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CHAPTER 4. ENGINE OVERHAUL

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ENGINE REMOVAL

ENGINE OVERHAUL ENGINE REMOVAL

NOTE:

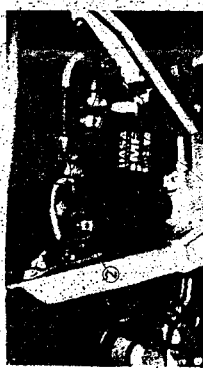
It is not necessary to remove the engine in order to remove the following components:

- Cylinder head
- Cylinder
- Piston
- Clutch
- Water pump
- AC magneto

ENGINE REMOVAL

2. Drain:
 - Radiator
 - Recovery tank
 - Crankcase

(of them coolant)
Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.



VEHICLE

BATTERY LEADS

1. Disconnect:
 - Battery leads

CAUTION

Disconnect the negative lead ① first and then disconnect the positive lead ②.

2. Remove:
 - Battery

SEAT, FUEL TANK AND COVER

1. Remove:
 - Seat
 - Side covers
 - Air scoops
 - Fuel tank

Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

ENGINE GUARD

1. Remove:
 - Engine guard ①



VEHICLE

RADIATOR

1. Disconnect:
 - Band ①
 - Horn leads ②
 - Thermo switch ③
 - Thermo unit ④
 - Earth lead ⑤
 - Fan motor lead coupler ⑥

ENGINE OIL AND COOLANT

1. Drain:
 - Oil tank ①
 - Crankcase ②

(of them oil)
Refer to the "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.



VEHICLE

RADIATOR

2. Loosen:
 - Screw ① (hose clamp)
3. Disconnect:
 - Radiator hose ② (from water pump)



4. Loosen:
• Screws ① (hose clamp)

5. Disconnect:
• Radiator hose ②



6. Disconnect:
• Recovery tank hose ①
• Breather hose ② (recovery tank)

7. Remove:
• Bolt ③ (conduction)
• Bolt ④ (radiator stay)



8. Remove:
• Radiator ①



- EXHAUST PIPE AND MUFFLER
1. Loosen:
• Bolt ① (clamp)
• Bolt ② (clamp)



2. Remove:
• Muffler ①



3. Remove:
• Exhaust pipe ①



- OIL TANK HOSE
1. Disconnect:
• Breather hose ① (from crankcase)
• Oil hose ② (from crankcase)
2. Remove:
• Screw ③ (oil hose)



- AIR FILTER CASE AND CARBURETOR
1. Disconnect:
• Breather hose ① (from crankcase)
2. Remove:
• Bolt ② (rear brake reservoir tank)



3. Loosen:
• Screws ① (carburetor joints)



4. Remove:
• Bolt ① (air filter case)
Carburetor joint from carburetor by moving air filter case to the rear.

ENGINE REMOVAL



5. Loosen:
 - Screws ① (intake manifold)
6. Disconnect:
 - Vacuum hose ②
 - Delivery hose ③
 - Carburetors ④ (from intake manifold)

NOTE:
Cover the carburetor with a clean rag to prevent dirt or foreign material from entering the carburetor.

D CARBURETOR

reservoir tank)

itor joints

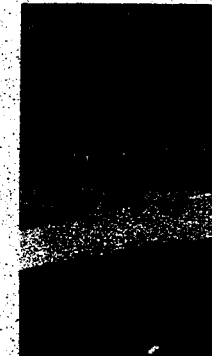
ise)
n carburetor by moving
' rear.



1. Loosen:
 - Nuts ①
2. Disconnect:
 - Clutch cable ② (from pull lever and cable clamps)



3. Disconnect:
 - Spark plug lead ① (from spark plug)



4. Disconnect:
 - Neutral switch lead ①
 - AC magneto lead ②
 - Pickup coil lead ③

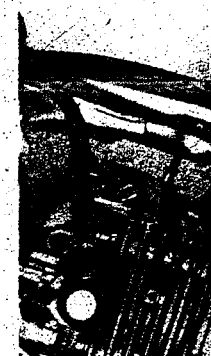
ENGINE REMOVAL



5. Disconnect:
 - Ground lead ① (from crankcase cover)



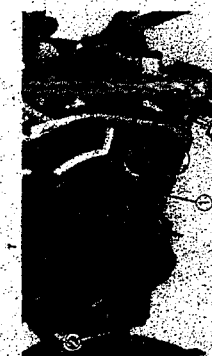
6. Disconnect:
 - Starter motor lead ① (from starter motor)



7. Disconnect:
 - Tachometer cable ①



8. Loosen:
 - Axle nut ①
 - Nuts ② (chain pullers)



9. Remove:
 - Footrest ① (left)
 - Shift pedal ②



ENGINE REMOVAL

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4. Remove:
• Cover (1)



5. Straighten:
• Lock washer tab (1)

6. Remove:
• Nut (1)
• Lock washer (2)
• Drive sprocket (3)

NOTE:

Loosen the nut while applying the rear brake.



7. Remove:
• Footrest (1) (right)

8. Disconnect:
• Rear brake switch (2)
• Clip (3)

9. Remove:
• Rear brake pedal (4)

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ENGINE REMOVAL

1. Place suitable stand under the frame and engine.

WARNING

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



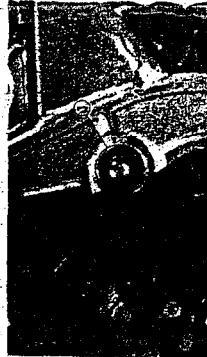
2. Remove:
• Mounting bolts (1) (front - lower)



3. Remove:
• Mounting bolt (1) (rear - lower)



4. Remove:
• Mounting bolts (1) (front - upper)



5. Remove:
• Pivot shaft cap (left and right)
• Pivot shaft (1)

NOTE:

The engine and swingarm are installed using the same pivot shaft. Therefore, take care so that the pivot shaft is pulled, not entirely out, but for enough to set the engine free.



6. Remove:
• Engine assembly (from right side of motorcycle)

① (rear - lower)

① (front - upper)

(left and right)

gum are installed using the
refuse take care so that the
not entirely out, but for
spine free

of motorcycle)

ENGINE DISASSEMBLY
PIPE, STARTER MOTOR AND HOSES

1. Remove:
 - Oil pipe ①



2. Remove:
 - Oil pipe ①



3. Remove:
 - Starter motor ①



4. Remove:
 - Oil hose ①
 - Breather hose ② (crankcase)
 - Breather hose ③ (oil tank)



5. Remove:
 - Coolant hose ①



CYLINDER HEAD, CYLINDER AND
PISTON

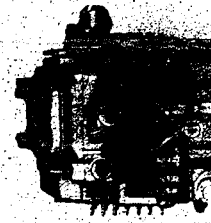
NOTE:
With the engine mounted, the cylinder head cover, camshaft and cylinder head can be maintained by removing the following parts.

- Seat
- Side covers
- Air scoops
- Fuel tank
- Engine guard
- Radiator
- Exhaust pipes
- Ignition coil
- Oil tank breather hose
- Carburetor

1. Remove:
 - Spark plug ①



2. Remove:
 - Intake manifolds ①



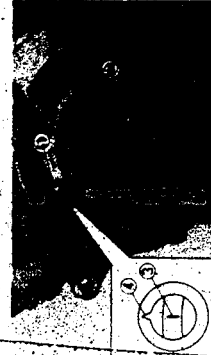
3. Remove:
 - Tachometer gear unit ①



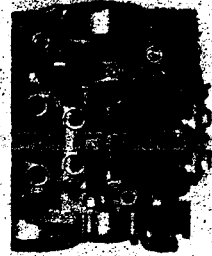
4. the cylinder head can be main-
allowing parts.

ENGINE DISASSEMBLY

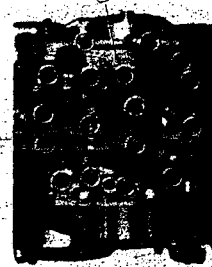
E-12



4. Remove:
- Timing plug (1)
 - Plug (center) (2)
5. Turn:
- Crankshaft:
- (until TDC mark (3) is aligned with station-
any pointer (4))



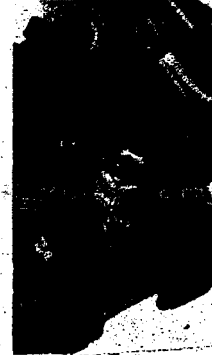
6. Remove:
- Tappet cover (intake) (1)
 - Tappet cover (exhaust) (2)



7. Remove:
- Cylinder head cover (1)
- NOTE:
- Working in a crisscross pattern, loosen the bolts
1/4 turn each. Remove them after all are
loosened.



8. Loosen:
- Bolts (1) (cam sprocket)



9. Loosen:
- Cap bolt (1) (chain tensioner)
10. Remove:
- Chain tensioner (2)

ENGINE DISASSEMBLY



11. Remove:
- Cam sprocket (1)
 - Camshaft (2)
- NOTE:
- Fasten a safety wire (3) to the timing chain to prevent it from falling into the crankcase.
 - Do not fall the stopper guide plate (4) into the crankcase when removing the bolts (cam sprocket).



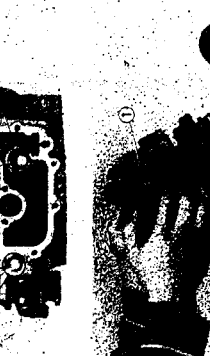
12. Remove:
- Chain guide (1) (exhaust)



13. Remove:
- Pipe (1)
 - O-ring
 - Bolts (2)
 - Bolts (3)
 - Bolts (4)



- NOTE:
- Working in a crisscross pattern, loosen the bolts
1/4 turn each. Remove them after all are
loosened.



14. Remove:
- Cylinder head (1)

to the timing chain to
to the crankcase.
guide plate 4 into the
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attern, loosen the bolts
s them after all are

ENGINE DISASSEMBLY

15. Remove:

- Gasket 1 (cylinder head)
- Dowel pins 2



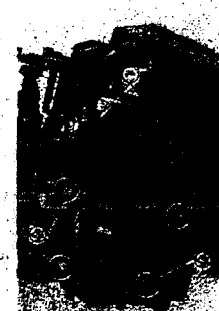
16. Remove:

- Pipe 1



17. Remove:

- Bolts 1
- Bolts 2

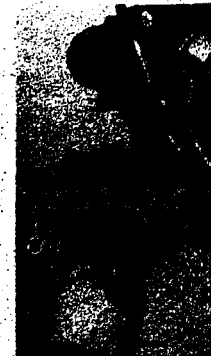


NOTE:

Working in a crisscross pattern, loosen the bolts
1/4 turn each. Remove them after all are loosend.

18. Remove:

- Cylinder 1



19. Remove:

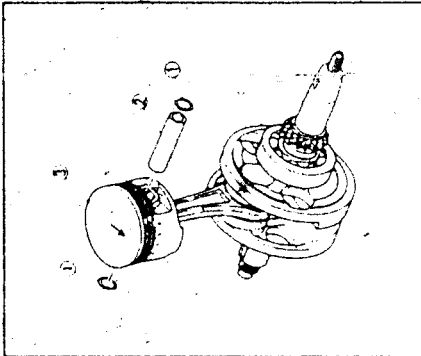
- Gasket 1 (cylinder)
- Dowel pins 2



ENGINE DISASSEMBLY

20. Remove:

- Piston pin circlip 1
- Piston pin 2
- Piston 3



NOTE:

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

Piston pin puller:
P/N YU 01304, 90890-01304

CAUTION:

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

NOTE:

ROTOR AND STARTER DRIVERS

NOTE:

With the engine mounted, the AC magneto and starter drivers can be maintained by removing the following part:

- Engine guard

1. Remove:

- Cover 1





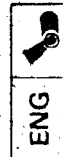
cover the
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piston pin.
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1304

piston pin.

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moving the



ENGINE DISASSEMBLY

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2. Remove:
 - Starter idle gear 1
 - Needle bearing 2
 - Shaft 3
 - Gasket 4
 - Dowel pin 5



3. Disconnect:
 - Neutral switch lead 1
4. Remove:
 - Crankcase cover 2 (left)



NOTE:
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.

5. Remove:
 - Starter idle gear 2 1
 - Needle bearing 2
 - Shaft 3
 - Gasket 4 (crankcase cover)
 - Dowel pins 5
 - O-rings 6



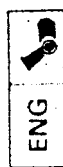
6. Remove:
 - Nut 1 (rotor)

NOTE:
Loosen the nut (rotor) while holding the rotor with the rotor holder 2.



Rotator holder:
P/N. YS-01880, 90890-01701

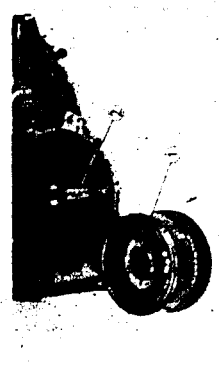
CAUTION:
Do not allow the rotor holder to touch the projections 3 on the rotor.



ENGINE DISASSEMBLY

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7. Remove:
 - Rotor 1
 - Woodruff key 2
- Use the rotor puller 3 and adapter 4.

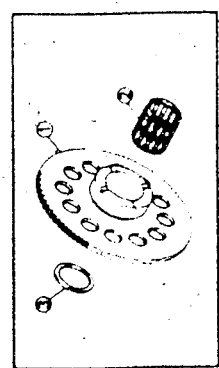


Rotator puller:
P/N. YU-33270, 90890-01362
Adapter:
P/N. YM-04063-A, 90890-04063

NOTE:
Tighten the tool holding bolts. But make sure that the tool body is parallel with the rotor. If necessary, one screw may be backed out slightly to level tool body.



8. Remove:
 - Wheel gear 1
 - Needle bearing 2
 - Washer 3



9. Remove:
 - Chain guide 1
 - Timing chain 2



OIL FILTER AND WATER PUMP

NOTE:
With the engine mounted, the water pump can be maintained by removing the following part:
• Engine guard



1. Remove:
 - Oil filter cover 1

3. and adapter 4.

0. 90680-01362

53-A. 90680-04063

its. But make sure that
ith the rotor. If neces-
cked out slightly to lev-

IR PUMP

the water pump can
g the following part.

ENGINE DISASSEMBLY

- 2 Remove
- Oil filter 1
 - O-rings 2



- 3 Remove
- Water pump cover 1



- 4 Remove
- O-ring 1



- 5 Remove
- Water pump housing 1



- 6 Remove
- Circlip 1
 - Water pump gear 2
 - Pin 3
 - Circlip 4
 - Water pump housing 5
 - Impeller shaft 6



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ENGINE DISASSEMBLY

CLUTCH AND BALANCER GEAR

NOTE
When the engine mounted, the clutch can be main-
tained by removing the following parts

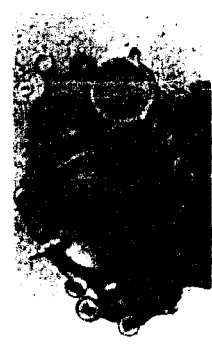
- Clutch cable
- Engine guard
- Water pump housing
- Footrest (right)
- Brake pedal

- 1 Remove
- Circlip 1
 - Washer 2
 - Pull lever 3
 - Return spring 4
 - Washer 5



- 2 Remove
- Crankcase cover 1 (right)

NOTE
Working in a crisscross pattern, loosen the bolts
1/4 turn each. Remove them after all are
loosened.



- 3 Remove
- Gasket 1 (crankcase cover)
 - Dowel pins 2



- 4 Remove
- Bolt 1
 - Washer 2
 - Pull lever axle 3
(from crankcase cover)



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the clutch can be main-
lowing parts.

ern, loosen the bolts,
them after all are

the clutch can be main-
lowing parts.

ern, loosen the bolts,
them after all are

5. Remove

- Bolts 1
- Clutch springs 2
- Pressure plate 3
- Washer 4
- Bearing 5
- Pull rod 6
- Friction plate 7
- Clutch plate 8
- Cushion spring 9

NOTE:

Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.

