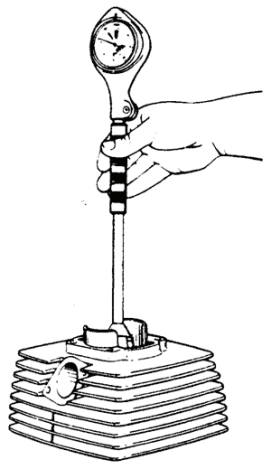
ENGINE TOLERANCES MEASUREMENTS

CYLINDER TAPER

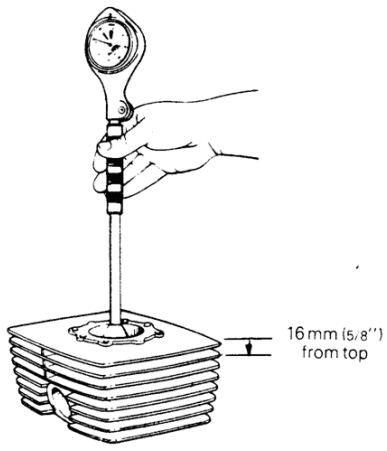
Maximum: 0.08 mm (.003")

Compare cylinder diameter 16 mm (5/8") from top of cylinder with down to just below auxiliary transfer port, facing exhaust port.

If the difference exceeds 0.08 mm (.003") the cylinder should be rebored and honed or the cylinder sleeve should be replaced.



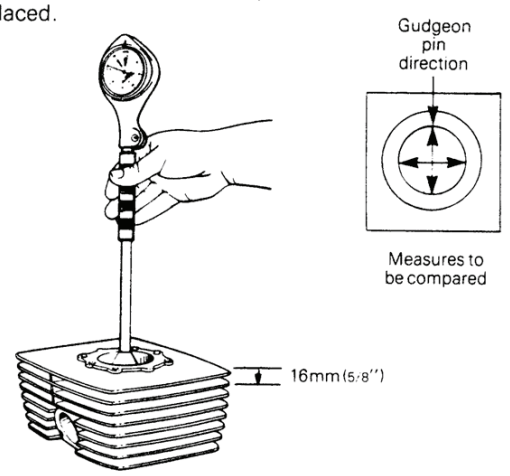
Below the auxiliary transfer port



CYLINDER OUT OF ROUND

Maximum: 0.05 mm (.002")

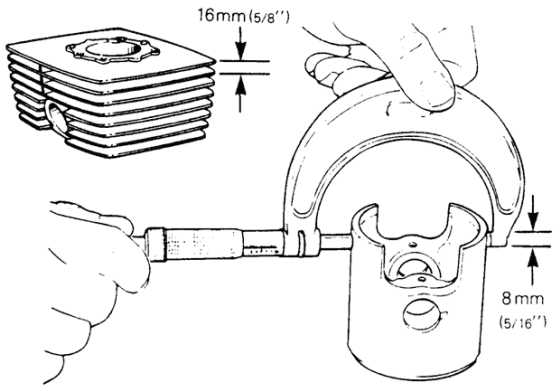
Measuring 16 mm (5/8") from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than 0.05 mm (.002"). If larger, cylinder should be rebored and honed or the cylinder sleeve should be replaced.



PISTON TO CYLINDER WALL CLEARANCE

Accurate measurement

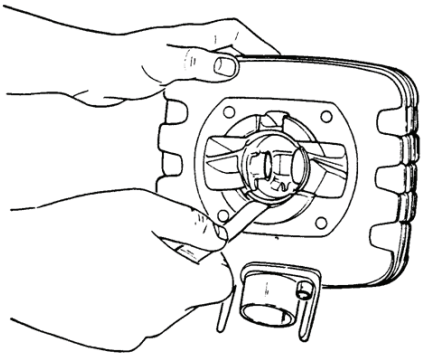
To determine piston to wall clearance, the piston should be measured 8 mm (5/16") above its bottom edge and the cylinder should be measured 16 mm (5/8") below its top edge.



The difference between these two measurements should be within specified tolerance.

Quick measurement

Place cylinder upside down on a work-bench and press a feeler gauge against the cylinder wall (intake side) while trying to insert the piston without any ring in its usual position.

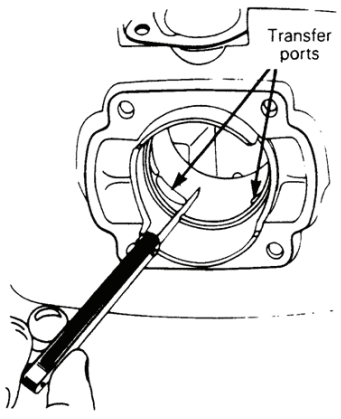


The thickest possible to use feeler gauge will determine the piston to wall clearance.

RING END GAP

Position ring under the transfer ports. Using a feeler gauge, check ring end gap. If gap exceeds specified tolerance the ring should be replaced.

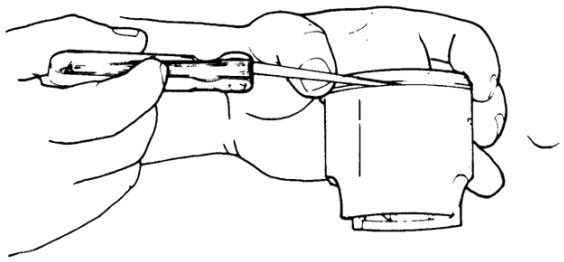
NOTE: In order to correctly position the ring in the cylinder, use the piston as a pusher.



PISTON "R" RING/GROOVE CLEARANCE (QUALIFIER MODELS)

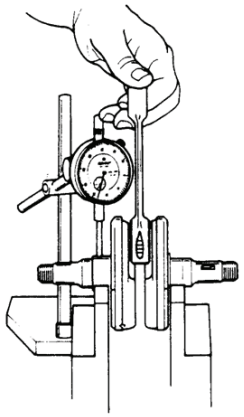
Maximum: 0.20 mm (.008")

Using a feeler gauge check clearance between rectangular ring and groove. If clearance exceeds 0.20 mm (.008"), replace piston.

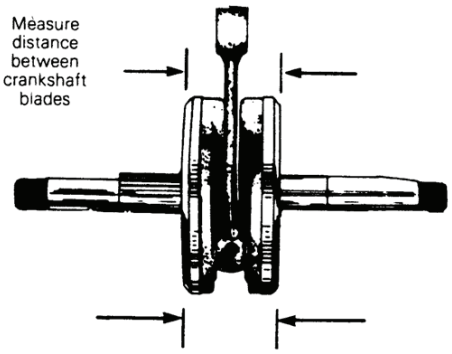


CRANKSHAFT EXCENTRICITY

If possible, mount the bearings on the crankshaft and install it on two crankshaft supporting blocks, install a dial indicator as close as possible to crankshaft blade (or bearing) then rotate the crankshaft and measure the deflection on each side. If deflection exceed 0.05 mm (.002") the crankshaft should be repaired by a specialized shop or it should be replaced.



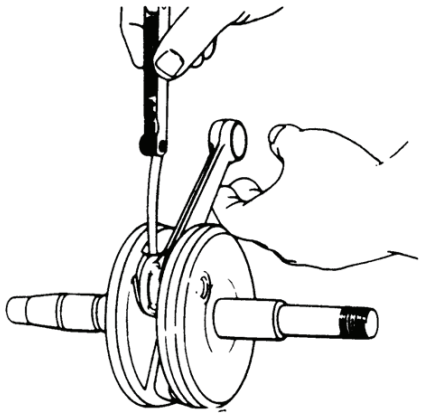
CRANKSHAFT BLADE WIDTH



The distance between the two points must be equal.

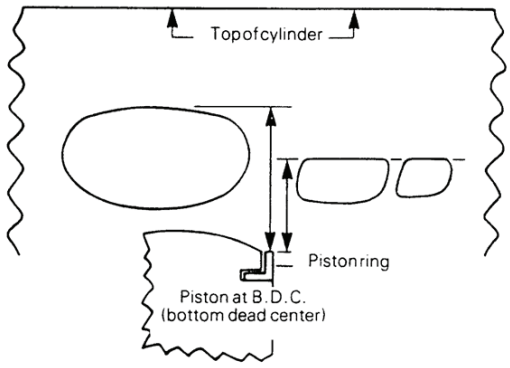
CONNECTING ROD BIG END AXIAL PLAY

Using a feeler gauge measure distance between connecting rod and thrust washer. If axial play exceeds wear limit the crankshaft should be rebuilded or replaced.

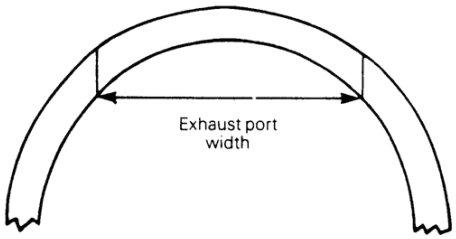


PORT HEIGHT MEASUREMENT

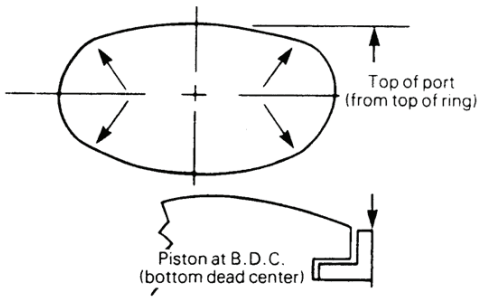
Port heights are measured on the inside diameter of the cylinder and are taken from the top of the piston ring with the piston at bottom dead center (BDC).



The exhaust port width is measured in a straight line from edge to edge (**Not** around the cylinder wall).



The height and width specifications do not include port radius or edge chamfer.



The port shape must be approximately as shown to prevent piston ring breakage. The radius in each "Corner" guides the piston ring back into place as the piston travels past the port.

ROTARY VALVE TIMING

The rotary valve controls the opening and closing of the intake port, therefore, its installation position is critical toward efficient operation.

For example, an engine with the following specifications:

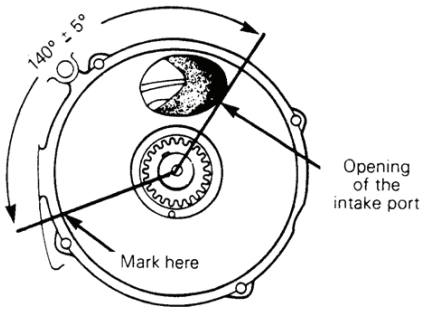
Disc opening at 140° B.T.D.C.

Disc closing at 85° A.T.D.C.

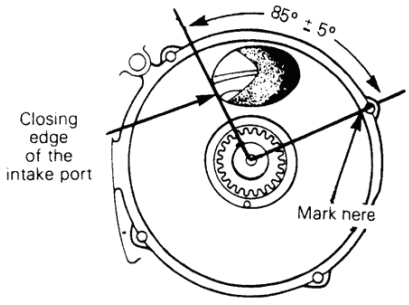
Disc is asymmetrical.

Proceed as follows:

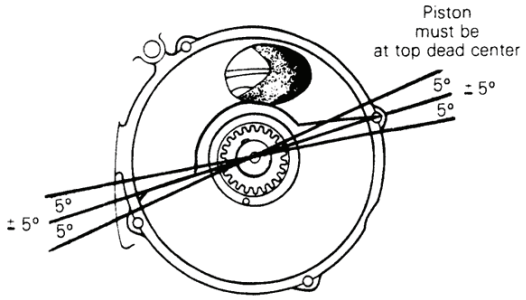
Using a degree wheel, mark 140° after the opening of the intake port. (Degrees follow a counter-clockwise direction).



From the closing edge of the intake port, mark 85° (degrees follow a clockwise direction).



Using a dial indicator, place the piston at top dead center to have the edges of the disc as close as possible to the marks. If the edges do not align exactly, make sure the **error** is subdivided equally on either side of the marks. The maximum tolerance is 5° on either side of the marks.



SQUISH AREA MEASUREMENT/ COMPRESSION RATIO

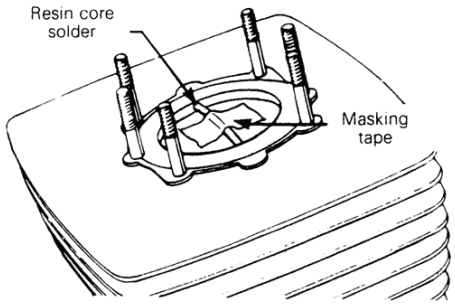
Squish area

In a criss-cross sequence, gradually remove the cylinder head nuts, then remove the head. Note the head shim/s used, (if any).

Bring the piston to 1/4'' B.T.D.C. and place a length of soft resin core solder (maximum of 1/8'' diameter) across the piston, making sure it is positioned parallel to the wrist pin to obtain an equal reading on each side of the cylinder.

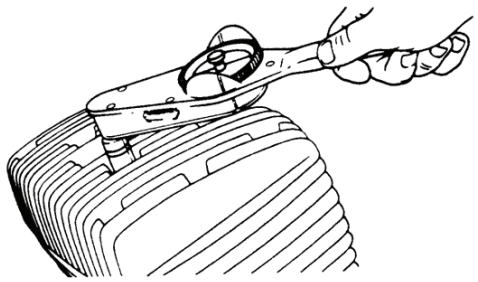
▼ **CAUTION: Do not use acid core solder, the acid can damage the piston and cylinder wall.**

◯ **NOTE:** To hold the resin core solder in place, clean the piston surface and use masking tape.



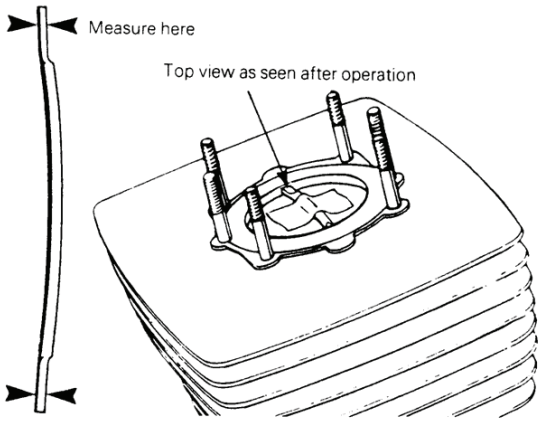
Install the cylinder head and using a criss-cross sequence, gradually torque the cylinder head nuts to the correct specifications:

124-174 ..... 16 N•m (12 ft-lbs)
244-281 ..... 19 N•m (14 ft-lbs)
406 ..... 40 N•m (30 ft-lbs)



Using the magneto side crankshaft nut, rotate the crankshaft in order for the piston to pass the T.D.C. point.

Remove the head, remove the resin core solder and measure both ends.



Using this measurement, calculate the required head shim(s) needed to provide the specified squish area.

NOTE: The head shim is not a head gasket and does not need replacement unless damaged.

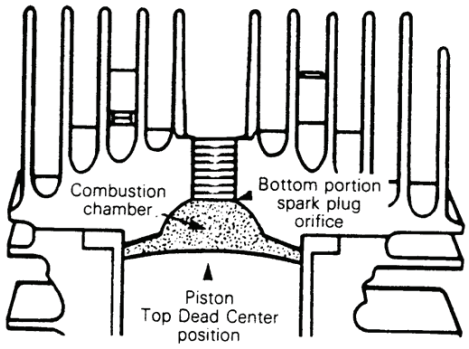
Fit the necessary shim/s (if required) and, using a criss-cross sequence, gradually torque the head nuts to the correct torque.

CAUTION: It is imperative to check the compression ratio after the squish has been corrected.

COMPRESSION RATIO

To check the compression ratio, bring the piston to the **top dead center** position and pour a given amount (see chart) of oil (30 grade) into the combustion chamber through the spark plug orifice.

The compression ratio will be correct, when the specific given amount of oil fills the combustion chamber up to the **bottom** portion of the spark plug orifice.



MODEL	REQUIRED VOLUME OF OIL (mL) (30 grade)	NOMINAL COMPRESSION RATIO
175 Qualifier 3	13.6 ± 0.6	13.2-14.4 to 1
250 Qualifier 3	21.6 ± 1.0	12-13 to 1
350 Qualifier 3	24.1 ± 1.0	12-13 to 1
400 Qualifier 3	40.7 ± 2.0	10.3-11.3 to 1
125 MX-6	8.5 ± 0.3	15-16 to 1
250 MX-6	20.0 ± 0.8	13-14 to 1
400 MX-6	36.3 ± 1.7	11.5-12.5 to 1

CAUTION: To carry out some of the following procedures, it is necessary that special equipment be available. If you do not possess such equipment, have the cylinder head modified in a work-shop equipped with a proper tooling.

