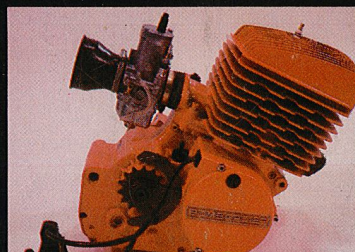
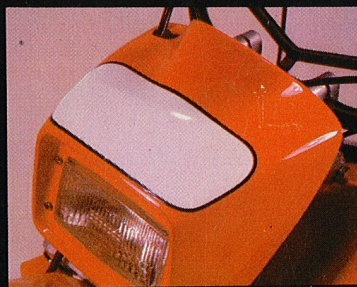
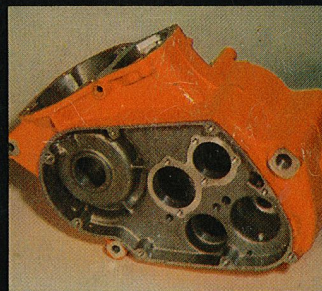
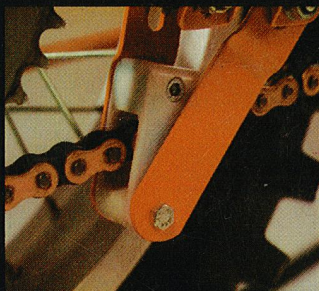
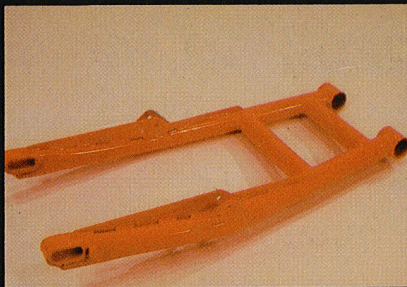
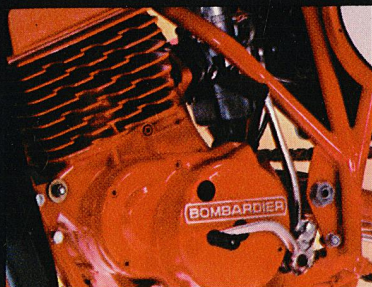


SHOP MANUAL

QUALIFIER* (8955-8965-8985)

MX-5 (8964-8984)





SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair the Can-Am motorcycle.

This edition was primarily published to be used by motorcycle mechanics who are already familiar with all service procedures relating to Bombardier made motorcycles.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

Strict adherence to the information within will result in better, safer service work.

This manual emphasizes particular information denoted by the wording and symbols;

◆ **WARNING:** Identifies and instruction which, if not followed, could cause personal injury.

▼ **CAUTION:** Denotes an instruction which, if not followed, could severely damage vehicle components.

○ **NOTE:** Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use.

◆ **WARNING:** This information relates to the preparation and use of Can-Am motorcycles and has been utilized safely and effectively by Bombardier Limited. However, Bombardier Limited disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

INTRODUCTION

Before using this manual, read carefully the following information.

DEFINITION OF NUMBERING SYSTEMS

The manual makes use of a 2-part digital numbering system (i.e. 01-01), in which the first digit represents the Section, the second digit the Sub-section.

Example: section 01 Tools
sub-section 01 (Basic Motorcycle Tool Kit)

The numerotation at the bottom of each page assists the user in page location.

ARRANGEMENT OF THE MANUAL

The manual is divided in 8 major sections, 01 Tools, 02 Engine, 03 Electrical, 04 Suspension, 05 Wheels, 06 Steering, 07 Chassis, 08 Warranty.

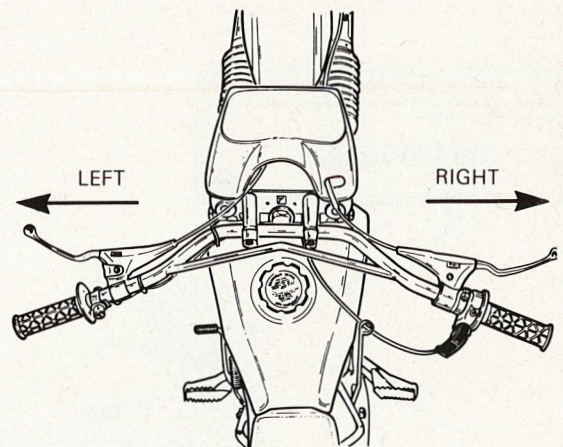
Each section is comprised of various sub-sections, and yet again, although not indicated in the table of content, each sub-section has one or more divisions. For example, section 03 electrical; sub-section 02 ignition system, contains two divisions: "Bosch 55W, 4 Poles" and "Bosch 60W, 6 Poles".

ILLUSTRATIONS AND PROCEDURES

An exploded view is conveniently located as close as possible to the written procedures and is meant to assist the user in identifying parts and components. When something special applies (such as adjustment, torques, etc.) the specific parts are circled and referred to in the text.

For more convenience, the main torque values can be found in text and also in exploded view.

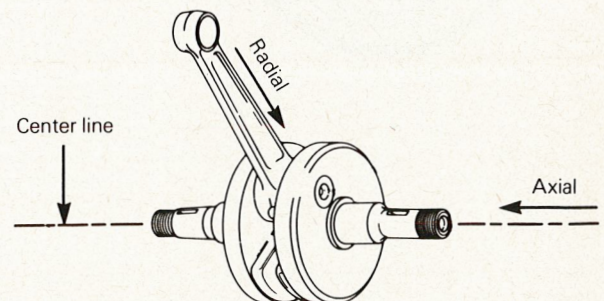
The use of "RIGHT" and "LEFT" indications in text, always refers to (when sitting on the bike) driving position.



When speaking of forces and stresses applied to rotating parts it may be useful to explain the following words:

Axial: parallel to the center line.

Radial: perpendicular to the center line.

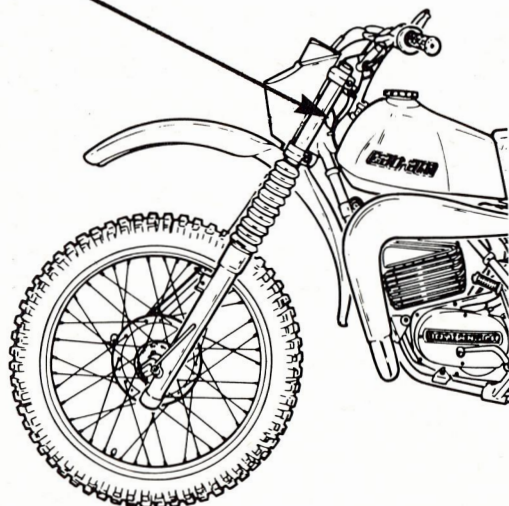


As many procedures in this manual are interrelated, we suggest that before undertaking any task, you read and thoroughly understand the entire section in which the procedure is contained. A number of procedures throughout the book require the use of special tools. **Before commencing any procedure be sure to have on hand all of the tools required, or approved equivalents.**

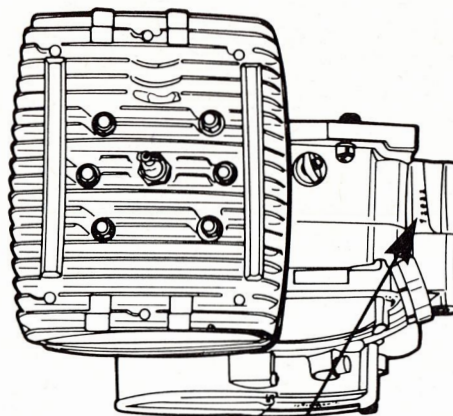
MODEL IDENTIFICATION

8955: Qualifier 175
8965: Qualifier 250
8985: Qualifier 370
8964: MX-5 250
8984: MX-5 370

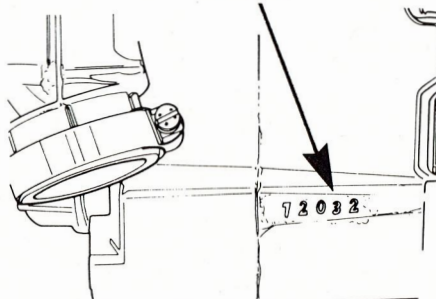
10% OF GROSS OF RECONSTRUCTION TRUMP
 EMPLOYER L&L OWNER P&C L&L NAME L&L
 THE VEHICLE CONTAINS IN ALL APPLICABLE REGIONS, NOTING VEHICLE MONEY STATIONING OF ROBERT OF
 THE NAME OF RECONSTRUCTION TRUMP ABOVE
 N.B.
 8965000022
 89TRUMP/CL



This number may be useful to identify some difference in the specifications or in the mechanical aspect of a given engine type.



ENGINE
SERIAL
NUMBER



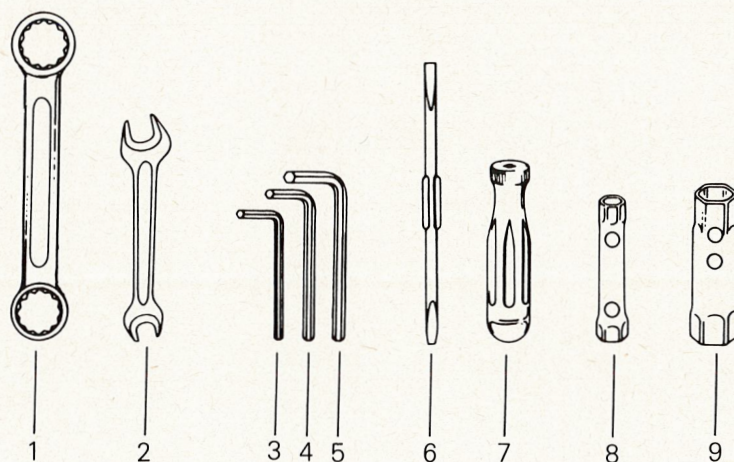
All of the information, illustrations and component/system descriptions contained in this manual are correct at time of publication. Bombardier Limited, however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

(INTRODUCTION), PAGE 2

TABLE OF CONTENTS SHOP MANUAL

SECTION	SUB-SECTION
01 TOOLS	01 Basic motorcycle tool kit 02 Service tools 03 Service products
02 ENGINE	01 Engine tolerances measurements 02 Engine/transmission <ul style="list-style-type: none"> – Engine removal (all models) – 174 Engine type – 244 Engine type – 366 Engine type – Engine installation (all models) 03 Carburetor 04 Exhaust system 05 Technical data
03 ELECTRICAL	01 Electrical charts 02 Ignition system <ul style="list-style-type: none"> – Bosch 55W – Bosch 60W 03 Testing procedure 04 Ignition timing 05 Spark plug 06 Technical data
04 SUSPENSION	01 Forks 02 Swing arm 03 Technical data
05 WHEELS	01 Wheels 02 Brake 03 Technical data
06 STEERING	01 Handlebar 02 Steering head
07 CHASSIS	01 Frame 02 Body 03 Fuel tank 04 Cable routing 05 Technical data
08 WARRANTY	

BASIC MOTORCYCLE TOOL KIT



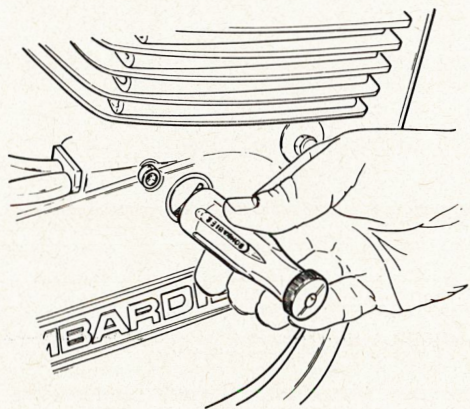
Part number

1. Combined wrench 22/24 mm	420 277 825
2. Open end wrench 10/13 mm	420 276 065
3. Hexagonal wrench no. 4	420 277 790
4. Hexagonal wrench no. 5	420 876 360
5. Hexagonal wrench no. 6	420 277 810
6. Insert for screwdriver	420 277 830
* 7. Grip for screwdriver	420 277 840
8. Socket wrench 11/13 mm	420 876 220
9. Socket wrench 17/21 mm	420 277 411


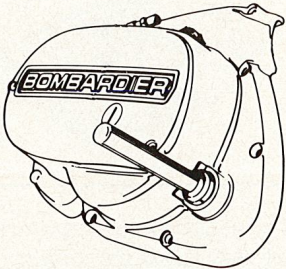
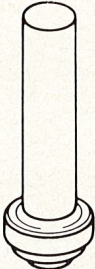
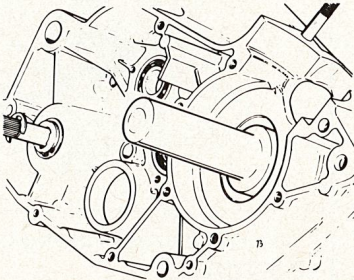
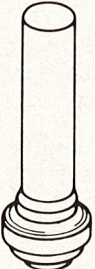
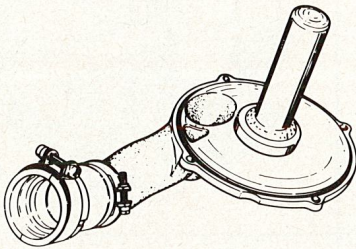
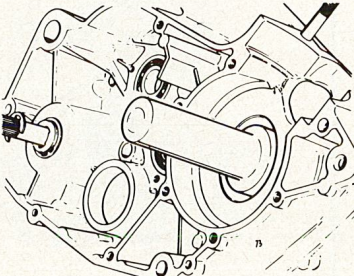
*SPECIFIC APPLICATION:

Item 7 (grip for screwdriver):

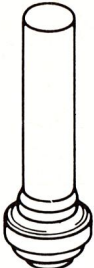
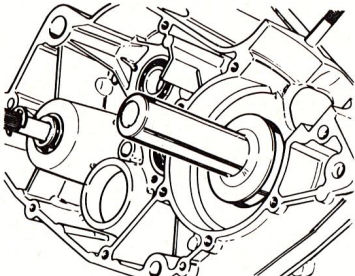
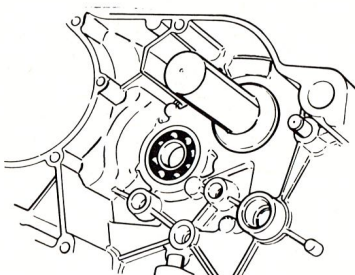
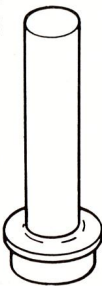
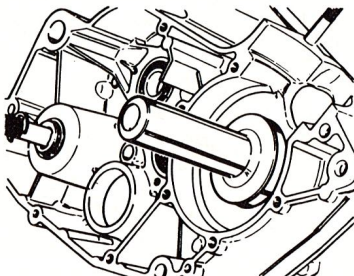
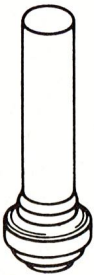
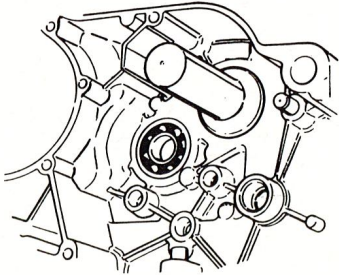
The screwdriver grip can also be used for installation and removal of the plugs.




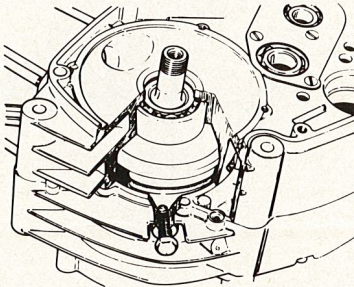
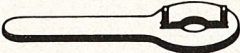
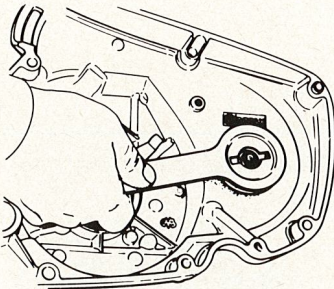

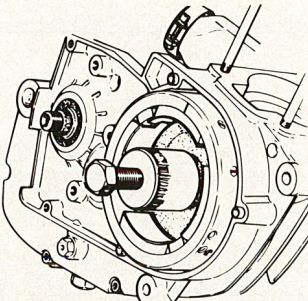
SERVICE TOOLS

ITEM	USE	APPLICABLE TO
<p>Insertion pusher (420 277 850)</p> 	<p>To install kick starter oil seal.</p> 	<p>All engine types.</p>
<p>(420 277 980)</p> 	<p>To install crankcase magneto side seal.</p> 	<p>244 engine type (MX-5)</p>
<p>(420 277 875)</p> 	<p>To install disc valve cover seal.</p> 	<p>174 engine type 244 engine types (Qualifier & MX-5)</p>
	<p>To install magneto side and clutch side crankcase seal.</p> 	<p>366 engine types (MX-5 & Qualifier)</p>

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

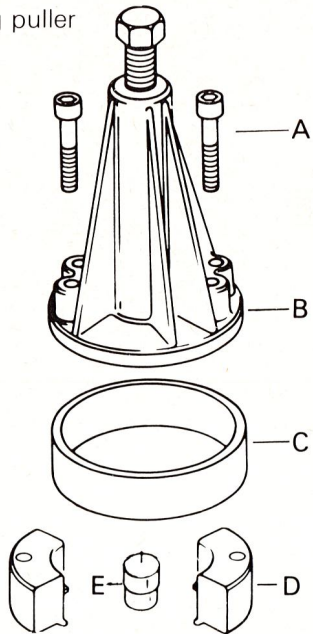
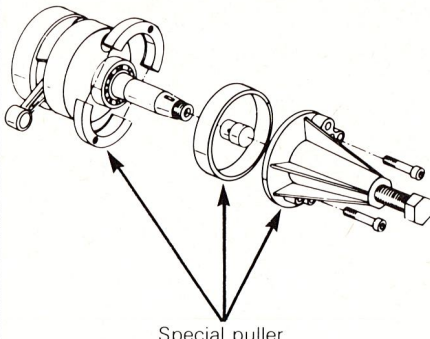
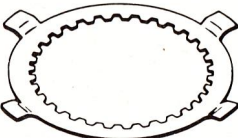
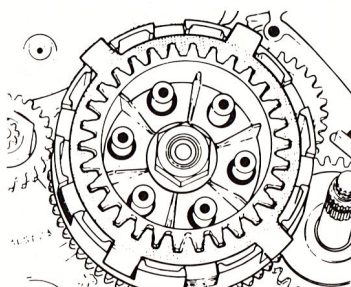
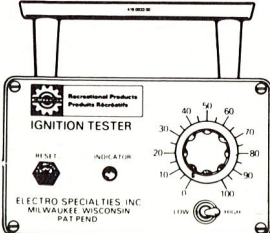
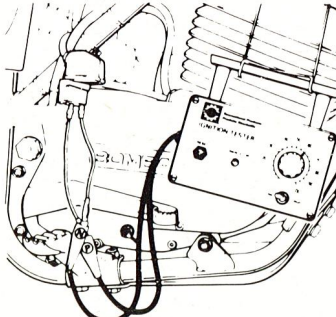
<p>(420 277 861)</p> 	<p>To install crankcase magneto side oil seal</p> 	<p>174-244 engine types (Qualifier)</p>
	<p>To install transmission main shaft oil seal (sprocket side).</p> 	<p>366 engine types (Qualifier & MX-5)</p>
<p>(420 276 190) (420 276 200) (420 276 930) (420 276 940)</p> 	<p>To install polyamid ring in crankcase.</p> 	<p>(420 276 190) clutch side 174-244 engine types (Qualifier & MX-5) (420 276 200) magneto side 174 engine type (420 276 930) magneto side 244 engine types (Qualifier & MX-5) (420 276 940) magneto & clutch side 366 engine types (Qualifier & MX-5)</p>
<p>(420 277 870)</p> 	<p>To install transmission main shaft oil seal (sprocket side).</p> 	<p>174-244 engine types (Qualifier & MX-5)</p>

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

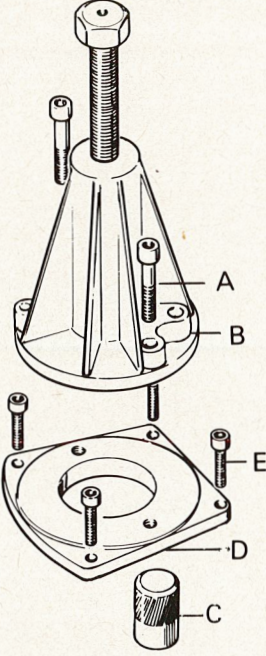
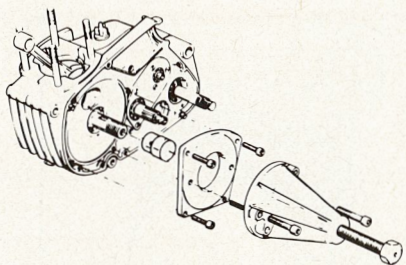

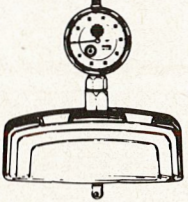
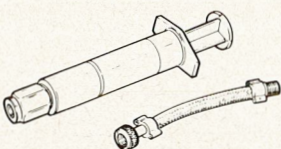
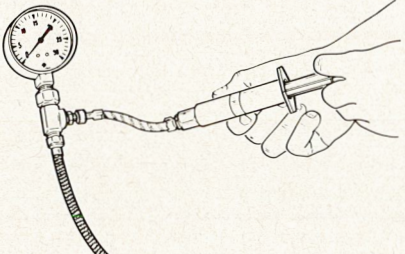
<p>Crankshaft locking bolt (420 241 965)</p> 	<p>To lock crankshaft at top dead center.</p> 	<p>All engine types.</p>
<p>Pump gear holder (420 277 900)</p> 	<p>To remove the oil pump driven gear</p> 	<p>174-244 engine types (Qualifier)</p>
<p>Flywheel puller (420 277 807)</p> 	<p>To remove the flywheel</p> 	<p>244-366 engine types (Bosch ignition system)</p>

SECTION 01 TOOLS

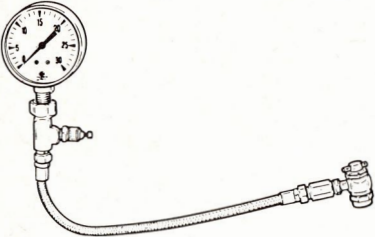
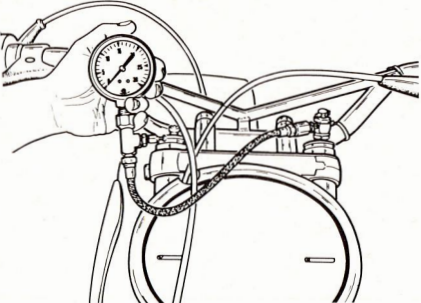
SUB-SECTION 02 (SERVICE TOOLS)

<p>Bearing puller</p>  <p>A) Allen screw M8 x 40 B) Puller C) Ring for puller D) Ring half for ball bearing E) Protection cap</p>	<p>To remove the crankshaft bearings</p>  <p>Special puller</p>	<p>A) (420 840 680) Screw M8 x 40 B) (420 876 296) C) (420 977 480) 174-244 engine types (420 977 490) 366 engine types D) (420 277 890) — 174 engine type: magneto & clutch side bearing. — 244 engine type: clutch side bearing. (420 276 020) 244 engine type: magneto side bearing. (420 977 470) — 366 engine types: magneto & clutch side bearing. E) 420 276 920</p>
<p>Clutch hub locking tool (420 277 885)</p> 	<p>To remove the clutch shaft nut</p> 	<p>All engine types.</p>
<p>Ignition tester (419 0033 00)</p> 	<p>Engine electronic components test.</p> 	<p>All engine types.</p>

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

<p>Crankcase separator</p>  <p>A) Allen screw B) Puller C) Protector cap D) Extractor plate E) Allen screw</p>	<p>To split engine crankcase.</p> 	<p>A) (420 840 680) Allen screw M8 x 40 B) (420 876 296) C) (420 276 920) D) (420 276 910) 174-244 engine types (420 276 915) 366 engine types E) (420 840 351) Cylinder screw M5 x 20 174-244 engine types (420 940 451) Cylinder screw M6 x 25 366 engine types</p>
<p>Dial indicator (T.D.C. gauge) (414 104 700)</p> 	<p>To perform B.T.D.C. measurement</p>  <p>(Basic timing)</p>	<p>All engine types.</p>
<p>Air pump 747 024 000</p> 	<p>To fill the front fork with air (MX-5 models) or for tire inflation</p> 	<p>250-370 MX-5 models</p>

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

<p>Pressure gauge (747 025 000)</p> 	<p>To perform the front fork air pressure adjustments</p> 	<p>250-370 MX-5</p>
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SERVICE PRODUCTS

Tie rap



748 001 000

Loctite 242 blue
(medium strength)



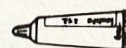
413 702 500

Silicone seal



747 002 000

Loctite 271 red
(high strength)



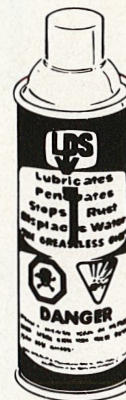
747 020 000

Loctite 515
Crankcase sealant



413 702 700

L.P.S.
(metal protector)



413 902 200

Silicone grease
(dielectric)



747 018 002

K & N
Air filter oil



747 021 002

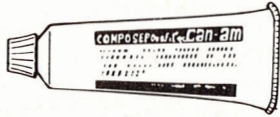
Air filter cleaner



747 023 000

SECTION 01 TOOLS
SUB-SECTION 03 (SERVICE PRODUCTS)

Air filter
compound



747 021 001



Injection oil

747 017 002

Red paint
Orange paint



413 404 100
413 404 200



Bombardier oil
50/1

496 013 200

Lithium grease



498 028 100

Fork oil



747 016 003

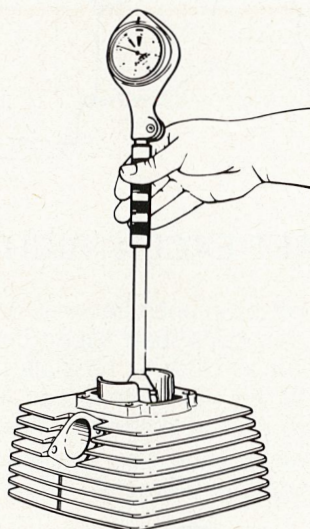
ENGINE TOLERANCES MEASUREMENTS

CYLINDER TAPER

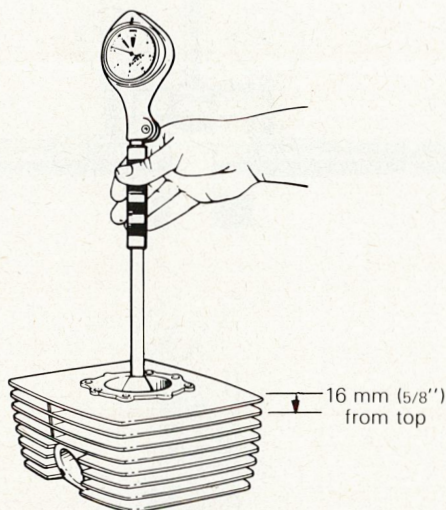
Maximum: 0.08 mm (.003'')

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.



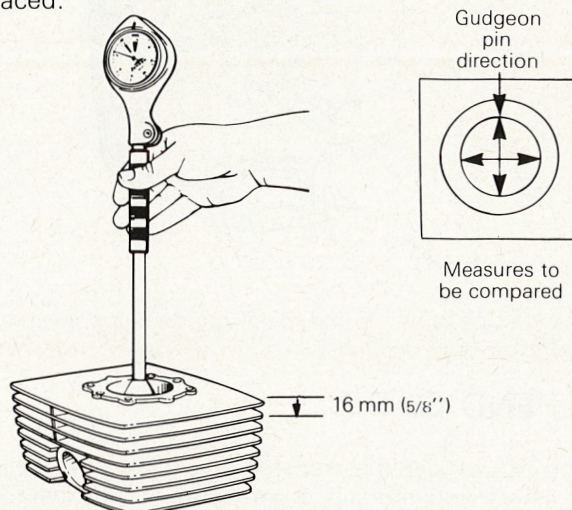
Below the
auxiliary
transfer port



CYLINDER OUT OF ROUND

Maximum: 0.05 mm (.002'')

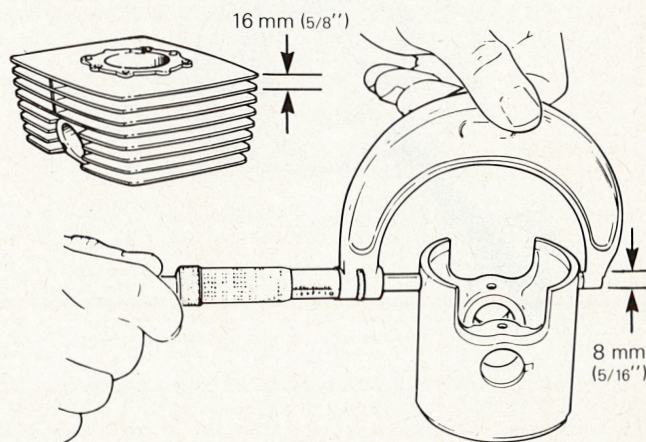
Measuring 16 mm (5/8'') from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than 0.05 mm (.002''). If larger, cylinder should be rebored and honed or the cylinder sleeve should be replaced.



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.



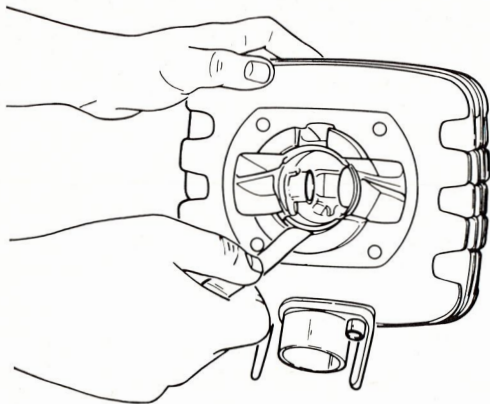
The difference between these two measurements should be within specified tolerance.

SECTION 02 ENGINE

SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENTS)

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.

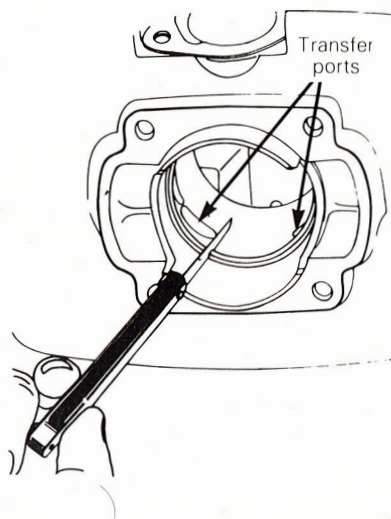


The thickest possible to use feeler gauge will determine the piston to wall clearance.

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.

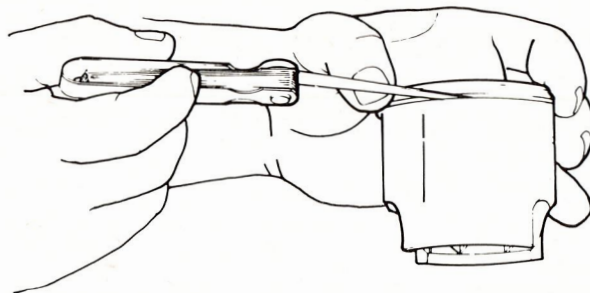
NOTE: In order to correctly position the ring in the cylinder, use the piston as a pusher.



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

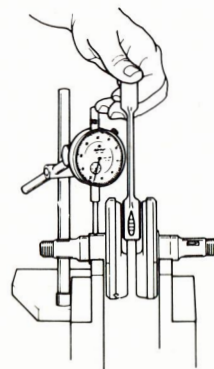
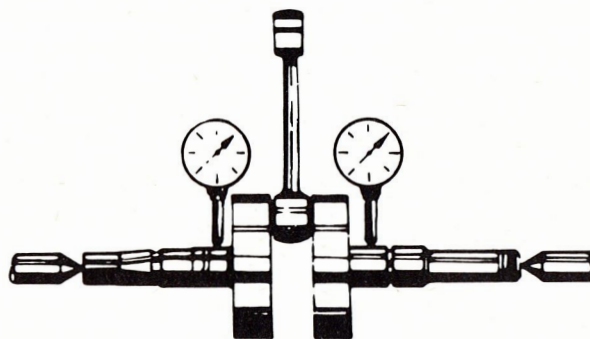
Maximum: 0.20 mm (.008")

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



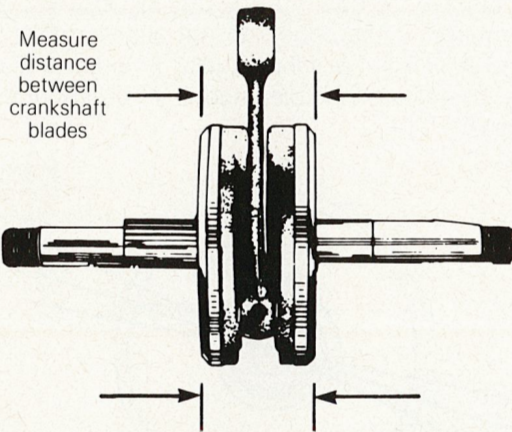
CRANKSHAFT EXCENTRICITY

With the crankshaft positioned between a center lathe, or supported by two crankshaft supporting blocks, install a dial indicator as close as possible to crankshaft blade 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.



SECTION 02 ENGINE
SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENTS)

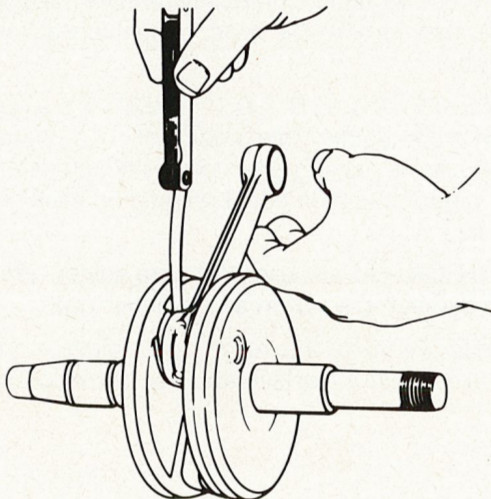
CRANKSHAFT BLADE WIDTH



The distance between the two points must be equal.

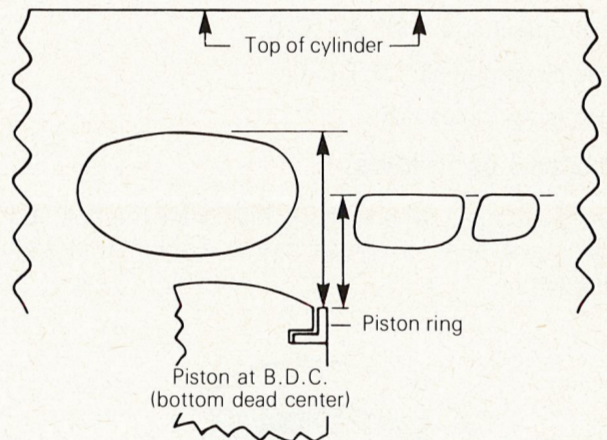
CONNECTING ROD BIG END AXIAL PLAY

Using a feeler gauge measure distance between connecting rod and thrust washer. If axial play exceeds 0.8 mm (.030"), the crankshaft should be replaced.

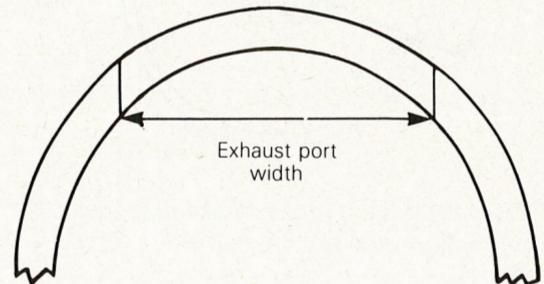


PORT HEIGHT MEASUREMENT

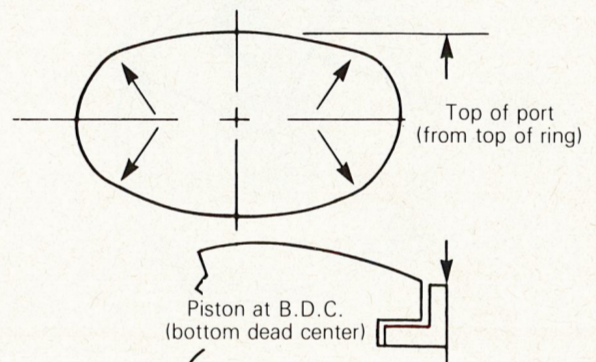
Port heights are measured on the inside diameter of the cylinder and are taken from the top of the piston ring with the piston at bottom dead center (BDC).



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.

SECTION 02 ENGINE

SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENTS)

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:

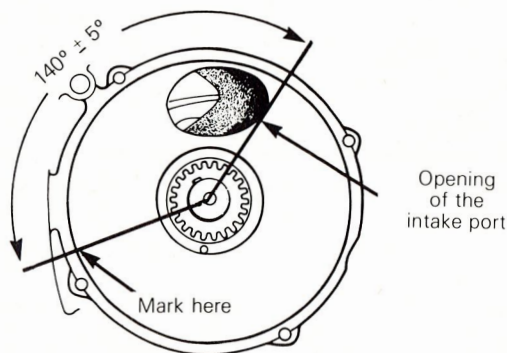
Disc opening at 140° B.T.D.C.

Disc closing at 85° A.T.D.C.

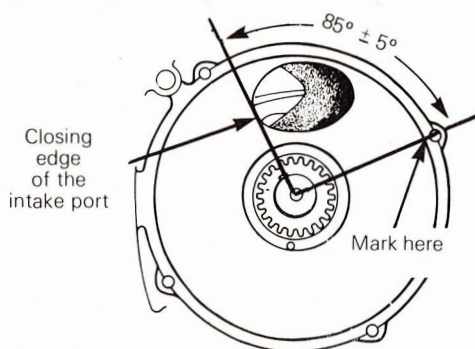
Disc is asymmetrical.

Proceed as follows:

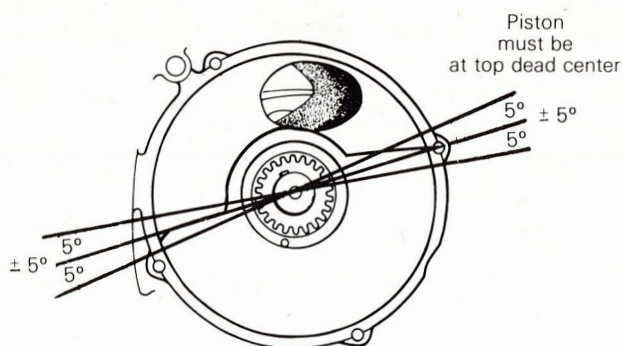
Using a degree wheel, mark 140° after the opening of the intake port. (Degrees follow a counter-clockwise direction).



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

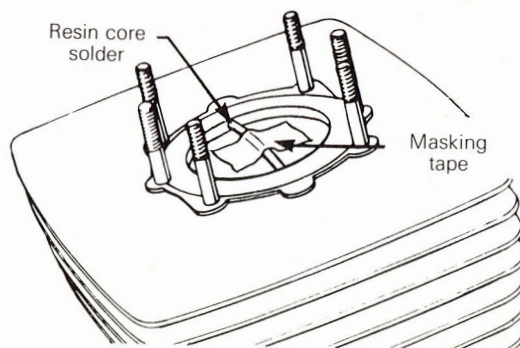
Squish area

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.

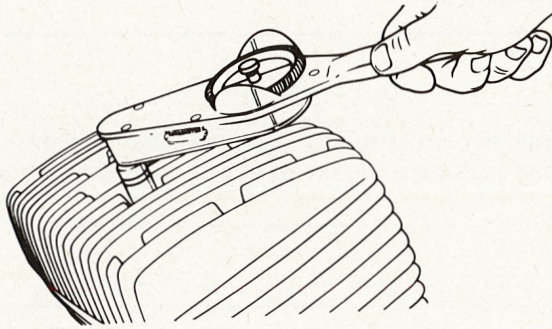


SECTION 02 ENGINE

SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENTS)

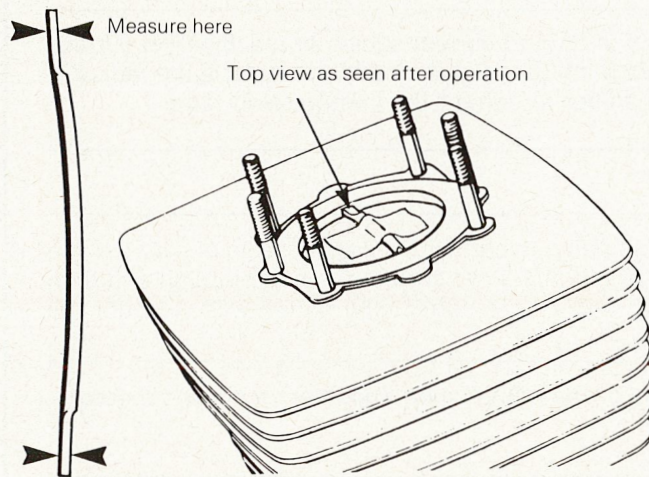
Install the cylinder head and using a criss-cross sequence, gradually torque the cylinder head nuts to the correct specifications:

175 cm ³	16 N•m (12 ft-lbs)
250 cm ³	19 N•m (14 ft-lbs)
370 cm ³	25 N•m (19 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.

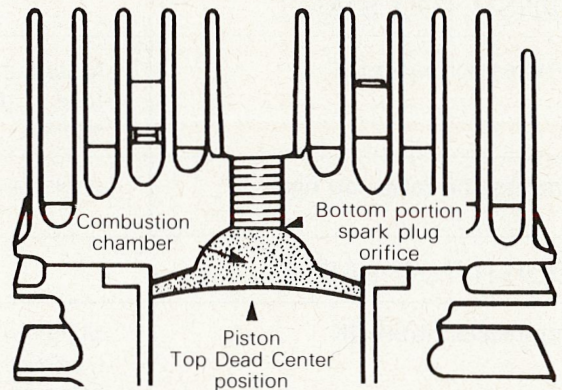
Fit the necessary shim/s (if required) and, using a criss-cross sequence, gradually torque the head nuts to the correct torque.

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 (30 grade)	NOMINAL COMPRESSION RATIO
Qualifier 175	13.4 mL ± 0.5	13.5-14.5 to 1
Qualifier 250	19.8 mL ± 0.8	13-14 to 1
Qualifier 370	36.7 mL ± 2.0	10.5-11.5 to 1
MX-5 250	20 mL ± 0.8	13-14 to 1
MX-5 370	31.7 mL ± 1.4	12-13 to 1

SECTION 02 ENGINE

SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENTS)

 **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.

SECTION 02 ENGINE

SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENTS)

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.

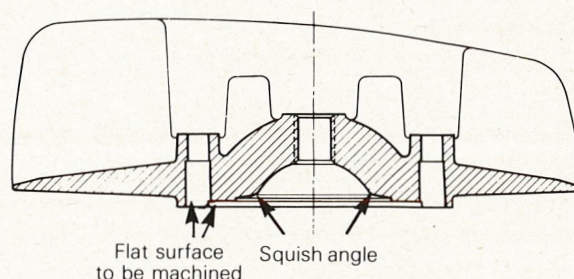
COMPRESSION RATIO TOO LOW

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.

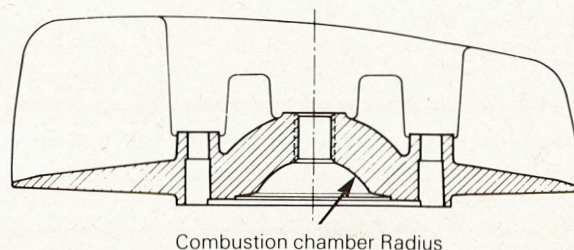
SQUISH ANGLE

Qualifier 175	9°
Qualifier 250	118 mm radius
Qualifier 370	not applicable
MX-5 250	12°
MX-5 370	20°



COMBUSTION CHAMBER RADIUS

Qualifier 175	23.4 mm (0.921")
Qualifier 250	27 mm (1.063")
Qualifier 370	hemispherical
MX-5 250	3 mm (.118")
MX-5 370	8 mm (.314")



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

ENGINE REMOVAL (ALL MODELS)

Disconnect or remove the following from vehicle if applicable:

Vent tubes

Magneto cover

Spark plug

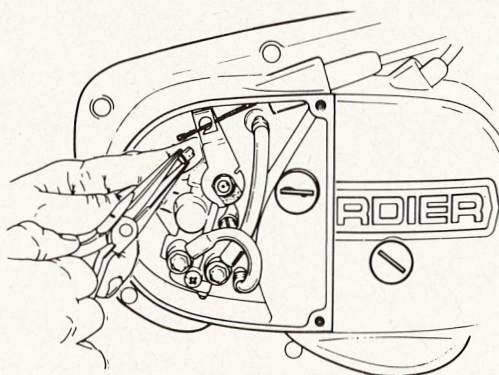
Drive chain

Exhaust pipe

○ **NOTE:** On 370 models it is necessary to remove the exhaust socket (at engine) while removing the exhaust pipe.

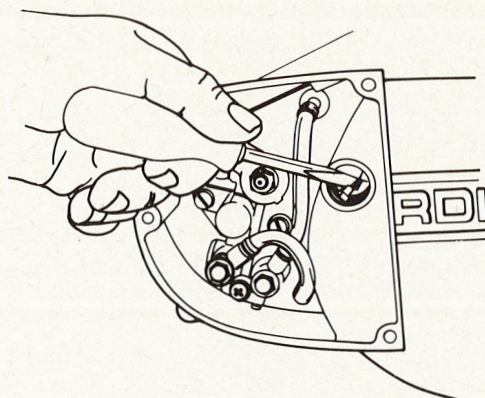
Carburetor.

Oil pump cable (Qualifier 175-250). Remove the oil pump cover, rotate the oil pump control lever clockwise to disengage the cable and pull the split nipple out.



Front engine mounts and stud.

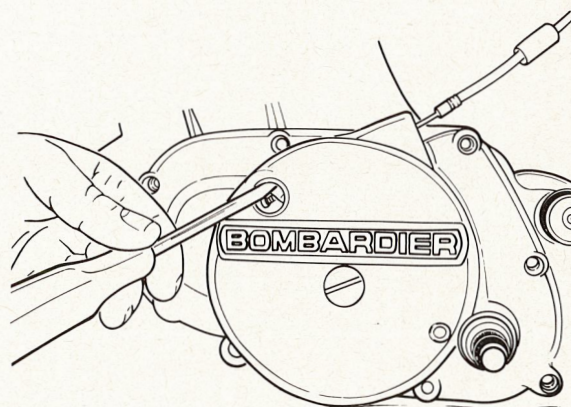
Clutch cable. (Remove the clutch cable from the handlebar lever. Remove the clutch cable access plug. Pull the cable housing away from the clutch cover. Push the inner cable inside the cover until its tip is visible through the installation hole, with a screwdriver, disengage it from the clutch release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



Lower engine stud and spacers.

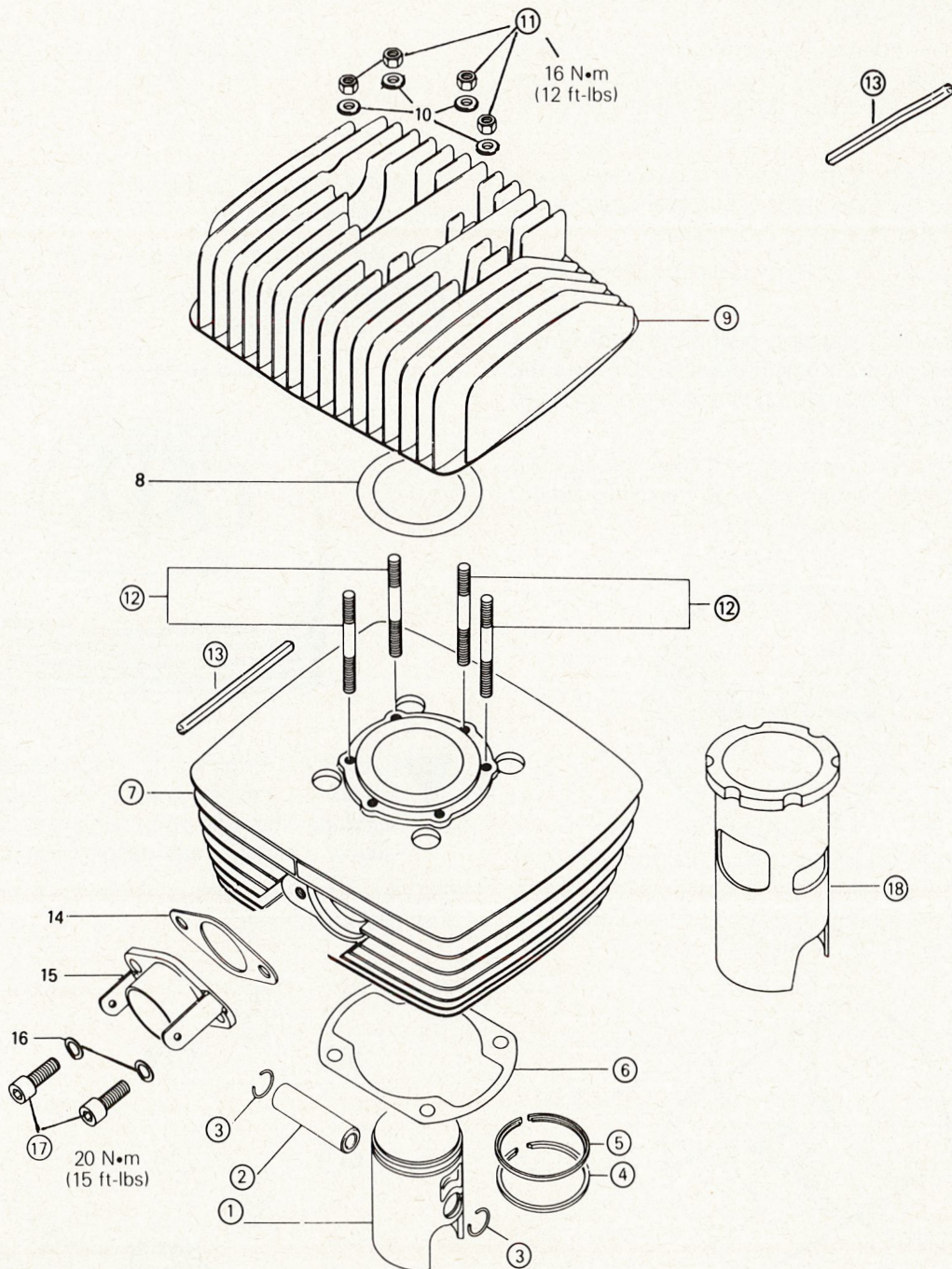
Swing arm pivot bolt (note the number of shim/s on the inside swing arm pivot flanges).

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



174 ENGINE TYPE

TOP END (QUALIFIER 175)



- | | | |
|-------------------------|---|-------------------------|
| 1. Piston | 7. Cylinder | 13. Noise damper |
| 2. Piston pin | 8. Cylinder head shim (as required) | 14. Exhaust gasket |
| 3. Circlip (2) | 9. Cylinder head | 15. Exhaust socket |
| 4. Rectangular ring | 10. Flat washer 7.4 mm (6) | 16. Lockwasher |
| 5. "L"-semi-trapez ring | 11. Cylinder head nut M7 (6) | 17. Allen screw M8 x 25 |
| 6. Cylinder base gasket | 12. Cylinder head stud M7 x 33.5 mm (6) | 18. Cylinder sleeve |

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TOP END

Disassembly & assembly

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

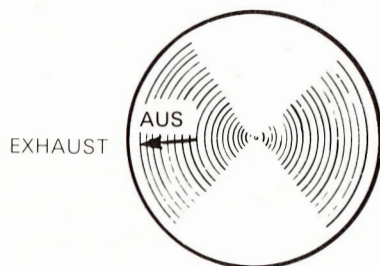
① ⑦ ⑨ ⑱ At the replacement of the piston, cylinder, cylinder head and cylinder sleeve, the squish area should be remeasured (See "Engine tolerances measurements").

① ② ③ Place a clean cloth over the crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

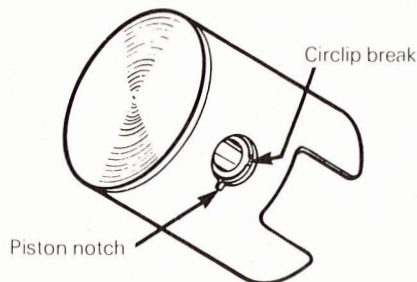
Drive the piston pin in or out using a suitable drive punch and hammer.

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

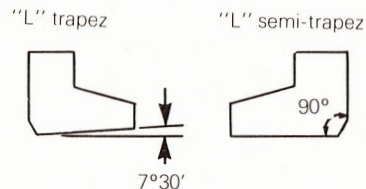
At assembly, place the piston over the connecting rod with the letters AUS, over an arrow on the piston dome, facing direction of the exhaust port.



Once the circlips are installed, turn each circlip 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.



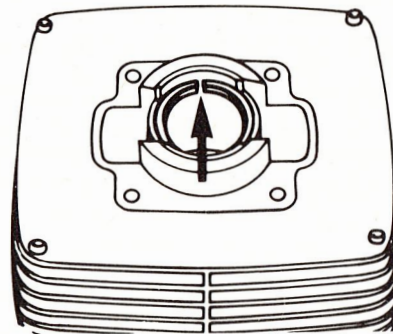
④ ⑤ There is two different types of "L" ring.



174 engine type (Qualifier 175) uses "L" semi-trapez and 1 rectangular ring.

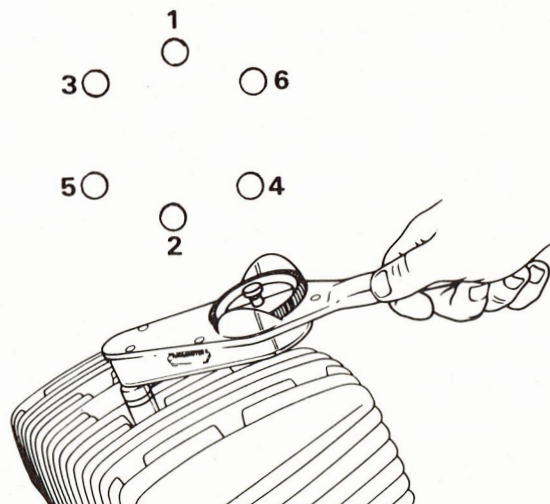
Ring end gap: 0.20 - 0.40 mm (.008" - .016")

○ **NOTE:** 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.

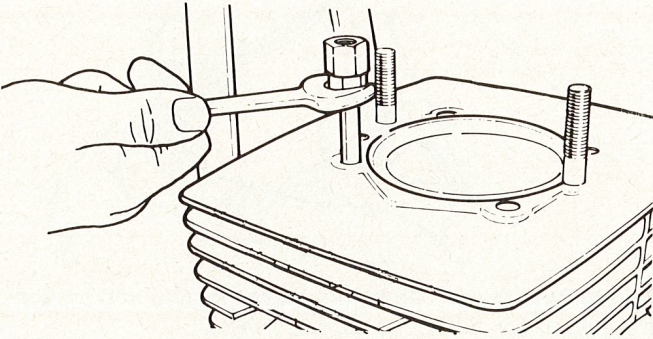
⑨ ⑪ At assembly, torque to 16 N•m (12 ft-lbs) in a criss-cross sequence.



SECTION 02 ENGINE

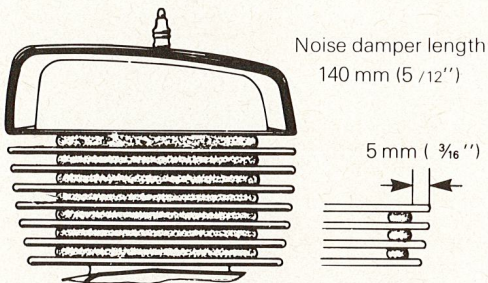
SUB-SECTION 02 (ENGINE/TRANSMISSION)

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



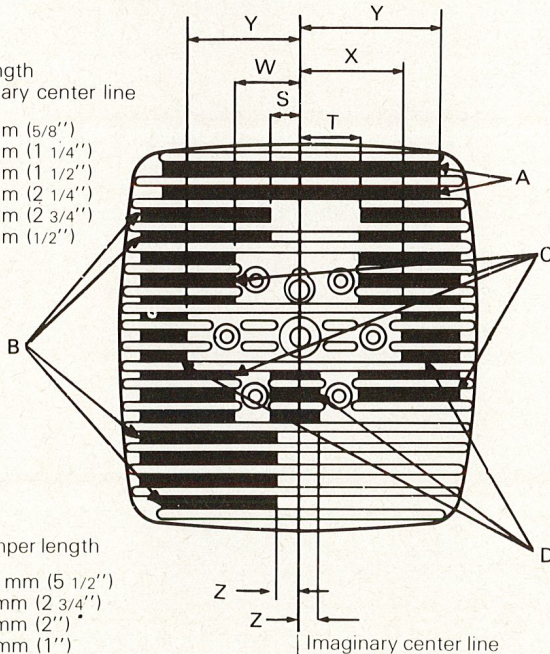
At assembly, screw the long threaded portion of the stud into the cylinder.

- ⑬ If replaced, noise dampers should be installed as illustrated.



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 0.135 mm (0.005'') or more larger than a new 3rd oversize piston.

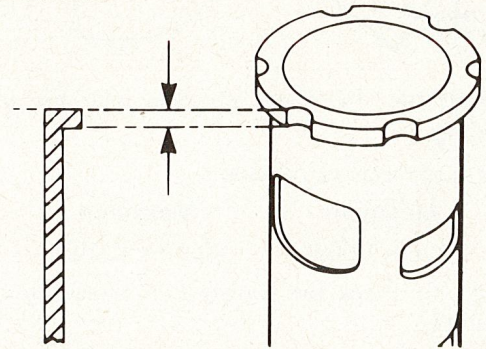
Proceed as follows:

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.

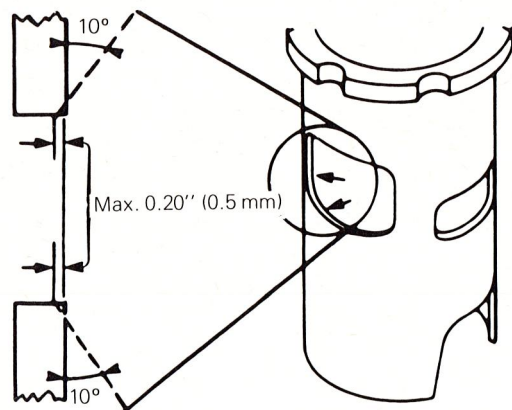
Bore the new sleeve to provide piston clearance of:

	Minimum	Maximum
175cc:	0.50 mm (.002'')	.076 mm (.003'')

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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



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.

CAUTION: Excessive chamfer will alter the port timing.

Gap the new rings to provide:

Minimum	Maximum
.20 mm (.008")	.40 mm (0.016")

Make sure to check the squish area measurement during assembly.

(See "Engine tolerances measurements").

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.

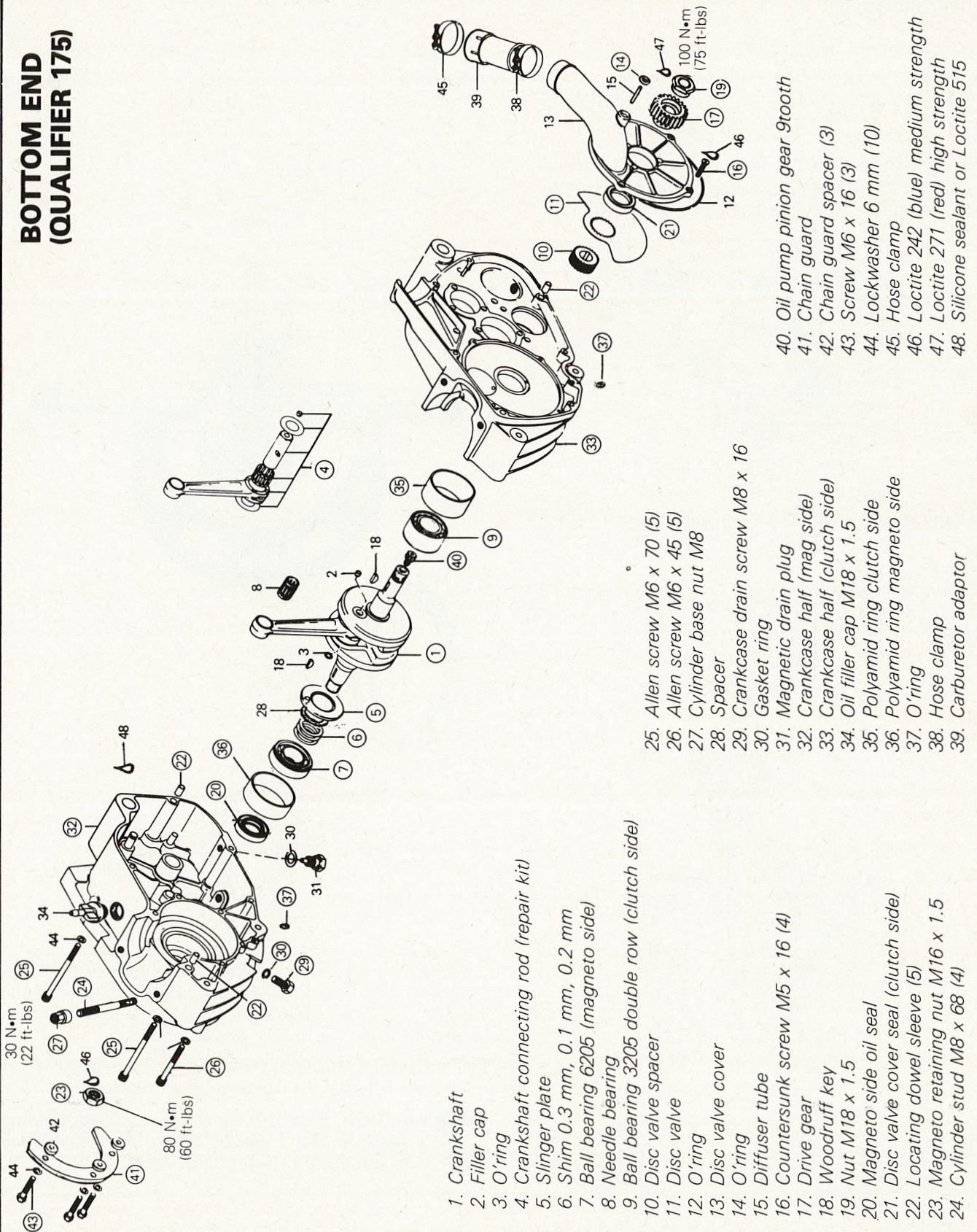
Scrape any carbon deposits from cylinder exhaust port, cylinder head and piston dome using a wooden spatula and repeat periodically.

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.

**BOTTOM END
(QUALIFIER 175)**



1. Crankshaft
2. Filler cap
3. O'ring
4. Crankshaft connecting rod (repair kit)
5. Slinger plate
6. Shim 0.3 mm, 0.1 mm, 0.2 mm
7. Ball bearing 6205 (magneto side)
8. Needle bearing
9. Ball bearing 3205 double row (clutch side)
10. Disc valve spacer
11. Disc valve
12. O'ring
13. Disc valve cover
14. O'ring
15. Diffuser tube
16. Countersunk screw M5 x 16 (4)
17. Drive gear
18. Woodruff key
19. Nut M18 x 1.5
20. Magneto side oil seal
21. Disc valve cover seal (clutch side)
22. Locating dowel sleeve (5)
23. Magneto retaining nut M16 x 1.5
24. Cylinder stud M8 x 68 (4)
25. Allen screw M6 x 70 (5)
26. Allen screw M6 x 45 (5)
27. Cylinder base nut M8
28. Spacer
29. Crankcase drain screw M8 x 16
30. Gasket ring
31. Magnetic drain plug
32. Crankcase half (mag side)
33. Crankcase half (clutch side)
34. Oil filler cap M18 x 1.5
35. Polyamid ring clutch side
36. Polyamid ring magneto side
37. O'ring
38. Hose clamp
39. Carburetor adaptor
40. Oil pump pinion gear 9tooth
41. Chain guard
42. Chain guard spacer (3)
43. Screw M6 x 16 (3)
44. Lockwasher 6 mm (10)
45. Hose clamp
46. Locite 242 (blue) medium strength
47. Locite 271 (red) high strength
48. Silicone sealant or Locite 515

SECTION 02 ENGINE

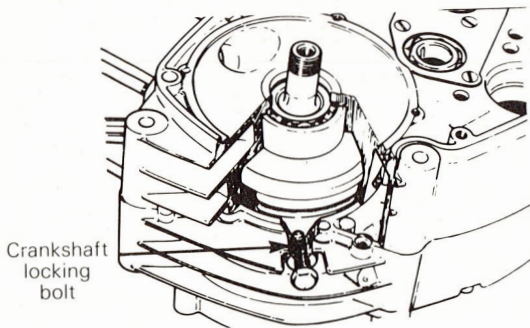
SUB-SECTION 02 (ENGINE/TRANSMISSION)

BOTTOM END

Disassembly & assembly

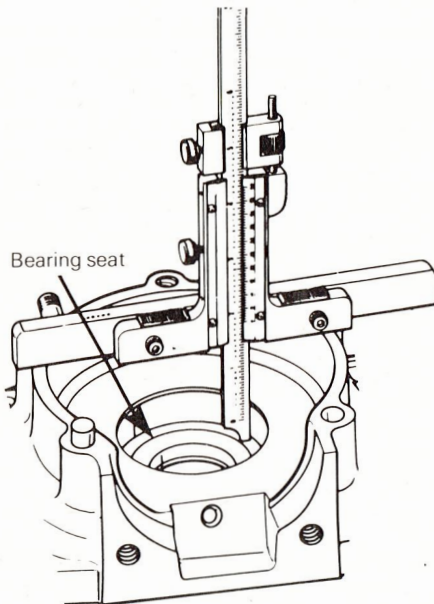
① ④ ③② ③③ At the replacement of the crankshaft, connecting rod and crankcase halves, the squish area should be measured (see Technical Data).

① ③② To facilitate some procedures, the crankshaft can be locked at the top dead center position using a crankshaft locking bolt as illustrated. (See Tools Section)

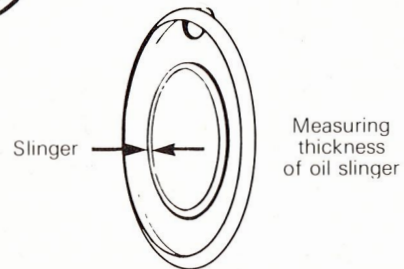
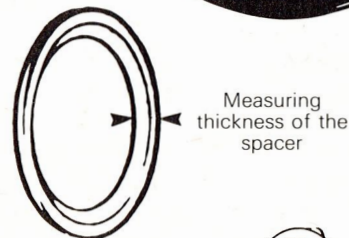
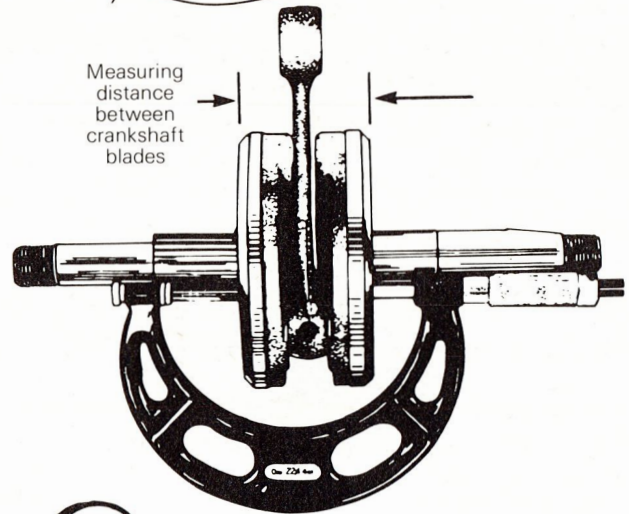
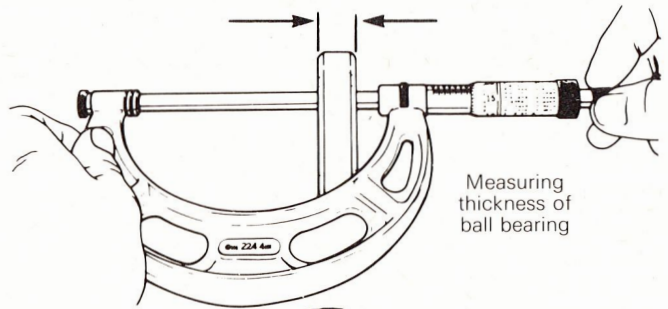


① ⑥ Crankshaft end-play should be between 0.1 mm (0.004") to 0.2 mm (0.008"). To determine necessary shims:

Measure 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 spacer ②⑧, and measure the thickness of the oil slinger. Add the measurements, total equals B.



Subtract measurement B from measurement A, minus tolerance of 0.1 mm (0.004") to 0.2 mm (0.008"). Total balance is distance to be shimmed. Shim(s) must be located between the spacer and the bearing.

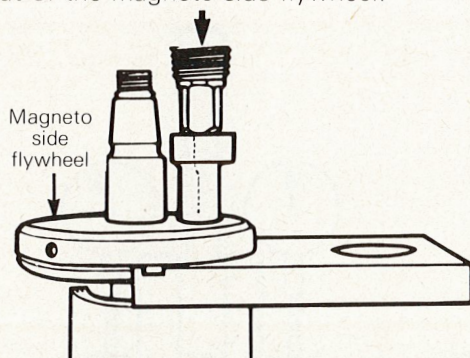
○ **NOTE:** Crankshaft end-play is adjusted only when crankshaft and/or crankcase is replaced.

▼ **CAUTION:** If the crankshaft magneto side bearing is replaced with a plastic caged bearing, refer to Can-Am Service Bulletin no. 79-13.

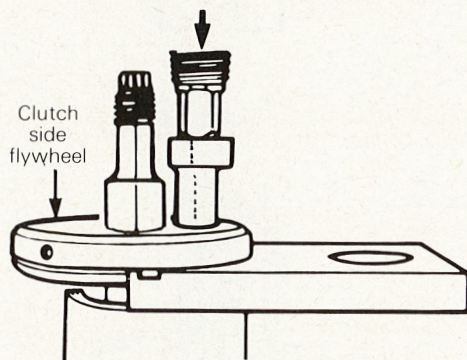
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

- ④ To replace the connecting rod proceed as follows:
Mount the crankshaft assembly in jig and press the crankpin out of the magneto side flywheel.



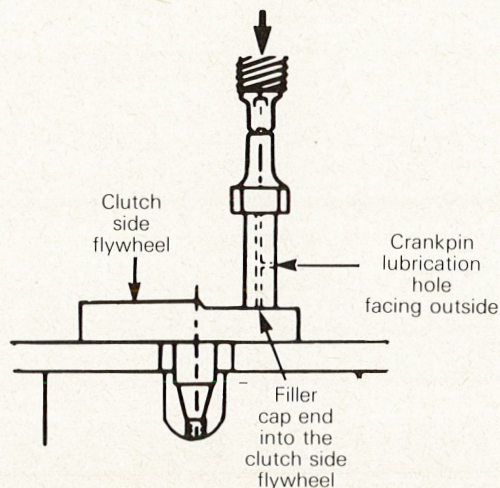
Remove the connecting rod and the bearing.
Press the crankpin out of the clutch side flywheel.



Press the new crankpin into the clutch side flywheel.
Crankpin lubrication hole must point to the outside.

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

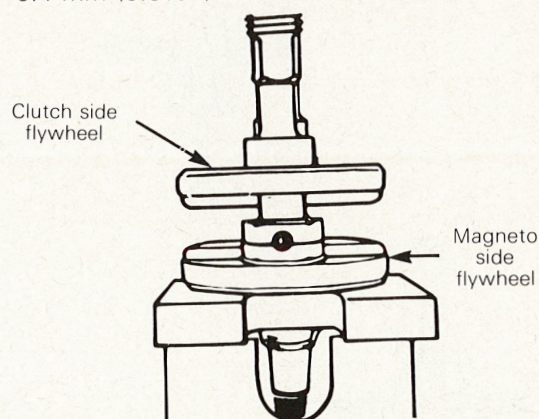
○ **NOTE:** The end of the crankpin with the filler cap must be installed in the clutch side flywheel.



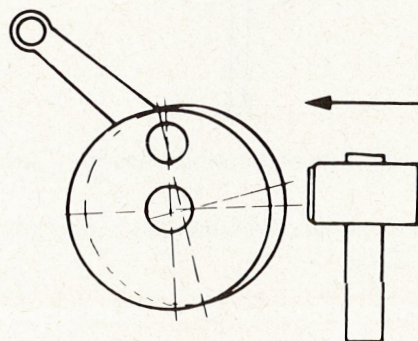
Fit the connecting rod and the bearing into place with light grease.

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.

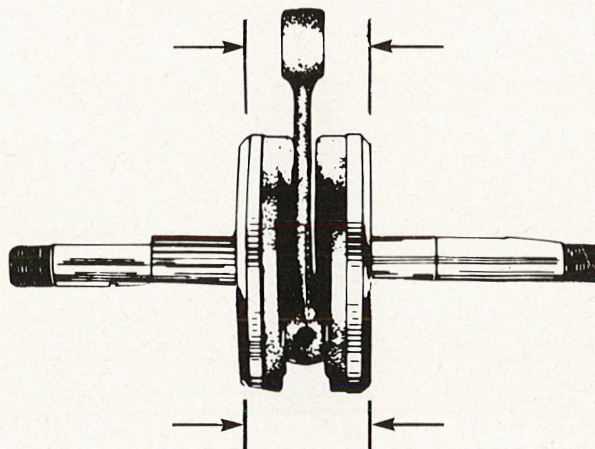
○ **NOTE:** The connecting rod side clearance must be 0.4 mm (0.015") to 0.5 mm (0.020").



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



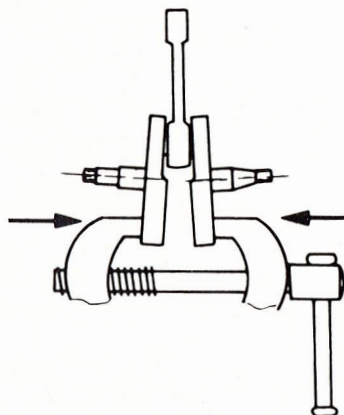
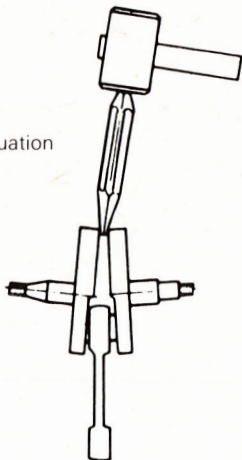
Using a micrometer or vernier caliper, check for flywheel alignment.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

Use a wedge to correct this situation

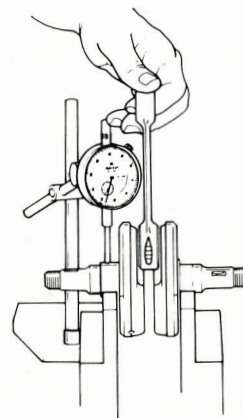
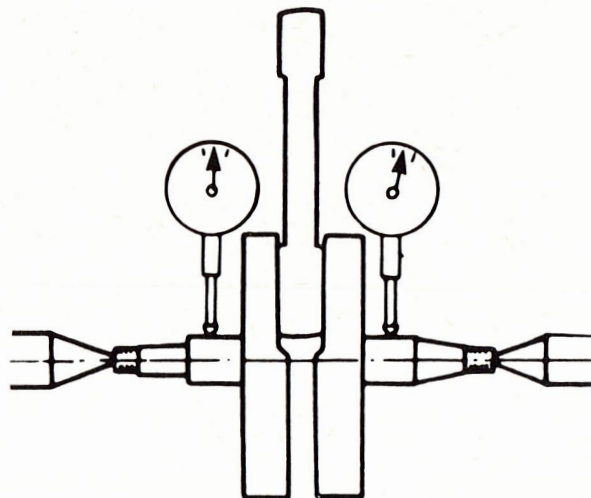


Use a clamp or vise to correct this situation

NOTE: For final alignment measures, see technical data.

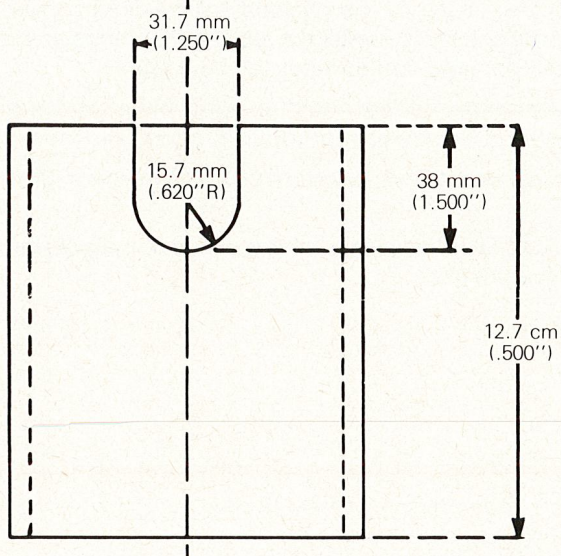
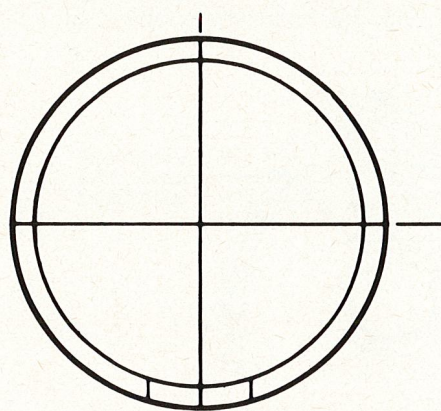
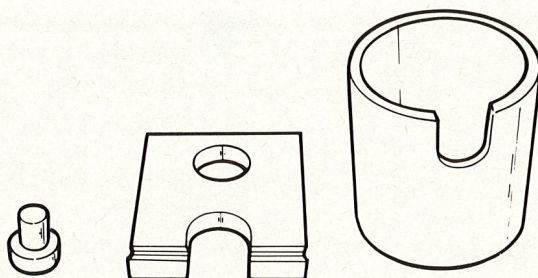
When overall alignment is completed, verify connecting rod side clearance.

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

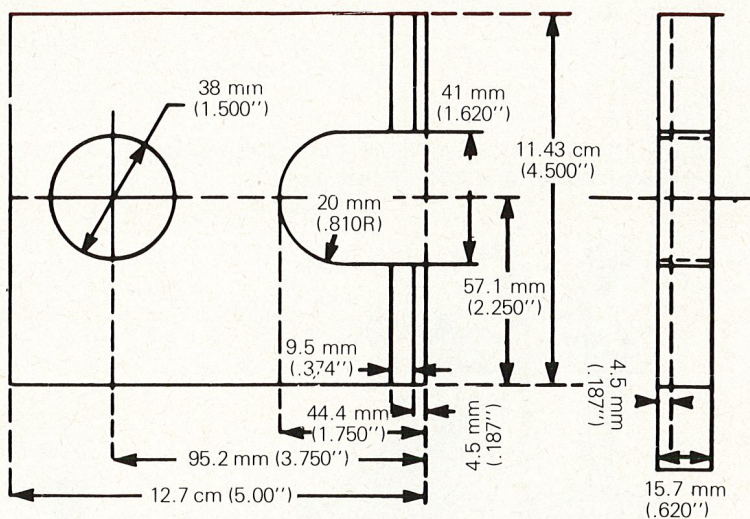


SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

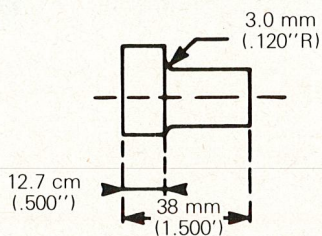
Suggested crankshaft repair tool



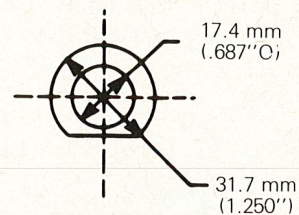
STEEL TUBE 11.43 cm (4.5'') O.D. x 63 mm (.250'') WALL



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



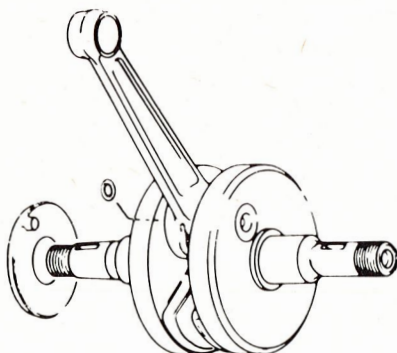
H.R.C.Q. ST'L 31.7 mm (1.250'') DIA.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

- ⑤ At assembly, insert the "O" ring and the oil slinger spout into the crank pin hole as illustrated.



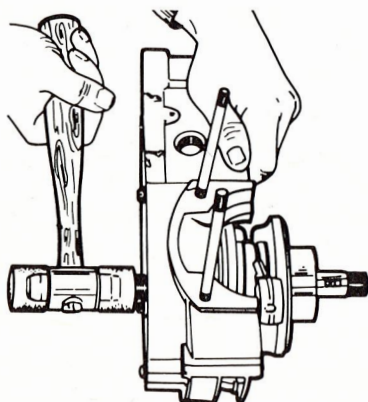
- ⑥ The shims are available in the following thickness:

0.1 mm (0.004")

0.2 mm (0.008")

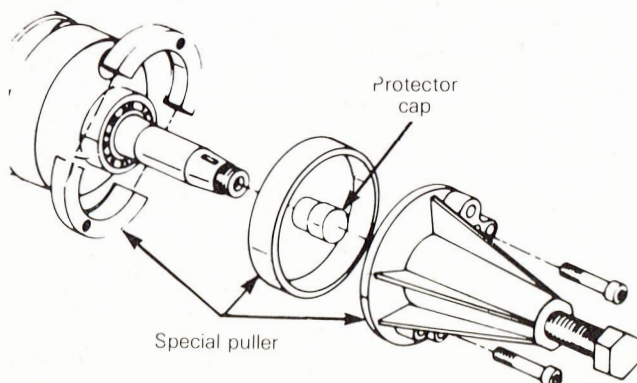
0.3 mm (0.012")

- ⑦ ③② 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.

- ⑦ ⑨ To remove bearing from crankshaft use a bearing puller as illustrated. (See tool section).



- **NOTE:** Prior to magneto side bearing installation, install oil slinger plate, spacer required shim(s) and bearing on crankshaft.

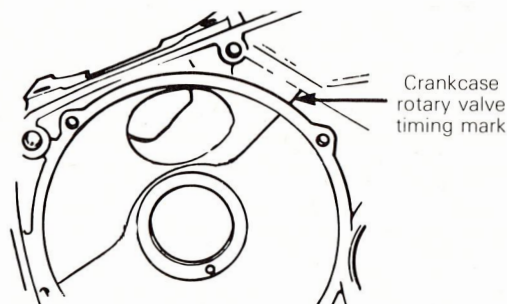
- ⚠ **CAUTION:** If the crankshaft magneto side bearing is replaced with a plastic caged bearing refer to Can-Am Service Bulletin 79-13.

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.

- ⑩ At assembly, the chamfered side of the disc valve spacer must face towards the crankshaft.

- ⑪ On the Qualifier models the disc valve is symmetrical and can be installed either way.

The leading edge must be aligned with the timing mark on the crankcase, with the crankshaft locked at top dead center (T.D.C.).



To check the timing mark refer to sub-section "Engine tolerances measurements".

- ⚠ ⑭ **CAUTION:** At the assembly of the clutch cover, make sure to install the sealing "O" rings as severe damage could occur to the engine.

- ⑯ At assembly, apply Loctite 242 blue (medium strength) on threads and torque to 5.5 N•m (4 ft-lbs).

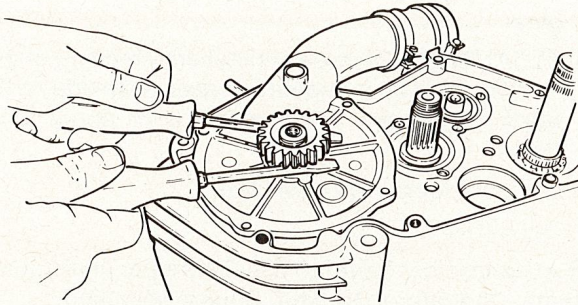
- ⑰ Use 2 screwdrivers to remove the crankshaft drive gear.

- ⚠ **CAUTION:** Excessive leverage may damage rotary valve cover.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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.

⑲ Prior to the installation of the crankshaft drive gear retaining nut, proceed as follows:

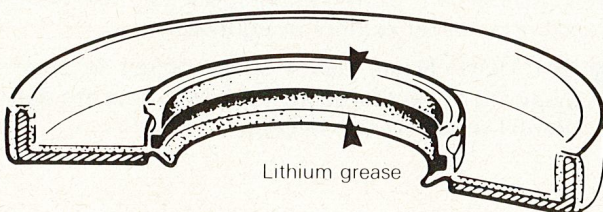
Clean the nut and crankshaft threads with Loctite "Kleen N'Prime" or equivalent. Apply Loctite 271 red (high strength) or equivalent on the inside threads of the drive gear retaining nut only.

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 100 N•m (75 ft-lbs).

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

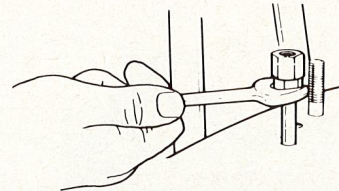
⑳ ㉑ To install new seals, use the appropriate oil seal insertion pusher. (See Tool section). At assembly, apply a light coat of lithium grease on the seal lips.



㉒ At the joining of the crankcase halves, magneto cover or clutch cover make sure the locating dowel sleeves are in place.

㉓ At assembly, apply Loctite 242 blue (medium strength) on the inside threads of the magneto retaining nut and torque to 80 N•m (60 ft-lbs).

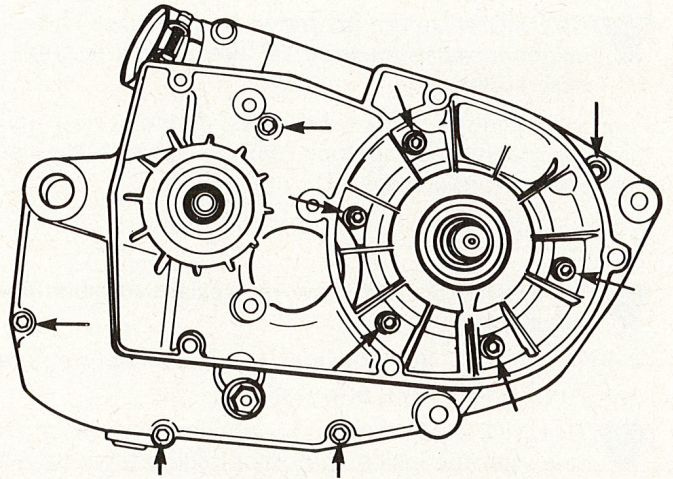
㉔ To unscrew, use 2 cylinder base nuts blocked one against the other.



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

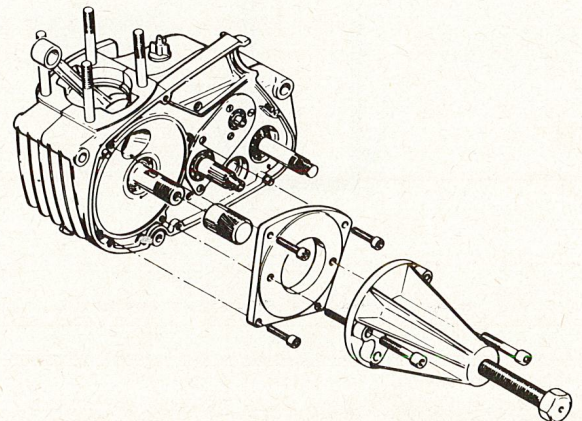
㉕ ㉖ At assembly, torque to 11 N•m (8 ft-lbs) following a criss-cross sequence.

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



㉗ At assembly torque the cylinder base nuts to 30 N•m (22 ft-lbs) following a criss-cross sequence.

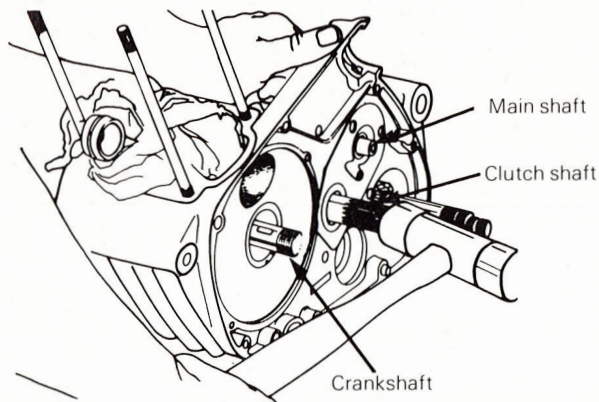
㉘ ㉙ To split the crankcase halves, use a protective cap and puller (See Tools section).



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

○ **NOTE:** The crankcase halves can also be splitted, by tapping equally on the main shaft, clutch shaft and crankshaft. (Prior to tapping on the crankshaft make sure the oil pump pinion gear has been removed).



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

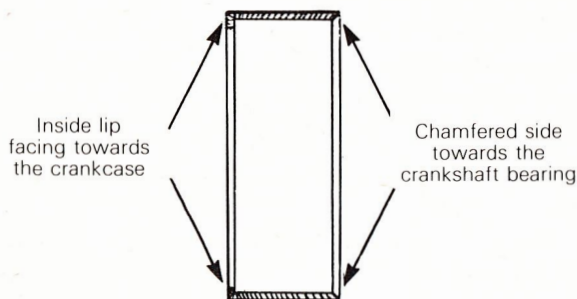
Prior to joining the crankcase halves, carefully clean the mating surfaces with acetone, wood alcohol or equivalent. Ensure to place the "O" ring ③⑦

Apply a light coat of Loctite 515 sealant or silicone sealant.

▼ **CAUTION:** Do not allow the sealant to reach the oil passages.

③⑤ ③⑥ To 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.



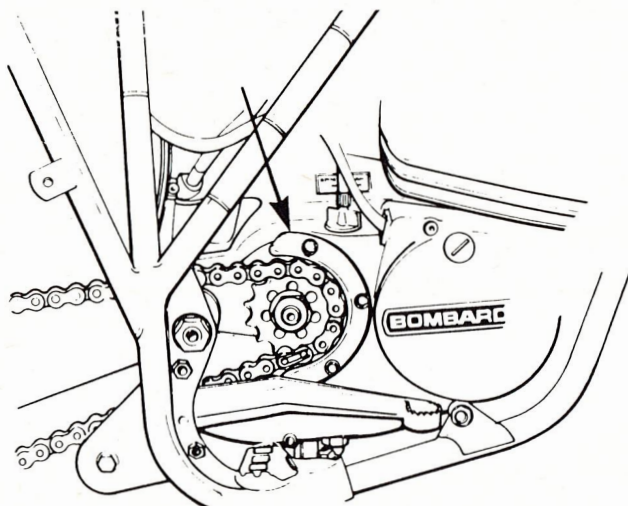
▼ ③⑦ **CAUTION:** Prior to crankcase and/or clutch cover assembly, make sure to install the sealing "O" ring as severe damage could occur to the engine.

▼ ④① **CAUTION:** Exercise care when removing or installing the oil pump pinion gear. Damage to the teeth could occur and impair the oil pump function.

Turn counter-clockwise to remove.

Turn clockwise to install.

④① ④③ 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.

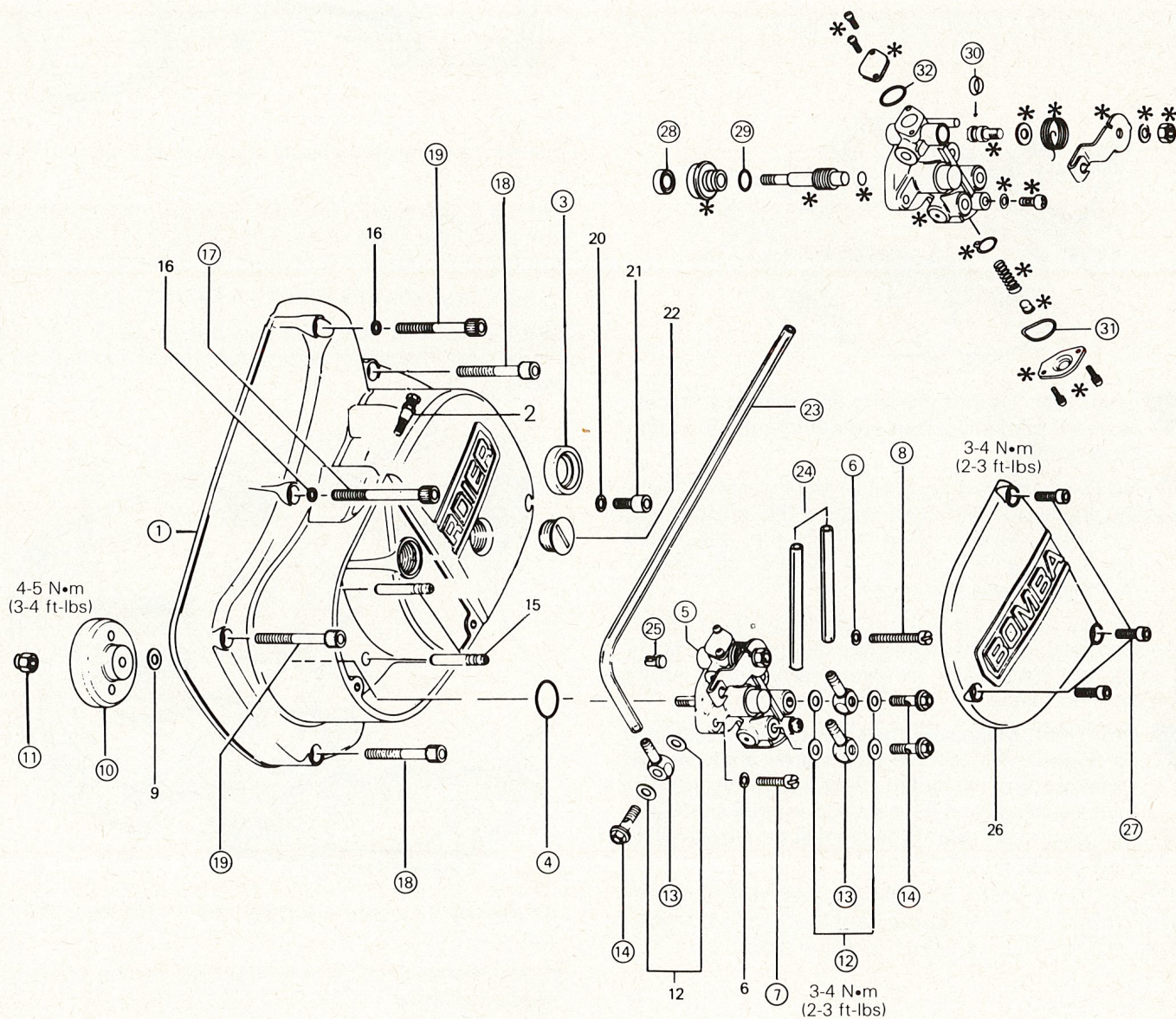
◆ **WARNING:** Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Remove old sealant from mating surfaces of crankcase 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.

