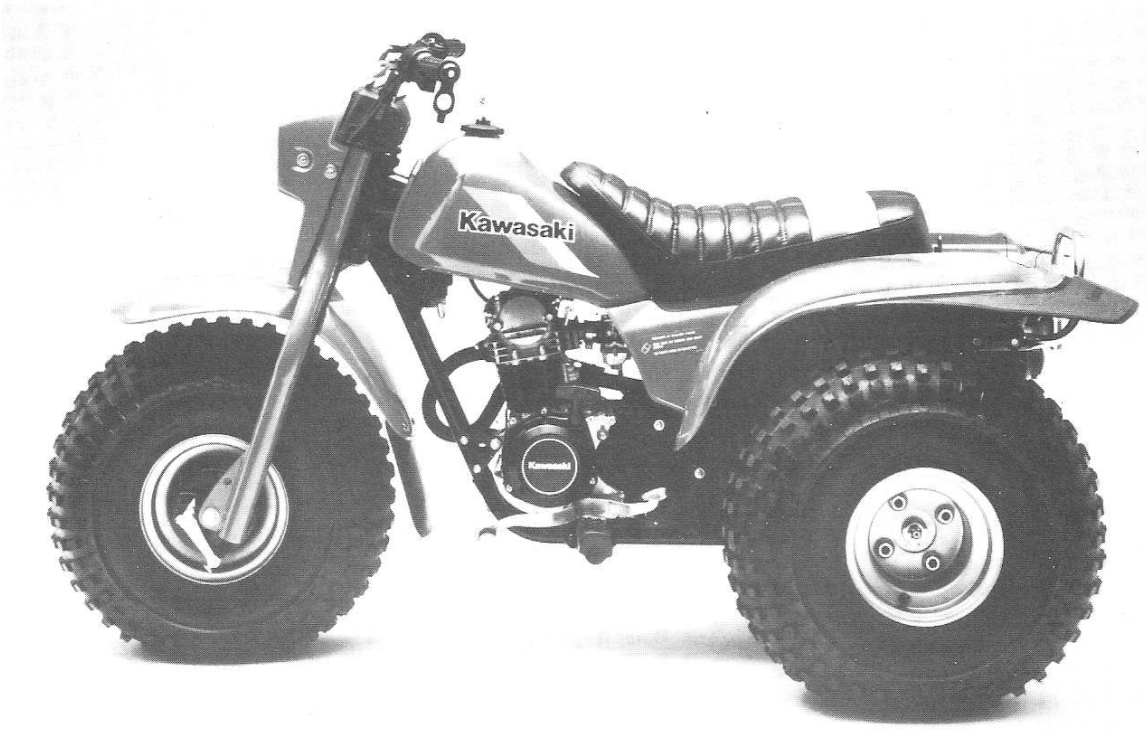
Contents



Left-hand view of the KLT110 A1 model

Right-hand view of the KLT160 A1 model

About this manual

Its purpose

The purpose of this manual is to help you maintain and repair 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 it offers diagnostic and repair procedures to follow when trouble occurs.

It is hoped that you will use the manual to tackle the work yourself. For many simple jobs, doing it yourself may be quicker than arranging an appointment to get the machine 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 having done 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.

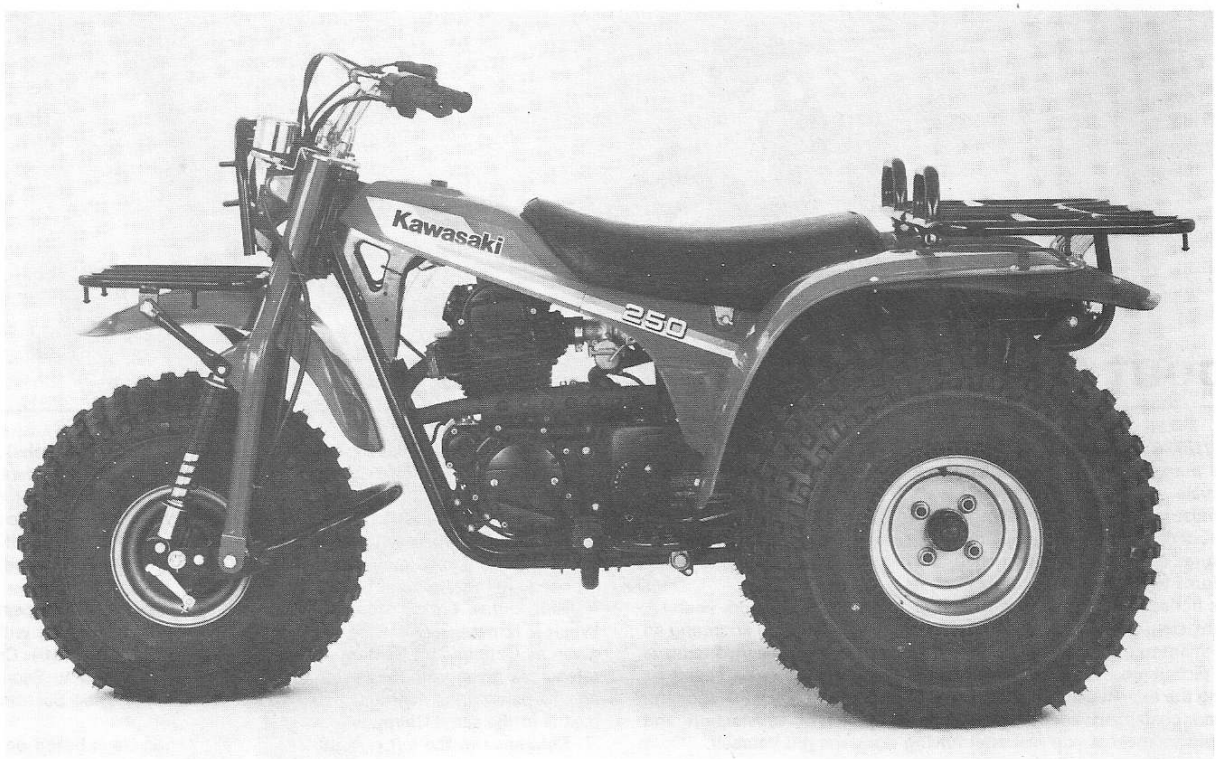
The two types of illustrations used (figures and photographs) are referenced by a number preceding their caption. Figure reference numbers denote Chapter and numerical sequence within the Chapter (ie Fig. 3.4 means Chapter 3, figure number 4). Figure captions are followed by a Section number which ties the figure to a specific portion of the text. All photographs apply to the Chapter in which they appear and the reference number pinpoints the pertinent Section and paragraph.

Procedures, once described in the text, are not normally repeated. When it is necessary to refer to another Chapter, the reference will be given as Chapter and Section number (ie Chapter 1, Section 16). 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.

Reference to the left or right side of the motorcycle is based on the assumption that one is 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.

Right-hand view of the KLT200 C2 model



Left-hand view of the KLT250 C3 model

Introduction to the Kawasaki ATVs

All Kawasaki KLT models have continued to be sold with very few modifications to design since their respective dates of introduction. Reference to the Specifications of each Chapter will show any design modifications and also the design variations between model types. The following table shows the model suffix relating to each year of production and the frame number(s) with which each model's production run commenced (and finished, where available).

KLT110 A1	1984	JKALTSA1*EB500001 to 514100
KLT110 A2	1985	JKALTSA1*FB514101
KLT160 A1	1985	JKALT5A1*FB500001
KLT200 A1	1981	LT200A-500001 to 503800, JKALTNA1*BB503801 to 508600
KLT200 A2	1981	JKALTNA1*BB508601 to 517088
KLT200 A3	1982	JKALTNA1*CB517101 to 529138
KLT200 A4	1983	JKALTNA1*DB529200 to 538235
KLT200 A4A	1983	JKALTNA1*DB533220 to 538235
KLT200 B1	1983	JKALTNB1*DB500001 to 503001
KLT200 C1	1983	JKALTNC1*DB500001 to 503600
KLT200 C2	1984	JKALTNC1*EB503601 to 508600
KLT250 A1	1982	JKALTMA1*CB500001 to 509667
KLT250 A2	1983	JKALTMA1*DB509668
KLT250 C1	1983	JKALTMC1*DB500001 to 506000
KLT250 C2	1984	JKALTMC1*EB506001 to 513300
KLT250 C3	1985	JKALTMC1*FB513301
KLT250 P1	1984	JKALTMP1*EB500001 to 500300

Model dimensions and weights

	KLT110 A1/A2	KLT160 A1
Overall length	1700 mm (66.93 in) - A1 1710 mm (67.3 in) - A2	1730 mm (68.11 in)
Overall width	975 mm (38.4 in)	1000 mm (39.37 in)
Overall height	970 mm (38.2 in) - A1 990 mm (39.0 in) - A2	1000 mm (39.37 in)
Wheelbase	1075 mm (42.32 in) - A1 1090 mm (42.9 in) - A2	1110 mm (43.70 in)
Track	700 mm (27.6 in)	740 mm (29.13 in)
Ground clearance	130 mm (5.12 in) - A1 135 mm (5.3 in) - A2	135 mm (5.31 in)
Dry weight	109 kg (240 lb) - A1 110 kg (243 lb) - A2	124 kg (273 lb)

	KLT200 A/B/C	KLT250 A/C/P
Overall length	1695 mm (66.7 in) - A 1720 mm (67.7 in) - B 1730 mm (68.1 in) - C	1820 mm (71.7 in) - A/P 1900 mm (74.8 in) - C
Overall width	1025 mm (40.4 in)	1080 mm (42.5 in)
Overall height	940 mm (37.0 in) - A1 965 mm (38.0 in) - A2 on/B 1000 mm (39.4 in) - C	1040 mm (40.9 in)
Wheelbase	1125 mm (44.3 in) - A 1135 mm (44.7 in) - B 1145 mm (45.1 in) - C	1210 mm (47.6 in)
Track	725 mm (28.5 in) - B/C	790 mm (31.1 in)
Ground clearance	120 mm (4.7 in)	120 mm (4.7 in) - A1 150 mm (5.9 in) - A2/P/C
Dry weight	142 kg (313 lb) - A/B 146 kg (322 lb) - C	150 kg (330 lb) - A1 155 kg (342 lb) - A2 164 kg (362 lb) - C 160 kg (352 lb) - P

Ordering spare parts

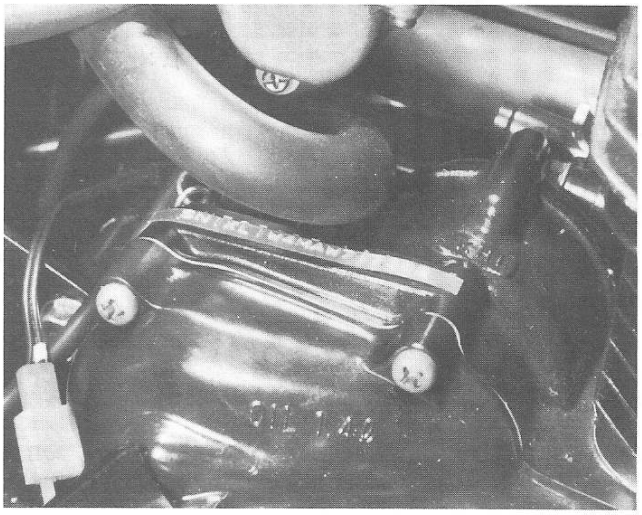
When ordering spare parts for any Kawasaki, deal direct with an official Kawasaki agent who should be able to supply most of the parts ex-stock. Parts cannot be obtained from Kawasaki direct, even if the parts required are not held in stock. Always quote the engine and frame numbers in full, especially if parts are required for earlier models.

The frame number is stamped on the steering head and the engine number on the crankcase (usually on the top surface of the right-hand half).

Use only genuine Kawasaki spares. Some pattern parts are available that may be packed in similar looking packages. They should only be used if genuine parts are hard to obtain or in an emergency, for they do not normally last as long as genuine parts, even although there may be a price advantage.

Some of the more expendable parts such as spark plugs, bulbs, oils and greases etc, can be obtained from accessory shops and motor factors, who have convenient opening hours, and can be found not far from home. It is also possible to obtain parts on a Mail Order basis from a number of specialists who advertise regularly in the motorcycle magazines.

Location of frame number



Location of engine number

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 fluid 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.

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.

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. 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).

Torquing sequences and procedures

When threaded fasteners are tightened, they are tightened to a specific torque valve (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 is 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. For fasteners not requiring a specific torque, a general torque value chart is presented as a guide.

Fasteners laid out in a pattern (i.e. cylinder head bolts, engine case bolts, etc.) must be loosened and torqued 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 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. Make note of special characteristics or markings 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 helpful to make simple 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 mixups later. If nuts and bolts cannot 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 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 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.

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 newcomer 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 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)
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

Note: *Since basic ignition timing checks are a part of routine maintenance, it will be necessary to purchase a good quality, inductive pickup stroboscopic timing light. Although it is included in the list of Special tools, it is mentioned here because ignition timing checks cannot be made without one.*

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).

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 – vise grip
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
Allen wrench set (4 mm to 10 mm)
Pin-type spanner wrench
A selection of files
Wire brush (large)

Note: *Another tool which is often useful is an electric drill motor with a chuck capacity of 3/8 in (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).

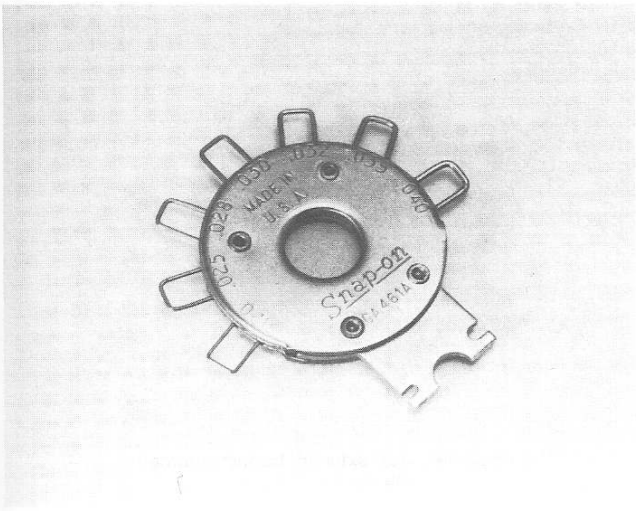
This list primarily contains tools and instruments widely available to the public, as well as some special tools produced by the vehicle manufacturer for distribution to dealer service departments. As a result, references to the manufacturer's special tools are occasionally included in the text of this 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 cannot be purchased or borrowed, the work should be turned over to the dealer service department or a motorcycle repair shop.

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
Valve lifter depressing tool
TORX driver bits (T-25 and T-30)
Flywheel (alternator rotor) puller
45 mm (1 13/16 inch) crowfoot wrench or deep socket
Manometer or vacuum gauge set
Stroboscopic timing light
Work light with extension cord
Small air compressor with blow gun and tire chuck

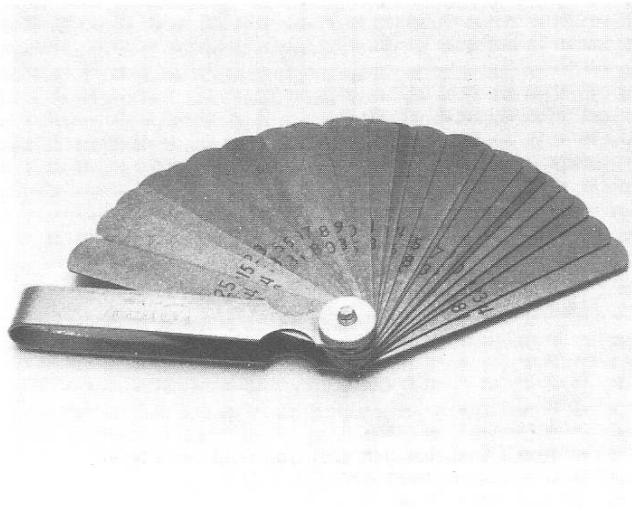
Buying tools

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.

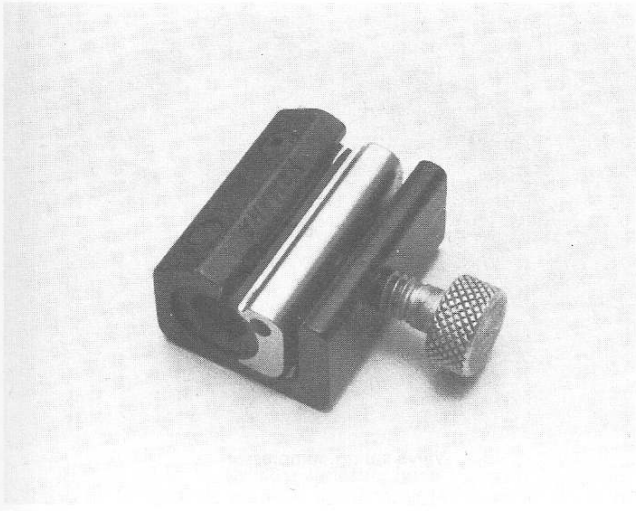
Tool stores and motorcycle dealers will often be the only source of some of the special tools that are needed, but regardless of where tools are bought, try to avoid cheap ones (especially when buying screwdrivers and sockets) because they won't last very long. The expense involved in replacing cheap tools will eventually be greater than the initial cost of quality tools.



Spark plug gap adjusting tool



Feeler gauge set



Control cable pressure luber

Hand impact screwdriver and bits

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 areas.

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 cannot 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).

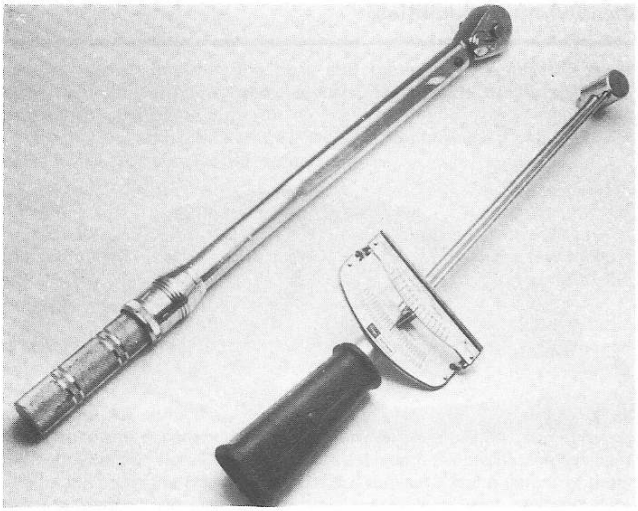
A clean, flat workbench or table of comfortable working height is an absolute necessity. The workbench should be equipped with a vise that has a jaw opening of at least four inches.

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.

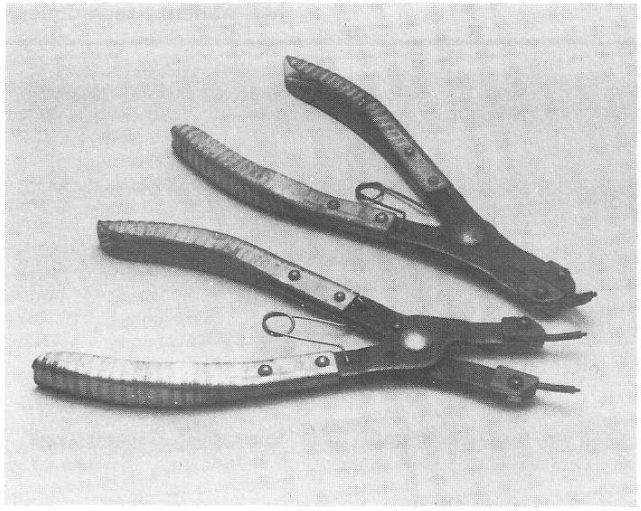
Sometimes waste oil and fluids, drained from the engine or cooling system during normal maintenance or repairs, present a disposal problem. To avoid pouring them on the ground or into the sewage system, simply pour the used fluids into large containers, seal them with caps and take them to an authorized 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.

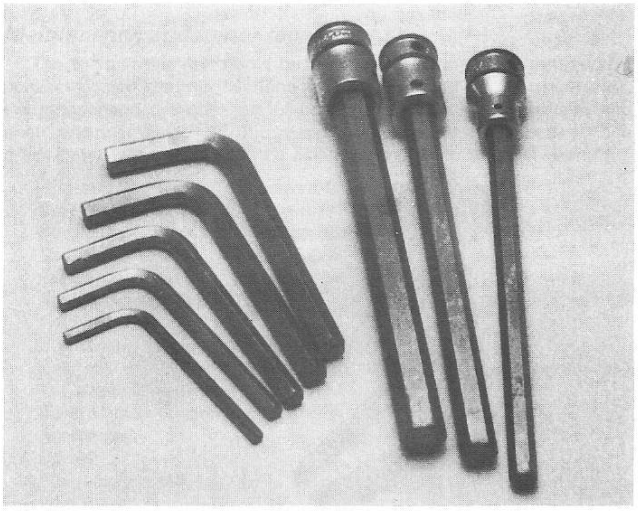
Whenever working over a painted surface (such as the fuel tank) cover it with an old blanket or bedspread to protect the finish.



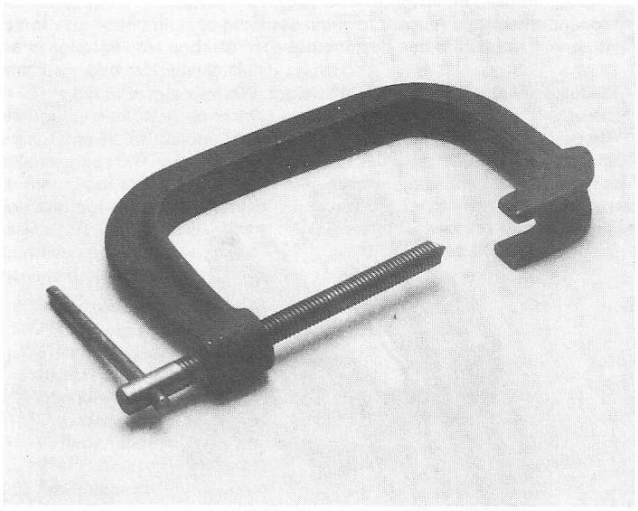
Torque wrenches (left-click type, right-beam type)



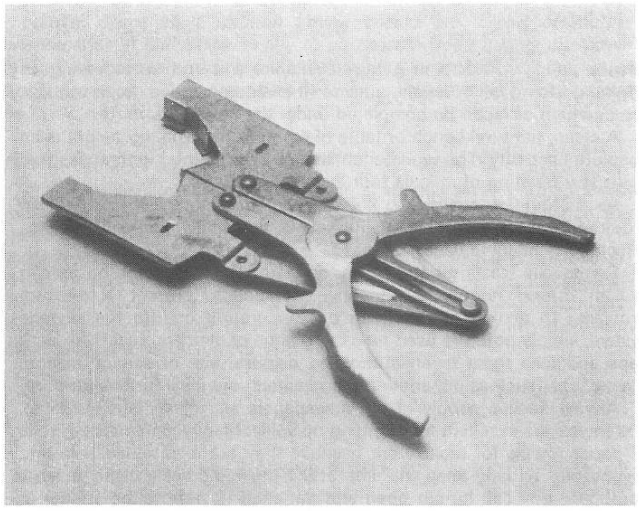
Circlip pliers (top-external, bottom-internal)



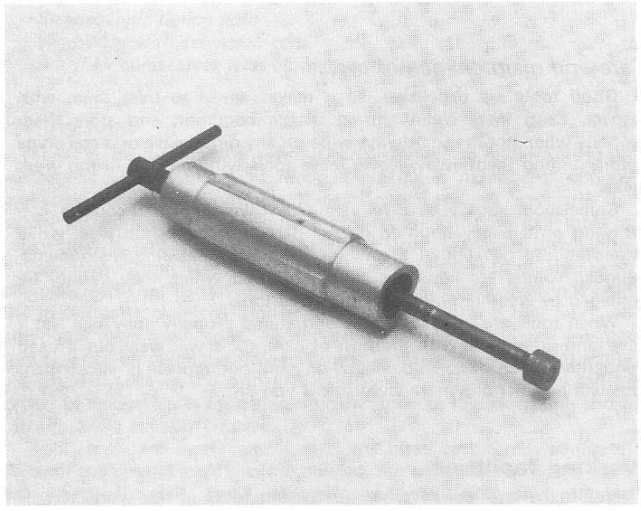
Allen wrenches (left) and Allen head sockets (right)



