

BOMBARDIER

SHOP MANUAL 2001

DS 650



704 100 011

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INTRODUCTION

This *Shop Manual* uses technical terms which may be slightly different from the ones in the parts catalog.

TYPICAL PAGE

Section 03 ENGINE
Subsection 05 (CYLINDER AND HEAD)

CYLINDER AND HEAD
CYLINDER AND HEAD

10 N•m (89 lbf•in)

10 N•m (89 lbf•in)

33 N•m (24 lbf•ft)

60 N•m (44 lbf•ft)

Loctite 243

10 N•m (89 lbf•in)

10 N•m (89 lbf•in)

10 N•m (89 lbf•in)

10 N•m (89 lbf•in)

9

12

Engine oil

22

21

4

8

23

27

Drop represents a liquid product to be applied to a surface.

Tightening torque nearby fastener. In this case, nut must be torqued to 10 N•m or 89 lbf•in.

Illustration number for publishing process.

CAUTION: Pay attention to torque specifications. Some of these are in lbf•ft instead of lbf•in. Use appropriate torque wrench.

Document number for publishing process.

Page numbering system:
03: ENGINE section
05: CYLINDER AND HEAD subsection
1: First page of this subsection

Page heading indicates section and subsection detailed.

Subsection title indicates beginning of the subsection.

Exploded view assists you in identifying parts and related positions.

Bold face number indicates special procedure concerning this part.

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03-05-1

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Section 01 SERVICE TOOLS AND SERVICE PRODUCTS

Subsection 03 (SERVICE PRODUCTS)

RECOMMENDED SERVICE PRODUCTS

Anti-seize lubricant
(P/N 413 701 000)

Loctite anti-seize
lubricant 454 g (16 oz)



F01B174

Degreaser

(P/N 413 708 400)

Permatex® 48 TA
433 g (15 oz)



A00B3K4

Fuel stabilizer

(P/N 413 408 600)

236 mL (8 oz)



A00B3V4

Bombardier storage oil
(P/N 413 711 600)

(12 x 350 g)



A02B054

Plastic & vinyl cleaner
(P/N 413 711 200)

(6 x 1 L)



A00B4V4

Paste gasket

(P/N 413 702 700)

Loctite® 515:
Gasket eliminator (50 mL)



A00B2T4

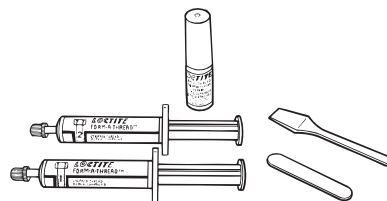
Silicone compound
(P/N 420 897 061)

Dow Corning® MS4



A00B3R4

Stripped threads repair kit
(P/N 413 708 600)



A00A1J4

BOMBARDIER LUBE

(P/N 293 600 016)

(12 x 14 oz)



F01B0S4

Section 02 MAINTENANCE

Subsection 03 (MAINTENANCE/LUBRICATION)

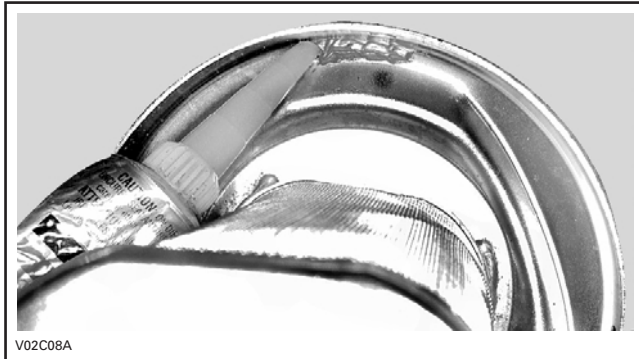
Installation

For installation, reverse the removal procedure, paying attention to the following details:

Check:

- wool and change if it deteriorate
- the spark arrester condition, it must be free of breaks and holes. Replace if necessary.

Remove the old sealant joint and replace by a new one. Use ULTRA COOPER sealant (P/N 413 710 300).



Be sure that wool is in place when inserting grill. Align grill properly in bottom of muffler shell.

TIRES AND WHEELS

Tire Pressure

CAUTION: Underpressure may cause tire to deflate and rotate on wheel. Overpressure might burst the tire. Always follow recommended pressure. Since tires are low-pressure type, a manual pump should be used.

Check pressure when tires are cold before using the vehicle.

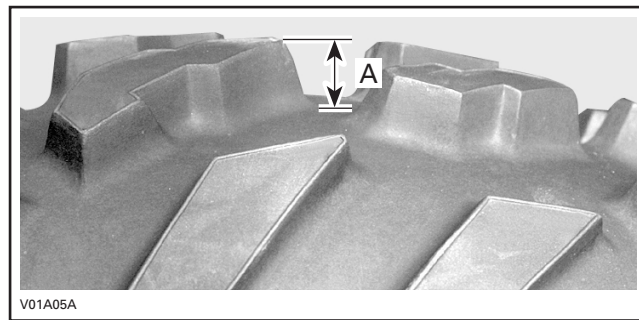
NOTE: Tire pressure changes with temperature and altitude. Recheck pressure if one of these conditions has changed.

