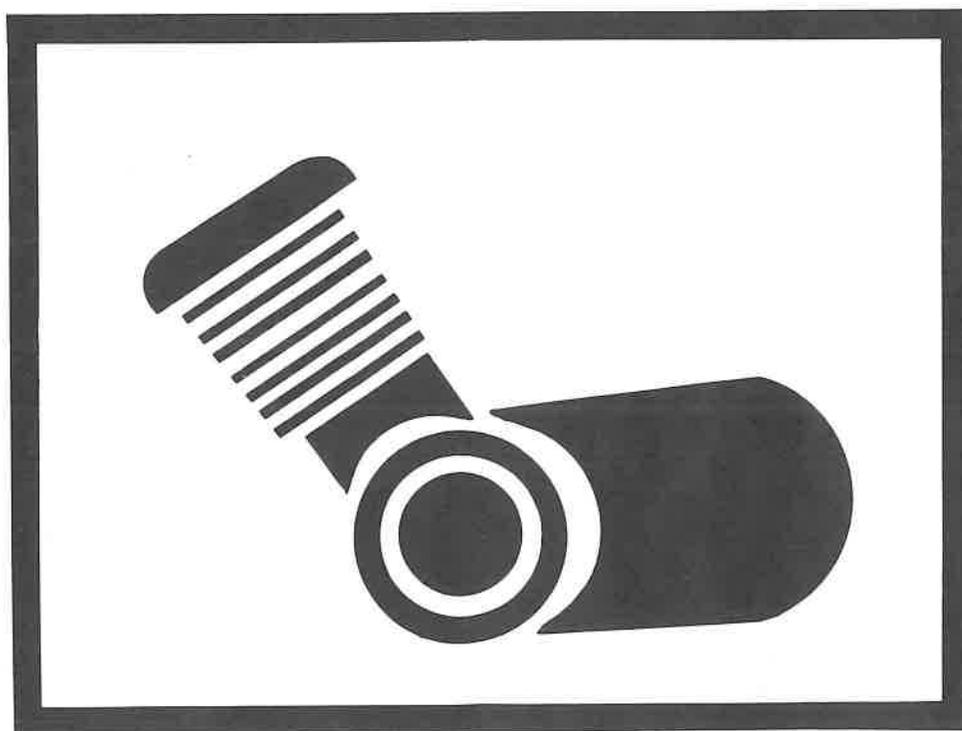




# CHAPTER 4 ENGINE

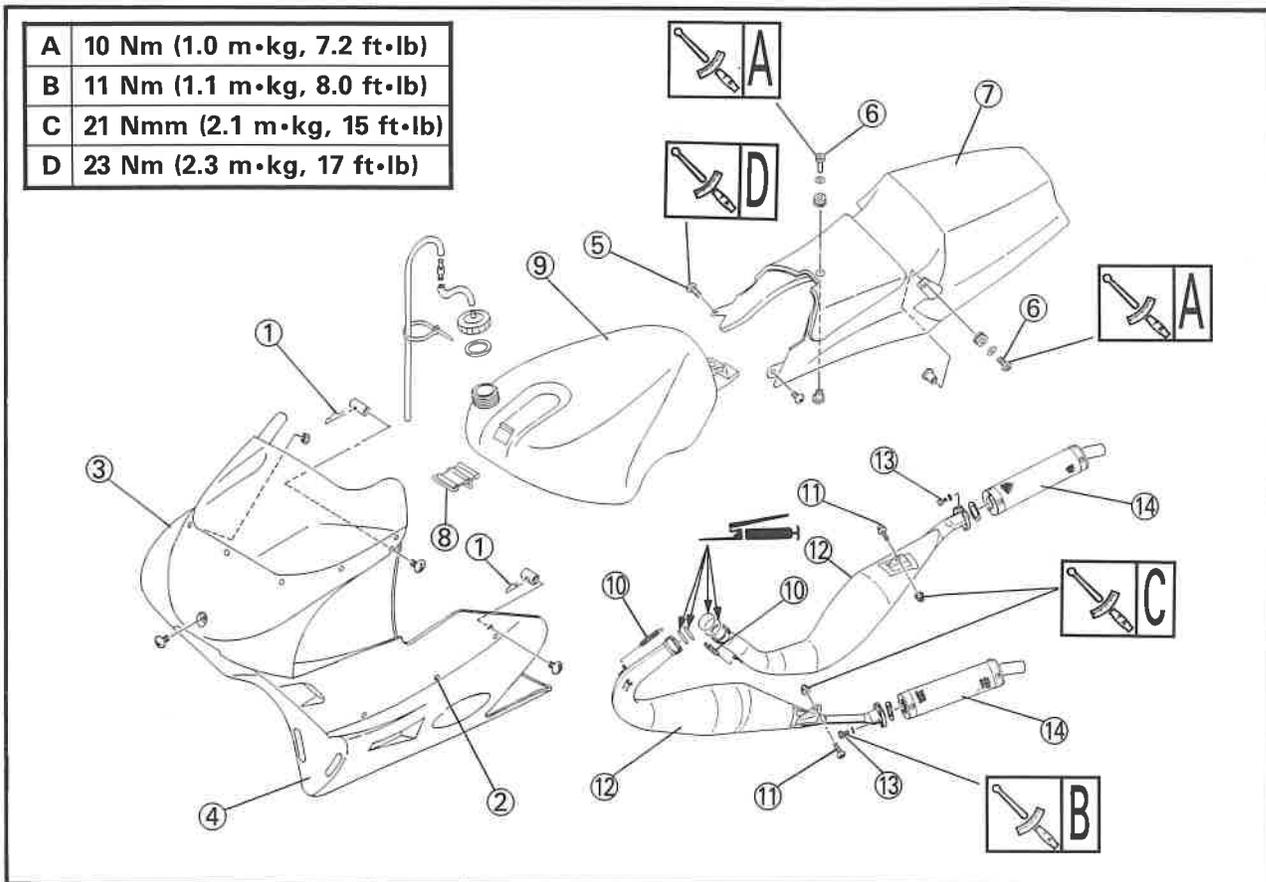




## COWLING, SEAT, FUEL TANK, EXHAUST PIPE AND SILENCER PREPARATION FOR REMOVAL



- \* Turn the fuel cock to "OFF"
- \* Disconnect the fuel hose.
- \* Disconnect the fuel tank breather hose.



# 4

Extent of removal:    ① Cowling removal    ② Seat removal    ③ Fuel tank removal  
                                  ④ Exhaust pipe and silencer removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Clip	4	
	2	Quick fastener	6	
	3	Upper cowl	1	
	4	Lower cowl	1	
	5	Screw (seat)	2	
	6	Bolt (seat)	3	
	7	Seat	1	
	8	Fitting band	1	Remove on fuel tank side
	9	Fuel tank	1	
	10	Tension spring	2ea.	
	11	Bolt (exhaust pipe)	1ea.	
	12	Exhaust pipe	1ea.	
	13	Bolt (silencer)	2ea.	
	14	Silencer	1ea.	



RADIATOR HOSES

PREPARATION FOR REMOVAL

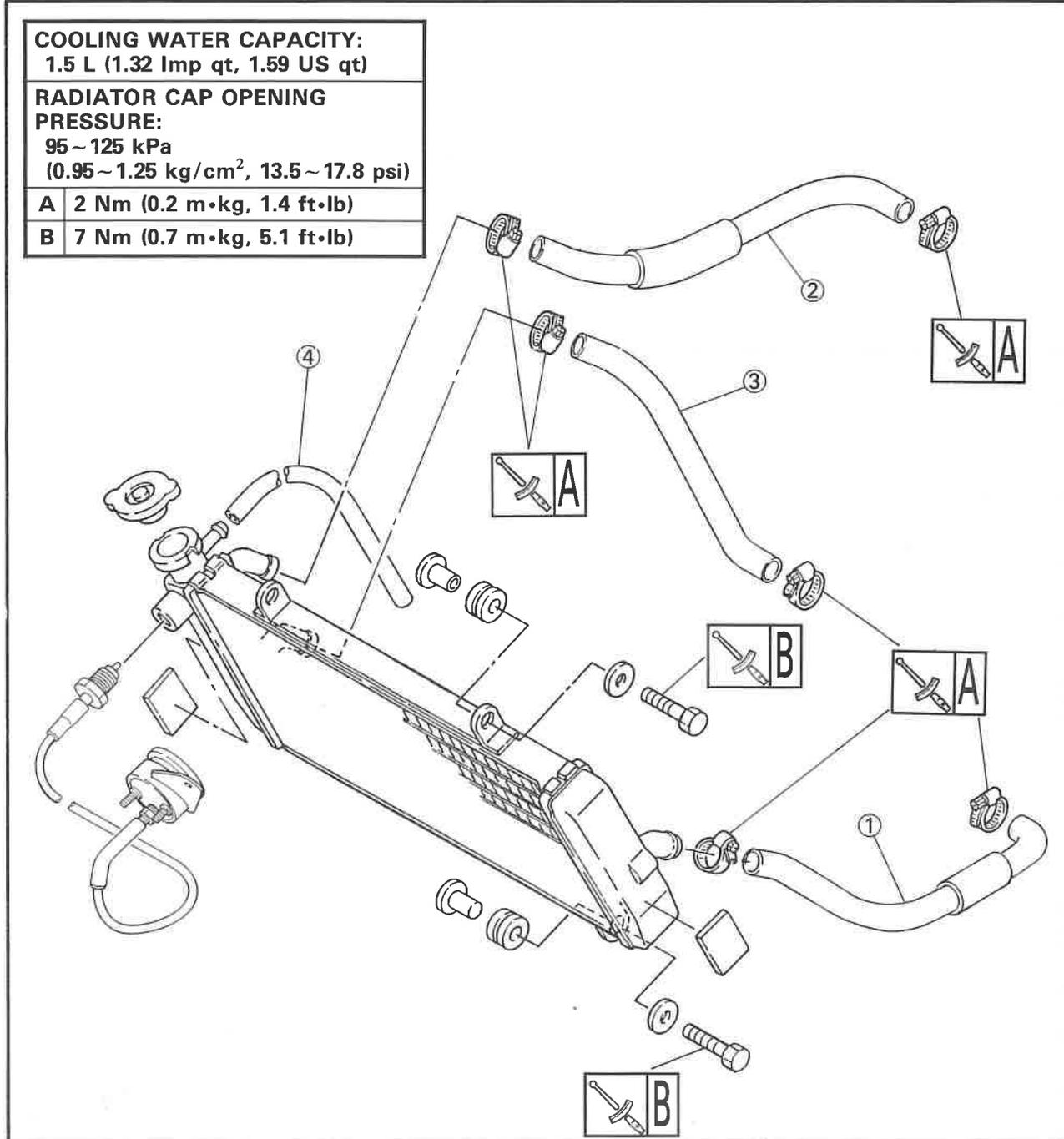


\* Remove the following parts:

- Cowling
- Fuel tank

\* Drain the cooling water.

<b>COOLING WATER CAPACITY:</b>	
1.5 L (1.32 Imp qt, 1.59 US qt)	
<b>RADIATOR CAP OPENING PRESSURE:</b>	
95 ~ 125 kPa (0.95 ~ 1.25 kg/cm <sup>2</sup> , 13.5 ~ 17.8 psi)	
<b>A</b>	2 Nm (0.2 m·kg, 1.4 ft·lb)
<b>B</b>	7 Nm (0.7 m·kg, 5.1 ft·lb)



Extent of removal: ① Radiator hose removal

Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Radiator hose 2	1	
	2	Radiator hose 3	1	
	3	Radiator hose 4	1	
	4	Radiator breather hose	1	



### CARBURETOR AND REED VALVE PREPARATION FOR REMOVAL



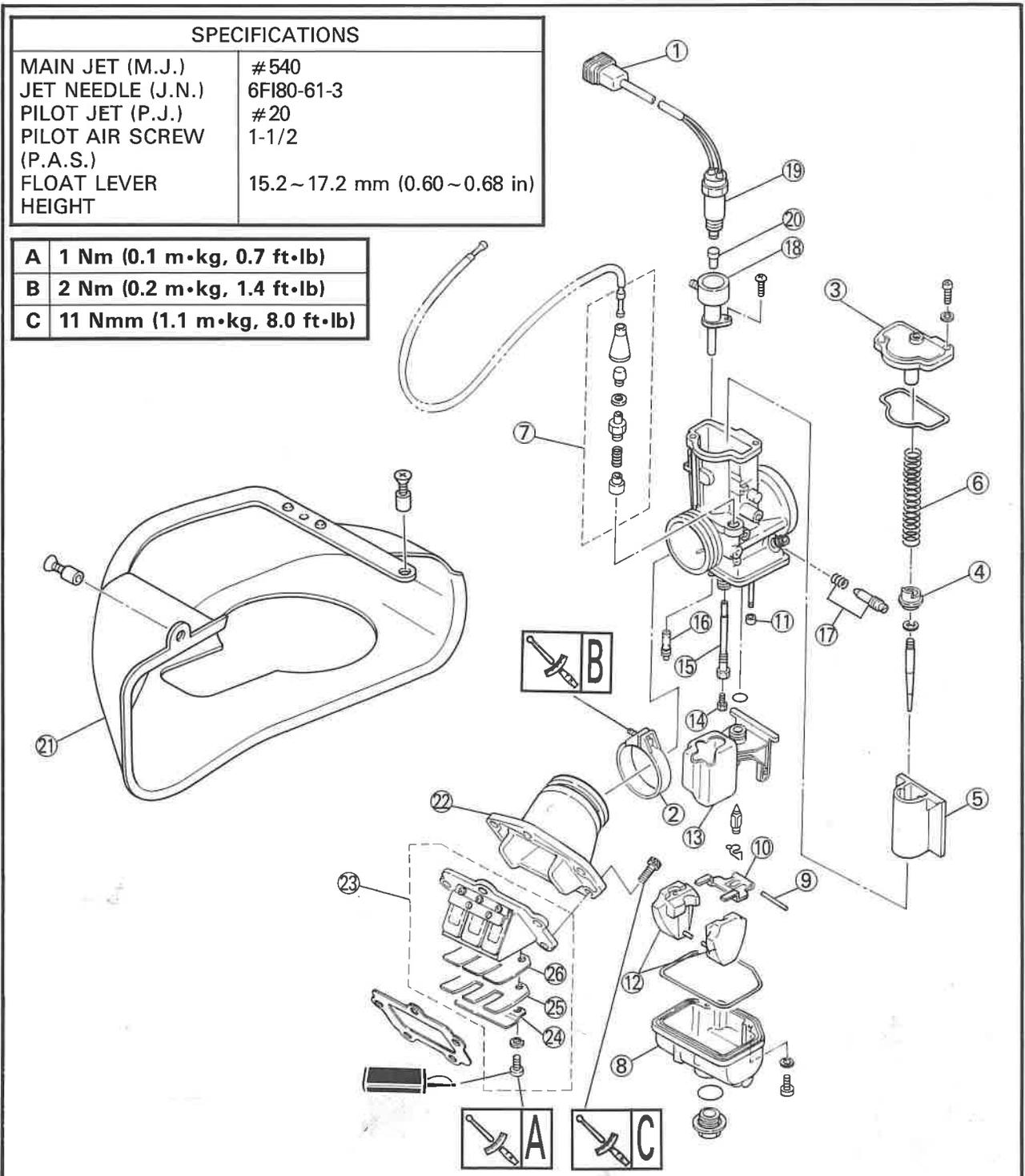
- \*Turn the fuel cock to "OFF".
- \*Disconnect the fuel hose.

- \*Remove the following parts.
  - Cowling
  - Fuel tank

#### SPECIFICATIONS

MAIN JET (M.J.)	# 540
JET NEEDLE (J.N.)	6F180-61-3
PILOT JET (P.J.)	# 20
PILOT AIR SCREW (P.A.S.)	1-1/2
FLOAT LEVER HEIGHT	15.2~17.2 mm (0.60~0.68 in)

<b>A</b>	<b>1 Nm (0.1 m•kg, 0.7 ft•lb)</b>
<b>B</b>	<b>2 Nm (0.2 m•kg, 1.4 ft•lb)</b>
<b>C</b>	<b>11 Nmm (1.1 m•kg, 8.0 ft•lb)</b>



# 4



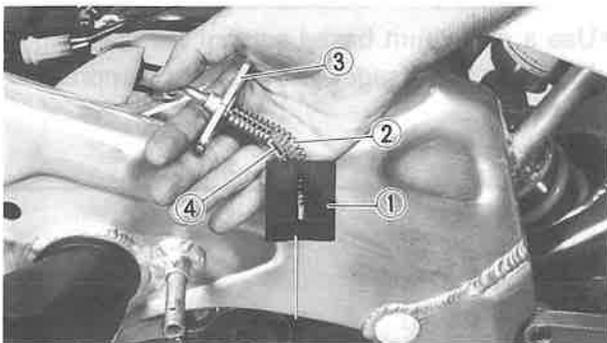
## NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the machine and take care so that foreign material does not enter the engine.
- Remove any gasket adhered to the contacting surfaces.
- Before inspection, the removed parts should be cleaned and blow out all passages and jets with compressed air.
- After removing the carburetor, cover the carburetor joint not to foreign material.

Extent of removal:    ① Carburetor removal    ② Carburetor disassembly  
    ③ Reed valve removal and disassembly

Extent of removal	Order	Part name	Q'ty	Remarks	
	1	Solenoid valve lead	1ea.	Disconnect the solenoid valve lead.	
	2	Clamp (carburetor joint)	1ea.	Loosen the screw (carburetor joint).	
	3	Mixing chamber top	1ea.	Refer to "REMOVAL POINTS"	
	4	Ring	1ea.		
	5	Throttle valve	1ea.		
	6	Spring (throttle valve)	1ea.		
	7	Starter plunger	1ea.		
		8	Float chamber	1ea.	Refer to "REMOVAL POINTS"
		9	Pin (float)	1ea.	
		10	Float arm	1ea.	
11		Cap	2ea.		
12		Float	2ea.		
	13	Needle jet cover	1ea.	Refer to "REMOVAL POINTS"	
	14	Main jet	1ea.		
	15	Main nozzle	1ea.		
	16	Pilot jet	1ea.		
	17	Air screw	1ea.		
	18	Holder	1ea.	Refer to "REMOVAL POINTS"	
	19	Solenoid valve	1ea.		
	20	Power jet	1ea.		
	21	Carburetor cover	1ea.		
	22	Carburetor joint	1ea.		
	23	Reed valve assembly	1ea.		
	24	Stopper (reed valve)	2ea.		
	25	Reed valve 2	2ea.		
	26	Reed valve 1	2ea.		

4



### REMOVAL POINTS THROTTLE VALVE

1. Remove:
- Throttle valve ①
  - Spring (throttle valve) ②
  - Mixing chamber top ③
  - Throttle cable ④

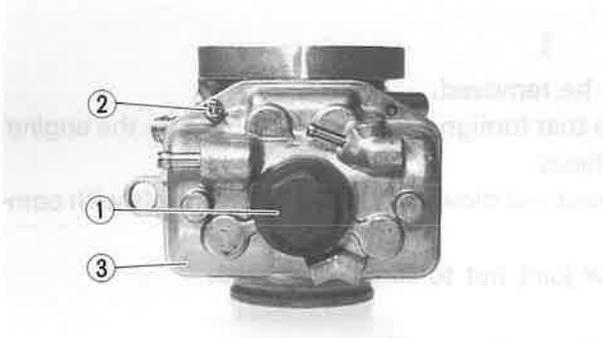
**NOTE:** \_\_\_\_\_  
 While compression the spring (throttle valve), disconnect the throttle cable.  
 \_\_\_\_\_



## FLOAT CHAMBER

1. Remove:

- Drain plug ①
- Screw ②
- Float chamber ③



## REED VALVE ASSEMBLY (RIGHT SIDE ONLY)

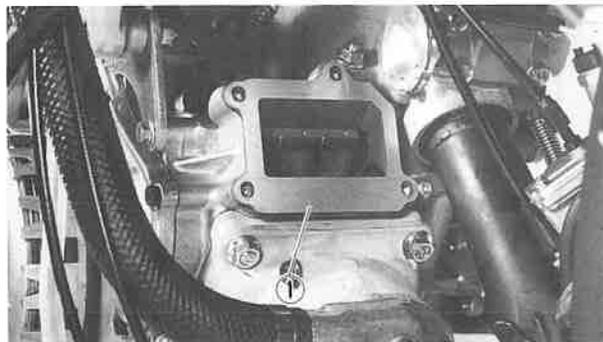
1. Remove:

- Carburetor (right side)
- Carburetor cover (right side)
- Tension spring (left exhaust pipe) ①
- Carburetor joint (right side) ②



2. Remove:

- Reed valve assembly (right side) ①



## INSPECTION CARBURETOR

1. Inspect:

- Carburetor body
- Contamination → Clean.

**NOTE:** \_\_\_\_\_

- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.

- Never use a wire.

2. Inspect:

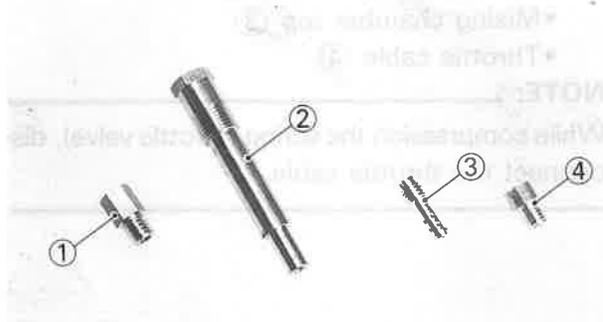
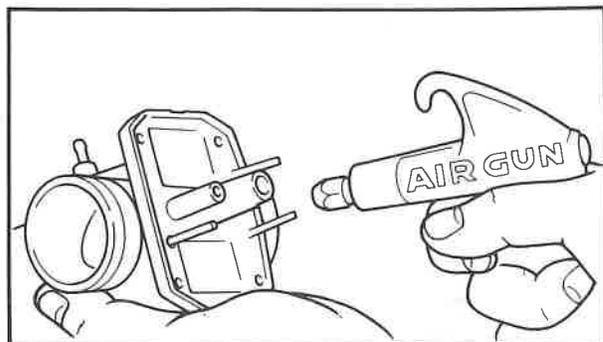
- Main jet ①
- Main nozzle ②
- Pilot jet ③
- Power jet ④

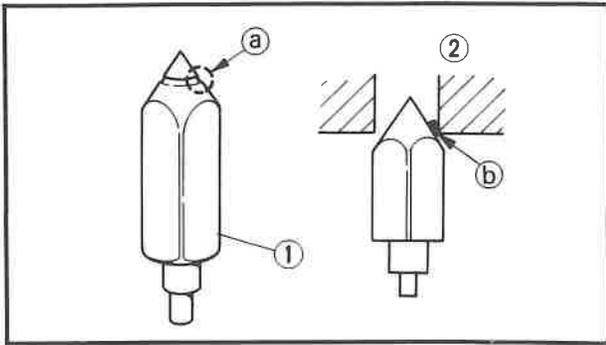
Contamination → Clean.

**NOTE:** \_\_\_\_\_

- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.

- 4-5 • Never use a wire.





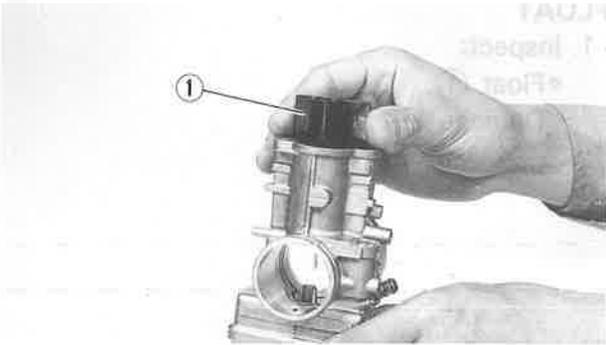
## NEEDLE VALVE

1. Inspect:

- Needle valve ①
- Valve seat ②
- Grooved wear (a) → Replace.
- Dust (b) → Clean.

**NOTE:** \_\_\_\_\_

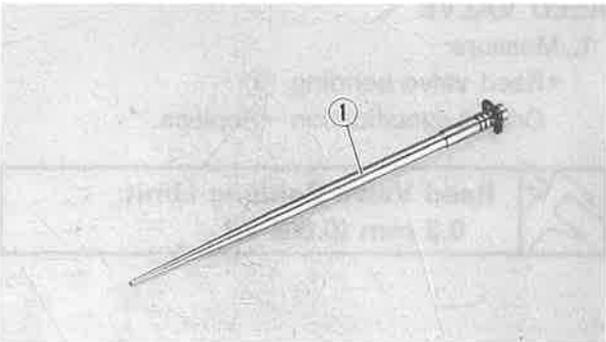
Always replace the needle valve and valve seat as a set.



## THROTTLE VALVE

1. Check:

- Free movement
- Stick → Repair or replace.
- Insert the throttle valve ① into the carburetor body, and check for free movement.



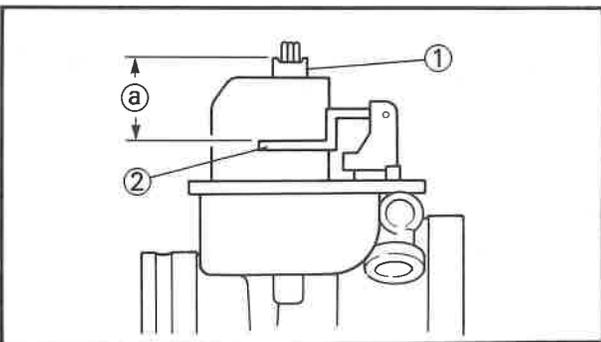
2. Inspect:

- Jet needle ①
- Bends/Wear → Replace.
- Clip position



**Standard Clip Position:  
No. 3 Groove**

**4**



## FLOAT ARM HEIGHT

1. Measure:

- Float arm height (a)
- Out of specification → Adjust.



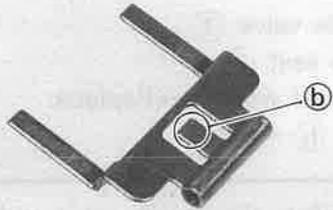
**Float Arm Height.  
15.2 ~ 17.2 mm (0.60 ~ 0.68 in)**

**Measurement and adjustment steps:**

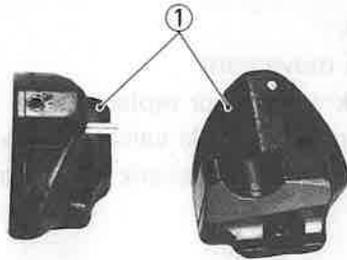
- Hold the carburetor in an upside down position.
- Measure the distance between the top surface of the main nozzle ① and the top surface of the float arm ② using vernier calipers.

**NOTE:** \_\_\_\_\_

The float arm should be resting on the needle valve, but not compressing the needle valve.

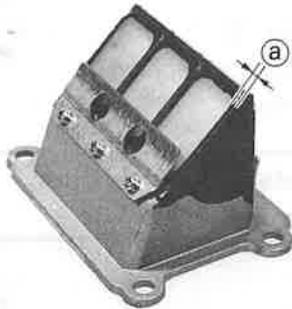


- If the float height is not within specification, inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float height by bending the float tab (b) on the float arm.
- Recheck the float height.



### FLOAT

1. Inspect:
  - Float (1)
  - Damage → Replace.

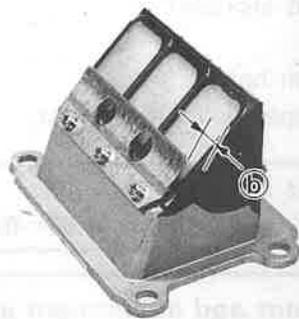


### REED VALVE

1. Measure:
  - Reed valve bending (a)
  - Out of specification → Replace.



**Reed Valve Bending Limit:**  
0.2 mm (0.008 in)



- Valve Stopper Height (b)
- Out of specification → Adjust stopper/Replace valve stopper.



**Valve Stopper Height:**

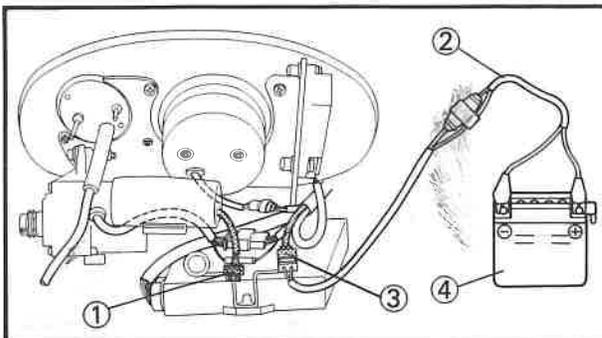
Left side	Right side
2.8 ~ 3.0mm (0.110 ~ 0.118 in)	6.5 ~ 6.9 mm (0.256 ~ 0.272 in)

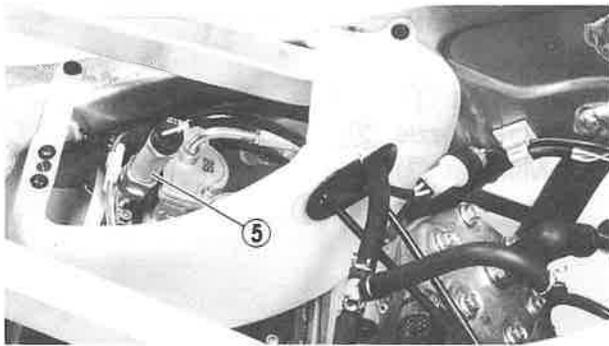
### SOLENOID VALVE

1. Check:
  - Solenoid valve operation

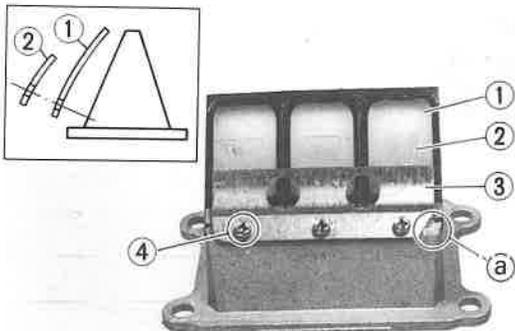
#### Checking steps:

- Disconnect the condenser lead (1).
- Connect the checking lead (with packing parts) (2) between the wire harness (3) and battery (12V) (4).





- Check the solenoid valve ⑤ operation.  
If a click can be heard the solenoid valve is working properly.  
No click → Replace.



## ASSEMBLY AND INSTALLATION REED VALVE

### 1. Install:

- Reed valve 1 ①
- Reed valve 2 ②
- Stopper (reed valve) ③
- Screw (reed valve) ④

### NOTE:

- Install the reed valve with the reed valve bending as shown.
- Note the cut ① in the lower corner of the reed and stopper plate.

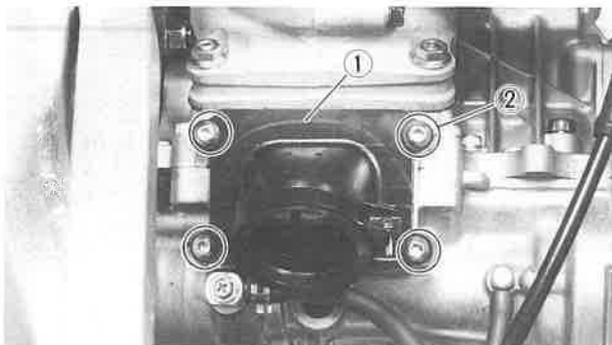


### Screw (Reed Valve):

1 Nm (0.1 m•kg, 0.7 ft•lb)  
LOCTITE®

### CAUTION:

Tighten each screw gradually to avoid warping.



### 2. Install:

- Gasket
- Reed valve assembly
- Carburetor joint ①
- Bolt (carburetor joint) ②

### NOTE:

- Always use a new gasket.
- Right side only:  
While pulling up the left cylinder, install the reed valve assembly.



### Bolt (Carburetor Joint):

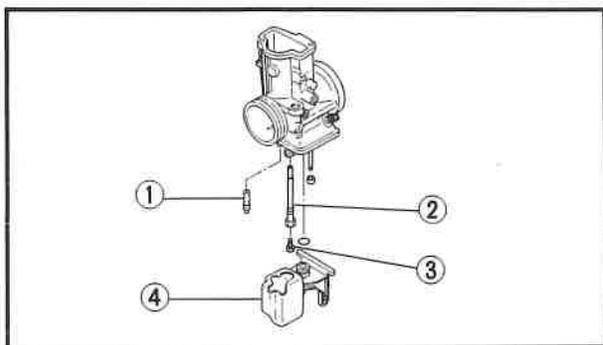
11 Nm (1.1 m•kg, 8.0 ft•lb)



## CARBURETOR

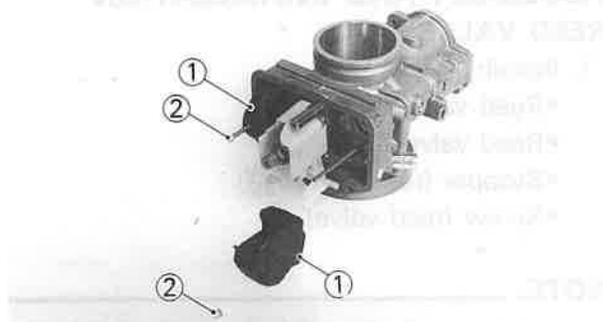
### 1. Install:

- Pilot jet ①
- Main nozzle ②
- Main jet ③
- Needle jet cover ④



### 2. Install:

- Float ①
- Cap ②



### 3. Install:

- Needle valve
- Float arm ①
- Float pin ②

After installing the needle valve to float arm, install them to the carburetor.