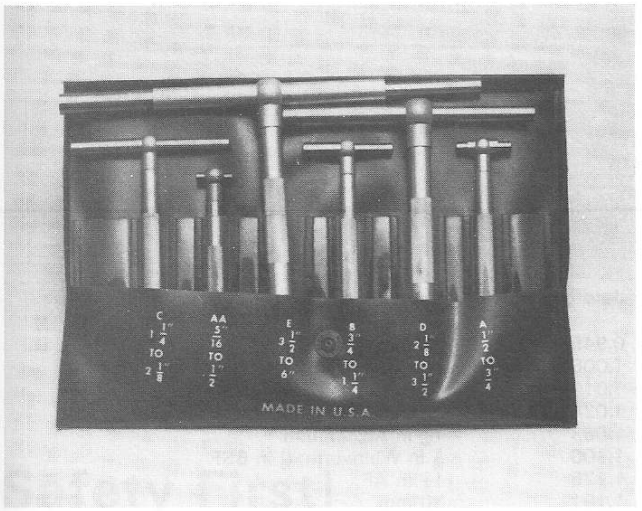
Valve spring compressor



Piston ring removal/installation tool

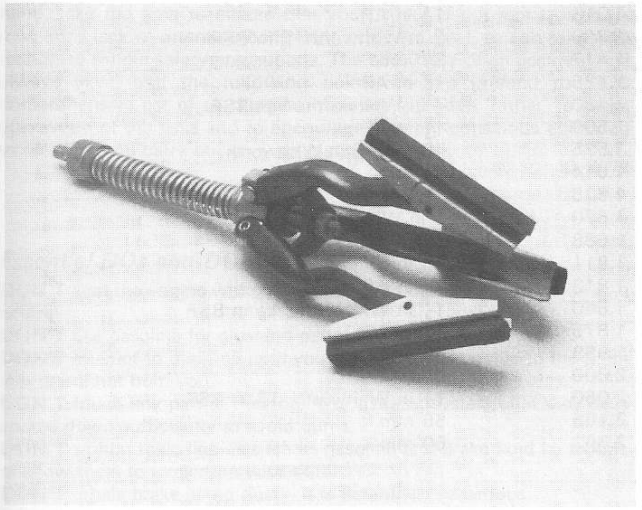


Piston pin puller

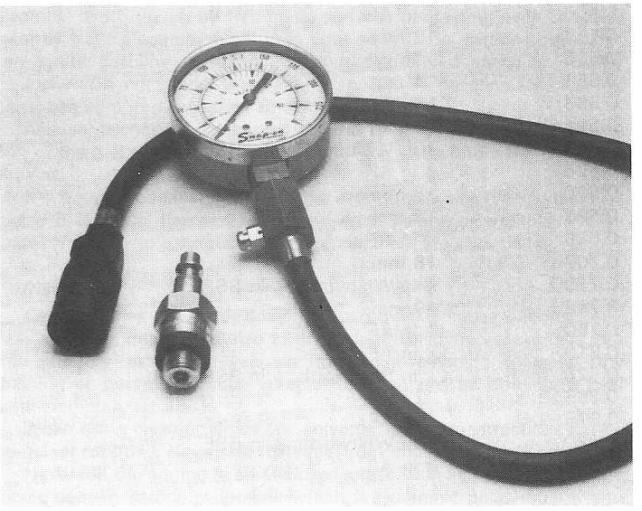


Telescoping gauges

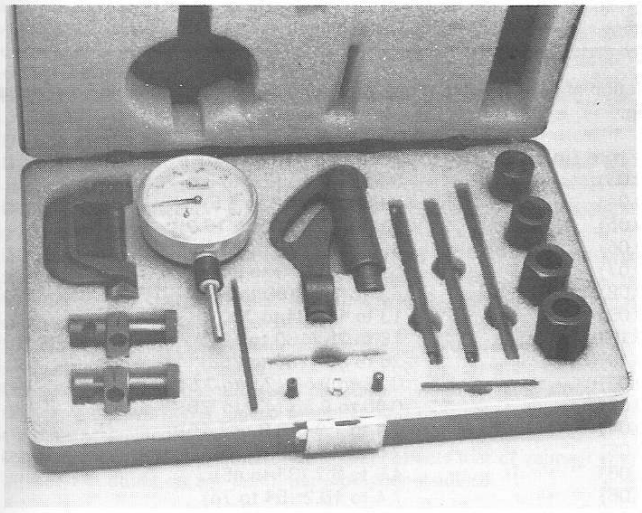
0-to-1 inch micrometer



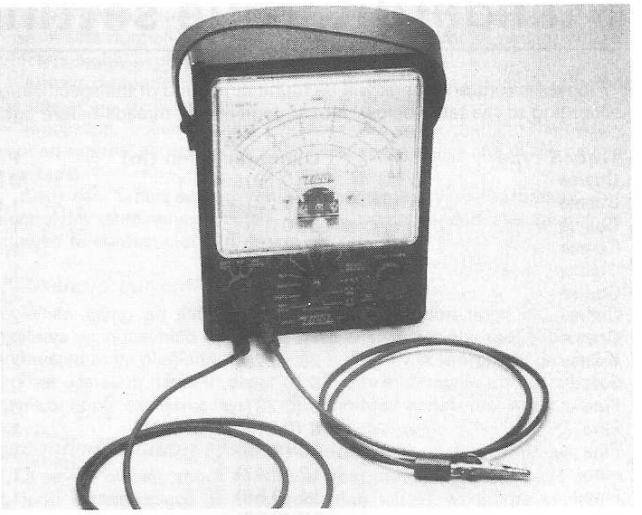
Cylinder surfacing hone



Cylinder compression gauge



Dial indicator set



Multimeter (volt/ohm/ammeter)

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 jeopardized. A moment's lack of attention can result in an accident, as can failure to recognize simple safety precautions. The possibility of an accident will always exist, and the following points do not pretend to be a comprehensive list of all dangers; they are intended 'rather' to make you aware of the risks and to encourage a safety-conscious approach to all work you carry out on your machine.

Essential DOs and DON'Ts

DON'T start the engine without first checking that the transmission is in neutral.
DON'T use gasoline for cleaning parts.
DON'T attempt to drain oil until you are sure it has cooled to the point that it will not burn you.
DON'T touch any part of the engine or exhaust system until they have cooled down sufficiently to avoid burns.
DON'T siphon toxic liquids such as gasoline and brake fluid by mouth, or allow them to remain on your skin.
DON'T inhale brake lining dust – it is potentially hazardous.
DON'T allow any spilled oil or grease to remain on the floor – wipe it up before someone slips on it.
DON'T use loose fitting wrenches or other tools which may slip and cause injury.
DON'T push on wrenches when loosening or tightening nuts or bolts. Always try to pull the wrench towards you. If the situation calls for pushing the wrench away, push with an open hand to avoid scraped knuckles if the wrench should slip.
DON'T attempt to lift a heavy component which may be beyond your capability – get someone to help you.
DON'T rush or take unsafe shortcuts, to finish a job.
DON'T allow children on or around the motorcycle while you are working on it.
DO wear eye protection when using power tools such as drill, bench grinder etc.
DO keep loose clothing and long hair well out of the way of moving parts.
DO make sure that any hoist used has a safe working load rating adequate for the job.
DO make sure that the machine is securely supported, especially when removing wheels.
DO get someone to check on you periodically when working alone.
DO carry out work in a logical sequence and check that everything is correctly assembled and tightened.
DO remember that your motorcycle's safety affects that of yourself and others. If in doubt on any point, get professional advice.

Fire

Remember at all times that gasoline is highly flammable. Never smoke, or have any kind of open flame around, when working on your machine. But, the risk does not end there – a spark caused by an electrical short-circuit, by two metal surfaces contacting each other, or even by static electricity built up in your body under certain conditions, can ignite gasoline vapours, which in a confined space are highly explosive. Do not, under any circumstances, use gasoline for cleaning parts; use an approved safety solvent.

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

It is highly 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 vapour falls into this category, as do the vapours from some cleaning solvents. 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 on the container carefully. Never use materials from unmarked containers.

Never run the engine 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 machine outside the workarea.

The battery

Never create a spark, or allow a bare light bulb near the battery vent hose. It will normally be giving off a certain amount of hydrogen gas, which is highly explosive.

Always disconnect the battery earth ground cable before working on the fuel or electrical systems.

If possible, loosen the filler plugs or cover when charging the battery from an external source. Do not charge at an excessive rate or the battery may burst.

Take care when adding water and when carrying the battery. The electrolyte, even when diluted, is very corrosive and should not be allowed to contact clothing or skin.

Household current

When using an electric power tool, inspection light, etc., which operates on household current, always ensure that the tool is correctly connected to its plug and that, where necessary, it is properly grounded. Do not use such items in damp conditions and, again, do not create a spark or apply excessive heat in the vicinity of fuel or fuel vapor.

Secondary ignition system voltage

A severe electric shock can result from touching certain parts of the ignition system, (such as the spark plug wires) when the engine is running or being cranked, particularly if components are damp or the insulation is defective. Where an electronic ignition system is in use, the HT 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 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 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 of the combustion chambers. Some additives contain upper cylinder lubricants for valves and piston rings.

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.

Choosing and fitting accessories

Kawasaki supply an excellent range of accessories for their ATV machines. These accessories are designed to adapt the vehicle for a particular working role and include front and rear carrying racks, sprung luggage holders and headlamp stone guards. Your Kawasaki dealer can give details of the accessories supplied for each model type and instructions for fitting the same.

The following text gives advice on what to look for when choosing alternative accessories. This text can only cover the subject in the most general terms and so it is recommended that the owner, having decided that he wants to fit, for example, a carrier, seeks the advice of several local dealers and the owners of similar machines. This will give a good idea of what makes of carrier are easily available, and at what price. Talking to other owners will give some insight into the drawbacks or good points of any one make.

Carriers

When selecting a carrier, always look for one which is made specifically for your machine and which is bolted on with as few separate brackets as possible. A good carrier should bolt directly to the main frame and have its luggage platform as low and as far forward as possible to minimise the effect of any load on the machine's stability. Look for good quality, heavy gauge tubing, good welding and good finish. Also ensure that the carrier does not prevent removal of the seat. When using a carrier, be very careful not to overload it. Excessive weight placed so high and so far to the rear of any ATV will have an adverse effect on the machine's steering and stability.

Handlebars

The riding position (and therefore comfort) of any machine can be improved by the fitting of alternative types of handlebar.

Whatever the reason, there are several considerations to be borne in mind when changing the handlebars of your machine. If fitting lower bars, check carefully that the switches and cables do not foul the petrol tank or frame cover on full lock and that the surplus lengths of cable and electrical wiring are smoothly and tidily disposed of. Avoid tight kinks in cables which will produce stiff controls or the premature and disastrous failure of an overstressed component. If necessary, remove the petrol tank or frame cover and re-route the cable from the engine/gearbox unit upwards, ensuring smooth gentle curves are produced. In extreme cases, it will be necessary to produce shorter cables to overcome this problem. In the case of higher handlebars than standard, it will almost certainly be necessary to purchase extended cables. Check the potential reach of the switch wiring before purchasing high handlebars.

When fitting different types of handlebar, ensure that the mounting clamps are correctly tightened to the manufacturer's specifications and that cables and wiring, as previously mentioned, have smooth easy runs and do not snag on any part of the motorcycle throughout the full steering lock. Also check that the cables are adjusted correctly and that all handlebar controls operate correctly and can be easily reached when riding.

Crashbars

Crashbars, also known as engine protector bars, engine guards, or case savers, are extremely useful items of equipment which can contribute protection to the machine's structure when riding across rocky or rough terrarin. They do not, as has been inferred in the US, prevent the rider from crashing, or necessarily prevent rider injury should a crash occur.

It is recommended that only the smaller, neater, engine protector type of crashbar is considered. This type will offer protection while restricting, as little as is possible, access to the engine and the machine's ground clearance. The crashbars should be designed for use specifically on your machine, and should be constructed of heavy-gauge tubing with strong, integral mounting brackets. Where possible, they should bolt to a strong lug on the frame, usually at the engine mounting bolts.

The alternative type of crashbar is the larger cage type. This type is not recommended in spite of its appearance which promises some protection to the rider as well as to the machine. The larger amount of leverage imposed by the size of this type of crashbar increases the risk of severe frame damage in the event of an accident. This type also decreases the machine's ground clearance and restricts access to the engine. The amount of protection afforded the rider is open to some doubt as the design is based on the premise that the rider will stay in the normally seated position during an accident, and the crashbar structure will not itself fail. Neither result can in any way be guaranteed.

As a general rule, always purchase the best, ie usually the most expensive, set of crashbars you can afford. The investment will be repaid by minimising the amount of damage incurred, should the machine strike the ground.

Avoid the universal type of crashbar. This should be regarded only as a last resort to be used if no alternative exists. With its usual multitude of separate brackets and spacers, the universal crashbar is far too weak in design and construction to be of any practical value.

Finally, if the machine is in constant use over rocky terrain, the fitting of a good, heavy gauge, sump guard is strongly recommended. If unobtainable as an accessory, a guard can be easily formed from a sheet of mild steel or thick aluminium alloy and attached to the engine lower mounting points.

Exhaust systems

The usual motive for fitting an aftermarket exhaust system is to gain more engine performance but other considerations are to gain more ground clearance, to reduce weight of the machine, to obtain a more distinctive exhaust note, or to find a cheaper alternative to the manufacturer's original equipment exhaust system. Original equipment exhaust systems often cost more and may well have a relatively short life. It should be noted that it is rare for an aftermarket exhaust system alone to give a noticeable increase in the engine's power output.

Kawasaki have designed the system fitted to their ATVs to give the highest power output possible allowing for factors such as quietness, fuel economy, spread of power, and long-term reliability. If there were a magic formula which allowed the exhaust system to produce more power without affecting these other considerations you can be sure that Kawasaki, with their large research and development facilities, would have found it and made use of it. Performance increases of a worthwhile and noticeable nature only come from well-tried and properly matched modifications to the entire engine, from the air filter, through the carburetors, port timing or camshaft and valve design, combustion chamber shape, compression ratio, and the exhaust systems. Such modifications are well outside the scope of this manual but interested owners might refer to the 'Piper Tuning Manual' produced by the publisher of this manual; this book goes into the whole subject in great detail.

Whatever your motive for wishing to fit an alternative exhaust system, be sure to seek expert advice before doing so. Changes to the carburetor

jetting will almost certainly be required for which you must consult the exhaust system manufacturer. If he cannot supply adequately specific information it is reasonable to assume that insufficient development work has been carried out, and that particular make should be avoided. Other factors to be borne in mind are whether the system allows sufficient access to the items requiring routine maintenance (oil filter, oil filler cap, etc) and whether the silencer aligns with the original mounting points.

On the subject of the finish of aftermarket exhausts, avoid black-painted system unless you enjoy painting. As any trail-bike owner will tell you, rust has a great affinity for black exhausts and re-painting or rust removal becomes a task which must be carried out with a monotonous regularity. A bright chrome finish is, as a general rule, a far better proposition as it is much easier to keep clean and to prevent rusting. Although the general finish of aftermarket exhaust systems is not always up to the standard of the original equipment the lower cost of such systems does at least reflect this fact.

When fitting an alternative system always purchase a full set of new exhaust gaskets, to prevent leaks. Fit the exhaust first to the cylinder head, tightening the retaining nuts or bolts by hand only and then line up the exhaust rear mountings. If the new system is a one-piece unit and the rear mountings do not line up exactly, spacers must be fabricated to take up the difference. Do not force the system into place as the stress thus imposed will rapidly cause cracks and splits to appear. Once all the mountings are loosely fixed, tighten the retaining nuts or bolts securely, being careful not to overtighten them. Where the machine manufacturer's torque settings are available, these should be used. Do not forget to carry out any carburation changes recommended by the exhaust system's manufacturer.

Electrical equipment

Generally, all electical equipment available for fitting to motorcycles can be fitted to ATVs. The range of equipment is so large and so diverse that only the most general outline can be given here. Electrical accessories vary from electronic ignition kits fitted to replace contact breaker points, to additional lighting at the front and rear, powerful horns, various instruments and gauges, clocks, anti-theft systems, heated clothing, CB radios and radio-cassette players, to name but a few of the more popular items of equipment.

As will be evident, it would require a separate manual to cover this subject alone and this section is therefore restricted to outlining a few basic rules which must be borne in mind when fitting electrical equipment. The first consideration is whether your machine's electrical system has enough reserve capacity to cope with the added demand of the accessories you wish to fit. The vehicle manufacturer or importer should be able to furnish this sort of information and may also be able to offer advice on uprating the electircal system. Failing this, a good dealer or the accessory manufacturer may be able to help. In some cases, more powerful generator components may be available, perhaps from another machine in the manufacturer's range.

When fitting electrical equipment always disconnect the battery first to prevent the risk of a short-circuit, and be careful to ensure that all connections are properly made and that they are waterproof. Remember that many electrical accessories are designed primarily for use in cars and that they cannot easily withstand the exposure to vibration and to the weather. Delicate components must be rubber-mounted to insulate them from vibration, and sealed carefully to prevent the entry of rainwater and dirt. Be careful to follow exactly the accessory manufacturer's instructions in conjunction with the wiring diagram at the back of this manual.

General

Accessories fitted to your machine will rapidly deteriorate if not cared for. Regular washing and polishing will maintain the finish and will provide an opportunity to check that all mounting bolts and nuts are securely fastened. Any signs of chafing or wear should be watched for, and the cause cured as soon as possible before serious damage occurs.

As a general rule, do not expect the re-sale value of your machine to increase by an amount proportional to the amount of money and effort put into fitting accessories. It is usually the case that an absolutely standard machine will sell more easily at a better price than one that has been modified. If you are in the habit of exchanging your machine for another at frequent intervals, this factor should be borne in mind to avoid loss of money.

Troubleshooting

Contents

1 Introduction

This Section provides an easy reference-guide to the more common problems that are likely to afflict your machine. Obviously, the opportunities are almost limitless for faults to occur as a result of obscure failures, and to try and cover all eventualities would require a book. Indeed, a number have been written on the subject.

Successful fault diagnosis is not a mysterious 'black art' but the application of knowledge combined with a systematic and logical approach to the problem. Approach any fault diagnosis by first accurately identifying the symptom and then checking through the list of possible causes, starting with the simplest or most obvious and progressing in stages to the most complex. Take nothing for granted, but above all apply liberal quantities of common sense.

The main symptom of a fault is given in the text as a major heading below which are listed, as Section headings, the various systems or areas which may contain the fault. Details of each possible cause for a fault and the remedial action to be taken are given, in brief, in the paragraphs below each Section heading. Further information should be sought in the relevant Chapter.

Starter motor problems

2 Starter motor not rotating

Engine stop switch off.

Fuse blown. Check the main fuse.

Battery voltage low. Switching on the headlamp will give a good indication of the charge level. If necessary recharge the battery from an external source.

Neutral gear not selected, where a neutral indicator switch is fitted.

Faulty neutral indicator switch or clutch interlock switch (where fitted). Check the switch wiring and switches for correct operation.

Ignition switch defective. Check switch for continuity and connections for security.

Engine stop switch defective. Check switch for continuity in 'Run' position. Faults will be caused by broken, wet or corroded switch contacts. Clean or renew as necessary.

Starter button switch faulty. Check continuity of switch. Faults as for engine stop switch.

Starter relay (solenoid) faulty. If the switch is functioning correctly a pronounced click should be heard when the starter button is depressed. This presupposes that current is flowing to the solenoid when the button is depressed.

Wiring open or shorted. Check first that the battery terminal connections are tight and corrosion free. Follow this by checking that all wiring connections are dry, tight and corrosion free. Check also for frayed or broken wiring. Occasionally a wire may become trapped between two moving components, particularly in the vicinity of the steering head, leading to breakage of the internal core but leaving the softer but more resilient outer cover intact. This can cause mysterious intermittent or total power loss.

Starter motor defective. A badly worn starter motor may cause high current drain from a battery without the motor rotating. If current is found to be reaching the motor, after checking the starter button and starter relay, suspect a damaged motor. The motor should be removed for inspection.

3 Starter motor rotates but engine does not turn over

Starter motor clutch defective. Suspect jammed or worn engagement rollers, plungers and springs.

Damaged starter motor drive train. Inspect and renew component where necessary. Failure in this area is unlikely.

4 Starter motor and clutch function but engine will not turn over

Engine seized. Seizure of the engine is always a result of damage to internal components due to lubrication failure, or component breakage resulting from abuse, neglect or old age. A seizing or partially seized component may go un-noticed until the engine has cooled down and an attempt is made to restart the engine. Suspect first seizure of the valves, valve gear and the piston. Instantaneous seizure whilst the engine is running indicates component breakage. In either case major dismantling and inspection will be required.

Engine does not start when turned over

5 No fuel flow to carburetor

No fuel or insufficient fuel in tank.

Fuel tap lever position incorrectly selected.

Float chamber requires priming after running dry (vacuum taps only).

Tank filler cap air vent obstructed. Usually caused by dirt or water. Clean the vent orifice.

Fuel tap or filter blocked. Blockage may be due to accumulation of rust or paint flakes from the tank's inner surface or of foreign matter from contaminated fuel. Remove the tap and clean it and the filter. Look also for water droplets in the fuel.

Fuel line blocked. Blockage of the fuel line is more likely to result from a kink in the line rather than the accumulation of debris.

Fuel pump defective. Where fitted, check output.

6 Fuel not reaching cylinder

Float chamber not filling. Caused by float needle or floats sticking in up position. This may occur after the machine has been left standing for an extended length of time allowing the fuel to evaporate. When this occurs a gummy residue is often left which hardens to a varnish-like substance. This condition may be worsened by corrosion and crystaline deposits produced prior to the total evaporation of contaminated fuel. Sticking of the float needle may also be caused by wear. In any case removal of the float chamber will be necessary for inspection and cleaning.

Blockage in starting circuit, slow running circuit or jets. Blockage of these items may be attributable to debris from the fuel tank by-passing the filter system or to gumming up as described in paragraph 1. Water droplets in the fuel will also block jets and passages. The carburettor should be dismantled for cleaning.

Fuel level too low. The fuel level in the float chamber is controlled by float height. The float height may increase with wear or damage but will never reduce, thus a low float height is an inherent rather than developing condition. Check the float height and make any necessary adjustment.

7 Engine flooding

Float valve needle worn or stuck open. A piece of rust or other debris can prevent correct seating of the needle against the valve seat thereby permitting an uncontrolled flow of fuel. Similarly, a worn needle or needle seat will prevent valve closure. Dismantle the carburettor float bowl for cleaning and, if necessary, renewal of the worn components.

Fuel level too high. The fuel level is controlled by the float height which may increase due to wear of the float needle, pivot pin or operating tang. Check the float height, and make any necessary adjustment. A leaking float will cause an increase in fuel level, and thus should be renewed.

Cold starting mechanism. Check the choke (starter mechanism) for correct operation. If the mechanism jams in the 'On' position subsequent starting of a hot engine will be difficult.

Blocked air filter. A badly restricted air filter will cause flooding. Check the filter and clean or renew as required. A collapsed inlet hose will have a similar effect.

8 No spark at plug

Ignition switch not on.

Engine stop switch off.

Fuse blown. Check fuse for ignition circuit. See wiring diagram.

Battery voltage low. The current drawn by a starter motor is sufficiently high that an under-charged battery may not have enough spare capacity to provide power for the ignition circuit during starting. Use of the kickstart (where fitted) is recommended until the battery has been recharged either by the machine's generator or from an external charger.

Starter motor inefficient. A starter motor with worn brushes and a worn or dirty commutator will draw excessive amounts of current causing power starvation in the ignition system. See the preceding paragraph. Starter motor overhaul will be required.

Spark plug failure. Clean the spark plug thoroughly and reset the electrode gap. Refer to the spark plug section and the colour condition guide (Tune-up and routine maintenance). If the spark plug shorts internally or has sustained visible damage to the electrodes, core or ceramic insulator it should be renewed. On rare occasions a plug that appears to spark vigorously will fail to do so when refitted to the engine and subjected to the compression pressure in the cylinder.

Spark plug cap or high tension (HT) lead faulty. Check condition and security. Replace if deterioration is evident.

Spark plug cap loose. Check that the spark plug cap fits securely over the plug and, where fitted, the screwed terminal on the plug end is secure.

Shorting due to moisture. Certain parts of the ignition system are susceptible to shorting when the machine is ridden or parked in wet weather. Check particularly the area from the spark plug cap back to the ignition coil. A water dispersant spray may be used to dry out waterlogged components. Recurrence of the problem can be prevented by using an ignition sealant spray after drying out and cleaning.

Ignition or stop switch shorted. May be caused by water, corrosion or wear. Water dispersant and contact cleaning sprays may be used. If this fails to overcome the problem dismantling and visual inspection of the switches will be required.

Shorting or open circuit in wiring. Failure in any wire connecting any of the ignition components will cause ignition malfunction. Check also that all connections are clean, dry and tight.

Ignition coil failure. Check the coil, referring to Chapter 3.

Capacitor (condenser) failure (contact breaker systems only). The capacitor may be checked most easily by direct substitution with a replacement item. Blackened contact breaker points indicate capacitor malfunction but this may not always occur.

Contact breaker points pitted, burned or closed up. Check the contact breaker points, referring to Chapter 3. Check also that the low tension leads at the contact breaker are secure and not shorting out.

9 Weak spark at plug

Feeble sparking at the plug may be caused by any of the faults mentioned in the preceding Section other than those items in paragraphs 1 and 2. Check first the contact breaker assembly (where fitted) and the spark plug, these being the most likely culprits.

10 Compression low

Spark plug loose. This will be self-evident on inspection, and may be accompanied by a hissing noise when the engine is turned over. Remove the plug and check that the threads in the cylinder head are not damaged. Check also that the plug sealing washer is in good condition.

Cylinder head gasket leaking. This condition is often accompanied by a high pitched squeak from around the cylinder head and oil loss, and may be caused by insufficiently tightened cylinder head fasteners, a warped cylinder head or mechanical failure of the gasket material. Re-torqueing the fasteners to the correct specification may seal the leak in some instances but if damage has occurred this course of action will provide, at best, only a temporary cure.

Valve not seating correctly. The failure of a valve to seat may be caused by insufficient valve clearance, pitting of the valve seat or face, carbon deposits on the valve seat or seizure of the valve stem or valve gear components. Valve spring breakage will also prevent correct valve closure. The valve clearances should be checked first and then, if these are found to be in order, further dismantling will be required to inspect the relevant components for failure.

Cylinder, piston and ring wear. Compression pressure will be lost if any of these components are badly worn. Wear in one component is invariably accompanied by wear in another. A top end overhaul will be required.

Piston rings sticking or broken. Sticking of the piston rings may be caused by seizure due to lack of lubrication or heating as a result of poor carburation or incorrect fuel type. Gumming of the rings may result from lack of use, or carbon deposits in the ring grooves. Broken rings result from over-revving, overheating or general wear. In either case a top-end overhaul will be required.

Engine stalls after starting

11 General causes

Improper cold start mechanism operation. Check that the operating controls function smoothly and, where applicable, are correctly adjusted. A cold engine may not require application of an enriched mixture to start initially but may baulk without choke once firing. Likewise a hot engine may start with an enriched mixture but will stop almost immediately if the choke is inadvertently in operation.

Ignition malfunction. See Section 9, 'Weak spark at plug'.

Carburetor incorrectly adjusted. Maladjustment of the mixture strength or idle speed may cause the engine to stop immediately after starting. See Chapter 2.

Fuel contamination. Check for filter blockage by debris or water which reduces, but does not completely stop, fuel flow or blockage of the slow speed circuit in the carburetor by the same agents. If water is present it can often be seen as droplets in the bottom of the float bowl. Clean the filter and, where water is in evidence, drain and flush the fuel tank and float bowl.

Intake air leak. Check for security of the carburetor mounting and hose connections, and for cracks or splits in the hoses. Check also that the carburetor top is secure.

Air filter blocked or omitted. A blocked filter will cause an over-rich mixture; the omission of a filter will cause an excessively weak mixture. Both conditions will have a detrimental affect on carburation. Clean or renew the filter as necessary.

Fuel filler cap air vent blocked. Usually caused by dirt or water. Clean the vent orifice.

