

HONDA COMMON SERVICE MANUAL

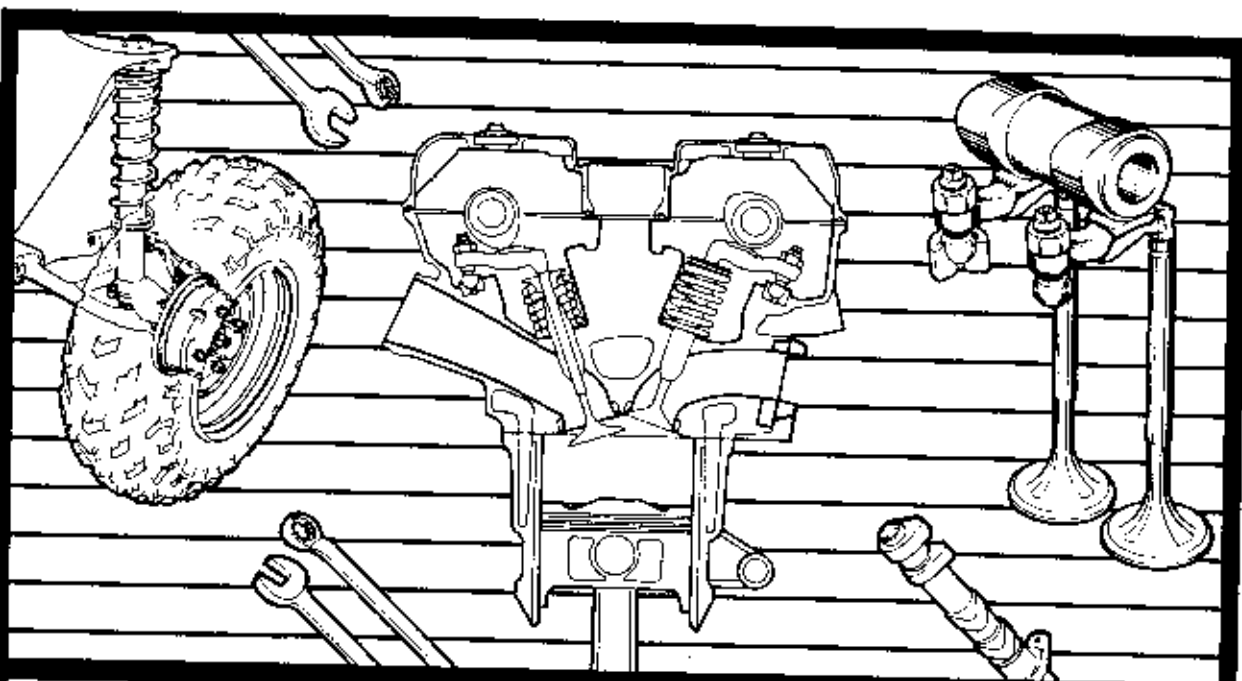
This manual is provided at no charge, and may be distributed freely.

Pages were scanned from photocopies, as Honda no longer print originals.
The alphabeticised index is not available.

***COMMON SERV
MANUAL***

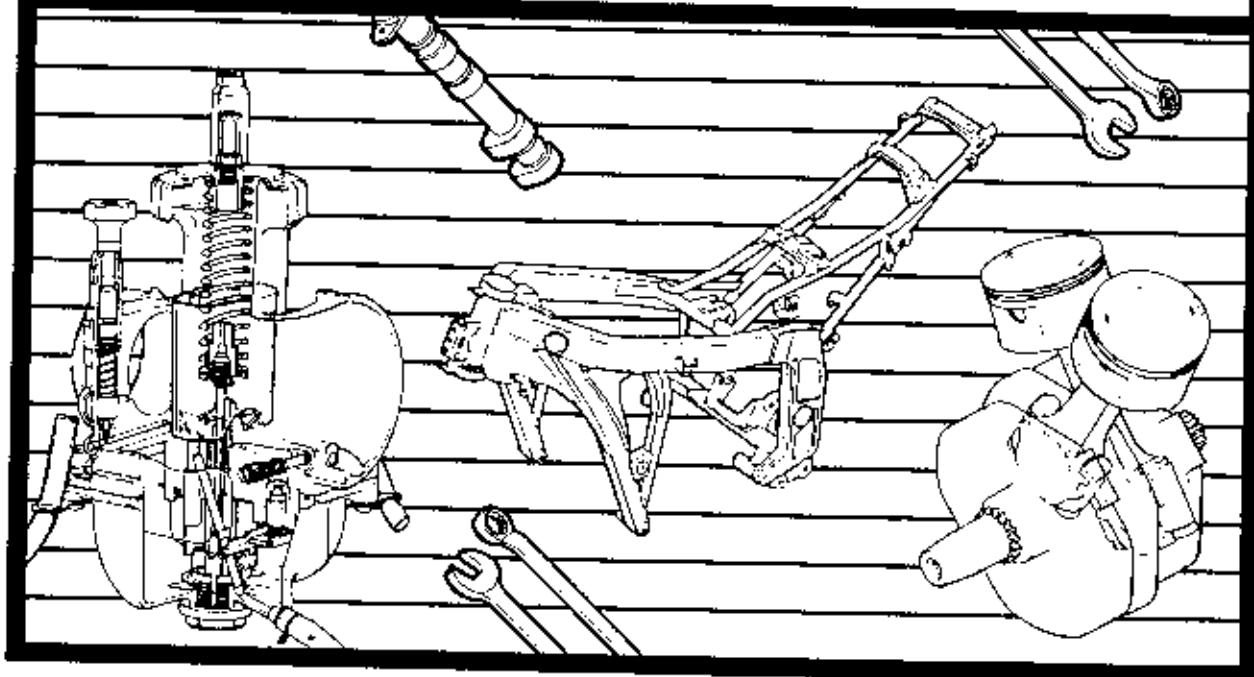
OWNERS MANUAL

PART NO. 61CM000C



HONDA

Common Service Manual



© HONDA MOTOR CO., LTD. 1988
PRINTED IN JAPAN

61CM000
B1508811

IMPORTANT SAFETY NOTICE

⚠ WARNING Indicates a strong possibility of severe personal injury or death if instructions are not followed.

CAUTION: Indicates a possibility of equipment damage if instructions are not followed.

NOTE: Gives helpful information.

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. It is important to note that this manual contains *some* warnings and cautions against some specific service methods which could cause **PERSONAL INJURY** to service personnel or could damage a vehicle or render it unsafe. Please understand that those warnings could not cover all conceivable ways in which service, whether or not recommended by Honda, might be done or of the possibly hazardous consequences of each conceivable way, nor could Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by Honda, *must satisfy himself thoroughly* that neither personal safety nor vehicle safety will be jeopardized by the service methods or tools selected.

HOW TO USE THIS MANUAL

This manual explains the theory of operation of the various systems common to HONDA motorcycles and motor scooters and ATVs. It also provides basic information on troubleshooting, inspection and repair of components and systems found on these machines.

Refer to the Model Specific Service Manual for the model you are servicing for adjustments, maintenance and repair information for components on that model.

Section 1 provides general information on the whole motorcycle as well as Warnings and Cautions to remember when performing maintenance and repairs.

Sections 2 through 15 cover all aspects of the engine and drive train.

Sections 16 through 20 include all of the component groups that make up the chassis.

Section 21 through 25 apply to the various electrical components and systems found on Honda motorcycles.

An extensive alphabetized Index provides rapid access to information on specific components or systems.

All information, illustrations, directions and specifications included in this publication are based on the latest product information available at the time of approval for printing. Honda Motor Co., LTD. reserves the right to make changes at any time without notice and without incurring any obligation whatever. No part of this publication may be reproduced without written permission.