### NOTE:

- Make sure the float arm for smooth movement.
- Position the float arm ① lower than pin ④ of the float ③.

### 4. Install:

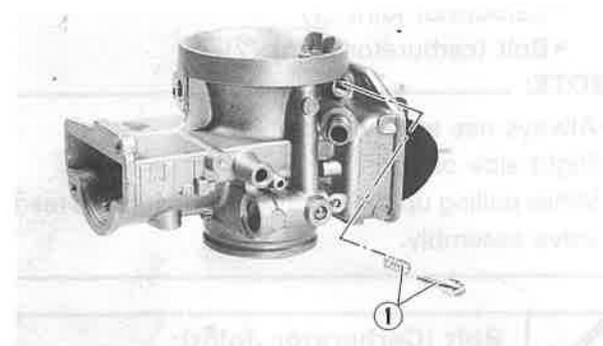
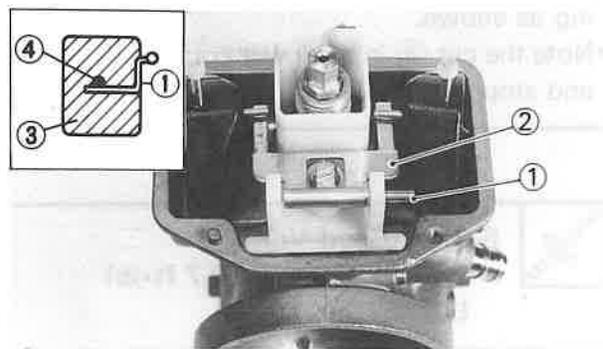
- Air screw ①

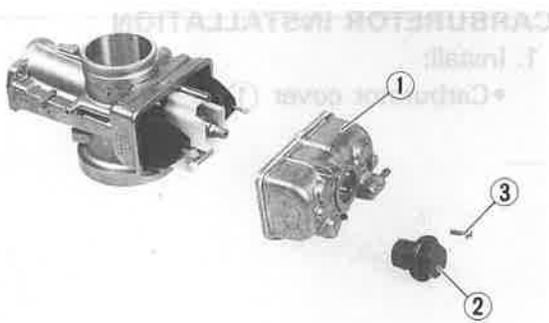
### Note the following installation points:

- Screw in the pilot air screw ② until it is lightly seated.
- Back out it by the specified number of turns.



**Pilot Air Screw:**  
1-1/2 turns out

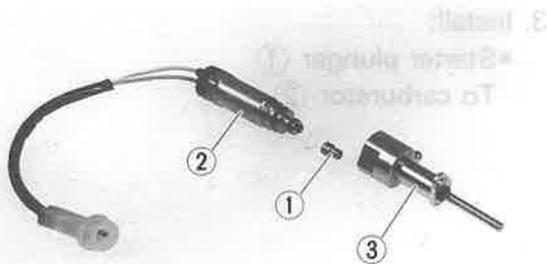
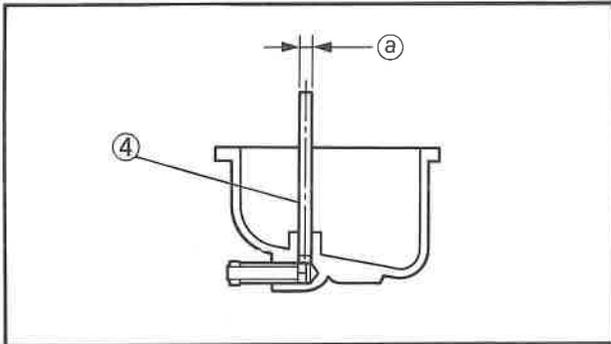




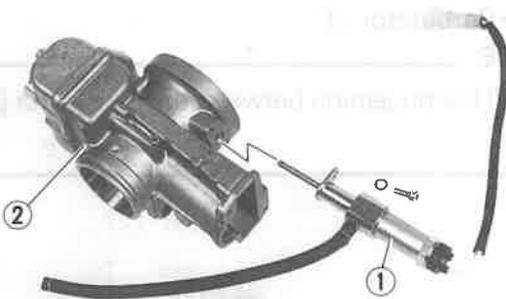
5. Install:
- Float chamber ①
  - Drain plug ②
  - Screw ③

**NOTE:**

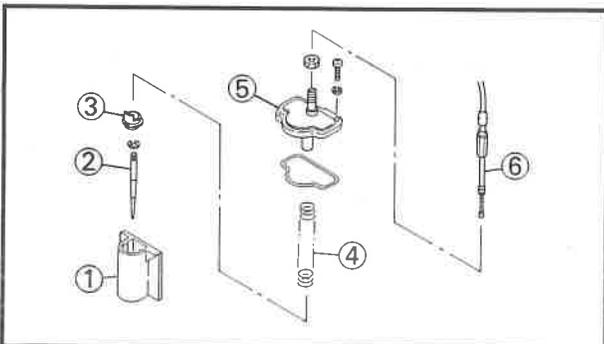
The diameter ① of the overflow pipe ④ installed in the left float chamber body is  $\phi 2$  mm (0.08 in). The right one is  $\phi 0.9$  mm (0.04 in).



6. Install:
- Power jet ①
  - Solenoid valve ②
  - To holder ③.



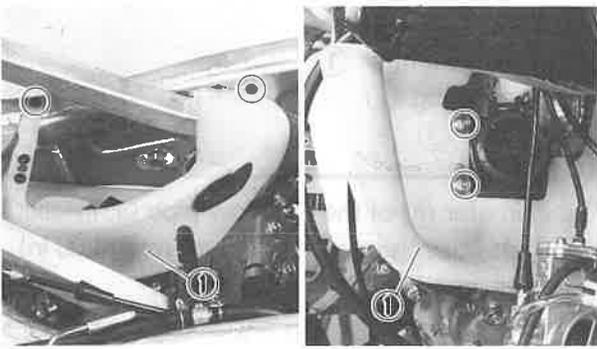
7. Install:
- Solenoid valve ①
  - To carburetor ②.



8. Install:
- Throttle valve ①
  - Jet needle ②
  - Ring ③
  - Spring (throttle valve) ④
  - Mixing chamber top ⑤
  - Throttle cable ⑥

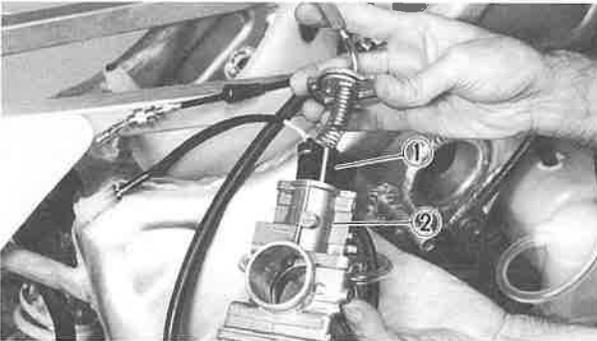
**NOTE:**

While compressing the spring, connect the throttle cable.



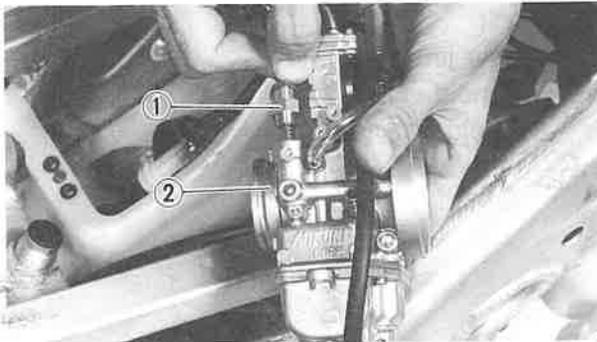
## CARBURETOR INSTALLATION

1. Install:
  - Carburetor cover ①



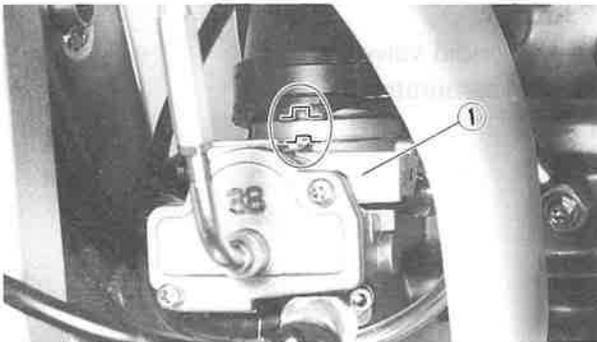
2. Install:
  - Throttle valve ①
  - To carburetor ②.

**NOTE:** \_\_\_\_\_  
 After installing, check the smooth movement of the throttle valve.  
 \_\_\_\_\_



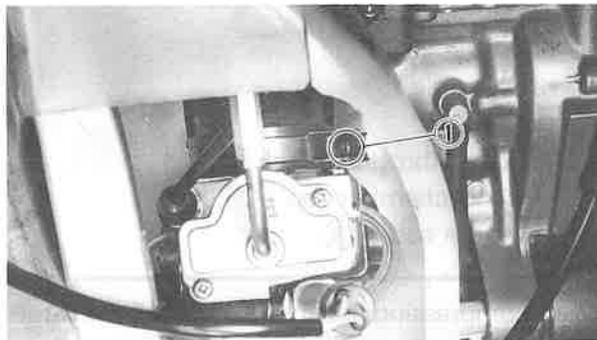
3. Install:
  - Starter plunger ①
  - To carburetor ②.

**4**

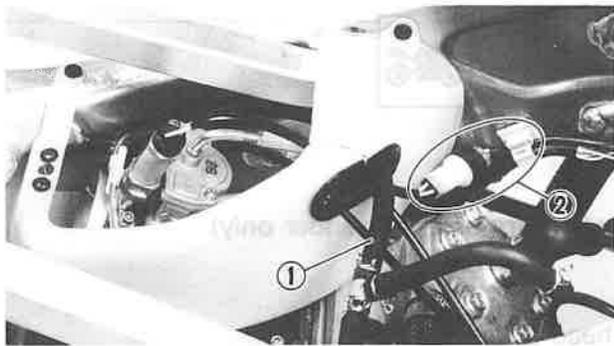


4. Install:
  - Carburetor ①

**NOTE:** \_\_\_\_\_  
 Install the projection between the carburetor joint slots.  
 \_\_\_\_\_



5. Tighten:
  - Screw (carburetor joint) ①



6. Connect:

- Fuel hose ①
- Solenoid valve lead ②



**CYLINDER HEAD, CYLINDER AND PISTON  
PREPARATION FOR REMOVAL**



\*Remove the cowling.

\*Drain the cooling water.

\*Remove the following parts:

•Fuel tank

•Exhaust pipe

•Plug cap and spark plug

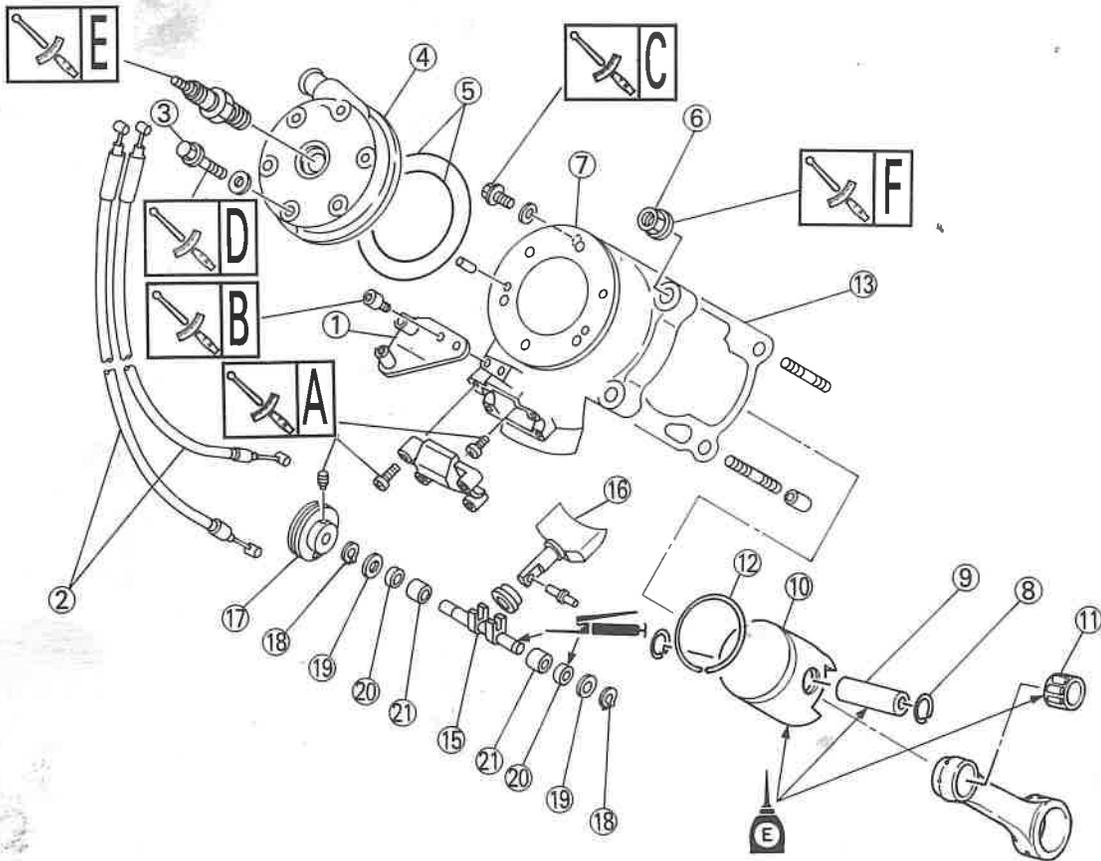
•Carburetor (left cylinder only)

\*Disconnect the radiator hose 3 and 4 at cylinder head side.

<b>CYLINDER HEAD WARPAGE LIMIT:</b> 0.03 mm (0.0012 in)
<b>PISTON CLEARANCE:</b> 0.045~0.055 mm (0.0018~0.0022 in)
<b>PISTON RING SIDE CLEARANCE:</b> 0.03~0.07 mm (0.0012~0.0028 in)
<b>PISTON RING END GAP (INSTALLED):</b> 0.15~0.35 mm (0.006~0.014 in)
<b>SPARK PLUG:</b> R5184-105/NGK
<b>SPARK PLUG GAP:</b> 0.5~0.6 mm (0.020~0.024 in)

A	4 Nm (0.4 m•kg, 2.9 ft•lb)
B	7 Nm (0.7 m•kg, 5.1 ft•lb)
C	8 Nm (0.8 m•kg, 5.8 ft•lb)
D	11 Nm (1.1 m•kg, 8.0 ft•lb)
E	19 Nm (1.9 m•kg, 13 ft•lb)
F	20 Nm (2.0 m•kg, 14 ft•lb)

4





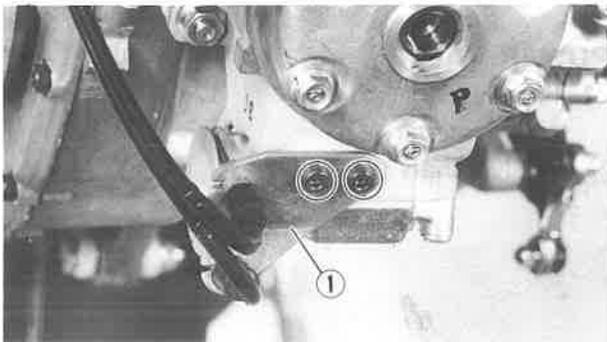
## NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material does not enter the crankcase.
- Remove any gasket adhered to the contacting surface.
- Take care not to scratch the contacting surfaces when removing the cylinder and cylinder head.
- Take care not to scratch the cylinder and piston surfaces.
- For reassembly, the removed parts should be cleaned with solvent, and apply the engine oil to the sliding surfaces.
- Take care so that the coolant does not enter the crankcase. If the coolant enters the crankcase, clean the inside of the crankcase and apply oil on it.
- When removing the cylinder head, the piston should be positioned at TDC (top dead center).

Extent of removal: ① Cylinder head removal    ② Cylinder removal  
 ③ Piston and piston ring removal    ④ Power valve removal

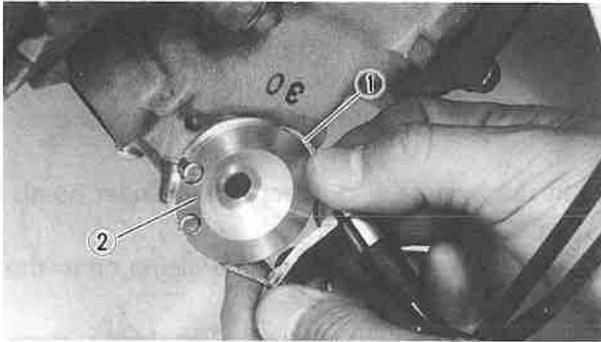
Extent of removal	Order	Part name	Q'ty	Remarks
	1	Cable stay	1ea.	Refer to "REMOVAL POINTS".
	2	YPVS cable	2ea.	
	3	Bolt (cylinder head)	6ea.	
	4	Cylinder head	1ea.	
	5	O-ring	2ea.	
	6	Nut (cylinder)	4ea.	Refer to "REMOVAL POINTS".
	7	Cylinder	1ea.	
	8	Clip (piston pin)	2ea.	
	9	Piston pin	1ea.	
	10	Piston	1ea.	
	11	Small end bearing	1ea.	Refer to "REMOVAL POINTS".
	12	Piston ring	1ea.	
	13	Cylinder gasket	1ea.	Refer to "REMOVAL POINTS".
	14	Valve cover	1ea.	
	15	Valve shaft	1ea.	
	16	Power valve	1ea.	
	17	Valve pulley	1ea.	
	18	Circlip	2ea.	
	19	Washer	2ea.	
	20	Oil seal	2ea.	
	21	Solid bush	2ea.	

4

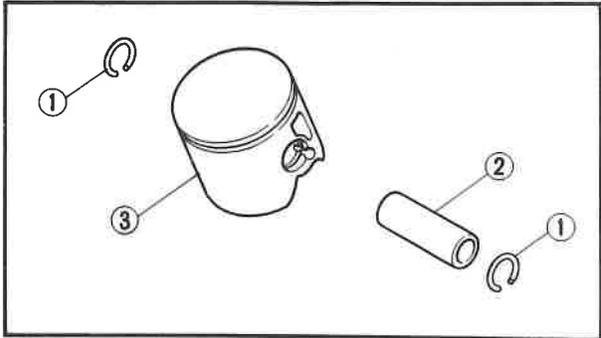


### REMOVAL POINTS YPVS CABLE

1. Remove:
  - Cable stay ①



2. Remove:
- YPVS cable ①
  - From the valve pulley ②.



**PISTON AND PISTON RING**

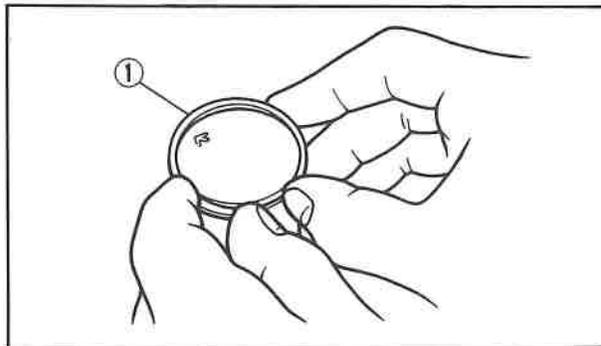
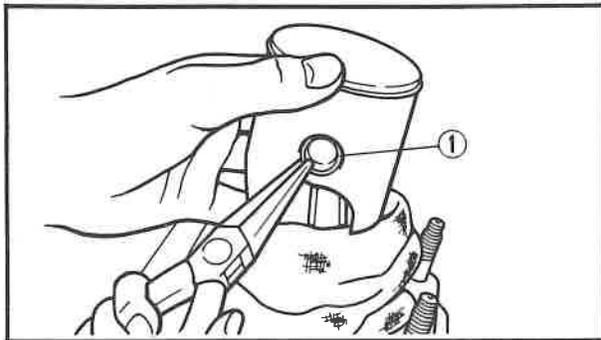
1. Remove:
- Piston pin clip ①
  - Piston pin ②
  - Piston ③

**NOTE:** \_\_\_\_\_

- Before removing piston pin clip, cover crankcase with a clean rag to prevent piston pin clip from falling into crankcase cavity.
- Before removing the piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use the Piston Pin Puller.

**CAUTION:** \_\_\_\_\_

**Do not use a hammer to drive the piston pin out.**



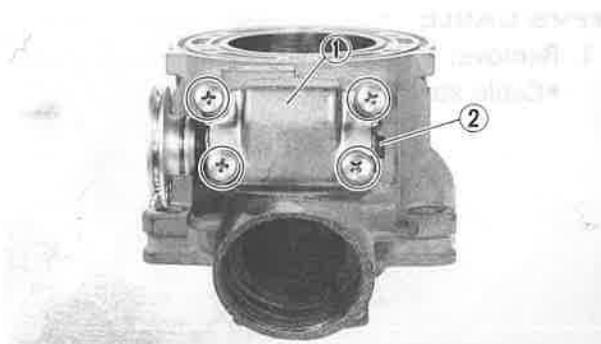
2. Remove:
- Piston ring ①

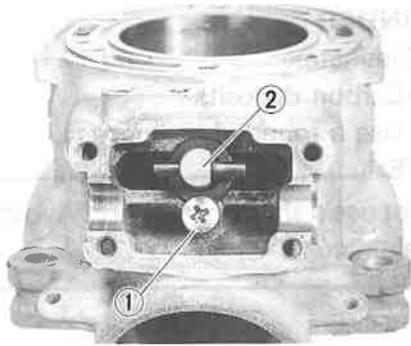
**NOTE:** \_\_\_\_\_

Take care not to scratch the piston and damage the piston ring.

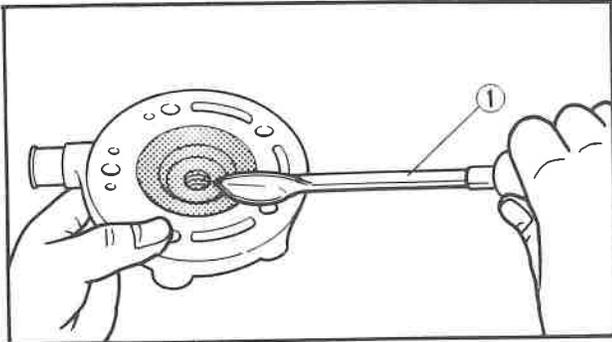
**POWER VALVE**

1. Remove:
- Valve cover ①
  - Valve shaft ②





2. Remove:
  - Screw (power valve) ①
  - Power valve ②



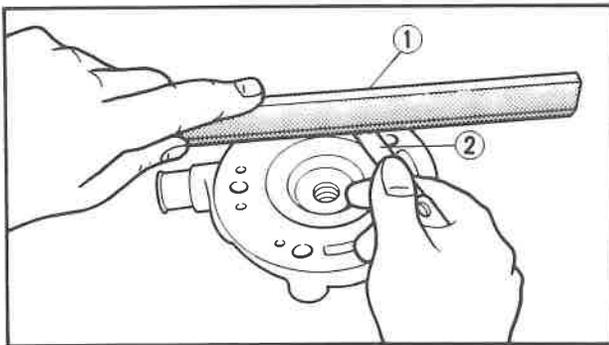
**INSPECTION  
CYLINDER HEAD**

1. Remove:
  - Carbon deposits  
Use a rounded scraper ①.

**NOTE:** \_\_\_\_\_  
Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the aluminum.

2. Inspect:
  - Cylinder head water jacket  
Crust of minerals/Rust→Remove.
  - Cylinder head warpage  
Out of specification→Re-surface.

**4**



**Warpage measurement and re-surface-ment steps:**

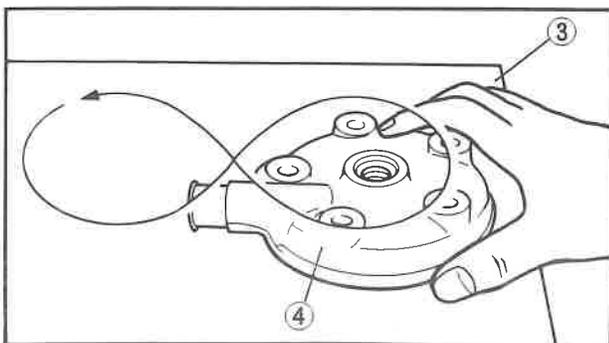
- Attach a straightedge ① and a thickness gauge ② on the cylinder head.
- Measure the warpage.

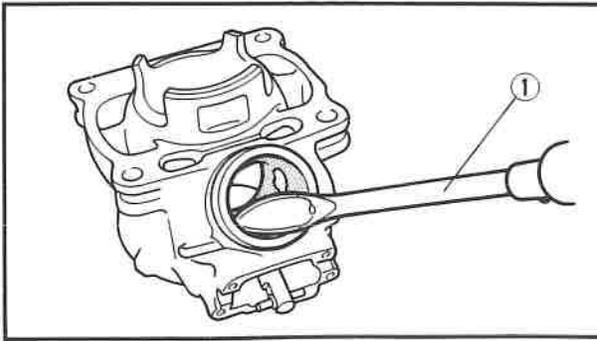


**Warpage Limit:**  
**0.03 mm (0.0012 in)**

- If the warpage is out of specification, re-surface the cylinder head.
- Place a 400~600 grit wet sandpaper ③ on the surface plate, and re-surface the head ④ using a figure-eight sanding pattern.

**NOTE:** \_\_\_\_\_  
Rotate the head several times to avoid removing too much material from one side.

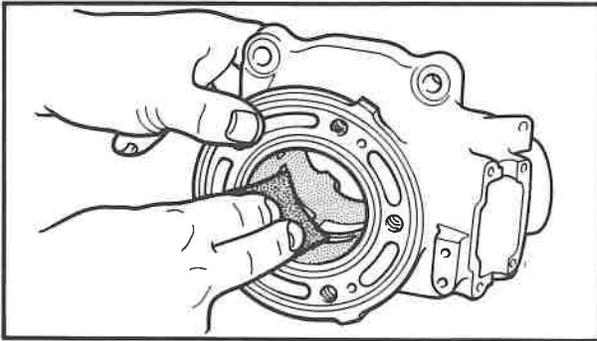




**CYLINDER**

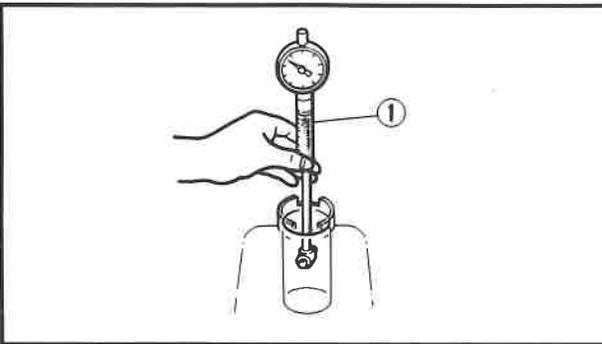
1. Eliminate:
  - Carbon deposits
  - Use a rounded scraper ①.

**NOTE:** \_\_\_\_\_  
Do not use a sharp instrument. Avoid scratching the aluminum.



2. Inspect:
  - Cylinder inner surface
  - Score marks → repair or replace.
  - Use #600 ~ 800 grit wet sandpaper.

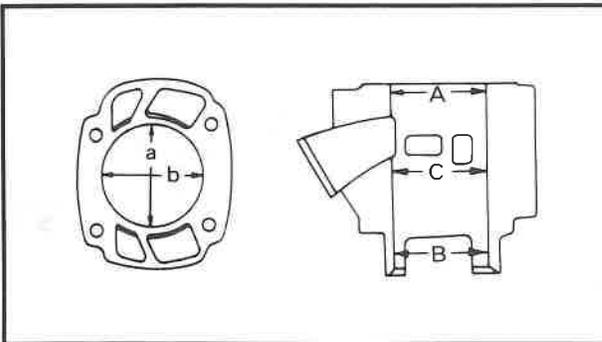
**CAUTION:** \_\_\_\_\_  
Do not rebores the cylinder.



**CYLINDER BORE**

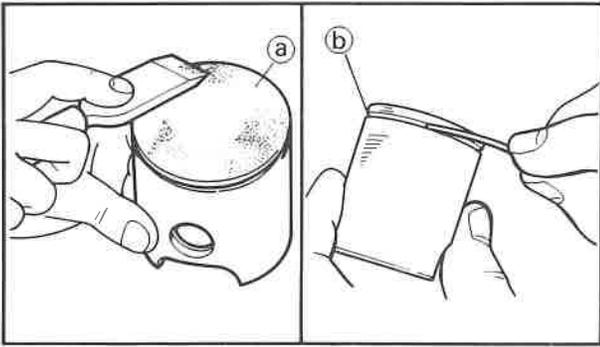
1. Measure:
  - Cylinder bore "C"
  - Use cylinder gauge ①.
  - Out of limit → Replace.

**NOTE:** \_\_\_\_\_  
Measure the cylinder bore "C" in parallel (A, B, C) to and at right angles to the crankshaft (a, b). Then, find the average of the measurements.



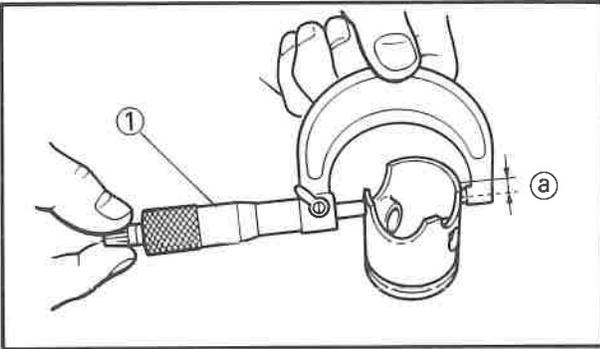
	Standard	Wear Limit
Cylinder Bore "C"	56.000 ~ 56.020 mm (2.2047 ~ 2.2055 in)	56.1 mm (2.209 in)
Taper "T"	—	0.05 mm (0.0020 in)
<p><b>C = Maximum Aa ~ Cb</b>  <b>T = (Maximum Aa, or Ab) – (Maximum Ba, or Bb)</b></p>		

4



## PISTON

- Eliminate:
  - Carbon deposits  
From the piston crown (a) and ring groove (b).
- Inspect:
  - Piston wall  
Score marks → Repair or replace.

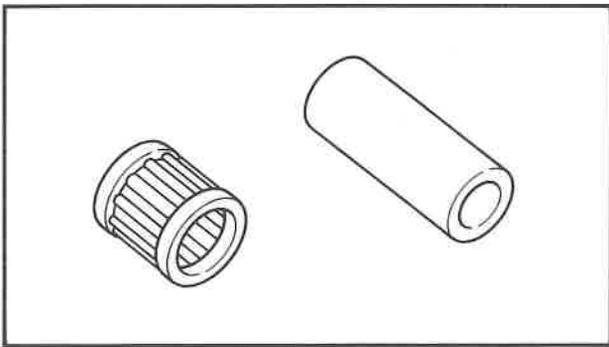


## PISTON DIAMETER

- Measure:
  - Piston skirt diameter  
Use Micrometer (1).  
Measure specific distance (a) from the bottom edge.  
Out of specification → Replace.

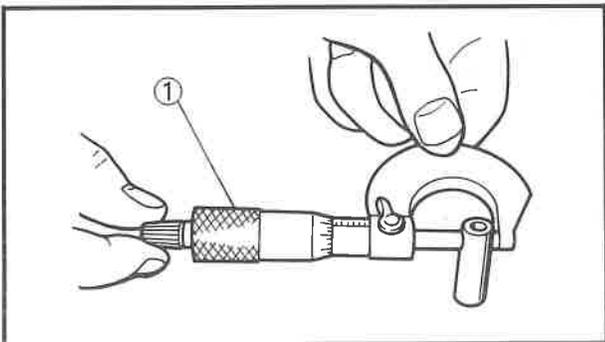
	Distance (a)	Piston DIA.
	19 mm (0.75 in)	55.950 ~ 55.970 mm (2.2028 ~ 2.2035 in)

4



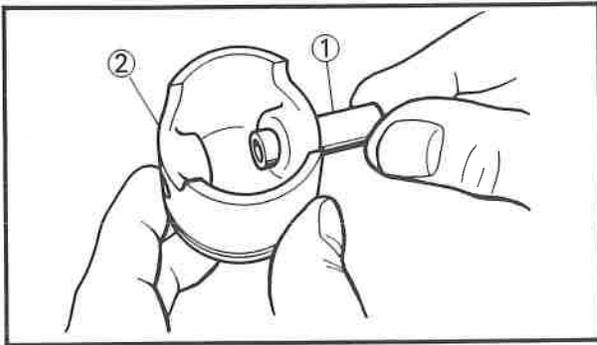
## PISTON PIN AND SMALL END BEARING

- Inspect:
  - Piston pin
  - Small end bearing  
Signs of heat discoloration → Replace.