POSSIBILITY CHART

SQUISH TOO SMALL	
Compression ratio OK	Machine the squish angle to correct squish, then machine the flat surface of the cylinder head to correct the compression and re-verify the squish.
Compression ratio too high	Add shim/s.
SQUISH TOO LARGE	
Compression ratio OK	Machine flat surface of cylinder head to correct the squish and then machine the radius of the combustion chamber to correct the compression ratio.
Compression ratio too low	Remove the shim/s (if any) or machine flat surface of cylinder head to correct squish and verify compression ratio.
Compression ratio too high	Remove the shim/s (if any) to correct squish or machine flat surface of the cylinder head to correct squish and then machine the radius of the combustion chamber to correct the compression ratio.
SQUISH OK	
Compression ratio too low	Remove the shim/s (if any) to correct the compression or machine the flat surface of the cylinder head to correct the compression and then machine the squish angle to re-correct the squish and re-verify the compression ratio.
Compression ratio too high	Machine the radius of the combustion chamber to correct the compression ratio.
COMPRESSION RATIO OK	
Squish too small	Machine the squish angle to correct squish then machine the flat surface of the cylinder head to correct the compression and re-verify the squish.
Squish too large	Remove the shim/s (if any) or machine the flat surface of cylinder head to correct the squish then machine the radius of the combustion chamber to correct the compression ratio.

COMPRESSION RATIO TOO HIGH	
Squish too small	Add shim/s and verify the compression ratio.
Squish OK	Machine the radius of the combustion chamber to correct the compression.
Squish too large	Remove shim/s (if any) or machine the flat surface of the cylinder head to correct squish area then machine the radius of the combustion chamber to correct the compression.

COMPRESSION RATIO TOO LOW	
Squish too small	Remove the shim/s (if any) to correct the compression or machine the flat surface of the cylinder head to correct the compression ratio and then machine the squish angle to correct the squish, re-verify the compression ratio.
Squish too large	Remove the shim/s (if any) or machine the flat surface of the cylinder head to correct the squish and verify compression ratio.
Squish OK	Machine the flat surface of the cylinder head to correct the compression and then machine the squish angle to re-correct the squish.

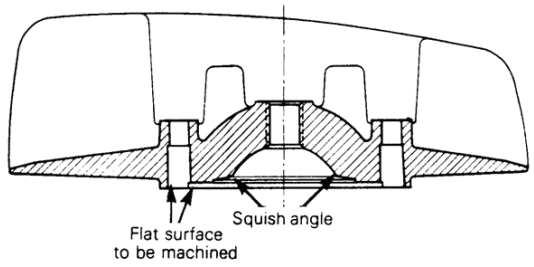
CAUTION: It is very difficult to pre-determine the amount of material to remove from the cylinder head anytime the squish and/or compression ratio needs to be modified, so, when machining is required, we recommend very light cuts and verify the results between each cut.

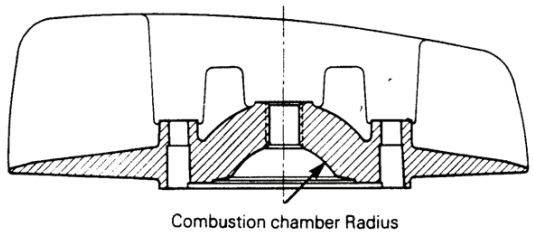
SQUISH ANGLE	
175 Qualifier 3	9°
250 Qualifier 3	12°
350 Qualifier 3	20°
400 Qualifier 3	N.A.
125 MX-6	N.A.
250 MX-6	12°
400 MX-6	N.A.

N.A.: Not applicable

COMBUSTION CHAMBER RADIUS	
175 Qualifier 3	23.4 mm
250 Qualifier 3	27 mm
350 Qualifier 3	44 mm
400 Qualifier 3	63.2 mm
125 MX-6	44 mm
250 MX-6	31.5 mm
400 MX-6	63.2 mm

CAUTION: Squish area and compression ratio are interrelated, do not modify one without checking the other.





ENGINE INSTALLATION (ALL MODELS)

To install engine on vehicle inverse removal procedure.

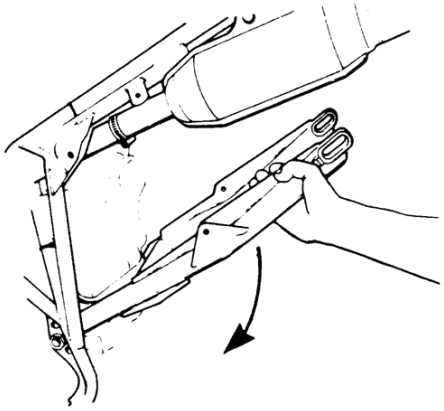
NOTE: 406 engines must be installed without carburetor & exhaust socket.

However, special attention should be paid to the following.

Torque the engine mounts to:
50-54 N•m (37-40 ft-lbs)

Install the swing arm bolt and nut torque the nut to 95 N•m (70 ft-lbs).

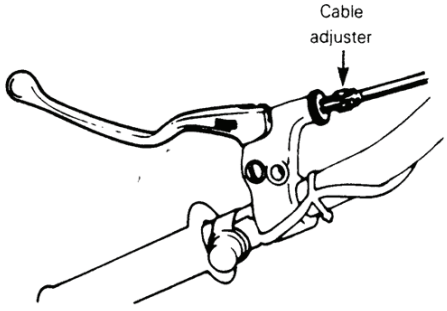
Manually lift the swing arm to its highest position and release it; **the swing arm must go downward by its own weight.** (See section 04 Suspension, sub-section 02 (Swing arm)).



Adjust the clutch.

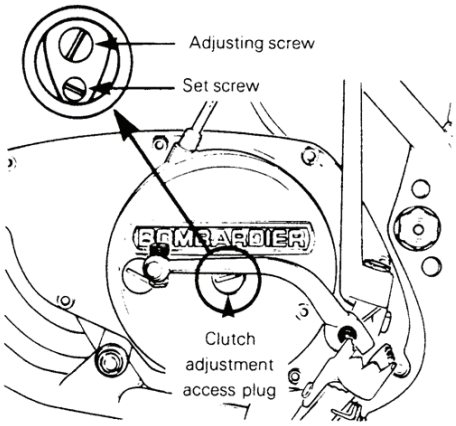
NOTE: Prior to clutch adjustment, operate the clutch lever a couple of times, to seat the cable in place.

Loosen the clutch cable adjuster (at handlebar) to provide maximum slack.



Remove the adjustment access plug and loosen the 4 mm set screw.

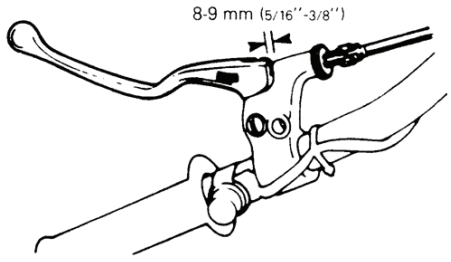
Turn the 8 mm clutch adjusting screw in and out to locate the point of contact with the release bearing, then turn the screw 1/2 **turn counter-clockwise.**



Carefully tighten the 4 mm set screw to lock the adjustment.

Replace the access plug.

Adjust the cable adjuster to provide 8-9 mm (5/16''-3/8'') slack between clutch lever and housing.



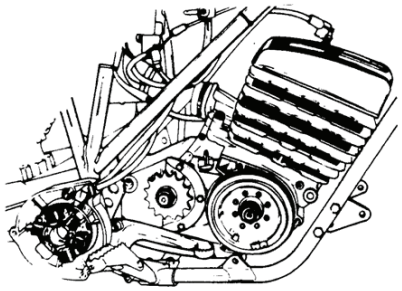
Check ignition timing. (See section 03 Electrical), subsection 04 (Ignition Timing).

ENGINE REMOVAL (ALL MODELS)

Disconnect or remove the following from vehicle

– Vent tubes.

– Magneto cover.



– Spark plug.

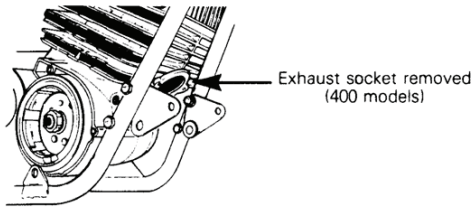
– Drive chain.

– Exhaust pipe.

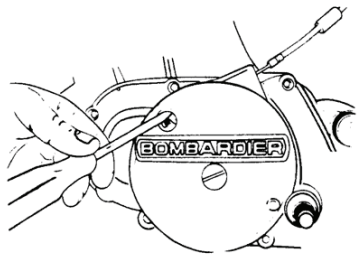
NOTE: On 400 models it is necessary to remove the exhaust socket (at engine) while removing the exhaust pipe.

– Carburetor.

– Front engine mounts and stud.



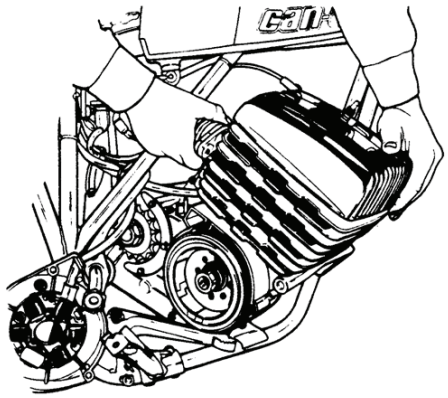
– Clutch cable. (Remove the clutch cable from the handlebar lever. Remove the clutch cable access plug. Pull the cable housing away from the clutch cover. Push the inner cable inside the cover until its tip is visible through the installation hole, with a screwdriver, disengage it from the clutch release arm and pull it out of the cover).



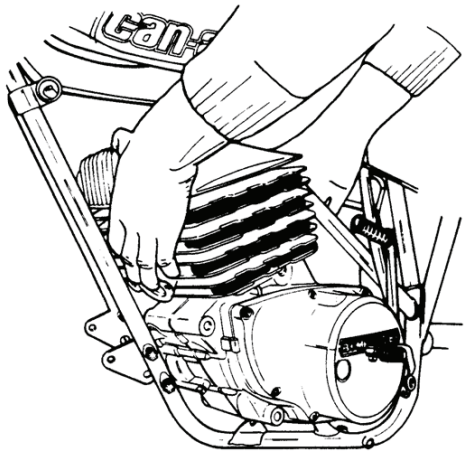
– Lower engine stud and spacers.

– Swing arm pivot bolt (note the number of shim/s on the inside swing arm pivot flanges).

Pull the engine upward and forward and withdraw it from the frame through the magneto side.

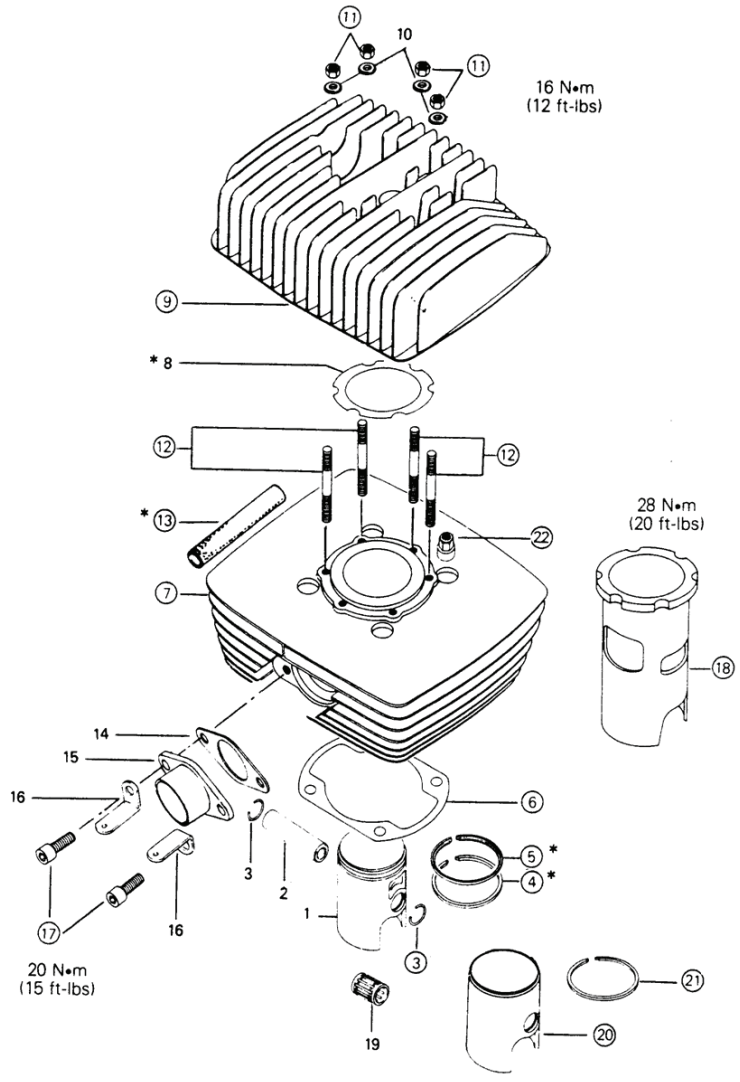


NOTE: The engine may also be removed from the clutch side if the left foot peg has been removed.



124-174 ENGINE TYPES

TOP END 175 QUALIFIER 3 & 125 MX-6



*175 Qualifier only

1. *Piston (175 Qualifier)*
2. *Piston pin*
3. *Circlip (2)*
4. *Rectangular ring (175 Qualifier)*
5. *"L"-semi-trapez ring (175 Qualifier)*
6. *Cylinder base gasket*
7. *Cylinder*
8. *Cylinder head shim (as required)*
9. *Cylinder head*
10. *Flat washer 7.4 mm (6)*
11. *Cylinder head nut M7 (6)*
12. *Cylinder head stud M7 x 33.5 mm (6)*
13. *Noise damper*
14. *Exhaust gasket*
15. *Exhaust socket*
16. *Spring bracket*
17. *Allen screw M8 x 25*
18. *Cylinder sleeve*
19. *Needle bearing*
20. *Piston (125 MX-6)*
21. *Rectangular ring (125 MX-6)*
22. *Cylinder base nut M8 (4)*

TOP END

Disassembly & assembly

NOTE: Refer to Technical Data for component fitted tolerance wear limit.

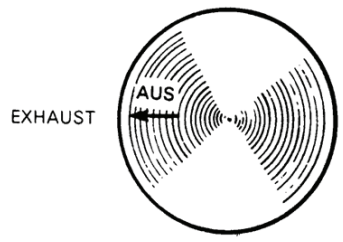
①⑦⑨⑱ On 175 Qualifier, at the replacement of the piston, cylinder, cylinder head and cylinder sleeve, the squish area should be remeasured (See "Engine tolerances measurements").

①②③ Place a clean cloth over the crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

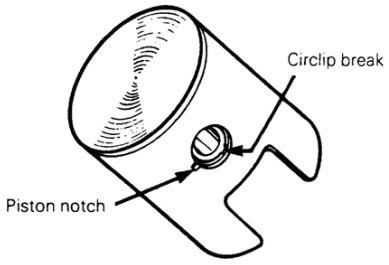
Drive the piston pin in or out using a suitable drive punch and hammer.

CAUTION: When tapping piston pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmetting shock and pressure to the connecting rod.

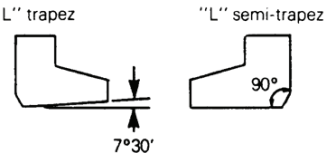
At assembly, place the piston over the connecting rod with the letters AUS, over an arrow on the piston dome, facing direction of the exhaust port.



Once the circlips are installed, turn each circlips so that the circlip break is not directly in line with piston notch. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.



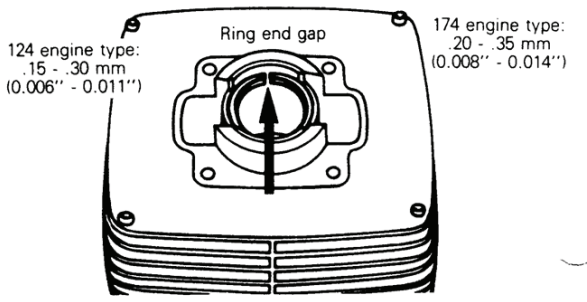
④⑤㉑ There are two different types of "L" ring.



