FH451V,FH500V,FH531V
FH601V,FH641V,FH680V
FH721V

4–stroke air cooled v-twin gasoline engine

Service Manual

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Periodic Maintenance Chart

To ensure satisfactory operation over an extended period of time, any engine requires normal maintenance regular intervals. The Periodic Maintenance Chart below shows periodic inspection and maintenance items and suitable intervals. The bullet mark (•) designates that the corresponding item should be performed at that interval.

Some adjustments require the use of special tools or other equipment. An electronic tachometer will facilitate setting idle and running speeds.

FH451V, FH500V, FH531V

OPERATION	INTERVAL						
	Daily	First 8 hr.	Every 25 hr.	Every 50 hr.	Every 100 hr.	Every 200 hr.	Every 300 hr.
Check or clean air intake screen	●						
Check and add engine oil	●						
Check for fuel and oil leakage	●						
Check for loose or lost nut and screw	●						
Check battery electrolyte level	●						
Clean air cleaner foam element (1)			●				
Clean air cleaner paper element (1)				●			
Clean dust and dirt from cylinder and cylinder head fins (1)					●		
Tighten nut and screws					●		
Change engine oil		●			●		
Clean and re-gap spark plugs					●		
Change Oil filter						●	
Change air cleaner paper element (1)						●	
★Check and adjust vlave clearance							●
★Clean and lap valve seating surface							●
★Clean combustion chamber							●

(1): Service more frequently under dusty conditions.

★: These items must be performed with the proper tools. See your authorized Kawasaki Engine Dealer for service, unless you have the proper equipment and mechanical proficiency.

Exploded View

[FH451V, FH500V, FH531V]

1. Pilot Screw
2. Pilot Air Jet
3. Main Air Jet
4. Main Jet
5. Pilot Jet
6. Solenoid Valve

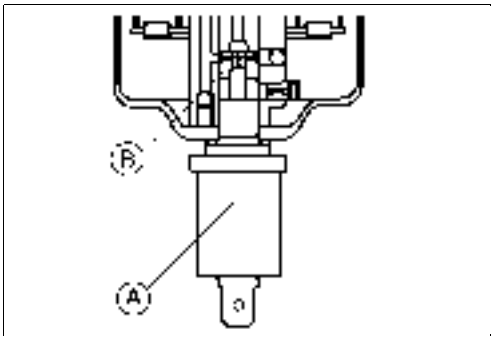
T1: 0.7 N·m (0.07 kg·m, 6 in·lb)
T2: 1.0 N·m (0.10 kg·m, 9 in·lb)
T3: 1.3 N·m (0.13 kg·m, 11 in·lb)
T4: 1.7 N·m (0.17 kg·m, 15 in·lb)
T5: 2.0 N·m (0.20 kg·m, 17 in·lb)
T6: 3.4 N·m (0.35 kg·m, 30 in·lb)
T7: 3.9 N·m (0.40 kg·m, 35 in·lb)
T8: 6.9 N·m (0.70 kg·m, 61 in·lb
T9: 7.8 N·m (0.80 kg·m, 69 in·lb)
T10: 8.8 N·m (0.90 kg·m, 78 in·lb)

Carburetor

Fuel Shut Off Solenoid Valve (Electric Starter Model)

To avoid after firing when stopping the engine, a solenoid actuated fuel shut off solenoid valve [A] is installed in the carburetor bowl. The valve shuts off the fuel supply to the valve seat [B] simultaneously when the switch key turned to the “OFF” position.

The valve opens automatically when the switch key is turned to the “Run” position.



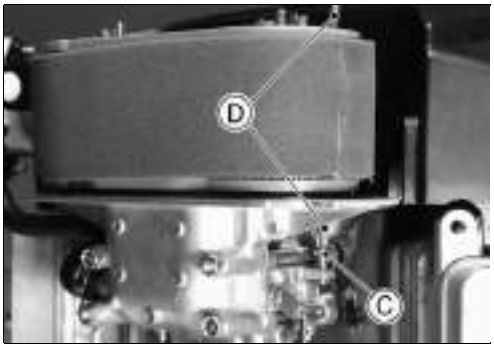
Low Idle Speed Adjustment

- Disconnect all possible external loads from the engine.
- Start the engine and warm it up thoroughly.

⚠ WARNING

Always keep your hands clear of the moving parts.

