necessary.					x	

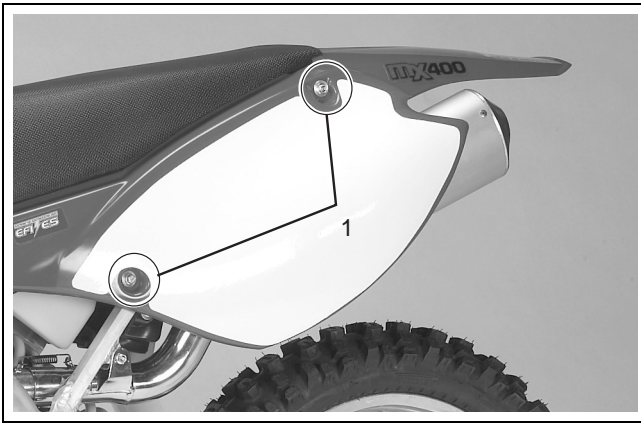
PANELS

This section describes how to properly remove and install the various panels of the vehicle.

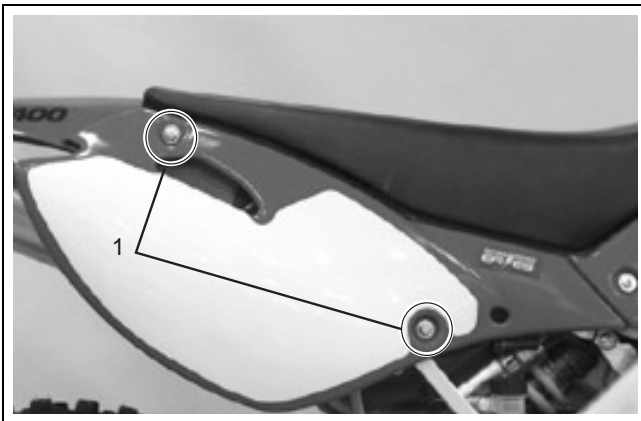
After removing panels, inspect them for cracks, chips, or other damage. If any panel is heavily damaged or interferes with vehicle operation (e.g., fork leg guard damage causes it to interfere with the front suspension movement), replace the damaged component with a new one.

SIDE NUMBER PANELS

To remove the side number panels, remove the bolts and the panel.



1. Bolts (left panel)



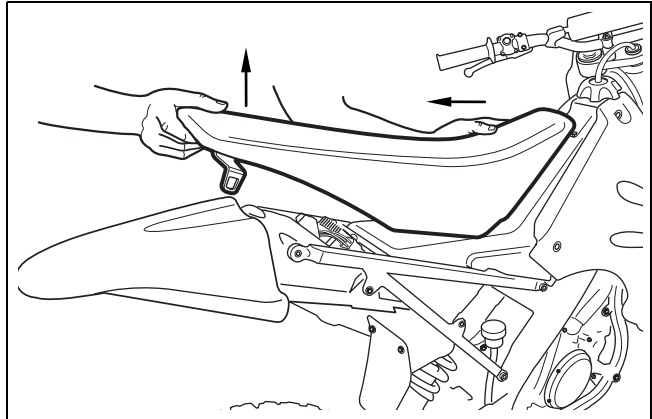
1. Bolts (right panel)

To install, place the panel in the original position and install the bolts.

TORQUE : Panel, side number bolts
5.0 lbf•ft (6.8 N•m)

SEAT

1. To remove, first remove the side number panels.
2. Lift up the rear of the seat slightly, pulling it back and away from the fuel tank.



WARNING

POTENTIAL HAZARD

Seat coming off while riding.

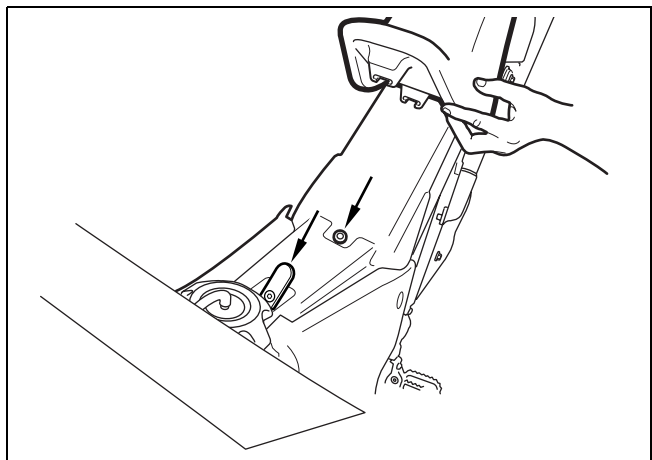
WHAT CAN HAPPEN

If you install the seat incorrectly or if it is damaged, it can shift or come off while you are riding causing you to lose control. You could be seriously injured or killed.

HOW TO AVOID THE HAZARD

Make sure the seat is fastened securely and it is in good condition. After installing the seat, pull the front of the seat upwards to make sure it is locked into position.

3. To install the seat, align retaining tabs located on the fuel tank with the receivers on the underside of the seat. Align the upper fuel tank tab first.

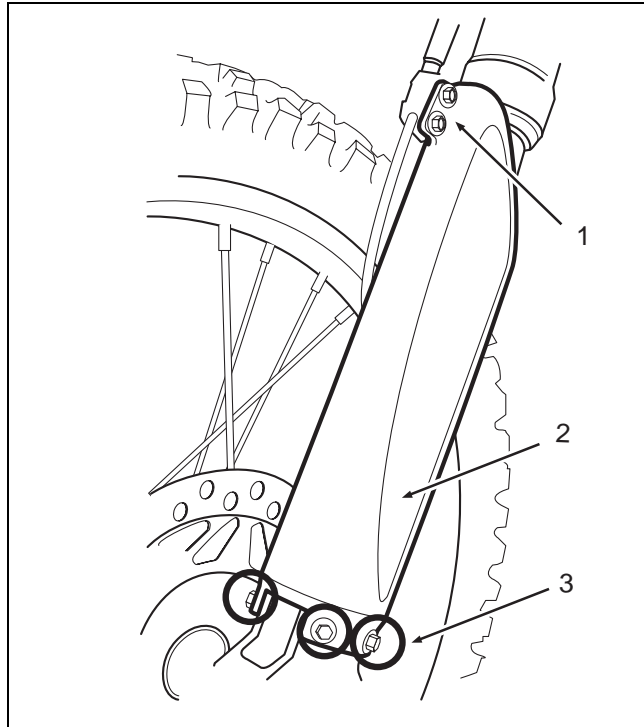


Align seat and tank tabs

4. Use slight downward pressure at the mid section of the seat while sliding the seat forward onto tabs.
5. Position the seat so the rear seat brackets are on the outside of the subframe rails.
6. Install the side number panels.

FORK LEG GUARDS

Remove the brake line clamp bolts from the left fork guard. Then, remove the fork leg bolts and guard.



1. Brake line clamp (left guard)
2. Guard
3. Bolts

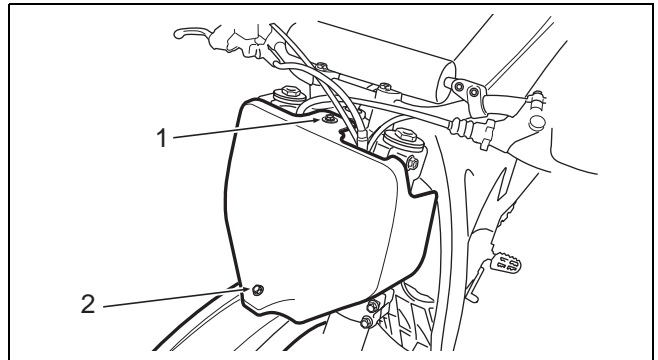
To install, place the panel in the original position and install the bolts.

TORQUE : Fork, leg guard, bolts
5.0 lbf•ft (6.8N•m)

TORQUE : Brake, fork leg brake line clamp, bolts
5.0 lbf•ft (6.8N•m)

To remove, remove the upper and lower (with fender nut) number plate bolt.

NOTE : Keep your hand under the front fender so the fender nut does not fall when the lower bolt is removed



1. Upper bolt
2. Lower bolt

To install, place the front fender and panel in the original position and install the bolts.

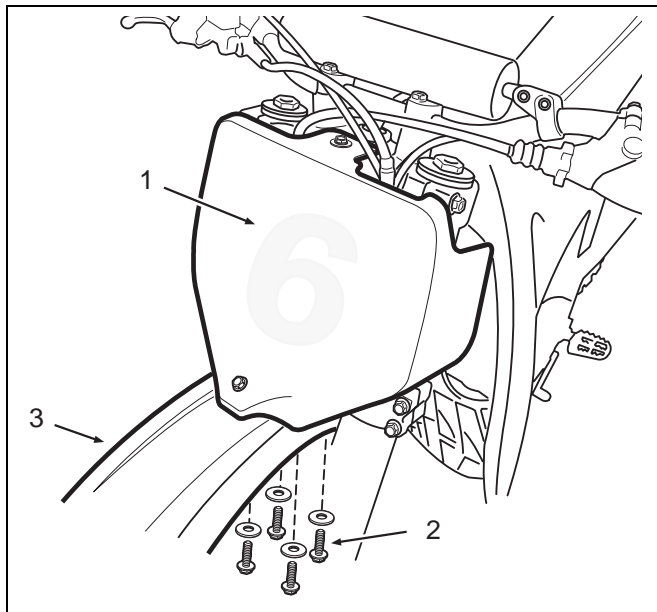
TORQUE : Panel, front number plate, lower bolt
5.0 lbf•ft (6.8 N•m)

FRONT FENDER

CAUTION

Be careful not to damage the radiator core during removal.

Remove the front number plate, front fender bolts and washers. Then, remove the fender.



1. Front number plate
2. Fender bolts
3. Front fender

To install, place the panel in the original position and install the bolts.

TORQUE : Panel, front fender, mounting bolts
5.0 lbf•ft (6.8 N•m)

RADIATOR SHROUDS

Place the vehicle on a stand and remove radiator shroud bolts.



1. Left radiator shroud



1. Right radiator shroud

To install, place the panel in the original position and install the bolts.

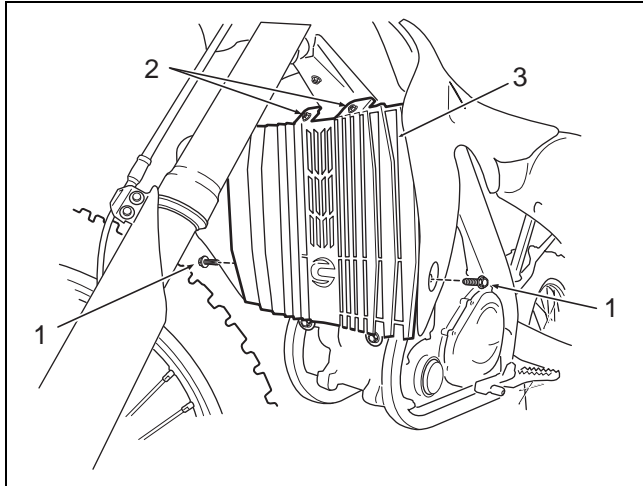
TORQUE : Panel, radiator shroud, bolts
5.0 lbf•ft (6.8 N•m)

RADIATOR GUARD

CAUTION

Do not damage the radiator core during removal.

1. Place the vehicle on a stand.
2. Remove front fender.
3. Remove side bolts, upper bolts, the radiator guard.



1. Side bolts
2. Upper bolts
3. Radiator guard

4. To install, place the panel in the original position and install the bolts.

TORQUE : Panel, radiator guard, side bolts
5.0 lbf•ft (6.8 N•m)

TORQUE : Panel, radiator guard, upper bolts
5.0 lbf•ft (6.8 N•m)

MUDFLAP

⚠ WARNING

POTENTIAL HAZARD

Electrical short-circuit or electrical fire.

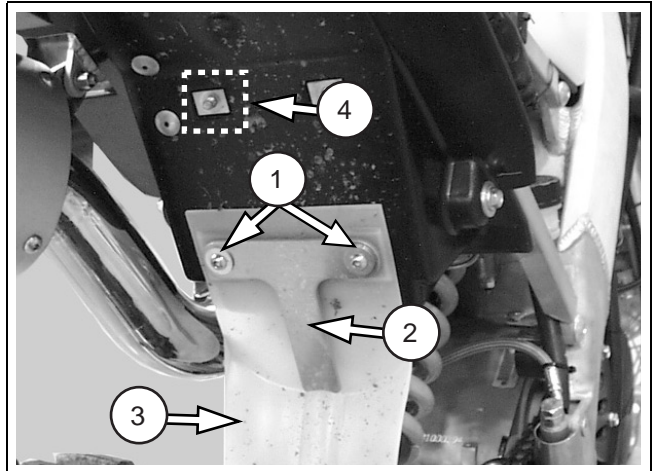
WHAT CAN HAPPEN

You can short the battery to ground with a tool and the vehicle frame. This can cause an electrical fire. You can be burned severely or injured by the sparks themselves.

HOW TO AVOID THE HAZARD

When removing the mudflap use extra care to not contact the 12V+ battery jump start terminal. Cover this terminal with electrical tape to prevent an accidental short to ground. (i.e., touching the terminal with a tool that is grounded to the frame, subframe, swingarm or exhaust system)

Remove mudflap bolts (1), retainer (2) and mudflap (3).



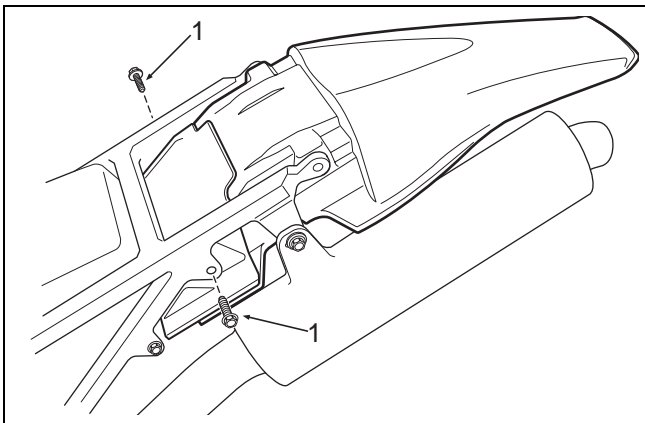
1. Bolts
2. Retainer
3. Mudflap
4. (12V+ - Battery jump start terminal)

To install, place the panel in the original position and install the bolts.

TORQUE : Panel, mudflap, mounting bolts
5.0 lbf•ft (6.8 N•m)

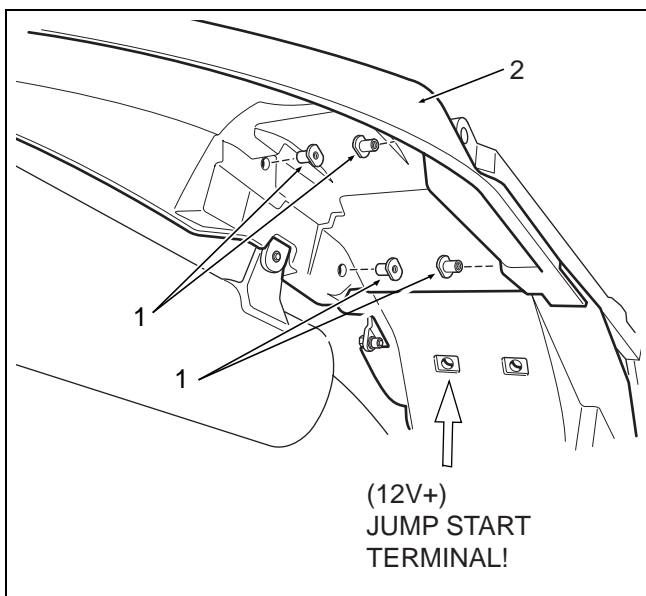
REAR FENDER

1. Remove the seat and the bolts (1).



1. Bolts

2. Remove the fender nut and the rear fender.



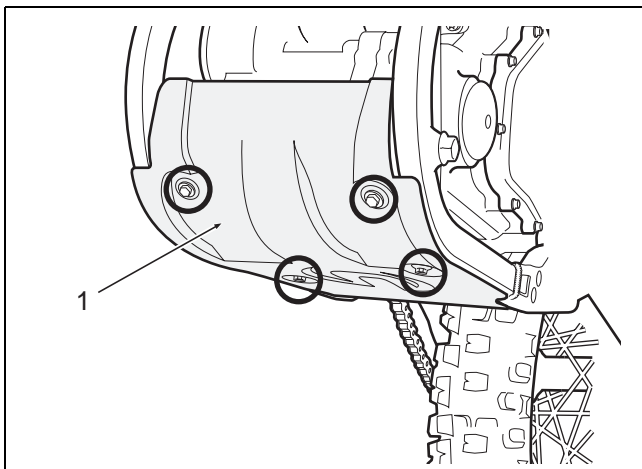
1. Fender nuts
2. Rear fender

3. To install, place the panel in the original position and install the bolts.

TORQUE : Panel, rear fender bolts
5.0 lbf•ft (6.8 N•m)

GLIDE PLATE

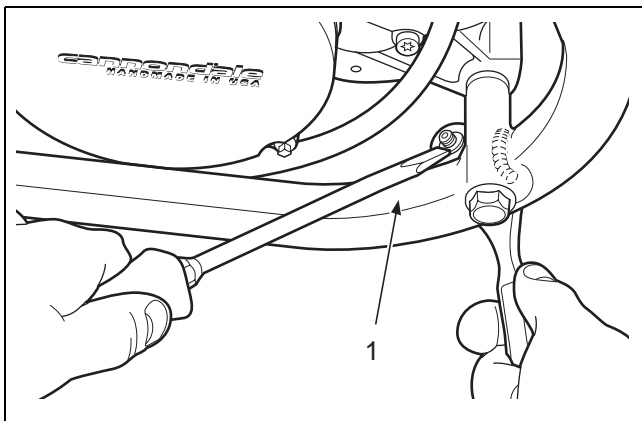
1. Secure the vehicle in a wheel vice.
2. Remove the bolts, nuts, and glide plate (1).



1. Glide plate

NOTE : To prevent the nuts from spinning, hold them with a thin-blade screwdriver while removing the bolts.

The nuts are not secured within frame rails. Be careful not to lose them.



3. To install, place the panel in the original position and install the bolts.

TORQUE : Panel, glide plate bolts
5.0 lbf•ft (6.8 N•m)

AIR

CLEANING THE AIRBOX FILTER

CAUTION

Be very careful not to allow any dirt or foreign matter into the airbox when you have the filters removed. Severe engine damage will result if foreign matter or dirt enter the combustion chamber via the airbox.

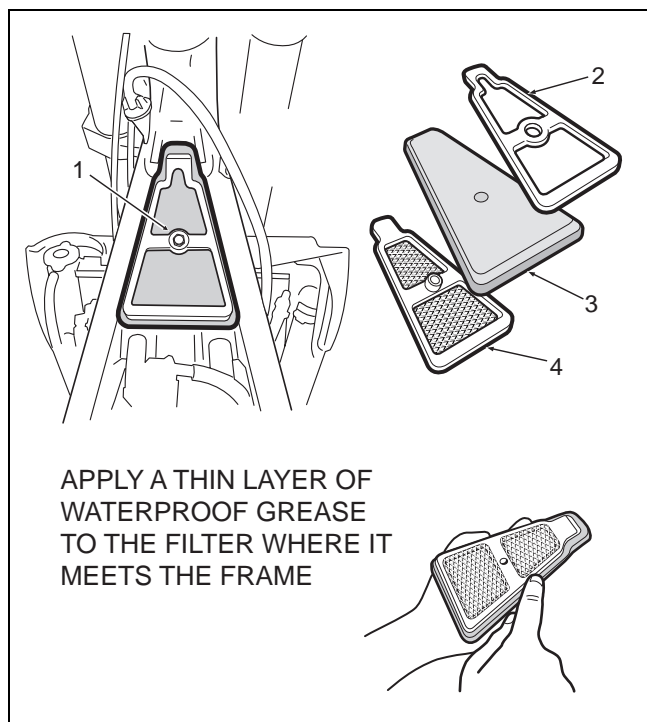
Use only high quality foam air filter specific oils on the filters. Local operating conditions may require different air filter oils. Consult your authorized Canondale motorsports dealer for available oil brands.

The air filter must be completely dry before applying the air filter oil.

Make sure the airbox filter fits properly in the frame so there are no gaps around the mating surfaces. Use a high quality water-proof grease on the filter where it contacts the frame to help guard against unfiltered air entering the system.

1. Remove the fuel tank. See "Fuel" the Maintenance & Adjustment section of this manual for how to properly remove the fuel tank.

2. Remove the airbox filter bolt and the filter elements.



1. Bolt
 2. Cover
 3. Foam element
 4. Screen
3. Spray the inside and outside of the filter elements completely with a non-flammable or high-flash point air-filter specific cleaning solvent. Do NOT use gasoline!
 4. Rinse elements with warm water, squeeze out any excess water, and let the elements air dry thoroughly.
 5. Inspect the airbox filter foam element, cover, and screen for damage. Replace new if damaged.
 6. Coat both sides of the air filter foam element evenly with a high quality foam air-filter oil. Squeeze the element a few times to ensure complete coverage.
 7. Clean interior of airbox with contact cleaner and wipe with a lint-free rag before installing.
 8. Apply a thin layer of high quality water-proof grease to the flange of the airbox filter mounting surface. Install the airbox filter screen, foam element with the denser

(white/denser) foam side down, and cover into the frame.



9. Tighten the airbox filter bolt.

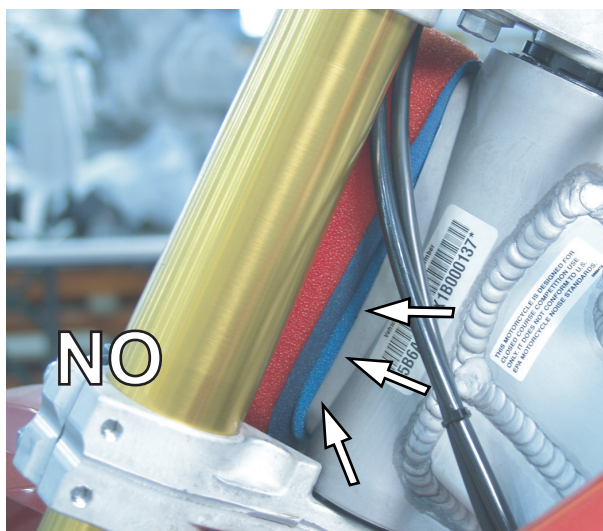
10. Reinstall the removed components.

CLEANING THE STEERING HEAD FILTER

CAUTION

When re-installing the filter make sure the inner light blue foam is not exposed. This will allow unfiltered air to enter the system resulting in severe engine damage.

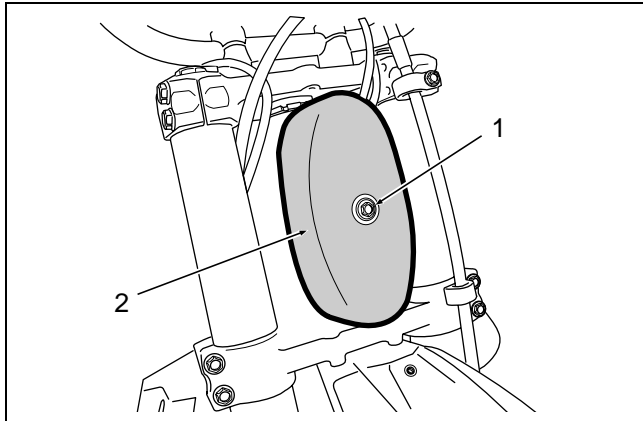
Also, apply a layer of a high-quality waterproof grease to the mating surface of the foam.



1. Correct
2. Incorrect

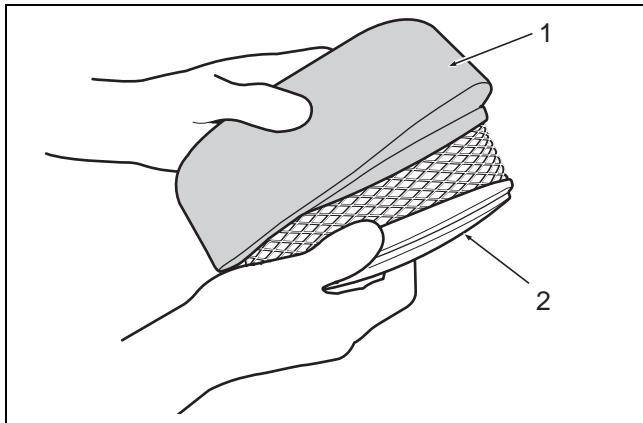
1. To remove and clean the steering head filter, first remove the front number plate.

2. Remove the bolt, washer, and filter assembly from the steering head.



1. Bolt and washer
2. Steering head filter

3. Separate the filter foam element from the cage.



1. Foam element
2. Cage

4. To clean, spray a non-flammable or high-flash point air filter specific cleaning solvent over the inside and outside of the filter element and cage. Do NOT use gasoline!
5. Allow it to soak then squeeze it a few times until all the dirt has come off. Repeat if heavily soiled.
6. Rinse the filter with warm water and squeeze out excess water.

