QUICK REFERENCE DATA

MOTORCYCLE INFORMATION

MODEL:_____ YEAR:_____

VIN NUMBER:_____

ENGINE SERIAL NUMBER:_____

CARBURETOR SERIAL NUMBER OR I.D. MARK:_____

TIRE INFLATION PRESSURE

Front	100 kPa (14 psi)
Rear	100 kPa (14 psi)

RECOMMENDED LUBRICANTS AND FUEL

Engine oil	Kawasaki 2-stroke racing oil
Transmission oil	SAE 10W/30 or 10W/40 oil
API Classification	
1991-1999	SE
2000-on	SE, SF, SG (SH, SJ with JASO MA)
Front fork oil	
1982-1983	KYB G-10 or SAE 10
1984	10 wt.
1985	10W/20
1986	10 wt.
1987-on	5 wt.
Air filter	Foam air filter oil
Drive chain	Chain lube
Brake fluid	DOT 3
Fuel	Premium grade-research octane 90 or higher
Control cables	Cable lube

FUEL/OIL PREMIX RATIO

Model	Premix ratio
1982-1983	20:1
1984	30:1
1985-on	32:1

FUEL/OIL RATIO (IN GALLONS)

Gasoline (in gallons)	Ratio (ounces of oil*)						
	16:1	20:1	24:1	28:1	32:1	40:1	50:1
0.5	4.0	3.2	2.7	2.3	2.0	1.6	1.3
1.0	8.0	6.4	5.3	4.6	4.0	3.2	2.6
1.5	12.0	9.6	8.0	6.9	6.0	4.8	3.8
2.0	16.0	12.8	10.7	9.1	8.0	6.4	5.1

(continued)

FUEL/OIL RATIO (IN GALLONS) (continued)

Gasoline (in gallons)	Ratio (ounces of oil*) 16:1	20:1	24:1	28:1	32:1	40:1	50:1
2.5	20.0	16.0	13.3	11.4	10.0	8.0	6.4
3.0	24.0	19.2	16.0	13.7	12.0	9.6	7.7
3.5	28.0	22.4	18.7	16.0	14.0	11.2	9.0
4.0	32.0	25.6	21.3	18.3	16.0	12.8	10.2
4.5	36.0	28.8	24.0	20.6	18.0	14.4	11.5
5.0	40.0	32.0	26.7	22.9	20.0	16.0	12.8

*Rounded to the closest tenth

FUEL/OIL RATIO (IN LITERS)

Gasoline (in liters)	Ratio [cc(s)/ml(s) of oil*] 16:1	20:1	24:1	28:1	32:1	40:1	50:1
2.0	125	100	83.3	71.4	62.5	50	40
3.0	187.5	150	125	107.1	93.8	75	60
4.0	250	200	166.7	142.9	125	100	80
5.0	312.5	250	208.3	178.6	153.6	125	100
6.0	375	300	250	214.3	187.5	150	120
7.0	437.5	350	291.7	250.0	218.8	175	140
8.0	500	400	333.3	285.7	250	200	160
9.0	562.5	450	375	321.4	281.3	225	180
10.0	625	500	416.7	357.1	312.5	250	200
11.0	687.5	550	458.3	392.9	343.8	275	220

*Rounded to the closest tenth.

FUEL TANK CAPACITY

Model	U.S. gal.	Liters
KX125		
1982-1983	2.0	7.6
1984	2.1	8.0
1985-1987	2.0	7.6
1988-1989	2.3	8.7
1990-1991	2.2	8.3
KX250		
1982	2.4	9.1
1983-1986	2.1	8.0
1987	2.0	7.6
1988	2.6	9.8
1989-1991	2.2	8.3
KX500		
1983	2.4	9.1
1984	2.7	10.2
1985-1986	2.5	9.5
1987	2.4	9.1
1988-on	2.6	9.8

CLUTCH/TRANSMISSION OIL CAPACITY

Model	cc	ounces
KX125		
1982-1984	550	18.6
1985-1987	600	20.3
1988	650	22.0
1989-1991	700	23.7
KX250		
1982	900	30.4
1983-1984	700	23.7
1985-1991	800	27.1
KX500		
1983-on	800	27.1

FRONT FORK OIL SPECIFICATIONS

1982-1989 models	See Table 7 on page 104
1990-on models	See Table 9 on page 105

COOLANT CAPACITY

	Liters	qt.
KX125		
1982-1983	0.70	0.74
1984	0.90	0.95
1985-1989	0.88	0.93
1990-1991	0.96	1.0
KX250		
1983-1984	1.05	1.1
1985-1991	1.1	1.2
KX500		
1985-on	1.3	1.4

SPARK PLUG TYPE AND GAP

Model	
KX125	See Table 14 on page 107
KX250	See Table 15 on page 107
KX500	See Table 16 on page 108

CARBURETOR PILOT AIR SCREW ADJUSTMENT

Model	Turns out
KX125	
1982-1987	*
1988-1991	1 1/2
KX250	
1982-1986	1 1/2
1987	1
1988-1991	1 1/2
KX500	
1983-on	1 1/2

* The stock carburetors on these models were not equipped with a pilot air screw.

DRIVE CHAIN LENGTH MEASUREMENT*

	Standard mm (in.)	Wear limit mm (in.)
KX125		
1982-1987	317.5 (12.5)	323 (12.7)
1988	307.5 (12.1)	314 (12.4)
1989-1991	317.5 (12.5)	323 (12.7)
KX250		
1982-1987	317.5 (12.5)	323 (12.7)
1988-1991	317.5 (12.5)	314 (12.4)
KX500		
1983-1987	317.5 (12.5)	323 (12.7)
1988-1991	317.5 (12.5)	314 (12.4)

* 20-link length; see text for measurement procedures.