– 174 engine type uses 1 "L" semi-trapez and 1 rectangular ring.

– 125 engine type uses 1 rectangular ring.

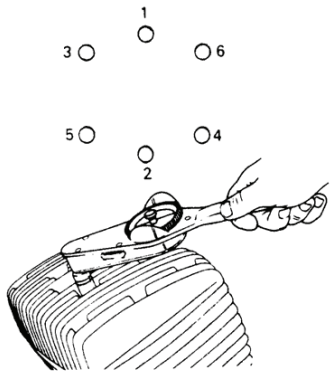
NOTE: For 174 engine type, 2nd and 3rd oversize piston and rings are "L" trapez types.



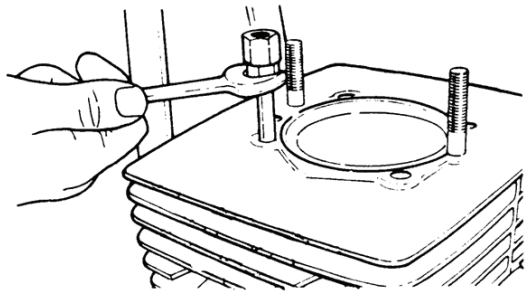
CAUTION: Prior to "L" ring replacement always ensure to visually identify the appropriate type needed. The two ring types are not interchangeable. Damage may occur if interchanged.

⑥ At assembly, install a new lightly greased gasket.

⑨ ⑪ At assembly, torque to 16 N•m (12 ft-lbs) in a criss-cross sequence.

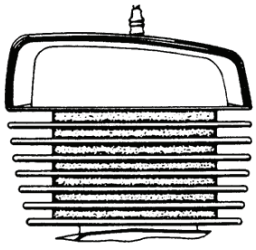


⑫ To unscrew, use 2 cylinder head nuts blocked one against the other.

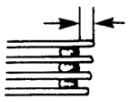


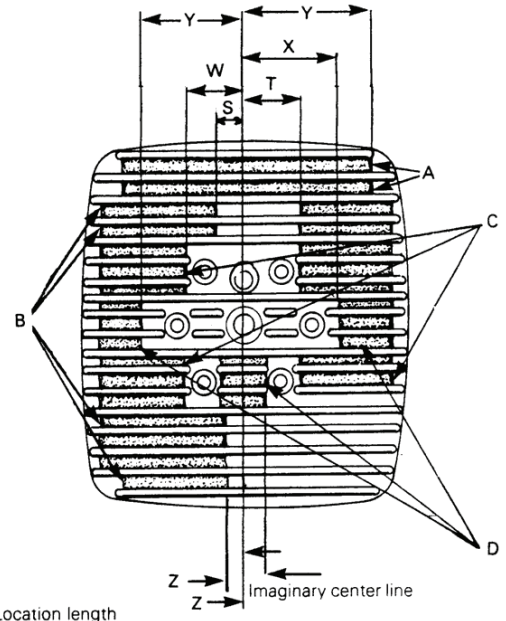
At assembly, screw the long threaded portion of the stud into the cylinder.

⑬ if replaced, noise dampers should be installed as illustrated. (174 engine type).



Noise damper length
140 mm (5 1/2")





Location length
from imaginary center line

S – 16 mm (5/8")
T – 32 mm (1 1/4")
W – 38 mm (1 1/2")
X – 57 mm (2 1/4")
Y – 70 mm (2 3/4")
Z – 13 mm (1/2")

Noise damper length

A – 140 mm (5 1/2")
B – 70 mm (2 3/4")
C – 50 mm (2")
D – 25 mm (1")

⑰ At assembly, torque to 20 N•m (15 ft-lbs).

⑱ The cylinder sleeve should be replaced whenever its inside diameter becomes 0.14 mm (0.006") or more larger than a new 3rd oversize piston.

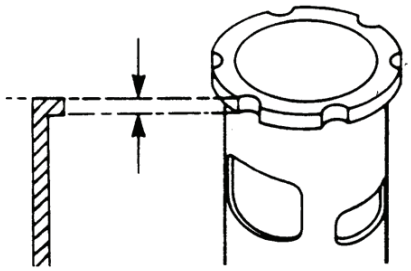
Proceed as follows:

Place the cylinder in a range oven for 30 minutes, at a temperature of 175°C (350°F) maximum.

Place the new cylinder sleeve in a freezer for one hour minimum.

Support cylinder barrel upside down and press out old cylinder sleeve using a suitable pusher.

Measure the thickness of the old liner top flange and if necessary, machine the new liner flange to the same measurement.



Inspect cylinder barrel, remove any grooves or scratches. Clean away any dirt or carbon.

Re-heat cylinder barrel in range oven for 30 minutes at a temperature of 175°C (350°F) maximum.

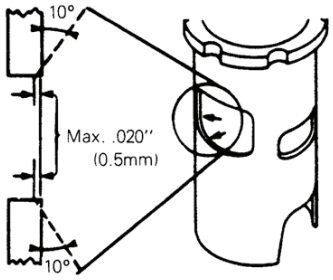
Immediately align chilled cylinder sleeve with hot cylinder, drop into place from top side making sure to align the exhaust port of the sleeve with the one of the cylinder barrel. To ease alignment, leave two cylinder studs in the cylinder.

NOTE: Only 3-4 seconds maximum are needed before cylinder cools sufficiently to grip onto sleeve.

Bore the new sleeve to provide piston clearance of:

	Minimum	Maximum
124 & 174 engine types:	0.50 mm (.002")	.08 mm (.003")

Using a rotary file or jeweler's hand file, chamfer the sharp edges of each port 10°, to width of .5 mm (.020").



CAUTION: Excessive chamfer will alter the port timing.

Gap the new rings to provide:

124: .15 mm (0.006") to .30 mm (0.011")
174: .20 mm (0.008") to .35 mm (0.014")

On 174 engine type make sure to check the squish area measurement during assembly. (See "Engine tolerances measurements").

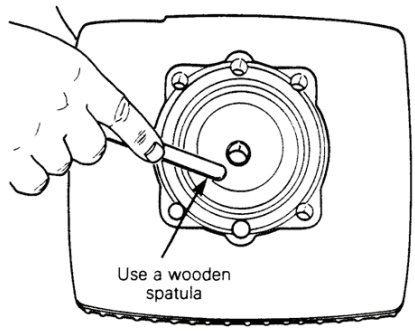
㉒At assembly, torque to 28 N•m (20 ft-lbs) in a criss-cross sequence.

Cleaning

Clean all the metal components in a metal cleaner.

WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

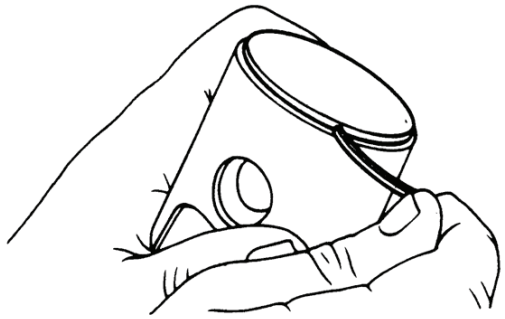
Scrape any carbon deposits from cylinder exhaust port, cylinder head and piston dome using a wooden spatula and repeat periodically.



NOTE: The letter **AUS** over an arrow on the piston dome must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or using a piece of broken ring.

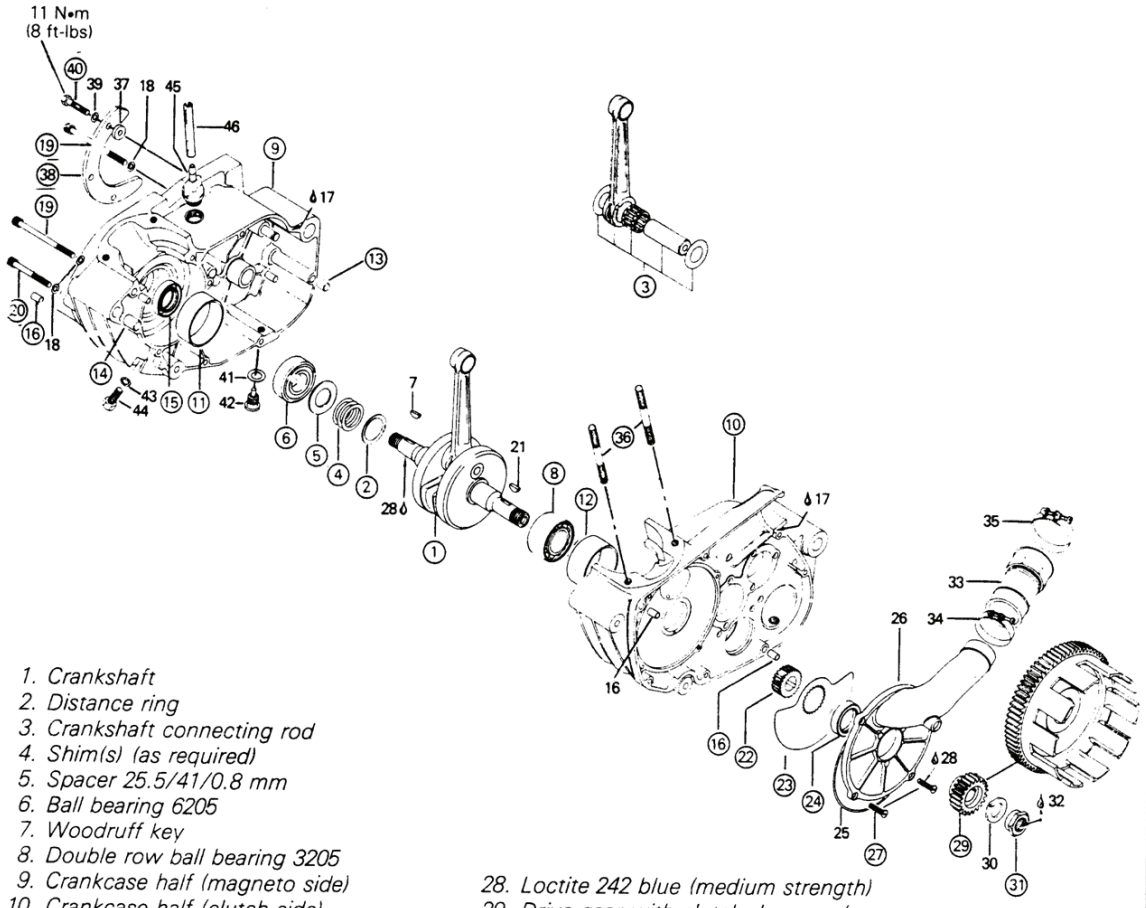
NOTE: It is suggested to periodically clean the cylinder head and piston of carbon build up.



Scrape any deposit from the piston crown and inspect the piston for cracks or seizure marks.

Remove all traces of the cylinder base gasket and fit a new lightly greased gasket.

BOTTOM END
175 QUALIFIER 3 & 125 MX-6



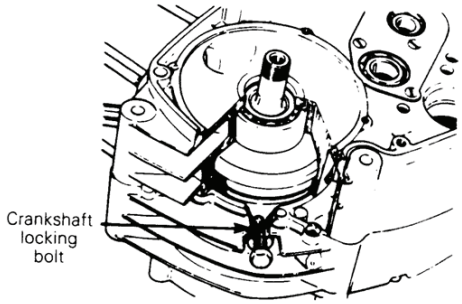
1. Crankshaft
2. Distance ring
3. Crankshaft connecting rod
4. Shim(s) (as required)
5. Spacer 25.5/41/0.8 mm
6. Ball bearing 6205
7. Woodruff key
8. Double row ball bearing 3205
9. Crankcase half (magneto side)
10. Crankcase half (clutch side)
11. Magneto side ring
12. Clutch side ring
13. Dowel pin 9.8 x 10
14. Dowel pin 13.8 x 15
15. Seal
16. Dowel pin (5)
17. Loctite 515 (purple)
18. Lockwasher 6 (10)
19. Allen screw M6 x 70 (5)
20. Allen screw M6 x 45 (5)
21. Woodruff key
22. Disc valve spacer
23. Disc valve
24. Seal
25. "O" ring
26. Disc valve cover
27. Flat slotted head screw M5 x 16 (4)
28. Loctite 242 blue (medium strength)
29. Drive gear with clutch drum ass'y
30. Lockwasher 18
31. Hexagonal nut 18 x 1.5
32. Loctite 271 red (high strength)
33. Carburetor adaptor
34. Clamp
35. Carburetor clamp
36. Cylinder stud M8 x 68 (4)
37. Chain guard spacer (3)
38. Chain guard
39. Lockwasher 6 (3)
40. Hexagonal head screw M6 x 16 (3)
41. Washer
42. Magnetic drain plug
43. Washer
44. Crankcase drain screw M8 x 16
45. Oil filler cap M18 x 1.5
46. Vent tube

BOTTOM END

Disassembly & assembly

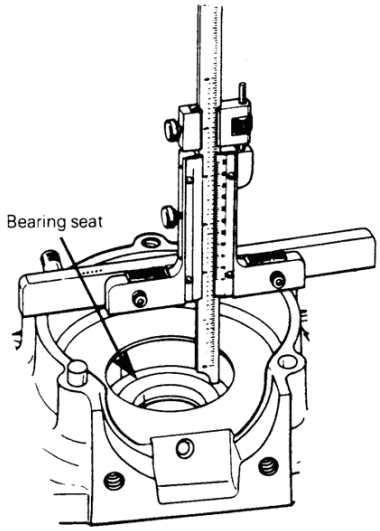
①③⑨⑩On 175 Qualifier 3, at the replacement of the crankshaft, connecting rod and crankcase halves, the squish area should be measured (see Technical Data).

①⑨To facilitate some procedures, the crankshaft can be locked at the top dead center position using a crankshaft locking bolt as illustrated. (See Tools Section)

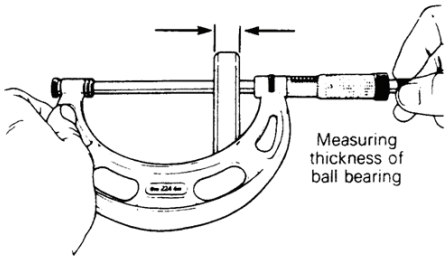


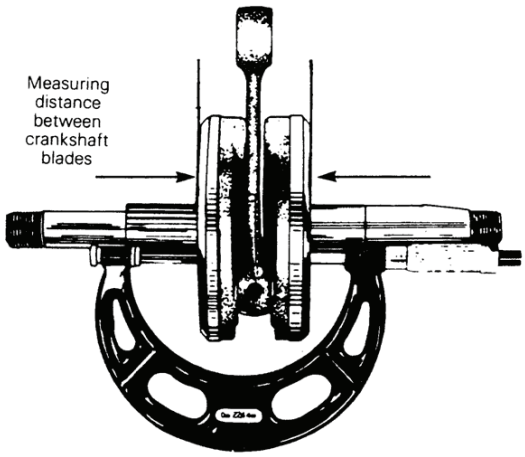
②At assembly, position the distance ring with the chamfered side facing the crankshaft.

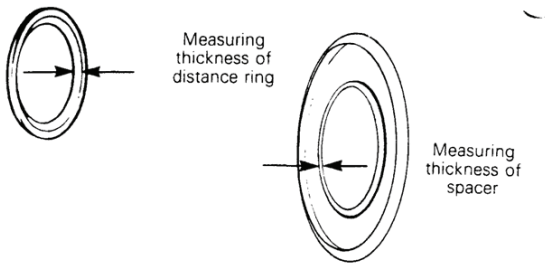
①④Crankshaft end-play should be between 0.1 mm (.004") to 0.3 mm (.011"). To determine the necessary shims: it is necessary to measure the crankcase. To do this, first measure each half from mating surface to bottom of bearing seat. Add measurements of both halves, total equals A.



Measure thickness of each ball bearing. Measure distance between crankshaft blades, measure the thickness of the distance ring ② and measure the thickness of the spacer ⑤. Add measurements. Total equals B.





