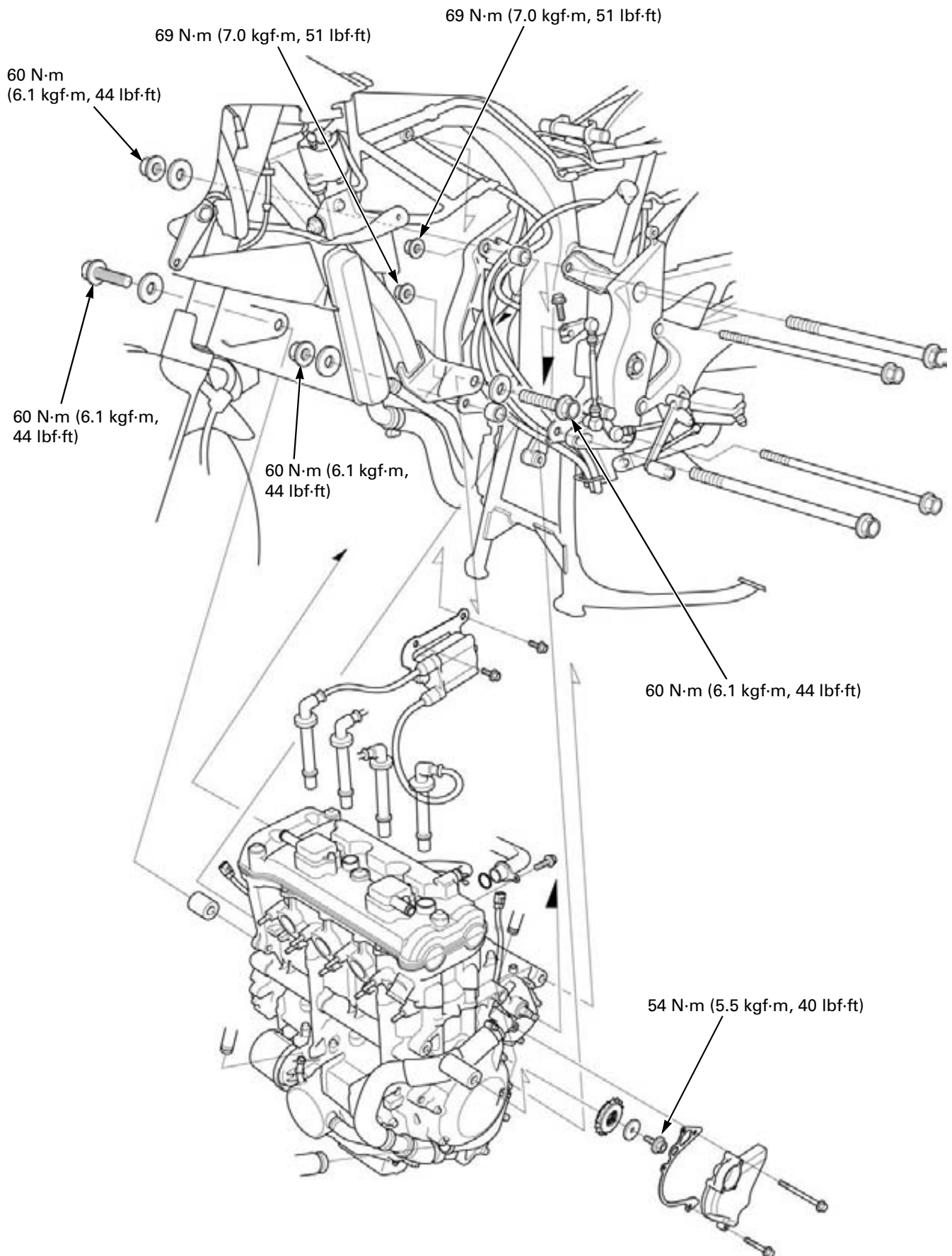


8. ENGINE REMOVAL/INSTALLATION

COMPONENT LOCATION	8-2	ENGINE REMOVAL	8-4
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ENGINE REMOVAL/INSTALLATION

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- A hoist or equivalent is required to support the motorcycle when removing and installing the engine.
- A floor jack or other adjustable support is required to support and maneuver the engine.
- Do not use the oil filter and oil cooler as a jacking point.
- The following components can be serviced with the engine installed in the frame.
 - Alternator (page 11-4)
 - Clutch (page 10-17)
 - Camshaft (page 9-8)
 - Gearshift linkage (page 12-11)
 - Oil cooler (page 5-12)
 - Oil pump (page 5-8)
 - Transmission/gearshift linkage (page 12-11)
 - Water pump (page 7-16)
- The following components require engine removal for service.
 - Cylinder head (page 9-12)
 - Crankshaft (page 13-8)
 - Piston/cylinder (page 13-16)