Fuel pump defective. Where fitted, check output.

Poor running at idle and low speed

12 Weak spark at plug or erratic firing

Battery voltage low. In certain conditions low battery charge, especially when coupled with a badly sulphated battery, may result in misfiring. If the battery is in good general condition it should be recharged; an old battery suffering from sulphated plates should be renewed.

Spark plug fouled, faulty or incorrectly adjusted. See Section 8 or refer to Chapter 1.

Spark plug cap or high tension lead shorting. Check the condition of both these items ensuring that they are in good condition and dry and that the cap is fitted correctly.

Spark plug type incorrect. Fit plug of correct type and heat range as given in Specifications. In certain conditions a plug of hotter or colder type may be required for normal running.

Contact breaker points pitted, burned or closed-up. Check the contact breaker assembly (if fitted), referring to Chapter 1.

Igniting timing incorrect. Check the ignition timing statically and dynamically, ensuring that the advance is functioning correctly.

Faulty ignition coil. Partial failure of the coil internal insulation will diminish the performance of the coil. No repair is possible, a new component must be fitted.

Faulty capacitor (condesner). A failure of capacitor will cause blackening of the contact breaker point faces (if fitted) and will allow excessive sparking at the points. A faulty capacitor may best be checked by substitution of a serviceable replacement item.

13 Fuel/air mixture incorrect

Intake air leak. See Section 11.

Mixture strength incorrect. Adjust slow running mixture strength using pilot adjustment screw.

Pilot jet or slow running circuit blocked. The carburetor should be removed and dismantled for thorough cleaning. Blow through all jets and air passages with compressed air to clear obstructions.

Air cleaner clogged or omitted. Clean or fit air cleaner element as necessary. Check also that the element and air filter cover are correctly seated.

Cold start mechanism in operation. Check that the choke has not been left on inadvertently and the operation is correct. Where applicable check the operating cable free play.

Fuel level too high or too low. Check the float height and adjust as necessary. See Section 7.

Fuel tank air vent obstructed. Obstruction usually caused by dirt or water. Clean vent orifice.

Where fitted, check fuel pump output and delivery pressure.

Valve clearance incorrect. Check, and if necessary, adjust, the clearances.

14 Compression low

See Section 10.

Acceleration poor

15 General causes

All items as for previous Section.

Accelerator pump defective. Where so equipped, check that the accelerator pump injects raw fuel into the carburetor venturi, when the throttle is open fully. If this does not occur check the condition of the pump components and that the feed passage to the pump is not obstructed.

Timing not advancing. This is caused by a sticking or damaged automatic timing unit (ATU) (contact breaker systems only). Cleaning and lubrication of the ATU will usually overcome sticking, failing this, and in any event if damage is evident, renewal of the ATU will be required.

Sticking throttle vacuum piston. CD carburetors only.

Brakes binding. Usually caused by maladjustment or partial seizure of the operating mechanism due to poor maintenance. Check brake adjustment (where applicable). A bent wheel spindle can produce similar symptoms.

Poor running or lack of power at high speeds

16 Weak spark at plug or erratic firing

All items as for Section 12.

HT lead insulation failure. Insulation failure of the HT lead and spark plug cap due to old age or damage can cause shorting when the engine is driven hard. This condition may be less noticeable, or not noticeable at all, at lower engine speeds.

17 Fuel/air mixture incorrect

All items as for Section 13, with the exception of items 2 and 4.

Main jet blocked. Debris from contaminated fuel, or from the fuel tank, and water in the fuel can block the main jet. Clean the fuel filter, the float bowl area, and if water is present, flush and refill the fuel tank.

Main jet is the wrong size. The standard carburetor jetting is for sea level atmospheric pressure. For high altitudes, usually above 5000 ft, a smaller main jet will be required.

Jet needle and needle jet worn. These can be renewed individually but should be renewed as a pair. Renewal of both items requires partial dismantling of the carburetor.

Air bleed holes blocked. Dismantle carburetor and use compressed air to blow out all air passages.

Reduced fuel flow. A reduction in the maximum fuel flow from the fuel tank to the carburetor will cause fuel starvation, proportionate to the engine speed. Check for blockages through debris or a kinked fuel line. Where fitted, check fuel pump output and delivery pressure.

Vacuum diaphragm split. Renew.

18 Compression low

See Section 10.

Knocking or pinking

19 General causes

Carbon build-up in combustion chamber. After high mileages have been covered large accumulation of carbon may occur. This may glow red hot and cause premature ignition of the fuel/air mixture, in advance of normal firing by the spark plug. Cylinder head removal will be required to allow inspection and cleaning.

Fuel incorrect. A low grade fuel, or one of poor quality may result in compression induced detonation of the fuel resulting in knocking and pinging noises. Old fuel can cause similar problems. A too highly leaded fuel will reduce detonation but will accelerate deposit formation in the combustion chamber and may lead to early pre-ignition as described in item 1.

Spark plug heat range incorrect. Uncontrolled pre-ignition can result from the use of a spark plug the heat range of which is too hot.

Weak mixture. Overheating of the engine due to a weak mixture can result in pre-ignition occurring where it would not occur when engine temperature was within normal limits. Maladjustment, blocked jets or passages and air leaks can cause this condition.

Overheating

20 Firing incorrect

Spark plug fouled, defective or maladjusted. See Section 6.

Spark plug type incorrect. Refer to the Specifications and ensure that the correct plug type is fitted.

Incorrect ignition timing. Timing that is far too much advanced or far too much retarded will cause overheating. Check the ignition timing is correct and that the advance mechanism is functioning.

21 Fuel/air mixture incorrect

Slow speed mixture strength incorrect. Adjust pilot air screw.

Main jet wrong size. The carburetor is jetted for sea level atmospheric conditions. For high altitudes, usually above 5000 ft, a smaller main jet will be required.

Air filter badly fitted or omitted. Check that the filter element is in place and that it and the air filter box cover are sealing correctly. Any leaks will cause a weak mixture.

Induction air leaks. Check the security of the carburetor mountings and hose connections, and for cracks and splits in the hoses. Check also that the carburettor top is secure and that the vacuum gauge adaptor plug (where fitted) is tight.

Fuel level too low. See Section 6.

Fuel tank filler cap air vent obstructed. Clear blockage.

Fuel pump defective. Where fitted, check output.

22 Lubrication inadequate

Engine oil too low. Not only does the oil serve as a lubricant by preventing friction between moving components, but it also acts as a coolant. Check the oil level and replenish.

Engine oil overworked. The lubricating properties of oil are lost

slowly during use as a result of changes resulting from heat and also contamination. Always change the oil at the recommended interval.

Engine oil of incorrect viscosity or poor quality. Always use the recommended viscosity and type of oil.

Oil filter and filter by-pass valve blocked. Renew filter and clean the by-pass valve.

23 Miscellaneous causes

Engine fins clogged. A build-up of mud in the cylinder head and cylinder barrel cooling fins will decrease the cooling capabilities of the fins. Clean the fins as required.

Clutch operating problems

24 Clutch slip

No clutch lever play. Adjust clutch lever end play according to the procedure in Chapter 1.

Friction plates worn or warped. Overhaul clutch assembly, replacing plates out of specification (Chapter 2).

Steel plates worn or warped. Overhaul clutch assembly, replacing plates out of specification (Chapter 2).

Clutch springs broken or worn. Old or heat-damaged (from slipping clutch) springs should be replaced with new ones (Chapter 2).

Clutch release not adjusted properly. See the adjustments section of Chapter 1.

Clutch inner cable snagging. Caused by a frayed cable or kinked outer cable. Replace the cable with a new one. Repair of a frayed cable is not advised.

Clutch release mechanism defective. Worn or damaged parts in the clutch release mechanism could include the shaft, cam, actuating arm or pilot. Replace parts as necessary.

Clutch hub and outer drum worn. Severe indentation by the clutch plate tangs of the channels in the hub and drum will cause snagging of the plates preventing correct engagement. If this damage occurs, renewal of the worn components is required.

Lubricant incorrect. Use of a transmission lubricant other than that specified may allow the plates to slip.

25 Clutch drag

Clutch lever play excessive. Adjust lever at bars or at cable end if necessary.

Clutch plates warped or damaged. This will cause a drag on the clutch, causing the machine to creep. Overhaul clutch assembly (Chapter 2).

Clutch spring tension uneven. Usually caused by a sagged or broken spring. Check and replace springs (Chapter 2).

Engine oil deteriorated. Badly contaminated engine oil and a heavy deposit of oil sludge and carbon on the plates will cause plate sticking. The oil recommended for this machine is of the detergent type, therefore it is unlikely that this problem will arise unless regular oil changes are neglected.

Engine oil viscosity too high. Drag in the plates will result from the use of an oil with too high a viscosity. In very cold weather clutch drag may occur until the engine has reached operating temperature.

Clutch hub and outer drum worn. Indentation by the clutch plate tangs of the channels in the hub and drum will prevent easy plate disengagement. If the damage is light the affected areas may be dressed with a fine file. More pronounced damage will necessitate renewal of the components.

Clutch housing seized to shaft. Lack of lubrication, severe wear or damage can cause the housing to seize to the shaft. Overhaul of the clutch, and perhaps the transmission, may be necessary to repair damage (Chapter 2).

Clutch release mechanism defective. Worn or damaged release mechanism parts can stick and fail to provide leverage. Overhaul clutch cover components (Chapter 2).

Loose clutch hub nut. Causes drum and hub misalignment, putting a drag on the engine. Engagement adjustment continually varies. Overhaul clutch assembly (Chapter 2).

Gear selection problems

26 Gear lever does not return

Weak or broken centralizer spring. Renew the spring.

Gearchange shaft bent or seized. Distortion of the gearchange shaft often occurs if the machine is dropped heavily on the gear lever. Provided that damage is not severe straightening of the shaft is permissible.

27 Gear selection difficult or impossible

Clutch not disengaging fully. See Section 25.

Gearchange shaft bent. This often occurs if the machine is dropped heavily on the gear lever. Straightening of the shaft is permissible if the damage is not too great.

Gearchange arms, pawls or pins worn or damaged. Wear or breakage of any of these items may cause difficulty in selecting one or more gears. Overhaul the selector mechanism.

Gearchange shaft centraliser spring maladjusted. This is often characterised by difficulties in changing up or down, but rarely in both directions. Adjust the centraliser anchor bolt as described in Chapter 1.

Gearchange arm spring broken. Renew spring.

Gearchange drum stopper cam or detent plunger damage. Failure, rather than wear, of these items may jam the drum thereby preventing gearchanging. The damaged items must be renewed.

Selector forks bent or seized. This can be caused by dropping the machine heavily on the gearchange lever or as a result of lack of lubrication. Though rare, bending of a shaft can result from a missed gearchange or false selection at high speed.

Selector fork end and pin wear. Pronounced wear of these items and the grooves in the gearchange drum can lead to imprecise selection and, eventually, no selection. Renewal of the worn components will be required.

Structural failure. Failure of any one component of the selector rod and change mechanism will result in improper or fouled gear selection.

28 Jumping out of gear

Detent plunger assembly worn or damaged. Wear of the plunger and the cam with which it locates and breakage of the detent spring can cause imprecise gear selection resulting in jumping out of gear. Renew the damaged components.

Gear pinion dogs worn or damaged. Rounding off the dog edges and the mating recesses in adjacent pinion can lead to jumping out of gear when under load. The gears should be inspected and renewed. Attempting to reprofile the dogs is not recommended.

Selector forks, gearchange drum and pinion grooves worn. Extreme wear of these interconnected items can occur after high mileages especially when lubrication has been neglected. The worn components must be renewed.

Gear pinions, bushes and shafts worn. Renew the worn components.

Bent gearchange shaft. Often caused by dropping the machine on the gear lever.

Gear pinion tooth broken. Chipped teeth are unlikely to cause jumping out of gear once the gear has been selected fully; a tooth which is completely broken off, however, may cause problems in this respect and in any event will cause transmission noise.

29 Overselection

Pawl spring weak or broken. Renew the spring.

Detent plunger worn or broken. Renew the damaged items.

Stopper arm spring worn or broken. Renew the spring.

Gearchange arm stop pads worn. Repairs can be made by welding and reprofiling with a file.

Selector limiter claw components (where fitted) worn or damaged. Renew the damaged items.

Abnormal engine noise.

30 Knocking or pinging

See Section 19.

31 Piston slap or rattling from cylinder

Cylinder bore/piston clearance excessive. Resulting from wear, partial seizure or improper boring during overhaul. This condition can often be heard as a high, rapid tapping noise when the engine is under little or no load, particularly when power is just beginning to be applied. Reboring to the next correct oversize should be carried out and a new oversize piston fitted.

Connecting rod bent. This can be caused by over-revving, trying to start a very badly flooded engine (resulting in a hydraulic lock in the cylinder) or by earlier mechanical failure such as a dropped valve. Attempts at straightening a bent connecting rod from a high performance engine are not recommended. Careful inspection of the crankshaft should be made before renewing the damaged connecting rod.

Wrist pin, piston boss, bore or small-end bearing wear or seizure. Excess clearance or partial seizure between normal moving parts of these items can cause continuous or intermittent tapping noises. Rapid wear or seizure is caused by lubrication starvation resulting from an insufficient engine oil level or oilway blockage.

Piston rings worn, broken or sticking. Renew the rings after careful inspection of the piston and bore.

32 Valve noise or tapping from the cylinder head

Valve clearance incorrect. Adjust the clearances with the engine cold.

Valve spring broken or weak. Renew the spring set.

Camshaft or cylinder head worn or damaged. The camshaft lobes are the most highly stressed of all components in the engine and are subject to high wear if lubrication becomes inadequate. The bearing surfaces on the camshaft and cylinder head are also sensitive to a lack of lubrication. Lubrication failure due to blocked oilways can occur, but over-enthusiastic revving before engine warm-up is complete is the usual cause.

Rocker arm or spindle wear. Rapid wear of a rocker arm, and the resulting need for frequent valve clearance adjustment, indicates breakthrough or failure of the surface hardening on the rocker arm tips. Similar wear in the cam lobes can be expected. Renew the worn components after checking for lubrication failure.

Worn camshaft drive components. A rustling noise or light tapping which is not improved by correct re-adjustment of the cam chain tension can be emitted by a worn cam chain or worn sprockets and chain. If uncorrected, subsequent cam chain breakage may cause extensive damage. The worn components must be renewed before wear becomes too far advanced.

33 Other noises

Big-end bearing wear. A pronounced knock from within the crankcase which worstens rapidly is indicative of big-end bearing failure as a result of extreme normal wear or lubrication failure. Remedial action in the form of a bottom end overhaul should be taken; continuing to run the engine will lead to further damage including the possibility of connecting rod breakage.

Main bearing failure. Extreme normal wear or failure of the main bearings is characteristically accompanied by a rumble from the crankcase and vibration felt through the frame and footrests. Renew the worn bearings and carry out a very careful examination of the crankshaft.

Crankshaft excessively out of true. A bent crank may result from over-revving or damage from an upper cylinder component or gearbox failure. Damage can also result from dropping the machine on either crankshaft end. Straightening of the crankshaft is not possible in normal circumstances; a replacement item should be fitted.

Engine mountings loose. Tighten all the engine mounting nuts and bolts.

Cylinder head gasket leaking. The noise most often associated with a leaking head gasket is a high pitched squeaking, although any other noise consistent with gas being forced out under pressure from a small orifice can also be emitted. Gasket leakage is often accompanied by oil seepage from around the mating joint or from the cylinder head holding down bolts and nuts. Leakage into the cam chain tunnel or oil return passages will increase crankcase pressure and may cause oil leakage at joints and oil seals. Also, oil contamination will be accelerated. Leakage results from insufficient or uneven tightening of the cylinder head fasteners, or from random mechanical failure. Retightening to the correct torque figure will, at best, only provide a temporary cure. The gasket should be renewed at the earliest opportunity.

Exhaust system leakage. Popping or crackling in the exhaust system, particularly when it occurs with the engine on the overrun, indicates a poor joint either at the cylinder port or at the exhaust pipe/silencer connection. Failure of the gasket or looseness of the clamp should be looked for.

Abnormal transmission noise

34 Clutch noise

Clutch outer drum/friction plate tang clearance excessive.
Clutch outer drum/spacer clearance excessive.
Clutch outer drum/thrust washer clearance excessive.
Primary drive gear teeth worn or damaged.
Clutch shock absorber assembly worn or damaged.

35 Transmission noise

Bearing or bushes worn or damaged. Renew the affected components.

Gear pinions worn or chipped. Renew the gear pinions.

Metal chips jams in gear teeth.This can occur when pieces of metal from any failed component are picked up by a meshing pinion. The condition will lead to rapid bearing wear or early gear failure.

Engine/transmission oil level too low. Top up immediately to prevent damage to gearbox and engine.

Gearchange mechanism worn or damaged. Wear or failure of certain items in the selection and change components can induce mis-selection of gears (see Section 27) where incipient engagement of more than one gear set is promoted. Remedial action, by the overhaul of the gearbox, should be taken without delay.

Loose gearbox chain sprocket. Remove the sprocket and check for impact damage to the splines of the sprocket and shaft. Excessive slack between the splines will promote loosening of the securing nut; renewal of the worn components is required. When retightening the nut ensure that it is tightened fully and that, where fitted, the lock washer is bent up against one flat of the nut.

Chain snagging on cases or cycle parts. A badly worn chain or one that is excessively loose may snag or smack against adjacent components.

Exhaust smokes excessively

36 White/blue smoke (caused by oil burning)

Piston rings worn or broken. Breakage or wear of any ring, but particularly the oil control ring, will allow engine oil past the piston into the combustion chamber. Overhaul the cylinder barrel and piston.

Cylinder cracked, worn or scored. These conditions may be caused by overheating, lack of lubrication, component failure or advanced normal wear. The cylinder barrel should be renewed or rebored and the next oversize piston fitted.

Valve oil seal damaged or worn. This can occur as a result of valve guide failure or old age. The emission of smoke is likely to occur when the throttle is closed rapidly after acceleration, for instance, when changing gear. Renew the valve oil seals and, if necessary, the valve guides.

Valve guides worn. See the preceding paragraph.

Engine oil level too high. This increases the crankcase pressure and allows oil to be forced pass the piston rings. Often accompanied by seepage of oil at joints and oil seals.

Cylinder head gasket blown between cam chain tunnel or oil return passage. Renew the cylinder head gasket.

Abnormal crankcase pressure. This may be caused by blocked breather passages or hoses causing back-pressure at high engine revolutions.

37 Black smoke (caused by over-rich mixture)

Air filter element clogged. Clean or renew the element.

Main jet loose or too large. Remove the float chamber to check for tightness of the jet. If the machine is used at high altitudes rejetting will be required to compensate for the lower atmospheric pressure.

Cold start mechanism jammed on. Check that the mechanism works smoothly and correctly and that, where fitted, the operating cable is lubricated and not snagged.

Fuel level too high. The fuel level is controlled by the float height which can increase as a result of wear or damage. Remove the float bowl and check the float height. Check also that floats have not punctured; a punctured float will loose buoyancy and allow an increased fuel level.

Float valve needle stuck open. Caused by dirt or a worn valve. Clean the float chamber or renew the needle and, if necessary, the valve seat.

Poor handling or roadholding

38 Directional instability

Steering head bearing adjustment too tight. This will cause rolling or weaving at low speeds. Re-adjust the bearings.

Steering head bearing worn or damaged. Correct adjustment of the bearing will prove impossible to achieve if wear or damage has occurred. Inconsistent handling will occur including rolling or weaving at low speed and poor directional control at indeterminate higher speeds. The steering head bearing should be dismantled for inspection and renewed if required. Lubrication should also be carried out.

Bearing races pitted or dented. Impact damage caused, perhaps, by an accident or riding over a pot-hole can cause indentation of the bearing, usually in one position. This should be noted as notchiness when the handlebars are turned. Renew and lubricate the bearings.

Steering stem bent. This will occur only if the machine is subjected to a high impact such as hitting a curb or a pot-hole. The lower yoke/stem should be renewed; do not attempt to straighten the stem.

Front or rear tire pressures too low.

Wheel bearings worn. Renew the worn bearings.

Tires unsuitable for machine.

If handling problems occur immediately after changing to a new tire type or make, revert to the original tires to see whether an improvement can be noted. In some instances a change to what are, in fact, suitable tires may give rise to handling deficiences. In this case a thorough check should be made of all frame items which affect stability.

39 Steering bias to left or right

Wheels out of alignment. This can be caused by impact damage to the frame, wheel spindles or front forks. Although occasionally a result of material failure or corrosion, it is usually as a result of a crash.

Front forks twisted in the steering yokes (where applicable). A light impact, for instance with a pot-hole or low curb, can twist the fork legs in the steering yokes without causing structural damage to the fork legs or the yokes themselves. Re-alignment can be made by loosening the yoke pinch bolts, wheel spindle and mudguard bolts. Re-align the wheel with the handlebars and tighten the bolts working upwards from the wheel spindle. This action should be carried out only when there is no chance that structural damage has occurred.

40 Handlebar vibrates or oscillates

Tires worn or out of balance. Either condition, particularly in the front tire, will promote shaking of the fork assembly and thus the handlebars.

Tires badly positioned on the wheel rims. A moulded line on each wall of a tire is provided to allow visual verification that the tire is correctly positioned on the rim. A check can be made by rotating the tire; any misalignment will be immediately obvious.

Wheel rims warped or damaged. Inspect the wheels for runout.

Wheel bearings worn. Renew the bearings.

Steering head bearings incorrectly adjusted. Vibration is more likely to result from bearings which are too loose rather than too tight. Re-adjust the bearings.

Loosen fork component fasteners (where applicable). Loose nuts and bolts holding the fork legs, wheel spindle, mudguards or steering stem can promote shaking at the handlebars. Fasteners on running gear such as the forks and suspension should be check tightened occasionally to prevent dangerous looseness of components occurring.

Engine mounting bolts loose. Tighten all fasteners.

41 Poor front fork performance – telescopic type

Damping fluid level incorrect. If the fluid level is too low poor suspension control will occur resulting in early loss of tire adhesion when cornering and braking. Too much oil is unlikely to change the fork characteristics unless severe overfilling occurs when the fork action will become stiffer and oil seal failure may occur.

Damping oil viscosity incorrect. The damping action of the fork is directly related to the viscosity of the damping oil. The lighter the oil used, the less will be the damping action imparted. For general use, use the recommended viscosity of oil, changing to a slightly higher or heavier oil only when a change in damping characteristic is required. Overworked oil, or oil contaminated with water which has found its way past the seals, should be renewed to restore the correct damping performance and to prevent bottoming of the forks.

Damping components worn or corroded. Advanced normal wear of the fork internals is unlikely to ocur until a very high mileage has been covered. Continual use of the machine with damaged oil seals which allows the ingress of water, or neglect, will lead to rapid corrosion and wear. Dismantle the forks for inspection and overhaul. See Chapter.

Weak fork springs. Progressive fatigue of the fork springs, resulting in a reduced spring free length, will occur after extensive use. This condition will promote excessive fork dive under braking, and in its advanced form will reduce the at-rest extended length of the forks and thus the fork geometry. Renewal of the springs as a pair is the only satisfactory course of action.

Bent stanchions or corroded stanchions. Both conditions will prevent correct telescoping of the fork legs, and in an advanced state can cause sticking of the fork in one position. In a mild form corrosion will cause stiction of the fork thereby increasing the time the suspension takes to react to an uneven road surface. Bent fork stanchions should be attended to immediately because they indicate that impact damage has occurred, and there is a danger that the forks will fail with disastrous consequences.

42 Front fork judder when braking (see also Section 48)

Wear between the fork stanchions and the fork legs (telescopic type). Renewal of the affected components is required.

Slack steering head bearings. Re-adjust the bearings.

Warped brake drum. If irregular braking action occurs fork judder can be induced in what are normally serviceable forks. Renew the damaged brake components.

Abnormal frame and suspension noise

43 Front end noise

Telescopic fork oil level low or too thin. This can cause a 'spurting' sound and is usually accompanied by irregular fork action (Chapter 5).

Telescopic fork spring weak or broken. Makes a clicking or scraping sound. Fork oil will have a lot of metal particles in it (Chapter 5).

Steering head bearings loose or damaged. Clicks when braking. Check, adjust or replace (Chapters 1 and 5).

Telescopic fork clamps loose. Make sure all fork clamp pinch bolts are tight (Chapter 5).

Telescopic fork stanchion bent. Good possibility if machine has been dropped. Repair or replace tube (Chapter 5).

Brake problems

44 Brakes are spongy or ineffective

Brake cable deterioration. Damage to the outer cable by stretching or being trapped will give a spongy feel to the brake lever. The cable should be renewed. A cable which has become corroded due to old age or neglect of lubrication will partially seize making operation very heavy. Lubrication at this stage may overcome the problem but the fitting of a new cable is recommended.

Worn brake linings. Determine lining wear using the external brake wear indicator on the brake backplate, or by removing the wheel and withdrawing the brake backplate. Renew the shoe/lining units as a pair if the linings are worn below the recommended limit.

Worn brake camshaft. Wear between the camshaft and the bearing surface will reduce brake feel and reduce operating efficiency. Renewal of one or both items will be required to rectify the fault.

Worn brake cam and shoe ends. Renew the worn components.

Linings contaminated with dust or grease. Any accumulations of dust should be cleaned from the brake assembly and drum using a petrol dampened cloth. Do not blow or brush off the dust because it is asbestos based and thus harmful if inhaled. Light contamination from grease can be removed from the surface of the brake linings using a solvent; attempts at removing heavier contamination are less likely to be successful because some of the lubricant will have been absorbed by the lining material which will severely reduce the braking performance.

45 Brake drag

Incorrect adjustment. Re-adjust the brake operating mechanism.

Drum warped or oval. This can result from overheating or impact. The condition is difficult to correct, although if slight ovality only occurs, skimming the surface of the brake drum can provide a cure. This is work for a specialist engineer. Renewal of the complete wheel hub is normally the only satisfactory solution.

Weak brake shoe return springs. This will prevent the brake lining/shoe units from pulling away from the drum surface once the brake is released. The springs should be renewed.

Brake camshaft, lever pivot or cable poorly lubricated. Failure to attend to regular lubrication of these areas will increase operating resistance which, when compounded, may cause tardy operation and poor release movement.

