

HONDA

XL600R and XR600R

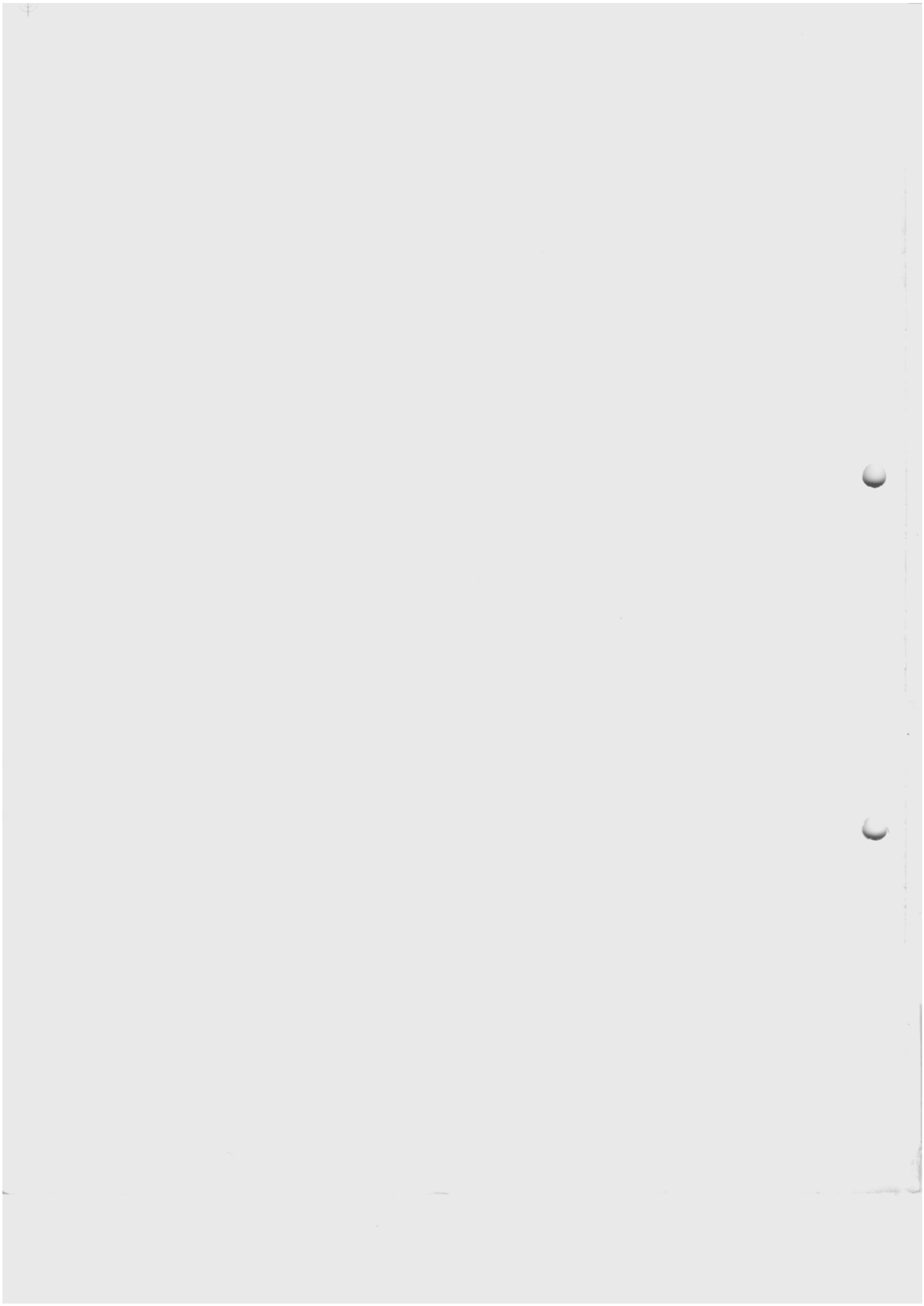
1983 thru 2000 □ 589cc □ 591cc

Owners Workshop Manual



2183





Honda XL/XR600R Owners Workshop Manual

by Alan Ahlstrand
and John H Haynes

Member of the Guild of Motoring Writers

Models covered:

XL600R, 1983 through 1987

XR600R, 1985 through 2000



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We take great pride in the accuracy of information given in this manual, but motorcycle manufacturers make alterations and design changes during the production run of a particular motorcycle of which they do not inform us. No liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

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Contents

Introductory pages

Introduction to the Honda XL/XR600	0-4
About this manual	0-5
Buying parts	0-5
Identification numbers	0-6
General specifications	0-7
Maintenance techniques, tools and working facilities	0-8
Safety first!	0-14
Motorcycle chemicals and lubricants	0-16
Troubleshooting	0-17

Chapter 1

Tune-up and routine maintenance	1-1	1
---------------------------------	-----	----------

Chapter 2

Engine, clutch and transmission	2-1	2
---------------------------------	-----	----------

Chapter 3

Fuel and exhaust systems	3-1	3
--------------------------	-----	----------

Chapter 4

Ignition and electrical systems	4-1	4
---------------------------------	-----	----------

Chapter 5

Steering, suspension and final drive	5-1	5
--------------------------------------	-----	----------

Chapter 6

Brakes, wheels and tires	6-1	6
--------------------------	-----	----------

Chapter 7

Frame and bodywork	7-1	7
--------------------	-----	----------

Chapter 8

Wiring diagrams	8-1	8
-----------------	-----	----------

Conversion factors

Index	IND-1	IND
-------	-------	------------



1996 Honda XR600R

Introduction to the Honda XL/XR600

The XR600R and its street-legal version, the XL600R, are highly popular and successful big-bore trail bikes.

The engine on all models is an air-cooled single with an overhead camshaft, employing Honda's Radial Four-Valve Combustion (RFVC) valve arrangement. Power is transmitted through a five-speed transmission, wet multi-plate clutch and chain final drive.

Fuel is delivered to the cylinder by a slide-type carburetor (or two

carburetors, depending on the model).

The front suspension consists of telescopic forks mounted in upper and lower triple clamps. The rear suspension on all models uses a single shock absorber/coil spring unit and Honda's Pro-Link progressive rising rate suspension linkage. A disc brake is used at the front on all models. Early models used a drum brake at the rear; later models use a disc brake.

About this manual

Its purpose

The purpose of this manual is to help you get the best value from your motorcycle. It can do so in several ways. It can help you decide what work must be done, even if you choose to have it done by a dealer service department or a repair shop; it provides information and procedures for routine maintenance and servicing; and it offers diagnostic and repair procedures to follow when trouble occurs.

We hope you use the manual to tackle the work yourself. For many simpler jobs, doing it yourself may be quicker than arranging an appointment to get the vehicle into a shop and making the trips to leave it and pick it up. More importantly, a lot of money can be saved by avoiding the expense the shop must pass on to you to cover its labor and overhead costs. An added benefit is the sense of satisfaction and accomplishment that you feel after doing the job yourself.

Using the manual

The manual is divided into Chapters. Each Chapter is divided into numbered Sections, which are headed in bold type between horizontal lines. Each Section consists of consecutively numbered paragraphs or steps.

At the beginning of each numbered Section you will be referred to any illustrations which apply to the procedures in that Section. The reference numbers used in illustration captions pinpoint the pertinent Section and the Step within that Section. That is, illustration 3.2 means the illustration refers to Section 3 and Step (or paragraph) 2 within that Section.

Procedures, once described in the text, are not normally repeated. When it's necessary to refer to another Chapter, the reference will be given as Chapter and Section number. Cross references given without use of the word 'Chapter' apply to Sections and/or paragraphs in the same Chapter. For example, 'see Section 8' means in the same Chapter.

References to the left or right side of the vehicle assume you are sitting on the seat, facing forward.

Motorcycle manufacturers continually make changes to specifications and recommendations, and these, when notified, are incorporated into our manuals at the earliest opportunity.

Even though we have prepared this manual with extreme care, neither the publisher nor the authors can accept responsibility for any errors in, or omissions from, the information given.

NOTE

A **Note** provides information necessary to properly complete a procedure or information which will make the procedure easier to understand.

CAUTION

A **Caution** provides a special procedure or special steps which must be taken while completing the procedure where the Caution is found. Not heeding a Caution can result in damage to the assembly being worked on.

WARNING

A **Warning** provides a special procedure or special steps which must be taken while completing the procedure where the Warning is found. Not heeding a Warning can result in personal injury.

Buying parts

Once you have found all the identification numbers, record them for reference when buying parts. Since the manufacturers change specifications, parts and vendors (companies that manufacture various components on the machine), providing the ID numbers is the only way to be reasonably sure that you are buying the correct parts.

Whenever possible, take the worn part to the dealer so direct comparison with the new component can be made. Along the trail from the manufacturer to the parts shelf, there are numerous places that the part can end up with the wrong number or be listed incorrectly.

The two places to purchase new parts for your motorcycle - the accessory store and the franchised dealer - differ in the type of parts they carry. While dealers can obtain virtually every part for your motor-

cycle, the accessory dealer is usually limited to normal high wear items such as shock absorbers, tune-up parts, various engine gaskets, cables, chains, brake parts, etc. Rarely will an accessory outlet have major suspension components, cylinders, transmission gears, or cases.

Used parts can be obtained for roughly half the price of new ones, but you can't always be sure of what you're getting. Once again, take your worn part to the wrecking yard for direct comparison.

Whether buying new, used or rebuilt parts, the best course is to deal directly with someone who specializes in parts for your particular make.

Identification numbers

The frame serial number is stamped into the front of the frame and printed on a label affixed to the frame (**see illustration**). The engine number is stamped into the right side of the crankcase (**see illustration**). Both of these numbers should be recorded and kept in a safe place so they can be furnished to law enforcement officials in the event of a theft.

The frame serial number, engine serial number and carburetor identification number should also be kept in a handy place (such as with your driver's license) so they are always available when purchasing or ordering parts for your motorcycle.

The models covered by this manual are as follows:

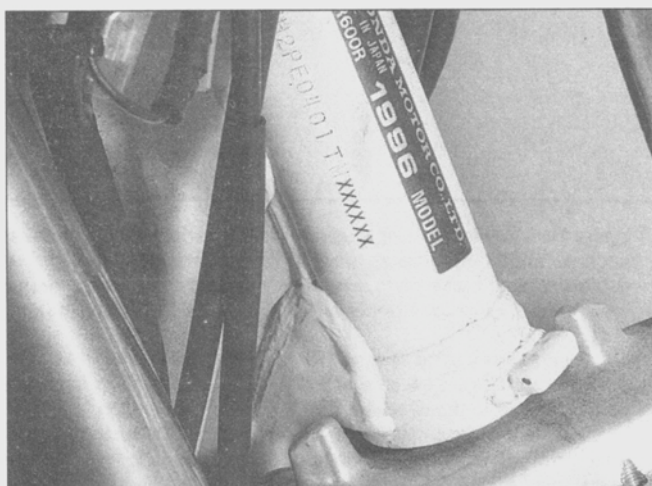
XL600R, 1983 through 1987

XR600R, 1985 through 2000

Identifying model years

XL600R

Year	Initial engine number	Initial frame number
1983	PD03E-5000053	PD030-DM000027
1984		
49 states	PD03E-5100007	PD030-EM100006
California	PD03E-5100214	PD031-EM100007
1985		
49 states	PD03E-5200004	PD030-FK200003
California	PD03E-5200008	PD031-FK200002
1986		
49 states	PD03E-5300004	PD030-GK300002
California	PD03E-5300002	PD031-GK300001
1987		
49 states	PD03E-5400003	PD030-HK400002
California	PD03E-5400008	PD031-HK400001



The frame serial number is located on the steering head

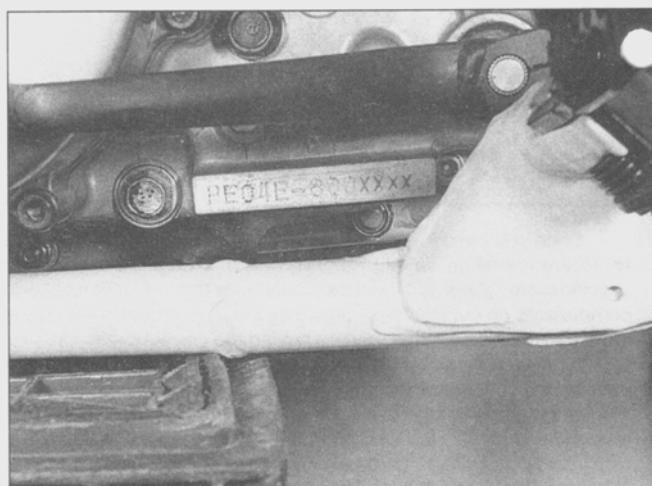
XR600R

Year	Initial engine number	Initial frame number
1985	PE04E-5000038	PE040-FK000024
1986	PE04E-5100003	PE040-GK100003
1987	PE04E-5200003	PE040-HK200003
1988	PE04E-5300014	PE040-JK300009
1989	PE04E-5400001	PE040-KK400001
1990	PE04E-5500011	PE040-LK500001
1991	PE04E-5600011	PE040-MK600008
1992	PE04E-5700007	PE040-NM700004
1993	PE04E-5800005	PE040-PM800002
1994	PE04E-5900001	PE040-RM900001
1995	PE04E-5950001	PE040-SM000001
1996	PE04E-6000001	PE040-TM000001
1997	PE04E-7000001	PE040-VM200001
1998		
49 states	PE04E-8100001 (1)	PE040-WM300001 (2)
California	PE04E-8000001	PE041-WM300001 (3)
1999		
49 states	PE04E-8100001	PE040-XK500001
California	PE04E-8100001	PE041-XK500001
2000		
49 states	PE04E-8100001	PE040-YK600001
California	PE04E-8100001	PE041-YK600001

(1) Or PE04E-8000001.

(2) Or PE040-WK4000001.

(3) Or PE041-WK4000001.



The engine serial number is located on the left side of the crankcase

General specifications

Bore	
XL600R	100.0 mm (3.94 inches)
XR600R	97.0 mm (3.82 inches)
Stroke	
XL600R	75.0 mm (2.95 inches)
XR600R	80.0 mm (3.15 inches)
Compression ratio	
XL600R	
1983 and 1984	8.6 to 1
1985 on	9.0 to 1
XR600R	9.0 to 1
Horsepower	
XL600R	43 at 6000 rpm
XR600R	
1985 through 1987	45 at 6500 rpm
1988 on	not specified
Wheelbase	
XL600R	1420 mm (55.9 inches)
XR600R	
1985 through 1987	1450 mm (57.1 inches)
1988 through 1990	1460 mm (57.5 inches)
1991 on	1455 mm (57.3 inches)
Overall length	
XL600R	2170 mm (85.4 inches)
XR600R	
1985 through 1987	2145 mm (84.4 inches)
1988 on	2160 mm (85.0 inches)
Overall width	
XL600R	865 mm (34.1 inches)
XR600R	
1985 through 1987	910 mm (35.8 inches)
1988 on	900 mm (35.5 inches)
Overall height	
XL600R	1235 mm (48.6 inches)
XR600R	
1985 through 1987	1205 mm (47.4 inches)
1988 through 1990	1220 mm (48.0 inches)
1991	1230 mm (48.4 inches)
1992 on	1215 mm (47.8 inches)
Seat height	
XL600R	860 mm (33.9 inches)
XR600R	
1985 through 1990	940 mm (37.0 inches)
1991 on	955 mm (37.6 inches)
Ground clearance	
XL600R	not specified
XR600R	
1985 through 1990	320 mm (12.6 inches)
1991 on	345 mm (13.6 inches)
Dry weight	
XL600R	134 kg (295 lbs)
XR600R	
1985 through 1987	124 kg (267 lbs)
1988 through 1990	119 kg (262 lbs)
1991	122 kg (269 lbs)
1992-on (except 1998-on California)	123 kg (271 lbs)
1998-on California	124 kg (273 lbs)

Maintenance techniques, tools and working facilities

Basic maintenance techniques

There are a number of techniques involved in maintenance and repair that will be referred to throughout this manual. Application of these techniques will enable the amateur mechanic to be more efficient, better organized and capable of performing the various tasks properly, which will ensure that the repair job is thorough and complete.

Fastening systems

Fasteners, basically, are nuts, bolts and screws used to hold two or more parts together. There are a few things to keep in mind when working with fasteners. Almost all of them use a locking device of some type (either a lock washer, locknut, locking tab or thread adhesive). All threaded fasteners should be clean, straight, have undamaged threads and undamaged corners on the hex head where the wrench fits. Develop the habit of replacing all damaged nuts and bolts with new ones.

Rusted nuts and bolts should be treated with a penetrating oil to ease removal and prevent breakage. Some mechanics use turpentine in a spout type oil can, which works quite well. After applying the rust penetrant, let it work for a few minutes before trying to loosen the nut or bolt. Badly rusted fasteners may have to be chiseled off or removed with a special nut breaker, available at tool stores.

If a bolt or stud breaks off in an assembly, it can be drilled out and removed with a special tool called an E-Z out (or screw extractor). Most dealer service departments and motorcycle repair shops can perform this task, as well as others (such as the repair of threaded holes that have been stripped out).

Flat washers and lock washers, when removed from an assembly, should always be replaced exactly as removed. Replace any damaged washers with new ones. Always use a flat washer between a lock washer and any soft metal surface (such as aluminum), thin sheet metal or plastic. Special locknuts can only be used once or twice before they lose their locking ability and must be replaced.

Tightening sequences and procedures

When threaded fasteners are tightened, they are often tightened to a specific torque value (torque is basically a twisting force). Over-tightening the fastener can weaken it and cause it to break, while under-tightening can cause it to eventually come loose. Each bolt, depending on the material it's made of, the diameter of its shank and the material it is threaded into, has a specific torque value, which is noted in the Specifications. Be sure to follow the torque recommendations closely.

Fasteners laid out in a pattern (i.e. cylinder head bolts, engine case bolts, etc.) must be loosened or tightened in a sequence to avoid warping the component. Initially, the bolts/nuts should go on finger tight only. Next, they should be tightened one full turn each, in a criss-cross or diagonal pattern. After each one has been tightened one full turn, return to the first one tightened and tighten them all one half turn, following the same pattern. Finally, tighten each of them one quarter turn at a time until each fastener has been tightened to the proper torque. To loosen and remove the fasteners the procedure would be reversed.

Disassembly sequence

Component disassembly should be done with care and purpose to help ensure that the parts go back together properly during reassembly. Always keep track of the sequence in which parts are removed. Take note of special characteristics or marks on parts that can be installed more than one way (such as a grooved thrust washer on a shaft). It's a good idea to lay the disassembled parts out on a clean surface in the order that they were removed. It may also be help-

ful to make sketches or take instant photos of components before removal.

When removing fasteners from a component, keep track of their locations. Sometimes threading a bolt back in a part, or putting the washers and nut back on a stud, can prevent mix-ups later. If nuts and bolts can't be returned to their original locations, they should be kept in a compartmented box or a series of small boxes. A cupcake or muffin tin is ideal for this purpose, since each cavity can hold the bolts and nuts from a particular area (i.e. engine case bolts, valve cover bolts, engine mount bolts, etc.). A pan of this type is especially helpful when working on assemblies with very small parts (such as the carburetors and the valve train). The cavities can be marked with paint or tape to identify the contents.

Whenever wiring looms, harnesses or connectors are separated, it's a good idea to identify the two halves with numbered pieces of masking tape so they can be easily reconnected.

Gasket sealing surfaces

Throughout any motorcycle, gaskets are used to seal the mating surfaces between components and keep lubricants, fluids, vacuum or pressure contained in an assembly.

Many times these gaskets are coated with a liquid or paste type gasket sealing compound before assembly. Age, heat and pressure can sometimes cause the two parts to stick together so tightly that they are very difficult to separate. In most cases, the part can be loosened by striking it with a soft-faced hammer near the mating surfaces. A regular hammer can be used if a block of wood is placed between the hammer and the part. Do not hammer on cast parts or parts that could be easily damaged. With any particularly stubborn part, always recheck to make sure that every fastener has been removed.

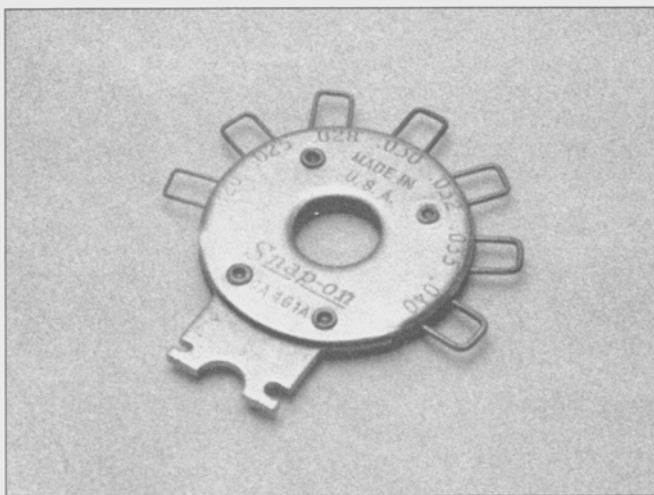
Avoid using a screwdriver or bar to pry apart components, as they can easily mar the gasket sealing surfaces of the parts (which must remain smooth). If prying is absolutely necessary, use a piece of wood, but keep in mind that extra clean-up will be necessary if the wood splinters.

After the parts are separated, the old gasket must be carefully scraped off and the gasket surfaces cleaned. Stubborn gasket material can be soaked with a gasket remover (available in aerosol cans) to soften it so it can be easily scraped off. A scraper can be fashioned from a piece of copper tubing by flattening and sharpening one end. Copper is recommended because it is usually softer than the surfaces to be scraped, which reduces the chance of gouging the part. Some gaskets can be removed with a wire brush, but regardless of the method used, the mating surfaces must be left clean and smooth. If for some reason the gasket surface is gouged, then a gasket sealer thick enough to fill scratches will have to be used during reassembly of the components. For most applications, a non-drying (or semi-drying) gasket sealer is best.

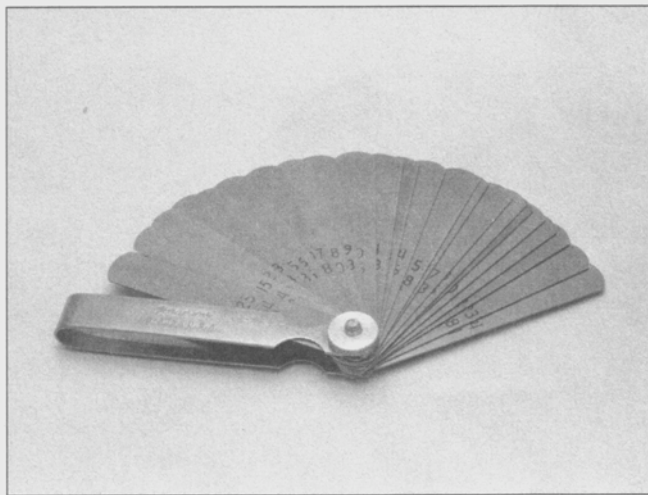
Hose removal tips

Hose removal precautions closely parallel gasket removal precautions. Avoid scratching or gouging the surface that the hose mates against or the connection may leak. Because of various chemical reactions, the rubber in hoses can bond itself to the metal spigot that the hose fits over. To remove a hose, first loosen the hose clamps that secure it to the spigot. Then, with slip joint pliers, grab the hose at the clamp and rotate it around the spigot. Work it back and forth until it is completely free, then pull it off (silicone or other lubricants will ease removal if they can be applied between the hose and the outside of the spigot). Apply the same lubricant to the inside of the hose and the outside of the spigot to simplify installation.

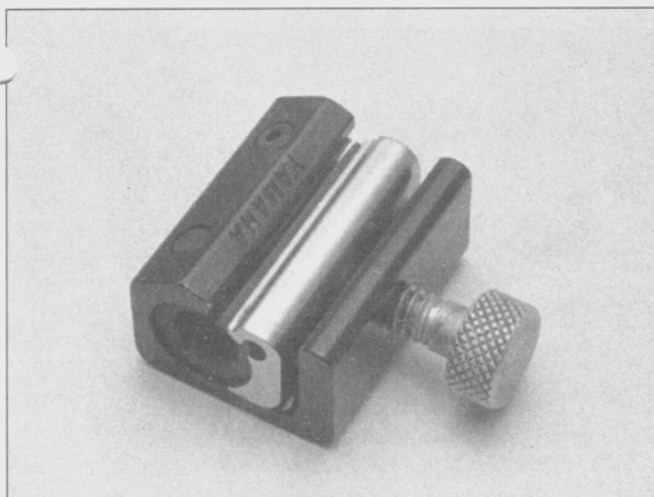
If a hose clamp is broken or damaged, do not reuse it. Also, do not reuse hoses that are cracked, split or torn.



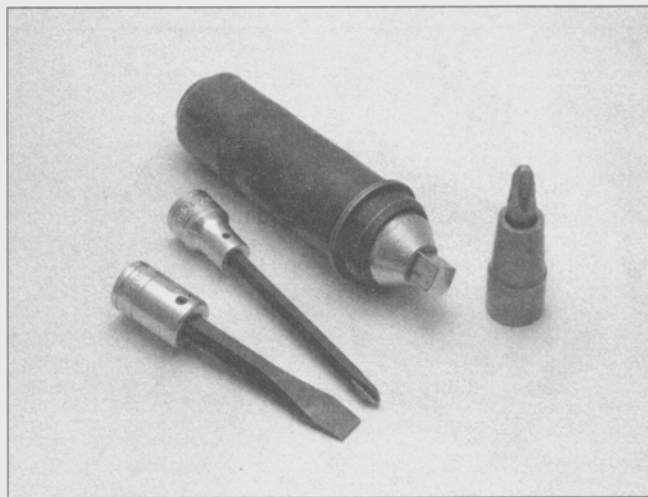
Spark plug gap adjusting tool



Feeler gauge set



Control cable pressure luber



Hand impact screwdriver and bits

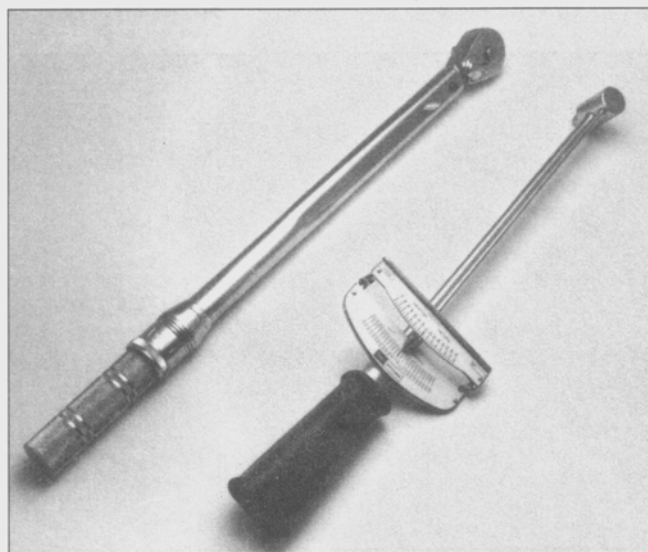
Tools

A selection of good tools is a basic requirement for anyone who plans to maintain and repair a motorcycle. For the owner who has few tools, if any, the initial investment might seem high, but when compared to the spiraling costs of routine maintenance and repair, it is a wise one.

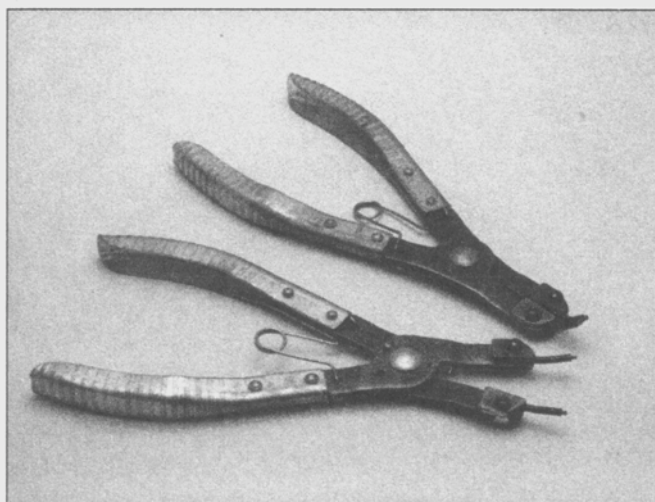
To help the owner decide which tools are needed to perform the tasks detailed in this manual, the following tool lists are offered: Maintenance and minor repair, Repair and overhaul and Special. The newcomer to practical mechanics should start off with the Maintenance and minor repair tool kit, which is adequate for the simpler jobs. Then, as confidence and experience grow, the owner can tackle more difficult tasks, buying additional tools as they are needed. Eventually the basic kit will be built into the Repair and overhaul tool set. Over a period of time, the experienced do-it-yourselfer will assemble a tool set complete enough for most repair and overhaul procedures and will add tools from the Special category when it is felt that the expense is justified by the frequency of use.

Maintenance and minor repair tool kit

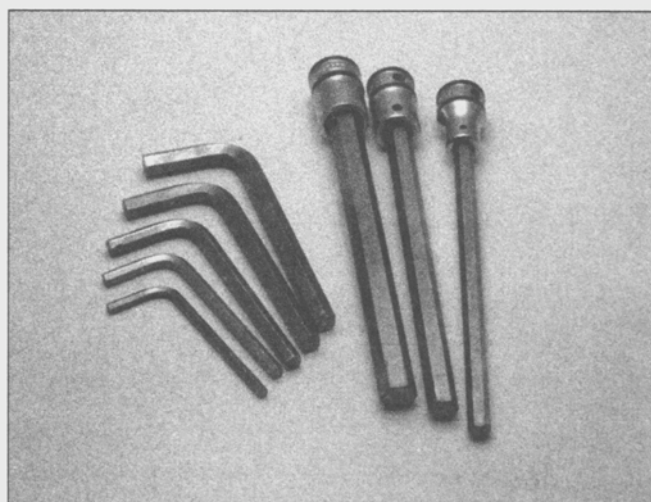
The tools in this list should be considered the minimum required for performance of routine maintenance, servicing and minor repair work. We recommend the purchase of combination wrenches (box end and open end combined in one wrench); while more expensive than



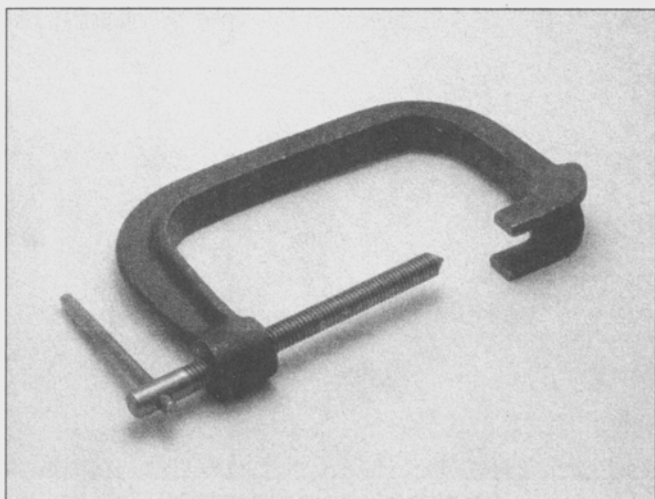
Torque wrenches (left - click; right - beam type)



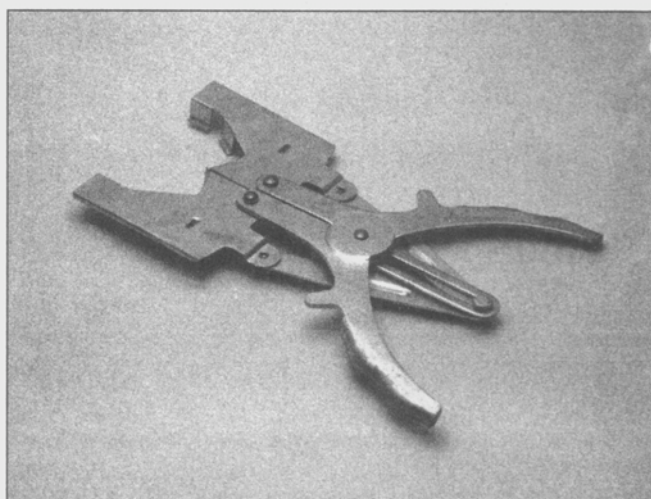
Snap-ring pliers (top - external; bottom - internal)



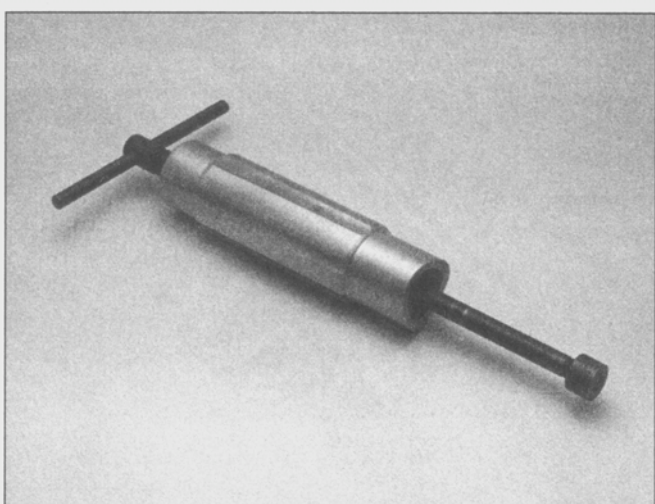
Allen wrenches (left), and Allen head sockets (right)



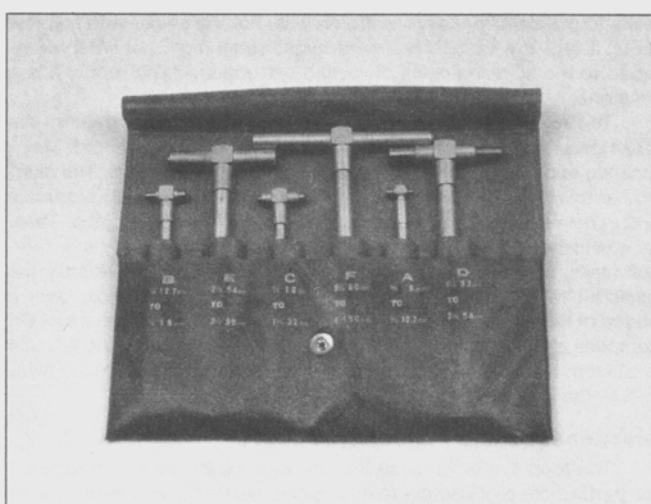
Valve spring compressor



Piston ring removal/installation tool



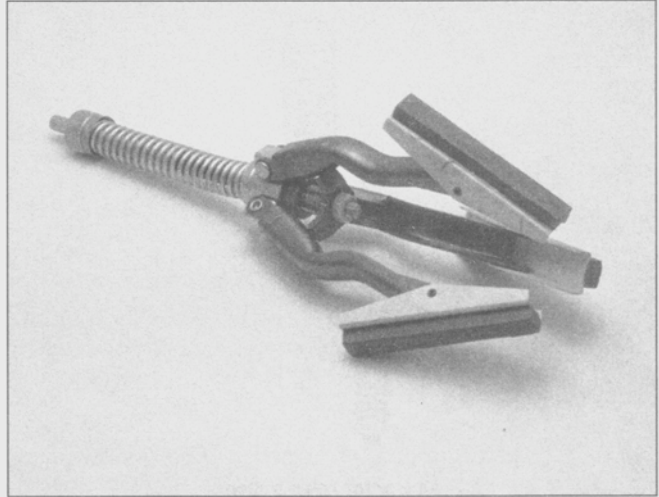
Piston pin puller



Telescoping gauges



0-to-1 inch micrometer



Cylinder surfacing hone



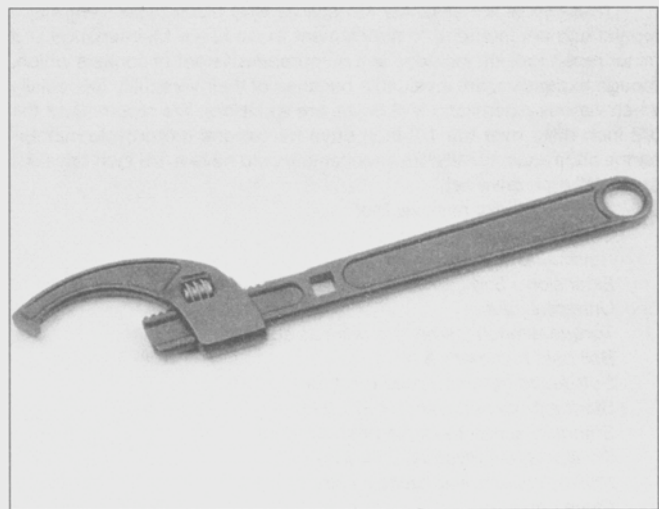
Cylinder compression gauge



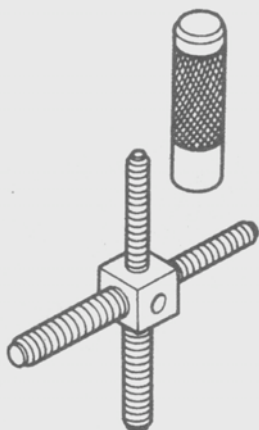
Dial indicator set



Multimeter (volt/ohm/ammeter)



Adjustable spanner



Alternator rotor puller

open-ended ones, they offer the advantages of both types of wrench.

Combination wrench set (6 mm to 22 mm)
Adjustable wrench - 8 in
Spark plug socket (with rubber insert)
Spark plug gap adjusting tool
Feeler gauge set
Standard screwdriver (5/16 in x 6 in)
Phillips screwdriver (No. 2 x 6 in)
Allen (hex) wrench set (4 mm to 12 mm)
Combination (slip-joint) pliers - 6 in
Hacksaw and assortment of blades
Tire pressure gauge
Control cable pressure luber
Grease gun
Oil can
Fine emery cloth
Wire brush
Hand impact screwdriver and bits
Funnel (medium size)
Safety goggles
Drain pan
Work light with extension cord

Repair and overhaul tool set

These tools are essential for anyone who plans to perform major repairs and are intended to supplement those in the Maintenance and minor repair tool kit. Included is a comprehensive set of sockets which, though expensive, are invaluable because of their versatility (especially when various extensions and drives are available). We recommend the 3/8 inch drive over the 1/2 inch drive for general motorcycle maintenance and repair (ideally, the mechanic would have a 3/8 inch drive set and a 1/2 inch drive set).

Alternator rotor removal tool
Socket set(s)
Reversible ratchet
Extension - 6 in
Universal joint
Torque wrench (same size drive as sockets)
Ball pein hammer - 8 oz
Soft-faced hammer (plastic/rubber)
Standard screwdriver (1/4 in x 6 in)
Standard screwdriver (stubby - 5/16 in)
Phillips screwdriver (No. 3 x 8 in)
Phillips screwdriver (stubby - No. 2)
Pliers - locking
Pliers - lineman's

Pliers - needle nose
Pliers - snap-ring (internal and external)
Cold chisel - 1/2 in
Scriber
Scraper (made from flattened copper tubing)
Center punch
Pin punches (1/16, 1/8, 3/16 in)
Steel rule/straightedge - 12 in
Pin-type spanner wrench
A selection of files
Wire brush (large)

Note: Another tool which is often useful is an electric drill with a chuck capacity of 3/8 inch (and a set of good quality drill bits).

Special tools

The tools in this list include those which are not used regularly, are expensive to buy, or which need to be used in accordance with their manufacturer's instructions. Unless these tools will be used frequently, it is not very economical to purchase many of them. A consideration would be to split the cost and use between yourself and a friend or friends (i.e. members of a motorcycle club).

This list primarily contains tools and instruments widely available to the public, as well as some special tools produced by the vehicle manufacturer for distribution to dealer service departments. As a result, references to the manufacturer's special tools are occasionally included in the text of this manual. Generally, an alternative method of doing the job without the special tool is offered. However, sometimes there is no alternative to their use. Where this is the case, and the tool can't be purchased or borrowed, the work should be turned over to the dealer service department or a motorcycle repair shop.

Paddock stand (for models not fitted with a centerstand)
Valve spring compressor
Piston ring removal and installation tool
Piston pin puller
Telescoping gauges
Micrometer(s) and/or dial/Vernier calipers
Cylinder surfacing hone
Cylinder compression gauge
Dial indicator set
Multimeter
Adjustable spanner
Manometer or vacuum gauge set
Small air compressor with blow gun and tire chuck

Buying tools

For the do-it-yourselfer who is just starting to get involved in motorcycle maintenance and repair, there are a number of options available when purchasing tools. If maintenance and minor repair is the extent of the work to be done, the purchase of individual tools is satisfactory. If, on the other hand, extensive work is planned, it would be a good idea to purchase a modest tool set from one of the large retail chain stores. A set can usually be bought at a substantial savings over the individual tool prices (and they often come with a tool box). As additional tools are needed, add-on sets, individual tools and a larger tool box can be purchased to expand the tool selection. Building a tool set gradually allows the cost of the tools to be spread over a longer period of time and gives the mechanic the freedom to choose only those tools that will actually be used.

Tool stores and motorcycle dealers will often be the only source of some of the special tools that are needed, but regardless of where tools are bought, try to avoid cheap ones (especially when buying screwdrivers and sockets) because they won't last very long. There are plenty of tools around at reasonable prices, but always aim to purchase items which meet the relevant national safety standards. The expense involved in replacing cheap tools will eventually be greater than the initial cost of quality tools.

It is obviously not possible to cover the subject of tools fully here. For those who wish to learn more about tools and their use, there is a book entitled *Motorcycle Workshop Practice Manual* (Book no. 1454) available from the publishers of this manual. It also provides an intro-

duction to basic workshop practice which will be of interest to a home mechanic working on any type of motorcycle.

Care and maintenance of tools

Good tools are expensive, so it makes sense to treat them with respect. Keep them clean and in usable condition and store them properly when not in use. Always wipe off any dirt, grease or metal chips before putting them away. Never leave tools lying around in the work area.

Some tools, such as screwdrivers, pliers, wrenches and sockets, can be hung on a panel mounted on the garage or workshop wall, while others should be kept in a tool box or tray. Measuring instruments, gauges, meters, etc. must be carefully stored where they can't be damaged by weather or impact from other tools.

When tools are used with care and stored properly, they will last a very long time. Even with the best of care, tools will wear out if used frequently. When a tool is damaged or worn out, replace it; subsequent jobs will be safer and more enjoyable if you do.

Working facilities

Not to be overlooked when discussing tools is the workshop. If anything more than routine maintenance is to be carried out, some sort of suitable work area is essential.

It is understood, and appreciated, that many home mechanics do

not have a good workshop or garage available and end up removing an engine or doing major repairs outside (it is recommended, however, that the overhaul or repair be completed under the cover of a roof).

A clean, flat workbench or table of comfortable working height is an absolute necessity. The workbench should be equipped with a vise that has a jaw opening of at least four inches.

As mentioned previously, some clean, dry storage space is also required for tools, as well as the lubricants, fluids, cleaning solvents, etc. which soon become necessary.

Sometimes waste oil and fluids, drained from the engine or cooling system during normal maintenance or repairs, present a disposal problem. To avoid pouring them on the ground or into a sewage system, simply pour the used fluids into large containers, seal them with caps and take them to an authorized disposal site or service station. Plastic jugs (such as old antifreeze containers) are ideal for this purpose.

Always keep a supply of old newspapers and clean rags available. Old towels are excellent for mopping up spills. Many mechanics use rolls of paper towels for most work because they are readily available and disposable. To help keep the area under the motorcycle clean, a large cardboard box can be cut open and flattened to protect the garage or shop floor.

Whenever working over a painted surface (such as the fuel tank) cover it with an old blanket or bedspread to protect the finish.

Safety first!

Professional mechanics are trained in safe working procedures. However enthusiastic you may be about getting on with the job at hand, take the time to ensure that your safety is not put at risk. A moment's lack of attention can result in an accident, as can failure to observe simple precautions.

There will always be new ways of having accidents, and the following is not a comprehensive list of all dangers; it is intended rather to make you aware of the risks and to encourage a safe approach to all work you carry out on your bike.

Essential DOs and DON'Ts

DON'T start the engine without first ascertaining that the transmission is in neutral or the clutch is pulled in.

DON'T attempt to drain oil until you are sure it has cooled sufficiently to avoid scalding you.

DON'T grasp any part of the engine or exhaust system without first ascertaining that it is cool enough not to burn you.

DON'T allow brake fluid to contact the machine's paint work or plastic components.

DON'T siphon toxic liquids such as fuel, brake fluid or antifreeze by mouth, or allow them to remain on your skin.

DON'T inhale dust - it may be injurious to health (see *Asbestos* heading).

DON'T allow any spilled oil or grease to remain on the floor - wipe it up right away, before someone slips on it.

DON'T use ill fitting wrenches or other tools which may slip and cause injury.

DON'T attempt to lift a heavy component which may be beyond your capability - get assistance.

DON'T rush to finish a job or take unverified short cuts.

DON'T allow children or animals in or around an unattended vehicle.

DON'T inflate a tire to a pressure above the recommended maximum. Apart from over stressing the carcase and wheel rim, in extreme cases the tire may blow off forcibly.

DO ensure that the machine is supported securely at all times. This is especially important when the machine is blocked up to aid wheel or suspension removal.

DO take care when attempting to loosen a stubborn nut or bolt. It is generally better to pull on a wrench, rather than push, so that if you slip, you fall away from the machine rather than onto it.

DO wear eye protection when using power tools such as drill, sander, bench grinder etc.

DO use a barrier cream on your hands prior to undertaking dirty jobs - it will protect your skin from infection as well as making the dirt easier to remove afterwards; but make sure your hands aren't left slippery. Note that long-term contact with used engine oil can be a health hazard.

DO keep loose clothing (cuffs, ties etc. and long hair) well out of the way of moving mechanical parts.

DO remove rings, wristwatch etc., before working on the vehicle - especially the electrical system.

DO keep your work area tidy - it is only too easy to fall over articles left lying around.

DO exercise caution when compressing springs for removal or installation. Ensure that the tension is applied and released in a controlled manner, using suitable tools which preclude the possibility of the spring escaping violently.

DO ensure that any lifting tackle used has a safe working load rating adequate for the job.

DO get someone to check periodically that all is well, when working alone on the vehicle.

DO carry out work in a logical sequence and check that everything is correctly assembled and tightened afterwards.

DO remember that your motorcycle's safety affects that of yourself and others. If in doubt on any point, get professional advice.

IF, in spite of following these precautions, you are unfortunate enough to injure yourself, seek medical attention as soon as possible.

Asbestos

Certain friction, insulating, sealing and other products - such as brake pads, clutch linings, gaskets, etc. - may contain asbestos. *Extreme care must be taken to avoid inhalation of dust from such products since it is hazardous to health.* If in doubt, assume that they do contain asbestos.

Fire

Remember at all times that gasoline is highly flammable. Never smoke or have any kind of naked flame around, when working on the vehicle. But the risk does not end there - a spark caused by an electrical short-circuit, by two metal surfaces contacting each other, by careless use of tools, or even by static electricity built up in your body under certain conditions, can ignite gasoline vapor, which in a confined space is highly explosive. Never use gasoline as a cleaning solvent. Use an approved safety solvent.

Always disconnect the battery ground terminal before working on any part of the fuel or electrical system, and never risk spilling fuel on to a hot engine or exhaust.

It is recommended that a fire extinguisher of a type suitable for fuel and electrical fires is kept handy in the garage or workplace at all times. Never try to extinguish a fuel or electrical fire with water.

Fumes

Certain fumes are highly toxic and can quickly cause unconsciousness and even death if inhaled to any extent. Gasoline vapor comes into this category, as do the vapors from certain solvents such as trichloroethylene. Any draining or pouring of such volatile fluids should be done in a well ventilated area.

When using cleaning fluids and solvents, read the instructions carefully. Never use materials from unmarked containers - they may give off poisonous vapors.

Never run the engine of a motor vehicle in an enclosed space such as a garage. Exhaust fumes contain carbon monoxide which is extremely poisonous; if you need to run the engine, always do so in the open air or at least have the rear of the vehicle outside the workplace.

The battery

XL600R models are equipped with a battery. Never cause a spark, or allow a naked light near the motorcycle's battery. It will normally be giving off a certain amount of hydrogen gas, which is highly explosive.

Always disconnect the battery ground terminal before working on the fuel or electrical systems (except where noted).

Do not charge the battery at an excessive rate or the battery may burst.

Take care when cleaning or carrying the battery. The acid elec-

trolyte, even when diluted, is very corrosive and should not be allowed to contact the eyes or skin. Always wear rubber gloves and goggles or a face shield. If you ever need to prepare electrolyte yourself, always add the acid slowly to the water; never add the water to the acid.

Electricity

When using an electric power tool, inspection light etc., always ensure that the appliance is correctly connected to its plug and that, where necessary, it is properly grounded. Do not use such appliances in damp conditions and, again, beware of creating a spark or applying excessive heat in the vicinity of fuel or fuel vapor. Also ensure that the appliances meet national safety standards.

A severe electric shock can result from touching certain parts of the electrical system, such as the spark plug wire, when the engine is running or being cranked, particularly if components are damp or the insulation is defective. Where an electronic ignition system is used (as it is on all models covered by this book), the secondary voltage is much higher and could prove fatal.

Motorcycle chemicals and lubricants

A number of chemicals and lubricants are available for use in motorcycle maintenance and repair. They include a wide variety of products ranging from cleaning solvents and degreasers to lubricants and protective sprays for rubber, plastic and vinyl.

Contact point/spark plug cleaner is a solvent used to clean oily film and dirt from points, grime from electrical connectors and oil deposits from spark plugs. It is oil free and leaves no residue. It can also be used to remove gum and varnish from carburetor jets and other orifices.

Carburetor cleaner is similar to contact point/spark plug cleaner but it usually has a stronger solvent and may leave a slight oily residue. It is not recommended for cleaning electrical components or connections.

Brake system cleaner is used to remove grease or brake fluid from brake system components (where clean surfaces are absolutely necessary and petroleum-based solvents cannot be used); it also leaves no residue.

Silicone-based lubricants are used to protect rubber parts such as hoses and grommets, and are used as lubricants for hinges and locks.

Multi-purpose grease is an all purpose lubricant used wherever grease is more practical than a liquid lubricant such as oil. Some multi-purpose grease is colored white and specially formulated to be more resistant to water than ordinary grease.

Gear oil (sometimes called gear lube) is a specially designed oil used in transmissions and final drive units, as well as other areas where high friction, high temperature lubrication is required. It is available in a number of viscosities (weights) for various applications.

Motor oil, of course, is the lubricant specially formulated for use in the engine. It normally contains a wide variety of additives to prevent corrosion and reduce foaming and wear. Motor oil comes in various weights (viscosity ratings) of from 5 to 80. The recommended weight of the oil depends on the seasonal temperature and the demands on the engine. Light oil is used in cold climates and under light load conditions; heavy oil is used in hot climates and where high loads are encountered. Multi-viscosity oils are designed to have characteristics of both light and heavy oils and are available in a number of weights from 5W-20 to 20W-50.

Gas (petrol) additives perform several functions, depending on their chemical makeup. They usually contain solvents that help dissolve gum and varnish that build up on carburetor and intake parts. They also serve to break down carbon deposits that form on the inside surfaces of the combustion chambers. Some additives contain upper

cylinder lubricants for valves and piston rings.

Brake fluid is a specially formulated hydraulic fluid that can withstand the heat and pressure encountered in brake systems. Care must be taken that this fluid does not come in contact with painted surfaces or plastics. An opened container should always be resealed to prevent contamination by water or dirt.

Chain lubricants are formulated especially for use on motorcycle final drive chains. A good chain lube should adhere well and have good penetrating qualities to be effective as a lubricant inside the chain and on the side plates, pins and rollers. Most chain lubes are either the foaming type or quick drying type and are usually marketed as sprays.

Degreasers are heavy duty solvents used to remove grease and grime that may accumulate on engine and frame components. They can be sprayed or brushed on and, depending on the type, are rinsed with either water or solvent.

Solvents are used alone or in combination with degreasers to clean parts and assemblies during repair and overhaul. The home mechanic should use only solvents that are non-flammable and that do not produce irritating fumes.

Gasket sealing compounds may be used in conjunction with gaskets, to improve their sealing capabilities, or alone, to seal metal-to-metal joints. Many gasket sealers can withstand extreme heat some are impervious to gasoline and lubricants, while others are capable of filling and sealing large cavities. Depending on the intended use, gasket sealers either dry hard or stay relatively soft and pliable. They are usually applied by hand, with a brush, or are sprayed on the gasket sealing surfaces.

Thread cement is an adhesive locking compound that prevents threaded fasteners from loosening because of vibration. It is available in a variety of types for different applications.

Moisture dispersants are usually sprays that can be used to dry out electrical components such as the fuse block and wiring connectors. Some types can also be used as treatment for rubber and as a lubricant for hinges, cables and locks.

Waxes and polishes are used to help protect painted and plated surfaces from the weather. Different types of paint may require the use of different types of wax polish. Some polishes utilize a chemical or abrasive cleaner to help remove the top layer of oxidized (dull) paint on older vehicles. In recent years, many non-wax polishes (that contain a wide variety of chemicals such as polymers and silicones) have been introduced. These non-wax polishes are usually easier to apply and last longer than conventional waxes and polishes.

Troubleshooting

Contents

<i>Symptom</i>	<i>Section</i>	<i>Symptom</i>	<i>Section</i>
Engine doesn't start or is difficult to start		Gear shifting problems	
Kickstarter moves but engine won't start	1	Doesn't go into gear, or lever doesn't return	28
Kickstarter moves but engine doesn't turn over	2	Jumps out of gear	29
Kickstarter won't turn engine over (seized)	3	Overshifts	30
No fuel flow	4	Abnormal engine noise	
Engine flooded	5	Knocking or pinging	31
No spark or weak spark	6	Piston slap or rattling	32
Compression low	7	Valve noise	33
Stalls after starting	8	Other noise	34
Rough idle	9	Abnormal driveline noise	
Poor running at low speed		Clutch noise	35
Spark weak	10	Transmission noise	36
Fuel/air mixture incorrect	11	Final drive noise	37
Compression low	12	Abnormal frame and suspension noise	
Poor acceleration	13	Suspension noise	38
Poor running or no power at high speed		Brake noise	39
Firing incorrect	14	Excessive exhaust smoke	
Fuel/air mixture incorrect	15	White smoke	40
Compression low	16	Black smoke	41
Knocking or pinging	17	Brown smoke	42
Miscellaneous causes	18	Poor handling or stability	
Overheating		Handlebar hard to turn	43
Engine overheats	19	Handlebar shakes or vibrates excessively	44
Firing incorrect	20	Handlebar pulls to one side	45
Fuel/air mixture incorrect	21	Poor shock absorbing qualities	46
Compression too high	22	Braking problems	
Engine load excessive	23	Brakes are spongy or weak, don't hold	47
Lubrication inadequate	24	Brake lever or pedal pulsates	48
Miscellaneous causes	25	Brakes drag	49
Clutch problems		Electrical problems	
Clutch slipping	26	Battery dead or weak	50
Clutch not disengaging completely	27	Battery overcharged	51

Engine doesn't start or is difficult to start

1 Kickstarter moves but engine won't start

- 1 Engine kill switch Off.
- 2 Wiring open or shorted. Check all wiring connections and harnesses to make sure that they are dry, tight and not corroded. Also check for broken or frayed wires that can cause a short to ground (see wiring diagram, Chapter 8).
- 3 Engine kill switch defective. Check for wet, dirty or corroded contacts. Clean or replace the switch as necessary (Chapter 4).

2 Kickstarter moves but engine doesn't turn over

- 1 Kickstarter mechanism damaged. Inspect and repair or replace (Chapter 2).
- 2 Damaged kickstarter pinion gears. Inspect and replace the damaged parts (Chapter 2).

3 Kickstarter won't engine turn over (seized)

Seized engine caused by one or more internally damaged components. Failure due to wear, abuse or lack of lubrication. Damage can include seized valves, rocker arms, camshaft, piston, crankshaft, connecting rod bearings, or transmission gears or bearings. Refer to Chapter 2 for engine disassembly.

4 No fuel flow

- 1 No fuel in tank.
- 2 Tank cap air vent obstructed. Usually caused by dirt or water. Remove it and clean the cap vent hole.
- 3 Clogged strainer in fuel tap. Remove and clean the strainer (Chapter 1).
- 4 Fuel line clogged. Pull the fuel line loose and carefully blow through it.
- 5 Inlet needle valve clogged. A very bad batch of fuel with an unusual additive may have been used, or some other foreign material has entered the tank. Many times after a machine has been stored for many months without running, the fuel turns to a varnish-like liquid and forms deposits on the inlet needle valve and jets. The carburetor should be removed and overhauled if draining the float chamber doesn't solve the problem.

5 Engine flooded

- 1 Float level too high. Check as described in Chapter 3 and replace the float if necessary.
- 2 Inlet needle valve worn or stuck open. A piece of dirt, rust or other debris can cause the inlet needle to seat improperly, causing excess fuel to be admitted to the float bowl. In this case, the float chamber should be cleaned and the needle and seat inspected. If the needle and seat are worn, then the leaking will persist and the parts should be replaced with new ones (Chapter 3).
- 3 Starting technique incorrect. Under normal circumstances (i.e., if all the carburetor functions are sound) the machine should start with little or no throttle. When the engine is cold, the choke should be operated and the engine started without opening the throttle. When the engine is at operating temperature, only a very slight amount of throttle should be necessary. If the engine is flooded, turn the fuel tap off and hold the throttle open while cranking the engine. This will allow addi-

tional air to reach the cylinder. Remember to turn the fuel tap back on after the engine starts.

6 No spark or weak spark

- 1 Spark plug dirty, defective or worn out. Locate reason for fouled plug using spark plug condition chart and follow the plug maintenance procedures in Chapter 1.
- 2 Spark plug cap or secondary wiring faulty. Check condition. Replace either or both components if cracks or deterioration are evident (Chapter 4).
- 3 Spark plug cap not making good contact. Make sure that the plug cap fits snugly over the plug end.
- 4 Defective alternator (see Chapter 4).
- 5 CDI models: Defective CDI unit (see Chapter 4).
- 6 Ignition coil defective. Check the coil, referring to Chapter 4.
- 7 Kill switch shorted. This is usually caused by water, corrosion, damage or excessive wear. The kill switch can be disassembled and cleaned with electrical contact cleaner. If cleaning does not help, replace the switch (Chapter 4).
- 8 Wiring shorted or broken between:
 - a) CDI unit and engine kill switch
 - b) CDI unit and ignition coil
 - c) CDI unit and alternator
 - d) Ignition coil and plug

Make sure that all wiring connections are clean, dry and tight. Look for chafed and broken wires (Chapter 4).

7 Compression low

- 1 Spark plug loose. Remove the plug and inspect the threads. Rein-stall and tighten to the specified torque (Chapter 1).
- 2 Cylinder head not sufficiently tightened down. If the cylinder head is suspected of being loose, then there's a chance that the gasket or head is damaged if the problem has persisted for any length of time. The head nuts and bolts should be tightened to the proper torque in the correct sequence (Chapter 2).
- 3 Improper valve clearance. This means that the valve is not closing completely and compression pressure is leaking past the valve. Check and adjust the valve clearances (Chapter 1).
- 4 Cylinder and/or piston worn. Excessive wear will cause compression pressure to leak past the rings. This is usually accompanied by worn rings as well. A top end overhaul is necessary (Chapter 2).
- 5 Piston rings worn, weak, broken, or sticking. Broken or sticking piston rings usually indicate a lubrication or carburetion problem that causes excess carbon deposits or seizures to form on the pistons and rings. Top end overhaul is necessary (Chapter 2).
- 6 Piston ring-to-groove clearance excessive. This is caused by excessive wear of the piston ring lands. Piston replacement is necessary (Chapter 2).
- 7 Cylinder head gasket damaged. If the head is allowed to become loose, or if excessive carbon build-up on a piston crown and combustion chamber causes extremely high compression, the head gasket may leak. Retorquing the head is not always sufficient to restore the seal, so gasket replacement is necessary (Chapter 2).
- 8 Cylinder head warped. This is caused by overheating or improperly tightened head nuts and bolts. Machine shop resurfacing or head replacement is necessary (Chapter 2).
- 9 Valve spring broken or weak. Caused by component failure or wear; the spring(s) must be replaced (Chapter 2).
- 10 Valve not seating properly. This is caused by a bent valve (from over-revving or improper valve adjustment), burned valve or seat (improper carburetion) or an accumulation of carbon deposits on the seat (from carburetion or lubrication problems). The valves must be cleaned and/or replaced and the seats serviced if possible (Chapter 2).

8 Stalls after starting

- 1 Improper choke action. Make sure the choke lever is getting a full stroke and staying in the out position.
- 2 Ignition malfunction. See Chapter 4.
- 3 Carburetor malfunction. See Chapter 3.
- 4 Fuel contaminated. The fuel can be contaminated with either dirt or water, or can change chemically if the machine is allowed to sit for several months or more. Drain the tank and float bowl and refill with fresh fuel (Chapter 3).
- 5 Intake air leak. Check for a loose carburetor-to-intake joint connection or a loose carburetor top (Chapter 3).
- 6 Engine idle speed incorrect. Turn the throttle stop screw until the engine idles at the specified rpm (Chapter 1).

9 Rough idle

- 1 Ignition malfunction. See Chapter 4.
- 2 Idle speed incorrect. See Chapter 1.
- 3 Carburetor malfunction. See Chapter 3.
- 4 Idle fuel/air mixture incorrect. See Chapter 3.
- 5 Fuel contaminated. The fuel can be contaminated with either dirt water, or can change chemically if the machine is allowed to sit for several months or more. Drain the tank and float bowls (Chapter 3).
- 6 Intake air leak. Check for a loose carburetor-to-intake joint connection, a loose or missing vacuum gauge access port cap or hose, or a loose carburetor top (Chapter 3).
- 7 Air cleaner clogged. Service or replace the air cleaner element (Chapter 1).

Poor running at low speed

10 Spark weak

- 1 Spark plug fouled, defective or worn out. Refer to Chapter 1 for spark plug maintenance.
- 2 Spark plug cap or secondary wiring defective. Refer to Chapters 1 and 4 for details on the ignition system.
- 3 Spark plug cap not making contact.
- 4 Incorrect spark plug. Wrong type, heat range or cap configuration. Check and install correct plug listed in Chapter 1. A cold plug or one with a recessed firing electrode will not operate at low speeds without fouling.
- 5 CDI unit defective. See Chapter 4.
- 6 Alternator defective. See Chapter 4.
- 7 Ignition coil defective. See Chapter 4.

11 Fuel/air mixture incorrect

- 1 Pilot screw out of adjustment (Chapter 3).
- 2 Pilot jet or air passage clogged. Remove and overhaul the carburetor (Chapter 3).
- 3 Air bleed holes clogged. Remove carburetor and blow out all passages (Chapter 3).
- 4 Air cleaner clogged, poorly sealed or missing.
- 5 Air cleaner-to-carburetor boot poorly sealed. Look for cracks, holes or loose clamps and replace or repair defective parts.
- 6 Float level too high or too low. Check and replace the float if necessary (Chapter 3).
- 7 Fuel tank air vent obstructed. Make sure that the air vent passage in the filler cap is open.
- 8 Carburetor intake joint loose. Check for cracks, breaks, tears or loose clamps or bolts. Repair or replace the rubber boot and its O-ring.

12 Compression low

- 1 Spark plug loose. Remove the plug and inspect the threads. Reinstall and tighten it to the specified torque (Chapter 1).
- 2 Cylinder head not sufficiently tightened down. If the cylinder head is suspected of being loose, then there's a chance that the gasket and head are damaged if the problem has persisted for any length of time. The head nuts should be tightened to the proper torque in the correct sequence (Chapter 2).
- 3 Improper valve clearance. This means that the valve is not closing completely and compression pressure is leaking past the valve. Check and adjust the valve clearances (Chapter 1).
- 4 Cylinder and/or piston worn. Excessive wear will cause compression pressure to leak past the rings. This is usually accompanied by worn rings as well. A top end overhaul is necessary (Chapter 2).
- 5 Piston rings worn, weak, broken, or sticking. Broken or sticking piston rings usually indicate a lubrication or carburetion problem that causes excess carbon deposits or seizures to form on the piston and rings. Top end overhaul is necessary (Chapter 2).
- 6 Piston ring-to-groove clearance excessive. This is caused by excessive wear of the piston ring lands. Piston replacement is necessary (Chapter 2).
- 7 Cylinder head gasket damaged. If the head is allowed to become loose, or if excessive carbon build-up on the piston crown and combustion chamber causes extremely high compression, the head gasket may leak. Retorquing the head is not always sufficient to restore the seal, so gasket replacement is necessary (Chapter 2).
- 8 Cylinder head warped. This is caused by overheating or improperly tightened head nuts and bolts. Machine shop resurfacing or head replacement is necessary (Chapter 2).
- 9 Valve spring broken or weak. Caused by component failure or wear; the spring(s) must be replaced (Chapter 2).
- 10 Valve not seating properly. This is caused by a bent valve (from over-revving or improper valve adjustment), burned valve or seat (improper carburetion) or an accumulation of carbon deposits on the seat (from carburetion, lubrication problems). The valves must be cleaned and/or replaced and the seats serviced if possible (Chapter 2).

13 Poor acceleration

- 1 Carburetor leaking or dirty. Overhaul the carburetor (Chapter 3).
- 2 Timing not advancing. The spark advancer (breaker point models) or CDI unit (CDI models) may be defective. If so, they must be replaced with new ones, as they can't be repaired.
- 3 Engine oil viscosity too high. Using a heavier oil than that recommended in Chapter 1 can damage the oil pump or lubrication system and cause drag on the engine.
- 4 Brakes dragging. Usually caused by a sticking caliper piston (disc brakes) or brake cam (drum brakes), by a warped disc or drum or by a bent axle. Repair as necessary (Chapter 6).

Poor running or no power at high speed

14 Firing incorrect

- 1 Air cleaner restricted. Clean or replace element (Chapter 1).
- 2 Spark plug fouled, defective or worn out. See Chapter 1 for spark plug maintenance.
- 3 Spark plug cap or secondary wiring defective. See Chapters 1 and 4 for details of the ignition system.
- 4 Spark plug cap not in good contact. See Chapter 4.
- 5 Incorrect spark plug. Wrong type, heat range or cap configuration. Check and install correct plugs listed in Chapter 1. A cold plug or one with a recessed firing electrode will not operate at low speeds

without fouling.

- 6 CDI unit defective. See Chapter 4.
- 7 Ignition coil defective. See Chapter 4.

15 Fuel/air mixture incorrect

- 1 Pilot screw out of adjustment. See Chapter 3 for adjustment procedures.
- 2 Main jet clogged. Dirt, water or other contaminants can clog the main jets. Clean the fuel tap strainer, the float bowl area, and the jets and carburetor orifices (Chapter 3).
- 3 Main jet wrong size. The standard jetting is for sea level atmospheric pressure and oxygen content. See Chapter 3 for high altitude adjustments.
- 4 Throttle shaft-to-carburetor body clearance excessive. Refer to Chapter 3 for inspection and part replacement procedures.
- 5 Air bleed holes clogged. Remove and overhaul carburetor (Chapter 3).
- 6 Air cleaner clogged, poorly sealed, or missing.
- 7 Air cleaner-to-carburetor boot poorly sealed. Look for cracks, holes or loose clamps, and replace or repair defective parts.
- 8 Float level too high or too low. Check float level and replace the float if necessary (Chapter 3).
- 9 Fuel tank air vent obstructed. Make sure the air vent passage in the filler cap is open.
- 10 Carburetor intake manifold loose. Check for cracks, breaks, tears or loose clamps or bolts. Repair or replace the rubber boots (Chapter 3).
- 11 Fuel tap clogged. Remove the tap and clean it (Chapter 1).
- 12 Fuel line clogged. Pull the fuel line loose and carefully blow through it.

16 Compression low

- 1 Spark plug loose. Remove the plug and inspect the threads. Reinstall and tighten it to the specified torque (Chapter 1).
- 2 Cylinder head not sufficiently tightened down. If the cylinder head is suspected of being loose, then there's a chance that the gasket and head are damaged if the problem has persisted for any length of time. The head nuts and bolts should be tightened to the proper torque in the correct sequence (Chapter 2).
- 3 Improper valve clearance. This means that the valve is not closing completely and compression pressure is leaking past the valve. Check and adjust the valve clearances (Chapter 1).
- 4 Cylinder and/or piston worn. Excessive wear will cause compression pressure to leak past the rings. This is usually accompanied by worn rings as well. A top end overhaul is necessary (Chapter 2).
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- 6 Piston ring-to-groove clearance excessive. This is caused by excessive wear of the piston ring lands. Piston replacement is necessary (Chapter 2).
- 7 Cylinder head gasket damaged. If a head is allowed to become loose, or if excessive carbon build-up on the piston crown and combustion chamber causes extremely high compression, the head gasket may leak. Retorquing the head is not always sufficient to restore the seal, so gasket replacement is necessary (Chapter 2).
- 8 Cylinder head warped. This is caused by overheating or an improperly tightened head nuts and bolts. Machine shop resurfacing or head replacement is necessary (Chapter 2).
- 9 Valve spring broken or weak. Caused by component failure or wear; the spring(s) must be replaced (Chapter 2).
- 10 Valve not seating properly. This is caused by a bent valve (from over-revving or improper valve adjustment), burned valve or seat (improper carburetion) or an accumulation of carbon deposits on the

seat (from carburetion or lubrication problems). The valves must be cleaned and/or replaced and the seats serviced if possible (Chapter 2).

17 Knocking or pinging

- 1 Carbon build-up in combustion chamber. Use of a fuel additive that will dissolve the adhesive bonding the carbon particles to the crown and chamber is the easiest way to remove the build-up. Otherwise, the cylinder head will have to be removed and decarbonized (Chapter 2).
- 2 Incorrect or poor quality fuel. Old or improper grades of fuel can cause detonation. This causes the piston to rattle, thus the knocking or pinging sound. Drain old fuel and always use the recommended fuel grade.
- 3 Spark plug heat range incorrect. Uncontrolled detonation indicates the plug heat range is too hot. The plug in effect becomes a glow plug, raising cylinder temperatures. Install the proper heat range plug (Chapter 1).
- 4 Improper air/fuel mixture. This will cause the cylinder to run hot, which leads to detonation. Clogged jets or an air leak can cause this imbalance. See Chapter 3.

18 Miscellaneous causes

- 1 Throttle valve doesn't open fully. Adjust the cable slack (Chapter 1).
- 2 Clutch slipping. May be caused by improper adjustment or loose or worn clutch components. Refer to Chapter 1 for adjustment or Chapter 2 for cable replacement and clutch overhaul procedures.
- 3 Timing not advancing.
- 4 Engine oil viscosity too high. Using a heavier oil than the one recommended in Chapter 1 can damage the oil pump or lubrication system and cause drag on the engine.
- 5 Brakes dragging. Usually caused by debris which has entered the brake piston sealing boot, or from a warped disc or bent axle. Repair as necessary.

Overheating

19 Engine overheats

- 1 Engine oil level low. Check and add oil (Chapter 1).
- 2 Wrong type of oil. If you're not sure what type of oil is in the engine, drain it and fill with the correct type (Chapter 1).
- 3 Air leak at carburetor intake manifold. Check and tighten or replace as necessary (Chapter 3).
- 4 Fuel level low. Check and adjust if necessary (Chapter 3).
- 5 Worn oil pump or clogged oil passages. Replace pump or clean passages as necessary.
- 6 Clogged external oil line. Remove and check for foreign material (see Chapter 2).
- 7 Carbon build-up in combustion chambers. Use of a fuel additive that will dissolve the adhesive bonding the carbon particles to the piston crown and chambers is the easiest way to remove the build-up. Otherwise, the cylinder head will have to be removed and decarbonized (Chapter 2).
- 8 Operation in high ambient temperatures.

20 Firing incorrect

- 1 Spark plug fouled, defective or worn out. See Chapter 1 for spark plug maintenance.
- 2 Incorrect spark plug (see Chapter 1).
- 3 Faulty ignition coil (Chapter 4).

21 Fuel/air mixture incorrect

- 1 Pilot screw out of adjustment (Chapter 3).
- 2 Main jet clogged. Dirt, water and other contaminants can clog the main jets. Clean the fuel tap strainer, the float bowl area and the jets and carburetor orifices (Chapter 3).
- 3 Main jet wrong size. The standard jetting is for sea level atmospheric pressure and oxygen content. See Chapter 3 for high altitude settings.
- 4 Air cleaner poorly sealed or missing.
- 5 Air cleaner-to-carburetor boot poorly sealed. Look for cracks, holes or loose clamps and replace or repair.
- 6 Fuel level too low. Check float level and replace the float if necessary (Chapter 3).
- 7 Fuel tank air vent obstructed. Make sure that the air vent passage in the filler cap is open.
- 8 Carburetor intake manifold loose. Check for cracks or loose clamps or bolts. Inspect the gasket and O-ring (Chapter 3).

22 Compression too high

- 1 Carbon build-up in combustion chamber. Use of a fuel additive that will dissolve the adhesive bonding the carbon particles to the piston crown and chamber is the easiest way to remove the build-up. Otherwise, the cylinder head will have to be removed and decarbonized (Chapter 2).
- 2 Improperly machined head surface or installation of incorrect gasket during engine assembly.

23 Engine load excessive

- 1 Clutch slipping. Can be caused by damaged, loose or worn clutch components. Refer to Chapter 2 for overhaul procedures.
- 2 Engine oil level too high. The addition of too much oil will cause pressurization of the crankcase and inefficient engine operation. Check the Specifications and drain to the proper level (Chapter 1).
- 3 Engine oil viscosity too high. Using a heavier oil than the one recommended in Chapter 1 can damage the oil pump or lubrication system as well as cause drag on the engine.
- 4 Brakes dragging. Usually caused by a sticking caliper piston (disc brakes), brake cam (drum brakes), by a warped disc or drum or by a bent axle. Repair as necessary (Chapter 6).

24 Lubrication inadequate

- 1 Engine oil level too low. Friction caused by intermittent lack of lubrication or from oil that is overworked can cause overheating. The oil provides a definite cooling function in the engine. Check the oil level (Chapter 1).
- 2 Poor quality engine oil or incorrect viscosity or type. Oil is rated not only according to viscosity but also according to type. Some oils are not rated high enough for use in this engine. Check the Specifications section and change to the correct oil (Chapter 1).
- 3 Camshaft or journals worn. Excessive wear causing drop in oil pressure. Replace cam or cylinder head. Abnormal wear could be caused by oil starvation at high rpm from low oil level or improper viscosity or type of oil (Chapter 1).
- 4 Crankshaft and/or bearings worn. Same problems as paragraph 3. Check and replace crankshaft assembly if necessary (Chapter 2).

25 Miscellaneous causes

Modification to exhaust system. Most aftermarket exhaust sys-

tems cause the engine to run leaner, which makes it run hotter. When installing an accessory exhaust system, always rejet the carburetor.

Clutch problems

26 Clutch slipping

- 1 Friction plates worn or warped. Overhaul the clutch (Chapter 2).
- 2 Steel plates worn or warped (Chapter 2).
- 3 Clutch spring(s) broken or weak. Old or heat-damaged spring(s) (from slipping clutch) should be replaced with new ones (Chapter 2).
- 4 Clutch release mechanism defective. Replace any defective parts (Chapter 2).
- 5 Clutch center or housing unevenly worn. This causes improper engagement of the plates. Replace the damaged or worn parts (Chapter 2).

27 Clutch not disengaging completely

- 1 Clutch improperly adjusted (see Chapter 1).
- 2 Clutch plates warped or damaged. This will cause clutch drag, which in turn will cause the machine to creep. Overhaul the clutch assembly (Chapter 2).
- 3 Sagged or broken clutch spring(s). Check and replace the spring(s) (Chapter 2).
- 4 Engine oil deteriorated. Old, thin, worn out oil will not provide proper lubrication for the discs, causing the clutch to drag. Replace the oil and filter (Chapter 1).
- 5 Engine oil viscosity too high. Using a thicker oil than recommended in Chapter 1 can cause the clutch plates to stick together, putting a drag on the engine. Change to the correct viscosity oil (Chapter 1).
- 6 Clutch housing seized on shaft. Lack of lubrication, severe wear or damage can cause the housing to seize on the shaft. Overhaul of the clutch, and perhaps transmission, may be necessary to repair the damage (Chapter 2).
- 7 Clutch release mechanism defective. Worn or damaged release mechanism parts can stick and fail to apply force to the pressure plate. Overhaul the release mechanism (Chapter 2).
- 8 Loose clutch center snap-ring. Causes housing and center misalignment putting a drag on the engine. Engagement adjustment continually varies. Overhaul the clutch assembly (Chapter 2).

Gear shifting problems

28 Doesn't go into gear, or lever doesn't return

- 1 Clutch not disengaging. See Section 27.
- 2 Shift fork(s) bent or seized. May be caused by lack of lubrication. Overhaul the transmission (Chapter 2).
- 3 Gear(s) stuck on shaft. Most often caused by a lack of lubrication or excessive wear in transmission bearings and bushings. Overhaul the transmission (Chapter 2).
- 4 Shift drum binding. Caused by lubrication failure or excessive wear. Replace the drum and bearing (Chapter 2).
- 5 Shift lever return spring weak or broken (Chapter 2).
- 6 Shift lever broken. Splines stripped out of lever or shaft, caused by allowing the lever to get loose. Replace necessary parts (Chapter 2).
- 7 Shift mechanism pawls broken or worn. Full engagement and rotary movement of shift drum results. Replace shaft assembly (Chapter 2).
- 8 Pawl spring broken. Allows pawl to float, causing sporadic shift operation. Replace spring (Chapter 2).

29 Jumps out of gear

- 1 Shift fork(s) worn. Overhaul the transmission (Chapter 2).
- 2 Gear groove(s) worn. Overhaul the transmission (Chapter 2).
- 3 Gear dogs or dog slots worn or damaged. The gears should be inspected and replaced. No attempt should be made to service the worn parts.

30 Overshifts

- 1 Pawl spring weak or broken (Chapter 2).
- 2 Shift drum stopper lever not functioning (Chapter 2).

Abnormal engine noise

31 Knocking or pinging

- 1 Carbon build-up in combustion chamber. Use of a fuel additive that will dissolve the adhesive bonding the carbon particles to the piston crown and chamber is the easiest way to remove the build-up. Otherwise, the cylinder head will have to be removed and decarbonized (Chapter 2).
- 2 Incorrect or poor quality fuel. Old or improper fuel can cause detonation. This causes the piston to rattle, thus the knocking or pinging sound. Drain the old fuel (Chapter 3) and always use the recommended grade fuel (Chapter 1).
- 3 Spark plug heat range incorrect. Uncontrolled detonation indicates that the plug heat range is too hot. The plug in effect becomes a glow plug, raising cylinder temperatures. Install the proper heat range plug (Chapter 1).
- 4 Improper air/fuel mixture. This will cause the cylinder to run hot and lead to detonation. Clogged jets or an air leak can cause this imbalance. See Chapter 3.

32 Piston slap or rattling

- 1 Cylinder-to-piston clearance excessive. Caused by improper assembly. Inspect and overhaul top end parts (Chapter 2).
- 2 Connecting rod bent. Caused by over-revving, trying to start a badly flooded engine or from ingesting a foreign object into the combustion chamber. Replace the damaged parts (Chapter 2).
- 3 Piston pin or piston pin bore worn or seized from wear or lack of lubrication. Replace damaged parts (Chapter 2).
- 4 Piston ring(s) worn, broken or sticking. Overhaul the top end (Chapter 2).
- 5 Piston seizure damage. Usually from lack of lubrication or overheating. Replace the pistons and bore the cylinder, as necessary (Chapter 2).
- 6 Connecting rod upper or lower end clearance excessive. Caused by excessive wear or lack of lubrication. Replace worn parts.

33 Valve noise

- 1 Incorrect valve clearances. Adjust the clearances by referring to Chapter 1.
- 2 Valve spring broken or weak. Check and replace weak valve springs (Chapter 2).
- 3 Camshaft or cylinder head worn or damaged. Lack of lubrication at high rpm is usually the cause of damage. Insufficient oil or failure to change the oil at the recommended intervals are the chief causes.

34 Other noise

- 1 Cylinder head gasket leaking.
- 2 Exhaust pipe leaking at cylinder head connection. Caused by improper fit of pipe, damaged gasket or loose exhaust flange. All exhaust fasteners should be tightened evenly and carefully. Failure to do this will lead to a leak.
- 3 Crankshaft runout excessive. Caused by a bent crankshaft (from over-revving) or damage from an upper cylinder component failure.
- 4 Engine mounting bolts or nuts loose. Tighten all engine mounting bolts and nuts to the specified torque (Chapter 2).
- 5 Crankshaft bearings worn (Chapter 2).
- 6 Camshaft chain tensioner defective. Replace according to the procedure in Chapter 2.
- 7 Camshaft chain, sprockets or guides worn (Chapter 2).

Abnormal driveline noise

35 Clutch noise

- 1 Clutch housing/friction plate clearance excessive (Chapter 2).
- 2 Loose or damaged pressure plate and/or bolts (Chapter 2).
- 3 Broken clutch springs (Chapter 2).

36 Transmission noise

- 1 Bearings worn. Also includes the possibility that the shafts are worn. Overhaul the transmission (Chapter 2).
- 2 Gears worn or chipped (Chapter 2).
- 3 Metal chips jammed in gear teeth. Probably pieces from a broken clutch, gear or shift mechanism that were picked up by the gears. This will cause early bearing failure (Chapter 2).
- 4 Engine oil level too low. Causes a howl from transmission. Also affects engine power and clutch operation (Chapter 1).

37 Final drive noise

- 1 Dry or dirty chain. Inspect, clean and lubricate (see Chapter 1).
- 2 Chain out of adjustment. Adjust chain slack (see Chapter 1).
- 3 Chain and sprockets damaged or worn. Inspect the chain and sprockets and replace them as necessary (see Chapter 5).
- 4 Sprockets loose (see Chapter 5).
- 5 On XL600R models, rubber dampers in the cush drive missing or deteriorated (see Chapter 5).

Abnormal chassis noise

38 Suspension noise

- 1 Spring weak or broken. Makes a clicking or scraping sound.
- 2 Steering head bearings worn or damaged. Clicks when braking. Check and replace as necessary (Chapter 5).
- 3 Front fork oil level incorrect. Check and correct oil level (see Chapter 5).
- 4 Front fork(s) assembled incorrectly. Disassemble the fork(s) and check for correct assembly (see Chapter 5).
- 5 Rear shock absorber fluid level incorrect. Indicates a leak caused by a defective seal. Shock will be covered with oil. It may be possible to overhaul the shock and repair the damage; take the shock to a Honda dealer or motorcycle repair shop for inspection.

- 6 Defective shock absorber with internal damage. This is in the body of the shock. It may be possible to overhaul the shock and repair the damage; take the shock to a Honda dealer or motorcycle repair shop for inspection.
- 7 Bent or damaged shock body. Replace the shock with a new one (Chapter 5).

39 Brake noise

- 1 Squeal caused by pad shim not installed or positioned correctly (Chapter 6).
- 2 Squeal caused by dust on brake [pads. Usually found in combination with glazed pads. Clean using brake cleaning solvent (see Chapter 6).
- 3 Contamination of brake pads. Oil, brake fluid or dirt causing pads to chatter or squeal. Clean or replace pads (see Chapter 6).
- 4 Pads glazed. Caused by excessive heat from prolonged use or from contamination. Do not use sandpaper, emery cloth or carborundum cloth or any other abrasives to roughen pad surface as abrasives will stay in the pad material and damage the disc. A very fine flat file can be used, but pad replacement is suggested as a cure (see Chapter 6).
- 5 Disc warped. Can cause a chattering, clicking or intermittent squeal. Usually accompanied by a pulsating lever and uneven braking. Replace the disc (see Chapter 6).
- 6 Drum brake linings worn or contaminated. Can cause scraping or squealing. Replace the shoes (Chapter 6).
- 7 Drum brake linings warped or worn unevenly. Can cause chattering. Replace the linings (Chapter 6).
- 8 Brake drum out of round. Can cause chattering. Replace brake drum (Chapter 6).
- 9 Loose or worn wheel bearings. Check and replace as needed (Chapter 6).

Excessive exhaust smoke

40 White smoke

- 1 Piston oil ring worn. The ring may be broken or damaged, causing oil from the crankcase to be pulled past the piston into the combustion chamber. Replace the rings with new ones (Chapter 2).
- 2 Cylinder worn, cracked, or scored. Caused by overheating or oil starvation. If worn or scored, the cylinder will have to be rebored and a new piston installed. If cracked, the cylinder block will have to be replaced (see Chapter 2).
- 3 Valve oil seal damaged or worn. Replace oil seals with new ones (Chapter 2).
- 4 Valve guide worn. Perform a complete valve job (Chapter 2).
- 5 Engine oil level too high, which causes the oil to be forced past the rings. Drain oil to the proper level (Chapter 1).
- 6 Head gasket broken between oil return and cylinder. Causes oil to be pulled into the combustion chamber. Replace the head gasket and check the head for warpage (Chapter 2).
- 7 Abnormal crankcase pressurization, which forces oil past the rings. Clogged breather or hoses usually the cause (Chapter 2).

41 Black smoke

- 1 Air cleaner clogged. Clean or replace the element (Chapter 1).
- 2 Main jet too large or loose. Compare the jet size to the Specifications (Chapter 3).
- 3 Choke stuck open (Chapter 3).
- 4 Fuel level too high. Check the float level and replace the float if necessary (Chapter 3).

- 5 Inlet needle held off needle seat. Clean the float chamber and fuel line and replace the needle and seat if necessary (Chapter 3).

42 Brown smoke

- 1 Main jet too small or clogged. Lean condition caused by wrong size main jet or by a restricted orifice. Clean float chamber and jets and compare jet size to Specifications (Chapter 3).
- 2 Fuel flow insufficient. Fuel inlet needle valve stuck closed due to chemical reaction with old fuel. Float level incorrect; check and replace float if necessary. Restricted fuel line. Clean line and float chamber.
- 3 Carburetor intake tube loose (Chapter 3).
- 4 Air cleaner poorly sealed or not installed (Chapter 1).

Poor handling or stability

43 Handlebar hard to turn

- 1 Steering stem adjusting nut too tight (Chapter 5).
- 2 Steering stem bearings damaged. Roughness can be felt as the bars are turned from side-to-side. Replace bearings and races (Chapter 5).
- 3 Races dented or worn. Denting results from wear in only one position (e.g. straight ahead), striking an immovable object or hole or from dropping the machine. Replace races and bearings (Chapter 5).
- 4 Steering stem bearing lubrication inadequate. Causes are grease getting hard from age or being washed out by high pressure car washes. Remove steering stem, clean and lubricate bearings (Chapter 5).
- 5 Steering stem bent. Caused by a collision, hitting a pothole or by dropping the machine. Replace damaged part. Don't try to straighten the steering stem (Chapter 5).
- 6 Front tire air pressure too low (Chapter 1).

44 Handlebar shakes or vibrates excessively

- 1 Tires worn or out of balance (Chapter 1 or 6).
- 2 Swingarm bearings worn. Replace worn bearings (Chapter 5).
- 3 Wheel rim(s) warped or damaged. Inspect wheels (Chapter 6).
- 4 Wheel bearings worn. Worn front or rear wheel bearings can cause poor tracking. Worn front bearings will cause wobble (Chapter 6).
- 5 Handlebar clamp bolts loose (Chapter 5).
- 6 Steering stem or triple clamps loose. Tighten them to the specified torque (Chapters 1 and 5).
- 7 Engine mount bolts loose. Will cause excessive vibration with increased engine rpm (Chapter 2).

45 Handlebar pulls to one side

- 1 Frame bent. Definitely suspect this if the machine has been dropped. May or may not be accompanied by cracking near the bend. Replace the frame (Chapter 5).
- 2 Front and rear wheels out of alignment. Caused by uneven adjustment of the drive chain adjusters (see Chapter 1). May also be caused by improper location of the axle spacers or from a bent steering stem or frame (see Chapter 5).
- 3 Swingarm bent or twisted. Caused by age (metal fatigue) or impact damage. Replace the swingarm (Chapter 5).
- 4 Steering stem bent. Caused by impact damage or by dropping the motorcycle. Replace the steering stem (Chapter 5).

46 Poor shock absorbing qualities

- 1 Too hard:
 - a) *Damping adjuster set too hard (cartridge forks) (see Chapter 5).*
 - b) *Fork oil level excessive (see Chapter 5).*
 - c) *Fork oil viscosity too high. Use a lighter oil (see the Specifications in Chapter 5).*
 - d) *Fork tube bent. Causes a harsh, sticking feeling (see Chapter 5).*
 - e) *Fork internal damage (see Chapter 5).*
 - f) *Shock internal damage.*
 - g) *Tire pressures too high (Chapter 1).*
- 2 Too soft:
 - a) *Damping adjuster set too soft (cartridge forks) (see Chapter 5).*
 - b) *Fork or shock oil insufficient and/or leaking (Chapter 5).*
 - c) *Fork oil level too low (see Chapter 5).*
 - d) *Fork springs weak or broken (Chapter 5).*

Braking problems**47 Brakes are spongy or weak, don't hold**

- 1 Air in brake line (disc brakes). Caused by inattention to master cylinder fluid level or by leakage. Locate problem and bleed brake (Chapter 6).
- 2 Pad or disc worn (Chapters 1 and 6).
- 3 Brake fluid leak. See paragraph 1.
- 4 Contaminated disc brake pads. Caused by contamination with oil, grease, brake fluid, etc. Clean or replace pads. Clean disc thoroughly with brake cleaner.
- 5 Brake fluid deteriorated (disc brakes). Fluid is old or contaminated. Drain system, replenish with new fluid and bleed the system (see Chapter 6).
- 6 Master cylinder internal parts worn or damaged, causing fluid to bypass (see Chapter 6).
- 7 Master cylinder bore scratched. From ingestion of foreign material or broken spring. Repair or replace master cylinder (see Chapter 6).
- 8 Disc warped. Replace disc (see Chapter 6).
- 9 Drum brake linings worn (Chapters 1 and 6).
- 10 Contaminated drum brake linings. Caused by contamination with oil, grease, etc. Clean or replace linings. Clean drum thoroughly with brake cleaner (Chapter 6).
- 11 Drum warped. Replace drum (Chapter 6).
- 12 Drum brake cable out of adjustment or stretched. Adjust or replace the cable (see Chapters 1 and 6).

48 Brake lever or pedal pulsates

- 1 Disc warped. Replace disc (see Chapter 6).
- 2 Axle bent. Replace axle (Chapter 6).
- 3 Brake caliper bolts loose (see Chapter 6).
- 4 Brake caliper shafts damaged or sticking, causing caliper to bind.

Lube the shafts or replace them if they are corroded or bent (see Chapter 6).

- 5 Wheel warped or otherwise damaged (Chapter 6).
- 6 Wheel bearings damaged or worn (Chapter 6).
- 7 Brake drum out of round. Replace brake drum (Chapter 6).

49 Brakes drag

- 1 Master cylinder piston seized. Caused by wear or damage to piston or cylinder bore (see Chapter 6).
- 2 Lever or pedal balky or stuck. Check pivot and lubricate (see Chapter 7).
- 3 Brake caliper binds. Caused by inadequate lubrication or damage to caliper shafts (see Chapter 6).
- 4 Brake caliper piston seized in bore. Caused by wear or ingestion of dirt past deteriorated seal (see Chapter 6).
- 5 Brake pad or shoes damaged. Pad or lining material separated from backing plate or shoes. Usually caused by faulty manufacturing process or contact with chemicals. Replace pads (see Chapter 6).
- 6 Pads or shoes improperly installed (see Chapter 6).
- 7 Cable sticking. Lubricate or replace cable (see Chapters 1 and 6).
- 8 Shoes improperly installed (Chapter 6).
- 9 Brake pedal or lever freeplay insufficient (Chapter 1).
- 10 Drum brake springs weak. Replace brake springs (Chapter 6).

Electrical problems**50 Battery dead or weak (XL600R)**

- 1 Battery faulty. Caused by sulfated plates which are shorted due to sedimentation or low electrolyte level. Also, broken battery terminal making only occasional contact (see Chapter 4).
- 2 Battery cables making poor contact (see Chapter 4).
- 3 Load excessive. Caused by addition of high wattage lights or other electrical accessories.
- 4 Ignition switch defective. Switch either grounds internally or fails to shut off system. Replace the switch (see Chapter 4).
- 5 Regulator/rectifier defective (see Chapter 4).
- 6 Stator coil open or shorted (see Chapter 4).
- 7 Wiring faulty. Wiring grounded or connections loose in ignition, charging or lighting circuits (see Chapter 4).

51 Battery overcharged

- 1 Regulator/rectifier defective. Overcharging is noticed when battery gets excessively warm or boils over (see Chapter 4).
- 2 Battery defective. Replace battery with a new one (see Chapter 4).
- 3 Battery amperage too low, wrong type or size. Install manufacturer's specified amp-hour battery to handle charging load (see Chapter 4).

Chapter 1

Tune-up and routine maintenance

Contents

	Section		Section
Air cleaner - filter element and drain tube cleaning	12	Front fork oil change	27
Brake lever and pedal freeplay - check and adjustment.....	5	Fuel system - check and filter cleaning.....	13
Brake system - general check.....	4	Idle speed - check and adjustment.....	20
Choke - operation check.....	9	Ignition timing.....	19
Clutch - check and freeplay adjustment	7	Introduction to tune-up and routine maintenance	2
Crankcase breather system - check	25	Lubrication - general	10
Cylinder compression - check	16	Routine maintenance intervals	1
Decompressor freeplay - check and adjustment	18	Sidestand - check	28
Drive chain and sprockets - check, adjustment and lubrication	24	Spark plug - replacement.....	15
Engine oil change and filter screen cleaning.....	11	Steering head bearings - check and adjustment	23
Engine oil level - check	3	Suspension - check.....	22
Evaporative emission control system - check	26	Throttle operation/grip freeplay - check and adjustment.....	8
Exhaust system - inspection and spark arrester cleaning	14	Tires/wheels - general check	6
Fasteners - check.....	21	Valve clearances - check and adjustment	17

Specifications

Engine

Spark plugs

Type

Standard	NGK DPR8EA-9 or ND X24EPR-U9
Extended high speed riding	NGK DPR9EA-9 or ND X27EPR-U9
Cold climates (below 5-degrees C/41-degrees F).....	NGK DPR7EA-9 or ND X22EPR-U9

Gap.....

0.8 to 0.9 mm (0.031 to 0.035 inch)
4000 rpm

Ignition timing full advance speed

Engine idle speed

1983 models.....	1200 rpm
1984 on	1300 +/- 100 rpm

Valve clearance (COLD engine)

XL600R

Intake	0.05 mm (0.002 inch)
Exhaust	0.10 mm (0.004 inch)

XR600R

Intake	0.10 mm (0.004 inch)
Exhaust	0.21 mm (0.005 inch)

Engine (continued)

Cylinder compression	
XL600R.....	12.5 kg/cm ² (172 psi)
XR600R	
1985 through 1987.....	12.5 +/- 1.5 kg/cm ² (172 +/- 21 psi)
1988 on.....	14 +/- 1 kg/cm ² (200 +/- 14 psi)

Miscellaneous

Brake pad lining thickness limit.....	See text (Section 4)
Rear brake shoe lining thickness	
New.....	4 mm (0.16 inch)
Wear limit.....	2 mm (0.08 inch)
Front brake lever freeplay	
XL600R, 1985 XR600R.....	See text (Section 5)
1986 and 1987 XR600R.....	1 to 8 mm (1/8 to 5/16 inch)
1988 on XR600R.....	0.6 to 8.0 mm (1/32 to 5/16 inch)
Rear brake pedal freeplay (drum brake models).....	20 to 30 mm (3/4 to 1-1/4 inch)
Rear master cylinder bolt length (disc brake models).....	71 mm (2.8 inch)
Rear brake light switch adjustment.....	10 mm (3/8 inch)
Clutch lever freeplay.....	10 to 20 mm (3/8 to 3/4 inch)
Throttle grip freeplay.....	2 to 6 mm (3/32 to 1/4 inch)
Choke valve stroke (XL600R).....	5 to 7 mm (3/16 to 1/4 inch)
Decompressor freeplay	
1983 through 1987	
Kickstarter decompressor.....	1 to 3 mm (1/32 to 1/8 inch)
Manual decompressor.....	1 to 2 mm (1/32 to 1/16 inch)
1988 on.....	5 to 8 mm (3/16 to 5/16 inch)
Minimum tire tread depth	
XL600R.....	Not specified
XR600R.....	3 mm (1/8 inch) minimum
Tire pressures (cold)	
XL600R.....	21 psi front and rear
XR600R.....	15 psi front and rear
Tire sizes	
XL600R	
Front.....	3.00-21-4PR
Rear.....	5.10-17-4PR
XR600R	
1985	
Front.....	3.00-21-6PR
Rear.....	5.10-17-6PR
1986 and 1987	
Front.....	80/100-21 51 M
Rear.....	110/100-17 63 M
1988 on	
Front.....	80/100-21 51 M
Rear.....	110/100-18 64 M
Drive chain slack	
XL600R.....	30 to 40 mm (1-1/4 to 1-5/8 inch)
XR600R.....	35 to 45 mm (1-3/8 to 1-3/4 inch)

Torque specifications

Oil drain plug in frame	
XL600R.....	25 to 32 Nm (18 to 23 ft-lbs)
1985 through 1987 XR600R.....	35 to 45 Nm (25 to 33 ft-lbs)
1988 on XR600R.....	40 Nm (29 ft-lbs)
Oil drain plug in crankcase	
1983 through 1987 models.....	30 to 40 Nm (22 to 29 ft-lbs)
1988 on.....	25 Nm (18 ft-lbs)
Oil filter cover bolts	
1983 through 1987 models.....	8 to 10 Nm (60 to 84 in-lbs)
1988 on.....	12 Nm (108 ft-lbs)
Oil strainer screen to frame	
XL600R.....	35 to 45 Nm (25 to 32 ft-lbs)
XR600R.....	55 Nm (40 ft-lbs)
Hose fitting to oil strainer screen.....	40 Nm (29 ft-lbs)
Crankcase oil strainer screen bolt.....	Not specified

Torque specifications

Spark plug	Not specified
Valve adjusting screw locknut	25 Nm (18 ft-lbs)
Valve adjusting hole cover	
Through 1997	Not specified
1998-on	15 Nm (11 ft-lbs)
Crankshaft hole cap	
Through 1997	Not specified
1998-on	15 Nm (11 ft-lbs)
Timing hole cap	
Through 1997	Not specified
1998-on	10 Nm (84 in-lbs)
Wheel spokes	2.5 to 5.0 Nm (29 to 57 inch-lbs)
Rim lock locknut	10 to 15 Nm (84 to 132 in-lbs)
Steering stem adjusting nut	
Initial torque	
XL600R	Not specified
XR600R	20 to 30 Nm (14 to 22 ft-lbs)
Final torque	
1983 through 1987	1 to 2 Nm (9 to 16 inch-lbs)
1988 through 1990	3 Nm (24 inch-lbs)
1991 and 1992	1 Nm (9 inch-lbs)
1993 on	1.5 Nm (13 inch-lbs)

Recommended lubricants and fluids

Engine/transmission oil	
Type	API grade SE or SF multigrade oil
Viscosity	
Standard	10W-40
Optional	
10 to 90-degrees F	10W-30
0 degrees F or above	20W-40 or 20W-50
Capacity	
Oil change	
XL600R	2.0 liters (2.1 US qts, 3.5 Imp pts)
XR600R	1.9 liters (2.0 US qts, 3.4 Imp pts)
After engine overhaul	
XL600R	2.5 liters (2.6 US qts, 4.4 Imp pts)
XR600R	2.3 liters (2.4 US qts, 4.0 Imp pts)
Air cleaner filter oil	SAE 80 or 90 gear oil
Brake fluid	DOT 4
Drive chain lubricant	Chain lube formulated for O-ring chains or SAE 80 to 90 gear oil
Miscellaneous	
Wheel bearings	Medium weight, lithium-based multi-purpose grease (NLGI no. 3)
Swingarm pivot bushings	Molybdenum disulfide paste grease containing 40 percent or more molybdenum disulfide
Cables and lever pivots	Medium weight, lithium-based multi-purpose grease (NLGI no. 3)
Brake pedal/shift lever/throttle lever pivots	Medium weight, lithium-based multi-purpose grease (NLGI no. 3)

Honda XL/XR600

Routine maintenance intervals

Note 1: The pre-ride inspection outlined in the owner's manual covers checks and maintenance that should be carried out on a daily basis. It's condensed and included here to remind you of its importance. Always perform the pre-ride inspection at every maintenance interval (in addition to the procedures listed). The intervals listed below are the shortest intervals recommended by the manufacturer for each particular operation during the model years covered in this manual. Your owner's manual may have different intervals for your model.