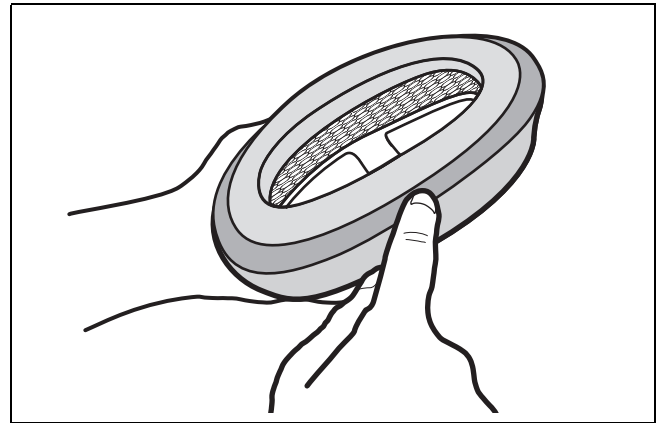
CAUTION

Do not wring or twist the air filter.

7. Inspect steering head filter foam element and cage for any damage. Replace new if damaged.
8. Apply a light, even coat of high-quality foam air-filter oil over both sides of the air filter element. Squeeze

the element a few times to ensure even distribution of the oil.

9. Carefully install the main air filter element onto the cage.
10. Apply a thin layer of a high-quality waterproof grease to the air filter mounting surface to help eliminate air leakage.



11. Install the filter over the steering head opening.
12. Install the steering head filter bolt and washer.

**TORQUE : Air, steering head filter, bolt
5.0 lbf•ft (6.8 N•m)**

FUEL

THROTTLE FREEPLAY

SERVICE : Fuel, throttle, freeplay
0.07-0.15 inches (2-4 mm)

WARNING

POTENTIAL HAZARD

Damaged throttle (e.g., sticking, cable frayed, or improper freeplay)

WHAT CAN HAPPEN

While riding you could lose the ability to accelerate or decelerate the engine with a subsequent loss of vehicle control resulting in an accident where you could be seriously injured or killed.

HOW TO AVOID THE HAZARD

Check the throttle for proper operation before each ride. Make sure the throttle has the specified freeplay.

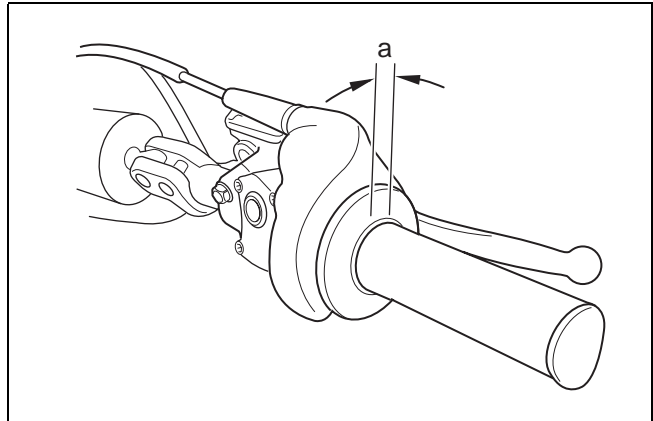
If the throttle sticks open, immediately push and hold down the stop button until the engine shuts off.

To check operation, with vehicle off, rotate the throttle grip and make sure it moves easily from fully closed to fully open with the front wheel turned in all steering positions. The throttle grip should return automatically from fully open to fully closed when released.

If the throttle grip sticks, it is probably due to a cable problem. Remove and lubricate the throttle cable, remove and clean the throttle tube, and adjust the freeplay. Install

the throttle tube and cable; making sure it is properly routed. If the throttle grip still does not operate properly, contact an authorized Cannondale motorsports dealer for servicing.

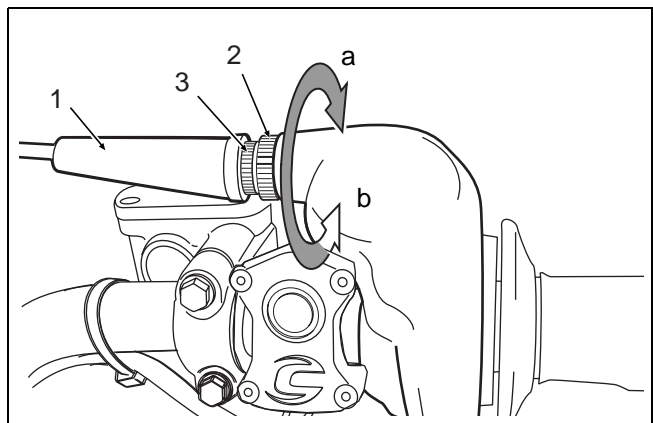
To measure the freeplay, gently rotate the throttle grip until the slack is taken up, then measure how far the grip moved. If the measurement (a) is out of specification, adjustments can be made at either the throttle grip or at the engine side of the throttle cable



a. Throttle cable freeplay

ADJUSTING THROTTLE FREEPLAY (AT THE HANDLEBARS)

1. Pull the long rubber boot (1) down the throttle cable so the locking (2) and throttle cable adjuster (3) are visible.
2. Turn the lockring, using pliers, in direction (a) to loosen it. Turn the adjuster in direction (a) to reduce freeplay or direction (b) to increase freeplay. Tighten the locking securely.



1. Long rubber boot
2. Lockring
3. Cable adjuster
- a. Loosen/decrease freeplay
- b. Increase freeplay

3. If the throttle can not be adjusted further and the freeplay is still out of specification, the cable will have to be adjusted at the engine side.

ADJUSTING THROTTLE FREEPLAY AT THE THROTTLE BODY

WARNING

POTENTIAL HAZARD

Crash resulting from a stuck throttle.

WHAT CAN HAPPEN

If the throttle cable locknut at the engine side of the cable is not tightened securely the nut can loosen and the cable can become dislodged. This could result in a loss of engine throttle control and you could be severely injured or killed in an accident.

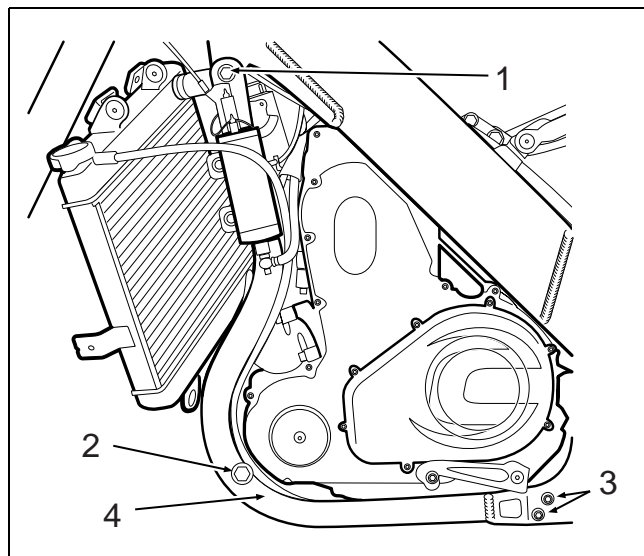
HOW TO AVOID THE HAZARD

When adjusting throttle cable freeplay at the throttle body side of the cable, make sure locknut is tightened securely.

1. Adjust for maximum freeplay at the lever on the handlebar.
2. Remove the front fender, left radiator shroud and the radiator guard.
3. Remove the upper radiator bolts and carefully move the radiator forward.
4. Remove the upper, center, and lower bolts. Then move the left frame rail so the throttle cable is accessible.

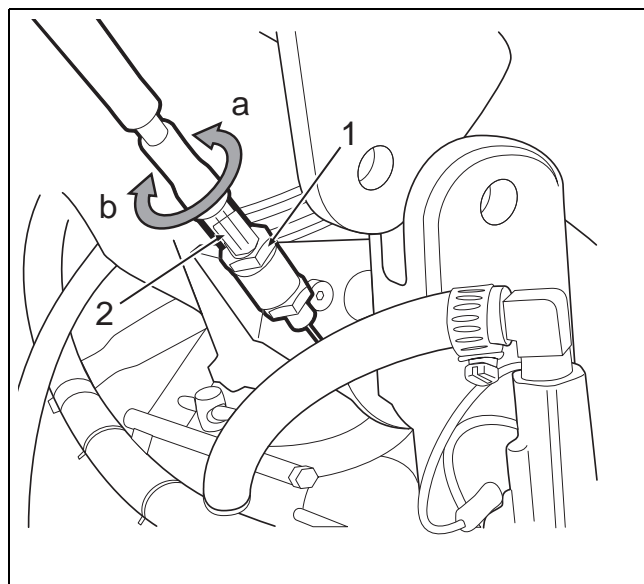
CAUTION

Make sure the engine is properly supported to relieve any undue stress after the left frame rail bolts are removed.



1. Upper bolt
2. Center bolt
3. Lower bolts
4. Left frame rail

5. Loosen the locknut. Turn the throttle cable adjuster in direction (a) to increase freeplay or direction (b) to reduce freeplay.



1. Locknut
2. Adjuster
- a. Increases freeplay
- b. Decreases freeplay

6. Tighten the locknut securely and install the left frame rail. Tighten the rail bolts to the specified torque.

TORQUE : Frame, left frame rail upper bolt
25.0 lbf•ft (34.0 N•m)

TORQUE : Frame, left frame rail center bolt
35.0 lbf•ft 47.5 N•m)

TORQUE : Frame, left frame rail lower bolt
20 lbf•ft (27.0 N•m)

TORQUE : Coolant, upper radiator mounting bolt
5.0 lbf•ft (6.8 N•m)

7. Install the radiator and tighten the upper bolts to the specified torque.
8. Install the radiator guard, left radiator shroud, and front fender.

CAUTION

The lower right radiator shroud bolt is supporting the radiator (along with the coolant hoses), so do not swing the radiator out too far.

IDLE SPEED ADJUSTMENT

It is necessary to periodically adjust the idle speed for optimum fuel efficiency and proper engine operation.

WARNING

POTENTIAL HAZARD

Severe burns to your hands or fingers.

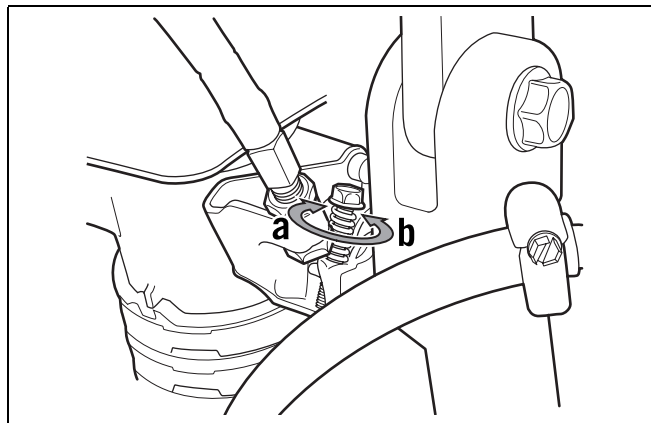
WHAT CAN HAPPEN

The engine operates at extremely high temperatures. If you touch the engine or surfaces around it, you can be severely burned.

HOW TO AVOID THE HAZARD

1. Use extra caution when adjusting the idle speed.
2. Have an authorized Cannondale Motorsports dealer adjust the idle speed.

1. Allow the engine to reach operating temperature 158°F (70°C).
2. To achieve the smoothest idle speed, turn the idle speed adjuster (1) in direction (a) to increase idle speed or in direction (b) to decrease idle speed.



- a. Increase
b. Decrease

FUEL TANK

WARNING

POTENTIAL HAZARD

Explosion or fire.

WHAT CAN HAPPEN

Gasoline is highly-flammable and an explosion can occur if handled improperly or in areas where an accidental spark or flame could ignite the gasoline. You can be burned severely or even be killed if you ignore this warning

HOW TO AVOID THE HAZARD

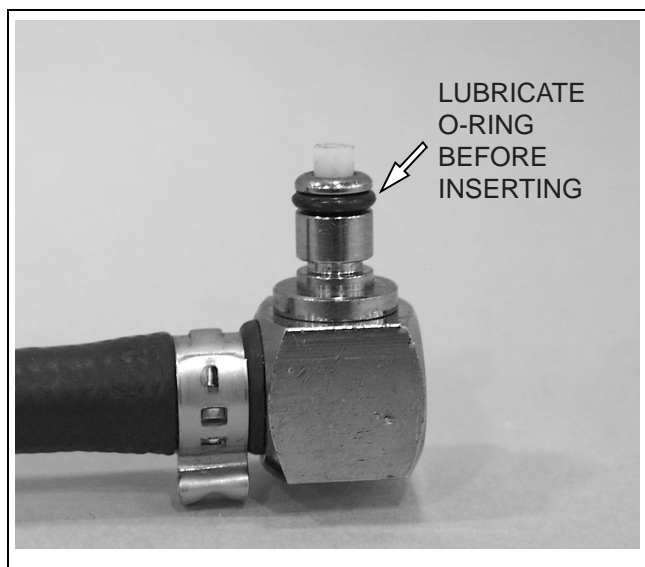
Always make sure the work area is free of possible ignition sources (e.g., sparks, cigarettes, welders, grinders, flames)

CAUTION

Press in the quick connect fitting tabs before re-installing the quick connect hose fitting, or the O-ring of the fittings can be damaged (i.e., ripped, torn, or dislodged).

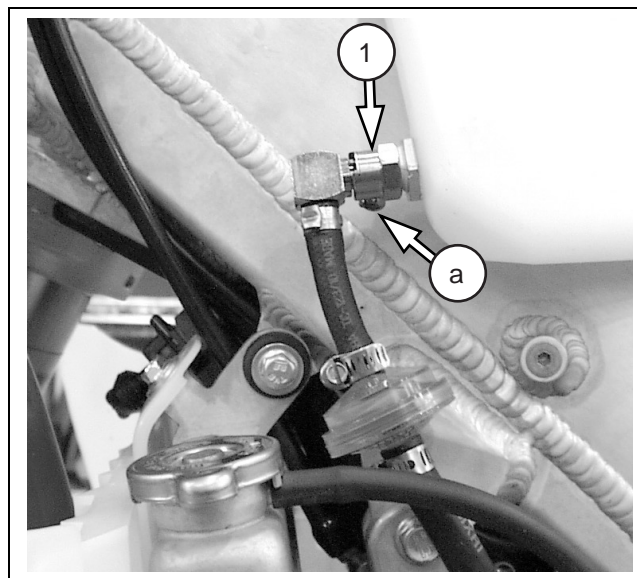
Always inspect the condition of the O-rings before re-installing and replace if they are torn.

Apply a light coat of engine oil to the quick connect fitting O-rings before re-stalling into the tank.



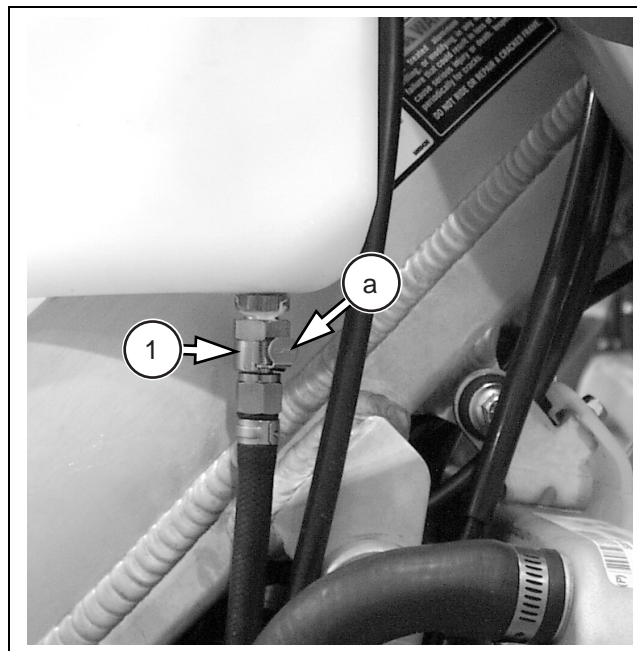
1. Remove the side number panels, seat and radiator shrouds.
2. Remove the fuse (located under the seat).

3. Disconnect the fuel tank quick connect outlet (1) located on the left side of the fuel tank by pressing on connector tabs and carefully withdrawing the hose fitting.



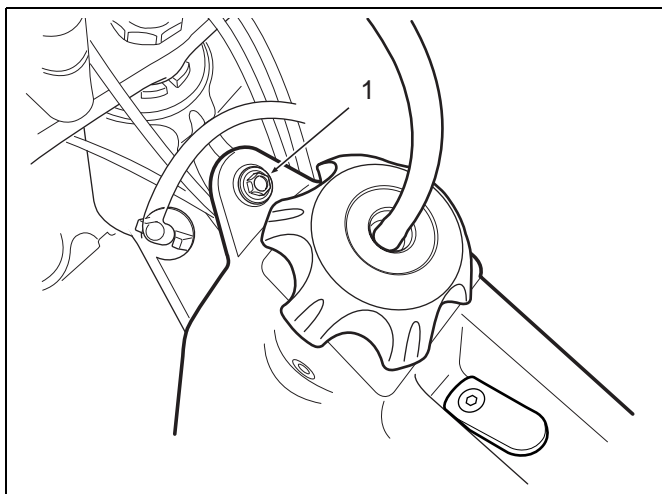
1. Fuel tank outlet (quick connect)
- a. Tab

4. Disconnect the fuel return quick connect located on the right side of the fuel tank .



1. Fuel tank return (quick connect)
- a. Tab

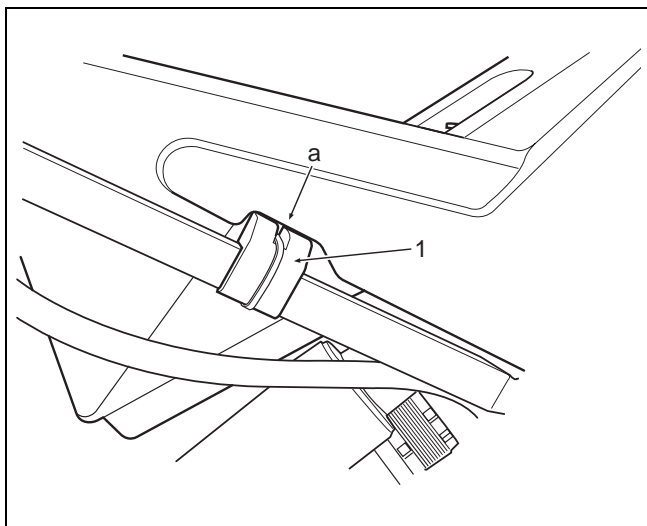
- Remove the fuel tank bolt and lift up the front of the fuel tank. Slide the tank forward slightly, and remove it from the vehicle.



1. Fuel tank bolt

- To install the fuel tank, align the tank onto the frame.

NOTE : Make sure the fuel tank buffers (1) align with the notches (a) on both sides of the fuel tank.



1. buffer
a. notch

- Tighten the bolt to the specified torque

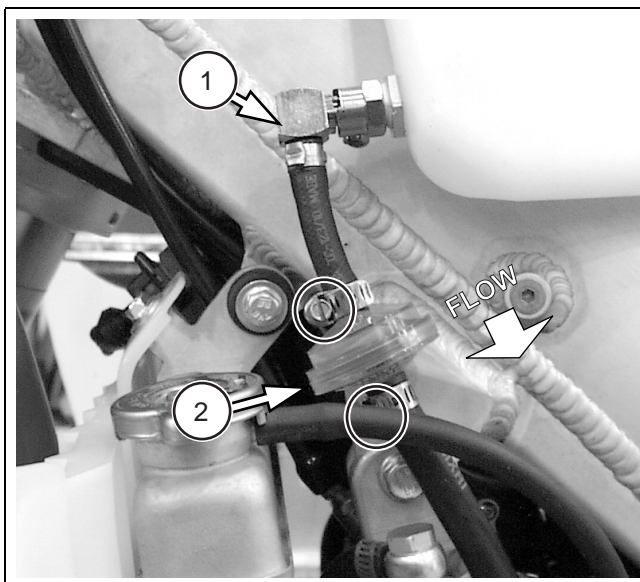
TORQUE : Fuel, fuel tank mounting bolt
5.0 lbf•ft (6.8 N•m)

- Press in the quick connect tabs on the fuel valves.
- Apply a light coat of engine oil to the outlet O-rings. Then, return the quick connects, and install them into the fuel tank valves.

REPLACING THE FUEL FILTER

NOTE : Accumulation of dirt in the fuel filter will restrict fuel flow. Proper fuel flow and pressure is critical to the reliability of the fuel injection system and level of vehicle performance. Therefore, the fuel filter should be inspected frequently and replaced if necessary.

- Remove the tank outlet quick connect fitting. Press in on the fitting tab before removing the fitting from the tank valve.
- Loosen the filter hose clamps and remove the filter.
- Reinstall a new filter and make sure the hose clamps are tightened securely. Be sure to observe any flow indicator on the filter housing.



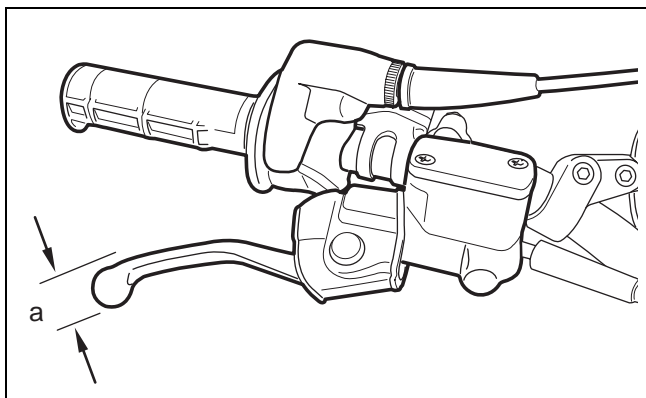
1. Outlet quick connect
2. Fuel filter

BRAKES

For safe motorcycle operation it is critical to have the brake system performing at its best. Regular inspection of the brake components and brake fluid level should become a habit prior to riding the motorcycle.

FRONT BRAKE FREEPLAY ADJUSTMENT

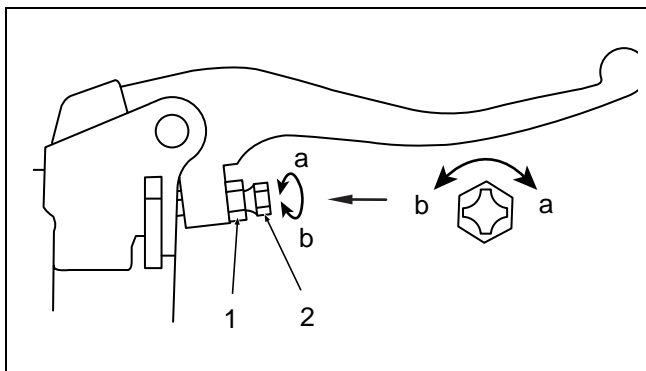
1. Gently pull in the brake lever until the play is taken up, then measure the freeplay (a) at the end of the brake lever. Adjust if out of specification.



a. Freeplay

**SERVICE : Brake, lever, front, freeplay, maximum
0.8 inches (20 mm)**

2. To adjust, loosen the locknut (1).
3. Turn the brake lever adjuster (2) in direction (a) decrease freeplay, in direction (b) to increase freeplay,



1. Locknut
2. Brake lever adjuster
- a. Decrease freeplay
- b. Increase freeplay

4. Tighten the locknut to the specified torque.

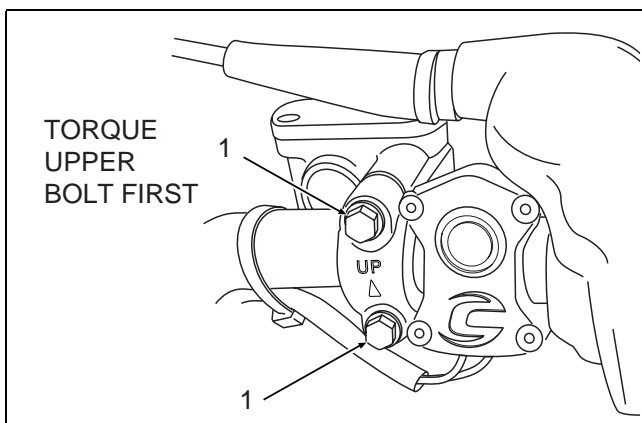
**TORQUE : Brake, lever adjuster, front, locknut
4.3 lbf•ft (5.8 N•m)**

FRONT BRAKE LEVER POSITION

The position of the brake lever can be adjusted so that control is comfortable when seated and standing.

1. Loosen the bolts (1).
2. Rotate the brake lever to the desired position and tighten the clamp bolts to the specified torque. Tighten the top bolt first, then the lower bolt.

**TORQUE : Brake, front, master cylinder mounting bolts
5.0 lbf•ft (6.8 N•m)**

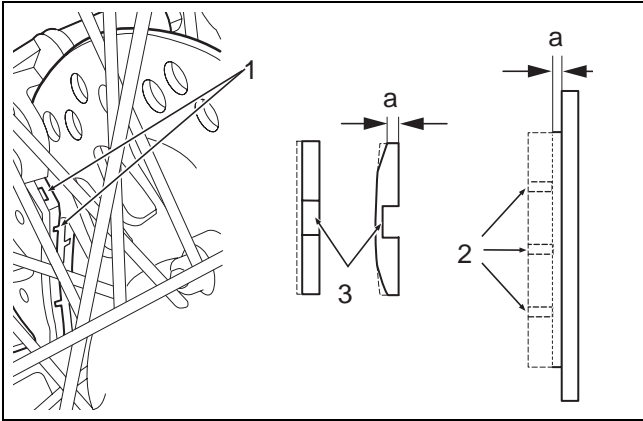


1. Front brake master cylinder mounting bolts

FRONT BRAKE PADS INSPECTION

Worn brake pads can damage the brake disc, adversely affecting brake performance and possibly causing an accident. Never ride the motorcycle with worn or damaged brake pads.

Each brake pad has wear indicator marks (1) and grooves (2). If either brake pad is worn to the minimum thickness indicator (3) or beyond the minimum thickness (a), the brake pads need to be replaced with a new set. Contact an authorized Cannondale Motorsports dealer for replacement.