For your convenience, a pressure gauge is supplied in tool box.

| TIRE PRESSURE | | |
|---------------|-------------------|-------------------|
| | FRONT | REAR |
| RECOMMENDED | 35 kPa (5 PSI) | 35 kPa (5 PSI) |
| MINIMUM | 21 kPa (3 PSI) | 21 kPa (3 PSI) |

Tire/Wheel Condition

Check tire for damage and wear. Measure thread height. It should be 4 mm (5/32 in) minimum. Replace if damaged or worn.



TYPICAL

A. 4 mm (5/32 in)

NOTE: Do not make a tire rotation. The front and rear tires have a different size. Besides, these tires are directional and their rotation must be kept in a specific direction for proper operation.

Wheel Removal

Untighten nuts then lift vehicle where needed. Place a support under vehicle. Remove nuts then withdraw wheel.

At installation, it is recommended to apply anti-seize lubricant on threads. Gently tighten nuts in a criss-cross sequence then apply a final torque of 52.5 N•m (39 lbf•ft).

ENGINE AREA

Check in the engine area, for leak or other damage. Clean mud, leaves, etc. from engine area.

5, Muffler Removal

Remove exhaust pipes.

Remove screw **no. 26**, washer **no. 27** and spacer **no. 28**.

Under rear fender, remove screw **no. 29**, washer **no. 30**, bushing **no. 31**, another washer **no. 32** and spacer **no. 33**.

Remove muffler.

Muffler Installation

For installation, reverse the removal procedure.

NOTE: Check rubber bushings **nos. 34** and **35** for cracks or other damages, change if necessary.

6, OIL TANK

Removal

Remove front fascia. Refer to BODY.

Remove head light. Refer to ACCESSORIES.

Drain engine oil.

Remove:

- oil inlet hose **no. 7**
- oil outlet hose **no. 8**
- oil tank vent **no. 36**.

Unscrew bolts retaining oil tank and fuel tank cover to the frame.

Unscrew bolt **no. 37** under oil tank.

Pull oil tank.

Installation

For installation, reverse the removal procedure. Paying attention to the following details.

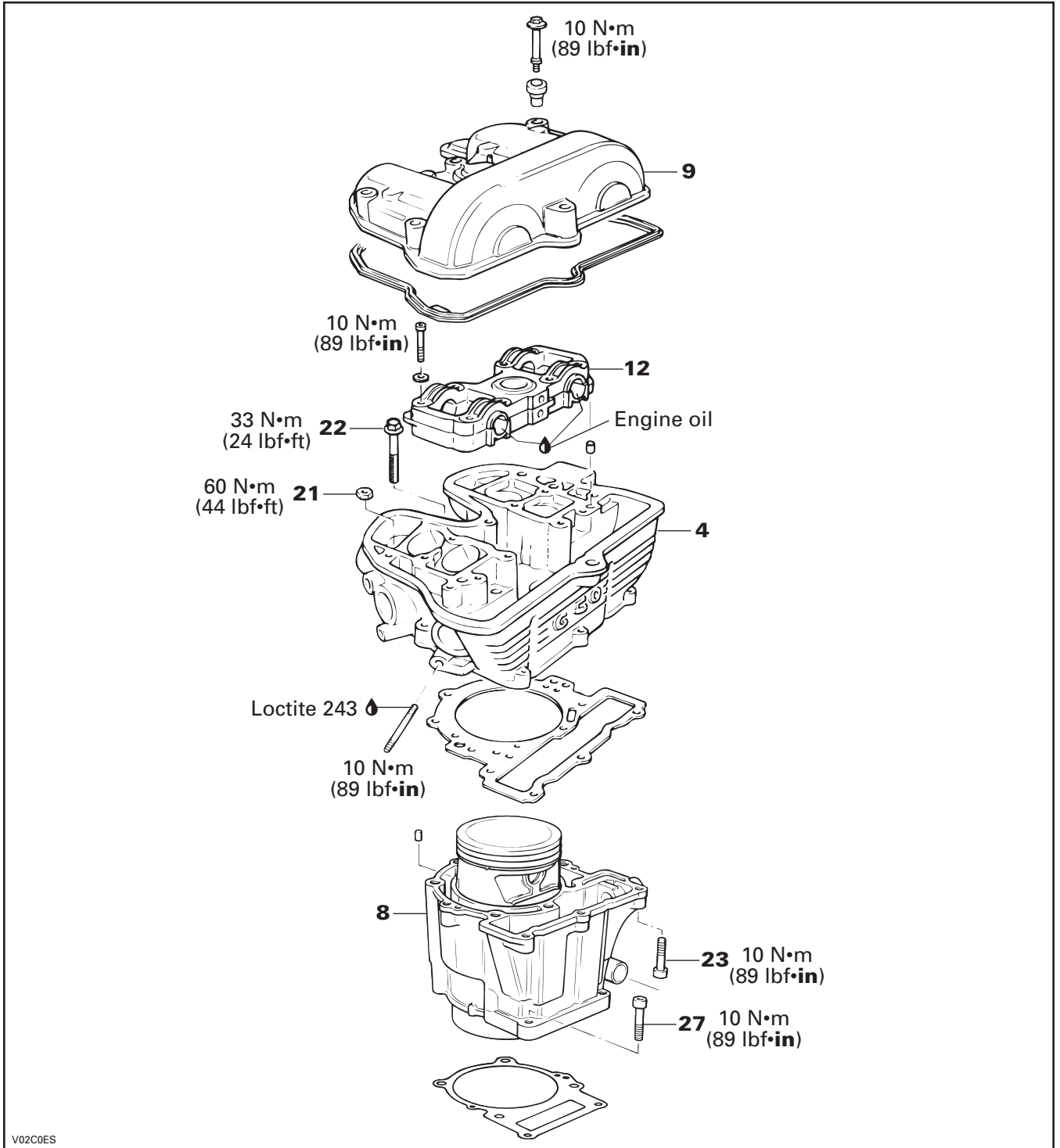
Install rubber washer **no. 38** between oil tank and frame.