46 Brake lever or pedal pulsates in operation

Drums warped or oval. This can result from overheating or impact. This condition is difficult to correct, although if slight ovality only occurs skimming the surface of the drum can provide a cure. This is work for a specialist engineer. Renewal of the hub is normally the only satisfactory solution.

47 Brake noise

Drum warped or oval. This can cause intermittent rubbing of the brake linings against the drum. See the preceding Section.

Brake linings glazed. This condition, usually accompanied by heavy lining dust contamination, often induces brake squeal. The surface of the linings may be roughened using glass-paper or a fine file.

48 Brake induced fork judder

Worn telescopic front fork stanchions and legs, or worn or badly adjusted steering head bearings. These conditions, combined with uneven or pulsating braking as described in Section 46 will induce more or less judder when the brakes are applied, dependent on the degree of wear and poor brake operation. Attention should be given to both areas of malfunction. See the relevant Sections.

Electrical problems

49 Battery dead or weak

Battery faulty. Battery life should not be expected to exceed 3 to 4 years, particularly where a starter motor is used regularly. Gradual sulphation of the plates and sediment deposits will reduce the battery performance. Plate and insulator damage can often occur as a result of vibration. Complete power failure, or intermittent failure, may be due to a broken battery terminal. Lack of electrolyte will prevent the battery maintaining charge.

Battery leads making poor contact. Remove the battery leads and clean them and the terminals, removing all traces of corrosion and tarnish. Reconnect the leads and apply a coating of petroleum jelly to the terminals.

Load excessive. If additional items such as spot lamps, are fitted, which increase the total electrical load above the maximum alternator output, the battery will fail to maintain full charge. Reduce the electrical load to suit the electrical capacity.

Regulator/rectifier failure (if fitted).

Alternator generating coils open-circuit or shorted.

Charging circuit shorting or open circuit. This may be caused by frayed or broken wiring, dirty connectors or a faulty ignition switch. The system should be tested in a logical manner. See Section 52.

50 Battery overcharged

Rectifier/regulator faulty (if fitted). Overcharging is indicated if the battery becomes hot or it is noticed that the electrolyte level falls repeatedly between checks. In extreme cases the battery will boil causing corrosive gases and electrolyte to be emitted through the vent pipes.

Battery wrongly matched to the electrical circuit. Ensure that the specified battery is fitted to the machine.

51 Total electrical failure

Fuse blown. Check the main fuse. If a fault has occurred, it must be rectified before a new fuse is fitted.

Battery faulty. See Section 49.

Earth failure. Check that the frame main earth strap from the battery is securely affixed to the frame and is making a good contact.

Ignition switch or power circuit failure. Check for current flow through the battery positive lead (red) to the ignition switch. Check the ignition switch for continuity.

52 Circuit failure

Cable failure. Refer to the machine's wiring diagram and check the circuit for continuity. Open circuits are a result of loose or corroded connections, either at terminals or in-line connectors, or because of broken wires. Occasionally, the core of a wire will break without there being any apparent damage to the outer plastic cover.

Switch failure. All switches may be checked for continuity in each switch position, after referring to the switch position boxes incorporated in the wiring diagram for the machine. Switch failure may be a result of mechanical breakage, corrosion or water.

Fuse blown. Refer to the wiring diagram to check whether or not a circuit fuse is fitted. Replace the fuse, if blown, only after the fault has been identified and rectified.

53 Bulbs blowing repeatedly

Vibration failure. This is often an inherent fault related to the natural vibration characteristics of the engine and frame and is, thus, difficult to resolve. Modifications of the lamp mounting, to change the damping characteristics may help.

Intermittent earth. Repeated failure of one bulb, particularly where the bulb is fed directly from the generator, indicates that a poor earth exists somewhere in the circuit. Check that a good contact is available at each earthing point in the circuit.

Reduced voltage. Where a quartz-halogen bulb is fitted the voltage to the bulb should be maintained or early failure of the bulb will occur. Do not overload the system with additional electrical equipment in excess of the system's power capacity and ensure that all circuit connections are maintained clean and tight.

Chapter 1 Tune-up and routine maintenance

Contents

Specifications

Engine

Spark plug type		
KLT110	NGK D7EA	
KLT160	NGK D8EA	
KLT200	NGK B7ES	
KLT250	NGK B8ES	
Spark plug gap		
KLT110, 160	0.6 to 0.7 mm (0.024 to 0.028 in)	
KLT200, 250	0.7 to 0.8 mm (0.028 to 0.032 in)	
Contact breaker – KLT200 A1 only		
Gap	0.3 to 0.4 mm (0.012 to 0.016 in)	
Dwell angle	97.0 to 112.0° (26.5 to 31.0%)	
Valve clearances – engine cold	**Inlet**	**Exhaust**
KLT110	0.12 to 0.17 mm (0.004 to 0.006 in)	0.12 to 0.17 mm (0.004 to 0.006 in)
KLT160	0.12 to 0.17 mm (0.004 to 0.006 in)	0.18 to 0.23 mm (0.007 to 0.009 in)
KLT200, 250	0.08 to 0.13 mm (0.003 to 0.005 in)	0.17 to 0.22 mm (0.006 to 0.009 in)
Throttle lever free play	2 to 3 mm (0.08 to 0.12 in)	
Clutch lever free play – KLT200, 250	2 to 3 mm (0.08 to 0.12 in)	

Chassis

Drive chain free play except KLT160	10 to 25 mm (0.4 to 1.0 in)
Front brake lever free play	4 to 5 mm (0.16 to 0.20 in)

Parking brake lever free play – KLT110, 160	4 to 5 mm (0.16 to 0.20 in)	
Rear brake pedal free play		
KLT110, 160	20 to 30 mm (0.8 to 1.2 in)	
KLT200, 250	50 mm (2 in)	
Tire pressures – measured cold	**Front**	**Rear**
KLT110 A1, 200, 250	2 psi (0.15 kg/cm²)	2 psi (0.15 kg/cm²)
KLT110 A2, 160	3 psi (0.21 kg/cm²)	2 psi (0.15 kg/cm²)

Torque wrench settings

Component	kgf m	lbf ft
Engine oil drain plug		
KLT110, 160	2.0	14.5
KLT200, 250	3.0	22.0
Oil filter – KLT160	2.0	14.5
Valve clearance adjuster locknuts		
KLT110	0.9	6.5
All other models	1.2	9.0
Spark plugs		
KLT110, 160	1.4	10.0
KLT200, 250	2.8	20.0
Final drive gear case		
Filler and drain plugs – KLT160	3.0	22.0
Level plug – KLT160	1.0	7.0
Drain plug – KLT200 C, 250 C, P	5.5	40.0
Rear axle mounting bolts – KLT110	7.0	50.0

Recommended lubricants

Engine oil	
Type	Good quality engine oil, SE class or equivalent
Viscosity	SAE 10W40, 10W50, 20W40 or 20W50
Quantity	
KLT110	1.1l (1.16 US qt)
KLT160	1.7l (1.80 US qt)
KLT200, 250 – at oil change	1.1l (1.16 US qt)
KLT200, 250 – at oil and filter change	1.4l (1.48 US qt)
Air cleaner	SAE 30SE engine oil or commercial air cleaner oil
Drive chain – except KLT160	SAE 90 gear oil
Final drive gear case – KLT160	
Type	Good quality engine oil, SE class or equivalent
Viscosity	SAE 10W40
Quantity	200 cc (0.21 US qt)
Final drive gear case – KLT200A	
Type	Sears No 59071 grease
Quantity	100 cc (3.4 fl oz)
Final drive gear case – KLT200 C, 250 C, P	
Type	Good quality hypoid gear oil, AP1 GL-5
Viscosity	
Above 5°C (41°F)	SAE 90
Below 5°C (41°F)	SAE 80
Quantity	60 cc (2.0 fl oz)
Front forks – KLT110 A2, 160	
Type	Fork oil
Viscosity	SAE 5W20
Quantity per leg – at oil change	75 cc (2.54 fl oz)
Fork oil level – springs removed, fork fully compressed	140 ± 2 mm (5.51 ± 0.08 in)
Propellor shaft joint – KLT160	High melting-point grease
Speedometer cable – KLT250	Multi-purpose grease
Front fork pivot bearings – KLT200 C, 250	Nil (self-lubricating bushings)
Miscellaneous	
Control cables	Light engine oil or cable lubricant
Control lever/pedal pivots	Multi-purpose grease
Wheel bearings	High melting-point grease
Steering head bearings	Multi-purpose grease
Brake camshafts	High melting-point grease

1 Introduction to tune-up and routine maintenance

1 This Chapter covers in detail the checks and procedures necessary for the tune-up and routine maintenance of your vehicle. It is divided into two parts. The first contains applicable specifications and service data and outlines routine maintenance intervals. The second covers procedures, or how to perform each of the maintenance functions.

2 Since routine maintenance plays such an important part in keeping your vehicle in a safe condition and operating at its optimum it is presented here as a comprehensive checklist. For the rider who does all his own maintenance, these lists outline the procedures and checks that should be done on a routine basis.

3 Deciding where to start or plug into the routine maintenance schedule depends on several factors. If you have a vehicle 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 the 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.

4 Note that the procedures normally associated with ignition and carburetion tune-ups are included in the routine maintenance schedule. A regular tune-up plays an important part in good engine performance and helps prevent engine damage due to improper carburetion and ignition timing.

5 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 take each of the routine inspections and maintenance functions on the checklist and explain them in detail. References to additional information in applicable Chapters is also included and should not be overlooked.

6 Before beginning any actual maintenance or repair, the machine should be cleaned thoroughly, especially around the controls, spark plug, side covers, carburetor, air box, 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.

2 Routine maintenance intervals

Whenever the machine is about to be used it must be checked carefully to ensure that it is in a safe and reliable condition. This pre-riding check, listed in Section 3 of this Chapter, must also be carried out as a preliminary to any maintenance work.

The manufacturer's maintenance schedule is based on days of use. To be safe, count each day that the machine is used as a full day, regardless of how long or how hard the machine is ridden; this will extend your vehicle's life and maintain its performance. **Note:** The intervals given should be regarded as the maximum permissible; if you use your machine in severe conditions such as in sand, in dusty areas or in wet, muddy areas, the intervals should be shortened.

Owners of KLT250 machines (which are fitted with speedometers) should note that a mileage interval is also given. Depending on the amount of use to which the machine is put, you should follow the mileage or time interval, whichever comes first.

Carry out the following tasks at the intervals specified below. The number against each task is the Section number of this Chapter in which that task is described.

Every 10 days (100 miles)

Pre-ride check (3)
Adjust brakes and check shoe wear (4)
Adjust control cables (5)
Clean air cleaner element (6)
Tighten all nuts, bolts and fasteners (7)
Adjust clutch (8)
Clean fuel filter – KLT200, 250 A2, C2, C3, P1 (9)
Check final drive gear case – KLT200 C, 250 C, P (10)

Every 30 days (300 miles)

Pre-ride check (3)
All operations listed under 10-day interval
General lubrication (11)
Change engine oil (12)
Check battery – KLT200, 250 (13)
Check final drive gear case – KLT200 A (10)

Every 90 days (900 miles)

Pre-ride check
All operations listed under 10- and 30-day intervals
Grease steering head bearings and adjust (14)
Check drive chain and sprockets – except KLT160 (15)
Grease brake camshafts (4)
Adjust valve clearances (16)
Check cleanliness of fuel system (9)
Clean/renew oil filter (17)
Clean/renew spark plug (18)
Change front fork oil – KLT110 A2, 160 (19)
Grease wheel bearings – KLT250 (20)
Check wheel bearings – KLT110, 160, 200 (20)
Grease propellor shaft joint – KLT160 (21)
Check ignition timing – KLT200 A1 (22)

Annually

Complete all previously-listed maintenance tasks
Grease wheel bearings – KLT110, 160, 200 (20)
Clean spark arrester – except KLT200 A, 250 A1 (23)
Change final drive gear case oil – KLT160, 200 C, 250 C, P (24)

3 Daily or pre-ride check

Before using the machine at any time, check carefully the following items to ensure that the machine is safe to ride. Where necessary, refer to the more detailed information given later in this Chapter on any particular task.

Fuel system

1 Check the gas tank fuel level. Check for leaks around the petcock, tank seam, filler cap and carburetor. Don't ride the bike with any fuel leakage.

Engine oil level

2 To prevent the risk of damage to any part of the engine or transmission, and the risk of personal injury should a malfunction occur due to oil starvation while the machine is in operation, the engine oil level must be checked regularly. With the machine standing on level ground so that it is level from front-to-rear and from side-to-side, start the engine and run it for several minutes at idle speed to distribute the oil fully around the engine/transmission, then stop the engine and wait for a few minutes for the level to settle. The true oil level, established in this way, must be between the upper and lower lines marked on the right crankcase cover next to the oil level sight glass. Never run the engine with the oil above the upper line or below the lower line.

If topping-up is necessary, add oil via the filter plug opening on the top of the crankcase cover, using only engine oil of the recommended type and grade. If too much oil is present, the surplus must be removed using a syringe or some other suitable device.

Check that the filler and drain plugs are securely fastened, that the filter assembly (where applicable) is secure and that there are no oil leaks.

Tires

3 Check the tires for foreign objects lodged in the tread, uneven tread wear and correct air pressure. Never ride on tires that are damaged. To check the pressures, use only a low pressure gauge (0 – 15 psi); Kawasaki market a suitable item which is available under part number 52005-1003. Any other type of gage will not be sensitive enough to be accurate. Measure the pressures only when the tires are cold; the rise in temperature caused by the flexing of the tire sidewalls will produce a marked increase in pressure even after the machine has been used for only a short journey. Be careful that both rear tires are always at exactly the same pressure to preserve the machine's stability.

Renew the tires if they are cut, split or damaged at any point on the tread or sidewalls, or if they are so worn that the sharp edges are rounded off on all tread knobs.

Drive chain – except KLT160

4 **Always** switch off the engine and place the transmission in neutral, to avoid any risk of personal injury, before checking the chain.

A neglected drive chain will not last long and can quickly damage the gearbox and rear sprockets. Routine chain adjustment and lubrication is not difficult and will ensure maximum chain and sprocket life.

Remove the rubber plug from the chain cover, insert a finger and feel for free play in the chain by pulling up and pushing down. Since chains do not wear evenly along their length, the free play is measured at the tightest point. Either support the machine securely on blocks so that the rear wheels are raised clear of the ground and can be rotated to check the entire length of the chain, or push the machine along the ground to achieve the same result. **Do not** insert your finger inside the chain cover while the chain is in motion; stop the wheels or machine fully before

checking.

When the free play has been checked at points all along the chain's length, and the tightest spot has been found, measure the total amount of up-and-down movement available; this should be not less than 10 mm (0.4 in) and not more than 25 mm (1.0 in). If the free play is outside the specified limits, the chain will require adjustment as follows.

KLT110 – Slacken the four rear axle mounting bolts by just enough to permit the axle to move, then slacken the chain adjuster locknut. To slacken the chain, unscrew the adjusting nut and press the axle forward until the chain is too slack, then draw the axle back as follows. To tighten the chain, tighten (clockwise) the adjusting nut to draw the axle back until the free play is correct. Tighten the axle mounting bolts to the specified torque setting, then tighten securely the adjuster locknut. Recheck the chain adjustment.

KLT200/250 – The chain is easily adjusted by rotating a knob which acts on a tensioner assembly – rotate the knob clockwise to tighten the chain.

All models – Never allow the chain to run too tight or too slack, and never overtighten the chain in an attempt to compensate for excessive slack points. Always replace the plug in the inspection hole before using the machine. Lubricate the chain using SAE 90 gear oil which can be dribbled slowly on to the chain rollers and between the sideplates until the chain in completely oily all along its length. Support the machine on blocks so that the rear wheels are clear of the ground and can be rotated. Commercially available chain lubricant applied by aerosol can also be used but note that on later models (KLT200 A4, A4A, C2 and 250 C2, C3) O-ring chains are fitted as standard. These chains have grease sealed into the bearings, by small O-rings set around each pin, on assembly at the factory. The propellant used in some aerosols may attack and destroy the O-rings causing loss of grease and premature wear. If an O-ring chain is fitted, check carefully that the aerosol can is marked as being suitable for use on O-ring chains; some have appeared on the market in recent years.

Never use the machine with any part of the chain cover missing or damaged. Quite apart from the risk of personal injury should any part of the rider's clothing or body be caught in the chain while the machine is in use, the cover is essential to keep dirt and water off the chain and will extend chain life many times.

Final drive – KLT160

5 For the pre-ride check it will suffice to ensure that there are no oil leaks from any part of the final drive system and that it operates smoothly with no strange noises.

The level of oil in the final drive gear case should be checked at regular intervals. With the vehicle standing on level ground so that it is level from front-to-rear and from side-to-side, remove the small level plug from the rear of the case. Oil should trickle out slowly if the level is correct.

If oil pours out, check that the machine is level, then allow the surplus to drain off until the flow slows to a trickle. If no oil appears add oil of the specified type and viscosity via the filler plug orifice in the top of the casing until the level is correct. Tighten the filler and level plugs to their specified torque settings and wash off any surplus oil using a high flash-point solvent, being especially careful to remove any oil from the wheels, brakes, or tires.

Air cleaner

6 With reference to Section 6 of this Chapter, check that the air cleaner element is clean and correctly fitted.

Nuts, bolts and fasteners

7 With reference to Section 7 of this Chapter, work methodically around the machine checking that all nuts, bolts and other fasteners are securely tightened. With practice this can become a quick and simple check which is essential to prevent any risk of a component working loose while the machine is in use.

Steering

8 Check that the front forks move smoothly and easily from lock to lock with no sign of stiffness or free play and no hindrance from control cables or wiring.

Brake system

9 Depress the front brake lever and rear brake pedal. They should feel firm and should never depress to the stops. Follow the brake adjustment procedures in this Chapter if adjustment is necessary.

Throttle action

10 Check the throttle for smooth action, correct free play and that the lever snaps back to the closed position when released.

Lights

11 With the engine running if necessary, check that all lights are working properly.

Kill switch

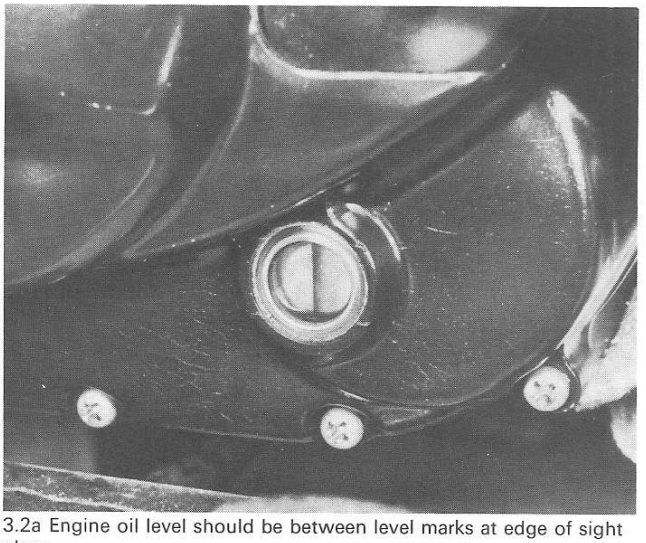
12 Check that the engine kill switch is working properly.

Clutch

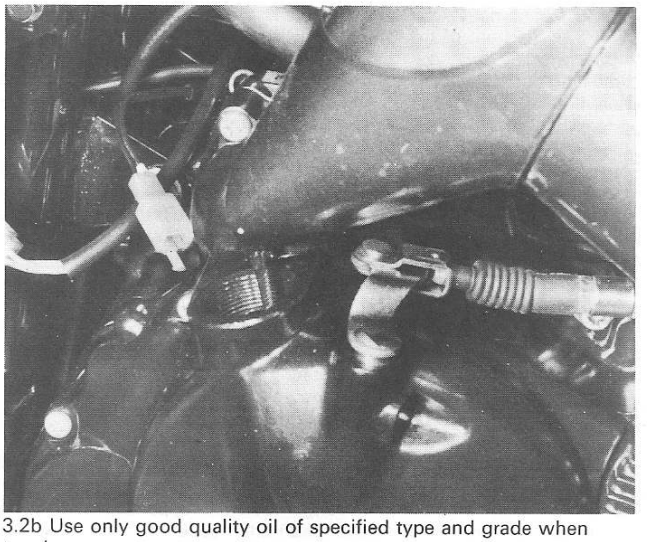
13 Check the clutch action and cable adjustment where applicable. Refer to Section 8 of this Chapter.

Battery – KLT200/250

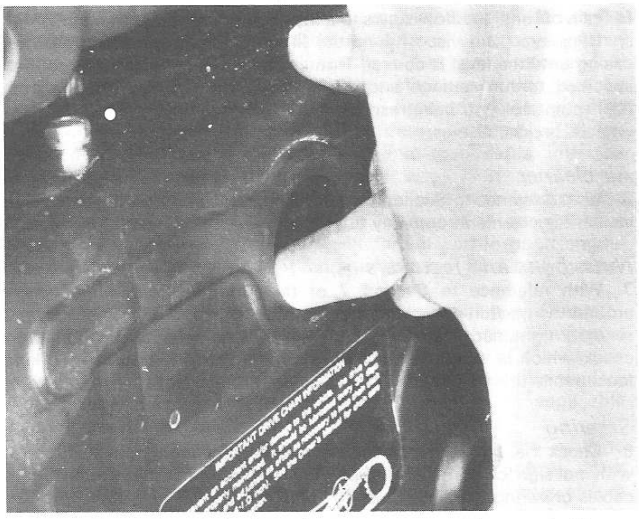
14 Referring to Section 13 of this Chapter, check the condition of the battery.



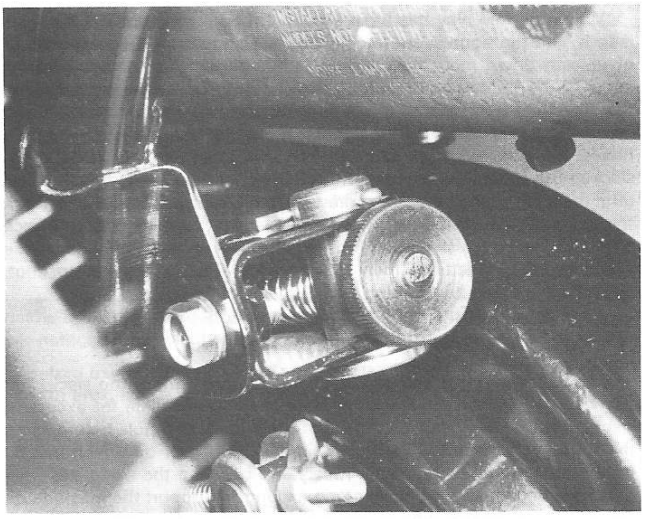
3.2a Engine oil level should be between level marks at edge of sight glass



3.2b Use only good quality oil of specified type and grade when topping-up



3.4a Checking drive chain free play – measure at tightest point in chain run



3.4b KLT200/250 – chain is adjusted by rotating knurled adjuster knob

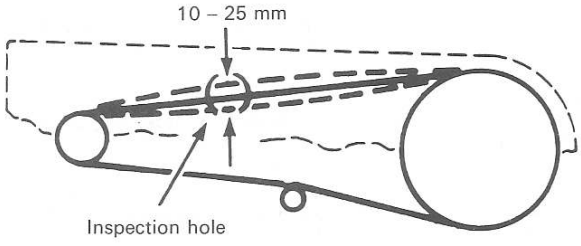


Fig. 1.1 Checking the drive chain free play (always measure at the tightest point) (Sec 3)

4 Adjust and check the brakes

Front brake – adjustment

1 Raise the front of the machine and support it on blocks so that the front wheel is clear of the ground. Spin the wheel and tighten the adjusting nut at the lower end of the brake cable until a rubbing sound is heard as the shoes begin to contact the drum. Back off the nut through one or two turns until the sound ceases, then spin the wheel hard, apply the lever hard to settle all components and re-check the adjustment. **Note:** where an adjuster is also fitted at the handlebar lever, this should be screwed fully in to gain the maximum cable free play before the brake is adjusted. Unless there is no more room for adjustment at the cable lower end, in which case both adjusters should be used together, the upper adjuster should be reserved for quick or fine adjustments.

2 The above procedure should produce the correct setting, which is that there should be 4 to 5 mm (0.16 to 0.20 in) free play in the cable measured between the handlebar lever butt end and the clamp; apply the lever lightly until resistance is felt to measure this.

3 Check that the brake is operating efficiently before using the machine. If the brake is spongy, especially after the wheel has been removed and refitted, slacken the spindle nut, spin the wheel hard and apply the brake firmly to centralise the shoes and backplate on the drum. Maintain brake pressure while tightening the spindle nut to the specified torque setting. Owners of early KLT200 A3 machines (frame numbers up to 520100) should note that a stronger cable and upper adjuster may be fitted to maintain a firm brake 'feel' and reduce the frequency of adjustments. The new cable, which has an OD of 7 mm instead of 6 mm, should have been fitted before delivery.

Rear brake – adjustment

4 Measure the vertical movement of the brake pedal tip from the at rest to the fully applied position; if this is not as specified, rotate the adjuster nut at the rear end of the brake operating rod or cable to tighten (or slacken) the adjustment. Check that the brake operates efficiently before using the machine.

Parking brake – adjustment – KLT110, 160

5 Whenever the rear brake adjustment is checked or altered, the parking brake must also be checked since the two affect each other. Adjust the parking brake after the rear brake.

6 The parking brake cable should have 4 to 5 mm (0.16 to 0.20 in) of free play, measured between the handlebar lever butt end and the clamp; this is adjusted by rotating the adjuster nut at the cable lower end. On KLT160 machines, use the handlebar adjuster only as described above for the front brake.

Operating mechanism

7 Check that all cables and rods are securely fastened and correctly routed and that all control and lever pivots are lubricated. Except on KLT160 models, to ensure that the mechanism is operating at maximum efficiency check that the angle formed between the front brake operating lever and its cable is at 80 – 90° when the brake is fully applied. If the angle is more than 90° and the shoes are not yet worn out (see below) disconnect the lever from the cable, remove fully its pinch bolt and pull the lever off the brake cam, taking care not to disturb the wear indicator pointer. Rotate the lever through one or two splines and refit it to the cam so that the angle will then be correct. Install and tighten securely the pinch bolt, connect the cable to the lever, adjust the brake and re-check the angle. **Note:** this does not apply to KLT160 front brakes or to any model's rear brake – the angle is essential to judge the condition of the brake shoes and the lever must not be moved from its original position.

