ZERO
MOTORCYCLES®



2013 - 2024 FX, FXS, FXE
SERVICE MANUAL

100%
ELECTRIC

CRAFTED IN
CALIFORNIA

8811943-AE

EMEA (Europe, Middle East, Africa) Disclaimer

This Service Manual has been drawn up by Zero Motorcycles Inc. and is intended for and addressed to technicians authorized by Zero Motorcycles to provide services or to other independent operators that are (in)directly involved and in the repair or maintenance of vehicles, who are in any case properly trained to provide repair and maintenance services and have specialized knowledge of mechanics principles and vehicle fixing techniques and procedures.

The Zero motorcycle contains high voltage components that should be treated with extreme caution. Exposure to high voltage can cause shock, burns, and even death. Operating, servicing and maintaining a Zero motorcycle can expose one to chemicals including engine exhaust, carbon monoxide, phthalates, which can lead to reproductive harm. Zero motorcycles should at all times, and only be serviced by specially trained and skilled technicians.

This Service Manual is not intended for owners. Zero motorcycles' owners are expressly recommended to consult the relevant Owner's Manual accompanying the motorcycle, which is designed to provide owners with a better understanding of the operation, inspection, and basic maintenance requirements of the motorcycle. Damage, malfunctions, or performance problems caused by the failure to follow recommended repair, service and maintenance requirements stipulated in the Owner's Manual, are not covered by the Zero Motorcycles Limited Warranty.

Zero warrants that all original, factory-produced Zero motorcycles are free from defects in material and workmanship, pursuant to the applicable Limited Warranty conditions stipulated in the Owner's Manual accompanying the motorcycle. Zero strongly recommends to have all maintenance and repair services carried out by authorized Zero dealers or service partners. Damage, malfunctions, or performance problems caused to the motorcycle due to or after service or repair by an unauthorized service provider, or due to the improper service, repair or installation of parts/accessories not sold or approved by Zero or altering the motorcycle's specifications from those set by Zero, are not covered by the Zero Motorcycles Limited Warranty.

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How To Use This Manual

General

To assist in the use of this Manual, it is divided into numbered sections (shown on the previous page). Each section starts with a contents page listing the service procedures covered within that section. Each section is numbered from page 1, and the page number is shown at the bottom of each page.

References will be made from within a service procedure to other procedures that should be carried out as part of the main procedure.

The individual actions of the service procedures must be followed in the sequence in which they appear. Annotation numbers on the illustrations refer to the relevant numbered action after the illustration.

For reference purposes, an illustration number is shown in the bottom left hand corner of each illustration.

Important Information Types

The following words are used within this manual to call your attention to specific types of information.

WARNING! An action or information which must be followed precisely to avoid the possibility of injury.

CAUTION: Calls attention action or information which must be followed to avoid damage to components.

NOTICE: Information that must be performed before starting the repair procedure.

Note: Gives helpful information.

Dimensions

The dimensions quoted are to design engineering specification. Service limits are included where applicable.

Terminology



Zero0052

Left side of motorcycle.



Zero0053

Right side of motorcycle.

Abbreviations and Symbols

AC	Alternating current
Amp (A)	Ampere
AUX	Auxiliary
C	Celsius
CCM	Cellular Connectivity Module
CEL	Check Engine Light
cm	Centimeter
DC	Direct Current
dia.	Diameter
DOT	Department of Transportation
EPA	Environmental Protection Agency
EV	Electric Vehicle
F	Fahrenheit
FRT	Flat Rate Time
HCU	Hydraulic Control Unit
HV	High Voltage
HW	Hardware
lb-ft	pounds-feet
in-lb	inch-pound
LH	Left hand
MBB	Main Bike Board
mm	millimeter
Nm	Newton-metre
OAL	Overall Length
OBC	On-Board Charger
SoC	State of Charge
RH	Right hand
V	Volt
W	Watt

Important Repair Information

Replacement Fasteners

Replacement fasteners must be the correct part number for that application. Use the correct fastener in the correct location. Fasteners requiring the use of thread-locking compound are specified in the repair procedure; refer to the product manufacturer for proper usage.

One-time Use

Always use new lock nuts, lock washers, crush washers, cotter pins, and cable ties.

Coatings

Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener contact surfaces unless otherwise specified in the installation procedure notes. Coatings affect fastener torque and clamping force, as well as damage the fastener. Coatings can also affect the operation of electrical components.

Repair of Electric Vehicles

Zero Motorcycles are electrically powered vehicles (“e-vehicles”) under which Regulation No. 100 of UNECE [2015/505] applies. In order to safely repair Zero Motorcycles, it is essential that any electrical hazards are eliminated, and damaged motorcycles or electrically hazardous components should be handled and stored safely. All work on Zero Motorcycles and their components must be carried out in compliance with safety instructions supplied by Zero Motorcycles and all applicable local standards and e-vehicle requirements.

Testing After a Repair

Operations covered in this Manual do not include reference to testing the motorcycle after repair. It is essential that work is inspected and tested after completion and if necessary a road test of the motorcycle is carried out. This is of particular importance where safety related items are concerned.

Description of Safety Cautions, Notices, and Important

Cautions, Notices, and Important are elements designed to prevent hazards, however, not all hazards can be foreseen. This information is placed at strategic locations within the service manual.

⚠ CAUTION

Caution is used for the technician to take necessary action or not to take a prohibited action. Cautions are used to help prevent bodily injury to the technician or to the owner if the motorcycle was improperly repaired.

Note: is used to call special attention to a necessary action or to a prohibited action. Notices are used to prevent damage to the motorcycle or prevent unnecessary repairs.

Important: is used to provide additional information or to clarify a procedure.



This symbol is located in various locations on the motorcycle to inform you that exposure to high voltage can cause shock, burns and even death.

The high voltage components on the motorcycle should be serviced by technicians with special training.

High voltage cable or wiring has an orange covering. Do not probe, tamper with, cut, or modify high voltage cable or wiring.

This manual covers the following motorcycle:

Zero FX Dual Sport

Zero FXS Supermoto

Zero FXE Street Bike

Cautions, Notices and Important

Brake Fluid Irritant Caution

⚠ CAUTION

Brake fluid may irritate eyes and skin. In case of contact, take the following actions:

- Eye Contact-rinse thoroughly with water
- Skin Contact-wash with soap and water
- If Ingested-contact a physician immediately

Eye Protectant Caution

⚠ CAUTION

Approved safety glasses and gloves should be worn when performing this procedure to reduce the chance of personal injury.

Road Test Caution

⚠ CAUTION

Test ride the motorcycle under safe conditions. Do not attempt any maneuvers that could jeopardize the motorcycles control. Failure to adhere to these precautions could lead to serious personal injury and motorcycle damage.

Brake Fluid Effects on Paint and Electrical Components Notice

Notice: Avoid spilling brake fluid onto painted or other surfaces, electrical connections, wiring, or cables. Brake fluid will damage painted or other surfaces and cause corrosion to electrical components. If any brake fluid comes in contact with painted surfaces, immediately flush the area with water. If any brake fluid comes in contact with electrical connections, wiring, or cables, use a clean shop cloth to wipe away the fluid.

Fastener Notice

Notice: Replacement fasteners must be the correct part number for that application. Use the correct fastener in the correct location. Fasteners requiring the use of thread-locking compound are specified in the repair procedure; refer to the product manufacture for proper usage. Always use new lock nuts, lock washers and cotter pins. Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener contact surfaces unless specified in the procedure. Coatings affect fastener torque and joint clamping force and may damage the fastener.

High Voltage Caution

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Failure to follow the procedures may result in serious injury or death.

- Always verify that the high voltage has been disabled before working on or around high voltage components, wires, cables, or harnesses.
- Remove all metal objects such as rings and watches.
- Always tighten the high voltage terminal fasteners to the specified torque. Insufficient or excessive torque will cause malfunctions or damage.
- After finishing work on the high voltage system and before turning the key ON.
- Verify high voltage system integrity and that all connectors and covers are installed.
- Verify that all tools or loose components have been removed.

⚠ CAUTION

Exposure to high voltage can cause shock, burns, and even death. The high voltage components on the motorcycle should only be serviced by technicians familiar with the circuit/system operation.

High voltage components are identified by labels. Do not remove, open, take apart, or modify these components. High voltage cable or wiring has orange covering. Do not probe, tamper with, cut, or modify high voltage cable or wiring.

Unpacking Procedure

Although unpacking the Zero motorcycle can be done by a single person, it is recommended to have a second person to help lift and remove your motorcycle from the crate base.

Wood Shipping Crate

Outer Box Cover

1. Cut and remove the two metal outer box retention straps.
2. Remove the screws along the crate base.
3. Remove the screws along the side of the crate that has the metal clamps on it.
4. Remove the metal clamps, and remove the side panel.
5. Remove the remaining outer box cover.

Inner Assembly

1. Carefully remove plastic cover from motorcycle.
2. Locate small parts box below motorcycle and put to the side. (This box contains important documentation, owner's manual, keys, handlebar clamps, and hardware, etc.)
3. Carefully lift rear portion of the motorcycle over the swingarm standoff and off crate base.
4. Carefully lift front wheel out of crate base.
5. Deploy kickstand, lean motorcycle and inspect in accordance with delivery inspection sheet.

Cardboard Shipping Crate

Outer Box Cover

1. Cut and remove the two outer box retention straps.

2. Unscrew the stabilizer bar bolts, one on each side of outer box.
3. Open box top and remove inner cardboard end reinforcement sleeves.
4. Unscrew stabilizer bar from handlebar riser and remove.
5. Unscrew lower crate cover retaining screws and washers.
6. Lift of cut outer box away from motorcycle.

Inner Assembly

1. Carefully remove plastic cover from motorcycle.
2. Locate small parts box below motorcycle and put to the side. (This box contains important documentation, owner's manual, keys).
3. Remove power pack retaining frame rail.
4. Remove power pack.
5. Remove the tie down straps from crate base.
6. Carefully lift rear portion of the motorcycle over the swingarm standoff and off crate base.
7. Carefully lift front wheel out of crate base.
8. Deploy kickstand (if equipped), lean motorcycle and inspect in accordance with delivery inspection sheet.

Recycling

The Zero Motorcycles shipping crate and packaging materials were designed to be completely recycled. Please cut down and recycle all cardboard, plastic, and metal materials in appropriate receptacles.

The tie down straps that accompanied your motorcycle can be reused as regular tie down straps for transporting your motorcycle.

Dealer Pre-Delivery Inspection

The latest version of the Pre-Delivery Inspection Checklist is available to your dealership through Zero Motorcycles Service Portal (Service.Zeromotorcycles.com) in the Dealer FAQ section.

Please insert a copy of this PDI in your sales packet for the customer.

ZERO MOTORCYCLES®

2023 Zero XMX
Pre-Delivery Inspection Form

Please attach this form to any PDI warranty claim or email to support@zeromotorcycles.com in the Americas or to eu.support@zeromotorcycles.com in the EMEA region.

Beginning January 2022, motorcycles are shipped with the drive belts loosened.
The drive belt MUST be properly tensioned before riding.

Motorcycle VIN# (last 5 digits):	Motorcycle Factory Configuration: ☐ FXE ZF7.2 ☐ FX ZF3.6 ☐ FXS ZF3.6 ☐ FX ZF7.2 ☐ FXS ZF7.2
Dealer Name:	Technician Name:
Phone Number:	Email Address:

- ☐ Verify all keys are present (two black key switch keys and two black battery rail keys).
- ☐ Verify motorcycle powers on when key is inserted in key switch and is turned to the on position. Turn key switch off.
- ☐ Verify that motorcycle powers on, green charge indicator on dash starts flashing and motorcycle starts charging when the supplied power cord is connected to the on-board charger connector on the front right side of the motorcycle. Unplug power cord.
- ☐ Remove safety film and inspect all surface areas for imperfections.
- ☐ Check tire pressure.
  - ☐ Front tire (Zero FXE and FXS - 32 PSI / 2.2 bar; Zero FX - 29 PSI / 2.0 bar)
  - ☐ Rear tire (Zero FXE and FXS - 34 PSI / 2.3 bar; Zero FX - 31 PSI / 2.2 bar)
- ☐ Check brake fluid levels in front and rear master cylinder.
- ☐ Check torque values of critical fasteners:
  - ☐ Front axle (40 ft-lbs / 54 Nm)
  - ☐ Front axle pinch bolts (16 ft-lbs / 22 Nm)
  - ☐ Front brake caliper mounting bolts (19 ft-lbs / 26 Nm)
  - ☐ Front rotor bolts (Zero FXE and FXS - 19 ft-lbs / 26 Nm; Zero FX 9.5 ft-lbs / 13Nm)
  - ☐ Handlebar mount bolts (18 ft-lbs / 24 Nm)
  - ☐ Motor mount bolts – left hand side (26 ft-lbs / 35 Nm)
  - ☐ Motor mount bolts – right hand side (20 ft-lbs / 27 Nm)
  - ☐ Rear axle (75 ft-lbs / 102 Nm)

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- ☐ Rear rotor bolts (9.5 ft-lbs / 13Nm)
- ☐ Fork tube pinch bolts (16 ft-lbs / 22 Nm)

☐ Check the belt tension at four locations by rotating the rear wheel forward one quarter turn after each check. Avoid rotating backwards. All locations need to be within 42.5 Hz to 73.6 Hz, as measured with the Gates Carbon Drive smartphone app. If not, adjust until all four locations are within range.

☐ On Zero FX, check spoke tension.

☐ Check all 12-volt system components and related switch gear for proper operation:

- ☐ Turn signals (left and right, front and rear)
- ☐ Headlight (low and high beam) – Also confirm proper alignment.
- ☐ Taillight (using both front and rear brakes)
- ☐ Horn
- ☐ Hazard lights

☐ Place motorcycle on a rear paddock stand and verify proper operation of throttle.

☐ Check firmware versions using the Zero Diagnostics Utility or Diag4Zero dealer diagnostic tools. Update firmware if needed.

☐ Check the Zero Motorcycles Partner Community for any open Service Campaigns or Recalls by searching on the last five digits of the VIN# from the Support tab.

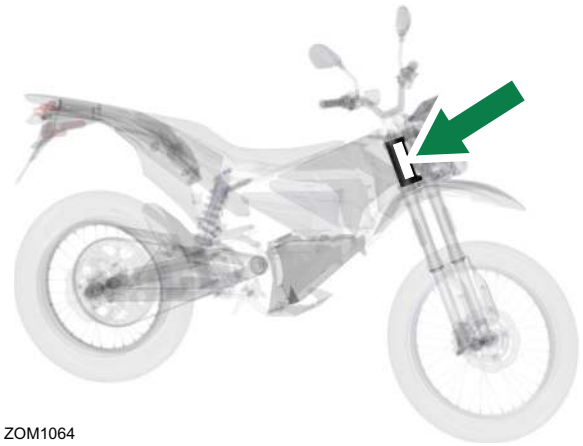
☐ During initial portion of motorcycle test ride, bed in front and rear brake pads by performing a series of braking maneuvers from 50 mph to 10 mph without coming to a complete stop. Let brakes cool between passes.

☐ Plug in charger and confirm motorcycle charges to 100%.

If you have any questions, please contact the Dealer Service Hotline.
In the Americas: 888-RUN-ZERO (888-786-9376) Ext 2
In the EMEA region: +31 (0) 72 5112014

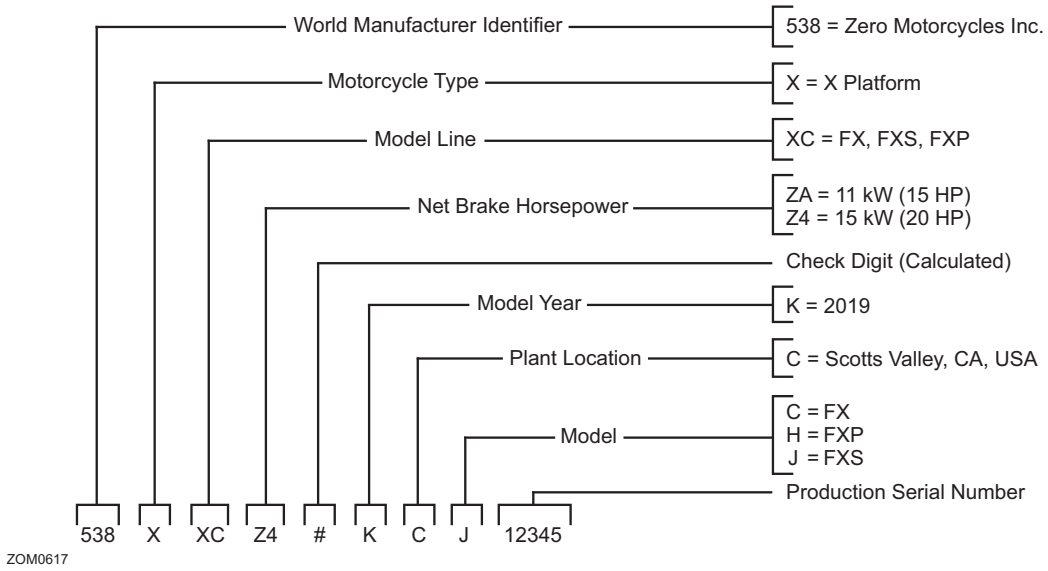
Vehicle Identification

Vehicle Identification Number (VIN)



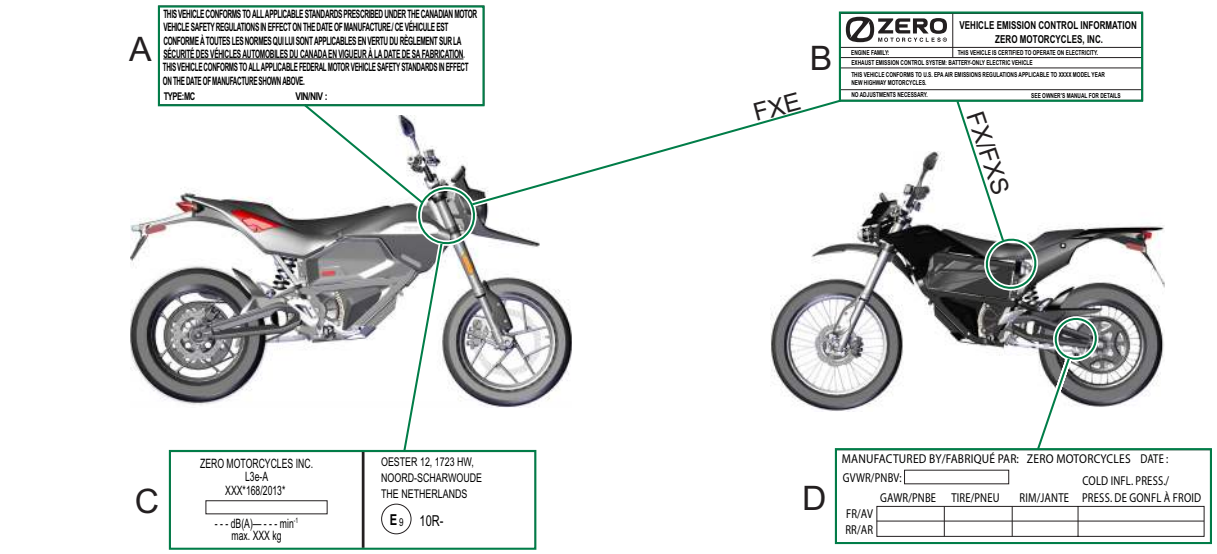
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VIN Break Down



ZOM0617

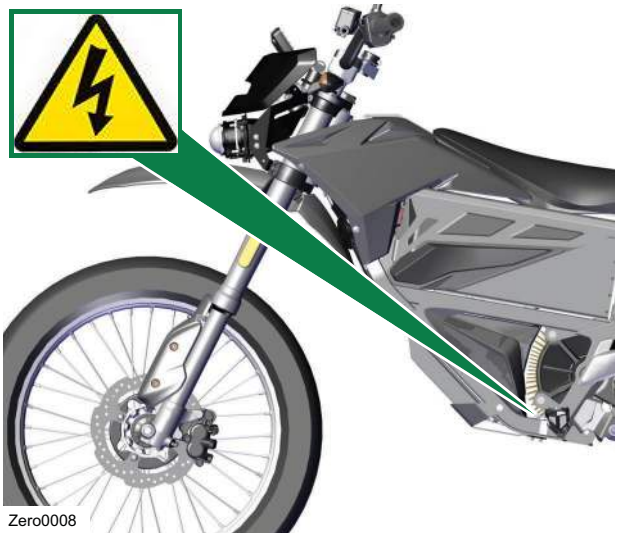
Location of Important Labels



ZOM1066

High Voltage Warning Labels

Located Near the Motor



Zero0008

Located on the frame if only one battery is installed.

Tools and Equipment

Use only Zero specified tools when servicing the motorcycle. The motorcycle contains a mix of metric and standard fasteners. Use of the incorrect tool or fastener may damage the motorcycle.

All dealers should have the following:

Special Tools:

- PN 85-05665 Controller Discharge Tool



Zero0044

Basic Tools:

- Gloves
- Safety glasses
- Spring loaded center punch
- 2.5 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm and 10 mm T, L, and socket hex wrenches
- 7 mm L Allen wrench
- T25 star driver or socket bit
- T15 tamperproof star socket
- Zip tie pulling/cutting gun
- 7 mm, 8 mm, 10 mm, 13 mm, 14 mm, 15 mm, 17 mm, 21 mm combination wrench
- Gear puller (motor sprocket)
- Rubber dead blow hammer
- Punch
- Flat and rat tail file
- Heavy duty 420 chain breaker
- Phillips and Flat head screw drivers
- 1/4" drive 1", 2”, and 3” socket extension
- 3/8" drive 1", 2", and 3" socket extension
- Needle nose pliers
- Adjustable pin spanner wrench
- 1/4" and 3/8” drive socket wrench
- Bicycle type headset press and removal tool
- Belt tension tester
- External snap ring pliers
- 7 mm, 8 mm, 10 mm, 13 mm, 1/4" and 3/8” drive socket
- 27 mm socket
- Motorcycle head bearing press and removal tool

Equipment:

- Wheel truing stand
- Tire levers and or a tire changing machine
- Motorcycle stand/lift

General Specifications

General specifications are listed in the Owner's Manual for each motorcycle. The Owner's Manual can be accessed using the URL below:

https://zeromotorcycles.com/owner-resources

Vibration Diagnostic Process

Important: Using the following steps of the vibration diagnostic process will help you to effectively narrow-down and pin-point the search for the specific source of a vibration concern and to arrive at an accurate repair.

1. Gather specific information on the customer's vibration concern.
2. Perform the road testing steps in sequence as identified in Road Testing Procedure in order to duplicate the customer's concern and evaluate the symptoms of the concern under changing conditions. Observe what the vibration feels like and what it sounds like. Observe when the symptoms first appear, when they change, and when they cease.
3. Determine if the customer's vibration concern is truly an abnormal condition or something that is potentially an operating characteristic of the motorcycle.
4. Systematically eliminate or 'rule-out' possible motorcycle systems.
5. Focus diagnostic efforts on the remaining motorcycle system and systematically eliminate or "rule-out" possible components of that system.
6. Make a repair on the remaining component, or components, which have not been eliminated systematically, and must therefore be the cause of the vibration.
7. Verify that the customer's concern has been eliminated or at least brought to an acceptable level.
8. Again perform the road testing steps in sequence in order to verify that the vehicle did not have more than one vibration occurring.

Preliminary Visual/Physical Inspection

- Inspect for aftermarket equipment and modifications, which could affect the operation of the motorcycles rotating component systems.
- Inspect the easily accessible or visible components of the motorcycles rotating component systems for obvious damage or conditions, which could cause the symptom.
- Inspect the tire inflation pressures for the proper pressure.

Road Testing Procedure

⚠ CAUTION

Road test a motorcycle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize the control of the motorcycle. Failure to adhere to these precautions could lead to serious personal injury and motorcycle damage.

Before the road test, ensure the following:

- The exterior lighting is working correctly.
- Tire pressure is correct.

During the road test:

- Perform the test only when traffic conditions permit.
- Operate the motorcycle in a controlled, safe manner.
- Observe all traffic regulations.
- Observe any unusual vibrations.
  - When braking
  - When coasting
  - When accelerating
  - When regen braking
- Observe any unusual sounds.
  - When braking
  - When coasting
  - When accelerating
  - When regen braking

Choose different road surfaces when test driving to verify that the condition is not related to road surfaces. Observe where the problem condition is located: Front, back or under the motorcycle. If the condition is something that is heard or felt, driving a similarly equipped motorcycle may determine if the issue is an operating characteristic of the motorcycle.

Warranty Information

Customer Assistance

Zero Motorcycles Inc. can be contacted via the contact methods listed below. Please have available the following, as it is essential to effectively and efficiently answer your questions or resolve your concerns.

- Owner's name and address
- Owner's telephone number
- Vehicle identification number (VIN)
- Date of purchase
- Power Pack serial number
- Motor serial number

An owner information chart is provided in the Zero Motorcycles Owner's Manual to record this information.

Zero Motorcycles Inc. can be contacted as follows:

Zero Motorcycles Inc.
380 El Pueblo Rd.
Scotts Valley, California 95066
USA

Phone: +1 (888) 786-9376
Monday-Friday
8am to 5pm Pacific Time

E-mail: support@zeromotorcycles.com.

For 24 hour updates and additional information about your motorcycle, visit the Owners Resources section of the Zero motorcycles website:

E-mail: service@zeromotorcycles.com.

Tire Pressure

⚠ CAUTION

Under-inflation is the most common cause of tire failure and may result in severe tire cracking, tread separation, "blowout," or unexpected loss of motorcycle control causing personal injury and possible death.

The tire pressure is checked using an accurate gauge when the tires are cold. This means that the tires have not been ridden on for 3 hours. Always replace the valve stem cap when finished.

Model	Front	Rear
FX	29 psi (200 kPa)	31 psi (214 kPa)
FXS/FXE	32 psi (221 kPa)	34 psi (234 kPa)

Replacement Bulbs

Part	Number
Headlight Bulb	H3 (55 Watt)
Turn Signal Light Bulb (amber)	RY10W (10 Watt)
Brake/Tail Light Bulb	1157 (5 Watt)
Front Running Light Bulb	W3W (3 Watt)

High Voltage Discharging

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Failure to follow the procedures may result in serious injury or death.

- ***Verify that the high voltage has been discharged before working on or around high voltage components, wires, cables, or harnesses.***
- ***Remove all metal objects such as rings and watches.***
- ***Tighten high voltage terminal fasteners to the specified torque. Insufficient or excess torque will cause malfunctions or damage.***
- ***After finishing work on the high voltage system and before turning the key ON.***
  - ***Verify high voltage system integrity and that all connectors and covers are installed.***
  - ***Verify that all tools or loose components have been removed.***

⚠ CAUTION

Exposure to high voltage can cause shock, burns, and even death. The high voltage components on the motorcycle may only be serviced by technicians familiar with the circuit/system operation.

High voltage components are identified by labels. Do not remove, open, take apart, or modify these components. High voltage cables and wiring are orange-sheathed. Do not probe, tamper with, cut, or modify high voltage cables or wiring.

Required Tools

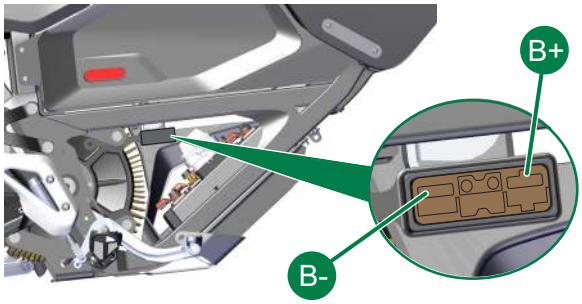


Zero0044

- PN 85-05665 Controller Discharge Tool

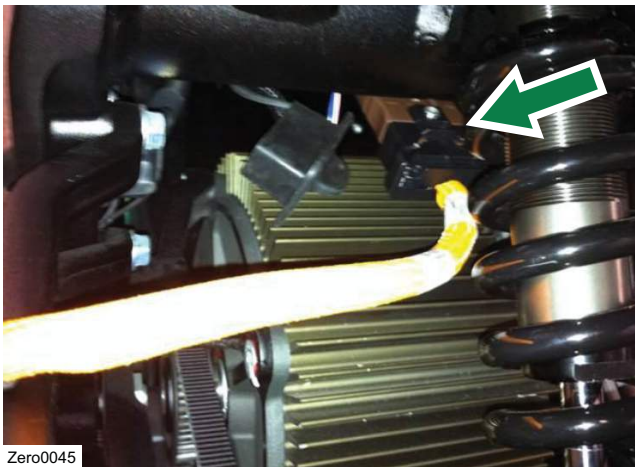
Discharge Procedure

1. Remove the key from the key switch.
2. Remove the lower power B+ fuse as outlined in Low Voltage Fuses, page 10-2.



Zero0121

3. Use a voltmeter to verify there is no voltage across the Anderson connector between B- and B+.
4. Remove the DC/DC converter fuse as outlined in High Voltage Fuses, page 10-3.
5. Clean any dirt or debris away from the quick charge connector.



Zero0045

6. Plug the controller discharge tool into the quick charge connector, allow 30 seconds for the capacitors to discharge. Note: the bulb may or may not light up pending on the amount of strained voltage in the motor controllers capacitors.

Low Voltage Fuses

Whenever there is an excessive amount of current flowing through a circuit the fusible element will melt and create an open or incomplete circuit. Fuses are a one-time protection device and must be replaced each time the circuit is overloaded. Replace the fuse with one of equal current and voltage rating. If the fuse melts repeatedly, inspect the circuit for an overload or short.

The 12 volt fuse center is located in front of the front power pack, on the right side of the frame.

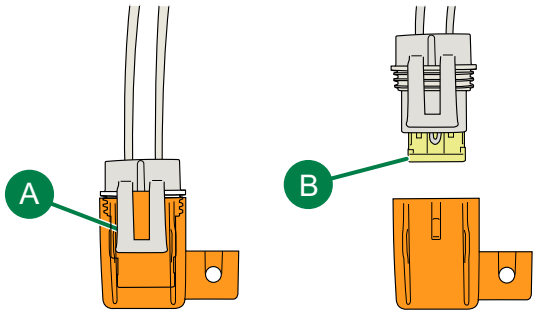


ZOM0648

Fuse Identification

Fuse Number	Amps	Circuits Controlled
1	5	ABS 4, Key
2	10	ABS 9, Valve
3	10	Voltage to Splice S25 to Left Handlebar Control
4	10	• Accessory Power Port • Accessory Power Connector
5	10	• Turn Signal Flasher • Horn • Flash to Pass • Foot Brake Light Switch • Hand Brake Light Switch
6	5	• Instrument Panel • Running Lights

ABS 12 Volt Fuse



ZOM0374

To access the fuse (B), gently pull tab (A) on the cap away from the fuse holder.

Amps	Circuits Controlled
25	ABS motor

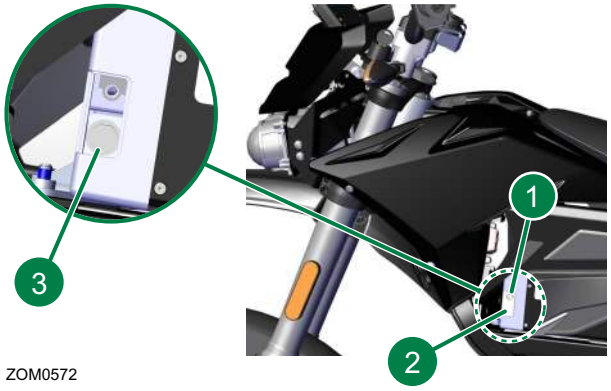
Low Power B+ Fuse (ZF7.2)

Amps	Circuits Controlled
(SPT) 3.15	Power pack

The low power B+ Fuse is located on the power pack, below the data link connector.

To access the low power fuse (left side):

1. Ensure that the key switch is in the OFF position.



ZOM0572

2. Remove bolt (1) securing the fuse cover.
3. Remove cover (2) to gain access to the fuse.
4. Unscrew the fuse cap (3) and withdraw the fuse from the power pack.
5. Pull fuse from fuse cap and replace fuse.
6. Install fuse and cap.
7. Install the cover and tighten the bolt to 10 lb-in. (1.3 Nm).

High Voltage Fuses

Whenever there is an excessive amount of current flowing through a circuit the fusible element will melt and create an open or incomplete circuit. Fuses are a one-time protection device and must be replaced each time the circuit is overloaded. Replace the fuse with one of equal current and voltage rating. If the fuse melts repeatedly, inspect the circuit for an overload or short.

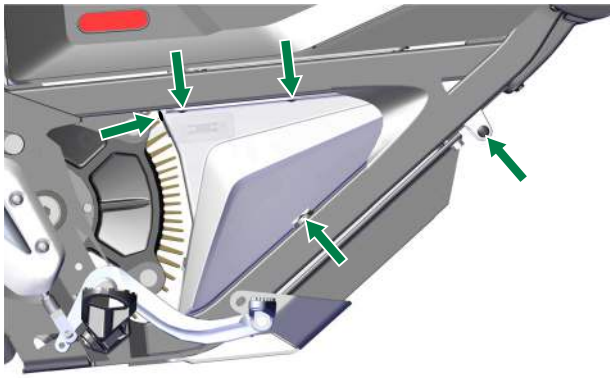
The high voltage fuses are located behind the rubber side inspection panels.

The high voltage fuse values are listed below:

Fuse	Amps	Circuits Controlled
1	ABC4A	Main Bike Board/Controller
2	ABC4A	DC/DC Converter
3	JLLN100	ACCY Charge Fuse (in-line)
4	ABC10A	Charge Fuse (on-board)

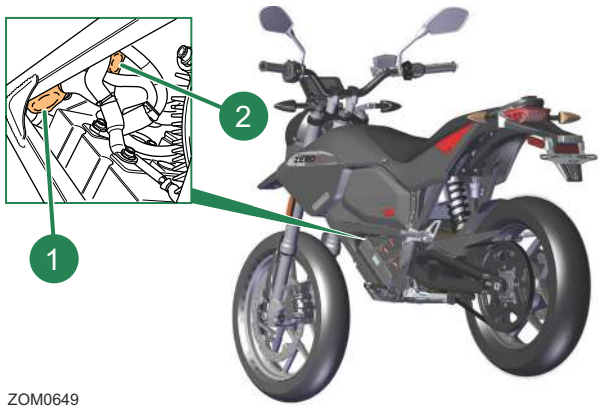
To access the high voltage fuses (left side):

1. Ensure that the key switch is in the OFF position.
2. Remove both power packs to gain access to fasteners and fuses.



ZOM0651

3. Remove the five fasteners (see arrows) securing the flexible protective cover to the motorcycle.
4. Remove the flexible protective cover to gain access to the fuses.
5. Pull back sheathing to access fuse holders (if necessary).

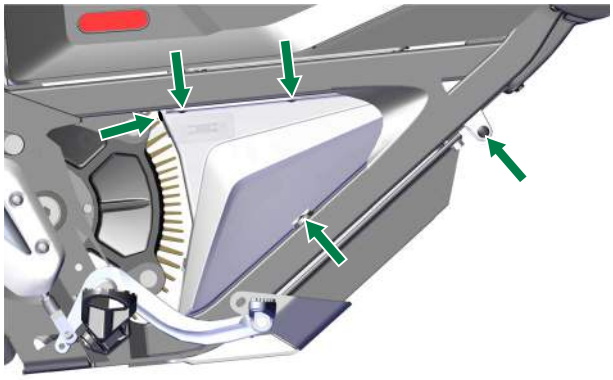


ZOM0649

6. Unscrew fuse caps (1 & 2).
7. Replace the fuse.

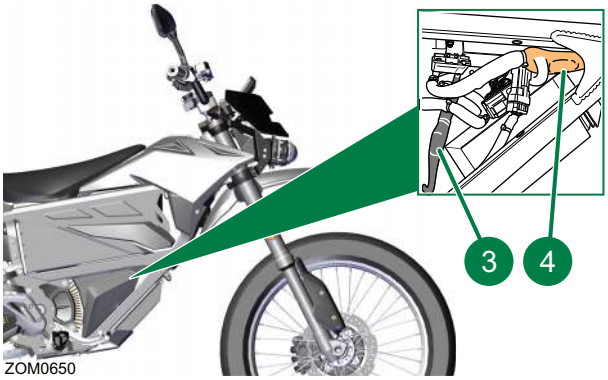
To access the high voltage fuses (right side):

1. Ensure that the key switch is in the OFF position.
2. Remove both power packs to gain access to fasteners and fuse.



ZOM0651

3. Remove the five fasteners securing the flexible protective cover to the motorcycle.



4. Remove the flexible protective cover to gain access to fuse (3 & 4).
5. Pull back sheathing to access fuse.
6. Replace the fuse.

Brake Pad/Rotor Inspection

Brake Pad Inspection

The brake pads must be inspected when specified in the maintenance schedule. Visually inspect the brakes by looking at the remaining brake pad material through the sides of the brake caliper.

Replace the brake pads if either pad's thickness is 0.053 in (1.35 mm) or less. If the brake pads are worn, replace both brake pads immediately.

Brake Disc Inspection

The thickness of the brake discs should be checked regularly. The minimum thickness is 0.15 in (3.85 mm).

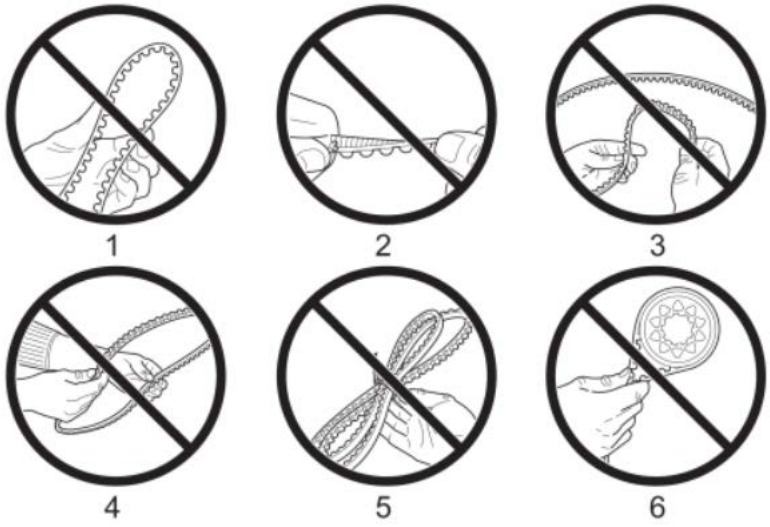
Drive Belt

Proper belt tension is essential for optimum operation of the Gates Carbon Drive System. Lack of belt tension can lead to so-called “ratcheting“. The teeth of the belt will slide over the teeth of the rear sprocket. This causes not only an unpleasant sound; the ratcheting can also cause damage to the carbon tensile cords. This would render a belt useless. If ratcheting has occurred, replace the belt.

Too much tension can also cause damage to the bearings within the rear hub. It also increases the wear of your drive system and the system can drag.

The belt must be replaced at 24,000 mi (37,000 km).

Drive belt and sprockets do not need lubrication of any kind. For cleaning, use only water and a soft brush. Do not use any type of detergent. Proper handling of the belt is crucial to obtain maximum life expectancy. Bending or twisting of the belt may cause damage to the carbon fibers inside the belt. Avoid the following conditions when handling the belt.



1. Crimping
2. Twisting
3. Back Bending
4. Inverting
5. Zip Tying
6. Using as a wrench

Belt Lubrication

The belt can make noise when forced to run hard against the flanges on the sprockets. This can be due to sprocket misalignment, wheel misalignment, or runout in the drive caused by damaged components. Spraying water on the belt may quiet the drive for a few minutes, but the permanent solution is to correct the alignment or replace the damaged components.

In most cases simply hosing off the belt and sprockets after a ride will end the noise. If noise continues, the solution is simple: Spray the belt with water, wait for it to dry, and apply a thin coating of dry silicone spray to the tooth side of the belt. Dry silicone dries instantly, helps shed grit, and does not affect the longevity of the belt.

1. Remove the key from the key switch.
2. Raise and safely support the motorcycle so that the rear wheel is off the ground.
3. Spray the belt with water and allow it to fully dry.

⚠ CAUTION

Do not allow any of the silicone spray to get on the brake rotor or brake pads.

4. Using a dry silicone lubricant and a clean shop towel, with the shop towel on the opposite side of the belt, spray a 3 - 4 in. (76 - 102 mm) spot on the inside of the belt.
5. Rotate the tire and spray another 3 - 4 in. (76 - 102 mm) spot on the belt opposite where it was sprayed before.
6. Rotate the wheel in order to evenly distribute the lubricant.

Belt Adjustment - Gates® Carbon Drive™ Smartphone Application

Required Tools

- Smart Phone with Gates Carbon Drive Application Installed
- 3 mm hex wrench
- 27 mm socket and socket wrench
- 13 mm wrench

Tension Checking Procedure

Belt Pitch	Recommended Tension Range
11 mm	42.5 - 73.6 Hz

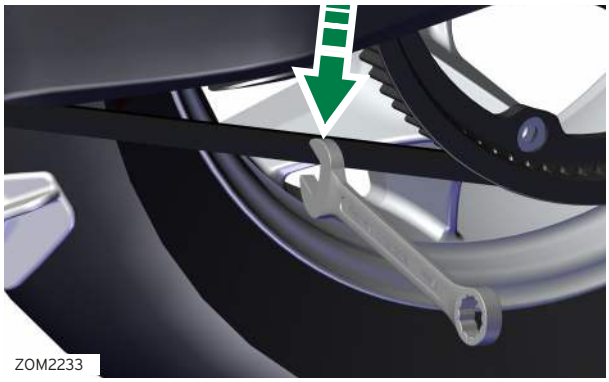
The drive belt tension can be checked by using the Gates® Carbon Drive™ Smartphone application, which measures belt tension frequency. The application is available for free to download at both the Apple iTunes® store and Google Play® store. iTunes® is a registered trademark of Apple. Google Play® store is a registered trademark of Google. Note: Perform belt frequency measurement on the lower belt span, close to the center (between the sprockets). Note: The application works best in a quiet environment.

Note: The following application instructions may differ between phones.

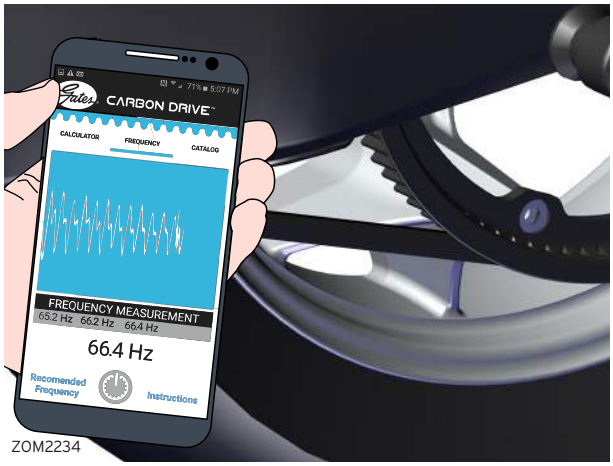
1. Remove the key from the key switch.