DRIVE CHAIN FREE PLAY

Model	mm	in.
1982-on	50-60	1.96-2.36

REAR SHOCK ABSORBER NITROGEN PRESSURE

Year	Standard kg/cm^2 (psi)	Minimum kg/cm^2 (psi)	Maximum kg/cm^2 (psi)
1982-1985	*	*	*
1986	10.0 (142)	10.0 (142)	15.0 (213)
1987-1990	12.0 (170)	10.0 (142)	15.0 (213)
1991			
KX125/KX250	10.0 (142)	10.0 (142)	15.0 (213)
1991-on			
KX500	10.0 (142)	10.0 (142)	15.0 (213)

* Not specified.

MAINTENANCE TORQUE SPECIFICATIONS

	N•m	ft.-lb.
Fork tube pinch bolts		
KX125		
1982-1988	20	15
1989		
U.S. and Canada	21	16
All other		
Upper	21	16
Lower	20	15
1990-1991	20	15
KX250	21	16
KX500	20	15

(continued

MAINTENANCE TORQUE SPECIFICATIONS (continued)

	N•m	ft.-lb.
Pushrod nut	20	15
Rear axle nut	98	72
Cylinder head nuts		
1982 KX250	35	26
All other models	25	18
Cylinder head bolts	25	18
Spark plug	27	30
Oil drain plug		
1982	13	115 in.-lb.
1983-on	20	15
Cylinder coolant drain bolt	15	11

CHAPTER ONE

GENERAL INFORMATION

This Clymer shop manual covers all 1982-1991 KX125 and KX250 and all 1983-2004 KX500 Kawasaki motocross bikes.

Troubleshooting, tune-up, maintenance and repair are not difficult, if you know what tools and equipment to use and what to do. Step-by-step instructions guide you through jobs ranging from simple maintenance to complete engine and suspension overhaul.

This manual has been specifically written for the amateur home mechanic. The text is complete enough, however, for use by professional mechanics. For example, engine service includes basic repair information as well as complete engine overhaul and crankshaft rebuilding. All procedures, tables, photos, etc., in this manual assume that the reader may be working on the bike 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 take best advantage of the information.

For the most frequently used general information and maintenance specifications refer to the *Quick Reference Data* pages.

For a better understanding of manual contents refer to *Manual 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 and indispensable tool. This manual can help make your repairs more successful and your machine better maintained and race ready.

Table 1 lists model numbers and serial numbers.

Table 2 lists weight specifications.

Table 3 lists general torque specifications. Use this table as a general guideline if a specific torque is not provided.

Table 4 lists conversion formulas.

Table 5 lists technical abbreviations.

Table 6 lists metric, inch and fractional equivalents.

Table 7 lists metric tap and drill sizes.

MANUAL ORGANIZATION

This chapter provides general information useful to Kawasaki owners and mechanics. In addition, information in this chapter discusses the tools and techniques for preventive maintenance, troubleshooting and repair.

Chapter Two provides methods and suggestions for quick and accurate diagnosis and repair of problems. Troubleshooting procedures discuss typical symptoms and logical methods to pinpoint the trouble.

Chapter Three explains all periodic lubrication and routine maintenance necessary to keep your Kawasaki operating well. Chapter Three also includes recommended tune-up procedures, eliminating the need to constantly consult other chapters on the various assemblies.

Subsequent chapters describe specific systems, providing disassembly, repair, assembly and adjustment procedures in simple step-by-step form. If a repair is impractical for a home mechanic, it is so indicated. It is usually faster and less expensive to take such repairs to a dealer or competent repair shop. Specifications concerning a specific system are included at the end of the appropriate chapter.

NOTES, CAUTIONS AND WARNINGS

The terms NOTE, CAUTION and WARNING have specific meanings in this manual. A NOTE provides additional information to make a step or procedure easier or clearer. Disregarding a NOTE could cause inconvenience, but would not cause damage or personal injury.

A CAUTION emphasizes areas where equipment damage could occur. Disregarding a CAUTION could cause permanent mechanical damage; however, personal injury is unlikely.

A WARNING emphasizes areas where personal injury or even death could result from negligence. Mechanical damage may also occur. WARNINGS *are to be taken seriously*. In some cases, serious injury and death has resulted from disregarding similar warnings.

SAFETY FIRST

Professional mechanics can work for years and never sustain a serious injury. If you observe a few rules of common sense and safety, you can enjoy many safe hours servicing your own machine. If you ignore these rules you can hurt yourself or damage the equipment.

1. Never use gasoline as a cleaning solvent.

2. Never smoke or use a torch in the vicinity of flammable liquids, such as cleaning solvent, in open containers.

3. If welding or brazing is required on the machine, remove the fuel tank to a safe distance, at least 50 feet away.

4. Use the proper sized wrenches to avoid damage to fasteners and injury to yourself.

5. When loosening a tight or stuck nut, be guided by what would happen if the wrench should slip. Be careful; protect yourself accordingly.

6. When replacing a fastener, make sure to use one with the same measurements and strength as the old one. Incorrect or mismatched fasteners can result in damage to the motorcycle and possible personal injury. Beware of fastener kits that are filled with cheap and poorly made nuts, bolts, washers and cotter pins. Refer to *Fasteners* in this chapter for additional information.