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

OIL PUMP/CLUTCH COVER (QUALIFIER 175)



1. Clutch cover
2. Cable adjuster
3. Kick start shaft seal
4. O'ring
5. Oil pump ass'y
6. Lockwasher 5 mm (2)
7. Screw M5 x 16
8. Screw M5 x 28
9. Flat washer 6.2 mm
10. Oil pump gear 34T
11. Hexagonal nut M6

12. Oil banjo gasket
13. Banjo (3)
14. Banjo bolt (3)
15. Check valve (2)
16. Gasket (2)
17. Allen screw M6 x 50 (1)
18. Allen screw M6 x 35 (4)
19. Allen screw M6 x 40 (3)
20. Fiber gasket
21. Oil level plug
22. Adjustment plug (2)

23. Oil line 560 mm (22")
24. Oil line 90 mm (3.5")
25. Nipple
26. Oil pump cover
27. Allen screw M5 x 12 (3)
28. Oil seal
29. O'ring
30. Ring
31. O'ring
32. O'ring

*Not available as spare parts

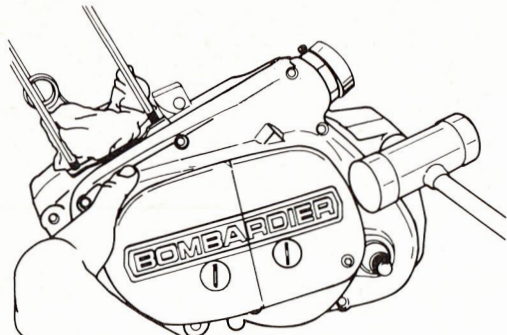
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

OIL PUMP/CLUTCH COVER

Disassembly & assembly

① To remove the clutch cover, tap **lightly** using a soft faced hammer to break the seal (as illustrated).



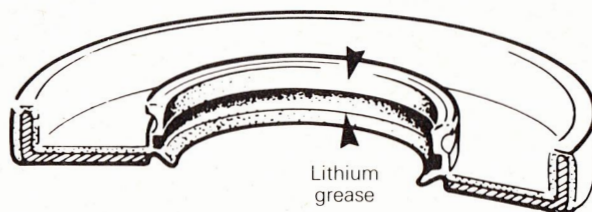
▼ **CAUTION:** Do not pry between sealing surfaces, as score marks incurred are detrimental to clutch cover sealing.

○ **NOTE:** If the clutch cover is to be removed with the engine in the frame, remove the left foot peg and both levers. With the clutch cable still connected, pull clutch in. It will pre-load against the cover to ease removal.

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

▼ **CAUTION:** Make sure the kick starter oil seal lip is not flipped over by the kick starter shaft splines when pushing the clutch cover into place and that the oil pump gear meshes with the crankshaft gear (to insure this, rotate the crankshaft slowly while pushing clutch cover on).

③ To install a new seal into clutch cover, use an appropriate oil seal insertion pusher (see tool section). Apply a light coat of lithium grease on the seal lip.

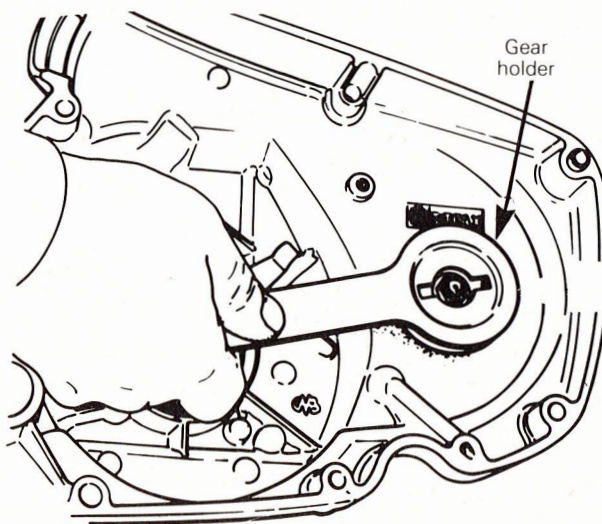


④ Prior to installation, apply lithium grease around "O" ring.

⑤ Prior to assembly, clean the mating surfaces of the oil pump and the clutch cover with acetone or equivalent. Apply a light coat of "Loctite 515" or silicone sealant.

⑦ ⑧ At assembly, torque to 3-4 N•m (2-3 ft-lbs).

⑩ ⑪ To remove the oil pump driven gear, lock the driven gear in position with special holder tool (see tool section).



At assembly, torque retaining nut to 4-5 N•m (3-4 ft-lbs).

⑬ At assembly, install the large I.D. of the banjo towards the pump.

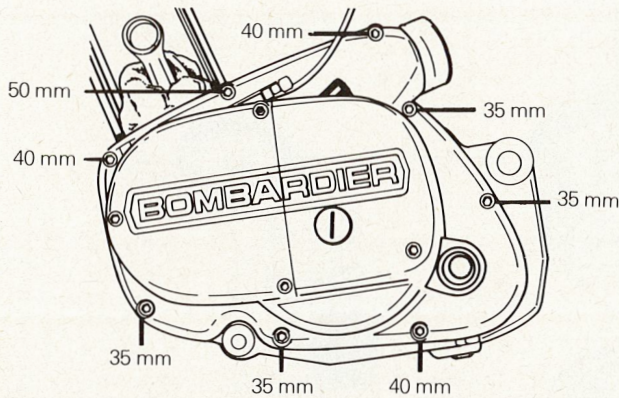
⑭ At assembly, torque to 4-5 N•m (3-4 ft-lbs).

⑰ ⑱ ⑲ 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.

SECTION 02 ENGINE

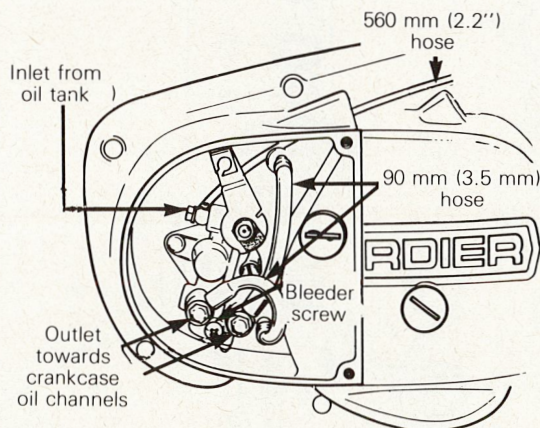
SUB-SECTION 02 (ENGINE/TRANSMISSION)

○ **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.

②③ ②④ At assembly, position oil line as illustrated and make sure to bleed the air out of the oil pump. Proceed as follows: At the installation, bleed the air out of the inlet oil line by unscrewing the lower screw (Phillips head type) until all the air bubbles are out. Then, to bleed the air out the oil pump, start the engine and let it idle at 1100-1300 R.P.M. Push control lever to maximum opening and hold in this position for 3-5 minutes.

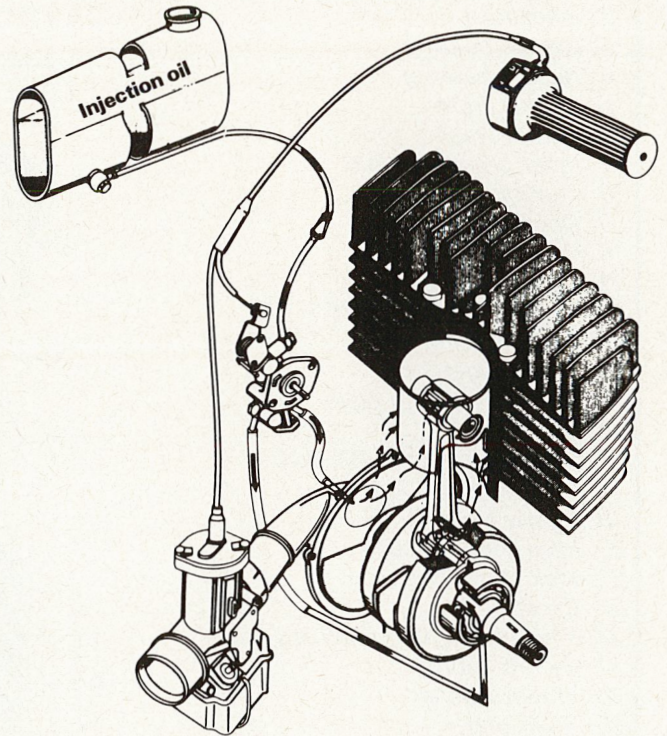


②⑦ At assembly, torque to 5.5 N•m (4 ft-lbs).

②⑧ ②⑨ ③① ③② Prior to installation, apply a light coat of lithium grease around the O'rings and on the oil seal lip.

○ **NOTE:** If the oil pump is defective, replace with a complete unit.

Oil injection diagram



Lubrication oil is supplied under pressure by a Mikuni twin outlet pump to (1) the intake manifold and to (2) the crankshaft bearing.

Engine speed controls the pressure while throttle action determines the flow.

○ **NOTE:** On the Qualifier 175-250 models, the oil pump delivery at full throttle are:

175 cm ³	80 mL/hr
250 cm ³	175 mL/hr

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.

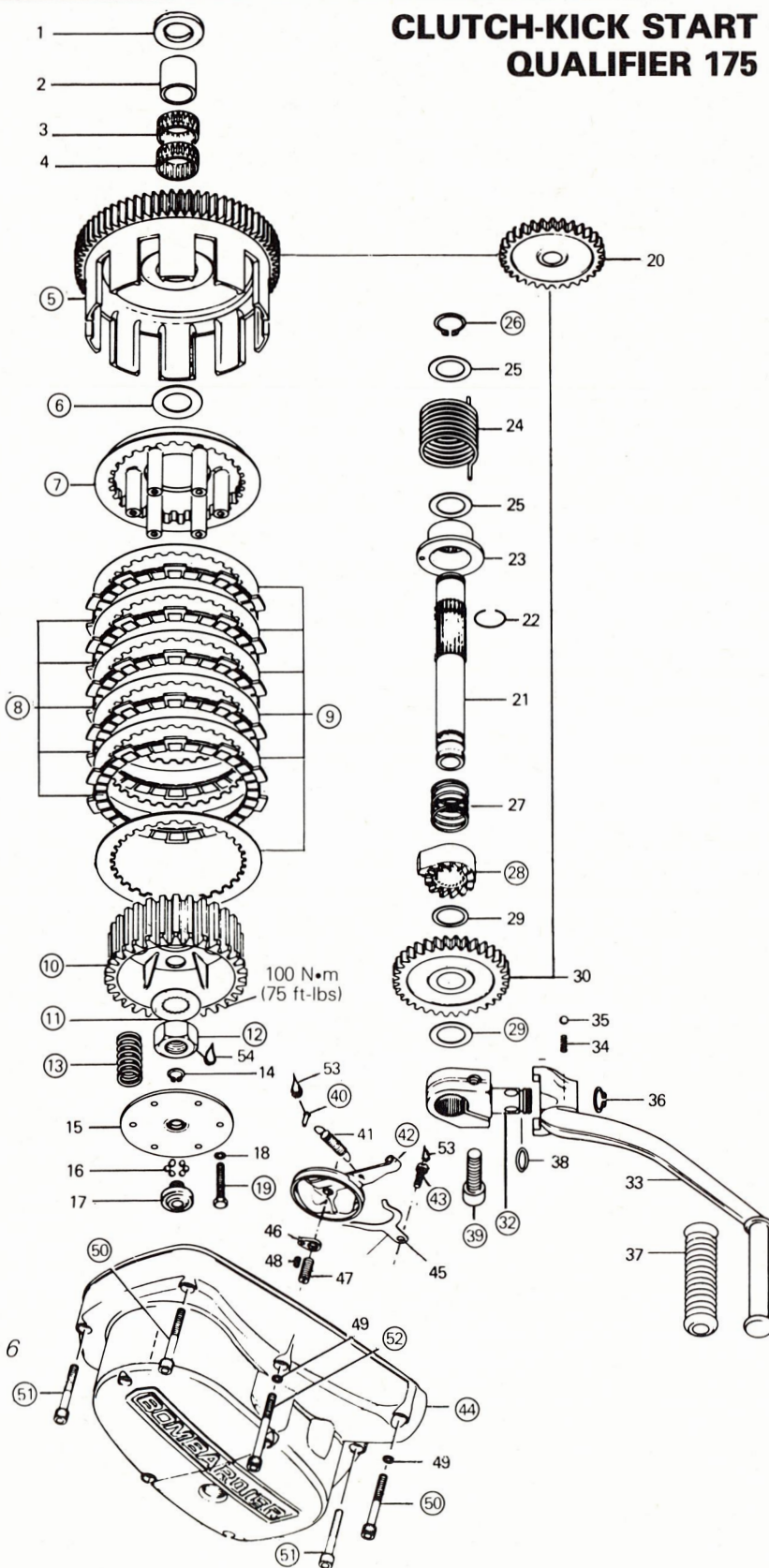
▼ **CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

CLUTCH-KICK START QUALIFIER 175

1. Thrust washer (inner)
2. Inner race
3. Needle bearing
4. Needle bearing
5. Clutch drum
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 M16 x 1.5
13. Clutch spring (6)
14. Snap ring 10 x 1
15. Spring retaining plate
16. Ball 5/32"
17. Spring retaining plate hub
18. Lockwasher 5 mm (5)
19. Screw M5 x 25 (5)
20. Idler gear 31 tooth
21. Kick start shaft
22. Circlip
23. Kick start spring retaining hub
24. Return spring
25. Thrust washer
26. Snap ring
27. Ratchet engagement spring
28. Ratchet gear
29. Thrust washer
30. Drive gear 34 tooth
31. Thrust washer
32. Kick start hub
33. Kick start lever
34. Spring
35. Ball 7/32"
36. Snap ring
37. Rubber sleeve
38. O'ring
39. Screw M8 x 30
40. Drive pin 3 x 8
41. Clutch cam return spring
42. Clutch release cam
43. Screw M5 x 12
44. Clutch cover
45. Clutch cam retaining spring
46. Clutch adjustment locking plate
47. Clutch adjustment screw M8 x 15
48. Clutch adjustment locking screw M4 x 6
49. Gasket (2)
50. Allen screw M6 x 40 (3)
51. Allen screw M6 x 35 (4)
52. Allen screw M6 x 50 (1)
53. Loctite 242 blue (medium strength)
54. Loctite 271 red (high strength)



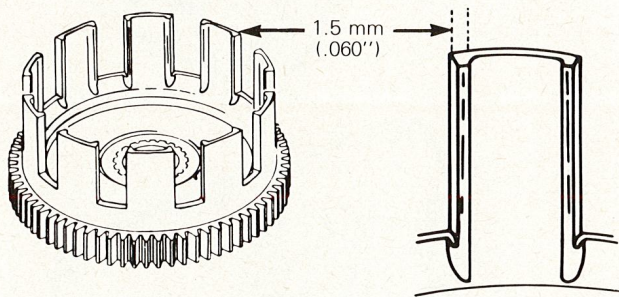
SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

CLUTCH AND KICK START

Disassembly & assembly

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

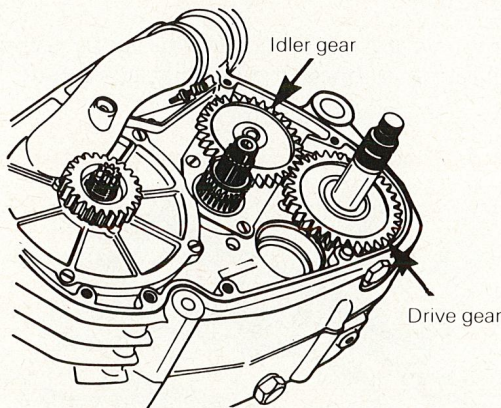
▼ **CAUTION:** The shouldered wall should not be filled thinner than 1.5 mm (.060").



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

⑤ ⑥ ⑦ ⑧ ⑨ ⑩ Prior to assembling the clutch hub, make sure to position the idler and drive gear as illustrated.

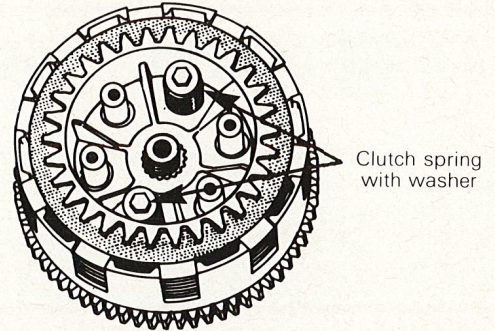
○ **NOTE:** The flanged side of the idler gear must face toward the crankcase.



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

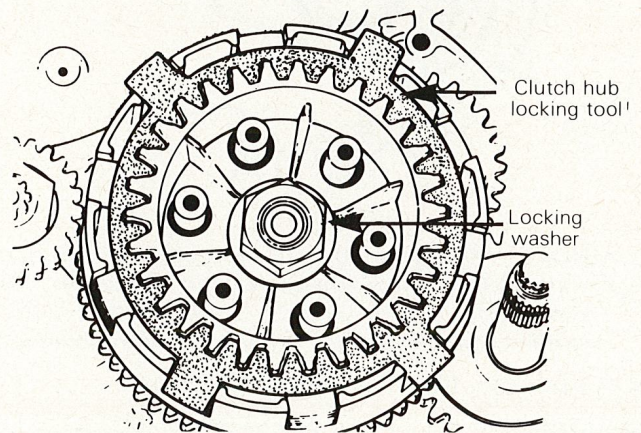
With the clutch plates mounted on the clutch hub, fit clutch inner pressure plate in alignment with hub splines. Carefully insert clutch hub/plate assembly into clutch drum onto clutch shaft.

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



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

⑫ To 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 100 N•m (75 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.

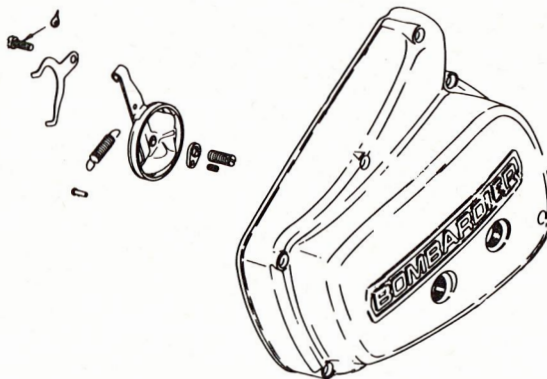
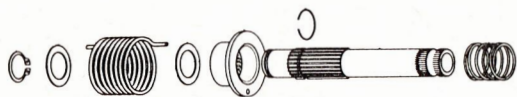
⑬ If spring(s) replacement is needed ensure to change the springs in sets only.

⑭ At assembly, tighten in a criss-cross sequence and torque to 5.5 N•m (4 ft-lbs).

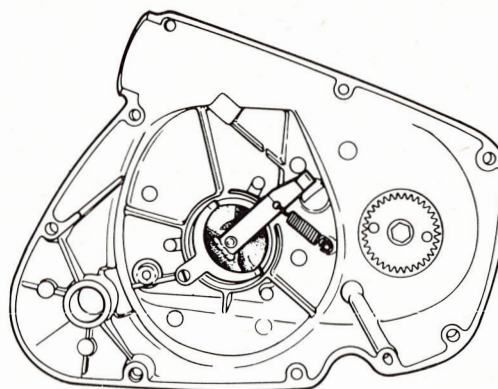
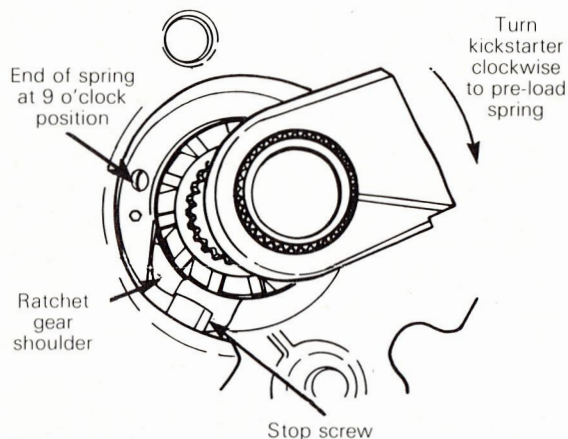
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

②⑥ To remove the kick start assembly from the crankcase remove the snap ring located in the inside portion of the crankcase.



②⑧ To position ratchet gear, install the kick starter lever and preload the kick starter spring approximately 3/4 turn clockwise. Slide ratchet gear onto spline. The end of the spring protruding through the retaining hub should be at the 9 o'clock position when the ratchet gear shoulder is leaning against the stop screw.



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.

③⑨ At assembly, torque to 20 N•m (15 ft-lbs).

④⑩ Apply Loctite no. 271 red (high strength) and press fit into place.

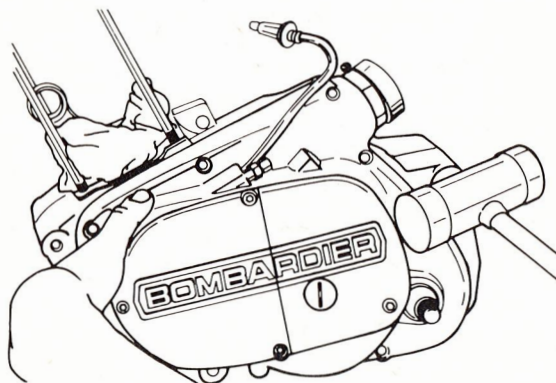
NOTE: Replace only if damaged or when replacing clutch cover.

④② ④③ At assembly, position as illustrated.

④③ At assembly, apply Loctite no. 242 blue (medium strength) on screw threads and torque the screw to 5.5 N•m (4 ft-lbs).

④④ To remove the clutch cover, tap lightly using a soft faced hammer to break the seal (as illustrated).

Refer to "Oil pump/clutch cover".



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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

○ **NOTE:** If the clutch cover is to be removed with the engine in the frame, remove the left foot peg and both levers. With clutch cable still connected, pull clutch lever in. It will then pre-load against the cover to ease removal.

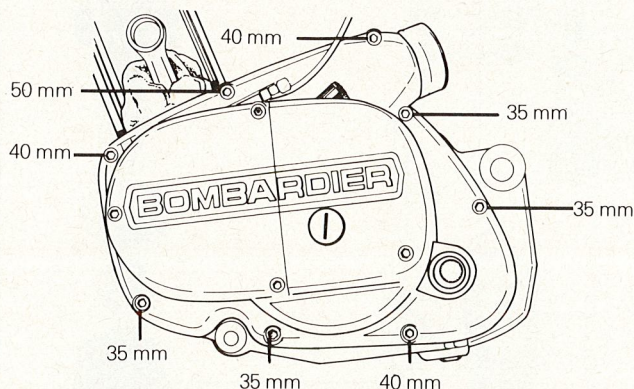
At assembly, clean the mating surfaces of the crankcase and clutch cover with acetone, wood alcohol or equivalent. Apply a light coat of Loctite 515 sealant or silicone sealant to the mating surfaces and lightly tap cover into place.

▼ **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 and that the oil pump gear meshes with the crankshaft gear. (To insure this, rotate the crankshaft slowly while pushing clutch cover on).

At assembly, apply lithium grease on the seal lips.

⑤① ⑤② 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.

Cleaning

Clean all the metal components in a metal cleaner.

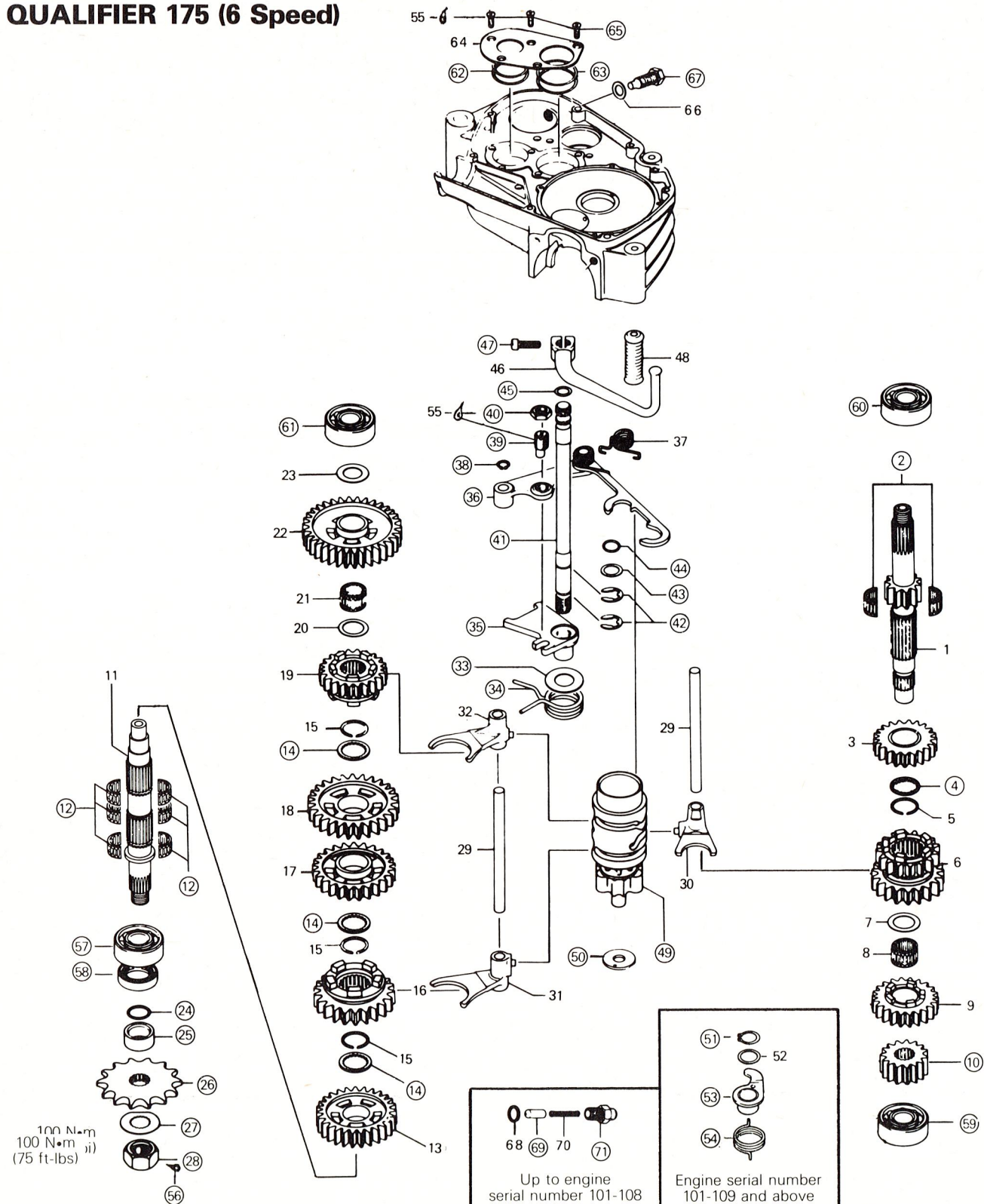
◆ **WARNING:** Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

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.

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

**TRANSMISSION (GEAR BOX)
QUALIFIER 175 (6 Speed)**



SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

1. Clutch shaft 10T
2. Needle bearing ass'y, clutch shaft, width 9.73 mm (.383")
3. 6th gear, clutch shaft 22T
4. Thrust washer, clutch shaft
5. Snap ring, clutch shaft
6. 3rd/4th gear, clutch shaft 16/19T
7. Thrust washer, clutch shaft
8. Needle bearing, clutch shaft
9. 5th gear, clutch shaft, 21T
10. 2nd gear, clutch shaft, 13T
11. Main shaft
12. Needle bearing ass'y main shaft, width 9.65 mm (.380") (3)
13. 2nd gear, main shaft, 30T
14. Thrust washer, main shaft (3)
15. Snap ring, main shaft (3)
16. 5th gear, main shaft, 23T
17. 4th gear, main shaft, 25T
18. 3rd gear, main shaft, 27T
19. 6th gear, main shaft, 21T
20. Thrust washer, main shaft
21. Needle bearing, main shaft
22. 1st gear, main shaft, 34T
23. Thrust washer, main shaft
24. "O" ring, main shaft
25. Sprocket spacer
26. Sprocket 15T
27. Locking washer, main shaft
28. Main shaft nut M16 x 1.5
29. Guide pin, shift fork (2)
30. Shifting fork, 5th-6th
31. Shifting fork, 2nd-4th
32. Shifting fork, 1st-3rd
33. Thrust washer, actuating lever
34. Spring, actuating lever
35. Actuating lever
36. Pawl ass'y
37. Pawl spring
38. Snap ring 10 x 1
39. Pawl positioning screw
40. Locking nut M12 x 1, pawl positioning screw
41. Shift shaft
42. Retaining ring (2)
43. Thrust washer, shift shaft
44. "O" ring, shift shaft
45. "O" ring, shift shaft
46. Shift lever
47. Allen screw M6 x 20
48. Shift lever rubber
49. Shift drum ass'y (C)
50. Washer, shift drum
51. Index snap ring (A)
52. Index washer (A)
53. Index lever (A)
54. Index spring (A)
55. Loctite 242 blue (medium strength)
56. Loctite 271 red (high strength)
57. Ball bearing 6204, main shaft, sprocket side
58. Seal main shaft
59. Ball bearing 6203, clutch shaft, sprocket side
60. Ball bearing 6204, clutch shaft, clutch side
61. Ball bearing 6203, main shaft, clutch side
62. Shim 0.5 mm (0.019"), 0.3 mm (0.011"), 0.1 mm (0.004") main shaft bearing (A.R.) *
63. Shim 0.5 mm (0.019"), 0.3 mm (0.011"), 0.1 mm (0.004") main shaft bearing (A.R.) *
64. Retaining plate (transmission bearings)
65. Countersunk screw M5 x 12 (5)
66. Gasket ring
67. Stop screw, kick starter
68. Gasket ring, index plug (B)
69. Index plunger (B)
70. Spring, index plunger (B)
71. Index plug (B)

*A.R.: As required

(A) Engine serial number 101-109 and above only.

(B) Up to engine serial number 101-108 only.

(C) As the shifting mechanisms, there is two type of shift drum: index plunger type or index lever type.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TRANSMISSION (GEAR BOX)

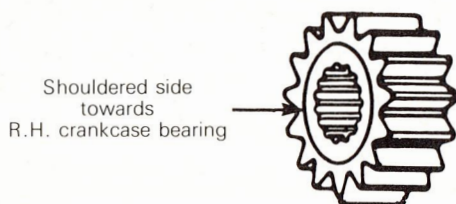
Disassembly & assembly

② ⑫ The needle bearing halves must be replaced in pairs only.

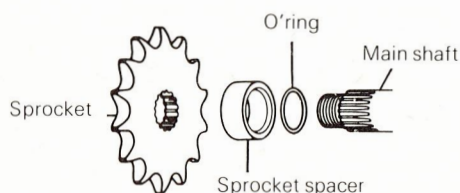
▼ **CAUTION:** Do not intermix the needle bearing halves, damage could occur. If bearing halves have been intermix, refer to the description to find the proper width of the bearing halves.

④ ⑭ The sharp edge of the splined thrust washer must face the retaining snap ring.

⑩ At assembly, the shouldered side of the 2nd gear clutch shaft must face towards the R.H. crankcase bearing.



②④ ②⑤ ②⑥ At assembly, ensure that the chamfered portion of the sprocket spacer is installed towards the main shaft.



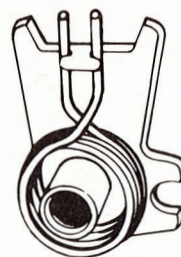
▼ ②⑦ **CAUTION:** Locking washer should be replaced if bent more than twice. If in doubt, replace.

②⑧ 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.

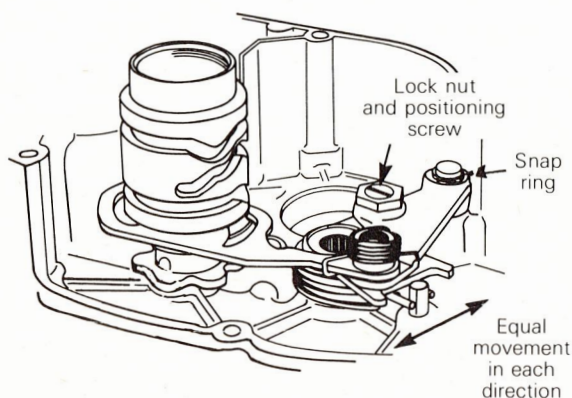
③③ ③④ ③⑤ Assemble the spring, thrust washer and actuating lever as illustrated.



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

③⑧ ③⑨ ④⑩ 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.



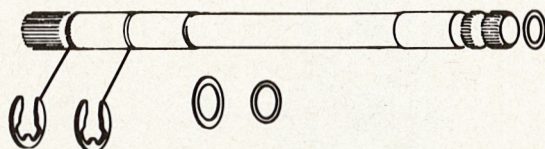
Movement in both direction must be equal. If not, the pawl ass'y can be repositioned by unlocking the lock nut and adjusting the pawl positioning screw. Lock the nut and verify. Repeat until the travel is equal on both sides.

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).

SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

▼ ③⑧ 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.

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

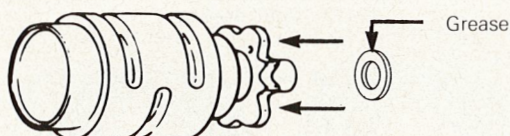


④⑦ At assembly, torque to 11 N•m (8 ft-lbs).

④⑨ There is two types of shift drum/shifting mechanism.
– Index **lever** type (engine serial number 101-109 and above).
– Index **plunger** type (up to engine serial number 101-108).

The two types of shift drum are not interchangeable and they must be matched with the right shifting mechanism:

⑤⑩ 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.



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

⑤① ⑤③ ⑤④ 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.



⑤⑦ 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

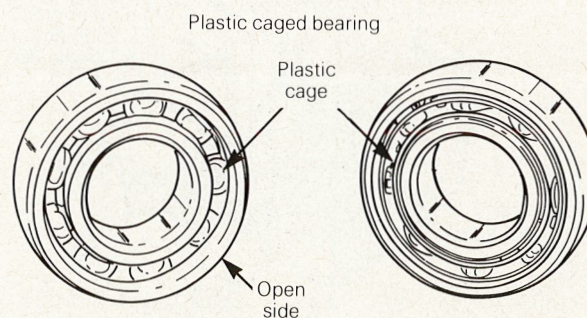
Grease the sprocket side main shaft oil seal with lithium grease.

Cut a 50 mm (2") diameter disc out of asbestos material. Place the disc over the oil 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.



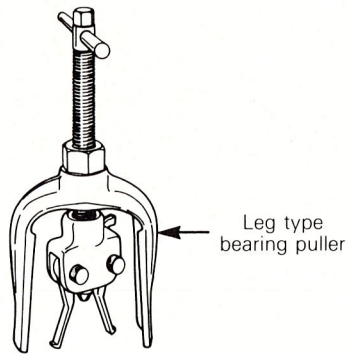
⑤⑧ To install the new seal, use the appropriate oil seal insertion pusher. (See tool section). Apply a light coat of lithium grease on the seal lip.

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

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

⑤⑨ 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.

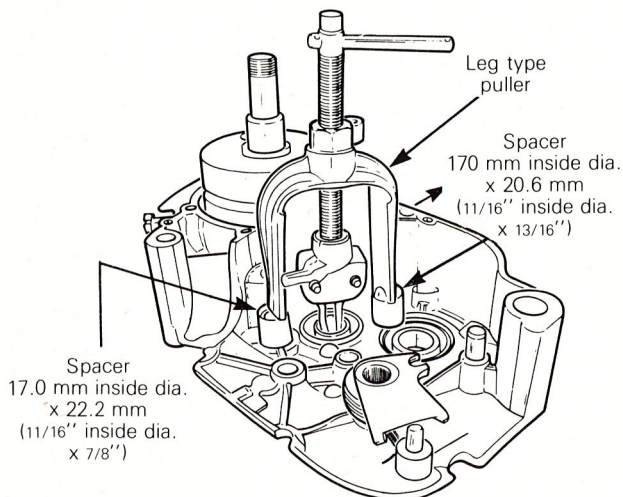
Proceed as follows:

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

Disassembly

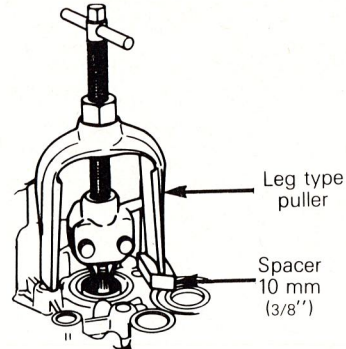
Install the puller as illustrated.

Engine serial number 101-109 and above.



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

Up to engine serial number 101-108.



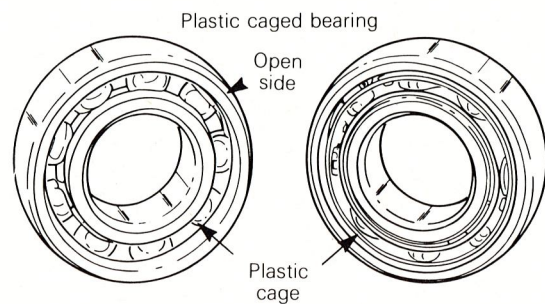
NOTE: A spacer of 10 mm (3/8") is needed to properly position the puller in the crankcase.

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.



⑥⑩ ⑥① 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 in the crankcase.

Proceed as follows:

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

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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 end-play.

⑥② ⑥③ The transmission shaft end-play must be 0.1 mm (.004") maximum.

Proceed as follows to verify the end-play.

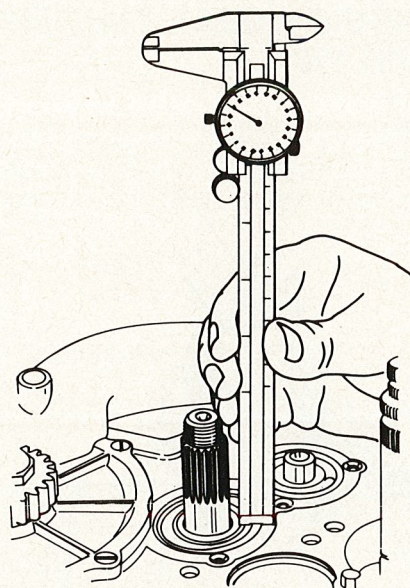
Remove the bearing(s) retaining plate and shims.

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.

⑥⑤ 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).

⑥⑦ 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.

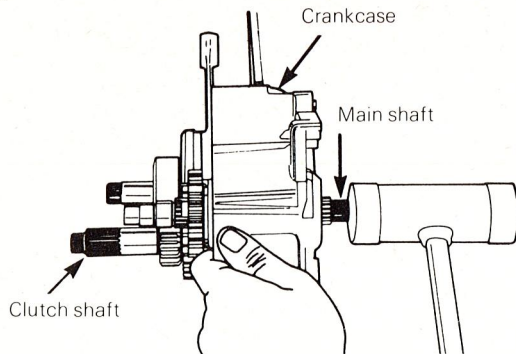
⑥⑨ ⑦① At assembly, ensure that the index plunger does not stick into the index plug and torque to 34-40 N•m (25-29 ft-lbs).

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

TRANSMISSION GEAR CLUSTER
(QUALIFIER 175)

Disassembly

To remove the clutch and main shaft gear cluster from the crankcase, tap on the sprocket side end of the main shaft.



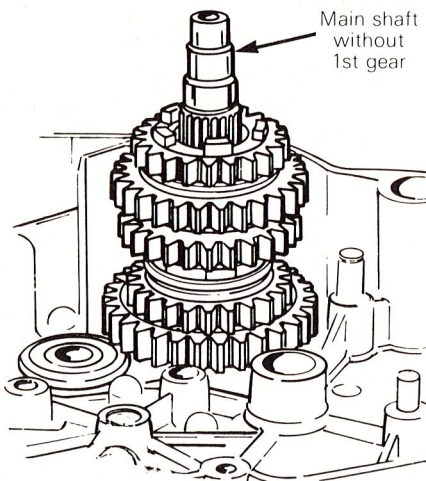
NOTE: To ease the clutch shaft removal, turn the clutch shaft manually while at the same time hitting the main shaft.

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).

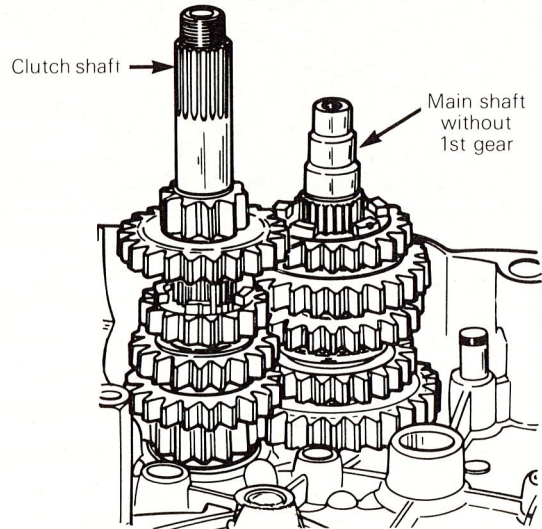
STEP 1



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.

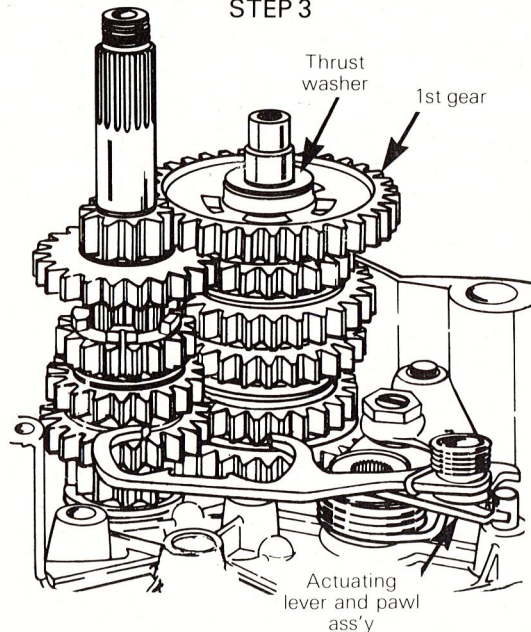
CAUTION: Prior to pushing the clutch shaft into the bearing, make sure the gears match.

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

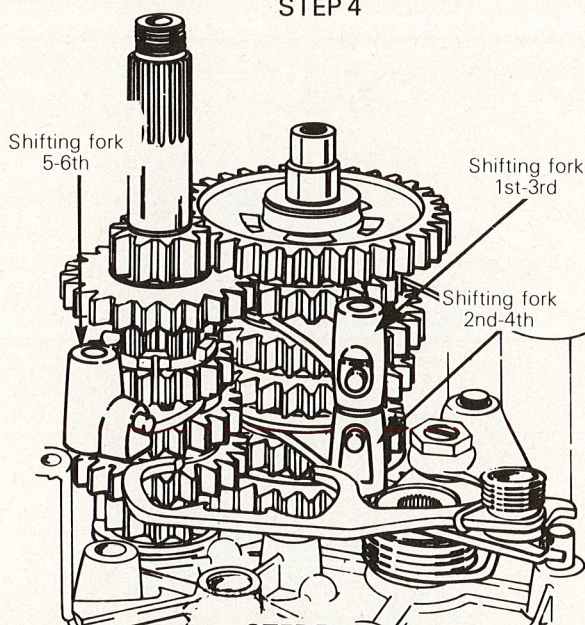


SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

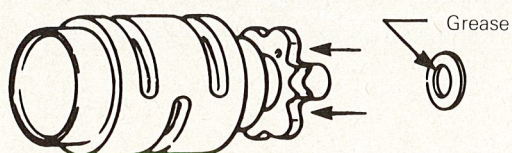
Position the shifting forks as illustrated.

STEP 4

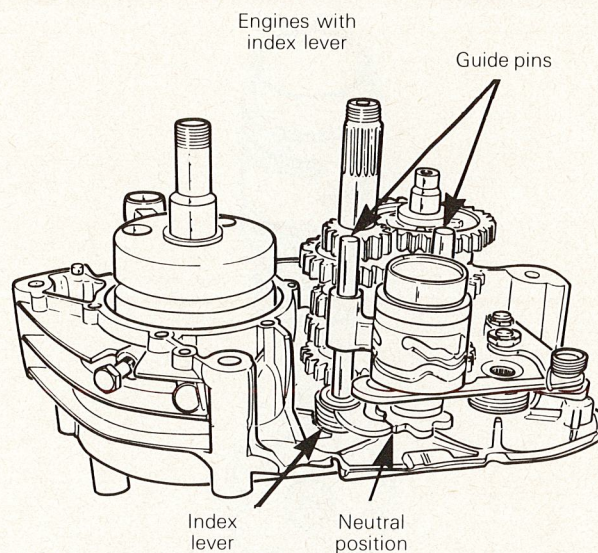


STEP 5

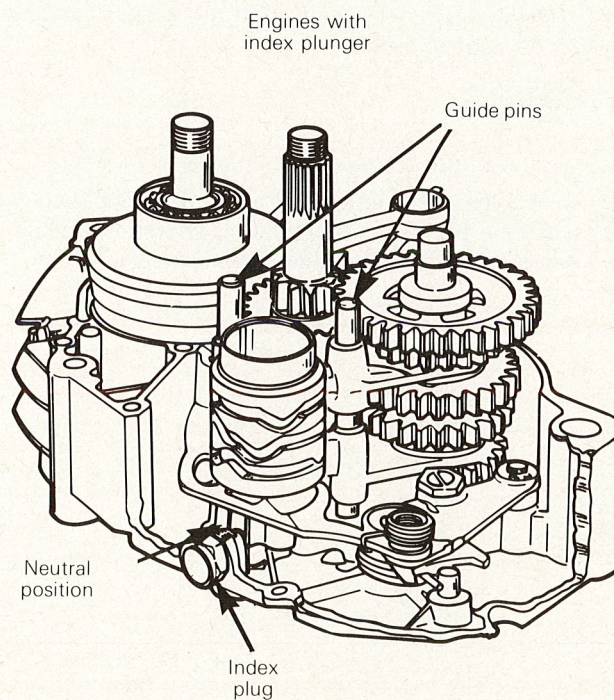
Coat the shift drum washer with grease, this will allow the washer to stick on the shift drum for ease of installation.



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.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

- **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 is leaning against the neutral notch.

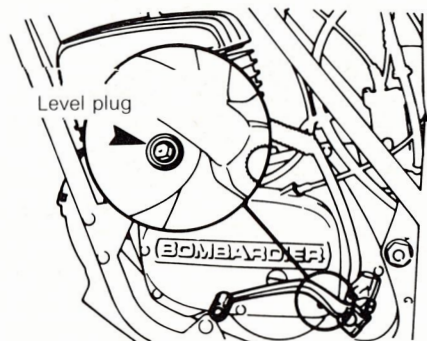
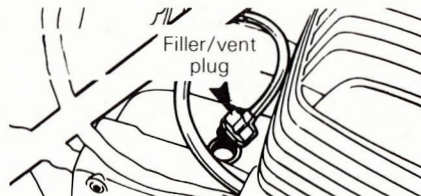
CLEANING

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.



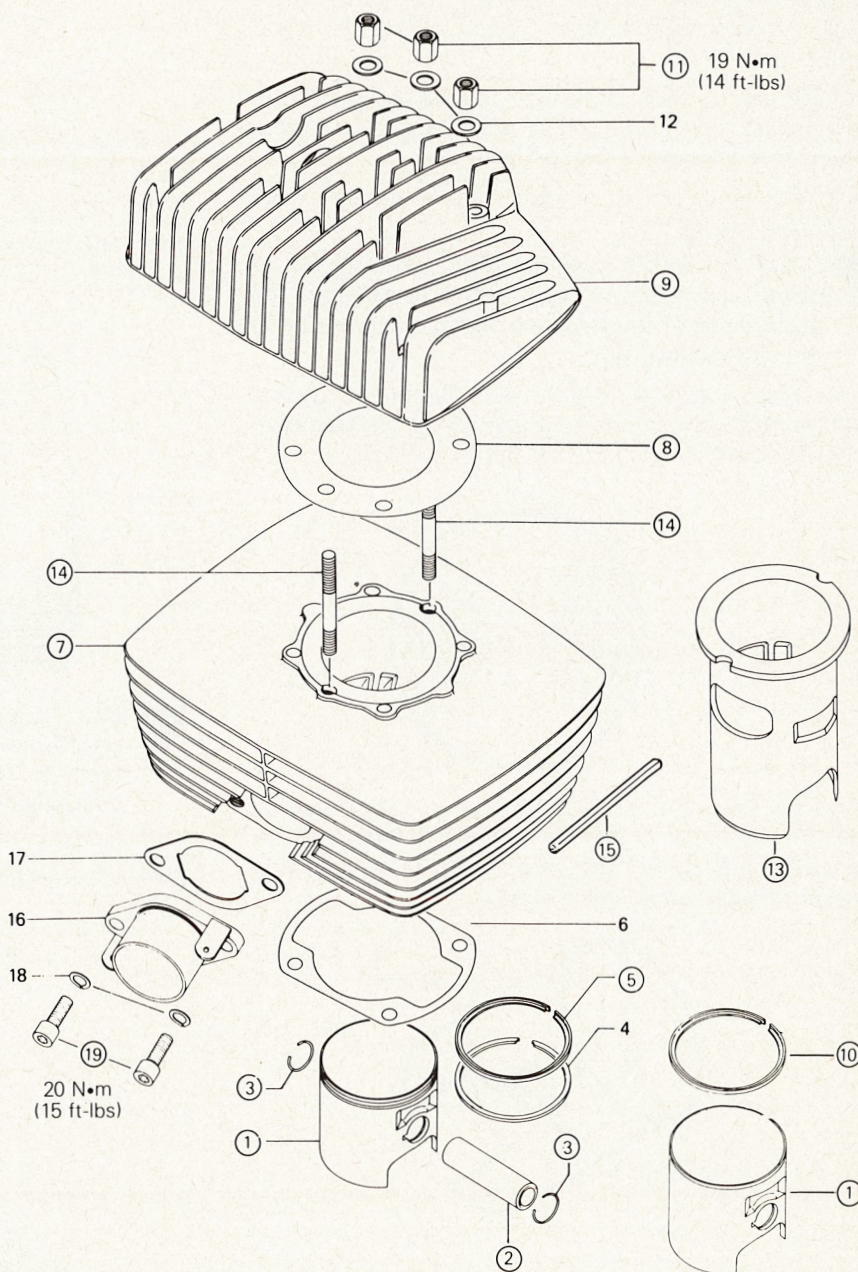
- **NOTE:** Hold motorcycle upright to check oil level. Replace the level plug, the filler/vent plug and the vent tube.

244 ENGINE TYPE

TOP END

Qualifier 250 - MX-5 250

1. Piston (MX or Qualifier type)
2. Piston pin
3. Circlip
4. Rectangular ring (Qualifier)
5. L-trapez ring or
L-semi-trapez ring (Qualifier)
6. Cylinder base gasket
7. Cylinder
8. Cylinder head shim
9. Cylinder head
10. L-semi-trapez ring (MX-5)
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
17. Exhaust socket
18. Lockwasher 8 mm
19. Allen screw M8 x 25



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TOP END

Disassembly & assembly

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

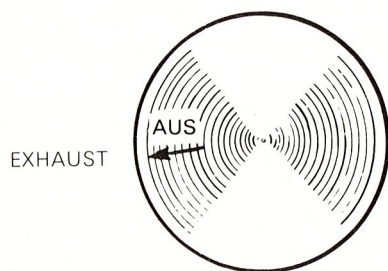
① ⑦ ⑨ ⑬ At the replacement of the piston, cylinder, cylinder head and cylinder sleeve, the squish area should be remeasured (See "Engine tolerances measurements").

① ② ③ Place a clean cloth over the crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

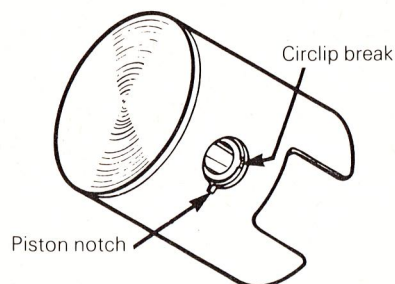
Drive the piston pin in or out using a suitable drive punch and hammer.

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

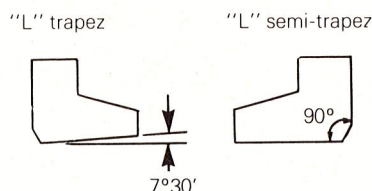
At assembly, place the piston over the connecting rod with the letters AUS, over an arrow on the piston dome, facing direction of the exhaust port.



Once the circlips are installed, turn each circlip 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.



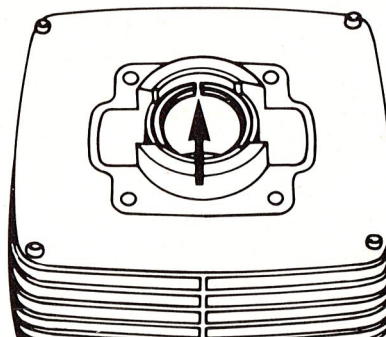
⑤ ⑩ There is two different types of "L" ring.



Qualifier 250 uses 1 "L" trapez or 1 "L" semi-trapez ring, matched with one rectangular ring.

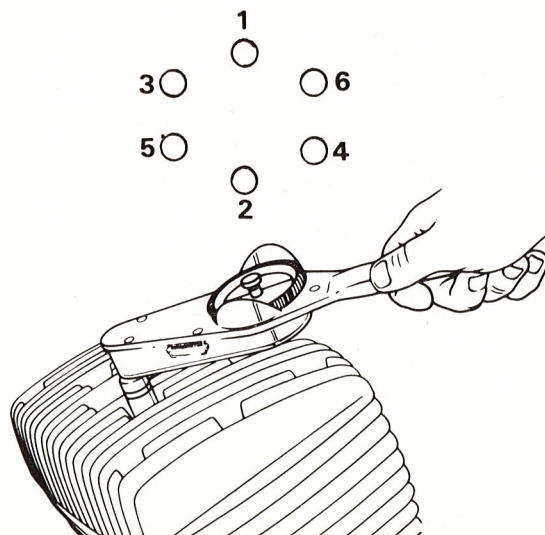
MX-5 250 uses 1 "L" semi-trapez ring only.

Ring end gap: 0.20 - 0.40 mm (.008" - .016")
(Qualifier & MX-5)



▼ **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.

⑨ ⑪ At assembly, torque to 19 N•m (14 ft-lbs) in a criss-cross sequence.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

⑬ Cylinder sleeve should be replaced whenever its inside diameter becomes 0.135 mm (0.005") or more larger than a new 3rd oversize piston.

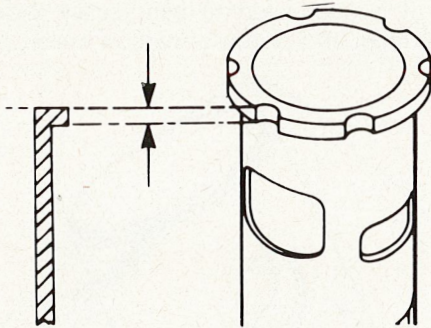
Proceed as follows:

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 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 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.

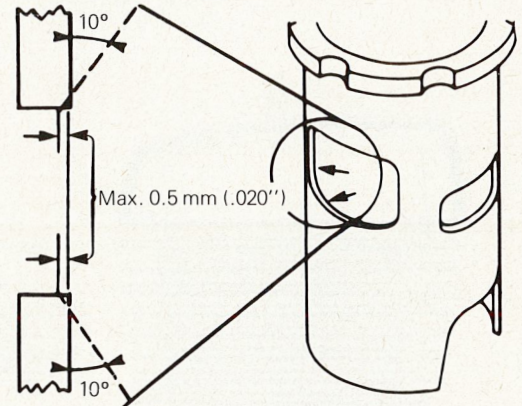
○ NOTE: Only 3-4 seconds maximum are needed before cylinder cools sufficiently to grip onto sleeve.

Bore the new sleeve to provide piston clearance of:

Minimum
0.050 mm (.002")

Maximum
0.085 mm (.003")

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

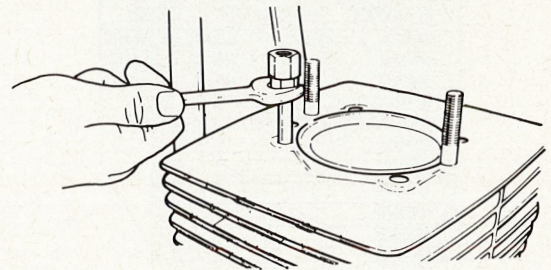


▼ **CAUTION:** Excessive chamfer will alter the port timing.

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.



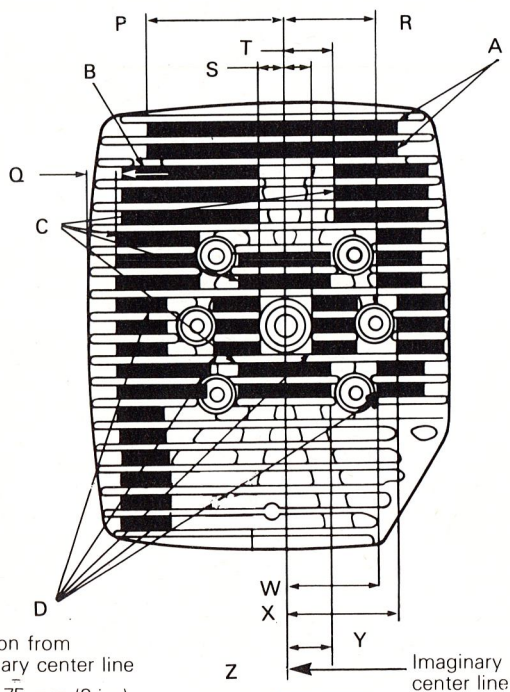
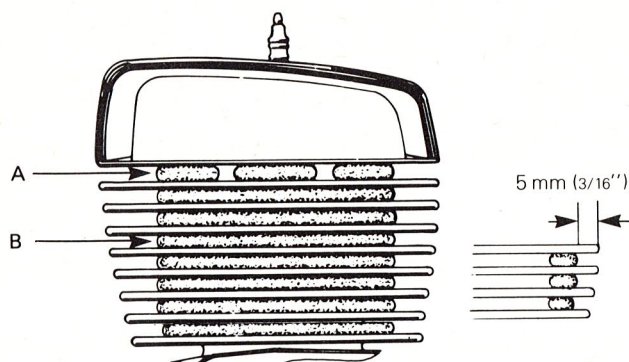
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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

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

Noise damper length
A: 25 mm (1 in.)
B: 140 mm (5 1/2 in.)



Location from
imaginary center line

P - 75 mm (3 in.)
R - 50 mm (2 in.)
S - 15 mm (5/8 in.)
T - 25 mm (1 in.)
W - 50 mm (2 in.)
X - 63 mm (2 1/2 in.)
Y - 25 mm (1 in.)

Noise damper
length

A - 140 mm (5 1/2 in.)
B - 70 mm (2 3/4 in.)
C - 50 mm (2 in.)
D - 25 mm (1 in.)

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.



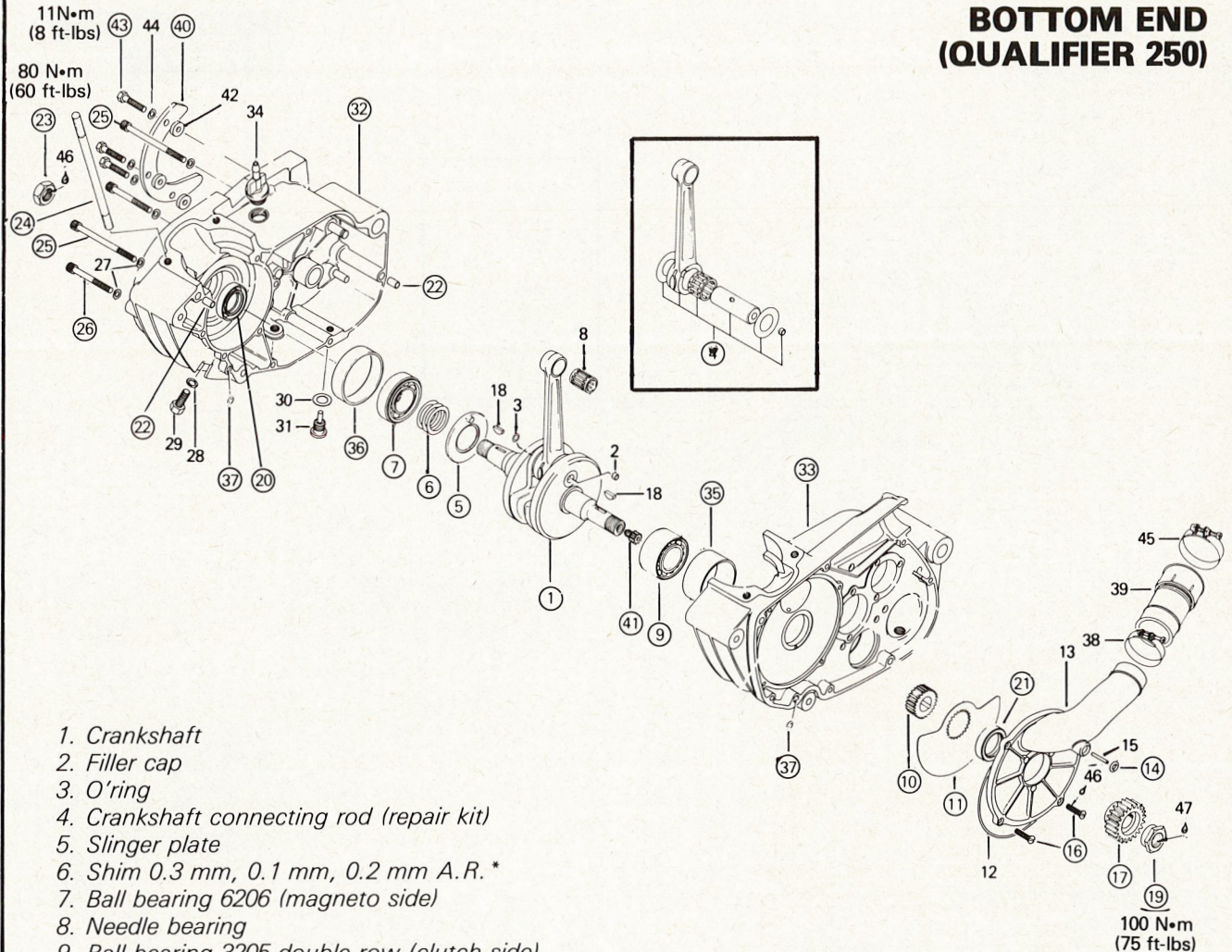
Scrape any deposit from the piston crown and inspect the piston for cracks or seizure marks.

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

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

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

**BOTTOM END
(QUALIFIER 250)**



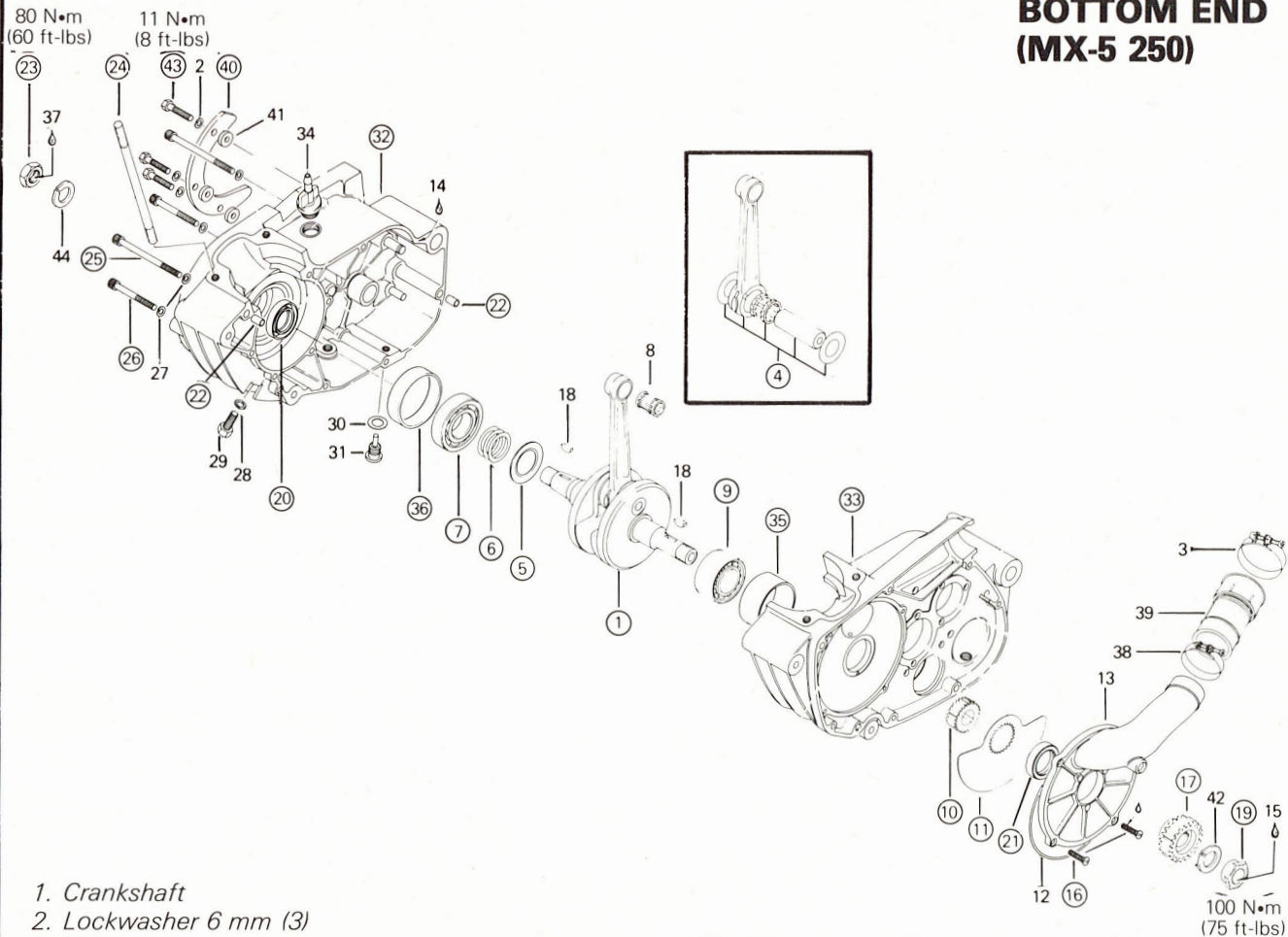
1. Crankshaft
2. Filler cap
3. O'ring
4. Crankshaft connecting rod (repair kit)
5. Slinger plate
6. Shim 0.3 mm, 0.1 mm, 0.2 mm A.R. *
7. Ball bearing 6206 (magneto side)
8. Needle bearing
9. Ball bearing 3205 double row (clutch side)
10. Disc valve spacer
11. Disc valve (symmetrical)
12. O'ring
13. Disc valve cover
14. O'ring
15. Diffuser tube
16. Countersunk screw M5 x 16 (4)
17. Drive gear
18. Woodruff key
19. Nut M18 x 1.5
20. Magneto side oil seal
21. Disc valve cover seal (clutch side)
22. Locating dowel sleeve (2)
23. Magneto retaining nut M16 x 1.5
24. Cylinder stud M8 (4)
25. Allen screw M6 x 70 (5)
26. Allen screw M6 x 45 (5)
27. Lockwasher 6 mm (10)
28. Gasket ring
29. Crankcase drain screw M8 x 16

30. Gasket ring
31. Magnetic drain plug
32. Crankcase half (mag side)
33. Crankcase half (clutch side)
34. Oil filler cap M18 x 1.5
35. Polyamid ring clutch side
36. Polyamid ring magneto side (If applicable)
37. O'ring
38. Hose clamp
39. Carburetor adaptor
40. Chain guard
41. Oil pump pinion gear 9 tooth
42. Chain guard spacer (3)
43. Screw M6 x 16 (3)
44. Lockwasher 6 mm (3)
45. Hose clamp
46. Loctite 242 (blue) medium strength
47. Loctite 271 (red) high strength

* A.R.: As required

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

**BOTTOM END
(MX-5 250)**



1. Crankshaft
2. Lockwasher 6 mm (3)
3. Hose clamp
4. Crankshaft connecting rod (repair kit)
5. Distance ring (1)
6. Shim 0.3 mm, 0.1 mm, 0.2 mm A.R. *
7. Ball bearing 6206 (magneto side)
8. Needle bearing
9. Ball bearing 3205 double row (clutch side)
10. Disc valve spacer
11. Disc valve (asymmetrical)
12. O'ring
13. Disc valve cover
14. Silicone sealant or Loctite 515
15. Loctite 271 red (high strength)
16. Countersunk screw M5 x 16 (4)
17. Drive gear
18. Woodruff key
19. Nut M18 x 1.5
20. Magneto side oil seal
21. Disc valve cover seal (clutch side)
22. Locating dowel sleeve (2)
23. Magneto retaining nut M16 x 1.5
24. Cylinder stud M8 x 167 (4)

25. Allen screw M6 x 70 (5)
26. Allen screw M6 x 45 (5)
27. Lockwasher 6 mm (10)
28. Gasket ring
29. Crankcase drain screw M8 x 16
30. Gasket ring
31. Magnetic drain plug
32. Crankcase half (mag side)
33. Crankcase half (clutch side)
34. Oil filler cap M18 x 1.5
35. Polyamid ring clutch side
36. Polyamid ring magneto side
37. Loctite 242 blue (medium strength)
38. Hose clamp
39. Carburetor adaptor
40. Chain guard
41. Chain guard spacer (3)
42. Lockwasher 18
43. Screw M6 x 16 (3)
44. Lockwasher 16

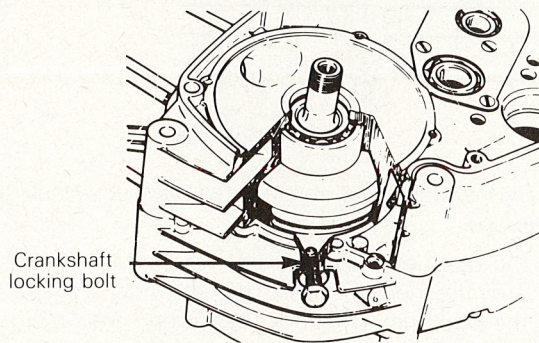
* A.R.: As required

BOTTOM END

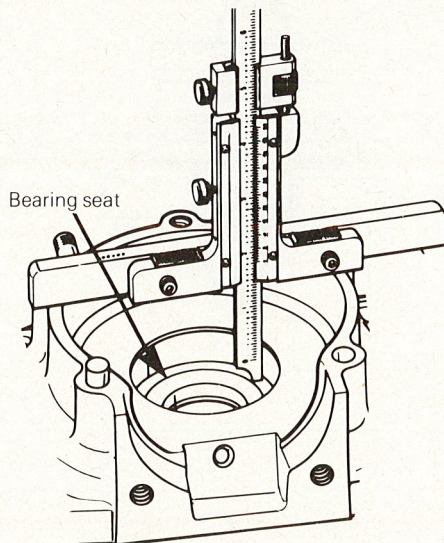
Disassembly & assembly

① ④ ③② ③③ At the replacement of the crankshaft, connecting rod and crankcase halves, the squish area should be measured (see engine tolerances measurements).

① ③② To facilitate some procedures, the crankshaft can be locked at the top dead center position using a crankshaft locking bolt as illustrated.

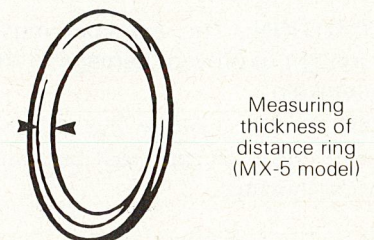
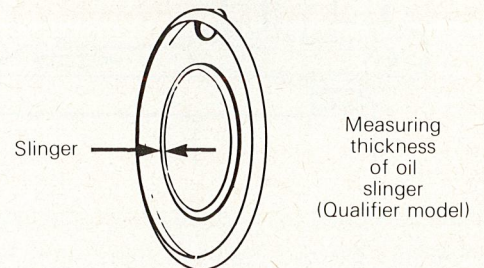
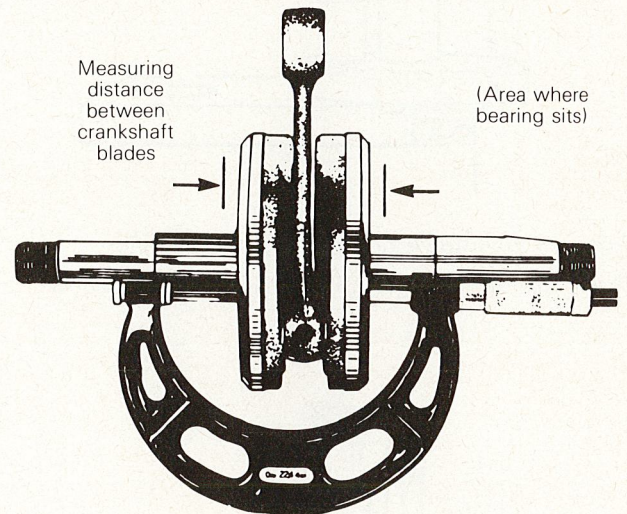
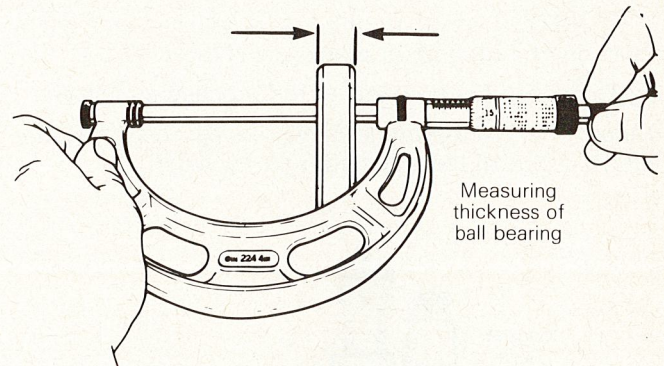


① ⑥ The crankshaft end-play should be between 0.1 mm (0.004") to 0.2 mm (0.008"). To determine necessary shims: it is necessary to measure the crankcase. To do this first measure each half from mating surface to bottom of bearing seat. Add measurements of both halves, total equals A.



Measure the thickness of each ball bearing. Measure the distance between crankshaft blades, and measure the thickness of the oil slinger (Qualifier model) or distance ring (MX-5 model).

Add the measurements, total equals B.



SECTION 02 ENGINE

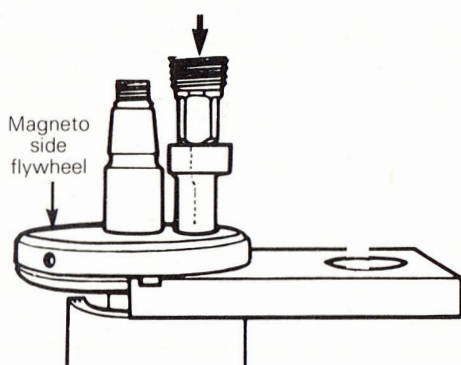
SUB-SECTION 02 (ENGINE/TRANSMISSION)

Subtract measurement B from measurement A, minus tolerance of 0.1 mm (0.004") to 0.2 mm (0.008"). Total balance is distance to be shimmed. Shim(s) must be located between oil slinger or distance ring and bearing.

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

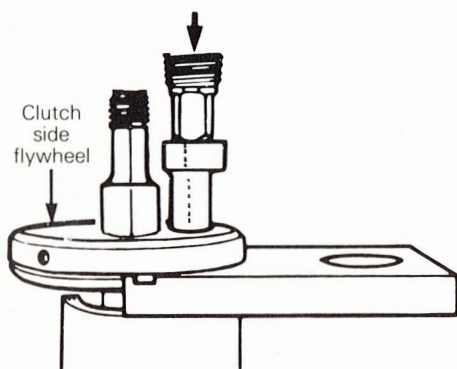
④ To replace the connecting rod proceed as follows:

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.

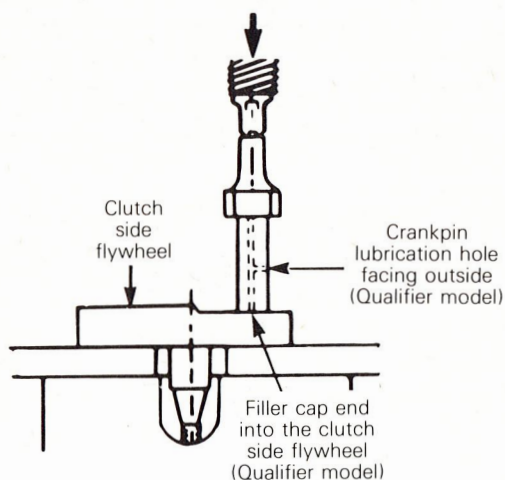


Press the new crankpin into the clutch side flywheel.

On Qualifier 250 the crankpin lubrication hole must point to the outside.

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

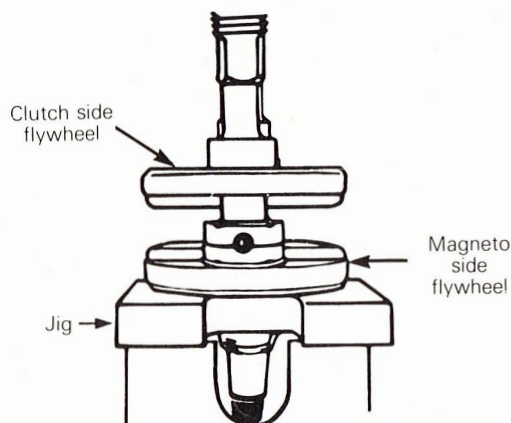
○ **NOTE:** On Qualifier 250 the end of the crankpin with the filler cap must be installed in the clutch side flywheel.



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.

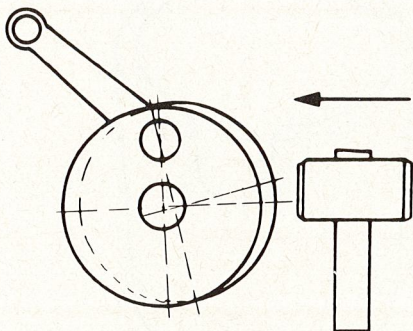
○ **NOTE:** The connecting rod side clearance must be 0.4 mm (.015") to 0.5 mm (.020").



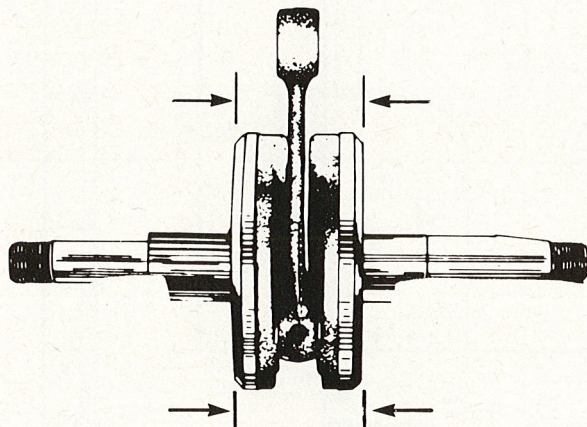
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

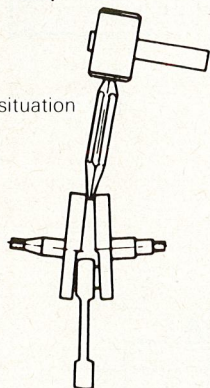
Using a "straight edge", check for flywheel alignment. Drift with a heavy brass mallet to align if necessary.



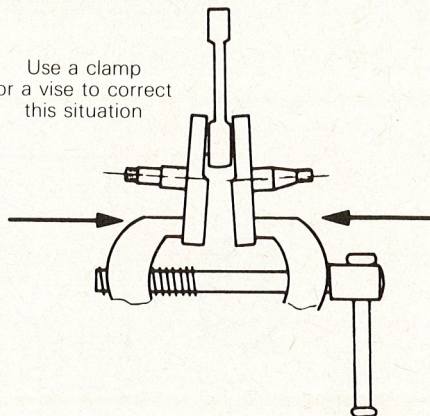
Using a micrometer or vernier caliper, check for flywheel alignment.



Use a wedge to correct this situation



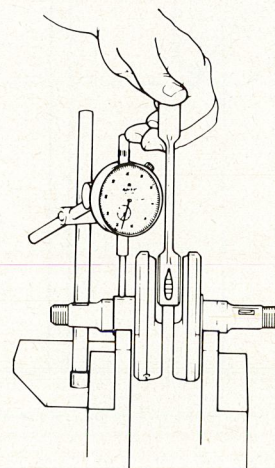
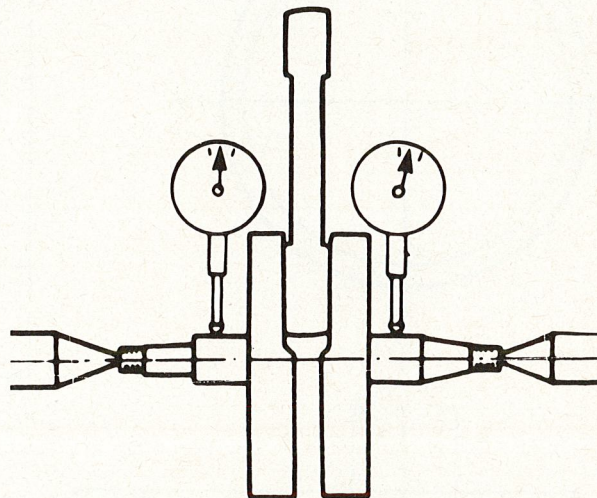
Use a clamp or a vise to correct this situation



NOTE: For final alignment measures, see technical data.

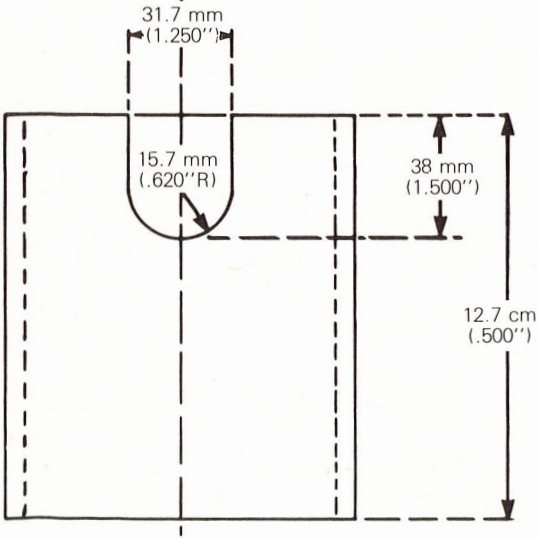
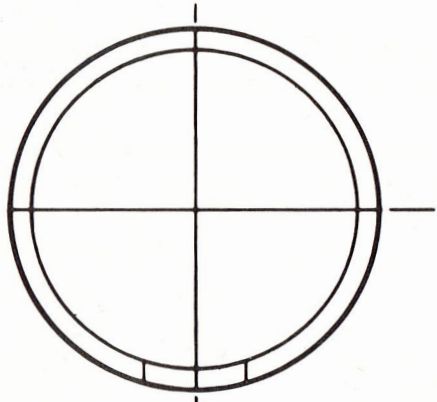
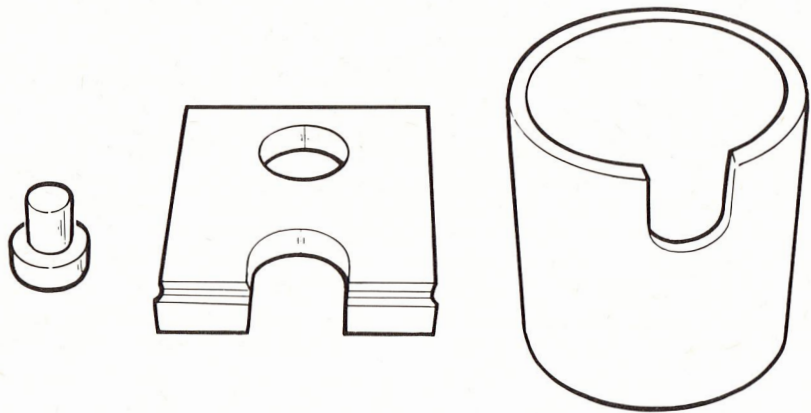
When overall alignment is completed, verify connecting rod side clearance.

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

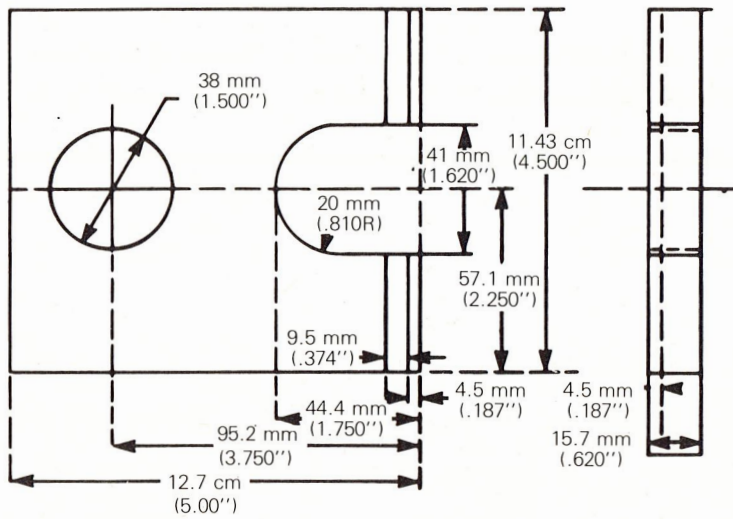


SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

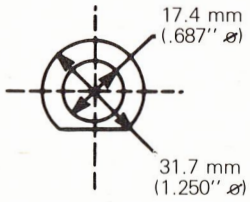
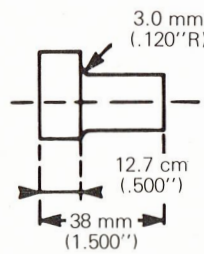
Suggested crankshaft repair tool



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



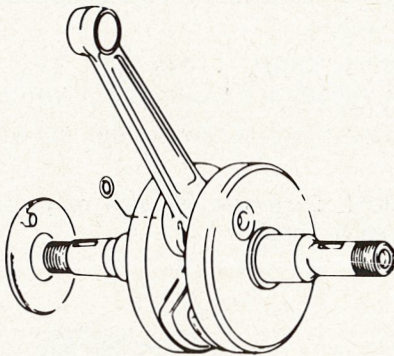
H.R.C.Q. ST'L 31.7 mm (1.250'') DIA

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

⑤ Qualifier model:

At assembly, insert the "O" ring and the oil slinger spout into the crank pin hole as illustrated.



MX-5 model:

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

⑦ ③② On Qualifier 250 heat is needed to remove or install the magneto side bearing of the crankcase.

▼ **CAUTION:** Always apply heat to remove or install a bearing into 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:

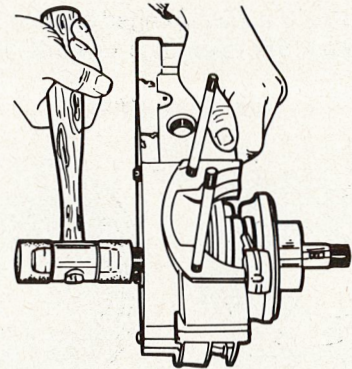
Disassembly

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

○ **NOTE:** It is not necessary to apply heat to remove or install a magneto side bearing into the crankcase of the MX-5 250.

Using a butane torch with a large **soft** flame, heat the magneto side crankcase with 4 or 5 rapid circular passes.

With the engine upright on a bench top, hold the **HOT** magneto side crankcase (with a rag), and drift the crankshaft out of the crankcase using a **SOFT** hammer.



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

Reassembly

Cut a 50 mm (2") diameter disc out of asbestos material.

Grease the magneto side crankshaft oil seal with lithium grease.

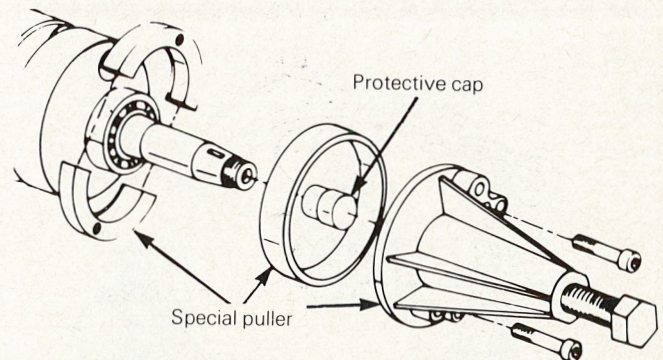
Place the disc over the crankshaft oil seal to protect it from the flame.

Heat the crankcase as described above.

Quickly remove the seal protector disc and drift the crankshaft, complete with main bearing, into the crankcase using a **SOFT** hammer.

○ **NOTE:** Some Qualifiers 250 may have a polyamid ring into the magneto side crankcase and do not require heat to reinstall the crankshaft.

⑦ ⑨ To remove bearing from crankshaft use a bearing puller as illustrated. (See tool section).



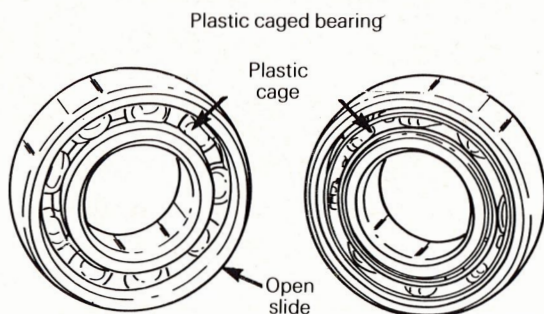
○ **NOTE:** Prior to magneto side bearing installation, install oil slinger plate or distance ring, required shim(s) and bearing on crankshaft.

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.

SECTION 02 ENGINE

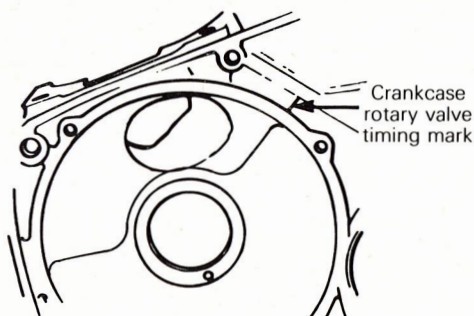
SUB-SECTION 02 (ENGINE/TRANSMISSION)

▼ **CAUTION:** If a plastic caged bearing is intalled, always place the open face towards the **outside**.

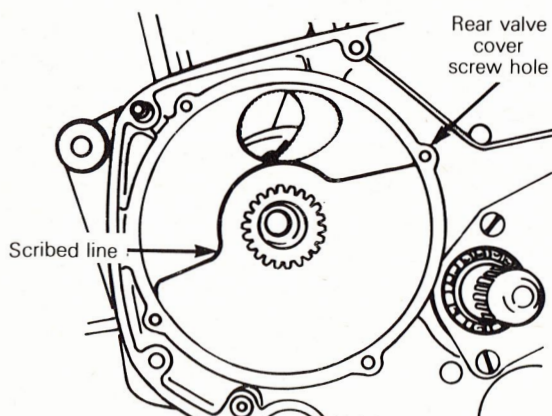


⑩ At assembly, the chamfered side of the disc valve spacer must face towards the crankshaft.

⑪ On Qualifier model 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-5 model 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.)



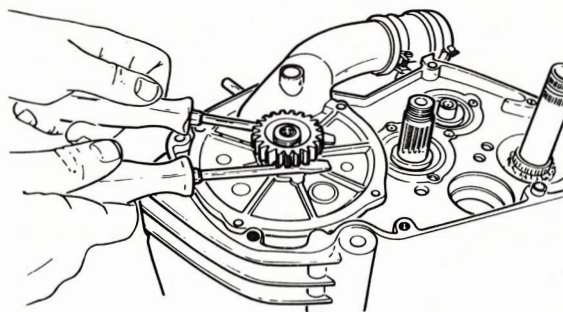
○ **NOTE:** If no line is scribed, refer to "Engine tolerances measurements" for positioning procedure.

▼ ⑭ **CAUTION:** On Qualifier model at the assembly of the clutch cover, make sure to install the sealing "O" rings as severe damage could occur to the engine.

⑮ At assembly, apply Loctite 242 blue (medium strength) on threads and torque to 5.5 N•m (4 ft-lbs).

⑰ Use 2 screwdrivers to remove the crankshaft drive gear.

▼ **CAUTION:** Excessive leverage may damage the 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.

⑲ 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**.

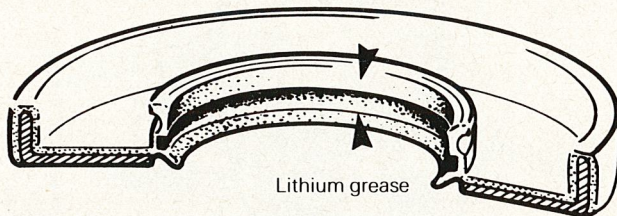
▼ **CAUTION:** Do not apply Loctite Lock'n Seal on the threaded portion of the crankshaft as the drive gear could become glued to the crankshaft and damage to other engine parts could occur during the removal of the drive gear.

Torque the drive gear retaining nut to 100 N•m (75 ft-lbs).

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

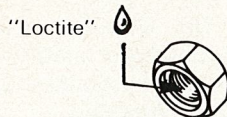
SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

②① To 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.

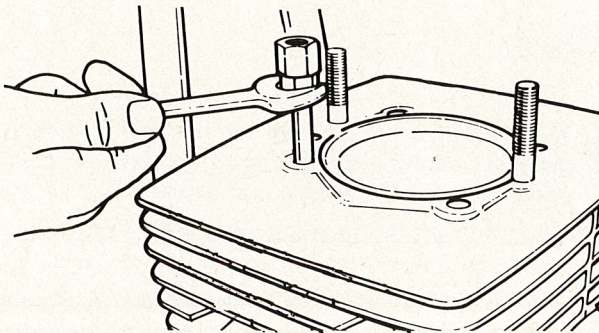


② At assembly, ensure that the locating dowel sleeves are in place.

②③ At assembly, apply Loctite 242 blue (medium strength) on the inside threads of the magneto retaining nut and torque to 80 N•m (60 ft-lbs).



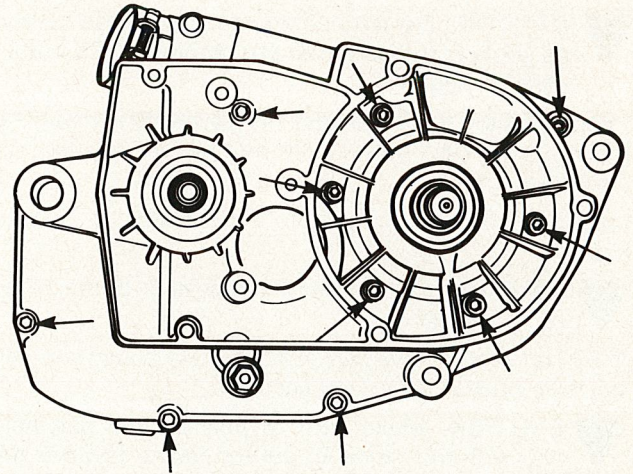
②④ To unscrew, use 2 cylinder base nuts blocked one against the other.