6. Straighten

- Lock washer tab

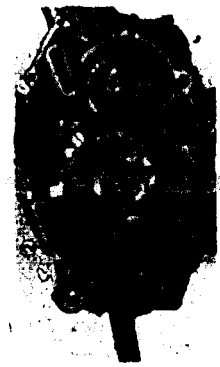
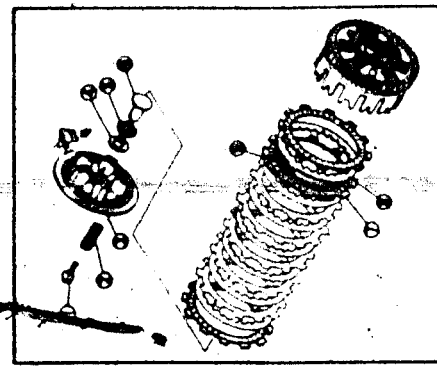
7. Loosen

- Nut 1 (clutch boss)

NOTE:

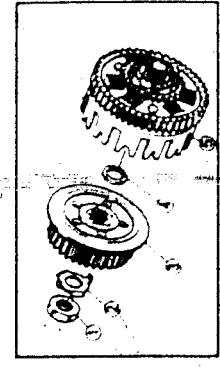
Loosen the nut (clutch boss) while holding the clutch boss with universal clutch holder 2.

Universal clutch holder
P/N: YM 8104Z, 80880-04088



8. Remove

- Nut 1 (clutch boss)
- Lock washer 2
- Clutch boss assembly 3
- Thrust plate 4
- Clutch housing 5

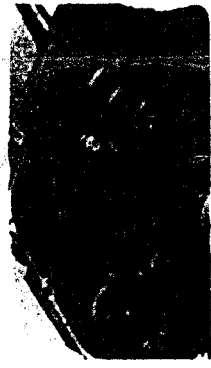


9. Straighten

- Lock washer tabs 1
- 10. Loosen
- Nut 2 (crankshaft)
- Nut 3 (balancer shaft)

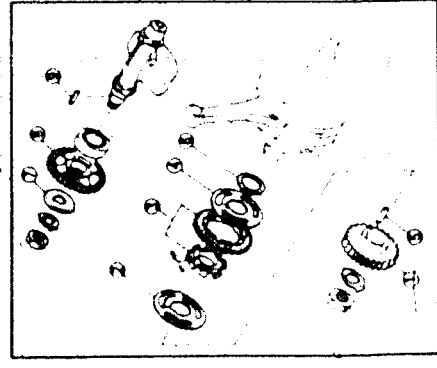
NOTE:

Place a folded rag or aluminum plate between the teeth of the balancer drive gear and balancer gear.
Take care not to damage the gear teeth.



11. Remove

- Primary drive gear 1
- Plate 2
- Balancer drive gear 3
- Plate 4
- Key 5
- Plate washer 6
- Plate 7
- Balancer gear 8
- Key 9



SHIFT LEVER AND OIL PUMP

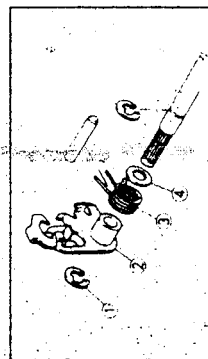
NOTE:

With the engine mounted, the oil pump can be maintained by removing the following parts:
•Clutch cable
•Engine guard
•Water pump housing
•Footrest (right)
•Brake pedal

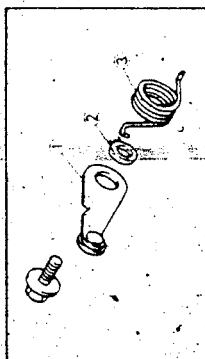
ENGINE DISASSEMBLY

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1. Remove:
- Circlip 1
 - Shift lever 2
 - Torsion spring 3
 - Washer 4



2. Remove:
- Stopper lever 1
 - Collar 2
 - Return spring 3



3. Remove:
- Circlip 1
 - Oil pump gear 2



4. Remove:
- Oil pump assembly 1



5. Remove:
- Gasket 1
 - O-rings 2

ENGINE DISASSEMBLY

ENG



6. Remove:
- Circlip 1
 - Collar 2
 - Circlip 3



- CRANKCASE (RIGHT)
1. Remove:
- Bolts (crankcase)



2. Attach:
- Crankcase separating tool 1



NOTE:

Turn the shift cam to the position shown in the figure so that it does not contact the crankcase when separating the crankcase.



3. Remove:
- Crankcase (right) 2

CRANKCASE SEPARATING TOOL
P/N: YU-01135-A, 90890-01135



and remove them
the highest num-
crankcase design

ion shown in the
of the crankcase

ng tool:
90890/01135

ENGINE DISASSEMBLY



NOTE

- Fully tighten the tool holding bolts, but make sure the tool body is parallel with the case. If necessary, one screw may be backed out slightly to level tool body.
- As pressure is applied, alternately tap on the front engine mounting boss, transmission shafts, and shift cam.

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. Make sure the case halves separate evenly. If one end "hangs up," take pressure off the push screw, realign, and start over. If the cases do not separate, check for a remaining case screw or fitting. Do not force.



4. Remove:
- Dowel pins 1
 - Dowel pin 2
 - O-ring 3

ENGINE DISASSEMBLY



OIL STRAINER

1. Remove:
- Oil strainer 1
 - Oil passage cover 2



2. Remove:

- Gasket 1 (oil strainer)



BALANCER, TRANSMISSION AND SHIFTER

1. Remove:

- Shift shaft 1
- Shift shaft 2 2



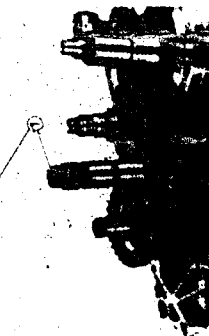
2. Remove:

- Guide bar 1 (short)
- Guide bar 2 (long)
- Shift cam 3
- Shift fork 2 "C" 4
- Shift fork 3 "R" 5
- Shift fork 1 "L" 6



3. Remove:

- Main axle assembly 1



ENGINE DISASSEMBLY

4. Remove:
- Drive axle assembly ①
 - Collar ②



5. Remove:
- Balancer shaft ①



6. Remove:
- Neutral switch ①



CRANKSHAFT

1. Remove:
- Crankshaft assembly ①
- Use the crankcase separating tool ② and adapter ③



Crankcase separating tool:
P/N. YU-01135-A, 90890-01135
Adapter:
P/N. YM-04063-A, 90890-04063

NOTE:
Tighten the tool holding bolts, but make sure that the tool body is vertical with the crankshaft. If necessary, one screw may be backed out slightly to level tool body.



ROCKER ARM

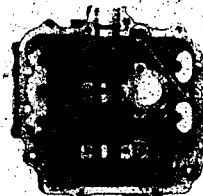
NOTE:
With the engine mounted, the rocker arm can be maintained by removing the following parts.

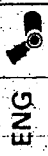
- Seat
- Side covers
- Air scoops
- Fuel tank
- Engine guard
- Radiator
- Exhaust pipes
- Ignition coil
- Oil tank breather hose
- Cylinder head cover

1. Remove:
- Plug ①



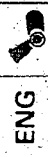
2. Remove:
- Bolt ① (rocker arm shaft)





ENG

ed, the rocker arm can be
g the following parts.



ENG

ENGINE DISASSEMBLY



3. Remove:
- Rocker arm shaft
 - Rocker arm

NOTE:

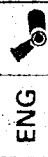
Remove the rocker arm shaft by the slide hammer bolt ① and weight ②.

Slide hammer set:
P/N. YU-01083-A
Slide hammer bolt:
P/N. 90890-01083
Weight:
P/N. 90890-01084



F-4

ENGINE DISASSEMBLY



ENG



2. Remove:
- Valve cotten

NOTE:

Remove the valve cotten while compressing the valve spring with the valve spring compressor.

Valve spring compressor:
P/N. YM-04019, 90890-04519

90890-01083

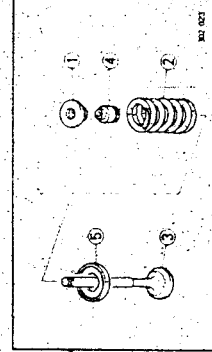
VALVES

NOTE:

Before removing the internal parts (valve, valve spring, valve seat etc.) of the cylinder head, The valve sealing should be checked.

1. Check:
- Valve sealing

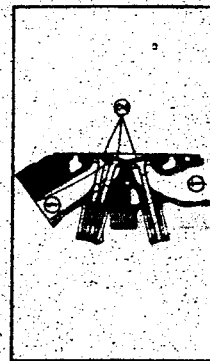
Leakage at valve seat→Inspect the valve face, valve seat and valve seat width.
Refer to the "INSPECTION AND REPAIR—VALVE SEAT".



3. Remove:
- Valve retainers ①
 - Valve spring ②
 - Valve ③
 - Oil seal ④
 - Spring seat ⑤

NOTE:

Identify each part position very carefully so that it can be reinstalled in its original place.



Checking steps:

- Pour a clean solvent ① into the intake and exhaust ports.
- Check the valve sealing.

There should be no leakage at the valve seat ②.



INSPECTION AND REPAIR

ENG

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INSPECTION AND REPAIR

CYLINDER HEAD

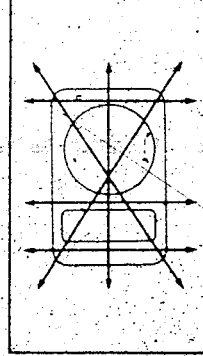
1. Eliminate:
 - Carbon deposit (from combustion chamber)
 - Use rounded scraper.



NOTE:

Do not use a sharp instrument and avoid damaging or scratching:
 • Spark plug thread
 • Valve seat

2. Inspect:
 - Cylinder head
Scratches/Damage - Replace.
 - Water jacket
Crust of minerals/Rust - Eliminate.



3. Measure:
 - Warpage
Out of specification - Resurface.

Cylinder head warpage:
 Less than 0.03 mm (0.0012 in)

4. Resurface:
 - Cylinder head

Resurfacing steps:

- Place a 400 - 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

INSPECTION AND REPAIR

ENG



NOTE:

Rotate the head several times to avoid removing too much material from one side.

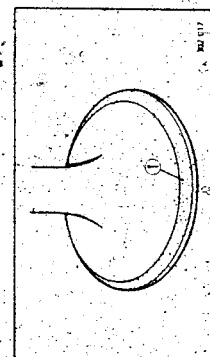
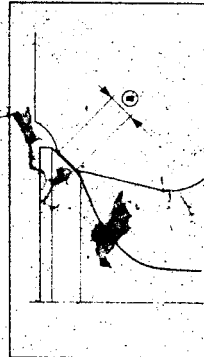
VALVE SEAT

1. Eliminate:
 - Carbon deposit (from valve face and valve seat)

2. Inspect:
 - Valve seat
Pitting/Wear - Reface the valve seat.

3. Measure:
 - Valve seat width: a
Out of specification - Reface the valve seat.

Valve seat width:
 Intake:
 0.9 - 1.1 mm (0.035 - 0.043 in)
 Exhaust:
 0.9 - 1.1 mm (0.035 - 0.043 in)



Measurement steps:

- Apply the Mechanic's bluing dye (Dykem) ① to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Wherever the valve seat and valve face made contact, bluing will have been removed.
- If the valve seat width is too wide, too narrow, or seat has not centered, the valve seat must be refaced.

avoid removing the valve seat.

seat

valve seat

the valve seat.

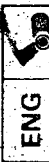
0.35 - 0.043 in.

0.35 - 0.043 in.

the (D/kern) ①

der head.
valve guide and
a clear pattern.
t. Wherever the
be contact by
ide, too narrow,
valve seat must

INSPECTION AND REPAIR



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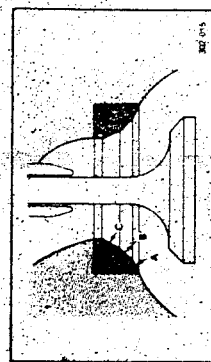
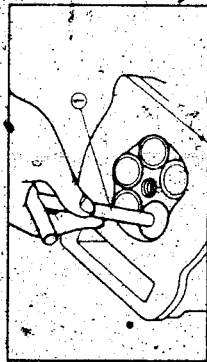
A. Reface:

- Valve seat
- Use a 30°, 45° and 60° valve seat cutter ①

Valve seat cutter:
P/N YM-91043

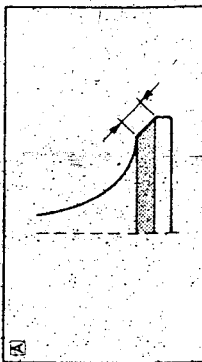
CAUTION:

When twisting cutter, keep an even downward pressure (4 - 5 kg) to prevent chatter marks.



Cut section as follows,	
Section	Cutter
A	30°
B	45°
C	60°

A

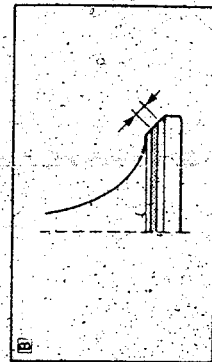


Refacing steps:

- ① Valve seat is centered on valve face but it is too wide.

Valve seat cutter set	
Use	Desired result
30° cutter lightly	To reduce valve seat width to 1.0 mm (0.039 in.)

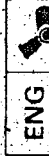
B



- ② Valve seat is in the middle of the face but it is too narrow.

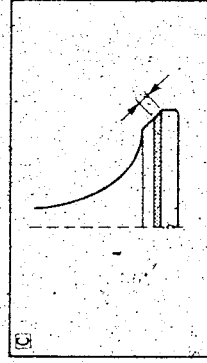
Valve seat cutter set	
Use	Desired result
45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.039 in.)

INSPECTION AND REPAIR



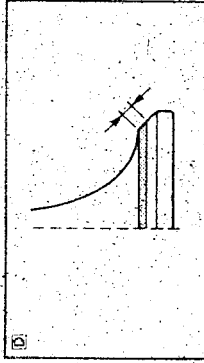
ENG

- ③ Valve seat is too narrow and it is near valve margin.



Valve seat cutter set	
Use	Desired result
First: 30° cutter Second: 45° cutter	To center the seat and to achieve its width of 1.0 mm (0.039 in.)

- ④ Valve seat is too narrow and it is located near the bottom edge of the valve face.



Valve seat cutter set	
Use	Desired result
First: 60° cutter Second: 45° cutter	To center the seat and increase its width.

5. Lap:

- Valve face
- Valve seat

NOTE:

After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.

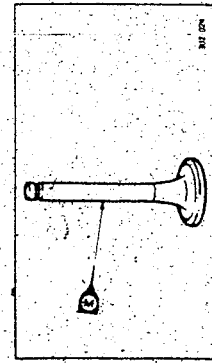
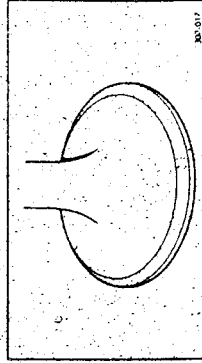
Lapping steps:

- Apply a coarse lapping compound to the valve face.

CAUTION:

Be sure no compound enters the gap between the valve stem and guide.

- Apply a molybdenum disulfide oil to the valve stem.
- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all compound.



and it is near

Tested result
enter the seat to achieve its h of 1.0 mm (3 in).

and it is located valve face.

Tested result
enter the seat and ase its width.

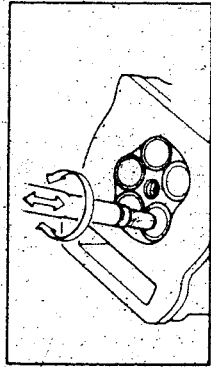
replacing the valve at and valve face

ound to the valve.

is the gap be- guide.

ad oil to the valve under hand. ace and valve seat 1. clean off all

INSPECTION AND REPAIR



NOTE:

To obtain the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- Apply fine lapping compound to the valve face and repeat the above steps.

NOTE:

Be sure to clean off all compound from the valve face and valve seat after every lapping operation.

- Apply a Mechanic's bluing dye (Dykem) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width again.
- If the valve seat width out of specification, reface and lap the valve seat.

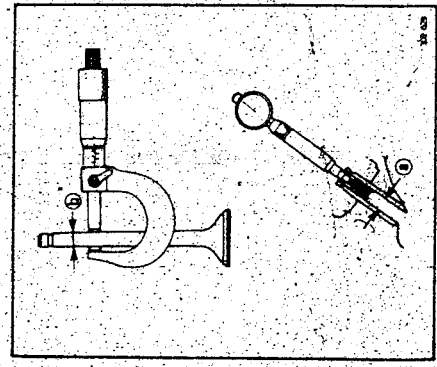
VALVE AND VALVE GUIDE

1. Measure:
 - Stem-to-guide clearance

Stem-to-guide clearance =
Valve guide inside diameter (A) -
Valve stem diameter (B)

Out of specification - Replace valve guide.

