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Recommended oil
Suzuki Supermoto
Synthetic SAE 100W

Recommended oil
Suzuki Supermoto
Synthetic SAE 100W

Bulb
Headlight (125 cc)
High beam
Low beam
Headlight (185 cc)
High beam
Low beam
Taillight (all)

Item
Front tire
ALT
LT
Rear tire
ALT
LT
Tire tread limit (all)

Fuel tank
125 cc
185 cc
Engine/transmission
Without filter change
With filter change
After overhaul

QUICK REFERENCE DATA

TUNE-UP SPECIFICATIONS

Recommended spark plug	NGK D7EA or ND X22ES-U
Spark plug gap	0.6-0.7 mm (0.024-0.028 in.)
Ignition timing	10° BTDC below 1,900-2,100 rpm 30° BTDC above 3,400-3,600 rpm
Valve clearance (cold)	0.08-0.13 mm (0.003-0.005 in.)
Idle speed	
125 cc	1,500-1,600 rpm
185 cc	1,350-1,450 rpm
Pilot air screw	
125 cc	1 3/4 turns out
185 cc	2 1/8 turns out

REPLACEMENT BULBS

Bulb	Rating (watts)
Headlight (125 cc)	
High beam	25
Low beam	25
Headlight (185 cc)	
High beam	35
Low beam	35
Taillight (all)	5

TIRE SPECIFICATION AND INFLATION PRESSURE

Item	Tire size	Inflation pressure
Front tire		
ALT	22×11.00-8	0.15 kg/cm ² (2.2 psi)
LT	20×7.00-8	0.15 kg/cm ² (2.2 psi)
Rear tire		
ALT	22×11.00-8	0.15 kg/cm ² (2.2 psi)
LT	22×11.00-8	0.15 kg/cm ² (2.2 psi)
Tire tread limit (all)		4.0 mm (0.16 in.) min.

CAPACITIES

Fuel tank	
125 cc	5.0 liters (1.6 U.S. gal./1.1 Imp. gal.)
185 cc	8.0 liters (2.1 U.S. gal./1.7 Imp. gal.)
Engine/transmission oil (all)	
Without filter change	1100 cc (1.1 U.S. qt./0.9 Imp. qt.)
With filter change	1150 cc (1.2 U.S. qt./1.0 Imp. qt.)
After overhaul	1200 cc (1.3 U.S. qt./1.1 Imp. qt.)

GENERAL TORQUE SPECIFICATIONS

Item	mkg	ft.-lb.
Cylinder head cover bolt	0.9-11.0	6.5-8
Cylinder head nut		
6 mm	0.7-1.1	5-8
8 mm	1.5-2.0	11.0-14.5
Cylinder base nut	0.7-1.1	5-8
Spark plug	1.5-2.0	11-14
Magneto flywheel nut		
125 cc	4-6	29-43.5
185 cc	5-6	36-43
Clutch sleeve nut	6.0-8.0	43-58
Engine oil drain plug	1.8-2.0	13-14
Engine sprocket nut		
125 cc	8-10	58-72.5
185 cc	10-13	72-94
Exhaust pipe clamp nut	1.8-2.8	13-20
Muffler mounting bolt	1.8-2.8	13-20
Footrest mounting bolts		
125 cc	1.8-2.8	13-20
185 cc	2.0-3.1	14.5-22.5
Engine mounting bolts		
8 mm	2.8-3.4	20-24.5
10 mm	8.0-9.5	58.0-68.5
Front axle nuts (ALT)	3.6-5.2	26-37.5
Steering stem head bolt and nut (ALT)	3.5-5.5	25.5-40.0
Handlebar clamp bolt (ALT)	1.2-2.0	8.5-14.5
Handlebar clamp bolt (LT)	1.0-1.6	7.0-11.5
Front and rear wheel lug nuts (125 cc)	2.0-3.1	14.5-22.5
Front wheel lug nut (185 cc)	4.5-6.5	32.5-47.0
Front wheel hub nut (LT)	5.0-8.0	36-58
Front and rear wheel rim nut (125 cc)	2.0-3.1	14.5-22.5
Steering shaft clamp bolt (LT)	1.8-2.8	13-20
Steering shaft lower nut (LT)	2.0-3.5	14.5-25.5
Knuckle arm bolt (LT)	4.0-6.0	29-43.5
Tie rod end nut (LT)	4.0-6.0	29-43.5
Tie rod end locknut (LT)	2.2-3.5	16-25.5
Wishbone arm (LT185)		
Outer bolt (upper and lower)	7.0-10.0	50.5-72.5
Inner bolt (upper and lower)	4.0-6.0	29-43.5
Shock absorber bolt (LT185)	4.0-6.0	29-43.5
Rear wheel lug nut	4.5-6.5	32.5-47.0
Rear wheel hub nut	8.5-11.5	61.5-83.0
Axle housing nut	1.8-2.8	13-20
Rear axle-to-brake drum nut	5-8	36-58
Rear axle locknut	16-20	115-144.5

RECOMMENDED FUEL AND LUBRICANTS

Fuel	Unleaded or low-lead; 85-95 octane
Engine/transmission oil	SAE 10W-40, SE or SF rating
Drive chain	SAE 90 oil or chain lubricant rated for O-ring chains

CHAPTER ONE

GENERAL INFORMATION

This manual provides service and maintenance procedures for the Suzuki ALT 125, LT 125, ALT 185 and LT 185 all-terrain vehicles.

HOW TO USE THIS MANUAL

This manual has been specifically written and formatted for the amateur home mechanic. All procedures, tables, photos, etc., in this manual assume that the reader may be working on the machine or using this manual for the first time. This section is included to acquaint the home mechanic with what is in the manual and how to best take advantage of the information.

For the most frequently used general information and maintenance specifications refer to the *Quick Reference Data* pages. These pages in the front of the book represent a compilation of the most commonly “referred to” facts. The *Quick Reference Data* pages save you from searching each chapter of the manual every time this information is needed.

To save time on all maintenance tasks, use the *Index*. The *Index* in the back of this manual has been carefully prepared and lists all major maintenance tasks by paragraph heading. Whether you want to remove the piston or simply adjust the drive chain, a quick look in the *Index* will tell you exactly what page the procedure is on.

For a better understanding of manual contents, refer to *Chapter Organization* in this chapter.

To save yourself time, energy and possible future aggravation, finish reading this entire chapter. If you acquaint yourself with all the special features of this manual it can become a valuable tool. This manual can help you have a better maintained and more reliable machine.

CHAPTER ORGANIZATION

This chapter provides general information on how the manual is organized as well as special information and maintenance tips to aid all repair tasks. Read this entire chapter before performing any maintenance procedure.

Chapter Two, *Troubleshooting*, contains many suggestions and tips for finding and fixing troubles fast. Troubleshooting procedures discuss symptoms and logical methods to pinpoint the trouble.

Chapter Three, *Lubrication, Maintenance and Tune-up*, includes all normal periodic and preventive maintenance tasks designed to keep your machine in peak operating condition.

Subsequent chapters describe specific systems such as engine, clutch and fuel system. Each chapter provides complete disassembly, repair and reassembly procedures in easy to follow, step-by-step form. If a repair is impractical for home mechanics, it is so indicated. Usually, such repairs are more economically done by a Suzuki dealer or a qualified specialist.

NOTES, CAUTIONS AND WARNINGS

NOTES, CAUTIONS and WARNINGS appear throughout this manual and provide specific and important information to the reader. A NOTE usually provides extra or special information to make a step or procedure clearer. Disregarding a NOTE might cause inconvenience but will not cause damage or personal injury.

A CAUTION is provided in a procedure wherever mechanical damage of any type may occur. Failure to heed a CAUTION will most certainly result in some form of damage to the machine; however, personal injury is unlikely.

WARNINGS are the most serious and are included in a procedure where personal injury or death may occur if the warning is not heeded. Mechanical damage may also occur.

PHOTOS, DRAWINGS AND TABLES

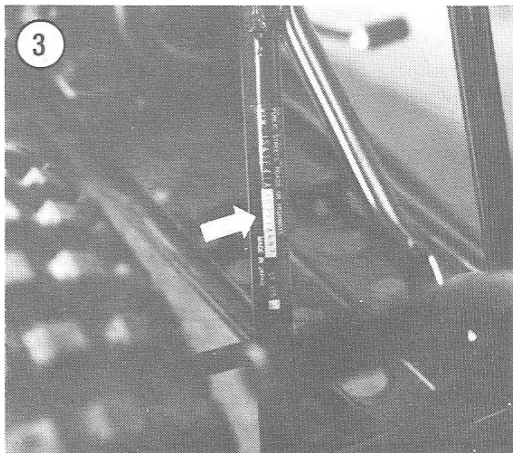
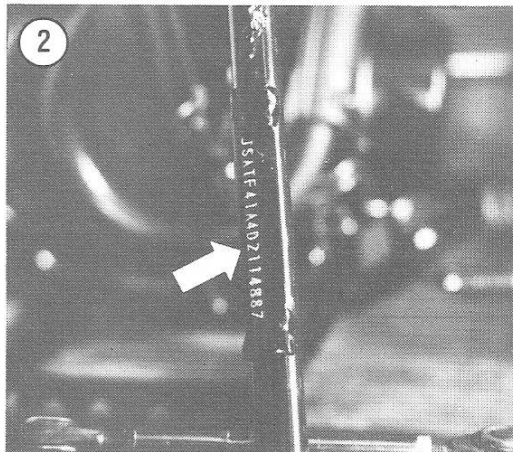
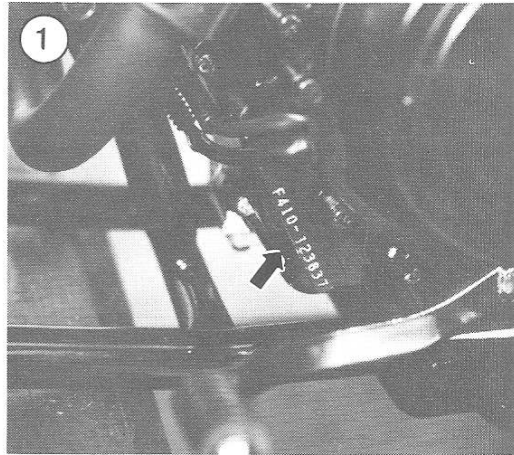
This manual contains literally hundreds of photos, drawings and tables that are used to support and clarify maintenance procedures. Each photo, drawing and table is referenced at least once within a specific procedure. When using a procedure, take full advantage of all the support data provided to make your job easier and help avoid costly errors.

MODEL IDENTIFICATION

The ALT and LT machines are designed specifically for off-road use. To keep their machine as reliable as possible, Suzuki often makes improvements and refinements during a production run. Major design changes are usually, though not always, introduced with a new model.

To take advantage of the improvements and changes, many of which can be incorporated on earlier machines, each owner should keep a written record of the engine number and frame number. The engine number is stamped on the front of the engine crankcase (Figure 1). The frame number is stamped on a forward frame tube (Figure 2) on LT models and on the steering head on ALT models. Machine identification and model number as well as the manufacturing date are printed on a decal attached to a frame tube in an easily seen location (Figure 3).

Improved part changes are usually identified by engine and/or frame numbers. Check with the service manager at your local dealership to find out if any service bulletins affecting your machine have been released by Suzuki. These bulletins are very complete and announce any changes in parts,



specifications, repair procedures and special tools. All applicable ALT and LT Service Bulletins released before the copyright date of the book have been incorporated in the manual.

SPECIAL SERVICE TIPS

Off-road machines are subjected to special loads and wear because of the environment they operate in. Mud, dirt, sand and water (especially salt water) cause extra and rapid wear on these machines. In addition, vibration caused by rough terrain places extra stress on all fasteners.

Because of the extraordinary demands placed on off-road machines, several points should be kept in mind when performing service and repair. The following items are special tips that may improve the overall life of the machine and help avoid costly breakdowns, not to mention a long walk back to the tow vehicle.

1. Use a thread locking compound such as blue Loctite (Lock N' Seal No. 2114) on all fasteners, even if they are secured with lockwashers. Blue Loctite does not harden completely and allows easy removal of the fastener. A screw lost from an engine cover or bearing retainer could easily cause serious and expensive damage before its loss is noticed.

When applying Loctite, use a small amount. If too much is used, it can squeeze out and stick to parts not meant to be stuck. Keep a tube of Loctite in your tool box. When used properly it is excellent and inexpensive insurance.

2. Use a hammer-driven impact tool to remove all screws, particularly engine cover screws. This tool will help prevent rounding the screw heads.

3. When removing the fold-over type of locking washers, if possible, use a wide-blade chisel such as an old and dull wood chisel. Such a tool provides a better purchase on the folded tab, making removal easier.

4. When installing the fold-over type of locking washer, always use a new washer if possible. If a new washer is not available, always fold over a part of the washer that has not been previously folded. Reusing the same fold may cause the washer to break, resulting in a loose piece of metal adrift in the engine.

When folding the washer, start the fold with a screwdriver and finish it with pliers. If a punch or chisel is used to make the fold, the fold may be too sharp, thereby increasing the chances of the washer breaking under stress.

These lockwashers are very inexpensive. It is recommended that each rider keep several in a tool box for field repairs.

5. When replacing missing or broken bolts, particularly on the engine, suspension or frame components, always use the proper Suzuki replacement bolt. Each bolt is specially hardened for each application. The wrong 25 cent bolt could easily cause many dollars worth of serious damage and possible rider injury.

6. When installing gaskets in the engine, always use Suzuki replacement gaskets *without* sealer, unless specifically designated. Suzuki gaskets are designed to swell when they come in contact with oil. Gasket sealer prevents the gaskets from swelling as intended, which can result in leaks. Suzuki gaskets are also cut from material of the precise thickness needed. Installation of a too thick or too thin gasket in a critical area, such as between the crankcase halves, could cause engine damage due to incorrect crankshaft clearance.

GENERAL MAINTENANCE HINTS

Most of the service procedures provided in this book can be performed by anyone reasonably handy with tools. It is suggested, however, that you carefully consider your own capabilities before attempting any repair task which involves major disassembly of the engine and transmission.

Crankshaft repairs, for example, require the use of a heavy hydraulic press. It is wiser to have a competent machine shop or authorized dealer perform the actual crankshaft work than try to do the job yourself with makeshift equipment. Other procedures require precision measurements and, unless you have the skills and equipment to make them, it would be better to have a motorcycle shop do the work.

Repairs can be made faster and easier if the machine is clean before you begin work. Good soap and pressurized water is usually the best way to clean all but the most stubborn dirt or grease. High-pressure coin operated car washes do a good job of cleaning; however, the machine must completely dried and lubricated after cleaning. High-pressure water and detergent can easily enter the wheel bearings, brake drum and other critical areas and cause corrosion if not treated immediately after cleaning.

Clean all oily and greasy parts with cleaning solvent. An approved solvent is usually available in bulk form from many automobile service stations and parts stores.

WARNING

*Never use gasoline as a cleaning agent.
It presents an extreme fire hazard.
Always work in a well ventilated area*

when using cleaning solvent. Keep a fire extinguisher, rated for gasoline and oil fires, handy just in case.

If you are not used to working with cleaning solvent use rubber gloves, if possible, or treat your hands with a good skin lotion immediately after cleaning parts. Solvent will remove the oils from your hands and cause painful and irritating "solvent burns" if left untreated.

Special tools are required for some service procedures. All special tools necessary are referenced by Suzuki part number and are available from an authorized dealer. If you are on good terms with the dealer's service department or know a professional motorcycle mechanic you may be able to borrow what you need.

Much of the labor charge made for repairs by a dealer is for removal and disassembly of other parts to reach the defective area. It is usually possible to perform much of the preliminary work yourself and then take the affected part or assembly to the dealer for repair.

Once you decide to tackle a job yourself, read the entire section that describes the task. Study the procedures, illustrations, tables and other support data until you have a thorough idea of what is involved in the job. If special tools are required, make arrangements for them before beginning the work. It is very frustrating to get partway into a job and then discover you do not have the necessary parts or tools to complete it.

There are many items available that can be used on your hands before and after working on your machine. A little preparation prior to getting "all greasy" will help cleanup later.

Before starting out, work soap or a product such as Pro-Tek into your hands, forearms and under your fingernails. This will make cleanup a lot easier. For cleanup, use a waterless hand soap and finish up with a good household detergent and a small hand brush.

During disassembly of parts, keep a few general cautions in mind. Force is rarely needed to get things apart. If parts are a tight fit, such as a bearing in a case, there is usually a tool designed to remove them. Never use a screwdriver to pry apart components with machined surfaces such as crankcase halves. The surfaces are easily damaged, resulting in leaks.

Make diagrams or take Polaroid photographs wherever similar appearing parts are found. You may think you can remember where everything

came from, but mistakes are costly. There is also the possibility you may be sidetracked and not be able to return to work for days or even weeks, such as when waiting for parts on order. In such an interval, carefully laid out parts may become disturbed.

Tag all similar internal parts for location and mark all mating parts for position. Record the number and thickness of any shims as they are removed. Small parts such as bolts can be identified by placing them in plastic sandwich bags or plastic food containers. Label the bags or containers with masking tape.

Wiring should be tagged with masking tape and marked as each wire is removed. Again, do not rely on memory alone.

Protect finished surfaces from physical damage or corrosion. Keep gasoline and other solvents off painted surfaces.

Frozen or very tight bolts and screws can be loosened by soaking with penetrating oil, such as WD-40 or Liquid Wrench, then striking the bolt head a few times with a hammer and punch (or screwdriver for screws). Avoid heat unless absolutely necessary, since it may melt, warp or remove the temper from many parts.

No parts, except those assembled with a press fit, require unusual force during assembly. If a part is hard to remove or install, find out why before proceeding.

Cover all openings after removing parts to keep dirt, small tools, etc., from falling in.

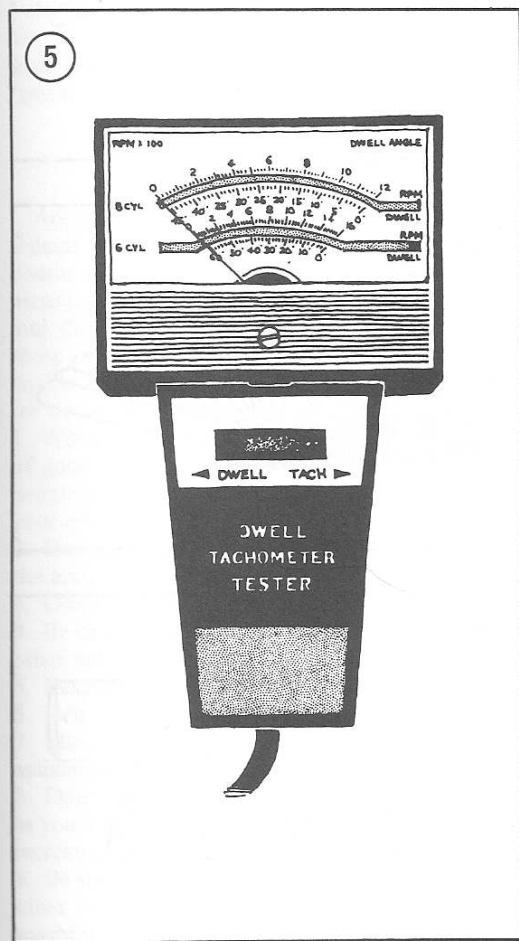
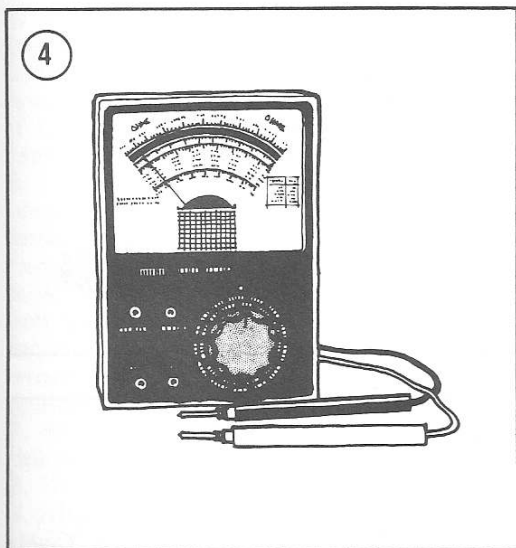
When assembling 2 parts, start all fasteners then tighten evenly.

Wiring connections and brake shoes should be kept clean and free of grease and oil.

When assembling parts, be sure all shims and washers are installed exactly as they were removed. Whenever a rotating part butts against a stationary part, look for a shim or washer. Use new gaskets if there is any doubt about the condition of the old ones.

Heavy grease can be used to hold small parts in place if they tend to fall out during assembly. However keep grease away from brake shoes and electrical components.

Most important, *take your time and do the job right*. Being in a hurry usually results in damaged or "left out" parts. More time is spent correcting mistakes than would have been spent doing the job correctly the first time. Remember, after an engine is rebuilt, it must be broken in like a new machine. Keep the rpms within the limits given in your owner's manual when you get back into operation.



TUNE-UP AND TROUBLESHOOTING TOOLS

To properly service your machine, you will need an assortment of ordinary hand tools. Some special troubleshooting tools are also helpful if you intend to do much of your own maintenance.

Always purchase quality tools. Beware of so-called bargain tools. Quality tools will cost more to purchase initially, but will usually last a lifetime. Quality tools are also precision made so there is less chance of damage to the machine or skinned knuckles. Good tools need not always be purchased new. Tool stores often have excellent prices on used, but very serviceable tools. The minimum number of tools required to perform most machine repairs includes the following:

- a. Combination wrenches (metric).
- b. Socket wrenches (metric).
- c. Plastic or compothane mallet.
- d. Small ballpeen hammer.
- e. Snap ring pliers (inside and outside).
- f. Screwdrivers (standard and Phillips).
- g. T-handle Phillips screwdrivers.
- h. Hammer driven impact tool.
- i. Pliers.
- j. Feeler gauges.
- k. Spark plug gauge.
- l. Spark plug wrench.
- m. Drift.
- n. Vernier calipers.
- o. Flywheel puller.
- p. Torque wrench (mkg/ft.-lb.).

Multimeter or VOM

This instrument (**Figure 4**) is invaluable for electrical system troubleshooting and service. A few of its functions may be duplicated by homemade test equipment, but for the serious mechanic it is a must. Its uses are described in the applicable sections of the book.

Portable Tachometer

A portable tachometer (**Figure 5**) is needed for accurate tune-ups. Carburetor adjustments must be performed at the specified idle speed. The best instrument for this purpose is one with a low range of 0-1,000 or 0-2,000 rpm range and a high range of 0-4,000 rpm. Extended range (0-6,000 or 0-8,000 rpm) instruments lack accuracy at lower speeds. The instrument should be capable of detecting changes of 25 rpm on the low range.

A tachometer is also necessary for performing centrifugal clutch engagement and lock-up tests.

Compression Gauge

A compression gauge measures the engine compression. The one shown in **Figure 6** is the type used for the Suzuki machines covered in this book.

Ignition gauge

This tool (**Figure 7**) combines round wire spark plug gap gauges with narrow feeler gauges in popular sizes. This type of wire gauge is best for setting the gap on spark plugs and is available at most auto parts stores.

Feeler Gauge

This tool (**Figure 8**) is available in most auto parts and tool stores and can be purchased with a variety of different sized gauges. Most gauges presently available feature both metric and American sizes.

Hammer Driven Impact

This tool (**Figure 9**) makes removal of Phillips and standard screws easy without screw head damage. These tools are available at most tool or hardware stores.

Compothane Mallet

This plastic covered "dead-blow" mallet is virtually indestructible and has become a favorite tool among professional and amateur mechanics. This mallet can be used on most metal surfaces without causing any damage to the surface. The mallet is available in a variety of shapes and weights and can be purchased from professional tool distributors such as Snap-On and Mac.

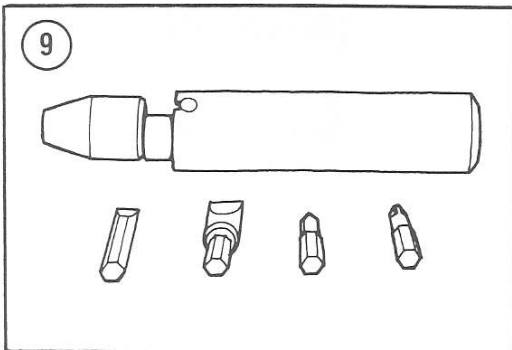
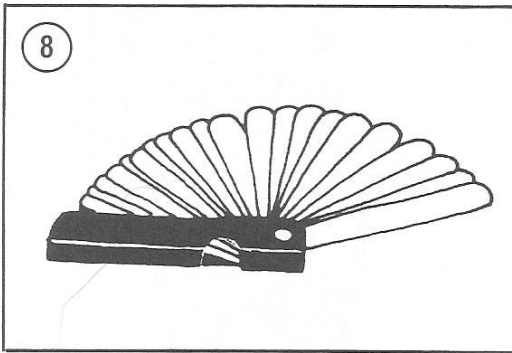
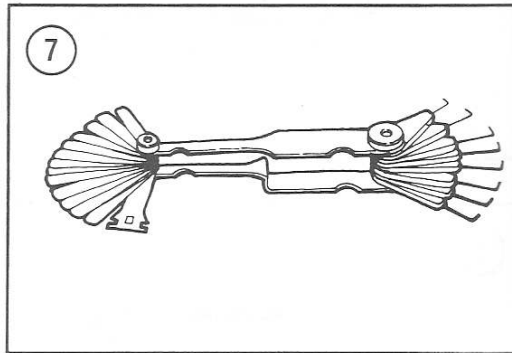
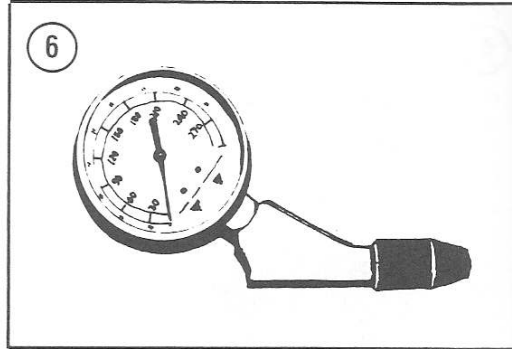
EXPENDABLE SUPPLIES


Certain expendable supplies are required. These include grease, oil, liquid fastener-locking compound (Loctite), rags, and cleaning solvent. These items are available at most machine and auto supply stores.

SAFETY FIRST

A safe mechanic, amateur or professional, can work for years and never sustain a serious injury. If you observe a few rules of common sense and safety, you too can enjoy many hours safely servicing your machine. Ignoring some of these basic rules, however, can cause serious injuries.

