

# 94000529 - 2018 HARLEY-DAVIDSON® SERVICE MANUAL: SOFTAIL® MODELS

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## Procedure

- HEATED OXYGEN SENSORS (HO2S)
  - Prepare
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    - Remove
    - Install
    - Complete
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    - Prepare
    - Remove
    - Install
    - Complete

Always use blocking or proper stands to support the part that has been hoisted. If a part cannot be removed, verify that all bolts and attaching hardware have been removed. Verify that no parts are in the way of the part being removed.

Always tag hoses, wiring or tubes to verify proper installation.

Thoroughly clean all parts to be reused before assembly. Clean parts promote better component operation and longer life. Seals, filters and covers used in this vehicle keep out extraneous dirt and dust. Keep these items in good condition to guarantee satisfactory operation. See **Cleaning**.

Check torque using a torque wrench set to the minimum specification for that fastener. If the fastener does not rotate, the torque has been maintained. If the fastener rotates, remove it to determine if it has a threadlocking agent.

If it has a threadlocking agent, clean all material from the threaded hole. Replace the fastener with a **new** one or clean the original fastener threads and apply the appropriate threadlocking product. Install and tighten the fastener to specification.

If the fastener does not use a threadlocking agent, install and tighten it to specification.

Air cleaner cover screw, single screw cover	5.6–7.3 N·m (50–65 <b>in-lbs</b> )	2.20 INSPECT AIR FILTER, Install  <i>Apply LOCTITE 243 (blue) to the threads of screw.</i>
Air cleaner cover screws, five-screw cover	5.4–8.1 N·m (48–72 <b>in-lbs</b> )	2.20 INSPECT AIR FILTER, Install  <i>Apply LOCTITE 243 (blue) to the threads of screw. Tighten in a star pattern.</i>
Air cleaner cover screws, oval cover	5.7–6.8 N·m (50–60 <b>in-lbs</b> )	2.20 INSPECT AIR FILTER, Install
Air cleaner trim insert screws	3–3.6 N·m (27–32 <b>in-lbs</b> )	2.20 INSPECT AIR FILTER, Install
Air filter element screws, round cover	5.4–8.1 N·m (48–72 <b>in-lbs</b> )	2.20 INSPECT AIR FILTER, Install
Axle nut, rear	128.8–142.4 N·m (95–105 ft-lbs)	2.17 INSPECT AND ADJUST DRIVE BELT AND SPROCKETS, Adjust Belt
Battery, positive cable, screw	8–12 N·m (6–9 ft-lbs)	2.21 INSPECT BATTERY, Install
Brake master cylinder, front, reservoir cover screws	1–1.2 N·m (9–11 <b>in-lbs</b> )	2.11 CHECK AND REPLACE BRAKE FLUID, Check Brake Fluid Level
Brake master cylinder, rear, reservoir cover screws	1–2 N·m (9–18 <b>in-lbs</b> )	2.11 CHECK AND REPLACE BRAKE FLUID, Check Brake Fluid Level
Clutch hub jamnut	8.1–13.6 N·m (72–120 <b>in-lbs</b> )	2.12 CHECK AND ADJUST CLUTCH, Check and Adjust
Clutch inspection cover screws (All except FLSB)	9.5–12.2 N·m (84–108 <b>in-lbs</b> )	2.6 REPLACE PRIMARY CHAINCASE LUBRICANT, Change Primary Chaincase Lubricant  <i>Torque sequence</i>
Clutch inspection cover screws (FLSB)	2.8–3.9 N·m (25–35 <b>in-lbs</b> )	2.6 REPLACE PRIMARY CHAINCASE LUBRICANT, Change Primary Chaincase Lubricant  <i>Torque sequence</i>
Engine oil drain plug	19–28.5 N·m (14–21 ft-lbs)	2.5 REPLACE ENGINE OIL AND FILTER, Change Oil and Oil Filter
Fork stem pinch bolt	21.7–27.1 N·m (16–20 ft-lbs)	2.14 ADJUST AND LUBRICATE STEERING HEAD BEARINGS,

Change engine oil often in colder climates. If motorcycle is frequently ridden less than 24 km (15 mi), in ambient temperatures below 16 °C (60 °F), reduce oil change intervals to 2,400 km (1500 mi).

**NOTE**

Lower ambient temperatures require more frequent oil changes.

Water vapor is a normal by-product of combustion . During cold-weather operation, some water vapor condenses to liquid form on the cool surfaces inside the engine. In freezing weather, this water becomes slush or ice. If the engine is not warmed to operating temperature, accumulated slush or ice blocks the oil lines and causes engine damage. Over time, water will accumulate, mix with the engine oil and form a sludge that is harmful to the engine.

If the engine is allowed to warm to normal operating temperature, most of the water evaporates and exits through the crankcase breather.

Figure 1. Transmission Drain Plug

### Special Tools

Description	Part Number	Qty.
DOT 4 BRAKE FLUID MOISTURE TESTER	HD-48497-A	1

### Consumables

Description	Part Number	Size
DOT 4 BRAKE FLUID	99953-99A	355 ml (12 fl oz)

#### NOTICE

Do not allow dirt or debris to enter the master cylinder reservoir. Dirt or debris in the reservoir can cause improper operation and equipment damage. (00205c)

#### NOTE

- At every service, check moisture content of fluid using **DOT 4 BRAKE FLUID MOISTURE TESTER (Part Number:HD-48497-A)**. Follow the instructions included with tool.
- Flush brake system and replace **DOT 4 BRAKE FLUID (99953-99A)** fluid every two years or sooner if brake fluid test shows moisture content is 3% or greater.
- Fluid should never need to be added or removed from the system during normal wear, except for fluid replacement as specified in the maintenance schedule.
- Fluid level in reservoir will decrease with brake wear. Reservoir volume is adequate to provide fluid to the wear limits of the pads and rotors.

Check brake pads and discs:

- At every scheduled service interval.
- When removed during service procedures.

#### **WARNING**

Always replace brake pads in complete sets for correct and safe brake operation. Improper brake operation could result in death or serious injury. (00111a)

#### **CAUTION**

Direct contact of DOT 4 brake fluid with eyes can cause irritation. Avoid eye contact. In case of eye contact flush with large amounts of water and get medical attention. Swallowing large amounts of DOT 4 brake fluid can cause digestive discomfort. If swallowed, obtain medical attention. Use in well ventilated area. **KEEP OUT OF REACH OF CHILDREN.** (00240b)

For this scheduled maintenance procedure, see **Drain**.

1. Disassemble the steering head assembly and lubricate the tapered roller bearings with SPECIAL PURPOSE GREASE. See **Prepare**

220	100		1	1.5	2	2.5	3	3.5	3.5	4	4.5	5
240	109		1.5	2	2.5	2.5	3	3.5	4	4.5	5	5
260	118		1.5	2	2.5	3	3.5	4	4.5	5	5	NA
280	127		2	2.5	3	3.5	4	4.5	NA	NA	NA	NA
300	136		2.5	3	3.5	NA	NA	NA	NA	NA	NA	NA

Table 2. Suspension Preload Table: FLFB

		LB	0	20	40	60	80	100	120	140	160	180
		KG	0	9	18	27	36	45	54	64	73	82
<b>RIDER WEIGHT</b>												
LB	KG	Preload Setting										
160	73	0	0.5	1	1.5	2	2.5	3	3.5	4	4	
180	82	0.5	1	1.5	2	2.5	3	3	3.5	4	4.5	
200	91	1	1.5	2	2	2.5	3	3.5	4	4.5	5	
220	100	1	1.5	2	2.5	3	3.5	4	4.5	5	5	
240	109	1.5	2	2.5	3	3.5	4	4	4.5	5	5	
260	118	2	2.5	3	3	3.5	4	4.5	5	5	5	
280	127	2	2.5	3	3.5	4	4.5	5	5	5	NA	
300	136	2.5	3	3.5	4	4.5	5	NA	NA	NA	NA	

Table 3. Suspension Preload Table: FLHC

		LB	0	20	40	60	80	100	120	140	160	180
		KG	0	9	18	27	36	45	54	64	73	82
<b>RIDER WEIGHT</b>												
LB	KG	Preload Setting										
160	73	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	
180	82	1	1.5	2	2.5	3	3	3.5	4	4.5	5	

1. Remove seat. See **Remove**.
2. Remove right side cover. See **Remove**.
3. Disconnect negative battery cable. See **Main Fuse**.

## NOTE

The spark plug gap is within specification when there is a slight drag on the gauge.

1. Verify proper gap before installing **new** or cleaned spark plugs.
  - a. Use a wire-type feeler gauge within specification.  
Refer to **Table 1**.
  - b. Pass the wire gauge between the center and the outer electrodes.
  - c. Adjust gap to within specification.
2. Verify that spark plug threads are clean and dry.
3. Install spark plugs. Tighten.  
Torque: 10–15 N·m (89–133 **in-lbs**) *Spark plug*
4. Install spark plug cables. See **Remove**.

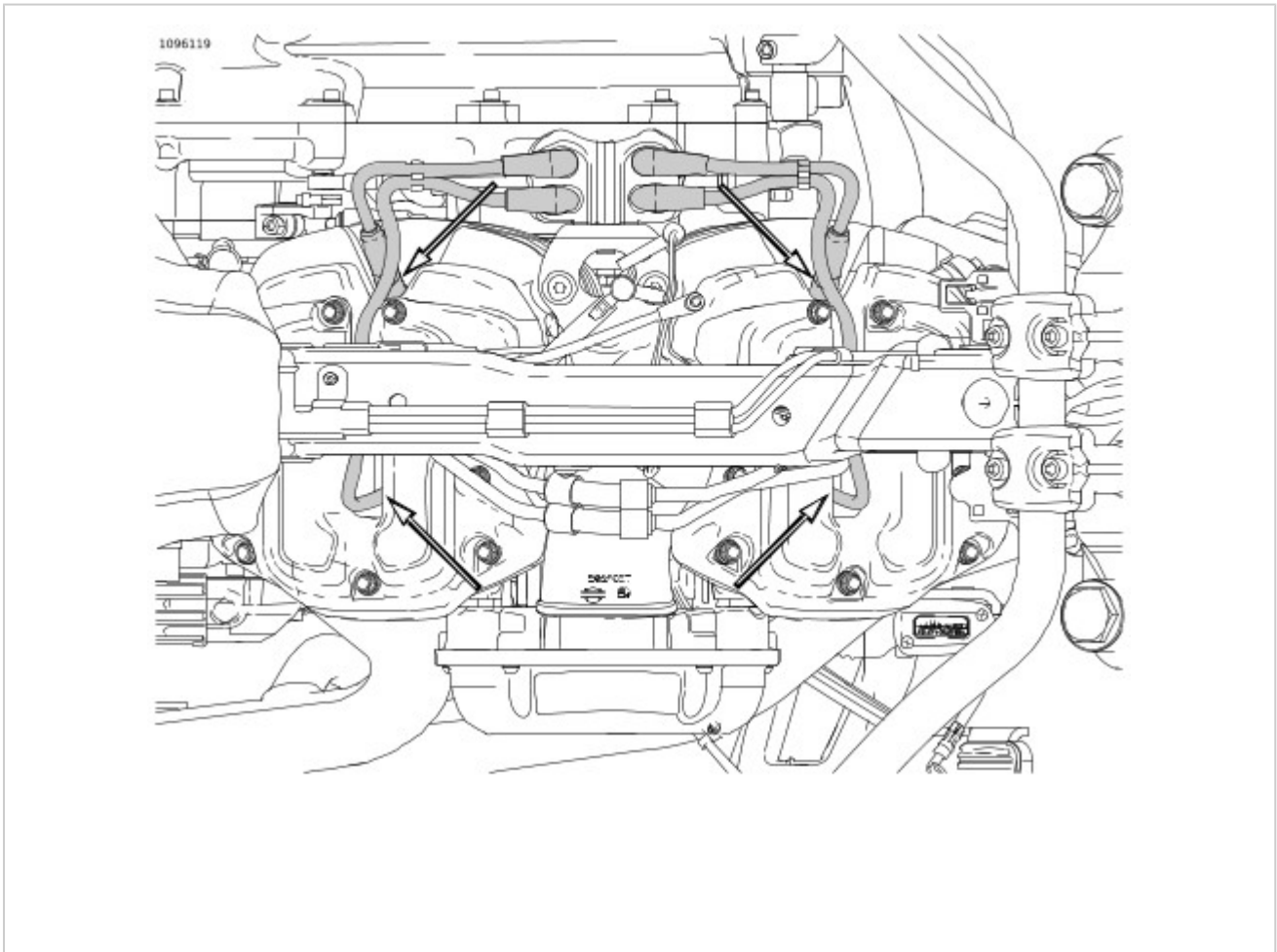


Figure 1. Spark Plug Location

Table 1. Spark Plug Gap

All Models	0.8-0.9	0.031-0.035

1. Primary chaincase overfilled.
2. Clutch not fully disengaging.
3. Transmission lubricant too heavy (winter operation).
4. Shifter return spring (inside transmission) bent or otherwise damaged.
5. Bent shifter rod.
6. Shifter forks sprung.
7. Corners worn off shifter clutch dog rings (inside transmission).

1. Shifter rod improperly adjusted.
2. Shifter drum damaged/worn.
3. Shifter engaging parts badly worn and rounded.
4. Bent shifter forks .
5. Damaged gears.

1. Reservoir overfull.
2. Clutch lever not returning completely.
3. Insufficient clutch spring tension.
4. Worn friction discs.

1. Lubricant level too high in primary chaincase.
2. Primary chain badly misaligned or too tight.
3. Insufficient clutch spring tension.
4. Clutch discs warped.