HONDA MOTOR CO., LTD.
Service Publications Office














Date of Issue: Sep., 1988
© HONDA MOTOR CO., LTD.

CONTENTS

| | | | |
|---------------------------|------------------------------------|--------------|----|
| | GENERAL INFORMATION | 1 | |
| | MAINTENANCE | 2 | |
| ENGINE AND DRIVE TRAIN | ENGINE TESTING | 3 | |
| | LUBRICATION | 4 | |
| | COOLING SYSTEM | 5 | |
| | EXHAUST SYSTEM | 6 | |
| | EMISSION CONTROL SYSTEMS | 7 | |
| | FUEL SYSTEM | 8 | |
| | CYLINDER HEAD/VALVES | 9 | |
| | CYLINDER/PISTON | 10 | |
| | CLUTCH | 11 | |
| | V-MATIC BELT DRIVE SYSTEM | 12 | |
| | TRANSMISSION/GEARSHIFT LINKAGE | 13 | |
| | CRANKCASE/CRANKSHAFT | 14 | |
| | FINAL DRIVE/OUTPUT SHAFT | 15 | |
| | CHASSIS | WHEELS/TIRES | 16 |
| | | BRAKES | 17 |
| FRONT SUSPENSION/STEERING | | 18 | |
| REAR SUSPENSION | | 19 | |
| FRAME/BODY PANELS | | 20 | |
| ELECTRICAL | ELECTRICAL FUNDAMENTALS | 21 | |
| | BATTERIES/CHARGING/LIGHTING SYSTEM | 22 | |
| | IGNITION SYSTEMS | 23 | |
| | ELECTRIC STARTER/STARTER CLUTCH | 24 | |
| | LIGHTS/METERS/SWITCHES | 25 | |

Symbol Marks

These symbols used throughout this manual show specific service procedures. If supplementary information is required pertaining to these symbols, it would be explained specifically in the text without the use of the symbols.

| | |
|---|--|
|  | Use recommended engine oil, unless otherwise specified. |
|  | Use molybdenum solution (mixture of the engine oil and molybdenum grease with the ratio 1 : 1). |
|  | Use multi-purpose grease (Lithium based multi-purpose grease NLGI #2 or equivalent) |
|  | Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent) Example: Molykote® BR-2 plus manufactured by Dow Corning, U.S.A. Multi-purpose M-2 manufactured by Mitsubishi Oil Japan |
|  | Use molybdenum disulfide paste (containing more than 40% molybdenum disulfide, NLGI #2 or equivalent) Example: Molykote® G-n Paste manufactured by Dow Corning, U.S.A. Honda Moly 45 (U.S.A. only) Rocol ASP manufactured by Rocol Limited, U.K. Rocol Paste manufactured by Sumico Lubricant, Japan |
|  | Use silicone grease |
|  | Apply locking agent. Use the agent of the middle strength, unless otherwise specified. |
|  | Apply sealant |
|  | Replace the part(s) with new one(s) before assembly. |
|  | Use brake fluid, DOT 3 or DOT 4. Use the recommended brake fluid, unless otherwise specified. |
|  | Use Automatic Transmission Fluid (ATF). |
|  | Use special tool |
|  | Use optional tool. These tools are obtained as you order parts. |

Abbreviations

Following abbreviations may be used in this manual. They stand for:

| | |
|----------|--|
| Assy | Assembly |
| R | Right (Right side viewed from rear side) |
| L | Left (Left side viewed from rear side) |
| IN | Intake side/Inside |
| EX | Exhaust side/Exterior side |
| STD | Standard |
| OP | Optional |
| OS | Oversized |
| L (100L) | Number of links (100 links) |
| C2 | Countershaft 2nd gear (Number indicates the stage of gear) |
| M5 | Mainshaft 5th gear (Number indicates the stage of gear) |
| rpm | Rotating speed per minute |
| BTDC | Before Top Dead Center |
| ATDC | After Top Dead Center |
| BBDC | Before Bottom Dead Center |
| ABDC | After Bottom Dead Center |
| AC | Alternating current |
| DC | Direct current |
| CDI | Capacitive discharge ignition |
| 4P | Number of coupler pins |

Following letters or marks stamped on the parts indicate the installation direction.

| | |
|---------------|---|
| IN | Install with "IN" toward inside/exhaust side. |
| TOP | Install with "TOP" toward up. (Do not install with the letter upside down.) |
| UP | Install with the "UP" toward up. (Do not install with the letter upside down.) |
| UP Δ | Install with the triangular mark toward up. (Some parts might be stamped with an arrow.) |
| F → | Install with the arrow toward front. (Some parts might be stamped with a triangular mark.) |
| R (RH) | Install on the right side, viewed from rear side. If an arrow or triangular mark is stamped, install with the mark toward right. |
| L (LH) | Install on the left side, viewed from rear side. If an arrow or triangular mark is stamped, install with the mark toward left. |
| F (FR) | Indicates the front side of the vehicle. |
| R (RR) | Indicates the rear side of the vehicle. |
| OUT (OUTSIDE) | Install with the letter toward out. |
| LOWER | Indicates lower level. |
| UPPER (FULL) | Indicates upper level. |
| ← | Indicates the rotating direction, if stamped on the rotating part. |

If a punch mark (•) is stamped on a part, it indicates the installation direction or alignment point. Pay attention to the mark when assembling.

1. GENERAL INFORMATION

| | | | |
|----------------|-----|--------------------------|------|
| GENERAL SAFETY | 1-1 | FASTENERS | 1-6 |
| SERVICE RULES | 1-3 | BALL BEARING REPLACEMENT | 1-14 |

GENERAL SAFETY

Carbon Monoxide

If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area.

▲WARNING

- The exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness and may lead to death.

Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

Gasoline

Work in a well ventilated area. Keep cigarettes, flames or sparks away from the work area or where gasoline is stored.

▲WARNING

- Gasoline is extremely flammable and is explosive under certain conditions. **KEEP OUT OF REACH OF CHILDREN.**

Battery Hydrogen Gas & Electrolyte

▲WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
 - If electrolyte gets on your skin, flush with water.
 - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician.
- Electrolyte is poisonous.
 - If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and call a physician. **KEEP OUT OF REACH OF CHILDREN.**

Coolant

Under some conditions, the ethylene glycol in engine coolant is combustible and its flame is not visible. If the ethylene glycol does ignite, you will not see any flame, but you can be burned.

▲WARNING

- Avoid spilling engine coolant on the exhaust system or engine parts. They may be hot enough to cause the coolant to ignite and burn without a visible flame.
- Coolant (ethylene glycol) can cause some skin irritation and is poisonous if swallowed. **KEEP OUT OF REACH OF CHILDREN.**
- Do not remove the radiator cap when the engine is hot. The coolant is under pressure and could scald you.
- Keep hands and clothing away from the cooling fan, as it starts automatically.

If it contacts your skin, wash the affected areas immediately with soap and water. If it contacts your eyes, flush them thoroughly with fresh water and get immediate medical attention. If it is swallowed, the victim must be forced to vomit then rinse mouth and throat with fresh water before obtaining medical attention. Because of these dangers, always store coolant in a safe place, away from the reach of children.

Brake Fluid

CAUTION

- Spilling fluid on painted, plastic or rubber parts will damage them. Place a clean shop towel over these parts whenever the system is serviced. **KEEP OUT OF REACH OF CHILDREN.**

Brake Dust

Never use an air hose or dry brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner or alternate method approved by OSHA, designed to minimize the hazard caused by airborne asbestos fibers.