Do not forget spacers **no. 39** in the grommets **no. 40**.

Bleed engine if necessary. Refer to MAINTENANCE.

CYLINDER AND HEAD

CYLINDER AND HEAD



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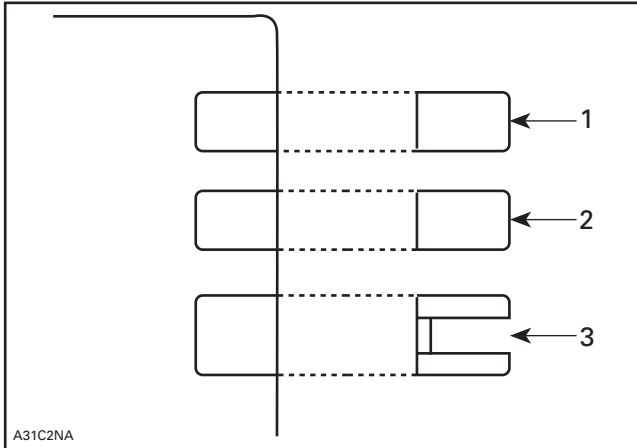
Section 03 ENGINE

Subsection 06 (CRANKSHAFT/BALANCER SHAFT)

Installation

For installation, reverse the removal procedure. Paying attention to the following details.

Install the oil ring first, then the middle ring with the word TOP facing up, then the top ring with a dot facing up.



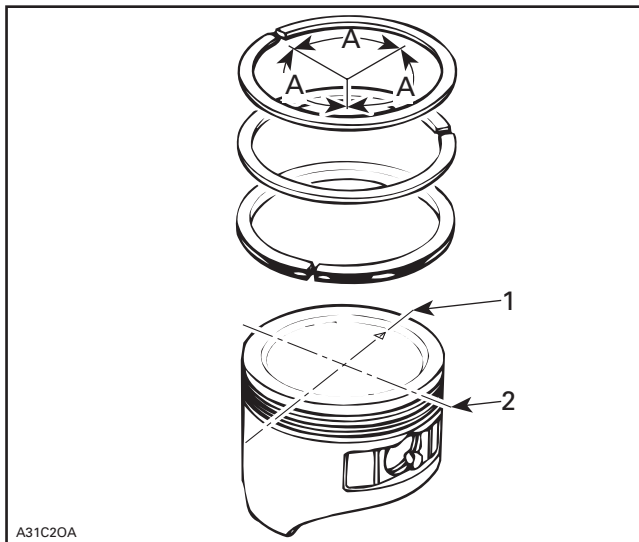
1. Top ring (rectangular, black/gray color)
2. Second ring (scraper, chrome/stainless steel looking ring)
3. Oil ring

CAUTION: Ensure that top and second rings are not interchanged.

NOTE: Use a ring expander to prevent breakage during installation. The oil ring must be installed by hand.

Check that rings rotate smoothly after installation.

Space the piston ring end gaps 120° apart and do not align the gaps with the piston pin bore or the thrust side axis.