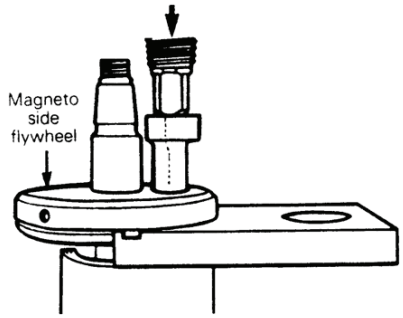


Subtract measurement B from measurement A, minus tolerance of 0.1 mm (.004") to 0.3 mm (.011"). Total balance is distance to be shimmed. Shim(s) must be located between distance ring and spacer.

NOTE: Crankshaft end-play is adjusted only when crankshaft and/or crankcase is replaced.

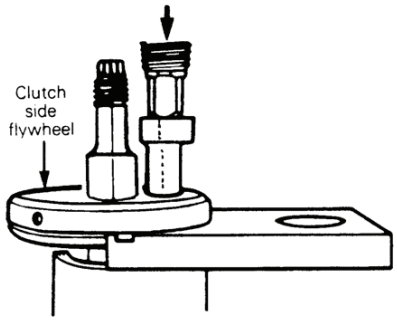
③To replace the connecting rod proceed as follows:

Mount the crankshaft assembly in jig and press the crankpin out of the magneto side flywheel.



Remove the connecting rod and the bearing.

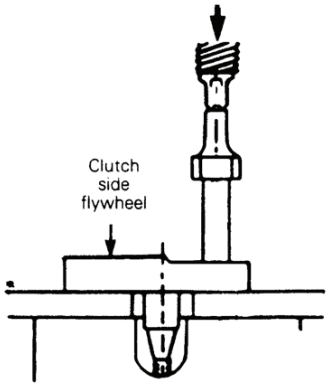
Press the crankpin out of the clutch side flywheel.



Press the new crankpin into the clutch side flywheel.

▼ **CAUTION: The crankpin must enter the bore straight to prevent damage to the bore and/or crankpin.**

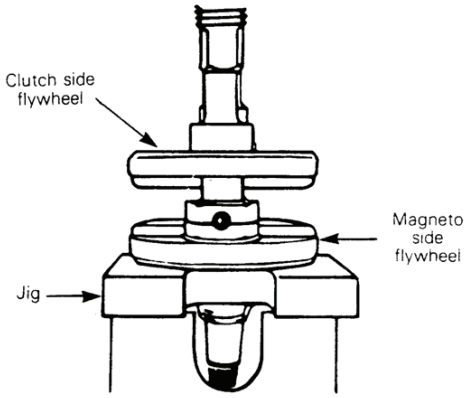
◯ **NOTE:** The crankpin can be installed on both sides.



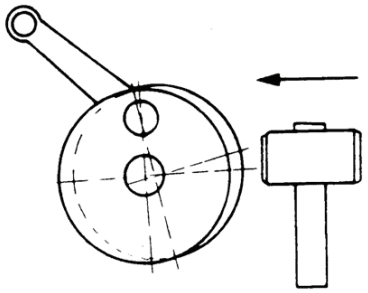
Fit the connecting rod and the bearing into place with light grease.

Place the magneto side flywheel on the jig. Align the clutch side flywheel with the magneto side flywheel and press the crankpin (with rod assembly) into magneto side flywheel.

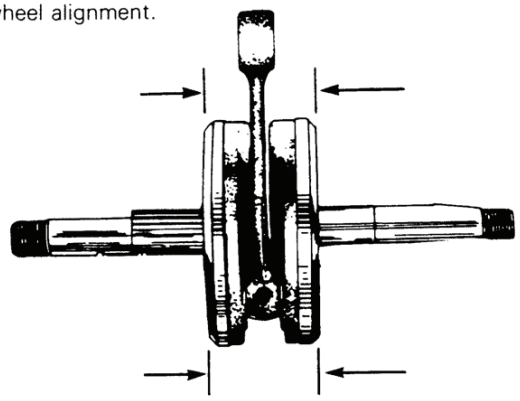
◯ **NOTE:** The connecting rod side clearance must be 0.2 mm (.008") to 0.5 mm (0.020").

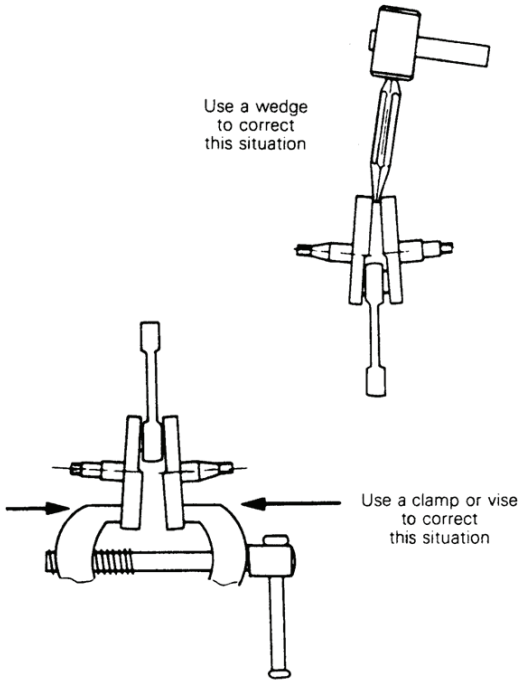


Using a "straight edge", check for flywheel alignment. Drift with a heavy brass mallet to align if necessary.



Using a micrometer or vernier caliper, check for flywheel alignment.

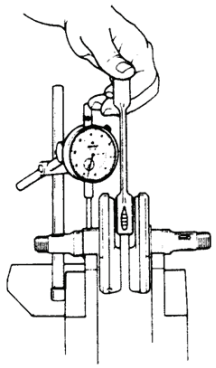




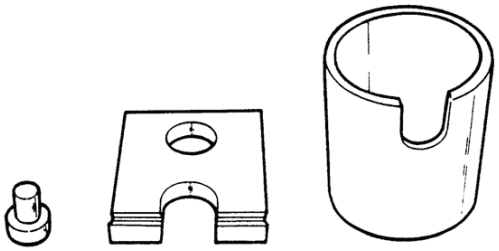
NOTE: For final alignment measures, see technical data.

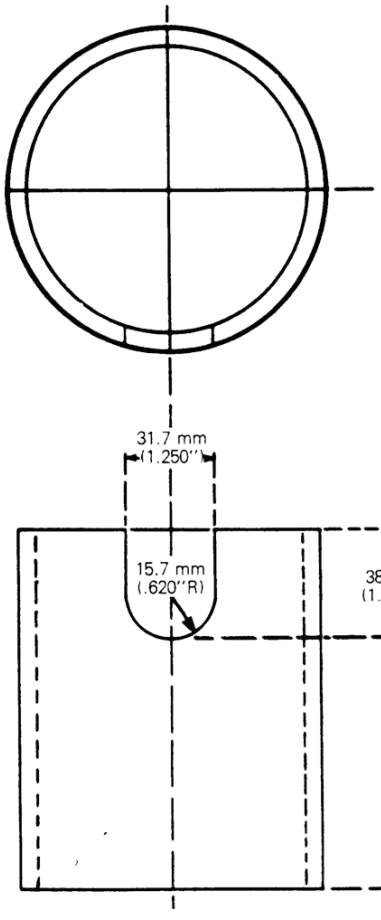
When overall alignment is completed, verify connecting rod side clearance.

NOTE: Make a final alignment check using a dial indicator.

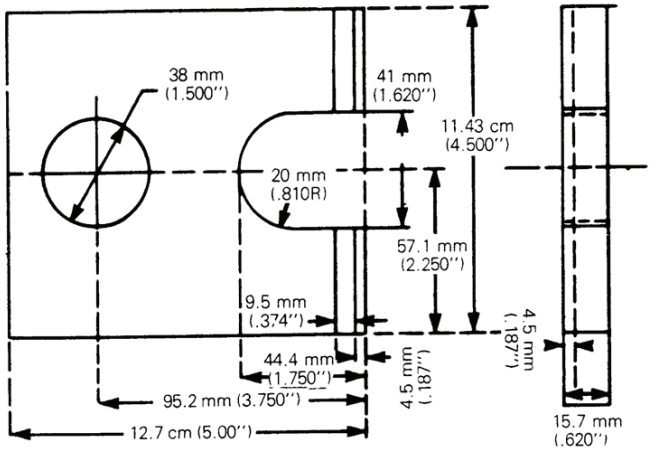


Suggested crankshaft repair tool

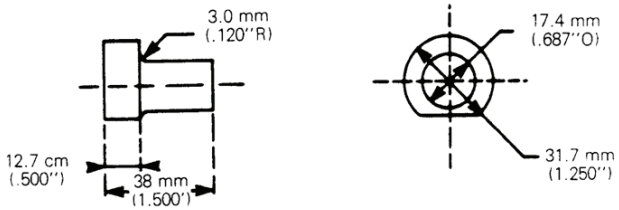




STEEL TUBE 11.43 cm (4.5") O.D. x 63 mm (.250") WALL



H.R. ST'L PLATE 11.43 cm (4 1/2") x 15.9 mm (.625") THICK

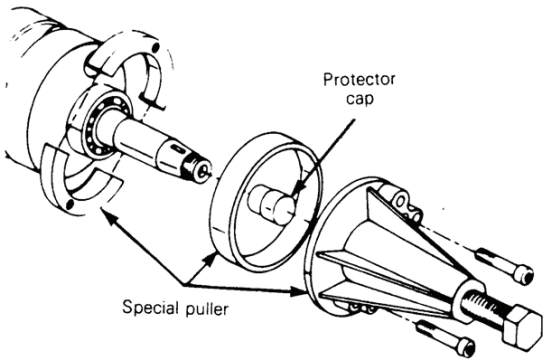


H.R.C.Q. ST'L 31.7 mm (1.250") DIA.

④ The shims are available in the following thickness:

0.1 mm (0.004")
0.2 mm (0.008")
0.3 mm (0.012")
0.5 mm (0.019")

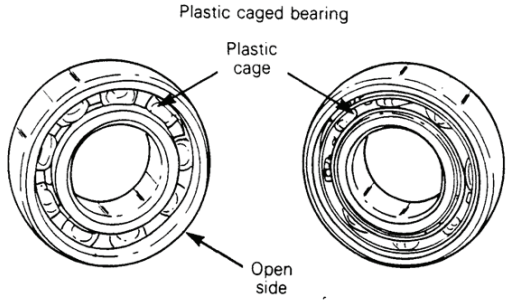
⑥ ⑧ To remove bearing from crankshaft use bearing puller as illustrated. (See tool section).



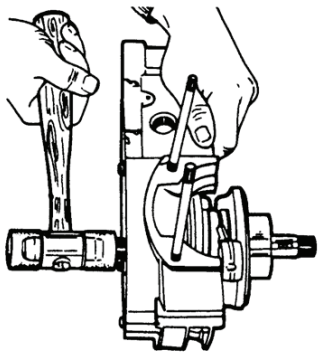
NOTE: Prior to magneto side bearing installation, install distance ring, required shim(s) spacer and bearing on crankshaft.

At assembly, place bearings in an oil container and heat the oil to 93°C (200°F) for 5 to 10 min. This will expand the bearings and permit them to slide easily onto the shaft.

CAUTION: For lubrication purpose, always place the magneto side bearing with open side facing towards outside.

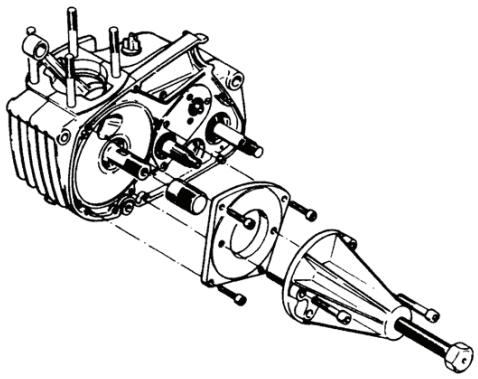


⑥ ⑨ Remove the crankshaft from the crankcase by tapping on the crankshaft end with a **soft** hammer.



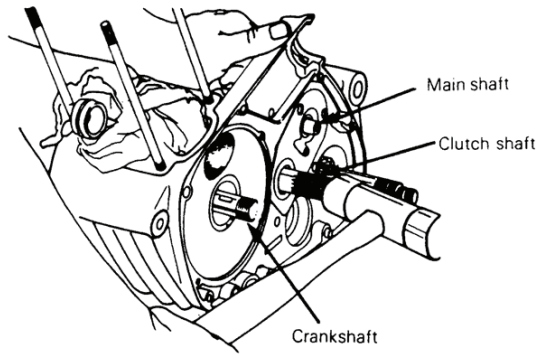
CAUTION: Prior to the crankshaft removal ensure that the crankshaft locking bolt is removed.

⑨ ⑩ To split the crankcase halves, use a protective cap and puller. (See Tools Section).



CAUTION: Ensure that all the necessary screws have been removed prior to spliting the crankcase halves.

NOTE: The crankcase halves can also be splitted, by tapping equally on the main shaft, clutch shaft and crankshaft.



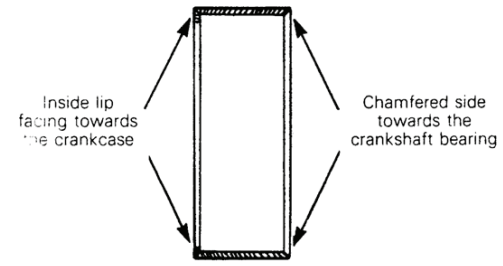
CAUTION: Do not pry between crankcase halves, as score marks incurred are detrimental to crankcase sealing.

Prior to joining the crankcase halves, carefully clean the mating surfaces with acetone, wood alcohol or equivalent.

Apply a light coat of Loctite 515 sealant.

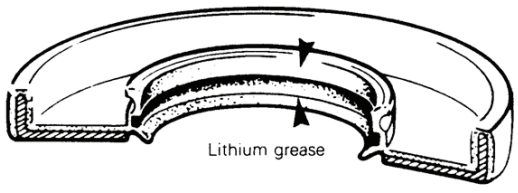
⑪⑫To install a new polyamid ring use an appropriate insertion pusher (See Tools section).

CAUTION: Make sure to position the polyamid ring with the inside lip portion facing towards the crankcase.



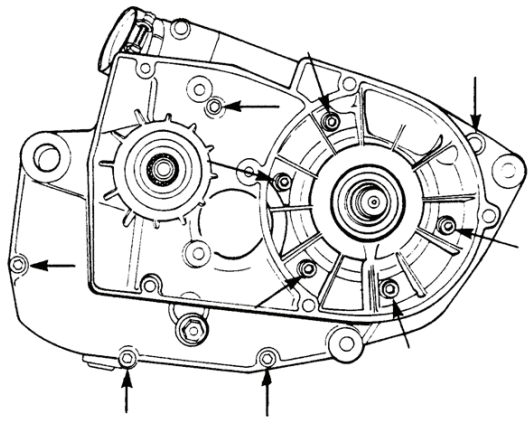
⑬⑭⑯At the joining of the crankcase halves, magneto cover or clutch cover make sure the dowel pin sleeves are in place.

⑮㉔To install new seals, use the appropriate oil seal insertion pusher. (See Tool section). At assembly, apply a light coat of lithium grease on the seal lips.



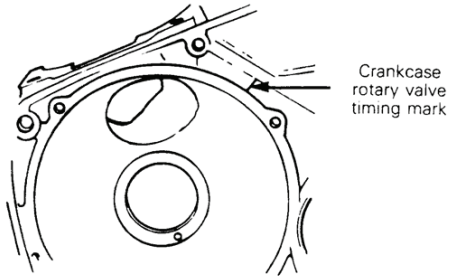
⑲⑳At assembly, torque to 11 N•m (8 ft-lbs) following a criss-cross sequence.

NOTE: It is recommended to apply a small drop of oil or a thin coat of grease on the threads.

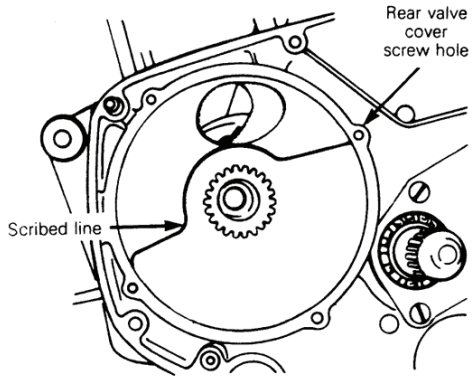


㉒At assembly, the chamfered side of the disc valve spacer must face towards the crankshaft.