Stem-to-guide clearance
Intake:
0.010 - 0.037 mm
0.0004 - 0.0014 in
< Limit > : 0.08 mm (0.0031 in)
Exhaust:
0.025 - 0.052 mm
0.001 - 0.002 in
< Limit > : 0.10 mm (0.0039 in)



INSPECTION AND REPAIR

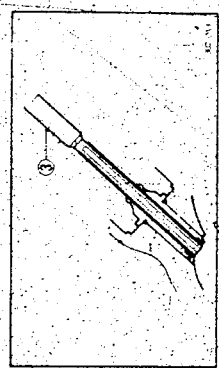
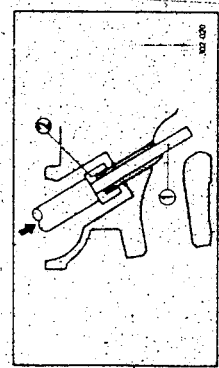
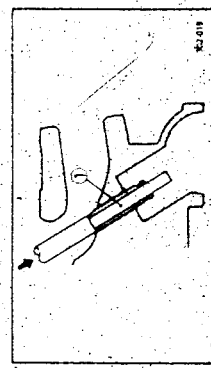
2. Replace:
 - Valve guide

Replacement steps:

NOTE:

Heat the cylinder head in an oven to 100°C (212°F) to ease guide removal and installation and to maintain correct interference fit.

- Remove the valve guide using the valve guide remover (1).
- Install the valve guide (new) using the valve guide installer (2) and valve guide remover (1).
- After installing the valve guide, bore the valve guide using the valve guide reamer (3) to obtain proper stem-to-guide clearance.



Valve guide remover 6 mm (0.24 in):
P/N: YM-04064-A, 90890-04064
Valve guide reamer 6 mm (0.24 in):
P/N: YM-04066, 90890-04066
Valve guide installer 6 mm (0.24 in):
P/N: YM-04065-A, 90890-04065

NOTE:

Replace the valve seat after replacing the valve guide.

3. Eliminate:
 - Carbon deposit (from valve face)
4. Inspect:
 - Valve face
 - Pitting/Wear - Grind the face.
 - Valve stem end
 - Mushroom shape or diameter larger than rest of stem - Replace.



IG

.....

oven to 100°C
of installation and
fit.

the valve guide

using the valve
guide remover ①,
bore the valve
guide ② to ob-
tance

6 mm
90890-04064
3 mm
890-04066
5 mm
90890-04065

.....

lacing the valve

ice.

x larger than test

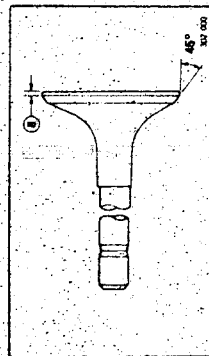


ENG

INSPECTION AND REPAIR

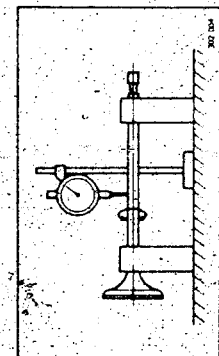
5. Measure:
• Margin thickness ②
Out of specification → Replace.

Margin thickness:
Limit: 0.8 mm (0.032 in)



6. Measure:
• Runout (valve stem)
Out of specification → Replace.

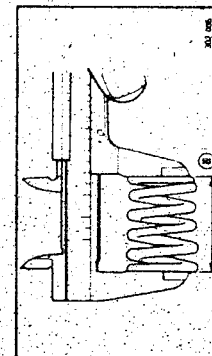
Runout:
Less than 0.01 mm (0.0004 in)



NOTE:
• Always replace the guide if the valve is replaced.
• Always replace the oil seal if the valve is removed.

VALVE SPRING
1. Measure:
• Free length ② (valve spring)
Out of specification → Replace.

Free length (valve spring):
Intake: 32.63 mm (1.285 in)
Exhaust: 36.46 mm (1.435 in)

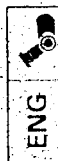


F-8



ENG

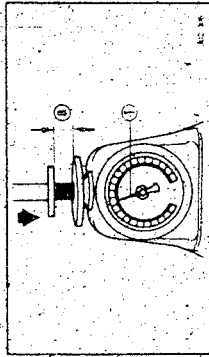
INSPECTION AND REPAIR



ENG

2. Measure:
• Compressed force (valve spring) ①
Out of specification → Replace.

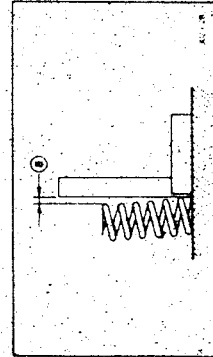
② Installed length



Compressed force:
Intake:
10.2 ~ 11.8 kg (22.49 ~ 26.01 lb)
at 27.50 mm (1.083 in)
Exhaust:
12.3 ~ 14.1 kg (27.12 ~ 31.08 lb)
at 31.00 mm (1.220 in)

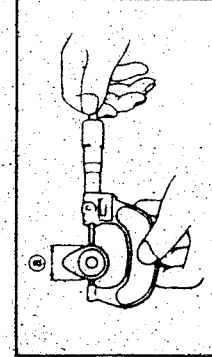
3. Measure:
• Spring tilt ③
Out of specification → Replace.

Spring tilt:
Intake:
Less than 1.4 mm (0.056 in)
Exhaust:
Less than 1.6 mm (0.063 in)

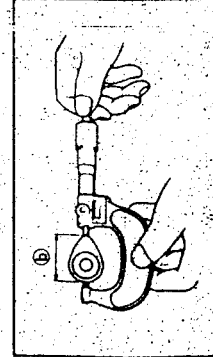


CAMSHAFT
1. Inspect:
• Cam lobes
Pitting/Scratches/Blue discoloration → Replace.

2. Measure:
• Cam lobes length ② and ③
Out of specification → Replace.



Cam lobes length:
Intake:
② 30.06 ~ 30.16 mm
(1.1836 ~ 1.1874 in)
③ 35.63 ~ 35.79 mm
(1.4031 ~ 1.4091 in)



(22.49 - 26.01 lb) 1.063 in)
(27.12 - 31.08 lb) 1.220 in)

Replace
mm (0.065 in)
mm (0.063 in)

discoloration →

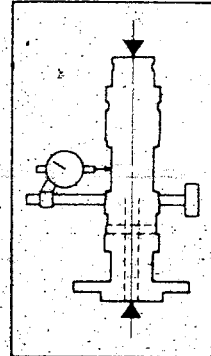
10 ⑥ Replace
6 mm 1 in)
9 mm 1 in)

Cam lobes length:

Exhaust:

④ 30.11 - 30.21 mm
(1.1854 - 1.1894 in)

⑤ 30.50 - 30.60 mm
(1.1970 - 1.2050 in)



3. Measure:

• Runout (camshaft)

Out of specification → Replace.

Runout (camshaft):

Less than 0.03 mm (0.0012 in)

4. Measure:

• Camshaft-to-cap clearance

Out of specification → Measure bearing diameter (camshaft).

Camshaft-to-cap clearance:

0.020 - 0.064 mm
(0.0008 - 0.0025 in)



Measurement steps:

- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® onto the camshaft.
- Install the dowel pins and cylinder head cover.

Bolt (cylinder head cover):

10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

- Tighten the bolts (cylinder head cover) in a cross-pattern from innermost to outer.
- Do not turn the camshaft when measuring clearance with the Plastigauge®.
- Remove the cylinder head cover and measure width of the Plastigauge®.

5. Measure:

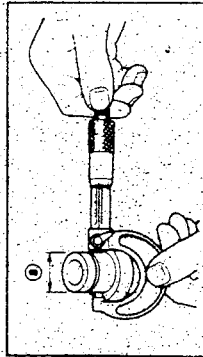
• Bearing diameter (camshaft)

Out of specification → Replace camshaft.

Within specification → Replace cylinder head.

Bearing diameter (camshaft):

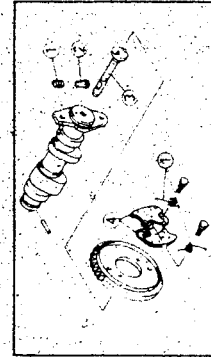
22.967 - 22.990 mm
(0.9042 - 0.9047 in)



DECOMPRESSION

1. Inspect:

- Spring
- Damage → Replace
- Decompression pin
- Decompression lever
- Decompression cam
- Damage/Bends/Wear → Replace



2. Check:

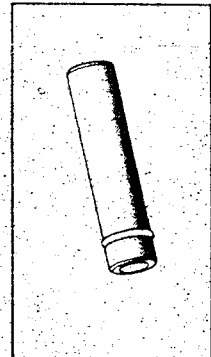
- Decompression play
- Play exists → Replace



ROCKER ARM AND ROCKER ARM SHAFT

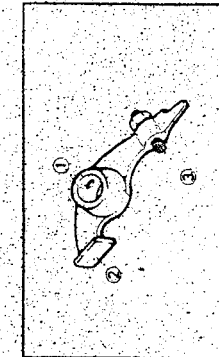
1. Inspect:

- Rocker arm shaft
- Blue discoloration/Grooves → Replace, then inspect lubrication system.



2. Inspect:

- Rocker arm shaft hole
- Cam lobe contact surface
- Adjuster surface
- Wear/Pitting/Scratches/Blue discoloration → Replace, then inspect lubrication system.



2. (camshaft)
n → Replace camshaft.
→ Replace cylinder head.

eter (camshaft):
300 mm
1047 in

1 2
er 3
m 4
es → Replace.

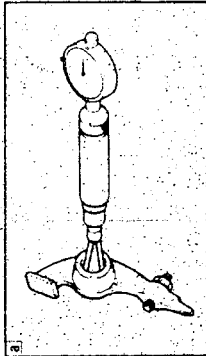
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ROCKER ARM SHAFT

Grooves → Replace, their
system.

hole 1
surface 2
3
itches/ Blue discoloration
spect lubrication system.

INSPECTION AND REPAIR

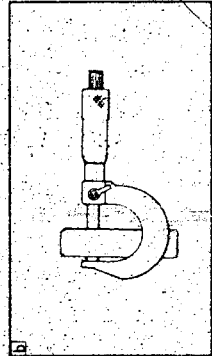


3. Measure:

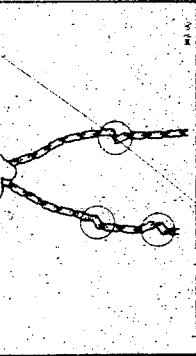
- Arm-to-shaft clearance.

Arm-to-shaft clearance ≈
Rocker arm inside diameter (a) -
Rocker arm shaft outside diameter (b)

Out of specification → Replace as a set.



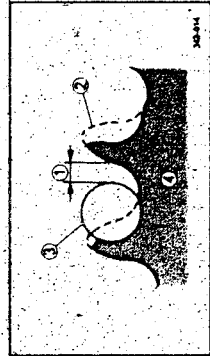
Arm-to-shaft clearance:
0.009 ~ 0.042 mm
(0.0004 ~ 0.0020 in)



TIMING CHAIN, SPROCKET AND CHAIN GUIDE

1. Inspect:

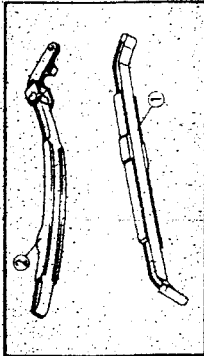
- Timing chain.
Stiff/Cracks → Replace timing chain and sprocket as a set.



2. Inspect:

- Cam sprocket
Wear/Damage → Replace cam sprocket and timing chain as a set.

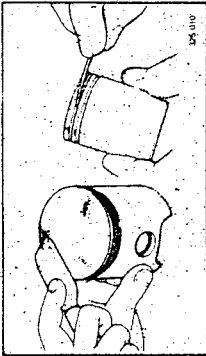
1 1/4 tooth
Correct
Roller
1 Sprocket



3. Inspect:

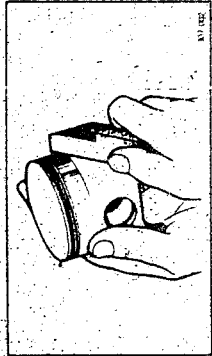
- Chain guide 1 (exhaust side)
• Chain guide 2 (intake side)

INSPECTION AND REPAIR



CYLINDER AND PISTON

- Eliminate:
 - Carbon deposits
(from the piston crown and ring grooves.)
- Inspect:
 - Piston wall
Wear/Scratches/Damage → Replace.



3. Eliminate:

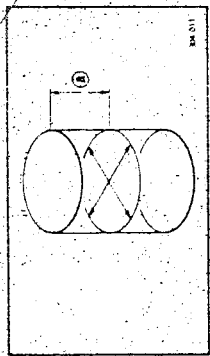
- Score marks and lacquer deposits
(from the side of the piston.)
Use a 600 ~ 800 grit wet sandpaper.

NOTE:

Sand in a crisscross pattern. Do not sand excessively.

4. Inspect:

- Cylinder water jacket
Crust of minerals/Rust → Remove.
- Cylinder wall
Wear/Scratches → Bore or replace.



5. Measure:

- Piston-to-cylinder clearance

Measurement steps:

First steps:

- Measure the cylinder bore "C" with a cylinder bore gauge.
- 50 mm (1.97 in) from the cylinder top

NOTE:

Measure the cylinder bore "C" in parallel to and at right angles to the crankshaft. Then, find the average of the measurements.

Cylinder bore "C":
100.005 ~ 100.045 mm
(3.9372 ~ 3.9388 in)
< Limit: 100.1 mm (3.94 in) >

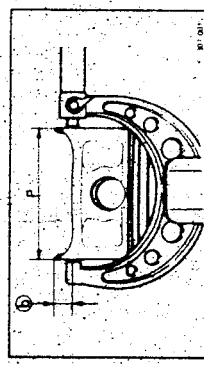
$C = (X + Y) / 2$

- If out of the specification, rebore or replace the cylinder, and the piston and piston rings as a set.

2nd steps

- Measure the piston skirt diameter "P" with a micrometer.

2.5 mm (0.098 in) from the piston bottom edge



Piston skirt diameter "P"
99.945 - 99.965 mm
(3.935 - 3.938 in)

- If out of the specification, replace the piston and piston ring as a set.

3rd steps

- Find the piston-to-cylinder clearance with following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" -
Piston skirt diameter "P"

Piston-to-cylinder clearance:
0.060 - 0.070 mm
(0.0020 - 0.0028 in)
< Limit: 0.15 mm (0.0059 in) >

- If out of the specification, rebore or replace the cylinder, and replace the piston and piston ring as a set.

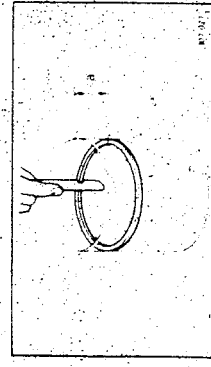
PISTON RING

1. Measure:

- Side clearance
Out of specification - Replace piston and piston ring as a set.

NOTE:
Clean carbon from piston ring grooves and rings before measuring side clearance.

Side clearance:
Top ring:
0.04 - 0.06 mm
(0.002 - 0.003 in)
2nd ring:
(0.03 - 0.07 mm)
(0.001 - 0.003 in)



2. Position:

- Piston ring
(into the cylinder)

NOTE:

Push the ring with the piston crown so that the ring will be at a right angle to cylinder bore.

20 mm (0.8 in)

3. Measure:

- End gap

Out of specification - Replace.

NOTE:

You cannot measure end gap on expander spacer of oil control ring. If oil control ring rails show excessive gap, replace all three rings.

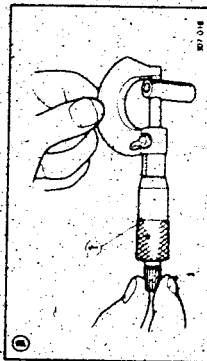
End gap:
Top ring:
0.30 - 0.45 mm
(0.012 - 0.018 in)
2nd ring:
0.30 - 0.45 mm
(0.012 - 0.018 in)
Oil ring:
0.2 - 0.7 mm (0.008 - 0.018 in)

PISTON PIN

1. Inspect:

- Piston pin

Blue discoloration/groove - Replace, then inspect lubrication system.



2. Measure:

- Piston pin-to-piston clearance

Measure the piston pin outside diameter (a). If out of specification, replace the piston pin.