1. DO NOT align ring gap with piston thrust side axis
2. DO NOT align ring gap with piston pin bore axis
- A. 120°

4, BALANCER SHAFT

Removal

Remove:

- engine (refer to REMOVAL AND INSTALLATION)
- cylinder (refer to CYLINDER AND HEAD)
- piston no. 2.

RH Side

Remove:

- magneto (refer to MAGNETO SYSTEM)
- free wheel and idle gears
- oil filter and unfasten two screw connections on base plate for engine housing.

LH Side

Remove:

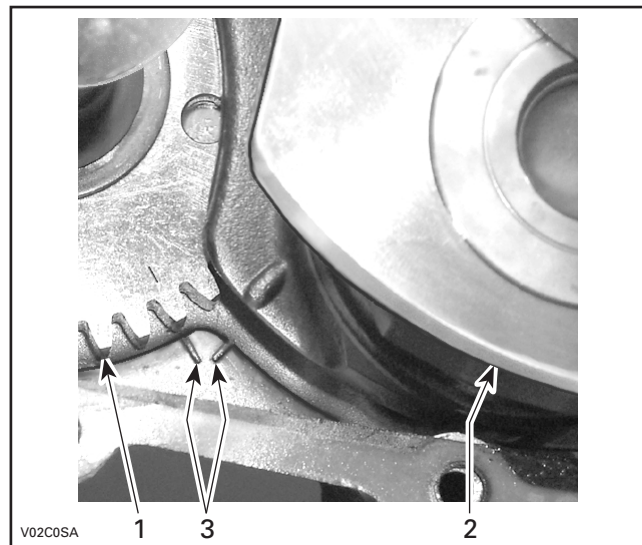
- clutch (refer to CLUTCH)
- double drive gear no. 9 and timing chain.

Lift up left side of engine housing, striking alternate gentle blows with plastic hammer on mainshaft, countershaft and balancer shaft to ensure that these remain on magnet side.

CAUTION: Do not tilt engine housing; this can cause damage to bearing cup.

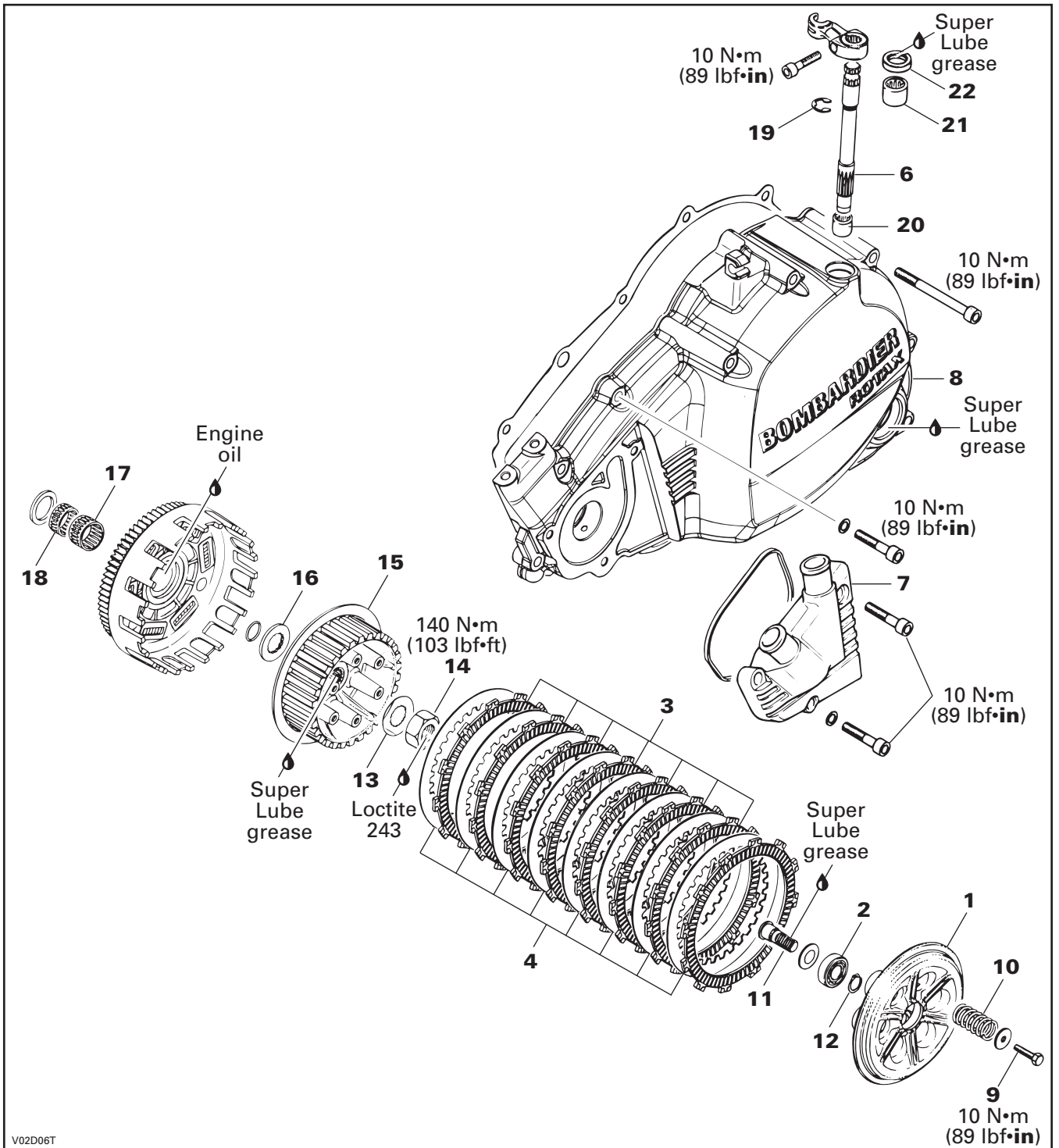
Remove shims no. 10 and no. 15 on crankshaft and balancer shaft.

