

# 8. ENGINE REMOVAL/INSTALLATION

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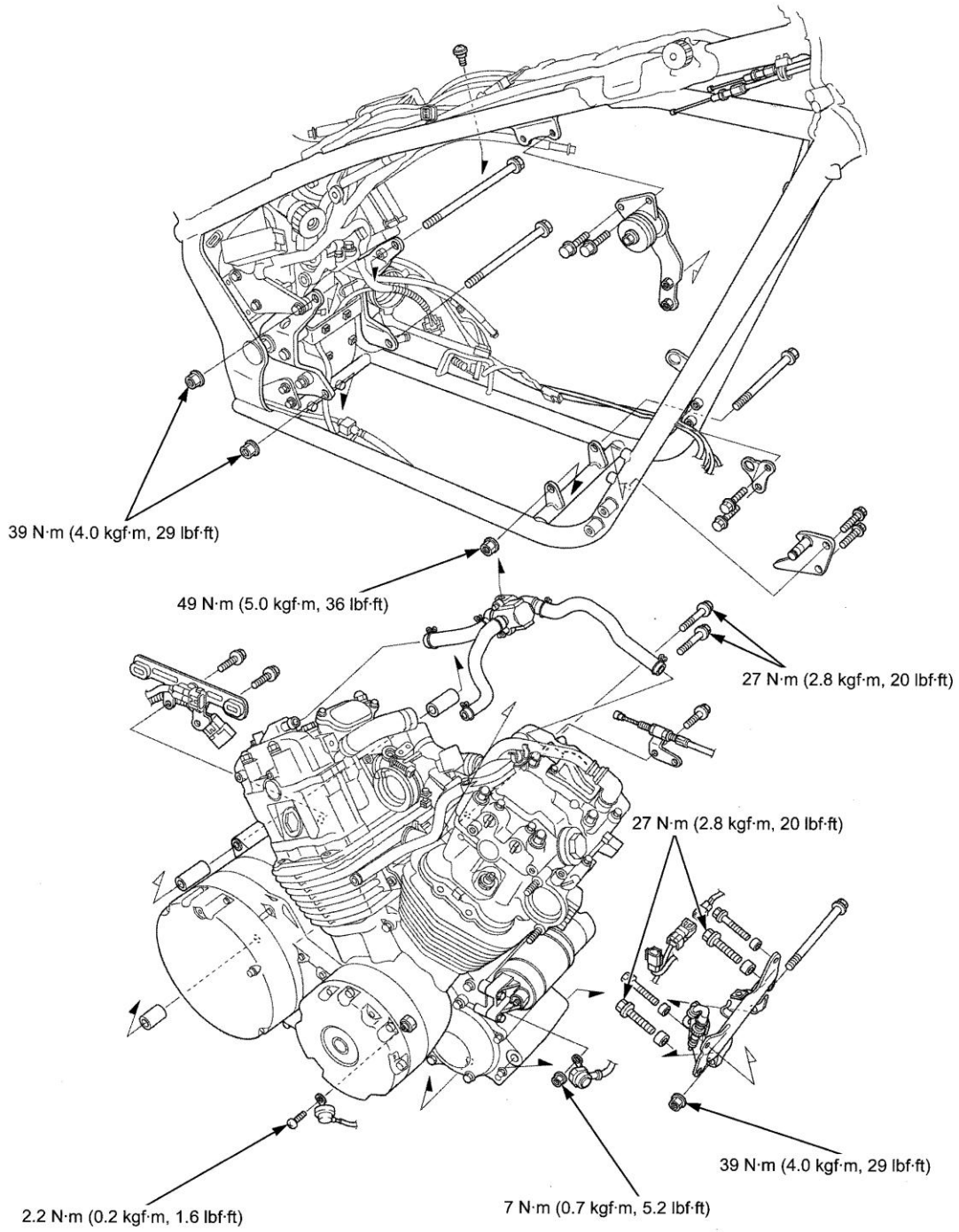
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8

# ENGINE REMOVAL/INSTALLATION

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## 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 support the engine using the engine oil filter or the filter boss will be damaged.
- When removing/installing the engine, tape the frame around the engine beforehand for frame protection.
- When installing the engine, be sure to tighten the engine mounting fasteners to the specified torque in the specified sequence. If you mistake the torque or sequence, loosen all mounting fasteners, then tighten them again to the specified torque in the correct sequence.
- The following components require engine removal for servicing.
  - Rear cylinder head cover (page 9-7)
  - Rear rocker arm (page 9-9)
  - Rear camshaft (page 9-10)
  - Rear cylinder head (page 9-15)
  - Rear cylinder (page 10-4)
  - Rear piston (page 10-6)
  - Rear oil jet (page 5-12)
  - Water pump (page 7-16)
  - Crankcase separation (page 13-7)
- The following components can be serviced with the engine in the frame.
  - Front cylinder head cover (page 9-7)
  - Front rocker arm (page 9-9)
  - Front camshaft (page 9-10)
  - Front cylinder head (page 9-15)
  - Front cylinder (page 10-4)
  - Front piston (page 10-6)
  - Front oil jet (page 5-12)
  - Fin (page 9-7)
  - Exhaust system (page 3-10)
  - Engine oil filter (page 4-14)
  - Air cleaner housing (page 6-44)
  - Throttle body (page 6-45)
  - Injector (page 6-50)
  - Intake manifold (page 6-54)
  - Clutch (page 11-6)
  - Gearshift linkage (page 11-15)
  - Primary gears (page 11-18)
  - Clutch lifter arm (page 11-24)
  - Stator (page 12-6)
  - Starter torque limiter/idle gear (page 12-8)
  - Flywheel/starter clutch (page 12-11)
  - Starter motor (page 21-6)