Friction discs or steel discs worn or warped.

	(96–120 <b>in-lbs</b> )	
Upper belt guard screw	8–9 N·m (71–80 <b>in-lbs</b> )	3.24 BELT GUARDS, Install
Upper belt guard screw	8–9 N·m (71–80 <b>in-lbs</b> )	3.24 BELT GUARDS, Install
Upper fork bracket pinch bolt	21.7–27.1 N·m (16–20 ft-lbs)	3.20 FRONT FORK, Install
Upper shock screw	108.4–122 N·m (80–90 ft-lbs)	3.25 REAR SHOCK ABSORBER, Install
Valve stem nut	1.4–1.7 N·m (12–15 <b>in-lbs</b> )	3.9 TIRES, Install
Wear peg	3.4–4.7 N·m (30–42 <b>in-lbs</b> )	3.39 LEFT FOOT CONTROLS, Disassemble and Assemble: Footboard
Wear peg	3.4–4.7 N·m (30–42 <b>in-lbs</b> )	3.39 LEFT FOOT CONTROLS, Disassemble and Assemble: Footpeg
Wear peg	3.4–4.7 N·m (30–42 <b>in-lbs</b> )	3.40 RIGHT FOOT CONTROLS, Disassemble and Assemble: Footboard
Wear peg	3.4–4.7 N·m (30–42 <b>in-lbs</b> )	3.40 RIGHT FOOT CONTROLS, Disassemble and Assemble: Footpeg
Windshield acorn nuts	2.6–3 N·m (23–27 <b>in-lbs</b> )	3.29 WINDSHIELD, Assemble
saddlebag lock screw	1.7–2.3 N·m (15–20 <b>in-lbs</b> )	3.45 SADDLEBAGS, Disassemble and Assemble: Quick Disconnect

1. Clean all parts thoroughly.
2. Inspect front wheel for damage. Replace or repair as necessary.
3. Check wheel lateral and radial runout before installing a new tire. See **General**.

1. See **Rear Wheel**. Remove rear brake disc.
  - a. Discard brake disk screws (15).
  - b. Remove rear brake disc (5).
2. Remove rear sprocket.
  - a. Discard rear sprocket screws (7)
  - b. Remove rear sprocket (8).
3. Remove rear tire. See **General**.
4. Remove valve stem. See **General**.
5. If necessary, remove and discard sealed wheel bearings. See **Prepare**.



2	Tread surface
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Figure 1. Tread Wear Indicators (Typical)

**NOTE**

ABS models must use properly inflated tires and wheels that are the same as the original equipment. The ABS monitors rotational speed of the wheels through individual wheel speed sensors to determine the application of ABS.

Different diameter wheels or tires can:

- Alter the rotational speed which can upset the calibration of the ABS.
- Adversely affect its ability to detect and prevent lockups.

Operating with over- or under-inflated tires can reduce ABS performance.

1. Remove mufflers as necessary. See **Prepare**.

1. See **Front Brake master Cylinder**. Remove retaining ring (7) from pivot pin groove at bottom of master cylinder bracket.
2. Remove pivot pin (4) and brake hand lever (6).
3. Remove dust boot (10) and discard.
4. Remove retaining ring (11).
5. Remove and discard piston assembly (9, 12-14).
6. Remove screws (1), cover (2) and gasket (3).

e. Always replace all seals after disassembly.

 **WARNING**

Always replace brake pads in complete sets for correct and safe brake operation. Improper brake operation could result in death or serious injury.  
(00111a)

4. Inspect brake pads and brake disc. Replace if necessary.
  - a. **Specifications: content:** See **Inspect**.
  - b. **Brake Disc:** See **Prepare**.

1. **If removed:** Install right footboard/footpeg bracket. See **Remove and Install: Forward Foot Controls.**
2. Fill and bleed rear brake system. See **Drain.**

## Consumables

Description	Part Number	Size
CCI #20 BRAKE GREASE	42830-05	29.6 ml (1 fl oz)
DOT 4 BRAKE FLUID	99953-99A	355 ml (12 fl oz)
G40M BRAKE GREASE	42820-04	29.6 ml (1 fl oz)

1. See **Rear Caliper Mounting Bracket**. Install caliper damper (3).
2. Apply grease to the inside of slider pin dust cover (4).  
**G40M BRAKE GREASE (42820-04)**
3. Install slider pin dust cover.
4. Install slider pin (5).

1. See **Rear Brake Caliper Assembly**. Install **new** medallion (7). See **Remove**.
2. Install bleeder screw (4). Hand tighten.
3. Install bleeder screw cap (5).
4. Lightly apply silicone grease to brake caliper sleeve boot (9).  
**CCI #20 BRAKE GREASE (42830-05)**
5. Install brake caliper sleeve (8).

### NOTICE

Avoid leakage. Prevent damage to piston or piston bore. Use non-metallic tools when servicing components. (00529d)

6. Install piston (1).
  - a. Apply a light coating of brake fluid over the pistons, dust seal (2) and piston seal (3).  
**DOT 4 BRAKE FLUID (99953-99A)**
  - b. See **Figure 1**. Install the piston seals (3) into the brake caliper piston bore.
  - c. Install the dust seals (2) into the brake caliper piston bore.
  - d. Insert pistons, by hand, into bores of caliper

## Special Tools

Description	Part Number	Qty.
12MM TORQUE ADAPTER	HD-52351	1

1. Remove main fuse. See **Main Fuse**.
2. Remove seat. See **Remove**.
3. Remove fuel tank. See **Prepare**.
4. Drain front brake line. See **Drain**.
5. Remove right side cover. See **Remove**.
6. Remove rear lighting caddy. See **Prepare**.

1. See **Front ABS Lines Clamps**. Disconnect ABS lines (2, 4) from front brake line (1).
2. Remove P-clamp screws (3).
3. See **Rear Frame Cover For Front ABS Lines**. Remove under seat frame cover (5).
  - a. Remove front screw (4).
  - b. Remove rear screws (6).
4. See **Front ABS Line Connections**. Remove banjo bolts (1) from ABS module (5).
5. Remove brake lines from vehicle.
6. See **Figure 2** and **Figure 3**. Remove P-clamps and grommets from brake lines.

1.

### NOTE

Under seat frame cover requires two grommets.

See **Figure 2** and **Figure 3**. Install grommets and P-clamps.

2. See **Figure 4**. Install brake lines to ABS module.

Special Tool: **12MM TORQUE ADAPTER** (HD-52351)

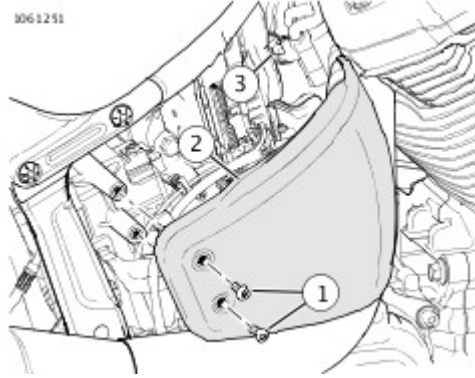
- a. Install banjo bolt (1), **new** gaskets (4) and brake line

## NOTICE

This device is sensitive to electrostatic discharge (ESD). To prevent damage to the device, always touch the motorcycle frame or a grounded surface before handling. (00588c)

1. Remove ABS module.
  - a. See **ABS Module**. Disconnect ABS connector (4).
  - b. Remove cable straps (3).
  - c. Remove side cover mounting stud (2).
  - d. Remove screw (1).
  - e. See **ABS Module Bracket**. Remove ABS module (3) with bracket.
  - f. Remove screws (2).
  - g. Remove bracket (1).

1. See **Figure 1**. Install side cover.
  - a. Align side cover (2) with mounting stud (3).
  - b. Press side cover until fully seated.
  - c. Install screws (1). Tighten.  
Torque: 2.7–4.1 N·m (24–36 **in-lbs**) *Side cover screws*



1	Screw (2)
2	Right side cover
3	Mounting stud

Figure 1. Right Side Cover

upward.

7. Place fork oil seal installer over fork slider (2). Seat upper slider bushing (10), seal spacer (9), and slider oil seal (8) into the slider bore by lightly tapping the components into place with the installation tool.

Special Tool: **FORK SEAL DRIVER** (HD-45305)

8. Install retaining ring (7).
9. Install dust seal (6).
  - a. **FXBB**: Install protector (5).
  - b. **FXBR, FXBRS, FXBRS ANX, FXLR**: Install case cover (4).

 **WARNING**

Incorrect amount of fork oil can adversely affect handling and lead to loss of vehicle control, which could result in death or serious injury. (00298a)

1. Fill fork tube.
  - a. Fully compress fork.
  - b. See **Figure 4**. Fill with TYPE "E" HYDRAULIC FORK OIL until oil level matches specification from top of fork tube with spring removed. Adjust oil level to specification using fork oil level gauge. Refer to **Table 1**

Special Tool: **FORK OIL LEVEL GAUGE** (HD-59000B)

Table 1. Oil Level, Front Fork

FLDE, FLHC, FLHCS, FLSL, FXBB, FXLR	118 mm (4.65 in)
FLFB, FLFBS	106 mm (4.17 in)
FXBR, FXBRS	99 mm (3.90 in)

during removal.

- a. If equipped, separate dust cover (17) from fork tube (4).
- b. Separate dust seal (16) from fork tube.
- c. Remove retaining ring (15).
- d. Expand fork slider (18) and fork tube (4) against each other repeatedly (in a slide-hammer effect) to remove fork tube.
- e. Gently pry at split line to remove fork tube bushing (12).
- f. Remove slider bushing (11), seal spacer (13), oil seal (14), retaining ring (15), and dust seal (16) from fork slider. Discard oil seal.
- g. If equipped, remove dust cover (17).

1. Clean all parts.
2. Inspect parts for wear or damage. Replace parts if necessary.
3. Inspect OD of slider bushing and ID of fork tube bushing.
  - a. If coating is worn through (metallic substrate showing), replace bushing.
  - b. Inspect for distortion.
  - c. If deep scratches or scoring are found, replace bushing. Also inspect mating components for similar wear. Replace or repair as necessary.
4. Check fork tube and slider for scoring, scratches and abnormal wear.
5. Inspect fork tube for nicks from stones and road debris, especially in area where seal contacts it. Replace if necessary.
6. See **Measure Fork Tube Runout**. Check runout with a dial indicator.
  - a. Set fork tube on V-blocks.
  - b. Replace fork if runout exceeds dimension.  
Dimension: 0.2 mm (0.008 in)

**NOTICE**

1. Turn forks to full right position.
- 2.

**NOTE**

Fork lock mounting screw has **left handed threads**.

Remove fork lock mounting screw through hole in lower fork clamp.

3. See **Fork Lock Location**. Remove fork lock (1) and gasket (2).

1. See **Rear Fork**. Install brake line P-clip (8).
2. Install belt guards. See **Prepare**.
3. Install mufflers and exhaust bracket. See **Prepare**.
4. Install saddlebags if equipped. See **Remove and Install: Standard**.
5. Install main fuse. See **Main Fuse**.

## Consumables

Description	Part Number	Size
ANTI-SEIZE LUBRICANT	98960-97	29.6 ml (1 fl oz)

The rear shock absorbers contain no serviceable parts except an adjustment knob and hardware kit.

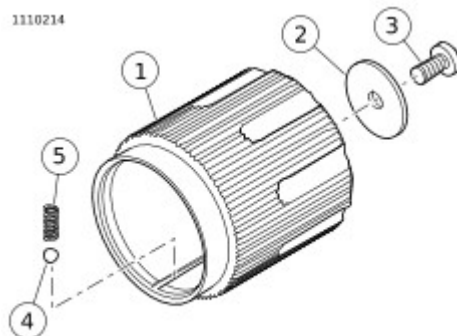
1. See **Rear Shock Adjuster Knob**. Remove shock adjuster knob (1).
  - a. Remove screw (3) and washer (2).
  - b. Hold a rag wrapped around the adjuster housing and knob to prevent loss of the detent ball (4) and spring (5). Carefully remove the knob.
  - c. Remove detent ball and spring.

1. See **Rear Shock Adjuster Knob**. Install shock adjuster knob (1).
  - a. Press and hold detent ball (4) onto end of spring (5). Install knob on adjuster housing.

### NOTE

Before mounting the knob apply a light coat of ANTI-SEIZE LUBRICANT to the knob mount shaft. **ANTI-SEIZE LUBRICANT (98960-97)**

- b. Install washer (2) and screw (3). Tighten securely.
- c. Rotate knob to verify that the detent is properly assembled. Clicks are heard every half rotation.



free-play at clutch lever.

6. See **Lock Button**. Push in lock button (2).
7. Check clutch operation.
8. See **Clutch Cover and Clip**. Slide cover (2) down and install spring clips (1).