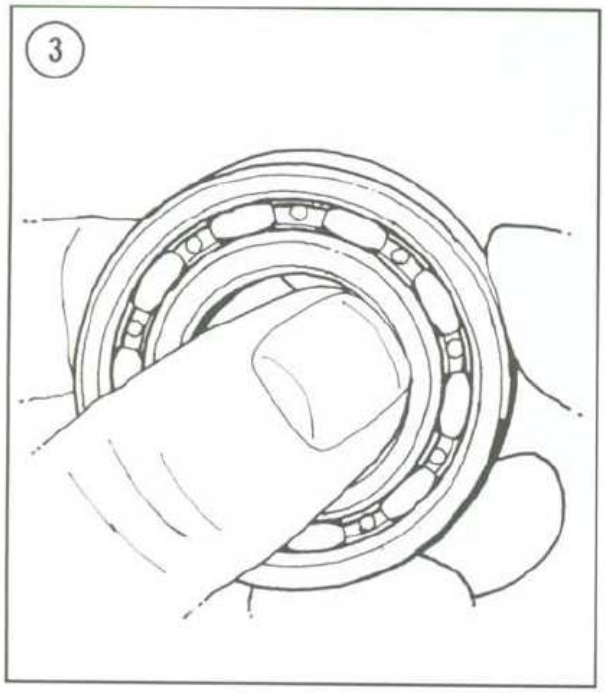
7. Keep all hand and power tools in good condition. Wipe greasy and oily tools after using them. They are difficult to hold and can cause injury. Replace or repair worn or damaged tools.

8. Keep your work area clean and uncluttered.

9. Wear safety goggles (**Figure 1**) during all operations involving drilling, grinding, the use of a cold chisel or *anytime* you feel unsure about the safety of your eyes. Safety goggles should also be worn anytime solvent and compressed air is used to clean parts.

10. Keep an approved fire extinguisher (**Figure 2**) near your workbench and in your tow vehicle while at the race track. Be sure it is rated for gasoline (Class B) and electrical (Class C) fires.

11. When drying bearings or other rotating parts with compressed air, never allow the air jet to rotate the bearing or part. The air jet is capable of rotating them at speeds far in excess of those for which they were designed. The bearing or rotating part is very likely to disintegrate and cause serious injury and damage. To prevent bearing damage when using compressed air, hold the inner bearing race by hand (**Figure 3**).



SERVICE HINTS

Most of the service procedures covered are straightforward and can be performed by anyone reasonably handy with tools. It is suggested, however, that you consider your own capabilities carefully before attempting any operation involving major disassembly.

1. "Front," as used in this manual, refers to the front of the motorcycle; the front of any component is the end closest to the front of the motorcycle. The "left-" and "right-hand" sides refer to the position of the parts as viewed by a rider sitting on the seat and facing forward. For example, the throttle control is on the right-hand side. These rules are simple, but confusion can cause a major inconvenience during service. See **Figure 4**.

2. When disassembling any engine or drive component, mark the parts for location and mark all parts which mate together. Small parts, such as bolts, can be identified by placing them in plastic sandwich bags (**Figure 5**). Seal the bags and label them with masking tape and a marking pen. When reassembly will take place immediately, an accepted practice is to place nuts and bolts in a cupcake tin or egg carton in the order of disassembly.

3. Finished surfaces should be protected from physical damage or corrosion. Keep gasoline off painted surfaces.

4. Use penetrating oil on frozen or tight bolts, then strike the bolt head a few times with a hammer and punch (use a screwdriver on screws). Avoid the use of heat where possible, as it can warp, melt or affect

the temper of parts. Heat also ruins finishes, especially paint and plastics. Additional information on removing frozen fasteners, repairing stripped threads and removing broken bolts and screws is described under *Mechanic's Tips* in this chapter.

5. No parts removed or installed (other than bushings and bearings) in the procedures given in this manual should require unusual force during disassembly or assembly. If a part is difficult to remove or install, find out why before proceeding.

6. Cover all openings after removing parts or components to prevent dirt, small tools, etc. from falling in.

7. Read each procedure *completely* while looking at the actual parts before starting a job. Make sure you *thoroughly* understand what is to be done and then carefully follow the procedure, step by step.

8. Recommendations are occasionally made to refer service or maintenance to a Kawasaki dealer or a specialist in a particular field. In these cases, the work will be done more quickly and economically than if you performed the job yourself.

9. In procedural steps, the term "replace" means to discard a defective part and replace it with a new or exchange unit. "Overhaul" means to remove, disassemble, inspect, measure, repair or replace defective parts, reassemble and install major systems or parts.

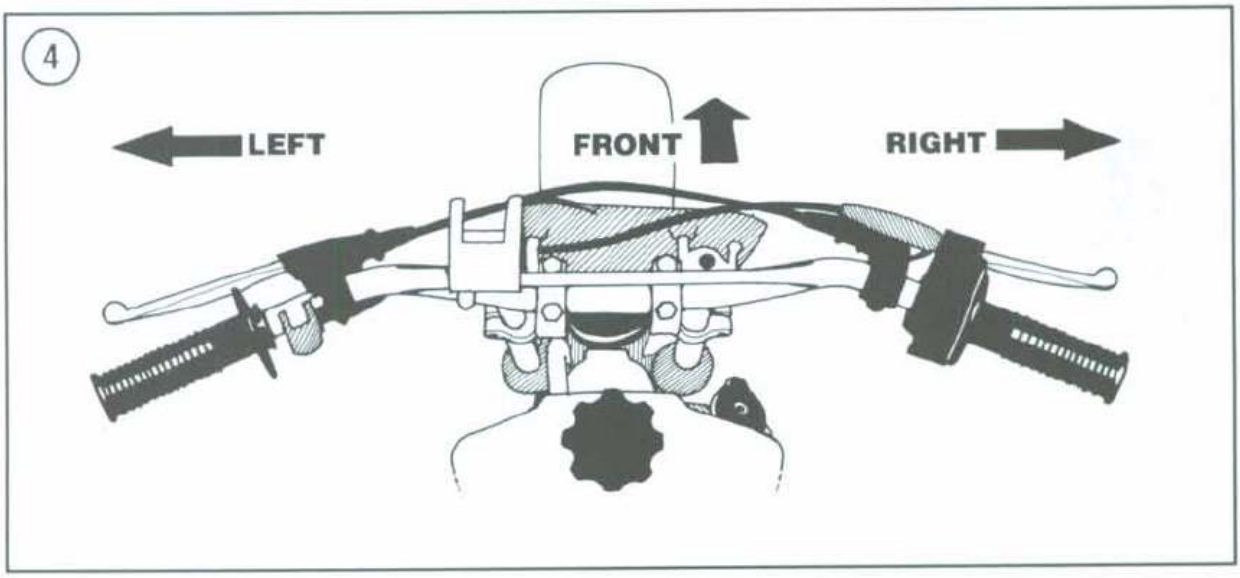
10. Some operations require the use of a hydraulic press. It would be wiser to have these operations performed by a shop equipped for such work, rather than to try to do the job yourself with makeshift equipment that may damage your machine.