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Engine dry weight		109.1 kg (240.5 lbs)
Engine oil capacity (At draining)		3.5 liters (3.7 US qt, 3.1 Imp qt)
Coolant capacity	Radiator and engine	2.30 liters (2.43 US qt, 2.02 Imp qt)
	Reserve tank	0.24 liters (0.25 US qt, 0.21 Imp qt)

### TORQUE VALUES

Front upper engine mounting nut	39 N·m (4.0 kgf·m, 29 lbf·ft)
Front lower engine mounting nut	49 N·m (5.0 kgf·m, 36 lbf·ft)
Rear upper engine mounting nut	39 N·m (4.0 kgf·m, 29 lbf·ft)
Rear lower engine mounting nut	39 N·m (4.0 kgf·m, 29 lbf·ft)
V-bank engine mounting bolt	27 N·m (2.8 kgf·m, 20 lbf·ft)
Front cross pipe mounting bolt	27 N·m (2.8 kgf·m, 20 lbf·ft)
Starter motor cable terminal nut	7 N·m (0.7 kgf·m, 5.2 lbf·ft)
EOP switch terminal screw	2.2 N·m (0.2 kgf·m, 1.6 lbf·ft)

## ENGINE REMOVAL/INSTALLATION

### ENGINE REMOVAL

Drain the engine oil (page 4-13).

Drain the coolant from the system (page 7-7).

Remove the following:

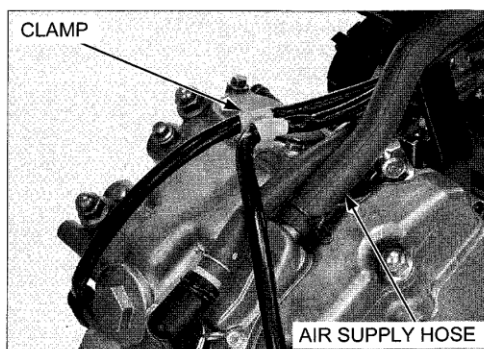
- Fuel tank (page 6-43)
- Over head cover (page 3-5)
- Fin (page 9-7)
- Throttle body (page 6-45)
- Injector (page 6-50)
- Radiator (page 7-10)
- Thermostat housing (page 7-10)
- Radiator reserve tank (page 7-18)
- Exhaust system (page 3-10)
- Main step (page 3-4)
- Rear master cylinder/brake pedal (page 17-34)
- Rear fender (page 3-8)
- Clutch cover/timing hole cap cover (page 11-6)

#### NOTE:

- Wrap the intake manifold port with a shop towel or cover them with a piece of tape to prevent any foreign material from dropping into the engine.

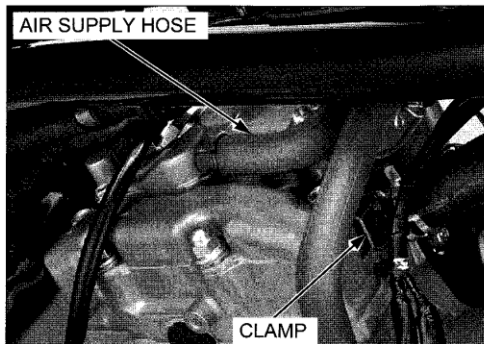
Release the front spark plug wires from the clamp.

Disconnect the secondary air supply hose.



Remove the wire clamp from the water pipe stay.

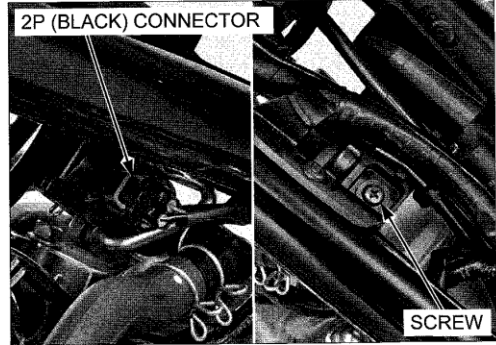
Disconnect the secondary air supply hose.