1. Wear indicator marks
2. Minimum thickness indicator
3. Wear indicator grooves
- a. Minimum thickness

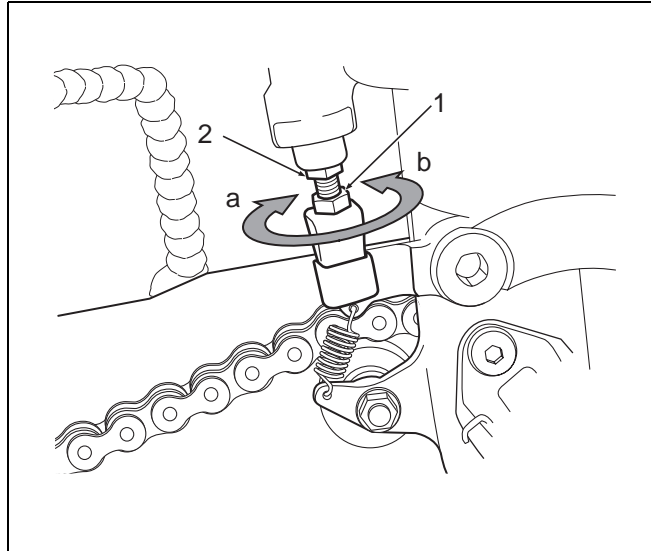
SERVICE : Brake, pad thickness, front, minimum
0.04 inches (1.0 mm)

REAR BRAKE PEDAL HEIGHT ADJUSTMENT

The rear brake pedal height can be adjusted for comfort as well as proper operation.

1. To adjust, loosen the locknut on the master cylinder pushrod.
2. Turn the hex on top of the pushrod until the brake pedal is at the correct height.

3. Turning the hex in direction (a) will lower the brake pedal and turning the hex in direction (b) will raise the pedal.



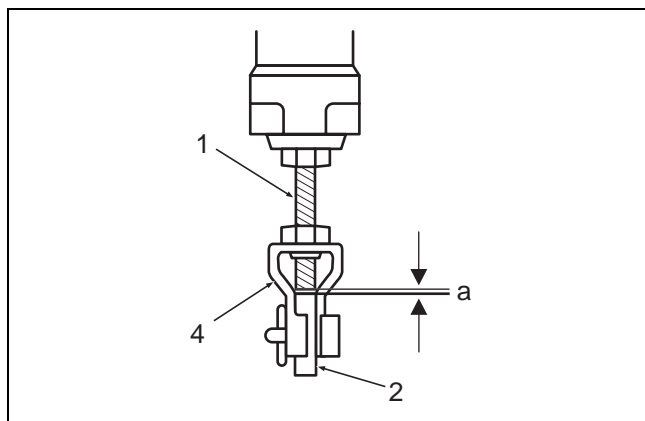
1. Locknut
2. Hex
- a. Lowers the brake pedal
- a. Raises the brake pedal

4. Tighten the locknut to the specified torque.

TORQUE : Brake, rear brake master cylinder pushrod, locknut
13.0 lbf•ft (17.6 N•m)

When adjusting the brake pedal, make sure that clearance (a) between the lower end of the pushrod (1) and the brake pedal is within specification.

When raising the brake pedal (2), do not allow the lower end of the pushrod thread (3) to enter into the brake pedal joint (4).

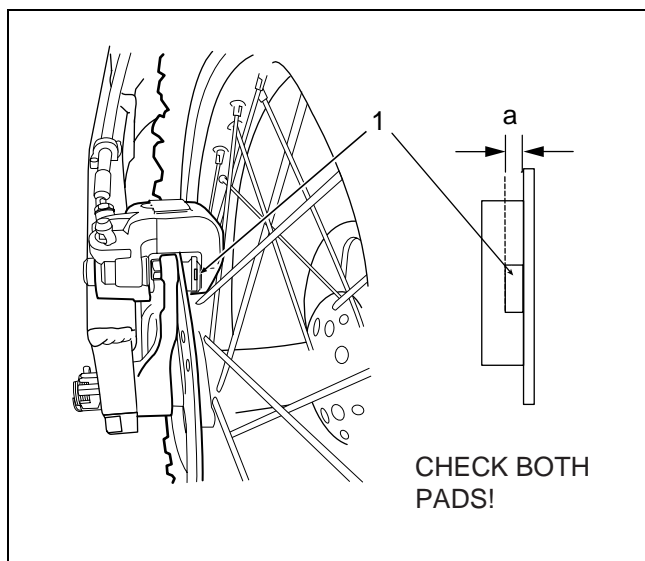


- 1. Pushrod lower end
- 2. Brake pedal
- 3. Pushrod thread
- 4. Brake pedal joint
- a. Clearance

SERVICE : Brake, rear, master cylinder pushrod, clearance
0.04 in (1mm)

REAR BRAKE PADS INSPECTION

Each brake pad has wear indicator grooves (1). If either brake pad is worn to the minimum thickness indicator (2) (or beyond the minimum thickness (a)), the brake pads need to be replaced with new ones as a set. Contact an authorized Cannondale Motorsports dealer for replacement.



- 1. Wear limit indicators
- a. Minimum thickness

SERVICE : Brake, pad thickness, rear, minimum
0.04 inches (1.0 mm)

EXHAUST

The primary functions of the exhaust system are to deliver the burned combustion gases to the atmosphere, reduce exhaust noise to an acceptable level, and to route the exhaust gases away from the rider.

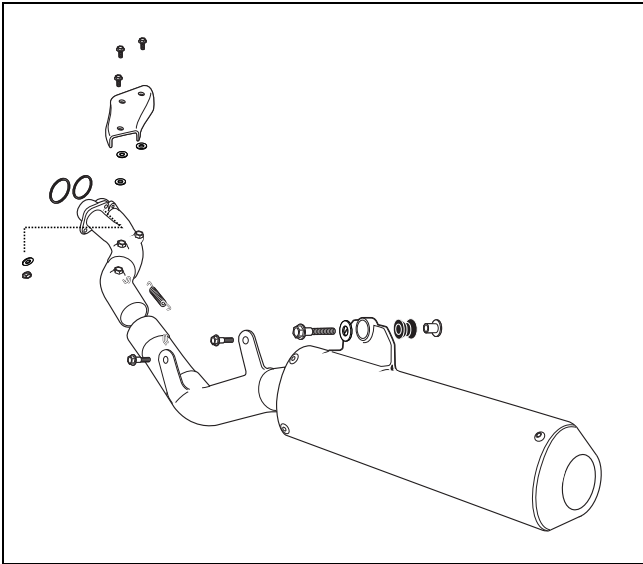
INSPECTING THE EXHAUST SYSTEM

Inspect the exhaust pipe and silencer for cracks, dents, rust or other damage. If any damage is found, contact an authorized Cannondale dealer for servicing.

NOTE : The exhaust system is shown removed from the vehicle for clarity.

TORQUE : Exhaust pipe bolt
5.0 lbf-ft (6.8 N•m)

TORQUE : Silencer mounting bolt
15.0 lbf-ft (20.3 N•m)

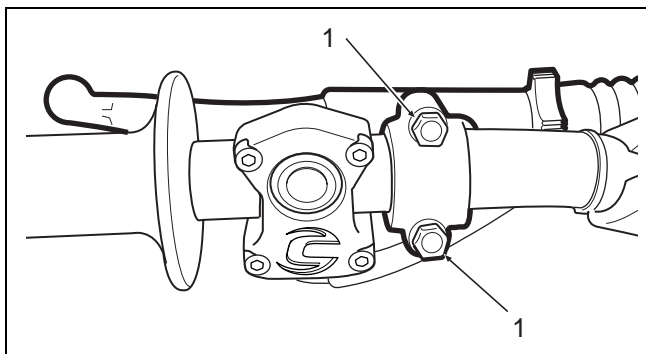


CLUTCH

CLUTCH LEVER POSITION

The clutch lever position can be adjusted so it can be used comfortably while sitting or standing.

1. Loosen the clutch lever clamp bolts (1).

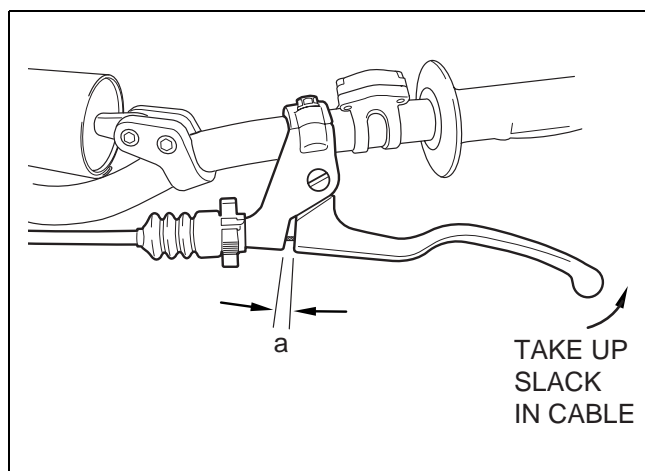


1. Clutch lever clamp bolts
2. Rotate the clutch lever to the desired position and tighten the clamp bolts to the specified torque.
3. Tighten the upper clamp bolt first, then the lower clamp bolt.

TORQUE : Clutch, lever clamp, bolts
5.0 lbf•ft (6.8 N•m)

CLUTCH LEVER FREEPLAY

SERVICE : Clutch, lever, freeplay
0.08 - 0.16 inches (2 - 4 mm)



- a. Clutch lever freeplay

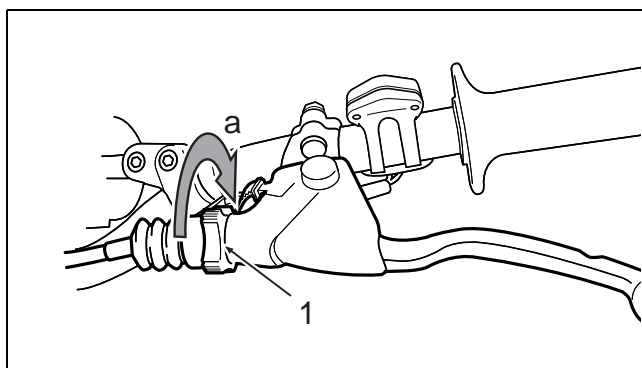
CAUTION

Check the clutch actuating arm position following any adjustment to the lever.

NOTE : Adjust clutch lever freeplay at the lever first. If the specified freeplay cannot be achieved, adjust for more available freeplay at the inline adjuster.

LEVER

1. To adjust the lever, the quick adjuster until the specified freeplay is reached.



1. Quick adjuster
- a. Increases freeplay

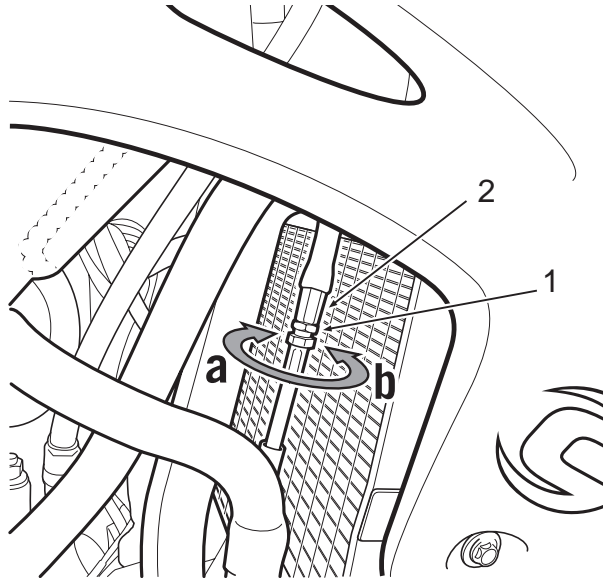
THE INLINE CABLE ADJUSTER

To increase available freeplay at the lever, loosen locknut and turn the adjuster clockwise.

To decrease available freeplay at the lever, loosen the locknut and turn the inline adjuster counterclockwise.

Re-adjust freeplay at the lever.

Tighten the locknut securely after adjusting the clutch cable.



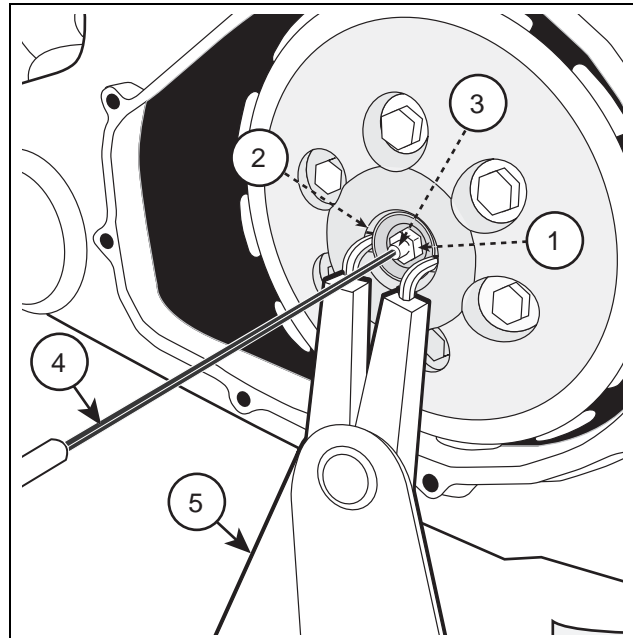
- 1. Locknut
- 2. Clutch cable adjuster
- a. Decreases freeplay
- b. Increases freeplay\

CLUTCH ACTUATING ARM ADJUSTMENT

NOTE : A special tool to hold the release collar has been developed for this procedure, but right angle circlip pliers of the correct size will work. For information on special tools developed to service your model, contact an authorized Cannondale dealer.

There is no need to drain transmission fluid to perform the following procedure. But, be sure to avoid contaminating the transmission oil when the clutch cover is removed. Also, make sure the cover seal is in good condition. Replace it with a new one if it is damaged.

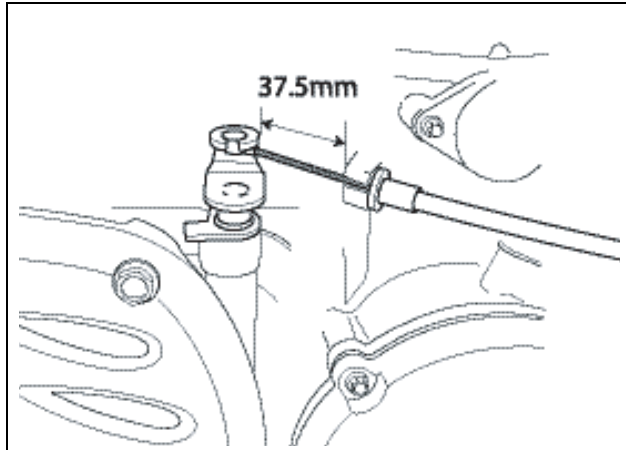
1. Place the vehicle on a stand.
2. Adjust the clutch lever to its maximum freeplay.
3. Remove the shift lever and clutch cover.
4. Hold the release collar with the special tool (or right angle circlip pliers) and loosen the adjuster locknut.



- 1. Locknut
- 2. Clutch release collar
- 3. Adjuster
- 4. T-handle (2.5mm allen)
- 5. Right angle circlip pliers

5. Have an assistant apply light pressure on the actuating arm toward the cylinder head.
6. As your assistant is holding light pressure on the arm, hold the release collar and turn the adjuster until the

actuating arm is positioned according to the following illustration.7



7. Tighten the adjuster locknut to the specified torque.

8. Reinstall the clutch cover and shift lever.

TORQUE : Clutch, release collar locknut
3.3 lbf•ft (4.5 N•m)

TORQUE : Clutch, cover bolts
3.3 lbf•ft (4.5 N•m)

TORQUE : Transmission, shift lever pinch bolt
5.0 lbf•ft (6.8 N•m)

9. Now, adjust the clutch lever freeplay.

DRIVE

DRIVE CHAIN SLACK

SERVICE : Drive, chain, slack
2.2 - 2.4 inches (55 - 60 mm)

WARNING

POTENTIAL HAZARD

Drive chain is too tight or loose, sprocket teeth are broken and/or worn, or chain and sprocket is packed with dirt.

WHAT CAN HAPPEN

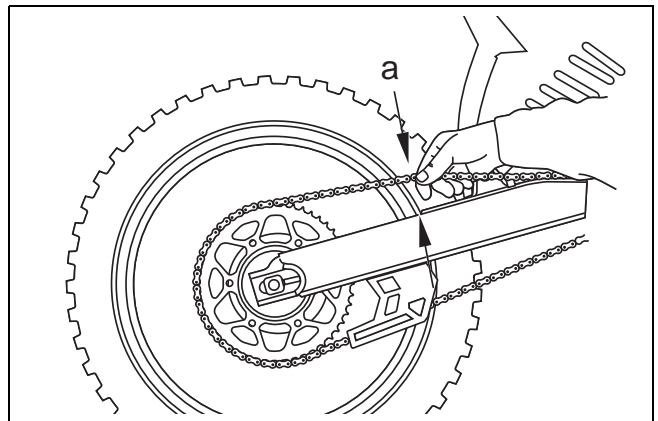
The vehicle's handling and engine performance will suffer which could cause the rider to lose control and have an accident.

HOW TO AVOID THE HAZARD

Inspect and clean the drive chain before each ride.

NOTE : Clean and lubricate the drive chain before measuring the slack. The chain's condition affects the accuracy of your measurement. Also, when measuring, rotate the chain and measure different links over the same spot.

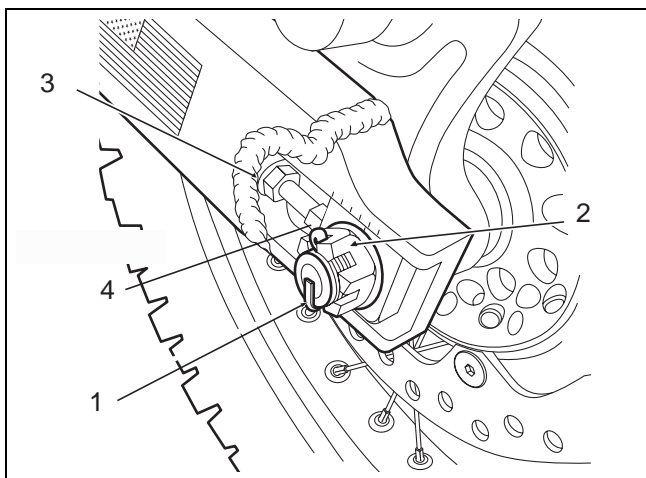
1. Place the vehicle on a stand so the rear wheel is off the ground.
2. Inspect the drive chain slack at a middle point between the two sprockets. If the slack is out of specification, adjust it.



a. Drive chain slack

3. To adjust the chain slack, straighten the cotter pin. Remove and discard it.

- Loosen the rear wheel axle nut (2) and the adjuster bolt locknuts (3).



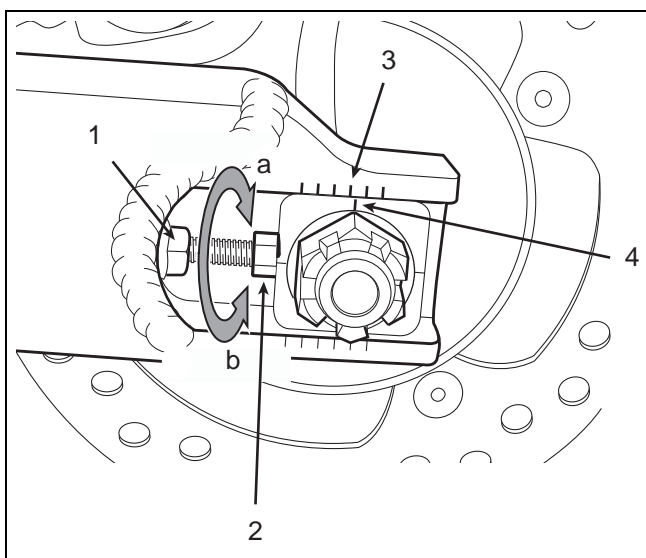
- Cotter pin
- Rear axle nut
- Locknut
- Adjuster bolt

- Increase or decrease slack by using the adjuster bolts.

CAUTION

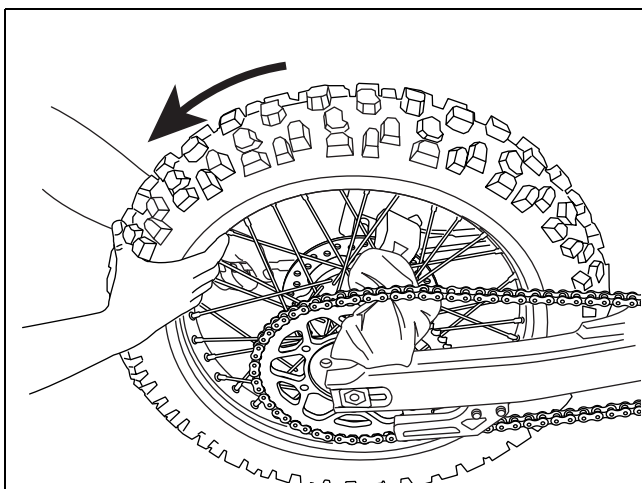
The alignment marks on the adjuster blocks and the marks on the swingarm must be adjusted so they are in the same position on each side of the swingarm.

Make sure the drive chain is straight and in-line with the sprockets.



- Lock nut
- Adjuster bolt
- Adjuster block mark
- Swingarm scale
- Increase slack
- Decrease slack

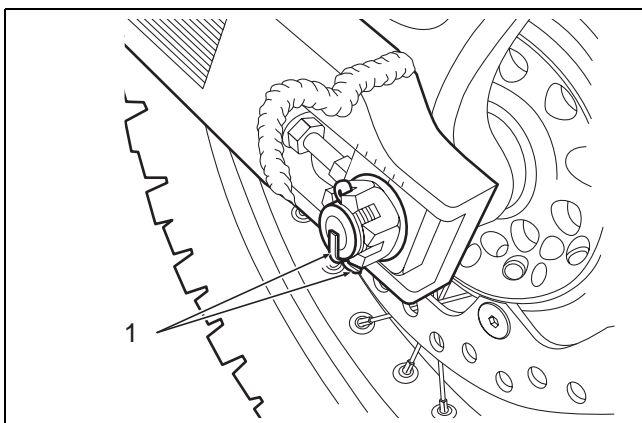
- Place a rag between the drive chain and rear sprocket then rotate the wheel backward to tighten the chain.



- Tighten the rear wheel axle nut.

TORQUE : Wheels, rear axle, nut
72.0 lbf•ft (98.0 N•m)

- Install a new cotter pin and properly bend the tabs around the axle nut.



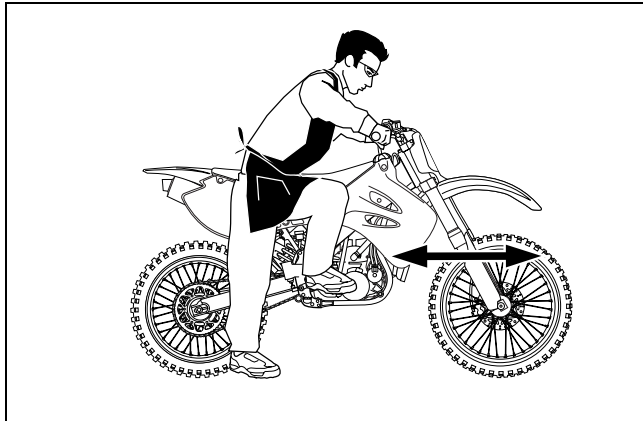
- Cotter pin tabs

- Tighten the drive chain adjuster locknuts securely.
- Measure the drive chain freeplay again and adjust if necessary.

NOTE : Make sure both adjuster blocks are in the same position on each side of the swingarm.

- Check the rear wheel alignment.
- Take the vehicle off the stand, roll it forward and backward a few times and apply the rear brake. Make sure the rear brake operates properly. The rear wheel

rotates properly and the brake disc is not rubbing against the brake pads.

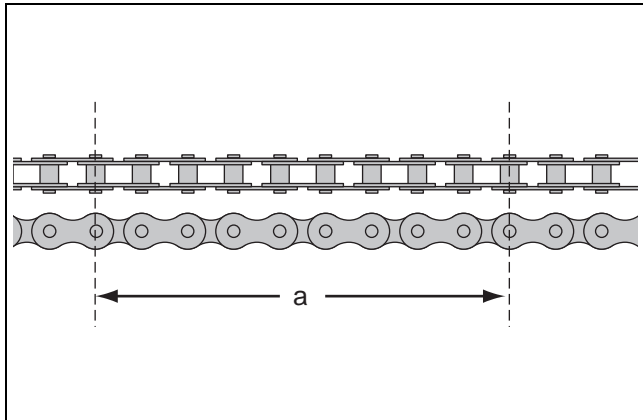


DRIVE CHAIN STRETCH LIMIT

**SERVICE : Drive, chain, length (stretch), maximum (see specification for exact pin count)
6.0 inches (151 mm)**

Place the vehicle on a stand so the rear wheel is off the ground.