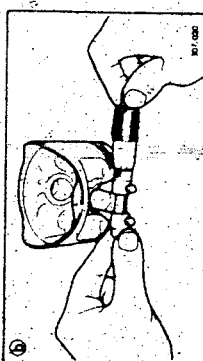
21.991 - 22.000 mm
(0.8658 - 0.8661 in)

Measure the piston inside diameter ϕ .
Calculate the piston pin-to-piston clearance with following formula:

Plaston pin-to-plaston clearance =
Bore size (plaston pin) (b)
Outside diameter (plaston pin)

If out of specification, replace the piston.

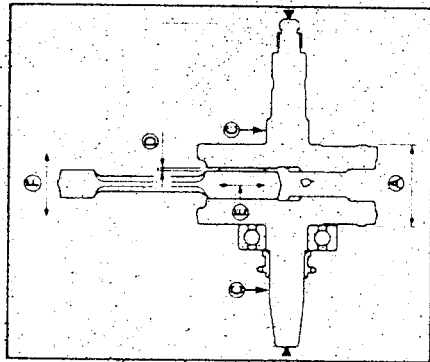
Piston pin-to-piston clearance:
0.004 - 0.024 mm
(0.0002 - 0.0009 in)
Limit: 0.07 mm (0.003 in)



●

 $\delta = 0.018 \text{ in.}$

Replace, then



1. Measure

- Crank width (A) Out of specification

Crank width:
74.95 - 75.00
(2.951 - 2.963)

- **Runout ©**
Out of spec
and/or bear

Runout limit:
0.03 mm (0.0012 in.)

Small end free play \textcircled{D}
Out of specification \rightarrow Replace big end bearing, crank pin and/or connecting rod

Small end free play:
0.8 mm (0.031 in)

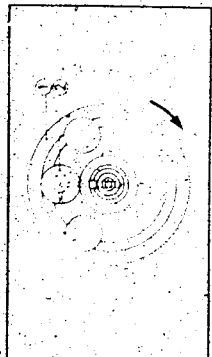
Big end radial clearance (E)
Out of specification → Replace connecting rod, big end bearing and/or crank pin.

Big end radial clearance:
0.01 ~ 0.025 mm
(0.0004 ~ 0.0010 in.)

Side clearance (F)
Out of specification
rod

Blg and side clearance:
0.35 - 0.65 mm (0.014 - 0.026 in)

Crankshaft reassembling point:
The crankshaft (1) and the crank pin (2) oil passages must be properly interconnected with a tolerance of less than 1 mm (0.04 in).



on → Replace crankshaft.

30 mm
1.18 in

ion → Replace crankshaft

0.001 in

ay →
in → Replace big end bearing
and/or connecting rod.

0.031 in

ion → Replace connecting
rod and/or crank pin.

5 mm
0.010 in

ion → Replace connecting

mm 0.014 - 0.026 in.

bling point:
t the crank pin 2 oil pas-
sage is interconnected with a
1 mm (0.04 in).

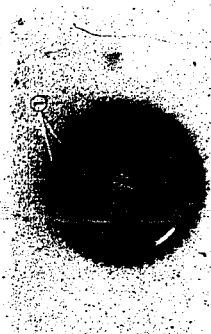
BALANCER DRIVE GEAR AND BALANCER GEAR

- Inspect:
 - Balancer drive gear teeth ①
 - Balancer gear teeth ②
- Wear/Damage → Replace both gears.



- Check:
 - Match marks ①

If they are not aligned → Align match marks as shown.



ELECTRIC STARTER DRIVE

- Inspect:
 - Starter idle gear 1 teeth ①
 - Starter idle gear 2 teeth ②
 - Starter wheel gear teeth ③

Burrs/Chips/Roughness/Wear → Replace.



- Inspect:
 - Starter wheel gear (contacting surfaces):

Pitting/Wear/Damage → Replace.



- Check:
 - Starter clutch operation

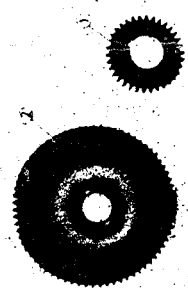
- Checking steps:
- Install the starter wheel gear to the starter clutch, and hold the starter clutch.
 - When turning the starter wheel gear clockwise [A], the starter clutch and the wheel gear should be engaged.
 - If not, the starter clutch is faulty. Replace it.



- When turning the starter wheel gear counter-clockwise [B], the starter clutch gear should turn freely.
- If not, the starter clutch is faulty. Replace it.

PRIMARY DRIVE

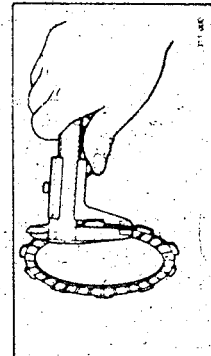
- Inspect:
 - Primary drive gear teeth ①
 - Primary driven gear teeth ②
- Wear/Damage → Replace both gears.
- Excessive noises during operation → Replace both gears.



CLUTCH

- Inspect:
 - Friction plate

Damage/Wear → Replace friction plate as a set.



- Measure:
 - Friction plate thickness

Out of specification → Replace friction plate as a set.

Measure at all four points.

	Thickness	Wear limit
Type "A" (2 pcs.)	2.94 - 3.06 mm (0.116 - 0.120 in)	2.8 mm (0.110 in)
Type "B" (6 pcs.)	2.74 - 2.86 mm (0.108 - 0.113 in)	2.6 mm (0.102 in)



at counter-
should turn
Replace it.

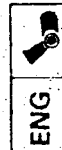
gears.
n--Replace

n plate as a

ction plate

Wear limit	2.8 mm 0.110 in
2.8 mm 0.112 in	

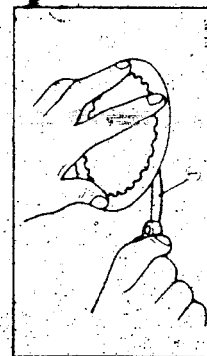
F-14



INSPECTION AND REPAIR

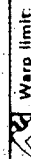
3. Inspect:

- Clutch plate
Damage -- Replace clutch plate as a set.



4. Measure:

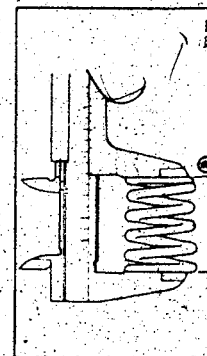
- Clutch plate warpage
Out of specification -- Replace clutch plate as a set.
Use a surface plate and feeler gauge ①.



Warp limit:
Less than 0.2 mm (0.008 in)

5. Inspect:

- Clutch spring
Damage -- Replace as a set.



6. Measure:

- Clutch spring free length ②
Out of specification -- Replace spring as a set.

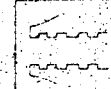
Free length (clutch spring):
42.8 mm (1.685 in)
< Limit: 40.8 mm (1.606 in) >

7. Inspect:

- Dogs on the clutch housing
Scoring/Wear/Damage -- Deburr or replace.

NOTE:

Scoring on the clutch housing dogs will cause erratic operation.



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INSPECTION AND REPAIR

8. Inspect:

- Clutch boss splines
Scoring/Wear/Damage -- Replace clutch boss.

NOTE:

Scoring on the clutch boss splines will cause erratic operation.



9. Check:

- Circumferential play
Free play exists -- Replace



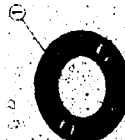
10. Inspect:

- Gear teeth (pull lever axle) 1
- Gear teeth (pull rod) 2
- Wear/Damage -- Replace as a set.



11. Inspect:

- Bearing 1 (pull rod)
Wear/Damage -- Replace

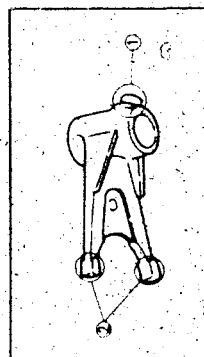


12. Inspect:

TRANSMISSION AND SHIFTER

1. Inspect:

- Shift fork cam follower 1
- Shift fork pawl 2
- Scoring/Bends/Wear -- Replace



4-48

age - Replace clutch

s splines will cause ar

place

axle 1

lace as a set

lace

SHIFTER

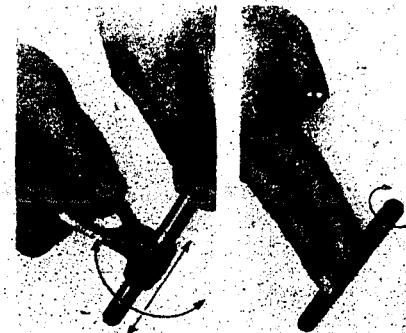
er 1

Replace

2. Inspect:
- Shift cam groove
 - Shift cam segment
 - Wear/Damage - Replace.



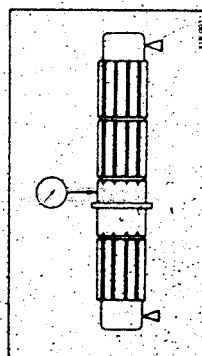
3. Check:
- Shift fork movement
 - Unsmooth operation - Replace shift fork and/or guide bar.



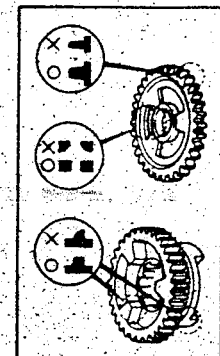
4. Inspect:
- Guide bar
 - Roll the guide bar on a flat surface.
 - Bends - Replace.
- WARNING**
- Do not attempt to straighten a bent guide bar.



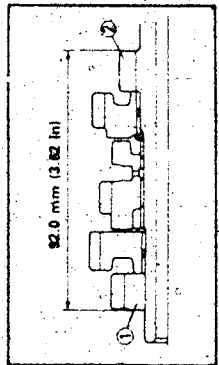
5. Measure:
- Runout (drive axle and main axle)
 - Out of specification - Replace.
- Runout: Less than 0.08 mm (0.003 in)
- WARNING**
- Do not attempt to straighten a bent axle.



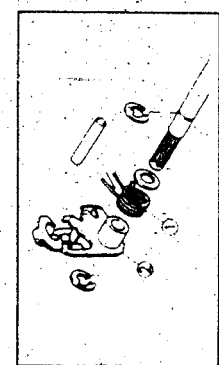
6. Inspect:
- Gear teeth
 - Blue discoloration/Pitting/Wear - Replace.
 - Mated dogs
 - Rounded edges/Cracks/Missing portions - Replace.



- Reassembling point:
- Press the 2nd pinion gear (1) in the main axle (2) as shown.



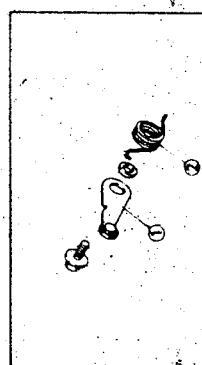
7. Inspect:
- Spring (1)
 - Damage - Replace.
 - Shift lever (2)
 - Damage/Bends/Wear - Replace.



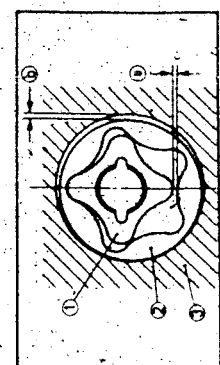
8. Inspect:
- Shift shaft
 - Bends/Wear/Damage - Replace.



9. Inspect:
- Stopper lever (1)
 - Roller turns roughly - Replace.
 - Bends/Damage - Replace.
 - Return spring (2)
 - Damage/Cracks - Replace.



- OIL PUMP, WATER PUMP AND STRAINER**
1. Measure:
- Tip clearance (a)
 - (between inner rotor (1) and outer rotor (2))
 - Side clearance (b)
 - (between outer rotor (2) and pump housing (3))
 - Out of specifications - Replace oil pump.



1.
 in gear 1 in the main axle

Wear - Replace

image - Replace

only - Replace
- Replace
- Replace

PUMP AND STRAINER

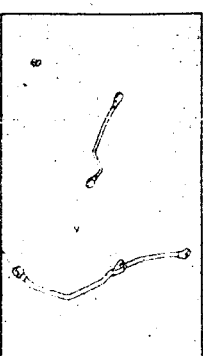
1. rotor 1 and outer rotor 2
2. rotor 2 and pump housing
3. strainer - Replace oil pump

Tip clearance:
0.12 mm (0.006 in)
Side clearance:
0.03 - 0.08 mm (0.001 - 0.003 in)

2. Inspect:
• Oil pump drive gear 1
• Oil pump driven gear 2
Wear/Cracks/Damage - Replace

3. Inspect:
• O-ring 1
• Water pump housing 2
• Water pump gear 3
Cracks/Wear/Damage - Replace

4. Inspect:
• Oil strainer 1
Damage - Replace



OIL DELIVERY PIPES
1. Inspect:
• Oil delivery pipes
Cracks/Damage - Replace
Clog - Blow out with compressed air

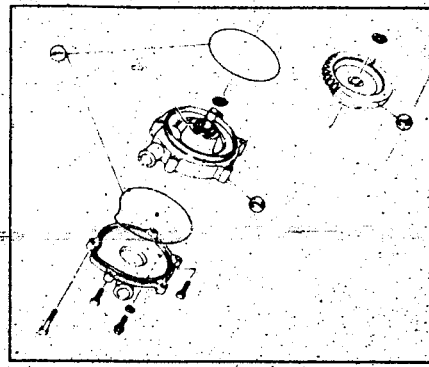
CRANKCASE
1. Thoroughly wash the case halves in mild solvent
2. Clean all the gasket mating surface and crank case mating surface thoroughly

3. Inspect:
• Crankcase
Cracks/Damage - Replace
• Oil delivery passages
Clog - Blow out with compressed air

BEARING AND OIL SEAL

1. Inspect:
• Bearings
Clean and lubricate, then rotate inner race with finger
Roughness - Replace

2. Inspect:
• Oil seals
Damage/Wear - Replace



ENGINE ASSEMBLY AND ADJUSTMENT

VALVE AND ROCKER ARM

- 1 Rocker arm #2
 2 Wave washer
 3 Rocker arm shaft (intake)
 4 Rocker arm #1
 5 Valve cotter
 6 Valve retainer
 7 Oil seal
 8 Valve spring
 9 Valve (intake)
 10 Spring seat
 11 Rocker arm shaft (exhaust)
 12 Rocker arm #4
 13 Rocker arm #3
 14 Rocker arm shaft (exhaust)
 15 Valve (exhaust)

VALVE SPRING TILT LIMIT:
 Inner spring:
 2.5° or 1.4 mm (0.055 in)
 Outer spring:
 2.5° or 1.8 mm (0.063 in)

VALVE CLEARANCE (COLD):
 Intake: 0.10~0.15 mm (0.004~0.006 in)
 Exhaust: 0.15~0.20 mm (0.006~0.008 in)

14 Nm (1.4 m·kg, 10 ft·lb)

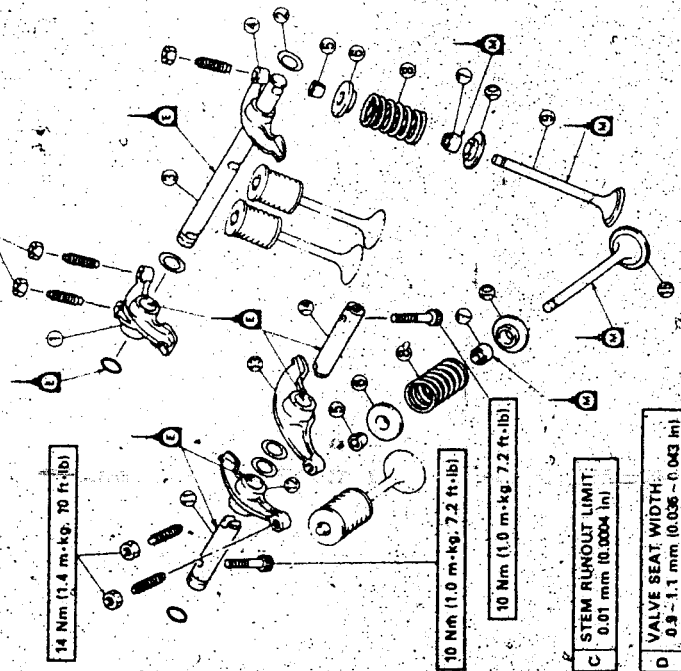
14 Nm (1.4 m·kg, 10 ft·lb)

10 Nm (1.0 m·kg, 7.2 ft·lb)

10 Nm (1.0 m·kg, 7.2 ft·lb)

STEM RUNOUT LIMIT:
 0.01 mm (0.0004 in)

VALVE SEAT WIDTH:
 0.9~1.1 mm (0.036~0.043 in)



13-0405

ENGINE ASSEMBLY AND ADJUSTMENT

WARNING

For engine reassembly, replace the following parts with new ones.