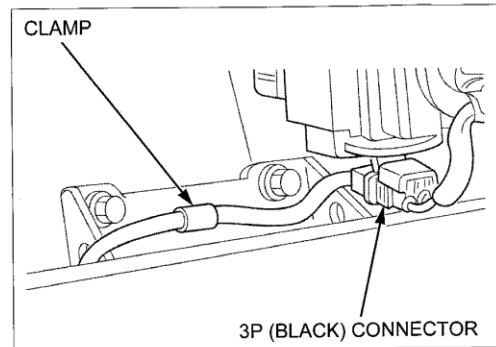
## ENGINE REMOVAL/INSTALLATION

Disconnect the PAIR control solenoid valve 2P (Black) connector.

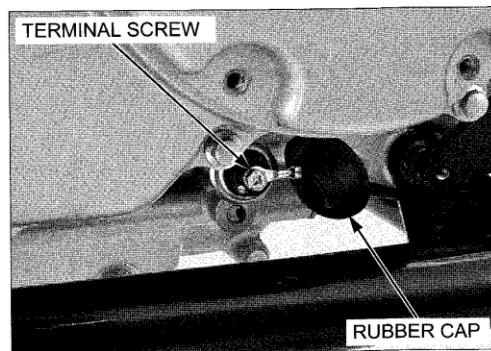
Remove the screw and PAIR control solenoid valve.



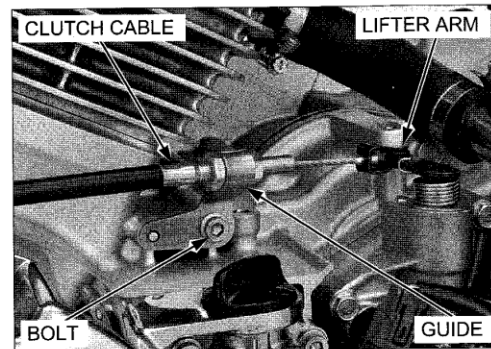
Disconnect the VS sensor 3P (Black) connector.  
Remove the VS sensor wire clamp from the frame.



Remove the rubber cap and disconnect the EOP switch wire by removing the terminal screw.



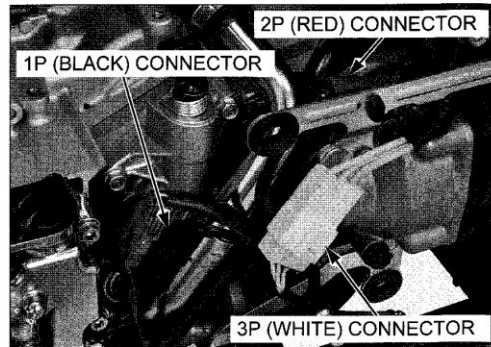
Remove the socket bolt and cable guide.  
Disconnect the clutch cable from the clutch lifter arm.



## ENGINE REMOVAL/INSTALLATION

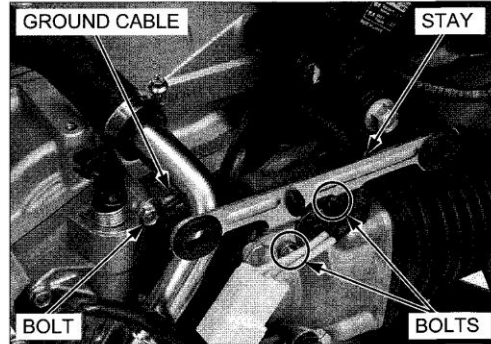
Disconnect the following:

- CKP sensor 2P (Red) connector
- Alternator 3P (White) connector
- Neutral switch 1P (Black) connector



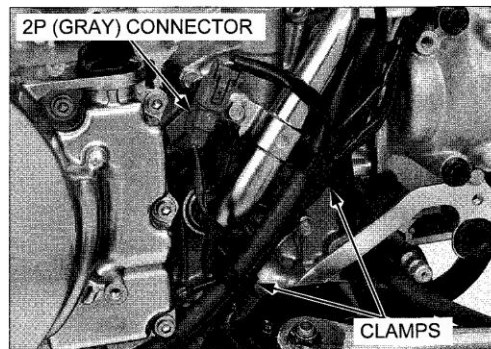
Remove the bolts and stay.

Remove the bolt and disconnect the ground cable.

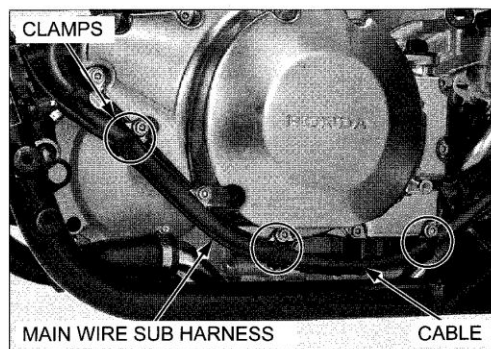


Release the harness, wires and cable from the clamps.

Remove the sidestand switch 2P (Gray) connector from the water pipe stay.