Measure the distance (a) from pin center to pin center across the specified pin count. If the measurement is out of specification, replace the drive chain with a new one.



a. Measurement

INSPECTING THE MASTER LINK CLIP.I

WARNING

POTENTIAL HAZARD

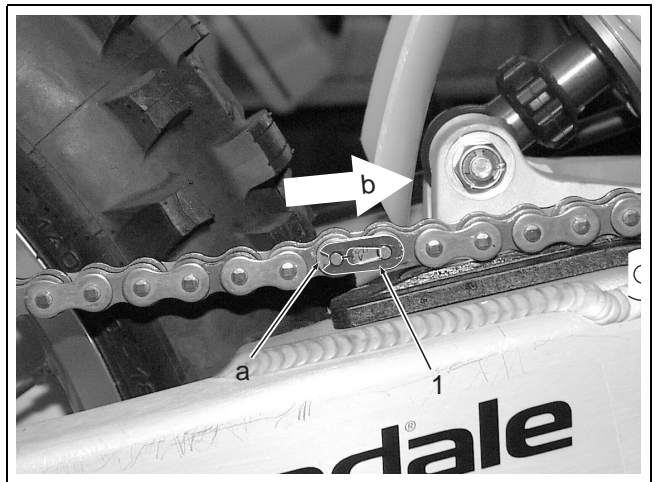
Breaking the drive chain.

WHAT CAN HAPPEN

If the master link clip is installed incorrectly it can be dislodged allowing the chain to break. This will cause you to lose control. You can be seriously injured or killed.

HOW TO AVOID THE HAZARD

Anytime the drive chain is serviced make sure the drive chain clip is completely installed in its groove and that the open end of the clip faces opposite the chain rotation. Make sure the master link clip is completely installed in its groove.



- 1. Clip
- a. Open end
- b. Direction of chain rotation

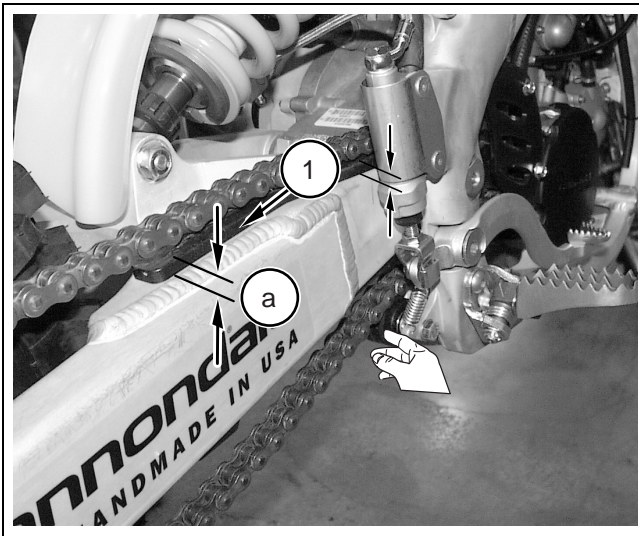
INSPECTING/REPLACING THE SWINGARM BUFFER

SERVICE : Drive, swingarm buffer, thickness, standard
0.4 inches (10 mm)

SERVICE : Drive, swingarm buffer, thickness, minimum
0.1 inches (3 mm)

NOTE : Be sure to inspect the thickness of the buffer at a few different points of its entire length. Wear may not be uniform. If out of specification at any point, replace it with a new one.

1. Inspect the swingarm buffer for cracks, wear, or other damage. Replace the swingarm buffer with a new one if it is damaged or the wear (a) is out of specification.



1. Swingarm buffer
- a. Thickness

2. To replace, place the vehicle on a suitable stand.
3. Remove the bolts and the old buffer. Make sure you clean the buffer mounting screws with contact cleaner and apply Loctite #242 agent before installing the new buffer.
4. Install the new buffer and tighten screws to specified torque.

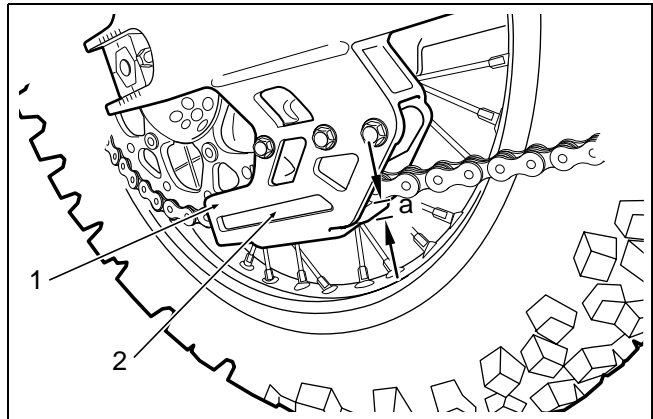
TORQUE : Drive, swingarm buffer, mounting screws
17.0 lbf•in (0.19 N•m)

DRIVE CHAIN GUIDE AND BLOCK

SERVICE : Drive, chain guide block, thickness, standard
0.5 inches (12 mm)

SERVICE : Drive, chain guide block, thickness,
minimum
0.1 inches (3 mm)

Inspect the drive chain guide and drive chain guide block for cracks, wear, or other damage. Replace the drive chain guide block with a new one if it is damaged or the wear (a) is out of specification.



1. Drive chain guide
2. Drive chain guide block
- a. Maximum wear

Check the drive chain guide bolts and tighten to the specified torque if necessary.

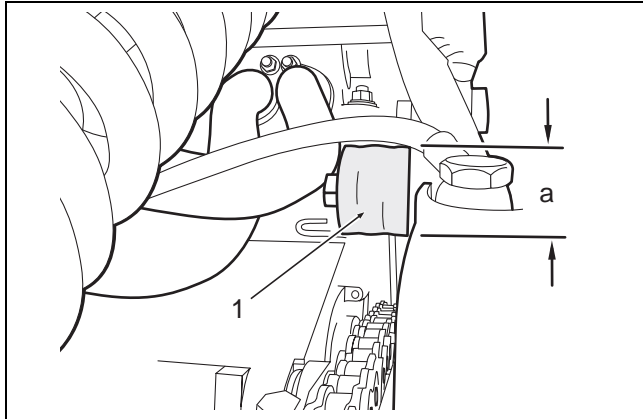
TORQUE : Drive, chain guide, mounting bolts
9 lbf•ft (12.2 N•m)

DRIVE CHAIN ROLLERS

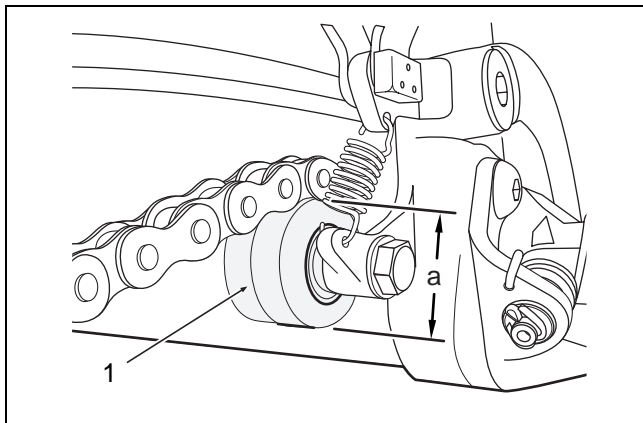
SERVICE : Drive, chain rollers, diameter, standard
1.4 inches (35.2 mm)

SERVICE : Drive, chain rollers diameter, minimum
1.3 inches (32 mm)

Inspect the upper and lower drive chain rollers for cracks, wear, or other damage. Replace the drive chain roller with a new one if the outside diameter (a) is out of specification.



- 1. Upper drive chain roller
- a. Outside diameter



- 1. Lower drive chain roller
- a. Outside diameter

CHECKING THE REAR END

Before every ride, check the rear end for worn or loose swingarm bearings.

⚠ WARNING

POTENTIAL HAZARD

Riding this vehicle with worn or loose swingarm bearings

WHAT CAN HAPPEN

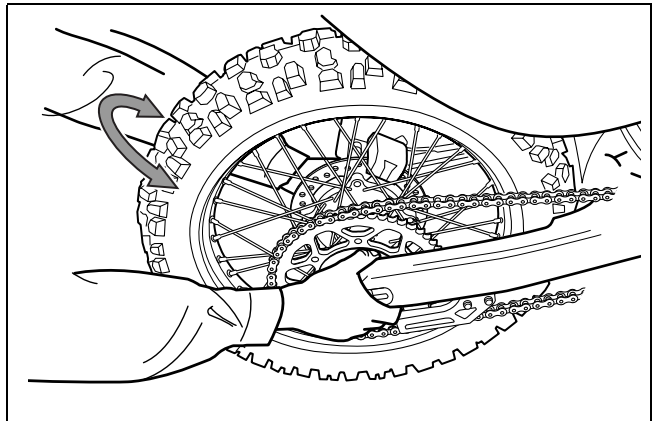
You can lose control of the vehicle resulting in serious injury or death.

HOW TO AVOID THE HAZARD

Always check the condition of the swingarm bearings before each ride.

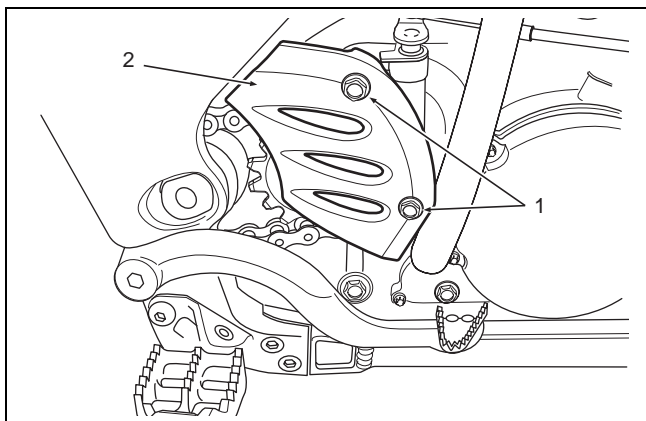
Place the vehicle on a stand so the rear wheel is off the ground.

Hold each side of the swingarm and try to move it from side-to-side. If any freeplay is felt, contact an authorized Cannondale motorsports dealer for servicing.

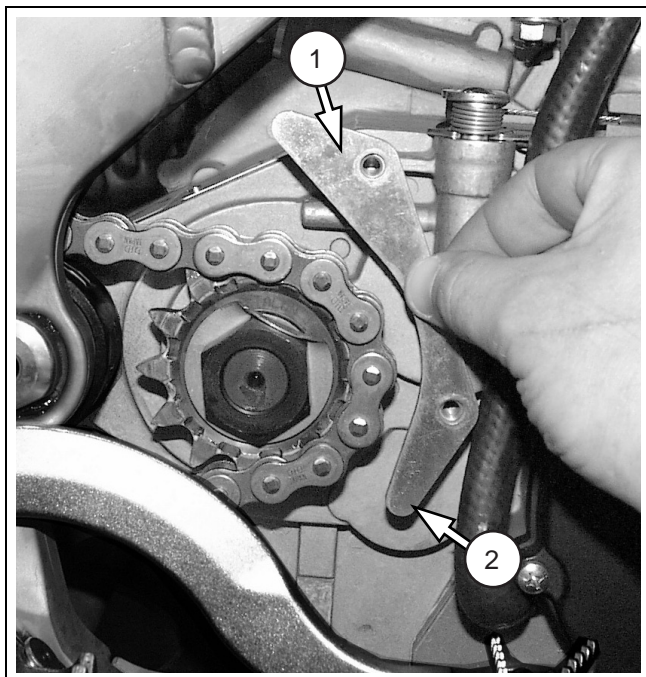


REMOVING AND RE-INSTALLING THE COUNTERSHAFT SPROCKET GUARD

1. Place the motorcycle on a stand.
2. Remove the bolts and countershaft sprocket guard.



1. Bolts
2. Countershaft sprocket guard



1. Larger end
2. Smaller end

This photo shows the correct installation of the chain guide plate mounted directly behind the countershaft sprocket guard. Notice the shape and orientation of the guide. It is being held here but would normally be installed together with the guard.

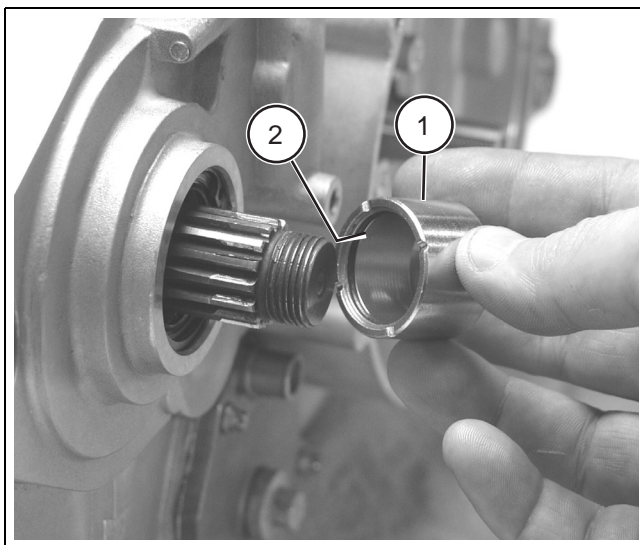
3. Installation is reverse order of removal.

TORQUE : Drive, counter shaft sprocket guard bolts
5.0 lbf•ft (6.8 N•m)

COUNTERSHAFT SPROCKET REPLACEMENT

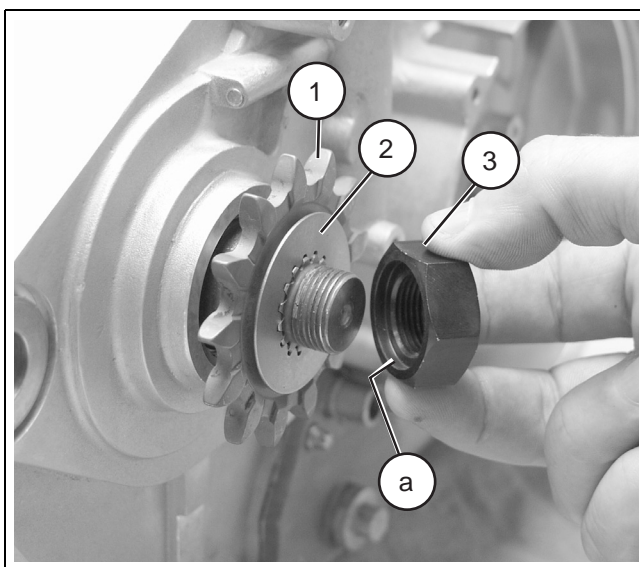
Engine was removed on photos of the following procedure. Follow same steps for an installed engine.

1. If removed, apply assembly lube to the countershaft sprocket spacer and to the lips of the seal. Install the spacer so that the internal o-ring faces inward.



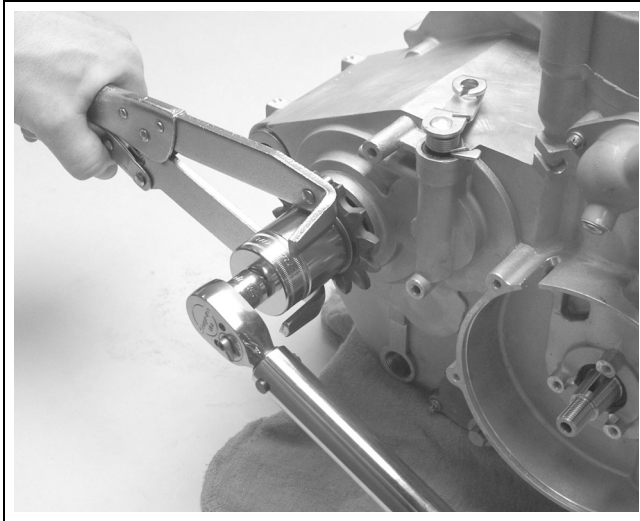
1. Countershaft spacer
2. O-ring

2. Install the countershaft sprocket, the splined lock washer, and countershaft sprocket nut with the recess (a) of the nut facing inward toward the sprocket.



1. Sprocket
2. Splined lock washer
3. Nut
- a. Recess

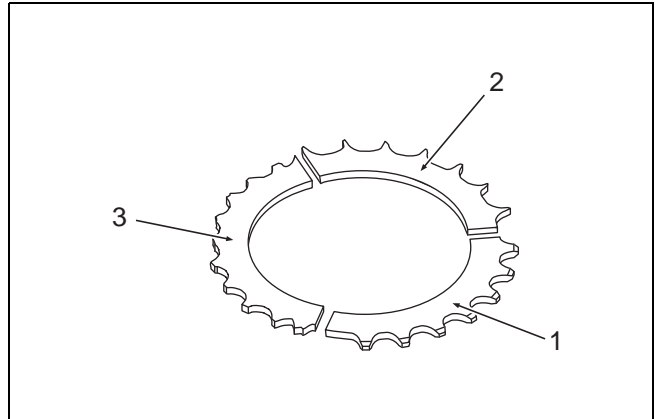
3. Use a sprocket wrench to hold the sprocket and tighten the nut to the specified torque.



SPROCKET INSPECTION

NOTE : Replace both the sprockets and drive chain as a set

Inspect the sprockets for cracks, chipped or broken teeth, excessive wear, or other damage. Check the countershaft sprocket nut and tighten if necessary.



1. Normal teeth
2. Worn teeth
3. Damaged teeth

TORQUE : Transmission, countershaft sprocket nut
29.5 lbf•ft (40.0 N•m)

4. Bend the splined lock washer over the nut.



ELECTRICAL

SYSTEM SERVICING

Many electrical problems are caused by faulty electrical connectors or couplers. For example, wet terminals/pins, dirty or corroded terminals/pins, or broken or bent cable pins within multi-plug couplers.



WARNING

POTENTIAL HAZARD

Damaged electrical system.

WHAT CAN HAPPEN

A damaged electrical system can cause a fire.

HOW TO AVOID THE HAZARD

Always disconnect the battery when working on an electrical part on the vehicle. When reconnecting the battery ALWAYS connect the positive (+) lead first.

CONNECTORS AND COUPLERS

Within this manual “connectors” refer to a single male lead that connects into a single female lead.

Couplers contain multi-pins and usually have some sort of locking device (e.g., barb, hook, eye) which must be released before the two halves can be separated. Both couplers and connectors will be referred to as quick-connects.

Refer to the following tips when disconnecting or connecting electrical connectors or couplers.

1. When disconnecting a connector, be sure to hold the coupler/connectors; do not pull the leads.
2. Always check for a locking device which must be released before the coupler can be separated. Also, be sure to hold both halves of the coupler; do not pull the leads.
3. Inspect couplers for bent terminals/pins, damaged cable terminal/pin joints, water, dirt, or corrosion, and secure wiring. If a terminal or pin is bent, carefully straighten it with a thin-blade screwdriver.
4. When connecting a connector or coupler, make sure there is no dirt present. Be sure to push the male and female ends together squarely to ensure that the terminals/pins do not get bent or incorrectly located. And most importantly, make sure the two halves connect positively.

5. Whenever a connector or coupler is disconnected or checked, be sure to clean it and apply some dielectric grease before reconnecting.

CLEANING CONNECTORS

Wipe the connector or coupler with a clean, lint-free rag and blow off any moisture using compressed air. Remove corrosion, rust, stains or other foreign material using contact cleaner on terminals and a water-displacement chemical on connector seals. Apply a light coat of dielectric grease onto the terminals/pins and properly connect the halves.

ENGINE MANAGEMENT SYSTEM

All Cannondale models use advanced fuel injection systems. Engine operation is supported by an Engine Management System (EMS) which controls both ignition and fuel delivery.

The engine management system consists of three types of electrical components: an Engine Control Module (ECM), sensors, and actuators.

- **The engine control module (ECM or ECU) precisely calculates ignition timing and fueling delivery for all engine speeds and loads (based on the currently installed ECM mapping). The ECM is an extremely reliable component and should be the last component checked in the event there is a problem with the fuel injection system.**
- **Sensors collect engine operating information and transmit it to the ECU.**
- **Actuators are devices like the fuel injectors, fuel pump, fuel pressure regulator, spark plug coil, and relays.**

IGNITION TIMING

Ignition timing is continuously changed based on rpm and engine load conditions determined by the ECM and the installed map(s). The ignition system is a constant energy type ignition with 12 V primary and approximately 10,000-20,000 V secondary.

- **Ignition timing is controlled by the ECM and is not user adjustable.**
- **Ignition dwell time is controlled by the ECM and is not user adjustable.**

Timing is accomplished by the crankshaft position sensor which is located in the generator housing. The wide tooth/wide space pattern on the flywheel passes under the sensor near bottom dead center (BDC).

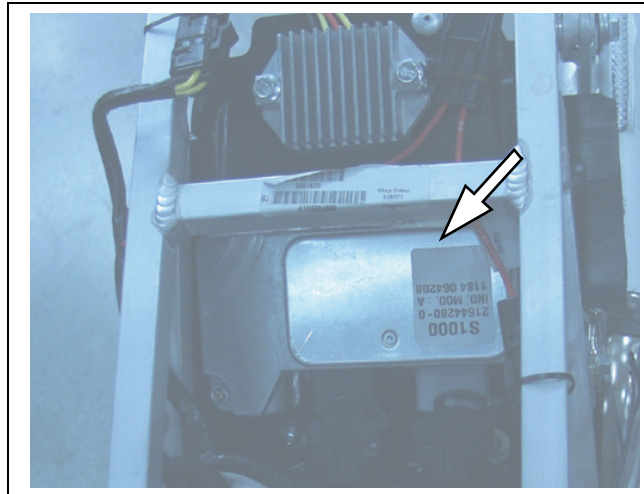
CAUTION

Do not attempt to advance or retard the ignition timing by moving the crankshaft position sensor. The fuel injection and ignition timing have been tuned to produce maximum engine power at all speeds and throttle positions. Deviation from factory ignition timing can cause serious engine damage. The crankshaft position sensor monitors engine position at BDC, not TDC. Therefore, ignition timing is based off of BDC, not TDC.

Engine Control Module (ECM)

M1000

The ECM is located on the ECM mounting plate within the subframe. ECM diagnostics are performed by using specially developed Windows based software and a data cable.

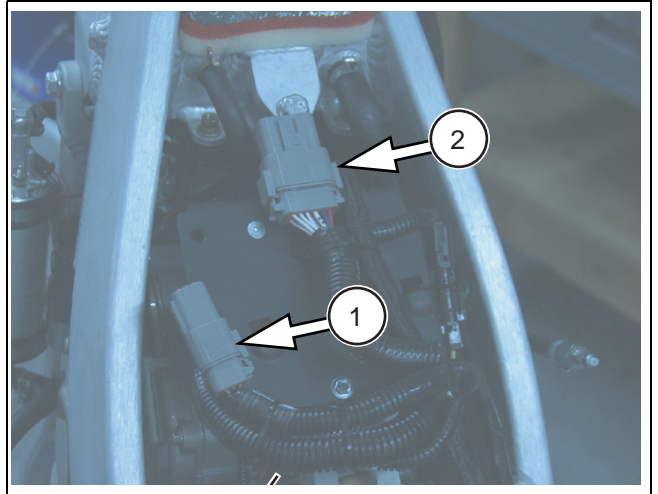


Components have been removed for this photo.

MC1000 DIAGNOSTICS

A software diagnostic program has been developed to service this vehicle. It is a Windows based program that can be used on a PC or Palm PC. A special data cable is used to connect the vehicle to the PC or Palm PC.

Contact an authorized Cannondale motorsports dealer for special tools developed to service your vehicle.



Components have been removed for this photo.

1. Data port
2. Data port

ECM HARNESS CONNECTOR(S)

The ECM harness connector is a “locking type.” Tests involving fault code diagnostics require the placing of test leads to specific pin locations of the connector.

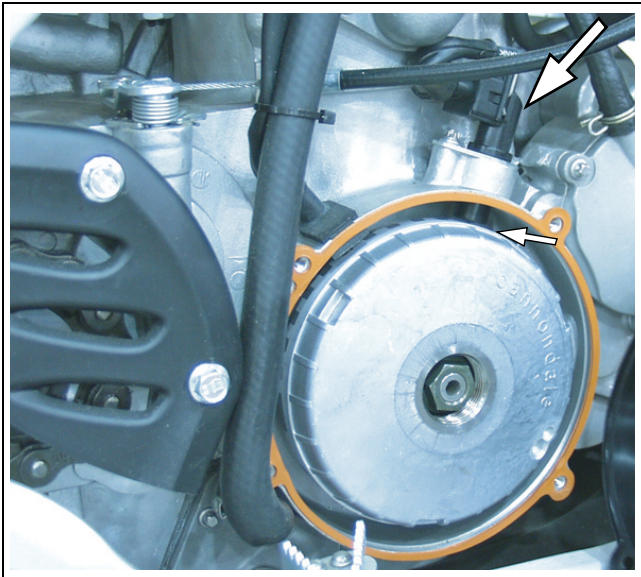
SENSORS

CRANKSHAFT POSITON SENSOR

NOTE : If the crankshaft position sensor fails, the motorcycle will not run.

The crankshaft position sensor is located in the generator housing. This sensor detects movement of a toothed wheel that is molded into the flywheel and attached to the right side of the crankshaft. The wheel has a 36-tooth pattern. The teeth are evenly spaced with the exception of one triple length tooth next to one triple length gap.

Everytime this tooth/gap passes the sensor the ECM interprets it as bottom dead center (BDC). The ECM uses this information to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the air/fuel mixture occurs.



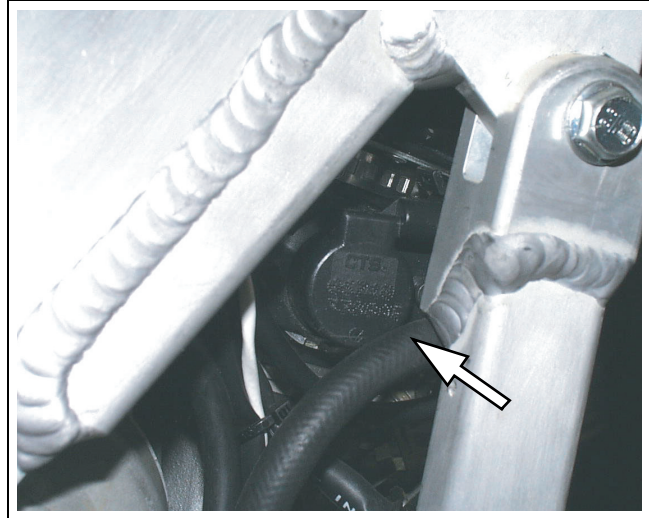
The flywheel cover has been removed for this photo to show the sensor tip.