- Movethe throttle lever on dash to the idle position, and hold the throttle lever on the carburetor in closed position (turn the governor arm clockwise all the way) and adjust the low idle speed screw [A] until the engine idles at specified speed. - FH451V, 500V, 531V.

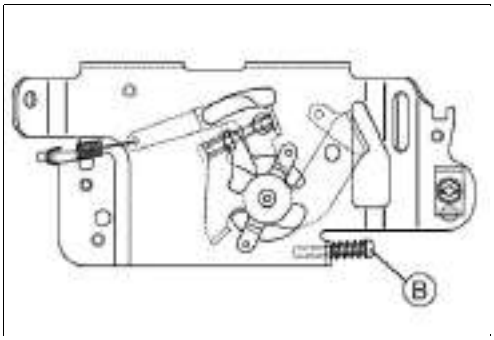


- Adjust the low idle speed screw [C] with Phillips Screwedriver [D] until the engine idles at specified speed.– FH601V, 641V, 680V, 721V.

Idle Speed (Carburetor idle rpm)
1450 rpm

- Release the throttle lever and adjust the low idle speed set screw [B] on the control plate to obtain the specified governed low idle speed.

Low Idle Speed (Governed idle rpm)
1550 rpm



High Idle Speed Adjustment

NOTE

○ *High idle speed adjustment should be made after the idle speed adjustment is performed.*

CAUTION

Do not adjust high idle speed with the air cleaner removed.

- Start and warm up the engine thoroughly.

Intake Manifold

Intake Manifold Inspection

- Inspect the intake manifold for cracks or porous casting.
- Cracksnot visible to the eye may be detected by coating the suspected area with mixture of 25% kerosene and 75% light engine oil.
- Wipethe area dry and immediately apply a coating of zinc oxide dissolved in wood alcohol. If a cracks is present, the coating will become discolored at the defective area.

  If a crack is present in the intake manifold, replace it.

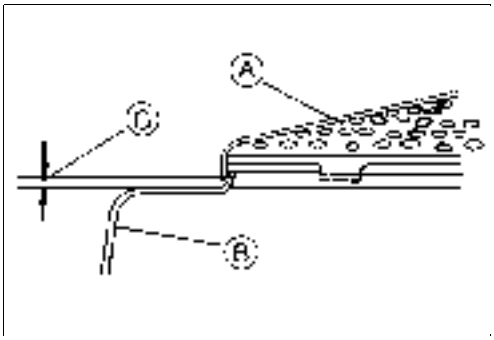
- Inspect the gasket surfaces for burns and nicks.

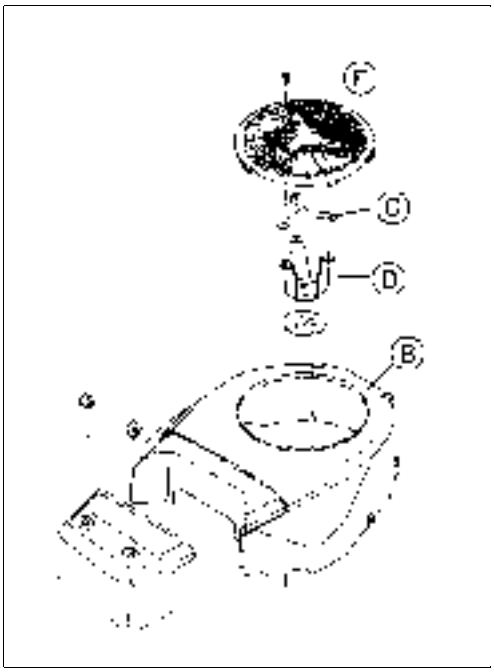
Cooling Fan

Screen Clearance Adjustment

- Checkclearance between screen [A] and fan housing [B]. If clearance is less than 1 mm, add proper number of spacer [C] between screen and bracket comp [D] to adjust clearance [G] 1 ∼ 3 mm.

  F: Screws
  G: Clearance 1 ∼ 3 mm





Cylinder Head

Compression Measurement

- Before measuring compression, do the following.
- Be sure the battery is fully charged.
- Thoroughlywarm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running.
- Stop the engine.
- Disconnect the spark plug caps of each cylinder and remove the spark plugs.
- Attach the compression gauge assembly firmly into one plug hole.