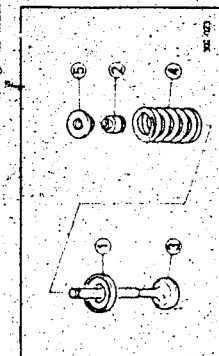
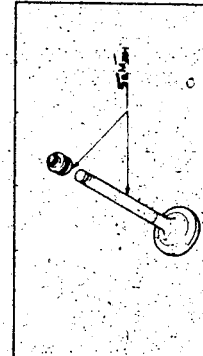
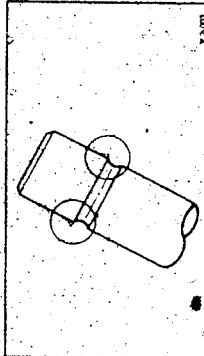
- O-ring
- Gasket
- Oil seal
- Copper washer
- Lock washer
- Circlip

VALVES

1. Deburr:
- Valve stem and
- Use an oil stone to smooth the stem end.

2. Apply:
- Molybdenum disulfide oil (onto valve stem and oil seal)

3. Install:
- Spring seat ①
 - Oil seal ②
 - Valve ③
 - Valve spring ④
 - Valve retainer ⑤ (into cylinder head)



ENG



Y AND

replace the follow-

nooth the stem end

oil
oil seal

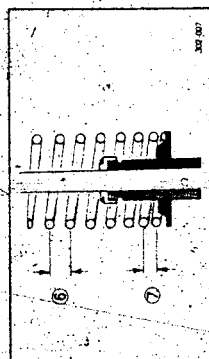
ENGINE ASSEMBLY AND ADJUSTMENT

ENG



NOTE:

- Make sure that the each valve is installed in its original place by reference to it embossed identification mark, as follows:
Intake: 3YF
Exhaust: 3YF
- Install the valve spring with larger pitch (6) facing upward.
- Smaller pitch



- 4. Install:
Valve cotter (1)

NOTE:

Install the valve cotter while compressing the valve spring with the valve spring compressor.

Valve spring compressor:
P/N. YM-04019, 90850-04019

- 5. Secure the valve cotter on to the valve stem by tapping it lightly with a piece of wood.

NOTE:

Do not hit so much as to damage the valve.

G-3

ENG



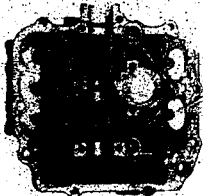
ENGINE ASSEMBLY AND ADJUSTMENT

ENG



ROCKER ARM

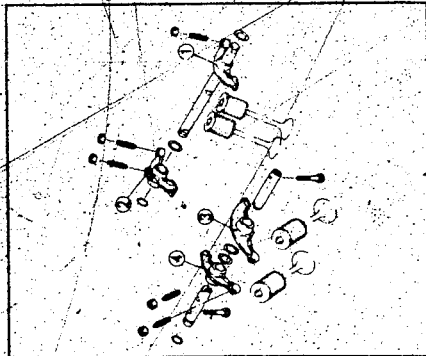
- 1. Lubricate:
Engine oil
(to the rocker arm shaft)
- 2. Install:
Rocker arm
Rocker arm shaft



Bolt (1) (rocker arm shaft):
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Numeral is stamped on the rocker arm.



- 3. Install:
Plug (1)



CRANK	74.95
RUNO	0.03
SMAL	0.8
BIG E	0.01
BIG E	0.35

863079

4-58

4-57

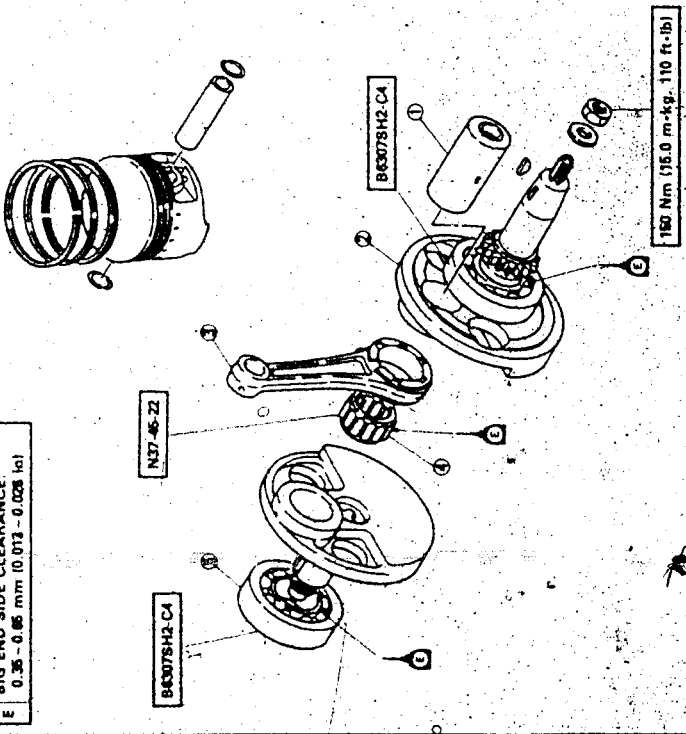
ENGINE ASSEMBLY AND ADJUSTMENT

ENGINE ASSEMBLY AND ADJUSTMENT

CRANKSHAFT

- 1 Crank pin
- 2 Crank (left)
- 3 Connecting rod
- 4 Bearing
- 5 Bearing

A	CRANK WIDTH:
B	74.95 - 75.00 mm (2.950 - 2.953 in)
C	RUNOUT LIMIT:
D	0.03 mm (0.0012 in)
E	SMALL END FREE PLAY:
F	0.8 mm (0.031 in)
G	BIG END RADIAL CLEARANCE:
H	0.01 - 0.025 mm (0.0004 - 0.0010 in)
I	BIG END SIDE CLEARANCE:
J	0.35 - 0.65 mm (0.013 - 0.026 in)



CRANKSHAFT

- 1. Attach:
 - Crankshaft installing tool

Crankshaft installer set:
P/N: YD-90050
Crank pin spacer ①:
P/N: YM-91044
P/N: 90690-04061
Adapter #10 ②:
P/N: YM-90069
P/N: 90690-04059
Crankshaft installer pin ③:
P/N: 90690-01274
Crankshaft installer bolt ④:
P/N: 90690-01275
Spacer ⑤:
P/N: 90690-01288

NOTE

Hold the connecting rod at top dead center with one hand while turning the nut of the installing tool with the other. Operate the installing tool until half of the crankshaft bearing ⑥ is inserted into the crankcase as shown. Then, add the spacer ⑤ as shown and operate the installing tool until the crankshaft bottoms against the bearing.

CAUTION

To protect the crankshaft against scratches or to facilitate the operation of the installation, Apply the grease to the oil seal lips, and apply the engine oil to each bearing.

- BALANCE
- 1 Drive sprocket
 - 2 Oil seal
 - 3 Bearing
 - 4 2nd wheel
 - 5 Drive pin
 - 6 5th wheel
 - 7 3rd wheel
 - 8 4th wheel
 - 9 1st wheel

MAIN
B 0.00

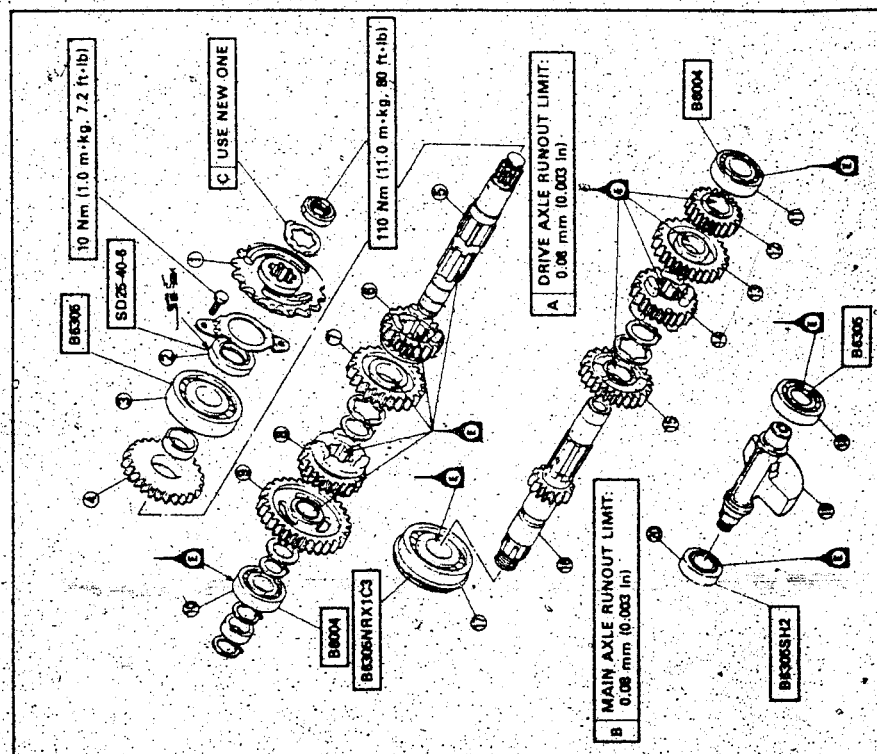
B 0.00

ENGINE ASSEMBLY AND ADJUSTMENT

BALANCER AND TRANSMISSION

- | | | | |
|---|----------------|----|-----------------|
| 1 | Drive sprocket | 11 | Bearing |
| 2 | Oil seal | 12 | Bearing |
| 3 | Bearing | 13 | 2nd pinion gear |
| 4 | 2nd wheel gear | 14 | 2nd pinion gear |
| 5 | Drive axle | 15 | 3rd pinion gear |
| 6 | 5th wheel gear | 16 | 4th pinion gear |
| 7 | 3rd wheel gear | 17 | Main axle |
| 8 | 4th wheel gear | 18 | Bearing |
| 9 | 1st wheel gear | 19 | Bearing |

- 19 Balancer
20 Bearing

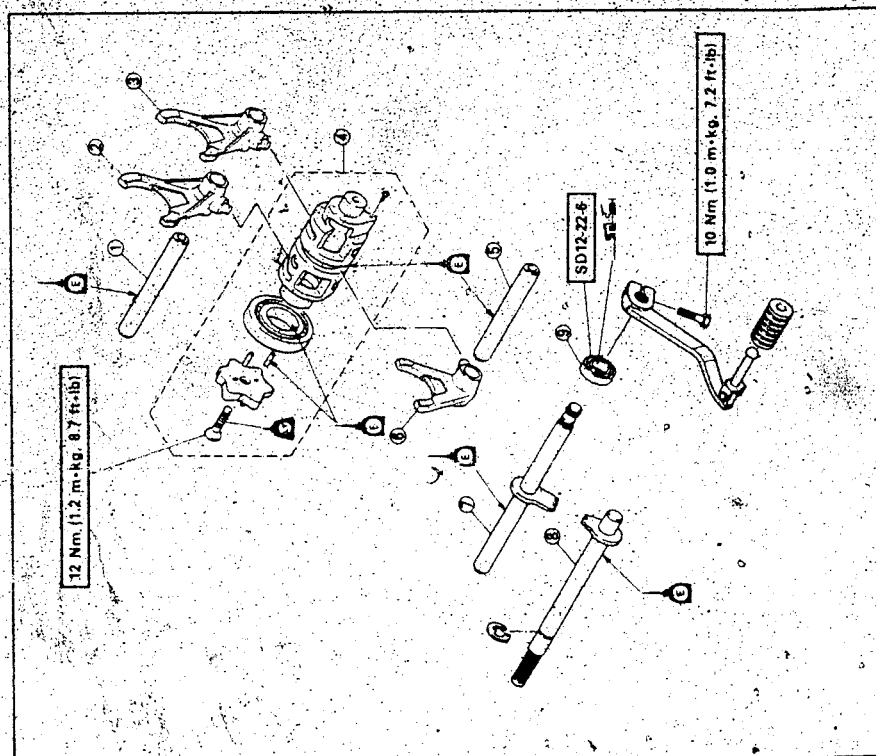


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ENGINE ASSEMBLY AND ADJUSTMENT

SHIFTER

- 1 Guide bar (long)
- 2 Shift fork #3 "R"
- 3 Shift fork #1 "L"
- 4 Shift cam
- 5 Guide bar (short)
- 6 Shift fork #2 "C"
- 7 Shift shaft 2
- 8 Shift shaft
- 9 Oil seal

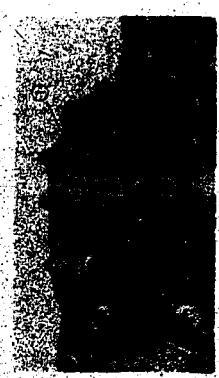


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BALANCER, TRANSMISSION AND SHIFTER

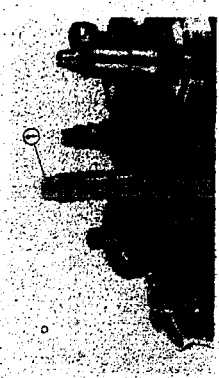
1. Install:
- Neutral switch ①



2. Install:
- Balancer shaft ①

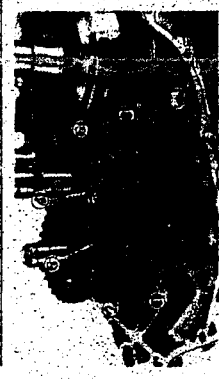


3. Install:
- Collar ①
 - Drive axle assembly ②



4. Install:
- Main axle assembly ①

5. Apply:
- Engine oil (onto guide bars)

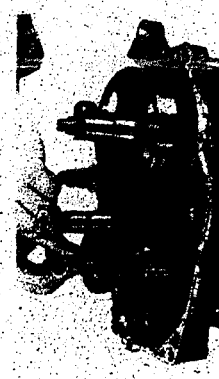


6. Install:
- Shift fork 1 "L" ①
 - Shift fork 3 "R" ②
 - Shift fork 2 "C" ③
 - Shift cam ④
 - Guide bar (long) ⑤
 - Guide bar (short) ⑥

NOTE:
Install the shift forks with the embossed mark on each shift fork facing right side of the engine.