SERVICE DATA

ITEM		SPECIFICATIONS
Engine dry weight		66.5 kg (146.6 lbs)
Engine oil capacity	After disassembly	3.8 liter (4.0 US qt, 3.3 Imp qt)
Coolant capacity	Radiator and engine	2.71 liter (2.86 US qt, 2.38 Imp qt)

TORQUE VALUES

Drive sprocket special bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)
Front engine hanger bolt	60 N·m (6.1 kgf·m, 44 lbf·ft)
Rear engine hanger nut (upper)	60 N·m (6.1 kgf·m, 44 lbf·ft)
Rear engine hanger nut (lower)	60 N·m (6.1 kgf·m, 44 lbf·ft)
Swingarm pivot bracket nut	69 N·m (7.0 kgf·m, 51 lbf·ft)
Swingarm pivot nut	98 N·m (10.0 kgf·m, 72 lbf·ft)
Gearshift arm pinch bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)

ENGINE REMOVAL/INSTALLATION

ENGINE REMOVAL

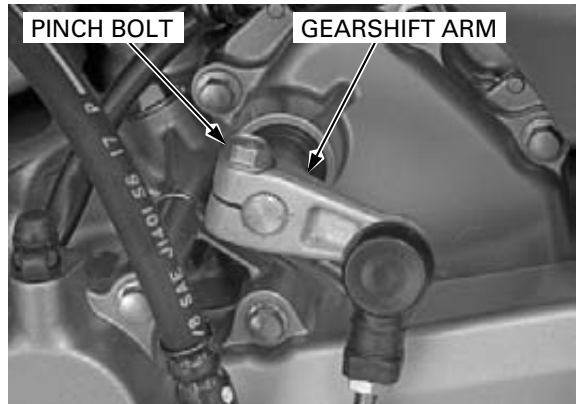
Drain the engine oil (page 4-16).
Drain the coolant (page 7-7).

Remove the following:

- Exhaust pipe (page 3-13)
- Air cleaner housing/throttle body (page 6-60)
- Left rear cowl (page 3-8)
- Clutch slave cylinder (page 10-13)

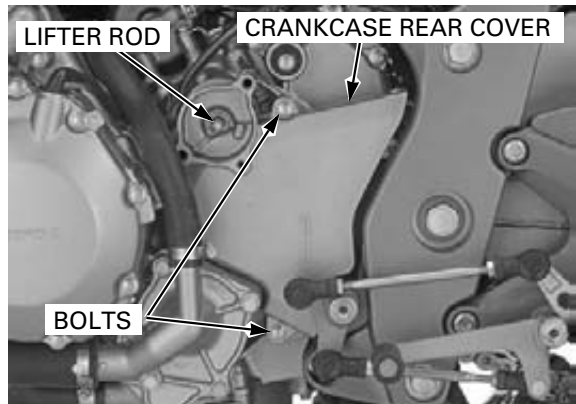
Loosen the lock nut, adjusting nut and rear axle nut to make a drive chain slack fully (page 4-21).

Remove the pinch bolt and gearshift arm.

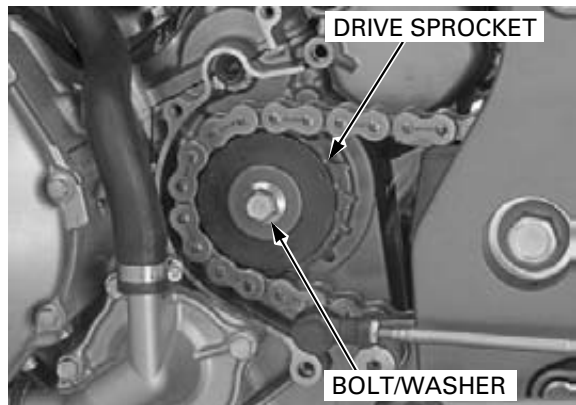


Remove the clutch lifter rod.

Remove the bolts, left crankcase rear cover, guide plate and dowel pins.



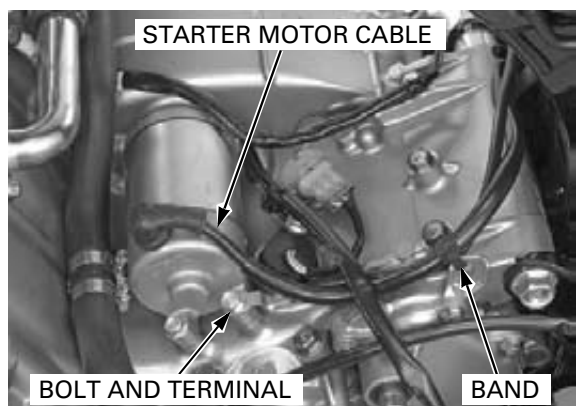
Remove the bolt, washer and drive sprocket from the countershaft.