㉓On Qualifier 3 models the disc valve is symmetrical and can be installed either way but the leading edge must be aligned with the timing mark on the crankcase, with the crankshaft locked at top dead center (T.D.C.)



On MX-6 models the disc is asymmetrical and can only be installed one way. The valve cut-away must align with the line scribed on the crankcase disc valve surface with the crankshaft locked at top dead center (T.D.C.)

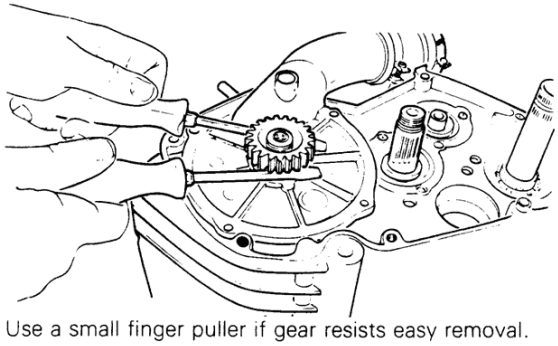


NOTE: If no line is scribed, refer to "Engine tolerances measurements" for positioning procedure.

㉗ At assembly, apply Loctite 242 blue (medium strength) on threads and torque to 5.5 N•m (4 ft-lbs).

㉙ Use 2 screwdrivers to remove the crankshaft drive gear.

CAUTION: Excessive leverage may damage rotary valve cover.



Use a small finger puller if gear resists easy removal.

At assembly, install the crankshaft drive gear very carefully to avoid folding the seal lip over.

If replacement is needed, always replace both crankshaft drive gear and clutch drum.

㉛ Prior to the installation of the crankshaft drive gear retaining nut, proceed as follows:

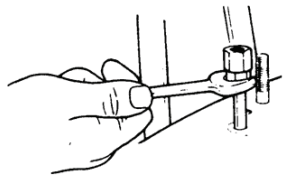
Clean the nut and crankshaft threads with Loctite "Kleen N'Prime" or equivalent. Apply Loctite 271 red (high strength) or equivalent on the inside threads of the drive gear **retaining nut only.**

CAUTION: Do not apply Loctite on the threaded portion of the crankshaft as the drive gear could become glued to the crankshaft and damage to other engine parts could occur during the removal of the drive gear.

Torque the drive gear retaining nut to 75 N•m (55 ft-lbs).

NOTE: Allow at least one hour for the Loctite to set before starting the engine.

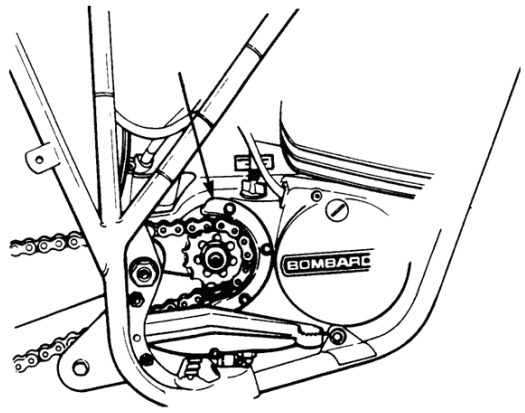
㊱ To unscrew, use 2 cylinder base nuts blocked one against the other.



At assembly, screw the flat end portion of the stud into the crankcase.

㊳ ㊵ At assembly, ensure to use the proper chain guard (13 teeth, 14 teeth or 15 teeth engine sprocket).

Torque the retaining bolts to 11 N•m (8 ft-lbs).



Cleaning

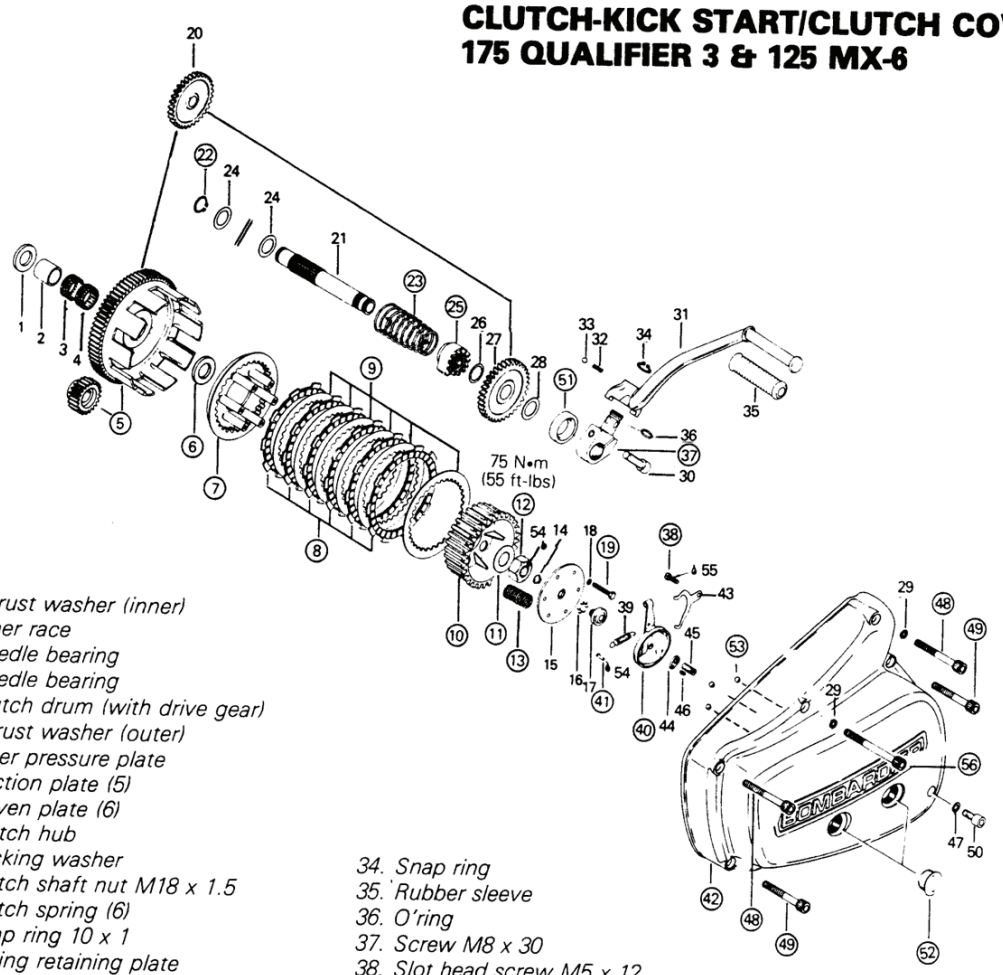
Clean all the metal components in a metal cleaner.

WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Remove old sealant from mating surfaces of crankcase/clutch cover with acetone, wood alcohol or equivalent.

CAUTION: Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

CLUTCH-KICK START/CLUTCH COVER
175 QUALIFIER 3 & 125 MX-6



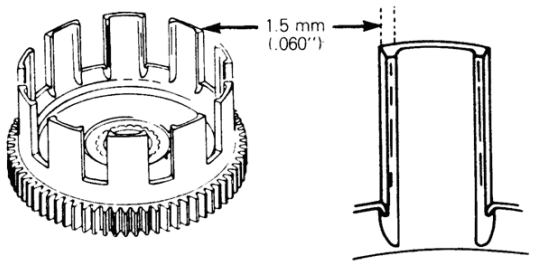
1. Thrust washer (inner)
2. Inner race
3. Needle bearing
4. Needle bearing
5. Clutch drum (with drive gear)
6. Thrust washer (outer)
7. Inner pressure plate
8. Friction plate (5)
9. Driven plate (6)
10. Clutch hub
11. Locking washer
12. Clutch shaft nut M18 x 1.5
13. Clutch spring (6)
14. Snap ring 10 x 1
15. Spring retaining plate
16. Ball 5/32" (12)
17. Spring retaining plate hub
18. Lockwasher 5 mm (6)
19. Screw M5 x 25 (6)
20. Idler gear 31 tooth
21. Kick start shaft
22. Circlip
23. Return spring
24. Thrust washer (2)
25. Ratchet gear
26. Thrust washer
27. Drive gear 34 tooth
28. Thrust washer
29. Washer (2)
30. Kick start hub
31. Kick start lever
32. Spring
33. Ball 7/32"
34. Snap ring
35. Rubber sleeve
36. O'ring
37. Screw M8 x 30
38. Slot head screw M5 x 12
39. Clutch cam return spring
40. Clutch release cam
41. Drive pin
42. Clutch cover
43. Clutch cam retaining spring
44. Clutch adjustment locking plate
45. Clutch adjustment screw M8 x 15
46. Clutch adjustment locking screw M4 x 6
47. Sealing ring
48. Allen screw M6 x 40 (3)
49. Allen screw M6 x 35 (5)
50. Plug, oil level
51. Seal, kick start shaft
52. Plug (2)
53. Balls 7/32" (3)
54. Loctite 271 red (high strength)
55. Loctite 242 blue (medium strength)
56. Allen screw M6 x 50

CLUTCH AND KICK START/ CLUTCH COVER

Disassembly & assembly

⑤If the clutch drum splines are found to be severely worn, replacement may not be necessary. File the damaged spline surfaces equally.

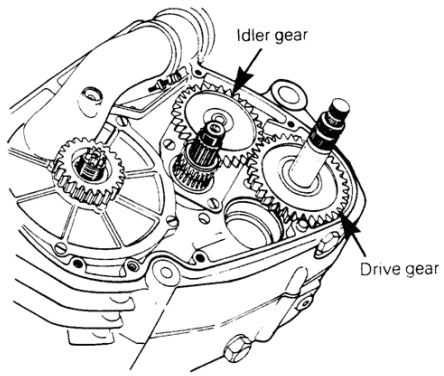
▼ **CAUTION: The shouldered wall should not be filed thinner than 1.5 mm (.060").**



If replacement is needed, always replace both crankshaft drive gear and clutch drum.

⑤⑥⑦⑧⑨⑩ Prior to assembling the clutch hub, make sure to position the idler and drive gear as illustrated.

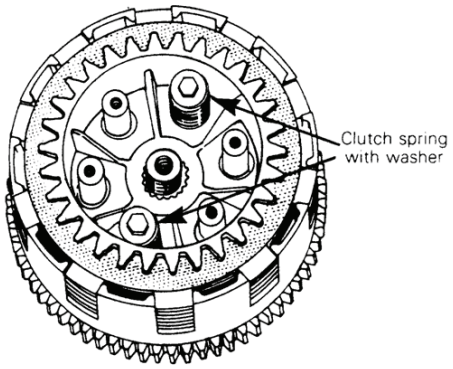
○ **NOTE:** The flanged side of the idler gear must face toward the crankcase.



▼ **CAUTION: Prior, to clutch hub installation properly position the thrust washer ⑥**

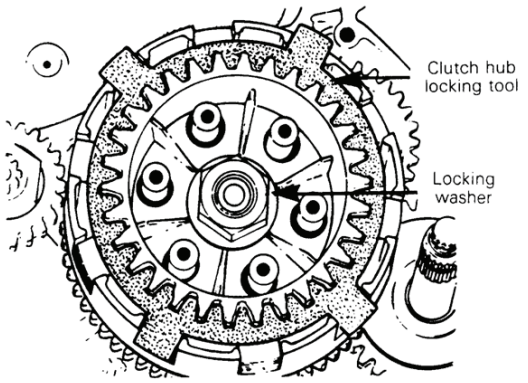
With the clutch plates mounted on the clutch hub, fit clutch inner pressure plate in alignment with hub splines. Carefully insert clutch hub/plate assembly into clutch drum onto clutch shaft.

○ **NOTE:** To ease assembly, install two clutch springs with washers to hold the clutch together.



▼ **⑪CAUTION: Locking washer should be replaced if bent more than twice. If in doubt, replace.**

⑫To remove clutch shaft nut, lock the crankshaft at top dead center, unbend the locking washer and lock the clutch using the clutch hub locking tool (see tool section).



At assembly, apply Loctite no. 271 red (high strength) on the threads of the clutch shaft nut and torque to 75 N•m (55 ft-lbs).

◆ **WARNING: Make sure to bend the clutch shaft nut locking washer.**

▼ **CAUTION: Do not pry on the inner pressure plate spring post to bend the locking washer, use a pair of waterpump pliers.**

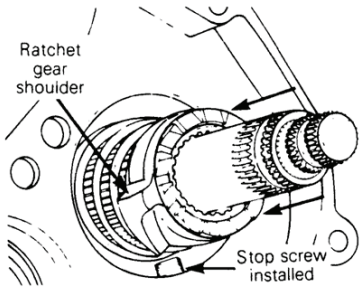
⑬ If spring(s) replacement is needed ensure to change the springs in sets only.

⑲ At assembly, tighten in a criss-cross sequence and torque to 5.5 N•m (4 ft-lbs).

㉒ To remove the kick start assembly from the crankcase remove the snap ring located in the inside portion of the crankcase and unscrew the kick starter stop screw under the left crankcase half.

㉓ It is possible to change the return spring without splitting the crankcase. At assembly, ensure that the springs ends are well positioned in the crankcase and ratchet gear holes.

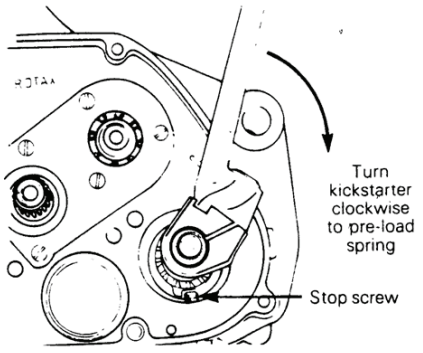
㉕ At assembly, position the springs end into the ratchet gear and partially engage the ratchet gear onto the shaft splines.

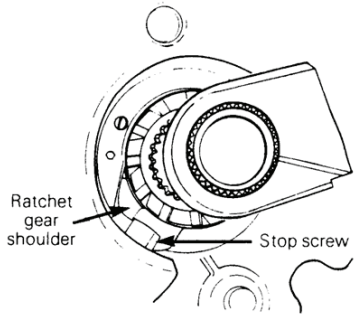


Install the kick starter lever and preload the return spring approximately 1 turn **clockwise.**

Completely slide the ratchet gear onto the splines while retaining the tension with the kick starter lever.

Slowly release the kick starter lever and the ratchet gear will lean against the stop screw.



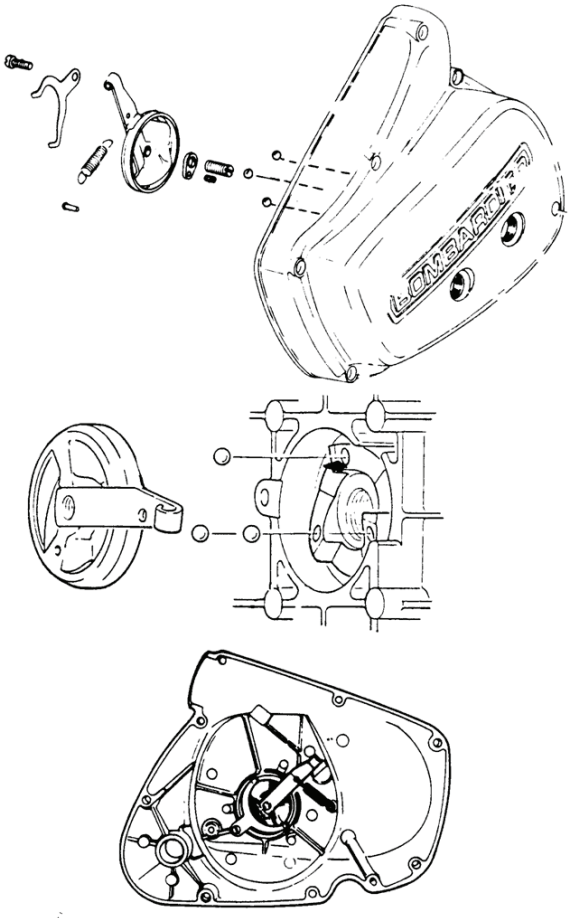


◆ **WARNING: Exercise care when removing or installing the ratchet gear.**

○ **NOTE:** After assembly, do not remove the kick starter stop screw unless needed otherwise the kick starter spring will lose its preload and the clutch cover will have to be removed to reposition.