Note 2: The following schedules are for motorcycles given normal use (including off-road riding). If the bike is used in competition, perform the entire maintenance schedule before every race.

Daily or before riding

- Check the engine oil level
- Check the fuel level and inspect for leaks
- Check the operation of both brakes - check the front brake lever and rear brake pedal for correct freeplay
- Check the tires for damage, the presence of foreign objects and correct air pressure
- Check the throttle for smooth operation and correct freeplay
- Make sure the steering operates smoothly
- Make sure the engine kill switch works properly
- Check the air cleaner drain tube and clean it if necessary
- Check all fasteners, including axle nuts, for tightness
- Check for mud or debris that could start a fire or interfere with motorcycle operation

Every 300 miles

- Lubricate and inspect the drive chain and sliders

Every 4,000 miles on XR600L or every 30 operating days (approximately 1,000 miles) on XR600R through 1997

Perform all of the daily checks plus:

- Inspect the brakes
- Check the brake pads and shoes for wear
- Check the brake fluid level
- Check and adjust the valve clearances
- Check the decompressor system
- Clean the air filter element*
- Clean the air cleaner housing drain tube
- Check the crankcase breather (XL600R)
- Check the evaporative emission control system (XL600R California models)
- Inspect the battery (XL600R)

- Check/adjust the throttle lever freeplay
- Check choke operation
- Check/adjust the idle speed
- Change the engine oil and filter and clean the strainer screen
- Check the tightness of all fasteners
- Inspect the suspension
- Clean and gap the spark plug
- Check/adjust the clutch
- Check the exhaust system for leaks and check fastener tightness; clean the spark arrester
- Inspect the wheels and tires
- Check the cleanliness of the fuel system and the condition of the fuel line
- Clean the fuel tap strainer screen
- Inspect the steering system and steering head bearings
- Check the sidestand operation

Every 600 miles or 6 months on 1998 and later models

Perform all of the daily checks plus:

- Inspect the brakes
- Check the brake pads and shoes for wear
- Check the brake fluid level
- Clean the air filter element*
- Clean and gap the spark plug
- Check the decompressor system
- Check and adjust the valve clearance
- Check engine idle speed
- Change the engine oil and filter
- Check/adjust the clutch
- Inspect the wheels and tires

Every 1,200 miles or 12 months on 1998 and later models

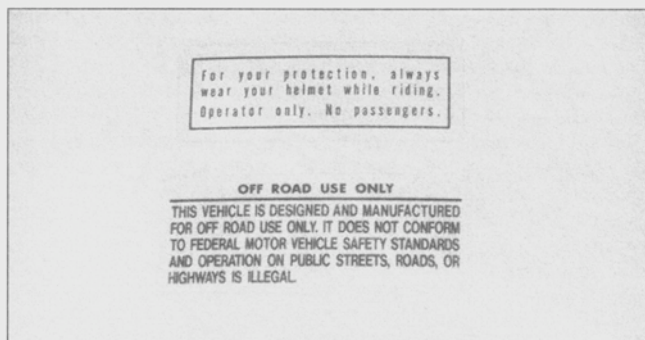
Perform all of the daily and 600-mile checks plus:

- Check the cleanliness of the fuel system
- Clean the fuel tap strainer screen
- Check/adjust the throttle lever freeplay
- Check choke operation
- Clean the engine oil strainer screen (in the frame down-tube)
- Check the tightness of all fasteners
- Inspect the steering system and steering head bearings
- Inspect the suspension
- Inspect the sidestand
- Check headlight aim

*More often in dusty, sandy or wet conditions.



2.1a Decals on the motorcycle include maintenance information such as drive chain adjustment . . .



2.1b . . . as well as certification and safety information

2 Introduction to tune-up and routine maintenance

Refer to illustrations 2.1a and 2.1b

This Chapter covers in detail the checks and procedures necessary for the tune-up and routine maintenance of your motorcycle. Section 1 includes the routine maintenance schedule, which is designed to keep the machine in proper running condition and prevent possible problems. The remaining Sections contain detailed procedures for carrying out the items listed on the maintenance schedule, as well as additional maintenance information designed to increase reliability. Maintenance, certification and safety information is also printed on decals, which are mounted in various locations on the motorcycle (see illustrations). Where information on the decals differs from that presented in this Chapter, use the decal information.

Since routine maintenance plays such an important role in the safe and efficient operation of your motorcycle, it is presented here as a comprehensive check list. For the rider who does all his own maintenance, these lists outline the procedures and checks that should be done on a routine basis.

Deciding where to start or plug into the routine maintenance schedule depends on several factors. If you have a motorcycle whose warranty has recently expired, and if it has been maintained according to the warranty standards, you may want to pick up routine maintenance as it coincides with the next mileage or calendar interval. If you have owned the machine for some time but have never performed any maintenance on it, then you may want to start at the nearest interval and include some additional procedures to ensure that nothing important is overlooked. If you have just had a major engine overhaul, then you may want to start a maintenance routine from the beginning. If you have a used machine and have no knowledge of its history or maintenance record, you may desire to combine all the checks into one large service initially and then settle into the maintenance schedule prescribed.

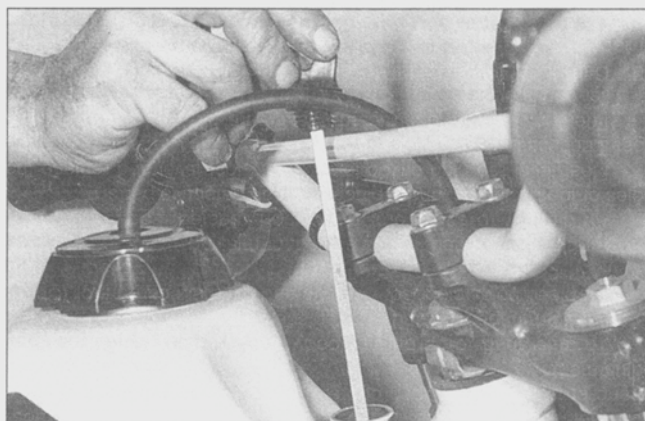
The Sections which actually outline the inspection and maintenance procedures are written as step-by-step comprehensive guides to the actual performance of the work. They explain in detail each of the routine inspections and maintenance procedures on the check list. References to additional information in applicable Chapters is also included and should not be overlooked.

Before beginning any actual maintenance or repair, the machine should be cleaned thoroughly, especially around the oil filter housing, spark plug, valve cover, side covers, carburetor, etc. Cleaning will help ensure that dirt does not contaminate the engine and will allow you to detect wear and damage that could otherwise easily go unnoticed.

3 Engine oil level - check

Refer to illustration 3.3

- 1 Support the motorcycle in a level position, then start the engine



3.3 The engine oil level must be between the upper and lower marks on the dipstick

and allow it to reach normal operating temperature. **Warning:** Do not run the engine in an enclosed space such as a garage or shop.

- 2 Stop the engine and allow the machine to sit undisturbed in a level position for about five minutes.
- 3 With the engine off, unscrew the dipstick from the front center of the frame (the frame acts as an oil tank for the dry sump lubrication system). Pull it out, wipe it off with a clean rag, and reinsert it (let the dipstick rest on the threads - don't screw it back in). Pull the dipstick out and check the oil level on the dipstick scale. The oil level should be between the Maximum and Minimum level marks on the scale (see illustration).
- 4 If the level is below the Minimum mark, add oil through the dipstick hole. Add enough oil of the recommended grade and type to bring the level up to the Maximum mark. Do not overfill.

4 Brake system - general check

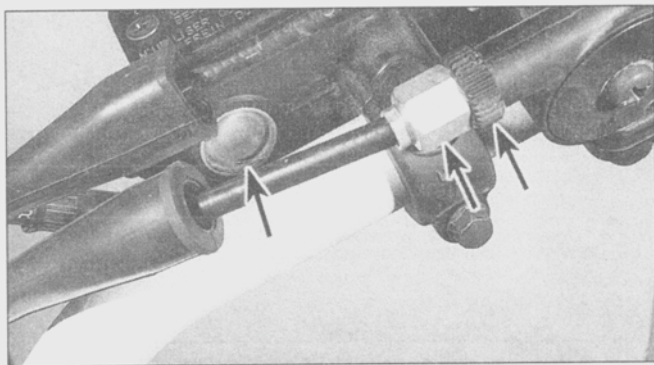
- 1 A routine general check of the brakes will ensure that any problems are discovered and remedied before the rider's safety is jeopardized.
- 2 Check the brake lever and pedal for loose connections, excessive play, bends, and other damage. Replace any damaged parts with new ones (see Chapter 6).
- 3 Make sure all brake fasteners are tight. Check the brakes for wear as described below.

Brake fluid

Front brakes

Refer to illustrations 4.6, 4.7a and 4.7b

- 4 To ensure proper operation of the hydraulic disc brakes, the fluid level in the master cylinder reservoirs must be maintained within a safe range.
- 5 With the motorcycle supported in an upright position, turn the



4.6 The front brake level should be at least up to the Lower mark next to the window (left arrow); the lockwheel and adjuster (right arrows) are used to set throttle cable freeplay

handlebars until the top of the front brake master cylinder is as level as possible.

6 The fluid level is visible in the window on the reservoir (see illustration). Make sure the fluid level is above the Lower mark cast on the master cylinder body next to the reservoir.

7 If the fluid level is low, clean the area around the reservoir cover. Remove the cover screws and take off the cover, diaphragm retainer and diaphragm (see illustrations). Add new clean brake fluid of the type listed in this Chapter's Specifications until the fluid level is even with the line cast inside the reservoir.

8 Install the diaphragm, retainer and cover, then tighten the cover screws securely.

Rear brakes

Refer to illustration 4.9

9 The fluid level is visible through the master cylinder reservoir (see illustration). If it's below the Lower mark cast in the reservoir body, the fluid must be replenished.

10 Unscrew the reservoir cap and pour in fluid to bring the level up to the Upper mark cast in the reservoir. Install the cap and tighten it securely.

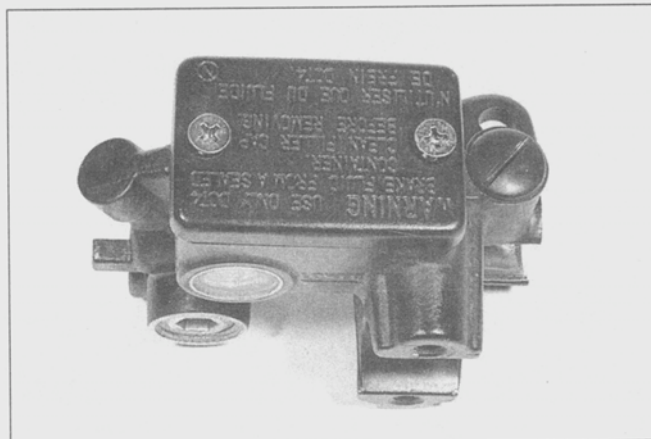
Disc Brakes

11 Look into the caliper from either the front or the rear. Each brake pad has a wear line marked on the pad material - if either pad has worn down to this mark (or approximately 1 mm [0.040 inch]), replace the pads as a set (see Chapter 6).

Rear drum brakes

Refer to illustration 4.13

12 Operate the brake pedal. If operation is rough or sticky, refer to



4.7a Remove the cover screws . . .

Section 10 and lubricate the cable.

13 With the rear brake lever and pedal freeplay properly adjusted (see Section 5), check the wear indicator on the brake panel (see illustration). If the pointer lines up with the indicator when the pedal is pressed, refer to Chapter 6 and replace the brake shoes.

5 Brake lever and pedal freeplay - check and adjustment

Front brake lever

XL600R; 1985 XR600R

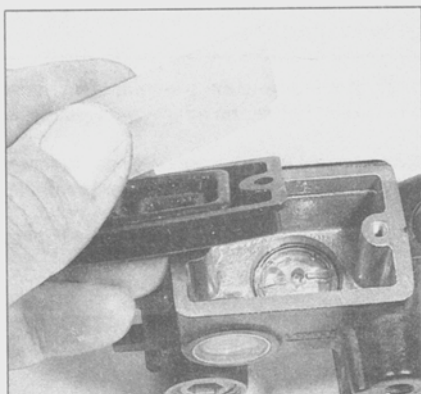
1 These models don't have a specified amount of freeplay. There are only two freeplay settings, which can be selected by turning the adjuster on the brake lever. Align the single dot on the adjuster with the pointer for maximum freeplay; align the double dots for minimum freeplay. Be sure not to place the adjuster in any but the two specified positions.

1986 and later XR600R

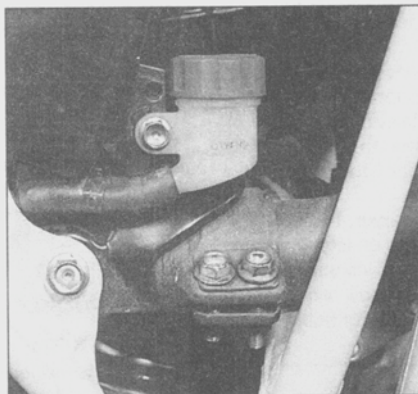
Refer to illustration 5.3

2 Squeeze the front brake lever and note how far the lever travels (measure at the tip of the lever). If it exceeds the limit listed in this Chapter's Specifications, adjust the front brake as described below.

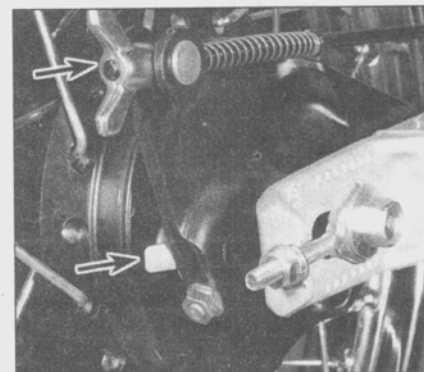
3 If lever travel needs to be adjusted on a 1986 or later XR600R, loosen the locknut and turn the adjusting screw (see illustration). Tighten the locknut after making the adjustment.



4.7b . . . and lift off the retainer and diaphragm to add brake fluid



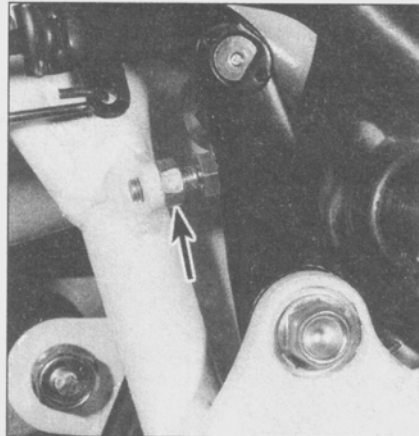
4.9 The rear brake fluid level is visible through the reservoir



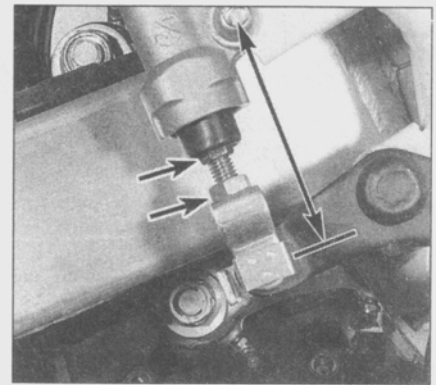
4.13 The wear indicator on rear drum brakes is at the rear of the panel (lower arrow); adjustments are made with the wingnut (upper arrow)



5.3 Front brake lever freeplay on later models is adjusted by loosening the locknut and turning the screw (arrow)



5.4 Drum brake pedal height is adjusted by loosening the locknut and turning the bolt (arrow)



5.6 Rear disc brake pedal height is adjusted by loosening the locknut (lower arrow) and turning the adjusting bolt (upper arrow); pushrod length is measured from the center of the lower mounting bolt to the center of the clevis pin

Rear brake pedal

Drum brake models

Refer to illustration 5.4

4 To adjust brake pedal height, loosen the locknut and turn the adjusting bolt (**see illustration**). Honda doesn't specify pedal height.

5 Check the play of the brake pedal. If it exceeds the limit listed in this Chapter's Specifications, adjust it with the wingnut at the rear end of the brake rod (**see illustration 4.5**).

Disc brake models

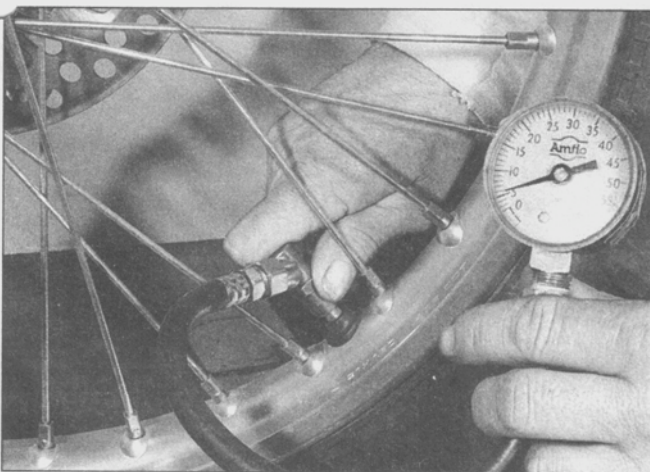
Refer to illustration 5.6

6 To adjust pedal height, loosen the locknut and turn the adjusting bolt on the rear master cylinder (**see illustration**). Although pedal height isn't specified, a dimension for the length of the clevis assembly is listed in this Chapter's Specifications.

7 Pedal freeplay on disc brake models is automatic and no means of manual adjustment is provided.

Rear brake light switch

8 The rear brake light on XL600R models should illuminate when the pedal is pressed 10 mm (3/8 inch) from its resting position. If it comes on too soon or too late, turn the plastic nut that secures the switch to the bracket (on the frame member above and behind the brake pedal). Don't try to turn the switch itself.



6.4 Check tire pressure with a gauge

6 Tires/wheels - general check

Refer to illustrations 6.4, 6.5 and 6.7

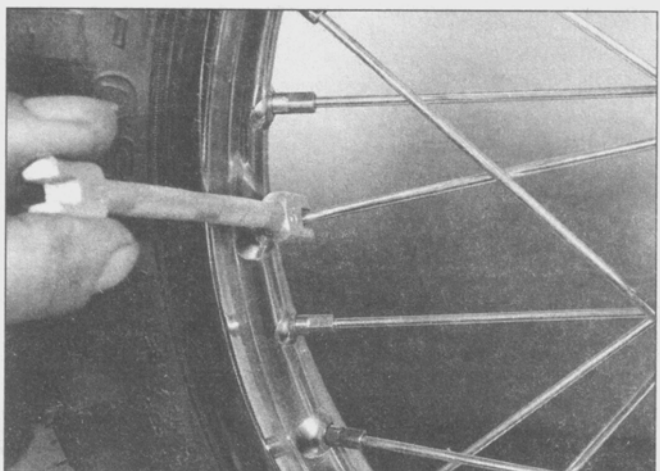
1 Routine tire and wheel checks should be made with the realization that your safety depends to a great extent on their condition.

2 Check the tires carefully for cuts, tears, embedded nails or other sharp objects and excessive wear. Operation of the motorcycle with excessively worn tires is extremely hazardous, as traction and handling are directly affected. Check the tread depth at the center of the tire and compare it to the value listed in this Chapter's Specifications. Honda doesn't specify a minimum tread depth for some models, but as a general rule, tires should be replaced with new ones when the tread knobs are worn to 3 mm (1/8 inch) or less.

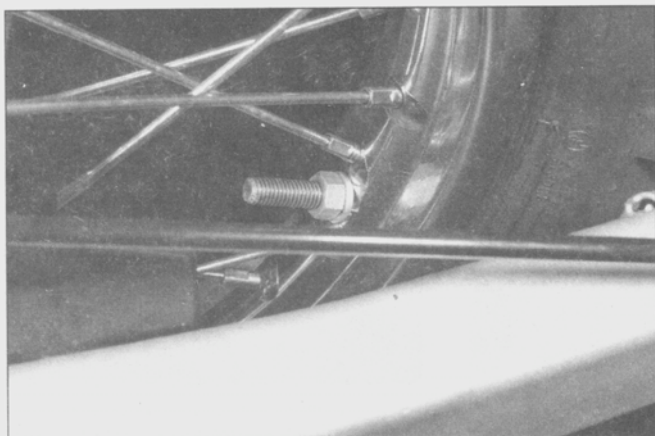
3 Repair or replace punctured tires as soon as damage is noted. Do not try to patch a torn tire, as wheel balance and tire reliability may be impaired.

4 Check the tire pressures when the tires are cold and keep them properly inflated (**see illustration**). Proper air pressure will increase tire life and provide maximum stability and ride comfort. Keep in mind that low tire pressures may cause the tire to slip on the rim or come off, while high tire pressures will cause abnormal tread wear and unsafe handling.

5 The wheels should be kept clean and checked periodically for cracks, bending, loose spokes and rust. Never attempt to repair damaged wheels; they must be replaced with new ones. Loose spokes can



6.5 Make sure the spokes are tight, but don't overtighten them



6.7 Tighten the locknut on the rim lock to the specified torque

be tightened with a spoke wrench (**see illustration**), but be careful not to overtighten and distort the wheel rim.

6 Check the valve stem locknuts to make sure they're tight. Also, make sure the valve stem cap is in place and tight. If it is missing, install a new one made of metal or hard plastic.

7 Check the tightness of the locknut on the rim lock (**see illustration**). Tighten it if necessary to the torque listed in this Chapter's Specifications.

7 Clutch - check and freeplay adjustment

Refer to illustrations 7.2 and 7.4

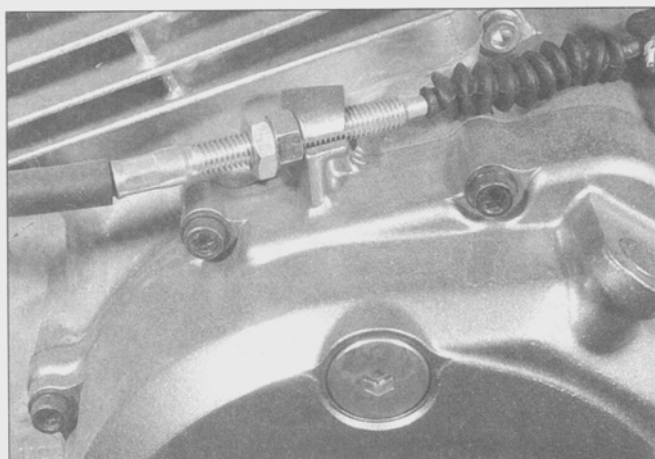
1 Operate the clutch lever and measure freeplay at the tip of the lever. If it's not within the range listed in this Chapter's Specifications, adjust it as follows.

2 Pull back the rubber cover from the adjuster at the handlebar (**see illustration**). Loosen the lockwheel and turn the adjuster to change freeplay.

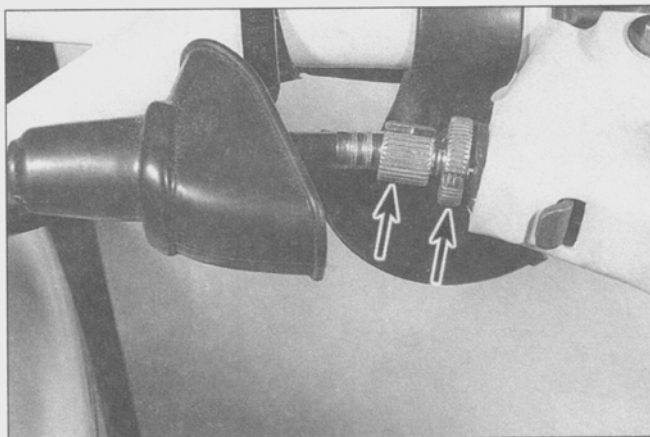
3 If freeplay can't be brought within specifications by using the handlebar adjuster, turn the handlebar adjuster in all the way, then back it out one turn.

4 Loosen the locknut on the lower cable adjuster and turn the adjuster to set freeplay (**see illustration**). Tighten the locknuts on the upper and lower adjusters.

5 If freeplay still can't be adjusted to within the specified range, the cable is probably stretched and should be replaced with a new one.



7.4 Major adjustments are made at the adjuster near the lower end of the clutch cable



7.2 Loosen the lockwheel (right arrow) and turn the adjuster (left arrow) to make minor adjustments in clutch lever freeplay

8 Throttle operation/grip freeplay - check and adjustment

Check

1 Make sure the throttle twistgrip moves easily from fully closed to fully open with the front wheel turned at various angles. The grip should return automatically from fully open to fully closed when released. If the throttle sticks, check the throttle cable for cracks or kinks in the housings. Also, make sure the inner cable is clean and well-lubricated.

2 Check for a small amount of freeplay at the twistgrip and compare the freeplay to the value listed in this Chapter's Specifications.

Adjustment

Refer to illustration 8.5

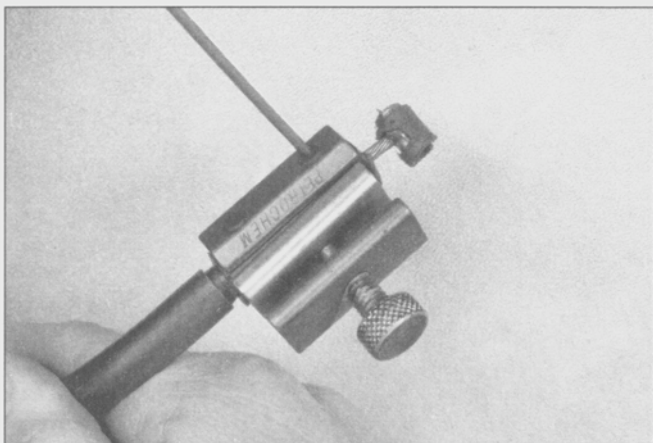
3 Minor adjustments are made at the throttle lever end of the accelerator cable. Major adjustments are made at the carburetor end of the cable.

4 Pull back the rubber cover from the adjuster and loosen the lockwheel on the cable (**see illustration 4.6**). Turn the adjuster until the desired freeplay is obtained, then retighten the lockwheel.

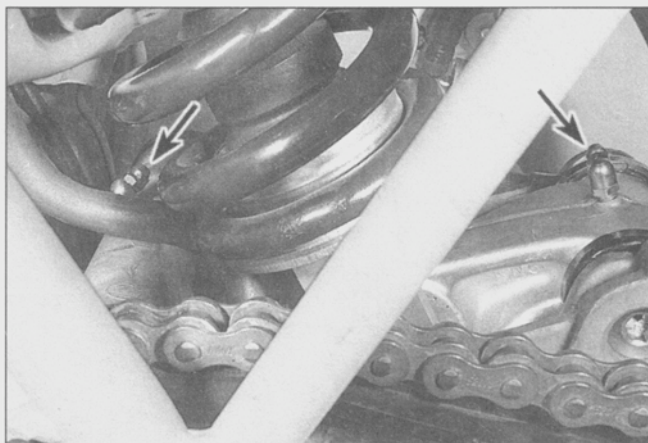
5 If the freeplay can't be adjusted at the grip end, loosen the locknuts at the carburetor end of the cable (**see illustration**). Turn the adjuster to set freeplay, then tighten the locknuts securely.



8.5 Major throttle cable adjustments are made at the adjuster near the carburetor



10.3 Lubricating a cable with a pressure lube adapter (make sure the tool seats around the inner cable)



10.5a There's a grease fitting on the swingarm (left arrow) and on the shock arm pivot (right arrow)

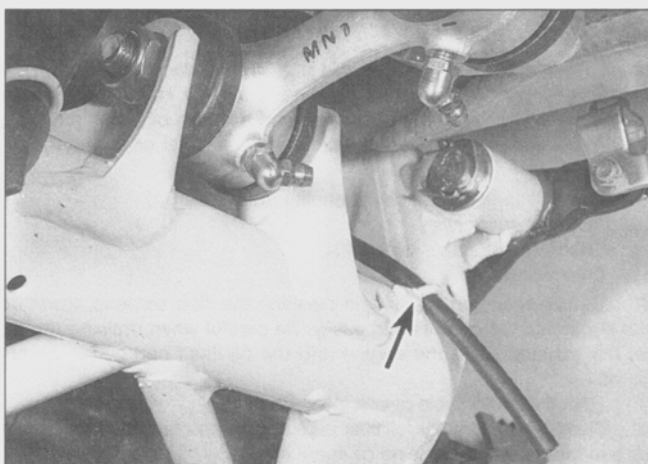
9 Choke - operation check

L600R models

- 1 Check that the choke lever on the left handlebar moves smoothly. If not, refer to Section 10 and lubricate the cable.
- 2 Remove the seat and fuel tank (see Chapters 7 and 3). Locate the choke cable at its connection to the carburetor. Move the choke lever through its full stroke and measure the distance that the cable fitting at the carburetor moves. Compare this to the value listed in this Chapter's Specifications.
- 3 If the choke valve stroke is not within the specified range, loosen the cable fitting at the carburetor and relocate the cable housing within the fitting.

XR600R models

- 4 Operate the choke lever on the carburetor while you feel for smooth operation.
- 5 If the lever doesn't move smoothly, refer to Chapter 3 and check the choke mechanism for worn or damaged parts.



10.5b Lubricate the suspension linkage relay arm through the two grease fittings; the carburetor vent hose (arrow) on XR600R models fits through a bracket on the swingarm

10 Lubrication - general

Refer to illustrations 10.3, 10.5a and 10.5b

Since the controls, cables and various other components of a motorcycle are exposed to the elements, they should be lubricated periodically to ensure safe and trouble-free operation.

2 The throttle twistgrip, brake lever, brake pedal, kickstarter pedal pivot and sidestand pivot should be lubricated frequently. In order for the lubricant to be applied where it will do the most good, the component should be disassembled. However, if chain and cable lubricant is being used, it can be applied to the pivot joint gaps and will usually work its way into the areas where friction occurs. If motor oil or light grease is being used, apply it sparingly as it may attract dirt (which could cause the controls to bind or wear at an accelerated rate). **Note:** One of the best lubricants for the control lever pivots is a dry-film lubricant (available from many sources by different names).

3 The throttle and clutch cables (and the brake and choke cables, if equipped) should be removed and treated with a commercially available cable lubricant which is specially formulated for use on motorcycle control cables. **Note:** Honda states that lubrication of the throttle and clutch cables (except for the end pivots) is not necessary on XR600R models. They recommend replacing these cables if their operation is sticky. Small adapters for pressure lubricating the cables with spray can lubricants are available and ensure that the cable is lubricated along its entire length (see illustration). When attaching the

cable to the lever, be sure to lubricate the barrel-shaped fitting at the end with multi-purpose grease.

4 To lubricate the cables, disconnect them at the upper end, then lubricate the cable with a pressure lube adapter (see illustration 10.3). See Chapter 3 (throttle cable) or Chapter 6 (brake cables).

5 The swingarm and rear suspension linkage pivots can be lubricated with a grease gun through the grease fittings (see illustrations).

6 Refer to Chapter 5 for the following lubrication procedures:

- a) Swingarm bearings and dust seals
- b) Steering head bearings

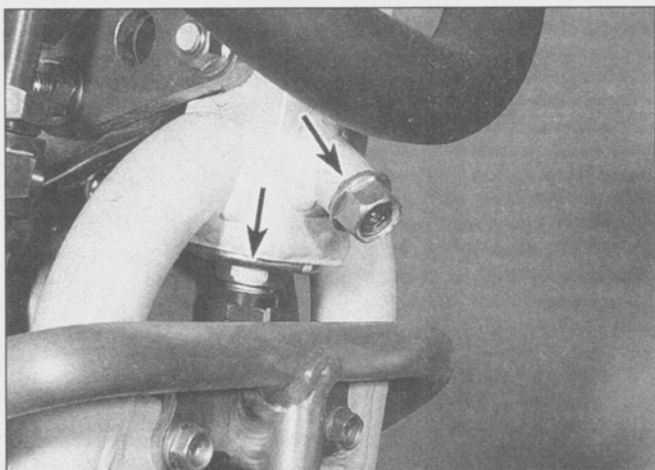
7 Refer to Chapter 6 for the following lubrication procedures:

- a) Front and rear wheel bearings
- b) Brake pedal pivot

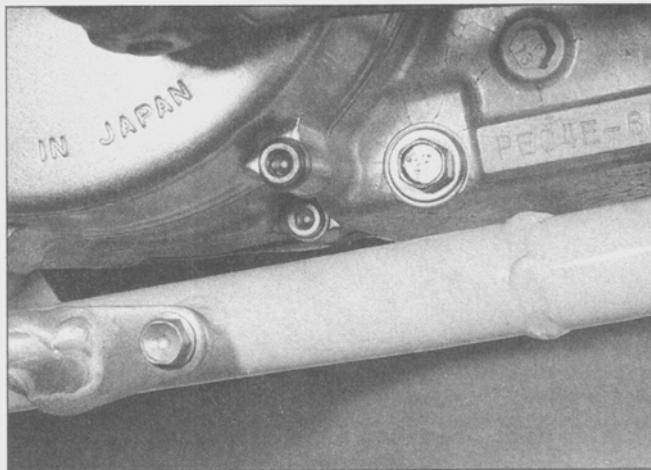
11 Engine oil change and filter screen cleaning

Refer to illustrations 11.5a, 11.5b, 11.6a, 11.6b, 11.8a, 11.8b, 11.11a and 11.11b

1 Consistent routine oil changes and filter screen cleaning are the single most important maintenance procedure you can perform on these models. The oil not only lubricates the internal parts of the engine, transmission and clutch, but it also acts as a coolant, a cleaner, a sealant, and a protectant. Because of these demands, the oil



11.5a The oil tank drain plug is located in the bottom of the front frame member (right arrow); the oil hose strainer screen is behind it (left arrow)



11.5b There's another oil drain plug in the crankcase

takes a terrific amount of abuse and should be replaced often with new oil of the recommended grade and type. Saving a little money on the difference in cost between a good oil and a cheap oil won't pay off if the engine is damaged. Honda recommends against using the following:

- a) Oils with graphite or molybdenum additives
- b) Non-detergent oils
- c) Castor or vegetable based oils
- d) Oil additives

2 Before changing the oil and cleaning the filter screens, warm up the engine so the oil will drain easily. Be careful when draining the oil, as the exhaust pipe, the engine and the oil itself can cause severe burns.

3 Park the motorcycle over a clean drain pan.

4 Remove the dipstick/oil filler cap to vent the crankcase and to act as a reminder that there is no oil in the engine.

5 Next, remove the drain plugs from the frame and crankcase (**see illustrations**) and allow the oil to drain into the pan. Do not lose the sealing washers on the drain plugs.

6 Remove the filter cover from the right side of the crankcase, then pull out the filter and spring (**see illustrations**).

7 As the oil is draining, unscrew the hose fitting from the frame oil

screen, then unscrew the strainer screen from the bottom of the oil tank (**see illustration 11.5a**). If additional maintenance is planned for this time period, check or service another component while the oil allowed to drain completely.

8 Although it's not required at periodic oil changes, Honda recommends that the strainer screen in the bottom of the crankcase be removed and cleaned whenever the right engine cover is removed. For access, remove the right engine cover (see Chapter 2). Remove the mounting bolt and pull the filter screen out of its slot in the crankcase (**see illustrations**).

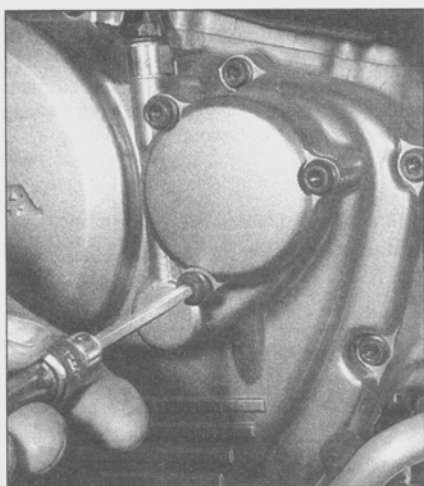
9 Clean the strainer screen(s) thoroughly with a high flash point solvent, then dry them completely (blow dry with compressed air, if available).

10 Check the condition of the drain plug threads. Replace the plug if the threads are damaged.

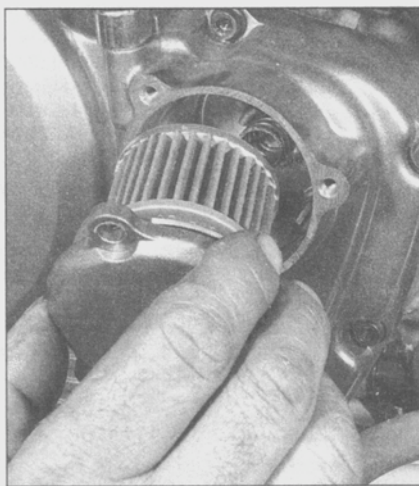
11 Install the spring and a new oil filter in the engine (**see illustrations**). **Caution:** Be sure to install the filter facing in the proper direction, referring to the instructions stamped on the filter.

12 Install the filter screen in its slot (if it was removed) and install the mounting bolt, then refer to Chapter 2 and install the right engine cover.

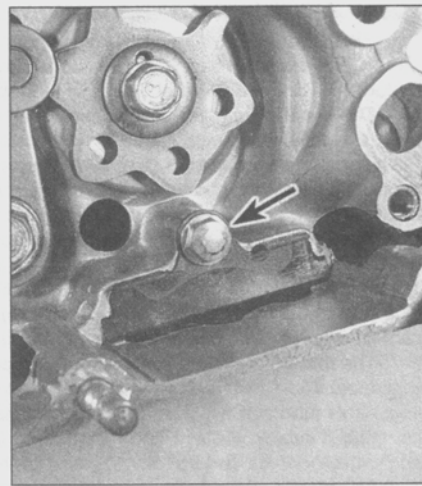
13 Place a new O-ring on the strainer fitting in the frame. Place the frame strainer screen in the frame, then install the fitting.



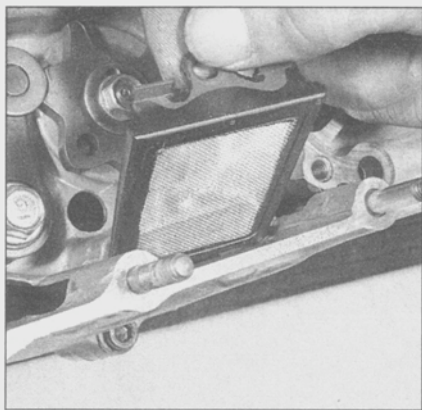
11.6a Remove the Allen bolts . . .



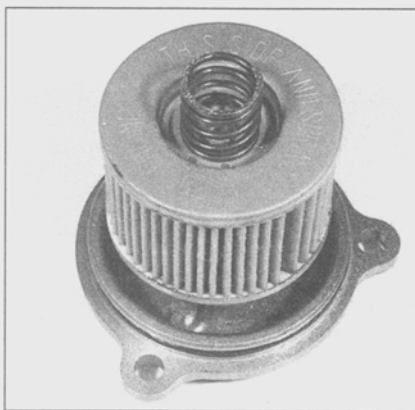
11.6b . . . then pull off the oil filter cover, filter element and spring



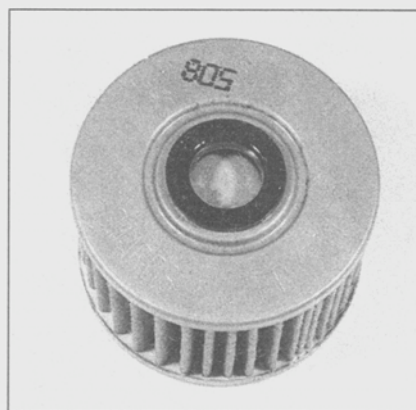
11.8a The right engine cover must be removed for access to the oil strainer screen; remove its bolt (arrow) . . .



11.8b ... and slide the screen out of the crankcase



11.11a It's important to install the filter in the right direction; the side labeled **THIS SIDE AND SPRING TOWARD ENGINE** goes into the engine first ...



11.11b ... while the side labeled **OUT SIDE TOWARD FILTER COVER** faces out when the filter is installed

14 Slip a new sealing washer over each drain plug, then install and tighten the plugs to the torque listed in this Chapter's Specifications. Avoid overtightening, as damage to the threads or engine case will result.

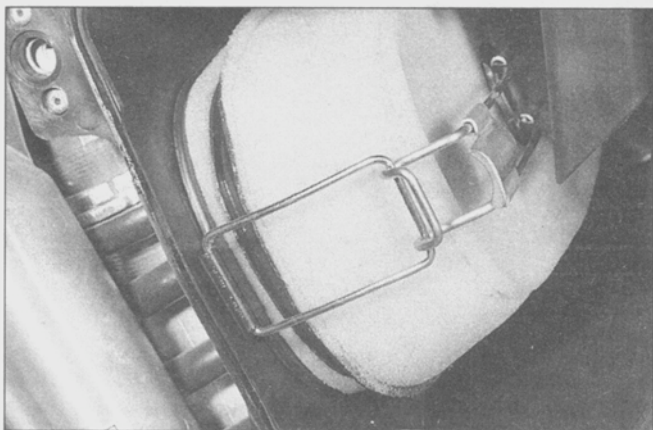
15 Before refilling the engine, check the old oil carefully. If the oil was drained into a clean pan, small pieces of metal or other material can be easily detected. If the oil is very metallic colored, then the engine is experiencing wear from break-in (new engine) or from insufficient lubrication. If there are flakes or chips of metal in the oil, then something is drastically wrong internally and the engine will have to be disassembled for inspection and repair.

16 If there are pieces of fiber-like material in the oil, the clutch is experiencing excessive wear and should be checked.

17 If the inspection of the oil turns up nothing unusual, add one quart of the recommended oil to the frame oil tank and install the dip-stick/filler cap (there isn't room in the frame oil tank for the full amount at this time). Start the engine and let it idle (don't rev it up) for two or three minutes.

18 Shut the engine off, wait a few minutes, then add the remaining oil. Approximate capacity is listed in this Chapter's Specifications. Use the dipstick to determine the exact amount to add. Check around the drain plugs and filter cover for leaks.

19 The old oil drained from the engine cannot be reused in its present state and should be disposed of. Check with your local refuse disposal company, disposal facility or environmental agency to see if they will accept the oil for recycling. Don't pour used oil into drains or onto the ground. After the oil has cooled, it can be drained into a suitable container (capped plastic jugs, topped bottles, milk cartons, etc.) for transport to one of these disposal sites.



12.3a Unclip the filter retaining band and pull the filter out of the case

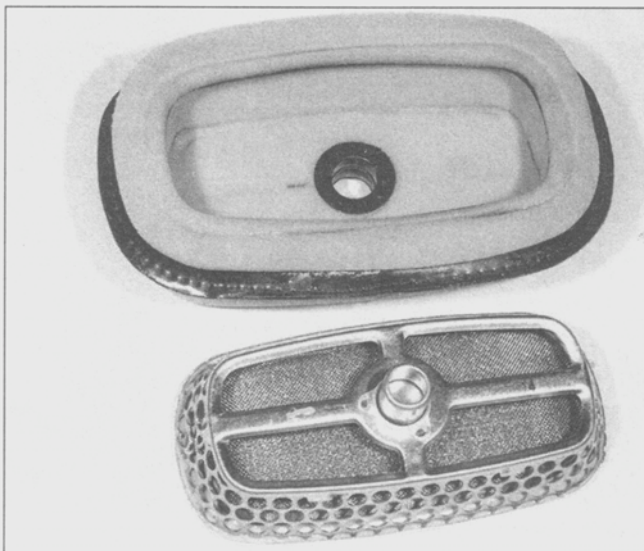
12 Air cleaner - filter element and drain tube cleaning

Element cleaning

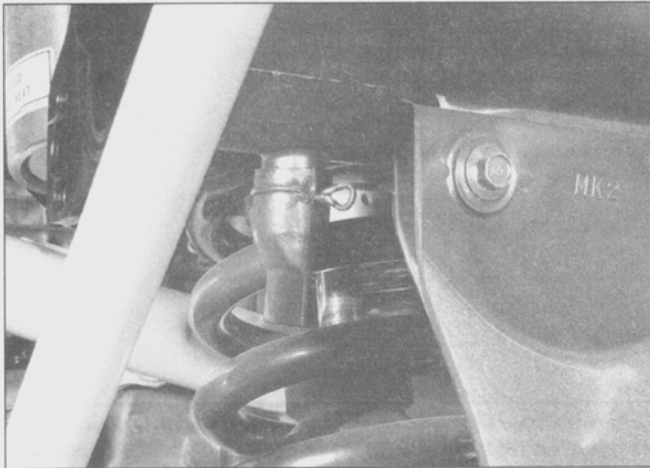
Refer to illustrations 12.3a and 12.3b

- 1 Remove the left side cover (see Chapter 7).
- 2 If you're working on an XL600R, remove three cover screws and take the cover off the air cleaner case. Grasp the holder tab, pull out the holder together with the foam element and separate the element from the holder.
- 3 If you're working on an XR600R and the air cleaner duct is attached to the case, remove the seat (see Chapter 7) and the air cleaner duct (see Chapter 3). Unclip the retaining band that secures the filter, pull the filter out and separate the foam element from the metal core (**see illustrations**).
- 4 Clean the element and holder or core in a high flash point solvent, squeeze the solvent out of the foam and let the core and element dry completely.
- 5 Soak the foam element in the type of oil listed in this Chapter's Specifications, then squeeze it firmly to remove the excess oil.
- 6 Place the element on the holder or core.
- 7 The remainder of installation is the reverse of the removal steps.

1



12.3b Separate the foam element from the core for cleaning and re-oiling



12.8 Open the drain tube (arrow) to release accumulated oil and water; if it's clogged, remove it for cleaning

Drain tube cleaning

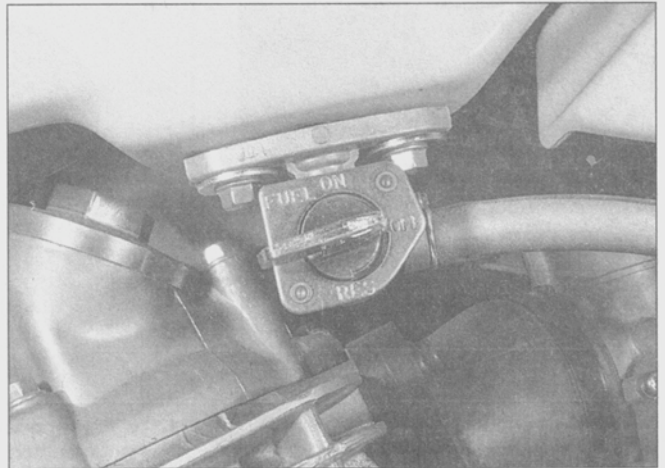
Refer to illustration 12.8

8 Squeeze the drain tube to let accumulated water and oil run out (see illustration). If the tube is clogged, squeeze its clamp, remove it from the air cleaner housing and clean it out. Install the drain tube on the housing and secure it with the clamp.

13 Fuel system - check and filter cleaning

Refer to illustrations 13.1a and 13.1b

Warning: Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any fuel spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher



13.1a The fuel tap on XR600R models is bolted to the tank

(flammable liquids) on hand.

- 1 Check the carburetor, fuel tank, the fuel tap and line and the carburetor hoses for leaks and evidence of damage (see illustrations).
- 2 If carburetor gaskets are leaking, the carburetor should be disassembled and rebuilt (refer to Chapter 3).
- 3 If the fuel tap is leaking at the gasket, tightening the screws may help. If leakage persists, the tap should be removed and a new gasket installed. The tap can't be disassembled, so if it's leaking around the handle, it should be replaced with a new one.
- 4 If the fuel line or drain hose is cracked or otherwise deteriorated, replace it with a new one.
- 5 Place the fuel tap lever in the Off position.

XL600R models

Refer to illustrations 13.6a and 13.6b

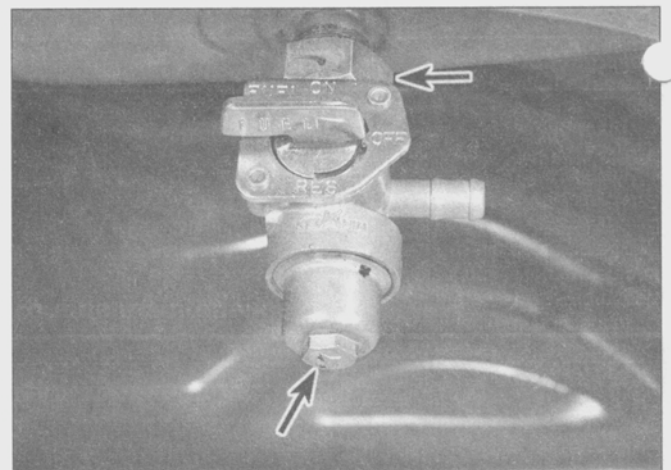
- 6 Place a wrench on the hex at the bottom of the fuel tap and remove the cup, strainer and O-ring (see illustrations).
- 7 Clean the strainer. If it's heavily clogged, remove the fuel tank (see Chapter 3). Unscrew the fuel valve nut (see illustration 13.6a), then remove the fuel tank and clean the in-tank strainer.

XR600R models

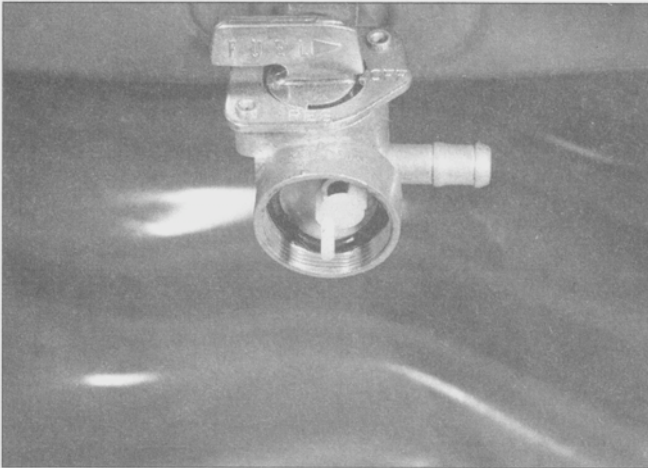
- 8 Disconnect and plug the fuel line, remove the bolts and take the



13.1b There's a drain hose and a vent hose connected to the bottom of the float chamber



13.6a On XL600R models, turn the hex (lower arrow) counterclockwise to unscrew the cup from the fuel tap; drain the fuel tank and remove the fuel tap nut (upper arrow) if it's necessary to remove the in-tank strainer



13.6b Pull the O-ring and plastic strainer from the fuel tap; on installation, line up the match mark on the strainer with the mark on the fuel tap

tap out of the fuel tank (see illustration 13.1a).

Clean the strainer. If it's too heavily clogged to clean, replace the fuel tap.

10 Installation is the reverse of the removal steps. Tighten the fuel tap screws securely, but don't overtighten them and strip out the threads.

11 After installation, run the engine and check for fuel leaks.

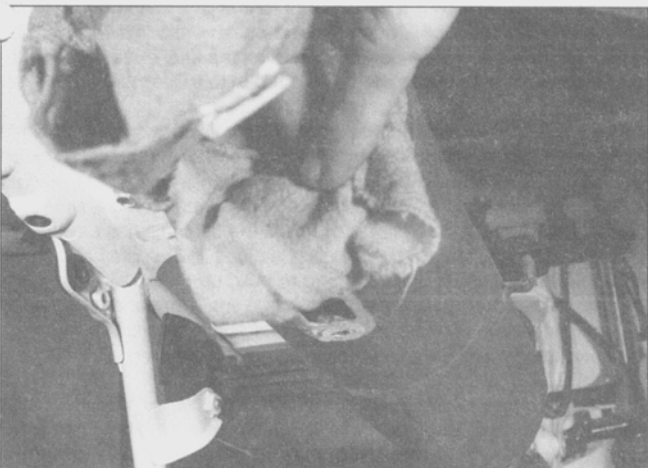
12 If the motorcycle will be stored for a month or more, remove and drain the fuel tank. Also loosen the float chamber drain screw and drain the fuel from the carburetor (see Chapter 3).

14 Exhaust system - inspection and spark arrester cleaning

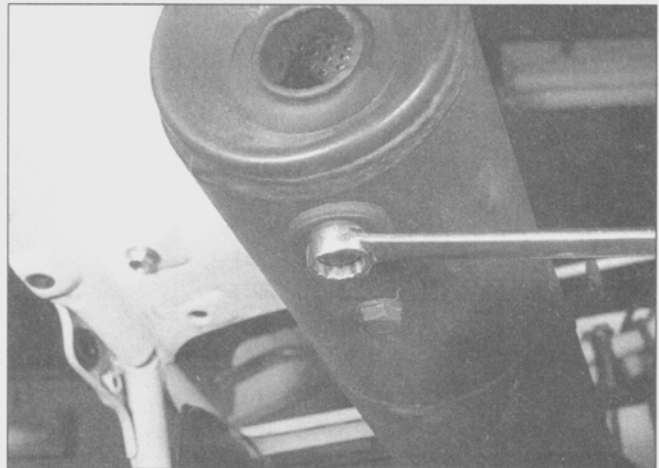
Refer to illustrations 14.3a and 14.3b

1 Periodically check the exhaust system for leaks and loose fasteners (see Chapter 3). If tightening the holder nuts at the cylinder head fails to stop any leaks, replace the gasket with a new one (a procedure which requires removal of the system).

2 The exhaust pipe flange nuts at the cylinder head are especially prone to loosening, which could cause damage to the head. Check them frequently and keep them tight.



14.3b ... then hold a rag against the muffler opening and rev the engine a few times to blow carbon out of the spark arrester



14.3a Unbolt the plate . . .

3 **Warning:** Make sure the exhaust system is cool before doing this procedure. At the specified interval, remove the plate from under the rear end of the muffler (see illustration). Fold up a thick rag and hold it firmly over the normal exhaust outlet at the rear end of the muffler (see illustration). Have an assistant start the engine and rev it a few times to blow carbon out of the plate hole, then shut the engine off.

4 After the exhaust system has cooled, install the plate and gasket. Tighten the bolts securely.

15 Spark plug - replacement

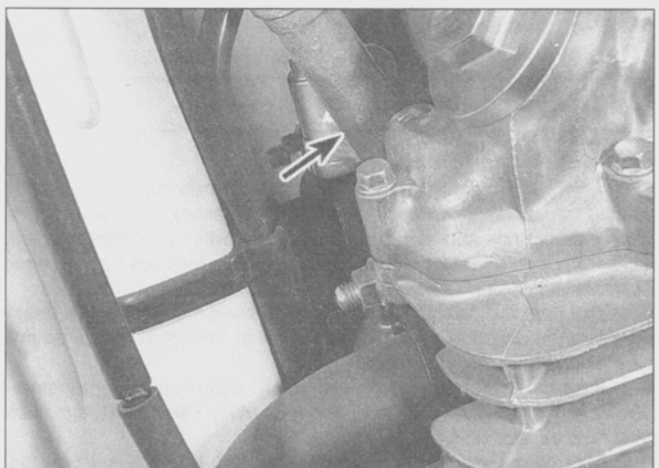
Refer to illustrations 15.1, 15.6a and 15.6b

1 Twist the spark plug cap to break it free from the plug, then pull it off (see illustration).

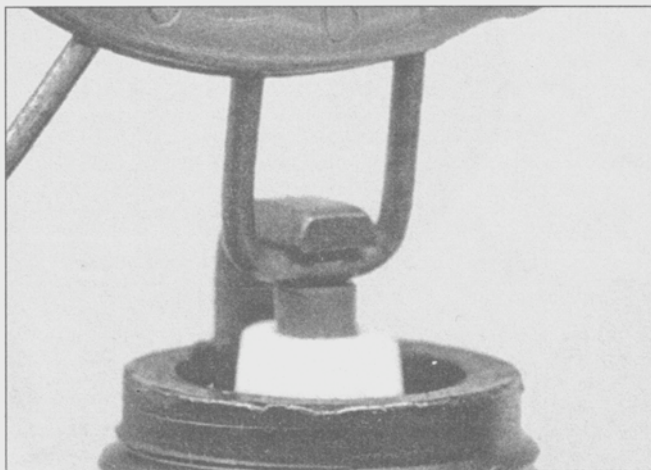
2 If available, use compressed air to blow any accumulated debris from around the spark plug. Remove the plug with a spark plug socket.

3 Inspect the electrodes for wear. Both the center and side electrodes should have square edges and the side electrode should be of uniform thickness. Look for excessive deposits and evidence of a cracked or chipped insulator around the center electrode. Compare your spark plugs to the color spark plug reading chart. Check the threads, the washer and the ceramic insulator body for cracks and other damage.

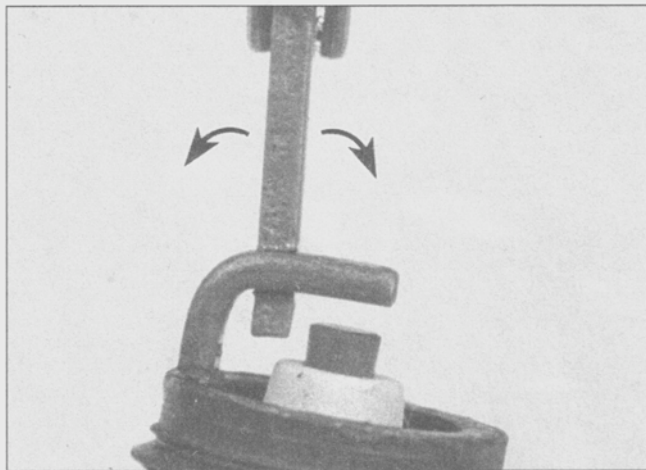
1



15.1 Twist the spark plug cap back and forth to free it, then pull it off the plug



15.6a Spark plug manufacturers recommend using a wire type gauge when checking the gap - if the wire doesn't slide between the electrodes with a slight drag, adjustment is required



15.6b To change the gap, bend the side electrode only, as indicated by the arrows, and be very careful not to crack or chip the ceramic insulator surrounding the center electrode

4 If the electrodes are not excessively worn, and if the deposits can be easily removed with a wire brush, the plug can be regapped and reused (if no cracks or chips are visible in the insulator). If in doubt concerning the condition of the plug, replace it with a new one, as the expense is minimal.

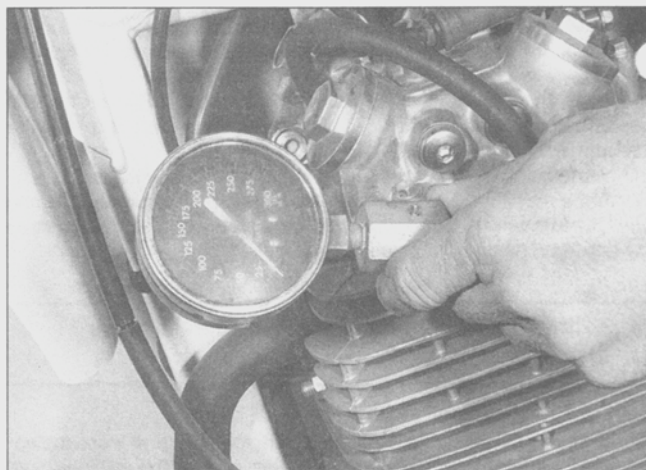
5 Cleaning the spark plug by sandblasting is permitted, provided you clean the plug with a high flash-point solvent afterwards.

6 Before installing a new plug, make sure it is the correct type and heat range. Check the gap between the electrodes, as it is not preset. For best results, use a wire-type gauge rather than a flat gauge to check the gap (**see illustration**). If the gap must be adjusted, bend the side electrode only and be very careful not to chip or crack the insulator nose (**see illustration**). Make sure the washer is in place before installing the plug.

7 Since the cylinder head is made of aluminum, which is soft and easily damaged, thread the plug into the head by hand. Slip a short length of hose over the end of the plug to use as a tool to thread it into place. The hose will grip the plug well enough to turn it, but will start to slip if the plug begins to cross-thread in the hole - this will prevent damaged threads and the accompanying repair costs.

8 Once the plug is finger tight, the job can be finished with a socket. Honda doesn't specify a spark plug torque setting for these models. Tighten the plug finger tight (until the washer bottoms on the cylinder head) then use a wrench to tighten it an additional 1/4 turn. Regardless of the method used, do not over-tighten it.

9 Reconnect the spark plug cap.



16.5 A compression gauge with a threaded fitting for the spark plug hole is preferred over the type that requires hand pressure to maintain the seal

16 Cylinder compression - check

Refer to illustration 16.5

1 Among other things, poor engine performance may be caused by leaking valves, incorrect valve clearances, a leaking head gasket, or a worn piston, rings and/or cylinder wall. A cylinder compression check will help pinpoint these conditions and can also indicate the presence of excessive carbon deposits in the cylinder head.

2 The only tools required are a compression gauge and a spark plug wrench. Depending on the outcome of the initial test, a squirt-type oil can may also be needed.

3 Start the engine and allow it to reach normal operating temperature, then remove the spark plug. Work carefully - don't strip the spark plug hole threads and don't burn your hands.

4 Disable the ignition by disconnecting the primary (low tension) wires from the coil (see Chapter 4). Be sure to mark the locations of the wires before detaching them.

5 Install the compression gauge in the spark plug hole (**see illustra-**

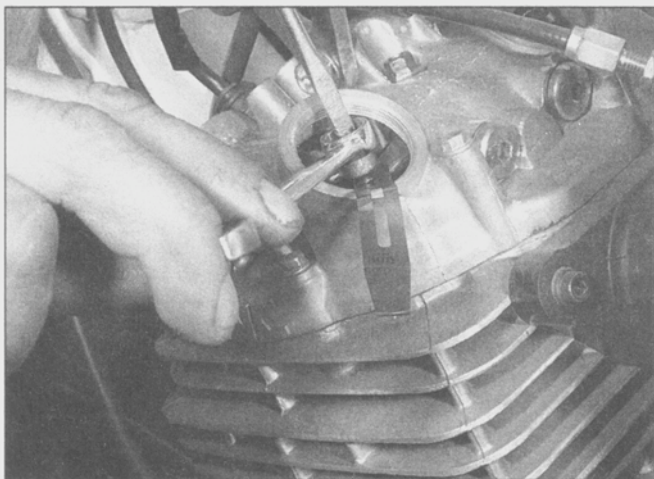
tion). Hold or block the throttle wide open.

6 Kick the engine over a minimum of four or five revolutions (or until the gauge reading stops increasing) and observe the initial movement of the compression gauge needle as well as the final total gauge reading. Compare the results to the value listed in this Chapter's Specifications.

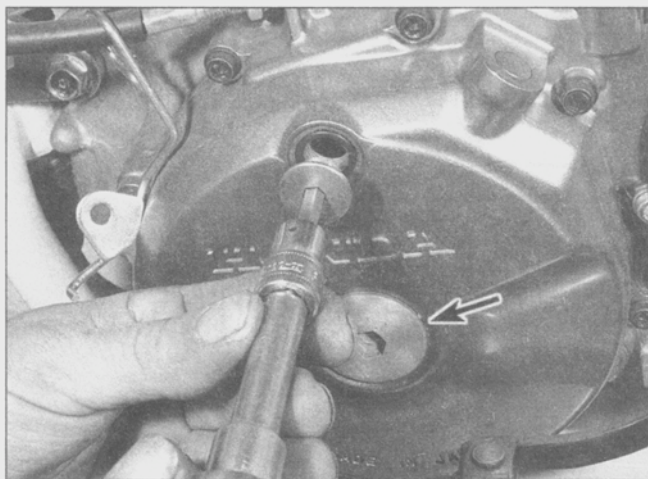
7 If the compression built up quickly and evenly to the specified amount, you can assume the engine upper end is in reasonably good mechanical condition. Worn or sticking piston rings and worn cylinders will produce very little initial movement of the gauge needle, but compression will tend to build up gradually as the engine spins over. Valve and valve seat leakage, or head gasket leakage, is indicated by low initial compression which does not tend to build up.

8 To further confirm your findings, add a small amount of engine oil to the cylinder by inserting the nozzle of a squirt-type oil can through the spark plug hole. The oil will tend to seal the piston rings if they are leaking.

9 If the compression increases significantly after the addition of the oil, the piston rings and/or cylinder are definitely worn. If the compression does not increase, the pressure is leaking past the valves or the head gasket. Leakage past the valves may be due to insufficient valve clearances, burned, warped or cracked valves or valve seats or valves that are hanging up in the guides.



17.3 Unscrew the valve adjuster hole cover, then slip a feeler gauge between the rocker arm and valve stem to measure the clearance; to change it, loosen the locknut and turn the adjuster with a screwdriver



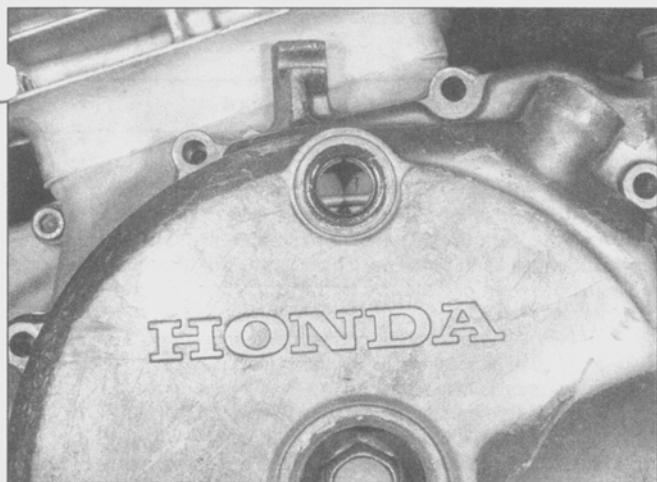
17.4 Unscrew the timing hole cover to look at the timing marks (don't forget to inspect its O-ring); the center cover (arrow) provides access to the alternator rotor bolt, which you can use to turn the engine

If compression readings are considerably higher than specified, the combustion chamber is probably coated with excessive carbon deposits. It is possible (but not very likely) for carbon deposits to raise the compression enough to compensate for the effects of leakage past rings or valves. Refer to Chapter 2, remove the cylinder head and carefully decarbonize the combustion chamber.

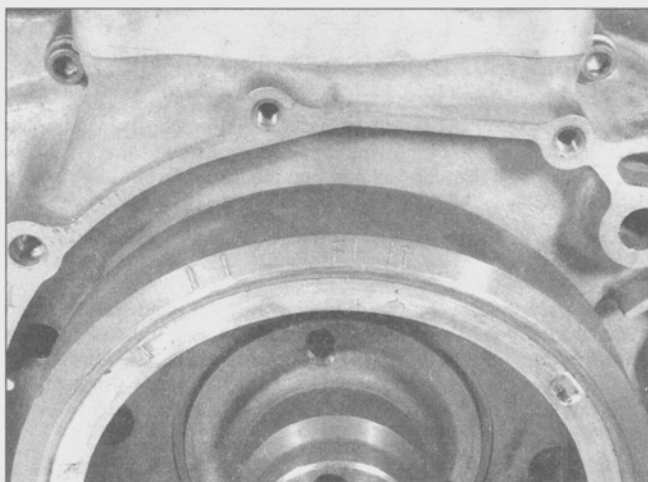
17 Valve clearances - check and adjustment

Refer to illustrations 17.3, 17.4, 17.5a and 17.5b

- 1 The engine must be completely cool for this maintenance procedure (below 35-degrees C/95-degrees F), so if possible let the machine sit overnight before beginning.
- 2 Refer to Section 15 and remove the spark plug. This will make it easier to turn the engine.
- 3 Remove the valve adjusting hole plugs from the cylinder head cover (see illustration).
- 4 Remove the timing hole plug and the center access plug from the left engine cover (see illustration).



17.5a The line next to the T on the alternator rotor should be aligned with the timing hole notch for valve adjustment

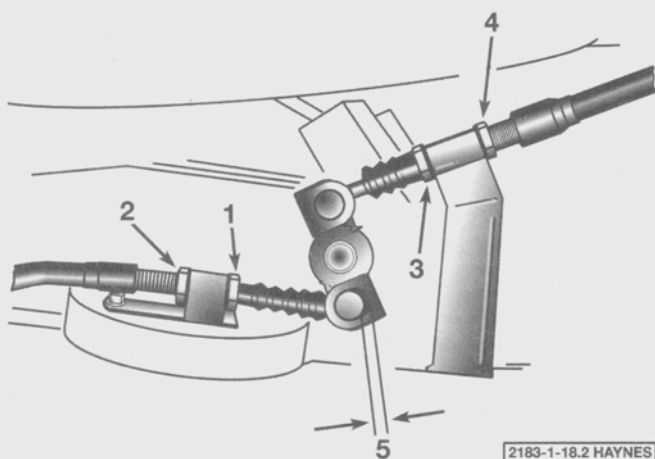


17.5b The line next to the T indicates top dead center; the line next to the F is the ignition timing mark at idle speed; the two parallel lines form the advance timing mark (left engine cover removed for clarity)

5 Position the piston at Top Dead Center (TDC) on the compression stroke. Do this by turning the crankshaft until the T mark on the rotor is aligned with the timing pointer on the crankcase (see illustrations). Reach through the access holes and try to wiggle the rocker arms. They should have some play. If they don't, the piston is on the exhaust stroke; rotate the crankshaft one full turn to bring the marks into alignment again and recheck to make sure there's now some play in the rocker arms. **Caution:** Be sure the engine is on the compression stroke, not the exhaust stroke; engine damage may occur if the valves are adjusted with the piston on the exhaust stroke. If you're still in doubt, place a thumb over the spark plug hole while you turn the engine. As the piston rises on its compression stroke, you'll feel the compression build up.

6 With the engine in this position, all four of the valves can be checked.

7 To check, insert a feeler gauge of the thickness listed in this Chapter's Specifications between the valve stem and rocker arm (see illustration 17.3). Pull the feeler gauge out slowly - you should feel a slight drag. If there's no drag, the clearance is too loose. If there's a heavy drag, the clearance is too tight.



2183-1-18.2 HAYNES

18.2 Kickstarter decompressor details (1986 and 1987 models)

- 1 Locknut (kickstarter decompressor)
- 2 Adjusting nut (kickstarter decompressor)
- 3 Locknut (manual decompressor)
- 4 Adjusting nut (manual decompressor)
- 5 Freeplay (kickstarter decompressor)

8 If the clearance is incorrect, loosen the adjuster locknut with a box wrench (ring spanner). Turn the adjusting screw until the correct clearance is achieved, then tighten the locknut.

9 After adjusting, recheck the clearance with the feeler gauge to make sure it wasn't changed when the locknut was tightened.

10 Now measure the other valves, following the same procedure you used for the first valve. Make sure to use a feeler gauge of the specified thickness.

11 With all of the clearances within the Specifications, install the adjusting hole plugs, center access cover and the timing hole plug.

12 Always check the adjustment of the decompressor after adjusting the valve clearances.

18 Decompressor freeplay - check and adjustment

1 Refer to Section 17 and make sure the engine is at top dead center on its compression stroke. Make the adjustments in the following order.

1986 and 1987 models

Refer to illustration 18.2

2 Measure play at the end of the kickstarter decompressor cable (**see illustration**). If it's not within the range listed in this Chapter's Specifications, loosen the locknut, turn the adjusting nut to obtain the correct freeplay and tighten the locknut.

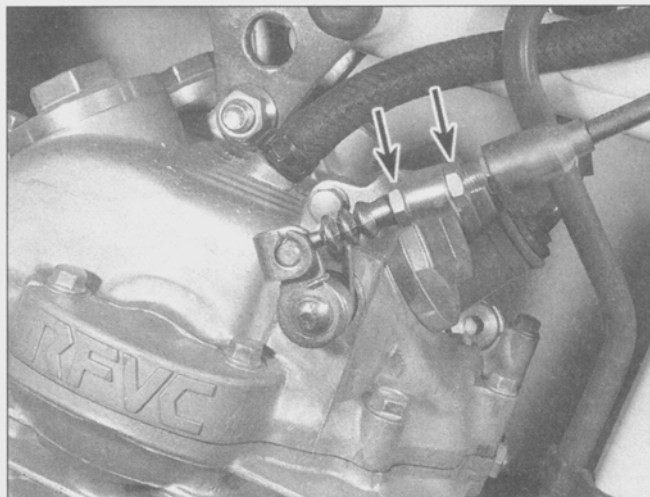
All models

Refer to illustration 18.3

3 Operate the decompressor lever on the left handlebar and note the amount of freeplay at the outer end of the lever (how far the lever travels before it starts to pull the decompressor) (**see illustration**). If it's not within the range listed in this Chapter's Specifications, loosen the locknut(s) at the engine. Turn the adjuster to obtain correct freeplay and tighten the locknut(s).

1983 through 1985 models

4 Measure freeplay at the tip of the decompressor lever on the rear side of the cylinder head. If it's not within the range listed in this Chapter's Specifications, loosen the locknut, turn the adjusting nut to obtain the correct freeplay and tighten the locknut.



18.3 On 1988 and later models, loosen the locknuts (left arrow) and turn the adjusting nut (right arrow) to set decompressor lever freeplay

19 Ignition timing

1 Ignition timing is fixed and can't be adjusted.

2 Connect a timing light and tune-up tachometer to the engine, following manufacturer's instructions.

3 Remove the timing hole plug from the left engine cover (**see illustration 17.4**).

4 Start the engine. Let it idle and compare idle speed with this Chapter's Specifications. If necessary, adjust idle speed (**see Section 20**).

5 At idle, the timing light should flash when the F mark on the alternator rotor is aligned with the timing pointer on the crankcase (**see illustration 17.5b**).

6 Operate the throttle to slowly increase engine speed to the full advance speed listed in this Chapter's Specifications. At that point, the timing light should flash when the timing pointer on the crankcase is between the full advance marks (parallel lines) on the alternator rotor (**see illustration 17.5b**).

7 If the light doesn't flash at the proper time, there's a problem in the electronic ignition system (possibly a defective CDI unit). Have the system tested by a Honda dealer or motorcycle repair shop.

20 Idle speed - check and adjustment

Refer to illustration 20.3

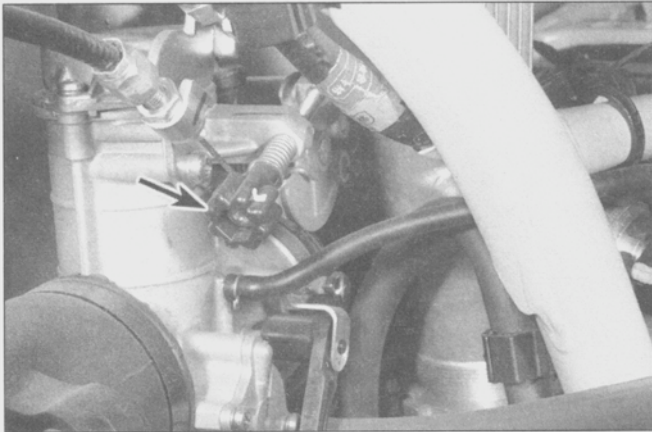
1 Before adjusting the idle speed, make sure the valve clearances and spark plug gap and breaker point gap (models so equipped) are correct. Also, turn the handlebars back-and-forth and see if the idle speed changes as this is done. If it does, the throttle cable may not be adjusted correctly, or it may be worn out. Be sure to correct this problem before proceeding.

2 The engine should be at normal operating temperature, which is usually reached after 10 to 15 minutes of stop and go riding. Make sure the transmission is in Neutral.

3 Turn the throttle stop screw (**see illustration**) until the idle speed listed in this Chapter's Specifications is obtained.

4 Snap the throttle open and shut a few times, then recheck the idle speed. If necessary, repeat the adjustment procedure.

5 If a smooth, steady idle can't be achieved, the fuel/air mixture may be incorrect. Refer to Chapter 3 for additional carburetor information.



20.3 Turn the throttle stop screw to set idle speed

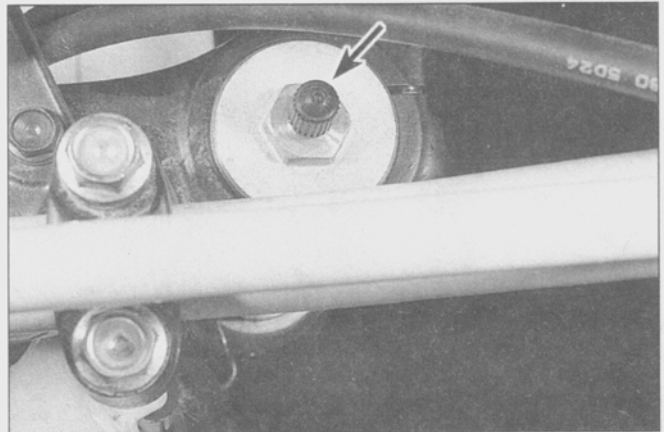
21 Fasteners - check

- 1 Since vibration of the machine tends to loosen fasteners, all nuts, bolts, screws, etc. should be periodically checked for proper tightness. Also make sure all cotter pins or other safety fasteners are correctly installed.
- 2 Pay particular attention to the following:
 - Spark plug
 - Engine oil drain plugs
 - Gearshift pedal
 - Brake lever and pedal
 - Kickstarter pedal
 - Footpegs
 - Engine mounting bolts
 - Steering stem locknut
 - Front axle nut
 - Rear axle nut
 - Skid bar bolts
- 3 If a torque wrench is available, use it along with the torque specifications at the beginning of this, or other, Chapters.

22 Suspension - check

Refer to illustration 22.4

- 1 The suspension components must be maintained in top operating condition to ensure rider safety. Loose, worn or damaged suspension parts decrease the motorcycle's stability and control.
- 2 Lock the front brake and push on the handlebars to compress the front forks several times. See if they move up-and-down smoothly without binding. If binding is felt, the forks should be disassembled and inspected as described in Chapter 6.
- 3 Check the tightness of all front suspension nuts and bolts to be sure none have worked loose.
- 4 With the front forks cold and fully extended, remove the air valve caps from the forks and check air pressure with a pressure gauge (**see illustration**). Compare with the pressure listed in this Chapter's Specifications.
- 5 Inspect the rear shock absorber for fluid leakage and tightness of the mounting nuts and bolts. If leakage is found, the shock should be replaced.
- 6 Support the motorcycle securely upright with its rear wheel off the ground. Grab the swingarm on each side, just ahead of the axle. Rock the swingarm from side to side - there should be no discernible movement at the rear. If there's a little movement or a slight clicking can be heard, make sure the swingarm pivot shaft is tight. If the pivot shaft is tight but movement is still noticeable, the swingarm will have to be removed and the bearings replaced as described in Chapter 5.
- 7 Inspect the tightness of the rear suspension nuts and bolts.



22.4 Remove the air valve cap to check fork air pressure

23 Steering head bearings - check and adjustment

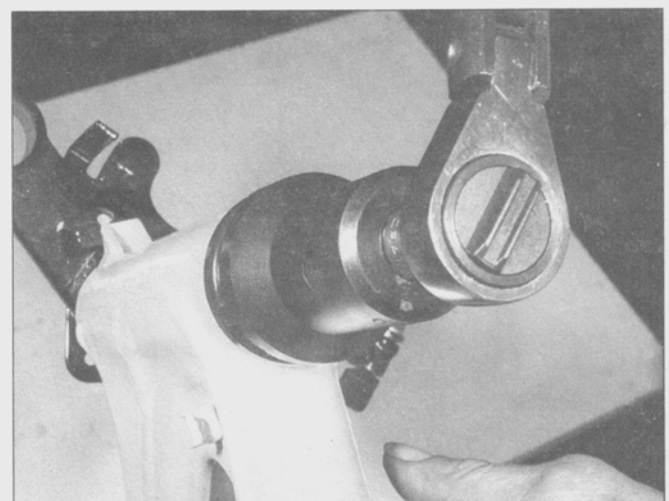
Inspection

- 1 These motorcycles are equipped with ball-and-cone or roller-and-cone type steering head bearings, which can become dented, rough or loose during normal use of the machine. In extreme cases, worn or loose steering head bearings can cause steering wobble that is potentially dangerous.
- 2 To check the bearings, Lift up the front end of the motorcycle and place a secure support beneath the engine so the front wheel is off the ground.
- 3 Point the wheel straight ahead and slowly move the handlebars from side-to-side. Dents or roughness in the bearing will be felt and the bars will not move smoothly. **Note:** Make sure any hesitation in movement is not being caused by the cables and wiring harnesses that run to the handlebars.
- 4 Next, grasp the fork legs and try to move the wheel forward and backward. Any looseness in the steering head bearings will be felt. If play is felt in the bearings, adjust the steering head as follows.

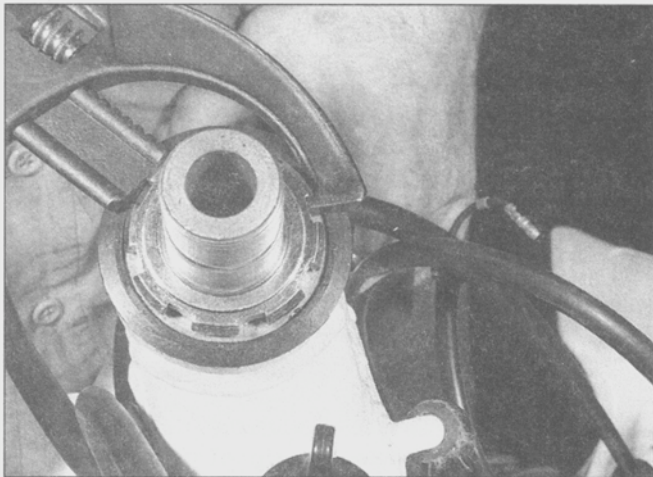
Adjustment

Refer to illustrations 23.6 and 23.9

- 5 Remove the handlebars and upper triple clamp (see Chapter 5).
- 6 Loosen the bearing adjusting nut, then tighten it to the torque listed in this Chapter's Specifications (**see illustration**).



23.6 The best way to adjust the steering stem bearings is with a torque wrench and a special socket . . .



23.9 . . . but an adjustable spanner can also be used; be very sure there's no binding or looseness in the bearings

7 Turn the lower triple clamp from lock-to-lock (all the way to the left and all the way back to the right) four or five times to seat the bearings.

8 Loosen the adjusting nut all the way, then tighten it to the final torque listed in this Chapter's Specifications.

9 An adjustable spanner wrench can be used to adjust the bearings if you don't have the special socket (see illustration). Since this tool can't be used with a torque wrench, it will be necessary to estimate the tightness of the nut. Be sure the final result is that the steering stem turns from side-to-side freely, but there is no side-to-side or vertical play of the steering stem in the bearings.

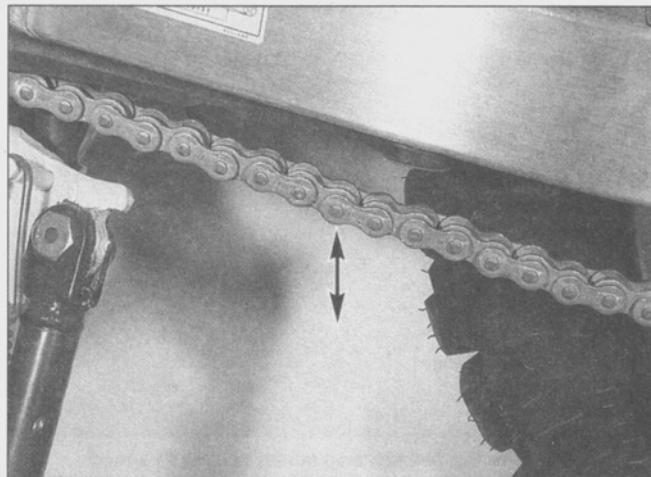
24 Drive chain and sprockets - check, adjustment and lubrication

Refer to illustrations 24.3 and 24.6

1 A neglected drive chain won't last long and can quickly damage the sprockets. Routine chain adjustment isn't difficult and will ensure maximum chain and sprocket life.

2 To check the chain, support the bike securely with the rear wheel off the ground. Place the transmission in neutral.

3 Push up on the bottom run of the chain and measure the slack



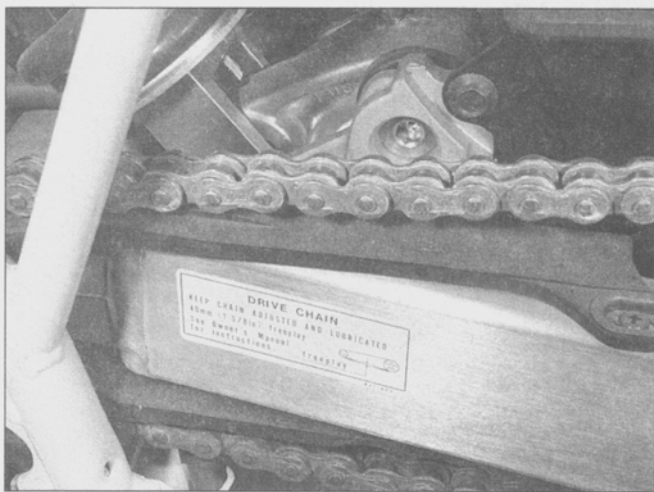
24.3 Check drive chain freeplay midway along the lower chain run

midway between the two sprockets (see illustration), then compare the measurements to the value listed in this Chapter's Specifications. As wear occurs, the chain will actually stretch, which means it must be adjusted by removing some slack from the chain. In some cases where lubrication has been neglected, corrosion and galling may cause the links to bind and kink, which effectively shortens the chain's length. If the chain is tight between the sprockets, rusty or kinked, it's time to replace it with a new one. **Note:** Repeat the chain slack measurement along the length of the chain - ideally, every inch or so. If you find a tight area, mark it with a felt pen or paint and repeat the measurement after the bike has been ridden. If the chain is still tight in the same areas, it may be damaged or worn. Because a tight or kinked chain can damage the transmission countershaft bearing, it's a good idea to replace it.

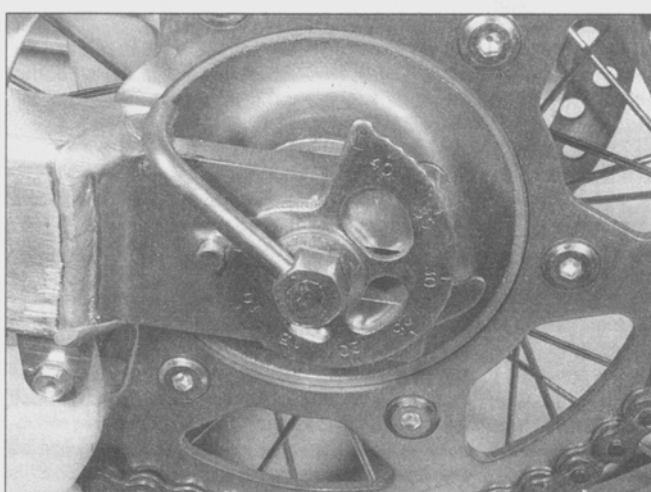
4 Check the entire length of the chain for damaged rollers, loose links and loose pins.

5 Look through the slots in the engine sprocket cover and inspect the engine sprocket. Check the teeth on the engine sprocket and the rear sprocket for wear (see illustration 12.3 in Chapter 5). Refer to Chapter 5 for the sprocket replacement procedure if the sprockets appear to be worn excessively.

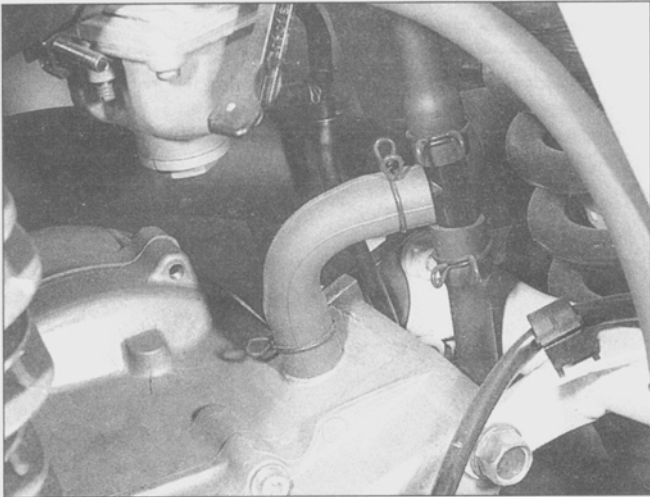
6 Check the chain slider on the swingarm near the front (see illustration). If it's worn, measure its thickness. If it's less than the value listed in the Chapter 5 Specifications, replace it (see Chapter 5).



24.6 Inspect the slider at the front of the swingarm and replace it if it's worn



24.8 Turn the chain adjuster to tighten or loosen the chain



25.1 Inspect the breather hoses (XR600R except 1998-on California shown)

Adjustment

Refer to illustration 24.8

- 7 Rotate the rear wheel until the chain is positioned with the least amount of slack present.
- 8 Loosen the rear axle nut (see illustration 11.14a in Chapter 6). Turn the snail adjuster on each side of the swingarm evenly until the proper chain tension is obtained (get the adjuster on the chain side close, then set the adjuster on the opposite side) (see illustration). Be sure to turn the adjusters evenly to keep the wheel in alignment. If the adjusters reach the end of their travel, the chain is excessively worn and should be replaced with a new one (see Chapter 5).
- 9 When the chain has the correct amount of slack, make sure the marks on the adjusters correspond to the same relative marks on each side of the swingarm (see illustration 24.8). Tighten the axle nut to the torque listed in the Chapter 5 Specifications.

Lubrication

Note: If the chain is dirty, it should be removed and cleaned before it's lubricated (see Chapter 5).

- 10 Use a good quality chain lubricant of the type listed in this Chapter's Specifications. Be sure the lubricant is intended for use with O-ring chains - if the lubricant causes the O-rings to deteriorate, the chain will lose its internal lubricant and dirt will find its way into the rollers. Apply the lubricant along the top of the lower chain run, so that when the bike is ridden centrifugal force will move the lubricant into the chain, rather than throwing it off.
- 11 After applying the lubricant, let it soak in a few minutes before wiping off any excess.

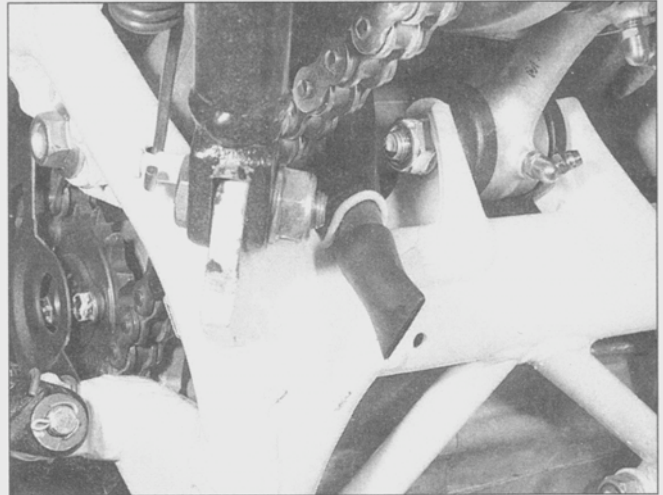
25 Crankcase breather system - check

Refer to illustrations 25.1 and 25.2

- 1 Check the breather hoses for damage, deterioration and loose connections (see illustration). On 1998 and later California models, make sure the breather separator unit is securely mounted in the hoses.
- 2 On all except 1998 and later California models, at the bottom end of the drain hose, either remove the plug (XL600R) or squeeze the fitting (XR600R) to open it so any breather deposits can drain out (see illustration). If the hose is clogged, remove it and clean out the deposits.

26 Evaporative emission control system - check

- 1 This system is used on XL600R models first sold in California. It



25.2 Squeeze the fitting at the bottom end of the drain hose to let out accumulated oil and water

stores gasoline vapor from the fuel system in a canister filled with activated charcoal. The stored vapor is pulled into the engine for combustion when the engine is run.

- 2 To inspect the system, check the hoses for misconnection, cracks and general deterioration and connect or replace them as necessary.
- 3 Remove the canister from the hoses and turn it upside down. If gasoline runs out, the canister should be replaced.

27 Front fork oil change

- 1 Although fork oil changes are not a regularly scheduled maintenance procedure, the oil should be changed if it becomes contaminated. The following steps apply to models equipped with fork drain screws. If you're working on a bike that doesn't have a drain screw, you'll need to disassemble the forks part-way to drain the oil (see Chapter 5).
- 2 Support the motorcycle securely upright.
- 3 Remove the handlebars (see Chapter 5).
- 4 Remove the fork cap bolts.
- 5 Wrap a rag around the top of the fork to catch dripping oil, then lift out the fork spring from each fork.
- 6 Place a pan under the fork drain bolt and remove the drain bolt and gasket. **Warning:** Do not allow the fork oil to drip onto the tire or brake disc. If it does, wash it off with soap and water before riding the motorcycle.
- 7 After most of the oil has drained, slowly compress and release the forks to pump out the rest of the oil. An assistant may be needed to do this.
- 8 Check the drain bolt gasket for damage and replace it if necessary. Clean the threads of the drain bolt with solvent and let it dry, then reinstall the bolt and gasket, tightening it securely.
- 9 Pour the type and amount of fork oil listed in the Chapter 5 Specifications into the fork tube through the opening at the top. Slowly pump the forks a few times to purge air from the upper and lower chambers.
- 10 Fully compress the front forks (you may need an assistant to do this). Insert a stiff tape measure into the fork tube and measure the distance from the oil to the top of the fork tube (see illustration 4.15b in Chapter 5). Compare your measurement to the value listed in the Chapter 5 Specifications. Drain or add oil as necessary until the level is correct.
- 11 Check the O-ring on the fork cap bolt and replace it with a new one if it's deteriorated, broken or otherwise damaged. Install the fork

spring. Install the cap bolt and tighten it to the torque listed in the Chapter 5 Specifications.

12 Repeat the procedure for the other fork. It is essential that the oil quantity and level are identical in each fork.

13 Install the handlebar, being sure to locate it correctly in the brackets, and tighten the handlebar bracket bolts to the torque listed in the Chapter 5 Specifications.

28 Sidestand - check

The sidestand should be checked to make sure it stays down when extended and up when retracted. Refer to Chapter 7 and check tightness of the sidestand mounting bolts. Check the spring for cracks or rust and replace it if any problems are found.

Chapter 2

Engine, clutch and transmission

Contents

	Section		Section
Cam chain tensioner - removal, inspection and installation	8	General information.....	1
Camshaft, guides and chain - removal and installation.....	9	Initial start-up after overhaul	28
Clutch - removal, inspection and installation.....	16	Internal shift mechanism - removal, inspection and	
Compression test	See Chapter 1	installation.....	25
Crankcase - disassembly and reassembly	23	Kickstarter - removal, inspection and installation	21
Crankcase components - inspection and servicing.....	24	Major engine repair - general note	4
Crankshaft and balancer - removal, inspection and		Oil pump and internal pipe - removal, inspection and	
installation.....	27	installation.....	17
Cylinder - removal, inspection and installation	13	Operations possible with the engine in the frame.....	2
Cylinder head - removal and installation.....	10	Operations requiring engine removal	3
Cylinder head and valves - disassembly, inspection		Piston - removal, inspection and installation	14
and reassembly.....	12	Piston rings - installation.....	15
Cylinder head cover and rocker arms - removal,		Primary drive gear and camshaft sprocket - removal,	
inspection and installation	7	inspection and installation	18
Decompressor lever and cable - removal and installation	20	Recommended break-in procedure	29
Engine - removal and installation	5	Spark plug replacement	See Chapter 1
Engine disassembly and reassembly - general information.....	6	Transmission shafts - removal, inspection and installation	26
External oil line and hoses - removal and installation	22	Valves/valve seats/valve guides - servicing	11
External shift mechanism - removal, inspection and			
installation.....	19		

Specifications

Main rocker arms

Rocker arm inside diameter	
Standard.....	11.500 to 11.518 mm (0.4528 to 0.4535 inch)
Limit	11.55 mm (0.455 inch)
Rocker shaft outside diameter	
Standard.....	11.466 to 11.484 mm (0.4514 to 0.4521 inch)
Limit	11.41 mm (0.449 inch)
Shaft-to-arm clearance	
Standard.....	0.016 to 0.052 mm (0.0006 to 0.0020 inch)
Limit	0.14 mm (0.006 inch)

Sub-rocker arms

Rocker arm inside diameter

Intake

Standard	8.000 to 8.015 mm (0.3150 to 0.3155 inch)
Limit	8.05 mm (0.317 inch)

Exhaust

Standard	7.000 to 7.015 mm (0.2756 to 0.2761 inch)
Limit	7.05 mm (0.277 inch)

Rocker shaft outside diameter

Intake

Standard	7.969 to 7.972 mm (0.3137 to 0.3139 inch)
Limit	7.92 mm (0.312 inch)

Shaft-to-arm clearance

Standard	0.033 to 0.043 mm (0.0013 to 0.0017 inch)
Limit	0.08 mm (0.003 inch)

Camshaft

Lobe height

XL600R

Intake

Standard	31.023 mm (1.2214 inches)
Limit	30.85 mm (1.215 inches)

Exhaust

Standard	30.976 mm (1.2195 inches)
Limit	30.81 mm (1.213 inches)

XR600R

Intake

Standard	31.155 to 31.315 mm (1.2266 to 1.2329 inches)
Limit	31.05 mm (1.222 inches)

Exhaust

Standard	31.901 to 31.251 mm (1.2241 to 1.2304 inches)
Limit	31.00 mm (1.220 inches)

Journal diameter

Not specified

Bearing journal inside diameter

Not specified

Camshaft runout limit

0.04 mm (0.002 inch)

Camshaft side clearance

XL600R

Standard	0.05 to 0.25 mm (0.002 to 0.010 inch)
Limit	0.40 mm (0.016 inch)

XR600R

Not specified

Cylinder head, valves and valve springs

Cylinder head warpage limit

0.10 mm (0.004 inch)

Valve stem runout

Not specified

Valve stem diameter

Intake

Standard	6.575 to 6.590 mm (0.2589 to 0.2594 inch)
Limit	6.56 mm (0.257 inch)

Exhaust

Standard	6.560 to 6.575 mm (0.2583 to 0.2589 inch)
Limit	6.55 mm (0.257 inch)

Valve guide inside diameter (intake and exhaust)

Standard	6.600 to 6.615 mm (0.2598 to 0.2421 inch)
Limit	6.63 mm (0.261 inch)

Stem to guide clearance

Intake

Standard	0.010 to 0.040 mm (0.0004 to 0.0016 inch)
Limit	0.065 mm (0.0026 inch)

Exhaust

XL600R

Standard	0.030 to 0.055 mm (0.0012 to 0.0022 inch)
Limit	0.08 mm (0.0031 inch)

1985 through 1987 XR600R

Standard	0.025 to 0.050 mm (0.0010 to 0.0020 inch)
Limit	0.08 mm (0.0031 inch)

1988 and later XR600R

Standard	0.025 to 0.055 mm (0.0010 to 0.0022 inch)
Limit	0.08 mm (0.0031 inch)

Valve seat width (intake and exhaust)	
Standard	1.2 to 1.4 mm (0.05 to 0.06 inch)
Limit	2.0 mm (0.08 inch)
Valve spring free length	
Inner spring	
Standard	35.1 mm (1.240 inches)
Limit	34.1 mm (1.34 inches)
Outer spring	
Standard	36.0 mm (1.417 inches)
Limit	35.0 mm (1.38 inches)
Valve face width	
Intake	
Standard	1.20 to 1.85 mm (0.047 to 0.071 inch)
Limit	2.6 mm (0.10 inch)
Exhaust	
Standard	0.9 to 1.7 mm (0.04 to 0.67 inch)
Limit	2.4 mm (0.09 inch)
Sub-chamber valve (1983 through 1985 XL600R)	
Stem runout	Not specified
Stem diameter	
Standard	4.970 to 4.985 mm (0.1957 to 0.1963 inch)
Limit	4.96 mm (0.195 inch)
Guide inside diameter	
Standard	5.010 to 5.028 mm (0.1972 to 0.1980 inch)
Limit	5.02 mm (0.199 inch)
Stem to guide clearance	Not specified
Seat width limit	1.5 mm (0.059 inch)
Face width	
Standard	1.00 to 1.40 mm (0.039 to 0.0551 inch)
Limit	2.0 mm (0.08 inch)
Spring free length	
Standard	40.5 mm (1.594 inches)
Limit	39.3 mm (1.55 inches)

Cylinder

Bore	
XL600R	
Standard	100.00 to 100.01 mm (3.937 to 3.975 inches)
Limit	100.12 mm (3.942 inches)
XR600R (1985 through 1990)	
Standard	97.000 to 97.010 mm (3.8189 to 3.8193 inches)
Limit	97.12 mm (3.823 inches)
XR600R (1991 on)	
Standard	97.010 to 97.020 mm (3.8193 to 3.8197 inches)
Limit	97.13 mm (3.824 inches)
Taper and out-of-round limits	0.05 mm (0.002 inch)
Surface warpage limit	0.10 mm (0.004 inch)

Piston

Piston diameter	
XL600R	
Standard	99.95 to 99.98 (3.935 to 3.936 inches)
Limit	99.85 mm (3.93 inches)
XR600R	
Standard	96.96 to 96.99 mm (3.8173 to 3.8284 inches)
Limit	96.96 mm (3.813 inches)
Piston diameter measuring point (above bottom of piston)	10 mm (0.40 inch)
Piston-to-cylinder clearance	
Standard	
XL600R	0.01 to 0.04 mm (0.0004 to 0.0016 inch)
XR600R (1985 through 1987)	0.02 to 0.06 mm (0.001 to 0.002 inch)
XR600R (1988 on)	0.01 to 0.05 mm (0.0004 to 0.0020 inch)
Limit (all models)	0.10 mm (0.004 inch)
Piston pin bore in piston	
Standard	24.002 to 24.008 mm (0.9450 to 0.9452 inch)
Limit	24.03 mm (0.946 inch)
Piston pin bore in connecting rod	
Standard	24.020 to 24.041 mm (0.9457 to 0.9465 inch)
Limit	24.07 mm (0.948 inch)

Side clearance (rotors to straightedge)

Standard	0.02 to 0.08 mm (0.001 to 0.003 inch)
Limit	0.12 mm (0.005 inch)

Kickstarter

Shaft outside diameter

Standard	21.959 to 21.980 mm (0.8645 to 0.8654 inch)
Limit	21.90 mm (0.862 inch)

Pinion gear inside diameter

1983 through 1986	
Standard	22.00 to 22.033 mm (0.8661 to 0.8674 inch)
Limit	22.12 mm (0.871 inch)

1987 on

Standard	25.500 to 25.521 mm (1.0039 to 1.0048 inches)
Limit	25.58 mm (1.007 inches)

Pinion bushing inside diameter

Standard	21.995 to 22.015 mm (0.8660 to 0.8667 inch)
Limit	22.07 mm (0.869 inch)

Pinion bushing outside diameter

Standard	25.465 to 25.485 mm (1.0026 to 1.0033 inches)
Limit	25.41 mm (1.004 inches)

Idler gear inside diameter

Standard	20.00 to 20.021 mm (0.7874 to 0.7822 inch)
Limit	20.11 mm (0.792 inch)

Idler gear bushing inside diameter

Standard	16.00 to 16.018 mm (0.6299 to 0.6366 inch)
Limit	16.03 mm (0.631 inch)

Idler gear bushing outside diameter

Standard	19.959 to 19.980 mm (0.7858 to 0.7866 inch)
Limit	19.90 mm (0.783 inch)

Shift drum and forks

Fork inside diameter

Standard	14.000 to 14.018 mm (0.5512 to 0.5518 inch)
Limit	14.05 mm (0.553 inch)

Fork shaft outside diameter

Standard	13.966 to 13.984 mm (0.5498 to 0.5506 inch)
Limit	13.90 mm (0.547 inch)

Fork ear thickness

Standard	4.93 to 5.00 mm (0.194 to 0.197 inch)
Limit	4.50 mm (0.18 inch)

Shift drum groove width limit.....