Align marks on balancer shaft and crankshaft with marks on housing.



1. Balancer shaft
2. Crankshaft
3. Marks on housing

CLUTCH



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Section 04 FUEL SYSTEM

Subsection 02 (FUEL CIRCUIT)

FUEL LINE

WARNING

Whenever working on fuel system, always verify for water or dust infiltration in reservoir. Replace any damaged, leaking or deteriorated fuel line.

When replacing fuel line, be sure to use hoses as available from Bombardier parts department. This will ensure continued proper and safe operation.

WARNING

Use of improper fuel line could compromise fuel system integrity.

WARNING

When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

1, FUEL TANK

NOTE: Disconnect BLACK negative cable from battery.

Draining

Turn fuel valve **no. 2** to the position OFF then obstruct line **no. 3** with a hose pincher (P/N 295 000 076).

Disconnect fuel line from carburetor.

Place fuel line in a reservoir, turn fuel valve on REVERSE and remove hose pincher.

NOTE: To accelerate fuel tank draining and ensure complete draining, remove cap **no. 4**.

When the tank is empty, turn valve OFF.

Removal

Drain fuel tank.

Remove following items from body. Refer to BODY for complete detailed procedure:

- seat
- front facia
- fuel tank cover.

Inspection

Inspect fuel tank for any damage or cracks which may result in fuel leaks. If so, replace tank with new one.

Installation

Reverse removal procedure, however pay attention to the following:

Perform fuel system pressurization as described in the following procedure.

2, FUEL VALVE

Removal

Remove fuel tank.

Place fuel tank on the side.

Unscrew the bolts **no. 7** retaining fuel valve to fuel tank.

Remove fuel valve.

Inspection

Check strainer on each end of fuel valve rods. If one strainer is damaged, change fuel valve.

Check gasket between fuel valve and fuel tank for damage. If so, replace by a new.

Installation

For installation, reverse the removal procedure.

Clean strainer on each end of fuel valve rods.

Perform fuel system pressurization as described in the following procedure.

Section 05 ELECTRICAL

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Section 05 ELECTRICAL

Subsection 04 (STARTING SYSTEM)

INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery and thoroughly clean battery rack with water and baking soda.

Inspect battery rack mounting.

Inspect battery posts for security of mounting.

BATTERY STORAGE

Disconnect and remove battery from the vehicle (see above).

The battery must always be stored in fully charged condition.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 413 701 700) or petroleum jelly on terminals.

Clean battery casing using a solution of baking soda and water. Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging to a minimum.

ACTIVATION OF A NEW BATTERY

⚠ WARNING

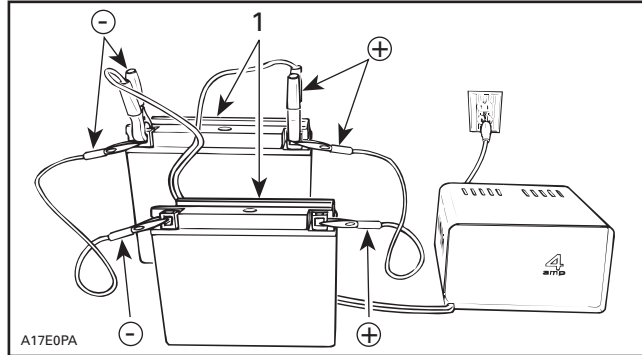
Never charge or boost battery while installed on vehicle.

1. Connect a 10 A battery charger for a few hours.
2. Disconnect battery charger.
3. Test battery state of charge. Use a multimeter.

NOTE: It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

CHARGING 2 OR MORE BATTERIES AT A TIME

Connect all positive battery posts together and use a charger with a capacity (rated) equal to number of batteries to be charged.