- Measure:
  - Piston pin outside diameter  
Use micrometer (1).  
Out of limit → Replace.

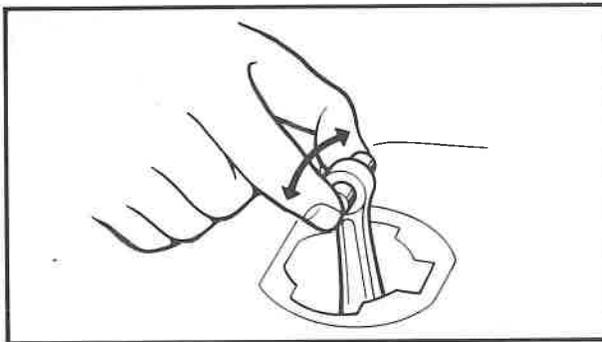
	Piston Pin Outside Diameter:	
	Standard	<Limit>
	15.995 ~ 16.000 mm (0.6297 ~ 0.6299 in)	15.975 mm (0.6289 in)


**3. Check:**

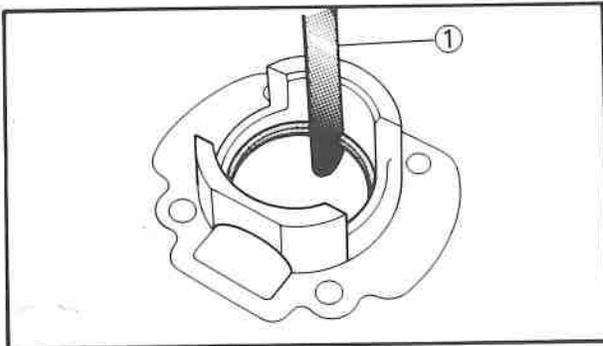
- Free play (when the piston pin ① is in place in the piston ②)  
There should be no noticeable for the play.  
Free play exists → Replace piston pin and/or piston.

**4. Install:**

- Small end bearing
- Piston pin  
Into the small end of connecting rod.


**5. Check:**

- Free play  
There should be no noticeable free play.  
Free play exists → Inspect the connecting rod for wear/Replace the pin and/or connecting rod as required.

**4**

**PISTON RING**
**1. Install:**

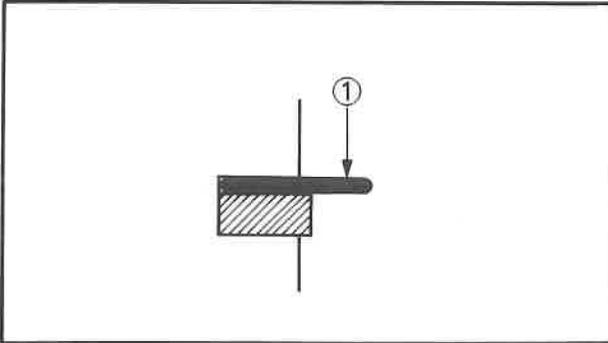
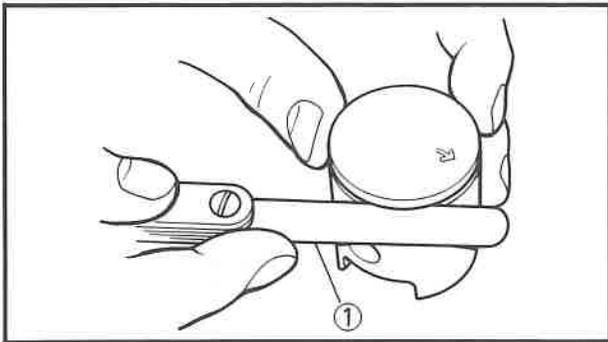
- Piston ring  
Into the cylinder.  
Push the ring with the piston crown.

**2. Measure:**

- End gap  
Out of specification → Replace.  
Using a Thickness Gauge ①.


**Ring End Gap (Installed):**

Standard	< Limit >
0.15 ~ 0.35 mm (0.006 ~ 0.014 in)	0.4 mm (0.016 in)



3. Measure:
- Side clearance  
Out of limit → Replace piston and/or ring.  
Using a thickness Gauge ①.

Side Clearance:	
Standard	< Limit >
0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.1 mm (0.004 in)

NOTE: \_\_\_\_\_  
Check at several points.  
\_\_\_\_\_

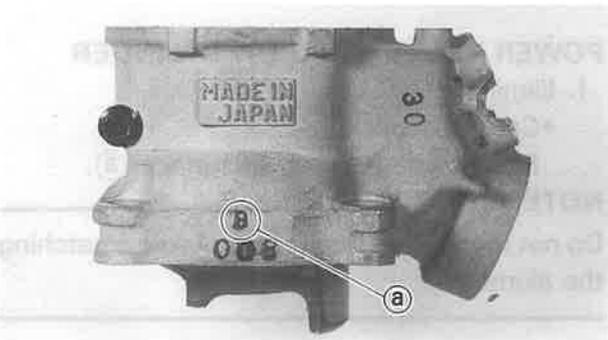
## PISTON CLEARANCE

1. Calculate:
- Piston clearance  
Out of limit → Replace piston, and piston ring and/or cylinder.  
Refer to "CYLINDER BORE" and "PISTON DIAMETER".

$$\text{PISTON CLEARANCE} = \text{CYLINDER BORE} - \text{PISTON DIAMETER}$$

Piston Clearance:	
Standard	< Limit >
0.045 ~ 0.055 mm (0.0018 ~ 0.0022 in)	0.1 mm (0.004 in)

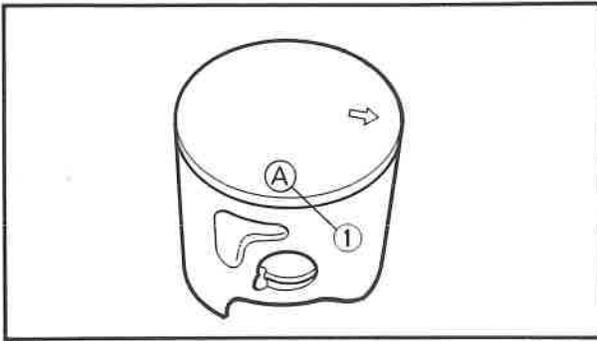
4



## COMBINATION OF PISTON AND CYLINDER

1. Cylinder mark:

Cylinder mark ①	Cylinder size
A	56.000 ~ 56.005 mm (2.2048 ~ 2.2049 in)
B	56.005 ~ 56.010 mm (2.2049 ~ 2.2051 in)
C	56.010 ~ 56.016 mm (2.2051 ~ 2.2054 in)
D	56.016 ~ 56.020 mm (2.2054 ~ 2.2055 in)



## 2. Piston mark:

Piston mark (a)	Size
A	55.950 ~ 55.954 mm (2.2028 ~ 2.2029 in)
B	55.955 ~ 55.960 mm (2.2030 ~ 2.2031 in)
C	55.961 ~ 55.965 mm (2.2032 ~ 2.2033 in)
D	55.965 ~ 55.970 mm (2.2033 ~ 2.2035 in)

## 3. Combination:

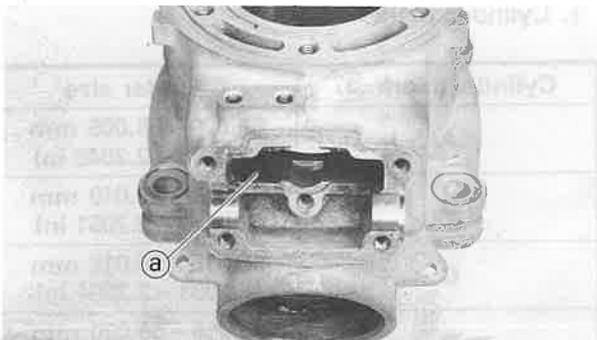
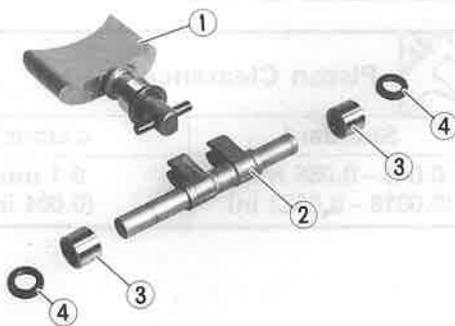
Combine the piston and cylinder by the following chart.

Cylinder mark	Piston mark
A	A
B	B
C	C
D	D

### NOTE:

When you purchase a cylinder, you cannot designate its size. Choose the piston that matches the above chart.

# 4



## POWER VALVE

### 1. Inspect:

- Power valve ①  
Wear/Damage → Replace.  
Carbon deposits → Eliminate.
- Valve shaft ②
- Solid bush ③
- Oil seal ④  
Wear/Damage → Replace.

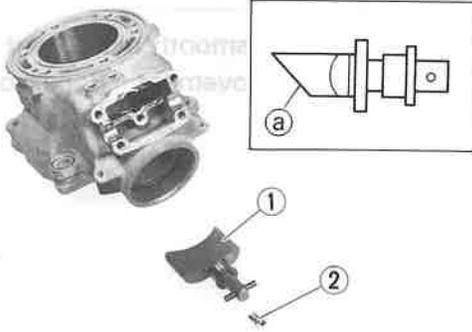
## POWER VALVE HOLD ON CYLINDER

### 1. Eliminate:

- Carbon deposits  
From power valve hole surface (a).

### NOTE:

Do not use a sharp instrument. Avoid scratching the aluminum.



**ASSEMBLY AND INSTALLATION  
POWER VALVE**

1. Install:
  - Power valve ①
  - Screw (power valve) ②

**NOTE:** \_\_\_\_\_  
Install the power valve at cut-away faced (a) for down side.

 **Screw (Power Valve):**  
4 Nm (0.4 m•kg, 2.9 ft•lb)

2. Install:
  - Solid bush ①
  - Oil seal ②
  - Washer ③
  - Circlip ④
  - Valve pulley ⑤
  - To valve shaft ⑥.

**NOTE:** \_\_\_\_\_  
• Apply the lithium soap base grease on the valve shaft and oil seal lip.  
• Always use a new circlip.

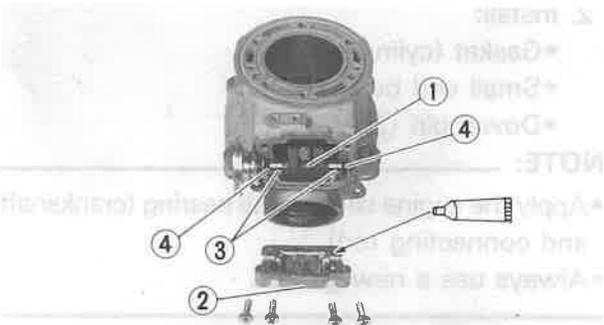
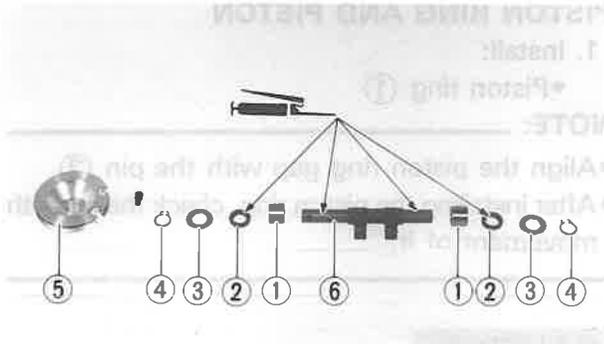
 **Screw (Valve Pulley):**  
4 Nm (0.4 m•kg, 2.9 ft•lb)

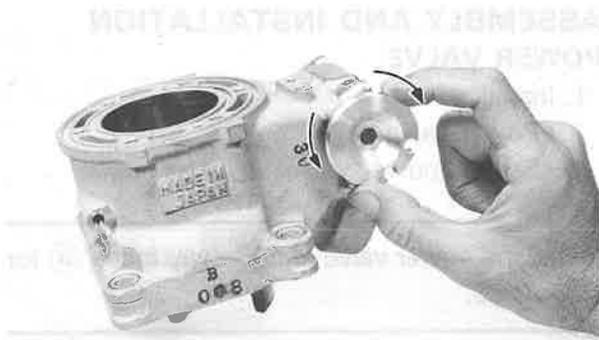
3. Install:
  - Valve shaft ①
  - Valve cover ②

**NOTE:** \_\_\_\_\_  
• When installing the valve shaft into the cylinder, lightly touch the solid bush ③ with the oil seal ④.  
• Clean the contacting surface of the valve cover and cylinder before applying the sealant.

 **Quick gasket®**  
ACC-11001-30-00  
**Yamaha bond No. 4:**  
90890-05143

 **Screw (Valve Cover):**  
4 Nm (0.4 m•kg, 2.9 ft•lb)





### 4. Check:

- Power valve smooth movement
- Unsmooth movement → Repair or replace.

## PISTON RING AND PISTON

### 1. Install:

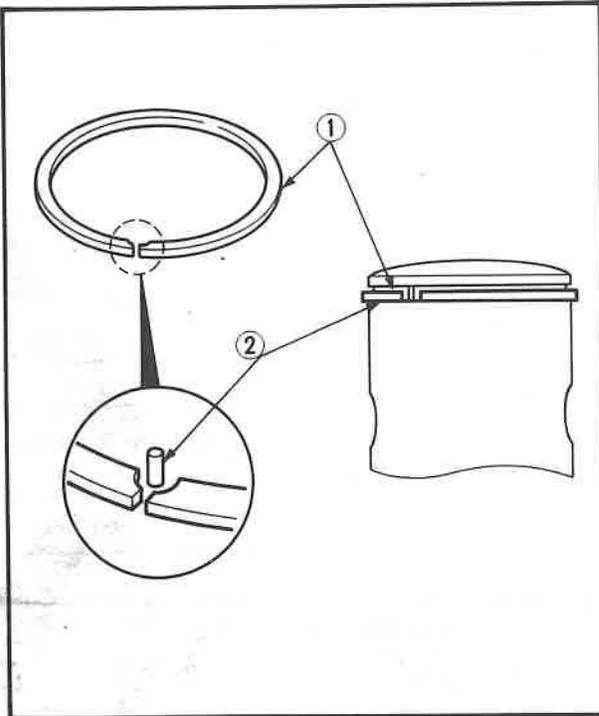
- Piston ring ①

#### NOTE:

- Align the piston ring gap with the pin ②.
- After installing the piston ring, check the smooth movement of it.

#### CAUTION:

Take care not to scratch the piston or damage the piston ring.



### 2. Install:

- Gasket (cylinder) ①
- Small end bearing ②
- Dowel pin ③

#### NOTE:

- Apply the engine oil onto the bearing (crankshaft and connecting rod).
- Always use a new gasket.

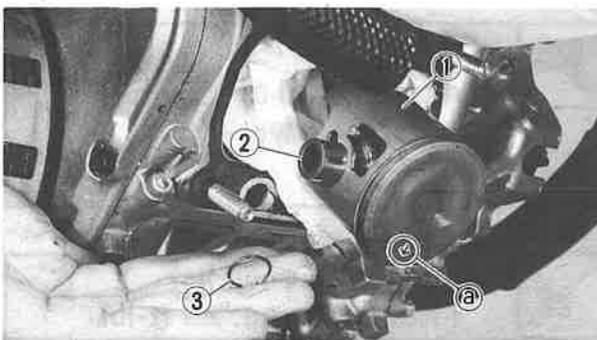
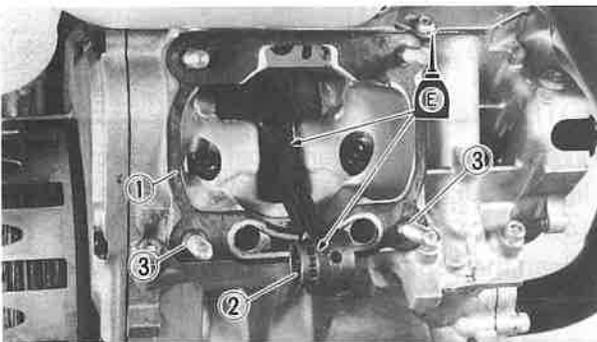
### 3. Install:

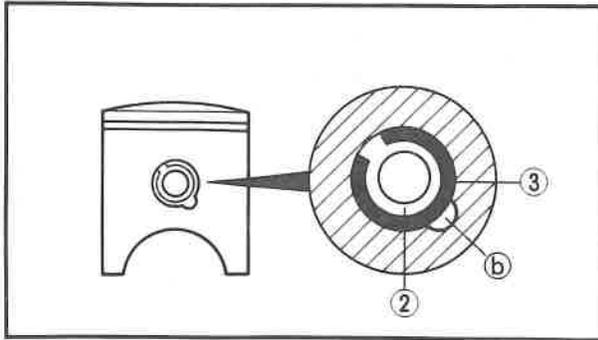
- Piston ①
- Piston pin ②
- Piston pin clip ③

#### NOTE:

- The arrow (a) on piston must point to exhaust side.
- Before installing piston pin circlip, cover crankcase with a clean rag to prevent circlip from falling into crankcase cavity.

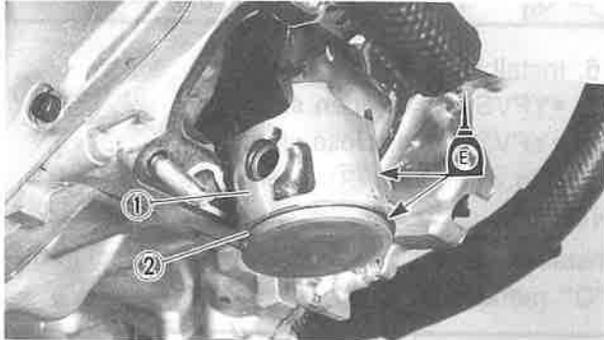
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### CAUTION:

- Do not allow the clip open ends to meet the piston pin slot.
- Always use a new piston pin clip.



### CYLINDER HEAD AND CYLINDER

#### 1. Apply:

- Engine oil

To piston ①, piston ring ② and cylinder inner surface.

*+ 3mm deck height*

#### 2. Install:

- Cylinder ①

### CAUTION:

Make sure the rings are properly positioned. Install the cylinder with one hand while compressing the piston ring with the other hand.

### NOTE:

After installing, check the smooth movement of the piston.

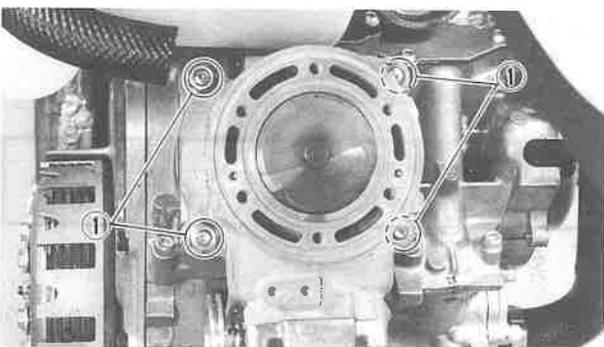


#### 3. Tighten:

- Nut (cylinder) ①

### NOTE:

Tighten the nuts in stages, using a diagonal pattern.



**Nut (Cylinder):**

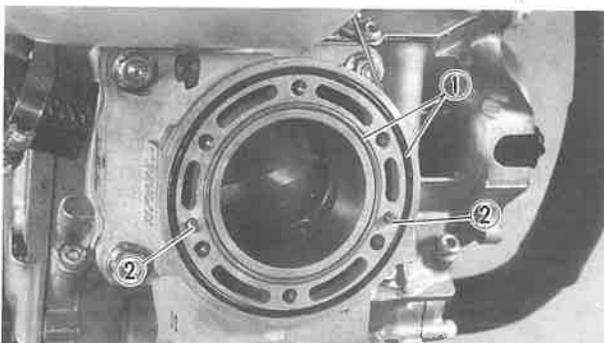
**20 Nm (2.0 m•kg, 14 ft•lb)**

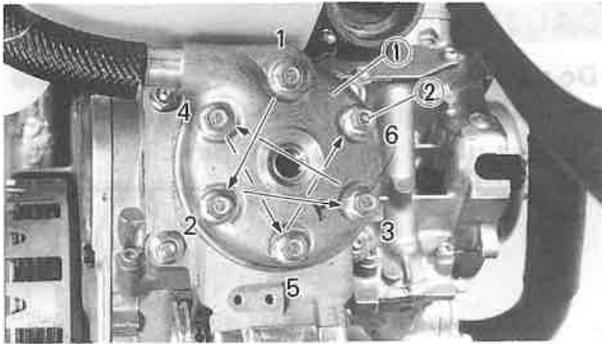
#### 4. Install:

- O-rings ①
- Dowel pin ②

### NOTE:

- Always use a new O-ring.
- Apply the lithium soap base grease on the O-ring.



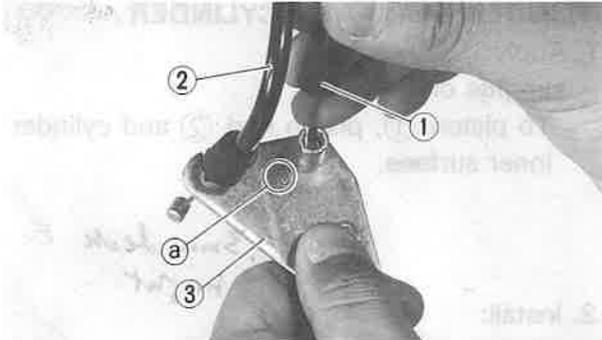


5. Install:
- Cylinder head ①
  - Copper washer
  - Bolt (cylinder head) ②

**NOTE:** \_\_\_\_\_  
Tighten the bolts (cylinder head) ② in stage, using a diagonal pattern.

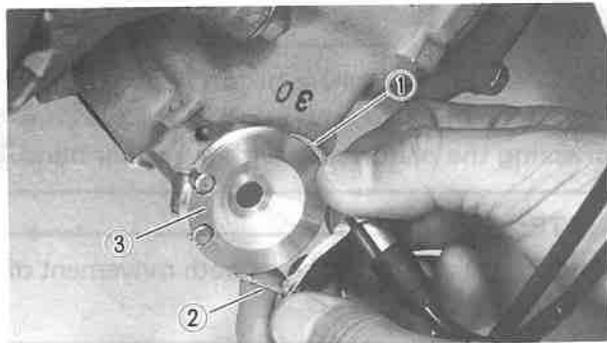


**Bolt (Cylinder Head):**  
11 Nm (1.1 m•kg, 8.0 ft•lb)



6. Install:
- YPVS cable (open side) ①
  - YPVS cable (close side) ②
  - To cable stay ③.

**NOTE:** \_\_\_\_\_  
Install the open side cables (sleeved cables) to the "O" marked (a) side of the cable stay.



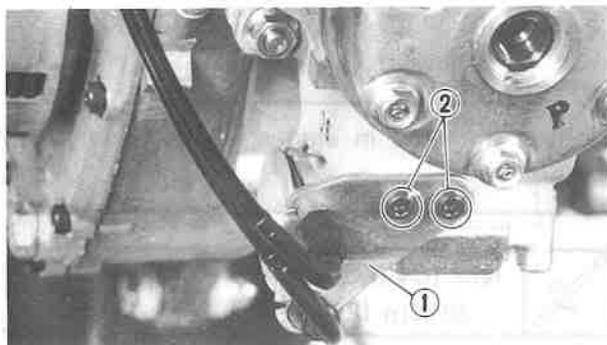
7. Connect:
- YPVS cable (open side) ①
  - YPVS cable (close side) ②
  - To valve pulley ③.

**NOTE:** \_\_\_\_\_  
Connect the silver cables to the left side cylinder and the black cables to the right cylinder.

8. Install:
- Cable stay ①
  - Bolt (cable stay) ②

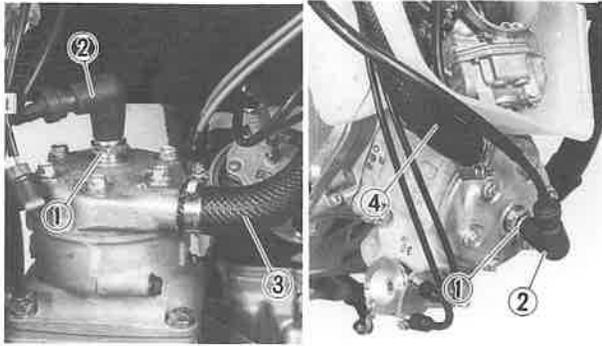


**Bolt (Cable Stay):**  
7 Nm (0.7 m•kg, 5.1 ft•lb)



9. Adjust:
- YPVS cable
- Refer to the "YPVS OPEN SIDE CABLE ADJUSTMENT" and "YPVS CLOSE SIDE CABLE ADJUSTMENT" section in the CHAPTER 3.

4



10. Install:

- Spark plug ①
- Plug cap ②
- Radiator hose 3 ③
- Radiator hose 4 ④

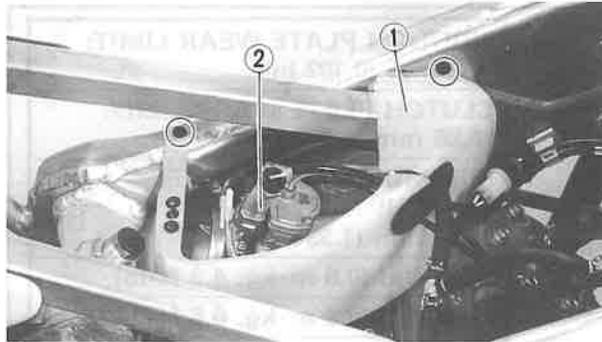


**Spark Plug:**

**19 Nm (1.9 m•kg, 13 ft•lb)**

**Radiator Hose Joint:**

**2 Nm (0.2 m•kg, 1.4 ft•lb)**



11. Install:

- Carburetor cover (left side only) ①
- Carburetor (left side only) ②



**CLUTCH  
PREPARATION FOR REMOVAL**



\*Remove the lower cowl.

**FRICTION PLATE WEAR LIMIT:**  
2.6 mm (0.102 in)

**CLUTCH PLATE WARP LIMIT:**  
0.05 mm (0.002 in)

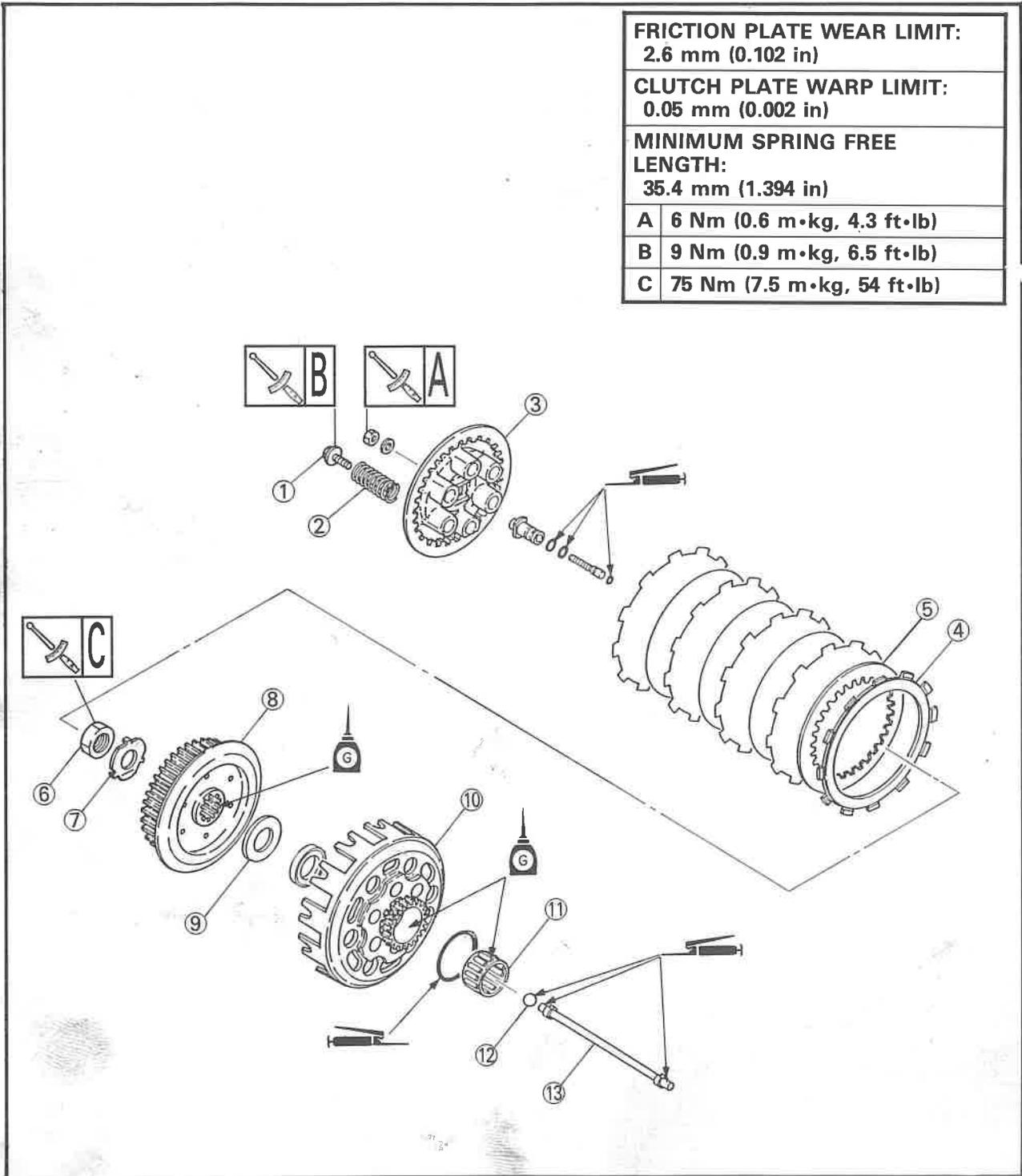
**MINIMUM SPRING FREE LENGTH:**  
35.4 mm (1.394 in)

**A** 6 Nm (0.6 m•kg, 4.3 ft•lb)

**B** 9 Nm (0.9 m•kg, 6.5 ft•lb)

**C** 75 Nm (7.5 m•kg, 54 ft•lb)

**4**





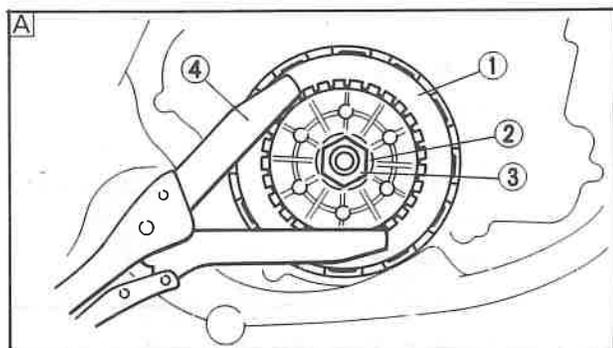
**NOTE ON REMOVAL AND REASSEMBLY**

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material does not enter the crankcase.
- For reassembly, the removed parts should be cleaned with solvent.

Extent of removal: ① Clutch plate and friction plate removal      ② Clutch housing removal  
 ③ Push rod removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Screw (clutch spring)	6	Use special tool. Refer to "REMOVAL POINTS".
	2	Clutch spring	6	
	3	Pressure plate	1	
	4	Friction plate	5	
	5	Clutch plate	4	
	6	Nut (clutch boss)	1	
	7	Lock washer	1	
	8	Clutch boss	1	
	9	Plain washer	1	
	10	Clutch housing	1	
	11	Bearing	1	
	12	Ball	1	
	13	Push rod	1	

**4**



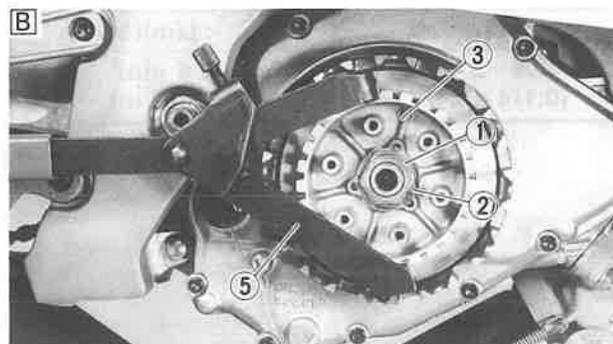
**REMOVAL POINTS**

**CLUTCH BOSS**

- Remove:
  - Nut ①
  - Lock washer ②
  - Clutch boss ③

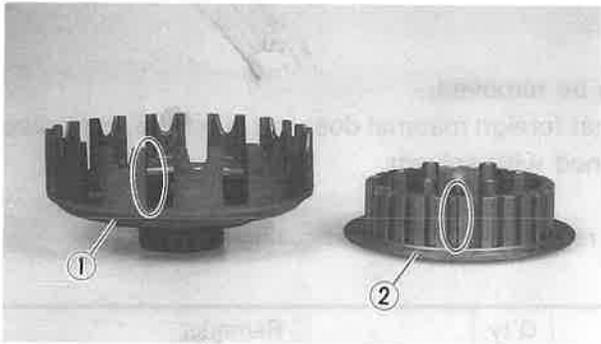
**NOTE:**

Straighten the lock washer tab and use the Clutch Holder ④, ⑤ to hold the clutch boss.