Special Tool - Compression Gauge: 57001–221 [A]
Compression Gauge Adapter: 57001–1159 [B]

- Ground the spark plugs to the engine.

⚠WARNING

To avoid fire, do not ground the spark plugs in proximity to the plug holes. Keep the plugs as far away as possible from the plug holes.

- Withthe throttle fully open, turn engine over sharply with the recoil starter several times until the compression gauge stops rising; the compression is the highest reading obtainable. (Recoil Model)

Cylinder Compression (MIN) 390 kPa (57 psi)

- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; (Electric Starter Model).

Cylinder Compression (MIN) 390 kPa (57 psi)

- Repeat the measurement to the other cylinder.

★If the compression is higher than the specified value, the piston rings, cylinder and valves are probably in good condition.

★If the compression is too high, check the following.

1. Carbon build-up on the piston crown and cylinder head - clean off any carbon on the piston crown and cylinder head.
2. Cylinder head gasket - use only the proper gasket. The use of a gasket of incorrect thickness will change the compression.
3. Valve guides and piston rings - rapid carbon accumulation in the combustion chamber may be caused by worn valve guides and/ or worn piston oil rings. This may be indicated by white exhaust smoke.

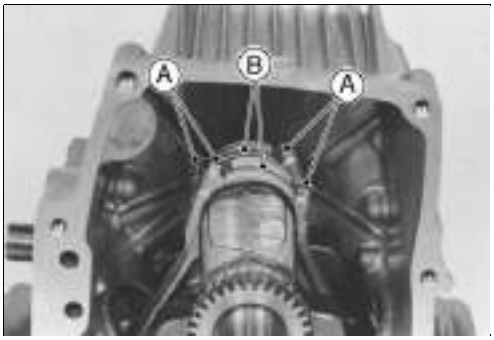
★If cylinder compression is lower than the (MIN), check the following:

1. Gas leakage around the cylinder head - replace the damaged gasket and check and check the cylinder head warp.
2. Condition of the valve seating.
3. Valve clearance.
4. Piston/cylinder wear, piston seizure.
5. Piston ring, piston ring groove.

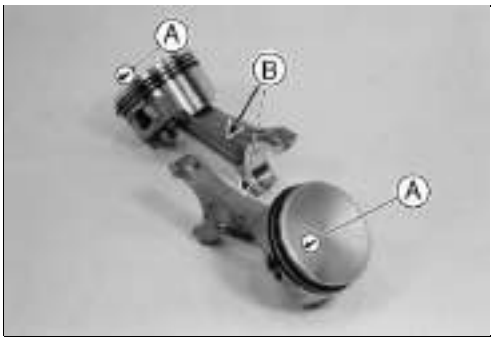
Cylinder, Piston

Piston Removal

- Split the crankcase (see Camshaft/Crankshaft chapter).
- Remove the camshaft (see Camshaft/Crankshaft chapter).
- Turn the crankshaft to expose the connecting rod cap bolts [A].
- Remove the bolts and take off the connecting rod caps [B]. **NOTE**
  - *Note the position of the connecting rod caps for reinstalling the caps.*



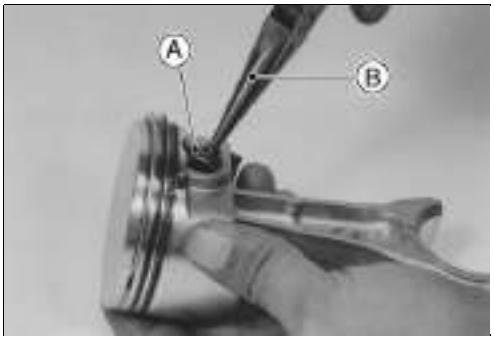
- Push the connecting rod end into the cylinder, and pull the piston and connecting rod out of the cylinder.



CAUTION

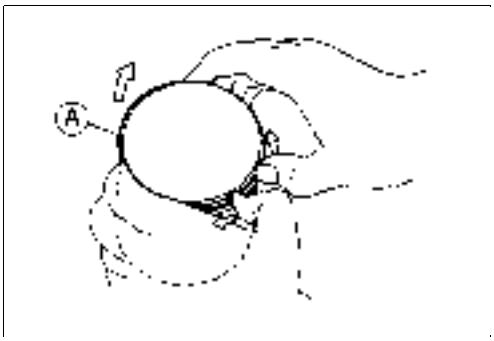
Note a location of the arrow match mark [A] on the piston head in relation to K Mark [B] on the connecting rod.
No.1 cyl. K Mark on the connecting rod is face to face with No.2 cyl. K Mark on the connecting rod.
Keep parts together as a set.