Remove the wire band.

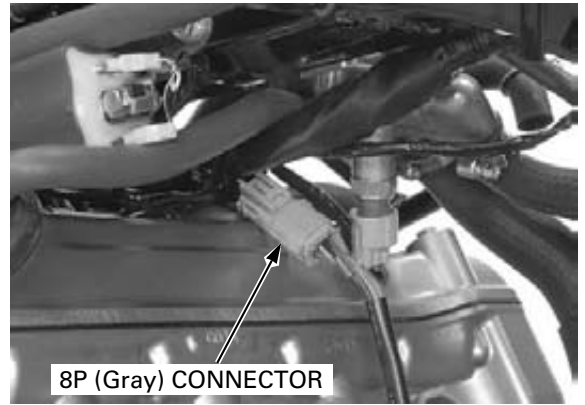
Remove the terminal nut and starter motor cable (page 20-6).

Remove the bolt and ground cable.

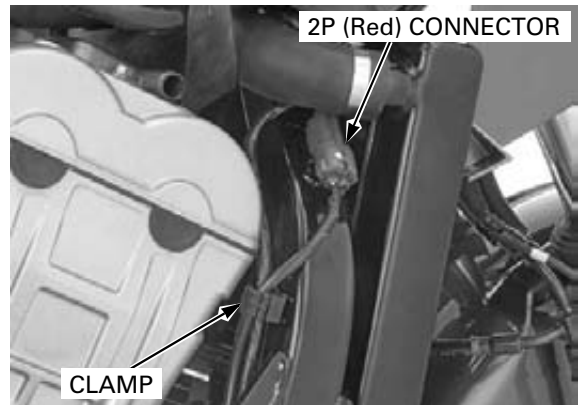


ENGINE REMOVAL/INSTALLATION

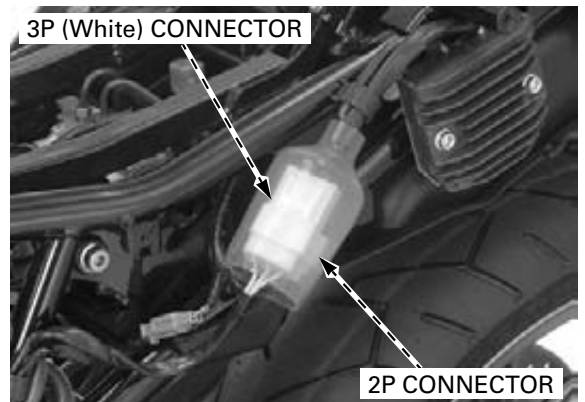
Disconnect the engine sub-harness 8P (Gray) connector.



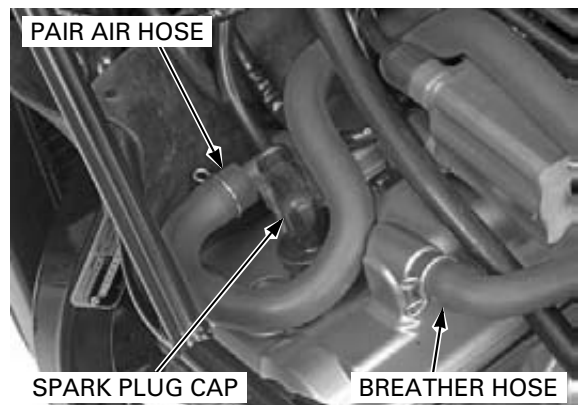
Release the CKP sensor wire from the clamp. Disconnect the CKP sensor 2P (Red) connector.



Disconnect the alternator 3P (White) connector and regulator/rectifier 2P connector.



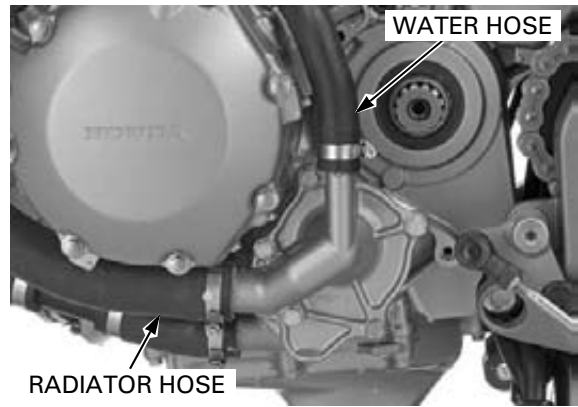
Disconnect the PAIR air hose and crankcase breather hose from the cylinder head cover. Remove the spark plug caps.