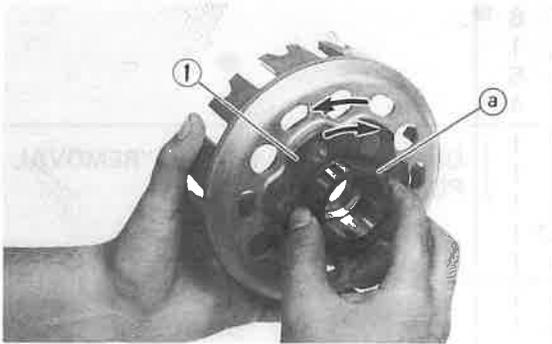
	<b>Clutch Holder:</b>
	YM-91042 ..... ④ 90890-04086 ..... ⑤

- Ⓐ For USA and CDN
- Ⓑ Except for USA and CDN



**INSPECTION  
CLUTCH HOUSING AND BOSS**

1. Inspect:
- Clutch housing ①  
Cracks/Wear/Damage → Replace.
  - Clutch boss ②  
Scoring/Wear/Damage → Replace.

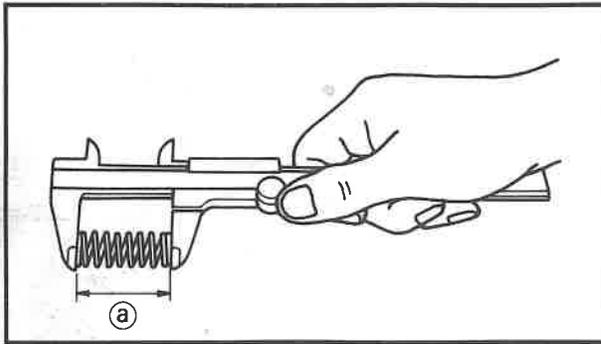


**CLUTCH HOUSING**

1. Check:
- Circumferential play  
Free play exists → Replace.
  - Gear teeth ①  
Wear/Damage → Replace.
  - O-ring ①  
Damage → Replace.

**CLUTCH SPRING**

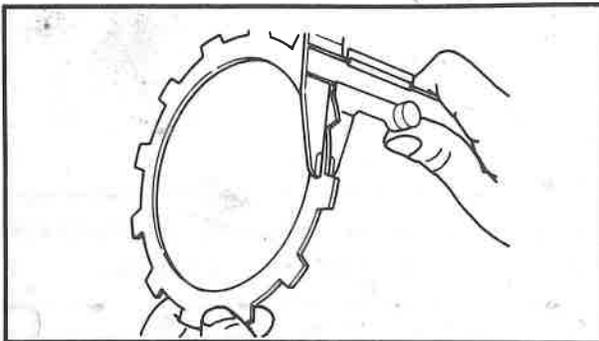
1. Measure:
- Clutch spring free length ①  
Out of specification → Replace springs as a set.



Clutch Spring Length:	
Standard	< Limit >
36.4 mm (1.433 in)	35.4 mm (1.394 in)

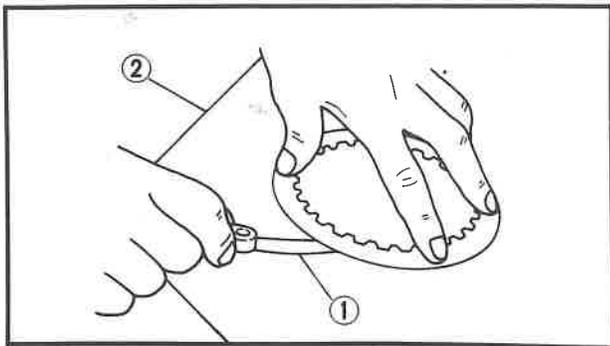
**FRICITION PLATE**

1. Measure:
- Friction plate thickness  
Out of specification → Replace friction plate as a set.  
Measure at all four points.



Friction Plate Thickness:	
Standard	< Limit >
2.9 ~ 3.1 mm (0.114 ~ 0.122 in)	2.6 mm (0.102 in)

4



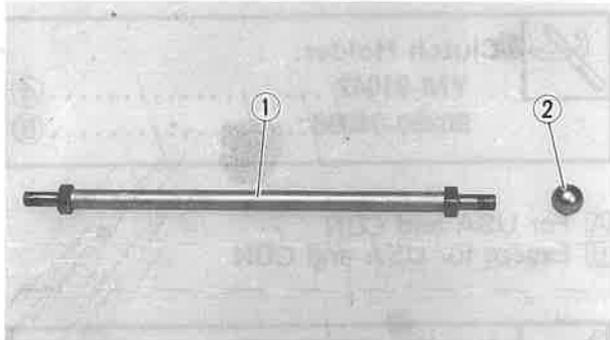
### CLUTCH PLATE

#### 1. Measure:

- Clutch plate warpage  
Out of specification → Replace clutch plate as a set.
- Use a surface plate ② and thickness gauge ①.



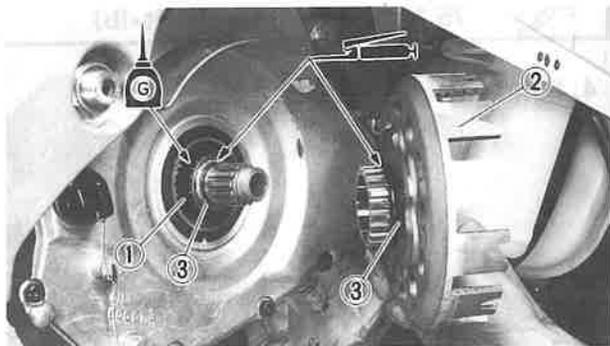
Warp Limit: 0.05 mm (0.002 in)



### PUSH ROD AXLE

#### 1. Inspect:

- Push rod ①
- Ball ②
- Wear/Damage/Bend → Replace.



### ASSEMBLY AND INSTALLATION CLUTCH

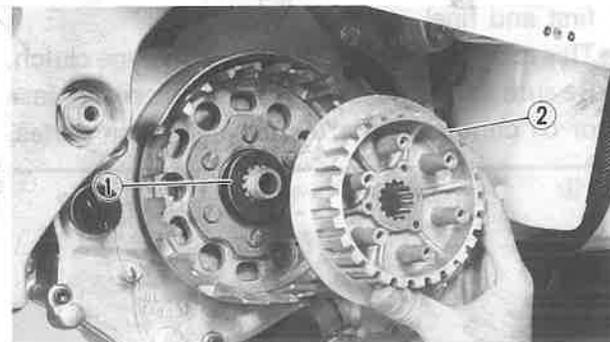
#### 1. Install:

- Bearing ①
- Clutch housing ②

#### NOTE:

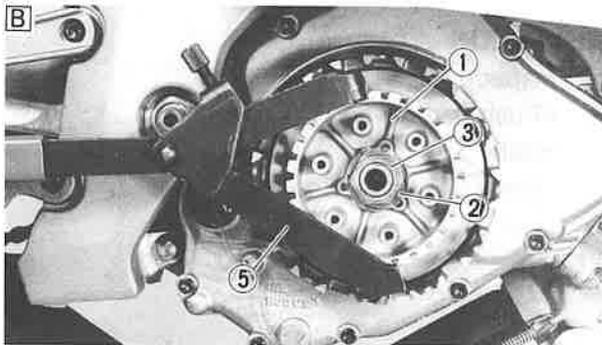
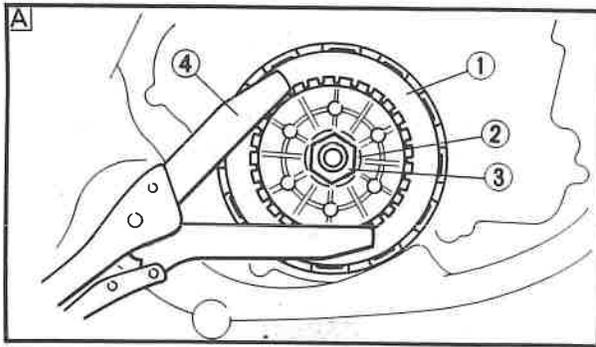
- Apply the transmission oil onto the bearing.
- Apply the lithium soap base grease on the O-rings ③.

# 4



#### 2. Install:

- Plain washer ①
- Clutch boss ②



3. Install:

- Clutch boss ①
- Lock washer ②
- Nut (clutch boss) ③

NOTE:

- Always use a new lock washer.
- Straighten the lock washer tab and use the Clutch Holder ④, ⑤ to hold the clutch boss.

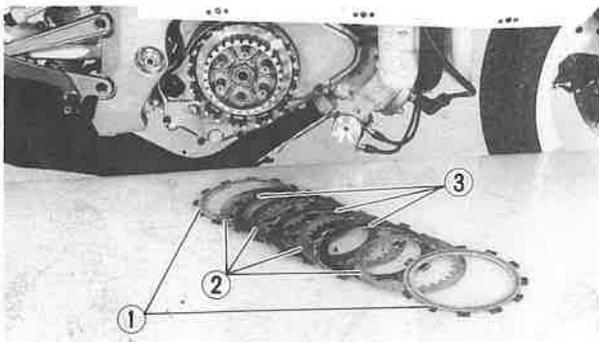
	<b>Clutch Holder:</b>	
	YM-91042 .....	④
	90890-04086 .....	⑤

- Ⓐ For USA and CDN
- Ⓑ Except for USA and CDN

	<b>Nut (Clutch Boss):</b>	
	75 Nm (7.5 m•kg, 54 ft•lb)	

4. Bend the lock washer tab.

4

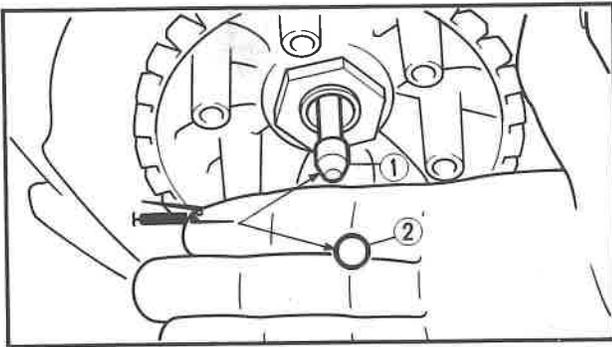


5. Install:

- Friction plate (yellow) ①
- Clutch plate ②
- Friction plate (brown) ③

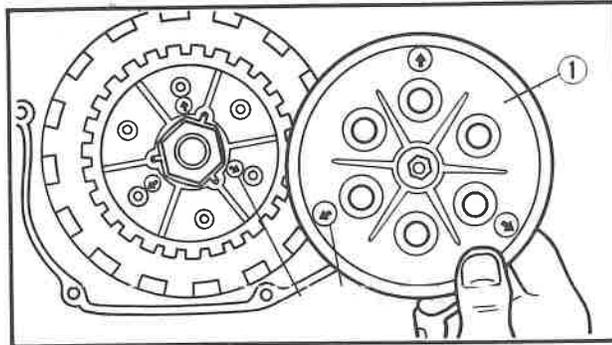
NOTE:

- Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.
- Yellow colored friction plates are used for the first and final.
- This machine is equipped with a dry type clutch. Be sure to clean with solvent or replace if grease or oil contacts either clutch or friction plates.



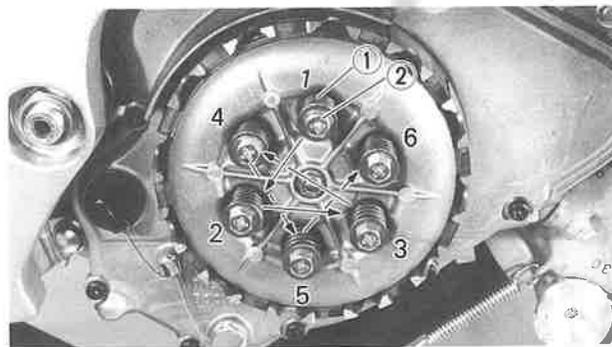
6. Install:
- Push rod ①
  - Ball ②

**NOTE:** \_\_\_\_\_  
Apply the lithium-soap base grease onto the push rod and ball.



7. Install:
- Pressure plate ①

**NOTE:** \_\_\_\_\_  
Align the arrow marks (a) on the clutch boss with the arrow marks (b) on the pressure plate.

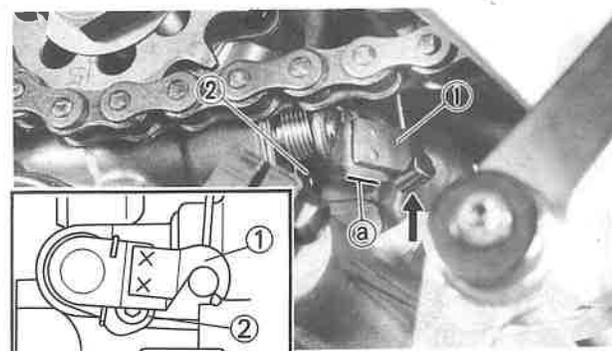


8. Install:
- Clutch spring ①
  - Screw (clutch spring) ②

**NOTE:** \_\_\_\_\_  
Tighten the screws in stages, using a diagonal pattern.

**4**

 **Screw (Clutch Spring):**  
9 Nm (0.9 m·kg, 6.5 ft·lb)



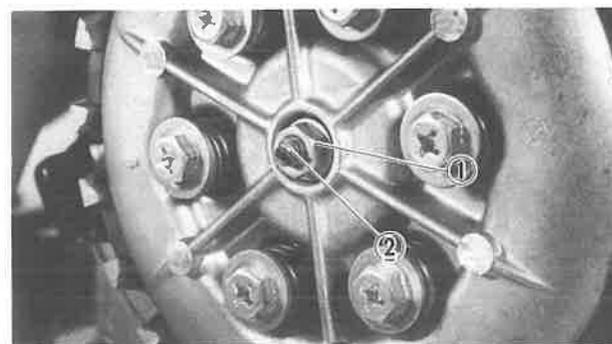
9. Check:
- Push lever position  
Push the push lever ① forward until it stops. With the push lever in this position, the rear edge (a) of the push lever should be aligned with the center of the push lever installation bolt ②.  
Not aligned → Adjust.

10. Adjust:
- Push lever position

**Push lever position adjustment steps:**

- Loosen the locknut ①.
- Turn the adjuster ② to align the rear edge of the push lever with the center of the push lever installation bolt.
- Tighten the locknut ①.

 **Locknut:**  
6 Nm (0.6 m·kg, 4.3 ft·lb)



# PRIMARY DRIVE GEAR, PRIMARY DRIVEN GEAR AND BALANCER SHAFT

ENG



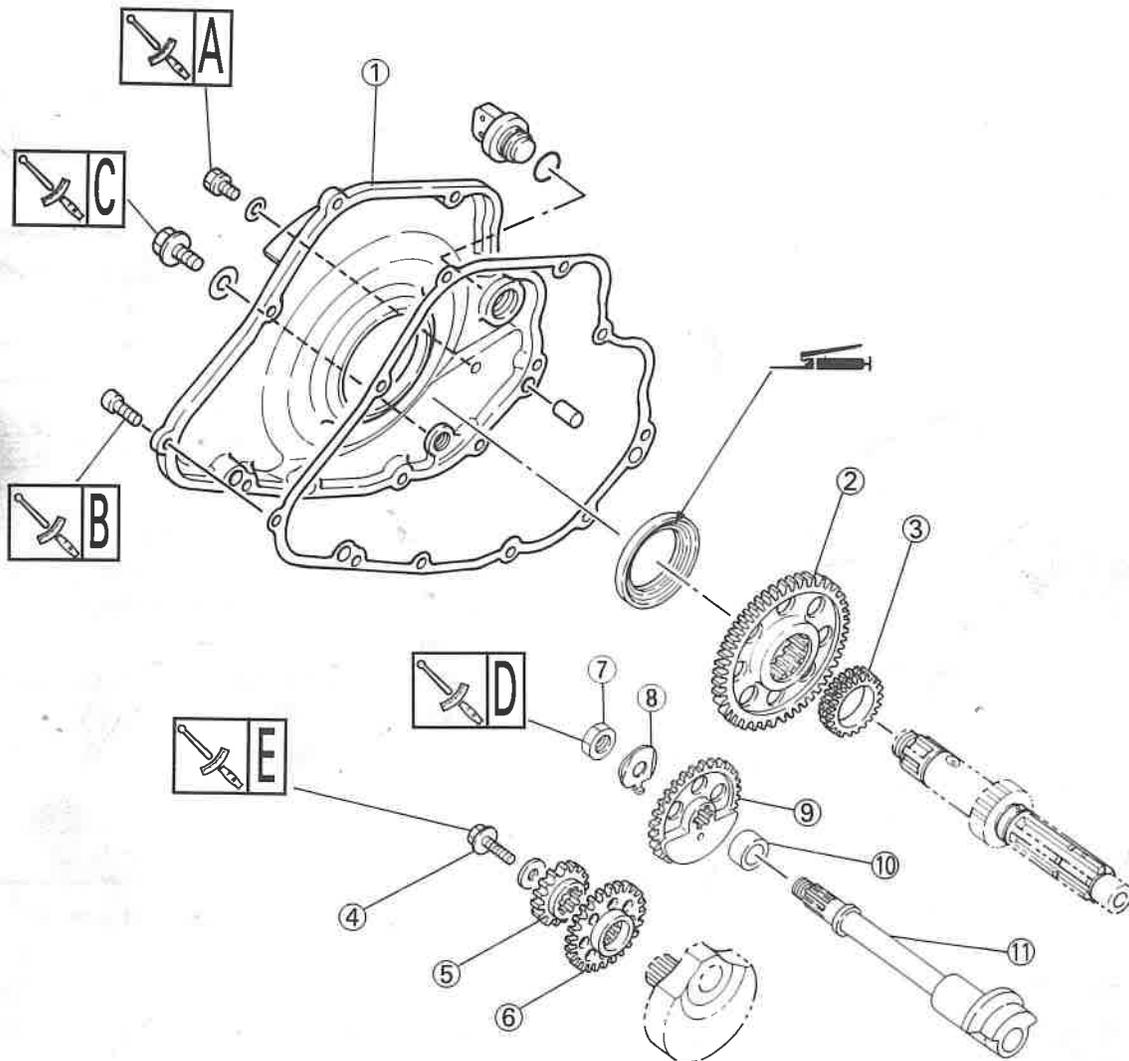
## PRIMARY DRIVE GEAR, PRIMARY DRIVEN GEAR AND BALANCER SHAFT PREPARATION FOR REMOVAL



- \*Remove the cowling.
- \*Drain the transmission oil.
- \*Remove the clutch.

4

A	9 Nm (0.9 m·kg, 6.5 ft·lb)
B	11 Nm (1.1 m·kg, 8.0 ft·lb)
C	20 Nm (2.0 m·kg, 14 ft·lb)
D	50 Nm (5.0 m·kg, 36 ft·lb)
E	55 Nm (5.5 m·kg, 40 ft·lb)



# PRIMARY DRIVE GEAR, PRIMARY DRIVEN GEAR AND BALANCER SHAFT

ENG

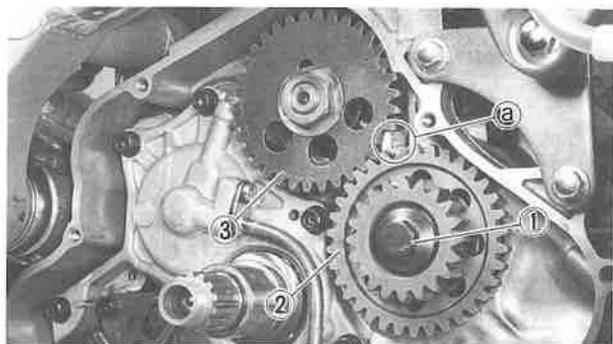


## NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material does not enter the crankcase.
- Remove any gasket adhered to the contacting surfaces.
- For reassembly, the removed parts should be cleaned with solvent, and apply the transmission oil to the sliding surfaces.

Extent of removal: ① Primary driven gear removal ② Primary drive gear removal  
③ Balancer shaft removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Crankcase cover (right)	1	Refer to "REMOVAL POINTS"
	2	Primary driven gear	1	
	3	Oil pump drive gear	1	
	4	Bolt (primary drive gear)	1	
	5	Primary drive gear	1	
	6	Balancer drive gear	1	
	7	Nut (balancer weight gear)	1	
	8	Lock washer	1	
	9	Balancer weight gear	1	
	10	Collar	1	
	11	Balancer shaft	1	



## REMOVAL POINTS PRIMARY DRIVE GEAR AND BALANCER WEIGHT GEAR

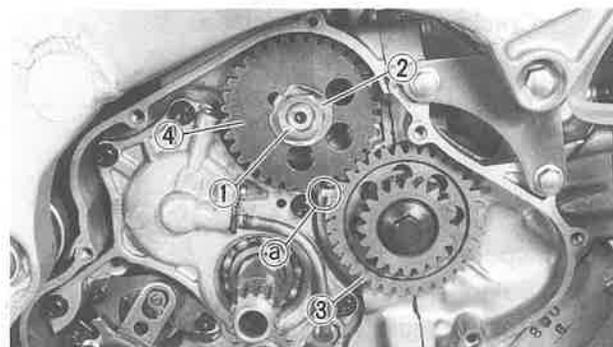
4

1. Loosen:

- Bolt (primary drive gear) ①

NOTE:

Place an aluminum plate (a) between the teeth of the balancer drive gear ② and balancer weight gear ③.

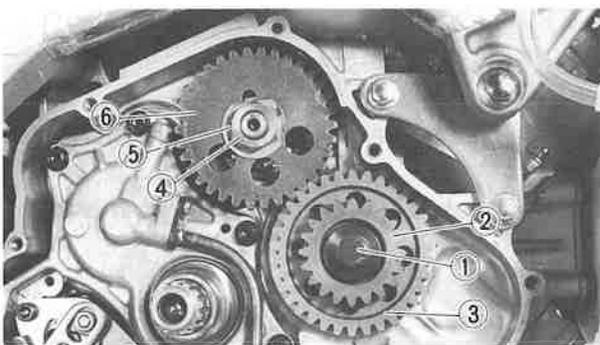


2. Loosen:

- Nut (balancer weight gear) ①

NOTE:

Straighten the lock washer ② tab and place an aluminum plate (a) between the teeth of the balancer drive gear ③ and balancer weight gear ④.



3. Remove:

- Bolt (primary drive gear) ①
- Primary drive gear ②
- Balancer drive gear ③
- Nut (balancer weight gear) ④
- Lock washer ⑤
- Balancer weight gear ⑥

**INSPECTION**

**PRIMARY DRIVE GEAR, PRIMARY DRIVEN GEAR AND OIL PUMP DRIVE GEAR**

1. Inspect:

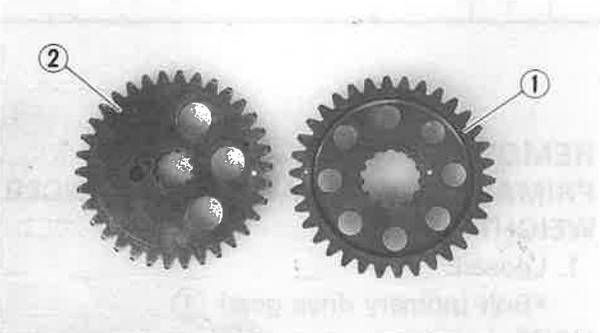
- Primary drive gear ①
  - Primary driven gear ②
  - Oil pump drive gear ③
- Wear/Damage → Replace.



**BALANCER DRIVE GEAR AND BALANCER WEIGHT GEAR**

1. Inspect:

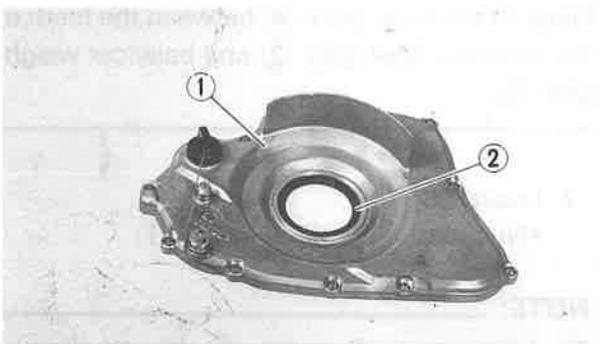
- Balancer drive gear ①
  - Balancer weight gear ②
- Wear/Damage → Replace.



**CRANKCASE COVER (RIGHT)**

1. Inspect:

- Contacting surface  
Scratches → Replace.
- Crankcase cover (right) ①  
Cracks/Damage → Replace.
- Oil seal ②  
Wear/Damage → Replace.



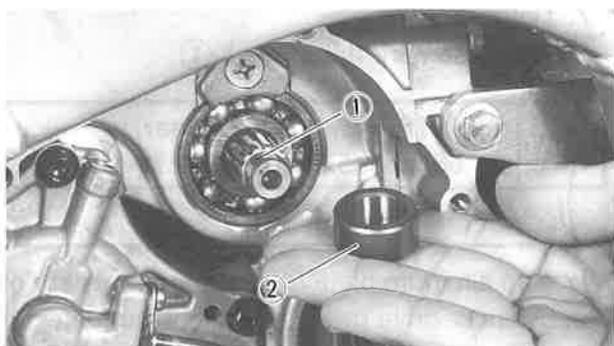
**BALANCER SHAFT**

1. Inspect:

- Balancer shaft ①  
Bend/Wear/Damage → Replace.



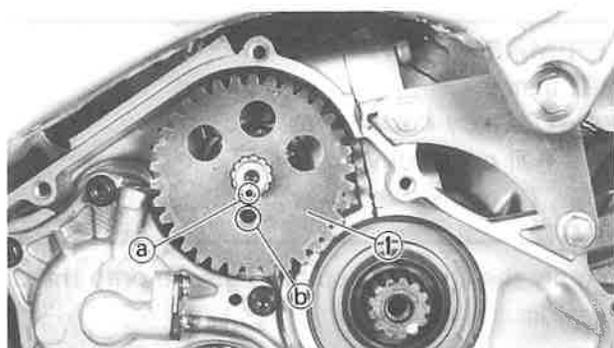
**4**



## ASSEMBLY AND INSTALLATION BALANCER SHAFT AND PRIMARY DRIVE GEAR

1. Install:

- Balancer shaft ①
- Collar ②

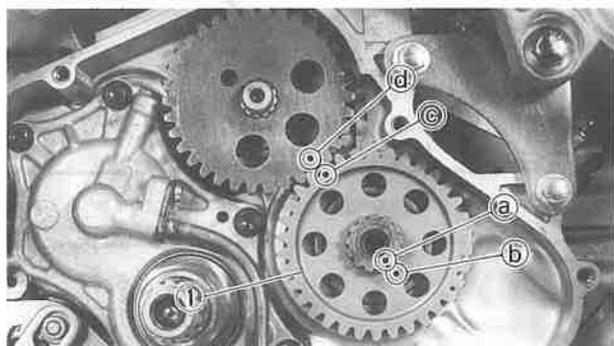


2. Install:

- Balancer weight gear ①

**NOTE:**

Align the punch mark (a) on the balancer shaft with the hole (b) of the balancer weight gear.



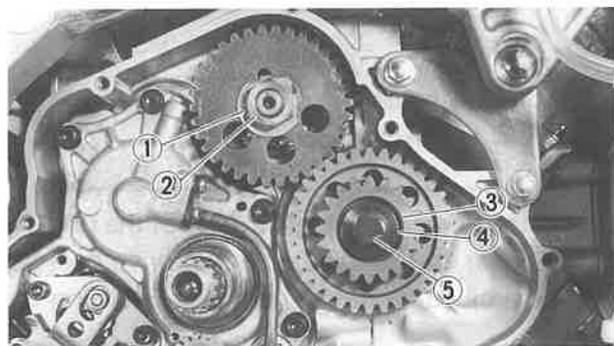
3. Install:

- Balancer drive gear ①

**NOTE:**

Align the punch marks, (a) (crankshaft) with (b) (balancer drive gear) and (c) (balancer drive gear) with (d) (balancer weight gear) as shown.

4



4. Install:

- Lock washer ①
- Nut (balancer weight gear) ②
- Primary drive gear ③
- Plain washer ④
- Bolt (primary drive gear) ⑤

**NOTE:**

Always use a new lock washer.

5. Tighten:

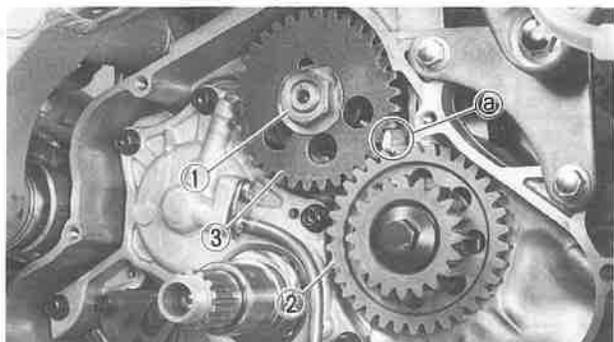
- Nut (balancer weight gear) ①



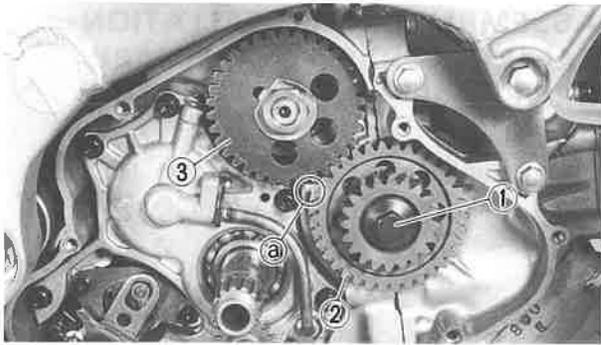
**Nut (Balancer Weight Gear):  
50 Nm (5.0 m·kg, 36 ft·lb)**

**NOTE:**

Place an aluminum plate (a) between the teeth of the balancer drive gear (2) and balancer weight gear (3).



6. Bend the lock washer tab.



7. Tighten:

- Bolt (primary drive gear) ①



**Bolt (Primary Drive Gear):**  
55 Nm (5.5 m•kg, 40 ft•lb)

**NOTE:**

Place an aluminum plate ① between the teeth of the balancer drive gear ② and balancer weight gear ③.

## PRIMARY DRIVEN GEAR

1. Install:

- Primary driven gear ①
- Oil pump drive gear ②
- To crankcase cover (right) ③.

**NOTE:**

Apply the lithium soap base grease onto the oil seal lip.

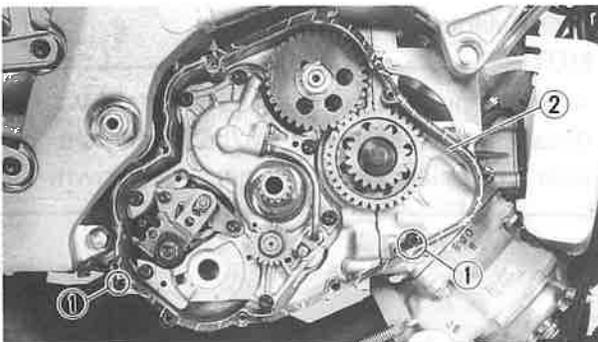


2. Install:

- Dowel pin ①
- Gasket (crankcase cover) ②

**NOTE:**

Always use a new gasket.



3. Install:

- Crankcase cover (right) ①
- Bolt (crankcase cover) ②

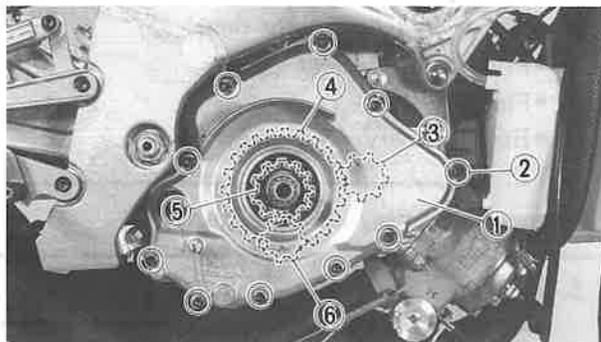
**NOTE:**

Mesh the primary drive gear ③ with the primary driven gear ④, and the oil pump drive gear ⑤ with the oil pump driven gear ⑥ by turning the rotor.