Note: The location of the swingarm ground strap and brake line clips, before removing the rear fender.

2. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.
3. From the application, click the tension icon and measure.
4. Confirm the phone's microphone is on (if applicable).
5. Hold the phone, so the microphone is as close to the drive belt as possible (without touching the belt).


ZOM2233

6. Pluck the belt with your thumb or a wrench (as shown) so that it vibrates like a guitar string.

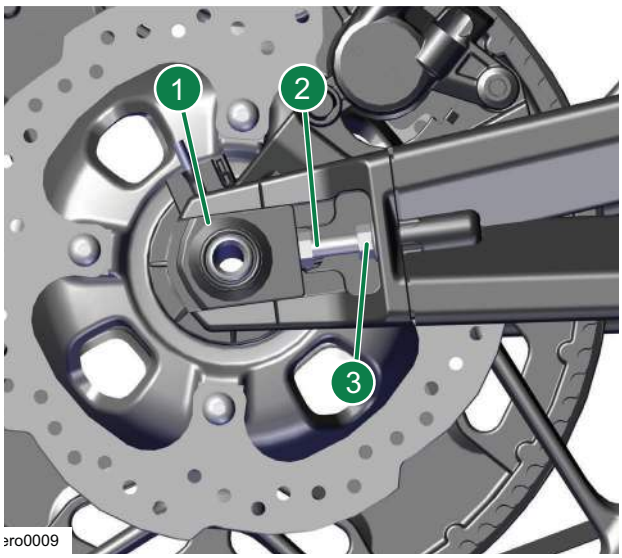


ZOM2234

7. The microphone will measure vibration's frequency.
8. Rotate the rear wheel a quarter-turn and repeat the frequency measurement.
9. Compare your belt's frequency readings to the recommended range values (see chart above).

Adjustment Procedure

1. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.



ero0009

2. Loosen the rear axle shaft nut (1).
3. Loosen jam nuts (3) and adjust the belt tension by turning axle adjusters (2). Turn an equal number of turns to keep the wheel aligned until the specification is achieved.
4. Tighten jam nuts (3).
   - Tighten to 15 lb-ft (20 Nm)
5. Apply Loctite® 242® to the threaded portion of the axle and tighten the axle shaft nut.
   - Tighten to 75 lb-ft (102 Nm)
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12.
7. Recheck the belt for proper tension adjustment after the test ride and readjust if necessary.
8. Install the fender onto the swingarm.
9. If the tension is not within specification, the belt will need to be adjusted.

Belt Adjustment - Tension Tester Tool

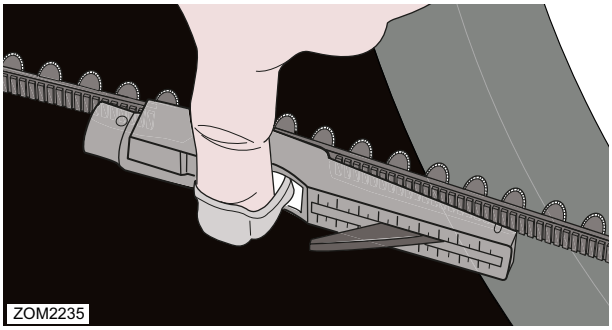
Tension Checking Procedure

Required Tools

- Belt Tension Tester
- 3 mm hex wrench
- 27 mm socket and socket wrench
- 13 mm wrench

The tension tester has a plastic measurement arm, located in a slot. Along this slot there is a measuring scale. The point of intersection of the measurement arm and the measuring scale shows the tension of the belt. There is a button (clicking pad) on the upper side of the Tension Tester, where you can secure your finger with a rubber band holder. A spring is located underneath this clicking pad. If a certain pressure is applied to the spring, it makes a clicking sound.

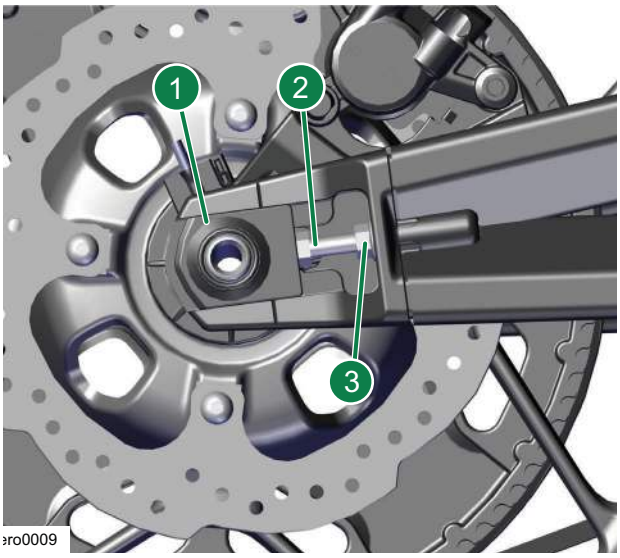
1. Remove the key from the key switch.



2. Press the tension tester steadily to the middle of the upper side of the belt. The “lip” will lead the tester to the belt.
3. Slowly increase the pressure on the tester, until you hear a clicking sound. Do not increase the pressure after the tester has clicked.
4. Remove the tester carefully from the belt. Avoid rough movements of the tester, as this would change the results of the measurement. The measurement should be in the range of 55 - 169 lb. (25 - 77 kg).
5. The measurement should be in the range of 55 - 169 lb. (25 - 77 kg). If the tension is not within specification the belt will need to be adjusted. Refer to the following adjustment procedure.

Adjustment

1. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.



2. Loosen the rear axle shaft nut (1).
3. Loosen jam nuts (3), adjust the belt tension by turning axle adjusters (2). Turn an equal number of turns to keep the wheel aligned until the specification is achieved.
4. Tighten jam nuts (3).
   - Tighten to 15 lb-ft (20 Nm)
5. Apply Loctite® 242® to the threaded portion of the axle and tighten the axle shaft nut.
   - Tighten to 75 lb-ft (102 Nm)
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12.
7. Recheck the belt for proper tension adjustment after the test ride and readjust if necessary.
8. Install the fender onto the swingarm.

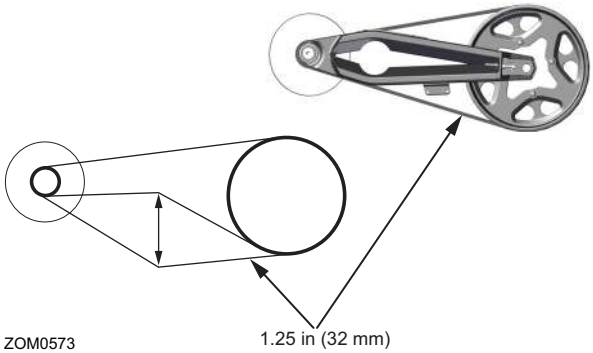
Chain Tension Adjustment

Required Tools

- 3 mm hex wrench
- 27 mm socket and socket wrench
- 13 mm wrench

Checking Procedure

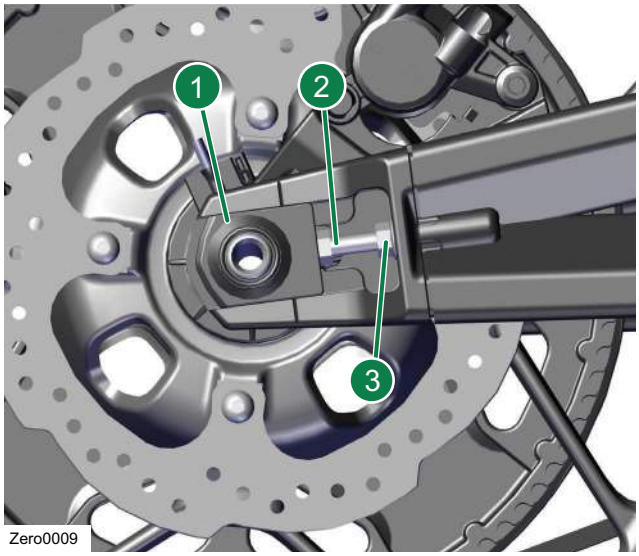
1. Remove the key from the key switch.
2. Have an assistant hold the motorcycle upright with the motorcycles wheels on the ground.



3. Using a ruler, grasp the chain halfway between the front and rear sprockets.
   The chain should move 0.75 in. (16 mm) in either direction, so 1.25 in. (32 mm) of total free play.
4. If the chain's free play is not within specifications it will need to be adjusted. Refer to the following Adjustment Procedure.

Adjustment

1. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.



2. Loosen rear axle shaft nut (1).
3. Loosen jam nuts (3) and adjust the belt tension by turning axle adjusters (2). Turn an equal number of turns to keep the wheel aligned until the specification is achieved.
4. Tighten jam nuts (3).
   - Tighten to 15 lb-ft (20 Nm)
5. Apply Loctite® 242® to the threaded portion of the axle and tighten the axle shaft nut.
   - Tighten to 75 lb-ft (102 Nm)
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12.
7. Recheck the chain for proper tension adjustment after the test ride and readjust if necessary.
8. Install the fender onto the swingarm.

Diagnostic Trouble Code (DTC) List

If a diagnostic code has been recorded, it will be displayed on the dash in Display A.



To view any DTC's, switch to Display A by momentarily pressing the **SEL** button once. Press the **ADJ** button to toggle through the fields.

DTC	Description
0	No Error
1	High Throttle
2	Motor Temperature Warning Stage 1
3	Motor Temperature Warning Stage 2
4	Controller Temperature Warning Stage 1
5	Controller Temperature Warning Stage 2
6	Throttle Enable Wire Error
7	Low Battery Voltage
8	High Battery Temperature Status
9	Low Battery Temperature Status
10	Battery Temperature Warning Stage 1
11	Battery Temperature Warning Stage 2
12	Reserve Partition Warning
13	Reserve Switch Warning
14	Safety Override Active
15	Charger Attached But Not Charging
16	CIB Contactor Compromised
17	Charger Error
18	Battery Temperature Sensor Fault
19	High Charge Current
20	BMS Low Isolation
21	Board Vpack Error
22	Board Temperature Error
23	Post Error
24	Startup Error

DTC	Description
25	Contactor Open Warning
26	Contactor Welded Error
27	Precharge Error
28	BMS Isolation Fault
29	BMS Isolation Danger
30	BMS CAN Error
31	Sevcon CAN Error
32	Module Variance Too High
33	Sevcon Error Turn Off
34	Charge Error Turn Off
35	Loopback Error
36	Board 5V Error
37	Board 3 3V Error
38	Idle Turn Off
39	Throttle Out Of Range Disable
40	BMS Throttle Enable Wire Disable
41	Low Battery Voltage Disable
42	High Battery Temperature Status Disable
43	Low Battery Temperature Status Disable
44	Kill Switch Disable
45	Kickstand Switch Disable
46	BMS Charger Connected Disable
47	MBB Charger Connected Disable
48	Sevcon Startup Disable
49	Contactor Open Disable
50	BMS Self Test Error
51	BMS Self Test Warning
52	Reserve Partition Disable
53	BMS Internal Disable
54	Internal Disable Error
55	Internal Fault Error
56	Monolith Not Connected
57	Module Did Not Connect
58	BMS Sensor Warning
59	BMS System Warning
60	Bike Configuration

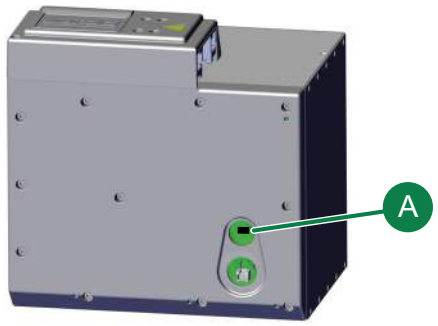
Note: If code 57 is retrieved, your motorcycle may only require recharging.

Powerpack Diagnostics

Battery Management System (BMS)

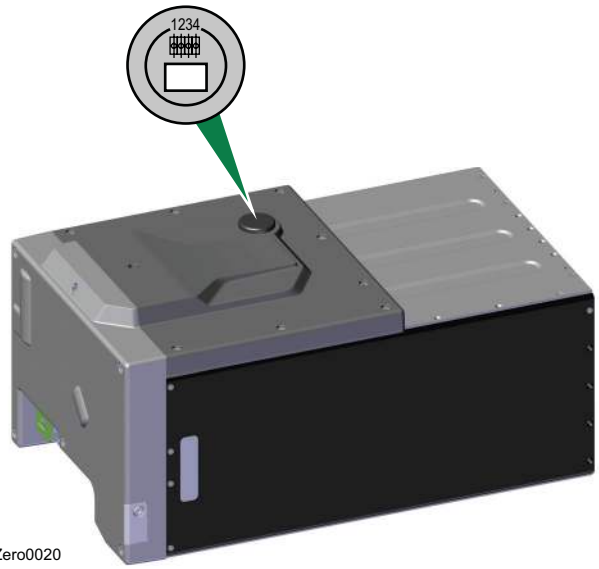
The Battery Management System (BMS) is located inside the power pack and is fitted with a window (A) to provide visual notification about the status of the power pack. There are four LED lamps that will flash: one red and three green lamps. The window is located on the front side of the power pack .

Modular



ZOM0653

Integrated



Zero0020

Understanding BMS Flash Code Patterns (Idle Mode)

In this mode the key is OFF and the power pack is not being charged (the BMS is only monitoring the battery).

1 Red	2 Green	3 Green	4 Green	On	Off	Meaning	Solution
			*	50 ms	5 sec	Healthy	BMS ok
*			*	50 ms	5 ms	Isolation fault	
*				50 ms	60 sec	Pack low	Charge power pack
*				50 ms	1 sec	Number of cell packs not set	
*				50 ms	1 sec	Self-test failed	
			*	50 ms	250 ms	Waiting for UART input	
sec = seconds ms = milliseconds							

Understanding BMS Flash Code Patterns (Charge Mode)

This mode is with the charging cord plugged into the AC power, and the key in the OFF position. During the Charging process, first all lights will flash. Next, lights 1 through 4 will flash depending on the power pack's state of charge.

1 Red	2 Green	3 Green	4 Green	On	Off	Meaning	Solution
*	*	*	*	100 ms	5 sec	Charge complete	Unplug charger
Charging							
*				2 sec		25%	Continue charging
*	*			2 sec		50%	Continue charging
*	*	*		2 sec		75%	Continue charging
	*	*	*	2 sec		100%	Continue charging
Balancing							
		*		500 ms		Power pack unbalanced	Let the power pack cool down
	*		*	500 ms			
Temperature Disable							
*			*	100 ms	500 ms	Too hot	Let the power pack cool down
sec = seconds ms = milliseconds							

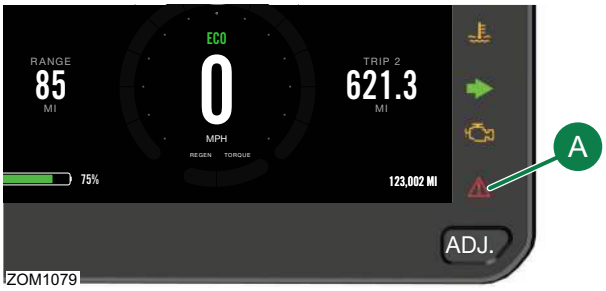
Understanding BMS Flash Code Patterns (Run Mode)

In this mode, the key is in the ON position.

1 Red	2 Green	3 Green	4 Green	On	Off	Meaning	Solution
				5 sec	1 sec	25% of power remaining	Charge soon
*	*			5 sec	1 sec	50% of power remaining	Charge soon
*	*	*		5 sec	1 sec	75% of power remaining	Charge soon
*	*	*	*	5 sec	1 sec	100% of power remaining	Ok
sec = seconds ms = milliseconds							

System Warning Indicator

If a fault has been detected, count the number of times the red indicator light (A) flashes (flashing sequence repeats).



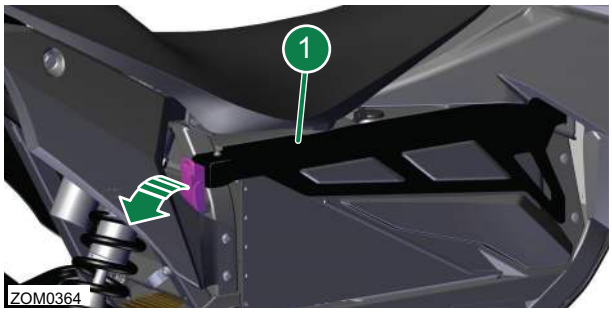
Number of Red Flashes		Cause	Solution
1	▮	Safety Override is Active (when blinking fast constantly)	
1	▮	BMS Isolation Fault (when blinking fast intermittently)	
1	▬	Charger Not Charging (when accompanied by fast constant blink of the Charge LED or all blinking dash segments)	
1	▬	Motor Stop Switch Disabled or Kickstand Switch Disabled	Motor stop switch is in the OFF position. Press the motor stop switch ON button. Kickstand is down. Raise kickstand.
2	▮▮	Self-Test Failed	Contact Zero or your dealer.
3	▮ ▮▮▮	High Throttle Disable	Throttle is ON or throttle/connection is bad. Verify throttle action and/or check connection.
4	▮ ▮▮▮▮	Precharge Fail	Could not pre-charge motor controller. Contact Zero or your dealer.
5	▮ ▮▮▮▮▮	Low Power Pack Disable	Charge Power Pack Before Riding.
6	▮▮ ▮	Contactor Error	Contact Zero or your dealer.
7	▮▮ ▮▮	Charger Problem	Contact Zero or your dealer.
8	▮▮ ▮▮▮	Controller Area Network (CAN) Error	Contact Zero or your dealer.
9	▮▮ ▮▮▮▮	Battery Management System (BMS) Throttle Disable	Contact Zero or your dealer.
10	▮▮ ▮▮▮▮▮	Module Variance Too High	Contact Zero or your dealer.
11	▮▮▮ ▮▮▮	Battery Temperature Sensor Fault	Motorcycle will run, but needs service. Contact your dealer
12	▮▮▮▮ ▮	Welded Contactor	Contact Zero or your dealer.
13	▮▮▮▮ ▮▮▮	Motor Controller Error	Motorcycle needs service. Contact Zero or your dealer.

Number of Red Flashes		Cause	Solution
14		Loopback Error	Needs second module, or blanking plug inserted.
15		Battery Management System (BMS) Startup Error	Reset BMS with button. If problem persists contact Zero or your dealer.
16		Battery Management System (BMS) Internal Disable	Cycle Ignition Key OFF and then ON again, or reset BMS with button. If problem persists contact Zero or your dealer.
17		Battery Management System (BMS) Internal Fault	Cycle Ignition Key OFF and then ON again, or reset BMS with button. If problem persists contact Zero or your dealer.
18		Miscellaneous Error	Contact Zero or your dealer.

Power Pack Replacement (Modular)

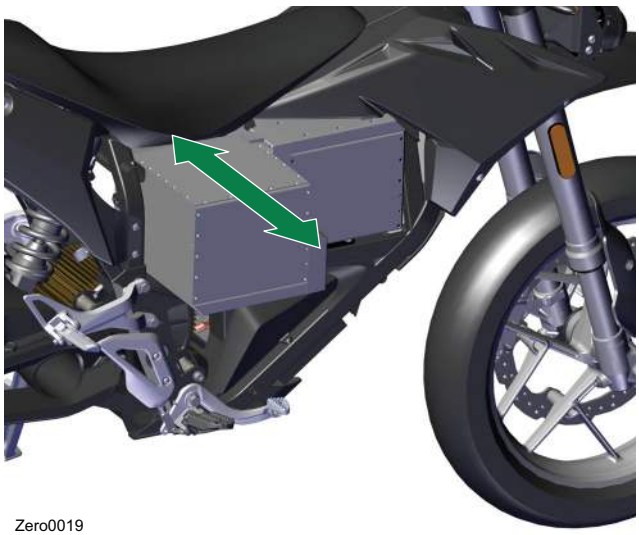
Note: Mark the location of all wires, cables and harness ties prior to removal.

1. Remove the key from the key switch and safely support the motorcycle.
2. Grasp the top of the key lock latch (see arrows) and pull downward to unlock the power pack rail.



3. Pull the power pack rail (1) away from the motorcycle.

Note: If necessary, assist removal by also pushing battery from opposite side of the motorcycle.



4. Using a firm grip, slide the power pack out of the frame.

Installation

1. Slide the power pack into the frame.
2. Re-attach the power pack rail.
3. Use the key to lock the rail, if equipped.

Power Pack Replacement (Ingetrated)

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

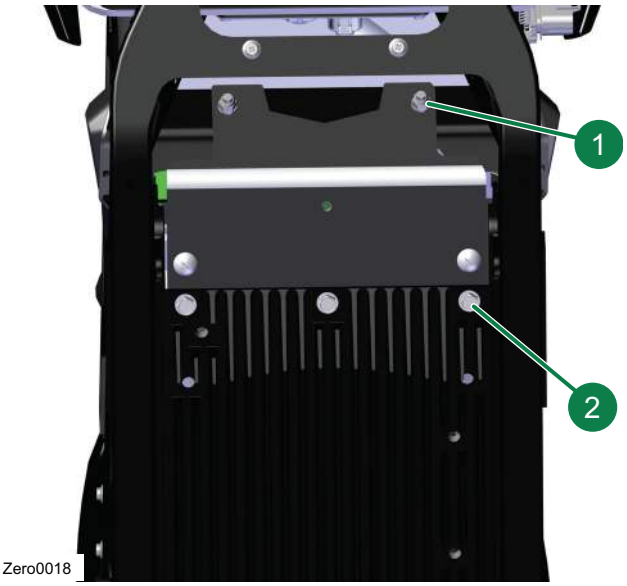
Required Tools

- 3 mm hex wrench
- 4 mm hex wrench
- 10 mm wrench or socket
- Socket wrench
- PN 85-05665 Controller Discharge Tool

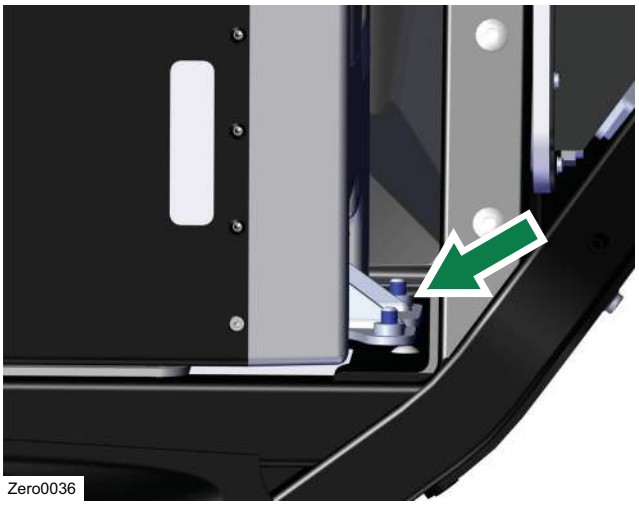
Removal

Note: Mark the location of all wires, cables and harness ties prior to removal.

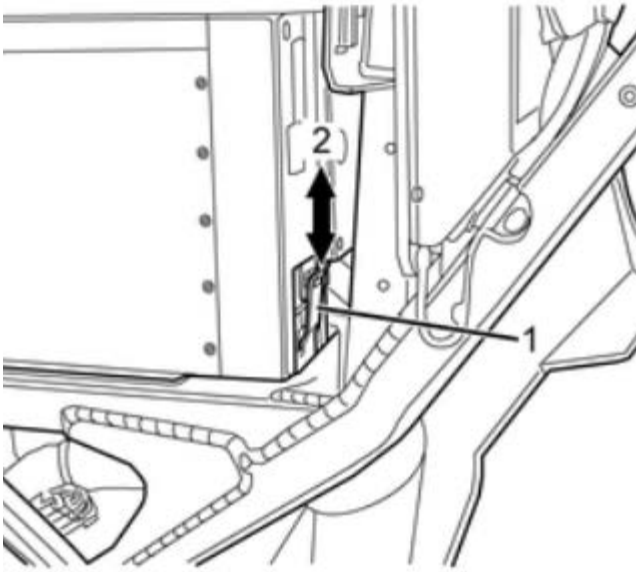
1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the rubber side panels.
3. Remove the front fender.
4. Remove the center fairing panel.



5. Remove the motor controller top bracket nuts (1), bolts (2) and bracket.


Zero0036

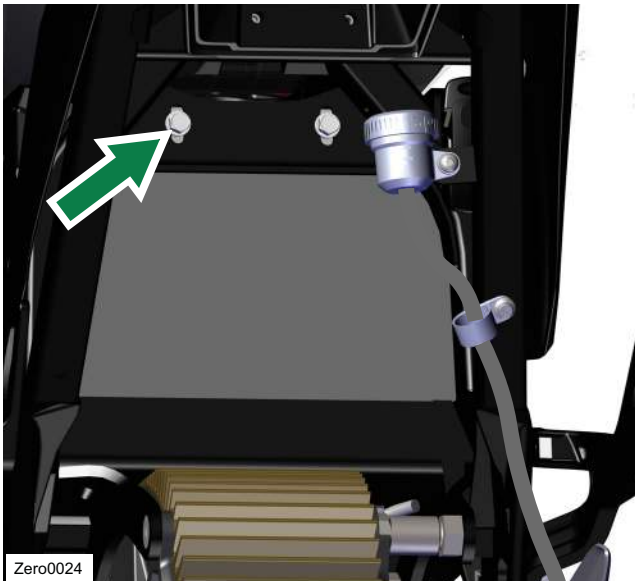
6. Remove the power pack retainer bolts from the retainer located at the front of the power pack.
7. Remove the right side battery retaining rail.



8. Pull out on the power pack connector tab (1), located at the right front of the power pack.

Note: Remove and discard any harness ties around the connector to aid in its removal.

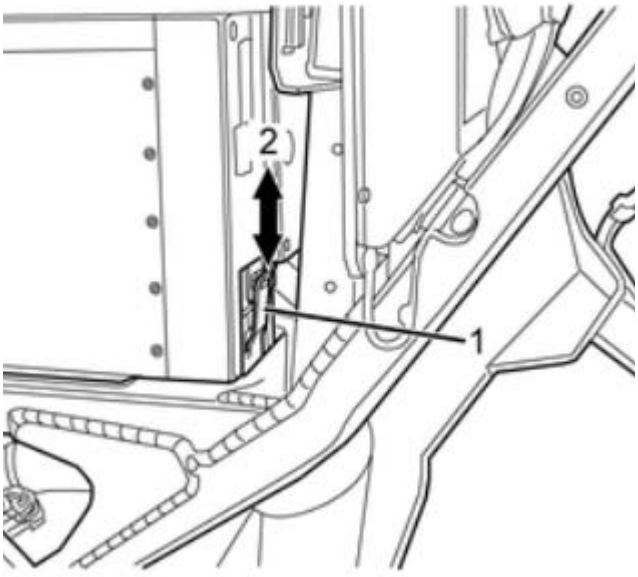
9. Slide down the connector (2) to disconnect.


Zero0024

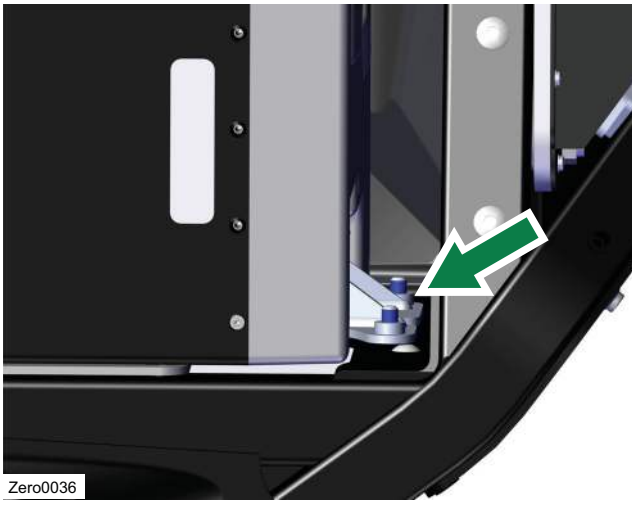
10. Remove the bolts from the battery retainer at the top rear of the power pack. The bolts are on the other side of the retainer threads.
11. Slide the power pack out of the frame with the rear retainer in place.

Installation

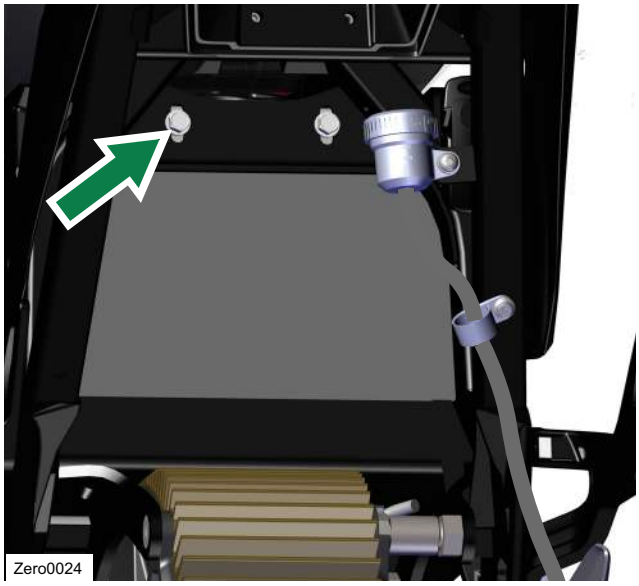
1. With the rear retainer in place, slide the power pack into the frame.



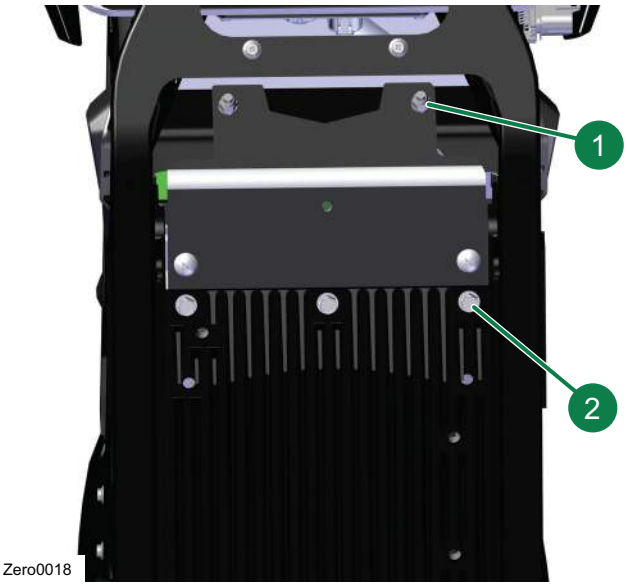
2. Connect the power pack connector (2) and push up until the tab (1) is locked in.


Zero0036

3. Install the bolts to the front power pack retainer.
   - Tighten to 8 lb-ft (11 Nm)


Zero0024

4. Install the rear power pack retainer bolts. The bolts are on the other side of the retainer threads.
   - Tighten to 8 lb-ft (11 Nm)
5. Install the right side battery retaining rail.
6. Install any harness ties as required.



Zero0018

7. Install the motor controller top bracket nuts (1) and bolts (2).
   - Tighten to 8 lb-ft (11 Nm)
8. Install the center fairing panel.
9. Install the front fender.
   - Tighten to 24 lb-in (2.7 Nm)
10. Install the rubber side panels.

BMS Replacement and Configuration (Modular)

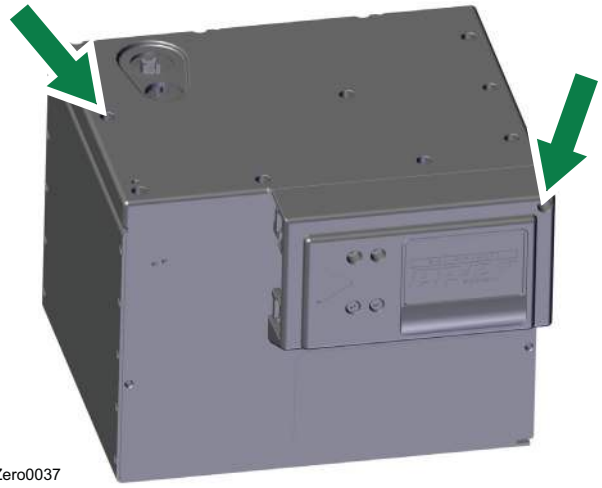
The BMS is located inside the power pack, behind the cover with the round clear window.

Required Tools

- 3 mm Hex wrench
- Computer with Diag4Zero installed
- 86-08084 Diag4Zero VCI Module
- 86-08083 Diag4Zero Motorcycle Cable Set

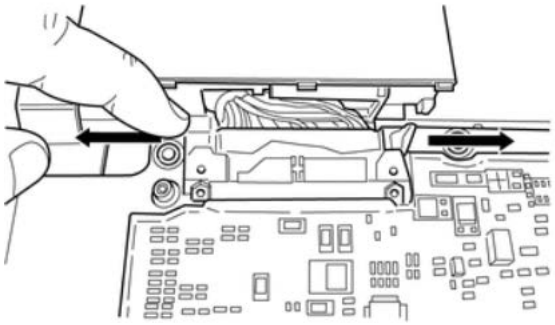
Removal

1. Remove the low power B+ fuse before removing the BMS board. Refer to Low Voltage Fuses, page 10-2.
2. Remove the power pack from the motorcycle. Refer to Power Pack Replacement (Modular), page 20-7

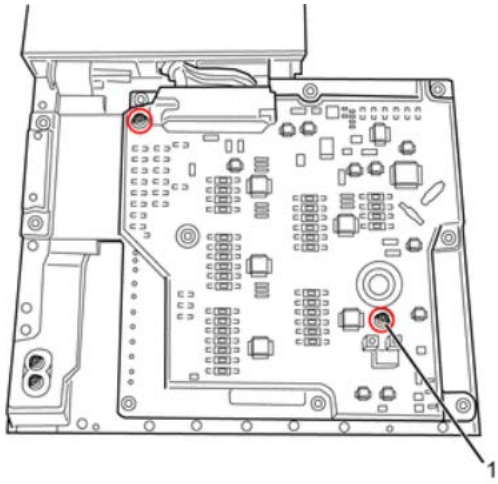


Zero0037

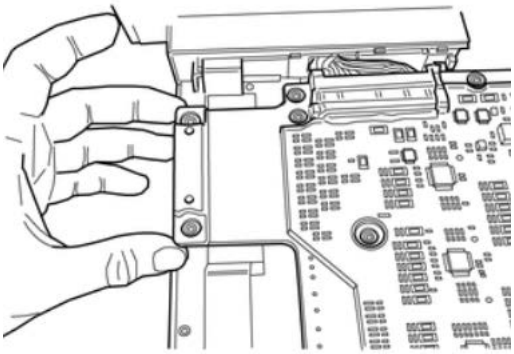
3. With the power pack round clear window facing up, remove the 11 screws and the 1 screw on the upper corner of the connector housing.
4. Lift off the power pack cover to access the BMS.



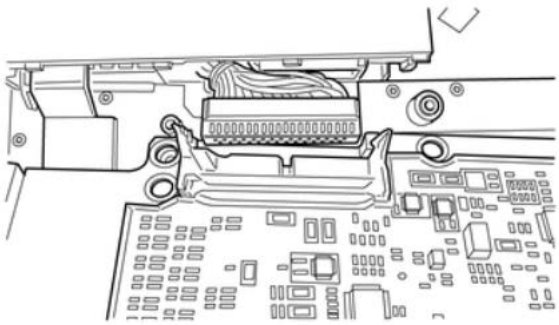
5. Spread the retaining tabs on the BMS signal connector.



6. Remove the two 3 mm hex head screws holding the BMS to the battery. Note There is an external tooth washer on screw (1).



7. Holding the white cell tap connector from both sides, lift and support the BMS and pull the connector straight out of the battery.



8. Once the BMS cell-tap pins are out of the battery pull the BMS out and away from the battery, making sure the signal connector is also released.

⚠ CAUTION

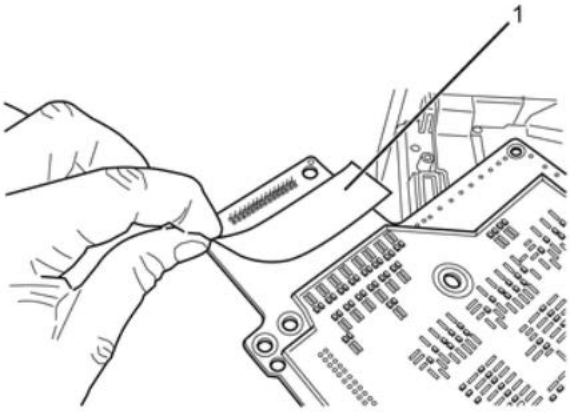
There are rubber spacers on the standoffs under the BMS, be careful not to lose any of these as they sometimes stick to the bottom of the BMS. Also check that the top and bottom flex cable gaskets are not stuck to the old BMS. Remove the BMS from the battery.

Installation

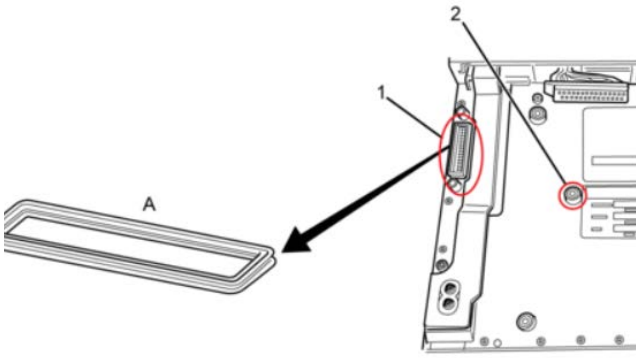
1. Peel off the strip of fiberglass PTFE tape (PN 20-00544) from the underside of the BMS and place in the same location on the replacement BMS

⚠ CAUTION

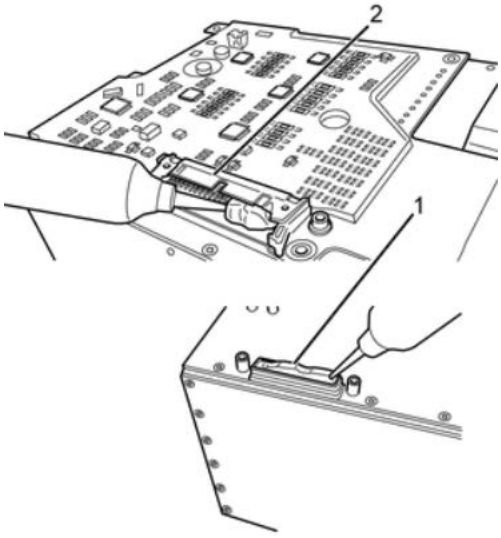
DO NOT reinstall the B+ fuse until the BMS is fully connected and mounted.



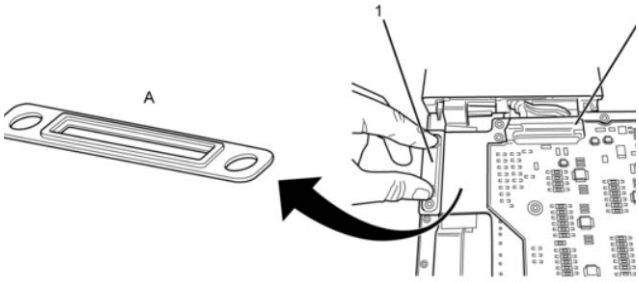
2. Before installing the new BMS make sure ALL of the rubber bushings (2) (PN 20-06089) and the module cell-tap connector (1) gasket (A) (PN 20-07637) are in place.



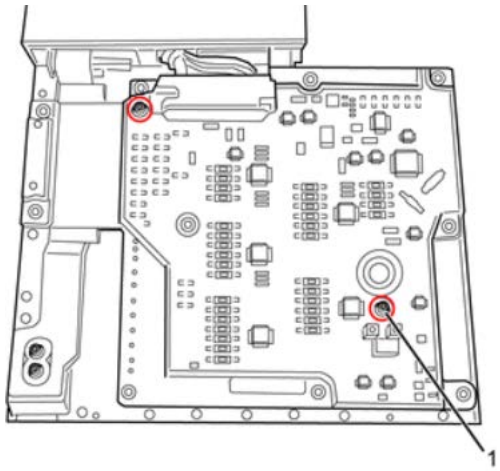
3. Apply compound 70 to cell-tap connector (1) and the BMS signal connector (2).



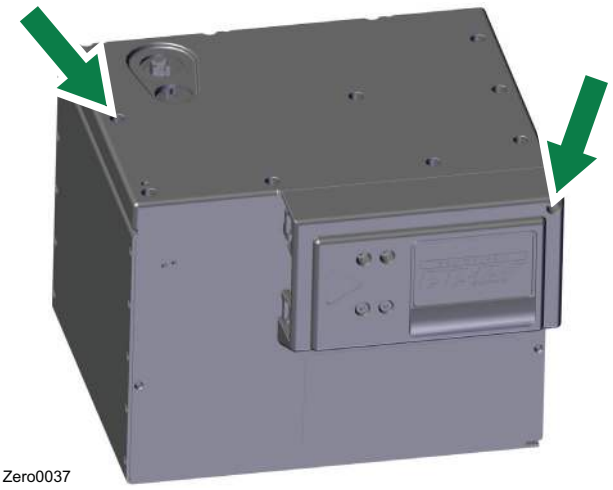
4. Verify that the top flex cable gasket (A) is in place.
5. Line up BMS with signal connector (2) and mounting holes and press gently down on the cell-tap connector (1).



6. Install the hex head screws holding the BMS to the battery. Be sure to use the external tooth washer with the screw (1) that goes above the pushbuttons.



7. Fully seat the BMS signal connector, there should be an audible click from each retaining tab when it is fully engaged.
8. Install the BMS cover and secure with the 3 mm hex head screws.



9. Install the low power B+ fuse.
10. Configure the BMS as outlined in BMS Configuration, page 20-18.

BMS Replacement and Configuration (Integrated)

The BMS is located inside the power pack, behind the top power pack cover.

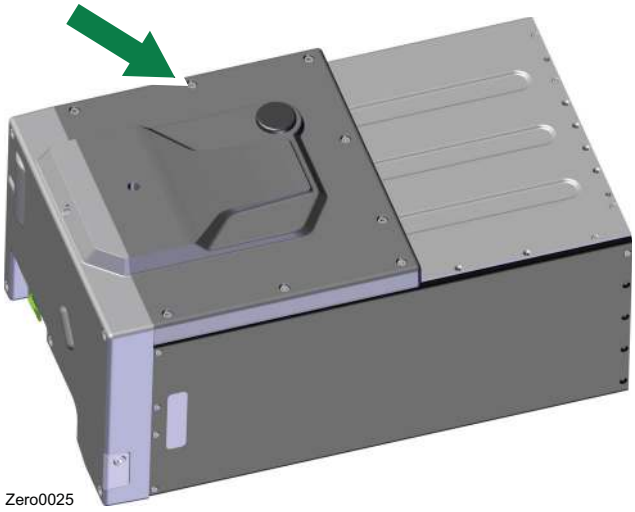
Required Tools

- 3 mm Hex wrench
- Computer with Diag4Zero installed
- 86-08084 Diag4Zero VCI Module
- 86-08083 Diag4Zero Motorcycle Cable Set

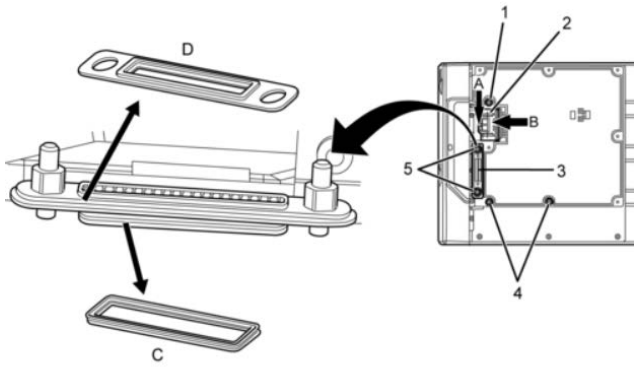
Removal

1. Remove the power pack. Refer to Power Pack Replacement (Ingetrated), page 20-7.

Note: Clean/remove and dirt or water from the front of the power pack cover prior to removal.