11. Repairs go much faster and easier if your machine is clean before you begin work. There are many special cleaners on the market, like Bel-Ray Degreaser, for washing the engine and related parts. Follow the manufacturer's directions on the container for the best results. Clean all oily or greasy parts with cleaning solvent as you remove them.

WARNING

Never use gasoline as a cleaning agent. It presents an extreme fire hazard. Be sure to work in a well-ventilated area when using cleaning solvent. Keep a fire extinguisher, rated for gasoline fires, handy in any case.

12. Much of the labor charges for repairs made by dealers are for the time involved during in the removal, disassembly, assembly, and reinstallation of other parts in order to reach the defective part. It is



frequently possible to perform the preliminary operations yourself and then take the defective unit to the dealer for repair at considerable savings.

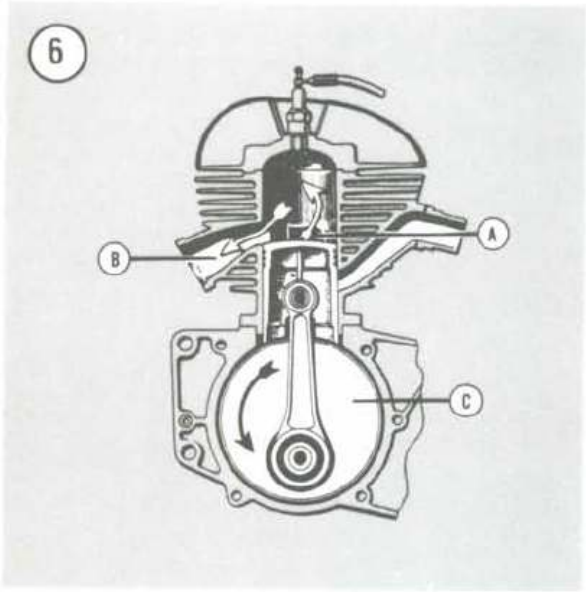
13. If special tools are required, make arrangements to get them before you start. It is frustrating and time-consuming to get partly into a job and then be unable to complete it.

14. Make diagrams (or take a Polaroid picture) wherever similar-appearing parts are found. For instance, crankcase bolts are often not the same length. You may think you can remember where everything came from—but mistakes are costly. There is also the possibility that you may be sidetracked and not return to work for days or even weeks—in which the time carefully laid out parts may have become disturbed.

15. When assembling parts, be sure all shims and washers are replaced exactly as they came out.

16. 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. A thin coat of silicone sealant on non-pressure type gaskets may help them seal more effectively.

17. When installing engine gaskets, always use Kawasaki replacement gaskets *without* sealer, unless specifically designated in the text. Kawasaki gaskets are designed to swell when in contact with oil. Gasket sealer prevents the gaskets from swelling as intended, which can result in oil leaks. Kawasaki gaskets are also cut from material of the precise thickness needed. Installation of a too thick or too thin gasket in a critical area could cause engine damage.



NOTE

If you're in a jam and your dealer does not have the correct gasket, you can purchase gasket material from an automotive parts store and make a gasket. When purchasing gasket material, measure the thickness of the old gasket and purchase gasket material with the same approximate thickness. Do not attempt to make a replacement head gasket with gasket material.

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

19. A carburetor is best cleaned by disassembling it and soaking the parts in a commercial carburetor cleaner. Never soak gaskets and rubber parts in these cleaners. Never use wire to clean out jets and air passages. They are easily damaged. Use compressed air to blow out the carburetor only if the float has been removed first.

20. When installing the "fold-over" type locking washers 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 over, start the fold with a screwdriver and finish it with a pair of 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. Because these washers are inexpensive, it is recommended to keep several on hand.

21. Take your time and do the job right. Do not forget that a newly rebuilt engine must be broken in just like as a new one.

ENGINE OPERATION

All Kawasaki KX models are equipped with 2-stroke engines. During this discussion, assume that the crankshaft is rotating counterclockwise in **Figure 6**. As the piston travels downward, a transfer port (A) between the crankcase and the cylinder is uncovered. The exhaust gases leave the cylinder

through the exhaust port (B), which is also opened by the downward movement of the piston. A fresh fuel-air charge, which has previously been compressed slightly, travels from the crankcase (C) to the cylinder through the transfer port (A) as the port opens. Since the incoming charge is under pressure, it rushes into the cylinder quickly and helps to expel the exhaust gases from the previous cycle.