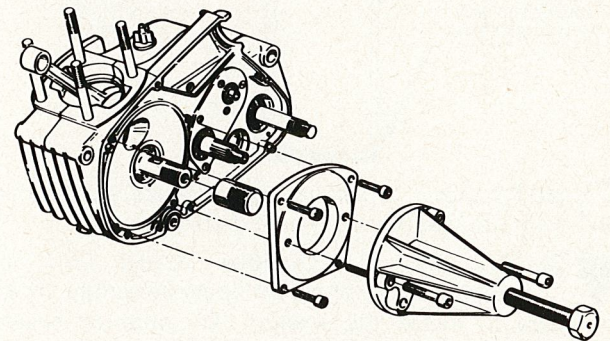
At assembly, position the long threaded portion of the stud into the crankcase.

②⑤ ②⑥ At assembly, torque to 11 N•m (8 ft-lbs) following a criss-cross sequence.

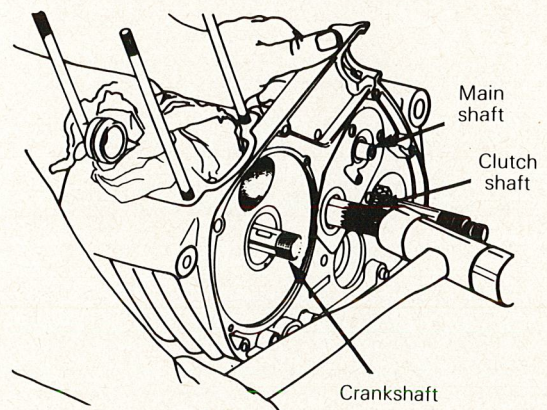
○ **NOTE:** It is recommended to apply a small drop of oil or a thin coat of grease on the threads.



③② ③③ To split the crankcase halves, use a protective cap and puller (See Tools section).



○ **NOTE:** The crankcase halves can also be splitted, by tapping equally on the main shaft, clutch shaft and crankshaft (on Qualifier model, prior to tapping on the crankshaft make sure the oil pump pinion gear has been removed).



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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

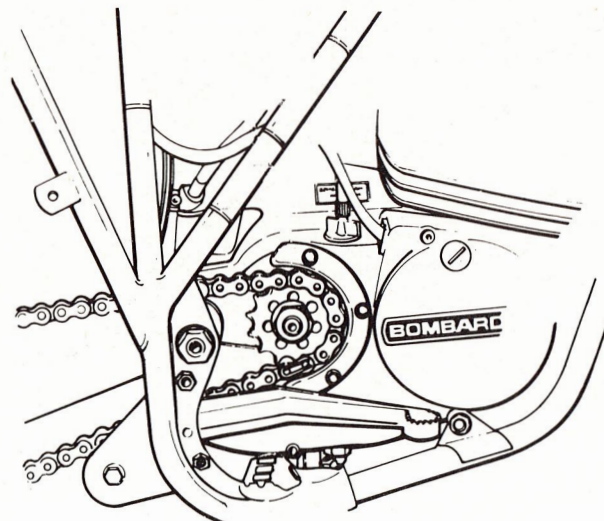
Prior to joining the crankcase halves carefully clean the mating surfaces with acetone, wood alcohol or equivalent.

Apply a light coat of Loctite 515 sealant or silicone sealant.

▼ **CAUTION:** Do not allow the sealant to reach the oil passages.

③⑤ ③⑥ To install a new polyamid ring use an appropriate insertion pusher (See Tool section).

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



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

▼ ④① **CAUTION:** On Qualifier model, exercise care when removing or installing the oil pump pinion gear. Damage to the teeth could occur and impair the oil pump function.

Turn counter-clockwise to remove.

Turn clockwise to install.

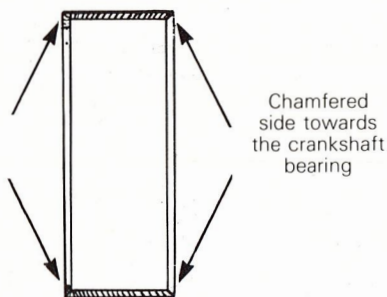
Cleaning

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.



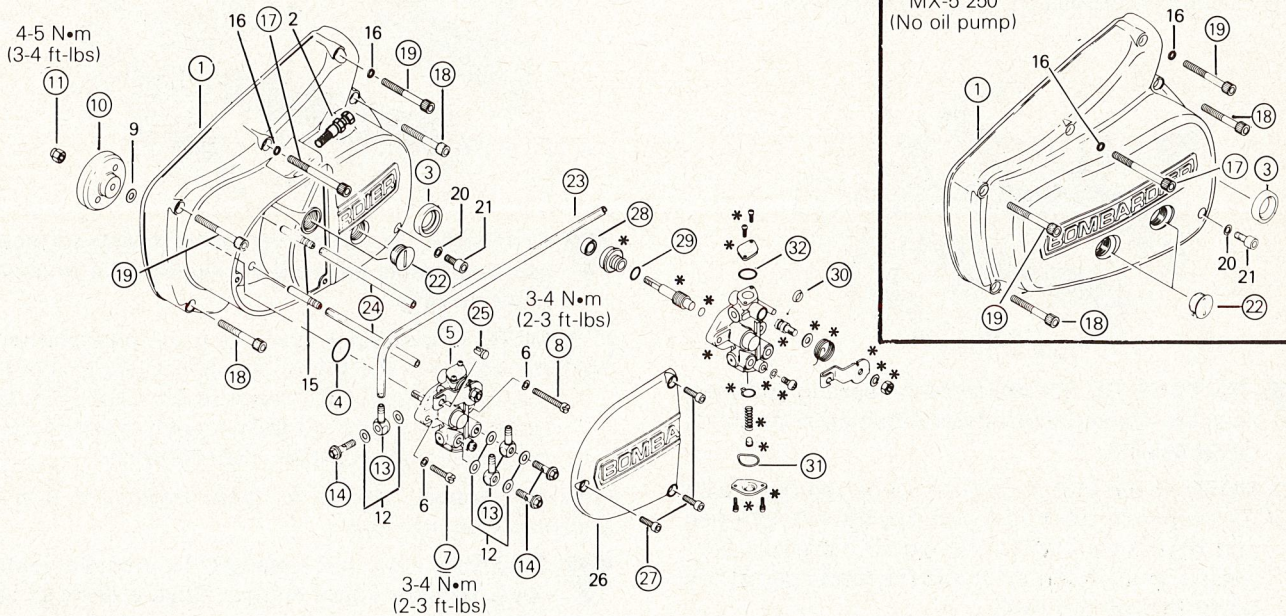
○ **NOTE:** Some Qualifiers do not have a polyamid ring into the magneto side crankcase.

▼ ③⑦ **CAUTION:** On Qualifier model prior to crankcase and/or clutch cover assembly, make sure to install the sealing "O" rings as severe damage could occur to the engine.

④⑩ ④③ At assembly, ensure to use the proper chain guard (13 teeth, 14 teeth or 15 teeth engine sprocket).

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

OIL PUMP/CLUTCH COVER
(QUALIFIER 250)



1. Clutch cover
2. Cable adjuster
3. Kick start shaft seal
4. O'ring
5. Oil pump assembly
6. Lockwasher 5 mm (2)
7. Screw M5 x 16
8. Screw M5 X 28
9. Flat washer 6.2 mm
10. Oil pump gear 34T
11. Hex. nut M6
12. Oil banjo gasket
13. Banjo (3)
14. Banjo bolt (3)
15. Check valve (2)
16. Gasket (2)
17. Allen screw M6 x 50 (1)

18. Allen screw M6 x 35
Qualifier (4)
MX-5 (5)
19. Allen screw M6 x 40 (3)
20. Fiber gasket
21. Oil level plug
22. Adjustment plug (2)
23. Oil line 560 mm (22")
24. Oil line 90 mm (3.5")
25. Nipple
26. Oil pump cover
27. Allen screw M5 x 12 (3)
28. Oil seal
29. O'ring
30. Ring
31. O'ring
32. O'ring

*Not available as spare parts

SECTION 02 ENGINE

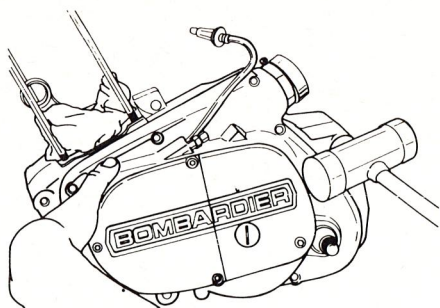
SUB-SECTION 02 (ENGINE/TRANSMISSION)

OIL PUMP/CLUTCH COVER

Disassembly & assembly

Qualifier 250

① To remove the clutch cover, tap **slightly** 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.

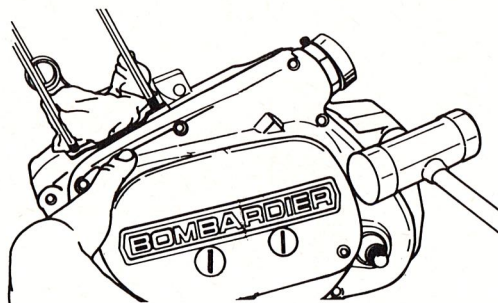
○ **NOTE:** If the clutch cover is to be removed with the engine in the frame, remove the left foot peg and both levers. With the clutch cable still connected, pull clutch in. It will pre-load against the cover to ease removal.

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

▼ **CAUTION:** Make sure the kick starter oil seal lip is not flipped over by the kick starter shaft splines when pushing the clutch cover into place and that the oil pump gear meshes with the crankshaft gear (to insure this, rotate the crankshaft slowly while pushing clutch cover on).

MX-5 250

① To remove the clutch cover, tap lightly using a soft faced hammer to break the seal (as illustrated).

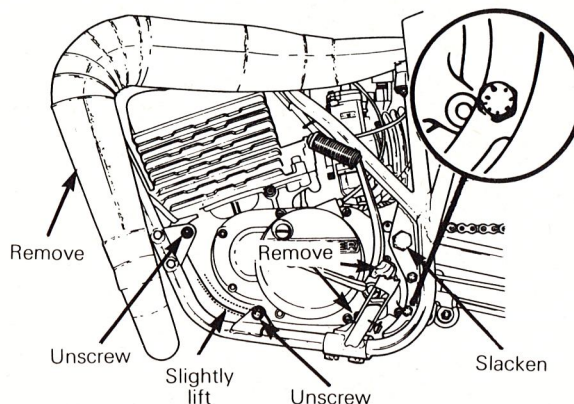


▼ **CAUTION:** Do not pry between sealing surfaces, as score marks incurred are detrimental to clutch cover sealing.

○ **NOTE:** If the clutch cover is to be removed with the engine in the frame, it is necessary to remove the left foot peg, both levers and to slightly lift the front of the engine to allow clutch cover to clear the lower frame portion, near footrest.

Prior to removal, ensure to drain engine oil and to slacken swing arm bolt.

▼ **CAUTION:** Do not attempt to remove clutch cover without lifting engine. Severe damage can occur.



○ **NOTE:** Muffler must be removed to allow sufficient lifting at the front of the engine.

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

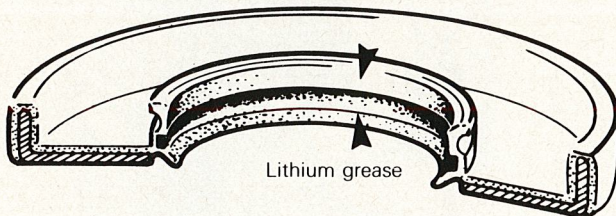
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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 or silicone sealant to the mating surfaces and lightly tap cover into place.

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.

③ To install a new seal into clutch cover, use an appropriate oil seal insertion pusher (see tool section). Apply a light coat of lithium grease on the seal lip.

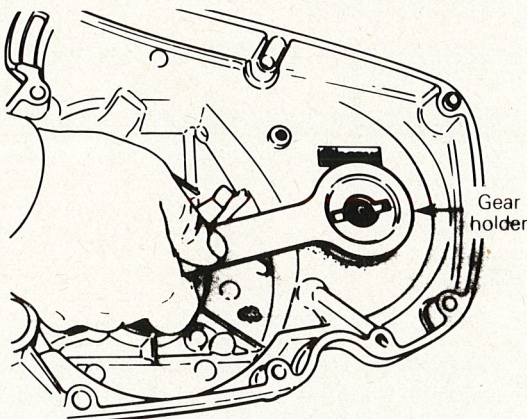


④ Prior to installation, apply lithium grease around "O" ring.

⑤ Prior to assembly, clean the mating surfaces of the oil pump and the clutch cover with acetone or equivalent. Apply a light coat of Loctite 515 or silicone sealant.

⑦ ⑧ At assembly, torque to 3-4 N•m (2-3 ft-lbs).

⑩ ⑪ To remove the oil pump driven gear, lock the driven gear in position with special holder tool (see tool section).



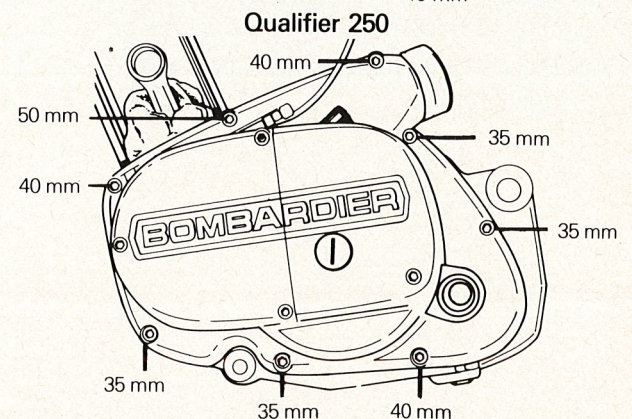
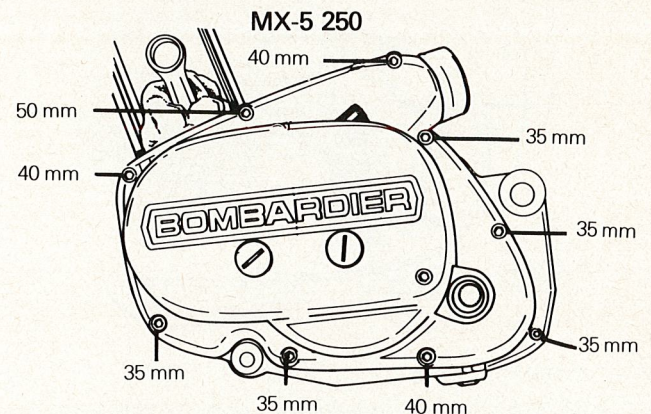
At assembly, torque retaining nut to 4-5 N•m (3-4 ft-lbs).

⑬ At assembly, install the large I.D. of the banjo towards the pump.

⑭ At assembly, torque to 4-5 N•m (3-4 ft-lbs).

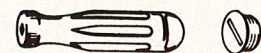
⑰ ⑱ ⑲ At assembly, torque the retaining screws to 8 N•m (6 ft-lbs) following a criss-cross sequence and apply a small drop of oil or a thin coat of grease on the threads.

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



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

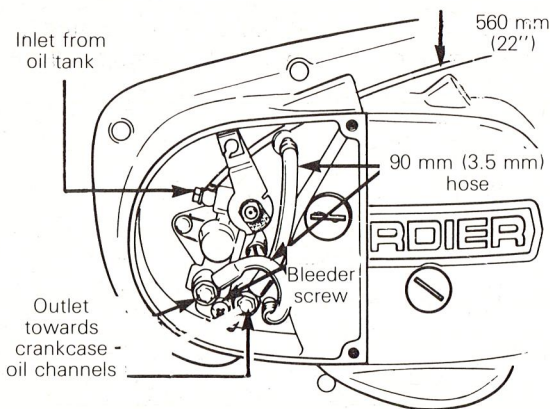
⑳ For removal or installation use the screwdriver grip end, provided with the motorcycle tool kit.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

②③ ②④ At assembly, position oil line as illustrated and make sure to bleed the air out of the oil pump. Proceed as follows: At the installation, bleed the air out of the inlet oil line by unscrewing the lower screw (Phillips head type) until all the air bubbles are out. Then, to bleed the air out the oil pump, start the engine and let at idle at 1100-1300 R.P.M. Push control lever to maximum opening and hold in this position for 3-5 minutes.

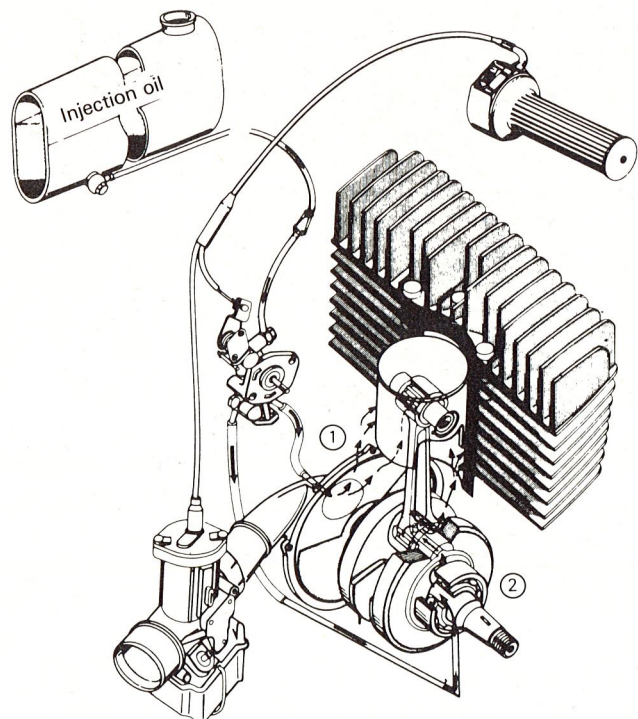


②⑦ At assembly, torque to 5.5 N•m (4 ft-lbs).

②⑧ ②⑨ ③① ③② Prior to installation, apply a light coat of lithium grease around the O'rings and on the oil seal lip.

○ **NOTE:** If the oil pump is defective, replace with a complete unit.

Oil injection diagram (Qualifier 250)



Lubrication oil is supplied under pressure by a Mikuni twin outlet pump to (1) the intake manifold and to (2) the crankshaft bearing.

Engine speed controls the pressure while throttle action determines the flow.

○ **NOTE:** On the Qualifier 175-250 models, the oil pump delivery at full throttle are:

175 cm³: 80 mL/hr

250 cm³: 175 mL/hr

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.

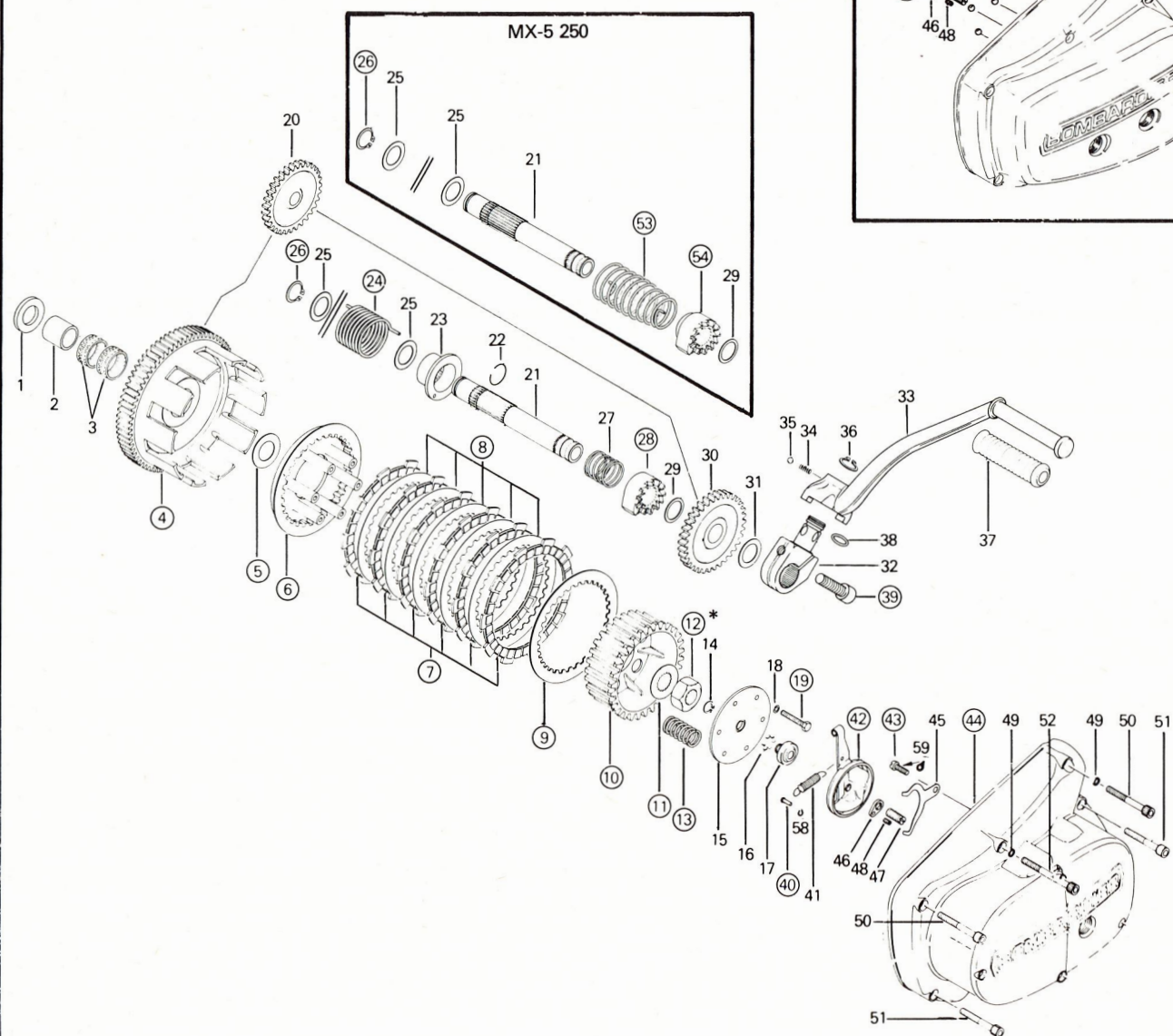
Remove old sealant from mating surfaces of crankcase/clutch cover with acetone, wood alcohol or equivalent.

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

**CLUTCH-KICK START
QUALIFIER 250, MX-5 250**

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

**CLUTCH-KICK START
QUALIFIER 250, MX-5 250**



*torque:
M16 x 1.5 nut
88 N•m (65 ft-lbs)
M18 x 1.5 nut
100 N•m (75 ft-lbs)

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

1. Thrust washer (inner)
2. Inner race
3. Needle bearing
4. Clutch drum
5. Thrust washer (outer)
6. Inner pressure plate
7. Friction plate (6)
8. Driven plate (5)
9. Outer pressure plate (1)
10. Clutch hub
11. Locking washer
12. Clutch shaft nut
Qualifier: M16 x 1.5
MX-5: M16 x 1.5 or
M18 x 1.5
13. Clutch spring (6)
14. Snap ring 10 x 1
15. Spring retaining plate
16. Ball 5/32"
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. Kick start spring retaining hub
24. Return spring
25. Thrust washer
26. Snap ring
27. Ratchet engagement spring
28. Ratchet gear
29. Thrust washer
30. Drive gear 34 tooth
31. Thrust washer
32. Kick start hub
33. Kick start lever
34. Spring
35. Ball 7/32"
36. Snap ring
37. Rubber sleeve
38. O'ring
39. Screw M8 x 30
40. Drive pin 3 x 8
41. Clutch cam return spring
42. Clutch release cam
43. Screw M5 x 12
44. Clutch cover
45. Clutch cam retaining spring
46. Clutch adjustment locking plate
47. Clutch adjustment screw M8 x 15
48. Clutch adjustment locking screw
M4 x 6
49. Gasket
50. Allen screw M6 x 40 (3)
51. Allen screw M6 x 35
Qualifier (4)
MX-5 (5)
52. Allen screw M6 x 50 (1)
53. Return spring (conical)
54. Ratchet gear (for conical return spring)
55. Clutch release cam (three balls clutch
release mechanism)
56. Clutch cover (three balls clutch
release mechanism)
57. Ball 7/32" (3)
58. Loctite 271 red (high strength)
59. Loctite 242 blue (medium strength)

SECTION 02 ENGINE

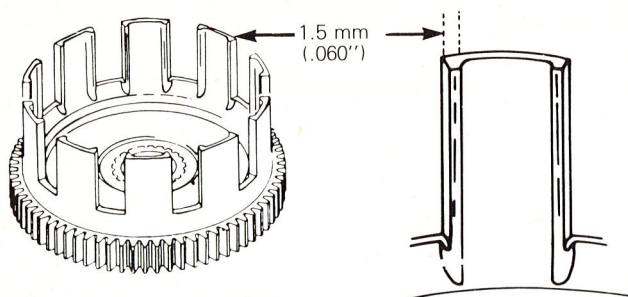
SUB-SECTION 02 (ENGINE/TRANSMISSION)

CLUTCH AND KICK START

Disassembly & assembly

④ If the clutch drum splines are found to be severely worn, replacement may not be necessary. File the damaged spline surfaces equally.

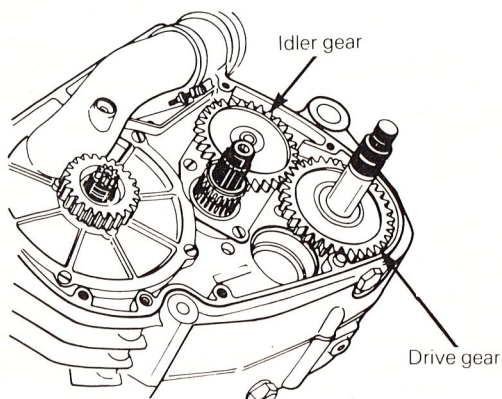
▼ **CAUTION:** The shouldered wall should not be filed thinner than 1.5 mm (.060").



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

④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ 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 towards the crankcase.

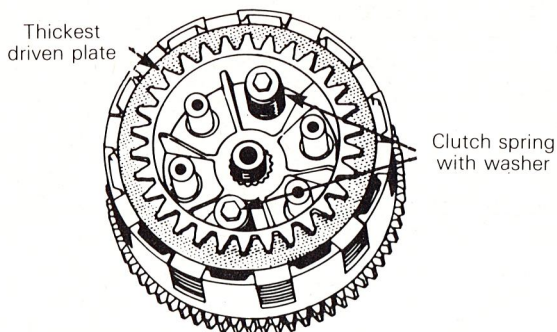


▼ **CAUTION:** Prior to the clutch hub installation, ensure to properly position the thrust washer ⑤.

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

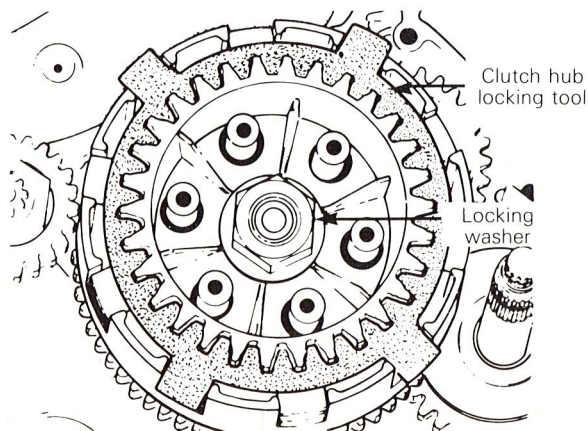
Ensure to place the thickest driven plate ⑨ on the top.

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



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

⑫ To 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 tools section).



At assembly, apply Loctite no. 271 red (high strength) on the threads of the clutch shaft nut and torque to :
M16 x 1.5 nut 88 N•m (65 ft-lbs)
M18 x 1.5 nut 100 N•m (75 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.

SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

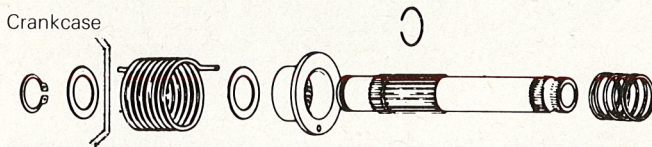
⑬ If spring(s) replacement is needed, ensure to change the springs in sets only.

⑰ At assembly, tighten in a criss-cross sequence and torque to 5.5 N•m (4 ft-lbs).

⑳ (Qualifier model) It is not possible to change the return spring without splitting the crankcase. At assembly, ensure that the spring ends are well positioned in the crankcase and the retaining hub hole.

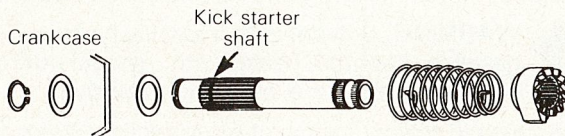
⑳ Qualifier model

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.



MX-5 model

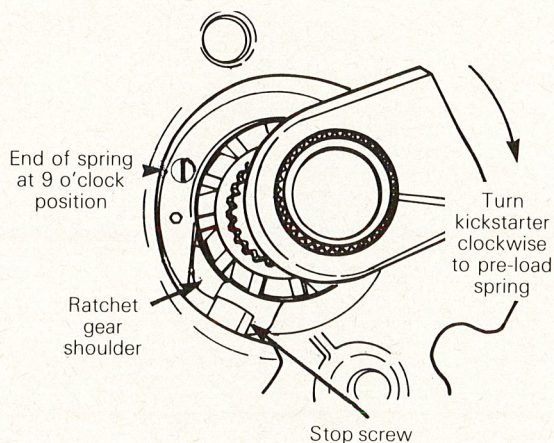
To remove the kick start assembly from the crankcase remove the snap ring located in the inside portion of the crankcase and unscrew the kick starter stop screw under the left crankcase half.



㉘ (Qualifier model)

To position the ratchet gear, install the kick starter lever and preload the kick starter spring approximately 3/4 turn clockwise. Slide the ratchet gear onto the splines.

Release the kick starter lever until the ratchet gear leans against the stop screw. The end of the spring protruding through the retaining hub should be at 9 o'clock position.



○ **NOTE:** After assembly, do not remove the kick starter stop screw unless needed, otherwise the kick starter spring will lose its preload and the removal of the clutch cover will be necessary to re-preload the spring.

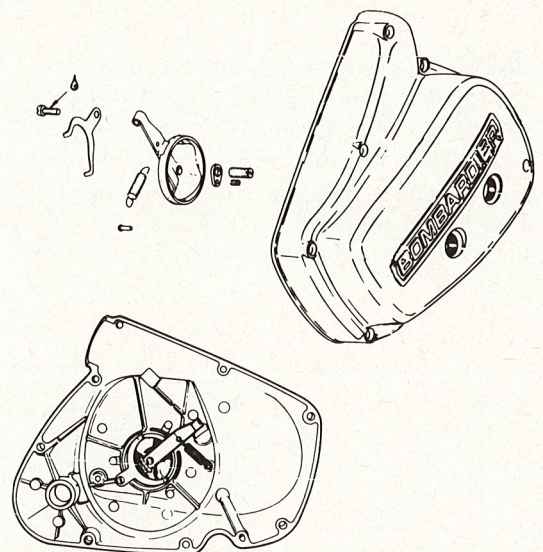
◆ **WARNING:** Exercise care when removing or installing the ratchet gear.

㉙ At assembly, torque to 20 N•m (15 ft-lbs).

㉚ At assembly, apply Loctite no. 271 red (high strength) and press fit into place.

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

㉛ ㉜ At assembly, position as illustrated.



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

㉞ ㉟ For clutch cover removal or installation, refer to "oil pump/clutch cover" (244 engine type) in this sub-section.

㊱ (MX-5 model) It is possible to change the return spring without splitting the crankcase. At assembly, ensure that the spring ends are well positioned in the crankcase and ratchet gear holes.

㊲ (MX-5 model) To position the ratchet gear, install the kick starter lever and preload the kick starter spring approximately 1 turn clockwise.

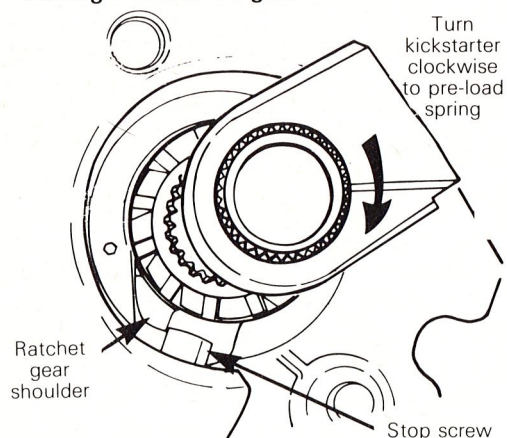
Completely slide the ratchet gear onto the splines while retaining the tension with the kick starter lever.

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

SECTION 02 ENGINE

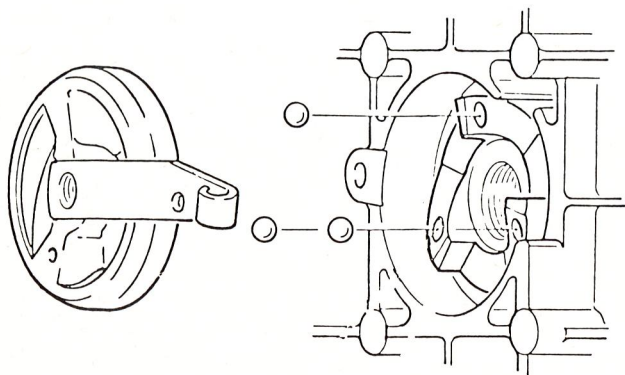
SUB-SECTION 02 (ENGINE/TRANSMISSION)

◆ **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.

⑤⑤ 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 balls.

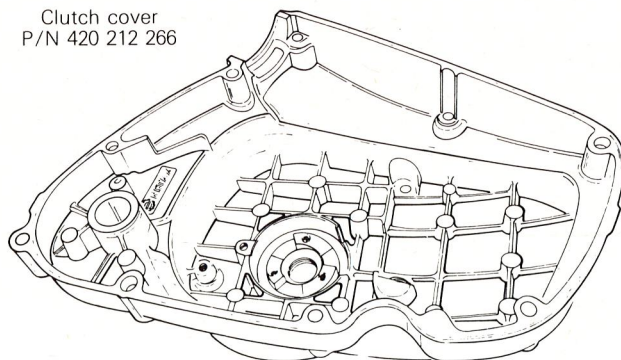


▼ **CAUTION:** Ensure to install the proper clutch release cam otherwise damage will occur.

⑤⑥ ⑤⑦ The clutch cover is slightly different with the clutch release mechanism with balls.

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" balls.

Clutch cover
P/N 420 212 266



○ **NOTE:** This type of clutch release mechanism is used on the MX-5 250 from engines serial no. 114 241 to 114 746.

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.

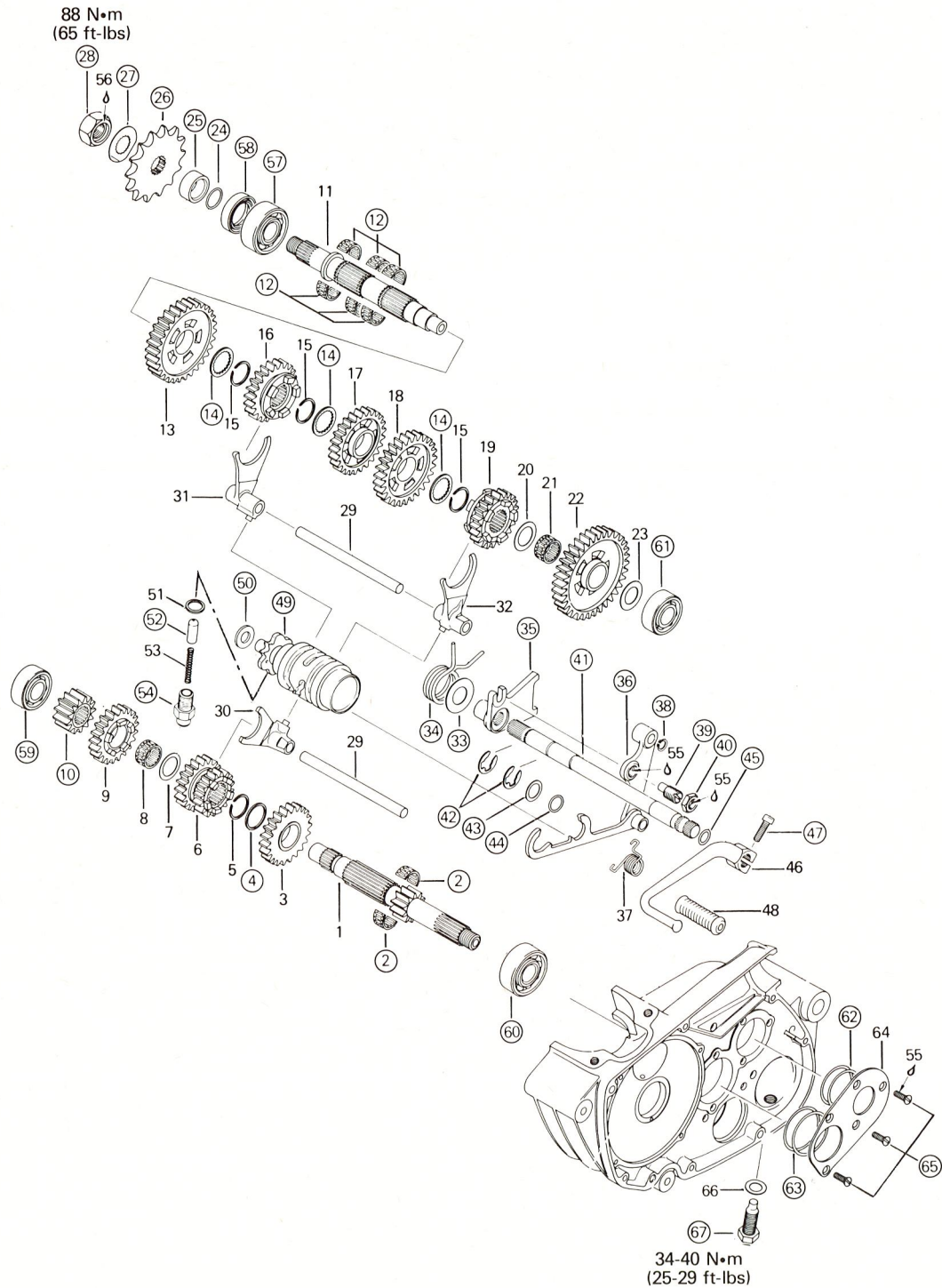
Remove old sealant from mating surfaces of crankcase/clutch cover with acetone, wool alcohol or equivalent.

▼ **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)
QUALIFIER 250
MX-5 250

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

**TRANSMISSION (GEAR BOX)
QUALIFIER 250
(6 speed)**



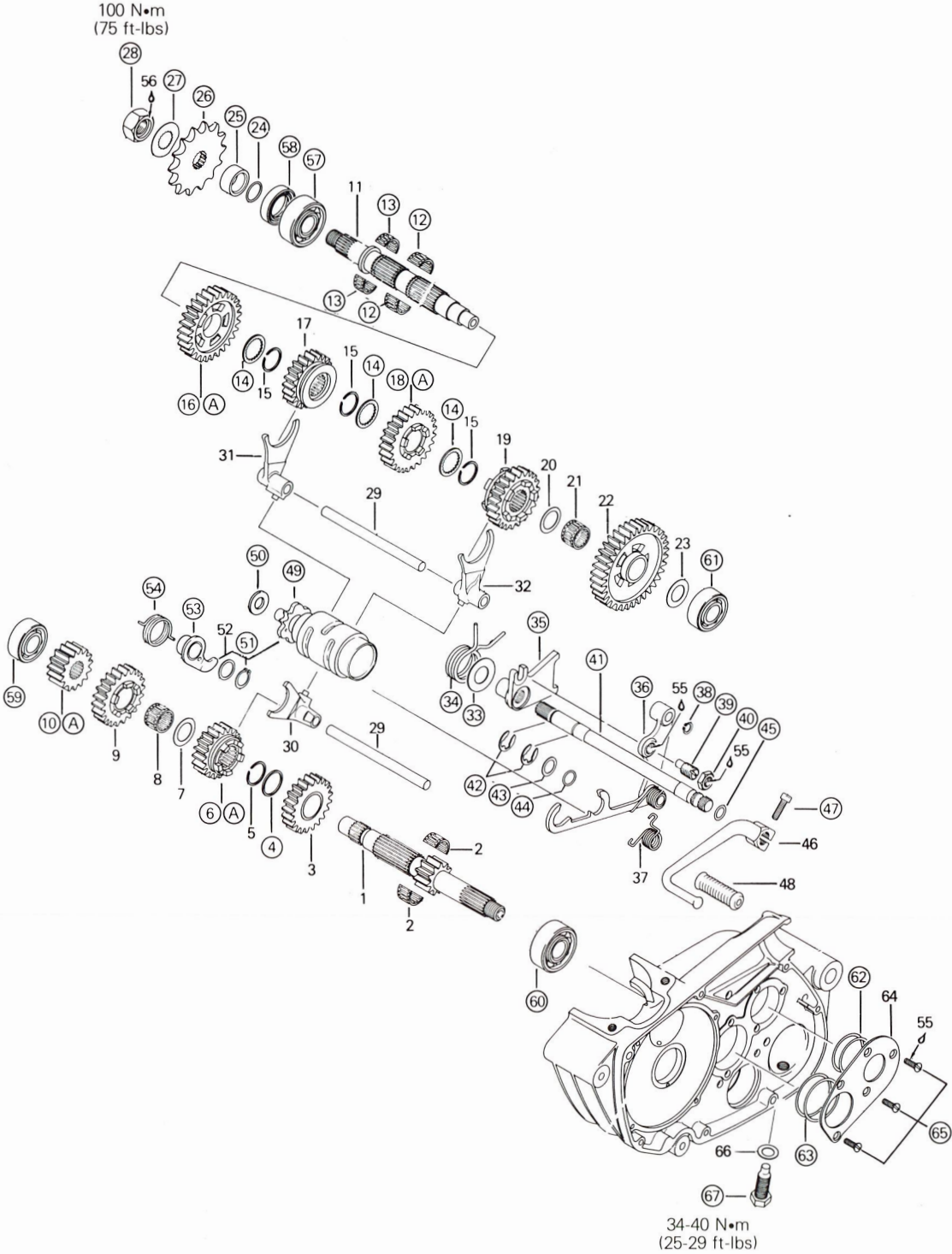
SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

QUALIFIER 250 (6 SPEED)

1. Clutch shaft 10T
2. Needle bearing ass'y, clutch shaft, width 9.73 mm (.383")
3. 6th gear, clutch shaft 22T
4. Thrust washer, clutch shaft
5. Snap ring, clutch shaft
6. 3rd/4th gear, clutch shaft 16/19T
7. Thrust washer, clutch shaft
8. Needle bearing, clutch shaft
9. 5th gear, clutch shaft, 21T
10. 2nd gear, clutch shaft, 13T
11. Main shaft
12. Needle bearing ass'y main shaft, width 9.65 mm (.380") (3)
13. 2nd gear, main shaft, 30T
14. Thrust washer, main shaft (3)
15. Snap ring, main shaft (3)
16. 5th gear, main shaft, 23T
17. 4th gear, main shaft, 25T
18. 3rd gear, main shaft, 27T
19. 6th gear, main shaft, 21T
20. Thrust washer, main shaft
21. Needle bearing, main shaft
22. 1st gear, main shaft, 34T
23. Thrust washer, main shaft
24. "O" ring, main shaft
25. Sprocket spacer
26. Sprocket (15T)
27. Locking washer, main shaft
28. Main shaft nut M16 x 1.5
29. Guide pin, shift fork (2)
30. Shifting fork, 5th-6th
31. Shifting fork, 2nd-4th
32. Shifting fork, 1st-3rd
33. Thrust washer, actuating lever
34. Spring, actuating lever
35. Actuating lever
36. Pawl ass'y
37. Pawl spring
38. Snap ring 10 x 1
39. Pawl positioning screw
40. Locking nut M12 x 1, pawl positioning screw
41. Shift shaft
42. Retaining ring (2)
43. Thrust washer, shift shaft
44. "O" ring, shift shaft
45. "O" ring, shift shaft
46. Shift lever
47. Allen screw M6 x 20
48. Shift lever rubber
49. Shift drum ass'y
50. Washer shift drum
51. Gasket ring, index plug
52. Index plunger
53. Spring index plunger
54. Index plug
55. Loctite 242 blue (medium strength)
56. Loctite 271 red (high strength)
57. Ball bearing 6204, main shaft, sprocket side
58. Seal main shaft
59. Ball bearing 6203, clutch shaft, sprocket side
60. Ball bearing 6204, clutch shaft, clutch side
61. Ball bearing 6203, main shaft, clutch side
62. Shim 0.5 mm (0.019"), 0.3 mm (0.011"), 0.1 mm (0.004"), main shaft bearing (A.R.)*
63. Shim 0.5 mm (0.019"), 0.3 mm (0.011"), 0.1 mm (0.004"), clutch shaft bearing (A.R.)*
64. Retaining plate (transmission bearings)
65. Countersunk screw M5 x 12 (5)
66. Gasket ring
67. Stop screw, kick starter

*(A.R.): As required

TRANSMISSION (GEAR BOX)
MX-5 250
(5 speed)



SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

MX-5 250 (5 speed)

- | | |
|--|---|
| 1. Clutch shaft 13T (M16 or M18 thread type) | 35. Actuating lever |
| 2. Needle bearing ass'y, clutch shaft,
width 11.68 mm (.460") | 36. Pawl ass'y |
| 3. 4th gear, clutch shaft, 21T | 37. Pawl spring |
| 4. Thrust washer, clutch shaft | 38. Snap ring 10 x 1 |
| 5. Snap ring, clutch shaft | 39. Pawl positioning screw |
| 6. 3rd gear, clutch shaft, 18T (A) | 40. Locking nut M12 x 1, pawl positioning screw |
| 7. Thrust washer, clutch shaft | 41. Shift shaft |
| 8. Needle bearing, clutch shaft | 42. Retaining ring (2) |
| 9. 5th gear, clutch shaft, 23T | 43. Thrust washer, shift shaft |
| 10. 2nd gear, clutch shaft, 16T (A) | 44. "O" ring, shift shaft |
| 11. Main shaft | 45. "O" ring, shift shaft |
| 12. Needle bearing ass'y main shaft
width 12.55 mm (.494") | 46. Shift lever |
| 13. Needle bearing ass'y main shaft
width 9.65 mm (.380") | 47. Allen screw M6 x 20 |
| 14. Thrust washer, main shaft (3) | 48. Shift lever rubber |
| 15. Snap ring, main shaft (3) | 49. Shift drum ass'y |
| 16. 2nd gear, main shaft, 28T (A) | 50. Washer, shift drum |
| 17. 5th gear, main shaft, 21T | 51. Index snap ring |
| 18. 3rd gear, main shaft, 25 T (A) | 52. Index washer |
| 19. 4th gear, main shaft, 23T | 53. Index lever |
| 20. Thrust washer, main shaft | 54. Index spring |
| 21. Needle bearing, main shaft | 55. Loctite 242 blue (medium strength) |
| 22. 1st gear, main shaft, 31T | 56. Loctite 271 red (high strength) |
| 23. Thrust washer, main shaft | 57. Ball bearing 6204, main shaft, sprocket side |
| 24. "O" ring, main shaft | 58. Seal main shaft |
| 25. Sprocket spacer | 59. Ball bearing 6203, clutch shaft, sprocket side |
| 26. Sprocket, 14T | 60. Ball bearing 6204, clutch shaft, clutch side |
| 27. Locking washer, main shaft | 61. Ball bearing 6203, main shaft, clutch side |
| 28. Main shaft nut M18 x 1.5 | 62. Shim 0.5 mm, 0.3 mm, 0.1 mm, main shaft bearing
(.019") (.011") (.004") A.R. * |
| 29. Guide pin, shift fork (2) | 63. Shim 0.5 mm, 0.3 mm, 0.1 mm, clutch shaft
(.019") (.011") (.004") |
| 30. Shifting fork, 4-5th | 64. Retaining plate (transmission bearings) |
| 31. Shifting fork, 2nd | 65. Countersunk screw M5 x 12 (5) |
| 32. Shifting fork, 1st-3rd | 66. Gasket ring |
| 33. Thrust washer, actuating lever | 67. Stop screw, kick starter |
| 34. Spring, actuating lever | |

*A.R.: As required

(A) Two types of tooth profile have been used for the second and third gears of the MX-5 250 gear box. Do not intermix those gear types; refer to the parts catalog for proper identification according to the engine serial number.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TRANSMISSION (GEAR BOX)

Disassembly & assembly

② ⑫ ⑬ The needle bearing halves must be replaced in pairs only.

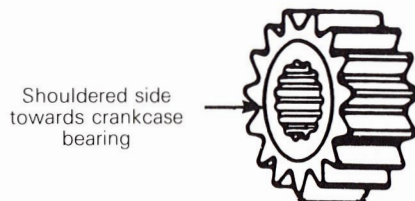
▼ **CAUTION:** Make sure not to intermix the needle bearings halves, damage could occur. If bearing halves have been intermixed refer to the description to find the proper width of the bearing halves.

④ ⑭ The sharp edge of the splined thrust washer must face the retaining snap ring.

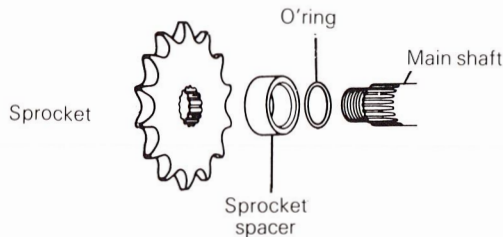
⑥ ⑩ ⑯ ⑱ Two types of tooth profile have been used for the second and third gears of the MX-5 250 gear box.

▼ **CAUTION:** Do not intermix those gear types; refer to the parts catalog for proper identification according to the engine serial number.

⑩ At assembly, the shouldered side of the 2nd gear, clutch shaft, must face towards the crankcase bearing.



②④ ②⑤ ②⑥ At assembly, ensure that the chamfered portion of the sprocket spacer is installed towards the main shaft.



▼ ②⑦ **CAUTION:** Locking washer should be replaced if bent more than twice. If in doubt, replace.

②⑧ 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.

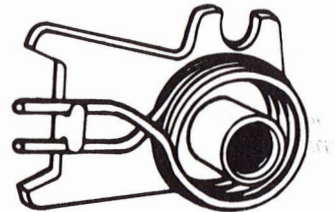
At assembly, follow the same procedure, apply Loctite no. 271 red (high strength) on the retaining nut threads and torque to:

Qualifier 250: 88 N•m (65 ft-lbs)

MX-5 250: 100 N•m (75 ft-lbs)

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

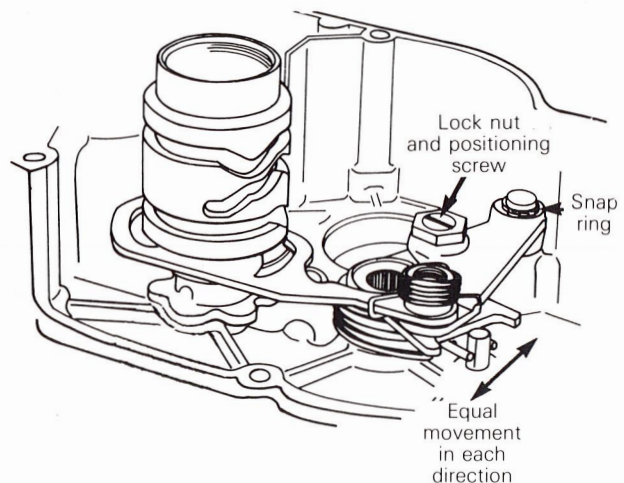
③③ ③④ ③⑤ Assemble the spring, thrust washer and actuating lever as illustrated.



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

③⑥ ③⑨ ④⑩ 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.



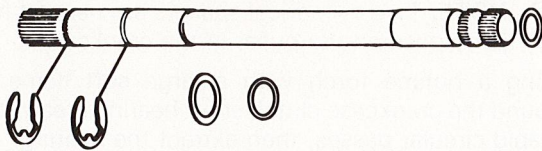
SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

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).**

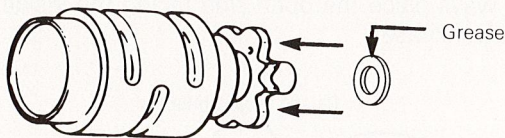
▼ **CAUTION:** At the removal of the pawl ass'y take care not to overspread the snap ring. Prior to assembly, make sure to reclose snap ring gap.

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



④⑦ At assembly, torque to 11 N•m (8 ft-lbs).

④⑨ ⑤① 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.



On MX-5 model, hold the index lever (in crankcase) fully open while inserting the shift drum in place.

⑤① ⑤③ ⑤④ (MX-5 model) At assembly, properly position the spring end into the index lever and crankcase hole.

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



⑤② ⑤④ (Qualifier model) At assembly, ensure that the index plunger does not stick into the index plug and torque to 34-40 N•m (25-29 ft-lbs).

⑤⑦ 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 oil seal with lithium grease.

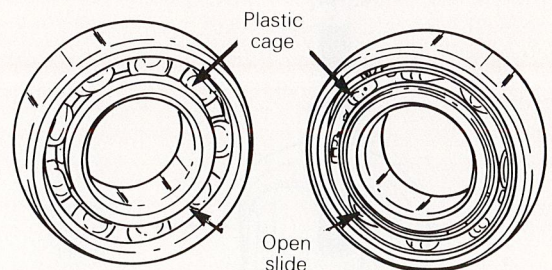
Cut a 50 mm (2") diameter disc out of asbestos material. Place the disc over the oil seal to protect it from the flame.

Heat the crankcase bearing embossment as described above.

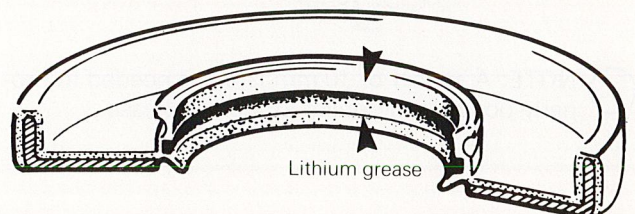
Quickly turn the crankcase half over and drift the bearing into the crankcase using a **soft** hammer.

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

Plastic caged bearing



⑤⑧ To install a new seal, use the appropriate oil seal insertion pusher. (See tool section). Apply a light coat of lithium grease on the seal lip.

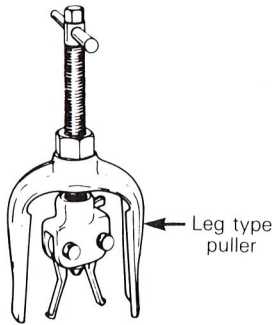


SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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

⑤9 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.

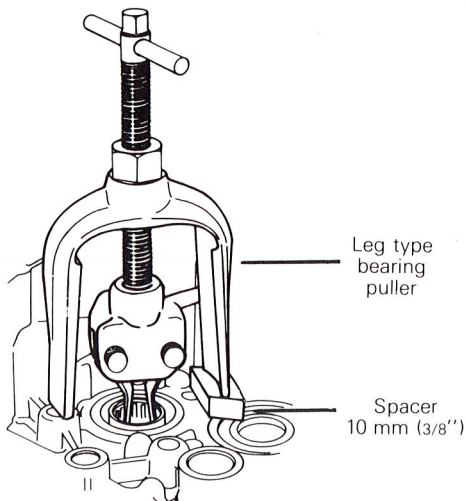
Proceed as follows:

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

Disassembly

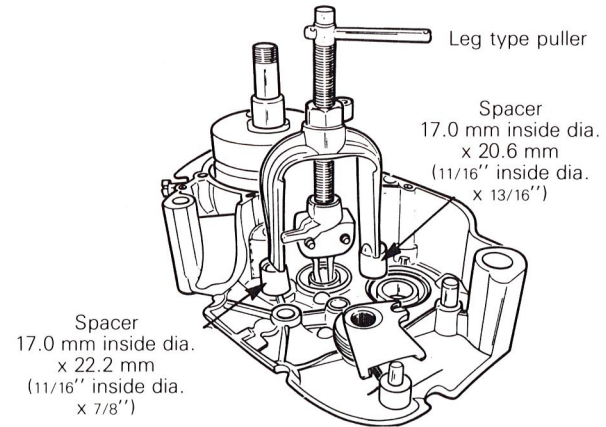
Remove the bearing retaining plate and shim(s).

Qualifier 250



○ **NOTE:** A spacer of 10 mm (3/8") is needed to properly position the puller in the crankcase.

MX-5 250



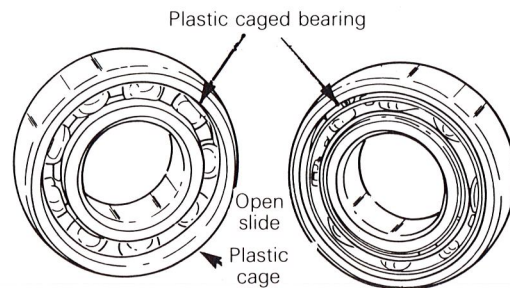
○ **NOTE:** Two cylindrical spacers are needed to properly position the puller in the crankcase.

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 bearing 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.



⑥0 ⑥1 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 in 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 a **soft** hammer.

Reassembly

Install the bearing 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) seats 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 end play.

⑥2 ⑥3 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.

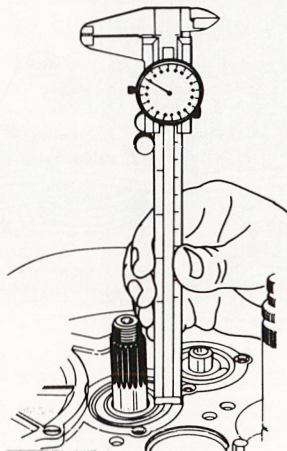
The end-play must be 0.1 mm (.004") maximum.

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

⑥5 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).

⑥7 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 removal of the clutch cover will be necessary to re-preload the spring.



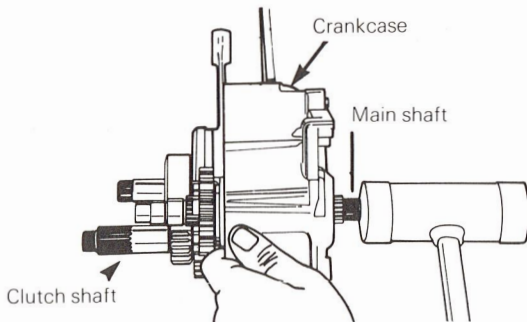
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TRANSMISSION GEAR CLUSTER (QUALIFIER 250)

Disassembly

To remove the clutch and main shaft gear cluster from the crankcase, tap on the sprocket side end of the main shaft.

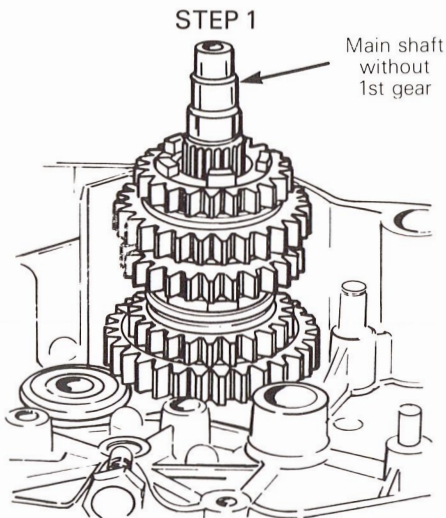


NOTE: To ease the clutch shaft removal, turn the clutch shaft manually while at the same time hitting the main shaft.

Reassembly

Proceed as follows:

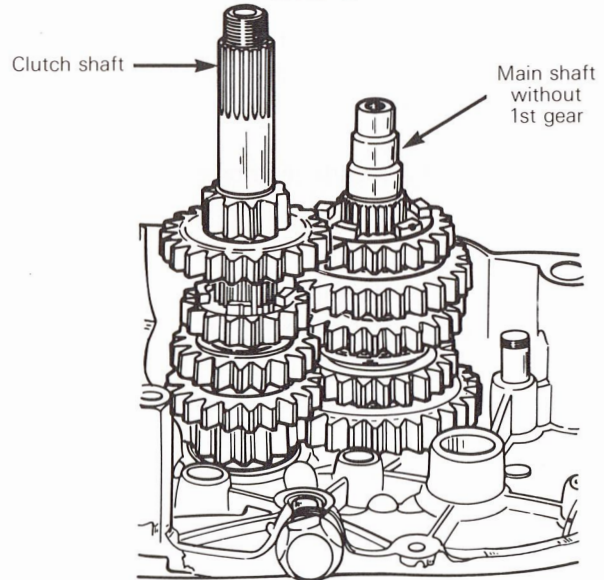
Position the main shaft as illustrated, tap gently without pushing completely the shaft into the bearing. (To ease the clutch shaft installation).



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

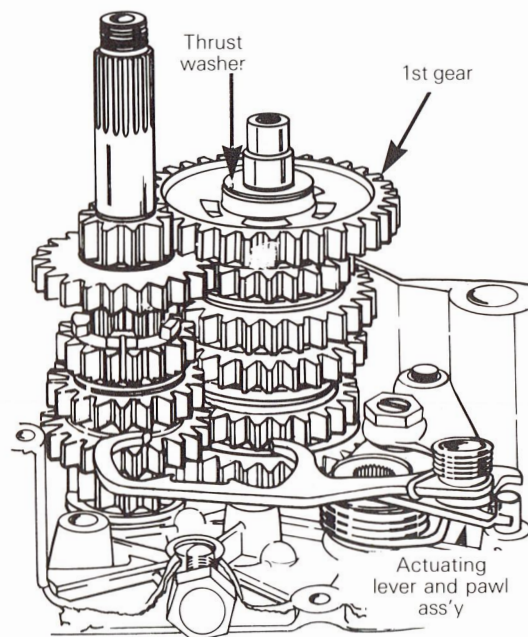
CAUTION: Prior to pushing the clutch shaft into the bearing, make sure the gears match.

STEP 2



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

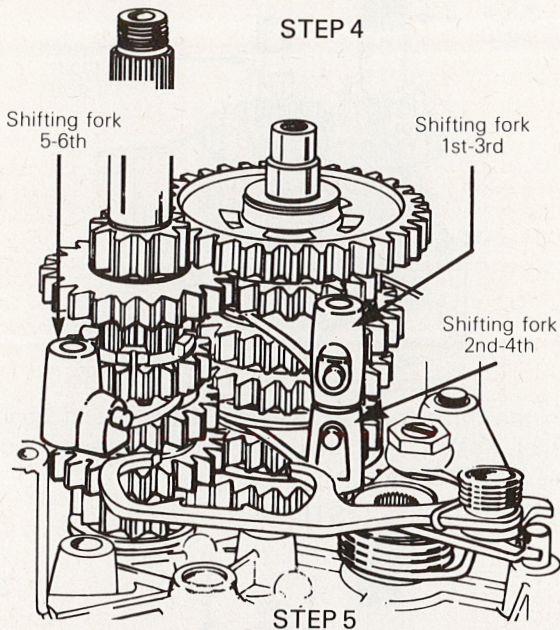
STEP 3



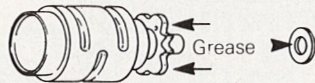
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

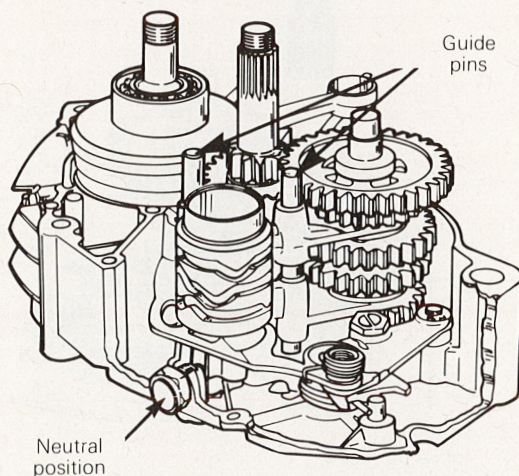
Position the shifting forks as illustrated.



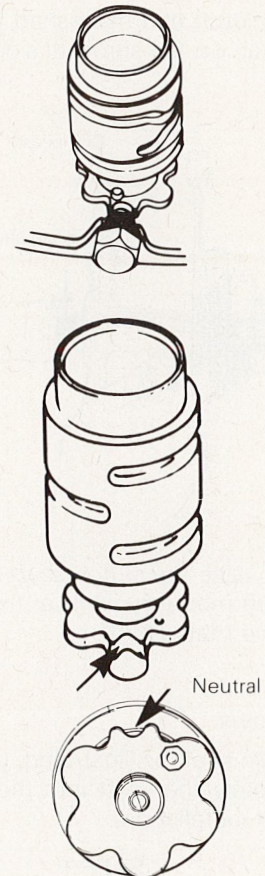
Coat the shift drum washer with grease, this will allow the washer to stick on the shift drum for ease of installation.



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



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 is leaning against the neutral notch.

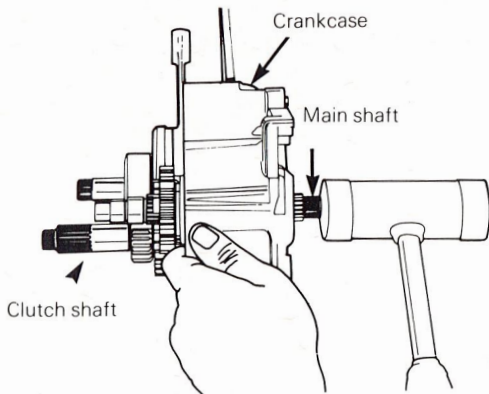
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TRANSMISSION GEAR CLUSTER (MX-5 250)

Disassembly

To remove the clutch and main shaft gear cluster from the crankcase, tap on the sprocket side end of the main shaft.



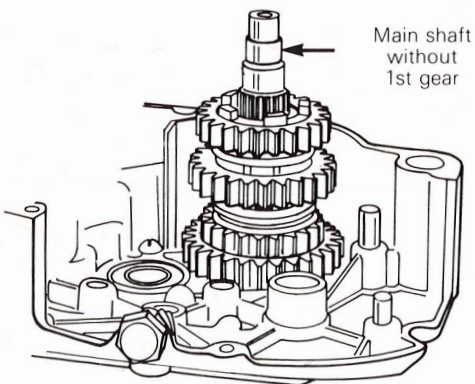
○ **NOTE:** To ease the clutch shaft removal, turn the clutch shaft manually while at the same time, tapping on the main shaft.

Reassembly

Proceed as follows:

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

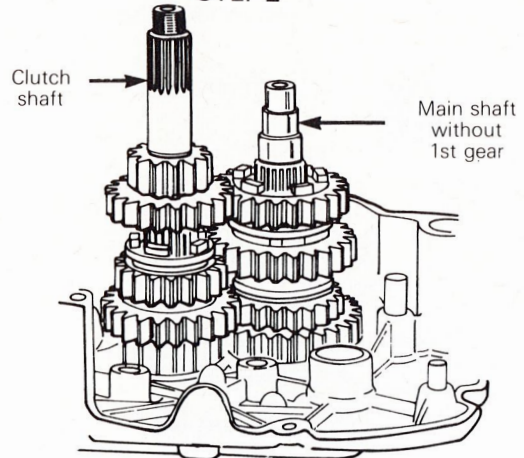
STEP 1



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

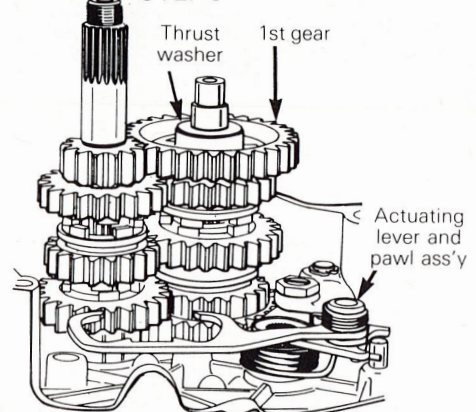
▼ **CAUTION:** Prior to pushing the clutch shaft into the bearing, make sure the gears match one another.

STEP 2



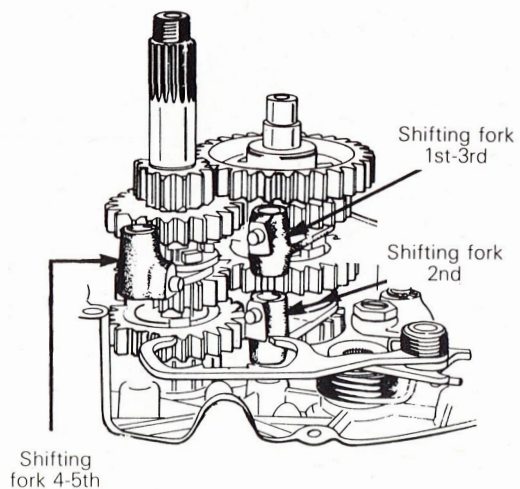
Position the thrust washer, needle bearing, first gear and thrust washer, and then the actuating lever and pawl ass'y as illustrated.

STEP 3



Position the shifting forks as illustrated.

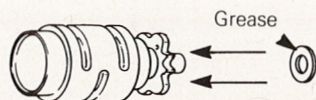
STEP 4



SECTION 02 ENGINE

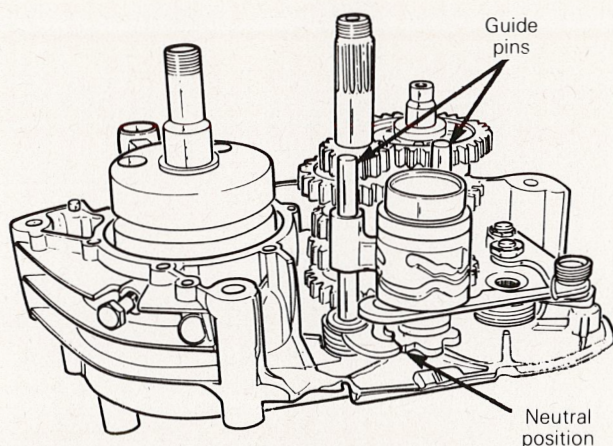
SUB-SECTION 02 (ENGINE/TRANSMISSION)

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



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

STEP 5



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 is leaning against the neutral notch.

CLEANING

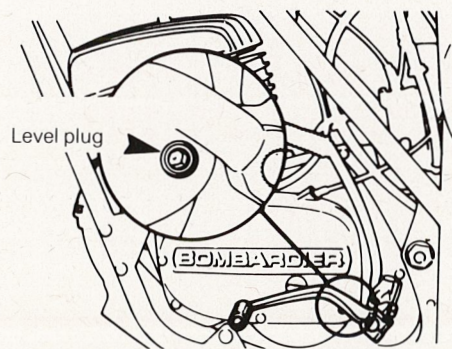
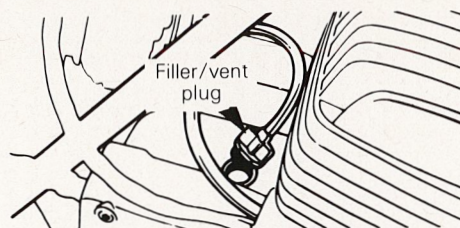
Clean all the metal components in a metal cleaner.

◆ **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.

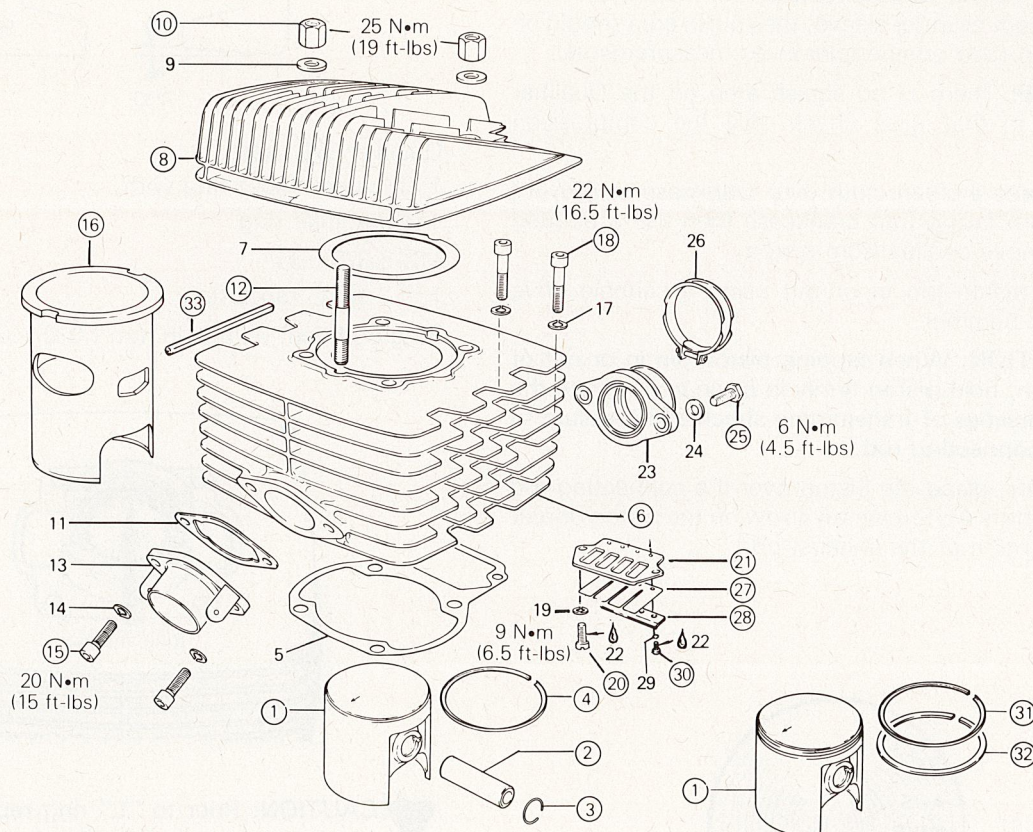


○ **NOTE:** Hold motorcycle upright to check oil level. Replace the level plug, the filler/vent plug and the vent tube.

366 ENGINE TYPE

TOP END

Qualifier 370 - MX-5 370



1. Piston (MX or Qualifier type)
 2. Piston pin
 3. Circlip
 4. "L" Semi-trapez ring (1) (MX-5)
 5. Cylinder base gasket
 6. Cylinder
 7. Cylinder head shim A.R. *
 8. Cylinder head
 9. Washer 10.5 (6)
 10. Cylinder head nut hexagonal M10 (6)
 11. Gasket (exhaust)
 12. Cylinder head stud M10 x 56 (2)
 13. Exhaust socket
 14. Lockwasher 8 (2)
 15. Allen screw M8 x 25 (2)
 16. Cylinder sleeve
 17. Lockwasher 8 (2)
 18. Allen screw M8 x 40 (2)
 19. Lockwasher 6 (2)
 20. Pan head screw M6 x 16 (2)
 21. Reed valve assembly
 22. Loctite 242 blue (medium strength)
 23. Rubber flange
 24. Washer 8.4 (2)
 25. Hexagonal screw M8 x 20 (2)
 26. Clamp
 27. Reed petal
 28. Reed petal stop
 29. Lockwasher 3 (4)
 30. Screw M3 x 6 (4)
 31. "L" Semi-trapez ring (1) (Qualifier)
 32. Rectangular ring (1) (Qualifier)
 33. Damper rubber (Qualifier)
- *A.R.: As required

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

TOP END

Disassembly & Assembly

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

①⑥⑧⑩ At the replacement of the piston, cylinder, cylinder head, cylinder sleeve, the squish area should be remeasured (See engine tolerances measurements).

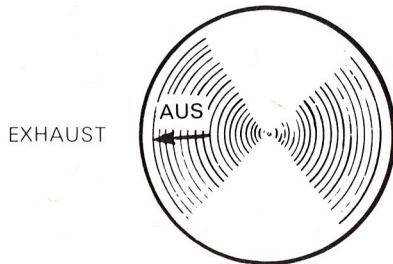
○ **NOTE:** There is no squish area on the Qualifier 370, in that case check only the compression ratio.

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

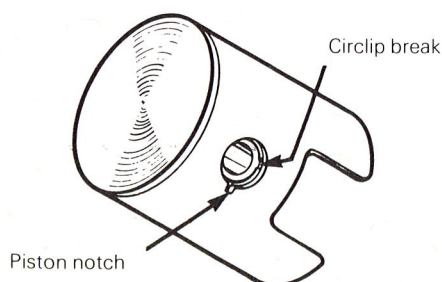
Drive the piston pin in or out using a suitable drive punch and hammer.

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

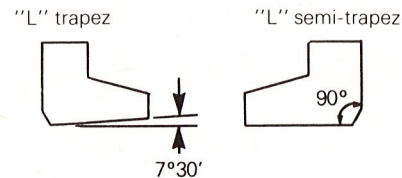
At assembly, place the piston over the connecting rod with the letters AUS (over an arrow on the piston dome) facing direction of the exhaust port.



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



④③③② The are two different types of "L" ring.



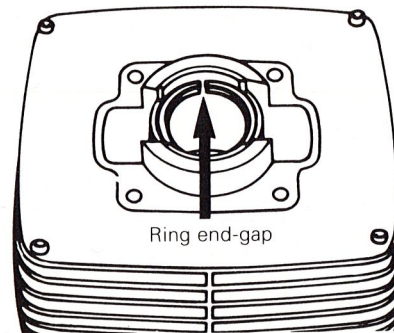
Qualifier 370 uses:

1 "L" semi-trapez ring with
1 rectangular ring

MX-5 370 uses:

1 "L" semi-trapez ring

Ring end-gap: 0.25-0.45 mm (.010"-.017")



▼ **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.

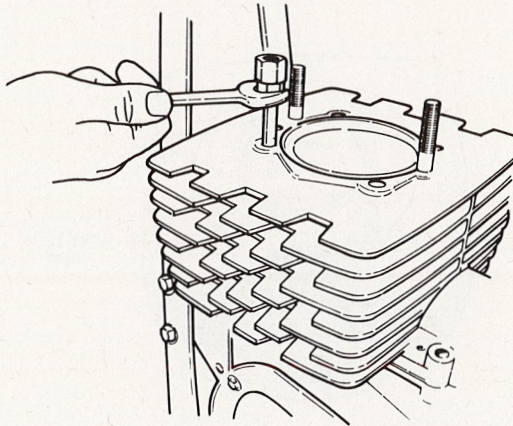
⑥ It is possible to remove the cylinder from the engine with the engine in the frame.

Proceed as follows:

- Remove the seat, the gas tank, the L.H. side panel and the complete exhaust pipe, **including the engine exhaust socket.**
- Disconnect the high tension wire and remove the carburetor and rubber flange.
- Remove the front and lower engine supports, including the R.H. and L.H. bushing under the engine.
- Remove the magneto cover.
- Remove the front bolt of the left foot peg.
- Slacken the swing arm bolt to ease the lowering of the engine.

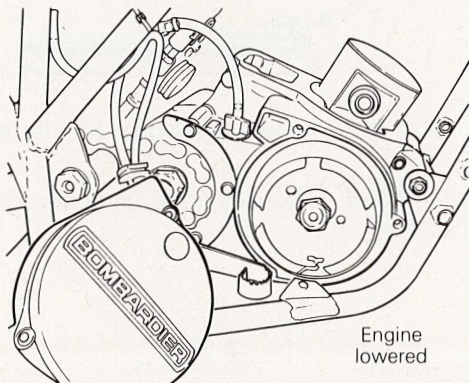
SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

- Remove the cylinder head.
- Remove the four (4) cylinder studs.

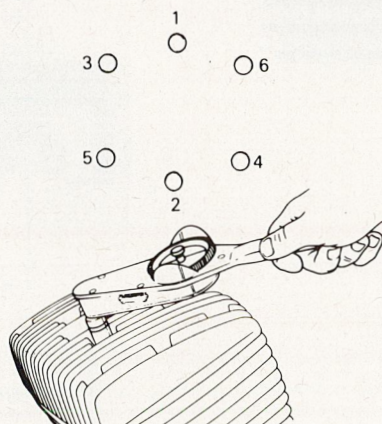


NOTE: It is not necessary to remove the front and rear middle studs which are screwed into the cylinder instead of the crankcase.

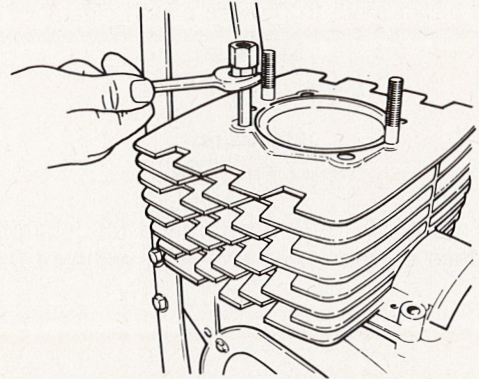
Lift and remove the cylinder.



⑧⑩ At assembly, torque to 25 N•m (19 ft-lbs) in a criss-cross sequence.



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



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

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

⑯ Cylinder sleeve should be replaced whenever its inside diameter becomes 0.190 mm (.0075") or more larger than a new 2nd oversize piston.

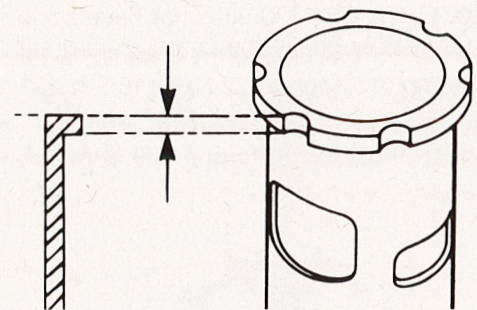
Proceed as follows:

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 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.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

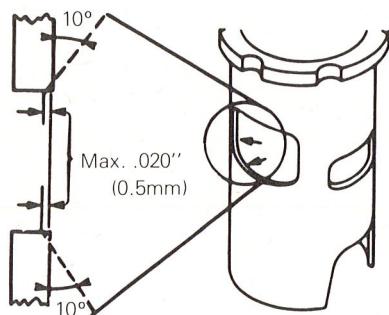
○ **NOTE:** Only 3-4 seconds maximum are needed before cylinder cools sufficiently to grip onto sleeve.

Bore the new sleeve to provide piston clearance of:

Minimum
0.060 mm (.0025")

Maximum
0.100 mm (.004")

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



▼ **CAUTION:** Excessive chamfer will alter port timing.

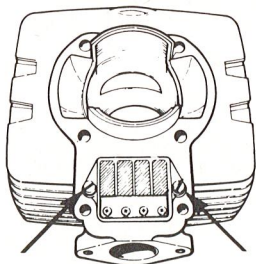
Check the ring end gap.

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

○ **NOTE:** Qualifier 370 does not have a squish area. At assembly check the compression ratio.

⑱ At assembly, torque to 22 N•m (16.5 ft-lbs).

⑳ ㉑ At assembly, apply Loctite 242 blue (medium strength) on threads and torque to 9 N•m (6.5 ft-lbs)

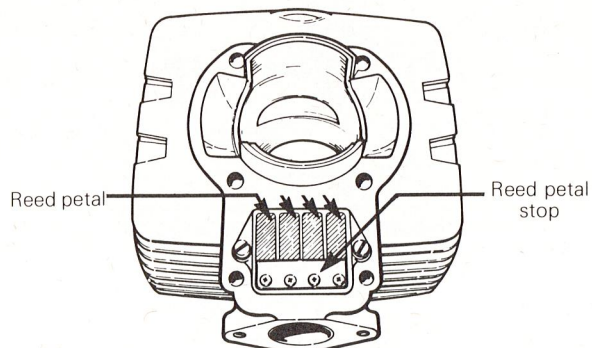


○ **NOTE:** It is necessary to use an impact screwdriver to remove the screws.

㉕ At assembly torque to 6 N•m (4.5 ft-lbs).

㉗ ㉘ ㉚ If the reed petal has to be removed proceed as follows:

Remove the four (4) screws retaining the reed petal stop.



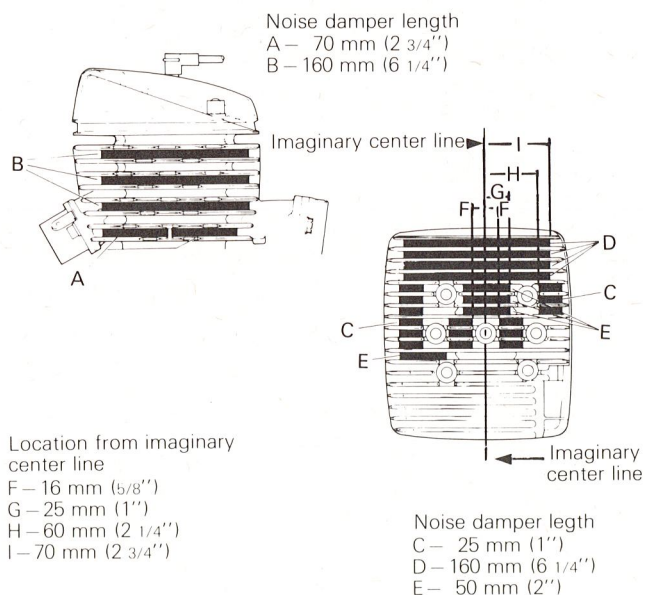
Remove the reed petal.

At reassembly install the reed petal stop ensuring to position as illustrated.



Apply Loctite 242 (medium strength) to the retaining screws.

㉛ (Qualifier 370) If replaced, noise dampers should be installed as illustrated.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

Cleaning

Clean all the metal components in a metal cleaner.

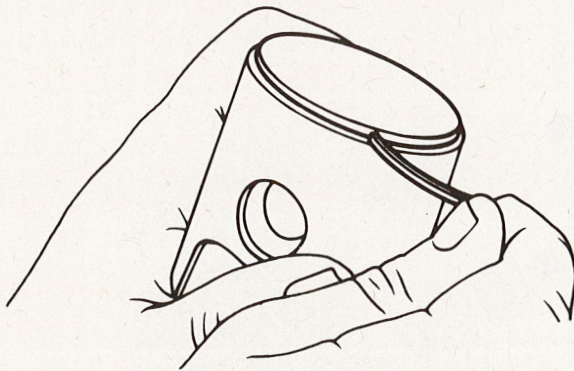
◆ **WARNING:** Solvent with a low flash point such as gasoline, maphtha, benzol, etc, should not be used as they are flammable and explosive.

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.

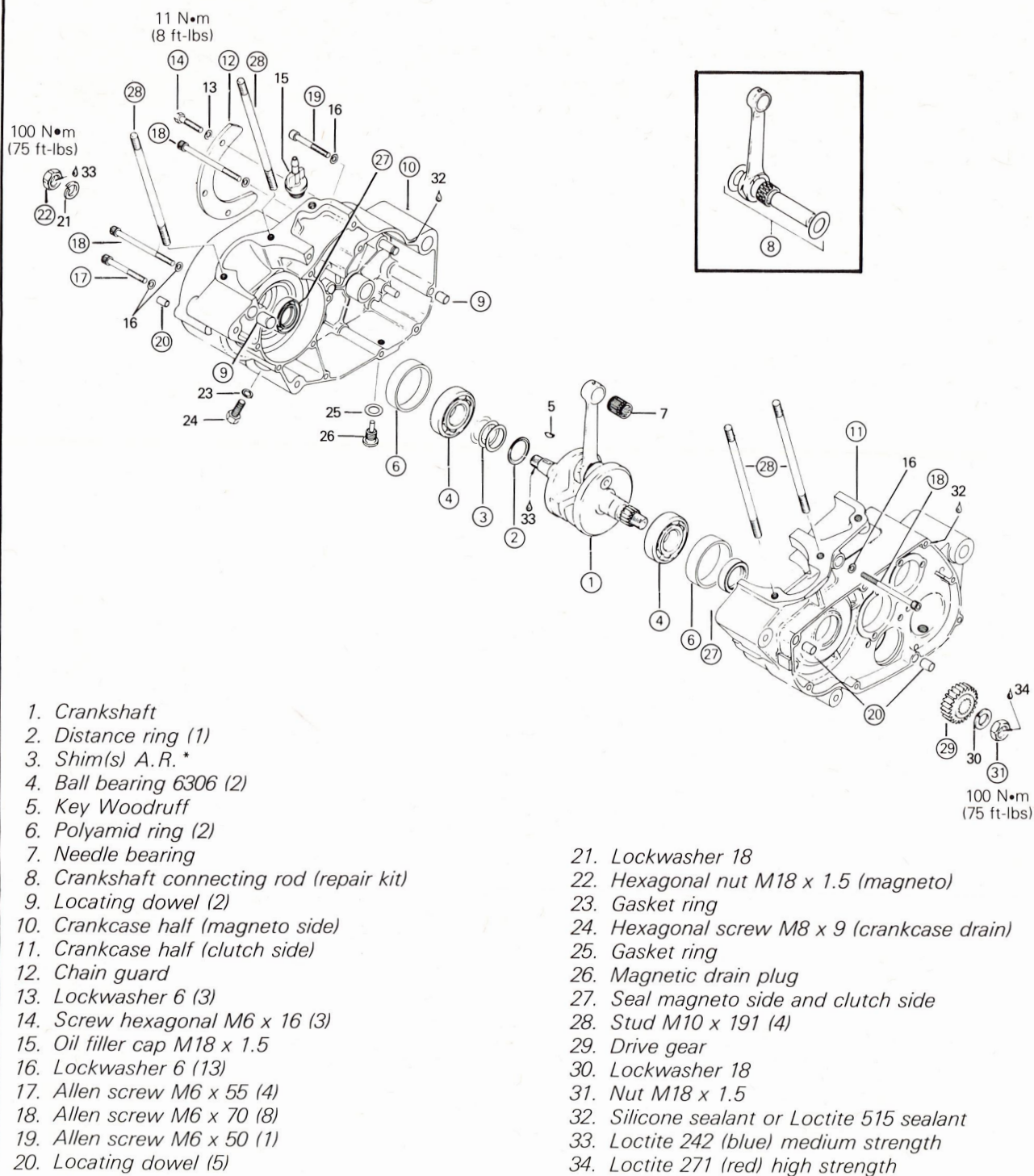
Remove all traces of the cylinder base gasket and fit a new lightly greased gasket.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

BOTTOM END

Qualifier 370 - MX-5 370



SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

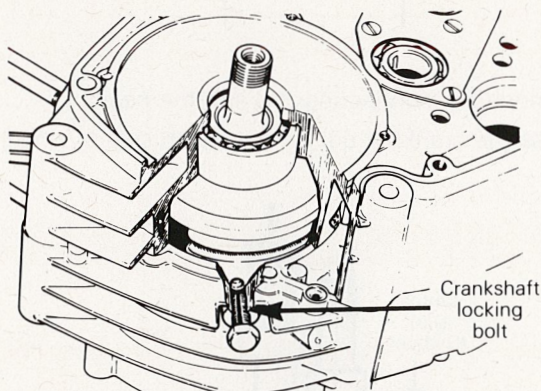
BOTTOM END

Disassembly & Assembly

①⑧⑩⑪ At the replacement of the crankshaft, connecting rod and crankcase halves, the squish area should be measured (See engine tolerances measurements).

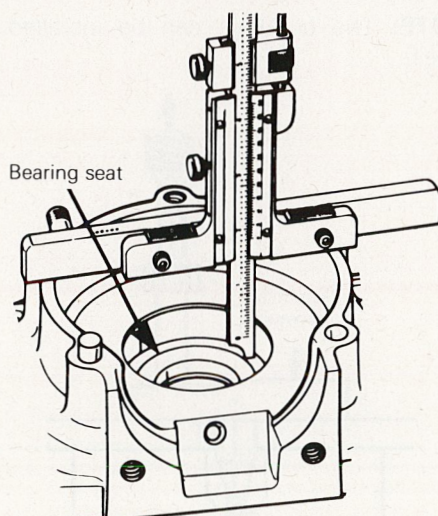
○ **NOTE:** There is no squish area on the Qualifier 370, in that case, check only the compression ratio.

①⑩ To facilitate some procedures, the crankshaft can be locked at the top dead center position using a crankshaft locking bolt as illustrated.

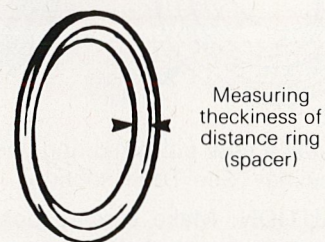
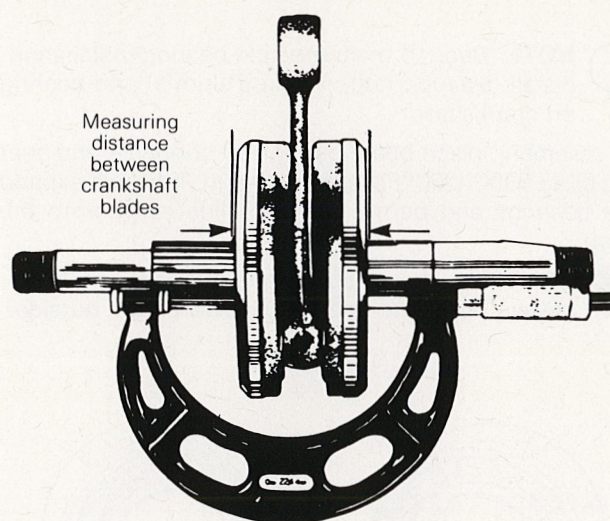
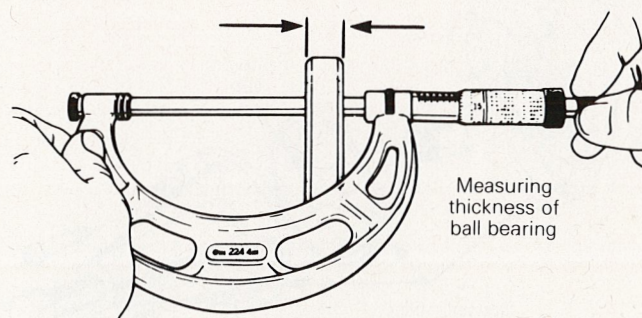


② At assembly, position the distance ring with the chamfered side facing the crankshaft.

①③ Crankshaft end-play should be between 0.1 mm (.004") to 0.2 mm (.008"). 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, and measure the thickness of the distance ring ②. Add measurements. Total equals B.



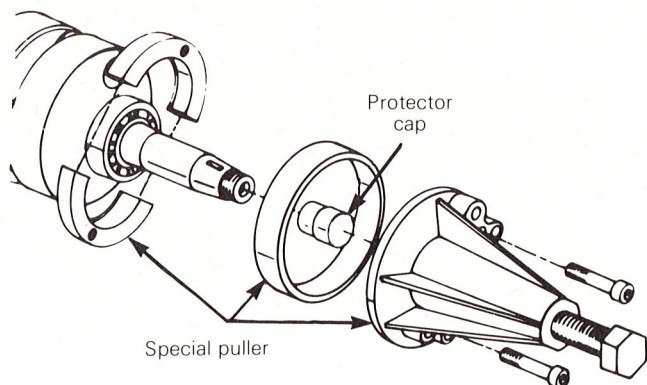
Subtract measurement B from measurement A, min. tolerance of 0.1 mm (.004") to 0.2 mm (.008"). Total balance is distance to be shimed. Shim(s) must be located between distance ring and bearing.

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

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

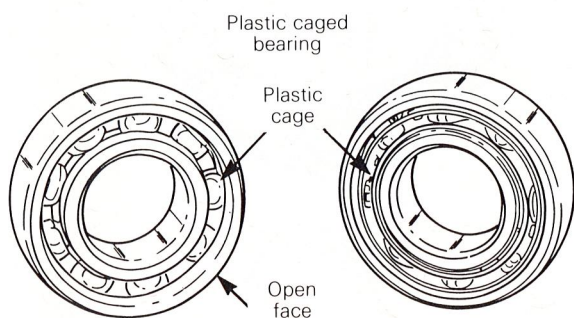
④ To remove bearing from crankshaft use A bearing puller as illustrated. (See tool section).