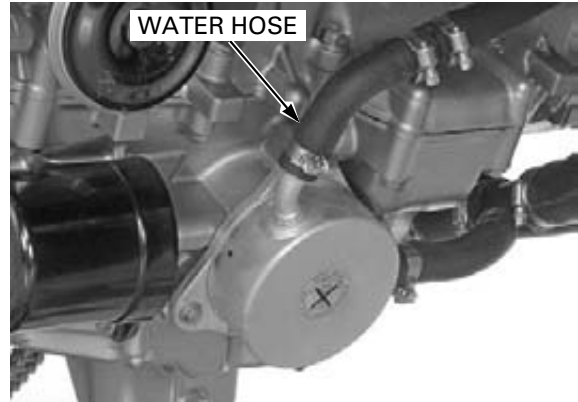
ENGINE REMOVAL/INSTALLATION

Remove the exhaust pipe (page 3-13).

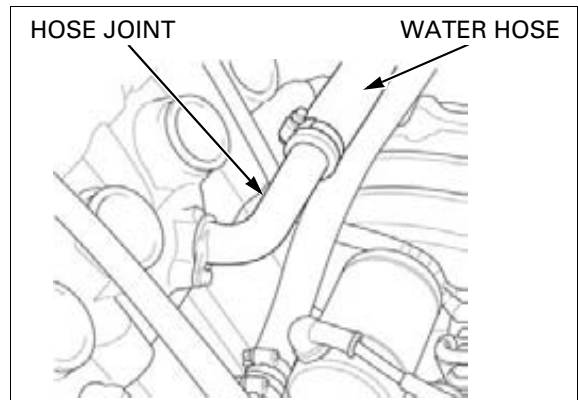
Loosen the hose band screws and disconnect the lower radiator hose and water hose from the water pump.



Loosen the hose band screw and disconnect the oil cooler water hose.

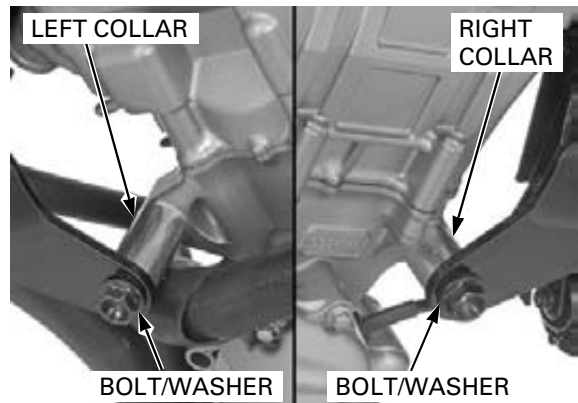


Loosen the hose band screw and disconnect the water hose from the hose joint.

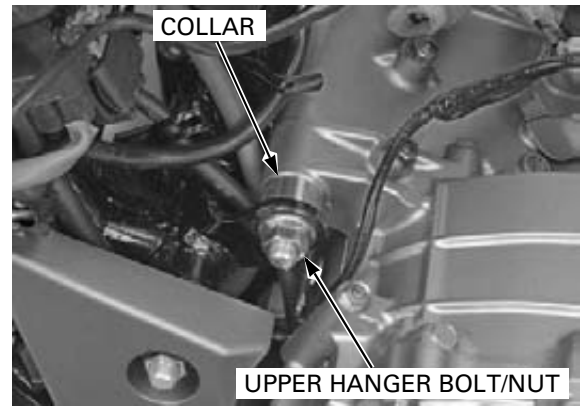


Support the engine using a jack or other adjustable support.

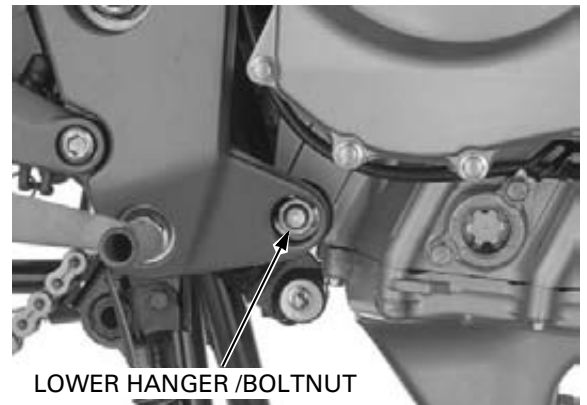
Remove the right and left front engine hanger bolts, washers and distance collars.



Loosen the rear upper engine hanger nut.