- Remove one of the piston pin snap rings [A] with needle nose pliers [B].



- Remove the piston by pushing the piston pin [A] out the side from which the snap ring was removed.

- Remove the top and second rings with piston ring pliers. **Special Tool - Piston Ring Pliers: 57001–115**
- If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Lubrication System

Table of Contents

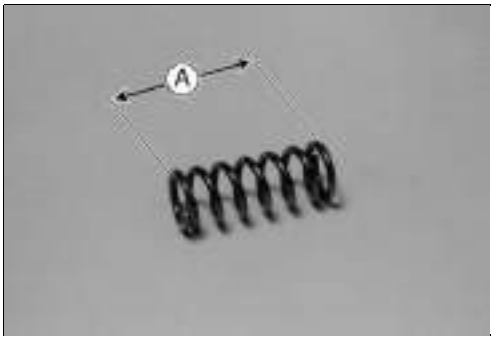
Oil Pump, Relief Valve

★If cleaning does not solve the problem, replace the relief valve parts. If
★necessary, put the ball in position and lightly tap the ball with a suitable tools to form a perfect seat.

● Measure free length [A] of the spring with a vernier caliper.

★If the free length of the spring is less than the service limit, replace the spring.

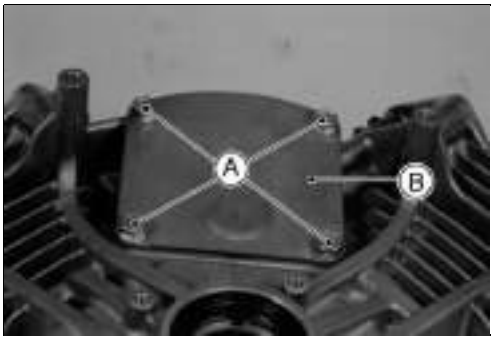
Relief Valve Spring Free Length
Service Limit: 19.50 mm (0.77 in.)



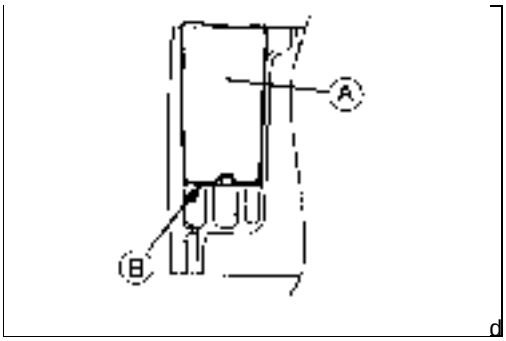
Breather

Breather Element Removal - FH451V, 500V, 531V

- Remove the bolts [A] and breather chamber cover [B].



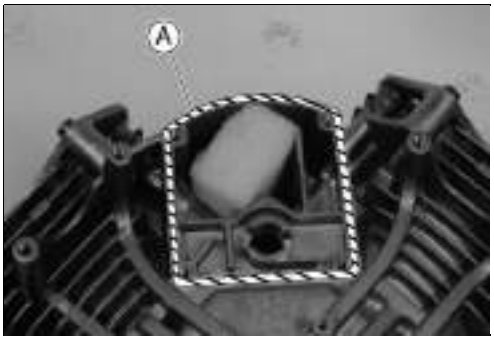
- Remove the element [A].
- Check to see that the plate [B] is in place under the element [A].



Breather Element Installation - FH451V, 500V, 531V

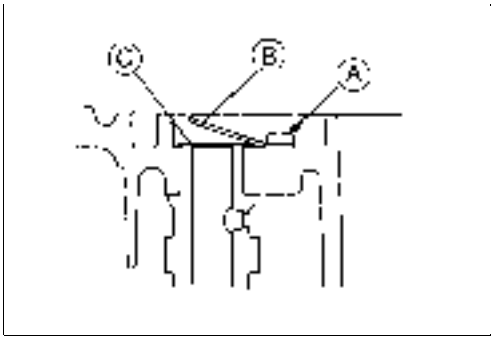
- Apply sealant [A] to the mating surface of the crankcase. **Sealant - Kawasaki Bond (Silicone Sealant) : 56019-120**
- Install a new gasket and the breather chamber cover, and tighten the bolts.