Figure 7 illustrates the next phase of the cycle. As the crankshaft continues to rotate, the piston moves upward, closing the exhaust and transfer ports. As the piston continues upward, the air/fuel mixture in the cylinder is compressed. Notice also that a vacuum is created in the crankcase at the same time. Further upward movement of the piston uncovers the intake port (D). A fresh fuel-air charge is then drawn into the crankcase through the intake port because of the vacuum created by the upward piston movement.

The third phase is shown in **Figure 8**. As the piston approaches top dead center, the spark plug fires, igniting the compressed mixture. The piston is then driven downward by the expanding gases.

When the top of the piston uncovers the exhaust port, the fourth phase begins, as shown in **Figure 9**. The exhaust gases leave the cylinder through the exhaust port. As the piston continues downward, the intake port is closed and the mixture in the crankcase is compressed in preparation for the next cycle.

It can be seen from this discussion that every downward stroke of the piston is a power stroke.

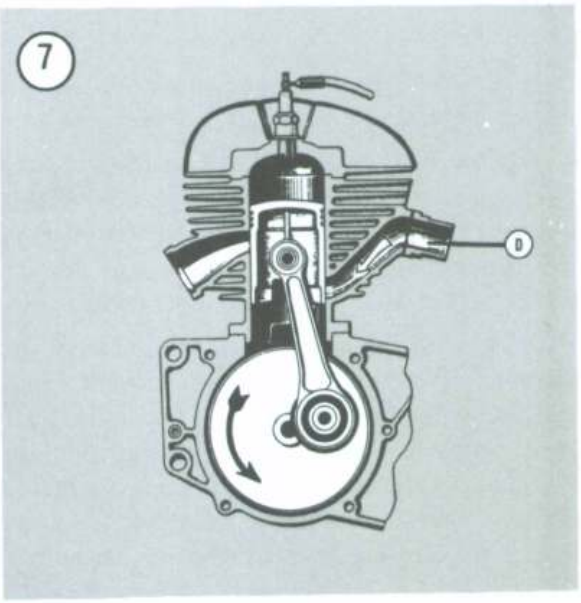
WASHING THE BIKE

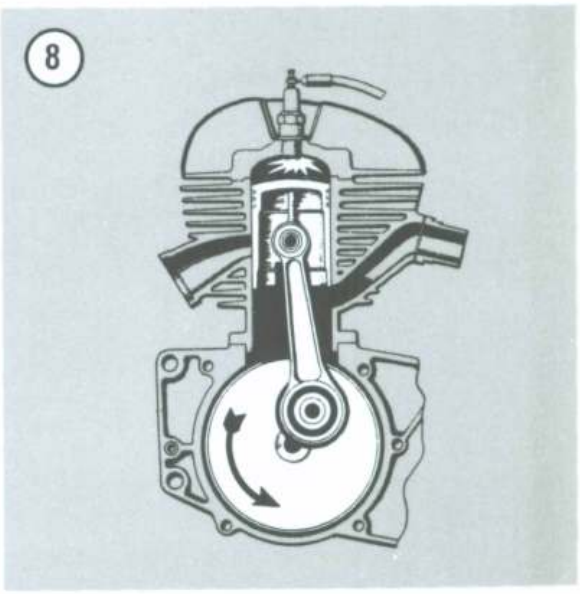
Dirt bikes get dirty. If you are riding your bike and maintaining it properly, you will spend a good deal of time cleaning it. After each riding session, wash the bike. It will make maintenance and service procedures quick and easy. More important, proper cleaning will prevent dirt from falling into critical areas undetected. Failing to clean the bike or cleaning it incorrectly will add to your maintenance costs and shop time because dirty parts wear out prematurely. It's unthinkable that your bike could break during a moto because of improper cleaning, but it can happen.

When cleaning your bike, you will need a few tools, shop rags, scrub brush, bucket, liquid cleaner and access to water. Many riders use a coin-operated car wash. Coin-operated car washes are convenient and quick, but with improper use, the high water pressure can do your bike more damage than good.

NOTE

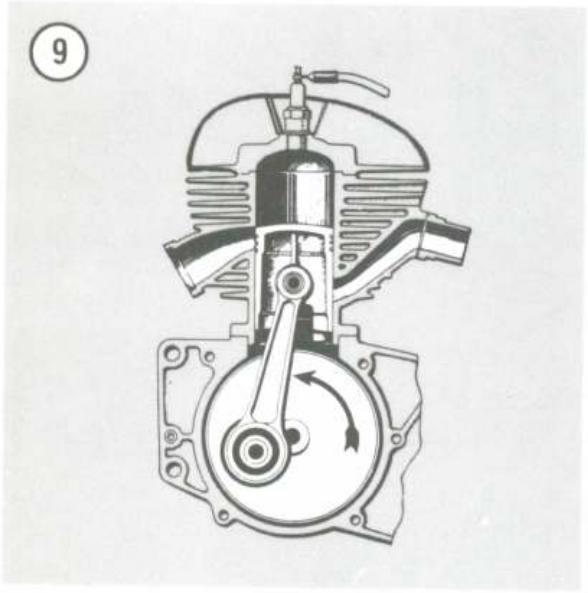
A safe biodegradable, non-toxic and non-flammable liquid cleaner that works well for washing your bike as well as removing grease and oil from engine and suspension parts is Simple Green. Simple Green can be purchased through some hardware, garden and discount supply houses. Follow the directions on the container for recommended dilution ratios.





When cleaning your bike, and especially when using a spray type degreaser, remember that what goes on the bike will rinse off and drip onto your driveway or into your yard. If you can, use a degreaser at a coin-operated car wash. If you are cleaning your bike at home, place thick cardboard or newspapers underneath the bike to catch the oil and grease deposits that are rinsed off.