**Bolt (Crankcase Cover):**  
11 Nm (1.1 m•kg, 8.0 ft•lb)

4





MEMO



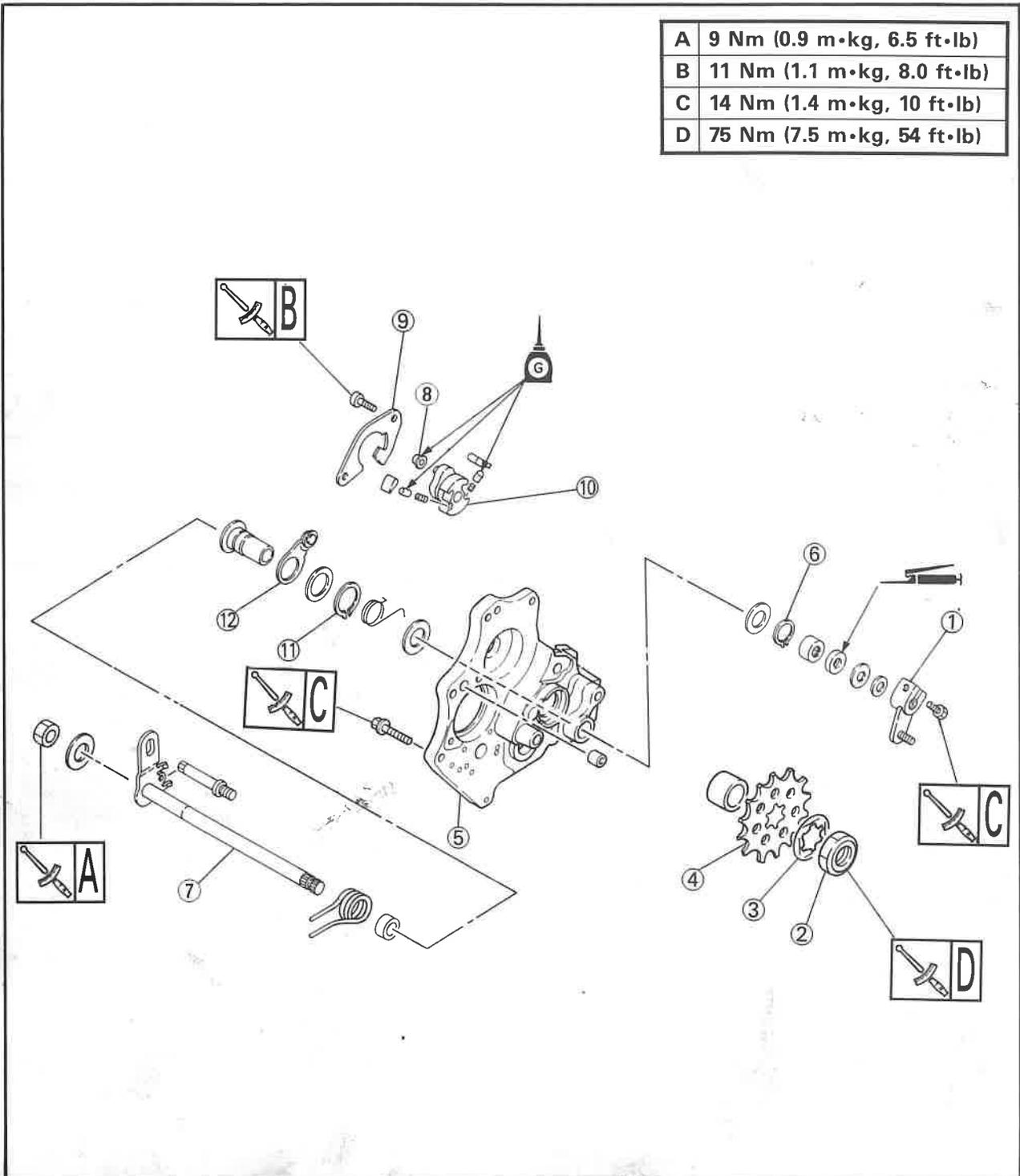
**SHIFT SHAFT**  
**PREPARATION FOR REMOVAL**



- \* Remove the cowling.
- \* Drain the transmission oil.
- \* Remove the clutch.
- \* Remove the crankcase cover (right).

**4**

A	9 Nm (0.9 m•kg, 6.5 ft•lb)
B	11 Nm (1.1 m•kg, 8.0 ft•lb)
C	14 Nm (1.4 m•kg, 10 ft•lb)
D	75 Nm (7.5 m•kg, 54 ft•lb)



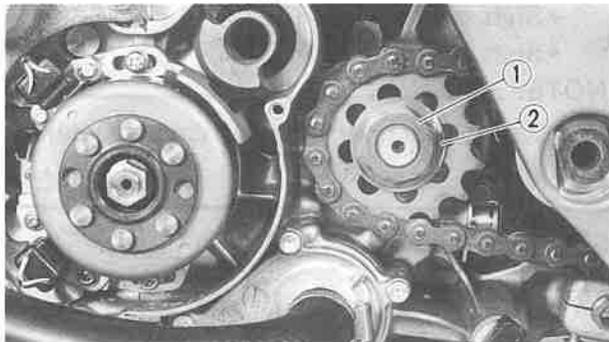


**NOTE ON REMOVAL AND REASSEMBLY**

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material does not enter the crankcase.
- Remove any gasket adhered to the contacting surfaces.
- For reassembly, the removed parts should be cleaned with solvent, and apply the transmission oil to the sliding surfaces.

Extent of removal: ① Shift shaft removal ② Stopper lever removal

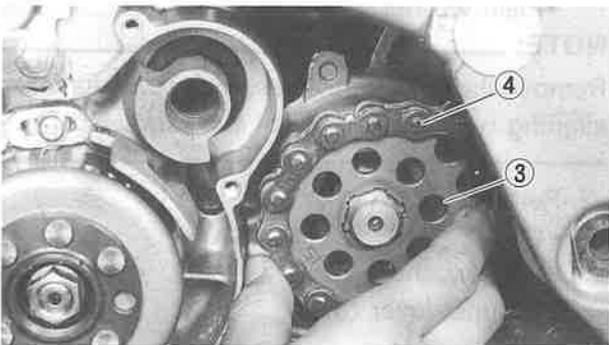
Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Shift arm	1	Refer to "REMOVAL POINTS".
	2	Nut (drive sprocket)	1	
	3	Lock washer	1	
	4	Drive sprocket	1	
	5	Transmission housing	1	
②	6	Circlip	1	Refer to "REMOVAL POINTS".
	7	Shift shaft	1	
	8	Roller	1	Refer to "REMOVAL POINTS".
	9	Shift guide	1	
	10	Shift lever	1	
	11	Circlip	1	Refer to "REMOVAL POINTS".
	12	Stopper lever	1	

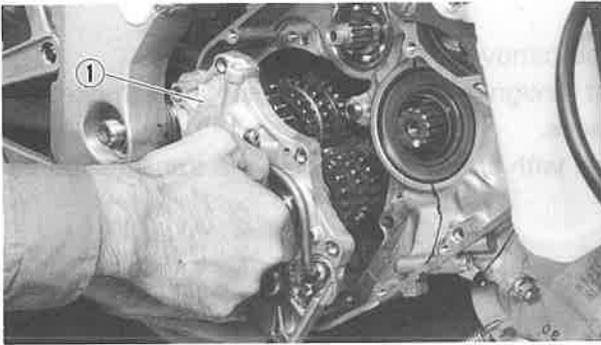


**REMOVAL POINTS  
TRANSMISSION HOUSING**

- Remove:
  - Nut (drive sprocket) ①
  - Lock washer ②
  - Drive sprocket ③
  - Drive chain ④
 Straighten the lock washer.

**NOTE:** Remove the drive sprocket ③ together with the drive chain ④.

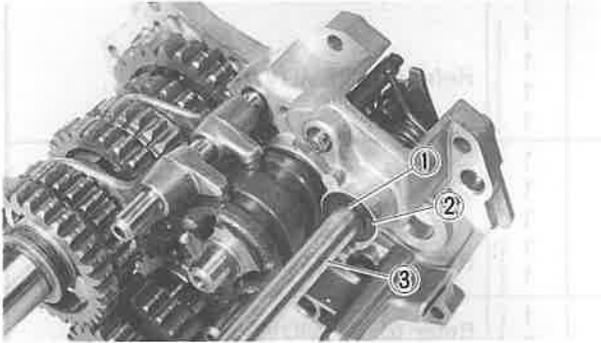




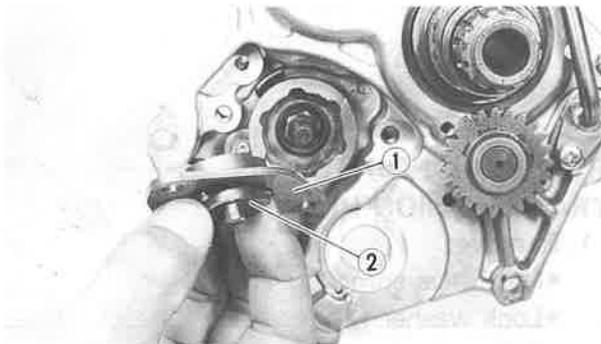
2. Remove
  - Bolt (transmission housing)
  - Transmission housing ①

**NOTE:**

Remove the transmission housing together with the transmission, shift cam, shift fork and shift shaft.

**SHIFT SHAFT**

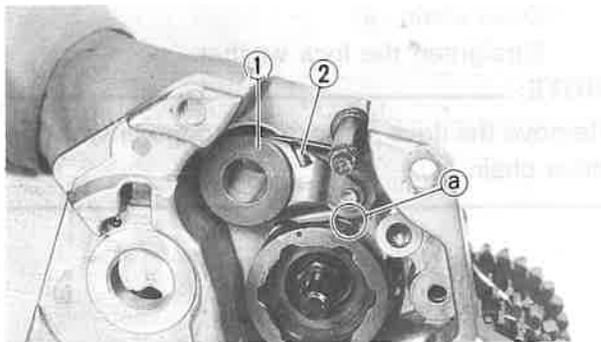
1. Remove:
  - Circlip ①
  - Plate washer ②
  - Shift shaft ③

**SHIFT GUIDE AND SHIFT LEVER ASSEMBLY**

1. Remove:
  - Bolt (shift gauge)
  - Shift guide ①
  - Shift lever assembly ②

**NOTE:**

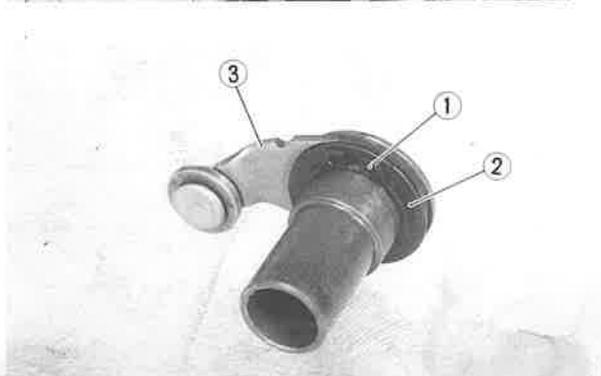
Remove the shift lever assembly together with the shift guide.

**STOPPER LEVER**

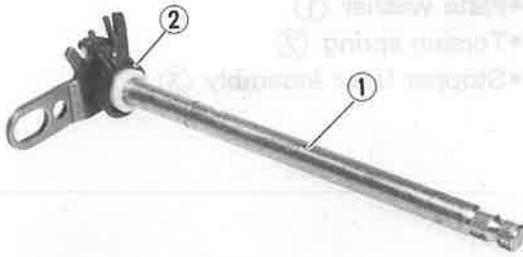
1. Remove
  - Stopper lever assembly ①
  - Torsion spring ②
  - Plain washer

**NOTE:**

Remove the stopper lever assembly with its roller aligning with the top (a) of the segment.



2. Remove
  - Circlip ①
  - Plain washer ②
  - Stopper lever ③



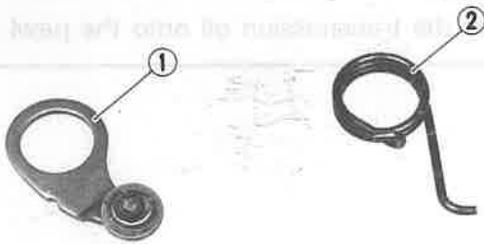
## INSPECTION SHIFT SHAFT

1. Inspect:
  - Shift shaft ①  
Bend/Damage → Replace.
  - Spring ②  
Broken/Damage → Replace.



## SHIFT GUIDE AND SHIFT LEVER ASSEMBLY

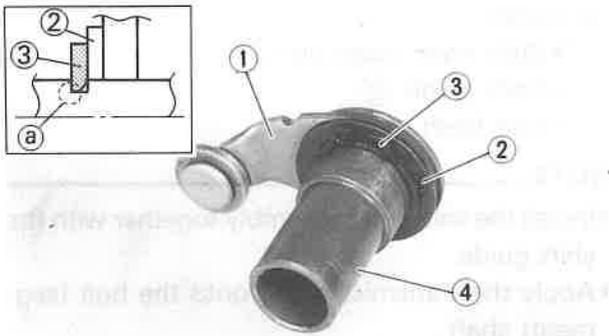
1. Inspect:
  - Shift lever ①
  - Pawl ②
  - Pawl pin ③
  - Spring ④
  - Shift guide ⑤  
Wear/Damage → Replace.



## STOPPER LEVER

1. Inspect:
  - Stopper lever ①  
Wear/Damage → Replace.
  - Torsion spring ②  
Broken/Damage → Replace.

# 4

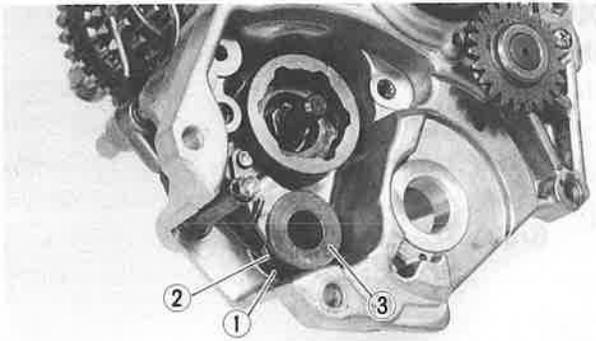


## ASSEMBLY AND INSTALLATION STOPPER LEVER

1. Install:
  - Stopper lever ①
  - Plain washer ②
  - Circlip ③  
To collar ④.

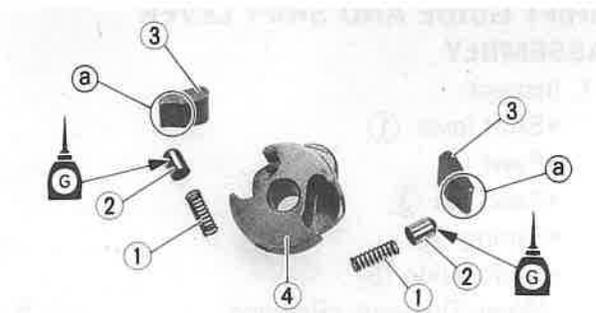
### NOTE:

- Be sure the circlip sharp-edged corner (a) is positioned opposite side to the plain washer ②.
- Always use a new circlip.



2. Install:

- Plate washer ①
- Torsion spring ②
- Stopper lever assembly ③



### SHIFT GUIDE AND SHIFT LEVER ASSEMBLY

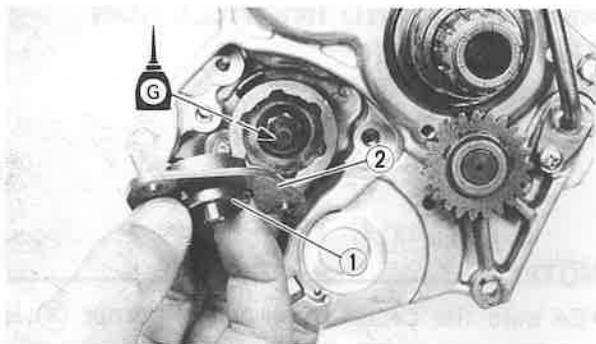
1. Install:

- Spring ①
  - Pawl pin ②
  - Pawl ③
- To shift lever ④.

**NOTE:** \_\_\_\_\_

- When installing the pawl into the shift lever, make sure the chamfered side (a) face the pawl pin side.
- Apply the transmission oil onto the pawl pin.

4



2. Install:

- Shift lever assembly ①
- Shift guide ②
- Bolt (shift guide)

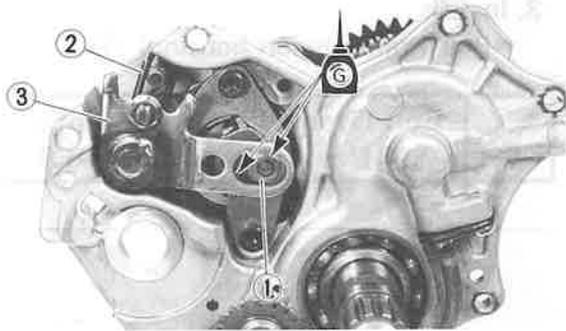
**NOTE:** \_\_\_\_\_

- Install the shift lever assembly together with the shift guide.
- Apply the transmission oil onto the bolt (segment) shaft.



**Bolt (Shift Guide):**

**11 Nm (1.1 m•kg, 8.0 ft•lb)**

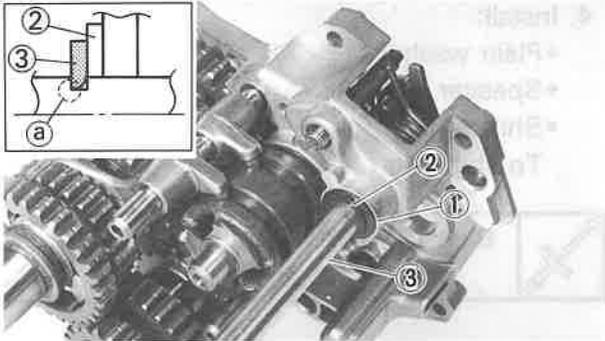
**SHIFT SHAFT**

## 1. Install:

- Roller ①
- Torsion spring ②
- Shift Shaft ③

**NOTE:**

Apply the transmission oil onto the roller and shift shaft.



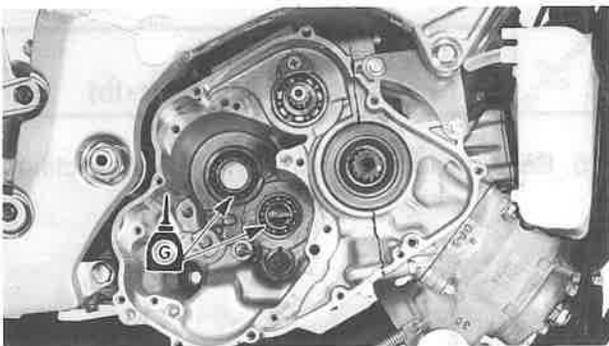
## 2. Install:

- Plain washer ①
- Circlip ②
- To shift shaft ③.

**NOTE:**

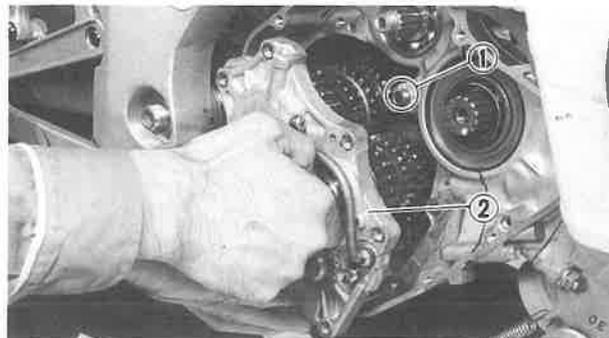
- Be sure the circlip sharp-edged corner (a) is positioned opposite side to the plain washer ①.
- Always use a new circlip.

4

**TRANSMISSION HOUSING**

## 1. Apply:

- Transmission oil
- Onto the bearing (crankcase left).

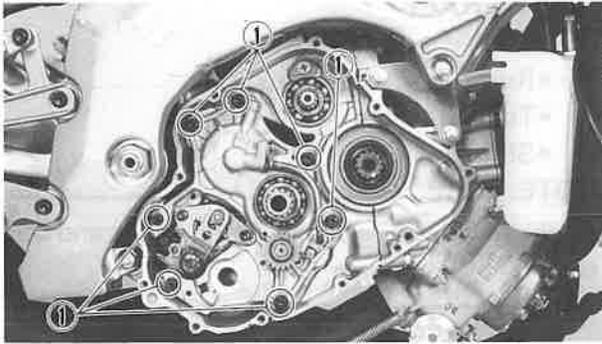


## 2. Install:

- Dowel pin ①
- Transmission housing ②

**NOTE:**

Install the transmission housing together with the transmission, shift cam, shift fork and shift shaft.



## 3. Install:

- Bolt (transmission housing) ①



**Bolt (Transmission Housing):**  
14 Nm (1.4 m•kg, 10 ft•lb)

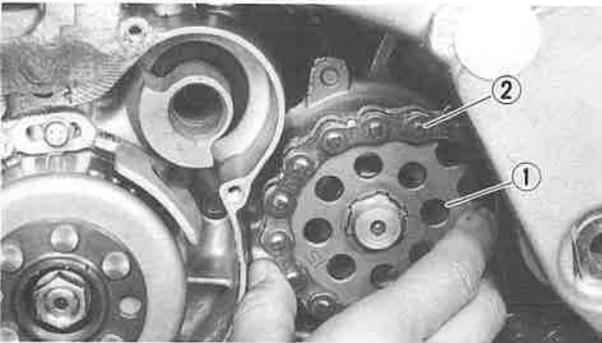


## 4. Install:

- Plain washer ①
  - Spacer ②
  - Shift arm ③
- To shift shaft.



**Bolt (Shift Arm):**  
14 Nm (1.4 m•kg, 10 ft•lb)



## 5. Install:

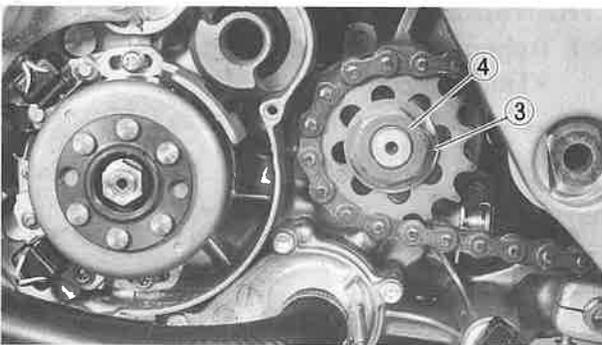
- Drive sprocket ①
- Drive chain ②
- Lock washer ③
- Nut (drive sprocket) ④

**NOTE:**

- Install the drive sprocket ① together with the drive chain ②.
- Always use a new lock washer.

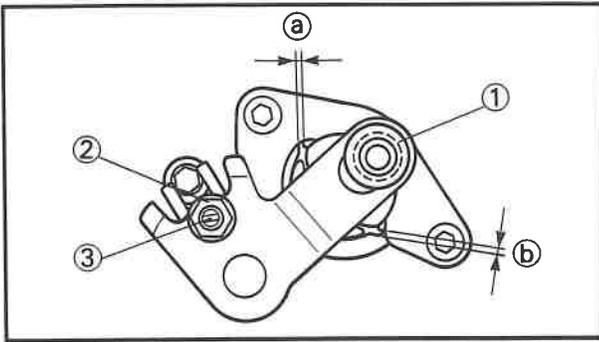


**Nut (Drive Sprocket):**  
75 Nm (7.5 m•kg, 54 ft•lb)



- 6. Bend the lock washer tab to lock the locknut.

4



## 7. Check:

- Shift lever position

**Checking steps:**

- Attach the collar (with packing parts) ① onto the roller.
- Check the shift lever position.
- Gaps ① and ② are not equal → Adjust.

## 8. Adjust:

- Shift lever position

**Adjusting steps:**

- Loosen the locknut ②.
- Turn the adjuster ③ in or out.
- Tighten the locknut ②.

**Locknut:**

**9 Nm (0.9 m·kg, 6.5 ft·lb)**

- Remove the collar ①.



**TRANSMISSION, SHIFT CAM AND SHIFT FORK  
PREPARATION FOR REMOVAL**

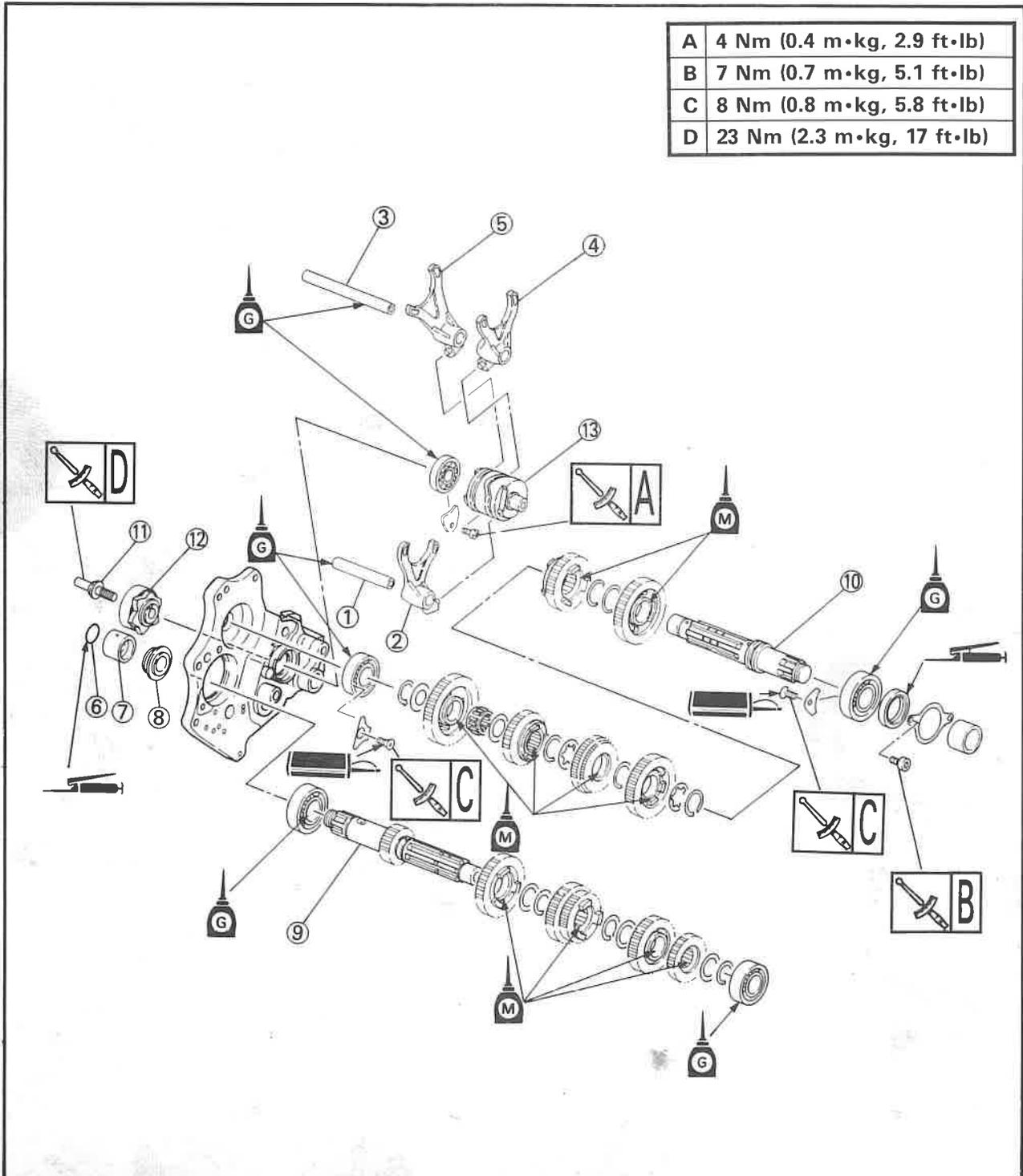


- \*Remove the cowling.
- \*Drain the transmission oil.
- \*Remove the following parts:
  - Clutch
  - Crankcase cover (right)
  - Shift arm

- Drive sprocket
- Transmission housing
- Shift shaft and shift lever

**4**

A	4 Nm (0.4 m•kg, 2.9 ft•lb)
B	7 Nm (0.7 m•kg, 5.1 ft•lb)
C	8 Nm (0.8 m•kg, 5.8 ft•lb)
D	23 Nm (2.3 m•kg, 17 ft•lb)



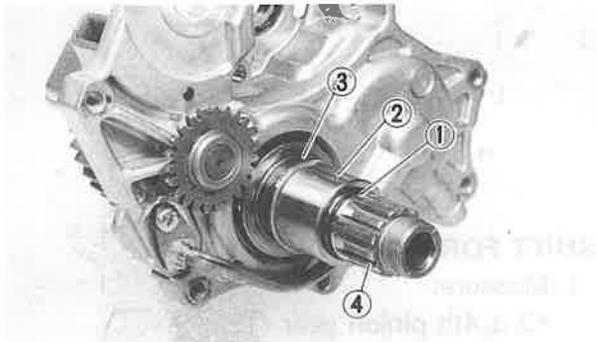


## NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material do not enter the crankcase.
- Remove the gasket adhered on the contacting surface.
- For reassembly, the removed parts should be cleaned with solvent, and apply the transmission oil onto the sliding surface.

Extent of removal: ① Shift fork removal    ② Main axle and drive axle removal  
 ③ Shift cam removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Guide bar (short)	1	
	2	Shift fork 2	1	
	3	Guide bar (long)	1	
	4	Shift fork 1	1	
	5	Shift fork 3	1	
	6	O-ring	1	Refer to "REMOVAL POINTS".
	7	Spacer	1	
	8	Thrust plate	1	
	9	Main axle	1	
	10	Drive axle	1	
	11	Bolt (segment)	1	Refer to "REMOVAL POINTS".
	12	Segment	1	
	13	Shift cam	1	



## REMOVAL POINTS TRANSMISSION

- Remove:
  - O-ring ①
  - Spacer ②
  - Thrust plate ③
 From main axle ④.

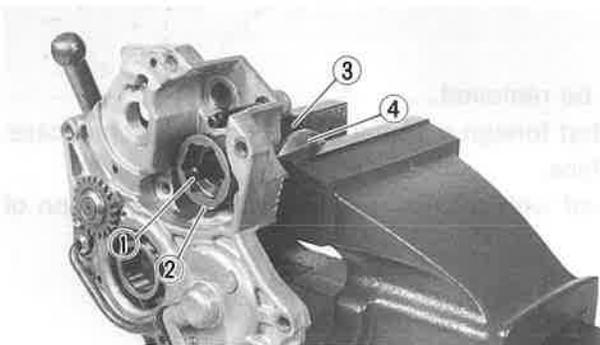


- Remove:
  - Main axle ①
  - Drive axle ②

### NOTE:

- Remove the main axle together with the drive axle from the transmission housing ③.
- Remove assembly carefully. Note the position of each part. Pay particular attention to the location and direction of shift forks.

4

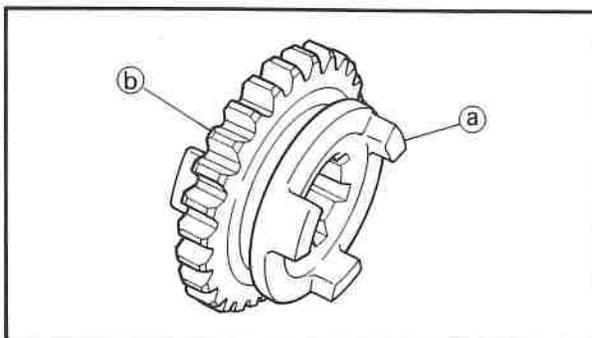


### SEGMENT

1. Remove:
  - Bolt (segment) ①
  - Segment ②

### NOTE:

Clamp the shift cam ③ securely in a vise, using soft protecting material ④ to loosen the bolt (segment).



### INSPECTION

#### GEARS

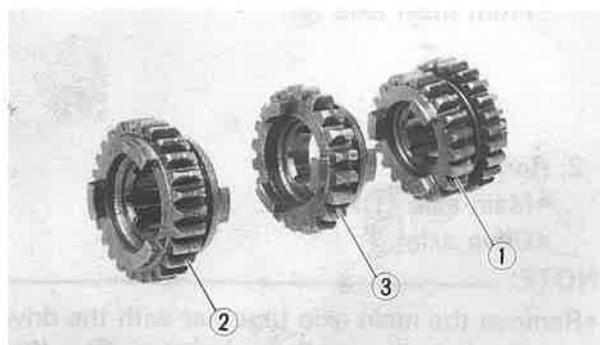
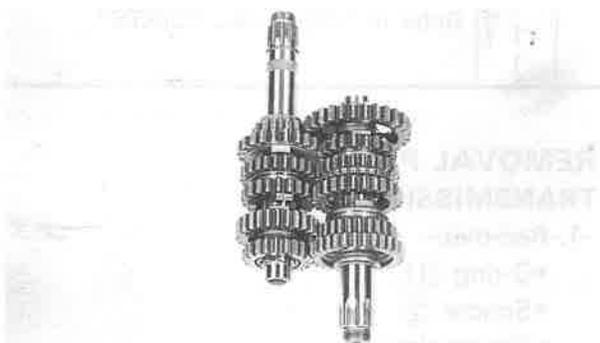
1. Inspect:
  - Matching dog a
  - Gear teeth b

Wear/Damage → Replace.