▲WARNING

- Inhaled asbestos fibers have been found to cause respiratory disease and cancer.

GENERAL INFORMATION

Nitrogen Pressure

For shock absorbers with a gas-filled reservoir:

⚠ WARNING

- Use only nitrogen to pressurize the shock absorber. The use of an unstable gas can cause a fire or explosion resulting in serious injury.
- The shock absorber contains nitrogen under high pressure. Allowing fire or heat near the shock absorber could lead to an explosion that could result in serious injury.
- Failure to release the pressure from a shock absorber before disposing of it may lead to a possible explosion and serious injury if it is heated or pierced.

To prevent the possibility of an explosion, release the nitrogen by pressing the valve core. Then remove the valve stem from the shock absorber reservoir. Dispose of the oil in a manner acceptable to the Environment Protection Agency (EPA).

Before disposal of the shock absorber, release the nitrogen by pressing the valve core. Then remove the valve stem from the shock absorber.

Hot Components

⚠ WARNING

- Engine and exhaust system parts become very hot and remain hot for some time after the engine is run. Wear insulated gloves or wait until the engine and exhaust system have cooled before handling these parts.

Used Engine/Transmission Oil

⚠ WARNING

- Used engine oil (or transmission oil in two-strokes) may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil. **KEEP OUT OF REACH OF CHILDREN.**

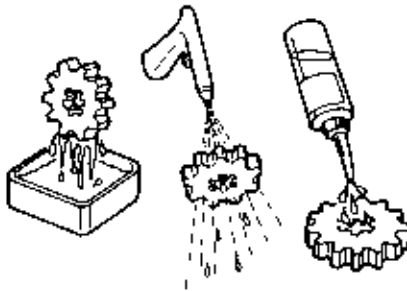
SERVICE RULES

Use only metric tools when servicing this motorcycle or scooter. Metric bolts, nuts and screws are not interchangeable with English fasteners. The use of incorrect tools and fasteners may damage the motorcycle or scooter.

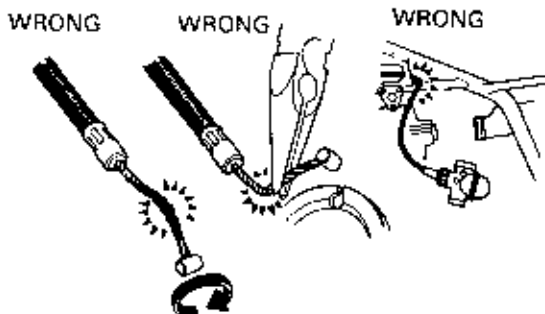
Special tools are designed to remove or replace a specific part or assemblies without damage. The use of other procedures, without using the specified special tools, may damage the parts.

Clean the outside of a part or assembly before removing it from the motorcycle or opening its cover for service. Dirt which has accumulated on the outside could fall into the engine, chassis or brake system and cause damage later.

Clean the parts after disassembly but before measuring them for wear. Parts should be washed in high-flash point solvent and dried with compressed air. Beware of parts containing O-rings or oil seals since these are adversely affected by most cleaning solvents.



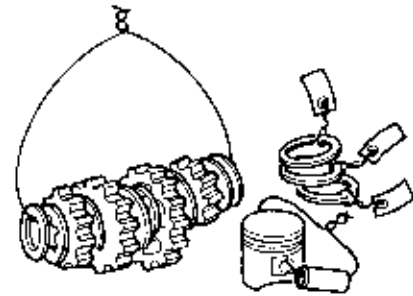
Control cables must not be bent or distorted. This will lead to stiff operation and premature cable failure.



Rubber parts can deteriorate with age and are highly-susceptible to damage from solvents and oils. Check these parts before reassembly and replace as necessary.

Loosening a part with multiple fasteners should be done from the outside-to-inside in a crisscross pattern, loosening the small fasteners first. Loosening the big fasteners first will place an excessive force on the smaller fasteners.

Complex assemblies, such as transmission parts, should be stored in the proper assembly order and held securely with wire. This will simplify reassembly at a later date.



Reassembly position of critical parts should be noted before the parts are disassembled. This will allow those dimensions (depth, distance, or position) to be correctly duplicated upon reassembly.

Non-reuseable parts are always replaced whenever something is disassembled. These include the gaskets, metal sealing washers, O-rings, oil seals, snap rings, and cotter pins.

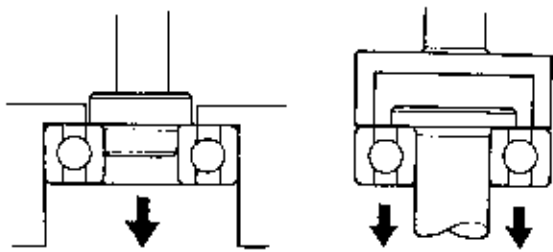


CAUTION

- Coolant or brake fluid will damage the appearance of painted parts. In addition, these fluids can damage the structural integrity of plastic or rubber parts.

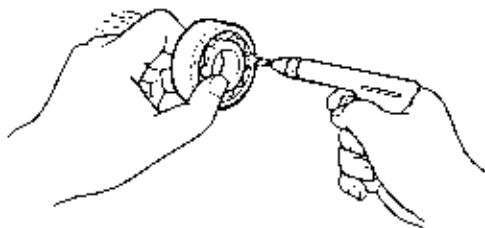
GENERAL INFORMATION

Ball bearings are removed using tools which apply force against one or both inner and outer bearing races. If the force is applied against only one race (either inner or outer), the bearing will be damaged during removal and must be replaced. If the force is applied against both races equally, the bearing will not be damaged during removal.

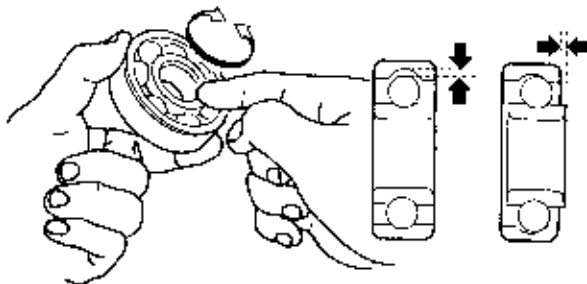


Both examples ruin the bearing

Ball bearings are cleaned in high flash-point solvent then dried with compressed air. Air dry the bearing while holding both races to prevent it from spinning. If the bearing is allowed to spin, the high speed generated by the air jet can overspeed the bearing and cause permanent damage.



Ball bearings are checked (after cleaning) by slowly rotating the inner race while holding the outer race stationary. If any radial play or roughness is felt, it must be replaced. The bearing should have no axial play; if it has noticeable axial play, it must be replaced.



Ball bearings are always installed with the manufacturer's name and size code facing out. (Facing out meaning—the name and sizing code should be visible from the side the bearing is installed from.) This is true for open, single-sealed and double-sealed bearings. Apply the proper grease to open and single sealed bearings before reassembly.

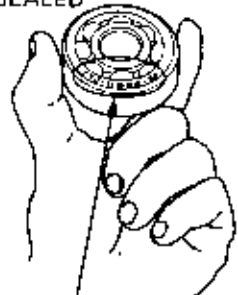
SINGLE-SEALED
TYPE



DOUBLE-SEALED
TYPE

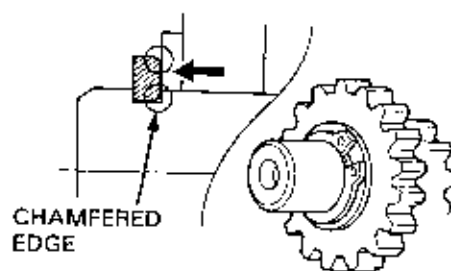


OPEN
TYPE



MANUFACTURER'S
NAME, BEARING No.