7. Install:
- Shift shaft 2 ①
 - Shift shaft ②



8. Check:
- Transmission operation unsmooth operation - Repair



ENGINE ASSEMBLY AND ADJUSTMENT



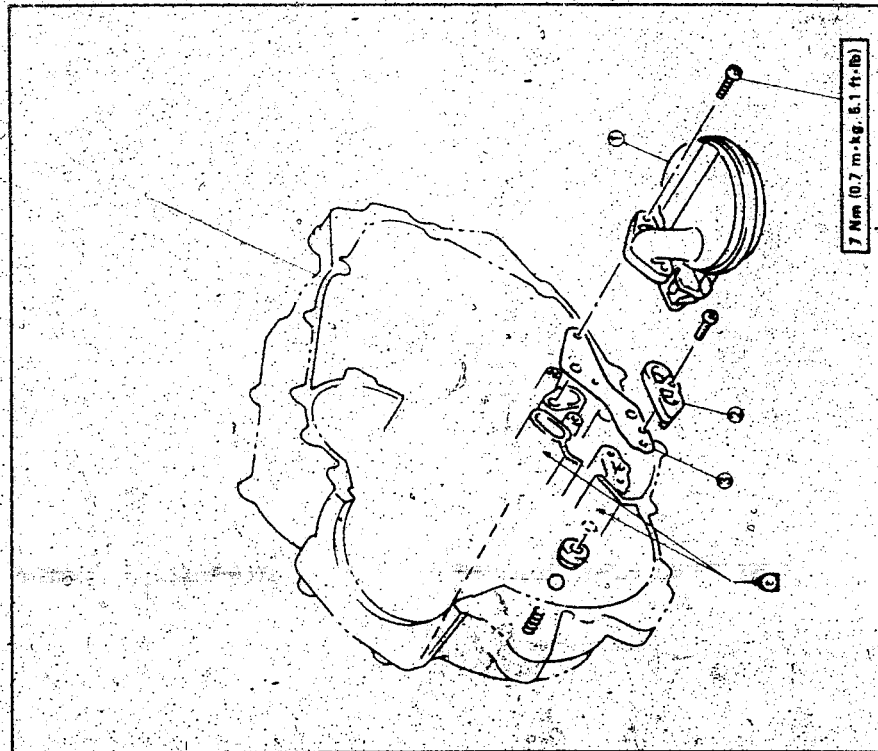
G-7

ENGINE ASSEMBLY AND ADJUSTMENT



OIL STRAINER

- ① Oil strainer
- ② Oil passage cover
- ③ Gasket



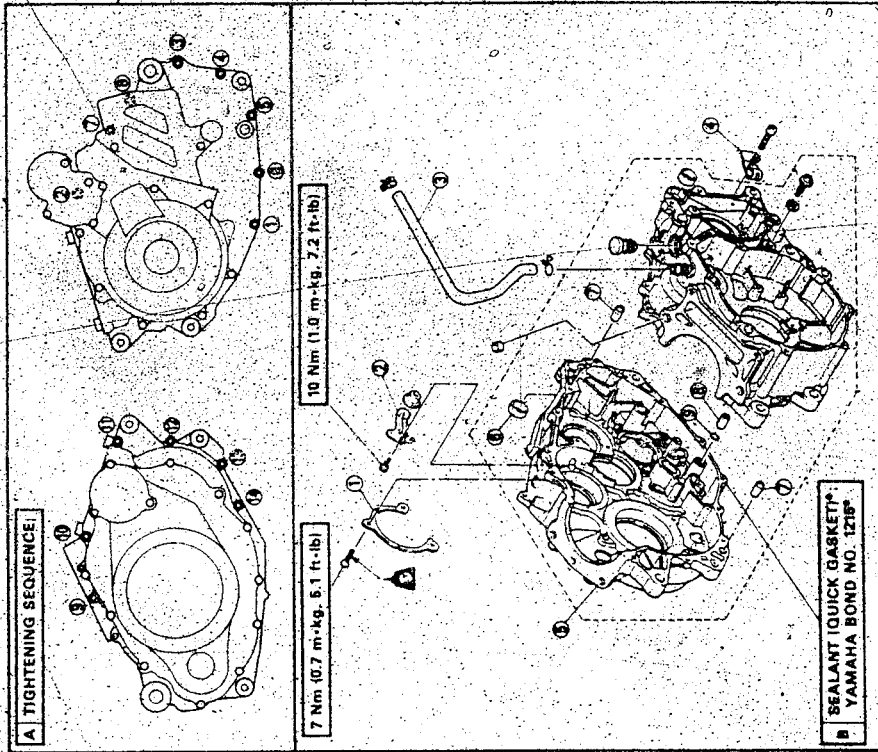
7 Nm (0.7 m·kg, 5.1 ft·lb)

embossed mark on side of the engine.

unsmooth operation

CRANKCASE

- ① Bearing cover plate
- ② Lock plate
- ③ Crankcase ventilation hose
- ④ Cable clamp
- ⑤ Crankcase
- ⑥ Collar
- ⑦ Dowel pin
- ⑧ Dowel pin
- ⑨ O-ring



A TIGHTENING SEQUENCE

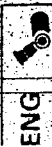
7 Nm (0.7 m·kg, 5.1 ft·lb)

10 Nm (1.0 m·kg, 7.2 ft·lb)

B SEALANT (QUICK GASKET)[®]
YAMAHA BOND NO. 1218[®]

- SHIFT LEV
- ① Stopper
- ② Collar
- ③ Return spring
- ④ Collar
- ⑤ Shift lever

10 Nm



ENG



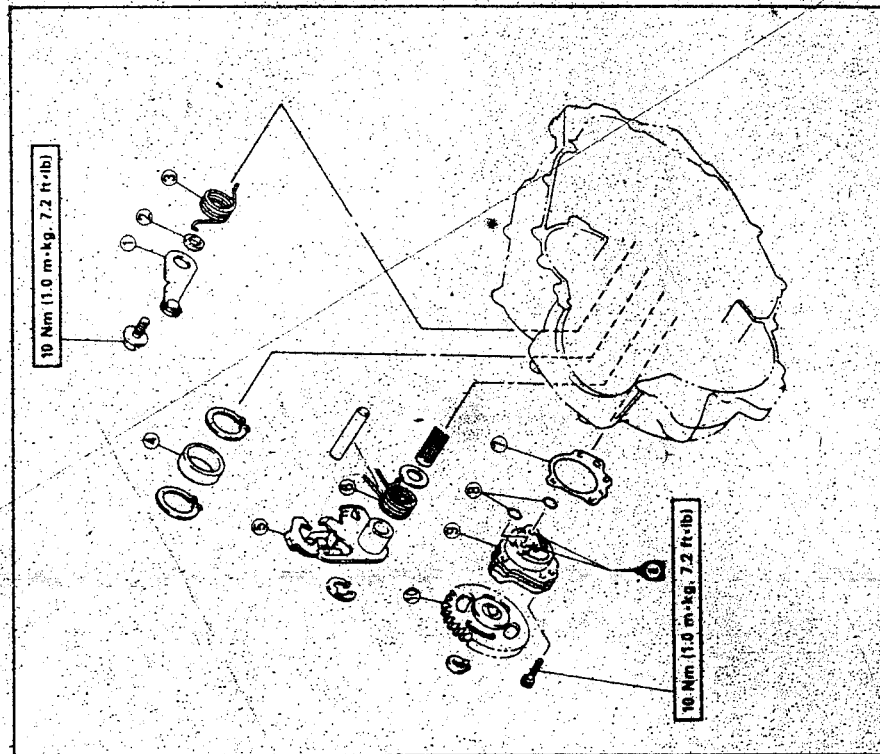
ENG

G-8

ENGINE ASSEMBLY AND ADJUSTMENT

SHIFT LEVER AND OIL PUMP

- ① Stopper lever
- ② Collar
- ③ Return spring
- ④ Collar
- ⑤ Shift lever
- ⑥ Tension spring
- ⑦ Gasket
- ⑧ O-ring
- ⑨ Oil pump
- ⑩ Oil pump gear



4-57

ENGINE ASSEMBLY AND ADJUSTMENT



ENG

OIL STRAINER

- 1. Install:
 - Gasket ①
 - Oil strainer ②
 - Oil passage cover ③



Bolt (oil strainer):
7 Nm (0.7 m·kg, 5.1 ft·lb)

Bolt (oil passage cover):
7 Nm (0.7 m·kg, 5.1 ft·lb)



CRANKCASE (RIGHT)

- 1. Apply:
 - Sealant (onto mating surfaces of both case halves)



Sealant (quick gasket):
P/N: ACC-11001-01
Yamaha Bond No. 1216³
P/N: 90880-85505

NOTE:

DO NOT ALLOW any sealant to come in contact with the oil gallery.

- 2. Install:
 - O-ring ①
 - Dowel pin ②
 - Dowel pins ③



- 3. Fit the left crankcase onto the right case. Tap lightly on the case with a soft hammer.

4-58



NOTE:

Turn the shift cam to the position shown in the figure so that it does not contact the crankcase when installing the crankcase.

③
nert;
n·kg, 5.1 ft·lb)
age cover):
n·kg, 5.1 ft·lb).

ces of both case halves)

k gasket:
1001-01
No. 1218
8506

about to come in contact

onto the right case. Tap
with a soft hammer.



2. Apply:

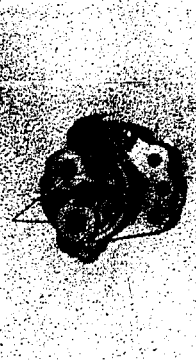
- 4-stroke engine oil
(to the oil passages in the crankcase)

CAUTION:

Apply a liberal amount of 4-stroke engine oil to the oil pump passages in the crankcase, or the engine may be damaged.

3. Apply:

- 4-stroke engine oil
(to the oil passages in the oil pump)



4. Install:

- Gasket ①
- O-ring ②
- Oil pump ③
- Oil pump gear ④
- Circlip ⑤

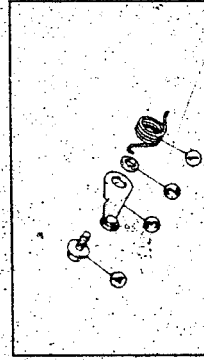


Bolt (oil pump):

10 Nm (1.0 m·kg, 7.2 ft·lb)

5. Install:

- Return spring ①
- Collar ②
- Stopper lever ③



Bolt (stopper lever):

10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Set the spring and stopper lever at proper position.



4. Tighten:

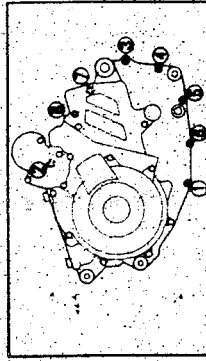
- Bolt (crankcase) ①-④

NOTE:

- Tighten the bolts starting with the lowest numbered one.
- Install the cable clamp on the bolt No. 4.

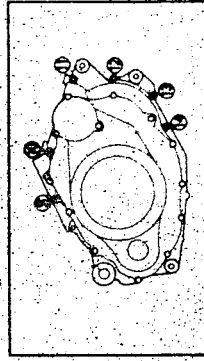
Bolts (crankcase):

10 Nm (1.0 m·kg, 7.2 ft·lb)



5. Apply:

- 4-stroke engine oil
(to the crank pin, bearing and oil delivery hole)



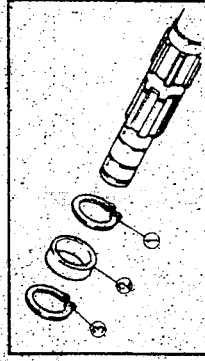
6. Check:

- Crankshaft and transmission operation
Unsmooth operation—Repair.

SHIFT LEVER AND OIL PUMP

1. Install:

- Circlip ① (to drive axle)
- Collar ②
- Circlip ③





ENG

the crankcase

1-stroke engine oil
in the crankcase,
mixed

the oil pump

9.72 ft. (lb)

level:

9.72 ft. (lb)

level at proper po



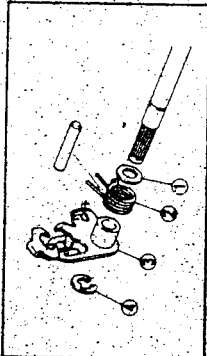
ENG

ENGINE ASSEMBLY AND ADJUSTMENT



ENG

G-10



6. Install:

- Plain washer ①
- Torsion spring ②
- Shift lever ③
- Circlip ④

NOTE:

When installing the shift lever, align the punched mark on the shift lever with the punched mark on the shift shaft.



ENG

BALANCE
① Key
② Balancer
③ Plate
④ Lock wash
⑤ Nut
⑥ Plate wash
⑦ Key

80 Nm (60

A US

43

120 Nm

471

472

ENG



ENGINE ASSEMBLY AND ADJUSTMENT

ENG



G-11

ENGINE ASSEMBLY AND ADJUSTMENT

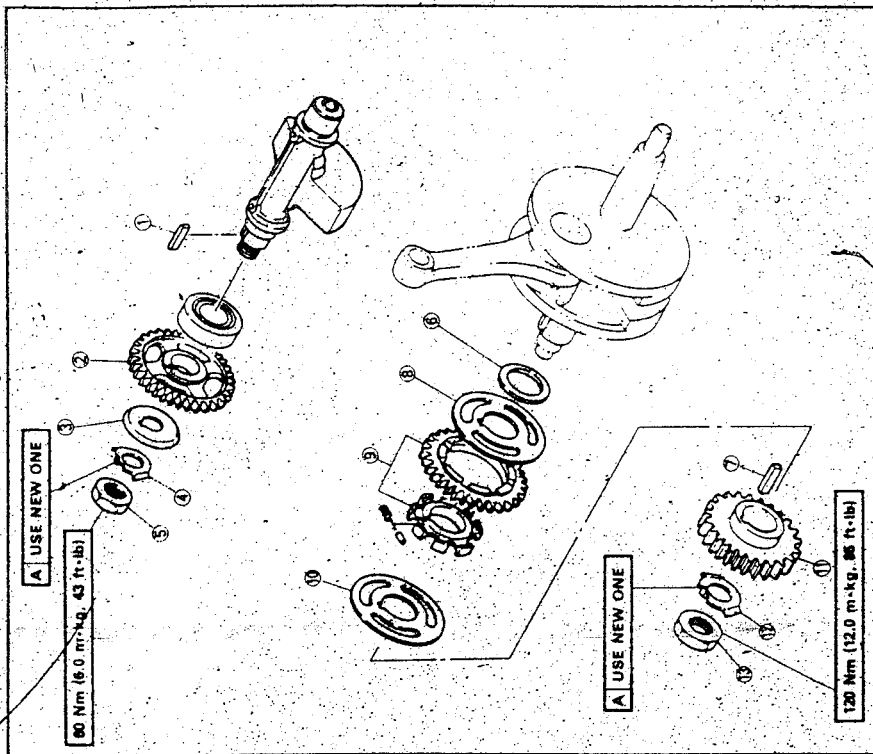
ENG



BALANCER GEAR

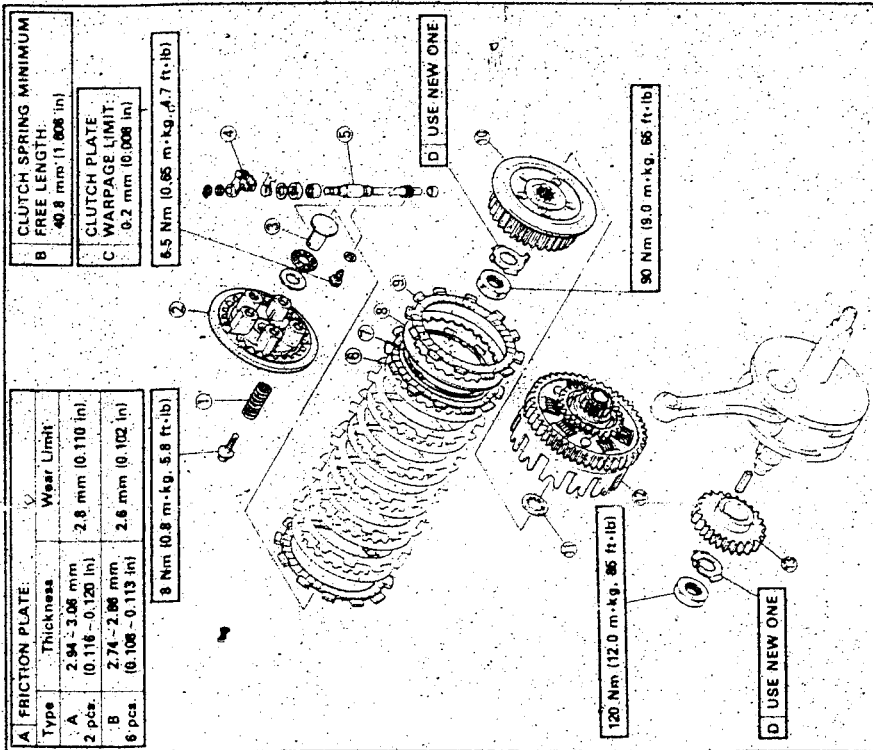
- 1 Key
- 2 Balancer gear
- 3 Plate
- 4 Lock washer
- 5 Nut
- 6 Plate washer
- 7 Key

- 8 Plate
- 9 Balancer drive gear
- 10 Plate
- 11 Primary drive gear
- 12 Lock washer
- 13 Nut



CLUTCH

- 1 Clutch spring
- 2 Pressure plate
- 3 Pull rod
- 4 Thrust boss
- 5 Thrust washer
- 6 Pull lever axle
- 7 Friction plate (type A)
- 8 Wave plate
- 9 Clutch plate (type B)
- 10 Friction plate
- 11 Thrust boss
- 12 Thrust washer
- 13 Clutch housing
- 14 Primary drive gear



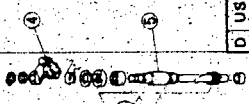
NT

ENG

UTCH SPRING MINIMUM
LEE LENGTH:
0.8 mm (1.008 in)

UTCH PLATE
ARPAE LIMIT:
2 mm (0.008 in)

m 0.85 m.kg 4.7 ft-lb)



D USE NEW ONE

1.0 m.kg 85 ft-lb)

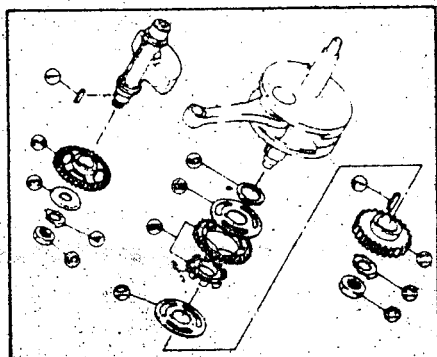
ENGINE ASSEMBLY AND ADJUSTMENT

ENG

G-12

CLUTCH AND BALANCER GEAR

1. Install:
 - Key ①
 - Balancer gear ②
 - Plate ③
 - Lock washer ④
 - Nut ⑤ (balancer gear)
 - Plate washer ⑥
 - Key ⑦
 - Plate ⑧
 - Balancer drive gear ⑨
 - Plate ⑩
 - Primary drive gear ⑪
 - Lock washer ⑫
 - Nut ⑬ (primary drive gear)



Nut (Balancer gear):
80 Nm (6.0 m.kg, 43 ft-lb)
Nut (Primary drive gear):
120 Nm (12.0 m.kg, 88 ft-lb)

NOTE:

- When installing the drive gear, align the punched mark ⑭ on the drive gear with the punched mark ⑮ on the balancer gear.
- Place a folded rag or aluminum plate between the teeth of the balancer drive gear and balancer gear.
- Take care not to damage the gear/teeth.