Not specified

Transmission

Gear inside diameters

Mainshaft fourth (XL600R)

Standard	25.020 to 25.041 mm (0.9850 to 0.9859 inch)
Limit	25.10 mm (0.988 inch)

Mainshaft fourth (XR600R)

Standard	28.020 to 28.041 mm (1.1031 to 1.1040 inches)
Limit	28.10 mm (1.106 inches)

Mainshaft fifth

Standard	28.000 to 28.021 mm (1.1024 to 1.1032 inches)
Limit	28.08 mm (1.105 inches)

Countershaft first

Standard	25.020 to 25.041 mm (0.9850 to 0.9859 inch)
Limit	25.10 mm (0.988 inch)

Countershaft second

Standard	28.020 to 28.041 mm (1.1031 to 1.1040 inches)
Limit	28.10 mm (1.106 inches)

Countershaft third

Standard	25.020 to 25.041 mm (0.9850 to 0.9859 inch)
Limit	25.10 mm (0.988 inch)

Bushing inside diameters

Countershaft first

Standard	20.020 to 20.041 mm (0.7880 to 0.7890 inch)
Limit	20.01 mm (0.791 inch)

Transmission (continued)

Countershaft second, mainshaft fourth	
Standard	25.020 to 25.041 mm (0.9850 to 0.9859 inch)
Limit	25.10 mm (0.988 inch)
Bushing outside diameters	
Mainshaft fifth	
Standard	27.949 to 27.980 mm (1.1004 to 1.1016 inch)
Limit	27.90 mm (1.098 inches)
Countershaft first	
Standard	24.984 to 25.005 mm (0.9836 to 0.9844 inch)
Limit	24.93 mm (0.981 inch)
Countershaft second	
Standard	27.979 to 28.000 mm (1.1015 to 1.1024 inches)
Limit	27.93 mm (1.100 inches)
Gear-to-bushing clearances	
Mainshaft fifth	
Standard	0.020 to 0.072 mm (0.0008 to 0.0028 inch)
Limit	0.10 mm (0.004 inch)
Mainshaft fourth, countershaft second	
Standard	0.020 to 0.062 mm (0.0008 to 0.0024 inch)
Limit	0.10 mm (0.040 inch)
Countershaft first	
Standard	0.015 to 0.057 mm (0.0006 to 0.0022 inch)
Limit	0.10 mm (0.004 inch)
Mainshaft diameter (at fourth gear)	
Standard	24.972 to 24.993 mm (0.9831 to 0.9840 inch)
Limit	24.92 mm (0.981 inch)
Mainshaft diameter (at clutch housing bushing)	
XL600R	Not specified
XR600R (limit)	21.91 mm (0.863 inch)
Countershaft diameter (at kickstarter idler gear)	
Standard	15.966 to 15.984 mm (0.6286 to 0.6293 inch)
Limit	15.93 mm (0.627 inch)
Countershaft diameter (at first gear)	
Standard	19.980 to 19.993 mm (0.7866 to 0.7871 inch)
Limit	19.94 mm (0.785 inch)
Countershaft diameter (at second gear)	
Standard	24.972 to 24.993 mm (0.9831 to 0.9840 inch)
Limit	24.92 mm (0.981 inch)
Countershaft diameter (at third gear)	
Standard	24.959 to 24.980 mm (0.9826 to 0.9835 inch)
Shaft-to-gear clearance	
Mainshaft fourth	
Standard	0.027 to 0.068 mm (0.0011 to 0.0027 inch)
Limit	0.10 mm (0.004 inch)
Countershaft third	
Standard	0.041 to 0.082 mm (0.0016 to 0.0032 inch)
Limit	0.15 mm (0.006 inch)
Shaft-to-bushing clearance	
Countershaft first	
Standard	0.027 to 0.061 mm (0.0011 to 0.0024 inch)
Limit	0.10 mm (0.004 inch)
Countershaft second	
Standard	0.027 to 0.069 mm (0.0011 to 0.0027 inch)
Limit	0.10 mm (0.004 inch)

Crankshaft and balancer

Connecting rod side clearance	
Standard	0.050 to 0.650 mm (0.0020 to 0.0256 inch)
Limit	0.80 mm (0.031 inch)
Connecting rod big end radial clearance	
Standard	0.006 to 0.018 mm (0.0002 to 0.0007 inch)
Limit	0.05 mm (0.002 inch)
Runout limit	0.10 mm (0.004 inch)
Balancer shaft diameter	
XL600R	
Standard	16.977 to 16.995 mm (0.6684 to 0.6691 inch)
Limit	16.95 mm (0.667 inch)
XR600R	Not specified

Torque specifications

Engine mounting bolts

XL600R

8 mm bolts	30 to 37 Nm (22 to 27 ft-lbs)
Front 10 mm mounting bracket bolts.....	35 to 45 Nm (25 to 33 ft-lbs)
Rear and top 10 mm mounting bolts	55 to 65 Nm (40 to 47 ft-lbs)

XR600R

8 mm bolts	27 Nm (20 ft-lbs)
10 mm bolts	40 Nm (29 ft-lbs)
External oil hose and pipe nuts	40 Nm (29 ft-lbs)

Cylinder head cover bolts

6 mm small head bolt.....	10 Nm (84 in-lbs)
6 mm regular head bolts	12 Nm (108 in-lbs)
8 mm bolt	23 Nm (17 ft-lbs) (1)

Cam sprocket bolts

20 Nm (14 ft-lbs)

Main rocker shafts

28 Nm (20 ft-lbs)

Sub-rocker shafts (2)

Intake	28 Nm (20 ft-lbs)
Exhaust.....	22 Nm (16 ft-lbs)

Cam chain tensioner bolt

Through 1997	Not specified
1998-on	12 Nm (108 inch-lbs) (2)

Cylinder head main bolts

1983 through 1987 models	28 to 32 Nm (20 to 23 ft-lbs)
1988-on	36 Nm (26 ft-lbs)

Cylinder head small nuts/bolts

Through 1997	Not specified
1998-on	12 Nm (108 inch-lbs)

Cylinder main bolts

50 Nm (36 ft-lbs)

Cylinder small bolts

Not specified

Right and left engine cover bolts.....

12 Nm (108 in-lbs)

Clutch spring bolts

XL600R.....	8 to 12 Nm (72 to 108 in-lbs)
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XR600R

Through 1997.....	Not specified
1998-on.....	12 Nm (108 inch-lbs)

Primary drive gear locknut

XL600R.....	50 to Nm (36 to 43 ft-lbs)
-------------	----------------------------

XR600R

1985 through 1987	70 to 80 Nm (50 to 58 ft-lbs)
1988-on.....	110 Nm (80 ft-lbs)

Clutch locknut

XL600R.....	50 to Nm (36 to 43 ft-lbs)
-------------	----------------------------

XR600R

1985 through 1987	70 to 80 Nm (50 to 58 ft-lbs)
1988-on.....	110 Nm (80 ft-lbs)

Shift cam plate to shift drum bolt

12 Nm (108 in-lbs)

Shift drum stopper arm bolt

25 Nm (18 ft-lbs)

Shift pedal pinch bolt

XL600R.....	8 to 12 Nm (72 to 108 in-lbs)
-------------	-------------------------------

XR600R

not specified

Crankcase bolts.....

12 Nm (108 in-lbs)

Crankshaft bearing retainer bolt

Through 1997	Not specified
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1998-on	25 Nm (18 ft-lbs)
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Center shift fork to shaft bolt.....

15 Nm (132 in-lbs)

(1) On 1998 and later models, apply clean engine oil to the bolt threads.

(2) On 1998 and later models, apply non-permanent thread locking agent to the bolt threads.

1 General information

The engine/transmission unit is of the air-cooled, single-cylinder four-stroke design. The four valves are operated by an overhead camshaft which is chain driven off the crankshaft. The valves are arranged in a circle, rather than in the parallel pairs more commonly used in four-valves-per-cylinder engines. To accommodate this arrangement, the camshaft operates four main rocker arms, each of which in turn operates its valve through a sub-rocker arm rather than directly. Honda refers to this design as Radial Four Valve Combustion (RFVC).

The engine/transmission assembly is constructed from aluminum alloy. The crankcase is divided vertically.

The crankcase incorporates a dry sump, pressure-fed lubrication system which uses a gear-driven rotor-type oil pump, an oil filter and separate strainer screen (or more than one screen, depending on model). Oil not circulating through the engine is stored inside the upper and front frame member, which acts as an oil tank. The oil pump has two sets of rotors, one to circulate oil under pressure to the engine and the other to scavenge oil from the engine.

Power from the crankshaft is routed to the transmission via a wet, multi-plate type clutch. The transmission has five forward gears.

A decompressor reduces the effort required to kick start the engine. On 1988 and later models, there are two decompressor cams; one to reduce starting effort and the other to reduce engine kickback during starting.

2 Operations possible with the engine in the frame

The components and assemblies listed below can be removed without having to remove the engine from the frame. If, however, a number of areas require attention at the same time, removal of the engine is recommended.

Camshaft, rocker arms and cylinder head (1988 and later models only)

External shift mechanism

Clutch

External oil hoses

Oil pump and pipe

Kickstarter

3 Operations requiring engine removal

It is necessary to remove the engine/transmission assembly from the frame and separate the crankcase halves to gain access to the following components:

Camshaft, rocker arms and cylinder head (1983 through 1987 models)

Cylinder and piston

Crankshaft, balancer and connecting rod

Transmission shafts

Internal shift mechanism (shift shaft, shift drum and forks)

Crankcase bearings

4 Major engine repair - general note

1 It is not always easy to determine when or if an engine should be completely overhauled, as a number of factors must be considered.

2 High mileage is not necessarily an indication that an overhaul is needed, while low mileage, on the other hand, does not preclude the need for an overhaul. Frequency of servicing is probably the single most important consideration. An engine that has regular and frequent oil and filter changes, as well as other required maintenance, will most likely give many miles of reliable service. Conversely, a neglected engine, or one which has not been broken in properly, may require an overhaul very early in its life.

3 Exhaust smoke and excessive oil consumption are both indica-

tions that piston rings and/or valve guides are in need of attention. Make sure oil leaks are not responsible before deciding that the rings and guides are bad. Refer to Chapter 1 and perform a cylinder compression check to determine for certain the nature and extent of the work required.

4 If the engine is making obvious knocking or rumbling noises, the connecting rod and/or main bearings are probably at fault.

5 Loss of power, rough running, excessive valve train noise and high fuel consumption rates may also point to the need for an overhaul, especially if they are all present at the same time. If a complete tune-up does not remedy the situation, major mechanical work is the only solution.

6 An engine overhaul generally involves restoring the internal parts to the specifications of a new engine. During an overhaul the piston rings are replaced and the cylinder walls are bored and/or honed. If a rebore is done, then a new piston is also required. The crankshaft and connecting rod are permanently assembled, so if one of these components needs to be replaced, both must be. Generally the valves are serviced as well, since they are usually in less than perfect condition at this point. While the engine is being overhauled, other components such as the carburetor can be rebuilt also. The end result should be a like-new engine that will give as many trouble-free miles as the original.

7 Before beginning the engine overhaul, read through all of the related procedures to familiarize yourself with the scope and requirements of the job. Overhauling an engine is not all that difficult, but it is time consuming. Plan on the motorcycle being tied up for a minimum of two (2) weeks. Check on the availability of parts and make sure that all necessary special tools, equipment and supplies are obtained in advance.

8 Most work can be done with typical shop hand tools, although a number of precision measuring tools are required for inspecting parts to determine if they must be replaced. Often a dealer service department or repair shop will handle the inspection of parts and offer advice concerning reconditioning and replacement. As a general rule, time is the primary cost of an overhaul so it doesn't pay to install worn or sub-standard parts.

9 As a final note, to ensure maximum life and minimum trouble from a rebuilt engine, everything must be assembled with care in a spotlessly clean environment.

5 Engine - removal and installation

Refer to illustrations 5.11a, 5.11b and 5.13a through 5.13e

Note: Engine removal and installation should be done with the aid of an assistant to avoid damage or injury that could occur if the engine is dropped. A hydraulic floor jack should be used to support and lower the engine if possible (they can be rented at low cost).

Removal

1 Drain the engine oil (see Chapter 1).

2 Remove the seat, both side covers and the left footpeg (see Chapter 7). If you're working on an XL600R, remove the right footpeg as well.

3 Remove the fuel tank, exhaust system and carburetor (see Chapter 3).

4 Disconnect the spark plug wire (see Chapter 1).

5 Label and disconnect the alternator and pulse generator wires (refer to Chapter 4 for component location if necessary). Detach the wires from their retainers.

6 Remove the drive chain (see Chapter 5).

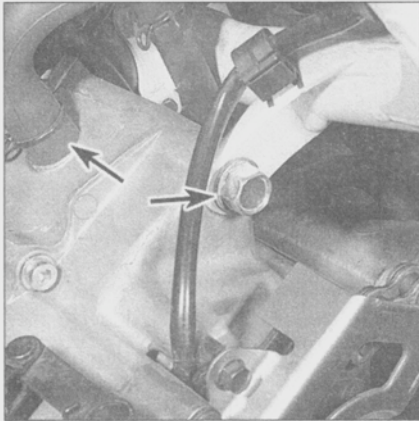
7 Remove the skid plate/bars from beneath the engine (see Chapter 7).

8 Disconnect the clutch cable (see Section 16).

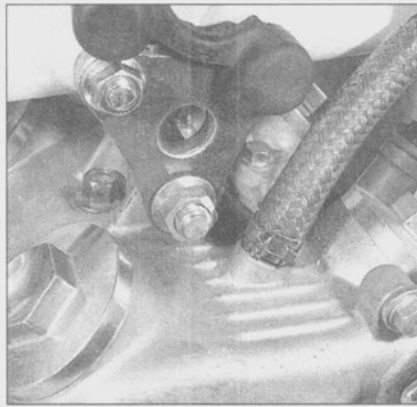
9 Remove the kickstarter pedal (see Section 21).

10 Disconnect the decompressor cable(s) from the engine (see Section 20).

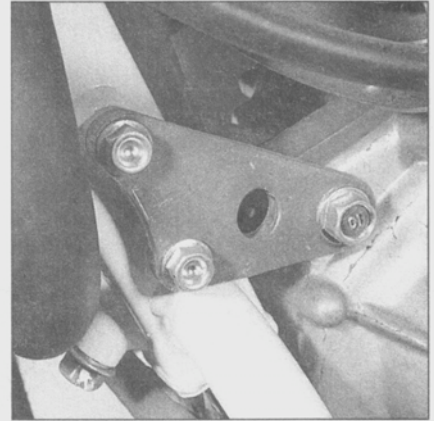
11 Disconnect the crankcase breather tube and oil overflow hose from the top of the engine (see illustrations). If you're working on an XL600R, remove the oil separator. On all models, refer to Section 22



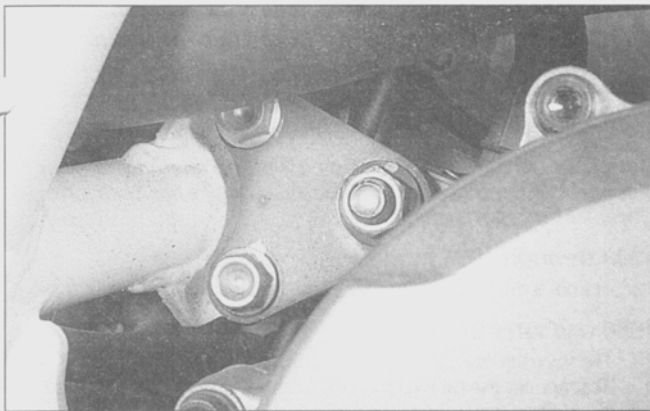
5.11a Disconnect the breather hose (left arrow) and remove the upper rear mounting bolt (right arrow)



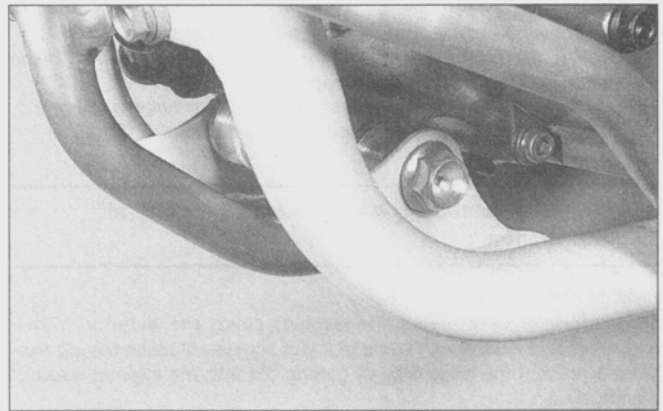
5.11b Disconnect the oil overflow hose and pull back the rubber cover from the upper mount nuts; pull off the cover on the other side for access to the bolt heads



5.13a Remove the front engine mounting bolts and bracket



5.13b Remove the upper rear engine mounting bolts and bracket



5.13c Remove the lower front through-bolt . . .

and disconnect the oil hoses from the engine.

12 Support the bike securely upright so it can't fall over during the remainder of this procedure. Support the engine with a jack, using a block of wood between the jack and the engine to protect the crankcase.

13 Remove the engine mounting bolts, nuts and brackets at the top, upper front, upper rear, lower front and lower rear (**see illustration 5.11a and the accompanying illustrations**). **Note:** Raise and lower the jack as needed to relieve strain on the mounting bolts.

14 Have an assistant help you lift the engine out of the right side of

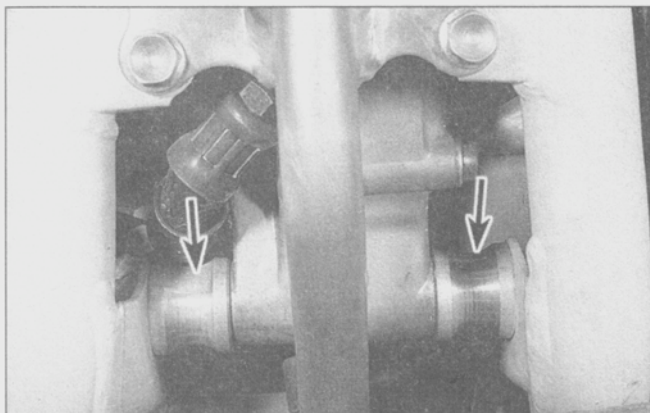
the frame.

15 Slowly lower the engine to a suitable work surface.

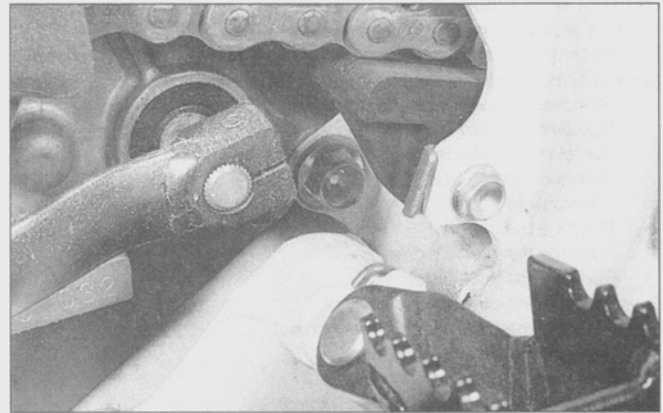
Installation

16 Have an assistant help lift the engine into the frame so it rests on the jack and block of wood. Use the jack to align the mounting bolt holes, then install the brackets, bolts and nuts. Tighten them to the torque values listed in this Chapter's Specifications.

17 The remainder of installation is the reverse of the removal steps, with the following additions:



5.13d . . . and its spacers (arrows)



5.13e Remove the lower rear mounting bolt



6.2 A selection of brushes is required for cleaning holes and passages in the engine components

- Use new gaskets at all exhaust pipe connections.
- Adjust the throttle cable, decompression cable and clutch cable following the procedures in Chapter 1.
- Fill the engine with oil, also following the procedures in Chapter 1.
- Run the engine and check for oil or exhaust leaks.

6 Engine disassembly and reassembly - general information

Refer to illustrations 6.2 and 6.3

1 Before disassembling the engine, clean the exterior with a degreaser and rinse it with water. A clean engine will make the job easier and prevent the possibility of getting dirt into the internal areas of the engine.

2 In addition to the precision measuring tools mentioned earlier, you will need a torque wrench, a valve spring compressor, oil gallery brushes (see illustration), a piston ring removal and installation tool and a piston ring compressor. Some new, clean engine oil of the correct grade and type, some engine assembly lube (or moly-based grease) and a tube of RTV (silicone) sealant will also be required.

3 An engine support stand made from short lengths of 2 x 4's bolted together will facilitate the disassembly and reassembly procedures (see illustration). If you have an automotive-type engine stand, an adapter plate can be made from a piece of plate, some angle iron and some nuts and bolts.

4 When disassembling the engine, keep "mated" parts together (including gears, rocker arms and shafts, etc.) that have been in contact with each other during engine operation. These "mated" parts must be reused or replaced as an assembly.

5 Engine/transmission disassembly should be done in the following general order with reference to the appropriate Sections.

Remove the cylinder head cover and rocker assembly

Remove the cam sprocket and camshaft

Remove the cylinder head and cam chain tensioner

Remove the cylinder

Remove the piston

Remove the clutch

Remove the primary drive gear

Remove the kickstarter

Remove the oil pump

Remove the external shift mechanism

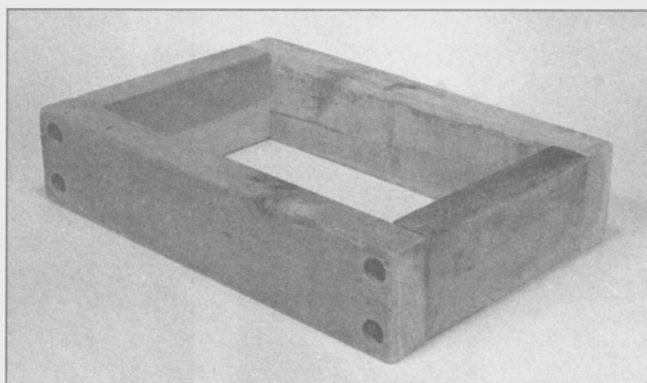
Remove the alternator rotor

Separate the crankcase halves

Remove the internal shift mechanism

Remove the transmission shafts/gears

Remove the crankshaft, connecting rod and balancer



6.3 An engine stand can be made from short lengths of lumber and lag bolts or nails

6 Reassembly is accomplished by reversing the general disassembly sequence.

7 Cylinder head cover and rocker arms - removal, inspection and installation

Removal

Note: The cylinder head cover on 1988 and later models can be removed with the engine in the frame. If the engine has been removed, ignore the steps which don't apply.

1983 through 1987 models

- Remove the engine from the frame (see Section 5).

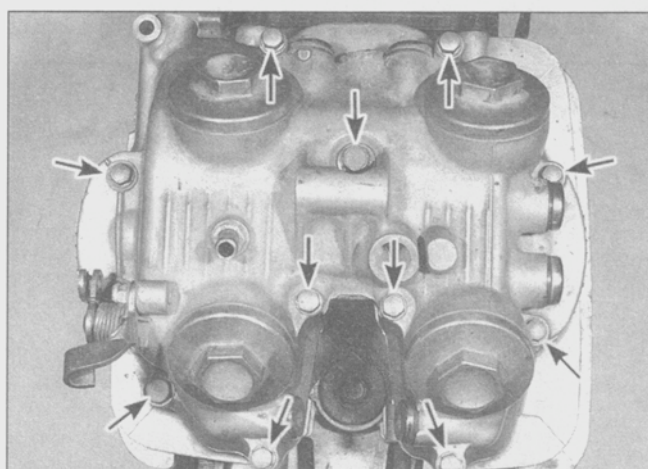
1988 and later models

- Remove the seat, fuel tank and carburetor (see Chapters 7 and 3).
- Disconnect the oil overflow tube from the cover (see illustration 5.11b).
- Disconnect the decompressor cable from the cover (see Section 20).

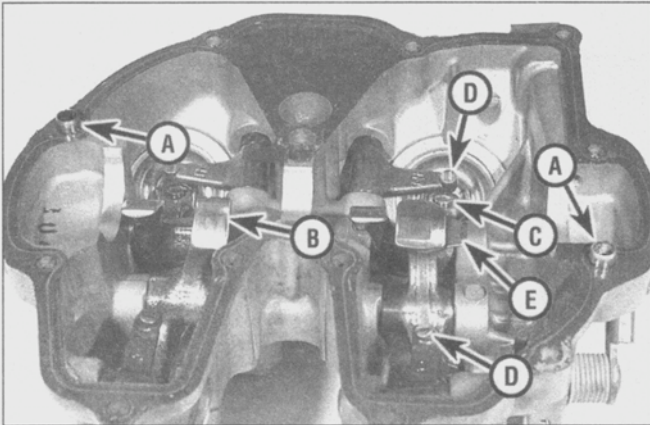
All models

Refer to illustrations 7.7 and 7.10

- Remove the external oil line (see Section 22).
- Refer to the valve adjustment procedure in Chapter 1 and place the piston at top dead center on its compression stroke. Remove the valve adjusting hole covers from the cylinder head cover.
- Unscrew the cylinder head cover bolts (see illustration). On 1983



7.7 Loosen the cover bolts evenly in two or three stages



7.10 Lift off the cover, remove the gasket and note the locations of the dowels; they may come off with the cover or stay in the head

- A Dowels
- B Main rocker arm camshaft contact surfaces
- C Main rocker arm to sub-rocker arm contact surfaces
- D Sub-rocker arm valve stem contact surfaces
- E Decompressor lever contact surface

through 1987 models, remove all of the bolts. On 1988 and later models, loosen the two center bolts for now and remove them after the cover is removed.

8 If you're working on a 1988 or later model, pull the cover toward the carburetor side of the engine to provide removal clearance.

9 Lift the cover off the engine. If it's stuck, don't attempt to pry it off - tap around its sides with a plastic hammer to dislodge it.

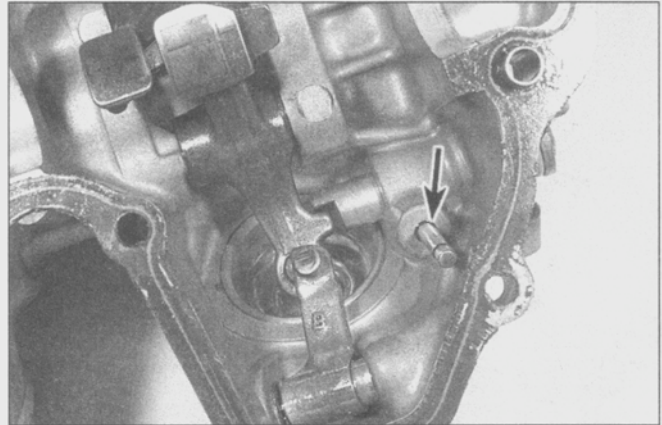
10 Remove the gasket from the cylinder head cover (see illustration). Use a new gasket whenever the cover is removed.

Inspection

Refer to illustrations 7.12a, 7.12b and 7.13

11 Refer to Section 9 and check the cam bearing surfaces in the cylinder head and its cover for wear or damage. Check the rocker arms for wear at the cam contact surfaces and at the tips of the valve adjusting screws (see illustration 7.10). Also check the decompression shaft for wear at the point where it contacts the exhaust rocker arm. Try to twist the rocker arms from side-to-side on the shafts. If they're loose on the shafts or if there's visible wear, remove them as described below.

12 Pull out the decompression shaft retaining pin (see illustration). If



7.12a Pull out the decompressor shaft retaining pin (arrow)

you're working on a 1983 through 1985 XL600R, remove the kick-starter decompressor lever. On all models, unbolt the cable bracket/spring retainer and pull the decompression shaft out of the cover (see illustration).

13 Unscrew the rocker shafts and sub-rocker shafts and pull them out of the cover, making careful notes as to the locations of all the components (see illustration). Remove the sealing washers, wave washers (sub-rocker arms only) and the rocker arms. **Note:** Some of the rocker arms (all of the rocker arms on some models) have identification marks so they can be returned to their original positions. Look for the marks, and make your own if they aren't clearly visible. It's a good idea to label all of the rocker arms and sub-rocker arms so they can be reinstalled in their original locations. In addition to developing wear patterns with their shafts, some of the rocker arms are shaped differently from the others and won't work in the wrong location.

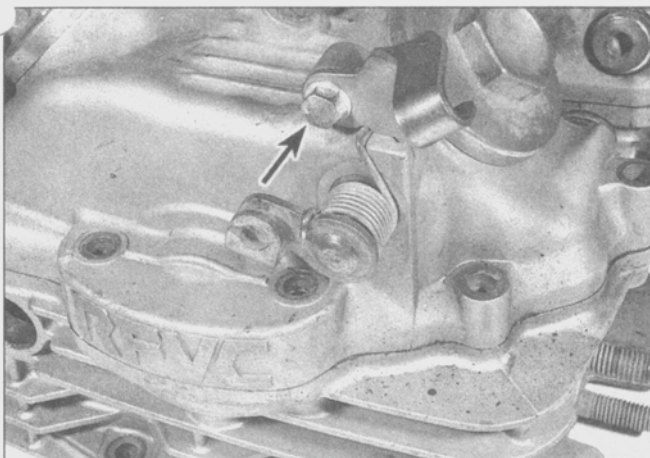
14 Check the decompression lever and its shaft for wear, damage or a broken spring. If any problems are found, replace the shaft or spring. Pry the shaft oil seal out of its bore.

15 Measure the outer diameter of each rocker shaft and the inner diameter of the rocker arms with a micrometer and compare the measurements to the values listed in this Chapter's Specifications. If rocker arm-to-shaft clearance is excessive, replace the rocker arm or shaft, whichever is worn.

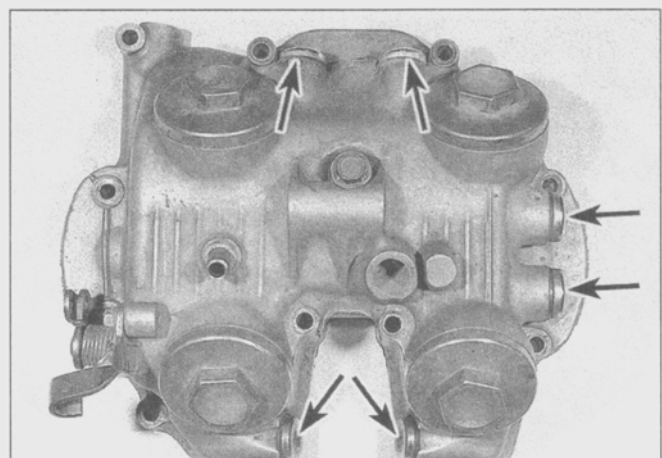
Installation

Refer to illustrations 7.19, 7.20a and 7.20b

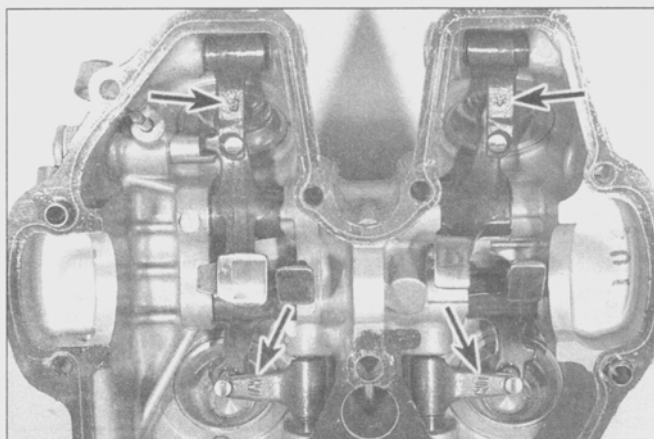
16 Press a new decompression shaft oil seal into the bore with a seal



7.12b Note how the cable bracket secures the spring, then remove the bracket bolt (arrow)



7.13 Remove the rocker shafts



7.19 The exhaust sub-rocker arms are labeled A and B (upper arrows); both intake sub-rocker arms are labeled IN (lower arrows)

driver or a socket the same diameter as the seal. Install the shaft, securing its spring with the cable bracket (see illustration 7.12b). Install the retaining pin.

17 Coat the main rocker shafts and rocker arm bores with moly-based grease containing 40-percent or more molybdenum disulfide. Apply non-hardening gasket sealant to the threads of the main rocker shafts. Install the rocker shafts and rocker arms in the cylinder head cover, using new copper sealing washers on the shafts. Depending on model, the main rocker arms will be marked as follows:

- a) No marks
- b) A and B
- c) A, B, C and D

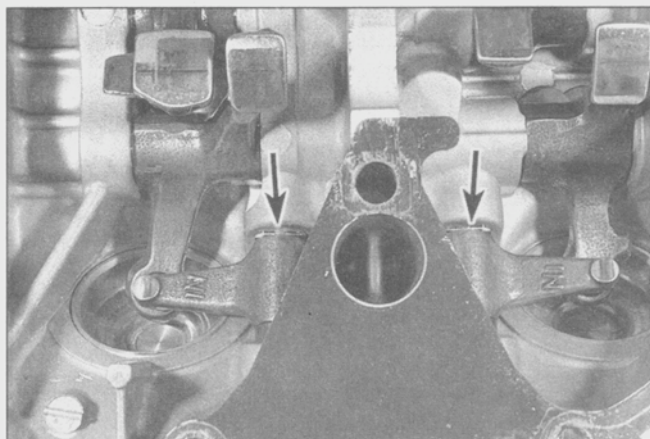
18 If the rocker arms are unmarked, you'll need to refer to the labels made on disassembly. Note that the exhaust rocker arm with the lug for the decompressor goes next to the decompressor shaft bore.

19 If the rocker arms have factory labels, install them in the specified locations (see illustration).

20 Coat new sub-rocker shaft sealing rings with clean engine oil and install them on the shafts. Coat the shaft threads with non-hardening gasket sealant. Install the sub-rocker arms and their wave washers in the correct locations in the cylinder head cover, then install the shafts and sealing washers (see illustrations).

21 Install the decompressor shaft in the cylinder head cover. Align the groove in the shaft with the retaining pin, then install the retaining pin through the groove.

22 Clean the mating surfaces of the cylinder head and cover with



7.20a Intake sub-rocker shaft wave washer locations

lacquer thinner, acetone or brake system cleaner. Install a new gasket, taking care not to damage its silicone coating.

23 Make sure the piston is still at top dead center on its compression stroke (both cam lobes pointing downward). Fill the oil pockets in the top of the cylinder head with clean engine oil so the oil covers the cam lobes.

24 Loosen the valve adjusting screws all the way, then install the cover on the cylinder head. Install the bolts and tighten them evenly in two or three stages to the torque values listed in this Chapter's Specifications. Note that there are three types of bolts with different torque settings.

25 Adjust the valve clearances (see Chapter 1).

26 Install the oil pipe, using new sealing washers (see Section 22).

27 Refer to Section 20 and reconnect the decompressor cable.

28 The remainder of installation is the reverse of the removal steps.

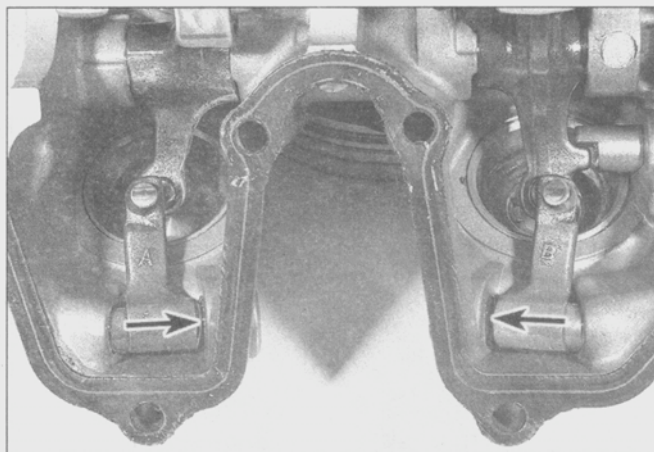
29 Refer to Chapter 1 and adjust the decompressor cable.

8 Cam chain tensioner - removal, inspection and installation

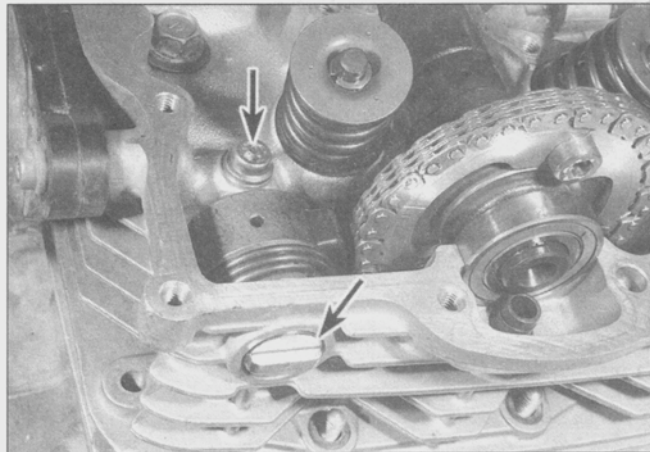
Removal

Refer to illustrations 8.2 and 8.3

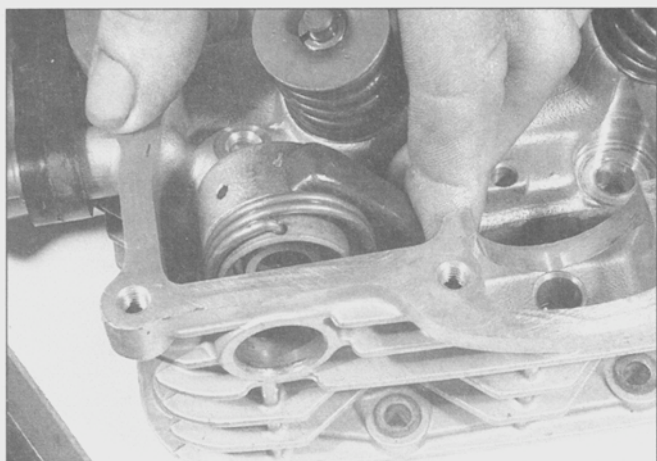
- 1 Refer to Section 7 and remove the cylinder head cover.
- 2 If you're working on a 1983 through 1986 model, pull out the tensioner retaining pin with pliers. If you're working on a 1987 or later



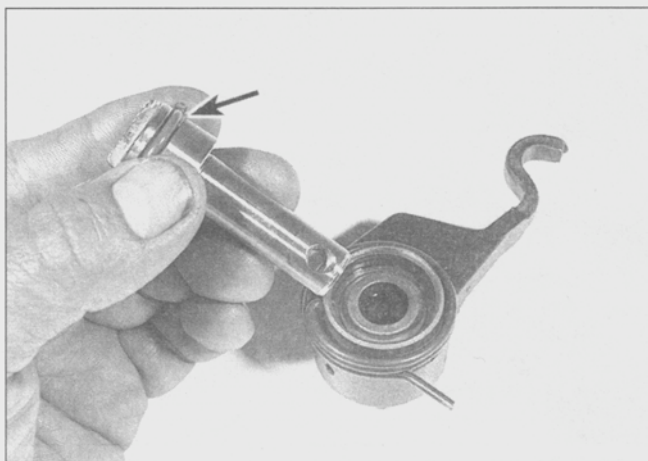
7.20b Exhaust sub-rocker shaft wave washer locations



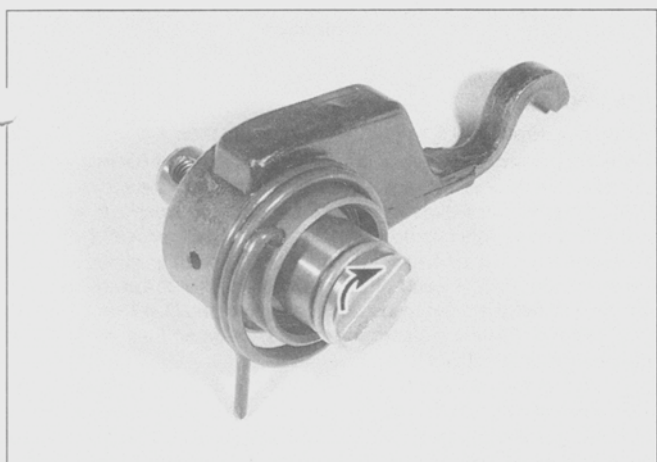
8.2 Remove the cam chain tensioner bolt (upper arrow) and pull out the shaft (lower arrow)



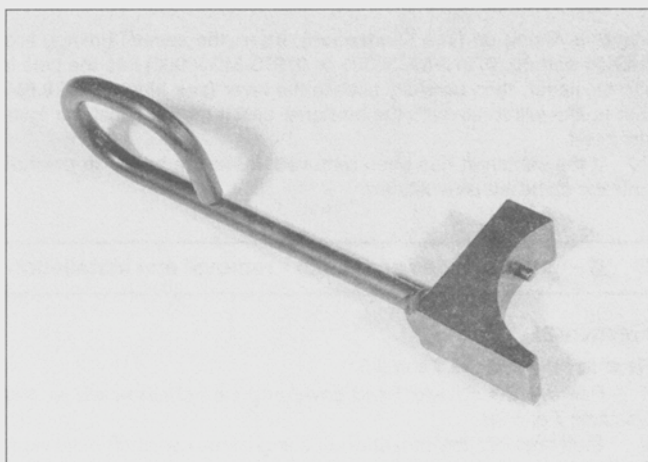
8.3 Lift the tensioner out of the cylinder head



8.4 Pull the shaft out of the tensioner and inspect its O-ring (arrow)



8.5 The tensioner shaft should rotate clockwise, but not counterclockwise



8.6a This tool holds the tensioner spring compressed . . .

model, unscrew the tensioner bolt (see illustration).

3 Pull the tensioner shaft out of the cylinder head and lift out the tensioner (see illustration).

Inspection

Refer to illustrations 8.4 and 8.5

4 Check the tensioner shaft and bushing for wear (see illustration). Check for wear or damage at the tensioner tip and check the spring for breakage. Replace any worn or damaged parts. It's a good idea to replace the O-ring whenever the tensioner is removed.

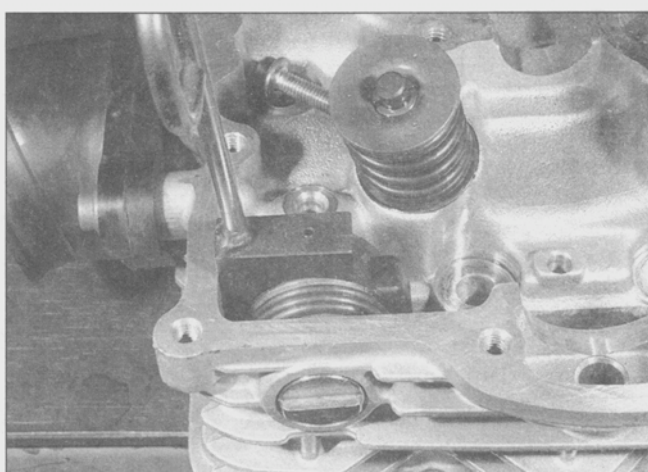
5 Insert the shaft into the tensioner and try to rotate it (see illustration). The shaft should turn freely clockwise and not at all counterclockwise. If not, replace the tensioner.

Installation

Refer to illustrations 8.6a, 8.6b and 8.9

6 You'll need a way to hold the tensioner lever against its spring tension while you install the tensioner in the cylinder head. Honda manufactures a special tool that's curved to fit the tensioner body, with a pin that fits into the hole in the tensioner (see illustrations). If you don't have the special tool, you may be able to fabricate a substitute, but be sure it holds the tensioner securely - the spring is powerful and can cause injury if it's released suddenly.

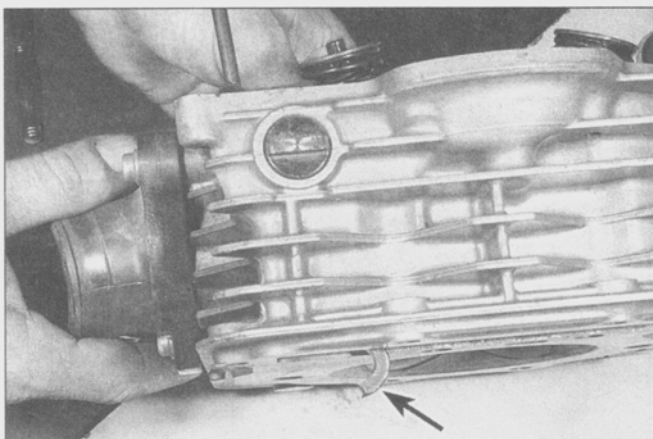
7 Coat a new O-ring with clean engine oil and install it on the tensioner shaft.



8.6b . . . its pin fits into the hole in the tensioner and its curved portion fits over the tensioner body

8 Place the spring on the tensioner, then position them in the cylinder head and insert the shaft.

9 Push the tensioner lever straight down, so the hole in the ten-



8.9 Pull the end of the cam chain tensioner down (arrow) and secure it in this position with the holder (cylinder head removed for clarity)

sioner is facing up (see illustration). Insert the special holding tool (Honda part no. 07973-MG30001 or 07973-MG30002) into the hole in the tensioner, then carefully release the lever (see illustration 8.6b). The holder will rotate with the tensioner until it rests against the cylinder head.

10 If the camshaft has been removed, leave the holder in position until the camshaft is reinstalled.

9 Camshaft, guides and chain - removal and installation

Removal

Refer to illustrations 9.3 and 9.5

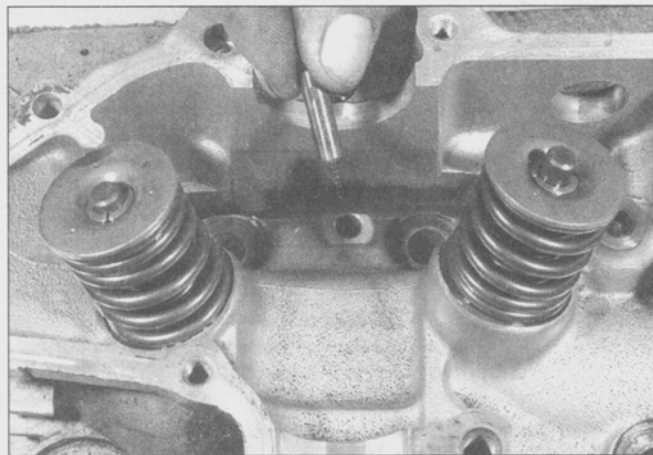
1 Remove the cylinder head cover and cam chain tensioner (see Sections 7 and 8).

2 Stuff rags into the cam chain opening so the camshaft bolts won't fall into the crankcase.

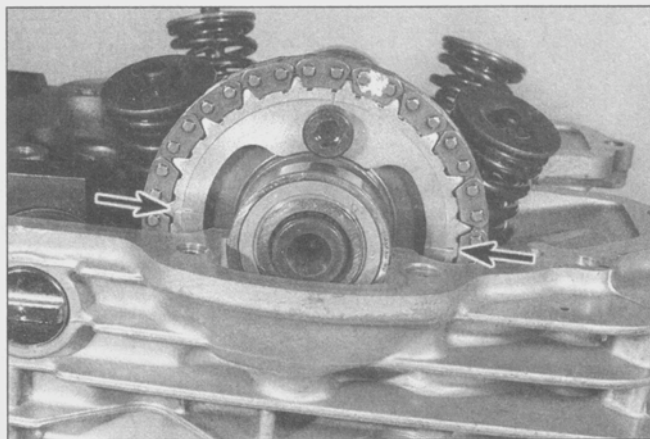
3 Turn the engine so one of the cam sprocket bolts is accessible, then remove it (see illustration). Next, turn the engine so the other bolt is accessible, remove it and turn the engine back to TDC compression (see illustration).

4 Disengage the sprocket from the cam chain. Support the cam chain so it won't drop into the engine, then remove the sprocket.

5 Lift the camshaft out of the cylinder head, then remove the decompressor pin and spring (see illustration).



9.5 Pull the decompressor pin and spring out of the cylinder head



9.3 Rotate the camshaft sprocket so one bolt is accessible, then remove the bolt; rotate the engine to remove the other bolt, then turn the engine back so the sprocket marks (arrows) are even with the cylinder head surface and the sprocket timing mark is straight up

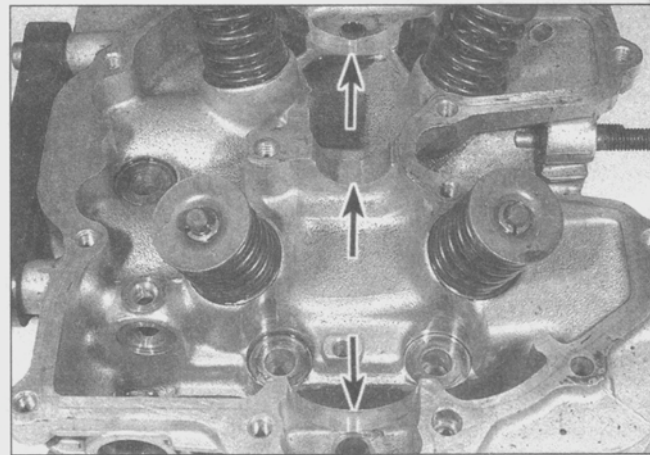
Inspection

Refer to illustrations 9.6, 9.7a, 9.7b, 9.8a, 9.8b, 9.8c, 9.9 and 9.11

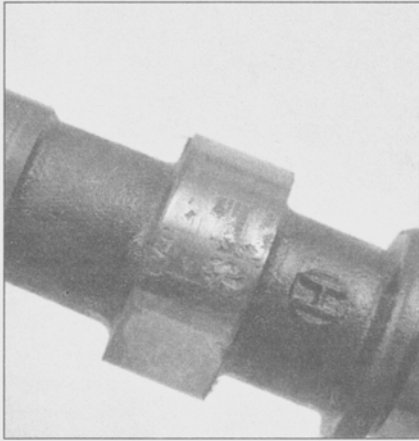
Note: Before replacing camshaft or the cylinder head cover and cylinder head because of damage, check with local machine shops specializing in motorcycle engine work. In the case of the camshaft, it may be possible for cam lobes to be welded, reground and hardened, at a cost far lower than that of a new camshaft. If the bearing surfaces in the center of the cylinder head or cover are damaged, it may be possible for them to be bored out to accept bearing inserts. Due to the cost of a new cylinder head it is recommended that all options be explored before condemning it as trash!

6 Inspect the cam bearing surfaces of the cylinder head and cover (see illustration). Look for score marks, deep scratches and evidence of spalling (a pitted appearance). The bearing surfaces that support the ends of the camshaft contain ball bearings, so the surfaces shouldn't be scored or worn. If they are, the bearings may have spun in their bores due to seizure or a loose cylinder head cover.

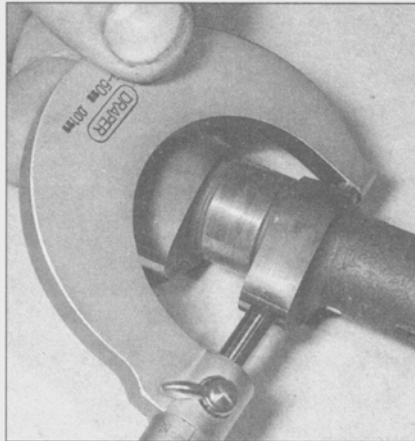
7 Check the camshaft lobes for heat discoloration (blue appearance), score marks, chipped areas, flat spots and spalling (see illustration). Measure the height of each lobe with a micrometer (see illustration) and compare the results to the minimum lobe height listed in this Chapter's Specifications. If damage is noted or wear is excessive, the camshaft must be replaced. Also, be sure to check the condition of



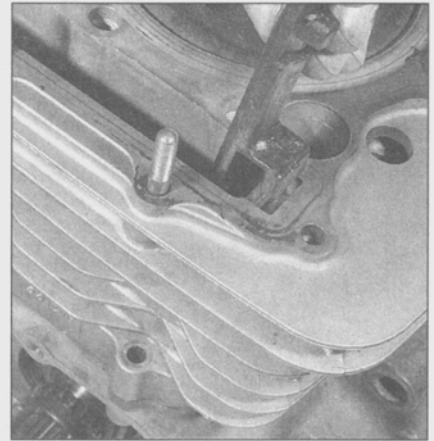
9.6 Check the cam bearing surfaces (arrows) for scoring or wear



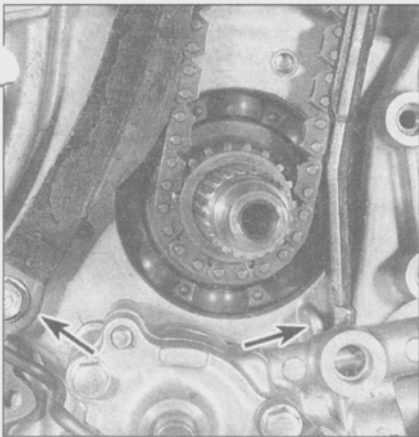
9.7a Check the cam lobes for wear - here's a good example of lobe damage which will require replacement (or repair) of the camshaft



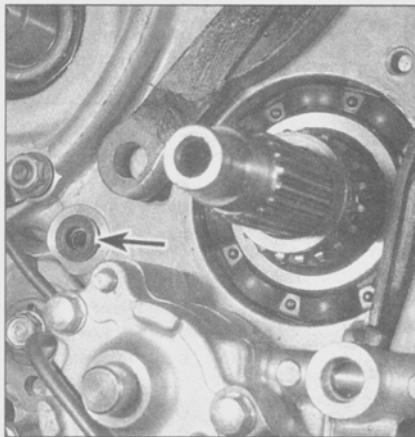
9.7b Measure the height of the cam lobes with a micrometer



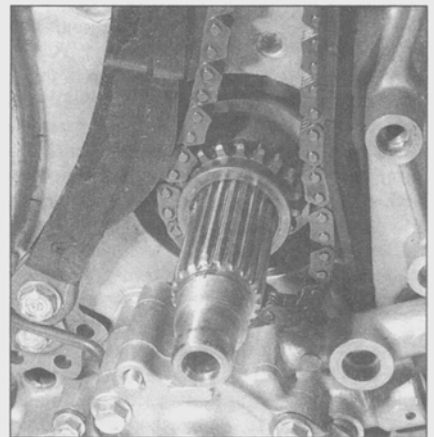
9.8a The front chain guide fits in notches in the cylinder head



9.8b The rear chain guide is secured by a shouldered bolt (left arrow); the front chain guide fits in a pocket cast in the crankcase (right arrow)



9.8c There's an O-ring between the rear chain guide and the crankcase (arrow)



9.9 Lower the chain and take it off the sprocket

2

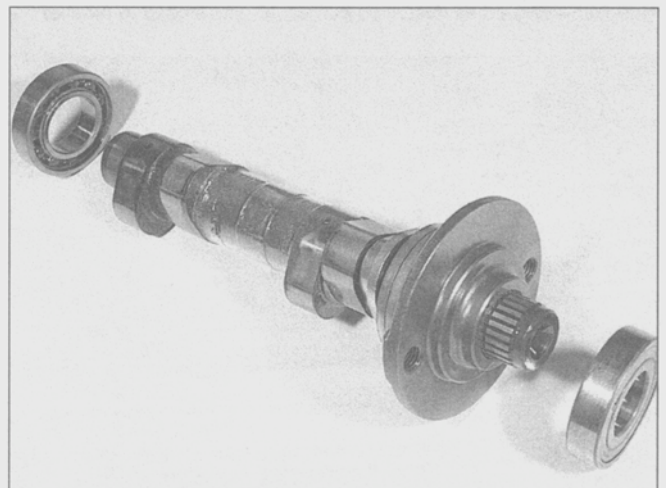
the rocker arms as described in Section 7.

8 Check the chain guides for wear or damage. If they are worn or damaged, replace them. To remove the exhaust side (front) chain guide, you'll need to remove the cylinder head (see Section 10), then lift the guide out of its notches (see illustration). To remove the intake side guide, you'll need to remove the right engine cover (see Section 16), then unscrew the shouldered bolt and take off the chain guide and O-ring (see illustrations).

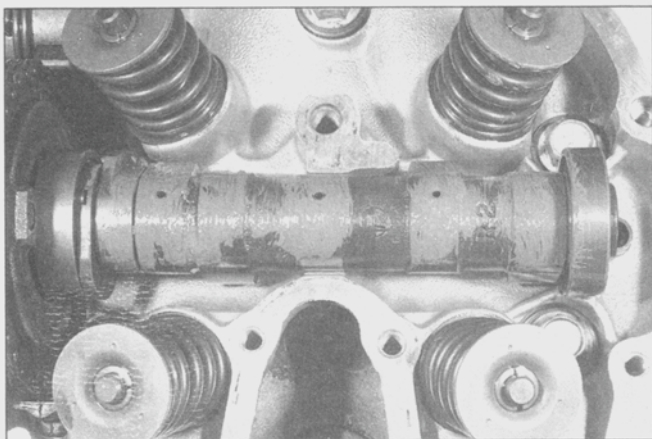
9 Except in cases of oil starvation, the camshaft chain wears very little. If the chain has stretched excessively, which makes it difficult to maintain proper tension, replace it with a new one. To remove the chain from the crankshaft sprocket, it's necessary to remove the chain guides as described above. Once this is done, the chain can be lowered away from the sprocket (see illustration).

10 Check the sprocket for wear, cracks and other damage, replacing it if necessary. If the sprocket is worn, the chain is also worn, and possibly the sprocket on the crankshaft. If wear this severe is apparent, the entire engine should be disassembled for inspection.

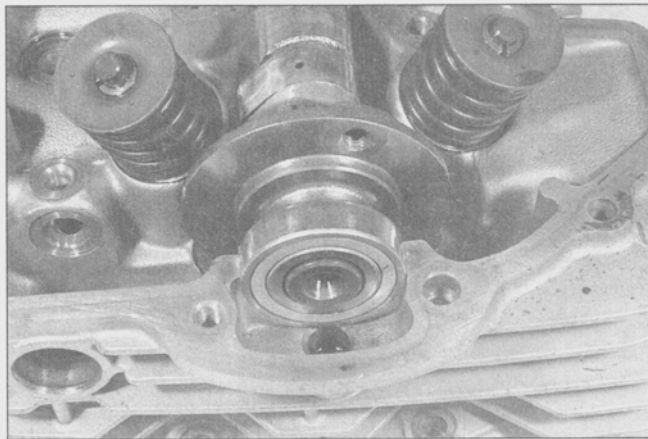
11 Slip the ball bearings off the ends of the camshaft (see illustration). Hold the center race of each bearing with fingers and turn the outer race. The bearing should spin freely without roughness, looseness or noise. If it has obvious problems, or if you aren't sure it's in good condition, replace the bearing.



9.11 There's a ball bearing on each end of the camshaft; the sealed side of the bearing at the sprocket end faces away from the camshaft



9.14a Coat the cam lobes with moly-based grease



9.14b Position the bearing in its saddle and make sure the dowel is in position, then do the same at the other end of the camshaft

Installation

Refer to illustrations 9.14a, 9.14b 9.15 and 9.16

12 Install the cam chain guides, cylinder head and right side cover if they were removed.

13 Make sure the bearing surfaces in the cylinder head and cylinder head cover are clean. Install the ball bearings on the ends of the camshaft (**see illustration 9.11**). If there's only one sealed bearing, install it on the sprocket end of the camshaft with its sealed side facing away from the center of the engine. If both bearings are sealed, install both with their sealed sides facing away from the center of the engine.

14 Lubricate the cam bearing journals with moly-based grease. Lay the camshaft in the cylinder head with the lobes downward (**see illustration**). Install the bearing retaining dowels in the cylinder head at each end of the camshaft (**see illustration**).

15 Engage the sprocket with the chain so its timing mark will be straight up and its OUT mark faces away from the center of the engine (**see illustration 9.3**). Place the sprocket on the camshaft so its bolt holes align with the camshaft bolt holes. Rotate the sprocket as needed for access, install the bolts and tighten them to the torque listed in this Chapter's Specifications.

16 Turn the sprocket so its timing mark is straight up and the marks are aligned with the cylinder head gasket surface (**see illustration 9.3**).

17 Recheck the crankshaft timing mark on the alternator rotor to make sure it's still at the TDC position (**see Valve clearance - check and adjustment** in Chapter 1). If it's out of position and the camshaft sprocket is aligned as described in Step 16, you'll need to remove the

chain from the sprocket and reposition it. Don't run the engine with the marks out of alignment or severe engine damage could occur.

18 Remove the holder from the cam chain tensioner.

19 Adjust the valve clearances (**see Chapter 1**).

20 The remainder of installation is the reverse of removal.

10 Cylinder head - removal and installation

Caution: The engine must be completely cool before beginning this procedure, or the cylinder head may become warped.

Removal

Refer to illustrations 10.3, 10.4 and 10.6

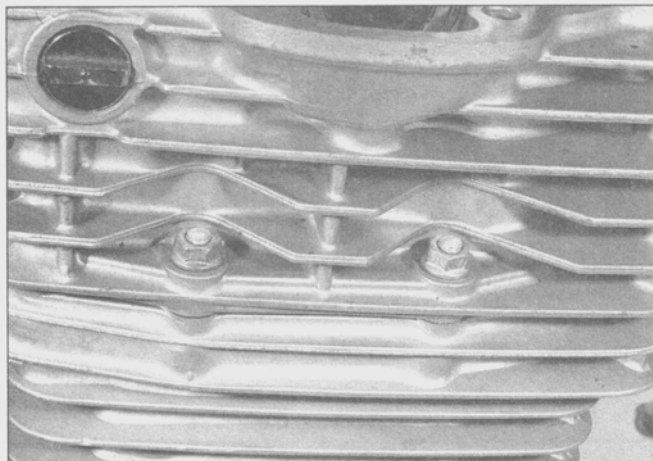
1 Remove the engine from the frame (**see Section 5**).

2 Remove the cylinder head cover, cam chain tensioner and camshaft (Sections 7, 8 and 9).

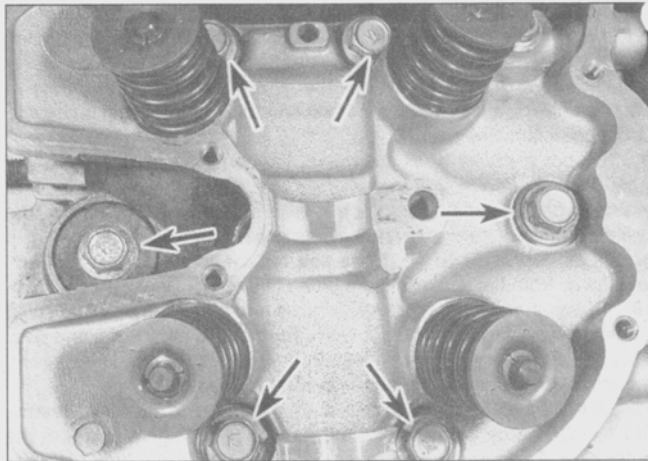
3 Remove the two nuts that secure the cylinder head to the cylinder (**see illustration**).

4 Loosen the main cylinder head bolts in two or three stages, in a criss-cross pattern (**see illustration**).

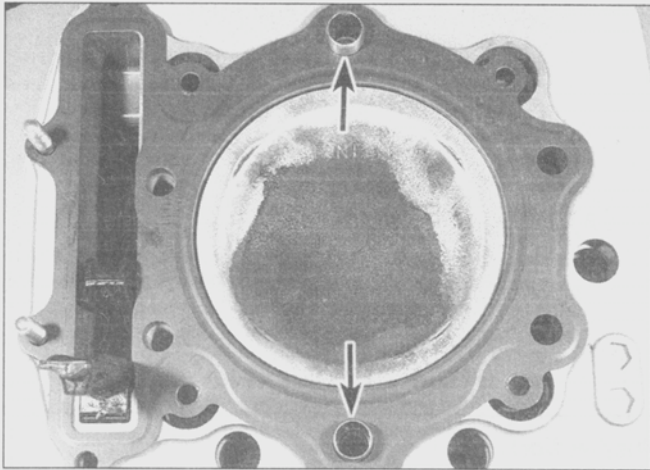
5 Lift the cylinder head off the cylinder. If the head is stuck, tap around the side of the head with a rubber mallet to jar it loose, or use wooden dowels inserted into the intake or exhaust ports to lever the head off. Don't attempt to pry the head off by inserting a screwdriver between the head and the cylinder - you'll damage the sealing surfaces.



10.3 Remove the two small cylinder head nuts



10.4 Loosen the head bolts evenly, in a criss-cross pattern, in two or three stages



10.6 Lift the head off, remove the gasket and locate the dowels (arrows); they may come off with the head or stay in the cylinder

- 6 Support the cam chain so it won't drop into the cam chain tunnel, and stuff a clean rag into the tunnel to prevent the entry of debris. Once this is done, remove the gasket and two dowel pins from the cylinder (see illustration).
- 7 If the front (exhaust) side chain guide is worn, lift it out of its notches (see illustration 9.8a).
- 8 Check the cylinder head gasket and the mating surfaces on the cylinder head and cylinder for leakage, which could indicate warpage. Refer to Section 12 and check the flatness of the cylinder head.
- 9 Clean all traces of old gasket material from the cylinder head and cylinder. Be careful not to let any of the gasket material fall into the crankcase, the cylinder bore or the bolt holes.

Installation

- 10 Install the two dowel pins, then lay the new gasket in place on the cylinder block. Never reuse the old gasket and don't use any type of gasket sealant.
- 11 Make sure the cam chain front guide fits in its notches (see illustration 9.8b).
- 12 Carefully lower the cylinder head over the dowels. It's helpful to have an assistant support the camshaft chain with a piece of wire so it doesn't fall and become kinked or detached from the crankshaft. When the head is resting on the cylinder, wire the cam chain to another component to keep tension on it.
- 13 Install the head bolts and their washers in the proper holes (they're different lengths). Tighten the bolts in two or three stages, in a criss-cross pattern, to the torque listed in this Chapter's Specifications.
- 14 Install the cylinder head nuts and tighten them securely, but don't overtighten them and strip the threads.
- 15 The remainder of installation is the reverse of the removal steps.
- 16 Change the engine oil (see Chapter 1).

11 Valves/valve seats/valve guides - servicing

- 1 Because of the complex nature of this job and the special tools and equipment required, servicing of the valves, the valve seats and the valve guides (commonly known as a valve job) is best left to a professional.
- 2 The home mechanic can, however, remove and disassemble the head, do the initial cleaning and inspection, then reassemble and deliver the head to a dealer service department or properly equipped motorcycle repair shop for the actual valve servicing. Refer to Section 12 for those procedures.
- 3 The service department will remove the valves and springs, recondition or replace the valves and valve seats, replace the valve

guides, check and replace the valve springs, spring retainers and keepers (as necessary), replace the valve seals with new ones and reassemble the valve components.

- 4 After the valve job has been performed, the head will be in like-new condition. When the head is returned, be sure to clean it again very thoroughly before installation on the engine to remove any metal particles or abrasive grit that may still be present from the valve service operations. Use compressed air, if available, to blow out all the holes and passages.

12 Cylinder head and valves - disassembly, inspection and reassembly

- 1 As mentioned in the previous Section, valve servicing and valve guide replacement should be left to a dealer service department or motorcycle repair shop. However, disassembly, cleaning and inspection of the valves and related components can be done (if the necessary special tools are available) by the home mechanic. This way no expense is incurred if the inspection reveals that service work is not required at this time.

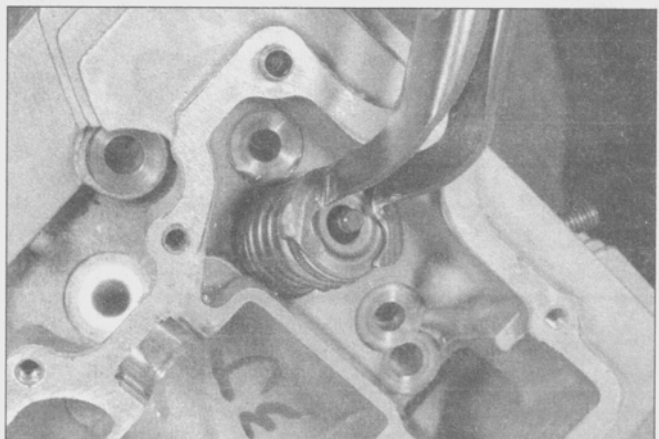
- 2 To properly disassemble the valve components without the risk of damaging them, a valve spring compressor is absolutely necessary. If the special tool is not available, have a dealer service department or motorcycle repair shop handle the entire process of disassembly, inspection, service or repair (if required) and reassembly of the valves.

Disassembly

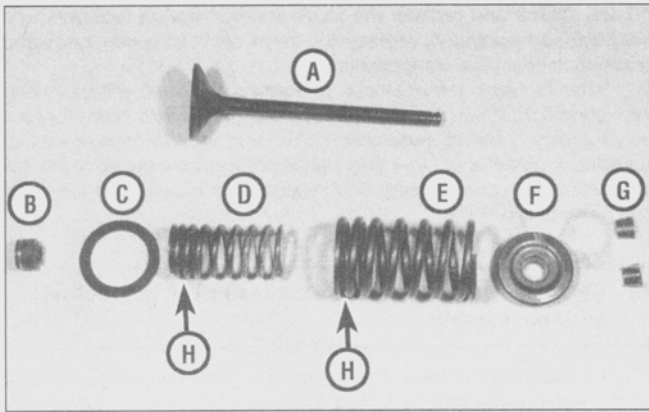
Refer to illustrations 12.7a, 12.7b and 12.7c

- 3 Remove the intake manifold from the cylinder head (see Chapter 3).
- 4 Before the valves are removed, scrape away any traces of gasket material from the head gasket sealing surface. Work slowly and do not nick or gouge the soft aluminum of the head. Gasket removing solvents, which work very well, are available at most motorcycle shops and auto parts stores.
- 5 Carefully scrape all carbon deposits out of the combustion chamber area. A hand-held wire brush or a piece of fine emery cloth can be used once most of the deposits have been scraped away. Do not use a wire brush mounted in a drill motor, or one with extremely stiff bristles, as the head material is soft and may be eroded away or scratched by the wire brush.
- 6 Before proceeding, arrange to label and store the valves along with their related components so they can be kept separate and reinstalled in the same valve guides they are removed from (plastic bags work well for this).
- 7 Compress the valve spring(s) on the first valve with a spring com-

2



12.7a Install a valve spring compressor and compress the valve springs, then remove the keepers, the valve spring retainer, springs, spring seat and valve



12.7b Valve and related components

- | | |
|----------------------|-------------------------|
| A Valve | E Outer valve spring |
| B Oil seal | F Valve spring retainer |
| C Spring seat | G Keepers |
| D Inner valve spring | H Tightly wound coils |

pressor, then remove the keepers and the retainer from the valve assembly (**see illustrations**). Do not compress the spring(s) any more than is absolutely necessary. Carefully release the valve spring compressor and remove the spring(s), spring seat and valve from the head. If the valve binds in the guide (won't pull through), push it back into the head and deburr the area around the keeper groove with a very fine file or whetstone (**see illustration**).

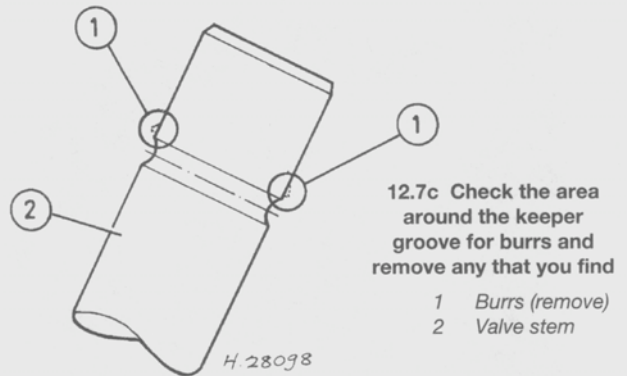
8 Repeat the procedure for the remaining valves. Remember to keep the parts for each valve together so they can be reinstalled in the same location.

9 Once the valves have been removed and labeled, pull off the valve stem seals with pliers and discard them (the old seals should never be reused).

10 Next, clean the cylinder head with solvent and dry it thoroughly. Compressed air will speed the drying process and ensure that all holes and recessed areas are clean.

11 Clean all of the valve springs, keepers, retainers and spring seats with solvent and dry them thoroughly. Do the parts from one valve at a time so that no mixing of parts between valves occurs.

12 Scrape off any deposits that may have formed on the valve, then use a motorized wire brush to remove deposits from the valve heads and stems. Again, make sure the valves do not get mixed up.



12.7c Check the area around the keeper groove for burrs and remove any that you find

- 1 Burrs (remove)
- 2 Valve stem

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Inspection

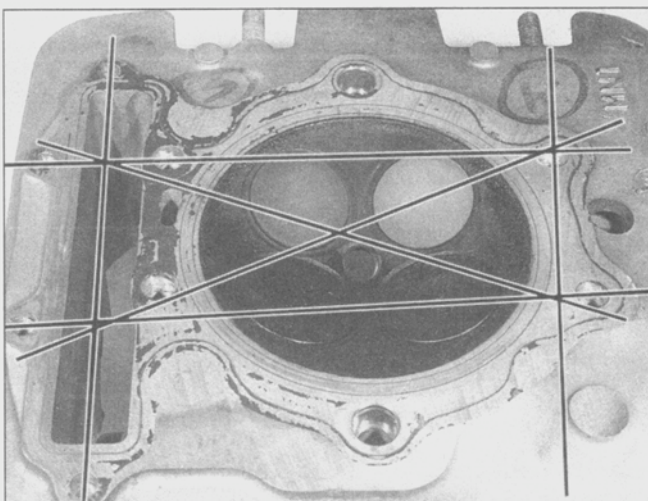
Refer to illustrations 12.14, 12.15, 12.16, 12.17, 12.18a, 12.18b, 12.19a and 12.19b

13 Inspect the head very carefully for cracks and other damage. If cracks are found, a new head will be required. Check the cam bearing surfaces for wear and evidence of seizure. Check the camshaft for wear as well (**see Section 9**).

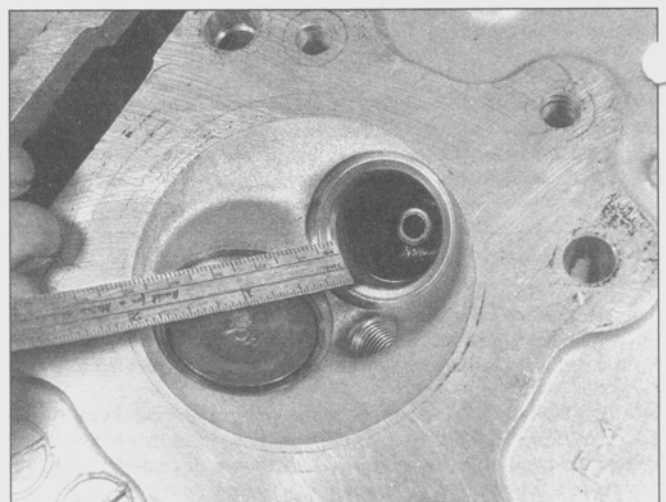
14 Using a precision straightedge and a feeler gauge, check the head gasket mating surface for warpage. Lay the straightedge lengthwise, across the head and diagonally (corner-to-corner), intersecting the head bolt holes, and try to slip a feeler gauge under it, on either side of the combustion chamber (**see illustration**). The feeler gauge thickness should be the same as the cylinder head warpage limit listed in this Chapter's Specifications. If the feeler gauge can be inserted between the head and the straightedge, the head is warped and must either be machined or, if warpage is excessive, replaced with a new one.

15 Examine the valve seats in each of the combustion chambers. If they are pitted, cracked or burned, the head will require valve service that is beyond the scope of the home mechanic. Measure the valve seat width (**see illustration**) and compare it to this Chapter's Specifications. If it is not within the specified range, or if it varies around its circumference, valve service work is required.

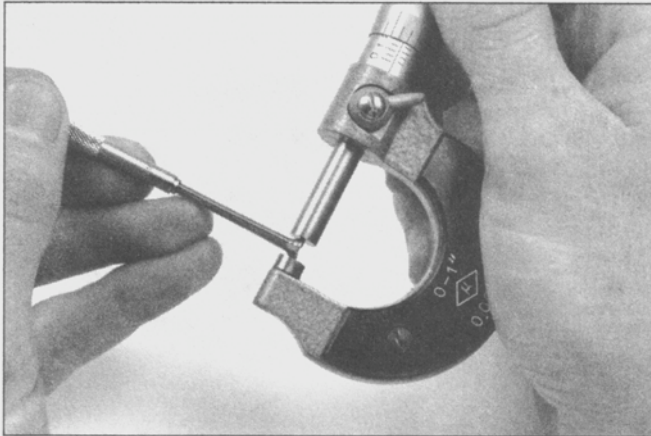
16 Clean the valve guides to remove any carbon buildup, then measure the inside diameters of the guides (at both ends and the center of the guide) with a small hole gauge and a micrometer (**see illustration**). Record the measurements for future reference. The guides are measured at the ends and at the center to determine if they are worn in a



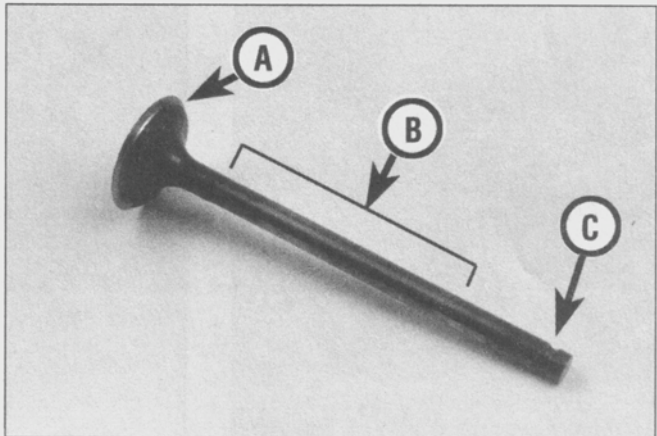
12.14 Check the gasket surface for flatness with a straightedge and feeler gauge in the directions shown



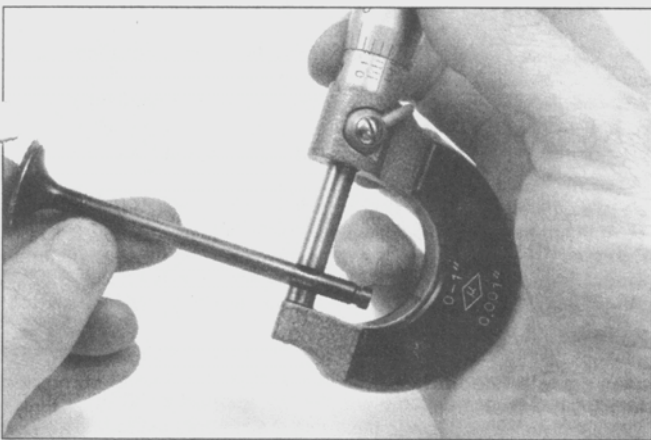
12.15 Measuring valve seat width



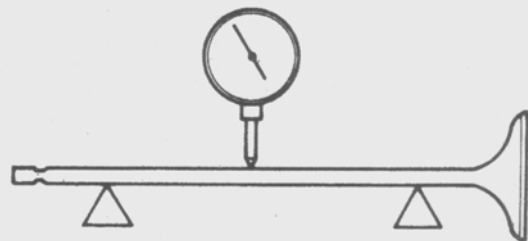
12.16 Measure the valve guide inside diameter with a hole gauge, then measure the gauge with a micrometer



12.17 Check the valve face (A), stem (B) and keeper groove (C) for wear and damage



12.18a Measuring valve stem diameter



12.18b Check the valve stem for bends with a V-block (or V-blocks, as shown here) and a dial indicator

bell-mouth pattern (more wear at the ends). If they are, guide replacement is an absolute must.

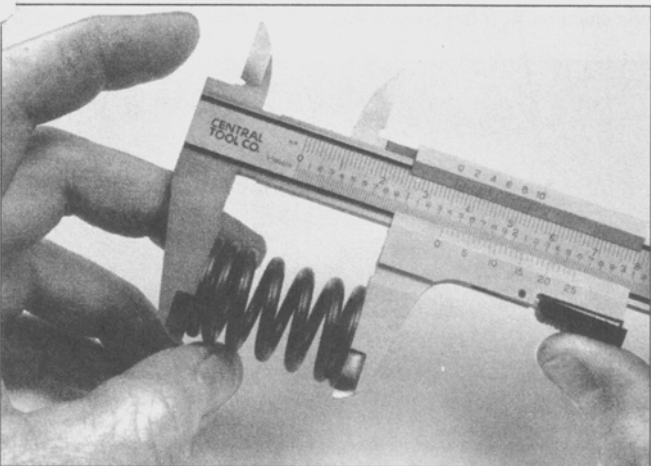
17 Carefully inspect each valve face for cracks, pits and burned spots. Check the valve stem and the keeper groove area for cracks (see illustration). Rotate the valve and check for any obvious indication that it is bent. Check the end of the stem for pitting and excessive wear. The presence of any of the above conditions indicates the need

for valve servicing.

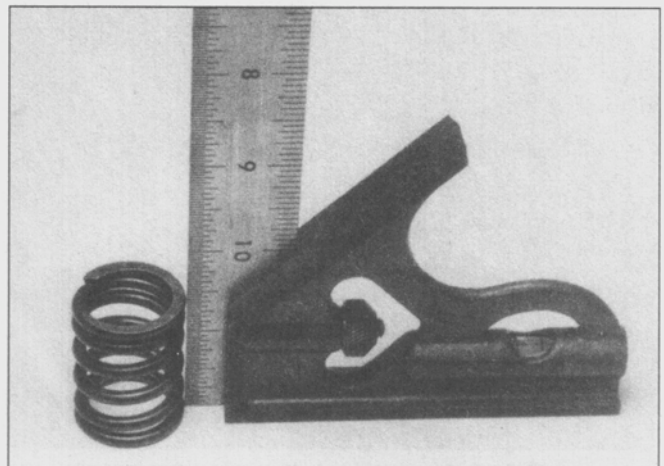
18 Measure the valve stem diameter (see illustration). If the diameter is less than listed in this Chapter's Specifications, the valves will have to be replaced with new ones. Also check the valve stem for bending. Set the valve in a V-block with a dial indicator touching the middle of the stem (see illustration). Rotate the valve and look for a reading on the gauge (which indicates a bent stem). If the stem is bent, replace the valve.

19 Check the end of each valve spring for wear and pitting. Measure the free length (see illustration) and compare it to this Chapter's Specifications. Any springs that are shorter than specified have sagged and should not be reused. Stand the spring on a flat surface and check it for squareness (see illustration).

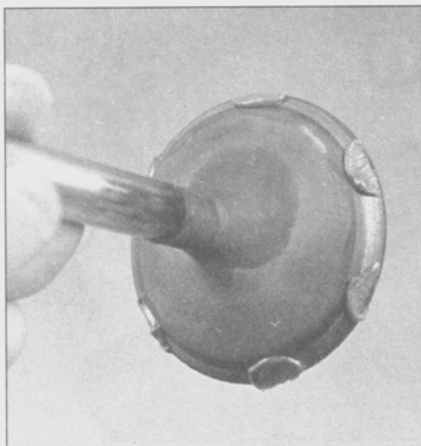
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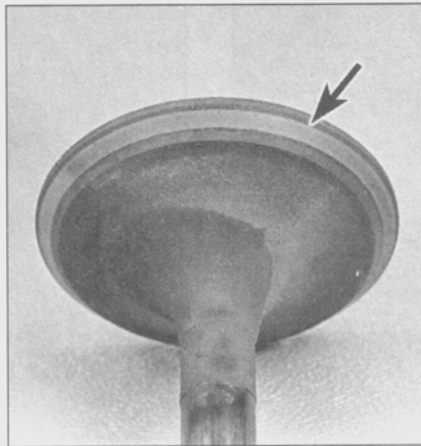
12.19a Measuring the free length of the valve springs



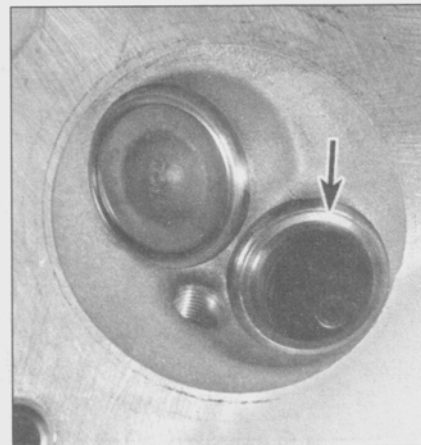
12.19b Checking the valve springs for squareness



12.23 Apply the lapping compound very sparingly, in small dabs, to the valve face only



12.24a After lapping, the valve face should exhibit a uniform, unbroken contact pattern (arrow) . . .



12.24b . . . and the seat (arrow) should be the specified width with a smooth, unbroken appearance

20 Check the spring retainers and keepers for obvious wear and cracks. Any questionable parts should not be reused, as extensive damage will occur in the event of failure during engine operation.

21 If the inspection indicates that no service work is required, the valve components can be reinstalled in the head.

Reassembly

Refer to illustrations 12.23, 12.24a, 12.24b, 12.26 and 12.27

22 If the valve seats have been ground, the valves and seats should be lapped before installing the valves in the head to ensure a positive seal between the valves and seats. This procedure requires coarse and fine valve lapping compound (available at auto parts stores) and a valve lapping tool. If a lapping tool is not available, a piece of rubber or plastic hose can be slipped over the valve stem (after the valve has been installed in the guide) and used to turn the valve.

23 Apply a small amount of coarse lapping compound to the valve face (**see illustration**), then slip the valve into the guide. **Note:** Make sure the valve is installed in the correct guide and be careful not to get any lapping compound on the valve stem.

24 Attach the lapping tool (or hose) to the valve and rotate the tool between the palms of your hands. Use a back-and-forth motion rather than a circular motion. Lift the valve off the seat and turn it at regular intervals to distribute the lapping compound properly. Continue the lapping procedure until the valve face and seat contact area is of uniform width and unbroken around the entire circumference of the valve

face and seat (**see illustrations**). Once this is accomplished, lap the valves again with fine lapping compound.

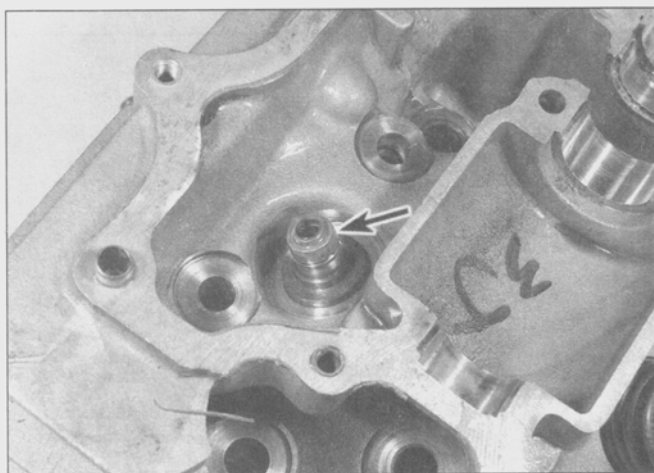
25 Carefully remove the valve from the guide and wipe off all traces of lapping compound. Use solvent to clean the valve and wipe the seat area thoroughly with a solvent soaked cloth. Repeat the procedure for the remaining valves.

26 Lay the spring seat in place in the cylinder head, then install a new valve stem seal on the guide (**see illustration**). Use a deep socket of the appropriate size to push the seals into place until they are properly seated. Don't twist or cock them, or they will not seal properly against the valve stems. Also, don't remove them again or they will be damaged.

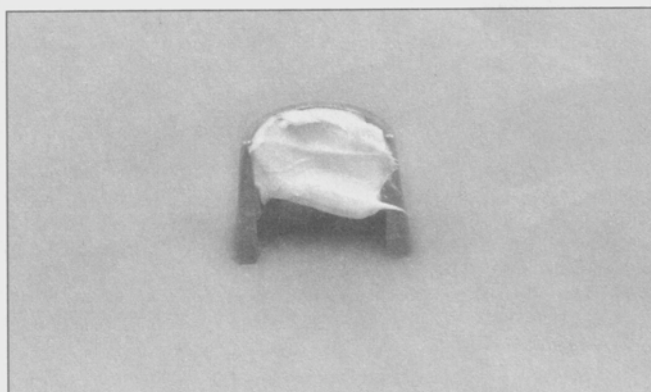
27 Coat the valve stems with assembly lube or moly-based grease, then install one of them into its guide. Next, install the spring seat, springs and retainers, compress the springs and install the keepers. **Note:** Install the springs with the tightly wound coils at the bottom (next to the spring seat). When compressing the springs with the valve spring compressor, depress them only as far as is absolutely necessary to slip the keepers into place. Apply a small amount of grease to the keepers (**see illustration**) to help hold them in place as the pressure is released from the springs. Make certain that the keepers are securely locked in their retaining grooves.

28 Support the cylinder head on blocks so the valves can't contact the workbench top, then very gently tap each of the valve stems with a soft-faced hammer. This will help seat the keepers in their grooves.

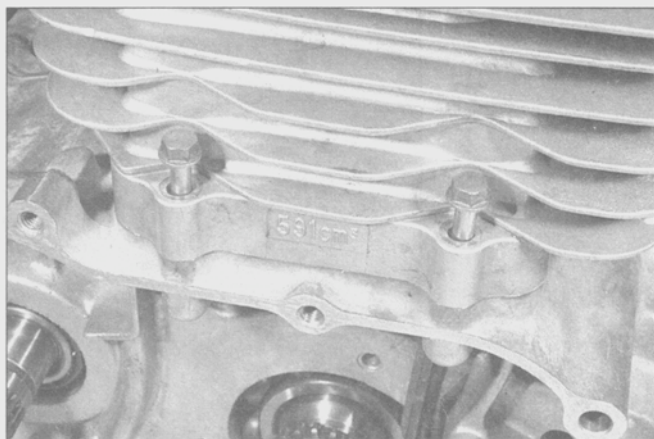
29 Once all of the valves have been installed in the head, check for proper valve sealing by pouring a small amount of solvent into each of the valve ports. If the solvent leaks past the valve(s) into the combu-



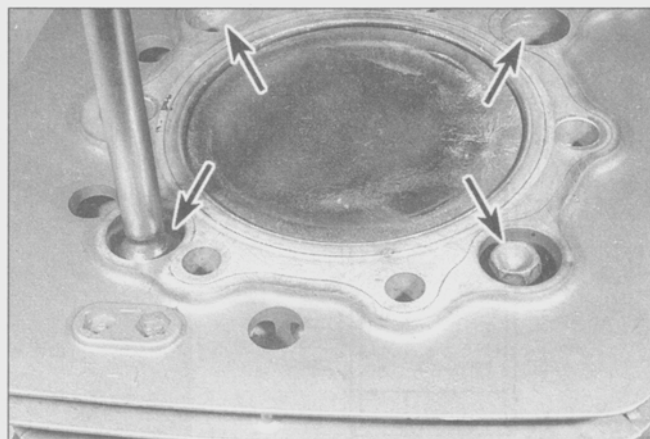
12.26 Push the oil seal onto the valve guide (arrow)



12.27 A small dab of grease will help hold the keepers in place on the valve while the spring compressor is released



13.2 Remove the two small bolts that secure the cylinder to the crankcase . . .



13.3 . . . then loosen the main bolts (arrows) evenly, in a criss-cross pattern; you'll need an extension to reach the shorter bolts

tion chamber area, disassemble the valve(s) and repeat the lapping procedure, then reinstall the valve(s) and repeat the check. Repeat the procedure until a satisfactory seal is obtained.

13 Cylinder - removal, inspection and installation

Removal

Refer to illustrations 13.2, 13.3, 13.4 and 13.5

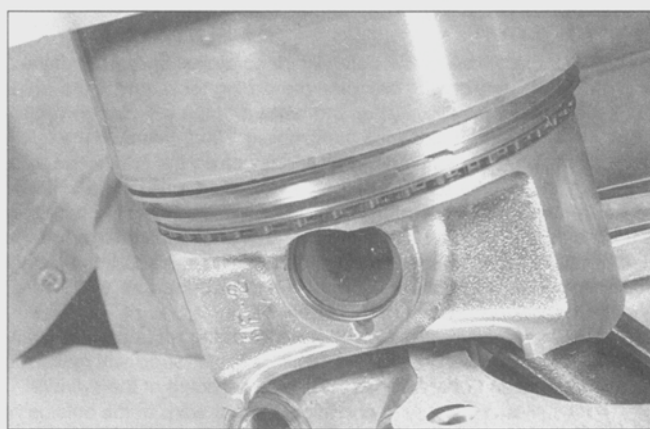
1 Remove the cylinder head cover, camshaft and cylinder head (see Sections 7, 9 and 10). Make sure the crankshaft is positioned at top dead center (TDC).

2 Remove two small bolts securing the cylinder to the crankcase (see illustration).

3 Loosen the main cylinder attaching bolts in two or three stages in a criss-cross pattern (see illustrations).

4 Lift the cylinder straight up, off the piston and the rear cam chain guide (see illustration). If it's stuck, tap around its perimeter with a soft-faced hammer (but don't tap on the cooling fins or they may break). Don't attempt to pry between the cylinder and the crankcase, as you'll ruin the sealing surfaces.

5 Locate the dowel pins (they may have come off with the cylinder or still be in the crankcase) (see illustration). Be careful not to let these drop into the engine. Stuff rags around the piston and remove the gasket and all traces of old gasket material from the surfaces of the cylinder and the crankcase.



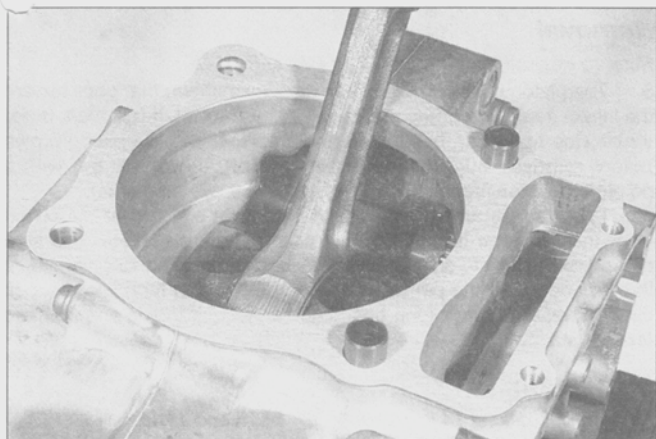
13.4 Lift the cylinder off the crankcase; if you're experienced and very careful, the cylinder can be installed over the rings without a ring compressor, but a compressor is recommended

Inspection

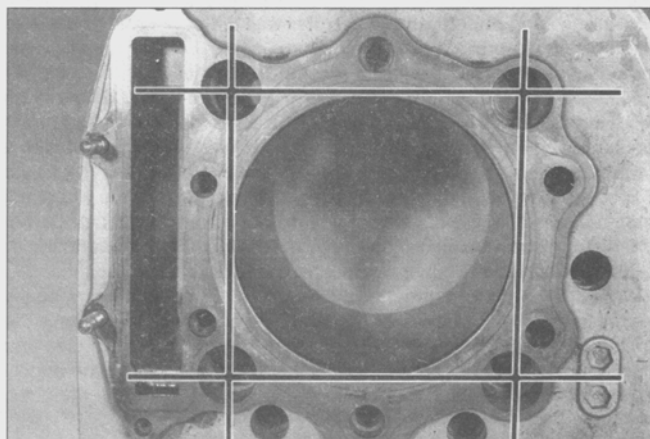
Refer to illustrations 13.6 and 13.8

Caution: Don't attempt to separate the liner from the cylinder.

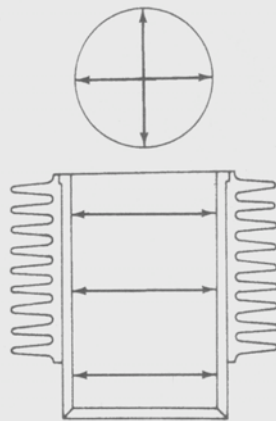
6 Check the top surface of the cylinder for warpage, using the same method as for the cylinder head (see Section 12) (see illustration).



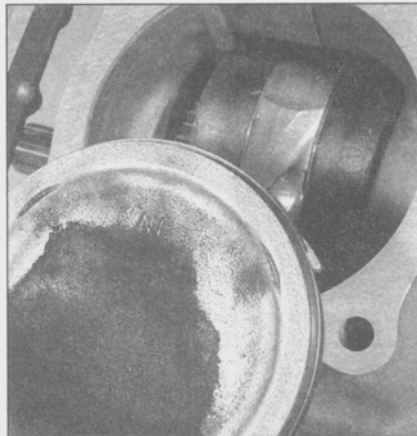
13.5 Locate the dowels and remove the base gasket



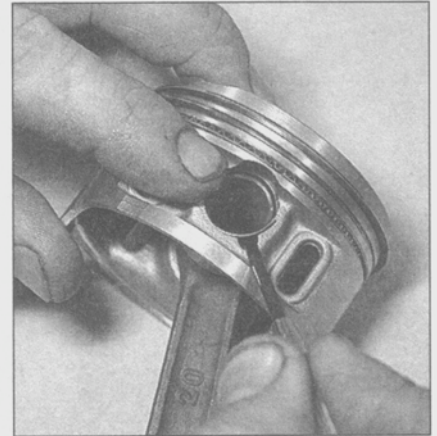
13.6 Check the cylinder top surface for warpage in the directions shown



13.8 Measure the cylinder diameter in two directions, at top, center and bottom of the ring travel



14.3a The IN mark on top of the piston faces the intake (rear) side of the engine



14.3b Wear eye protection and pry the circlip out of its groove with a pointed tool

7 Check the cylinder walls carefully for scratches and score marks.

8 Using the appropriate precision measuring tools, check the cylinder's diameter at the top, center and bottom of the cylinder bore, parallel to the crankshaft axis (**see illustration**). Next, measure the cylinder's diameter at the same three locations across the crankshaft axis. Compare the results to this Chapter's Specifications. If the cylinder walls are tapered, out-of-round, worn beyond the specified limits, or badly scuffed or scored, have the cylinder rebored and honed by a dealer service department or other motorcycle repair shop. If a rebore is done, oversize pistons and rings will be required as well. **Note:** Honda supplies pistons in two oversizes.

9 As an alternative, if the precision measuring tools are not available, a dealer service department or other repair shop will make the measurements and offer advice concerning servicing of the cylinder.

10 If it's in reasonably good condition and not worn to the outside of the limits, and if the piston-to-cylinder clearance can be maintained properly, then the cylinder does not have to be rebored; honing is all that is necessary.