1. Place the bike on a stand.
2. If the air filter has been removed, insert a dry rag into the carburetor throat to keep water from getting inside the engine.
3. Check the following before washing the bike:
   a. Make sure the gas cap is screwed on tightly.
   b. Make sure the oil fill cap is tight.
   c. Plug the silencer opening with a large cork or rag.
   d. Make sure the radiator cap is correctly installed on *liquid-cooled* models.
4. Wash the bike from top to bottom with soapy water. Use the scrub brush to get excess dirt out of the wheel rims and engine crannies. Concentrate on the upper controls, engine, side panels and gas tank during this wash cycle. Don't forget to wash dirt and mud from underneath the fenders.
5. Direct the hose underneath the engine and swing arm. Wash this area thoroughly. If this area is extremely dirty, you may want to lay the bike on its side.
6. The final wash is the rinse. Use cold water without soap and spray the whole motorcycle again. Use as much time and care when rinsing the bike as when washing it. Built up soap deposits will quickly corrode electrical connections and remove the natural oils from tires, causing premature cracks and wear. Make sure you thoroughly rinse the bike off.
7. Before taking the bike into the garage, wipe it dry with a shop rag. Inspect the machine as you dry it for further signs of dirt and grime. Make a quick visual inspection of the frame and other painted pieces. Spray any worn-down spots with WD-40 or Bel-Ray 6-in-1 to prevent rust from building on the bare metal. When the bike is back at your work area you can repaint the bare areas with touch-up paint. A quick shot from a paint can each time you work on the bike will keep it looking sharp and stop rust from building and weakening parts.



TORQUE SPECIFICATIONS

The materials used in the manufacturer of your bike can be subjected to uneven torque stresses if the fasteners used to hold the sub-assemblies are not installed and torqued correctly. Improper bolt tightening can cause cylinder head warpage, crankcase leaks, premature bearing and seal failure and suspension failure from loose or missing fasteners. An accurate torque wrench (described in this chapter) should be used together with the torque specifications listed at the end of most chapters.

Torque specifications throughout this manual are given in Newton-meters (N•m) and foot-pounds (ft.-lb.).

Table 5 lists general torque specifications for nuts and bolts that are not listed in the respective chapters. To use the table, first determine the size of the nut or bolt by measuring it with a vernier caliper. **Figure 10** and **Figure 11** show how to do this.

FASTENERS

The materials and designs of the various fasteners used on your bike are not arrived at by chance or accident. Fastener design determines the type of tool required to work the fastener. Fastener material is carefully selected to decrease the possibility of physical failure.

Nuts, bolts and screws are manufactured in a wide range of thread patterns. To join a nut and bolt, the diameter of the bolt and the diameter of the hole in the nut must be the same. It is just as important that the threads on both be properly matched.

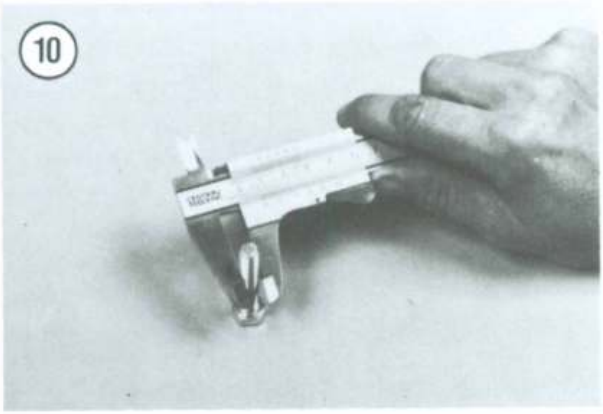
The best way to tell if the threads on 2 fasteners are matched is to turn the nut on the bolt (or the bolt into the threaded hole in a piece of equipment) with fingers only. Be sure both pieces are clean. If much force is required, check the thread condition on each fastener. If the thread condition is good but the fasteners jam, the threads are not compatible. A thread pitch gauge (**Figure 12**) can also be used to determine pitch. Kawasaki motorcycles are manufactured with ISO (International Organization for Standardization) metric fasteners. The threads are cut differently than that of American fasteners (**Figure 13**).

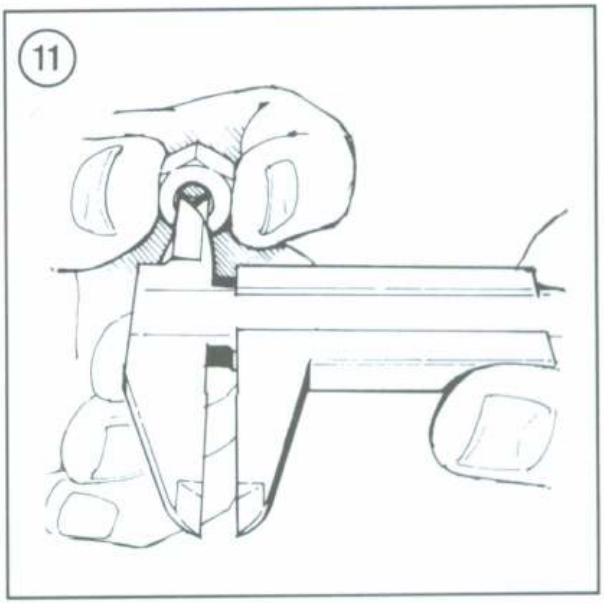
Most threads are cut so that the fastener must be turned clockwise to tighten it. These are called right-hand threads. Some fasteners have left-hand threads; they must be turned counterclockwise to be tightened. Left-hand threads are used in locations where normal rotation of the equipment would tend to loosen a right-hand threaded fastener.