㊲ At assembly, torque to 20 N•m (15 ft-lbs).

㊳ ㊵ At assembly, position as illustrated.



Apply Loctite no. 242 blue (medium strength) on screw threads and torque the screw to 5.5 N•m (4 ft-lbs).

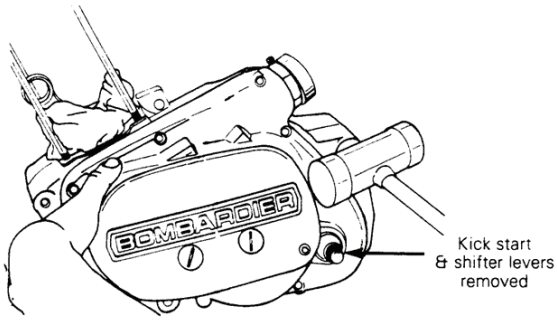
(40) If replacement is needed, ensure to order the hardened type clutch release cam (P/N 420 259 790) which must be used with the clutch release mechanism with bearing balls.

CAUTION: Ensure to install the proper clutch release cam otherwise damage will occur.

(41) At assembly, apply Loctite no. 271 red (high strength) and force fit into place.

NOTE: Replace only if damaged or when replacing clutch cover.

(42) To remove the clutch cover, tap **lightly** using a **soft** faced hammer to break the seal (as illustrated).



CAUTION: Do not pry between sealing surfaces, as score marks incurred are detrimental to clutch cover sealing.

NOTE: The clutch cover can be removed with the engine in the frame, but it is necessary to remove the left foot peg.

Prior to removal, ensure to drain the engine oil.

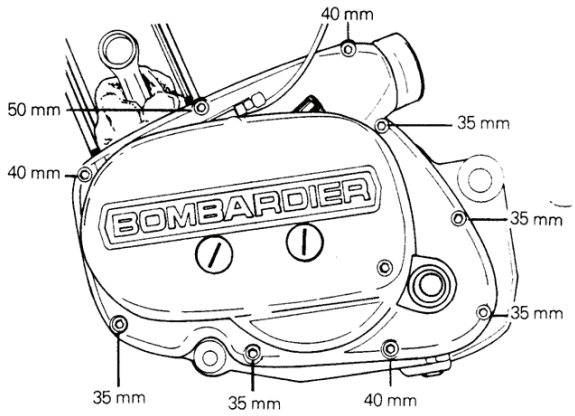
With clutch cable still connected, pull the clutch lever in. It will then preload against the cover to ease removal.

At assembly, clean the mating surfaces of the crankcase and clutch cover with acetone, wood alcohol or equivalent. Apply a light coat of Loctite 515 sealant to the mating surfaces and lightly tap cover into place.

CAUTION: At installation, ensure that the kick starter oil seal lip is not flipped over by the kick starter shaft splines when pushing the clutch cover into place.

(48) (49) (56) At assembly, torque the retaining screws to 8 N•m (6 ft-lbs) following a criss-cross sequence and apply a small drop of oil or a thin coat of grease on the threads.

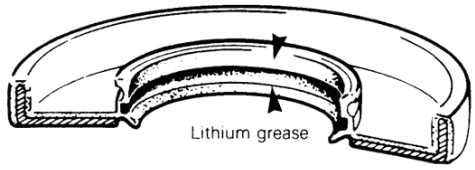
NOTE: For the proper location of the clutch cover retaining screws follow illustrated sequence.



CAUTION: Ensure to use the correct screw for its location otherwise damage to the crankcase will occur.

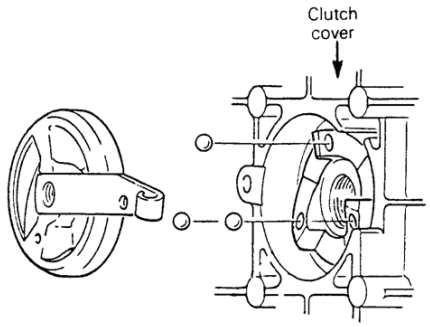
(51) CAUTION: Make sure the kick starter oil seal is not flipped over by the kick starter shaft splines when pushing the clutch cover into place.

At assembly, apply lithium grease on the seal lips.



(52) For removal or installation use the screwdriver grip end, provided with the motorcycle tool kit.

(53) At assembly, clean the three holes with compressed air. Drop a small amount of oil into the three holes and install the three 7/32" bearing balls.



Cleaning

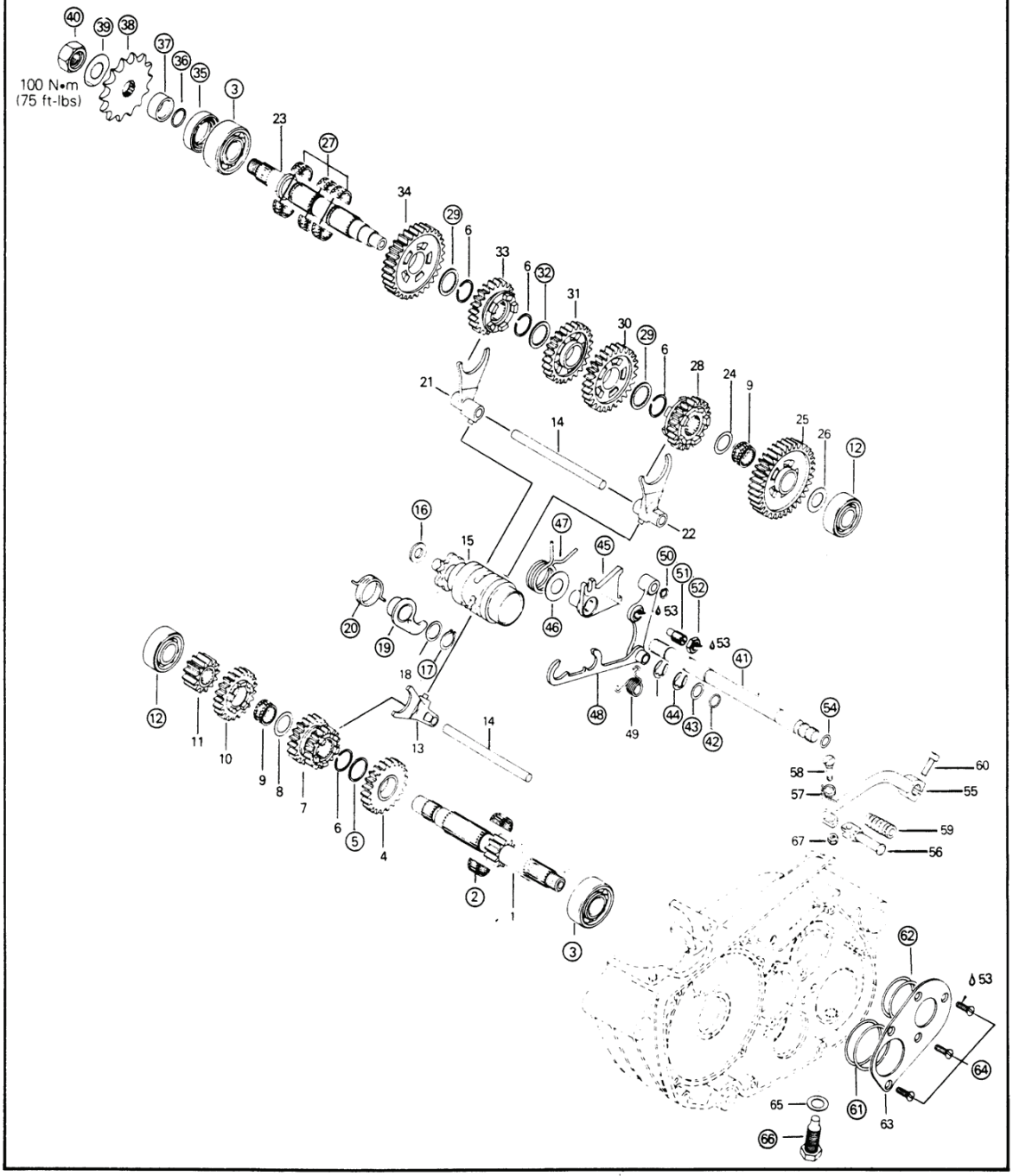
Clean all the metal components in a metal cleaner.

WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Remove old sealant from mating surfaces of crankcase/clutch cover with acetone, wood alcohol or equivalent.

CAUTION: Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase/clutch cover sealing.

TRANSMISSION (GEAR BOX) 6 SPEED
175 QUALIFIER 3 & 125 MX-6



1. *Clutch shaft 10 T (175)*
   12 T (125)
2. *Needle bearing ass'y, 9.73 mm (.383") width*
3. *Ball bearing 6204 (2)*
4. *6th gear clutch shaft 23 T (175)*
   21 T (125)
5. *Thrust washer*
6. *Circlip (4)*
7. *3rd/4th gear clutch shaft 16/19 T (175)*
   17/19 T (125)
8. *Thrust washer*
9. *Needle bearing (2)*
10. *5th gear clutch shaft 21T (175)*
    20 T (125)
11. *2nd gear clutch shaft 13T (175)*
    14 T (125)
12. *Ball bearing 6203 (2)*
13. *5th & 6th speed shifting fork*
14. *Guide pin (2)*
15. *Shift drum*
16. *Shift drum washer*
17. *Snap ring*
18. *Washer*
19. *Index lever*
20. *Index spring*
21. *2nd & 4th speed shifting fork*
22. *1st & 3rd speed shifting fork*
23. *Main shaft*
24. *Thrust washer*
25. *1st gear main shaft 34 T (175)*
    32 T (125)
26. *Thrust washer*
27. *Needle bearing 9.65 mm (.380") width (3)*
28. *6th gear main shaft 21 T (175)*
    23 T (125)
29. *Thrust washer (2)*
30. *3rd gear main shaft 27 T (175 & 125)*
31. *4th gear main shaft 25 T (175)*
    26 T (125)
32. *Flanged thrust washer*
33. *5th gear main shaft 23 T (175)*
    24 T (125)
34. *2nd gear main shaft 30 T (175)*
    28 T (125)
35. *Seal*
36. *O'ring*
37. *Sprocket spacer*
38. *Sprocket 15 T (175)*
    13 T (125)
39. *Lockwasher*
40. *Hexagonal nut M18 X 1.5*
41. *Shift shaft*
42. *O'ring*
43. *Thrust washer*
44. *Retaining ring (2)*
45. *Actuating lever*
46. *Thrust washer*
47. *Spring*
48. *Pawl*
49. *Pawl spring*
50. *Snap ring 10 X 1*
51. *Pawl positioning screw*
52. *Positioning screw lock nut 12 x 1*
53. *Loctite 242 blue (medium strength)*
54. *O'ring*
55. *Lever*
56. *Folding lever*
57. *Spring*
58. *Pivot screw M6 x 19*
59. *Lever rubber*
60. *Allen screw M6 x 20*
61. *Shim 0.5 mm, 0.3 mm, 0.1 mm, clutch shaft bearing as required*
62. *Shim 0.5 mm, 0.3 mm, 0.1 mm, main shaft bearing as required*
63. *Retaining plate*
64. *Flat slotted head screw M5 x 12 (5)*
65. *Washer*
66. *Kickstarter stop screw*
67. *Hexagonal nut M6 (if applicable)*

TRANSMISSION (GEAR BOX)

Disassembly & assembly

②㉗The needle bearing halves must be replaced in pairs only.

CAUTION: Do not intermix the needle bearing halves, damage could occur. If bearing halves have been intermix, refer to the description to find the proper width of the bearing halves.

③⑫Clutch side

Heat is needed to remove or install the clutch and main shaft bearings in the clutch side crankcase.

CAUTION: Always apply heat to remove or install a bearing in the crankcase. Failure to apply heat may result in metal being drawn out of the bearing to crankcase contact surface, thus causing a loose fit within the crankcase.

Proceed as follows:

WARNING: Engines have magnesium crankcase. Magnesium must be heated with great care.

Disassembly

Remove the bearing retaining plate and shim(s).

Using a butane torch with a large soft flame, heat the crankcase (inside portion) around the bearing area with 4 to 5 rapid circular passes.

Drift the bearing(s) out with an appropriate pusher and soft hammer.

Reassembly

Install the bearings retaining plate without shim(s).

Heat the crankcase (inside portion) as described above.

Quickly drift the bearing(s) into the crankcase using a soft hammer, until the bearing(s) sit against the bearing retaining plate.

NOTE: If plastic caged bearings are installed, always place the open side facing the outside of the crankcase.

Remove the bearing retaining plate and verify the endplay. (See ⑥① ⑥②)

③ ⑫ Magneto side

Heat is needed to remove or install the main shaft bearing into the sprocket side.

CAUTION: Always apply heat to remove or install a bearing in the crankcase. Failure to apply heat may result in metal being drawn out of the bearing to crankcase contact surface, thus causing a loose fit within the crankcase.

Proceed as follows:

WARNING: Engines have magnesium crankcase. Magnesium must be heated with great care.

Disassembly

Using a butane torch with a large soft flame, heat the outside crankcase bearing embossment with 4 to 5 rapid circular passes.

Drift the bearing out with an appropriate pusher and soft faced hammer.

Reassembly

Grease the sprocket side main shaft seal with lithium grease.

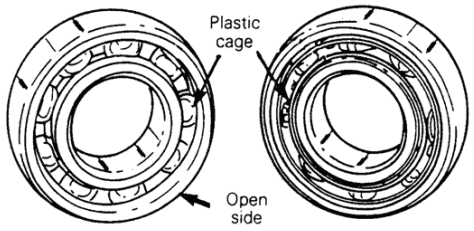
Cut a 50 mm (2") diameter disc out of asbestos material. Place the disc over the seal to protect it from the flame.

Heat the crankcase bearing embossment as described above.

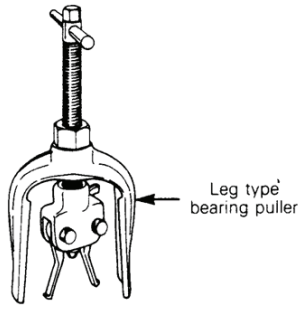
Quickly turn the crankcase half over and drift the bearing into the crankcase using a soft hammer.

NOTE: If a plastic caged bearing is installed, always place the open side facing the inside of the crankcase.

Plastic caged bearing



⑫ Heat and a leg type puller is needed to remove the clutch shaft bearing from sprocket side crankcase.



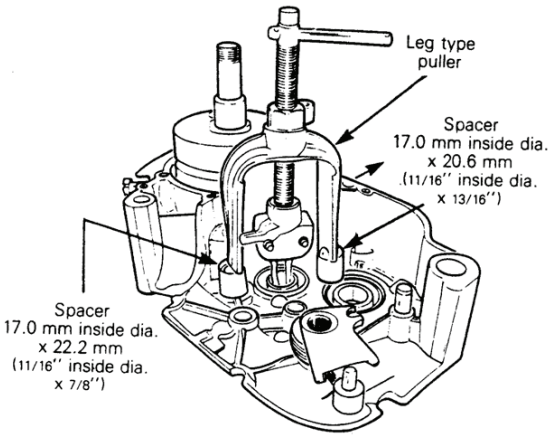
CAUTION: Always apply heat to remove or install a bearing in the crankcase. Failure to apply heat may result in metal being drawn out of the bearing to crankcase contact surface, thus causing a loose fit in the crankcase.

Proceed as follows:

WARNING: Engines have magnesium crankcase. Magnesium must be heated with great care.

Disassembly

Install the puller as illustrated.



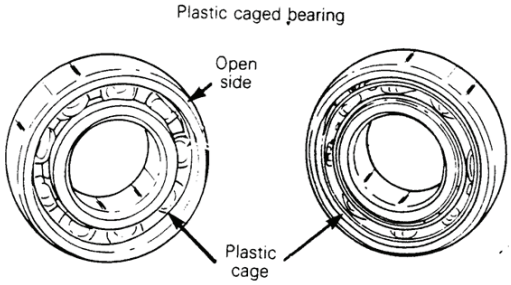
NOTE: Two (2) cylindrical spacers are needed to properly position the puller in the crankcase.