11 To perform the honing operation you will need the proper size flexible hone with fine stones as shown in *Maintenance techniques, tools and working facilities* at the front of this book, or a "bottle brush" type hone, plenty of light oil or honing oil, some shop towels and an electric drill motor. Hold the cylinder in a vise (cushioned with soft jaws or wood blocks) when performing the honing operation. Mount the hone in the drill motor, compress the stones and slip the hone into the cylinder. Lubricate the cylinder thoroughly, turn on the drill and move the hone up and down in the cylinder at a pace which will produce a fine crosshatch pattern on the cylinder wall with the crosshatch lines intersecting at approximately a 60-degree angle. Be sure to use plenty of lubricant and do not take off any more material than is absolutely necessary to produce the desired effect. Do not withdraw the hone from the cylinder while it is running. Instead, shut off the drill and continue moving the hone up and down in the cylinder until it comes to a complete stop, then compress the stones and withdraw the hone. Wipe the oil out of the cylinder. Remember, do not remove too much material from the cylinder wall. If you do not have the tools, or do not desire to perform the honing operation, a dealer service department or other repair shop will generally do it for a reasonable fee.

12 Next, the cylinder must be thoroughly washed with warm soapy water to remove all traces of the abrasive grit produced during the honing operation. Be sure to run a brush through the bolt holes and flush them with running water. After rinsing, dry the cylinder thoroughly and apply a coat of light, rust-preventative oil to all machined surfaces.

Installation

13 Lubricate the cylinder bore with plenty of clean engine oil. Apply a thin film of moly-based grease to the piston skirt.

14 Install the dowel pins, then lower a new cylinder base gasket over them (**see illustration 13.5**).

15 Attach a piston ring compressor to the piston and compress piston rings. A large hose clamp can be used instead - just make sure it doesn't scratch the piston, and don't tighten it too much.

16 Install the cylinder over the studs and carefully lower it down until the piston crown fits into the cylinder liner (**see illustration 13.4**). While doing this, pull the camshaft chain up, using a hooked tool or a piece of stiff wire. Push down on the cylinder, making sure the piston doesn't get cocked sideways, until the bottom of the cylinder liner slides down past the piston rings. A wood or plastic hammer handle can be used to gently tap the cylinder down, but don't use too much force or the piston will be damaged.

17 Remove the piston ring compressor or hose clamp, being careful not to scratch the piston.

18 The remainder of installation is the reverse of the removal steps.

14 Piston - removal, inspection and installation

1 The piston is attached to the connecting rod with a piston pin that is a slip fit in the piston and rod.

2 Before removing the piston from the rod, stuff a clean shop towel into the crankcase hole, around the connecting rod. This will prevent the circlips from falling into the crankcase if they are inadvertently dropped.

Removal

Refer to illustrations 14.3a, 14.3b, 14.4a and 14.4b

3 The piston should have an IN mark on its crown that goes toward the intake (rear) side of the engine (**see illustration**). If this mark is not visible due to carbon buildup, scribe an arrow into the piston crown before removal. Support the piston and pry the circlip out with a pointed tool (**see illustration**). **Warning:** Wear eye protection.

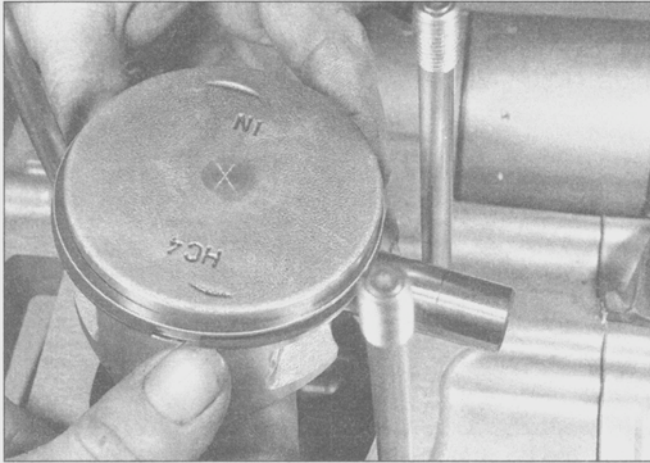
4 Push the piston pin out from the opposite end to free the piston from the rod (**see illustration**). You may have to deburr the area around the groove to enable the pin to slide out (use a triangular file for this procedure). If the pin won't come out, you can fabricate a piston pin removal tool from a long bolt, a nut, a piece of tubing and washers (**see illustration**).

Inspection

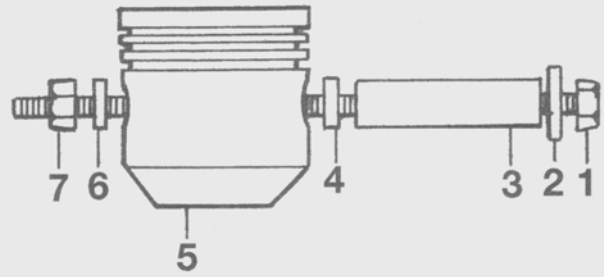
Refer to illustrations 14.6, 14.13, 14.14, 14.15 and 14.16

5 Before the inspection process can be carried out, the pistons must be cleaned and the old piston rings removed.

6 Using a piston ring removal and installation tool, carefully remove



14.4a Push the piston pin part way out, then pull it the rest of the way



14.4b The piston pin should come out with hand pressure - if it doesn't, this removal tool can be fabricated from readily available parts

- | | |
|---------------|--|
| 1 Bolt | 7 Nut (B) |
| 2 Washer | A Large enough for piston pin to fit inside |
| 3 Pipe (A) | B Small enough to fit through the pin bore in the piston |
| 4 Padding (A) | |
| 5 Piston | |
| 6 Washer (B) | |

the rings from the pistons (see illustration). Do not nick or gouge the pistons in the process.

Scrape all traces of carbon from the tops of the pistons. A hand-held wire brush or a piece of fine emery cloth can be used once the majority of the deposits have been scraped away. Do not, under any circumstances, use a wire brush mounted in a drill motor to remove deposits from the pistons; the piston material is soft and will be eroded away by the wire brush.

8 Use a piston ring groove cleaning tool to remove any carbon deposits from the ring grooves. If a tool is not available, a piece broken off the old ring will do the job. Be very careful to remove only the carbon deposits. Do not remove any metal and do not nick or gouge the sides of the ring grooves.

9 Once the deposits have been removed, clean the pistons with solvent and dry them thoroughly. Make sure the oil return holes below the oil ring grooves are clear.

10 If the pistons are not damaged or worn excessively and if the cylinders are not rebored, new pistons will not be necessary. Normal piston wear appears as even, vertical wear on the thrust surfaces of the piston and slight looseness of the top ring in its groove. New piston rings, on the other hand, should always be used when an engine is rebuilt.

11 Carefully inspect each piston for cracks around the skirt, at the pin bosses and at the ring lands.

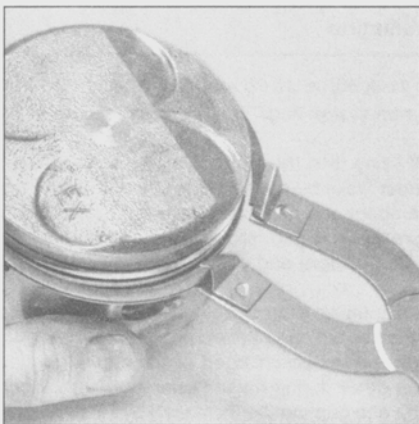
12 Look for scoring and scuffing on the thrust faces of the skirt, holes in the piston crown and burned areas at the edge of the crown. If

the skirt is scored or scuffed, the engine may have been suffering from overheating and/or abnormal combustion, which caused excessively high operating temperatures. The oil pump should be checked thoroughly. A hole in the piston crown, an extreme to be sure, is an indication that abnormal combustion (pre-ignition) was occurring. Burned areas at the edge of the piston crown are usually evidence of spark knock (detonation). If any of the above problems exist, the causes must be corrected or the damage will occur again.

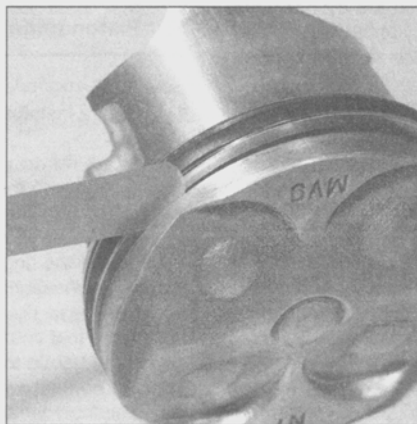
13 Measure the piston ring-to-groove clearance (side clearance) by laying a new piston ring in the ring groove and slipping a feeler gauge in beside it (see illustration). Check the clearance at three or four locations around the groove. Be sure to use the correct ring for each groove; they are different. If the clearance is greater than specified, a new piston will have to be used when the engine is reassembled.

14 Check the piston-to-bore clearance by measuring the bore (see Section 13) and the piston diameter (see illustration). Measure the piston across the skirt on the thrust faces at a 90-degree angle to the piston pin, at the specified distance up from the bottom of the skirt. Subtract the piston diameter from the bore diameter to obtain the clearance. If it is greater than specified, the cylinder will have to be rebored and a new oversized piston and rings installed. If the appropriate precision measuring tools are not available, the piston-to-cylinder clearance can be obtained, though not quite as accurately, using feeler gauge stock. Feeler gauge stock comes in 12-inch lengths and various thicknesses and is generally available at auto parts stores. To check

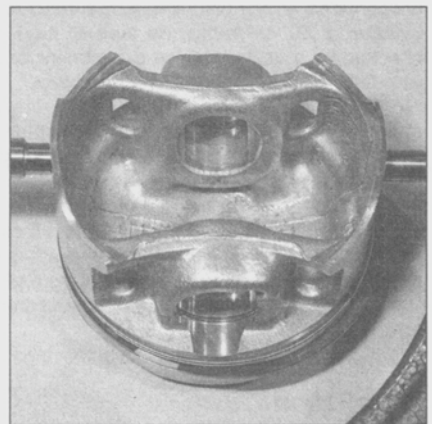
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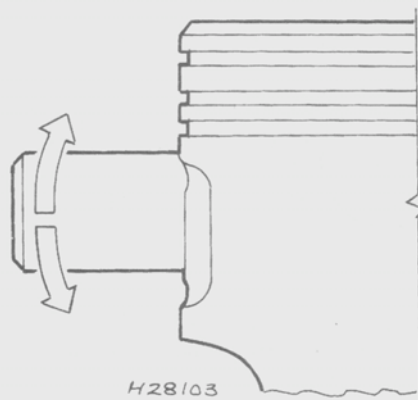
14.6 Remove the piston rings with a ring removal and installation tool



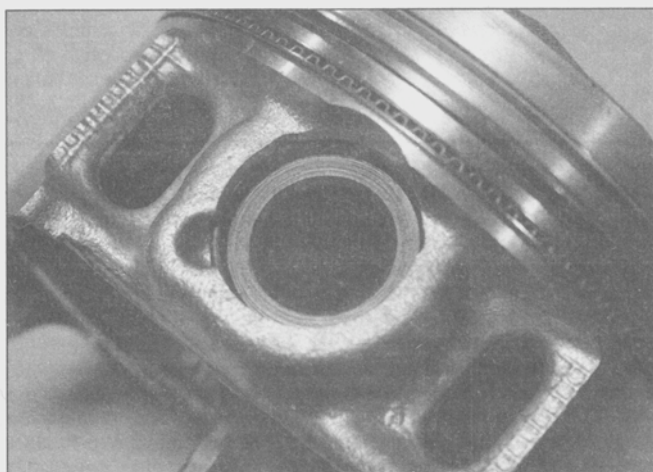
14.13 Measure the piston ring-to-groove clearance with a feeler gauge



14.14 Measure the piston diameter with a micrometer



14.15 Slip the pin into the piston and try to wiggle it back-and-forth; if it's loose, replace the piston and pin



14.18 Make sure both piston pin circlips are securely seated in their grooves

the clearance, slip a piece of feeler gauge stock of the same thickness as the specified piston clearance into the cylinder along with appropriate piston. The cylinder should be upside down and the piston must be positioned exactly as it normally would be. Place the feeler gauge between the piston and cylinder on one of the thrust faces (90-degrees to the piston pin bore). The piston should slip through the cylinder (with the feeler gauge in place) with moderate pressure. If it falls through, or slides through easily, the clearance is excessive and a new piston will be required. If the piston binds at the lower end of the cylinder and is loose toward the top, the cylinder is tapered, and if tight spots are encountered as the piston/feeler gauge is rotated in the cylinder, the cylinder is out-of-round. Be sure to have the cylinder and piston checked by a dealer service department or a repair shop to confirm your findings before purchasing new parts.

15 Apply clean engine oil to the pin, insert it into the piston and check for freeplay by rocking the pin back-and-forth (**see illustration**). If the pin is loose, a new piston and possibly a new pin must be installed.

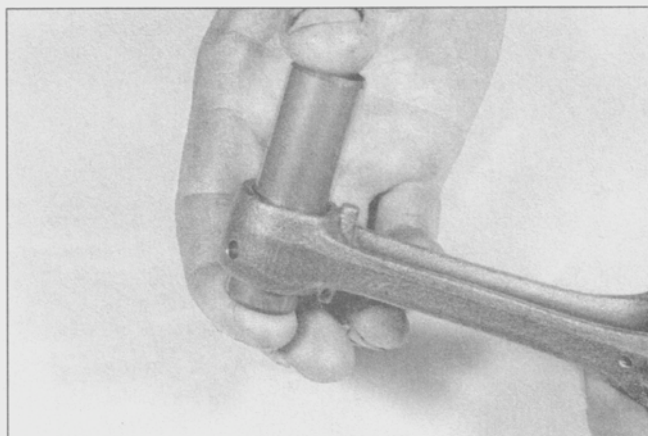
16 Repeat Step 15, this time inserting the piston pin into the connecting rod (**see illustration**). If the pin is loose, measure the pin diameter and the pin bore in the rod (or have this done by a dealer service department or other repair shop). A worn pin can be replaced separately; if the rod bore is worn, the rod and crankshaft must be replaced as an assembly.

17 Refer to Section 15 and install the rings on the pistons.

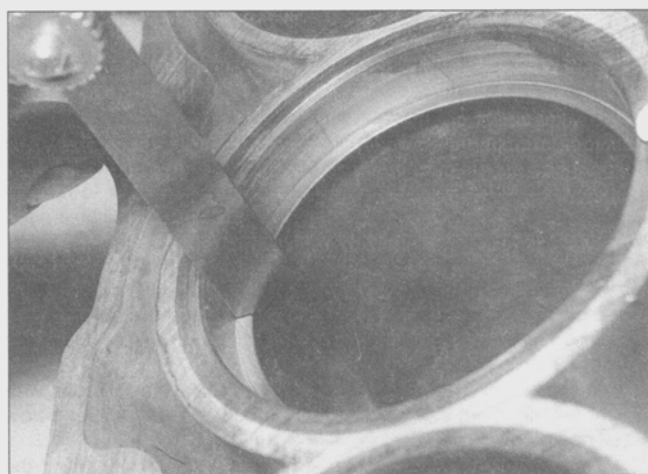
Installation

Refer to illustration 14.18

18 Install the piston with its IN mark toward the intake side (rear) of



14.16 Slip the piston pin into the rod and try to rock it back-and-forth to check for looseness



15.2 Check the piston ring end gap with a feeler gauge at the bottom of the cylinder

the engine. Lubricate the pin and the rod bore with moly-based grease. Install a new circlips in the groove in one side of the piston (don't reuse the old circlips). Push the pin into position from the opposite side and install another new circlip. Compress the circlips only enough for them to fit in the piston. Make sure the clips are properly seated in the grooves (**see illustration**).

15 Piston rings - installation

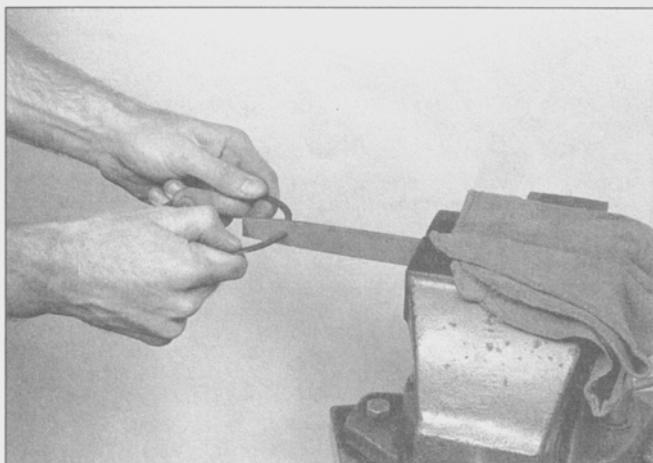
Refer to illustrations 15.2, 15.4, 15.7a, 15.7b and 15.7c

1 Before installing the new piston rings, the ring end gaps must be checked.

2 Insert the top (No. 1) ring into the bottom of the cylinder and square it up with the cylinder walls by pushing it in with the top of the piston. The ring should be about one-half inch above the bottom edge of the cylinder. To measure the end gap, slip a feeler gauge between the ends of the ring (**see illustration**) and compare the measurement to the Specifications.

3 If the gap is larger or smaller than specified, double check to make sure that you have the correct rings before proceeding.

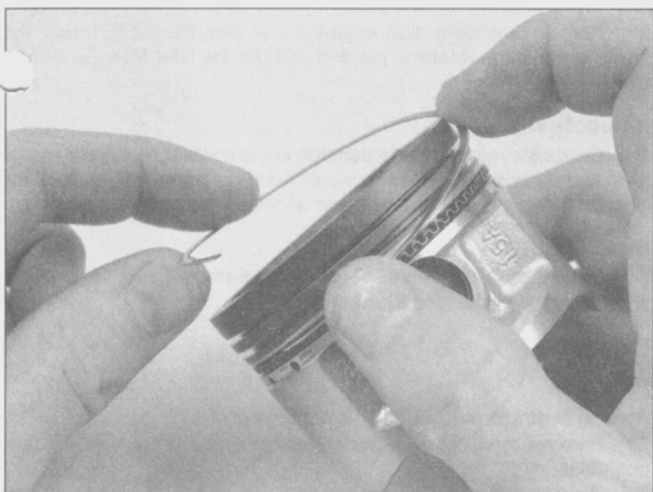
4 If the gap is too small, it must be enlarged or the ring ends may come in contact with each other during engine operation, which can cause serious damage. The end gap can be increased by filing the ring ends very carefully with a fine file (**see illustration**). When performing this operation, file only from the outside in.



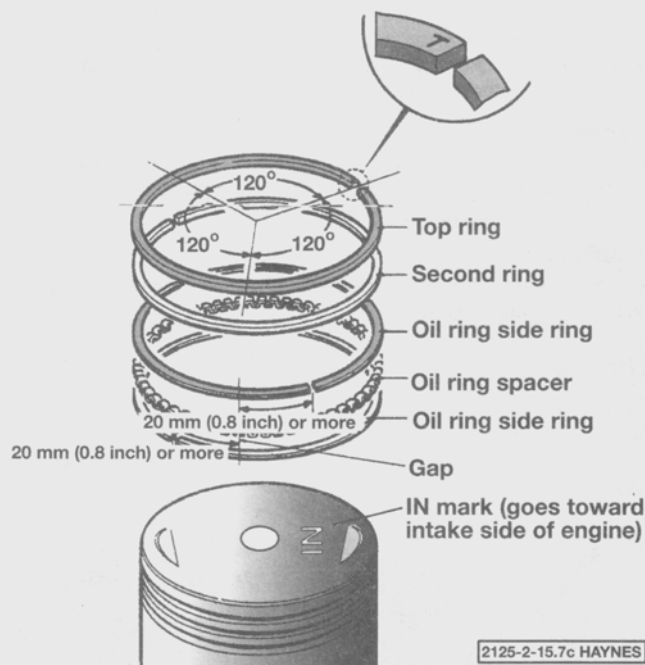
15.4 If the end gap is too small, clamp a file in a vise and file the ring ends (from the outside in only) to enlarge the gap slightly



15.7a Installing the oil ring expander - make sure the ends don't overlap



15.7b Installing an oil ring side rail - don't use a ring installation tool to do this



15.7c Ring details

5 Repeat the procedure for the second compression ring and oil ring.

Once the ring end gaps have been checked/corrected, the rings can be installed on the piston.

7 The oil control ring (lowest on the piston) is installed first. It is composed of three separate components. Slip the spacer into the groove, then install the upper side rail (**see illustrations**). Do not use a piston ring installation tool on the oil ring side rails as they may be damaged. Instead, place one end of the side rail into the groove between the spacer expander and the ring land. Hold it firmly in place and slide a finger around the piston while pushing the rail into the groove (taking care not to cut your fingers on the sharp edges). Next, install the lower side rail in the same manner.

8 After the three oil ring components have been installed, check to make sure that both the upper and lower side rails can be turned smoothly in the ring groove.

9 Install the no. 2 (middle) ring next. It can be readily distinguished from the top ring by its cross-section shape (**see illustration 15.7c**). Do not mix the top and middle rings.

10 To avoid breaking the ring, use a piston ring installation tool and make sure that the identification mark is facing up (**see illustration 15.7c**). Fit the ring into the middle groove on the piston. Do not expand the ring any more than is necessary to slide it into place.

11 Finally, install the no. 1 (top) ring in the same manner. Make sure the identifying mark is facing up. Be very careful not to confuse the top and second rings.

12 Once the rings have been properly installed, stagger the end gaps, including those of the oil ring side rails (**see illustration 15.7c**).

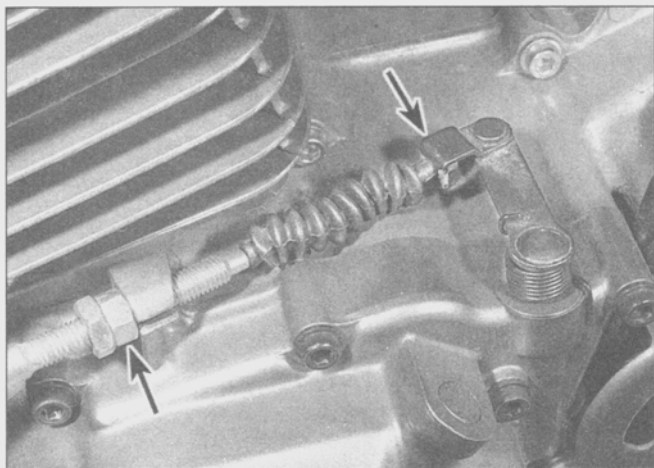
16 Clutch - removal, inspection and installation

Cable

Removal

Refer to illustration 16.2

1 Loosen the cable adjuster at the handlebar grip all the way (see Chapter 1). Rotate the cable so the inner cable aligns with the slot in the lever, then slip the cable end fitting out of the lever.



16.2 Loosen the locknut and adjusting nut (left arrow) and slip the cable out of the bracket, then slip it out of the lifter lever (right arrow)

2 Loosen the locknut and adjusting nut at the engine bracket (see illustration). Slip the cable out of the bracket, then disengage it from the lifter lever in the left engine cover.

Inspection

3 Slide the inner cable back and forth in the housing and make sure it moves freely. If it doesn't, try lubricating it as described in Chapter 1. If that doesn't help, replace the cable.

Installation

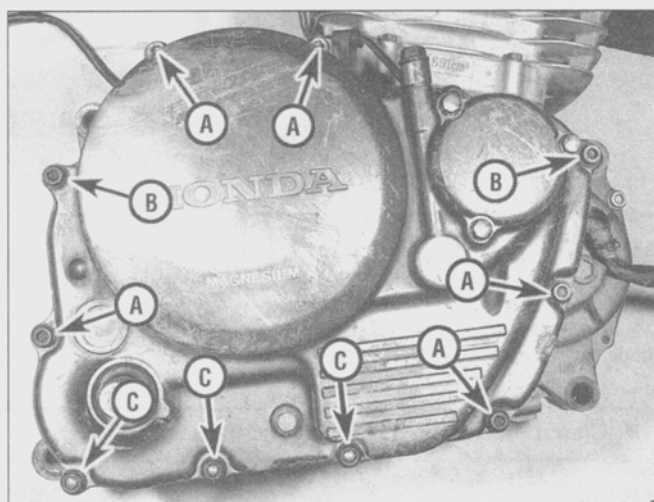
4 Installation is the reverse of the removal steps. Refer to Chapter 1 and adjust clutch freeplay.

Lifter lever

Removal

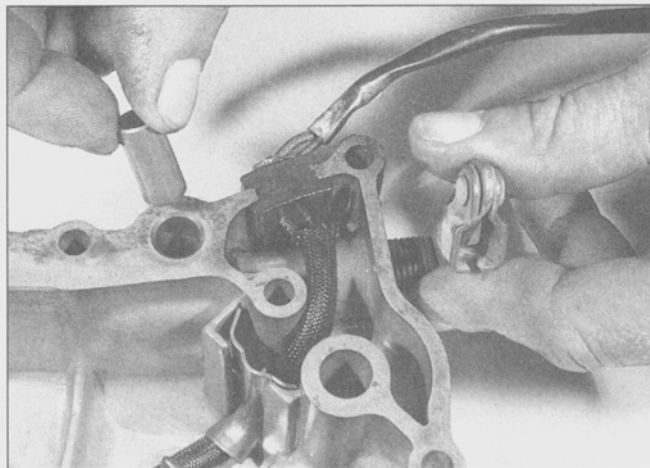
Refer to illustration 16.6

5 Disconnect the clutch cable from the lifter lever as described above.



16.11 Remove the cover bolts and nuts and take off the right engine cover to expose the clutch

- a) Cover bolts (without dowels)
- b) Cover bolts (with dowels)
- c) Cover nuts



16.6 Pull out the retaining pin and slide the lifter lever out of the engine cover

6 Remove the right-side engine cover (see Step 11). Inside the cover, remove the retaining pin and pull out the lifter lever (see illustration).

Inspection

7 Check for visible wear or damage at the contact points of the lifter lever and pushrod. Replace any parts that show problems. Replace the lifter shaft O-ring in the engine cover whenever it's removed.

Installation

8 Installation is the reverse of the removal steps. Refill the engine oil and adjust the clutch (see Chapter 1).

Clutch

Removal

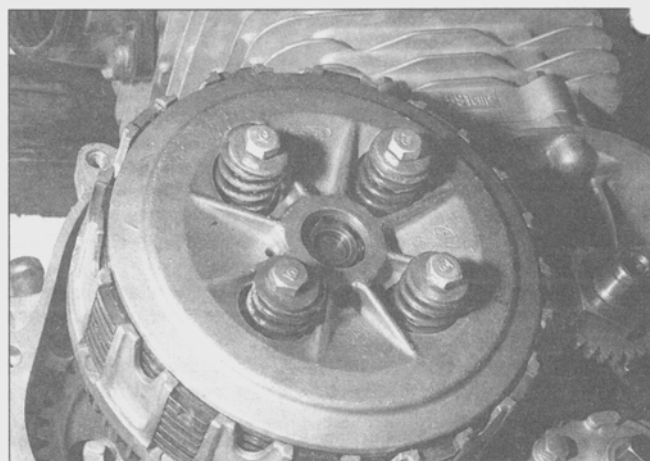
Refer to illustrations 16.11 and 16.12a through 16.12j

9 Remove the kickstarter pedal (Section 21) and the lower oil pipe bolt (Section 22).

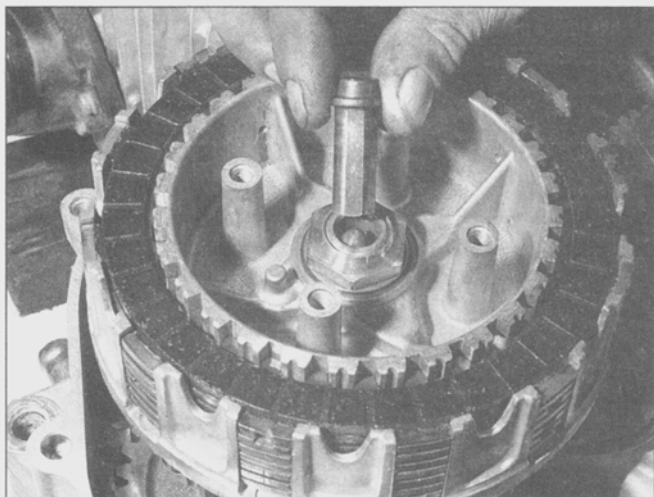
10 Remove the right footpeg and the skid bars (see Chapter 7) and the brake pedal (see Chapter 6).

11 Remove the bolts and nuts and take off the right-side engine cover (see illustration).

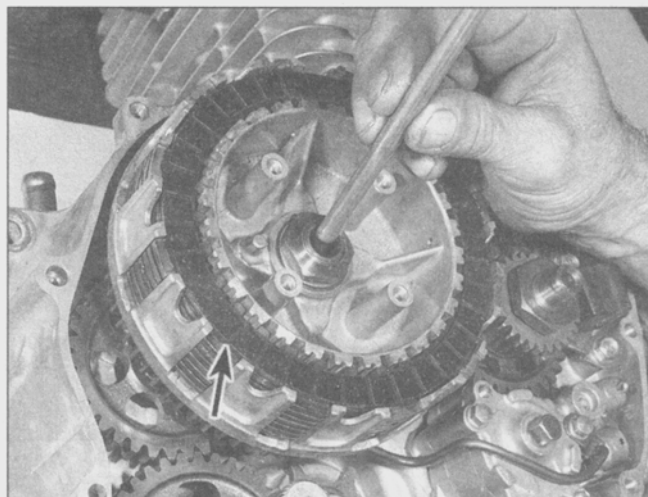
12 Refer to the accompanying illustrations to remove the clutch components (see illustrations).



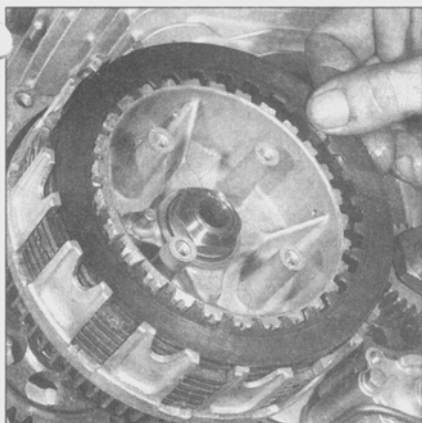
16.12a Remove the spring bolts, washers, springs and pressure plate . . .



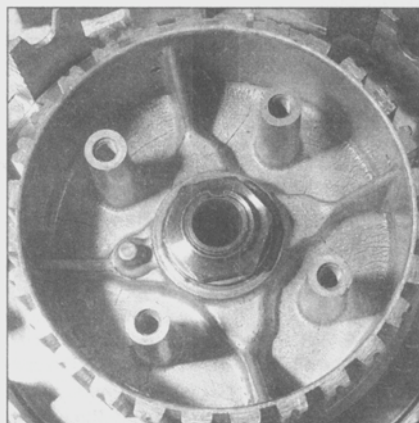
16.12b ... lift out the push piece ...



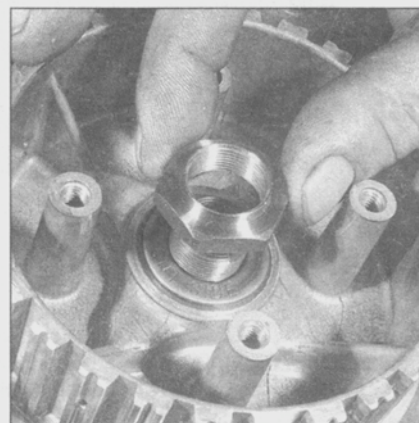
16.12c ... the clutch pushrod and the outermost friction plate (arrow) ...



16.12d ... the outermost metal plate, then the remaining friction and metal plates

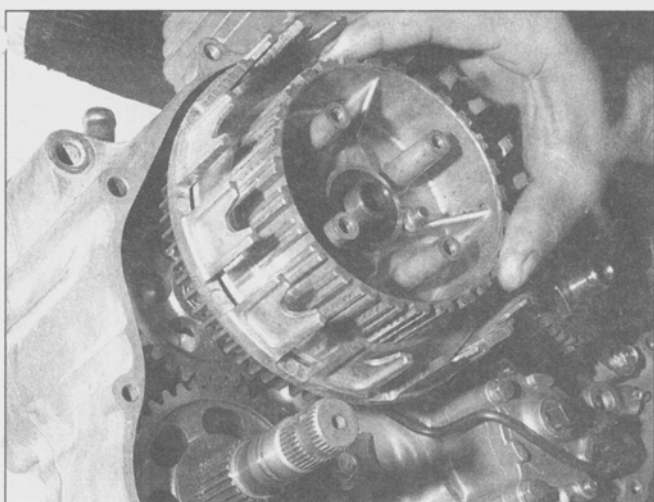


16.12e ... If you're working on a 1985 through 1987 model, bend back the lockwasher tab; if you're working on a 1988 or later model (shown), bend back the staked portion of the locknut ...

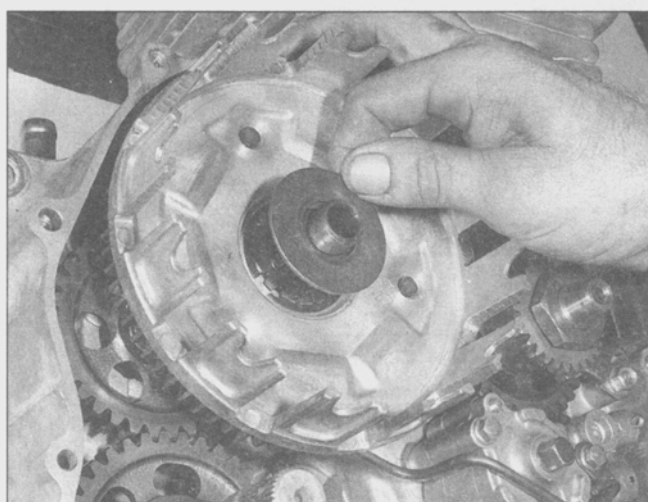


16.12f ... then unscrew the locknut and remove the washer; if there's an OUT SIDE mark on the washer, it faces away from the engine on installation

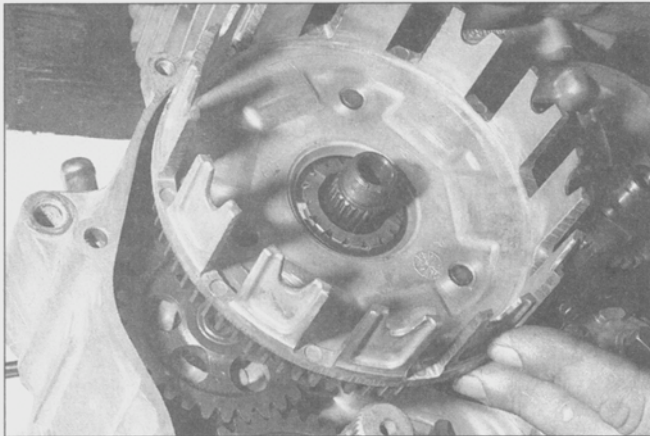
2



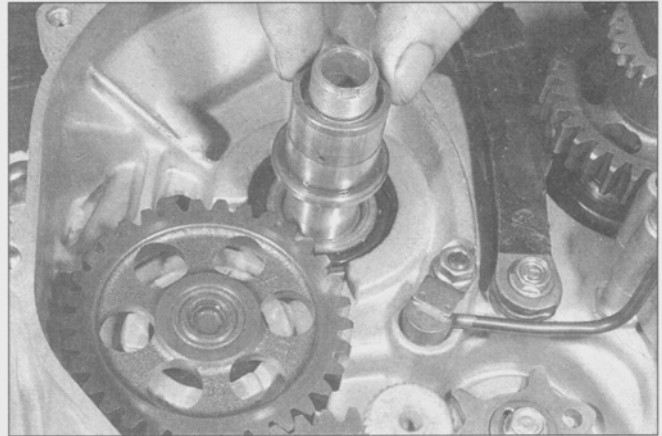
16.12g Pull off the clutch center ...



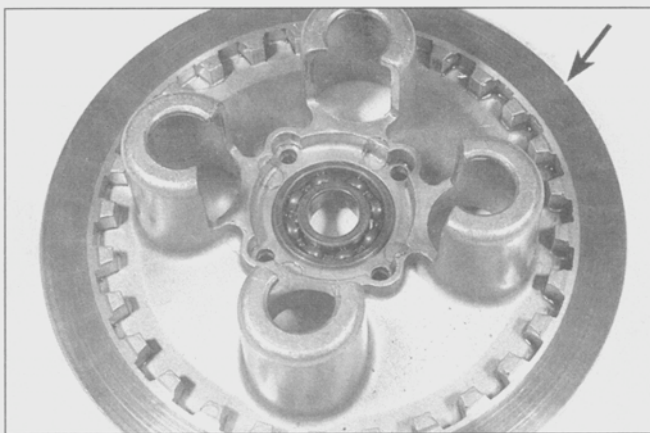
16.12h ... the thrust washer ...



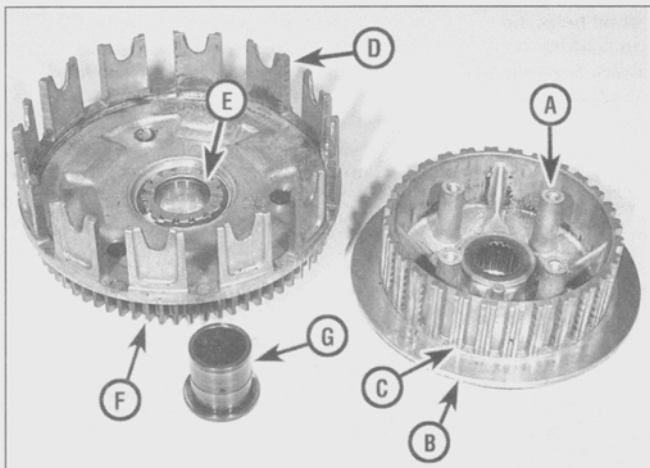
16.12i ... the clutch housing ...



16.12j ... and the clutch housing bushing



16.13 Check the ball bearing in the center of the pressure plate for roughness, looseness or noise; check the friction surface (arrow) for scoring



16.14 Clutch inspection points

- A Clutch center posts
- B Clutch center friction surface
- C Clutch center splines
- D Clutch housing slots
- E Clutch housing bushing surface
- F Driven gear
- G Clutch housing bushing

Inspection

Refer to illustrations 16.13, 16.14, 16.17, 16.18, 16.19, 16.21 and 16.22

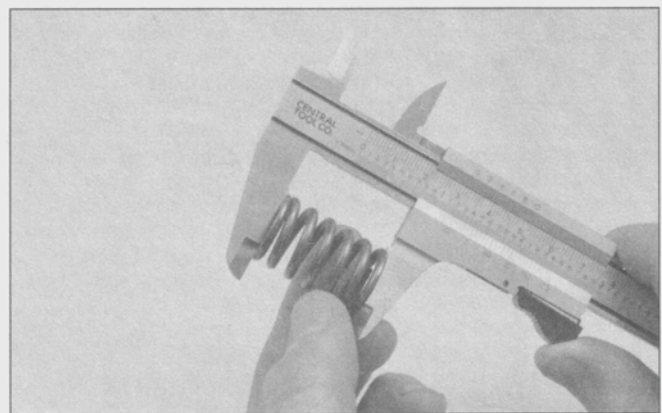
13 Check the friction surface on the pressure plate for scoring or wear (**see illustration**). Replace the pressure plate if any defects are found. Rotate the release bearing and check it for rough, loose or noisy operation. If the bearing's condition is in doubt, push it out of the pressure plate and push in a new one.

14 Check the edges of the slots in the clutch housing for indentations made by the friction plate tabs (**see illustration**). If the indentations are deep they can prevent clutch release, so the housing should be replaced with a new one. If the indentations can be removed easily with a file, the life of the housing can be prolonged to an extent. Also, check the driven gear teeth for cracks, chips and excessive wear and the springs on the back side (if equipped) for breakage. If the gear is worn or damaged or the springs are broken, the clutch housing must be replaced with a new one.

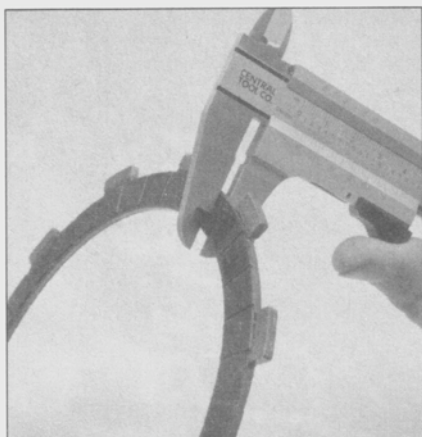
15 Check the bearing surface in the center of the clutch housing for score marks, scratches and excessive wear (**see illustration 16.14**). Measure the inside diameter of the bearing surface, the inside and outside diameters of the clutch housing bushing and the bushing's mounting surface on the transmission mainshaft. Compare these to the values listed in this Chapter's Specifications. Replace any parts worn beyond the service limits. If the bushing mounting surface is worn excessively, the mainshaft will have to be replaced.

16 Check the clutch center's friction surface and slots for scoring, wear and indentations (**see illustration 16.14**). Also check the splines in the middle of the clutch center. Replace the clutch center if problems are found.

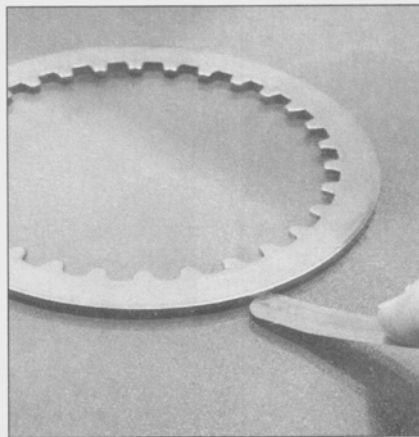
17 Measure the free length of the clutch springs (**see illustration**)



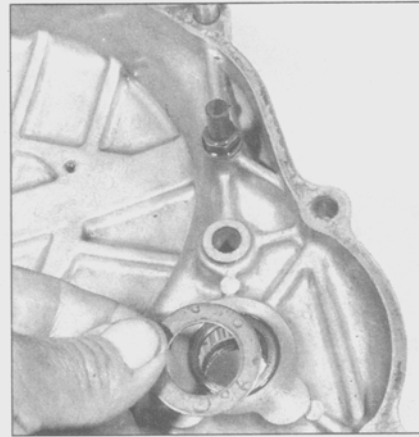
16.17 Measure the clutch spring free length



16.18 Measure the thickness of the friction plates



16.19 Check the metal plates for warpage



16.21 Remove the thrust washer and inspect the kickstarter shaft bearing

and compare the results to this Chapter's Specifications. If the springs have sagged, or if cracks are noted, replace them with new ones as a set.

18 If the lining material of the friction plates smells burnt or if it is glazed, new parts are required. If the metal clutch plates are scored or discolored, they must be replaced with new ones. Measure the thickness of the friction plates (**see illustration**) and replace with new parts any friction plates that are worn.

19 Lay the metal plates, one at a time, on a perfectly flat surface (such as a piece of plate glass) and check for warpage by trying to slip a feeler gauge between the flat surface and the plate (**see illustration**). The feeler gauge should be the same thickness as the maximum warp listed in this Chapter's Specifications. Do this at several places around the plate's circumference. If the feeler gauge can be slipped under the plate, it is warped and should be replaced with a new one.

20 Check the tabs on the friction plates for excessive wear and mushroomed edges. They can be cleaned up with a file if the deformation is not severe. Check the friction plates for warpage as described in Step 14.

21 Inside the right engine cover, remove the thrust washer (if it didn't stay on the kickstarter shaft) and check the kickstarter shaft needle bearing and seal (**see illustration**). Replace the seal if it has been leaking and replace the needle bearing if it's worn or damaged. If you're working on a bike equipped with a kickstarter decompressor cable, you'll need to remove the snap-ring, lifter lever, spring and lifter cam

(mounted inside the cover) for access to the seal.

22 Also inside the right engine cover, check the primary drive gear shaft seal for wear (**see illustration**). If necessary, remove the snap-ring and replace it. The oil passage O-ring should be replaced whenever the cover is removed (it may have come off with the cover or stayed on the oil pump sleeve).

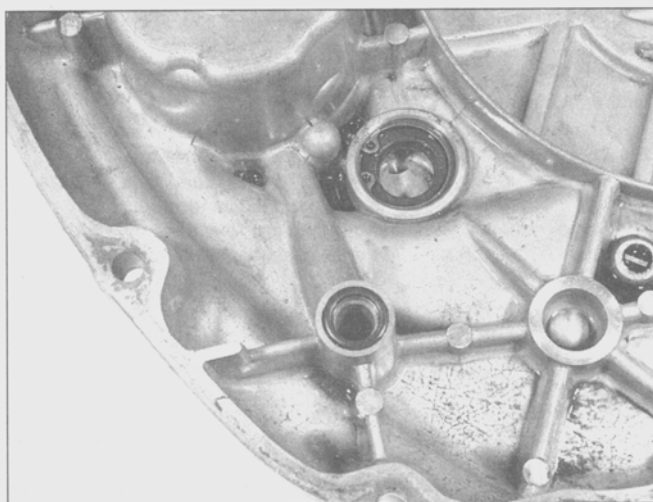
Installation

Refer to illustrations 16.23a and 16.23b

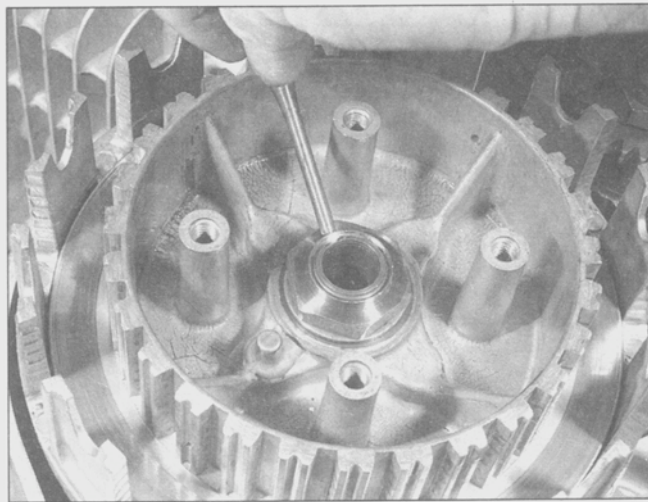
23 Installation is the reverse of the removal steps, with the following additions:

- If you're working on a 1983 or 1984 model, install the lockwasher with its **OUT SIDE** mark facing away from the engine, then install the clutch nut and tighten it to the torque listed in this Chapter's Specifications.
- If you're working on a 1985 through 1987 model, install a new lockwasher with its small round hole over the post on the clutch housing. Install the clutch nut and tighten it to the torque listed in this Chapter's Specifications, then bend a lockwasher tab up against one of the flats on the nut.
- If you're working on a 1988 or later model, install a new clutch nut and stake it into the notch on the mainshaft (**see illustration**).
- Coat the friction plates with clean engine oil before you install them.

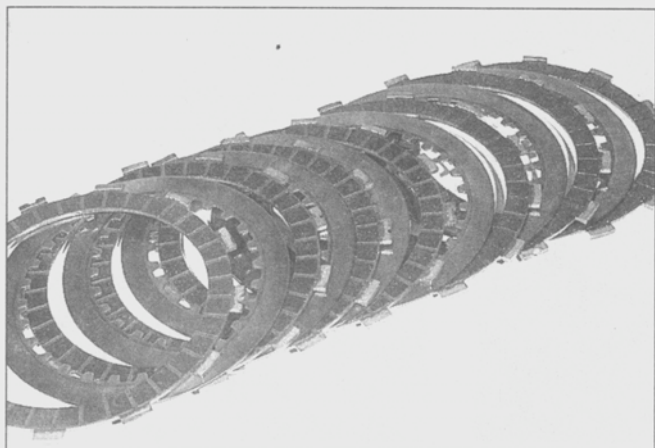
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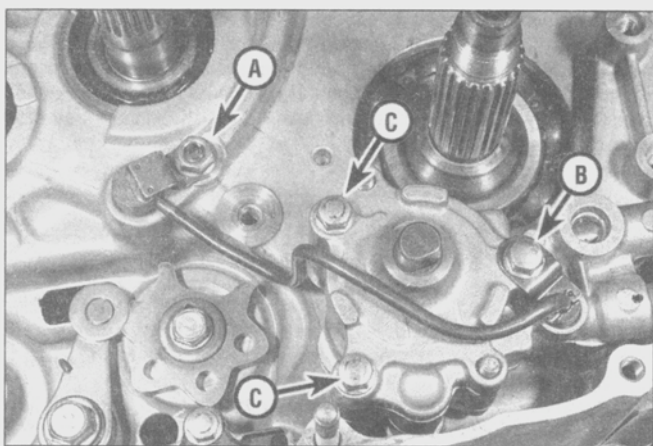
16.22 Inspect the seal for the primary drive gear shaft and replace the oil passage O-ring



16.23a Stake the locknut with a hammer and punch

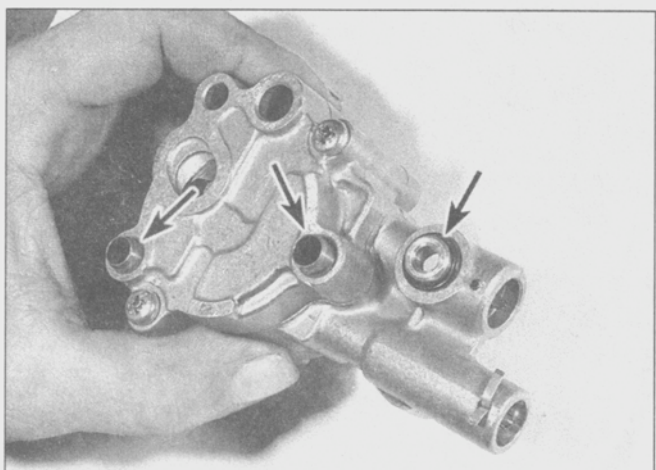


16.23b There's a metal plate between each pair of friction plates; friction plates go on first and last

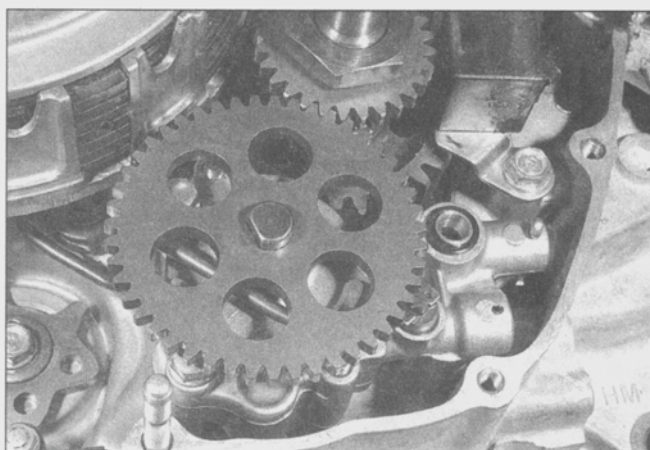


17.3a Remove the oil pipe nut (A) and bolt (B); the two remaining bolts (C) secure the oil pump to the crankcase

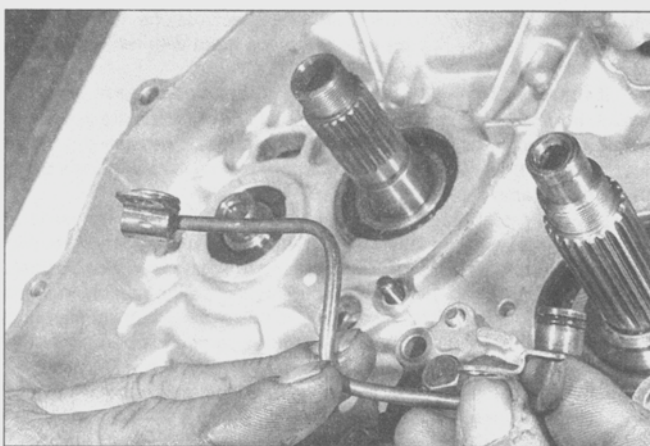
- e) Install a friction plate, then alternate the remaining metal and friction plates until they're all installed. Friction plates go on first and last, so the friction material contacts the metal surfaces of the clutch center and the pressure plate (see illustration).



17.4 Pull the oil pipe off the engine and locate the dowels (left arrows) and the sleeve and O-ring (right arrow)



17.2 Remove the oil pump gear



17.3b Work the fittings free of the engine and take the pipe off; there's an O-ring at each end that should be replaced whenever the pipe is removed

17 Oil pump and internal pipe - removal, inspection and installation

Note: The oil pump can be removed with the engine in the frame.

Removal

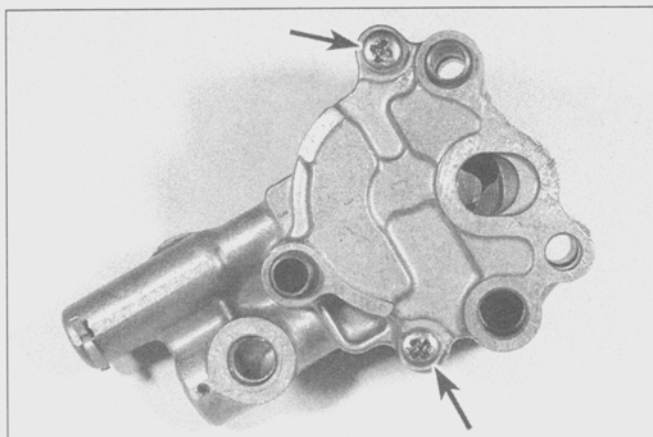
Refer to illustrations 17.2, 17.3a, 17.3b and 17.4

- 1 Remove the right engine cover and clutch (see Section 16).
- 2 Slide the oil pump gear off its shaft (see illustration).
- 3 Remove the oil pipe mounting nut and bolt and take the pipe off the engine, together with the O-rings (see illustrations).
- 4 Remove the two remaining mounting bolts, then pull the pump out of the engine and remove the sleeve and O-ring (see illustration). Note the locations of the two dowels.

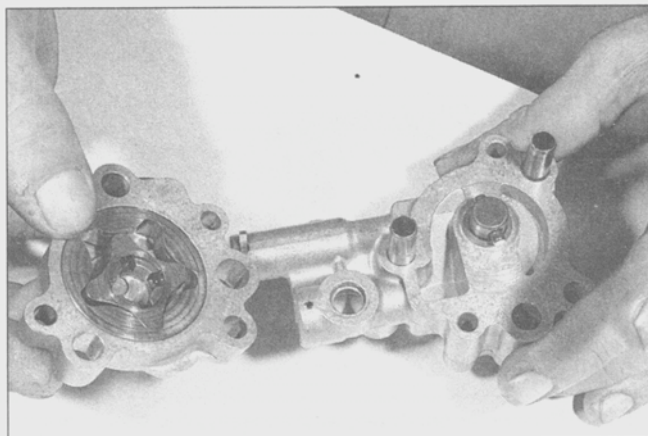
Inspection

Refer to illustrations 17.5a, 17.5b, 17.6a, 17.6b, 17.8a, 17.8b, 17.9 and 17.11

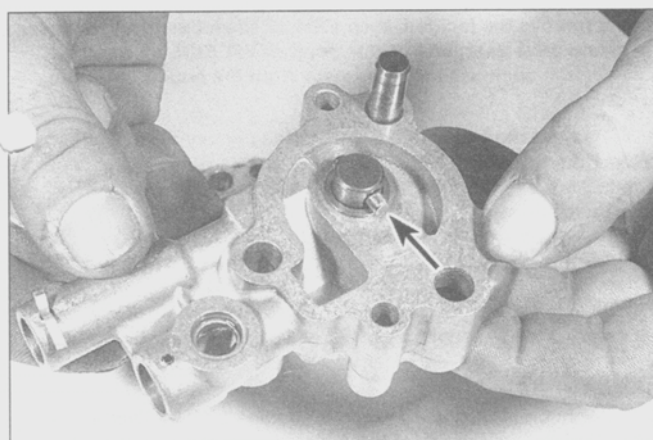
- 5 Remove the screws (1983 through 1992 models) or bolts (1993 and later models) and lift off the pump cover with its rotors (see illustrations).
- 6 Pull the drive pin and remove the washer and shaft, then remove the remaining set of rotors (see illustrations).
- 7 Wash all the components in solvent, then dry them off. Check the pump body, the rotors, the drive gear and the covers for scoring and



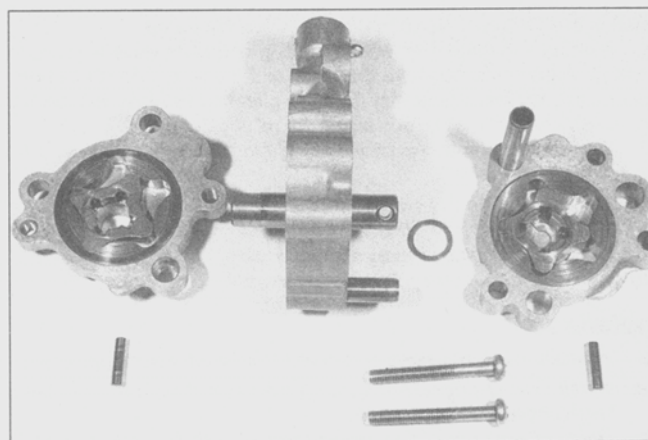
17.5a Remove the oil pump cover screws (arrows) . . .



17.5b . . . then lift off the housing and scavenge rotors



17.6a Push out the drive pin (arrow) and remove the washer . . .



17.6b . . . then remove the remaining housing and rotors

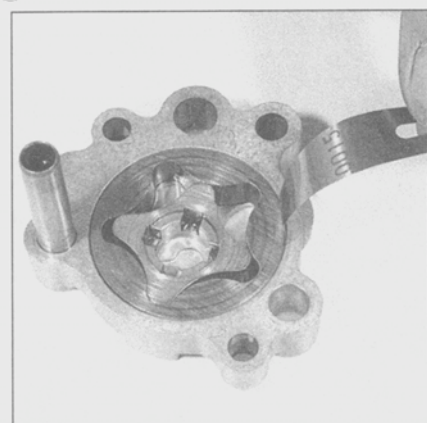
wear. If any damage or uneven or excessive wear is evident, replace the pump. If you are rebuilding the engine, it's a good idea to install a new oil pump.

8 Place the rotors in the pump body. Measure the clearance between the outer rotor and body, and between the inner and outer rotors, with a feeler gauge (see illustrations). If any of the clearances are beyond the limits listed in this Chapter's Specifications, replace the pump.

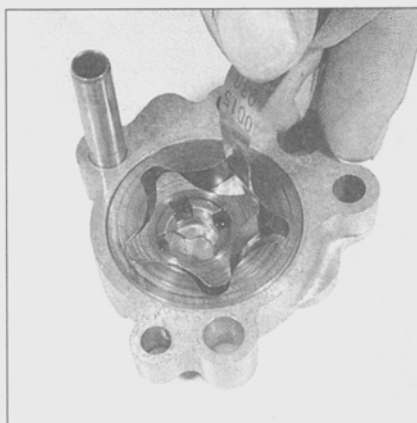
9 Place a straightedge across the outer pump body and rotors and measure the gap with a feeler gauge (see illustration). If the clearance is beyond the limits listed in this Chapter's Specifications, replace the pump.

10 To check the end clearance of the inner rotors and pump, you'll need some Plastigage. Place the rotors in the pump. Cut a strip of Plastigage, lay it across the rotors, then install the pump cover and tighten the screws or bolts. Remove the screws or bolts, lift off the

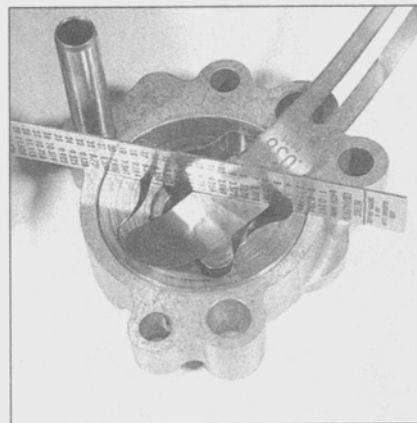
2



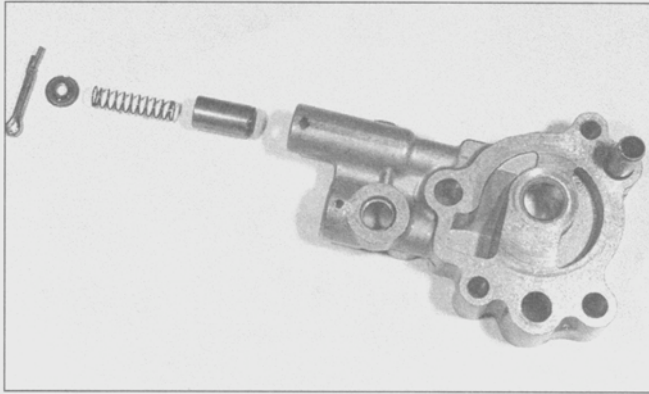
17.8a Measure the clearance between the outer rotor and body . . .



17.8b . . . between the inner and outer rotors . . .



17.9 . . . and between the thin rotors and a straightedge laid across the pump body



17.11 Remove the cotter pin, washer, spring and check valve

cover, and measure the width of the crushed Plastigage with the scale on the envelope it comes in. If the end clearance is beyond the limit listed in this Chapter's Specifications, replace the pump.

11 Remove the cotter pin, washer, spring and relief valve (**see illustration**). If any of the parts are damaged or if the relief valve or its bore are scored, replace the pump. If you're planning to reuse the pump, use a new cotter pin when you install the relief valve.

12 Reassemble the pump by reversing the disassembly steps, with the following additions:

- a) Before installing the covers, pack the cavities between the rotors with petroleum jelly - this will ensure the pump develops suction quickly and begins oil circulation as soon as the engine is started.
- b) Tighten the cover screws or bolts securely.

Installation

13 Installation is the reverse of removal, with the following additions:

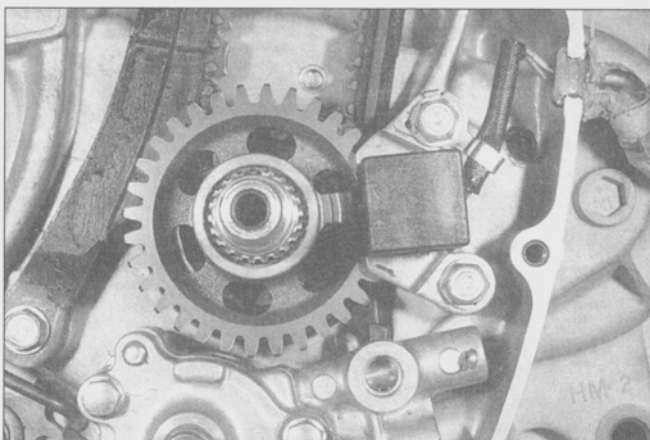
- a) Install new O-rings on the pump sleeve and pipe fittings (**see illustration 17.3b and 17.4**).
- b) Tighten the oil pump mounting screws or bolts securely, but don't overtighten them.

18 Primary drive gear and camshaft sprocket - removal, inspection and installation

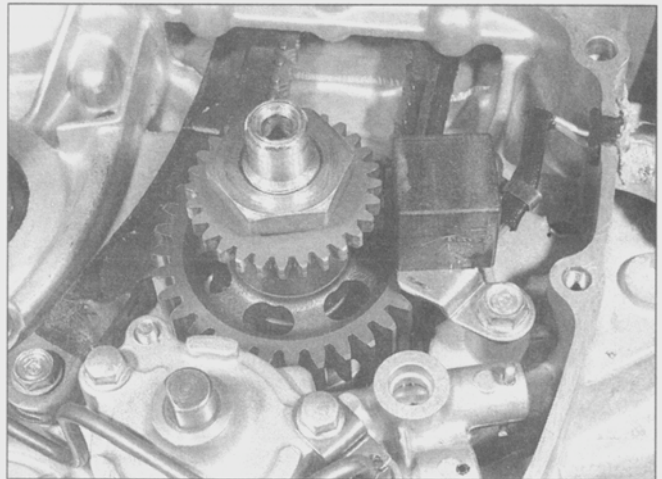
Removal

Refer to illustrations 18.2, 18.4, 18.5a and 18.5b

1 Remove the oil pump (see Section 17).



18.4 Remove the pulse generator rotor and the pulse generator



18.2 Wedge a rag between the primary drive and driven gears and remove the locknut, then slide off the lockwasher and oil pump drive gear; on installation, the OUT SIDE mark on the lockwasher faces away from the engine

- 2 Wedge a rag between the teeth of the primary drive gear and the primary driven gear on the clutch housing. Unscrew the primary drive gear locknut, then remove the lockwasher and the oil pump drive gear (**see illustrations**).
- 3 Remove the clutch (see Section 16).
- 4 Remove the pulse generator rotor and the pulse generator (**see illustration**).
- 5 Slide the primary drive gear off the crankshaft (**see illustration**). If necessary, slide the camshaft sprocket off as well (**see illustration**).

Inspection

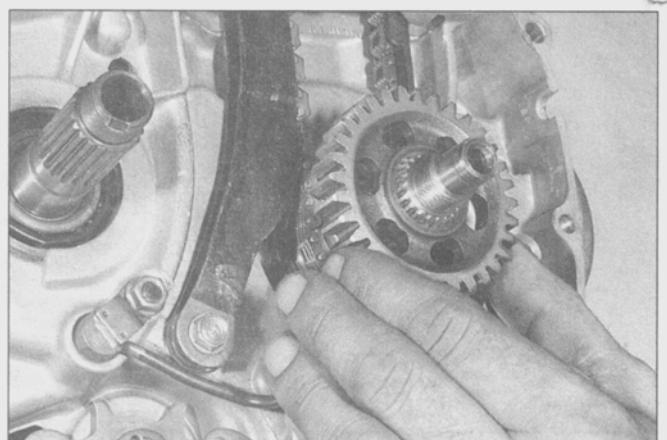
6 Check the drive gear for obvious damage such as chipped or broken teeth. Replace it if any of these problems are found.

Installation

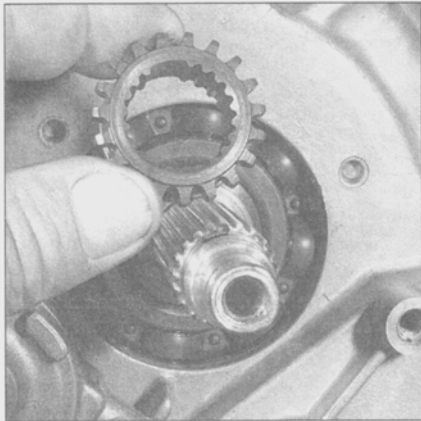
Refer to illustration 18.7

7 Installation is the reverse of the removal steps, with the following additions:

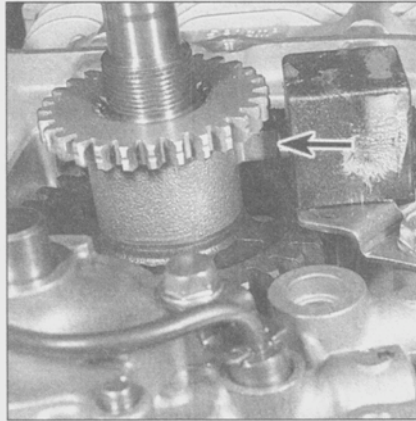
- a) The wide spline on the crankshaft aligns with a wide groove on the primary drive gear and pulse generator rotor so they can only be installed one way.
- b) Install the pulse generator rotor with its tab outward (away from the engine) (**see illustration**).



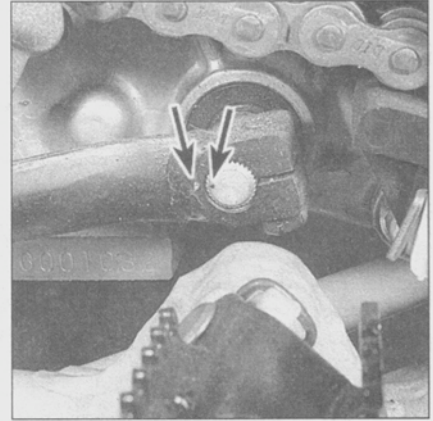
18.5a Slide the primary drive gear off



18.5b Slide off the cam chain sprocket; the wide notch in the sprocket aligns with a wide spline on the crankshaft



18.7 The tab on the pulse generator rotor faces away from the engine (arrow)



19.1 If you don't see a punch mark on the pedal and the end of the spindle, make your own (arrows)

- c) Install the lockwasher with its **OUT SIDE** mark away from the engine.
- d) Tighten the locknut to the torque listed in this Chapter's Specifications.

19 External shift mechanism - removal, inspection and installation

Shift pedal

Removal

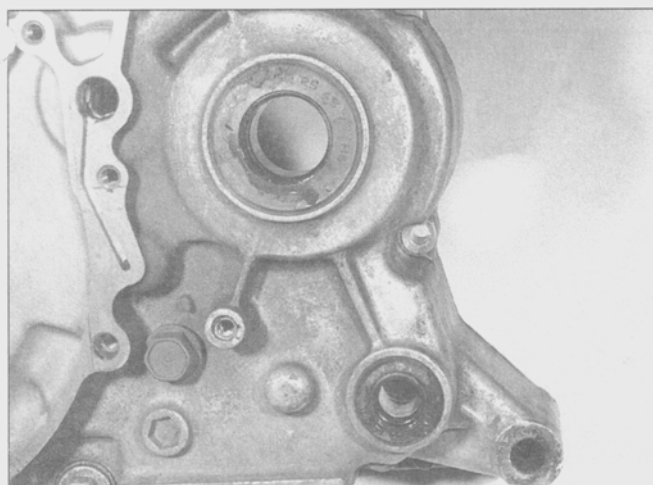
Refer to illustration 19.1

- 1 Look for alignment marks on the end of the shift pedal and shift shaft (**see illustration**). If they aren't visible, make your own marks with a sharp punch.
- 2 Remove the shift pedal pinch bolt and slide the pedal off the shaft.

Inspection

Refer to illustration 19.4

- 3 Check the shift pedal for wear or damage such as bending. Check the splines on the shift pedal and shaft for stripping or step wear. Replace the pedal or shaft if these problems are found.



19.4 The smaller seal in the left engine cover is for the shift shaft; the other is for the transmission countershaft

- 4 Check the shift shaft seal for signs of oil leakage (**see illustration**). If it has been leaking, refer to Chapter 4 and remove the left engine cover. Pry the seal out of the cover and install a new one. You may be able to push the seal in with your thumbs; if not, tap it in with a hammer and block of wood or a socket the same diameter as the seal.

Installation

- 5 Line up the punch marks, install the shift pedal and tighten the pinch bolt securely.

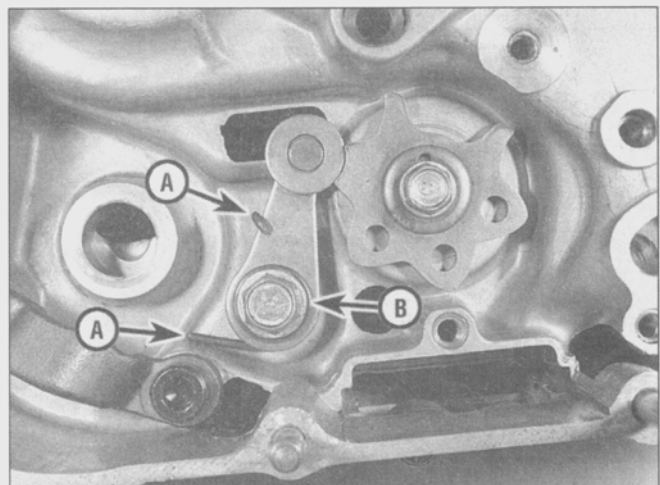
External shift linkage

- 6 Shift linkage components accessible without splitting the crankcase include the stopper plate and cam plate.

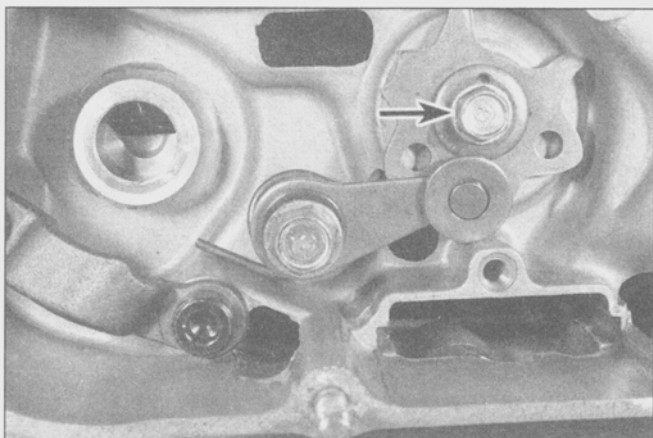
Removal

Refer to illustrations 19.9a and 19.9b

- 7 Remove the shift pedal as described above.
- 8 Remove the clutch (Section 16).
- 9 Note how the stopper arm spring presses against the case and hooks around the stopper arm (**see illustration**). Pull the stopper arm away from the shift drum cam, then loosen the stopper arm bolt and release the spring tension (**see illustration**). Remove the bolt and take the stopper arm and spring off the crankcase.
- 10 Remove the bolt from the shift drum cam and take the cam off the drum (**see illustration 19.9b**).



19.9a Note how the ends of the spring are positioned (A), then loosen the stopper arm bolt (B) . . .



19.9b . . . release the spring tension and remove the bolt; the shift drum cam bolt (arrow) can then be removed

Inspection

11 Check all parts for visible wear or damage and replace any parts that show problems.

Installation

12 Position the shift drum cam on the shift drum, aligning the hole in the back of the cam with the pin on the shift drum. Apply non-permanent thread locking agent to the threads of the bolt, then tighten it to the torque listed in this Chapter's Specifications.

13 Position the spring on the stopper arm, then install the stopper arm on the engine and tighten its bolt loosely (**see illustration 19.9b**). Pull up the stopper arm and engage its roller end with the neutral notch in the shift drum cam (**see illustration 19.9a**). Tighten the bolt to the torque listed in this Chapter's Specifications.

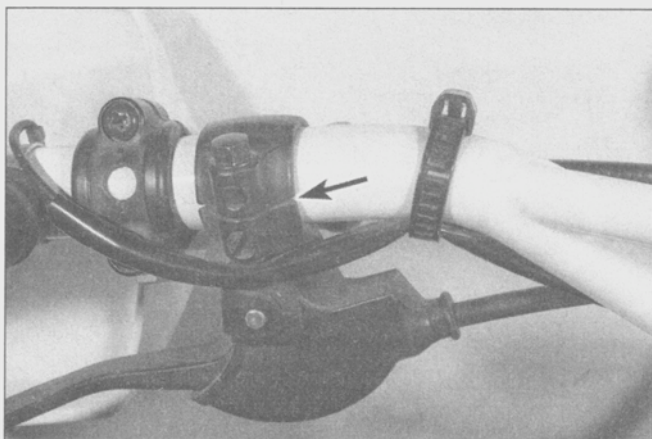
14 The remainder of installation is the reverse of the removal steps.

15 Check the engine oil level and add some, if necessary (see Chapter 1).

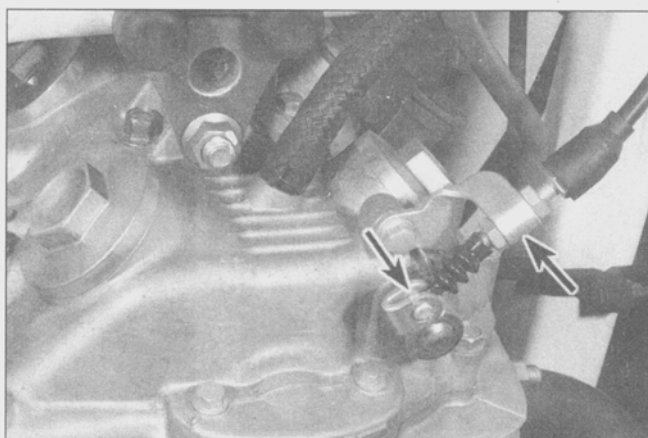
20 Decompressor lever and cable - removal and installation

Refer to illustrations 20.1 and 20.2

1 At the engine, loosen the cable locknuts and slip the cable out of the bracket (**see illustration**). Turn the cable end to align the cable



20.2 The decompressor lever is secured to the handlebar by a clamp; on installation, align the split in the clamp with the punch mark on the handlebar (arrow)



20.1 Loosen the locknuts and slip the cable out of the bracket (right arrow), then rotate the cable to align it with the slot in the lever (left arrow) and slide it sideways out of the lever

with the groove in the decompression lever, then slip it sideways out of the lever.

2 At the left handlebar, loosen the pinch bolt on the decompressor lever (**see illustration**). Slide the lever toward the center of the bike to create slack in the cable. Pull back the rubber boot, rotate the cable to align it with the slot in the lever and detach the cable from the lever.

3 Note carefully how the cable is routed and detach it from any retainers.

4 Installation is the reverse of the removal steps, with the following additions:

- Align the punch mark on the handlebar with the parting line of the decompressor lever bracket (**see illustration 20.2**).
- Adjust the decompressor lever freeplay (see Chapter 1).

21 Kickstarter - removal, inspection and installation

Removal

Pedal

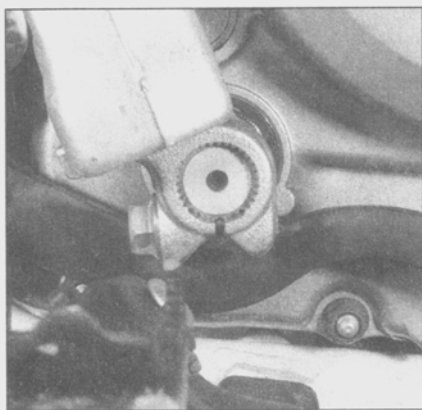
Refer to illustrations 21.2 and 21.3

1 The kickstarter pedal is accessible from outside the engine. The kickstarter mechanism can be reached by removing the right engine cover (Section 16).

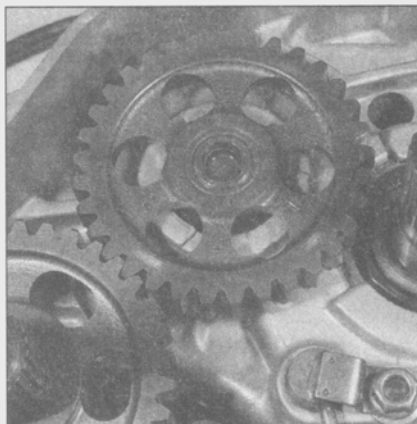
2 To remove the pedal from the shaft, remove its mounting screw



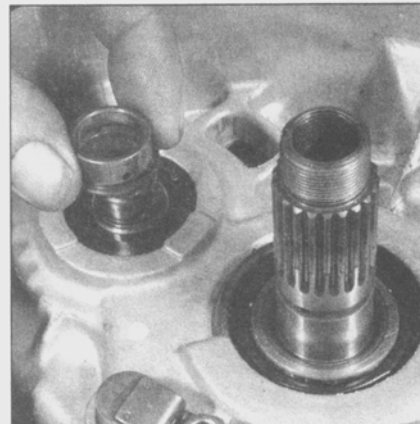
21.2 The pedal is secured to the lever by a screw



21.3 Look for alignment marks on the pedal and shaft; if you don't see them, make a punch mark on the end of the shaft that aligns with the slit in the pedal



21.5a With the clutch removed, the kickstarter idler gear can be pulled off its shaft . . .



21.5b . . . followed by the bushing

and slip the pedal off (see illustration).

3 Look for a punch mark on the end of the kickstarter spindle (see illustration). If you can't see one, make your own to align with the slit in the pedal shaft. Loosen the pinch bolt and slide the pedal off the spindle.

Kickstarter mechanism

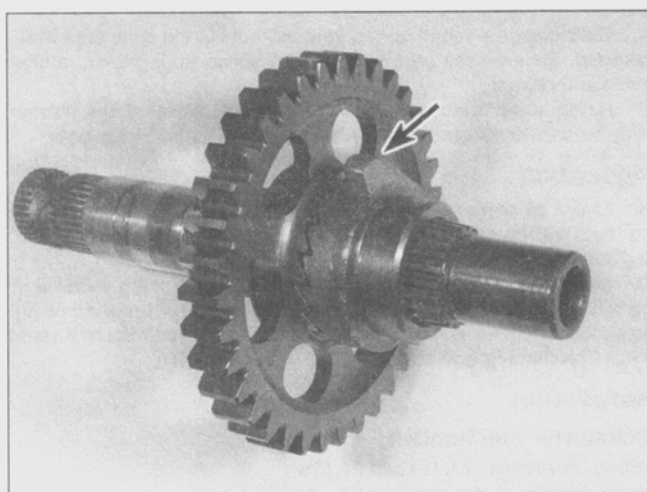
Refer to illustrations 21.5a, 21.5b, 21.6a, 21.6b, 21.7, 21.8, 21.9a, 21.9b and 21.10

4 Remove the kickstarter pedal (see Step 3 above) and the right engine cover (see Section 16). If you're planning to remove the kickstarter idler gear, you'll need to remove the clutch (Section 16).

5 Slide the kickstarter idler gear off its shaft, then remove its bushing (see illustrations).

6 Slip the kickstarter pedal back onto the shaft. Turn the pedal counterclockwise until the ratchet pawl clears the guide, then pull the kickstarter out of the engine (see illustrations). Pull the kickstarter out until the pawl clears the guide, then slowly release the spring tension and pull the pedal off the shaft.

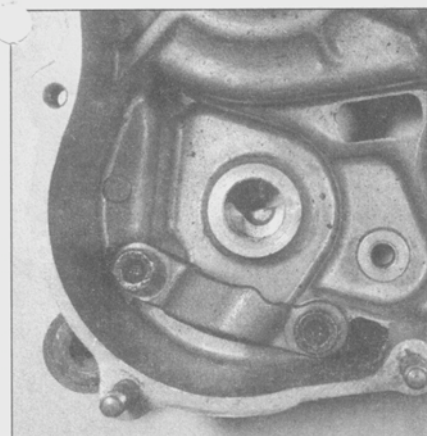
7 If the thrust washer for the needle bearing in the right engine cover didn't come off the cover, remove it from the kickstarter shaft (see illustration). If you're working on an XL600R, remove the decompressor cam, cam spring, spring seat and snap-ring, carefully noting how the parts are arranged. If you're working on an XR600R, note the position of the remaining washer; it can be removed now or left where



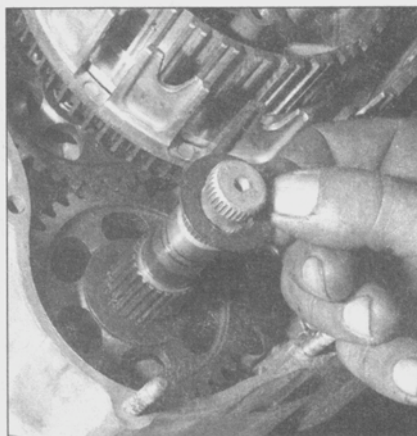
21.6a Turn the kickstarter so the tab (arrow) . . .

it is for the time being.

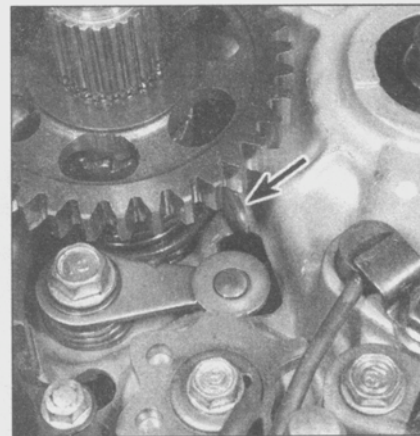
8 Unhook the return spring from its lug on the crankcase casting and pull the kickstarter assembly out of the engine (see illustration).



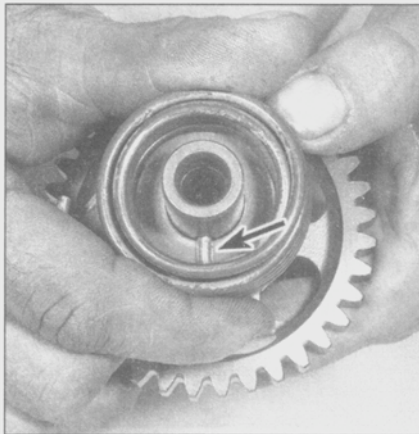
21.6b . . . clears the guide on the crankcase (kickstarter removed for clarity)



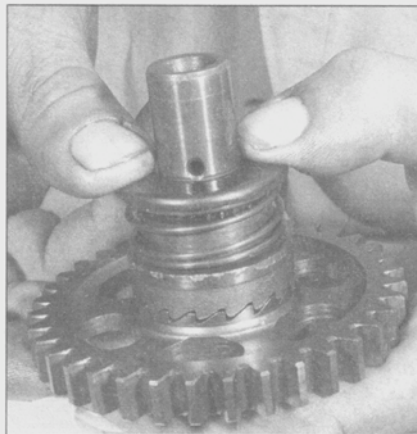
21.7 Slide the washer off the shaft; on installation, its OUT SIDE mark faces away from the engine



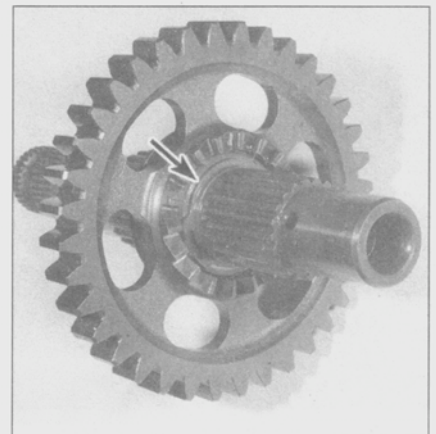
21.8 The return spring hooks into the crankcase (arrow)



21.9a The straight end of the return spring (arrow) . . .



21.9b . . . fits into this hole in the shaft



21.10 Remove the snap-ring (arrow), washer or bushing and the kickstarter gear from the shaft

9 Disengage the return spring from the hole in the shaft (see illustrations). Slide off the return spring and collar, spring seat, ratchet spring and ratchet.

10 Remove the snap-ring (see illustration). Slide off the washer (early models) or flange bushing (later models) and the pinion gear.

Inspection

11 Check all parts for wear or damage, paying special attention to the teeth on the ratchet and the matching teeth on the pinion gear. Replace worn or damaged parts.

12 Measure the inside diameter of the pinion gear (early models) or the bushing (later models) and the outside diameter of the shaft where the pinion rides. Replace any parts that are worn beyond the limit listed in this Chapter's Specifications.

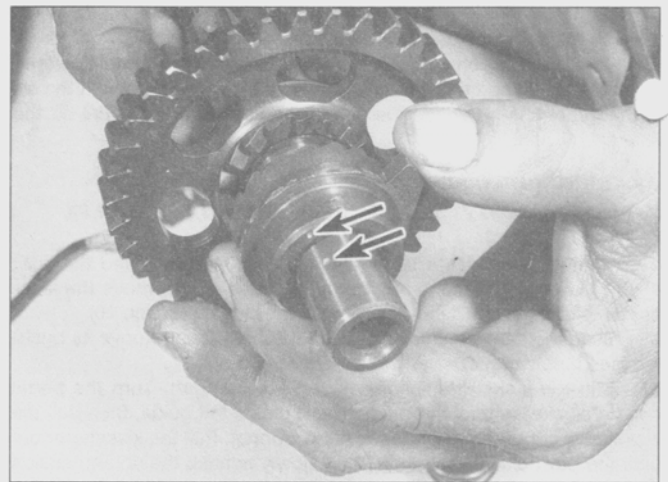
Installation

Kickstarter mechanism

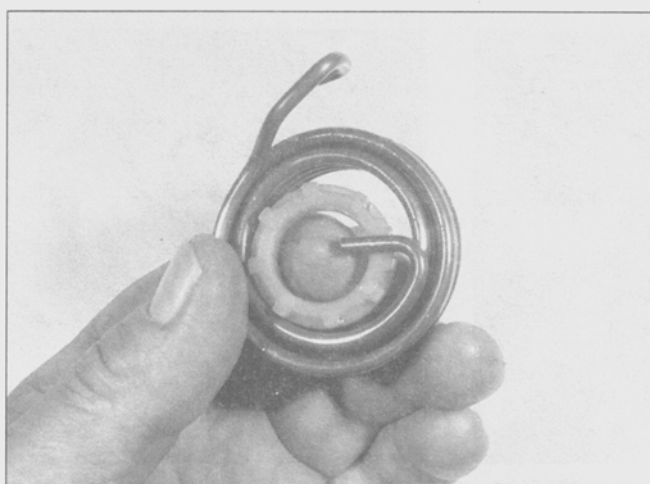
Refer to illustrations 21.13a and 21.13b

13 Installation is the reverse of the removal steps, with the following additions:

- Use a new snap-ring (two new snap-rings on XL600R models).
- Align the punch marks on the ratchet and shaft (see illustration).
- Place the end of the return spring in the notch of the collar (see illustration).



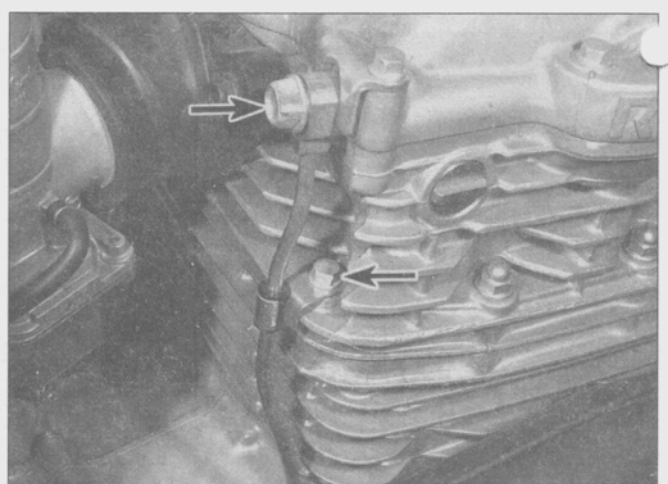
21.13a Align the punch marks on the shaft and ratchet (arrows)



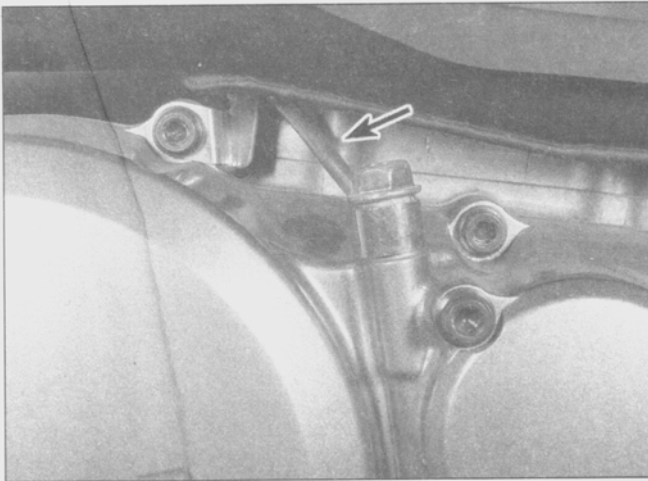
21.13b The straight end of the return spring fits into this notch in the collar

Pedal

14 Slip the pedal onto the kickstarter spindle, aligning the marks. Install the pinch bolt and tighten it securely.



22.1 At the upper end of the pipe, remove the union bolt and sealing washers (upper arrow) and the bracket (lower arrow) . . .



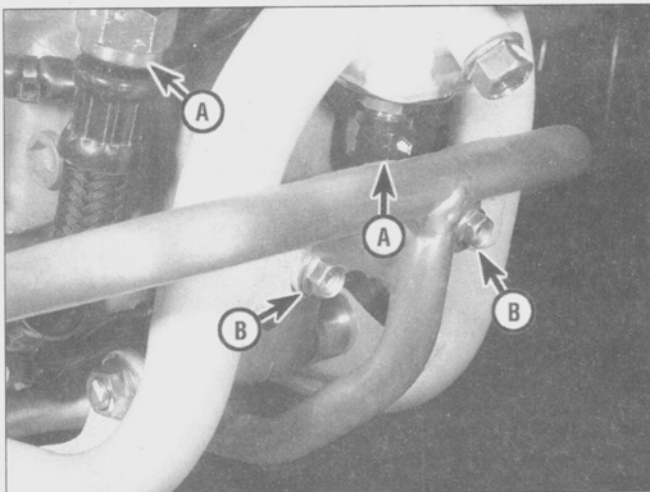
22.3 ... and at the lower end of the pipe, remove the union bolt - on installation, use new sealing washers on both union bolts and place the lower end of the pipe against the stop on the crankcase (arrow); this prevents the pipe from being twisted when the union bolt is tightened

22 External oil line and hoses - removal and installation

Refer to illustrations 22.1 and 22.3

External oil line

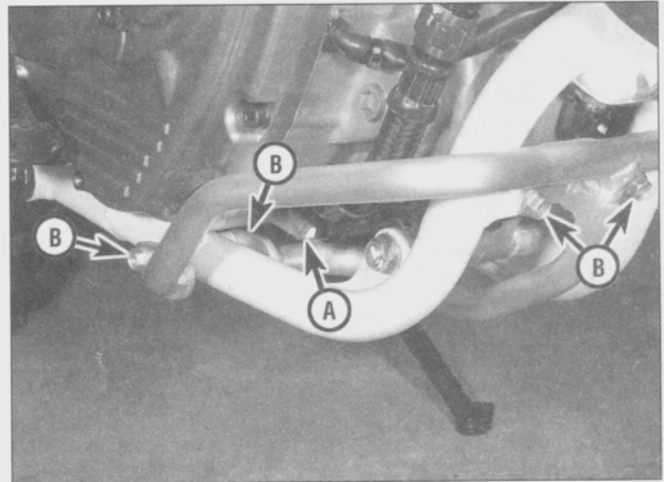
- 1 Loosen the union bolt at the upper rear corner of the cylinder head (see illustration). Unbolt the retainer, then remove the union bolt and its two sealing washers.
- 2 Unbolt the bracket from the cylinder head (see illustration 22.1).
- 3 Follow the oil line to the lower union bolt, then remove the bolt and its two sealing washers (see illustration). Lift the oil line off the engine.
- 4 Installation is the reverse of the removal steps, with the following additions:
 - a) Install the light-colored union bolt (with the small oil hole) at the upper end of the oil line. Install the dark-colored union bolt (with the large oil hole) at the lower end of the oil line.
 - b) Use a new sealing washer on each side of the union bolt fittings.



22.8 Unscrew the fittings to detach the upper ends of the oil hoses

A Oil hose fittings

B Skid bar bolts



22.7 The oil hose retaining plate is at the right front corner of the crankcase

A Oil hose retaining plate

B Skid bar bolts

- c) Tighten the union bolts to the torque listed in this Chapter's Specifications.

Oil hoses

Refer to illustrations 22.7 and 22.8

- 5 There are two oil hoses connected to the lower front of the engine. The shorter hose is the inlet from the oil reservoir (in the upper frame member) to the engine. The longer hose returns oil from the engine to the oil tank.
- 6 Drain the engine oil (see Chapter 1).
- 7 Unbolt the hose mounting plate at the crankcase (see illustration). Pull out the two hoses and their O-rings.
- 8 Unscrew the fitting at the upper end of each hose from the frame (see illustration).
- 9 Installation is the reverse of the removal steps, with the following addition:
 - a) Use new O-rings at the lower ends of the hoses.
 - b) Tighten the nuts at the upper ends of the hoses to the torque listed in this Chapter's Specifications.

2

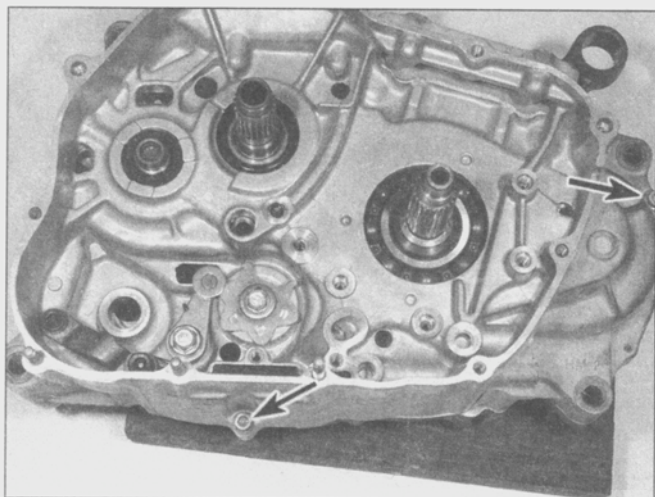
23 Crankcase - disassembly and reassembly

- 1 To examine and repair or replace the crankshaft, connecting rod, balancer, bearings and transmission components, the crankcase must be split into two parts.

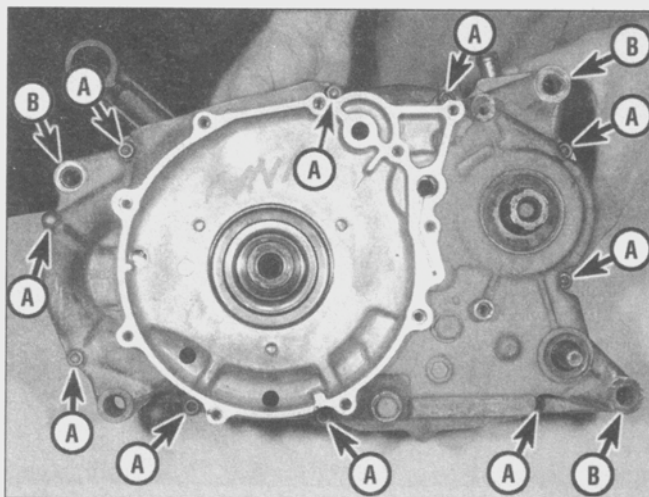
Disassembly

Refer to illustrations 23.11a, 23.11b and 23.12

- 2 Remove the engine from the motorcycle (see Section 5).
- 3 Remove the carburetor (see Chapter 3).
- 4 Remove the alternator rotor (see Chapter 4).
- 5 Remove the clutch (see Section 16).
- 6 Remove the external shift mechanism (see Section 19).
- 7 Remove the oil pump (see Section 17).
- 8 Remove the cylinder head cover, cam chain tensioner, camshaft, cylinder head, cylinder, cam chain, chain guides and piston (see Sections 7, 8, 9, 10, 13 and 14).
- 9 Remove the kickstarter (see Section 21).
- 10 Check carefully to make sure there aren't any remaining components that attach the halves of the crankcase together.



23.11a Remove two bolts from the right side of the crankcase (arrows) ...



23.11b ... and remove the remaining bolts from the left side

A Crankcase bolts

B Dowel locations

11 Loosen the crankcase bolts in the right side of the crankcase evenly in two or three stages, then remove them (see illustration). Do the same to remove the bolts from the other side of the crankcase (see illustration).

12 Place the crankcase with its left side down on a pair of wood blocks so the shift pedal shaft and transmission countershaft can extend downward. Carefully pry the crankcase apart and lift the right half off the left half (see illustration). Don't pry against the mating surfaces or they'll develop leaks.

13 Locate the three crankcase dowels (see illustration 23.11b).

14 Refer to Sections 24 through 27 for information on the internal components of the crankcase.

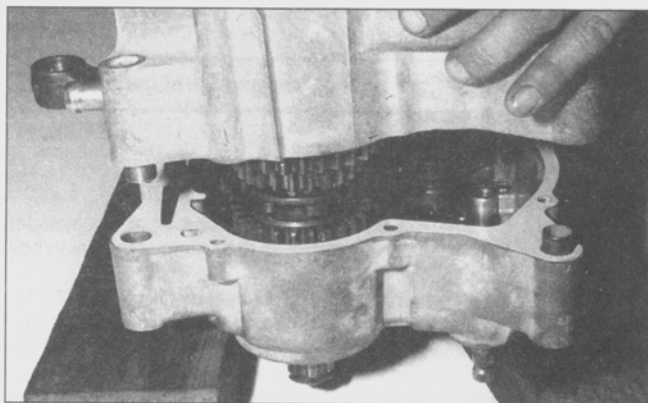
Reassembly

Refer to illustrations 23.18a and 23.18b

15 Remove all traces of old gasket and sealant from the crankcase mating surfaces with a sharpening stone or similar tool. Be careful not to let any fall into the case as this is done and be careful not to damage the mating surfaces.

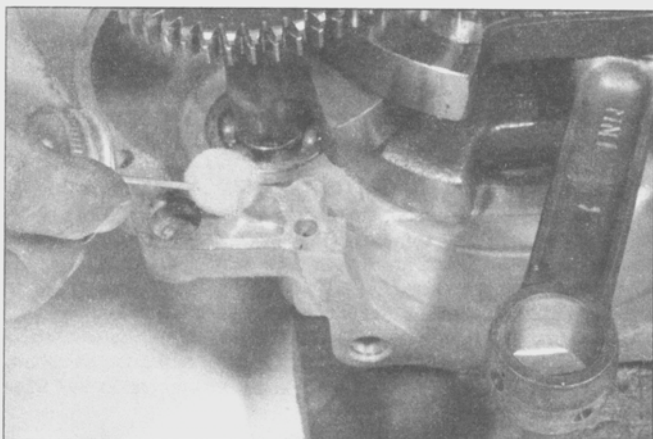
16 Check to make sure the three dowel pins are in place in their holes in the mating surface of the left crankcase half (see illustration 23.11b).