Brake shoe wear – KLT110, 200, 250 (front)

8 External wear indicators are provided to allow a quick check to be made of the amount of friction material remaining.

9 With the brake correctly adjusted and fully applied, check that the pointer on the cam does not indicate beyond the 'Usable Range' arc stamped on the brake backplate. If it does the shoes are worn out and must be renewed. This involves the removal of the wheel from the machine and the disassembly of the brake mechanism. Refer to Chapter 7.

Brake shoe wear – KLT160 (front), all models (rear)

10 Since no wear indicators are provided, the amount of friction material remaining must be judged by the following check.

11 With the brake correctly adjusted and fully applied the angle formed between the brake lever and the rod or cable must be less than 90°. If the

angle is 90° or greater, the wheel (KLT160, front) or rear axle (all models, rear) must be removed so that the brake can be dismantled and checked for wear. Refer to Chapters 7 and 6 as appropriate.

12 **Note:** If there is the slighest doubt about the condition of the brakes at any time, disassemble them for complete and careful checking. The test given above is only reliable if the operating lever has not been disturbed from its original position on the brake camshaft.

Brake camshafts

13 At the specified intervals the front wheel or rear axle must be removed so that the brake can be disassembled, cleaned and checked for wear. When reinstalling, grease the brake camshafts. Refer to Chapters 7 and 6 as appropriate.

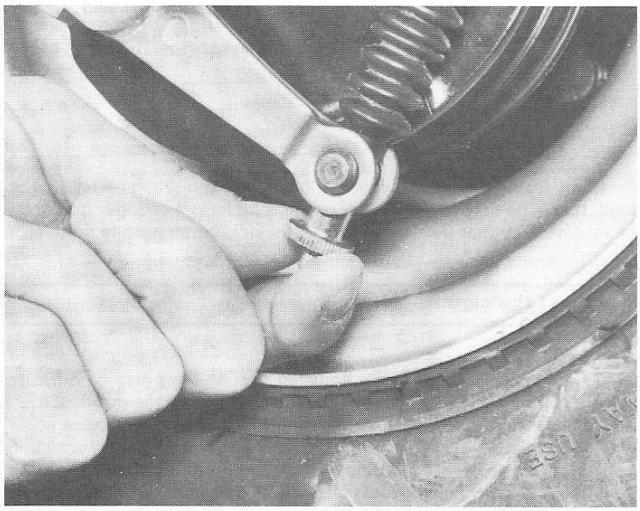
5 Adjust the control cables

1 Brakes – see Section 4.
2 Clutch – see Section 8.

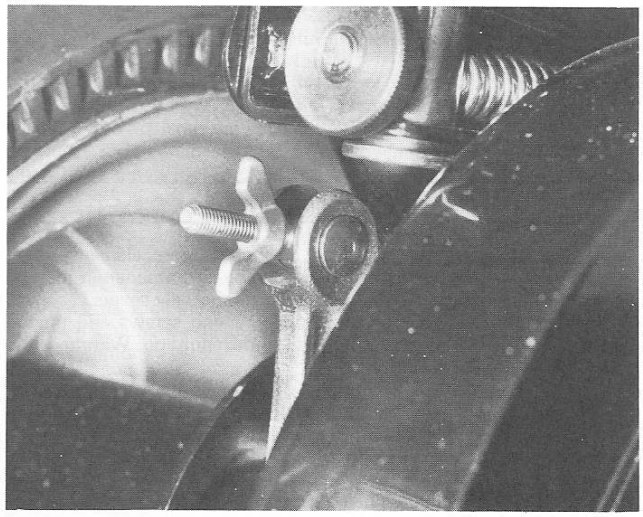
3 Throttle – the throttle lever should have 2 to 3 mm (0.08 to 0.12 in) free play from the fully closed position to the point where light resistance is encountered as the valve begins to lift against spring pressure. On KLT110 A1 models adjustment is made at the adjuster on the carburetor top. On all other models adjustment is made first at the adjuster set either in the throttle lever housing (KLT110 A2, 160, 200 C2, 250 C3) or in the cable itself (KLT200 A, B, C1, 250 A1, A2, C1, P1) followed by the adjuster on the carburetor top, if necessary. Note that the cable adjuster on KLT250 A1, A2 and C1 models is at the cable mid-way point, next to the cylinder head; it may be necessary to lift the front cover or to release the cable from any ties securing it to the frame to reach the adjuster.

4 Slide back the rubber cover (where fitted), slacken the adjuster locknut (where applicable) and rotate the adjusting nut until the free play is correct. Tighten securely all the locknuts, slide back the rubber cover, and re-check the cable adjustment. Start the engine and check that the idle speed remains constant at all handlebar positions.

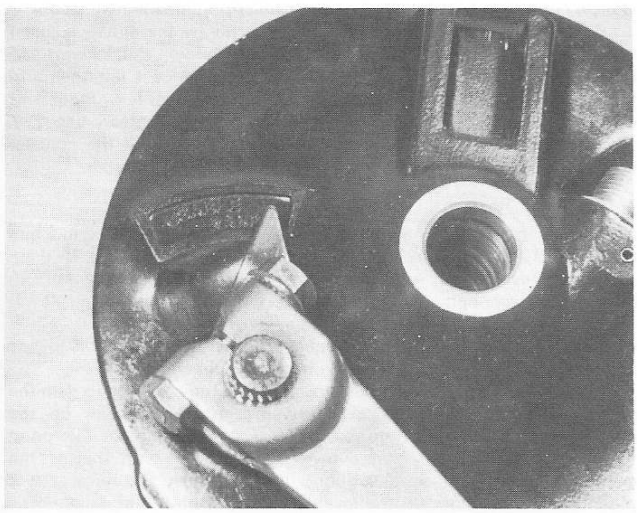
5 Complete cable maintenance by lubricating all lever pivots, cable end nipples, adjusters and any exposed lengths of inner cable – see Section 11.



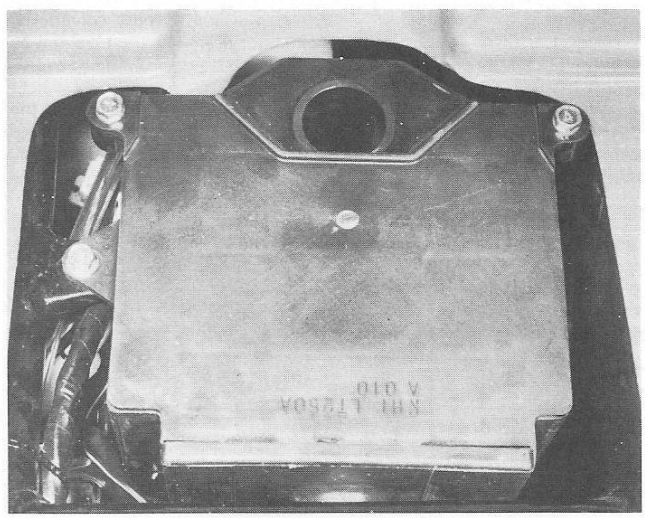
4.1 Front brake is adjusted at knurled adjuster knob shown



4.4 Adjust rear brake at adjuster nut (wingnut) at rear of brake rod or cable

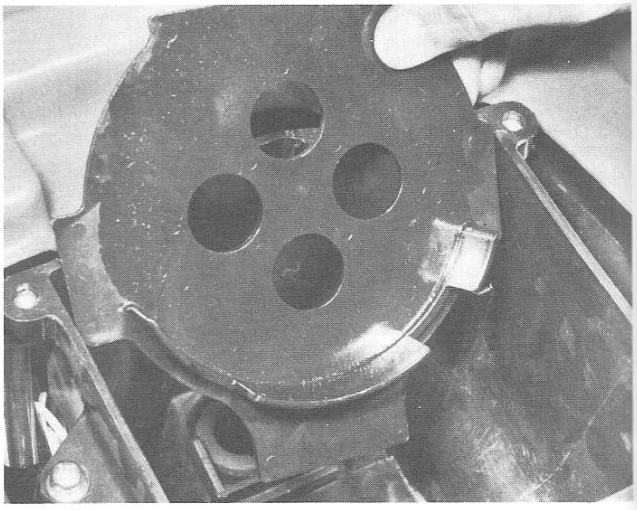


4.8 Brake shoe wear can be checked by referring to external wear indicator – KLT110, 200, 250 front brakes only



5.2 Remove two front mounting screws and lift cover away ...

5.3 ... to expose air filter element – note element supporting frame



5.7 Ensure element holder (where fitted) is correctly installed

6 Clean the air cleaner element

1 The air cleaner incorporates an oil-wetted foam element which must be cleaned regularly to maintain engine performance. It may be necessary to clean it daily if conditions are especially severe.
2 Remove the seat. Remove the two retaining screws and lift the cover at the rear to unhook it from its front mounting. Withdraw the cover.
3 Lift out the element noting the position of the element holder (KLT110, 160) or the supporting brace (KLT200). Cover the carburetor air passage with rag to prevent the entry of dirt.
4 Peel the element off its supporting frame and check it for splits, tears or other damage. If the element has been already cleaned five times, or if it is damaged or heavily clogged it should be renewed to prevent the risk of unfiltered air entering the engine and to maintain performance.
5 Clean the element by soaking it in a high flash-point solvent, taking care to prevent the risk of fire. **Do not** use gasoline; the risk of fire or explosion is too great. Gently squeeze out the surplus solvent by pressing the element between the palms of the hands, then leave it so that the remainder can evaporate. Do not wring out the element as this will damage it.
6 When the element is completely clean and dry, soak it in the specified oil, gently squeeze out the surplus, then wrap the element in a clean rag and squeeze out the remainder so that the element is left only slightly oily to the touch. Again, do not wring or twist the element.
7 Install the element in its frame apply a smear of grease to the foam gasket, remove the rag and insert the assembly into the airbox. Check that the gasket is seated correctly around the carburetor air passage so that it is not blocked and so that unfiltered air cannot bypass the element. Check that the element holder or brace (where fitted) is correctly installed before refitting the air cleaner cover and seat.
8 Never run the machine with the air cleaner removed or disconnected.

7 Tighten all nuts, bolts and fasteners

1 Work methodically around the vehicle checking that all nuts, bolts and other fasteners are securely fastened.
2 Where torque specifications are given at the beginning of each Chapter, use a torque wrench to ensure that each fastener is tightened correctly.
3 If any fastener repeatedly works loose, find out why and rectify the fault. It may be that a lock washer or nut is no longer effective and must be renewed, or that the use of thread-locking compound is required.

8 Adjust the clutch

KLT110

1 If the clutch is not correctly adjusted gear shifting may be difficult, vehicle control will be impaired and transmission damage may result.
2 Remove the rubber cap from the centre of the right crankcase cover and slacken the adjuster locknut. Turn the adjusting screw clockwise one turn to ensure there is no pressure on it, then turn it counterclockwise until firm resistance is felt. Hold the screw steady and tighten the locknut securely. Refit the rubber cap.

KLT160

3 If the clutch is not correctly adjusted gear shifting may be difficult, vehicle control will be impaired and transmission damage may result.
4 Remove its two retaining screws and withdraw the clutch adjuster cover from the right crankcase cover. Slacken the adjuster locknut and turn the adjusting screw clockwise until light resistance is felt, then turn the screw counterclockwise until firm resistance is felt. From this position turn the screw clockwise 1/8 turn to set the necessary free play, then hold it steady while the locknut is tightened. Refit the adjuster cover.

KLT200 A

5 The clutch is correctly adjusted if it operates smoothly with 2 to 3 mm (0.08 to 0.12 in) of free play in the cable and no signs of slip or drag. Apply the lever lightly until resistance is felt and measure the gap between the lever butt end and the handlebar clamp to assess free play. If this is not the case the clutch must be adjusted.
6 Adjustment is made at the handlebar adjuster and at the cable in-line adjuster in front of the engine. Slide back the rubber covers.
7 Slacken both adjuster locknuts and screw in the adjusters to gain the maximum cable free play. Push forward the release lever on the crankcase underside until firm resistance is encountered. At this point the raised edge on the release lever should align with that of the crankcase left cover (see illustration). If not, remove the release lever pinch bolt and re-position the lever on its shaft until the alignment is correct. Tighten securely the pinch bolt.
8 Unscrew the handlebar adjuster until 5 to 6 mm (0.20 – 0.24 in) of thread is exposed then unscrew the cable in-line adjuster nut until all

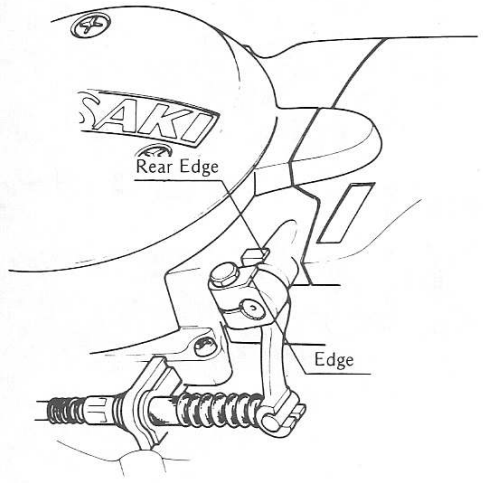


Fig. 1.2 Clutch release lever alignment – KLT200 A (Sec 8)

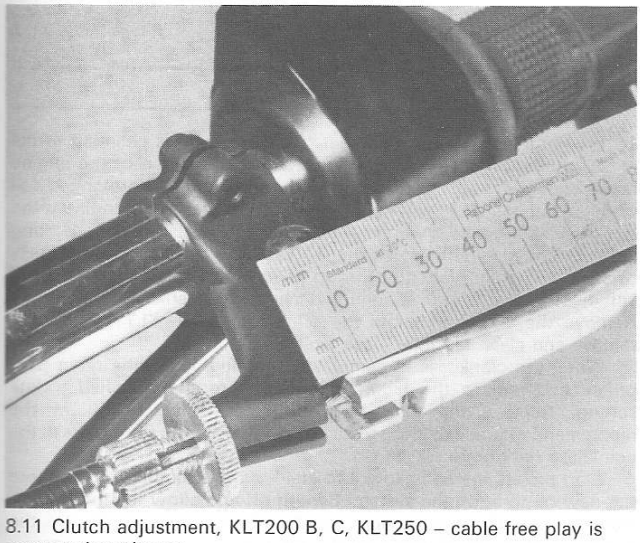
free play is removed. Check that the outer cable lower end is seated correctly in the crankcase left cover and tighten the in-line adjuster locknut.
9 Screw in the handlebar adjuster until the correct free play is achieved, then tighten its locknut. Re-check the adjustment.
10 Start the engine and check that the clutch operates correctly, then lubricate all lever pivots, cable end nipples, adjusters and any exposed lengths of inner cable – see Section 11. Refit the rubber covers.

KLT200 B, C, KLT250

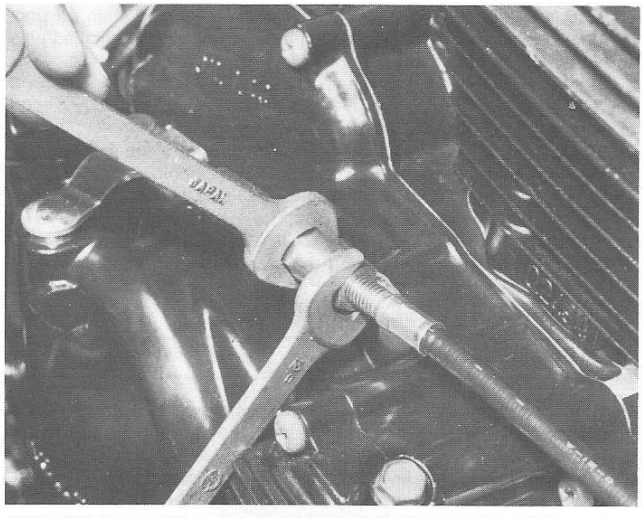
11 The clutch is correctly adjusted if it operates smoothly with 2 to 3 mm (0.08 to 0.12 in) of free play in the cable and no signs of slip or drag. Apply the lever lightly until resistance is felt and measure the gap between the lever butt end and the handlebar clamp to assess free play. If this is not the case the clutch must be adjusted.
12 Adjustment is made at the adjuster on the crankcase right cover and the handlebar adjuster. Slide back the rubber covers.
13 Slacken fully both nuts of the crankcase adjuster to gain the maximum cable free play, then slacken the handlebar adjuster locknut. Rotate the handlebar adjuster until 5 to 6 mm (0.20 – 0.24 in) of thread is exposed. Pull the cable tight through the crankcase cover adjuster until all free play is removed, then tighten securely the adjuster nut and locknut.
14 Screw in the handlebar adjuster until the correct free play is achieved, then tighten its locknut. Re-check the adjustment.
15 Start the engine and check that the clutch operates correctly, then lubricate all lever pivots, cable end nipples, adjusters and any exposed lengths of inner cable – see Section 11. Refit the rubber covers.

9 Clean the fuel system

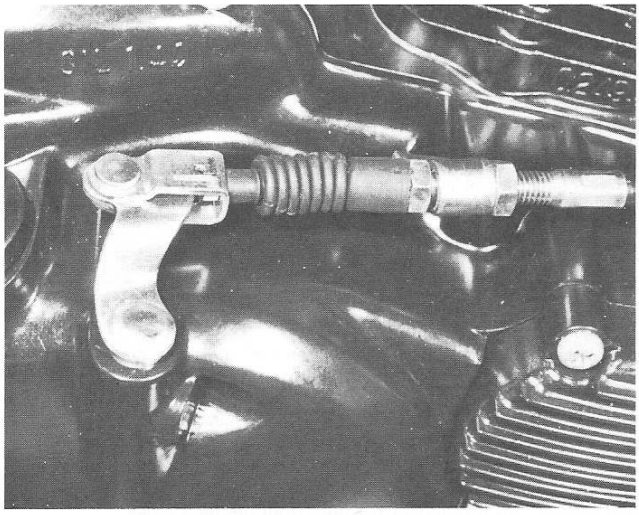
1 On KLT200 and 250 A2, C2, C3 and P1 models a filter is fitted in the fuel line between the tank and pump. It is located to the front of the fuel tank.
2 Examine the filter closely. If it is dark or looks dirty it must be renewed; cleaning is not possible.
3 Clamp the crankcase vent hose shut with self-locking pliers and release the clips from each end of the filter. Tilt the machine up on its rear wheels and disconnect the filter from the feed pipes.
4 Be ready to mop up any spilled gasoline. Work only in a well-ventilated area and be careful to take precautions to prevent the risk of fire.
5 Install the new filter with the arrow on its body facing in the direction of fuel flow. Secure the hoses with the clips, lower the machine and unclamp the vent hose.
6 Check the cleanliness of the system by placing a clean container to catch the drained fuel, then slacken the drain plug in the carburetor float bowl; fuel will pour either from the drain tube or the float bowl itself. When the fuel stops flowing, tighten the drain plug.
7 If any dirt or water is seen in the drained fuel, clean all components of the fuel system. Refer to Chapter 3. Do not forget to check that the fuel tank filler cap and/or vent hose are clear.
8 While this is all the attention that the fuel system requires as part of routine maintenance, if rough running, poor starting or idling or any other symptoms appear which indicate a carburetor fault, the carburetor may require adjustment.
9 Before disturbing the carburetor check that the fuel system is clean and in good order, that the air cleaner is clean and correctly fitted, that the valve clearances are correct and that the spark plug, ignition timing (KLT200 A1) and exhaust system are in good order.
10 Refer to Chapter 3 for details of carburetor adjustment, should this prove necessary.



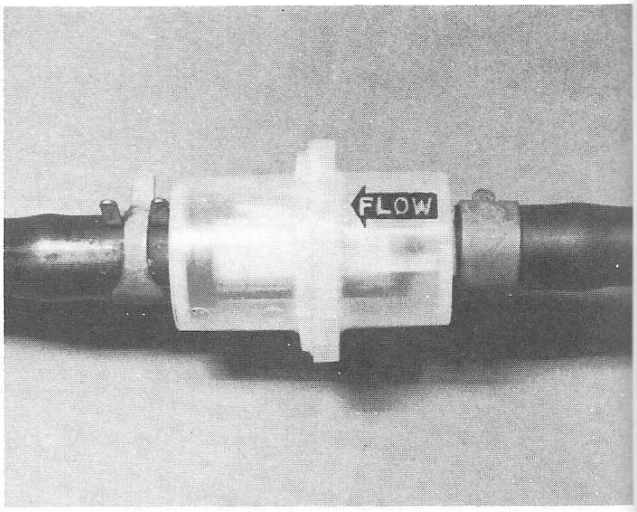
8.11 Clutch adjustment, KLT200 B, C, KLT250 – cable free play is measured as shown



8.13a Slacken crankcase adjuster nuts fully, then set handlebar adjuster – see text



8.13b Pull cable tight and secure crankcase adjuster nuts, then set free play at handlebar adjuster



9.5 Fuel filter (where fitted) must be installed with arrow in direction of fuel flow

10 Check the final drive gear case

KLT200 A

1 Since the final drive gear case is filled with grease it is normal for a thin film of grease to appear on the outside of the casing once the cover inspection plate has been removed so that the casing can be inspected.
2 A grease nipple is provided so that grease can be injected into the casing but this should be regarded as a temporary measure only; if large quantities of grease leak out, the rear axle should be dismantled for checking. Refer to Chapter 6.

KLT200 C, 250 C, P

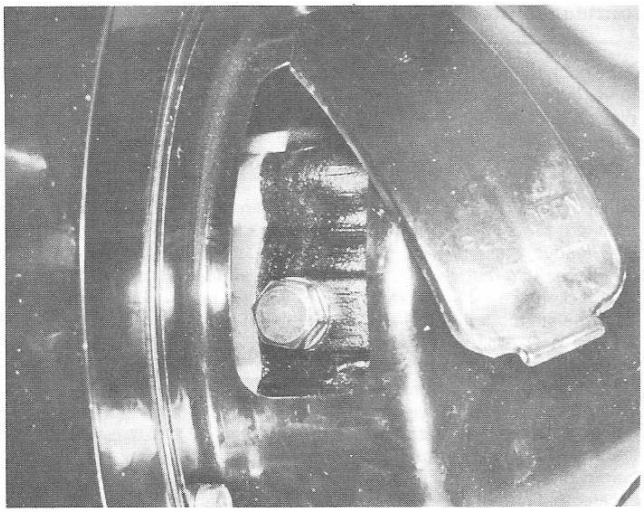
3 With the vehicle standing on level ground so that it is level from front-to-rear and from side-to-side, open the rear axle cover inspection plate and roll the machine slowly forwards until the drain plug appears.
4 Unscrew the plug and very slowly roll the machine backwards until the lower edge of the opening is exactly level with the centreline of the rear axle. At this point oil should slowly trickle out if the level is correct.
5 If oil pours out, check that the machine is level and the drain plug opening is in the correct place, then allow the surplus to drain off until the flow slows to a trickle. If no oil appears add oil of the specified type and viscosity via the drain plug orifice until the level is correct.
6 Tighten the drain plug to the specified torque setting and wash off any surplus oil using a high flash-point solvent, being especially careful to remove any oil from the wheels, brakes or tires.
7 **Note:** The differentials on some early versions of these models were packed with grease at the factory. Kawasaki now recommend that if one of these is encountered the rear axle must be removed and disassembled so that the grease can be cleaned out. The axle should then be rebuilt and filled with the specified type, viscosity and quantity of oil. **Do not** try to shorten this task by flushing the case with solvent, or similar, to remove the grease.

11 General lubrication

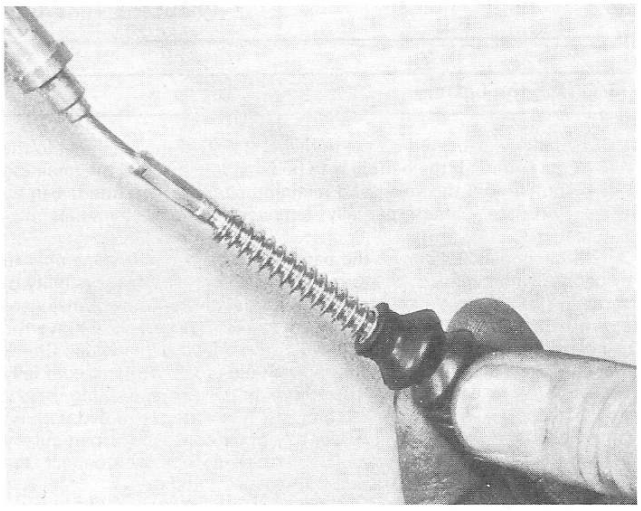
1 Since the controls, cables, and various other components of a motorcycle are exposed to the elements, they should be lubricated periodically to ensure proper operation.
2 The clutch and brake levers should all be lubricated with a light oil. Care should be taken not to apply too much oil to the brake lever pivot, as the oil will attract dirt which could cause the controls to bind.
3 The brake, clutch and throttle cables should be treated with a light oil or a commercially available cable lubricant which is specially formulated for use on motorcycle control cables. Small adapters for pressure lubricating cables with spray can lubricants are available and work very well. The alternative is to remove the cable from the machine, hang it upright and make up a small funnel arrangement from plasticine or by taping a plastic bag around the upper end. Fill the funnel with oil and leave it overnight to drain through. Note that where nylon-lined cables are fitted they should be used dry or lubricated only with a silicone-based lubricant; ordinary oil will cause the nylon to swell, producing a stiff cable action.
4 Where necessary disassemble the control levers or pivots so that all bearing surfaces can be cleaned and packed with grease.
5 On KLT250 machines uncouple the speedometer drive cable at its lower end, slide out the inner cable. Check the cable for signs of fraying or damage which would require its renewal, then smear grease over all but the upper six inches or so of the inner cable (to prevent grease from working its way into the instrument) and reconnect the cable to the machine.
6 The life of all electrical components can be extended by cleaning the connectors and packing them with silicone grease, and by spraying switch internals with WD40 or a similar water dispersant lubricant.