1. See **Clutch Assembly**. Install clutch hand control assembly.
  - a. Install hand lever bracket (4).
  - b. Install lever bracket clamp (9).
  - c. Install washers (2) and screws (1). Tighten.  
Torque: 6.8–9 N·m (60–80 **in-lbs**) *Clutch cable lever screw*

1. **FLDE and FLHC/S:** Install headlamp. See **Bulb Replacement: Standard Round.**
2. Install main fuse. See **Main Fuse.**

## Consumables

Description	Part Number	Size
HARLEY-DAVIDSON ADHESIVE (GRIPLOCK)	99839-95	29.6 ml (1 fl oz)
LOCTITE 770 PRISM PRIMER	Loctite 770	-

1. Install left hand grip.

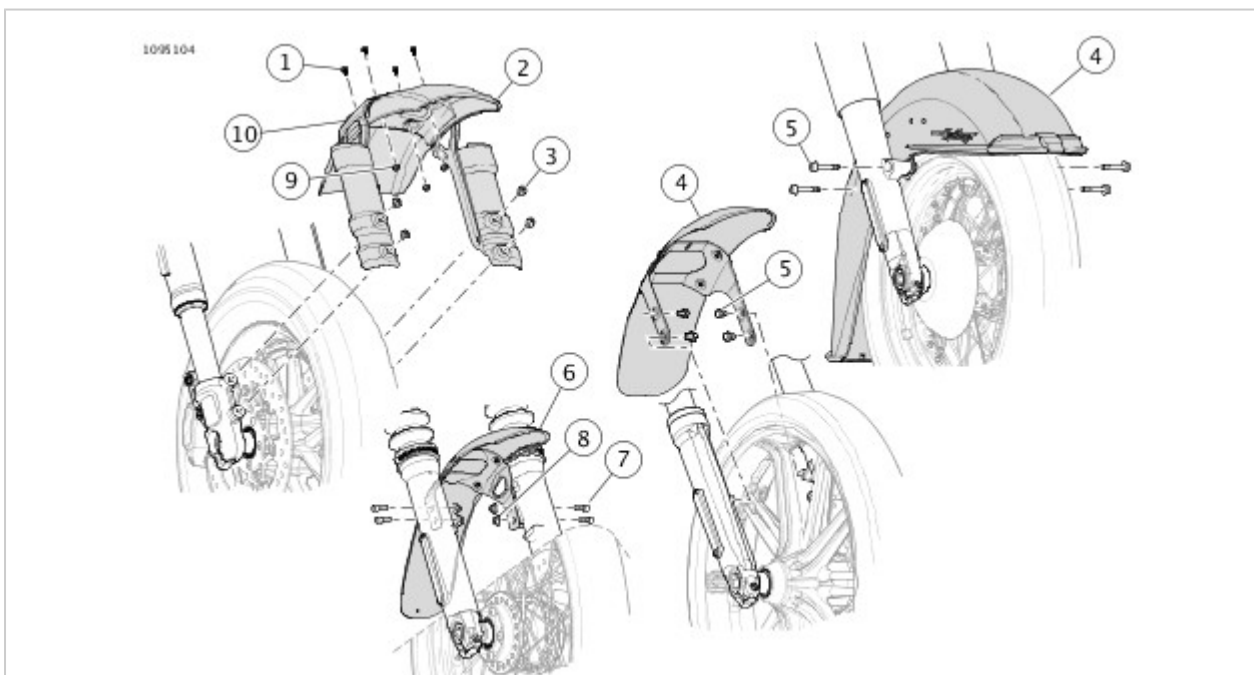
### NOTE

Adhesive sets in 4 minutes and cures in 24 hours.

- a. Prepare the left grip end of the handlebar with emery cloth.
  - b. Clean the left grip end of the handlebar with acetone.
  - c. Apply primer to the inside of the **new** hand grip.  
**LOCTITE 770 PRISM PRIMER (Loctite 770)**
  - d. Remove excess primer. Wait 2 minutes for the primer to set.
  - e. Apply adhesive to the inside of the **new** hand grip.  
**HARLEY-DAVIDSON ADHESIVE (GRIPLOCK) (99839-95)**
  - f. Install the **new** hand grip with a twisting motion, ending with cosmetic features properly positioned.
2. Install LHCM. See **Prepare**.

1. Install hand grip with cosmetic features properly positioned.
  - a. Rotate to verify that internal splines are engaged with the twist grip sensor.
2. Install RHCM. See **Prepare**

1. See **Front Fenders**. Install front fender.
  - a. Align fender (4) to the mounting holes on fork.
  - b. Apply threadlock to screws (5).  
**LOCTITE 243 MEDIUM STRENGTH  
 THREADLOCKER AND SEALANT (BLUE)  
 (99642-97)**
  - c. Install Screws. Tighten.  
 Torque: 22–28 N·m (16–21 ft-lbs) *Front fender  
 mounting screw (typical)*



1	Screw (4)
2	Fender, FXFB/FXFB S
3	Screw (4)
4	Fender (typical)
5	Screw (4)
6	Fender, FXBB
7	Screw (4)
8	Nut (4)

and Inner Fender Mount Screws. Install stud plate, if equipped.

- a. Position stud plate (14) on fender.
  - b. Install washers (15).
2. See **Chopped Fender: W/O License Plate Bracket, Chopped Fender: With Licence Plate Bracket, W/O Inner Fender Mounting Screws** or **Chopped Fender: With license Plate Bracket and Inner Fender Mount Screws**. Install seat retention nut.
- a. Position nut (3).
  - b. Install clip (4).
3. Install reflector bracket (2) and reflectors (1, 6).
- a. Clean mounting surface. See **Remove**.
  - b. Test fit reflector (1, 6).
  - c. Remove adhesive backing.
  - d. Install and press firmly to adhere.
4. Install turn signals. See **Bulb Replacement**.
5. See **Chopped Fender: W/O License Plate Bracket**.  
**Models without license plate support brackets:**  
Install rear fender supports.

#### NOTE

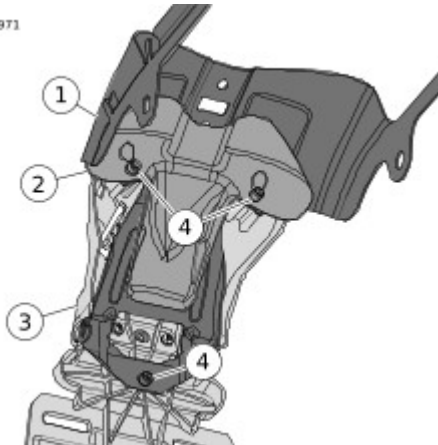
Before installing fender supports, route and secure turn signal wire harnesses through fender supports.  
See **Bulb Replacement**

- a. Align holes on fender supports (7,10) with holes in fender.
  - b. Place fender mounts (9) in holes on fender.
  - c. Install screws (11). Tighten.  
Torque: 28–37 N·m (21–27 ft-lbs) *Rear fender support screw*
6. See **Chopped Fender: With Licence Plate Bracket, W/O Inner Fender Mounting Screws** or **Chopped Fender: With license Plate Bracket and Inner Fender Mount Screws**. **Models with license plate support brackets:** Install rear fender supports.
- a. Align holes on bracket (12) with holes on fender and insert fender mounts (9).
  - b. Align fender supports (7,10).
  - c. **Models equipped with license plate bracket and inner fender screws:** Apply threadlock and install screw (13) through license plate bracket. Tighten.  
Torque: 28–37 N·m (21–27 ft-lbs) *Rear fender inner mount screw*  
**LOCTITE 243 MEDIUM STRENGTH  
THREADLOCKER AND SEALANT (BLUE)  
(99642-97)**
  - d. Apply threadlock and install screws (11). Tighten.  
Torque: 28–37 N·m (21–27 ft-lbs) *Rear fender*

1. Install wiring harness.
  - a. Slide wiring harness through new conduit.
  - b. Install wire terminals into connector housings. See the electrical diagnostic manual.
  
1. Install connectors to proper component and install rear fender. See **Prepare**.

1. Remove license plate lamp. See **Bulb Replacement**.
2. Remove turn signal lamps. See **Bulb Replacement**.
3. See **Figure 1**. Remove center mount licence plate holder.
  - a. Remove screws (4).
  - b. Disassemble license plate holder (3), support bracket assembly (1) and support bracket reinforcement (2).

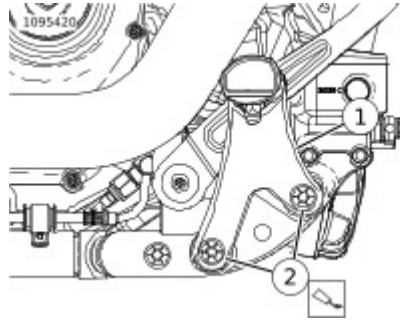
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1	Support bracket assembly
2	Support bracket reinforcement
3	License plate holder
4	Screw (3)

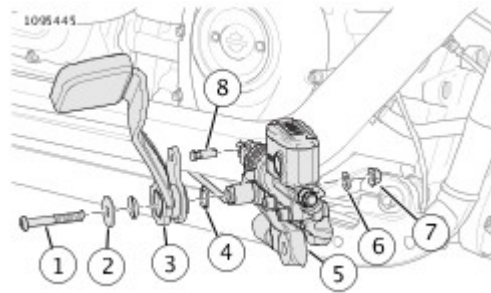
Figure 1. License Plate Support Assembly

1. See **Figure 1**. Install center mount licence plate holder.
  - a. Assemble license plate holder (3), support bracket assembly (1) and support bracket reinforcement (2).
  - b. Install screws (4). Tighten.  
Torque: 7.11–8.69 N·m (63–77 **in-lbs**) *License plate holder screw*
2. Install license plate lamp. See **Bulb Replacement**.



1	Foot support bracket
2	Screw (2)

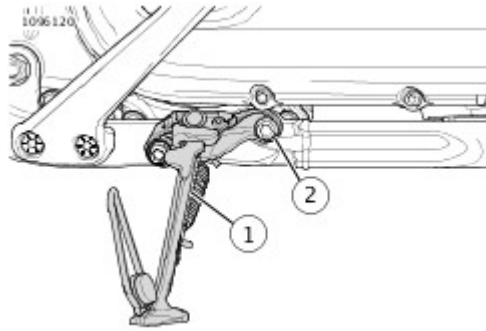
Figure 1. Right Foot Support Bracket (Typical)



1	Screw
2	Large washer
3	Brake pedal
4	O-ring (2)
5	Bracket
6	Washer
7	Flange nut
8	Clevis pin

Figure 2. Brake Pedal

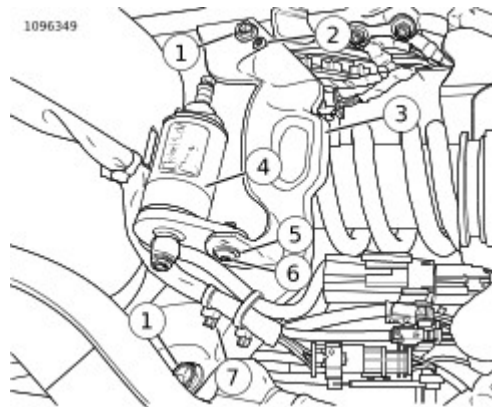
1. See **Figure 1**. Install Jiffy stand (1).
2. Install screws (2). Tighten.  
Torque: 54.2–61 N·m (40–45 ft-lbs) *Jiffy stand screws*



1	Jiffy stand
2	Screw (2)

Figure 1. Jiffy Stand Screws

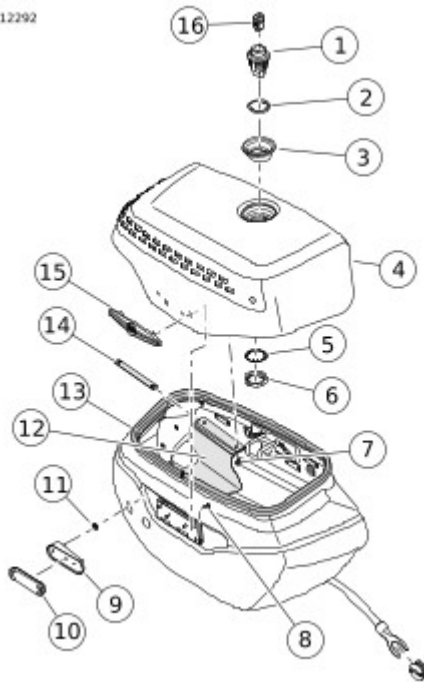
1. See **Figure 1**. Install frame crossmember (3).
2. Install small screw (2) hand tight.
3. Install mounting screws (1). Tighten.  
Torque: 23.1–27.1 N·m (17–20 ft-lbs) *Frame crossmember mounting screws*
4. Tighten small screw.  
Torque: 6.2–6.8 N·m (55–60 **in-lbs**) *ECM caddy small screw*
5. Install wire harness anchor (7).
6. **If equipped with hydraulic under seat adjust shock absorber:**
  - a. Install preload adjuster (4).
  - b. Install screw (6) and washer (5). Tighten.  
Torque: 6.1–8.8 N·m (54–78 **in-lbs**) *Shock adjuster mounting screw*



1	Mounting screw (2)
2	Small screw
3	Frame crossmember
4	Preload adjuster
5	Washer
6	Screw
7	Wire harness anchor

Figure 1. Frame Crossmember

1112292



1	Lock
2	Gasket
3	Bezel
4	Saddlebag lid
5	Lockwasher
6	Nut
7	Screw (2)
8	Screw (4)
9	Reflector bracket
10	Reflector
11	Retainer clip (2)
12	Tether
13	Gasket
14	Tether bracket
15	Medallion
16	Lockset

## NOTE

- Apply in ambient temperatures between 21–38 °C (70–100 °F).
- Parts cannot be repositioned after initial installation. Do not remove protective film from adhesive until ready to apply.
- Do not bend emblem to fit contour of mounting surface.
- Allow at least 24 hours after application before exposing the area to vigorous washing, strong water spray or extreme weather.
- The adhesive bond will increase to maximum strength after about 72 hours at normal room temperature.

1. Test fit medallion in intended location.
  - a. Check medallion against curve of mounting surface.
  - b. Match left and right sides of fuel tank.

## NOTE

- Protect adhesive from grease, oil, dust, dirt and fingerprints.
- Once applied, do not shift medallion.
- The adhesive bonds in 72 hours at room temperature.