Torque - Breather Chamber Cover Bolts: 5.9 N·m (0.6 kg·m, 52 in·lb)



Breather Valve Inspection - FH601V, 641V, 680V, 721V

- Unscrew the mounting screw (A), and remove the plate (B) and the breather valve (C).
- Inspect the breather valve (C) for breakage, hair crack or distortion, replace it if necessary.
- Inspect the plate (B) for damage or rough contact surface, replace it if necessary.
- Inspect the valve seating surface. The surface should be free of nicks or burrs.
- Be sure the drain hole on the breather chamber does not accumulate with slugs before installing the breather valve.
- Align center of the valve seat with center of the breather valve and the plate, then tighten the mounting screw.



NOTE

○ *Themounting screw is a self-tapping one. Be aware that misthreading or overtightening screw will strip the female threads and ruin the hole.*

Exploded View

[FH451V, FH500V, FH531V]

T1: 3.9 N·m (0.40 kg·m, 35 in·lb)
T2: 5.9 N·m (0.60 kg·m, 52 in·lb)
T3: 7.8 N·m (0.80 kg·m, 69 in·lb)
T5: 56 N·m (5.7 kg·m, 41 ft·lb)
T6: 22 N·m (2.2 kg·m, 16 ft·lb)

[FH601V, FH641V, FH680V, FH721V]

T1: 3.9 N·m (0.40 kg·m, 35 in·lb)
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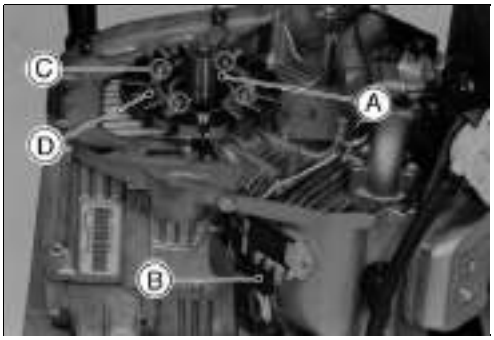
T6: 22 N·m (2.2 kg·m, 16 ft·lb)

G: Apply grease.

Charging, Ignition System

- Remove: Woodruff Key [A]
  Stator Coil Lead Connector [B]
  Stator Coil Screw [C]
  Stator Coil [D]

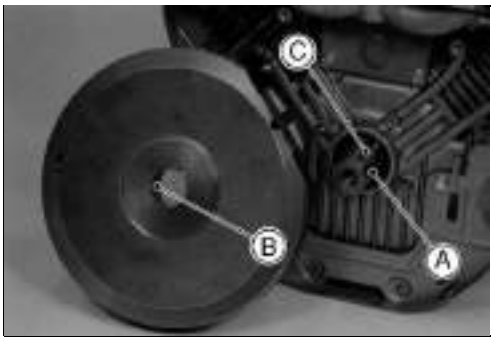


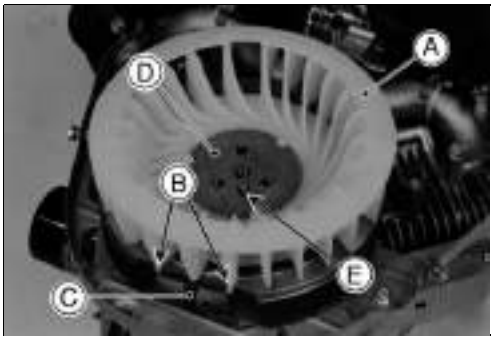
Flywheel, Stator Coil Installation

- Install the stator coil and tighten the screws.

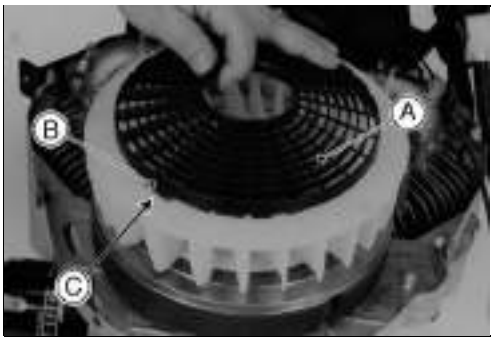
Torque - Stator Coil Screws: 3.4 N·m (0.35 kg·m, 30 in·lb)

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  [A] Crankshaft Tapered Portion
  [B] Flywheel Tapered Portion
- Fit the Woodruff key [C] securely in the slot in the crankshaft before installing the flywheel.
- Install the fan [A] so that two positioning bosses [B] fit around flywheel ignition magnet [C].
- Install the plate [D] so that the notch [E] inserts into the slot in the flywheel.