2. Bend the lock washer tab along the nut flats ⑯

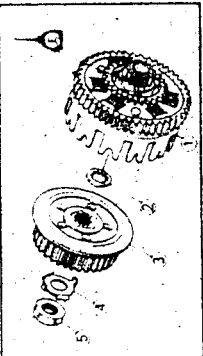


ENGINE ASSEMBLY AND ADJUSTMENT

ENG

ENG

3. Apply:
 - Engine oil (onto bearing and gear teeth)
4. Install:
 - Clutch housing ①
 - Thrust plate ②
 - Clutch boss assembly ③
 - Lock washer ④
 - Nut ⑤ (clutch boss)



NOTE:

Fit the tabs of the lock washer to the groove of the clutch boss.



5. Tighten:
 - Nut ⑤ (clutch boss)



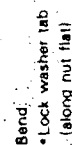
NOTE:

Tighten the nut (clutch boss) while holding the clutch boss with the universal clutch holder ⑥

Universal clutch holder:
P/N 3 VM 91042, 30890-04068

Nut (clutch boss):
90 Nm (9.0 m.kg, 65 ft-lb)

6. Bend:
 - Lock washer tab (along nut flat)



NOTE:

- Molybdenum disulfide grease (onto gear teeth of pull rod)
- Engine oil (onto bearing (pull rod))



seth)

to the groove of

while holding the clutch holder 2

ider:
0830-04066

65 ft (lb)

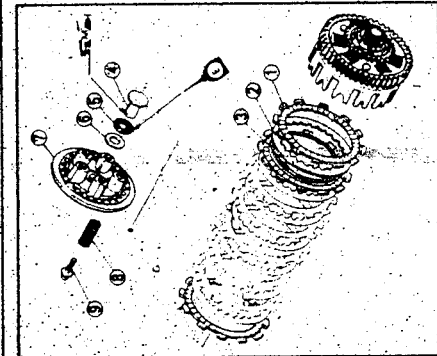
assa
od)

ENGINE ASSEMBLY AND ADJUSTMENT

ENG



G-13



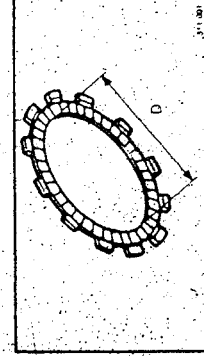
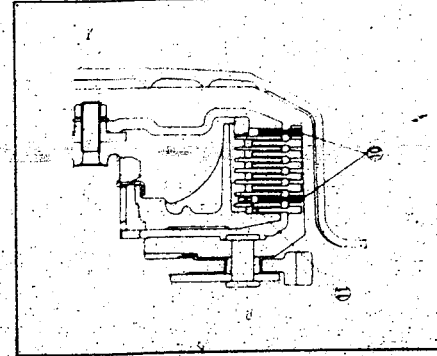
8. Install:
- Friction plate 1
 - Clutch plates 2
 - Cushion spring 3
 - Pull rod 4 (pull rod)
 - Bearing 5
 - Washer 6
 - Pressure plate 7
 - Clutch spring 8
 - Bolts 9

NOTE:

Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.

CAUTION:

- The friction plates (type A) 1 with the larger of the inside diameter must be installed in the second and last places.
- The cushion spring 8 must be placed on the inside of the second friction plate.



Friction Plate	Type "A"		Type "B"	
	Quantity	Type "A"	Type "B"	
	2 pcs.	2 pcs.	6 pcs.	
Inside Diameter "D"		118 mm (4.67 in)	113 mm (4.46 in)	

ENGINE ASSEMBLY AND ADJUSTMENT

ENG



NOTE:
Align the punched mark 1 on the clutch boss with the arrow mark on the clutch pressure plate 13

Bolt (pressure plate):
8 Nm (0.8 m·kg, 5.8 ft·lb)



9. Apply:
- Lithium soap base grease (onto oil seal lips in crankcase cover)
 - Engine oil (onto bearings in crankcase cover)

10. Install:

- Pull lever axle 1 (into crankcase cover)
- Washer 2
- Bolt 3



Bolt (pull lever axle):
6.5 Nm (0.65 m·kg, 4.7 ft·lb)

11. Install:

- Gasket 1 (crankcase cover)
- Dowel pins 2



12. Install:

- Crankcase cover 1 (right)



Bolt (crankcase cover):
30 Nm (3.0 m·kg, 7.2 ft·lb)

NOTE:

Tighten the bolts (crankcase cover) in a crisscross pattern.



NG

the clutch boss
pressure plate

5.8 ft.-lb)

case cover)

se cover)

9. 4.7 ft.-lb)

vel)

it)

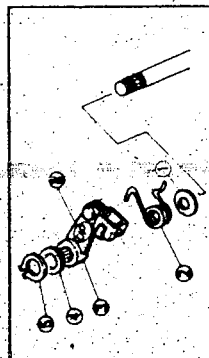
7.2 ft.-lb)

vel) in a cross



ENGINE ASSEMBLY AND ADJUSTMENT

G-14



13. Install:
- Washer 1
 - Return spring 2
 - Pull lever 3
 - Washer 4
 - Circlip 5

NOTE:

Make sure that the mark 6 on the pull lever is aligned with the embossed mark 7 on the crankcase while pushing the pull lever. If not, change the pull lever position.

Align the pull lever with the "Up" mark 8 facing upward.



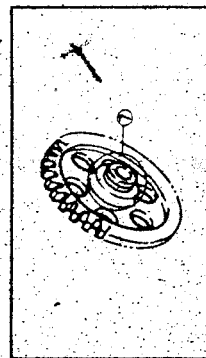
WATER AND WATER PUMP



14. Install:
- Impeller shaft 1
 - Water pump housing 2
 - Circlip 3
 - Pin 4
 - Water pump gear 5
 - Circlip 6

NOTE:

Install the water pump gear with embossed side facing to inside.



2. Apply:
- Molybdenum disulfide grease (onto impeller shaft end).



4-79



ENGINE ASSEMBLY AND ADJUSTMENT

G-14



3. Install:
- O-ring 1



4. Install:
- Water pump housing 1
 - Water pump cover 2

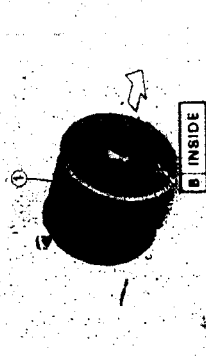
Bolt (water pump):
10 Nm (1.0 m.-kg, 7.2 ft.-lb)



5. Install:
- Oil filter 1
 - Rings 2

CAUTION:

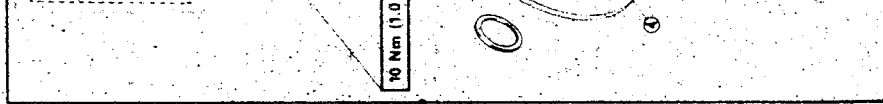
Install the oil filter as shown.



6. Install:
- Oil filter cover 1
- Bolt (oil filter cover):
10 Nm (1.0 m.-kg, 7.2 ft.-lb)

4-80

- ROTOR AND
- 1 Starter gear
 - 2 Starter idle
 - 3 Starter idle
 - 4 Starter wheel
 - 5 Starter clutch
 - 6 Rotor (A.C.)

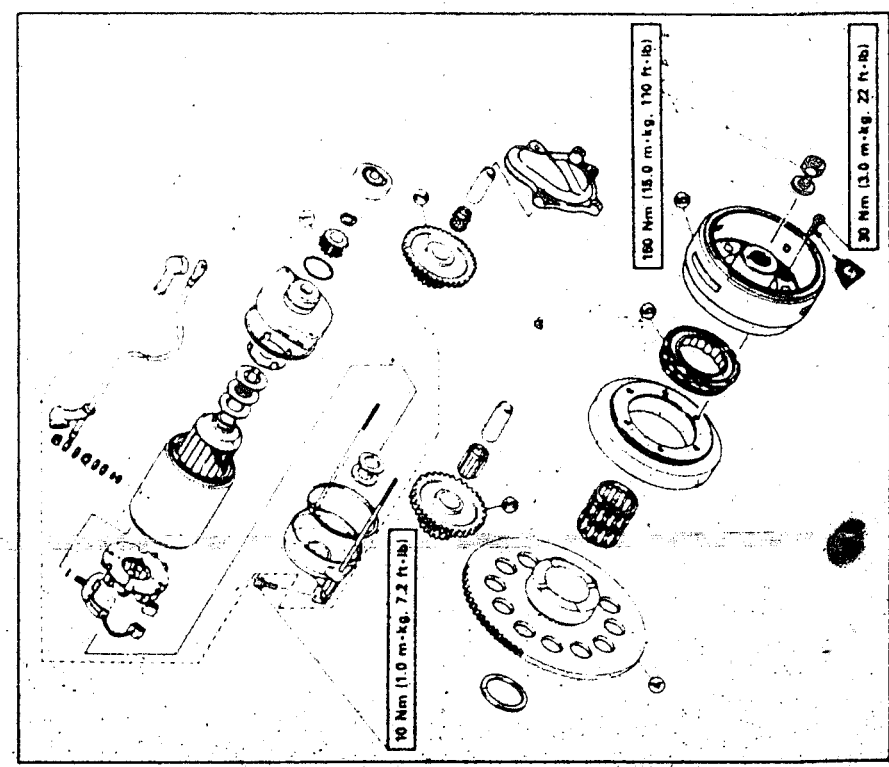


10 Nm (1.0

ENGINE ASSEMBLY AND ADJUSTMENT

ROTOR AND STARTER DRIVES

- 1 Starter gear
- 2 Starter idle gear 1
- 3 Starter idle gear 2
- 4 Starter wheel gear
- 5 Starter clutch
- 6 Rotor (A.C.G.)



ENGINE ASSEMBLY AND ADJUSTMENT

ROTOR AND STARTER DRIVES

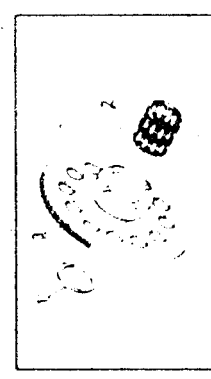
1. Install:
 - Timing chain 1
 - Chain guide 2

Bolt (chain guide):
10 Nm (1.0 m.kg, 7.2 ft.-lb.)

NOTE:

Fasten a safety wire (3) to the timing chain to prevent it from falling into the crankcase.

2. Apply:
 - Engine oil (onto bearing on starter drives)



3. Install:
 - Washer 1
 - Needle bearing 2
 - Wheel gear 3



4. Install:
 - Woodruff key 1
 - Rotor 2

NOTE:

When installing the magneto rotor, make sure that the woodruff key is properly seated in the key-way of the crankshaft.



5. Install:
 - Nut 1 (rotor)

Bolt (rotor):
180 Nm (15 m.kg, 110 ft.-lb.)

NOTE:

Tighten the nut (rotor) while holding the rotor with the rotor holder 2.

1. kg. 7.2 ft.-lb.)

the timing chain to the crankcase.

xr drives)

otor, make sure that / seated in the key.

kg. 110 ft.-lb.)

olding the rotor with

Rotor holder:
P/N. YS-01880, 80880-01701

CAUTION:

Do not allow the rotor holder to touch the projections 3 on the rotor.



6. Install
- Starter idle gear 2, 1.
 - Needle bearing 2.
 - Shaft 3.
 - Gasket 4 (crankcase cover)
 - Dowel pins 5
 - O-rings 6



7. Install
- Crankcase cover 1 (left)
- Bolt (crankcase cover)
10 Nm (1.0 m.-kg. 7.2 ft.-lb.)

NOTE:
Tighten the bolts (crankcase cover) in a crisscross pattern.

8. Connect
- Neutral switch 2



9. Install
- Shaft 1 (starter idle gear)
 - Needle bearing 2
 - Starter idle gear 3
 - Gasket 4
 - Dowel pin 5

10. Install

- Cover 1



Bolt (cover)
10 Nm (1.0 m.-kg. 7.2 ft.-lb.)

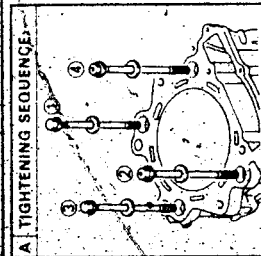
ENGINE ASSEMBLY AND ADJUSTMENT

ENG

H-1

CYLINDER

- 1 Cylinder head gasket
- 2 Cylinder
- 3 O-ring
- 4 Cylinder gasket
- 5 Dowel pin



A TIGHTENING SEQUENCE

BORE SIZE:
100.006 - 100.046 mm (3.9372 - 3.9388 in)
B < LIMIT >:
< 100.1 mm (3.941 in) >

PISTON-TO-CYLINDER CLEARANCE:
0.050 - 0.070 mm (0.0020 - 0.0028 in)
C < LIMIT >:
< 0.16 mm (0.0063 in) >

42 Nm (4.2 m.kg, 30 ft.-lb.)

10 Nm (1.0 m.kg, 7.2 ft.-lb.)

D USE NEW ONE

38 Nm (3.8 m.kg, 27 ft.-lb.)

D USE NEW ONE

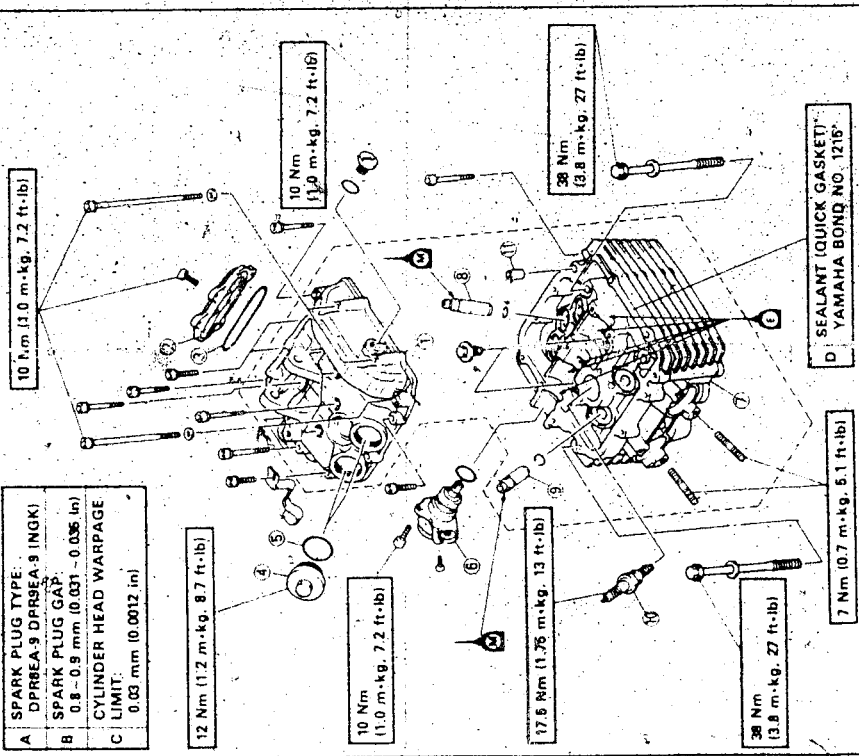
ENGINE ASSEMBLY AND ADJUSTMENT

ENG

CYLINDER HEAD

- 1 Cylinder head cover
- 2 Tappet cover (intake)
- 3 O-ring
- 4 Tappet cover (exhaust)
- 5 O-ring
- 6 Tachometer gear unit
- 7 Cylinder head
- 8 Valve guide (intake valve)
- 9 Valve guide (exhaust valve)
- 10 Spark plug
- 11 Dowel pin

A SPARK PLUG TYPE:
DPR9EA-9 DPR9EA-9 (NGK)
B SPARK PLUG GAP:
0.8 - 0.9 mm (0.031 - 0.036 in)
C CYLINDER HEAD WARPAGE
LIMIT:
0.03 mm (0.0012 in)



D SEALANT (QUICK GASKET)
YAMAHA BOND NO. 1216

7 Nm (0.7 m.kg, 5.1 ft.-lb.)

ENGINE

- ### CAMSHAFT AND TIMING
- 1 Camshaft
 - 2 Spring
 - 3 Decompression pin
 - 4 Decompression lever
 - 5 Cam sprocket
 - 6 Decompression cam
 - 7 Spring

SHAFT-TO-CAP CLEAR:
A 0.020 - 0.064 mm
(0.0008 - 0.0027 in)

8 CAMSHAFT RUNOUT:
0.03 mm (0.0012 in)





ID PISTON

pins)

ictures marks
p side of the

point to the
he crankcase
not accident-
rial into the

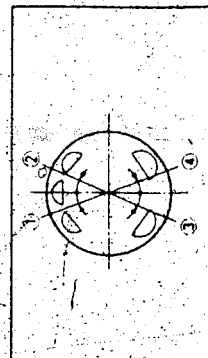
ENGINE ASSEMBLY AND ADJUSTMENT



H-3



ENGINE ASSEMBLY AND ADJUSTMENT



5. Position:
- Top ring
 - 2nd ring

Offset the piston ring end gaps as shown.