2. Remove protective film from back of medallion.
3. Apply even pressure across entire surface with palms and fingers of both hands. Hold in place for 15 seconds.
4. Wait 20 minutes before touching medallion.
5. Wait 24 hours before washing.

Roller bearing fit (loose)	More than 0.0015	More than 0.038
Bearing fit in crankcase (tight)	Less than 0.0038	Less than 0.097
Inner race on crankshaft (tight)	Less than 0.0004	Less than 0.010

Symptoms indicating a need for engine repair are often misleading. If more than one symptom is present, possible causes can be narrowed to make at least a partial diagnosis.

For example, an above normal consumption of oil could be caused by several mechanical faults. However when accompanied by blue-gray smoke from the exhaust and low compression, it indicates the rings need replacing. Low compression by itself is more likely to be caused by improperly seated or burned valves, not worn rings.

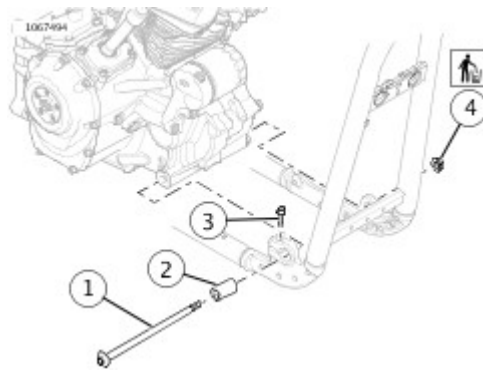
Certain knocking noises may occur because of loose bearings, others by piston slap. Piston slap is a condition where piston or cylinder or both are out of tolerance. This excessive clearance allows the piston to slap the cylinder as it moves up and down.

Most frequently, valves, rings, pins, bushings and bearings need attention at about the same time. If the symptoms indicate that any one of the above components is worn, service all related parts.

1. Remove main fuse. See **Main Fuse**.
2. See **null**. Remove oil cooler cover.
  - a. Remove screw (6).
  - b. Remove cover (5).

1. See **Figure 1**. Loosen pinch bolt (3).
2. Remove and discard locknut (4).
3. Remove mounting bolt (1).
4. Remove spacer (2).

1. See **Figure 1**. Install mounting bolt (1) through spacer (2).
2. Install **new** locknut (4). Tighten.  
Torque: 67.8–74.5 N·m (50–55 ft-lbs) *Engine mount bolt, front, lower*
3. See **Figure 2**. Verify spacer is installed properly.
4. See **Figure 1**. Tighten pinch bolt (3).  
Torque: 10.2–12.2 N·m (8–9 ft-lbs) *Engine mount pinch bolt, front, lower*

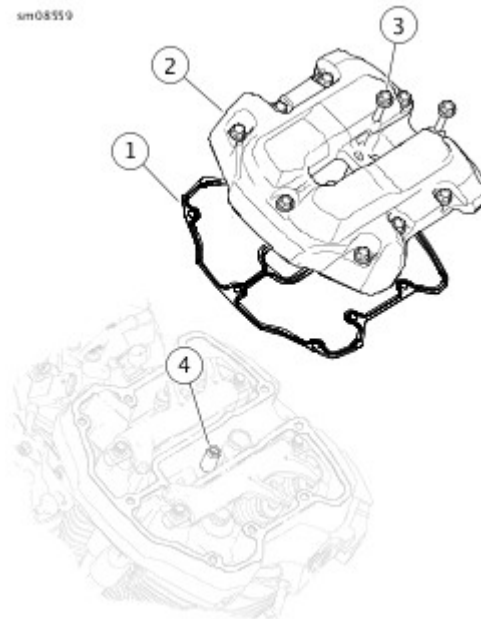


1	Mounting bolt
2	Spacer
3	Pinch bolt
4	Locknut

Figure 1. Lower Front engine Mount

1. See **Engine Wire Harness**. Attach engine harness and caddy.
  - a. Gently bend tabs outward at rear of electrical caddy to allow rear mounting pins to engage holes in backbone.
  - b. Install push/lock pin through electrical caddy mounting hole on right side of backbone.
  - c. Connect front ACR (10).
  - d. Connect rear ACR (9).
  - e. Attach rear knock sensor (8) to electrical caddy.
  - f. Connect rear knock sensor.
2. Install upper cooling lines. See **Prepare**.
3. Install upper front engine mount. See **Prepare**.
4. Install spark plug cables. See **Remove**.
5. Install fuel tank. See **Prepare**.
6. Install seat. See **Remove**.
7. Connect negative battery cable. See **Main Fuse**.

sm08559



1	Gasket
2	Rocker cover
3	Center screw
4	Stud

1. Clean all parts.
2. Inspect for wear. Replace or repair as necessary.
  - a. Measure rocker arm bore.
  - b. Measure rocker arm shaft for excessive wear.
  - c. Inspect valve contact areas for excessive wear.
  - d. Inspect pushrod pocket for excessive wear.
  - e. Verify that oil holes in rocker arms are clean and open.

1. Install rocker arms. See **Prepare**.
2. Install upper rocker covers. See **Prepare**.
3. Install spark plugs. See **Prepare**.
4. Connect electrical connectors.
  - a. **Rear cylinder:** Knock sensor and ACR.
  - b. **Front cylinder:** ACR
5. Install upper cooling lines. See **Prepare**.
6. Install oil cooler upper screw and cover. See **Prepare**.
7. Install upper front engine mount. See **Prepare**.
8. Install air cleaner backplate assembly. See **Prepare**.
9. Install air cleaner. See **Remove**.
10. Install spark plug cables. See **Remove**.
11. Install fuel tank. See **Prepare**.
12. Install seat. See **Remove**.
13. Connect negative battery cable. See **Main Fuse**.

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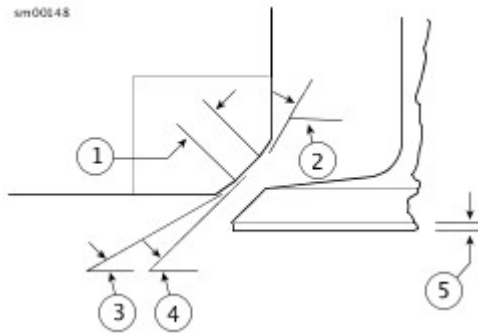


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**NOTE**

- Verify correct valve stem to valve guide clearance before refacing. Refer to **Table 1**.
- The correct finished angles are 45 degree valve face and 46 degree valve seat eliminating the need to lap.
- Finish valve seat to an even width of 1.016–1.575 mm (0.040–0.062 in).
- See **Figure 1**. Replace the valve if margin (5) is less than 0.795 mm (0.0313 in).
- Refurbish valves and seats in pairs. Valve stem protrusion of a pair operated by the same rocker arm must be equal. Verify that valve lash is within specification. See **Install**.
- If valve stem protrusion exceeds 44.5 mm (1.752 in), replace the valve or cylinder head as necessary.



1	0.040-0.080 in (1.02-2.03 mm)
2	60 degrees
3	31 degrees
4	46 degrees
5	Margin: 0.031 in (0.79 mm) minimum

Figure 1. Valve and Seat Dimensions

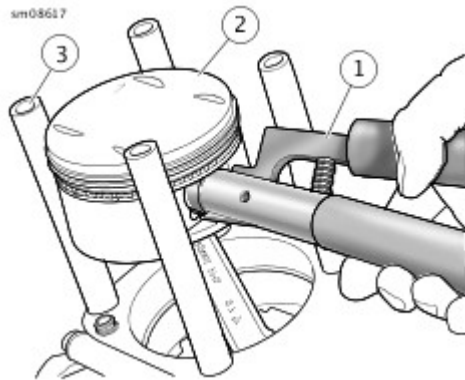
Table 1. Valve Stem to Guide Clearance

Intake	0.001-0.003	0.0254-0.0762
Exhaust	0.001-0.003	0.0254-0.0762

## NOTE

It is not necessary to remove both piston pin retaining rings for piston removal.

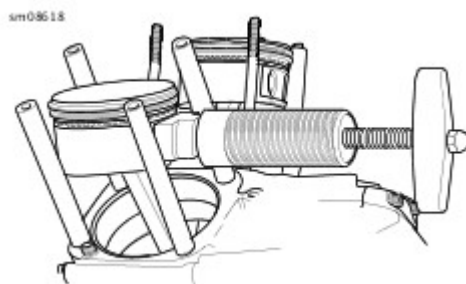
1. Place clean shop towels over crankcase bore to prevent the piston pin retaining ring from falling into the crankcase.
2. See **Figure 1**. Using HD-51069-2 (PISTON PIN RETAINING RING INSTALLER) with HD-51069-17 (NOSE ADAPTER), remove and discard one piston pin retaining ring.
  - a. Insert tool (1) into piston pin bore with claw on tool in slot of piston (2) (directly under retaining ring).
  - b. Squeeze handles of tool together.
  - c. Pull retaining ring from bore. Discard retaining ring.



1	Piston pin retaining ring installer
2	Piston
3	Protective material over cylinder studs

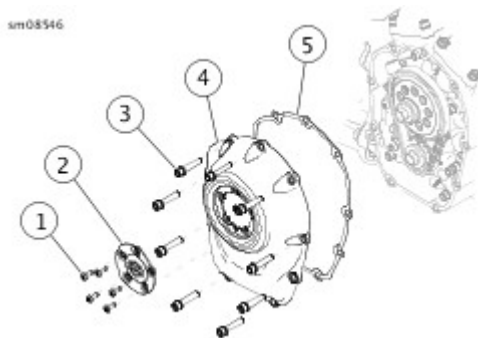
Figure 1. Piston Pin Retaining Ring Removal

3. See **Figure 2**. Remove piston.
  - a. Remove the piston pin using HD-42320-8 (PISTON PIN EXTRACTOR) with HD-42320-D (PISTON PIN REMOVER).
  - b. Hold the connecting rod to prevent it from striking the crankcase. Remove the piston.
  - c. Place a piece of foam-type water pipe insulation around connecting rod to prevent damage.
4. Identify piston location by marking piston pin boss underneath.



1. See **Figure 1**. Remove camshaft cover.
  - a. Remove screws (3).
  - b. Remove camshaft cover (4).
  - c. Discard gasket (5).

1. See **Figure 1**. Install camshaft cover.
  - a. Install **new** gasket (5).
  - b. Install camshaft cover (4).
  - c. Install screws (3). Hand tighten.
  - d. See **Figure 2**. Tighten screws in the sequence shown.  
Torque: 10.2–13.6 N·m (90–120 **in-lbs**) *Camshaft cover screws*
2. See **Figure 1**. Install timer cover, if removed.
  - a. Install timer cover (2).
  - b. Install screws (1). Tighten.  
Torque: 2.8–4 N·m (25–35 **in-lbs**) *Camshaft timer cover screws*



1	Screw (5)
2	Timer cover
3	Screw (9)
4	Camshaft cover
5	Gasket

## NOTE

Abrasive particles can damage machined surfaces or plug oil passageways. Clean parts before disassembly to prevent component damage.

1. Use low-pressure compressed air to clean exterior surfaces of engine.
2. Disconnect negative battery cable. See **Main Fuse**.
- 3.

## NOTE

Detach rider foot control bracket only if needed to remove exhaust system.

Detach right side rider foot control bracket. See **Remove and Install: Forward Foot Controls**.

4. Remove exhaust system. See **Prepare**.
5. Remove seat. See **Remove**.
6. Remove fuel tank. See **Prepare**.
7. Remove spark plug cables. **Remove**.
8. Remove upper front engine mount. See **Prepare**.
9. Remove oil cooler cover and upper screw. See **Prepare**.
10. Remove upper cooling lines. See **Prepare**.
11. Disconnect electrical connectors.
  - a. **Rear cylinder:** Engine temperature sensor, knock sensor and ACR.
  - b. **Front cylinder:** Knock sensor and ACR.
12. Remove upper rocker covers. See **Prepare**.
13. Loosen rocker arm screws to relieve tension on pushrods. See **Prepare**.
14. Remove camshaft cover and cam support plate. See **Prepare**.

c. Check for leaks.

d. Check engine oil level (hot).

## Special Tools

Description	Part Number	Qty.
MAIN BEARING ARBOR	HD-52071-2	1
MAIN BEARING INSTALLER	HD-52071-3	1
BEARING SUPPORT	HD-52071-4	1

### CAUTION

Do not rotate crankcase half in engine stand when flywheel is installed. The flywheel assembly can fall out, resulting in parts damage or moderate injury. (00552c)

### NOTE

- Never move or lift crankcase by grasping cylinder studs.
- Always replace sprocket shaft bearing inner race whenever left main bearing is replaced. See **Sprocket Shaft Bearing Inner Race**.

1. Remove thrust washer from outboard side of crankcase half by pulling it past oil seal. Set thrust washer aside for inspection or reuse.
2. Remove oil seal.
3. Remove bearing using **MAIN BEARING ARBOR (Part Number:HD-52071-2)** and **BEARING SUPPORT (Part Number:HD-52071-4)**.
  - a. See **Figure 1**. Remove bearing retaining ring.
  - b. See **Figure 2**. Press bearing from stator side into flywheel side of crankcase.
4. Discard bearing.

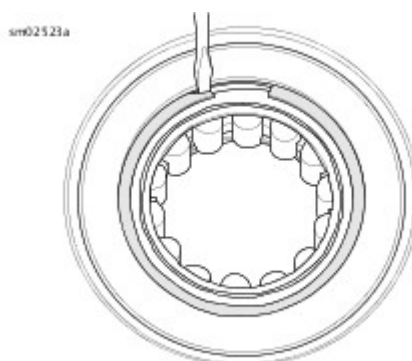


Figure 1. Remove Retaining Ring

## NOTE

Do not attempt to straighten connecting rods. Straightening rods damage both the upper bushing and lower bearing.