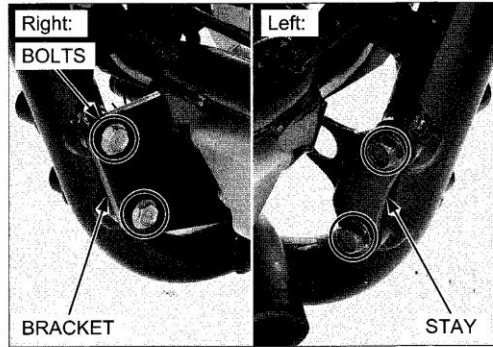


Release the starter motor cable and main wire sub harness from the clamps.

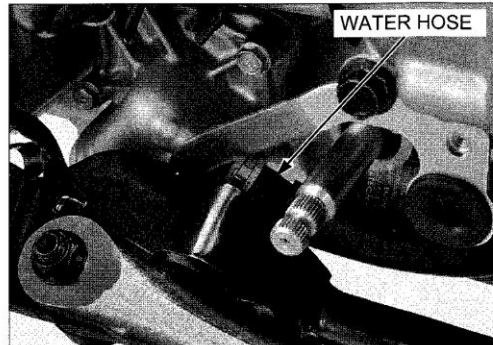


## ENGINE REMOVAL/INSTALLATION

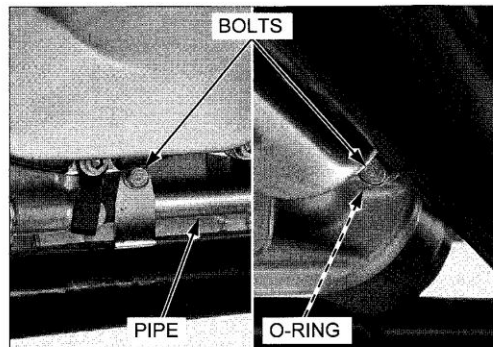
Remove the bolts, rear brake pedal bracket and radiator stay.



Disconnect the water hose from the water pump.

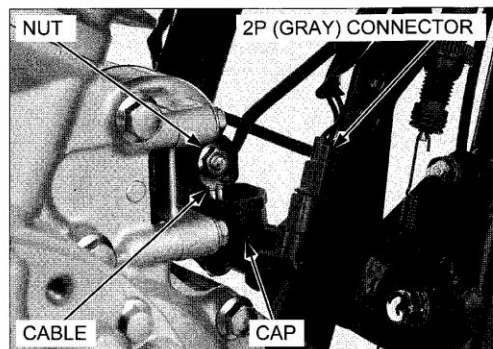


Remove the bolts and lower water pipe.  
Remove the O-ring from the lower water pipe.



Disconnect the rear brake light switch 2P (Gray) connector.

Remove the rubber cap and disconnect the starter motor cable by removing the terminal nut.

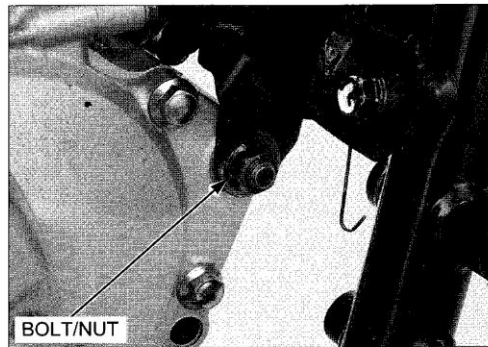


## ENGINE REMOVAL/INSTALLATION

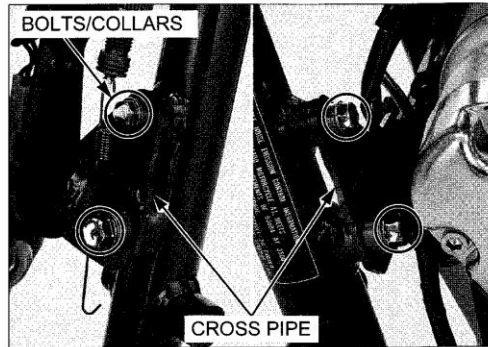
Remove the front upper engine mounting nut and bolt.  
Place the floor jack or other adjustable support under the engine.

**NOTE:**

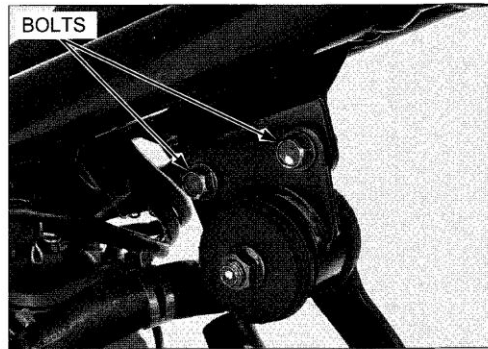
- The jack height must be continually adjusted to relieve stress for ease of mounting bolt removal.



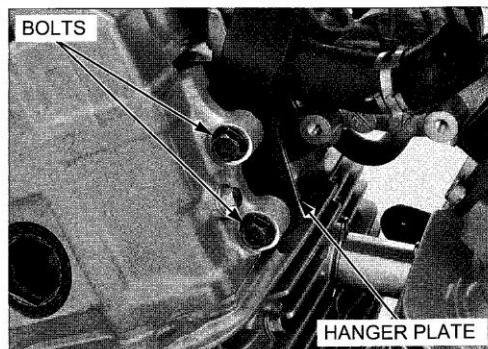
Remove the bolts, collars and front cross pipe.