Using a butane torch with a large soft flame, heat around the crankcase clutch shaft bearing area with 4 to 5 rapid circular passes, then extract the bearing.

Reassembly

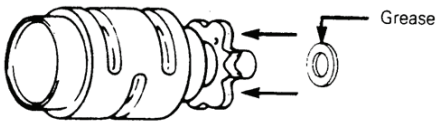
Heat around the crankcase area as described above and quickly drift the bearing into the crankcase using a soft hammer.

NOTE: If a plastic caged bearing is installed, always place the open side facing the inside of the crankcase.



⑤ ㉙ The sharp edge of the splined thrust washer must face the retaining snap ring.

⑯ At re-assembly it is recommended to coat the shift drum washer with grease, this will allow the washer to stick on the shift drum for ease of installation. (If applicable).

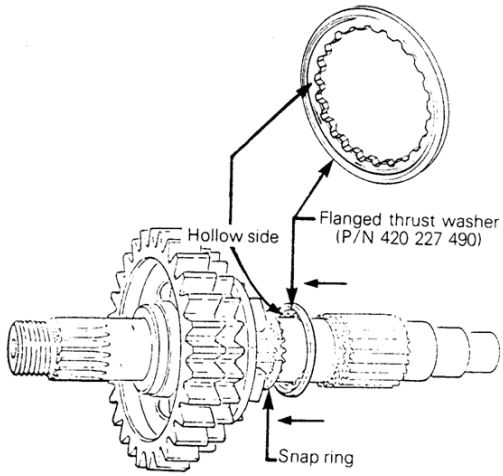


Hold the index lever (in crankcase) fully open while inserting the shift drum in place.

⑰ ⑲ ⑳ At assembly, properly position the index spring in index lever hole and crankcase hole.

CAUTION: Ensure that the index snap ring is well seated in its groove.

㉜ At assembly, install the flanged thrust washer with the hollow side facing the snap ring (in order to partially cover the snap ring).

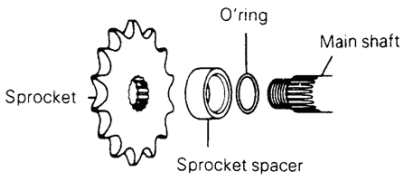


NOTE: Always install the snap ring so that the sharp edge points toward the sprocket. When installed, the snap ring should not be able to be turned by hand in the groove.

㉟ To install the new seal, use the appropriate oil seal insertion pusher. (See tool section). Apply a light coat of lithium grease on the seal lip.

NOTE: The seal can only be replaced with the main shaft bearing removed.

㊱ ㊲ ㊳ At assembly, ensure that the chamfered portion of the sprocket spacer is installed towards the main shaft.



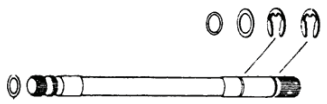
▼ ㊴ CAUTION: Locking washer should be replaced if bent more than twice. If in doubt, replace.

㊵ To remove the sprocket retaining nut, unbend locking washer. Lock crankshaft at the top dead center position and with the transmission in gear, unscrew the nut.

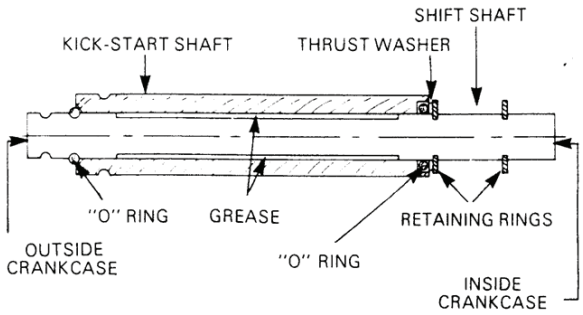
At assembly, follow the same procedure, apply Loctite no. 271 red (high strength) on the retaining nut threads and torque to 100 N•m (75 ft-lbs).

NOTE: At assembly, position the sprocket retaining nut with the hollowed side facing the sprocket.

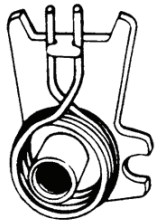
㊶ ㊷ ㊸ ㊹ ㊺ At assembly, position the retaining rings, thrust washers and "O" rings as illustrated.



Coat the shift shaft with grease.



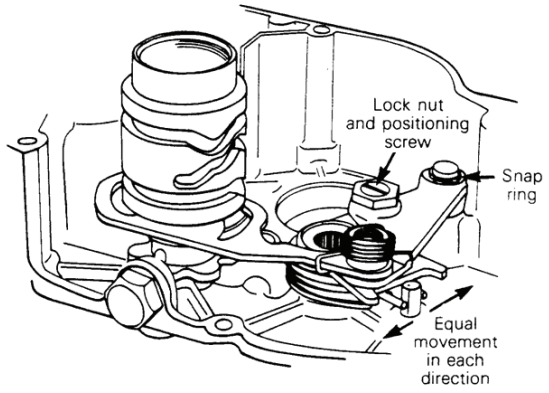
㊺ ㊻ ㊼ Assemble the spring, thrust washer and actuating lever as illustrated.



◆ WARNING: Exercise care when removing or installing the actuating lever spring.

㊽ ㊾ ㊿ To adjust shifter drum actuating pawl proceed as follows. Position shift drum ass'y in 2nd gear or above to obtain an even travel at the actuating lever.

Then with the shift shaft in position, gently move shift lever in each direction from the middle position until shifter pawl contacts the shifter drum pin and note the amount of movement in each direction at the actuating lever.



Movement in both direction must be equal. If not, the pawl ass'y can be repositioned by unlocking the lock nut and adjusting the pawl positioning screw. Lock the nut and verify. Repeat until the travel is equal on both sides.

When final adjustment has been reached, **apply Loctite no. 242 blue (medium strength) on the lock nut threads and torque to 27-29 N•m (20-22 ft-lbs).**

▼ (50) CAUTION: At the removal of the pawl ass'y take care not to overspread the snap ring. Prior to assembly, make sure to reclose snap ring gap.

(60) At assembly, torque to 11 N•m (8 ft-lbs).

(61) (62) The transmission shaft end-play must be 0.1 mm (.004") maximum.

Proceed as follows to verify the end-play.

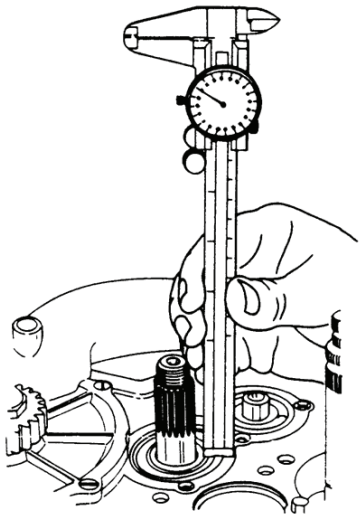
Remove the bearing(s) retaining plate and shims.

Tap both clutch and main shafts towards the sprocket side crankcase.

Tap both bearing **inner** races towards the sprocket side crankcase.

Measure the distance between the bearing **outer race** and the **crankcase surface** to determine the shims required between the bearing and the retaining plate.

The end-play must be 0.1 mm (.004") maximum.



CAUTION: If transmission shimming is too tight, transmission binding and excessive friction will occur.

(64) At assembly, apply Loctite no. 242 blue (medium strength) on the retaining screw threads and torque to 4-5.5 N•m (3-4 ft-lbs).

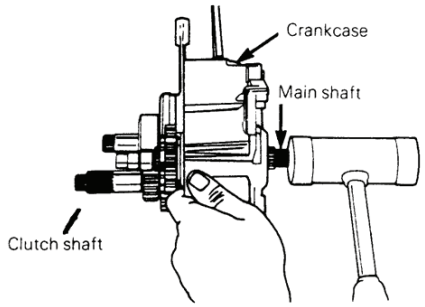
(66) At assembly, torque the kick starter stop screw to 34-40 N•m (25-29 ft-lbs).

NOTE: After assembly, do not remove the kick starter stop screw unless needed otherwise the kick starter spring will loose its preload and the clutch cover will have to be removed to reposition.

TRANSMISSION GEAR CLUSTER

Disassembly

To remove the clutch and main shaft gear cluster from the crankcase, tap on the sprocket side end of the main shaft. Use a **soft hammer.**



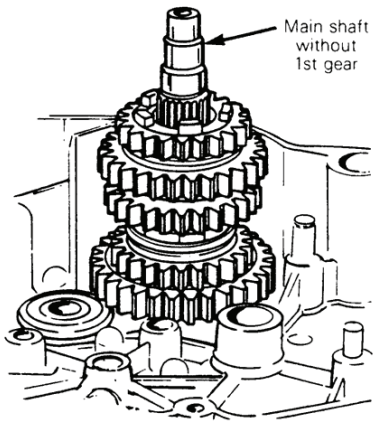
NOTE: To ease the clutch shaft removal, turn the clutch shaft manually while at the same time hitting the main shaft.

Reassembly

Proceed as follows:

Position the main shaft as illustrated, tap gently without pushing completely the shaft into the bearing. (To ease the clutch shaft installation).

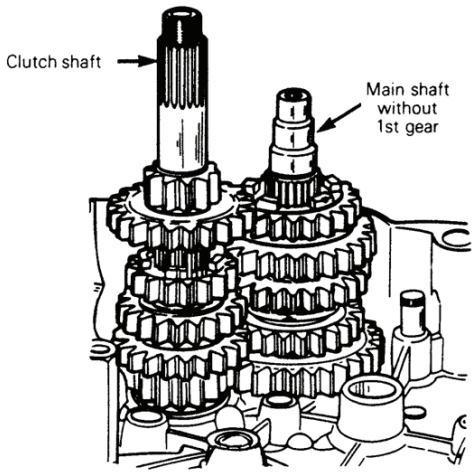
STEP 1



Position the clutch shaft as illustrated, tap gently to push the shaft into the bearing, while turning the main shaft manually; completely seat both shafts.

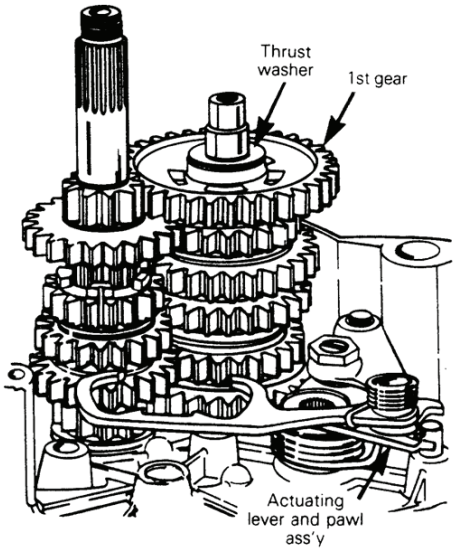
CAUTION: Prior to pushing the clutch shaft into the bearing, make sure the gears match.

STEP 2



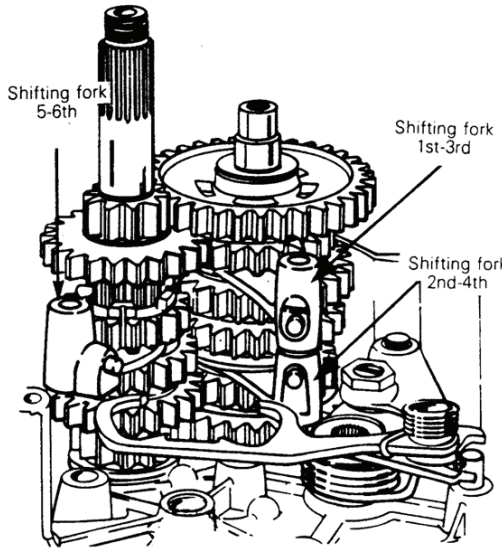
Position the thrust washer, needle bearing, first gear and thrust washer, and then the actuating lever and pawl ass'y as illustrated.

STEP 3



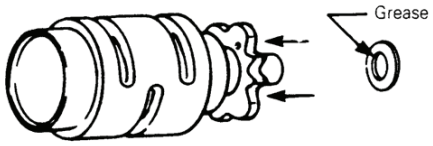
Position the shifting forks as illustrated.

STEP 4

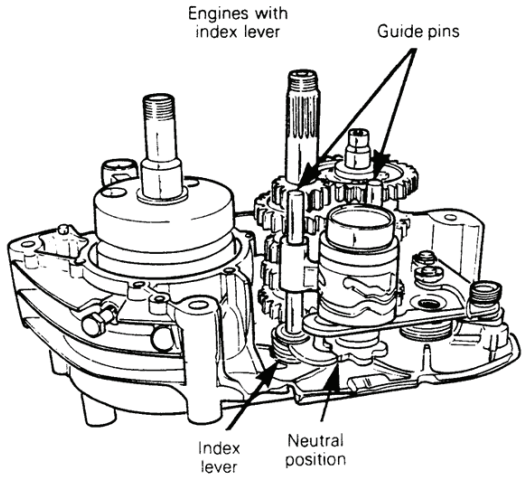


STEP 5

Coat the shift drum washer with grease, this will allow the washer to stick on the shift drum for ease of installation. (If applicable).

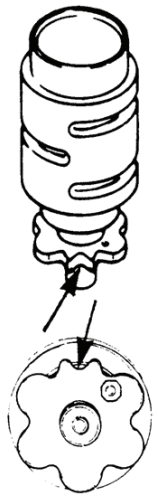


Position the shift drum ass'y and match all the shifting forks with the drum slots then position the guide pins as illustrated:



Hold the index lever (in crankcase) fully open while inserting the shift drum in place.

NOTE: To facilitate the assembly of the shifting forks, position the shift drum assembly at the neutral position.



Prior to reassembly of the crankcase halves, **adjust the shifting mechanism** and ensure that the **index lever is leaning against the neutral notch.**

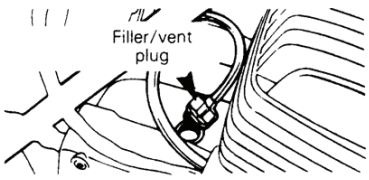
CLEANING

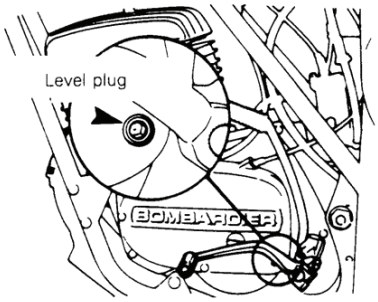
Clean all the metal components in a metal cleaner.

WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

TRANSMISSION OIL

After the engine has been installed in the frame, remove the filler/vent plug and refill the transmission with approximately 1200 ml (40 fl. oz.) of SAE 30 motor oil until oil reaches the level orifice.





NOTE: Hold motorcycle upright to check oil level.

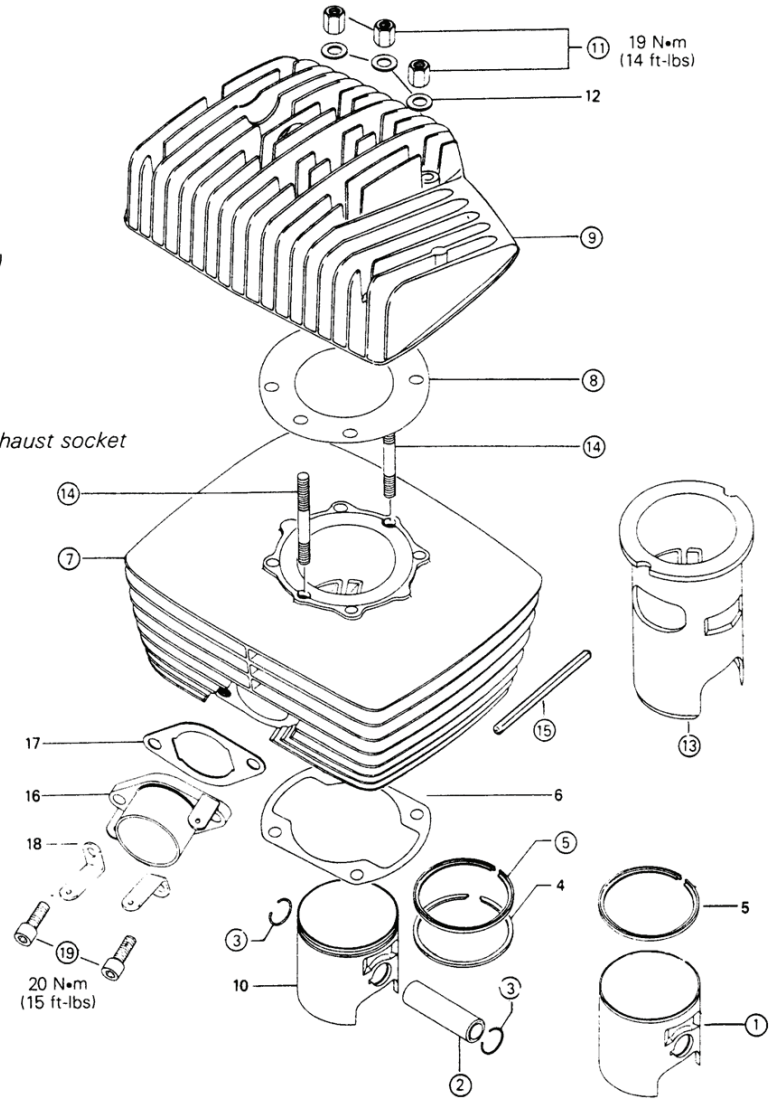
Replace the level plug, the filler/vent plug and the vent tube.