2. Remove the nine screws from the front of the power pack, and carefully remove the front cover. There may be some resistance caused by the cover sealant.

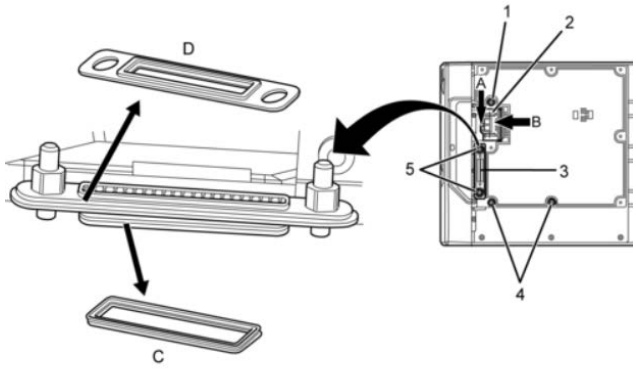


3. Disconnect the connector (2) on the upper edge of the board by pressing in retaining tab (A) then pushing up (B) on the connector.
4. Remove the screw (1) with an external tooth washer.
5. Remove the two cell-tap nuts (5) from the BMS.
6. Remove the socket head screws (4) holding the board to the battery.
7. Gently pull out on the cell-tap connector (3) on the upper edge of the BMS, while supporting the BMS board.
8. Ensure that the cell-tap connector upper gasket (D) and lower gasket (C) are in place and not stuck to the old BMS board.

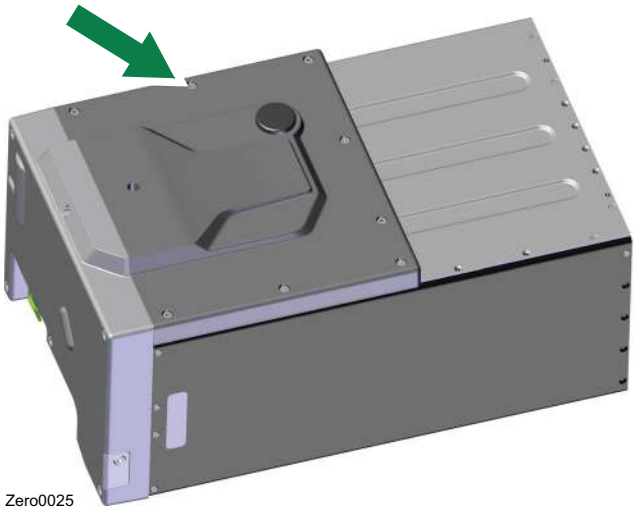
Installation

⚠ CAUTION

Do not reinstall the B+ fuse until the BMS is fully connected and mounted.

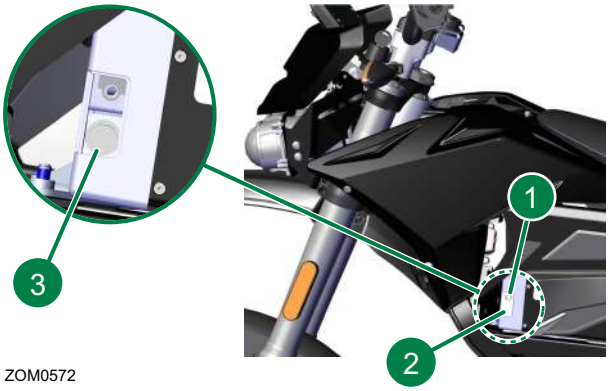


1. Ensure that the lower gasket (C) and upper gasket (D) are in place.
2. Press down on white cell-tap connector (3) while supporting the rest of the board to ensure the BMS goes in straight.
3. Press down on connector (2) on left side of BMS while supporting the other side. An audible click will be heard when the connector is fully engaged.
4. Replace the socket head screws (4) holding the BMS in place.
5. Replace the screw (1) with the external tooth washer in the location shown.
6. Replace the 2 cell-tap nuts (5) and tighten.



Zero0025

7. Install the power pack front cover and install the nine screws.
8. Install the power pack. Refer to Power Pack Replacement (Ingetrated), page 20-7.



ZOM0572

9. Install the low power B+ fuse.
10. Configure the BMS as outlined in BMS Configuration, page 20-18.

Power Pack Harness Replacement (Modular)

⚠ CAUTION

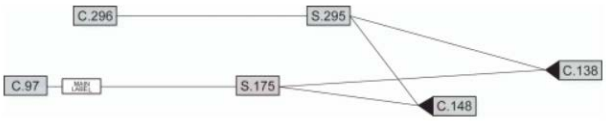
Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Required Tools

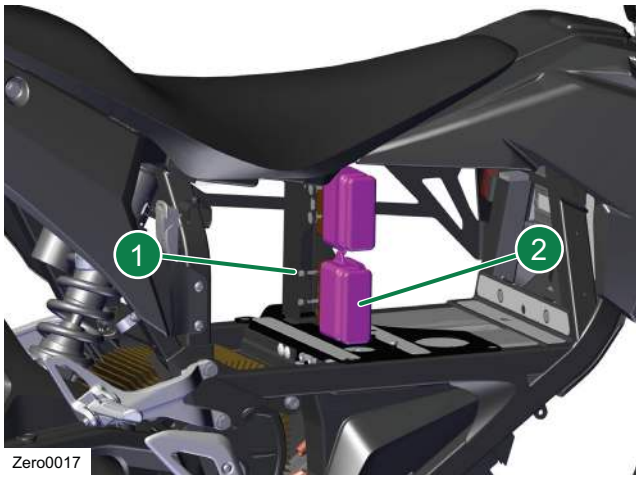
- 3 mm hex wrench
- 13 mm wrench
- PN 85-05665 Controller Discharge Tool

Removal

1. Note routing and location of harness and zip tie.



2. Discharge the High Voltage system. Refer to High Voltage Discharging, page 10-1.
3. Remove the power packs.
4. Remove the lower rubber side covers.

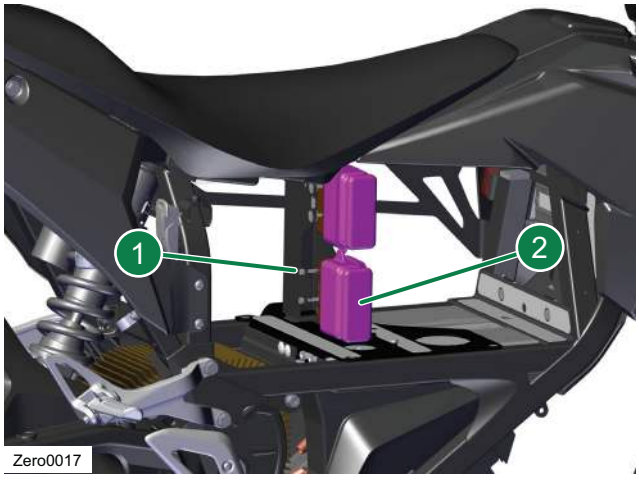


5. Remove screws (1) securing the securing power pack connectors (2) to the frame.
6. Remove the C138 and C148 connectors and separate C137 and C147 from the power pack connector body.
7. Remove C97 ground eyelet from the motor controller.
8. Remove C296 positive eyelet from the motor controller.
9. Note harness routing prior to removal, this will aid in reassembly of the harness to the motorcycle.
10. Remove all main wiring harness zip ties and hold down brackets and remove the harness.

Installation

1. Layout the wiring harness in the same location as removed on the frame.
2. Install C97 ground eyelet onto the motor controller and tighten the bolt.
   - Tighten to 8 lb-ft (11 Nm)
3. Install C296 positive eyelet onto the motor controller and tighten the bolt.
   - Tighten to 8 lb-ft (11 Nm)
4. Insert C137 and C147 into the power pack connector body.
5. Install the C138 and C148 connectors (2) onto the mounting bracket.

Note: Connector C147 is for the bottom connector and the C137 is for the top connector.



6. Install the power pack connector bolts (1) and cover.
7. Install zip ties in the same locations as removed.

8. Inspect harness routing to ensure that it is not in contact with any moving or sharp parts that could cause damage to the harness.
9. Install the lower rubber side covers.
10. Install the power packs.

Power Pack Harness Replacement (Integrated)

⚠ CAUTION

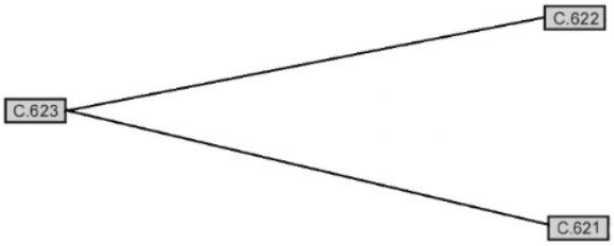
Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

Required Tools

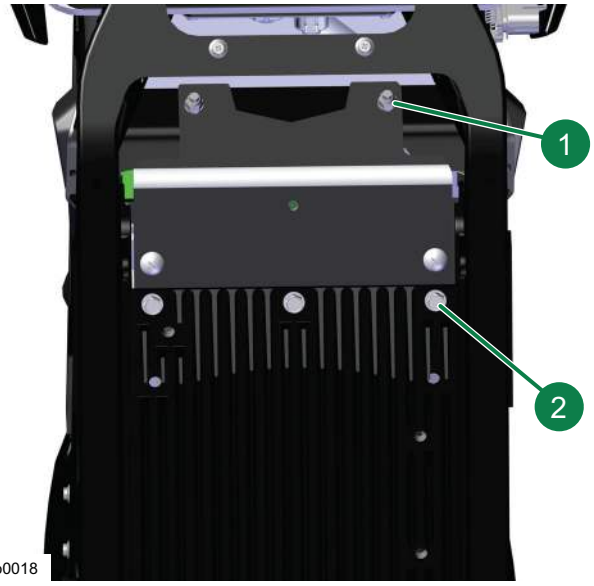
- 3 mm hex wrench
- 4 mm hex wrench
- 10 mm wrench or socket
- Socket wrench
- PN 85-05665 Controller Discharge Tool

Removal

Note: Mark the location of all wires, cables and harness ties prior to removal.

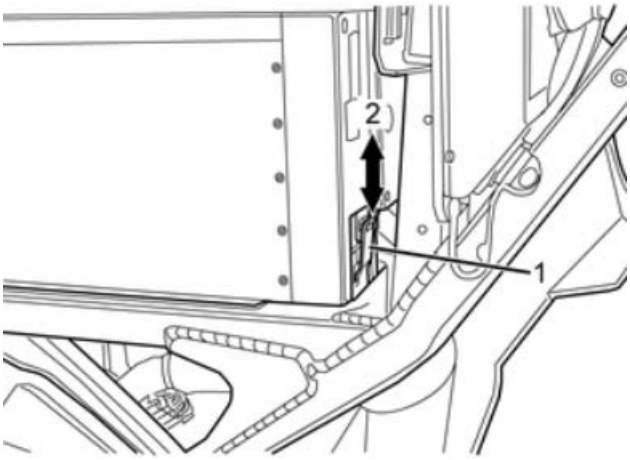


1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the rubber side panels.
3. Remove the front fender.
4. Remove the center fairing panel.



Zero0018

5. Remove the motor controller top bracket nuts (1), bolts (2) and bracket.



6. Pull out on the power pack connector tab (1), located at the right front of the power pack.

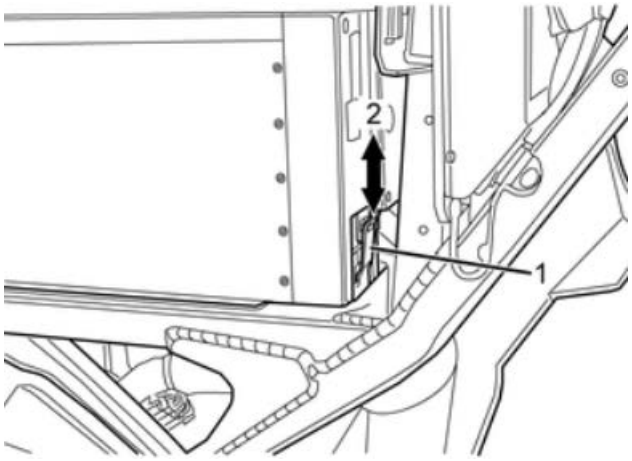
Note: Remove and discard any harness ties around the connector to aid in its removal.

7. Slide down the connector (2) to disconnect.
8. Remove the C623 and separate C138 from the power pack connector body.
9. Remove C622 ground eyelet from the motor controller.
10. Remove C621 positive eyelet from the motor controller.
11. Note harness routing prior to removal, this will aid in reassembly of the harness to the motorcycle.

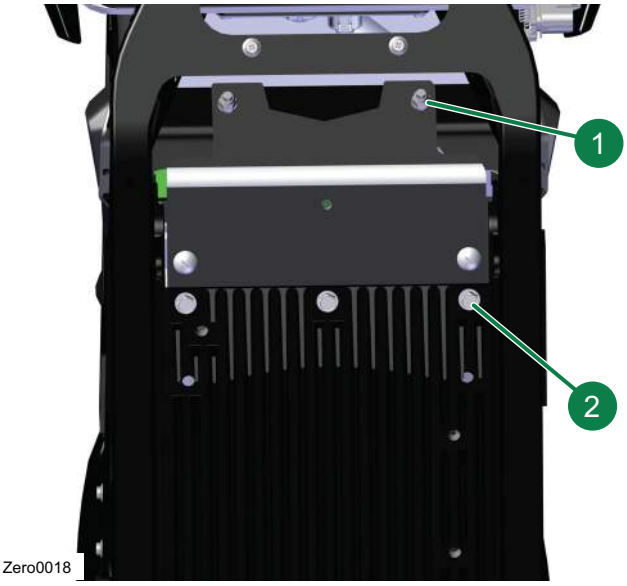
12. Remove all main wiring harness zip ties and hold down brackets and remove the harness.

Installation

1. Layout the wiring harness in the same location as removed on the frame.
2. Install C622 ground eyelet onto the motor controller and tighten the bolt.
   - Tighten to 8 lb-ft (11 Nm).
3. Install C621 positive eyelet onto the motor controller and tighten the bolt.
   - Tighten to 8 lb-ft (11 Nm)
4. Insert C137 into the power pack connector body.



5. Connect the power pack connector (2) and push up until the tab (1) is locked in.
6. Install zip ties in the same locations as removed.
7. Inspect harness routing to ensure that it is not in contact with any moving or sharp parts that could cause damage to the harness.



8. Install the motor controller top bracket nuts (1) and bolts (2).
   - Tighten to 8 lb-ft (11 Nm)
9. Install the center fairing panel.
10. Install the front fender.
    - Tighten to 24 lb-in (2.7 Nm)
11. Install the rubber side panels.

BMS Configuration

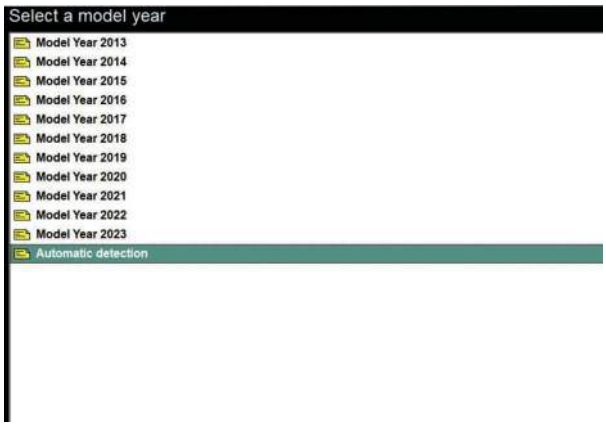
Required Tools

- Computer with Diag4Zero Installed
- 86-08084 Diag4Zero VCI Module
- 86-08083 Diag4Zero Motorcycle Cable Set

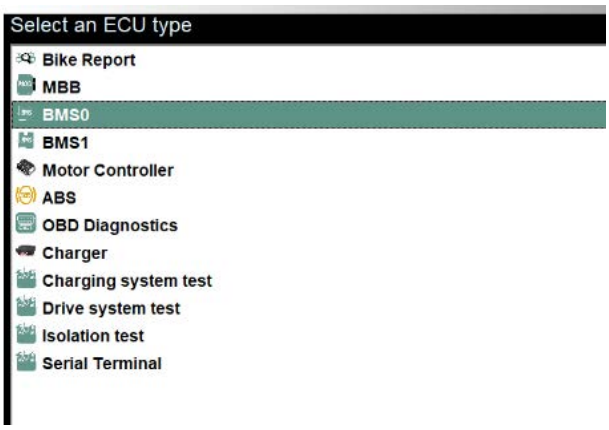
1. Plug-in to the motorcycle's OBDII port using the Diag4Zero Cable.
2. Open Diag4Zero.



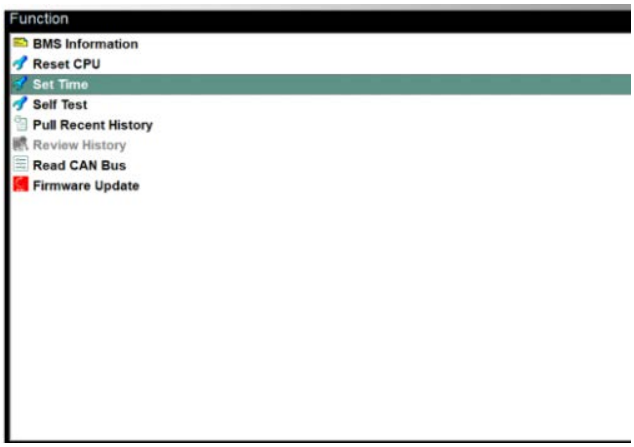
3. In Diag4Zero, select the Troubleshooting Menu.



4. Select the appropriate Model Year and Model or use Automatic Detection.



5. Click on BMS0 (If a Power Tank BMS is being configured, click on BMS1).



6. Click on the 'Set Time' button, and wait for the pop-up verifying the time setting.

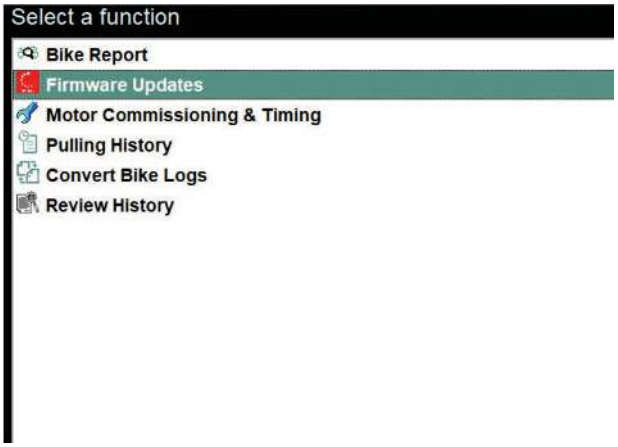
Checking and Updating Firmware (MBB and BMS)

This procedure is used to check the firmware revision, pull diagnostic logs, and update individual systems or all systems through one diagnostic port. This greatly reduces the chance of loading non-current firmware, and saves time by going to one location on the motorcycle and one system to perform the update and retrieve the different logs. The new diagnostic interface is called “Zero Diagnostics Utility” or ZDU. Currently you can run a version check of firmware for all the components (MBB and BMS), and then update them as needed. You can also pull MBB and BMS logs and zip them to a folder for fast emailing to Zero Technical Support for analysis.

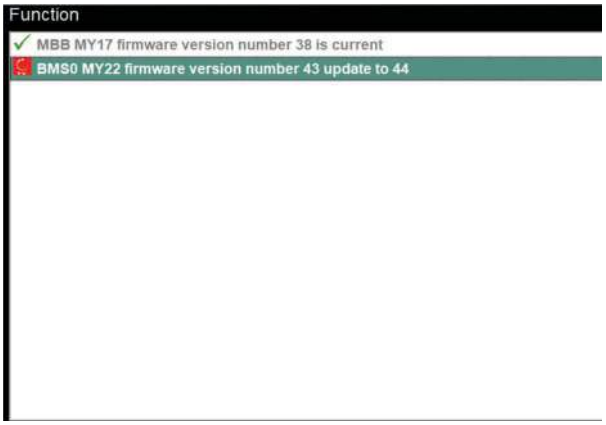
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



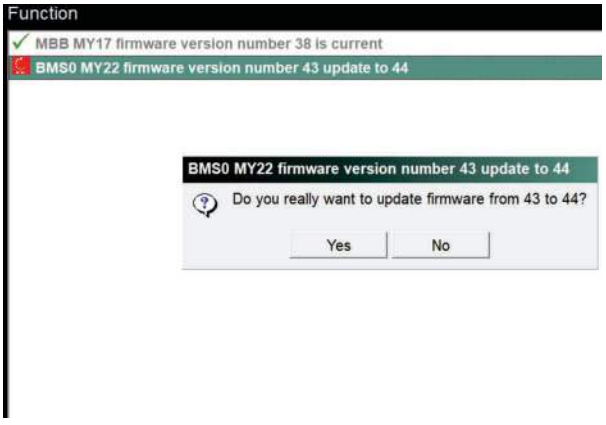
3. Select “Maintenance”.



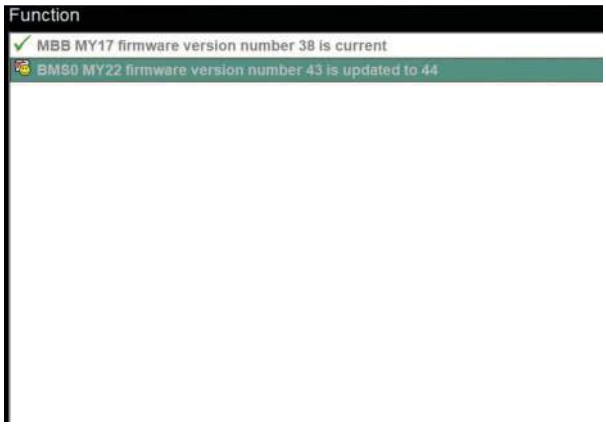
4. Select “Firmware Updates”.



5. Update any firmware that has an update available.



6. Select “Yes” to confirm the update..
7. Once complete, select “Ok” and exit.



8. Confirm the menu shows the firmware has been updated, then exit.

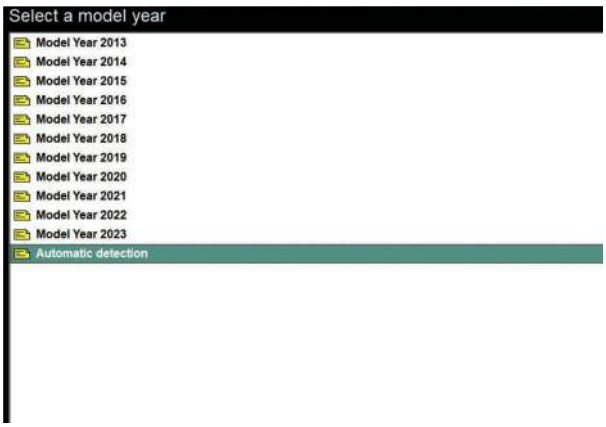
MBB/BMS Interface

The MMB/BMS Interface function can be used for diagnostic troubleshooting. The screen provides information such as statistics, inputs/outputs, event and error logs, etc.

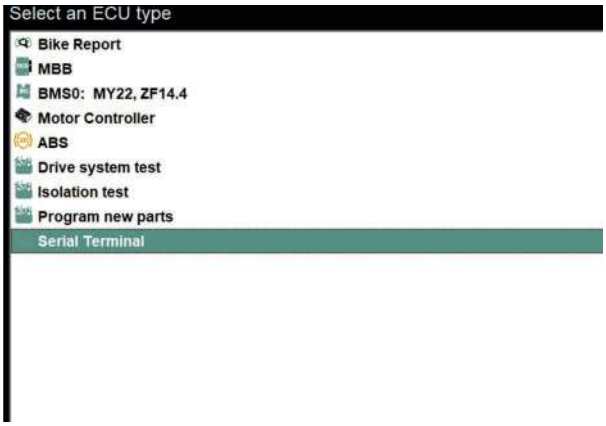
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



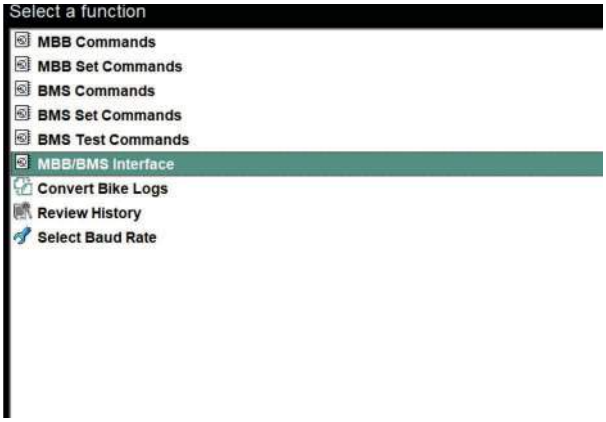
3. Select “Troubleshooting”.



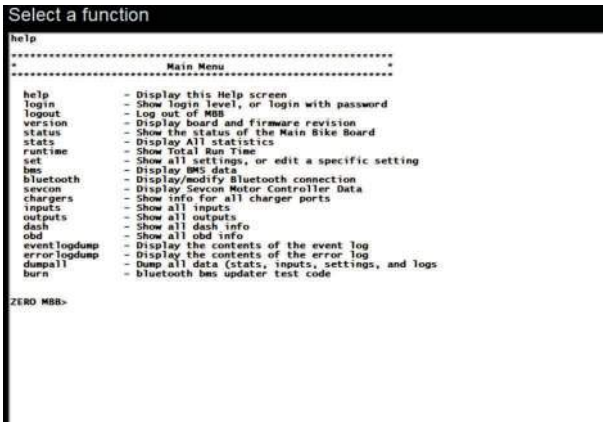
4. Select the model year or select “Automatic detection”.



5. Select “Serial Terminal”.



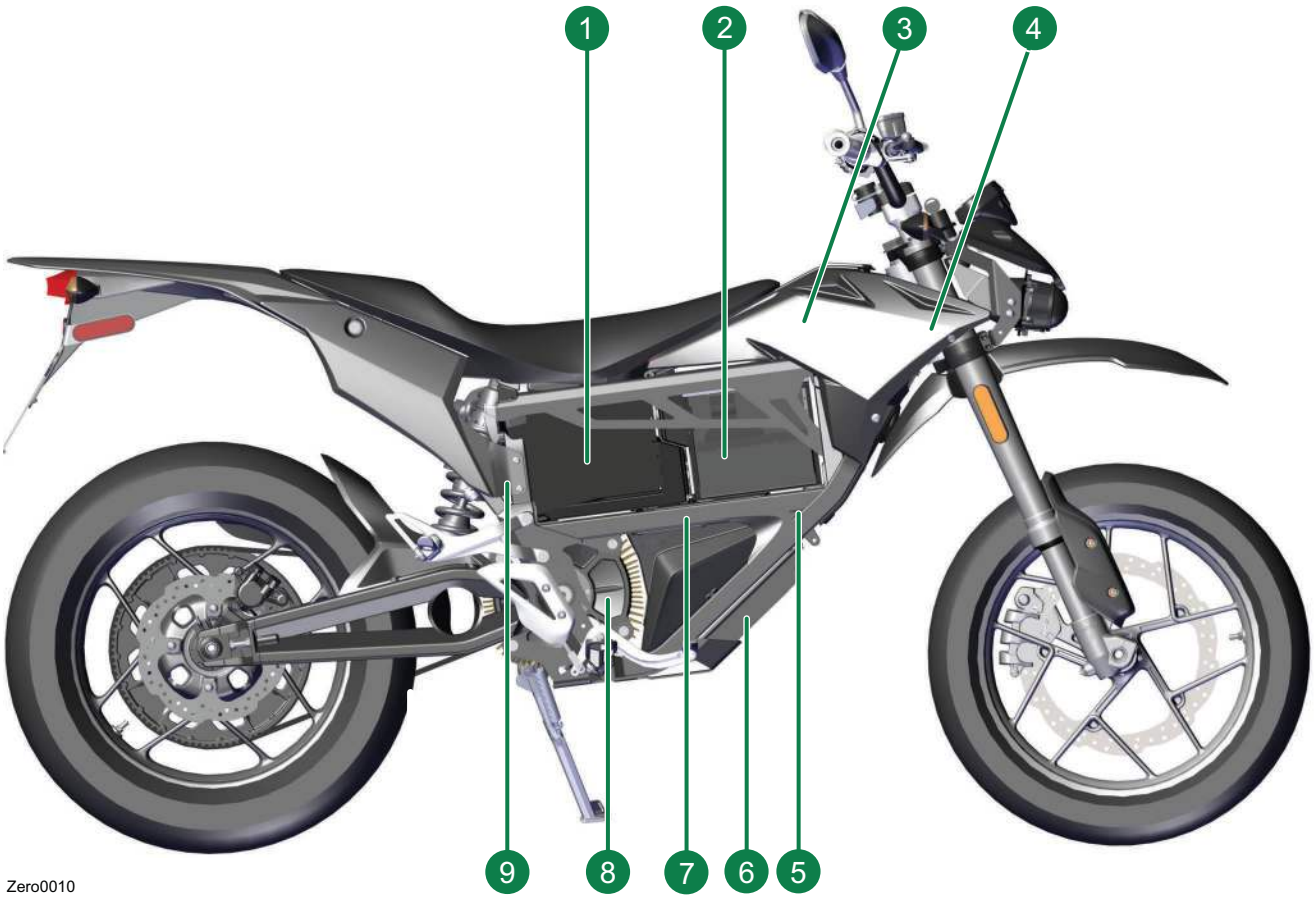
6. Select “MBB/BMS Interface”.



7. Type the command for the function you are testing.

Motor/Charging

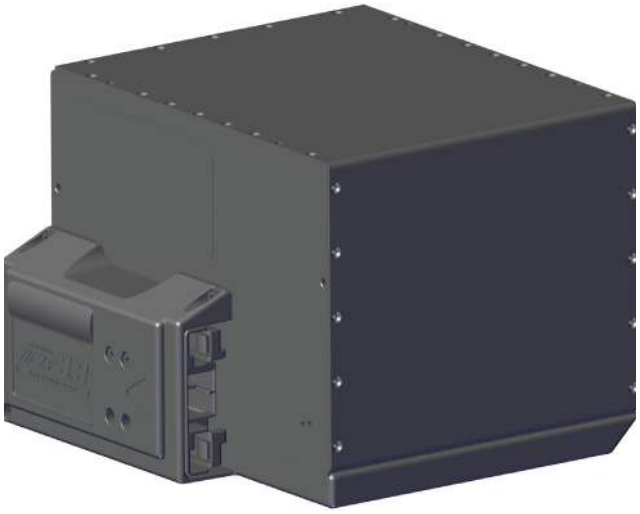
Component Location Views



Zero0010

1. Rear power pack (modular)
2. Front power pack (modular)
3. Fuse center/Turn signal flasher
4. Integrated power pack charger
5. Main bike board (MBB)
6. Motor controller
7. DC/DC converter
8. Motor
9. Power pack (integrated)

Rear Power Pack (Modular)



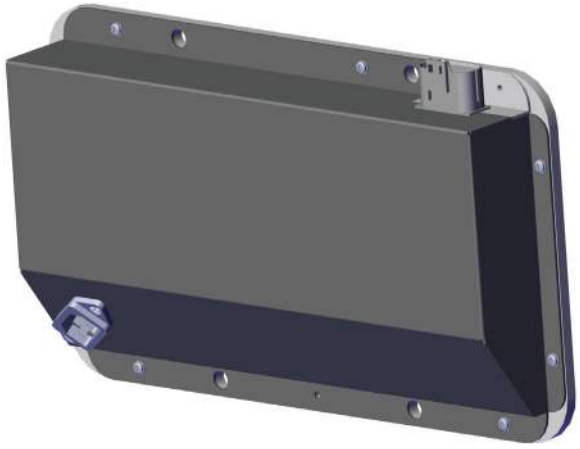
Power Pack (Integrated)



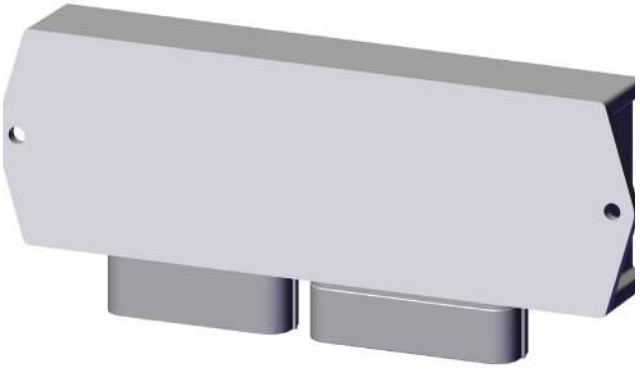
Front Power Pack (Modular)



Integrated Power Pack Charger



Main Bike Board (MBB)



Motor Controller



Motor



DC/DC Converter



Operation

Power Pack

The normal recharging time of the power pack to a 100% state of charge is usually less than 6 hours for the ZF3.6 and 10 hours for the ZF7.2 in mild ambient temperatures. Out of the normal temperature range, charging and run-time times will vary. The power pack should not be used outside of the range of 23°F to 140°F (-5°C to 60°C); the Battery Management System (BMS) turns off the power controller outside of this range.

Note: The battery will not charge if below 0°C or 32°F.

Only charge the Zero power pack with the Zero charger.

Power Pack Charger

Keep the power pack connected to the charger when the motorcycle is sitting in storage or if it will be sitting unused for more than 30 days. The power pack must be charged within 24 hours if fully discharged, and charged within 90 days if stored fully charged. Zero recommends to plug in the Zero Motorcycle after 30 days, even if fully charged. Leave the Zero Motorcycle plugged in whenever possible.

Only charge the Zero power pack with the Zero charger. The chargers are located under the fairing panels in front of the front power pack.

When charging the motorcycle's power pack, the charger can be left ON, even after the power pack is fully charged. There are two possible cases that can occur:

- When connected to the charger, the power pack will receive a full charge. Once fully charged, the charger will check the status of the power pack once every 72 hours to ensure that it maintains a full charge. When fully charged, a green light illuminates on the charger. Should the charger not read that the power pack is full, it continues to attempt to fully charge the power pack. In this event the green light may not illuminate; however, the power pack may be fully charged.

  To ensure that the power pack is charged, check the charge indicator on the dash display prior to riding.
- If the power pack terminates the charge before the charger reaches the state previously mentioned, then the charger continues to cycle and tops off the power pack until the power pack is removed from the charger, or the charger reaches the complete state previously noted.

Charging the Power Pack

Charge the Zero power pack with the Zero charger.

It is possible for lithium ion cells to overheat and fail.

Note: Charge the Zero Power pack in a location that is well-ventilated and away from combustible materials. If charging the motorcycle outdoors, avoid charging in the rain.

The maximum power pack internal charging temperature is 122°F (50°C). If the power pack's internal temperature is over 122°F (50°C), it will not accept a charge until it is moved to a cooler location. Also, if the power pack has just been run hard, it may internally be above 122°F (50°C) even if the ambient temperature is lower.

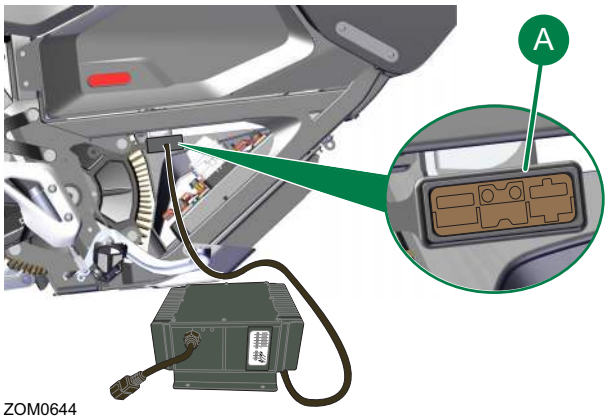
If you experience a power pack that will not take a charge, you should ensure the internal temperature is below 122°F (50°C). If the power pack was recently run and it will not take a charge, the power pack should cool and begin taking a charge in around 30 minutes or less. The maximum charging temperature cutoff is a power pack longevity feature. Charging at higher temperatures can shorten the life of the power pack.

Note: Frequent top off charging is good for the power pack's life span, so do not hesitate to charge frequently.

Quick Charging (Off Board Accessory Charger)

The “scalable” quick charging feature allows up to three supplemental accessory chargers (in addition to the existing integrated charger) to be connected to the motorcycle. Use of supplemental accessory chargers can reduce the charging time by up to 75%.

Note: The time for charging the motorcycle using quick charging will vary with the number of chargers used.



ZOM0644

The accessory charging connector (A) is located above the motor. For more information on how to connect additional chargers, refer to the quick charger’s owner’s manual.

Cold and Hot Weather Considerations

Cold Weather

Cold Weather operation of the motorcycle has no permanent impact on its battery pack/cells; however, the rider may see a reduction in range due to the effect cold temperature has on the amount of energy the pack/cells can release. The colder the weather, the greater the effect; so that, as compared to operation in 80°F (27°C) ambient, at 30°F (-1°C) ambient the rider could experience a temporary reduction in range of up to 30%. In extreme cold weather the motorcycle may also experience a temporary reduction in power and, correspondingly, achieved top speed. It is not recommended that the motorcycle be ridden while its battery temperature is below 23°F (-5°C). If it is, its battery needs to be put on the charger at a temperature above 32°F (0°C) as soon as the ride is concluded. It is worth noting that the Battery Management System (BMS) will not allow the battery to be discharged below -22°F (-30°C), which is the absolute lowest discharge temperature prescribed by the cell manufacturer.

Storage of the motorcycle for the winter in a non-heated garage is acceptable, as long as:

1. The coldest temperature in the garage does not fall below -31°F (-35°C)
2. The battery is left on the charger continuously
3. The battery is initially topped off at a temperature above 32°F (0°C)

Storage temperatures below -31°F (-35°C) may result in accelerated permanent decay of the battery performance, and hence, it is not recommended. Above this temperature, working as a system with the BMS, the charger will ensure the battery survives winter storage with no permanent damage, even if the temperatures dip well below freezing for weeks at a time.

Note that, to prevent battery damage, the BMS will prevent the charger from charging the battery at a temperature below 32°F (0°C). Again, as long as the battery was initially topped off by the charger above 32°F (0°C) and remains on the charger through the winter at temperatures above -31°F (-35°C), the system will guard the battery from damage.

Hot Weather Operation

Operation of the motorcycle in hot temperatures should not result in any noticeable performance changes. However, the BMS will not allow motorcycle operation and its associated battery discharge above 140°F (60°C), as measured at the battery. In hot temperatures greater than 110°F (43°C), the charger reduces its charge current to the battery, increasing charge time accordingly; the hotter the ambient temperature, the greater the effect. Above a battery temperature of 122°F (50°C), the BMS will no longer allow charging.

Note: Storing the motorcycle or its battery in direct sunlight in ambient temperatures above 105°F (41°C) may result in accelerated permanent decay of battery performance, and hence, it is not recommended.

Battery Management System (BMS)

Every power pack contains a Battery Management System (BMS) which monitors the condition of the cells, and optimizes the charging process to provide the highest-performance, longest-range, and longest life for the power pack. The BMS safeguards the power pack by means of safety interlocks. These interlocks turn off or control certain operations that could damage the power pack. The BMS also monitors the power pack for a host of predefined conditions, and then takes actions according to those conditions. The BMS is sealed inside the power pack.

Safety Interlocks

If the BMS detects a serious internal fault, it can take either or both of two actions to prevent damage to the power pack:

- Throttle Disable. The BMS disables the throttle if the power pack is empty, or if the BMS detects certain serious internal problems. The motorcycle can't be ridden until the problem is resolved.
- Charger Disable. The BMS prevents charging if it detects certain serious internal problems - even if the power pack is connected to a charger and plugged in to AC power. The power pack cannot be charged until the problem is resolved.

Throttle Disable Interlock

The BMS communicates with the main motorcycle control module. The BMS can send a signal to the main motorcycle controller requesting that the throttle control on the motorcycle be disabled. When the throttle control is disabled, the motor will not deliver power to the rear wheel, and the motorcycle cannot be ridden. If the throttle is disabled while riding, the motorcycle will cease to provide power, and the operator must pull over to a safe location. All conditions which would cause the BMS to disable the throttle are also signaled by a flash code pattern at self-test. If you suspect that the BMS has disabled the throttle control on your motorcycle, turn the key switch OFF and back ON again to enter self-test mode. The flash code pattern from the BMS reports any of the error conditions which would cause the BMS to disable the throttle.

- Power Pack Empty
- Too Hot
- Power Pack Unbalanced

Charger-Disable Interlock

When the charger is attached and plugged in to AC power, the BMS communicates with the charger. The BMS can send a signal to the charger requesting that charging terminates immediately. When the charger is disabled, the indicator lights on the charger displays that charging has stopped. There are two conditions that cause the BMS to disable charging:

1. Too hot
   - The BMS detects an internal power pack temperature above 122°F (50°C).
2. Too cold
   - The BMS detects an internal power pack temperature below 32°F (0°C).