THROTTLE POSITION SENSOR (TPS)

The TPS is a small, black plastic sensor attached to the throttle plate shaft and located on the right side of the throttle body. The TPS is a potentiometer that gives a reading in the fully-closed position and all other throttle-plate opening angles are calculated using the fully-closed position

as a base. Throttle-plate angle is used by the ECM to determine fueling requirements for all throttle positions. The signals that the TPS sends, informs the ECM of not only the position of the throttle plate, but the speed with which it is being opened or closed. The engine load is determined from the TPS and engine speed (rpm).

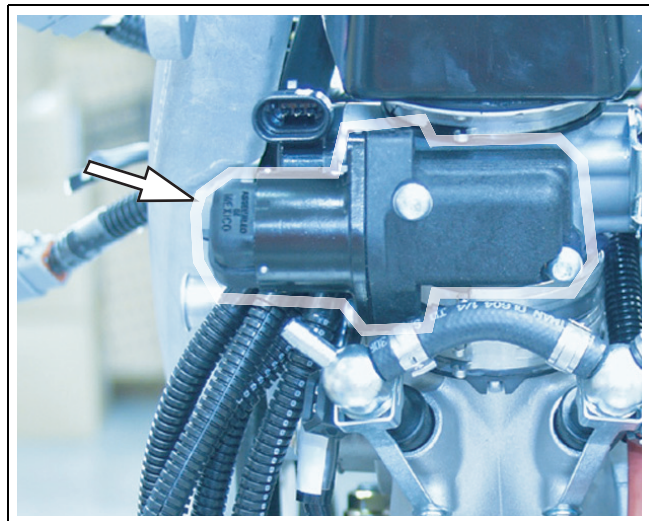
The voltage output from the TPS increases proportionately as the throttle is opened .



Components have been removed for this photo.

IDLE AIR CONTROL VALVE (MC1000)

The idle air control valve is mounted on the front of the throttle body and permits air flow to bypass the throttle plate. The valve is controlled by the ECU.

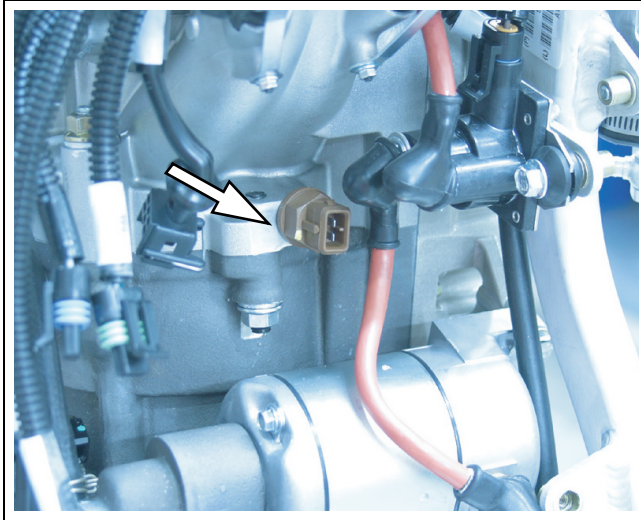


Components have been removed for this photo.

COOLANT TEMPERATURE SENSOR

The engine temperature sensor is brown, located on the front of the cylinder head, and is an NTC thermistor. The ECM receives electronic signals from this thermistor and uses them to determine the coolant temperature. This information is used by the ECM to optimize fueling at all engine temperatures and to calculate hot and cold start fueling requirements.

The engine temperature sensor's resistance decreases as the temperature increases.



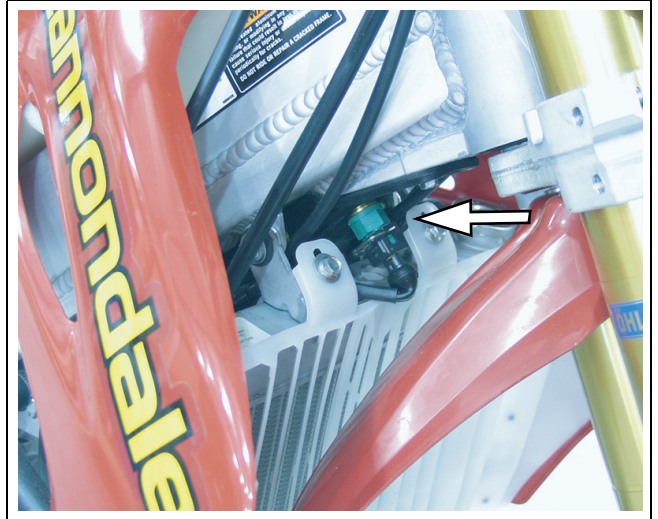
Components have been removed for this photo.

AIR TEMPERATURE SENSOR

The intake air temperature sensor is green, located on the front area of the airbox. It is a NTC thermistor that gives an indication of the temperature of the air that will be inducted into the engine. An intake air temperature sensor is installed because the air temperature affects the density of the

inducted air (and therefore the amount of oxygen available to ignite the fuel), altering the effective engine load and thus the fuel required for proper combustion.

The ECM uses information from this sensor to compensate for changes in air temperature by adjusting the amount of injected fuel to a level which enables clean combustion (reducing the risk of knock caused by high air intake temperatures) and low emissions.



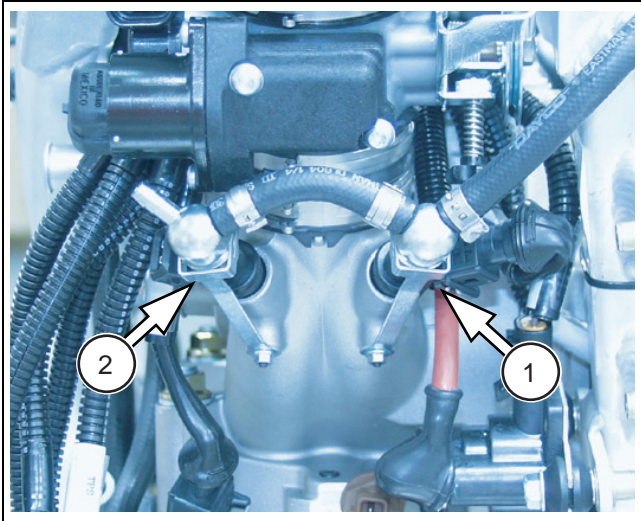
BAROMETRIC PRESSURE SENSOR

NOTE : The barometric pressure sensor is intergrated inside the ECU.

The intake air pressure (barometric) sensor is built into the ECM and is connected to the airbox plenum by a narrow tube. The sensor measures the air pressure in the airbox. Using this information the ECM determines the air density, and when added to other inputs to the ECM, the engine load is calculated. This information is then used to adjust the amount of injected fuel to match the prevailing conditions.

FUEL INJECTORS (LEFT AND RIGHT)

The fuel injectors are located in the throttle body and are positioned as close as possible to the back of the intake valves. The spray pattern and flow rate of the injectors are fixed, but the length of time they remain open is variable. The duration that the injectors stay open is calculated by the ECM using data received by the various sensors.

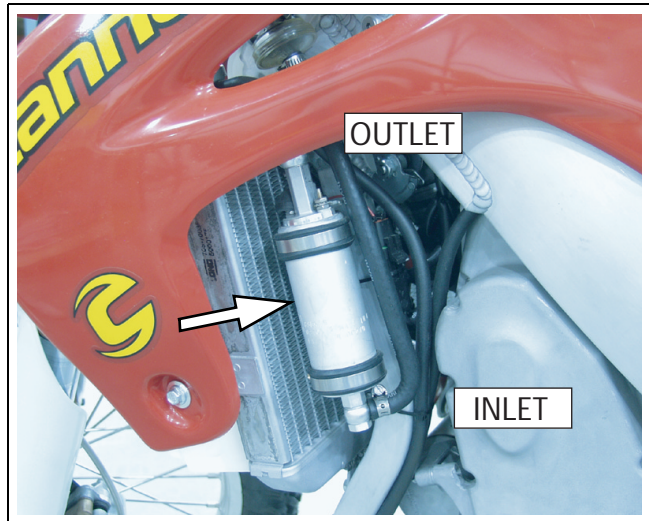


1. Left fuel injector
2. Right fuel injector

FUEL PUMP

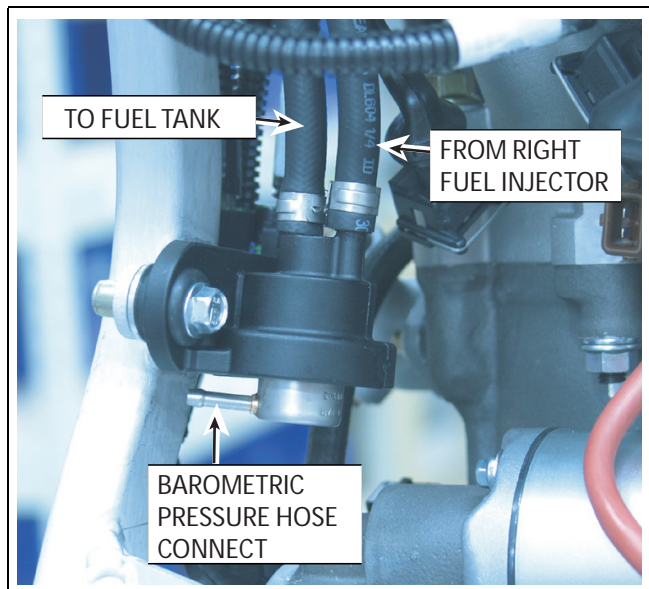
The fuel pump is located on the left side of the vehicle and is mounted on the engine rail. When the engine management system is first "powered-up" (accomplished by pressing the start button without running the starter motor) this pump activates for 3 seconds to pressure the fuel system then turns off again until the engine starts. When the engine starts, it resumes pumping providing pressurized fuel to the injectors. The three second pressurizing cycle may have to be repeated if the pump does not receive adequate fuel

during the first three seconds (e.g., fuel lines drained or tank empty). To activate the pressurizing cycle, momentarily press the start button without activating the starter motor.



FUEL PRESSURE REGULATOR

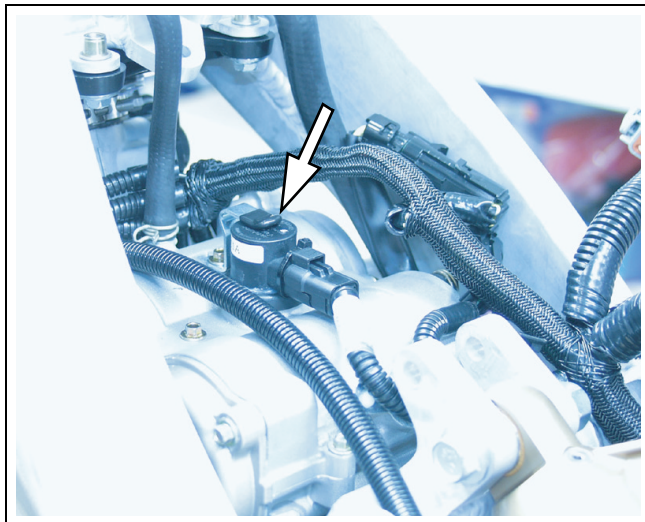
The fuel pressure regulator is mounted on the right side of the vehicle on the engine rail. This device maintains the correct fuel pressure and returns fuel to the tank after it passes the fuel injectors.



Components have been removed for this photo.

SPARK PLUG CAP/COIL

The spark plug cap/coil is a “pencil-type” coil located on top of the spark plug. The ECM controls when the coil is switched on or off. The coil is switched on to allow sufficient time for the coil to charge to a level where a spark can be produced at the spark plug. The coil switches off at ignition, which is timed for good engine performance.



Components have been removed for this photo.

BATTERY

The battery is mounted within the subframe. Cannondale motorcycles are equipped with maintenance free type batteries and do not require the addition of water. In fact, if you try to open the battery you will damage it and exposed yourself to harm.

The fuel injection system benefits most from a fully charged battery. Weak batteries will cause hard starting and a general reduction in vehicle performance.

WARNING

POTENTIAL HAZARD

Battery explosion or electrical fire.

WHAT CAN HAPPEN

Failure to disconnect negative (-) battery lead first can cause the battery to explode. This could result in serious injury to anyone in the vicinity of the battery.

HOW TO AVOID THE HAZARD

Always disconnect the negative (-) battery lead first. When reconnecting connect the negative lead last.

BATTERY REMOVAL (MC1000)

To remove the battery :

Remove the side number panels, radiator shrouds, seat, , fuse, and fuel tank. Unbolt the MC1000 and lay it carefully over the right side of the subframe. Be careful not to disconnect the barometric sensor hose of the ECU or damage the harness connectors. Disconnect the negative lead of the battery first, then disconnect the positive (+) lead. Be careful not to disconnect the barometric sensor hose of the ECU or damage the harness connectors. Then, remove the hold down strap and lift out the battery.

CHARGING THE BATTERY

WARNING

POTENTIAL HAZARD

Attempting to open the battery, remove the cap strip or add fluids to this maintenance free battery.

WHAT CAN HAPPEN

If you pry off the cap strip on a maintenance free battery, you could release poisonous gas and corrosive fluid which could injure you severely.

HOW TO AVOID THE HAZARD

Never attempt to open the battery cap strip. Keep sources of ignition away from the battery (e.g. cigarettes, flames, or sparks).

CAUTION

Never allow a battery to stand in a discharged condition.

The battery capacity is sized for maximum performance and minimal weight. Repeated starting without running the engine long enough to replenish the battery will result in a discharged battery with insufficient power to restart the engine.

Don't charge the battery in your motorcycle with a car-type battery charger - you will ruin it. Use a motorcycle-type battery charger. Typically, these types of chargers deliver a much lower maximum charging rate (2 amps).

1. Remove the battery.
2. Set the battery charger to 12 V.
3. Connect the red battery charger lead to the positive (+) battery terminal and the black battery charger lead to the negative (-) battery terminal.

NOTE : After charging the battery, mark the charging date on the battery case.

NOTE : Do not overcharge battery. Overcharging can cause the volume of electrolyte to decrease reducing the effectiveness and life of the battery.

FUSE

The fuse is located under the seat. If a fuse blows repeatedly this could indicate a problem in the electrical system. If this happens, consult an authorized Cannondale motorsports dealer.

**SERVICE : Electrical, fuse, rating
20A (amps)**

FUSE REPLACEMENT

WARNING

POTENTIAL HAZARD

Using a fuse with a current rating other than specified.

WHAT CAN HAPPEN

An incorrect fuse may not provide protection to the electrical system. An unprotected system can cause an electrical fire which can lead to a serious accident.

HOW TO AVOID THE HAZARD

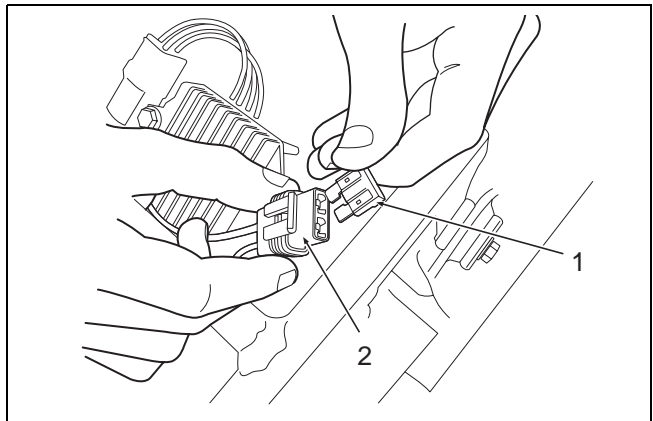
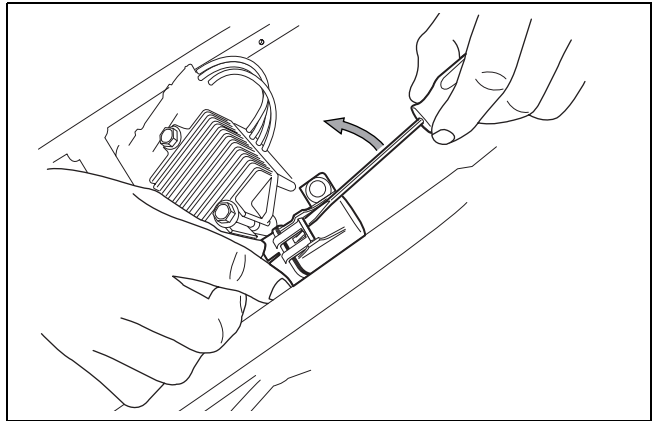
Replace only with the specified fuse.

CAUTION

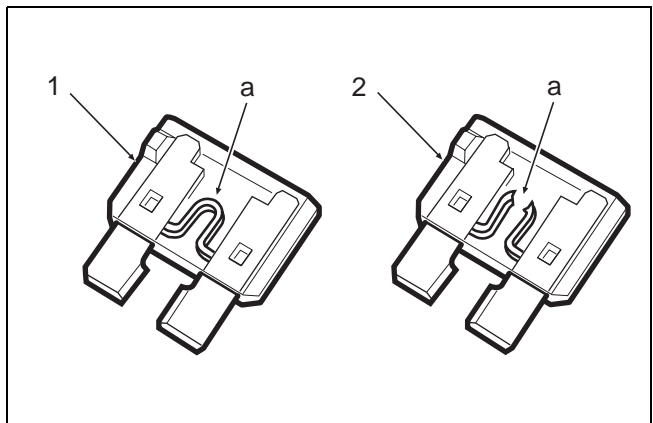
Do not pull on the leads when separating the bottom from the top of the fuse holder.

1. Remove the seat.
2. Pull the catch up with your finger or a thin-blade screwdriver.
3. Pull the bottom of the fuse holder towards the front of the vehicle, and remove the fuse.

4. Inspect the fuse for a blown link or other damage.



1. Fuse
2. Fuse holder bottom



1. Good fuse
 2. Blown Fuse
- a. Fuse link

SPARK PLUG

REMOVING THE SPARK PLUG

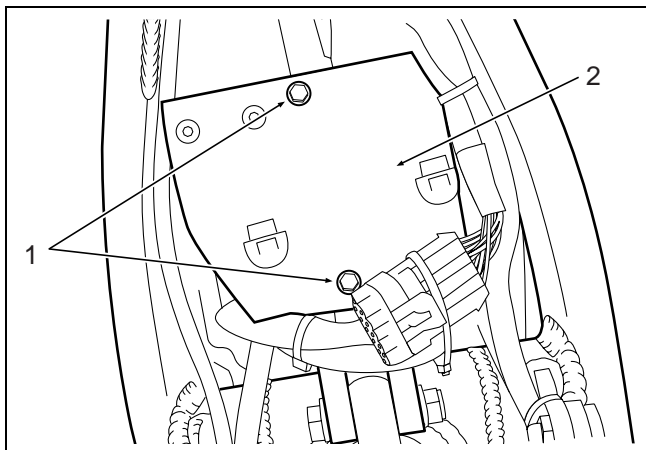
SERVICE : Electrical, spark plug, type
NGK (CR8EK)

SERVICE : Electrical, spark plug, gap
0.024 - 0.028 inches 0.6 - 0.7 mm)

CAUTION

Whenever the spark plug is removed from the cylinder head, cover the spark plug hole with a clean rag to avoid dirt getting into the engine.

1. Remove the fuel tank. See "Fuel" in the Maintenance and Adjustment section of this manual for how to remove the fuel tank.
2. Remove the bolts (1) and move the main relay mounting plate assembly (2), along with the wire harness, away from the rear shock strut.

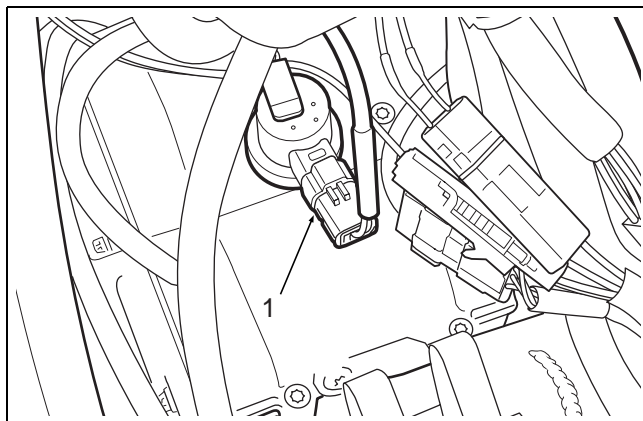


1. Bolts
2. Mounting plate

3. Remove the bolts, washers, and the rear shock strut.

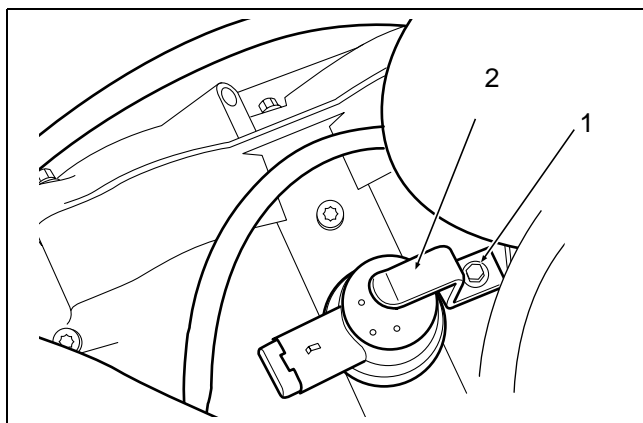
NOTE : Keep your hand under the upper nut and washer so they do not fall on top of the engine.

4. Disconnect the spark plug coil coupler (1) from the coil.



1. Spark plug coil coupler

5. Remove the bolt and spark plug coil holder.



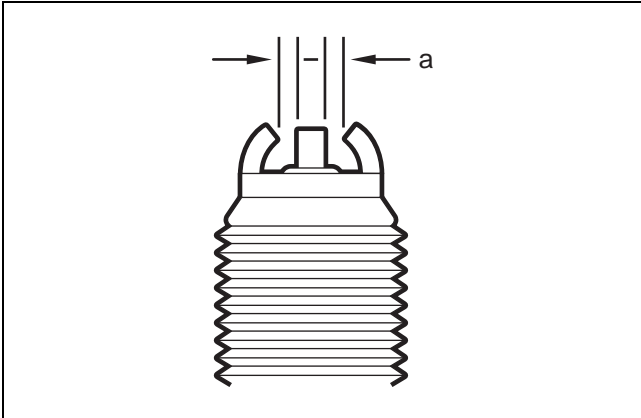
1. Bolt
2. Spark plug coil holder

6. Remove any dirt from the cylinder head and the area around the spark plug with compressed air.
7. Remove the spark plug coil.
8. Use a socket and long extension to loosen and remove the spark plug.

INSPECTING THE SPARK PLUG

If in doubt concerning the condition of the spark plug, consult an authorized Cannondale Motorsports dealer. The simple answer is to replace an old spark plug with a new one anytime you remove it, but since the spark plug is a valuable indicator of engine operating characteristics it is extremely important to have it evaluated by a skilled service technician. Consult an authorized Cannondale motorsports dealer.

The spark plug gap (a) must be measured with a wire gauge or feeler gauge. If the gap is out of specification, adjust it. If the spark plug utilizes multiple ground electrodes, measure each gap.



a. Spark plug gap

INSTALLING THE SPARK PLUG

CAUTION

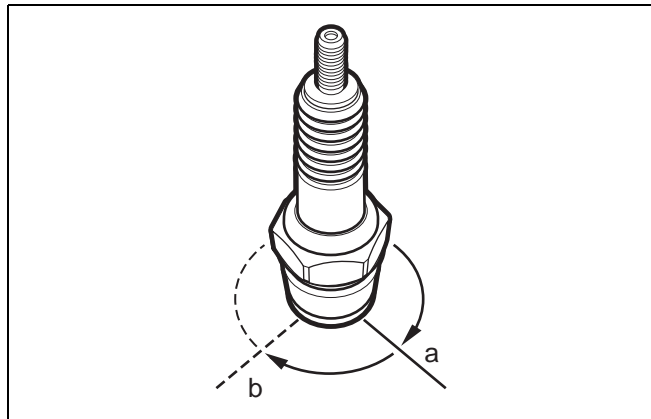
Only install the spark plug into a cool engine.

Always use the specified spark plug with the proper gap. Using an incorrect spark plug may cause severe engine damage.

Incorrectly installing the spark plug can damage the cylinder head. An overly-tight or cross-threaded spark plug will damage the threads in the spark plug hole

Make sure the specified gap is set and lightly coat the plug threads with a suitable anti-seize compound; this will allow for easier spark plug removal in the future.

Then, finger-tighten (a) the spark plug into its hole, and tighten it to the specified torque (b).



- a. Finger tighten
- b. Tightening torque

TORQUE : Electrical, spark plug
8.9 lbf•ft (12.0 N•m)

TORQUE : Electrical, relay plate, mounting screws
3.3 lbf•ft (4.5 N•m)

TORQUE : Frame, rear shock strut, mounting bolts
25.0 lbf•ft (34.0 N•m)

STEERING

ADJUSTING THE HANDLEBAR POSITION

The handlebar can be adjusted rearward from the factory-set position by removing the lower handlebar clamps and rotating them 180°.



WARNING

POTENTIAL HAZARD

Handlebar clamp bolts not tightened to their specified torque.