1. Never use gasoline as a cleaning solvent.
2. Never smoke or use a torch around flammable liquids such as cleaning solvent and many spray lubricants.



- 
3. Never smoke or use a torch in areas where batteries are being charged. Highly explosive hydrogen gas is formed during the charging process. Never arc the terminals of a battery to see if it has a charge; the sparks could ignite the explosive hydrogen as easily as an open flame.
 4. If welding or brazing is required on the machine, remove the fuel tank and set it a safe distance away (at least 50 feet) and drain the fuel from the carburetor.
 5. Always use the correct size wrench for turning nuts and bolts. When a nut is tight, think for a moment what will happen to your hand if the wrench slips.
 6. Keep your work area clean and uncluttered.
 7. Wear safety goggles in all operations involving drilling, grinding or use of a chisel or air hose.
 8. Do not use worn-out tools.
 9. Always allow yourself sufficient time to do a thorough and complete job. Many accidents happen as a direct result of "being in a hurry to finish."
 10. Keep a fire extinguisher handy. Be sure it is at least rated for Class B and Class C fires (gasoline/oil and electrical).

"OFF THE ROAD" RULES

Areas set aside for off-road riding either by the federal government or state or local agencies are continuing to disappear. The loss of many of these areas is usually due to the few who really don't care and therefore ruin the sport of off-road fun for those who do. Following these basic rules will enable you and others to always have an area open for this type of recreational use.

1. When riding, always observe the basic practice of good sportsmanship and recognize that other people will judge all off-road vehicle owners by your actions.
2. Don't litter the trails or camping areas. Leave the area cleaner than it was before you came.
3. Don't pollute lakes, streams or the ocean.
4. Be careful not to damage living trees, shrubs or other natural terrain.
5. Respect other people's rights and property.
6. Help anyone in distress.
7. Make yourself and your vehicle available for assistance in any search and rescue parties.
8. Don't harass other people using the same area as you are. Respect the rights of others enjoying the recreation area.
9. Be sure to obey all federal, state, provincial and other local rules regulating the operation of your machine.

10. Inform public officials when using public lands.
11. Don't harass wildlife. Stay out of areas posted for the protection and feeding of wildlife.
12. Always run with the spark arrester in place and keep your exhaust noise to a minimum.

RIDE SAFELY

General Tips

1. Read your owner's manual and know your machine.
2. Check the throttle and brake controls before starting the engine.
3. Know how to make an emergency stop.
4. Know all State, federal and local laws concerning operation of an off-road vehicle. Respect private property.

NOTE

The Suzuki ALT and LT machines are designed and manufactured for off-road use only. They do not conform to Federal Motor Vehicle Safety Standards. It is illegal to operate them on public streets, roads or highways.

5. Never add fuel while anyone is smoking in the area or when the engine is running.
6. Never wear loose scarves, belts or boot laces that could catch on moving parts or trees limbs.
7. Always wear eye protection and a helmet.
8. Never allow anyone to operate the machine without proper instruction. This is for their bodily protection and to keep your machine from damage or destruction.

CAUTION

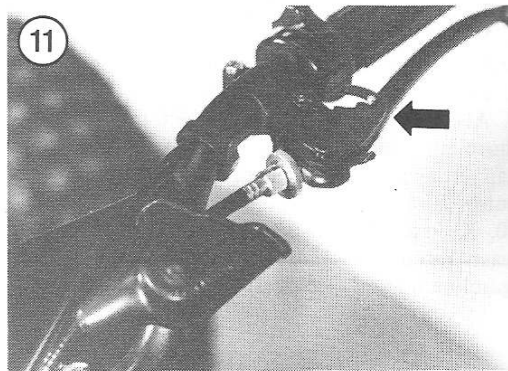
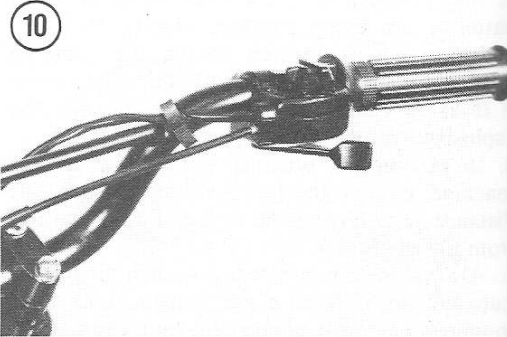
Do not "pop wheelies" and run for any distance with the front wheels off the ground. The oil capacity is relatively small and the oil will drain out of the oil pump area, causing a loss of oil pressure and costly engine damage.

9. Use the "buddy system" for long trips, just in case you have a problem or run out of gas.
10. Never attempt to repair your machine with the engine running except when necessary for certain tune-up procedures.
11. Check all of the machine components and hardware frequently, especially the wheels and the steering.
12. Push your machine onto a trailer bed—never ride it on. Secure it firmly to the trailer and be sure that the trailer lights operate properly.
13. Always wear comfortable clothing and warm clothing in cool or cold weather. Even mild

temperatures can be very uncomfortable and dangerous when combined with a strong wind or when traveling at high speed. See **Table 1** for wind chill factors. Always dress according to what the wind chill factor is, not what the outside temperature is.

Operating Tips

1. Never operate the machine in crowded areas or steer toward persons.
2. Avoid dangerous terrain.
3. Cross highways (where permitted) at a 90 degree angle after looking in both directions. Post traffic guards if crossing in groups.
4. Do not ride the vehicle on or near railroad tracks. The engine and exhaust noise can drown out the sound of an approaching train.
5. Keep the headlight free of dirt and never ride at night without the headlight on.
6. Do not ride the machine without the seat/fender assembly in place.
7. Always steer with both hands.
8. Be aware of the terrain and avoid operating the machine at excessive speed.
9. Do not panic if the throttle sticks. Turn the engine stop switch to the OFF position (**Figure 10**).
10. Do not speed through wooded areas. Hidden obstructions, hanging tree limbs, unseen ditches, hikers and even wild animals can cause injury and damage to you as well as the machine.
11. Do not tailgate. Rear end collisions can cause injury and machine damage.
12. Do not mix alcoholic beverages with riding.
13. Keep both feet on the foot pegs. Do not permit your feet to hang out to stabilize the machine when making turns or in near-spill situations; broken limbs could result.



14. Check your fuel supply regularly. Do not travel farther than your fuel supply will permit you to return.
15. Do not run without the spark arrester in place.
16. Check to make sure that the parking brake (**Figure 11**) is *completely released* while riding. If left on, the drag can cause engine overheating as well as excessive wear of the brake shoes.

Table 1 WIND CHILL FACTORS

Estimated Wind Speed in MPH	Actual Thermometer Reading (° F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Temperature (° F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-21	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-36	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
*	Little Danger (for properly clothed person)			Increasing Danger				Great Danger				
	• Danger from freezing of exposed flesh •											
*Wind speeds greater than 40 mph have little additional effect.												

NOTE: If you own a 1984 or later model, first check the Supplement at the back of the book for any new service information.

CHAPTER TWO

TROUBLESHOOTING

Diagnosing mechanical problems is relatively simple if you use orderly procedures and keep a few basic principles in mind. The troubleshooting procedures in this chapter analyze typical symptoms and show logical methods of isolating causes. These are not the only methods. There may be several ways to solve a problem, but only a systematic, methodical approach can guarantee success.

Never assume anything. Do not overlook the obvious. If you are riding along and the engine suddenly quits, check the easiest, most accessible problem spot first. Is there gasoline in the tank? Is the fuel shutoff valve in the ON position? Has the spark plug wire fallen off? Check the ignition switch to make sure it is in the RUN position. If nothing turns up in a quick check, look a little further.

Learning to recognize and describe symptoms will make repairs easier for you or a mechanic at the shop. Describe problems accurately and fully. Saying that "it won't run" isn't the same as saying "it quit climbing a hill and won't start" or that "it sat in my garage for 3 months and then wouldn't start." Gather as many symptoms together as possible to aid in diagnosis. Note whether the engine lost power gradually or all at once, what color smoke (if any) came from the exhaust and so on. Remember that the more complicated a machine is, the easier it is to troubleshoot because symptoms point to specific problems. After the symptoms are defined, areas which could cause the

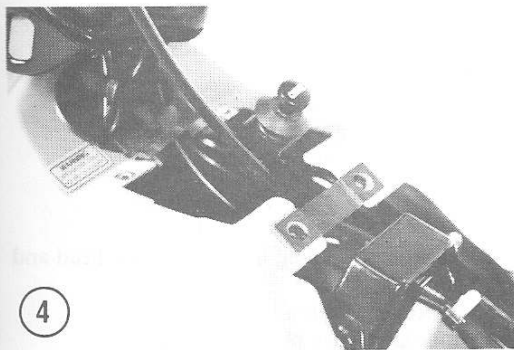
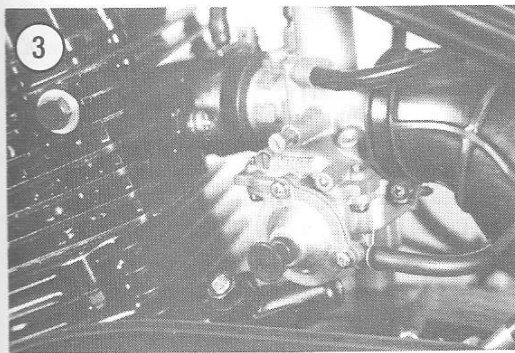
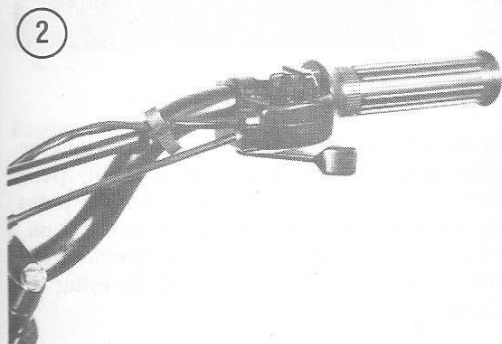
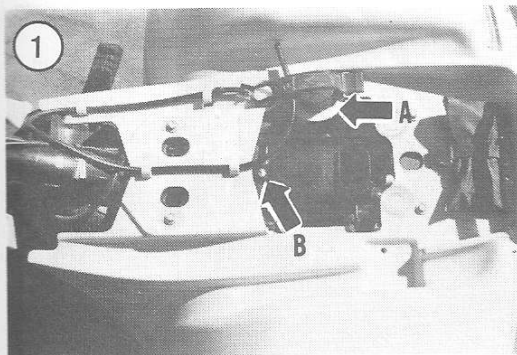
problems are tested and analyzed. Guessing at the cause of a problem may provide the solution, but it can also easily lead to frustration, wasted time and a series of expensive, unnecessary parts replacements.

You do not need fancy equipment or complicated test gear to determine whether repairs can be attempted at home. A few simple checks could save a large repair bill and time lost while the machine sits in a dealer's service department. On the other hand, be realistic and don't attempt repairs beyond your abilities. Service departments tend to charge heavily for putting together a disassembled engine that may have been abused. Some dealers won't even take on such a job—so use common sense and don't get in over your head.

OPERATING REQUIREMENTS

To run properly, an engine needs these three basics: correct fuel-air mixture, compression and a spark at the correct time. If one or more are missing, the engine won't run. The electrical system is the weakest link of the three basics. More problems result from electrical breakdowns than from any other source. Keep that in mind before you begin tampering with carburetor adjustments.

If the machine has been sitting for any length of time and refuses to start, check and clean the spark plug and then look to the gasoline delivery system. This includes the fuel tank vent, fuel tank filter, fuel pump, fuel lines and the carburetor. Dirt may have settled in the gas tank, restricting fuel flow.



Gasoline deposits may have formed and gummed up the fuel pump, carburetor jets and air passages. Gasoline tends to lose its potency after standing for long periods and condensation may contaminate it with water. Drain old gas and try starting with fresh gasoline.

EMERGENCY TROUBLESHOOTING

When the engine is difficult or impossible to start, it does not help to keep pulling on the recoil starter rope. Check for obvious problems even before getting your tools by following the listed steps below. You may be embarrassed to find your engine stop switch in the OFF position but that is better than wearing out your arm trying to start the engine. If it still will not start, refer to the appropriate troubleshooting procedures in this chapter.

1. Is there fuel in the tank? Remove the seat as outlined in Chapter Ten and remove the fuel tank filler cap (A, **Figure 1**). Rock the machine and listen for sloshing fuel. Make sure the vent line (B, **Figure 1**) is clear and unobstructed.

WARNING

Do not use an open flame to check in the tank. A serious explosion is certain to result.

2. Make sure the engine kill switch is in the RUN position (**Figure 2**).
3. Make sure there is gas in the carburetor. Pull out the priming pump knob and release it (**Figure 3**). Do not push it in or the pump may be damaged.
4. Is the spark plug wire on tight? Push the plug cap on and slightly rotate it to clean the electrical connection between the plug and the connector.
5. Is the choke in the right position (**Figure 4**)? The knob should be *up* for a cold engine and *down* for a warm engine.

ENGINE STARTING

An engine that refuses to start or is difficult to start is very frustrating. More often than not, the problem is very minor and can be found with a simple and logical troubleshooting approach.

The following items show a beginning point from which to isolate engine starting problems.

Engine Fails to Start

Perform the following spark test to determine if the ignition system is operating properly.

1. Remove the spark plug from the cylinder.
2. Connect the spark plug wire and connector to the spark plug and touch the base of the plug to a

good ground such as the engine cylinder head. Position the spark plug so you can see the electrodes.

3. Crank the engine over with the recoil starter. A fat blue spark should be evident across the spark plug electrodes.

WARNING

These machines are equipped with a CDI ignition system. If it is necessary to hold the spark plug lead, do so with an insulated pair of pliers. The high voltage generated by the CDI could produce serious or fatal shocks.

4. If the spark is good, check for one or more of the following possible malfunctions:
 - a. Obstructed fuel tank filter or fuel pump.
 - b. Leaking head gasket.
 - c. Low compression.
5. If spark is not good, check for one or more of the following:
 - a. Weak ignition coil.
 - b. Weak CDI unit.
 - c. Broken or shorted high tension lead to the spark plug.
 - d. Loose electrical connections.
 - e. Ignition coil ground wire loose or broken (Figure 5). Remove the front fender (LT) or frame cover (ALT) as outlined in Chapter Ten to gain access to the coil wires.

Engine Is Difficult to Start

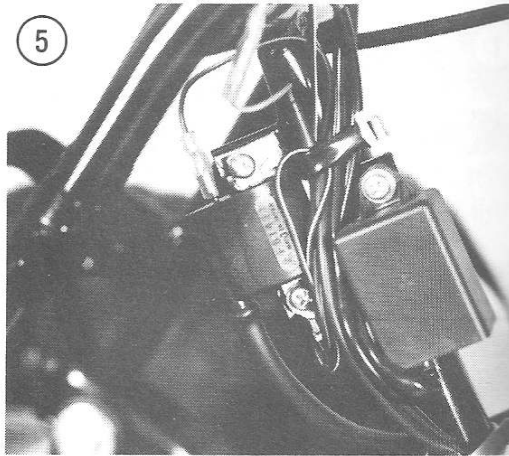
Check for one or more of the following possible malfunctions:

- a. Fouled spark plug.
- b. Improperly adjusted choke.
- c. Contaminated fuel system.
- d. Improperly adjusted carburetor.
- e. Weak ignition coil.
- f. Weak CDI pulse generator.
- g. Defective fuel pump.
- h. Poor compression.

Engine Will Not Crank

Check for one or more of the following possible malfunctions:

- a. Broken recoil starter.
- b. Seized piston.
- c. Seized crankshaft bearings.
- d. Broken connecting rod.
- e. Locked-up transmission or clutch assembly.



ENGINE PERFORMANCE

In the following check lists, it is assumed that the engine runs but is not operating at peak performance. This will serve as a starting point from which to isolate a performance malfunction.

The possible causes for each malfunction are listed in a logical sequence and in order of probability.

Engine Will Not Idle

- a. Carburetor incorrectly adjusted.
- b. Fouled or improperly gapped spark plug.
- c. Leaking head gasket.
- d. Ignition timing incorrect.
- e. Weak or faulty ignition pickup coil.
- f. Valve clearance incorrect.
- g. Obstructed fuel line filter.
- h. Loose carburetor mounting.

Engine Misses at High Speed

- a. Fouled or improperly gapped spark plug.
- b. Improper ignition timing.
- c. Improper valve clearance.
- d. Improper carburetor main jet selection.
- e. Clogged jets in the carburetor.
- f. Weak fuel pump.
- g. Weak ignition coil.
- h. Weak or faulty ignition pickup coil.
- i. Obstructed fuel line filter.

Engine Overheating

- a. Obstructed cooling fins on cylinder head and cylinder.
- b. Improper ignition timing.
- c. Improper spark plug heat range.

Smoky Exhaust and Engine Runs Roughly

- a. Carburetor adjustment incorrect (mixture too rich).
- b. Choke not operating correctly.
- c. Water or other contaminants in the fuel.
- d. Clogged air filter element.

Engine Loses Power

- a. Carburetor incorrectly adjusted.
- b. Engine overheating.
- c. Improper ignition timing.
- d. Incorrectly gapped spark plug.
- e. Weak ignition coil.
- f. Weak CDI unit
- g. Obstructed muffler.
- h. Dragging brake.

Engine Lacks Acceleration

- a. Carburetor mixture too lean.
- b. Clogged fuel line filter.
- c. Fuel contaminated with water.
- d. Improper valve clearance.
- e. Dragging brake.

ENGINE NOISES

1. *Knocking or pinging during acceleration*—Caused by using a lower octane fuel than recommended or by poor fuel. Pinging can also be caused by using a spark plug of the wrong heat

range. Refer to *Engine Tune-Up* in Chapter Three to ensure the correct heat range plug is installed.

2. *Slapping or rattling noises at low speed or during acceleration*—May be caused by piston slap (excessive piston-to-cylinder wall clearance).
3. *Knocking or rapping while decelerating*—Usually caused by excessive rod bearing clearance.
4. *Persistent knocking and vibration*—Usually caused by excessive main bearing clearance.
5. *Rapid on-off squeal*—Compression leak around cylinder head gasket or spark plug.

EXCESSIVE VIBRATION

This can be difficult to find without disassembling the engine. Usually this is caused by loose engine mounting hardware.

FRONT SUSPENSION AND STEERING

Poor handling may be caused by improper front tire pressure or uneven rear tire pressure, a damaged or bent frame or front steering components, a worn front fork assembly, worn wheel bearings or dragging brakes.

BRAKE PROBLEMS

A sticking drum brake may be caused by worn or weak return spring, dry pivot and cam bushings or improper adjustment. Grabbing brakes may be caused by greasy linings which must be replaced. Brake grab may also be due to an out-of-round drum. Glazed linings will cause loss of stopping power.

NOTE: If you own a 1984 or later model, first check the Supplement at the back of the book for any new service information.

CHAPTER THREE

LUBRICATION, MAINTENANCE AND TUNE-UP

If this is your first experience with an all terrain vehicle or motorcycle, you should become acquainted with products that are available in auto or motorcycle parts and supply stores. Look into the tune-up tools and parts and check out the different lubricants such as motor oil, locking compounds and greases. Also check engine degreasers, such as Gunk or Bel-Ray Degreaser, for cleaning your engine prior to working on it.

The more you get involved in your all terrain vehicle the more you will want to work on it. Start out by doing simple tune-up, lubrication and maintenance. Tackle more involved jobs as you gain experience.

The Suzuki ALT and LT are relatively simple machines but to gain the utmost in safety, performance and useful life, it is necessary to make periodic inspections and adjustments. It frequently happens that minor problems are found during such inspections that are simple and inexpensive to correct at the time, but which could lead to major problems if not corrected.

This chapter explains lubrication, maintenance and tune-up procedures required for the Suzuki ALT 125 and LT 125. **Table 1** is a suggested factory maintenance schedule (**Tables 1-6** are located at the end of this chapter).

SERVICE INTERVALS

The services and intervals shown in **Table 1** are recommended by the factory. Strict adherence to these recommendations will ensure long service from your Suzuki ALT/LT. However, if the vehicle

is run in an area of high humidity the lubrication and services must be done more frequently to prevent possible rust damage. This is especially true if you have run the ALT/LT through water (especially salt water).

For convenience when maintaining your vehicle, most of the services shown in **Table 1** are described in this chapter. However, some procedures which require more than minor disassembly or adjustment are covered elsewhere in the appropriate chapter.

ROUTINE CHECKS

Develop a habit of making the following basic checks at each fuel stop or before each riding session. A few minutes spent may prevent personal injury or damage to the machine. At the very least, it may prevent a long walk. Correct any problem found before riding.

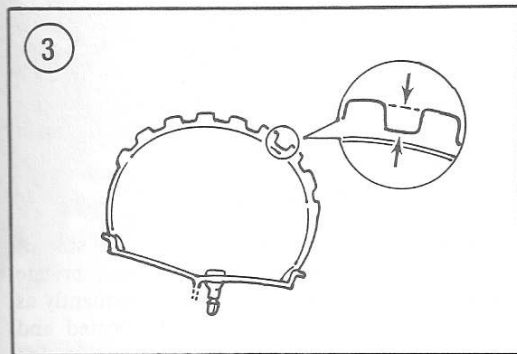
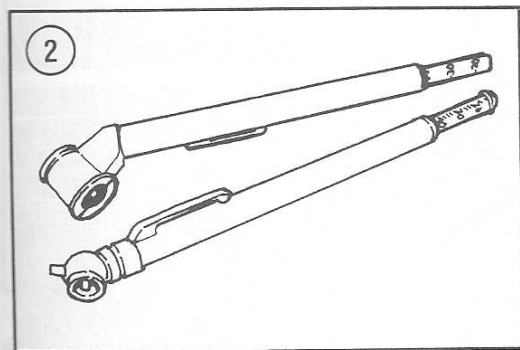
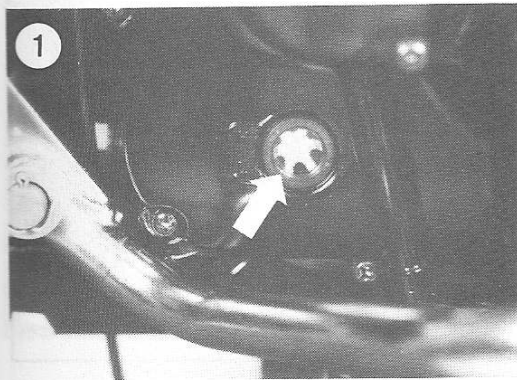
Engine Oil Level

Roll the machine to level ground and check the engine oil (with the engine off) through the inspection window (**Figure 1**). Maintain the oil level between the "F" and "L" marks. Use the appropriate oil recommended in **Table 2**.

General Inspection

1. Inspect all fuel lines and fittings for wetness.
2. Make sure the fuel tank is full of fresh gasoline.
3. Make sure the engine oil level is correct; add oil if necessary.
4. Make sure the air cleaner is clean.





5. Check the operation of the clutch and gearshift mechanism and adjust if necessary.
6. Check the throttle and the brake levers. Make sure they operate properly with no binding.
7. Check the drive chain for wear and correct tension.
8. Check tire pressure. Refer to **Table 3**.
9. Check the exhaust system for damage.
10. Check the tightness of all fasteners, especially engine mounting hardware.
11. Check for frayed cables or wiring that is not secured.

12. Make sure the headlight and taillight work properly and that the engine kill switch will shut off the engine.

TIRES AND WHEELS

Tire Pressure

Tire pressure should be checked and adjusted to maintain the smoothness of the tire, good traction and handling and to get the maximum life out of the tire. A simple, accurate gauge (**Figure 2**) can be purchased for a few dollars and should be carried in your tool box. Make sure you purchase a pressure gauge that is capable of accurately measuring the low pressures used in these machines. The appropriate tire pressures are shown in **Table 3**.

CAUTION

Do not over-inflate the stock tires as they will be permanently distorted and damaged. If overinflated, they will bulge out similar to inflating an inner tube that is not within the constraints of a tire. If this happens the tire will not return to its original contour.

WARNING

Always inflate both rear tires to the same pressure. If the ALT/LT is run with unequal air pressures it will cause poor handling.

Tire Inspection

The tires take a lot of punishment due to the variety of terrain they are subjected to. Inspect them periodically for excessive wear, cuts, abrasions, etc. If you find a nail or other object in the tire, mark its location with a light crayon prior to removing it. This will help locate the hole for repair.

Suzuki recommends replacing any tire that has only 4 mm (approx. 3/16 in.) of tread left (**Figure 3**). Refer to Chapter Eight for tire changing and repair information.

Rim Inspection

Frequently inspect the wheel rims, especially the outer side. If the wheel has hit a tree or large rock, rim damage may be sufficient to cause an air leak or knock it out of alignment. Improper wheel alignment can cause severe vibration and result in an unsafe riding condition.

Make sure that the cotter pins are securely in place on all wheels (one on each side of the front axle on ALT models). If they are lost and the castellated nut works loose, it's good-bye wheel.

LUBRICANTS AND SOLVENTS

Engine Oil

Oil is graded according to its viscosity, which is an indication of how thick it is. The Society of Automotive Engineers (SAE) system distinguishes oil viscosity by numbers. Thick oils have higher viscosity numbers than thin oils. For example, an SAE 5 oil is a thin oil while an SAE 90 oil is relatively thick.

Chassis Grease

A good quality grease (preferably waterproof) should be used to grease the items specified in **Table 1**. Water does not wash grease off parts as easily as it washes oil off. In addition, grease maintains its lubricating qualities better than oil on long and strenuous rides.

Cleaning Solvents

A number of solvents can be used to remove old dirt, grease and oil. Regular "parts cleaning solvent" is usually available from service stations or auto parts stores. Kerosene and diesel fuel are both readily available and comparatively inexpensive. However, kerosene and diesel fuel will leave a slight oily film on clean parts. In most circumstances this is not a problem, but if the parts are to be repainted (such as engine cases or the frame), the oily film must be cleaned off.

These solvents have a very high temperature flash point (they have to be very hot in order to ignite and catch fire) and can be used safely in any adequately ventilated area away from open flames (this includes pilot lights on home water heaters and clothes driers that are sometimes located in the garage).