244-281 ENGINE TYPES

TOP END

250-350 Qualifier 3 & 250 MX-6

1. *Piston (MX type)*
2. *Piston pin*
3. *Circlip*
4. *Rectangular ring (Qualifier)*
5. *L-semi-trapez ring*
6. *Cylinder base gasket*
7. *Cylinder*
8. *Cylinder head shim (as required)*
9. *Cylinder head*
10. *Piston (Qualifier Type)*
11. *Cylinder head nut M8 (6)*
12. *Flat washer 8.4 mm (6)*
13. *Cylinder sleeve*
14. *Cylinder head stud M8 x 49 (2)*
15. *Damper rubber (Qualifier)*16. *Exhaust socket*
16. *Exhaust socket*
17. *Exhaust gasket*
18. *Spring bracket*
19. *Allen screw M8 x 25 (2)*



TOP END

Disassembly & assembly

NOTE: Refer to Technical Data for component fitted tolerance wear limit.

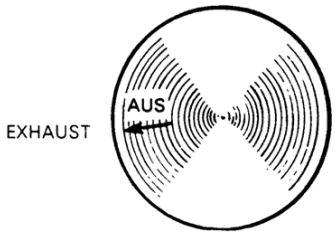
①⑦⑨⑩⑬ At the replacement of the piston, cylinder, cylinder head and cylinder sleeve, the squish area should be remeasured (See "Engine tolerances measurements").

①②③⑩ Place a clean cloth over the crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

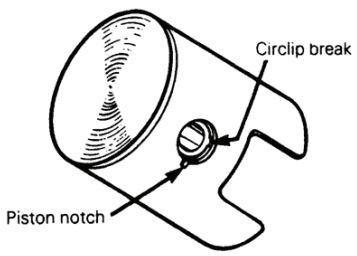
Drive the piston pin in or out using a suitable drive punch and hammer.

CAUTION: When tapping piston pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmetting shock and pressure to the connecting rod.

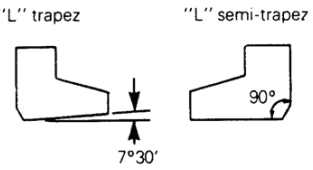
At assembly, place the piston over the connecting rod with the letters AUS, over an arrow on the piston dome, facing direction of the exhaust port.



Once the circlips are installed, turn each circlips so that the circlip break is not directly in line with piston notch. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.



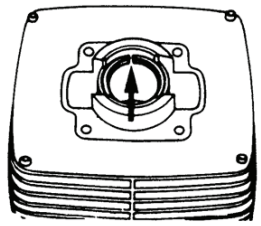
⑤ There are two different types of "L" ring.



Qualifier uses 1 "L" semi-trapez ring, matched with one rectangular ring.

MX-6 uses 1 "L" semi-trapez ring only.

Ring end gap: 244 engines: 0.20-0.35 mm (.008"-.014")
281 engines: 0.25-0.40 mm (0.010-0.016")

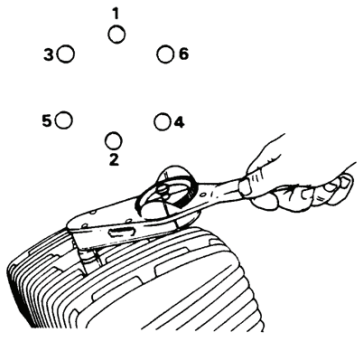


NOTE: 2nd oversize piston & rings are "L" trapez type.

CAUTION: Prior to "L" ring replacement always ensure to visually identify the appropriate type needed. The two ring/piston types are not interchangeable. Damage may occur if interchanged.

⑥ At assembly, install a new lightly greased gasket.

⑨⑪ At assembly, torque to 19 N•m (14 ft-lbs) in a criss-cross sequence.



⑬ Cylinder sleeve should be replaced whenever its inside diameter becomes 0.14 mm (0.006") or more larger than a new 2nd oversize piston.

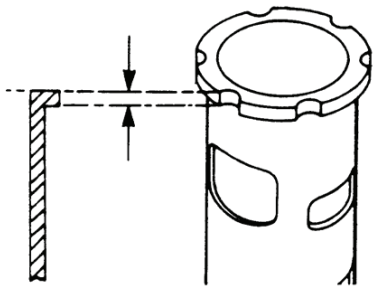
Proceed as follows:

Place the cylinder in a range oven for 30 minutes, at a temperature of 175°C (350°F) maximum.

Place the new cylinder sleeve in a freezer for one hour minimum.

Support cylinder barrel upside down and press out the cylinder sleeve using a suitable pusher.

Measure the thickness of the old liner top flange and if necessary, machine the new liner flange to the same measurement.



Inspect cylinder barrel, remove any grooves or scratches. Clean away any dirt or carbon.

Re-heat cylinder barrel in range oven for 30 minutes at a temperature of 175°C (350°F) maximum.

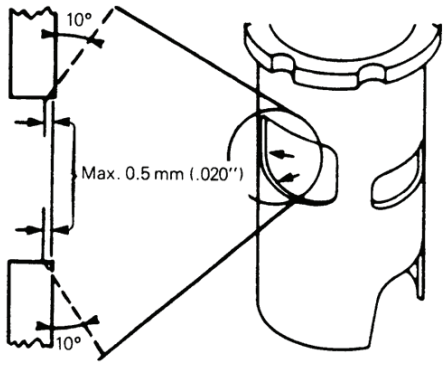
Immediately align chilled cylinder sleeve with hot cylider, drop into place from top side making sure to align the exhaust port of the sleeve with the one of the cylinder barrel. To ease alignment, leave two cylinder studs in the cylinder.

NOTE: Only 3-4 seconds maximum are needed before cylinder cools sufficiently to grip onto sleeve.

Bore the new sleeve to provide piston clearance of:

	Minimum	Maximum
250 MX-6:	0.06 mm (0.002")	0.08 mm (0.003")
250-350 Qualifier 3:	0.07 mm (0.003")	0.09 mm (0.035")

Using a rotary file or jeweler's hand file, chamfer the sharp edges of each port 10°, to width of 0.5 mm (.020").

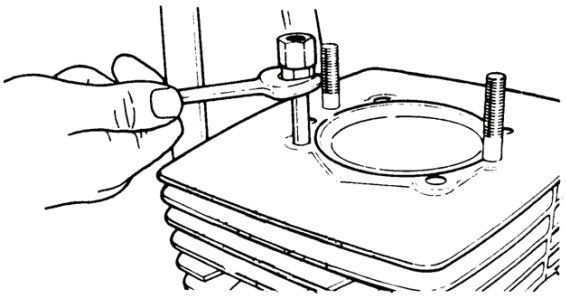


CAUTION: Excessive chamfer will alter the port timing.

Check the ring end gap.

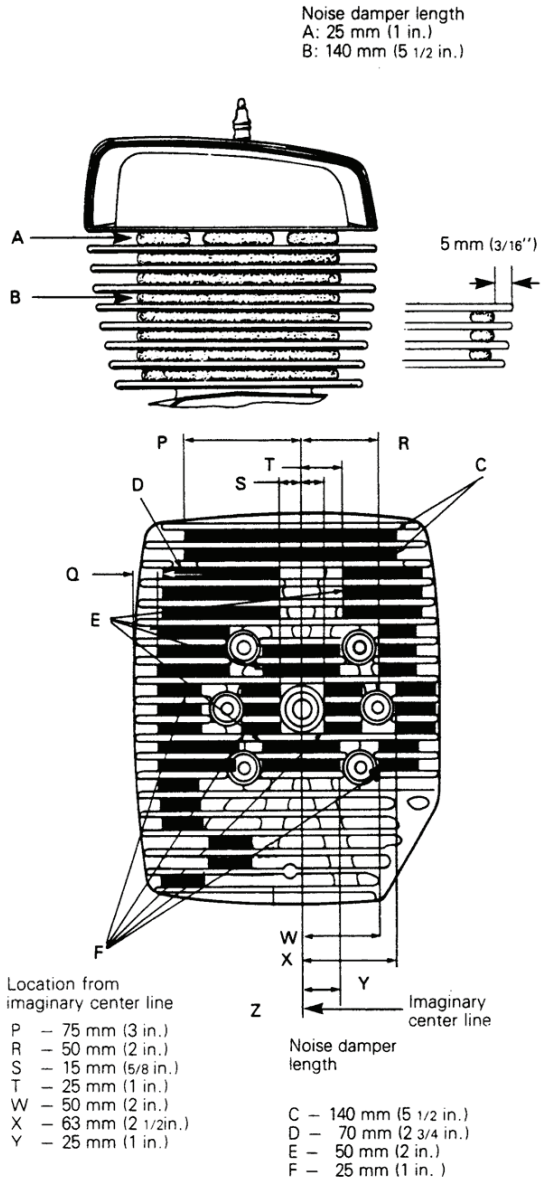
Make sure to check the squish area measurement during assembly. (See engine tolerances measurements).

⑭ To unscrew, use 2 cylinder head nuts blocked one against the other.



At assembly, screw the long threaded portion of the stud into the cylinder.

⑮ If replaced, noise dampers should be installed as illustrated.



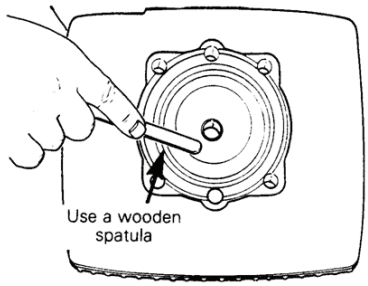
⑲ At assembly, torque to 20 N.m (15 ft-lbs).

Cleaning

Clean all the metal components in a metal cleaner.

◆ **WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.**

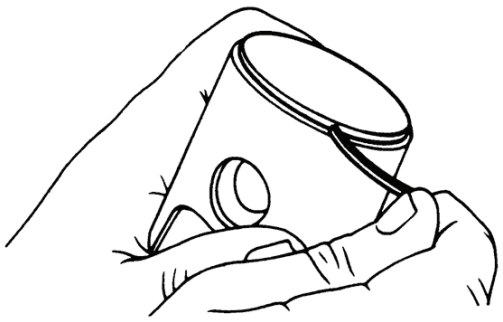
Scrape any carbon deposits from cylinder exhaust port, cylinder head and piston dome using a wooden spatula and repeat periodically.



○ **NOTE:** The letter **AUS** over an arrow on the piston dome must be visible after cleaning.

Clean the piston ring groove(s) with a groove cleaner tool, or using a piece of broken ring.

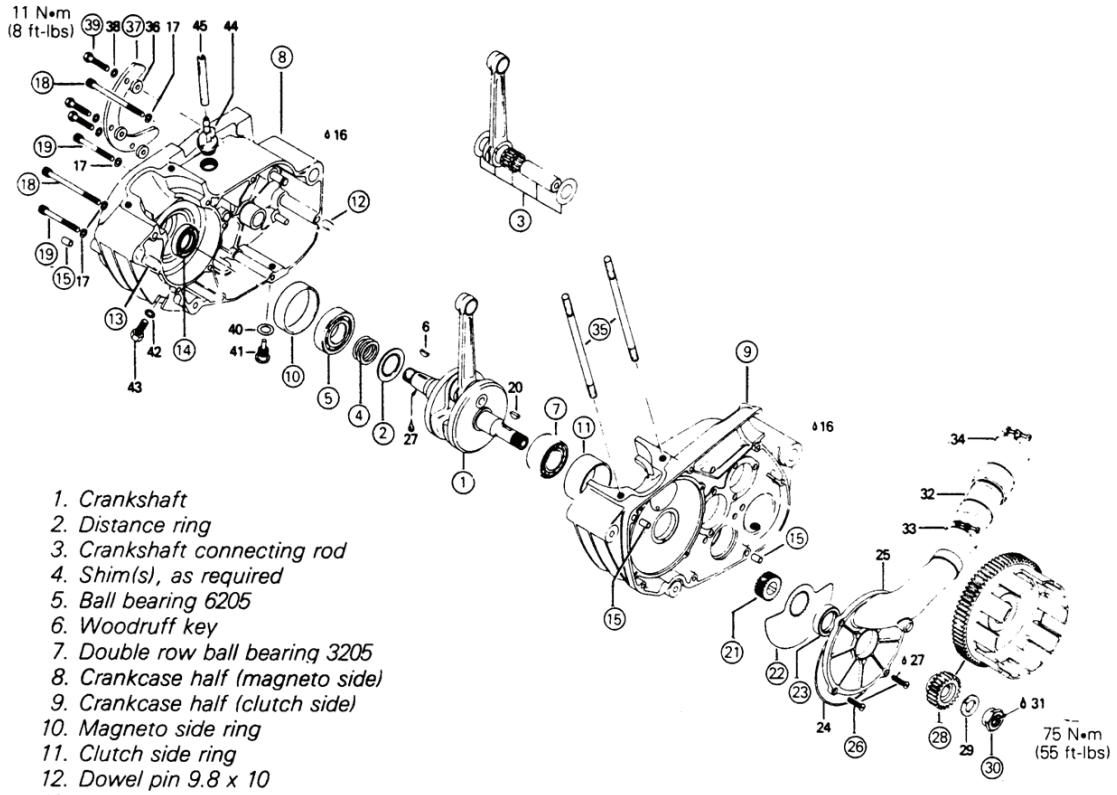
○ **NOTE:** It is suggested to periodically clean the cylinder head and piston of carbon build up.



Scrape any deposit from the piston crown and inspect the piston for cracks or seizure marks.

Remove all traces of the cylinder base gasket and fit a new lightly greased gasket.

BOTTOM END 250-350
Qualifier 3 & 250 MX-6



1. *Crankshaft*
2. *Distance ring*
3. *Crankshaft connecting rod*
4. *Shim(s), as required*
5. *Ball bearing 6205*
6. *Woodruff key*
7. *Double row ball bearing 3205*
8. *Crankcase half (magneto side)*
9. *Crankcase half (clutch side)*
10. *Magneto side ring*
11. *Clutch side ring*
12. *Dowel pin 9.8 x 10*
13. *Dowel pin 13.8 x 15*
14. *Seal*
15. *Dowel pin (5)*
16. *Loctite 515 (Purple)*
17. *Lockwasher 6 (10)*
18. *Allen screw M6 x 70 (5)*
19. *Allen screw M6 x 45 (5)*
20. *Woodruff key*
21. *Disc valve spacer*
22. *Disc valve*
23. *Seal*
24. *O'ring*
25. *Disc valve cover*
26. *Flat slotted head screw M5 x 16 (4)*
27. *Loctite 242 blue (medium strength)*
28. *Drive gear (with clutch drum ass'y)*
29. *Lockwasher 18*
30. *Hexagonal nut 18 x 1.5*
31. *Loctite 271 red (high strength)*
32. *Carburetor adaptor*
33. *Clamp*
34. *Carburetor clamp*
35. *Cylinder stud M8 x 167 (4)*
36. *Chain guard spacer (3)*
37. *Chain guard*
38. *Lockwasher 6 (3)*
39. *Hexagonal screw M6 x 16 (3)*
40. *Washer*
41. *Magnetic drain plug*
42. *Washer*
43. *Crankcase drain screw M8 x 16*
44. *Oil filler cap M18 x 1.5*
45. *Vent tube*