17 Pour some engine oil over the transmission and balancer gears, the right crankshaft bearing and the shift drum. Don't get any oil on the crankcase mating surface.

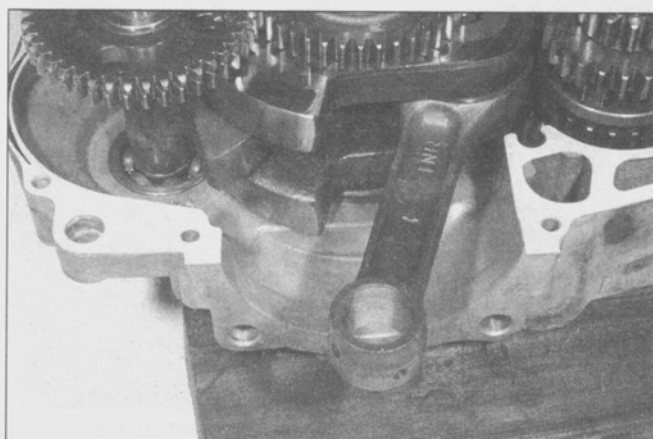


23.12 Support the crankcase on wood blocks so it isn't resting on the shift or transmission shafts, then lift the right case half off the left half

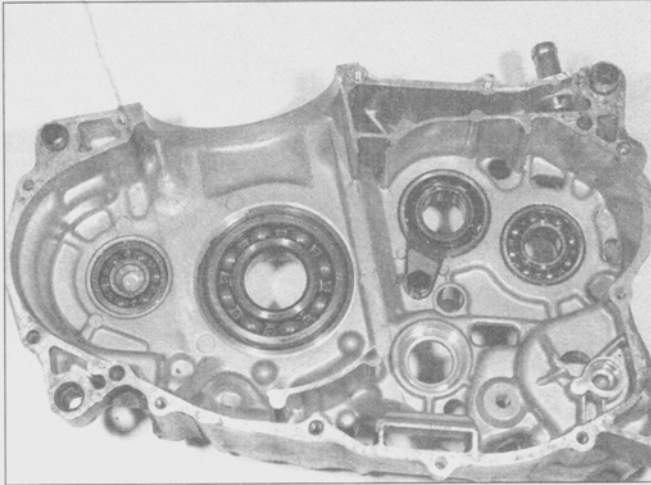
18 Coat the crankcase mating surface with Gaskacinch or equivalent sealant, then install a new gasket on the crankcase mating surface (see illustrations). Cut out the portion of the gasket that crosses the cylinder opening.



23.18a Coat the mating surfaces with sealant ...



23.18b ... then install the gasket (cut away the portion that spans the cylinder opening)



24.3a Check the bearings in the right case half for roughness, looseness or noise

19 Carefully place the right crankcase half onto the left crankcase half. While doing this, make sure the transmission shafts, shift drum, crankshaft and balancer fit into their bearings in the right crankcase half.

20 Install the crankcase bolts and tighten them so they are just snug. Then tighten them evenly in two or three stages to the torque listed in this Chapter's Specifications.

21 Turn the transmission mainshaft to make sure it turns freely. Also make sure the crankshaft turns freely.

22 The remainder of assembly is the reverse of disassembly.

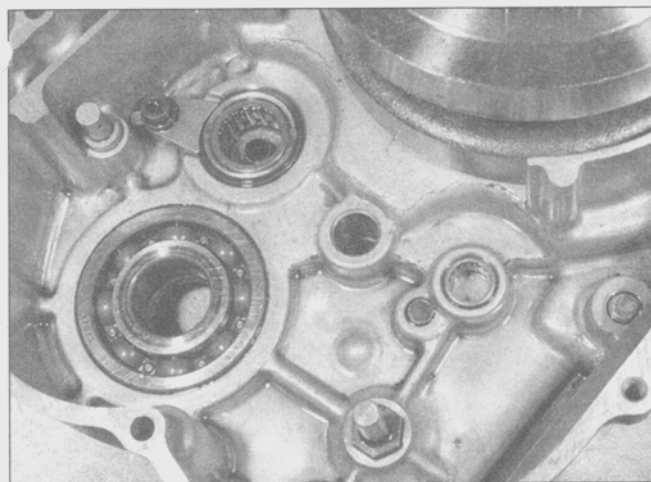
24 Crankcase components - inspection and servicing

Refer to illustrations 24.3a, 24.3b, 24.3c and 24.3d

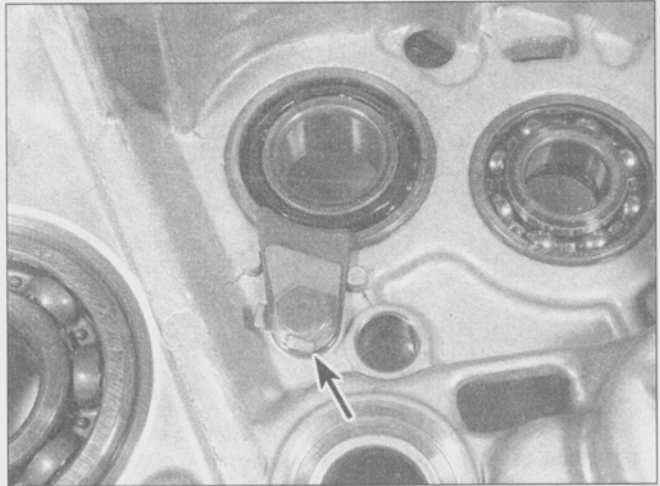
1 Separate the crankcase and remove the following:

- a) Balancer
- b) Transmission shafts and gears
- c) Crankshaft
- d) Shift drum and forks

2 Clean the crankcase halves thoroughly with new solvent and dry them with compressed air. All oil passages should be blown out with



24.3c The left half contains needle roller bearings (one held by a retainer), as well as ball bearings for the transmission, crankshaft and balancer



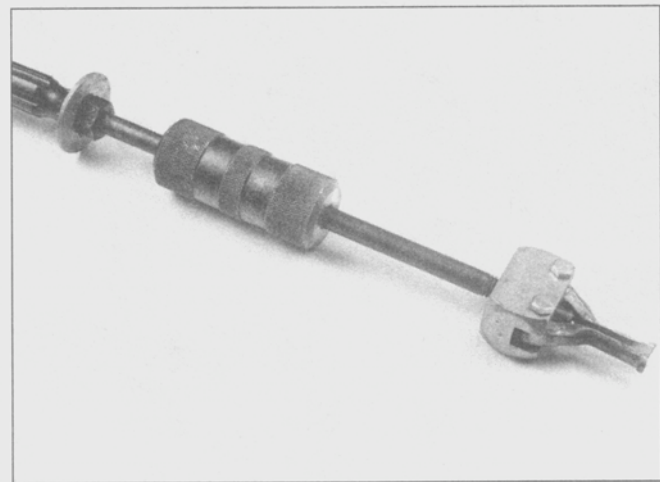
24.3b To remove the retainer, bend back its lockwasher tab (arrow) and unscrew the bolt

compressed air and all traces of old gasket should be removed from the mating surfaces. **Caution:** Be very careful not to nick or gouge the crankcase mating surfaces or leaks will result. Check both crankcase halves very carefully for cracks and other damage.

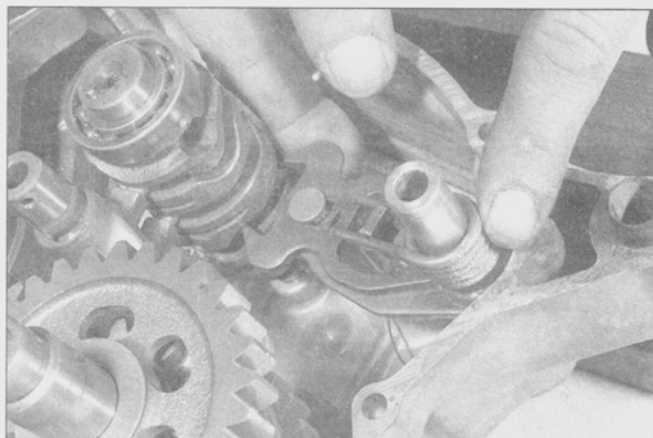
3 Check the bearings in the case halves (see illustrations). For details of the transmission and balancer bearings in the left side of the crankcase, see Sections 26 and 27. If the bearings don't turn smoothly, replace them. For bearings which aren't accessible from the outside, a blind hole puller will be needed for removal (see illustration). Drive the remaining bearing out with a bearing driver or a socket having an outside diameter slightly smaller than that of the bearing outer race. Before installing the bearings, allow them to sit in the freezer overnight, and about fifteen minutes before installation, place the case half in an oven, set to about 200-degrees F, and allow it to heat up. The bearings are an interference fit, and this will ease installation. **Warning:** Before heating the case, wash it thoroughly with soap and water so no explosive fumes are present. Also, don't use a flame to heat the case. Install the ball bearings with a socket or bearing driver that bears against the bearing outer race.

4 If any damage is found that can't be repaired, replace the crankcase halves as a set.

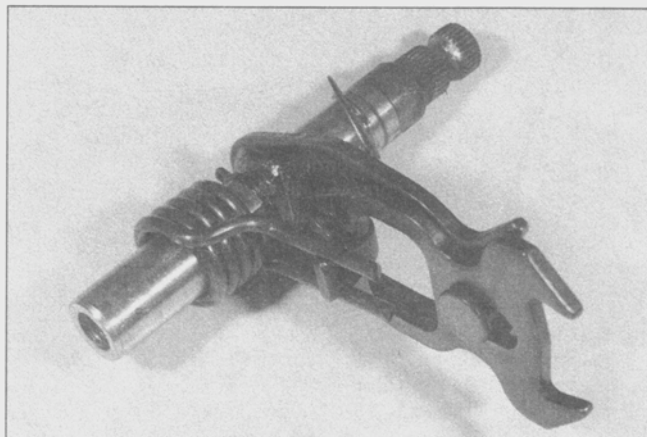
5 Assemble the case halves (see Section 23) and check to make sure the crankshaft and the transmission shafts turn freely.



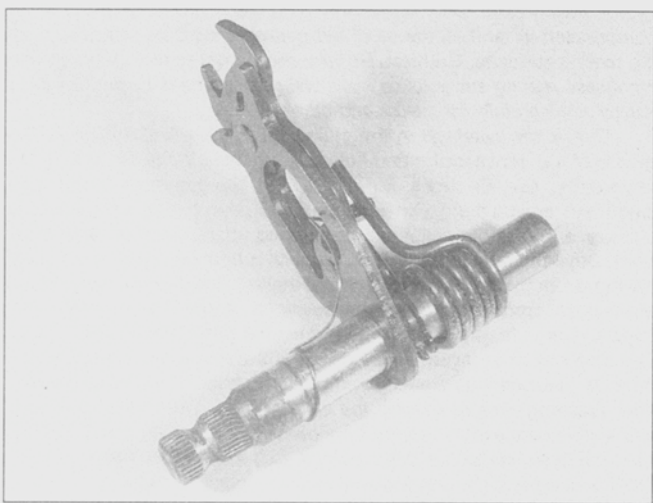
24.3d A blind hole puller like this one is needed to remove bearings which are only accessible from one side



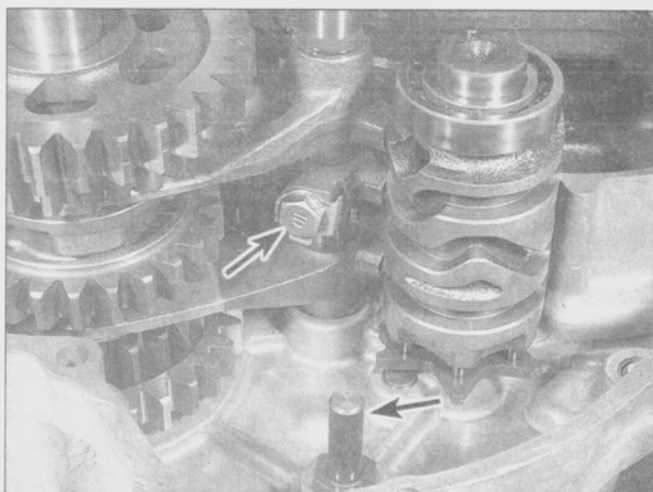
25.2 Push the shift shaft pawls in the direction of the arrow to disengage them from the shift drum and pull the shift shaft out of the crankcase



25.3a The return spring is installed like this . . .



25.3b . . . and the pawl spring is installed like this



25.4 The return spring post (lower arrow) should be tight; the center fork is secured to the shift shaft by a bolt and lockwasher (upper arrow)

25 Internal shift mechanism - removal, inspection and installation

- 1 Refer to Section 23 and separate the crankcase halves.

Shift shaft

Removal

Refer to illustration 25.2

- 2 Pull the pawls of the gearshift plate back against spring pressure until they clear the shift drum, then lift the shift shaft out of the crankcase (see illustration).

Inspection

Refer to illustrations 25.3a, 25.3b and 25.4

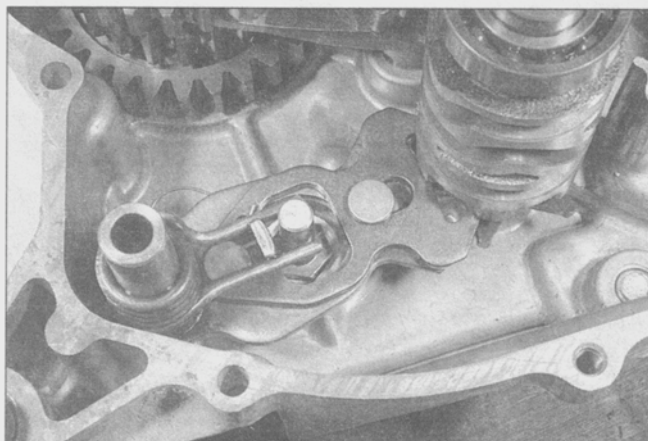
- 3 Check the shift shaft for bends and damage to the splines (see illustration). If the shaft is bent, you can attempt to straighten it, but if the splines are damaged it will have to be replaced. Check the condition of the gearshift plate and the pawl spring (see illustration). Replace them if they're worn, cracked or distorted.

- 4 Make sure the return spring post isn't loose (see illustration). If it is, unscrew it, apply a non-hardening locking compound to the threads, then reinstall it and tighten it securely.

Installation

Refer to illustration 25.5

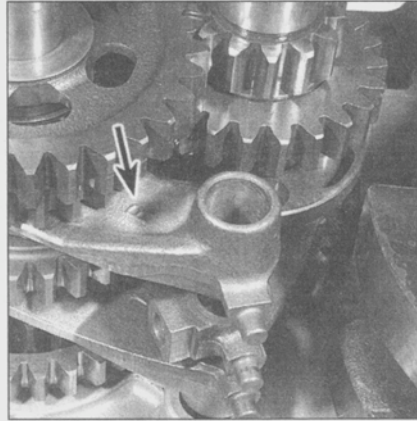
- 5 Pull back the pawls of the gearshift plate, slide the shaft into its



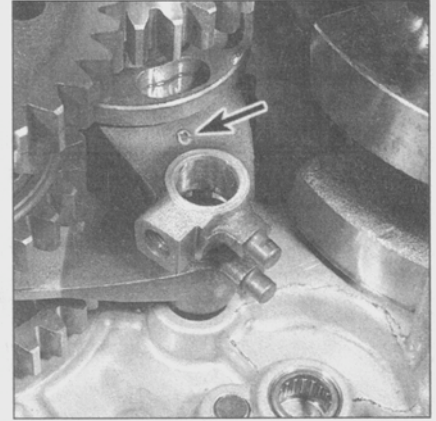
25.5 One end of the return spring should be on each side of the post and the pawls should engage the shift drum



25.7 Lift out the shift drum (arrow)



25.8a With the shift shaft removed from the forks, disengage the right fork; on installation, its letter R (arrow) goes upward) . . .



25.8b . . . the center fork, identified by the letter C (arrow) . . .

bore and release the claws. Make sure the return spring fits over the post and the pawls engage the shift drum pins (**see illustration**).

Shift drum and forks

Removal

Refer to illustrations 25.7, 25.8a, 25.8b and 25.8c

6 Bend back the lockplate and unbolt the center shift fork from the fork shaft (**see illustration 25.4**).

7 Note how the forks fit in the gear and shift drum grooves, then pull the fork shaft out of the forks and lift out the shift drum (**see illustration**).

8 Disengage the forks from the gears and lift them out (**see illustrations**).

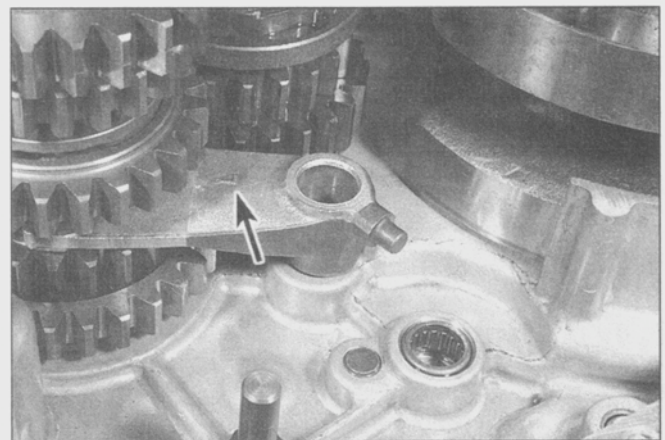
Inspection

Refer to illustrations 25.11a, 25.11b, 25.13 and 25.15

9 Wash all of the components in clean solvent and dry them off.

10 Inspect the shift fork grooves in the gears. If a groove is worn or scored, replace the affected gear (see Section 26) and inspect its corresponding shift fork.

11 Check the shift forks for distortion and wear, especially at the fork ears (**see illustrations**). Measure the thickness of the fork ears and compare your findings with this Chapter's Specifications. If they are discolored or severely worn they are probably bent. Inspect the guide

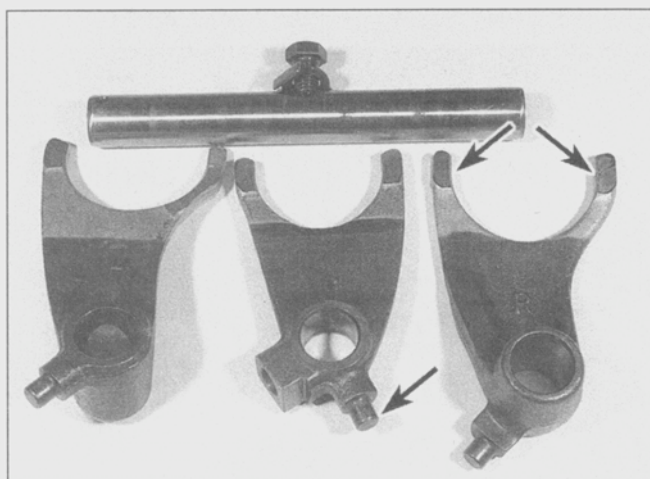


25.8c . . . and the left fork, identified by the letter L (arrow)

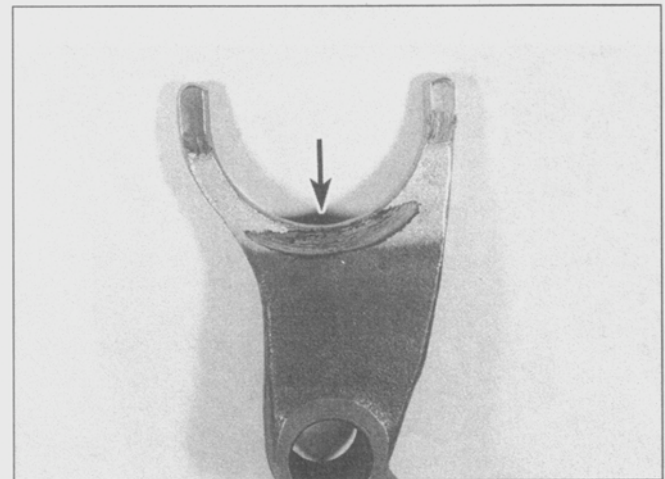
pins for excessive wear and distortion and replace any defective parts with new ones.

12 Measure the inside diameter of the forks and the outside diameter of the fork shaft and compare to the values listed in this Chapter's

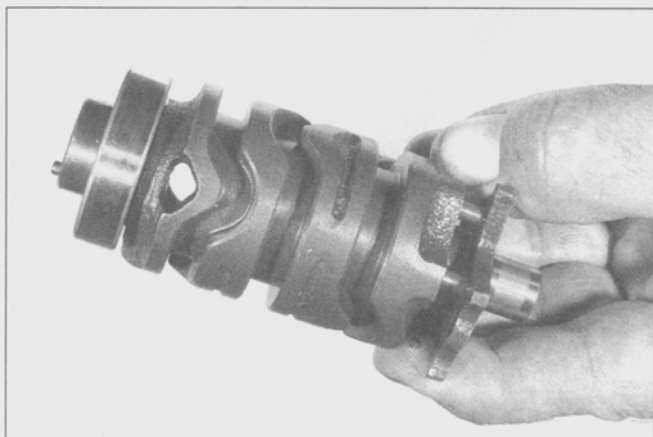
2



25.11a The fork ears and pins (arrows) are common wear points



25.11b An arc-shaped burn mark like this means the fork was rubbing against a gear, probably due to bending or worn fork ears

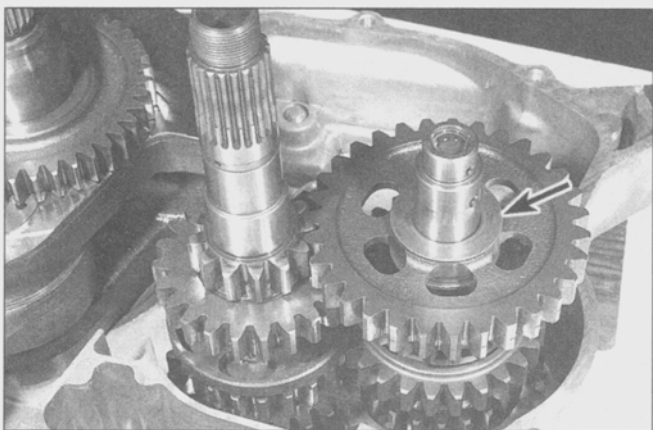


25.13 Check the shift drum grooves for wear, especially at the points

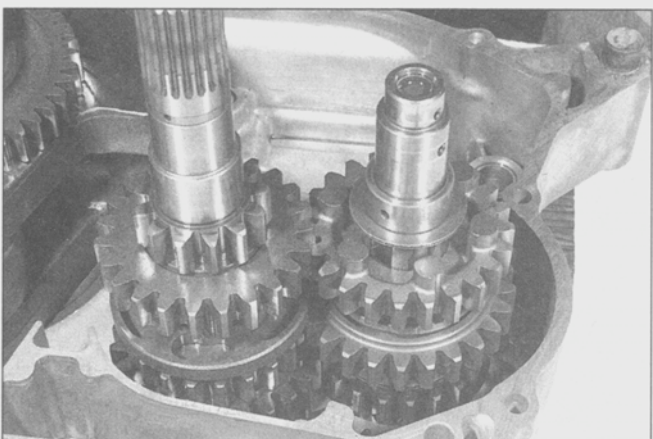
Specifications. Replace any parts that are worn beyond the limits. Check the shift fork shaft for evidence of wear, galling and other damage. Make sure the shift forks move smoothly on the shaft. If the shaft is worn or bent, replace it with a new one.

13 Check the edges of the grooves in the drum for signs of excessive wear (**see illustration**).

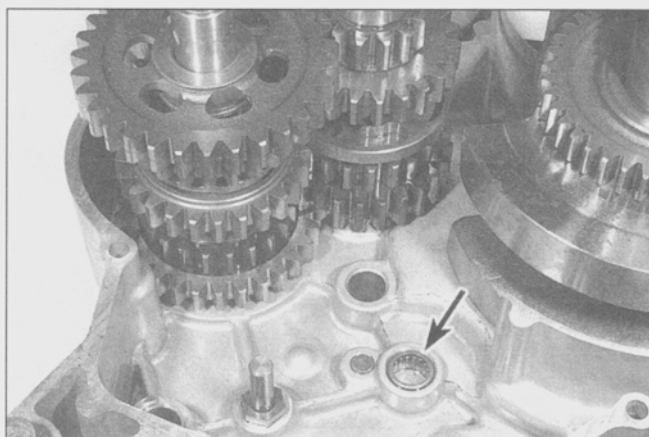
14 Spin the shift drum bearing with your fingers and replace it if it's



26.4a Lift off the thrust washer (arrow) and countershaft first gear . . .



26.4b . . . lift off the bushing, thrust washer and countershaft fourth gear . . .



25.15 Wear on the shift drum needle roller bearing is hard to see, so it should be replaced if there's any doubt about its condition

rough, loose or noisy.

15 Check the shift drum bearing in the transmission case (**see illustration**). If it's worn or damaged, lift it out. If it won't come easily, use a blind hole puller (**see illustration 24.3d**).

Installation

16 Installation is the reverse of the removal steps, with the following additions:

- Refer to the identifying letters on the forks and make sure they're installed in the correct positions.
- Use a new lockplate on the center shift fork bolt. Tighten the bolt to the torque listed in this Chapter's Specifications.

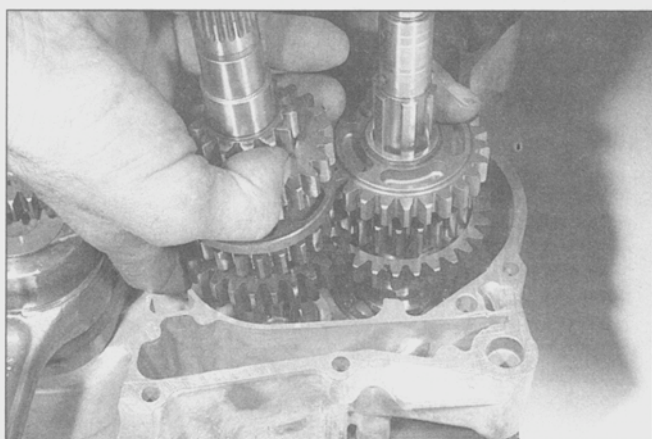
26 Transmission shafts - removal, inspection and installation

Note: When disassembling the transmission shafts, place the parts on a long rod or thread a wire through them to keep them in order and facing the proper direction.

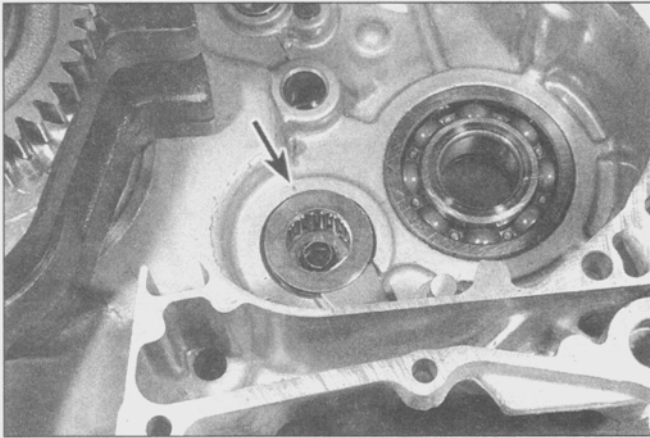
Removal

Refer to illustrations 26.4a through 26.4f

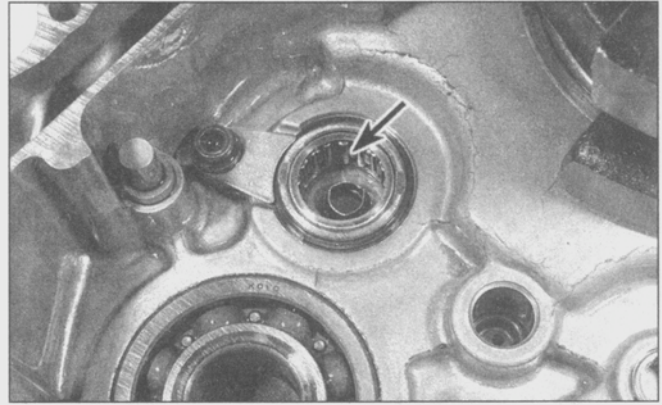
- Remove the engine, then separate the case halves (**see Sections 5 and 23**).
- The transmission components remain in the left case half when



26.4c . . . then lift the transmission shafts out of the case



26.4d Lift the thrust washer off the needle roller bearing . . .



26.4e . . . lift the bearing out of the housing . . .

the case is separated.

3 Refer to Section 25 and remove the shift shaft, shift drum and forks.

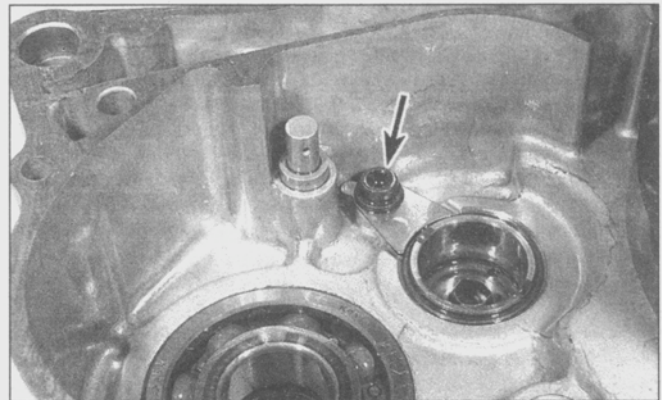
Lift the transmission shafts out of the case together. This will be easier if two of the gears are removed from the countershaft first (see illustrations).

5 Separate the shafts once they're lifted out. If you're not planning to disassemble them right away, reinstall the removed components and place a large rubber band over both ends of each shaft so the gears won't slide off.

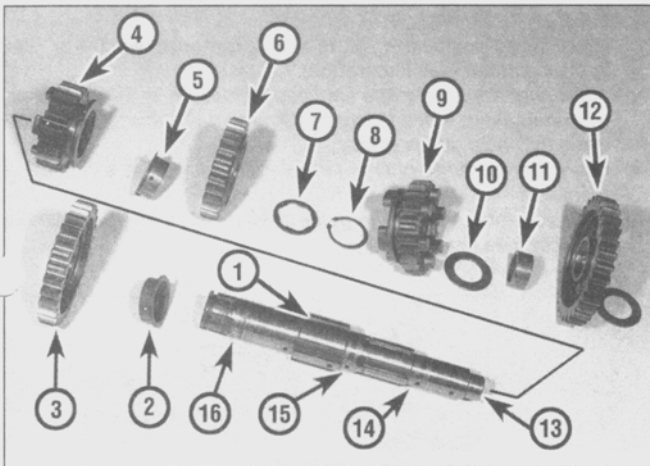
Disassembly

Refer to illustrations 26.6a and 26.6b

6 To disassemble the shafts, remove the snap-rings and slide the gears, bushings and thrust washers off (see illustrations).

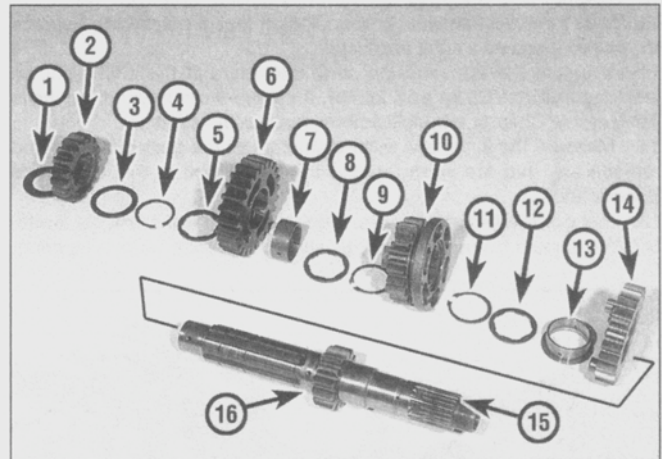


26.4f . . . then unbolt the retainer and lift the housing out of the case



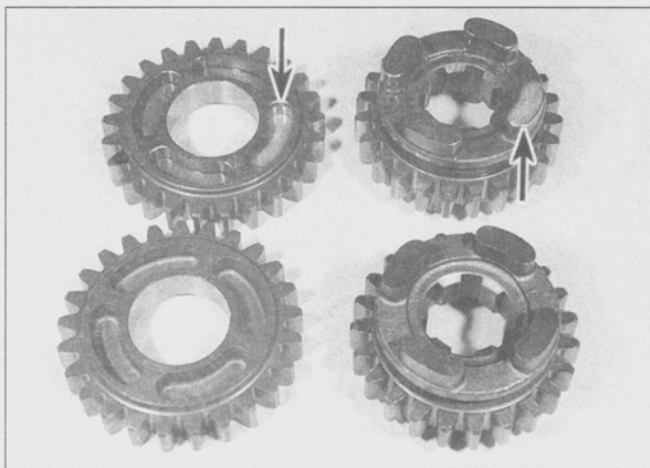
26.6a Countershaft details

- | | |
|----------------------------|---|
| 1 Countershaft | 12 Countershaft first gear |
| 2 Flanged bushing | 13 Measuring point (kickstarter idler gear) |
| 3 Countershaft second gear | 14 Measuring point (countershaft first gear) |
| 4 Countershaft fifth gear | 15 Measuring point (countershaft third gear) |
| 5 Flanged bushing | 16 Measuring point (countershaft second gear) |
| 6 Countershaft third gear | |
| 7 Splined thrust washer | |
| 8 Snap-ring | |
| 9 Countershaft fourth gear | |
| 10 Thrust washer | |
| 11 Bushing | |



26.6b Mainshaft details

- | | |
|-------------------------------|--|
| 1 Thrust washer | 11 Snap-ring |
| 2 Mainshaft second gear | 12 Splined thrust washer |
| 3 Thrust washer (some models) | 13 Flanged bushing (install on mainshaft first, flange toward integral first gear) |
| 4 Snap-ring | 14 Mainshaft fourth gear (install after flanged bushing) |
| 5 Thrust washer | 15 Mainshaft with integral first gear |
| 6 Mainshaft fifth gear | |
| 7 Bushing | |
| 8 Thrust washer | |
| 9 Snap-ring | |
| 10 Mainshaft third gear | |

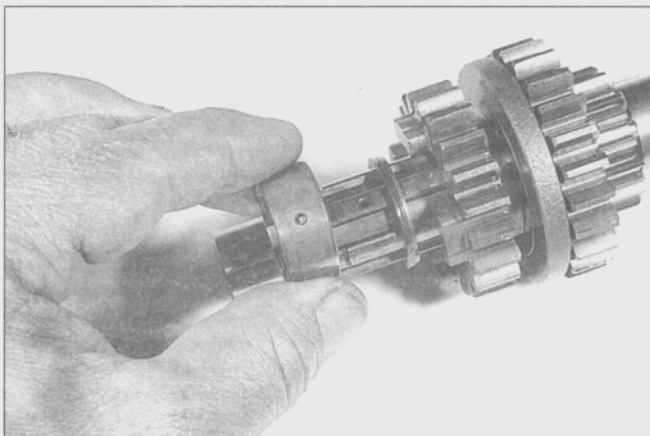


26.10 Check the slots (left arrow) and dogs (right arrow) for wear, especially at the edges; rounded corners cause the transmission to jump out of gear - new gears (bottom) have sharp edges

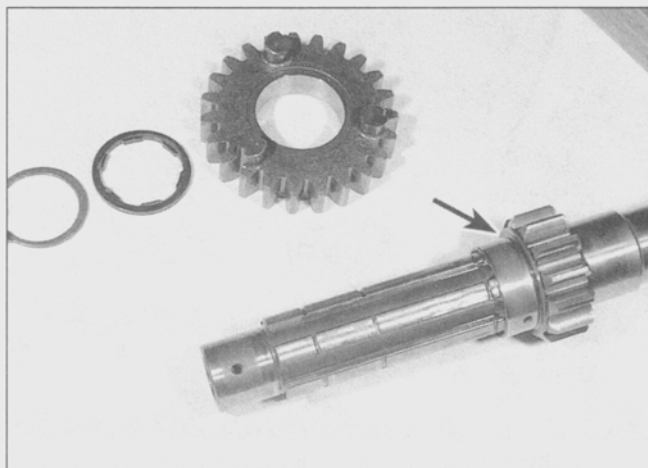
Inspection

Refer to illustration 26.10

- 7 Wash all of the components in clean solvent and dry them off.
- 8 Inspect the shift fork grooves in the countershaft fifth gear, countershaft fourth gear and mainshaft third gear. If a groove is worn or scored, replace the affected gear and inspect its corresponding shift fork.
- 9 Check the gear teeth for cracking and other obvious damage. Check the bushing or surface in the inner diameter of the freewheeling gears for scoring or heat discoloration. Measure the inside diameters of the gears and compare them to the values listed in this Chapter's Specifications. Replace parts that are damaged or worn beyond the limits.
- 10 Inspect the engagement dogs and dog holes on gears so equipped for excessive wear or rounding off (**see illustration**). Replace the paired gears as a set if necessary.
- 11 Measure the transmission shaft diameters at the points shown (**see illustrations 26.6a and 26.6b**). If they're worn beyond the limits listed in this Chapter's Specifications, replace the shaft(s).
- 12 Measure the inner and outer diameters of the gear bushings and replace any that are worn beyond the limit listed in this Chapter's Specifications.
- 13 Inspect the thrust washers. Honda doesn't specify wear limits, but they should be replaced if they show any visible wear or scoring.



26.16b Be sure the oil hole in the mainshaft fifth gear bushing aligns with the oil hole in the mainshaft



26.16a Install the flanged bushing on the mainshaft first with its wide side toward the integral first gear

It's a good idea to replace them whenever the transmission is disassembled.

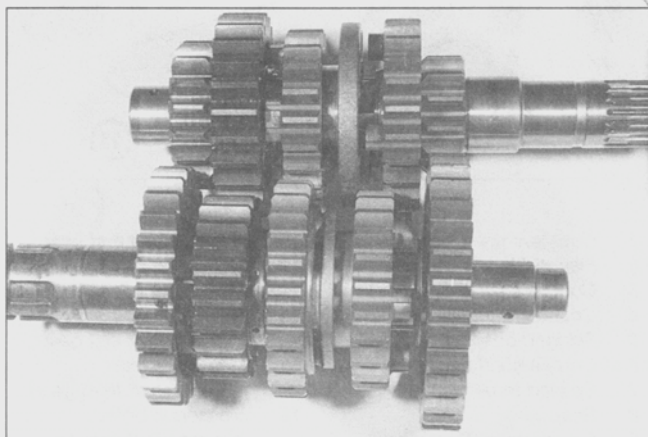
- 14 Check the transmission shaft bearings in the crankcase for roughness, looseness or noise and replace them if necessary (**see illustrations 26.4d, 26.4e and 26.4f**) [left side bearings] or Section 24 [right side bearings]).
- 15 Discard the snap-rings and use new ones on reassembly.

Assembly and installation

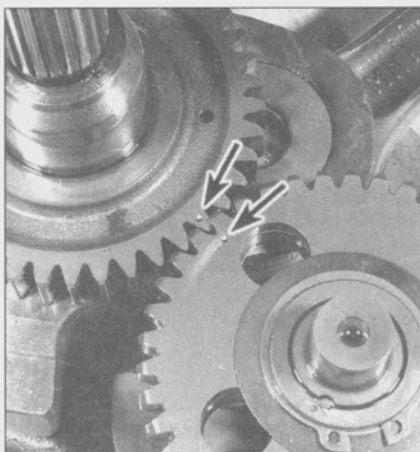
Refer to illustrations 26.16a, 26.16b and 26.16c

16 Assembly and installation are the reverse of the removal procedure, but take note of the following points:

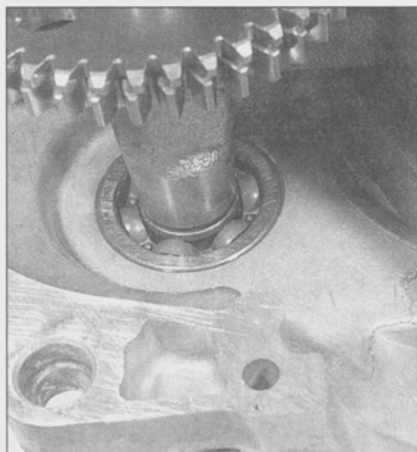
- a) If you're working on an XR600R, install the flanged bushing on the mainshaft, wide side first, then install fourth gear (**see illustration**).
- b) Install the splined bushing so its oil hole is aligned with the oil hole in the mainshaft (**see illustration**).
- c) Make sure the snap-rings are securely seated in their grooves, with their sharp sides facing the direction of thrust (toward the gears they hold on the shafts).
- d) Lubricate the components with engine oil before assembling them.
- e) After assembly, check the gears to make sure they're installed correctly (**see illustration**).



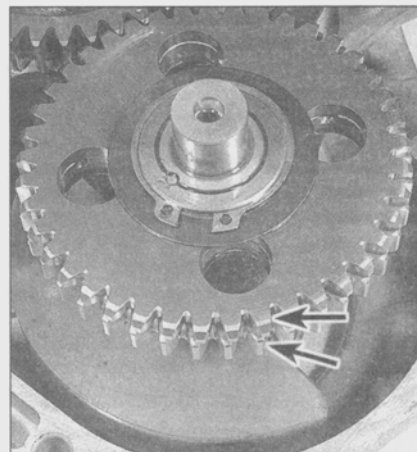
26.16c The assembled shafts and gears should fit together like this



27.2 The timing marks (arrows) on the balancer and crankshaft must be aligned to prevent severe engine vibration



27.3 With the marks aligned, lift the balancer shaft out of the case and inspect the bearing



27.5 The outer and inner portions of the balancer gear are slightly offset (arrows); be sure to position the outer gear's alignment mark between the lines on the inner gear

Crankshaft and balancer - removal, inspection and installation

Balancer

Removal

Refer to illustrations 27.2 and 27.3

- 1 Remove the engine and separate the crankcase halves (Sections 5 and 23).
- 2 Turn the crankshaft so the punch marks on the balancer and crankshaft are aligned (**see illustration**). The marks must be aligned like this on installation to prevent severe engine vibration.
- 3 Lift the balancer shaft out of its bearing (**see illustration**).

Inspection

Refer to illustration 27.5

- 4 Check the balancer gear teeth and its bearing surface for wear or damage. Replace the balancer if problems can be seen in these areas.
- 5 The balancer gear on 1983 through 1990 models is made in two parts, with the teeth of each part held slightly offset from each other by

springs. This spring-loaded offset eliminates backlash between the balancer and crankshaft gears. To check the springs, first note the alignment of the punch mark on the outer gear between the lines on two of the teeth of the inner gear. Remove the snap-ring and washer from the balancer gear and lift the outer portion of the gear off (**see illustration**). Check the four springs for wear or damage, replacing them if their condition is in doubt.

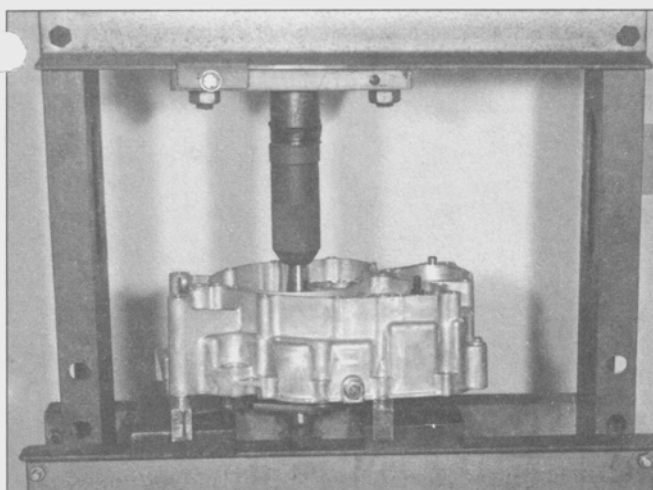
Crankshaft

Removal

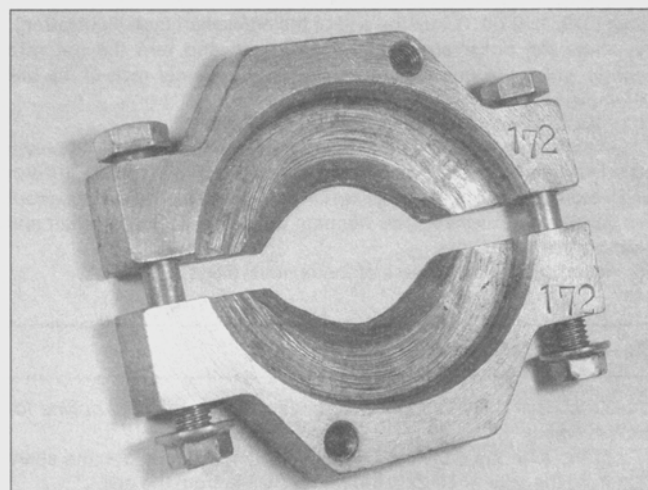
Refer to illustrations 27.6a and 27.6b

Note: Removal and installation of the crankshaft require a press and some special tools. If you don't have the necessary equipment or suitable substitutes, have the crankshaft removed and installed by a Honda dealer or other qualified repair shop.

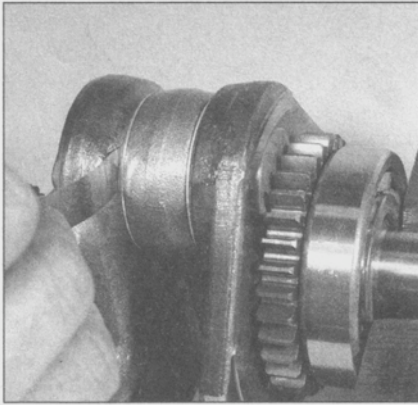
- 6 Place the left crankcase half in a press and press out the crankshaft (**see illustration**). The ball bearing may remain in the crankcase or come out with the crankshaft. If it stays on the crankshaft, remove it with the press and a bearing splitter (**see illustration**). Discard the bearing, no matter what its apparent condition, and use a new one on installation.



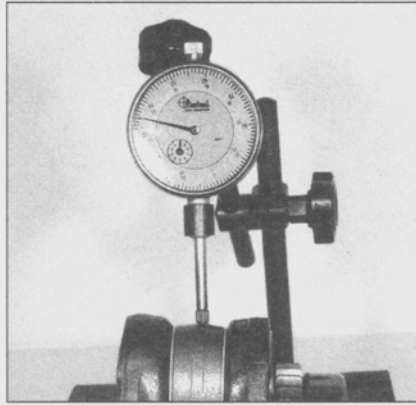
27.6a Press the crankshaft out of the crankcase



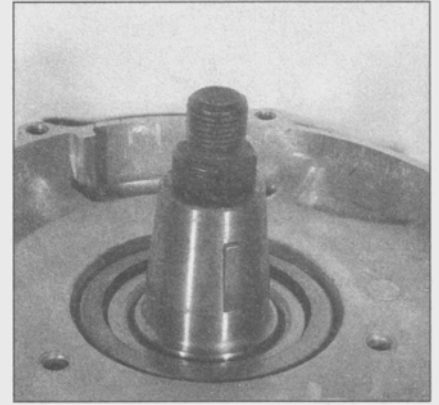
27.6b If the bearing stays on the crankshaft, remove it with the press and a bearing splitter



27.7 Check the connecting rod side clearance with a feeler gauge



27.8 Check the connecting rod radial clearance with a dial indicator



27.13 Thread the adapter into the end of the crankshaft . . .

Inspection

Refer to illustrations 27.7 and 27.8

7 Measure the side clearance between connecting rod and crankshaft with a feeler gauge (**see illustration**). If it's more than the limit listed in this Chapter's Specifications, replace the crankshaft and connecting rod as an assembly.

8 Set up the crankshaft in V-blocks with a dial indicator contacting the big end of the connecting rod (**see illustration**). Move the connecting rod up-and-down against the indicator pointer and compare the reading to the value listed in this Chapter's Specifications. If it's beyond the limit, replace the crankshaft and connecting rod as an assembly.

9 Check the crankshaft, gear and splines for visible wear or damage, such as chipped teeth or scoring. If any of these conditions are found, replace the crankshaft and connecting rod as an assembly.

10 Set the crankshaft in a pair of V-blocks, with a dial indicator contacting the bearing surface on each end. Rotate the crankshaft and note the runout. If the runout at either end is beyond the limit listed in this Chapter's Specifications, replace the crankshaft and connecting rod as an assembly.

Installation

Refer to illustrations 27.13 and 27.14

11 Install the crankshaft bearing in the left crankcase half.

12 Install the crankshaft in the left crankcase half.

13 Thread a puller adapter (Honda part no. 07931-KF00200) into the end of the crankshaft (**see illustration**).

14 Install a crankshaft puller (Honda part no. 07931-ME4000A) and collar (07931-KF00100) on the end of the crankshaft (**see illustration**).

15 Hold the puller shaft with one wrench and turn the nut with another wrench to pull the crankshaft into the center race of the ball bearing.

16 Remove the special tools from the crankshaft.

17 Install the balancer shaft in the crankcase, making sure its punch mark is aligned with the punch mark on the crankshaft (**see illustration 27.2**). **Note:** It's important to align the timing marks exactly throughout this procedure. Severe engine vibration will occur if the crankshaft and balancer are out of time.

18 Installation is the reverse of the removal steps.

28 Initial start-up after overhaul

Warning: Have a fire extinguisher handy when starting the engine for the first time.

1 Make sure the engine oil level is correct, then remove the spark plug from the engine. Unplug the primary wires from the coil.

2 Crank the engine over with the kickstarter several times to build up oil pressure. Reinstall the spark plug and connect the wires.

3 Make sure there is fuel in the tank, then operate the choke.

4 Start the engine and allow it to run at a moderately fast idle. Let the engine continue running until it reaches operating temperature.

5 Check carefully for oil leaks and make sure the transmission and controls, especially the brakes, function properly before road testing the machine. Refer to Section 29 for the recommended break-in procedure.

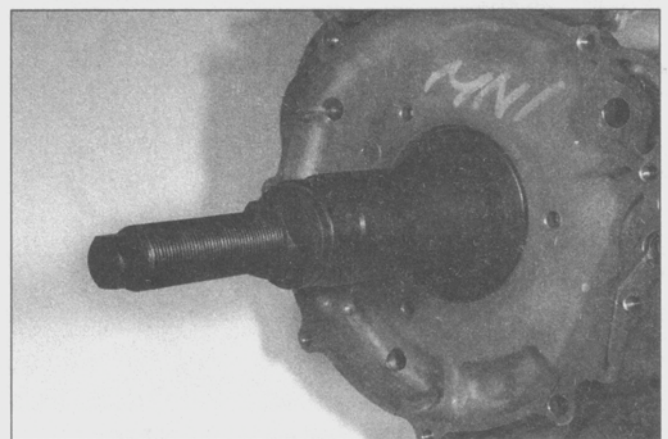
6 Upon completion of the road test, and after the engine has cooled down completely, recheck the oil level and valve clearances (see Chapter 1).

29 Recommended break-in procedure

1 Any rebuilt engine needs time to break-in, even if parts have been installed in their original locations. For this reason, treat the machine gently for the first few miles to make sure oil has circulated throughout the engine and any new parts installed have started to seat.

2 Even greater care is necessary if the cylinder has been rebored or a new crankshaft has been installed. In the case of a rebore, the engine will have to be broken in as if the machine were new. This means greater use of the transmission and a restraining hand on the throttle for the first few operating days. There's no point in keeping to any set speed limit - the main idea is to vary the engine speed, keep from lugging the engine and to avoid full-throttle operation. These recommendations can be lessened to an extent when only a new crankshaft is installed. Experience is the best guide, since it's easy to tell when an engine is running freely.

3 If a lubrication failure is suspected, stop the engine immediately and try to find the cause. If an engine is run without oil, even for a short period of time, irreparable damage will occur.



27.14 . . . and attach the puller to the adapter

Chapter 3

Fuel and exhaust systems

Contents

	Section		Section
Air cleaner housing - removal and installation	9	Exhaust system - removal and installation.....	11
Air filter element - servicing	See Chapter 1	Fuel tank - cleaning and repair.....	3
Carburetor - disassembly, cleaning and inspection.....	7	Fuel tank - removal and installation	2
Carburetor overhaul - general information	5	General information.....	1
Carburetor - reassembly and float height check.....	8	Idle fuel/air mixture adjustment.....	4
Carburetor - removal and installation.....	6	Spark arrester cleaning.....	See Chapter 1
Evaporative emission control system - check.....	See Chapter 1	Throttle cables - removal, installation and adjustment	10
Exhaust system - check	See Chapter 1		

Specifications

General

Fuel type	Unleaded or low lead gasoline subject to local regulations; minimum octane 91 RON (87 pump octane)
-----------------	---

Carburetor (XL600R)

Identification mark

1983	PH60A
1984 49 states	PH64A
1984 California	PH66A
1985 49 states	PH68A-B
1985 California	PH68B-B
1986 and later 49 states.....	PH68G
1986 and later California	PH68H

Jet sizes and settings

Standard main jet (sea level to 5000 ft)

1983	
Primary	125
Secondary	112
1984 49 states (primary and secondary)	120
1984 California (primary and secondary)	118
1985 on	
Primary	118
Secondary	115

High altitude main jet (5000 ft to 6500 ft)

Same as standard

High altitude main jet (above 6500 ft)

1983	Same as standard
1984 49 states (primary and secondary)	112
1984 California (primary and secondary)	110
1985 on	
Primary	115
Secondary	112

Slow jet

1983	55
1984 and 1985	65
1986 on	62

Jet needle clip position.....

Not specified

Mixture screw setting (turns out from lightly seated position)

Sea level to 5000 ft

1983	1
1984 and 1985	2
1986 on	1-1/2

Above 5000 ft

1983	1/2
1984	1-1/2
1985 on	1-3/8

Float level

1983 and 1984	20.0 mm (0.79 inch)
1985 on	18.0 mm (0.71 inch)

Chapter 3

Fuel and exhaust systems

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Air filter element - servicing	See Chapter 1	Fuel tank - cleaning and repair.....	3
Carburetor - disassembly, cleaning and inspection.....	7	Fuel tank - removal and installation	2
Carburetor overhaul - general information	5	General information.....	1
Carburetor - reassembly and float height check.....	8	Idle fuel/air mixture adjustment.....	4
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Evaporative emission control system - check.....	See Chapter 1	Throttle cables - removal, installation and adjustment	10
Exhaust system - check	See Chapter 1		

Specifications

General

Fuel type	Unleaded or low lead gasoline subject to local regulations; minimum octane 91 RON (87 pump octane)
-----------------	---

Carburetor (XL600R)

Identification mark

1983	PH60A
1984 49 states	PH64A
1984 California	PH66A
1985 49 states	PH68A-B
1985 California	PH68B-B
1986 and later 49 states.....	PH68G
1986 and later California	PH68H

Jet sizes and settings

Standard main jet (sea level to 5000 ft)

1983	
Primary	125
Secondary	112
1984 49 states (primary and secondary)	120
1984 California (primary and secondary)	118

1985 on

Primary	118
Secondary	115

High altitude main jet (5000 ft to 6500 ft)

Same as standard

High altitude main jet (above 6500 ft)

1983	Same as standard
1984 49 states (primary and secondary)	112
1984 California (primary and secondary)	110
1985 on	
Primary	115
Secondary	112

Slow jet

1983	55
1984 and 1985	65
1986 on	62

Jet needle clip position.....

Not specified

Mixture screw setting (turns out from lightly seated position)

Sea level to 5000 ft

1983	1
1984 and 1985	2
1986 on	1-1/2

Above 5000 ft

1983	1/2
1984	1-1/2
1985 on	1-3/8

Float level

1983 and 1984	20.0 mm (0.79 inch)
1985 on	18.0 mm (0.71 inch)

Carburetor (XR600R)

Identification mark

1983 through 1987	PH52A
1988	PD8-AA
1989 and 1990	PD8A-D
1991-on (except 1998-on California)	PD8-AF
1998-on California	PDM18

Jet sizes and settings

Standard main jet (sea level to 5000 ft)

1983 through 1987 (primary and secondary)	122
1988 through 1990	165
1991-on (except 1998-on California)	152
1998-on California	128

Slow jet

1983 through 1987	45
1988	60
1989-on (except 1998-on California)	62
1998-on California	58

Jet needle clip position

1983 through 1987	
Primary	4th groove
Secondary	2nd groove
1988 on	3rd groove

Mixture screw setting (turns out from lightly seated position)

Standard

1983 through 1987	1-3/8
1988	2-5/8
1989 through 1997	2
1998-on California	

Initial setting	1-1/8
Final setting	1/2

1998-on (except California)

Initial setting	2
Final setting	3/4

High altitude	1/2 turn in from standard
---------------------	---------------------------

Float level

1983 through 1987	18.0 mm (0.71 inch)
1988 on	14.5 mm (0.57 inch)

Torque specifications

Exhaust pipe to cylinder head nuts

1983 through 1987	18 to 25 Nm (13 to 18 ft-lbs)
1988 on	27 Nm (22 ft-lbs)

Muffler clamp bolts

1983 through 1987	15 to 25 Nm (13 to 18 ft-lbs)
1988 on	27 Nm (20 ft-lbs)

1 General information

The fuel system consists of the fuel tank, fuel tap, filter screen, carburetor and connecting lines, hoses and control cables.

All models use the slide carburetor design, in which the slide acts as the throttle valve. 1983 through 1987 models use dual carburetors. The primary carburetor operates from idle to 1/3 throttle, which allows high mixture velocity at low speeds for efficient combustion. At about 1/3 to 1/2 throttle, the secondary carburetor begins to open, allowing increased fuel mixture flow to meet the needs of the large-displacement engine. A crossover port in the cylinder connects the intake tracts of the two carburetors. On 1983 models only, a reed valve in the crossover port closes as the primary carburetor starts to open.

1988 and later models use a single slide-type carburetor of a design basically the same as the primary carburetor on dual-carburetor models.

For cold starting on all models, a choke valve is actuated by a lever mounted on the carburetor.

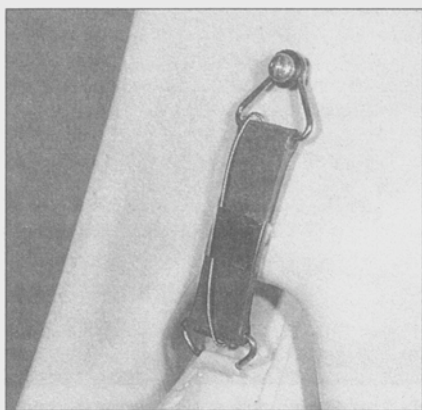
The exhaust system consists of a pipe and muffler/silencer with a spark arrester function.

XL600R models sold in California use an evaporative emission control system that routes fuel tank vapors to the engine for burning.

Many of the fuel system service procedures are considered routine maintenance items and for that reason are included in Chapter 1.

2 Fuel tank - removal and installation

Warning: Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) with a pilot light is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and, if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any spills immediately and do not store



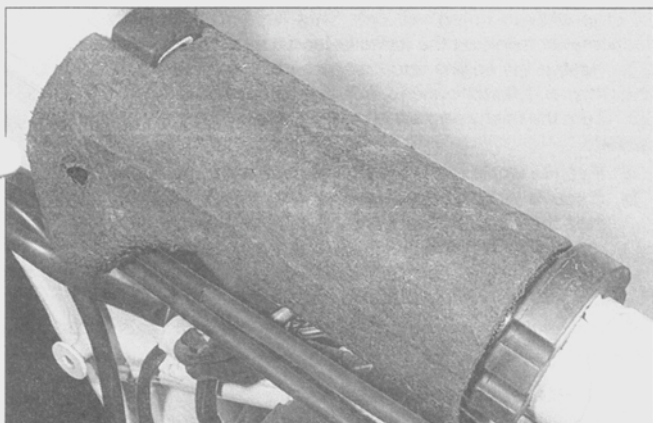
2.5 Unhook the retaining strap from the tank



2.6 Remove the mounting bolts at the front (there's one on each side)



2.7 Disconnect the fuel line from the tap



2.9 Replace the mounting insulator on top of the frame if it's deteriorated

fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher on hand.

Removal

- 1 Remove the seat (see Chapter 7).

XL600R models

- 2 Turn the fuel tap to Off and disconnect the fuel line.
Remove the mounting bolt at the rear of the tank. Pull the tank backward so the cups clear the rubber mounts, then lift the tank off the machine.

XR600R models

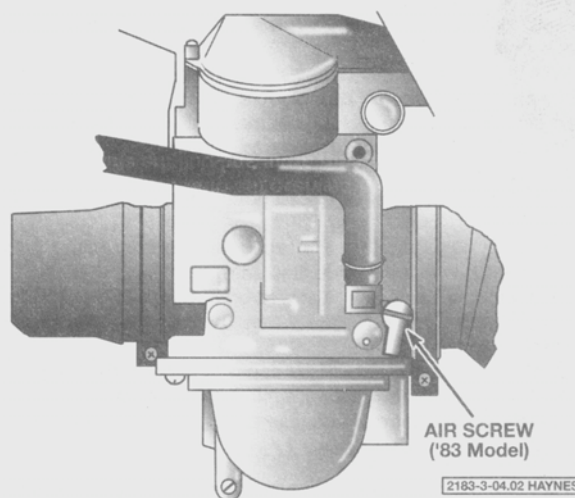
Refer to illustrations 2.5, 2.6 and 2.7

- 4 Remove the seat (see Chapter 7).
- 5 Unhook the strap from the rear of the tank (see illustration).
- 6 Remove the fuel tank mounting bolts (see illustration).
- 7 Disconnect the fuel line from the fuel tap (see illustration).
- 8 Lift the fuel tank off the bike together with the fuel tap.

Installation

Refer to illustration 2.9

- 9 Before installing the tank, check the condition of the rubber mounting bushings at the front, the insulator on the frame and the rubber mount or strap at the rear - if they're hardened, cracked, or show any other signs of deterioration, replace them (see illustration).
- 10 When installing the tank, reverse the removal procedure. Make sure the tank does not pinch any wires. Tighten the tank mounting bolt(s) securely, but don't overtighten them and strip the threads.



4.2 Idle mixture on some models is adjusted with an air screw that may have a limiter cap . . .

3 Fuel tank - cleaning and repair

- 1 All repairs to the fuel tank should be carried out by a professional who has experience in this critical and potentially dangerous work. Even after cleaning and flushing of the fuel system, explosive fumes can remain and ignite during repair of the tank.

- 2 If the fuel tank is removed from the vehicle, it should not be placed in an area where sparks or open flames could ignite the fumes coming out of the tank. Be especially careful inside garages where a natural gas-type appliance is located, because the pilot light could cause an explosion.

4 Idle fuel/air mixture adjustment

Refer to illustrations 4.2 and 4.3

Normal adjustment

- 1 Idle fuel/air mixture on these vehicles is preset at the factory and should not need adjustment unless the carburetor is overhauled or the mixture adjustment screw is replaced. A limiter cap on XL600R models prevents the mixture adjustment screw from being turned to enrich the mixture. Because XR600R models are off-road bikes, they are not required to have a limiter cap on the mixture screw.

- 2 On 1983 XL600R models and 1983 through 1987 XR600R models, mixture adjustment is controlled by an air screw mounted in the side of the carburetor (see illustration).

3 On 1984 through 1987 XL600R models and 1988 and later XR600R models, mixture is controlled by a pilot screw mounted in the underside of the carburetor body (see illustration).

4 The engine must be properly tuned up before making the adjustment (valve clearances set to specifications, spark plug in good condition and properly gapped). You'll also need a tune-up tachometer that can accurately indicate changes as small as 100 rpm.

1983 XL600R models

5 The air screw is covered by a limiter cap that allows it to be rotated only counterclockwise (leaner mixture) and prevents it from being rotated clockwise (richer mixture). The limiter cap must be broken off with pliers to make initial mixture adjustments when the carburetor is overhauled.

6 Once the limiter cap is removed, back the air screw all the way out of the carburetor.

7 Install the new air screw in the carburetor and turn it clockwise until it seats lightly, then back it out the number of turns listed in this Chapter's Specifications (see illustration 4.2). **Caution:** Turn the screw just far enough to seat it lightly. If it's bottomed hard, the screw or its seat may be damaged, which will make accurate mixture adjustments impossible.

8 Warm up the engine to normal operating temperature (10 minutes of stop-and-go riding will do). Shut it off and connect a tune-up tachometer, following the tachometer manufacturer's instructions.

9 Restart the engine and compare idle speed to the value listed in the Chapter 1 Specifications. Adjust it if necessary.

10 Turn the air screw in or out to obtain the highest possible idle speed.

11 Recheck idle speed on the tachometer and readjust it to the specified setting with the throttle stop screw.

12 Slowly turn the air screw clockwise until idle speed drops 100 rpm.

13 Back the air screw out one full turn, then readjust idle speed with the throttle stop screw.

14 Coat the inside of a new limiter cap with Loctite 601 or equivalent, then install it with its tab resting against the stop on the carburetor body so the screw can be turned counterclockwise but not clockwise.

1984 through 1987 XL600R models

15 Remove the carburetor from the motorcycle, then remove the float chamber from the carburetor (see Sections 6 and 7).

16 If you're installing a new pilot screw, remove the old one from the carburetor. Install the new one without the limiter cap for now.

17 Turn the pilot screw clockwise until it seats lightly, then back it out the number of turns listed in this Chapter's Specifications (see illustration 4.3). **Caution:** Turn the screw just far enough to seat it lightly. If it's bottomed hard, the screw or its seat may be damaged, which will make accurate mixture adjustments impossible.

18 Warm up the engine to normal operating temperature (10 minutes of stop-and-go riding will do). Shut it off and connect a tune-up tachometer, following the tachometer manufacturer's instructions.

19 Restart the engine and compare idle speed to the value listed in the Chapter 1 Specifications. Adjust it if necessary.

20 Turn the pilot screw in or out to obtain the highest possible idle speed.

21 Recheck idle speed on the tachometer and readjust it to the specified setting with the throttle stop screw.

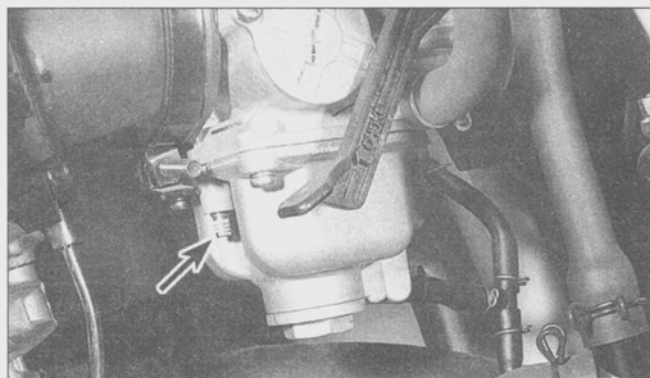
22 Slowly turn the pilot screw clockwise until idle speed drops 100 rpm. **Note:** If the pilot screw bottoms before engine speed drops 100 rpm, go to the next step.

23 Back the pilot screw out two full turns, then readjust idle speed with the throttle stop screw.

24 Coat the inside of a new limiter cap with Loctite 601 or equivalent, then install it so its tab will rest against the stop on the float chamber (after the float chamber is installed) so the screw can be turned clockwise but not counterclockwise.

XR600R models

25 Turn the idle mixture screw clockwise until it seats lightly, then back it out the number of turns listed in this Chapter's Specifications (on 1998 and later models, use the initial setting) (see illustration 4.2 or 4.3).



4.3 ... on other models it's adjusted with a pilot screw (arrow); the pilot screw has a limiter cap on street-legal models

26 Warm up the engine to normal operating temperature (10 minutes of stop-and-go riding will do). Shut it off and connect a tune-up tachometer, following the tachometer manufacturer's instructions.

27 Restart the engine and compare idle speed to the value listed in the Chapter 1 Specifications. Adjust it if necessary.

28 Turn the mixture screw in or out to obtain the highest possible idle speed.

a) If you're working on a 1997 or earlier model, go to Step 29.

b) If you're working on a 1998 or later model, turn the pilot screw (not the throttle stop screw) slowly clockwise until idle speed drops 100 rpm from the highest speed. Then turn the pilot screw back out the number of turns listed under the final setting in this Chapter's Specifications.

29 Recheck idle speed on the tachometer and readjust it to the specified setting with the throttle stop screw.

High altitude adjustment

30 If the motorcycle is normally used at altitudes from sea level to 5000 feet, use the normal main jets and mixture screw setting. If it's used regularly at altitudes above 5000 feet, the mixture screw setting, as well as the main jets on all except 1983 XL600R models, must be changed to compensate for the thinner air. **Caution:** Don't use the bike for sustained operation below 5000 feet with the main jets and mixture screw at the high altitude settings or the engine may overheat and be damaged.

1983 XL600R models

31 Warm up the engine to normal operating temperature (10 minutes of stop-and-go riding will do). Shut it off and connect a tune-up tachometer, following the tachometer manufacturer's instructions.

32 Turn the air screw 1/2 turn counterclockwise, then recheck idle speed on the tachometer and reset it if necessary to the value listed in this Chapter's Specifications.

1984 through 1987 XL600R models

33 Remove the carburetors (see Section 6). Replace the primary and secondary main jets with the high altitude jets listed in this Chapter's Specifications, then reinstall the carburetors.

34 Turn the pilot screw to the high altitude setting listed in this Chapter's Specifications.

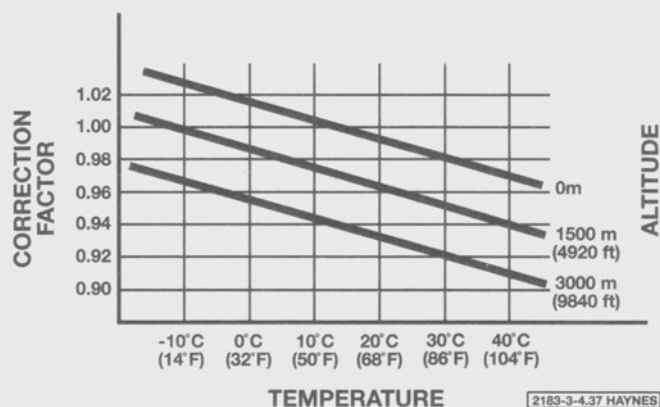
35 Warm up the engine to normal operating temperature (10 minutes of stop-and-go riding will do). Shut it off and connect a tune-up tachometer, following the tachometer manufacturer's instructions.

36 Restart the engine and compare idle speed to the value listed in the Chapter 1 Specifications. Adjust it if necessary with the throttle stop screw.

XR600R models

Refer to illustration 4.37

37 These models are rejetted to compensate for changes in temperature as well as altitude. This means you'll need a thermometer to determine the air temperature. To figure out whether you need to make



4.37 Use this chart to determine the correction factor

any changes, find your altitude and the local air temperature on the accompanying chart (see illustration). Draw a line up from the temperature setting to the altitude line. From where the two lines meet, read across to the correction factor.

38 If the correction factor is above 0.95, leave the carburetor at the standard settings. If it's 0.95 or less, make changes as described below.

39 Turn the mixture adjusting screw in 1/2 turn from the standard setting. Raise the jet needle clip by one groove from the standard setting.

40 Multiply the standard main jet number by the correction factor to determine the proper size of main jet. For example, if your main jet is a no. 165 and the correction factor is 0.92, multiply 165×0.92 to get 151.8. Rounded off, the correct size main jet is 152.

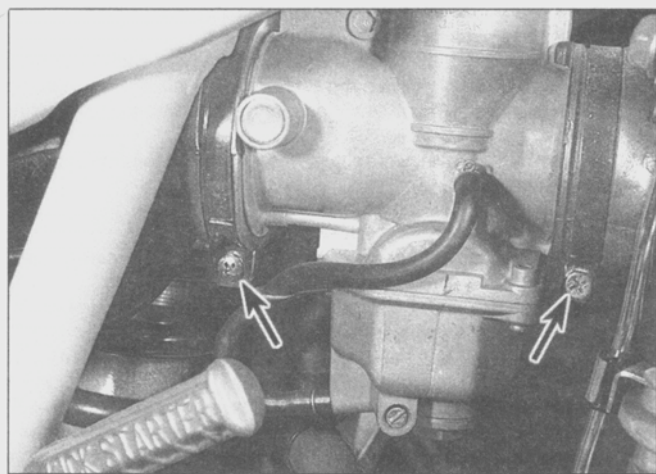
41 Refer to Section 7 and change the main jet to the high altitude jet.

42 With the motorcycle at high altitude, refer to Chapter 1 and adjust the idle speed.

5 Carburetor overhaul - general information

1 Poor engine performance, hesitation, hard starting, stalling, flooding and backfiring are all signs that major carburetor maintenance may be required.

2 Keep in mind that many so-called carburetor problems are really not carburetor problems at all, but mechanical problems within the engine or ignition system malfunctions. Try to establish for certain that the carburetor is in need of maintenance before beginning a major overhaul.



6.5 Loosen the clamping band screws (arrows)

3 Check the fuel tap and its strainer screen, the fuel lines, the intake manifold clamps, the O-ring between the intake manifold and cylinder head, the vacuum hoses, the air filter element, the cylinder compression, the spark plug and the ignition timing before assuming that a carburetor overhaul is required. If the bike has been unused for more than a month, refer to Chapter 1, drain the float chamber and refill the tank with fresh fuel.

4 Most carburetor problems are caused by dirt particles, varnish and other deposits which build up in and block the fuel and air passages. Also, in time, gaskets and O-rings shrink or deteriorate and cause fuel and air leaks which lead to poor performance.

5 When the carburetor is overhauled, it is generally disassembled completely and the parts are cleaned thoroughly with a carburetor cleaning solvent and dried with filtered, unlubricated compressed air. The fuel and air passages are also blown through with compressed air to force out any dirt that may have been loosened but not removed by the solvent. Once the cleaning process is complete, the carburetor is reassembled using new gaskets, O-rings and, generally, a new inlet needle valve and seat.

6 Before disassembling the carburetor(s), make sure you have a carburetor rebuild kit (which will include all necessary O-rings and other parts), some carburetor cleaner, a supply of rags, some means of blowing out the carburetor passages and a clean place to work.

6 Carburetor - removal and installation

Warning: Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) with a pilot light is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and, if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher on hand.

Removal

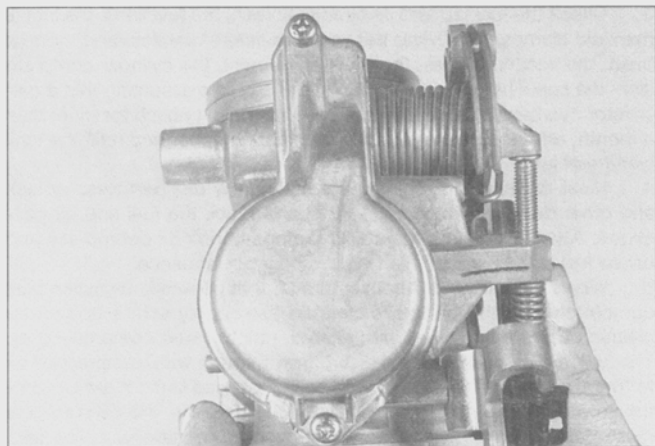
Refer to illustration 6.5

- 1 Remove the seat and both side covers (see Chapter 7).
- 2 Remove the fuel tank (see Section 2).
- 3 If you're working on an XL600R, disconnect the throttle and choke cables at the carburetor (see Section 10).
- 4 If you're working on a 1985 through 1987 XR600R, remove the mounting bands from the rear shock reservoir and move the shock reservoir out of the way.
- 5 Loosen the clamping bands on the air cleaner duct and intake manifold (see illustration). Work the carburetor free of the duct and manifold and lift it off.
- 6 If you're working on an XR600R, disconnect the throttle cables from the carburetor (see Section 10).
- 7 Disconnect the vent and drain hoses from the carburetor.
- 8 Check the intake manifold tube for cracks, deterioration or other damage. If it has visible defects, or if there's reason to suspect its O-ring is leaking, remove it from the engine and inspect the O-ring. On 1983 through 1987 models, also remove the insulator spacer and inspect its O-rings.
- 9 After the carburetor has been removed, stuff clean rags into the intake manifold (or the intake port in the cylinder head, if the manifold has been removed) to prevent the entry of dirt or other objects.

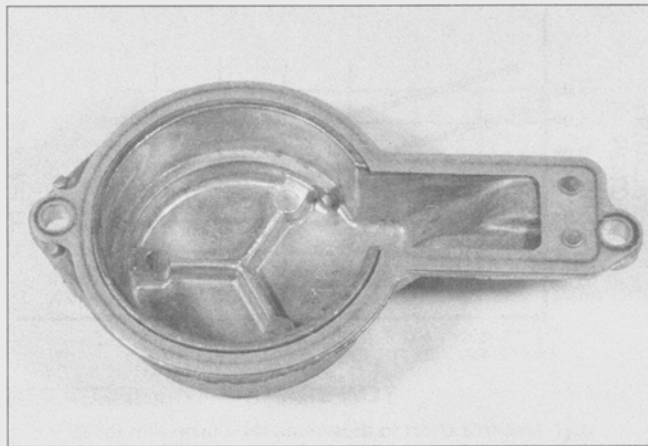
Installation

10 Installation is the reverse of the removal steps, with the following additions:

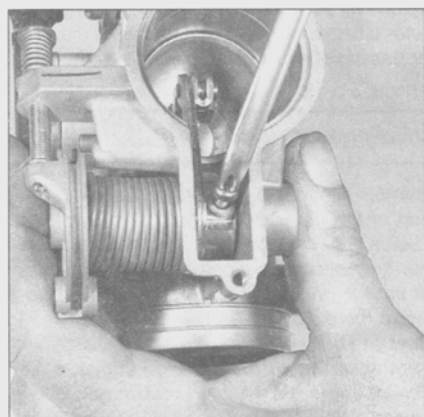
- a) Adjust the throttle freeplay (see Chapter 1).
- b) Adjust the idle speed (see Chapter 1).



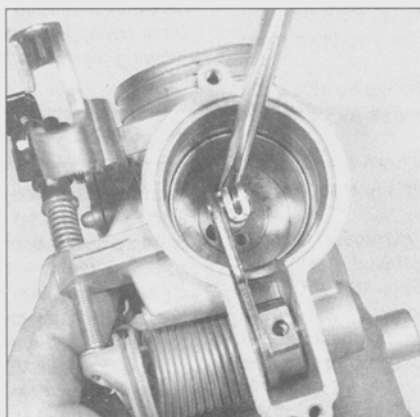
7.3a Remove the two screws . . .



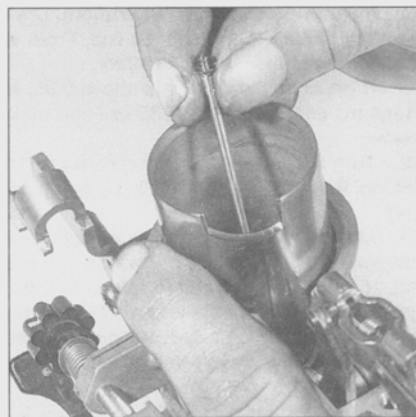
7.3b . . . and lift the top and gasket off the carburetor



7.3c Remove the screw from the link arm



7.3d Remove the screws and lift out the link arm, link and jet needle retainer



7.3e Lift the jet needle out of the throttle valve and lift the throttle valve out of the carburetor

7 Carburetor - disassembly, cleaning and inspection

Warning: Gasoline is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance (such as a water heater or clothes dryer) with a pilot light is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to

fuel, and, if you spill any fuel on your skin, rinse it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a Class B type fire extinguisher on hand.

Disassembly

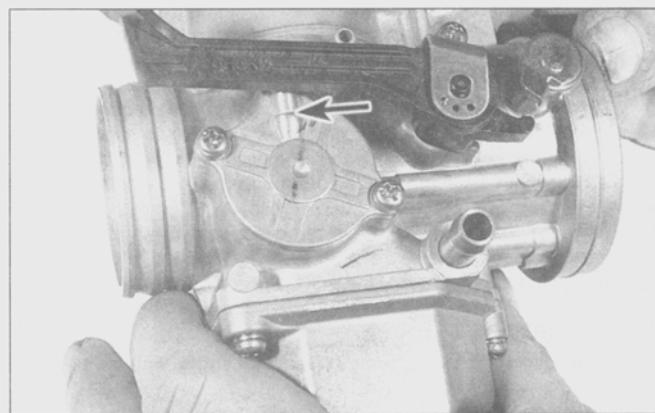
Refer to illustrations 7.3a through 7.3m

- 1 Remove the carburetor(s) from the machine as described in Section 6. Set it on a clean working surface.
- 2 If it's necessary to separate the carburetors from each other on a dual carburetor model, remove the two assembly screws and detach the connecting hose. Remove the bracket for the throttle stop screw and separate the carburetors.
- 3 To disassemble the carburetor(s), refer to the accompanying illustrations (see illustrations).

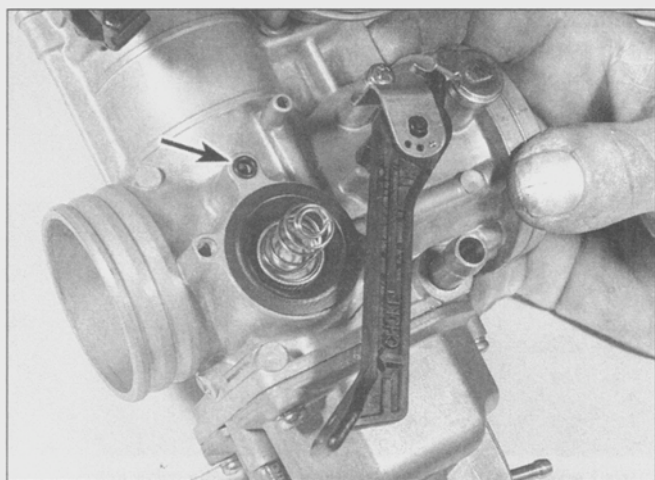
Cleaning

Caution: Use only a carburetor cleaning solution that is safe for use with plastic parts (be sure to read the label on the container).

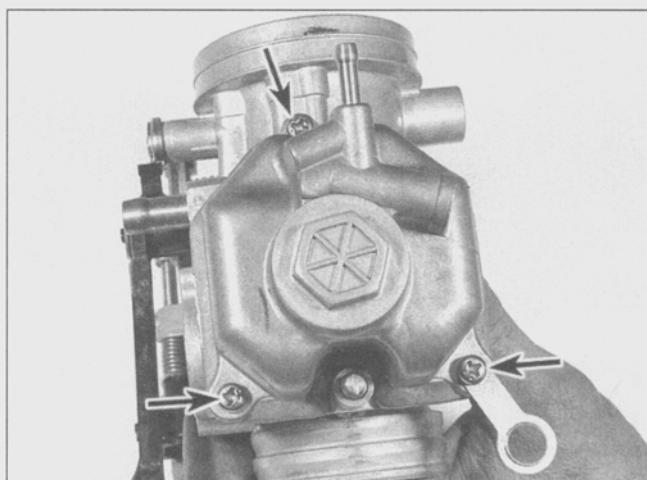
- 4 Submerge the metal components in the carburetor cleaner for approximately thirty minutes (or longer, if the directions recommend it).
- 5 After the carburetor has soaked long enough for the cleaner to loosen and dissolve most of the varnish and other deposits, use a brush to remove the stubborn deposits. Rinse it again, then dry it with compressed air. Blow out all of the fuel and air passages in the carburetor body. **Caution:** Never clean the jets or passages with a piece of wire or a drill bit, as they will be enlarged, causing the fuel and air metering rates to be upset.



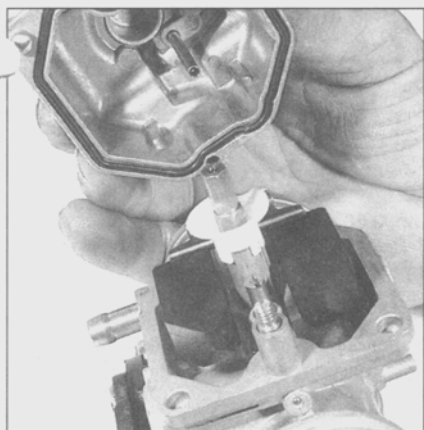
7.3f Remove the air cutoff valve cover screws; note the location of the air passage (arrow)



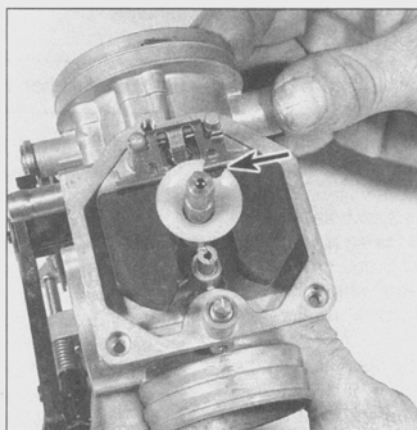
7.3g Remove the O-ring (arrow), spring and diaphragm



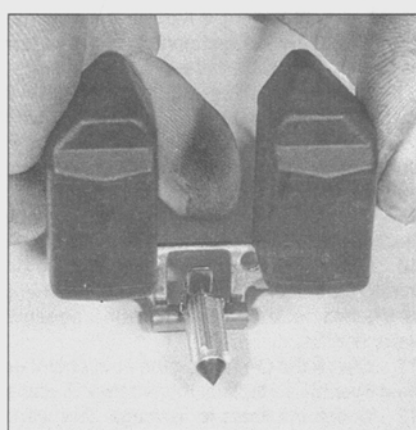
7.3h Remove the float chamber screws (arrows); the plug in the bottom of the float chamber allows the main jet to be changed without removing the carburetor from the engine



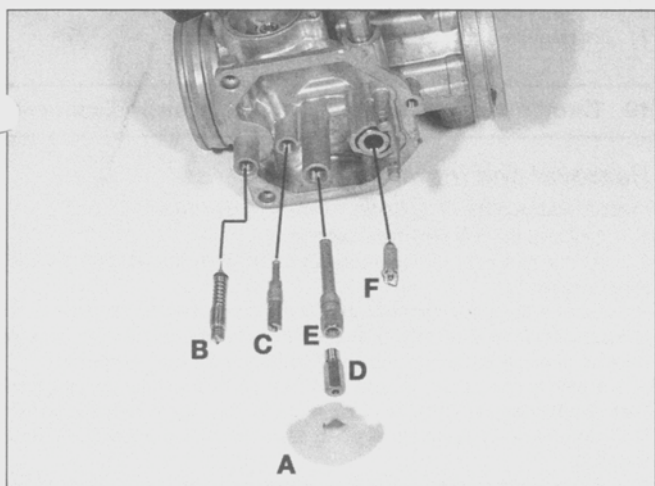
7.3i Lift the float chamber and O-ring off the carburetor body



7.3j Note the location of the notch in the baffle (arrow); push out the float pivot pin and remove the floats



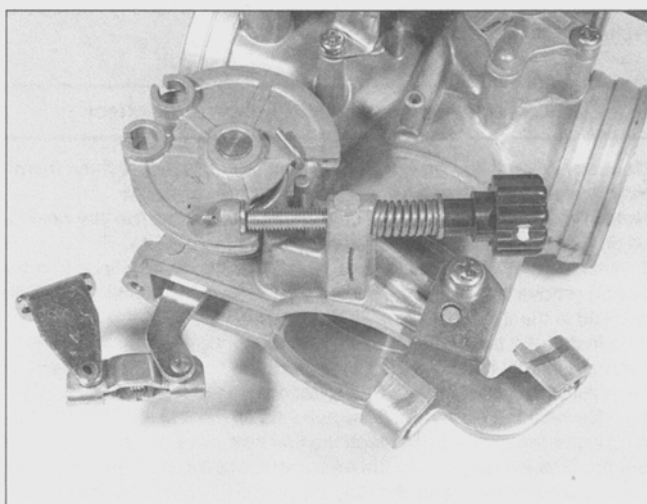
7.3k Remove the clip and detach the needle valve from the floats



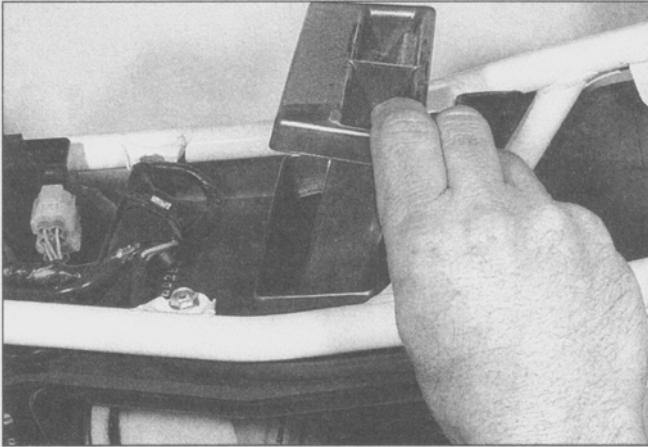
7.3l Float chamber component details

A Baffle
B Pilot screw (if equipped)
C Slow jet

D Main jet
E Needle jet holder
F Needle valve and clip



7.3m If necessary, remove the throttle stop screw and spring



9.5 Lift the air duct out of the air cleaner housing

Inspection

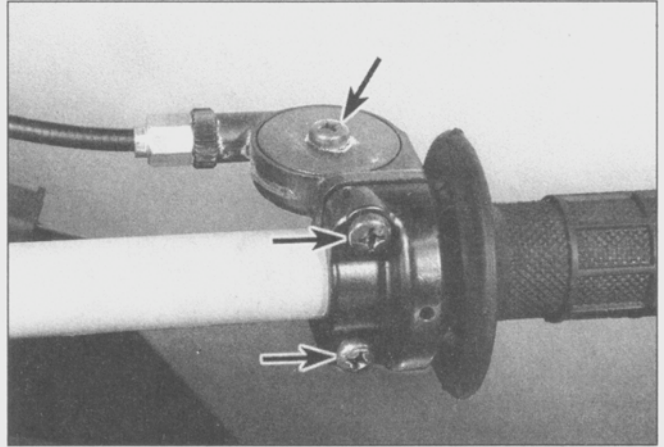
- 6 Check the operation of the choke valve (1983 through 1987) or choke lever (1988 on). If it doesn't move smoothly, replace it.
- 7 Check the tapered portion of the air screw or pilot screw for wear or damage. Replace the screw if necessary.
- 8 Check the carburetor body, float chamber and carburetor top for cracks, distorted sealing surfaces and other damage. If any defects are found, replace the faulty component, although replacement of the entire carburetor will probably be necessary (check with your parts supplier for the availability of separate components).
- 9 Check the jet needle for straightness by rolling it on a flat surface (such as a piece of glass). Replace it if it's bent or if the tip is worn.
- 10 Check the tip of the fuel inlet valve needle. If it has grooves or scratches in it, it must be replaced. Push in on the rod in the other end of the needle, then release it - if it doesn't spring back, replace the valve needle.
- 11 Check the O-rings on the float chamber and the drain plug (in the float chamber). Replace them if they're damaged.
- 12 Check the floats for damage. This will usually be apparent by the presence of fuel inside one of the floats. If the floats are damaged, they must be replaced.
- 13 Insert the throttle valve in the carburetor body and see that it moves up-and-down smoothly. Check the surface of the throttle valve for wear. If it's worn excessively or doesn't move smoothly in the bore, replace the carburetor.

8 Carburetor - reassembly and float height check

Caution: When installing the jets, be careful not to over-tighten them - they're made of soft material and can strip or shear easily.

Note: When reassembling the carburetor, be sure to use the new O-rings, gaskets and other parts supplied in the rebuild kit.

- 1 Install the clip on the jet needle if it was removed. Place it in the needle groove listed in this Chapter's Specifications. Install the needle and clip in the throttle valve.
- 2 Install the pilot screw along with its spring, washer and O-ring, turning it in until it seats lightly. Now, turn the screw out the number of turns listed in this Chapter's Specifications.
- 3 Reverse the disassembly steps to install the jets.
- 4 Invert the carburetor. Attach the fuel inlet valve needle to the float. Set the float into position in the carburetor, making sure the valve needle seats correctly. Install the float pivot pin. To check the float height, hold the carburetor so the float hangs down, then tilt it back until the valve needle is just seated. Measure the distance from the float chamber gasket surface to the top of the float and compare your measurement to the float height listed in this Chapter's Specifications. Bend the float tang as necessary to change the adjustment.



10.3 Loosen the screw that secures the throttle roller cover (upper arrow) and remove the throttle housing screws (lower arrows)

- 5 Install the O-ring into the groove in the float chamber. Place the float chamber on the carburetor and install the screws, tightening them securely.

9 Air cleaner housing - removal and installation

Refer to illustration 9.5

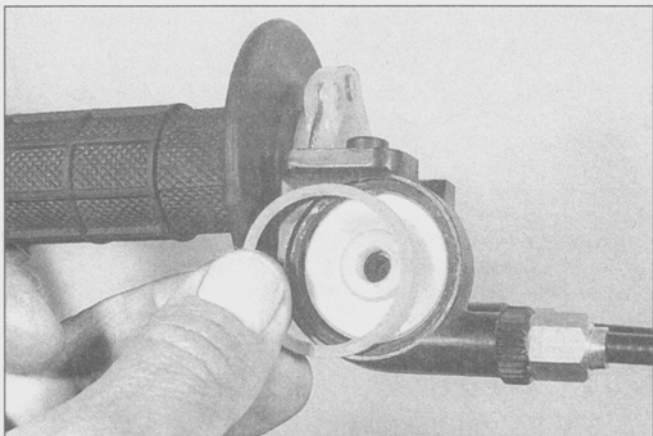
- 1 Remove the seat and both side covers (see Chapter 7). If you're working on an XR600R, remove the inner fender as well.
- 2 If you're working on an XL600R, remove the battery, regulator and regulator/rectifier (see Chapter 4). Remove the retainer for the wiring harness that runs across the top of the air cleaner case, then unplug the harness at the connector and position it out of the way.
- 3 If you're working on a 1985 through 1987 XR600R, remove the shock absorber reservoir mounting bands and position the reservoir out of the way. Remove the regulator and detach the wiring harness retainer from the top of the air cleaner case.
- 4 Loosen the clamp and detach the connecting tube(s) from the carburetor (see illustration 6.5).
- 5 Lift the air duct out of the air cleaner housing (see illustration).
- 6 Remove the air cleaner housing bolts (two on top of the case and one on the right side). Lift the air cleaner housing out of the frame, together with the intake duct.
- 7 Installation is the reverse of the removal steps.

10 Throttle cables - removal, installation and adjustment

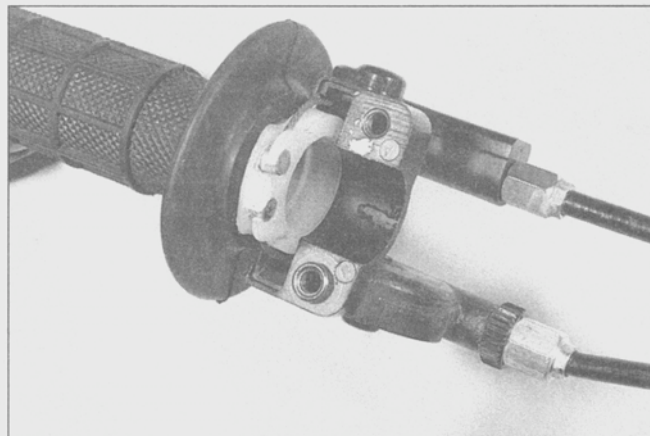
Removal and installation

Refer to illustrations 10.3, 10.4a, 10.4b, 10.5 and 10.8

- 1 Remove the fuel tank (see Section 2).
- 2 At the handlebar, loosen the throttle cable adjuster all the way (see Chapter 1).
- 3 Loosen the screw that secures the cover on the throttle cable roller (if equipped) (see illustration). Separate the halves of the throttle cable housing, then slide the housing and throttle grip off the handlebar.
- 4 Remove the cover, gasket and throttle cable roller (if equipped) (see illustration). Rotate the cable ends to align them with the slots in the throttle grip pulley, then slip the ends out of the pulley (see illustration).
- 5 At the carburetor(s), loosen the cable locknuts and slip the cables out of the bracket (see illustration). Rotate the cables to align with the slots in the throttle pulley and slide the cable ends sideways to detach them from the pulley.
- 6 Route the cables into place. Make sure they don't interfere with any other components and aren't kinked or bent sharply.



10.4a Slide the throttle grip off the handlebar, then remove the throttle roller cover, gasket and throttle roller



10.4b Free the ends of the throttle cables from the throttle grip pulley

7 Lubricate the throttle pulley ends of the cables with multi-purpose grease. Reverse the disconnection steps to connect the throttle cables to the throttle grip pulley. If the bike has a throttle roller, install the roller, gasket and cover.

Coat the handlebar with silicone grease and slide the throttle housing and throttle grip on. Position the throttle housing so the parting line of the throttle housing and clamp is aligned with the punch mark on the handlebar, then install the clamp (see illustration). Tighten the clamp screws securely, then tighten the throttle roller screw (if equipped) securely.

9 Attach the cables to the throttle pulley at the carburetor and position them in the bracket.

10 Operate the throttle and make sure it returns to the idle position by itself under spring pressure. **Warning:** If the throttle doesn't return by itself, find and solve the problem before continuing with installation. A stuck throttle can lead to loss of control of the motorcycle.

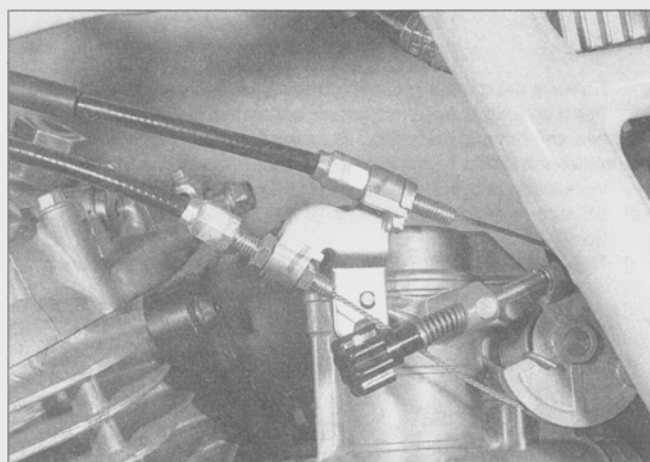
Adjustment

11 Follow the procedure outlined in Chapter 1, Throttle operation/grip freeplay - check and adjustment, to adjust the cables.

12 Turn the handlebars back and forth to make sure the cables don't cause the steering to bind.

13 Once you're sure the cables operate properly, install the fuel tank.

14 With the engine idling, turn the handlebars through their full travel (full left lock to full right lock) and note whether idle speed increases. If it does, the cable is routed incorrectly. Correct this dangerous condition before riding the bike.

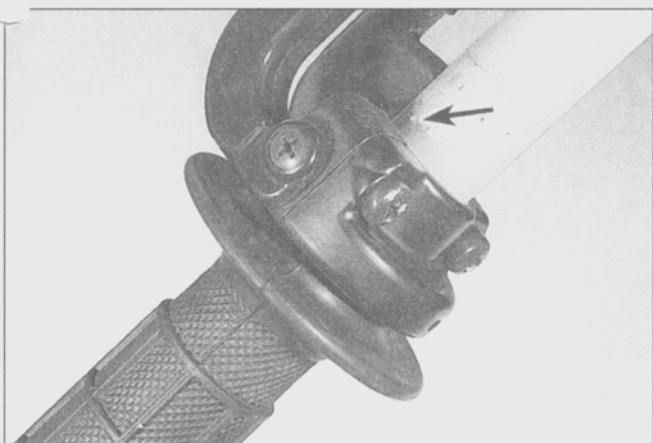


10.5 At the carburetor, loosen the cable locknuts, detach the cables from the bracket and free the ends from the throttle pulley

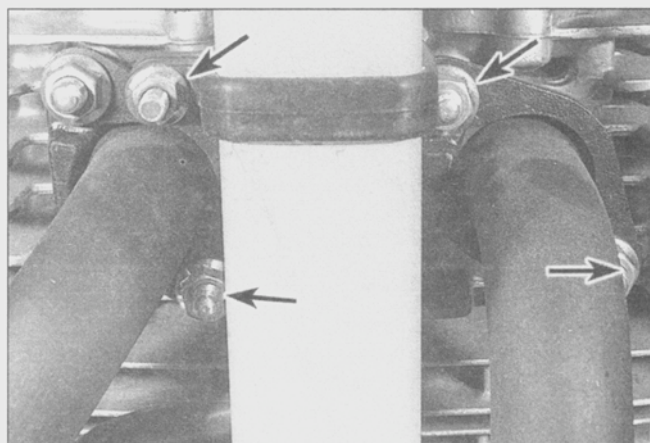
11 Exhaust system - removal and installation

Refer to illustrations 11.1, 11.2a, 11.2b and 11.4

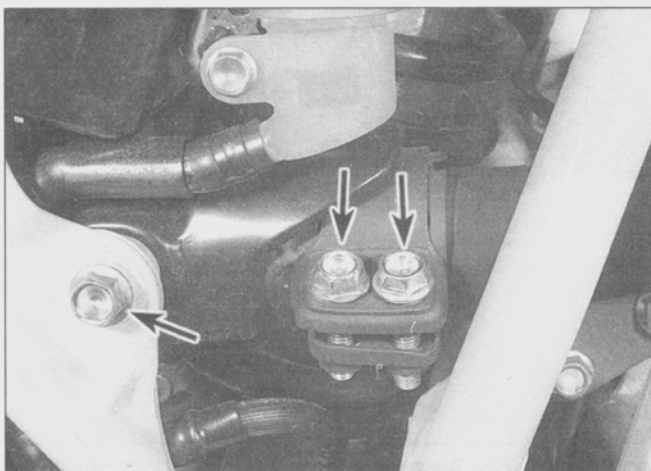
1 Remove the exhaust pipe holder nuts and slide the holders off the mounting studs (see illustration).