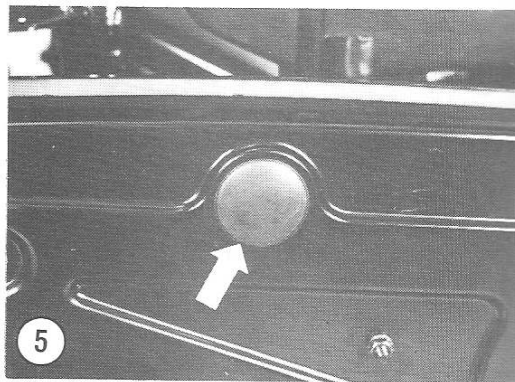
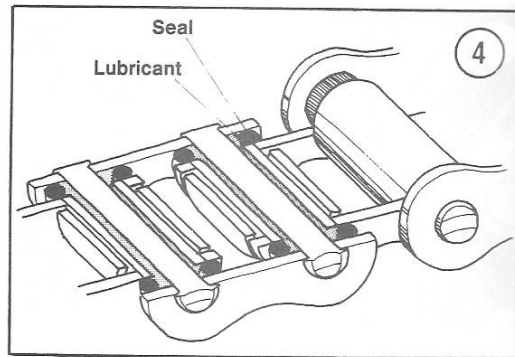
WARNING

Never use gasoline as a cleaning solvent. Gasoline is extremely volatile and contains tremendously destructive potential energy. The slightest spark from metal parts accidentally hitting or a tool slipping could cause a fatal explosion.

It should be remembered that many cleaning jobs can be handled effectively by a good grade of detergent and hot water. Always use hot water if possible, since it not only cleans better but will dry quickly, preventing rust on certain metal parts.

PERIODIC MAINTENANCE

The following maintenance items are summarized in **Table 1**. A good way to ensure that



all necessary items are covered during a periodic service is to make a check list and use it each time you service the machine. Keep an up-to-date record of all items serviced and when the service was performed; otherwise it is too easy to forget what was done and when.

DRIVE CHAIN

Check the drive chain slack at every fuel stop or at the beginning of each riding day. Clean, lubricate and adjust the drive chain at least as frequently as specified in **Table 1**. A properly lubricated and adjusted chain will provide maximum service life and reliability.

The drive chain is a pre-lubricated, long-life endless type with no master link. The lubrication between the rollers and pins in each link is sealed with O-rings as shown in **Figure 4**.

Adjustment (Chain Case Installed)

1. Roll the machine to level ground and shift the transmission to NEUTRAL.
2. Jack up the rear of the machine so that both rear wheels are clear of the ground.
3. Remove the rubber plug from the outer chain case (**Figure 5**).



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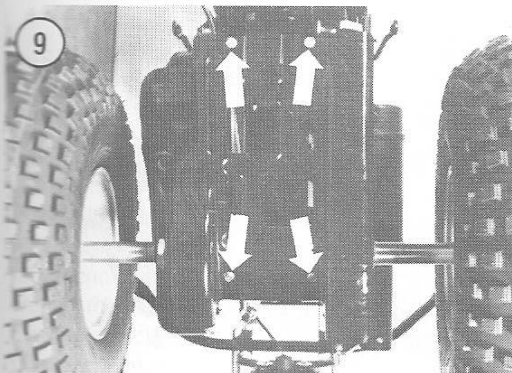
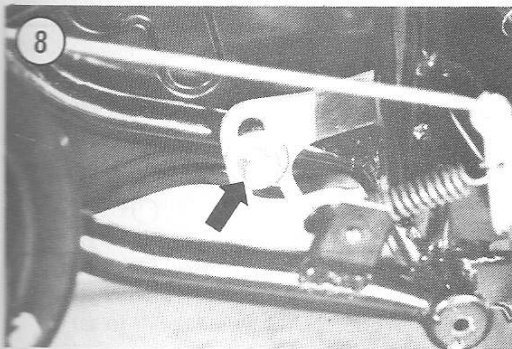
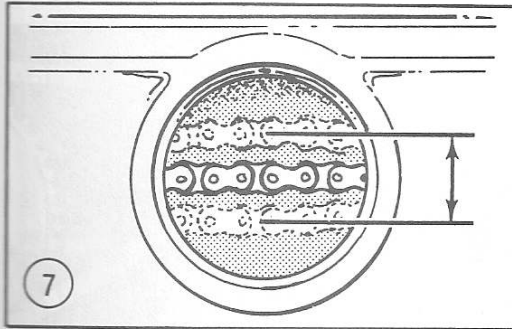
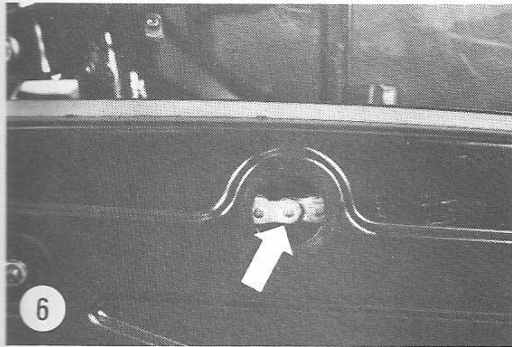
... fuel stop or
... Clean, lubricate
... frequently as
... and
... service life

... long-life
... The lubrication
... link is sealed

... and shift the

... that both rear

... water chain



4. Reach through the opening in the chain case (Figure 6), push up on the drive chain and let it fall back down.

5. Slowly turn one rear wheel and check the slack at several places in the drive chain. A drive chain will seldom stretch uniformly; therefore, it will be tighter in some places. The correct amount of free play in the chain is 10-20 mm (3/8-3/4 in.) at the tightest place as shown in Figure 7.

6. If the chain slack is correct, proceed to Step 7. If the chain slack is incorrect, perform the following steps:

- a. Loosen the bolt securing the chain tension adjuster (Figure 8, fuel tank removed for clarity).
- b. Slide the chain adjuster up or down until the correct slack in the chain can be felt through the inspection hole.
- c. Tighten the bolt securing the chain adjuster. Recheck the chain tension in several places to avoid having it too tight in any one place. Readjust the chain if necessary.
- d. Lubricate the chain as described in Step 7.

7. When the chain slack is correct, perform the following:

- a. Lubricate the chain with spray chain lube or oil through the inspection hole in the chain case. Make sure the spray chain lube is approved and recommended for O-ring chains. If an approved chain lube is not available, use SAE 90 gear oil.

NOTE

If the side plates of the chain are very dirty and covered with sand and grit, the chain should be removed for a more thorough cleaning and lubrication as described in this chapter.

- b. Install the rubber inspection plug and remove the jack from under the machine.

Cleaning, Lubrication and Adjustment (Chain Case Removed)

1. Remove the seat and rear fender.
2. Refer to Chapter Nine and remove the left rear wheel.
3. Remove the bolts securing the skid plate and remove the plate (Figure 9).
4. Release the clamps (A, Figure 10) securing the edges of the chain case.
5. Remove the nuts and washers securing the center of the chain case (B, Figure 10).

6. Slide the outer chain case back and clear of the inner case and remove the outer case. Take care not to damage the dust seal around the axle hole in the chain case.
7. Loosen the bolt securing the chain tension adjuster (Figure 8, fuel tank removed for clarity).
8. Slide the chain adjuster down as far as possible to provide maximum slack in the chain (Figure 11).
9. Roll the chain off the engine and rear sprockets and remove the chain.

NOTE

If the chain is new or has been used very little, it may not be stretched enough to roll off both sprockets. It may be necessary to remove either the engine sprocket or rear sprocket to remove the chain. Refer to Chapter Four for engine sprocket removal or Chapter Nine for rear sprocket removal.

10. Immerse the chain in a pan of kerosene and allow it to soak for about half an hour.

CAUTION

Never use any solvent other than kerosene to clean the drive chain or the O-rings in the chain may be damaged, ruining the chain.

11. Scrub the rollers and side plates with a stiff brush and rinse the chain in clean kerosene to carry away the loosened grit. Hang up the chain and allow it to drain.

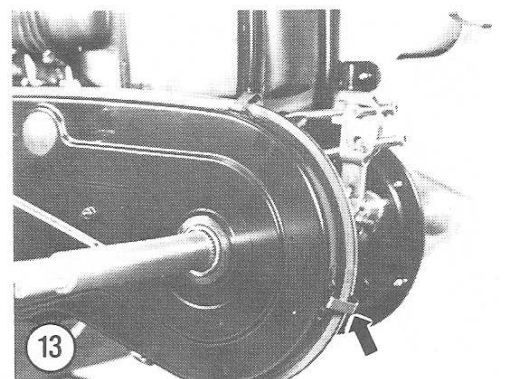
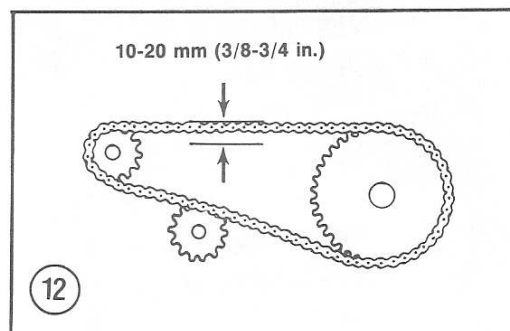
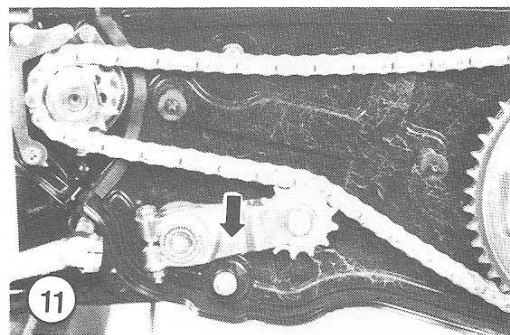
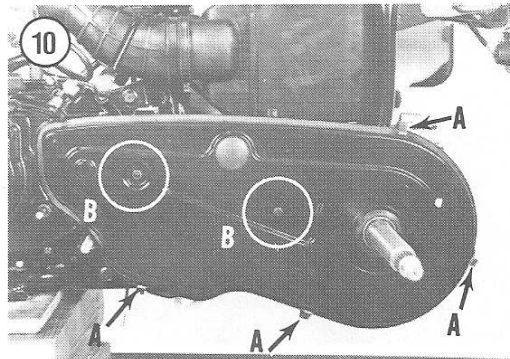
12. Lubricate the chain with SAE 90 oil or a good grade of chain lubricant specially recommended for O-ring chains. If using chain lubricant, follow the manufacturer's instructions for its use.

13. Install the chain on the machine. Install the engine sprocket or rear sprocket, if removed.

14. Slide the chain tensioner against the bottom run of the chain and set the chain tension for 10-20 mm (3/8-3/4 in.) of free play as shown in Figure 12. Slowly turn the rear wheel and check the slack at several places. A drive chain will seldom stretch uniformly; therefore, it will be tighter in some places. The correct amount of free play in the chain is 10-20 mm (3/8-3/4 in.) at the tightest place. Tighten the bolt securing the chain tensioner when the chain slack is correct.

15. Installation of the chain case is the reverse of the removal procedure. Keep the following points in mind:

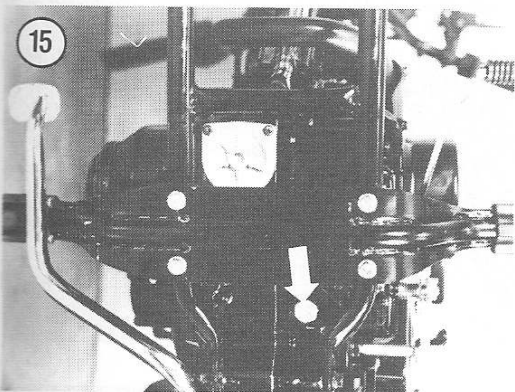
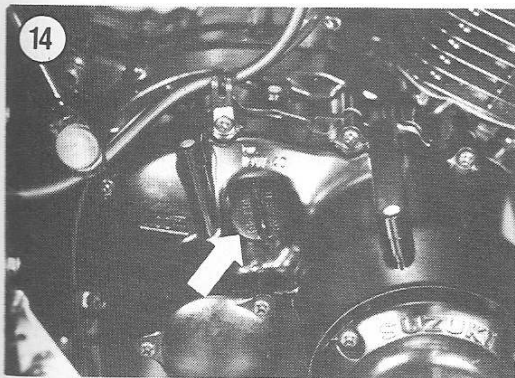
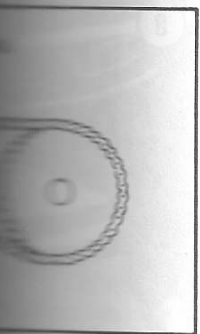
- a. Inspect the rubber seal around the edge of the outer chain case. The seal must be in perfect condition or sand, dirt and water will enter the chain case and significantly shorten the life of



the drive chain
turns or splits.
b. Install the
chain into the
case and lock
c. Install the
nut of the chain
nuts on the
d. Install the
nut.
e. Install the
f. Install the

**ENG
FILL**

Regular oil change
give longevity than
very recommended
well as the cleaning
that the vehicle is
it is operated under



the drive chain. Always replace the seal if any tears or splits are present.

- b. Install the outer case and snap the retaining clamps into place. Make sure each clamp snaps firmly over the edge of the inner chain case and locks into place (Figure 13).
- c. Install the washers and nuts to secure the center of the chain case. Do not overtighten the bolts or the chain cases may be damaged.
- d. Install the left rear wheel as outlined in Chapter Nine.
- e. Install the skid plate.
- f. Install the rear fender and seat.

ENGINE OIL AND FILTER CHANGE

Regular oil changes will contribute more to engine longevity than any other single factor. The factory recommended oil and filter change intervals (as well as the cleaning of the oil sump screen) assume that the vehicle is operated in moderate climates. If it is operated under dusty conditions. The oil will

get dirty more quickly and should be changed more frequently than recommended.

Use only a high quality detergent motor oil with an API classification of SE or SF. The classification is printed on the oil container. Try to use the same brand of oil at each oil change.

CAUTION

Never add STP or similar friction reducing oil additives to the engine oil. These products will destroy the friction properties of the clutch, necessitating a complete flushing of the engine and replacement of the clutch plates.

To change the engine oil and filter you will need the following items:

- a. Drain pan.
- b. Funnel.
- c. Can opener or pour spout.
- d. Drain plug socket.
- e. 2 quarts of oil.

There are a number of ways to discard the old oil safely. The easiest way is to pour it from the drain pan into a gallon plastic bleach or milk bottle. Some service stations and oil retailers will accept your used oil for recycling; some may even give you money for it. Check local regulations before discarding the oil in your household trash. Never let oil drain out onto the ground.

1. Warm up the engine then removal the oil filler cap (Figure 14).

WARNING

During the next step, get your hand out of the way as soon as the plug is ready to come out. Hot oil drains very rapidly and could cause painful burns.

2. Place a drain pan under the engine. Use a socket and remove the drain plug (Figure 15). Allow several minutes for the oil to drain completely.
3. Remove the screws securing the oil filter cover and remove the cover (Figure 16). Pull out the oil filter (Figure 17).
4. Clean the filter cover and drain plug in solvent. Inspect the gasket on the drain plug and the O-ring on the filter cover (A, Figure 18). Replace the gasket or O-ring if they are not in good condition. Use a little grease to help hold the O-ring in the filter cover.
5. Install the new filter with its open end in (B, Figure 18) and secure it with the filter cover. Tighten the screws securing the filter cover gradually and evenly in a crisscross pattern.

6. Tighten the oil drain plug to 1.8-2.0 mkg (13.0-14.0 ft.-lb.).
7. Fill the crankcase through the filler opening with the recommended quantity and type of oil. Refer to **Table 2** and **Table 4**.
8. Start the engine and allow it to idle so the oil will completely circulate. When the engine has warmed up, shut it off and wait at least 2 minutes. With the machine sitting on level ground, check the oil level through the oil level window. If the level is below the "L" mark, add oil until the level is between the "L" and the "F" marks.
9. Check carefully for leaks around the filter cover and the drain plug.

ENGINE SUMP SCREEN CLEANING

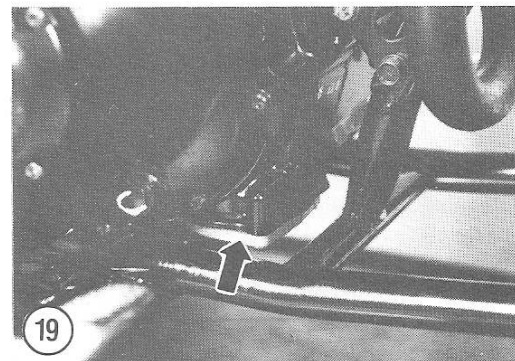
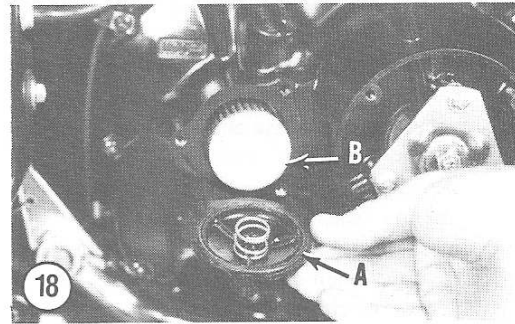
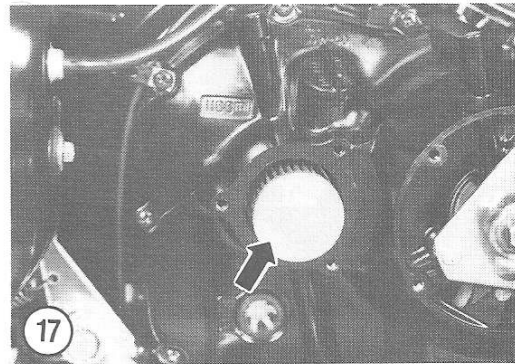
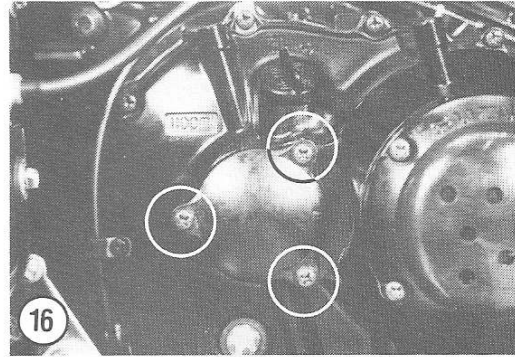
The engine sump screen under the engine (**Figure 19**) should be cleaned as specified in **Table 1**.

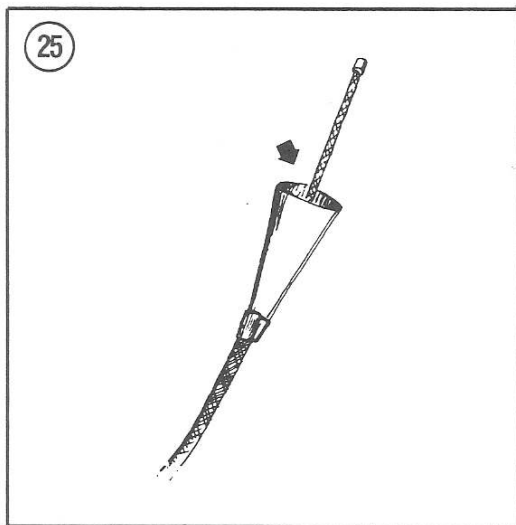
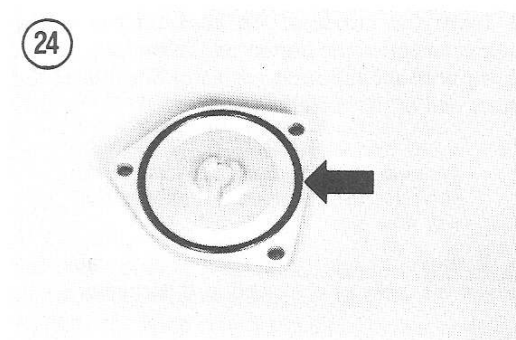
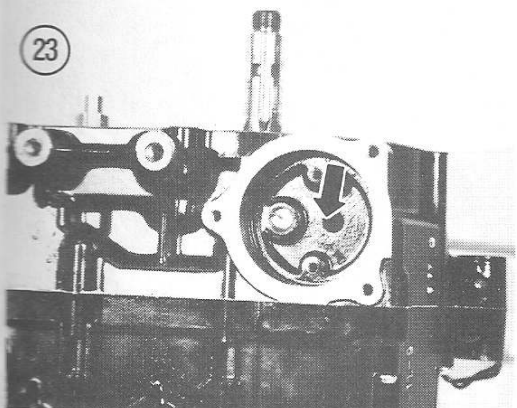
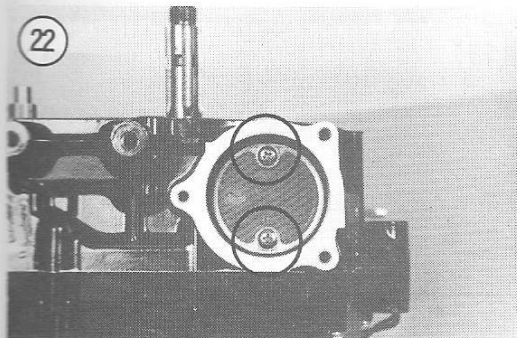
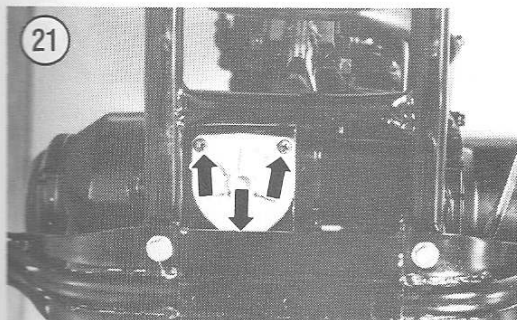
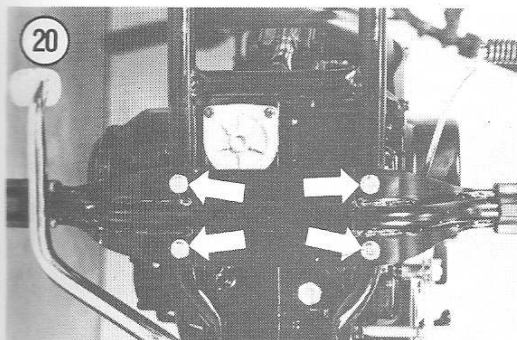
1. Remove the bolts securing the footrest unit and remove the unit (**Figure 20**).
2. Remove the screws securing the oil sump cover and remove the cover (**Figure 21**).
3. Remove the screws securing the oil sump screen and remove the screen (**Figure 22**).
4. Clean the screen in solvent. Carefully wipe out the cavity in the engine (**Figure 23**).
5. Install the sump screen into the engine cavity. Apply a small amount of blue Loctite (Lock N' Seal No. 2114) to the screws securing the screen.
6. Carefully inspect the O-ring on the sump cover (**Figure 24**). Replace the O-ring if not in perfect condition or oil leaks may result. Use a small amount of grease to help hold the O-ring in place in the cover.
7. Install the cover on the engine sump. Use blue Loctite to secure the cover screws.
8. Install the footrest unit. Note that it is slightly longer on the clutch side of the engine and can be installed in only one direction. Torque the footrest bolts as specified in **Table 5**.

CONTROL CABLES LUBRICATION

The control cables should be lubricated as frequently as specified in **Table 1**. They should also be inspected at this time for fraying and the outer cable should be checked for chafing. The cables are relatively inexpensive and should be replaced when found to be faulty.

The control cables can be lubricated either with oil or with any of the popular cable lubricants and a cable lubricator. The first method requires more time and the complete lubrication of the entire cable is less certain.





3

Oil Method

1. Disconnect the cable at each end.
2. Make a cone of stiff paper and tape it to the end of the cable sheath (Figure 25).
3. Hold the cable upright and pour a small amount of engine oil (SAE 10W-40) into the cone. Work the inner cable in and out of the outer cable for several minutes to help the oil work its way down to the end.

NOTE

To avoid a mess, place a shop cloth at the end of the cable to catch the oil as it runs out.

4. Remove the cone, reconnect the cable and adjust the cable as described in this chapter.

Lubricator Method

1. Disconnect the cable at each end.
2. Attach a lubricator following the manufacturer's instructions.

3. Insert the nozzle of the lubricant can in the lubricator, press the button on the can and hold it down until the lubricant begins to flow out of the other end of the cable.

NOTE

Place a shop cloth at the end of the cable to catch all excess lubricant that will flow out.

4. Remove the lubricator, reconnect the cable and adjust the cable as described in this chapter.

MISCELLANEOUS CHASSIS LUBRICATION

Lubricate the following items as frequently as specified in Table 1.

Brake Pedal

Lubricate the brake pedal pivot point (Figure 26) with oil or grease. Use a good grade of multipurpose chassis grease or engine oil.

Rear Axle Housing

Wipe the grease fitting on the rear axle housing (Figure 27) with a clean rag. Use a grease gun loaded with multipurpose chassis grease and inject approximately 4-6 pumps of grease into the rear axle housing. Do not inject too much grease or the axle housing seals may be damaged, allowing grease to contaminate the brake shoes.

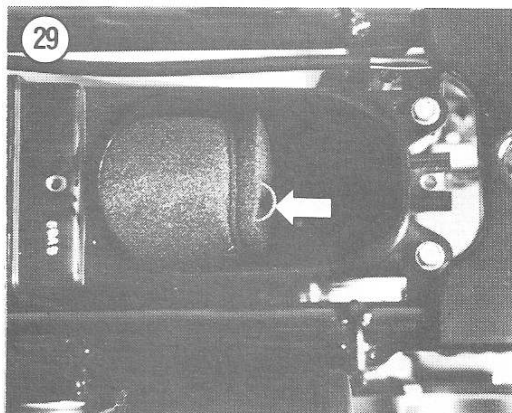
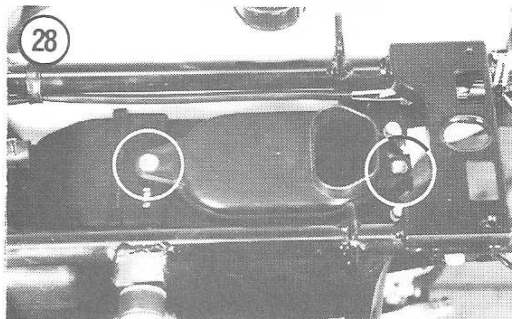
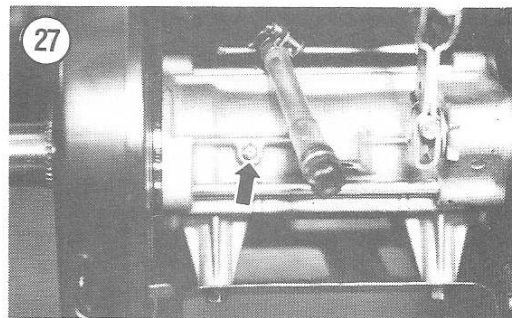
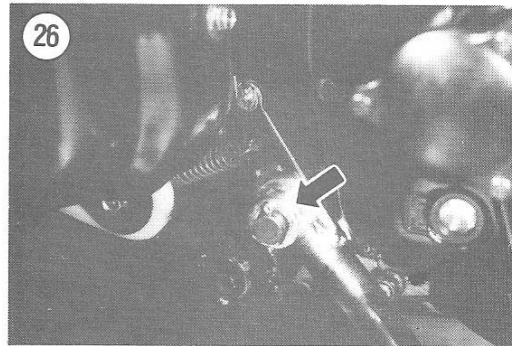
Brake Cam

To lubricate the brake cam with grease, the brake shoes and brake cam shaft must be removed. Refer to Chapter Nine for removal procedures. Use a good grade of high-temperature chassis grease when lubricating the brake cam shaft.