12 Change the engine oil

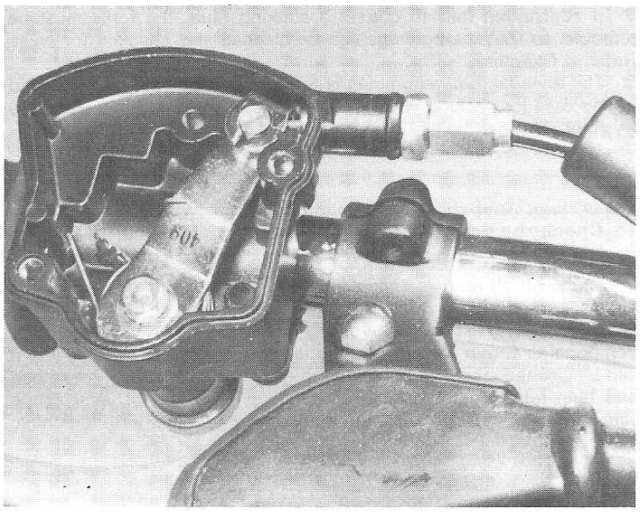
1 It is important that the engine/transmission oil is changed at the recommended intervals to ensure adequate lubrication of the engine components. If regular oil changes are overlooked, the prolonged use of degraded and contaminated oil will lead to premature engine wear.
2 The oil should be changed with the engine at its normal operating temperature, preferably after a run. This ensures that the oil is relatively thin and will drain more quickly and completely. Obtain a container of sufficient capacity, and arrange it beneath the crankcase drain plug. Remove the plug and allow the oil to drain. On KLT160 models, remove and clean the filter – see Section 17.
3 When the crankcase is completely emptied, clean the drain plug orifice and replace the plug, tightening it to the specified torque setting. Remove the filler plug, and add sufficient oil of the recommended grade to bring the level half way up the sight glass in the crankcase right cover.
4 Start the engine and allow it to idle for a few minutes to distribute the new oil through the system. Switch off and allow the machine to stand for a while, then check that the oil level comes between the upper and lower level marks on the sight glass. Top up if necessary – see the pre-ride check.



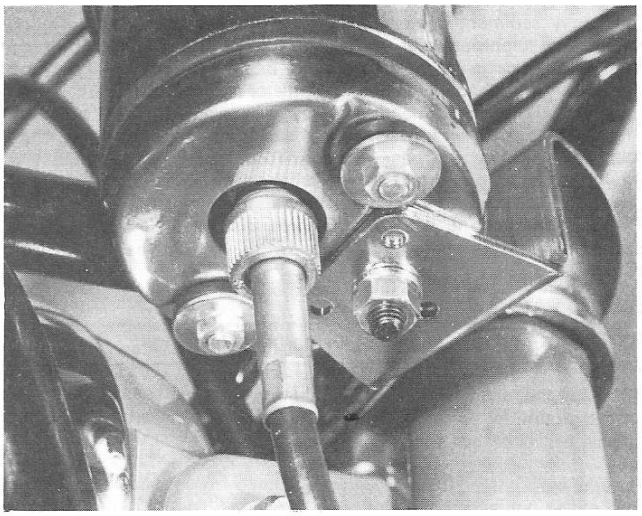
10.3 Checking the final drive gear case oil level – KLT200 C, 250 C, P – slide back cover and rotate axle until drain plug appears



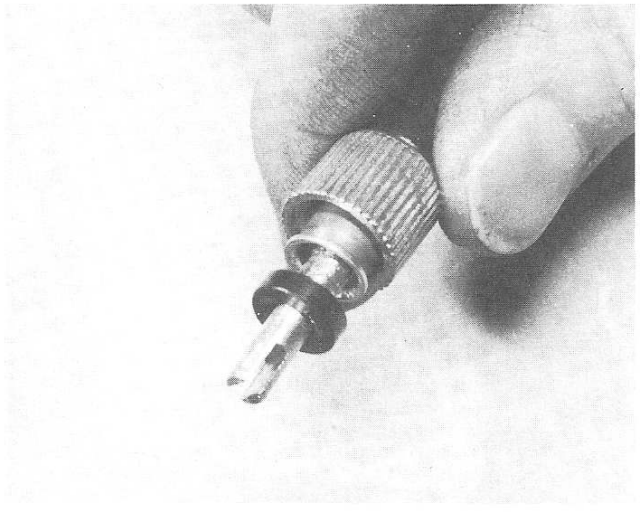
11.3 All control cables should be lubricated at regular intervals – disconnect if necessary



11.4 Dismantle control lever assemblies for cleaning and greasing



11.5a KLT250 – uncouple speedometer drive cable ...



11.5b ... so that inner cable can be removed and greased – do not omit oil seal

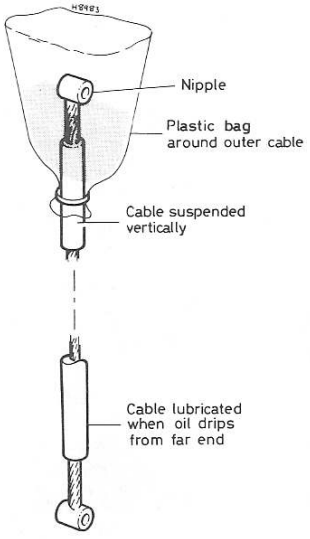


Fig. 1.3 Oiling a control cable (Sec 11)

13 Check the battery

1 The battery is located on the right-hand side of the machine, to the rear of the engine. If the battery is to be removed unscrew the retaining bolt or nut so that the cover and retaining strap (where fitted) can be withdrawn, the battery partially removed and the terminals disconnected.
2 On all models, whenever the battery is disconnected, remember to disconnect the negative (−) terminal first, to prevent the possibility of short circuits. The electrolyte level, visible through the translucent casing, must be between the two level marks. If necessary remove the cell caps and top up to the upper level using only distilled water. Check that the terminals are clean and apply a thin smear of petroleum jelly (not grease) to each to prevent corrosion. When reinstalling, check that the vent hose is not blocked and that it is correctly routed with no kinks, also that it hangs well below any other component, particularly the chain or exhaust system. Remember always to connect the negative (−) terminal last when refitting the battery.
3 Always check that the terminals are tight and that the rubber covers are correctly refitted, also that the fuse connections are clean and tight, that the fuse is of the correct rating and in good condition, and that a spare is available on the machine should the need arise.
4 At regular intervals remove the battery and check that there is no pale grey sediment deposited at the bottom of the casing. This is caused by sulphuration of the plates as a result of re-charging at too high a rate or as a result of the battery being left discharged for long periods. A good battery should have little or no sediment visible and its plates should be straight and pale grey or brown in colour. If sediment deposits are deep enough to reach the bottom of the plates, or if the plates are buckled and have whitish deposits on them, the battery is faulty and must be renewed. Remember that a poor battery will give rise to a large number of minor electrical faults.
5 If the machine is not in regular use, disconnect the battery and give it a refresher charge every month to six weeks, as described in Chapter 8.

14 Adjust and grease the steering head bearings

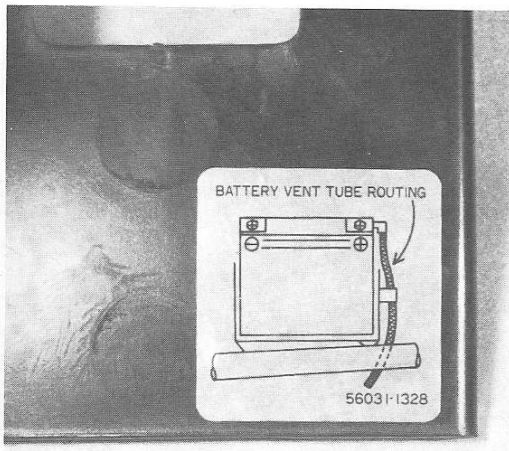
1 Place the machine on level ground and raise the front wheel clear of the ground by placing a suitable support under the crankcase.
2 Check the bearing adjustment by grasping the bottom of both fork lower legs, then pulling and pushing in a fore and aft direction; any free play should be felt between the fork and the frame head lug. Check for overtightened bearings by placing the forks in the straight ahead position and tapping lightly on one handlebar end; the forks should fall away smoothly and easily to the opposite lock, taking into account the effect of cables and wiring, with no trace of notchiness. If adjustment is required, proceed as follows:
3 Remove the fuel tank or front cover, as applicable. Remove the handlebar clamp cover (KLT110, 160) or ignition switch (KLT200 C).
4 Slacken the two fork top bolts to release the stem head bracket, then the stem head bolt.
5 Use a C-spanner to rotate the slotted adjuster nut immediately below the stem head bracket. As a guide to adjustment, tighten the slotted nut until a light resistance is felt, then back it off by 1/8 turn. The object is to remove all discernible play without applying any appreciable preload. It should be noted that it is possible to apply a loading of several tons on the small steering head bearings without this being obvious when turning the handlebars. This will cause an accelerated rate of wear, and causes the machine to weave from side to side at low speeds. When adjustment is correct, tighten the steering stem head bolt to the specified torque setting.
6 Tighten the fork top bolts to the specified torque setting, then re-check the adjustment.
7 If adjustment fails to correct a steering fault, the forks must be removed so that the bearings can be cleaned and checked for wear. Refer to Chapter 5.
8 The manufacturer recommends that the bearings are disassembled in any case for packing with grease at this interval. If this is done the bearings can then be adjusted on reinstallation. Refer to Chapter 5.

15 Check the drive chain and sprockets

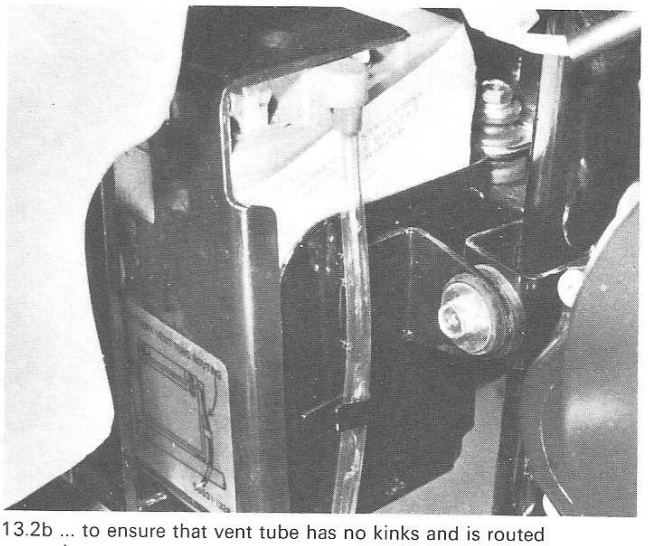
Since, on all models except the KLT160, close inspection of the chain requires its removal from the machine, refer to Chapter 6. The chain must be removed, involving the disassembly of the cover components and in some cases, the removal of the rear axle, so that it can be cleaned, checked for wear and renewed if necessary, lubricated and then refitted. The sprockets should be checked for wear at the same time and must be renewed, if necessary, together with the chain.

13.1a Remove retaining bolt and withdraw battery retaining strap and cover ...

13.1b ... so that battery can be examined – note electrolyte level marks on casing



13.2a Note vent tube routing warning label ...



13.2b ... to ensure that vent tube has no kinks and is routed correctly

16 Adjust the valve clearances

1 The valve clearances must be checked at regular intervals to maintain performance and to prevent serious engine damage.
2 Note that valve clearances are always checked with the engine **cold.**
3 Remove the seat and the fuel tank or front cover (as applicable). Remove the two inspection caps and the spark plug from the cylinder head.
4 On KLT110, 160 models remove the recoil starter assembly and the timing inspection plug from the crankcase left cover.
5 On KLT200, 250 models remove the inspection cover (two or three screws, as applicable) from the crankcase left cover.
6 Using a spanner on the flywheel rotor/starter pulley bolt, turn the crankshaft anti-clockwise until the inlet valve can be seen to have opened and then closed. Carry on turning the crankshaft until the T mark on the rotor aligns with the index mark on the cover. Using a feeler gauge, check, and if necessary, reset the gap between the adjusting screws and the valve stems.
7 The correct gaps are given in the Specifications Section of this Chapter. Note also the torque settings specified for the adjuster locknuts; these should never be overtightened as this merely distorts the fine threads and makes future adjustment very difficult.
8 When set correctly, the feeler gauge will be a light sliding fit in the gap. After tightening the locknuts, turn the engine a few times, then recheck the clearances to ensure accuracy.
9 Check that the O rings are in good condition before replacing the inspection covers, noting that each cap has an 'UP' mark on it for obvious reasons. Reinstall all other disturbed components.

17 Clean/renew the engine oil filter

KLT110

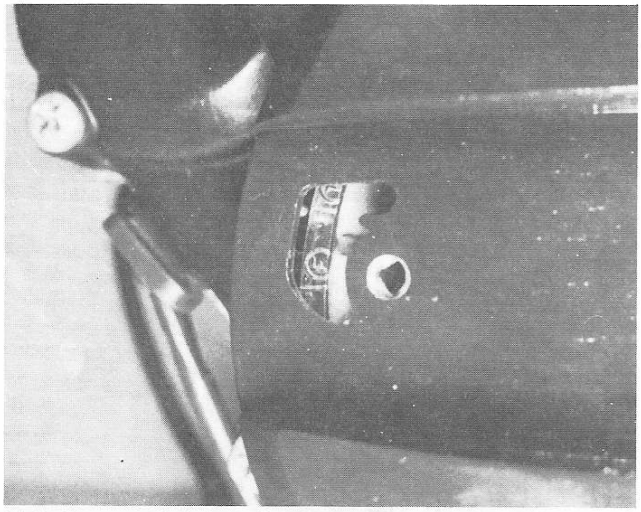
1 The oil filters consist of a gauze screen set in the bottom of the crankcase and a centrifugal filter in the centre of the clutch housing.
2 Referring to Chapter 2 for further information where necessary, remove crankcase right cover. The filter gauze can be seen immediately beneath the crankshaft. Pull it out carefully and wash it in a high flash-point solvent. Renew it if it is split or torn. Use a fine-bristled brush to remove any larger particles stuck to it. Insert the gauze into its crankcase recess.
3 To reach the centrifugal filter, remove the clutch release lever, followed by the pusher plate (retained by three screws and plain washers); do not lose the bushing and pins fitted over each pusher plate screw boss on the clutch housing. Scrape out all deposits from the centre of the clutch housing and use a paintbrush and solvent to remove all traces of dirt. Reinstall the clutch components.
4 Replace the crankcase right cover and refill the engine with oil – see Section 12.

KLT160

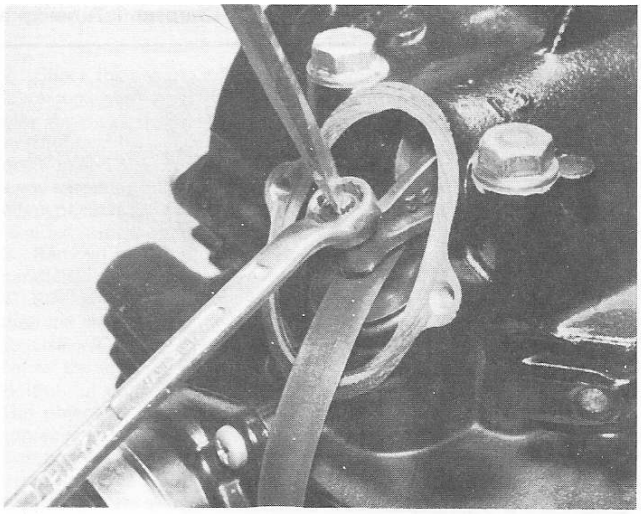
5 The only filter is a gauze attached to a plug which is threaded into the crankcase underside next to the oil drain plug.
6 It is recommended that the filter is removed whenever the oil is drained; this being done by unscrewing the plug.
7 Wash the filter in high flash-point solvent and renew it if any splits or tears are found in the gauze. Renew the sealing O-ring if it is flattened or damaged. Use a fine bristled brush to remove any large particles which may be stuck in the gauze.
8 Wipe the orifices clean of oil and reinstall the filter at the same time as the drain plug. Both are tightened to the same torque setting before the engine is refilled with oil – see Section 12.

KLT200, 250

9 Although these machines have two oil filters, one is a gauze filter located in the crankcase just below the clutch which needs only be cleaned whenever the crankcase right cover has been removed, for whatever reason; since a much larger renewable filter element protects the engine components the cleaning of the gauze filter is not a specified Routine Maintenance item.
10 If the crankcase right cover is ever removed, the gauze filter should also be removed automatically for cleaning, which is as described above for the KLT110/160 items.
11 The filter element cannot be cleaned; it must be renewed at this interval. Proceed as follows:
12 Drain the engine oil (see Section 12) then remove the three screws securing the filter cover to the crankcase right cover and withdraw the cover. Slide the filter off its mounting pin and discard it.
13 The mounting pin, which incorporates the bypass valve, may pull out with the filter. If this happens clean the valve (see Chapter 3) then refit the pin.
14 Lightly oil the rubber grommets at each end of the new filter element and slide the element on to the pin, ensuring that the grommets are not dislodged.
15 Renew the two O-rings if they are flattened or damaged, reinsert them to their grooves in the filter cover and refit the cover, tightening the retaining screws securely.
16 Replace the drain plug and fill the engine with oil as described in Section 12, but note that a slightly larger amount of oil will be required to fill the engine to the correct level (see Specifications).



16.6a Rotate crankshaft to align generator rotor T mark with crankcase cover index mark



16.6b Adjusting valve clearances – feeler gauge of correct thickness should be a light sliding fit.

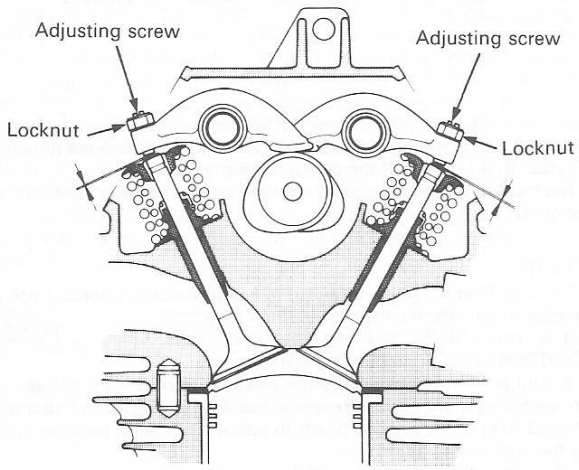
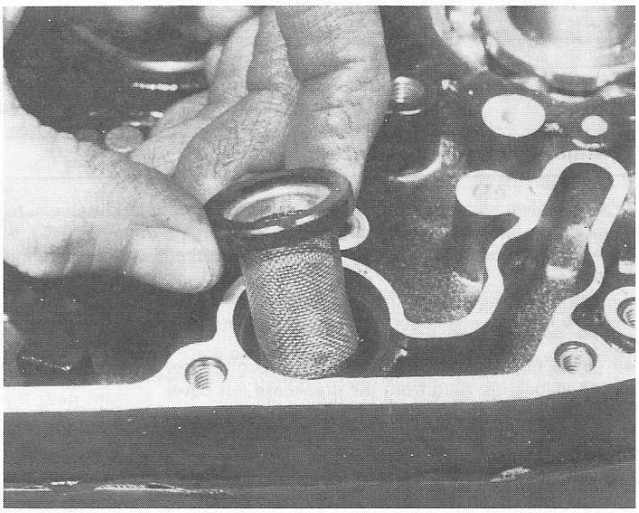
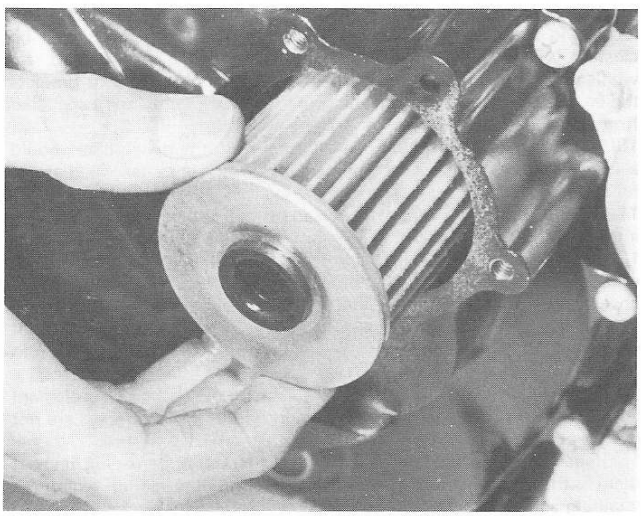


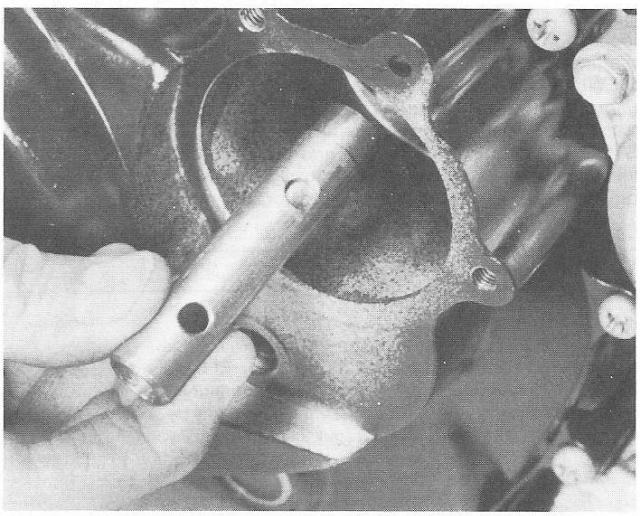
Fig. 1.4 Adjusting the valve clearances (Sec 16)



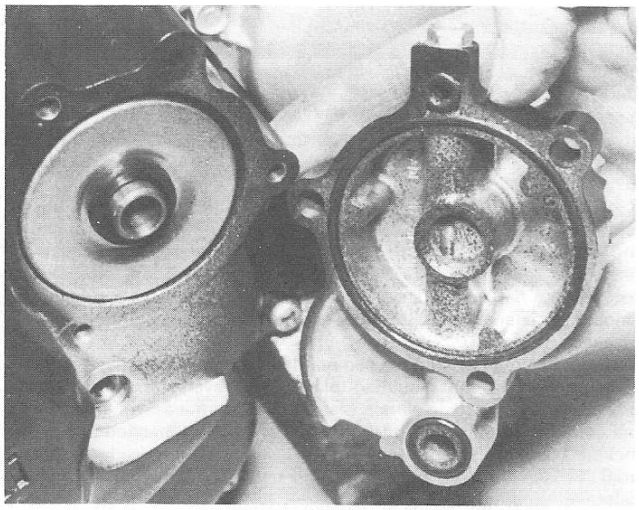
17.9 KLT200, 250 – oil pump pickup filter gauze need only be cleaned whenever crankcase right cover is removed



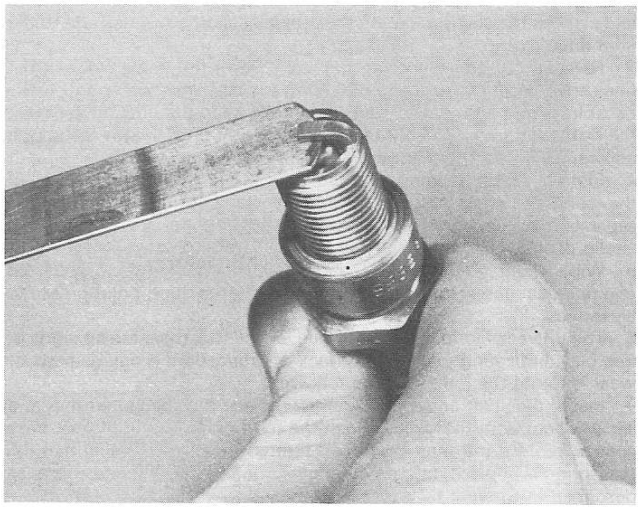
17.11 KLT200, 250 – main oil filter uses a pleated paper filter element – renew at specified intervals



17.13 Filter element mounting pin incorporates bypass valve – check and clean if necessary ...



17.14 ... lightly oil element rubber grommets before installing – renew cover sealing O-rings if flattened or damaged



18.5 Measuring spark plug electrode gap

18 Clean/renew the spark plug

1 The spark plug recommended by the manufacturer as being most suitable for all normal use is given in the Specifications Section of this Chapter; alternatives are available to allow for varying altitudes, climatic conditions and the use to which the machine is put. If a spark plug is suspected of being faulty it can be tested only by the substitution of a brand new (not second-hand) plug of the correct make, type, and heat range; always carry a spare on the machine.
2 Note that the advice of a competent Kawasaki Service Agent or similar expert should be sought before the plug heat range is altered from standard. The use of too cold, or hard, a grade of plug will result in fouling and the use of too hot, or soft, a grade of plug will result in engine damage due to the excess heat being generated. If the correct grade of plug is fitted, however, it will be possible to use the condition of the spark plug electrodes to diagnose a fault in the engine or to decide whether the engine is operating efficiently or not. The accompanying series of colour photographs will show this clearly.
3 It is advisable to carry a new spare spark plug on the machine, having first set the electrodes to the correct gap. Whilst spark plugs do not fail often, a new replacement is well worth having if a breakdown does occur. Ensure that the spare is of the correct heat range and type.
4 Clean the electrodes with a wire brush or similar and polish their tips with fine abrasive paper to leave smooth square surfaces. If the electrodes appear excessively worn, or if there is any doubt about the plug's efficiency, it should be renewed as a matter of course to preserve the engine's performance, efficiency and reliability. Renew the plug annually as a matter of course, regardless of its apparent condition.
5 The correct electrode gap is given in the Specifications Section of this Chapter. The gap can be assessed using feeler gauges. If necessary, alter the gap by bending the outer electrode, preferably using a proper electrode tool. **Never** bend the centre electrode, otherwise the porcelain insulator will crack, and may cause damage to the engine if particles break away whilst the engine is running.
6 Before refitting a spark plug into the cylinder head, coat the threads sparingly with a graphited grease to aid future removal. Use the correct size spanner when tightening a plug, otherwise the spanner may slip and damage the ceramic insulator. The plug should be tightened by hand only at first and then secured with a quarter turn of the spanner so that it seats firmly on its sealing ring. If a torque wrench is available, tighten the plug to the specified torque setting.
7 Never overtighten a spark plug otherwise there is risk of stripping the threads from the cylinder head, especially as it is cast in light alloy. A stripped thread can be repaired without having to scrap the cylinder head by using a 'Helicoil' thread insert. This is a low-cost service operated by a number of dealers.