TYPICAL

1. Two batteries connected in parallel

INSTALLATION

Reinstall battery in vehicle. Fasten battery holder.

⚠ WARNING

Connect positive RED cable first then negative cable. Always connect RED positive cable first.

ACCESSORIES

REMOVAL AND INSTALLATION

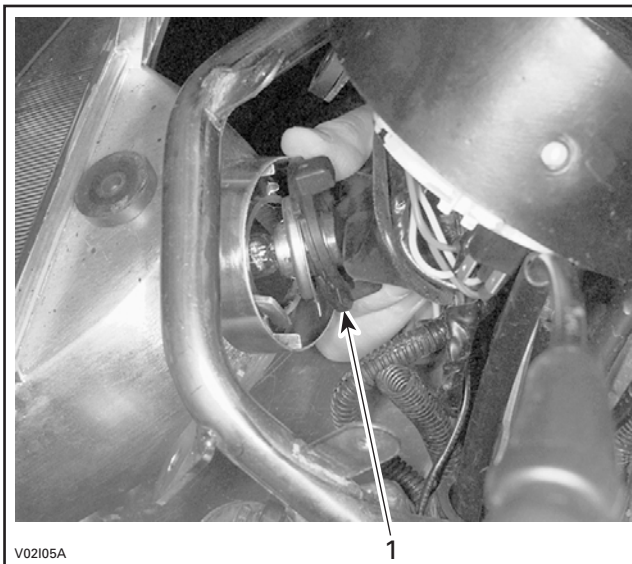
CAUTION: It is recommended to always disconnect the battery when replacing any electric or electronic parts.

HEADLIGHT

If the Headlight Bulb is Burnt

Remove front fascia and dashboard.

Remove rubber boot and turn counterclockwise bulb retaining ring.



1. Retaining ring

Detach bulb and replace.

Properly reinstall removed parts in the reverse order of their removal.

CAUTION: On applicable models, never touch glass portion of an halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

Removal

Remove front fascia and dashboard. Refer to BODY. Unscrew the bolts retaining headlight then unplug the connector.

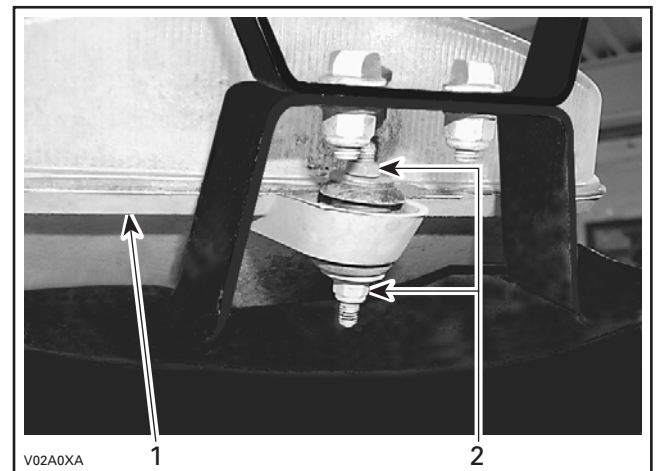
Installation

Properly reinstall removed parts in the reverse order of their removal.

Adjustment

Adjust beam aiming as follows:

Turn nuts to adjust beam height orientation as explained below.



1. Headlight
2. Beam height adjustment

HEADLIGHT BEAM AIMING

Select **high** intensity.

Beam aiming is correct when center of high beam is 131 mm (5 in) below the headlight horizontal center line, scribed on a test surface, 5 m (17 ft) away.

NOTE: Sit down the driver or place the same weight on the vehicle.

Measure headlight center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 131 mm (5 in) below scribed line.

Section 06 DRIVE TRAIN

Subsection 03 (FINAL DRIVE)

Reinstall in their proper order all removed parts.
Secure with a new cotter pin.

Preload Adjustment

Turn adjusting nut counterclockwise (towards front of ATV) and **hand tighten only**.

CAUTION: Do not over tighten using a tool; this would cause tapered bearings to overheat and thus reduce their life expectancy.

Ensure axle turns freely and without bearing play and then tighten adjusting nut lock screw no. 21 to 10 N•m (89 lbf•in).

WARNING

Torque wrench tightening specifications must strictly be adhered to. Locking devices (ex.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

NOTE: Adjust chain slack. Refer to MAINTENANCE for the proper procedure.

6, ECCENTRIC AXLE HOUSING

Removal

Remove the rear axle.

On the LH side, remove the circlip and the caliper bracket.

Loosen rear axle lock bolts.