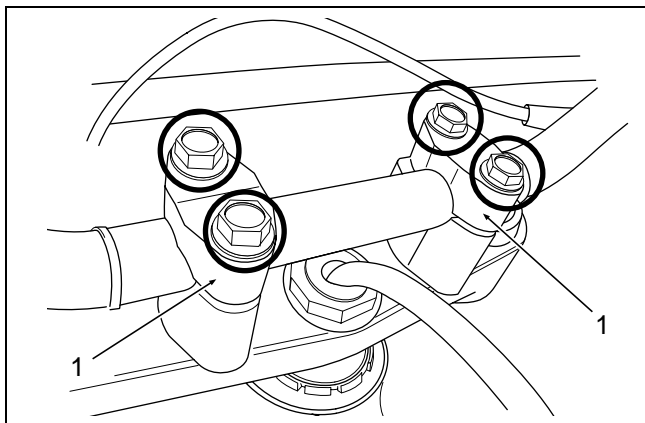
WHAT CAN HAPPEN

Handlebar may move or come off during operation. Failure to follow these warnings can lead to an accident resulting in severe injury or death.

HOW TO AVOID THE HAZARD

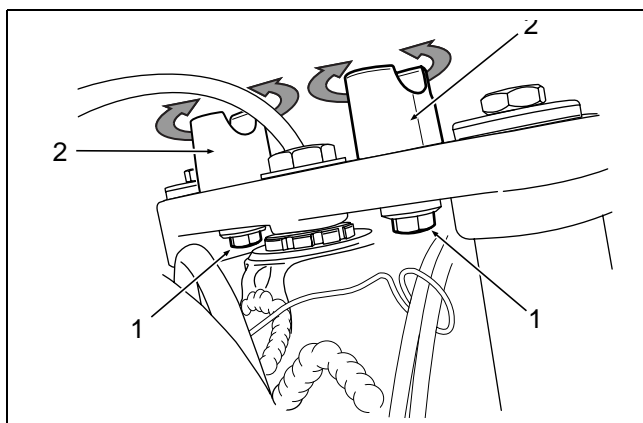
The lower handlebar clamps must be positioned evenly so there is the same amount of space between both the front and rear. And, they must be tightened to the specified torque.

1. Place the vehicle on a stand and cover the gas tank with a clean rag.
2. Remove the handlebar pad.
3. Remove the bolts from each upper handlebar clamp (1). Then, remove the upper handlebar clamps and lay the handlebar on top of the front number plate.



1. Upper handlebar clamp

4. Loosen the bolt (1) from each lower handlebar clamp (2). Rotate the lower handlebar clamp 180° and tighten the bolts to the specified torque.



1. Bolts
2. Lower handlebar clamps

5. Place the handlebar onto the lower handlebar clamps, install the upper handlebar clamps, and tighten the bolts to the specified torque

TORQUE : Steering, handlebar clamp upper bolts
17.0 lbf•ft (23.0 N•m)

TORQUE : Steering, handlebar clamp, lower bolts
60.0 lbf•ft (81.0 N•m)

After installing the handlebar, sit on the vehicle, apply the front brake, and push down on the front end a few times to check if the handlebar moves.

Also, turn the handlebar from lock-to-lock to check for looseness or binding.

SUSPENSION

FORK MAINTENANCE

Telescopic front forks depend on smooth friction free action. Be certain to follow the maintenance recommendations in the table below.

CAUTION

Do not use strong solvents (e.g., brake cleaner) to clean the fork legs. Strong solvents will dry out the fork seals and steel tubes, and cause friction and leakage.)

Fork Leg Maintenance	
Pre-Ride	<ol style="list-style-type: none"> 1. Inspect for deep scratches, nicks, or other damage. 2. Inspect the fork seals for cracks, nicks, leaks, or other damage. Also, check the area around and below the fork seals for fork fluid. If there is any indication of damage or leaks consult an authorized Cannondale motorsports dealer 3. Make sure the fork leg guards are clean and not packed with mud or dirt and the upper and lower triple clamp pinch bolts are tightened to the specified torque. 4. After inspecting the fork legs, apply a small amount of the specified lubricant onto the fork tubes. (Daily care) 5. Take the vehicle off the stand, apply the front brake, and push down on the handlebar several times. This will allow the grease to spread evenly over the fork tubes and to allow you to check for smooth and proper fork leg operation.
Post-Ride (to be performed by owner)	<ol style="list-style-type: none"> 1. Clean externally with a light/mild detergent and spray with an all-purpose oil after drying. 2. Check externally for leaks and damage (e.g., nicks, dent). 3. Apply a small amount of the specified grease onto the inner tube and work it in by pushing the fork legs up and down. 4. Remove the bleed screw to allow built up air pressure in each fork leg to escape, and then reinstall the screw.
Every 25 Hours (to be performed by an authorized Cannondale motorsports dealer)	<ol style="list-style-type: none"> 1. Disassemble the fork legs and inspect all parts for wear and damage. Replace worn parts, O-rings, seals, and other items according to assembly procedure. 2. Change the fork oil.

BLEEDING AIR FROM THE FRONT FORKS

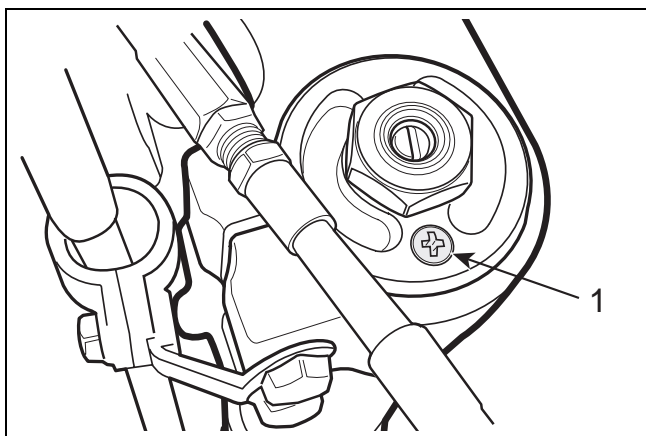
Bleed any accumulated air using the bleed screw located on top of each fork leg after every ride.

CAUTION

When removing the bleed screw, do not allow dirt or debris to enter the opening. The smallest amount of dirt can severely damage the forks.

Do not over-tighten the bleed screw.

1. Place the vehicle in a stand so that the front wheel is off the ground and the forks are fully extended.
2. Remove the bleed screw (1) and allow any accumulated air to escape.



1. **Bleed screw**
3. Reinstall the bleed screw and tighten.

ADJUSTING THE FRONT & REAR SUSPENSION “CLICKERS” (FRONT OR REAR)

Your 2002 Cannondale motorcycle suspension valving settings are provided by Pro-Action Suspension. The production settings and adjustments are design for a wide range of riders and terrain. However these settings may not be optimum for your weight, skill level, or terrain. Please contact Pro-Action's authorized service centers for service or re-valving needs. They have 27 authorized service centers across the United States. Contact Pro-Action for the one nearest you.

PRO-ACTION WORLD HEADQUARTERS LOCATIONS

East

Pro-Action Suspension

3611 8th Avenue

Beaver Falls, PA 15010

PH: 724-846-9055

FX: 724-846-1629

Email: GQ@PROACTION.ATTBBS.COM

Website: www.pro-action.com

West

Pro-Action INC

12156 Severn Way

Riverside, CA 92503

PH: 909-280-9882

FX: 909-280-9886

Email: WESTCOASTHQ@AOL.COM

Website: www.pro-action.com

ADJUSTMENT TIPS

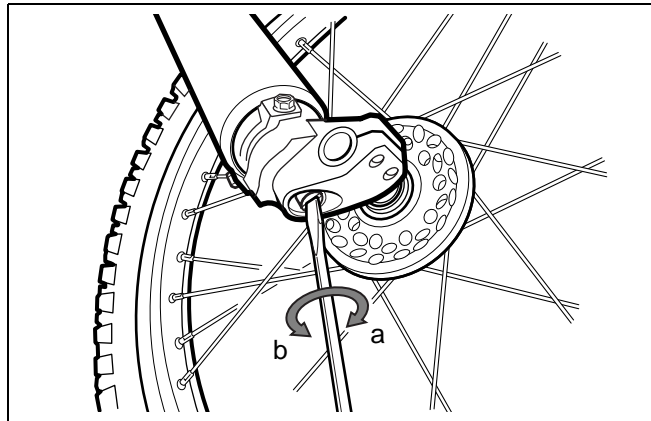
CAUTION

Using too much force when closing the adjusters will destroy important sealing surfaces.

Do not turn the adjusters beyond the fully closed position (fully seated) or the adjusters will be severely damaged.

1. The front and rear suspension systems are factory pre-set, based on a average rider (weight & skill). Choice of individual settings will vary depending on skill and riding style.
2. When making adjustments, make them one at a time and in small steps.
3. The external adjusters have a normal right-hand thread. As you turn the external adjusters, you will hear them click. Each click identifies a setting.
4. To avoid turning the adjuster in the wrong direction, always fully close the adjuster (turn it clockwise until it seats), then turn it counterclockwise the required number of clicks until the desired setting is reached.
5. Click position 0 (zero) is when the adjusters are turned clockwise until they are fully closed (i.e., fully seated). This is the hardest damping and should be your starting point. Turn the adjuster counterclockwise and listen for the clicks that identify setting positions "1", "2", etc.
6. Turning the adjusters counterclockwise (more clicks out) will give less damping force.
7. Normally, the adjusters should not be adjusted more than two clicks at a time and not outside the maximum click range.
8. When you think you have made an improvement, go back to what you started with and double check to be sure an improvement was made. Also, pay attention to changes in conditions (e.g., tires, air temperature).
9. In general, compression damping changes should be used to influence the vehicle's stability and response, while rebound damping changes should be used to influence comfort and traction.
10. When you need more damping force, you should mainly try to increase compression damping and use as little rebound damping as possible. This will result in a gain in comfort and handling performance.

FORK COMPRESSION ADJUSTER

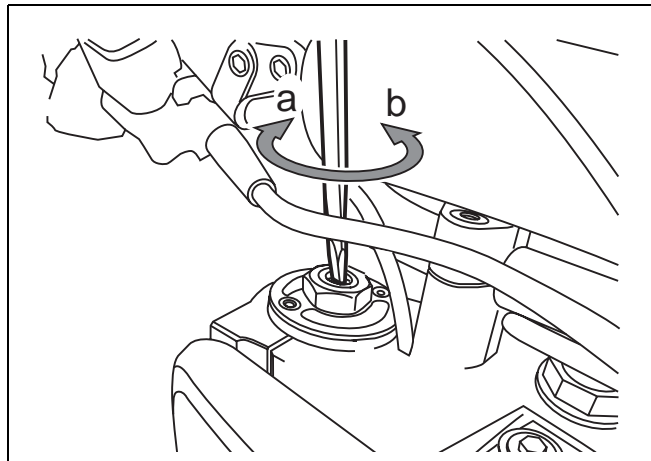


1. Fork leg compression adjuster
 - a. More damping (stiffer)
 - b. Less damping (softer)

SERVICE : Suspension, front forks, compression adjuster "clicks out from fully seated," standard, 12

SERVICE : Suspension, front forks, compression adjuster "clicks out from fully seated," maximum, 30

FORK REBOUND ADJUSTER



1. Fork leg rebound adjuster
 - a. More damping (stiffer)
 - b. Less damping (softer)

SERVICE : Suspension, front forks, rebound adjuster "clicks out from fully seated", standard, 12

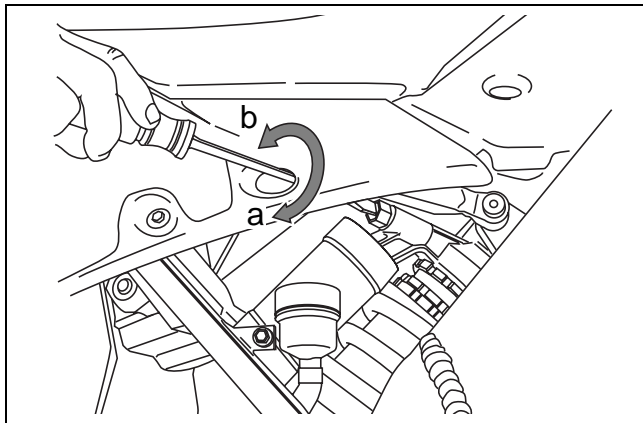
SERVICE : Suspension, front forks, rebound adjuster "clicks out from fully seated", maximum, 27

REAR SHOCK

CAUTION

Do not attempt to disassemble or service the front or rear shock absorber.

REAR SHOCK COMPRESSION ADJUSTER

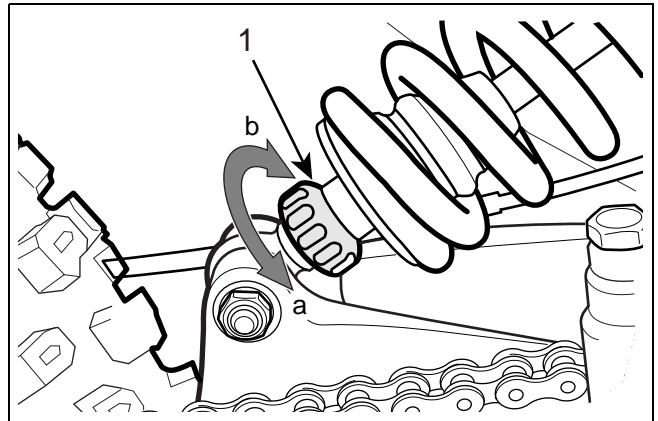


- 1. Rear shock compression adjuster
- a. More damping (stiffer)
- b. Less damping (softer)

SERVICE : Suspension, rear shock compression adjuster “clicks out from fully seated”, standard, 18

SERVICE : Suspension, rear shock compression adjuster “clicks out from fully seated,” maximum, 32

REAR SHOCK REBOUND ADJUSTER



- 1. Rear shock rebound adjuster
- a. More damping (stiffer)
- b. Less damping (softer)

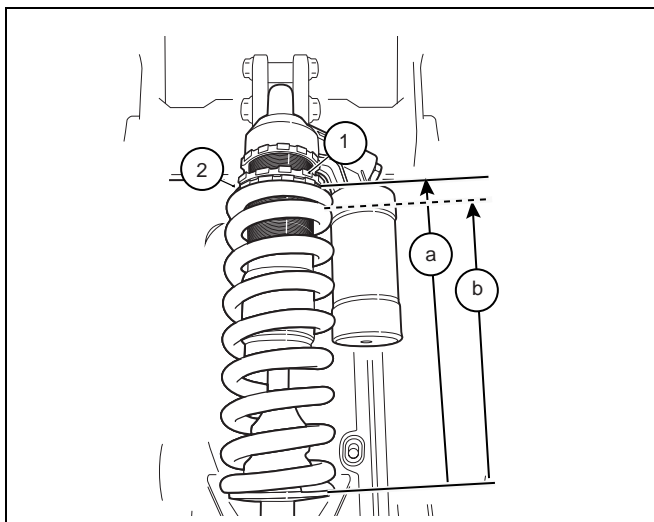
SERVICE : Suspension, rear shock rebound adjuster “clicks out from fully seated,” standard, 14

SERVICE : Suspension, rear shock rebound adjuster “clicks out from fully seated,” maximum, 32

REAR SPRING PRELOAD ADJUSTMENT

CAUTION

When adjusting the preload, be sure not to adjust the spring out of the minimum installed length. If the spring is not compressed to its minimum installed length, which is slightly shorter than its uninstalled length - the suspension travel could allow the uncompressed spring to become loose and “slap” on the shock resulting in damage.



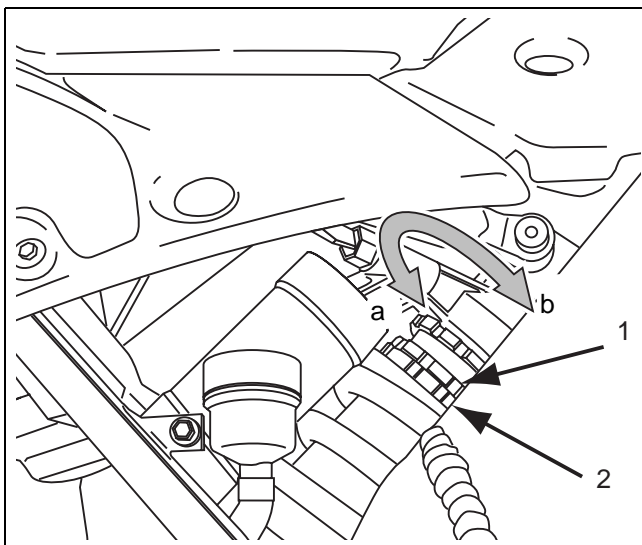
1. Lockring
2. Adjusting ring
- a. Minimum installed length
- b. Maximum installed length

SERVICE : Suspension, rear shock spring, uninstalled length, 230mm

SERVICE : Suspension, rear shock spring, minimum installed length (a), 228mm

SERVICE : Suspension, rear shock spring, maximum installed length (b), 220mm

On the rear shock absorber the preload adjuster is the metal notched ring on the shock body.



1. Rear shock spring preload adjuster
2. Lockring
3. Adjuster ring
- a. More preload (stiffer)
- b. Less preload (softer)

RIDE HEIGHT

SERVICE : Suspension, front ride height, 95mm

SERVICE : Suspension, rear ride height, 95mm

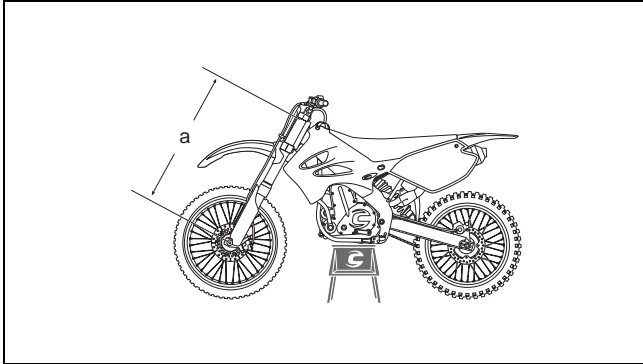
SETTING THE FRONT RIDE HEIGHT

Ride height is the amount the suspension sags with the rider on the bike in full riding gear.

CAUTION

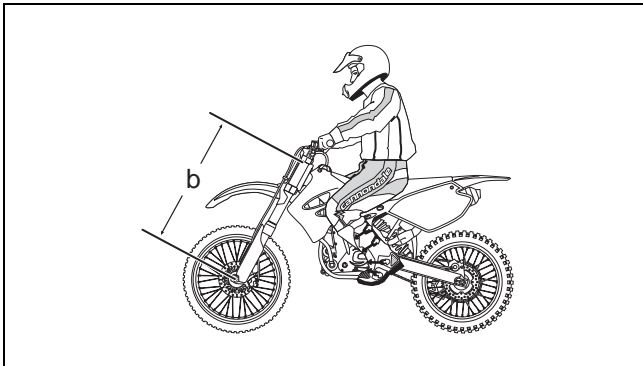
If the front ride height is out of the specified range, the fork spring preload must be changed. Changing the spring preload should be left to an authorized Cannondale motorsports dealer.

1. Place on a stand and measure height (a) with no rider.



a. No rider

2. Remove stand and measure height (b) with rider.



b. Measurement with rider

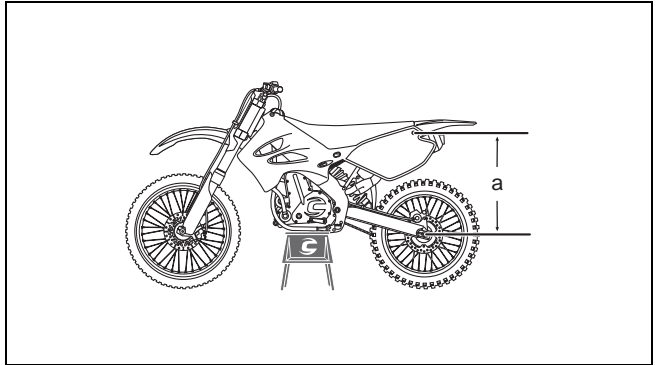
3. Calculate (a - b = ride height).

SETTING THE REAR RIDE HEIGHT

Ride height is the amount the suspension sags with the rider on the bike in full riding gear.

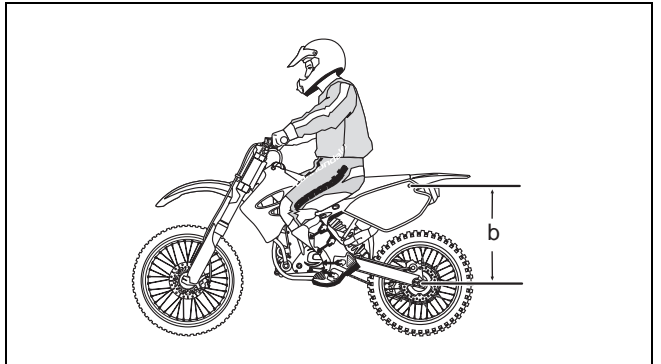
NOTE : Adjust if out of the specified range. To decrease the ride height, increase the rear spring preload. To increase the ride height, decrease the rear spring preload.

1. Place on a stand and measure height (a) with no rider.



a. No rider

2. Remove stand and measure height (b) with rider.



b. Measurement with rider

3. Calculate (a - b = ride height).

STATIC SAG

SERVICE : Suspension, front static sag, 25-35mm

SERVICE : Suspension, rear static sag, 25-35mm

MEASURING THE FRONT STATIC SAG

Static sag is the amount the suspension sags without the rider on the vehicle.

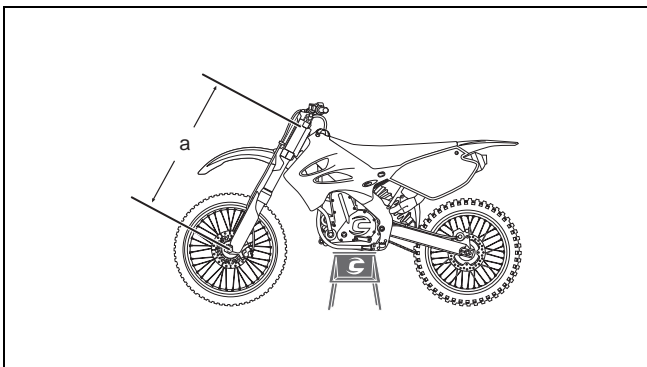
CAUTION

If the front static sag is out of the specified range, the spring preload must be changed. Changing the spring preload should be left to an authorized Cannondale motorsports dealer.

NOTE : Measure from the axle to the same point on the upper triple clamp each time.

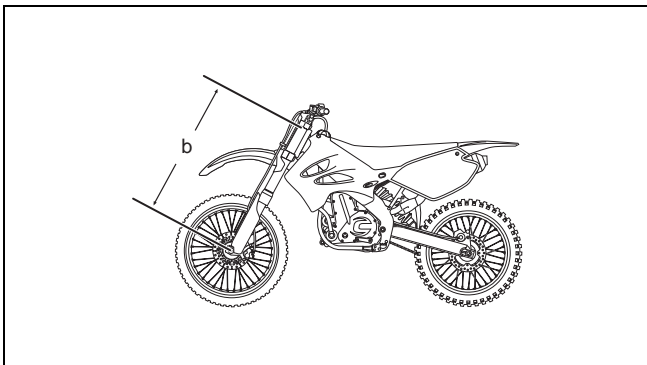
SETTING THE REAR STATIC SAG

1. Place on stand and measure (a) with no rider.



a. Measurement on stand

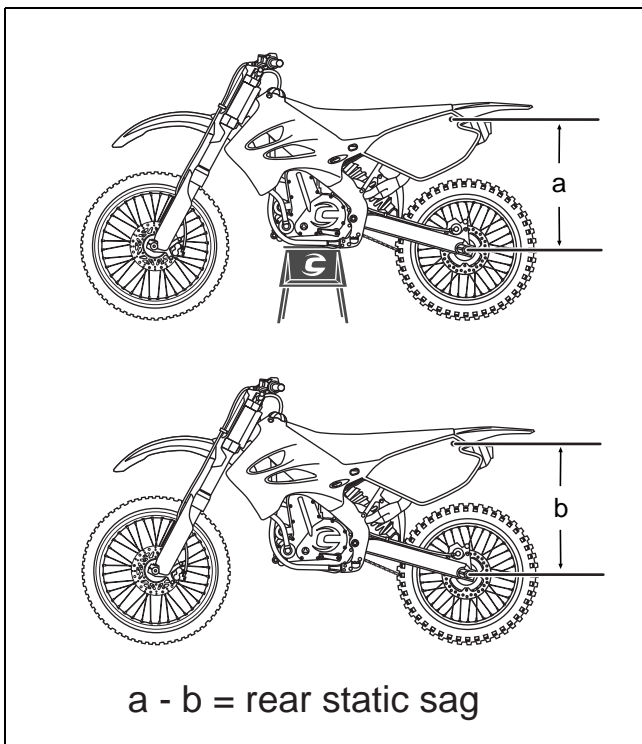
2. Remove stand and measure height (b) with rider.



b. Measurement without stand

3. Calculate ($a - b = \text{static sag}$).

NOTE : Measure from the axle to the same point on the rear fender each time.