Remove the engine center hanger plate mounting bolts.



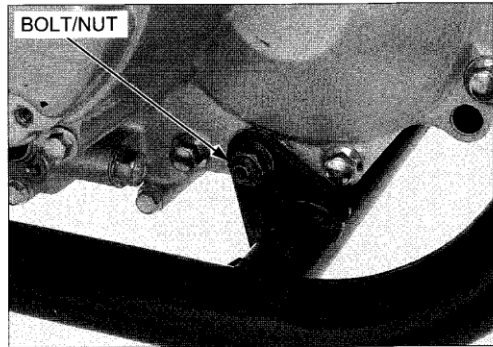
Remove the V-bank engine mounting bolts and engine hanger plate.



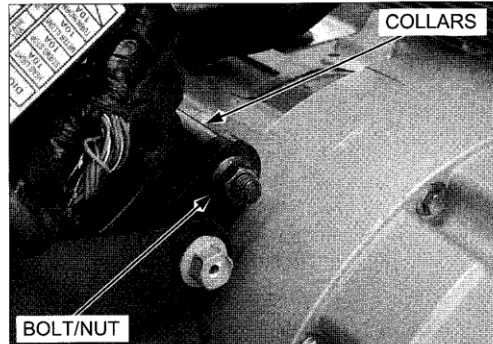


## ENGINE REMOVAL/INSTALLATION

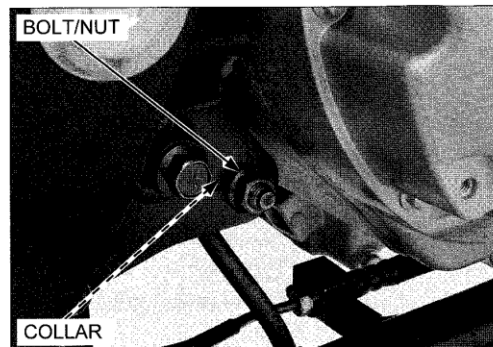
Remove the front lower engine mounting nut and bolt.



Remove the rear upper engine mounting nut, bolt and collars.



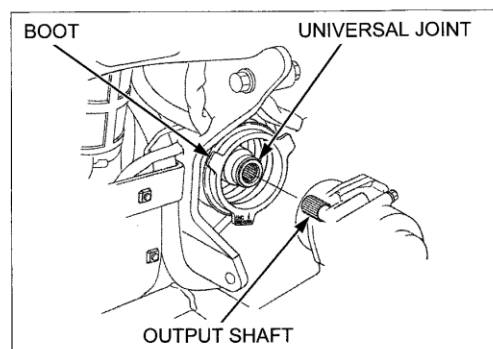
Remove the rear lower engine mounting nut, bolt and collar.



Release the joint boot from the output gear case.

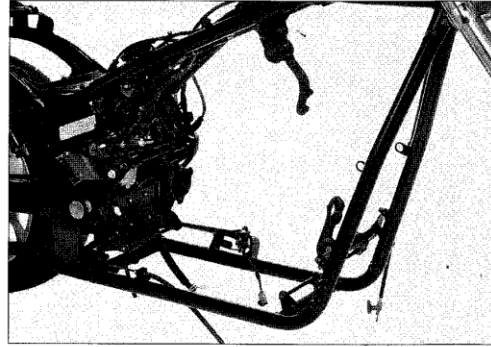
*During engine removal, hold the engine securely and be careful not to damage the frame and engine.*

Move the engine forward and release the output shaft from the universal joint in the swingarm. Carefully maneuver the engine and remove it out of the frame to the right.



## ENGINE REMOVAL/INSTALLATION

Note the direction of engine hanger bolts.



## ENGINE INSTALLATION

### NOTE:

- All the engine mounting bolts, nuts, hanger plate, collars and cross pipe loosely install then tighten the bolts and nuts to the specified torque in the specified sequence.
- Route the wires, hoses and cables properly (page 1-22).

Apply 1 g (0.04 oz) of molybdenum disulfide grease to the output shaft splines.

Make sure the "↓" mark facing down of the joint boot.

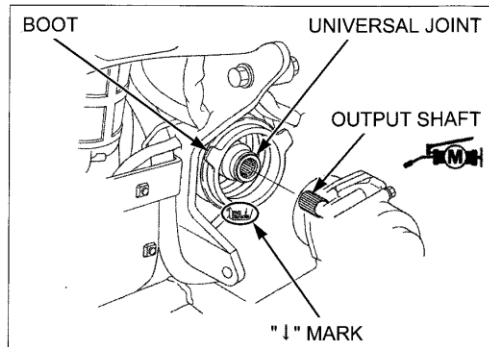
*During engine installation, hold the engine securely and be careful not to damage the frame and engine.*

Using a floor jack or other adjustable support, carefully place the engine into the frame and maneuver it into place.