Connecting rod bearing failures generally exhibit noise and secondary damage in the form of steel debris circulating throughout the engine. Closely scrutinize the connecting rod bearing if any of the following are evident:

- Rod knock noise
- Steel debris in oil filter
- Piston skirt scoring / scuffing
- Wear of the oil pump scavenge rotor and housing
- Piston to valve contact
- Damage to the flywheel pinion journal

1. Replace the flywheel/connecting rod assembly if any of the following conditions are noted:
  - a. Bent or twisted connecting rods
  - b. Sprocket teeth are worn in an irregular pattern or chipped
  - c. The crankshaft (roller) bearing inner races are brinelled, burnt, scored, blued or damaged
  - d. Crankshaft runout exceeds specification

## NOTE

Bluing on connecting rods is part of the hardening process and is considered a normal condition.

## NOTE

In some cases the connecting rods will not fall under their own weight due to as-designed bearing preload. flywheels should NOT be replaced if the rods can be rotated with light finger pressure.

2. Check connecting rod bearing clearance. Place the assembly as shown in **Figure 1** .
  - a. Rotate each connecting rod around crankpin feeling for smooth operation.
  - b. Holding the shank of each rod just above the bearing bore, pull up and down on the connecting rods.
  - c. Any up and down movement indicates excessive lower bearing clearance. Replace the flywheel/connecting rod assembly.
3. Measure crankshaft runout if the crankshaft is suspected of being out-of-true.

## NOTE

If the flywheel, connecting rods or right side bearing inner race require replacement, replace the entire flywheel assembly.

Table 1. Transmission Specifications

Type	6-speed forward constant mesh
FORMULA+ TRANSMISSION AND PRIMARY CHAINCASE LUBRICANT	Part No. 99851-05 (qt)
SYN3 20W50 Oil	Part No. 99824-03/00QT (qt)
Capacity (dry; approximate)	0.95 L (32 fl oz)

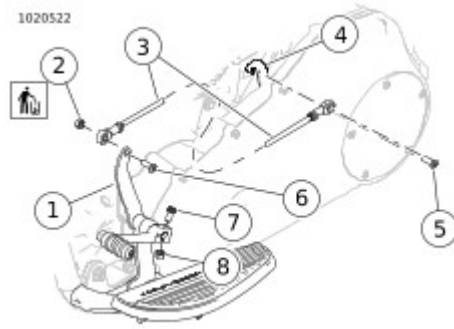
Table 2. Transmission Gear Ratios

First (low)	3.34
Second	2.31
Third	1.72
Fourth	1.39
Fifth	1.19
Sixth (high)	1.00

**NOTE**

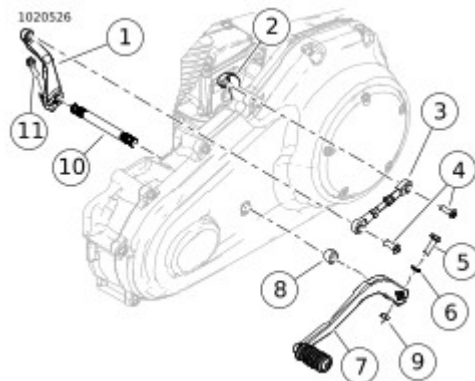
Final gear ratios indicate the number of mainshaft revolutions required to drive the output sprocket one revolution.

Torque: 9.5–14.9 N·m (84–132 in-lbs) *Shifter rod jamnut*



1	Shifter rod lever, front
2	Nut
3	Shifter rod
4	Shifter rod lever, rear
5	Screw
6	Screw
7	Pinch screw
8	Nut

Figure 1. Shift Linkage: Forward Foot Control Models

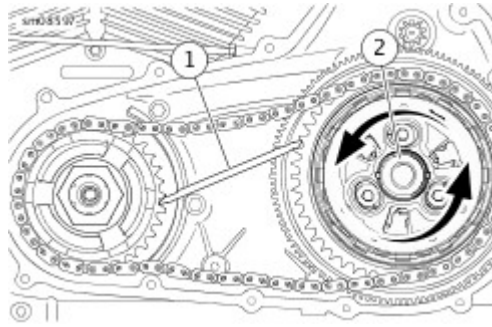


1	Shifter rod lever, front
---	--------------------------

 **WARNING**

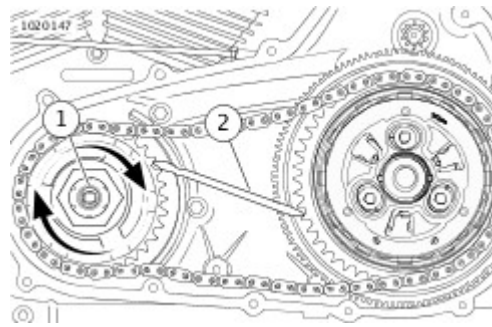
To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

1. Disconnect negative battery cable. See **Main Fuse**.
2. Remove rider left footboard and bracket, if necessary. See **Prepare**.
3. **Mid-mount controls:** Remove foot shift lever. See **Shifter Rod**.
4. Drain primary chaincase oil. See **Change Primary Chaincase Lubricant**.



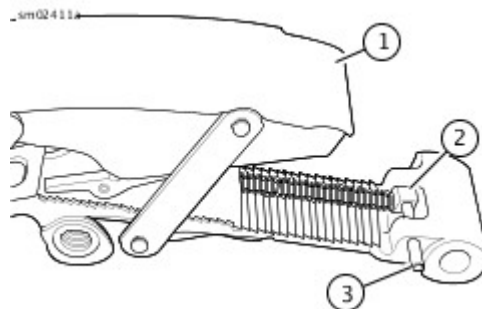
1	Primary drive locking tool
2	Nut

Figure 7. Installing Clutch Hub Mainshaft Nut



1	Bolt
2	Primary drive locking tool

Figure 8. Installing Engine Compensating Sprocket Bolt



 **WARNING**

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

1. Disconnect negative battery cable. See **Main Fuse**.
2. Remove rider footboard and bracket, if needed. See **Prepare**.
3. **Mid-mount controls:** Remove foot shift lever. See **Shifter Rod**.
4. Drain primary chaincase oil. See **Change Primary Chaincase Lubricant**.
5. Remove primary chaincase cover. See **Prepare**.
6. Remove starter. See **Prepare**.
7. Remove primary chain, clutch and compensating sprocket. See **Prepare**.

1. See **Engine Oil Fill Spout**. Remove screws (4).
2. Remove fill spout (3).
3. Discard O-ring (1).

**NOTE**

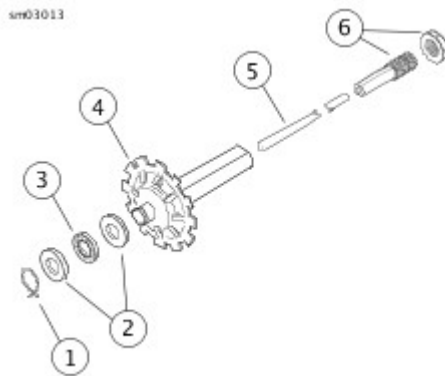
Do not remove the transmission case unless the case requires replacement. See **Prepare**.

1. See **Figure 1**. Remove oil slinger assembly and pushrod from main shaft.
2. Remove transmission top cover.
3. See **Figure 2**. Set a rag over the transmission case.
4. Set shifter cam pawl on rag.
5. Cover mainshaft clutch hub splines with tape to prevent damaging the main drive gear bearings and oil seal.

**NOTE**

See **Figure 3**. Always pry bearing housing loose. Never tap on shafts to remove transmission assembly. The bearing housing bearings will be damaged.

6. See **Figure 4**. Remove the transmission and bearing housing assembly:
  - a. Remove the transmission bearing housing screws (1).
  - b. See **Figure 3**. Pry the bearing housing loose.
  - c. Remove bearing housing and transmission components from transmission case as an assembly.



1	Retaining ring
2	Thrust washer (2)
3	Throw out bearing
4	Oil slinger
5	Push rod
6	Push rod end, left side

Figure 1. Push Rod Assembly

 **WARNING**

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

1. Clean parts in a non-volatile cleaning solution. Dry parts with low-pressure, compressed air.
2. Replace gears that are worn or damaged.
3. Replace the dog rings if dogs and/or pockets are rounded, battered or chipped.
4. Replace guiding hubs if splines are rounded, battered or chipped.
5. Replace shift fork shafts if bent or damaged.
6. Replace a shift fork if it is excessively worn or shows signs of overheating.
7. See **Figure 1**. Using a small square, verify that the shift forks are square. Replace shift fork if not square.
8. Replace shift drum assembly if drum or bearing are damaged.
9. Clean shift cam lock plate mounting holes in transmission bearing housing.

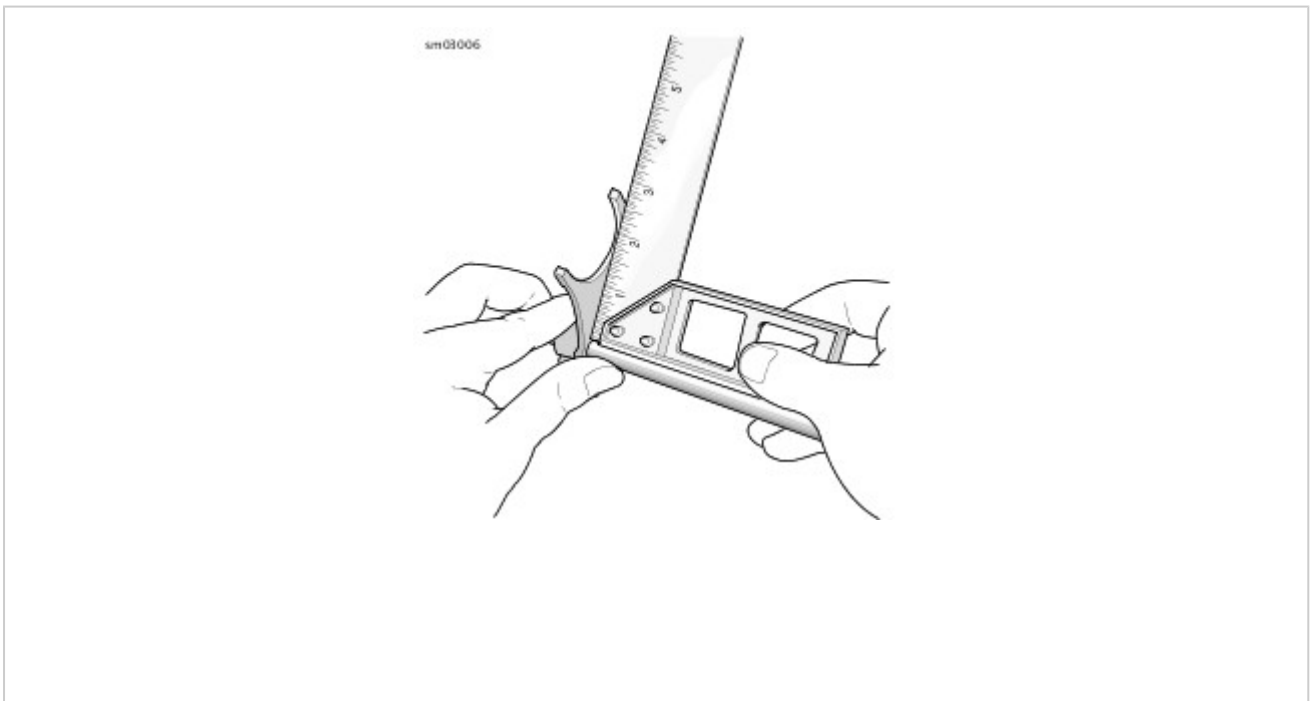


Figure 1. Checking Fork

## **NOTE**

Never wash the transmission case and needle bearings with solvent unless replacing the needle bearings. Normal cleaning methods wash dirt or other contaminants into the bearing case (behind the needles) and leads to bearing failure.

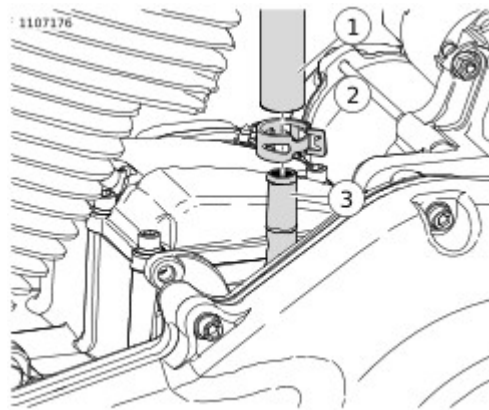
1. Clean all parts in solvent except the transmission case and needle bearings. Dry parts with low-pressure, compressed air.
2. Inspect the main drive gear for pitting and wear.
3. Inspect the needle bearings inside the main drive gear.
4. Inspect mainshaft race. Replace the needle bearings if the mainshaft race is damaged.

1. Remove battery negative cable from ground post at top of transmission case.
2. Move aside the harness that terminates at the O2 sensor, starter solenoid, neutral switch and VSS.
3. Remove transmission shift lever.
  - a. Mark splines on transmission shift lever and shift shaft to help with assembly.
  - b. Remove pinch screw.
  - c. Pull lever from shaft.
4. In a cross-wise pattern, remove four bolts securing transmission to engine.