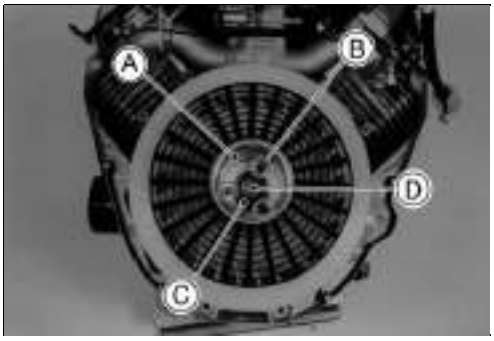


- Install the screen [A] so that the projections [B] fit into the recess [C] of the fan.



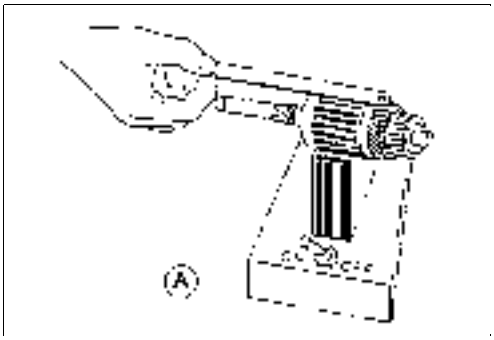
- Install the pulley [A] or bracket so that the tabs of the plate fit into holes [B] in the pulley.
- Put the washer [C] as shown.
- Tighten the flywheel bolt [D].

Torque - Flywheel Bolt: 56 N·m (5.7 kg·m, 41 ft·lb)



Starter System

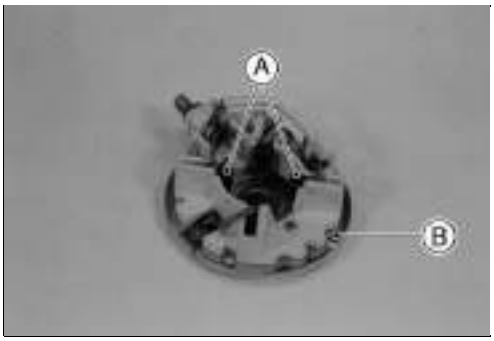
● Test the armature winding for shorts.
○ Place the armature on a growler [A].
○ Hold a thin metal strip (e.g., hack saw blade) on top of the armature.
○ Turn on the growler and rotate the armature one complete turn.
★ If the metal strip vibrates, the windings are internally shorted to each other and the starter motor must be replaced.



Yoke Assembly Inspection

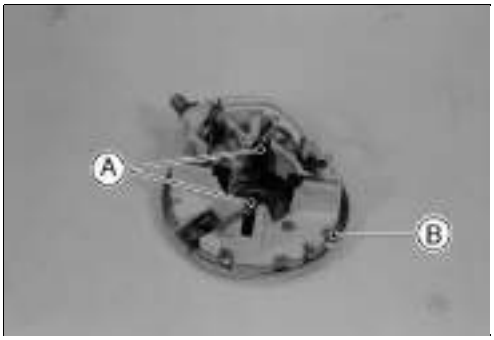
● Set the hand tester to the R × 1 kΩ range and measure the resistance between the positive brush (es) [A] and brush plate [B].
★ If the resistance is less than infinite, the positive brush is shorted to ground. Replace the brush plate assembly.

Positive Brush to Ground Resistance
0



● Set the hand tester to the R × 1 Ω range and measure the resistance between the negative brush (es) [A] and brush plate [B].
★ If the meter does not read close to 0 Ω, the brush plate is faulty. Replace the brush plate assembly.

Negative Brush to Ground Resistance
Close to 0 Ω



Pinion Clutch Inspection

● Turn the pinion gear by hand. The pinion gear should turn clockwise freely.
★ If the pinion clutch does not operate as it should, or if it makes noise, replace the pinion clutch.