2. Check:
  - Gears movement

Unsmooth movement → Repair or replace.

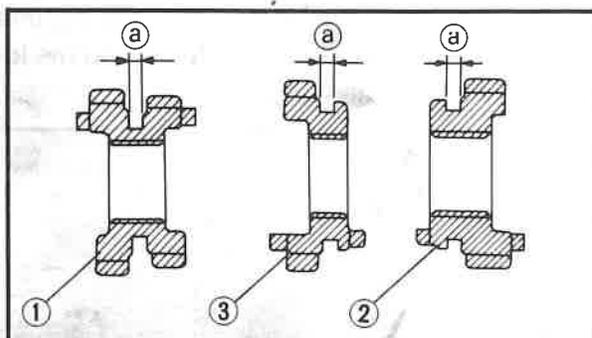
# 4



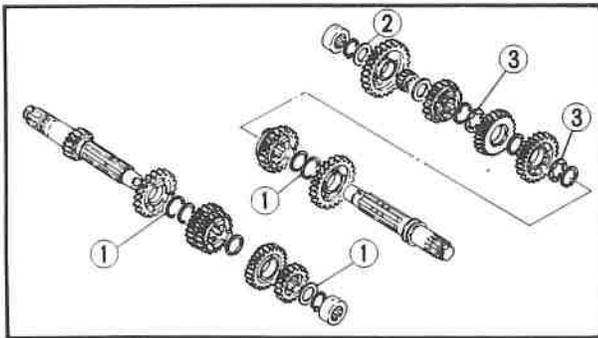
### SHIFT FORK GROOVE

1. Measure:
  - 3rd/4th pinion gear ①
  - 5th wheel gear ②
  - 6th wheel gear ③
  - Shift fork groove a

Out of specification → Replace.



Shift Fork Groove a:	
Standard	< Limit >
5.05 ~ 5.18 mm (0.199 ~ 0.204 in)	5.35 mm (0.211 in)



### THRUST CLEARANCE

#### 1. Check:

- After assembling the transmission, check whether the idle gear turns smoothly without a thrust.

If the thrust clearance is too large or the idle gear moves with difficulty → Replace the shim ①, ② and ③.

Chose the shims by the following chart.

Part name	Size (thickness)	Part number
Shim ① STD	t = 1.0 mm (0.039 in)	90201-253K0
	t = 0.9 mm (0.035 in)	90201-256E6
Shim ② STD	t = 1.0 mm (0.039 in)	90201-20276
	t = 0.9 mm (0.035 in)	90201-206E5
Shim ③ STD	t = 0.7 mm (0.028 in)	5F7-17136-00
	t = 0.5 mm (0.020 in)	90209-22082

#### NOTE:

It is necessary to adjust the thrust clearance when the transmission gear, axle, washer, circlip, bearing or crankcase is replaced.

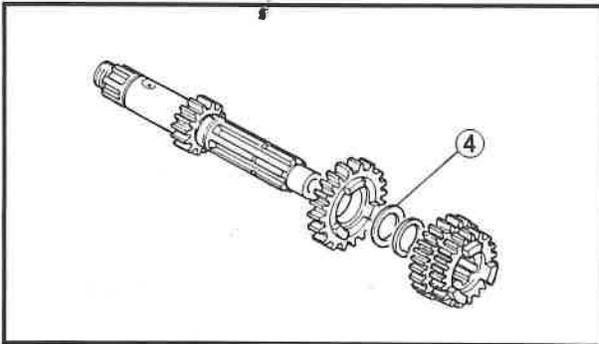
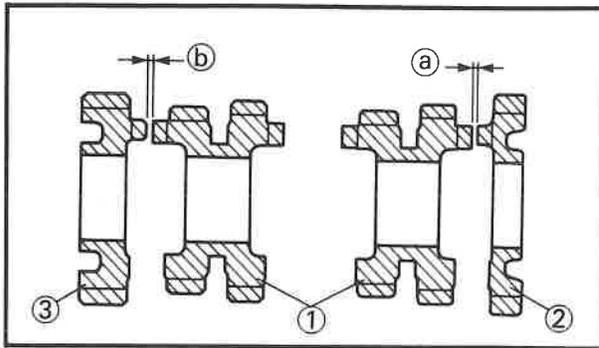
# 4

### DOG CLEARANCE

#### NOTE:

- It is necessary to adjust the dog clearance when the transmission gear, axle, washer, circlip, bearing or crankcase is replaced.
- If there is any shifting trouble, it is necessary to check the shift fork, shift cam, shift lever and gears. But if there are in good condition, the dog clearance should be inspected.

1. Install the transmission, shift cam and shift fork into the transmission housing.
2. Position the transmission is neutral.
3. Pull the main axle toward the clutch side.



4. Bring the 3rd/4th pinion gear ① into light contact with the 6th pinion gear ② to the extent that they are not engaged, and measure the clearance ① between 3rd/4th pinion gear and 6th pinion gear.

Bring the 3rd/4th pinion gear ① into light contact with the 5th pinion gear ② to the extent that they are not engaged and measure the clearance ② between 3rd/4th pinion gear and 5th pinion gear.

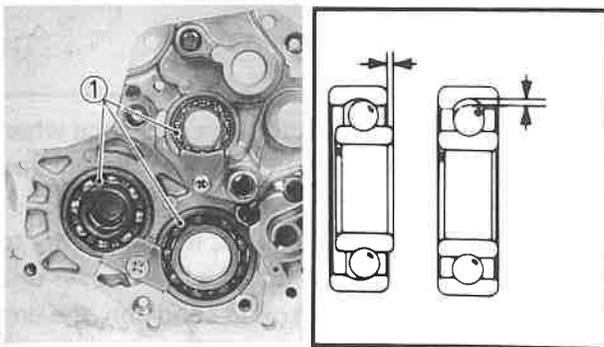


**Dog Clearance ①, ②:**  
0.5 mm (0.020 in) or more

Out of specification or clearance ① and ② are not equal → Replace the shim ④.  
Chose the shim by the following chart.

Part name	Size (thickness)	Part number
Shim ④ STD	t = 1.0 mm (0.039 in)	90201-253K0
	t = 0.9 mm (0.035 in)	90201-256E6

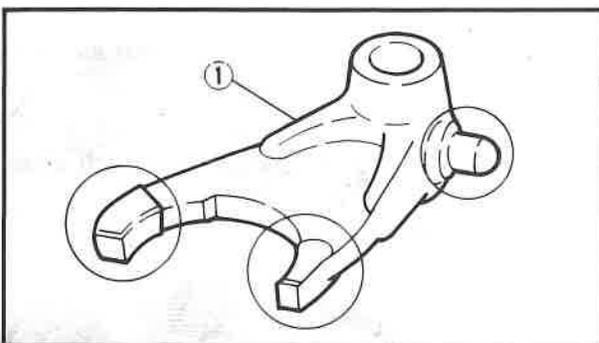
4



**BEARING**

1. Inspect:

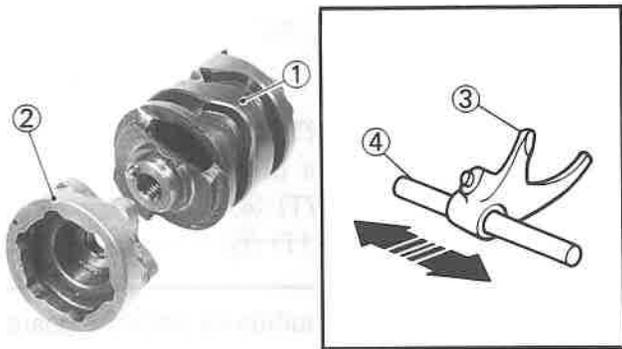
- Bearing ①  
Rotate inner race with a finger.  
Rough spot/Seizure → Replace.



**SHIFT FORK, SHIFT CAM AND SEGMENT**

1. Inspect:

- Shift fork ①  
Wear/Damage/Scratches → Replace.



2. Inspect:
- Shift cam ①
  - Segment ②
  - Shift fork ③
  - Wear/Damage/Scratches → Replace.
  - Guide bar ④
  - Bend/Wear/Damage → Replace.

3. Check:
- Shift fork movement
  - On its guide bar.
  - Unsmooth operation → Replace.
  - Shift fork and/or guide bar.

**NOTE:** \_\_\_\_\_

For a malfunctioning shift fork, replace not only the shift fork itself but the two gears adjacent to the shift fork.

## ASSEMBLY AND INSTALLATION

### SHIFT CAM

1. Install:
- Shift cam ①

**NOTE:** \_\_\_\_\_

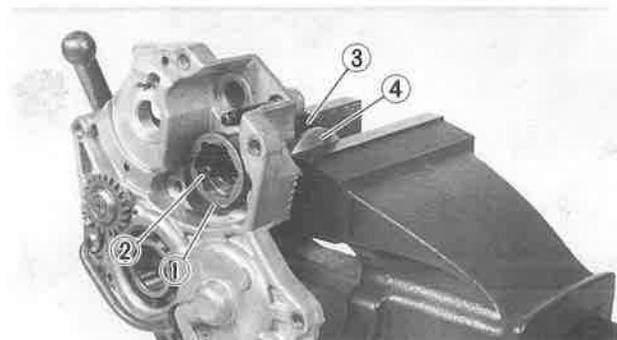
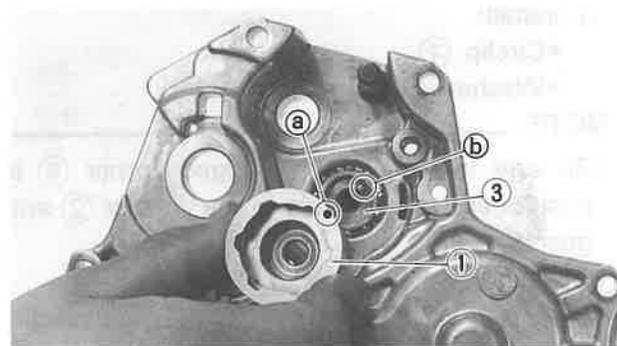
Apply the transmission oil onto the shift cam bearing.



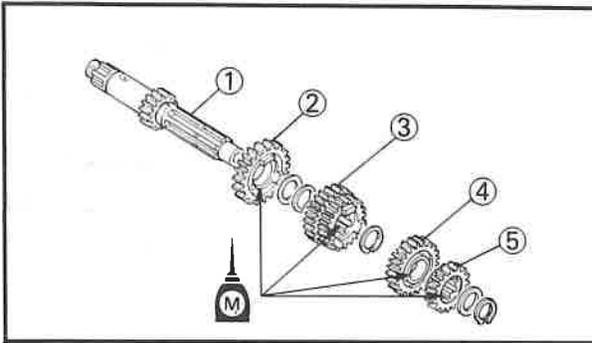
2. Install:
- Segment ①
  - Bolt (segment) ②

**NOTE:** \_\_\_\_\_

- When installing the segment ① onto the shift cam ③, align the punch mark (a) with the dowel pin (b).
- Clamp the shift cam ③ securely in a vise, using soft protecting material ④ to tighten the bolt (segment).



**Bolt (Segment):**  
23 Nm (2.3 m•kg, 17 ft•lb)



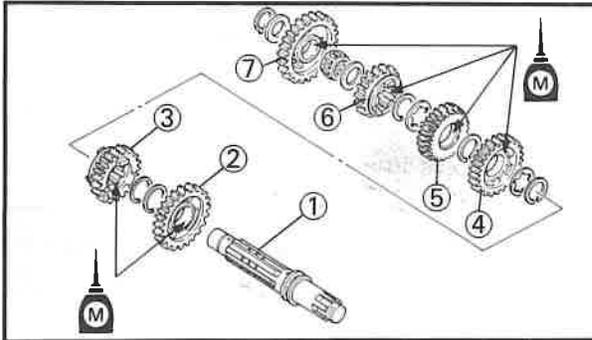
**TRANSMISSION**

1. Install:

- Main axle ①
- 6th pinion gear (22T) ②
- 3rd/4th pinion gear (21T/25T) ③
- 5th pinion gear (27T) ④
- 2nd pinion gear (21T) ⑤

**NOTE:**

Apply the molybdenum disulfide oil onto the gears inner circumference.



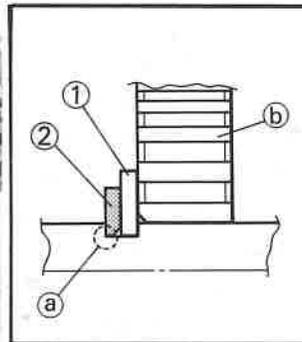
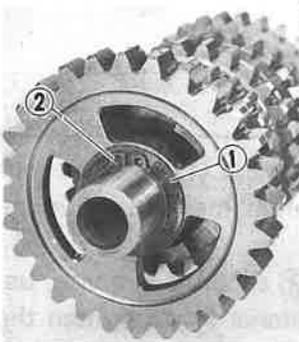
2. Install:

- Drive axle ①
- 2nd wheel gear (31T) ②
- 5th wheel gear (26T) ③
- 3rd wheel gear (26T) ④
- 4th wheel gear (27T) ⑤
- 6th wheel gear (20T) ⑥
- 1st wheel gear (28T) ⑦

**NOTE:**

Apply the molybdenum disulfide oil onto the gears inner circumference.

**4**

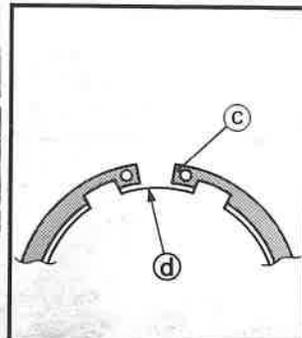
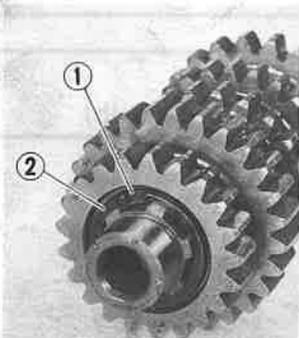


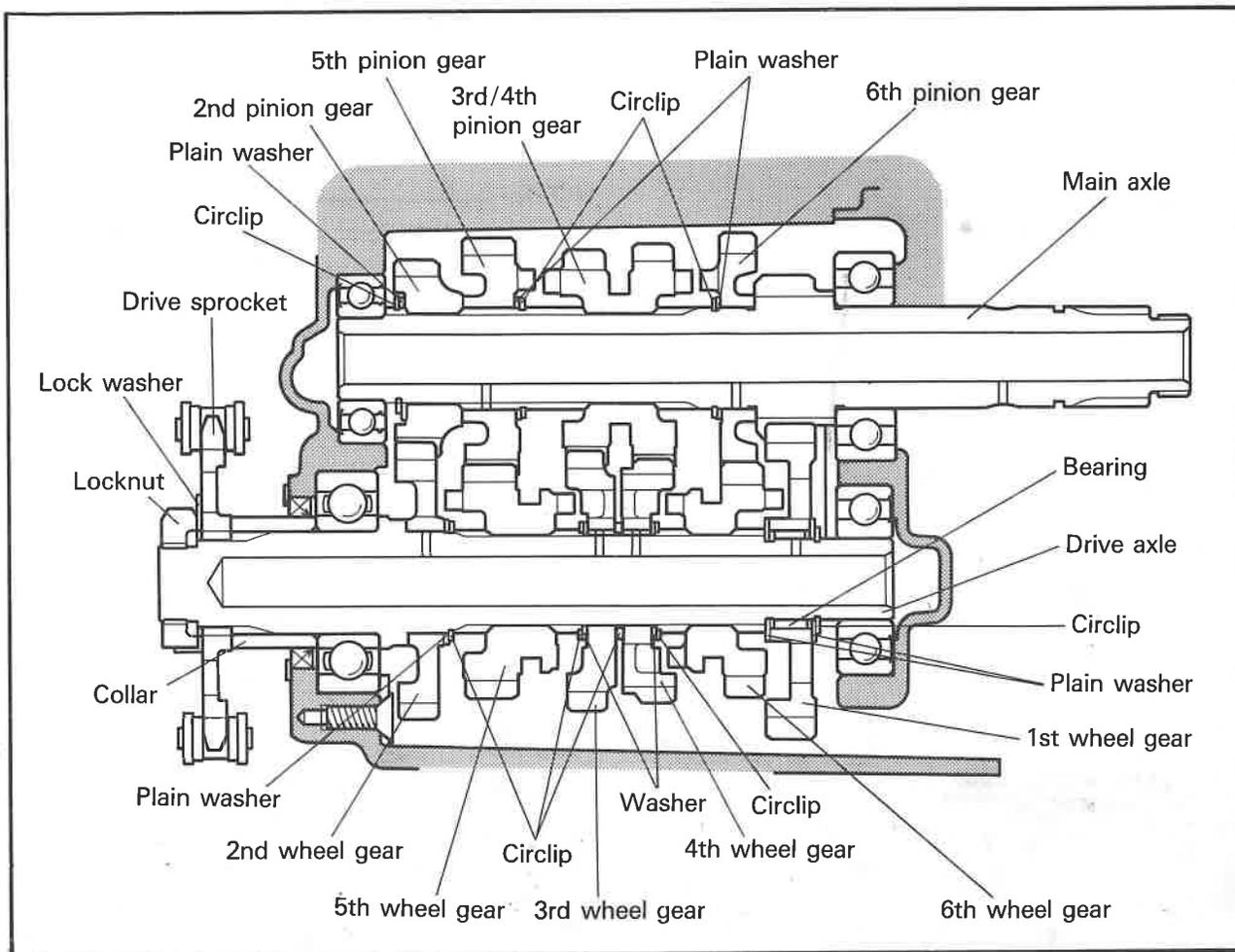
3. Install:

- Circlip ①
- Washer ②

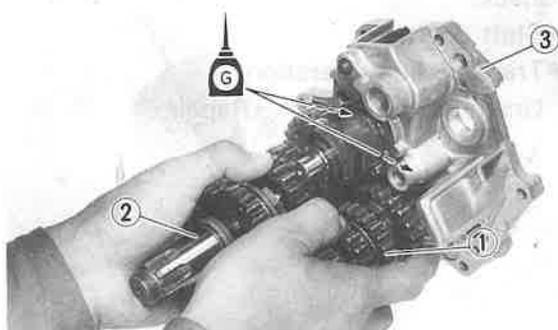
**NOTE:**

- Be sure the circlip sharp-edged corner (a) is positioned opposite side to the washer (2) and gear (b).
- Always use a new circlip.
- Be sure the circlip end (c) is positioned at axle spline groove (d).





## 4

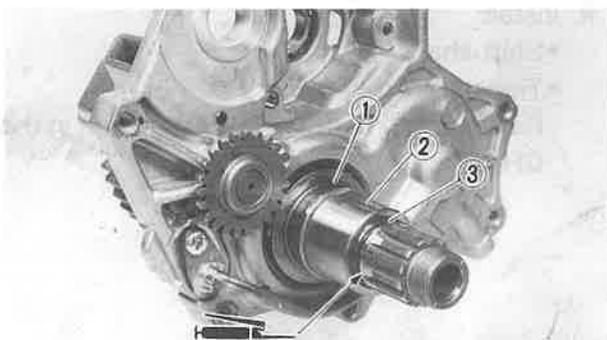


4. Install:

- Main axle ①
- Drive axle ②

**NOTE:**

- Apply the transmission oil onto the main axle and drive axle bearings.
- Install the main axle together with the drive axle into the transmission housing ③.

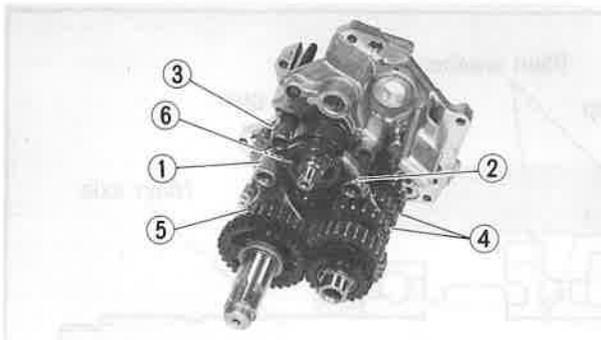


5. Install:

- Thrust plate ①
- Spacer ②
- O-ring ③

**NOTE:**

- Always use a new O-ring.
- Apply the lithium soap base grease on the O-ring.



## SHIFT FORK

### 1. Install:

- Shift fork 1 ①
- Shift fork 2 ②
- Shift fork 3 ③

### NOTE:

- Mesh the shift fork #1 ① with the 5th wheel gear ⑤ and #3 ③ with the 6th gear ⑥ on the drive axle.
- Mesh the shift fork #2 ② with the 3rd/4th pinion gear ④ on the main axle.

### 2. Install:

- Guide bar (longer) ①
- Guide bar (shorter) ②

### NOTE:

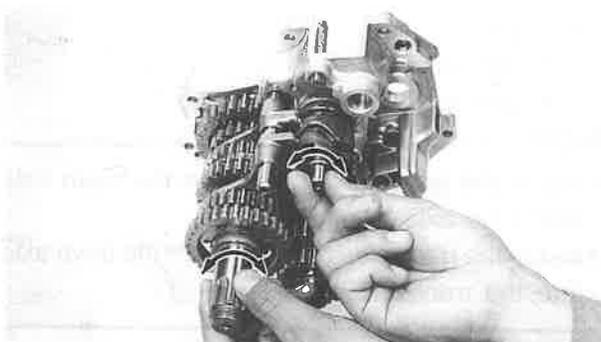
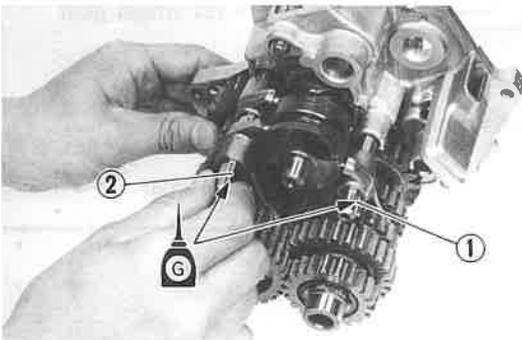
- Apply the transmission oil onto the guide bars.
- Be sure the long bar ① is inserted into the shift forks #1 and #3 and the short one ② into #2.

### 3. Check:

- Shift operation
- Transmission operation  
Unsmooth operation → Repair.

### 4. Install:

- Shift shaft
- Transmission housing  
Refer to the "SHIFT SHAFT" section in the CHAPTER 4.



4



MEMO



# OIL PUMP

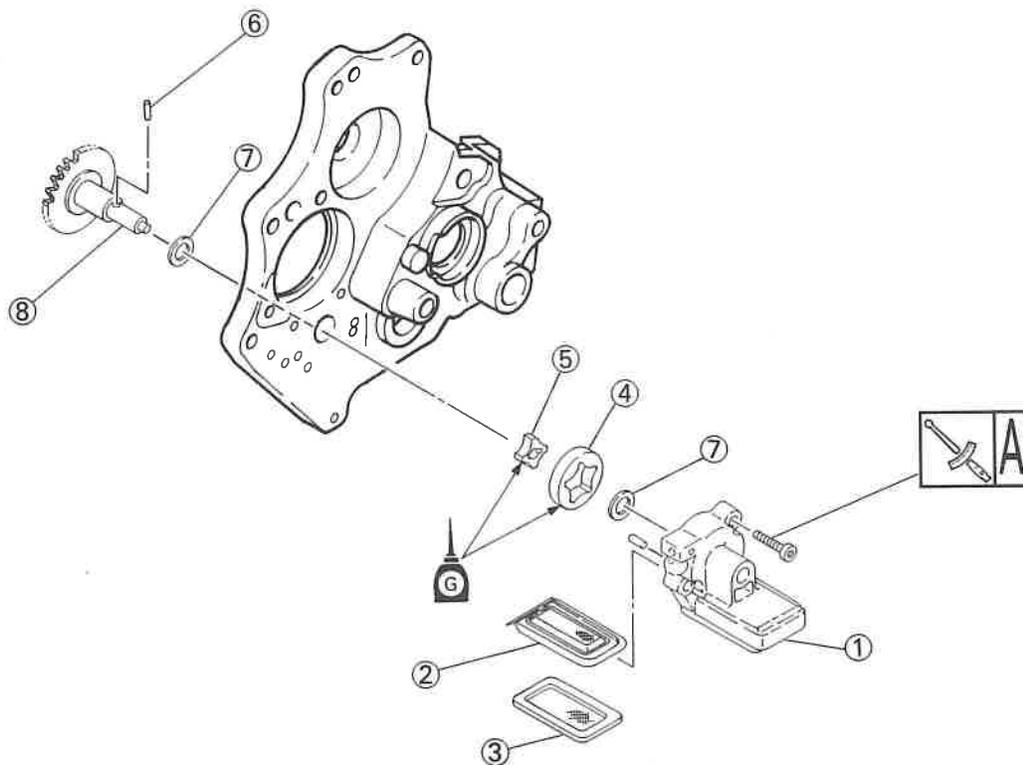
## PREPARATION FOR REMOVAL



- \* Remove the cowling.
- \* Drain the transmission oil.
- \* Remove the following parts:
  - Clutch
  - Crankcase cover (right)
  - Shift arm
  - Drive sprocket

- Transmission housing
- Shift shaft and shift lever
- Transmission
- Shift fork

<b>TIP CLEARANCE LIMIT:</b> 0.15 mm (0.0059 in)	
<b>A</b>	<b>8 Nm (0.8 m•kg, 5.8 ft•lb)</b>



4

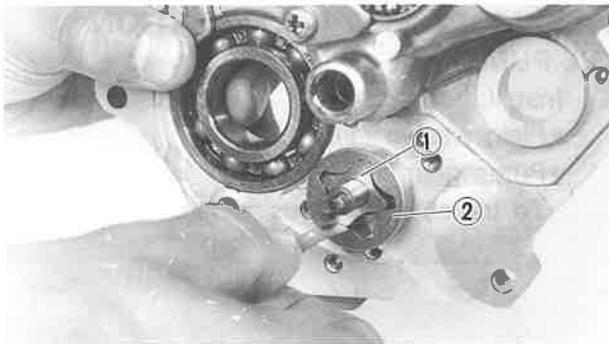


## NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material do not enter the crankcase.
- Remove the gasket adhered on the contacting surface.
- For assembly, the removed parts should be cleaned with solvent, and apply the transmission oil onto the sliding surface.

Extent of removal: ① Oil pump disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Oil pump cover	1	
	2	Strainer 1	1	
	3	Strainer 2	1	
	4	Outer rotor	1	
	5	Inner rotor	1	
	6	Dowel pin	1	
	7	Plain washer	2	
	8	Pump gear shaft	1	



## INSPECTION OIL PUMP

### 1. Measure:

- Tip clearance

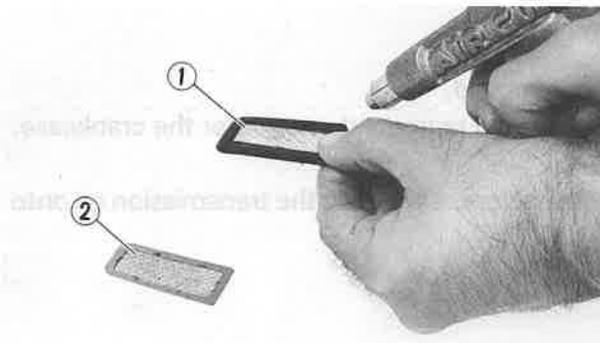
Measure the clearance between the inner rotor ① and outer rotor ②.

Out of limit → Replace the inner rotor and outer rotor as a set.



**Tip Clearance Limit:**  
0.15 mm (0.0059 in)

# 4

**STRAINER**

## 1. Clean:

- Strainer 1 ①
- Strainer 2 ②

Use compressed air.

**NOTE:**

- Clean the strainer every 500 km.
- If a lot of metallic dust is noticed, disassemble the engine and check.

**PUMP GEAR SHAFT**

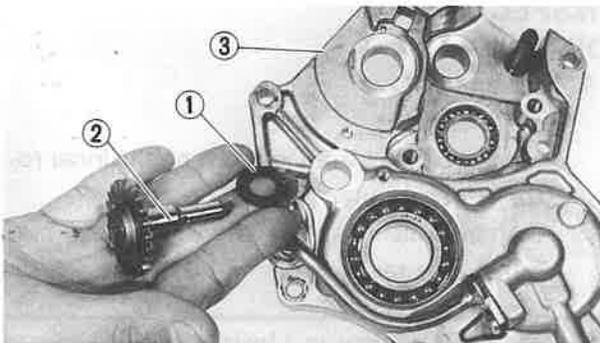
## 1. Inspect:

- Pump gear shaft ①
- Wear/Damage → Replace.

**ASSEMBLY AND INSTALLATION  
OIL PUMP**

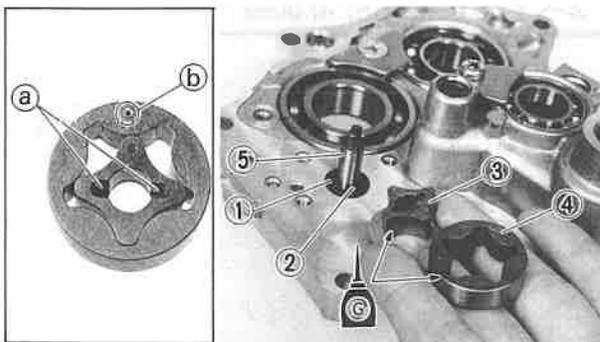
## 1. Install:

- Plain washer ①
  - Pump gear shaft ②
- To transmission housing ③.

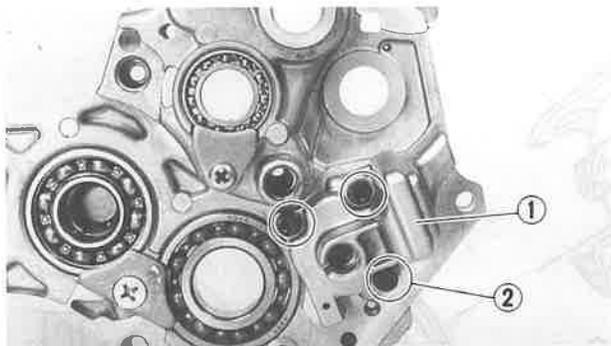
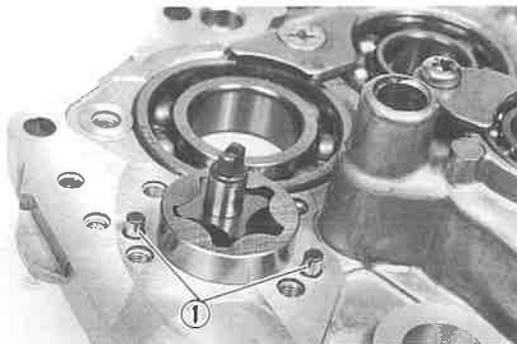
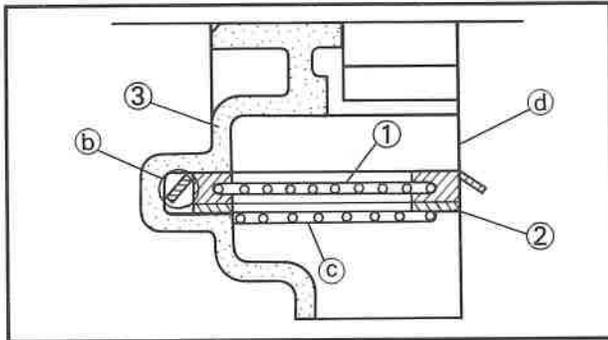
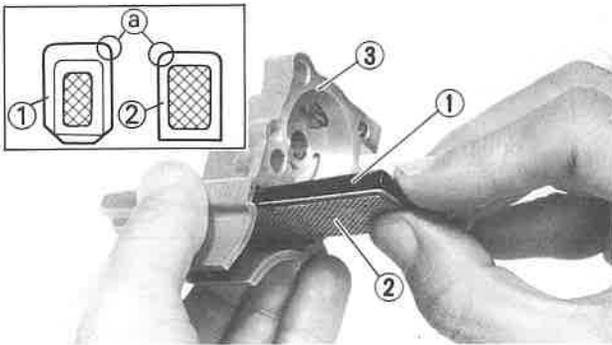


## 2. Install:

- Plain washer ①
  - Dowel pin ②
  - Inner rotor ③
  - Outer rotor ④
- To pump gear shaft ⑤.

**NOTE:**

- Apply the transmission oil onto the inner rotor and outer rotor.
- Make sure the dowel pin ② fits into the groove ① in the inner rotor ③.
- When installing the outer rotor ④, make sure the punch mark ② on the outer rotor face the transmission housing side.



## 3. Install:

- Strainer 1 ①
  - Strainer 2 ②
- To oil pump cover ③.

**NOTE:**

- Each strainer is installed with the rounded corner (a) facing inward.
- Strainer 1 ① is installed with the flange (b) facing downward.
- Strainer 2 ② is installed with the mesh (c) facing downward.
- After installing the strainers, make sure the strainer 2 ② is not protruding from the oil pump cover surface (d).