Snap rings are always installed with the chamfered (rolled) edge facing away from the thrust of the mating part. This way, pressure against the snap ring presses against the areas in the snap ring groove with the most parallel contact area against one another. Installed incorrectly, pressure against the rolled or chamfered edge could compress the snap ring with the possibility of dislodging it. Never reuse snap rings since they are often used to control end play and become worn with normal use. Wear is especially critical on snap rings which retain spinning parts such as gears. After installing a snap ring, always rotate it in its groove to be sure it is fully-seated.



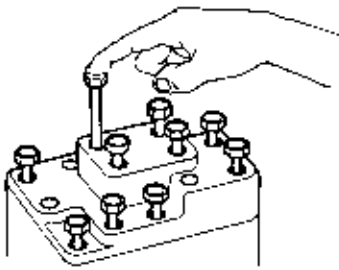
CHAMFERED
EDGE

Grease or oil sliding or turning parts with the recommended lubricant before reassembly.

Replacement parts and fluids must be genuine Honda or recommended by Honda. The use of non-Honda parts and non recommended fluids can have an adverse affect on performance and durability.

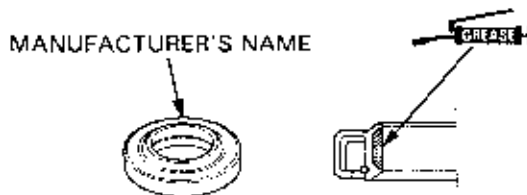
Reassembly operation should be tested, whenever possible, before the part is installed onto the motorcycle.

Bolt or screw lengths can vary for an assembly, cover, or case. These different lengths must be installed into the correct locations. If you become confused, place the bolts into their holes and compare the exposed lengths; each should be exposed by the same amount.

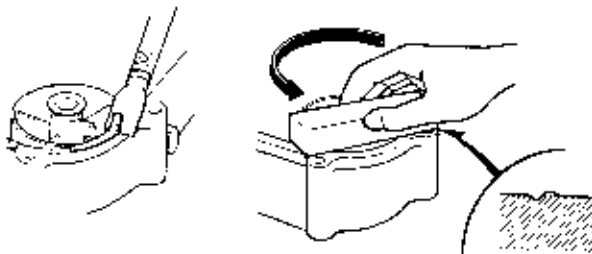


Torquing multiple sized fasteners should be done as follows: tighten all to hand-tight, then torque big fasteners before little fasteners. Torque pattern should be crisscross from inner-to-outer. To minimize distortion, critical fasteners should be torqued in two or three increments. Unless specified otherwise, bolts and fasteners are installed clean and dry; do not use oil on the threads.

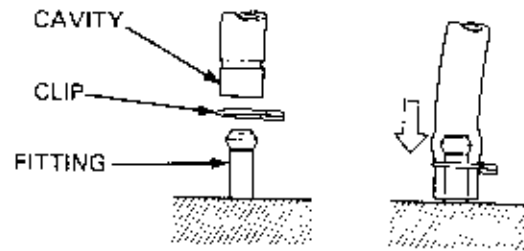
Oil seals are always installed with grease packed into the seal cavity and the manufacturer's name facing the outside (dry side). When installing seals, always check that the shaft over which the seal fits is smooth and free of burrs which could damage the seal.



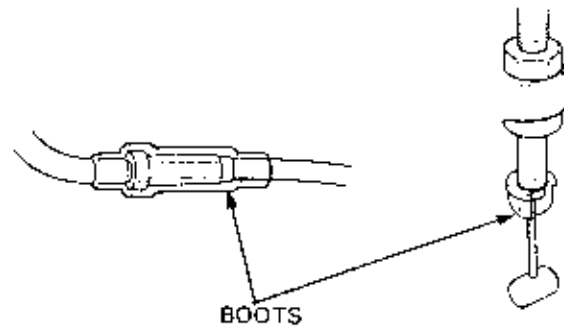
Old gasket material or sealant must be removed before reassembly. If the gasket surface is damaged slightly, it may be possible to smooth that area with an oil stone.



Rubber hoses (fuel, vacuum, or coolant) should be installed so the end is bottomed onto its fitting. This allows adequate area for the hose clip to grip the hose beneath the flared end of the fitting.



Rubber or Plastic Dust/Dirt Boots should be replaced securely in the exact positions they were designed for.



GENERAL INFORMATION

FASTENERS

A motorcycle is composed of a number of connected parts. A variety of fasteners are used to connect these parts. Unlike permanent connection methods like welding, riveting and glueing, threaded fasteners are essential as a means of non-permanent connection which can be disconnected whenever necessary.

Roughly estimated, the thread diameter is the O.D. of the male thread or the I.D. across the full width of the "valleys" of the female thread.

The pitch is the thread-to-thread distance that a male/female bolt moves in a turn.

TYPES OF THREADS

Metric threads, as specified by the International Standards Organization (ISO), are used on HONDA motorcycles.

The typical ISO threads found on Honda products are the following threads and pitches.

| Diameter (mm) | Pitch (mm) | Diameter (mm) | Pitch (mm) |
|---------------|------------|---------------|------------|
| 3 | 0.5 | 12 | 1.25 |
| 4 | 0.7 | 14 | 1.5 |
| 5 | 0.8 | 16 | 1.5 |
| 6 | 1.0 | 18 | 1.5 |
| 8 | 1.25 | 20 | 1.5 |
| 10 | 1.25 | | |

The few parts which do not have conventional (ISO) metric threads are listed below.

The threads are NOT INTERCHANGEABLE with conventional (ISO) metric threads.

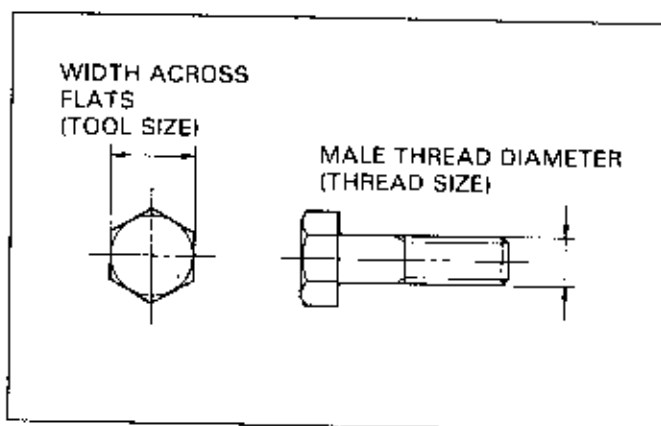
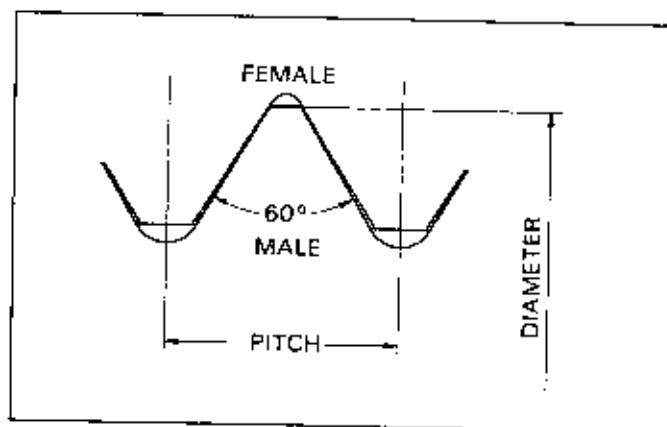
| Description | * Symbols (typical examples) | Example of application |
|-------------------------------|------------------------------|------------------------|
| Parallel threads for tubes | PF 1/8 | Oil pressure switch |
| Tapered threads for tubes | PT 1/8 | Thermostatic units |
| Thread type used on bicycles | BC 3.2 | Spokes and nipples |
| Spark plug threads | M 12S | Spark plugs |
| Automobile tire Valve stem | TV8 | Tire valve stem |

* The figures given above represent screw sizes. An example is given for each type of screw or thread type.