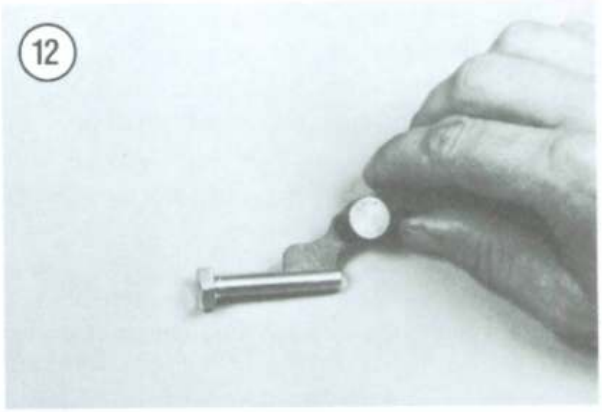
ISO Metric Screw Threads

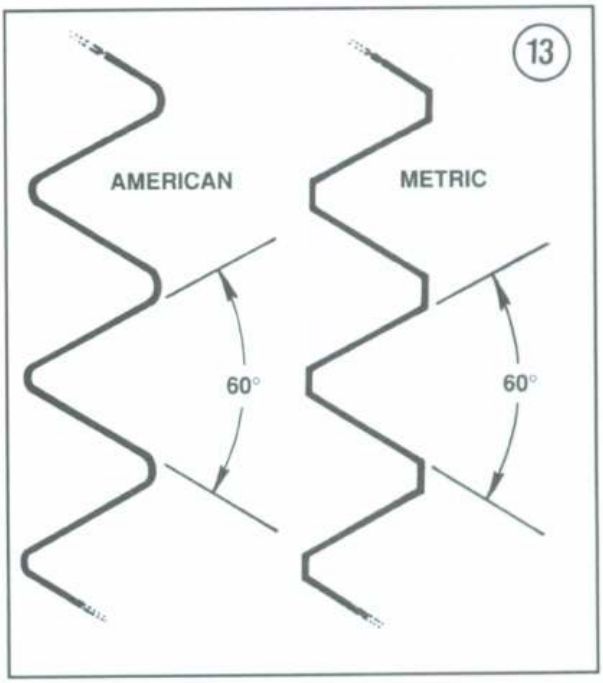
ISO (International Organization for Standardization) metric threads come in 3 standard thread sizes: coarse, fine and constant pitch. The ISO coarse pitch is used for most all common fastener applications. The fine pitch thread is used on certain precision tools and instruments. The constant pitch thread is used mainly on machine parts and not for fasteners. The constant pitch thread, however, is used on all metric thread spark plugs.

ISO metric threads are specified by the capital letter M followed by the diameter in millimeters and the pitch (or the distance between each thread) in millimeters separated by the sign ×. For example a M8 × 1.25 bolt is one that has a diameter of 8





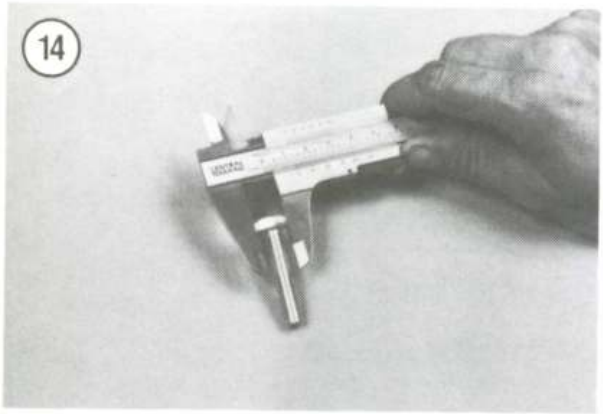


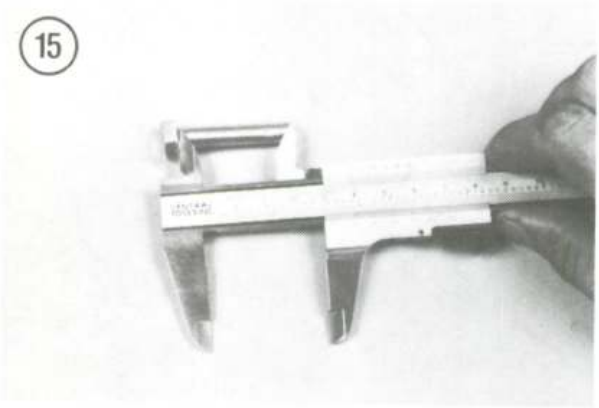


millimeters with a distance of 1.25 millimeters between each thread. The measurement across 2 flats on the head of the bolt (**Figure 14**) or nut indicates the proper wrench size to be used. **Figure 10** shows how to determine bolt diameter.

NOTE

*When purchasing a bolt from a dealer or parts store, it's important to know how to specify bolt length. The correct way to measure bolt length is by measuring the length starting from underneath the bolt head to the end of the bolt (**Figure 15**). Installing a bolt that is too long in a blind hole can cause damage. Always measure bolt length in this manner to avoid purchasing bolts that are too long.*





Machine Screws

There are many different types of machine screws. **Figure 16** shows a number of screw heads requiring different types of turning tools. Heads are also designed to protrude above the metal (round) or to be slightly recessed in the metal (flat). See **Figure 17**.