Engage the output shaft with the universal joint.

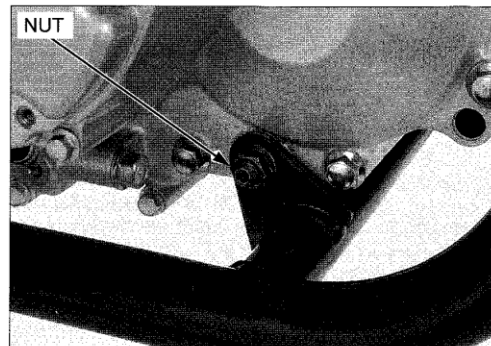
Install the joint boot to the output gear case.

Loosely install the all engine mounting bolts, nuts, hanger plate and collars.



Tighten the front lower engine mounting nut to the specified torque.

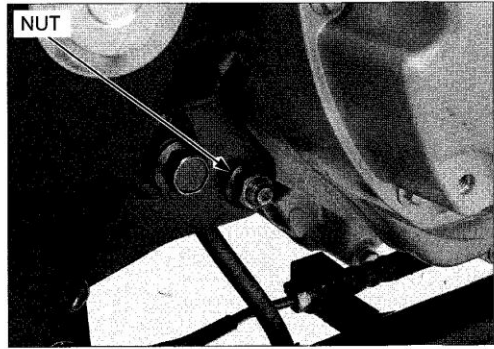
**TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)**



## ENGINE REMOVAL/INSTALLATION

Tighten the rear lower engine mounting nut to the specified torque.

**TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)**



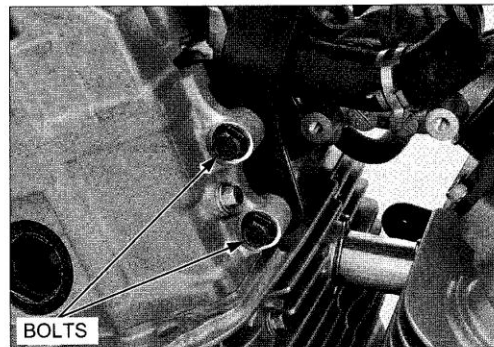
Tighten the rear upper engine mounting nut to the specified torque.

**TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)**

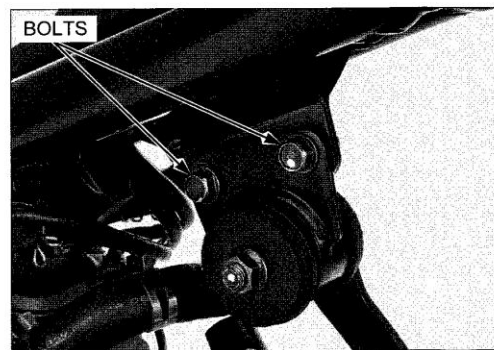


Tighten the V-bank engine mounting bolts to the specified torque.

**TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)**



Tighten the engine center hanger plate mounting bolts.

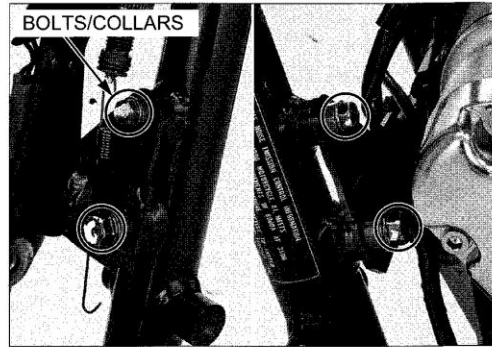


## ENGINE REMOVAL/INSTALLATION

Install the front cross pipe, collars and bolts.

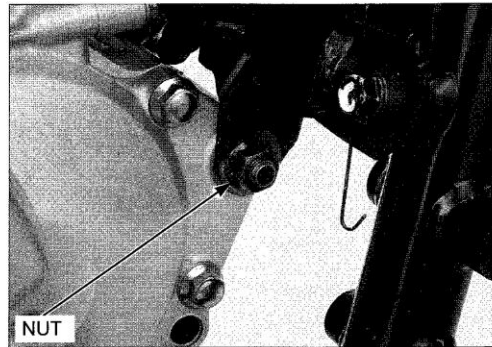
Tighten the upper mounting bolts first then tighten the lower mounting bolts to the specified torque.

**TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)**



Tighten the front upper engine mounting nut to the specified torque.

**TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)**

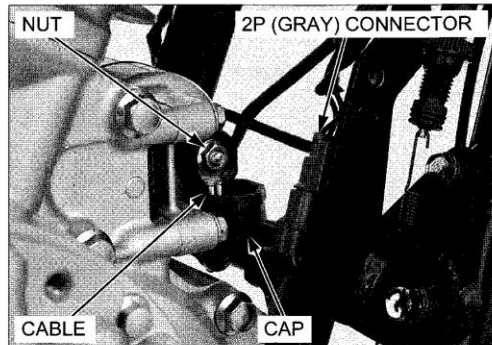


Connect the starter motor cable.