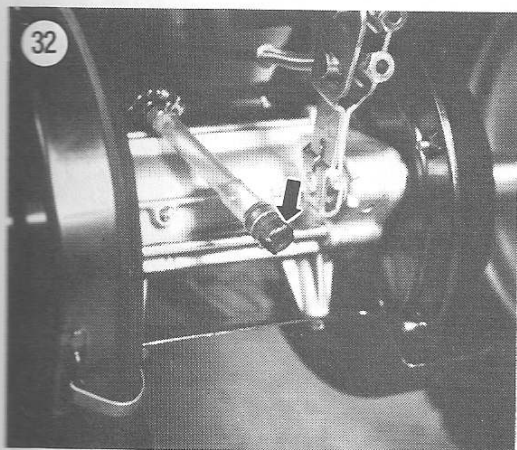
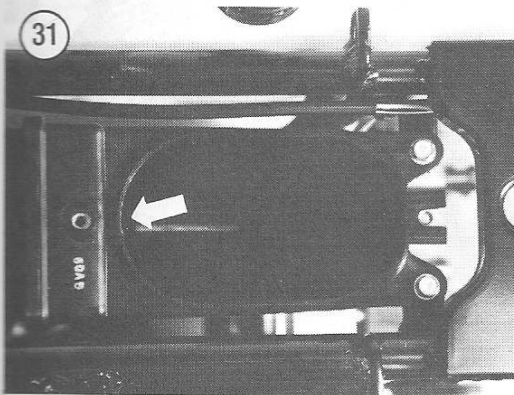
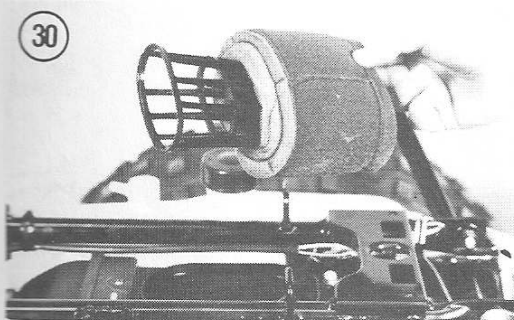
AIR FILTER SERVICE

The air filter removes dust and abrasive particles from the air before they can enter the engine. Even very fine particles entering the engine will rapidly wear the piston rings, cylinder and bearings as well as clog the small passages in the carburetor. The machine should never be operated without the air filter installed. Both LT and ALT models are equipped with a foam filter element.

1. Remove the seat.
2. Remove the screws securing the air box cover and remove the cover (Figure 28).
3. Remove the retaining pin securing the filter element to the air box (Figure 29) and lift out the filter element.



4. Carefully separate plastic cage (Figure 30).
5. Wash the foam of soap water. Rinse it between your palms as possible. The element several layers of paper drying process. Allow completely.



4. Carefully separate the foam element from the plastic cage (Figure 30).

5. Wash the foam element in solvent then in hot, soapy water. Rinse it in clean water and squeeze it between your palms to remove as much water as possible. The element can be squeezed between several layers of paper towels to speed up the drying process. Allow the foam element to dry completely.

CAUTION

Never wring or twist the foam element during the cleaning or reoiling process, as the foam can easily be damaged. Do not use compressed air to dry the foam element. High-pressure air will break down the structure of the foam filter material.

6. Carefully examine the filter element for any tears or splits in the foam. Replace the foam element if it is damaged in any way.

7. Place the foam element in a plastic bag and add a few ounces of special air filter oil to the bag. Use filter oil designed for foam filter elements.

NOTE

If possible, always use a special air filter oil designed for foam filter elements rather than plain engine oil. A good grade of special air filter oil provides better protection against dirt and water than plain engine oil.

8. Gently work the foam element, through the bag, with your hands until the element is completely saturated with oil. Squeeze the element between your palms to remove all the excess oil. Remove the saturated element from the plastic bag.

9. Place the saturated foam element on a clean surface for approximately one hour. This allows the solvent base in the special filter oil to evaporate, leaving a sticky film on the surface of the foam element.

10. Thoroughly clean the filter sealing surfaces inside the air box (Figure 31).

11. Wipe out the inside of the air box to remove all dirt and moisture.

12. Carefully slide the foam element over the plastic cage (Figure 30). Take care not to damage the foam material. Make sure the lip of the element is pulled completely over the rim of the cage.

13. Apply a light coat of grease to the sealing surface of the foam element.

14. Carefully install the filter element. Secure the element in the air box with the retaining clip (Figure 29).

15. Install the air box cover and secure it with the screws (Figure 28).

16. Make sure the air box drain is clear of dirt or moisture (Figure 32).

17. Install the rear fender and seat.

FUEL STRAINER

Clean the fuel strainer as often as specified in Table 1. To remove the fuel strainer, you must remove the fuel tank. Refer to Chapter Six for fuel tank removal and fuel strainer servicing.

CAM CHAIN TENSIONER ADJUSTMENT

To ensure proper tension on the cam chain, perform the adjustment procedure at least as often as specified in **Table 1**.

1. With the engine off, loosen the locknut securing the adjuster screw (**Figure 33**).
2. Back out the adjuster screw one turn to allow the spring-loaded plunger to take up the slack in the cam chain.
3. Tighten the adjuster screw. Tighten the locknut to secure the adjustment.

NOTE

If the cam chain is noisy after performing the adjustment procedure, the spring-loaded plunger in the tensioner assembly may be sticking. Remove and disassemble the tensioner assembly as outlined in Chapter Four.

CLUTCH ADJUSTMENT

1. Remove the screws securing the clutch adjustment cover and remove the cover (**Figure 34**).
2. Loosen the locknut securing the clutch adjuster screw (**Figure 35**).
3. Turn in on the adjuster screw until the screw contacts the inner mechanism and resistance can be felt. Back out the adjuster screw 1/8 turn. Hold the screw and tighten the locknut to secure the adjustment.
4. Install the clutch adjustment cover.

FRAME AND ENGINE FASTENERS

Constant vibration can loosen many of the fasteners on the machine. Check the torque on all engine and frame fasteners at intervals specified in **Table 1**. Pay particular attention to the fasteners on the following:

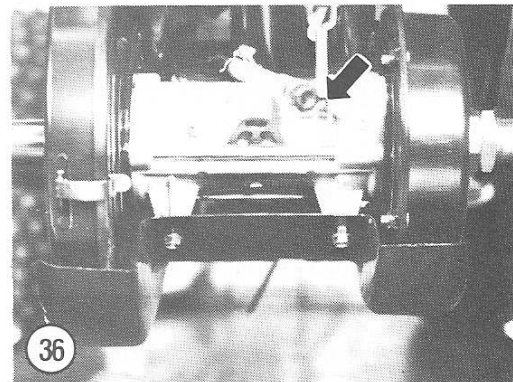
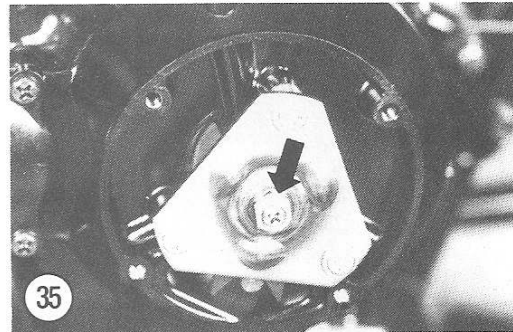
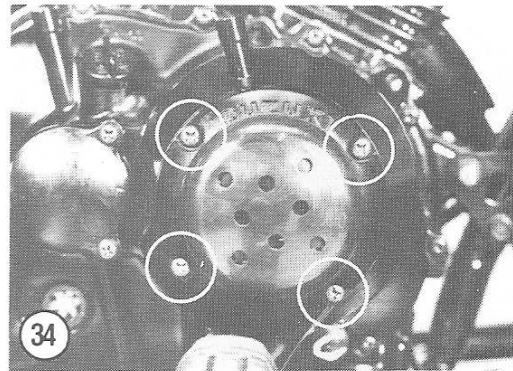
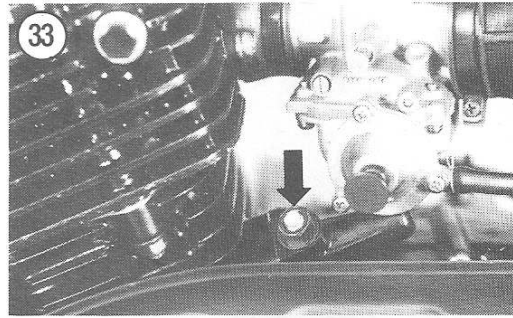
- a. Engine mounting hardware.
- b. Engine crankcase covers.
- c. Handlebar and front forks.
- d. Gearshift lever.
- e. Brake pedal and lever.
- f. Exhaust system.

Refer to **Table 5** for torque values. Refer to procedures in Chapter Four to torque the cylinder head cover, cylinder head and cylinder.

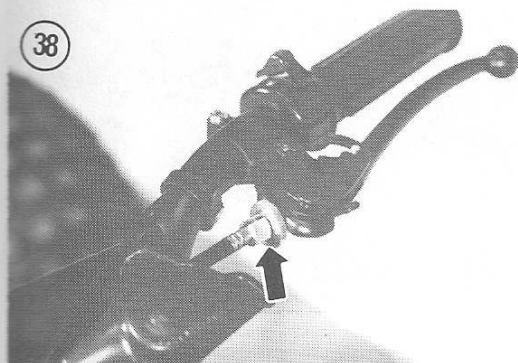
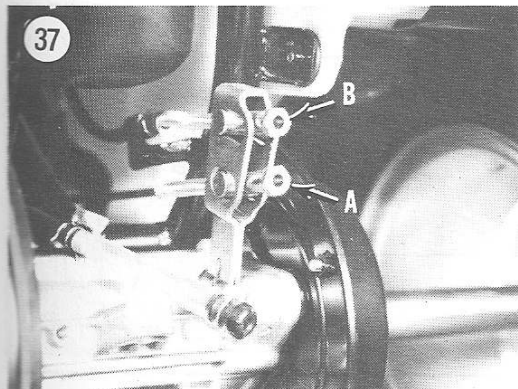
BRAKES

Brake Lining Inspection

Whenever the brake is adjusted, inspect the brake lining wear indicator. Apply the brake fully and check that the brake arm movement is within



the range of the rear
(Figure 36). If the
or if the brake arm
shown in Figure 3
replace the brake
Rear Brake Pedal
Always adjust the
the hand brake lever
offer as specified
distance the pedal
to the applied ped
depressed by hand.
The brake pedal
(3-4) (1-4 in.) bet
contact with the br
not be adjusted w
contact the brake d
If adjustment is
adjustment nut (A,
the correct amount
Hand Brake Lever
1. Adjust the bra
adjusting the hand



the range of the marks cast in the rear axle housing (Figure 36). If the brake does not operate properly or if the brake arm movement is outside the marks shown in Figure 36, refer to Chapter Nine and replace the brake shoes.

Rear Brake Pedal Adjustment

Always adjust the brake pedal before adjusting the hand brake lever. Check the pedal free play as often as specified in Table 1. Free play is the distance the pedal travels from the at-rest position to the applied position when the pedal is lightly depressed by hand.

The brake pedal should travel about 20-30 mm (3/4-1 1/4 in.) before the brake shoes come in contact with the brake drum, but the brake must not be adjusted so closely that the brake shoes contact the brake drum with the pedal relaxed.

If adjustment is necessary, turn the lower adjustment nut (A, Figure 37) in or out to achieve the correct amount of free play.

Hand Brake Lever Adjustment

1. Adjust the brake pedal free play before adjusting the hand brake lever.

2. Loosen the knurled locknut securing the brake cable adjuster and turn the adjuster in as far as possible (Figure 38).

3. Firmly apply the hand brake lever. The hand brake lever should be 20-30 mm (3/4-1 1/4 in.) from the hand grip.

4. If the brake lever position is incorrect, turn the adjustment nut (B, Figure 37) in or out to achieve the correct amount of free play.

5. Minor adjustments can be made at the hand lever adjuster to ensure the brake operates properly and that the parking brake, when set, prevents the machine from moving.

WHEEL BEARINGS

There is no factory-recommended interval for cleaning and repacking the wheel bearings. They should be serviced whenever they are removed from the wheel hub or whenever there is the likelihood of water contamination (especially salt water). The correct service procedures are covered in Chapter Eight.

STEERING

Steering Head Adjustment Check (ALT Models)

The steering head is fitted with loose ball bearings. It should be checked every year of operation or after a serious spill or collision to ensure that it is adjusted properly.

Place the machine up on wood block(s) or a milk crate so that the front wheel is off the ground. Hold onto the front fork tubes and gently rock the fork assembly back and forth. If you can feel looseness, refer to *Front Fork/Steering Stem Installation* in Chapter Eight.

Front Wheel Toe-in (LT Models)

The steering system and toe-in alignment should be checked as often as specified in Table 1.

1. Visually inspect all components of the steering system. Pay close attention to the tie-rods and steering shaft, especially after a hard spill or collision. If any signs of damage are apparent the steering components must be repaired. Refer to Chapter Eight.

2. Make sure the front tire pressure is 2.2 psi (0.15 kg/cm²).

3. Place a jack under the front of the machine and raise the front end until both front tires are clear of the ground.

4. Hold a scribe or felt tip pen against the center of one front tire and spin the wheel. Make sure the line is visible on the front and rear of the tire. Repeat for the other tire.

5. Carefully measure the distance between the center line of both front tires as shown in **Figure 39**. The front measurement should be 7-9 mm (0.28-0.35 in. or approximately 1/4-5/16 in.) less than the rear measurement. This amount of toe-in is necessary for proper steering. Too much toe-in can cause excessive tire wear and hard steering. Too little toe-in will allow the front end to wander.
6. If the toe-in is incorrect, refer to Chapter Eight for adjustment.
7. Lower the front of the machine and remove the jack.

ENGINE TUNE-UP

An engine tune-up consists of several accurate and careful adjustments made to obtain maximum engine performance and efficiency. Because different systems in the engine interact to affect the overall performance, tune-ups must be carried out in the following order:

- a. Clean air filter element.
- b. Adjust valve clearance.
- c. Clean and/or replace spark plug.
- d. Adjust carburetor.

Perform engine tune-up procedures at least as frequently as specified in **Table 1**. Refer to **Table 6** for all tune-up specifications. These machines are fitted with a PEI (pointless electronic ignition) system so routine ignition timing adjustments are not necessary.

Air Filter Service

Clean and reoil the air filter as outlined in this chapter.

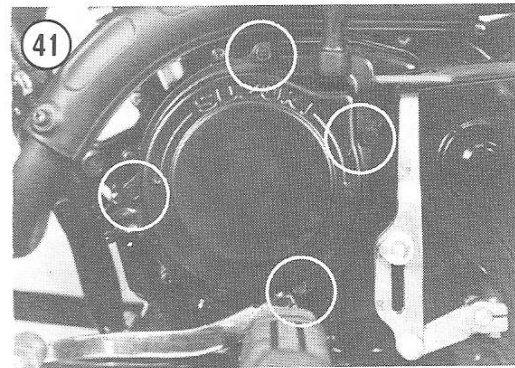
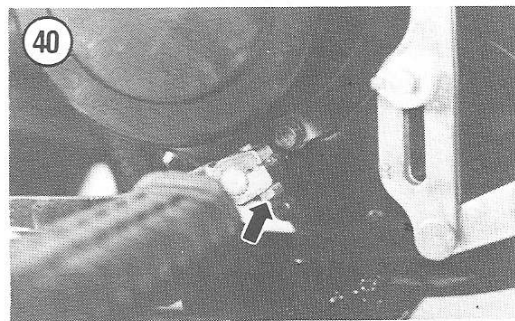
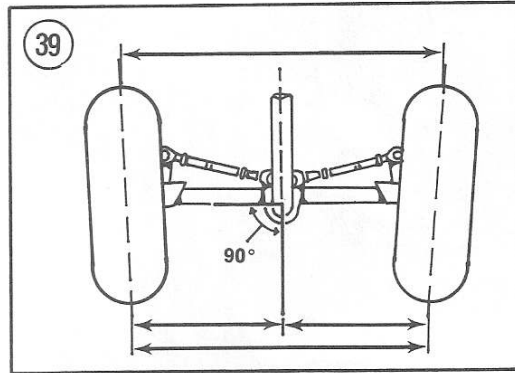
Valve Clearance Adjustment

CAUTION

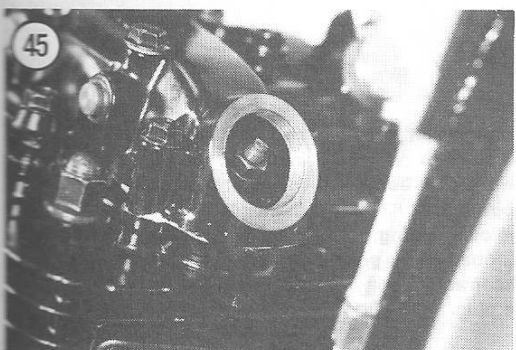
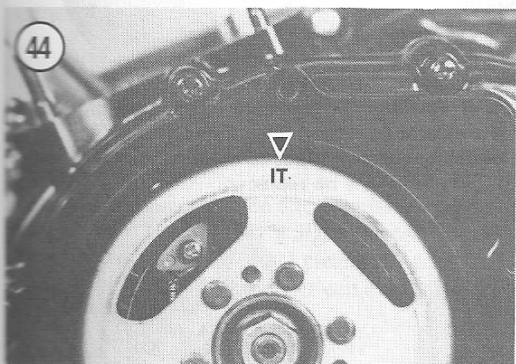
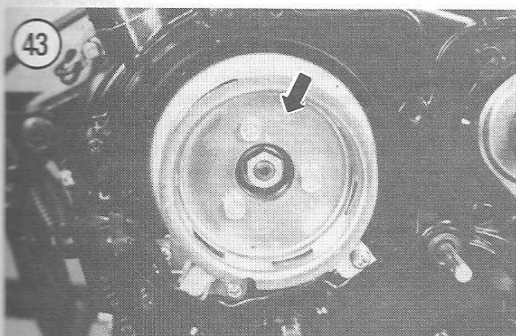
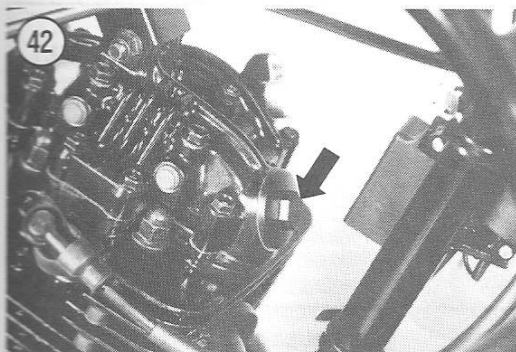
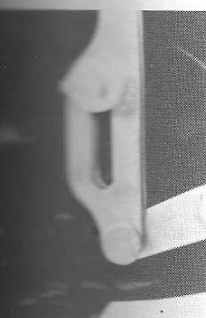
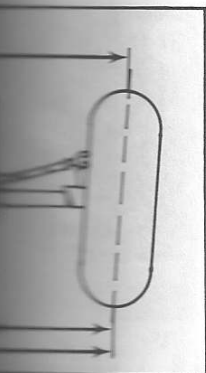
Valve clearance adjustments must be performed when the engine is completely cold—not run for at least 12 hours. If the engine is not cold, the adjustments will not be accurate and engine damage may result.

Valve clearance is the mechanical tolerance between the end of the valve and the actuating end of the rocker arm. Proper valve clearance is essential for engine performance and longevity. If valve clearances are too small, the valves may be burned or distorted. Excessive clearance will result in a noisy valve train and poor performance.

1. Place the machine on level ground and set the parking brake.
2. Remove the seat and front fender (LT models) or frame cover (ALT models) as outlined in Chapter Ten.



3. Remove the spark plug as described in this chapter.
4. Remove the bolt securing the gearshift lever and remove the lever (**Figure 40**). The bolt must be removed completely, not just loosened.
5. Remove the bolts securing the recoil starter unit and remove the starter (**Figure 41**).
6. Remove both valve inspection caps from the cylinder head cover (**Figure 42**).
7. Use the starter cup (**Figure 43**) and slowly rotate the engine until the "T" line on the alternator rotor is aligned with the pointer on the engine case (**Figure 44**). Check to see that both rocker arms can



be moved slightly, indicating that both valves are closed. This positions the piston at TDC (top dead center). If the intake (rear) rocker arm has clearance but the exhaust valve is down (rocker arm tight), the engine is on the exhaust stroke. Rotate the alternator rotor one more complete turn and again align the "T" mark. This will position the piston at TDC with both valves closed.

8. Hold the valve adjuster on one rocker arm with a short screwdriver and loosen the locknut securing the adjuster (Figure 45).

9. Back out the adjuster screw approximately one turn until there is obvious free play between the rocker arm and the end of the valve.

10. Insert a feeler gauge blade (within the valve tolerance specified in Table 6) between the end of the valve and the adjuster screw in the rocker arm. Slowly and carefully turn the adjuster screw down until it just contacts the feeler gauge blade. The clearance is correct when there is a slight resistance on the feeler gauge as the blade is inserted and withdrawn.

11. When the clearance is correct hold the adjuster screw in place with the screwdriver and tighten the locknut to secure the adjustment. Recheck the clearance as the adjuster screw will often tighten slightly as the locknut is tightened. Reset the clearance if necessary.

12. Perform the adjustment on the second valve.

13. Rotate the engine through a few revolutions and set at TDC again. Recheck both valve clearances and readjust if necessary.

14. Check that the O-rings in the valve inspection caps are in good condition and install the caps. Replace the O-rings if they are damaged or oil leaks may result. Do not overtighten the caps or they will be damaged.

15. Install the recoil starter, gearshift lever, body panels and seat. If a complete tune-up is being performed, do not install the spark plug at this time.

Spark Plug Heat Range

Spark plugs are available in various heat ranges, hotter or colder than the plugs originally installed at the factory. Unless the engine is heavily modified, use the spark plug recommended in Table 6.

Spark Plug Removal/Cleaning

1. Grasp the spark plug cap as near the plug as possible and pull it off the plug. Never pull on the plug lead itself or the lead could be damaged. If the cap is stuck to the plug, twist it slightly to break it loose.

as described in this

the gearshift lever
The bolt must be
loosened.

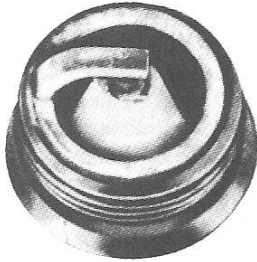
the recoil starter unit
(p. 41).

Remove caps from the

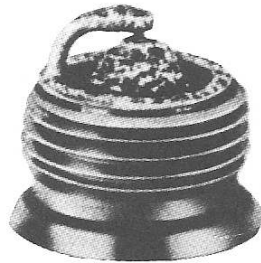
and slowly rotate
the alternator rotor
from the engine case
both rocker arms can

46

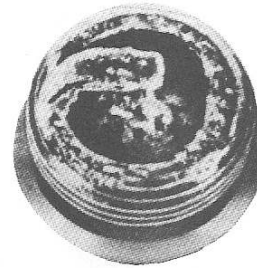
SPARK PLUG CONDITION

**NORMAL**

- Identified by light tan or gray deposits on the firing tip.
- Can be cleaned.

**GAP BRIDGED**

- Identified by deposit buildup closing gap between electrodes.
- Caused by oil or carbon fouling. If deposits are not excessive, the plug can be cleaned.

**OIL FOULED**

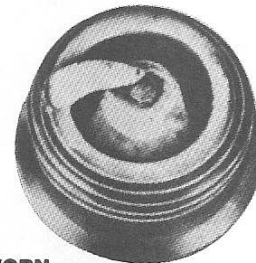
- Identified by wet black deposits on the insulator shell bore and electrodes.
- Caused by excessive oil entering combustion chamber through worn rings and pistons, excessive clearance between valve guides and stems, or worn or loose bearings. Can be cleaned. If engine is not repaired, use a hotter plug.

**CARBON FOULED**

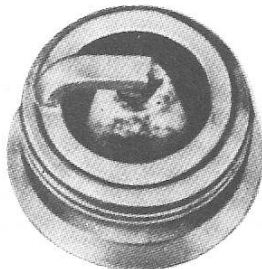
- Identified by black, dry fluffy carbon deposits on insulator tips, exposed shell surfaces and electrodes.
- Caused by too cold a plug, weak ignition, dirty air cleaner, too rich a fuel mixture or excessive idling. Can be cleaned.

**LEAD FOULED**

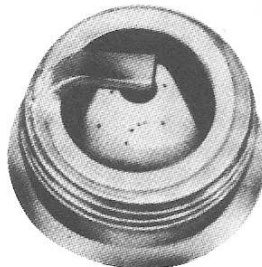
- Identified by dark gray, black, yellow or tan deposits or a fused glazed coating on the insulator tip.
- Caused by highly leaded gasoline. Can be cleaned.

**WORN**

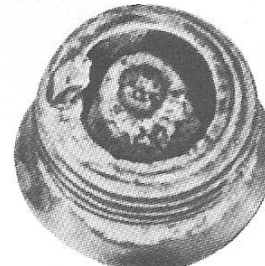
- Identified by severely eroded or worn electrodes.
- Caused by normal wear. Should be replaced.

**FUSED SPOT DEPOSIT**

- Identified by melted or spotty deposits resembling bubbles or blisters.
- Caused by sudden acceleration. Can be cleaned.

**OVERHEATING**

- Identified by a white or light gray insulator with small black or gray brown spots and with bluish-burnt appearance of electrodes.
- Caused by engine overheating, wrong type of fuel, loose spark plugs, too hot a plug or incorrect ignition timing. Replace the plug.