4. If the sag is out of the specified range. The rear spring must be changed.

TIRES & WHEELS

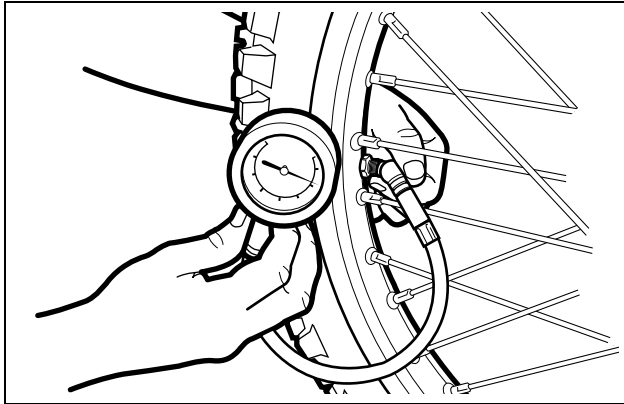
CHECKING THE TIRE PRESSURE

Sufficient tire pressure is vital for safe and proper handling. Overinflation may impair ride comfort and reduce the ground contact of the tires.

Insufficient tire pressure will result in:

- Poor handling and may cause the motorcycle to “wander.”
- Rapid tire wear.
- Increase fuel consumption,
- Inhibit performance
- Less control.

Use a gauge to measure the pressure in a cold tire. Regulate the tire pressure before each ride.



SERVICE : Tires, front, size
80/100x21

SERVICE : Tires, rear, size
110/90x19

SERVICE : Tires, front, tire cold pressure
14 psi (96.5 kPa)

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle with improper tires, or with improper or uneven tire pressure.

WHAT CAN HAPPEN

Use of improper tires on this vehicle, or operation of this vehicle with improper or uneven tire pressure, may cause loss of control, increasing your risk of having an accident which could result in severe injury or death.

HOW TO AVOID THE HAZARD

Always use the size and type tires specified in the Owner's Manual for this vehicle.

Always maintain proper tire pressure as described in this Owner's Manual.

INSPECTING THE TIRES

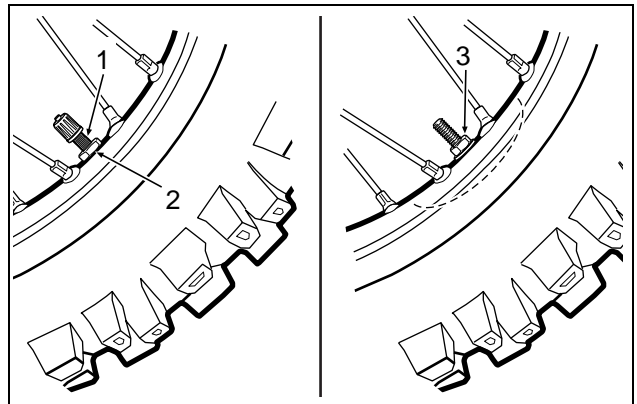
Inspect each tire for worn tread, cracks, or other damage. If damaged, replace with new tires.

Check the valve stem for cracks or other damage. If damage is found, replace with a new inner tube. A tilted tire valve stem indicates that the tire has slipped out of position and must be remounted properly.

Make sure the tire valve locknut is secure and the rimlock nut is tightened to its specified torque.

NOTE : If the tire or inner tube needs to be replaced or remounted, contact an authorized Cannondale dealer for servicing.

TORQUE : Rimlock nut
9lbf-ft (12.2 N•m).



REAR WHEEL ALIGNMENT

The following procedure requires a special tool. Do not attempt the following procedure if you do not have the tool or the skills to perform the procedure as described; consult an authorized Cannondale motorsports dealer.

WARNING

POTENTIAL HAZARD

Reusing a cotter pin.

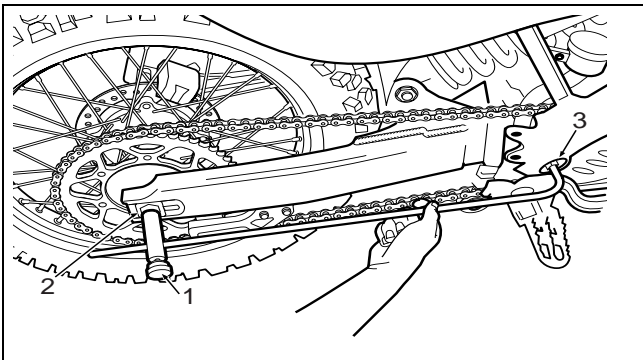
WHAT CAN HAPPEN

The cotter pin can break which could allow the rear wheel axle nut to come loose. This could cause a loss of control resulting in serious injury or death.

HOW TO AVOID THE HAZARD

NEVER re-use a cotter pin. Always replace cotter pins with new ones.

1. Place the vehicle on a stand.
2. Loosen the lockring (1) on the special tool. Install the special tool so each spindle fits snug and flush into the rear axle (2) and pivot shaft (3) on the right side of the vehicle, then tighten the locking.



1. Lockring
2. Rear axle
3. Pivot shaft

NOTE : Use the right-side as a base and then adjust the left-side into alignment.

3. Remove the special tool and install it on the left side of the vehicle. If the spindle does not fit snug and flush into the rear axle and the pivot shaft on the left side of the vehicle, the wheel is out of alignment and needs to be adjusted.
4. Readjust the drive chain freeplay, measure the freeplay, and check the wheel alignment again. After the drive chain freeplay and wheel alignment are correct, install a new cotter pin. Do not loosen the locking or move the spindles on the special tool. Only adjust the position of the adjuster blocks in the swingarm.

FRAME, SUB-FRAME, SWINGARM

INSPECTIONS



WARNING

POTENTIAL HAZARD

Driving a vehicle with a cracked or damaged frame, subframe or other components.

WHAT CAN HAPPEN

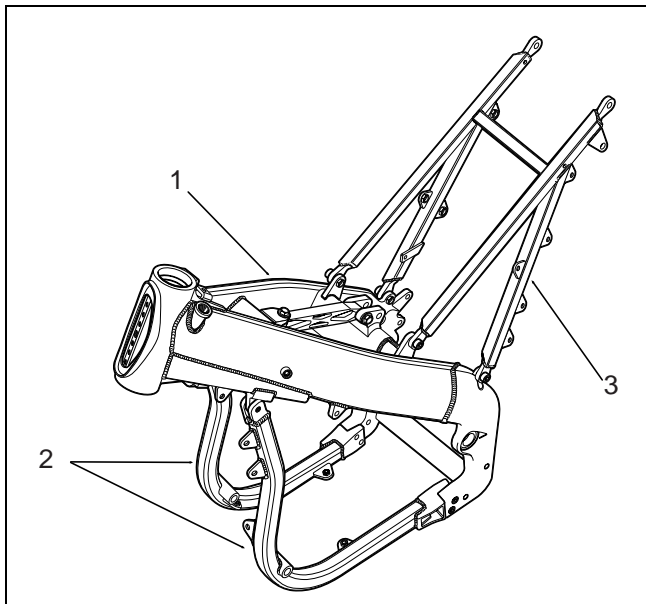
A complete frame failure could result leading to a serious accident.

HOW TO AVOID THE HAZARD

Do not ride a motorcycle that has a cracked or damaged frame.

The aluminum frame is heat treated. Do not weld, drill, or modify the frame, subframe, or swingarm; these modifications may weaken the component.

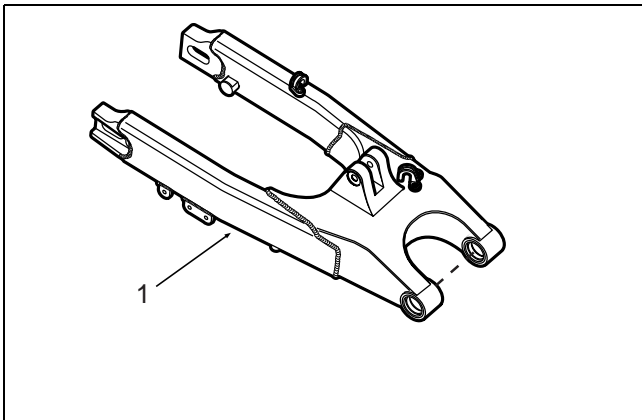
Inspect the frame (1), lower frame rails (2) and subframe (3) for cracks, deep scratches, or other damage. If any damage is found, contact an authorized Cannondale motorsports dealer for servicing.



1. Frame
2. Lower frame rails
3. Subframe

NOTE : The frame and subframe are shown removed from the vehicle for clarity.

Inspect the swingarm for cracks, deep scratches, or other damage. If any damage is found, contact an authorized Cannondale motorsports dealer for servicing.

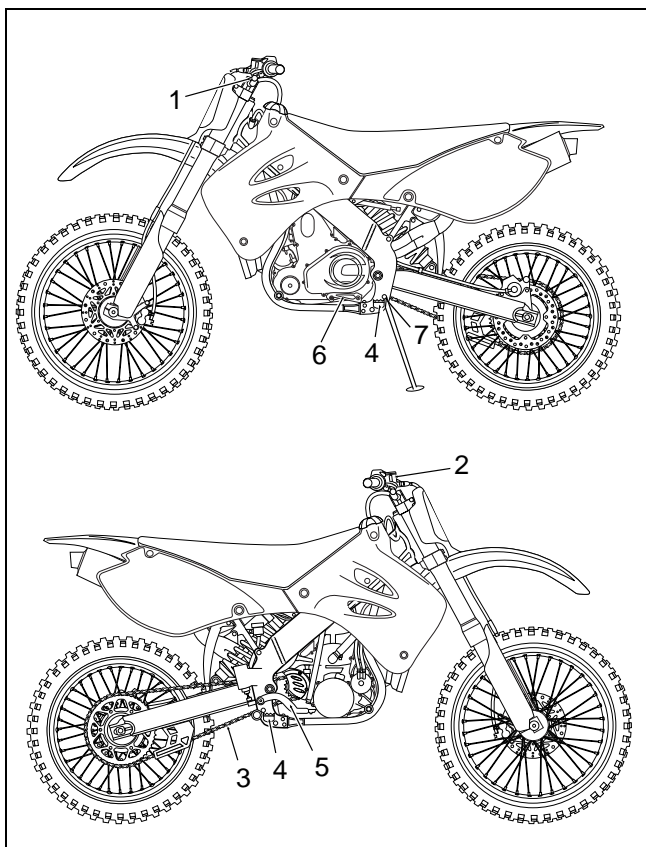


1. Swingarm

NOTE : The swingarm is shown removed from the vehicle for clarity.

LUBRICATION

Lubricate the points shown in the illustrations in accordance with the maintenance schedule or after the vehicle has been washed or operated in wet, dusty, or rainy conditions. Before lubricating each point, make sure it is clean and free of any grease, rust, dirt, or grime.



1. Clutch lever & cable
2. Throttle lever & cable
3. Drive chain
4. Footpeg pivot
5. Rear brake pedal pivot
6. Shift lever folding tip pivot
7. Kick stand pivot

After the vehicle is thoroughly dry, lubricate the controls as described in this manual and coat any unprotected areas with a water-displacement chemical.

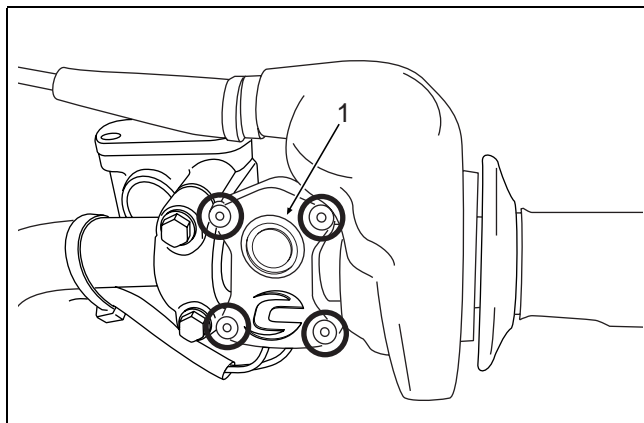
Start the engine and let it run until the radiator is slightly warm and then turn it off.

NOTE : Before riding the vehicle, it is recommended to go over the entire vehicle and check for any damage or loose fasteners.

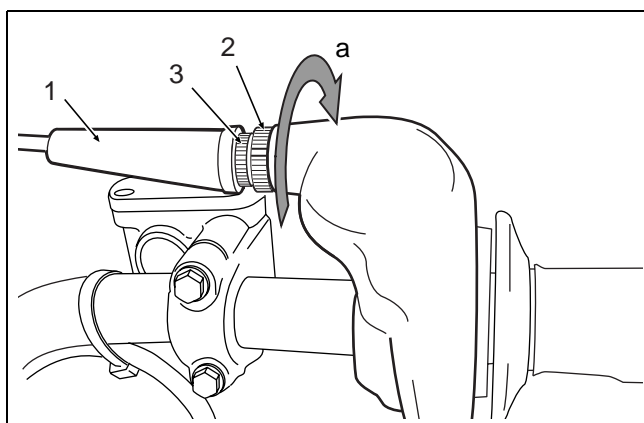
Throttle lubrication

NOTE : If the throttle does not operate properly the cable may have been installed incorrectly. Remove the throttle cable and make sure it is installed properly.

1. Place the vehicle on a stand.
2. Remove the engine start switch (1) screws and separate the engine start switch housing.

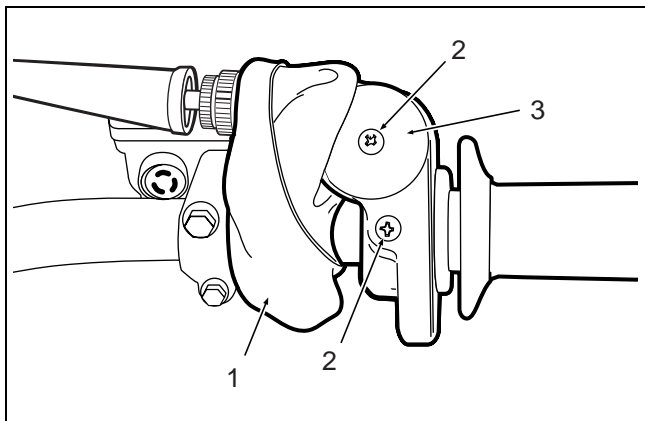


1. Engine start switch
3. Remove the engine start switch from the handlebar. The engine start switch can just hang freely or can be zip-tied to the handlebar; away from the throttle area.
4. Pull the long rubber boot (1) down the throttle cable so the locknut (2) and throttle cable adjuster (3) are visible.
5. Turn the locknut using pliers, in direction (a). Turn the adjuster in direction (a) to slacken the throttle cable.



1. Long rubber boot
2. Locknut
3. Cable adjuster
- a. Loosening direction
6. Pull the large rubber boot (1) over the throttle cable housing and past the locknut and adjuster.

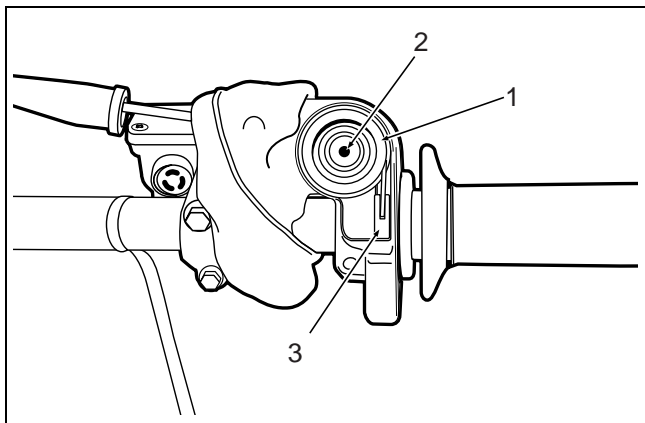
7. Remove the screws (2) and remove the throttle housing cover (3).



1. Large rubber boot
2. Screws
3. Throttle housing cover

8. Remove the throttle housing wheel (1) and collar (2).

9. Remove the cable nipple from the throttle pulley (3) and pull the cable out. Ensure that the throttle pulley rotates freely on the handlebar.

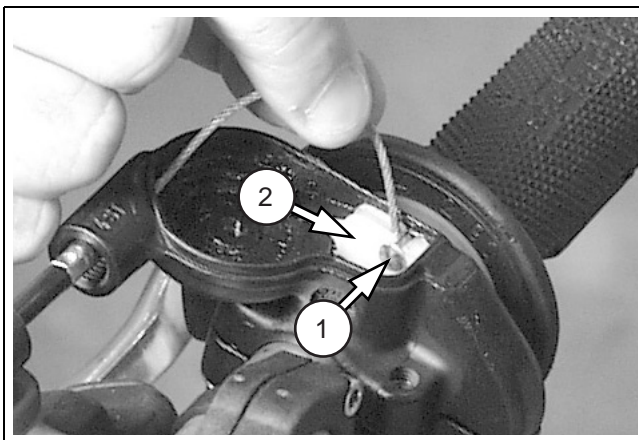


1. Throttle housing wheel
2. Collar
3. Throttle pulley

10. Spray all the parts with a water-displacement chemical, wipe them off, and dry them thoroughly.

11. Lubricate the cable as described in the end of this section of the manual.

12. Place the cable nipple (1) into the slot in the throttle tube pulley (2).

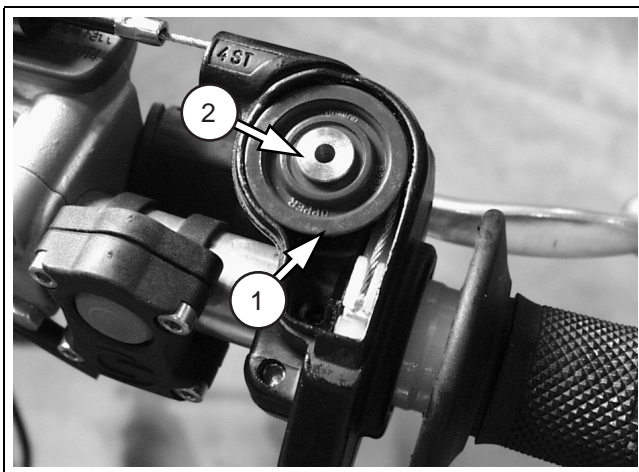


1. Cable nipple
2. Throttle tube pulley

13. Apply a light coat of high-quality waterproof grease to the collar.

NOTE : Only apply a light coat of grease so it does not attract a lot of dirt and debris.

14. Install the collar and throttle housing wheel.



1. Wheel
2. Collar

Install the throttle housing plate and tighten the screws to the specified torque

**TORQUE : Fuel, throttle lever housing plate screws
5.0 lbf•ft (6.8 N•m)**

15. Pull the large rubber boot over the throttle housing.

16. Install the throttle cable adjuster and lockring onto the throttle cable.

17. Adjust the throttle cable freeplay and pull the long rubber cable boot over the locknut and adjuster.

18. Check the throttle grip for proper operation.

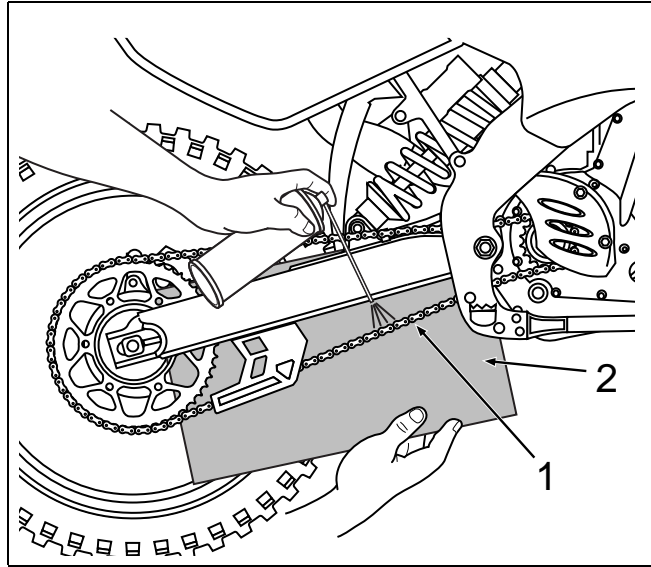
CHAIN LUBRICATION

CAUTION

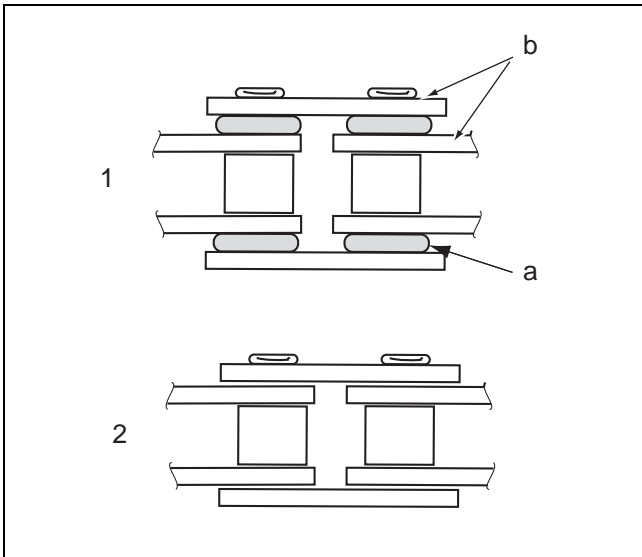
Do not use grease to lubricate the drive chain. Grease will attract and accumulate dirt and grime resulting in damage to the chain and sprocket.

If vehicle is equipped with an O-ring type chain, use an O-ring chain specific lubricant.

NOTE : Place a piece of cardboard (2) between the drive chain and vehicle to catch any over-spray.



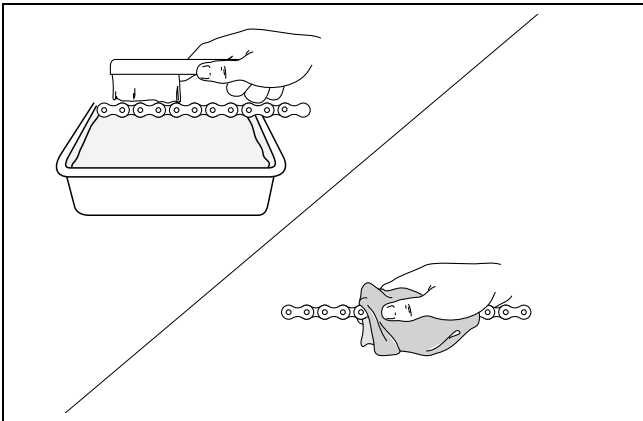
1. Clean drive chain
2. Cardboard



1. O-ring chain
2. Conventional (non-O-ring) chain
- a. O-rings
- b. Plates

Place the vehicle on a stand so that rear wheel is off the ground.

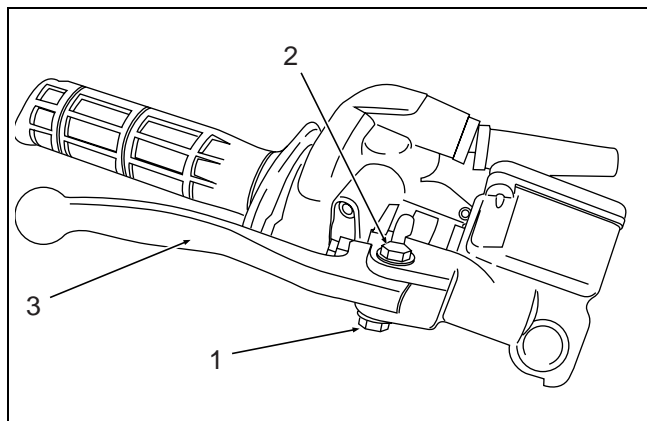
Carefully clean the chain with a mild detergent and water solution. Rinse with clean water while gently scrubbing the chain with a light nylon brush. Repeat as needed.



Wipe dry with a clean shop towel. Slowly rotate the drive chain and apply the specified lubricant on the sag side (1) of the drive chain. Be sure to uniformly lubricate the entire drive chain three to four times.

FRONT BRAKE LEVER LUBRICATION

1. Place the vehicle on a stand.
2. Remove the rubber cover from the brake lever.
3. Remove the nut (1), pivot bolt (2), and brake lever (3).



1. Nut
2. Pivot bolt
3. Brake lever

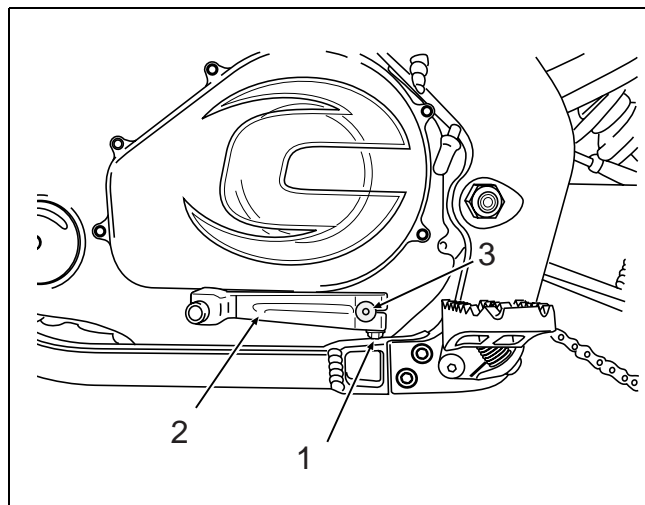
4. Spray all the parts with a water-displacement chemical, wipe them off, and dry them thoroughly.
5. Install the brake lever and apply a light coat of high quality waterproof grease onto the pivot bolt.

NOTE : Only apply a light coat of grease so it does not attract a lot of dirt and debris.