THREAD SIZES

Thread sizes are represented by male thread diameters. Widths across flats represent applicable tool sizes. Note that these widths are not related to thread sizes.

On Honda motorcycles, scooters and ATVs, the size of the bolt, nut or screw is considered to be the thread diameter.

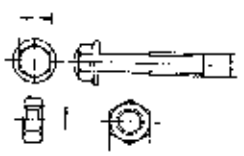
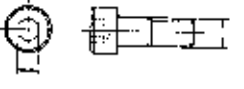


WIDTH ACROSS FLATS

The width across flats is the portion where tools such as a wrench or a socket are applied. Applicable tool sizes are represented by these widths. The denomination of a "10 mm wrench," for example, represents a wrench to be used on hex-heads with widths across flats of 10 mm.

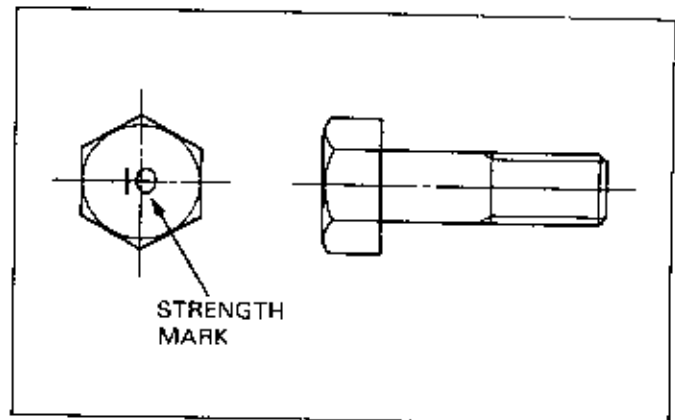
On the right is a table to show representative widths across flats and thread sizes often used for Honda motorcycles. Not all widths across the flats are shown.

Some other common widths across the flats are 22, 24, 27, 30, 32 mm, etc. Spark plugs have particular width across flats; they should be removed with special spark plug wrenches (16, 18 and 20.6 mm).

| Hexagon portion | Width across flats | Thread (diameter) x (pitch) |
|--|--------------------|-----------------------------|
|  | 8 | 5 x 0.8 |
| | 8 | 6 x 1.0 |
| | 10 | 6 x 1.0 |
| | 12 | 8 x 1.25 |
| | 14 | 10 x 1.25 |
| | 17 | 12 x 1.25 |
|  | 19 | 14 x 1.5 |
| | 5 | 6 x 1.0 |
| | 6 | 8 x 1.25 |
| | 8 | 10 x 1.25 |
| | 10 | 12 x 1.25 |

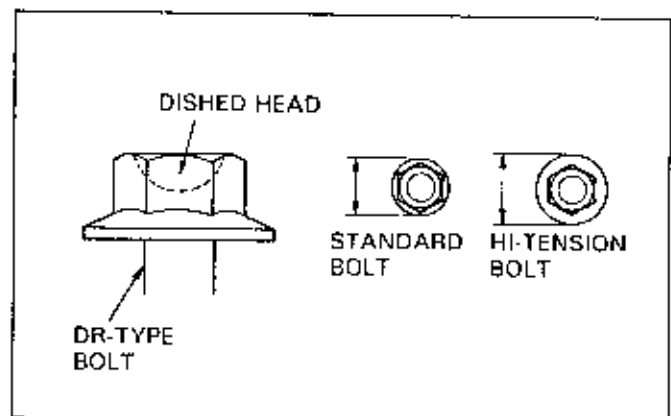
HEX-HEAD BOLT STRENGTH MARKINGS

Strength marks, indicating material type, are visible on the head of some hex-headed bolts. Bolts are classified into standard bolts and high-tension bolts by material types. During assembly, take care not to install any high-tension bolts in the wrong place. Note that while standard bolts are tightened to a standard torque unless otherwise specified, high-tension bolts always have their own specified torque values. 6 mm SH bolts without strength marks (small-headed flange bolts with a width across flats of 8 mm and a thread size of 6 mm) are all considered standard bolts.



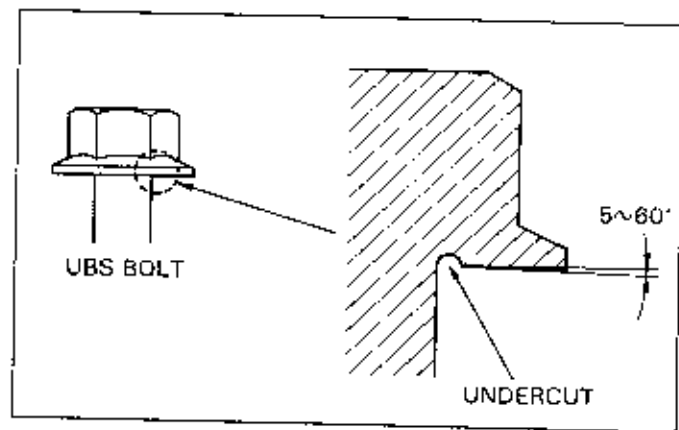
| Mark | No mark | ⊖ or ⊕ | 10 | 12 |
|-------------------------|--------------------------|---------------------------|----------------------------|----------------------------|
| Strength Class. | 5.8 | 8.8 | 10.9 | 12.9 |
| Tension strength Class. | 50-70 kg/mm ² | 80-100 kg/mm ² | 100-120 kg/mm ² | 120-140 kg/mm ² |
| | Standard Bolts | | High tension | |

DR-type (or dished-headed) bolts, without strength markings (flange bolts with hex-heads and weight reduction holes in them, are classified by outer flange diameters. Be careful about the installation points and the torques of high-tension bolts having the same hexagon dimensions as standard bolts, but having larger flanges.



GENERAL INFORMATION

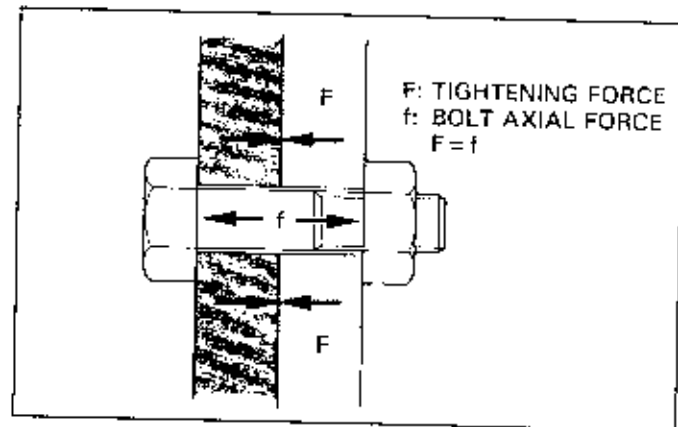
UBS bolts are in the high-tension category. They can be recognized by undercuts under their bolt necks. UBS bolts are marked either with or without strength marks. Furthermore, these bolts are so structured so they will not easily loosen, by the provision of a slight slope of 5 to 60° on the bottom of the flange.