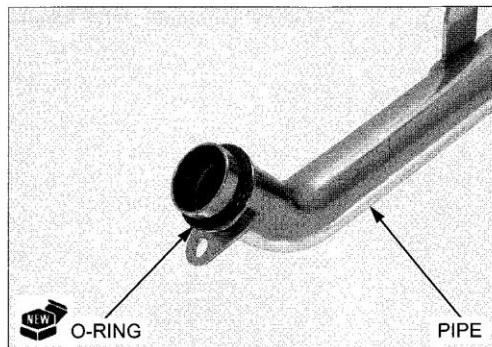
Install and tighten the starter motor cable terminal nut to the specified torque.

**TORQUE: 7 N·m (0.7 kgf·m, 5.2 lbf·ft)**

Reposition the rubber cap securely.  
Connect the rear brake light switch 2P (Gray) connector.

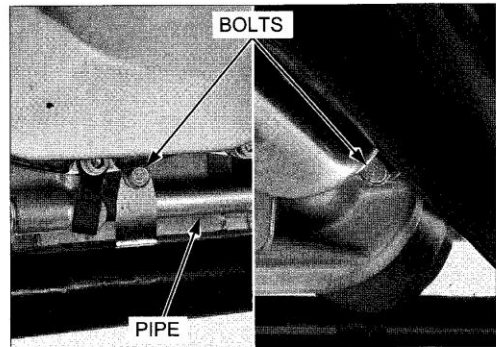


Install a new O-ring to the lower water pipe (water pump side).

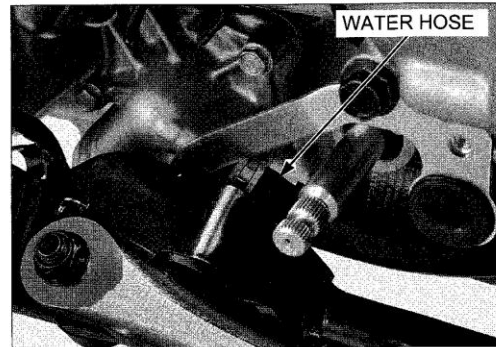


## ENGINE REMOVAL/INSTALLATION

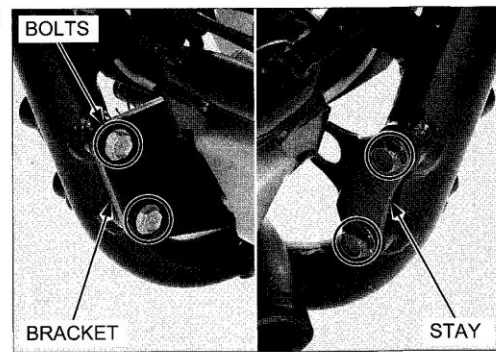
Install the water pipe and bolts.  
Tighten the bolts.



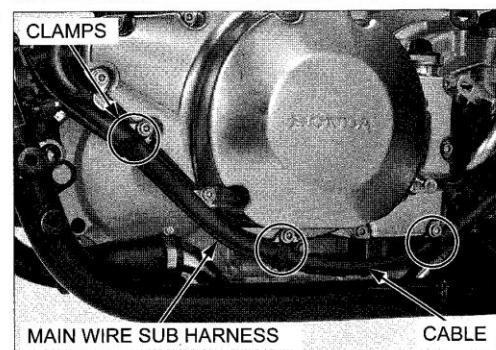
Connect the water hose to the water pump.  
Refer to water hose clamp direction (page 1-22).



Install the rear brake pedal bracket, radiator stay and bolts.  
Tighten the bolts.



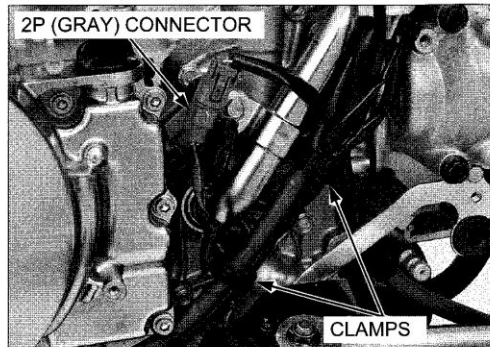
Secure the starter motor cable and main wire sub harness to the clamps.



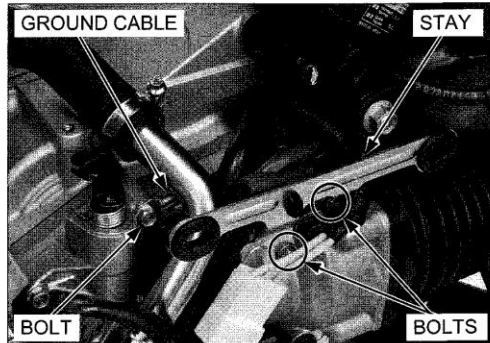
## ENGINE REMOVAL/INSTALLATION

Install the sidestand switch 2P (Gray) connector to the water pipe stay.