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

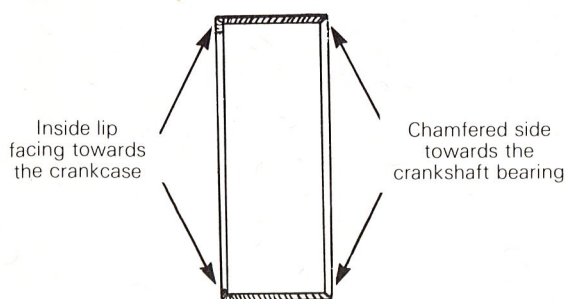
At assembly, place bearings in an oil container and heat the oil to 93°C (200°F) for 5 to 10 min. This will expand the bearings and permit them to slide easily onto the shaft.

▼ **CAUTION:** If a plastic caged bearing is installed, always place the open face towards the outside.



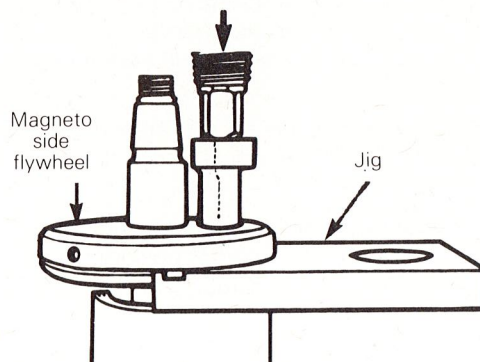
⑥ To install a new polyamid ring use an appropriate insertion pusher (See Tools section).

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



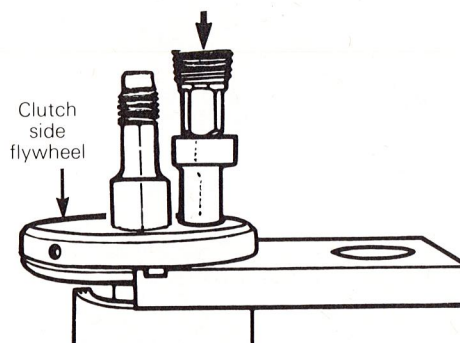
⑧ To replace the connecting rod proceed as follows:

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



Remove the connecting rod and the bearing.

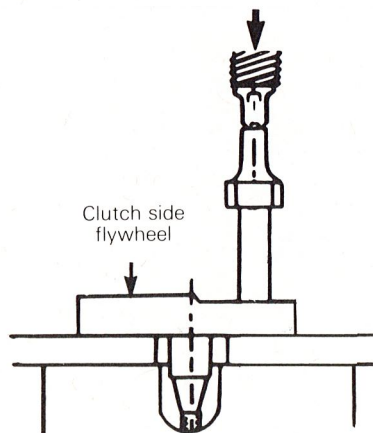
Press the crankpin out of the clutch side flywheel.



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 the crankpin.

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

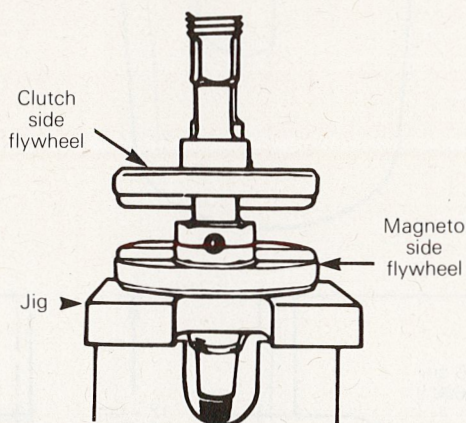


SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

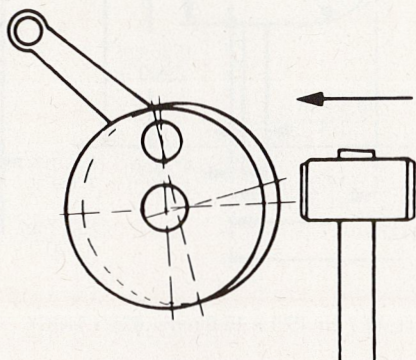
Fit the connecting rod and the bearing into place with light grease.

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.

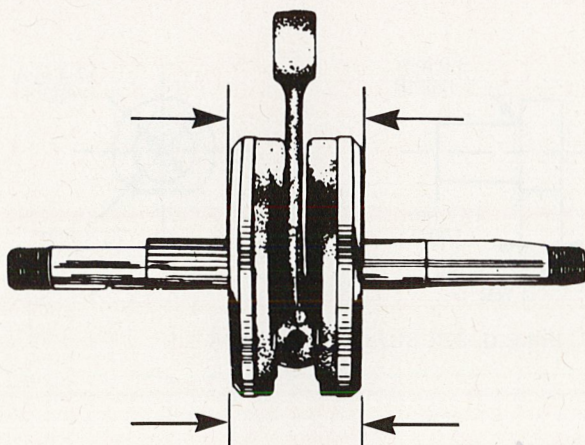
○ **NOTE:** The connecting rod side clearance must be 0.4 mm (.015") to 0.5 mm (.020").



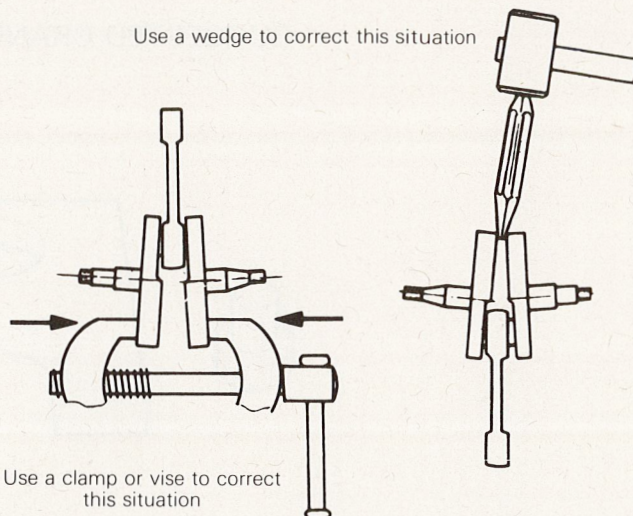
Using a "straight edge", check for flywheel alignment. Drift with a heavy brass mallet to align if necessary.



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



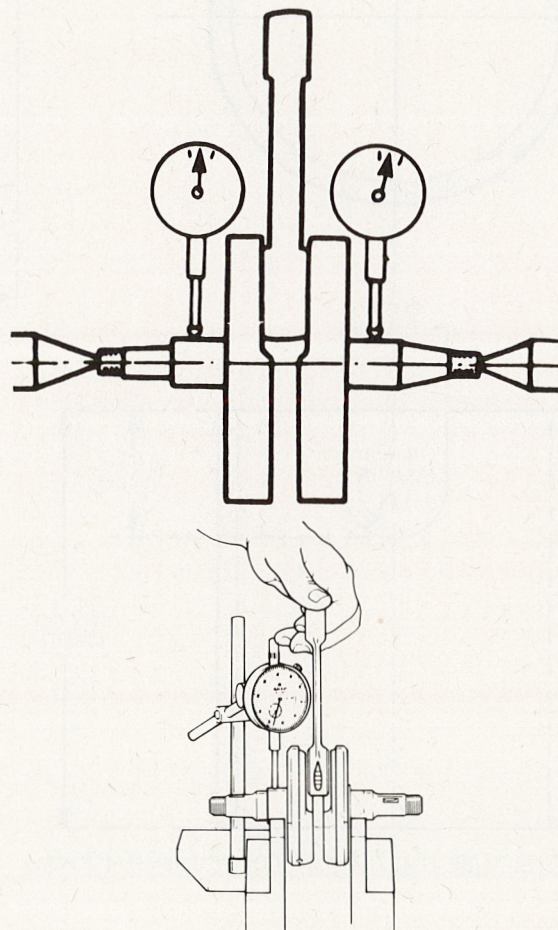
Use a wedge to correct this situation



○ **NOTE:** For final alignment measures, see technical data.

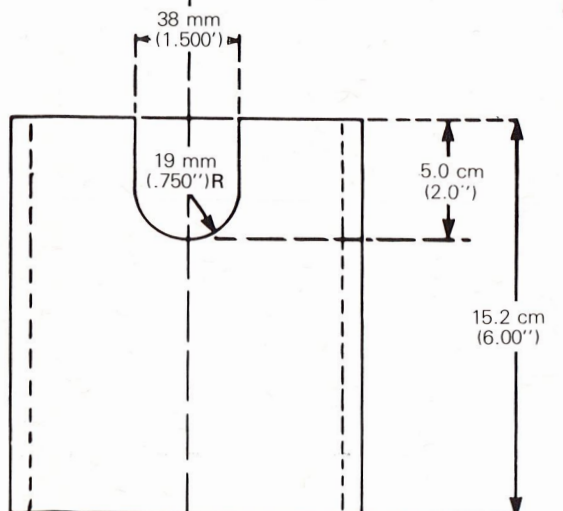
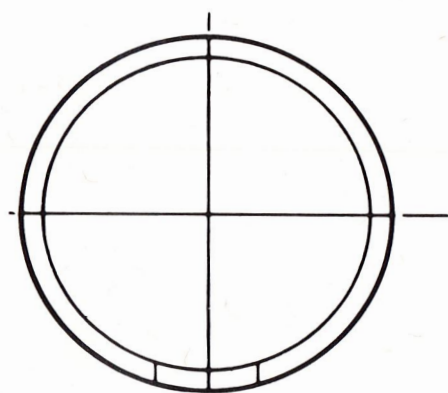
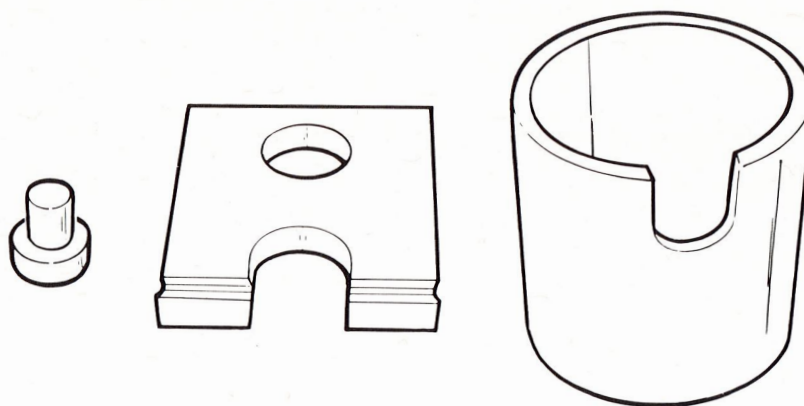
When overall alignment is completed, verify connecting rod side clearance.

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

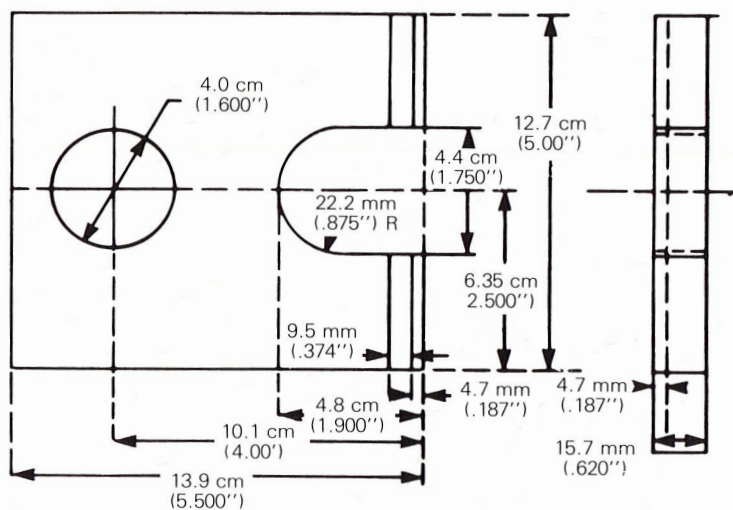


SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

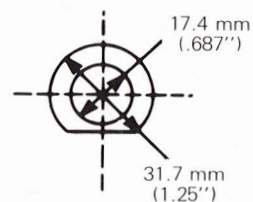
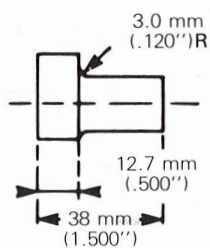
SUGGESTED CRANKSHAFT REPAIR TOOL



STEEL TUBE 11.43 CM (4.5") I.D. x 6.3 mm (1/4") WALL



H.R. ST'L PLATE 12.7 cm (5") x 15.9 mm (.625") THICK



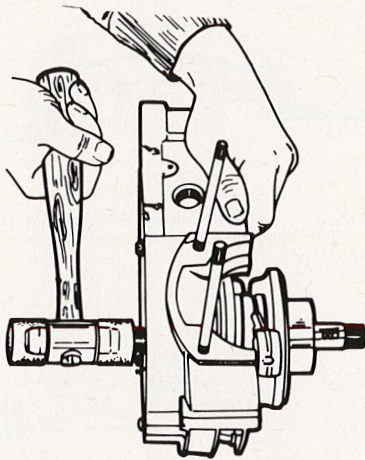
H.R.C.Q. ST'L 31.7 mm (1.250") DIA.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

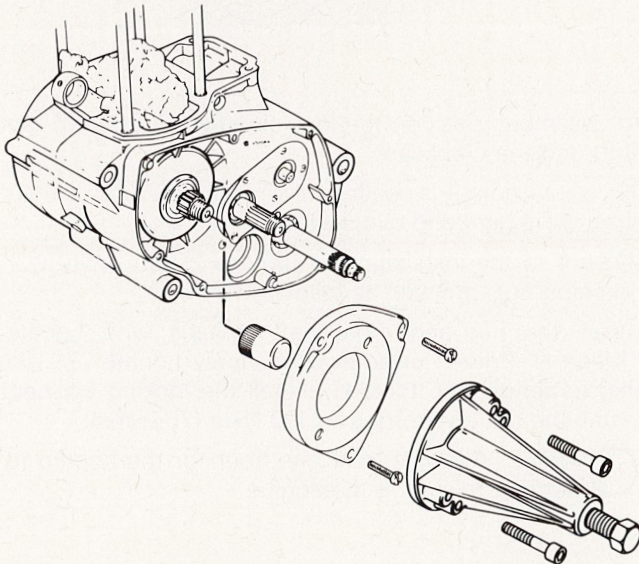
⑨ At the joining of the crankcase halves, make sure the locating dowel sleeves are in place.

⑩ Remove the crankshaft from the crankcase by tapping on the crankshaft end with a **soft** hammer.



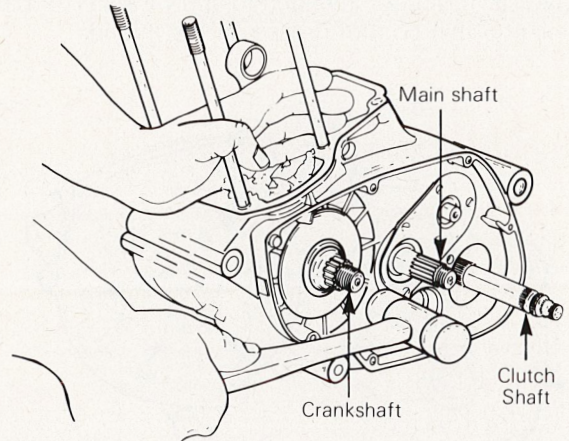
▼ **CAUTION:** Prior to the crankshaft removal ensure that the crankshaft locking bolt is removed.

⑩ ⑪ To split the crankcase halves, use a protective cap and puller (See Tools section).



○ **NOTE:** The crankcase halves can also be splitted, by tapping equally on the main shaft, clutch shaft and crankshaft with a **soft** faced hammer.

▼ **CAUTION:** Ensure that all the crankcase retaining screws have been removed (including the screw behind the chainguard).

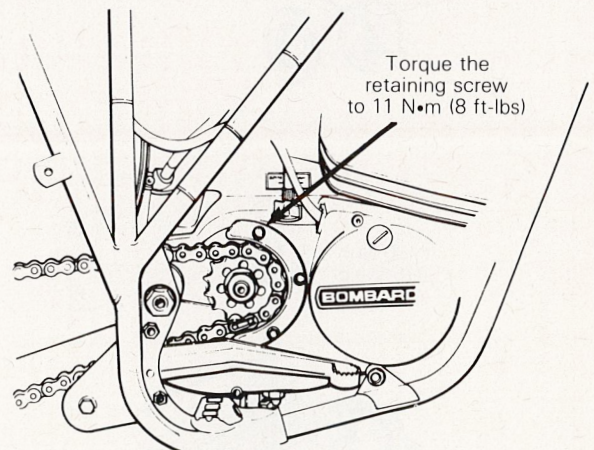


▼ **CAUTION:** Do not pry between crankcase halves, as score marks incurred are detrimental to crankcase sealing.

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 or silicone sealant.

⑫ At assembly, ensure to use the proper chain guard (13 teeth, 14 teeth or 15 teeth engine sprocket).



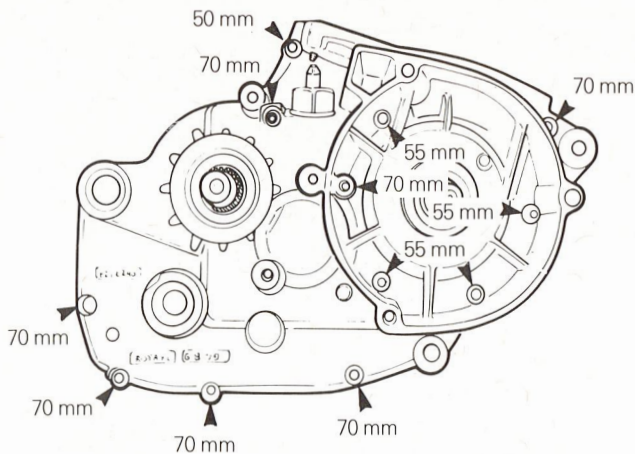
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

⑭ At assembly, torque to 11 N•m (8 ft-lbs).

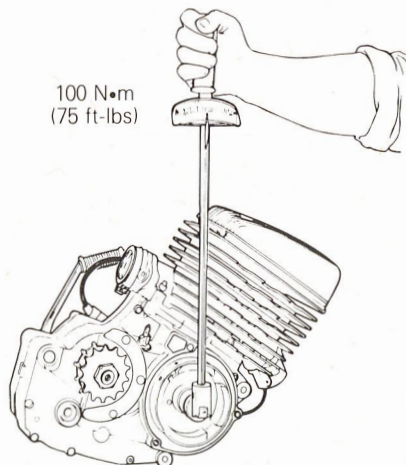
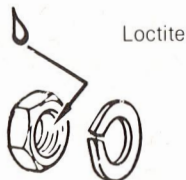
⑰⑱⑲ At assembly, torque to 11 N•m (8 ft-lbs) following a criss-cross sequence.

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

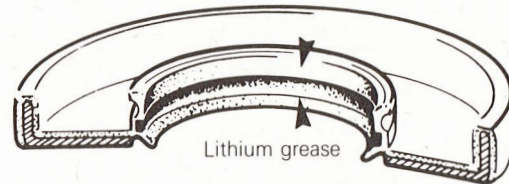


⑳ At assembly, ensure that the locating dowel sleeves are in place.

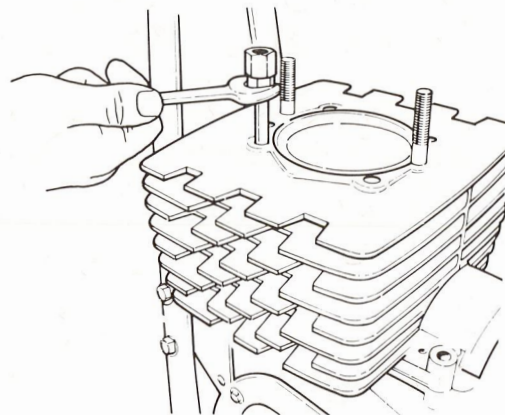
㉑ At assembly, apply Loctite 242 blue (medium strength) on the threads of the flywheel retaining nut and torque to 100 N•m (75 ft-lbs).



㉒ To 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.



㉓ To unscrew, use 2 cylinder head nuts blocked one against the other.



At assembly, position the long threaded portion of the stud into the crankcase.

㉔ If replacement is needed, always replace both crankshaft drive gear and clutch drum.

㉕ 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) on threads, install the locking washer, install the nut and torque to 100 N•m (75 ft-lbs).

○ **NOTE:** Allow at least one hour for the Loctite to set before setting the engine.

Cleaning

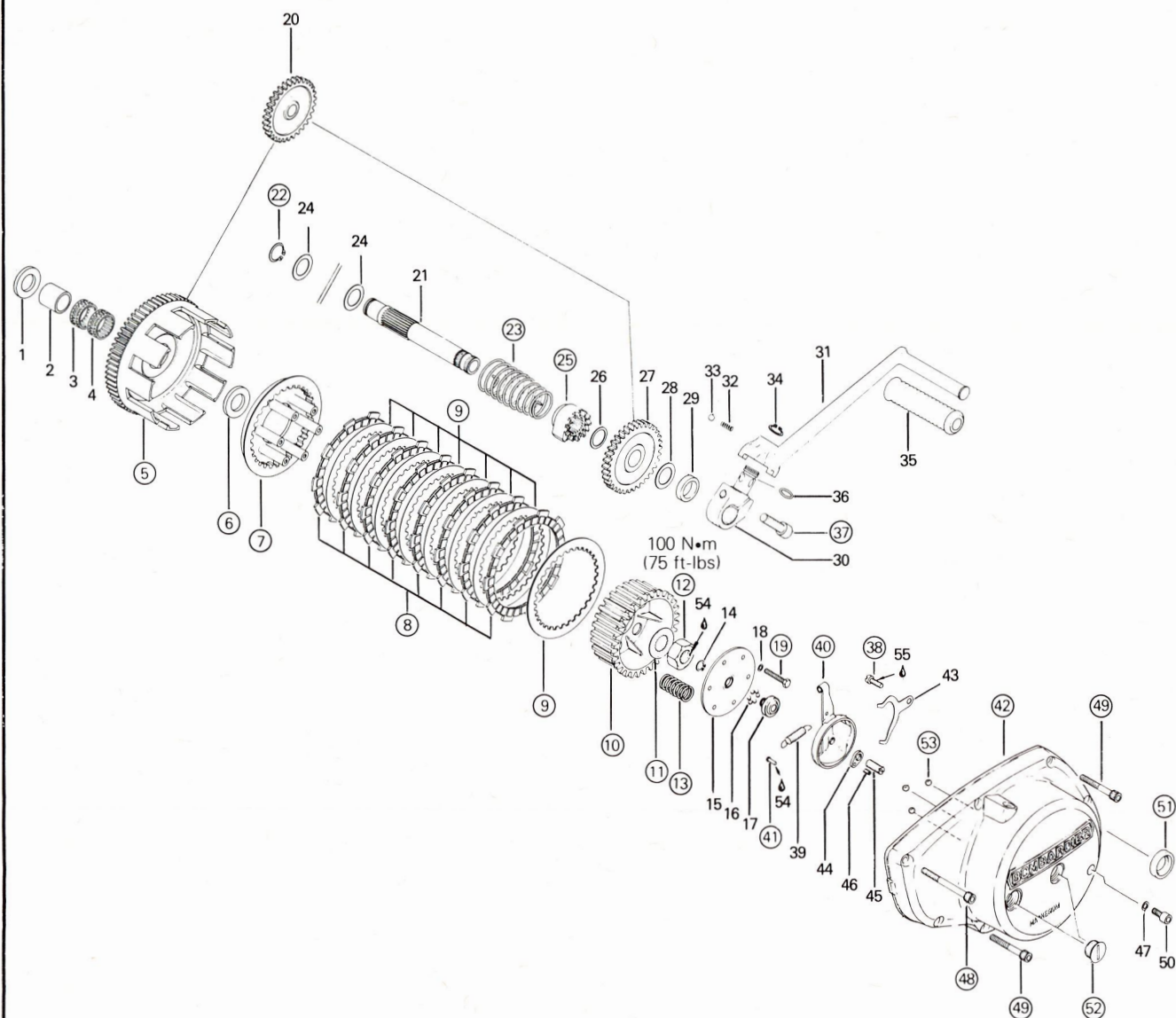
Clean all the metal components in a metal cleaner.

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

Remove old sealant from mating surfaces of crankcase 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**
Qualifier 370 - MX-5 370



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

1. Thrust washer (inner)
2. Inner race
3. Needle bearing
4. Needle bearing
5. Clutch drum
6. Thrust washer (outer)
7. Inner pressure plate
8. Friction plate 8
9. Driven plate 8
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. Distance sleeve 6 mm
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 19.5
46. Clutch adjustment locking screw M4 x 6
47. Sealing ring
48. Allen screw M6 x 40 (2)
49. Allen screw M6 x 35 (6)
50. Plug, oil lever
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)

SECTION 02 ENGINE

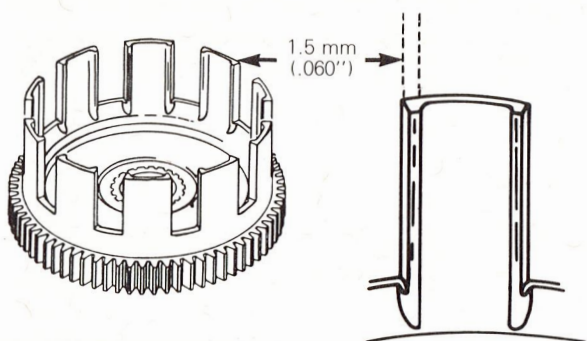
SUB-SECTION 02 (ENGINE/TRANSMISSION)

CLUTCH AND KICK START/ CLUTCH COVER

Disassembly & Assembly

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

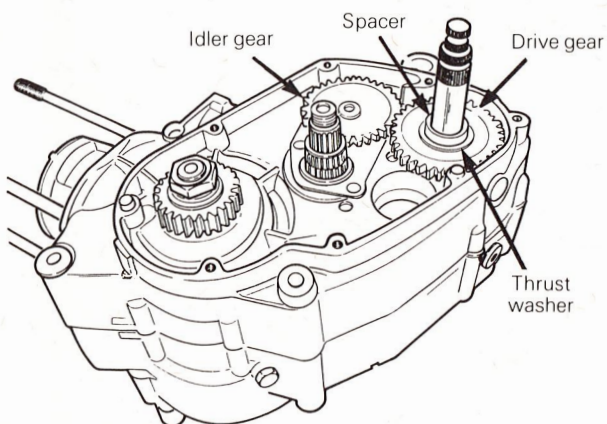
▼ **CAUTION:** The shouldered wall should not be filed thinner than 1.5 mm (.060").



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 towards the crankcase.

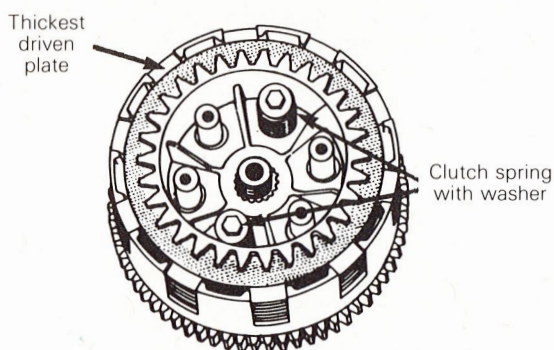


▼ **CAUTION:** Prior to the clutch hub installation, ensure to properly position the thrust washer ⑥.

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.

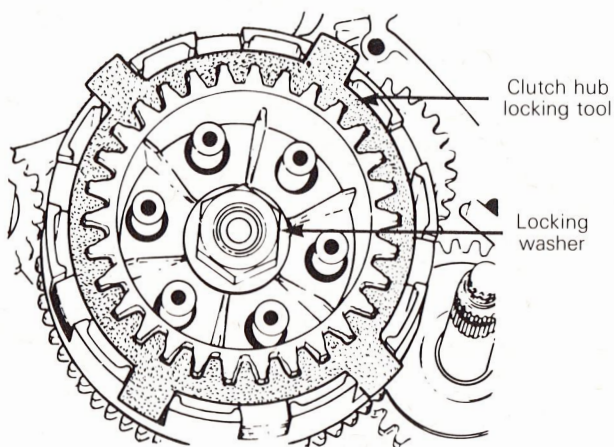
Ensure to place the thickest driven plate on the top.

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



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

⑫ To 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 100 N•m (75 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.

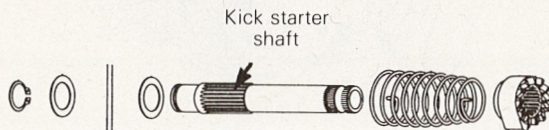
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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

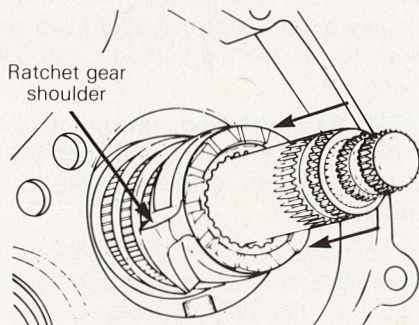
⑰ At assembly, tighten in a criss-cross sequence and torque to 5.5 N•m (4 ft-lbs).

⑳ 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 spring ends are well positioned in the crankcase and ratchet gear holes.

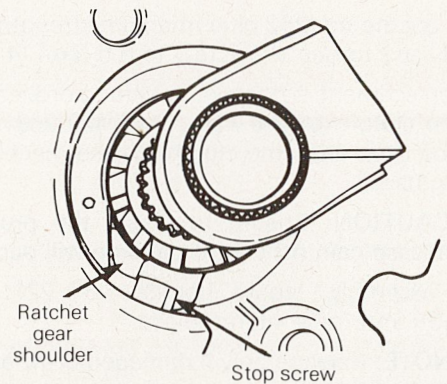
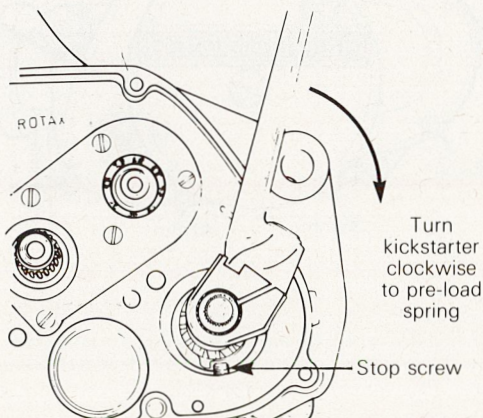
㉕ At assembly, position the spring end into the ratchet gear and partially engage the ratchet gear onto the shaft splines.



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.

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

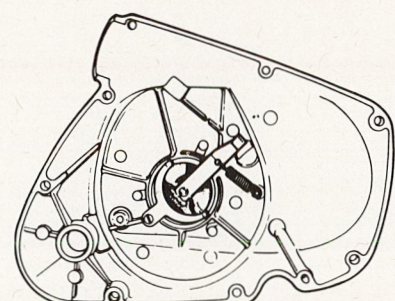
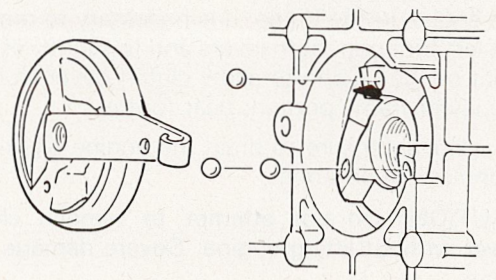
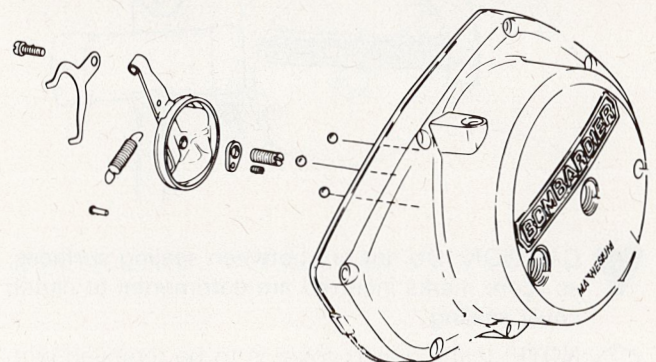


◆ **WARNING:** Exercise care when removing or installing the ratchet gear.

○ **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 ④① At assembly, position as illustrated.



SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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

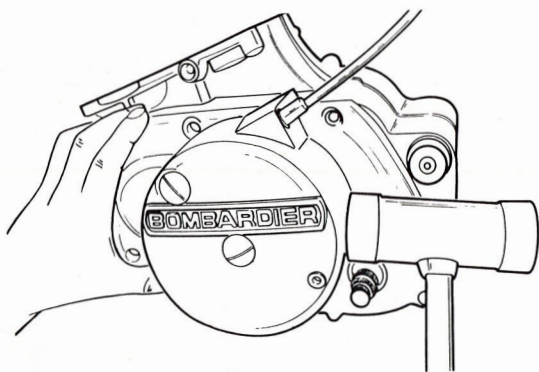
④① If replacement is needed, ensure to order the hardened type clutch release cam (P/N 420 259 790) which must be used with the clutch release mechanism with bearing balls.

▼ **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).

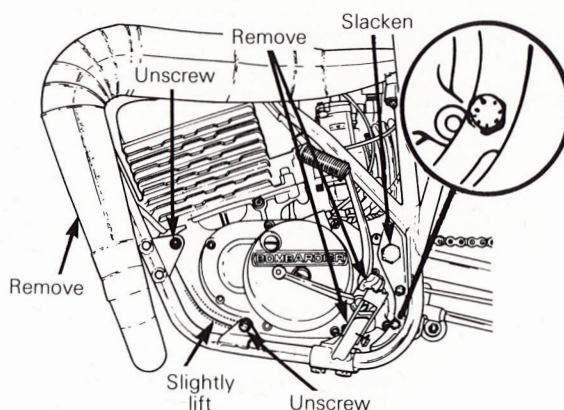


▼ **CAUTION:** Do not pry between sealing surfaces, as score marks incurred are detrimental to clutch cover sealing.

○ **NOTE:** If the clutch cover is to be removed with the engine in the frame, it is necessary to remove the left foot peg, both levers and to slightly lift the front of the engine to allow clutch cover to clear the lower frame portion, near footrest.

Prior to removal, ensure to drain the engine oil and to slacken the swing arm bolt.

▼ **CAUTION:** Do not attempt to remove clutch cover without lifting engine. Severe damage can occur.



○ **NOTE:** Muffler must be removed to allow sufficient lifting at the front of the engine.

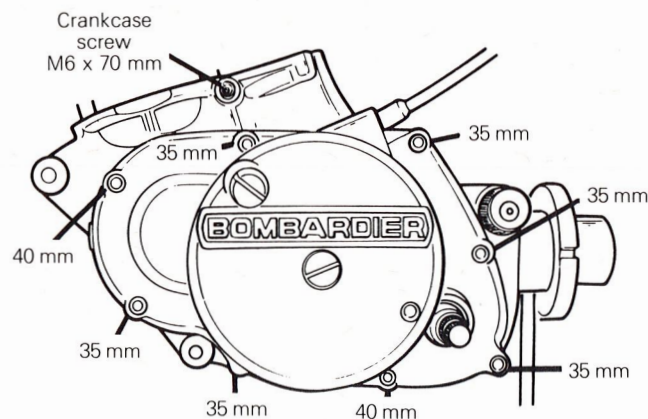
With clutch cable still connected, pull the clutch lever in. It will then preload against the cover to ease removal.

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 or silicone 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.

④⑧⑨ 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.



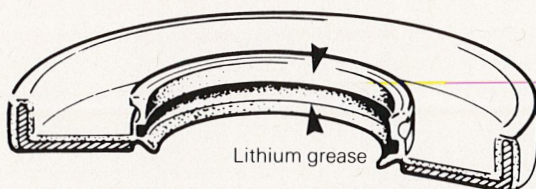
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

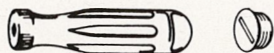
▼ **CAUTION:** Ensure to use the correct screw for its location otherwise damage to the crankcase will occur.

▼ **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.

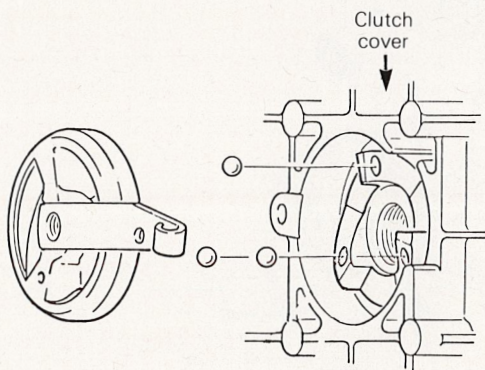
At assembly, apply lithium grease on the seal lips.



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.

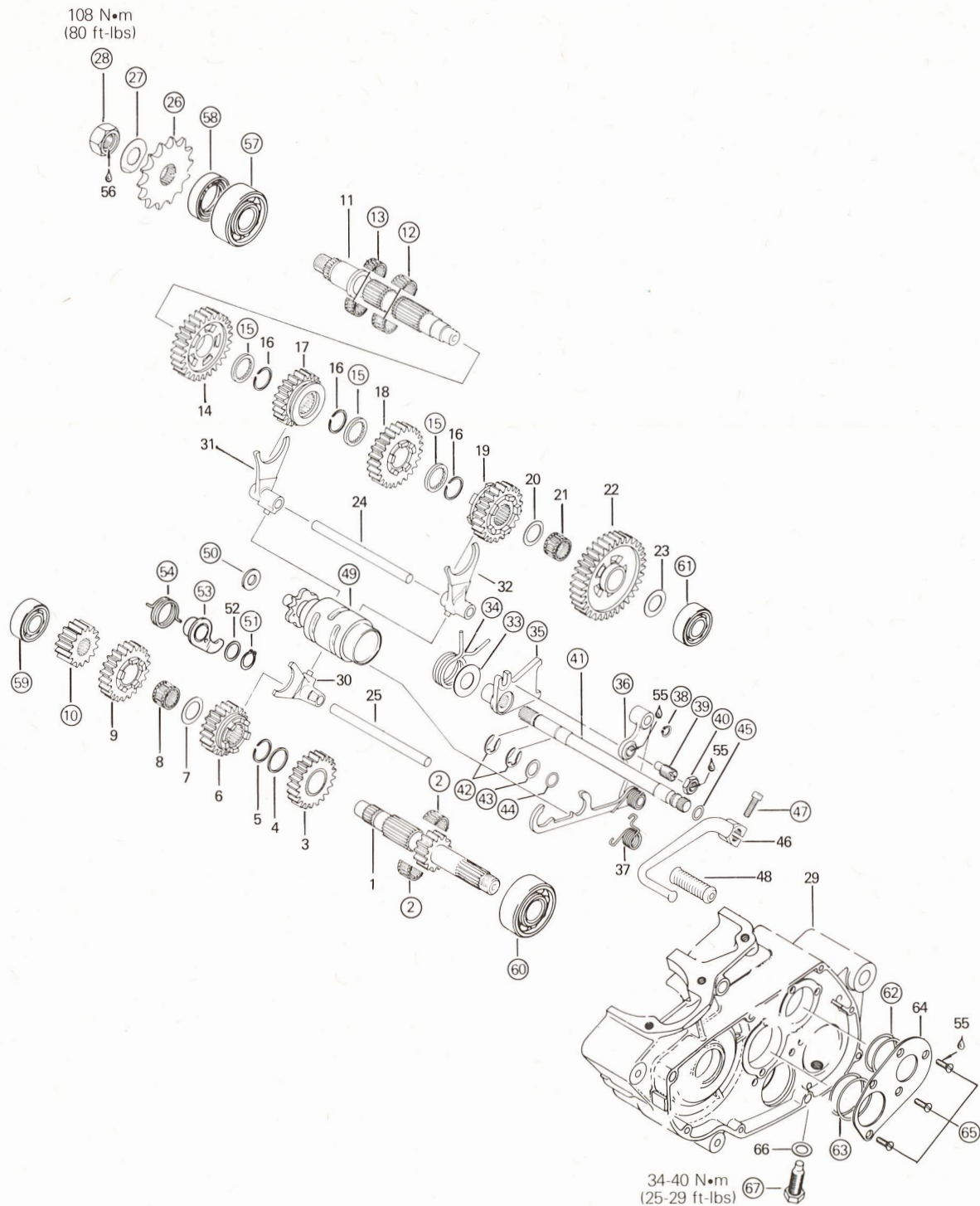
◆ **WARNING:** Solvent with a low flash point such as gasoline, maphtha, benzol, etc., should not be used as they are flammable and explosive.

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.

SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

TRANSMISSION (GEAR BOX)
QUALIFIER 370 - MX-5 370
(5 speed)



SECTION 02 ENGINE
SUB-SECTION 02 (ENGINE/TRANSMISSION)

1. Clutch shaft 11 T (Qualifier 370)
13 T (MX-5 370)
2. Needle bearing ass'y, clutch shaft
width 11.68 mm (.460")
3. 4th gear, clutch shaft, 21 T
4. Thrust washer, clutch shaft
5. Snap ring, clutch shaft
6. 3rd gear, clutch shaft, 18 T
7. Thrust washer, clutch shaft
8. Needle bearing, clutch shaft
9. 5th gear, clutch shaft, 23 T
10. 2nd gear, clutch shaft 15 T (Qualifier 370)
16 T (MX-5 370)
11. Main shaft
12. Needle bearing ass'y main shaft
width 12.55 mm (.494")
13. Needle bearing ass'y main shaft
width 9.65 mm (.380")
14. 2nd gear, main shaft, 28 T
15. Thrust washer, main shaft (3)
16. Snap ring, main shaft (3)
17. 5th gear, main shaft, 21 T
18. 3rd gear, main shaft, 25 T
19. 4th gear, main shaft, 23 T
20. Thrust washer, main shaft
21. Needle bearing, main shaft
22. 1st gear, main shaft 32 T (Qualifier 370)
31 T (MX-5 370)
23. Thrust washer, main shaft
24. Shift fork guide pin
25. Shift fork guide pin
26. Sprocket, 15 T (Qualifier 370)
14 T (MX-5 370)
27. Locking washer, main shaft
28. Main shaft nut M20 x 1.5
29. Magneto side crankcase half
30. Shifting fork, 4-5th
31. Shifting fork, 2nd
32. Shifting fork, 1st-3rd
33. Thrust washer, actuating lever
34. Spring, actuating lever
35. Actuating lever
36. Pawl ass'y
37. Pawl spring
38. Snap ring 10 x 1
39. Pawl positioning screw
40. Locking nut M12 x 1, pawl positioning screw
41. Shift shaft
42. Retaining ring (2)
43. Thrust washer, shift shaft
44. "O" ring, shift shaft
45. "O" ring, shift shaft
46. Shift lever
47. Allen screw M6 x 20
48. Shift lever rubber
49. Shift drum ass'y
50. Washer, shift drum
51. Index snap ring
52. Index washer
53. Index lever
54. Index spring
55. Loctite 242 blue (medium strength)
56. Loctite 271 red (high strength)
57. Ball bearing 6205, main shaft, sprocket side
58. Seal main shaft
59. Ball bearing 6203, clutch shaft, sprocket side
60. Ball bearing 6204, clutch shaft, clutch side
61. Ball bearing 6203, main shaft, clutch side
62. Shim 0.5 mm (0.019"), 0.3 mm (0.011"), 0.1 mm (0.004"), main shaft bearing *A.R.
63. Shim 0.5 mm (0.019"), 0.3 mm (0.011"), 0.1 mm (0.004") (clutch shaft bearing) *A.R.
64. Retaining plate (transmission bearings)
65. Countersunk screw M5 x 12 (5)
66. Gasket ring
67. Stop screw, kick starter

*A.R.: As required

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

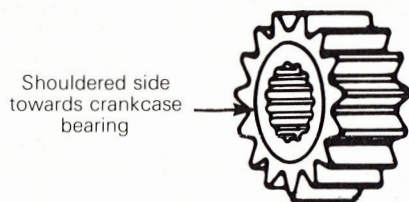
TRANSMISSION (GEAR BOX)

Disassembly & Assembly

②⑫⑬ The needle bearing halves must be replaced in pairs only.

▼ **CAUTION:** Make sure not to intermix the needle bearings halves, damage could occur. If bearing halves have been intermixed refer to the description to find the proper width of the bearing halves.

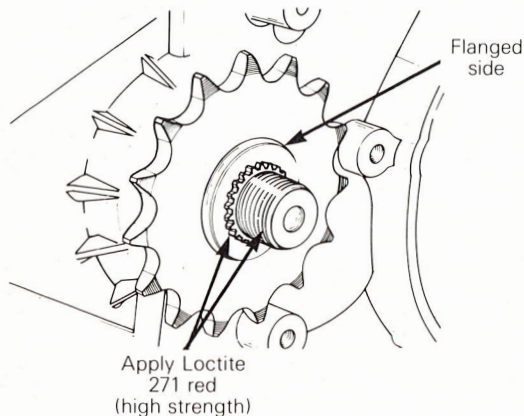
⑩ At assembly, the shouldered side of the 2nd gear, clutch shaft must face towards the crankcase bearing.



⑮ The sharp edge of the splined thrust washer must face retaining snap ring.

②⑥ At assembly, apply Loctite 271 red (high strength) on the splines.

▼ **CAUTION:** Ensure to position the sprocket with the flanged side facing outside.



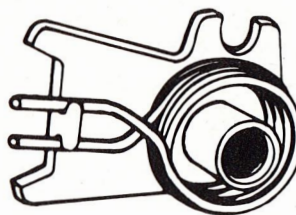
▼ ②⑦ **CAUTION:** Locking washer should be replaced if bent more than twice. If in doubt, replace.

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 108 N•m (80 ft-lbs).

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

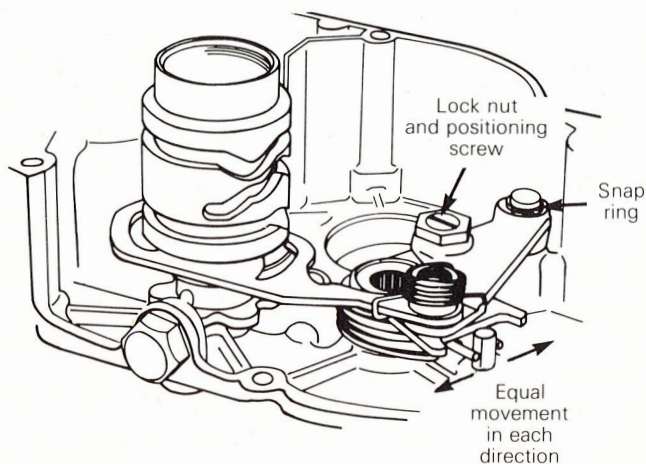
③③ ③④ ③⑤ Assemble the spring, thrust washer and actuating lever as illustrated.



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

③⑥ ③⑨ ④⑩ 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.



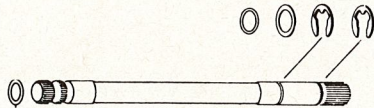
Movement in both direction must be equal. If not, the pawl ass'y can be repositioned by unlocking the lock nut and adjusting the pawl positioning screw. Lock the nut and verify. Repeat until the travel is equal on both sides.

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

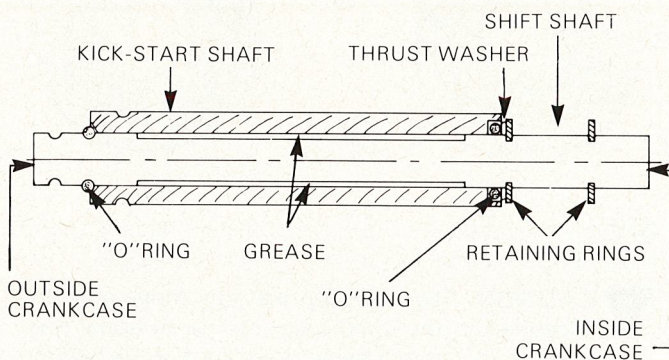
SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

▼ ③⑧ 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.

④①④②④③④④④⑤ At assembly, position the retaining rings, thrust washers and "O" rings as illustrated.

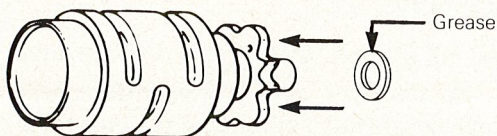


Coat the shift shaft with grease.



④⑦ At assembly, torque to 11 N•m (8 ft-lbs).

④⑨⑤① 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.



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

⑤①⑤③⑤④ At assembly, properly position the spring end into the index lever and crankcase hole.

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



⑤⑦ 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 imagnesium 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

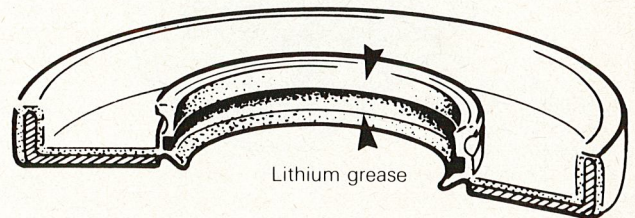
Grease the sprocket side main shaft oil seal with lithium grease.

Cut a 50 mm (2") diameter disc out of asbestos material. Place the disc over the oil 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 and an appropriate pusher.

⑤⑧ To install a new seal, use the appropriate oil seal insertion pusher. (See toll section). Apply a light coat of lithium grease on the seal lip.

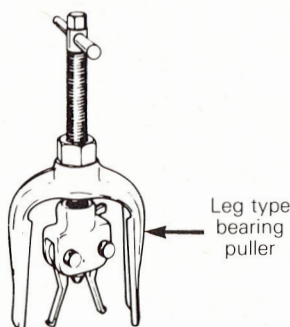


○ NOTE: The oil seal can only be replaced with the main shaft bearing removed.

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

⑤⑨ Heat and a leg type puller is needed to remove the clutch shaft bearing from sprocket side crankcase.



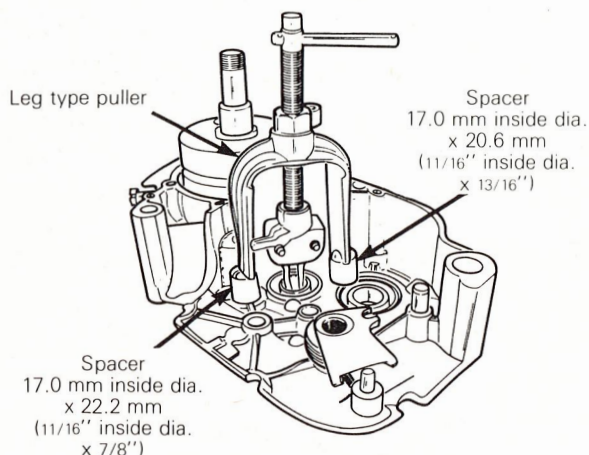
▼ **CAUTION:** Always apply heat to remove or install a bearing in the crankcase. Failure to apply heat may result in metal being drawn out of the bearing to crankcase contact surface, thus causing a loose fit in the crankcase.

Proceed as follows:

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

Disassembly

Install the puller as illustrated.



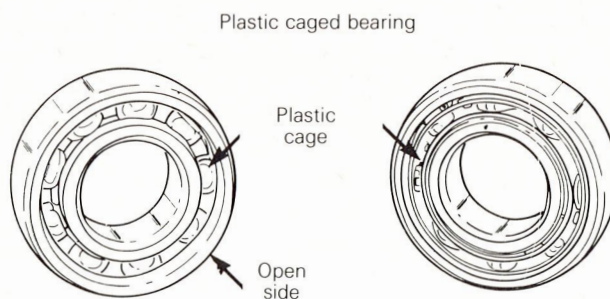
○ **NOTE:** Two cylindrical spacers are needed to properly position the puller in the crankcase.

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 bearing 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.



⑥⑥ 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 in 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).

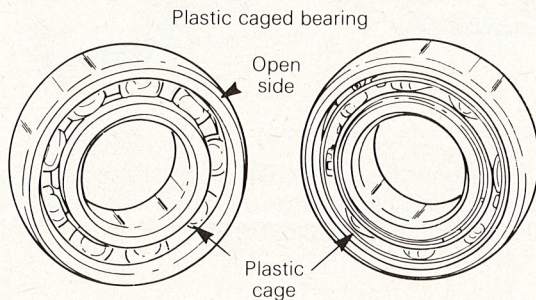
Heat the crankcase (inside portion) as described above.

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

SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

- **NOTE:** If plastic caged bearings are installed, always place the clutch shaft bearing with the open side facing the inside of the crankcase and the main shaft bearing with the open side facing the outside of the crankcase.



Remove the bearing retaining plate and verify the end play.

- ⑥② ⑥③ 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.

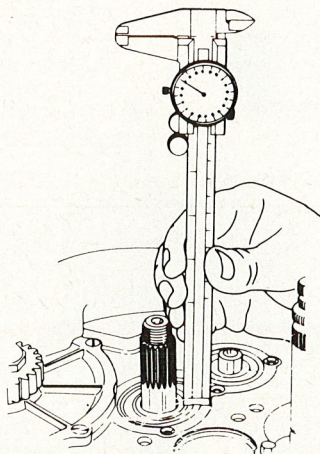
The end-play must be 0.1 mm (.004") maximum.

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

- ⑥⑤ 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)

- ⑥⑦ 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 removal of the clutch cover will be necessary to re-preload the spring.



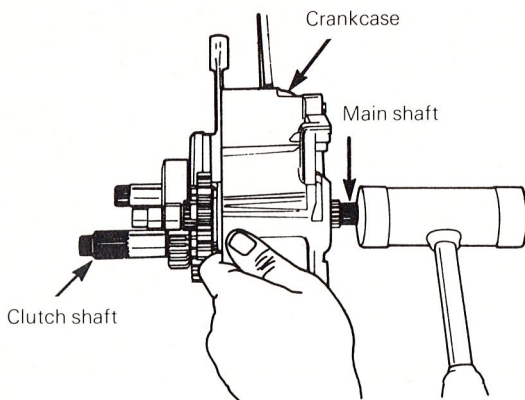
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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.



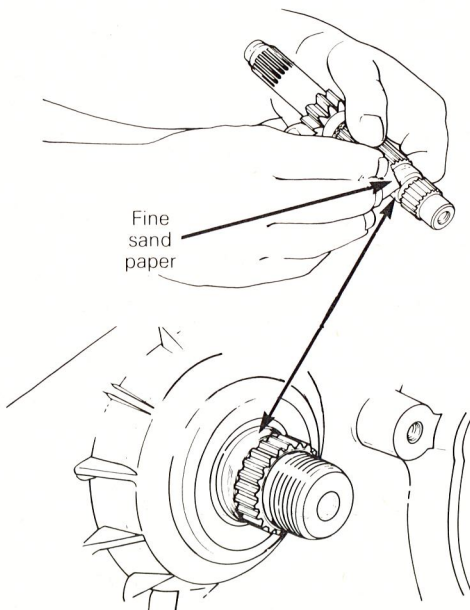
○ **NOTE:** To ease the clutch shaft removal, turn the clutch shaft manually while at the same time hitting the main shaft.

Reassembly

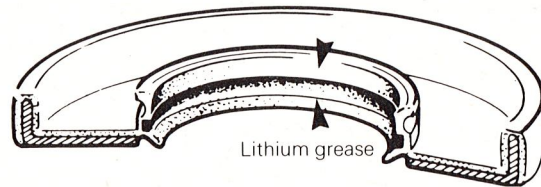
Proceed as follows:

○ **NOTE:** To prevent the seal lip from flipping over while inserting the main shaft:

— Remove the mainshaft sharp edge.

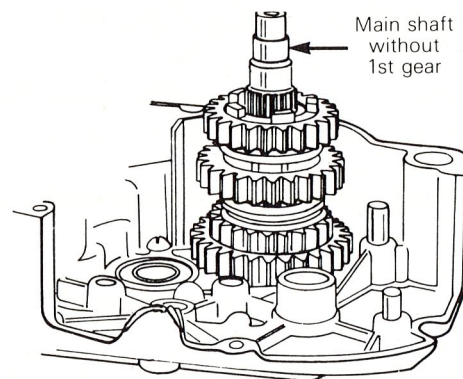


— Apply a liberal amount of grease on the seal lip.



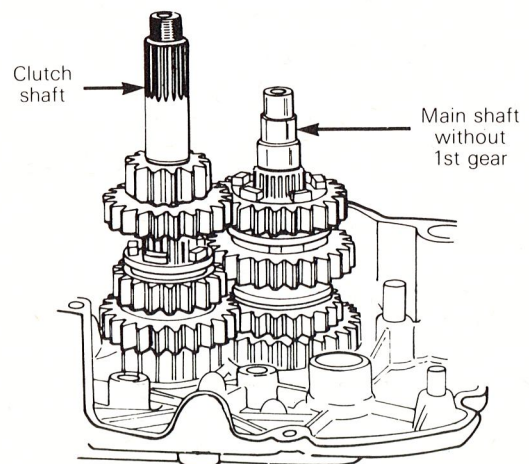
— Ensure to rotate the main shaft at installation.

Step 1 position the main shaft as illustrated tap gently without pushing completely the shaft into the bearing (to ease the clutch shaft installation).



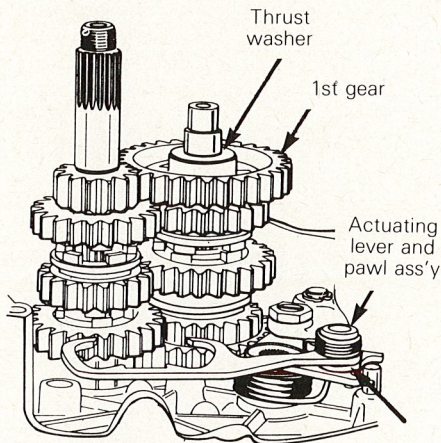
Step 2 position the clutch shaft as illustrated, tap gently to push the shaft into the bearing, while turning the main shaft manually, completely seat both shafts.

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

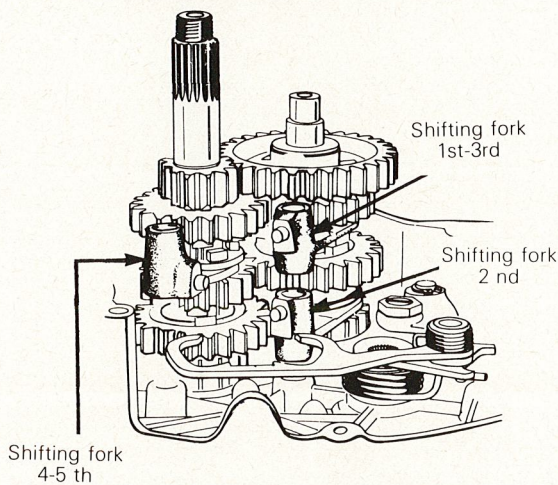


SECTION 02 ENGINE SUB-SECTION 02 (ENGINE/TRANSMISSION)

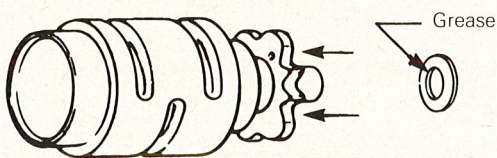
Step 3 position the thrust washer, needle bearing, first gear and thrust washer, and then the actuating lever and pawl ass'y as illustrated.



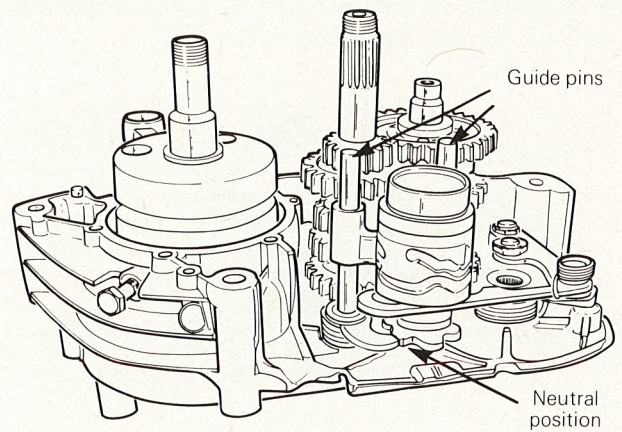
Step 4 position the shifting forks as illustrated.



Step 5 coat the shift drum washer with grease, this will allow the washer to stick on the shift drum for ease of installation.



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 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.

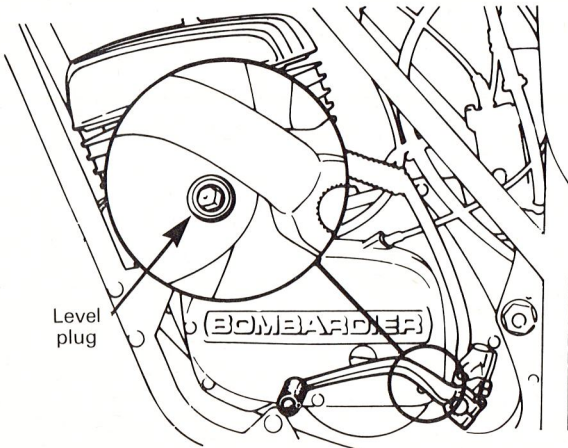
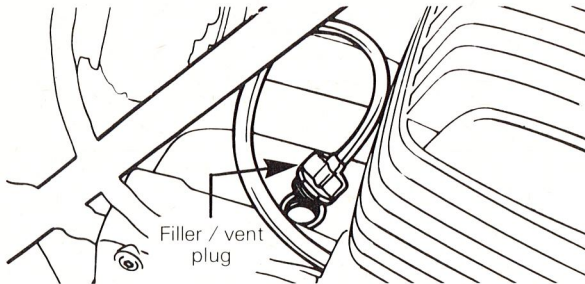
SECTION 02 ENGINE

SUB-SECTION 02 (ENGINE/TRANSMISSION)

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.

ENGINE INSTALLATION (ALL MODELS)

To install engine on vehicle inverse removal procedure.

○ **NOTE:** 370 engines must be installed without carburetor & exhaust socket.

However, special attention should be paid to the following.

Torque the engine mounts to:

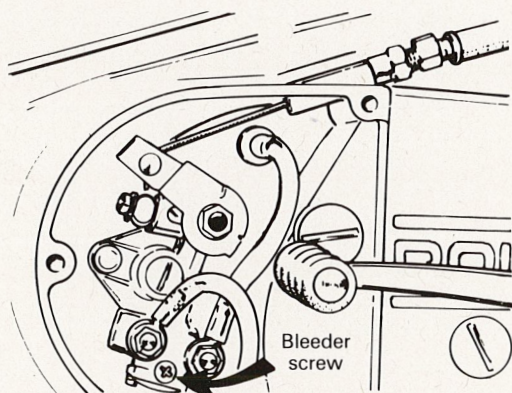
175-250 models: 20-27 N•m (15-20 ft-lbs)

370 models: 50-54 N•m (37-40 ft-lbs)

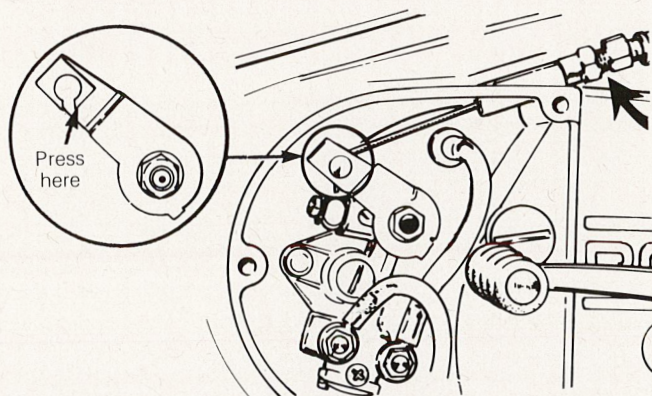
Install the swing arm bolt and nut, hold the swing arm in the mid-way position and torque the nut to 95 N•m (70 ft-lbs).

Qualifier 175-250:

After installation, bleed the air out of the inlet oil line by unscrewing the lower screw (Phillips head type) until all the air bubbles are out.



After the installation of the throttle cable to the oil injection pump lever, make sure to block the cable in place by bending the hooked end of the lever as illustrated.



All Models:

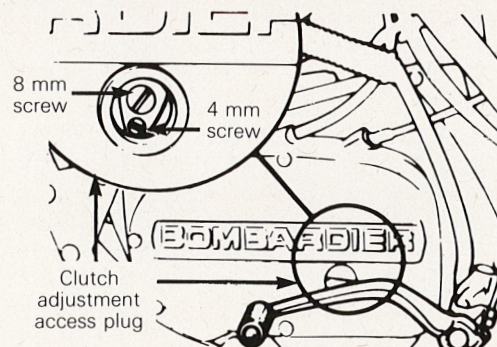
Adjust the clutch.

○ **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.

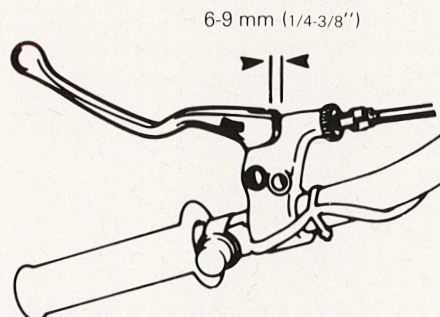
Turn the 8 mm clutch adjusting screw in and out to locate the point of contact with the release bearing, then turn the screw 1/2 turn counter-clockwise.



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

Replace the access plug.

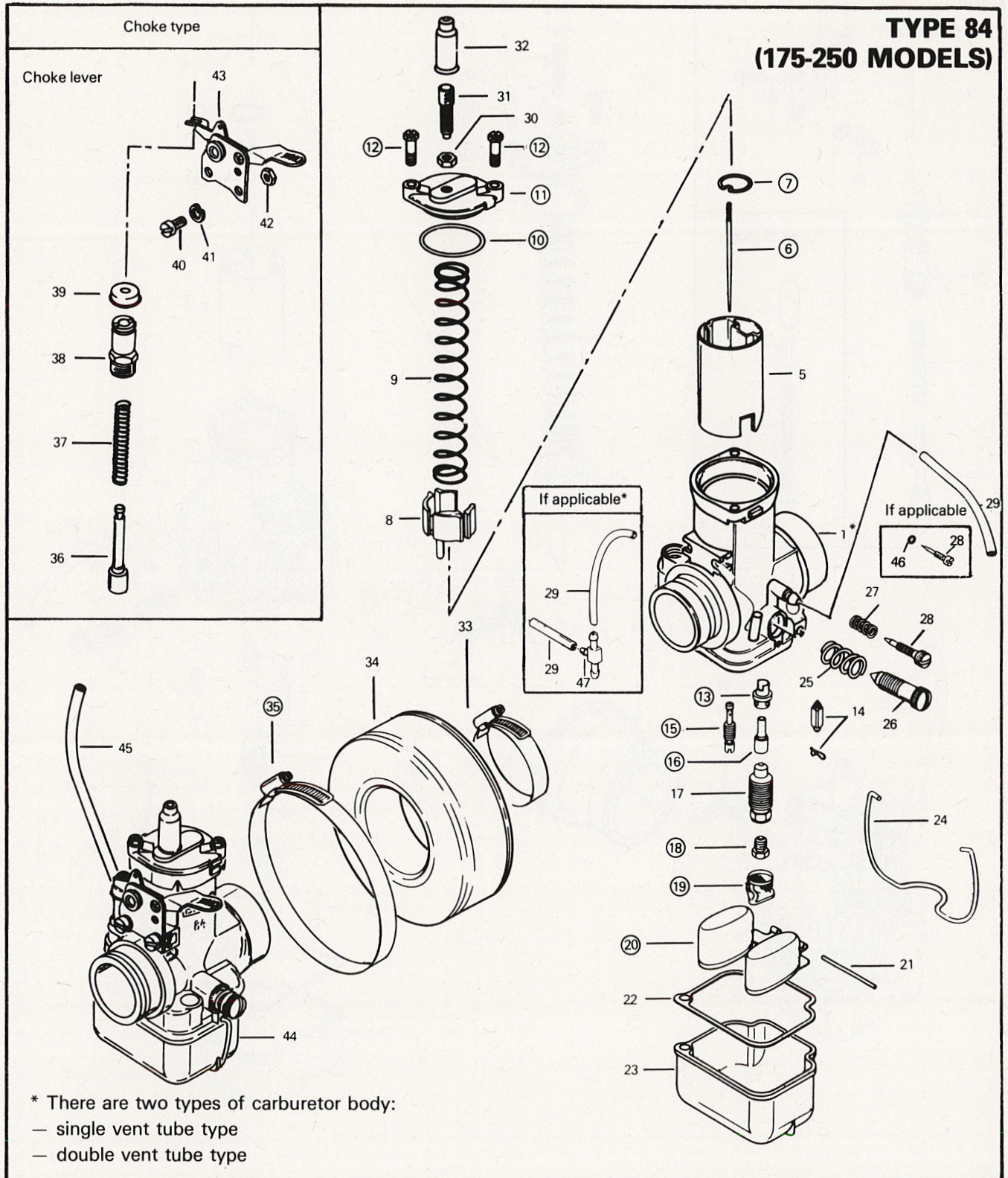
Adjust the cable adjuster to provide 6-9 mm (1/4-3/8") slack between clutch lever and housing.



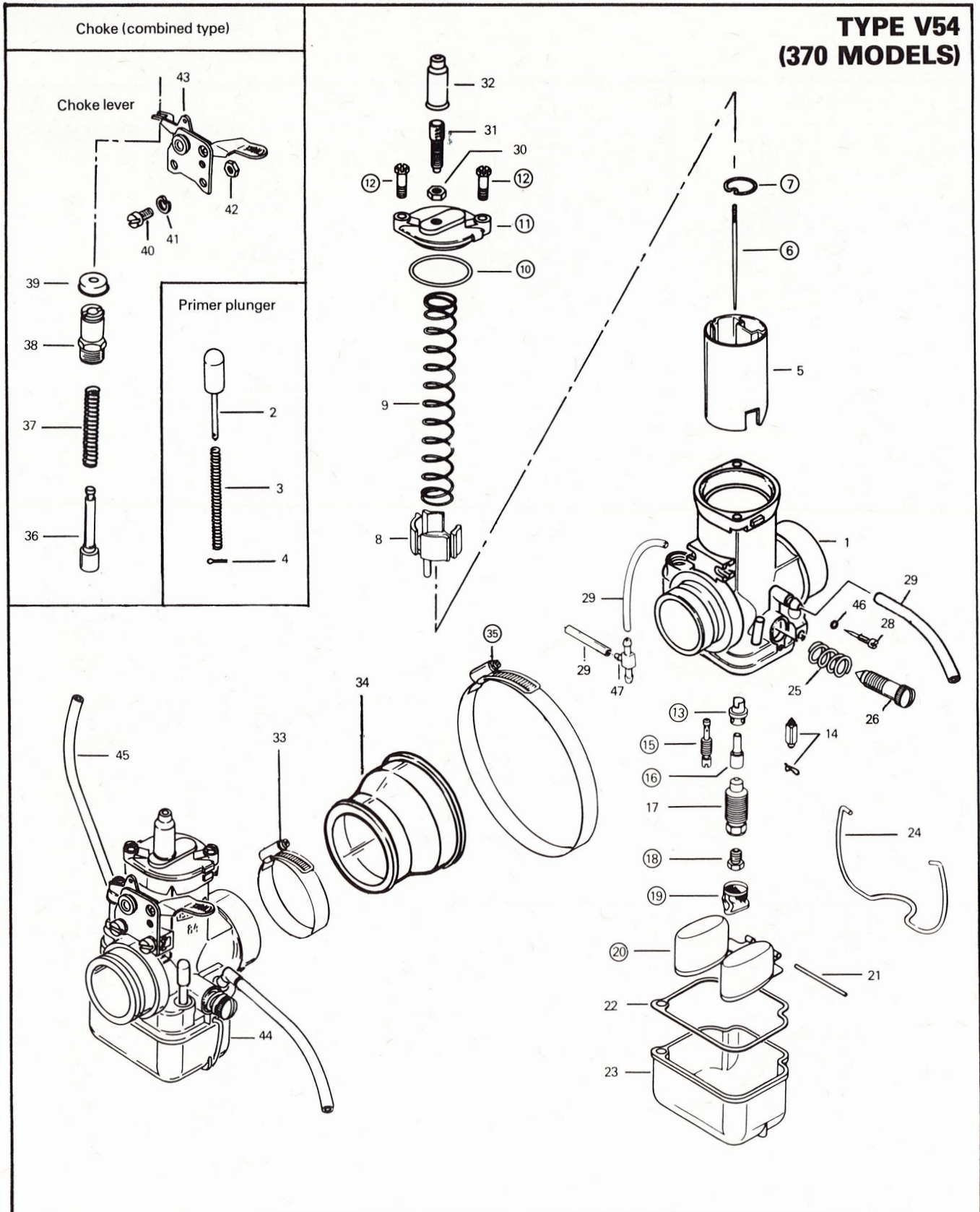
Check ignition timing. (See section 03 Electrical)

CARBURETOR

TYPE 84 (175-250 MODELS)



SECTION 02 ENGINE
SUB-SECTION 03 (CARBURETOR)



SECTION 02 ENGINE

SUB-SECTION 03 (CARBURETOR)

1. Carburetor body
2. Primer knob
3. Primer spring
4. Primer split pin
5. Throttle slide
6. Needle
7. Needle clip
8. Plastic spring cup
9. Throttle slide spring
10. "O" ring
11. Slide chamber cover
12. Hexagonal screw, M5 x 12 (2)
13. Diffuser
14. Inlet needle & clip
15. Idle jet (pilot jet)
16. Needle jet
17. Mixing tube
18. Main jet
19. Screen sleeve
20. Float
21. Float arm pin
22. Float chamber gasket
23. Float chamber
24. Float chamber spring clip
25. Idle adj. screw spring
26. Idle adj. screw
27. Idle air screw spring
28. Idle air screw
29. Vent tube
30. Hexagonal nut M6 x 0.75
31. Adj. screw M6 x 0.75
32. Rubber grommet
33. Hose clamp (carburetor)
34. Carburetor boot
35. Hose clamp (air box)
36. Choke piston w/gasket
37. Choke piston spring
38. Closure screw
39. Rubber cap
40. Cylinder screw M5 x 10 (2)
41. Lockwasher 5 mm (2)
42. Hexagonal nut M5 (2)
43. Choke lever ass'y
44. Bing double float carburetor
45. Fuel line
46. O'ring
47. "Tee"

REMOVAL

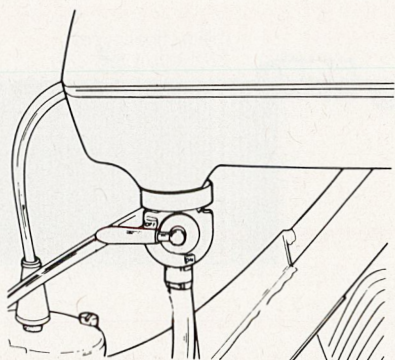
◆ **WARNING:** Gasoline is flammable and explosive under certain conditions. Always perform procedures in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

Disconnect or perform the following then remove the carburetor from engine.

Fuel line (at carburetor).

○ **NOTE:** Make sure the fuel valve is on (off) position.

Vent tube(s)



Completely loosen both carburetor retaining hose clamps. (Slide front clamp forward and rotate carburetor towards clutch side).

Unscrew the 2 screws from carburetor slide chamber cover & pull out throttle slide ass'y.

▼ **CAUTION:** Exercise care when handling throttle slide. Damage incurred may cause throttle slide to stick open in operation.

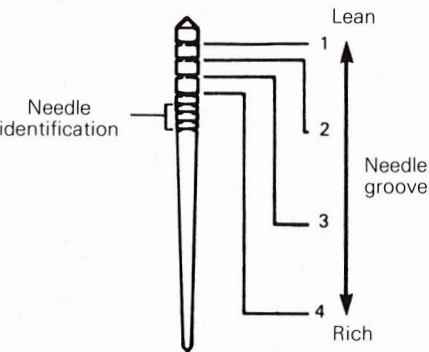
Pry carburetor body towards air box, out of the engine/carburetor adaptor.

Twist carburetor body away from engine intake manifold and remove carburetor (complete with boot).

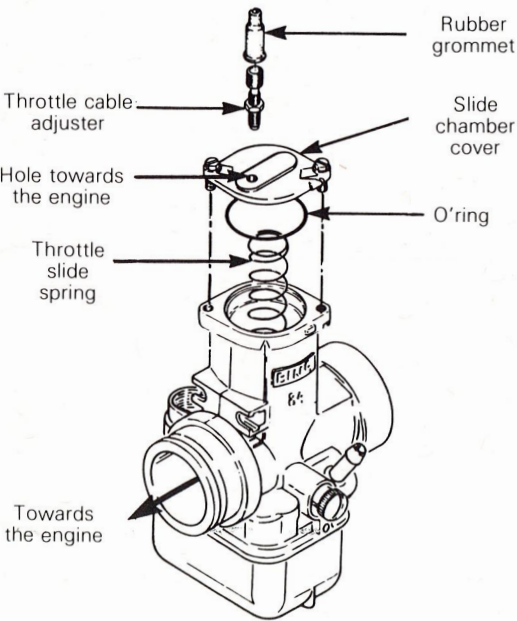
SECTION 02 ENGINE
SUB-SECTION 03 (CARBURETOR)

DISASSEMBLY & ASSEMBLY

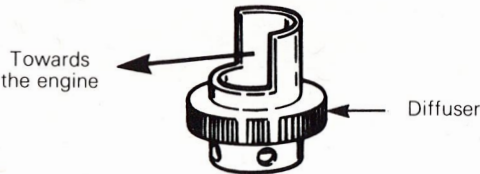
- ⑥ ⑦ At assembly, refer to technical data for correct installation position of needle clip into needle grooves.
- NOTE: Grooves are numbered 1 to 4, starting from the top.



- NOTE: Three grooves only for V54 type carburetor (370 models).
- ⑩ ⑪ ⑫ The slide chamber cover should be installed with the throttle cable adjuster facing **towards the engine**. Tighten the (2) retaining screws securely.

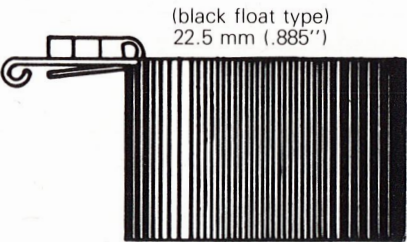


- NOTE: If the slide chamber cover is positioned backwards, the throttle slide will not reach the full throttle opening.
- ⑬ The diffuser should be installed with the cut-away facing towards the engine.



- NOTE: The diffuser comes with the carburetor body (1) and is not sold separately.
- ⑮ ⑯ ⑰ Different size jets (main, idle, needle) are available for various temperatures and altitudes. Refer to the technical data's application charts for jet selection.
- ⑲ **CAUTION:** At assembly, make sure to install the screen sleeve, otherwise dirt or water may reach the carburetor main jet.

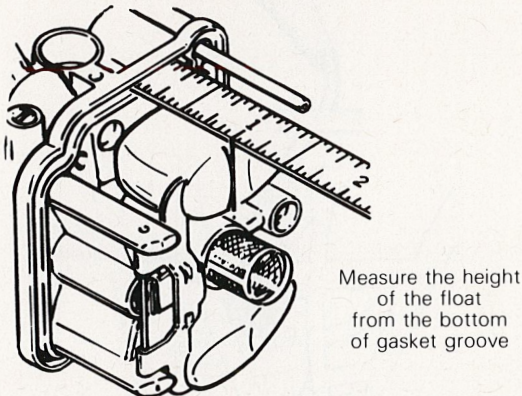
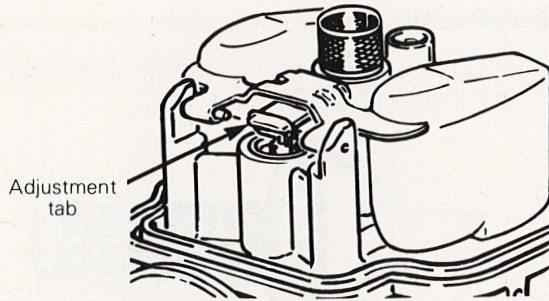
- ⑳ Correct fuel level in float chamber is vital for engine efficiency. To check for correct level, proceed as follows:
- Remove float chamber and gasket from carburetor.
- With carburetor on its side with float adjustment tab just touching the needle**, measure distance between top of float chamber body (from the gasket groove bottom).
- Adjust float height to:



SECTION 02 ENGINE

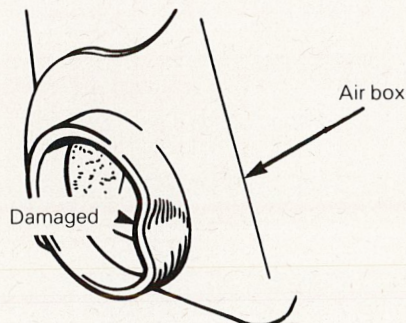
SUB-SECTION 03 (CARBURETOR)

To adjust, carefully bend adjustment tab of float arm until specified height is reached.



○ **NOTE:** If no measuring device is available, position the top of the float parallel with the carburetor body.

③⑤ ▼ **CAUTION:** Make sure not to overtighten the air box boot hose clamp. Air box flange may distort sufficiently to allow entry of foreign particles.



CLEANING AND INSPECTION

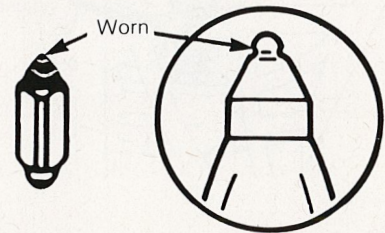
The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O'ring, etc. Therefore, it is recommended to remove those parts prior to cleaning.

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

Check inlet needle tip condition ⑭. If worn, the inlet needle should be replaced.



▼ **CAUTION:** A worn inlet needle will cause carburetor overflowing.

Check if floats are leaking or damaged and replace if necessary.

Check the throttle slide for wear, replace if worn or damaged.

◆ **WARNING:** An excessively worn or damaged throttle slide may cause the slide to stick in the open position.

SECTION 02 ENGINE

SUB-SECTION 03 (CARBURETOR)

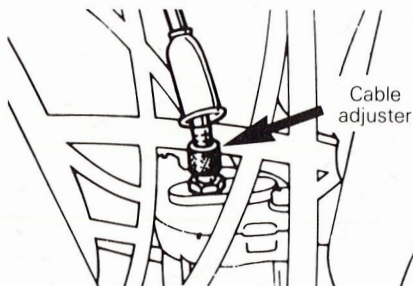
INSTALLATION AND ADJUSTMENT

To install the carburetor, inverse the removal procedure.

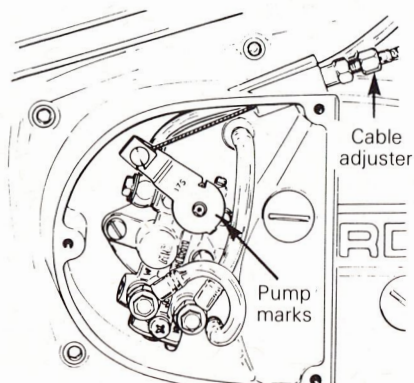
Throttle and injector pump synchronization (Qualifier 175-250)

Loosen the twist grip throttle cable adjuster (located on the mid-portion of the cable routed underneath the gas tank) to provide maximum slack.

Using the cable adjuster located on the throttle slide chamber cover, set cable slack to 1.6 mm (1/16").



Using pump cable adjuster, adjust cable to align pump marks as shown.

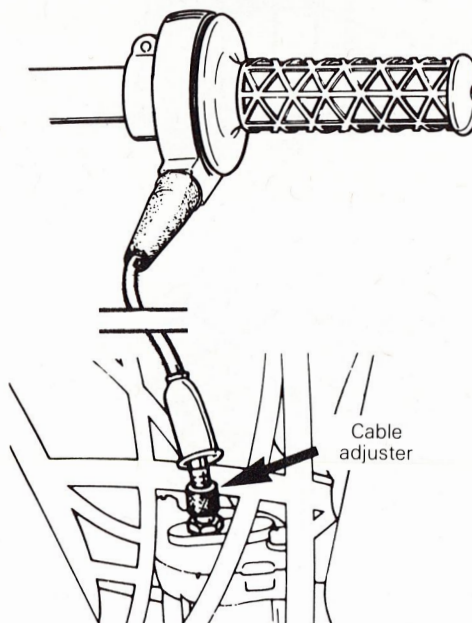


Adjust throttle cable at twist grip (cable adjuster is located on the mid-portion of the cable mounted underneath the gas tank) to provide 1.6 mm (1/16") slack.

◆ **WARNING:** Before starting engine, carburetor slide must be free to snap back to idle position. Make sure the rubber grip does not rub on the throttle body.

Throttle adjustment (Qualifier 370 & MX-5 250-370)

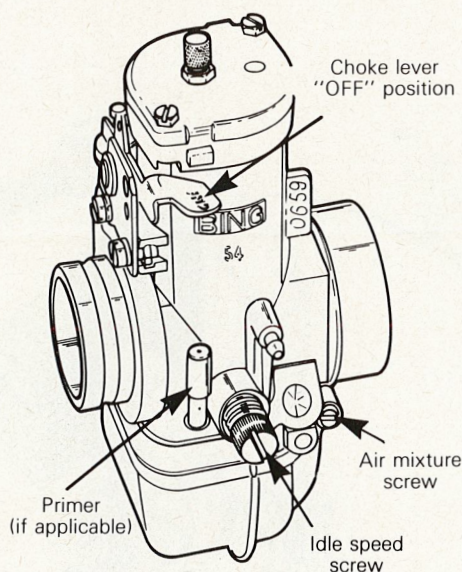
Using the cable adjuster on the throttle slide chamber cover, set cable slack to 1.6 mm (1/16").



◆ **WARNING:** Before starting engine, carburetor slide must be free to snap back to idle position. Make sure the rubber grip does not rub on the throttle body or the handlebar end.

Mixture adjustment

With the motorcycle held in a vertical position, gently turn air mixture screw in until it stops, then back it out to specification. (Refer to technical data section at the end of this section).



Idle speed adjustment

Start the engine and allow it to warm.

Adjust idle speed screw in or out for desired idle speed (approximately 1,000 R.P.M.).

○ **NOTE:** The air mixture screw can be turned in or out (within 1/4 turn of basic setting) to achieve smoothest idle possible. Re-adjust idle speed if necessary.

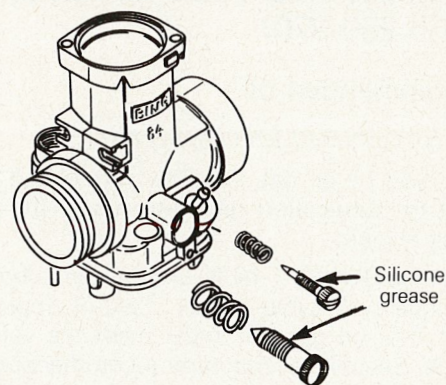
▼ **CAUTION:** Do not attempt to set the idle speed by using the air mixture screw. Severe engine damage can occur.

WATERPROOFING

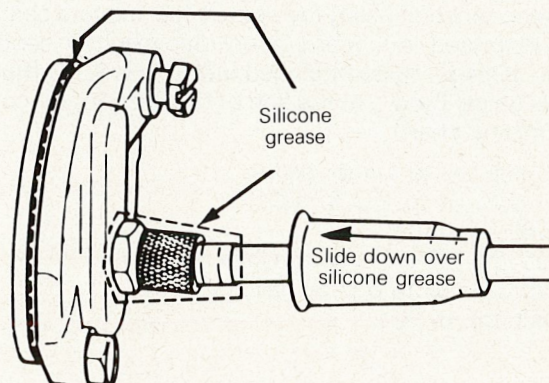
Under wet and muddy conditions it is recommended to properly seal the carburetor.

Proceed as follows:

To improve the sealing ability, apply a light coat of silicone grease (DC-4 or equivalent), on the adjustment screw threads.



Apply silicone grease (DC-4 or equivalent) to the carburetor cover and throttle cable rubber boot (at carburetor top).



Ensure carburetor/engine and carburetor/air box connections are leakproof.

▼ **CAUTION:** The carburetor-air filter servicing/sealing is of the utmost importance under wet and muddy conditions.

SECTION 02 ENGINE

SUB-SECTION 03 (CARBURETOR)

FUEL

Recommended gasoline (all models)

The correct gasoline is **leaded** premium gasoline. However, if leaded premium is unavailable, **leaded** regular is acceptable. For more information refer to Can-Am Service Bulletin no 79-18.

FUEL MIXING (QUALIFIER 370 & MX-5 250-370)

Recommended oil

Use concentrated Bombardier 50/1.

This type of oil has specially formulated oil bases to meet the lubrication requirements of the Bombardier-Rotax engine.

If Bombardier 50/1 oil is unavailable substitute with a high-quality 2 cycle oil, ex: Castrol Super TT, Belray MC3. The oil gas mix must meet the vehicle requirements. See oil manufacturer recommendations on container.

CAUTION: Never use outboard oils, straight mineral oils or injector oils.

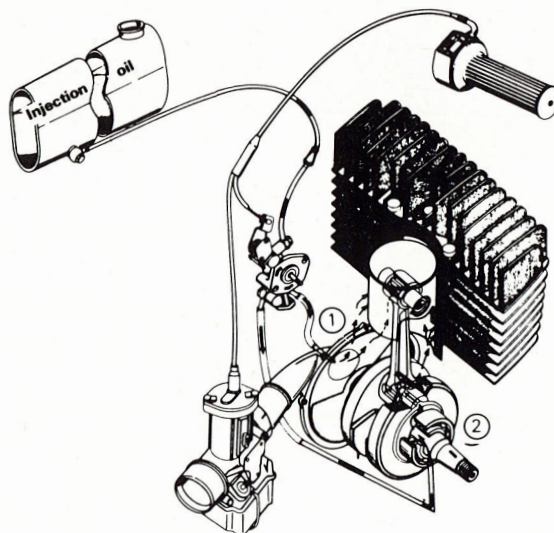
Fuel mixture ratio

The importance of using the correct fuel mixture cannot be overstressed. An incorrect fuel ratio results in serious engine damage. Recommended fuel ratio is 32/1. (Refer to "Technical Data", at the end of this section, for complete mixing chart).

EX.: 5 imp. oz to 1 imp. gallon
4 U.S. oz to 1 U.S. gallon
160 mL to 5 L
25 imp. oz to 5 imp. gallons
20 U.S. oz to 5 U.S. gallons
625 mL to 20 L

OIL INJECTION (QUALIFIER 175-250)

On those models lubrication oil is supplied under pressure by a Mikuni twin outlet pump to (1) the intake manifold and to (2) the crankshaft bearing.



Engine speed controls the pressure while throttle action determines the flow.

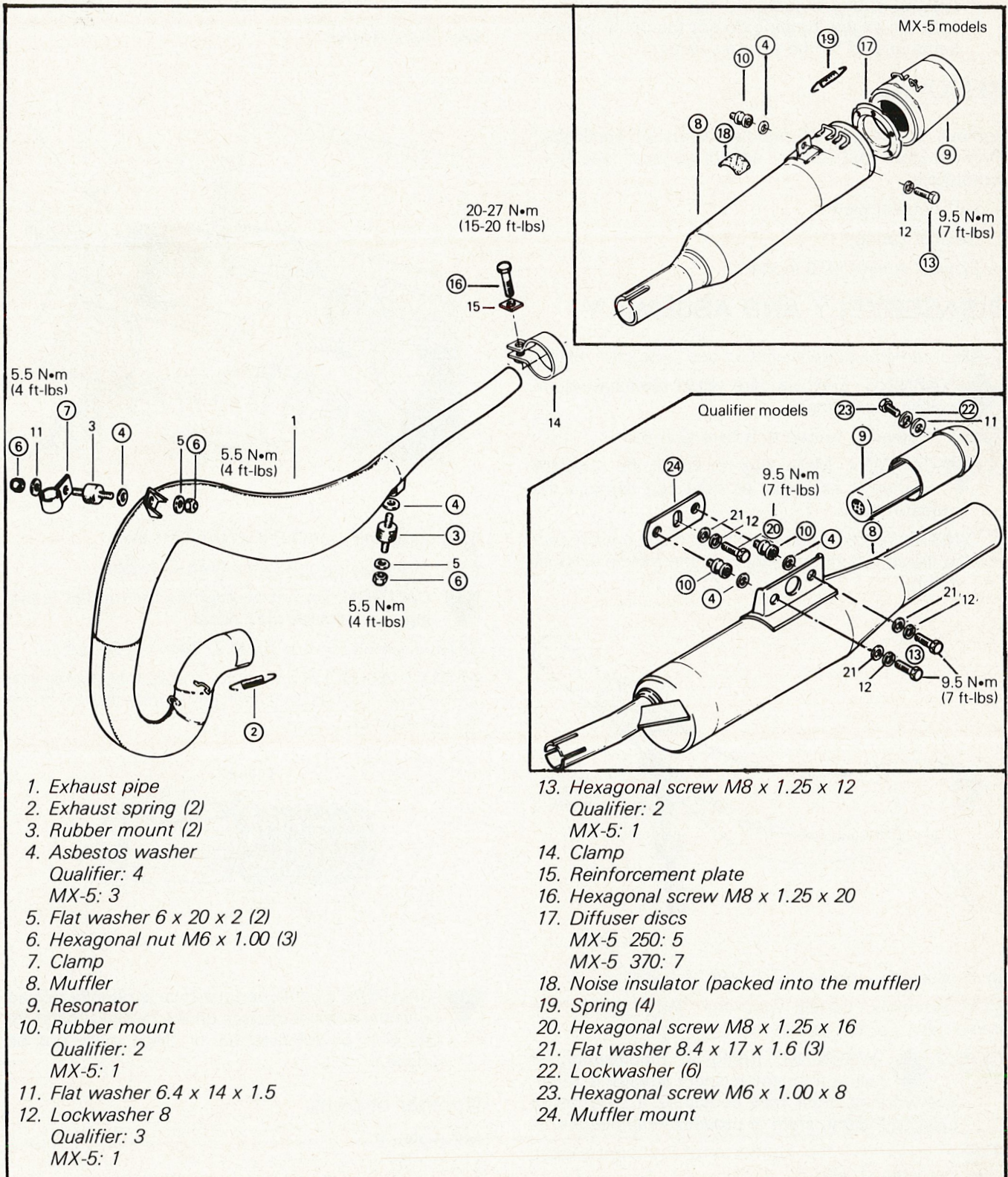
Use Can-Am injection oil or any equivalent high quality injection oil.

AIR FILTER SERVICING

Refer to section 07 chassis, sub-section 02, (Body).

SECTION 02 ENGINE
SUB-SECTION 04 (EXHAUST SYSTEM)

EXHAUST SYSTEM



SECTION 02 ENGINE

SUB-SECTION 04 (EXHAUST SYSTEM)

WARNING: To prevent any burns, it is necessary to allow sufficient time to the exhaust system to cool prior to working on or near the exhaust system. If any adjustment has to be performed with the engine running do not touch the components related to the exhaust system.

REMOVAL

Remove or disconnect the followings (if applicable) then withdraw the muffler and/or exhaust pipe from motorcycle.