19 Change the front fork oil – KLT110 A2, 160

1 Referring to Chapter 5 for further information where necessary, remove the front wheel, then remove the two fork legs from the fork top section.
2 Remove from each leg the circlip and withdraw the top plug, the top spring, spring seat and the main spring.
3 Invert each leg and tip out as much oil as possible, pumping the leg to expel the remainder. Compress the inner tube fully into the outer tube and pour in exactly the specified amount of the correct type and grade of oil.
4 With the leg absolutely upright, pump the inner tube up and down to distribute the oil around the leg then compress it fully again. Measure the distance between the top of the leg and the top of the oil, using a dipstick made of a length of welding rod or similar.
5 If the level is not as specified, add (or remove) oil until the level is exactly correct, then repeat the procedure on the remaining leg.
6 Replace the fork springs, spring seat, top plug (renewing if necessary its sealing O-ring) and install the circlip in each fork leg.
7 Reinstall the fork legs on the machine and replace the front wheel. Check the front suspension and brake before using the machine.

20 Check and grease the wheel bearings

1 At specified intervals the wheels and bearings must be checked for wear and disassembled for greasing.
2 Check the wheel rims for dents, chips or other damage and examine closely the hub centres for signs of splits, serious rusting or cracks. Any sign of damage of this sort will mean that the wheel must be renewed.
3 Check the bearings by supporting the machine so that the front and rear wheels are raised in turn from the ground, then grasp each wheel at the top and bottom and try to rock it sideways. If any sign of free play is felt the wheel must be removed so that the bearings can be checked and renewed. Refer to Chapters 7 or 6.
4 Greasing the wheel bearings involves the removal of the rear axle (except KLT160) so that it can be partially (or wholly) disassembled – refer to Chapter 6. The removal and reinstallation of the front wheel bearings is described in Chapter 7.

21 Grease the propeller shaft joint – KLT160

1 With reference to Chapter 6 for further information when required, support the vehicle on blocks so that the rear wheels are raised clear of the ground.

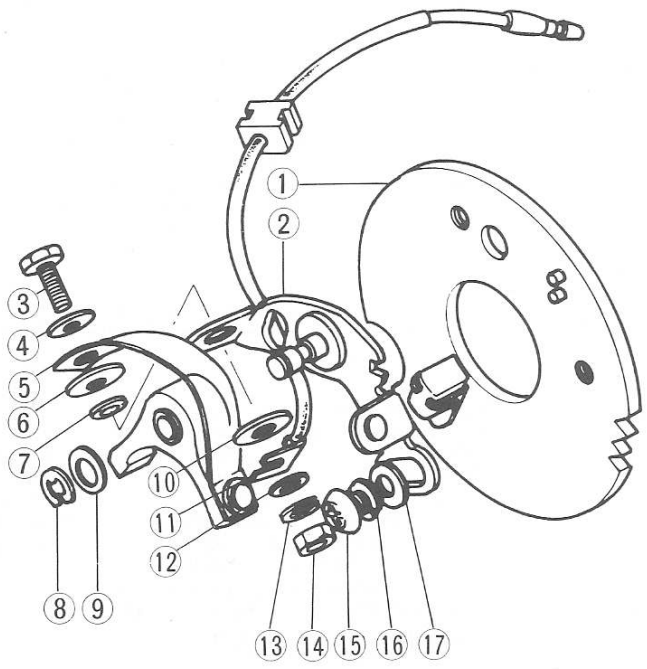
2 Disconnect the rear brake operating cable and rod from the lever and slacken the clamp securing the propeller shaft cover rear end to the final drive casing.
3 Remove the bolts securing the rear axle to the frame (four to the final drive casing, two to its mounting bracket and two to the brake backplate) and lift away the axle assembly. Keep the final drive casing the right way up to prevent the loss of oil and note the presence of a coil spring at the shaft rear end, around the pinion gear nut.
4 Slacken its front clamp and withdraw the shaft cover then pull off the complete shaft assembly and universal joint. The two can be separated by removing the circlip at the rear of the shaft using long circlip pliers.
5 Wipe all old grease off the shaft splines, including those of the front and rear gear cases; apply a thin smear of high-melting point grease to all splines.
6 The universal joint is sealed for life; check that there are no signs of free play, indicating wear, or of a lack of lubrication. If any damage or wear is found the joint must be renewed.
7 Install the shaft and joint together, replace the shaped washer and secure them with the circlip. Push the joint on to the front gear case splines, replace the shaft cover and tighten the clamp. Check that the coil spring is in place on the pinion gear nut and install the rear axle, as described in Chapter 6.

22 Check the ignition timing – KLT200 A1

1 Before the ignition timing can be checked, the contact breaker points must be cleaned and correctly adjusted. There are two methods of doing this. First remove the spark plug and the contact breaker cover (two screws) from the cylinder head, then the inspection cover (three screws) from the crankcase left cover.

Adjustment using feeler gauges

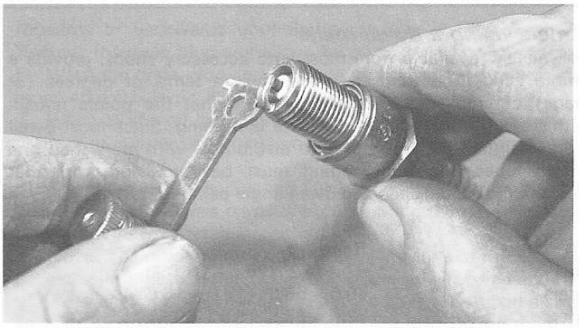
2 Rotate the engine by applying a spanner to the flywheel rotor nut until the points are fully open. Examine the faces of the contacts for pitting and burning. If badly pitted or burnt they should be renewed. Undo the two screws that hold the fixed contact, slacken the retaining nut, and remove the low-tension wire, which will allow the points to be lifted off. Removal of the circlip on the end of the pivot pin will permit the moving contact point to be detached. Note the arrangement of the insulating washers.
3 The points should be dressed with an oil stone or fine emery cloth to remove deposits due to arcing. Keep them absolutely square throughout the dressing operation, otherwise they will make angular contact on reassembly, and rapidly burn away. If emery cloth is used, it should be backed by a flat strip of steel. If it is necessary to remove a substantial amount of material before the faces can be restored, the points should be renewed.
4 Refit the contacts with the peg on the fixed contact rear face inserted into the hole in the mounting plate, then reverse the disassembly procedure, making quite certain that the insulating washers are fitted in the correct way. In order for the ignition system to function at all, the moving contact and the low-tension lead must be perfectly insulated from the fixed contact. Apply a very light smear of grease to the pivot pin, before refitting the moving contact.
5 Adjustment is carried out by slackening the screws on the base of the fixed contact, and adjusting the gap within the range 0.3 – 0.4 mm (0.012 – 0.016 in) when the points are fully open, by moving the fixed contact with a screwdriver between the screw head and the two raised ears. Retighten the two screws after adjustment with the feeler gauge and re-check the gap. Do not forget to double check after you have tightened the setting screws, in case the setting has altered.
6 Before replacing the cover and gasket, place a slight smear of grease on the cam and a few drops of oil on the felt pad. Do not over lubricate for fear of oil getting on the points, and causing poor electrical contact.



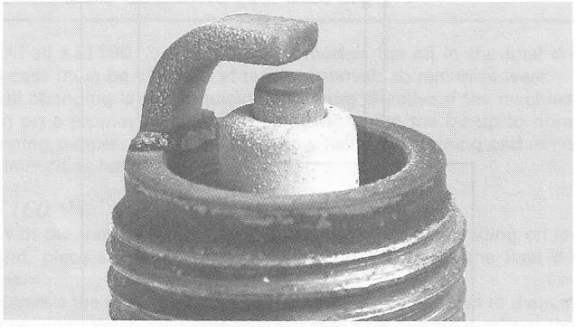
1 *Baseplate*
2 *Fixed contact*
3 *Bolt*
4 *Washer*
5 *Moving contact*
6 *Large insulator*
7 *Small insulator*
8 *Circlip*
9 *Washer*
10 *Large insulator*
11 *Low tension lead*
12 *Flat washer*
13 *Spring washer*
14 *Nut*
15 *Screw*
16 *Spring washer*
17 *Flat washer*

Fig. 1.5 Contact breaker assembly – KLT200 A1 (Sec 22)

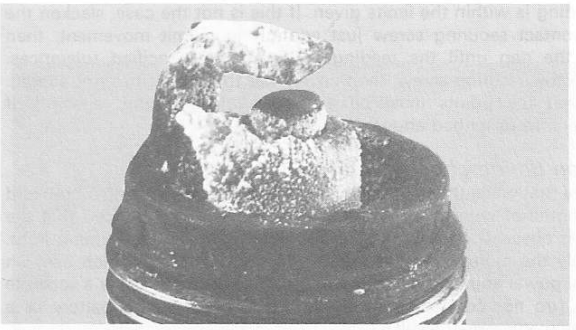
Spark plug maintenance: Checking plug gap with feeler gauges



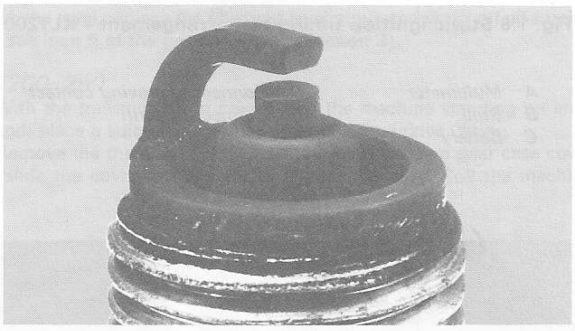
Altering the plug gap. Note use of correct tool



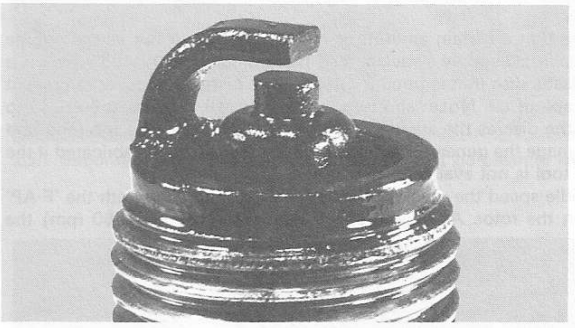
Spark plug conditions: A brown, tan or grey firing end is indicative of correct engine running conditions and the selection of the appropriate heat rating plug



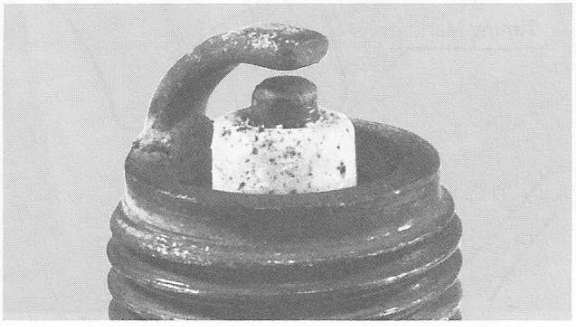
White deposits have accumulated from excessive amounts of oil in the combustion chamber or through the use of low quality oil. Remove deposits or a hot spot may form



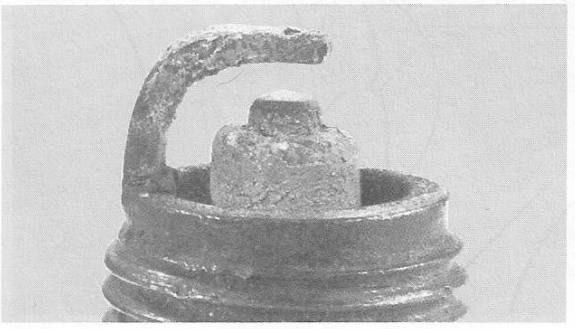
Black sooty deposits indicate an over-rich fuel/air mixture, or a malfunctioning ignition system. If no improvement is obtained, try one grade hotter plug



Wet, oily carbon deposits form an electrical leakage path along the insulator nose, resulting in a misfire. The cause may be a badly worn engine or a malfunctioning ignition system



A blistered white insulator or melted electrode indicates over-advanced ignition timing or a malfunctioning cooling system. If correction does not prove effective, try a colder grade plug



A worn spark plug not only wastes fuel but also overloads the whole ignition system because the increased gap requires higher voltage to initiate the spark. This condition can also affect air pollution

Adjustment using a dwell meter

7 Dwell meters, available from most auto accessory shops, provide a much more accurate setting by measuring, in terms of degrees (or percentage) of crankshaft rotation, the time that the points remain closed; this being done while the engine is running. Since most dwell meters are designed for use with auto distributors with more than one points cam lobes, the true reading must be calculated from that measured as follows, the specified dwell angle being 97 to 112° (26.5 to 31.0%):

Meter setting	Reading
1 cylinder	97 – 112° (26.5 – 31.0%)
2 cylinders	48.5 – 56.0° (13.0 – 16.0%)
3 cylinders	32.0 – 37.5° (8.5 – 10.5%)
4 cylinders	24.0 – 28.0° (6.5 – 8.0%)

8 Set the dwell tester in the appropriate position, then connect the positive (+) probe to the moving contact terminal, and the negative (−) probe to the crankcase. With the engine running at idle speed, check that the reading is within the limits given. If this is not the case, slacken the fixed contact securing screw just enough to permit movement, then adjust the gap until the reading is within the specified tolerances. Tighten the securing screw, then check that the setting has not altered. Note that the points must be examined, cleaned and renewed, if necessary, as described above.

Ignition timing check

9 Note that while the timing can be checked statically using a bulb and two lengths of wire to make a test circuit, it is recommended that the timing is checked with the engine running, using a strobe timing light. Use only the more expensive xenon-tube type of lamp which uses an external power source such as the household mains supply or a separate battery (do not connect a strobe to the machine's own battery or a spurious reading may result).

10 First check that the points are clean and correctly adjusted as described above, then connect the strobe, following its manufacturer's instructions, to the spark plug (or its HT lead). Start the engine and allow it to idle, then aim the light at the inspection window in the crankcase left cover.

11 Note that a certain amount of oil will be thrown out as the engine runs. Kawasaki supply a special tool, part number 57001-405 which is a clear plastic disc that is fitted in place of the inspection cover to prevent the escape of oil. **Note:** shorter screws (15 – 18 mm) must be used to mount the disc as the standard cover retaining screws are too long and may damage the generator wiring. A similar cover can be fabricated if the special tool is not available.

12 At idle speed the crankcase index mark should align with the 'F·AP' mark on the rotor. As engine speed increases (1300 – 1660 rpm) the timing begins to advance progressively until full advance (see accompanying illustration) is reached at 2800 – 3200 rpm.

13 To adjust the timing slacken the mounting plate retaining screws and move the plate until the timing marks align, then tighten the screws and recheck the setting.

14 When the timing is correct stop the engine and re-check the contact breaker gap; if this has altered the procedure must be repeated until both contact breaker gap and ignition timing are correct.

15 If the timing is correct at only one engine speed the advancer assembly should be checked carefully for wear and renewal if necessary.

16 Replace the inspection covers and their gaskets. Note that the O-rings must be pushed against the heads of the crankcase cover retaining screws to prevent damage as they are tightened.

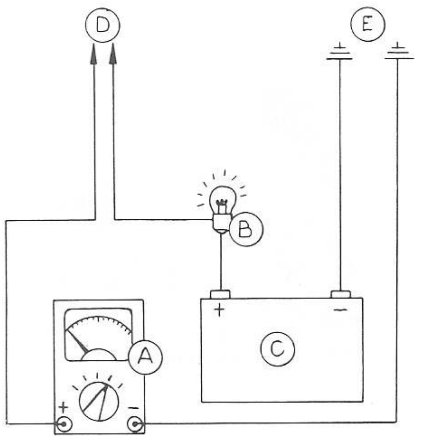
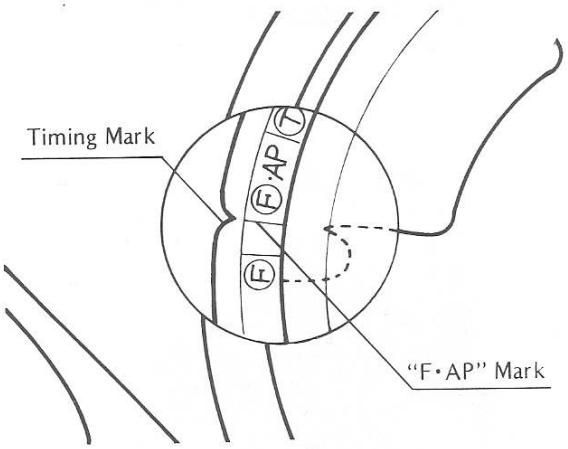
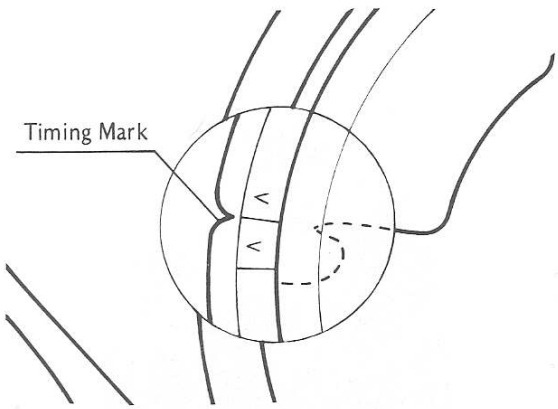


Fig. 1.6 Static ignition timing test arrangement – KLT200 A1 (Sec 22)

A Multimeter
B Bulb
C Battery
D Connect to moving contact
E Connect to earth



Static/low speed



High speed

Fig. 1.7 Ignition timing marks – KLT200 A1 (Sec 22)

23 Clean the spark arrester

1 All models except KLT200 A and 250 A1 are fitted with a removable spark arrester which must be cleaned regularly.
2 Unscrew the retaining bolt and draw the spark arrester out of the muffler end.
3 Scrub the spark arrester with a wire brush to remove all carbon deposits.
4 With the machine in neutral in a well-ventilated area and far away from any combustible materials, start the engine and tap sharply on the muffler with a rubber mallet to jar free any carbon deposits; these will then be blown out of the muffler.
5 Refit the spark arrester and tighten securely the retaining screw. Never use the machine with the spark arrester removed.

24 Change the final drive gear case oil

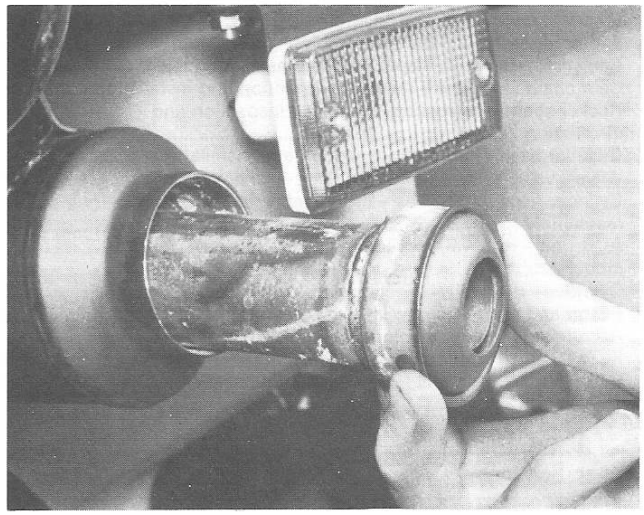
1 On all KLT160, 200 C, 250 C, P, models the oil in the final drive gear case must be changed at regular intervals to minimise wear.
2 Oil changing is much quicker and more effective if the machine is taken on a journey of sufficient length to warm the oil up to normal operating temperature; it will then flow faster on draining and remove any impurities held in suspension.

KLT160

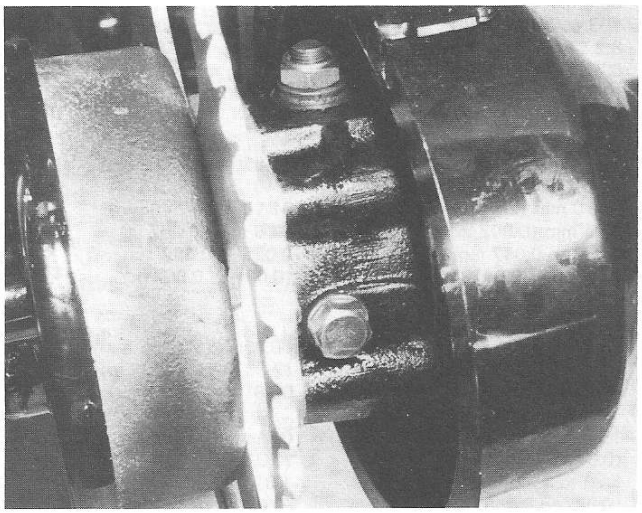
3 With the transmission in neutral and the machine standing on level ground, place a container of sufficient capacity under the final drive casing.
4 Remove the filler, level and drain plugs and allow the oil to drain into the container. Wash the plugs and examine their sealing washers; these should be renewed if worn, flattened or damaged.
5 When all the oil has drained, wipe clean the drain plug orifice and replace the plug, tightening it to its specified torque setting.
6 Fill the casing with the specified quantity of the recommended oil. Check the level, replace the filler and level plugs and wash off all surplus oil – see item 5 of the pre-ride check (Section 3).

KLT200, 250

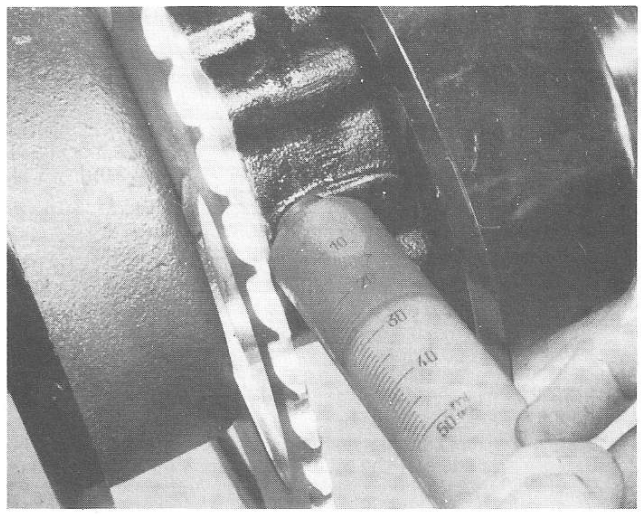
4 With the transmission in neutral and the machine standing on level ground, place a suitable container under the final drive casing.
5 Remove the three bolts which secure the final drive gear case cover and slide the cover to the right to expose the case. Roll the machine forwards or backwards until the drain plug is underneath the axle. Remove the drain plug and allow the oil to drain into the container.
6 Wash the drain plug and examine its sealing washer; this should be renewed if it is worn, flattened or damaged.
7 When all the oil has drained out roll the machine forwards until the drain plug is now uppermost and pour in the specified quantity of the recommended oil.
8 Check the level (see Section 10) before replacing the drain plug and washing off all surplus oil as described. Slide the cover into place and tighten securely its retaining bolts.
9 **Note:** The differentials on some early versions of these models were packed with grease at the factory. Kawasaki now recommend that if one of these is encountered the rear axle must be removed and disassembled so that the grease can be cleaned out. The axle should then be rebuilt and filled with the specified type, viscosity and quantity of oil. **Do not** try to shorten this task by flushing the case with solvent, or similar, to remove the grease.