DC/DC Converter Replacement (Modular)

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

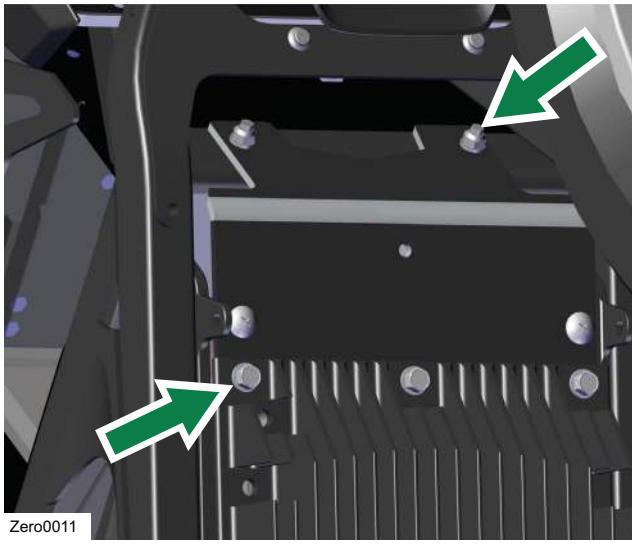
Required Tools

- 4 mm hex wrench
- 8 mm wrench or socket
- 10 mm wrench or socket
- Socket wrench
- PN 85-05665 Controller Discharge Tool

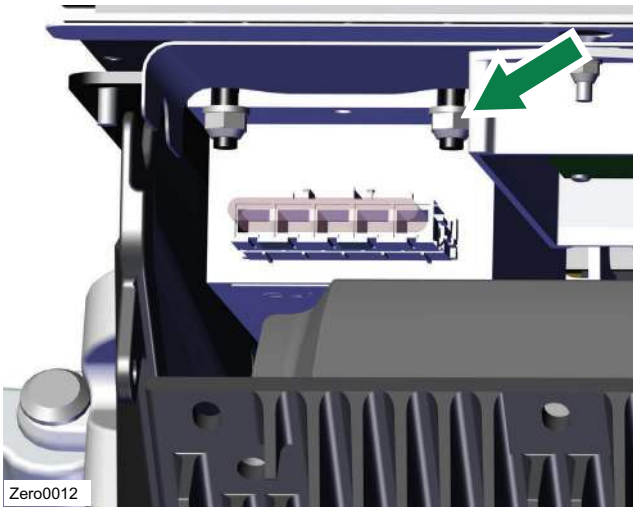
Removal

Note: Mark the location of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the right rubber side panel.
3. Remove the front fender.
4. Remove the center fairing panel.


Zero0011

5. Remove the motor controller top bracket nuts and bolts and remove the top bracket.
6. Remove the quick charge connector bracket.
7. Disconnect the converter connector C8.


Zero0012

8. Remove the two front and the two rear nuts and washers securing the converter and remove.

Installation

1. Install the converter onto the mounting studs and install the washers and nuts (1).
   - Tighten to 7 lb-ft (9 Nm)
2. Connect the converter connector C8.
3. Install the quick charge connector bracket.
4. Install the motor controller top bracket, nuts (1) and bolts (2).
   - Tighten to 8 lb-ft (11 Nm)
5. Install the center fairing panel.
6. Install the front fender.
   - Tighten to 24 lb-in (2.7 Nm)
7. Install the right rubber side panel.

DC/DC Converter Replacement (Integrated)

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

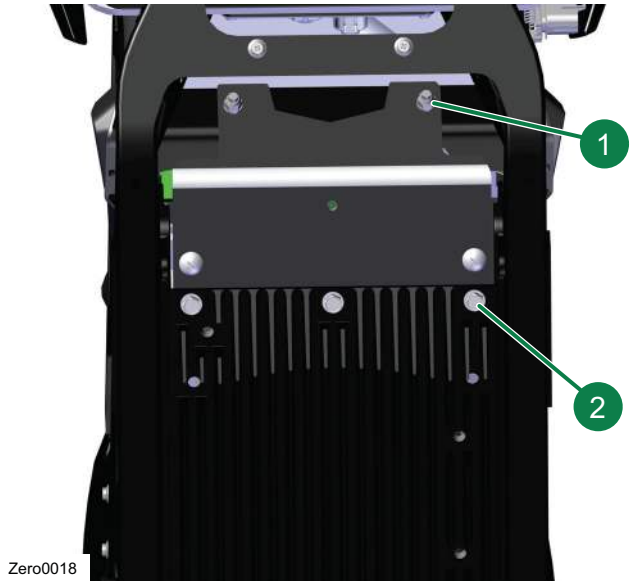
Required Tools

- Philips screwdriver
- 2.5 mm hex wrench
- 3 mm hex wrench
- 7 mm wrench or socket
- 10 mm wrench or socket
- Socket wrench
- PN 85-05665 Controller Discharge Tool

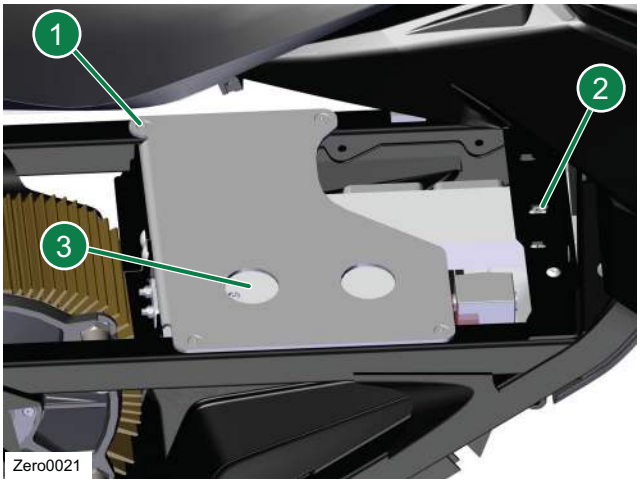
Removal

Note: Mark the location of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to .High Voltage Discharging, page 10-1..
2. Remove the rubber side panels.
3. Remove the front fender.
4. Remove the center fairing panel.
5. Remove the power pack. Refer to Power Pack Harness Replacement (Integrated), page 20-16.

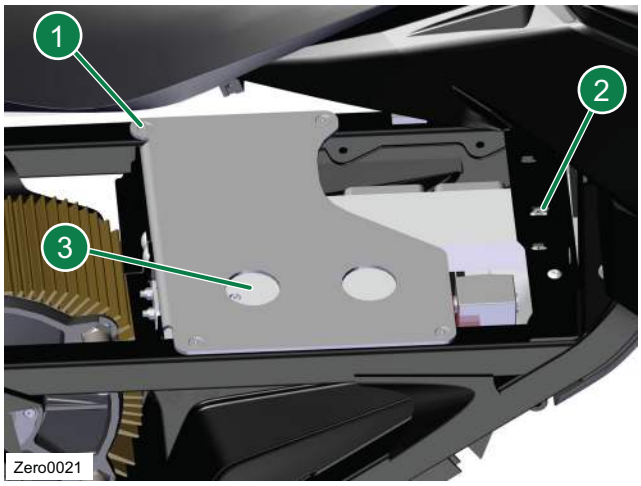


6. Remove motor controller top bracket nuts (1) and bolts (2).

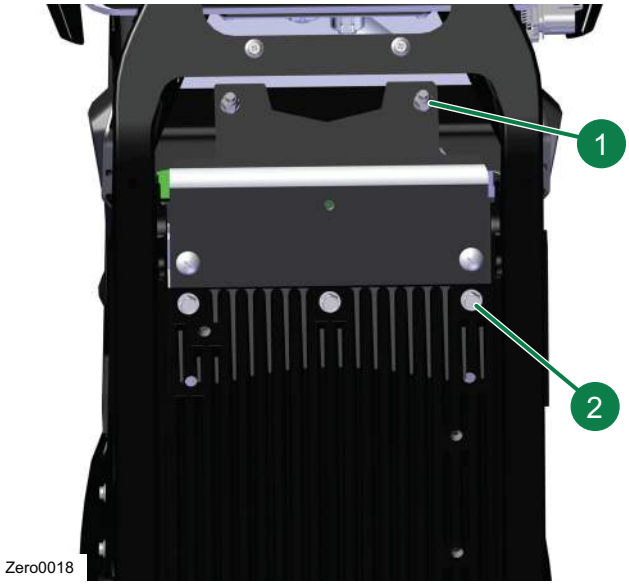


7. Remove four bolts and nuts (1) and bolt (2).
8. Lift up on the bracket and disconnect the DC/DC converter connector.
9. Remove the four nuts that secure DC/DC converter (3) and remove from the bracket.

Installation



1. Position DC/DC converter (3) onto the bracket and install the four nuts.
   - Tighten to 7 lb-ft (9 Nm)
2. Connect the DC/DC converter connector.
3. Lower the battery base plate and install four bolts and nuts (1) and bolt (2).
   - Tighten to 12 lb-in (1.3 Nm)
   - Battery base plate nut and bolt to 54 lb-in (6 Nm)



4. Install the motor controller top bracket nuts (1) and bolts (2).

Tighten to 8 lb-ft (11 Nm)

5. Install the center fairing panel.
6. Install the front fender.
   - Tighten to 24 lb-in (2.7 Nm)
7. Install the rubber side panels.
8. Install the power pack. Refer to Power Pack Harness Replacement (Integrated), page 20-16.

Power Pack Charger Replacement

⚠ CAUTION

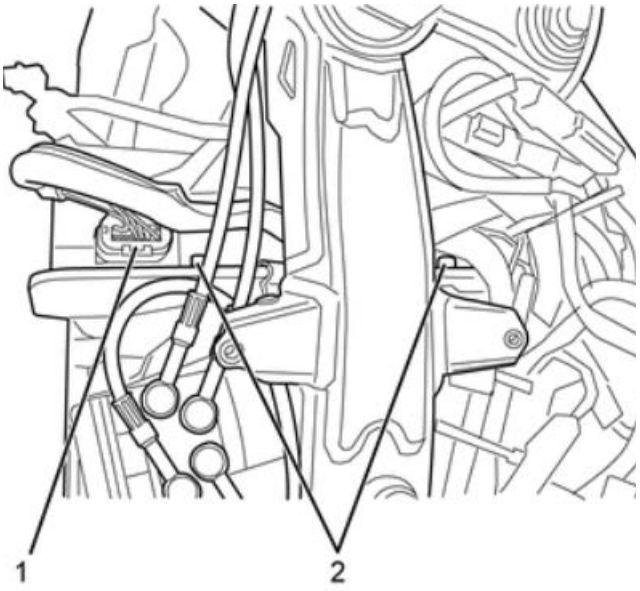
Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

Required Tools

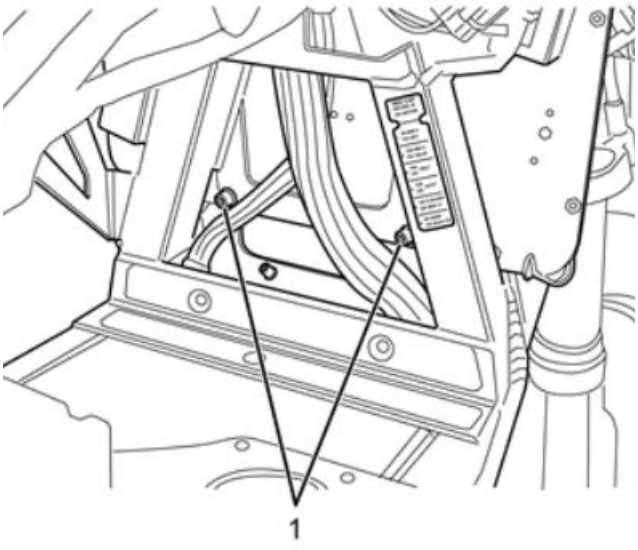
- Philips screwdriver
- Socket wrench
- 5 mm hex wrench
- 13 mm socket
- 3 mm hex wrench
- 7 mm wrench or socket
- 10 mm wrench or socket
- PN 85-05665 Controller Discharge Tool

Removal

1. Discharge the high voltage system. Refer to .High Voltage Discharging, page 10-1.
2. Remove the front fender.
3. Remove the seat.
4. Remove the fairing assembly (front, top, both sides).

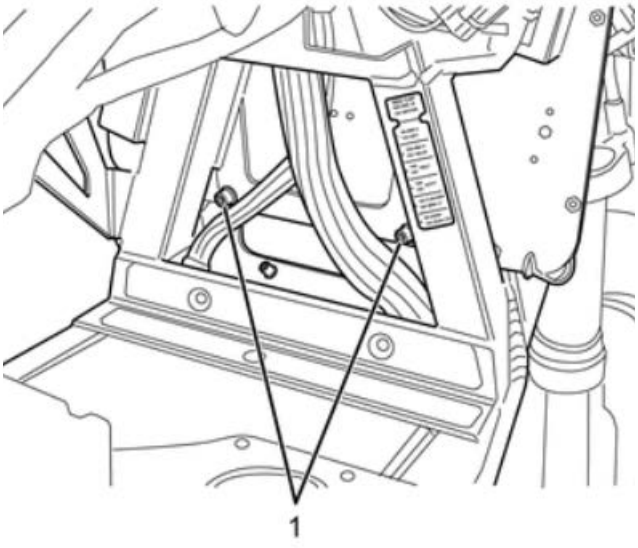


5. Remove the two top nuts, bolts, and washers (2) and the C57 harness connector (1).

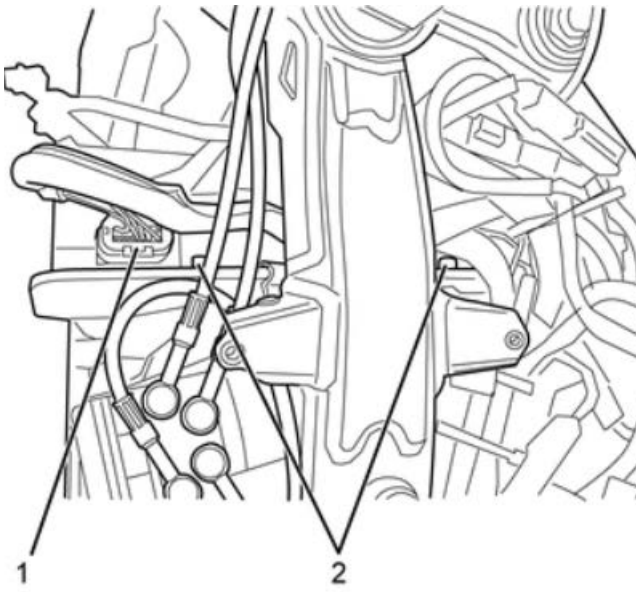


6. Remove the two lower nuts, bolts, and washers (1), and slide the charger out of the frame.

Installation



1. Slide the charger into the frame and install the lower bolts, washers, and nuts (1).
   - Tighten 36 lb-in (4 Nm)



2. Install the upper bolts, washers, and nuts (2).
   - Tighten to 36 lb-in (4 Nm)

Note: Prior to connecting the charger connector coat the terminals with CP70 dielectric grease.

3. Connect the C57 harness connector (1).
4. Install the fairing assembly.
5. Install the front fender.
   - Tighten to 24 lb-in (2.7 Nm)
6. Install the seat.

Belt Replacement

⚠ CAUTION

Do not attempt to install the belt onto the motorcycle without loosening the belt using the axle adjusters. Failure to follow this procedure to release belt tension will cause premature failure of the belt.

Required Tools

- 10 mm hex wrench
- 3 mm hex wrench
- Two 13 mm wrenches
- 27 mm socket and socket wrench

Note: Refer to Drive Belt, page 10-5 *for proper handling of the belt.*

Uncoiling the Belt

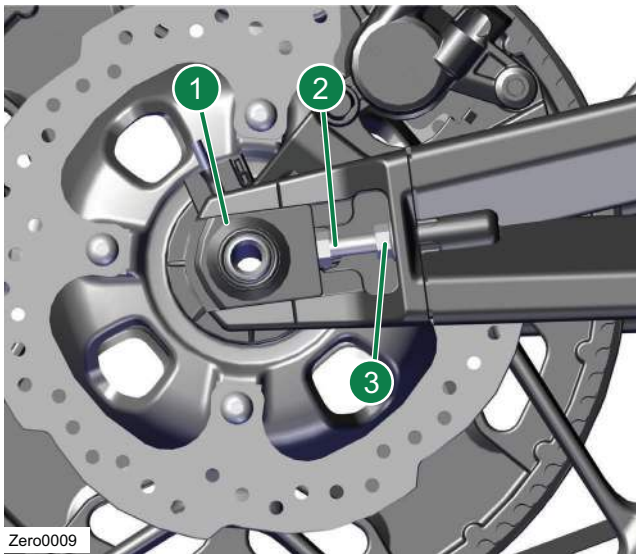
Note: Improper uncoiling may cause permanent damage to the belt.

1. Hold the belt chest high in front of your body and hold the outer coil with both hands.
2. Move your hands away from each other slowly, until the belt uncoils on its own.
3. Now the belt is properly uncoiled.

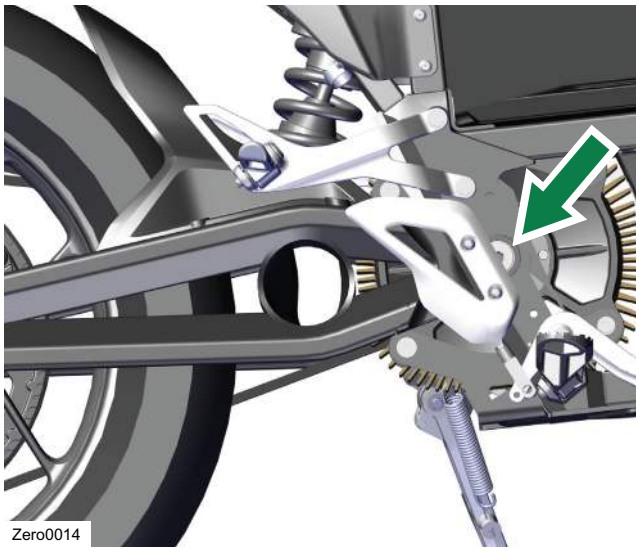
Removal

Note: If reusing the belt, mark the direction on the belt so it can be installed in that direction.

1. Raise and safely support the motorcycle.
2. Remove the four bolts securing the rear fender to the swingarm, and remove the rear fender.



3. Loosen the rear axle nut (1).
4. Loosen belt tensioner jam nut (3) and adjuster bolt (2) on both sides of the bike.
5. Slide the wheel forward and remove the belt from the sprocket.
6. Remove the rear master cylinder bracket bolts from the right side and if equipped the heel guard from the left side.



7. Remove the pivot bolt. Right side shown; left side similar.
8. Pull the swingarm out enough to remove the belt from the motor pulley.

Installation

1. Inspect the sprockets for wear or damage, replace as needed.
2. Pull back on the swingarm enough to install the belt on the motor pulley.
3. Apply Loctite® 242® to the threaded portion of the axle and install the swingarm pivot bolts (1) and tighten. Right side shown; left side similar.
   - Tighten to 75 lb-ft (102 Nm)
4. Install the rear master cylinder bracket bolts on the right side and if removed the heel guard from the left side.
   - Tighten to 20 lb-ft (27 Nm)
5. Install the belt on the wheel sprocket.
6. Adjust the belt tension. Refer to Belt Adjustment - Gates® Carbon Drive™ Smartphone Application, page 10-6 or Belt Adjustment - Tension Tester Tool, page 10-8.
7. Install the fender onto the swingarm.
8. Lower the motorcycle.

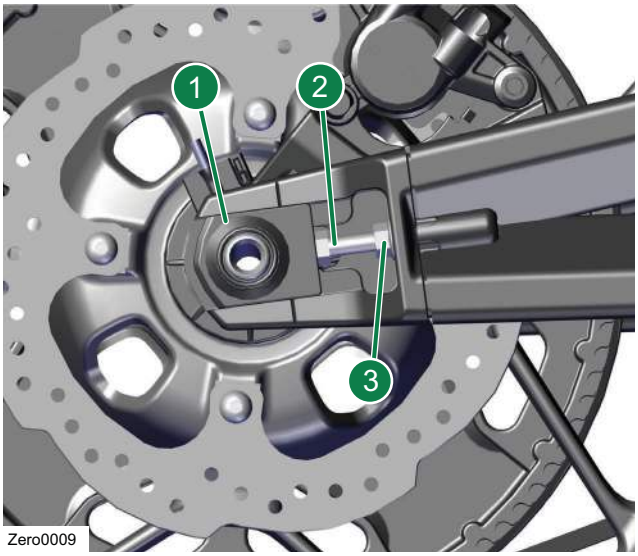
Chain Replacement

Required Tools

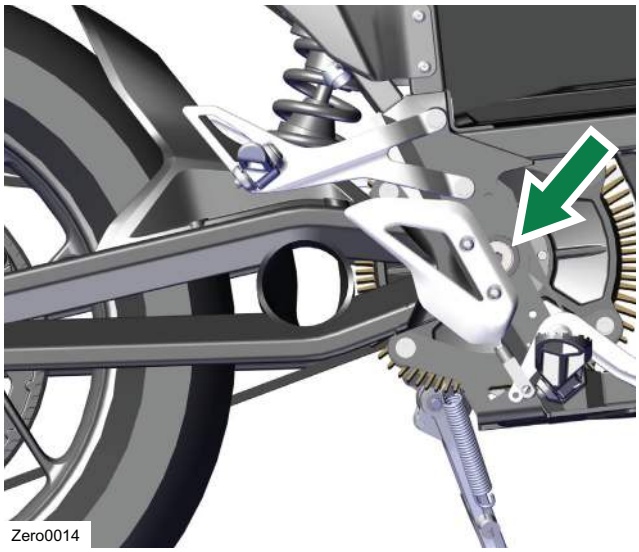
- 10 mm hex wrench
- 3 mm hex wrench
- Two 13 mm wrenches
- 27 mm socket and socket wrench

Removal

1. Raise and safely support the motorcycle.
2. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.



3. Loosen rear axle nut (1).
4. Loosen chain tensioner jam nut (3) and adjuster bolt (2) on each side of the bike.
5. Slide the wheel forward and remove the chain from the sprocket.
6. Remove the rear master cylinder bracket bolts from the right side and if equipped the heel guard from the left side.



7. Remove the pivot bolts on both sides of the bike.
8. Pull the swingarm out enough to remove the chain from the motor pulley.

Installation

1. Inspect the sprockets for wear or damage, replace as needed.
2. Pull back on the swingarm enough to install the chain on the motor pulley.
3. Install the swingarm pivot bolts (1) and tighten. Right side shown, left side similar.
   - Tighten to 75 lb-ft (102 Nm)
4. Install the rear master cylinder bracket bolts on the right side and if removed the heel guard from the left side.
   - Tighten to 20 lb-ft (27 Nm)
5. Install the chain on the wheel sprocket.
6. Adjust the chain tension. Refer to Chain Tension Adjustment, page 10-9.
7. Install the fender onto the swingarm.
8. Lower the motorcycle.

Motor Sprocket Replacement

Required Tools

- Propane torch
- Gear puller
- Loctite 271 and 680
- Approx. 18 in. (457 mm) section of old drive belt

Preparation



1. Make a “sprocket brake” out of an old section (approx. 18 in. (457 mm)) of belt as shown. This will be used to hold the sprocket stationary during removal and installation.

Removal

1. Remove the belt. Refer to Belt Replacement, page 30-1.



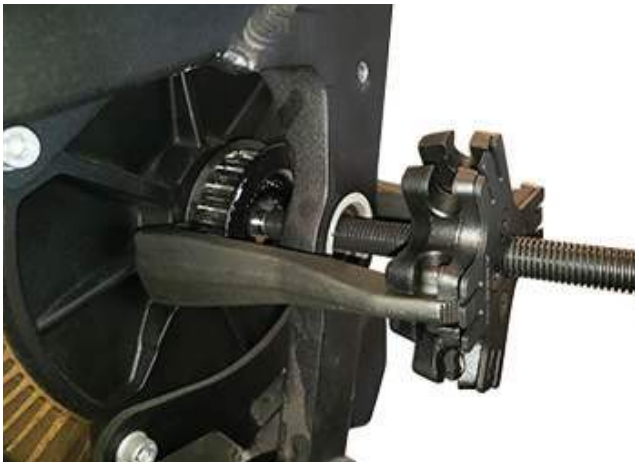
2. Heat the sprocket bolt for a minimum of 4 minutes (approx. 500° F {260 ° C}).



3. Carefully, install the belt tool using a punch to anchor the belt. Remove the sprocket screw using a hand ratchet. If the sprocket screw can not be easily removed with the ratchet, repeat the heating process.

⚠ CAUTION

Do not use an impact wrench or other power tool to remove the sprocket screw. Using an impact can cause permanent damage to the encoder and/or the target magnet resulting in unsafe operation.



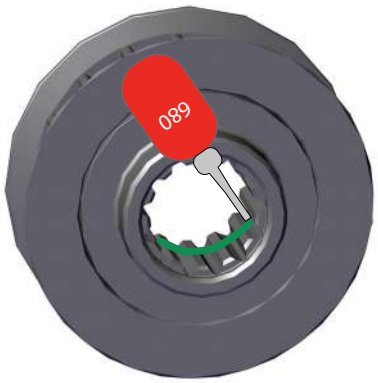
4. Use a jaw puller to remove the pulley. Slowly turn the puller to gently separate the pulley from the motor shaft.

⚠ CAUTION

Prying or hammering on the motor shaft can cause permanent damage to the encoder and or the target magnet resulting in unsafe operation.

Installation

1. Clean the motor shaft of any oil and/or grease. Use alcohol or brake cleaner with a wire brush and clean with a clean cloth.
2. Ensure that the shaft spacer is in place, if equipped.



Zero0068

3. Apply Loctite 680 onto the motor shaft splines and the splines of new sprocket. Install the sprocket onto the shaft.

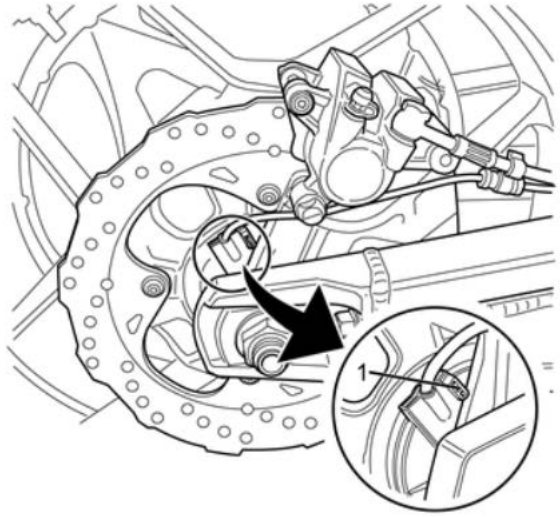
⚠ CAUTION

Prying or hammering on the motor shaft can cause permanent damage to the encoder and or the target magnet resulting in unsafe operation.

4. Apply Loctite 271 onto the sprocket screw and install the top hat washer and the screw.
5. Use the section of belt that was fabricated to hold the sprocket stationary while tightening the screw.
   - Tighten to 53 lb-ft (72 Nm).
6. Install the belt. Refer to Belt Replacement, page 30-1.

Rear Drive Sprocket Replacement-Belt

Note: Belt drive shown, chain drive similar. FX shown, FXS similar.



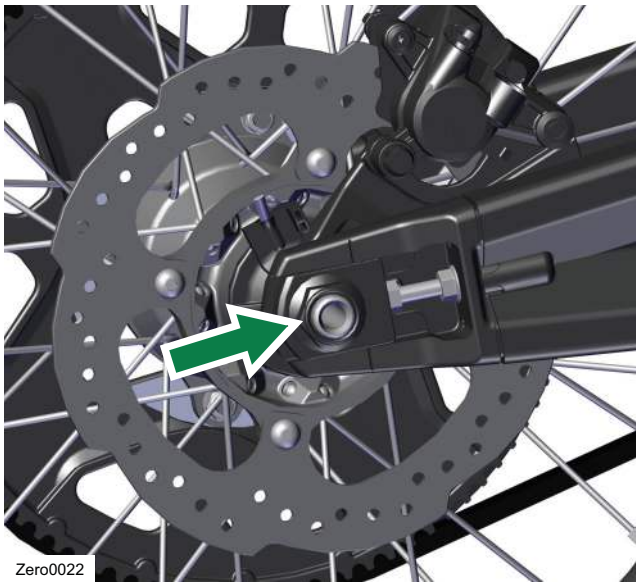
IMPORTANT: Placement of the anti-rotation tab (1) of the ABS sensor is critical, failure to install the anti-rotation tab in the correct location will cause sensor damage/failure. The anti-rotation tab must be installed outside of the rear brake caliper housing.

Required Tools

- 27 mm socket and socket wrench
- 5 mm hex wrench

Removal

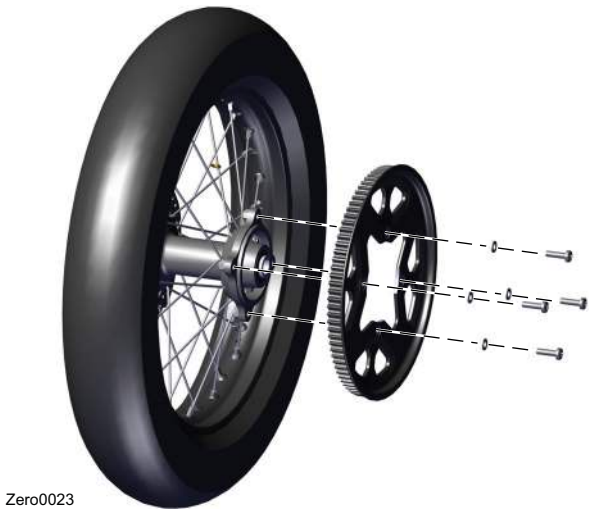
1. Securely raise and support the motorcycle so that the rear wheel is off the ground.
2. Remove the axle cover from the center of the axle (if equipped).



3. Remove the rear axle nut and tap out the axle shaft. Note that there is an axle shaft spacer on the left side of the wheel.
4. Lower the wheel and remove the drive belt (or chain) from the sprocket.

Important: Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

5. Move and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.


Zero0023

6. Remove the four Allen bolts , washers, and nuts securing the sprocket to the wheel.
7. Remove rear sprocket from the wheel.

Installation

Important: Whenever the sprocket has been separated from the wheel flange, any rust or contaminants must be cleaned from the wheel flange and the sprocket mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the sprocket, which could lead to vibration.

1. Inspect the sprocket and wheel flange surface for rust or contamination. Remove rust or contamination if necessary.
2. Install the sprocket (2) onto the wheel flange.
3. Install the sprocket bolts (1) washers and nuts. Tighten in a crisscross pattern.
   - Tighten to 26 lb-ft (35 Nm)
4. Place the caliper into position on the swingarm.
5. Place the drive belt onto the wheel sprocket, ensuring that the left wheel spacer and the ABS sensor are in place.
6. Move the wheel into position, ensure that the brake rotor is centered between the brake pads.
7. Slide axle shaft (2) through the swingarm and wheel, apply Loctite® 242® to the threaded portion of the axle and install the nut (1)
   - Tighten to 75 lb-ft (102 Nm)
8. Install the axle cover if removed.

Motor Replacement

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

Important: Always ensure that the motor is timed using Zero motorcycle programming tools priot to operation.

Required Tools

- 5 mm hex wrench
- 6 mm hex wrench
- 3 mm hex wrench
- 21 mm wrench
- 13 mm wrench
- PN 85-05665 Controller Discharge Tool

Removal

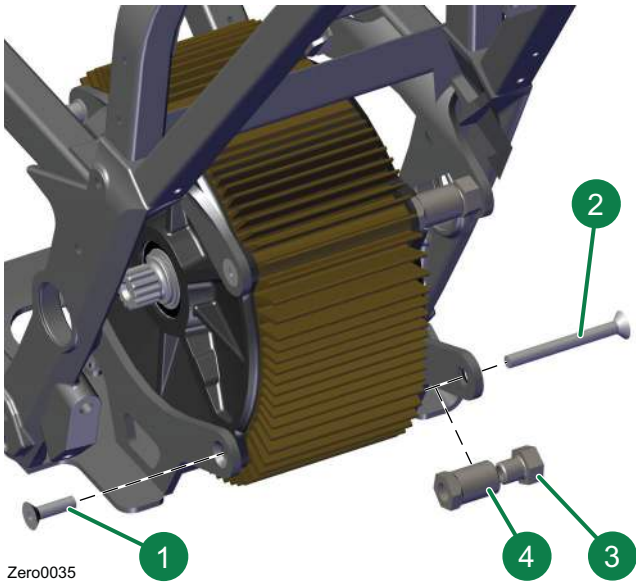
Note: Mark the location of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the rubber side panels.



Zero0034

3. Remove the controller cable bolts (M1, M2, M3).
4. Disconnect the motor harness connector C14 except 11kW or C14 11kW.
5. Remove the swingarm. Refer to Swingarm Assembly Replacement, page 40-13.
6. Mark the direction of rotation on the drive belt and remove the drive belt from the motor pulley.

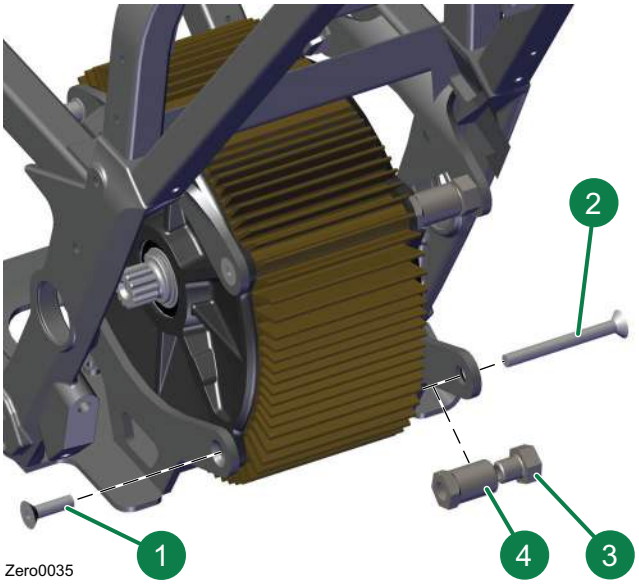


Zero0035

7. Loosen four LH motor bolts (1). Loosen RH motor bolts (2).
8. Loosen jack screws (3 & 4).
9. Remove the motor hardware and lower the motor out the bottom of the motorcycle.

Installation

1. Place the motor into the frame from the bottom, routing the cable to the motor controller.



Zero0035

2. Install Polylube 1000 TM on the bolt threads and install the four LH motor bolts (1) and tighten.
   - Tighten to 26 lb-ft (35 Nm)
3. Install jack screws (3 & 4) and gently expand screw (3) to take up the clearance between the motor and frame.
4. Install Polylube 1000 TM on the bolt threads and install four RH motor bolts (2) and tighten.
   - Tighten to 20 lb-ft (27 Nm)
5. Install the drive belt onto the motor pulley in the same direction as removed.
6. Install the swingarm. Refer to Swingarm Assembly Replacement, page 40-13.



Zero0034

7. Install the motor cables (M1, M2, M3) onto the motor controller in the same locations as removed.
   - Tighten to 8 lb-ft (11 Nm)
8. Connect the motor harness connector C14 except 11kW or C14 11kW.
9. Adjust the belt tension. Refer to Belt Adjustment - Gates® Carbon Drive™ Smartphone Application, page 10-6 or Belt Adjustment - Tension Tester Tool, page 10-8.
10. If a new motor was installed, manually enter the offset angle listed on the sticker of the new motor before proceeding to the next step.
11. Perform Motor Commissioning to pair the new motor with the controller. Refer to Motor Commissioning, page 30-11.

Motor Controller Heat Sink Replacement

Required Tools

- 10 mm wrench or socket
- Socket wrench
- 5 mm hex wrench

Removal

1. Remove the motor controller. Refer to Motor Controller Replacement, page 30-10.


Zero0015

2. Remove the four heat sink bolts and separate the heat sink from the motor controller.

Installation

Important: A layer of thermal grease (such as Dow Corning® 340) MUST be applied as described below, before bolting the motor controller to the heat sink.

1. Clean the mounting surface of the motor controller of any old thermo grease.
2. Apply the thermal grease to both the motor controller and the heat sink using a small soft paint roller to ensure an even spread of thermal compound. The most appropriate thickness will look white but with a grayish color still showing through from the controller base or heat sink. Note that too little thermal compound will not fill all gaps of the contact surfaces, but too much thermal compound may prevent the gap from closing up when tightening.
3. Place the heat sink onto the motor controller and rub both surfaces together. This will help transfer the thermal compound between the two surfaces.
4. Install heat sink bolts.
   - Tighten to 8 lb-ft (11 Nm)
5. Install the motor controller. Refer to Motor Controller Replacement, page 30-10.

Motor Controller Replacement

⚠ CAUTION

Caution: Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

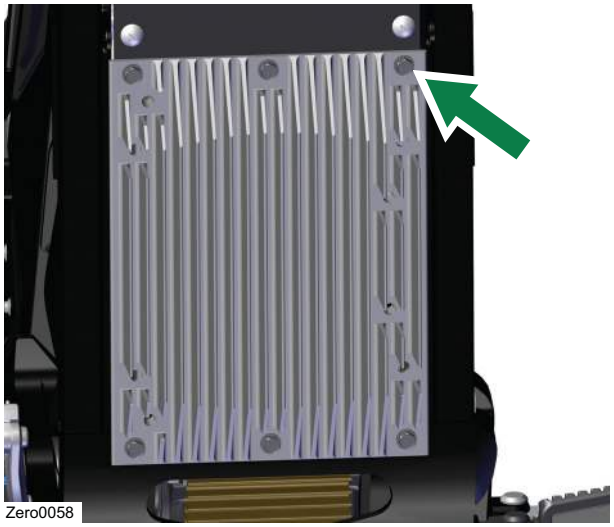
Required Tools

- Socket wrench
- 13 mm socket
- 3 mm hex wrench
- 4 mm hex wrench
- 5 mm hex wrench
- 8 mm wrench or socket
- 10 mm wrench or socket
- P/N 85-05665 Controller Discharge Tool

Removal

Note: Mark the location of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the rubber side panels.
3. Remove the skid plate.


Zero0058

4. Remove the six bolts securing the motor control onto the frame and remove the controller.
5. Disconnect the motor controller connector C90.



Zero0034

6. Remove motor cables (M1, M2, M3) from the motor controller.
7. Remove the power pack cables (B-, B+) from the motor controller and remove the motor controller.
8. Remove the heat sink from the controller if required. Refer to Motor Controller Heat Sink Replacement, page 30-9.

Installation

1. Install the heat sink onto the controller if required. Refer to Motor Controller Heat Sink Replacement, page 30-9.
2. Place the controller into position and loosely install the three lower bolts.



Zero0034

3. Install the five cables onto the motor controller.
   - Tighten to 8 lb-ft (11 Nm)

4. Install the upper motor controller bolts.
5. Tighten all motor controller bolts.
   - Tighten to 8 lb-ft (11 Nm)
6. Connect the motor controller connector C90.
7. Install the skid plate.
   - Tighten to 8 lb-ft (11 Nm)
8. Install the rubber side panels.
9. Perform Motor Commissioning to pair the new controller with the motor. Refer to Motor Commissioning, page 30-11.

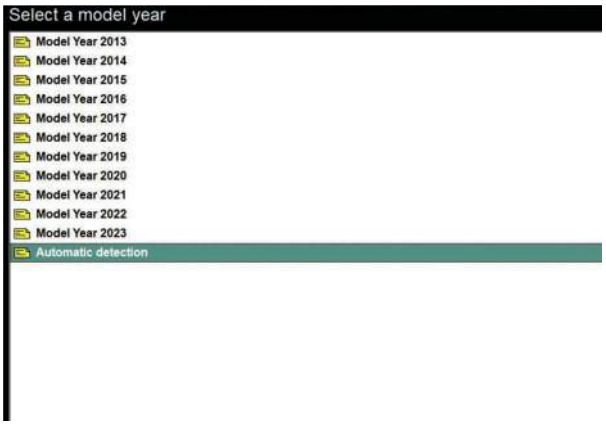
Motor Commissioning

Perform this procedure after replacing the motor or controller.

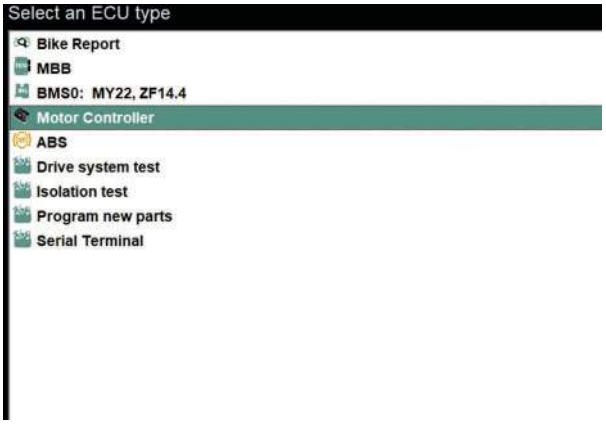
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



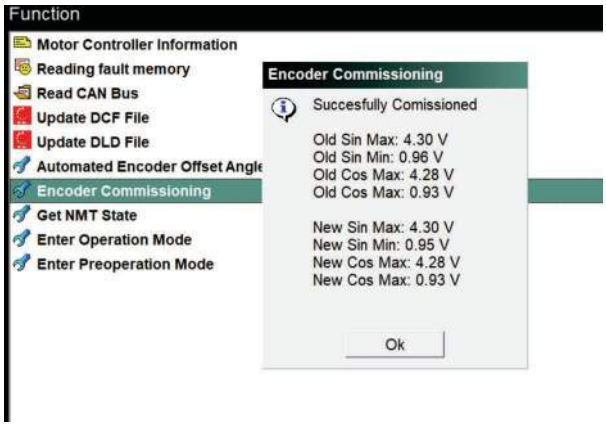
3. Select “Troubleshooting”.



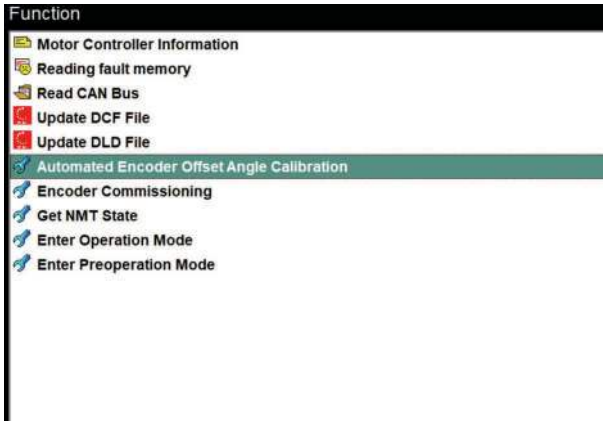
4. Select the model year or select “Automatic detection”.



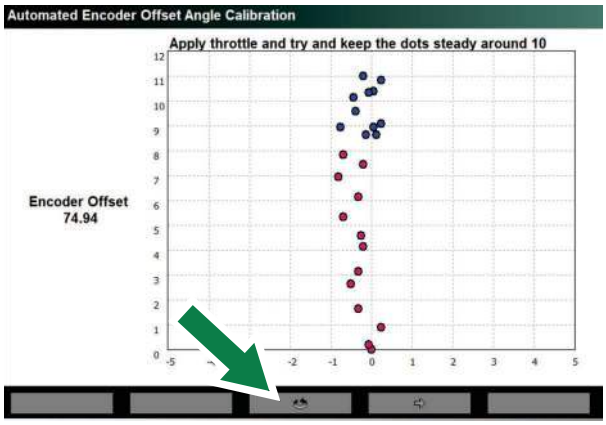
5. Select “Motor Controller”.