TORQUE VALUES (Tightening Force)

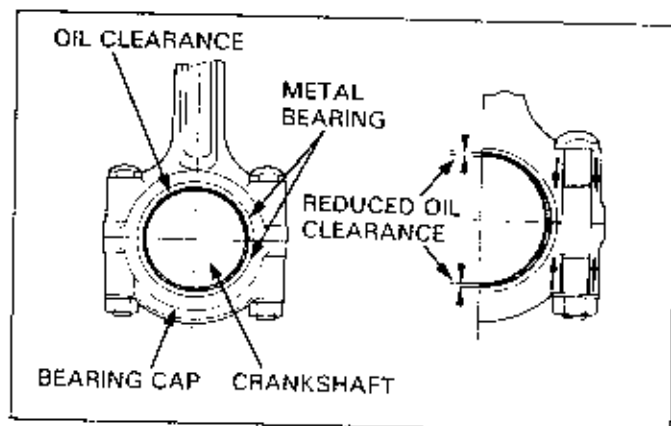
When two or more parts are connected by a fastener, their connection should not be affected by external forces; i.e. there should be no gap between the parts which are fastened together. The first priority of threaded fastener connected parts is the state of being tightened with a sufficient force. When any tightening force is sufficient for the intended function, it is called "proper tightening force".

The tightening force of one bolt is equal to bolt axial tensile strength. Bolt tightening force is, therefore, often called "bolt axial force".

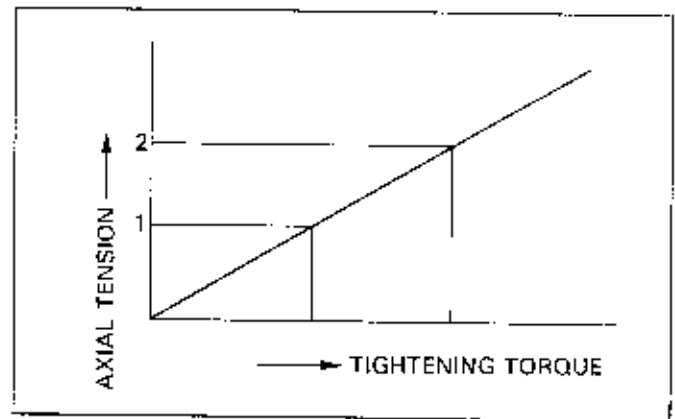


A decrease in tightening force (initial tightening force) due to the passage of time, external forces or vibration applied during use is called "fastener loosening". Even when the initial tightening force was correct, loosening may cause it to decrease in later use, finally damaging some parts. As a countermeasure against fastener loosening, retightening is carried out after a certain period of time. Periodically tightening wheel spokes is an example of this operation.

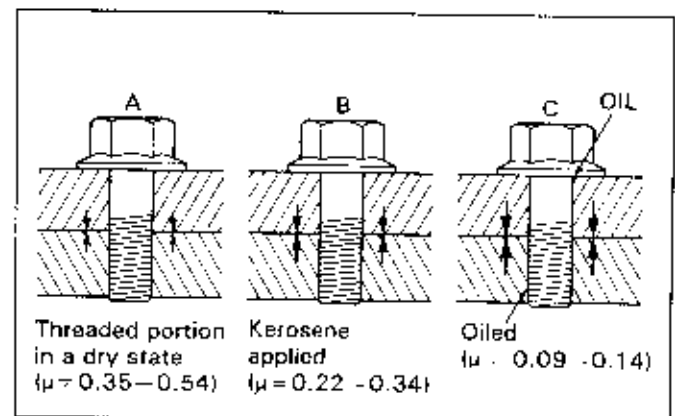
Proper tightening forces are specified according to fastener strength, strength of fastened parts and intensity of external forces. Tightening must be carried out in strict accordance with this specification, especially at important points. Tightening a connecting rod bearing cap with a stronger force than is proper, for example, will deform the tightened part (bearing cap) slightly and cause the oil clearance for the bearing to become smaller than specified, which may lead to the bearing seizing. An insufficient tightening force, on the other hand, may allow the nuts or bearing caps to loosen and fall off during engine operation, leading to serious engine trouble.



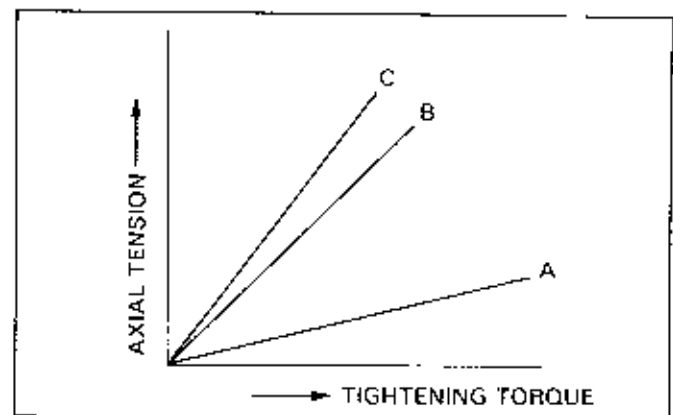
As mentioned earlier, the most important point in fastener tightening is the tightening force. The problem is that this tightening force (axial tension) is difficult to measure. Using a predetermined tightening torque is, therefore, the most common method of controlling fastener tension.



It must be noted that, in this control method using torque values, the axial tension is proportional to the torque under certain conditions. Under other conditions, this important axial tension varies even when the fastener is tightened to the same torque.



The table on the right gives some examples of friction coefficient when oil has adhered to the threaded portion. Under the same conditions from the viewpoint of the tightening torque and the material of the parts that are fastened together, $\langle \mu \rangle$ varies largely. Out of the tightening torque applied on an unlubricated fastener, 88 to 92 percent is consumed by the friction of flanges and thread surfaces and only 8 to 12 percent is effectively transformed into axial tension. This percentage of transformation into an axial tension increases as the above-mentioned friction decreases: i.e. as the value $\langle \mu \rangle$ decreases, the axial tension increases. Axial tension varies when the same tightening torque value is obtained. Furthermore, in a dry (unlubricated) state, the value $\langle \mu \rangle$ varies in a wider range and has a tendency to increase as the tightening/loosening procedure is repeated.



It is important to oil the threads of specific fasteners when instructed to do so in the Model Specific manual. Oiling the threads of these fasteners ensures stable fastening tension in critical areas. No other bolts besides those specifically pointed out in the Model Specific service manual text require oil on their threads.

Lubrication of the threaded portion or of the bottom of the flange reduces friction and the anti-loosening effect. However, this lubrication also increases fastener axial tension and results in a sufficient tightening strength, so that the fastener is less likely to loosen.

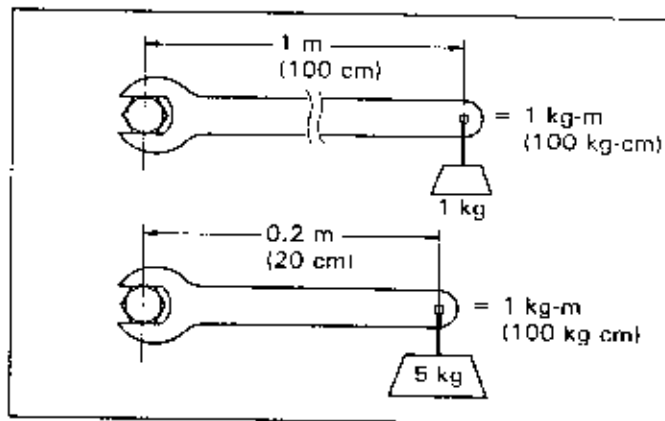
GENERAL INFORMATION

Torque values are determined according to fastener size and strength, and the strength of the parts that are fastened together. In many of our previous service manuals, torque values are specified within a certain range. Due to slight variation in torque wrench precision and fastener friction coefficient, the target torque value should be the middle of the range of the torque value specified. The Model Specific manuals provide only the simplified, middle-range torque values. Kg-m is used as a tightening torque unit.