**PREIGNITION**

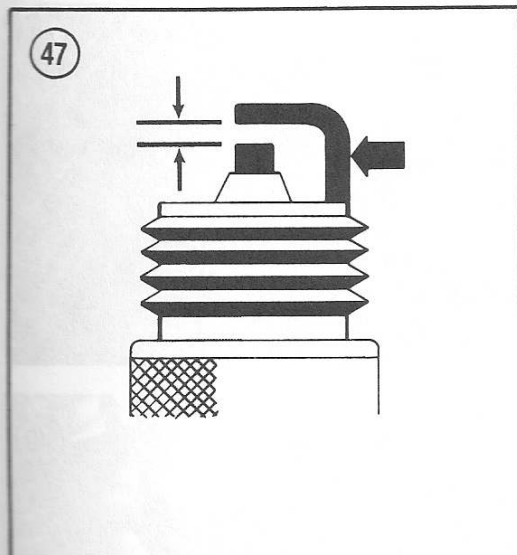
- Identified by melted electrodes and possibly blistered insulator. Metallic deposits on insulator indicate engine damage.
- Caused by wrong type of fuel, incorrect ignition timing or advance, too hot a plug, burned valves or engine overheating. Replace the plug.

black deposits on
insulator and electrodes.
Prevent oil entering
through worn
gaskets and stems, or
leakage. Can be
repaired.

severely eroded or
worn. Should

melted electrodes
distorted
deposits on
engine

wrong type of fuel,
ignition timing or
other hot a plug,
wires or engine
parts. Replace the plug.



2. If compressed air is available, blow away any dirt that may have accumulated in the spark plug well.
3. Use a spark plug socket and remove the spark plug.

NOTE

If the plug is difficult to remove, apply penetrating oil such as WD-40 or Liquid Wrench around the base of the plug and let it soak in about 10-20 minutes.

4. Inspect the spark plug carefully. Refer to **Figure 46**. Check for broken or cracked porcelain, an excessively eroded electrode and excessive carbon or oil fouling. A plug with a light deposit may be cleaned in solvent or contact cleaner. A wire brush or spark plug sandblast cleaner can also be used.

Spark Plug Gapping/Installation

A spark plug should be carefully gapped to ensure a reliable, consistent spark. This is true of a new plug as well as a used plug. Use a special spark plug gapping tool or a round feeler gauge.

1. Remove the new spark plug from the box.
2. Use a round feeler gauge to gap the spark plug to 0.6-0.8 mm (0.0224-0.031 in.) by bending the side electrode (**Figure 47**). Do not file the electrode to correct the gap. If the gap is correct, you will feel a slight drag as you pull the gauge through. If there is no drag or the gauge will not pass through, carefully bend the side electrode to set the proper gap.
3. Put a small drop of oil or anti-seize compound on the threads of the spark plug.

4. Screw the spark plug in by hand until it seats. Very little effort is required. If force is necessary, you have the plug cross-threaded; unscrew it and try again.

CAUTION

Take care not to cross-thread the spark plug in the cylinder head. The cylinder head is aluminum and the threads are easily damaged.

5. Tighten the spark plug an additional 1/8-1/4 turn. If a torque wrench is available, torque the plug to 1.5-2.0 mkg (11-14 ft.-lb.).

NOTE

Do not overtighten. This will only squash the gasket and destroy its sealing ability.

Reading Spark Plugs

Much information about engine and spark plug performance can be determined by careful examination of the spark plug. This information is more valid after performing the following steps.

1. Ride the machine a short distance at full throttle.
2. Turn the ignition switch OFF before closing the throttle and simultaneously shift to NEUTRAL; coast and brake to a stop.
3. Remove the spark plug and examine it. Compare it to **Figure 46**.
 - a. If the insulator is white or burned, the plug is too hot and should be replaced with a colder one.
 - b. A too-cold plug will have sooty or oily deposits ranging in color from dark brown to black. Replace with a hotter plug and check for too-rich carburetion or evidence of oil blow-by at the piston rings.
 - c. If the plug has a light tan or gray colored deposit and no abnormal gap wear or electrode erosion is evident, the plug and the engine are running properly.
 - d. If the plug exhibits a black insulator tip, a damp and oily film over the firing end and a carbon layer over the entire nose, it is oil fouled. An oil fouled plug can be cleaned, but it is better to replace it.

Throttle Cable Adjustment

1. Remove the seat and front fender (LT models) or frame cover (ALT models) as outlined in Chapter Ten.
2. Pull back the rubber boot over the throttle cable housing where it enters the top of the carburetor

(Figure 48). Throttle cable free play should be 0.5-1.0 mm (0.02-0.04 in. or approximately 1/32-1/16 in.).

3. If cable adjustment is necessary, perform the following:

- a. Pull back the rubber boot covering the throttle cable adjuster (Figure 49).
 - b. Loosen both locknuts securing the cable adjuster (Figure 50).
 - c. Turn the cable adjuster until the specified cable free play is obtained where the cable enters the top of the carburetor. Tighten the locknuts to secure the adjustment.
 - d. Pull the rubber boot over the cable adjuster.
4. Pull back the rubber boot over the cable housing at the top of the carburetor. Install the body panels and seat.

Carburetor Adjustment

All other tune-up procedures must be performed before the carburetor can be adjusted effectively. Float level adjustments are outlined in Chapter Six.

1. Carefully turn in the pilot air screw (Figure 51) until it just bottoms. Do not overtighten the screw or it will be damaged. Back the screw out the number of turns specified in Table 6.
2. Start the engine and warm it up to operating temperature. Readjust the pilot air screw in or out approximately 1/4 turn from the preset position to obtain smooth acceleration without any hesitation when the throttle is applied.
3. Connect an external tachometer to the engine according to the manufacturer's instructions.
4. Warm up the engine and adjust the throttle stop screw (idle speed screw) to obtain an even idling speed of 1,500-1,600 rpm (Figure 52). Disconnect the tachometer.

Fuel Strainer

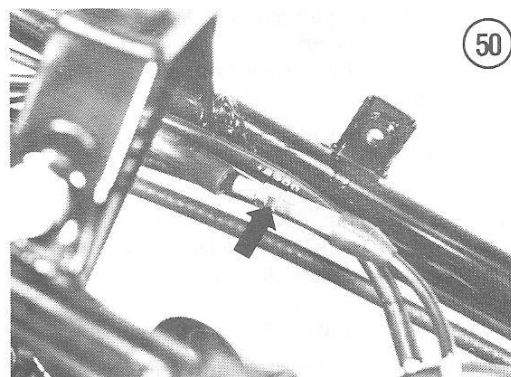
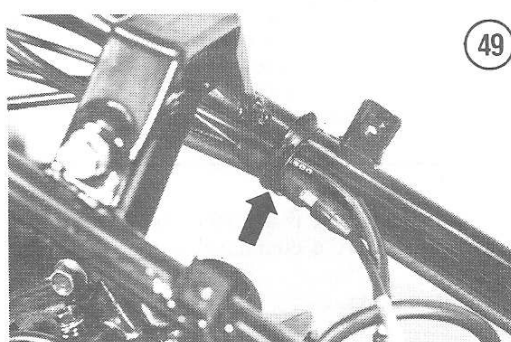
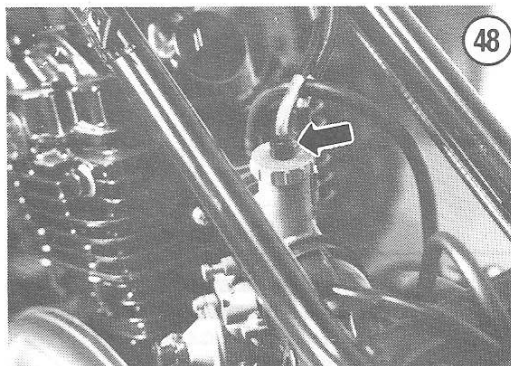
To clean the fuel strainer you must remove the fuel tank. Refer to Chapter Six for procedures to remove the fuel tank and clean the fuel strainer.

Compression Test

During every tune-up, check the cylinder compression. Record the results and compare them at the next check. A running record will show trends in deterioration so that corrective action can be taken before a complete failure occurs.

Both a dry test and a wet test should be carried out to isolate trouble to the cylinder and piston or to the valves.

1. Warm the engine to normal operating temperature then shut it off.

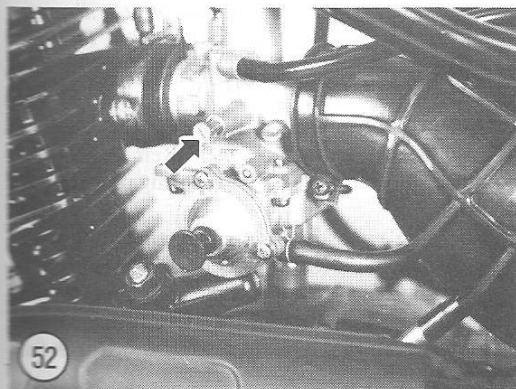


2. Remove the spark plug.
3. Connect a compression tester following the manufacturer's instructions.
4. Make sure the choke is off. Hold the throttle fully open and pull the recoil starter several times until the gauge needle ceases to rise. Record the results and remove the tester.
5. When interpreting the results, look for a marked loss compared to a previous test. Standard cylinder compression is 10-14 kg/cm² (142-199 psi). A reading below 8.0 kg/cm² (114 psi) indicates an engine overhaul is due.

4. The decrease in compression is due to a worn piston ring and/or worn valves. The spark plug hole may be slightly worn, but it probably won't change little from probably worn.

If a compression tester is used, the gauge needle will rise and then fall. The gauge needle will be steady if the compression is good. If the gauge needle falls, it indicates a problem with the piston and/or valves.

Several months of problems and a



6. To determine whether the compression problem is due to valves or piston rings, perform a second compression test after pouring approximately 15 cc (1/2 oz.) of motor oil through the spark plug hole. If the compression reading rises significantly, piston rings and/or cylinder bore are probably worn. If the "wet" compression test changes little from the dry test, the valves are probably burned.

NOTE

If a compression check indicates the engine has bad valves, install the spark plug and run the engine for a few minutes. Remove the spark plug and recheck the compression. Occasionally a small piece of carbon, loosened when the spark plug is first removed, will lodge under a valve seat during the compression test and cause a false "bad valves" indication. Running the engine briefly will burn out any such carbon particles and allow an accurate compression test.

STORAGE

Several months of inactivity can cause serious problems and a general deterioration of the

condition of your ALT/LT. This is especially true in areas of weather extremes. During the winter months it is advisable to specially prepare the machine for lay-up.

Selecting a Storage Area

Most owners store their vehicles in their home garages. If you do not have a home garage, facilities suitable for long-term storage are available for rent or lease in most areas. In selecting a building, consider the following points.

1. The storage area must be dry, free from dampness and excessive humidity. Heating is not necessary, but the building should be well insulated to minimize extreme temperature variations.
2. Buildings with large window areas should be avoided or such windows should be masked if direct sunlight can fall on the machine. This is also a good security measure.
3. Buildings in industrial areas, where factories are liable to emit corrosive fumes, are not desirable nor are facilities near bodies of salt water.
4. The area should be selected to minimize the possibility of loss from fire, theft or vandalism. The area should be fully insured, perhaps with a package covering fire, theft, vandalism, weather and liability. The advice of your insurance agent should be sought in these matters. The building should be fireproof and items such as the security of doors and windows, alarm facility and proximity of police should be considered.

Preparation for Storage

Careful preparation will minimize deterioration and make it easier to restore your machine to service later. Use the following procedure.

1. Wash everything completely. Make certain to remove all dirt in all the hard-to-reach parts such as the cooling fins on the head and cylinder. Completely dry all parts of the machine to remove all moisture. Wax all painted and polished surfaces.
2. Run the engine for about 20-30 minutes to warm up the oil in the engine. Drain the oil and remove the oil filter, regardless of the time since the last oil change. Do not replace the oil filter at this time. Fill the engine with the new engine oil all the way to the filler hole.
3. Drain all gasoline from the fuel tank, the fuel pump, interconnecting hoses and the carburetor. As an alternative, a fuel preservative may be added to the fuel. This preservative is available from many motorcycle shops and marine equipment suppliers.

4. Lubricate the drive chain and control cables; refer to specific procedures in this chapter.
5. Remove the spark plug and add 1-2 tablespoons of SAE 10W-40 motor oil into the cylinder. Turn the engine over slowly a few revolutions with the recoil starter to distribute the oil and then install the spark plug.
6. One additional safeguard for winter or prolonged storage is the Engine Protection Dispenser that screws into the spark plug hole. It dispenses a vapor into the cylinder, crankcase, carburetor and muffler which works against rust and acid damage. It is rated to be good for up to 2 years and is available from the Brookstone Co., 127 Voss Farm Road, Peterborough, NH 03458.
7. Tape or tie a plastic bag over the end of the muffler to prevent the entry of moisture.
8. Inflate the tires to 2 psi (0.15 kg/cm²) and move the machine to the storage area. Place it securely on a milk crates or wood blocks with all wheels off the ground.
9. Spray the vinyl and rubber components with a preservative such as Armor All.
10. Cover the machine with a tarp, blanket or heavy plastic drop cloth. Place this cover over the machine mainly as a dust cover—do not wrap it tightly especially if it is plastic, as it may trap moisture. Leave room for air to circulate around the vehicle. Make sure the building's fans or blowers are not directed at the machine. The constant motion of air against the tarp or cover can scratch or chafe the finish on the machine.

Inspection During Storage

Try to inspect your machine weekly while in storage. Any deterioration should be corrected as soon as possible. For example, if corrosion of metal parts is observed, cover them with a light coat of grease or silicone spray after a thorough cleaning. Turn the engine over a couple of times—don't start it; use the recoil starter with the ignition switch in the OFF position.

Restoring The Machine To Service

A machine that has been properly prepared and stored in a suitable area requires only light maintenance to restore it to service. It is advisable, however, to perform a tune-up.

1. Before removing the ALT/LT from service, reinflate the tires to the correct pressures. Air loss during storage may have nearly flattened the tires and moving the vehicle can cause damage to tires and rims.

WARNING

During the next steps, place a metal container under the fuel tank and carburetor to catch all fuel or it will create a real fire danger if allowed to drain onto the machine and the floor. Dispose of the fuel properly.

2. Drain the engine oil and change the filter as outlined earlier in this chapter. Remember you overfilled the crankcase with oil during preparation for storage.
3. When the vehicle is brought to the work area, drain the fuel tank if fuel preservative was used.
4. Add new fuel to the tank and operate the carburetor priming pump a few times until resistance is felt in the pump movement. Check for leaks in the fuel system.
5. Remove the drain screw from the carburetor float bowl. Operate the priming pump and allow several cups of fuel to pass through the fuel system. Allow the float bowl to drain completely and install the drain screw. Operate the priming pump until resistance is felt.
6. Remove the spark plug or the engine protection dispenser (if installed) and install a fresh spark plug. Start up the engine.
7. Perform a tune-up as described in this chapter.
8. Check the operation of the ignition switch and the head and taillight switch. Oxidation of the switch contacts during storage may make them inoperative. Make sure the kill switch shuts off the engine.
9. Clean and test ride the machine. Adjust or tighten any cables or components as necessary.

Table 1 MAINTENANCE AND LUBRICATION SCHEDULE*

Every fuel stop or every time machine is ridden	<ul style="list-style-type: none"> • Check tire condition and inflation • Lubricate drive chain • Check the operation of all control levers and cables • Check operation of all electrical switches
Initial 100 miles (200 km)	<ul style="list-style-type: none"> • Check all engine and chassis nuts and bolts, tighten if necessary. • Check and/or adjust valve clearance • Torque cylinder head nuts, cylinder nuts and exhaust pipe nuts • Change engine oil and oil filter • Inspect fuel lines • Adjust cam chain tension • Adjust clutch • Adjust brake • Adjust engine idle speed • Clean, lubricate and adjust drive chain (every 600 miles) • Check and/or adjust steering • Adjust throttle and choke cables
Every 600 miles (1,000 km)	<ul style="list-style-type: none"> • Perform initial 100 mile (200 km) service plus the following: • Clean air cleaner element • Lubricate control cables with motor oil or special cable lubricant • Grease brake pedal pivot
Every 1,200 miles (2,000 km)	<ul style="list-style-type: none"> • Perform initial 100 miles (200 km) service plus the following: • Clean fuel strainer • Clean and regap spark plug • Clean engine oil sump screen • Adjust clutch • Grease throttle lever • Grease odometer cable • Grease brake cam shaft • Grease rear axle housing
Every 3,100 miles (5,000 km)	<ul style="list-style-type: none"> • Replace spark plug
Every 4 years	<ul style="list-style-type: none"> • Replace fuel lines
<p>* This maintenance schedule is based on the minimum maintenance requirements as specified by Suzuki in order to keep the ALT/LT machines in top operating condition. Harder-than-normal use as well as exposure to mud, sand and water (particularly salt water) will naturally dictate more frequent attention to most maintenance items.</p>	

3

Table 2 RECOMMENDED FUEL AND LUBRICANTS

Fuel	Unleaded or low-lead; 85-95 octane
Engine/transmission oil	SAE 10W-40 SE or SF rated
Drive chain	SAE 90 oil or chain lubricant rated for O-ring chains

Table 3 RECOMMENDED TIRE PRESSURES

Tire	psi	kg/cm ²
Front and rear (solo only)	2.2	0.15

Table 4 CAPACITIES

Fuel tank	5.0 liters	1.6 U.S. gal.	1.1 Imp. gal.
Engine/transmission oil			
Without filter change	1100 cc	1.1 U.S. qt.	0.9 Imp. qt.
With filter change	1150 cc	1.2 U.S. qt.	1.0 Imp. qt.
After overhaul	1200 cc	1.3 U.S. qt.	1.1 Imp. qt.

Table 5 GENERAL TORQUE SPECIFICATIONS

Item	mkg	ft.-lb.
Cylinder head cover bolt	0.9-1.0	6.5-7.0
Cylinder head nut		
(8 mm)	1.5-2.0	11.0-14.5
(6 mm)	0.7-1.1	5-8
Cylinder base nut	0.7-1.1	5-8
Spark plug	1.5-2.0	11-14
Magneto flywheel nut	5-6	36.0-43.5
Clutch sleeve hub nut	4-6	29.0-43.5
Engine oil drain plug	1.8-2.0	13-14
Engine sprocket nut	8-10	58.0-72.5
Exhaust pipe clamp nut	0.9-1.2	6.5-8.5
Footrest mounting bolts	1.8-2.8	13-20
Muffler mounting bolt	1.8-2.8	13-20
Engine mounting bolts		
10 mm	8.0-9.5	58.0-68.5
8 mm	2.8-3.4	20.0-24.5
Front axle nuts (ALT)	3.6-5.2	36-58
Steering stem head bolt and nut (ALT)	3.5-5.0	25.5-40.0
Handlebar clamp bolt (ALT)	1.2-2.0	8.5-14.5
Handlebar clamp bolt (LT)	1.0-1.6	7.0-11.5
Front and rear wheel lug nuts	2.0-3.1	14.5-22.5
Front wheel hub nut (LT)	5-8	36-58
Front and rear wheel rim nut	2.0-3.1	14.5-22.5
Steering shaft clamp bolt (LT)	1.8-2.8	13-20
Steering shaft lower nut (LT)	2.2-3.5	16.0-25.5
Knuckle arm bolt (LT)	4-6	29.0-43.5
Tie rod end nut (LT)	4-6	29.0-43.5
Tie rod end lock nut (LT)	2.2-3.5	16.0-25.5
Rear wheel hub retaining nut	8.5-11.5	61.5-83.0
Axle housing nut	1.8-2.8	13-20
Rear axle-to-brake drum nut	5-8	36-58
Rear axle locknut	16-20	115.5-144.5

Table 6 TUNE-UP SPECIFICATIONS

Recommended spark plug	NGK D7EA or ND X22ES-U
Spark plug gap	0.6-0.7 mm (0.024-0.028 in.)
Ignition timing (preset non-adjustable)	10° BTDC below 1,900-2,100 rpm 30° BTDC above 3,400-3,600 rpm
Valve clearance (cold)	0.08-0.13 mm (0.003-0.005 in.)
Idle speed	1,500-1,600 rpm
Pilot air screw	1 3/4 turns out

CHAPTER FOUR

NOTE: If you own a 1984 or later model, first check the Supplement at the back of the book for any new service information.

ENGINE

The engine used in the Suzuki AT and LT models is an air-cooled single cylinder, 4-stroke model equipped with a single overhead camshaft (SOHC). The crankshaft is supported by two sets of ball bearings in a vertically split crankcase.

The camshaft is chain-driven from the crankshaft. The cam chain tension is controlled by an adjustable spring-loaded slipper tensioner which bears against the rear vertical run of the chain.

The engine and transmission are lubricated from a common wet-sump oil supply. The clutch is a wet-plate type located inside the right engine cover.

This chapter provides complete service and overhaul procedures for the ALT/LT engine. Refer to Chapter Five for transmission and clutch repair procedures.

All engine upper end repair, including camshaft, cylinder head and cylinder block, can be performed with the engine installed in the machine. Engine removal is necessary to perform repair on the crankshaft, transmission and certain components of the gearshift mechanism.

Refer to **Table 1** for all engine torque specifications. Tables are at the end of the chapter.

Reread the service hints in Chapter One before beginning any engine work. You will do a better job with this information fresh in your mind.

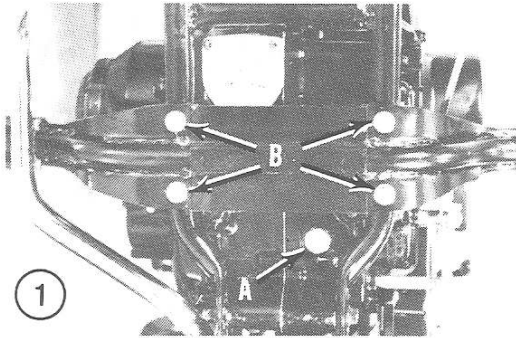
SERVICING ENGINE
IN THE FRAME

Since most engine repairs can be performed with the engine still mounted in the frame, the engine should be left installed, whenever possible. The frame is an excellent holding device, making it much easier to loosen stubborn nuts and bolts.

It is only necessary to completely remove the engine to repair the crankshaft, transmission and the internal gearshifting mechanism. However, if you are performing the repair work without assistance, it may be easier to first remove the cylinder head, cylinder and piston, even if repair on these items is not needed. Head and cylinder removal will greatly reduce the bulk and weight of the engine, making engine removal much more manageable for one person.

If the engine has to be disassembled for repair, most of the external components should be removed before the engine is removed from the frame. It is much easier disassembling the engine in the frame than wrestling with a complete engine unit on a workbench.

Any of the following external engine components can be serviced or repaired with the engine installed in the frame. However, if the engine must be completely disassembled for crankshaft, crankcase, transmission or gearshift repair, remove

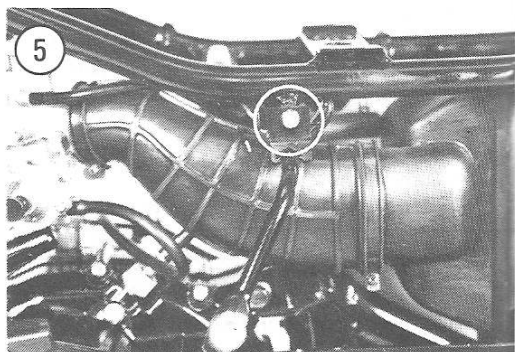
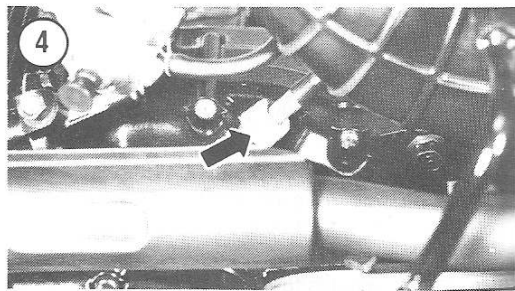
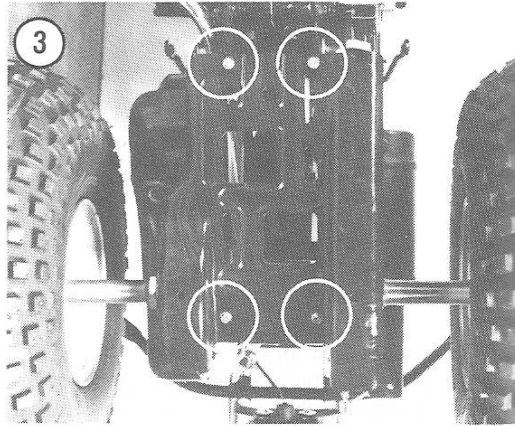
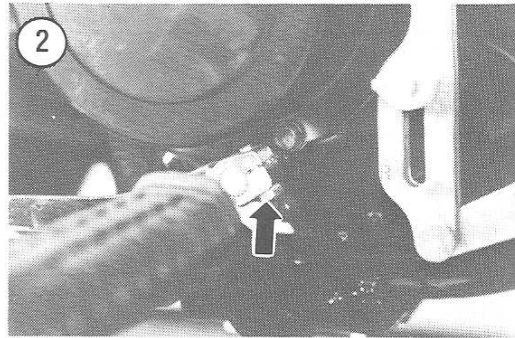


all of the following items before removing the engine from the frame:

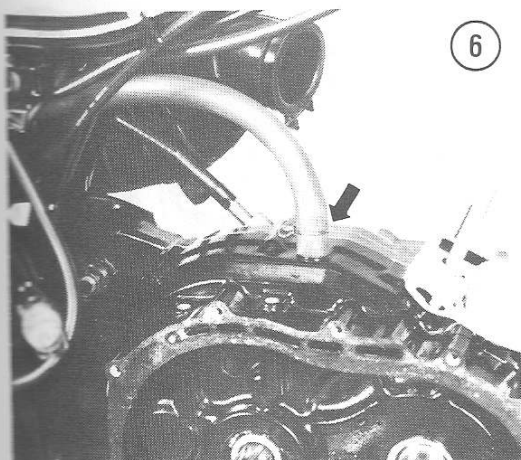
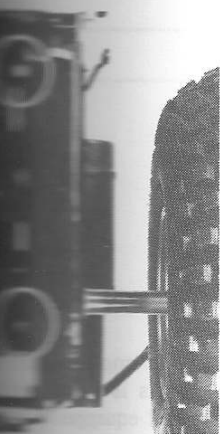
- a. Cylinder head, cylinder and piston.
- b. Carburetor and exhaust system (refer to Chapter Six).
- c. Clutch assembly, primary gears, external gearshift mechanism and reverse gearshift mechanism (refer to Chapter Five).
- d. Magneto rotor and stator.
- e. Outer chain case.
- f. Magneto housing.
- g. Gear position indicator gears.
- h. Engine sprocket.
- i. Oil pump (only if it is going to be inspected or replaced).