- Left number plate.
- Exhaust springs.
- Exhaust socket (370 models)

DISASSEMBLY AND ASSEMBLY

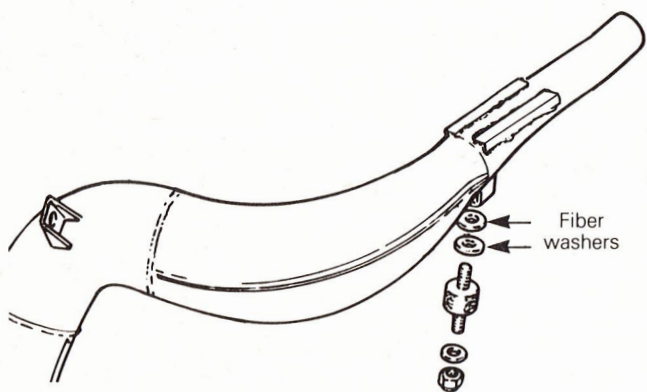
②⑱ For removal and installation use "vise-grip" pliers.

WARNING: Exercise care when removing or installing the springs.

③⑩ At assembly, torque to 3 N•m (2 ft-lbs).

④ **CAUTION:** Make sure to install the asbestos washer at assembly as heat can damage the rubber mount.

○ **NOTE:** To obtain a better fit, it may be necessary to install two fiber washers to the middle exhaust mount.



⑥ At assembly, torque to 5.5 N•m (4 ft-lbs).

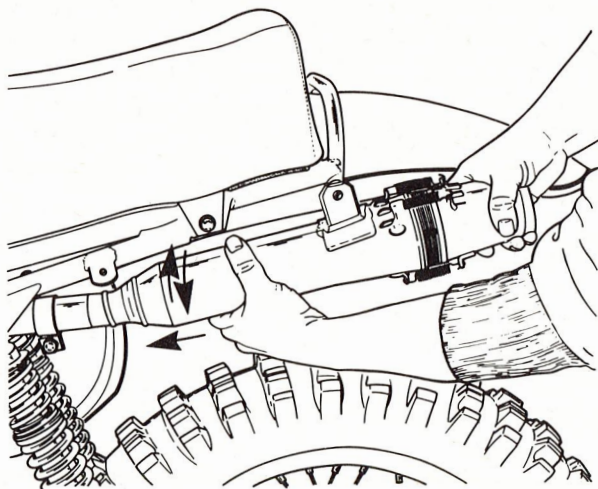
⑦ At assembly, closely wrap the clamp around the frame tube, using a pair of "vise grip" pliers.

⑧⑨⑰ **WARNING:** Removal, modification or failure to maintain spark arrestor in effective working order may constitute a violation of existing federal, state or provincial regulations.

⑧⑨ At assembly, the muffler must be hand slipped over the exhaust pipe.

CAUTION: Do not use a hammer or heavy mallet to drive the muffler onto the exhaust pipe. Damage may occur, causing improper pressure in the exhaust system and possible engine damage.

EX.: MX-5 models.



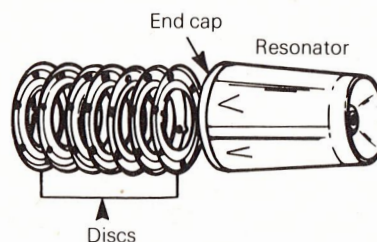
⑩ At assembly, torque to 3 N•m (2 ft-lbs).

⑬ At assembly torque to 9.5 N•m (7 ft-lbs).

CAUTION: Do not overtighten the muffler retaining nut, damage may occur.

⑯ At assembly, torque to 20-27 N•m (15-20 ft-lbs).

⑰ (MX-5 250-370) at assembly, ensure that the dimples around the outer edge of each disc interlocks with those on the end cap.



CAUTION: Engine performance is directly related with the number of discs on the muffler, therefore addition or subtraction of discs must not be made.

Number of discs:

MX-5 250: 5

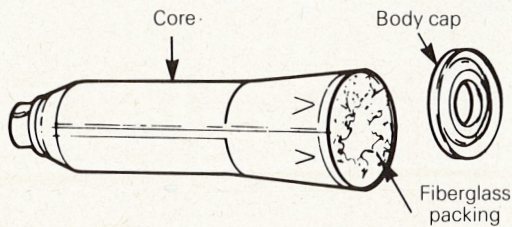
MX-5 370: 7

SECTION 02 ENGINE

SUB-SECTION 04 (EXHAUST SYSTEM)

CAUTION: To maintain vehicle performance and resonator efficiency, the discs should be periodically cleaned, and the core repacked with new fiberglass insulation.

⑱ The fiberglass packing inside the core can be replaced by removing the body cap.



⑳ ㉔ The muffler mount is slotted to allow proper muffler alignment. At assembly torque the retaining screw to 9.5 N•m (7 ft-lbs).

㉓ At assembly, torque to 4-5 N•m (3-4 ft-lbs).

CLEANING AND INSPECTION

Clean the exhaust pipe and muffler with a solution of soapy water to remove dirt, mud, grease, etc.

Inspect the exhaust pipe for any fractured brackets or crushed surfaces. Replace or repair as per condition.

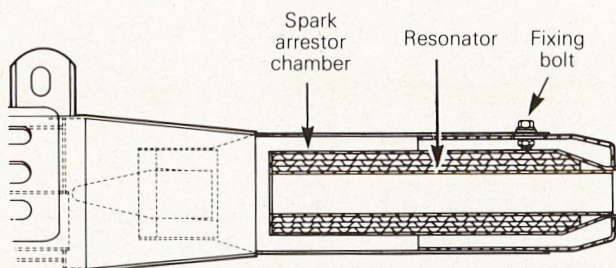
NOTE: If any welding is required, use oxy-acetylene with a steel rod, it is not recommended to braze weld.

Inspect exhaust pipe for accumulation or carbon. Clean with a scraper or a length of old chain.

Inspect nuts and rubber mounts. If damaged, replace.

Qualifier models

The resonator is replaceable and may be removed to clean the spark arrestor chamber as required.



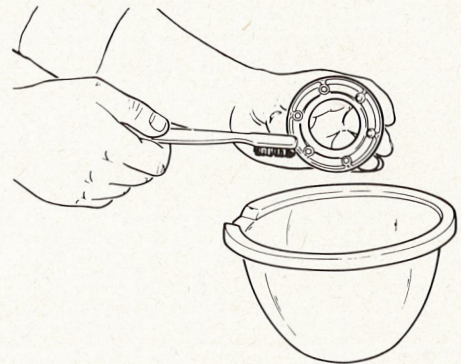
NOTE: It is recommended to clean the spark arrestor chamber periodically to maintain it in effective working order.

WARNING: Removal, modification or failure to maintain spark arrestor in effective working order may constitute a violation of existing Federal, State or Provincial regulations.

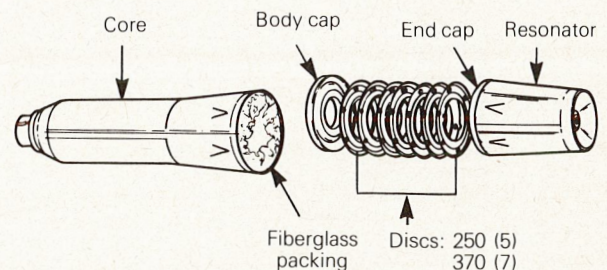
MX-5 models

These models are equipped with "multidisc/resonator" muffler.

The resonator and the discs must be cleaned regularly to prevent carbon build up. To clean the discs use a brush or a cloth.



CAUTION: Any carbon build up, will greatly affect engine performance.



The fiberglass packing inside the core must be checked once a year by removing the body cap.

CAUTION: Engine performance is directly related with the number of discs on the muffler, therefore addition or subtraction of discs must not be made.

SECTION 02 ENGINE

SUB-SECTION 04 (EXHAUST SYSTEM)

◆ **WARNING:** Removal, modification or failure to maintain spark arrestor in effective working order may constitute a violation of existing Federal, State or Provincial regulations.

INSTALLATION

To install the exhaust pipe and/or muffler on the vehicle, inverse removal procedure.

▼ **CAUTION:** After installation of exhaust pipe, be sure all cables, hoses or wires are routed away from exhaust pipe. Use tape or tie wraps if necessary.

SECTION 02 ENGINE
SUB-SECTION 05(TECHNICAL DATA)

ENGINE

ENGINE

VEHICLE MODEL		QUALIFIER 175 8955	QUALIFIER 250 8965	MX-5 250 8964	QUALIFIER 370 8985	MX-5 370 8984
Bombardier Rotax type		174 Rotary valve, 2 stroke, single cylinder, air cooled	244	244	366 Reed valve, 2 stroke, single cylinder, air cooled.	366
Bore	mm (in.)	62 (2.441)	74 (2.910)	72 (2.834)	84 (3.307)	
Stroke	mm (in.)	57.5 (2.260)	57.5 (2.260)	61 (2.402)	66 (2.598)	
Displacement	cm ³ (in. ³)	173.6 (10.60)	247 (15.07)	248 cm (15.13)	366 (22.33)	
Compression ratio ①		14:1 ± .5	13.5:1 ± .5	13.5:1 ± .5	11:1 ± .5	12.5:1 ± .5
Squish area	mm (in.)	1.1 - 1.45 (0.043 - 0.057)	1.4 - 1.75 (0.055 - 0.068)	1.39 - 1.65 (0.054 - 0.065)	N.A.	1.4 - 1.8 (0.055 - 0.070)
Power at R.P.M. at rear wheel		18 kW (24 H.P.) at 8500	22.1 kW (29.5 H.P.) at 8000	28.1 kW (37.5 H.P.) at 8000	28.6 kW (38 H.P.) at 6000	31.6 kW (42 H.P.) at 7000
Maximum recommended R.P.M.		9,500	8,700	9,500	8,500	
Lubrication		Oil injection, variable volume		Pre-mix (32 to 1 ratio.)		
Starter		Foot operated L.H., in gear starting				
Connecting rod big end side play/ wear limit	mm (in.)	0.4 - 0.5 / 0.8 (0.015 - 0.020 / 0.030)				
Piston ring type ③		1 "L" semi-trapez 1 rect.	1 "L" semi-trapez 1 rect. or ④ 1 "L" trapez, 1 rect.	1 "L" semi-trapez	1 "L" semi-trapez 1 rect.	1 "L" semi-trapez
Ring end gap ②	mm (in.)	0.20 - 0.40 (.008 - .016)			0.25 - 0.45 (.010 - .017)	
Piston/cylinder ② wall clearance	mm (in.)	.050 - .085 (.002 - .003)			0.060 - 0.100 (.0025 - .004)	
Piston/cylinder wear limit	mm (in.)	.135 (.005)			0.19 (.0075)	
Crankshaft end play	mm (in.)	0.1 - 0.2 (.004 - .008)				

SECTION 02 ENGINE

SUB-SECTION 05 (TECHNICAL DATA)

VEHICLE MODEL			QUALIFIER 175 8955	QUALIFIER 250 8965	MX-5 250 8964	QUALIFIER 370 8985	MX-5 370 8984
Rotary disc valve	open BTDC		137°		140°	N.A. (reed valve type)	
	close ATDC		75°		85°	N.A. (reed valve type)	
Torque (cold)	Cylinder head	N•m (ft-lbs)	16 (12)	19 (14)		26 (19)	
	Magneto	N•m (ft-lbs)	80 (60)			102 (75)	
	Engine sprocket	N•m (ft-lbs)	102 (75)			108 (80)	
POWER TRAIN	Primary drive		Straight cut and ground gears				
	Primary drive ratio		3.286 (21/69T)	2.91 (23/67T)		2.60 (25/65T)	
	Clutch		Multi plate 5 discs, oil bath	Multi plate 6 discs, oil bath		Multi plate 8 discs, oil bath	
	Transmission		Constant mesh 6 speed			Constant mesh 5 speed	
	Gear ratio						
	1st		3.40 (10/34)		2.38 (13/31)	2.91 (11/32)	2.38 (13/31)
	2nd		2.31 (13/30)		1.75 (16/28)	1.86 (15/28)	1.75 (16/28)
	3rd		1.68 (16/27)		1.39 (18/25)	1.39 (18/25)	1.39 (18/25)
	4th		1.31 (19/25)		1.095 (21/23)	1.095 (21/23)	1.095 (21/23)
	5th		1.095 (21/23)		0.913 (23/21)	0.913 (23/21)	0.913 (23/21)
6th		0.96 (22/21)		— — —	— — —	— — —	

① Uncorrected

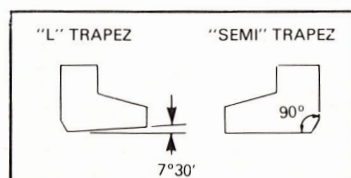
② When fitting new parts

③ Ring types:

④ As fitted

N.A. not applicable

T: teeth



SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

POWER HEAD				
	STANDARD	FIRST OVERSIZED	SECOND OVERSIZED	THIRD OVERSIZED
Cylinder bore nominal dimension				
175 cm ³	62 mm (2.440")	62.25 mm (2.450")	62.50 mm (2.460")	62.75 mm (2.470")
(Qualifier) 250 cm ³	74 mm (2.913")	74.25 mm (2.923")	74.50 mm (2.933")	74.75 mm (2.943")
(MX-5) 250 cm ³	72 mm (2.834")	72.25 mm (2.844")	72.50 (2.854")	not available
370 cm ³	84 mm (3.307")	84.25 mm (3.317")	84.50 mm (3.327")	not available
		WHEN FITTING NEW PARTS		
		MINIMUM	MAXIMUM	WEAR LIMIT
Piston to cylinder wall clearance				
175 cm ³		0.050 mm (.002")	0.085 mm (.003")	0.135 mm (.005")
250 cm ³		0.050 mm (.002")	0.085 mm (.003")	0.135 mm (.005")
370 cm ³		0.060 mm (.0025")	0.100 mm (.004")	0.190 mm (.0075")
Piston ring end gap				
175 cm ³		0.20 mm (.008")	0.40 mm (.016")	1.0 mm (.039")
250 cm ³		0.20 mm (.008")	0.4 mm (.016")	1.0 mm (.039")
370 cm ³		0.25 mm (.010")	0.45 mm (.018")	1.2 mm (.047")
Squish area measurement				
175 cm ³		1.1 mm (.043")	1.45 mm (.057")	
(Qualifier) 250 cm ³		1.4 mm (.055")	1.75 mm (.068")	
(MX-5) 250 cm ³		1.39 mm (.055")	1.65 mm (.065")	
(Qualifier) 370 cm ³		not applicable		
(MX-5) 370 cm ³		1.4 mm (.055")	1.8 mm (.070")	
Compression ratio (uncorrected)				
175 cm ³		13.5 to 1	14.5 to 1	
(Qualifier) 250 cm ³		13 to 1	14 to 1	
(MX-5) 250 cm ³		13 to 1	14 to 1	
(Qualifier) 370 cm ³		10.5 to 1	11.5 to 1	
(MX-5) 370 cm ³		12 to 1	13 to 1	
Exhaust port height				
175 cm ³		27 mm (1.063")		
(Qualifier) 250 cm ³		29.2 mm (1.149")		
(MX-5) 250 cm ³		30 mm (1.181")		
(Qualifier) 370 cm ³		31 mm (1.220")		
(MX-5) 370 cm ³		33 mm (1.299")		

SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

	WHEN FITTING NEW PARTS		WEAR LIMIT
	MINIMUM	MAXIMUM	
Exhaust port width 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	40 mm (1.575") 54 mm (2.125") 52 mm (2.047") 58 mm (2.283")		
Transfer port height 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ (Qualifier) 370 cm ³ (MX-5) 370 cm ³	12.8 mm (.504") 14.3 mm (.562") 15 mm (.590") 15 mm (.590") 16 mm (.629")		
Rotary valve disc opens BTDC 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	137° 137° 140° not applicable		
Rotary valve disc closes ATDC 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	75° 75° 85° not applicable		
Cylinder sleeve outside diameter 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	68.1 mm (2.681") 80.124 mm (3.154") 79.124 mm (3.115") 90.126 mm (3.548")	68.121 mm (2.682") 80.146 mm (3.155") 79.146 mm (3.116") 90.146 mm (3.549")	
Cylinder inside dia. (without sleeve) 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	68 mm (2.677") 80 mm (3.149") 79 mm (3.110") 90 mm (3.543")	68.03 mm (2.678") 80.035 mm (3.150") 79.035 mm (3.111") 90.035 mm (3.544")	
Cylinder/sleeve interference fit 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	0.072 mm (.003") 0.09 mm (.0035") 0.101 mm (.004") 0.09 mm (.0035")	0.121 mm (.005") 0.146 mm (.0057") 0.152 mm (.006") 0.146 mm (.0057")	

SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

CRANKSHAFT/CRANKCASE	WHEN FITTING NEW PARTS		WEAR LIMIT
	MINIMUM	MAXIMUM	
Crankshaft end play	0.1 mm (.004")	0.2 mm (.008")	
Crankshaft excentricity		0.05 mm (.002")	
Crankshaft blade width (nominal) 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	46 mm (1.811") 49 mm (1.929") 51.18 mm (2.015") 64.94 mm (2.557")		
Connecting rod side play in crankshaft	0.4 mm (.015")	0.5 mm (.020")	0.8 mm (.030")
Crankpin interference fit 175, 250,370 cm ³	0.076 mm (.003")	0.095 mm (.0037")	
Connecting rod to crankpin clearance Qualifier 175-250 cm ³ MX-5 250-370 cm ³ & Qualifier 370 cm ³			0.2 mm (.008") 0.1 mm (.004")
Connecting rod to piston pin radial clearance Qualifier 175-250 cm ³ MX-5 250-370 cm ³ & Qualifier 370 cm ³			0.1 mm (.004") 0.05 mm (.002")
Piston pin outside diameter	18 mm (.7086")		0.05 mm (.002")
Depth of groove caused by crankshaft seals			0.15 mm (.006")
Ball bearings clearances (all axial)			0.1 mm (.004")
Ball bearings clearances (all radial)			0.05 mm (.002")
Crankshaft balance factor 175 cm ³ (Qualifier) 250 cm ³ (MX-5) 250 cm ³ 370 cm ³	50% 35% 50% 50%		
Clearance between bearing and polyamid ring			0.1 mm (.004")
Disc valve rotational play 175, 250 cm ³ 370 cm ³			1.2 mm (.047") not applicable

SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

	WHEN FITTING NEW PARTS		
CLUTCH	MINIMUM	MAXIMUM	WEAR LIMIT
Radial clearance of clutch drum needle bearing			0.06 mm (.0024")
Rotational play between slots of clutch drum and friction plate area			1 mm (.040")
Rotational play between the splines of clutch hub and the teeth of driven plate			0.7 mm (.028")
Thickness of friction plate	3.5 mm (.138")		0.4 mm (.016")
TRANSMISSION			
Needle bearing radial play			0.08 mm (.003")
Axial clearance between shift fork and groove in gear			0.5 mm (.020")
Axial clearance between pin of shift forks and groove in shift drum (Measured with shifter drum indexed in each gear except neutral)			0.4 mm (.015")
Main shaft end play		0.1 mm (.004")	
Clutch shaft end play		0.1 mm (.004")	
Shifter shaft end play	0.03 mm (.001")	1.18 mm (.046")	
Shifter drum end play Qualifier 175-250 cm ³ MX-5 250-370 cm ³ & Qualifier 370 cm ³		0.35 mm (.013") 0.47 mm (.018")	
Kick starter shaft end play	0.02 mm (.0007")	0.74 mm (.029")	
Shifter shaft radial clearance	0.127 mm (.005")	0.152 mm (.006")	

CARBURETOR

CARBURETION	VEHICLE MODEL	QUALIFIER 175 8955	QUALIFIER 250 8965	MX-5 250 8964	QUALIFIER 370 8985	MX-5 370 8984
	Carburetor type	Bing 32 mm (V-84)			Bing 36 mm (V-54)	
	Carburetor number	84-32-3418	84-32-3419	84-32-3417	54-36-127	54-36-120
	Main jet	150		155		165
	Needle jet	2.70		2.73	2.82	
	Idle jet	40			50	60
	Needle identification	4 rings			8 G 2	
	Needle setting	3rd groove from top	2nd groove from top			
	Slide	No 1			230	
	Air screw adjustment \pm 1/4	1 turn out			1 1/4 turn out	1 turn out
	Float level mm (in.)	22.5 (0.885)				
	Air filter	K & N oil wetted filter, with oil impregnated air filter sock				
	Idle speed	Approximately 1,000 R.P.M.				
	Fuel grade ①	Leaded premium				


- ① If **leaded** premium is unavailable, **leaded** regular is acceptable.
Refer also to Can-Am Service Bulletin no 79-18.

SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

CARBURETOR SETTING APPLICATION CHART **QUALIFIER 175 (8955) (CARB. NO.84-32-3418)**

TEMPERATURE			ALTITUDE						
°C	(°F)		SEA LEVEL	500 m (1600 ft)	1 000 m (3200 ft)	1 500 m (4900 ft)	2 000 m (6500 ft)	2 500 m (8200 ft)	3 000 m (9800 ft)
40°	(104°)	①	145	140	135	130	125	125	120
		②	3rd	2nd	2nd	2nd	2nd	2nd	2nd
		③	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
30°	(86°)	①	150	145	140	135	130	125	120
		②	3rd	3rd	2nd	2nd	2nd	2nd	2nd
		③	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
20°	(68°)	①	150	145	140	135	130	125	120
		②	3rd	3rd	2nd	2nd	2nd	2nd	2nd
		③	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
10°	(50°)	①	150	145	140	135	130	125	120
		②	3rd	3rd	3rd	2nd	2nd	2nd	2nd
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
0°	(32°)	①	155	150	145	140	135	130	125
		②	3rd	3rd	3rd	2nd	2nd	2nd	2nd
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-10°	(14°)	①	160	155	150	145	140	135	130
		②	4th	3rd	3rd	3rd	2nd	2nd	2nd
		③	1 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-20°	(- 4°)	①	160	155	150	145	140	135	130
		②	4th	3rd	3rd	3rd	2nd	2nd	2nd
		③	1/2 turn	1 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn

- ① Main jet no.
- ② Needle position (groove from top)
- ③ Air screw

 **CAUTION:** These adjustments are guidelines only. Specific adjustments vary with temperature, altitude and terrain conditions. Always observe spark plug condition for proper jetting.

CARBURETOR SETTING APPLICATION CHART QUALIFIER 250 (8965) (CARB. NO.84-32-3419)

TEMPERATURE			ALTITUDE						
°C	(°F)		SEA LEVEL	500 m (1600 ft)	1 000 m (3200 ft)	1 500 m (4900 ft)	2 000 m (6500 ft)	2 500 m (8200 ft)	3 000 m (9800 ft)
40°	(104°)	①	145	140	135	130	125	125	120
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
30°	(86°)	①	150	145	140	135	130	125	120
		②	2nd	2nd	1st	1st	1st	1st	1st
		③	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
20°	(68°)	①	150	145	140	135	130	125	120
		②	2nd	2nd	1st	1st	1st	1st	1st
		③	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
10°	(50°)	①	150	145	140	135	130	125	120
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
0°	(32°)	①	155	150	145	140	135	130	125
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-10°	(14°)	①	160	155	150	145	140	135	130
		②	3rd	2nd	2nd	2nd	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-20°	(- 4°)	①	160	155	150	145	140	135	130
		②	3rd	2nd	2nd	2nd	2nd	1st	1st
		③	1/2 turn	1 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn

- ① Main jet no.
- ② Needle position (groove from top)
- ③ Air screw




CAUTION: These adjustments are guidelines only. Specific adjustments vary with temperature, altitude and terrain conditions. Always observe spark plug condition for proper jetting.

SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

CARBURETOR SETTING APPLICATION CHART
QUALIFIER 370 (8985) (CARB. NO.54-36-127)

TEMPERATURE			ALTITUDE						
°C	(°F)		SEA LEVEL	500 m (1600 ft)	1 000 m (3200 ft)	1 500 m (4900 ft)	2 000 m (6500 ft)	2 500 m (8200 ft)	3 000 m (9800 ft)
40°	(104°)	①	150	145	140	140	135	130	125
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 1/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	2 1/4 turn
30°	(86°)	①	155	150	145	140	135	135	130
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 1/4 turn	1 3/4 turn	1 3/4turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn
20°	(68°)	①	155	150	145	140	140	135	130
		②	2nd	2nd	1st	1st	1st	1st	1st
		③	1 1/4 turn	1 1/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn
10°	(50°)	①	155	155	150	145	140	135	135
		②	2nd	2nd	1st	1st	1st	1st	1st
		③	1 1/4 turn	1 1/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn
0°	(32°)	①	160	155	155	150	145	140	135
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 1/4 turn	1 1/4 turn	1 1/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn
-10°	(14°)	①	165	160	155	150	145	140	135
		②	2nd	2nd	2nd	2nd	1st	1st	1st
		③	1 1/4 turn	1 1/4 turn	1 1/4 turn	1 1/4 turn	1 3/4 turn	1 3/4 turn	1 3/4 turn
-20°	(- 4°)	①	170	165	160	155	150	145	140
		②	3rd	2nd	2nd	2nd	2nd	1st	1st
		③	3/4 turn	1 1/4 turn	1 1/4 turn	1 1/4 turn	1 1/4 turn	1 3/4 turn	1 3/4 turn

- ① Main jet no.
- ② Needle position (groove from top)
- ③ Air screw

 **CAUTION:** These adjustments are guidelines only. Specific adjustments vary with temperature, altitude and terrain conditions. Always observe spark plug condition for proper jetting.

CARBURETOR SETTING APPLICATION CHART MX-5 250 (8964) (CARB. NO.84-32-3417)

TEMPERATURE			ALTITUDE						
°C	(°F)		SEA LEVEL	500 m (1600 ft)	1 000 m (3200 ft)	1 500 m (4900 ft)	2 000 m (6500 ft)	2 500 m (8200 ft)	3 000 m (9800 ft)
40°	(104°)	①	150	145	140	140	135	130	125
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 tour	2 turn
30°	(86°)	①	150	150	145	140	135	130	130
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
20°	(68°)	①	155	150	145	145	140	135	130
		②	2nd	2nd	1st	1st	1st	1st	1st
		③	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
10°	(50°)	①	155	155	150	145	140	135	135
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
0°	(32°)	①	160	155	150	150	145	140	135
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-10°	(14°)	①	165	160	155	150	145	140	135
		②	2nd	2nd	2nd	2nd	1st	1st	1st
		③	7/8 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-20°	(- 4°)	①	165	165	160	155	150	145	140
		②	3rd	2nd	2nd	2nd	2nd	1st	1st
		③	1/2 turn	1 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn

- ① Main jet no.
- ② Needle position (groove from top)
- ③ Air screw




CAUTION: These adjustments are guidelines only. Specific adjustments vary with temperature, altitude and terrain conditions. Always observe spark plug condition for proper jetting.

SECTION 02 ENGINE
SUB-SECTION 05 (TECHNICAL DATA)

CARBURETOR SETTING APPLICATION CHART
MX-5 370 (8984) (CARB. NO.54-36-120)

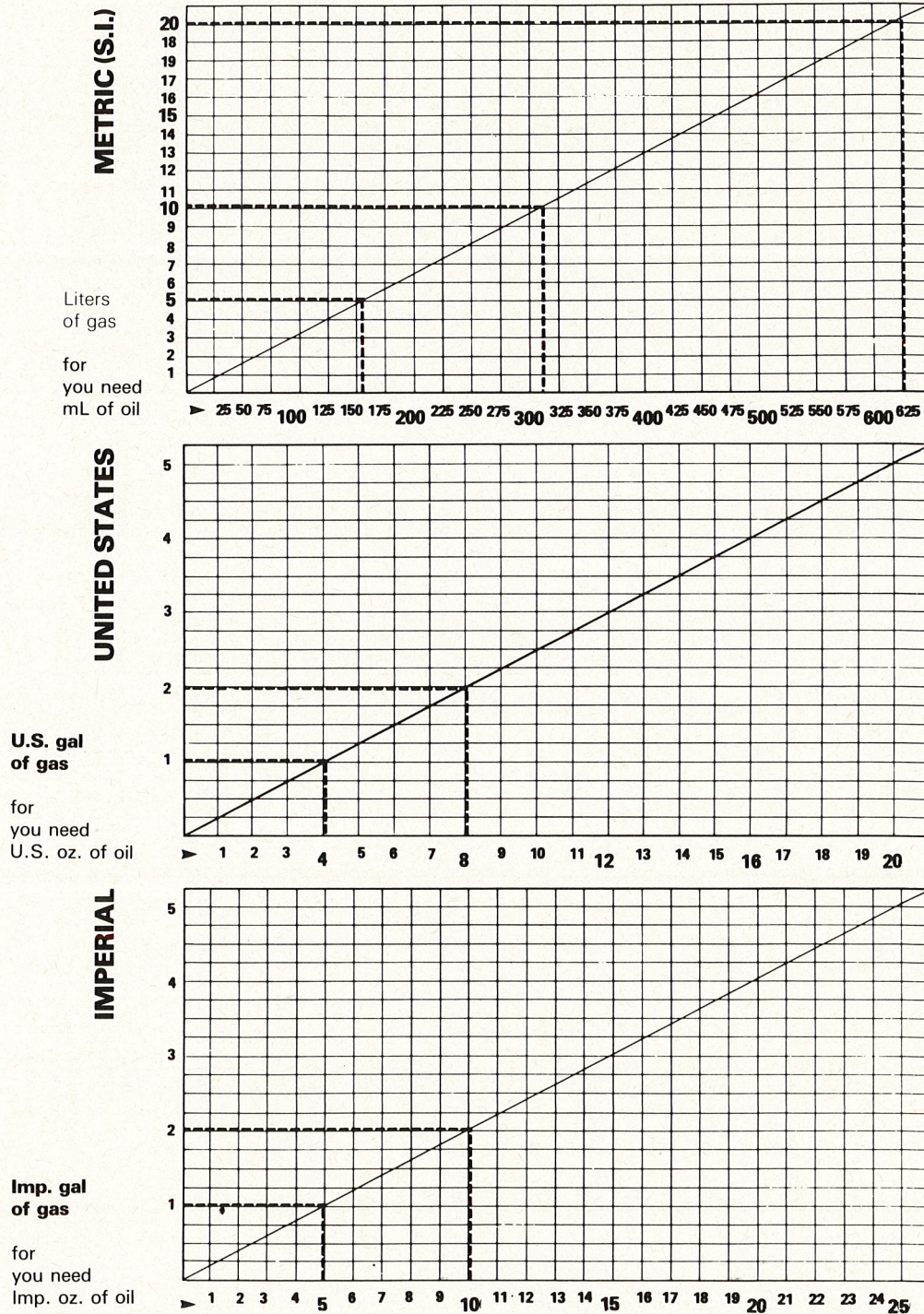
TEMPERATURE			ALTITUDE						
°C	(°F)		SEA LEVEL	500 m (1600 ft)	1 000 m (3200 ft)	1 500 m (4900 ft)	2 000 m (6500 ft)	2 500 m (8200 ft)	3 000 m (9800 ft)
40°	(104°)	①	160	155	150	150	140	140	135
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 tour	2 turn
30°	(86°)	①	165	160	155	150	145	140	135
		②	2nd	1st	1st	1st	1st	1st	1st
		③	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
20°	(68°)	①	165	165	155	155	150	145	140
		②	2nd	2nd	1st	1st	1st	1st	1st
		③	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
10°	(50°)	①	170	165	160	155	150	145	140
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
0°	(32°)	①	170	165	165	160	155	150	145
		②	2nd	2nd	2nd	1st	1st	1st	1st
		③	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-10°	(14°)	①	175	170	165	160	155	150	145
		②	3rd	2nd	2nd	2nd	1st	1st	1st
		③	1/2 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn	1 1/2 turn
-20°	(- 4°)	①	180	175	170	165	160	155	150
		②	3rd	2nd	2nd	2nd	2nd	1st	1st
		③	1/2 turn	1 turn	1 turn	1 turn	1 turn	1 1/2 turn	1 1/2 turn

- ① Main jet no.
② Needle position (groove from top)
③ Air screw

 **CAUTION:** These adjustments are guidelines only. Specific adjustments vary with temperature, altitude and terrain conditions. Always observe spark plug condition for proper jetting.

MX-5 250-370 & QUALIFIER 370

FUEL MIXING RECOMMENDATIONS (32 to 1 ratio)

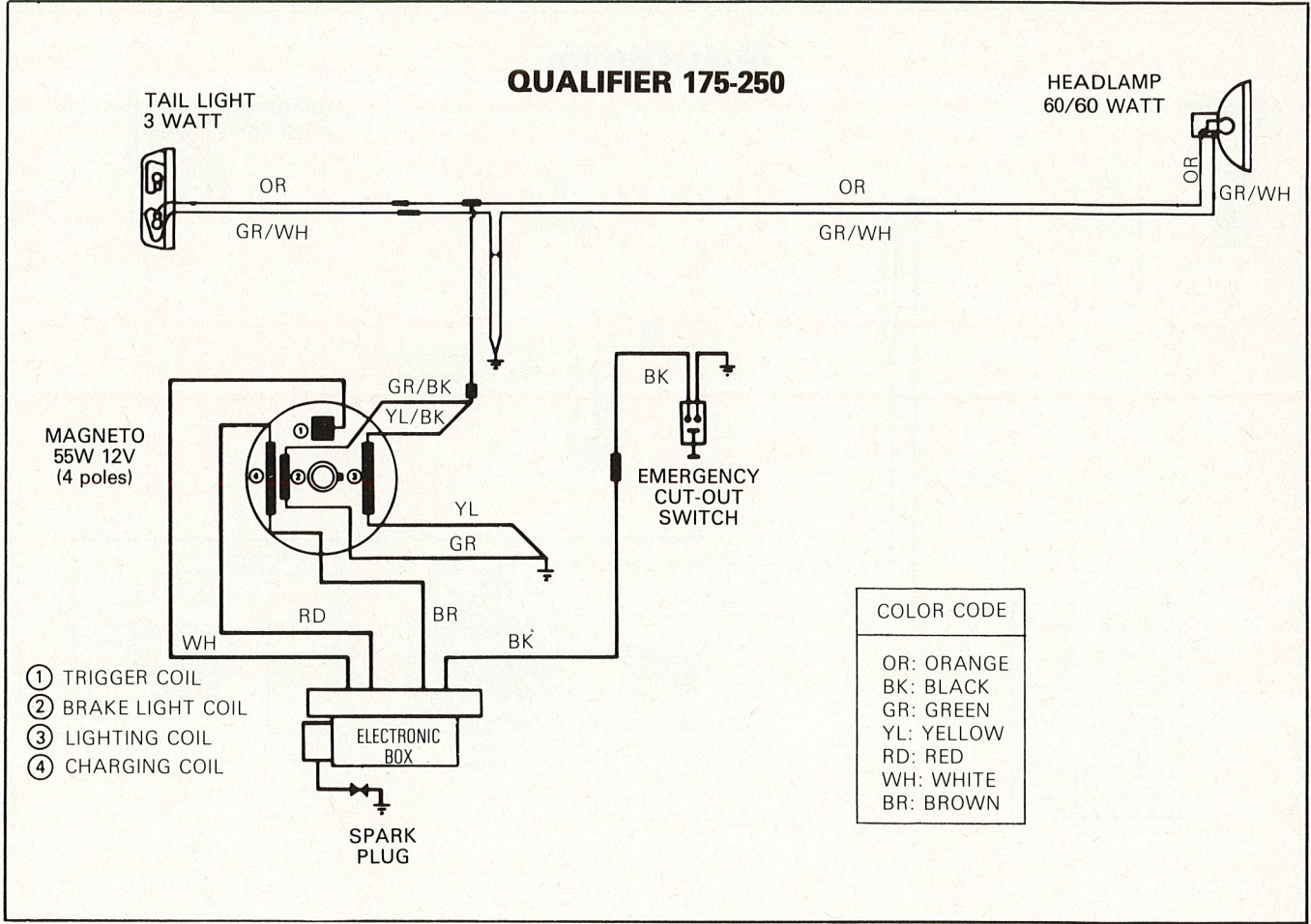


Use concentrated Bombardier 50/1 oil or any equivalent, high quality 2 cycle oil mixed with leaded premium gasoline. If leaded premium is unavailable, leaded regular is acceptable.

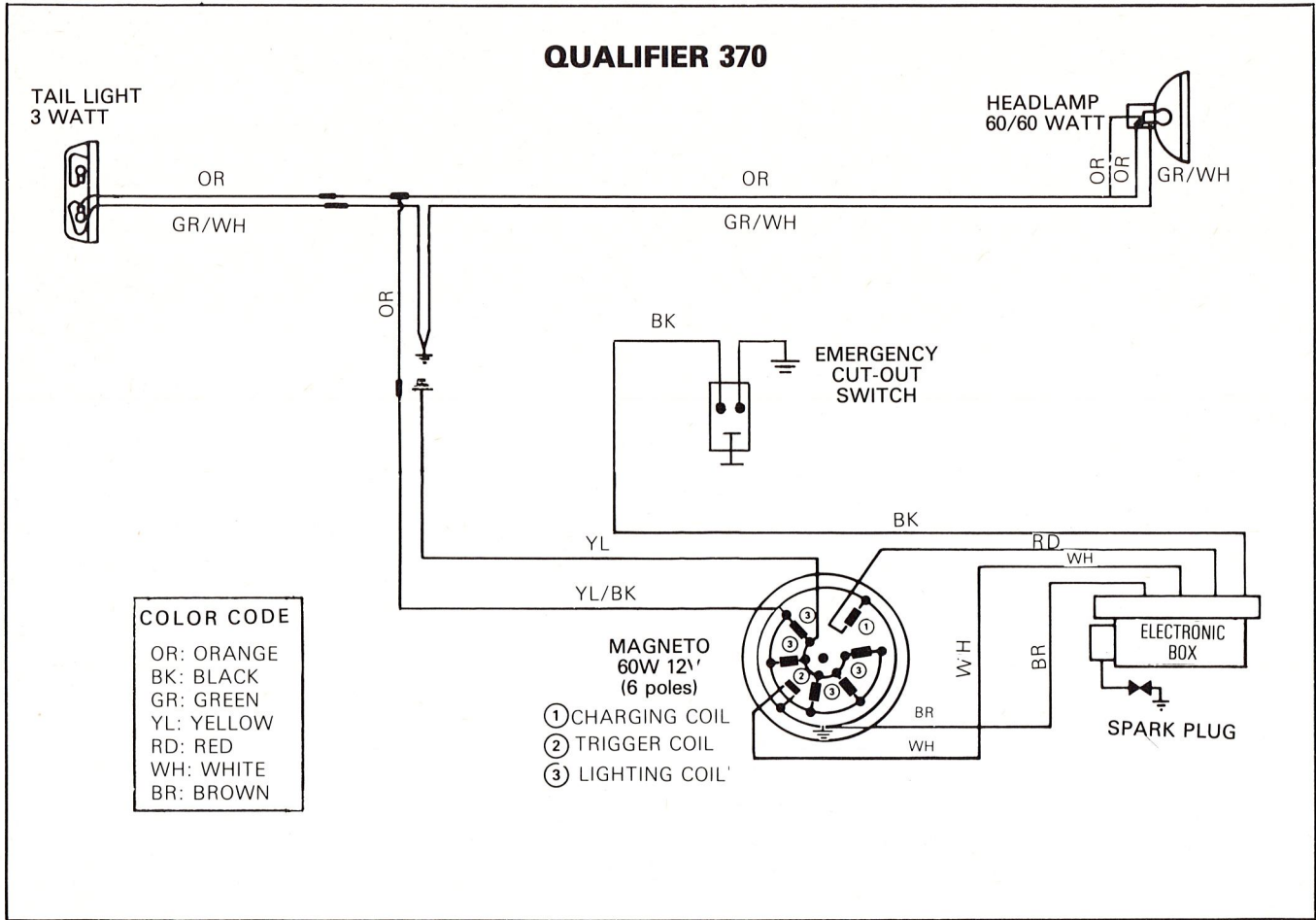


CAUTION: Never use outboard oils, straight mineral oils or injector oils.

SECTION 03 ELECTRICAL
SUB-SECTION 01 (ELECTRICAL CHARTS)



SECTION 03 ELECTRICAL
SUB-SECTION 01 (ELECTRICAL CHARTS)

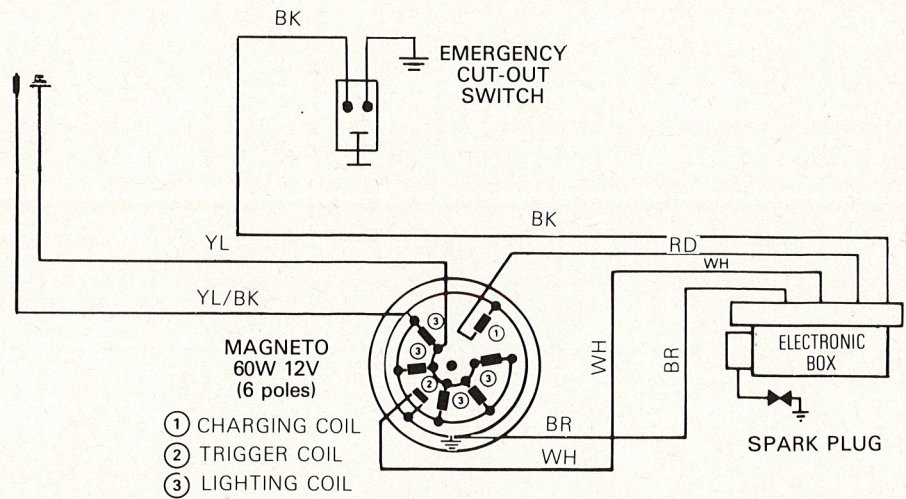


SECTION 03 ELECTRICAL
SUB-SECTION 01 (ELECTRICAL CHARTS)

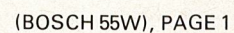
MX-5 250-370

COLOR CODE

BK: BLACK
GR: GREEN
YL: YELLOW
RD: RED
WH: WHITE
BR: BROWN



BOSCH 55W (QUALIFIER 175 - 250)



SECTION 03 ELECTRICAL

SUB-SECTION 02 (IGNITION SYSTEM)

- | | | |
|-----------------------------|--|---------------------------------|
| 1. Stator plate assembly | 16. Allen screw M5 x 16 (2) | 31. Crankshaft nut M16 x 1.5 |
| 2. Flywheel | 17. Lockwasher 5 mm | 32. Lighting coil |
| 3. Electronic box | 18. Flat washer 5.3 mm | 33. Charging coil |
| 4. Protection hose 400 m | 19. Emergency cut-out switch | 34. Brake light coil |
| 5. Cable grommet | 20. Allen screw M6 x 50 (2) | 35. Screw M4 x 30 (2) |
| 6. Protection boot | 21. Allen screw M6 x 45 | 36. Distance sleeve 10.5 mm (2) |
| 7. Protection hose (185 mm) | 22. Magneto cover | 37. Screw M4 x 22 (2) |
| 8. Female connector | 23. Locating dowel (3) | 38. Screw M4 x 6 |
| 9. Connector housing | 24. Rubber mount (2) | 39. Lockwasher 4 mm |
| 10. Holder | 25. Elastic stop nut 6 mm (2) | 40. Cable shoe M4 |
| 11. Male contact pin | 26. Spark plug protector | 41. Splice connector |
| 12. Ring terminal | 27. Spark plug | 42. Protector tube |
| 13. Protection cap | 28. High tension wire | 43. Adjustment plug |
| 14. Lockwasher | 29. "Loctite 242" blue (medium strength) | 44. Trigger plate |
| 15. Allen screw M6 x 16 | 30. Male contact pin | |

DISASSEMBLY & ASSEMBLY

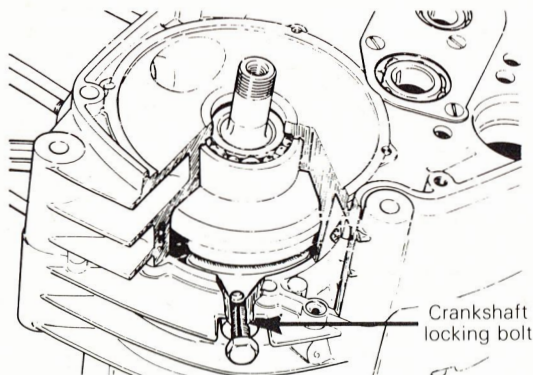
WARNING: To prevent powerful electric shocks make sure to stop the engine prior to performing any adjustment or repair onto or near the CD ignition sytem (i.e. ignition timing, ignition tester, replacement of spark plug, coil or ignition armature, HT lead wire, emergency cut-out switch).

If any adjustment has to be performed with the engine running, do not touch any components related to the C.D. ignition system (i.e. ignition coil, H.T. lead wire, wiring harness, etc...).

① To facilitate timing procedure, perform primary adjustment by matching magneto cover and stator plate marks.

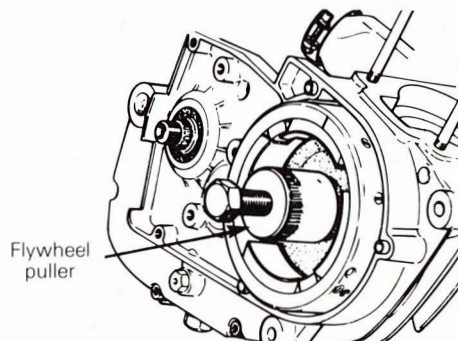
② To remove the flywheel, lock crankshaft at the top dead center position using a crankshaft locking bolt.

CAUTION: At the replacement of the flywheel and/or magneto cover the timing marks must be checked. (See timing sub-section).



CAUTION: Prior to screwing the locking bolt, ensure that the crankshaft and crankcase holes are properly aligned.

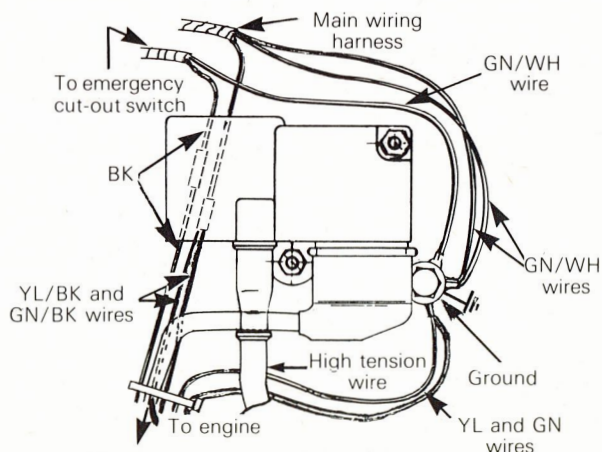
Remove the flywheel retaining nut and install the special puller on the flywheel. Tighten puller bolt and at the same time, tap gently on the bolt head using a soft hammer to release the flywheel from its taper.



Prior to assembly, apply a light coat of Loctite 242 blue (medium strength) on the crankshaft taper and threads. Torque to 80 N•m (60 ft-lbs).

③⑪⑫③⑩ At assembly, connect the wires (as illustrated).

COLOR CODE: GN – GREEN
WH – WHITE
YL – YELLOW
BK – BLACK

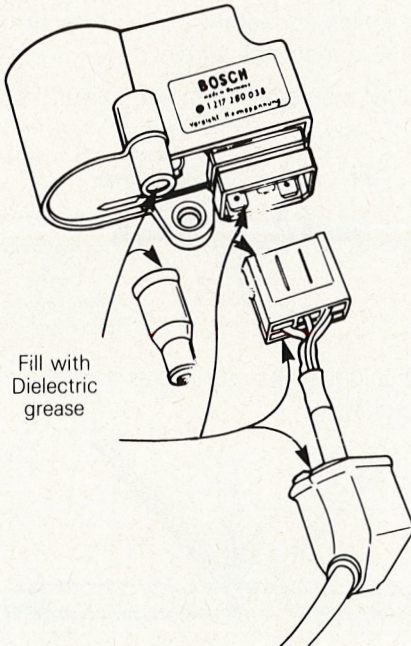


SECTION 03 ELECTRICAL

SUB-SECTION 02 (IGNITION SYSTEM)

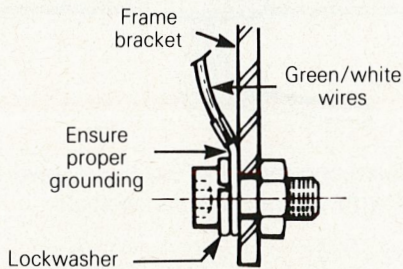
⑥ ⑨ ⑬ Prior to assembly check all connections for dirt or corrosion.

Fully pack the electronic control, the connector block, the rubber boot, the high tension connection and the protector boot with dielectric grease Dow Corning DC 4, or equivalent.



CAUTION: To prevent moisture, make sure no air is trapped within the connections. Do not use silicone sealant as contacts may corrode.

⑮ At assembly, torque to 8-10 N•m (6-8 ft-lbs) and ensure proper grounding.

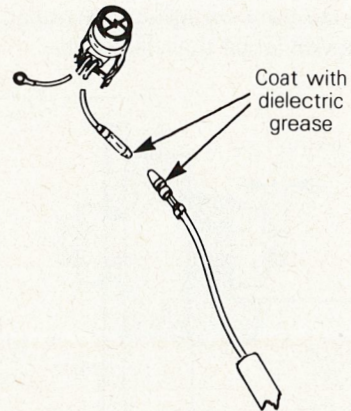


⑯ At assembly, apply Loctite 242 blue (medium strength) on the retainer screw threads and torque to 4-5 N•m (3-4 ft-lbs).

CAUTION: Ensure to use "Loctite" and to properly tighten the screws, otherwise loosening may happen during engine operation and damage to the ignition unit will occur.

⑰ Prior to assembly, check connection for dirt or corrosion.

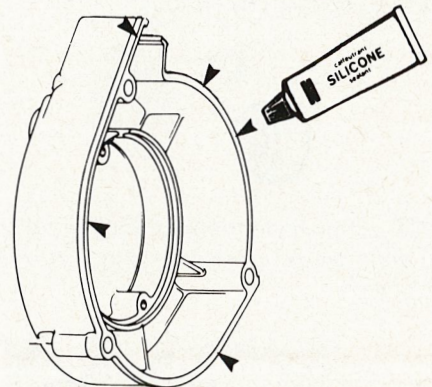
Coat the contact pin with dielectric grease Dow Corning DC 4 or equivalent.



⑳ ㉑ At assembly, apply a small drop of oil or a thin coat of grease on threads and torque to 8 N•m (6 ft-lbs).

NOTE: The longest retaining screws (50 mm long) must be fitted in the top and bottom magneto cover holes.

㉒ At assembly, apply a light coat of Loctite 515 sealant or silicone sealant or equivalent on the mating surface.



CAUTION: At the replacement of the flywheel and/or magneto cover, the timing marks must be checked. (See timing sub-section).

㉓ At assembly, make sure the three (3) locating dowels are in position, either in crankcase or in magneto cover.

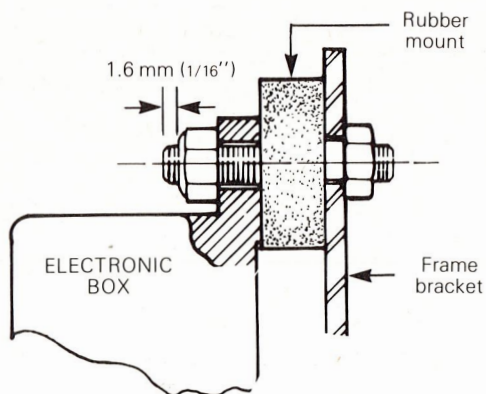
㉔ At assembly, ensure the rubber mounts are properly tightened.

SECTION 03 ELECTRICAL

SUB-SECTION 02 (IGNITION SYSTEM)

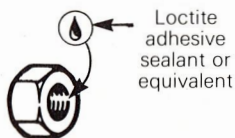
②⑤ At assembly, tighten the elastic stop nut in order to obtain at least 1.6 mm (1/16") long of threads protruding past the nylock. This will secure the assembly.

▼ **CAUTION:** Do not overtighten the nuts or the rubber mounts will loose their flexibility.

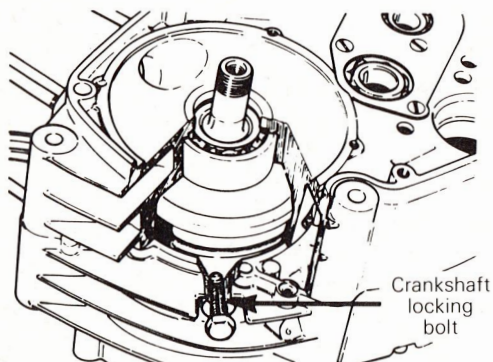


②⑥ At assembly, ensure spark plug protector is not screwed in high tension wire insulation instead of wire core, causing a poor contact.

③① At assembly, apply Loctite 242 blue (medium strength) on the threads of the magneto retaining nut and torque to 80 N•m (60 ft-lbs).



○ **NOTE:** Prior to tightening, lock crankshaft at the top dead center position using a crankshaft locking bolt.



▼ **CAUTION:** Prior to screwing the locking bolt, ensure that the crankshaft and crankcase holes are properly aligned.

③② ③③ ③④ At assembly, hold the coils towards the center, of the stator plate while tightening to prevent the coil shoes from contacting the magneto.

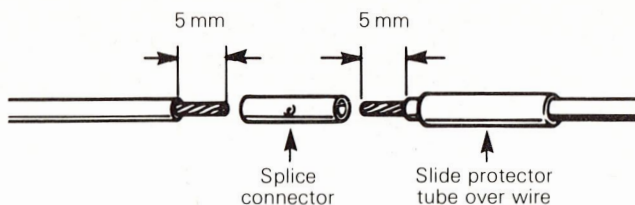
▼ **CAUTION:** Make sure to route the coil wires away from the center of the stator plate to prevent the wires from rubbing on the magneto flywheel nut.

③⑤ ③⑦ ③⑧ At assembly, torque to 3 N•m (2 ft-lbs).

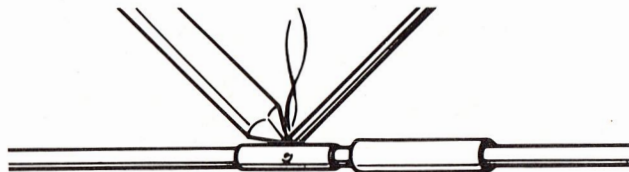
③⑨ ④① At assembly, ensure proper grounding with stator plate.

④① ④② Use a splice connector and a protector tube, as illustrated, to connect the wires.

Strip 5 mm of insulation from each end.

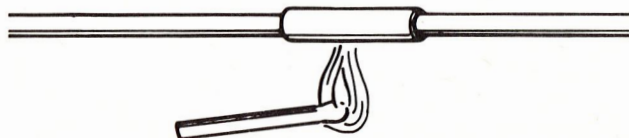


Crimp and solder wires into splice connector with resin core type solder.

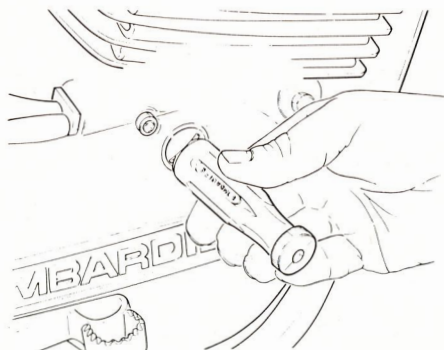


▼ **CAUTION:** Do not use acid core solder, as connections will corrode.

Slide protector tube over splice connector then heat with a match to shrink the protector tube.



④③ For installation and removal, use the screwdriver grip end provided with the motorcycle tool kit.



CLEANING AND SERVICING

Clean the stator plate and flywheel using only a clean cloth.

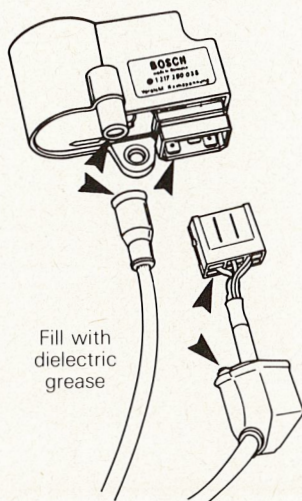
▼ **CAUTION:** Due to the very sensitive built-in components. Always handle ignition parts with care.

It is important to inspect all electrical connections for dirt or corrosion.

Clean as necessary.

The timing must always be recheck after working on inition system. (See timing sub-section).

Fully pack the electronic control, the connector block the rubber boot, the high tension connection and the protector boot with dielectric grease Dow Corning DC 4, or equivalent.



▼ **CAUTION:** To prevent moisture, make sure no air is trapped within the connections. Do not use silicone sealant as contacts may corrode.

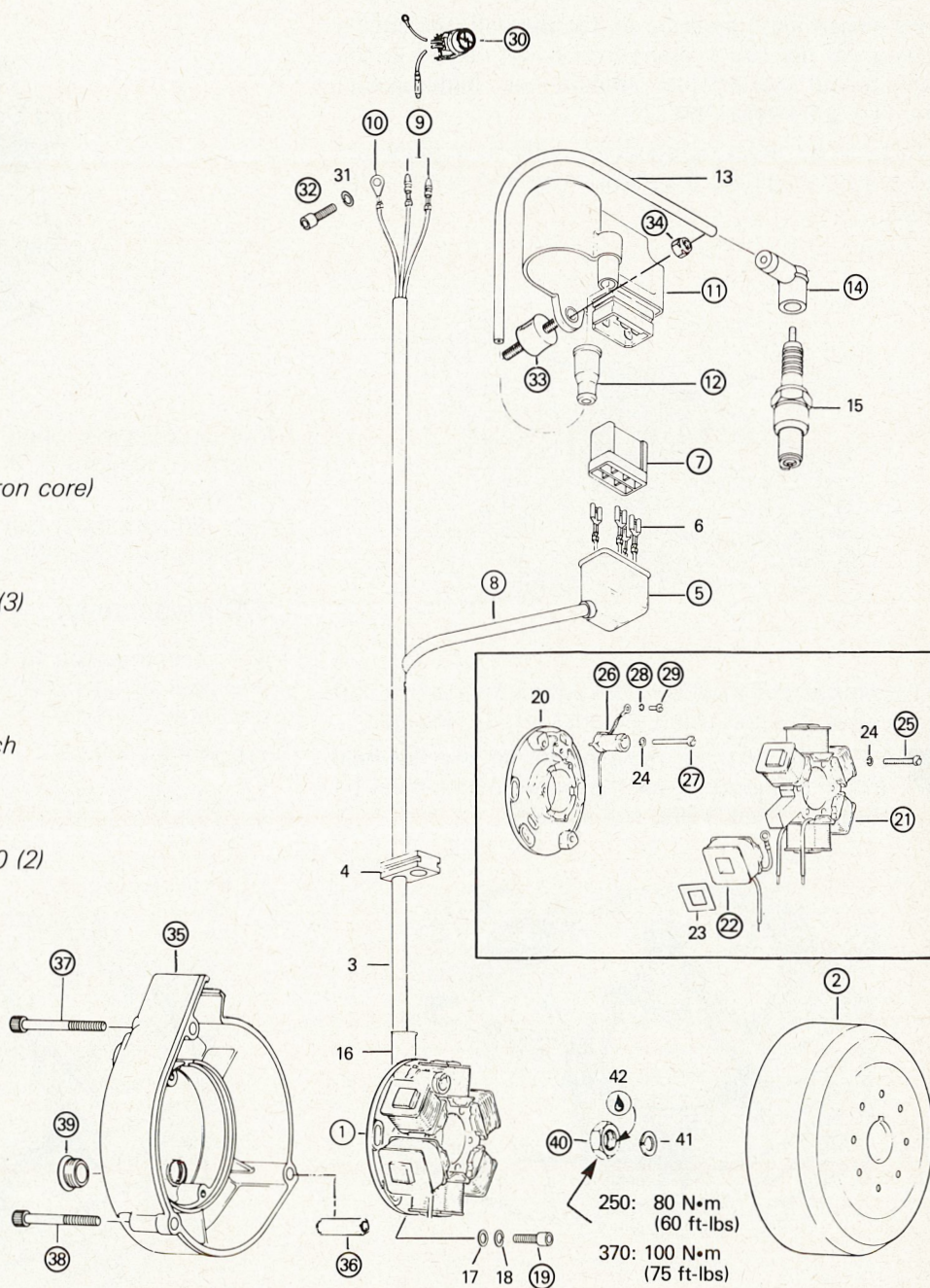
Frequently inspect the ignition cover and crankcase unpainted surfaces for corrosion. If corroded, clean then spray with LPS 3 or equivalent.

▼ **CAUTION:** Do not attempt to stop the engine by removing the high tension wire from the spark plug. Severe damage will occur to electronic box.

SECTION 03 ELECTRICAL
SUB-SECTION 02 (IGNITION SYSTEM)

BOSCH 60W
(MX-5 250 - 370 & QUALIFIER 370)

1. Stator plate assembly
2. Flywheel
3. Protection hose 400 m
4. Cable grommet
5. Protection boot
6. Female connector (4)
7. Connector housing
8. Protection hose 185 mm
9. Male contact pin (2)
10. Ring terminal
11. Electronic box
12. Protection cap
13. High tension wire
14. Spark plug protector
15. Spark plug
16. Holder
17. Washer 5,3 mm (2)
18. Lockwasher 5 mm (2)
19. Allen screw M5 x 16 (2)
20. Stator plate
21. Lighting coils set (with iron core)
22. Charging coil
23. Damping plate
24. Lockwasher 4 mm (4)
25. Cylinder screw M4 x 25 (3)
26. Trigger coil
27. Cylinder screw M4 x 28
28. Lockwasher 3 mm
29. Cylinder screw M3 x 6
30. Emergency cut-out switch
31. Lock washer 6 mm
32. Allen screw M6 x 16
33. Rubber mount (2)
34. Hexagonal nut M6 x 1.00 (2)
35. Magneto cover
36. Locating dowel (3)
37. Allen screw M6 x 50 (2)
38. Allen screw M6 x 45
39. Adjustment plug
40. Crankshaft nut
250: M16 x 1.5
370: M18 x 1.5
41. Lockwasher
250: 16 mm
370: 18 mm
42. Loctite 242 blue
(medium strength)



SECTION 03 ELECTRICAL

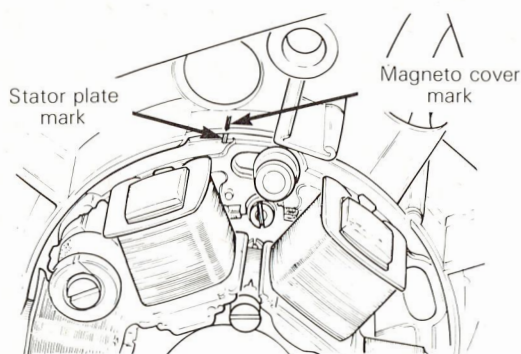
SUB-SECTION 02 (IGNITION SYSTEM)

DISASSEMBLY & ASSEMBLY

◆ **WARNING:** To prevent powerful electric shocks make sure to stop the engine prior to performing any adjustment or repair onto or near the CD ignition system (i.e. ignition timing, ignition tester, replacement of spark plug, coil or ignition armature, high tension wire, emergency cut-out switch).

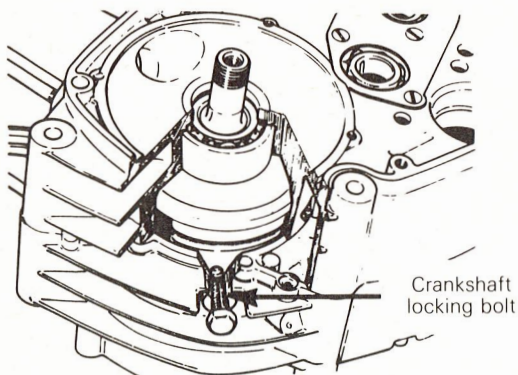
If any adjustment has to be performed with the engine running, do not touch any components related to the C.D. ignition system (i.e. ignition coil, high tension wire, wiring harness, etc...).

① To facilitate timing procedure, perform primary adjustment by matching magneto cover and stator plate marks.



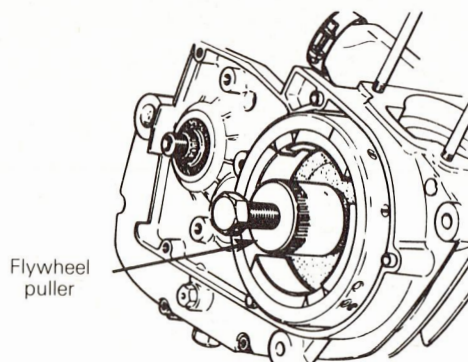
② To remove the flywheel, lock crankshaft at the top dead center position using a crankshaft locking bolt.

▼ **CAUTION:** At the replacement of the flywheel and/or magneto cover the timing marks must be checked. (See timing sub-section).



▼ **CAUTION:** Prior to screwing the locking bolt, ensure that the crankshaft and crankcase holes are properly aligned.

Remove the flywheel retaining nut and install special puller on the flywheel. Tighten puller bolt and at the same time, tap gently on the bolt head using a soft hammer to release the flywheel from its taper.



Prior to assembly, apply a light coat of Loctite 242 blue (medium strength) on the crankshaft taper and threads. Torque to

250: 80 N•m (60 ft-lbs)

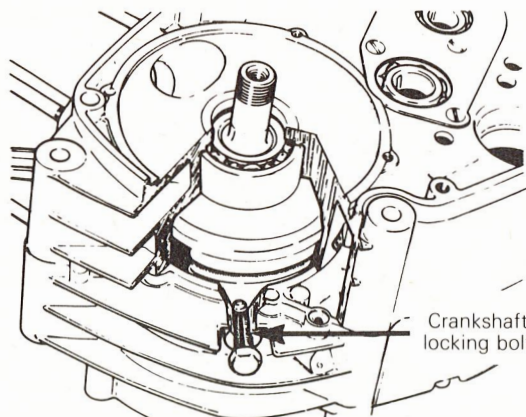
370: 100 N•m (75 ft-lbs)

370 model only:

It is recommended to retorque the flywheel after the first hour of operation and to retorque again after the first three (3) to five (5) hours of operation.

Proceed as follows:

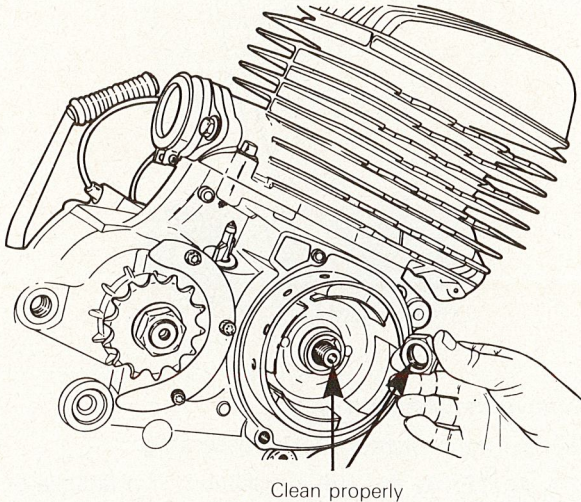
To remove the flywheel nut, lock crankshaft at the top dead center position using a crankshaft locking bolt.



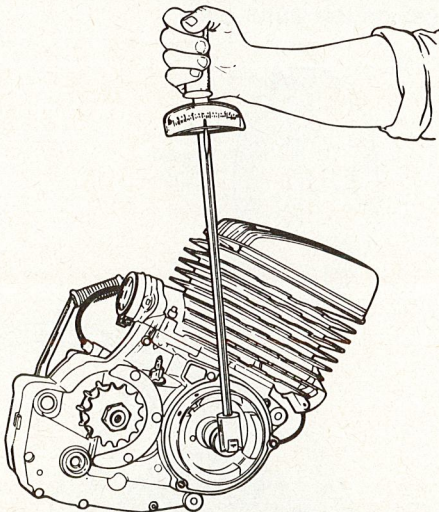
SECTION 03 ELECTRICAL

SUB-SECTION 02 (IGNITION SYSTEM)

Remove the magneto cover and the crankshaft nut.
Clean threads properly.

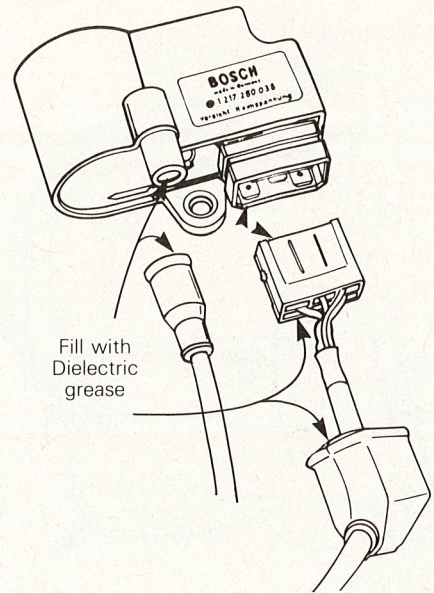


Apply Loctite adhesive sealant 242 blue (medium strength) on threads and retorque to 100 N•m (75 ft-lbs).



⑤⑦⑫ Prior to assembly check all connections for dirt or corrosion.

Fully pack the electronic control, the connector block, the rubber boot, the high tension connection and the protector boot with dielectric grease Dow Corning DC 4, or equivalent.

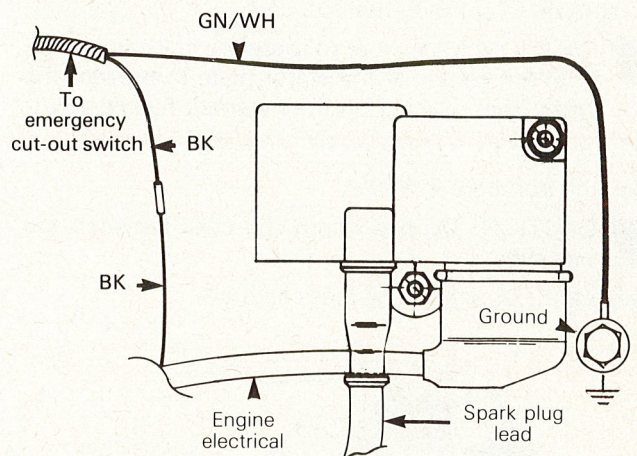


CAUTION: To prevent moisture, make sure no air is trapped within the connections. Do not use silicone sealant as contacts may corrode.

⑨⑩⑪ At assembly, connect the wires (as illustrated).

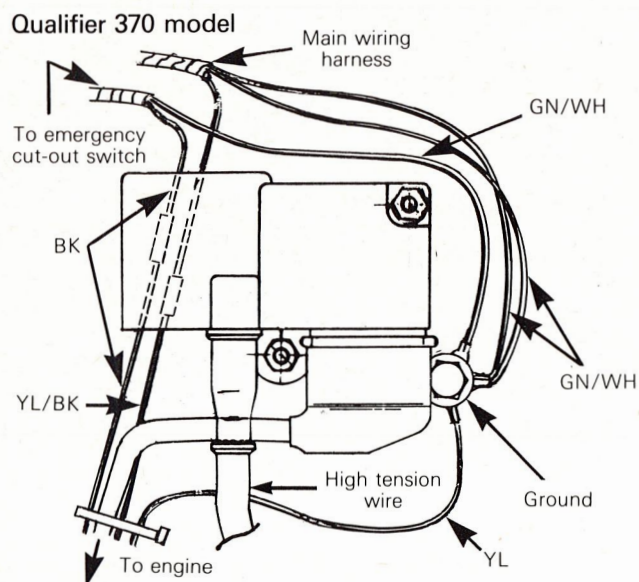
COLOR CODE: GN — GREEN
WH — WHITE
BK — BLACK
YL — YELLOW

MX-5 250-370 models



SECTION 03 ELECTRICAL

SUB-SECTION 02 (IGNITION SYSTEM)



⑭ At assembly, ensure spark plug protector is not screwed in high tension wire insulation instead of wire core, causing a poor contact.

⑰ At assembly, apply Loctite 242 blue (medium strength) on the retainer screw threads and torque to 4-5 N•m (3-4 ft-lbs).

▼ **CAUTION:** Ensure to use Loctite and to properly tighten the screws, otherwise loosening may happen during engine operation and damage to the ignition unit will occur.

⑳ The 5 lighting coils are connected in parallel and must be replaced in set with the iron core.

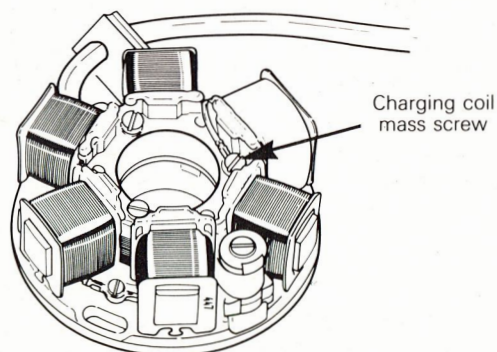
▼ **CAUTION:** Make sure to route the coil wires away from the center of the stator plate to prevent the wires from rubbing on the magneto flywheel nut.

㉑ To replace the charging coil, proceed as follows:

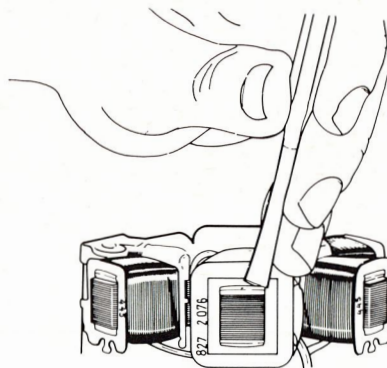
Lock the iron core in a vise.

▼ **CAUTION:** Do not clamp the coils between the vise jaws.

Remove the charging coil mass screw.



Using the suitable tools unbend the two outer sheet metal plates of the iron core.



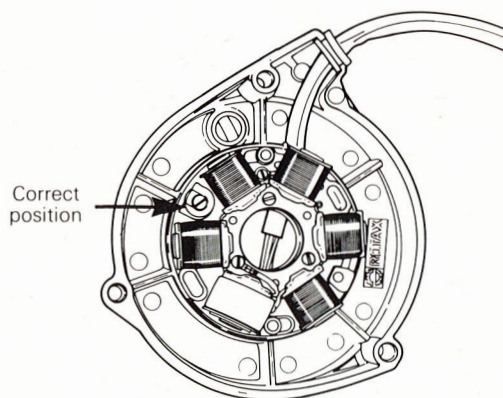
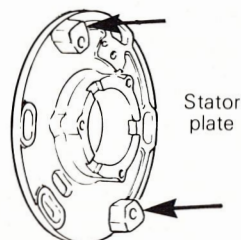
Remove the charging coil.

Reverse the procedure for re-assembly.

○ **NOTE:** At the coil installation, if a lamella of the iron core breaks, bend back the next lamella.

㉓ ㉔ At assembly, torque to 3 N•m (2 ft-lbs).

㉕ Prior to the removal of the trigger coil, ensure to mark its position as the trigger coil can be installed at two places on the stator plate.



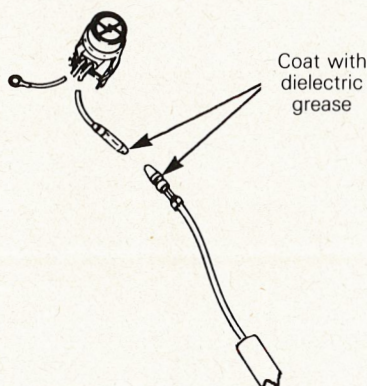
㉖ ㉗ At assembly, torque to 3 N•m (2 ft-lbs) and ensure proper grounding.

SECTION 03 ELECTRICAL

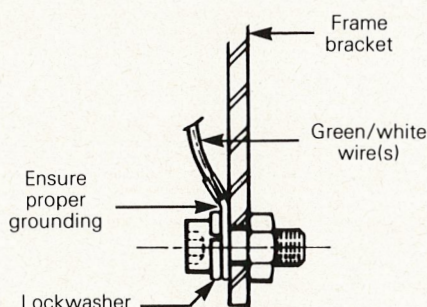
SUB-SECTION 02 (IGNITION SYSTEM)

③① Prior to assembly, check connection for dirt or corrosion.

Coat the contact pin with dielectric grease Dow Corning DC 4 or equivalent.

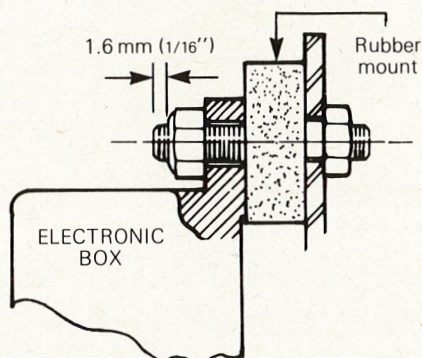


③② At assembly, torque to 8-10 N•m (6-8 ft-lbs) and ensure proper grounding.

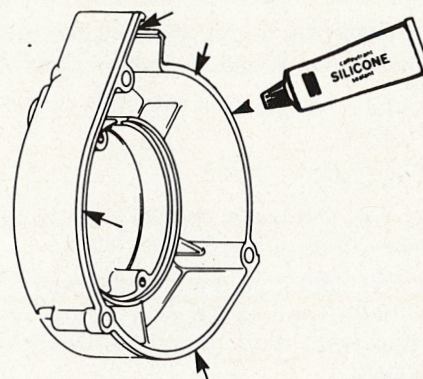


③③ ③④ At assembly, tighten the elastic stop nut in order to obtain at least 1.6 mm (1/16") long of threads protruding past the nylock. This will secure the assembly.

CAUTION: Do not overtighten the nuts or the rubber mounts will loose their flexibility.



③⑤ At assembly, apply a light coat of Loctite 515 sealant or silicone sealant or equivalent on the mating surface.



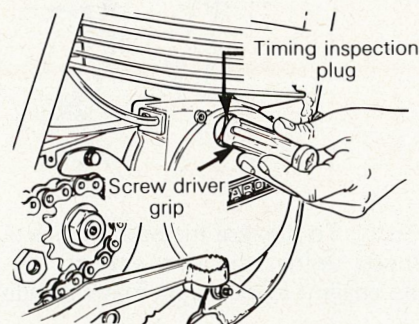
CAUTION: At the replacement of the flywheel and/or magneto cover, the timing marks must be checked. (See timing sub-section).

③⑥ At assembly, make sure the three (3) locating dowels are in position, either in crankcase or in magneto cover.

③⑦ ③⑧ At assembly, apply a small drop of oil or a thin coat of grease on screw threads and torque to 8 N•m (6 ft-lbs).

NOTE: The longest retaining screw (50 mm long) must be fitted in the top and bottom magneto cover holes.

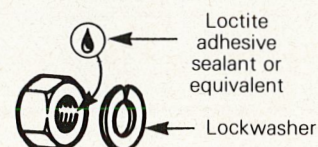
③⑨ For installation & removal use the screwdriver grip end, provided with motorcycle tool kit.



④① At assembly, apply Loctite 242 blue (medium strength) on the threads of the magneto retaining nut and torque to

250: 80 N•m (60 ft-lbs)

370: 100 N•m (75 ft-lbs)



SECTION 03 ELECTRICAL

SUB-SECTION 02 (IGNITION SYSTEM)

CLEANING AND SERVICING

Clean the stator plate and flywheel using only a clean cloth.

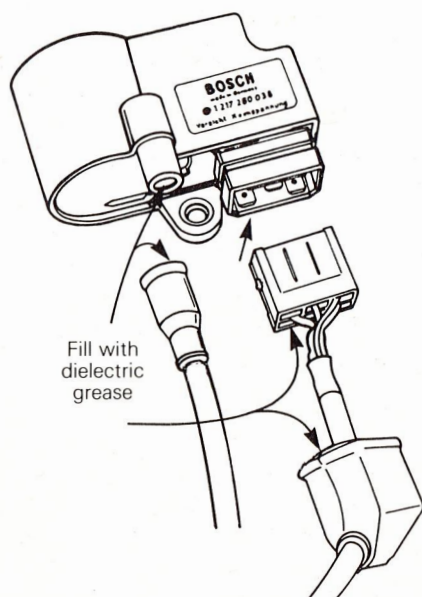
CAUTION: Due to the very sensitive built-in components. Always handle ignition parts with care.

It is important to inspect all electrical connections for dirt or corrosion.

Clean as necessary.

The timing must always be recheck after working on ignition system. (See timing sub-section).

Fully pack the electronic control, the connector block the rubber boot, the high tension connection and the protector boot with dielectric grease Dow Corning DC 4, or equivalent.



CAUTION: To prevent moisture, make sure no air is trapped within the connections. Do not use silicone sealant as contacts may corrode.

Frequently inspect the ignition cover and crankcase unpainted surfaces for corrosion. If corroded, clean then spray with LPS 3 or equivalent.

CAUTION: Do not attempt to stop the engine by removing the high tension wire from the spark plug. Severe damage will occur to electronic box.

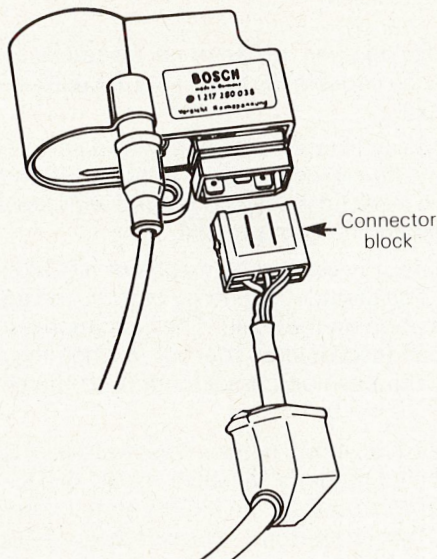
TESTING PROCEDURE

COUNTINUITY TESTS

The charging coils, triggering coils, lighting coils high tension wires and emergency cut-off switches can be tested using an ohmmeter.

○ **NOTE:** Values are taken at 20°C (68°F), remember that resistance increases with temperature.

Disconnect the multiple connector at the electronic box unit and run a resistance test between the pins of the connector block.



Trigger coil:

Between white and brown (ground)

60W, 6 poles ignition unit: (5 coils parallel)

MAX.: 67 ohms

MIN. : 59 ohms

55W, 4 poles ignition unit: (2 coils parallel, tested separately)

MAX.: 80 ohms

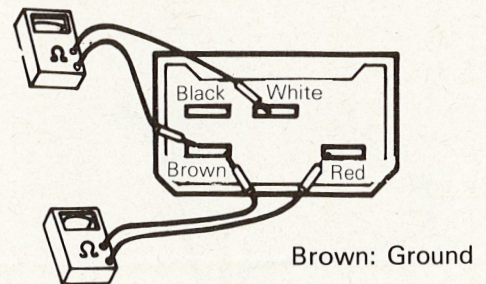
MIN. : 50 ohms

Charging coil: (cloth insulated)

Between red and brown (ground)

MAX.: 550 ohms

MIN. : 450 ohms



Lighting coils:

60W, 6 poles ignition unit: (5 coils parallel)

– Between yellow/black wire and yellow wire (ground):

MAX.: 0.46 ohms

MIN. : 0.38 ohms

55W, 4 poles ignition unit: (2 coils parallel, tested separately)

– 40 watts coil; between yellow/black wire and yellow wire (ground):

MAX.: 0.68 ohms

MIN. : 0.56 ohms

– 15 watts coil; between green/black wire and green wire (ground):

MAX.: 7.7 ohms

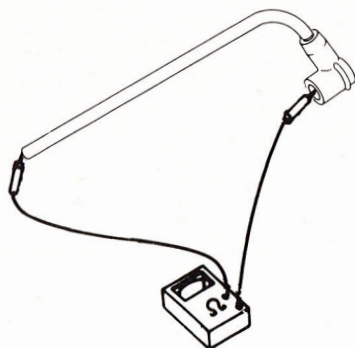
MIN. : 6.3 ohms

○ **NOTE:** While testing the coils with the ohmmeter it may occur that the readings alter. To make sure the proper reading is obtained, inverse the test lead of the ohmmeter and perform the test again. Take the highest reading.

SECTION 03 ELECTRICAL

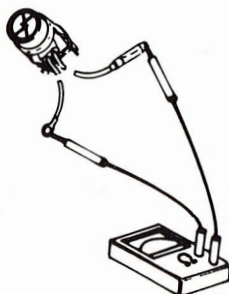
SUB-SECTION 03 (TESTING PROCEDURE)

High tension wire



RESISTANCE = 0 ohm = continuity

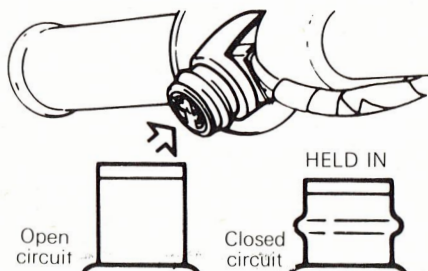
Emergency cut-off switch.



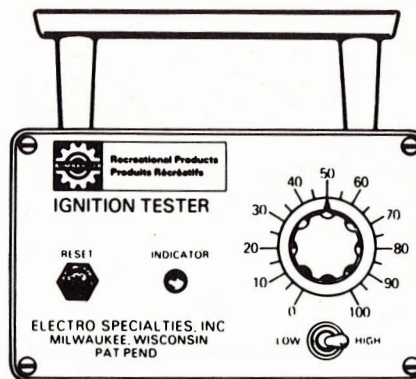
RÉSISTANCE

Open circuit: = 1000 ohms
minimum

Closed circuit: = .001 ohm
maximum



BOMBARDIER IGNITION TESTER (P/N 419 0033 00)



General

The Bombardier ignition tester is an electrical energy measuring device capable of measuring the peak energy output of a coil.

The tester is of solid state construction and performs as a comparator. The correct value of energy output is indicated in each test and is then compared with the value taken from the engine being tested.

The energy output is verified by means of a 0-100 scale on the tester. The greater the energy output, the greater the value indication on the scale. The indication is in the form of an incandescent lamp that lights when the scale knob is set at the position corresponding to the energy output.

The tester has two input ranges selected by a toggle switch. The LOW range is sensitive to AC or DC voltages from 0.5 to 27 volts. The HIGH range is sensitive to AC or DC voltages from approximately 75 to 500 volts.

Test condition

All tests are performed on the vehicle at cranking speed. It would seem logical that removal of spark plug would allow the engine to turn over faster, therefore raising the output level of the ignition system. It was found that vigorous cranking against compression causes the flywheel to snap over, raising the output higher than by cranking without compression. **Test values listed are taken against compression.**



CAUTION: Never crank engine with spark plug wire detached from spark plug unless emergency cut-off switch is at **off** position otherwise electronic box damage may occur.

SECTION 03 ELECTRICAL

SUB-SECTION 03 (TESTING PROCEDURE)

Always crank vigorously as in actual starting.

Read all instructions **thoroughly** and as you become familiar with this test instrument it will be possible to test a complete ignition system in a matter of minutes.

Always proceed in the following order:

1. Connect tester **P** and **N** clip leads as illustrated.
2. Follow test procedure sequence.
3. After every test that lights the indicator lamp, **reset** the indicator circuit by depressing the reset button.

ANALYSIS OF TEST RESULTS

Indicator lamp lights at specific setting

Output is as specified. Test results should repeat 3 times. If readings do not repeat, output is erratic and cause should be investigated (loose connections or components, etc.).

Indicator lamp lights at a lower setting

This indicates that the output is less than that designed to operate the engine in a satisfactory manner. The engine may run at lower setting but be subject to hard starting and misfiring. Be certain that correct engine cranking conditions were met before condemning the ignition.

Indicator lamp does not light

One component is defective. Proceed as instructed to find defective component.

Intermittent ignition problems

In dealing with intermittent problems there is no easy diagnosis. For example, problems that occur only at normal engine operating temperature have to be tested under similar conditions.

In most cases of temperature and/or vibration failure, only parts replacement can solve the problem as most of these failures return to normal when engine is not running.

Double trouble

There is always the possibility of more than one defective part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other defective part.

ANALYSER TEST AND MAINTENANCE

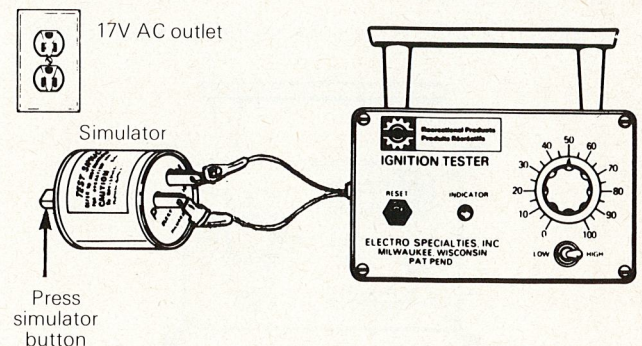
At test simulator is provided with each tester as a means to test the lamp, detector circuit, and batteries.

High scale test

- a) Place switch in HIGH position. Plug the simulator into an electric outlet (117V AC) for ten seconds.

CAUTION: After charging, do not touch plug terminals while pressing test button. A mild shock will result.

- b) Remove the simulator from the outlet, and connect the "P" and "N" leads from the tester to the simulator as indicated on the bottom of the simulator.
- c) Set the tester dial to 50, or below. Depress the button of the simulator. The indicator lamp on the tester should light.



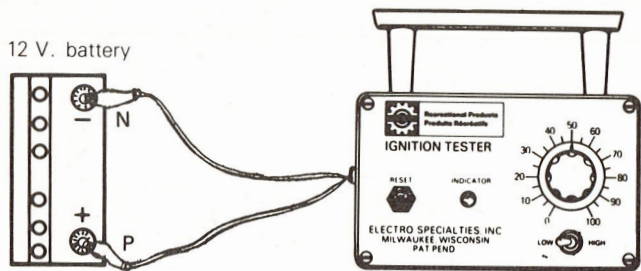
NOTE: For each test performed by the simulator it must be recharged.

SECTION 03 ELECTRICAL
SUB-SECTION 03 (TESTING PROCEDURE)

Low scale test

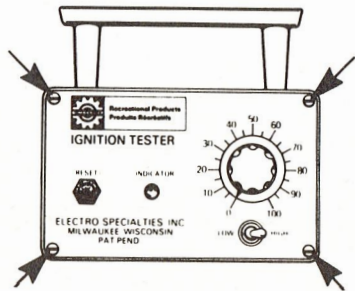
- a) Place switch in LOW position.
- b) Set tester dial to 50, or below.
- c) Connect **N** lead to negative terminal of 12 volt battery. Connect **P** lead to positive terminal of a fully charged 12 volt battery. Indicator lamp should light.

If lamp does not light, check tester batteries. If they are installed correctly and are good, check the clip lead for faulty connections. If no fault can be found, refer to the warranty statement for instructions for sending the tester back to Electro-Specialties, Inc.

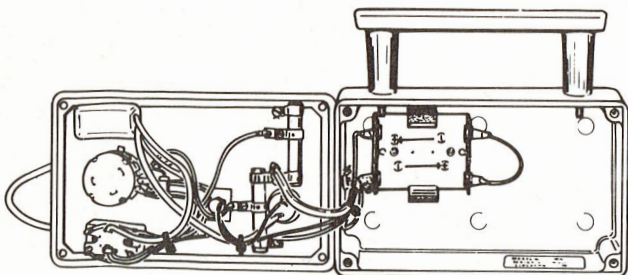


Battery replacement

- 1. Remove the four (4) screws securing cover to case.



- 2. Carefully lift cover.
- 3. Replace batteries with size "C" Alkaline batteries. Be sure to observe polarity markings on battery holder or lamp will not light.



- 4. Install cover on case carefully being certain that no wires are pinched between cover and case. Secure cover.

NOTE: Weak batteries will not impair tester operation or calibration. The light will glow dim.

Indicator knob alignment

Check indicator knob alignment by turning knob fully clockwise. The white mark on the knob must align with the no. 100 on the scale. If the mark does not line up with the no. 100, loosen the knob set screw, line the mark on the knob with the no. 100, and tighten the set screw. Recheck alignment.

NOTE: If after adjustment, the knob is turned fully counter-clockwise and it does not exactly align with the 0, it is no consequence.

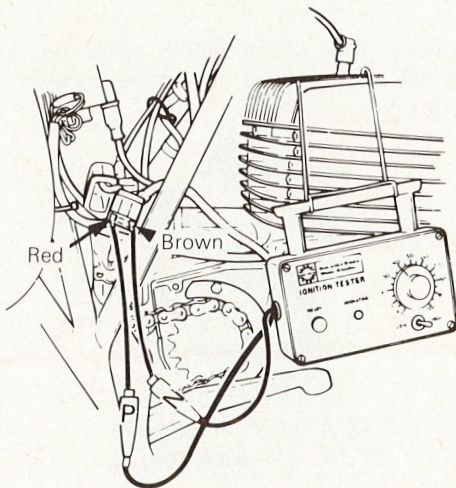
The ignition tester may give false readings if the rivets on the back cover come in contact with metal.

INDEX	PAGE
<u>4 poles ignition system, 55W</u>	
test no. 1: charging coil output	5
test no. 2: trigger coil output	5
test no. 3: lighting coil output	6
<u>6 poles ignition system, 60W</u>	
test no. 1: charging coil output	7
test no. 2: trigger coil output	7
test no. 3: lighting coils output	8
<u>IGNITION TROUBLE SHOOTING</u>	9

4 POLES IGNITION SYSTEM (55W)

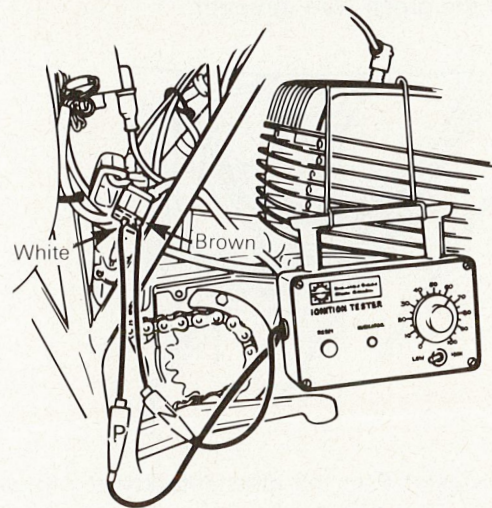
Test no. 1 Charging coil output

1. Disconnect wire connector at C.D.I. electronic box.
 2. Connect test **P** lead to the **red** wire coming from the charging coil using the harness adaptor, as illustrated. Connect tester **N** lead, to the ground wire (**brown**).
 3. Set tester switch at HIGH position and dial at **40**.
 4. Set transmission in neutral, then kick start pedal down vigorously.
- A. Indicator lamp lights:** Charging coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
- B. Indicator lamp lights at lower setting:** Charging coil output is weak. Check for resistance, bad connections or broken flywheel magnets; replace if necessary.
- C. Indicator lamp lights intermittent:** Check for bad connections or loose components.
- D. Indicator lamp does not light:** Replace charging coil and repeat test, ensure proper grounding.



Test no. 2 Trigger coil output

1. Disconnect wire connector at C.D.I. electronic box.
 2. Connect test **P** lead to the **white** wire leading from trigger coil using the harness adaptor, as illustrated. Connect tester **N** lead to the ground wire (**brown**).
 3. Set tester switch at LOW position and dial at **65**.
 4. Set transmission in neutral, kick start pedal down vigorously.
- A. Indicator lamp lights:** Charging coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
- B. Indicator lamp lights at lower setting:** Charging coil output is weak. Check for resistance, bad connections or broken flywheel magnets. Replace if necessary.
- C. Indicator lamp lights intermittent:** Check for bad connections or loose components.
- D. Indicator lamp does not light:** Grounding is defective or starter plate is faulty, check and replace if necessary.