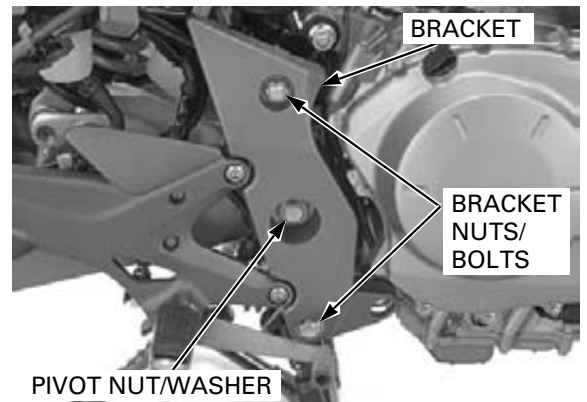
Loosen the rear lower engine hanger nut.



Loosen the swingarm pivot nut.

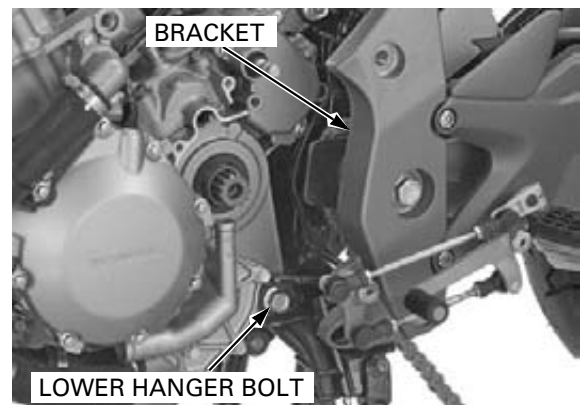
Do not remove the swingarm pivot shaft.

Remove the swingarm pivot bracket nuts/bolts and swingarm pivot nut/washer.



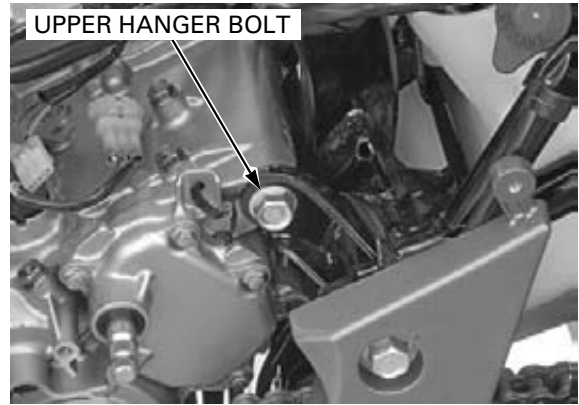
Slide the left swingarm pivot bracket outward and turn it counterclockwise slightly.

Remove the nut, washer, rear lower engine hanger bolt and distance collar.



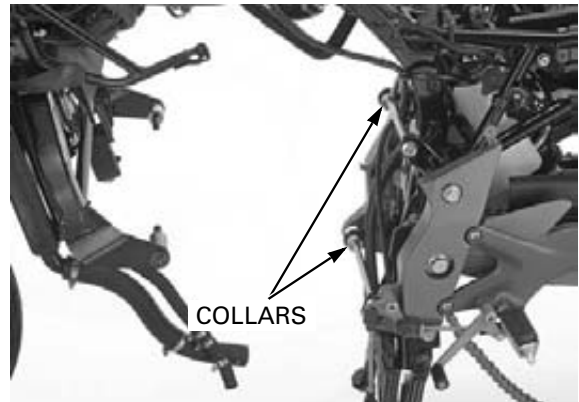
ENGINE REMOVAL/INSTALLATION

- Remove the collar from the right side.* Remove the nut, washer, rear upper engine hanger bolt and distance collar.
- Remove the engine from the frame.



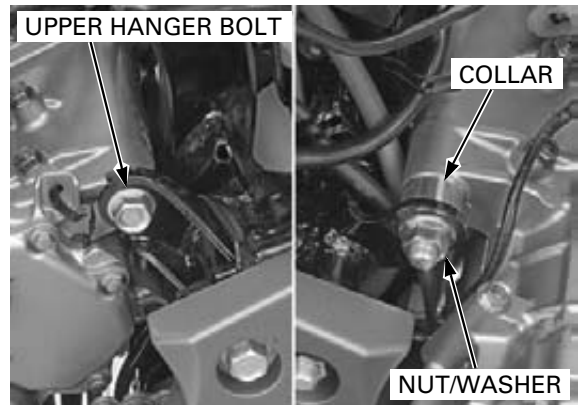
ENGINE INSTALLATION

- Note the direction of the engine hanger bolts and collars.
- The jack height must be continually adjusted to relieve stress from the mounting fasteners.
- Route the wire and cables properly (page 1-23).