Example: A torque of 1 kg-m refers to the moment of force obtained when a 1-meter long wrench is loaded with 1 kilogram. At the same moment, a heavier load is needed as the effective wrench length is shorter.

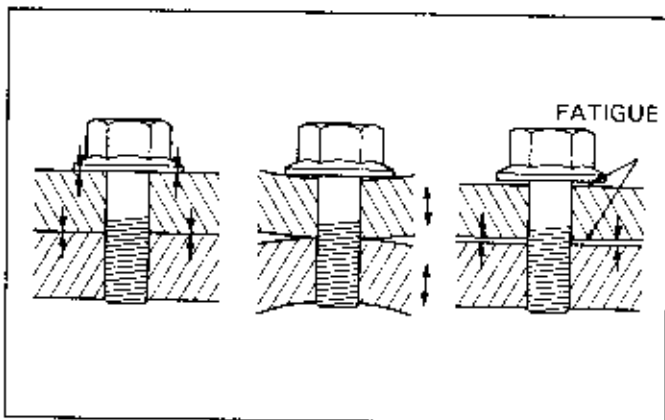
1 kg-m = 10 N·m

1 kg-m = 7 ft-lb



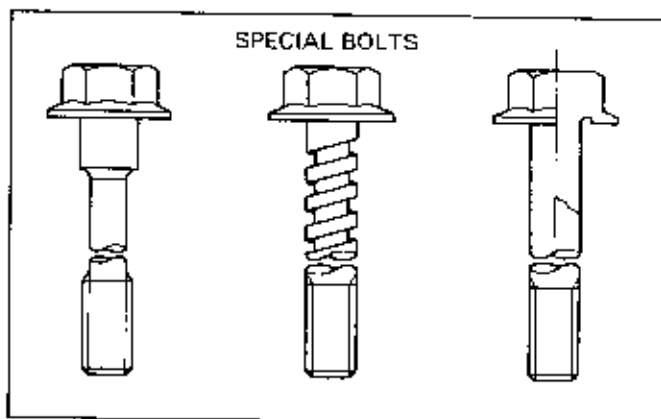
FASTENER LOOSENING

In most of the cases, fastener loosening is due to external forces repeatedly applied to, or working against, the fastener (such as vibration), thus reducing screw axial tension.



Certain areas of the motorcycle or scooter are subject to repeated and severe external forces. Special bolts with a high percentage of elastic deformation capability are used in these areas.

Installing common bolts in these areas with special requirements may lead to loosening or shearing of the fastener. Therefore it is important to identify both these specially designed bolts and the positions where these are required.

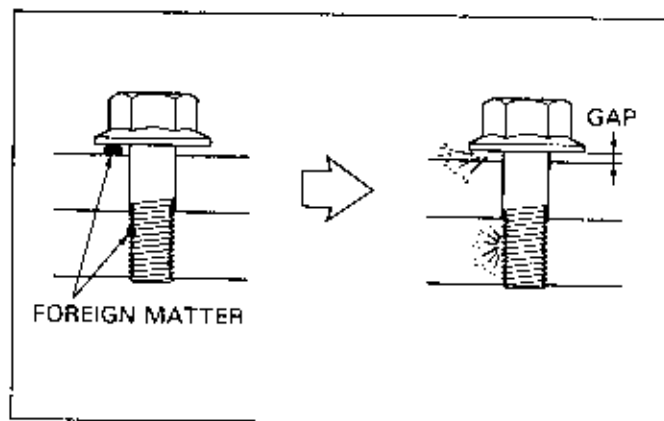


Always clean fasteners thoroughly if there is any dirt present anywhere on the fastener.

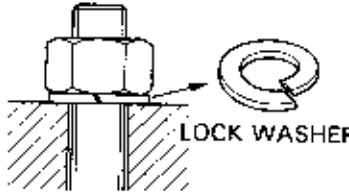
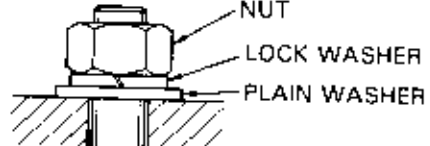
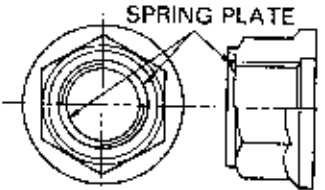
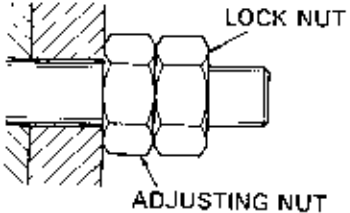
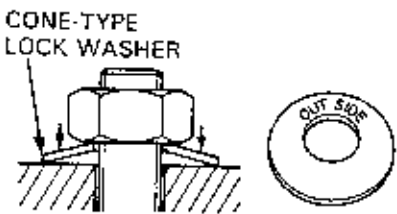

Installing fasteners with dirt or other foreign matter on their threads or on the bolt or nut bearing surfaces will result in improper axial tension, despite the use of the proper torque specification.

As the dirt or foreign matter breaks down due to vibration and the attached parts working against each other, the fastener will soon work its way loose.

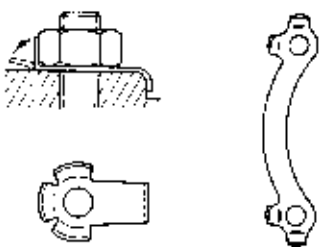

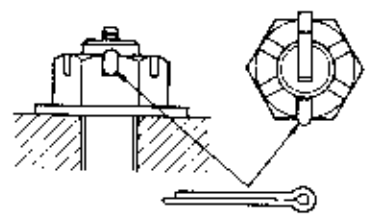
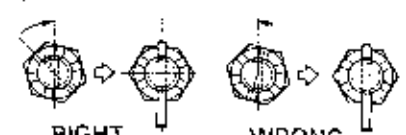

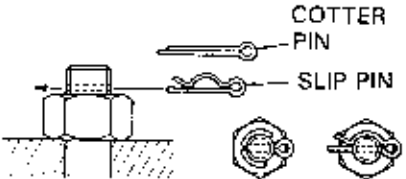
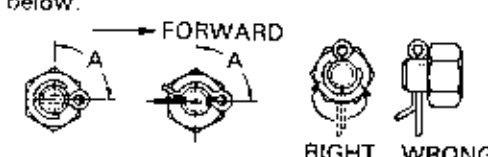
There are several methods of preventing the various types of fasteners from loosening. Some representative examples are presented on the next page, together with the necessary instructions for proper use.