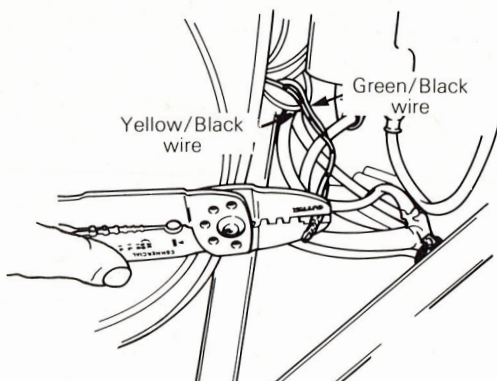


SECTION 03 ELECTRICAL

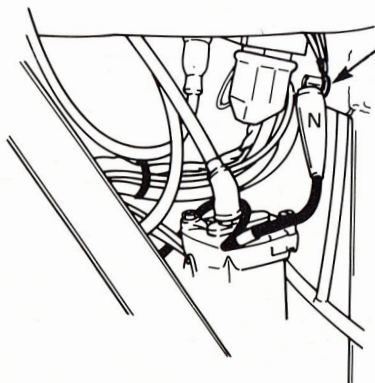
SUB-SECTION 03 (TESTING PROCEDURE)

Test no. 3 Lighting coil output

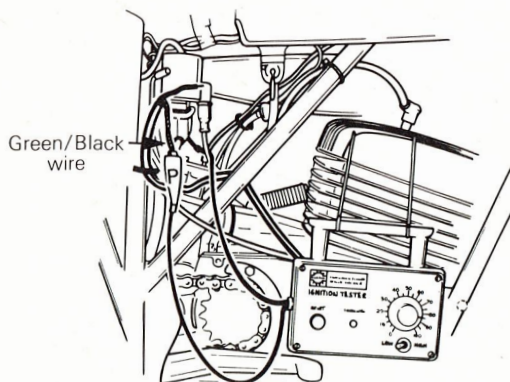
○ **NOTE:** There are two (2) lighting coils, 15 watts and 40 watts, connected in parallel. To test each coil individually, it is necessary to separate the green/black and yellow/black wires leading from the magneto.



1. Connect tester **N** at the junction between the yellow wire and the green wire (ground).



2. Connect tester **P** to the green/black wire (15 watts coil).

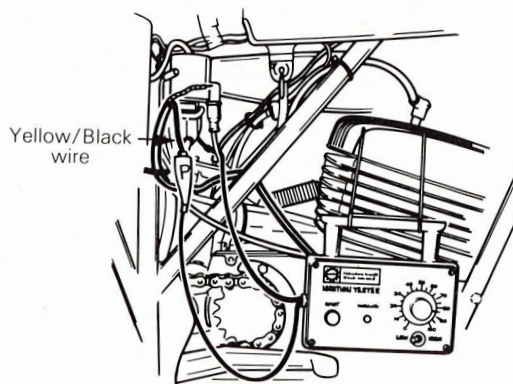


3. Set tester switch at **LOW** position and dial at **85**.
4. Set transmission in neutral, then kick start pedal down.

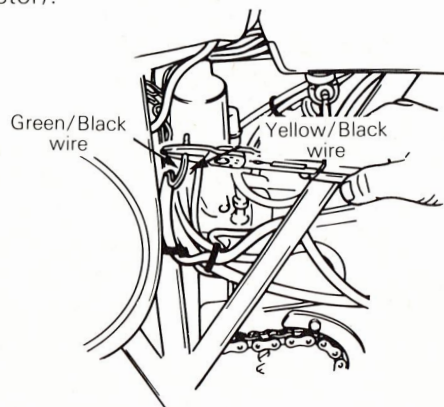
A. Indicator lamp lights: Lighting coil is operating.

B. Indicator lamp does not light: Lighting coil is defective.

5. Connect tester **P** lead to the yellow/black wire (40 watts coil) then repeat step 3 and 4.



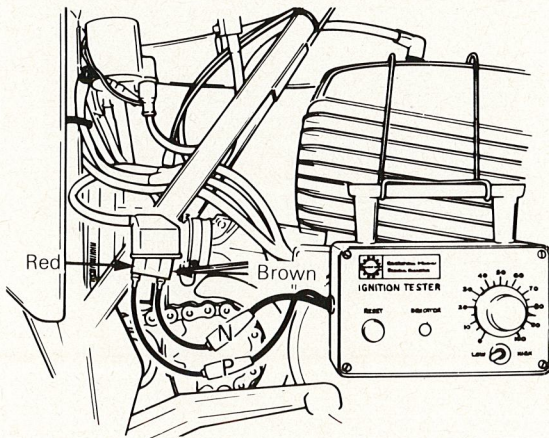
6. Reconnect the green/black wire and the yellow/black wire using a new male contact pin (connector).



6 POLES IGNITION SYSTEM (60W)

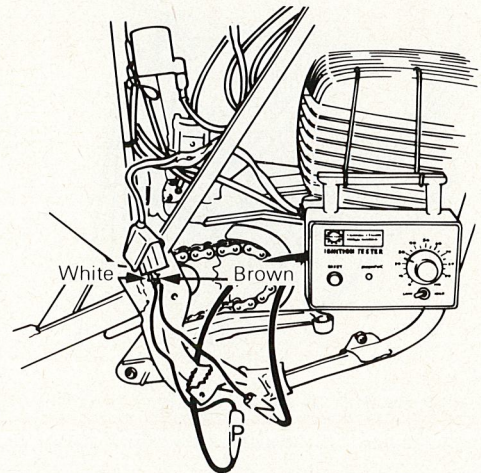
Test no. 1 Charging coil output

1. Disconnect wire connector at C.D.I. electronic box.
 2. Connect tester **P** lead to the **red** wire coming from the charging coil using the harness adaptor, as illustrated. Connect test **N** lead, to the ground wire (**brown**).
 3. Set tester switch at LOW position and dial at **85**.
 4. Set transmission in neutral, then kick start pedal down vigorously.
- A. Indicator lamp lights:** Charging coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
- B. Indicator lamp lights at lower setting:** Charging coil output is weak. Check for resistance, bad connections or broken flywheel magnets; replace if necessary.
- C. Indicator lamp lights intermittent:** Check for bad connections or loose components.
- D. Indicator lamp does not light:** Replace charging coil and repeat test, ensure proper grounding.



Test no. 2 Trigger coil output

1. Disconnect wire connector at C.D.I. electronic box.
 2. Connect test **P** lead to the **white** wire leading from trigger coil using the harness adaptor, as illustrated. Connect tester **N** lead to the ground wire (**brown**).
 3. Set tester switch at LOW position and dial at **25**.
 4. Set transmission in neutral, then kick start pedal down vigorously.
- A. Indicator lamp lights:** Trigger coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
- B. Indicator lamp lights at lower setting:** Trigger coil output is weak. Check for resistance, bad connections or broken flywheel magnets. Replace if necessary.
- C. Indicator lamp lights intermittent:** Check for bad connections or loose components.
- D. Indicator lamp does not light:** Grounding is defective or trigger coil is faulty, check and replace if necessary.

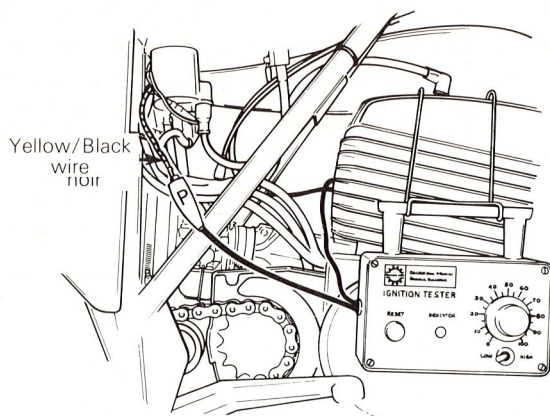


SECTION 03 ELECTRICAL

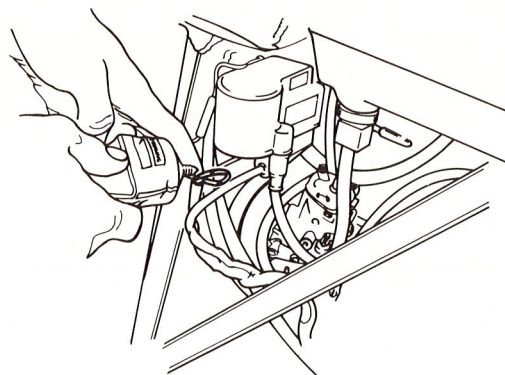
SUB-SECTION 03 (TESTING PROCEDURE)

Test no. 3 Lighting coils output

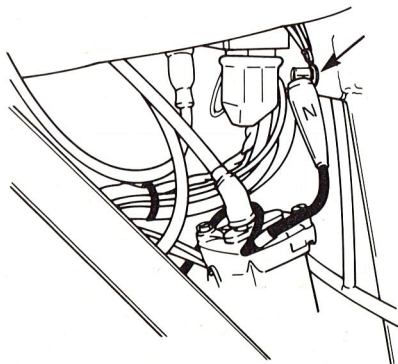
1. Connect tester **P** lead to yellow/black wire leading from the magneto.



On MX-5 models, when the lighting coil output test is completed, the yellow/black wire must be inserted into the magneto harness. Dielectric grease (or equivalent) must be used to provide water-proofing.

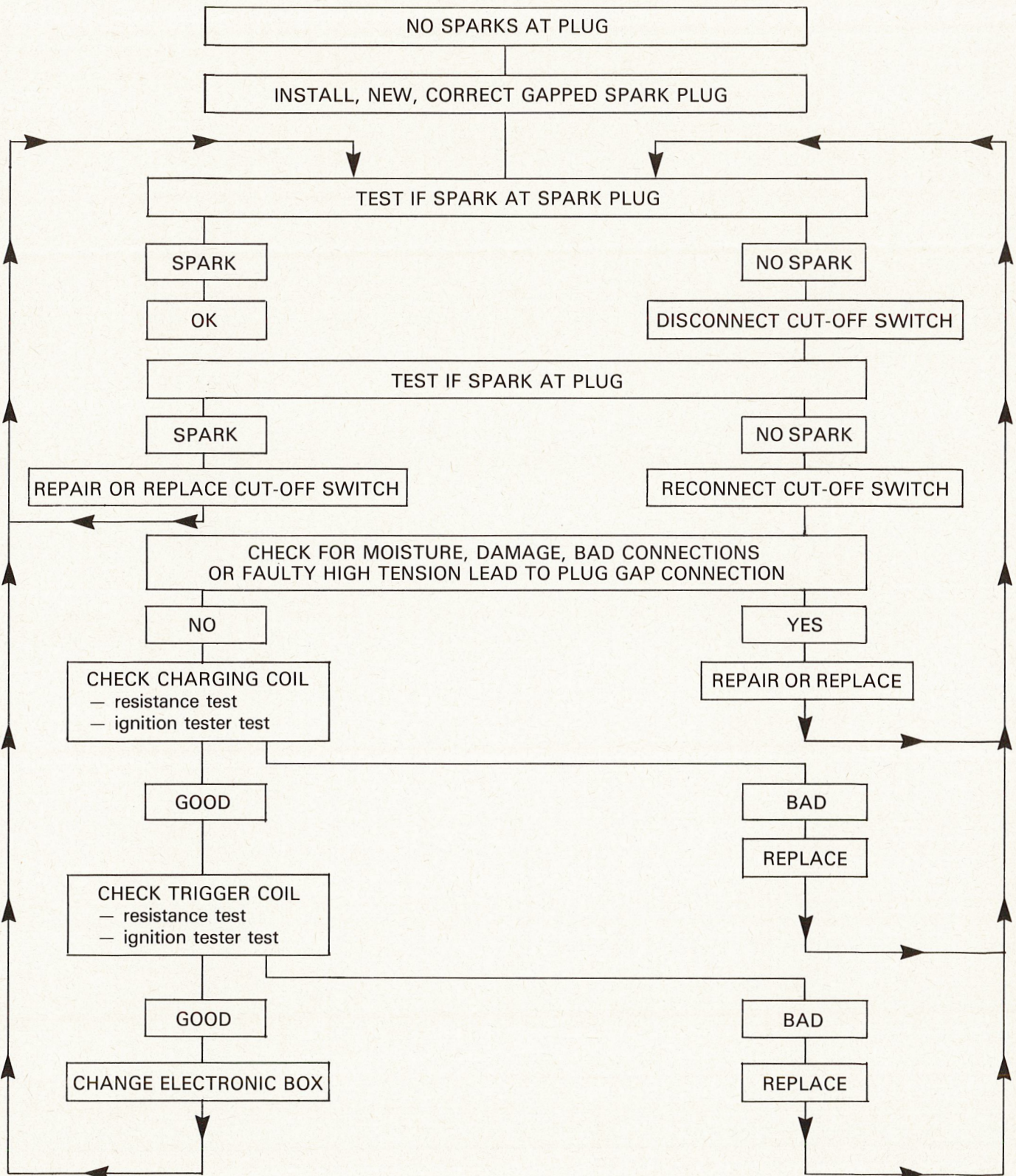


2. Connect tester **N** lead to the ground wire (yellow).



3. Set tester switch at **LOW** position and dial at **80**.
 4. Set transmission in neutral, kick start down vigorously.
- A. Indicator lamp lights:** Lighting coils output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
 - B. Indicator lamp lights at lower setting:** Lighting coils output is weak. Check for resistance, bad connections, or broken flywheel magnets. Replace if necessary.
 - C. Indicator lamp lights intermittent:** Check for bad connections or loose components.
 - D. Indicator lamp does not light:** Grounding is defective or lighting coils are faulty, check and replace if necessary.

IGNITION TROUBLE SHOOTING CHART



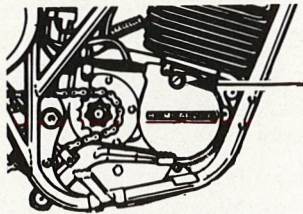
IGNITION TIMING

TIMING MARK VERIFICATION (TOP DEAD CENTER GAUGE)

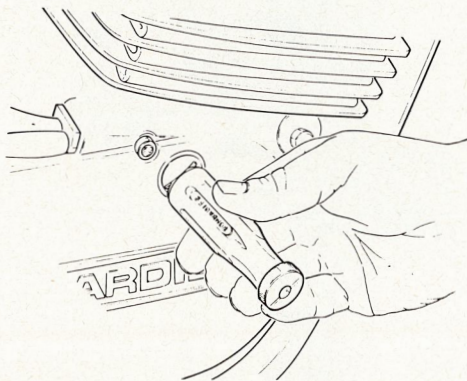
Mount the motorcycle on a box or stand with the rear wheel raised.

Disconnect spark plug wire and remove spark plug.

Remove the inspection plug on the magneto cover.

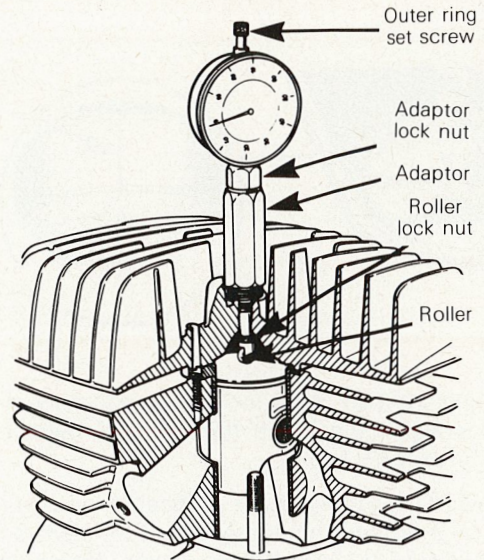


○ **NOTE:** For screwing or unscrewing the plug use screw driver grip end, provided with motorcycle tool kit.



Install and adjust T.D.C. gauge (dial indicator) on engine as follows:

- Engage the transmission in the highest gear.
- Rotate the rear wheel until the piston is just before top dead center.
- With gauge in adaptor, adjust roller parallel with dial face. Tighten roller lock nut.



- Loosen adaptor lock nut then holding gauge with dial face toward magneto. Screw adaptor in spark plug hole.
- Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
- Rotate the rear wheel until the piston is at top dead center.
- Unlock the outer ring of the dial and turn it until "O" on the dial aligns with the pointer.
- Lock the outer ring in position.

Rotate the rear wheel **counter-clockwise** and slightly go beyond the specified distance before top dead center then gently rotate. **Clockwise** until the specified distance before top dead center is reached:

Qualifier 175-250: 1.2 mm \pm .2 (0.047" \pm .007")

MX-5 250: 1.3 mm \pm .2 (0.051" \pm .007")

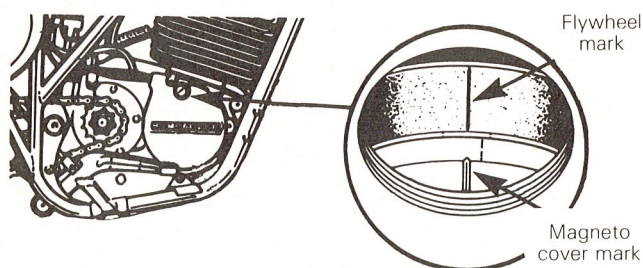
Qualifier 370 & MX-5 370: 2.5 mm \pm .2 (0.098" \pm .007")

○ **NOTE:** Turning clockwise to achieve setting will take up all free-play and ensure an accurate reading.

SECTION 03 ELECTRICAL

SUB-SECTION 04 (IGNITION TIMING)

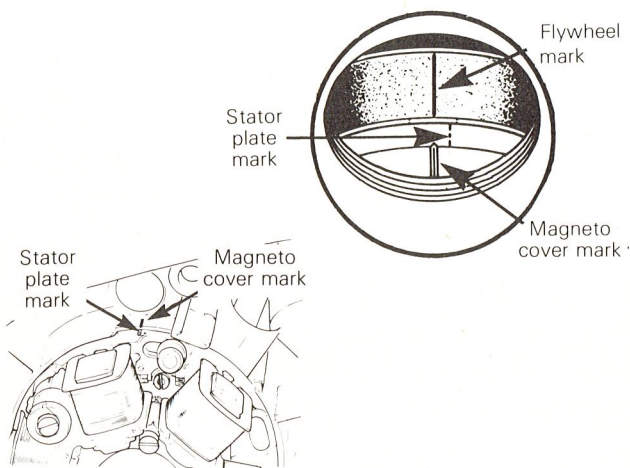
Look through the inspection hole to see if the flywheel and magneto cover marks align.



If the marks do not align, scribe a new mark on the magneto cover in line with the flywheel mark at the specified piston (B.T.D.C.).

▼ **CAUTION:** Timing mark verification cannot be used as a timing procedure, therefore always check the timing (using a stroboscopic timing light at 7,000 R.P.M.) after the marks have been aligned.

The stator plates also marked.



The stator plate mark is used only to ease the preliminary timing adjustment, by matching stator plate mark and magneto cover mark, when parts are re-assembled. Also, this mark may be used, when performing timing with a stroboscopic timing lamp. To determine the approximate distance the stator plate should be rotated (retard or advance) using magneto cover mark as a reference.

Prior to timing procedure, ensure to clearly identify all the timing marks.

▼ **CAUTION:** Only the magneto cover mark and the flywheel mark must be matched to obtain proper timing.

TIMING PROCEDURE (stroboscopic timing lamp)

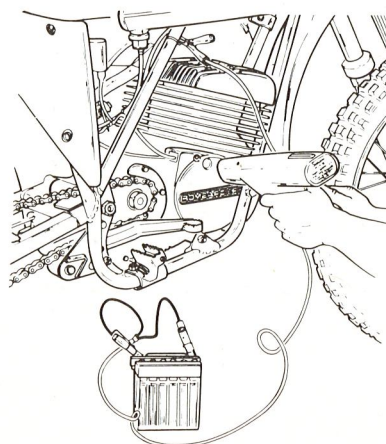
Remove the timing inspection plug, and connect the timing light pick-up to the high tension lead.

○ **NOTE:** Use a separate battery to supply timing lamp.

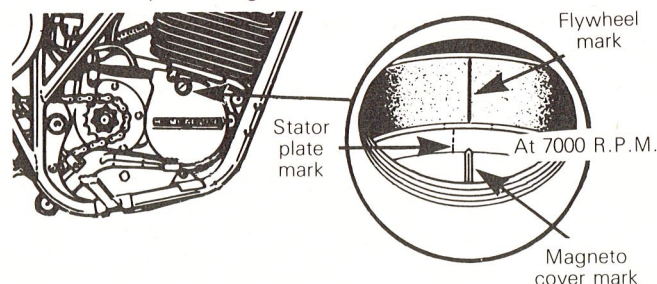
Start the engine and allow it to warm.

◆ **WARNING:** To prevent powerful electric shock, do not touch the high tension wire while the engine is running.

Point the timing light beam straight into the inspection hole and, revving the engine to 7000 R.P.M. for a brief instant.



Check the timing mark alignment. If timing is correct, the magneto cover mark and flywheel mark will align as shown. Stop the engine.



▼ **CAUTION:** Prior to timing procedure, ensure that the timing marks have been checked with a dial indicator for perfect accuracy.

SECTION 03 ELECTRICAL

SUB-SECTION 04 (IGNITION TIMING)

If timing was incorrect,
Remove the magneto cover.

Loosen the stator retaining screws then move the stator plate in the advance or retard direction to correct the misalignment.

Examples of suitable timing lights:

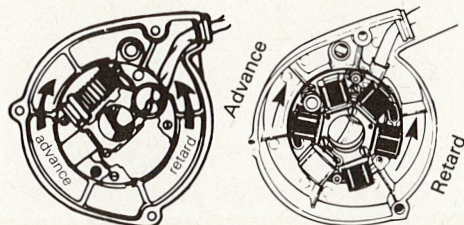
SUN PTL 45

Snap-on MT 215 B

Bosch EFAW 169 A

Marquette 41-220

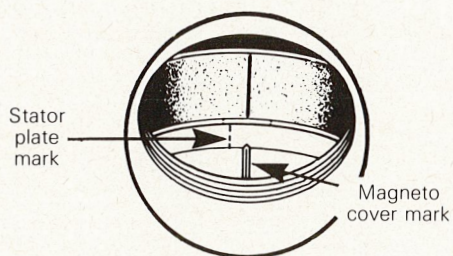
CAUTION: Only the **magneto cover mark** and **the flywheel mark** must be matched to obtain proper timing.



55W Magneto
(4 poles)

60W Magneto
(6 poles)

NOTE: To determine the amount of rotation given to the stator plate, use the stator plate mark with the magneto cover mark as a reference point.



Tighten the stator plate screws.

CAUTION: Ensure to apply "Loctite 242" blue (medium strength) to the retaining screws and torque to 4-5 N•m (3-4 ft-lbs).

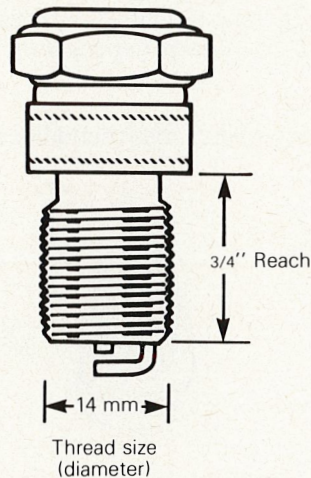
Install the magneto cover, start the engine and recheck the alignment of the timing marks on the **flywheel** and **magneto cover**.

Repeat this procedure until the timing marks on the flywheel and magneto cover are perfectly aligned at 7000 R.P.M.

NOTE: Only stroboscopic timing lights utilizing capacitor or inductive pick-up can be used to indicate correct spark setting without disturbing the electronic equilibrium of the ignition circuit.

SPARK PLUG

SPARK PLUG TYPE



BOSCH SPARK PLUG NUMBERING SYSTEM

Old system:

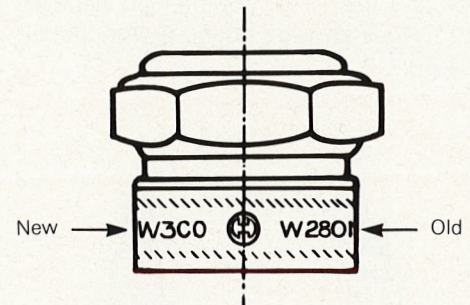
W 280 MZ 2—Indicates particular design detail (such as 3/4" reach).
M: Two cycle engine
Z: Semi covered front electrode
Heat range: If we consider a 280 rating as normal, a plug with a 260 rating is "hotter" and a 300 rating is "colder".
W: indicates 14 mm thread.

New system:

W 3 CO
C: thread reach 3/4" regular electrode.
O: electrode design.
Heat range: If we consider a 3 rating as normal, a plug with a 2 rating is "colder" and a 4 rating is "hotter".
W: indicates 14 mm thread.

CAUTION: On the **new** Bosch identification system, the heat range identification must be well understood; the higher the number is, the hotter is the plug and the lower the number is, the colder is the plug.

NOTE: The spark plug will carry the new and old type identification system on the plug shell during the transition period.

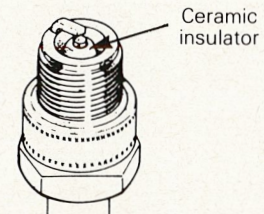


HEAT RANGE

Factory tests have shown that the **Bosch W 280 MZ2/W 3 CO** or **W 275 T 2/W 3 C** spark plugs are the best for general use. However, spark plug requirements may slightly differ with the ignition and carburation adjustments and with the various riding conditions.

When the correct heat range is used, the spark plug electrode will stay hot enough to keep all the carbon burned off and also, the electrode will stay cool enough to prevent overheating or red-hot points which are harmful to the engine and to the plug itself.

A careful inspection of the condition and color of the ceramic insulator around the center electrode will show you if the plug has the proper heat range:



the ideal condition is when the ceramic is clean and of a light brown color.

NOTE: To obtain a very accurate reading, install a brand new plug for the test and ensure that the carburetor jetting, fuel/oil mixture and engine conditions are good; refer to spark plug check procedure.

SECTION 03 ELECTRICAL

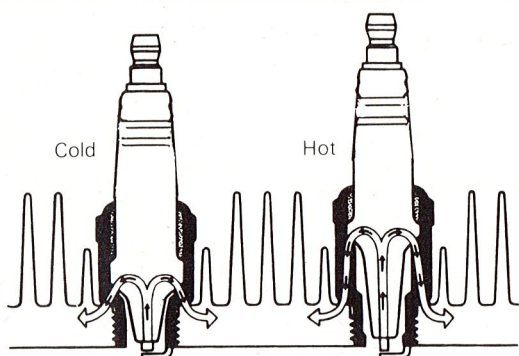
SUB-SECTION 05 (SPARK PLUG)

Difference between a "cold" and a "hot" spark plug:

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



▼ **CAUTION:** Severe engine damage can occur if a wrong heat range plug is used:

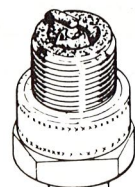
A too "hot" plug will result in overheating and re-hot points pre-ignition, etc.

A too "cold" plug will result in fouling (shorting the spark) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

SPARK PLUG ANALYSIS

The plug face reveals the condition of the engine, operating condition, method of driving, and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining in particular the plug face (i.e. the part of the plug projecting into the combustion chamber). The plug face generally reveals any trouble symptoms.

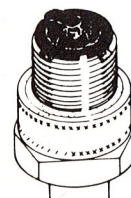
A brownish tip reflects ideal conditions.



Normal
(brownish)

A black insulator tip indicates fouling caused by:

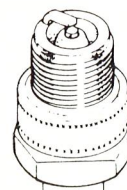
- fuel/oil mixture too rich
- dirty air cleaner element
- wrong spark plug heat range (too cold)
- fuel/air mixture too rich, wrong jetting
- weak or faulty ignition system.



Fouled
(black)

A light gray, ash white insulator tip indicates a lean mixture caused by:

- advanced ignition timing
- insufficient lubrication
- clogged carburetor jets or lean jetting
- wrong spark plug heat range
- spark plug loose in head or no gasket fitted
- leaking seal or gasket.



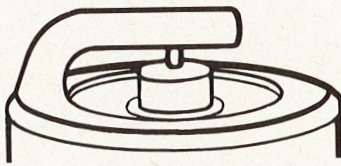
Overheated
(light grey)

SECTION 03 ELECTRICAL

SUB-SECTION 05 (SPARK PLUG)

Lead or carbon particles wedged or fused between the electrodes are caused by:

- excessive carbon in cylinder
- brand of fuel or oil
- dirt particles entering through the carburetor with the air flow
- improper ratio of fuel/oil mixture.



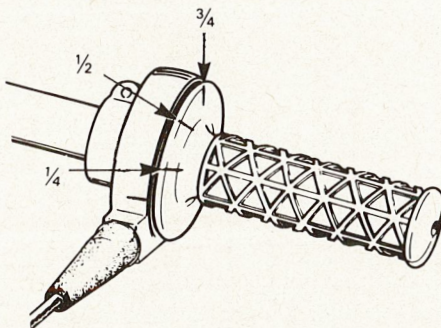
Gap binding

Spark plug procedure

The reading of the spark plug face is the best method to find the good spark plug heat range or to achieve correct carburetor jetting.

Proceed as follows to check the carburetor jetting.

Mark the throttle twist grip and the twist grip body to indicate 1/4, 1/2, 3/4 throttle opening:



CAUTION: It is best to start test with standard jetting or slightly richer to ensure engine protection.

Install a brand new spark plug and run the motorcycle along a **level** 1/2 mile open road, at a **steady** 1/4 throttle opening. At the end of the 1/2 mile pull the clutch lever in while readily stopping the engine using the kill switch.

Remove the spark plug and perform a plug reading.

If the plug reads lean, fit a larger idle jet; if the plug reads rich, fit a smaller idler jet.

NOTE: It is important to readily stop the engine at the end of a steady throttle opening test to have an accurate plug reading.

Variable throttle opening and prolonged idle period alter the readings.

NOTE: To obtain a very accurate reading, a brand new spark plug should be installed before each run. The air filter should always be clean and the engine in perfect condition.

Proceed to the 1/2 throttle opening and adjust as necessary.

If the plug reads rich, position the needle clip in a higher groove or install a larger needle jet.

If the plug reads lean, position the needle clip in a lower groove or install a smaller needle jet.

Proceed to the 3/4 full throttle opening and adjust as necessary. If the plug reads rich, fit a smaller main jet.

If the plug reads lean, fit a larger main jet.

CAUTION: Always verify each jetting change by repeating the test before proceeding to the next step.

	<i>This chart indicates the range of throttle openings through which each adjustment is effective.</i>	
4	3/4 - Full Opening	Main jet size
3	1/4 - 3/4 Opening	Needle jet size and needle clip position.
2	1/8 - 1/4 Opening	Throttle slide cut-away.
1	0 - 1/8 Opening	Idle jet size and air screw adjustment.

NOTE: Unless effected by climatic conditions, altitude or special engine modifications, carburetion should be left at standard settings.

SECTION 03 ELECTRICAL

SUB-SECTION 05 (SPARK PLUG)

SPARK PLUG MAINTENANCE/ INSTALLATION

Clean the electrodes and the ceramic insulator and wash the plug in gasoline.

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.


1. Using a wire feeler gauge, set electrode gap to 0.5 mm (.020").
2. Apply a light coat of graphite grease over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench.

Torque to: 27 N•m (20 ft-lbs)

 **NOTE:** A used spark plug needs a lot more voltage to spark than a new one, but when **cleaned** and **re-gapped** the voltage needed drops near the specification and the service life of the plug is extended.

OPTIONAL SPARK PLUGS

- NGK: B 8 ES
- Champion: N 59 G

 **CAUTION:** Use as a guideline only, check spark plug heat range. Due to the different design, material etc., heat ranges vary from one plug manufacturer to another.

SECTION 03 ELECTRICAL

SUB-SECTION 06 (TECHNICAL DATA)

ELECTRICAL

VEHICLE MODEL		QUALIFIER 175 8955	QUALIFIER 250 8965	MX-5 250 8964	QUALIFIER 370 8985	MX-5 370 8984
Ignition system		Bosch electronic C.D.I. 4 poles 30,000 V		Bosch electronic C.D.I. 6 poles 30,000 V		
Magneto gen. output (nominal)		55W		60W		
Spark plug		Bosch W280 MZ2-W3C0 or W 275T2-W3C				
Spark plug optional ①		NGK B8ES - Champion N-59G				
Spark plug gap		0.5 mm (.020")				
Ignition timing at 7000 R.P.M.		Align flywheel and cover marks				
Basic timing B.T.D.C.	mm	1.2 ± .2		1.3 ± .2	2.5 ± .2	
	(in.)	(0.47 ± .007)		(0.51 ± .007)	(.098 ± .007)	
	(degr.)	15 ± 1		15 ± 1	20 ± 1	
Electrical résistance (ohms)	gen. coil	450 - 550				
	pick-up coil	50 - 80		63 ± .4		
	light coil	0.62± 0.06		Total 0.42 ± 0.04		
	brake light coil	7 ± 0.7		N.A.		
Headlamp		60/60 W - 12 V		N.A.	60/60 W - 12 V	N.A.
Taillamp		3 W - 12 V		N.A.	3 W - 12 V	N.A.

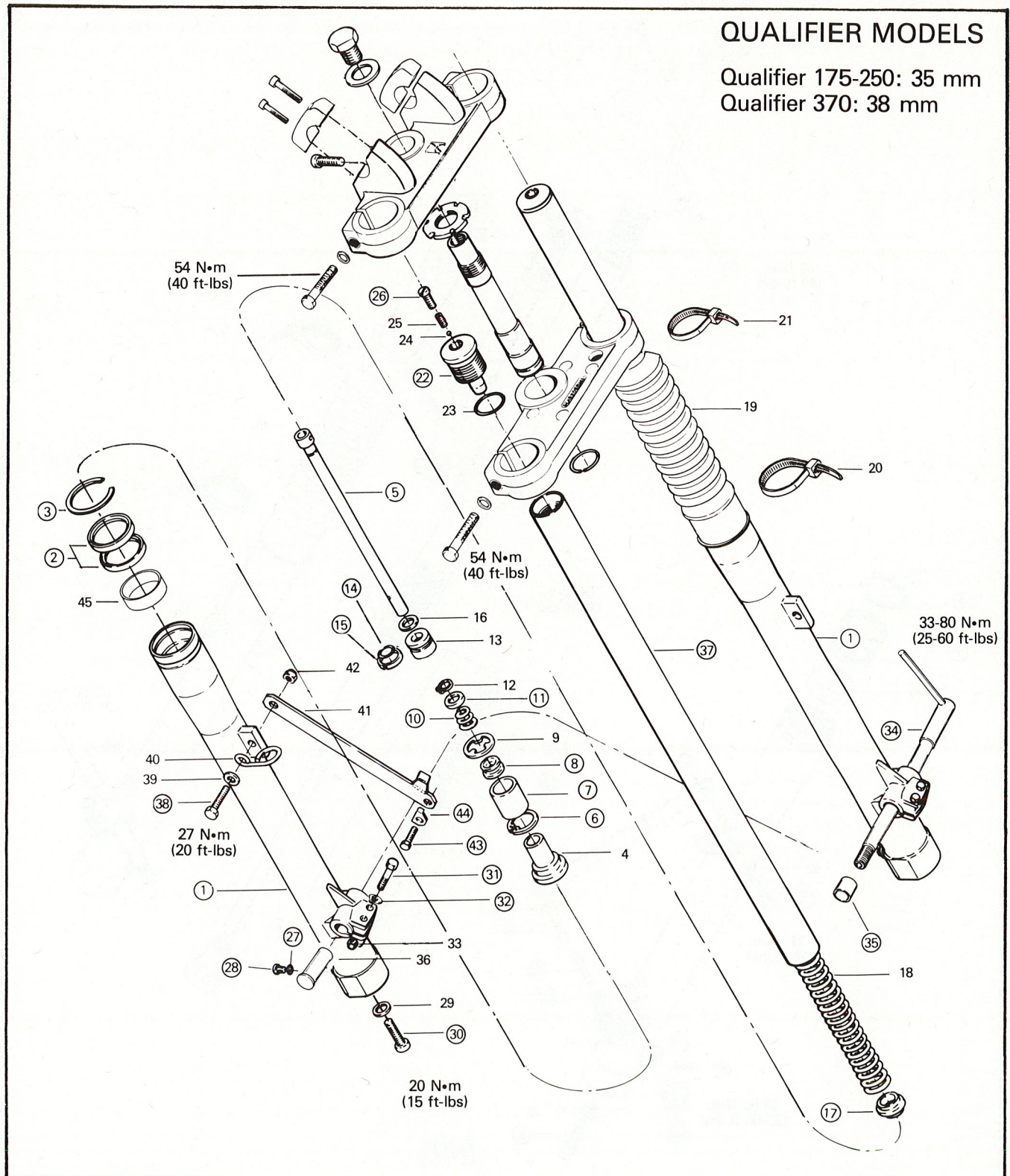
① Use as a guideline only, check spark plug heat range

N.A.: not applicable

FORKS (MARZOCCHI)

QUALIFIER MODELS

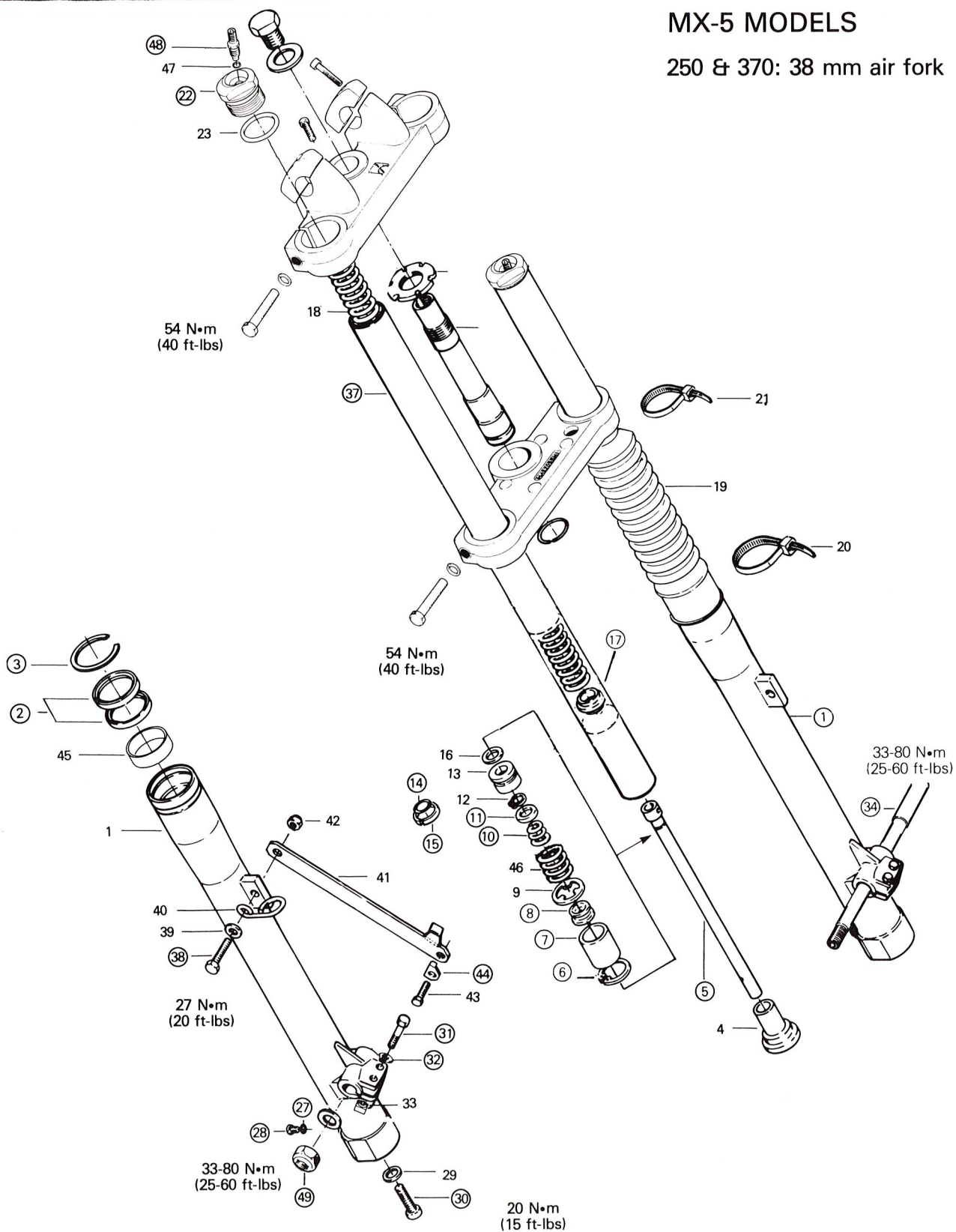
Qualifier 175-250: 35 mm
Qualifier 370: 38 mm



SECTION 04 SUSPENSION
SUB-SECTION 01 (FORKS)

MX-5 MODELS

250 & 370: 38 mm air fork



SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

1. Fork slider
- *2. Main seal: 1 single lip seal (lower)
1 double lip seal (upper)
3. Snap ring
4. Bottom valve
5. Damper rod
6. Snap ring
7. Valve retainer bushing
8. Valve
9. Valve washer
10. Rebound spring
11. Piston ring
12. Snap ring
13. Piston
14. Spring ring
15. Sealing ring
16. Washer
17. Spring guide
18. Fork spring
19. Dust boot
20. Tie wrap (lower)
21. Tie wrap (upper)
22. Fork cap
23. "O" ring

* Some vehicles may have two (2) **single lip seals** at each fork leg.

24. Check ball
25. Check ball spring
26. Machine screw, flat head M6 x 1.00 x 10
27. "O" ring
28. Drain screw pan head M6 x 1.00 x 7
29. Sealing washer
30. Damping rod screw
31. Hexagonal screw M6 x 1.00 x 40
32. Washer 6.4 x 1.5 x 14
33. Square nut M6 x 1.00
34. Front axle
35. Front wheel spacer
36. Threaded bushing
37. Fork tube
38. Hexagonal screw M8 x 1.25 x 30
39. Washer 8.4 x 17 x 1.6
40. Brake cable guide
41. Torque arm
42. Hexagonal nut M8 x 1.25
43. Hexagonal screw M8 x 1.25 x 25
44. Lock tab
45. Teflon sleeve
46. Spring
47. "O" ring
48. Air valve
49. Hexagonal nut

NOTE: This sub-section covers the Marzocchi forks only, information on the steering head are needed, refer to section 06 steering, sub-section 02 (steering head).

REMOVAL

Remove or disconnect the following. Then remove the fork legs from the motorcycle.

Mount the motorcycle on a box or a stand with the front wheel raised.

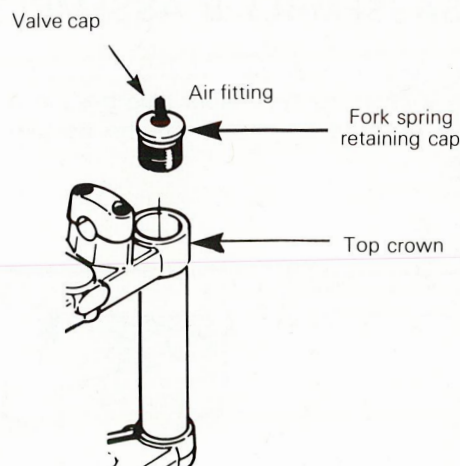
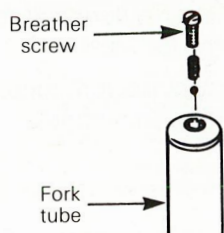
Remove the front number plate or headlamp ass'y.

Unscrew the torque arm to backing plate retaining screw and disconnect the front brake cable.

Remove the front wheel assembly.

On Qualifier models loosen the fork cap breather screws to nullify the inside pressure.

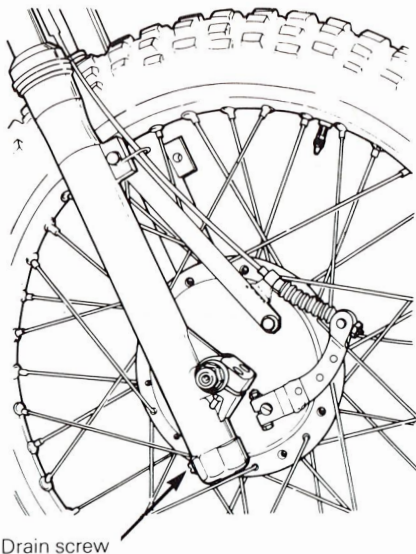
On MX-5 models remove the valve caps on the fork spring retaining caps and release the pressure inside the fork tubes.



SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

Remove the drain screws and drain the fork oil.



◆ **WARNING:** Ensure that all the pressure inside the fork tube is released prior to the removal of the drain screw.

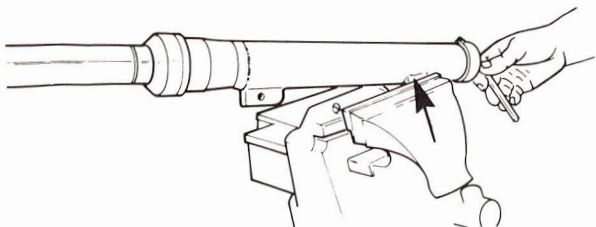
Loosen the top crown clamp screws and remove the fork caps.

○ **NOTE:** The fork caps must be removed prior to the removal of the fork legs from the lower crown.

Loosen the lower crown retaining screws and pull the fork leg assemblies.

DISASSEMBLY & ASSEMBLY

①⑤③⑦ To pull the fork slider apart proceed as follows: Clamp the fork slider axle boss in a vise and remove the retaining screw at the bottom of the fork slider.



▼ **CAUTION:** Never apply the vise jaws directly onto the fork slider. Always use the axle boss or the torque arm boss as a clamping point.

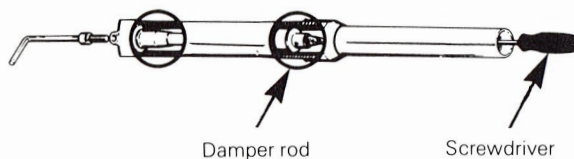
Reinstall and finger tighten the fork caps, the pressure created by the spring on the damper rod should be enough to ease the removal of the fork slider retaining screw.

However, if the fork slider retaining screw still rotates freely, use the following procedure:

Remove the fork cap.

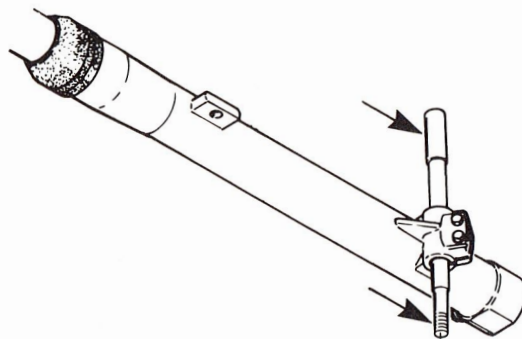
Remove the fork spring.

Using an appropriate screwdriver, hold the damper rod, then remove retaining screw at bottom of fork slider.



▼ **CAUTION:** This procedure must be done with great care, making sure that the screwdriver doesn't make any damage. Never insert any jamming device into oil drain orifice or slider may be damaged.

○ **NOTE:** When the retaining screw is removed, it is possible to ease the removal of the slider by inserting the axle into the slider and by striking it downwards using a soft faced hammer.



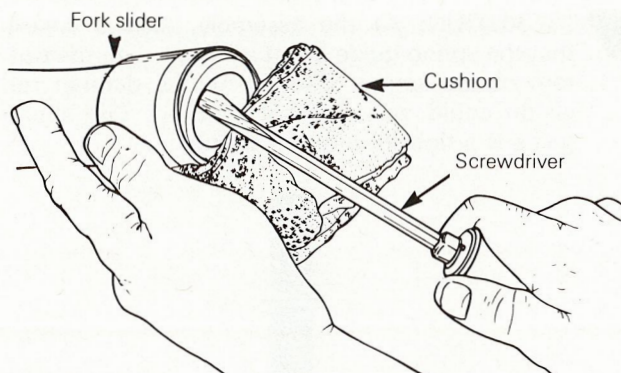
At assembly, inverse the procedure and torque the retaining screw to 20 N•m (15 ft-lbs).

○ **NOTE:** Fully compress the fork tube into the fork slider and check travel smoothness.

SECTION 04 SUSPENSION

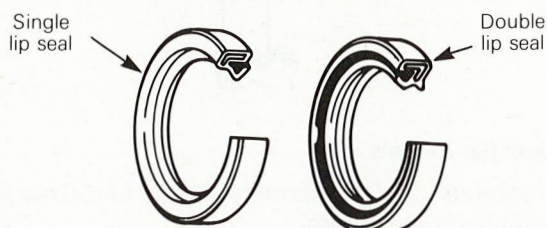
SUB-SECTION 01 (FORKS)

②③ To remove the fork seals, remove the snap ring with a screwdriver, and pry the seals out as illustrated.



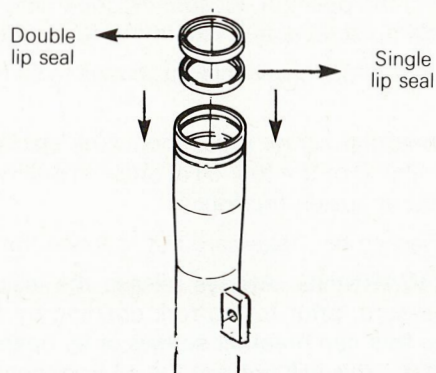
CAUTION: Use an appropriate cushion between the screwdriver blade and the fork slider top portion when prying seals out. Take care not to scratch or damage inside of fork slider.

The two seals are different, one is a "single lip" type and the other is a "double lip" type.

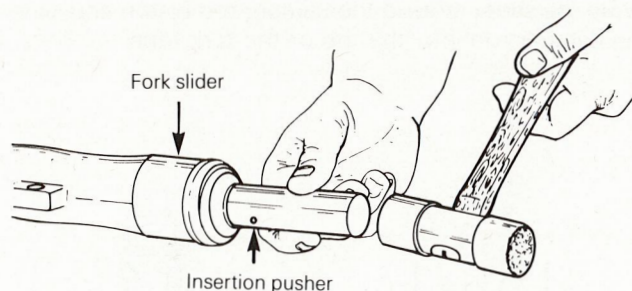


NOTE: Some vehicles may have two "single lip" seals at each fork leg.

Always install the single lip seal first.



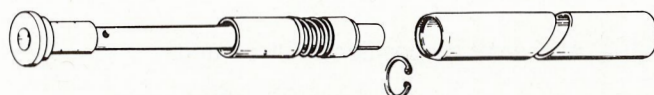
To install new seals use the appropriate oil seal insertion pusher. Apply a light coat of lithium grease or oil on the seal lip.



NOTE: If an insertion pusher is not available, it is possible to use an appropriate sized socket, which may be found in any socket wrench kit.

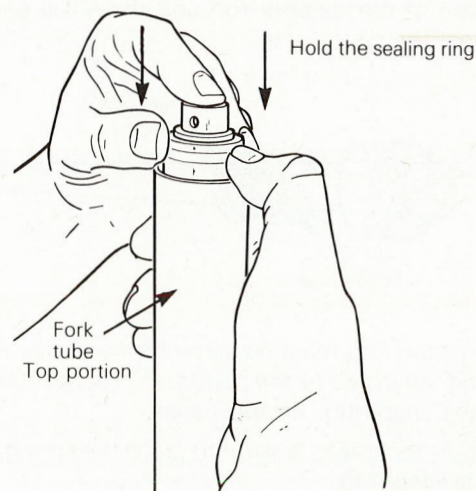
⑤⑥③⑦ To remove the damper rod assembly proceed as follows:

Remove the fork slider, then remove the fork cap and fork spring. Remove the large circlip from the bottom of the fork tube and pull on the damper rod.



CAUTION: At the assembly, ensure that the circlip is not deformed, and that the damper rod is properly centered in the valve retaining bushing.

At assembly, insert the damping rod through the top of the fork tube then install the other parts and the snap ring to the bottom.



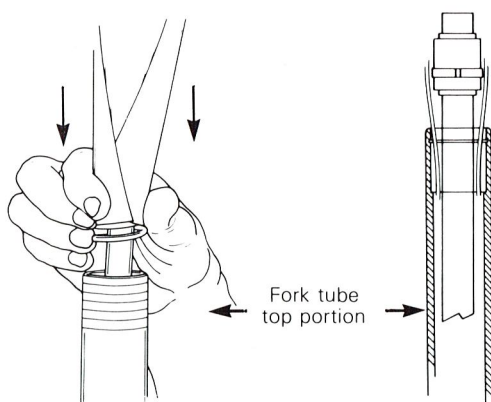
SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

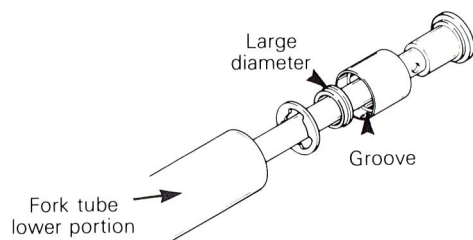
To ease the installation of the damping rod it is possible to use a thin metal sheet.

Ex.: Automotive shim stock (2 mm (0.078'') thickness).

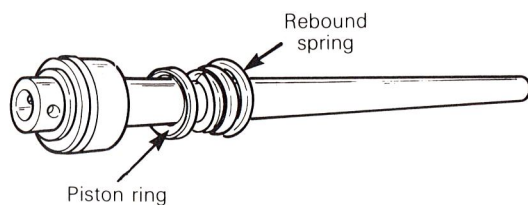
Wrap the sheet around the damper rod piston and slide the damper rod into the top of the fork tube.



⑦ ⑧ At assembly, position as illustrated.



⑩ ⑪ The rebound spring is a tight fit onto the upper portion of the damper rod and the small end must sit against the piston ring.

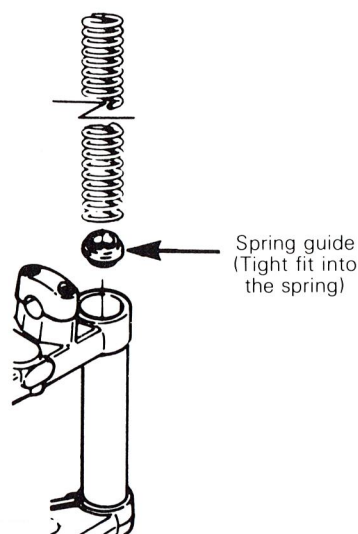


The piston ring must be assembled with the hollow side facing the inside of the piston, in order to relieve the retaining snap ring. (If applicable)

⑭ ⑮ At assembly, ensure to place the spring ring under the sealing ring.

▼ **CAUTION:** At the assembly of the damper rod, be careful when inserting the piston into the fork tube, damage to the sealing ring could occur.

▼ ⑰ **CAUTION:** At the assembly, always ensure that the spring guide insert is installed on the bottom of the spring. Damage to the damper rod piston could occur, if not installed. The spring guide is a tight fit into the spring.



⑳ Qualifier models

For assembly and disassembly, ensure to use the proper hexagonal tool (12 mm).

MX-5 models

At assembly, fully tighten the fork caps and check the air valve position. The valve should be slightly towards the outside to allow the fork to be filled with air and the pressure to be adjusted.

To correct the position, loosen the upper and lower fork crown clamp screws and rotate the fork tube.

Retorque the fork crown clamp screws to 54 N•m (40 ft-lbs).

⑳ The breather screw must always be slackened prior to the draining of the fork oil in order to nullify any pressure build-up inside the fork.

㉑ At disassembly, take care not to loose the "O" ring.

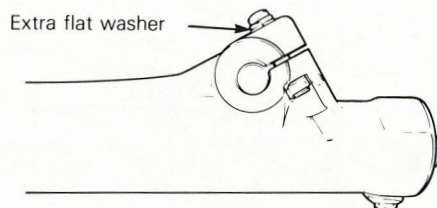
◆ ㉒ **WARNING:** Always release the inside fork air pressure, prior to the fork draining by slackening the fork cap breather screws or by opening the air fitting, this will prevent the oil from coming out of the fork under pressure.

㉓ At assembly, torque the retaining screw to 20 N•m (15 ft-lbs). Fully compress the fork tube into the fork slider, check travel smoothness.

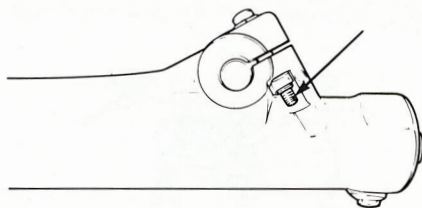
SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

③①③② When installing the front wheel, it may be necessary to install two flat washers on each of the fork leg axle pinch bolts.



▼ **CAUTION:** Without these washers the front fork axle pinch bolts may interfere with the fork slider when fully tightened thus causing a false torque reading and possible damage to the material.



▼ **CAUTION:** To ensure correct fork action, briskly compress forks (with brake applied) to align fork legs before tightening axle pinch bolts.

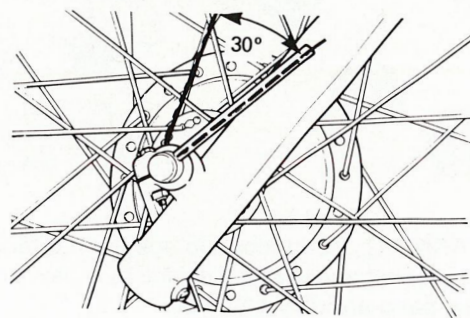
Torque axle pinch bolt to 8-10 N•m (6-8 ft-lbs).

③④ At installation, spin front wheel in forward rotation, apply brake and while holding brake on, tighten the axle to 33-80 N•m (25-60 ft-lbs).

○ **NOTE:** This is important, it centers the brake shoes.

Qualifier models:

◆ **WARNING:** The front axle lever must be within a 30° angle with the fork slider when finally tightened.



The front axle lever can be repositioned by slackening the **brake side** axle pinch bolts and rotating the axle lever clockwise until the desired position is reached. Retorque the axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

▼ **CAUTION:** To ensure correct fork action, briskly compress forks (with brake applied) to align fork legs before tightening axle pinch bolts.

Retorque axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

③⑤ (Qualifier models): The spacer must always be placed between the front wheel and the clutch side fork leg.

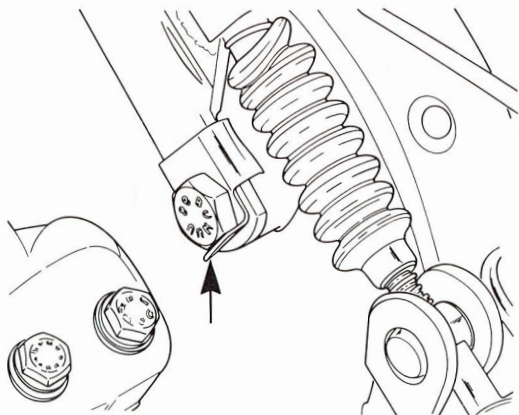
③⑧④③ At assembly, torque to 20-27 N•m (15-20 ft-lbs).

SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

④ At assembly, it is of the utmost importance that the lock tab be correctly placed and secured.

Torque to 20-27 N•m (15-20 ft-lbs).



WARNING: Bend lock tab against flat face of retaining bolt and always replace by a new one each time parts are disassembled.

CLEANING AND INSPECTION

Clean all parts carefully with a general purpose solvent.

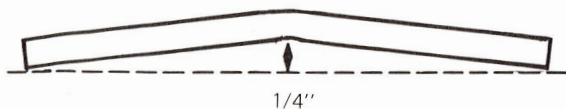
WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc. should not be used as each is flammable and explosive.

Inspect all parts for damage, excessive wear or dents, replace if necessary.

Inspect the fork seals, replace if worn excessively or damaged.

Check if fork tubes are bent.

CAUTION: Tubes bent more than 1/4" must be replaced.



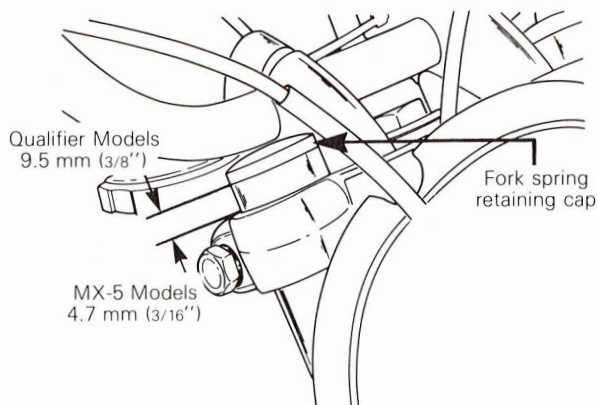
Check if the fork springs are broken, sagged, or worn.

CAUTION: If the fork springs need replacing, both springs should be replaced.

Inspect dust boots, if damaged replace.

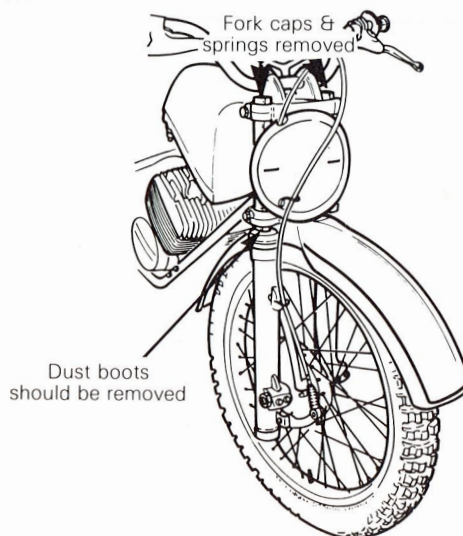
INSTALLATION

Slide both fork leg assemblies in position and adjust the fork tubes with the specified distance protruding over the upper crown, tighten the fork crown clamp screws.



To obtain a very accurate fork tube adjustment, proceed as follows:

Remove the fork spring retaining cap and fork springs. Fully compress the front suspension and check if there is clearance between the front fender and the front wheel.



To set, loosen the top and bottom crown clamp screws, afterwards, retorque to 47-54 N•m (35-40 ft-lbs).

Install the front number plate or headlamp assembly.

Remove the fork caps and add the recommended amount of fork oil.

Install the fork springs and fork caps.

Qualifier models:

Ensure that the fork cap breather screws are tightened.

SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

MX-5 models:

Fill and adjust the front fork with air, (refer to "air pressure" procedure).

Install the front wheel assembly and secure the torque arm in place. Torque the retaining bolts to 20-27 N•m (15-20 ft-lbs).

◆ **WARNING:** Bend the lock tab against flat face of retaining bolt.

FORK SPRINGS

Spring rate

To change the spring rate, it is necessary to change the fork springs.

Qualifier 175-250 models:

Standard spring: 4.2 kN/m (23 lbF/in)

color code: orange/white

Optional spring: 3.8-5 kN/m (21-29 lbF/in)

color code: -----

Qualifier 370 model:

Standard spring: 3.6 kN/m (20.5 lbF/in)

color code: white

Optional spring: 4 kN/m (22 lbF/in)

color code: midnight blue

MX-5 250 & 370 models:

Standard spring: 2 kN/m (11 lbF/in)

color code: light blue

○ **NOTE:** For additional informations covering the fork springs, refer to sub-section 03 (technical data) at the end of this section.

FORK OIL

Oil change

○ **NOTE:** This operation should be performed one leg at a time.

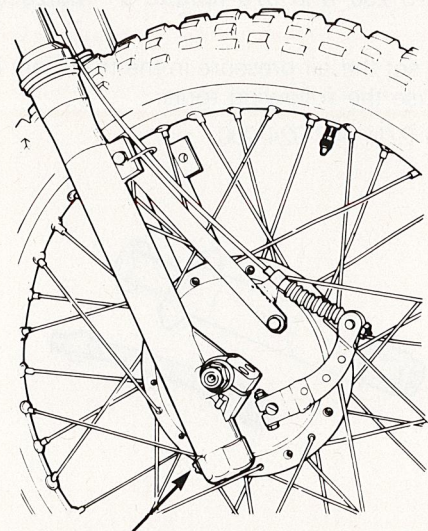
On Qualifier models: Slacken the fork cap breather screw to nullify the inside pressure and remove the fork cap.

▼ **CAUTION:** Use the proper hexagonal tool (12 mm) to remove the fork cap.

On MX-5 models: Remove the valve cap on the fork spring retaining cap and release the pressure inside the fork tube. Remove the fork cap.

Place a drain pan underneath the fork leg and remove the drain screw from the bottom side of the fork slider.

◆ **WARNING:** Ensure that all the pressure inside the fork tube have been released prior to the drain screw removal.



Drain screw

Bounce the forks (hold brake on) a few times to insure complete draining of all the oil.

Reinstall drain screw and "O" ring, add the recommended amount of fork oil.

Quantity:

Qualifier 175: 240 mL (8.1 fl oz)

Qualifier 250: 265 mL (9.3 fl oz)

Qualifier 370: 370 mL (12.5 fl oz)

MX-5 250 & 370: 350 mL (11.8 fl oz)

Suggested grade: SAE 10

Reinstall the fork spring retaining cap.

Qualifier models: Ensure that the breather screws are tightened.

MX-5 models: Fill and adjust the front fork with air (refer to "air pressure" procedure).

Torque the fork cap to 40-54 N•m (30-40 ft-lbs) and the top crown retaining screws to 40-54 N•m (30-40 ft-lbs).

SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

FRONT FORK ALIGNMENT

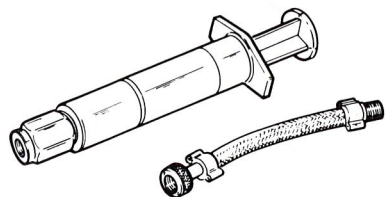
To correct any misalignment, loosen the screws on each side of the top and lower triple clamps, hold the front wheel tightly between your legs and twist the handlebar right or left as necessary. Tighten the screws and test ride for result.

AIR PRESSURE

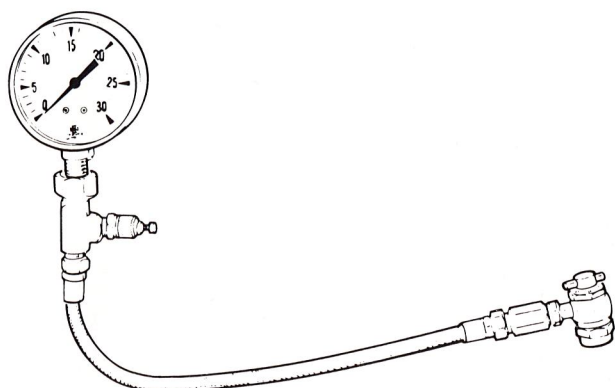
All the MX-5 250 and 370 feature a "Marzocchi" air fork.

To properly set the air pressure in the front fork it is necessary to use the following tools:

- 1 air pump P/N 747 024 000



- 1 low pressure gauge P/N 747 025 000



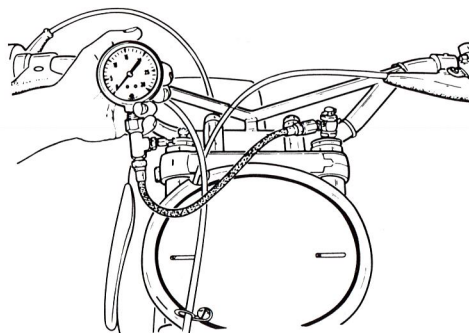
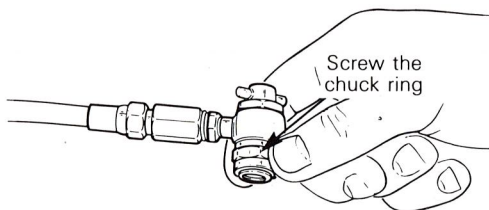
Proceed as follows:

Lift the front wheel off the ground using a stand or a box.

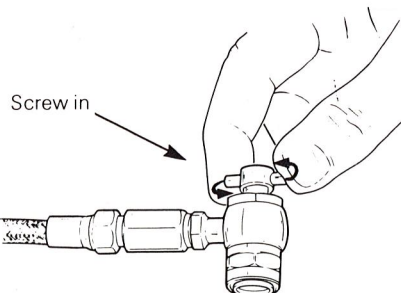


NOTE: The front suspension must be fully extended in order to obtain an accurate pressure reading. The volume being very small, a slight compression of the fork may alter the pressure reading.

Remove one valve cap and install the pressure gauge on the fork valve.



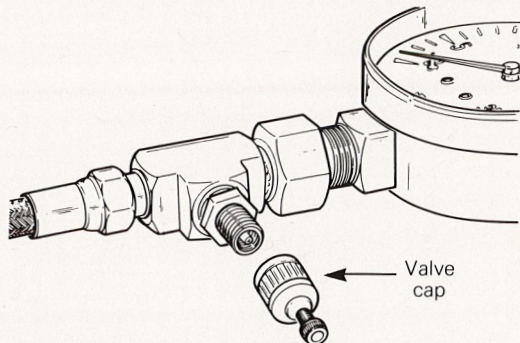
When the gauge is correctly installed, screw in the T-handle.



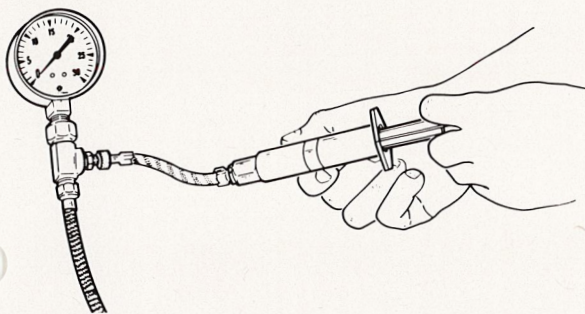
SECTION 04 SUSPENSION

SUB-SECTION 01 (FORKS)

Remove the valve cap on the pressure gauge.

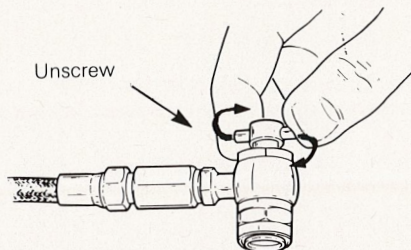


Install the air pump and pump air into the fork.



NOTE: It is not recommended to go over or below the suggested pressure. Higher than suggested pressure will shorten the fork travel. Lower than suggested pressure will cause a soft and spongy fork operation.

When the pressure is set, unscrew the T-handle to prevent any loss of pressure when removing the gauge.



Remove the gauge and repeat the procedure for the other fork leg.

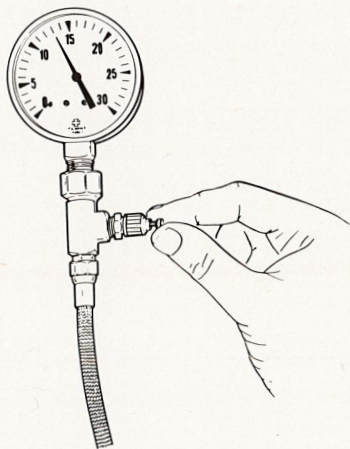
Ensure that both fork legs are set to 82.7 ± 7 kPa (12 ± 1 P.S.I.).

Fork resistance

The fork resistance is directly affected by the oil viscosity; the higher the viscosity, the stiffer the resistance. The motorcycle is supplied with "Bel-Ray" SAE 10W fork oil as it is considered best for normal use.

Fork liquid capacity: 350 mL (11.8 fl oz).

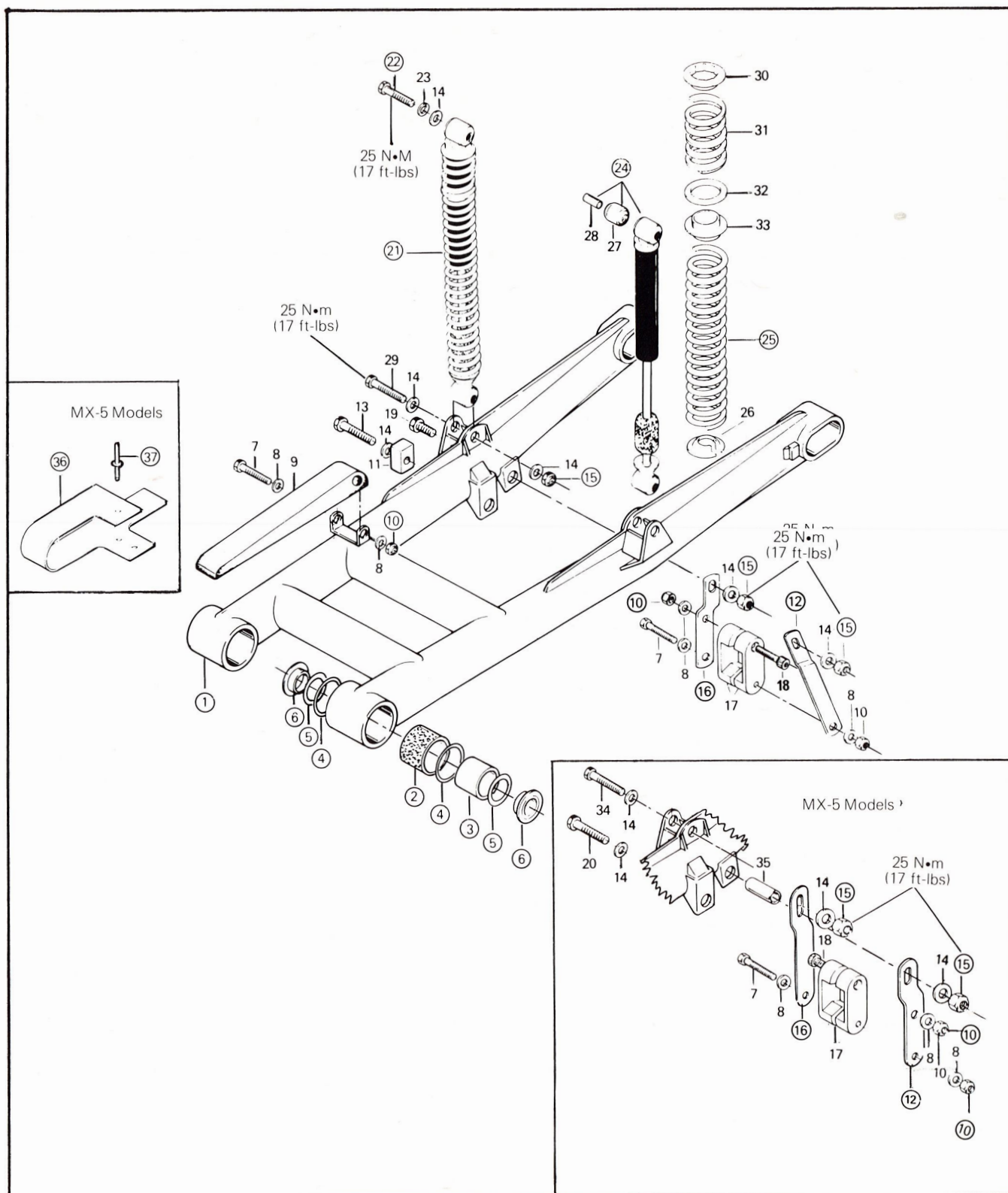
NOTE: If the resistance is too soft it is recommended to add oil in 20 mL (0.7 fl oz) increments up to a maximum of 390 mL (13.2 fl oz) without changing the air pressure. Test ride motorcycle between each addition of oil.



SWING ARM

SECTION 04 SUSPENSION
SUB-SECTION 02 (SWING ARM)

SWING ARM



SECTION 04 SUSPENSION

SUB-SECTION 02 (SWING ARM)

1. Swing arm
2. Bushing (2)
3. Sleeve (2)
4. "O" ring (4)
5. Shim AR*
6. Flanged bushing (4)
7. Hexagonal screw M6 x 1.00 x 45
Qualifier models: 2
MX-5 models: 1
8. Washer 6 x 12 x 1.50
Qualifier models: 5
MX-5 models: 3
9. Swing arm protector
10. Hexagonal nut M6 x 1.00
Qualifier models: 3
MX-5 models: 2
11. Chain protector (block)
12. Inside strut
13. Hexagonal screw M8 x 1.25 x 30
14. Washer 8 x 17 x 2
Qualifier models: 10
MX-5 models: 11
15. Hexagonal nut M8 x 1.25 (4)
16. Outside strut
17. Chain guide block
18. Cylindrical hex. socket head M6 x 1.00 x 35
19. Hexagonal screw M8 x 1.25 x 16
20. Hexagonal screw M8 x 1.25 x 20
21. Shock absorber (2)
22. Hexagonal screw M8 x 1.25 x 40 (2)
23. Lockwasher 8 (2)
24. Damper (2)
25. Spring (2)
26. Spring collar (2)
27. Bushing (4)
28. Sleeve (4)
29. Hexagonal screw M8 x 1.25 x 45 (2)
30. Spring retainer (2)
31. Spring (2)
32. Spring seat (2)**
33. Spring separator (2)
34. Hexagonal screw M8 x 1.25 x 50
35. Spacer
36. Swing arm protector (MX-5 models)
37. Rivet (3)

* AR: as required

** May not have been installed on some Qualifier 250.

REMOVAL

Mount the motorcycle on a stand or a box.

Remove the drive chain and the rear wheel ass'y.

Remove the two side number plates.

Remove both shock absorbers.

Remove the swing arm pivot bolt, pull the swing arm away from its position.

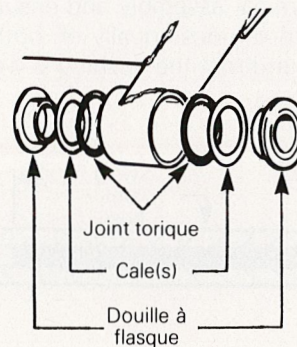


NOTE: Observe the position of the shim/s on each side of flanged bushing.

DISASSEMBLY & ASSEMBLY

①④⑤⑥ When a swing arm assembly or any associated parts are replaced, the following instructions apply:

Fit a flanged bushing, a .018" shim and a "O" ring into each end of each swing arm bushing.



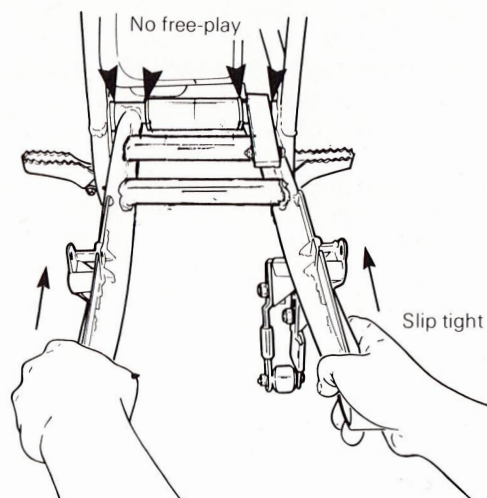
The swing arm must be slipped tight in place without any clearance between the flanged bushings and the frame plates or the engine mount boss.



NOTE: If clearance is noted between a flanged bushing and the frame or the engine mount boss, a .036" shim may be required at that particular flanged bushing. Remove or add shim(s) until the swing arm is perfectly slip tight.

SECTION 04 SUSPENSION

SUB-SECTION 02 (SWING ARM)



Insert the swing arm pivot bolt.

Place the swing arm at the middle of its travel, then tighten the pivot bolt.

Torque to 88-100 N•m (65-75 ft-lbs).

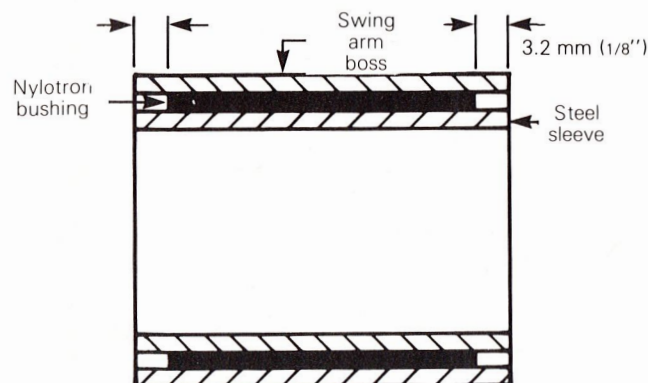
Check travel smoothness.

②③ To replace the bushing or the sleeve, proceed as follows:

Using the proper diameter adaptor (ex: socket) press the inner steel sleeve out of the swing arm.

Using another adaptor (slightly bigger), press the bushing out of the swing arm.

Inverse procedure for assembly and ensure that the inner steel sleeve protrudes equally on both sides of the swing arm boss and that the bushing is well centered in the swing arm boss.

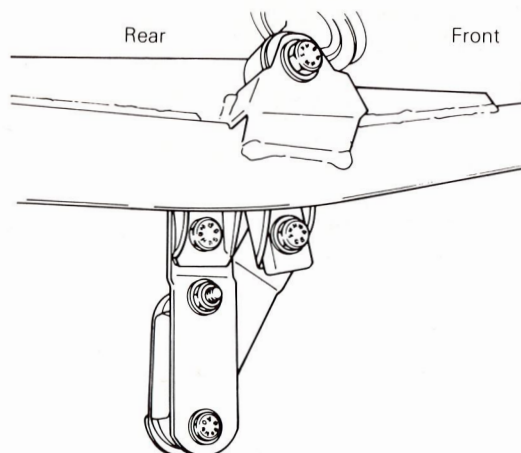


CAUTION: The bushings are maintenance free but the pivot bolt must be tight or sleeve damage will occur.

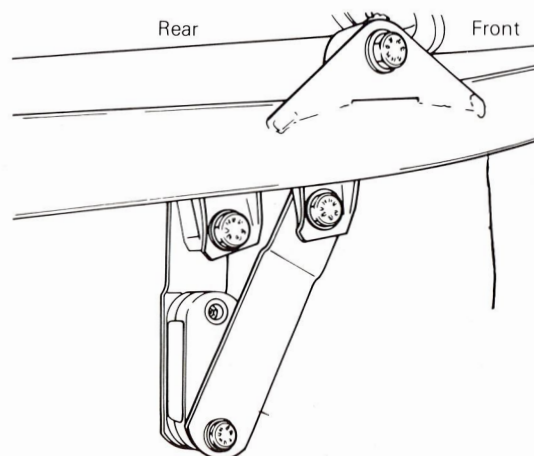
⑩ At assembly, torque to 7-8 N•m (5-6 ft-lbs).

⑫⑬ At assembly, always ensure that the chain guide struts are installed at their highest point. This will partially take up the chain slack.

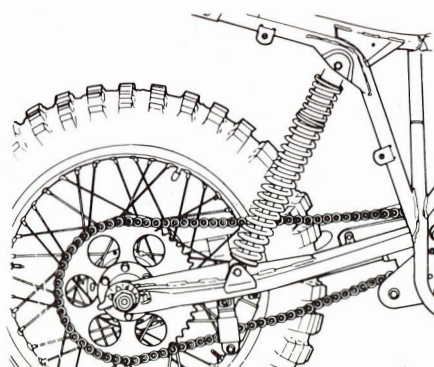
Qualifier models



MX-5 models



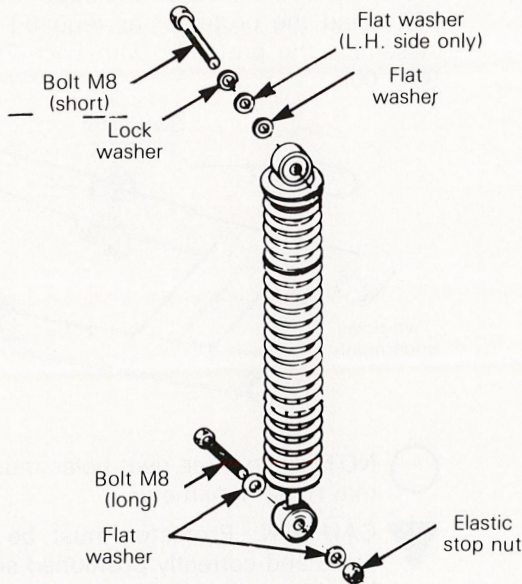
⑭ At assembly, raise the rear end slightly then mount the shocks on the swing arm, as illustrated.



SECTION 04 SUSPENSION

SUB-SECTION 02 (SWING ARM)

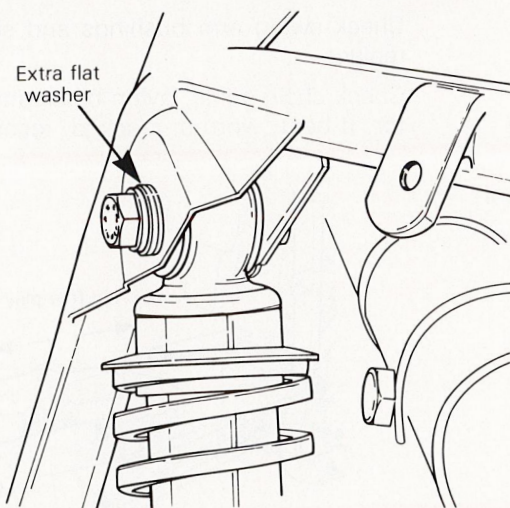
EX. left side shock



NOTE: Install the longest bolt at the lower end of shock.

22 At assembly, torque to 20-27 N•m (15-20 ft-lbs).

NOTE: (L.H. side only). It is recommended to add an extra flat washer at the upper retaining screw, to provide better clearance between exhaust pipe and upper screw.

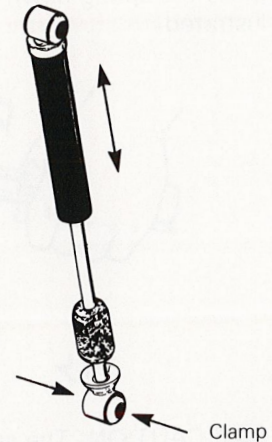


24 Proceed as follows to test the shock absorber damping condition.

Remove both shocks from motorcycle, and remove the shock springs.

With the shocks in a vertical position, clamp lower mounts in a vise.

NOTE: The shocks must be checked by clamping the rod end in order to partially create the operating position.



CAUTION: Do not clamp the shock body in the vise.

Compress and extend each shock by hand at various speeds and compare the resistance of one shock to the other.

NOTE: Obtain a known good shock for comparison purposes and keep in mind that the rebound resistance (extending the shock) is normally stronger than the compression resistance.

Pay attention to the following conditions that will denote a defective shock:

A skip or a hang back when reversing stroke at mid-travel.

Seizing or binding condition except at extreme end of either stroke.

Oil leakage.

A gurgling noise, after completing one full compression and extension stroke.

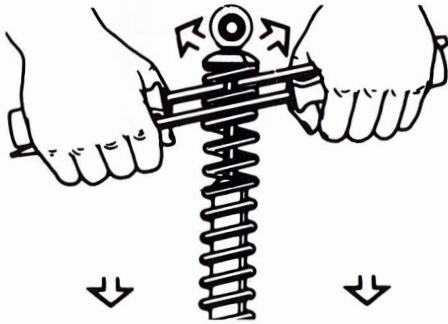
CAUTION: The minimum length of shock fully collapsed must be 24.43 cm (9.62 in.)

SECTION 04 SUSPENSION

SUB-SECTION 02 (SWING ARM)

②⑤ To replace the shock spring proceed as follows:

Clamp the shock absorber lower mount in a vise and press the spring down with a pair of screwdrivers as illustrated.



CAUTION: The small auxiliary spring is not interchangeable and must not be removed.

Spring rate

Qualifier 175-250

STD: 34 kN/m (195 lbF/in)

Color code: blue/white

Qualifier 370

STD: 25 kN/m (145 lbF/in)

Color code: purple/purple (red spring)

MX-5 250-370

STD: 25 kN/m (145 lbF/in)

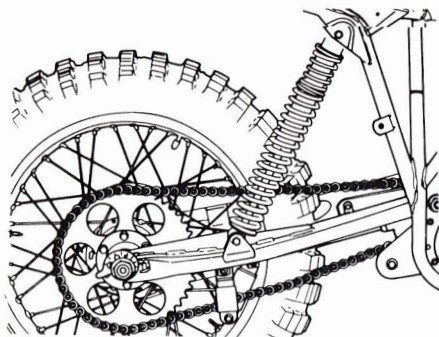
Color code: purple/purple (orange spring)

Optional spring for Qualifier 370 & MX-5 250-370

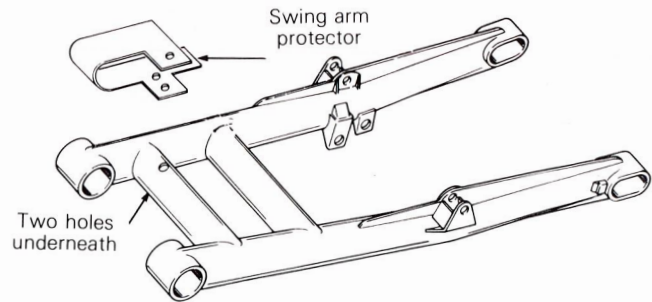
22 kN/m (128 lbF/in)

Color code: purple/green

Make sure at re-assembly to position the shocks as illustrated.



③⑥ ③⑦ At assembly, correctly position the protector on the swing arm and install the upper rivet (P/N 390 9017 00). Bend the protector as required (see illustration). Assemble the protector with two (2) rivets (P/N 390 9017 00).



NOTE: The three rivet holes must not exceed 5.1 mm (13/64") diameter.

CAUTION: Protector must be well secured in place and correctly positioned so that it does not interfere with the chain and the sprocket.

CLEANING AND INSPECTION

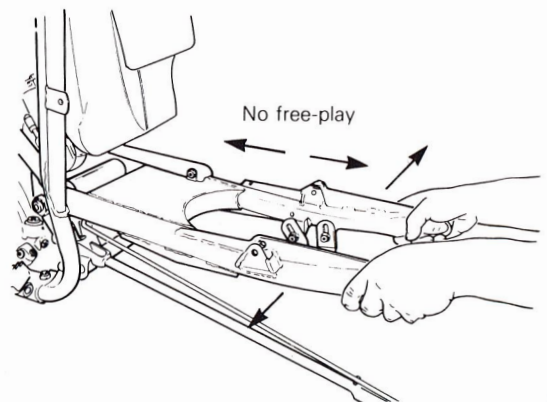
Clean all parts carefully using a general purpose solvent.

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

Check if swing arm is bent, cracked or twisted, repair or replace if necessary.

Check swing arm bushings and sleeves. If damaged, replace.

Check chain guide, nylon block and swing arm protector. If bent, worn or cracked, repair or replace.



INSTALLATION

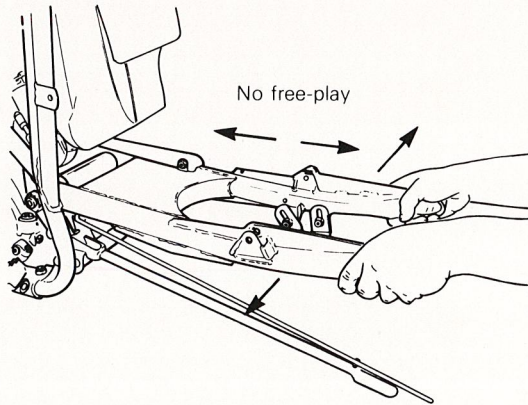
To install the swing arm on vehicle inverse removal procedure, however, pay a special attention to the following:

Install the swing arm bolt and nut, hold the swing arm in the mid-travel position and torque the nut to 88-100 N•m (65-75 ft-lbs).

Check travel smoothness before shocks installation.

MAINTENANCE

Regularly check the swing arm for any looseness and for bushing or sleeve wear.



SECTION 04 SUSPENSION
SUB-SECTION 03 (TECHNICAL DATA)

SUSPENSION

VEHICLE MODEL	QUALIFIER 175 8955	QUALIFIER 250 8965	QUALIFIER 370 8985	MX-5 250 8964	MX-5 370 8984
Front	Marzocchi 35 mm		Marzocchi 38 mm	Marzocchi air fork 38 mm	
Travel mm (in.)	220 (8.8)	240 (9.4)	250 (9.8)	270 (10.6)	
Air pressure	Not applicable			82.7 kPa \pm 7 kPa (12 P.S.I.) \pm 1 P.S.I.	
Rear	Trailing arm, Girling gas shock absorber				
Travel ① mm (in.)	206 (8.1)		244 (9.6)	254 (10.0)	
Shocks length extended	36.2 cm (14.250'')		38.1 cm (15'')		
Fork angle	30°				
Fork springs	4.2 kN/m (23 lbF/in)		3.6 kN/m (20.5 lbF/in)	2 kN/m (11 lbF/in)	

① at rear wheel

FORK SPRINGS SPECIFICATIONS

MODEL		SPRING RATE (progressive)	COLOR CODE	WIRE DIAMETER	SPRING LENGTH	OUTSIDE DIAMETER (small)	TOTAL COILS	SPRING COLLAPSED LENGTH
Qualifier 175-250	STD	4.2 kN/m (23 lbF/in)	white/ orange	4.2 mm (.169'')	59.7 cm (23.5'')	28.2 mm (1.112'')	66	30.3 cm (11.96'')
	OPT	3.8 - 5 kN/m (21-29 lbF/in)	- - -	4.2 mm (.169'')	58.7 cm (23.125'')	27.6 mm (1.090'')	72 1/2	34.6 cm (13.620'')
Qualifier 370	STD	3.6 kN/m (20.5 lbF/in)	white	4.2 mm (.169'')	63.1 cm (24.62'')	27.5 mm (1.085'')	72	32.9 cm (12.97'')
	OPT	4 kN/m (22 lbF/in)	midnight blue	4.2 mm (.169'')	63.1 cm (24.62'')	27.5 mm (1.085'')	65	29.4 cm (11.59'')
MX-5 250-370	STD	2 kN/m (11 lbF/in)	light blue	3.75 mm (.148'')	60.4 cm (23.8'')	30.9 mm (1.220'')	52 1/2	21.5 cm (8.47'')

SHOCK SPRING

MODEL		SPRING RATE	COLOR CODE	WIRE DIAMETER	SPRING LENGTH	INSIDE DIAMETER	TOTAL COILS	SPRING COLLAPSED LENGTH
Qualifier 175-250	STD	34 kN/m (105 lbF/po)	blue/ white	7.9 mm (.312")	24.7 cm (9.75")	36.1 mm (1.425")	15	11.55 cm (4.55")
Qualifier 370	STD	25 kN/m (145 lbF/in)	purple/ purple ^①	7.7 mm (.306")	26.6 cm (10.5")	36.1 mm (1.425")	16.5	12.5 cm (4.92")
MX-5 250-370	STD	25 kN/m (145 lbF/in)	purple/ purple ^②	7.7 mm (.306")	27.1 cm (10.67")	36.1 mm (1.425")	18.5	13.8 cm (5.45")
Optional spring (MX-5 250-370 & Qualifier 370)		22 kN/m (128 lbF/in)	purple/ green	7.1 mm (.281")	26.6 cm (10.5")	36.1 mm (1.425")	15.5	10.8 cm (4.24")

① spring color: red

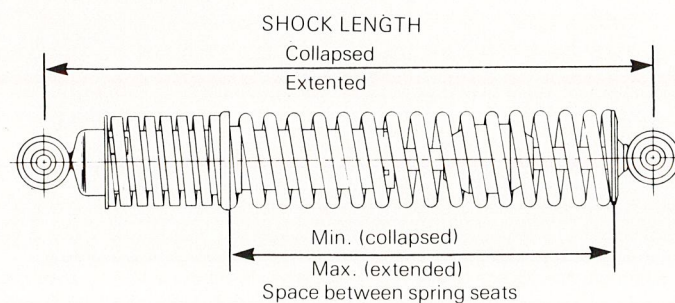
② spring color: orange

CAUTION: Always ensure that the collapsed spring length is shorter than the minimum space between the spring seats.