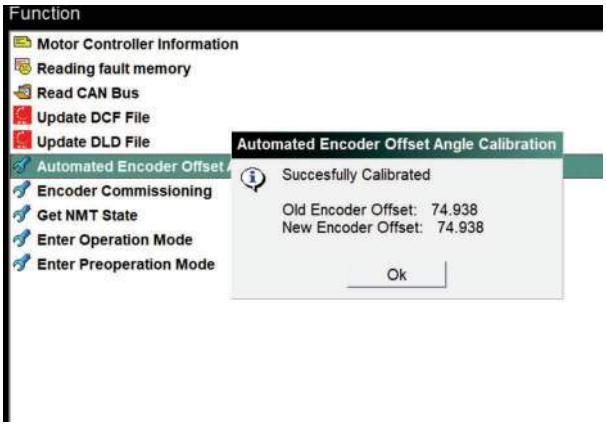
6. Select Encoder Commissioning. Once complete, select Ok.



7. Select “Automatic Encoder Offset Angle Calibration”.



8. Press the circular arrow button and enter the offset value from the motor. Then, follow the prompts for the dots.
9. Press the blue arrow to input motor offset.
10. After entering the offset, press the green arrow and then follow the prompt on top of the graph.



11. Once complete, select “Ok” and exit the program.

Main Bike Board (MBB) Replacement (Modular)

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

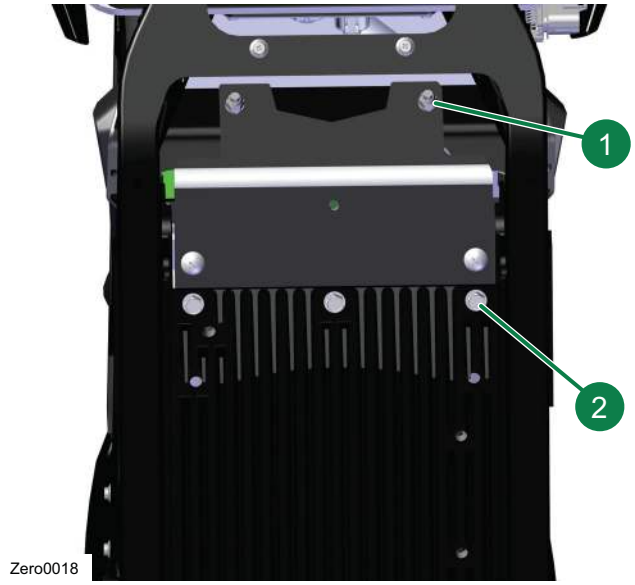
Required Tools

- 2.5 mm hex wrench
- 3 mm hex wrench
- 4 mm hex wrench
- 7 mm wrench or socket
- 8 mm wrench or socket
- Socket wrench
- PN 85-05665 Controller Discharge Tool

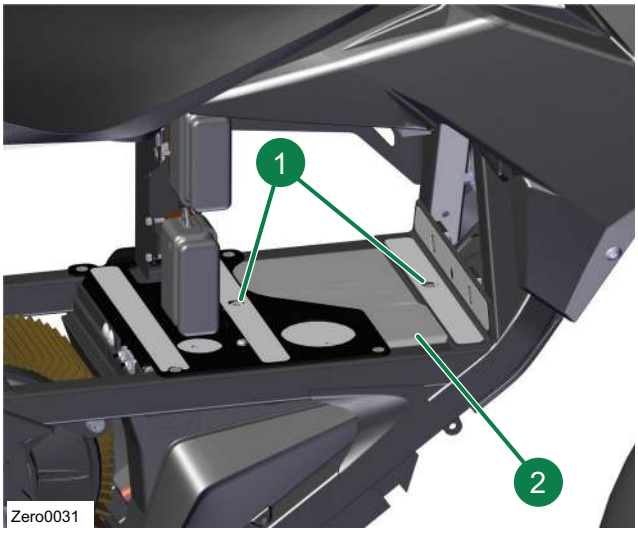
Removal

Note: Mark the location of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the rubber side panels.
3. Remove the battery packs.
4. Remove the front fender.
5. Remove the center fairing panel.



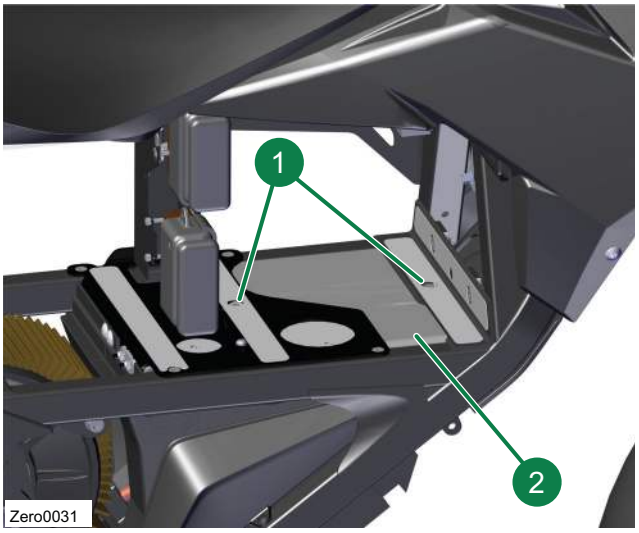
6. Remove the motor controller top bracket nuts (1) and bolts (2).



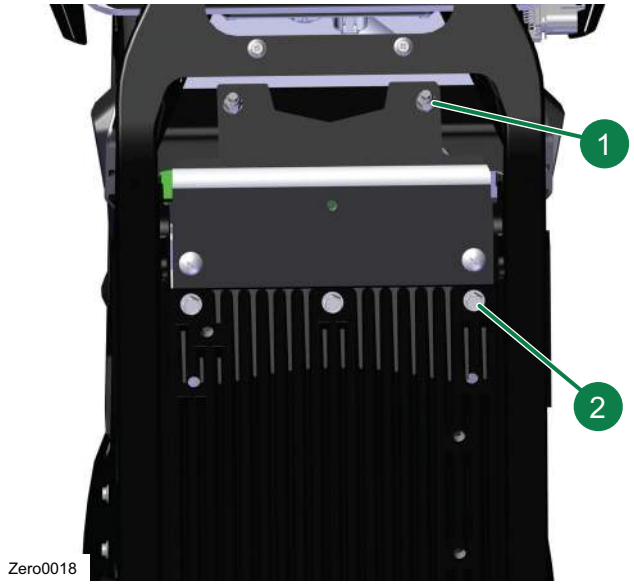
7. Remove the bolts (1) and remove the cover (2). Note: The front bolt has a nut on the bottom that has to be held.
8. Disconnect the MBB connectors (C1 and C2).
9. Remove the MBB.

Installation

1. Install the MBB and connect the C1 and C2 connectors.



2. Install cover (2) and bolts (1).
   - Tighten to 12 lb-in. (1.3 Nm)



3. Install the motor controller top bracket nuts (1) and bolts (2).
   - Tighten to 8 lb-ft (11 Nm)
4. Install the center fairing panel.
5. Install the front fender.
   - Tighten to 24 lb-in (2.7 Nm)
6. Install the rubber side panels.
7. Install the battery packs.

Main Bike Board (MBB) Replacement (Integrated)

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed!

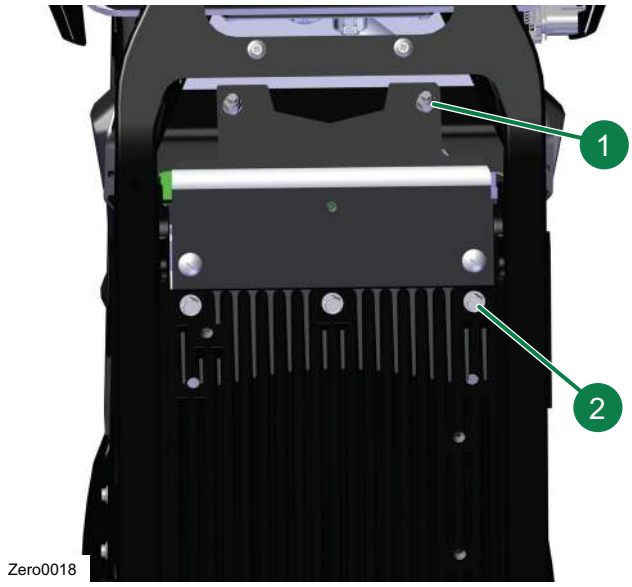
Required Tools

- Philips screwdriver
- 2.5 mm hex wrench
- 3 mm hex wrench
- 7 mm wrench or socket
- 10 mm wrench or socket
- Socket wrench
- PN 85-05665 Controller Discharge Tool

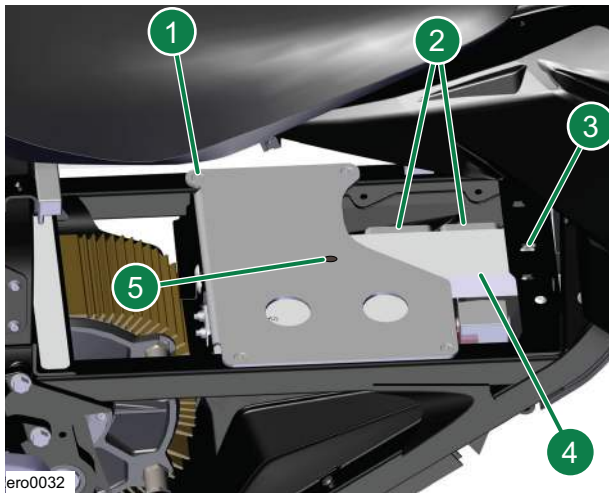
Removal

Note: Mark the location of all wires and cables prior to removal.

1. Discharge the high voltage system. Refer to High Voltage Discharging, page 10-1.
2. Remove the rubber side panels.
3. Remove the front fender.
4. Remove the center fairing panel.
5. Remove the power pack. Refer to Power Pack Replacement (Ingetrated), page 20-7.

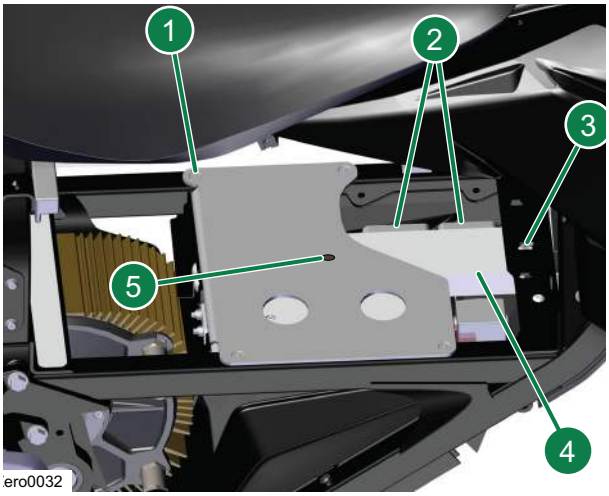


6. Remove the motor controller top bracket nuts (1) and bolts (2).

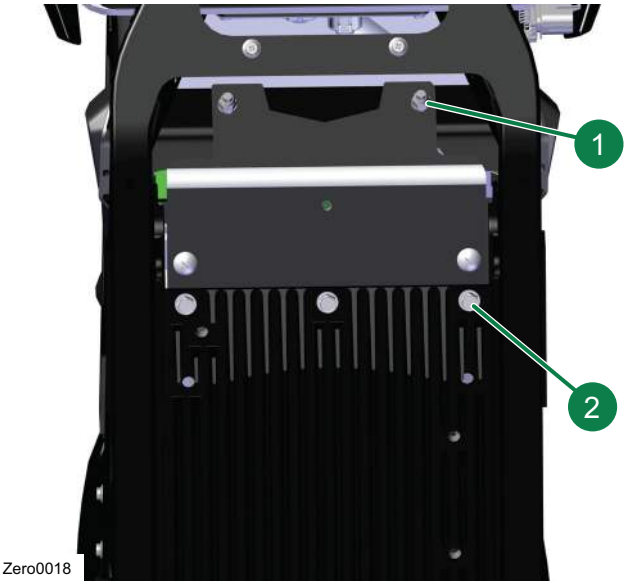


7. Remove the bolts (1) and nut and bolt (3). Note: The front bolt has a nut on the bottom that has to be held.
8. Lift up on the bracket and disconnect MBB connectors (2).
9. Remove the nut (5) then remove MBB (4) from the bracket.

Installation



1. Install the MBB (4) onto the bracket and install the nut (5).
   - Tighten to 12 lb-in (1.3 Nm)
2. Connect the C1 and C2 connectors (2).
3. Lower the battery base plate and install the bolts (1) and nut and bolt (2).
   - Tighten main bike board nut to 12 lb-in (1.3 Nm)
   - Tighten battery base plate nut and bolt to 54 lb-in (6 Nm)



4. Install the motor controller top bracket nuts (1) and bolts (2).
   - Tighten to 8 lb-ft (11 Nm)
5. Install the center fairing panel.

6. Install the front fender.
   - Tighten to 22 lb-in (2 Nm)
7. Install the rubber side panels.
8. Install the power pack. Refer to Power Pack Replacement (Ingetrated), page 20-7.

Throttle Replacement

Required Tools

- T25 tamper proof star wrench
- 10 mm socket
- Socket wrench
- 3 mm hex wrench

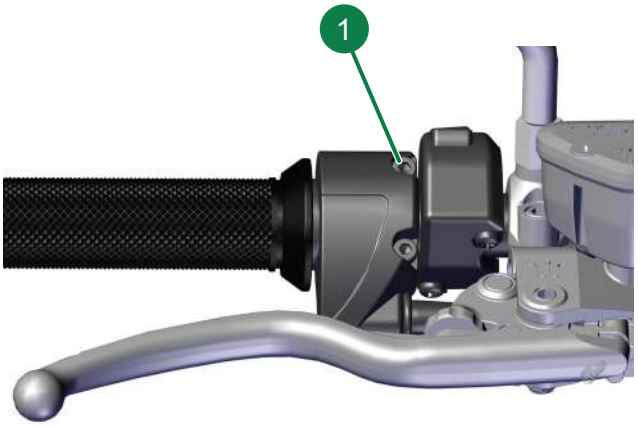
Removal

1. Remove the fly-screen.



Zero0059

2. Remove the two nuts and washers securing the instrument panel to the bracket; move the instrument panel to the bracket; move the instrument panel off to the side.
3. Note the location of the harness routing a zip tie locations for reassembly. Remove and discard the zip ties.
4. Disconnect the throttle harness connector C459.

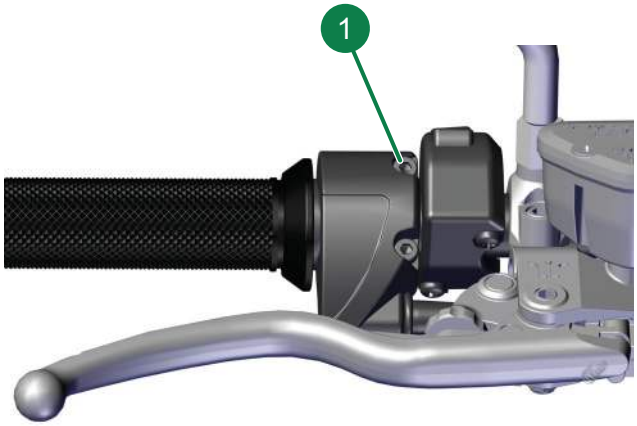


Zero0033

5. Loosen two throttle screws (1) and separate the top of the housing enough so that alignment pin is out of the hole in the handlebar. Slide the throttle off of the handlebar.

Installation

1. Slide the throttle back into position next to the handlebar control. Note: there is a pin on the throttle that must align with the hole in the handlebar.
2. Tighten throttle screws (1).



Zero0033

3. Route the harness in the same routing as removed, and connect the throttle harness connector C459.
4. Install new zip ties in the same location as removed.



Zero0059

5. Position the instrument panel onto the turn signal brackets and install the two washers and nuts.
   - Tighten to 36 lb-in (4 Nm)
6. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
7. Twist the throttle and verify that throttle is smooth and returns correctly.

Front Fork Specifications

Model	FX	FXS/FXE	MMX
Free Length	789.1±2.0 mm	769.4±2.0 mm	789.1±2.0 mm
Max Length	798 mm	778 mm	798 mm
Min Length	580 mm	600 mm	580 mm
Stroke	218 mm	178 mm	218 mm
Spring Rate	5.4 N/mm	6.0-7.0 N/mm**	5.4 N/mm
Oil	SS No.8	SS No.8	SS No.8
Oil Volume	432±2.5 cm^3	408±2.5 cm^3	432±2.5 cm^3
Oil Level	127 mm	170 mm*	127 mm
Rebound (Tension)	Max - 9 clicks	Max - 12 clicks	Max - 9 clicks
Compression	Max - 5 clicks	Max - 7 clicks	Max - 5 clicks
Preload	Min + 7.5 turns	Min + 5.5 turns	Min + 7.5 turns
Outer Tube Finish	Natural Anodized (silver)	Natural Anodized (silver)	Natural Anodized (silver)
Slide Tube Finish	Nickel - Hard Chrome	Nickel - Hard Chrome	Nickel - Hard Chrome
Rebound (Tension) Finish	Blue Anodized	Blue Anodized	Blue Anodized
Compression Finish	Blue Anodized	Blue Anodized	Blue Anodized

*Measured from outer tube end to oil surface (condition: spring, spring joint, spring collar, seat rubber, slider, fork bolt are removed and dust seal touches axle holder)
**Dual Rate

Rear Suspension Specifications

Factory Supplied Rear Shock Settings

Description	Value
Spring Rate	73.6-82.4 N/mm**
Free Length	320 ± 2.0 mm
Max Length	320.5 mm
Min Length	246 mm
Stroke	74.5
Rebound (Tension)	Max - 12 clicks
Compression	Max - 9 clicks
Preload	5th Position
Body Finish	Natural Anodized (silver)
Rod Finish	Nickel - Hard Chrome
Rebound (Tension) Finish	Black Anodized
Compression Finish	Black Anodized

*Measured from outer tube end to oil surface (condition: spring, spring joint, spring collar, seat rubber, slider, fork bolt are removed and dust seal touches axle holder)
**Dual Rate

Preferred Rear Sag Settings

Model	SAG
FX, FXS, FXE	3.22 in (82 mm)

Description and Operation

The front and rear suspension can be adjusted for sag and damping. For adjustment procedures, refer to Suspension Adjustment, page 40-3

Front Suspension

The fork assembly contains the triple tree and fork legs (shocks). The triple tree holds the fork legs in place and attaches the fork assembly to the frame.

The shock has two main actions: Compression when the shock gets compressed, and rebound when the shock returns back to full length. Compression damping is the adjustment that determines how fast or slow the fork compresses. Rebound damping is the adjustment that determines how fast or slow the fork rebounds.

Rear Suspension

The rear suspension is a swingarm with a mono-shock design. One end of the swingarm is connected to the frame (pivot end) and the end to the wheel. Controlling the action/movement of the swingarm is the shock.

The shock is a fully adjustable coilover design. The coilover shock contains a spring surrounding it. The spring rate is adjustable and is factory set for a 180 lb (82 kg) rider. The rate is a measure of how much force is required to compress the spring a given distance. The higher the rate, the more force it takes to compress it a given distance, and the less it compresses under a given force.

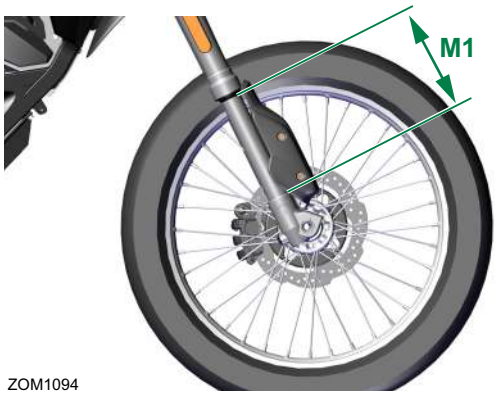
The shock has two main actions: Compression when the shock gets compressed, and rebound when the shock returns back to full length. Compression damping is the adjustment that determines how fast or slow the shock compresses. Rebound damping is the adjustment that determines how fast or slow the shock rebounds.

Suspension Adjustment

Front Fork Adjustment

Adjusters should never be forced completely in one direction; always leave one click of adjustment in either direction.

1. Fork Preload (sag)
   a. Support your motorcycle upright on a stand with the front wheel on the ground.
   b. Measure vertically from the bottom of the fork tube to the bottom of the tube's dust seal.



ZOM1094

   c. Record this measurement (this is the measurement referred to as M1).
   d. Remove the motorcycle from the stand.
   e. Wearing your normal riding apparel, sit on the motorcycle.
   f. Have an assistant hold the motorcycle upright, your feet should be on both pegs.
   g. Bounce the suspension a couple of times.
   h. Have a second assistant take a measurement using the same locations as in step b.



ZOM0640

   i. Record this measurement (this is the measurement referred to as M2).
   j. Subtract the second measurement (M2) from the first measurement (M1).

Example:

Measurement		Value
M1		6.49 in (165 mm)
M2	-	3.62 in (92 mm)
Sag	=	2.87 in (73 mm)

The total sag is 2.87 in (73 mm). Refer to the following chart below for the correct sag. If the sag is not correct the spring pre-load should be adjusted. Refer to Spring Pre-load Adjustment.

2. Rebound Damping



ZOM1095

The rebound damping is adjusted by turning the slotted brass adjuster screw (A) on the top of both fork legs. Next to it will be the writing S-F, meaning Slow and Fast. The adjuster has 9 stages of adjustment. This determines how quickly the fork returns to its extended position after being compressed.

Turning the rebound adjuster screw clockwise will slow the rebound speed down making it better for larger, rolling terrain or bumps. Turning the rebound adjuster screw counter-clockwise will increase the rebound speed making it better for smaller, rougher bumps. Adjust each fork leg evenly.

3. Spring Preload Adjustment

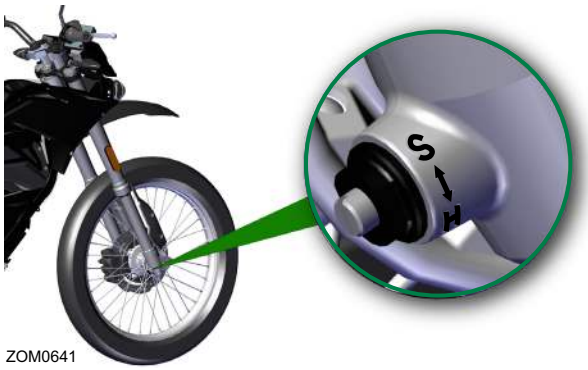
The spring preload is adjusted by turning the 19 mm anodized hex nut (B) located on top of the fork spring.

Note: When adjusting preload, always start from the minimum setting and adjust each fork leg evenly.

• *Turning the adjustment nut clockwise increases the spring preload and reduces sag of the front suspension.*

• *Turning the adjustment nut counter-clockwise decreases the spring preload and increases sag of the front suspension.*

4. Compression Damping



ZOM0641

The compression damping is adjusted by turning the screw on the bottom of each fork leg. There is a rubber dust cover protecting the jam nut. Next to the screw are the letters “H” meaning Hard (slower compression) and “S” meaning Soft (faster compression). The adjuster has 12 stages of adjustment. Turn the adjuster counter-clockwise for slower compression. To speed up compression, turn the adjuster clockwise. Start with a middle setting and fine tune the compression from there. Proper compression will allow the tire to track the ground over consecutive bumps. Compression that is set too slow will pack-up (feel harsh over consecutive bumps) while compression that is set too fast will cause the fork to bottom out harshly. If the fork is bottoming out, turn the adjuster one turn at a time until the bottoming-out stops. Adjust each fork leg evenly.

Factory Supplied Front Suspension Settings

FX Models	
Adjustment	**Setting**
Front Fork Compression	5 clicks counter-clockwise from maximum (H) position
Front Fork Preload	7.5 turns clockwise from the full out position
Front Fork Rebound (tension)	9 clicks counter-clockwise from maximum (H) position

FX Models	
Front Sag	2.87 in (73 mm)

FXS/FXE Models	
Adjustment	**Setting**
Front Fork Compression	7 clicks counter-clockwise from maximum (H) position.
Front Fork Preload	5.5 turns clockwise from the full out position
Front Fork Rebound (tension)	12 clicks counter-clockwise from maximum (H) position
Front Sag	2.36 in (60 mm)

Rear Shock Adjustment

Adjusters should never be forced completely in one direction; always leave on click of adjustment in either direction.

Spring Adjustment

Obtaining the correct rear spring rate is critical for proper handling. The spring rate must be set to match the weight of the rider. The spring is preloaded for an 180 lb (82 kg) rider. Heavier riders require stiffer spring rates. A good approximation of the rear spring requirements can be found by measuring the rear suspension’s sag. This measurement will quickly determine if the rear spring is approximately correct for the rider's weight. This adjustment is a recommendation guideline; personal riding preference may vary from the specifications given.

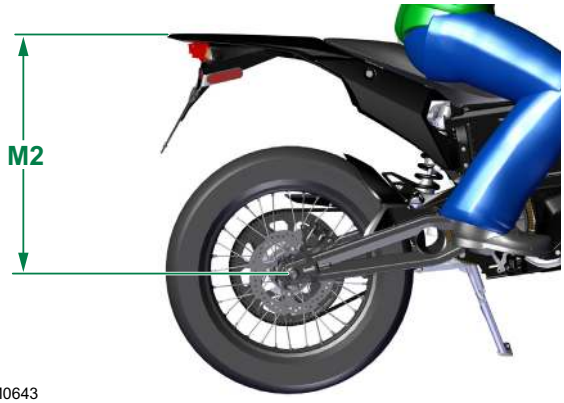
• Checking Sag

1. Support the motorcycle on a stand with the rear wheel off the ground.
2. Measure vertically from the rear axle to the rear fender; mark this spot as it will be used for other measurements.



ZOM0642

3. Record this measurement; this will be measurement M1.
4. Remove the motorcycle from the stand.
5. Wearing normal riding apparel, sit on the motorcycle.
6. Have an assistant hold the motorcycle up, your feet should be on both pegs.
7. Bounce the suspension a couple of times.
8. Have a second assistant take a measurement using the same locations as in step 2.



ZOM0643

9. Record this measurement; this will be measurement M2.
10. Subtract the second measurement (M2) from the first measurement (M1).

Example:

Measurement		Value
M1		24.02 in (610 mm)
M2	-	20.97 in (528 mm)
Sag	=	3.22 in (82 mm)

The total sag is 3.22 in (82 mm). Refer to the chart below for the correct sag. If the sag is not correct the spring pre-load should be adjusted. Refer Spring Pre-load Adjustment.

Preferred rear settings

Model	Sag
FX, FXS, FXE	3.22 in (82 mm)

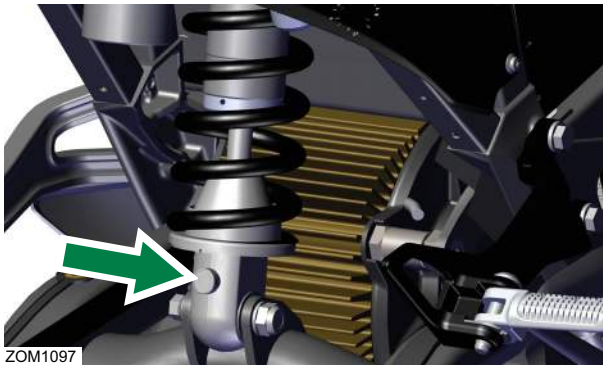
Spring Pre-load Adjustment

1. Clean any dirt or debris from the slots of the shock adjusting collar.


ZOM1096

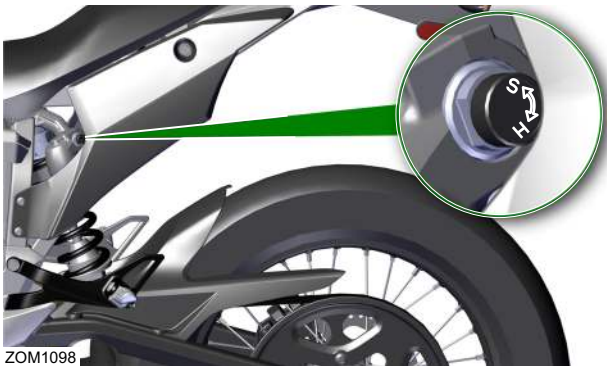
2. Using a lock ring wrench turn the adjusting collar.
3. For measurements less than the specified value, decrease the pre-load on the spring by turning the adjustment collar counter-clockwise on the shock. If more than the specified value, increase the pre-load on the spring by turning the adjustment collar clockwise on the shock.

Rebound Adjustment


ZOM1097

The rebound adjuster knob is at the bottom of the shock. It has 8 stages of adjustment. Printed on the knob is H-S, meaning Hard and Slow. The rebound adjuster knob controls how slow or fast the shock returns to its extended position after being compressed. Turning the knob clockwise, or S direction, is good for big impacts. Turning the knob counterclockwise, or S direction, is good for many smaller and more frequent impacts.

Compression Adjustment



ZOM1098

The compression adjustment knob is at the top of the shock. It has 18 stages of adjustment. Printed on the knob is “H” meaning Hard (slower compression) and “S” meaning Soft (faster compression). Turn the adjuster clockwise for slower compression. To speed up compression, turn the adjuster counter-clockwise. Start with a middle setting and fine tune the compression from there. Proper compression will allow the tire to track the ground over consecutive bumps. Compression that is set too slow will pack-up (feel harsh over consecutive bumps) while compression that is set too fast will cause the shock to bottom out harshly. If the shock is bottoming out, turn the adjuster one click at a time until the bottom out stops.

Factory Supplied Rear Suspension Settings

Adjustment	Setting
Rear Shock Compression	9 clicks counter-clockwise from maximum (H) position
Rear Shock Rebound (tension)	12 clicks counter-clockwise from maximum (H) position
Rear Shock Spring Preload	5th position from minimum unloaded position

Suspension General Diagnosis

Preliminary Checks

Since problems in steering, suspension, tires, and wheels involve several systems, all systems must be considered when diagnosing a complaint. In order to avoid pursuing the wrong symptom, always test ride the vehicle first. Refer to Road Testing Procedure, page 1-12. Proceed with the following preliminary checks and correct any substandard conditions which are found.

- Inspect the tires for the following:
  - Pressure
  - Wear
  - Size
  - Brand
  - Construction
  - Balance
  - Runout
- Inspect the wheels for the following:
  - Size
  - Balance
  - Runout
  - Damage
  - Proper installation
- Inspect the following for loose connections, wear, or damage:
  - The steering fork
  - The front suspension
  - The rear suspension

Steering Head Service

Required Tools

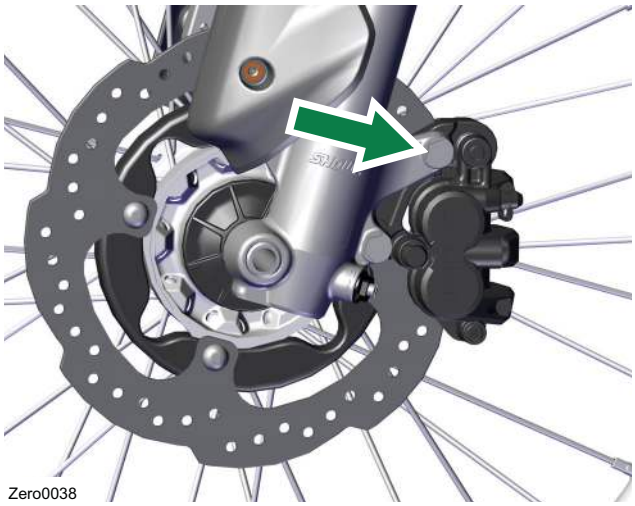
- 8 mm hex wrench
- Steering stem lock nut socket
- 16 mm hex wrench
- 41 mm socket
- 6 mm hex wrench
- 5 mm hex wrench
- 3 mm hex wrench

Replacement Parts

- Dust seals
- Upper and Lower Bearing set
- Lower Triple Clamp Assembly – XMX

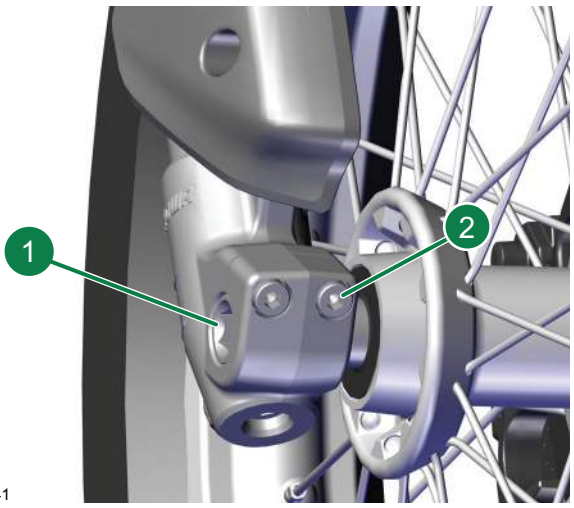
Removal

1. Remove the key from the key switch and support the motorcycle upright on a stand with the front wheel off the ground.


Zero0038

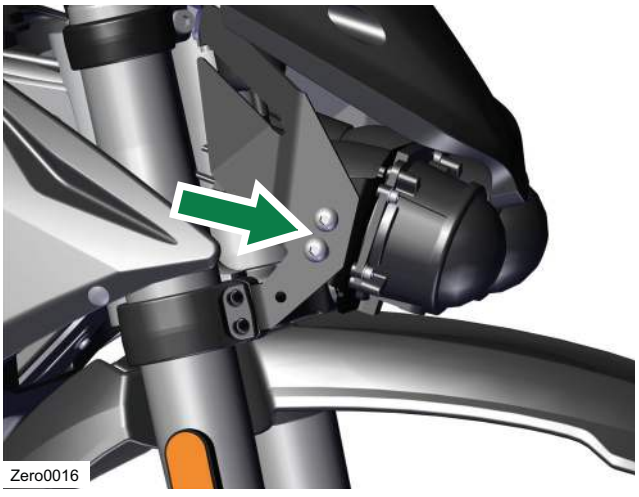
2. Remove two caliper bolts. Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

3. Slide the brake caliper off of the brake rotor and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.

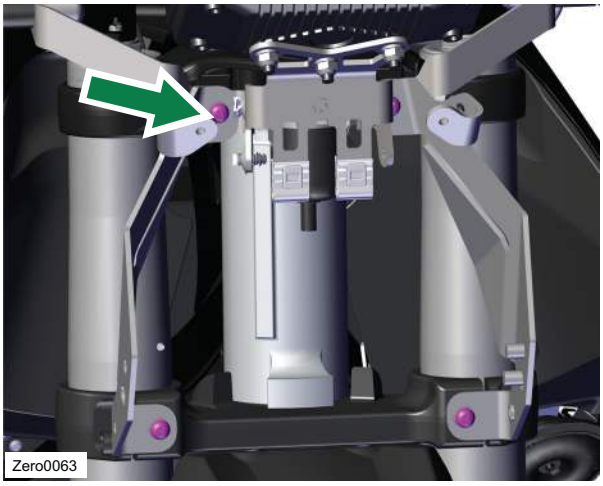


Zero0041

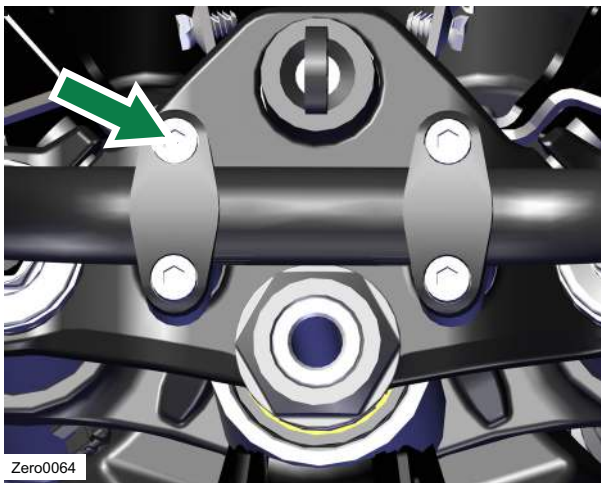
4. Remove the front axle shaft pinch bolts (2) from the right lower fork leg.
5. Unscrew the front axle (1) then slide the axle out of the fork.
6. Remove sensor wire/brake line clips from the fork.
7. Remove the front fender.
8. Remove the fly-screen bolts and the fly-screen.


Zero0016

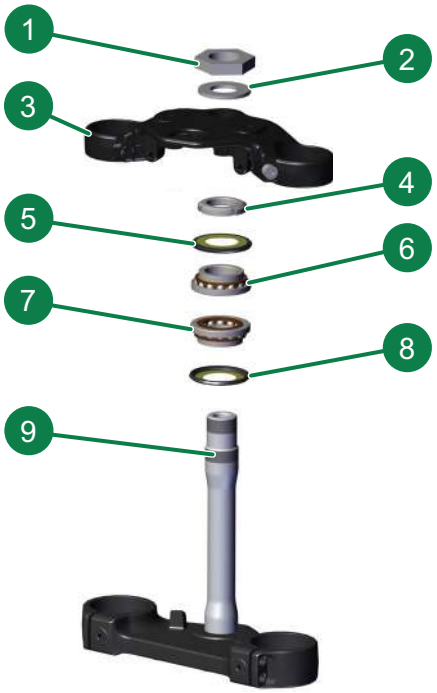
9. Remove the lower headlight bolts from both sides and move the headlight off to the side.


Zero0063

10. Remove the headlight/turn signal bracket bolts from both sides.


Zero0064

11. Remove handlebar bolts, clamps, and the handlebar. Lay forward along with the turn signals and instrument panel assembly.



ero0030

1. Steering Stem Nut
2. Washer
3. Upper Triple Clamp
4. Steering Stem Lock Nut
5. Dust Seal
6. Bearing and Inner Race
7. Bearing
8. Dust Seal
9. Lower Triple Clamp

12. Loosen the upper triple clamp pinch bolts.
13. Remove steering stem nut and washer.
14. Remove upper triple clamp. Place towel between triple clamp and handlebar for protection.
15. Loosen the lower triple clamp pinch bolts.
16. Remove both of the forks from the lower triple clamp.
17. Using a steering stem nut socket, remove steering stem lock nut.
18. Remove lower triple clamp assembly from frame.
19. Remove all bearings and dust seals.

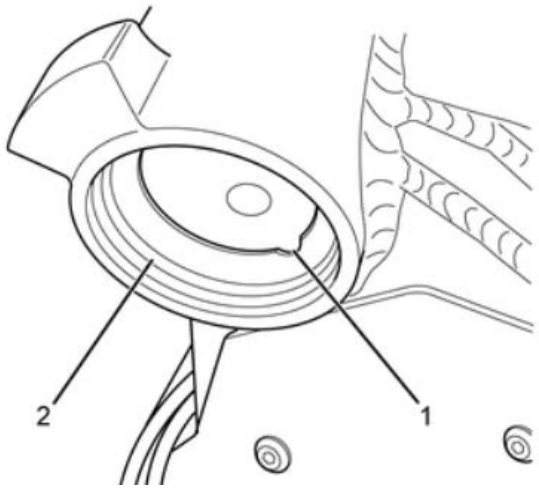
Inspection

1. Clean head tube bore completely.
2. Clean bearing races and steering stem with brake clean or alcohol.
3. Inspect steering stem just above the lower inner race for scoring/gouging of steering stem.

If you find scoring or damage to steering stem, you must replace the lower triple clamp assembly, bearings, and races. If the bearing races are loose in the head tube bores the frame must be replaced.

If scoring/pitting or any other damage is found on the bearings or races, the bearing and races must be replaced.

Bearing Race Replacement



1. The bearing race is pressed into the head tube bore. To remove the race, insert a soft punch into the head tube and carefully tap the race out from the inside. There are notches (1) in the head tube for the punch to get the race started. After it is started, tap around the race to get it out evenly without damaging the head tube bore.

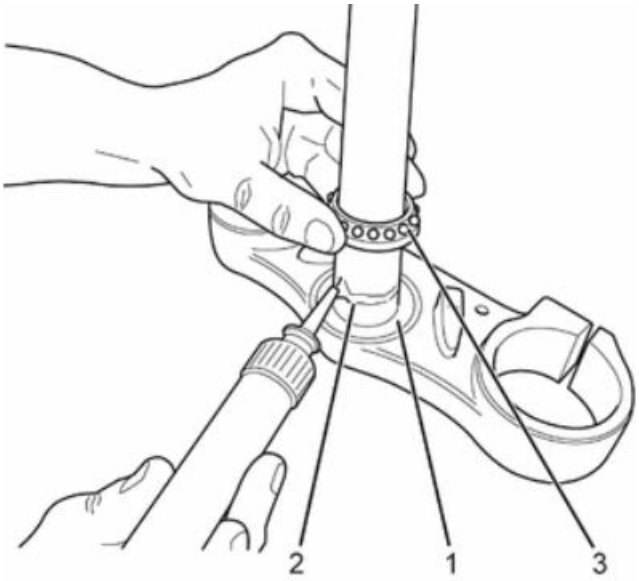
Note: When the race is removed, it can score the head tube bore. Inspect the head tube bore area (2) for any damage. If any damage is found, smooth bore with 600 grit sandpaper to remove scores or ridges.

2. Apply Loctite® 609® to sides and bottom of outer race and sides and bottom of head tube bore.

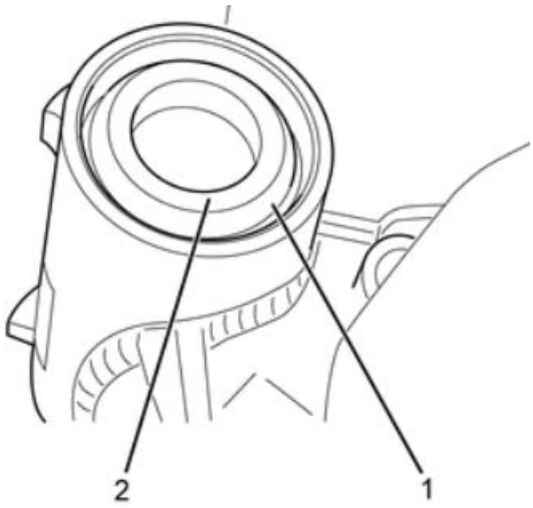
3. Tap the race in slowly and evenly with a race installer or suitable socket. Make sure that the race is squarely seated in the head set bore before tapping it in. Ensure that the race is fully seated in the head tube bore.
4. Wipe residual green Loctite® 609® from race and head tube.

Installation

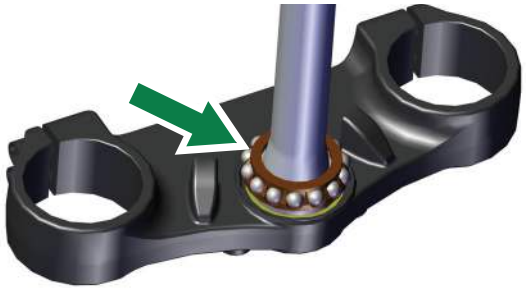
1. Fully pack the bearings with grease. You MUST thoroughly work the grease into the bearings, between the rollers, the core and the cage.



2. Install lower dust seal (1) on the steering stem.
3. Apply Loctite® 609® to steering stem (2) and inner race.
4. Slip the inner race (3) onto stem and rotate 2 full turns to evenly distribute Loctite.
5. Wipe clean any residual Loctite.