ENGINE REMOVAL/INSTALLATION

1. Thoroughly clean the machine at a coin-operated car wash or with detergent and a hose. Make sure the engine and all nuts and bolts are as clean as possible. A clean machine is not only more pleasant to work on, it helps prevent contamination of vital moving parts.
2. Remove seat and fenders as outlined in Chapter Ten.
3. Place a drain pan under the engine. Use a socket and remove the oil sump drain plug (A, **Figure 1**). Allow several minutes for the oil to drain completely.
4. Remove the bolts securing the footrest unit and remove the unit (**Figure 1**).
5. Remove the pinch bolt securing the gearshift lever (**Figure 2**). The bolt must be removed completely before the lever can be removed.
6. Remove the bolts securing the skid plate and remove the plate (**Figure 3**).
7. Disconnect the odometer cable from the drive unit (**Figure 4**).
8. Remove the bolts securing the upper fender mounting bracket and remove the bracket (**Figure 5**).

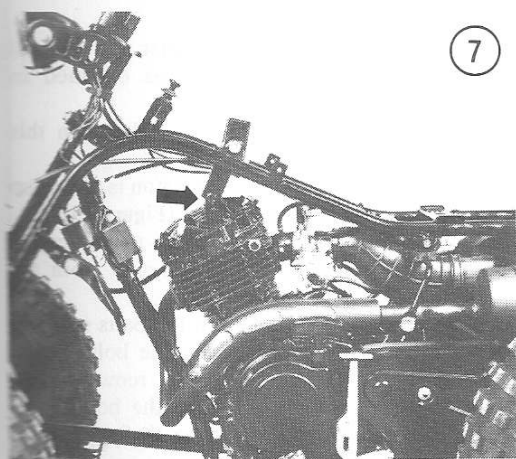
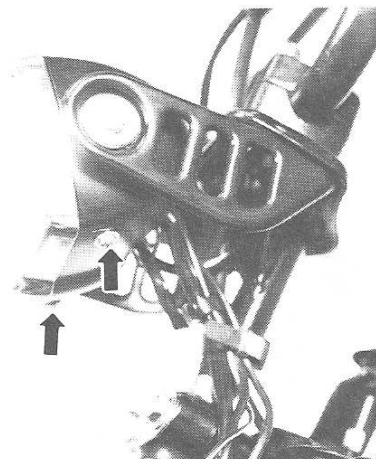


4. Disconnect the
 machine (Figure
 10). If the system
 performs the follow-
 a. Remove the
 mount to the
 b. Refer to Ch
 carburetor and
 11. Remove the
 plug. Pull on the
 12. Remove the
 this chapter.
 13. Remove the
 (Figure 8) and con-
 gain access to the
 the wire connect
 magnets lighting
 14. Disconnect
 Figure 10.



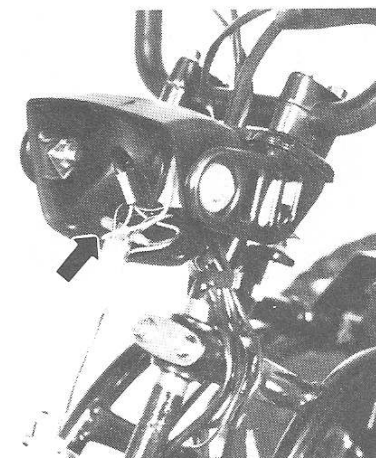
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9. Disconnect the crankcase vent hose from the crankcase (Figure 6).

10. If the cylinder head has not been removed, perform the following:

- a. Remove the bolt securing the upper engine mount to the cylinder head cover (Figure 7).
- b. Refer to Chapter Six and remove the carburetor and exhaust pipe.

11. Remove the spark plug lead from the spark plug. Pull on the spark plug cap, not the lead wire.

12. Remove the engine sprocket as described in this chapter.

13. Remove the screws securing the headlamp unit (Figure 8) and carefully remove the headlamp to gain access to the electrical connectors. Disconnect the wires connected to the headlamp from the magneto lighting coils (Figure 9).

14. Disconnect the ignition wire connectors (Figure 10).

15. Remove all the clamps and straps securing the ignition and lighting wires to the frame (Figure 11).

16. Check that all cables, wires, hoses and brackets are clear of the engine. Remove any item that may interfere with engine removal.

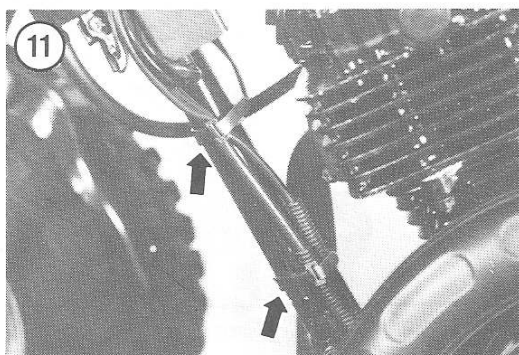
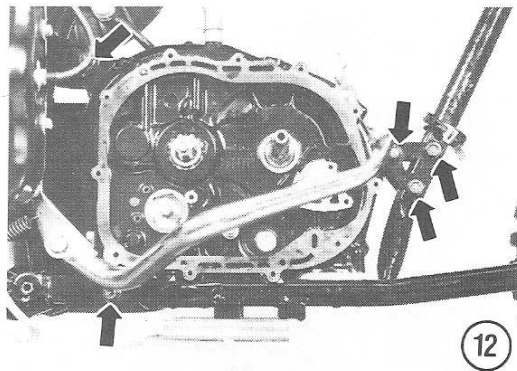
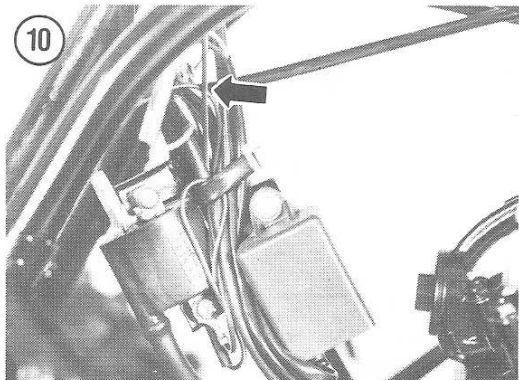
17. Remove the bolts securing the engine and engine mounting plates to the frame (Figure 12). Lift the engine out of the right side of the frame.

18. Installation is the reverse of these steps. Keep the following points in mind:

- a. Install the long mounting bolts from the left side.

NOTE

The nuts used on the engine mounting bolts are a self-locking type. Suzuki recommends that new self-locking nuts be used when installing the engine.



- b. Tighten all engine mounting bolts to the torque specified in **Table 1**.
 - c. Install all engine components removed as outlined in this chapter.
 - d. Install the carburetor and exhaust pipe as outlined in Chapter Six.
 - e. Ensure that all the wires, cables and fuel vent hoses are correctly routed and secured to the frame as shown in **Figures 13-18**.
 - f. Install the footrest and skid plate. Note that the footrest unit is slightly longer on the clutch side of the engine.
19. Refer to Chapter Three and perform the following:
- a. Fill engine with oil.
 - b. Adjust the clutch.
 - c. Adjust throttle cable free play and engine idle speed.
 - d. Adjust the drive chain.

CYLINDER HEAD COVER

The rocker arms and rocker arm shafts are contained in the cylinder head cover. It is necessary to remove the cylinder head cover before the camshaft and cylinder head can be removed.

The cylinder head cover can be removed with the engine mounted in the frame.

Removal

1. Remove the seat and front fender (LT models) or frame cover (ALT models) as outlined in Chapter Ten.
2. Remove the recoil starter as outlined in this chapter.
3. Turn the starter cup until the piston is at the top of the compression stroke (TDC) (**Figure 19**).
4. Remove the bolts securing the upper engine support mount and remove the mount from the head cover (**Figure 20**).
5. Gradually and evenly loosen the bolts securing the cylinder head cover. Loosen the bolts in the order shown in **Figure 21**. Do not remove the 2 bolts that have a slight recess in the bolt heads. These bolts secure the rocker arm shafts.

NOTE

Before removing the head cover bolts, cut a cardboard template the approximate size of the head cover. Punch holes in the template for each bolt location and place the bolts in the template holes as they are removed. This will greatly speed up the assembly time by eliminating the search for the correct bolt.

6. Remove the cylinder head cover bolts and lift off the head cover. Note the gasket/washer under bolt No. 9 (**Figure 21**). It may be necessary to tap the cover with a plastic or rubber mallet to break it loose from the head.

CAUTION

Never use a screwdriver or similar sharp tool to loosen or pry off the cylinder head cover. Serious and very expensive damage to the head cover or the cylinder head will result.

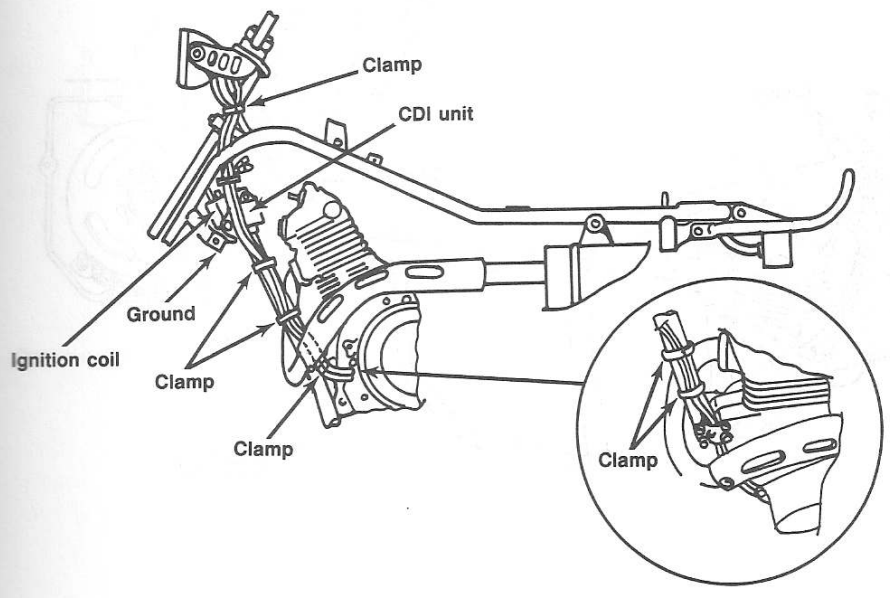
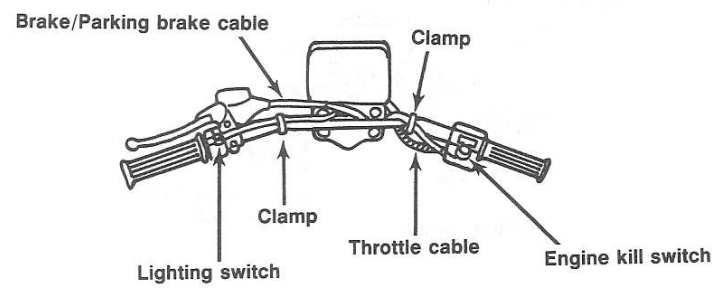
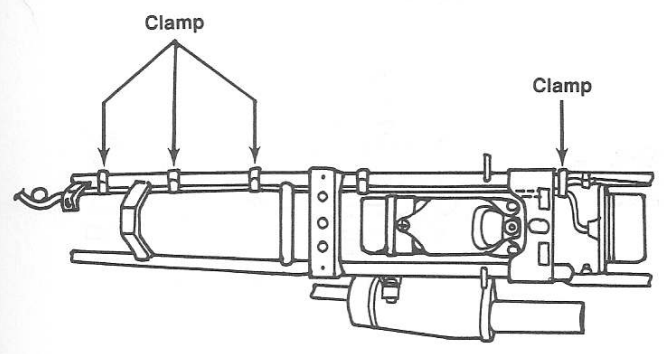


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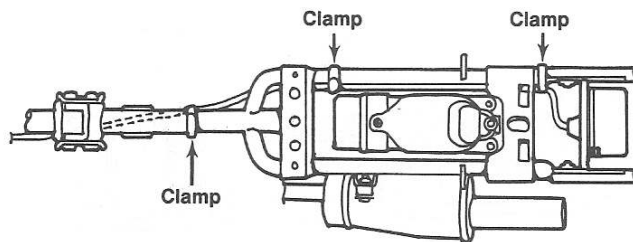
LT MODELS



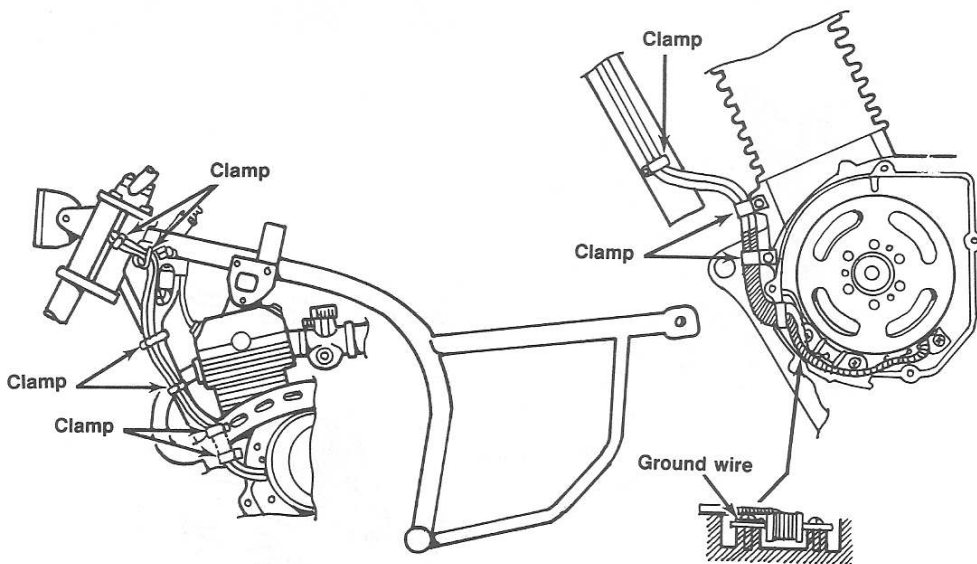
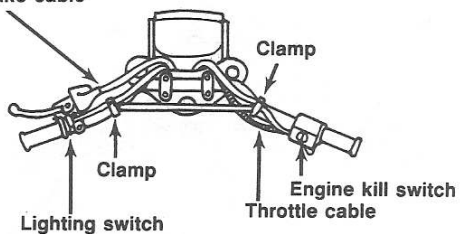
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ALT MODELS

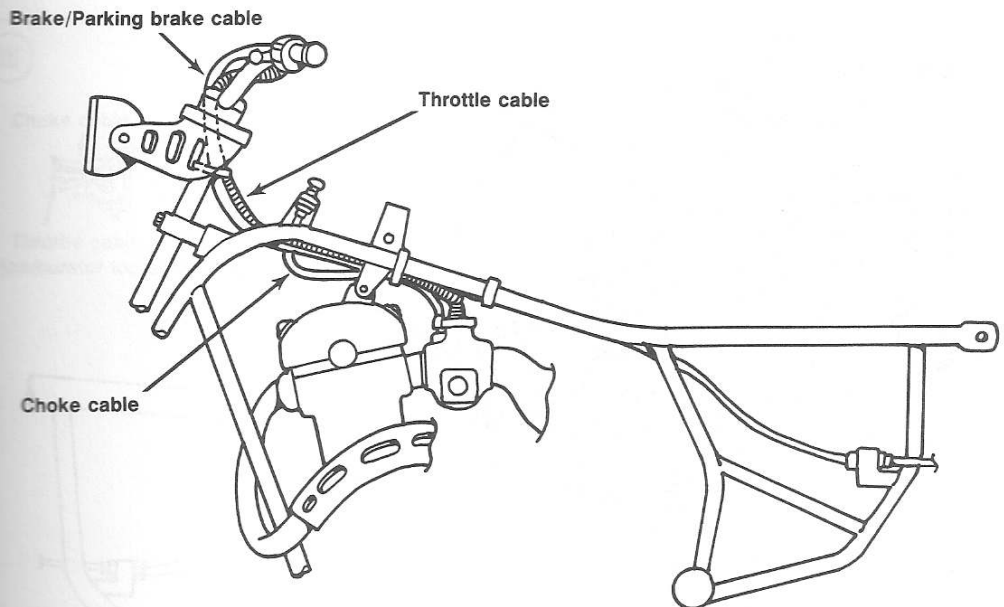
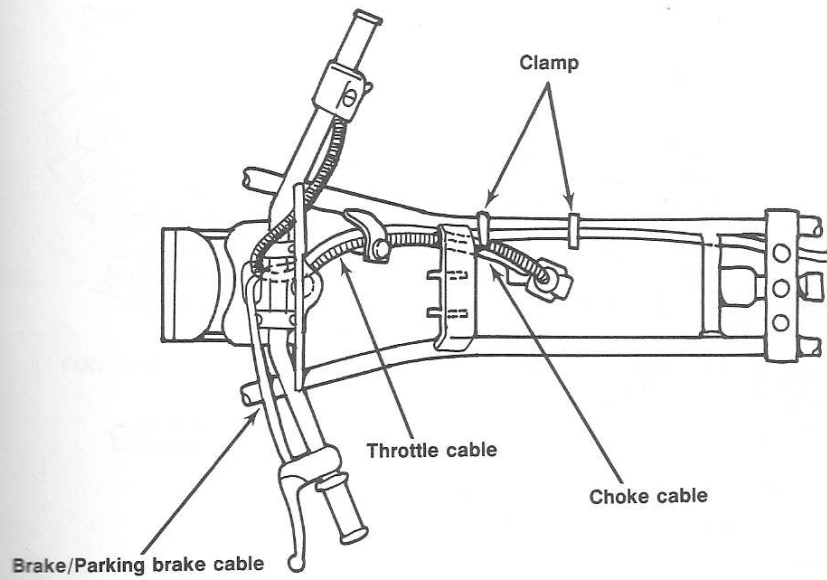


Brake/Parking brake cable



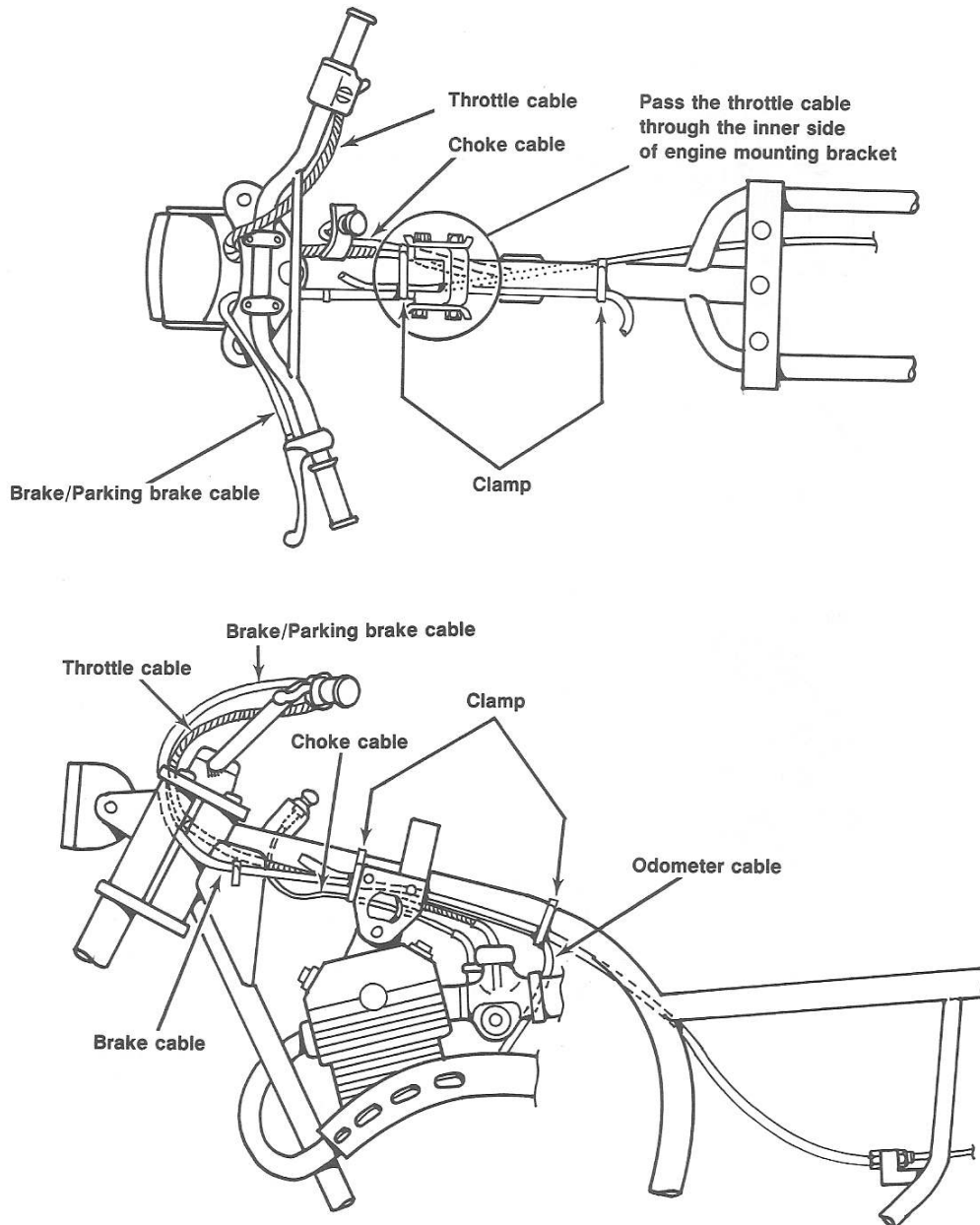
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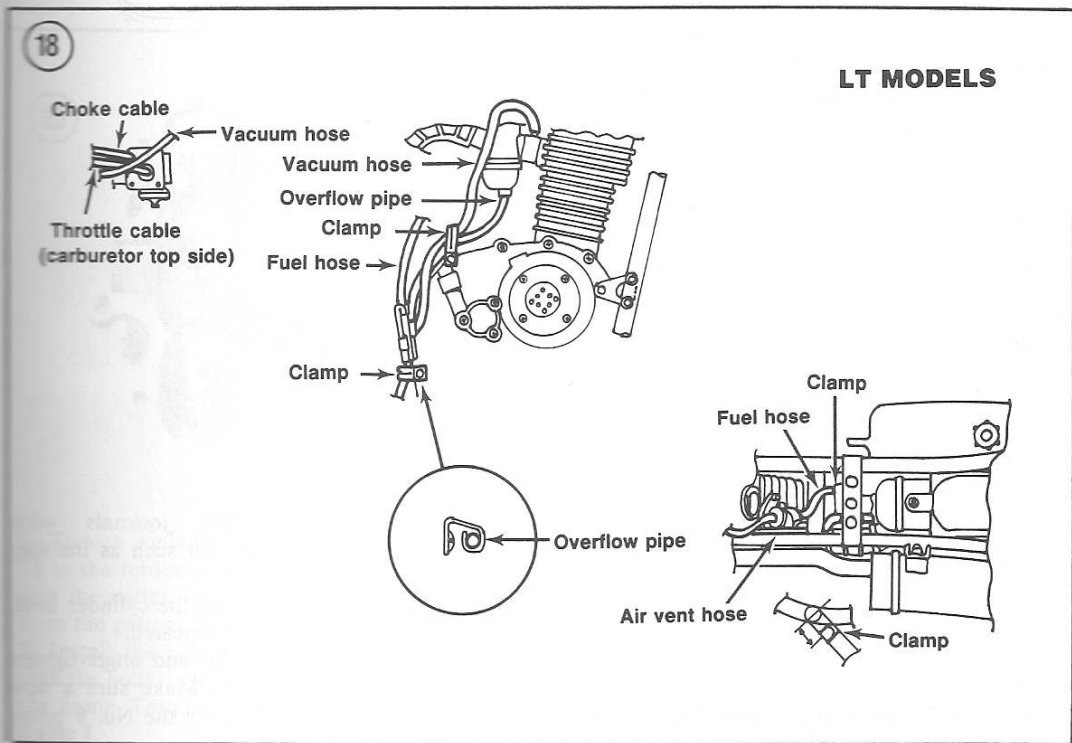
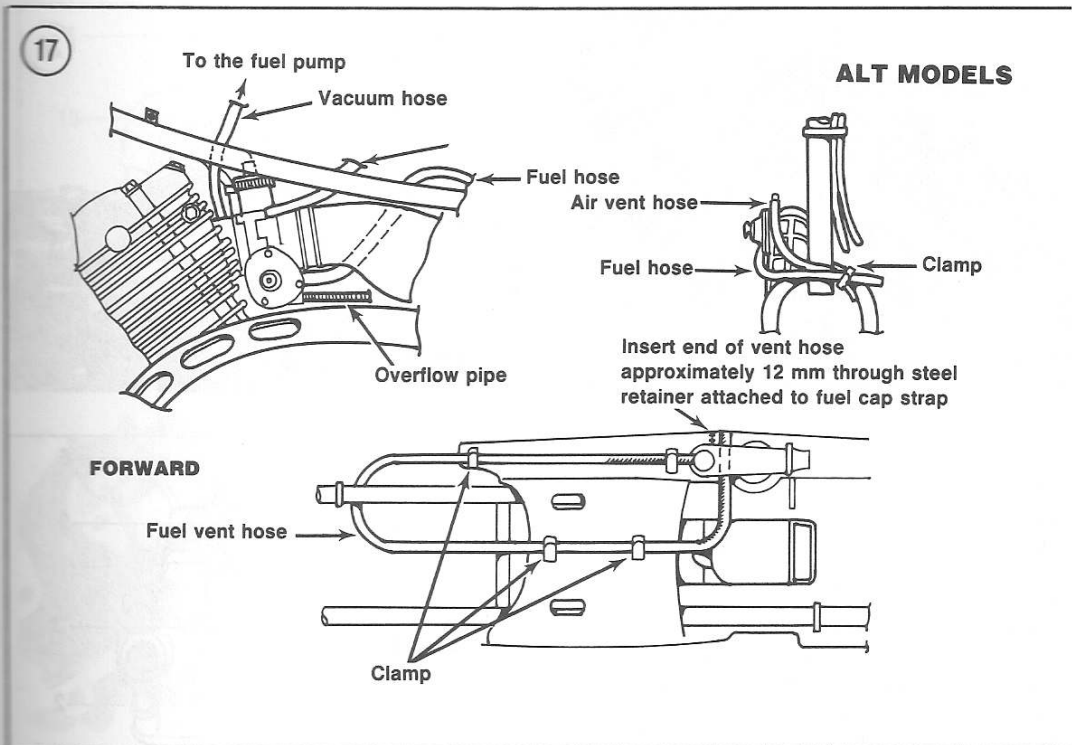
LT MODELS

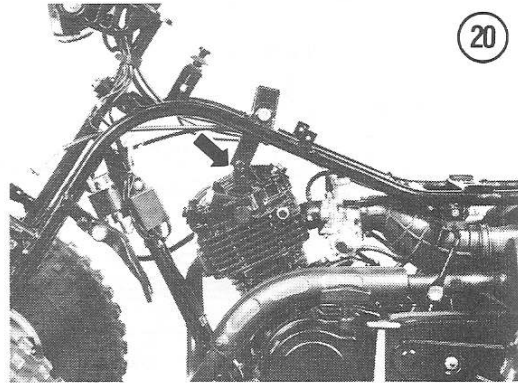
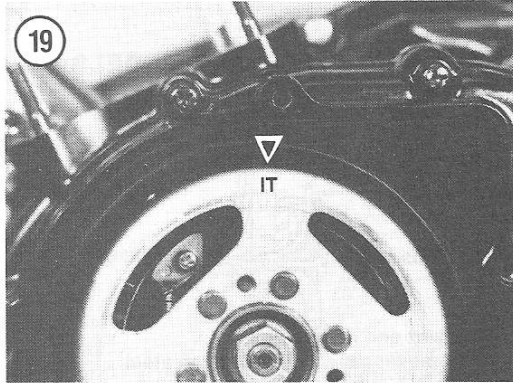


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ALT MODELS







Inspection

If oil leakage was visible between the head cover and the cylinder head, the sealing surface of the head cover may be warped or damaged. Inspect the sealing surface of the head cover for scoring or other signs of damage (Figure 22).