**NOTE**

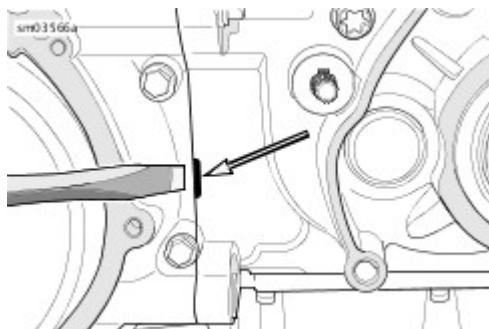
See **Figure 2**. Do not use a hammer to remove transmission. If the transmission sticks or binds on the ring dowels, gently pry away from crankcase using the pry point.

5. Move transmission rearward until two ring dowels in lower flange are free of crankcase.
6. Remove transmission case from rear of the motorcycle.



1	Oil return line
2	Clamp
3	Oil return tube

Figure 1. Oil Return Line



Exhaust shield screws	8.8–10.8 N·m (78–96 <b>in-lbs</b> )	6.20 EXHAUST SYSTEM, Disassemble and Assemble: Upswept
Exhaust support clamp screw	54.2–67.8 N·m (40–50 ft-lbs)	6.20 EXHAUST SYSTEM, Install
Exhaust to engine flange nuts	11.3–13.6 N·m (100–120 <b>in-lbs</b> )	6.20 EXHAUST SYSTEM, Install
Fuel line to fuel rail screw	2.5–4.5 N·m (22–40 <b>in-lbs</b> )	6.8 FUEL LINE, Install
Fuel line to fuel rail screw	2.5–4.5 N·m (22–40 <b>in-lbs</b> )	6.16 INDUCTION MODULE, Install
Fuel pump assembly screws	4.5–5 N·m (40–45 <b>in-lbs</b> )	6.10 FUEL PUMP, Install
Fuel rail screws	3.5–5.5 N·m (31–49 <b>in-lbs</b> )	6.15 FUEL INJECTORS, Install
Fuel tank mounting screw	38–43.4 N·m (28–32 ft-lbs)	6.7 PURGE FUEL LINE, Secure Fuel Tank
Fuel tank mounting screw	38–43.4 N·m (28–32 ft-lbs)	6.7 PURGE FUEL LINE, Secure Fuel Tank
Fuel tank vent screws	9.5–12.2 N·m (84–108 <b>in-lbs</b> )	6.9 FUEL TANK, Install
HO2S (Heated oxygen sensor)	16.3–19 N·m (12–14 ft-lbs)	6.18 HEATED OXYGEN SENSORS (HO2S), Install
Induction module bracket	7.5–9.5 N·m (66–84 <b>in-lbs</b> )	6.16 INDUCTION MODULE, Assemble
Induction module flange adapter screws	10.9–17.6 N·m (96–156 <b>in-lbs</b> )	6.16 INDUCTION MODULE, Install  <i>metric</i>
Induction module flange adapter screws	10.9–17.6 N·m (96–156 <b>in-lbs</b> )	6.16 INDUCTION MODULE, Install  <i>metric</i>
Muffler clamp	51.5–58.3 N·m (38–43 ft-lbs)	6.19 MUFFLERS, Install
Muffler end cap screws	8.8–10.8 N·m (78–96 <b>in-lbs</b> )	6.19 MUFFLERS, Install
Muffler screws	13.5–16.3 N·m (119–144 <b>in-lbs</b> )	6.19 MUFFLERS, Install
Muffler screws	13.6–16.3 N·m (120–144 <b>in-lbs</b> )	6.20 EXHAUST SYSTEM, Install

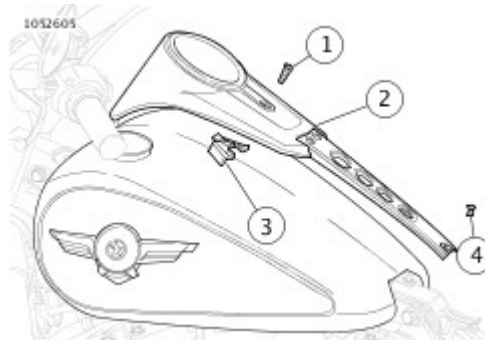
1. See **Figure 1**. Detach console.
  - a. Remove front screw (1).
  - b. Remove rear screw (4)
  - c. Move console (2) rearward.
2. See **Figure 2**. Disconnect connector.
  - a. Remove grommet (4) from backbone (1).
  - b. Pull harness (2) from backbone.

**NOTE**

See the electrical diagnostic manual for the appropriate disassembly procedure for the connector.

- c. Disconnect connector (3).
3. Remove console.

1. See **Figure 2**. Connect connector.
  - a. Connect connector (3).
  - b. Feed harness (2) into backbone (1).
  - c. Position grommet (4) into backbone.
2. See **Figure 1**. Install console.
  - a. Align console (2) with bracket (3).
  - b. Install front screw (1).
  - c. Install rear screw (4).
  - d. Tighten front screw.  
Torque: 3.4–5.6 N·m (30–50 **in-lbs**) *Console screw (Front)*
  - e. Tighten rear screw.  
Torque: 2.8–3.4 N·m (25–30 **in-lbs**) *Console screw (Rear)*



1. See **Fuel Tank**. Lift rear of fuel tank.

a. Loosen front fuel tank mounting screw (5).

b. Remove rear fuel tank mounting screw (1), washers (2), and acorn nut (3).

**NOTE**

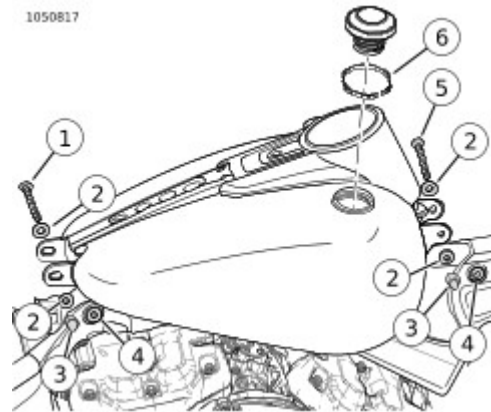
Verify fuel tank or fuel tank console do not contact any components when lifting.

c. Lift rear of fuel tank.

1. See **Figure 1**. Install fuel tank.
  - a. Install bushings and grommets (4) if removed.
  - b. Place fuel tank onto frame backbone.
  - c. Loosely install front fuel tank mounting screw (5), washers (2), and acorn nut (3).

**NOTE**

Filler neck ring (6) is a functional part which must remain in position for proper fuel system operation.



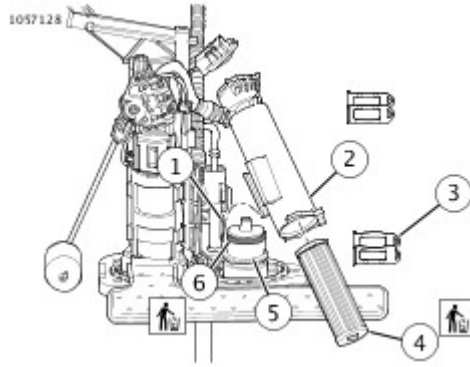
1	Rear fuel tank mounting screw
2	Washer (4)
3	Acorn nut (2)
4	Bushing and grommet (4)
5	Front fuel tank mounting screw
6	Filler neck ring

Figure 1. Fuel Tank

**NOTE**

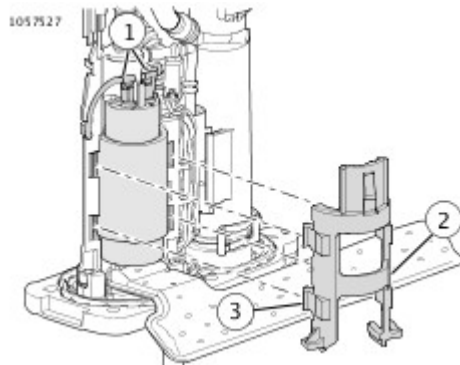
Vent screws are not meant to be removed. If removed for any reason, replace with **new** screws.

1. See **Figure 2**. Install **new** screws. Tighten.  
Torque: 9.5–12.2 N·m (84–108 **in-lbs**) *Fuel tank vent screws*



1	Bracket
2	Filter housing
3	Retaining clip
4	Fuel filter
5	Filter base
6	O-ring

Figure 3. Fuel Filter



1	Electrical connector (2)
2	Pump retainer
3	Tab (4)

Figure 4. Fuel Pump

1. Disconnect TMAP sensor connector.
2. See **TMAP Sensor** . Remove TMAP sensor.
  - a. Remove screw (2).
  - b. Remove TMAP sensor (1).

 **WARNING**

Gasoline is extremely flammable and highly explosive. Keep gasoline away from ignition sources which could result in death or serious injury. See the Safety chapter. (00635c)

1. Remove seat. See **Remove**.
2. Purge fuel system. See **Prepare**.
3. Remove main fuse. See **Main Fuse**.
4. Remove fuel tank. See **Prepare**.
5. Remove air cleaner. See **Remove**.
6. Remove air cleaner backplate assembly. See **Prepare**.

**Special Tools**

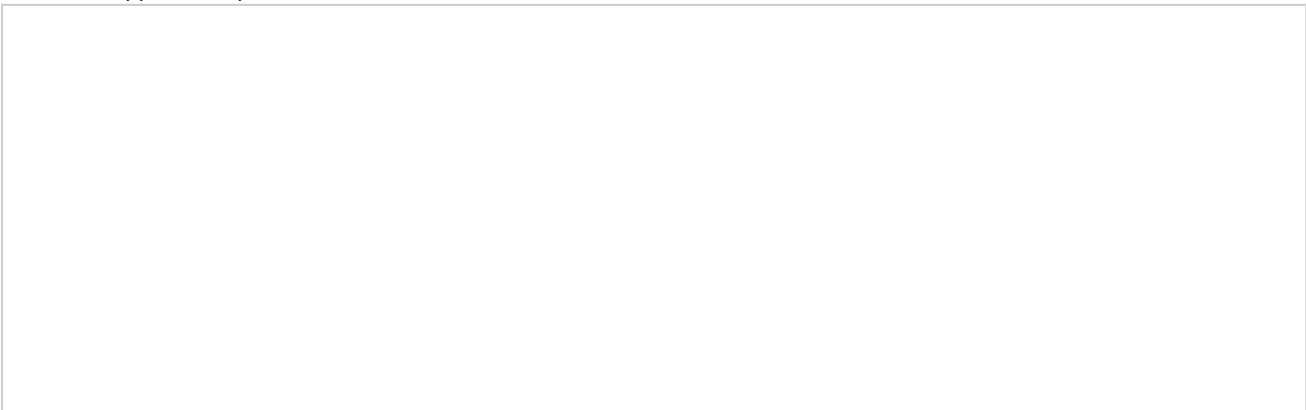
Description	Part Number	Qty.
OXYGEN SENSOR WRENCH	HD-50017	1

1. See **Front HO2S (Heated Oxygen Sensor)** or **Rear HO2S (Heated Oxygen Sensor)**. Disconnect **HO2S (Heated oxygen sensor)** connector (1).
2. Remove **HO2S (2)** with **OXYGEN SENSOR WRENCH (Part Number:HD-50017)**.

**Consumables**

Description	Part Number	Size
LOCTITE 243 MEDIUM STRENGTH THREADLOCKER AND SEALANT (BLUE)	99642-97	6 ml (¼ fl oz)

1. See **Figure 1** or **Figure 2**. If removed install exhaust bracket.
  - a. Install exhaust bracket (2).
  - b. Apply thread-locker to exhaust bracket screws (3).  
**LOCTITE 243 MEDIUM STRENGTH  
THREADLOCKER AND SEALANT (BLUE) (99642-97)**
  - c. Install exhaust bracket screws (3). Tighten.  
Torque: 54.2–67.8 N·m (40–50 ft-lbs) *Exhaust bracket screws*
2. Install **new** gaskets (6).
3. Install exhaust system.
  - a. Install and align exhaust system.
  - b. Apply thread-locker to muffler screws (1).  
**LOCTITE 243 MEDIUM STRENGTH  
THREADLOCKER AND SEALANT (BLUE) (99642-97)**
  - c. Install muffler screws. Hand tighten.
  - d. **FLDE,FLHC,FLHCS**: Install support clamp screw (4).  
Hand tighten.
  - e. Install flange nuts (5). Hand tighten.
  - f. Tighten flange nuts.  
Torque: 11.3–13.6 N·m (100–120 **in-lbs**) *Exhaust to engine flange nuts*
  - g. Tighten muffler screws.  
Torque: 13.6–16.3 N·m (120–144 **in-lbs**) *Muffler screws*
  - h. **FLDE,FLHC,FLHCS**: Tighten support clamp screw.  
Torque: 54.2–67.8 N·m (40–50 ft-lbs) *Exhaust support clamp screw*



1. See **Purge Solenoid**. Remove purge solenoid.
  - a. Disconnect purge solenoid connector (2).
  - b. Remove solenoid-to-induction module and canister-to-solenoid lines (3, 4) from purge solenoid (1).
  - c. Remove purge solenoid.