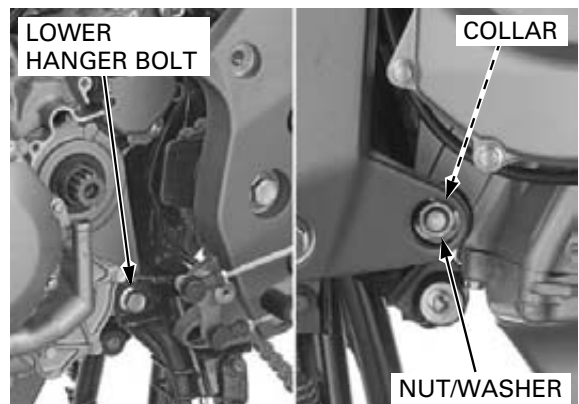


Carefully install the engine into the frame.

- Install the collar onto the right side engine mount.* Install the rear upper engine hanger bolt from the left side and install the collar between the engine and frame. Install the washer and upper engine hanger nut.



- Install the collar onto the right side engine mount.* Install the rear lower engine hanger bolt from the left side and install the collar between the engine and frame. Install the washer and lower engine hanger nut.



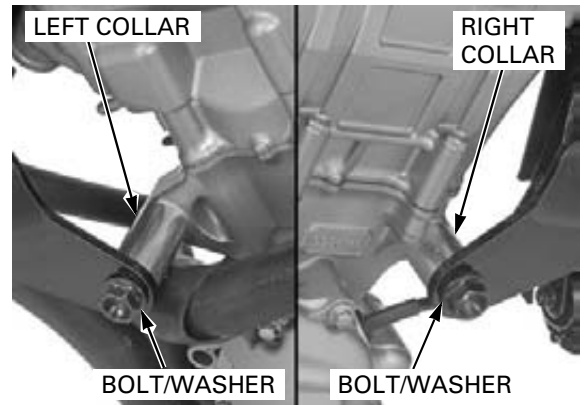
ENGINE REMOVAL/INSTALLATION

Install the right and left front engine hanger bolts/washers with the distance collars.

Tighten all of the engine hanger nut and bolts to the specified torque.

TORQUE:

- Front engine hanger bolt:
60 N·m (6.1 kgf·m, 44 lbf·ft)
- Rear upper engine hanger nut:
60 N·m (6.1 kgf·m, 44 lbf·ft)
- Rear lower engine hanger nut:
60 N·m (6.1 kgf·m, 44 lbf·ft)



Set the swingarm pivot bracket onto the frame and align the bolt holes.

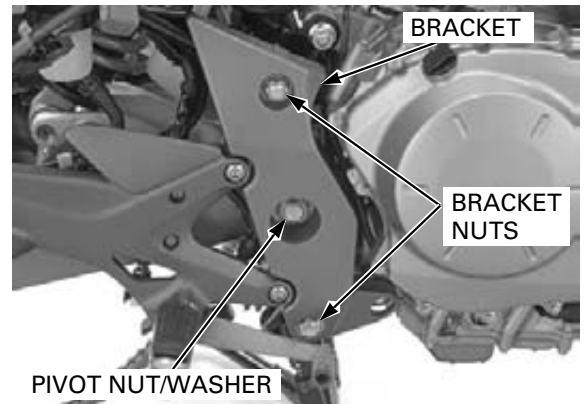
Install the bracket bolts and nuts.

Install the washer and swingarm pivot nut, and tighten the nut to the specified torque.

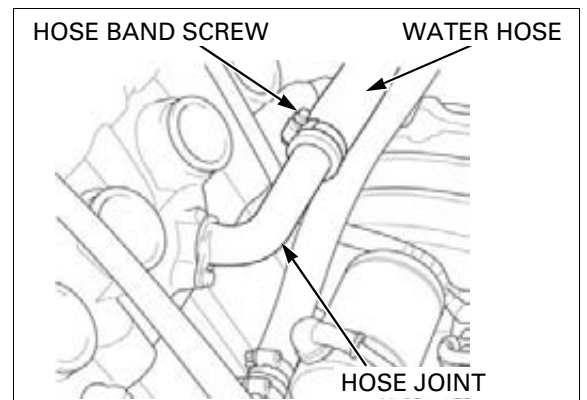
TORQUE: 98 N·m (10.0 kgf·m, 72 lbf·ft)

Tighten the bracket nuts to the specified torque.

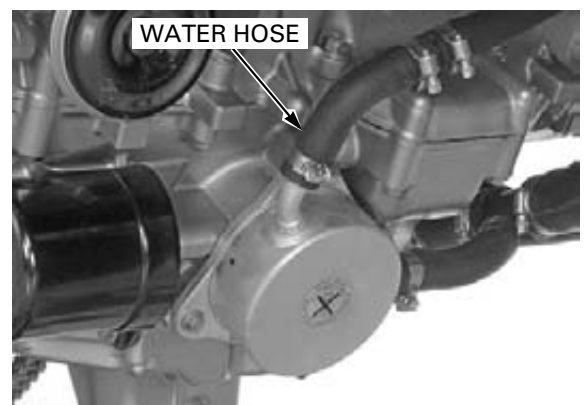
TORQUE: 69 N·m (7.0 kgf·m, 51 lbf·ft)



Install and tighten the hose joint bolt securely.