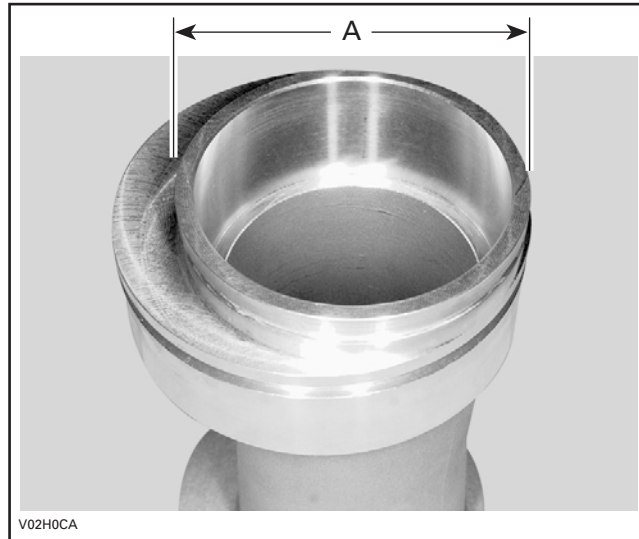
Pull out, by the RH side, the eccentric axle housing.

Inspection

Check for worn diameter where the caliper bracket seats.

ECCENTRIC AXLE LH O.D.

| | |
|----------------------|-----------------|
| SERVICE LIMIT | 75 mm (2.95 in) |
|----------------------|-----------------|



A. 75 mm (2.95 in)

Installation

Installation takes place in the reverse order of removal.

7, ECCENTRIC AXLE BEARINGS

Inspection

Eccentric axle bearings must have full freedom of movement. If not, change the bearings.

Removal

NOTE: Bearings and seals must be replaced if removed.

Pry out drive axle seals no. 24. Be careful not to damage seal bore or eccentric axle housing.

Use a punch and drive bearings cup outward from opposite end of housing.

Installation

Place new bearings in a freezer for 10 minutes before installation.

Place eccentric axle housing in oven to 100°C (212°F) to ease bearings installation for a half hour maximum.

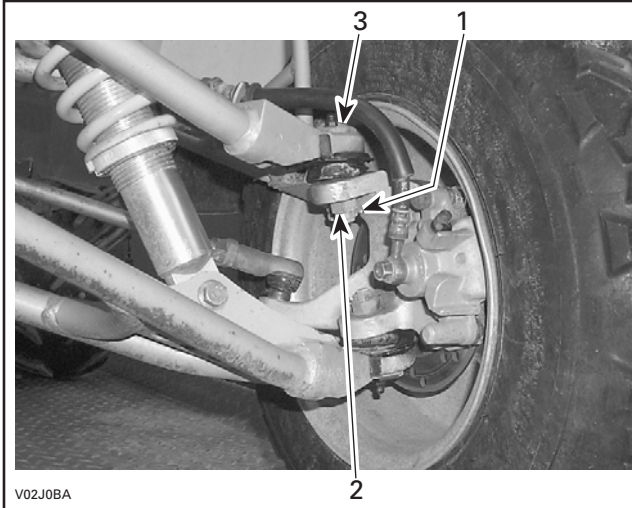
WARNING

Clean all grease, outside and inside, from eccentric housing before put in oven.

Section 08 SUSPENSION

Subsection 02 (FRONT SUSPENSION)

Remove cotter pin no. 9, castellated nut no. 10 and hardened washer no. 11 from upper ball joint no. 4.



1. Remove cotter pin
2. Castellated nut
3. Upper ball joint

Loosen wheel nuts.

Lift front of vehicle and install jack stands under the frame to support the vehicle off the ground.

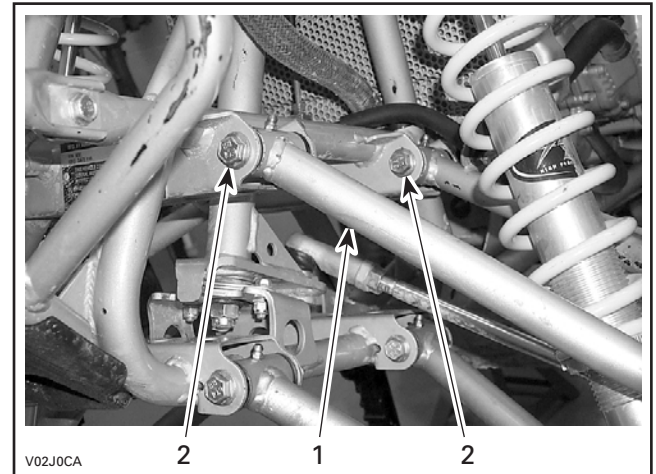
NOTE: Lift up vehicle high enough to have the wheel off the ground and shock absorber no. 1 fully extended.

Remove wheel(s).

Use a ball joint remover and detach upper A-arm from knuckle.

CAUTION: Never tap the knuckle with a hammer.