Completely remove all gasket and/or sealant residue from the sealing surface on the head cover. Check the head cover for distortion with a feeler gauge on a surface plate such as a piece of plate glass. Check at least 6 different places on the head cover. The maximum allowable distortion is 0.05 mm (0.002 in.). If the head cover is warped or distorted beyond the limit, the head cover and the cylinder head must be replaced as a set.

To inspect for camshaft journal and rocker arm wear, refer to *Camshaft Inspection* and *Rocker Arm Inspection* in this chapter.

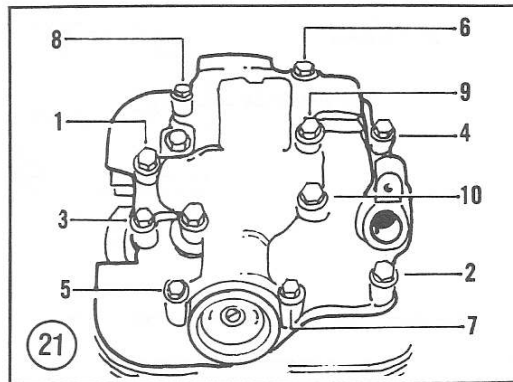
Installation

1. Make sure the sealing surfaces on the cylinder head and head cover are completely clean and free of old sealant residue. Use a wooden scraper or similar device to clean off the old sealant. Wipe the surfaces clean with solvent or lacquer thinner.

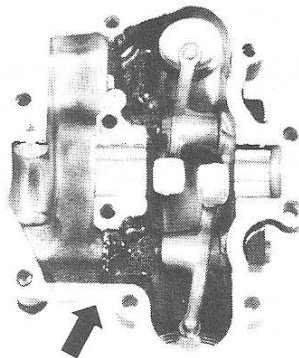
CAUTION

Do not use a metal scraper, screwdriver, knife or similar sharp metal tool to clean the sealing surfaces or the surfaces may be seriously damaged. A damaged sealing surface cannot be repaired; the head cover and head must be replaced as a set.

2. Carefully apply a small amount of Suzuki Bond No. 1215 (or equivalent) to the sealing surfaces on the head cover and cylinder head. Do not apply sealant to the large rubber end cap.



22

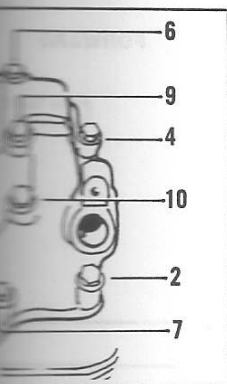
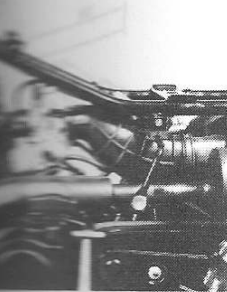


3. Lubricate the camshaft journals with molybdenum disulfide lubricant such as Bel-Ray Molylube.

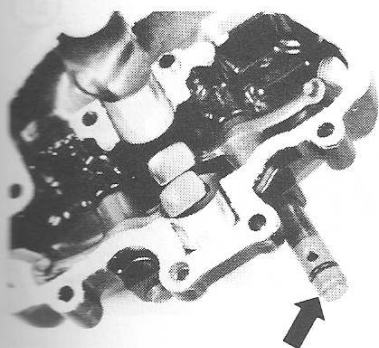
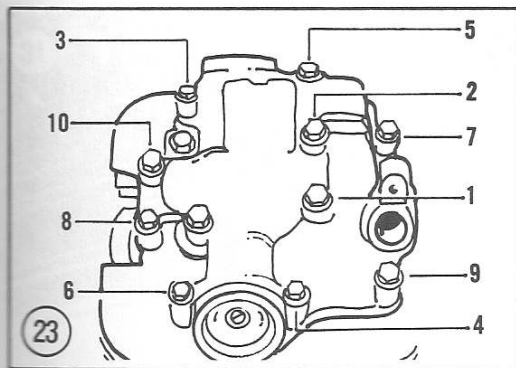
4. Position the head cover on the cylinder head carefully so the sealant is not smeared.

5. Install the head cover bolts and finger-tighten them in a diagonal pattern. Make sure a new gasket/washer is installed under the No. 9 cover bolt (Figure 21).

20



shaft journals with
lubricant such as Bel-Ray
on the cylinder head
and smeared.
bolts and finger-tighten
them. Make sure a new
washer under the No. 9 cover



24

25



6. Tighten the bolts in the pattern shown in **Figure 23** to the torque value specified in **Table 1**. Note that the pattern used to tighten the bolts differs from the pattern used to loosen the bolts.
7. Install the engine support mount and secure with the bolts. Install the bolts from the left side of the frame. Torque the mount bolts as specified in **Table 1**.

8. Install the recoil starter as outlined in this chapter.
9. Install the front fender and seat.

ROCKER ARMS

The rocker arms and rocker arm shafts are installed in the cylinder head cover. The rocker arms are actuated by the camshaft and bear directly against the end of each valve.

Removal/Installation

1. Remove the cylinder head cover as described in this chapter.
2. Remove the bolts securing each rocker shaft. Note the gasket/washers under each bolt.
3. Carefully pull out the rocker shafts (**Figure 24**) and lift out the rocker arms.

CAUTION

Both intake and exhaust rocker arms are identical. However, you must keep the intake rocker components separate from the exhaust rocker components. Once wear patterns are developed on these parts, they should only be installed as they were removed or excessive wear may occur.

4. Perform *Inspection*.
5. Installation is the reverse of these steps. Keep the following points in mind:
 - a. Install a new O-ring on each rocker shaft.
 - b. Install new gasket/washers under each bolt securing the rocker shafts.
 - c. Lubricate each rocker shaft and rocker arm with Bel-Ray Molylube before installing the components.

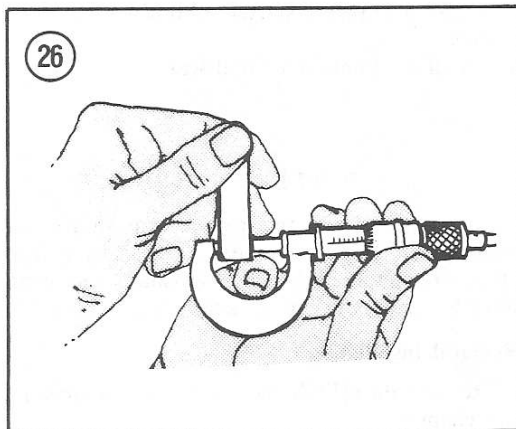
Inspection

Refer to **Table 2** for all rocker arm and rocker shaft wear limits and specifications.

NOTE

Some of the following component inspections require the use of expensive measuring equipment as well as considerable skill in using these devices. Refer such inspection tasks to an authorized dealer if the necessary tools are not available.

1. Examine the wear area on each rocker shaft (**Figure 25**). If the wear area is scored, grooved or discolored the rocker shaft must be replaced.



2. Use a micrometer or accurate caliper and measure the outside diameter of the rocker shafts over the wear area (Figure 26). Replace any shaft worn beyond the limits specified in Table 2.

3. Measure the inside diameter of each rocker arm (Figure 27). Replace any rocker arm with an inside diameter larger than specified in Table 2.

4. Inspect the machined surfaces on each rocker arm that contact the camshaft and valve stem (Figure 28). Replace the rocker arm if these surfaces are grooved, scored or discolored.

5. Examine each valve adjuster and locknut (Figure 29). These parts are available separately and should be replaced if they show signs of wear or damage.

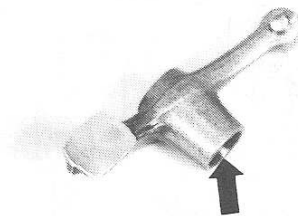
CAMSHAFT

The camshaft is located on top of the cylinder head and rotates in bearing surfaces machined in the cylinder head and the cylinder head cover.

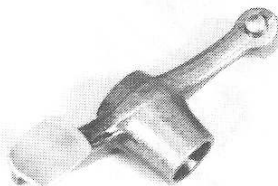
Removal

1. Remove the cylinder head cover as described in this chapter.
2. Remove the spark plug as outlined in Chapter Three. The engine is easier to turn over by hand with the spark plug removed.
3. Remove the bolts securing the recoil starter assembly and remove the starter (Figure 30).
4. Remove the bolts securing the cam chain tensioner (Figure 31) and remove the tensioner. Do not loosen the locknut securing the adjustment screw at this time.
5. Remove the rubber end cap from the cylinder head (A, Figure 32).
6. Fold back the locking washer securing the one camshaft sprocket bolt that is now visible (B, Figure 32). Remove the bolt.

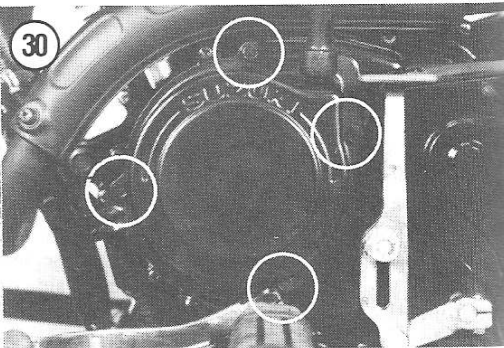
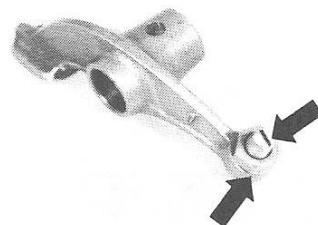
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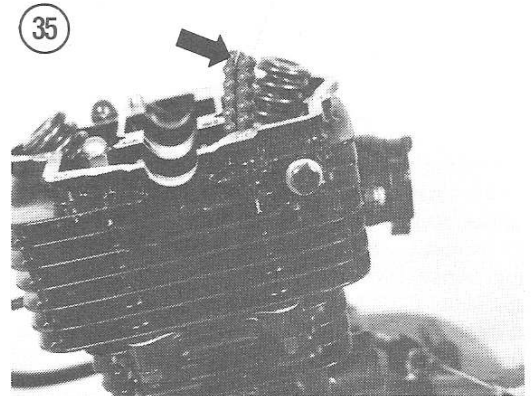
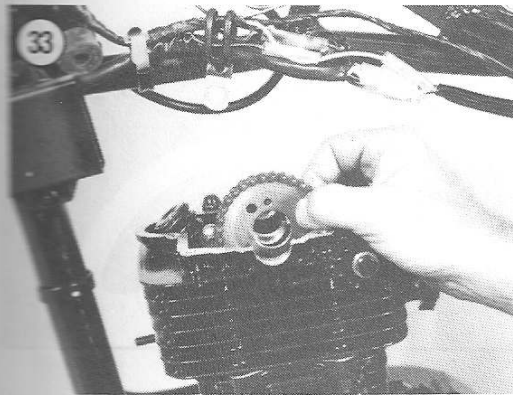
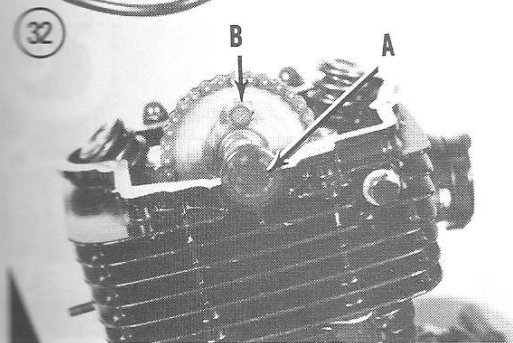
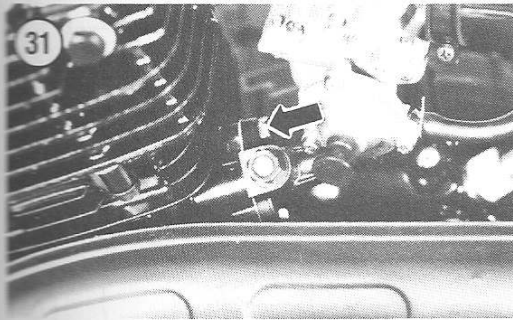


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7. Rotate the crankshaft by turning the starter cup to gain access to the second camshaft bolt. Fold back the locking washer securing the second sprocket bolt and remove the bolt.

8. Gently pry the camshaft sprocket free from the camshaft and carefully lift out the camshaft.

NOTE

A small drive pin is used to keep the sprocket aligned with the camshaft. The drive pin may remain with the sprocket or the camshaft. Take care not to drop the drive pin into the crankcase.

9. Remove the sprocket at this time, if desired (Figure 33).

10. If cylinder head removal is desired, remove the C-clip retainer (Figure 34).

11. Attach a wire to the cam chain as shown in Figure 35 to keep the chain from falling into the engine.

CAUTION

If the crankshaft must be rotated with the camshaft removed, hold all slack out of the cam chain and turn the crankshaft very carefully. Do not rotate the crankshaft if the chain has fallen into the engine. The chain will bunch up and damage the castings in the lower part of the crankcase.

NOTE

If possible, do not allow the cam chain to fall into the engine. Should the chain fall into the engine it can be retrieved and rerouted onto the lower sprocket; however, the process can be time-consuming and very inconvenient.

Inspection

This procedure describes how to use Plastigage to measure camshaft bearing journal wear. Plastigage

can be purchased from most auto supply stores and is available in several sizes. Make sure you purchase Plastigage small enough to measure the camshaft bearing clearance as specified in **Table 3**.

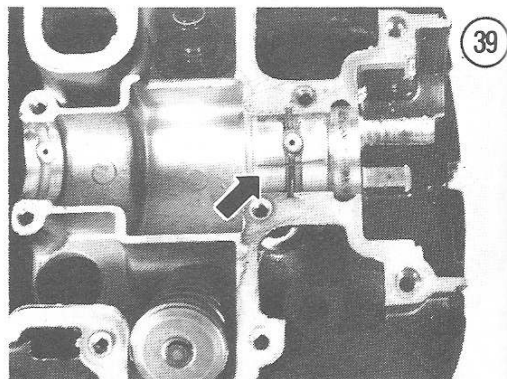
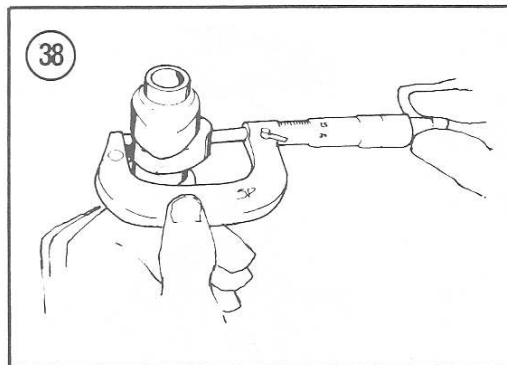
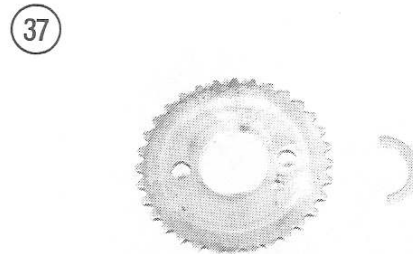
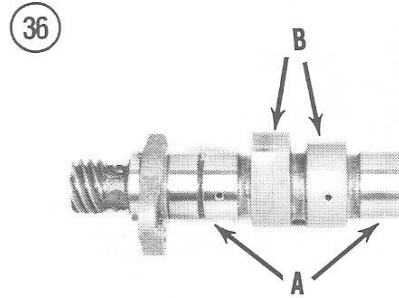
1. Carefully examine the camshaft journals for signs of excessive or abnormal wear (A, **Figure 36**).
2. Inspect the camshaft lobes for signs of scoring or excessive wear (B, **Figure 36**). Replace the camshaft if the lobes are not in perfect condition.
3. Inspect the cam sprocket and the C-clip retainer for signs of wear (**Figure 37**). The cam chain sprockets should not have worn excessively unless the engine has been subjected to very heavy use or the cam chain is worn. The sprockets must be replaced in pairs along with a new cam chain. The lower cam chain sprocket is part of the left half of the crankshaft. The crankshaft must be replaced to replace the lower chain sprocket.
4. Use a micrometer and measure the height of each cam lobe as shown in **Figure 38**. Refer to **Table 3** for wear specifications. Replace the camshaft if either lobe is worn beyond the specified limits.
5. Measure bearing journal wear with Plastigage as follows:

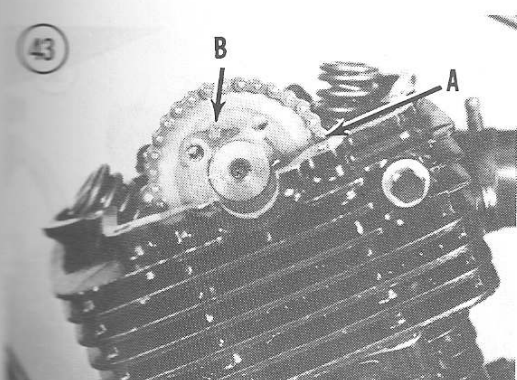
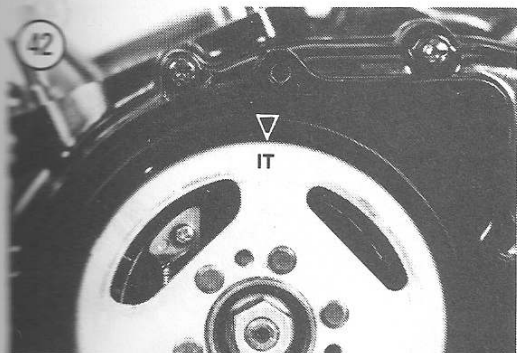
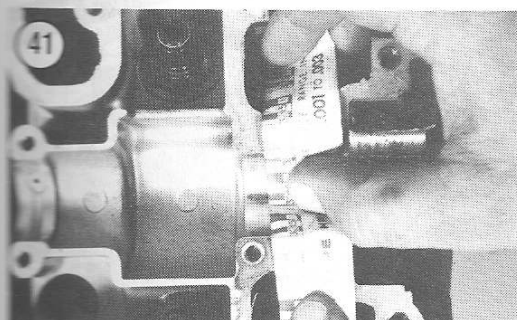
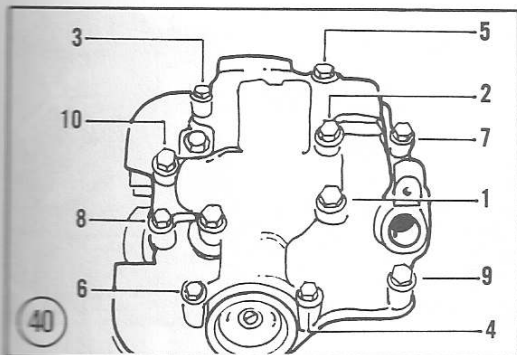
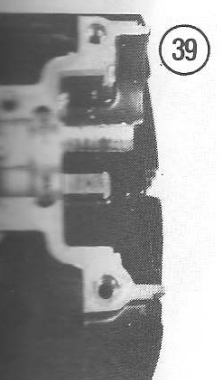
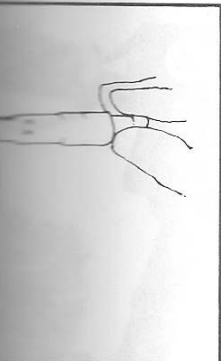
- a. Clean all gasket or sealant residue from the cylinder head and the cylinder head cover.

CAUTION

All gasket and sealant residue must be removed from the cylinder head and the cylinder head cover before the cover is torqued in place. Any left-over sealant residue will not allow the Plastigage to compress completely and a false bearing clearance measurement will result.

- b. Wipe off all oil from the bearing journals on the camshaft and in the cylinder head and head cover.
- c. Place a small strip of Plastigage on each cam bearing surface as shown in **Figure 39**.
- d. Carefully place the camshaft in position on the cylinder head. Make sure that the camshaft does not shift or rotate.
- e. Install the cylinder head cover and torque the bolts in the pattern shown in **Figure 40**. Refer to **Table 1** for bolt torque specifications.
- f. Remove the bolts and carefully lift off the cylinder head cover. Measure the thickness of the Plastigage with the Plastigage wrapper as shown in **Figure 41**. The Plastigage may adhere to the camshaft or the cylinder head journal; either location will provide a correct measurement. Refer to **Table 3** for wear specifications.





g. If journal clearance is excessive, use a micrometer and measure each journal of the camshaft. If the camshaft journals are worn beyond the limits specified in Table 3, replace the camshaft. If the camshaft journals are not worn beyond the limits but the journal clearance is excessive, the cylinder head and cylinder head cover must be replaced. The head and head cover must be replaced together as they are a matched set.

6. Mount the camshaft in V blocks or in a lathe and measure camshaft deflection with a dial indicator. Replace the camshaft if the deflection exceeds the limit specified in Table 3.

Installation

1. The piston must be at TDC on the compression stroke before the camshaft can be correctly installed and timed. Hold up on the cam chain to remove all the slack and slowly rotate the crankshaft until the "T" mark on the flywheel is exactly aligned with the pointer on the crankcase (Figure 42).

2. Ensure that the C-clip retainer is properly installed in the cylinder head (Figure 34).

3. Apply molybdenum disulfide lubricant such as Bel-Ray Moly Lube to the camshaft bearings in the cylinder head.

4. Install the camshaft sprocket into the cam chain as shown in Figure 33. With the piston at TDC, the drive pin hole in the sprocket should be approximately one tooth forward of the top center position.

5. Install the camshaft so that the straight marks on the end are perfectly aligned with the surface of the cylinder head (A, Figure 43).

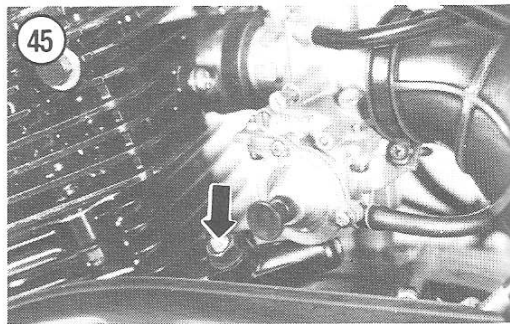
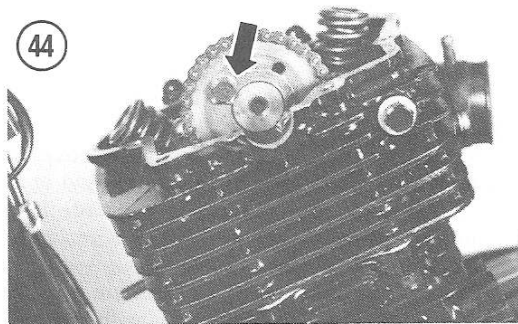
6. Slide the cam sprocket over the shoulder on the cam shaft. The drive pin holes in the sprocket and camshaft should be aligned. Install the drive pin (B, Figure 43). If the drive pin holes are not perfectly aligned, move the cam sprocket in the cam chain. Take care not to move the camshaft or move the crankshaft from the TDC mark.

7. Apply blue Loctite (Lock N' Seal No. 2114) to one of the sprocket bolts and install the bolt. Make sure the locking washer is installed under the bolt (Figure 44).

8. Rotate the engine one turn. Apply blue Loctite to the second sprocket bolt and install the bolt.

9. Torque both sprocket bolts as specified in Table 1. Fold over the tab on each locking washer to secure the sprocket bolts.

10. Install the cam chain tensioner assembly. Make sure the gasket is installed between the cylinder and tensioner assembly. Adjust the cam chain tension as follows:



- a. Loosen the locknut (Figure 45) securing the adjuster screw and back out the adjuster screw one turn. This releases the spring-loaded plunger against the internal chain tensioner.
 - b. Tighten the adjuster screw to secure the spring-loaded plunger. Tighten the locknut to secure the adjuster screw.
11. Install the cylinder head cover as outlined in this chapter.
 12. Install the recoil starter assembly.