6. Install upper bearing (1) and upper inner race (2) into top head tube bore.
7. Install the upper dust seal.



Zero0065

8. Install lower bearing onto the steering stem.
9. Install lower triple clamp assembly into head tube.

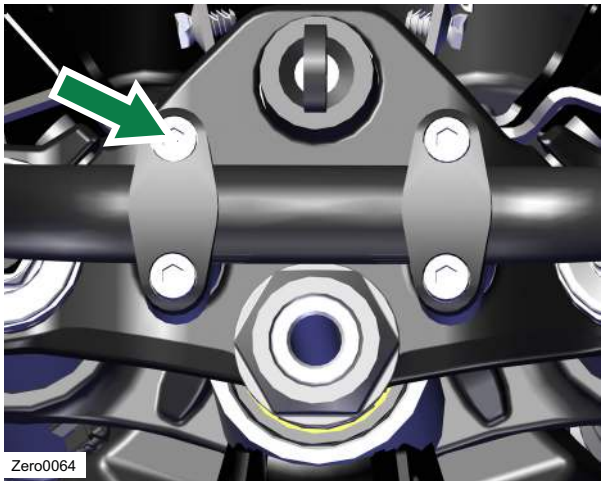
Note: Install steering stem lock nut with bevel side down. Take care to keep centered, upward force on lower triple clamp while installing steering stem lock nut so that it is hand-tight. Rotate lower triple clamp and feel for smooth rotation.

10. Using a steering stem lock nut socket tighten the steering stem lock nut to 50 lb-ft (68 Nm) and then back off the nut so that it is hand-tight.
11. Then tighten the steering stem lock nut.
    - Tighten to 25 lb-ft (34 Nm)
12. Rotate lower triple clamp assembly and feel for smooth rotation again.
13. Install upper triple clamp onto steering stem.
14. Check that the routing of brake lines and harness is correct.

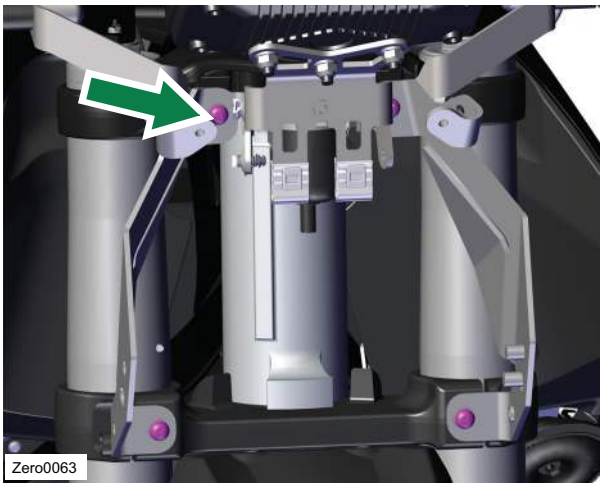
15. Install the top washer and nut onto steering stem and leave loose.
16. Install forks into triple clamps.



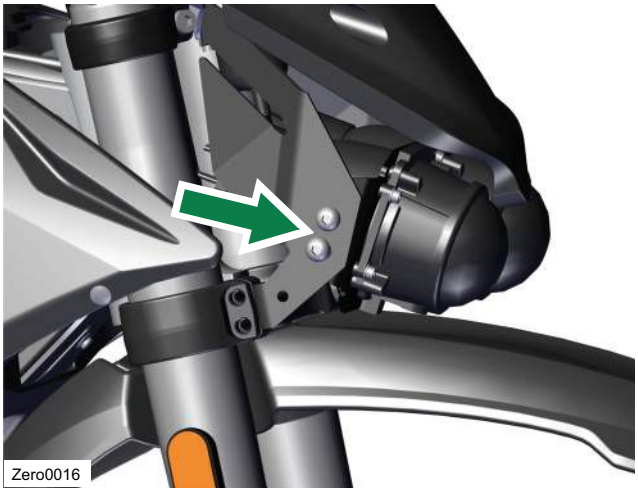
17. Set the top of forks 10 mm (A) from the top of upper triple clamp bore.
18. Tighten the lower triple clamp pinch bolts.
    - Tighten to 16 lb-ft (22 Nm)
19. Tighten the steering stem nut (2).
    - Tighten to 60 lb-ft (81 Nm)
20. Tighten the upper triple clamp pinch bolts.
    - Tighten to 16 lb-ft (22 Nm)



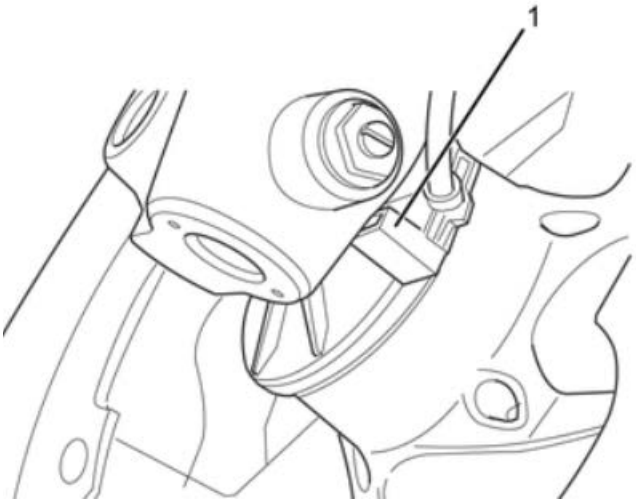
21. Install the handlebar, clamps and bolts.
    - Tighten to18 lb-ft (24 Nm)



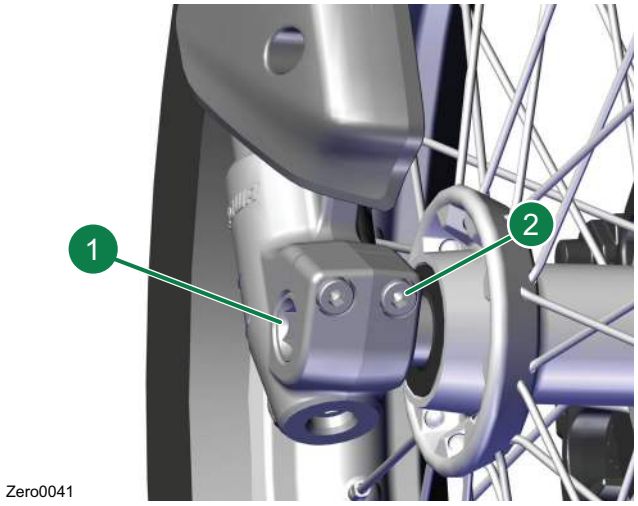
22. Install the headlight/turn signal brackets and bolts for both sides.
    - Tighten to 8 lb-ft (11 Nm)



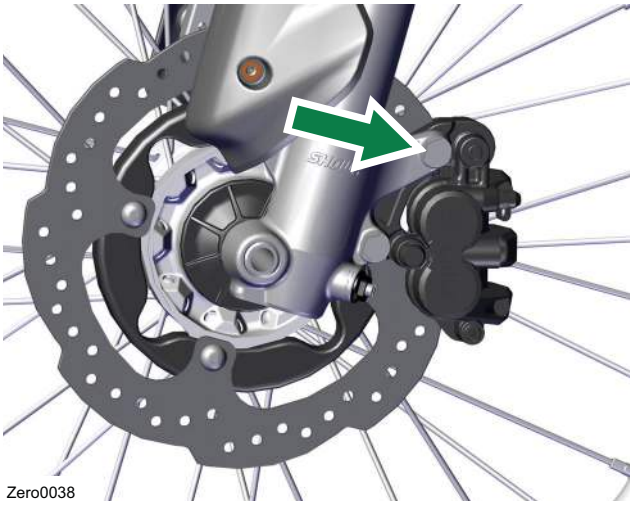
23. Install the headlight and adjuster bolts (1).
    - Tighten to19 lb-ft (26 Nm)
24. Install the fly-screen. Ensure the ground C239 is between the fly-screen bolts and the bracket.
25. Install the front fender.
26. Install front wheel assembly.



27. Be sure to orient wheel speed sensor to avoid breaking tab (1) on sensor hub.



28. Install the front axle shaft (1).
    - Tighten to 40 lb-ft (54 Nm)
29. Verify that the wheel speed sensor has not moved after torquing axle shaft.
30. Apply Loctite® 242® to the front axle pinch bolts (2).
    - Tighten to 16 lb-ft (22 Nm)
31. Apply Loctite® 242® to the brake caliper bolts.



32. Install the front brake caliper and bolts. Ensure that the disc brake pads are centered on the brake rotor.
    - Tighten to 19 lb-ft (26 Nm)
33. Install ABS sensor wire and brake line clamps in the same locations as removed.
34. Let the motorcycle sit for no less than 12 hours to allow Loctite to cure.
35. Adjust the headlight. Refer to Headlight Adjustment, page 70-5.
36. Road test the motorcycle to ensure that the condition has been corrected. Refer to Road Testing Procedure, page 1-12.

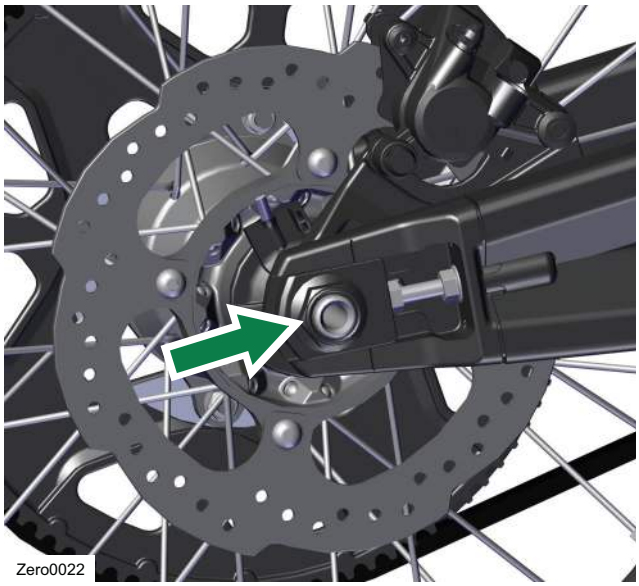
Swingarm Assembly Replacement

Required Tools

- 3 mm hex wrench
- 10 mm hex wrench
- 27 mm socket
- Socket wrench
- 15 mm wrench
- 13 mm wrench
- 17 mm wrench

Removal

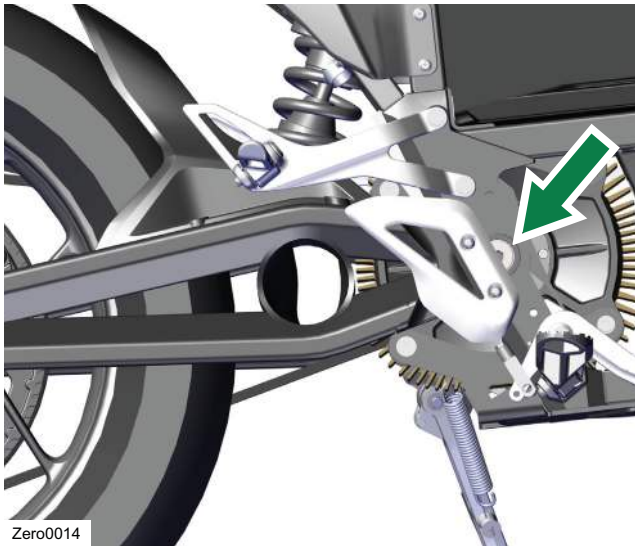
1. Remove the four bolts securing the rear fender to the swingarm, and remove the fender.
2. Securely raise and support the motorcycle so that the rear wheel is off the ground.


Zero0022

3. Remove the rear axle nut and tap out the axle shaft. Note that there is an axle shaft spacer on the left side of the wheel.
4. Lower the wheel and remove the drive belt (or chain) from the sprocket.

Important: Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

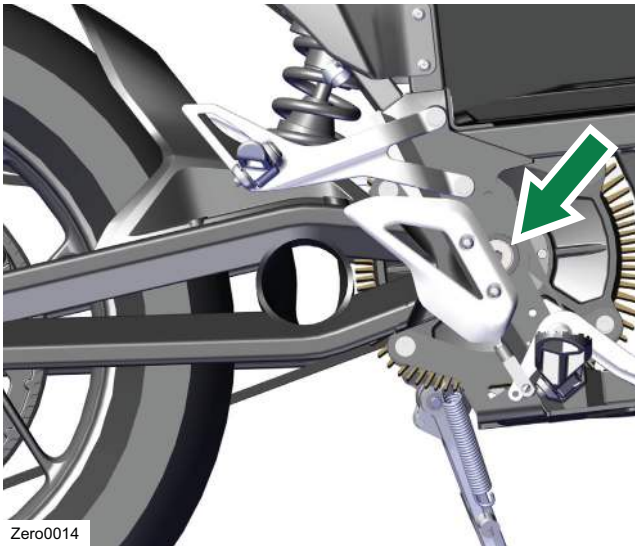
5. Move and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.
6. Remove the rear master cylinder bracket bolts from the right side, if equipped remove the heel guard from the left side.
7. Remove the shock lower nut, washer, and bolt.


Zero0014

8. Remove the swing arm pivot bolt. Right side shown, left side similar.
9. Remove the swingarm assembly.

Installation

1. Place the swingarm assembly into position.



2. Install the swingarm pivot bolts and tighten. Right side shown, left side similar.
   - Tighten to 75 lb-ft (102 Nm)
3. Install the shock lower nut and bolt.
   - Tighten to 38 lb-ft (52 Nm)
4. Install the rear master cylinder bracket bolts and if removed install the heel guard.
   - Tighten to 20 lb-ft (27 Nm)
5. Place the caliper into position on the swingarm.
6. Place the drive belt (or chain) onto the wheel sprocket, ensuring that the left wheel spacer is in place.
7. Move the wheel into position, ensuring that the brake rotor is centered between the brake pad and the ABS sensor is in place.
8. Slide the axle shaft (2) through the swingarm and wheel, apply Loctite® 242® to the threaded portion of the axle and install the nut (1).
   - Tighten to 75 lb-ft (102 Nm)
9. Install the fender onto the swingarm.
10. Check the adjustment of the belt or chain.

Hydraulic Brake System Description and Operation

General Information

Bleed the hydraulic brake system any time a brake hose, ABS HCU, master cylinder or brake caliper has been opened or disassembled, or whenever the brake lever operation feels "spongy." Bleeding evacuates air from the system leaving only incompressible hydraulic fluid. This system requires a special bleeding procedure.

⚠ CAUTION

Use only fresh, uncontaminated DOT 4 brake fluid. Fluid containers that have been opened may have been contaminated by dirt or moisture. Use of contaminated brake fluid may adversely affect braking ability and lead to brake failure which could result in death or serious injury.

Note: Cover adjacent surfaces when removing, draining, filling and/or bleeding brake system components. Spilling brake fluid on painted or other finished surfaces can result in cosmetic damage. Immediately wipe up any spilled brake fluid and thoroughly clean affected area.

System Component Description

The hydraulic brake system consists of the following:

Hydraulic Brake Master Cylinder

- Contains the supply of brake fluid for the hydraulic brake system.
- Converts mechanical input force (brake lever/ pedal) into hydraulic output pressure.

The amount of stroke required for this stage will depend of the amount of clearance between the pads and disc.

- Modulation

The brake pads are now clamping the rotor and by stroking the lever further, additional brake power will be generated.

Hydraulic Brake Flexible Hoses

Carry brake fluid to and from hydraulic brake system components.

Hydraulic Brake Wheel Apply Components

Convert hydraulic input pressure into mechanical output force.

System Operation

The front brake is controlled by a hand-operated master cylinder located on the right handlebar. The rear brake is controlled by a foot-operated master cylinder next to the right foot peg. The master cylinder converts mechanical force into hydraulic pressure. Brake flexible hoses form the hydraulic brake wheel circuits and deliver the hydraulic pressure to the brake calipers. The brake calipers convert the hydraulic pressure into mechanical force which presses linings against rotating brake rotors.

Diagnostics - Non-ABS

Brakes Drag

Causes	Correction
Sticky caliper or caliper pistons	Replace the caliper.
Contaminated or improper brake fluid	Flush the brake system and repair the affected brake components.
Loose front or rear brake assembly components	Locate and tighten the loose brake components.
Brake lever/pedal binding	Repair or replace the brake lever/pedal.

Brake Lever Travel Gradually Increases

Causes	Correction
Leaking brake hose or connection	Locate and repair the brake hose or the connection.
Leaking caliper piston seal	Replace the caliper.
Leaking master cylinder (internally)	Replace the master cylinder.

Brake System Groan at End of Stop

Causes	Correction
Linings damaged by abusive use	Replace the brake linings.
Poor rotor surface finish	Replace the rotor.

Brake System Noise with Brakes Not Applied

Causes	Correction
Worn-out brake linings	Replace the brake linings.
Incorrect lining material	Replace the brake linings.
Contaminated brake linings	Replace the brake linings.
Linings damaged by abusive use	Replace the brake linings.
Scored rotor	Replace the rotor. Inspect and replace brake linings if necessary.

Brake System Slow to Release

Causes	Correction
Contaminated or improper brake fluid	Flush the brake system and repair the affected brake components.
Sticky caliper pistons	Replace the caliper.

Excessive Brake Lever/Pedal Effort

Causes	Correction
Glazed brake linings	Replace the brake linings.
Worn-out brake linings	Replace the brake linings.
Incorrect lining material	Replace the brake linings.
Contaminated brake linings	Replace the brake linings.
Linings damaged by abusing use	Replace the brake linings.
Restricted brake fluid passage	Locate and repair the brake fluid passage restriction.
Brake lever/pedal interference or binding	Repair or replace the brake lever/pedal.

Excessive Brake Lever/Pedal Travel

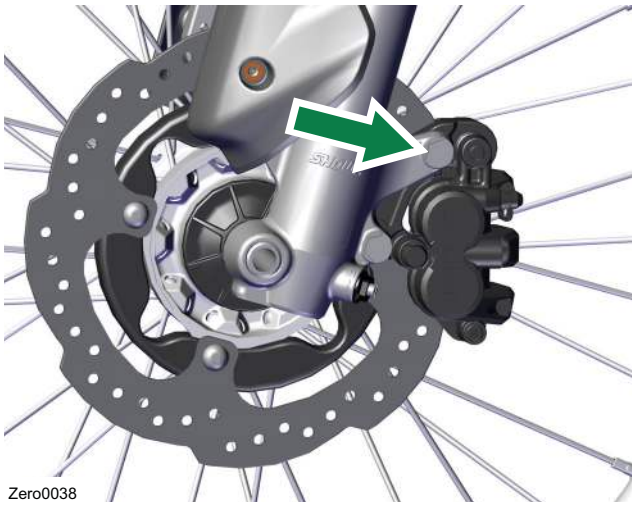
Causes	Correction
Air in the brake system	Bleed the brake system.
Leaking brake hose or connection	Locate and repair the brake hose or the connection.
Leaking caliper piston seal	Replace the caliper.
Leaking master cylinder (internally)	Replace the master cylinder.
Contaminated/improper brake fluid	Flush the brake system and repair the affected brake components.
Loose front or rear brake assembly components	Locate and tighten loose brake components.

Brake Pad Replacement - Front

Required Tools

- Flat blade screwdriver
- T25 star socket
- 8 mm hex wrench

Removal


Zero0038

1. Remove the two caliper bolts.

Important: Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount, and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

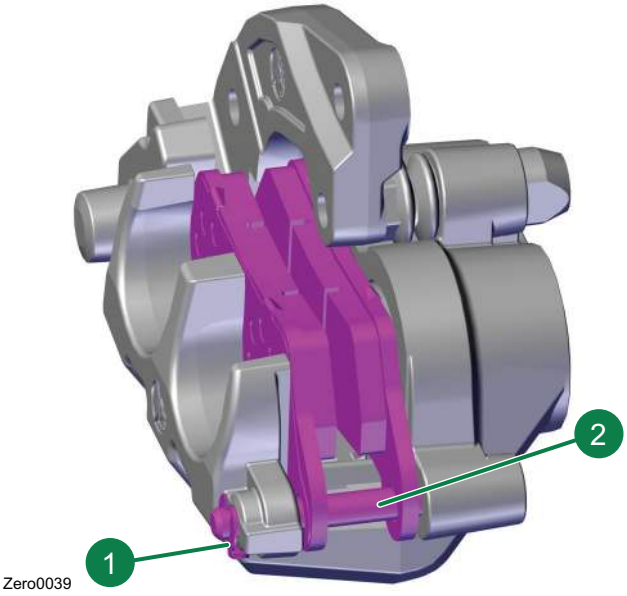
2. Slide the brake caliper off of the brake rotor and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.

Important: To prevent dirt and other contaminants from entering the master cylinder, thoroughly clean the cover before removal.

3. Remove the two screws to release the cover from the front master cylinder reservoir.

Note: As the pistons are pushed back into the caliper, the fluid level may rise and overflow the reservoir. Watch the fluid level as the pistons are retracted and remove fluid from the reservoir if necessary.

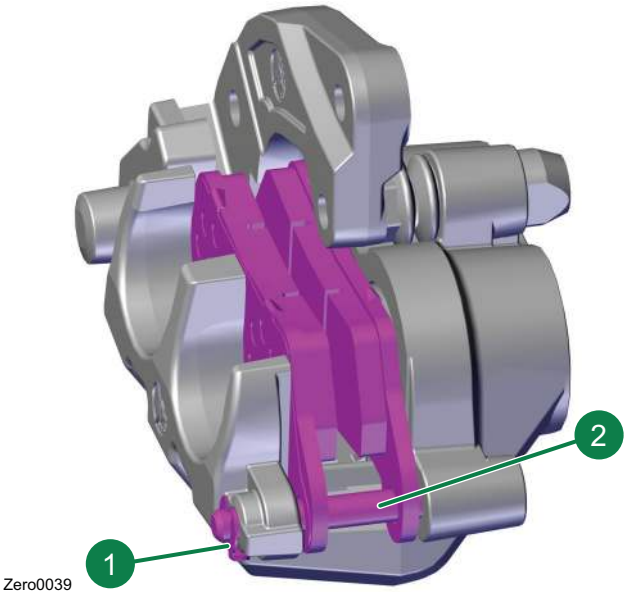
4. Press in the inner and outer brake pads pushing the pistons back into their bores.



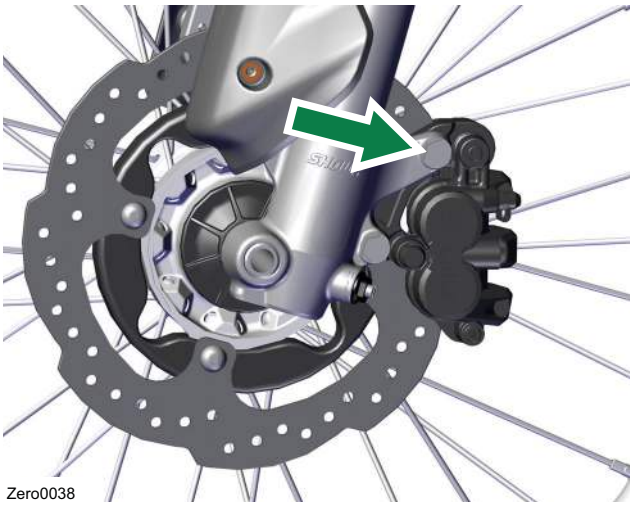
5. Remove the caliper slide pin clip (1).
6. Remove the caliper slide pin (2), and remove the pads from the caliper.
7. Inspect the brake caliper and brake hardware and replace as needed.

Installation

1. Install the disc brake pads into the brake caliper, making sure that the anti-rattle clip is in position.
2. Press the brake pads into the caliper so that the slide pin will line up.



3. Install caliper slide pin (2) and tighten.
4. Install the caliper slide pin clip (1).
5. Slide the brake caliper (2) onto the rotor, making sure that the disc brake pads are centered on the brake rotor.



6. Install the front caliper bolts.
   - Tighten to 19 lb-ft (26 Nm)

⚠ CAUTION

After installation of new pads, and before moving motorcycle, pump the front brake lever to build brake system pressure. Insufficient pressure can adversely affect brake performance, which could result in death or serious injury.

7. Verify that brake fluid level is full. Add DOT 4 brake fluid, if necessary.
8. Install master cylinder reservoir cover.

⚠ CAUTION

After completing repairs or bleeding the system, always test motorcycle brakes at low speed. If brakes are not operating properly or braking efficiency is poor, testing at a high speed could result in death or serious injury.

9. Perform the brake pad bedding procedure. See Brake Bedding, page 45-6.

Brake Pad Replacement - Rear

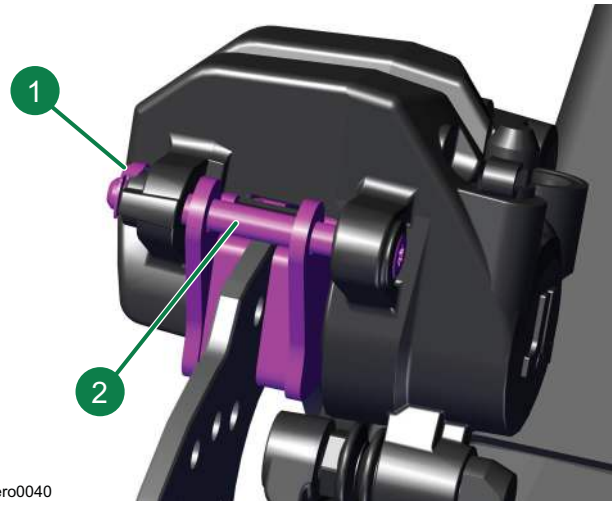
Required Tools

- T25 star socket

⚠ CAUTION

Always replace brake pads in pairs. Never replace just one brake pad. Mismatched brake pads can lead to brake system damage and loss of braking performance, which could result in serious injury or death.

Removal



Zero0040

1. Remove the caliper slide pin clip (1).
2. Remove the caliper slide pin (2).

Important: To prevent dirt and other contaminants from entering the master cylinder, thoroughly clean the cover before removal.

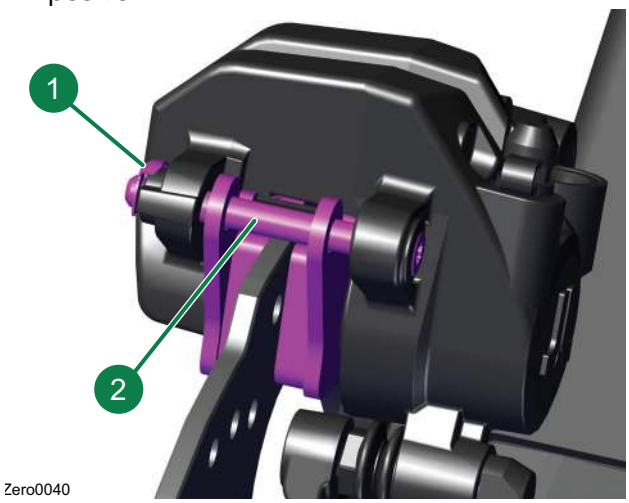
3. Remove the brake fluid reservoir cap from the reservoir.

Note: As the piston is pushed back into the caliper, fluid level may rise and overflow the reservoir. Watch the fluid level as the piston is retracted and remove fluid from the reservoir if necessary.

4. Press in the inner and outer brake pads pushing the piston back into the bore.
5. Remove the disc brake pads from the brake caliper.
6. Inspect the brake caliper and brake hardware and replace as needed.

Installation

1. Install the disc brake pads into the brake caliper, making sure that the anti-rattle clip is in position.



2. Install the caliper slide pin (2).
3. Install the caliper slide pin clip (1).

⚠ CAUTION

After installation of new pads and before moving motorcycle, pump the rear brake pedal to build brake system pressure. Insufficient pressure can adversely affect brake performance, which could result in death or serious injury.

4. Verify that brake level fluid is full. Add DOT 4 brake fluid, if necessary.
5. Install master cylinder reservoir cap.

⚠ CAUTION

After completing repairs or bleeding the system, always test motorcycle brakes at low speed. If brakes are not operating properly or braking efficiency is poor, testing at a high speed could result in death or serious injury.

6. Perform the brake pad bedding procedure. See Brake Bedding, page 45-6.

Brake Bedding

Note: Bedding in new brake systems or new pads is recommended to ensure proper brake performance and maximize brake life. Proper bedding improves brake pedal/lever feel and reduces or eliminates brake squeal. Bedding in the brakes is a process of depositing an even layer of pad material on the surface of the brake rotor.

⚠ CAUTION

With new brake systems or just new pads, the first few braking applications will result in very little braking power. Gently use the brakes a few times at low speeds (<25 mph) to develop proper braking friction.

Process

1. Begin at 40 mph (64 km/h) and gradually apply the brake to reduce speed to 10 mph (16 km/h). Avoid locking the tires or triggering the ABS, and do not come to a complete stop to prevent pad material from adhering to the rotor which can cause vibration.
2. Accelerate back to 40 mph (64 km/h) and repeat this process 15-20 times, ensuring you work on the front and rear brakes separately.
3. After completing 15-20 cycles for both the front and rear brakes, take a 10 mile (16 km) ride to allow the braking system to cool down.

Brake Caliper Replacement - Front

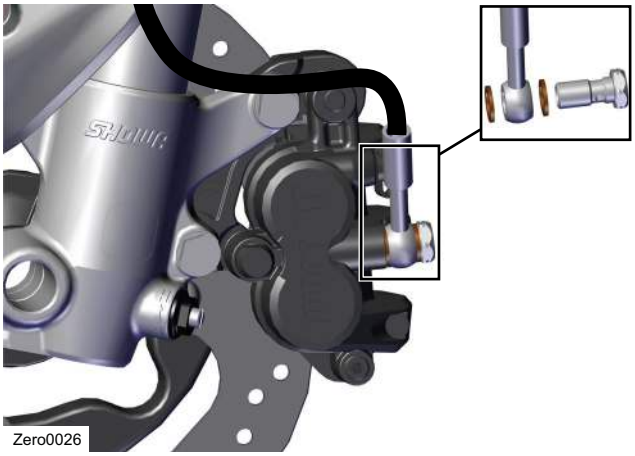
Required Tools

- 14 mm wrench

Removal

1. Remove the brake pads. Refer to Brake Pad Replacement - Front, page 45-3.

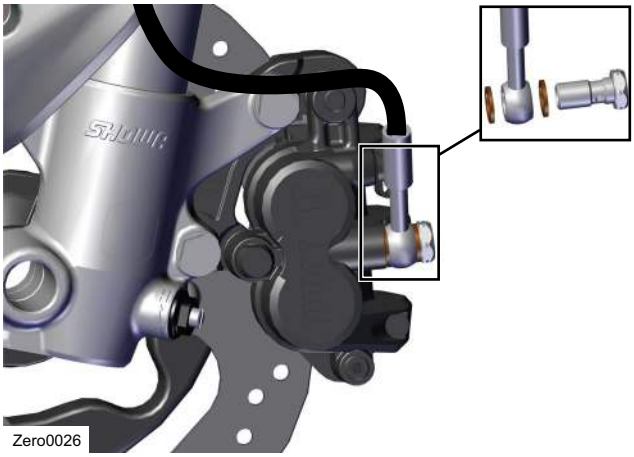
Note: Refer to Brake Fluid Effects on Paint and Electrical Components Notice in General Information.



2. Remove the front brake hose banjo bolt and sealing washers from the caliper.
3. Drain the brake fluid into an approved container.

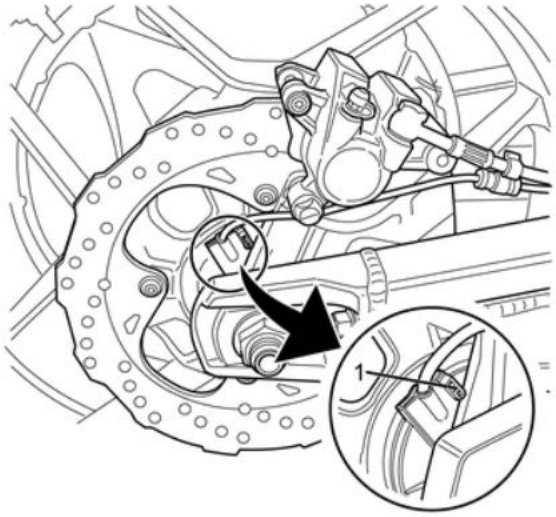
Installation

Important: Always use new sealing washers on the banjo fittings.



1. Install the front brake hose to the caliper with the banjo bolt and new sealing washers.
   - Tighten to 23 lb-ft (31 Nm)
2. Install the brake pads. Refer to Brake Pad Replacement - Front, page 45-3.
3. Bleed the front brake system.
4. If new pads have been installed, perform the brake pad bedding procedure. See Brake Bedding, page 45-6.
5. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12.

Brake Caliper Replacement - Rear



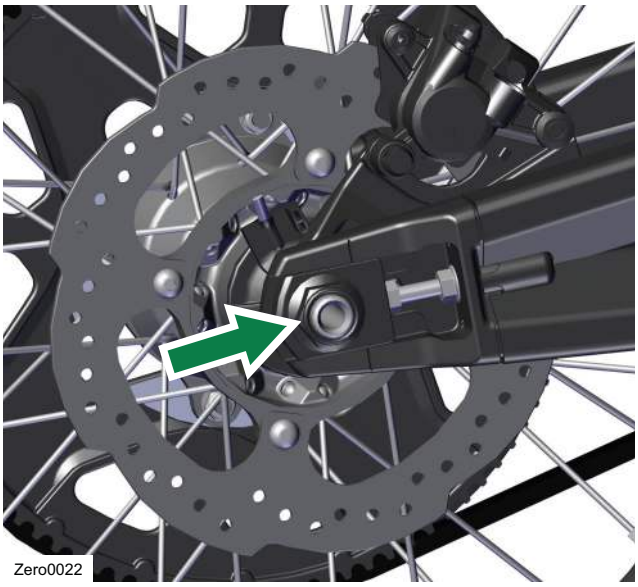
Important: Placement of the anti-rotation tab (1) of the ABS sensor is critical; failure to install the anti-rotation pin in the correct location will cause sensor damage/failure. The anti-rotation tab must be installed outside of the rear brake caliper housing.

Required Tools

- 27 mm socket
- 14 mm wrench

Removal

1. Remove the brake pads. Refer to Brake Pad Replacement - Rear, page 45-5.
2. Securely raise and support the motorcycle so that the rear wheel is off the ground.

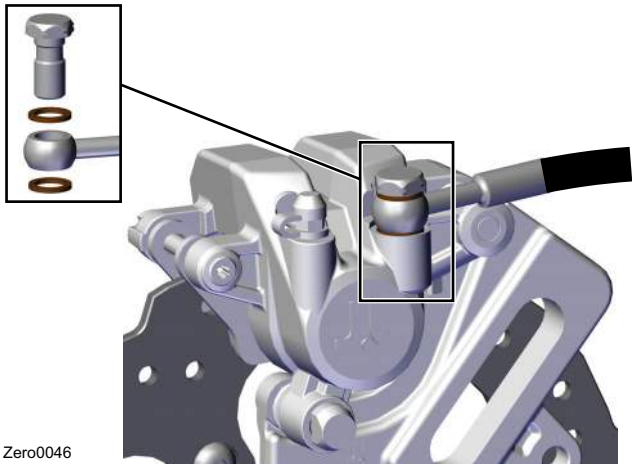

Zero0022

3. Remove the rear axle nut and tap out the axle shaft.

Note: Be aware of the axle shaft spacer on the left side of the wheel.

4. Lower the wheel and remove the drive belt from the sprocket.
5. Separate the brake caliper mounting bracket from the swingarm.

Note: Refer to Brake Fluid Effects on Paint and Electrical Components Notice in General Information.

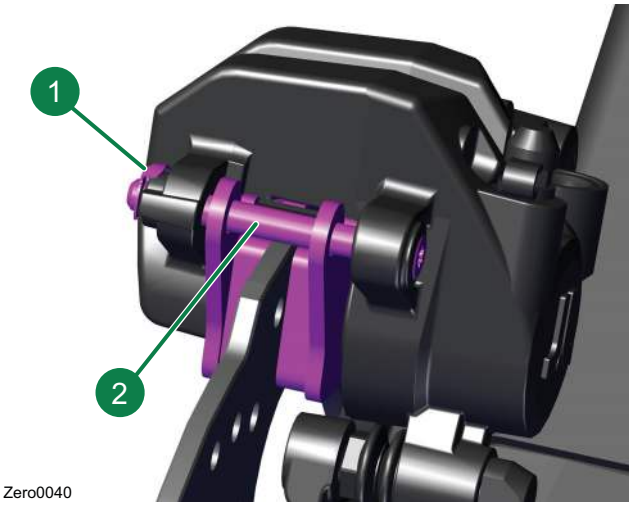

Zero0046

6. Remove the rear brake hose banjo bolt and sealing washers from the caliper .
7. Drain the brake fluid into an approved container.

Installation

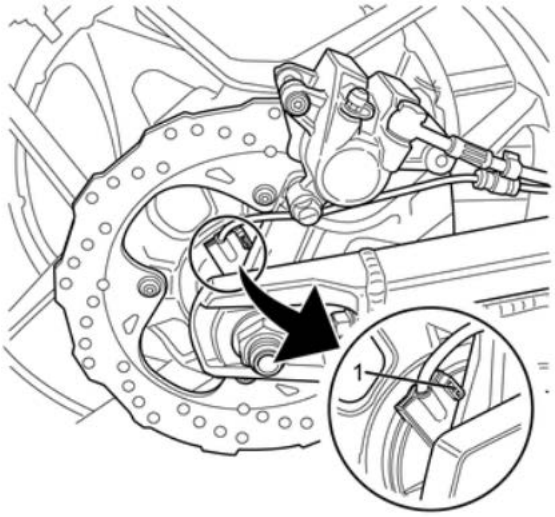
Important: Always use new sealing washers on the banjo fittings.

1. Install the disc brake pads into the brake caliper, making sure that the anti-rattle clip is in position.

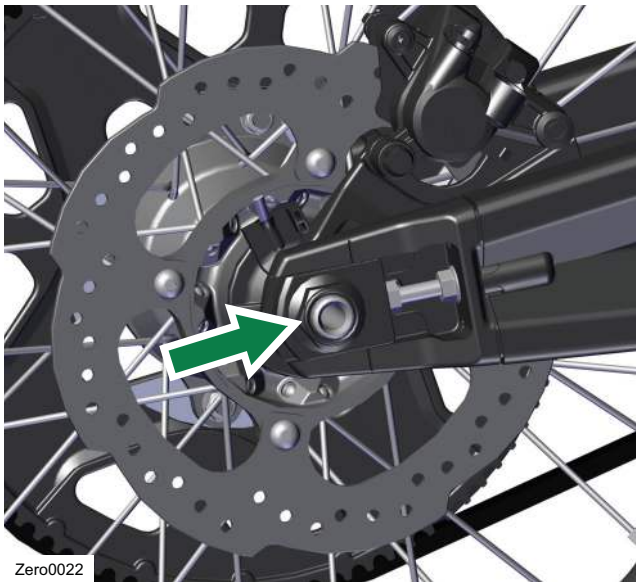


Zero0040

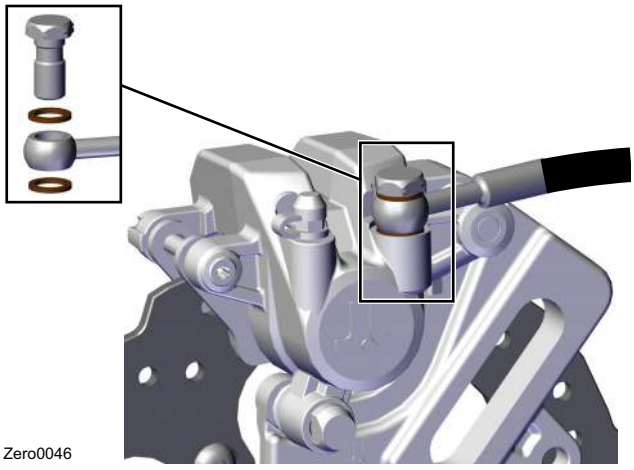
2. Install the caliper slide pin (2).
   - Tighten to 6.6 lb-ft (8 Nm)
3. Install the caliper slide pin clip (1).
4. Place the caliper into position on the swingarm.



5. Place the drive belt onto the wheel sprocket, ensure that left wheel spacer and the ABS sensor are in place. The anti-rotation tab (1) must be installed outside of the rear brake caliper housing.
6. Move the wheel into position, ensuring that the brake rotor is centered between the brake pads.


Zero0022

7. Slide the axle shaft through the swingarm and wheel and install the nut.
   - Tighten to 75 lb-ft (102 Nm)


Zero0046

8. Install the rear brake hose to the caliper with the banjo bolt and new sealing washers.
   - Tighten to 23 lb-ft (31 Nm)
9. Bleed the rear brake system.
10. If new brake pads were installed, perform the brake pad bedding procedure. See Brake Bedding, page 45-6.
11. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12.

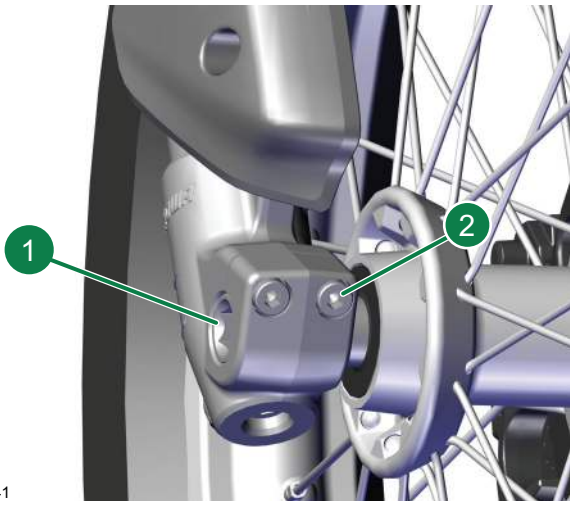
Brake Rotor Replacement - Front

Required Tools

- 16 mm hex wrench
- 6 mm hex wrench

Removal

1. Remove the front wheel.
   a. Raise and support the motorcycle.



Zero0041

   b. Remove the front axle shaft pinch bolts (2) from the right lower fork leg.
   c. Unscrew the front axle (1) then slide the axle out of the fork.


Zero0042

2. Remove the Allen bolts securing the rotor to the wheel and remove the rotor

Installation

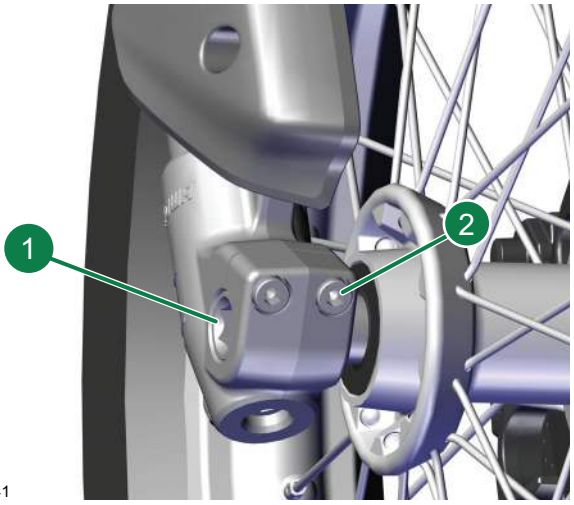
Important: Whenever the rotor has been separated from the wheel flange, any rust or contaminants must be cleaned from the wheel flange and the rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

1. Inspect the rotor and wheel flange surface for rust or contamination. Remove rust or contamination if necessary. Clean all fastener threads of Loctite®, oil, or grease.