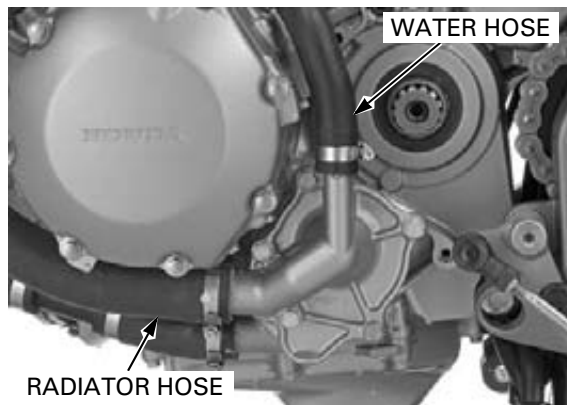


Connect the water hose to the oil cooler.



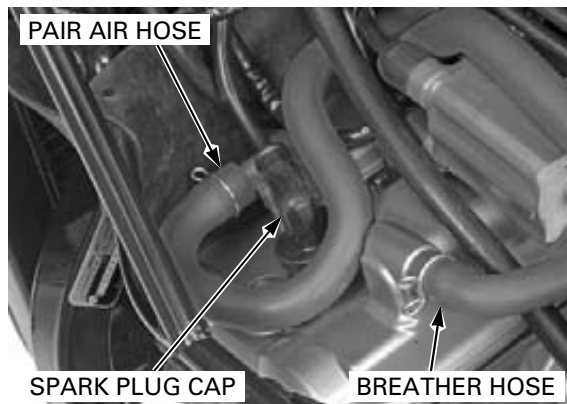
ENGINE REMOVAL/INSTALLATION

Connect the lower radiator hose and water hose to the water pump.

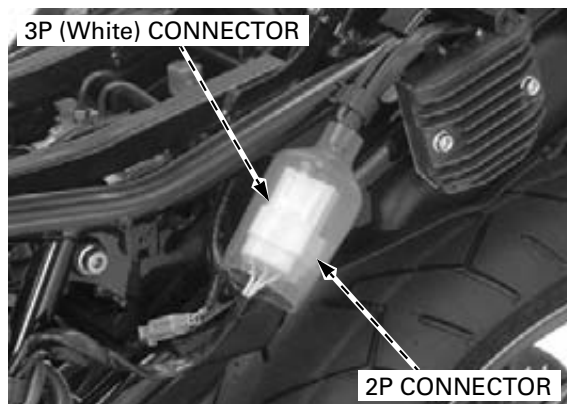


Connect the crankcase breather hose and PAIR air hoses.

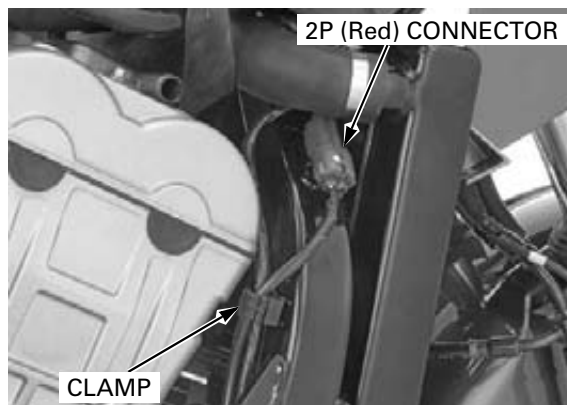
Install the spark plug caps.



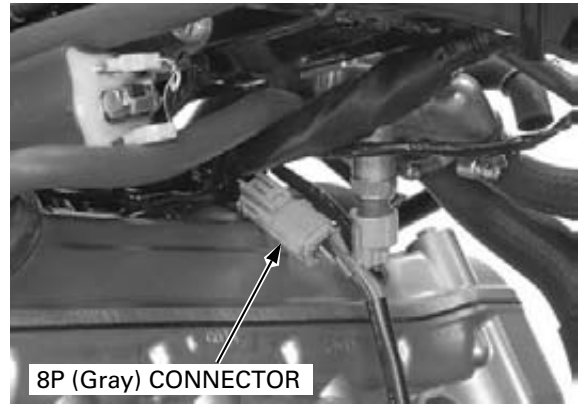
Connect the alternator 3P (White) connector and regulator/rectifier 2P connector.