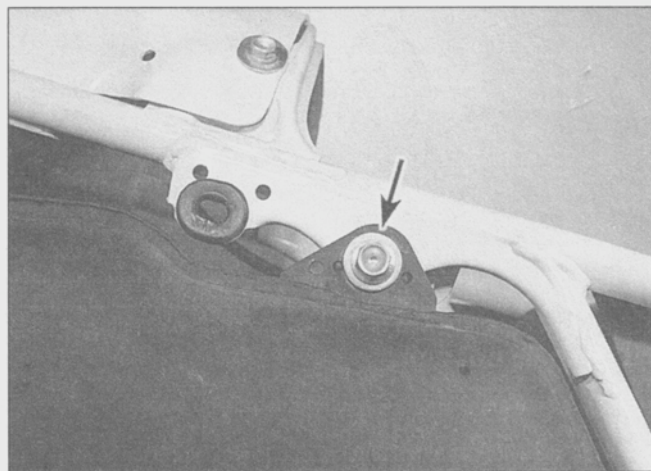
10.8 The punch mark in the handlebar (arrow) aligns with the parting line of the throttle housing halves upon installation



11.1 Remove the holder nuts (arrows) and slide the holders off the studs

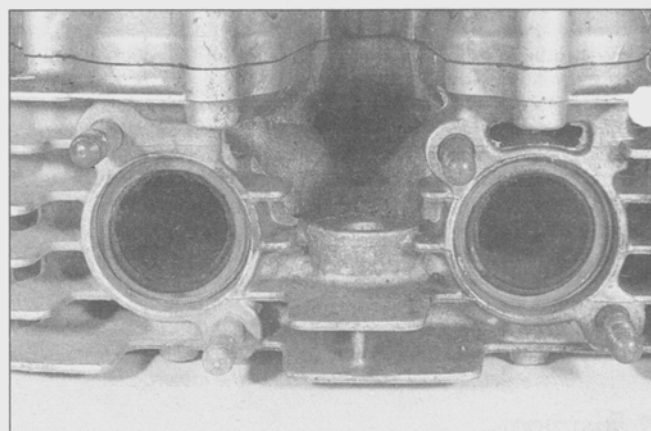


11.2a Remove the forward mounting bolt (left arrow); to separate the muffler from the exhaust pipes, loosen the clamp bolts (right arrows)



11.2b Remove the rear mounting bolt (arrow) to detach the muffler from the frame

- 2 Remove the muffler mounting bolts (see illustrations).
- 3 Pull the exhaust system forward, separate the pipe from the cylinder head and remove the system from the machine. To detach the muffler, loosen the clamp and pull the pipes out of it (see illustration 11.2a).
- 4 Installation is the reverse of removal, with the following additions:
 - a) Be sure to install new gaskets at the cylinder head (see illustration).
 - b) Tighten the muffler mounting bolts and holder nuts securely.



11.4 Install new gaskets in the exhaust ports

Chapter 4

Ignition and electrical systems

Contents

	Section		Section
AC regulator - check and replacement	15	General information	1
Alternator stator coils and rotor - check and replacement	14	Handlebar switches - check and replacement	10
Battery (XL600R models) - charging	4	Headlight aim - check and adjustment	7
Battery (XL600R models) - inspection and maintenance	3	Ignition coil - check, removal and installation	19
Brake light switches (XL600R) - check and replacement	8	Ignition system - check	18
Bulbs - replacement	6	Ignition system - general information	17
CDI unit - harness check, removal and installation	21	Ignition switch (XL600R) - check and replacement	9
Charging system (XL600R) - leakage and output test	13	Pulse generator - check, removal and installation	20
Charging system testing (XL600R) - general information		Regulator/rectifier (XL600R) - replacement	16
and precautions	12	Spark plug replacement	See Chapter 1
Electrical troubleshooting	2	Speedometer/odometer and cable - removal and	
Fuse (XL600R models) - check and replacement	5	installation	11

Specifications

General

Battery (XL600R)	
Type	12V, 3Ah (amp-hours)
Specific gravity	See Chapter 1
Fuse rating (XL600R)	10 amps
Charging system voltage (XL600R)	13.7 to 15.3 volts AC
AC regulator voltage	
1983 through 1986 XL600R	13.5 to 14.5 volts at 5000 rpm
1987	
XL600R	13.7 to 14.2 volts at 5000 rpm
XR600R	13.5 to 14.5 volts at 5000 rpm

Alternator stator coil resistance

XL600R	
Charging coil	0.95 to 1.29 ohms
Lighting coil	0.4 to 0.55 ohms
Exciter coil	230 to 320 ohms
XR600R	
Exciter coil	
1985 through 1990	230 to 320 ohms
1991 on	50 to 200 ohms
Lighting coil	
1985 through 1987	0.44 to 0.60 ohms
1988 on	0.1 to 1.0 ohms
Pulse generator resistance	360 to 440 ohms

Ignition coil resistance (at 20-degrees C/68-degrees F)

1983 through 1987 XL600R, 1990 and earlier XR600R	
Primary resistance	0.1 to 0.3 ohms
Secondary resistance	
With plug cap attached	8500 to 11,000 ohms
With plug cap detached	3700 to 4500 ohms
1991 and later XR600R	
Primary resistance	0.1 to 0.3 ohms
Secondary resistance (with plug cap detached)	2000 to 4000 ohms

Torque specifications

Alternator rotor bolt	
1983 through 1987	100 to 120 Nm (72 to 87 ft-lbs)
1988-on	123 Nm (90 ft-lbs)*

*On 1998 and later models, apply clean engine oil to the threads and the underside of the bolt head.

1 General information

All of the machines covered by this manual are equipped with a capacitive discharge ignition system (CDI), a headlight and a taillight. The engine is started with a kickstarter.

XR600R models do not have a battery, a fuse, turn signals or brake lights. Current generated by the alternator operates the ignition system and powers the lights.

XL600R models, which are street-legal, use a 12-volt electrical system with a battery. The components include a crankshaft-mounted permanent-magnet alternator and a solid state voltage regulator/rectifier unit.

The alternator consists of a multi-coil stator mounted inside the left engine cover and a permanent magnet rotor mounted on the end of the crankshaft. The regulator maintains the charging system output within the specified range to prevent overcharging. The rectifier converts the AC output of the alternator to DC current to power the lights and other components and to charge the battery. A single main fuse protects the electrical system.

Note: *Keep in mind that electrical parts, once purchased, can't be returned. To avoid unnecessary expense, make very sure the faulty component has been positively identified before buying a replacement part.*

2 Electrical troubleshooting

A typical electrical circuit consists of an electrical component, the switches, relays, etc. related to that component and the wiring and connectors that hook the component to both the battery (if equipped) and the frame. To aid in locating a problem in any electrical circuit, complete wiring diagrams of each model are included at the end of this Chapter.

Before tackling any troublesome electrical circuit, first study the appropriate diagrams thoroughly to get a complete picture of what makes up that individual circuit. Trouble spots, for instance, can often be narrowed down by noting if other components related to that circuit are operating properly or not. If several components or circuits fail at one time, chances are the fault lies in the fuse (if equipped) or ground connection, as several circuits often are routed through the same fuse and ground connections.

Electrical problems often stem from simple causes, such as loose or corroded connections or a blown fuse. Prior to any electrical troubleshooting, always visually check the condition of the fuse (if equipped), wires and connections in the problem circuit.

If testing instruments are going to be utilized, use the diagrams to plan where you will make the necessary connections in order to accurately pinpoint the trouble spot.

The basic tools needed for electrical troubleshooting include a test light or voltmeter, an ohmmeter or a continuity tester (which includes a bulb, battery and set of test leads) and a jumper wire, preferably with a circuit breaker incorporated, which can be used to bypass electrical components. Specific checks described later in this Chapter may also require an ammeter.

On XL600R models (which have a battery), voltage checks should be performed if a circuit is not functioning properly. Connect one lead of a test light or voltmeter to either the negative battery terminal or a known good ground. Connect the other lead to a connector in the circuit being tested, preferably nearest to the battery or fuse. If the bulb lights, voltage is reaching that point, which means the part of the circuit between that connector and the battery is problem-free. Continue checking the remainder of the circuit in the same manner. When you reach a point where no voltage is present, the problem lies between there and the last good test point. Most of the time the problem is due to a loose connection. Keep in mind that some circuits only receive voltage when the ignition key is in the On position.

One method of finding short circuits on XL600R models is to remove the fuse and connect a test light or voltmeter in its place to the fuse terminals. There should be no load in the circuit. Move the wiring

harness from side-to-side while watching the test light. If the bulb lights, there is a short to ground somewhere in that area, probably where insulation has rubbed off a wire. The same test can be performed on other components in the circuit, including the switch.

A ground check should be done on XL600R models to see if a component is grounded properly. Disconnect the battery and connect one lead of a self-powered test light (such as a continuity tester) to a known good ground. Connect the other lead to the wire or ground connection being tested. If the bulb lights, the ground is good. If the bulb does not light, the ground is not good.

A continuity check is performed to see if a circuit, section of circuit or individual component is capable of passing electricity through it. Disconnect the battery and connect one lead of a self-powered test light (such as a continuity tester) to one end of the circuit being tested and the other lead to the other end of the circuit. If the bulb lights, there is continuity, which means the circuit is passing electricity through it properly. Switches can be checked in the same way.

Remember that all electrical circuits are designed to conduct electricity from the battery (if equipped), through the wires, switches, etc. to the electrical component (light bulb, etc.). From there it is directed to the frame (ground) where it is passed back to the battery or alternator. Electrical problems are basically an interruption in the flow of electricity from the battery or back to it.

3 Battery (XL600R models) - inspection and maintenance

1 Most battery damage is caused by heat, vibration, and/or low electrolyte levels, so keep the battery securely mounted, check the electrolyte level frequently and make sure the charging system is functioning properly.

2 Refer to Chapter 1 for electrolyte level and specific gravity checking procedures.

3 Check around the base inside of the battery for sediment, which is the result of sulfation caused by low electrolyte levels. These deposits will cause internal short circuits, which can quickly discharge the battery. Look for cracks in the case and replace the battery if either of these conditions is found.

4 Check the battery terminals and cable ends for tightness and corrosion. If corrosion is evident, remove the cables from the battery and clean the terminals and cable ends with a wire brush or knife and emery paper. Reconnect the cables and apply a thin coat of petroleum jelly to the connections to slow further corrosion.

5 The battery case should be kept clean to prevent current leakage, which can discharge the battery over a period of time (especially when it sits unused). Wash the outside of the case with a solution of baking soda and water. Do not get any baking soda solution in the battery cells. Rinse the battery thoroughly, then dry it.

6 If acid has been spilled on the frame or battery box, neutralize it with the baking soda and water solution, dry it thoroughly, then touch up any damaged paint. Make sure the battery vent tube is directed away from the frame and is not kinked or pinched.

7 If the motorcycle sits unused for long periods of time, disconnect the cables from the battery terminals. Refer to Section 4 and charge the battery approximately once every month.

4 Battery (XL600R models) - charging

1 If the machine sits idle for extended periods or if the charging system malfunctions, the battery can be charged from an external source.

2 To properly charge the battery, you will need a charger of the correct rating, a hydrometer, a clean rag and a syringe for adding distilled water to the battery cells.

3 The maximum charging rate for any battery is 1/10 of the rated amp/hour capacity. As an example, the maximum charging rate for the 14 amp/hour battery would be 1.4 amps. If the battery is charged at a higher rate, it could be damaged.

4 Do not allow the battery to be subjected to a so-called quick charge (high rate of charge over a short period of time) unless you are prepared to buy a new battery.

5 When charging the battery, always remove it from the machine and be sure to check the electrolyte level before hooking up the charger. Add distilled water to any cells that are low.

6 Loosen the cell caps, hook up the battery charger leads (red to positive, black to negative), cover the top of the battery with a clean rag, then, and only then, plug in the battery charger. **Warning:** Remember, the gas escaping from a charging battery is explosive, so keep open flames and sparks well away from the area. Also, the electrolyte is extremely corrosive and will damage anything it comes in contact with.

7 Allow the battery to charge until the specific gravity is as specified (refer to Chapter 1 for specific gravity checking procedures). The charger must be unplugged and disconnected from the battery when making specific gravity checks. If the battery overheats or gases excessively, the charging rate is too high. Either disconnect the charger or lower the charging rate to prevent damage to the battery.

8 If one or more of the cells do not show an increase in specific gravity after a long slow charge, or if the battery as a whole does not seem to want to take a charge, it is time for a new battery.

9 When the battery is fully charged, unplug the charger first, then disconnect the leads from the battery. Install the cell caps and wipe any electrolyte off the outside of the battery case.

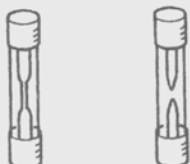
5 Fuse (XL600R models) - check and replacement

Refer to illustration 5.2

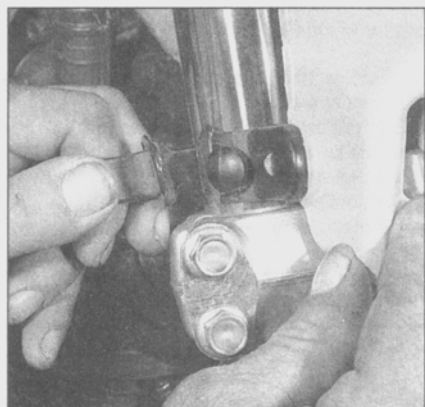
1 The fuse is located under the seat, next to the battery. The fuse is protected by a plastic cover.

2 The fuse can be removed and checked visually. A blown fuse is easily identified by a break in the element (**see illustration**).

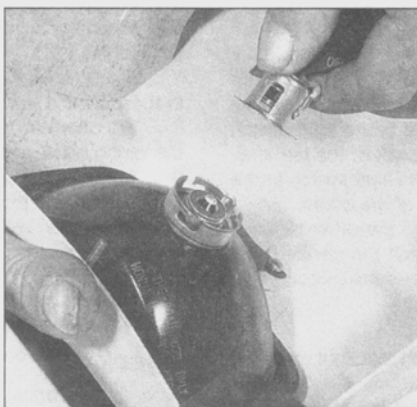
3 If the fuse blows, be sure to check the wiring harnesses very carefully for evidence of a short circuit. Look for bare wires and chafed, melted or burned insulation. If a fuse is replaced before the cause is located, the new fuse will blow immediately.



5.2 A blown fuse can be identified by its broken element - the fuse on the left is good; the fuse on the right is blown



6.6 Unwrap the retainer bands from the fork tubes to detach the headlight housing



6.7 Press in the bulb socket and turn it counterclockwise, then pull it out



6.8 Rotate the bulb to align its tabs with the slots and pull it out

4 Never, under any circumstances, use a higher rated fuse or bridge the fuse holder terminals, as damage to the electrical system or a fire could result.

5 Occasionally a fuse will blow or cause an open circuit for no obvious reason. Corrosion of the fuse ends and fuse holder terminals may occur and cause poor fuse contact. If this happens, remove the corrosion with a wire brush or emery paper, then spray the fuse end and terminals with electrical contact cleaner.

6 Bulbs - replacement

1 Since these bikes are used off-road, it's a good idea to check the lens and bulb housing for built-up dirt and clean them thoroughly whenever a bulb is changed.

Headlight bulbs

Warning: To avoid burning your fingers, let the bulb cool before replacing it.

XL600R models

2 Remove the two mounting bolts and take the headlight case off the motorcycle.

3 Pull off the rubber cover on the back of the headlight assembly.

4 Remove the bulb retaining clip and pull the bulb out.

5 Installation is the reverse of the removal steps. Make sure the Top marks on the rubber cover and bulb are up.

XR600R models

Refer to illustrations 6.6, 6.7 and 6.8

6 Unhook the four rubber mounting bands and take the headlight case off (**see illustration**).

7 Twist the bulb socket counterclockwise and remove it from the headlight assembly (**see illustration**).

8 Twist the bulb counterclockwise and remove it (**see illustration**).

9 Installation is the reverse of the removal steps.

All models

10 Refer to Section 7 and adjust headlight aim.

Tail/brake/license plate light bulb (XL600R models)

11 Remove the lens screws and take the lens off the tail light housing.

12 Press the bulb into its socket, turn it counterclockwise to align the bulb retaining pins with their grooves and pull the bulb out.

13 Installation is the reverse of the removal steps. The bulb pins are offset so the bulb can only go in one way.

Tail light bulb (XR600R models)

Refer to illustration 6.14

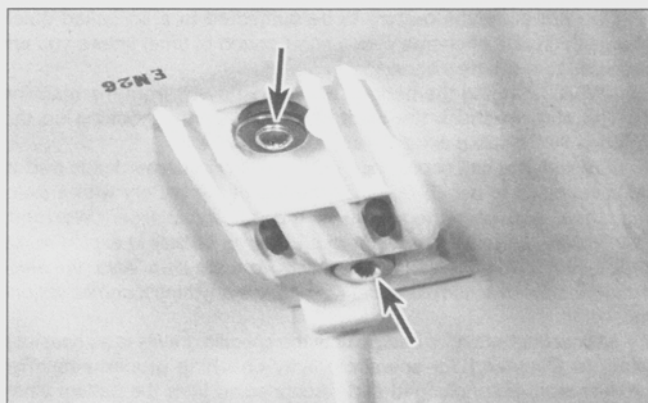
- 14 Remove the lens screws (they're accessible from underneath the fender) (see illustration).
- 15 Take the lens off, pull the bulb out of its socket and install a new one.

Turn signal bulbs (XL600R models)

- 16 Remove the lens screws from the turn signal housing and take the lens and gasket off the housing.
- 17 Press the bulb into its socket, turn it counterclockwise to align the bulb retaining pins with their grooves and pull the bulb out.
- 18 Installation is the reverse of the removal steps.

Instrument light bulbs (XL600R models)

- 19 Pull the bulb socket out of the underside of the instrument housing. Pull the bulb out of the socket, push in a new one and push the socket back into the housing.



6.14 The XR600R tail light lens screws (arrows) are accessible from beneath the fender

7 Headlight aim - check and adjustment

- 1 An improperly adjusted headlight may cause problems for oncoming traffic or provide poor, unsafe illumination of the terrain ahead. Before adjusting the headlight, be sure to consult with local traffic laws and regulations. Honda doesn't provide specifications for headlight adjustment.

XL600R models

- 2 Adjust the headlight vertically by loosening the headlight housing bolts, swiveling the housing and tightening the bolts.
- 3 Adjust the headlight horizontally by turning the screw in the underside of the headlight housing, to the right of center.

XR600R models

- 4 These bikes don't have a horizontal adjustment. Adjust the beam vertically by turning the screw in the lower front edge of the headlight housing.

8 Brake light switches (XL600R) - check and replacement

- 1 Before checking any electrical circuit on an XL600R model, check the fuse (see Section 5).
- 2 The front brake light switch is mounted under the master cylinder. The rear brake light switch is mounted in a bracket behind the brake pedal.

Test light check

- 3 Turn the ignition switch On. Using a test light connected to a good ground, check for voltage to the black wire at the front brake light switch or the black wire in the harness side of the connector at the rear brake light switch. Leave the connector at the rear brake light switch connected and insert the test light probe into the back of the terminal. If there's no voltage, check the wiring from the brake light switch to the ignition switch (see the wiring diagrams at the end of the book).
- 4 If voltage is available, connect the test light to the other terminal at the brake light switch, then pull the lever or push the pedal. If the test light comes on, the switch is good. If not, replace the switch.

Ohmmeter check

- 5 This test can also be made with a self-powered test light (one that has its own battery).
- 6 Disconnect the wires from the switch. Connect the ohmmeter or test light between the switch terminals (if you're testing a rear switch, connect the tester between the terminals in the switch side of the wiring harness).

- 7 Pull the lever or press the pedal. The ohmmeter should show zero or near-zero; the test light should illuminate. If not, replace the switch.

Replacement

- 8 To remove a front brake light switch, disconnect its wires, remove the switch mounting screw and take the switch off the master cylinder.
- 9 To remove a rear brake light switch, unhook the spring and disconnect the electrical connector. Loosen the adjusting nut until it comes off the switch threads, then pull the switch out of the bracket (don't turn the switch body).
- 10 Installation is the reverse of the removal steps. Refer to Chapter 1 to adjust the rear brake light switch. The front switch isn't adjustable.

9 Ignition switch (XL600R) - check and replacement**Check**

- 1 Follow the wiring harness from the ignition switch to the connector and unplug the connector.
- 2 Using an ohmmeter, check the continuity between the black wire and red wire terminals with the switch in the On position; continuity should exist. Next, check the continuity between the black/white wire and the green wire terminals with the switch in the Off position; continuity should exist.
- 3 If the switch fails either test, replace it.

Replacement

- 4 Refer to Section 6 and remove the headlight housing.
- 5 Follow the switch wires to the connector and unplug it.
- 6 Place the key in the lock and turn it to a position halfway between On and Off.
- 7 If you're working on a 1986 or 1987 model, remove three screws that secure the switch to the lock cylinder.
- 8 Pry open the metal clip or cut off the plastic tie wrap that secures the wiring harness just below the switch.
- 9 Squeeze the plastic lugs that secure the switch in the lock cylinder housing and pull the switch out of the lock cylinder.
- 10 Installation is the reverse of the removal steps.

10 Handlebar switches - check and replacement**Check**

Refer to illustration 10.4

- 1 Generally speaking, the switches are reliable and trouble-free. Most troubles, when they do occur, are caused by dirty or corroded contacts, but wear and breakage of internal parts is a possibility that

ENGINE STOP SWITCH

	BI/W	G
OFF	●	●
RUN		
OFF	●	●

REAR BRAKE LIGHT SWITCH

	BI	BI
ON	●	●
OFF		

TURN SIGNAL SWITCH

	Gr	Lb	O
R	●	●	
(N)			
L	●	●	

DIMMER SWITCH

	W/Y	W	Blu
R	●	●	
(N)	●	●	●
L	●	●	

FRONT BRAKE LIGHT SWITCH

	BI	G/Y
ON	●	●
OFF		

HORN SWITCH

	Lg	B
FREE		
PUSH	●	●

2183-4-10.4 HAYNES

10.4 Continuity should exist between the terminals connected by the lines when the switch is in the indicated position

should not be overlooked. If breakage does occur, the entire switch and related wiring harness will have to be replaced with a new one, since individual parts are not usually available.

2 The switches can be checked for continuity with an ohmmeter or a continuity test light. If you're working on an XL600R, always disconnect the battery negative cable, which will prevent the possibility of a short circuit, before making the checks.

3 Trace the wiring harness of the switch in question and unplug the electrical connectors.

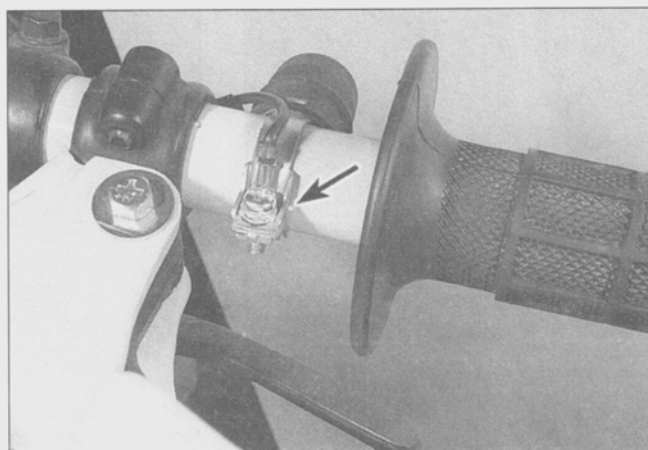
4 Using the ohmmeter or test light, check for continuity between the terminals of the switch harness with the switch in the various positions (**see illustration**). Refer to the continuity diagrams contained in the wiring diagrams at the end of the book. Continuity should exist between the terminals connected by a solid line when the switch is in the indicated position.

5 If the continuity check shows that a problem exists, disassemble the switch and spray the switch contacts with electrical contact cleaner. If they are accessible, the contacts can be scraped clean with a knife or polished with crocus cloth. If switch components are damaged or broken, it will be obvious when the switch is disassembled.

Replacement

Refer to illustration 10.8

6 The handlebar switches, with the exception of the XR600R kill switch, are composed of two halves that clamp around the bars. The XR600R kill switch is a button that is secured to the left handlebar by a clamp. They are easily removed for cleaning or inspection by taking



10.8 Align the split in the switch housing or clamp with the punch mark in the handlebar (arrow) (XR600R kill button shown)

out the clamp screws and pulling the switch halves away from the handlebars.

7 To completely remove the switches, the electrical connectors in the wiring harness must be unplugged and the harness separated from the tie wraps and retainers.

8 When installing the switches, make sure the wiring harness is properly routed to avoid pinching or stretching the wires. Align the split in the switch housing or clamp with the punch mark on the handlebar (**see illustration**).

11 Speedometer/odometer and cable - removal and installation

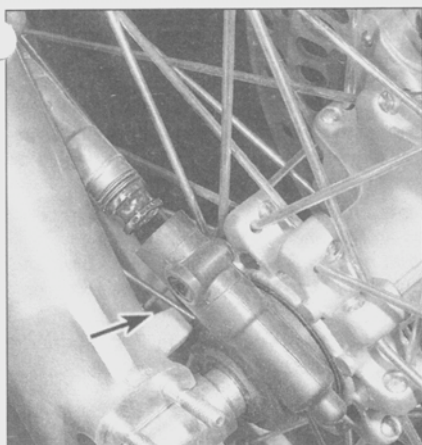
Refer to illustrations 11.2, 11.3, 11.4, 11.5a and 11.5b

1 XL600R models use a speedometer. 1985 and 1986 XR600R models are equipped with Honda's Digital Enduro Meter, which includes a speedometer, trip odometer and elapsed time counter. 1987 and later XR600R models are equipped with a trip odometer.

2 Unscrew the cable retaining bolt and pull the lower end of the cable out of the gear at the front wheel (**see illustration**).

3 Remove the retainer that secures the cable to the right fork leg (**see illustration**).

4 Unscrew the knurled nut and detach the cable from the instrument housing (**see illustration**). **Note:** If you're removing the



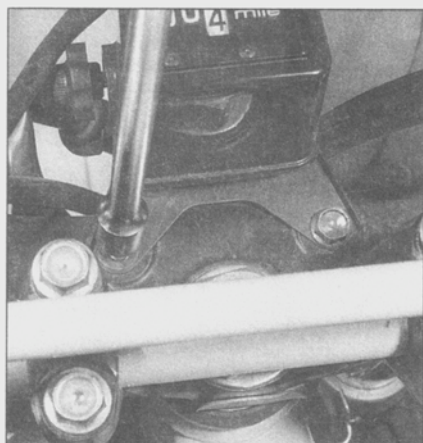
11.2 Remove the bolt and pull the speedometer cable out of the gear; on installation, position the gear lug in the notch on the fork leg (arrow)



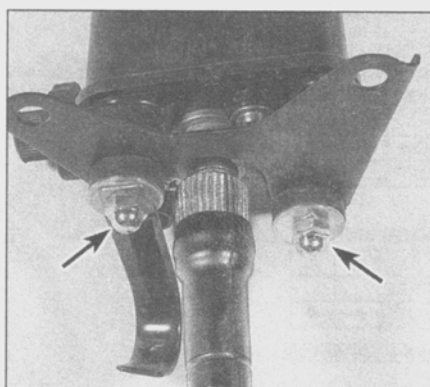
11.3 Detach the cable retainer from the fork leg



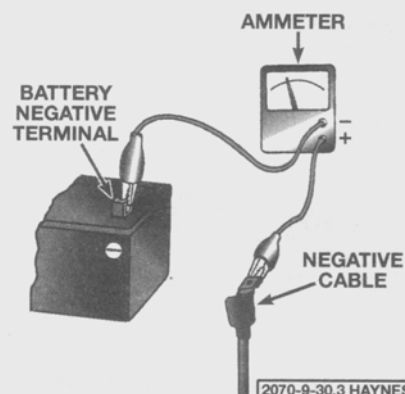
11.4 Unscrew the knurled nut (arrow) and detach the cable from the meter (XR600R trip odometer shown)



11.5a Unbolt the bracket . . .



11.5b . . . and take the meter off (you can leave the cable connected if you're removing it for access to other components); remove the mounting nuts (arrows) to detach the meter from the bracket



13.3 Checking the charging system leakage rate with an ammeter

speedometer or odometer just for access to the components, you can leave the cable connected.

5 Unbolt the bracket and take the speedometer or odometer off the triple clamp (see illustrations).

6 Installation is the reverse of the removal steps.

12 Charging system testing (XL600R) - general information and precautions

1 If the performance of the charging system is suspect, the system as a whole should be checked first, followed by testing of the individual components (the alternator and the regulator/rectifier). **Note:** Before beginning the checks, make sure the battery is fully charged and that all system connections are clean and tight.

2 Checking the output of the charging system and the performance of the various components within the charging system requires the use of a voltmeter, ammeter and ohmmeter or the equivalent multimeter.

3 When making the checks, follow the procedures carefully to prevent incorrect connections or short circuits, as irreparable damage to electrical system components may result if short circuits occur.

4 If the necessary test equipment is not available, it is recommended that charging system tests be left to a dealer service department or a reputable motorcycle repair shop.

13 Charging system (XL600R) - leakage and output test

1 If a charging system problem is suspected, perform the following checks. Start by removing the right side cover for access to the battery (see Chapter 7).

Leakage test

Refer to illustration 13.3

2 Turn the ignition switch Off and disconnect the cable from the battery negative terminal.

3 Set the multimeter to the mA (milliamps) function and connect its negative probe to the battery negative terminal, and the positive probe to the disconnected negative cable (see illustration). Although Honda doesn't specify a leakage limit for these models, it should be very low - about 0.1 milliamp or less.

4 If the reading is too high there is probably a short circuit in the wiring. Thoroughly check the wiring between the various components (see the wiring diagrams at the end of the book).

5 If the reading is satisfactory, disconnect the meter and connect the negative cable to the battery, tightening it securely. Check the alternator output as described below.

Output test

6 Start the engine and let it warm up to normal operating temperature.

7 With the engine idling, attach the positive (red) voltmeter lead to the positive (+) battery terminal and the negative (black) lead to the battery negative (-) terminal. The voltmeter selector switch (if equipped) must be in the 0-20 DC volt range.

8 Slowly increase the engine speed until voltage reaches its maximum (don't exceed 8000 rpm) and compare the voltmeter reading to the value listed in this Chapter's Specifications.

9 If the output is as specified, the alternator is functioning properly.

10 Low voltage output may be the result of damaged windings in the alternator charging coil or wiring problems between the alternator and battery. Make sure all electrical connections are clean and tight, then refer to the following Section to check the alternator charging coil. If the wiring and the charging coil are good, the problem may be a defective regulator/rectifier.

11 High voltage output (above the specified range) indicates a defective voltage regulator/rectifier.

14 Alternator stator coils and rotor - check and replacement

Stator coil check

1 Locate and disconnect the alternator coil connector on the left side of the vehicle frame.

2 To check the coils, connect an ohmmeter between the specified terminals in the side of the connector that runs back to the stator coils on the left side of the engine (in cases where ground is specified, connect the ohmmeter negative terminal to bare metal on the engine or frame). Wire colors and connections are as follows:

- a) XL600R - pink and yellow (charging coil), white/yellow and ground (lighting coil), black/red and ground (ignition exciter coil)
- b) XR600R - black/red and ground (ignition exciter coil), blue and ground (1985 through 1990 lighting coil), white/yellow and green (1991 and later lighting coil)

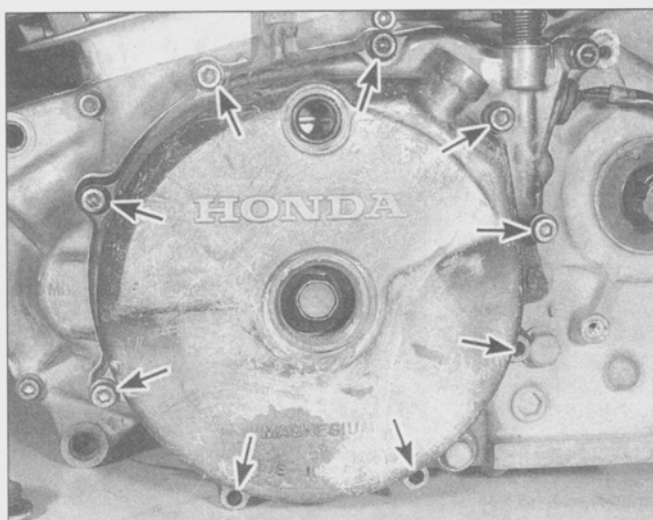
If the readings are much outside the value listed in this Chapter's Specifications, replace the stator coils as described below.

Stator coil replacement

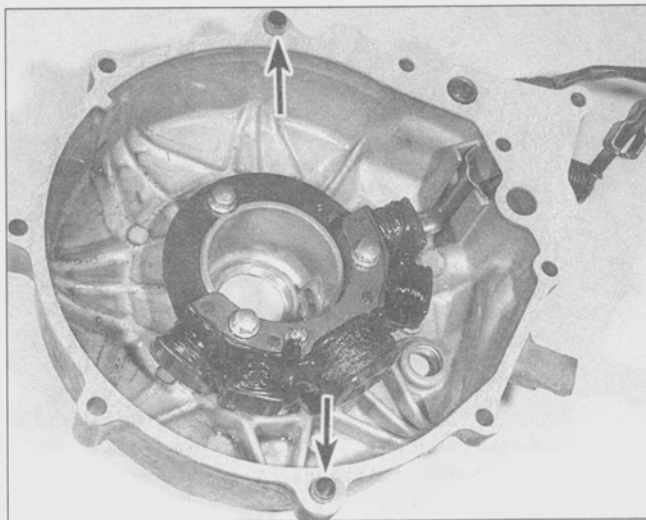
Refer to illustrations 14.3a, 14.3b, 14.4a and 14.4b

3 Remove the left engine cover (see illustrations).

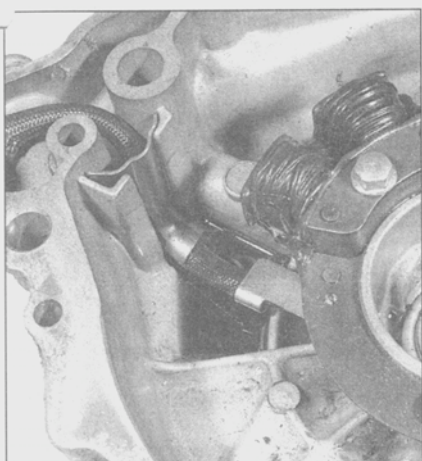
4 Peel the sealant away from the wiring harness grommet (see illustration). Remove the stator coil bolts and take the stator coils out of the cover (see illustration).



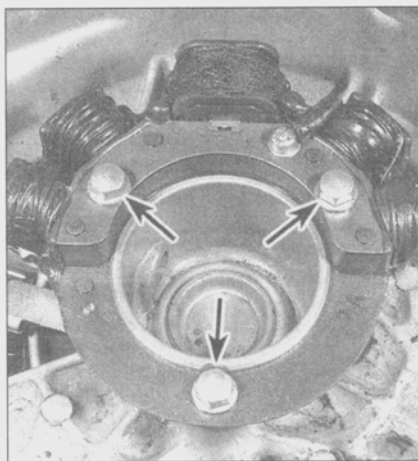
14.3a Remove the Allen bolts from the left-side engine cover (arrows) . . .



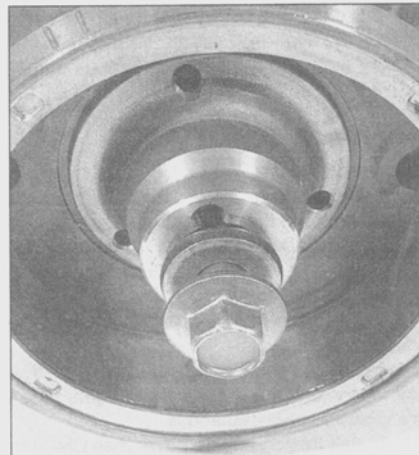
14.3b . . . then remove the gasket and dowels (arrows)



14.4a The harness grommet fits in a notch and the harness retainer fits in two slots



14.4b Remove the bolts (arrows) to detach the stator coils (XR600R shown)



14.7 Hold the rotor and unscrew the bolt

5 Installation is the reverse of the removal steps. Tighten the stator coil bolts securely, but don't overtighten them and strip the threads.

Rotor replacement

Removal

Refer to illustrations 14.7, 14.8 and 14.10

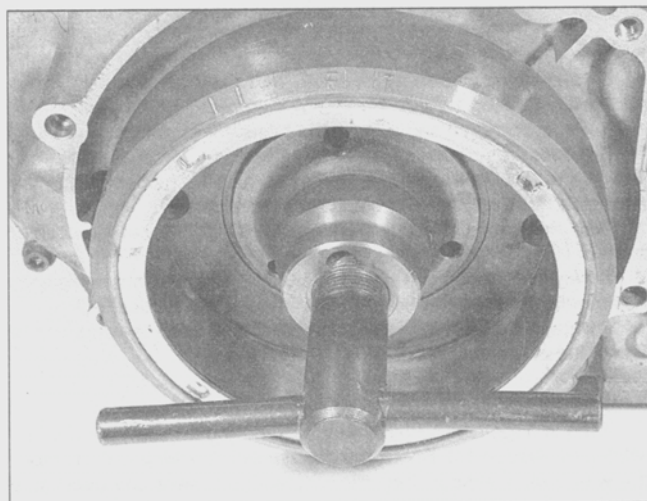
Note: To remove the alternator rotor, the special Honda puller (part no. 07733-0020001 or 07933-3290001) or an aftermarket equivalent will be required. Don't try to remove the rotor without the proper puller, as it's almost sure to be damaged. Pullers are readily available from motorcycle dealers and aftermarket tool suppliers.

6 Remove the left engine cover (see Chapter 2).

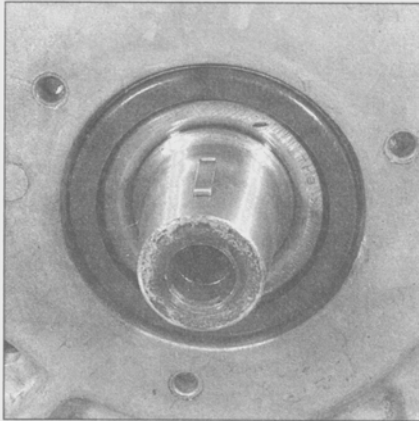
7 Hold the alternator rotor with a strap wrench. If you don't have one and the engine is in the frame, the rotor can be locked by placing the transmission in gear and holding the rear brake on. Unscrew the rotor bolt (see illustration).

8 Thread an alternator puller into the center of the rotor and use it to remove the rotor (see illustration). If the rotor doesn't come off easily, tap sharply on the end of the puller to release the rotor's grip on the tapered crankshaft end.

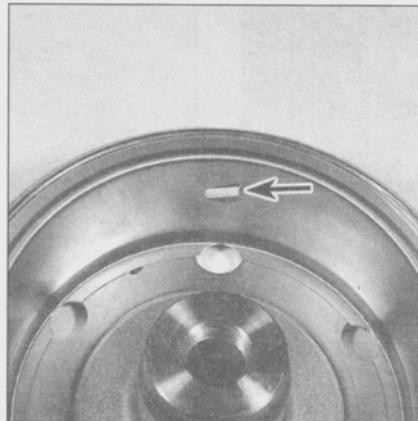
9 Pull the rotor off.



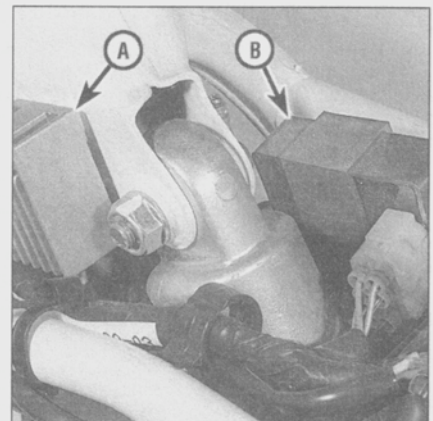
14.8 Remove the rotor with a puller like this one



14.10 Look for the Woodruff key - if it isn't secure in its slot, set it aside for safekeeping



14.11 Be sure there aren't any small metal objects stuck to the rotor magnets; an inconspicuous item like this Woodruff key (arrow) can ruin the rotor and stator if the engine is run



15.9 The AC regulator and CDI unit are mounted under the seat (XR600R shown)

A AC regulator
B CDI unit

10 Check the Woodruff key (*see illustration*); if it's not secure in its slot, pull it out and set it aside for safekeeping. A convenient method is to stick the Woodruff key to the magnets inside the rotor, but be certain not to forget it's there, as serious damage to the rotor and stator coils will occur if the engine is run with anything stuck to the magnets.

Installation

Refer to illustration 14.11

- 11 Take a look to make sure there isn't anything stuck to the inside of the rotor (*see illustration*).
- 12 Degrease the center of the rotor and the end of the crankshaft.
- 13 Make sure the Woodruff key is positioned securely in its slot (*see illustration 14.10*).
- 14 Align the rotor slot with the Woodruff key. Place the rotor on the crankshaft.
- 15 Install the rotor bolt. Hold the rotor from turning with one of the methods described in Step 7 and tighten the bolt to the torque listed in this Chapter's Specifications.
- 16 Install the left engine cover (see Chapter 2).

15 AC regulator - check and replacement

Check

- 1 If you're working on an XL600R, test the charging system as described in Section 13 and correct any problems.
- 2 Refer to Section 6 and remove the headlight assembly.
- 3 Connect a voltmeter between the headlight wires. Set the voltmeter to the 0 to 20-volt range. Connect a tune-up tachometer to the motorcycle, following the manufacturer's instructions.
- 4 Start the engine. If you're working on an XL600R, set the dimmer switch to Hi.
- 5 Slowly increase engine speed to 5,000 rpm and compare the voltmeter reading to the value listed in this Chapter's Specifications.
- 6 If voltage isn't within the specified range, shut off the engine and remove the seat (*see Chapter 7*).

XL600R models

- 7 If the voltage isn't within the specified range, check the dimmer switch (see Section 10). Check the dimmer switch wiring and AC regulator wiring for breaks or bad connections and make any necessary repairs.
- 8 If the switch and wiring are good, or if repairing them doesn't produce AC regulator voltage within the Specifications, the regulator itself

is probably defective. It's a good idea to have it tested by a Honda dealer or substitute a known good unit before condemning it as trash.

XR600R models

Refer to illustration 15.9

- 9 Set an ohmmeter at R x 1000 and connect it between the terminals of the AC regulator (*see illustration*). If the reading is not within specifications, the AC regulator is probably defective. If the AC regulator doesn't test as described, it may be defective. It's a good idea to have it tested by a Honda dealer or substitute a known good unit before condemning it as trash.

Replacement

- 10 Follow the wiring harness from the AC regulator to the connector and unplug the connector. Remove the mounting bolt and lift the regulator off the motorcycle.
- 11 Installation is the reverse of the removal steps.

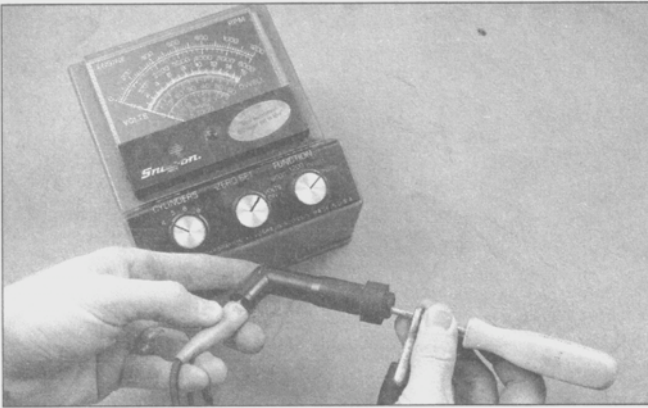
16 Regulator/rectifier (XL600R) - replacement

- 1 The regulator/rectifier is a plastic box mounted on the vehicle frame to the right of the AC regulator.
- 2 Follow the wiring harnesses from the regulator/rectifier to the six-pin connector and unplug the connectors. Remove the regulator/rectifier mounting bolt and lift it off the bike.
- 3 Installation is the reverse of the removal steps.

17 Ignition system - general information

These motorcycles are equipped with a breakerless (CDI) ignition system. The CDI ignition system functions on the same principle as a breaker point ignition system with the pulse generator and CDI unit performing the tasks previously associated with the breaker points and mechanical advance system. As a result, adjustment and maintenance of breakerless ignition components is eliminated (with the exception of spark plug replacement).

Because of their nature, the individual ignition system components can be checked but not repaired. If ignition system troubles occur, and the faulty component can be isolated, the only cure for the problem is to replace the part with a new one. Keep in mind that most electrical parts, once purchased, can't be returned. To avoid unnecessary expense, make very sure the faulty component has been positively identified before buying a replacement part.



18.5 Unscrew the spark plug cap from the plug wire and measure its resistance with an ohmmeter

18 Ignition system - check

Refer to illustrations 18.5 and 18.12

Warning: Because of the very high voltage generated by the ignition system, extreme care must be taken when these checks are performed.

1 If the ignition system is the suspected cause of poor engine performance or failure to start, a number of checks can be made to isolate the problem.

2 Make sure the ignition kill switch is in the Run or On position.

Engine will not start

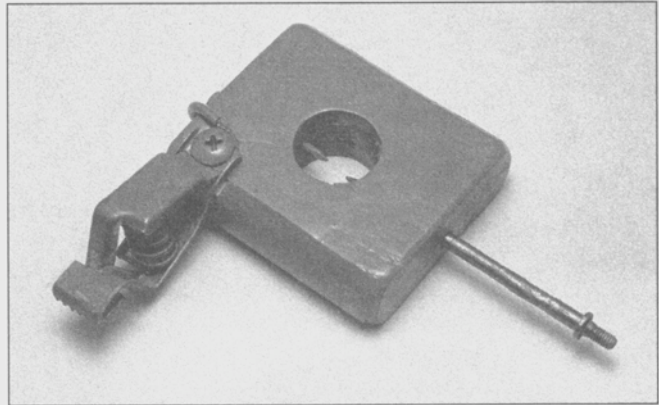
3 Refer to Chapter 1 and disconnect the spark plug wire. Connect the wire to a spare spark plug and lay the plug on the engine with the threads contacting the engine. If necessary, hold the spark plug with an insulated tool. Crank the engine over and make sure a well-defined, blue spark occurs between the spark plug electrodes. **Warning:** Don't remove the spark plug from the engine to perform this check - atomized fuel being pumped out of the open spark plug hole could ignite, causing severe injury!

4 If no spark occurs, the following checks should be made:

5 Unscrew the spark plug cap from the plug wire and check the cap resistance with an ohmmeter (see illustration). If the resistance is infinite, replace it with a new one.

6 Make sure all electrical connectors are clean and tight. Check all wires for shorts, opens and correct installation.

7 If you're working on an XL600R, check the battery voltage with a voltmeter. If the voltage is less than 12-volts, recharge the battery.



18.12 A simple spark gap testing fixture can be made from a block of wood, two nails, a large alligator clip, a screw and a piece of wire

8 On all models, check the pulse generator and exciter coil (see Sections 14 and 20).

9 Refer to Section 19 and check the ignition coil primary and secondary resistance.

10 If the preceding checks produce positive results but there is still no spark at the plug, refer to Section 21 and check the CDI unit.

Engine starts but misfires

11 If the engine starts but misfires, make the following checks before deciding that the ignition system is at fault.

12 The ignition system must be able to produce a spark across a seven millimeter (1/4-inch) gap (minimum). A simple test fixture (see illustration) can be constructed to make sure the minimum spark gap can be jumped. Make sure the fixture electrodes are positioned seven millimeters apart.

13 Connect one of the spark plug wires to the protruding test fixture electrode, then attach the fixture's alligator clip to a good engine ground.

14 Crank the engine over with the kill switch in the Run position and see if well-defined, blue sparks occur between the test fixture electrodes. If the minimum spark gap test is positive, the ignition coil is functioning properly. If the spark will not jump the gap, or if it is weak (orange colored), refer to Steps 5 through 10 of this Section and perform the component checks described.

19 Ignition coil - check, removal and installation

Check

Refer to illustration 19.5

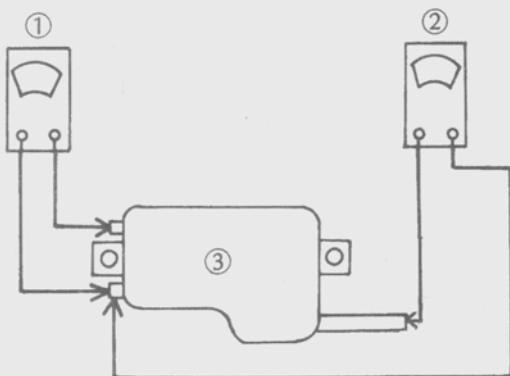
1 In order to determine conclusively that the ignition coil is defective, it should be tested by an authorized Honda dealer service department which is equipped with the special electrical tester required for this check.

2 However, the coil can be checked visually (for cracks and other damage) and the primary and secondary coil resistances can be measured with an ohmmeter. If the coil is undamaged, and if the resistances are as specified, it is probably capable of proper operation.

3 To check the coil for physical damage, it must be removed (see Steps 8 and 9). To check the resistance, remove the fuel tank (see Chapter 3), unplug the primary circuit electrical connector(s) from the coil and remove the spark plug wire from the spark plug. Mark the locations of all wires before disconnecting them.

4 Label the primary terminal wires, then disconnect them from the ignition coil primary terminals.

5 Connect an ohmmeter between the primary terminals. Set the ohmmeter selector switch in the Rx1 position and compare the measured resistance to the value listed in this Chapter's Specifications (see illustration).



19.5 Ignition coil test

- | | |
|--------------------------------------|--|
| 1 Measure primary winding resistance | 2 Measure secondary winding resistance |
| | 3 Ignition coil |



19.9 The ignition coil is mounted beneath the fuel tank

6 Connect the ohmmeter between the green wire's primary terminal and the spark plug cap. Place the ohmmeter selector switch in the Rx100 position and compare the measured resistance to the values listed in this Chapter's Specifications.

7 If the resistances are not as specified, unscrew the spark plug cap from the plug wire and check the resistance between the green wire's primary terminal and the end of the spark plug wire. If it's now within specifications, the spark plug cap is bad. If it's still not as specified, the coil is probably defective and should be replaced with a new one.

Removal and installation

Refer to illustration 19.9

8 To remove the coil, refer to Chapter 3 and remove the fuel tank, then disconnect the spark plug wire from the plug. After labeling them with tape to aid in reinstallation, unplug the coil primary circuit electrical connector(s).

9 Remove the coil mounting bolt, then lift the coil out (see illustration).

10 Installation is the reverse of removal.

20 Pulse generator - check, removal and installation

Check

1 Locate the pulse generator harness on the right side of the engine. Follow the harness to the connector and unplug it.

2 Connect an ohmmeter between the wire terminals in the pulse generator side of the connector. Compare the reading to the value listed in this Chapter's Specifications. If it's outside the specified range, replace the pulse generator.

Removal and installation

Refer to illustration 20.4

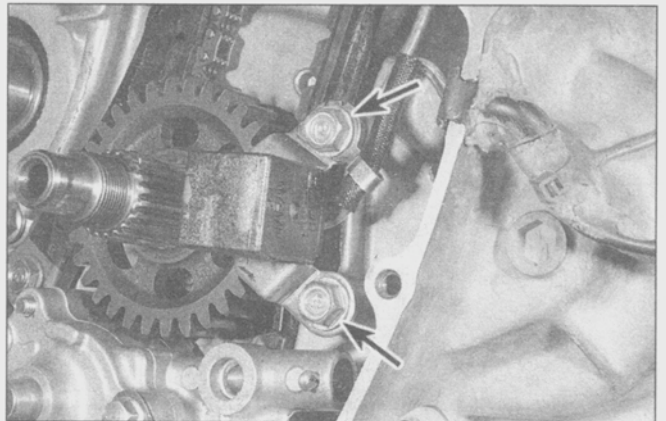
3 Remove the right engine cover (see Chapter 2). Disconnect the pulse generator wire at the connector above the engine.

4 Remove the pulse generator mounting bolts and take it off the engine (see illustration).

5 Installation is the reverse of the removal steps. Tighten the bolts securely, but don't overtighten them and strip the threads. Also, apply a film of RTV sealant to the wiring harness grommet to keep dirt and water out.

21 CDI unit - harness check, removal and installation

1 The CDI unit is tested by process of elimination (when all other possible causes of ignition problems have been checked and eliminated, the CDI unit is at fault).



20.4 The pulse generator is bolted to the right side of the engine, inside the cover (arrows); coat the wiring harness grommet in the crankcase with a thin layer of sealant upon installation

Harness check

2 Remove the fuel tank (see Chapter 3).

3 Follow the harness from the CDI unit to the two-pin and four-pin connectors and unplug them (see illustration 15.9).

4 Set an ohmmeter at R x 1 and connect it between the black/yellow and green wire terminals in the harness. It should give the same reading as for ignition coil primary resistance, listed in this Chapter's Specifications.

5 Disconnect the spark plug wire from the spark plug. If you're working on a 1988 or later model, remove the cap from the spark plug wire.

6 If you're working on an XL600R, set the ohmmeter to R x 1000 and connect it between the green wire terminal and the spark plug cap. It should give the same reading as for the secondary coil resistance, listed in this Chapter's Specifications.

7 If you're working on an XR600R, set the ohmmeter to R x 1000 and connect it between the black/yellow wire terminal and the spark plug cap (1985 through 1987) or the spark plug wire with the cap removed (1988 on). It should give the same reading as for the secondary coil resistance, listed in this Chapter's Specifications.

8 Set the ohmmeter at R x 100 and connect it between the green/white and blue/yellow wire terminals in the harness. It should give the same reading as for the pulse generator resistance, listed in this Chapter's Specifications.

9 Set the ohmmeter at R x 10 and connect the terminals between the black/red wire terminal in the harness and ground. It should give the same reading as for the alternator exciter coil resistance, listed in this Chapter's Specifications.

10 If you're working on an XL600R, turn the ignition switch to On. On all models, place the engine kill switch in the Run position. Connect the ohmmeter between the black/white and green terminals (1983 through 1987) or black/white and ground (1988 on). The ohmmeter should show infinite resistance (no continuity).

11 If the harness failed any of the preceding tests, check the affected wires for breaks or poor connections.

12 If the harness and all other system components tested good, the CDI unit may be defective. Before buying a new one, it's a good idea to substitute a known good CDI unit.

Removal and installation

13 Remove the fuel tank if you haven't already done so (see Chapter 3).

14 Locate the CDI unit (it's mounted under the main frame member near the coil on 1983 through 1987 models and near the rear shock upper mounting bolt on 1988 and later models) (see illustration 15.9). Unplug its connector and work the unit out of its mounting band.

15 Installation is the reverse of the removal steps.

Chapter 5

Steering, suspension and final drive

Contents

	<i>Section</i>		<i>Section</i>
Drive chain - removal, cleaning, inspection and installation	10	Sprockets - check and replacement	11
Drive chain adjustment	See Chapter 1	Steering head bearing adjustment	See Chapter 1
Front fork oil change	See Chapter 1	Steering head bearings - replacement	5
Front forks - disassembly, inspection and reassembly	4	Suspension - check	See Chapter 1
Front forks - removal and installation	3	Swingarm - removal and installation	8
General information	1	Swingarm bearings - check	7
Handlebars - removal, inspection and installation	2	Swingarm bearings - replacement	9
Rear shock absorber and suspension linkage - removal, inspection and installation	6		

Specifications

Front forks

Oil type	
1983 through 1987	Automatic transmission fluid
1988 on	Pro-Honda SS7 suspension fluid or equivalent
Oil capacity	
XL600R	455 cc (15.4 fl oz)
XR600R	
1985 through 1987	631 cc (21.3 fl oz)
1988 through 1990	643 cc (21.74 fl oz)
1991 and 1992	580 cc (19.61 fl oz)
1993 on	585 cc (19.78 fl oz)
Oil level (fork fully compressed and spring removed)	
XL600R	150 mm (5.9 inches)
XR600R	
1985 through 1987	127 mm (5.0 inches)
1988 through 1990	110 mm (4.3 inches)
1991 on	
Standard oil level	125 mm (4.92 inches)
Maximum oil level	115 mm (4.53 inches)
Minimum oil level	135 mm (5.31 inches)
Fork spring free length limit	
XL600R	557.0 mm (21.93 inch)
XR600R	
1985 through 1987	566.0 mm (22.28 inch)
1988 and 1990 (short spring)	62.0 mm (2.441 inches)
1988 and 1990 (long spring)	577.0 mm (22.717 inches)
1991 on	570.0 mm (22.441 inches)
Fork tube bend limit	0.2 mm (0.008 inch)

Rear suspension

Rear shock absorber spring length

XL600R	
Standard	276.0 mm (10.87 inches)
Limit	273 mm (10.75 inches)
XR600R	
1985 through 1987	
Standard	234.0 mm (9.2 inches)
Limit	231 mm (9.1 inches)
1988 through 1990	
Standard	242.3 mm (9.54 inches)
Limit	240.0 mm (9.45 inches)
1991 on	
Standard	215.5 mm (8.48 inches)
Limit	213.3 mm (8.40 inches)

Drive chain

Drive chain frame slider minimum thickness 6 mm (0.24 inch)

Drive chain length

XL600R	Not specified
XR600R	
1985 through 1987 (109 pins)	
Standard	1730 mm (68.1 inches)
Limit	1765 mm (69.5 inches)
1988 on (111 pins)	
Standard	1762 mm (69.4 inches)
Limit	1780 mm (59.7 inch)

Torque specifications

Handlebar bracket bolts

XL600R	18 to 30 Nm (13 to 22 ft-lbs)
XR600R	
1985 through 1987	22 to 30 Nm (16 to 22 ft-lbs)
1988 on	27 Nm (20 ft-lbs)

Front axle nut..... See Chapter 6

Upper triple clamp bolts

XL600R	18 to 30 Nm (13 to 22 ft-lbs)
XR600R	
1985 through 1987	25 to 30 Nm (18 to 22 ft-lbs)
1988 through 1990	33 Nm (24 ft-lbs)
1991 on	28 Nm (20 ft-lbs)

Lower triple clamp bolts

XL600R	30 to 35 Nm (22 to 25 ft-lbs)
XR600R	
1985 through 1987	30 to 35 Nm (22 to 25 ft-lbs)
1988 on	35 Nm (25 ft-lbs)

Damper rod bolt (XL600R, 1985 through 1987 XR600R) 15 to 25 Nm (11 to 18 ft-lbs)

Fork bottom bolt (1988-on XR600R) 35 Nm (25 ft-lbs)

Fork cap bolt

XL600R, 1985 through 1987 XR600R	15 to 30 Nm (11 to 22 ft-lbs)
1988 and later XR600R	23 Nm (17 ft-lbs)

Fork cap locknut (1991 and later XR600R) 60 Nm (43 ft-lbs)

Fork piston retainer (1991 on) 35 Nm (25 ft-lbs)

Steering stem bearing adjusting nut..... See Chapter 1

Steering stem nut

XL600R	80 to 120 Nm (58 to 87 ft-lbs)
XR600R	
1985 through 1987	95 to 140 Nm (60 to 101 ft-lbs)
1988 on	118 Nm (85 ft-lbs)

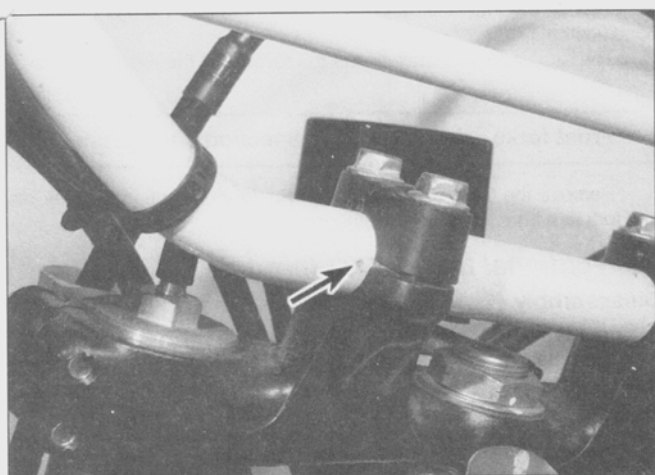
Rear shock absorber upper mounting bolt

XL600R	40 to 50 Nm (29 to 36 ft-lbs)
XR600R	
1985 through 1987	40 to 50 Nm (29 to 36 ft-lbs)
1988 on	45 Nm (33 ft-lbs)

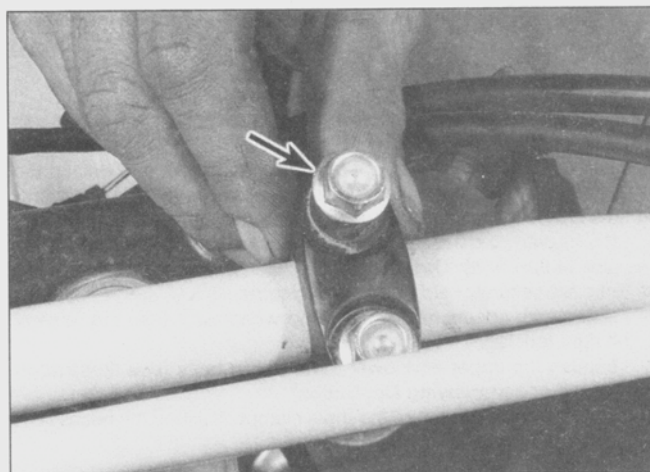
Rear shock absorber lower mounting bolt

XL600R	40 to 50 Nm (29 to 36 ft-lbs)
XR600R	
1985 through 1987	25 to 35 Nm (14 to 25 ft-lbs)
1988 through 1990	30 Nm (22 ft-lbs)
1991 on	35 Nm (25 ft-lbs)

Shock arm to swingarm	
XL600R.....	90 to 120 Nm (65 to 87 ft-lbs)
XR600R	
1985 through 1987.....	60 to 80 Nm (43 to 57 ft-lbs)
1988 on.....	70 Nm (51 ft-lbs)
Shock arm to shock link	
XL600R.....	40 to 50 Nm (29 to 36 ft-lbs)
XR600R	
1985 through 1987.....	40 to 50 Nm (29 to 36 ft-lbs)
1988 on.....	45 Nm (33 ft-lbs)
Shock link to frame	
XL600R.....	Not specified
XR600R	
1985 through 1987.....	40 to 50 Nm (29 to 36 ft-lbs)
1988 on.....	45 Nm (33 ft-lbs)
Swingarm pivot bolt	
XL600R, 1985 through 1987 XR600R.....	80 to 100 Nm (58 to 72 ft-lbs)
1988 and later XR600R.....	90 Nm (65 ft-lbs)
Engine sprocket bolts.....	Not specified
Rear sprocket bolts/nuts	
XL600R.....	32 to 35 Nm (23 to 25 ft-lbs)
XR600R	
1985 through 1987.....	34 to 40 Nm (24 to 29 ft-lbs)
1988 on.....	44 Nm (32 ft-lbs)



2.3 Remove the bolts and lift off the upper brackets; on installation, align the punch mark in the handlebar (arrow) with the edge of the lower bracket



2.6 Install the upper brackets with their punch marks (arrow) facing forward

1 General information

The steering system on these models consists of a one-piece handlebar and a tapered roller bearing steering head attached to the front portion of the frame. The front suspension consists of damper rod forks (early models), or cartridge forks (later models). The rear suspension consists of a single shock absorber with concentric coil spring, a swingarm and Honda's Pro-Link suspension linkage. The suspension linkage produces a progressive rising rate effect, where the suspension stiffens as its travel increases. This allows a softer ride over small bumps in the terrain, together with firmer suspension control over large irregularities.

2 Handlebars - removal, inspection and installation

Refer to illustrations 2.3 and 2.6

1 The handlebars rest in a bracket integral with the upper triple clamp. If the handlebars must be removed for access to other components, such as the steering head bearings, simply remove the bolts

and slip the handlebars off the bracket. It's not necessary to disconnect the throttle, clutch, or decompression cables, brake hose or the kill switch wire, but it is a good idea to support the assembly with a piece of wire or rope, to avoid unnecessary strain on the cables.

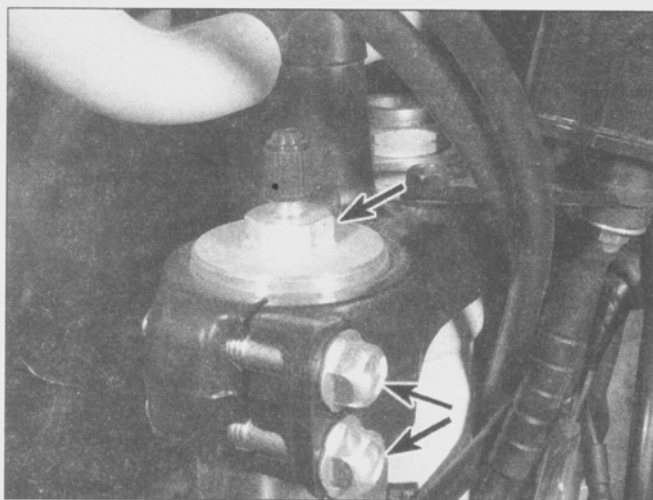
2 If the handlebars are to be removed completely, refer to Chapter 2 for the clutch lever removal procedure, Chapter 3 for the throttle housing removal procedure, Chapter 4 for the kill switch removal procedure and Chapter 6 for the brake master cylinder removal procedure.

3 Remove the upper bracket bolts, lift off the brackets and remove the handlebars (**see illustration**).

4 Check the handlebars and brackets for cracks and distortion and replace them if any problems are found.

5 Place the handlebars in the lower brackets. Line up the punch mark on the handlebar with the parting line of the upper and lower brackets (**see illustration 2.3**).

6 Install the upper brackets with their punch marks facing forward (**see illustration**). Tighten the front bolts, then the rear bolts, to the torque listed in this Chapter's Specifications. **Caution:** If there's a gap between the upper and lower brackets at the rear after tightening the bolts, don't try to close it by tightening beyond the recommended torque. You'll only crack the brackets.



3.3 If you're going to disassemble the forks, loosen the fork cap bolt (upper arrow) while the fork is held in the triple clamps; loosen the upper triple clamp bolts (lower arrows) . . .

3 Front forks - removal and installation

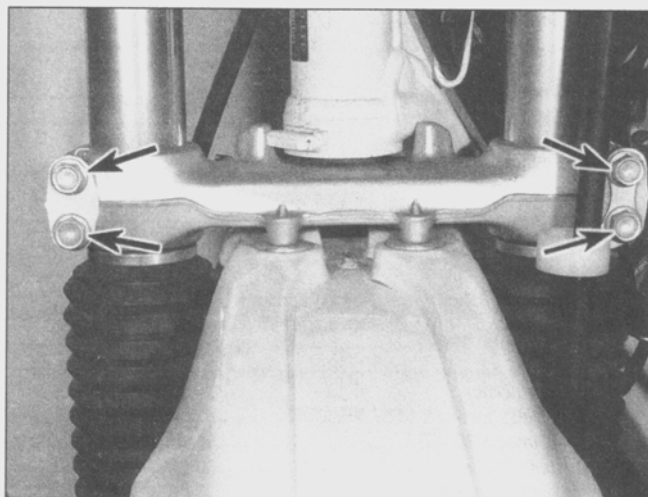
Removal

Refer to illustrations 3.3 and 3.5

- 1 Support the bike securely upright so it can't fall over during this procedure.
- 2 Remove the front wheel, unbolt the brake caliper and detach the brake hose retainer from the left fork leg (see Chapter 6). If you're working on an XR600R, remove the headlight assembly (see Chapter 4).
- 3 If you plan to disassemble the forks, loosen the fork cap bolts now (see illustration). This can be done later, but it will be easier while the forks are securely held in the triple clamps.
- 4 Detach the speedometer cable and withdraw it from the retainer on the right fork leg.
- 5 Loosen the upper and lower triple clamp bolts (see illustration 3.3 and the accompanying illustration).
- 6 Lower the fork leg out of the triple clamps, twisting it if necessary.

Installation

- 7 Slide each fork leg into the lower triple clamp.
- 8 Slide the fork legs up, installing the tops of the tubes into the



3.5 . . . and the lower triple clamp bolts (arrows) to remove the forks

upper triple clamp. Position the forks so the top of each tube is flush with the top surface of the upper triple clamp.

- 9 Tighten the triple clamp bolts to the torque listed in this Chapter's Specifications.
- 10 The remainder of installation is the reverse of the removal steps.

4 Front forks - disassembly, inspection and reassembly

- 1 Remove the forks following the procedure in Section 3. Work on one fork at a time to prevent mixing up the parts.

Conventional forks (1983 through 1990 models)

Disassembly

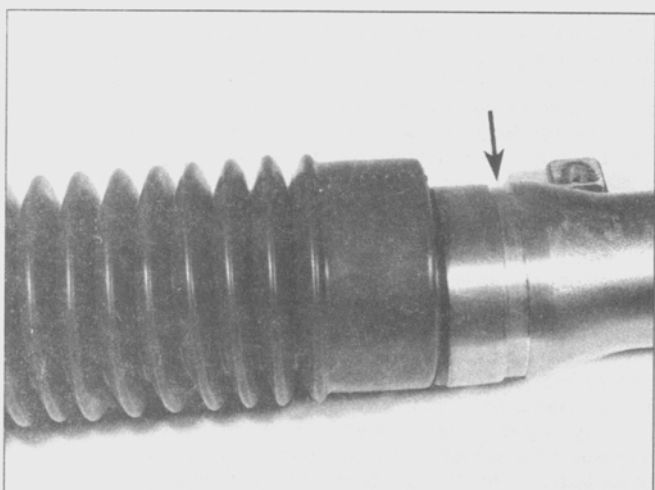
Refer to illustrations 4.2a through 4.k

- 2 To disassemble the forks, refer to the accompanying illustrations (see illustrations).

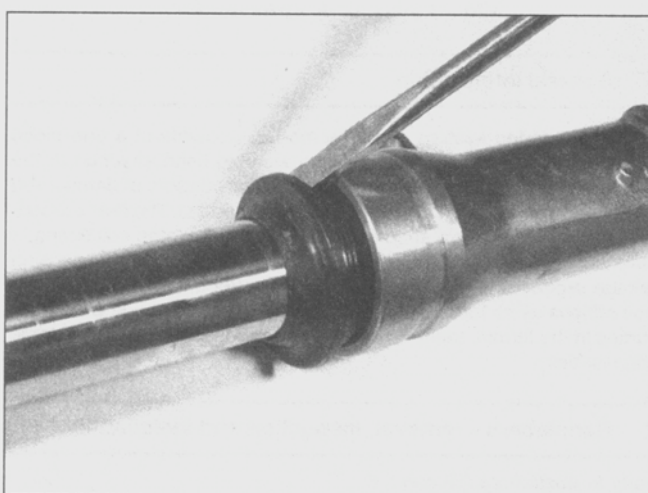
Inspection

Refer to illustration 4.6

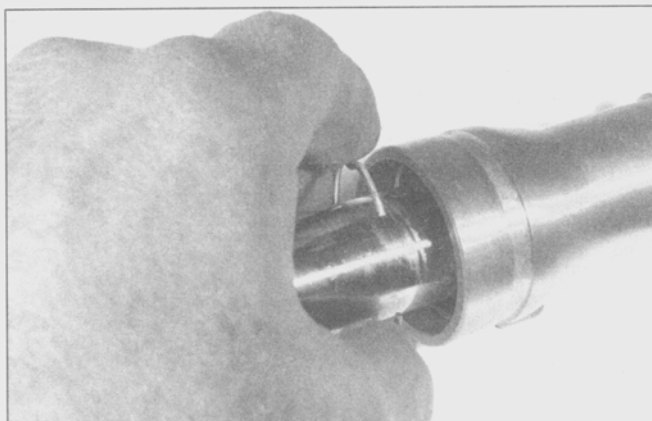
- 3 Clean all parts in solvent and blow them dry with compressed air, if available. Check the inner and outer fork tubes and the damper rod



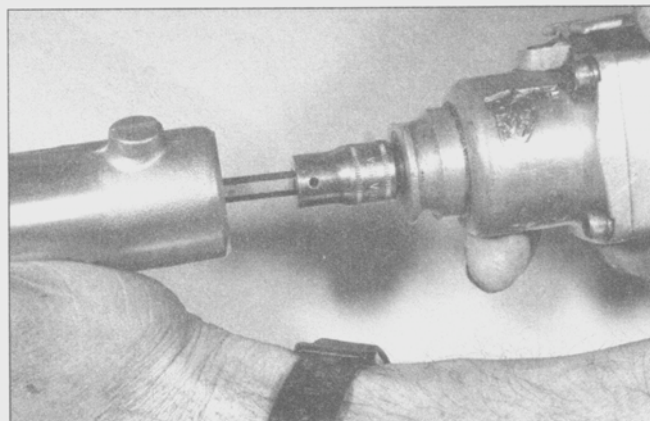
4.2a On 1988 and later models, slide the fork boot out of its groove (arrow) and loosen the clamp at the top end to remove the boot



4.2b Pry the dust seal out of the outer fork tube



4.2c Pry the retaining ring out of its groove and slide it off the inner fork tube

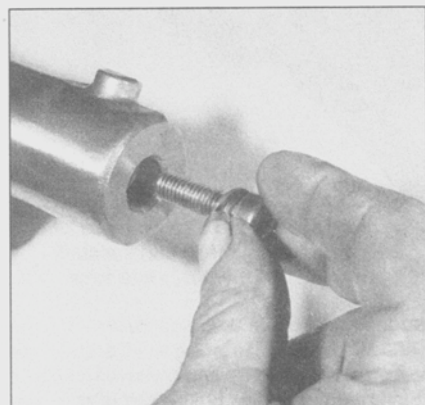


4.2d Loosen the Allen bolt in the bottom of the outer fork tube - an air wrench is the easiest way to do this if you have one, but if not, unscrew the bolt with an Allen wrench while the fork cap is still installed; the spring pressure will keep the damper rod from turning inside the fork

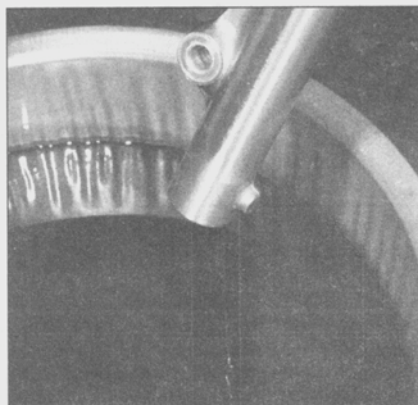
for score marks, scratches, flaking of the chrome and excessive or abnormal wear. Look for dents in the tubes and replace them if any are found. Check the fork seal seat for nicks, gouges and scratches. If damage is evident, leaks will occur around the seal-to-outer tube junction. Replace worn or defective parts with new ones.

4 Have the inner fork tube checked for runout at a dealer service department or other repair shop. **Warning:** If the tube is bent, it should be replaced with a new one. Don't try to straighten it.

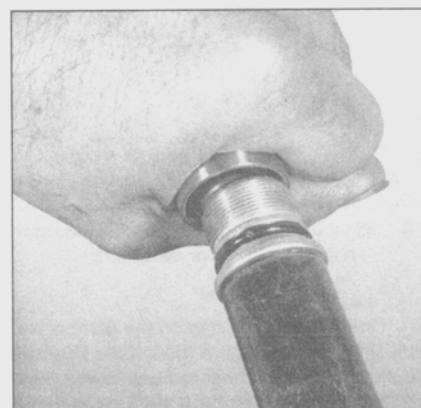
5 Measure the overall length of the fork spring and check it for cracks or other damage. Compare the length to the minimum length listed in this Chapter's Specifications. If it's defective or sagged, replace both fork springs with new ones. Never replace only one spring.



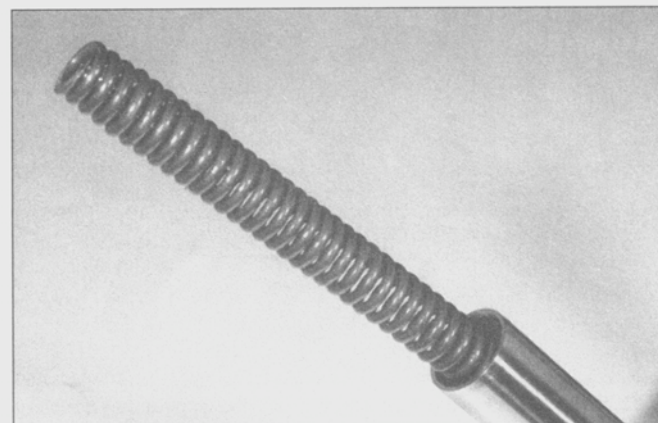
4.2e Remove the Allen bolt and its copper sealing washer; use a new washer on reassembly



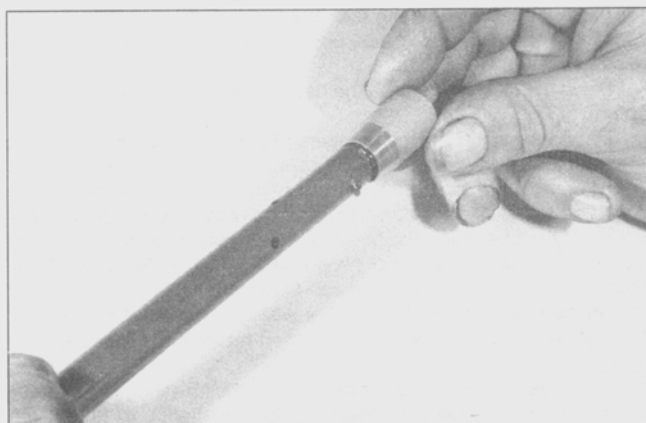
4.2f Let the oil drain from the bottom of the fork; pump the inner fork tube up and down to expel the oil



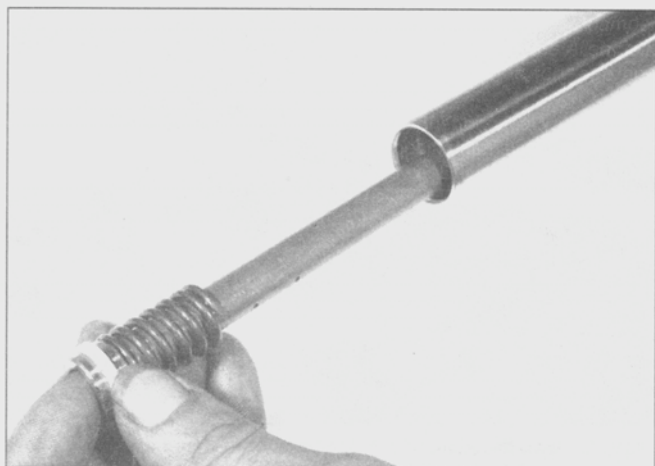
4.2g Unscrew the cap bolt and remove the O-ring - be careful of spring tension!



4.2h Pull the spring out of the fork; its narrow end faces into the fork tube on reassembly



4.2i Take the oil lock piece off the end of the damper rod . . .



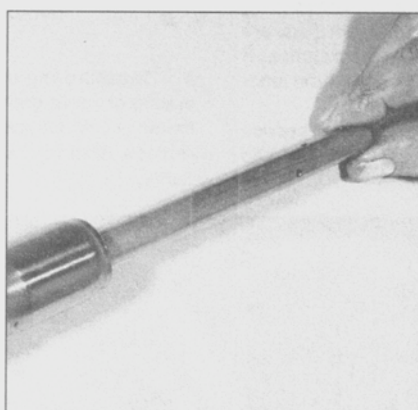
4.2j ... and remove the damper rod from the inner fork tube



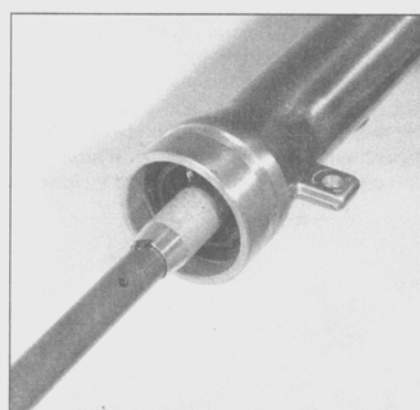
4.2k Pry the oil seal out of its bore; be careful not to scratch the seal's seating area in the fork tube



4.6 Replace the Teflon ring on the damper rod if it's worn or damaged



4.8 Place the damper rod in the inner fork tube so it protrudes from the bottom ...



4.9 ... then place the oil lock piece on the end of the damper rod and install the assembly in the outer fork tube

6 Check the Teflon ring on the damper rod for wear or damage and replace it if problems are found (**see illustration**). **Note:** Don't remove the ring from the damper rod unless you plan to replace it.

7 If you're working on a 1988 through 1990 model, check the fork slider bushing for wear and replace it if its condition is in doubt.

Reassembly

Refer to illustrations 4.8, 4.9, 4.12, 4.13, 4.14, 4.15a and 4.15b

8 Place the rebound spring over the damper rod and slide the rod assembly into the inner fork tube until it protrudes from the lower end (**see illustration**).

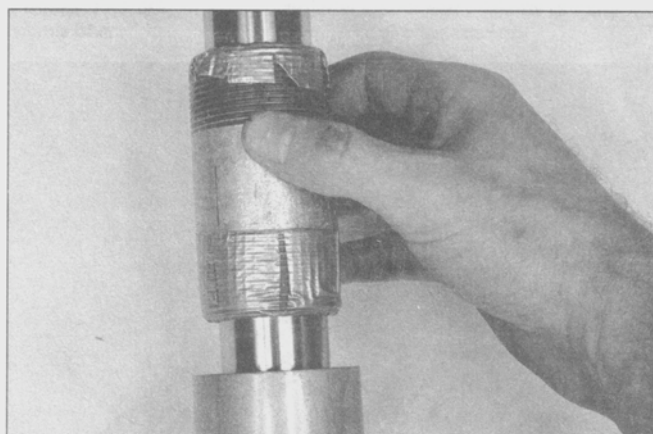
9 Place the oil lock piece on the base of the damper rod (**see illustration**).

10 Insert the inner fork tube/damper rod assembly into the outer fork tube until the Allen-head bolt (with copper washer) can be threaded into the damper rod from the lower end of the outer tube (**see illustration 4.2e**). **Note:** Apply a non-permanent thread locking agent to the threads of the bolt. Keep the two tubes fairly horizontal so the oil lock piece doesn't fall off the damper rod inside the outer fork tube. Temporarily install the fork spring and cap to place tension on the damper rod so it won't spin inside the fork tube while you tighten the Allen bolt.

11 Tighten the Allen bolt securely, then remove the fork cap and spring.

12 Lubricate the lips and outer diameter of the fork seal with the recommended fork oil (see this Chapter's Specifications). Slide the seal down the inner tube with the lips facing down. Drive the seal into position with a fork seal driver (Honda part no. 07747-0010100 and 07447-0010300 or 07947-1180001). If you don't have access to one of these,

it is recommended that you take the fork to a Honda dealer or other repair shop for seal installation. You can also make a substitute tool (**see illustration**). If you're very careful, the seal can be driven in with a hammer and drift punch. Work around the circumference of the seal, tapping gently on the outer edge of the seal until it's seated (**see illus-**



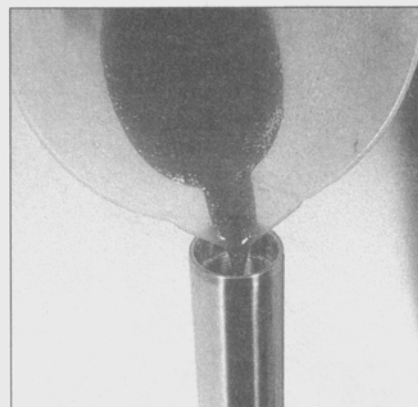
4.12 If you don't have a seal driver, a section of pipe can be used the same way the seal driver would be used - as a slide hammer (be sure to tape the ends of the pipe so it doesn't scratch the fork tube)



4.13 Make sure the retaining ring seats in its groove



4.14 Push the dust seal down until it seats in the outer fork tube



4.15a Pour the specified amount of oil into the fork

tration 4.2k). Be careful - if you distort the seal, you'll have to disassemble the fork and end up taking it to a dealer anyway!

13 Install the retaining ring, making sure it's completely seated in its groove (see illustration).

14 Install the dust seal, making sure it seats completely (see illustration). Pull the fork boot down into its groove on the outer fork tube and secure the upper end to the inner fork tube with the clamping band.

15 Compress the fork fully and add the recommended type and quantity of fork oil listed in this Chapter's Specifications (see illustration). Measure the fork oil level from the top of the fork tube (see illustration). If necessary, add or remove oil to bring it to the proper level.

16 Install the fork spring, with the small-diameter end facing down. Install the O-ring and fork cap.

17 Install the fork, following the procedure outlined in Section 3. Tighten the cap bolt after installation to the torque listed in this Chapter's Specifications.

Cartridge forks (1991 and later models)

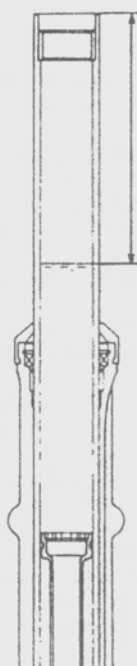
Disassembly

Refer to illustrations 4.18, 4.20, 4.23, 4.24, 4.26a, 4.26b and 4.28

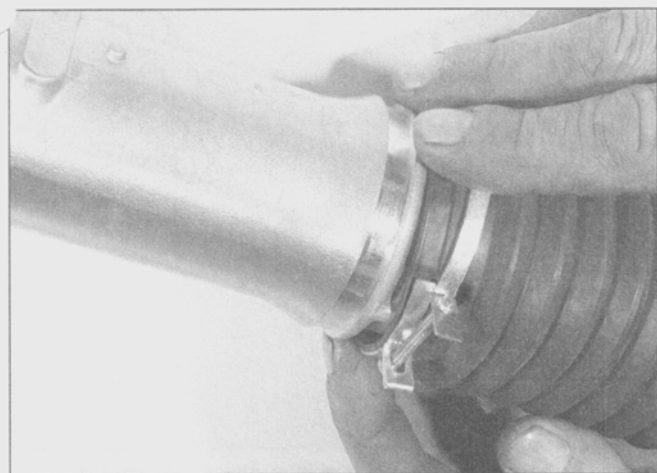
18 Loosen the boot clamps and slide the boot off the fork (see illustration).

19 **Warning:** Air and spring pressure in the fork may cause the cap bolt to shoot out when it's unscrewed. Make sure the cap bolt is not pointed at yourself or anyone else. Release all air pressure from the fork and unscrew the fork cap bolt.

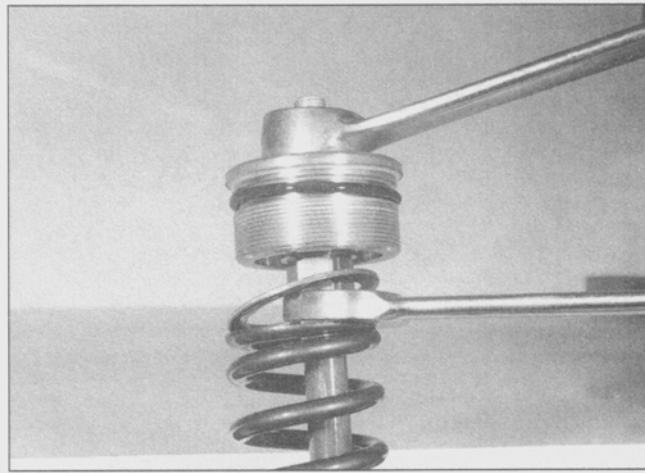
20 Push the inner and outer fork tubes together to expose the spring.



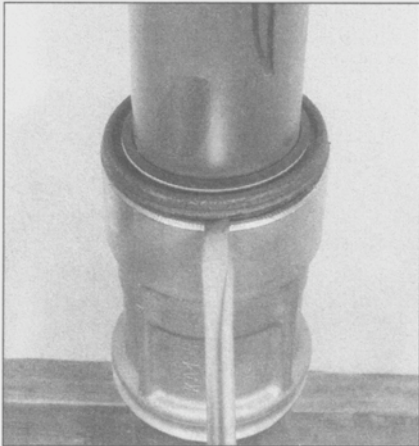
4.15b Measure the oil level in the fork with a stiff tape measure; add or drain oil to correct the level



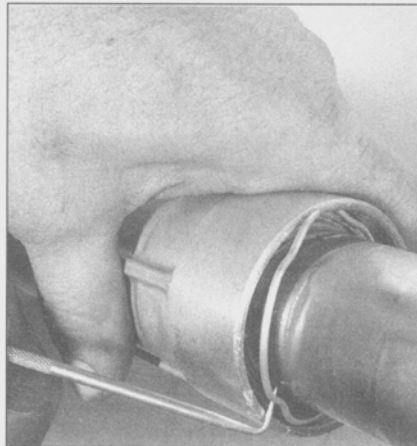
4.18 Loosen the clamps and detach the fork boots



4.20 Hold the fork cap with one wrench and loosen the locknut with another



4.23 Pry the dust seal out of its bore



4.24 Pry the oil seal retainer out with a pointed tool; be careful not to scratch the seal bore or the fork tube



4.26a Remove the bottom cover from the fork leg

Hold the cap nut with one wrench and loosen the locknut away from the cap bolt with another wrench (**see illustration**). Unscrew the cap bolt and locknut from the damper rod.

21 Take the washer off the spring, then lift the spring out of the fork.

22 Place the open (upper) end of the fork over a drain pan, then compress and extend the fork tubes several times to pump out the oil.

23 Pry the dust seal out of its bore, taking care not to scratch the fork tube (**see illustration**).

24 Pry the oil seal retainer out of its groove, again taking care not to scratch the fork tube (**see illustration**).

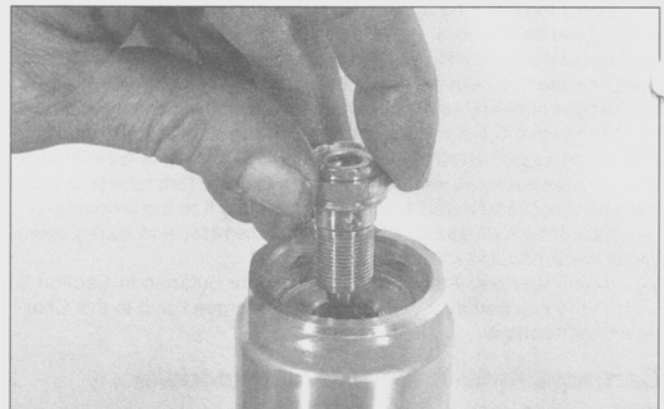
25 Place the outer fork tube in a padded vise. Tighten the vise just enough to keep the fork tube from rotating, but not tight enough to distort the fork tube.

26 Pry the bottom cover out of the fork tube (**see illustration**). Unscrew the bottom bolt and remove the bolt with its sealing washer (**see illustration**).

27 Unscrew the piston retainer from the piston cylinder with retainer wrench 07GMA-KS70100 and a box wrench. Take the bottom piece out of the cylinder.

28 Pull the piston and rod out of the inner fork tube (**see illustration**).

29 Hold one fork tube in each hand and pull the tubes apart sharply several times (like a slide hammer) to separate them. Once they're separated, remove the oil lock piece from the inner fork tube.



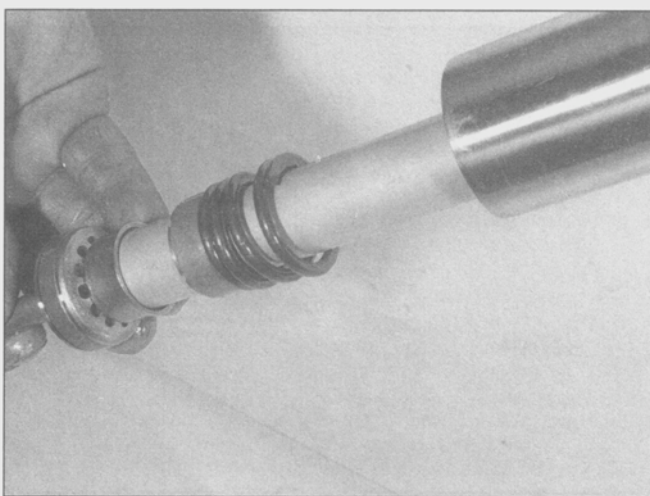
4.26b Unscrew the bottom bolt; use a new sealing washer on installation

Inspection

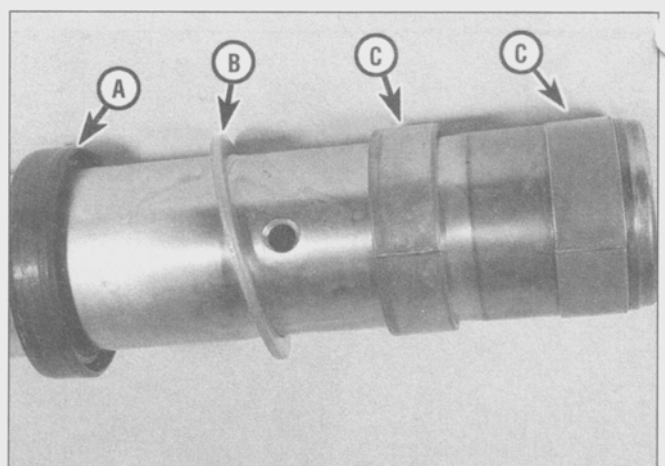
Refer to illustrations 4.31a, 4.31b and 4.31c

30 Refer to Steps 3 through 5 to inspect the forks.

31 Check the fork tube bushings as well as the bushing on the fork



4.28 Pull the piston and rod out of the fork tube



4.31a Don't remove the bushings unless they're worn

A Oil seal

B Backup ring

C Bushings

piston for wear (see illustrations). If the Teflon coating has worn off 3/4 or more of the surface, exposing the copper, replace the bushings.

Note: Don't remove the bushings unless they need to be replaced.

32 Check the ring on the fork piston rod. If it's worn, replace it.

Reassembly

Refer to illustration 4.39

33 Insert the piston rod into the bottom end of the fork piston, then push the rod all the way in so its other end sticks out the top of the fork piston. Thread the fork cap locknut all the way onto the piston rod.

34 Install a new O-ring on the bottom piece and put the bottom piece in the fork piston with its hex downward. Thread the retainer into the bottom end of the fork piston and tighten it to the torque listed in this Chapter's Specifications, using the same special tool used for removal.

35 Pull the piston rod up to make sure it's all the way into the fork piston, then insert the fork piston into the inner fork tube.

36 Coat the lip of a new oil seal with the recommended fork oil. Install the bushings (if removed), backup ring and oil seal on the inner fork tube (see illustration 4.31a).

37 Install the oil lock piece on the bottom of the fork piston, then install the inner fork tube in the outer fork tube.

38 Place the outer fork tube in a padded vise, tightening it just enough to keep the fork tube from rotating but not tight enough to distort the fork tube.

39 Place a new sealing washer on the bottom bolt. Coat the threads of the bottom bolt with a non-permanent thread locking agent, then tighten it to the torque listed in this Chapter's Specifications. Set the damping adjuster to the desired setting (see illustration).

40 Seat the oil seal in its bore with a seal driver (see Step 12). Install the retaining ring in its groove, then seat the dust seal with the same tool used for the oil seal.

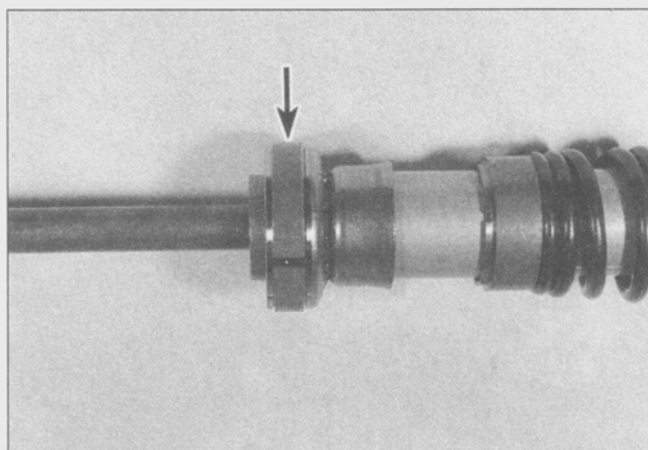
41 Compress the fork all the way. Pour half the amount of fork oil listed in this Chapter's Specifications into the inner fork tube. Pour the remaining fork oil slowly into the piston rod until it flows from the breather hole.

42 Slowly pump the piston rod up and down eight to ten times. Compress the fork all the way and leave it sitting upright for five minutes so the oil level can stabilize. Then measure the oil level and compare it to the values listed in this Chapter's Specifications. Add or drain oil as needed. **Note:** When the air pressure in the fork is at the standard setting, a higher oil level (shorter distance from the top of the fork tube) will have the same effect as increasing the stiffness of the fork spring.

Warning: To prevent unstable handling, make sure the oil level is exactly the same in both forks.

43 Install the fork spring in the fork tube, tapered end first.

44 Dip a new fork cap O-ring in fork oil and place it on the fork cap. Install the washer on top of the spring, then install the fork cap and thread it down against the locknut. Hold the fork cap with one wrench, then tighten the locknut against the fork cap to the torque listed in this



4.31b There's a bushing on the piston (arrow) . . .

Chapter's Specifications.

45 Install the fork boot with its row of breather holes to the outside of the fork.

5 Steering head bearings - replacement

Refer to illustrations 5.6a through 5.6e, 5.7a, 5.7b, 5.8, 5.9, 5.10, 5.12a, 5.12b, 5.12c, 5.14, 5.17 and 5.18

1 If the steering head bearing check/adjustment (see Chapter 1) does not remedy excessive play or roughness in the steering head bearings, the entire front end must be disassembled and the bearings and races replaced with new ones.

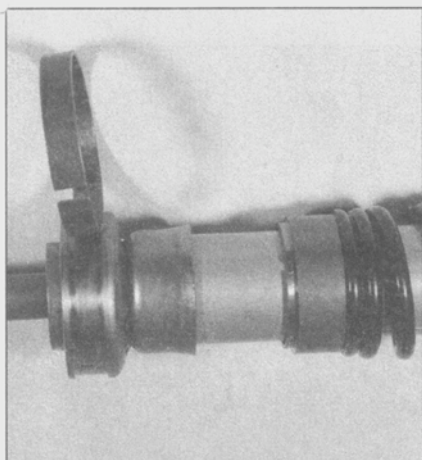
2 Remove the headlight assembly (see Chapter 4).

3 If you're working on an XL600R, remove the speedometer, its bracket and cable retainer and the horn (see Chapter 4). Unbolt the brake hose joint (see Chapter 6).

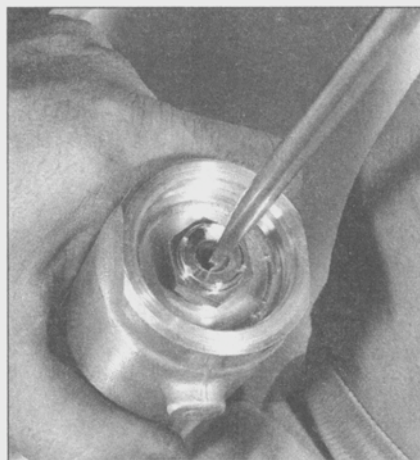
4 If you're working on an XR600R, remove the digital enduro meter and sensor (1985 and 1986 models) or the odometer (1987 and later models).

5 Remove the handlebars (see Section 2), the front wheel and brake caliper (see Chapter 6), the front fender (see Chapter 7) and the forks (see Section 3).

6 Loosen the steering stem nut with a socket (see illustration). Remove the nut, washer, upper triple clamp and lockwasher (see illustrations).