SHOCK

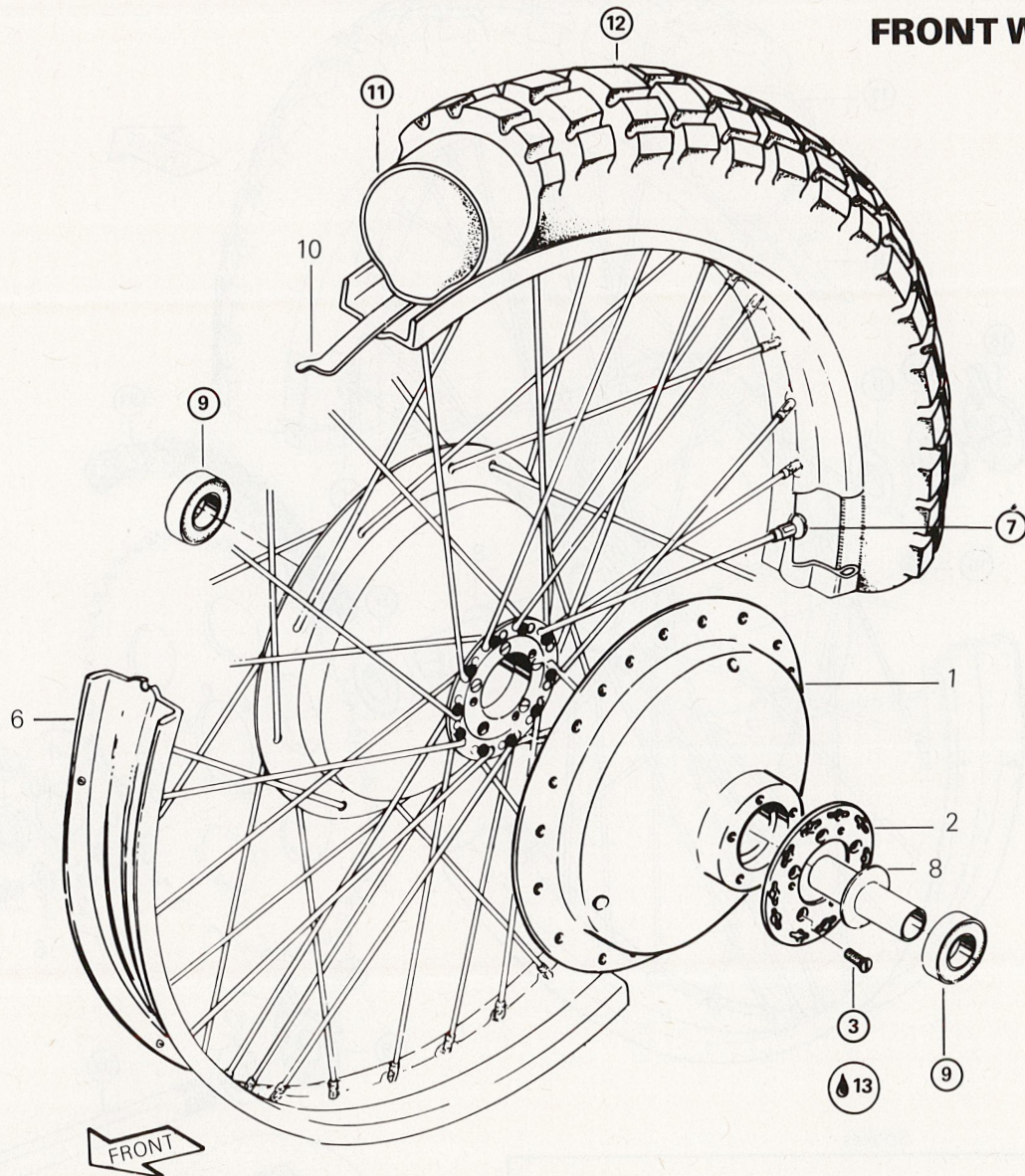
MODEL	SHOCK LENGTH EXTENDED	SHOCK LENGTH COLLAPSED	SPACE BETWEEN SPRING SEATS	
			MINIMUM	MAXIMUM
Qualifier 175-250	362.6 mm (14.28")	244.3 mm (9.62")	13.7 cm (5.42")	23.9 cm (9.44")
Qualifier 370 & MX-5 250-370	380 mm (14.96")	244.3 mm (9.62")	15.4 cm (6.1")	25.7 cm (10.125")

○ **NOTE:** The shock collapsed length is always measured with the rubber bumper fully compressed, and without the spring retainer.

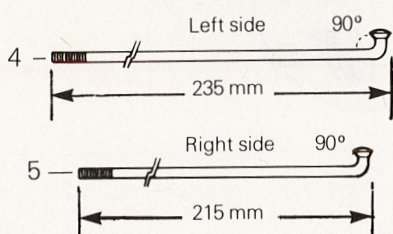


WHEELS

FRONT WHEEL

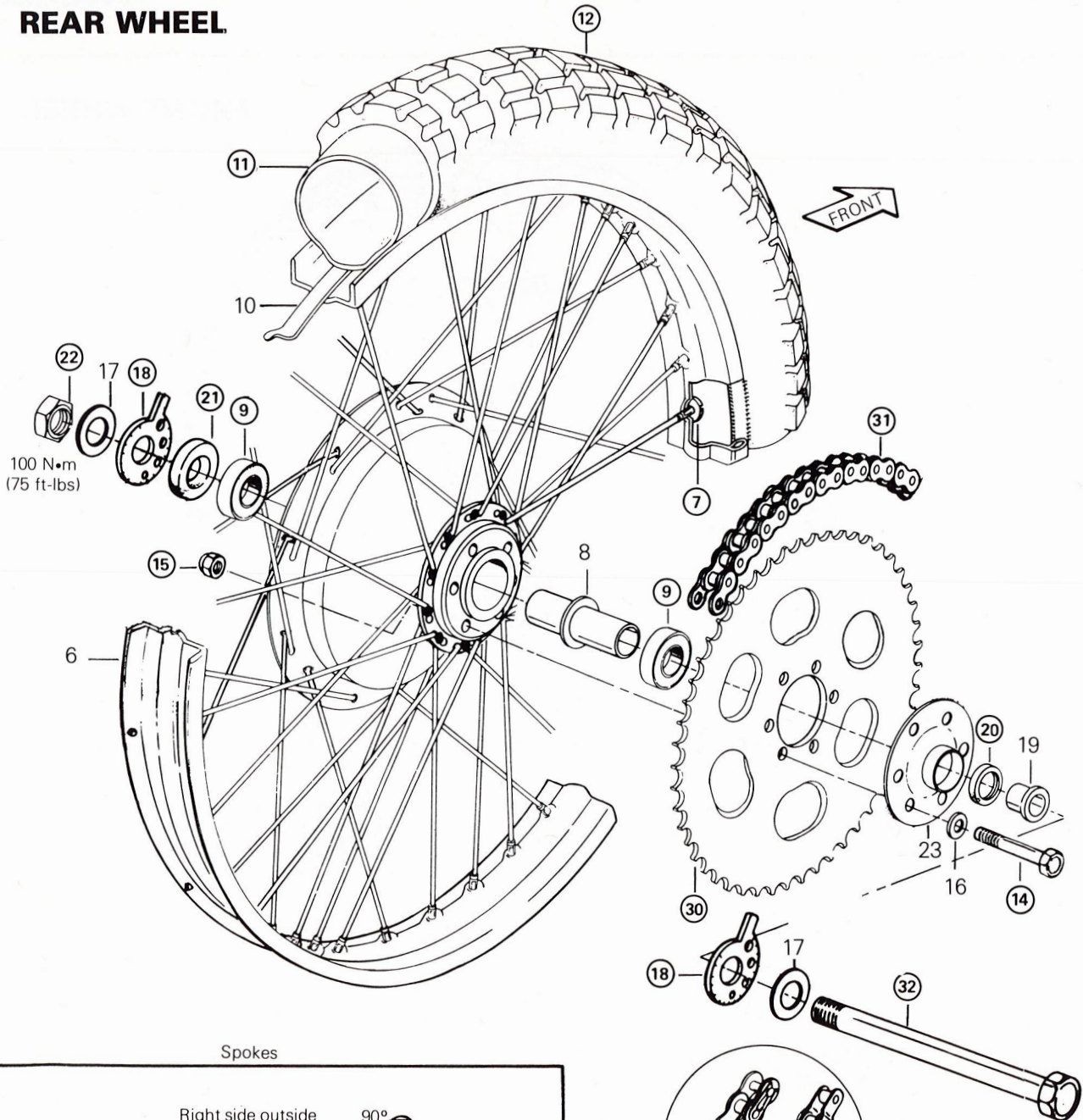


SPOKES (standard)

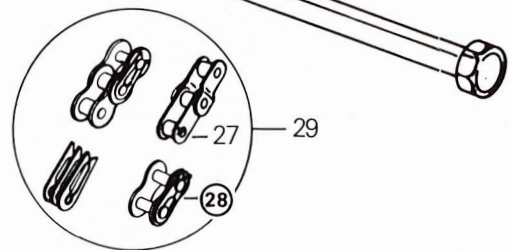
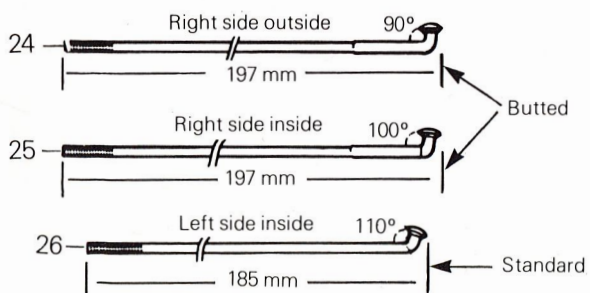


SECTION 05 WHEELS
SUB-SECTION 01 (WHEELS)

REAR WHEEL



Spokes



SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

1. Front hub
2. Spoke flange
3. Flat head screw M6 x 1.00 x 12 (5)
4. Spoke left side, 90 degree (235 mm long) standard (20)
5. Spoke right side, 90 degree (215 mm long) standard (20)
6. Rim
7. Nipple
8. Bearing Spacer
9. Bearing
10. Rim liner
11. Tube
12. Tire (knobby)
13. Loctite 271 blue (medium strength)
14. Hexagonal screw M8 x 1.25 x 45 (6)
15. Hexagonal nut M8 x 1.25 (6)
16. Washer 8 x 17 x 2 (6)
17. Washer 17.7 x 30 x 3 (2)
18. Adjuster cam (2)
19. Spacer R.H.
20. Seal 25 x 38 x 7 (1)
21. Seal 26 x 47 x 6 (1)
22. Hexagonal nut M16 x 1.5 (1)
23. Cover
24. Spokes: R.H. outside 90° 197 mm long (butted) (10)
25. Spokes: R.H. inside 100° 197 mm long (butted) (10)
26. Spokes: L.H. inside 110° 185 mm long (standard) (20)
27. Half link
28. Master link
29. Link kit
30. Sprocket
31. Chain (520)
32. Rear axle

REMOVAL

Front wheel

Qualifier models

Mount the motorcycle on the center stand with the front wheel raised.

Unscrew the brake cable adjuster nut completely (at brake plate) and pull the cable away from the backing plate.

○ **NOTE:** Place the spring, rubber boot, rod barrel and adjuster nut back on the cable to prevent loss.

Unscrew the torque arm to backing plate retaining screw.

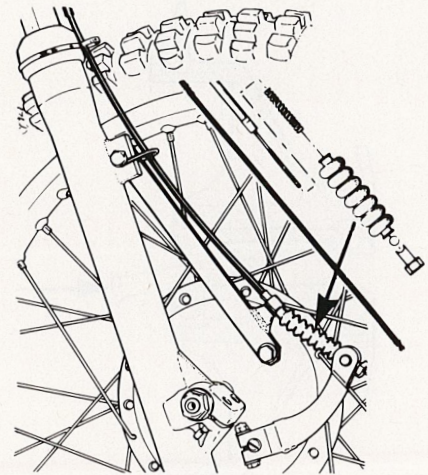
Loosen the clutch side axle pinch bolts and unscrew the axle (turn counter-clockwise).

MX-5 models

Mount the motorcycle on a stand or a box with the front wheel raised.

Unscrew the brake cable adjuster nut (at brake plate) and pull the cable completely away from the backing plate. Unscrew the torque arm retaining screw.

○ **NOTE:** Place the spring, rubber boot, rod barrel and adjuster nut back on the cable to prevent loss.



Remove the axle nut.

Loosen the four (4) axle pinch bolts, and remove axle.

Rear wheel

Mount the motorcycle on the center stand or a box with the rear wheel raised.

Remove the brake adjuster nut.

Remove the chain master link and the chain from the wheel sprocket.

Remove the axle nut, the washer and the cam adjuster; pull the axle out. The wheel can then easily be removed.

SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

DISASSEMBLY & ASSEMBLY

③ ⑬ At assembly, apply a light coat of Loctite no. 242 blue (medium strength) and torque to 8-10 N•m (6-8 ft-lbs).

⑦ At assembly, torque equally to 5-7 N•m (2-5 ft-lbs).

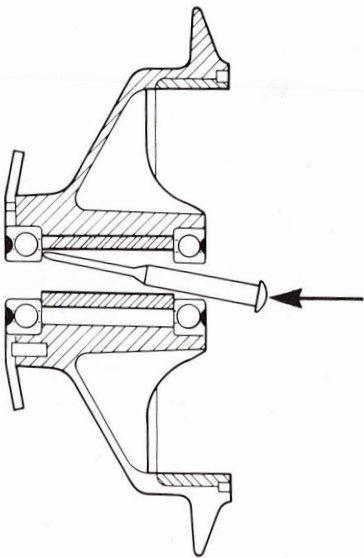
⑨ Proceed as follows to service the wheel bearings:

At disassembly,

Remove the oil seal, oil seal cover and sprocket from the rear wheel

◆ **WARNING:** The front wheels have magnesium hubs. Magnesium must be heated with great care to avoid personal injury. Use a torch with a large soft flame (butane), heat the boss with 4 to 5 rapid circular passes.

Heat inside bearing boss in hub with butane torch, place heated side on work bench and tap out bearing using a flat ended punch and hammer.



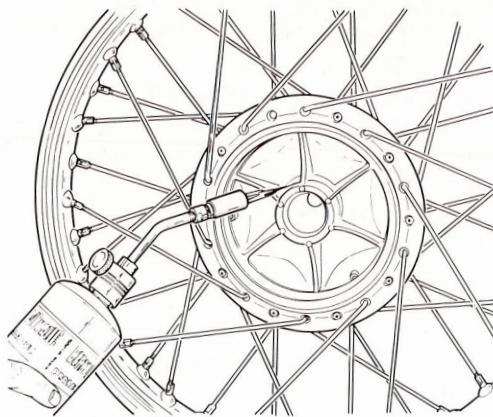
Set bearing distance spacer aside. Heat outer bearing boss and tap out outer bearing.

▼ **CAUTION:** Always apply heat to remove or install wheel bearings, failure to apply heat can result in metal being drawn out from the bearing boss, causing a loose fitting bearing within the hub.

At assembly, pack the wheel bearings with a waterproof wheel bearing grease.



Heat one side of the hub around bearing boss then seat bearing into hub.



▼ **CAUTION:** Be careful not to slant the bearing in the mount.

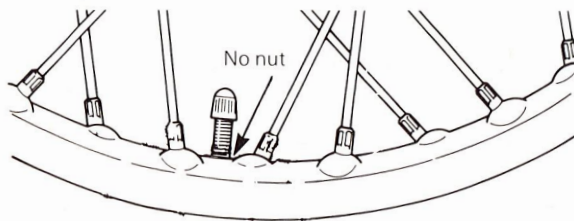
○ **NOTE:** The shielded portion of the bearings must face towards the outside of the wheel.

Turn the wheel over, install bearing distance spacer. Heat hub around bearing boss and install the other bearing.

◆ **WARNING:** Exercise care while heating with a butane torch and allow the hub to cool sufficiently after bearing installation is completed.

When the hub is cool, mount the cover/seals and the sprocket properly.

▼ ⑪ **CAUTION:** At assembly, if the valve stem is found to be tilted, deflate the tube and rotate the tire to straighten the valve stem. Assemble without nut.



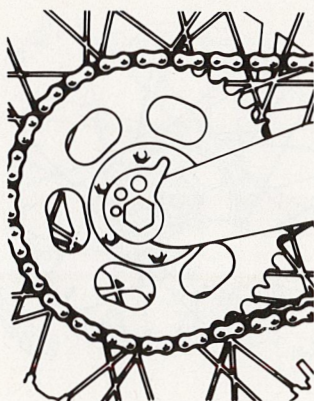
⑫ (If applicable) at the installation of a new tire, the painted dot on the side of the bead indicates a lighter point on the tire and should be placed next to the valve (front or rear wheel). To ease assembly, use a solution of soapy water.

SECTION 05 WHEELS

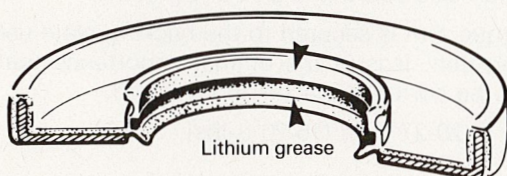
SUB-SECTION 01 (WHEELS)

⑭ ⑮ At assembly, torque to 20-27 N•m (15-20 ft-lbs).

▼ ⑮ CAUTION: Always position the chain adjuster cam as illustrated. This will prevent the cam end from being caught.



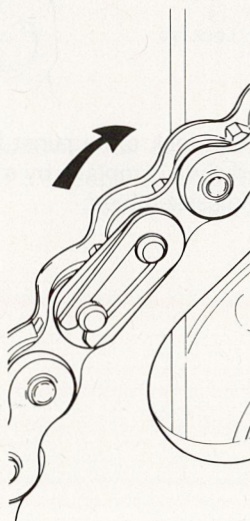
⑳ ㉑ At assembly, apply a light coat of lithium grease on the seal lip.



㉒ ㉓ Prior to assembly check the axle for rust or damage and also check for straightness.

At assembly, spin the wheel in forward rotation, apply brake and while holding brake on torque the axle nut to 88-100 N•m (65-75 ft-lbs).

㉔ At assembly, the master link clip must be installed with its closed end facing the direction of chain travel.

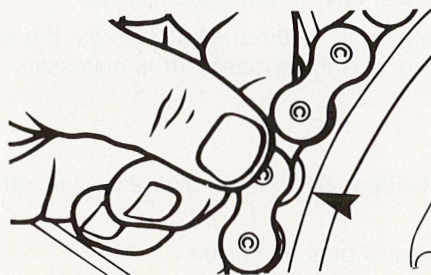


▼ ㉕ CAUTION: To prevent rapid chain wear the sprocket should be replaced as soon as a hooked appearance is noticed.

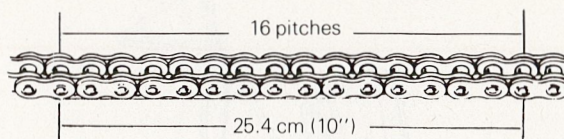


At installation, ensure to place the sprocket in order to have the word "Bombardier" (stamped) facing the outside.

▼ ㉖ CAUTION: To prevent rapid sprocket wear, the chain should be checked periodically. If the chain can be lifted away from the rear sprocket any more than illustrated, the chain should be replaced.



The length of 16 pitches of new chain (no. 520) is 25.4 cm (10"). If the chain has "stretched" more than 25.6 cm (10 7/32"), for 16 pitches, it must be replaced.



○ NOTE: Chain must be clean for this measurement.

SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

CLEANING AND INSPECTION

Clean bearings, distance spacer and wheel hub with solvent. Dry using compressed air.

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

Clean brake friction surface with lacquer thinner to remove any oil film. Remove the glazed finish using a medium grit paper.

◆ **WARNING:** Always perform this procedure in a well ventilated area.

Check if the inner and outer races of the wheel bearings are cracked, pitted or chafed. Rotate the bearing and check for roughness.

Inspect wheel hub at bearing bosses and inside where the distance spacer is supported. If distorted, fractured or worn, replace hub.

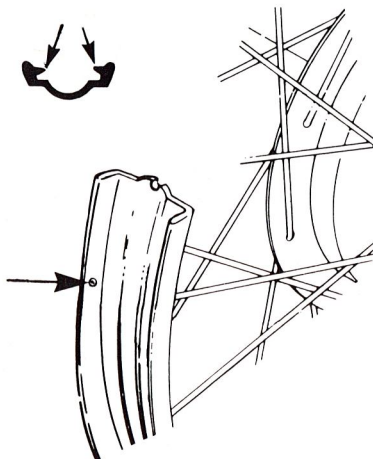
Inspect dust seal lips. If damaged, replace.

Check the bearing fit within the hub bosses. If a loose fit is encountered, a hub replacement is necessary.

RIMS

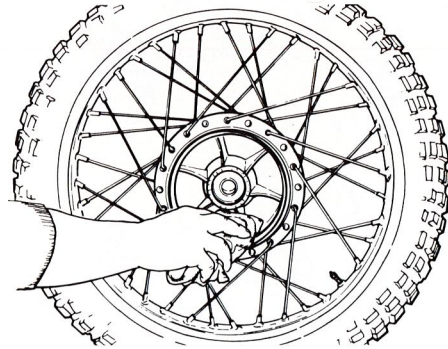
Rims are provided with inside pins as a tire retention device.

Quantity: front 5 pins each side
rear 10 pins each side



INSTALLATION

Carefully clean the brake shoe linings and the brake drum with a dry cloth.



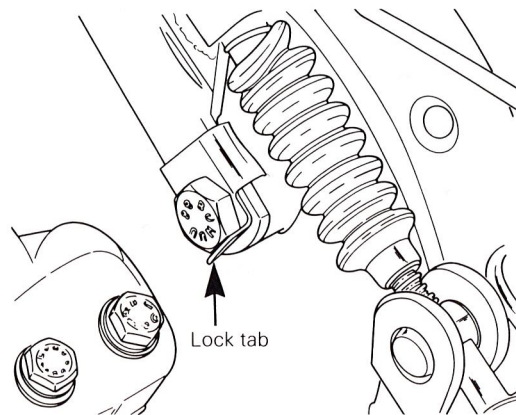
Front wheel

Qualifier models:

Position the wheel, the spacer and insert the axle from the clutch side screw the axle a few turns.

The torque arm is secured to the backing plate using a retaining bolt. It is of the utmost importance that the lock tab be correctly placed and secured.

Torque to 20-27 N•m (15-20 ft-lbs).

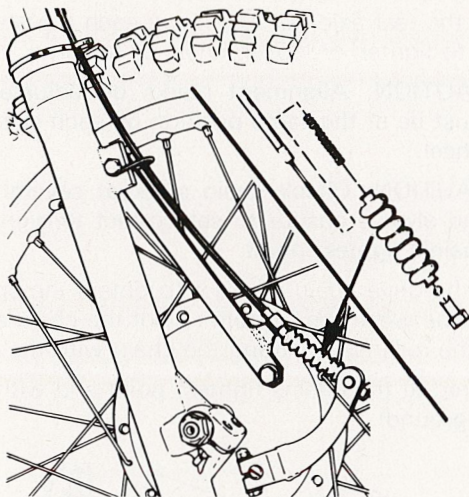


◆ **WARNING:** Bend lock tab against flat face of retaining bolt and always replace by a new one each time parts are disassembled.

SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

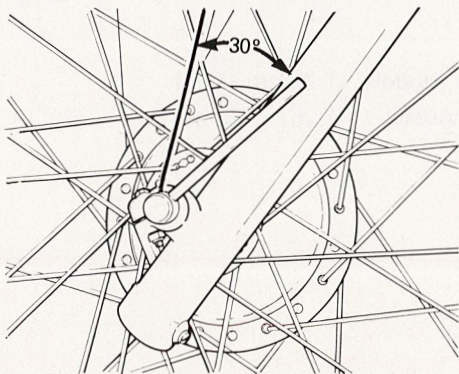
Install and route the front brake cable. As illustrated.



Spin front wheel in forward rotation, apply brake and while holding brake on, tighten the axle to 34-80 N•m (25-60 ft-lbs).

○ **NOTE:** This is important, it centers the brake shoes.

◆ **WARNING:** The front axle lever must be within a 30° angle with the fork slider when finally tightened.



The front axle lever can be repositioned by slackening the **brake side** axle pinch bolts and rotating the axle lever clockwise until the desired position is reached. Retorque the axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

▼ **CAUTION:** To ensure correct fork action, briskly compress forks (with brake applied) to align fork legs before tightening axle pinch bolts.

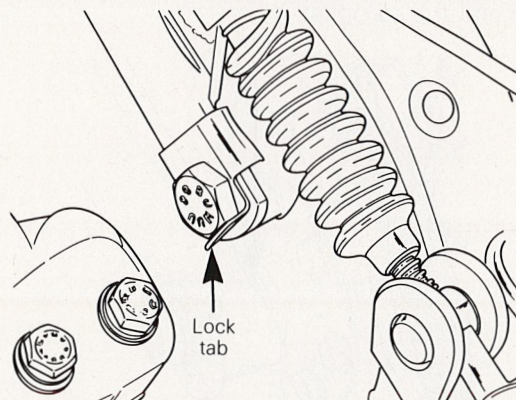
Retorque axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

MX-5 models

Position the brake plate on the R.H. side. Position the wheel and insert the axle from the clutch side. Slightly tighten the axle nut.

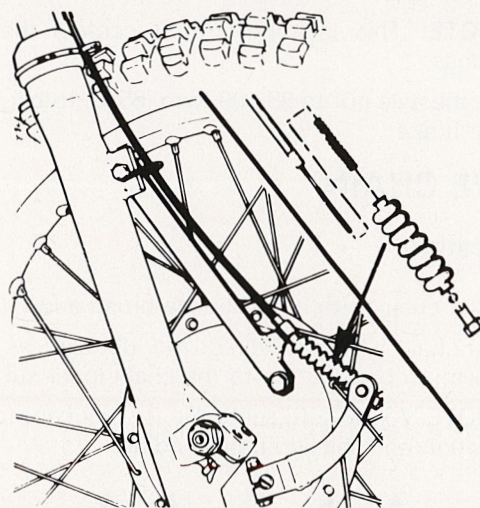
The torque arm is secured to the backing plate using a retaining bolt. It is of the utmost importance that the lock tab be correctly placed and secured.

Torque to 20-27 N•m (15-20 ft-lbs).



◆ **WARNING:** Bend lock tab against flat face of retaining bolt and always replace by a new one each time parts are disassembled.

Install and route the front brake cable. As illustrated.



Tighten the clutch side axle pinch bolts.

Spin front wheel in forward rotation, apply brake and while holding brake on, torque the axle nut to 34-80 N•m (25-60 ft-lbs).

○ **NOTE:** This is important, it centers the brake shoes.

▼ **CAUTION:** To ensure correct fork action, briskly compress forks (with brake applied) to align fork legs before tightening axle pinch bolts.

Torque axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

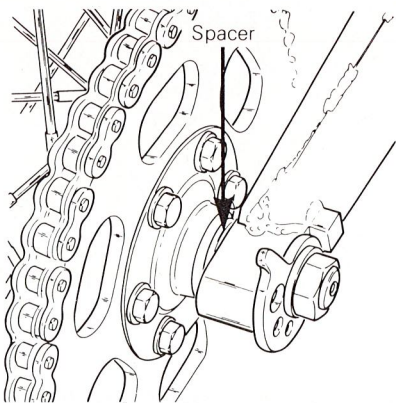
Adjust the front brake.

SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

Rear wheel

Inverse the removal procedures to re-install the wheel. Make sure the spacer is properly inserted between the frame and the sprocket.



Install brake adjuster nut and adjust chain tension.

Spin the wheel in forward rotation, apply brake, and while holding brake **on** tighten axle nut.

○ **NOTE:** This is important, it centers the brake shoes.

Torque the axle nut to 88-100 N•m (65-75 ft-lbs). Adjust the rear brake.

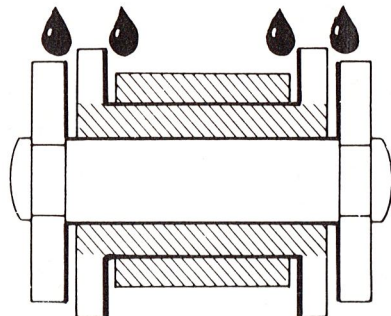
DRIVE CHAIN

Lubrication

Clean the chain with a stiff bristle brush and chain oil.

Using a chain lubricant, direct the lubricant as shown for maximum penetration to the chain inner surfaces.

○ **NOTE:** Allow sufficient time for lubricant to penetrate and thicken before riding.



If the motorcycle is not to be used for a long period of time, it is recommended to remove the chain from vehicle and to immerse it in chain oil.

○ **NOTE:** It is possible to slightly heat the oil to allow better oil penetration.

Drive chain adjustment

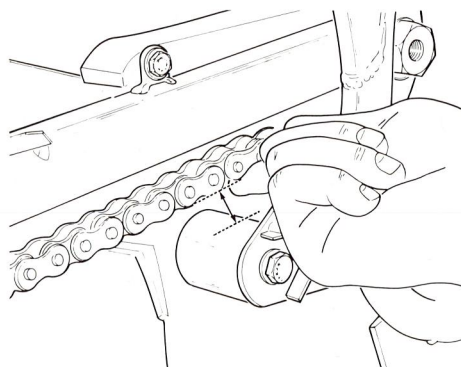
Loosen the rear axle nut and move each adjuster plate equally to tighten or loosen chain as required.

▼ **CAUTION:** Alignment marks on adjuster plate must be at the same position on each side of the wheel.

▼ **CAUTION:** Check chain slack at several places and always ensure to set correct tension at the chain's tightest point.

Adjust the drive chain in order to obtain the specified distance between the **bottom** run of the chain and the **top** of the roller while **lifting** the chain with the finger.

(Measured at the chains tightest point and with **wheel off the ground**).



Qualifier models: 1.25 cm (1/2")

MX-5 models: 1.25 - 1.50 cm (1/2" - 5/8")

FLAT TIRE REPAIR PROCEDURE

Removal

Mount the motorcycle on the center stand or a box with the applicable wheel raised.

Remove the wheel.

Remove the valve cap and core.

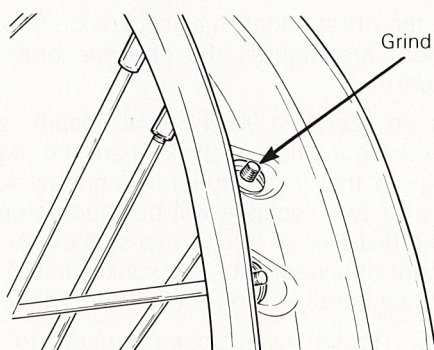
Work the tire bead away from the rim on both sides.

Beginning at the valve stem work either bead completely over the rim.

○ **NOTE:** A solution of soapy water around the rim on both sides, will considerably help the removal and installation of the tire.

The tube can now be removed for inspection or repair.

▼ **CAUTION:** Remove the rim liner and verify if any spoke stems protrude through the spoke nipples. File or grind down the ones that protrude.



Inspect the rim liner carefully before re-installing. If damaged, replace.

Re-assembly

(If applicable) at the installation of a new tire, the painted dot on the side of the bead indicates a lighter point on the tire and should be placed next to the valve, (front or rear wheel).

Lightly sprinkle inner tube with talcum or chalk powder.

Work the inner tube carefully into the casing and insert the valve stem through the rim.

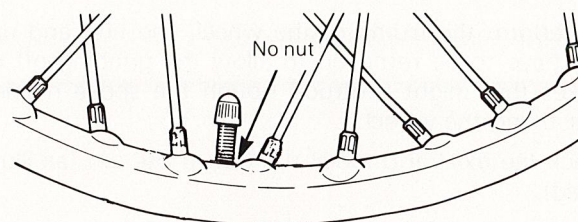
Work the bead under the rim, starting at a point opposite to the valve orifice.

▼ **CAUTION:** Be careful not to pinch the inner tube while working the bead over the rim.

Inflate the tire to 385 kPa (55 lbs/in²) maximum to properly seat the bead.

▼ **CAUTION:** If the valve stem is found to be tilted, deflate the tube and rotate the tire to straighten the valve stem.

Assemble without nut.



Release the air and install the valve core, inflate the tire to the recommended pressure:

Qualifier models

	Front	Rear
Dry and rocky terrain	98 kPa (14 P.S.I.)	98 kPa (14 P.S.I.)
Soft, wet, muddy terrain	84 kPa (12 P.S.I.)	84 kPa (12 P.S.I.)

MX-5 models

	Front	Rear
Dry and rocky terrain	84 kPa (12 P.S.I.)	84 kPa (12 P.S.I.)
Soft, wet, muddy terrain	76 kPa (11 P.S.I.)	76 kPa (11 P.S.I.)

Re-install wheel (front or rear wheel installation).

BALANCING WHEELS

Remove wheel assembly and set the brake backing plate aside.

Mount the wheel onto motorcycle (without the backing plate or the drive chain).

○ **NOTE:** Ensure that the wheel bearings are in good condition and properly lubricated.

Turn the wheel and allow it to stop. The heaviest portion will be down, mark the center of that heavy area.

Suppose the mark made is 0°, mark the wheel at 120° and 240° around the circumference of the tire.

Using resin core wire solder, add equal weight to the 120° and 240° positions by coiling the wire solder around the spokes nearest to the marks. Begin coiling around the spoke nipple and do not extend coils longer than 50 mm (2").

▼ **CAUTION:** Do not use acid core wire solder, the acid can damage the surface of the spokes and wheel.

Balancing is completed when the wheel remains in any static position without rolling.

Remount the wheel.

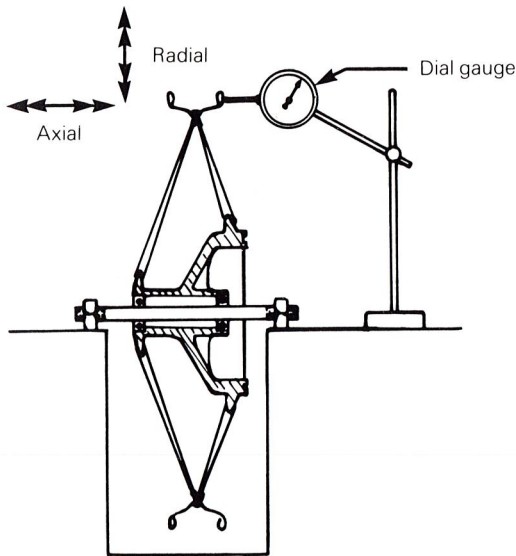
SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

TRUING WHEELS

To perform the truing of the wheel, the tire, and rim liner have to be removed to allow the grinding off of spokes that might protrude through the spoke nipples after truing the wheel.

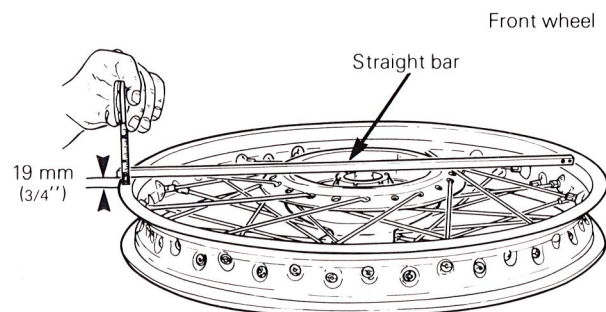
Check the axial and radial run-out of the rim (as illustrated).



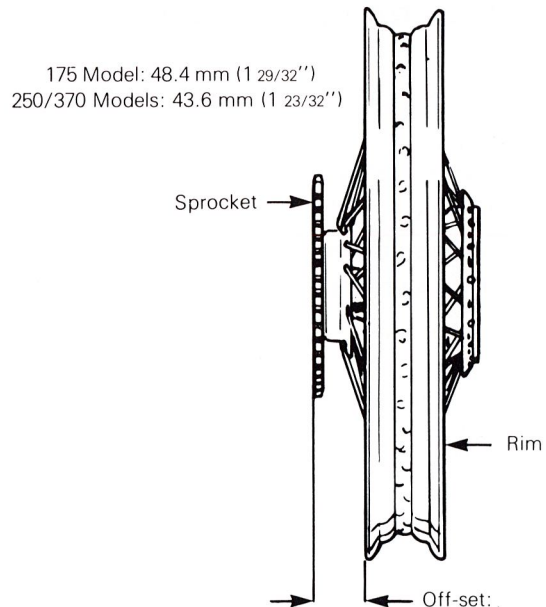
If all spokes are loose, tighten each spoke 1 to 1 1/2 turns. Tighten any single loose spoke and replace any broken one.

Check the rim off-set.

Front wheel rim off-set: measured from brake drum outer edge surface to outer edge of rim: 19 mm (3/4").



Rear wheel rim off-set: measured from sprocket outer edge to rim outer edge:



175 Model: 48.4 mm (1 29/32")
250/370 Models: 43.6 mm (1 23/32")

To correct the off-set, loosen all spokes on one side an equal amount and tighten the opposite ones by the same amount.

To correct an eccentric wheel (oval shape), spin the wheel then using a piece of chalk, mark the high spots on one edge of the rim. Stop wheel and check marks. Usually one or two sections will be found to be high, covering the distance of two to five spokes. According to the amount of eccentricity, the spokes in the marked area should be tightened, normally from 1 to 2 turns.

NOTE: Tighten each spoke equally, to prevent side to side distortion.

Erase the chalk marks and repeat process.

Adjust rim to run true within a radial tolerance of 1.6 mm (1/16") maximum.

CAUTION: Any overtightening in one area of the rim will create a flat spot. It may be necessary to loosen the spokes directly opposite from the high spots to relieve the pressure.

To correct a wobbling (side-to-side motion), spin the wheel and mark the rim to find the sections out of true. The out of true section is usually covered by two to five spokes. Supposing that the mark covers three spokes, the spokes on the marked side should be loosened 3/4 or 1 1/4 turns and the opposite spokes should be tightened the equal amount.

NOTE: As you move away from the high spots, in both directions, less turns are required on the spoke nipples.

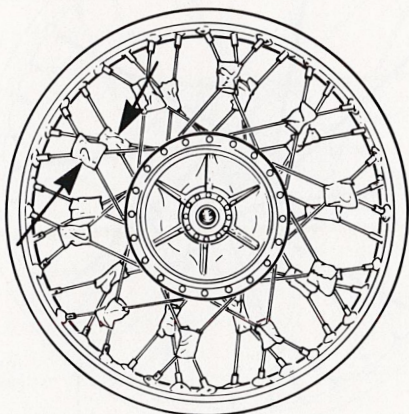
Erase chalk marks and repeat process.

Adjust rim to run within an axial tolerance of 1.6 mm (1/16") maximum.

LACING WHEELS

Rim replacement

Prior to the spoke nipple removal, tape spokes together at each meeting points midway between hub and rim.



Remove nipples and lift away hub and spokes.

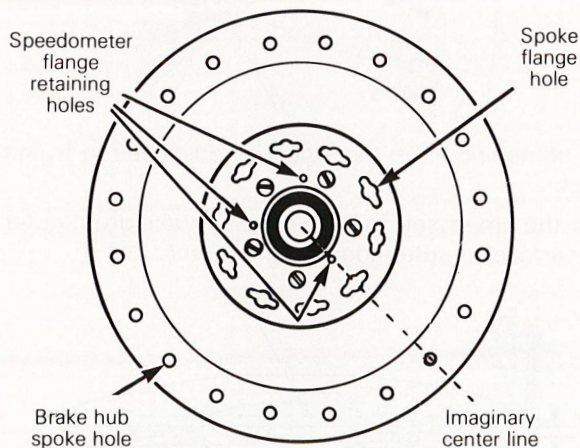
Prior to assembly, properly locate the rim, as described in hub replacement.

Reposition all the spokes and tighten. True the wheel as earlier described in truing wheel.

Hub replacement

Front wheel

Place hub with the brake side facing downwards. On the wheel hub, three holes align perfectly together when tracing an imaginary center line, i.e. one brake hub spoke hole, one spoke flange hole and one speedometer flange retaining holes.



Position the rim to have the numbers following the letters "DOT" (stamped) facing upwards.

CAUTION: The rim can be laced only from one side. A difficult lacing may be the result of a rim positioned upside down.

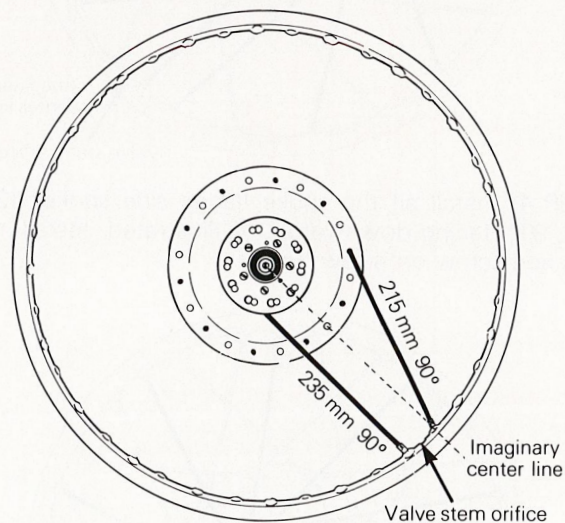
STEP 1: Align the hub and the rim on an imaginary center line drawn through the right spoke nipple hole (located to the right of the valve stem orifice) and the 3 centered holes of the hub.

Install the two first spokes, as illustrated.

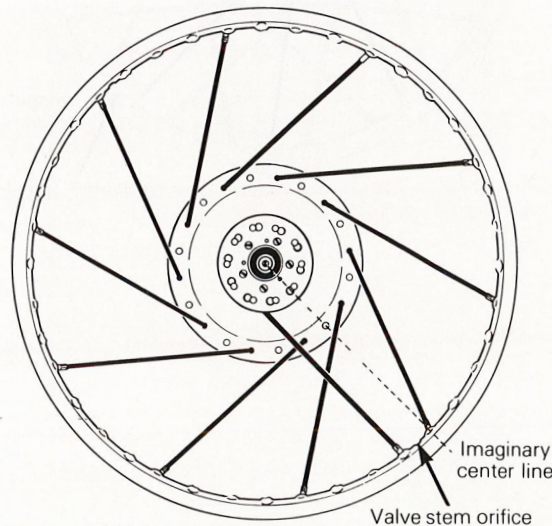
One 215 mm, 90° (right side).

One 235 mm, 90° (left side).

Install nipples and screw on a few turns.



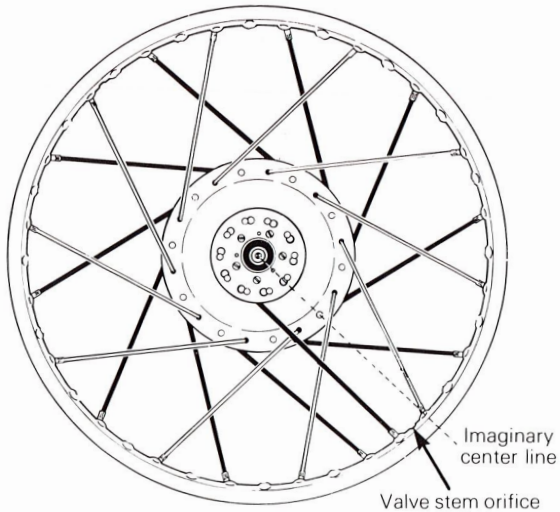
STEP 2: Install all the brake side spokes (215 mm, 90°) facing upwards. As illustrated. Install nipples and screw on a few turns.



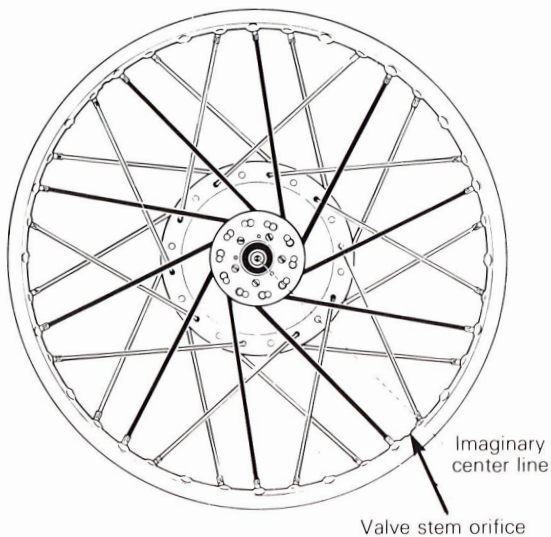
SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

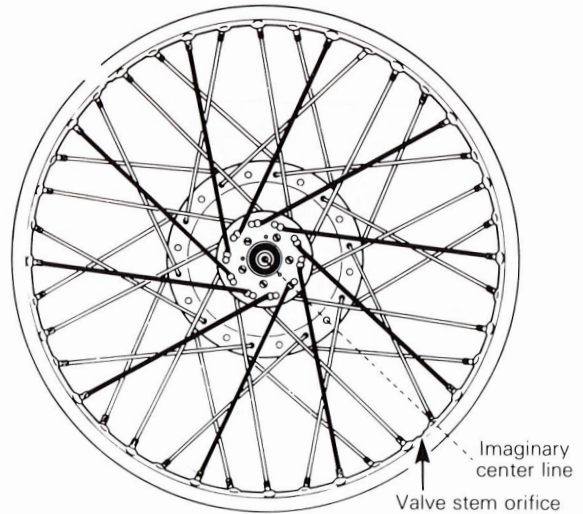
STEP 3: Install all the brake side spokes (215 mm, 90°) facing downwards. As illustrated. Install nipples and screw on a few turns.



STEP 4: Install all the spoke flange side spokes (235 mm, 90°) facing downwards. As illustrated. Install nipples and screw on a few turns.

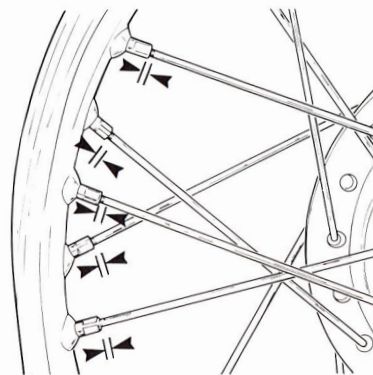


STEP 5: Install all the spoke flange side spokes (235 mm, 90°) facing upwards. As illustrated. Install nipples and screw on a few turns.



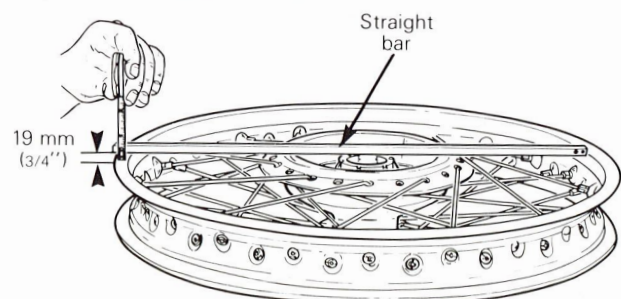
All the spokes are now loosely installed in the wheel assembly.

To ease the truing of the wheel it is suggested to tighten all spokes equally in order to have the same thread length protruding through the nipples. (Start at the valve stem orifice).



After tightening, true the wheel as described in truing wheels.

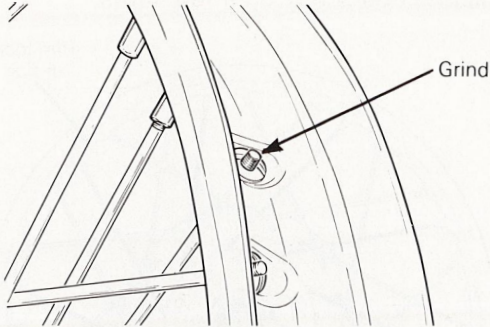
Check the rim offset, measured from brake drum outer edge surface to outer edge of rim: 19 mm (3/4")



SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

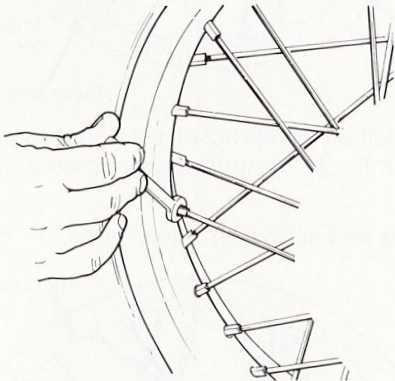
▼ **CAUTION:** When the wheel is true and the offset is correct, check if any spokes stems protrude through the spoke nipples. File or grind down the ones that protrude.



After wheel is put into service, the following maintenance schedule is suggested to keep rim true and spokes properly torqued.

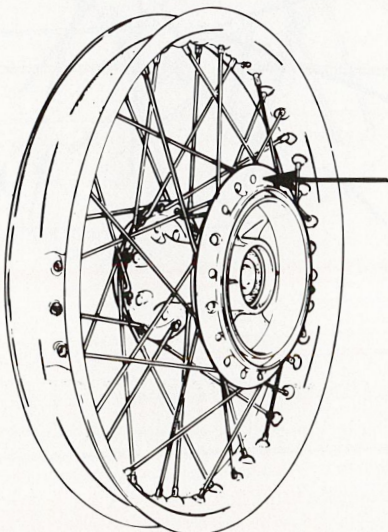
After First 5 hours;

As required, depending on riding conditions.



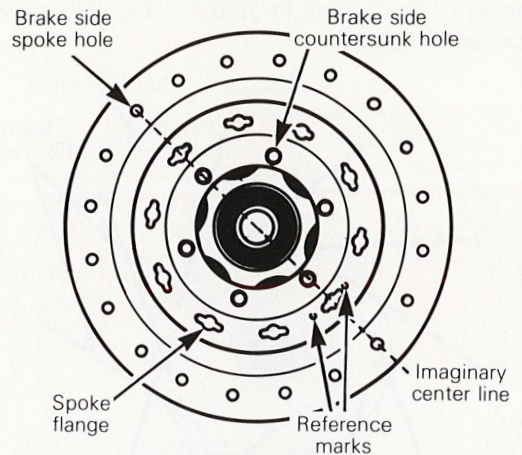
▼ **CAUTION:** Loose spokes will cause rim and/or hub damage. Always keep the spokes properly torqued.

Rear wheel: (spokes mounted on the inside of the hub, brake side).



Place hub with the brake side facing downwards. On the wheel hub 6 holes align perfectly together when tracing an imaginary center line, i.e. 2 brake side spoke holes, 2 spoke flange holes and 2 sprocket retaining holes.

○ **NOTE:** On the sprocket side one spoke hole is marked with 2 dots, to use as a reference mark.



Position the rim in order to have the numbers following the letters "DOT" (stamped) facing upwards.

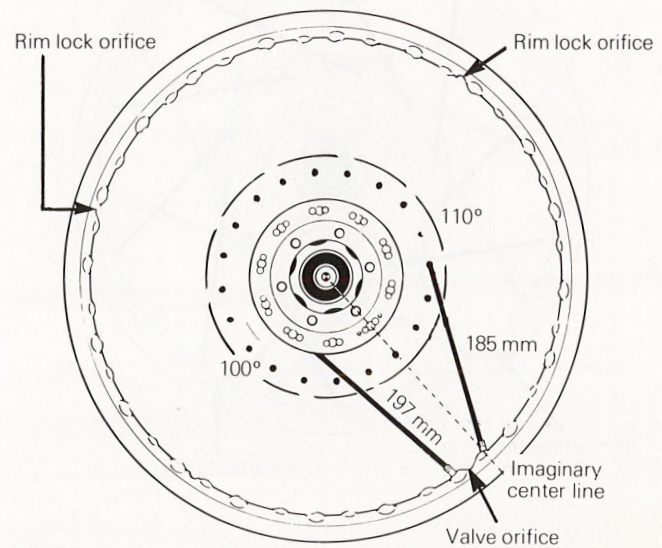
▼ **CAUTION:** The rim can be laced only from one side. A difficult lacing may be the result of a rim positioned upside down.

STEP 1: Align the hub and the rim on an imaginary center line drawn through the right spoke nipple hole located nearest to the right hand side of the valve stem orifice and the spoke flange reference mark (1 dot stamped on each side of a spoke hole).

Install the 2 first spokes, as illustrated.

One right side inside, 197 mm, 100° angle (butted). And one left side inside, 185 mm 110°, angle.

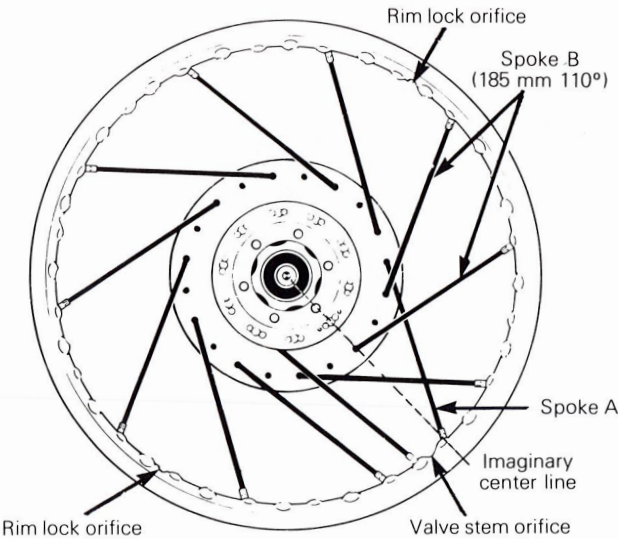
Install nipples and screw on a few turns.



SECTION 05 WHEELS
SUB-SECTION 01 (WHEELS)

STEP 2: Install all 10 brake side spokes (185 mm, left side inside, 110°) facing upwards into the inside of the hub countersunk holes. Install nipples and screw on a few turns.

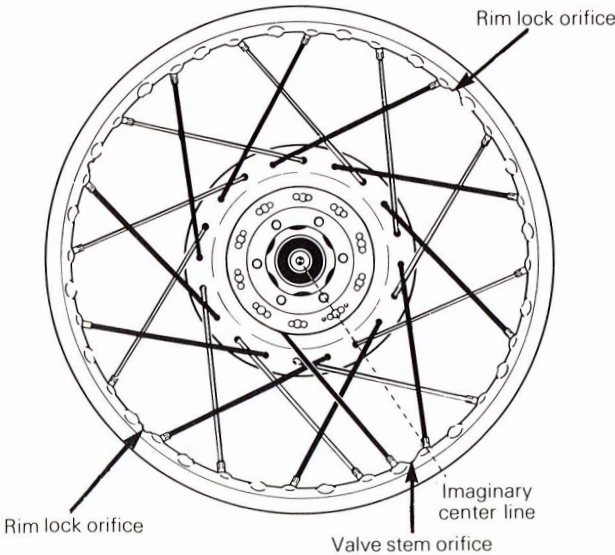
NOTE: In order to install all the spokes in step 2, it is necessary to remove the spoke (A) (185 mm facing upwards brake side) that was used to start the lacing of the wheel in step 1. This will route the spokes (B) properly.



STEP 3: Install all 10 brake side spokes (185 mm, left side inside, 110°) facing upwards into the inside of the hub non-countersunk holes.

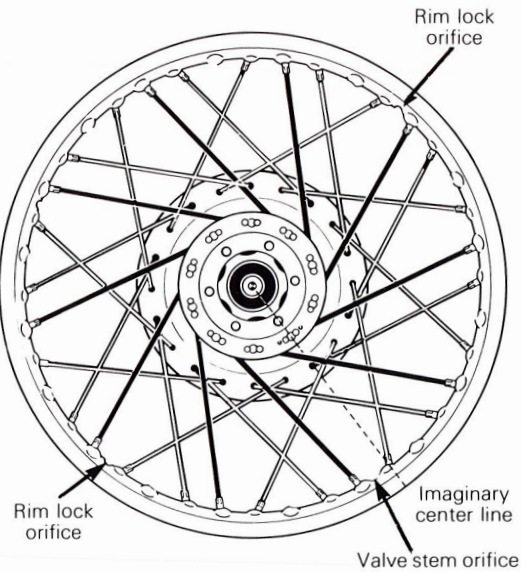
Install nipples and screw on a few turns.

NOTE: The spokes installed on step 3 must overlap the ones previously fitted in step 2.



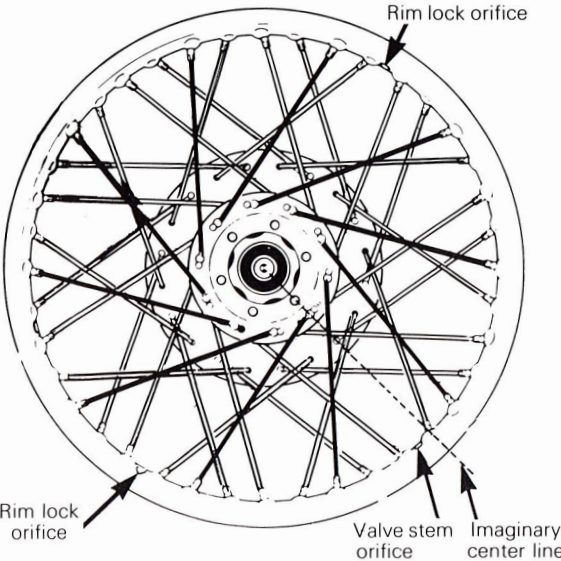
STEP 4: Install all 10 sprocket side spokes (right side inside, 197 mm, 100°) butted, facing downward, as illustrated.

Install nipples and screw on a few turns.



STEP 5: Install all 10 sprocket side spokes (right side outside, 197 mm, 90° butted) facing upward, as illustrated.

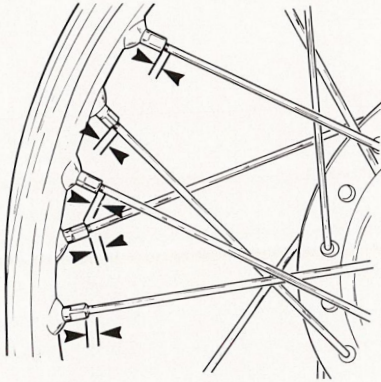
Install nipples and screw on a few turns.



SECTION 05 WHEELS

SUB-SECTION 01 (WHEELS)

All the spokes are now loosely installed in the wheel assembly. To ease the truing of the wheel it is suggested to tighten all the spokes equally, in order to have the same thread length protruding through the nipples. (Start at the valve stem orifice).

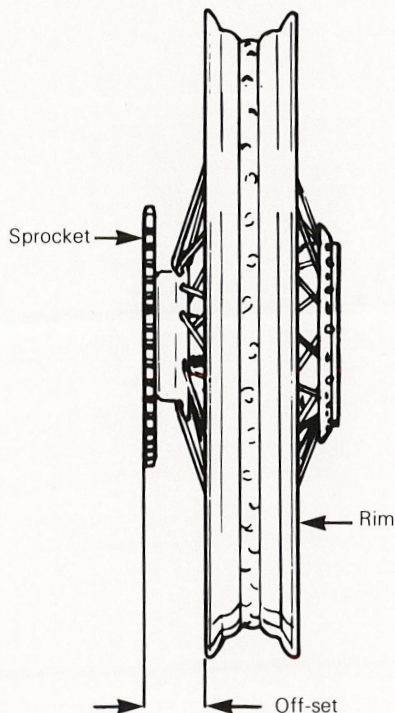


After tightening, true the wheel as described in truing wheels.

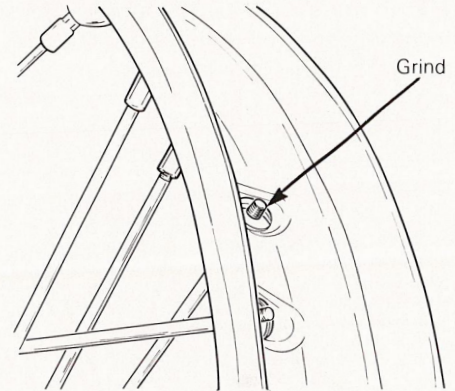
Rear wheel rim off-set; measured from sprocket outer edge to rim outer edge:

175 model: 48.4 mm (1 29/32")

250/370 models: 43.6 mm (1 23/32")



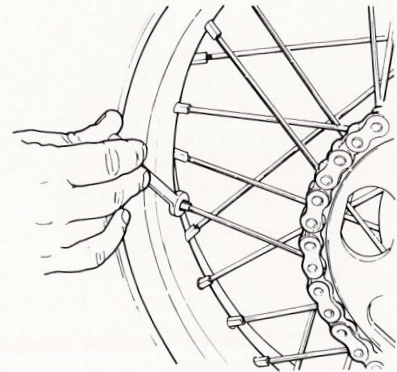
CAUTION: When the wheel is true and the offset is correct, check if any spokes stems protrude through the spokes nipples. File or grind down the ones that protrude.



After wheel is put into service, the following maintenance schedule is suggested to keep rim true and spokes properly torqued:

After first 5 hours;

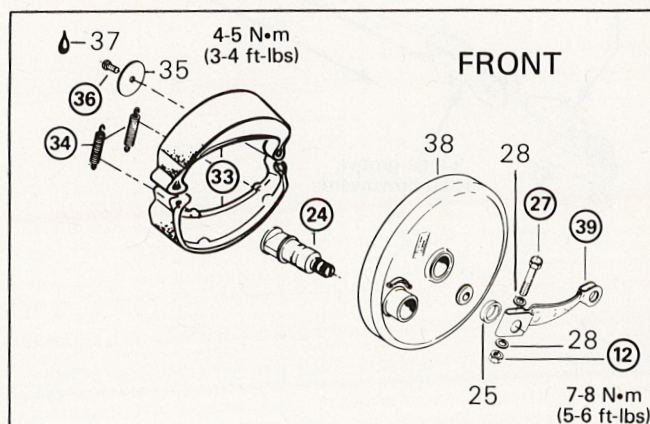
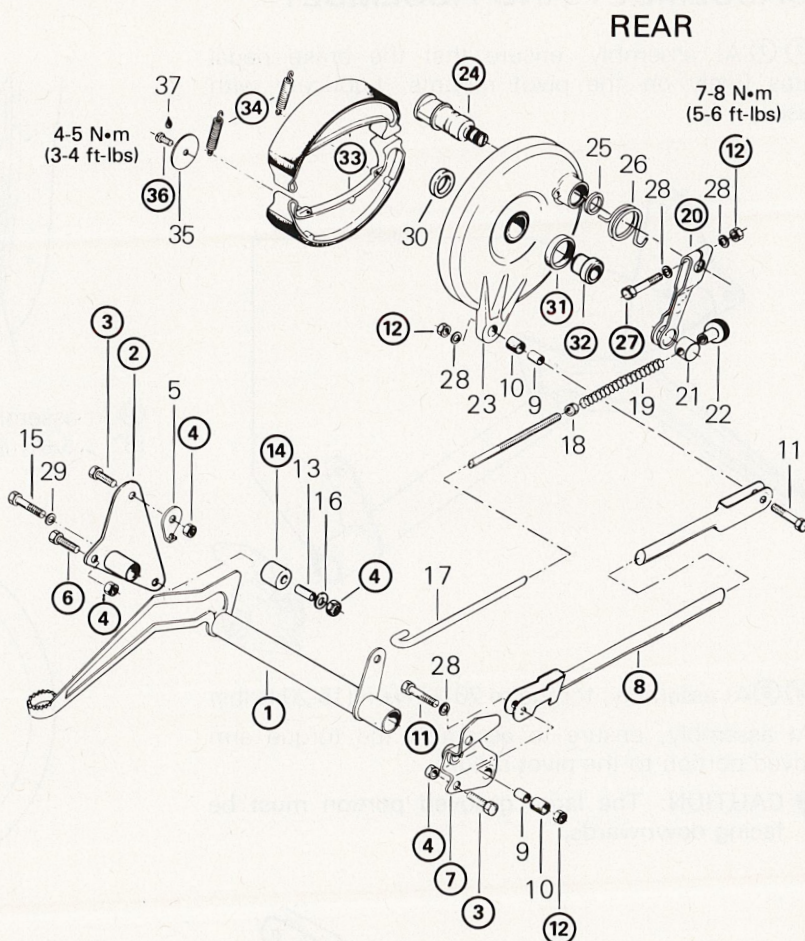
As required, depending on riding conditions.



CAUTION: Loose spokes will cause rim and/or hub damage. Always keep the spokes properly torqued.

BRAKE

1. Brake pedal
2. Pivot mount R.H.
3. Hexagonal screw M8 x 1.25 x 20 (3)
4. Hexagonal nut M8 x 1.25 (5)
5. Stop adjuster
6. Hexagonal screw M8 x 1.25 x 16
7. Pivot mount L.H.
8. Torque arm
9. Bushing (2)
10. Rubber cushion (2)
11. Hexagonal screw M6 x 1.00 x 30 (2)
12. Hexagonal nut M6 x 1.00 (4)
13. Bushing
14. Roller
15. Hexagonal screw M8 x 1.25 x 60
16. Washer 8 x 25 x 1.5
17. Brake rod
18. Hexagonal nut M6 x 1.00
19. Spring
20. Rear brake arm
21. Barrel
22. Adjuster nut
23. Rear backing plate (magnesium)
24. Cam (2)
25. Felt seal (2)
26. Rear brake arm spring
27. Hexagonal screw M6 x 1.00 x 35 (2)
28. Washer 6 mm x 12 x 1.5 (6)
29. Flat washer 8.4 x 17 x 1.6
30. Backing plate spacer
31. Rubber seal
32. Spacer L.H.
33. Brake shoe (set) (2)
34. Spring (4)
35. Washer (2)
36. Slotted pan head screw M5 x 0.80 x 10 (2)
37. Loctite no. 271, blue (high strength)
38. Front backing plate
39. Front brake arm



SECTION 05 WHEELS

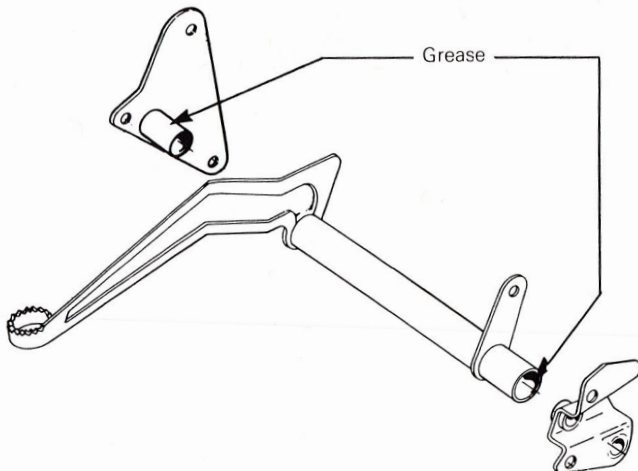
SUB-SECTION 02 (BRAKE)

REMOVAL

Mount the motorcycle on the center stand or a box.
Disconnect the brake cable/rod and remove the wheel.

DISASSEMBLY AND ASSEMBLY

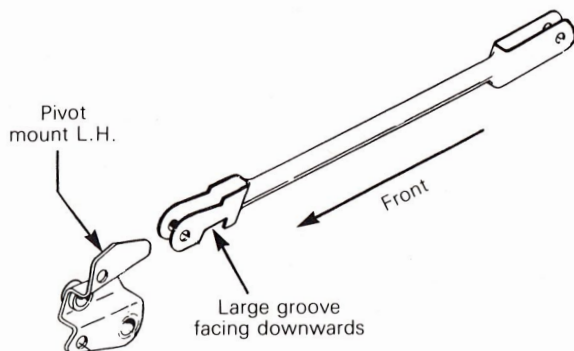
①②⑦ At assembly, ensure that the brake pedal rotates freely on the pivot mounts. Lubricate with grease.



③④⑥ At assembly, torque to 20-27 N•m (15-20 ft-lbs)

⑧ At assembly, ensure to assemble the torque arm grooved portion to the pivot mount.

▼ **CAUTION:** The large grooved portion must be facing downwards.

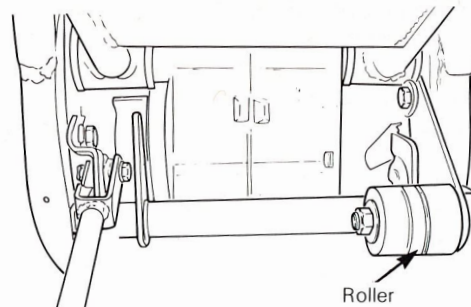


⑪⑫ At assembly, torque to 7-8 N•m (5-6 ft-lbs).

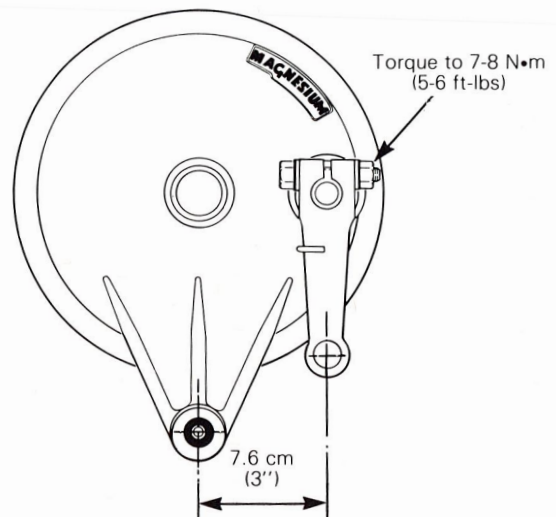
⑭ Inspect the roller and replace if excessive wear is noticed.

At assembly, ensure that the roller turns freely.

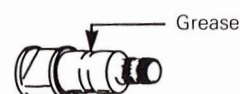
Torque to 20-27 N•m (15-20 ft-lbs).



⑳ At assembly, position the rear arm at 7.6 cm \pm 0.9 (3" \pm 3/8") away from the torque arm retaining hole.



㉔ At assembly, apply a light coat of lithium grease and ensure that the cam rotates freely in the backing plate.

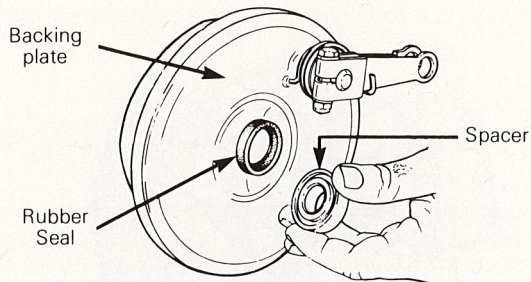


SECTION 05 WHEELS

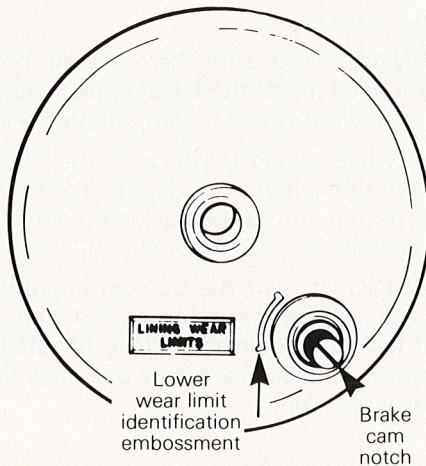
SUB-SECTION 02 (BRAKE)

②⑦ At assembly, torque to 7-8 N•m (5-6 ft-lbs).

③① ③② At assembly, ensure that the rubber seal is properly inserted between the spacer and the backing plate.

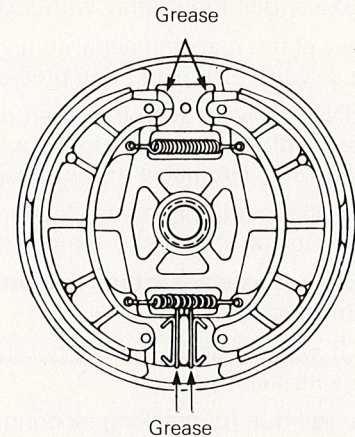


◆ ③③ **WARNING:** When the front brake cam notch comes in line with the lower wear limit identification embossment, the brake linings must be replaced or impaired braking may occur.



◆ **WARNING:** When the rear brake adjuster nut has reached its maximum adjustment, the brake linings must be replaced or impaired braking may occur.

At assembly, **slightly** grease the brake shoe pivots.

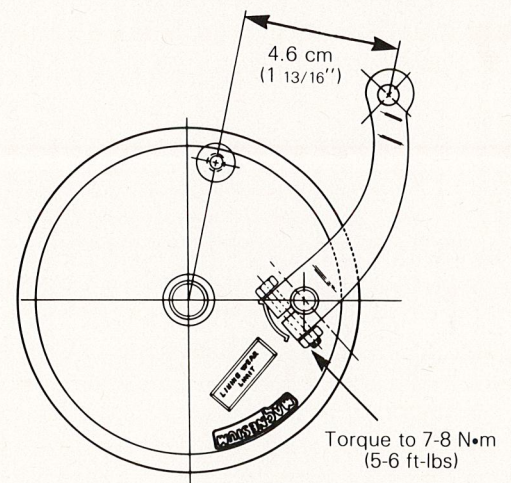


◆ **WARNING:** Do not allow any grease to reach the brake linings and/or the brake drum or impaired braking will occur.

③④ It is recommended to replace the brake shoe springs everytime new brake shoes are fitted.

③⑥ At assembly, apply Loctite no. 242 blue (medium strength) on screw threads and torque to 4-5 N•m (3-4 ft-lbs).

③⑨ At assembly, position the front brake arm at 4.6 cm \pm 0.6 (1 13/16" \pm 1/4) from the torque arm retaining hole.



SECTION 05 WHEELS

SUB-SECTION 02 (BRAKE)

CLEANING AND INSPECTION

Clean the brake shoes thoroughly with soapy water.

Clean the brake plate, cam and pedal components using a degreasing solvent. Dry using compressed air.

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

Reclean brake shoes and brake hub friction surface using lacquer thinner or acetone to remove any oil film.

◆ **WARNING:** Always perform this procedure in a well ventilated area.

○ **NOTE:** If wheel hub is rusted, polish the friction surface with sand paper.

Inspect the wheel hub for cracking, scoring, pitting, out of round, etc. If damaged, replace.

Inspect wheel bearings (See wheel bearing removal).

Inspect the lining condition. Replace if the lining is greased or oil soaked, or if lining is badly grooved.

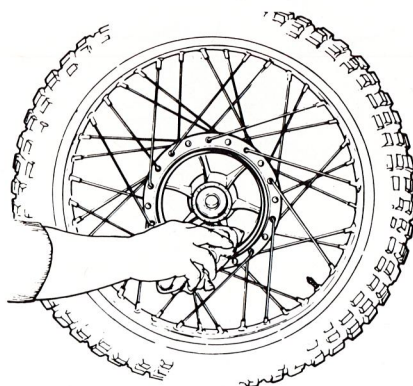
○ **NOTE:** If lining surface has a baked finish, rub it off using a fine sand paper.

Inspect backing plate casting, cam shaft and brake arm splines. Replace if damaged.

Inspect the torque arm bushings. If worn or damaged, replace.

INSTALLATION AND ADJUSTMENT

Carefully clean the brake shoe linings and the brake drum using a dry cloth.



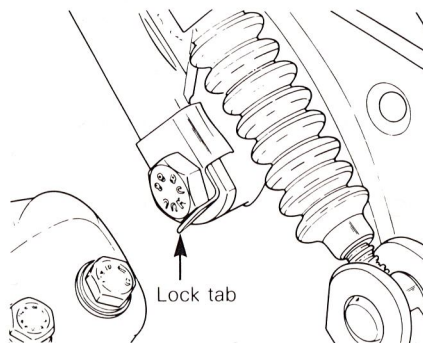
Front wheel

Position the brake plate.

◆ **WARNING:** Make sure there are no foreign particles lodged inside the backing plate assembly, it may cause the wheel to jam, stop or skid.

Position the wheel and insert the axle, the spacer (if applicable) from the clutch side. Slightly tighten the axle. Secure the torque arm to the backing plate and torque the retaining bolts to 20-27 N•m (15-20 ft-lbs).

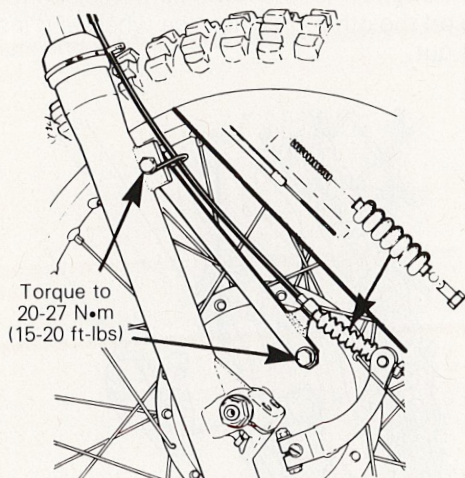
◆ **WARNING:** It is of the utmost importance that the lock tab be correctly placed and secured. Bend lock tab against flat face of retaining bolt and always replace by a new one each time parts are disassembled.



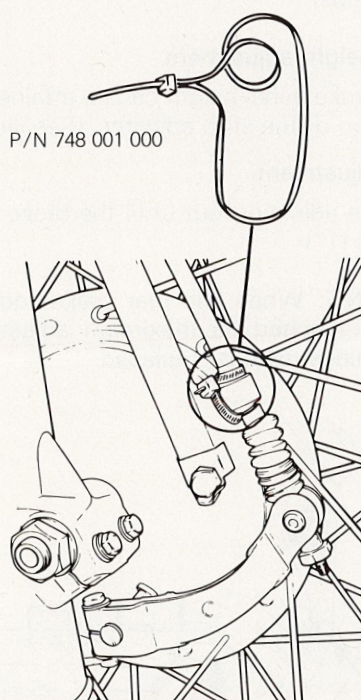
SECTION 05 WHEELS

SUB-SECTION 02 (BRAKE)

Install and route the front brake cable. As illustrated.



○ **NOTE:** It is recommended to use a tie wrap, to secure the lower end of the front brake cable housing to the backing plate cable retainer.

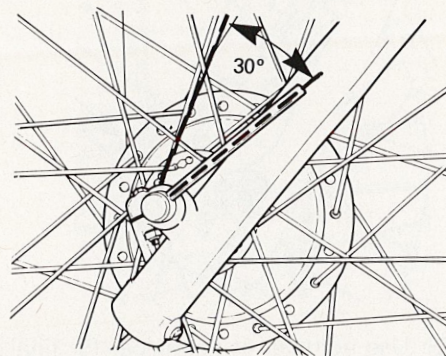


Qualifier models

Spin front wheel in forward rotation, apply brake and while holding brake on, tighten the axle to 34-80 N•m (25-60 ft-lbs).

○ **NOTE:** This is important, it centers the brake shoes.

◆ **WARNING:** The front axle lever must be within a 30° angle with the fork slider when finally tightened.



The front axle lever can be repositioned by slackening the **brake side** axle pinch bolts and rotating the axle lever clockwise until the desired position is reached. Retorque the axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

▼ **CAUTION:** To ensure correct fork action, briskly compress forks (with brake applied) to align fork legs before tightening axle pinch bolts.

Retorque axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

MX-5 models

Tighten the clutch side axle pinch bolts.

Spin front wheel in forward rotation, apply brake and while holding brake on, torque the axle nut to 34-80 N•m (25-60 ft-lbs).

○ **NOTE:** This is important, it centers the brake shoes.

▼ **CAUTION:** To ensure correct fork action, briskly compress forks (with brake applied) to align fork legs before tightening axle pinch bolts.

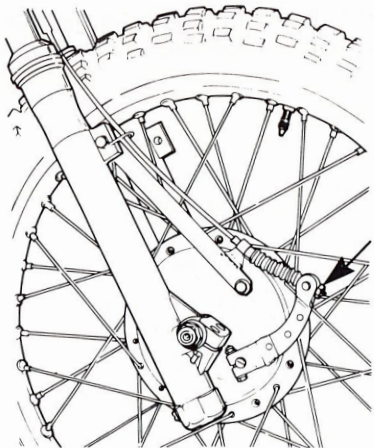
Torque axle pinch bolts to 8-10 N•m (6-8 ft-lbs).

SECTION 05 WHEELS

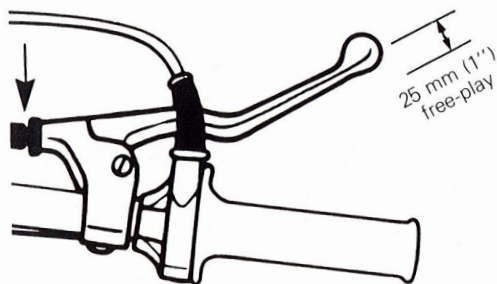
SUB-SECTION 02 (BRAKE)

Front brake adjustment

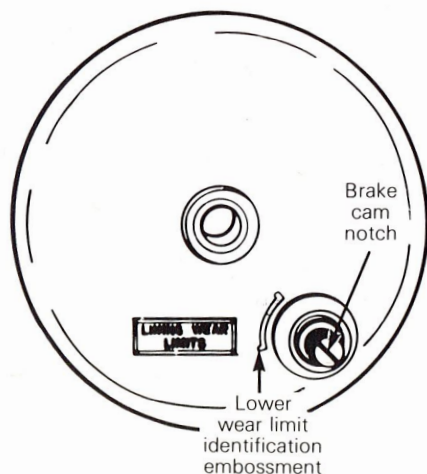
Completely loosen the brake cable adjuster (at handlebar) then using the adjuster located at the brake plate, adjust cable to provide 25 mm (1") of free lever travel (at handlebar).



○ NOTE: Use adjuster at handlebar for final adjustment.

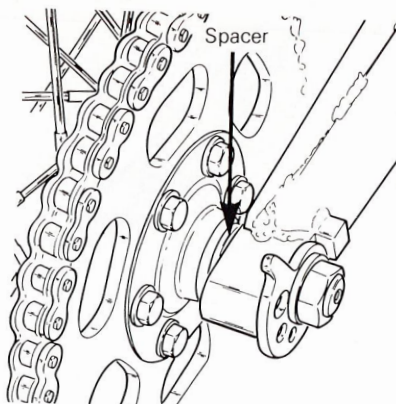


◆ WARNING: When the brake cam notch comes in line with the lower wear limit identification embossment, the brake linings must be replaced or impaired braking may occur.



Rear wheel

Position the spacer on the right hand side and the backing plate on the other. Position the wheel and insert the axle and nut.



Install the brake rod and adjust the chain tension.

Spin the wheel in forward rotation, apply brake, and while holding brake on, torque the axle nut to 88-100 N•m (65-75 ft-lbs).

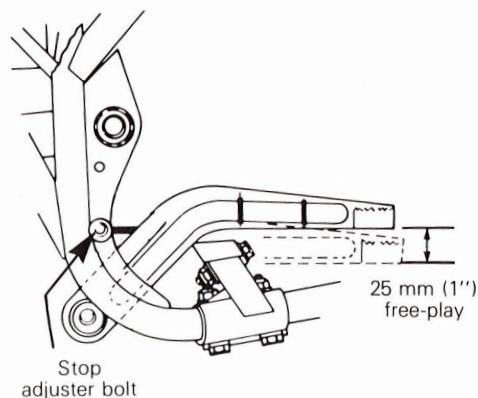
Brake pedal height adjustment

The desired brake pedal height can be attained by altering the position of the stop adjuster. (See illustration).

Rear brake adjustment

Turn the cable adjusting nut until the brake pedal free play is 25 mm (1").

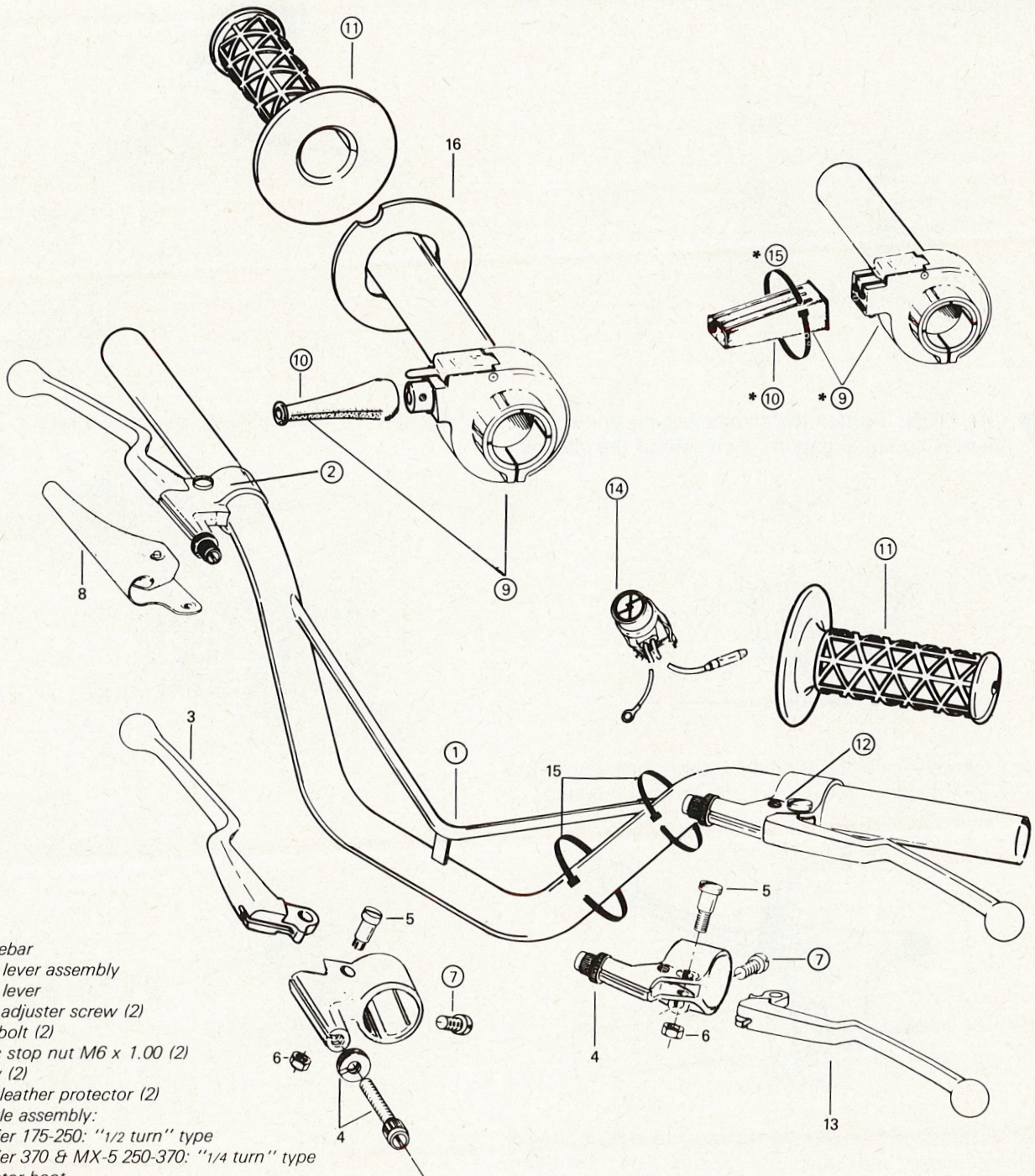
◆ WARNING: When the rear brake rod adjusting nut has reached its maximum adjustment, the brake linings must be replaced.



SECTION 05 WHEELS
SUB-SECTION 03 (TECHNICAL DATA)

VEHICLE MODEL		QUALIFIER 175 8955	QUALIFIER 250 8965	QUALIFIER 370 8985	MX-5 250 8964	MX-5 370 8984
Brake front		Drum, single leading shoe, 15.24 cm diameter x 2.54 cm (6" dia. x 1")				
Brake rear		Drum, single leading shoe 15.24 cm diameter x 2.54 cm (6" dia. x 1")				
Rim front		1.60" x 21" alloy low profile				
Rim rear		2.15" x 18" alloy low profile	2.75" x 18" alloy low profile			
Spokes front	right	Standard 3.5 mm diameter, 215 mm length, 90°				
	left	Standard 3.5 mm diameter, 235 mm length, 90°				
Spokes rear	right	Butted 4 mm diameter, 197 mm length, 90° (outside) Butted 4 mm diameter, 197 mm length, 100° (inside)				
	left	Standard 3.5 mm diameter, 185 mm length, 90°				
Tire front		3.00" x 21" knobby (Dunlop)				
Tire rear		4.00 x 18 knobby (Dunlop)	5.00x 18 knobby (Dunlop)			

HANDLEBAR



1. Handlebar
2. Brake lever assembly
3. Brake lever
4. Cable adjuster screw (2)
5. Pivot bolt (2)
6. Elastic stop nut M6 x 1.00 (2)
7. Screw (2)
8. Lever leather protector (2)
9. Throttle assembly:
Qualifier 175-250: "1/2 turn" type
Qualifier 370 & MX-5 250-370: "1/4 turn" type
10. Protector boot
11. Rubber grip (2)
12. Clutch lever assembly
13. Clutch lever
14. Cut-out switch assembly
15. Tie wrap (plastic), as required
16. Throttle washer (Qualifier 370 & MX-5 250-370 models only)

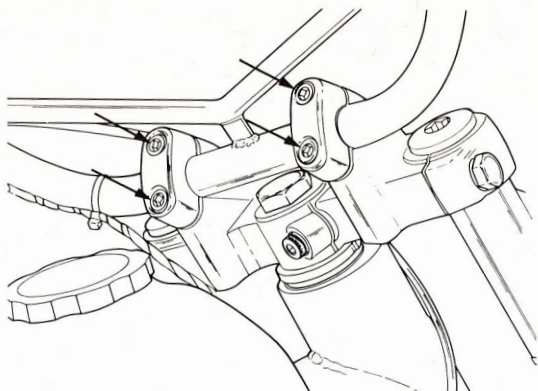
***Qualifier 175-250 models only**

SECTION 06 STEERING

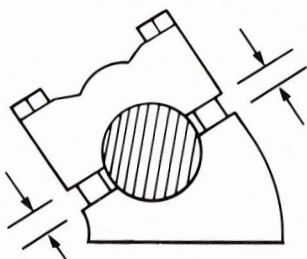
SUB-SECTION 01 (HANDLEBAR)

DISASSEMBLY AND ASSEMBLY

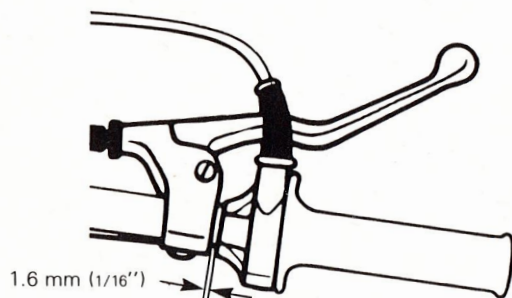
① At assembly, position the handlebar for the best riding position and torque the retaining screws to 13-16 N•m (10-12 ft-lbs).



CAUTION: Tighten the screws equally and ensure there is an equal gap on each side of the clamps.

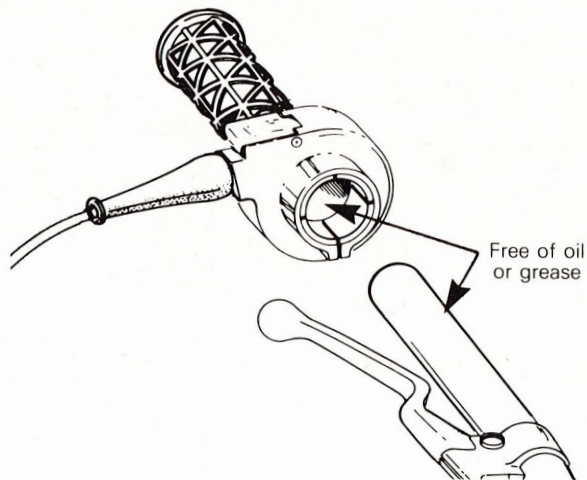


② At assembly, position the brake lever assembly at 1.6 mm (1/16") distance away from the throttle housing.

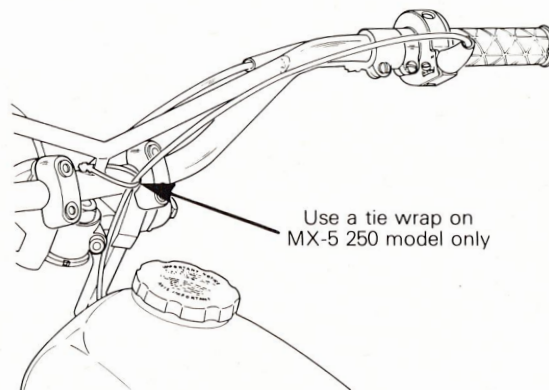
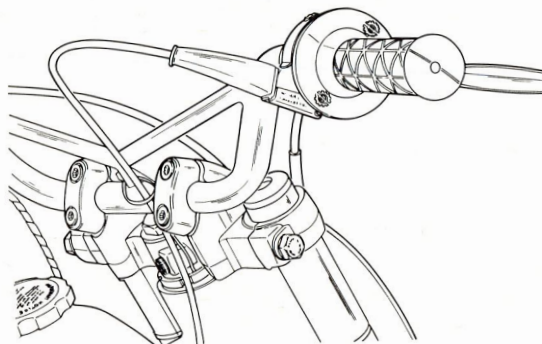


⑦ At assembly, only **slightly** tighten the lever housing retaining screw and adjust the position to the rider's preference.

⑨ Prior to assembly, ensure that the surface between the handlebar and the throttle assembly is clean and free of oil or grease.



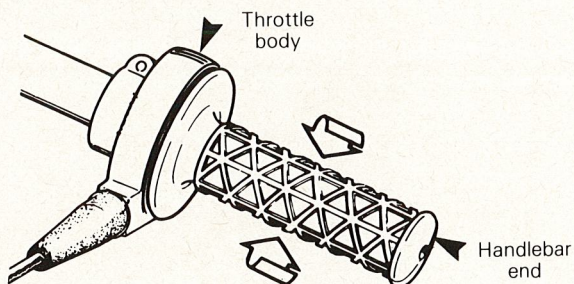
Position the throttle assembly as illustrated:



SECTION 06 STEERING

SUB-SECTION 01 (HANDLEBAR)

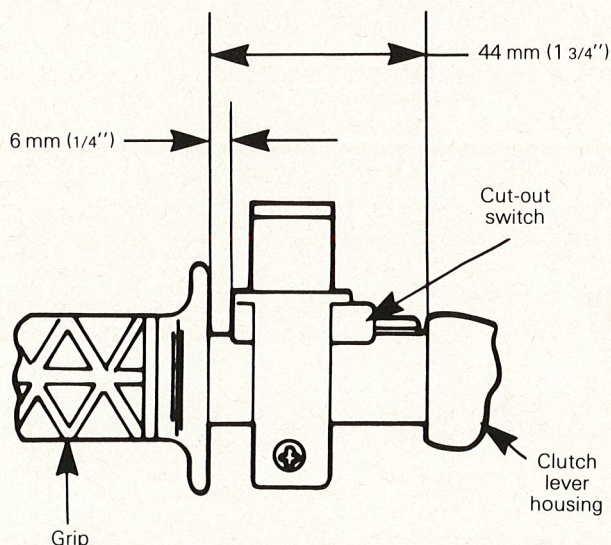
Ensure that the rubber grip does not rub on throttle body or handlebar end.



At assembly; use compressed air as explained above or dip the grip into a highly volatile alcohol such as wood alcohol, rubbing alcohol or equivalent, and rapidly slide the grip on the handlebar.

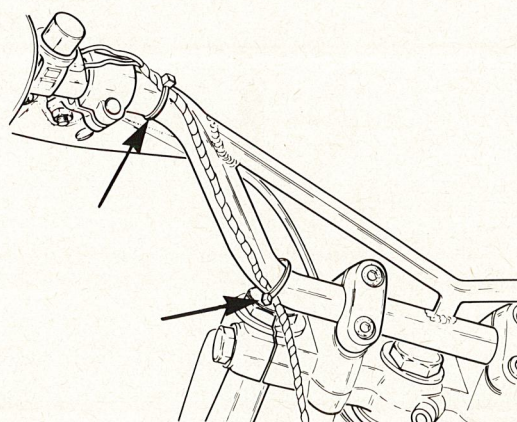
◆ **WARNING:** Always perform this procedure in a well ventilated area.