6. Install the pivot bolt and tighten the nut securely.
7. Install the rubber boot over the brake lever.

SHIFT LEVER LUBRICATION

1. Remove the pinch bolt (1) and carefully slide the shift lever (2) off the shift shaft (3).



1. Pinch bolt
2. Shift lever
3. Shift shaft

CAUTION

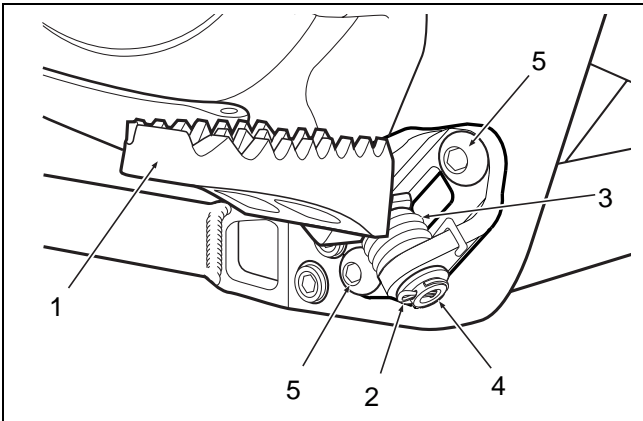
Do not bend the shift shaft or damage the splines when removing the shift lever.

2. Examine the cover shaft oil seal for leaks or other damage. Contact an authorized Cannondale Motorsports dealer for servicing if a leak is discovered.
3. Apply a light coat of clean motor oil onto the splined area of the shift shaft.
4. Install the shift lever pinch bolt and tighten to the specified torque.

TORQUE : Engine, shift lever pinch bolt
5.0 lbf•ft (6.8 N•m)

5. Apply a light coat of clean engine oil to the folding tip pivot.

FOOTPEG PIVOT LUBRICATION)

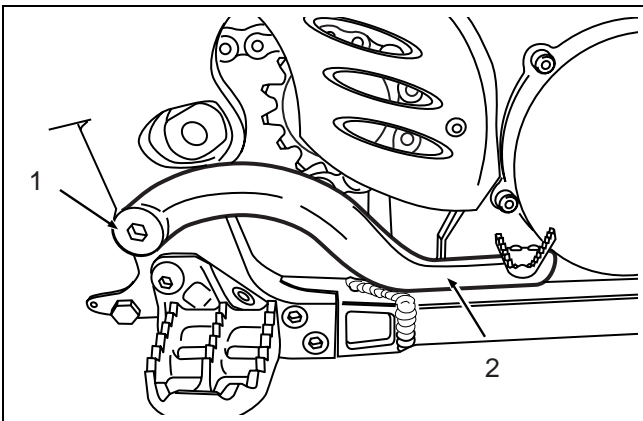


1. Footpeg
2. Cotter pin
3. Spring
4. Pivot pin
5. Bolts

1. Place the vehicle on a stand.
2. Clean the footpeg.
3. Spray the footpeg with a water-displacement chemical, wipe them off, and dry them thoroughly.
4. Apply a light coat of clean engine oil onto the footpeg pivot bolt.

REAR BRAKE PEDAL LUBRICATION

1. Place the vehicle on a stand.
2. Remove the mounting bolt (1) and remove the brake pedal (2).



1. Mounting bolt
2. Brake pedal

3. Spray all the parts with a water-displacement chemical, wipe them off, and dry them thoroughly.

4. Apply a light coat of a high quality waterproof grease onto the mounting bolt and rubber seals.

NOTE : Only apply a light coat of grease so it does not attract a lot of dirt and debris.

5. Install the pivot bolt and brake pedal, and tighten the bolt to the specified torque

**TORQUE : Brake, pedal, rear, mounting bolt.
15.0 lbf•ft (20.3 N•m)**

6. Adjust the brake pedal height if necessary.

WARNING

POTENTIAL HAZARD

Riding without checking the brakes.

WHAT CAN HAPPEN

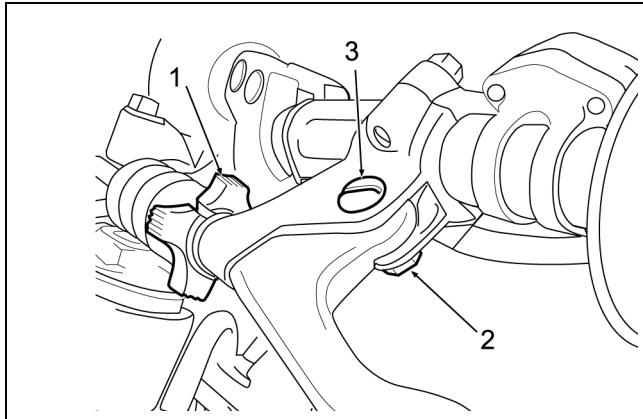
Leaving the rider without a rear brake, which can lead to an accident resulting in injury or death.

HOW TO AVOID THE HAZARD

Check brake pedal height and rear brake operation before every ride!

CLUTCH LUBRICATION

1. Place the vehicle on a stand.
2. Remove the clutch cable from the clutch lever.
3. Remove the quick-adjuster (1) from the clutch lever.
4. Remove the nut (2), pivot bolt (3), clutch lever and two washers.



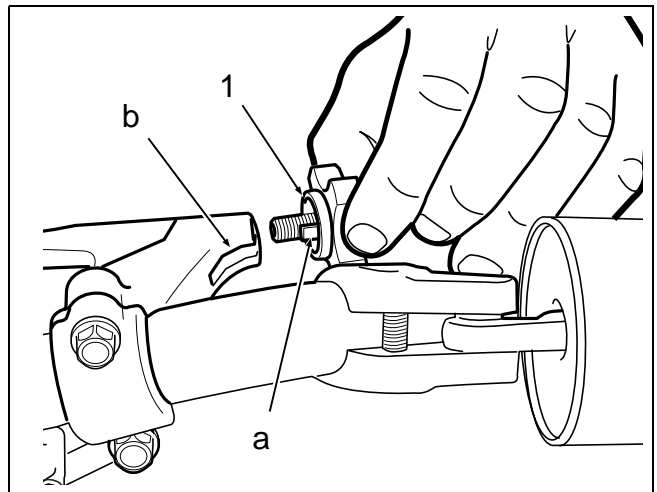
1. Quick adjuster
2. Nut
3. Pivot bolt

5. Spray all the parts with a water-displacement chemical, wipe them off, and dry them thoroughly.
6. Install the clutch lever and washers into the clutch housing.

NOTE : Apply a light coat of high-quality grease to the clutch lever pivot bolt. Only apply a light coat of grease so it does not attract a lot of dirt and debris.

7. Install the clutch lever pivot bolt and nut - tighten securely.

8. Lubricate the threads with clean engine oil and install the quick-adjuster (1) and align the tab (a) with the slot (b) in the clutch housing.



1. Quick adjuster
- a. Tab
- b. Slot

9. Lubricate the clutch cable as described in the next procedure and install the clutch cable into the clutch lever .
10. Adjust the clutch freeplay as specified.

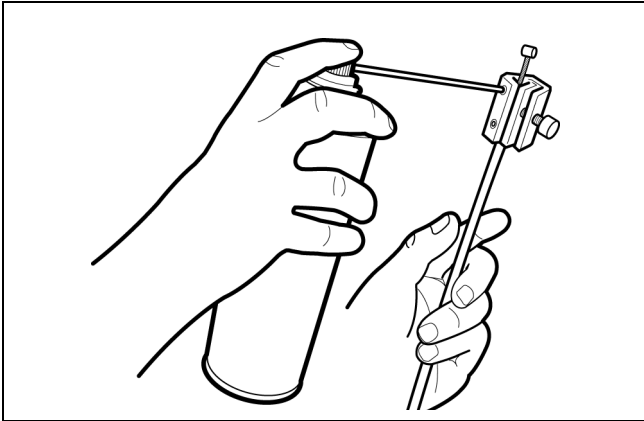
CABLE(S) LUBRICATION

CAUTION

After lubricating the cable, be sure to check the clutch and throttle operate properly.

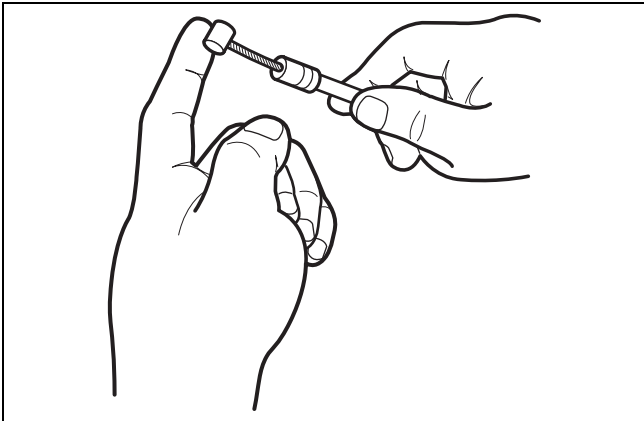
Use aerosol cable lubricant and lubricating tool on all cables

- **Clutch cable (inner)**
- **Throttle cable (inner).**



Apply a light coat of the grease to the cable nipples

- **Clutch cable (upper end)**
- **Throttle cable (upper end).**



Cleaning and Storage

CLEANING

CAUTION

Make sure the vehicle is cold before cleaning it.

Do not use high-pressure washers to clean the vehicle. High-pressure will force water through seals and corrode bearing surfaces and electrical connections eventually causing them to fail.

Be sure to thoroughly dry your vehicle after washing it. This will prevent corrosion and premature wear of components (e.g., switches, airbox, wheel bearings).

Do not use compressed air to dry the vehicle. Compressed air can force water or other contaminants into bearings and the electrical system leading to severe damage and component failure.

Do not get detergent onto the brake discs or pads. The detergent may cause the brake discs to glaze and ruin the brake pads.

Do not wax or lubricate the brake discs. Braking power will be reduced and may result in an accident.

The steering head, airbox, and fuel tank bolt hole plugs must be installed prior to washing the vehicle and according to exploded illustrations. Failure to follow this caution will result in water getting into the engine and causing severe engine damage.

Do not install the steel and rubber washers on the intake side of the airbox plug or they will fall into the throttle body and cause severe engine damage.

Before you start washing the vehicle, cover the following parts with plastic bags secured with rubber bands or duct tape.

⚠ WARNING

POTENTIAL HAZARD

Cleaning the seat with unrecommended cleaners.

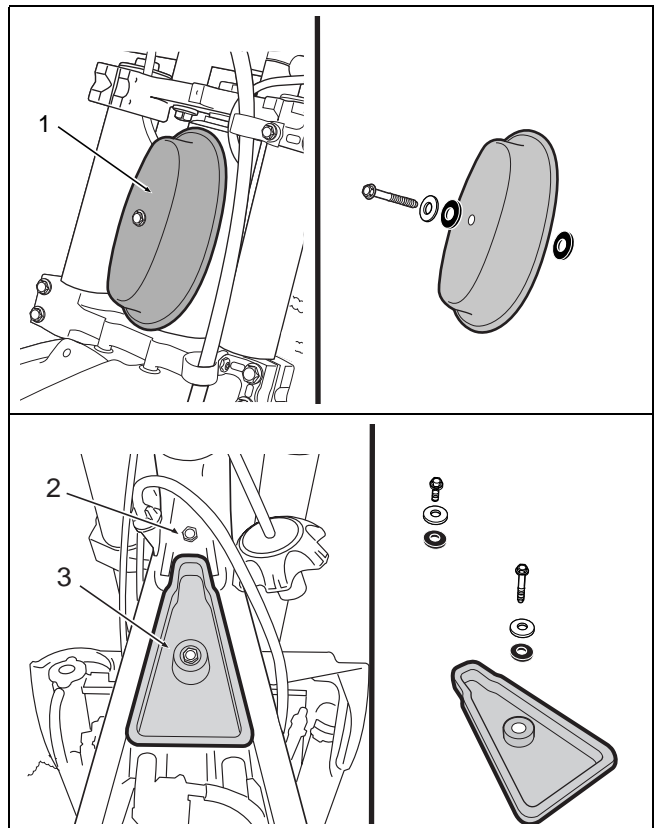
WHAT CAN HAPPEN

Some types of cleaners can leave the seat extremely slippery. A slippery seat could harm or affect the rider's ability to control the machine.

HOW TO AVOID THE HAZARD

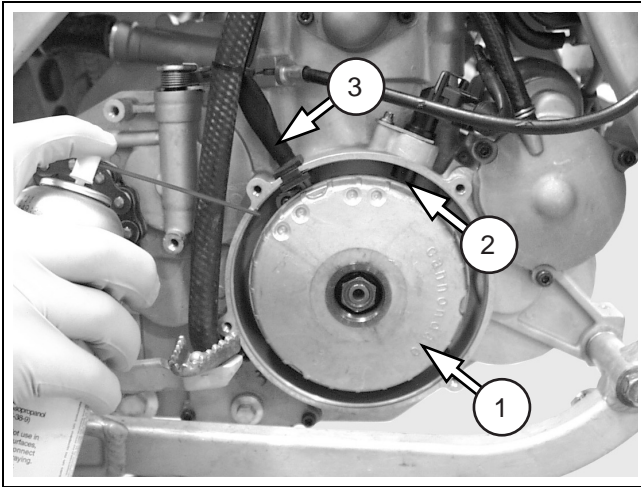
Consult a Authorized Cannondale Dealer for products available.

1. Rear opening of the silencer
2. Clutch lever assembly
3. Brake lever assembly
4. Engine stop switch
5. Engine start switch
6. Remove the steering head and airbox filters and install the steering head (1) and airbox (2) plugs that came with your vehicle. Also, install the fuel tank bolt hole plug.



1. Steering head plug
2. Fuel tank bolt hole plug
3. Airbox plug

NOTE : Remove the generator cover. Remove any debris with a clean rag. Use contact cleaner to displace any hidden water residue.



1. Flywheel
2. Crankshaft position sensor (tip)
3. Generator lead (to wiring harness)

NOTE : Reinstall the generator cover making sure that the cover gasket is properly installed onto the cover and tighten the cover bolts securely.

STORING

NOTE : Make any necessary repairs before storing the vehicle.

1. Thoroughly clean and dry the vehicle.
2. Change the engine and transmission oils to prevent moisture and acids in the old oil from contaminating the bearing surfaces during the storage period.
3. Drain the fuel tank.
4. Remove the spark plug and spray fogging oil directly into the cylinder. Reinstall the spark plug.
5. Lubricate the vehicle.
6. Insert a clean rag into the silencer opening and tie a plastic bag over the end of the silencer to prevent moisture from entering.
7. Coat all unexposed metal surfaces with a water-displacement chemical.

CAUTION

Do not spray the brake discs with the water-displacement chemical.

8. With the vehicle still on the stand, make sure the tire pressure is correct and then cover the vehicle and store it in a low-humidity and low-dust area.

REMOVING FROM STORAGE

1. Uncover the vehicle, and then clean and dry it.
2. Install the fully-charged battery.
3. Remove the rag and plastic bag from the silencer.
4. Drain the gasoline into an approved fuel container and recycle or dispose of the fuel at an EPA approved center.
5. Drain the cooling system and refill it with new coolant.
6. Lubricate the vehicle.
7. Perform all maintenance and pre-ride checks.
8. Start the engine and enjoy.

X440s Model Specifications

NOTE : The following specification were accurate at the time of publication. Specifications are subject to change without notice.

Overall length	85.5 in (2172 mm)
Overall width	32.25 in (819 mm)
Rake/trail	27.58 / 4.6 in (116.8 mm)
Seat height	36.7 in (93.2 mm)
Ground clearance.....	14.2 in (360.7 in)
Wheelbase	58.5 in (1485.9 mm)
Weight (Dry	242 pounds (110 kg)
Weight (Wet)(no fuel)	248 pounds (113 kg)
Fuel type	Premium unleaded only
Fuel capacity	2.1 U.S. gal (1.9 Imp gal, 8.0L)
Engine type	Four-stroke, single cylinder
Displacement	432 cc
Valve train type.....	Dual-overhead camshafts, four valves
Bore x stroke	95 x 61 mm
Compression ratio	12.5:1
Engine oil type.....	Sythetic or semi-synthetic 10W-40
Engine oil total quantity(dry fill)	1.3 U.S. qt. (1.5L, 1.3 Imp gal)
Transmission oil type	80W or 85W
Transmission oil total quantity (dry fill)	0.74 U.S. qt. (0.7L, 0.60 Imp gal)
Lubrication system	Dry sump
Clutch type	Wet, multi-plate
Clutch (number of plates	metallic (10), friction (9)
Transmission type	Constant mesh, five-speed, cassette
Transmission Gearshift pattern	One down, four up
1st gear ratio	30/15 (2.000)
2nd gear	27/17 (1.588)
3rd gear ratio	25/19 (1.316)
4th gear ratio	23/21 (1.095)
5th gear ratio	20/24 (0.833)
Air filter(s) type	Foam/oil
Fuel system.....	Electronic fuel injection, two injectors
Drive chain type	O-ring type
Drive chain slack.....	2.2 - 2.4 in (55 - 60 mm)
Drive chain max length (9-link section)	6.0 in (151 mm)
Countershaft sprocket	13 teeth

Rear wheel sprocket.....	50 teeth
Frame type	Aluminum, twin-spar, perimeter
Front suspension type	external compression and rebound, internal spring preload adjustments
Rear suspension type.....	Linkless, position sensitive damping (PSD), external compression, rebound, and spring preload adjustment
Front tire size.....	80/100 x 21
Rear tire size	110/90 x 19
Front brake type	Dual-piston caliper, single disc
Rear brake type	Single-piston caliper, single disc
Fuse rating.....	10 A
Spark plug type.....	CR8EK (NGK)
Ignition system type	Constant-energy inductive coil
Starter.....	Electric, 12-V starter motor
Battery manufacturer, type	YUASA, maintenance free
Battery voltage, capacity	12 V, 5 AH

X440s Service Specifications

NOTE : This section contains service specifications collected from the pages of the manual.

Brake, fluid type, DOT #4, (page 14)

Coolant, type

Anti-freeze Ethylene glycol with corrosion inhibitors for aluminum engines, (page 16)

Coolant, mixture ratio

1:1 (coolant/distilled water), (page 16)

Engine, oil recommended

Synthetic or semi-synthetic, 10W-40., (page 18)

Engine, oil, total quantity,

1.3 US qt. (1.2 L), (page 18)

Engine, oil, change, quantity (* see note below)

1 US quart (0.9 L), (page 18)

Transmission, oil, recommended type

80W or 85W, (page 23)

Transmission, oil, total quantity (dry fill)

0.74 US quart (0.7 L), (page 23)

Fuel, recommended fuel

Premium unleaded gasoline, (page 26)

Fuel, fuel tank capacity

2.1 US gal (8.0 L), (page 26)

Fuel, throttle, freeplay

0.07-0.15 inches (2-4 mm) , (page 38)

Brake, lever, front, freeplay, maximum

0.8 inches (20 mm), (page 43)

Brake, pad thickness, front, minimum

0.04 inches (1.0 mm), (page 44)

Brake, rear, master cylinder pushrod, clearance

0.04 in (1mm), (page 45)

Brake, pad thickness, rear, minimum

0.04 inches (1.0 mm), (page 45)

Clutch, lever, freeplay

0.08 - 0.16 inches (2 - 4 mm), (page 47)

Drive, chain, slack

2.2 - 2.4 inches (55 - 60 mm), (page 49)

Drive, chain, length (stretch), maximum (see specification for exact pin count)

6.0 inches (151 mm), (page 51)

Drive, swingarm buffer, thickness, standard

0.4 inches (10 mm), (page 52)

Drive, swingarm buffer, thickness, minimum

0.1 inches (3 mm), (page 52)

Drive, chain guide block, thickness, standard

0.5 inches (12 mm), (page 52)

Drive, chain guide block, thickness, minimum

0.1 inches (3 mm), (page 52)

Drive, chain rollers, diameter, standard

1.4 inches (35.2 mm), (page 53)

Drive, chain rollers diameter, minimum

1.3 inches (32 mm), (page 53)

Electrical, fuse, rating

20A (amps), (page 62)

Electrical, spark plug, type

NGK (CR8EK), (page 63)

Electrical, spark plug, gap

0.024 - 0.028 inches 0.6 - 0.7 mm), (page 63)

Suspension, fork leg, grease (daily care)

Ohlins green grease - 148-01, (page 66)

Suspension, front forks, compression adjuster "clicks out from fully seated," standard, 12, (page 68)

Suspension, front forks, compression adjuster "clicks out from fully seated," maximum, 30, (page 68)

Suspension, front forks, rebound adjuster "clicks out from fully seated", standard, 12, (page 68)

Suspension, front forks, rebound adjuster "clicks out from fully seated", maximum, 27, (page 68)

Suspension, rear shock compression adjuster "clicks out from fully seated", standard, 18, (page 69)

Suspension, rear shock compression adjuster "clicks out from fully seated," maximum, 32, (page 69)

Suspension, rear shock rebound adjuster "clicks out from fully seated", standard, 14, (page 69)

Suspension, rear shock rebound adjuster "clicks out from fully seated," maximum, 32, (page 69)

Suspension, rear shock spring, uninstalled length, 230mm, (page 70)

Suspension, rear shock spring, minimum installed length (a), 228mm, (page 70)

Suspension, rear shock spring, maximum installed length (b), 220mm, (page 70)

Suspension, front ride height, 95mm, (page 70)

Suspension, rear ride height, 95mm, (page 70)

Suspension, front static sag, 25-35mm, (page 72)

Suspension, rear static sag, 25-35mm, (page 72)

Tires, front, size

80/100x21, (page 73)

Tires, rear, size

110/90x19, (page 73)

Tires, front, tire cold pressure

14 psi (96.5 kPa), (page 73)

Tires, rear, tire pressure

14 psi (96.5 kPa), (page 73)

X440s Torques

NOTE : This section contains torque values collected from the pages of the manual.

Brake, master cylinder, front, cover screws
1.9 N•m (1.4 lbf•ft) 15

Frame, engine oil spar check bolt
15.0 lbf•ft (20.3 N•m) 19

Engine, engine oil drain bolt (left spar)
15.0 lbf•ft (20.3 N•m) 20

Engine, engine oil drain bolt (crankcase)
6.0 lbf•ft (8.1 N•m) 20

Engine, engine oil, filter cover bolt
3.3 lbf•ft (4.5 N•m) 21

Engine, engine oil inlet fitting
18.0 lbf•ft (25.0 N•m) 21

Transmission, oil level check bolt
5.0 lbf•ft (6.8 N•m) 23

Transmission, oil, drain bolt
6.0 lbf•ft (8.1 N•m) 25

Panel, side number bolts
5.0 lbf•ft (6.8 N•m) 30

Fork, leg guard, bolts
5.0 lbf•ft (6.8 N•m) 31

Brake, fork leg brake line clamp, bolts
5.0 lbf•ft (6.8 N•m) 31

Panel, front number plate, lower bolt
5.0 lbf•ft (6.8 N•m) 31

Panel, front fender, mounting bolts
5.0 lbf•ft (6.8 N•m) 32

Panel, radiator shroud, bolts
5.0 lbf•ft (6.8 N•m) 32

Panel, radiator guard, side bolts
5.0 lbf•ft (6.8 N•m) 33

Panel, radiator guard, upper bolts
5.0 lbf•ft (6.8 N•m) 33

Panel, mudflap, mounting bolts
5.0 lbf•ft (6.8 N•m) 33

Panel, rear fender bolts
5.0 lbf•ft (6.8 N•m) 34

Panel, glide plate bolts
5.0 lbf•ft (6.8 N•m) 34

Air, steering head filter, bolt
5.0 lbf•ft (6.8 N•m) 37

Frame, left frame rail upper bolt
25.0 lbf•ft (34.0 N•m) 40

Frame, left frame rail center bolt
35.0 lbf•ft (47.5 N•m) 40

Frame, left frame rail lower bolt
20 lbf•ft (27.0 N•m) 40

Coolant, upper radiator mounting bolt
5.0 lbf•ft (6.8 N•m) 40

Fuel, fuel tank mounting bolt
5.0 lbf•ft (6.8 N•m) 42

Brake, lever adjuster, front, locknut
4.3 lbf•ft (5.8 N•m) 43

Brake, front, master cylinder mounting bolts
5.0 lbf•ft (6.8 N•m) 43

Brake, rear brake master cylinder pushrod, locknut
13.0 lbf•ft (17.6 N•m) 44

Exhaust pipe bolt
5.0 lbf•ft (6.8 N•m) 46

Silencer mounting bolt
15.0 lbf•ft (20.3 N•m) 46

Clutch, lever clamp, bolts
5.0 lbf•ft (6.8 N•m) 47

Clutch, release collar locknut
3.3 lbf•ft (4.5 N•m) 49

Clutch, cover bolts
3.3 lbf•ft (4.5 N•m) 49

Transmission, shift lever pinch bolt
5.0 lbf•ft (6.8 N•m) 49

Wheels, rear axle, nut
72.0 lbf•ft (98.0 N•m) 50

Drive, swingarm buffer, mounting screws
17.0 lbf•in (0.19 N•m) 52

Drive, chain guide, mounting bolts
9 lbf•ft (12.2 N•m) 52

Drive, counter shaft sprocket guard bolts
5.0 lbf•ft (6.8 N•m) 54

Transmission, countershaft sprocket nut
29.5 lbf•ft (40.0 N•m) 55

Electrical, spark plug
8.9 lbf•ft (12.0 N•m) 64

Electrical, relay plate, mounting screws
3.3 lbf•ft (4.5 N•m) 64

Frame, rear shock strut, mounting bolts
25.0 lbf•ft (34.0 N•m) 64

Steering, handlebar clamp upper bolts
17.0 lbf•ft (23.0 N•m) 65

Steering, handlebar clamp, lower bolts
60.0 lbf•ft (81.0 N•m) 65

Rimlock nut
9 lbf•ft (12.2 N•m) 73

Fuel, throttle lever housing plate screws
5.0 lbf•ft (6.8 N•m) 77

Engine, shift lever pinch bolt
5.0 lbf•ft (6.8 N•m) 79

Brake, pedal, rear, mounting bolt.
15.0 lbf•ft (20.3 N•m) 80