## 4. Install:

- Dowel pin ①

## 5. Install:

- Oil pump cover ①
- Bolt (oil pump cover) ②

**NOTE:**

While turning the oil pump gear, install the oil pump cover.



**Bolt (Oil Pump Cover):**  
8 Nm (0.8 m•kg, 5.8 ft•lb)

## 6. Install:

- Transmission
- Shift shaft
- Transmission housing

Refer to the "TRANSMISSION, SHIFT CAM AND SHIFT FORK" and "SHIFT SHAFT" section in the CHAPTER 4.



**CDI MAGNETO  
PREPARATION FOR REMOVAL**



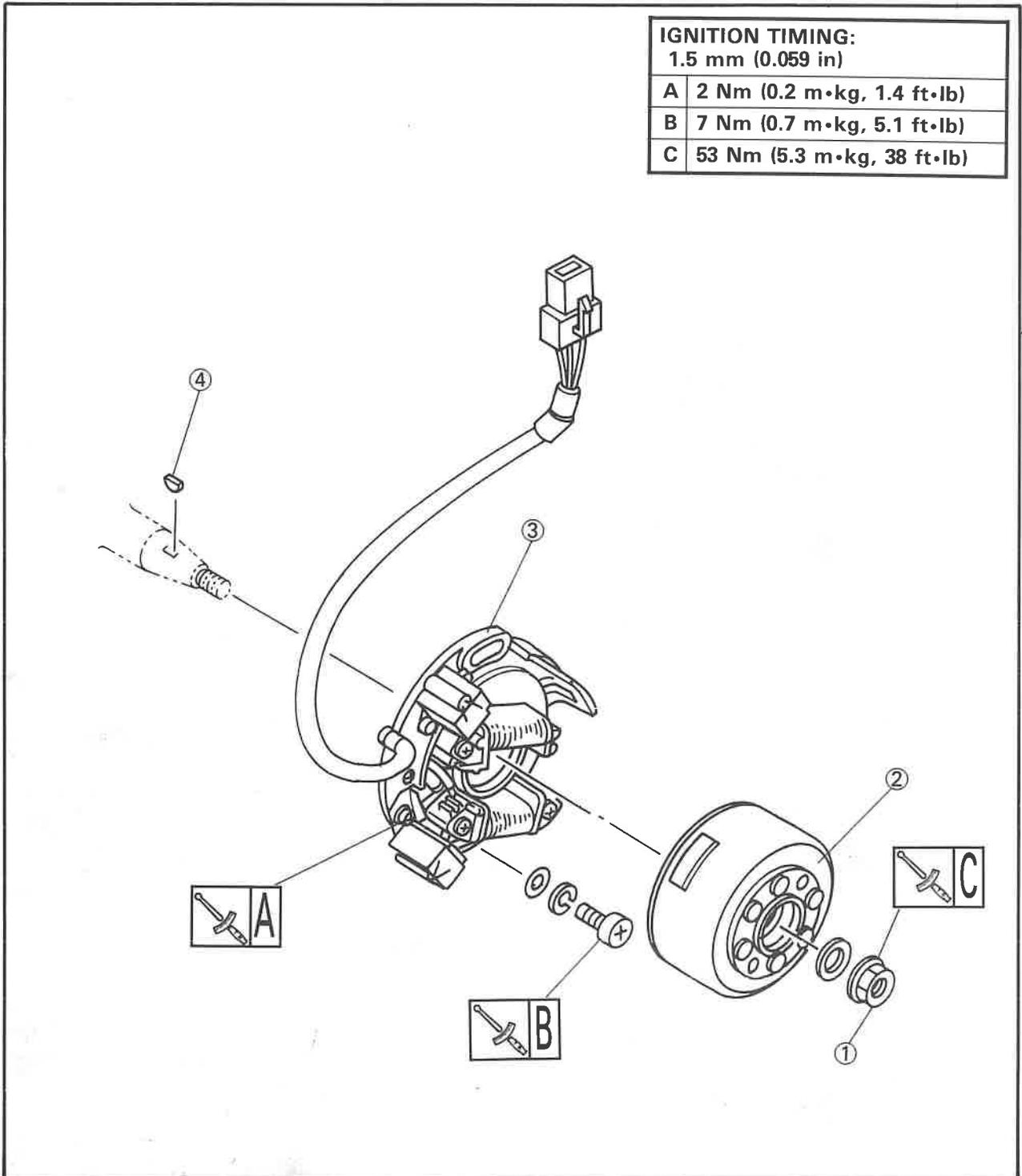
\*Remove the following parts:

- Cowling
- Fuel tank

\*Disconnect the CDI magneto lead.

<b>IGNITION TIMING:</b>	
1.5 mm (0.059 in)	
A	2 Nm (0.2 m•kg, 1.4 ft•lb)
B	7 Nm (0.7 m•kg, 5.1 ft•lb)
C	53 Nm (5.3 m•kg, 38 ft•lb)

**4**



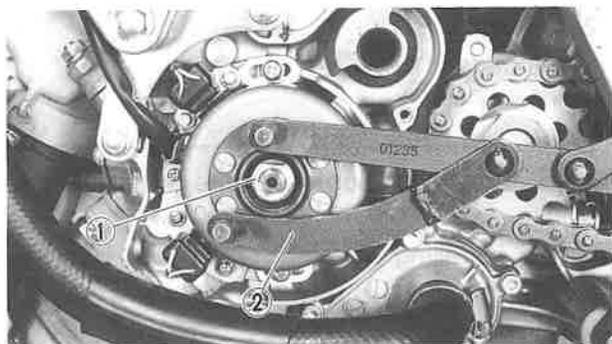


**NOTE ON REMOVAL AND REASSEMBLY**

- With the engine mounted, the following parts can be removed.
- Before servicing, clean the parts, and take care so that foreign material does not enter the crankcase.

Extent of removal: ① CDI magneto removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Nut (rotor)	1	Use special tool. Refer to "REMOVAL POINTS".
	2	Rotor	1	
	3	Stator	1	
	4	Woodruff key	1	

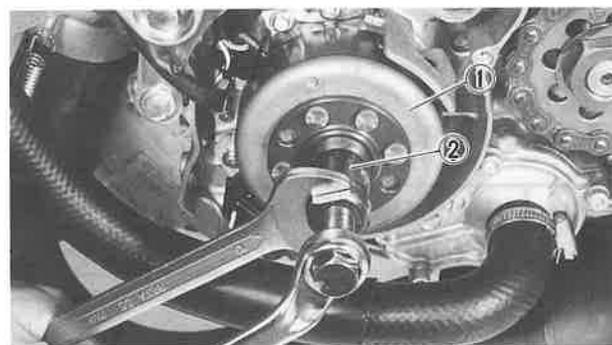


**REMOVAL POINTS**

**ROTOR**

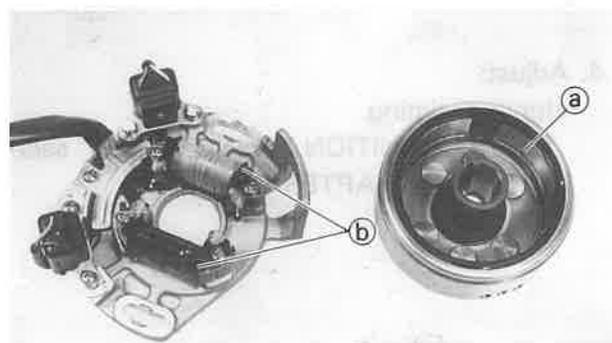
- Remove:
  - Nut (rotor) ①
  - Washer
 Use the Rotor Holding Tool ②.

**Rotor Holding Tool:**  
YU-01235/90890-01235



- Remove:
  - Rotor ①
 Use the Rotor Puller ②.

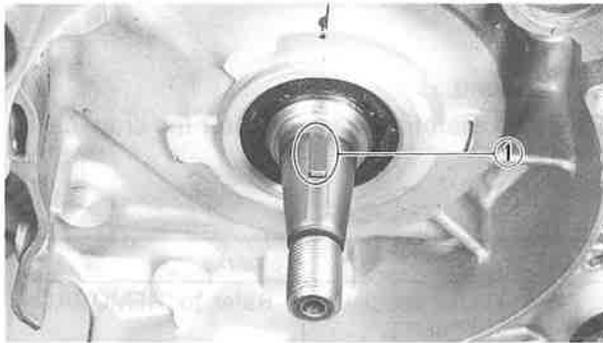
**Rotor Puller:**  
YM-01189/90890-01189



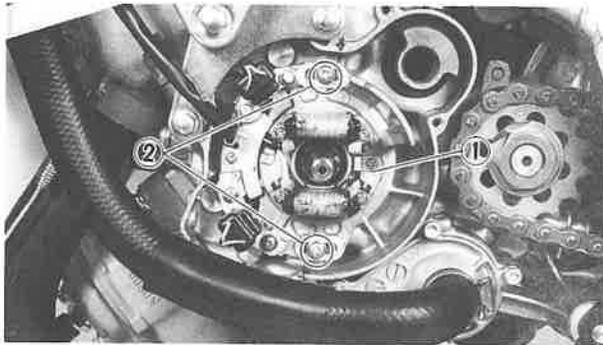
**INSPECTION**  
**CDI MEGNETO**

- Inspect:
  - Rotor inner surface (a)
  - Stator outer surface (b)
 Damage → Inspect the crankshaft runout and crankshaft bearing.  
 If necessary, replace CDI magneto/stator.

4



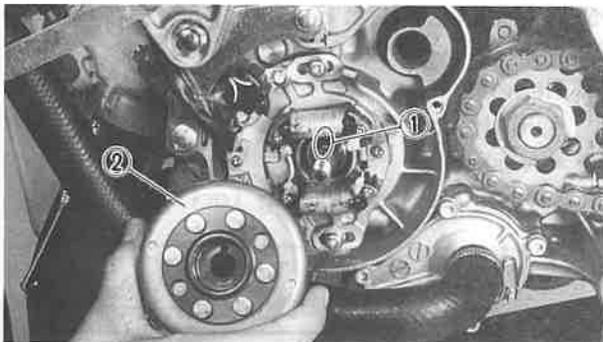
2. Inspect:
- Woodruff key (1)  
Damage → Replace.



**ASSEMBLY AND INSTALLATION  
CDI MAGNETO**

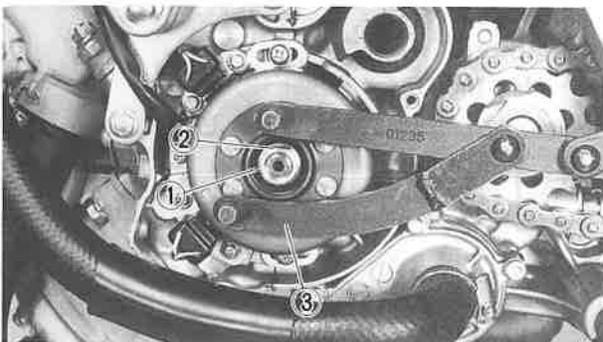
1. Install:
- Stator (1)
  - Screw (stator) (2)

**NOTE:** \_\_\_\_\_  
Temporarily tighten the screw (stator) at this point.  
\_\_\_\_\_



2. Install:
- Woodruff key (1)
  - Rotor (2)

**NOTE:** \_\_\_\_\_  
• Clean the tapered portions of the crankshaft and rotor.  
• When installing the rotor (2) make sure the woodruff key (1) is properly seated in the keyway of the crankshaft.



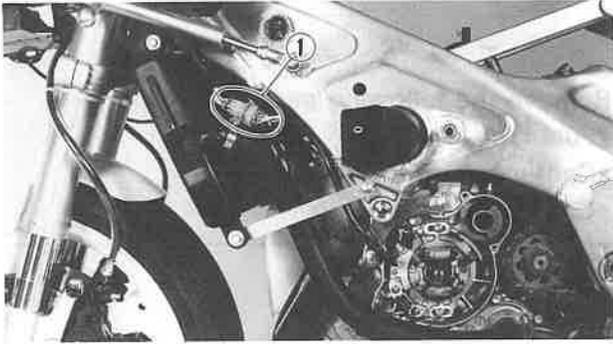
3. Install:
- Plain washer (1)
  - Nut (rotor) (2)  
Use the Rotor Holding Tool (3).

	<b>Rotor Holding Tool:</b> YU-01235/90890-01235
---	--

	<b>Nut (Rotor):</b> 53 Nm (5.3 m•kg, 38 ft•lb)
---	---

4. Adjust:
- Ignition timing  
Refer to "IGNITION TIMING CHECK" section in the CHAPTER 3.

4



5. Connect:

- CDI magneto lead ①

Refer to the "CABLE ROUTING DIAGRAM"  
section in the CHAPTER 2.



# ENGINE REMOVAL

## PREPARATION FOR REMOVAL

\* Hold the machine by placing suitable stand.

**⚠ WARNING**

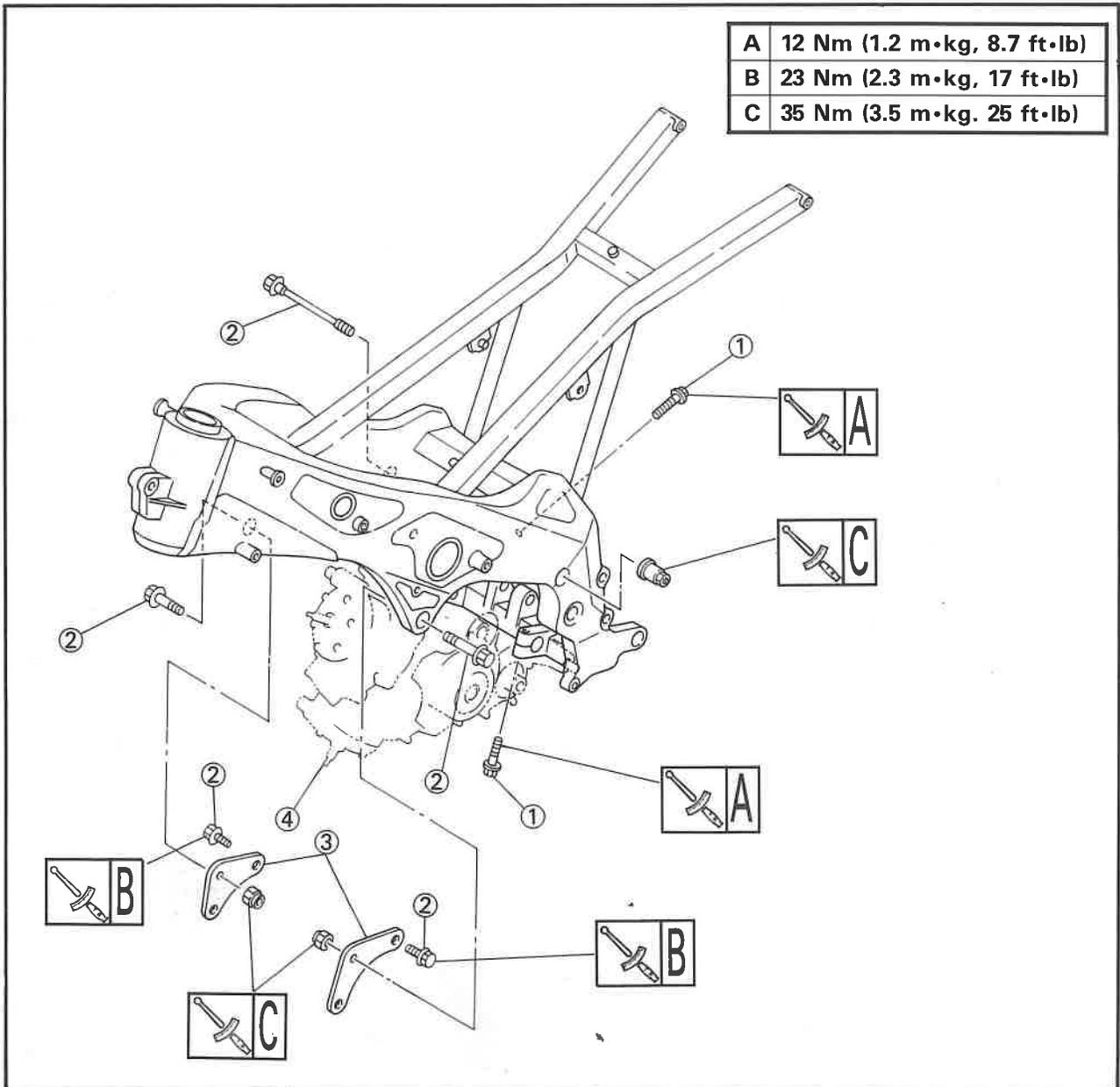
**Securely support the machine so there is no danger of it falling over.**

- \* Remove the cowling.
- \* Drain the transmission oil.
- \* Drain the cooling water.
- \* Disconnect the clutch cable at engine side.
- \* Disconnect the YPVS cable at engine side.
- \* Disconnect the radiator hose 2~4 at engine side.
- \* Disconnect the CDI magneto lead.
- \* Disconnect the spark plug cap.

\* Remove the following parts:

- Fuel tank
- Carburetor
- Carburetor cover
- Exhaust pipe
- Drive sprocket
- Shift arm

4



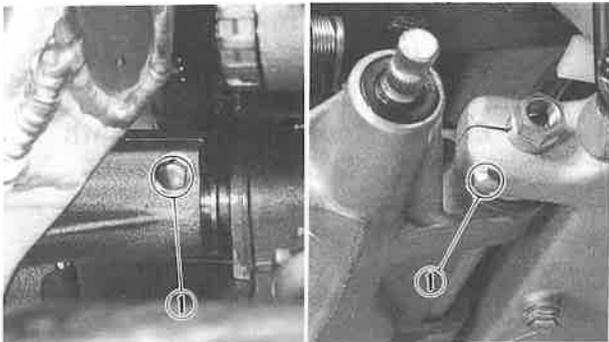


### NOTE ON REMOVAL AND REASSEMBLY

•Before servicing, clean the parts, and take care so that foreign material does not enter the crankcase.

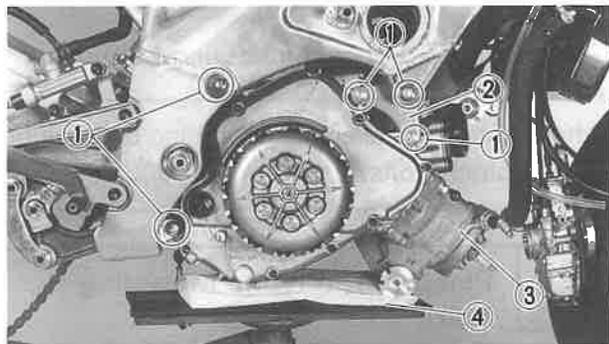
Extent of removal: ① Engine removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Pinch bolt (engine mounting bolt)	2	Only loosening.
	2	Engine mounting bolt	8	Refer to "REMOVAL POINTS".
	3	Engine bracket	2	
	4	Engine	1	



### REMOVAL POINTS ENGINE REMOVAL

- Loosen:
  - Pinch bolt (engine mounting bolt) ①

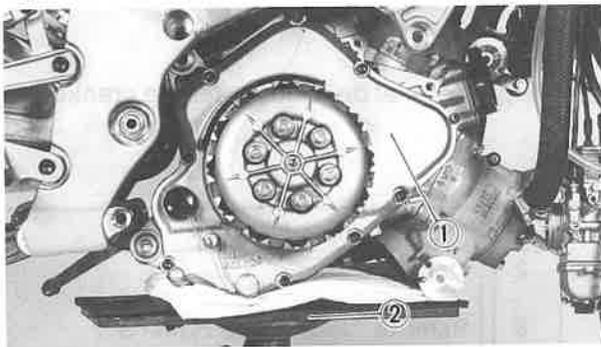


- Remove:
  - Engine mounting bolt ①
  - Engine bracket ②
  - Engine ③

**NOTE:**

- Before removing the engine, make sure that the couplers, hoses and cables are disconnected.
- Remove the engine ③ by lowering it with a jack ④.

# 4



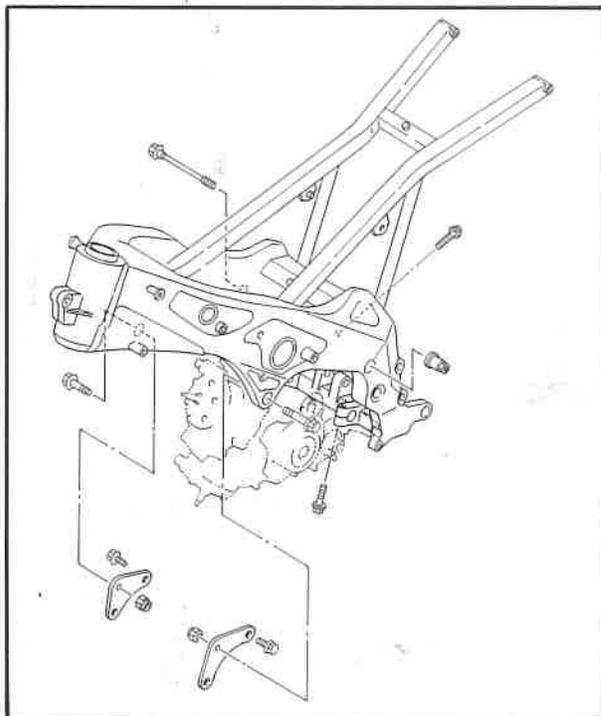
## ASSEMBLY AND INSTALLATION ENGINE INSTALLATION

1. Install:

- Engine ①

**NOTE:** \_\_\_\_\_

Install the engine ① by raising it into the frame with a jack ②.



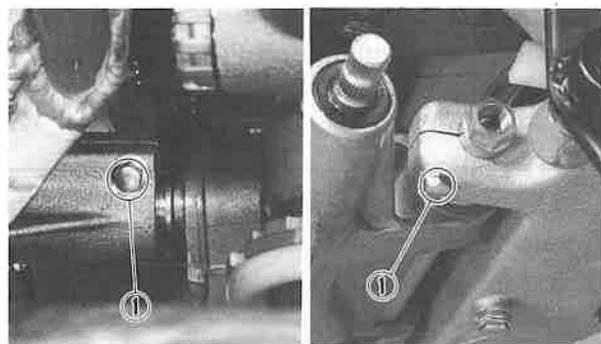
2. Install:

- Engine mounting bolt (upper) ①
- Engine mounting bolt (lower) ②
- Engine bracket ③
- Bolt (engine bracket) ④
- Engine mounting bolt (front) ⑤



**Engine Mounting Bolt (Upper):**  
35 Nm (3.5 m•kg, 25 ft•lb)  
**Engine Mounting Bolt (Lower):**  
35 Nm (3.5 m•kg, 25ft•lb)  
**Bolt (Engine Bracket):**  
23 Nm (2.3 m•kg, 17 ft•lb)  
**Engine Mounting Bolt (Front):**  
35 Nm (3.5 m•kg, 25 ft•lb)

# 4



3. Tighten:

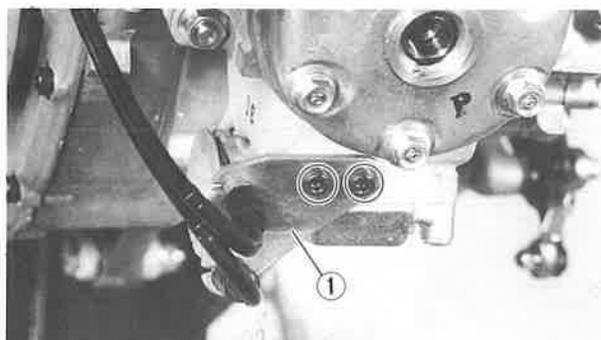
- Pinch bolt (engine mounting bolt) ①

**NOTE:** \_\_\_\_\_

After tightening the engine mounting bolts, tighten the pinch bolts.



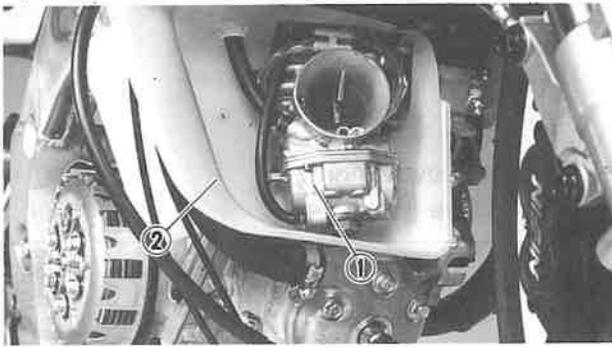
**Pinch Bolt (Engine Mounting Bolt):**  
12 Nm (1.2 m•kg, 8.7 ft•lb)



4. Connect:

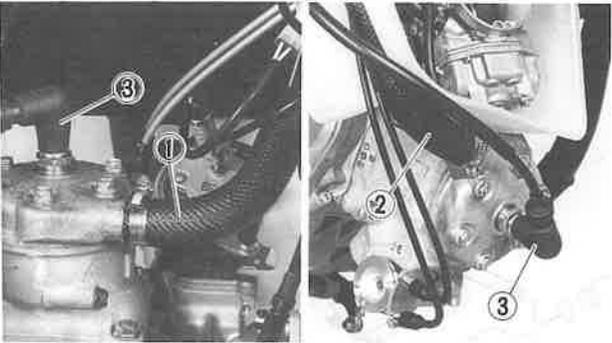
- YPVS cable ①

Refer to the "CYLINDER HEAD, CYLINDER AND PISTON" section in the CHAPTER 4.



### 5. Install:

- Carburetor cover ①
- Carburetor ②



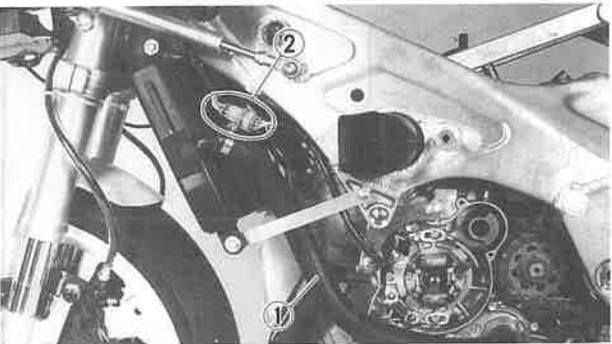
### 6. Connect:

- Radiator hose 3 ①
- Radiator hose 4 ②
- Plug cap ③



### Radiator Hose Joint:

2 Nm (0.2 m•kg, 1.4 ft•lb)



### 7. Connect:

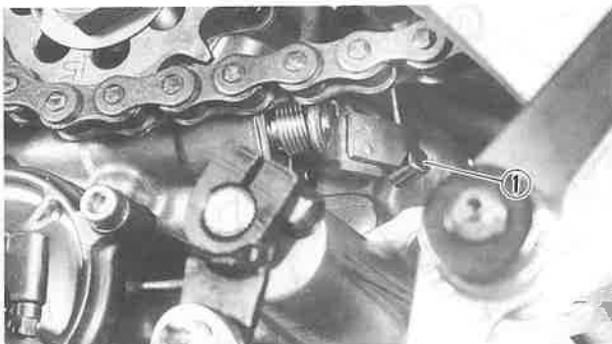
- Radiator hose 2 ①
- CDI magneto lead ②

Refer to the "CABLE ROOTING DIAGRAM" section in the CHAPTER 2.



### Radiator Hose Joint:

2 Nm (0.2 m•kg, 1.4 ft•lb)



### 8. Connect:

- Clutch cable ①

Refer to the "CABLE ROOTING DIAGRAM" section in the CHAPTER 2.

### 9. Adjust:

- Clutch lever free play

Refer to the "CLUTCH ADJUSTMENT" section in the CHAPTER 3.

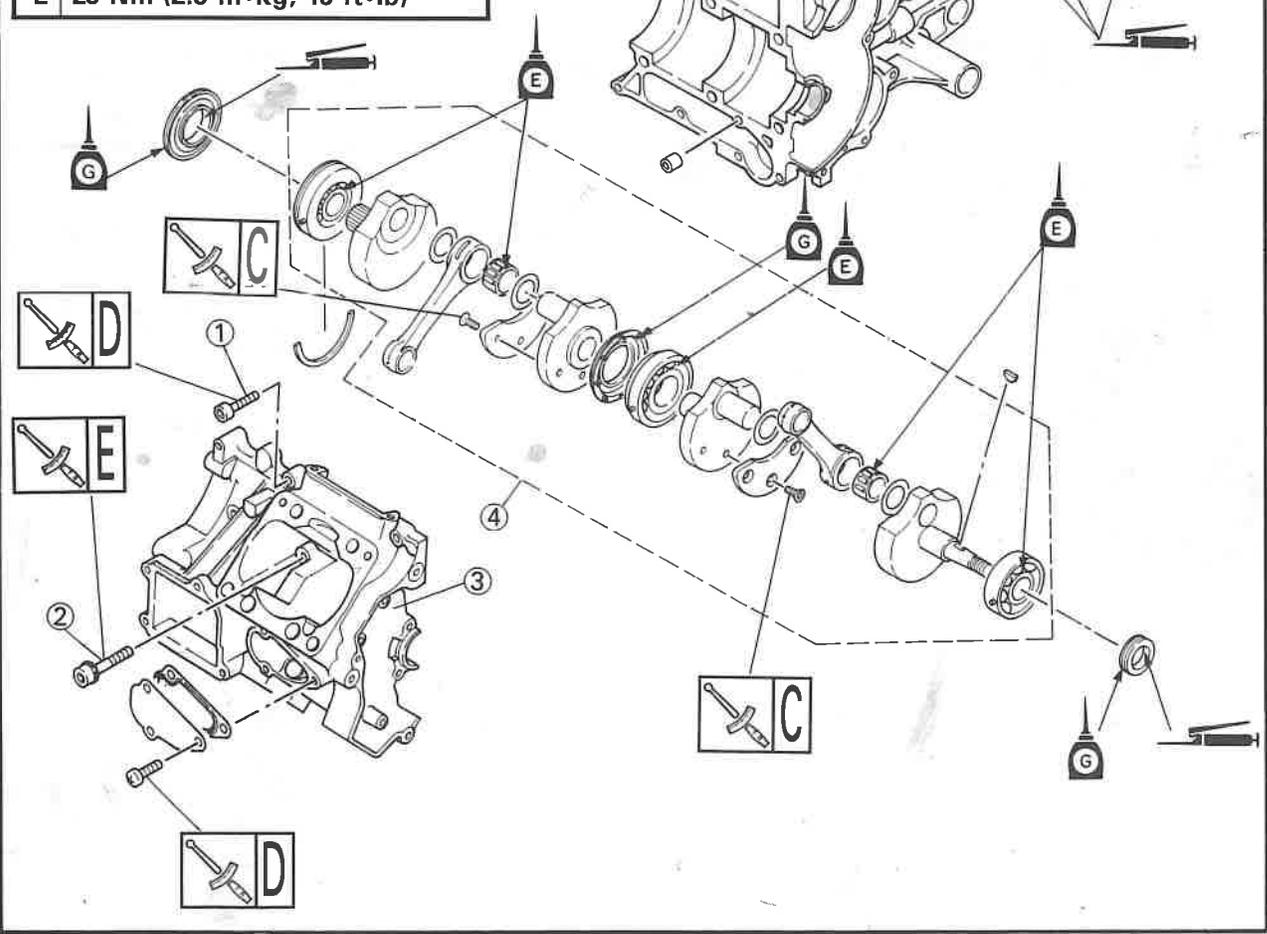
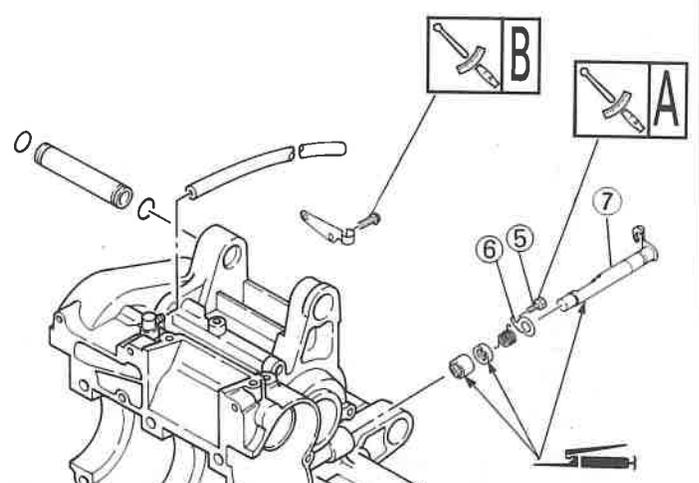


## CRANKCASE AND CRANKSHAFT PREPARATION FOR REMOVAL

- \* Remove the engine.
- \* Remove the following parts:
  - Cylinder head
  - Cylinder
  - Piston
  - Clutch

- Crankcase cover (right)
- Primary drive gear
- Reed valve
- Rotor and starter

<b>CRANKSHAFT RUNOUT LIMIT:</b> 0.03 mm (0.0012 in)	
<b>CONNECTION ROD BIG END SIDE CLEARANCE:</b> 0.25~0.75 mm (0.010~0.030 in)	
<b>CONNECTING ROD SMALL END FREE PLAY:</b> 0.8~1.0 mm (0.031~0.039 in)	
<b>CRANK WIDTH:</b> 49.975~50.025 mm (1.968~1.969 in)	
A	7 Nm (0.7 m•kg, 5.1 ft•lb)
B	8 Nm (0.8 m•kg, 5.8 ft•lb)
C	10 Nm (1.0 m•kg, 7.2 ft•lb)
D	11 Nm (1.1 m•kg, 8.0 ft•lb)
E	25 Nm (2.5 m•kg, 18 ft•lb)



4

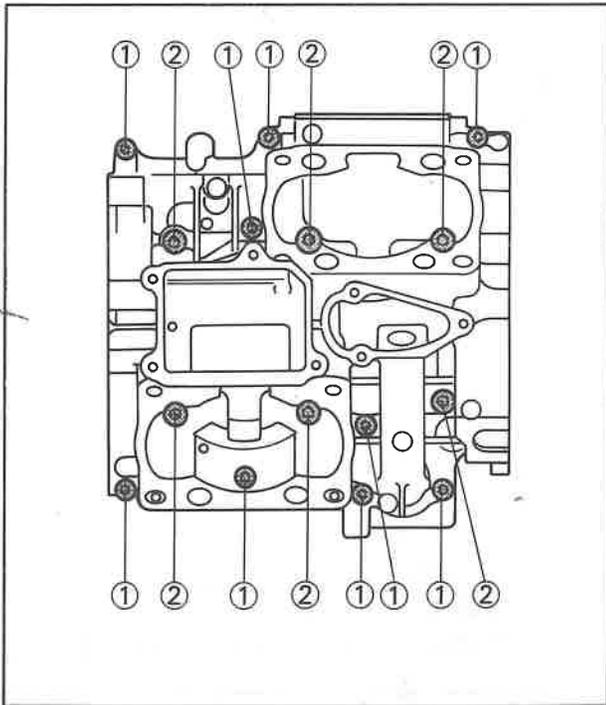


## NOTE ON REMOVAL AND REASSEMBLY

- Before servicing, clean the parts, and take care so that foreign material do not enter the crankcase.
- Remove the gasket adhered on the contacting surface.
- For reassembly, the removed parts should be cleaned and apply the transmission oil onto the sliding surface.