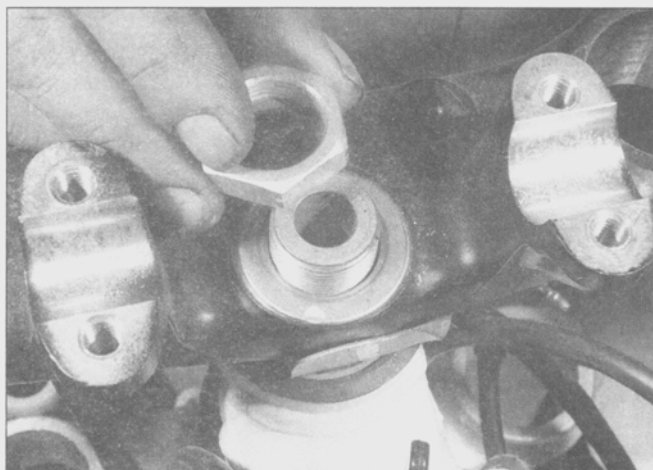
4.31c . . . to remove it, expand it at the slit and slip it off the fork



4.39 Turn the screw to adjust damping



5.6a Loosen the steering stem nut with a socket . . .



5.6b ... and unscrew it from the steering stem



5.6c Lift off the washer ...



5.6d ... the upper triple clamp ...



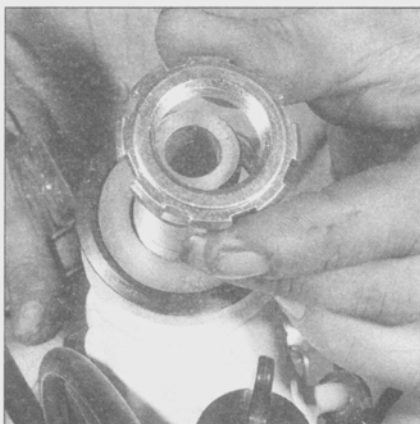
5.6e ... and the lockwasher

7 Using a spanner wrench of the type described in Chapter 1, remove the stem locknut and bearing cover (**see illustrations**) while supporting the steering head from the bottom.

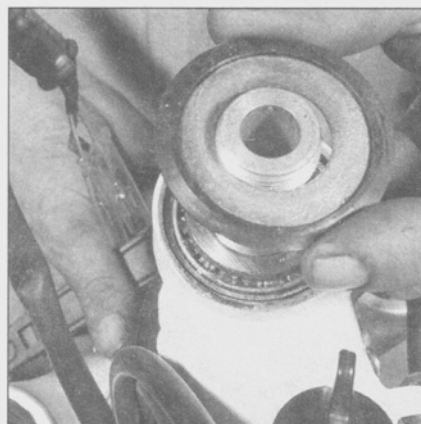
8 Remove the steering stem and lower triple clamp assembly (**see illustration**). If it's stuck, gently tap on the top of the steering stem with a plastic mallet or a hammer and a wood block.

9 Remove the upper bearing (**see illustration**).

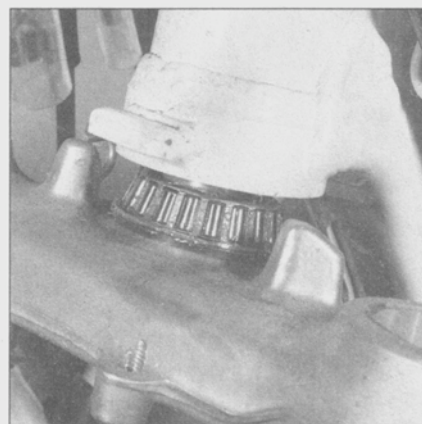
10 Clean all the parts with solvent and dry them thoroughly, using compressed air, if available (**see illustration**). If you do use compressed air, don't let the bearings spin as they're dried - it could ruin them. Wipe the old grease out of the steering head and bearing races.



5.7a Remove the bearing adjusting nut ...



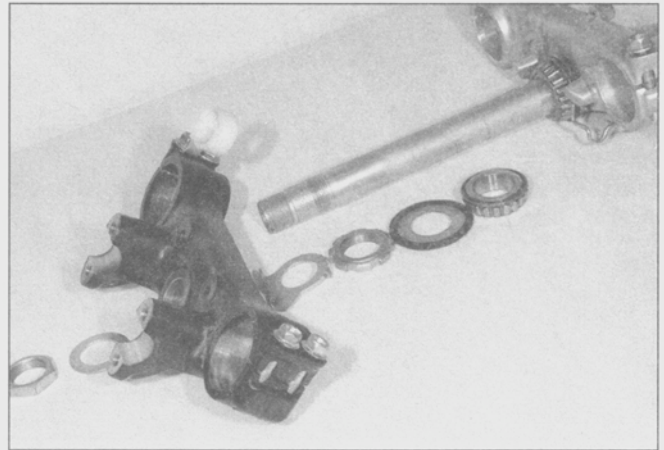
5.7b ... and lift off the bearing cover



5.8 Lower the steering stem out of the steering head



5.9 Lift the upper bearing out of the steering head



5.10 Steering stem and bearing details

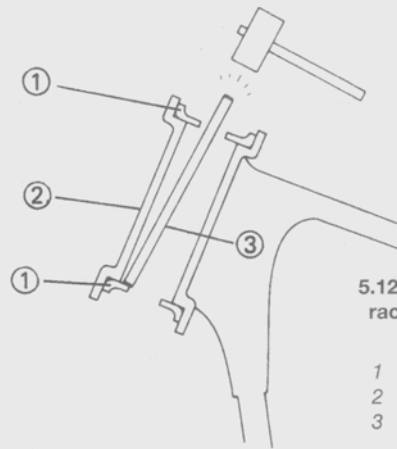
11 Examine the races in the steering head for cracks, dents, and pits. If even the slightest amount of wear or damage is evident, the races should be replaced with new ones.

12 To remove the races, drive them out of the steering head with Honda tool no. 07953-MJ10000 or a hammer and drift punch (**see illustrations**). A slide hammer with the proper internal-jaw puller will also work. Since the races are an interference fit in the frame, installation will be easier if the new races are left overnight in a refrigerator. This will cause them to contract and slip into place in the frame with very little effort. When installing the races, use a bearing driver the same diameter as the outer race (**see illustration**), or tap them gently into place with a hammer and punch or a large socket. Do not strike the bearing surface or the race will be damaged.

13 Check the bearings for wear. Look for cracks, dents, and pits in the races and flat spots on the bearings. Replace any defective parts with new ones. If a new bearing is required, replace both of them as a set.

14 Check the grease seal under the lower bearing and replace it with a new one if necessary (**see illustration**).

15 To remove the lower bearing and grease seal from the steering stem, you may need to use a bearing puller, which can be rented. Don't remove this bearing unless it, or the grease seal underneath, must be replaced. Removal will damage the grease seal, so replace it whenever the bearing is removed.

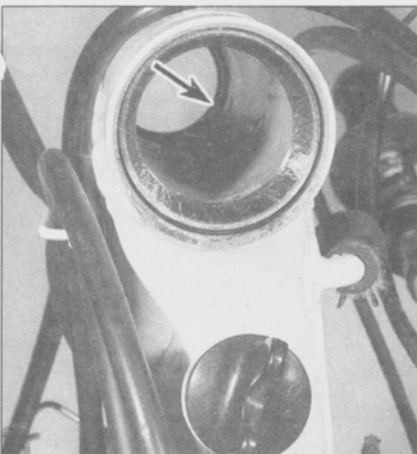


5.12a Drive out the bearing races with a hammer and brass drift

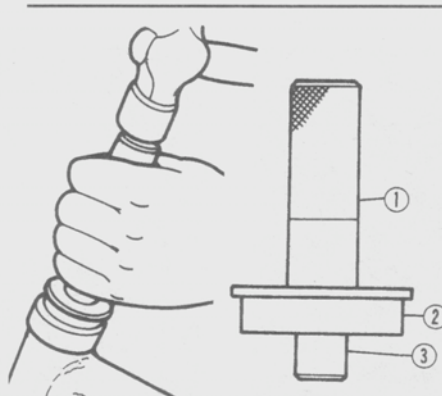
- 1 Outer races
- 2 Steering head
- 3 Brass drift

16 Inspect the steering stem/lower triple clamp for cracks and other damage. Do not attempt to repair any steering components. Replace them with new parts if defects are found.

17 Pack the bearings with high-quality grease (preferably a moly-

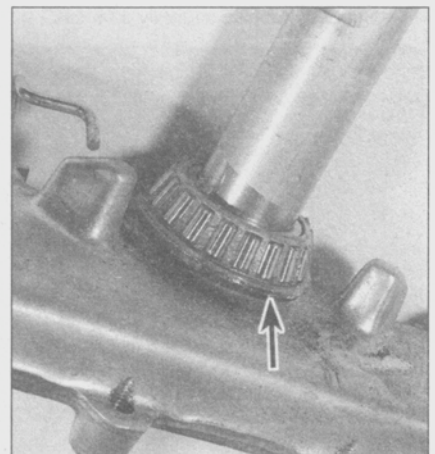


5.12b Place the drift against the edge of the lower bearing race (arrow) and tap evenly around it to drive the bearing out

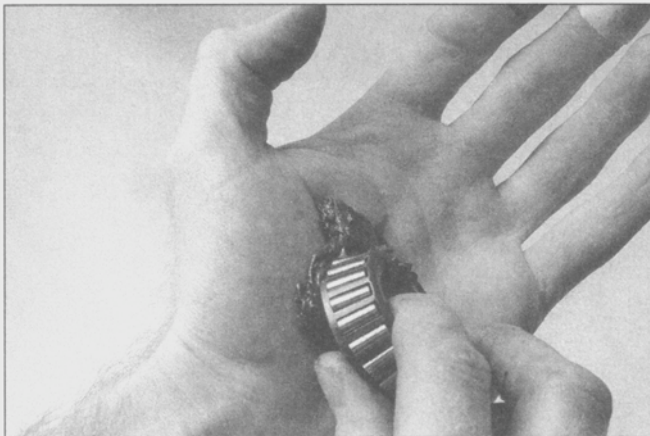


5.12c Drive in the bearing races with a bearing driver or socket the same diameter as the bearing race

- 1 Bearing driver handle
- 2 Bearing driver
- 3 Bearing driver



5.14 Leave the lower bearing and grease seal (arrow) on the steering stem unless you plan to replace them



5.17 Work the grease completely into the rollers

based grease) (**see illustration**). Coat the outer races with grease also.
 18 Install the grease seal and lower bearing onto the steering stem. Drive the lower bearing onto the steering stem using a pipe the same diameter as the bearing inner race (**see illustration**). If you don't have access to these tools, a section of pipe with a diameter the same as the inner race of the bearing can be used. Drive the bearing on until it's fully seated.

19 Insert the steering stem/lower triple clamp into the frame head. Install the upper bearing, bearing cover, lockwasher and locknut. Refer to the adjustment procedure in Chapter 1 and tighten the locknut to the torque listed in the Chapter 1 Specifications.

20 Make sure the steering head turns smoothly and that there's no play in the bearings.

21 Install a new lockwasher and the upper triple clamp. Bend the lockwasher against the upper triple clamp (**see illustration 5.6c**), then install the washer and nut. Tighten the nut to the torque listed in this Chapter's Specifications.

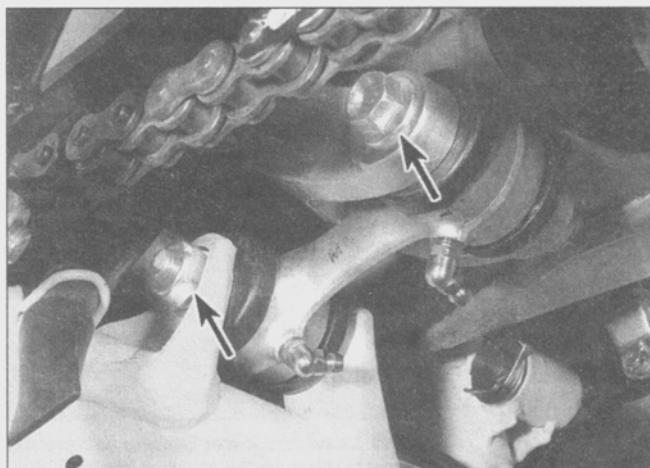
22 The remainder of installation is the reverse of removal.

6 Rear shock absorber and suspension linkage - removal, inspection and installation

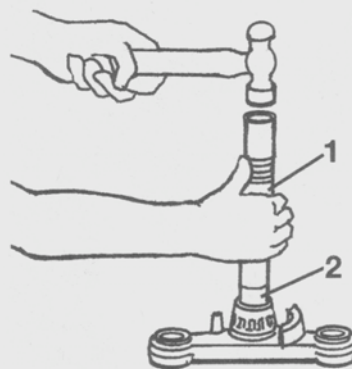
Removal

Refer to illustrations 6.5, 6.6 and 6.7

1 Support the bike securely so it can't be knocked over during this

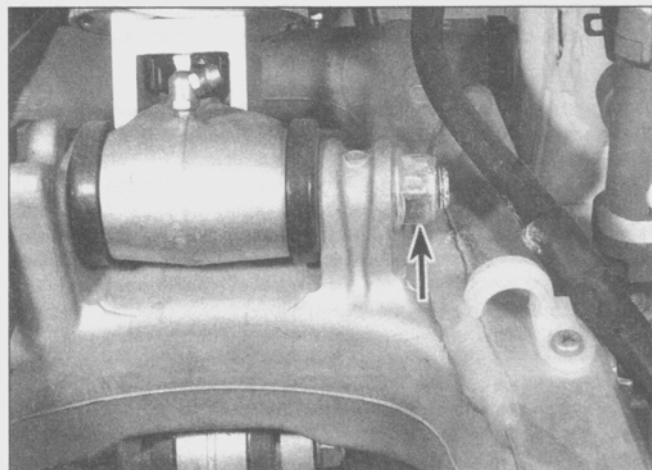


6.6 Unbolt the shock link from the frame (left arrow) and the shock arm (right arrow); note the directions of the bolt heads



5.18 Drive the grease seal and bearing lower race on with a hollow driver (or a piece of tubing of the same diameter as the bearing inner race)

- 1 Driver
- 2 Bearing and grease seal

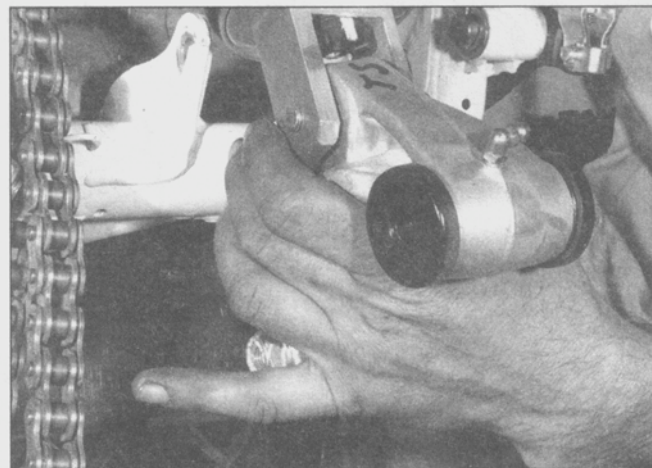


6.5 Remove the nut (arrow) and the Allen bolt that secure the shock arm to the swingarm

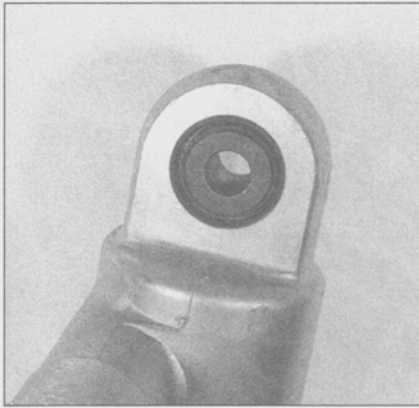
procedure. Support the swingarm with a jack so the suspension can be raised or lowered as needed for access.

2 Remove the seat, both side covers and the air cleaner case (**see Chapters 7 and 3**). Cover the carburetor inlet with a rag to keep out dirt.

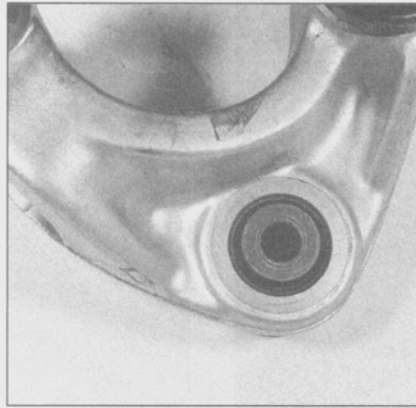
3 If you're working on a 1985 through 1990 XR600R, remove the shock reservoir's retaining bands and detach the reservoir from the bike.



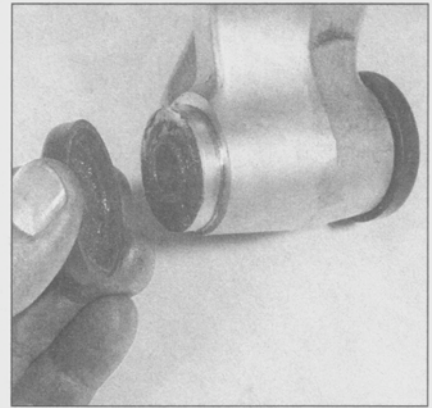
6.7 Lower the shock out together with the shock arm



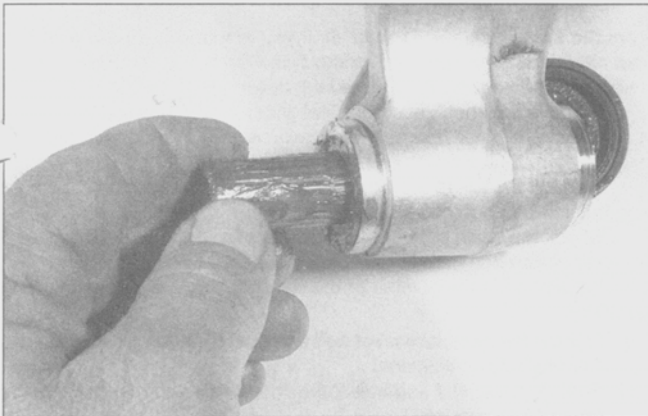
6.10a Check the spherical bearing in the shock absorber . . .



6.10b . . . and in the shock arm



6.11a Pull the covers off the shock arm end pivots . . .



6.11b . . . withdraw the pivot collars . . .

- 4 Remove the upper mounting bolt.
- 5 Unbolt the shock arm from the swingarm (see illustration).
- 6 Unbolt the shock link from shock arm and frame (see illustration).
- 7 Remove the shock from the bike together with the shock arm (see illustration). **Note:** On later models, the shock reservoir is solidly attached to the shock, rather than being connected by a hose.



6.11c . . . and inspect the needle bearings

Inspection

Refer to illustrations 6.10a, 6.10b, 6.11a, 6.11b, 6.11c and 6.11d

8 The shock absorber can be overhauled, but it's a complicated procedure that requires special tools not readily available to the typical owner. If inspection reveals problems, have the shock rebuilt by a dealer or motorcycle repair shop.

9 Check the shock absorber for damage and oil leaks. If these can be seen, have the shock overhauled.

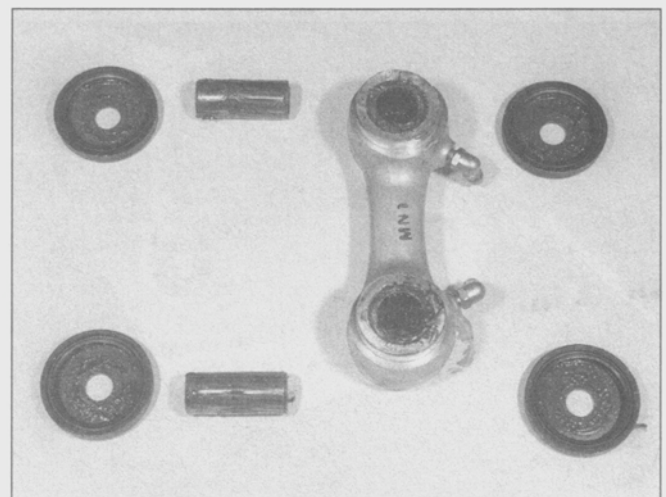
10 Check the spherical bearings at the upper end of the shock and in the shock for leaking grease, looseness or signs of damage (see illustrations). If any of these problems can be seen, have the bearing pressed out and a new one pressed in by a dealer or motorcycle repair shop.

11 The pivots at the ends of the shock link and the shock arm consist of needle bearings, sleeves and grease seals (see illustrations).

12 Clean all parts thoroughly with solvent and dry them with compressed air, if available. Check all parts for scoring, damage or heavy corrosion and replace them as necessary. Needle bearing replacement requires a press and a shouldered drift the same diameter as the inside of the bearings. If you don't have these, have the bearings replaced by a Honda dealer or motorcycle repair shop.

Installation

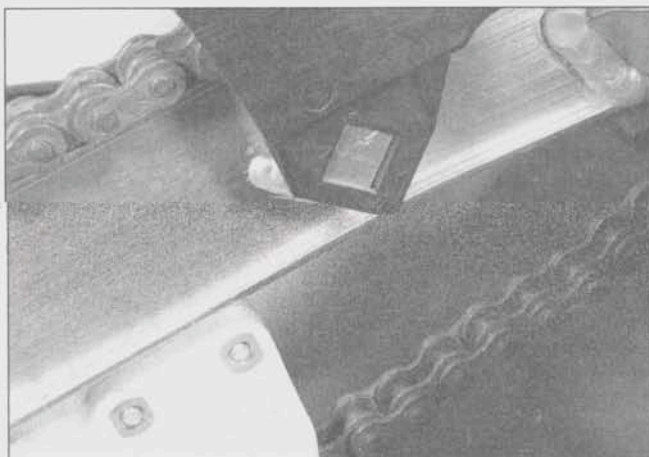
13 Apply a thin coat of moly-based grease to the sleeves and install them in the needle bearings.



6.11d Shock link details



8.4a Unbolt the upper chain guard from the swingarm . . .



8.4b . . . and slip it off its post

14 The remainder of installation is the reverse of the removal steps. Tighten the bolts to the torques listed in this Chapter's Specifications.

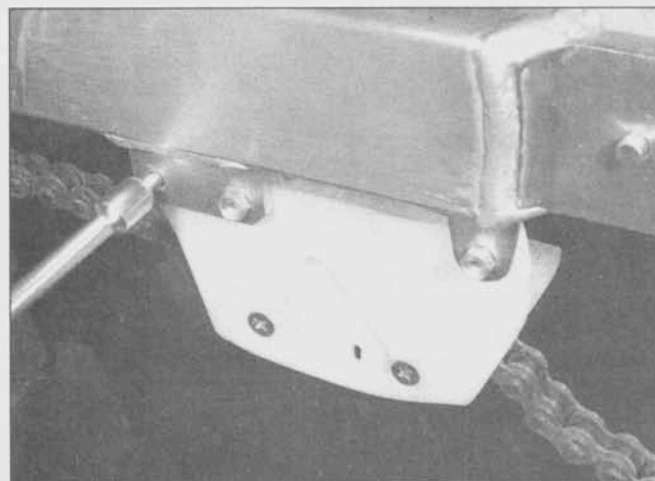
7 Swingarm bearings - check

- 1 Refer to Chapter 6 and remove the rear wheel, then refer to Section 6 and remove the rear shock absorber.
- 2 Grasp the rear of the swingarm with one hand and place your other hand at the junction of the swingarm and frame. Try to move the rear of the swingarm from side-to-side. Any wear (play) in the bushings should be felt as movement between the swingarm and the frame at the front. The swingarm will actually be felt to move forward and backward at the front (not from side-to-side). If any play is noted, the bearings should be replaced with new ones (see Section 9).
- 3 Next, move the swingarm up and down through its full travel. It should move freely, without any binding or rough spots. If it doesn't move freely, refer to Section 9 for servicing procedures.

8 Swingarm - removal and installation

Refer to illustrations 8.4a, 8.4b, 8.4c, 8.5a, 8.5b, 8.6a, 8.6b and 8.6c

- 1 Refer to Section 10 and disconnect the drive chain.
- 2 Remove the rear wheel and unhook the brake pedal return spring



8.4c Unbolt the lower chain guard

from the swingarm (see Chapter 6). If you're working on a bike with a rear disc brake, detach the brake hose from the retainers on the swingarm and support the caliper so it doesn't hang by the hose.

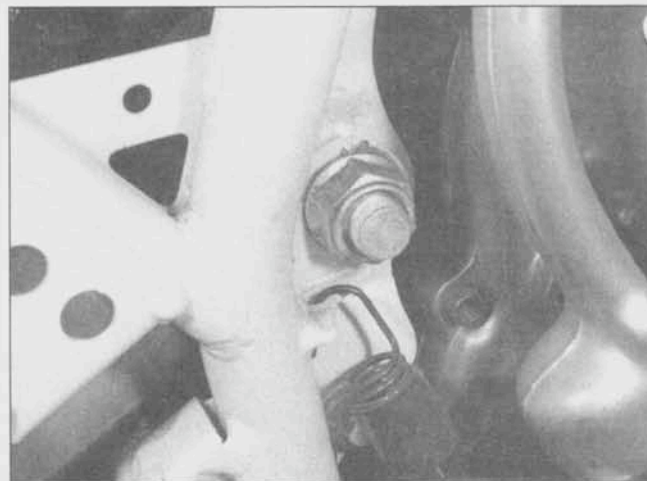
- 3 Remove the shock absorber and shock linkage (Section 6).
- 4 Check the chain guards on the swingarm for wear or damage and replace them if necessary (see illustrations).
- 5 Support the swingarm from below, then unscrew its pivot bolt nut and pull the bolt out (see illustrations).
- 6 Check the chain slider, chain adjuster plates and brake disc guard for wear or damage (see illustrations). Replace them as necessary.
- 7 Installation is the reverse of the removal steps, with the following additions:

- a) Tighten the swingarm pivot bolt and nut to the torque listed in this Chapter's Specifications.
- b) Refer to Chapter 1 and adjust the drive chain and rear brake pedal (drum brake models).
- c) Lubricate the swingarm bearings through the grease fittings (see Chapter 1).

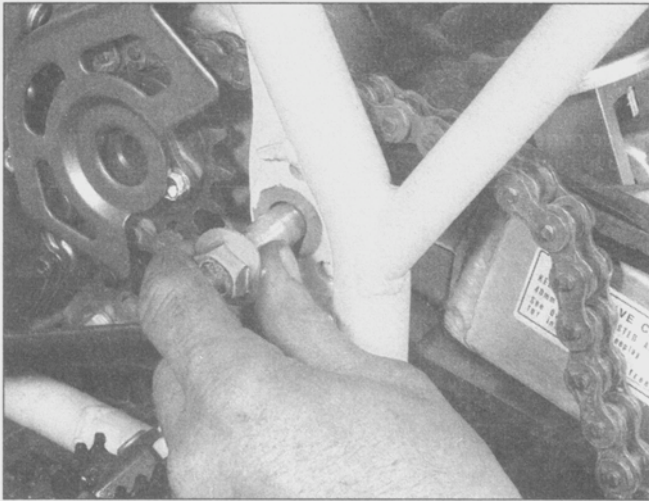
9 Swingarm bearings - replacement

Refer to illustrations 9.2, 9.3 and 9.4

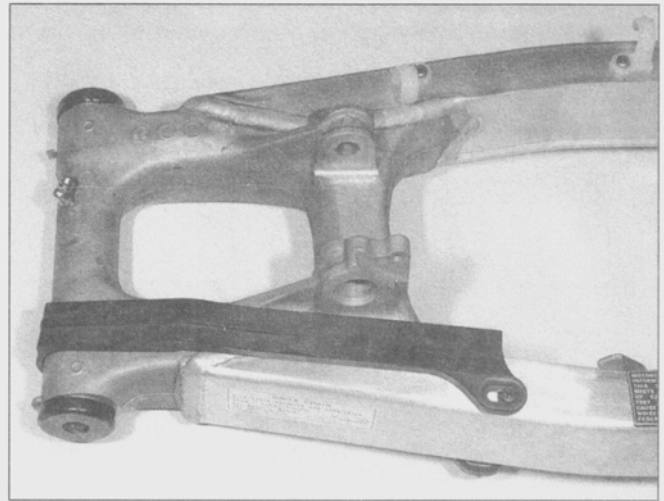
- 1 Refer to Section 8 and remove the swingarm.
- 2 Pull the dust covers off the swingarm (see illustration).
- 3 Pull the pivot collar out of the swingarm (see illustration).



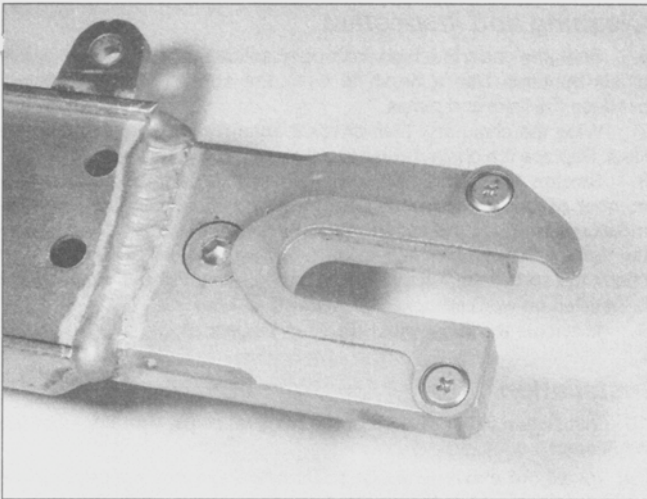
8.5a Remove the locknut . . .



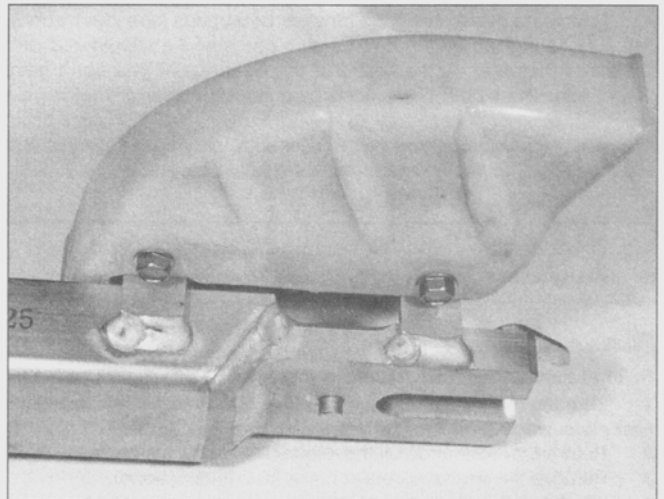
8.5b ... support the swingarm and pull the pivot bolt out



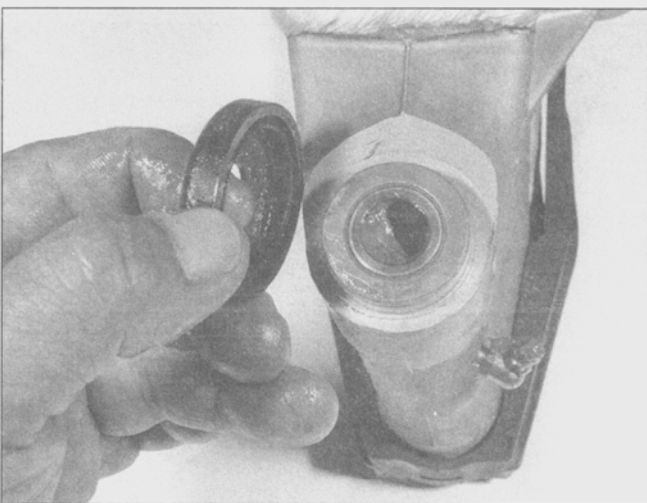
8.6a Remove the chain slider if it's worn



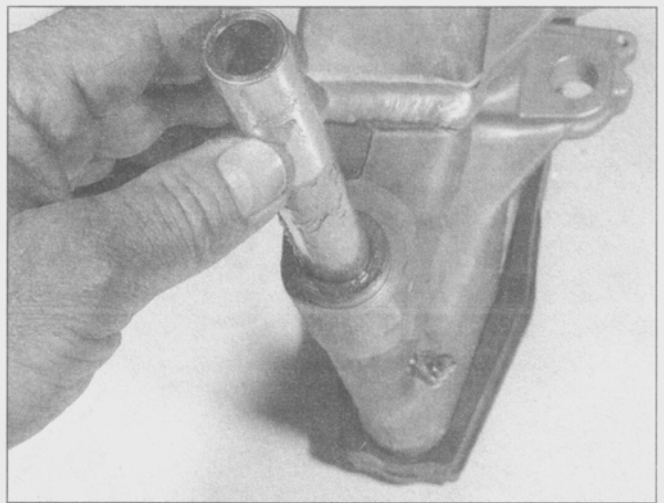
8.6b Check the adjuster plates for wear or damage



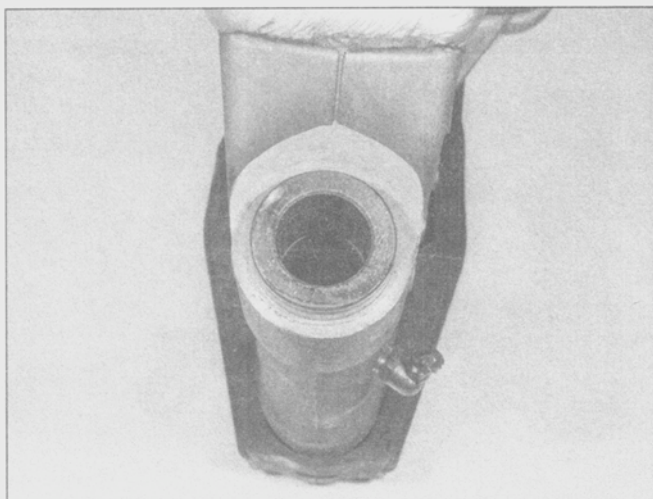
8.6c Unbolt the brake disc guard



9.2 Pull the dust covers off the swingarm



9.3 Slide the pivot collar out



9.4 Have the needle bearings pressed out and new ones pressed in if they're worn

4 Check the needle bearings for wear or damage (see illustration). Needle bearing replacement requires a press and a shouldered drift the same diameter as the inside of the bearings. If you don't have these, have the bearings replaced by a Honda dealer or motorcycle repair shop.

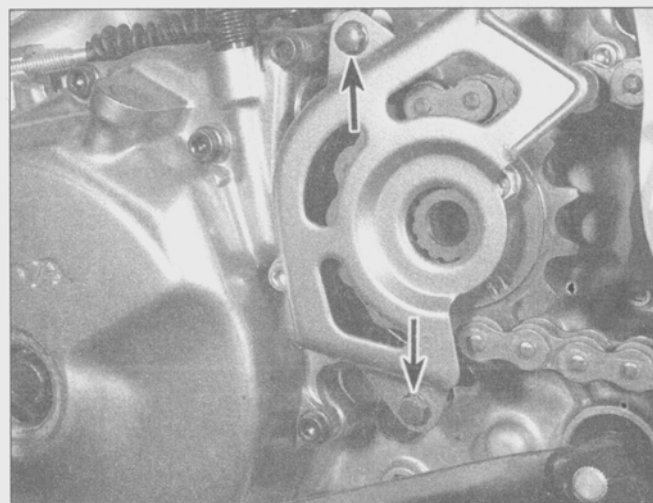
5 Coat the bearings and pivot collar with moly-based grease and slip the collar into the swingarm. Install the dust covers.

10 Drive chain - removal, cleaning, inspection and installation

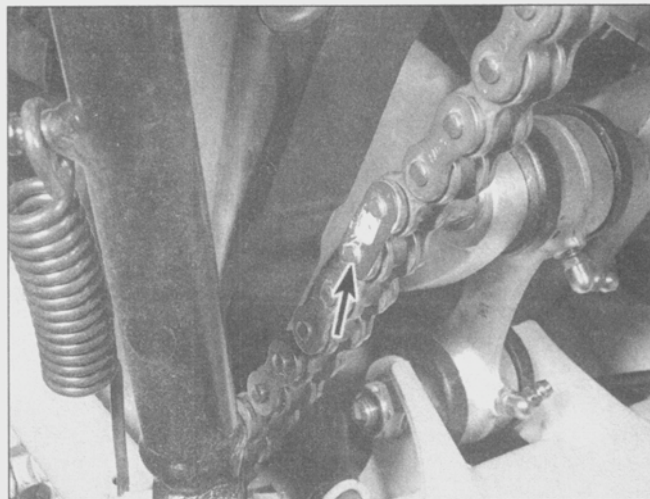
Removal

Refer to illustrations 10.1, 10.3a and 10.3b

- 1 Turn the rear wheel to place the drive chain master link where it's easily accessible (see illustration).
- 2 Remove the clip and pull the master link out of the chain.
- 3 Remove the engine sprocket cover (see illustrations).
- 4 Lift the chain off the sprockets and remove it from the bike.
- 5 Check the chain guards on the swingarm and frame for wear or damage and replace them as necessary (see Section 8).



10.3a Remove the bolts (arrows) . . .



10.1 Remove the clip from the master link; its open end (arrow) faces rearward when the chain is on the top run

Cleaning and inspection

6 Soak the chain in a high flash point solvent for approximately five or six minutes. Use a brush to work the solvent into the spaces between the links and plates.

7 Wipe the chain dry, then check it carefully for worn or damaged links. Replace the chain if wear or damage is found at any point.

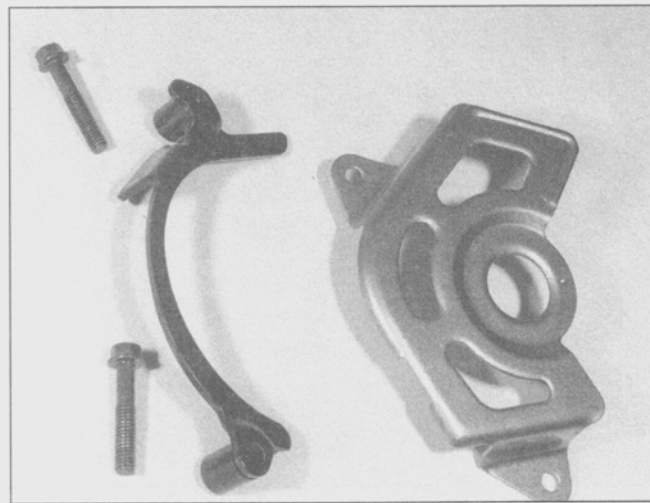
8 Stretch the chain taut and measure its length between the number of pins listed in this Chapter's Specifications. Compare the measured length to the specified value. Replace the chain if it's beyond the limit. If the chain needs to be replaced, refer to Section 11 and check the sprockets. If they're worn, replace them also. If a new chain is installed on worn sprockets, it will wear out quickly.

9 Lubricate the chain with SAE 80 or 90 gear oil.

Installation

10 Installation is the reverse of the removal steps, with the following additions:

- a) Install the master link clip so its opening faces the back of the motorcycle when the master link is in the upper chain run.
- b) Refer to Chapter 1 and adjust the chain.

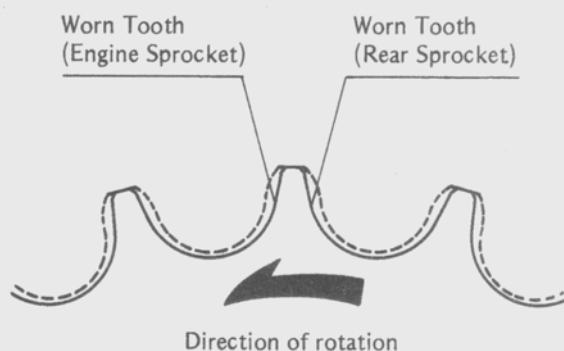


10.3b . . . and take off the engine sprocket cover and its spacer

11 Sprockets - check and replacement

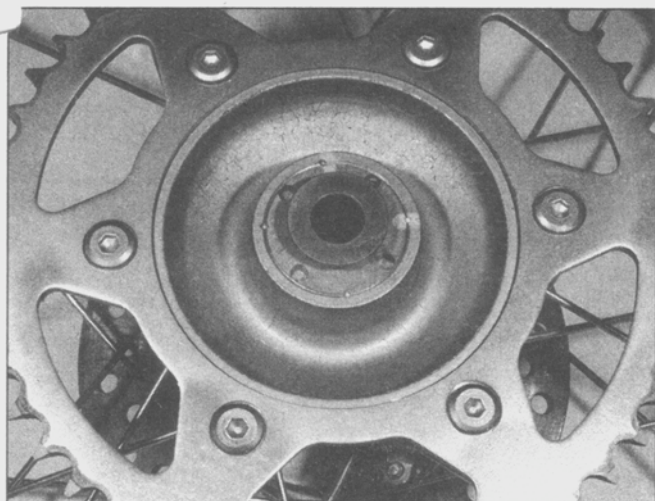
Refer to illustrations 11.3, 11.5 and 11.6

- 1 Support the bike securely so it can't be knocked over during this procedure.
- 2 Whenever the sprockets are inspected, the chain should be inspected also and replaced if it's worn. Installing a worn chain on new sprockets will cause them to wear quickly.
- 3 Remove the engine sprocket cover (see illustration 10.3a). Check the teeth on the engine sprocket and rear sprocket for wear (see illustration).
- 4 If the sprockets are worn, remove the chain (Section 10) and the rear wheel (see Chapter 6).
- 5 Unbolt the sprocket from the rear wheel hub (see illustration).
- 6 To remove the engine sprocket, remove two bolts and lift off the retainer plate (see illustration). Lift the sprocket off the transmission shaft.
- 7 Inspect the seal behind the engine sprocket. If it has been leaking, pry it out (taking care not to scratch the seal bore) and tap in a new seal with a socket the same diameter as the seal.
- 8 Installation is the reverse of the removal steps, with the following additions:

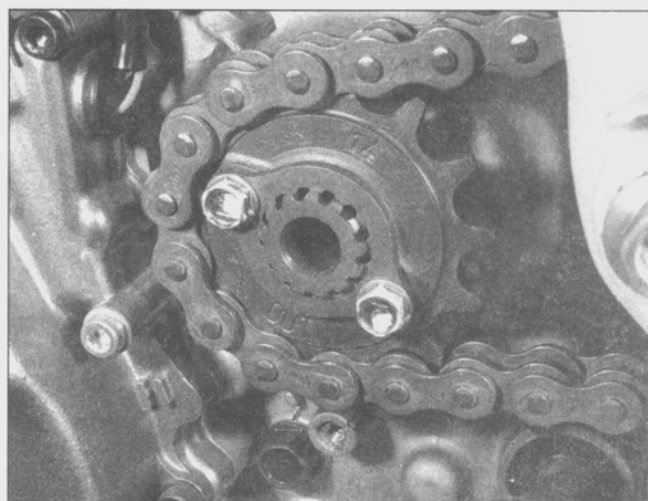


11.3 Check the sprockets in the areas indicated to see if they're worn excessively

- a) Tighten the driven sprocket bolts and nuts to the torques listed in this Chapter's Specifications. Tighten the engine sprocket bolts securely, but don't overtighten them and strip the threads
- b) Install the master link clip so its opening faces the back of the motorcycle when the master link is in the upper chain run.
- c) Refer to Chapter 1 and adjust the chain.



11.5 Remove the Allen bolts and nuts to detach the driven sprocket



11.6 The engine sprocket is secured by a plate and two bolts; the Out mark on the plate faces away from the engine

Notes

Chapter 6

Brakes, wheels and tires

Contents

	Section		Section
Brake caliper - removal, overhaul and installation	3	General information	1
Brake check	See Chapter 1	Rear brake master cylinder - removal, overhaul and installation	7
Brake disc - inspection, removal and installation	4	Tires - removal and installation	14
Brake drum and shoes - removal, inspection and installation	5	Tubes - repair	15
Brake hoses and lines - inspection and replacement	9	Wheel and rear coupling bearings - inspection and maintenance	13
Brake light switches - check and adjustment	See Chapter 1	Wheels - alignment check	12
Brake pads - replacement	2	Wheels - inspection, removal and installation	11
Brake pedal - removal and installation	8	Wheels and tires - general check	See Chapter 1
Brake pedal position check and adjustment	See Chapter 1		
Brake system bleeding	10		
Front brake master cylinder - removal, overhaul and installation	6		

Specifications

Disc brakes

Brake fluid type	See Chapter 1
Brake pad minimum thickness	See Chapter 1
Front disc thickness	
1983 through 1987 models	
Standard	3.5 mm (0.14 inch)
Limit	3.0 mm (0.12 inch)*
1988 and later models	
Standard	3.0 mm (0.12 inch)
Limit	2.5 mm (0.10 inch)*
Rear disc thickness	
Standard	4.5 mm (0.18 inch)
Limit	4.0 mm (0.16 inch)*
Disc runout limit	
Front	0.30 mm (0.012 inch)
Rear	0.15 mm (0.006 inch)

*Refer to marks stamped into the disc (they supersede information printed here)

Drum brakes

Brake lining minimum thickness	See Chapter 1
Brake pedal height	See Chapter 1
Drum diameter	
XL600R	
Standard	130 mm (5.12 inches)
Wear limit	131 mm (5.16 inches)*

Disc brakes (continued)

Drum diameter (continued)

XR600R	
Standard	110 mm (4.33 inches)
Limit	111 mm (4.37 inches)*

*Refer to marks cast into the drum (they supersede information printed here)

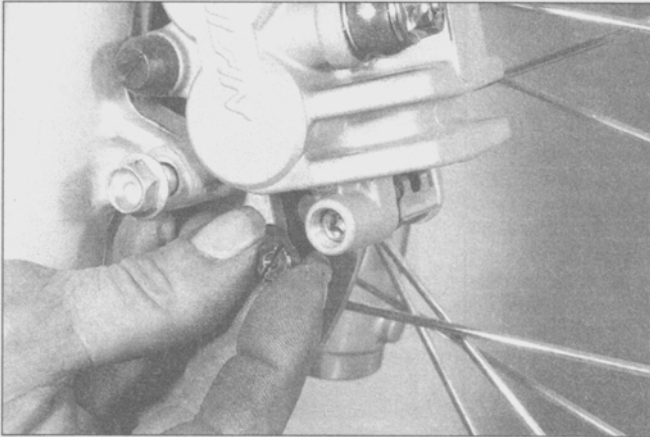
Wheels and tires

Tire pressures	See Chapter 1
Tire tread depth	See Chapter 1
Axle runout limit	0.2 mm (0.008 inch)
Wheel out-of-round and lateral runout limit (front and rear)	2.0 mm (0.08 inch)

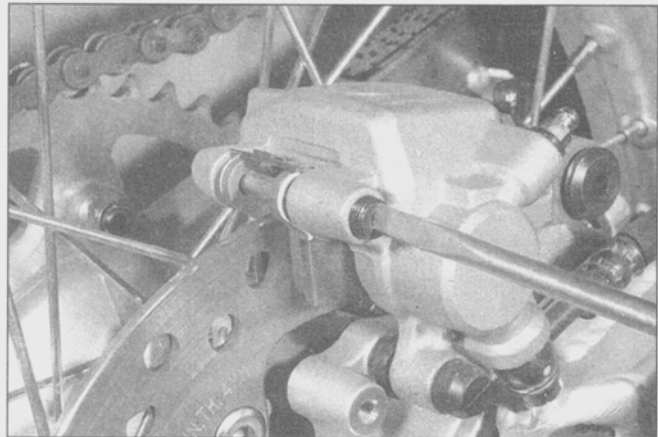
Torque specifications

Front axle	
1983 through 1987 models	50 to 80 Nm (36 to 58 ft-lbs)
1988 through 1992 models	65 Nm (47 ft-lbs)
1993 and later models	85 Nm (61 ft-lbs)
Front axle holder nuts	
1983 through 1987 models	10 to 14 Nm (84 to 120 in-lbs)
1988 and later models	12 Nm (108 in-lbs)
Rear axle nut	
1983 through 1987 models	80 to 110 Nm (58 to 72 ft-lbs)
1988 and later models	95 Nm (69 ft-lbs)
Front caliper	
XL600R	
Caliper bracket bolts	20 to 30 Nm (14 to 22 ft-lbs)
Lower caliper bolt	15 to 20 Nm (132 to 168 in-lbs)
Upper caliper bolt	20 to 25 Nm (14 to 18 ft-lbs)
XR600R (1983 through 1987)	
Caliper bracket bolts	20 to 30 Nm (14 to 22 ft-lbs)
Pad pins	15 to 20 Nm (84 to 168 in-lbs)
Upper slider pin to bracket	20 to 25 Nm (14 to 18 ft-lbs)
Lower slider pin to bracket	15 to 20 Nm (84 to 168 in-lbs)
XR600R (1988 on)	
Caliper bracket bolts	27 Nm (20 ft-lbs)
Slider pin to caliper	23 Nm (17 ft-lbs)
Slider pin to caliper bracket	13 Nm (120 in-lbs)
Pad pins	18 Nm (156 in-lbs)
Pad pin plugs	3 Nm (26 in-lbs)
Rear caliper	
Allen head slider pin to caliper	28 Nm (20 ft-lbs)
Slider pin to bracket	13 Nm (120 in-lbs)
Pad pins	18 Nm (156 in-lbs)
Pad pin plugs	3 Nm (26 inch-lbs)
Brake line union bolts	
XL600R	30 to 40 Nm (22 to 29 ft-lbs)
XR600R	
1983 through 1987	Not specified
1988 on	35 Nm (25 ft-lbs)
Brake hose to master cylinder (XL600R)	30 to 40 Nm (22 to 29 ft-lbs)
Brake disc-to-wheel bolts	
1983 through 1987 models	14 to 16 Nm (120 to 144 in-lbs)
1988 through 1990 models	15 Nm (132 in-lbs)*
1991 and later models	20 Nm (168 in-lbs)*
Rear drum brake arm pinch bolt	8 to 12 Nm (72 to 108 inch-lbs)
Front master cylinder	
Mounting bolts	
1983 through 1987	Not specified
1988 on	27 Nm (20 ft-lbs)
Pivot bolt locknut	
1983 through 1987	Not specified
1988 on	10 Nm (84 inch-lbs)
Rear master cylinder mounting bolts	Not specified
Pedal pivot bolt (drum brake models)	
1983 through 1987	35 to 45 Nm (25 to 33 ft-lbs)
1988 on	30 Nm (22 ft-lbs)

*Replace the bolts with new ones whenever they're removed.



2.3a Unscrew the pad pin plug; it's at the bottom of the front caliper ...

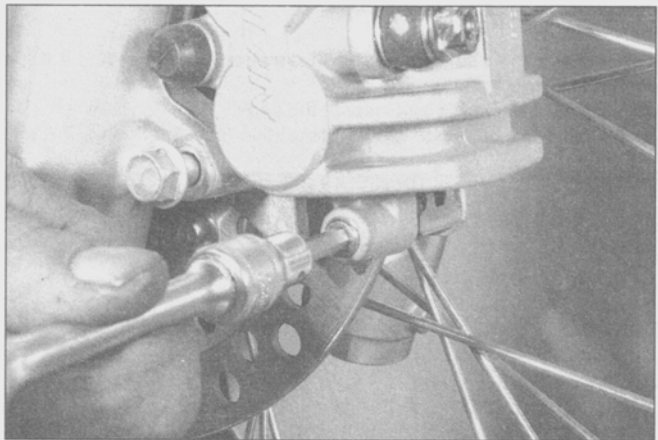


2.3b ... and at the rear of the rear caliper

1 General information

The front wheel on all motorcycles covered by this manual is equipped with a hydraulic disc using a dual-piston pin-slider caliper. The rear wheel on 1983 through 1987 models is equipped with a drum brake. The rear wheel on 1988 and later models is equipped with a hydraulic disc brake using a single-piston pin-slider caliper.

All models are equipped with spoked steel wheels. **Caution:** Disc brake components rarely require disassembly. Do not disassemble components unless absolutely necessary. If any hydraulic brake line connection in the system is loosened, the entire system should be disassembled, drained, cleaned and then properly filled and bled upon reassembly. Do not use solvents on internal brake components. Solvents will cause seals to swell and distort. Use only clean brake fluid or alcohol for cleaning. Use care when working with brake fluid as it can injure your eyes and it will damage painted surfaces and plastic parts.



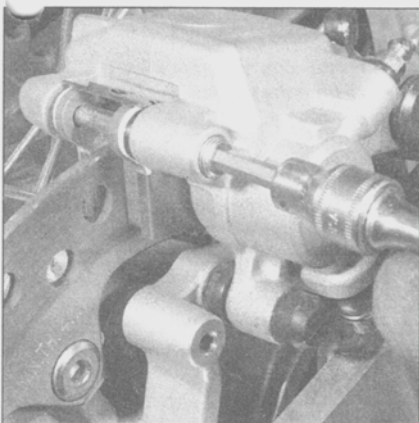
2.4a Unscrew the pad retaining pin; this is a front caliper ...

2 Brake pads - replacement

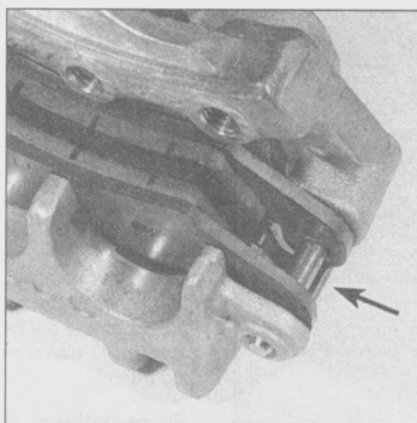
Refer to illustrations 2.3a, 2.3b, 2.4a, 2.4b, 2.5a, 2.5b, 2.6a and 2.6b

Warning: The dust created by the brake system may contain asbestos, which is harmful to your health. Honda hasn't used asbestos in brake parts for a number of years, but aftermarket parts may contain it. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes.

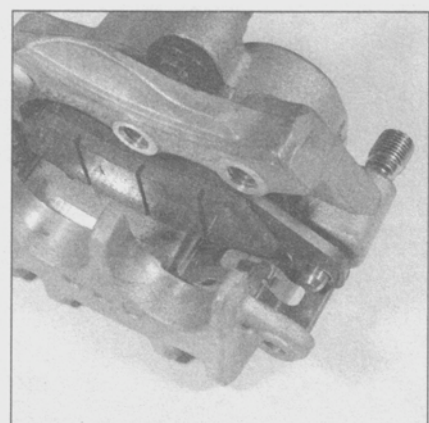
- 1 Support the bike securely upright.
- 2 The caliper doesn't need to be removed for pad replacement.
- 3 Unscrew the plug that covers the pad retaining pin (see illustrations).
- 4 Unscrew the pad retaining pin with an Allen wrench (see illustrations).
- 5 Pull the pads out of the caliper (see illustrations).



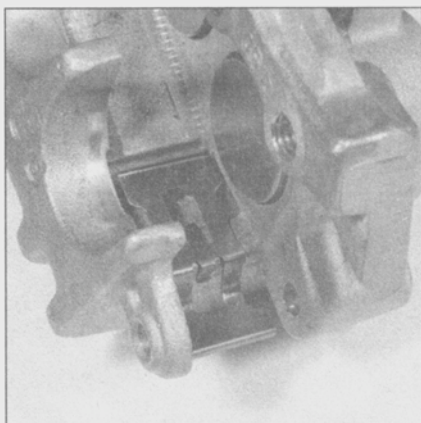
2.4b ... and this is a rear caliper



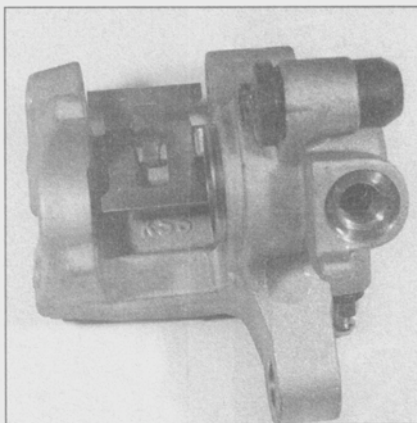
2.5a Pull out the pad retaining pin (arrow) and lift out the brake pad farthest from the piston ...



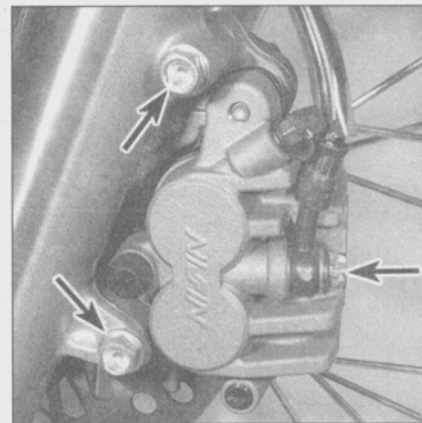
2.5b ... then pull the pin out the rest of the way and remove the remaining pad (caliper removed for clarity)



2.6a The front caliper's pad spring fits under the pad pin like this . . .

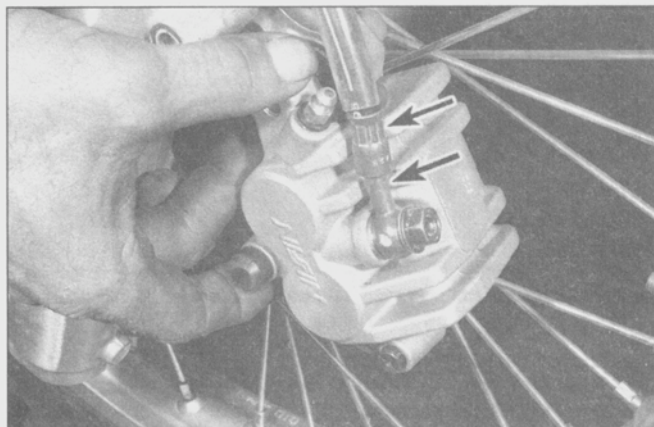


2.6b . . . and the rear caliper's pad spring fits like this

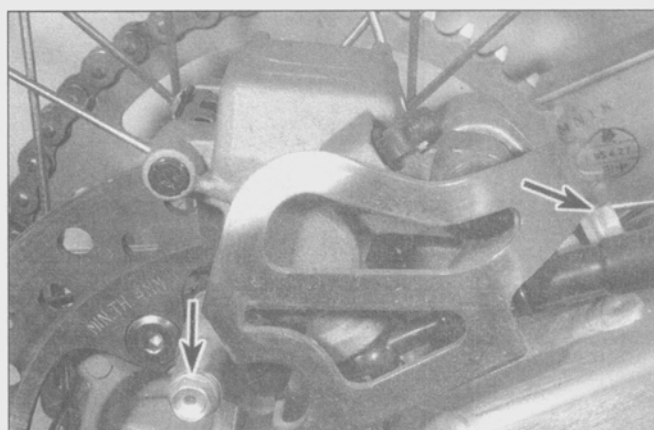


3.2 Unscrew the union bolt (right arrow) if you're planning to remove the caliper for overhaul; remove the mounting bolts (left arrows) to detach the caliper from the fork leg

- 6 Inspect the pad spring (see illustrations) and replace it if it's rusted or damaged.
- 7 Refer to Chapter 1 and inspect the pads.
- 8 Check the condition of the brake disc (see Section 4). If it's in



3.3 The hose can be left connected if you're removing the caliper for access to other components; on installation, be sure the brake hose fits in the notches (arrows)



3.4 Remove the rear caliper shield bolts (arrows) and lift off the shield for access to the caliper

need of machining or replacement, follow the procedure in that Section to remove it. If it's okay, deglaze it with sandpaper or emery cloth, using a swirling motion.

9 Remove the cover from the master cylinder reservoir and siphon out some fluid. Push the pistons into the caliper as far as possible, while checking the master cylinder reservoir to make sure it doesn't overflow. If you can't depress the pistons with thumb pressure, try using a C-clamp. If the pistons stick, remove the caliper and overhaul it as described in Section 3.

10 Install the spring (if removed), new pads and the retaining pin. Tighten the retaining pin to the torque listed in this Chapter's Specifications. Install the plug over the retaining pin and tighten it to the torque listed in this Chapter's Specifications.

11 Operate the brake lever or pedal several times to bring the pads into contact with the disc. Check the operation of the brakes carefully before riding the motorcycle.

3 Brake caliper - removal, overhaul and installation

Warning: If a caliper indicates the need for an overhaul (usually due to leaking fluid or sticky operation), all old brake fluid must be flushed from the system. Also, the dust created by the brake system may contain asbestos, which is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. Do not, under any circumstances, use petroleum-based solvents to clean brake parts. Use brake cleaner or denatured alcohol only!

Note: If you are removing the caliper only to remove the front or rear wheel, don't disconnect the hose from the caliper.

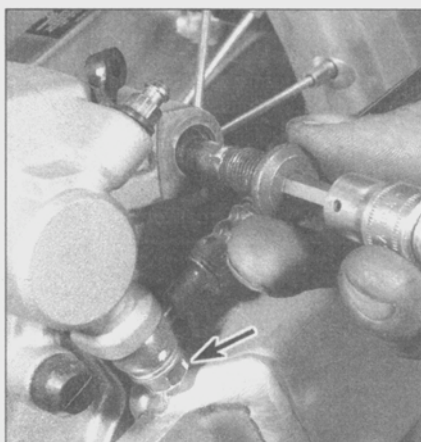
Removal

1 Support the bike securely upright. **Note:** If you're planning to disassemble the caliper, read through the overhaul procedure, paying particular attention to the steps involved in removing the pistons with compressed air. If you don't have access to an air compressor, you can use the bike's hydraulic system to force the pistons out instead. To do this, remove the pads and pump the brake lever or pedal. If one front caliper piston comes out before the other, push it back into its bore and hold it in with a C-clamp while pumping the brake lever to remove the remaining piston.

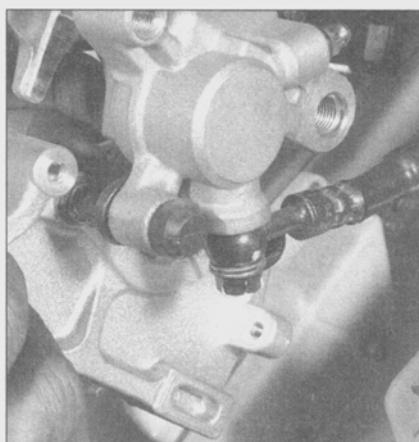
Front caliper

Refer to illustrations 3.2 and 3.3

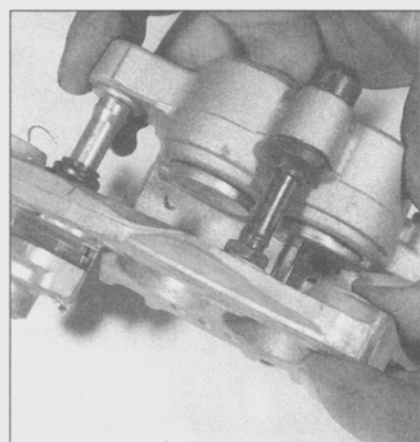
2 **Note:** Remember, if you're just removing the caliper to remove the



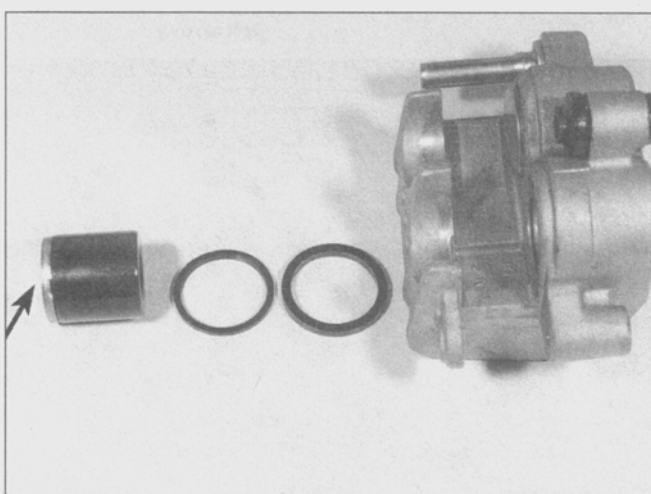
3.6a Unscrew the Allen-head caliper pin . . .



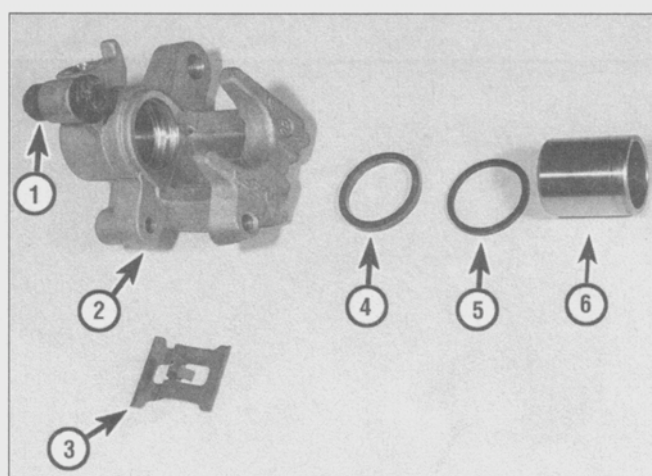
3.6b . . . then pivot the caliper up off the disc and slide it clear of the bracket



3.8 Slide the front caliper off the bracket



3.9a Front caliper piston and seal details (one of two pistons shown); the metal cap on the end of the piston (arrow) faces away from the bore



3.9b Rear caliper details

- | | |
|----------------|---------------|
| 1 Pin boot | 4 Dust seal |
| 2 Caliper body | 5 Piston seal |
| 3 Pad spring | 6 Piston |

wheel, ignore this step. Disconnect the brake hose from the caliper. Remove the brake hose banjo fitting bolt and separate the hose from the caliper (see illustration). Discard the sealing washers. Plug the end of the hose or wrap a plastic bag tightly around it to prevent excessive fluid loss and contamination.

3 Unscrew the caliper mounting bolts and lift it off the fork leg, being careful not to strain or twist the brake hose if it's still connected (see illustration).

Rear caliper

Refer to illustrations 3.4, 3.6a and 3.6b

4 Loosen the rear axle nut and disengage the drive chain from the sprocket (see Chapters 1 and 5). Remove the caliper shield (see illustration).

5 **Note:** If you're only removing the caliper to remove the wheel, ignore this step. Disconnect the brake hose from the caliper. Remove the brake hose banjo fitting bolt and separate the hose from the caliper. Discard the sealing washers. Plug the end of the hose or wrap a plastic bag tightly around it to prevent excessive fluid loss and contamination.

6 Unscrew the caliper mounting Allen bolt and slide the caliper off the bracket pin (see illustrations). Lower the caliper, being careful not to strain or twist the brake hose if it's still connected.

Overhaul

Refer to illustrations 3.8, 3.9a, 3.9b, 3.13, 3.16a, 3.16b and 3.16c

7 Remove the brake pads and anti-rattle spring from the caliper (see Section 2, if necessary). Clean the exterior of the caliper with denatured alcohol or brake system cleaner.

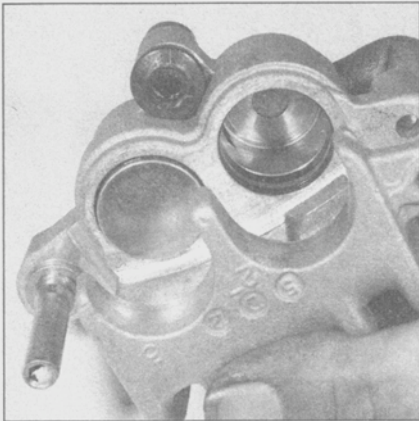
8 If you're working on a front caliper, separate it from the bracket (see illustration).

9 Pack a shop rag into the space that holds the brake pads. Use compressed air, directed into the caliper fluid inlet, to remove the piston(s) (see illustrations). Use only enough air pressure to ease the piston(s) out of the bore. If a piston is blown out forcefully, even with the rag in place, it may be damaged. **Warning:** Never place your fingers in front of the piston in an attempt to catch or protect it when applying compressed air, as serious injury could occur.

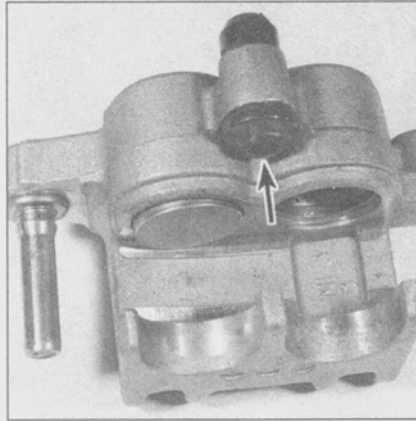
10 Using a wood or plastic tool, remove the piston seals. Metal tools may cause bore damage.

11 Clean the pistons and the bores with denatured alcohol, clean brake fluid or brake system cleaner and blow dry them with filtered, unlubricated compressed air.

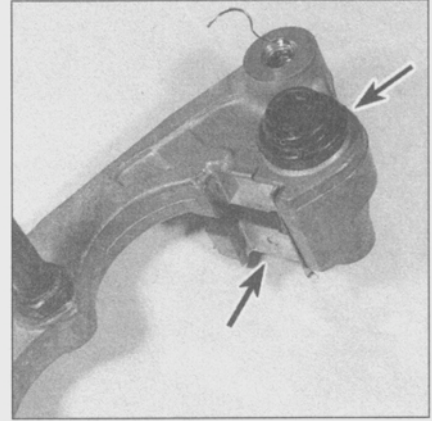
12 Inspect the surfaces of the pistons for nicks and burrs and loss of plating. Check the caliper bores, too. If surface defects are present, the caliper must be replaced. If the caliper is in bad shape, the master cylinder should also be checked.



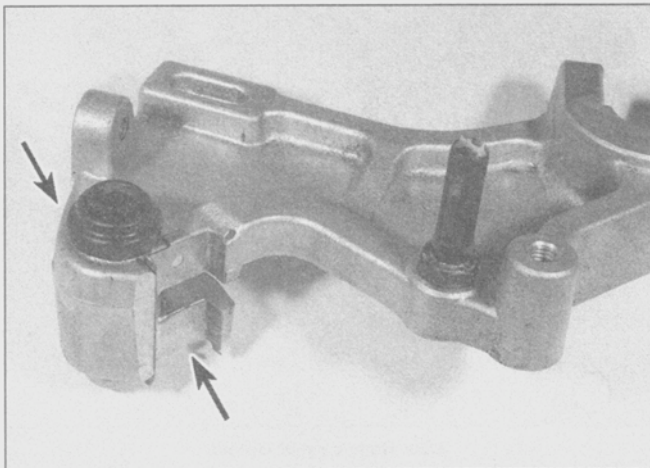
3.13 Fit the seals all the way into their grooves



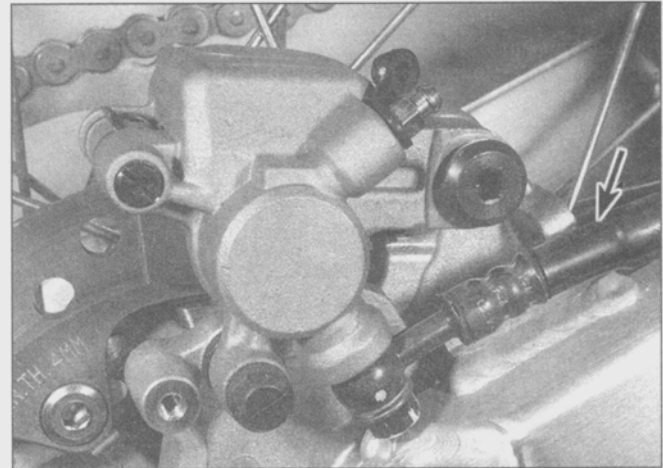
3.16a Install the boot in the front caliper with its wide end facing the same direction as the pistons (arrow)



3.16b Install the boot in the front caliper bracket with its wide end facing the same direction as the pin (right arrow) and install the spring in the bracket notch (left arrow)



3.16c Install the boot in the rear caliper bracket with its wide end facing the same direction as the pin (left arrow) and install the spring in the bracket notch (right arrow)



3.18 Be sure the brake hose fits in the caliper bracket notch (arrow) when the union bolt is tightened

13 Lubricate the piston seals with clean brake fluid and install them in their grooves in the caliper bore (see illustration). Make sure they seat completely and aren't twisted.

14 Lubricate the dust seals with clean brake fluid and install them in their grooves, making sure they seat correctly.

15 Lubricate the piston (both pistons on front calipers) with clean brake fluid and install it into the caliper bore. Using your thumbs, push each piston all the way in, making sure it doesn't get cocked in the bore.

16 Pull the old pin boots out of the caliper and bracket. Coat new ones with silicone grease and install them, making sure they seat completely (see illustrations).

17 Make sure the pad springs are in position on the caliper brackets (see illustrations 3.16b and 3.16c).

Installation

Refer to illustration 3.18

18 Installation is the reverse of the removal steps, with the following additions:

- a) Apply silicone grease to the slider pins on the caliper bracket and caliper.
- b) Space the pads apart so the disc will fit between them.

c) Use new sealing washers on the brake hose fitting. If you're working on a front caliper, position the brake hose fitting in the caliper notches (see illustration 3.3). If you're working on a rear caliper, position the brake hose against the stop on the swingarm (see illustration).

d) Tighten the caliper mounting bolt(s) and brake line union bolt to the torque listed in this Chapter's Specifications.

e) If you're working on a rear caliper, engage the drive chain with the sprocket and adjust the chain slack (see Chapter 1).

19 Fill the master cylinder with the recommended brake fluid (see Chapter 1) and bleed the system (see Section 10). Check for leaks.

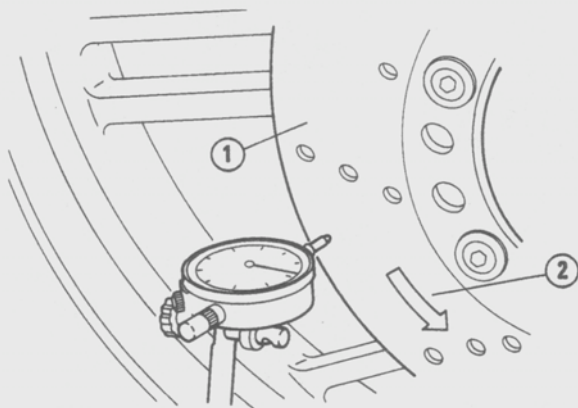
20 Check the operation of the brakes carefully before riding the motorcycle.

4 Brake disc - inspection, removal and installation

Inspection

Refer to illustrations 4.3 and 4.4

1 Support the bike securely upright. Place a jack beneath the bike and raise the wheel being checked off the ground. Be sure the bike is securely supported so it can't be knocked over.



4.3 Set up a dial indicator against the brake disc (1) and turn the disc in its normal direction of rotation (2) to measure runout

2 Visually inspect the surface of the disc for score marks and other damage. Light scratches are normal after use and won't affect brake operation, but deep grooves and heavy score marks will reduce braking efficiency and accelerate pad wear. If the discs are badly grooved they must be machined or replaced.

3 To check disc runout, mount a dial indicator to a fork leg or the swing-arm, with the plunger on the indicator touching the surface of the disc about 1/2-inch from the outer edge (**see illustration**). Slowly turn the wheel and watch the indicator needle, comparing your reading with the limit listed in this Chapter's Specifications. If the runout is greater than allowed, check the hub bearings for play (see Chapter 1). If the bearings are worn, replace them and repeat this check. If the disc runout is still excessive, the disc will have to be replaced.

4 The disc must not be machined or allowed to wear down to a thickness less than the minimum allowable thickness, listed in this Chapter's Specifications. The thickness of the disc can be checked with a micrometer. If the thickness of the disc is less than the minimum allowable, it must be replaced. The minimum thickness is also stamped into the disc (**see illustration**).

Removal

5 Remove the wheel (see Section 11). **Caution:** Don't lay the wheel down and allow it to rest on the disc - the disc could become warped. Set the wheel on wood blocks so the disc doesn't support the weight of the wheel.

Mark the relationship of the disc to the wheel, so it can be installed in the same position. Remove the nuts or Allen head bolts that retain the disc to the wheel (**see illustration 4.4**). Loosen the bolts a little at a time, in a criss-cross pattern, to avoid distorting the disc. **Note:** Allen head bolts must be replaced with new ones on installation.

7 Take note of any paper shims that may be present where the disc mates to the wheel. If there are any, mark their position and be sure to include them when installing the disc.

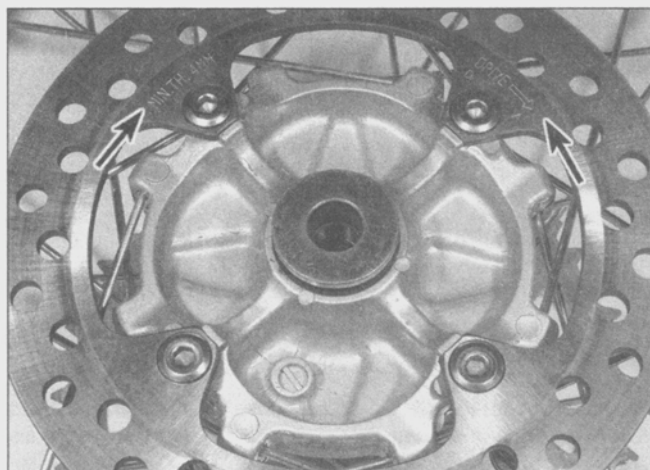
Installation

8 Position the disc on the wheel, aligning the previously applied matchmarks (if you're reinstalling the original disc). On models so equipped, make sure the arrow (stamped on the disc) marking the direction of rotation is pointing in the proper direction (**see illustration 4.4**).

9 If the brake disc is secured by Allen head bolts, use new ones. Apply a non-hardening thread locking compound to the threads of the nuts or bolts. Install the nuts or bolts, tightening them a little at a time in a criss-cross pattern, until the torque listed in this Chapter's Specifications is reached. Clean off all grease from the brake disc using acetone or brake system cleaner.

10 Install the wheel.

11 Operate the brake lever or pedal several times to bring the pads



4.4 Marks on the disc indicate the minimum thickness (left arrow) and direction of rotation (right arrow)

into contact with the disc. Check the operation of the brakes carefully before riding the motorcycle.

5 Brake drum and shoes - removal, inspection and installation

Warning: The dust created by the brake system may contain asbestos, which is harmful to your health (Honda hasn't used asbestos in brake parts for a number of years, but aftermarket parts may contain it). Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes.

Removal

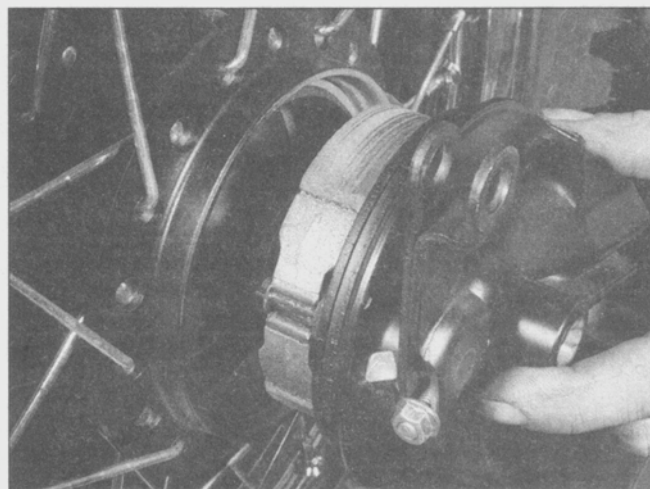
Refer to illustration 5.2

- 1 Remove the wheel (see Section 11).
- 2 Lift the brake panel out of the wheel (**see illustration**).

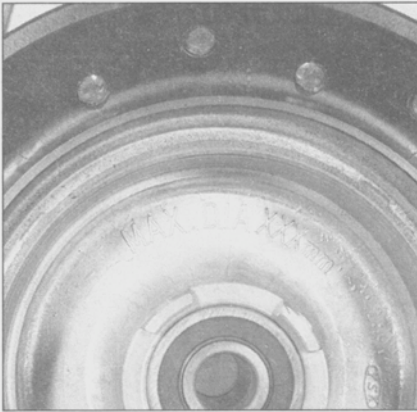
Inspection

Refer to illustrations 5.3, 5.6, 5.9, 5.10, 5.11, 5.12a and 5.12b

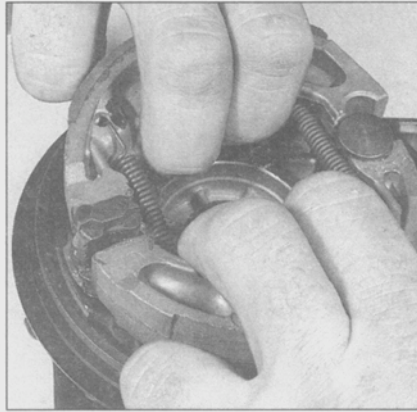
3 Check the brake drum for wear or damage. Measure the diameter at several points with a drum micrometer (or have this done by a Honda dealer). If the measurements are uneven (indicating that the drum is out-of-round) or if there are scratches deep enough to snag a fingernail, replace the drum. The drum must also be replaced if the



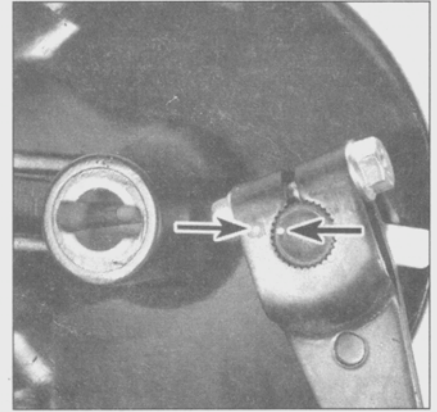
5.2 Lift the brake panel out of the drum



5.3 The maximum diameter is cast inside the brake drum



5.6 Spread the shoes and fold them into a V to release the spring tension



5.9 Look for alignment marks on the brake arm and cam (arrows); make your own marks if you can't see any

diameter is greater than that cast inside the drum (see illustration).

Note: Honda recommends against machining brake drums.

4 Check the linings for wear, damage and signs of contamination from road dirt or water. If the linings are visibly defective, replace them.

5 Measure the thickness of the lining material (just the lining material, not the metal backing) and compare with the value listed in the Chapter 1 Specifications. Replace the shoes if the material is worn to the minimum or less.

6 To remove the shoes, fold them toward each other to release the spring tension and lift them off the brake panel (see illustration).

7 Check the ends of the shoes where they contact the brake cam and anchor pin. Replace the shoes if there's visible wear.

8 Check the brake cam and anchor pin for wear and damage. The brake cam can be replaced separately; the brake panel must be replaced if the anchor pin is unserviceable.

9 Look for alignment marks on the brake arm and anchor pin (see illustration). Make your own if they aren't visible.

10 Remove the pinch bolt and nut and pull the brake arm off the cam (see illustration).

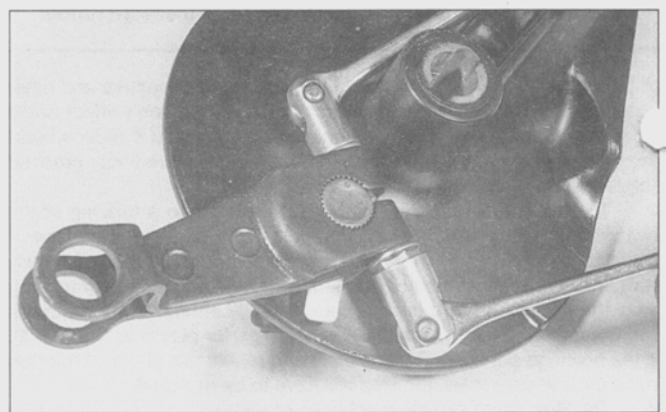
11 Lift off the wear indicator (see illustration). Pull the brake cam out of the brake panel.

12 Check the brake cam dust seal for wear and damage (see illustration). To replace it, pry it out of the brake panel and tap in a new one using a socket or seal driver the same diameter as the seal (see illustration).

Installation

Refer to illustrations 5.16 and 5.17

13 Apply high temperature brake grease to the brake cam, the



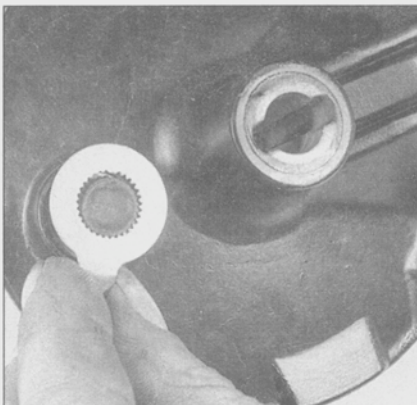
5.10 Remove the pinch bolt and nut and take the brake arm off the cam

anchor pin and the ends of the springs.

14 Install the cam through the dust seal. Install the wear indicator (see illustration 5.11). Align its wide groove with the wide spline in the cam.

15 Install the brake arm on the cam, aligning the punch marks. Tighten the nut and bolt to the torque listed in this Chapter's Specifications.

16 Hook the ends of the springs to the shoes. Position the shoes in a V on the brake panel, then fold them down into position (see illustration).



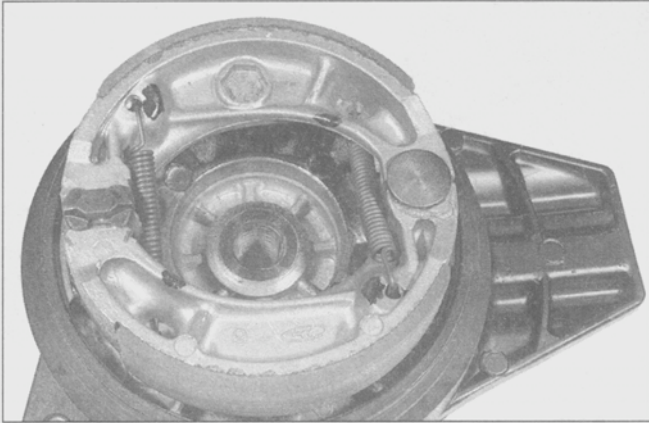
5.11 Remove the wear indicator; the wide spline on the wear indicator fits into a wide groove in the brake cam



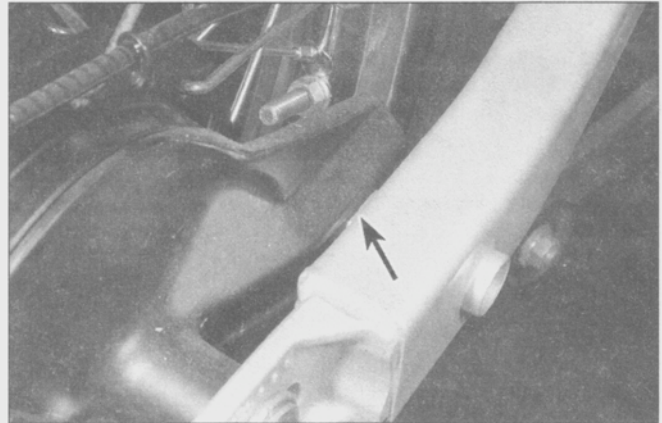
5.12a Replace the brake cam seal if it's worn or damaged



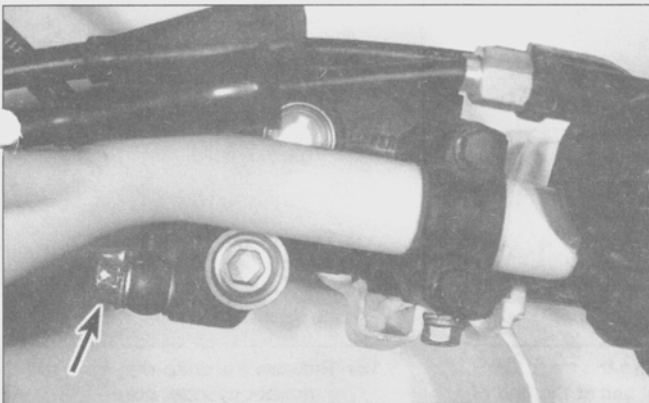
5.12b Pry out the old seal, then press a new one in with a socket the same diameter as the seal



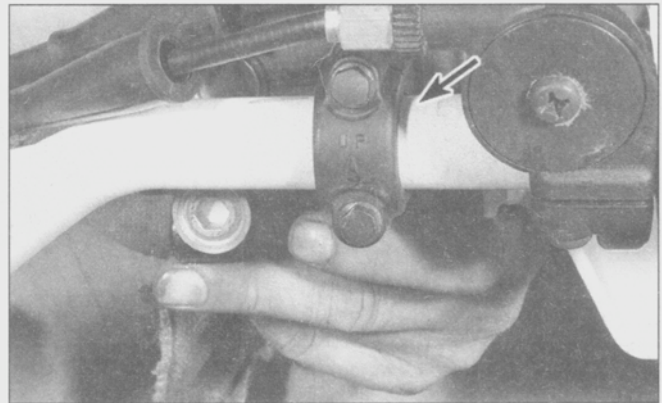
5.16 The assembled brakes should look like this



5.17 Be sure the protrusion on the swingarm fits into the notch in the brake panel (arrow)



6.8 Remove the union bolt (arrow) and disconnect the brake line from the master cylinder; use new sealing washers on installation



6.9 Remove the clamp bolts and detach the clamp from the handlebar; on installation, make sure the Up mark on the clamp bolt is upright and align the parting line of the clamp and master cylinder with the punch mark on the handlebar (arrow)

tion 5.6). Make sure the ends of the shoes fit correctly on the cam and the anchor pin (see illustration).

17 The remainder of installation is the reverse of the removal steps. Make sure the notch in the brake panel aligns with the boss on the swingarm (see illustration).

6 Front brake master cylinder - removal, overhaul and installation

1 If the master cylinder is leaking fluid, or if the lever doesn't produce a firm feel when the brake is applied, and bleeding the brakes doesn't help, master cylinder overhaul is recommended. Before disassembling the master cylinder, read through the entire procedure and make sure that you have the correct rebuild kit. Also, you will need some new, clean brake fluid of the recommended type, some clean rags and internal snap-ring pliers. **Note:** To prevent damage to the paint from spilled brake fluid, always cover the gas tank when working on the master cylinder.

2 **Caution:** Disassembly, overhaul and reassembly of the brake master cylinder must be done in a spotlessly clean work area to avoid contamination and possible failure of the brake hydraulic system components.

Removal

3 Place rags beneath the master cylinder to protect the paint in case of brake fluid spills.

XL600R

4 Disconnect the wires from the brake light switch.

5 Brake fluid will run out of the upper brake hose during this step, so either have a container handy to place the end of the hose in, or have a plastic bag and rubber band handy to cover the end of the hose. Unscrew the flare nut that connects the intermediate metal line to the upper brake hose with a flare nut wrench.

6 If you're planning to remove the rearview mirror from the master cylinder, do it now while the master cylinder is still attached to the handlebar.

7 Remove the master cylinder mounting bolts. Take the master cylinder off the handlebar, then unscrew the master cylinder from the brake hose and remove the sealing washer.

XR600R

Refer to illustrations 6.8 and 6.9

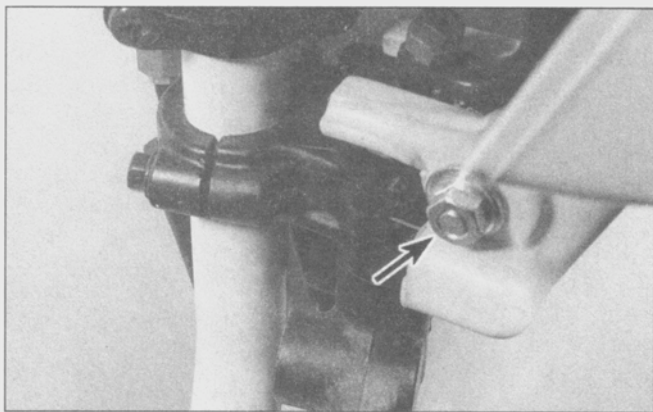
8 Remove the banjo fitting bolt (see illustration) and separate the brake hose from the master cylinder. Wrap the end of the hose in a clean rag and suspend the hose in an upright position or bend it down carefully and place the open end in a clean container. The objective is to prevent excess loss of brake fluid, fluid spills and system contamination.

9 Remove the master cylinder mounting bolts (see illustration) and separate the master cylinder from the handlebar together with the hand shield.

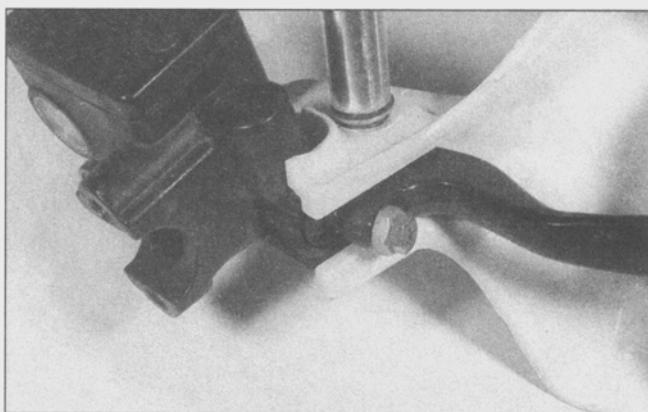
Overhaul

Refer to illustrations 6.11a, 6.11b, 6.12a, 6.12b, 6.13a, 6.13b and 6.15

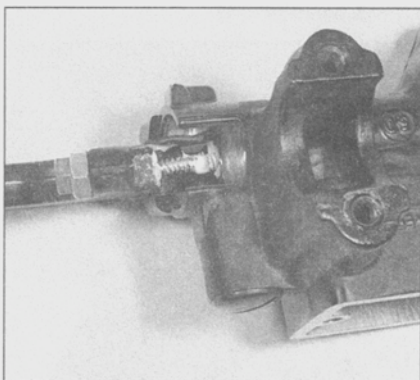
10 Remove the master cylinder cover, retainer (if equipped) and diaphragm (see Chapter 1).



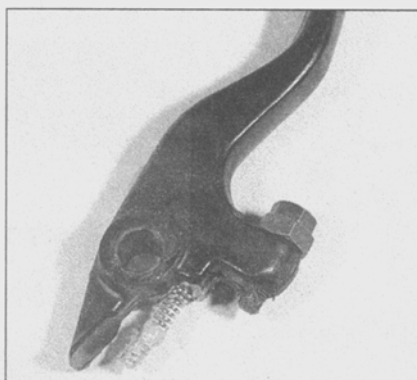
6.11a Remove the locknut (arrow) . . .



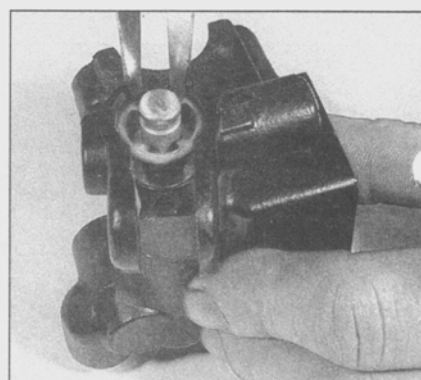
6.11b . . . and unscrew the pivot bolt to detach the lever



6.12a Remove the lever and spring from the master cylinder



6.12b The spring fits into the lever like this; there's a small steel ball at the end of the spring inside the hole



6.13a Remove the snap-ring from the master cylinder bore

11 If you're working on an XR600R, remove the locknut and bushing from the underside of the lever pivot bolt, then unscrew the bolt (**see illustrations**). Remove the hand protector (it's held on by the pivot bolt).

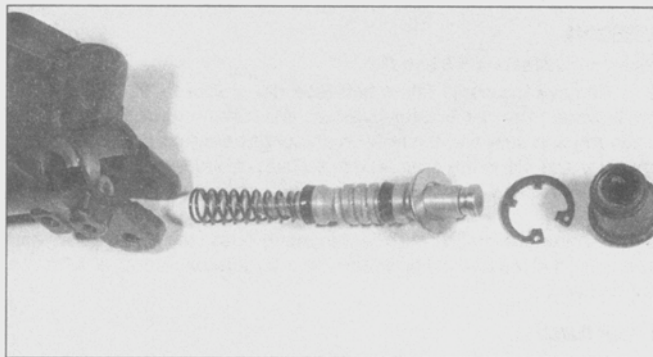
12 The lever on XL600R models is equipped with a cover, small pushrod and a pivot bushing; XR600R models have a spring and steel ball (**see illustrations**). These don't have to be removed to remove the hydraulic components, but make sure they don't get lost.

13 Using snap-ring pliers, remove the snap-ring and slide out the piston assembly and the spring (**see illustrations**). Lay the parts out in the proper order to prevent confusion during reassembly.

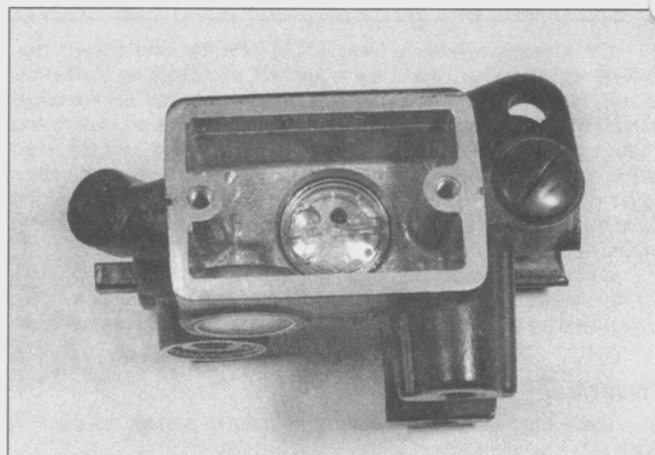
14 Clean all of the parts with brake system cleaner (available at auto parts stores), isopropyl alcohol or clean brake fluid. **Caution:** Do not, under any circumstances, use a petroleum-based solvent to clean

brake parts. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated). Check the master cylinder bore and piston for corrosion, scratches, nicks and score marks. If damage or wear can be seen, the master cylinder must be replaced with a new one. If you have a bore gauge and micrometer, check the bore and piston diameters and compare them to the values listed in this Chapter's Specifications. If the master cylinder is in poor condition, then the caliper should be checked as well.

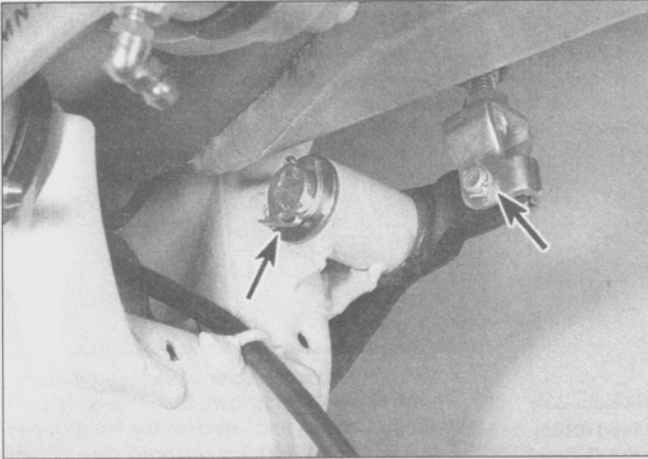
15 Check the baffle plate in the bottom of the reservoir to make sure it's securely held by its retainer (**see illustration**).



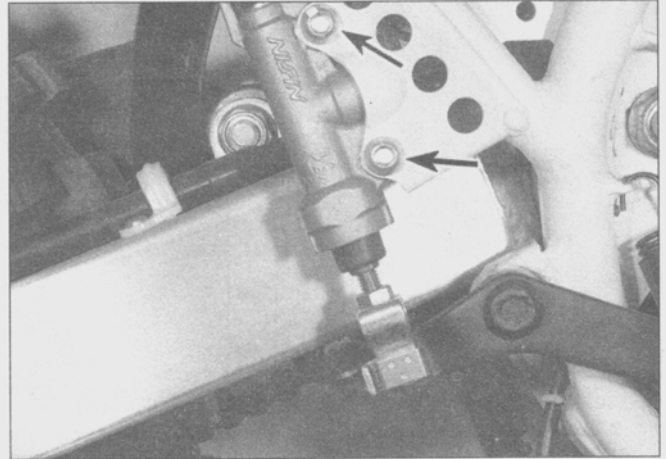
6.13b Remove the piston assembly from the bore



6.15 Make sure the baffle plate is securely retained in the bottom of the reservoir



7.4 Remove the cotter pin and clevis pin (right arrow) to detach the master cylinder from the pedal; the pedal itself is secured by a cotter pin and washer (left arrow)



7.6a Remove the mounting bolts (arrows) to detach the master cylinder from the frame

16 Honda supplies a new piston in its rebuild kits. If the cup seals are not installed on the new piston, install them, making sure the lips face away from the lever end of the piston (see illustration 6.13b). Use the new piston regardless of the condition of the old one.

17 Before reassembling the master cylinder, soak the piston and the rubber cup seals in clean brake fluid for ten or fifteen minutes. Lubricate the master cylinder bore with clean brake fluid, then carefully insert the piston and related parts in the reverse order of disassembly. Make sure the lips on the cup seals do not turn inside out when they are slipped into the bore.

18 Depress the piston, then install the snap-ring (make sure the snap-ring is properly seated in the groove with the sharp edge facing out) (see illustration 6.13a). Install the rubber dust boot (make sure the lip is seated properly in the piston groove).