Clamp the harness, wire and cable with the clamps.

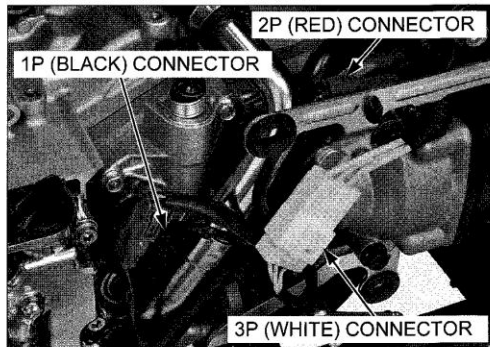


Connect the ground cable and tighten the bolt securely.  
Install the stay and tighten the bolts.



Connect the following:

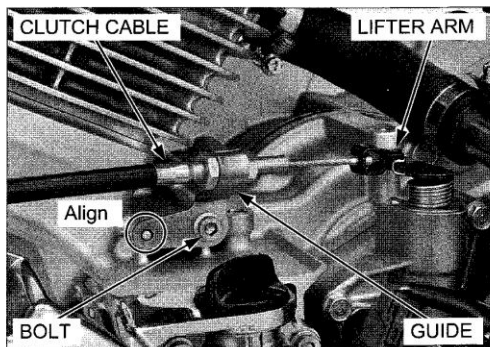
- CKP sensor 2P (Red) connector
- Alternator 3P (White) connector
- Neutral switch 1P (Black) connector



Connect the clutch cable to the clutch lifter arm.

Install the cable guide while aligning its hole with the left crankcase tab.

Install and tighten the socket bolt.



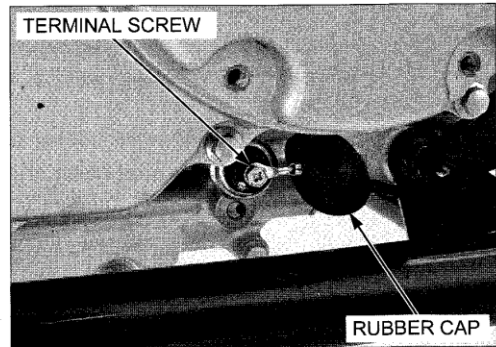
## ENGINE REMOVAL/INSTALLATION

Connect the EOP switch wire by installing the terminal screw.

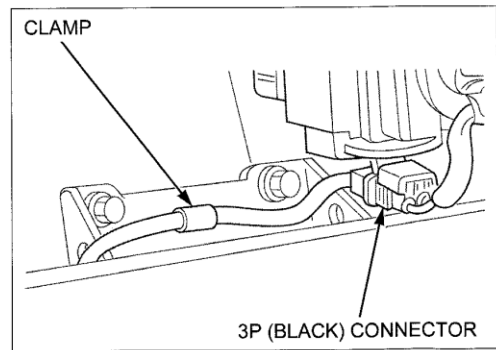
Tighten the terminal screw to the specified torque.

**TORQUE: 2.2 N·m (0.2 kgf·m, 1.6 lbf·ft)**

Reposition the rubber cap securely.

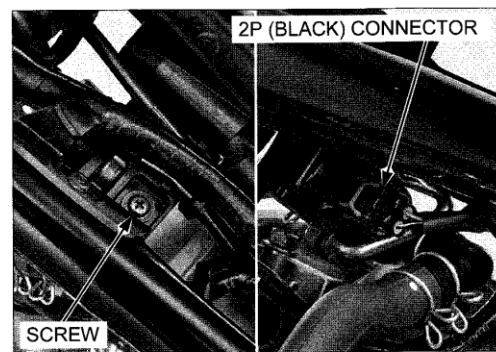


Connect the VS sensor 3P (Black) connector.  
Install the VS sensor wire clamp to the frame.

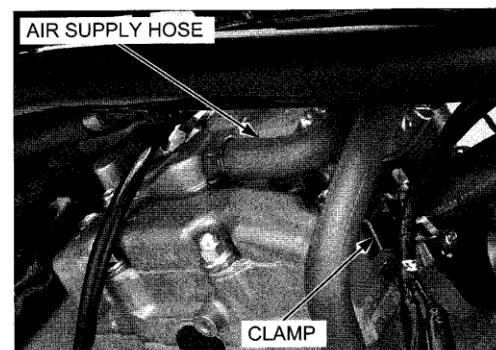


Install the PAIR control solenoid valve and screw.  
Tighten the screw.

Connect the PAIR control solenoid valve 2P (Black) connector.



Install the wire clamp to the water pipe stay.  
Connect the secondary air supply hose.



## ENGINE REMOVAL/INSTALLATION

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- Install the front spark plug wires to the clamp.
- Connect the secondary air supply hose.
- Install the remaining parts in the reverse order of removal.
- Check the clutch lever freeplay (page 4-24).
- Fill the recommended engine oil (page 4-13).
- Fill and bleed the cooling system (page 7-6).