⑩⑭ Position the clutch lever housing and cut-out switch as illustrated.



Only **slightly** tighten the clutch lever housing retaining screw, and adjust the position to the rider preference.

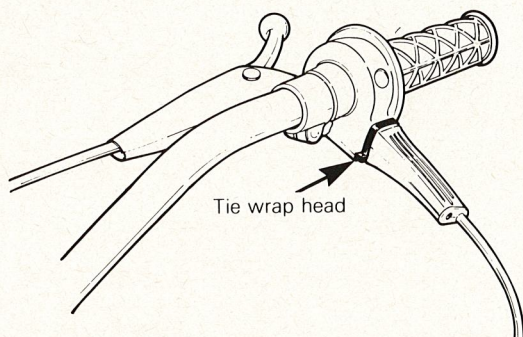
Use 2 tie wraps to secure the cut-out wire to the handlebar.



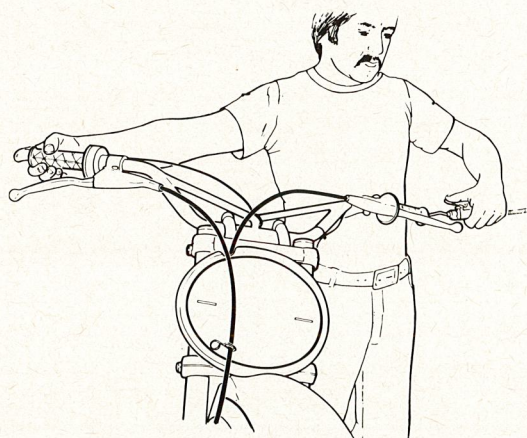
◆ **WARNING:** Before starting engine, ensure that the carburetor slide is free to snap back to idle position, and that the throttle grip is totally free to rotate.

⑩⑮ On Qualifier 175-250 models, secure the protector boot to the throttle body using a tie wrap.

◆ **WARNING:** Always position the tie wrap head to the inside to prevent any possibility from rubbing on the driver's hand while operating the motorcycle.

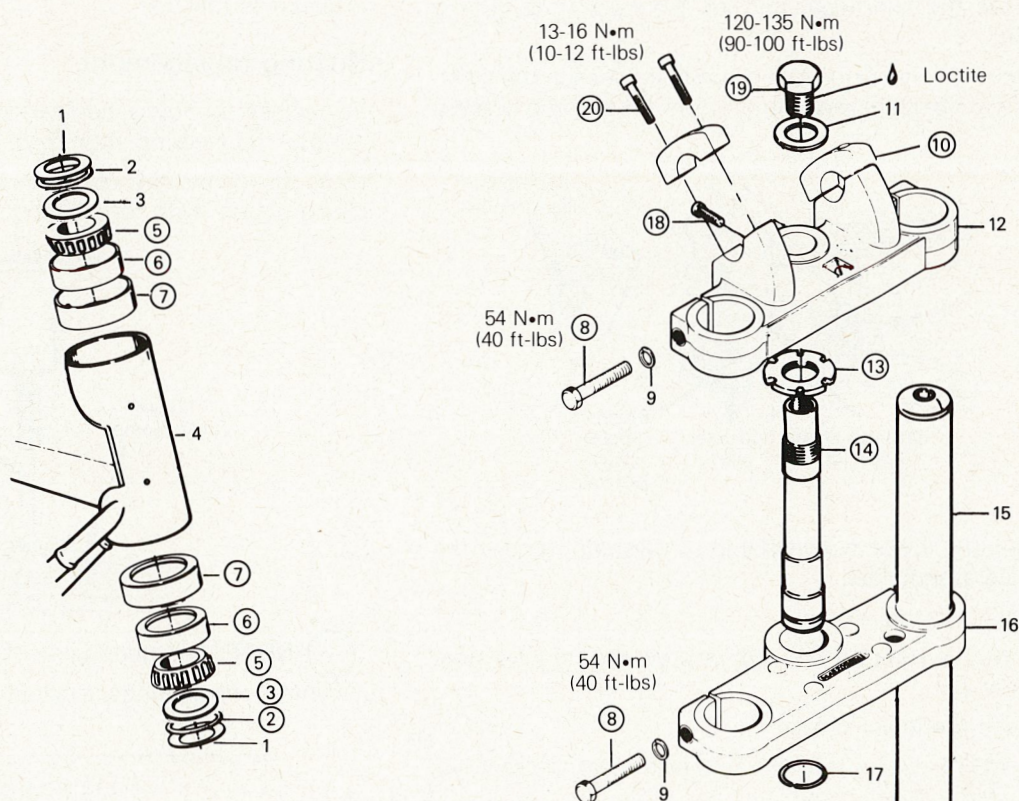


⑪ For removal without damage, use compressed air on one end of the handlebar while blocking off the air at the other end with your hand.



STEERING HEAD

Marzocchi type



1. Steering cover (2)
2. O'ring (2)
3. Thrust washer (2)
4. Frame
5. Conical bearing (2)
6. Bearing cup (2)
7. Steering cup (2)
8. Hex. screw M10 x 1.5 x 40 (4)
9. Lockwasher 10 (4)
10. Handlebar clamp top (2)
11. Steering stem cap screw washer
12. Top triple clamp*

13. Steering stem adjuster nut
14. Steering stem
15. Fork tube 38 mm*
16. Lower triple clamp*
17. Circlip
18. Allen screw M8 x 1.25 x 30
19. Steering stem cap screw
20. Allen screw M8 x 1.25 x 35 (4)

*On Qualifier 175-250 models:

Item 15: Fork tube 35 mm

Item 12 & 16: Upper and lower triple clamp
slightly different (35 mm)

SECTION 06 STEERING

SUB-SECTION 02 (STEERING HEAD)

REMOVAL

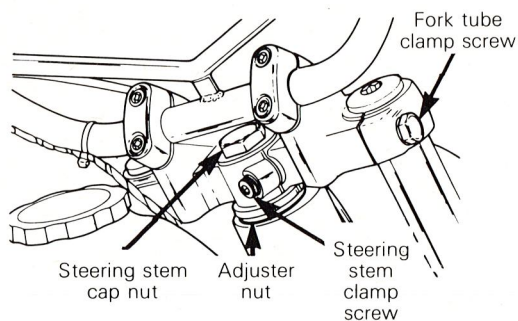
With the motorcycle mounted on a stand (front wheel raised), proceed as follows:

Remove the front number plate or the headlamp housing.

Remove the front wheel assembly.

Remove the handlebar and let it hang by the control cables.

Remove the steering stem cap nut and loosen the steering stem clamp screw and the fork tube clamp screws.



Loosen the lower crown clamp screws and remove the fork leg assemblies.

Remove the top crown.

Remove the front fender and unscrew the steering stem adjuster nut.

Remove the lower crown.

○ **NOTE:** Use a **rubber** hammer to help the removal of the lower crown.

DISASSEMBLY & ASSEMBLY

② At assembly, apply a small amount of lithium grease to the "O" rings.

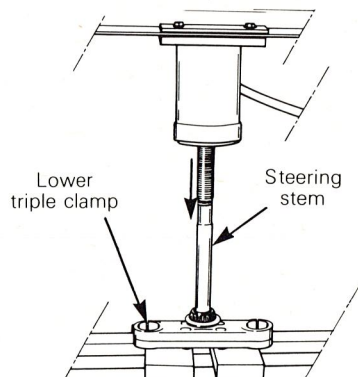
⑤⑥ ▼ **CAUTION:** If conical bearing replacement is needed, always replace both, bearing and bearing cup.

Proceed as follows:

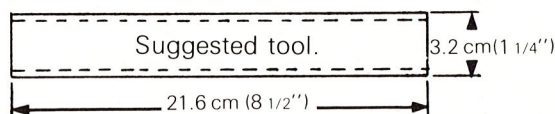
Bearing replacement

To replace the lower conical bearing it is necessary to remove the steering stem from the lower triple clamp.

Place the lower triple clamp on a press and drift out the steering stem with the bearing.

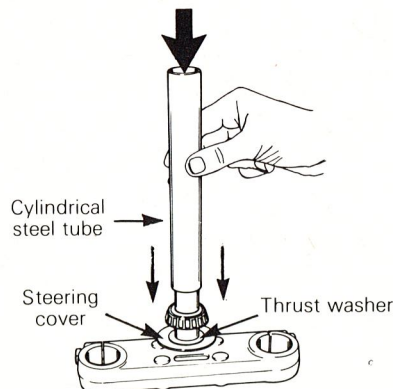


○ **NOTE:** For steering stem reassembly refer to ⑭
To install the bearings, a cylindrical steel tube is needed:



Material: cylindrical steel tube 1 1/4" dia. - 14 gauge.
(26.8 mm (1.055") I.D., 2.43 mm (.096") wall).

Place the steering cover, the thrust washer and, using a press or a hammer, install the bearing.



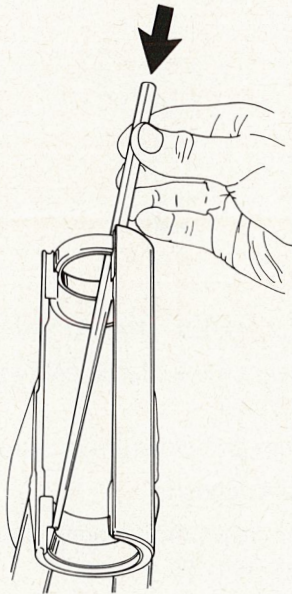
SECTION 06 STEERING

SUB-SECTION 02 (STEERING HEAD)

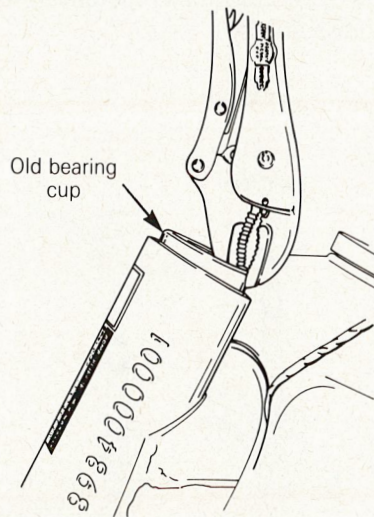
CAUTION: Apply pressure only to the bearing inner race otherwise damage may occur to the rollers and to the bearing cage.

Bearing cup replacement

Use a hammer and a punch to remove the bearing cup.



At installation press the new bearing cup into the steering cup. To completely seat the bearing cup use the old bearing cup as a pusher. After installation the old bearing cup can be removed using a vise grip.



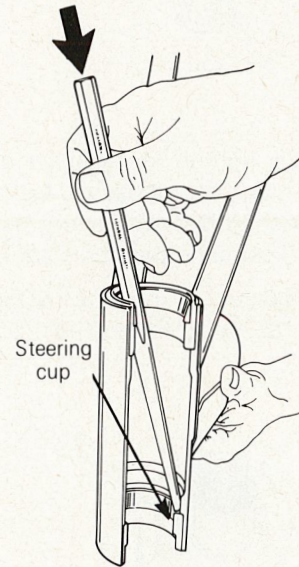
CAUTION: Ensure that the bearing cup is well seated into the steering cup.

⑦ To replace the steering head cups proceed as follows:

Remove the complete fork assembly.

Remove the gas tank.

Use a hammer and a punch to remove the damaged cups.

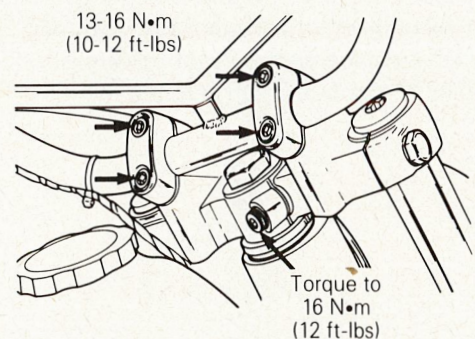


CAUTION: Take care not to damage the frame portion of the steering head.

Use a press to fit new cups into place.

⑧ At assembly torque to 54 N•m (40 ft-lbs).

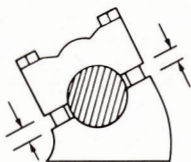
⑩⑪⑫ At assembly torque to the following values.



SECTION 06 STEERING

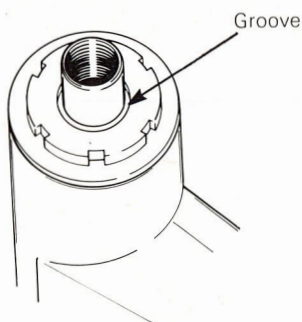
SUB-SECTION 02 (STEERING HEAD)

▼ **CAUTION:** Tighten the screws equally and ensure there is an equal gap on each side of the clamps.

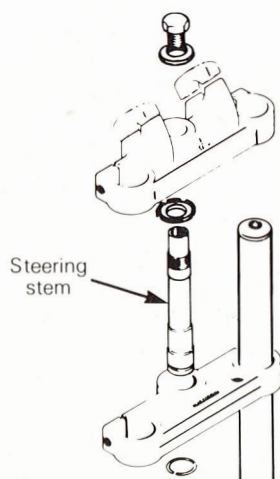


⑬ At assembly, fully tighten the adjuster nut to completely seat the bearings, then loosen 1/4 of turn and re-tighten until the steering becomes snug, but not tight. Refer to steering adjustment and verification.

○ **NOTE:** The adjuster nut must be installed with the grooved side facing the upper triple clamp.

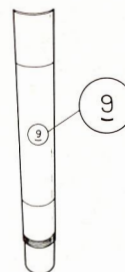


⑭ All the MX-5 and Qualifier 175-250-370 models feature a steering head with conical bearings set up. The steering stem, being of different heat treatment, cannot be used as a replacement part for the previous Can-Am MX-4 250-370 and MX-3 250 steering stem.



▼ **CAUTION:** The difference in heat treatment between the two types of steering stem do not allow any exchange possibility.

The conical bearings type is identified with a number "9" stamped in the center portion.



If replacement is needed, proceed as follows:

The steering stem on the Marzocchi type is press fitted into the lower crown.

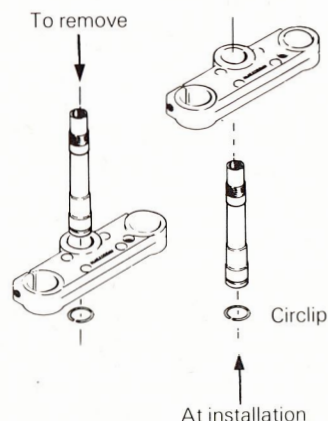
Remove the stem and crown from the steering head.

Remove the front fender.

Install the lower crown onto a press and drift the steering stem out and remove the circlip.

To re-install a new steering stem inverse the removal procedure, ensure to fit the circlip prior to final press in. Apply a light coat of grease on the area to be press fitted.

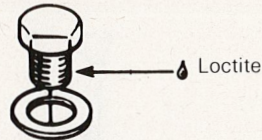
▼ **CAUTION:** Prior to the removal or installation of the steering stem, always ensure that the fork crown is properly supported and aligned perfectly with the stem. Clean any material that could have been pressed out.



SECTION 06 STEERING

SUB-SECTION 02 (STEERING HEAD)

①⁹ At assembly, apply Loctite no. 242 blue (medium strength) on the cap screw threads and torque to 120-135 N•m (90-100 ft-lbs).



CLEANING AND INSPECTION

Clean all parts carefully with a general purpose solvent.

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

Inspect the bearing cups and the bearings.

Inspect "O" rings. If damaged replace.

Inspect the thrust washers. If damaged, replace.

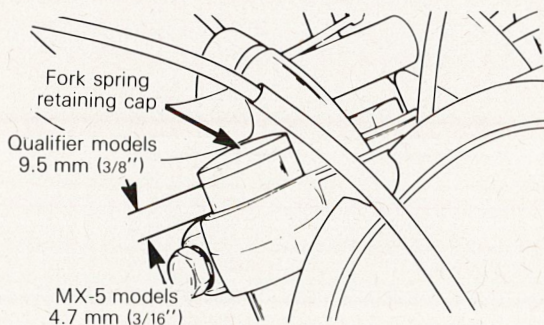
Inspect the steering cups. If damaged, replace.

INSTALLATION

Lubricate both conical bearings, bearing cups and "O" rings with lithium grease.

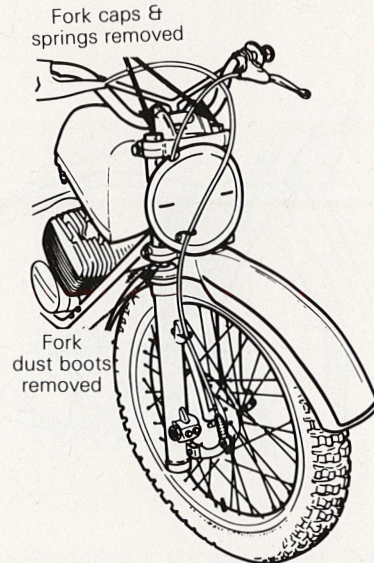
Position the lower crown and stem with the covers, the thrust washers and the bearings in place and fully tighten the steering stem adjuster nut to completely seat the bearings then loosen 1/4 of turn and retighten the steering stem adjuster nut until the steering becomes snug, but not tight. Refer to "steering adjustment and verification".

Replace handlebar/top crown and stem nut or screw, slide both fork leg assemblies in position and adjust the fork tubes with the specified distance protruding over the upper crown, tighten the fork crown clamp screws.



To obtain a very accurate fork tube adjustment, proceed as follows:

Remove the fork spring retaining caps and fork springs. Fully compress the front suspension and check if there is clearance between the front fender and the front wheel.



To set, loosen the top and bottom crown clamp screws, afterwards, retorque to 47-54 N•m (35-40 ft-lbs).

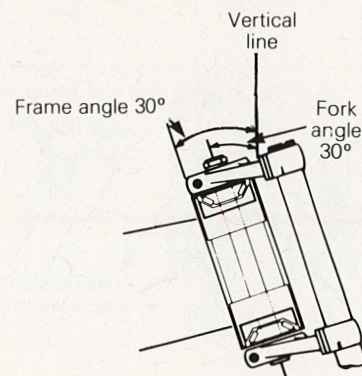
Install the front number plate or headlamp housing.

Apply Loctite 242 blue (medium strength) on the cap screw threads and torque to 120-135 N•m (90-100 ft-lbs).

FORK ANGLE

The standard frame angle is 30°.

The standard fork angle is 30° and provides the optimum steering and handling for most types of riding.

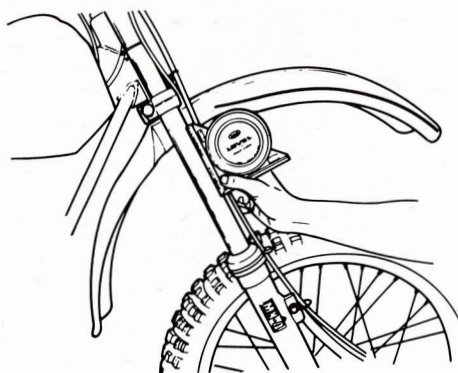


SECTION 06 STEERING

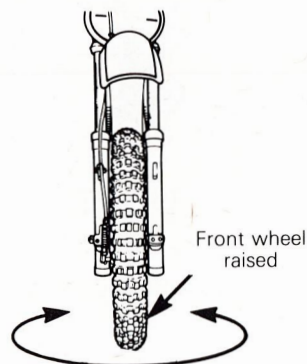
SUB-SECTION 02 (STEERING HEAD)

- **NOTE:** With the conical bearings set up, the fork angle is not adjustable. However, if an adjustable fork angle is needed it is possible to install the complete adjustable steering head from the previous Can-Am models. (Refer to the Can-Am MX-4 Shop manual).

For more accuracy, it is possible to use an angle finder tool to check the fork angle.



Check by turning steering from one side to the other for any flat spot or uneven tension. If any is noticed the steering head must be taken apart and checked.



Also, the steering head must be checked, if any radial play is noticed. To check, proceed as illustrated:

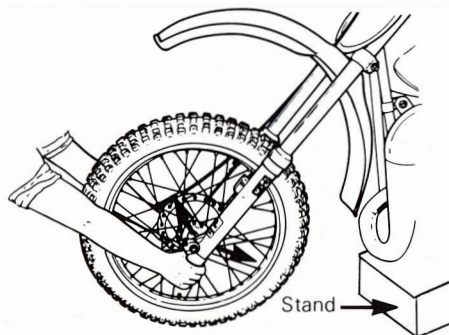
- **NOTE:** The fork angle can be altered by all kinds of factors, i.e. rear spring preload, fork spring, tire size/inflation, shock length, etc.

STEERING VERIFICATION AND ADJUSTMENT

Lift the front wheel off the ground using the center stand or a box under the motorcycle.

Loosen the stem cap nut and the screws retaining the upper crown.

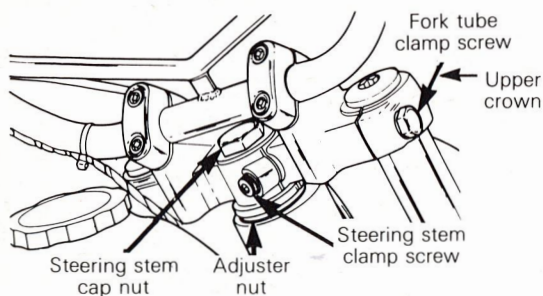
Tighten the adjuster nut until steering becomes snug, but not tight.



Tap upper crown down against adjuster nut then apply Loctite no. 242 blue (medium strength) adhesive sealant on the cap nut threads and torque to 120-135 N•m (90-100 ft-lbs).

Torque the steering stem clamp screw to 34 N•m (25 ft-lbs).

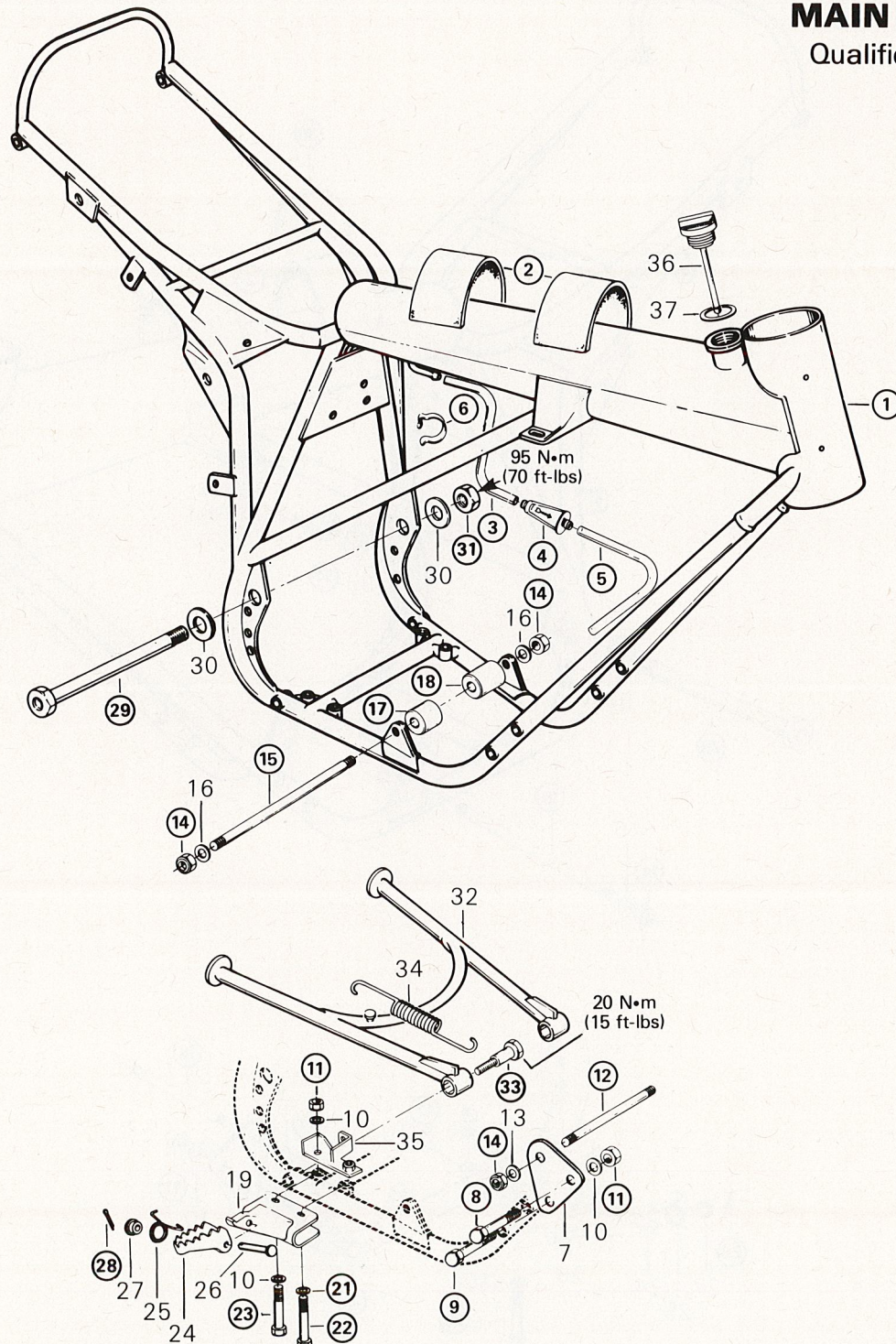
Torque the fork tube clamp screws to: 54 N•m (40 ft-lbs).



FRAME

MAIN FRAME

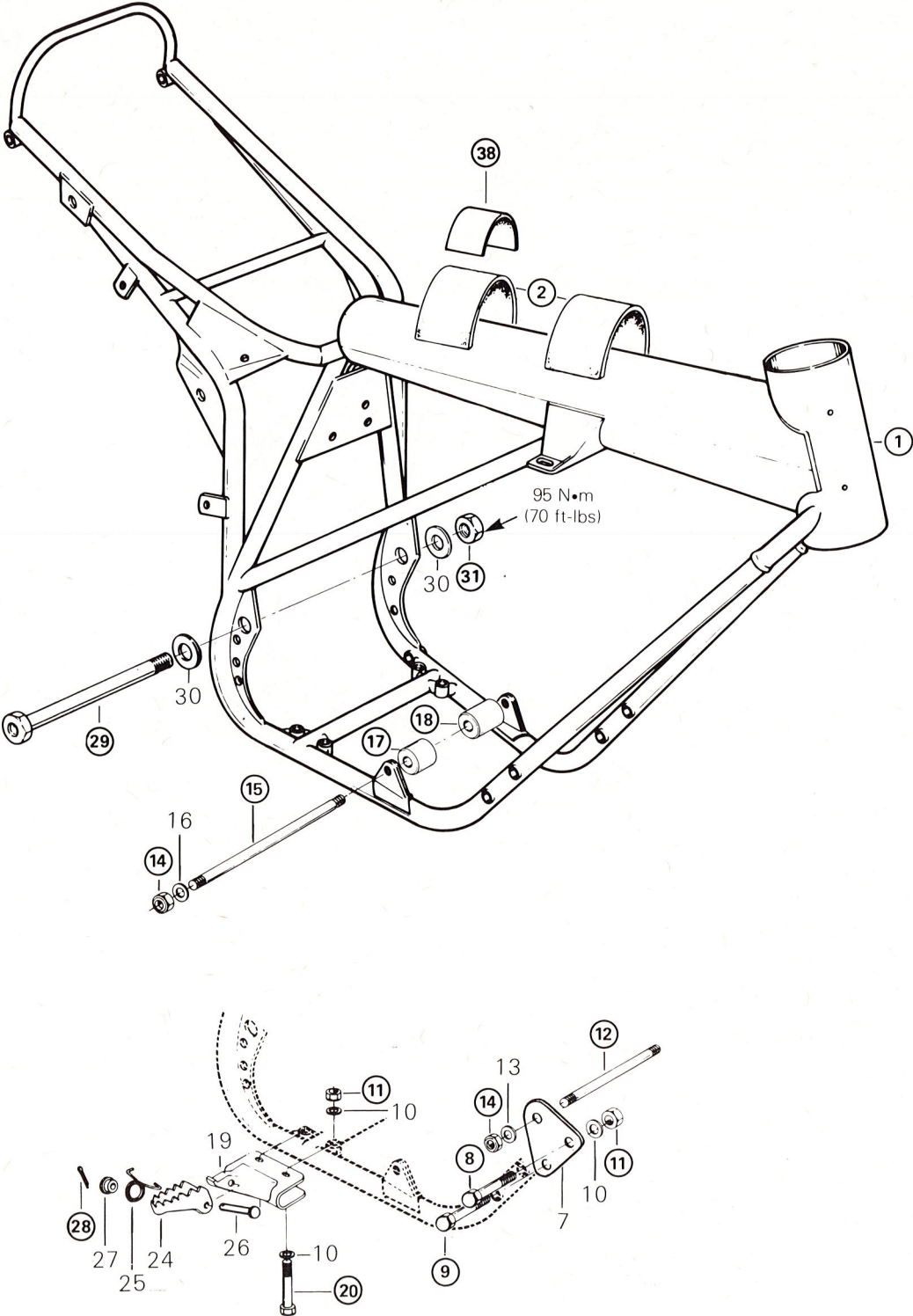
Qualifier models



SECTION 07 CHASSIS
SUB-SECTION 01 (FRAME)

MAIN FRAME

MX-5 models



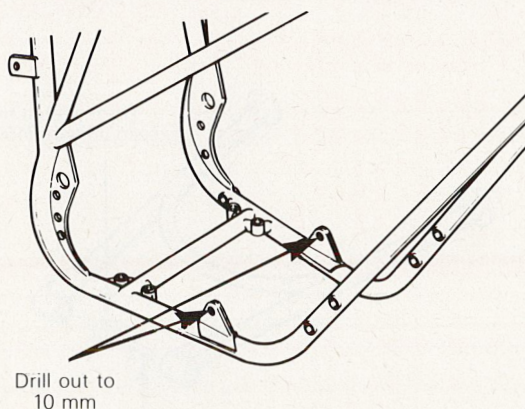
SECTION 07 CHASSIS

SUB-SECTION 01 (FRAME)

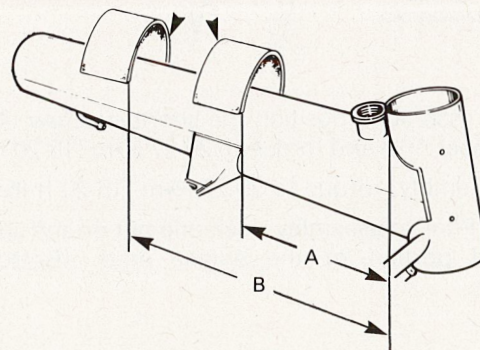
1. Frame
2. Rubber pad (2)
3. Oil line (Qualifier 175-250)
4. Oil filter (Qualifier 175-250)
5. Oil line (Qualifier 175-250)
6. Clip (Qualifier 175-250)
7. Front engine mount (2)
175-250 models: 8 mm
370 models: 10 mm
8. Hex. cap screw M8 x 1.25 x 45 (2)
9. Hex. cap screw M8 x 1.25 x 50 (2)
10. Flat washer 8.4 x 17 x 1.6
quantity: Qualifier 8
MX-5 12
11. Hex. elastic stop nut M8 x 1.25
quantity: Qualifier 6
MX-5 8
12. Front engine stud
175-250 models 8 mm
370 models 10 mm
13. Washer (2)
14. Hex. elastic stop nut (4)
175-250 models M8 x 1.25
370 models M10 x 1.5
15. Lower engine stud
175-250 models 8 mm
370 models 10 mm
16. Flat washer (2)
175-250 models 8.4 x 17 x 1.6
370 models 10 x 24 x 2.5
17. Spacer R.H.
175-250 models 8 mm
370 models 10 mm
18. Spacer L.H.
175-250 models 8 mm
370 models 10 mm
19. Foot peg (2)
20. Hex. cap screw M8 x 1.25 x 40 (4)
21. Lockwasher 8 (2)
22. Hex. cap screw M8 x 1.25 x 40 (2)
23. Hex. cap screw M8 x 1.25 x 45 (2)
24. Foot rest (2)
25. Spring (2)
26. Clevis pin (2)
27. Spacer (2)
28. Cotter pin (2)
29. Swing arm bolt
30. Flat washer (2)
31. Hexagonal nut
32. Center stand
33. Pivot shaft (2)
34. Center stand spring
35. Center stand stop (2)
36. Oil tank cap (Qualifier 175-250)
37. Gasket (Qualifier 175-250)
38. Rubber pad

DISASSEMBLY AND ASSEMBLY

① On the Qualifier 370 and MX-5 370 models, **replacement** frames have to be modified to accept the lower engine stud. The 8 mm lower engine stud holes must be drilled out to 10 mm.



② At assembly, position the rubber pads at the specified distance (approximately) away from the steering head.



distance "A" Qualifier models
8.9 cm (3 1/2")
MX-5 models
6.3 cm (2 1/2")

distance "B" Qualifier & MX-5 models
24.5 cm (10")

SECTION 07 CHASSIS

SUB-SECTION 01 (FRAME)

- ③ ⑤ **CAUTION:** At assembly, ensure that the oil line connections are tight and leakproof.

Oil line length:

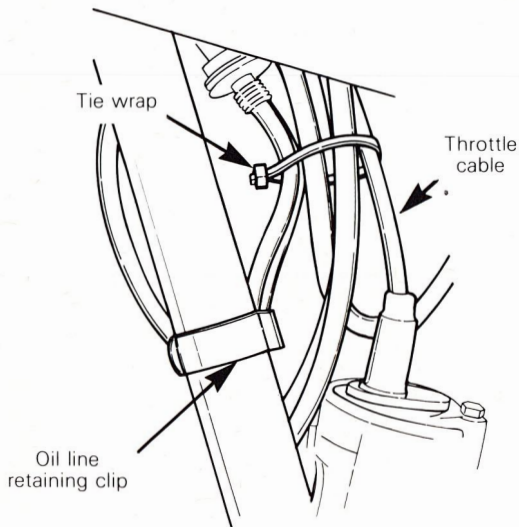
upper portion ③ : 15.2 cm (6'')

lower portion ⑤ : 36 cm (14'')

- ④ **CAUTION:** Ensure to position the filter in the proper flow direction, or engine damage may occur.



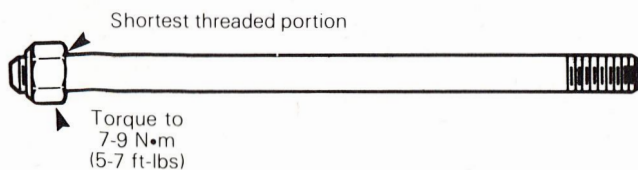
- ⑥ At assembly, secure the oil line to the frame using the clip.



- ⑧ ⑨ At assembly, position the shortest screw (45 mm) in the upper hole and torque to 20-27 N•m (15-20 ft-lbs).

- ⑪ At assembly, torque to 20-27 N•m (15-20 ft-lbs).

- ⑫ ⑭ ⑮ Prior to assembly, lock one nut on the shortest threaded portion of the engine stud. (Bottom of threads).

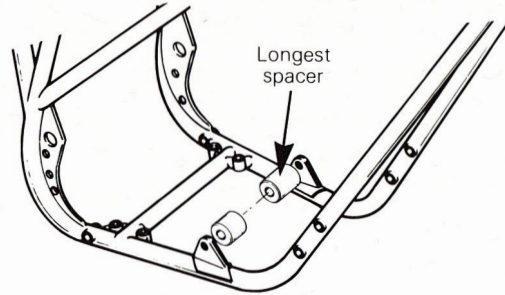


After the engine is installed, torque the other retaining nut to:

175-250 models: 20-27 N•m (15-20 ft-lbs)

370 models: 50-54 N•m (37-40 ft-lbs)

- ⑰ ⑱ At assembly, position the longest spacer at the left (clutch side).



- ⑳ At assembly torque to 20-27 N•m (15-20 ft-lbs).

- ㉑ At assembly, ensure to place the lockwasher at the front foot peg retaining screw ㉒ .

- ㉒ ㉓ At assembly always place the shortest screw (40 mm) at the front and torque to 20-27 N•m (15-20 ft-lbs).

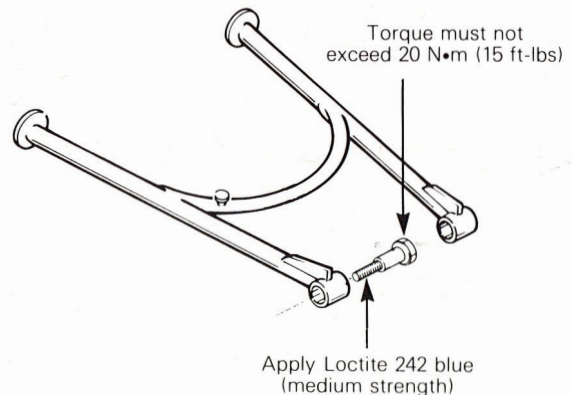
- ㉔ **WARNING:** Ensure to install a new cotter pin every time the footrest is disassembled.

- ㉙ ㉚ At assembly, (after engine is installed) torque to 88-100 N•m (65-75 ft-lbs).

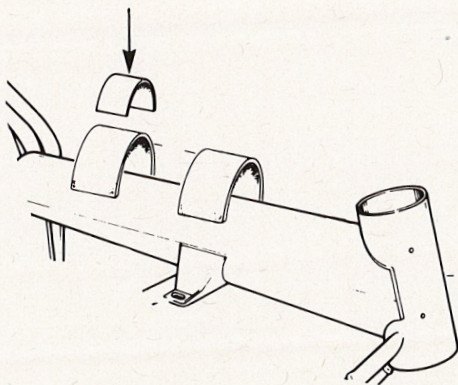
- **NOTE:** Swing arm must be slip tight between R.H. & L.H. side plate of the frame (see suspension section).

- ㉛ If the center stand bolts are removed, Loctite 242 blue (medium strength) must be applied on the threads when reinstalling the bolts, then torque the bolts to 20 N•m (15 ft-lbs).

- ▼ **CAUTION:** To avoid stripping the bolt threads, do not exceed 20 N•m (15 ft-lbs) of torque.



③⑧ On the MX-5 models it is necessary to install a small extra rubber pad at the rear.



ELECTRICAL WELDING RECOMMENDATIONS

The suggested welding rod is steel rod E 7014 and it is recommended to pre-heat and post-heat when welding.

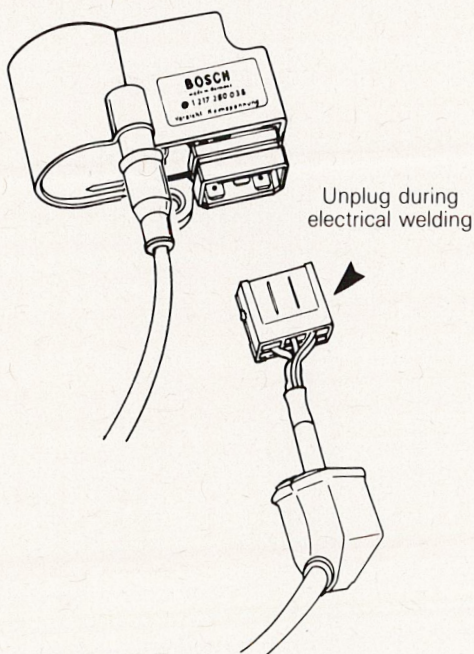
○ **NOTE:** Frame material is chromemoly 4130.

INSPECTION AND MAINTENANCE

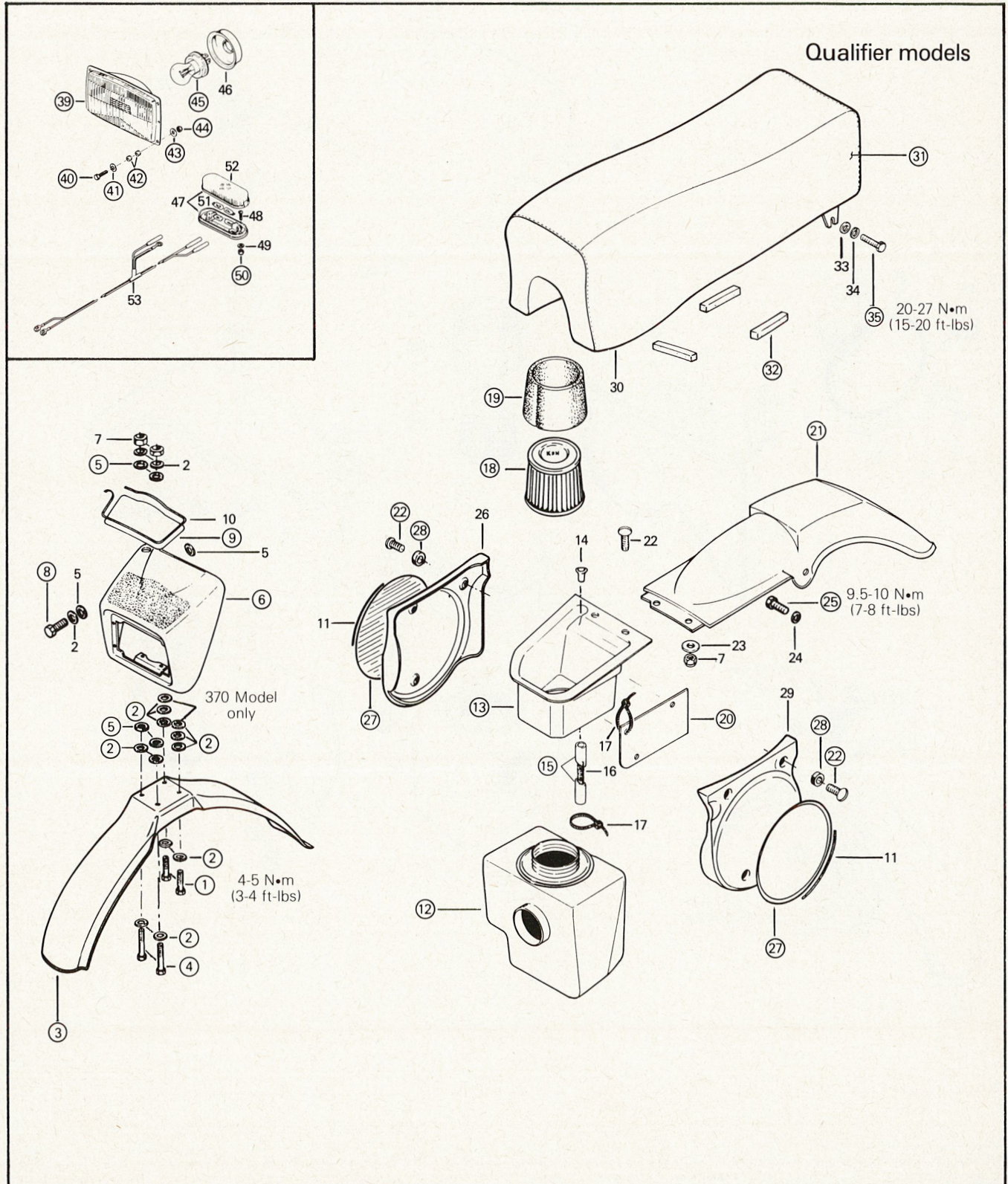
Carefully inspect the frame and the welding for damage or cracks. Repair as necessary.

If electrical welding is to be performed anywhere on the motorcycle, ensure to unplug the multiple connector at the electronic box prior to connecting the welding wire to the bike. This will protect the electronic box against damage caused by flowing current when welding.

○ **NOTE:** This procedure applies to all electronic ignition systems.



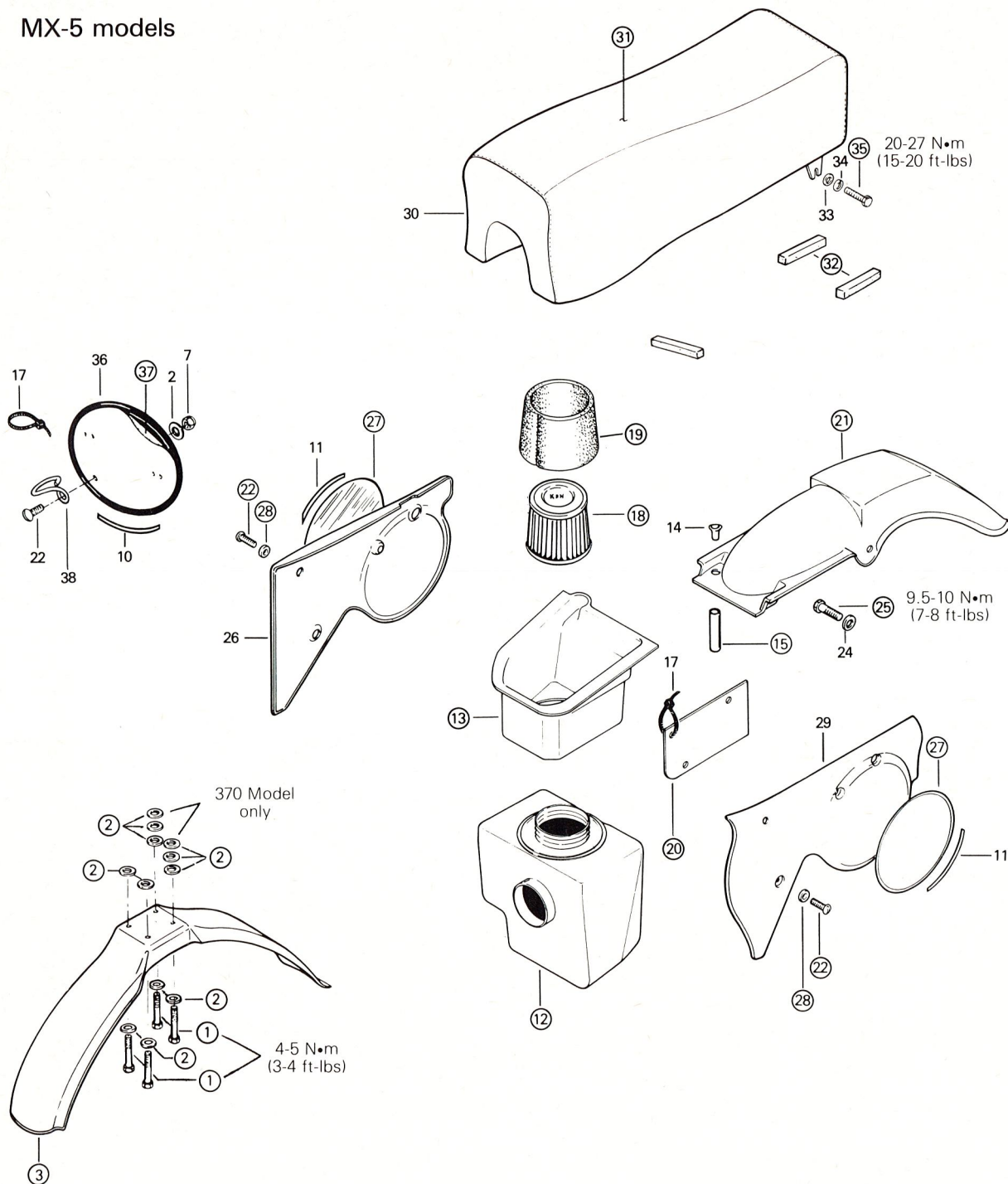
BODY



SECTION 07 CHASSIS

SUB-SECTION 02 (BODY)

MX-5 models

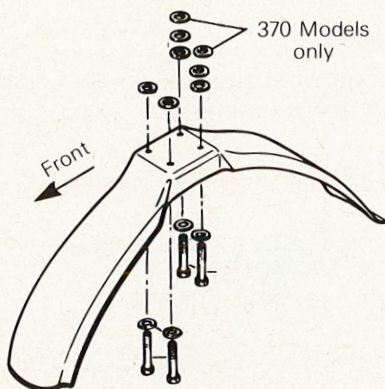


SECTION 07 CHASSIS SUB-SECTION 02 (BODY)

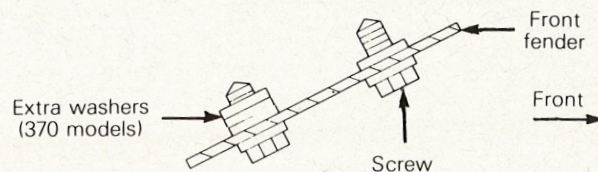
- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Hex. head cap screw M6 x 1.00 x 25
Qualifier models 2
MX-5 models 4 2. Flat washer 6 x 20 x 2
Quantity: Qualifier 175/250 14
370 16
MX-5 250 11
370 13 3. Front fender 4. Hex. head cap screw M6 x 1.00 x 60 (2) 5. Rubber washer (8) 6. Headlamp housing 7. Hex. elastic stop nut M6 x 1.00
Qualifier models 4
MX-5 models 1 8. Hex. head cap screw M6 x 1.00 x 20 (2) 9. Decal (1) 10. Stripe 11. Stripe 12. Air box 13. Bucket 14. Insert 15. Drain tube 16. Spring 17. Tie wrap (as required) 18. Air filter 19. Air filter envelope 20. Heat insulator 21. Rear fender 22. Machine screw (truss head slotted) M6 x 1.00 x 15
Qualifier 8
MX-5 7 | <ol style="list-style-type: none"> 23. Flat washer 6 x 20 x 1 (2) 24. Flat washer 8 x 25 x 1.5 (2) 25. Hex. head cap screw M8 x 1.25 x 12 (2) 26. Side panel R.H. 27. Decal 28. Rubber washer (6) 29. Side panel L.H. 30. Seat 31. Seat cover 32. Rubber strip 33. Flat washer 8.4 x 17 x 1.6 (2) 34. Lockwasher 8 35. Hex. head cap screw M8 x 1.25 x 20 (2) 36. Number plate 37. Decal 38. Cable guide 39. Headlamp 40. Hex. head cap screw M4 x 0.70 x 20 (4) 41. Flat washer 4 x 9 x 0.8 (4) 42. Grommet (8) 43. Flat washer 5/32 x 1/2 x 0.035 (4) 44. Hex. elastic stop nut M4 x 0.70 (4) 45. Bulb 60/60 W 46. Cover 47. Taillamp 48. Machine screw (pan head slotted) M5 x 0.80 x 16 (2) 49. Flat washer 7/32 x 1/2 x 0.060 (2) 50. Hex. elastic stop nut M5 x 0.80 (2) 51. Bulb (2) 52. Lens 53. Wiring harness |
|--|--|

DISASSEMBLY AND ASSEMBLY

- ① At assembly, torque to 4-5 N•m (3-4 ft-lbs).
- ② At installation, position the washers as illustrated.



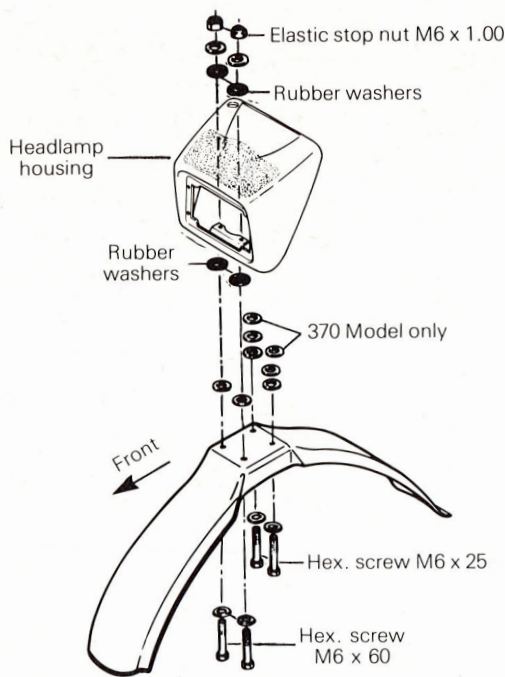
- CAUTION:** On the 370 models the two (2) extra washers must be placed at the rear to prevent the front fender from touching the exhaust pipe.



- ③ At installation, ensure that the front fender does not rub on the exhaust pipe.

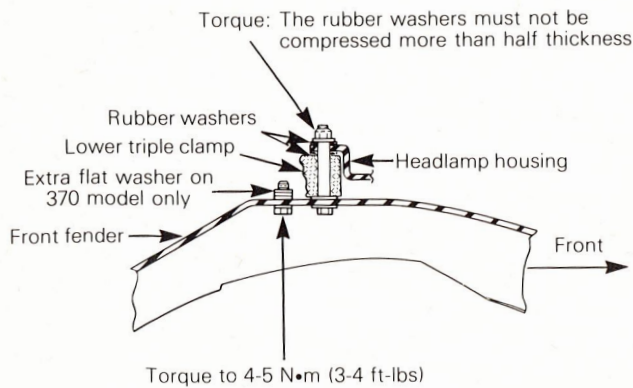
SECTION 07 CHASSIS
SUB-SECTION 02 (BODY)

④⑤ Install the front fender with the screws, washers and rubber washers positioned as illustrated. (Qualifier models).

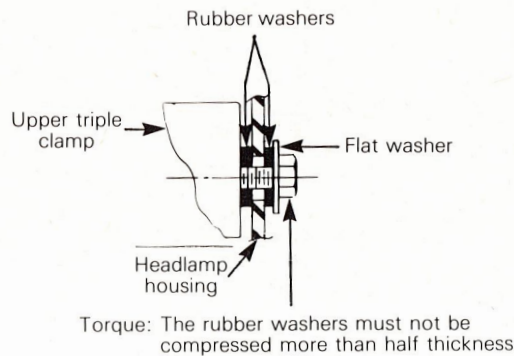


▼ **CAUTION:** On the 370 model to prevent the front fender from touching the exhaust pipe, the two (2) extra washers must be placed at the rear.

○ **NOTE:** The rubber washers must sit against the headlamp housing.



⑥⑧ At installation of the headlamp housing, place the screws, washers and rubber washers as illustrated:



⑨②⑦③⑦ Proceed as described to replace any decals: Remove the damaged decal and clean the surface with acetone, wood alcohol or equivalent.

◆ **WARNING:** Always perform procedures in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

Apply a solution of soapy water on the new decal. Position decal and pass a sponge over decal to remove air bubbles and excess water. Allow to dry.

⑫ To replace or remove the air box, the rear wheel must be removed.

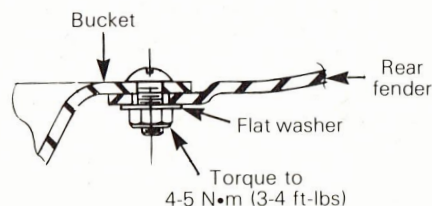
At installation, check that the large hose clamp securing the carburetor boot to the air box is not over-tightened. Over-tightening will cause the plastic flange to buckle. (Allowing dust, water, etc... to enter).



⑬ Proceed as follows to install the air filter bucket.

Qualifier models:

Secure the bucket to the rear fender using the screws, washers and hexagonal nut, as illustrated.

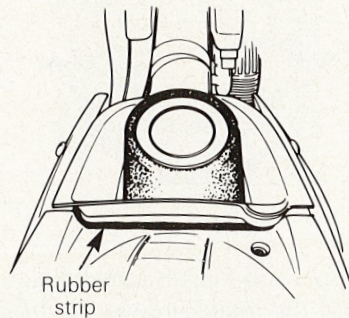


SECTION 07 CHASSIS

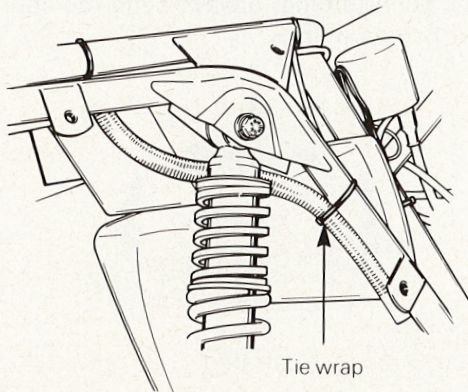
SUB-SECTION 02 (BODY)

MX-5 models:

Apply a rubber strip ③② on the rear fender front portion to properly seal the junction between the bucket and the rear fender then install the bucket.



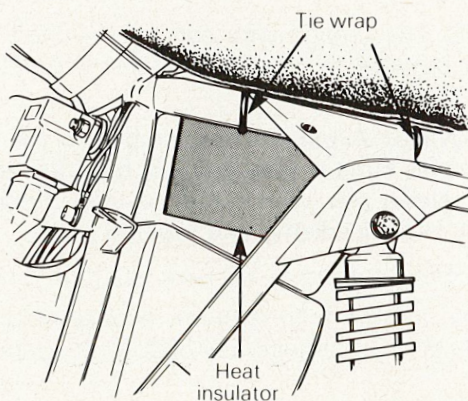
⑮ Secure the drain tube to the frame using a tie wrap but do not overtighten the tie wrap.



○ **NOTE:** The Qualifier models are equipped with a spring ⑮ inside the drain tube.

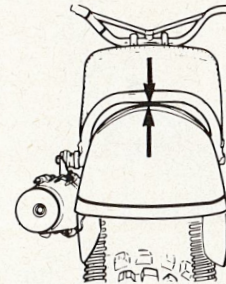
⑱⑲ Refer to "Air filter service".

⑳ **CAUTION:** To prevent any bucket deformation from exhaust pipe heat, always install the heat insulator as illustrated.



Secure to the frame using two tie wraps.

⑳ On the Can-Am motorcycles, the opening between the seat base and the rear fender is used as carburetion air intake. Therefore, to allow sufficient air intake breathing, ensure there is no obstruction in the area between the rear fender top portion and the seat base.



⑳⑳ At installation, the rubber washers must not be compressed more than half of the original thickness.

㉕ At installation, torque to 9.5-10 N•m (7-8 ft-lbs).

③① Proceed as follows to replace the seat cover:

Remove the seat.

Place the seat upside down on a clean surface and pry out all the retaining staples.

Remove the damaged cover.

Warm the new cover with a heat lamp so as to make the material supple.

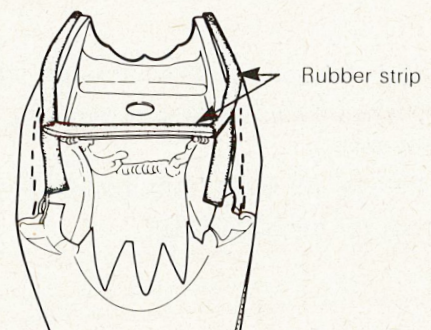
Fit the new cover over the seat and center it carefully.

Using contact cement or equivalent stick on the front and rear section then staple each side.

○ **NOTE:** While inserting the staples, compress the foam lightly by pushing on the bottom of the seat. This will stretch out the small wrinkles when releasing the tension on the foam.

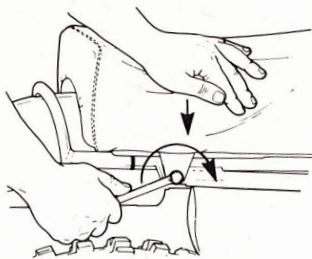
Apply new rubber strip on seat base.

③② Inspect the rubber strip for damage or bad adhesion and repair or replace as necessary.

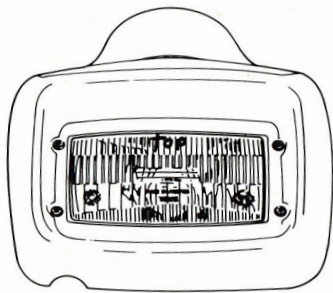


SECTION 07 CHASSIS
SUB-SECTION 02 (BODY)

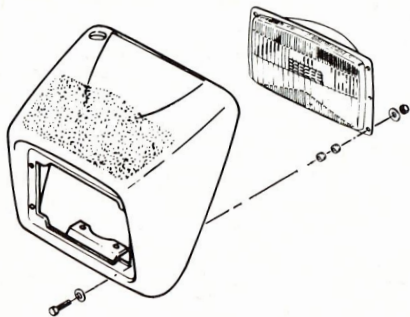
35 At installation, apply pressure to the seat while tightening it in place. This will slightly compress the rubber strip in position. Torque to 20-27 N•m (15-20 ft-lbs).



39 At assembly, refer to the word "top" (embossed in the glass) for proper headlamp position.



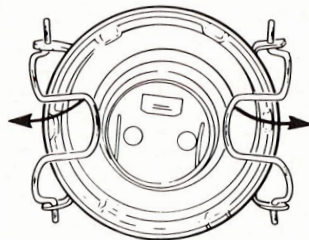
40 41 42 43 44 For proper assembly sequence, refer to the following illustration.



Torque: The grommets must not be compressed more than half thickness

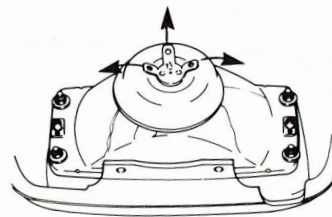
45 Proceed as follows to replace the light bulb:
Remove the headlamp housing by removing the four (4) retaining screws.
Unplug the two (2) wires from the headlamp.
(Three wires for the 370 model).

Remove the rubber boot and unfasten the two bulb retainer clips. Detach the bulb and replace.

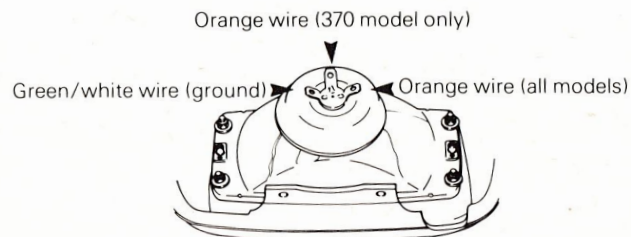


Inverse procedure to re-install. Making sure to align the index notch with the index groove on the headlamp.

CAUTION: To prevent any possibility for the headlamp bulb connectors from touching the frame when turning, always bend the connectors towards the outside.



Connect the wires as illustrated.



NOTE: The orange wire can be switched to the other terminal to correct a burned element situation.

WARNING: A burned headlamp bulb will create an excess current flow and will burn the taillamp bulb. Never ride with a burned bulb. Frequently check both headlamp and taillamp bulbs.

50 At assembly, torque to 1.3 N•m (10-12 in-lbs).

51 52 If the taillamp bulb is burnt, expose bulb by removing the lens. To remove, pry open with a screwdriver.

⑤ For complete wiring diagram, refer to section 03 Electrical, sub-section 01 (Electrical Charts).

For wiring harness installation refer to the appropriate illustrations in section 07 chassis sub-section 04 cable routing.

INSTALLATION

Headlamp beam adjustment

Qualifier models

The Qualifier meets the requirements of International Trials for off-road lighting only.

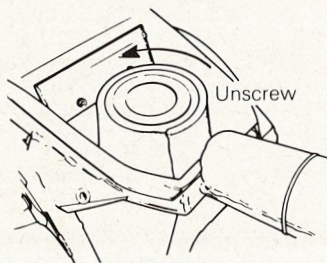
The angle of the headlamp beam has been factory adjusted and there is no possibility to change the basic adjustment.

◆ **WARNING:** The lighting system on this motorcycle is not street legal nor should it be utilized for night time riding. It is installed only to draw attention to the motorcycle while it is in operation on a given course.

AIR FILTER SERVICE

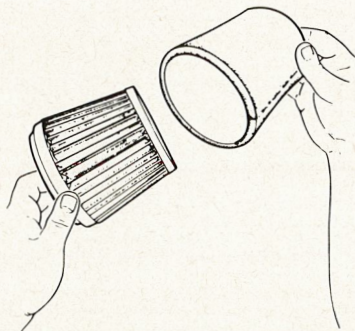
Remove the seat. Clean the area around the filter.

Remove the air filter.

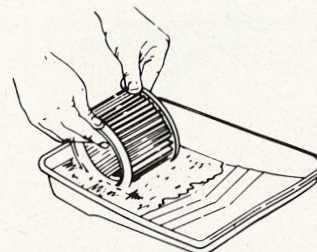


Do not allow dirt or dust to fall into the air box opening.

Remove the air filter sock from the air filter.

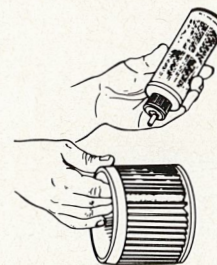


Clean the air filter and the air filter sock with air filter cleaner and degreaser or by rinsing thoroughly in cleaning solvent. Allow to air dry.



▼ **CAUTION:** Do not dry filter and filter sock with a high pressure air flow as they will loose efficiency.

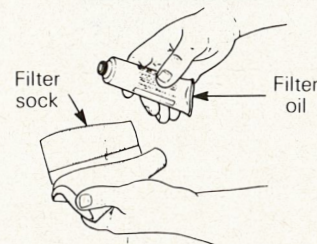
Generously apply "K & N" air filter oil into each pleat of the air filter.



○ **NOTE:** The "K & N" air filter oil is available from your dealer and is specially formulated for these filters. However, it is possible to use SAE 30 motor oil.

▼ **CAUTION:** White patches in the element indicate under oiling. Retouch if necessary.

Pour filter compound onto the air filter sock and work it well into the foam until it is completely saturated.



○ **NOTE:** "K & N" air filter oil can also be used.

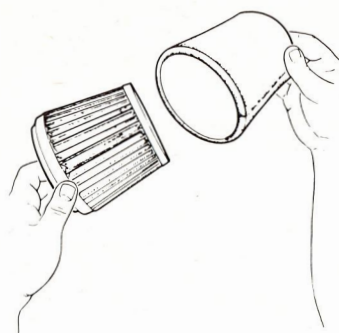
SECTION 07 CHASSIS

SUB-SECTION 02 (BODY)

Gently squeeze out excess oil.



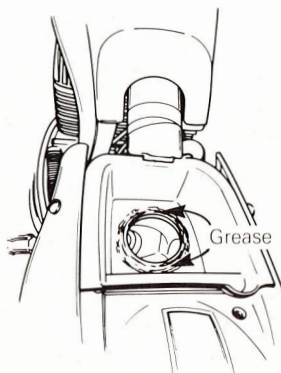
Fit the sock over the filter.



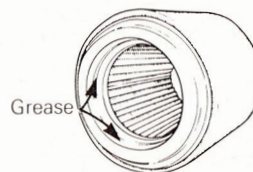
Clean the air filter pan thoroughly.

Inspect the interior of the air box. If dirt has entered, remedy the cause before re-assembly.

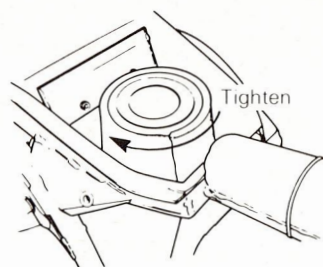
Generously grease the top of the pan around the air box opening.



Grease the bottom edge of the air filter and install it.

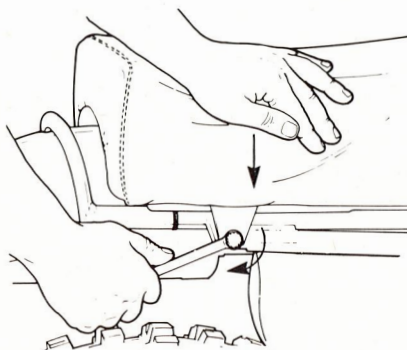


CAUTION: Ensure that the filter is well secured in place.

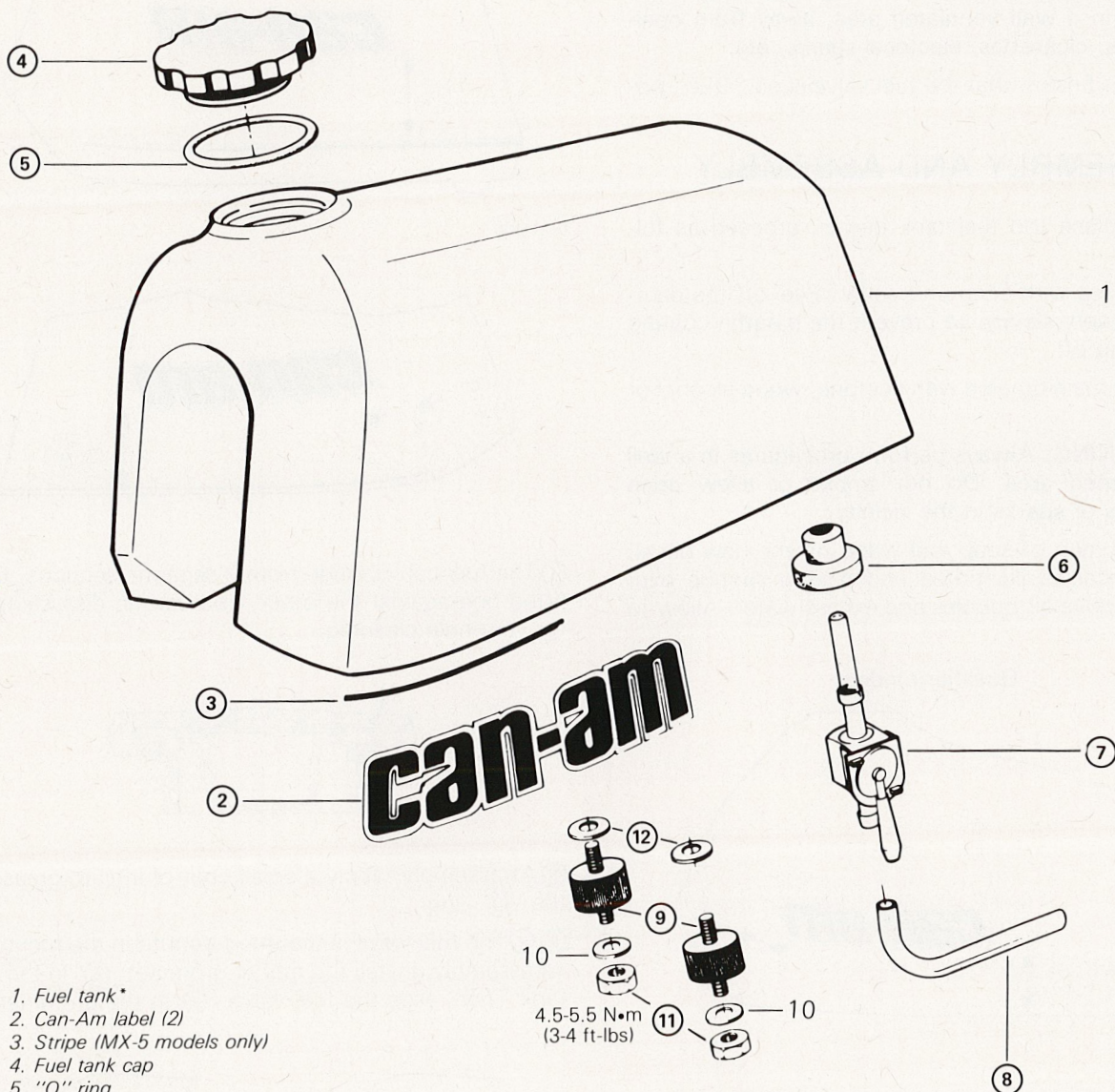


CAUTION: A dry or dirty filter will cause extreme piston and cylinder damage. Service filter monthly, weekly, daily, or hourly, as conditions dictate.

At installation, apply pressure to the seat while tightening it in place. This will slightly compress the rubber strip into position.



FUEL TANK



1. Fuel tank*
2. Can-Am label (2)
3. Stripe (MX-5 models only)
4. Fuel tank cap
5. "O" ring
6. Grommet
7. Valve
8. Fuel line
9. Rubber mount (2)
10. Washer 6 x 20 x 2 (2)
11. Hexagonal nut 6 x 1.00 (2)
12. Rubber spacer (2)

*Fuel tank capacities:

Qualifier models: 9.95 L, 2.62 U.S. gals, 2.19 Imp. gals

MX-5 models: 7.7 L, 2.0 U.S. gals, 1.7 Imp. gals

SECTION 07 CHASSIS

SUB-SECTION 03 (FUEL TANK)

REMOVAL

Remove the seat and unscrew the two fuel tank retaining nuts.

Disconnect the fuel line from carburetor.

◆ **WARNING:** Gasoline is flammable and explosive under certain conditions. Always use caution and work in a well ventilated area, away from open flames, cigarettes, electrical sparks, etc.

○ **NOTE:** Ensure that the fuel valve is on "OFF" position.

DISASSEMBLY AND ASSEMBLY

②③ To replace the fuel tank decals, proceed as follows:

Clean the area with soap and water. Peel off the damaged decal very slowly, to prevent the paraffin coating from coming off.

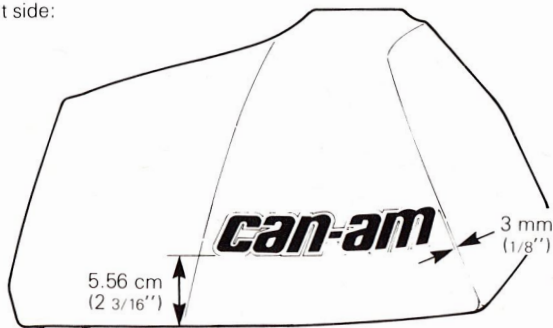
Clean the remaining glue with acetone, wood alcohol or equivalent.

◆ **WARNING:** Always perform procedures in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

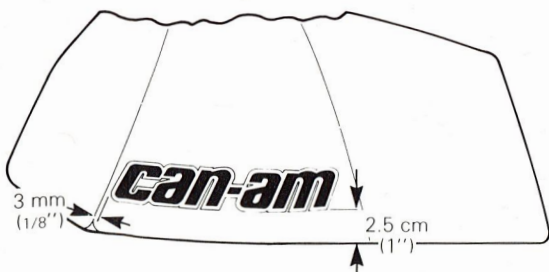
Apply a solution of soap and water on the new decal. Position decal as illustrated and pass a sponge over decal to remove air bubbles and excess water. Allow to dry.

Qualifier models

Right side:

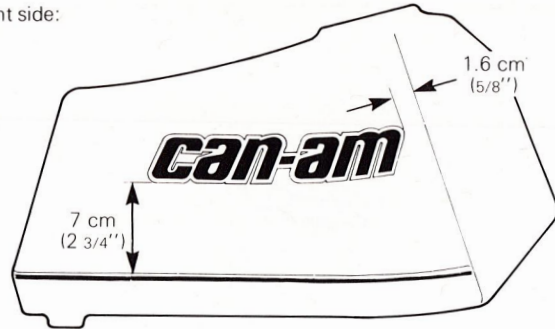


Left side:



MX-5 models

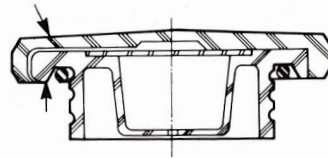
Right side:



Left side:

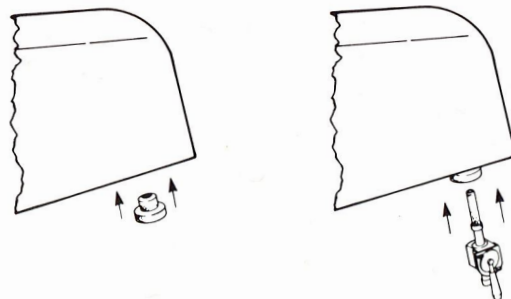


④ The fuel cap is made from 2 separate sections, tight fitted one against the other, and can be disassembled for vent hole cleaning.



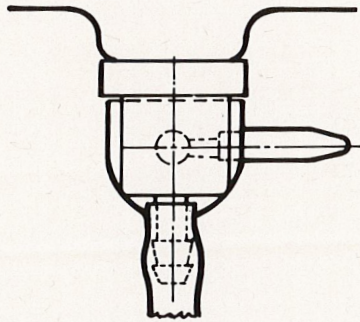
⑤ At assembly, apply a small coat of lithium grease to the "O" ring.

⑥⑦ The fuel valve is mounted tight fit in the fuel tank. At assembly, install the rubber grommet ⑥ in the fuel tank. Then, slide the fuel valve ⑦ in the grommet.

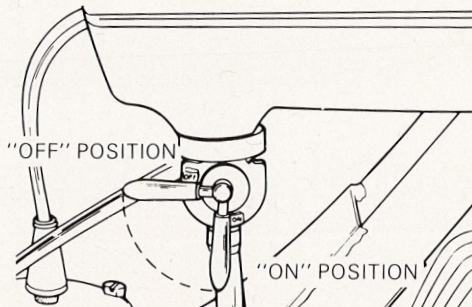


○ **NOTE:** It is possible to slightly grease the fuel valve to ease the installation.

For better protection, it is recommended to rotate the valve to the inside, as illustrated.



○ **NOTE:** The fuel valve controls the fuel flow as indicated by the lever pointer.

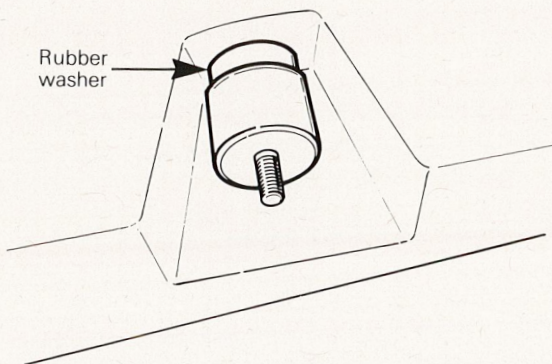


⑧ Fuel line length:

175-250 models: 25.4 cm (10")

370 models: 17.8 cm (7")

⑨ ⑫ At assembly, ensure to place the rubber washer between the fuel tank and the rubber mount.



⑪ At assembly torque to 4.5-5.5 N•m (3-4 ft-lbs).

CLEANING AND INSPECTION

Clean the fuel tank with a solution of soapy water and rinse thoroughly.

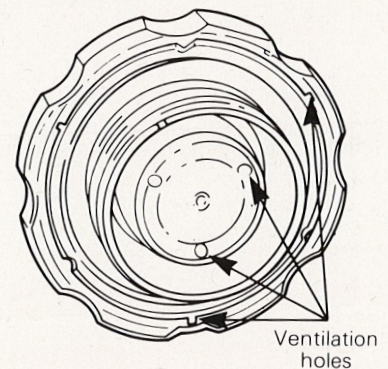
Inspect the rubber mounts. Replace if damaged.

Inspect the fuel line for leaks or cracks.

Inspect for any sediment in fuel tank. Flush, if necessary.

Inspect the fuel cap.

▼ **CAUTION:** Under severe riding conditions, the ventilation holes of the fuel cap may become obstructed by hardened mud, ice, frost, etc... Periodic inspection is strongly recommended and if necessary, cleaning of the ventilation holes.



INSTALLATION

Slip the fuel tank over the frame, insert both rubber mount studs into the frame brackets then torque the retaining nuts to 4.5-5.5 N•m (3-4 ft-lbs).

▼ **CAUTION:** Ensure that the fuel tank retaining brackets do not rub on the fuel tank.

Connect the fuel line to the carburetor.

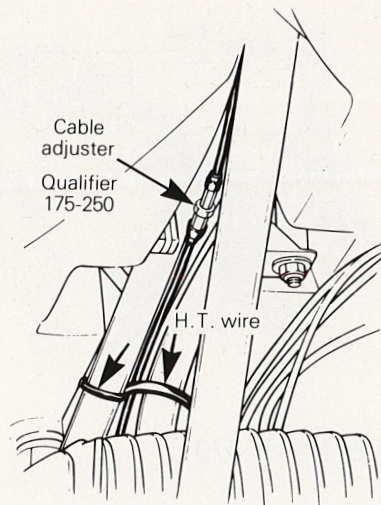
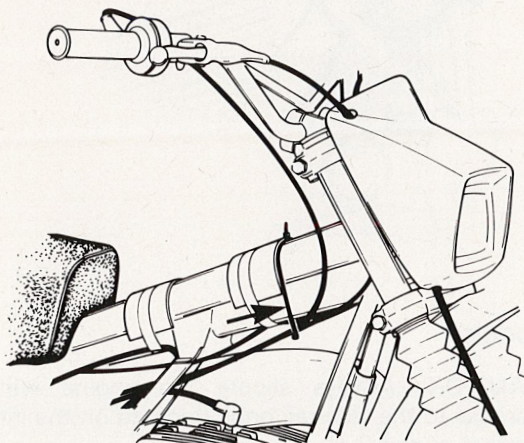
CABLE ROUTING

GENERAL VIEW

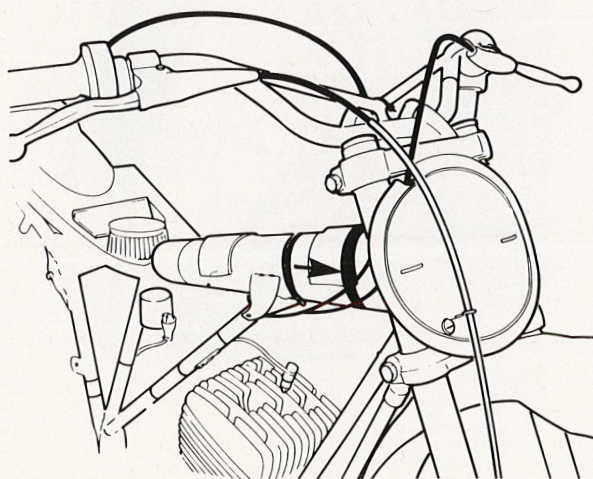
○ NOTE: The tie wraps are indicated by arrows.

All models

Qualifier models



MX-5 models



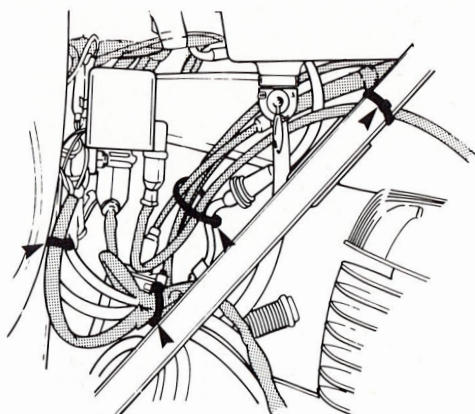
SECTION 07 CHASSIS

SUB-SECTION 04 (CABLE ROUTING)

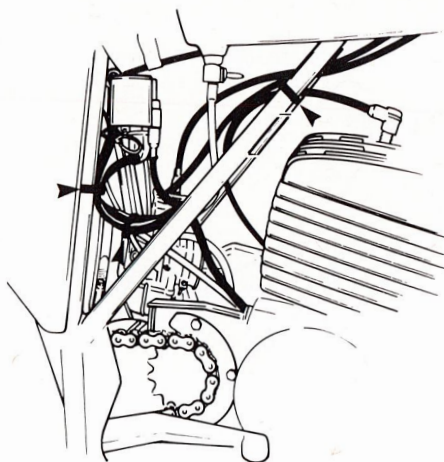
SIDE VIEW

○ NOTE: The tie wraps are indicated by arrows.

Qualifier 175-250



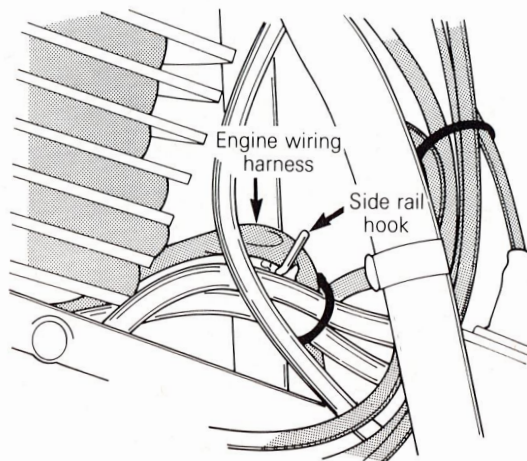
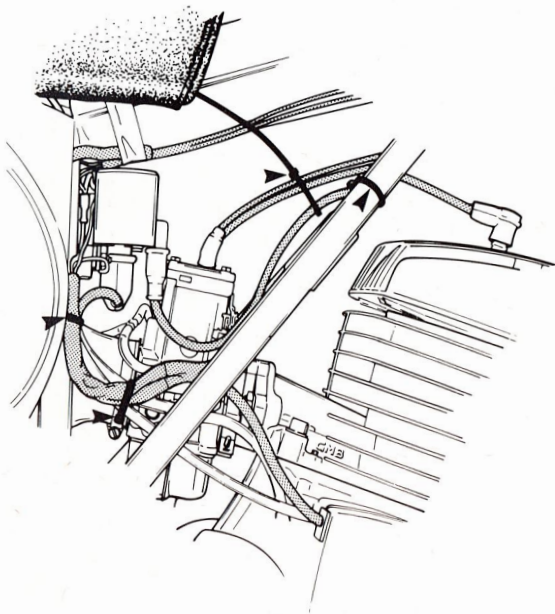
MX-5 250



Qualifier & MX-5 370

All models

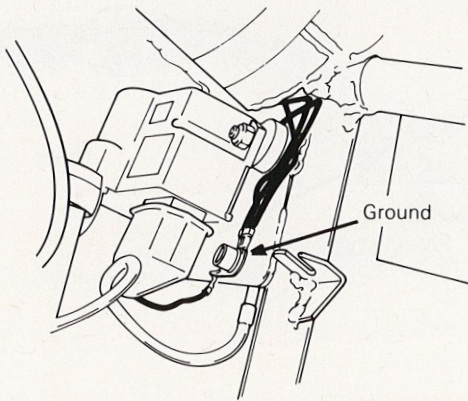
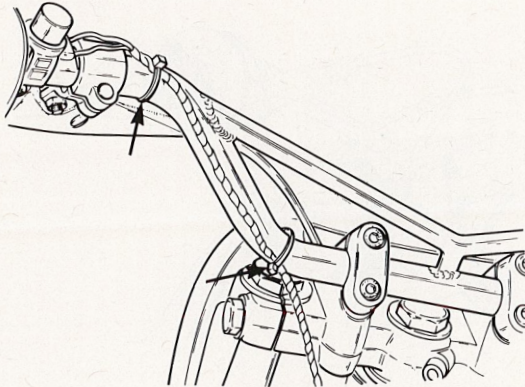
▼ CAUTION: Always secure the engine wiring harness to the side rail hook (located on the inner portion of the R.H. side rail).



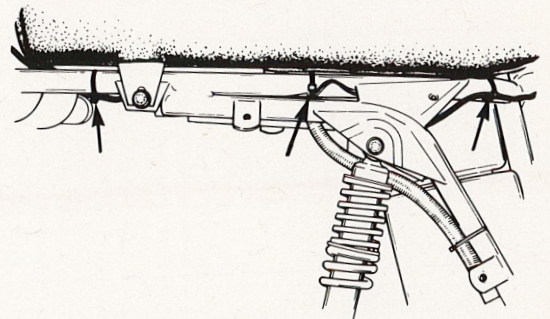
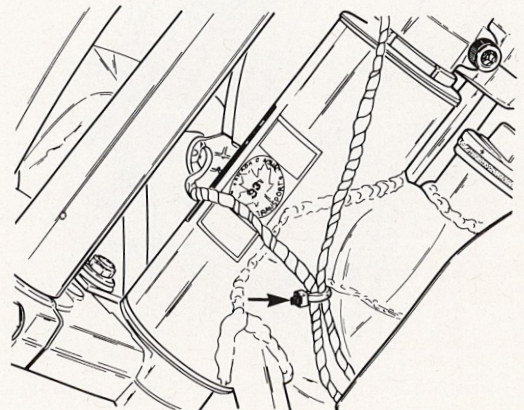
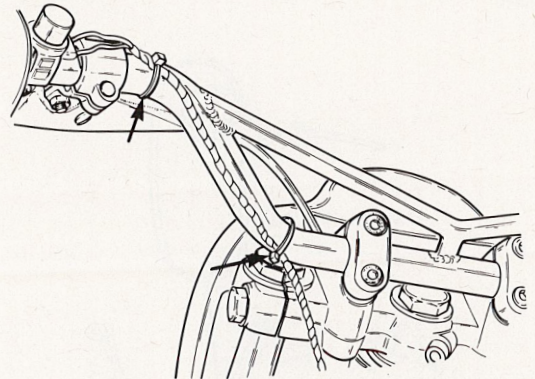
WIRING HARNESS

○ NOTE: Tie wraps are indicated by arrows.

All models



Qualifier models

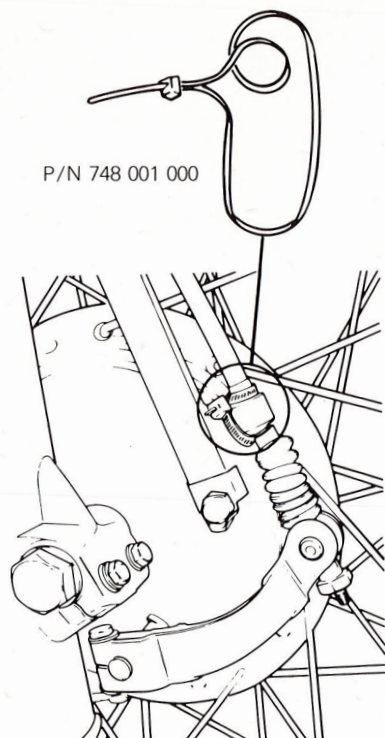


SECTION 07 CHASSIS

SUB-SECTION 04 (CABLE ROUTING)

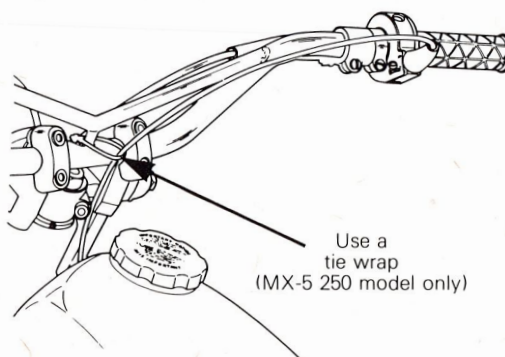
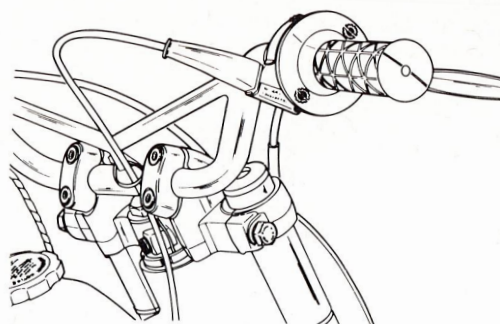
FRONT BRAKE CABLE

It is recommended to use a tie wrap, to secure the lower end of the front cable housing to the backing plate cable retainer.




THROTTLE CABLE

Check the throttle position. On the MX-5 250 model, secure the throttle cable to the handlebar using a tie wrap.



○ **NOTE:** The tie wrap must not be fully tightened.

SECTION 07 CHASSIS
SUB-SECTION 05 (TECHNICAL DATA)

	VEHICLE MODEL		QUALIFIER 175 8955	QUALIFIER 250 8965	QUALIFIER 370 8985	MX-5 250 8964	MX-5 370 8984
DIMENSIONS	Wheel base	cm (in.)	145.1 (57.125)			149.2 (58.75)	
	Overall length	cm (in.)	217.8 (85.75)		218.4 (86.0)	217.1 (85.5)	
	Overall width	cm (in.)	86.3 (34.0)				
	Overall height	cm (in.)	114.9 (45.25)		119.4 (47.0)	120.6 (47.5)	
	Ground clearance	cm (in.)	25.4 (10.0)		28.6 (11.25)	29.2 (11.5)	
	Seat height	cm (in.)	92.7 (36.5)		95.2 (37.5)		
	Dry weight	kg (lbs)	98.8 (218)	102.6 (225)	107 (236)	98.6 (217)	102.2 (225)
	Chassis type / material		Tubular double loop space frame with tapered backbone / chrome-moly.				
LIQ. CAPACITIES	Gas tank	liter Imp. gal: U.S. gal	9.95 2.19 2.62			7.7 1.7 2.0	
	Oil tank	liter Imp. qt U.S. qt	2.16 1.9 2.3		Not applicable		
			Use natural base Can-Am injection oil (50/1 ratio) or any equivalent 2 stroke injection oil.				
			 CAUTION: Never mix natural base injection oil with any synthetic oil as they are incompatible.				

LIMITED WARRANTY CAN-AM* MOTORCYCLE

QUALIFIER* MODELS

Bombardier Limited (BOMBARDIER), as manufacturer,

WARRANTS

FROM THE DATE OF FIRST CONSUMER SALE, every CAN-AM* motorcycle bearing production model numbers 8955-8965-8985 SOLD AS A NEW VEHICLE by an authorized CAN-AM dealer for a period of: NINETY (90) CONSECUTIVE DAYS FOR QUALIFIER* models.

BOMBARDIER will repair and/or replace, at its option, components defective in material and/or workmanship under normal use and service, with a genuine BOMBARDIER component, without charge for parts or labour at any authorized CAN-AM dealer.

EXCLUSIONS

Items and components

Any of the following expendable items and/or components that are damaged or worn due to normal use: filters, spark plugs, light bulbs, protective lenses, brake linings, labels, soft trim, appearance items, lubricants and paints and all tune-ups and adjustments required, seized, melted or holed piston.

BOMBARDIER UNDER THIS WARRANTY, WILL NOT REMEDY OR PAY FOR THE FOLLOWING

- Damage resulting from installation of parts other than genuine BOMBARDIER parts.
- Damage caused by parts excluded from this warranty.
- The labour parts and lubricant costs of all maintenance including tune-ups and/or adjustments and damage caused by failure to provide proper maintenance as detailed in the Operator Manual supplied with each new CAN-AM motorcycle.
- Damage or liability caused by installation by unauthorized personnel of genuine BOMBARDIER parts whether or not such parts have been provided under the warranty.
- Damage resulting from racing or competition events.
- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
- Damage resulting from modifying the motorcycle with high performance parts, whether or not such parts are supplied by BOMBARDIER or installed by an authorized CAN-AM dealer.

- Losses incurred by the motorcycle owner other than parts and labour such as, but not limited to: transportation, towing, telephone calls, taxis, or any incidental or consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply.

CONDITION TO HAVE WARRANTY WORK PERFORMED

Present, to the servicing dealer, your hard copy of the CAN-AM Customer Warranty Registration card obtained from the selling dealer at the time of purchase of your motorcycle.

SECTION 08 WARRANTY

CUSTOMER ASSISTANCE

Should you feel that the product or any services provided under warranty is unsatisfactory, BOMBARDIER recommends that you:

1. Return to your authorized CAN-AM dealer.
2. If the dealer cannot resolve the problem, contact your area distributor listed in the operator's manual.
3. If your grievance still remains unsolved, you may contact:

BOMBARDIER LIMITED
Customer Relations Center
Recreational Product Group
Valcourt, Quebec, Canada, J02 2L0

PLEASE PROVIDE ALL NECESSARY DETAILS INCLUDING:

- Model and serial numbers;
- Date of purchase;
- Name and address of your selling and/or servicing dealer;
- Problem

Where applicable, this warranty is expressly in lieu of all other expressed or implied warranties of BOMBARDIER, its distributors and the selling dealer, including any warranty of merchantability of fitness for any particular purpose, otherwise the implied warranty is limited to the duration of this warranty. However, some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.

Neither the distributor, the selling dealer nor any other person has been authorized to make any affirmation, representation or warranty other than those contained in this warranty, and if made, such affirmation, representation or warranty shall not be enforceable against BOMBARDIER or any other person.

SEPTEMBER 1978

BOMBARDIER LIMITED
Valcourt, Quebec,
Canada, J0E 2L0

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MX-5 models

IMPORTANT

All warranties on MX-5 models either expressed or implied including any implied warranty of merchantability and any implied warranty of fitness for a particular purpose are hereby excluded and disclaimed.

October 1978

Bombardier Limited
Valcourt, Quebec, Canada