Connect the CKP sensor 2P (Red) connector and secure the CKP sensor and horn wires with the harness clamp.



Connect the engine sub-harness 8P (Gray) connector.

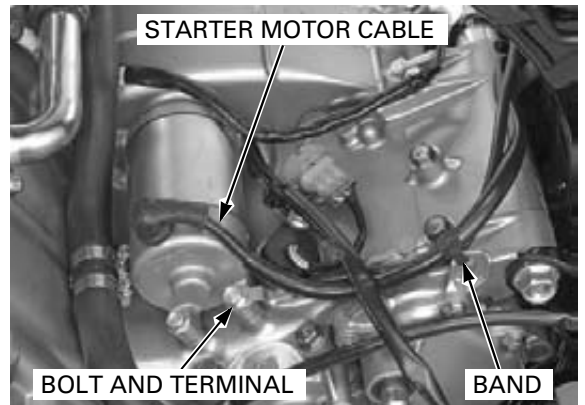


Install the starter motor cable to the motor terminal. Tighten the terminal nut to the specified torque and install the dust cover (page 20-12).

Install and tighten the starter motor mounting bolt with the ground cable.

Route the wire band through the hole on the gearshift linkage cover.

Secure the starter motor cable and ground cable with the wire band.

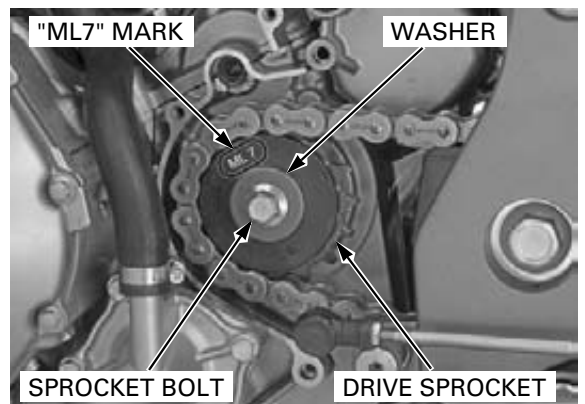


Install the drive sprocket with its "ML7" mark facing out.

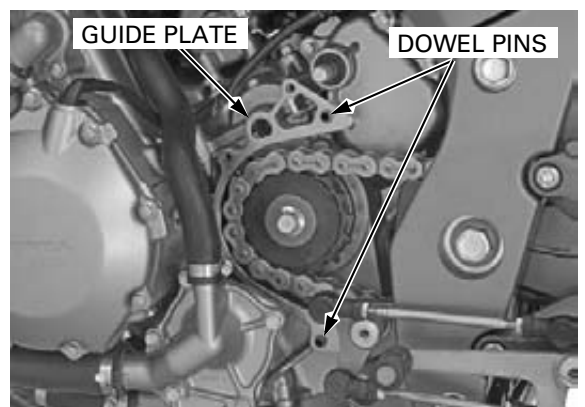
Install the washer and drive sprocket bolt, and tighten the drive sprocket bolt to the specified torque.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install the drive sprocket cover and clutch slave cylinder (page 12-11).



Install the dowel pins and guide plate.

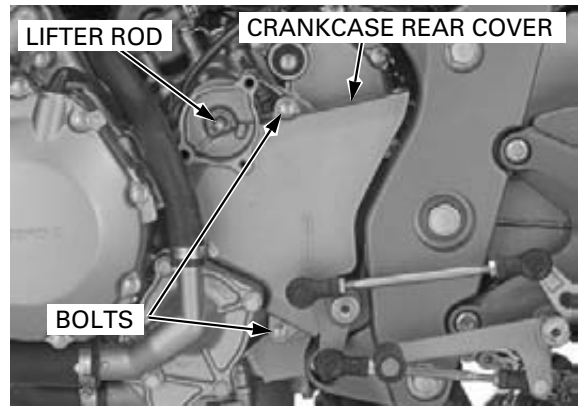


ENGINE REMOVAL/INSTALLATION

Install the left crankcase rear cover and tighten the cover bolts.

Install the clutch lifter rod.

Install the clutch slave cylinder (page 10-15).



Align the punch mark on the gearshift arm with the rear punch mark on the spindle.

Install the gearshift arm onto the gearshift spindle. Install and tighten the pinch bolt to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the following:

- Air cleaner housing/throttle body (page 6-67)
- Clutch slave cylinder (page 10-15)
- Exhaust pipe (page 3-13)
- Left rear cowl (page 3-8)

Adjust the drive chain slack (page 4-21).

Pour recommended engine oil up to the proper level (page 4-16).

Fill the cooling system with the recommended coolant and bleed any air (page 7-6).