Remove bolts no. 12 and nuts retaining upper A-arm to frame.



1. Upper A-arm
2. Remove nuts and bolts

Remove upper A-arm from vehicle.

Inspection

Check upper A-arm for cracks, distortion or other damages. Replace as required.

Inspect pivot bushings for wear or damages.

Replace pivot bushings if necessary.

Check ball joint bellows on upper A-arm for cracks or any other damage and inspect ball joint stud for damages. Ensure stud is moving freely. Refer to BALL JOINT section below.

Installation

Position upper A-arm and install bolts no. 12 and nuts.

Torque nuts to 70 N•m (52 lbf•ft).

Attach upper A-arm to knuckle. Install hardened washer no. 11 and castellated nut no. 10.

Torque to 50 N•m (37 lbf•ft). Finish by the hand tightening.

Install a new cotter pin. Both ends of cotter pins must be folded.

Secure brake hose to upper A-arm.

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Section 09 BRAKES

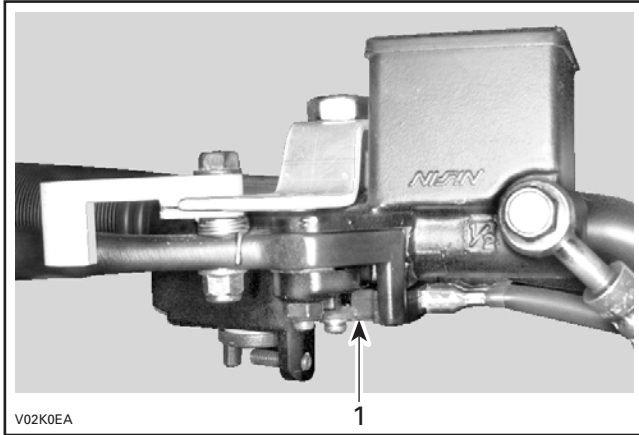
Subsection 02 (HYDRAULIC BRAKES)

BRAKE LIGHT SWITCH

Removal

Front Brake Light Switch

The front brakes switch **no. 45** is located on the master cylinder and cannot be adjusted. Check that switch is securely installed and operates rear light properly.



1. Front brake light switch

Rear Brake Light Switch

The rear brake switch is located on the rear master cylinder banjo fitting **no. 16**.

The rear brake light switch **no. 46** cannot be adjusted.

Remove RH foot protector. Refer to BODY for removal procedure.

Disconnect connectors.

Unscrew rear brake light switch **no. 46** from banjo fitting **no. 16**. Catch spilled fluid with a rag.

Installation

For installation, reverse the removal procedure.

NOTE: Apply pipe sealant on threads.

Bleed the brake system.

REAR CALIPER BRACKET

Removal

Remove brake hub. Refer to FINAL DRIVE.

Remove the large circlip **no. 47**.

Pull the caliper bracket **no. 48**.

Inspection

Check for wear or other damage on the eccentric bearing carrier and on the bracket. Replace parts if free play is excessive.

Installation

For installation, reverse the removal procedure.

Section 10 BODY/FRAME

Subsection 03 (FRAME)

1, FOOTREST

Removal

Unfasten foot protector supports from footrest.
Remove mounting flanged bolts **no. 5** and flanged nuts **no. 6**.

Inspection

Check for cracks or bent plate. Change or repair if necessary.

Installation

Installation is essentially the reverse of removal procedure.

2, DASHBOARD SUPPORT

Removal

Remove:

- dashboard
- fuel tank (refer to FUEL CIRCUIT)
- headlight (refer to ACCESSORIES)
- handle bar
(refer to STEERING/CONTROL SYSTEM)
- half housing bolts **no. 7**, stopper plates, half housings and housing bushings retaining steering column
(refer to STEERING/CONTROL SYSTEM).

Pull out the dashboard support.

Inspection

Check for cracks or bent tube. Change or repair if necessary.

Installation

For installation, reverse the removal procedure.

3, REAR FRAME EXTENSION

Removal

Remove:

- rear fender (refer to BODY)
- battery and all wire attached to frame extension
- muffler (refer to REMOVAL AND INSTALLATION)
- rear shock absorber reservoir
(refer to REAR SUSPENSION)
- rear brake fluid reservoir
(refer to HYDRAULIC BRAKES)
- rear brake hose
- upper bolts of foot protectors supports
(refer to BODY)
- air intake silencer (refer to CARBURETOR AND AIR INTAKE SILENCER)
- starting solenoid
- brake light.

Unscrew bolts **nos. 8** and **9** retaining rear extension frame to the frame.

Inspection

Check for cracks, bent tube or other damage. Repair or change if necessary.

Installation

Installation is the reverse of removal procedure.

NOTE: On the RH side, the lower bolt **no. 9** must be installed with the head inside the frame.

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