23.1 Separate spark arrester (where fitted) must be cleaned regularly



24.5 Remove final drive gear case cover to drain oil – KLT200 C, 250 C, P ...



24.7 ... fill gear case with specified quantity of recommended oil

Chapter 2 Engine, clutch and transmission

Contents

Specifications

	KLT110	KLT160
Engine		
Type	Air cooled, single cylinder, overhead camshaft, 4-stroke	
Bore	51 mm (2.008 in)	61 mm (2.401 in)
Stroke	50.6 mm (1.992 in)	52.4 mm (2.063 in)
Capacity	103 cc (6.28 cu in)	153 cc (9.33 cu in)
Compression ratio	8.2 : 1	9.5 : 1
Maximum torque	0.77 kg m (5.57 lb ft) at 6000 rpm	1.25 kg m (9.04 lb ft) at 6500 rpm
Cylinder barrel		
Standard bore	51.0 to 51.12 mm (2.0078 to 2.0083 in)	60.990 to 61.002 mm 2.4012 to 2.4016 in)
Service limit	51.10 mm (2.012 in)	61.10 mm (2.405 in)
Barrel to head face distortion limit	0.05 mm (0.002 in)	0.05 mm (0.002 in)
Bore to piston clearance	0.020 to 0.047 mm (0.0008 to 0.0018 in)	0.025 to 0.052 mm (0.001 to 0.002 in)
Piston		
Outside diameter	50.965 to 50.980 mm (2.0065 to 2.0071 in)	60.950 to 60.965 mm) (2.3996 to 2.4002 in)
Service limit	50.83 mm (2.001 in)	60.81 mm (2.394 in)
Ring groove width:		
Top	1.20 to 1.22 mm (0.047 to 0.048 in)	0.81 to 0.83 mm (0.032 to 0.033 in)
Second	1.20 to 1.22 mm (0.047 to 0.048 in)	1.02 to 1.04 mm (0.040 to 0.041 in)
Oil	2.50 to 2.52 mm (0.098 to 0.099 in)	2.51 to 2.53 mm (0.099 to 0.10 in)
Service limit:		
Top	1.30 mm (0.051 in)	0.91 mm (0.036 in)
Second	1.30 mm (0.051 in)	1.12 mm (0.044 in)
Oil	2.60 mm (0.102 in)	2.61 mm (0.103 in)

Piston rings	KLT110	KLT160
Ring groove clearance:		
Top	0.01 to 0.05 mm (0.0004 to 0.002 in)	0.015 to 0.065 mm (0.0006 to 0.0025 in)
Second	0.010 to 0.045 mm (0.0004 to 0.0017 in)	0.03 to 0.07 mm (0.0012 to 0.0027 in)
Service limit:		
Top and second	0.15 mm (0.006 in)	0.17 mm (0.0067 in)
End gap:		
Top	0.10 to 0.30 mm (0.004 to 0.012 in)	0.15 to 0.30 mm (0.006 to 0.012 in)
Second	0.15 to 0.30 mm (0.006 to 0.012 in)	0.15 to 0.35 mm (0.006 to 0.014 in)
Service limit:		
Top and second	0.6 mm (0.023 in)	0.6 mm (0.023 in)
Thickness:		
Top	1.170 to 1.190 mm (0.046 to 0.047 in)	0.765 to 0.795 mm (0.030 to 0.031 in)
Second	1.175 to 1.190 mm (0.046 to 0.047 in)	0.97 to 0.99 mm (0.038 to 0.039 in)
Service limit:		
Top	1.10 mm (0.043 in)	0.70 mm (0.027 in)
Second	1.10 mm (0.043 in)	0.90 mm (0.035 in)
Cylinder head		
Head to barrel face distortion limit	0.05 mm (0.002 in)	0.05 mm (0.002 in)
Valves		
Stem bend limit	0.05 mm (0.002 in)	0.05 mm (0.002 in)
Stem diameter:		
Inlet	5.495 to 5.510 mm (0.216 to 0.217 in)	5.495 to 5.510 mm 0.216 to 0.217 in)
Exhaust	5.480 to 5.495 mm (0.215 to 0.216 in)	5.480 to 5.495 mm (0.215 to 0.216 in)
Service limit:		
Inlet	5.48 mm (0.2157 in)	5.48 mm (0.2157 in)
Exhaust	5.47 mm (0.2153 in)	5.47 mm (0.2153 in)
Guide bore diameter:		
Inlet and exhaust	5.520 to 5.532 mm (0.2173 to 0.2178 in)	5.520 to 5.532 mm (0.2173 to 0.2178 in)
Service limit	5.60 mm (0.220 in)	5.60 mm (0.220 in)
Head thickness:		
Inlet	0.55 to 0.85 mm (0.021 to 0.033 in)	0.55 to 0.85 mm (0.021 to 0.033 in)
Exhaust	0.85 to 1.15 mm (0.033 to 0.045 in)	0.85 to 1.15 mm (0.033 to 0.045 in)
Service limit:		
Inlet	0.4 mm (0.016 in)	0.4 mm (0.016 in)
Exhaust	0.5 mm (0.019 in)	0.5 mm (0.019 in)
Seat surface diameter:		
Inlet	25.1 to 25.3 mm (0.988 to 0.996 in)	28.9 to 29.1 mm (1.137 to 1.145 in)
Exhaust	22.2 mm (0.874 in)	24.9 to 25.1 mm (0.980 to 0.988 in)
Seat surface angle:		
Inlet and exhaust	45°	45°
Seat width:		
Inlet	0.80 to 1.15 mm (0.031 to 0.045 in)	0.5 to 1.0 mm (0.019 to 0.039 in)
Exhaust	0.85 to 1.15 mm (0.033 to 0.045 in)	0.5 to 1.0 mm (0.019 to 0.039 in)
Valve clearance (cold):		
Inlet	0.12 to 0.17 mm (0.004 to 0.006 in)	0.12 to 0.17 mm (0.004 to 0.006 in)
Exhaust	0.12 to 0.17 mm (0.004 to 0.006 in)	0.18 to 0.23 mm (0.007 to 0.009 in)
Valve timing		
Inlet:		
Opens	20° BTDC	35° BTDC
Closes	40° ABDC	45° ABDC
Duration	240°	260°

	KLT110	KLT160
Exhaust:		
Opens	40°BBDC	55° BBDC
Closes	20° ATDC	25° ATDC
Duration	240°	260°
Valve springs		
Free length:		
Inner	33.5 mm (1.319 in) – standard 34.8 mm (1.370 in) – closed coil end	37.8 mm (1.488 in)
Outer	36.8 mm (1.449 in) – standard 37.5 mm (1.476 in) – closed coil end	40.35 mm (1.588 in)
Service limit:		
Inner	32.0 mm (1.260 in) – standard 33.2 mm (1.307 in) – closed coil end	36.2 mm (1.425 in)
Outer	35.5 mm (1.397 in) – standard 36.0 mm (1.417 in) – closed coil end	38.7 mm (1.523 in)
Camshaft		
Cam height:		
Inlet and exhaust	28.750 to 28.858 mm (1.132 to 1.136 in)	40.071 to 40.179 mm (1.577 to 1.582 in)
Service limit	28.65 mm (1.128 in)	39.97 mm (1.573 in)
Camshaft chain		
Length over 20 links	127 to 127.48 mm (5 to 5.02 in)	127 to 127.36 mm (5 to 5.014 in)
Service limit	128.9 mm (5.074 in)	129.9 mm (5.114 in)
Rockers		
Arm bore diameter	10 to 10.015 mm (0.393 to 0.394 in)	13 to 13.018 mm (0.511 to 0.512 in)
Service limit	10.05 mm (0.395 in)	13.05 mm (0.514 in)
Shaft diameter	9.980 to 9.995 mm (0.392 to 0.393 in)	12.976 to 12.994 mm (0.510 to 0.511 in)
Service limit	9.95 mm (0.391 in)	12.96 mm (0.510 in)
Crankshaft		
Maximum runout	0.1 mm (0.004 in)	0.1 mm (0.004 in)
Maximum connecting rod bend	0.2 mm (0.008 in)	0.2 mm (0.008 in)
Maximum connecting rod twist	0.2 mm (0.008 in)	0.2 mm (0.008 in)
Connecting rod big-end clearance:		
Radial	0.008 to 0.22 mm (0.0003 to 0.008 in)	0.008 to 0.019 mm (0.0003 to 0.0007 in)
Service limit	0.07 mm (0.003 in)	0.07 mm (0.003 in)
Side	0.3 to 0.5 mm (0.012 to 0.019 in)	0.2 to 0.3 mm (0.008 to 0.012 in)
Service limit	0.7 mm (0.003 in)	0.5 mm (0.019 in)
Clutch		
Primary clutch:		
Type	N/App	Centrifugal
Housing inside diameter		116.0 to 116.2 mm (4.567 to 4.574 in)
Service limit		116.5 mm (4.586 in)
Shoe groove depth		1.0 to 1.3 mm (0.039 to 0.051 in)
Service limit		0.5 mm (0.019 in)
Main clutch:		
Type	Wet, multiplate	
Friction plate thickness	2.95 to 3.05 mm (0.116 to 0.120 in)	2.8 to 2.9 mm (0.110 to 0.114 in)
Service limit	2.6 mm (0.102 in)	2.4 mm (0.094 in)
Friction and plain plate maximum warpage	0.3 mm (0.012 in)	0.3 mm (0.012 in)
Spring free length	N/Av	24 to 25 mm (0.945 to 0.984 in)
Service limit	N/Av	23.5 mm (0.925 in)

Transmission	KLT110	KLT160
Type	5-speed, constant mesh	
Gear ratios (no of teeth):		
1st	3.307 : 1 (43/13)	3.076 : 1 (40/13)
2nd	2.111 : 1 (38/18)	1.842 : 1 (35/19)
3rd	1.545 : 1 (34/22)	1.304 : 1 (30/23)
4th	1.285 : 1 (27/21)	1.076 : 1 (28/26)
5th	1.111 : 1 (30/27)	0.928 : 1 (26/28)
Reverse	N/App	3.384 : 1 (28/13x33/21)
Shift fork claw and thickness	4.9 to 5.0 mm (0.193 to 0.197 in)	4.9 to 5.0 mm (0.193 to 0.197 in)
Service limit	4.8 mm (0.189 in)	4.8 mm (0.189 in)
Shift fork guide pin diameter	4.9 to 5.0 mm (0.193 to 0.197 in)	5.9 to 6.0 mm (0.232 to 0.236 in)
Service limit	4.8 mm (0.189 in)	5.8 mm (0.228 in)
Pinion groove width	5.05 to 5.15 mm (0.199 to 0.203 in)	5.05 to 5.15 mm (0.199 to 0.203 in)
Service limit	5.3 mm (0.209 in)	5.3 mm (0.209 in)
Shift drum groove width	5.05 to 5.20 mm (0.199 to 0.205 in)	6.05 to 6.20 mm (0.238 to 0.244 in)
Service limit	5.3 mm (0.209 in)	6.3 mm (0.248 in)

Primary drive		
Reduction ratio (no of teeth)	3.619 : 1 (76/21)	3.695 : 1 (85/23)
Pinion backlash	N/Av	0.02 to 0.11 mm (0.0007 to 0.004 in)
Service limit	N/Av	0.14 mm (0.005 in)
Primary pinion bore diameter	22.020 to 22.041 mm (0.866 to 0.867 in)	24.0 to 24.021 mm (0.944 to 0.945 in)
Service limit	22.05 mm (0.868 in)	24.03 mm (0.946 in)
Crankshaft (pinion contact surface) diameter	N/App	23.959 to 23.980 mm (0.943 to 0.944 in)
Service limit	N/App	23.94 mm (0.942 in)
Primary pinion collar diameter	21.972 to 21.993 mm (0.865 to 0.866 in)	N/App
Service limit	21.95 mm (0.864 in)	N/App
Secondary pinion bore diameter	N/App	25.0 to 25.021 mm (0.984 to 0.985 in)
Service limit	N/App	25.03 mm (0.9854 in)
Secondary pinion collar diameter	N/App	24.970 to 24.985 mm (0.983 to 0.984 in)
Service limit	N/App	24.95 mm (0.982 in)

Final drive		
System type	Chain	Shaft
Reduction ratio (no of teeth)	4.166 : 1 (50/12)	3.712 : 1 (21/18 x 35/11)
Gearbox sprocket diameter	41.10 to 41.30 mm (1.618 to 1.626 in)	N/App
Service limit	40.4 mm (1.590 in)	N/App
Overall drive ratio (in top gear)	16.754 : 1	12.738 : 1

Torque wrench settings – kgf m (lbf ft)		
Component		
Cylinder head bolts:		
6 mm	1.0 (7.2)	1.0 (7.2)
8 mm	2.2 (16.0)	2.5 (18.0)
Camshaft sprocket bolt(s)	1.2 (8.6)	3.0 (22.0)
Valve clearance adjuster locknuts	0.9 (6.5)	1.2 (8.6)
Inlet stub bolts	1.0 (7.2)	N/Av
External oil pipe union bolts	1.8 (13.0)	1.5 (11.0)
Oil drain plug	3.0 (22.0)	2.0 (14.5)
Oil filter	N/App	2.0 (14.5)
Primary clutch hub nut	N/App	8.0 (58.0)
Main clutch:		
Hub nut	N/App	8.0 (58.0)
Spring plate bolts	N/App	1.5 (11.0)
Drum nut	6.3 (46.0)	N/App
Secondary gear nut	7.3 (53.0)	N/App
Recoil starter:		
Ratchet cover nut	N/App	1.2 (8.6)
Pulley bolt	N/App	6.0 (43.0)
Gearshift:		
Drum bearing plate screws	N/App	0.9 (6.5)
Return spring pin and cam pin	N/App	4.5 (33.0)

	KLT110	KLT160
Final drive:		
Bevel gear nuts	N/App	8.0 (58.0)
Gear and damper casing bolts	N/App	2.5 (18.0)
Bearing holder	N/App	8.0 (58.0)
Engine to mounting bracket bolts	3.0 (22.0)	3.0 (22.0)
Mounting bracket to frame bolts	1.8 (13.0)	2.0 (14.5)

Engine

	KLT200	KLT250–1982	KLT250–1983 on
Type	Air cooled, single cylinder, overhead camshaft, 4-stroke		
Bore	66 mm (2.598 in)	70 mm (2.756 in)	70.5 mm (2.775 in)
Stroke	58 mm (2.283 in)	64 mm (2.519 in)	64 mm (2.519 in)
Capacity	198 cc (12.08 cu in)	246 cc (15.01 cu in)	249 cc (15.19 cu in)
Compression ratio	9.0 : 1	8.9 : 1	9.3 : 1
Maximum torque	1.5 kg m (10.85 lb ft) at 6000 rpm	N/Av	2.0 kg m (14.47 lb ft) at 6500 rpm

Cylinder barrel

Standard bore	66.0 to 66.008 mm (2.5984 to 2.5987 in)	69.988 to 70.0 mm (2.7554 to 2.7559 in)	70.500 to 70.512 mm (2.7755 to 2.7760 in)
Service limit	66.10 mm (2.602 in)	70.01 mm (2.7563 in)	70.60 mm (2.780 in)
Barrel to head face distortion limit	0.05 mm (0.002 in)	0.05 mm (0.002 in)	0.05 mm (0.002 in)
Bore to piston clearance	0.035 to 0.058 mm (0.0014 to 0.0023 in)	0.031 to 0.058 mm (0.0012 to 0.0023 in)	0.035 to 0.062 mm (0.0014 to 0.0024 in)

Piston

Outside diameter	65.950 to 65.965 mm (2.5964 to 2.5970 in)	69.942 to 69.957 mm (2.7536 to 2.7542 in)	70.450 to 70.465 mm (2.7736 to 2.7742 in)
Service limit	65.80 mm (2.5905 in)	69.80 mm (2.7480 in)	70.30 mm (2.7677 in)

	KLT200	KLT250
Gudgeon pin hole diameter	17.006 to 17.011 mm (0.6695 to 0.6697 in)	17.005 to 17.011 mm (0.6694 to 0.6697 in)
Service limit	17.08 mm (0.672 in)	17.08 mm (0.672 in)
Gudgeon pin outside diameter	16.995 to 17.0 mm (0.6691 to 0.6693 in)	16.995 to 17.0 mm (0.6691 to 0.6693 in)
Service limit	16.96 mm (0.667 in)	16.96 mm (0.667 in)
Ring groove width:		
Top	1.50 to 1.52 mm (0.059 to 0.060 in)	1.23 to 1.25 mm (0.0484 to 0.0492 in)
Second	1.50 to 1.52 mm (0.059 to 0.060 in)	1.22 to 1.24 mm (0.0480 to 0.0488 in)
Oil	2.50 to 2.52 mm (0.098 to 0.099 in)	2.51 to 2.53 mm (0.099 to 0.10 in)
Service limit:		
Top	1.60 mm (0.063 in)	1.33 mm (0.052 in)
Second	1.60 mm (0.063 in)	1.32 mm (0.052 in)
Oil	2.60 mm (0.102 in)	2.61 mm (0.103 in)

Piston rings

Ring to groove clearance:		
Top	0.045 to 0.080 mm (0.002 to 0.003 in)	0.040 to 0.080 mm (0.001 to 0.003 in)
Second	0.010 to 0.050 mm (0.0004 to 0.002 in)	0.030 to 0.070 mm (0.001 to 0.0025 in)
Service limit:		
Top	0.18 mm (0.007 in)	0.18 mm (0.007 in)
Second	0.15 mm (0.006 in)	0.17 mm (0.0067 in)
End gap (fitted):		
Top and second	0.2 to 0.4 mm (0.008 to 0.016 in)	0.3 to 0.05 mm (0.012 to 0.019 in)
Service limit:		
Top and second	0.7 mm (0.027 in)	0.8 mm (0.031 in)
End gap (free):		
Top	Approx 9 mm (0.354 in)	Approx 7 mm (0.275 in)
Second	Approx 10.5 mm (0.413 in)	Approx 8 mm (0.315 in)
Service limit:		
Top	8.10 mm (0.319 in)	6.30 mm (0.248 in)
Second	9.50 mm (0.374 in)	7.20 mm (0.283 in)

	KLT200	KLT250
Thickness		
Top	1.440 to 1.455 mm (0.056 to 0.057 in)	1.17 to 1.19 mm (0.046 to 0.047 in)
Second	1.470 to 1.490 mm (0.057 to 0.058 in)	1.17 to 1.19 mm (0.046 to 0.047 in)
Service limit:		
Top	1.37 mm (0.054 in)	1.10 mm (0.043 in)
Second	1.40 mm (0.055 in)	1.10 mm (0.043 in)

Cylinder head

	KLT200 and 250
Head to barrel face distortion limit	0.05 mm (0.002 in)

Valves

Stem bend limit	0.05 mm (0.002 in)
Stem diameter:	
Inlet	6.965 to 6.980 mm (0.274 to 0.275 in)
Exhaust	6.950 to 6.970 mm (0.273 to 0.274 in)
Service limit:	
Inlet and exhaust	6.90 mm (0.271 in)
Guide bore diameter:	
Inlet and exhaust	7.0 to 7.015 mm (0.275 to 0.276 in)
Service limit	7.08 mm (0.278 in)
Stem to guide (wobble) clearance:	
Inlet	0.049 to 0.123 mm (0.002 to 0.005 in)
Exhaust	0.076 to 0.166 mm (0.003 to 0.006 in)
Service limit:	
Inlet	0.25 mm (0.009 in)
Exhaust	0.26 mm (0.010 in)
Head thickness:	
Inlet and exhaust	0.80 to 1.20 mm (0.031 to 0.047 in)
Service limit	0.70 mm (0.027 in)
Seat surface diameter:	
Inlet	35.7 to 36.3 mm (1.405 yo 1.429 in)
Exhaust	29.7 to 30.3 mm (1.169 to 1.193 in)
Seat angles:	
Inlet and exhaust	60°/45°/30°
Seat width:	
Inlet and exhaust	0.5 to 1.0 mm (0.02 to 0.04 in)
Valve clearance (cold):	
Inlet	0.08 to 0.13 mm (0.003 to 0.005 in)
Exhaust	0.17 to 0.22 mm (0.006 to 0.009 in)

Valve timing

Inlet:	
Opens	32° BTDC
Closes	60° ABDC
Duration	272°
Exhaust:	
Opens	67° BBDC
Closes	25° ATDC
Duration	272°
Overlap	57°

Valve springs

Limit of squareness:	
Inlet and exhaust	1.5 mm (0.06 in)

Camshaft

Cam height:	
Inlet and exhaust	40.643 to 40.783 mm (1.600 to 1.605 in)
Service limit	40.55 mm (1.596 in)
Journal minimum diameter:	
Large	43.91 mm (1.728 in)*
Small	21.92 mm (0.863 in)
Bearing maximum inside diameter:	
Large	44.09 mm (1.736 in)*
Small	22.06 mm (0.868 in)

*Not applicable on later models where camshaft is fitted with ball bearing

Camshaft chain

Length over 20 links	160 to 160.20 mm (6.29 to 6.30 in)
Service limit	162.40 mm (6.40 in)

Guide groove maximum depth:	
Front	2.0 mm (0.08 in)
Rear	1.5 mm (0.06 in)
Tensioner spring free length	75 mm (2.95 in)
Service limit	71.30 mm (2.81 in)

Rockers

Arm bore diameter	13 to 13.018 mm (0.511 to 0.512 in)
Service limit	13.05 mm (0.514 in)
Shaft diameter	12.976 to 12.994 mm (0.510 to 0.511 in)
Service limit	12.95 mm (0.510 in)

Crankshaft

Maximum runout:	
Left-hand side	0.08 mm (0.003 in)
Right-hand side	0.10 mm (0.004 in)
Crankpin minimum diameter	28.98 mm (1.141 in)
Connecting rod big-end:	
Maximum inside diameter	39.04 mm (1.537 in)
Minimum width	21.50 mm (0.846 in)
Thrust washer minimum thickness	1.10 mm (0.043 in)
Maximum radial clearance	0.07 mm (0.003 in)
Maximum side clearance	0.60 mm (0.023 in)
Connecting rod:	
Maximum bend	0.20 mm (0.008 in)
Maximum twist	0.20 mm (0.008 in)
Small-end maximum inside diameter	17.05 mm (0.671 in)

Clutch

Type	Wet, multiplate
Friction plate minimum thickness	2.5 mm (0.10 in)
Friction and plain plate maximum warpage	0.3 mm (0.012 in)
Friction plate to drum clearance	0.04 to 0.45 mm (0.001 to 0.017 in)
Service limit	0.65 mm (0.025 in)
Drum to primary pinion backlash	0.02 to 0.11 mm (0.0007 to 0.004 in)
Service limit	0.15 mm (0.006 in)
Drum bore diameter	20 to 20.021 mm (0.787 to 0.788 in)
Service limit	20.03 mm (0.789 in)
Input shaft diameter (at drum centre)	19.959 to 19.980 mm (0.786 to 0.787 in)
Service limit	19.94 mm (0.785 in)
Operating lever free play	2 to 3 mm (0.08 to 0.12 in)

Transmission

	KLT200 – 1981/82 and KLT250 – 1982	KLT200 – 1983 on and KLT250 – 1983 on
Type	5-speed constant mesh	5-speed constant mesh
Primary reduction ratio	3.737 : 1 (71/19)	3.285 : 1 (69/21)
Gear ratios (no of teeth):		
1st	2.636 : 1 (29/11)	3.400 : 1 (34/10)
2nd	1.733 : 1 (26/15)	2.077 : 1 (27/13)
3rd	1.300 : 1 (26/20)	1.444 : 1 (26/18)
4th	1.050 : 1 (21/20)	1.050 : 1 (21/20)
5th	0.905 : 1 (19/21)	0.833 : 1 (20/24)
Final reduction ratio	3.846 : 1 (50/13)	3.846 : 1 (50/13)
Overall drive ratio (in top gear)	13.003 : 1	10.531 : 1

	KLT200 and 250
Shift fork claw end thickness	4.4 to 4.5 mm (0.173 to 0.177 in)
Service limit	4.2 mm (0.165 in)
Shift fork guide pin diameter	5.9 to 6.0 mm (0.232 to 0.236 in)
Service limit	5.85 mm (0.230 in)
Pinion groove width	4.55 to 4.65 mm (0.179 to 0.183 in)
Service limit	4.75 mm (0.187 in)
Shift drum groove width	6.05 to 6.20 mm (0.238 to 0.244 in)
Service limit	6.25 mm (0.246 in)
Pinion to shaft clearances:	
4th and 5th input, 2nd and 3rd output	0.027 to 0.069 mm (0.001 to 0.003 in)
Service limit	0.17 mm (0.006 in)
1st output	0.016 to 0.046 mm (0.0006 to 0.002 in)
Service limit	0.15 mm (0.006 in)

Final drive

System type	Chain
Gearbox sprocket diameter	55.69 to 55.49 mm (2.192 to 2.184 in)
Service limit	54.8 mm (2.157 in)

Kickstart

	KLT200 – 1981
Gearbox input shaft to idle pinion clearance	0.020 to 0.062 mm (0.0008 to 0.002 in)
Service limit	0.16 mm (0.006 in)
Gearbox output shaft to idle pinion clearance	0.032 to 0.061 mm (0.001 to 0.002 in)
Service limit	0.16 mm (0.006 in)
Kickstart pinion bore diameter	16.500 to 16.518 mm (0.649 to 0.650 in)
Service limit	16.56 mm (0.652 in)
Kickstart shaft diameter (at pinion centre)	16.466 to 16.484 mm (0.648 to 0.649 in)
Service limit	16.44 mm (0.647 in)

Torque wrench settings – kgf m (lbf ft)

Component	KLT200A	KLT200 B/C	KLT250
Cylinder head bolts	2.6 (19.0)	2.6 (19.0)	2.6 (19.0)
Cylinder barrel base bolt	0.9 (6.5)	0.9 (6.5)	0.9 (6.5)
ATU bolt	0.9 (6.5)	N/App	N/App
Camshaft:			
Sprocket bolts	1.5 (11.0)	4.1 (30.0)	1.5 (11.0) – A1 4.1 (30.0) – A2, C1, P1
Chain guide bolts	1.0 (7.2)	N/Av	N/Av
Chain tensioner lock bolt	1.0 (7.2)	N/App	N/App
Valve clearance adjuster locknuts	1.2 (8.6)	1.2 (8.6)	1.2 (8.6)
AC generator bolt	6.0 (43.0)	6.0 (43.0)	6.0 (43.0)
Primary gear/oil pump drive bolt	6.0 (43.0)	6.0 (43.0)	6.0 (43.0)
Oil drain plug	3.0 (22.0)	3.0 (22.0)	3.0 (22.0)
Clutch spring bolts	1.0 (7.2)	1.0 (7.2)	1.0 (7.2)
Kickstart ratchet stop bolts	0.9 (6.5)	N/App	N/App
Electric start clutch bolts	3.5 (25.0)	3.5 (25.0)	3.5 (25.0)
Gearshift:			
Drum cam bolt	N/App	1.9 (13.5)	1.9 (13.5)
Drum detent bolt	2.8 (20.0)	N/App	2.8 (20.0)
Drum bearing plate screws	1.9 (13.5)	N/Av	N/Av
Neutral switch	1.5 (11.0)	1.5 (11.0)	1.5 (11.0)
Gearbox sprocket nut	8.0 (58.0)	8.0 (58.0)	8.0 (58.0)
Engine mounting bolts:			
Rear	3.0 (22.0)	3.0 (22.0)	3.0 (22.0)
Top	1.8 (13.0)	1.8 (13.0)	1.8 (13.0)

1 General information

All models use a single-cylinder engine unit with a chain-driven overhead camshaft. Starting is by a recoil starter assembly on KLT110, 160 models, this being fitted on the crankshaft left end, while all KLT 200 and 250 models are fitted with electric starter motors. These drive the engine via a chain and a one-way clutch mounted on the rear of the generator motor. Later KLT200 and 250 models are fitted with a single-shaft balancer to cancel out most of the vibration inherent in any single-cylinder engine. The KLT200 A1 model only is fitted with a contact breaker ignition system, and a kickstart assembly is fitted to the KLT200 A1, A2 and A3 models for emergency use.

The primary drive is by a gear mounted on the crankshaft right end. KLT200 and 250 models are fitted with a conventional multi-plate clutch which connects the engine to the five-speed constant mesh transmission. A sprocket on the output shaft transmits the drive to the rear axle by chain. KLT110 models are similar but are fitted with a semi-automatic clutch mounted on the crankshaft right end which transmits the drive via a secondary gear. The clutch is released by a slickshift mechanism attached to the shift shaft.

KLT160 models are fitted with a transmission in which an automatic centrifugal clutch mounted on the crankshaft right end transmits the drive (when engine speed has risen high enough) to a secondary multi-plate clutch mounted on the input (drive) shaft. This clutch is semi-automatic in operation, being released by a slickshaft mechanism attached to the shift shaft whenever a gear is selected. The gearbox is of the constant-mesh type but incorporates an extra shaft with a reverse gear fitted. A separate lever prevents accidental selection of reverse gear by restraining the movement of the shift drum. As the KLT160 final drive is by shaft, the output shaft carries a bevel gear instead of a sprocket, with the driven bevel gear assembly incorporating a spring-loaded face cam shock absorber. A one-way sprag clutch fitted in the centrifugal clutch allows the use of engine compression to slow the machine down.

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

4 Loss of power, rough running, and high fuel consumption 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.