Extent of removal: ① Crankcase separation ② Crankcase removal ③ Push lever axle removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Bolt [crankcase (M6)]	9	Refer to "REMOVAL POINTS"
	2	Bolt [crankcase (M8)]	6	
	3	Crankcase (upper)	1	
	4	Crankshaft	1	
	5	Bolt (seat plate)	1	
	6	Seat plate	1	
	7	Push lever axle	1	



## REMOVAL POINTS CRANKCASE

- Remove:
  - Bolt [crankcase (M6)] ①
  - Bolt [crankcase (M8)] ②

### NOTE:

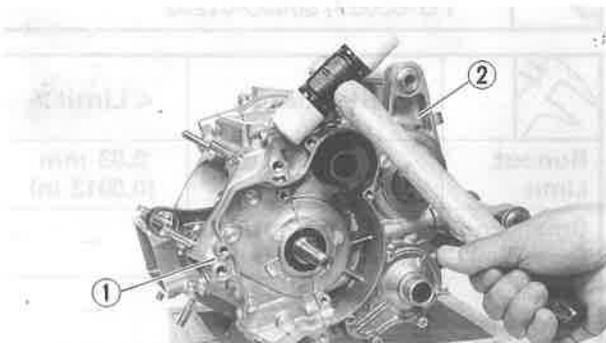
- The M6 size bolts should be removed first.
- Loosen the bolts from the outer sides inward.

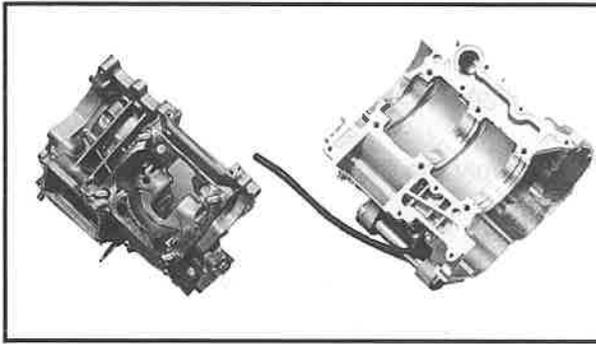
4

- Remove:
  - Crankcase (upper) ①
  - From crankcase (lower) ②.

### CAUTION:

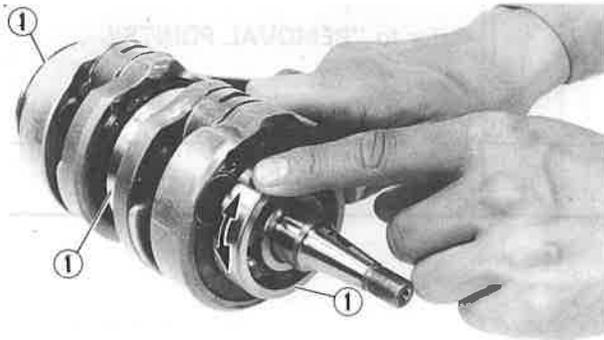
Use soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. Work slowly and carefully. If the cases do not separate, check for a remaining case screw or fitting. Do not force.





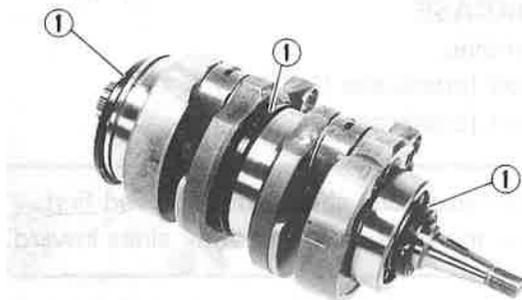
## INSPECTION CRANKCASE

- Inspect:
  - Contacting surface  
Scratches → Replace.
  - Crankcase  
Damage/Cracks → Replace.



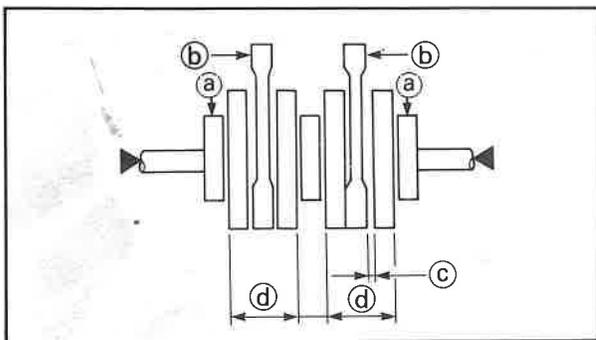
## CRANKSHAFT

- Inspect:
  - Bearing ①  
Rotate cutter race with a finger.  
Rough spot/Seizure → Replace.



- Inspect:
  - Oil seal ①  
Wear/Damage → Replace.

4



- Measure:
  - Runout limit ①
  - Small end free play ②
  - Connecting rod big end side clearance ③
  - Crank width ④  
Out of specification → Replace.  
Use Dial Gauge and thickness gauge.



Dial Gauge:  
YU-03097/90890-01252

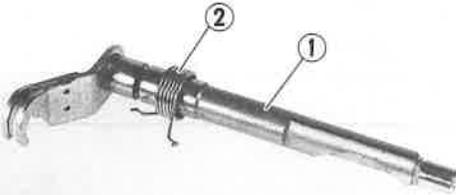
	Standard	< Limit >
Runout Limit	—	0.03 mm (0.0012 in)
Small End Free Play	0.8 ~ 1.0 mm (0.037 ~ 0.039 in)	←
Side Clearance	0.25 ~ 0.75 mm (0.010 ~ 0.030 in)	←
Crank Width	49.975 ~ 50.025 mm (1.968 ~ 1.969 in)	←



## PUSH LEVER AXLE

1. Inspect:

- Push lever axle ①  
Wear/Damage → Replace.
- Torsion spring ②  
Broken/Damage → Replace.



## ASSEMBLY AND INSTALLATION CRANKSHAFT

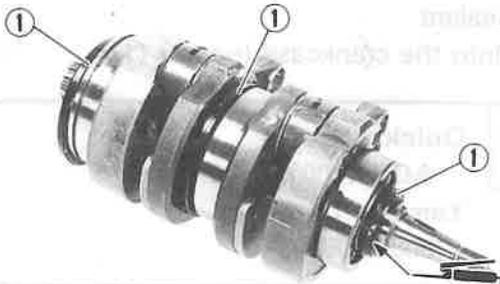
1. Install:

- Oil seal ①  
To crankshaft.

**NOTE:** \_\_\_\_\_

Apply the lithium soap base grease onto the oil seal lip.

\_\_\_\_\_



2. Install:

- Circlip ①  
To crankcase (lower) ②.

3. Install:

- Crankshaft ①

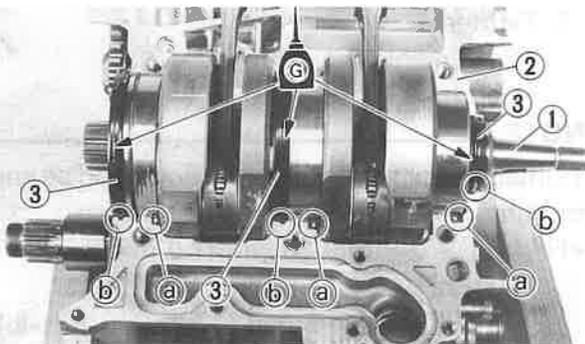
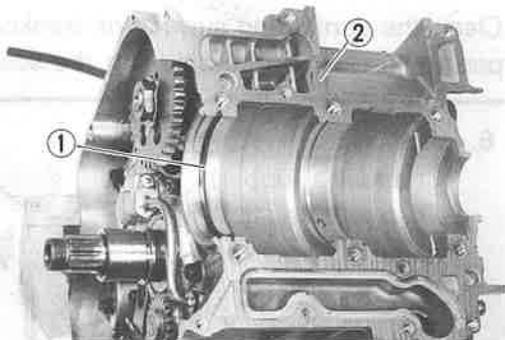
**NOTE:** \_\_\_\_\_

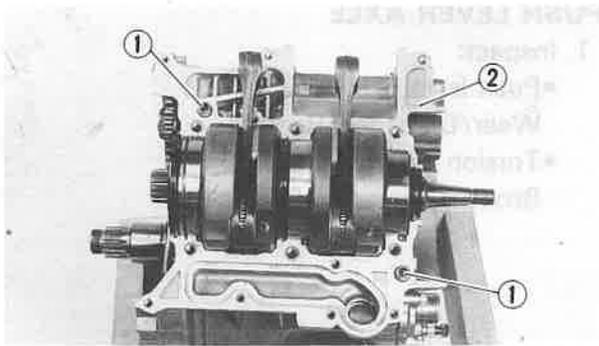
• When installing the crankshaft into the crankcase (lower) ②, apply the transmission oil onto the oil seal ③ outer circumference.

• Align the bearing knock pin with the pin slot (a) in the crankcase (lower) and the projection of oil seal with the groove (b) in the crankcase (lower).

• After installing the crankshaft, push the oil seal ③ to the crankcase (lower).

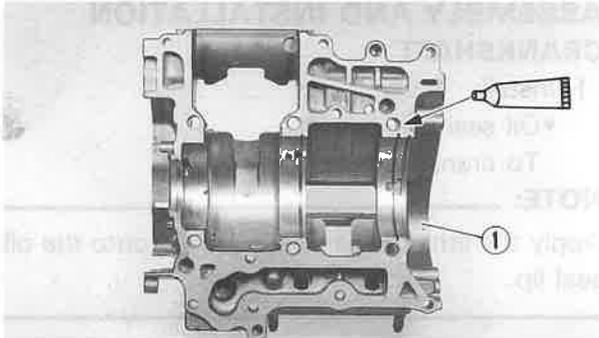
\_\_\_\_\_





### 4. Install:

- Dowel pin ①  
To crankcase (lower) ②.



### 5. Apply:

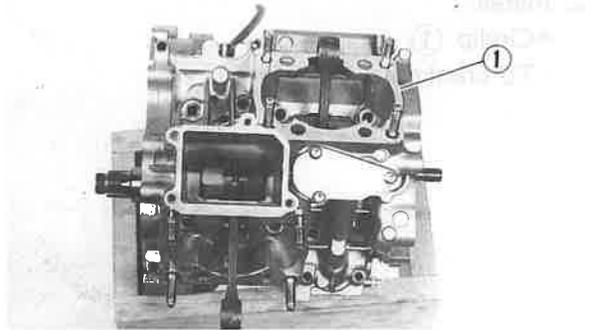
- Sealant  
Onto the crankcase (upper) ①



**Quick gasket®**  
**ACC-11001-30-00**  
**Yamaha bond No. 4:**  
**90890-05143**

### NOTE:

Clean the contacting surface of crankcase (upper and lower) before applying the sealant.



### 6. Install:

- Crankcase (upper) ①  
To crankcase (lower) ②.

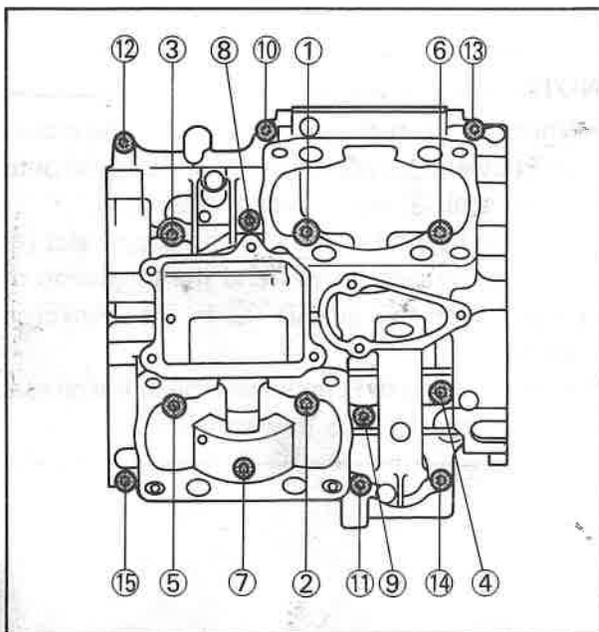
### 7. Tighten:

- Bolt [crankcase (M8)] ① ~ ⑥
- Bolt [crankcase (M6)] ⑦ ~ ⑮

### NOTE:

Tighten all bolts in 2 steps as follows and be sure to tighten in numbered order as shown.

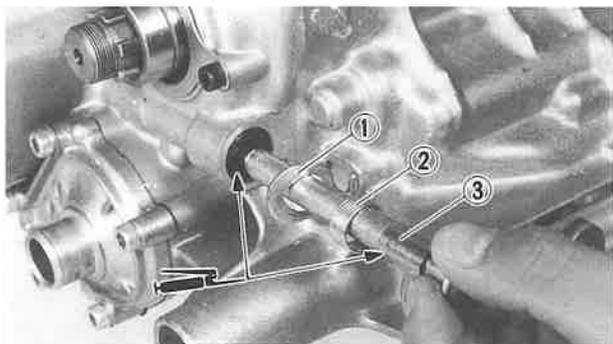
- First: ① ~ ⑥ (M8) 10 Nm (1.0 m•kg, 7.2 ft•lb)  
⑦ ~ ⑮ (M6) 5 Nm (0.5 m•kg, 8 ft•lb)
- Final: ① ~ ⑥ (M8) 25 Nm (2.5 m•kg, 18 ft•lb)  
⑦ ~ ⑮ (M6) 11 Nm (1.1 m•kg, 8 ft•lb)



### 8. Check:

- Crankshaft operation  
Unsmooth operation → Repair.

# 4



## PUSH LEVER AXLE

1. Install:

- Seat plate ①
- Torsion spring ②
- Push lever axle ③
- Bolt (seat plate)

### NOTE:

Apply the lithium soap base grease onto the push lever axle, oil seal lip and bearing.



**Bolt (Seat Plate):**

**7 Nm (0.7 m•kg, 5.1 ft•lb)**

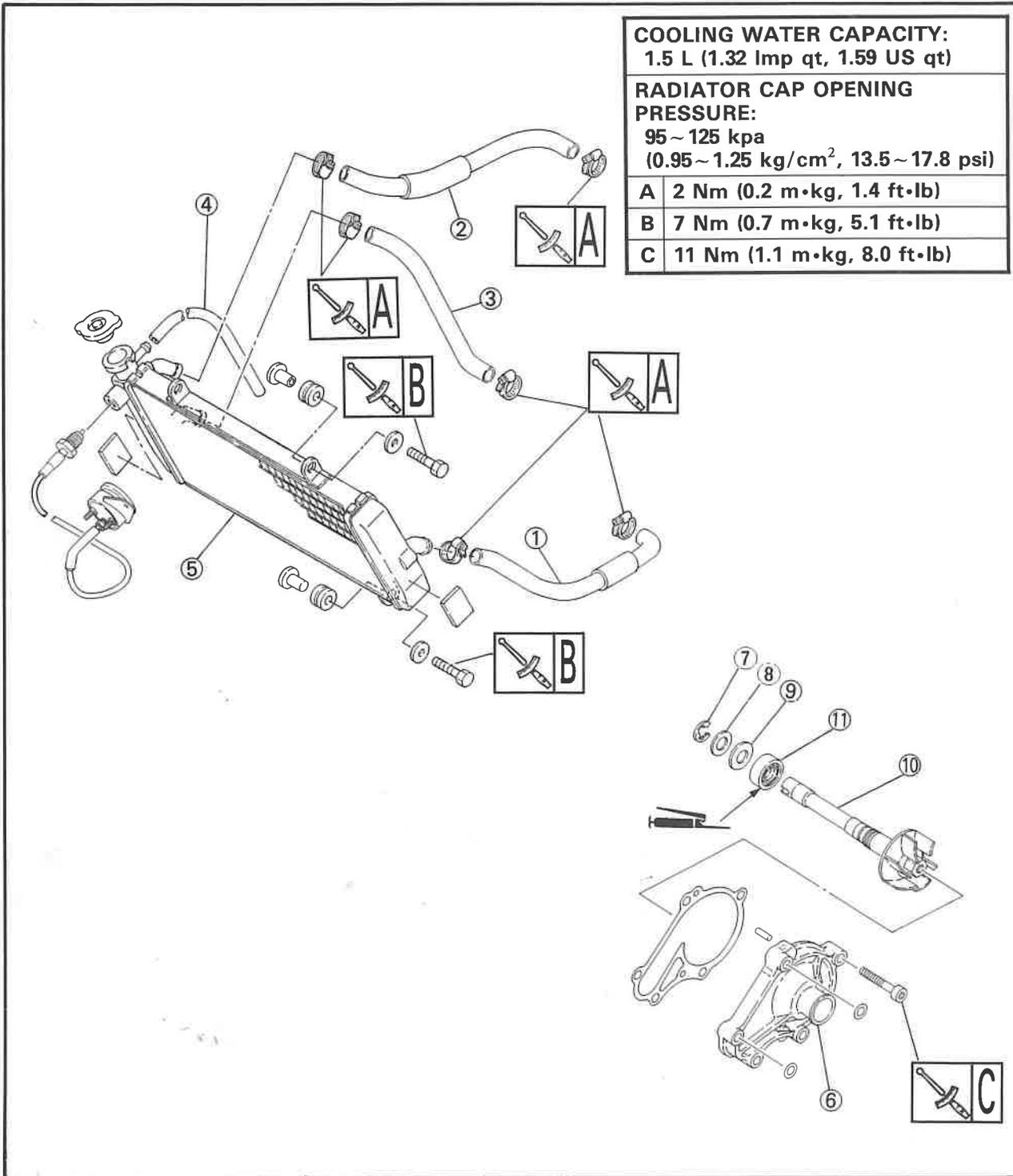


## RADIATOR AND WATER PUMP PREPARATION FOR REMOVAL



- \* Remove the cowling.
- \* Drain the cooling water.
- \* Drain the transmission oil.
- \* Remove the transmission.

**4**





## NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, following parts can be removed.
- Before servicing, clean the parts, and take care so that the foreign material does not enter the crankcase.
- Remove any gasket adhered to the contacting surfaces.
- For reassembly, the removed parts should be cleaned with solvent, and apply the transmission oil to the sliding surfaces.

- Extent of removal:
- ① Radiator removal
  - ② Impeller shaft removal
  - ③ Oil seal removal

Extent of removal	Order	Part name	Q'ty	Remarks
	1	Radiator hose 2	1	Refer to "REMOVAL POINTS".
	2	Radiator hose 3	1	
	3	Radiator hose 4	1	
	4	Radiator breather hose	1	
	5	Radiator	1	
	6	Water pump housing	1	Refer to "REMOVAL POINTS".
	7	Circlip	1	
	8	Plain washer [T = 1.0 mm (0.04 in)]	1	
	9	Plain washer [T = 2.0 mm (0.08 in)]	1	
	10	Impeller shaft	1	
	11	Oil seal	1	Refer to "REMOVAL POINTS".



## REMOVAL POINTS

**WARNING**

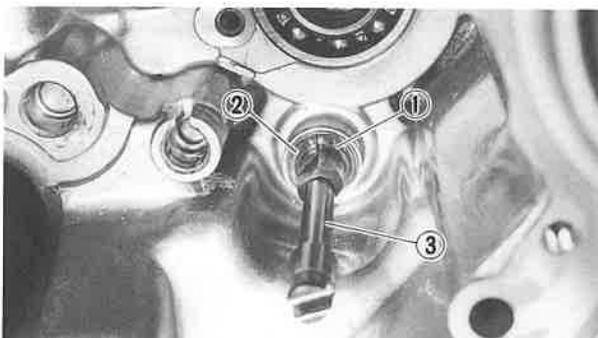
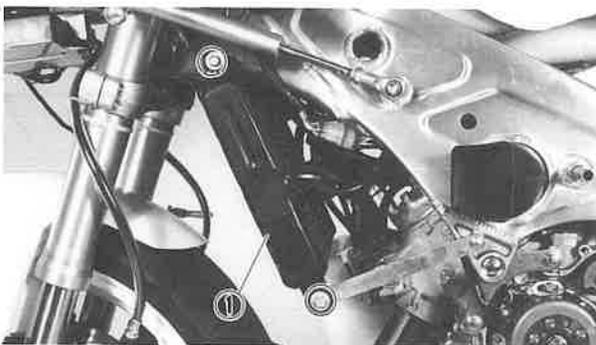
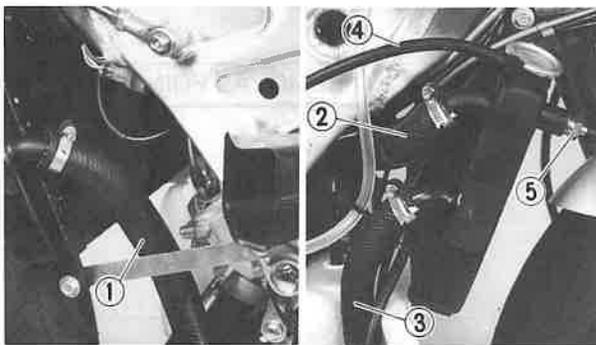
Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury.

When the engine has cooled, open the radiator cap by the following procedure:

Remove the radiator cover by removing the screw. Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape.

When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

4



## RADIATOR

## 1. Remove:

- Radiator hose 2 ①
- Radiator hose 3 ②
- Radiator hose 4 ③
- Radiator breather hose ④
- Thermo sensor ⑤

Remove at radiator side.

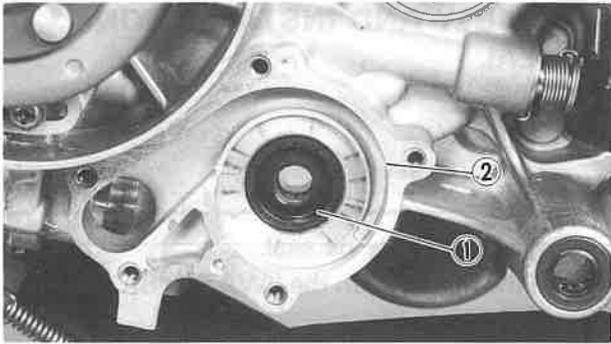
## 2. Remove:

- Radiator ①

## IMPELLER SHAFT

## 1. Remove:

- Circlip ①
- Plain washer ②
- Impeller shaft ③



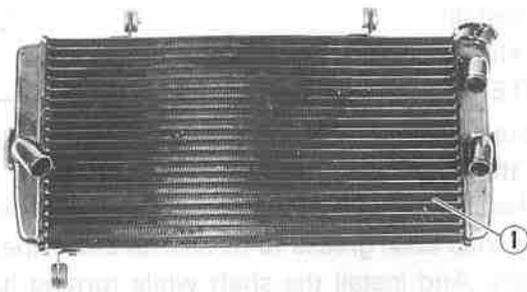
## OIL SEAL

### NOTE:

It is not necessary to disassemble the water pump, unless there is no abnormality such as excessive change in coolant level, discoloration of coolant, or milky transmission oil.

#### 1. Remove:

- Oil seal ①
- From crankcase (lower) ②.



## INSPECTION RADIATOR

#### 1. Inspect:

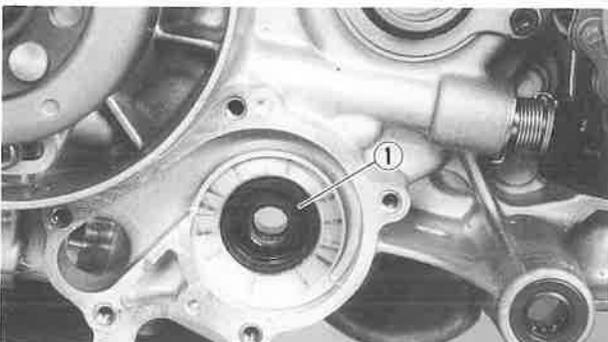
- Radiator core ①
- Obstruction → Blow out with compressed air through rear of the radiator.
- Bent fin → Repair/replace.



## IMPELLER SHAFT

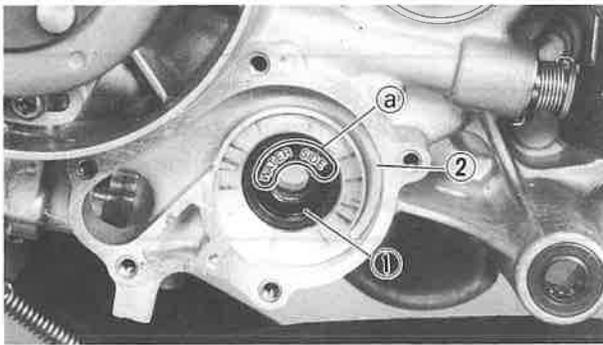
#### 1. Inspect:

- Impeller shaft
- Bend/Wear/Damage → Replace.
- Fur deposits → Clean.



#### 2. Inspect:

- Oil seal ①
- Wear/Damage → Replace.



## ASSEMBLY AND INSTALLATION

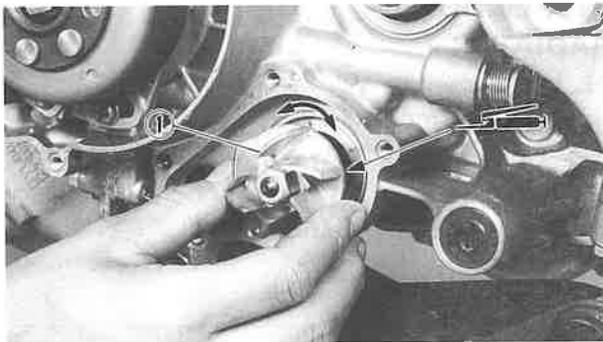
### OIL SEAL

1. Install:

- Oil seal ①
- To crankcase (lower) ②.

#### NOTE:

- Always use a new oil seal.
- Install the oil seal with the "WATER SIDE" mark **a** on the outside.

**4**


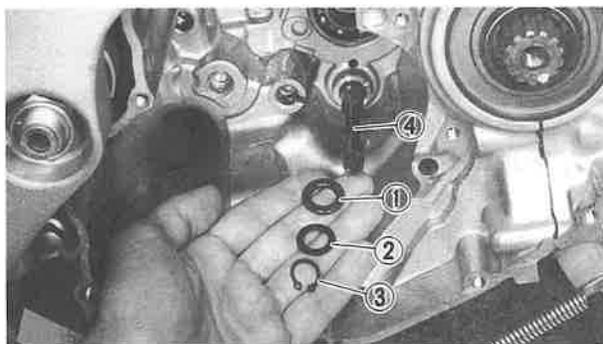
### IMPELLER SHAFT

1. Install:

- Impeller shaft ①

#### NOTE:

- Take care so that the oil seal lip is not damaged or the spring does not slip off its position.
- When installing the impeller shaft, apply the lithium soap base grease to oil seal lip and impeller shaft. And install the shaft while turning it.

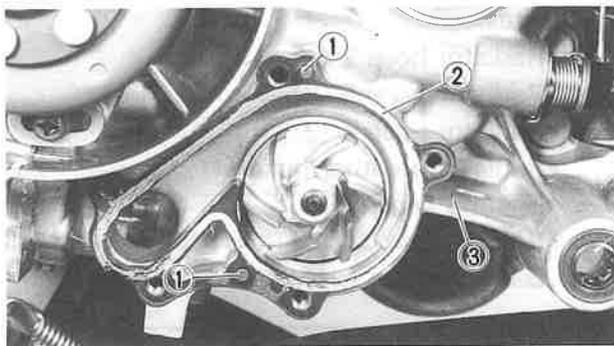


2. Install:

- Plain washer [T = 2.0 mm (0.08 in)] ①
- Plain washer [T = 1.0 mm (0.04 in)] ②
- Circlip ③
- To impeller shaft ④.

#### NOTE:

- Install the plain washer of 2 mm (0.08 in) thickness first.
- Always use a new circlip.

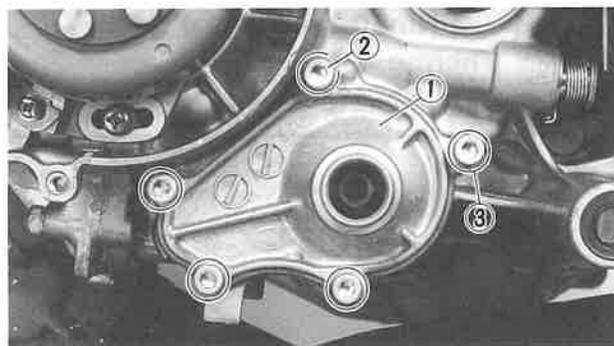


3. Install:

- Dowel pin ①
- Gasket (water pump housing) ②
- To crankcase (lower) ③.

**NOTE:** \_\_\_\_\_

Always use a new gasket.



4. Install:

- Water pump housing ①
- Copper washer ②
- Bolt (water pump housing) ③

**NOTE:** \_\_\_\_\_

Always use a new copper washer.



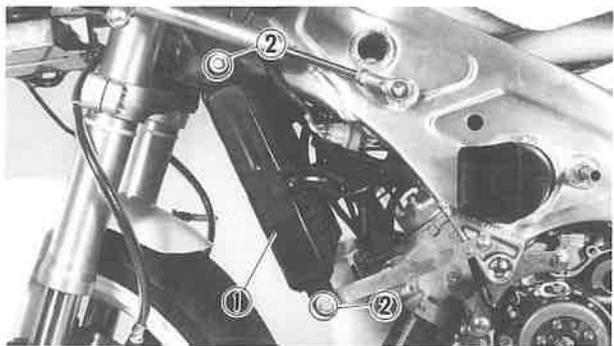
**Bolt (Water Pump Housing):**  
11 Nm (1.1 m•kg, 8.0 ft•lb)

5. Install:

- Transmission
- Clutch

Refer to the "TRANSMISSION, SHIFT CAM AND SHIFT FORK" and "CLUTCH" section in the CHAPTER 4.

4



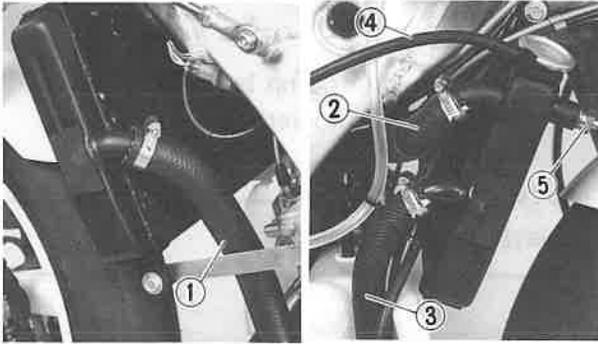
## RADIATOR

1. Install:

- Radiator ①
- Bolt (radiator) ②



**Bolt (Radiator):**  
7 Nm (0.7 m•kg, 5.1 ft•lb)



## 2. Install:

- Radiator hose 2 ①
- Radiator hose 3 ②
- Radiator hose 4 ③
- Radiator breather hose ④
- Thermo sensor ⑤

Refer to the "CABLE ROUTING DIAGRAM" section in the CHAPTER 2.



### Radiator Hose Joint:

2 Nm (0.2 m•kg, 1.4 ft•lb)

### Thermo Sensor:

17 Nm (1.7 m•kg, 12 ft•lb)