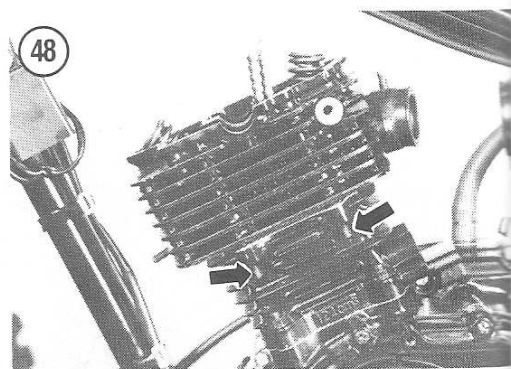
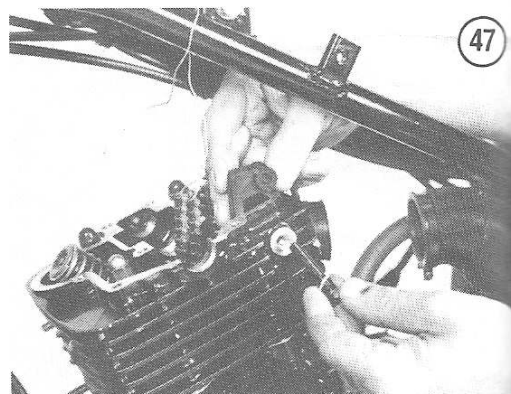
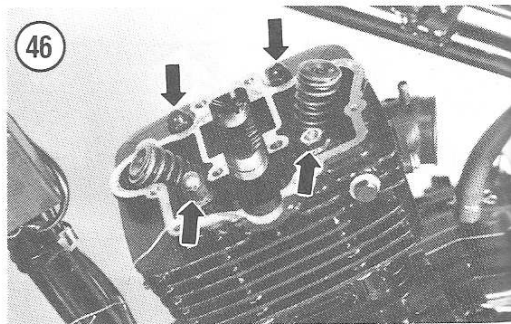
CYLINDER HEAD

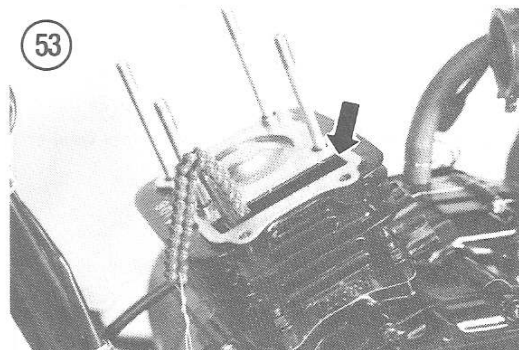
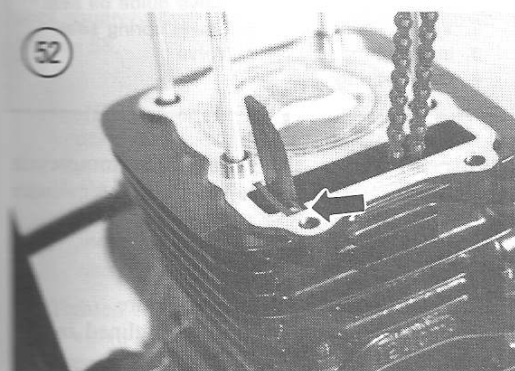
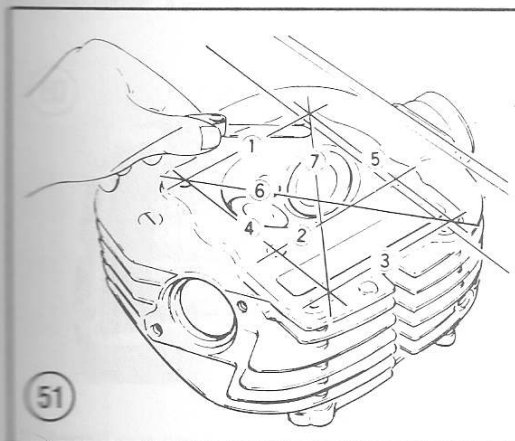
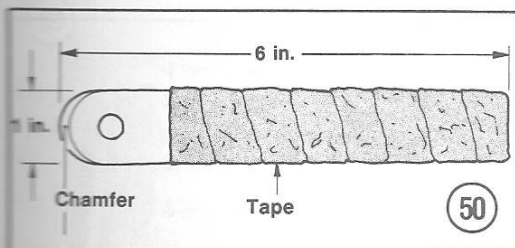
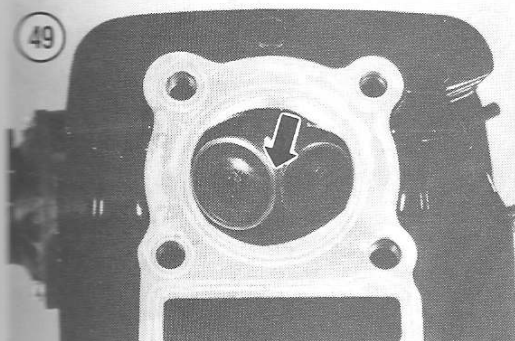
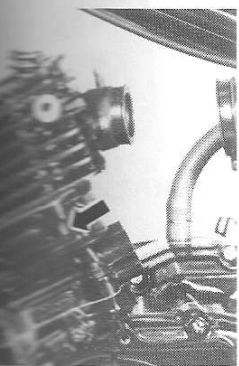
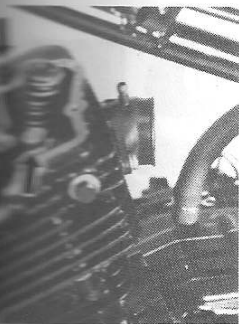
The cylinder head contains the valve mechanism as well as one-half of the camshaft bearing surface. The other half of the camshaft bearing surface is contained in the cylinder head cover.

The cylinder head can be removed while the engine is installed in the frame.

Removal

1. Remove the cylinder head cover and camshaft as outlined in this chapter.
2. Tie a wire to the cam chain so the chain can be lowered into the cylinder.
3. Refer to Chapter Six and remove the carburetor and exhaust pipe.
4. Gradually and evenly loosen then remove the 4 head nuts (Figure 46). Note that the dome nuts in the left-front and right-rear locations are fitted with copper washers. The left-rear nut is the only non-domed nut.
5. Remove the bolt securing the internal cam chain tensioner and carefully lift out the tensioner (Figure 47). Take care not to drop the tensioner into the engine as it will be aggravating and time-consuming to get out.
6. Remove the lower nuts securing the cylinder head to the cylinder (Figure 48).
7. Tap around the base of the cylinder head with a plastic or rubber mallet to break the head loose from the cylinder and lift off the head.
8. Perform *Inspection*.





Inspection

1. Carefully clean all traces of gasket and sealant residue from the combustion chamber side and camshaft side of the cylinder head.
2. Without removing the valves, remove all carbon deposits from the combustion chamber with a wire brush and solvent (Figure 49). Stubborn deposits can be removed with a blunt scraper made of hardwood or a piece of aluminum that has been rounded and smoothed on one end as shown in Figure 50. Never use a hard metal scraper. Small burrs resulting from gouges in the combustion chamber will create hot spots which can cause preignition and heat erosion of the head and piston. After all carbon has been removed from the combustion chamber and exhaust port, clean the entire head in solvent.

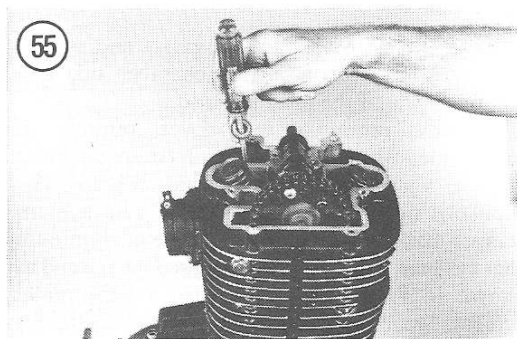
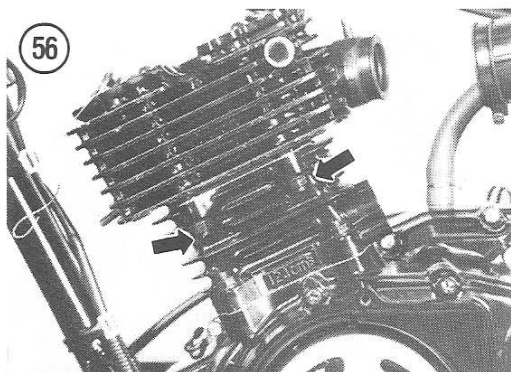
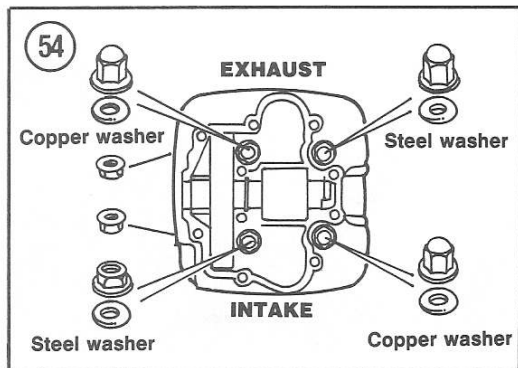
NOTE

*If valve inspection or repair is required, refer to **Valves** in this chapter.*

3. Carefully examine the combustion chamber and ports for cracks or damage. Some types of cracks and damage can be repaired with heliarc welding. Refer such work to an authorized dealer or welding shop experienced with cylinder head repair.
4. Use a straightedge and check the gasket surface of the head in several places as shown in Figure 51. Such an inspection might be best performed by a dealer or machine shop. Replace the head and head cover as a set if the gasket surface is warped beyond the service limit of 0.05 mm (0.002 in.).

Installation

1. Ensure that the gasket surface on the cylinder is clean and free of old gasket residue.
2. Check that the stationary cam chain slipper is properly positioned in the cylinder as shown in Figure 52.
3. Install a new head gasket over the studs on the cylinder (Figure 53).



4. Pull the cam chain up through the opening in the head and carefully lower the head down over the cylinder studs. Make sure the alignment dowels are engaged, then press the head down against the gasket.

5. Install the head nuts and washers as shown in **Figure 54**. Use a screwdriver as shown in **Figure 55** to help route the washers over the studs.

6. Install the lower nuts securing the head to the cylinder (**Figure 56**).

7. Tighten the 4 large head nuts gradually and evenly in a crisscross pattern to the torque value specified in **Table 1**, then torque the small nuts securing the head to the cylinder.

8. Install the internal cam chain tensioner (**Figure 47**).

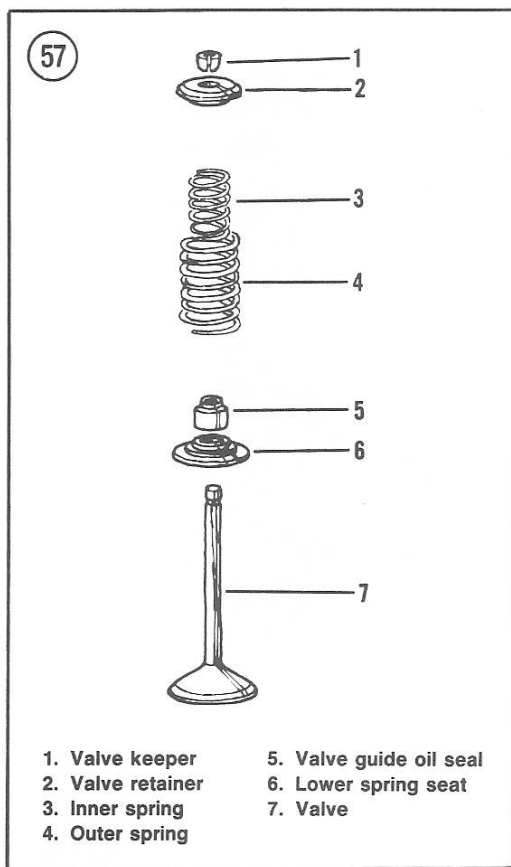
9. Refer to Chapter Six and install the exhaust pipe and carburetor.

10. Install the camshaft and cylinder head cover as outlined in this chapter.

11. Refer to Chapter Three and adjust the valves.

VALVES

Valve servicing requires the use of a valve spring compressor tool to remove the valves from the head. Suitable valve spring compressors can be rented from most rental shops; however, it may be

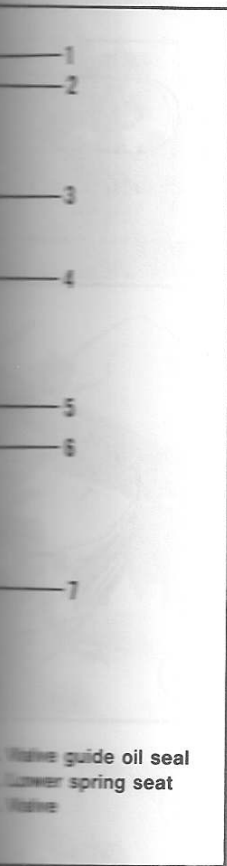
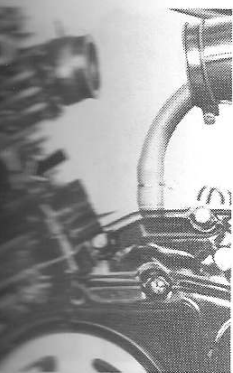


less expensive to have a dealer or other motorcycle repair shop remove the valves from the cylinder head.

Removal

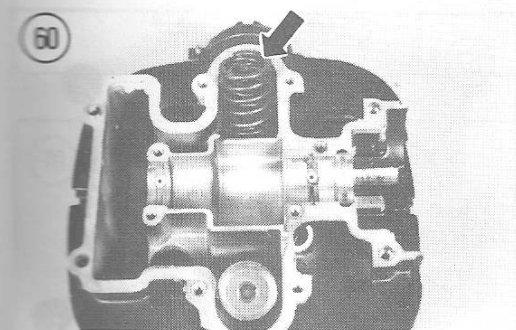
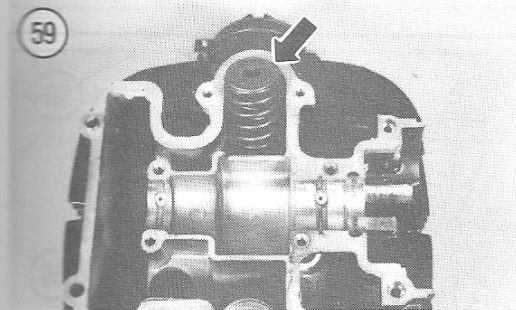
Refer to **Figure 57** for this procedure.

1. Remove the cylinder head as outlined in this chapter.



Remove the other motorcycle valves from the cylinder

procedure. as outlined in this

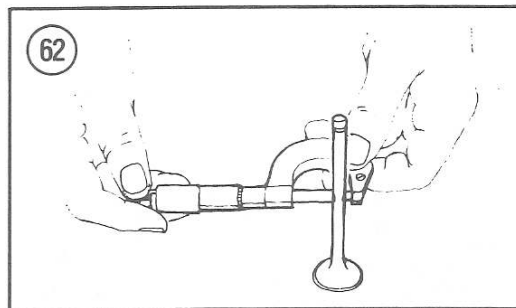
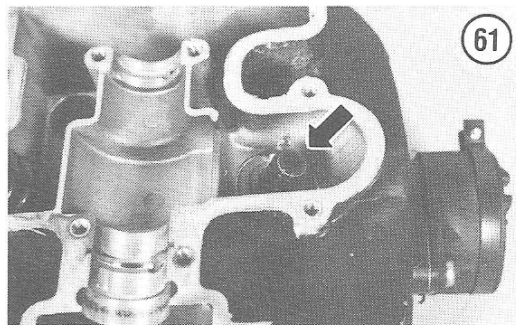


2. Install one end of the valve spring compressor against the valve head. Place the other end of the tool squarely over the valve retainer as shown in Figure 58.

CAUTION

All component parts of each valve assembly must be kept together as wear patterns on these parts have developed. Do not mix with like parts from the other valve assembly or excessive wear may result when all the parts are reassembled.

3. Tighten the valve spring compressor until the split valve keeper separates. Lift out both split keepers with a needlenose pliers.



4. Gradually loosen the compressor tool and remove it from the cylinder head. Lift off the valve retainer (Figure 59).
5. Remove the inner and outer valve springs (Figure 60). Keep the springs together as they are a matched pair.
6. Tip up the head and remove the valve.
7. Use needlenose pliers to remove the valve guide oil seal (Figure 61). Discard the old seal as it will be destroyed when it is removed.

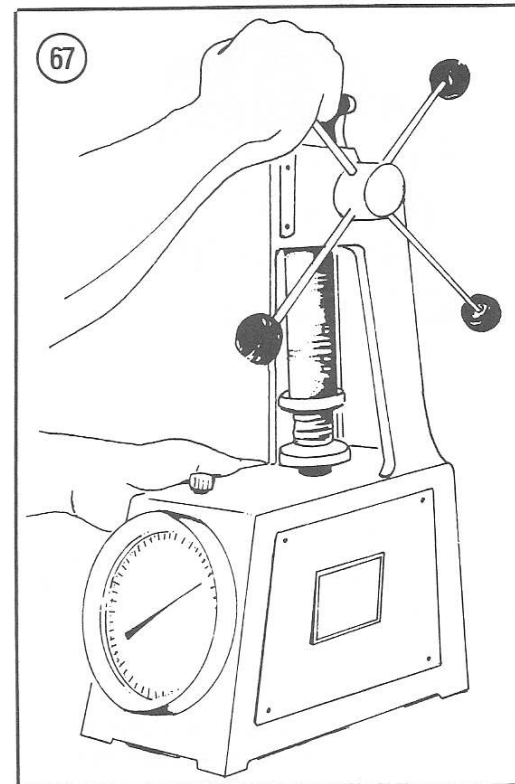
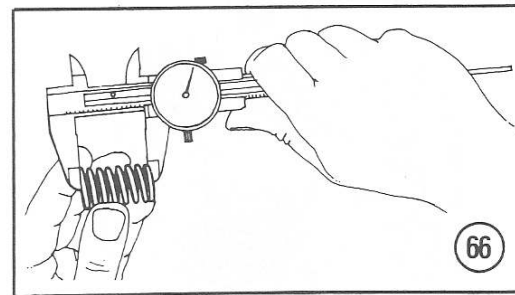
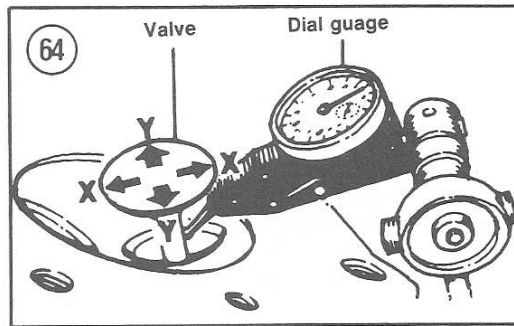
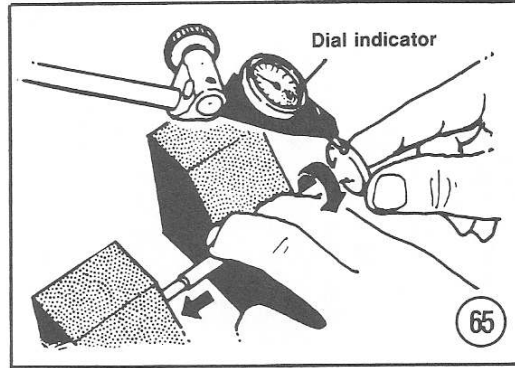
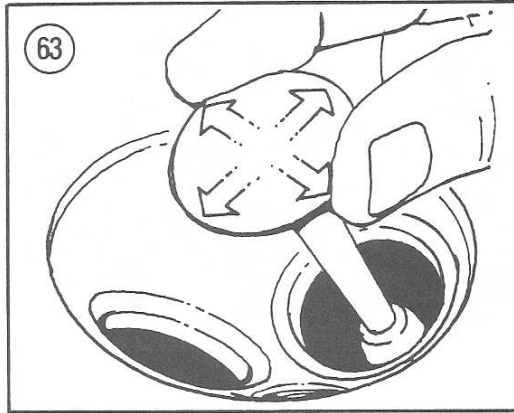
NOTE

Valve guide oil seals should be routinely replaced whenever the valves are removed. Failure to replace the seals may result in excessive oil consumption.

8. Lift out the lower valve seat.
9. Repeat the procedure for the other valve.
10. Perform Inspection.

Inspection

1. Clean the valves with a wire brush and solvent. Replace any valve that is burned, warped or cracked. The valves are made from a specially hardened material and should not be ground or refaced.
2. Measure valve stem with a micrometer as shown in Figure 62. Replace the valve if not within limits specified in Table 4.

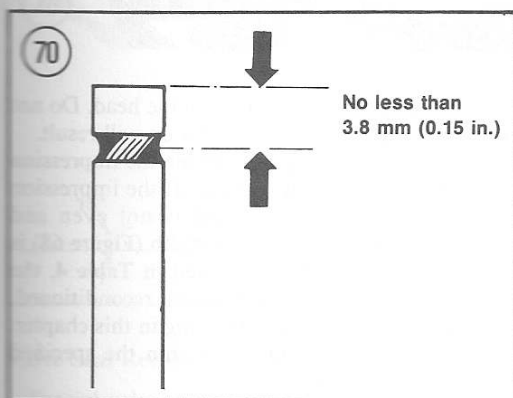
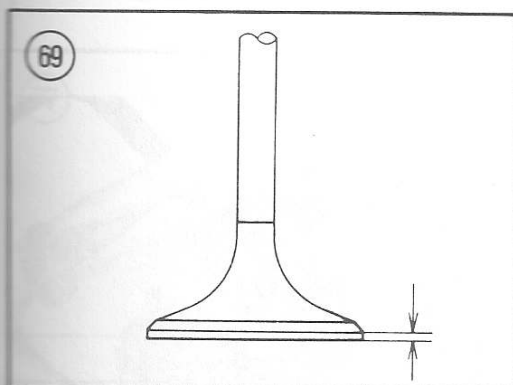
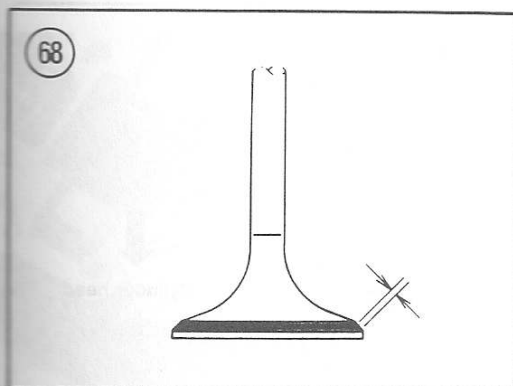
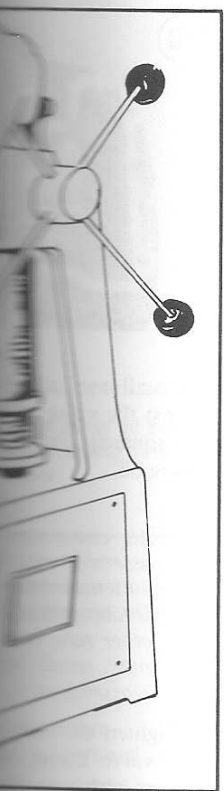
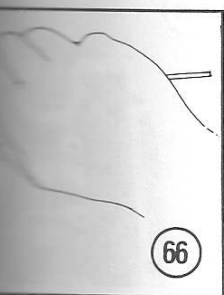


3. Remove all carbon and varnish from the valve guides with a stiff spiral wire brush.
4. Insert each valve in its guide. Hold the valve approximately 1/2 in. (12 mm) off its seat and rock it sideways in two directions as shown in **Figure 63**. If it rocks more than slightly, the guide is worn and must be replaced. If a dial indicator is available, a more accurate measurement can be made as shown in **Figure 64**. Replace any guides that exceed the valve guide-to-stem clearance specified in **Table 4**. If guides must be replaced, refer the task to an authorized dealer or machine shop.
5. Use a dial indicator and V-blocks as shown in **Figure 65** and measure the valve stem deflection or runout. Use the same setup and measure the deflection of the valve head. Replace the valve if the stem or head deflection exceeds the limits specified in **Table 4**.
6. Measure valve springs heights as shown in **Figure 66**. All springs should be as specified in **Table 4** with no bends or distortions. Replacement springs are sold in matched pairs.
7. Measure the valve spring tension as shown in **Figure 67**. Replace the valve springs as a set if the tension is not as specified in **Table 4**.



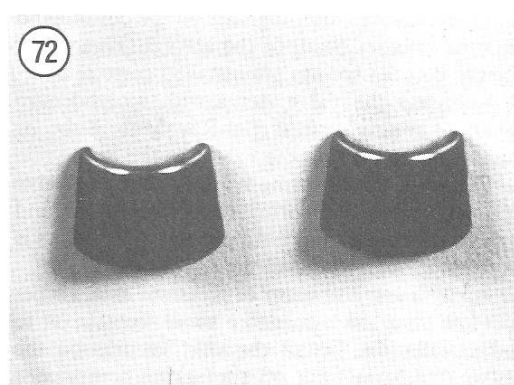
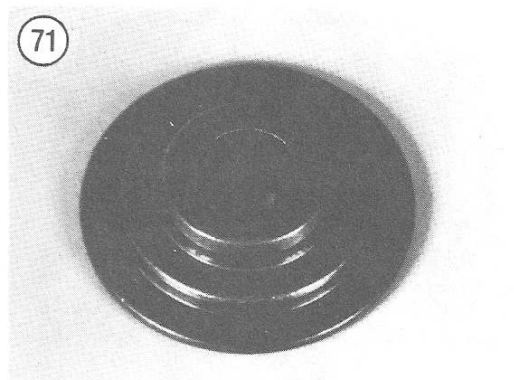
8. Measure the valve seat width with a dial indicator as shown in **Figure 68**. Replace the seat if necessary.

9. Measure the valve stem runout with a dial indicator as shown in **Figure 69**. The runout must be within the limits specified in **Table 4**. If the runout is excessive, the valve stem must be replaced.



8. Measure seat width on the valve (Figure 68). If the seat width exceeds the dimension specified in Table 4, valve seat reconditioning in the cylinder head is necessary. Refer to *Valve Servicing* in this chapter.

9. Measure the face on each valve with a caliper (Figure 69). The valve face decreases as the valve seat wears. If the valve face is not as specified in Table 4, the valve must be replaced.



10. Inspect the valve seats in the cylinder head. If the seats are burned or damaged they must be reconditioned. Refer to *Valve Servicing* in this chapter.

11. The ends of the valve stems can be refaced if necessary; however, the end of valve must not be less than 3.8 mm (0.15 in.) as shown in Figure 70.

12. Inspect the upper valve retainer (Figure 71) for signs of damage or wear. Replace any defective valve retainers.

13. Examine the split valve keeper for damage or grooves worn in the outside of each keeper half (Figure 72). Replace both valve keepers as a set if either half shows signs of wear or damage.

Installation

1. Install the lower spring seat over the valve guide.

2. Lubricate the lip on the new valve guide seal with engine oil. Use a 10 mm socket as a seal installing tool and position the seal over the end of the valve guide. Gently tap the seal into place. Ensure that the seal is seated squarely over the valve guide and is locked into place (Figure 73).