Zero0042

2. Install the brake rotor onto the wheel flange; make sure that the countersunk portion of the brake rotor is facing out.
3. Apply Loctite® 242® to the threaded portion of the rotor bolts and install.
   - Tighten to 9.5 lb-ft (13 Nm)

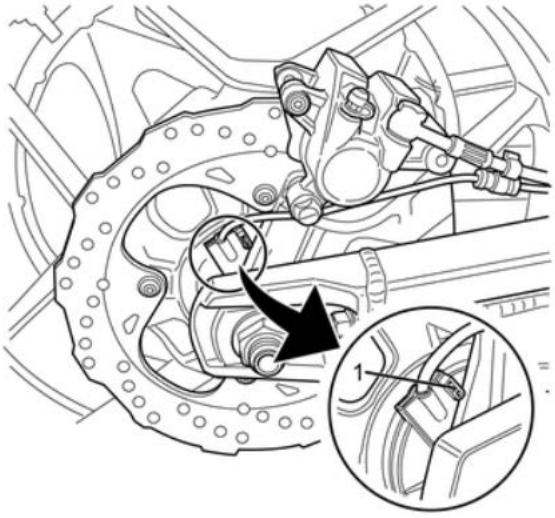
4. Install the front wheel.
   a. Position the wheel onto the motorcycle and ensure that the brake pads are on each side of the brake rotor.



Zero0041

   b. Slide the front axle shaft (1) through both fork legs and the wheel, making sure that the ABS sensor is in place, and tighten.
      • Tighten to 40 lb-ft (54 Nm)
   c. Tighten the front axle pinch bolts (2).
      • Tighten to 9.5 lb-ft (13 Nm)
5. Perform the brake pad bedding procedure. See Brake Bedding, page 45-6.

Brake Rotor Replacement - Rear



Important: Placement of the anti-rotation tab (1) of the ABS sensor is critical. Failure to install the anti-rotation tab in the correct location will cause sensor damage or failure. The anti-rotation pin must be installed outside of the rear brake caliper housing.

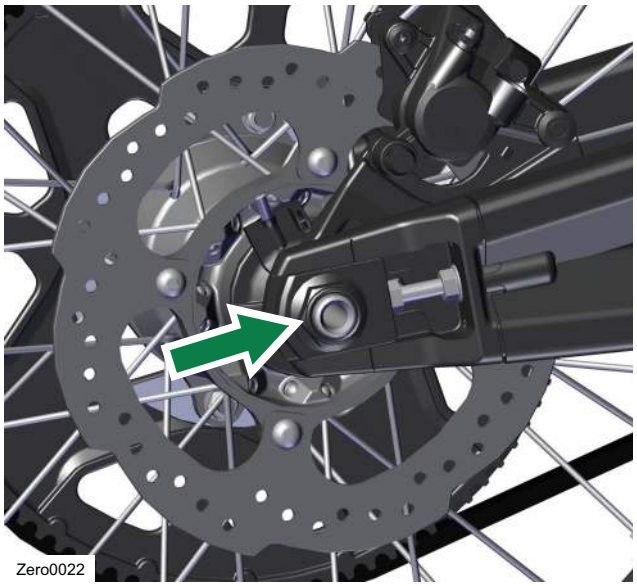
Required Tools

- 5 mm hex wrench
- 27 mm socket and socket wrench

Removal

1. Remove the rear wheel.

a. Securely raise and support the motorcycle so that the rear wheel is off the ground.

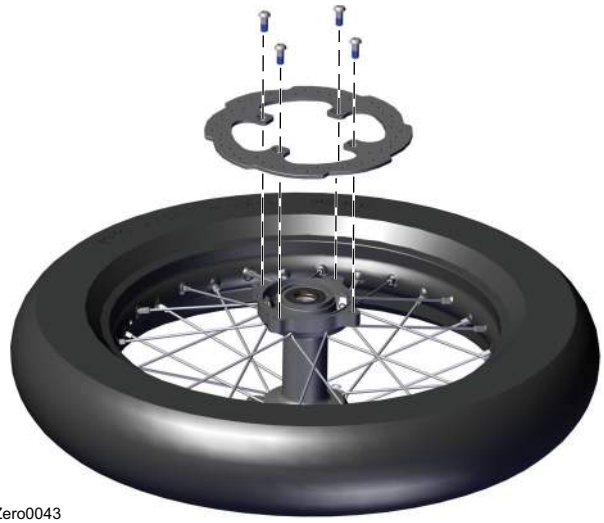

Zero0022

b. Remove the rear axle nut and tap out the axle shaft. Note: Be aware of the axle shaft spacer on the left side of the wheel.

c. Lower the wheel and remove the drive belt from the sprocket.

Important: Support the brake caliper with mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

2. Move and support the brake caliper with mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the brake caliper.


Zero0043

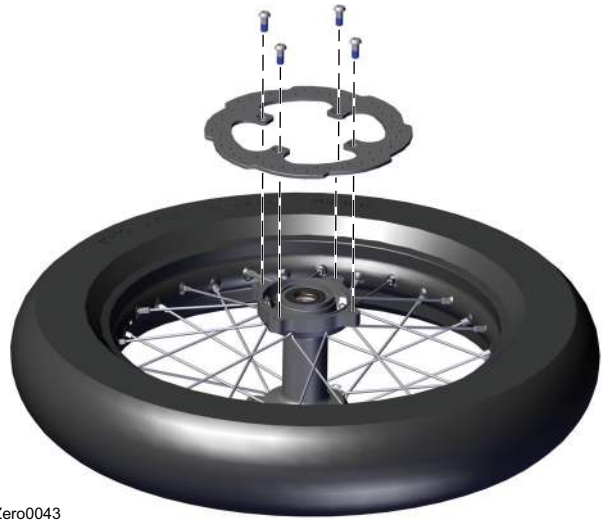
3. Remove the four Allen bolts securing the rotor to the wheel and remove the rotor.

Installation

Important: Whenever the rotor has been separated from the wheel flange, any rust or contaminants must be cleaned from the wheel flange and the rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

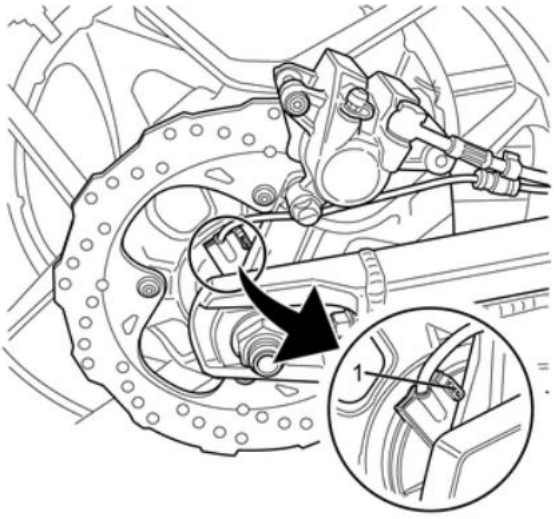
1. Inspect the rotor and wheel flange surface for rust or contamination. Remove rust or contamination if necessary. Clean all fastener threads of Loctite®, oil, or grease.

2. Install the brake rotor onto the wheel flange; make sure that the countersunk portion of the brake rotor is facing out.

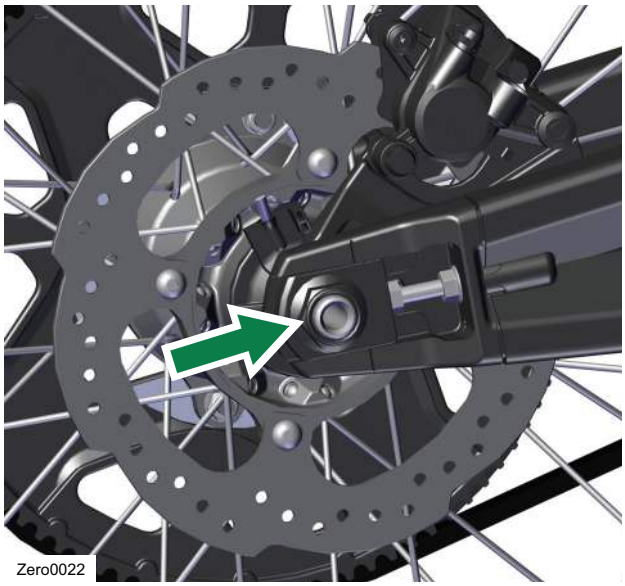


Zero0043

3. Apply Loctite® 242® to the threaded portion of the rotor bolts and tighten into the flange.
   - Tighten to 9.5 lb-ft (13 Nm)
4. Install the rear wheel.
   a. Place the drive belt onto the wheel sprocket, ensuring that the left wheel spacer is in place.
   b. Position the wheel onto the motorcycle and ensure that the brake pads are on each side of the brake rotor.



   c. Position the ABS sensor between the wheel and the rear brake caliper housing. The anti-rotation tab (1) must be installed outside of the rear brake caliper housing.



Zero0022

   d. Slide the axle shaft through the swingarm and wheel, apply Loctite® 242® to the threaded portion of the axle and install the nut (1).
      - Tighten to 75 lb-ft (102 Nm)
5. Perform the brake pad bedding procedure. See Brake Bedding, page 45-6.

Anti-Lock Brake System (ABS) Description and Operation

General Information

Bleed the hydraulic brake system any time a brake hose, ABS module, master cylinder or brake caliper has been opened or disassembled, or whenever the brake lever operation feels "spongy." Bleeding evacuates air from the system leaving only incompressible hydraulic fluid. This system requires a special bleeding procedure.

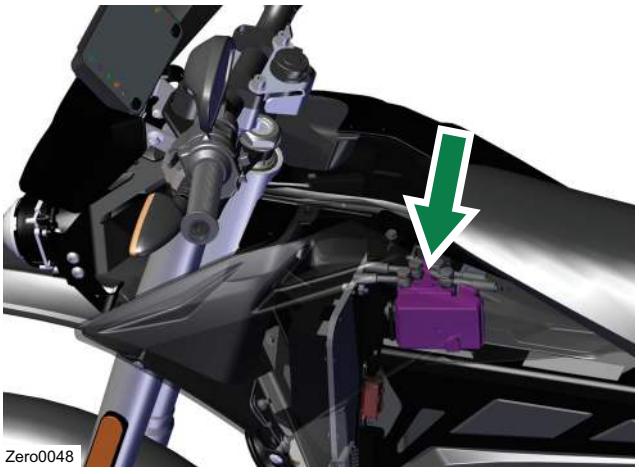
⚠ CAUTION

Use only fresh, uncontaminated DOT 4 brake fluid. Fluid containers that have been opened may have been contaminated by dirt or moisture. Use of contaminated brake fluid may adversely affect braking ability and lead to brake failure which could result in death or serious injury.

Note: Cover adjacent surfaces when removing, draining, filling and/or bleeding brake system components. Spilling brake fluid on painted or other finished surfaces can result in cosmetic damage. Immediately wipe up any spilled brake fluid and thoroughly clean affected area.

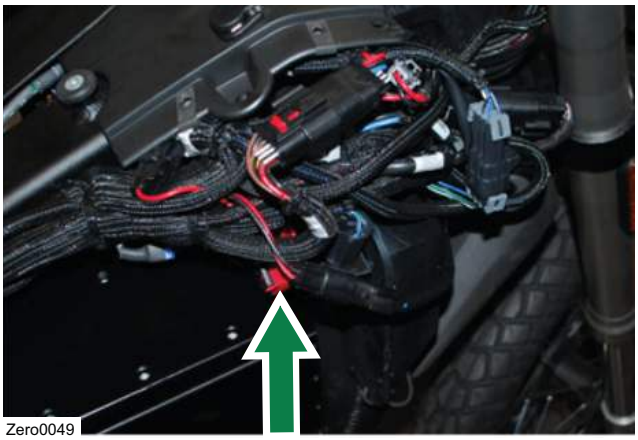
ABS Major Component Locations

1. ABS Hydraulic Control Unit (HCU)



Zero0048

2. ABS Module Fuse (25 amp)



Zero0049

3. Rear Wheel Speed Sensor



Zero0051

4. Front Wheel Speed Sensor



Zero0050

The ABS consists of the following components:

- A conventional hydraulic brake system
- Antilock components

The conventional brake system includes the following components:

- A rear master cylinder
- A front master cylinder
- Front disc brake
- Rear disc brake
- Interconnecting hydraulic brake lines

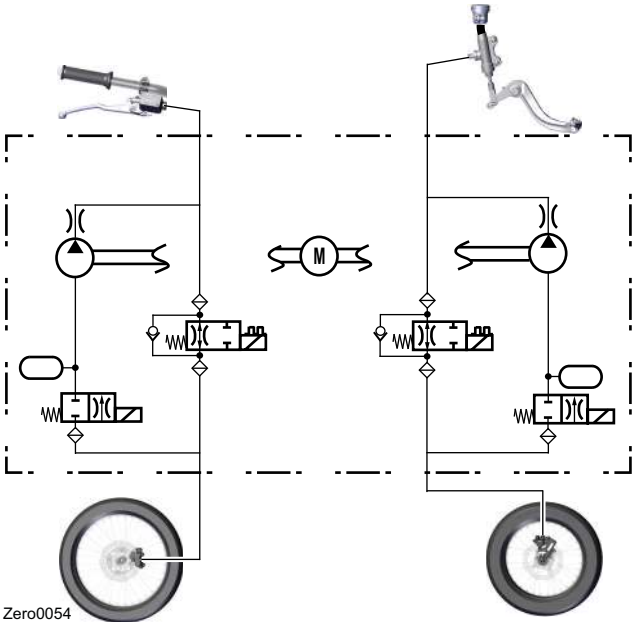
The ABS includes the following components:

- An ABS Hydraulic Control Unit (HCU)
- Two wheel speed sensors
- The interconnecting wiring
- An amber ABS warning indicator

The ABS HCU controls hydraulic pressure to the following areas:

- The front caliper
- The rear caliper

The ABS HCU controls hydraulic pressure by modulating the hydraulic pressure. This action prevents wheel lock-up.



The HCU constantly monitors the rotational speed of the front and back wheel; if it detects a wheel rotating significantly slower than the other, a condition indicative of impending wheel lock, it actuates the valves to reduce hydraulic pressure to the brake at the affected wheel, thus reducing the braking force on that wheel; the wheel then turns faster. Conversely, if the HCU detects a wheel turning significantly faster than the other, brake hydraulic pressure to the wheel is increased so the braking force is reapplied, slowing down the wheel. This process is repeated continuously.

The HCU is programmed to disregard differences in wheel rotation speed below 5 mph.

If a fault develops in any part of the ABS, a warning light will illuminated on the instrument panel, and the ABS will be disabled until the fault is corrected.

The diagnostic codes are held in the system and require a special cable to connect to it and retrieve the fault codes.

Disabling the Anti-Lock Brake System (ABS)

It may be necessary to temporarily disable the Bosch ABS system to further diagnose the hydraulic brake system.

Under normal operation, the ABS dash light will turn on when the motorcycle is keyed on. The ABS light will remain lit until both wheels reach 3 mph (5 km/h), at which time the ABS light should turn off. If the ABS light remains on, there may be an ABS fault, and the rider is advised that the ABS is NOT active.

To disable the ABS:

1. Ensure motorcycle is at rest on a level, stable surface.
2. Place side (kick) stand in down position.
3. Place motorcycle ignition (kill) switch in OFF position.
4. Turn key switch to ON position.
5. Press and hold the MODE and ADJ buttons on the dash. After four (4) seconds, the ABS light will begin to blink quickly (faster than once per second). Continue holding MODE and ADJ until the ABS light flashes slowly (approximately every 1.2 seconds), and then release.

To reactivate the ABS:

1. Ensure motorcycle is at rest on a level, stable surface.
2. Disconnect the motorcycle from external charge cables.
3. Turn key switch to OFF position.
4. Wait for dash display to turn off completely.
5. Turn key switch to ON position.
6. Resume normal operation.

When the motorcycle is turned off, upon restarting, the ABS will automatically return to its ON setting.

ABS Hydraulic Control Unit (HCU) Replacement

Required Tools

- 3 mm hex wrench
- 4 mm hex wrench
- 5 mm hex wrench
- 14 mm wrench

⚠ CAUTION

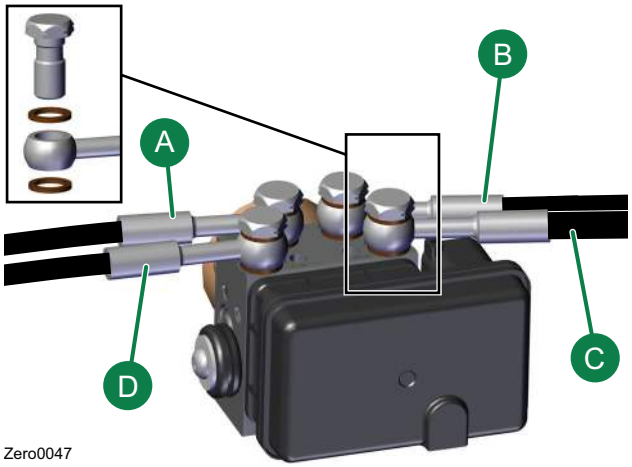
Mark the orientation and location of all hydraulic brake lines on the ABS Module (HCU) prior to removal. Failure to do so could result in incorrect ABS behavior, such as brake locking.

Removal

1. Remove the seat.
2. Remove the left fairing panel.

Note: Refer to Brake Fluid Effects on Paint and Electrical Components Notice in General Information.

3. Place a suitable drain pan under the HCU.
4. Disconnect the C428 module harness connector from the HCU.



Zero0047

A. Front Master Cylinder
B. Rear Master Cylinder
C. Rear Caliper
D. Front Caliper

⚠ CAUTION

Mark the orientation and location of all hydraulic brake lines on the ABS Module (HCU) prior to removal. Failure to do so could result in incorrect ABS behavior, such as brake locking.

5. Remove all brake hose banjo bolts and sealing washers from the HCU.
6. Remove the side HCU bolt and remove the HCU.

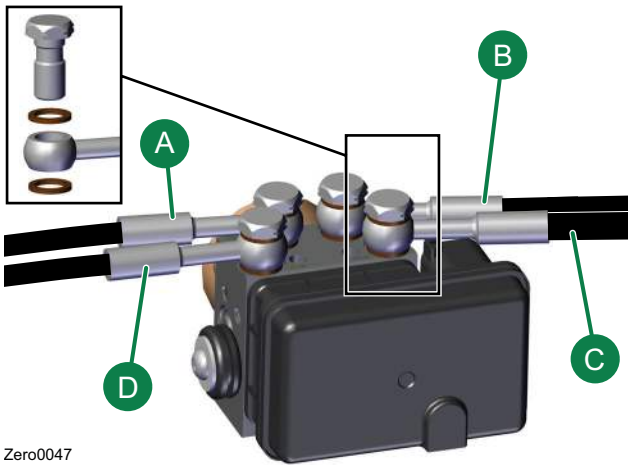
Installation

1. Install the HCU onto the frame and install the side bolt.
   - Tighten to 8 lb-ft (11 Nm)

⚠ CAUTION

Correct orientation and location of all hydraulic brake lines on the ABS Module (HCU) is crucial. Failure to do so could result in incorrect ABS behavior, such as brake locking.

Important: Always use new sealing washers on the banjo fittings.



Zero0047

A. Front Master Cylinder
B. Rear Master Cylinder
C. Rear Caliper
D. Front Caliper

2. Install the brake hoses to the module in the same orientation and location as removed with the banjo bolt and new sealing washers.
   - Tighten to 23 lb-ft (31 Nm)
3. Connect the C428 module harness connector (1) onto the HCU.
4. Install the left fairing panel.
5. Install the seat.
6. Bleed the brake system.
7. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12..

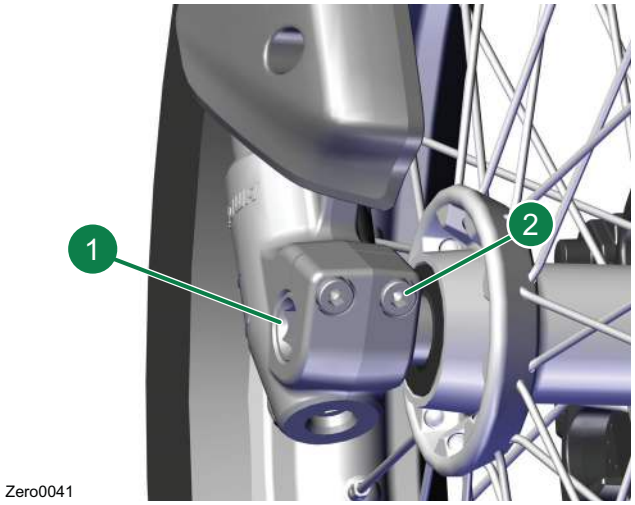
ABS Sensor Replacement - Front

Required Tools

- 16 mm hex wrench
- 6 mm hex wrench
- 3 mm hex wrench

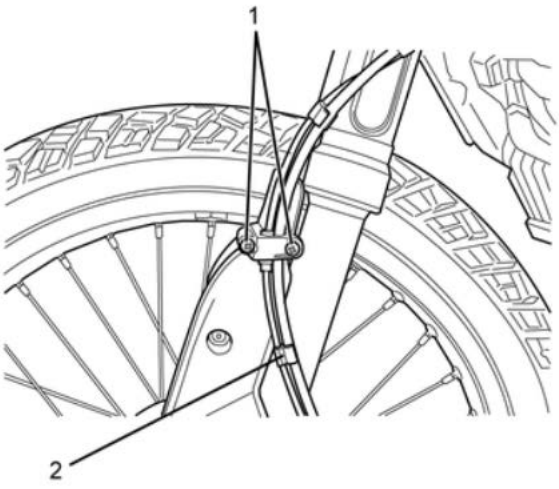
Removal

1. Remove the front wheel.
   a. Raise and support the motorcycle.
   b. Remove the front axle shaft pinch bolts (2) from the right lower fork leg.



Zero0041

   c. Unscrew the front axle (1) then slide the axle out of the fork.

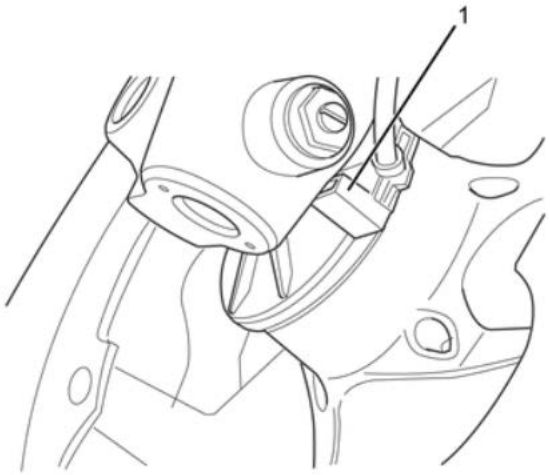


2. Remove the brake line/ABS harness clamp and screws (1).

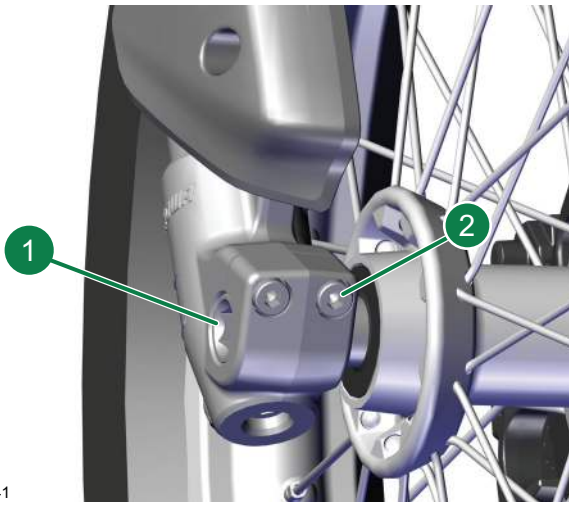
3. Remove the ABS harness to brake line clips (2).
4. Remove the fly-screen from above the headlight.
5. Disconnect the C429 harness connector from behind the headlamp.
6. Remove the ABS sensor, noting its routing locations for reassembly.

Installation

1. Install the front wheel.
   a. Position the wheel onto the motorcycle and ensure that the brake pads are on each side of the brake rotor.

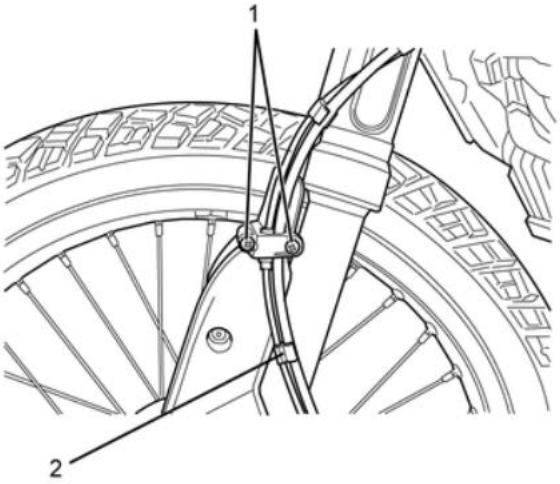


   b. Position the ABS sensor between the wheel and the left fork tube. The anti-rotation tab (1) must be installed as shown.



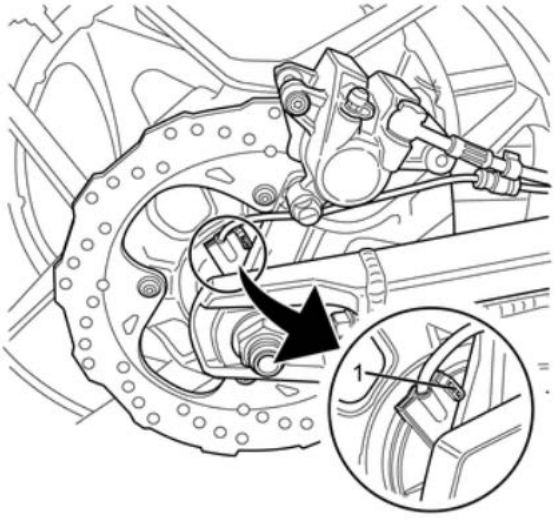
Zero0041

   c. Slide the front axle shaft (1) through both fork legs and the wheel, making sure that the ABS sensor is in place, and tighten.
      • Tighten to 40 lb-ft (54 Nm)
   d. Tighten the front axle pinch bolts (2).
      • Tighten to 16 lb-ft (22 Nm)



2. Position the ABS sensor harness into the clamp and install the screws (1).
3. Install the ABS sensor harness clips (2) onto the brake line.
4. Connect the C429 ABS sensor harness connector.
5. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
6. Road test the motorcycle. Refer to Road Testing Procedure, page 1-12..

ABS Sensor Replacement - Rear



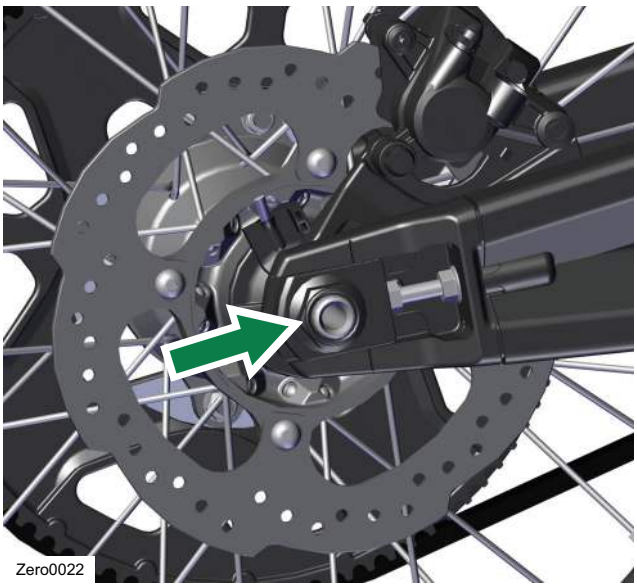
IMPORTANT: Placement of the anti-rotation tab (1) of the ABS sensor is critical, failure to install the anti-rotation tab in the correct location will cause sensor damage/failure. The anti-rotation tab must be installed outside of the rear brake caliper housing.

Required Tools

- 27 mm socket and socket wrench

Removal

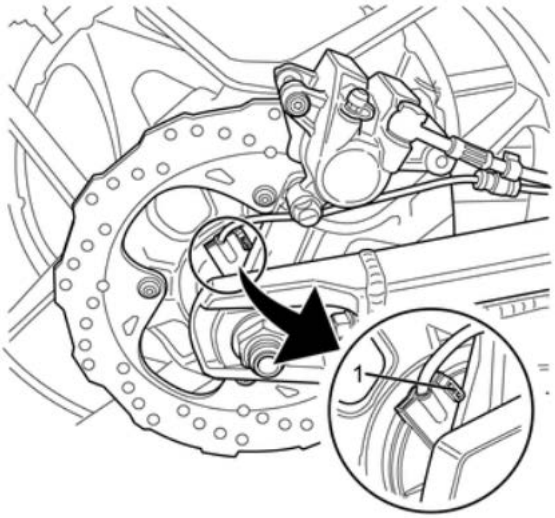
1. Raise and safely support the motorcycle.
2. Remove the rear fender.



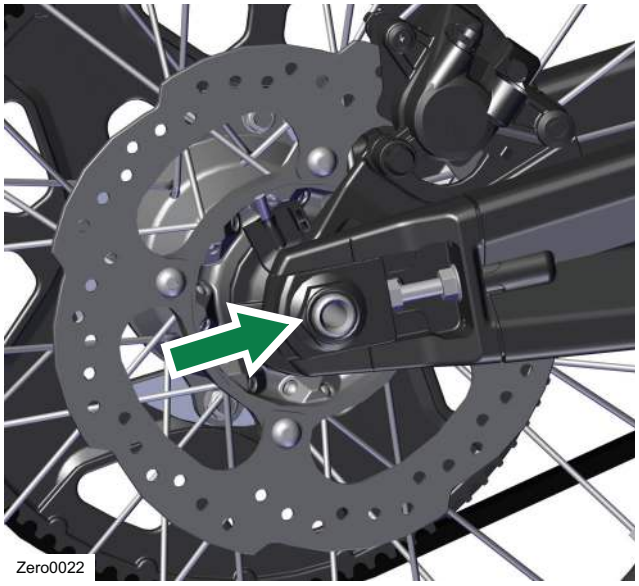
3. Remove the rear axle nut and tap out the axle shaft. Note: Be aware of the axle shaft spacer on the left side of the wheel.
4. Lower the wheel, ensure that the brake caliper housing remains in place on the swingarm.
5. Follow the ABS sensor harness up to the C430 harness connector and disconnect.
6. Remove and harness ties or clips securing the harness to the brake line and remove the sensor.

Installation

1. Ensure that the left wheel spacer is in place and move the wheel into position. Ensure that the brake rotor is centered between the brake pads.



2. Position the ABS sensor between the wheel and the rear brake caliper housing. The anti-rotation tab (1) must be installed outside of the rear brake caliper housing.


Zero0022

3. Slide the axle shaft through the swingarm and wheel, apply Loctite® 242® to the threaded portion of the axle and install the nut.
   - Tighten to 75 lb-ft (102 Nm)
4. Route the ABS sensor harness connector in the same locations as removed, inspect the routing to ensure that the cable is not in contact with any moving parts.
5. Connect the C430 ABS sensor harness connector.
6. Install the rear fender.

ABS Harness Replacement (except 11kW)

⚠ CAUTION

Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Required Tools

- 3 mm hex wrench
- 5 mm hex wrench
- PN 85-05665 Controller Discharge Tool

Removal

1. Note routing and location of harness and zip tie.
2. Discharge the High Voltage system. Refer to High Voltage Discharging, page 10-1.
3. Remove the power packs.
4. Remove the fly-screen.
5. Remove the seat.
6. Remove the both right and left fairing panels.
7. Disconnect C428 ABS HCU connector.
8. Disconnect C429 front wheel speed sensor connector.
9. Disconnect C430 rear wheel speed sensor connector.
10. Disconnect C142/C431 inline connector (chassis harness to ABS harness).
11. Disconnect C457/C472 inline connector (chassis harness to ABS harness).
12. Note harness routing prior to removal; this will aid in reassembly of the harness to the motorcycle.
13. Release all main wiring harness zip ties and hold down brackets and remove the harness.

Installation

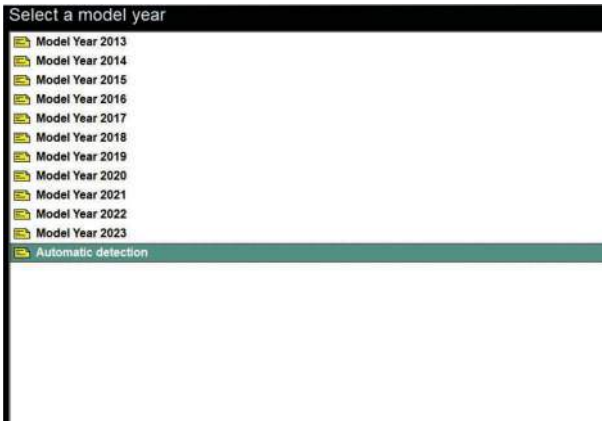
1. Layout the wiring harness in the same location as removed on the frame.
2. Connect C457/C472 inline connector (chassis harness to ABS harness).
3. Connect C142/C431 inline connector (chassis harness to ABS harness).
4. Connect C430 rear wheel speed sensor connector.
5. Connect C429 front wheel speed sensor connector.
6. Connect C428 ABS HCU connector.
7. Install both right and left fairing panels.
   - Tighten to 2.7 Nm (24 lb-in)
8. Install the seat.
   - Tighten to 15 Nm (11 lb-ft)
9. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
   - Tighten to 2.7 Nm (24 lb-in)
10. Install the power packs.

ABS Diagnostics

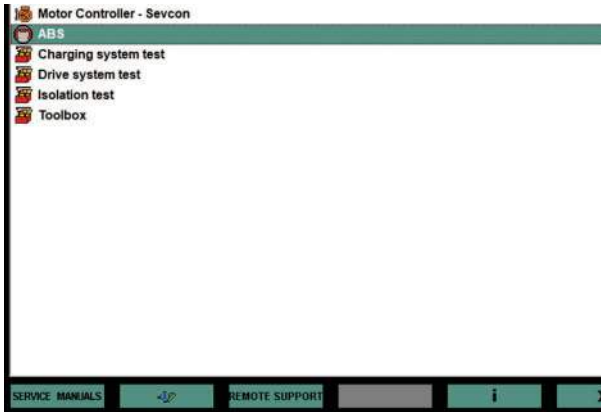
1. Connect the motorcycle to Diag4Zero and turn the key on.
2. Double click the Diag4 icon.



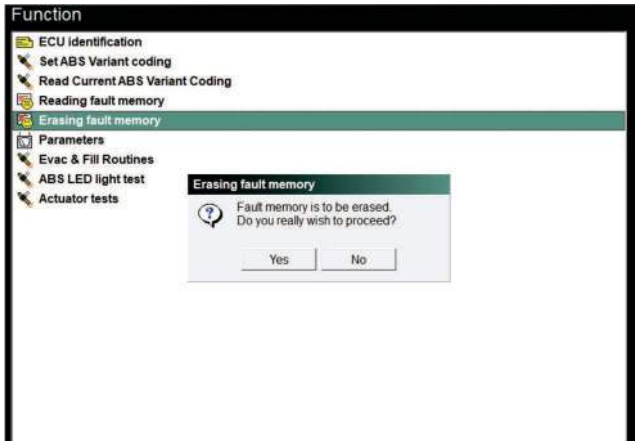
3. Select “Troubleshooting”.



4. Select the model year or select “Automatic detection”.



5. Select “ABS”.



6. Select “Erasing fault memory” and click on “Yes”.

Body - FX/FXS

Seat Removal



1. Remove two Torx bolts from the left and right sides of the seat.



2. Lift the rear of the seat and slide the front out from the seat mount.

Seat Installation

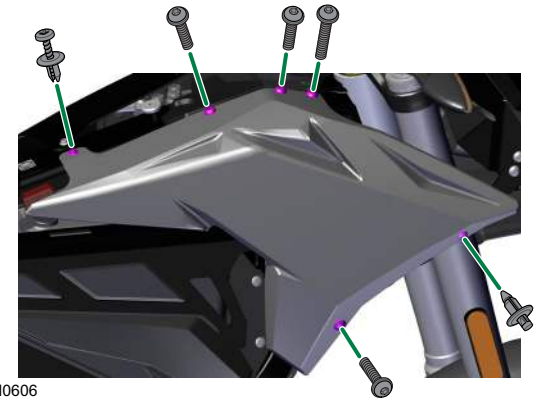
1. Installation of the seat is the reverse of the removal procedure.

During installation of the seat, confirm the front of the seat is properly located on the seat mount prior to reinstalling the securing bolts at the rear.

Front Panel Removal

The right front panel must be removed to gain access to the 12 volt fuse center.

1. Remove seat.



2. Remove the six fasteners securing the body panel to the frame.
3. Remove body panel.

Front Panel Installation

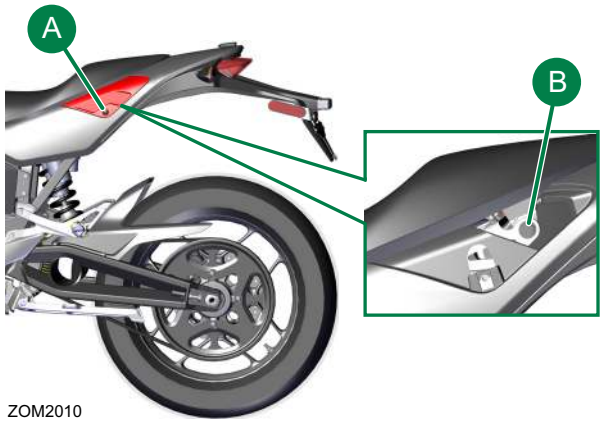
1. Installation of the front panel is the reverse of the removal procedure.

Note: When installing the body panel, make sure that no cables/wires are trapped between the frame and panel before tightening the fasteners.

Body - FXE

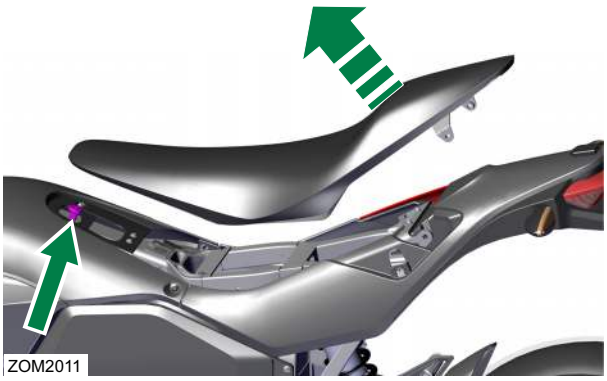
Seat Removal

The seat must be removed to gain access to the diagnostic connector.



1. Remove two Torx bolts (A) securing both left and right covers to the tail panel. Remove the covers.

2. Remove two bolts (B) securing the rider's seat to the frame.
   - Torque - 11 lb·ft (15 Nm).



3. Raise the rear of the seat and then slide forward to release the seat from the seat mounting point.
4. Remove the seat.

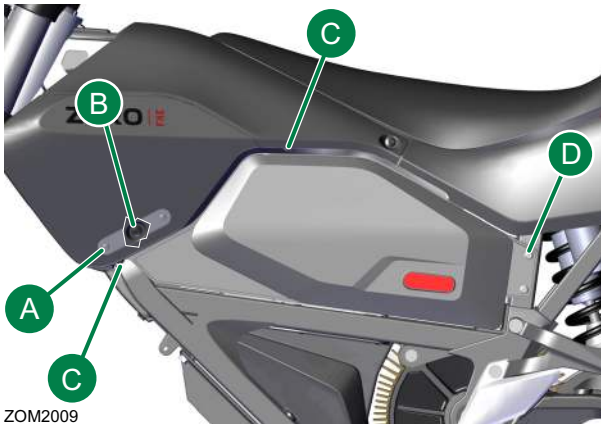
Seat Installation

1. Installation of the seat is the reverse of the removal procedure.

Note: During installation of the seat, confirm the front of the seat is properly located on the seat mount prior to reinstalling the securing bolts at the rear.

Side Panel Removal

Note: The left side panel will need to be removed to gain access to the power pack low power B+ fuse.



1. Remove two 2.5mm Hex head screws and washers (A) securing cover to front panel and remove cover.
   - Torque 8 in·lb (1 Nm).
2. Remove T25 Torx bolt (B) securing front panel to side panel.
   - Torque - 3.5 lb·ft (5 Nm).
3. Remove two 3mm Hex head bolts (C) and collect washers securing side panel to front panel. Torque - 2 lb·ft (3 Nm).
4. Remove two cross-head screws (D) securing side panel to frame.
5. Release side panel from front panel and remove.

Side Panel Installation

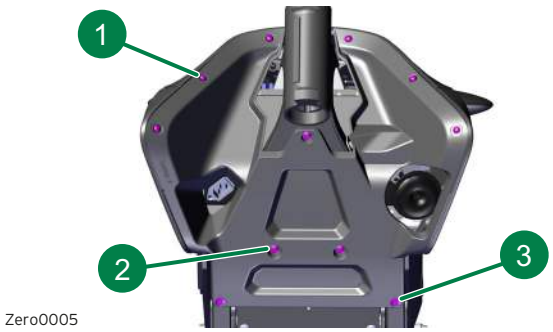
1. Installation of the panel is the reverse of the removal procedure.

⚠ CAUTION

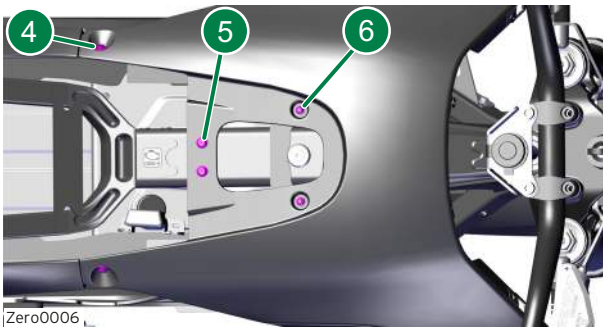
Do not over tighten fasteners securing side panel to front panel and frame.

Center Fairing Removal

1. Remove the seat. Seat Removal, page 60-1
2. Remove the side panel. See Side Panel Removal, page 60-2.



3. Remove six hex screws and washers (1), three rivet fasteners (2) and two T25 flanged screws (3).



4. Remove two flange hex screws (4), two rivet fasteners (5) and two locknuts and washers (6).
5. Remove the center fairing.