19 Install the brake lever (and the hand shield on XR600R models) and tighten the pivot bolt locknut.

Installation

20 Installation is the reverse of the removal steps, with the following additions:

- a) If you're working on an XL600R, use a new sealing washer at the connection of the brake hose to the master cylinder. Tighten the hose fitting to the torque listed in this Chapter's Specifications.
 - b) Attach the master cylinder to the handlebar. Align the upper gap between the master cylinder and clamp with the punch mark on the handlebar (see illustration 6.9).
 - c) Make sure the arrow and the word UP on the master cylinder clamp are pointing up, then tighten the bolts to the torque listed in this Chapter's Specifications.
 - d) If you're working on an XR600R, use new sealing washers at the brake hose banjo fitting. Tighten the union bolt to the torque listed in this Chapter's Specifications.
- 21 Refer to Section 10 and bleed the air from the system.

7 Rear brake master cylinder - removal, overhaul and installation

1 If the master cylinder is leaking fluid, or if the pedal does not produce a firm feel when the brake is applied, and bleeding the brake does not help, master cylinder overhaul is recommended. Before disassembling the master cylinder, read through the entire procedure and make sure that you have the correct rebuild kit. Also, you will need some new, clean brake fluid of the recommended type, some clean rags and internal snap-ring pliers.

2 **Caution:** Disassembly, overhaul and reassembly of the brake



7.6b The fluid reservoir is secured by a single bolt

master cylinder must be done in a spotlessly clean work area to avoid contamination and possible failure of the brake hydraulic system components.

Removal

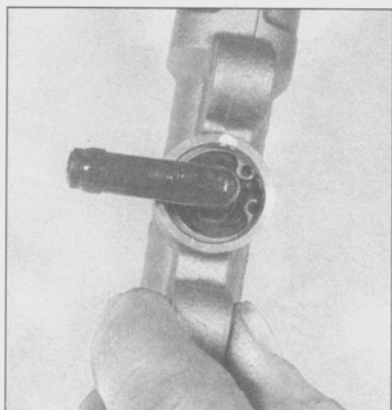
Refer to illustrations 7.4, 7.6a and 7.6b

- 3 Support the bike securely upright.
- 4 Remove the cotter pin from the clevis pin on the master cylinder pushrod (see illustration). Remove the clevis pin.
- 5 Have a container and some rags ready to catch spilling brake fluid. Using a six-point box wrench, unscrew the banjo fitting bolt from the top of the master cylinder. Discard the sealing washers on either side of the fitting.
- 6 Remove the two master cylinder mounting bolts and detach the cylinder from the bracket (see illustration). Pull the master cylinder out from behind the bracket, squeeze the fluid feed hose clamp with pliers and slide the clamp up the hose. Disconnect the hose from the fitting and take the master cylinder out. If necessary, remove the reservoir mounting bolt and detach it from the frame (see illustration).

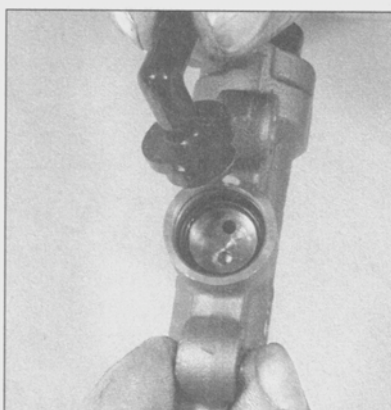
Overhaul

Refer to illustrations 7.7a, 7.7b, 7.8, 7.9, 7.10a, 7.10b and 7.14

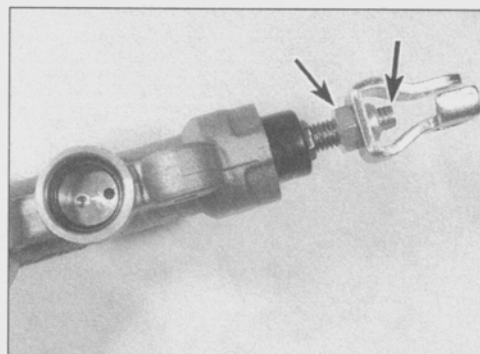
- 7 Using a pair of snap-ring pliers, remove the snap-ring from the fluid inlet fitting and detach the fitting from the master cylinder.



7.7a Remove the snap-ring . . .



7.7b . . . then work the fluid feed fitting free of its bore and remove the O-ring



7.8 Write down the number of exposed threads in the clevis (right arrow), then loosen the locknut (left arrow) and unscrew the locknut and clevis from the pushrod

Remove the O-ring from the bore (see illustrations).

8 Count the number of exposed threads on the end of the pushrod inside the clevis (see illustration). Write this number down for use on assembly. Hold the clevis with a pair of pliers and loosen the locknut, then unscrew the clevis and locknut from the pushrod.

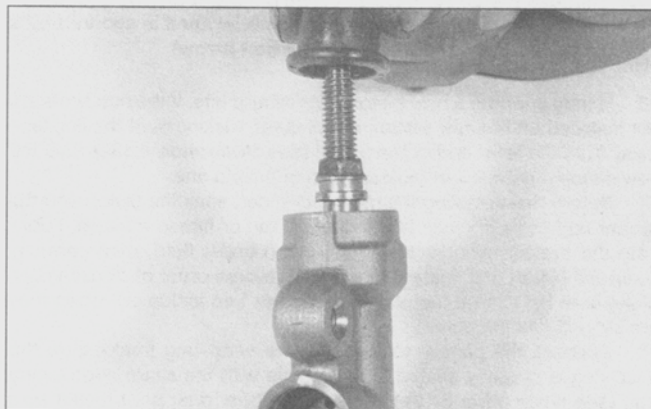
9 Carefully remove the rubber dust boot from the pushrod (see illustration).

10 Depress the pushrod and, using snap-ring pliers, remove the snap-ring (see illustration). Slide out the piston, the cup seal and spring. Lay the parts out in the proper order to prevent confusion during reassembly (see illustration).

11 Clean all of the parts with brake system cleaner (available at motorcycle dealerships and auto parts stores), isopropyl alcohol or clean brake fluid. **Caution:** Do not, under any circumstances, use a petroleum-based solvent to clean brake parts. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated). Check the master cylinder bore for corrosion, scratches, nicks and score marks. If damage is evident, the master cylinder must be replaced with a new one. If the master cylinder is in poor condition, then the caliper should be checked as well.

12 Honda supplies a new piston in its rebuild kits. If the cup seals are not installed on the new piston, install them, making sure the lips face the spring end of the piston (see illustration 7.10b). Use the new piston regardless of the condition of the old one.

13 Before reassembling the master cylinder, soak the piston and the rubber cup seals in clean brake fluid for ten or fifteen minutes. Lubricate the master cylinder bore with clean brake fluid, then carefully insert the parts in the reverse order of disassembly. Make sure the lips on the cup seals do not turn inside out when they are slipped into the bore.



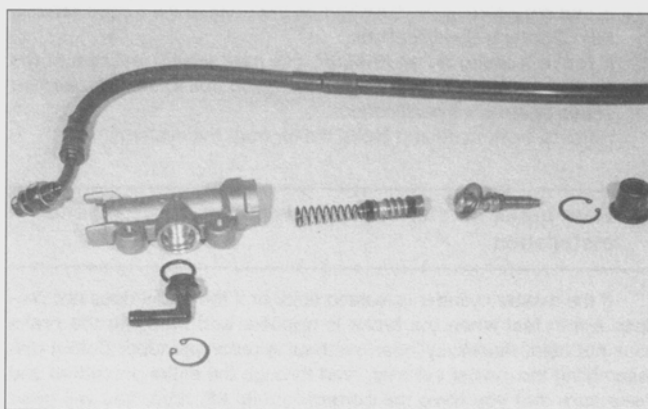
7.9 Take the dust boot off the pushrod

14 Lubricate the end of the pushrod with PBC (poly butyl cuprysil) grease, or silicone grease designed for brake applications, and install the pushrod and stop washer into the cylinder bore. Depress the pushrod, then install the snap-ring (make sure the snap-ring is properly seated in the groove with the sharp edge facing out) (see illustration). Install the rubber dust boot (make sure the lip is seated properly in the groove in the piston stop nut).

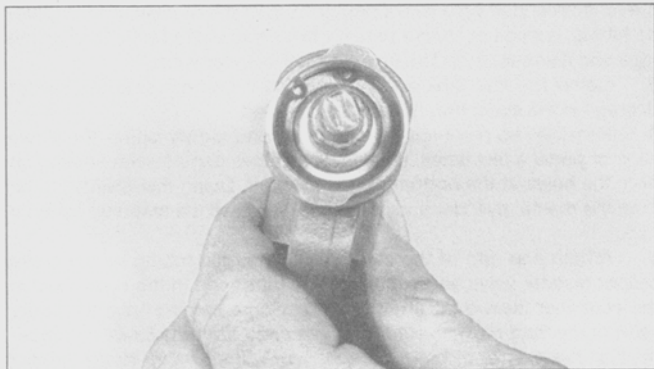
15 Install the locknut and clevis to the end of the pushrod, leaving the same number of exposed threads inside the clevis as was written down during removal. Tighten the locknut. This will ensure the brake pedal will be positioned correctly.



7.10a Remove the snap-ring from the master cylinder bore and withdraw the piston assembly and spring



7.10b Rear master cylinder details



7.14 Make sure the snap-ring is securely seated in its groove

16 Install the feed hose fitting, using a new O-ring. Install the snap-ring, making sure it seats properly in its groove.

Installation

- 17 Install the fluid reservoir if it was removed. Connect the fluid feed hose to the fitting on the master cylinder and secure it with the clamp.
- 18 Position the master cylinder on the frame and install the bolts, tightening them securely.
- 19 Connect the banjo fitting to the top of the master cylinder, using new sealing washers on each side of the fitting. Tighten the banjo fitting bolt to the torque listed in this Chapter's Specifications.
- 20 Connect the clevis to the brake pedal and secure the clevis pin with a new cotter pin.
- 21 Fill the fluid reservoir with the specified fluid (see Chapter 1) and bleed the system following the procedure in Section 10.
- 22 Check the position of the brake pedal (see Chapter 1) and adjust it if necessary. Check the operation of the brakes carefully before riding the motorcycle.

8 Brake pedal - removal and installation

1 Support the bike securely upright so it can't be knocked over during this procedure.

Drum brake models

- 2 Unhook the pedal return spring and the brake light switch spring. Remove the cotter pin, washer and pivot pin and detach the brake rod from the pedal.
- 3 Unscrew the pedal pivot Allen bolt and detach the pedal from the frame.

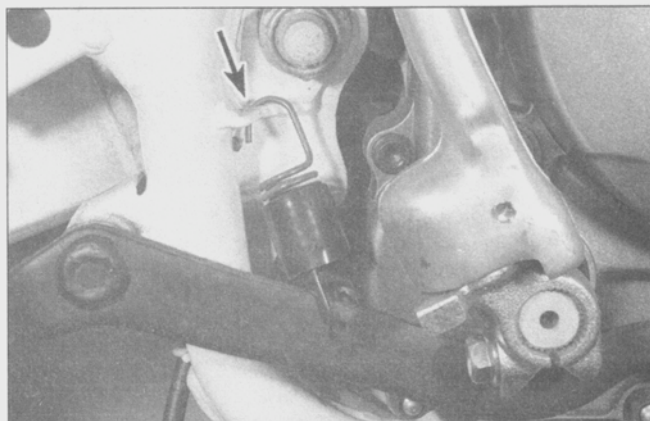
Disc brake models

Refer to illustration 8.4

- 4 Unhook the pedal return spring from the frame (see illustration).
- 5 Remove the cotter pin and master cylinder pushrod clevis (see illustration 7.4). Remove the cotter pin and washer from the brake pedal shaft and slide the brake pedal out of the frame.

All models

- 6 Inspect the pedal shaft seals (they're in the pedal on drum brake models and in the frame on disc brake models). If they're worn, damaged or appear to have been leaking, pry them out and press in new ones.
- 7 Installation is the reverse of the removal steps, with the following additions:
 - a) Lubricate the shaft seal lips and the pivot hole with multi-purpose grease.
 - b) If you're working on a drum brake model, tighten the pedal pivot bolt to the torque listed in this Chapter's Specifications.
 - c) Use new cotter pins.
 - d) Refer to Chapter 1 and adjust brake pedal height.



8.4 Unhook the pedal return spring (arrow)

9 Brake hoses and lines - inspection and replacement

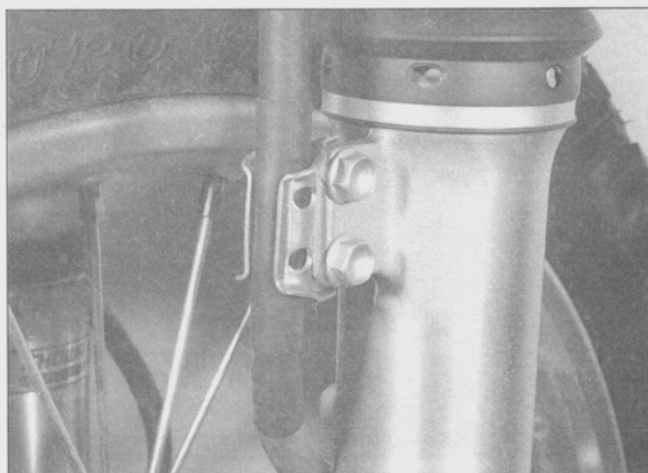
Inspection

- 1 Once a week, or if the motorcycle is used less frequently, before every ride, check the condition of the brake hoses (and the metal lines on XL600R models) that feed the brake fluid to the anti-dive units on the front forks.
- 2 Twist and flex the rubber hoses while looking for cracks, bulges and seeping fluid. Check extra carefully around the areas where the hoses connect with the metal fittings, as these are common areas for hose failure.

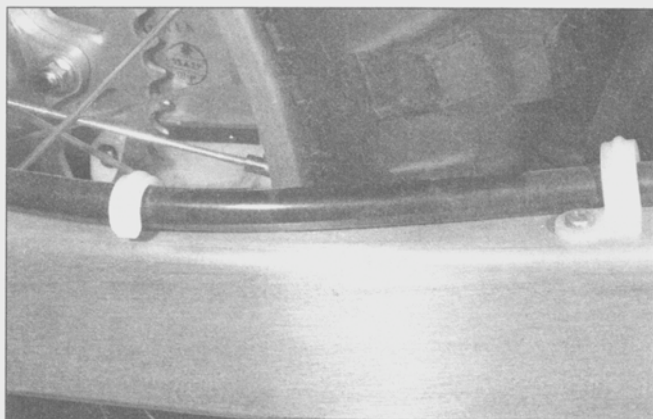
Replacement

Refer to illustrations 9.5a and 9.5b

- 3 The high-pressure brake hoses on XR600R models have banjo fittings on each end of the hose. The fluid feed hose that connects the rear master cylinder reservoir to the master cylinder is secured by spring clamps.
- 4 On XL600R models, the metal line connection to the front caliper has a banjo fitting. You'll need a flare nut wrench to loosen the flare nuts used on the metal lines. An open-end wrench will probably round the nuts off, especially if they haven't been loosened in some time.
- 5 Cover the surrounding area with plenty of rags and unscrew the banjo bolt or flare nut on either end of the hose. Detach the hose or line from any clips that may be present and remove the hose (see illustrations).



9.5a The front brake hose is secured to the fork leg by a clamp



9.5b The rear brake hose is secured to the swingarm by clips

6 Position the new hose or line, making sure it isn't twisted or otherwise strained. On hoses equipped with banjo fittings, make sure the metal tube portion of the banjo fitting is located against the stop on the component it's connected to, if equipped. Install the banjo bolts, using new sealing washers on both sides of the fittings, and tighten them to the torque listed in this Chapter's Specifications.

7 On XL600R models, tighten the flare nuts with a flare nut wrench. Where the upper hose joins the master cylinder, use a new sealing washer and tighten the fitting to the torque listed in this Chapter's Specifications.

8 Flush the old brake fluid from the system, refill the system with the recommended fluid (see Chapter 1) and bleed the air from the system (see Section 10). Check the operation of the brakes carefully before riding the motorcycle.

10 Brake system bleeding

Refer to illustrations 10.5a and 10.5b

1 Bleeding the brake is simply the process of removing all the air bubbles from the brake fluid reservoir, the lines and the brake caliper. Bleeding is necessary whenever a brake system hydraulic connection is loosened, when a component or hose is replaced, or when the master cylinder or caliper is overhauled. Leaks in the system may also allow air to enter, but leaking brake fluid will reveal their presence and warn you of the need for repair.

2 To bleed the brake, you will need some new, clean brake fluid of

the recommended type (see Chapter 1), a length of clear vinyl or plastic tubing, a small container partially filled with clean brake fluid, some rags and a wrench to fit the brake caliper bleeder valve.

3 Cover the fuel tank and other painted components to prevent damage in the event that brake fluid is spilled.

4 Remove the reservoir cover or cap and slowly pump the brake lever or pedal a few times, until no air bubbles can be seen floating up from the holes at the bottom of the reservoir. Doing this bleeds the air from the master cylinder end of the line. Reinstall the reservoir cover or cap.

5 Attach one end of the clear vinyl or plastic tubing to the brake caliper bleeder valve and submerge the other end in the brake fluid in the container (see illustrations). **Note:** Some models have a bleeder valve at the front master cylinder. In this case, start the bleeding procedure at the master cylinder bleeder valve, then move to the caliper bleeder valve.

6 Check the fluid level in the reservoir. Do not allow the fluid level to drop below the lower mark during the bleeding process.

7 Carefully pump the brake lever or pedal three or four times and hold it while opening the caliper bleeder valve. When the valve is opened, brake fluid will flow out of the caliper into the clear tubing and the lever will move toward the handlebar or the pedal will move down.

8 Retighten the bleeder valve, then release the brake lever or pedal gradually. Repeat the process until no air bubbles are visible in the brake fluid leaving the caliper and the lever or pedal is firm when applied. Remember to add fluid to the reservoir as the level drops. Only new, clean brake fluid of the recommended type. Never reuse the fluid lost during bleeding.

9 Be sure to check the fluid level in the master cylinder reservoir frequently.

10 Replace the reservoir cover or cap, wipe up any spilled brake fluid and check the entire system for leaks. **Note:** If bleeding is difficult, it may be necessary to let the brake fluid in the system stabilize for a few hours (it may be aerated). Repeat the bleeding procedure when the tiny bubbles in the system have settled out.

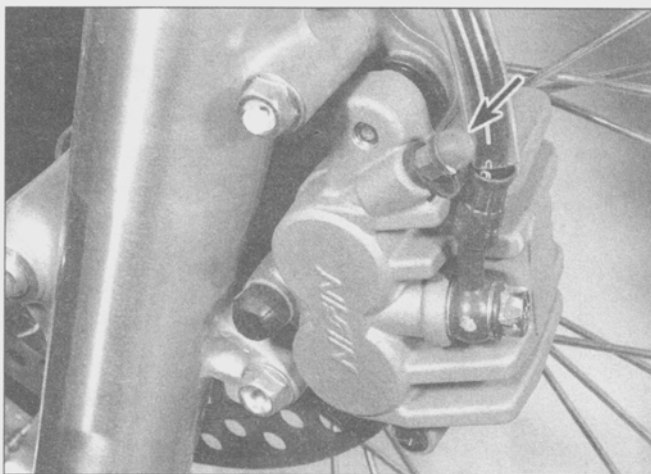
11 Wheels - inspection, removal and installation

Inspection

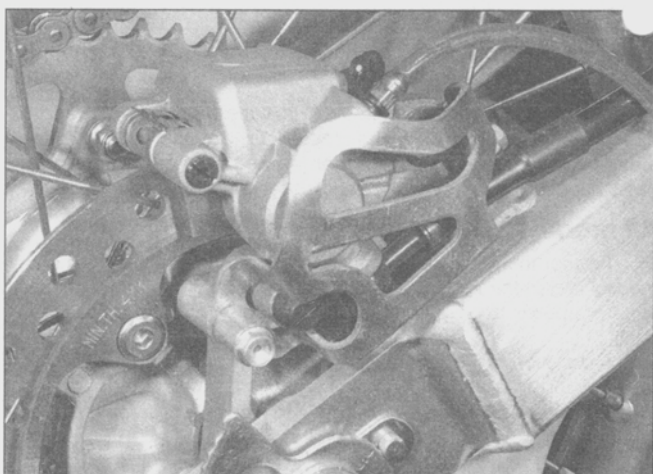
Refer to illustrations 11.2 and 11.5

1 Clean the wheels thoroughly to remove mud and dirt that may interfere with the inspection procedure or mask defects. Make a general check of the wheels and tires as described in Chapter 1.

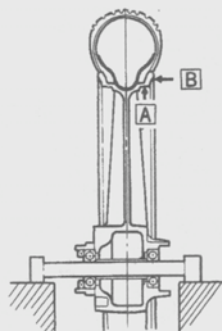
2 Support the motorcycle securely upright with the wheel to be checked in the air, then attach a dial indicator to the fork slider or the



10.5a Pull the rubber cap off the bleeder valve (front caliper shown) . . .



10.5b . . . and connect a clear plastic hose to the valve (rear caliper shown)



11.2 Check the wheel for out-of-round (A) and lateral movement (B)

swingarm and position the stem against the side of the rim (see illustration). Spin the wheel slowly and check the side-to-side (axial) runout of the rim, then compare your readings with the value listed in this Chapter's Specifications. In order to accurately check radial runout with the dial indicator, the wheel would have to be removed from the machine and the tire removed from the wheel. With the axle clamped in a vise, the wheel can be rotated to check the runout.

3 An easier, though slightly less accurate, method is to attach a stiff wire pointer to the outer fork tube or the swingarm and position the end a fraction of an inch from the wheel (where the wheel and tire join). If the wheel is true, the distance from the pointer to the rim will be constant as the wheel is rotated. Repeat the procedure to check the runout of the rear wheel. **Note:** If wheel runout is excessive, refer to the appropriate Section in this Chapter and check the wheel bearings very carefully before replacing the wheel.

4 The wheels should also be visually inspected for cracks, flat spots on the rim and other damage. Individual spokes can be replaced. If other damage is evident, the wheel will have to be replaced with a new one. Never attempt to repair a damaged wheel.

5 Before installing the wheel, check the axle for straightness. If the axle is corroded, first remove the corrosion with fine emery cloth. Set the axle on V-blocks and check it for runout with a dial indicator (see illustration). If the axle exceeds the maximum allowable runout limit listed in this Chapter's Specifications, it must be replaced.

Removal

Front wheel

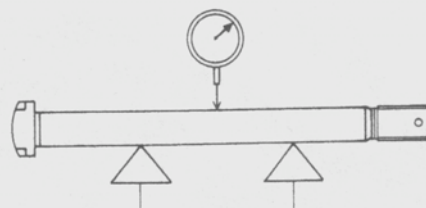
Refer to illustrations 11.9 and 11.10

6 Support the bike from below with a jack beneath the engine. Securely prop the bike upright so it can't fall over when the wheel is removed.

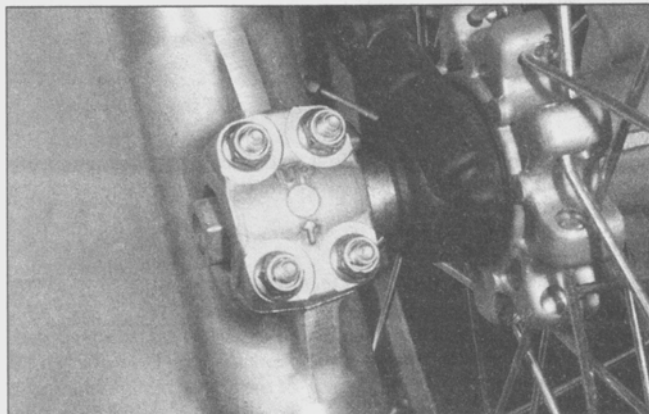
7 Refer to Chapter 4 and disconnect the speedometer cable.

8 If you're working on a 1983 or 1984 XL600R model, remove the guard from the front of the left fork leg.

9 Unscrew the nuts from the axle holder and lift it off the right fork



11.5 Check the axle for runout using a dial indicator and V-blocks - divide the total indicator reading by one-half to obtain the actual runout



11.9 Remove the axle holder nuts; the UP mark must be upright and the arrow must point upward on installation

leg (see illustration).

10 Unscrew the axle (it threads into the left fork) (see illustration). Support the wheel and pull the axle out. Lower the wheel away from the motorcycle, sliding the brake disc out from between the pads.

Rear wheel

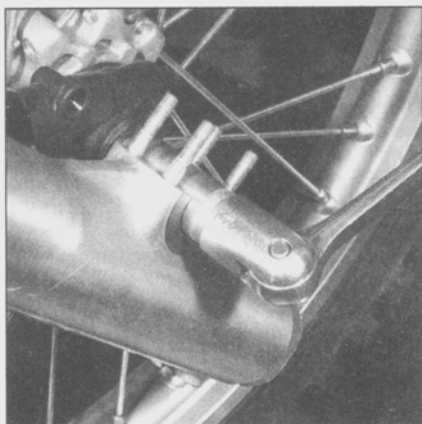
Refer to illustrations 11.14a, 11.14b and 11.14c

11 Support the bike from below with a jack beneath the swingarm. Securely prop the bike upright so it can't fall over when the wheel is removed.

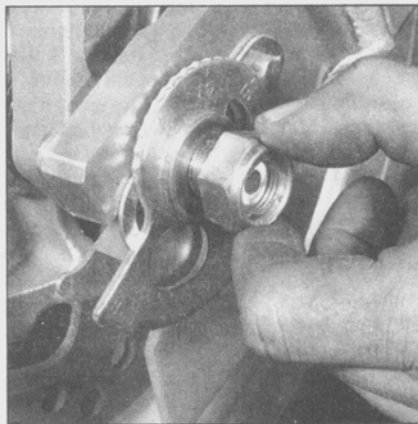
12 If you're working on a drum brake model, remove the rear brake adjuster wingnut from the brake rod (see Chapter 1). Pull the rod out of its pivot and remove the pivot from the brake arm.

13 Loosen the rear axle nut and back off the chain adjusters all the way (see Chapter 1). Disengage the drive chain from the rear sprocket.

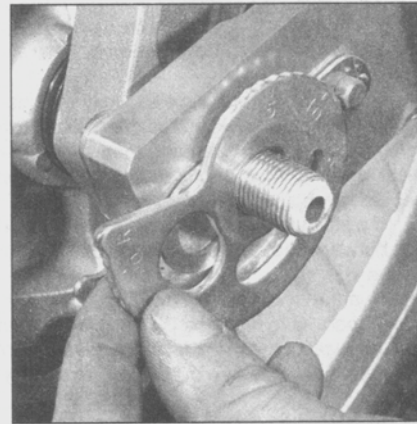
14 Hold the axle with a wrench and remove the axle nut, washer, chain adjuster and stopper plate (see illustrations).



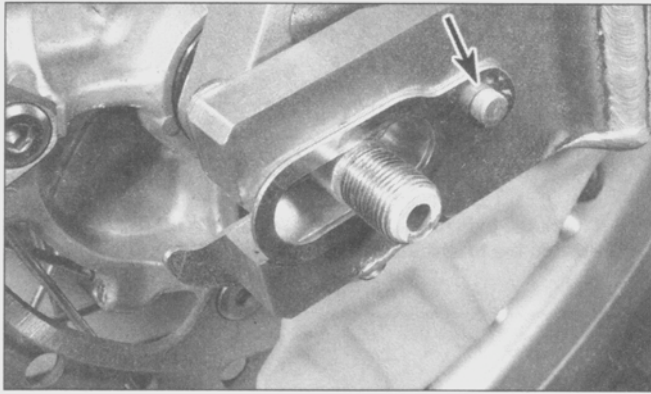
11.10 Unscrew the axle (it threads into the opposite fork leg)



11.14a Remove the axle nut and washer . . .



11.14b . . . slide off the chain adjuster . . .



11.14c ... and slide the stopper plate off the pin (arrow)

15 Support the wheel and slide it back until the axle clears the swingarm, then lower the wheel away from the motorcycle. Pull the axle out.

Installation

16 Installation is the reverse of the removal steps, with the following additions:

- a) If you're installing a front wheel, make sure the speedometer gear protrusion fits into the notch in the fork leg (see illustration 11.2 in Chapter 4). Lubricate the end of the speedometer cable with multi-purpose grease.
- b) If you're installing a rear wheel, make sure the stopper fits over the pin on the swingarm (see illustration 11.14c). Also make sure the boss on the swingarm fits into the brake panel notch (see illustration 5.17).
- c) If you're working on a front wheel, tighten the axle to the torque listed in this Chapter's Specifications, then install the holder with its UP mark upright and tighten the holder nuts to the torque listed in this Chapter's Specifications.
- d) If you're working on a rear wheel, tighten the axle nut to the torque listed in this Chapter's Specifications.
- e) Refer to Chapter 1 and adjust the rear brake (drum brake models) and drive chain slack.

12 Wheels - alignment check

1 Misalignment of the wheels, which may be due to a cocked rear wheel or a bent frame or triple clamps, can cause strange and possibly serious handling problems. If the frame or triple clamps are at fault, repair by a frame specialist or replacement with new parts are the only alternatives.

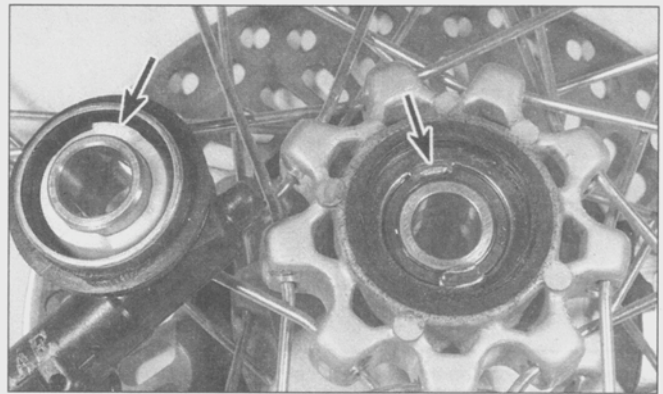
2 To check the alignment you will need an assistant, a length of string or a perfectly straight piece of wood and a ruler graduated in 1/64 inch increments. A plumb bob or other suitable weight will also be required.

3 Support the motorcycle securely upright, then measure the width of both tires at their widest points. Subtract the smaller measurement from the larger measurement, then divide the difference by two. The result is the amount of offset that should exist between the front and rear tires on both sides.

4 If a string is used, have your assistant hold one end of it about half way between the floor and the rear axle, touching the rear sidewall of the tire.

5 Run the other end of the string forward and pull it tight so that it is roughly parallel to the floor. Slowly bring the string into contact with the front sidewall of the rear tire, then turn the front wheel until it is parallel with the string. Measure the distance from the front tire sidewall to the string.

6 Repeat the procedure on the other side of the motorcycle. The distance from the front tire sidewall to the string should be equal on both sides.



13.3 Lift the speedometer drive out of the wheel; on installation, align the drive lugs with the retainer notches (arrows)

7 As was previously pointed out, a perfectly straight length of wood may be substituted for the string. The procedure is the same.

8 If the distance between the string and tire is greater on one side, or if the rear wheel appears to be cocked, refer to Chapter 5, *Swingarm bearings* - check, and make sure the swingarm is tight.

9 If the front-to-back alignment is correct, the wheels still may be out of alignment vertically.

10 Using the plumb bob, or other suitable weight, and a length of string, check the rear wheel to make sure it is vertical. To do this, hold the string against the tire upper sidewall and allow the weight to settle just off the floor. When the string touches both the upper and lower tire sidewalls and is perfectly straight, the wheel is vertical. If it is not, place thin spacers under one leg of the centerstand.

11 Once the rear wheel is vertical, check the front wheel in the same manner. If both wheels are not perfectly vertical, the frame and/or major suspension components are bent.

13 Wheel and rear coupling bearings - inspection and maintenance

Front wheel bearings

Refer to illustrations 13.3, 13.4a, 13.4b, 13.6a and 13.6b

1 Support the bike securely and remove the front wheel (see Section 11).

2 Set the wheel on blocks so as not to allow the weight of the wheel rest on the brake disc.

3 From the right side of the wheel, remove the speedometer drive (see illustration).

4 Pry out the grease seal from the right side of the wheel (see illustration). Remove the speedometer drive from beneath the grease seal (see illustration).

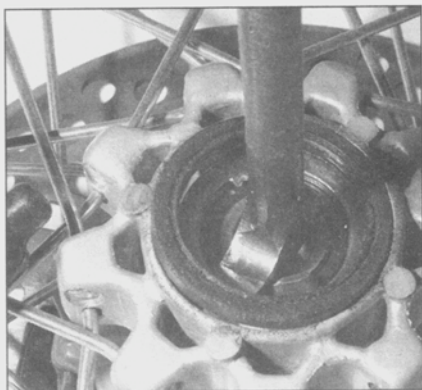
5 Turn the wheel over. Remove the cover and pry the grease seal out of the left side.

6 The usual method of removing front wheel bearings is to insert a metal rod (preferably a brass drift punch) through the center of the hub bearing and tap evenly around the inner race of the opposite bearing to drive it from the hub (see illustration). The bearing spacer will also come out. It may not be possible to tilt the rod enough to catch the edge of the opposite bearing's inner race. In this case, use a bearing remover tool consisting of a shaft and remover head (see illustration).

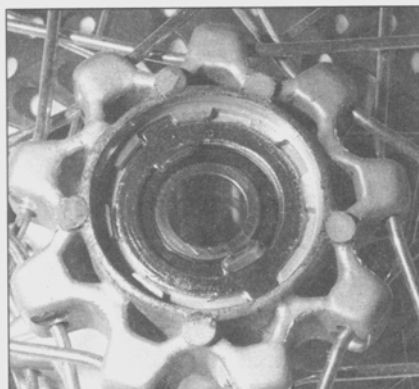
Honda part numbers are:

- a) Shaft, 07446-0050100
- b) Head for 1983 through 1990 models, 07446-0050400 (15 mm diameter)
- c) Head for 1991 and later models, 07446-0050500 (17 mm diameter).

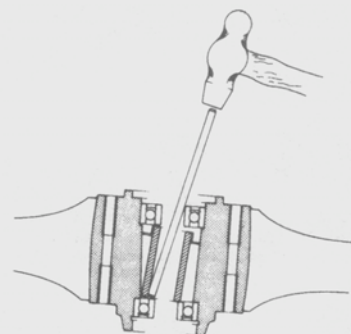
The head fits inside the bearing, then the wedge end of the shaft is tapped into the groove in the head to expand the head and lock it



13.4a Pry the grease seal out of the right side . . .



13.4b . . . and remove the speedometer drive



13.6a If there's enough room to tilt a metal rod so it will catch the bearing inner races, drive the bearings from the hub with a metal rod and hammer

inside the bearing. Tapping on the shaft from this point will force the bearing out of the hub.

7 Lay the wheel on its other side and remove the remaining bearing using the same technique. **Note:** The bearings must be replaced with new ones whenever they're removed, as they're almost certain to be damaged during removal.

8 Pack new bearings with grease from the open side. Rotate the bearing to work the grease in between the bearing balls.

9 Thoroughly clean the hub area of the wheel. Install the bearing into the recess in the right side of the hub, with the sealed side facing out. Using a bearing driver or a socket large enough to contact the outer race of the bearing, drive it in until it seats.

10 Turn the wheel over and install the bearing spacer and bearing, driving the bearing into place as described in Step 9.

11 Coat the lip of a new grease seal with grease.

12 Install the grease seal on the right side of the wheel; it should go in with thumb pressure but if not, use a seal driver, large socket or a flat piece of wood to drive it into place.

13 Clean off all grease from the brake disc using acetone or brake system cleaner. Install the wheel.

Rear coupling bearing (XL600R)

14 Refer to Section 11 and remove the rear wheel. Lay the wheel on its brake side. If the bike has a rear disc brake, support the wheel on blocks so its weight doesn't rest on the brake disc.

15 Lift off the coupling sleeve and rear wheel coupling.

16 Pry out the grease seal and remove the snap-ring from the sprocket side of the coupling.

17 Remove the coupling collar from the other side of the coupling.

18 Drive the bearing out of the coupling with a bearing driver or drift punch.

19 Clean the bearing with a high flash-point solvent (one which won't leave any residue) and blow it dry with compressed air (don't let the bearing spin as you dry it). Apply a few drops of oil to the bearing. Hold the outer race of the bearing and rotate the inner race - if the bearing doesn't turn smoothly, has rough spots or is noisy, replace it with a new one.

20 If the bearing checks out okay and will be reused, wash it in solvent once again and dry it, then pack the bearing from the open side with high-quality bearing grease.

21 Drive the bearing into the coupling with a bearing driver or socket that bears against the outer race of the bearing.

22 Install the snap-ring to secure the bearing, making sure it fits securely in its groove.

23 Coat the lip of a new grease seal with grease and install it on top of the snap-ring. It may go in with thumb pressure, but if not, tap it in with a hammer and socket, bearing driver or flat piece of wood.

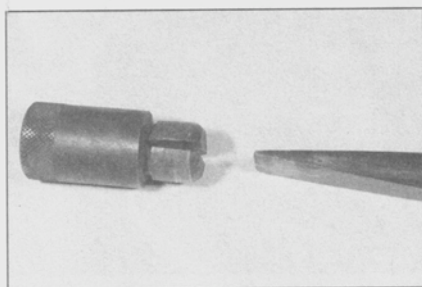
Rear wheel bearings

Refer to illustrations 13.24, 13.26, 13.27, 13.28a, 13.28b, 13.28c, 13.30, 13.31 and 13.32

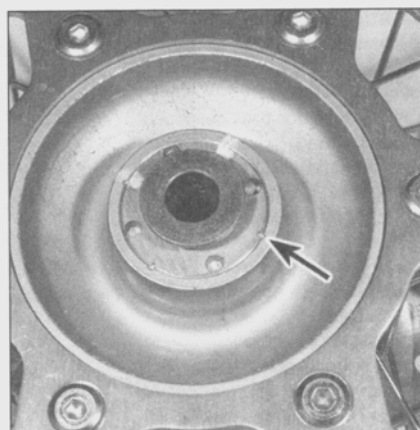
24 The left rear wheel bearing is held in place by a threaded retainer that is staked in position (see illustration). Removal requires special tools for which there are no good substitutes. Before you try to replace the bearings, read through the procedure. It may be more practical to take the wheel to a Honda dealer and have the bearings replaced.

25 Refer to Section 11 and remove the rear wheel.

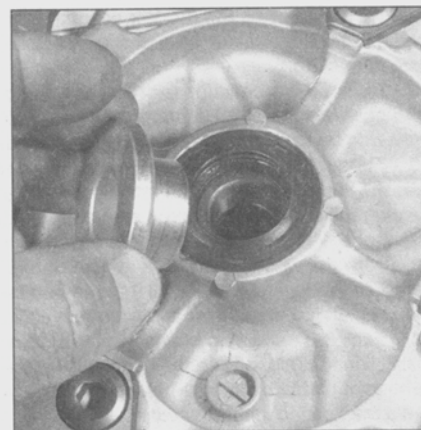
26 If you're working on a 1991 or later model, remove the collar from



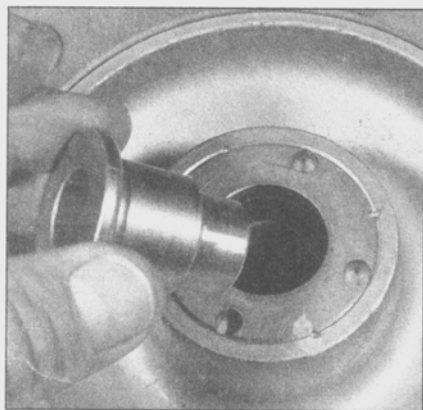
13.6b If you can't position a metal rod against the bearings, this tool can be used instead - place the split portion inside the bearing and pass the wedge through the hub into the split; tapping on the end of the rod will spread the split portion, locking it to the bearing, so the split portion and bearing can be driven out together



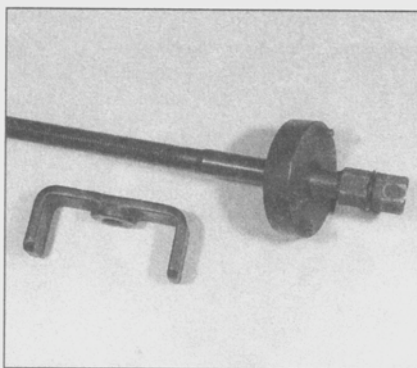
13.24 The bearing retainer is staked in place (arrow); this makes it impractical to remove it with makeshift tools



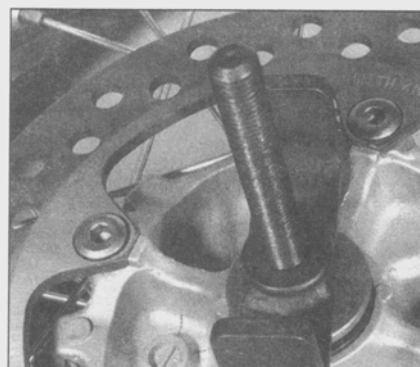
13.26 Remove the collar from the disc side of the wheel



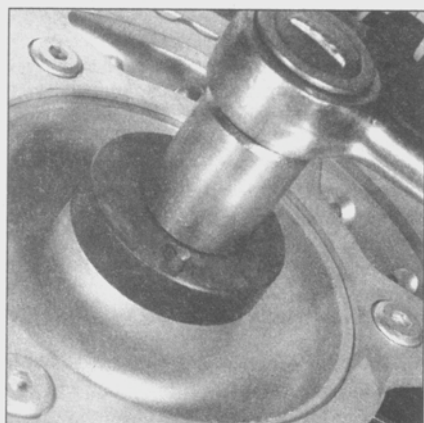
13.27 Turn the wheel over and remove the collar from the sprocket side



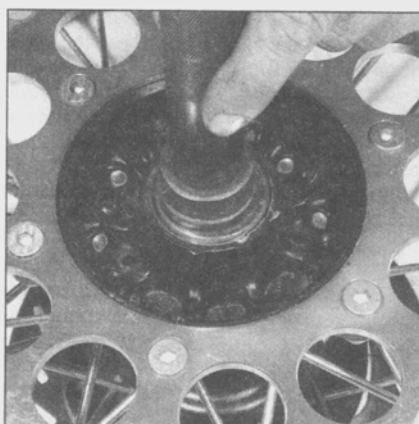
13.28a These tools are used to remove the bearing retainer; pass the shaft through the hub and fit the pins on the disc into the holes in the bearing retainer



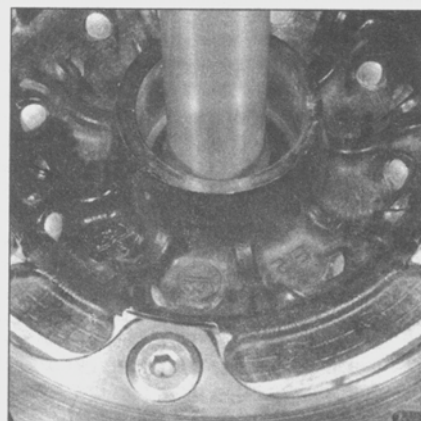
13.28b Thread the nut portion of the tool onto the shaft and tighten it to lock the pins on the disc securely into the holes in the bearing retainer



13.28c Turn the shaft with a socket or wrench to unscrew the retainer from the hub



13.30 Drive in the bearing on the sprocket side, using a bearing driver that contacts the outer race (the sealed side of the bearing faces out)



13.31 Insert the spacer into the hub, making sure its LH mark is toward the left side of the hub

the grease seal on the right side of the wheel, then pry the grease seal out (see illustration).

27 On the other side of the wheel, remove the collar from the bearing retainer and grease seal (see illustration).

28 Insert the shaft of the retainer wrench into the hub from the retainer side. Engage the pins of the wrench with the holes in the retainer, then thread the retainer wingnut onto the shaft (see illustrations). Turn the retainer wrench with a socket to unscrew the retainer (see illustration).

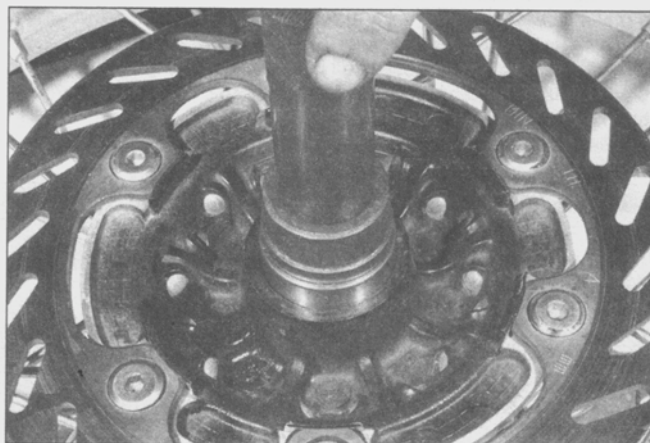
29 Remove the bearings with the special tools used for front wheel bearings (see Step 6). The remover head is 17 mm in diameter for the right side bearing and 20 mm in diameter for the left side bearing.

30 Thoroughly clean the hub area of the wheel. Install the left bearing into the recess in the hub, with the sealed side facing out. Using a bearing driver or a socket large enough to contact the outer race of the bearing, drive it in until it seats (see illustration).

31 Turn the wheel over. Apply a coat of multi-purpose grease to the inside of the spacer and install it in the hub (see illustration). Be sure the LH mark on the spacer is toward the left side of the wheel.

32 Pack the remaining bearing from the open side with grease, then install it in the hub, driving the bearing in with a socket or bearing driver large enough to contact the outer race of the bearing (see illustration). Drive the bearing in until it seats.

33 Pry the grease seal out of the bearing retainer. Place a new one on the retainer, positioned so its lip will face into the hub when the retainer is installed. Tap the seal in, using a bearing driver or socket the same diameter as the seal.

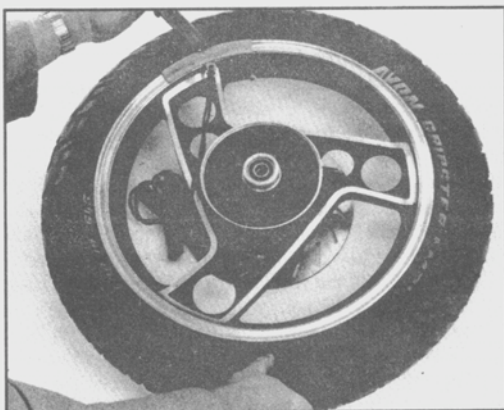


13.32 Drive in the bearing on the brake disc side, using a driver that contacts the outer race

34 Thread the retainer part way into the hub, then install it with the same tools used for removal (see illustrations 13.28a through 13.28c).

35 Install a new grease seal in the right side of the hub (see illustration 13.26). It may go in with thumb pressure, but if not, use a seal driver, large socket or a flat piece of wood to drive it into place.

TIRE CHANGING SEQUENCE - TUBED TIRES



A Deflate tire. After pushing tire beads away from rim flanges push tire bead into well of rim at point opposite valve. Insert tire lever next to valve and work bead over edge of rim.

Use two levers to work bead over edge of rim. Note use of rim protectors

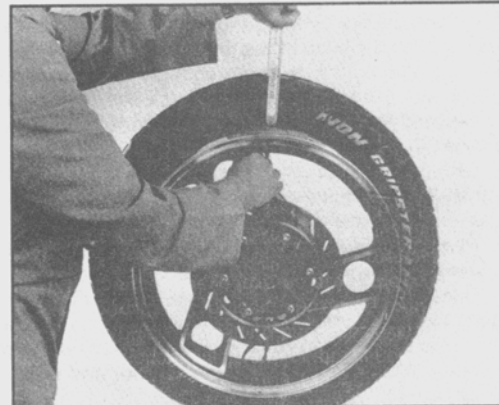
B



C Remove inner tube from tire

When first bead is clear, remove tire as shown

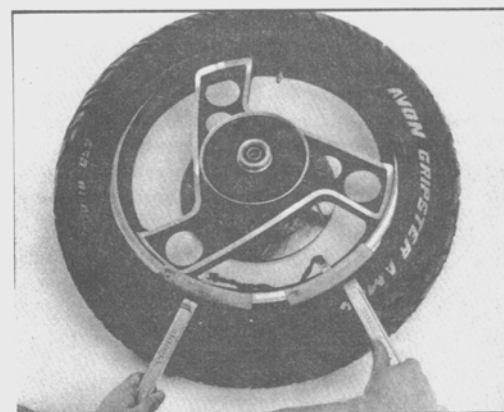
D



E To install, partially inflate inner tube and insert in tire

Work first bead over rim and feed valve through hole in rim. Partially screw on retaining nut to hold valve in place.

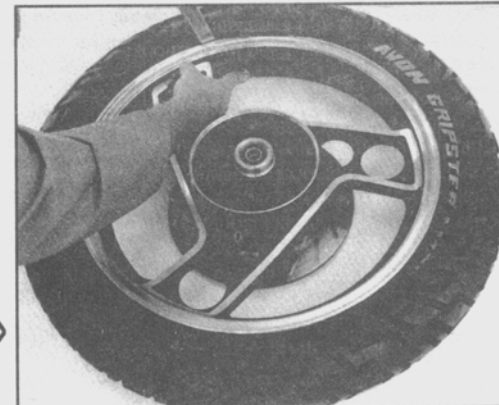
F



G Check that inner tube is positioned correctly and work second bead over rim using tire levers. Start at a point opposite valve.

Work final area of bead over rim while pushing valve inwards to ensure that inner tube is not trapped.

H



36 If you're working on a 1991 or later model, install the collar in the right side of the hub. On all models, install the collar in the left side of the hub.

37 If you're working on an XL600R, press a little grease into the bearing in the rear wheel coupling. Install the coupling to the wheel, making sure the coupling collar is located in the inside of the inner race (between the wheel and the coupling). **Caution:** *If the coupling collar is left out, the wheel bearings will be ruined when the axle is tightened.*

38 Clean off all grease from the brake discs using acetone or brake system cleaner. Install the wheel.

14 Tires - removal and installation

1 To properly remove and install tires, you will need at least two motorcycle tire irons, some water and a tire pressure gauge.

2 Begin by removing the wheel from the motorcycle. If the tire is going to be re-used, mark it next to the valve stem, wheel balance weight or rim lock.

3 Deflate the tire by removing the valve stem core. When it is fully deflated, push the bead of the tire away from the rim on both sides. In some extreme cases, this can only be accomplished with a bead breaking tool, but most often it can be carried out with tire irons. Riding on a deflated tire to break the bead is not recommended, as damage to the rim and tire will occur.

4 Dismounting a tire is easier when the tire is warm, so an indoor tire change is recommended in cold climates. The rubber gets very stiff and is difficult to manipulate when cold.

5 Place the wheel on a thick pad or old blanket. This will help keep the wheel and tire from slipping around.

6 Once the bead is completely free of the rim, lubricate the inside edge of the rim and the tire bead with water only. Honda recommends against the use of soap or other tire mounting lubricants, as the tire may shift on the rim. Remove the locknut and push the tire valve through the rim.

7 Insert one of the tire irons under the bead of the tire at the valve stem and lift the bead up over the rim. This should be fairly easy. Take care not to pinch the tube as this is done. If it is difficult to pry the bead up, make sure that the rest of the bead opposite the valve stem is in the dropped center section of the rim.

8 Hold the tire iron down with the bead over the rim, then move about 1 or 2 inches to either side and insert the second tire iron. Be careful not to cut or slice the bead or the tire may split when inflated. Also, take care not to catch or pinch the inner tube as the second tire iron is levered over. For this reason, tire irons are recommended over screwdrivers or other implements.

9 With a small section of the bead up over the rim, one of the levers can be removed and reinserted 1 or 2 inches farther around the rim until about 1/4 of the tire bead is above the rim edge. Make sure that the rest of the bead is in the dropped center of the rim. At this point, the bead can usually be pulled up over the rim by hand.

10 Once all of the first bead is over the rim, the inner tube can be withdrawn from the tire and rim. Push in on the valve stem, lift up on the tire next to the stem, reach inside the tire and carefully pull out the tube. It is usually not necessary to completely remove the tire from the rim to repair the inner tube. It is sometimes recommended though, because checking for foreign objects in the tire is difficult while it is still mounted on the rim.

11 To remove the tire completely, make sure the bead is broken all the way around on the remaining edge, then stand the tire and wheel up on the tread and grab the wheel with one hand. Push the tire down over the same edge of the rim while pulling the rim away from the tire. If the bead is correctly positioned in the dropped center of the rim, the tire should roll off and separate from the rim very easily. If tire irons are

used to work this last bead over the rim, the outer edge of the rim may be marred. If a tire iron is necessary, be sure to pad the rim as described earlier.

12 Refer to Section 15 for inner tube repair procedures.

13 Mounting a tire is basically the reverse of removal. Some tires have a balance mark and/or directional arrows molded into the tire sidewall. Look for these marks so that the tire can be installed properly. The dot should be aligned with the valve stem.

14 If the tire was not removed completely to repair or replace the inner tube, the tube should be inflated just enough to make it round. Sprinkle it with talcum powder, which acts as a dry lubricant, then carefully lift up the tire edge and install the tube with the valve stem next to the hole in the rim. Once the tube is in place, push the valve stem through the rim and start the locknut on the stem.

15 Lubricate the tire bead, then push it over the rim edge and into the dropped center section opposite the inner tube valve stem. Work around each side of the rim, carefully pushing the bead over the rim. The last section may have to be levered on with tire irons. If so, take care not to pinch the inner tube as this is done.

16 Once the bead is over the rim edge, check to see that the inner tube valve stem and the rim lock are pointing to the center of the hub. If they're angled slightly in either direction, rotate the tire on the rim to straighten it out. Run the locknut the rest of the way onto the stem and rim lock but don't tighten them completely.

17 Inflate the tube to approximately 1-1/2 times the pressure listed in the Chapter 1 Specifications and check to make sure the guidelines on the tire sidewalls are the same distance from the rim around the circumference of the tire. **Warning:** *Do not overinflate the tube or the tire may burst, causing serious injury.*

18 After the tire bead is correctly seated on the rim, allow the tire to deflate. Replace the valve core and inflate the tube to the recommended pressure, then tighten the valve stem locknut securely and tighten the cap. Tighten the locknut on the rim locknut to the torque listed in the Chapter 1 Specifications.

15 Tubes - repair

1 Tire tube repair requires a patching kit that's usually available from motorcycle dealers, accessory stores or auto parts stores. Be sure to follow the directions supplied with the kit to ensure a safe repair. Patching should be done only when a new tube is unavailable. Replace the tube as soon as possible. Sudden deflation can cause loss of control and an accident.

2 To repair a tube, remove it from the tire, inflate and immerse it in a sink or tub full of water to pinpoint the leak. Mark the position of the leak, then deflate the tube. Dry it off and thoroughly clean the area around the puncture.

3 Most tire patching kits have a buffer to rough up the area around the hole for proper adhesion of the patch. Roughen an area slightly larger than the patch, then apply a thin coat of the patching cement to the roughened area. Allow the cement to dry until tacky, then apply the patch.

4 It may be necessary to remove a protective covering from the top surface of the patch after it has been attached to the tube. Keep in mind that tubes made from synthetic rubber may require a special patch and adhesive if a satisfactory bond is to be achieved.

5 Before replacing the tube, check the inside of the tire to make sure the object that caused the puncture is not still inside. Also check the outside of the tire, particularly the tread area, to make sure nothing is projecting through the tire that may cause another puncture. Check the rim for sharp edges or damage. Make sure the rubber trim band is in good condition and properly installed before inserting the tube.

Chapter 7

Frame and bodywork

Contents

	Section		Section
Footpegs - removal and installation.....	3	Seat - removal and installation.....	2
Frame - general information, inspection and repair	9	Side covers - removal and installation.....	5
Front fender - removal and installation	6	Sidestand - removal and installation.....	4
General information.....	1	Skid plate/bars - removal and installation.....	8
Rear fender - removal and installation	7		

1 General information

This Chapter covers the procedures necessary to remove and install the fenders and other body parts. Since many service and repair operations on these motorcycles require removal of the fenders and/or other body parts, the procedures are grouped here and referred to from other Chapters.

In the case of damage to plastic body parts, it is usually necessary to remove the broken component and replace it with a new (or used) one. The material that the fenders and other plastic body parts are composed of doesn't lend itself to conventional repair techniques. There are, however, some shops that specialize in "plastic welding", so it would be advantageous to check around before throwing the damaged part away.

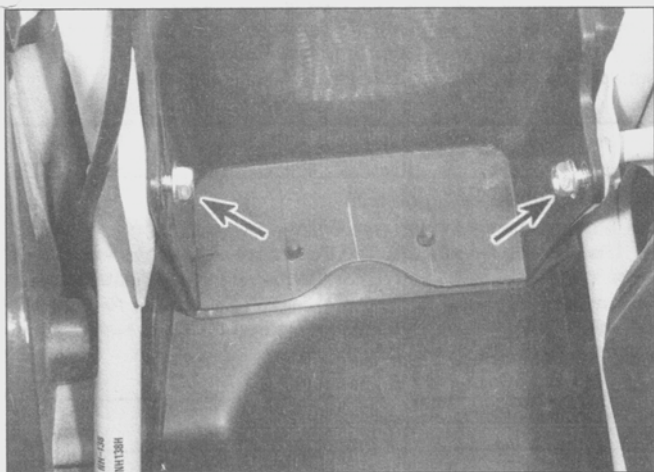
Note: When attempting to remove any body panel, first study the panel closely, noting any fasteners and associated fittings, to be sure of returning everything to its correct place on installation. In some cases, the aid of an assistant may be required when removing panels, to help

avoid damaging the paint. Once the visible fasteners have been removed, try to lift off the panel as described but **DO NOT FORCE** the panel - if it will not release, check that all fasteners have been removed and try again. Where a panel engages another by means of lugs and grommets, be careful not to break the lugs or damage the bodywork. Remember that a few moments of patience at this stage will save you a lot of money in replacing broken panels!

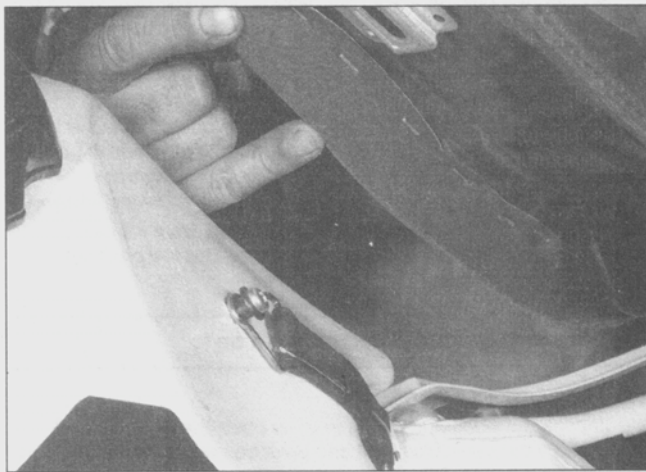
2 Seat - removal and installation

Refer to illustrations 2.2 and 2.3

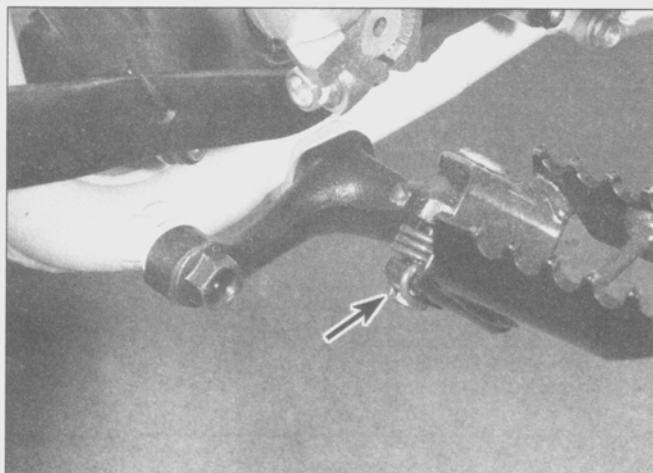
- 1 Remove the side covers (see Section 5).
- 2 Remove the mounting bolt on each side of the seat (see illustration).
- 3 Lift the back end of the seat. Pull it back and down to disengage the front end from the button on the fuel tank and lift it off (see illustration).
- 4 Installation is the reverse of removal.



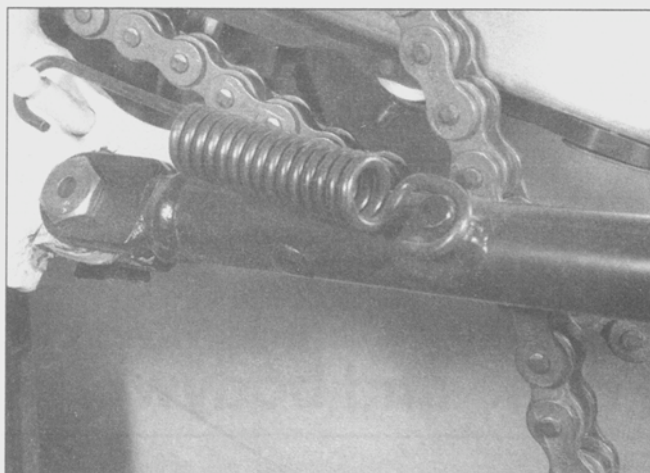
2.2 Remove the seat mounting bolt on each side . . .



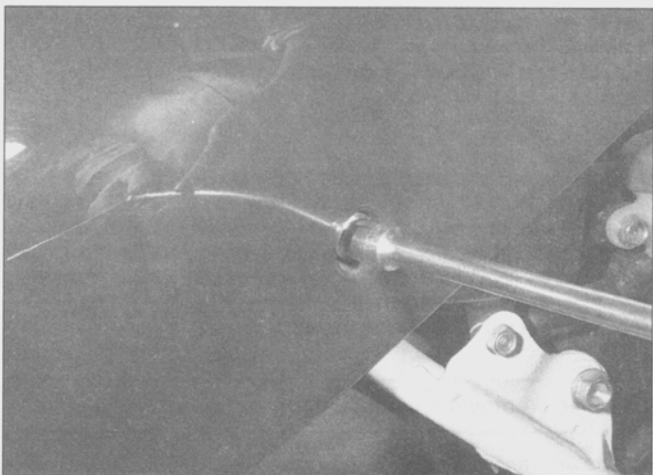
2.3 . . . and disengage the seat from the screw on the fuel tank



3.2 Remove the cotter pin (arrow), washer and pivot pin to detach the footpeg from the bracket



4.1 Unhook the sidestand spring from the posts on the sidestand and frame, then remove the locknut and mounting bolt



5.1a Remove the side cover mounting bolt . . .



5.1b . . . and carefully pull the lugs free of the grommets (arrows)

3 Footpegs - removal and installation

Refer to illustration 3.2

- 1 Support the bike securely so it can't be knocked over during this procedure.
- 2 To detach the footpeg from the bracket, remove the cotter pin, washer and footpeg pivot pin (**see illustration**). Separate the footpeg from the motorcycle.
- 3 On the right side only, the footpeg bracket can be detached from the motorcycle if necessary. Remove the bolts (early models) or bolt and nut (later models), then detach the bracket from the frame.
- 4 Installation is the reverse of removal, with the following additions:
 - a) Tighten the bracket fasteners securely if they were removed.
 - b) Use a new cotter pin and wrap its ends around the pivot pin.

4 Sidestand - removal and installation

Refer to illustration 4.1

- 1 Unhook the sidestand spring from its posts (**see illustration**).
- 2 Remove the self-locking nut and pivot bolt and separate the sidestand from the motorcycle.
- 3 Installation is the reverse of the removal steps.

5 Side covers - removal and installation

Refer to illustrations 5.1a and 5.1b

- 1 Remove the side cover bolt (**see illustration**). Pull the cover free of the grommets and take it off the motorcycle (**see illustration**).
- 2 Installation is the reverse of removal. Tighten the bolt securely, but don't overtighten it and strip the threads.

6 Front fender - removal and installation

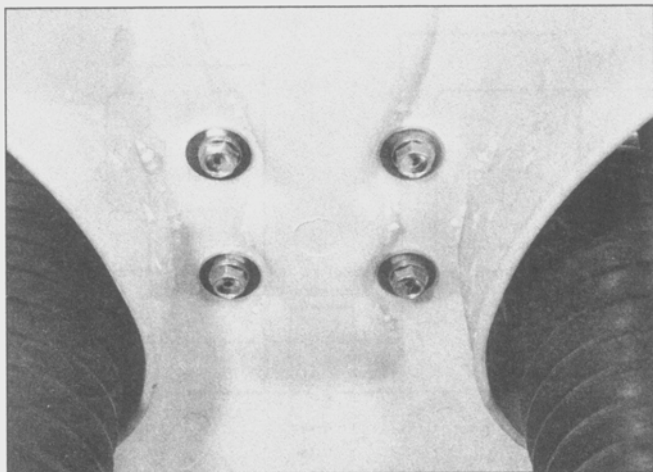
Refer to illustrations 6.2a and 6.2b

- 1 Remove the front wheel (see Chapter 6).
- 2 Remove the fender bolts (**see illustration**). Lower the fender clear of the lower triple clamp and remove the washers (**see illustration**).
- 3 Installation is the reverse of removal. Be sure to reinstall the grommets in their correct locations. Tighten the bolts securely, but don't overtighten them and strip the threads.

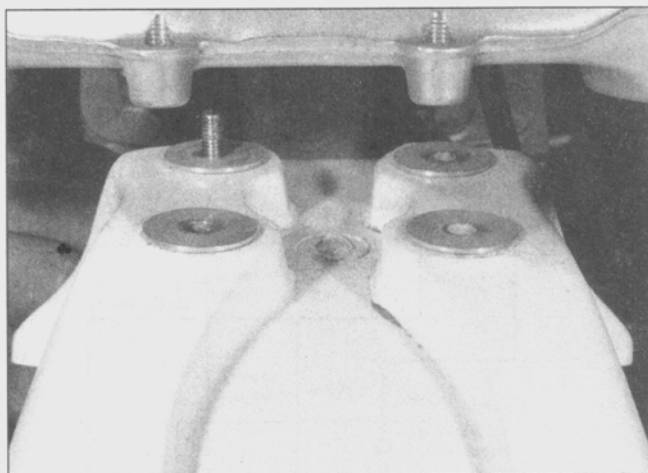
7 Rear fender - removal and installation

Refer to illustrations 7.2 and 7.3

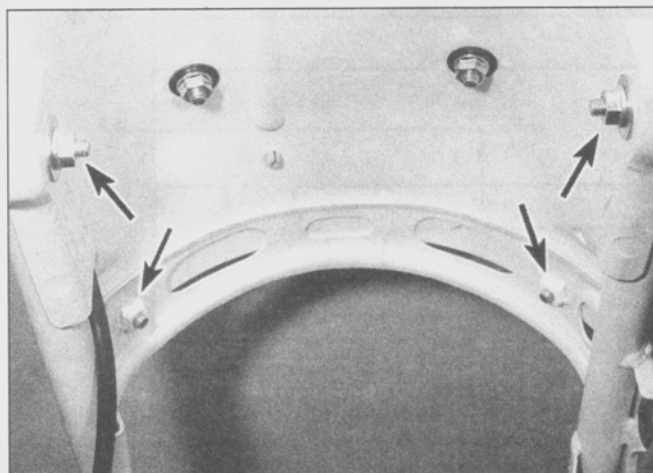
- 1 Remove the seat and both side covers (see Sections 2 and 5).



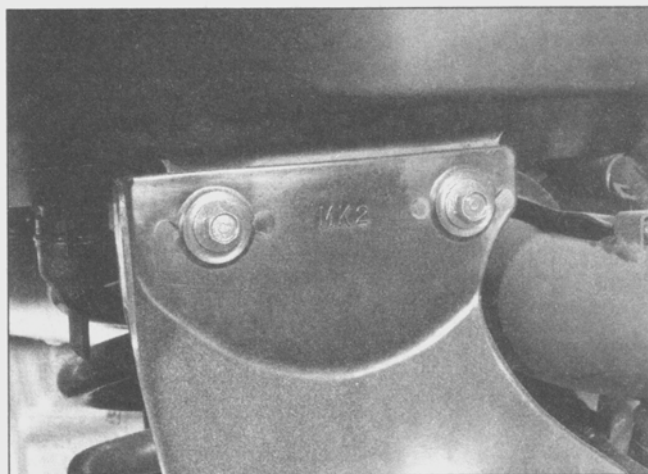
6.2a The front fender bolts are accessible from below



6.2b Don't forget the washers on top of the fender



7.2 Two of the rear fender bolts on XR600R models are accessible from below (upper arrows); two are accessible from above (lower arrows)



7.3 Remove two bolts to detach the inner fender

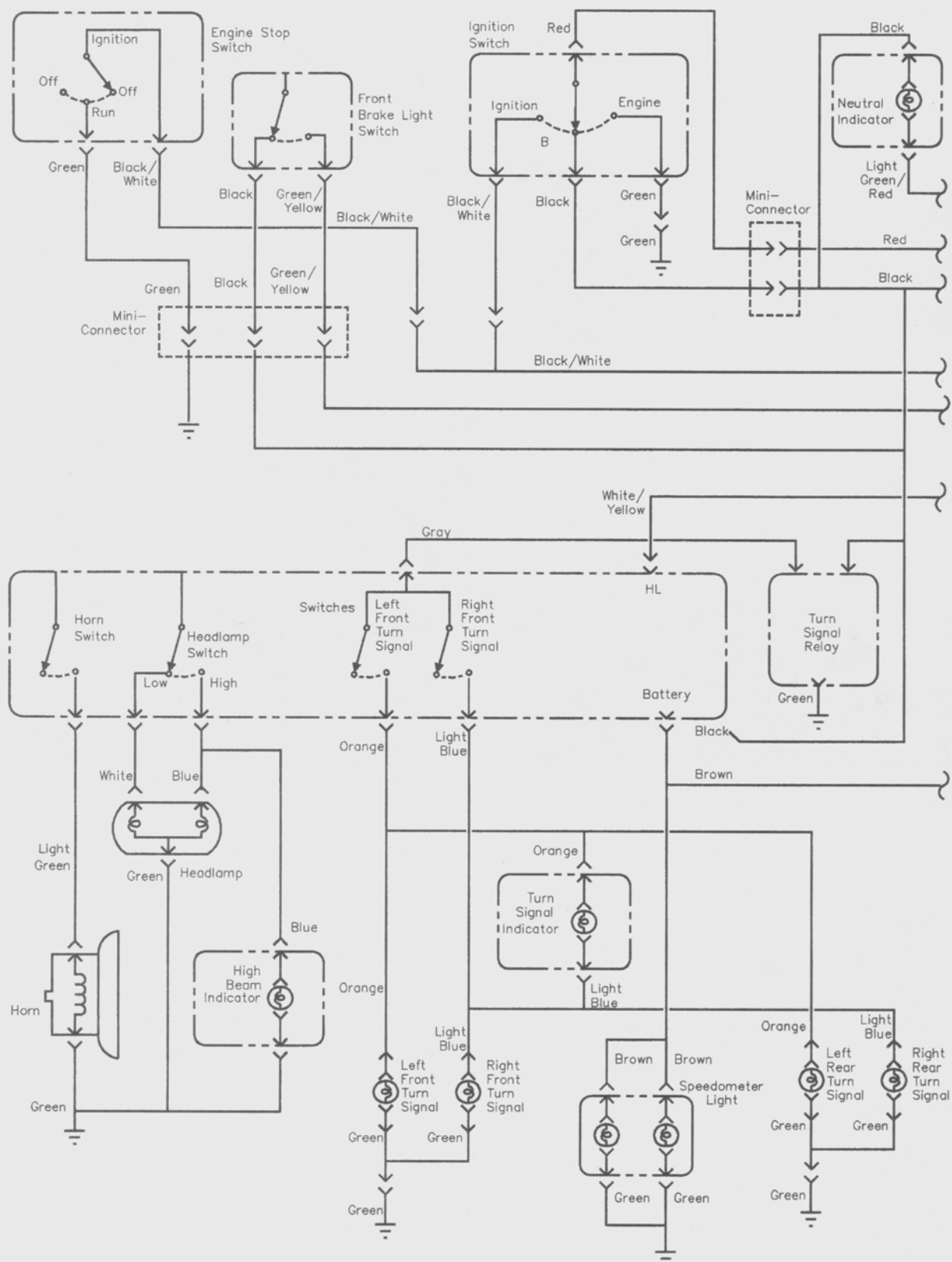
- 2 Remove the fender mounting bolts (and grommets if equipped) and take the fender off (see illustration).
- 3 If you're working on an XR600R, unbolt the inner fender and lift it off (see illustration).
- 4 Installation is the reverse of removal. Tighten the bolts securely, but don't overtighten them and strip the threads.

8 Skid plate/bars - removal and installation

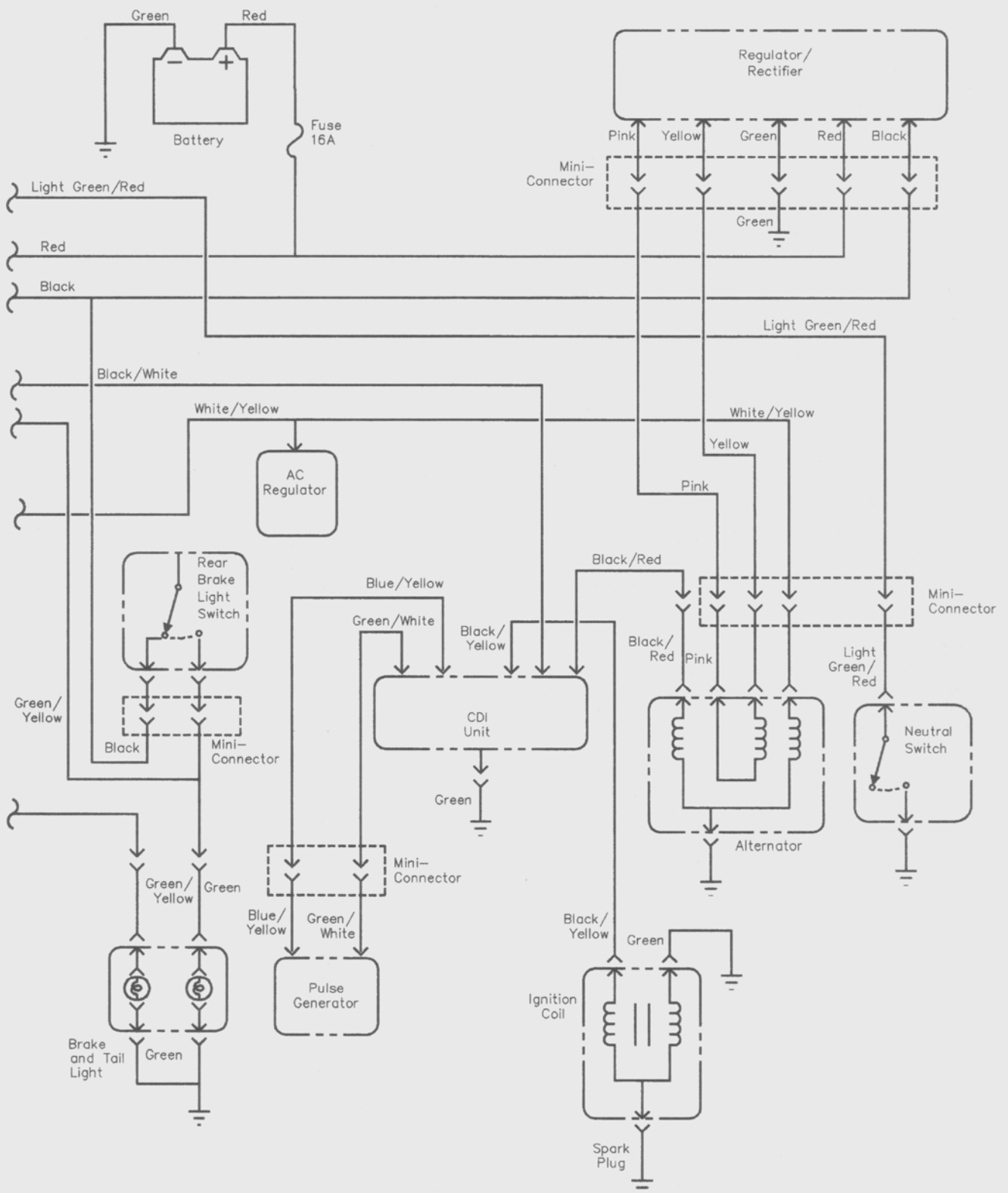
- 1 Support the bike securely so it can't be knocked over during this procedure.
- 2 If you're working on an XL600R, remove one nut at the front of the skid plate and two bolts from underneath, then lower the skid plate away from the motorcycle.
- 3 If you're working on an XR600R, remove the bolts at the front and rear of the bars. Lower the bars away from the motorcycle.
- 4 Installation is the reverse of removal. Tighten the bolts securely, but don't overtighten them and strip the threads.

9 Frame - general information, inspection and repair

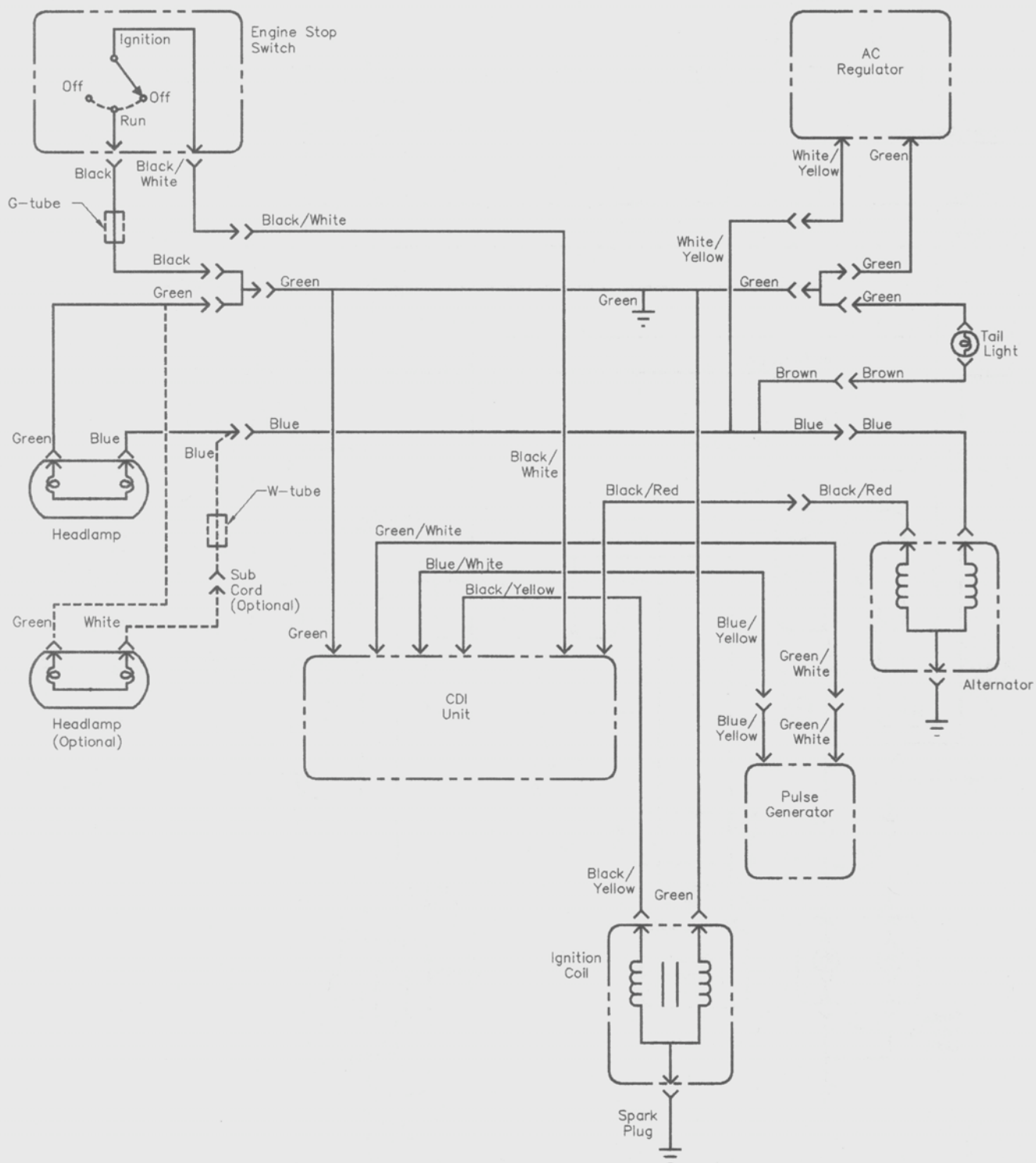
- 1 All models use a semi-double cradle frame made of round-section steel tubing.
- 2 The frame shouldn't require attention unless accident damage has occurred. In most cases, frame replacement is the only satisfactory remedy for such damage. A few frame specialists have the jigs and other equipment necessary for straightening the frame to the required standard of accuracy, but even then there is no simple way of assessing to what extent the frame may have been overstressed.
- 3 After the motorcycle has accumulated a lot of miles, the frame should be examined closely for signs of cracking or splitting at the welded joints. Corrosion can also cause weakness at these joints. Loose engine mount bolts can cause ovaling or fracturing to the mounting bolt holes. Minor damage can often be repaired by welding, depending on the nature and extent of the damage.
- 4 Remember that a frame that is out of alignment will cause handling problems. If misalignment is suspected as the result of an accident, it will be necessary to strip the machine completely so the frame can be thoroughly checked.



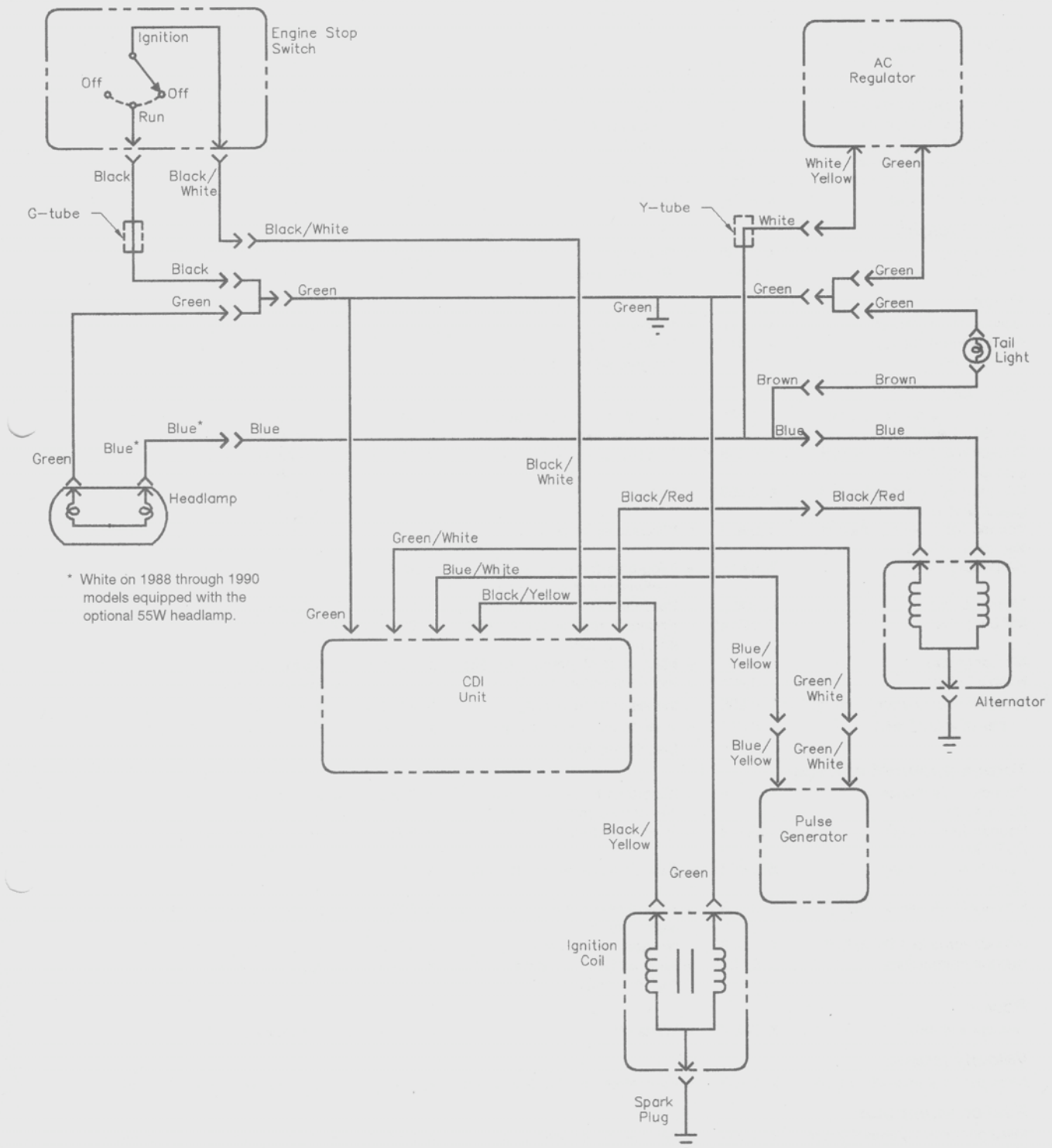
XL600R wiring diagram (1 of 2)



XL 600R wiring diagram (2 of 2)



XR600R wiring diagram - 1985 through 1987 models



XR600R wiring diagram - 1988 and later models

Conversion factors

Length (distance)

Inches (in)	X 25.4	= Millimetres (mm)	X 0.0394	= Inches (in)
Feet (ft)	X 0.305	= Metres (m)	X 3.281	= Feet (ft)
Miles	X 1.609	= Kilometres (km)	X 0.621	= Miles

Volume (capacity)

Cubic inches (cu in; in ³)	X 16.387	= Cubic centimetres (cc; cm ³)	X 0.061	= Cubic inches (cu in; in ³)
Imperial pints (Imp pt)	X 0.568	= Litres (l)	X 1.76	= Imperial pints (Imp pt)
Imperial quarts (Imp qt)	X 1.137	= Litres (l)	X 0.88	= Imperial quarts (Imp qt)
Imperial quarts (Imp qt)	X 1.201	= US quarts (US qt)	X 0.833	= Imperial quarts (Imp qt)
US quarts (US qt)	X 0.946	= Litres (l)	X 1.057	= US quarts (US qt)
Imperial gallons (Imp gal)	X 4.546	= Litres (l)	X 0.22	= Imperial gallons (Imp gal)
Imperial gallons (Imp gal)	X 1.201	= US gallons (US gal)	X 0.833	= Imperial gallons (Imp gal)
US gallons (US gal)	X 3.785	= Litres (l)	X 0.264	= US gallons (US gal)

Mass (weight)

Ounces (oz)	X 28.35	= Grams (g)	X 0.035	= Ounces (oz)
Pounds (lb)	X 0.454	= Kilograms (kg)	X 2.205	= Pounds (lb)

Force

Ounces-force (ozf; oz)	X 0.278	= Newtons (N)	X 3.6	= Ounces-force (ozf; oz)
Pounds-force (lbf; lb)	X 4.448	= Newtons (N)	X 0.225	= Pounds-force (lbf; lb)
Newtons (N)	X 0.1	= Kilograms-force (kgf; kg)	X 9.81	= Newtons (N)

Pressure

Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 0.070	= Kilograms-force per square centimetre (kgf/cm ² ; kg/cm ²)	X 14.223	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 0.068	= Atmospheres (atm)	X 14.696	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 0.069	= Bars	X 14.5	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 6.895	= Kilopascals (kPa)	X 0.145	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Kilopascals (kPa)	X 0.01	= Kilograms-force per square centimetre (kgf/cm ² ; kg/cm ²)	X 98.1	= Kilopascals (kPa)
Millibar (mbar)	X 100	= Pascals (Pa)	X 0.01	= Millibar (mbar)
Millibar (mbar)	X 0.0145	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 68.947	= Millibar (mbar)
Millibar (mbar)	X 0.75	= Millimetres of mercury (mmHg)	X 1.333	= Millibar (mbar)
Millibar (mbar)	X 0.401	= Inches of water (inH ₂ O)	X 2.491	= Millibar (mbar)
Millimetres of mercury (mmHg)	X 0.535	= Inches of water (inH ₂ O)	X 1.868	= Millimetres of mercury (mmHg)
Inches of water (inH ₂ O)	X 0.036	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 27.68	= Inches of water (inH ₂ O)

Torque (moment of force)

Pounds-force inches (lbf in; lb in)	X 1.152	= Kilograms-force centimetre (kgf cm; kg cm)	X 0.868	= Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X 0.113	= Newton metres (Nm)	X 8.85	= Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X 0.083	= Pounds-force feet (lbf ft; lb ft)	X 12	= Pounds-force inches (lbf in; lb in)
Pounds-force feet (lbf ft; lb ft)	X 0.138	= Kilograms-force metres (kgf m; kg m)	X 7.233	= Pounds-force feet (lbf ft; lb ft)
Pounds-force feet (lbf ft; lb ft)	X 1.356	= Newton metres (Nm)	X 0.738	= Pounds-force feet (lbf ft; lb ft)
Newton metres (Nm)	X 0.102	= Kilograms-force metres (kgf m; kg m)	X 9.804	= Newton metres (Nm)

Power

Horsepower (hp)	X 745.7	= Watts (W)	X 0.0013	= Horsepower (hp)
-----------------	---------	-------------	----------	-------------------

Velocity (speed)

Miles per hour (miles/hr; mph)	X 1.609	= Kilometres per hour (km/hr; kph)	X 0.621	= Miles per hour (miles/hr; mph)
--------------------------------	---------	------------------------------------	---------	----------------------------------

Fuel consumption*

Miles per gallon, Imperial (mpg)	X 0.354	= Kilometres per litre (km/l)	X 2.825	= Miles per gallon, Imperial (mpg)
Miles per gallon, US (mpg)	X 0.425	= Kilometres per litre (km/l)	X 2.352	= Miles per gallon, US (mpg)

Temperature

Degrees Fahrenheit = (°C x 1.8) + 32

Degrees Celsius (Degrees Centigrade; °C) = (°F - 32) x 0.56

* It is common practice to convert from miles per gallon (mpg) to litres/100 kilometres (l/100km), where mpg (Imperial) x l/100 km = 282 and mpg (US) x l/100 km = 235

Index

A

About this manual, 0-5
 AC regulator, check and replacement, 4-8
 Air cleaner housing, removal and installation, 3-8
 Air filter element, cleaning, 1-11
 Alternator stator coils and rotor, check and replacement, 4-6

B

Battery
 charging, 4-2
 inspection and maintenance, 4-2
Bodywork and frame, 7-1
Brake
 caliper, removal, overhaul and installation, 6-4
 disc, inspection, removal and installation, 6-6
 drum and shoes, removal, inspection and installation, 6-7
 general information, 6-3
 hoses and lines, inspection and replacement, 6-13
 lever and pedal freeplay, check and adjustment, 1-6
 light switches, check and replacement, 4-4
 master cylinder removal, overhaul and installation
 front, 6-9
 rear, 6-11
 pads, replacement, 6-3
 pedal, removal and installation, 6-13
 system bleeding, 6-14
 system, general check, 1-5
Brakes, wheels and tires, 6-1 through 6-20
Bulbs, replacement, 4-3
Buying parts, 0-5

C

Cable, throttle, removal, installation and adjustment, 3-8
 Caliper, brake, removal, overhaul and installation, 6-4
 Cam chain tensioner, removal, inspection and installation, 2-12
 Camshaft sprocket and primary drive gear, removal, inspection and installation, 2-32
 Camshaft, guides and chain, removal and installation, 2-14
Carburetor
 disassembly, cleaning and inspection, 3-6
 overhaul, general information, 3-5
 reassembly and float height check, 3-8
 removal and installation, 3-5
Cautions, Notes and Warnings, 0-5
 CDI unit, harness check, removal and installation, 4-10
 Chain, removal, cleaning, inspection and installation, 5-16
 Charcoal canister, evaporative emission control system, check, 1-19
Charging system
 leakage and output test, 4-6
 testing, general information and precautions, 4-6
Chemicals and lubricants, 0-16
Choke, operation check, 1-9
Clutch
 check and freeplay adjustment, 1-8
 general information, 2-7
 removal, inspection and installation, 2-25
Crankcase
 breather system, check, 1-19
 components, inspection and servicing, 2-39
 disassembly and reassembly, 2-37
Crankshaft and balancer, removal, inspection and installation, 2-45
Cylinder compression, check, 1-14

Cylinder head

- and valves, disassembly, inspection and reassembly, 2-17
- cover and rocker arms, removal, inspection and installation, 2-10
- removal and installation, 2-16

Cylinder, engine, removal and installation, 2-21**D****Decompressor**

- freeplay, check and adjustment, 1-16
- lever and cable, removal and installation, 2-34

Diagnosis, 0-17**Disc, brake, inspection, removal and installation, 6-6****Drive chain**

- and sprockets, check, adjustment and lubrication, 1-18
- removal, cleaning, inspection and installation, 5-16

E**Electrical system, 4-1****Electrical troubleshooting, 4-2****Engine**

- cam chain tensioner, removal, inspection and installation, 2-12
- camshaft, guides and chain, removal and installation, 2-14
- clutch, removal, inspection and installation, 2-25
- crankcase components, inspection and servicing, 2-39
- crankcase, disassembly and reassembly, 2-37
- crankshaft and balancer, removal, inspection and installation, 2-45
- cylinder head and valves, disassembly, inspection and reassembly, 2-17
- cylinder head cover and rocker arms, removal, inspection and installation, 2-10
- cylinder head, removal and installation, 2-16
- cylinder, removal and installation, 2-21
- decompressor lever and cable, removal and installation, 2-34
- disassembly and reassembly, general information, 2-10
- external oil line and hoses, removal and installation, 2-37
- external shift mechanism, removal, inspection and installation, 2-33
- general information, 2-8
- initial start-up after overhaul, 2-40, 2-46
- kickstarter, removal, inspection and installation, 2-34
- oil change and filter screen cleaning, 1-9
- oil level, check, 1-5
- oil pump and internal pipe, removal, inspection and installation, 2-30
- operations possible with the engine in the frame, 2-8
- operations requiring engine removal, 2-8
- piston rings, installation, 2-24
- piston, removal, inspection and installation, 2-22
- primary drive gear and camshaft sprocket removal, inspection and installation, 2-32
- recommended break-in procedure, 2-46
- removal and installation, 2-8
- repair, major, general note, 2-8
- transmission shafts, removal, inspection and installation, 2-42
- valves, valve seats and guides, servicing, 2-17

Engine, clutch and transmission, 2-1 through 2-46**Evaporative emission control system, check, 1-19****Exhaust system**

- inspection and spark arrester cleaning, 1-13
- removal and installation, 3-9

F**Fasteners, check, 1-17****Fault finding, 0-17****Fender, removal and installation**

- front, 7-2
- rear, 7-2

Filter cleaning

- air, 1-11
- fuel, 1-12
- oil, 1-9

Footpegs, removal and installation, 7-2**Fork, oil change, 1-19****Forks**

- disassembly, inspection and reassembly, 5-4
- removal and installation, 5-4

Frame and bodywork, 7-1 through 7-3**Frame, general information, inspection and repair, 7-3****Fuel**

- carburetor
 - disassembly, cleaning and inspection, 3-6
 - overhaul, general information, 3-5
 - reassembly and float height check, 3-8
 - removal and installation, 3-5
- filter cleaning, 1-12
- general information, 3-2
- idle fuel/air mixture adjustment, 3-3
- system check, 1-12
- tank
 - cleaning and repair, 3-3
 - removal and installation, 3-2
- throttle cable, removal, installation and adjustment, 3-8

Fuel and exhaust systems, 3-1 through 3-10**Fuse, check and replacement, 4-3****G****General specifications, 0-7****H****Handlebar switches, check and replacement, 4-4****Handlebar, removal, inspection and installation, 5-3****Headlight aim, check and adjustment, 4-4****Hoses and lines, brakes, inspection and replacement, 6-13****I****Identification numbers, 0-6****Idle fuel/air mixture adjustment, 3-3****Idle speed, check and adjustment, 1-16****Ignition and electrical system, 4-1 through 4-10****Ignition system**

- CDI unit, harness check, removal and installation, 4-10
- check, 4-9
- coil, check, removal and installation, 4-9
- general information, 4-2, 4-8
- pulse generator, check, removal and installation, 4-10
- switch (XL600R), check and replacement, 4-4
- timing, 1-16

Introduction to the Honda XL/XR600, 0-4**K****Kickstarter, removal, inspection and installation, 2-34**

L

Lubricants and chemicals, 0-16
Lubricants and fluids, recommended, 1-3
Lubrication, general, 1-9

M

Maintenance, 1-1 through 1-20
Maintenance schedule, 1-4
Maintenance techniques, 0-8

N

Notes, Cautions and Warnings, 0-5

O

Odometer/speedometer and cable, removal and installation, 4-5
Oil change and filter screen cleaning, 1-9
Oil level, check, 1-5
Oil line and hoses, external, removal and installation, 2-37
Oil pump and internal pipe, removal, inspection and installation, 2-30

P

Pads, brake, replacement, 6-3
Pedal freeplay and brake lever, check and adjustment, 1-6
Piston rings, installation, 2-24
Piston, removal, inspection and installation, 2-22
Primary drive gear and camshaft sprocket removal, inspection and installation, 2-32
Pulse generator, check, removal and installation, 4-10

R

Rear shock absorber and suspension linkage, removal, inspection and installation, 5-12
Recommended lubricants and fluids, 1-3
Regulator/rectifier (XL600R), replacement, 4-8
Rocker arms and cylinder head cover, removal, inspection and installation, 2-10
Rotor, brake, inspection, removal and installation, 6-6
Routine maintenance, 1-1 through 1-20
Routine maintenance intervals, 1-4

S

Safe repair practices, 0-14
Scheduled maintenance, 1-4
Seat, removal and installation, 7-1
Shift mechanism, external, removal, inspection and installation, 2-33
Shock absorber and suspension linkage, removal, inspection and installation, 5-12

Side covers, removal and installation, 7-2
Sidestand, check, 1-20
Sidestand, removal and installation, 7-2
Skid plate/bars, removal and installation, 7-3
Spark arrester, cleaning, 1-13
Spark plug
 replacement, 1-13
 type and gap, 1-1
Specifications, general, 0-7
Speedometer/odometer and cable, removal and installation, 4-5
Sprockets and drive chain, check, adjustment and lubrication, 1-18
Sprockets, check and replacement, 5-17
Stator coils, alternator and rotor, check and replacement, 4-6
Steering head bearings
 check and adjustment, 1-17
 replacement, 5-9
Steering, suspension and final drive, 5-1 through 5-18
Suspension linkage and rear shock absorber, removal, inspection and installation, 5-12
Suspension, check, 1-17
Swingarm
 bearings
 check, 5-14
 replacement, 5-14
 removal and installation, 5-14

T

Throttle cable, removal, installation and adjustment, 3-8
Throttle operation/grip freeplay, check and adjustment, 1-8
Timing, ignition, 1-16
Tires, removal and installation, 6-20
Tires/wheels, general check, 1-7
Tools, 0-9
Transmission
 general information, 2-7
 shafts, removal, inspection and installation, 2-42
Troubleshooting, 0-17
Troubleshooting, electrical, 4-2
Tubes, repair, 6-20
Tune-up and routine maintenance, 1-1 through 1-20
Tune-up and routine maintenance, introduction, 1-5

V

Valve clearances, check and adjustment, 1-15
Valves, valve seats and guides, servicing, 2-17

W

Warnings, Cautions and Notes, 0-5
Wheel and rear coupling bearings, inspection and maintenance, 6-16
Wheels
 alignment check, 6-16
 inspection, removal and installation, 6-14
Wheels/tires, general check, 1-7
Working facilities, 0-13



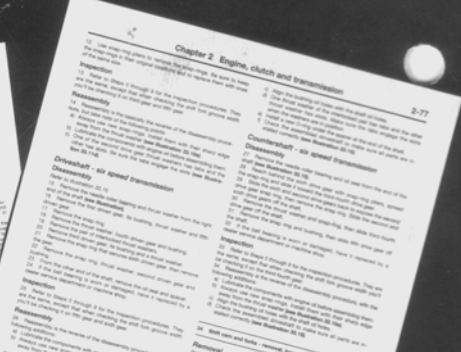
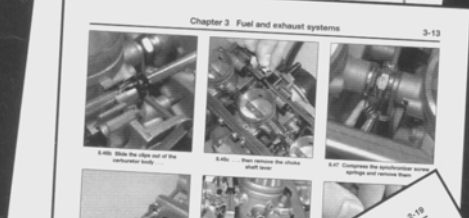
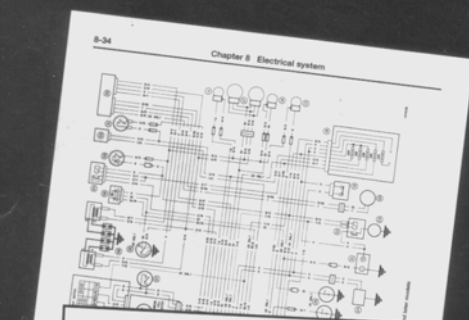
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