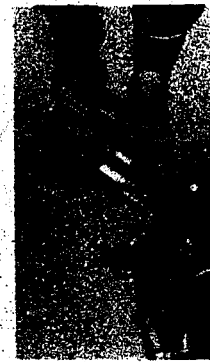
- ① Top ring end
- ② Oil ring end (lower)
- ③ Oil ring end (upper)
- ④ 2nd ring end

6. Install:
- Cylinder ①



NOTE:

Install the cylinder while compressing the piston ring by the hand.



7. Install:
- Bolts ①
 - Bolts ②

Bolts ①	42 Nm (4.2 m·kg, 30 ft·lb)
Bolts ②	10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Tighten the bolts ① in a crisscross pattern.



8. Install:
- Pipe ①

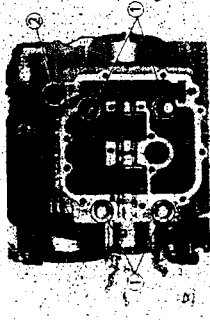
Bolt (pipe)	10 Nm (1.0 m·kg, 7.2 ft·lb)
-------------	-----------------------------



9. Install:
- Gasket ① (cylinder head)
 - Dowel pins ②



10. Install:
- Cylinder head ①



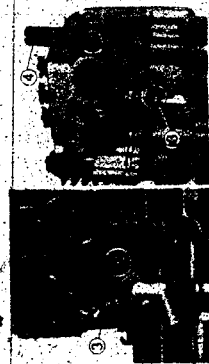
NOTE:

- Bolts ①
- Bolt ②
- Bolts ③
- O-ring (pipe ④)
- Pipe ④

Bolt ③	38 m·kg, 27 ft·lb
Bolt ②	10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

- Apply the engine oil onto the O-ring
- Tighten the bolts ① in a crisscross pattern.



12. Install:
- Chain guide ① (exhaust)



13. Install:
- Cam sprocket (1)
 - Camshaft (2)

Installing steps:

- Turn the crankshaft counterclockwise until the TDC mark (3) is aligned with the stationary pointer (4).
- Align the match mark (5) on the camshaft with the punched mark (6) on the decompression lever.
- Fit the timing chain onto cam sprocket and install the cam sprocket on the camshaft.

NOTE:

- When installing the cam sprocket, keep the timing chain as tense as possible on the exhaust side.
- Align the pins (7) on the decompression lever with the slots (8) in the decompression cam.
- Set the respective match marks (9) to be parallel with the case surface on the corresponding sides, and align the respective match marks (10) to be vertical.

CAUTION:

Do not turn the crankshaft during the camshafts installation. Damage or improper valve timing will result.

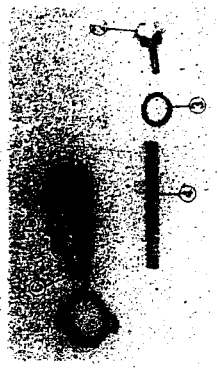
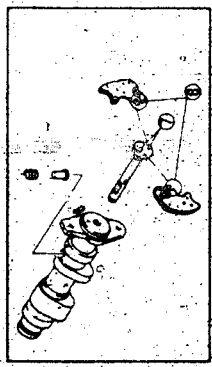
- While holding the camshaft, temporary tighten the bolts.



14. Install:
- Chain tensioner (1)

Installing steps:

- Remove the cap bolt (2), washer (3) and spring (4).
- Release the ratchet (5) and push the tension rod (6).



- Install the chain tensioner with the ratchet end facing downward.
- Tighten the bolts.

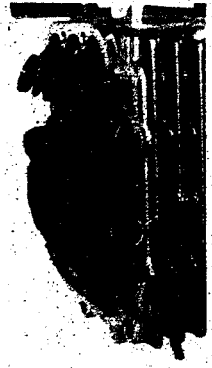
Bolt (chain tensioner):
10 Nm (1.0 m·kg, 7.2 ft·lb)

- Install the spring (4), washer (3) and cap bolt (2).

Cap bolt (timing chain tensioner):
20 Nm (2.0 m·kg, 14 ft·lb)

15. Tighten:
- Bolts (1) (cam sprockets)

Bolt (cam sprocket):
20 Nm (2.0 m·kg, 14 ft·lb)



16. Check:
- Valve timing
- Out of alignment → Adjust.
- Refer to above steps 13 - 15.

17. Check:
- Valve clearance
- Out of specification → Adjust.
- Refer to "VALVE CLEARANCE ADJUSTMENT" section in the CHAPTER 3.

Install valve (cold):
0.10 - 0.15 mm (0.004 - 0.006 in)
Exhaust valve (cold):
0.15 - 0.20 mm (0.006 - 0.008 in)

or with the ratchet and

ioner):
n·kg, 7.2 ft·lb)

asher ③ and cap bolts.

ig chain tensioner):
n·kg, 14 ft·lb)

ckers)

cket):
n·kg, 14 ft·lb)

Adjust:
s 13 - 15

Adjust:
LEARNANCE ADJUST
he CHAPTER 3.

old):
m 10.004 - 0.008 in)
cold):
m 10.006 - 0.008 in)

ENGINE ASSEMBLY AND ADJUSTMENT

18. Apply:
• Sealant ①
(onto the cylinder head mating surfaces)

Sealant (quick gasket)*
P/N, ACC-11001-01
Yamaha Bond No. 1215*
P/N, 90890-86506

19. Install:
• Dowel pin ②
20. Install:
• Cylinder head cover ①

NOTE:
Tighten the bolts in stage, using a crisscross pattern.

Bolt (cylinder head cover):
10 Nm (1.0 m·kg, 7.2 ft·lb)

21. Install:
• Timing plug ①
• Plug ②

22. Install:
• Tachometer, gear unit ①

Bolt (cylinder head):
10 Nm (1.0 m·kg, 7.2 ft·lb)

23. Install:
• Intake manifold ①

Bolt (intake manifold):
10 Nm (1.0 m·kg, 7.2 ft·lb)

ENGINE ASSEMBLY AND ADJUSTMENT

24. Install:
• Spark plug ①

Spark plug:
17.5 Nm (1.75 m·kg, 12.5 ft·lb)

PIPES AND HOSES.
1. Apply:
• Lithium soap base grease
(onto O-ring on oil pipes)

2. Install:
• Coolant hose ①

3. Install:
• Breather hose ① (oil tank)
• Breather hose ② (crankcase)
• Oil hose ③

Bolt (oil hose):
10 Nm (1.0 m·kg, 7.2 ft·lb)

4. Apply:
• Lithium soap base grease (onto O-ring on starter motor)



VG

g. 12.5 ft.-lb.)

7.2 ft.-lb.)

into O-ring on



ENG

ENGINE ASSEMBLY AND ADJUSTMENT

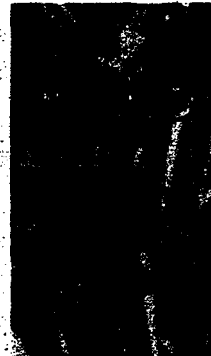
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5. Install:
- Starter motor ①



Bolt (starter motor):
10 Nm (1.0 m.-kg, 7.2 ft.-lb.)

6. Install:
- Oil pipe ①



Union bolt:
20 Nm (2.0 m.-kg, 14 ft.-lb.)
Bolt:
10 Nm (1.0 m.-kg, 7.2 ft.-lb.)

7. Install:
- Oil pipe ①



Union bolt (oil pipe):
20 Nm (2.0 m.-kg, 14 ft.-lb.)

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REMounting ENGINE

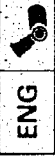
When remounting the engine, reverse the removal procedure. Note the following points.



1. Install:
- Pivot shaft ①
 - Mounting bolt ② (front—upper)
 - Mounting bolt ③ (rear—lower)
 - Mounting bolts ④ (front—lower)

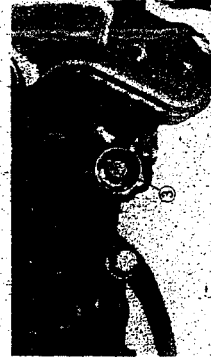


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ENG

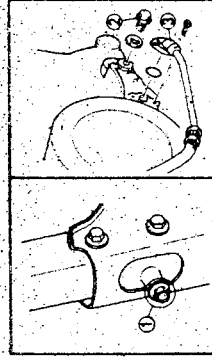
ENGINE ASSEMBLY AND ADJUSTMENT



NOTE:
Install the all bolts and nuts first, and then tighten the bolts and nuts to specifications.

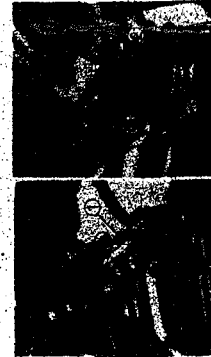


Nut (pivot shaft):
100 Nm (10.0 m.-kg, 72 ft.-lb.)
Nut (mounting bolt):
Front—upper
85 Nm (8.5 m.-kg, 47 ft.-lb.)
Front, Rear—lower
65 Nm (6.5 m.-kg, 47 ft.-lb.)



2. Install:
- Drain bolt ① (oil tank)
 - Drain bolt ② (crankcase)
 - Oil hose ③

Drain bolt ①:
18 Nm (1.8 m.-kg, 13 ft.-lb.)
Drain bolt ②:
30 Nm (3.0 m.-kg, 22 ft.-lb.)
Bolt (oil hose):
10 Nm (1.0 m.-kg, 7.2 ft.-lb.)



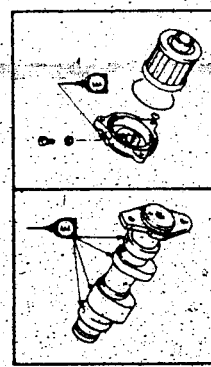
3. Remove:
- Tappet cover ① (intake)
 - Air bleed screw ② (oil filter cover)
4. Apply:
- 4-stroke engine oil (to the camshaft upper side and into the oil filter chamber).

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ENGINE ASSEMBLY AND ADJUSTMENT

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ENG



Apply a liberal amount of 4-stroke engine oil to the oil passage in the crankcase, or the engine may be damaged.

Oil quantity:
Camshaft:
0.1 L (0.09 imp qt, 0.11 US qt)
Oil filter chamber:
0.06 L (0.05 imp qt, 0.06 US qt)

5. Install:
- Tappet cover (intake)
 - Air bleed screw (oil filter cover)

Bolt (tappet cover):
10 Nm (1.0 m·kg, 7.2 ft·lb)
Bolt (air bleed screw):
5 Nm (0.5 m·kg, 3.6 ft·lb)

6. Install:
- Pivot shaft cap ① (right and left)
 - Rear brake pedal ②

Bolt (rear brake pedal):
35 Nm (3.5 m·kg, 25 ft·lb)

7. Connect:
- Clip ③
 - Rear brake switch ④
8. Install:
- Footrest ⑤ (right)

Bolts (footrest):
50 Nm (5.0 m·kg, 36 ft·lb)

ENGINE ASSEMBLY AND ADJUSTMENT

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9. Install:
- Drive sprocket ①
 - Lock washer ②
 - Nut ③

Nut:
110 Nm (11.0 m·kg, 80 ft·lb)

10. Bend:
- Lock washer tab (along nut flat)

11. Adjust:
- Drive chain slack
- Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.

Drive chain slack:
20-26 mm (0.79-1.77 in.)



Bolt (cover):
10 Nm (1.0 m·kg, 7.2 ft·lb)



13. Install:
- Shift pedal ①
 - Foot rest ② (left)

Bolt (shift pedal):
10 Nm (1.0 m·kg, 7.2 ft·lb)
Bolts (foot rest):
50 Nm (5.0 m·kg, 36 ft·lb)

ENGINE ASSEMBLY AND ADJUSTMENT



14. Connect:
• Ground lead ①
Refer to the "CABLE ROUTING" section in the CHAPTER 2.

Bolt:
10 Nm (1.0 m.kg, 7.2 ft.-lb)

15. Adjust:
• Clutch cable free play
Refer to the "CLUTCH ADJUSTMENT" section in the CHAPTER 3.

Free play:
10 - 15 mm (0.39 - 0.59 in)
at clutch lever end



16. Connect:
• Carburetors ①
Screw (carburetor joint clamp - left):
2 Nm (0.2 m.kg, 1.4 ft.-lb)
Screw (carburetor joint clamp - right):
5 Nm (0.5 m.kg, 3.6 ft.-lb)

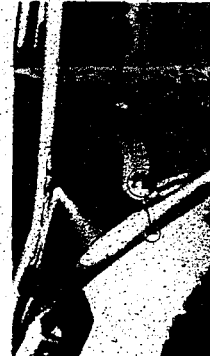


17. Install:
• Air filter case ①
Bolt (air filter case):
10 Nm (1.0 m.kg, 7.2 ft.-lb)



18. Connect:
• Carburetor joints ①
Screw (carburetor joint clamp - left):
2 Nm (0.2 m.kg, 1.4 ft.-lb)
Screw (carburetor joint clamp - right):
6 Nm (0.6 m.kg, 3.6 ft.-lb)

ENGINE ASSEMBLY AND ADJUSTMENT



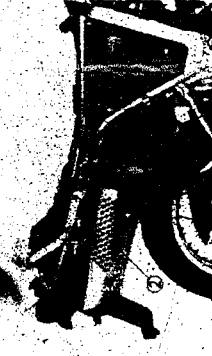
19. Install:
• Bolt (rear brake reservoir tank) ①

Bolt (rear brake reservoir tank):
4 Nm (0.4 m.kg, 2.9 ft.-lb)



20. Install:
• Exhaust pipes ①
• Muffler ②

Nut (exhaust pipe):
10 Nm (1.0 m.kg, 7.2 ft.-lb)
Bolt (muffler):
40 Nm (4.0 m.kg, 29 ft.-lb)



21. Tighten:
• Bolt ① (clamp)
• Bolt ② (clamp)
Bolt ①, ② (clamp):
20 Nm (2.0 m.kg, 14 ft.-lb)



22. Install:
• Radiator ①
Bolt (radiator):
10 Nm (1.0 m.kg, 7.2 ft.-lb)

ENGINE ASSEMBLY AND ADJUSTMENT



23. Install:

- Bolt ① (radiator stay)
- Bolt ② (conduction)

	Bolt (radiator stay): 16 Nm (1.5 m·kg, 11 ft·lb) Bolt (conduction): 10 Nm (1.0 m·kg, 7.2 ft·lb)
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24. Connect:

- Battery leads



Connect the positive lead ① first and then connect the negative lead ②.



25. Install:

- Engine guard ①

	Nut (engine guard): 7 Nm (0.7 m·kg, 5.1 ft·lb) Bolt (engine guard): 7 Nm (0.7 m·kg, 5.1 ft·lb)
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26. Fill:

- Radiator
 - Recovery tank
- Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.
- Oil tank
- Refer to the "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.

27. Install:

- Fuel tank
 - Air scoops
 - Side covers
 - Seat
- Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

	Bolts (fuel tank, cowl and fuel tank, side cover): 7 Nm (0.7 m·kg, 5.1 ft·lb) Bolt (seat): 10 Nm (1.0 m·kg, 7.2 ft·lb)
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