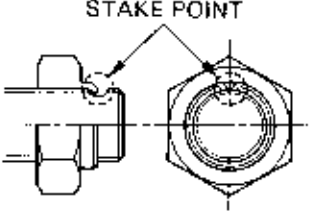
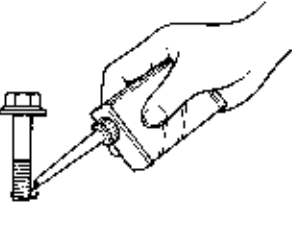

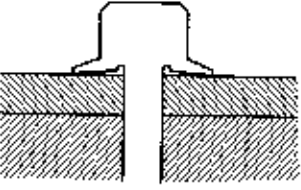


Locking

| TYPES OF FASTENERS | APPLICATIONS | CAUTION |
|---|--|--|
| <p>1. Lock washer (Conventional split-ring type)</p>  <p>LOCK WASHER</p> <p>When the washer is compressed under the bearing surface pressure, the elasticity of the spring and the edges of the ring ends prevent loosening.</p> | <ul style="list-style-type: none"> • Various points on frame (Bolts-incorporating washers are also available.) | <ul style="list-style-type: none"> • Do not use lock washers which have lost their elasticity or are deformed or eccentric. • Excessive torque will open or deform the washer and render it useless. • Use an appropriate size for thread dia. or hex. point. • When using with a plain washer, always put the lock washer between the nut and plain washer.  <p>NUT LOCK WASHER PLAIN WASHER</p> |
| <p>2. Self-locking nut</p>  <p>SPRING PLATE</p> <p>This is a nut with a spring plate on top. This spring plate presses against the thread, making it difficult for the nut to loosen. After removal, this type of nut can be used again.</p> | <ul style="list-style-type: none"> • Important points on the frame <ul style="list-style-type: none"> – PRO-Link pivot point nuts – Axle nuts | <ul style="list-style-type: none"> • Avoid using spring plate nuts with deformed or damaged spring plates. • The bolt head must be held during nut installation and removal due to the resistance of the nut spring plate against the bolt. • If the bolt length is too short, the spring plate portion of the lock nut will not engage with the thread fully. |
| <p>3. Double nut</p>  <p>LOCK NUT</p> <p>ADJUSTING NUT</p> <p>The lock nut, applied to the adjusting nut from outside, presses against the latter thus preventing loosening.</p> | <ul style="list-style-type: none"> • Chain adjusters • Cable adjusters (Also used for removing or installing the stud bolts) | <ul style="list-style-type: none"> • Hold the adjusting nut securely and tighten the lock nut. • Any attempt to loosen both nuts (adjusting and lock nuts) simultaneously will damage the bolt threads. |
| <p>4. Cone spring lock washer</p>  <p>CONE-TYPE LOCK WASHER</p> <p>OUT SIDE</p> <p>The bearing surface presses on the cone spring washer and the spring reaction presses against the nut to prevent it from loosening.</p> | <ul style="list-style-type: none"> • Important points inside the engine <ul style="list-style-type: none"> – Clutch lock nut – Primary gear lock nut • Drive sprocket center bolt | <ul style="list-style-type: none"> • Installing in the opposite direction prevents effective locking. Always install cone washers with their "OUTSIDE" mark facing out. No marked, set cone spring washers as shown in the table at left. • Do not use if damaged or deformed. • When using a lock nut chamfered on one side, install the nut with chamfered side facing the lock washer as shown below.  <p>LOCK NUT CHAMFERED EDGE</p> |

GENERAL INFORMATION

| TYPES OF FASTENERS | APPLICATIONS | CAUTION |
|--|--|--|
| <p>5. Tongued lock plate</p>  <p>Bend the tongue (claw) to the flat face of nut or into the groove of the nut to lock the nut or bolt head.</p> | <ul style="list-style-type: none"> • Important points inside engine <ul style="list-style-type: none"> – Clutch lock nut • Important safety points on the frame <ul style="list-style-type: none"> – Steering head bearing top nut – Driven sprocket nuts | <ul style="list-style-type: none"> • Ensure that a tongue (claw) has locked the nut properly. • Since repeated bending/straightening damages the tongue, replace the lock plate with a new one whenever the lock plate is removed. • Align the tongue to the nut in such a manner that the nut aligns perfectly when proper nut torque is reached, or so that the nut must be tightened further to align the tongue. • Do not align the nut in a position where the locking tongue aligns, but the nut torque is less than specified.  <p style="text-align: center;">RIGHT WRONG</p> |
| <p>6. Castle-headed nut</p>  <p>Inserting a cotter pin through a nut and bolt prevents loosening.</p> | <ul style="list-style-type: none"> • Important safety points on the frame <ul style="list-style-type: none"> – Axle nut – Brake torque rod | <ul style="list-style-type: none"> • Since repeated bending/straightening damages cotter pins, always use new cotter pins during assembly. • Tighten the nut to the specified torque. Then align the next possible pin hole while tightening the nut just beyond the specified torque. • Do not align the holes in a position where the nut torque is less than the specified torque.  <p style="text-align: center;">RIGHT WRONG</p> <ul style="list-style-type: none"> • Bend the cotter pin as shown below.  <p style="text-align: center;">RIGHT WRONG</p> |
| <p>7. Slip pin/cotter pin</p>  <p>Inserting a slip pin or cotter pin through a bolt prevents the nut from loosening.</p> | <ul style="list-style-type: none"> • Frame important safety points <ul style="list-style-type: none"> – Brake rod | <ul style="list-style-type: none"> • Since repeated bending /straightening damages cotter pins, always use new cotter pins during assembly. Although slip pins can be used again, replace slip pins with new ones if they are deformed or fatigued. • When using a cotter pin or slip pin on suspension and wheel components, install the pin with the head facing forward. If installed in the opposite direction, these pins may be bent and eventually broken and knocked out due to hitting stationary objects or from thrown stones on off-road bikes. Be sure to bend cotter pins properly as shown below.  <p style="text-align: center;">RIGHT WRONG</p> <ul style="list-style-type: none"> • Set the pin head in any position within the range A shown above. |

| TYPES OF FASTENERS | APPLICATIONS | CAUTION |
|--|---|--|
| <p>8. Stake-type lock nut</p>  <p>Stake (or indent) the collar of the nut to make it match the groove in the shaft.</p> | <ul style="list-style-type: none"> • Important points inside the engine <ul style="list-style-type: none"> – Clutch center lock nut – Wheel bearing retainer – Shift drum stopper plate | <ul style="list-style-type: none"> • During disassembly, eliminate the staking point to loosen the nut. • Replace the nut, if the old staked area of the nut aligns with the groove of the shaft after tightening the nut to specified torque. • After tightening the nut to the specified torque, stake the nut collar by striking it with a drift punch in such a way that the staking point matches the shaft groove. Ensure that the staking point has entered into the groove at least 2/3 of the groove depth. |
| <p>9. Thread locking agent</p>  <p>Apply a thread locking agent to the thread to prevent loosening.</p> | <ul style="list-style-type: none"> • Rotating points inside the engine, points which if loosened, may contact rotating parts. <ul style="list-style-type: none"> – Stator coil bolt – Bearing retainer bolts – Shift drum stopper plate bolt • Frame <ul style="list-style-type: none"> – Fork socket bolts – Brake disc bolts | <ul style="list-style-type: none"> • Application of a locking agent increases loosening torque. Take care not to damage the bolt during removal. • Before applying a locking agent clean off all oil and/or residual adhesive remaining on the threads and dry them completely. • Application of an excessive amount of adhesive may, during loosening, damage the thread or cause the bolt to be broken. Applying a small amount of adhesive to the end of the bolt threads distributes the adhesive throughout when the bolt is threaded in. <p style="text-align: center;">APPLY LOCKING AGENT</p>  |
| <p>10. UBS bolt</p>  <p>The threads are pressed by the reaction on the inclined bolt flange.</p> | <ul style="list-style-type: none"> • Used on the critical areas of the engine/frame where a nut cannot be used to tighten. <ul style="list-style-type: none"> Engine; <ul style="list-style-type: none"> – cylinder – cylinder head Frame; <ul style="list-style-type: none"> – foot peg – bracket | <ul style="list-style-type: none"> • The tightening surface where the bolt flange seats should be level and smooth. |