Center Fairing Installation

1. Installation of the panel is the reverse of the removal procedure.

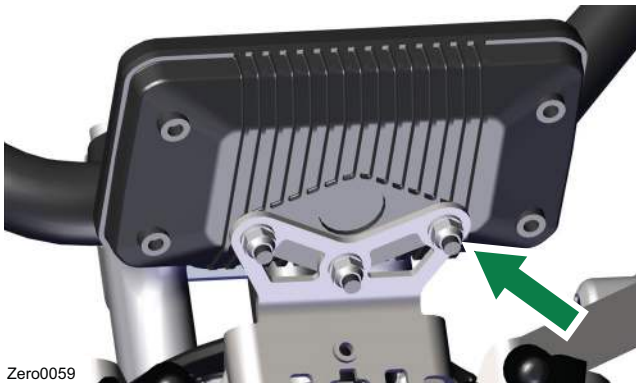
Instrument Panel Replacement

Required Tools

- 3 mm hex wrench
- 10 mm wrench or socket
- Socket wrench

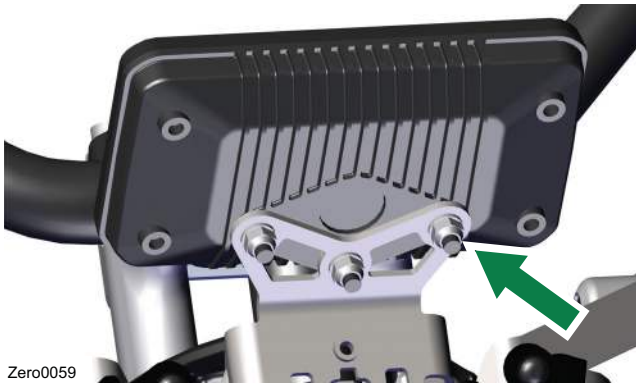
Removal

1. Remove the fly-screen.
2. Remove the right fairing panel.
3. Disconnect the instrument panel harness connector C282. Note the location of the zip ties for reassembly.
4. Remove and discard the zip ties.


Zero0059

5. Remove the three nuts and washers securing the instrument panel to the bracket. Remove the instrument panel.

Installation


Zero0059

1. Install the two nuts and washers securing the instrument panel to the turn signal brackets.
   - Tighten to 4 Nm (36 lb-in)
2. Connect the instrument panel harness connector C282.
3. Turn the handlebar fully right and install new zip ties in the same location as removed.
4. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
   - Tighten to 2.7 Nm (24 lb-in)
5. Install the right fairing panel.
   - Tighten to 2.7 Nm (24 lb-in)

Ignition Switch/Lock Cylinder Replacement

Required Tools

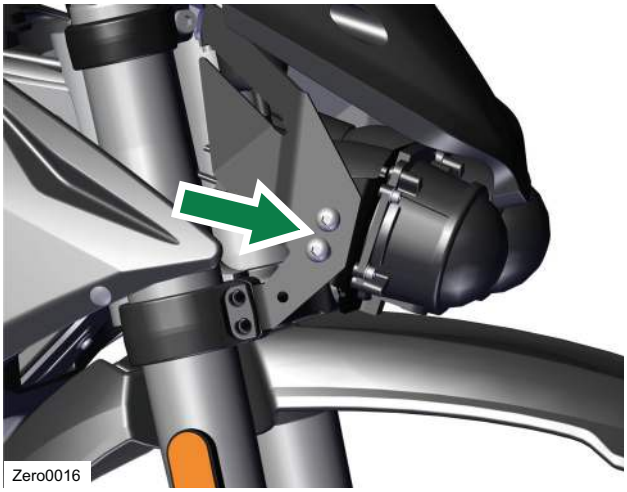
- Philips screwdriver
- 3 mm hex wrench
- 5 mm hex wrench

Removal

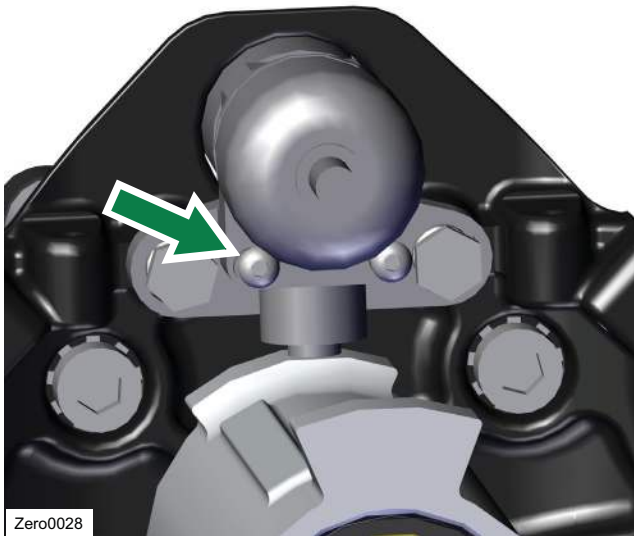
Note: Mark the location of all wires and cables prior to removal.

Note: The ignition switch and lock cylinder are replaced as a assembly.

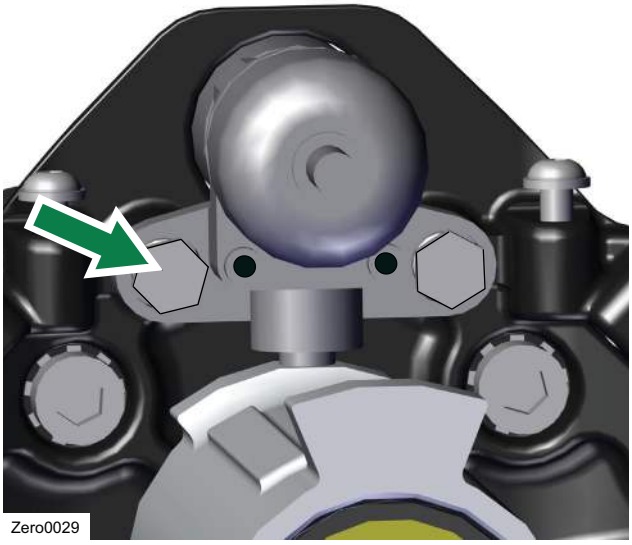
1. Remove the fly-screen.
2. Remove the front brake hose/ABS sensor upper harness bolt and clamp.


Zero0016

3. Remove the headlight bolts from the right and left side, and move the headlight off to the side.
4. Remove the front fender.


Zero0028

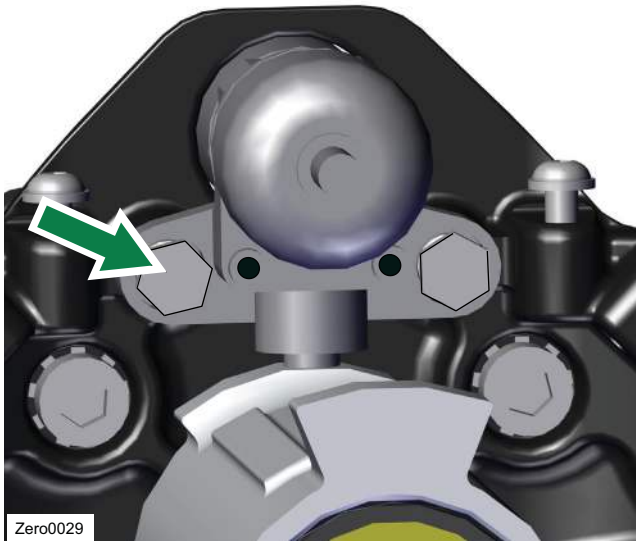
5. Remove the two screws securing the ignition switch to the key switch. This will provided additional clearance for removal of the break-away bolts.
6. Remove the right side fairing panel.
7. Disconnect the C274 ignition switch connector.
8. Remove and discard any zip ties necessary.


Zero0029

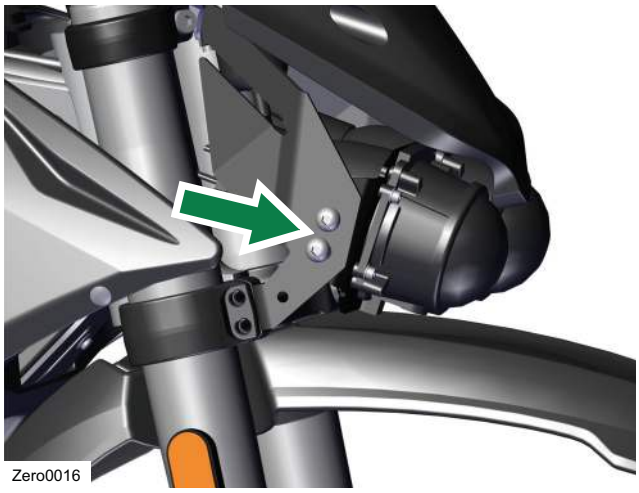
9. Remove the breakaway bolts, and remove the lock cylinder. To remove the bolt you must use a bolt extractor. Follow the manufacturer's instructions for correct use of the bolt extractor.

Installation

1. Install Loctite® 271™ to the threads of the lock cylinder bolts.


Zero0029

2. Install the lock cylinder and bolts. Tighten the bolts until the nut head breaks off.
3. Connect the C274 ignition switch connector.
4. Turn the handlebar all the way to the left. Install zip ties in the same location as removed.


Zero0016

5. Install the headlight and the right and left bolts.
6. Install the front brake hose/ABS sensor upper harness clamp and bolt.
7. Install the front fender.
   - Tighten to 2.7 Nm (24 lb-in)
8. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
9. Adjust the headlight. Refer to Headlight Adjustment, page 70-5.

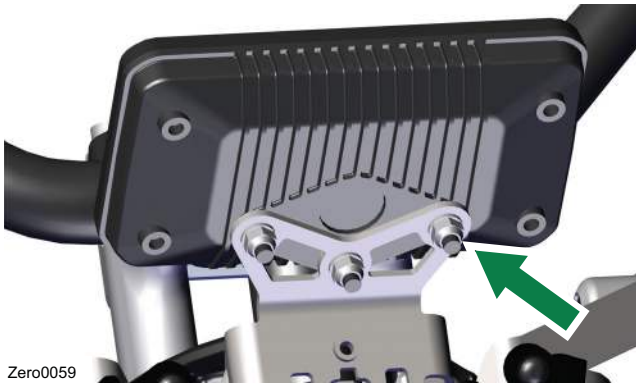
Right Handlebar Control Replacement

Required Tools

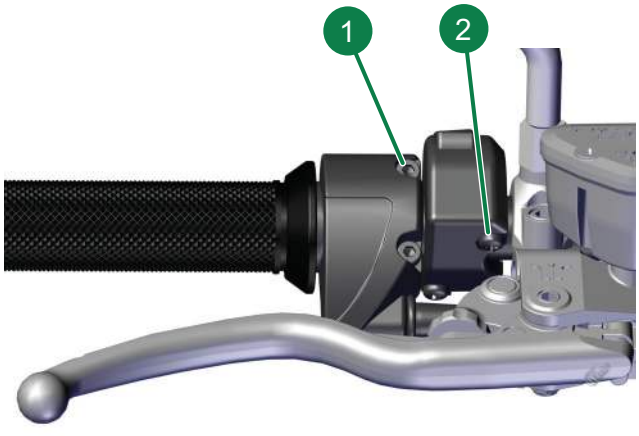
- Philips screwdriver
- 10 mm wrench or socket
- T25 tamper proof star wrench
- Socket wrench
- 3 mm hex wrench

Removal

1. Remove the fly-screen.


Zero0059

2. Remove the two nuts and washers securing the instrument panel to the bracket. Move the instrument panel off to the side.
3. Note the location of the harness routing a zip tie locations for reassembly. Remove and discard the zip ties.
4. Disconnect the right handlebar control harness connector C275.



Zero0027

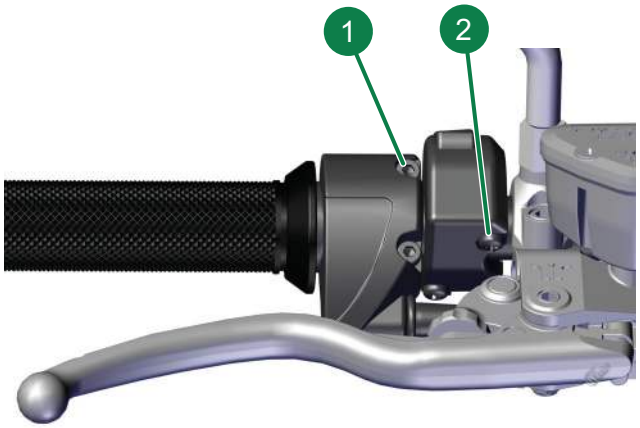
5. Loosen the two throttle screws (1) and separate the top of the housing enough so that alignment pin is out of the hole in the handlebar.

Slide the throttle back enough to access the lower handlebar control screw.

6. Remove the two Philips head screws (2) from the right handlebar switch, and remove the switch.

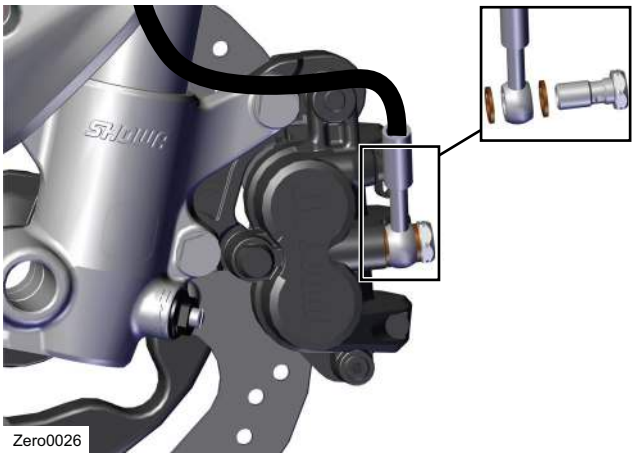
Installation

1. Place the right handlebar control onto the handlebar aligning the handlebar control pin with the hole in the handlebar.



Zero0027

2. Install two screws (2). Do not over tighten.
3. Slide the throttle back into position next to the handlebar control. Note: there is a pin on the throttle that must align with the hole in the hXandlebar.
4. Install throttle screws (1).
5. Route the harness in the same routing as removed and connect the right handlebar control harness connector C275.
6. Install new zip ties in the same location as removed.



Zero0026

7. Position the instrument panel onto the turn signal brackets and install the two washers and nuts.
   - Tighten to 4 Nm (36 lb-in)
8. Install the fly-screen. Ensure that ground C238 is between the fly-screen bolt and the bracket.
9. Twist the throttle and verify that the throttle is smooth and returns quickly.

Headlight Adjustment

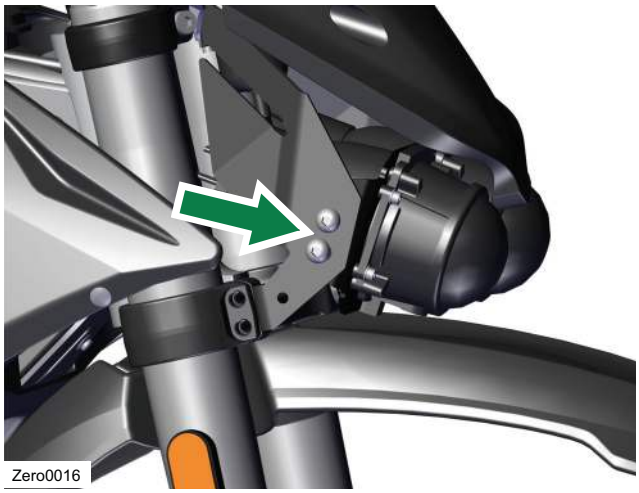
The headlight should be checked for correct alignment periodically. It must be aligned any time the suspension sag is adjusted because this will affect the headlight alignment. Before the headlight can be aligned, the sag and tire pressure must be correctly adjusted. The headlight can be adjusted vertically. If the vertical adjustment is off, it will cause the beam to point too close to or too far ahead of the motorcycle. With the headlight on the low beam position, the motorcycle perpendicular to the ground, and the operator sitting on the motorcycle, verify the beam alignment.

Note: The headlight is factory set for a 0.5-2.5% dip.

Required Tools

- 5 mm hex wrench

Adjustment



1. Loosen the headlight bracket bolts. Right side shown left side similar.
2. Lift up on the front of the fly-screen to release the velcro.
3. Move the housing until the correct beam alignment is achieved.
4. After the correct beam alignment is achieved, tighten the headlight bolts.
   - Tighten to 26 Nm (19 lb-ft)
5. Press down on the front of the fly-screen.

Headlight Bulb Replacement

⚠ CAUTION

Halogen bulbs contain gas under pressure. Handling a bulb improperly could cause it to shatter into flying glass fragments. To help avoid personal injury:

- *Turn off the key switch and allow the bulb to cool before changing the bulb.*
- *Leave the key switch OFF until the bulb change is complete.*
- *Always wear eye protection when changing a halogen bulb.*
- *Handle the bulb only by its base. Avoid touching the glass.*

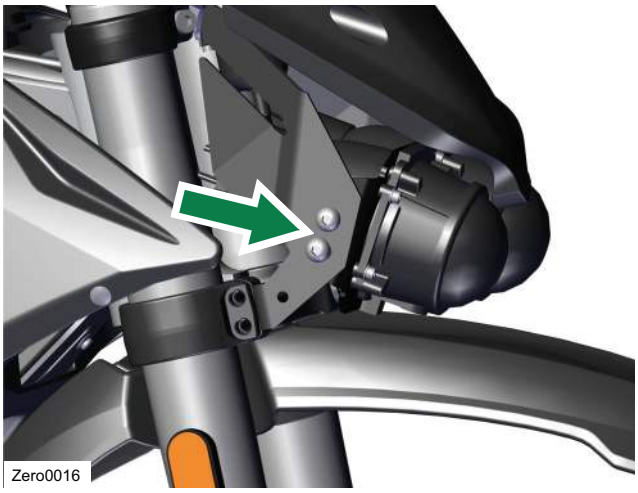
Note: Use a H3 bulb for both high and low beam replacement.

Required Tools

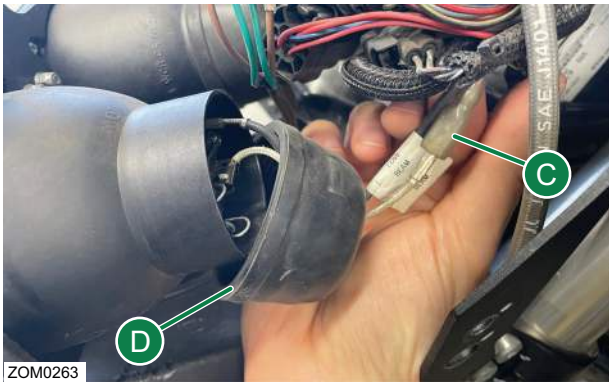
- 3 mm hex wrench
- 5 mm hex wrench

Removal

1. Remove the fly-screen bolts and the fly-screen.



2. Remove the headlight adjuster bolts. Left side shown; right side similar.



3. Disconnect the headlight bulb positive connector (C) and remove rubber cover (D).
4. Disconnect the headlight bulb ground connector.



5. Unhook the headlight bulb spring clip by pushing down then pushing to the inside.
6. Lift up on the spring clip and remove the headlight bulb.

Installation

Do not touch the glass portion of the headlight bulb. Keep the headlight bulb free of contaminants. Oil from your fingers or contaminates will shorten the life of the bulb. Thoroughly clean any fingerprints or contaminates from the bulb using a clean cloth moistened with alcohol.

1. Install the headlight bulb-into the lens.
2. Install the headlight spring clip and push the headlight bulb positive connector through the rubber cover.
3. Connect headlight bulb ground connector and install the rubber cover.
4. Install the headlight adjuster bolts.
5. Install the fly-screen, ensure that ground C239 is between the fly screen bolts and the bracket.
6. Adjust the headlight. Refer to Headlight Adjustment, page 70-5.

Turn Signal Flasher Replacement

Required Tools

- 3 mm hex wrench
- 5 mm wrench or socket
- Socket wrench

Note: The turn signal flasher is located at the right front of the frame, behind the power pack charger.

Removal

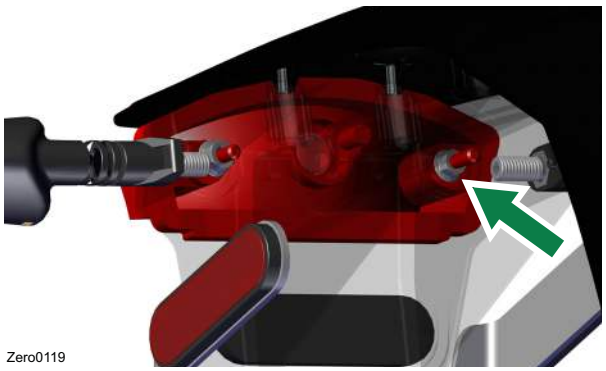
1. Remove the seat.
2. Remove the right fairing panel.
3. Disconnect the turn signal flasher harness connector C42 and remove the flasher.
4. Remove and discard the zip tie, securing the flasher to the harness.

Installation

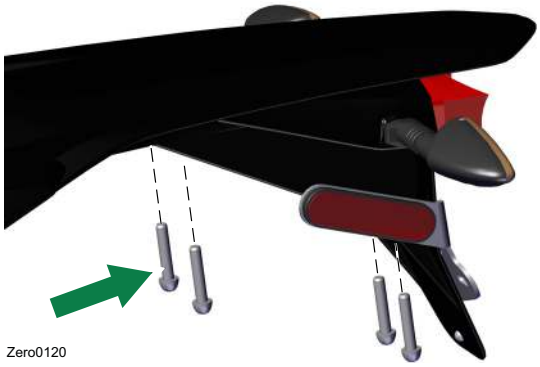
1. Connect the turn signal flasher harness connector C42.
2. Install a new zip tie securing the flasher to the harness in the same location as removed.
3. Install the right fairing panel.
4. Install the seat.

Tail Light Replacement

Removal

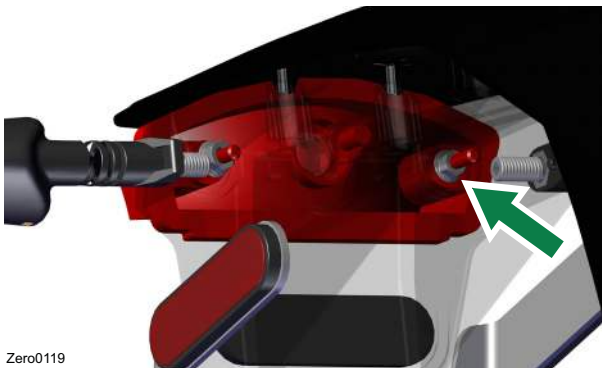

Zero0119

1. Remove the two nuts that secure the tail light to the tail pod.

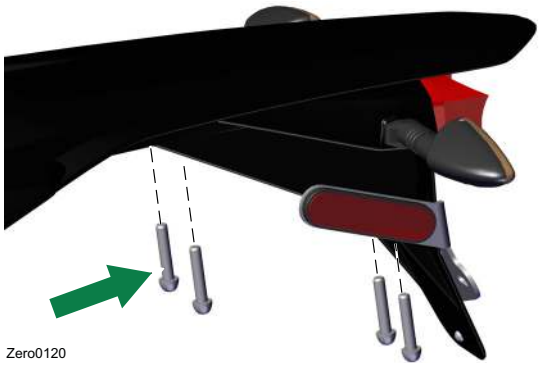

Zero0120

2. Remove four screws securing the upper tail panel to the tail pod.
3. Lift the panel to gain access to the tail light connector.
4. Unplug and remove the tail light.

Installation


Zero0119

1. Place the new tail light into position and install the nuts and washers.
   - Tighten to 1.75 lb-ft (2.4 Nm)
2. Connect the tail light and check operation.


Zero0120

3. Install the screws securing the upper tail panel to the tail pod

Main Chassis Harness Replacement (11kW)

⚠ CAUTION

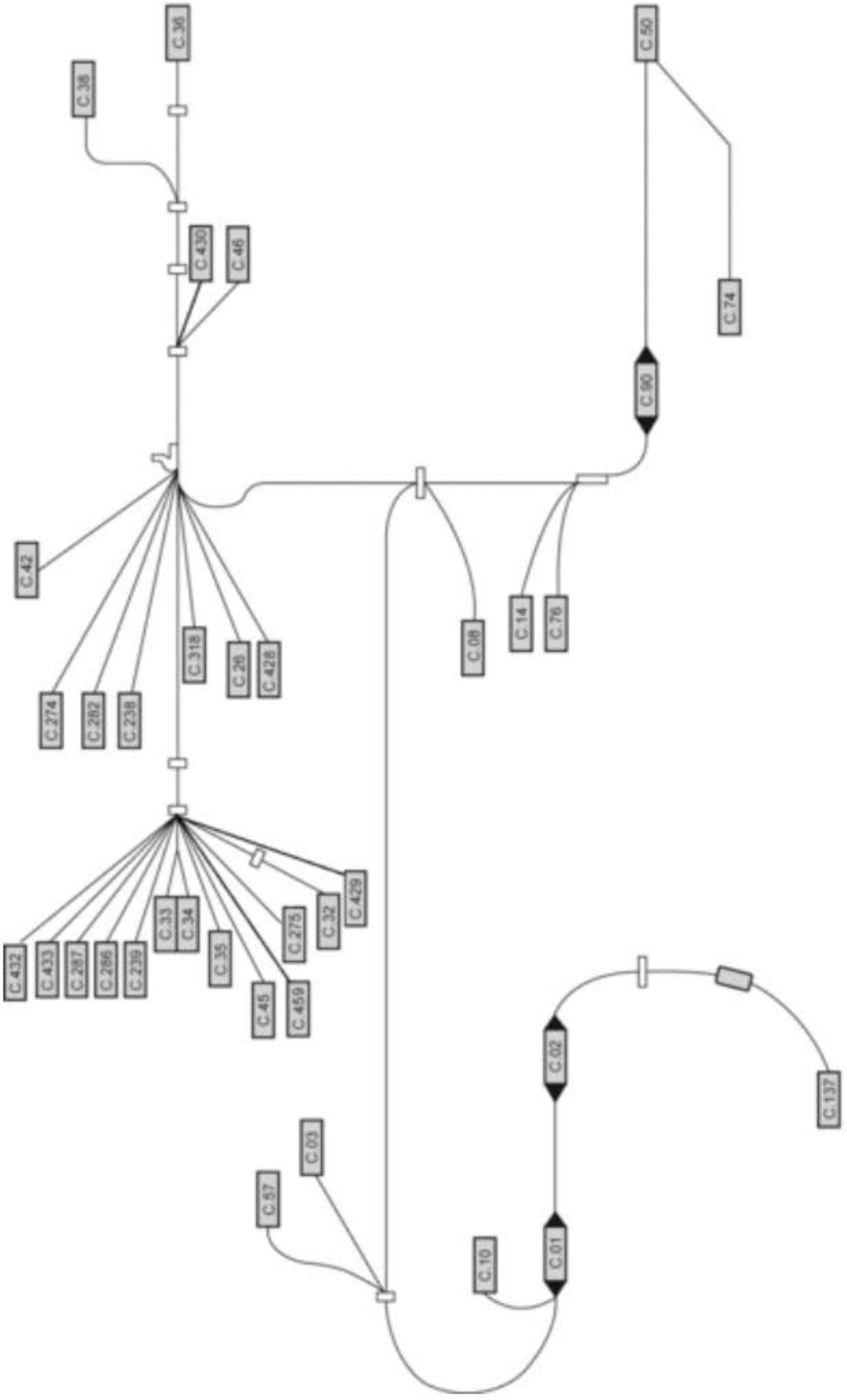
Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Required Tools

- 3 mm hex wrench
- 5 mm hex wrench
- 7 mm socket
- 10 mm socket
- Socket wrench
- 13 mm wrench
- Philips screw driver
- PN 85-05665 Controller Discharge Tool

Removal

1. Note the routing and location of harness and zip tie. (see following page)
2. Disable the High Voltage system. Refer to High Voltage Discharging, page 10-1.
3. Remove the fly-screen.
4. Remove the seat.
5. Remove the front fender.
6. Remove the fairing assembly.
7. Remove the upper motor controller bracket.
8. Remove the lower rubber side covers.
9. Remove the C137 from the power pack connector body.
10. Disconnect C1 and C2 main bike board connectors.
11. Disconnect C10 kickstand switch connector.
12. Disconnect C57 charger connector.
13. Remove the C3 data link connector fasteners.
14. Disconnect C8 DC/DC converter connector.
15. Disconnect C14 motor harness connector.
16. Remove C76 ground eyelet from the motor controller.
17. Disconnect the C90 motor controller connector.
18. Remove the C50 quick charge connector bracket.
19. Remove C74 positive eyelet from the motor controller.
20. Disconnect C274 key switch connector.
21. Disconnect C42 turn signal flasher connector.
22. Disconnect C459 throttle connector.
23. Disconnect C282 instrument panel connector.
24. Remove the headlight assembly, and disconnect C286, C287, C432, and C433.
25. Disconnect C275 right handlebar control connector.
26. Disconnect C33 right front turn signal connector.
27. Disconnect C34 left front turn signal connector.
28. Disconnect C35 left handlebar control connector.
29. Disconnect C32 horn connectors.
30. Disconnect C45 hand brake switch connector.


C.36
C.38
C.430
C.46
C.50
C.74
C.90
C.42
C.318
C.26
C.428
C.274
C.282
C.238
C.08
C.14
C.76
C.429
C.32
C.33
C.34
C.275
C.35
C.432
C.433
C.287
C.236
C.239
C.45
C.459
C.02
C.137
C.03
C.57
C.10
C.01

31. Disconnect C429 front wheel speed sensor.
32. Disconnect C238 ground eyelet from the frame.
33. Disconnect C428 anti-lock brake control module.
34. Remove the fuse center fasteners C46, and the ABS inline fuse fastener.
35. Disconnect C430 rear wheel speed sensor.
36. Disconnect C38 foot brake lamp switch connector.
37. Disconnect C36 inline connector (chassis harness to rear signal harness.
38. Note harness routing prior to removal; this will aid in reassembly of the harness to the motorcycle.
39. Release all main wiring harness zip ties and hold down brackets and remove the harness.

Installation

1. Layout the wiring harness in the same location as removed on the frame.
2. Connect C36 inline connector (chassis harness to rear signal harness.
3. Connect C38 foot brake lamp switch connector.
4. Connect C430 rear wheel speed sensor.
5. Install the fuse center and fuse center fasteners and the ABS inline fuse and fastener.
6. Connect C428 anti-lock brake control module.
7. Connect C238 ground eyelet from the frame.
8. Connect C429 front wheel speed sensor.
9. Connect C45 hand brake switch connector.
10. Connect C32 horn connectors.
11. Connect C35 left handlebar control connector.
12. Connect C34 left front turn signal connector.
13. Connect C33 right front turn signal connector.
14. Connect C275 right handlebar control connector.
15. Connect C286, C287, C432, and C433 and install the headlight assembly.
16. Connect C282 instrument panel connector.
17. Connect C459 throttle connector.
18. Connect C42 turn signal flasher connector.
19. Connect C274 key switch connector.
20. Install C74 positive eyelet onto the motor controller and tighten the bolt.
    - Tighten to 11 Nm (8 lb-ft)
21. Install the C50 quick charge connector bracket.
22. Connect the C90 motor controller connector.
23. Install C76 ground eyelet onto the motor controller and tighten the bolt.
    - Tighten to 11 Nm (8 lb-ft)
24. Connect C14 motor harness connector.
25. Connect C8 DC/DC converter connector.
26. Install the C3 data link connector fasteners.

Note: Prior to connecting the charger connector coat the terminals with CP70 dielectric grease.

27. Connect C57 charger connector.
28. Connect C10 kickstand switch connector.
29. Connect C1 and C2 main bike board connectors.
30. Install the C137 into the power pack connector body.
31. Install the zip ties in the same locations as removed.
32. Inspect harness routing to ensure that it is not in contact with any moving or sharp parts that could cause damage to the harness.
33. Install the upper motor controller bracket.
34. Install the front fairing.
35. Install the front fender.
36. Install the fly-screen. Ensure that ground C239 is between the fly-screen bolt and the bracket.
37. Install the lower rubber side covers.
38. Adjust the headlight. Refer to Headlight Adjustment, page 70-5.

Main Chassis Harness Replacement (except 11kW)

⚠ CAUTION

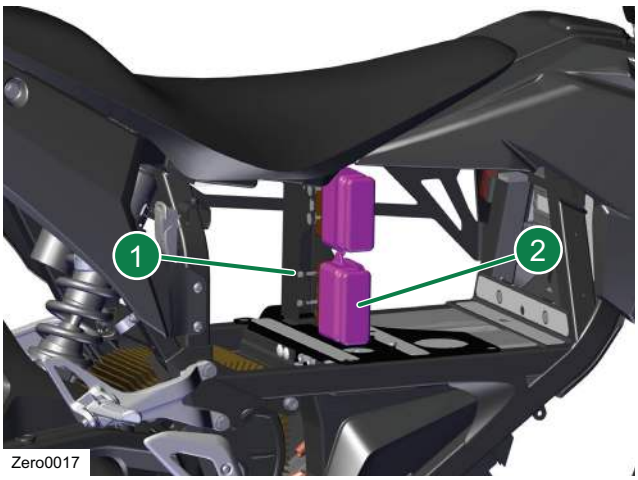
Always perform the High Voltage Discharging procedure prior to servicing any High Voltage component or connection. Proper procedures must be followed.

Required Tools

- 3 mm hex wrench
- 5 mm hex wrench
- 7 mm socket
- 10 mm socket
- Socket wrench
- 13 mm wrench
- PN 85-05665 Controller Discharge Tool

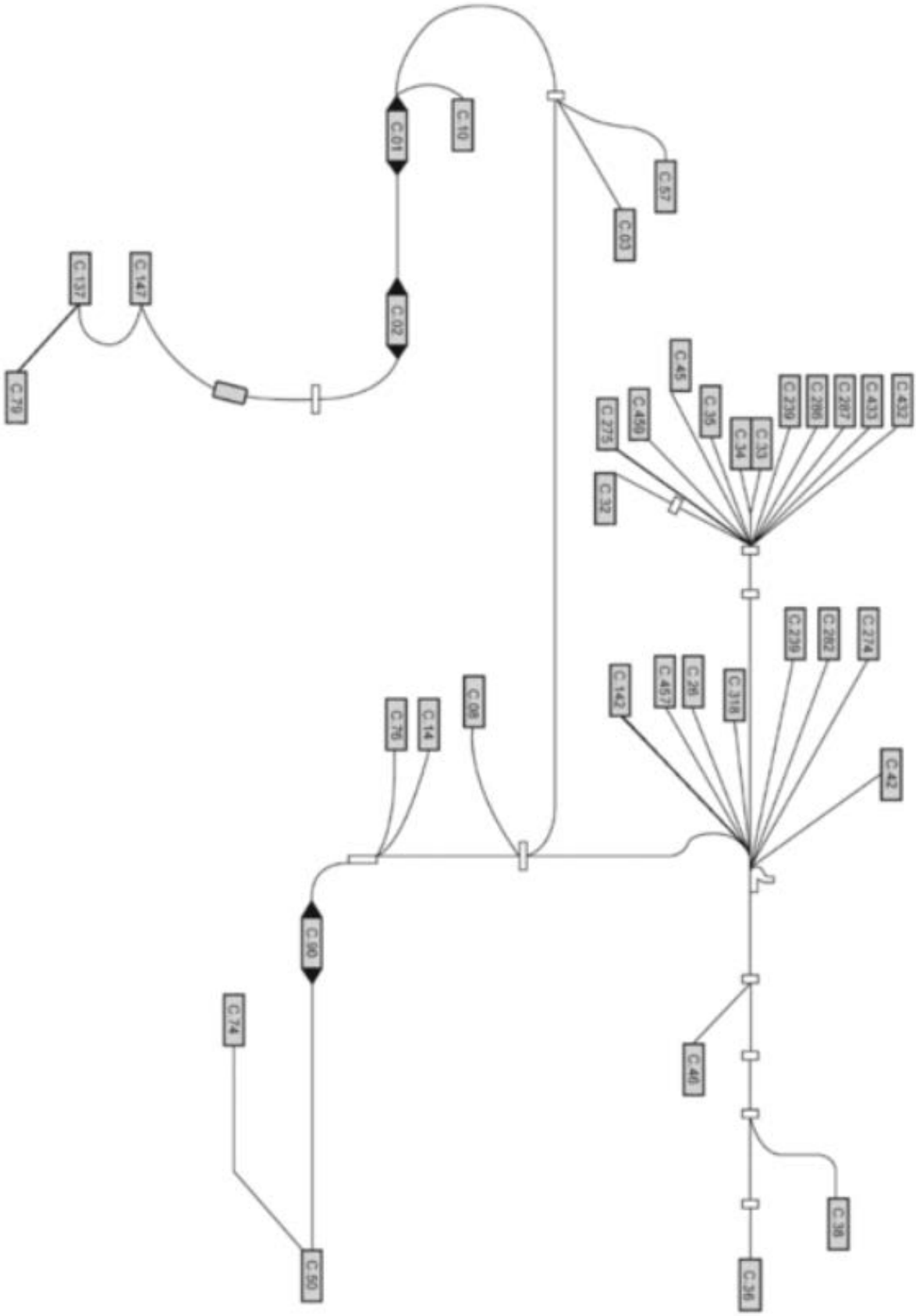
Removal

1. Note routing and location of harness and zip tie.
2. Disable the High Voltage system. Refer to High Voltage Discharging, page 10-1.
3. Remove the power packs.
4. Remove the fly-screen.
5. Remove the seat.
6. Remove the rear fender.
7. Remove the front fender.
8. Remove the fairing assembly.
9. Remove the upper motor controller bracket.
10. Remove the lower rubber side covers.
11. Remove C79 ground eyelet from the frame.



Zero0017

12. Remove screws (1) securing the securing power pack connectors (2) to the frame.
13. Remove the C137 and C147 from the power pack connector body.
14. Disconnect C1 and C2 main bike board connectors.


C 01
C 10
C 57
C 03
C 137
C 147
C 02
C 79
C 45
C 450
C 35
C 230
C 286
C 287
C 433
C 432
C 275
C 34
C 33
C 32
C 239
C 282
C 274
C 142
C 457
C 26
C 318
C 08
C 76
C 14
C 42
C 90
C 74
C 46
C 38
C 50
C 36

15. Disconnect C10 kickstand switch connector.
16. Disconnect C57 charger connector.
17. Remove the C3 data link connector fasteners.
18. Disconnect C8 DC/DC converter connector.
19. Disconnect C14 motor harness connector.
20. Remove C76 ground eyelet from the motor controller.
21. Disconnect the C90 motor controller connector.
22. Remove the C50 quick charge connector bracket.
23. Remove C74 positive eyelet from the motor controller.
24. Disconnect C274 key switch connector.
25. Disconnect C42 turn signal flasher connector.
26. Disconnect C282 instrument panel connector.
27. Disconnect C457/C472 inline connector (chassis harness to ABS harness).
28. Disconnect C142/C431 inline connector (chassis harness to ABS harness).
29. Remove the headlight assembly, and disconnect C286, C287, C432, and C433.
30. Disconnect C275 right handlebar control connector.
31. Remove the eyelet fastener for C239 ground.
32. Disconnect C33 right front turn signal connector.
33. Disconnect C34 left front turn signal connector.
34. Disconnect C35 left handlebar control connector.
35. Disconnect C45 hand brake switch connector.
36. Disconnect C459 throttle connector.
37. Disconnect C32 horn connectors.
38. Remove the fuse center fasteners, and the ABS inline fuse fastener.
39. Disconnect C38 foot brake lamp switch connector.
40. Disconnect C36 inline connector (chassis harness to signal harness).
41. Note harness routing prior to removal; this will aid in reassembly of the harness to the motorcycle.
42. Release all main wiring harness zip ties and hold down brackets and remove the harness.

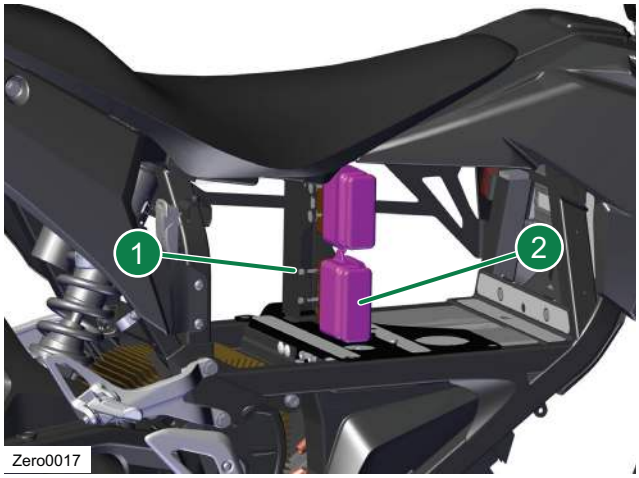
Installation

1. Layout the wiring harness in the same location as removed on the frame.
2. Connect C36 inline connector (chassis harness to signal harness).
3. Connect C38 foot brake lamp switch connector.
4. Install the fuse center and fuse center fasteners and the ABS inline fuse and fastener.
5. Connect C32 horn connectors.
6. Connect C459 throttle connector.
7. Connect C45 hand brake switch connector.
8. Connect C35 left handlebar control connector.
9. Connect C34 left front turn signal connector.
10. Connect C33 right front turn signal connector.
11. Install the C79 ground eyelet and screw on the frame.
12. Connect C275 right handlebar control connector.
13. Connect C286, C287, C432, and C433 and install the headlight assembly.
14. Connect C142/C431 inline connector (chassis harness to ABS harness).
15. Connect C457/C472 inline connector (chassis harness to ABS harness).
16. Connect C42 turn signal flasher connector.
17. Connect C282 instrument panel connector.
18. Connect C274 key switch connector.
19. Install C74 positive eyelet onto the motor controller and tighten the bolt.
    - Tighten to 11 Nm (8 lb-ft)
20. Install the C50 quick charge connector and bracket.
21. Connect the C90 controller connector.
22. Install C76 ground eyelet onto the motor controller and tighten the bolt.
    - Tighten to 11 Nm (8 lb-ft)
23. Connect C14 motor harness connector.
24. Connect C8 DC/DC converter connector.
25. Install the C3 data link connector and fasteners.

Note: Prior to connecting the charger connectors coat the terminals with CP70 dielectric grease.

26. Connect C57 charger connector.

27. Connect C10 kickstand switch connector.
28. Connect C1 and C2 main bike board connectors.
29. Install the C137 and C147 (2) into the power pack connector body. Connector C147 is for the bottom connector and the C137 is for the top connector.



30. Install power pack connector bolts (1) onto the connectors (2) and cover.
31. Install the zip ties in the same locations as removed.
32. Inspect harness routing to ensure that it is not in contact with any moving or sharp parts that could cause damage to the harness.
33. Install the upper motor controller bracket.
34. Install the front fairing.
35. Install the front fender.
36. Install the rear fender.
37. Install the fly-screen. Ensure that ground C239 is between the fly-screen bolt and the bracket.
38. Install the lower rubber side covers.
39. Install the power packs.
40. Adjust the headlight. Refer to Headlight Adjustment, page 70-5.