Fender Support, Screw	57–62.3 N·m (42–46 ft-lbs)	7.26 LICENSE PLATE LAMP, Remove and Install: Side Mount
Fender Support, Screw	28–37 N·m (21–27 ft-lbs)	7.26 LICENSE PLATE LAMP, Remove and Install: Side Mount
Frame ground stud nut	5.7–10.2 N·m (50–90 <b>in-lbs</b> )	7.45 ECM CADDY, Install
Frame ground stud nut	5.6–10.2 N·m (50–90 <b>in-lbs</b> )	7.49 ENGINE GROUND CABLE, Install
Frame ground stud nut	5.6–10.2 N·m (50–90 <b>in-lbs</b> )	7.52 MAIN WIRE HARNESS, Install
Front light bar mounting screw	27.1–33.9 N·m (20–25 ft-lbs)	7.20 FRONT LIGHT BAR, Remove and Install: Standard Lighting
Front light bar mounting screw	27.1–33.9 N·m (20–25 ft-lbs)	7.20 FRONT LIGHT BAR, Remove and Install: Integrated LED Lighting
Front light bar, bracket screw	21.7–27.1 N·m (16–20 ft-lbs)	7.20 FRONT LIGHT BAR, Remove and Install: Standard Lighting
Front light bar, clamp screw	0.67–1.1 N·m (6–10 <b>in-lbs</b> )	7.20 FRONT LIGHT BAR, Remove and Install: Standard Lighting
Handlebar switch assembly retainer screws	0.9–1.1 N·m (8–10 <b>in-lbs</b> )	7.11 LEFT HAND CONTROL MODULE (LHCM), Install
Handlebar switch assembly retainer screws	0.9–1.1 N·m (8–10 <b>in-lbs</b> )	7.11 LEFT HAND CONTROL MODULE (LHCM), Clutch Switch Replacement
Handlebar switch assembly retainer screws	0.9–1.1 N·m (8–10 <b>in-lbs</b> )	7.12 RIGHT HAND CONTROL MODULE (RHCM), Install
Handlebar switch assembly retainer screws	0.9–1.1 N·m (8–10 <b>in-lbs</b> )	7.12 RIGHT HAND CONTROL MODULE (RHCM), Front Brake Switch Replacement
Handlebar switch housing screws	4–5.1 N·m (35–45 <b>in-lbs</b> )	7.11 LEFT HAND CONTROL MODULE (LHCM), Install
Handlebar switch housing screws	4–5.1 N·m (35–45 <b>in-lbs</b> )	7.12 RIGHT HAND CONTROL MODULE (RHCM), Install
Handlebar-mounted turn signal, ball stud locknut	5.6–7.9 N·m (50–70 <b>in-lbs</b> )	7.22 FRONT TURN SIGNAL LAMPS, Remove and Install: Handlebar Mount
Handlebar-mounted turn signal, ball stud set screw	4–6.7 N·m (3–5 ft-lbs)	7.22 FRONT TURN SIGNAL LAMPS, Remove and Install: Handlebar Mount
Headlamp (Oblong) mounting screw	13.5–17.6 N·m	7.19 HEADLAMP, Bulb Replacement:

Remove main fuse when there is a possibility of injury caused by accidental vehicle start-up or electrical equipment damage.

1. **Models with security:**

- a. Verify that fob is present.
- b. Turn OFF/RUN switch to RUN.

2. Remove left side cover. See **Remove**.

 **WARNING**

To prevent accidental vehicle start-up, which could cause death or serious injury, remove main fuse before proceeding. (00251b)

3. See **Figure 1**. Remove fuse cover (2).

- a. Remove fuse block from ECM (Electronic control module) sub caddy.
- b. Remove fuse cover.

4. Remove main fuse (1).

5. **Models with security:** Turn ignition switch OFF.

1. See **Figure 1**. Install main fuse (1).

2. Install fuse cover (2).

3. Install fuse block onto ECM sub caddy.

4. Install left side cover. See **Remove**.

 **WARNING**

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

5. Test affected circuits for proper operation.

## Special Tools

Description	Part Number	Qty.
ALTERNATOR ROTOR REMOVER AND INSTALLER	HD-52073	1

1. Install grommet.
  - a. Lubricate parts with glass cleaner or isopropyl alcohol. Ribs of grommet must be clean and free of dirt and oily residue.
  - b. Feed connector and harness through hole from inside crankcase.
  - c. Push grommet into crankcase bore while carefully pulling on outside cable.
  - d. Installation is complete when cable stop contacts casting and capped rib of grommet exits crankcase bore.

### NOTE

Do not reuse stator mounting screws.

2. See **Figure 1**. Secure stator to crankcase using **new** screws (2). Tighten to:  
Torque: 6.2–8.5 N·m (55–75 **in-lbs**) *Stator mounting screws*
3. See **Figure 2**. Secure stator wiring (2) to frame with **new** cable strap (1). Verify that stator wire does not contact the engine.
4. Apply silicone based dielectric grease to connector.
5. Install connector to voltage regulator. Engage locking latch.

### NOTE

Install rotor slowly to prevent damaging rotor magnets. Damaged magnet fragments can damage the stator.

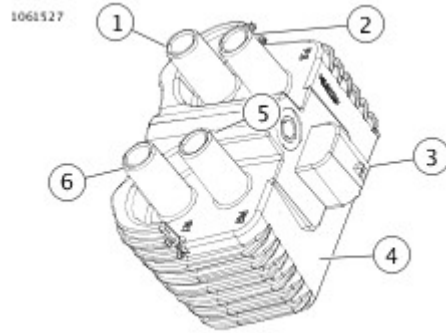
### CAUTION

The high-output rotor contains powerful magnets. Exercise caution to prevent possible hand injury during removal and installation. (00558b)

6. Install rotor.

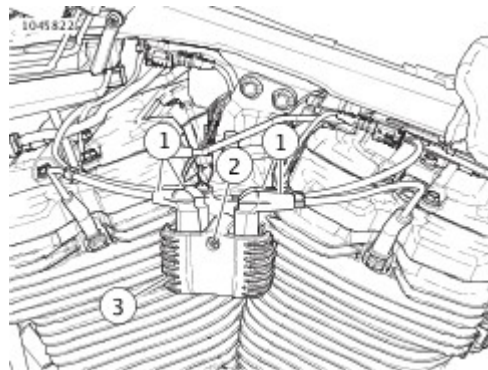
Special Tool: **ALTERNATOR ROTOR REMOVER AND**

1. See **Figure 2**. Install ignition coil (3).
2. Install screw (2). Tighten.  
Torque: 15–19 N·m (11–14 ft-lbs) *Ignition coil, screw*
3. Connect spark plug cables (1). See **Remove**
4. See **Figure 1**. Connect ignition coil connector.



1	Front left
2	Front right
3	Ignition coil connector
4	Ignition coil back
5	Rear right
6	Rear left

Figure 1. Ignition Coil Connector



1	Spark plug cable (4)
---	----------------------

1. Remove handlebar switch housing. See **Remove**.
2. Remove switch cap:
  - a. **Rocker switch caps:** See **Figure 1**. Entering from the end, carefully pry between the switch cap and switch plunger. Remove switch cap.
3. Install switch cap:
  - a. **Rocker switch caps:** Hook **new** cap on one end and rotate into place. An audible snap will be heard when securely installed.
4. Install switch housing. See **Install**.

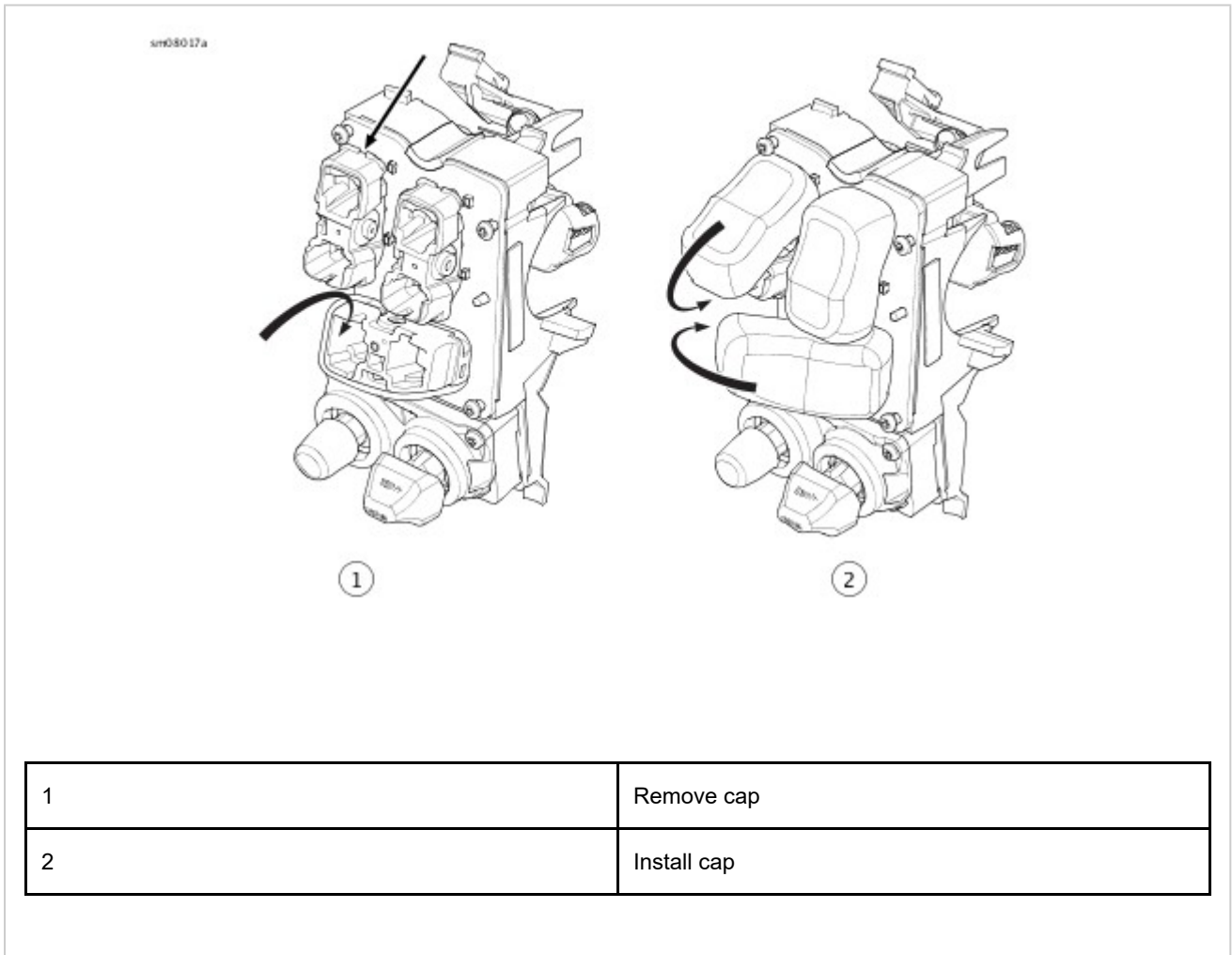


Figure 1. Replace Switch Caps (Typical)

- Both the **ECM** (**Electronic control module**) and the **IM** (**Instrument module**) retain the odometer value. If the **IM** is replaced, the new **IM** will display the odometer value stored in the **ECM**. The new **IM** will lock to the mileage stored in the **ECM** after 50 km (31 mi) have been accumulated. The trip B odometer will display the countdown mileage.
- If the **IM** is installed on another vehicle after it has locked to the **ECM**, the odometer will display "VIN ERR" on the new vehicle. If the **IM** is removed from the vehicle before the countdown reaches zero, it will reset the mileage countdown to 50 km (31 mi). This mileage countdown allows for a road test to verify that **IM** replacement was the proper repair.

3	IM gasket
4	Tachometer gasket

Figure 2. IM and Tachometer: FXLR

1.

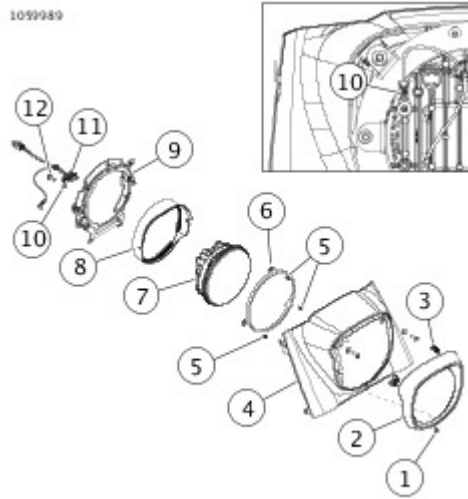
**NOTE**

Wires are interchangeable.

See **Neutral Indicator Switch**. Disconnect wires (1) from switch.

2. Remove switch (2).

1099989



1	Screw
2	Bezel
3	Isolator (2)
4	Nacelle
5	Screw (3)
6	Retainer
7	Headlamp
8	Gasket
9	Mounting ring
10	Ground strap
11	Connector
12	Screw

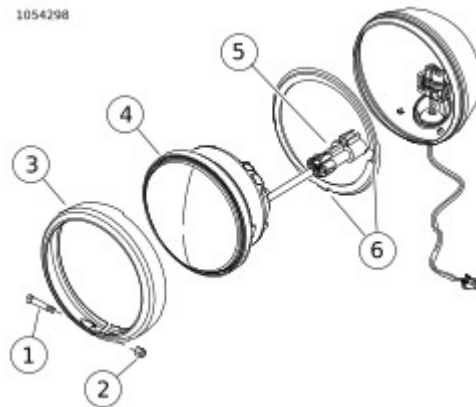
Figure 1. Nacelle Mounted Headlamp

1	Perpendicular line
2	Vertical line
3	7.6 m (25 ft)
4	Low beam bulb centerline
5	Horizontal line

Figure 1. LED Headlamp Alignment

1. See **Figure 1**. Remove screw (1) and nut (2).
2. Remove bezel (3).
3. Remove LED lamp (4).
4. Disconnect connector (5).

1. See **Figure 1**. Connect connector (5).
2. Install LED lamp (4) in alignment ring (6).
3. Install bezel (3).
4. Install screw (1) and nut (2). Tighten.  
Torque: 0.67–1.12 N·m (6–10 **in-lbs**) *Auxiliary lamp bezel nut*



1	Screw
2	Nut
3	Bezel
4	LED Lamp
5	Connector
6	Alignment ring

3. See **Figure 3**. Remove screws (1).
4. Remove cover (2).

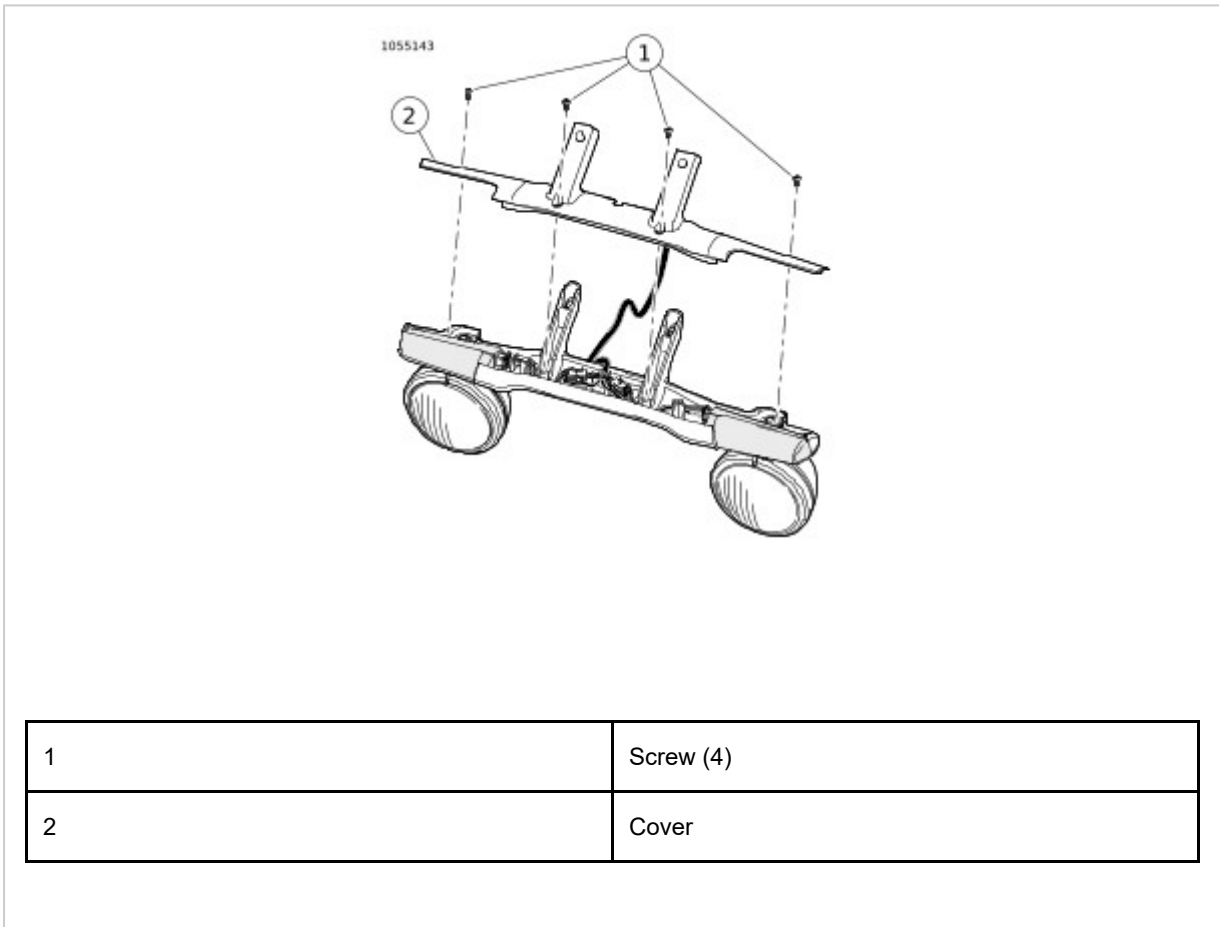
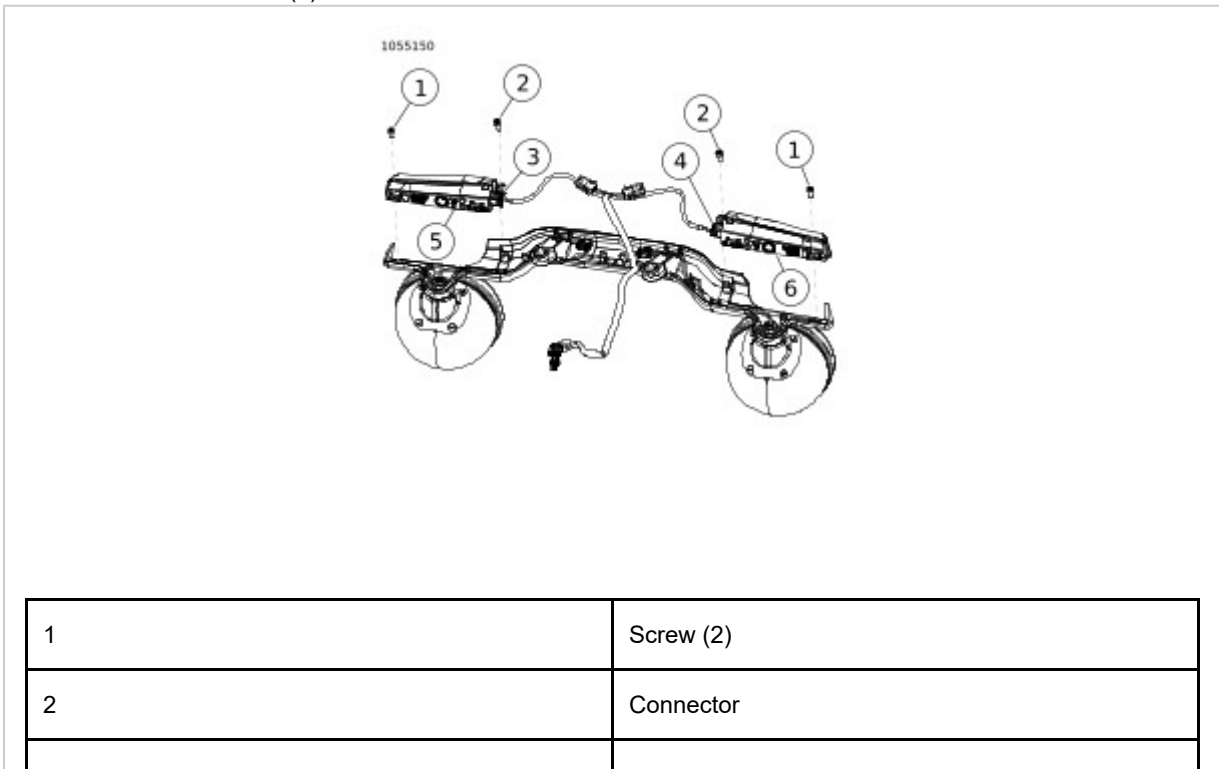


Figure 3. Lightbar Cover

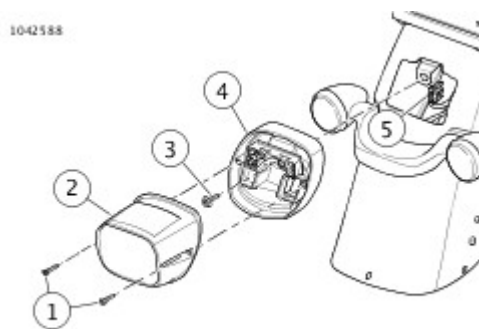
5. See **Figure 4**. Remove screw (1).
6. Remove LED signal (3 or 4).
7. Disconnect connector (2).



1. Remove main fuse. See **Main Fuse**.
2. Remove seat. See **Remove**.
3. **If removing both turn signals:** Remove rear fender. See **Prepare**.

1. See **Figure 1**. Remove narrow screws (1).
2. Remove lens (2).
3. Disconnect connector from circuit board.
4. Remove wide screw (3).
5. Remove base assembly (4).
6. Disconnect connector (5).

1. See **Figure 1**. Connect connector (5).
2. Install base assembly (4).
3. Install wide screw (3). Tighten.  
Torque: 4.5–5.4 N·m (40–48 **in-lbs**) *Tail Lamp, Standard, Base Screw*
4. Connect connector to circuit board.
5. Install lens (2).
6. Install narrow screws (1). Tighten.  
Torque: 2.3–2.7 N·m (20–24 **in-lbs**) *Tail Lamp, Standard, Lens Screw*



1	Narrow screw (2)
2	Lens
3	Screw, wide
4	Base Assembly
5	Connector

1. Remove main fuse. See **Main Fuse**.

Figure 3. License Plate Mount LED Housing

1. Install **ECM** ([Electronic control module](#)).
  - a. See **ECM Removed**. Connect **ECM** connectors.  
Verify locking tabs are in the lock position.
  - b. Install **ECM** into caddy.
2. Install sub caddy mounting bracket.
  - a. See **ECM Sub Caddy**. Route sub caddy into position.
  - b. Push and lock into position the rear sub caddy lock (2).
  - c. Push and lock into position the front sub caddy lock (1).
  - d. Install screw (3). Tighten  
Torque: 4.1–6.8 N·m (36–60 **in-lbs**) *Sub caddy screw*

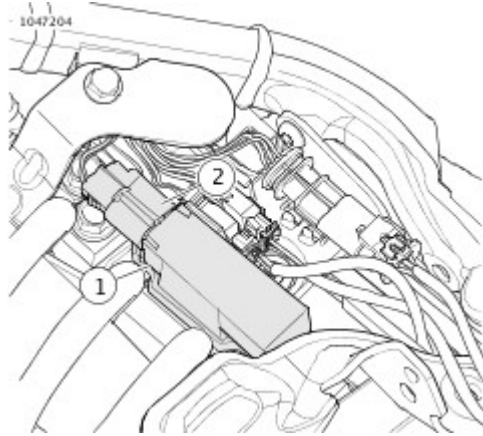
**Special Tools**

Description	Part Number	Qty.
DIGITAL TECHNICIAN II	HD-48650	1

With a fob present, the security system can be configured for service by disabling the security system with **DIGITAL TECHNICIAN II (Part Number:HD-48650)**.

Once disabled, the vehicle can be operated without an assigned fob present. To maintain the service mode, the assigned fobs must be kept out of range. If the fob appears in range, the service mode is cancelled.

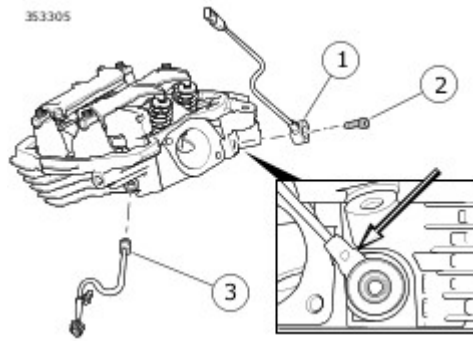
1. See **Figure 1**. Install antenna (1).
  - a. Connect connector (2).
  - b. Connect antenna to caddy.



1	Antenna
2	Connector

Figure 1. Security Antenna

1. See **Figure 1**. Install sensor (1).
  - a. Install sensor against head casting as shown.
  - b. Install screw. Tighten.  
Torque: 17.6–23 N·m (13–17 ft-lbs) *Knock sensor screw*
2. Connect connector.



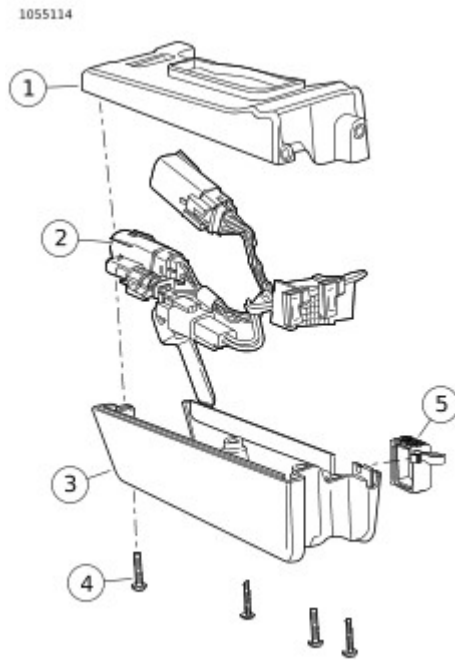
1	Knock sensor
2	Screw
3	<b>ET</b> (Engine temperature) sensor (rear head only)

Figure 1. Cylinder Head Sensors

1. Note location of cable straps and remove as needed.
2. See **Brake Line Clamps**. Remove brake line clamp screws.
3. See **Front Wheel Speed Sensor**. Detach WSS wire from clips (1).
4. Remove frame plug (2).
5. See **Front Wheel Speed Sensor Connector**. Disconnect connector (1).
6. Retract front axle until sensor is free. See **Prepare**.

1. Purge fuel system. See **Prepare**.
2. Remove left side cover. See **Remove**.
3. Remove main fuse. See **Main Fuse**.
4. Remove seat. See **Remove**.
5. Remove fuel tank. See **Prepare**.

1. Remove horn assembly. See **Prepare**.
  
2. See **Figure 1** Separate **USB (Universal serial bus)** caddy.
  - a. Remove screws (4).
  - b. Separate **USB** caddy.
  - c. Remove harness (2).



1	USB caddy upper
2	USB caddy harness
3	USB caddy lower
4	Screw (4)
5	Cap

Figure 1. USB Caddy Assembly

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