Bolts

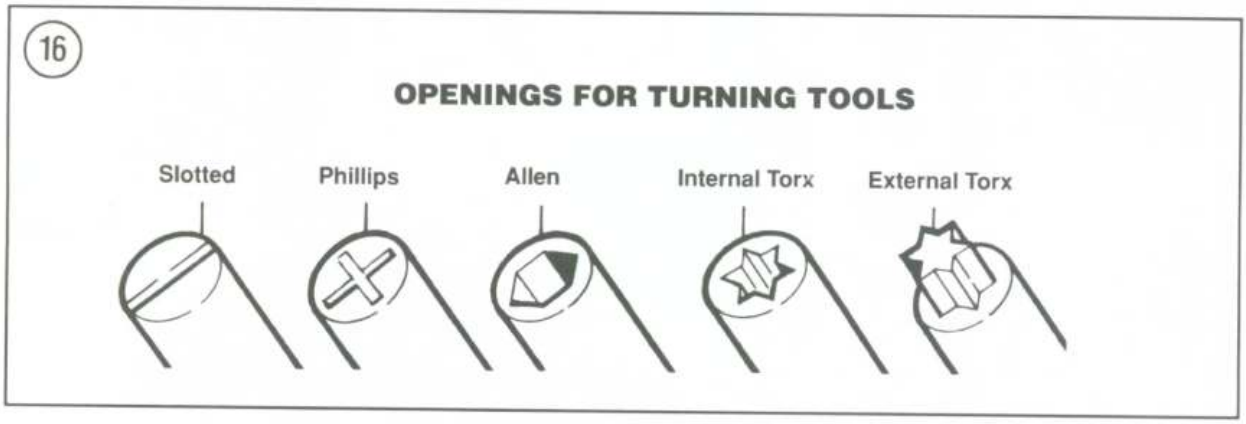
Commonly called bolts, the technical name for these fasteners is cap screw. Metric bolts are described by the diameter and pitch (or the distance between each thread).

Nuts

Nuts are manufactured in a variety of types and sizes. Most are hexagonal (6-sided) and fit on bolts, screws and studs with the same diameter and pitch.

Figure 18 shows several types of nuts. The common nut is generally used with a lockwasher. Self-locking nuts have a nylon insert which prevents the nut from loosening; no lockwasher is required. Wing nuts are designed for fast removal by hand. Wing nuts are used for convenience in non-critical locations.

To indicate the size of a metric nut, manufacturers specify the diameter of the opening and the thread pitch. This is similar to bolt specifications, but with-



out the length dimension. The measurement across 2 flats on the nut indicates the proper wrench size to be used.

Self-Locking Fasteners

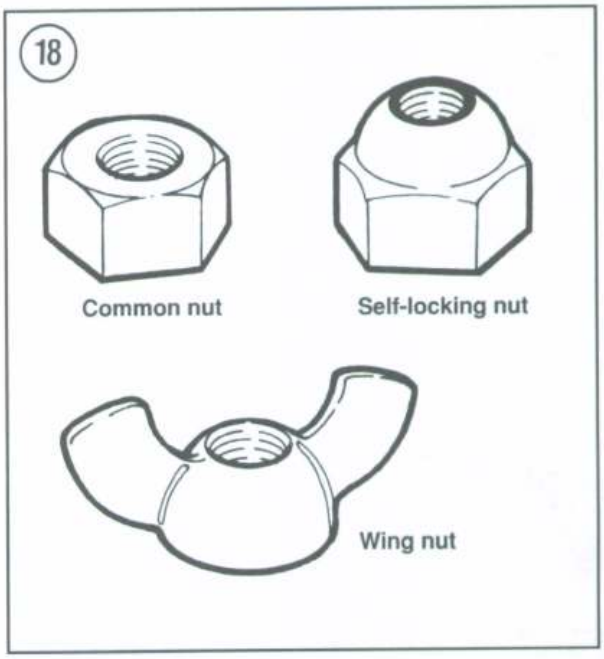
Self-locking fasteners incorporate a system that develops an interference between the bolt, screw, nut or tapped hold threads. Interference is achieved in various ways: by distorting threads, coating threads with dry adhesive or nylon, distorting the top of an all-metal nut, using a nylon insert in the center or at the top of a nut, etc.

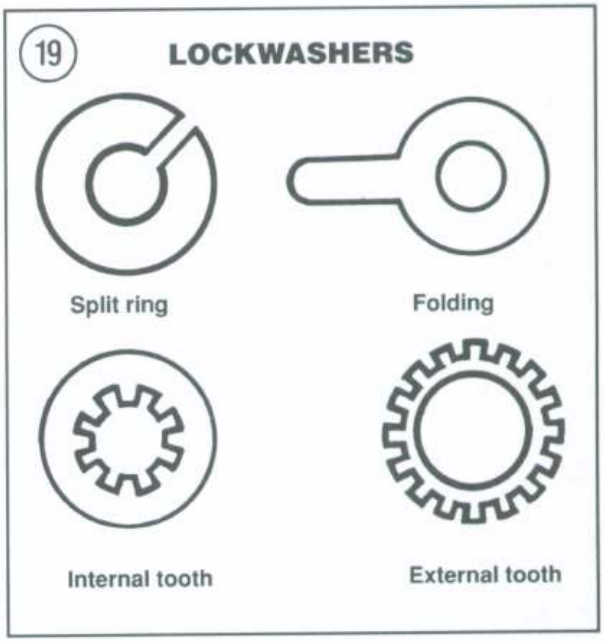
Self-locking fasteners offer greater holding strength and better vibration resistance. Some self-locking fasteners can be reused if in good condition. Others, like the nylon insert nut, form an initial locking condition when the nut is first installed; the nylon forms closely to the bolt thread pattern, thus reducing any tendency for the nut to loosen. When the nut is removed, the locking efficiency is greatly reduced. For greatest safety, it is recommended that you install new self-locking fasteners whenever they are removed.

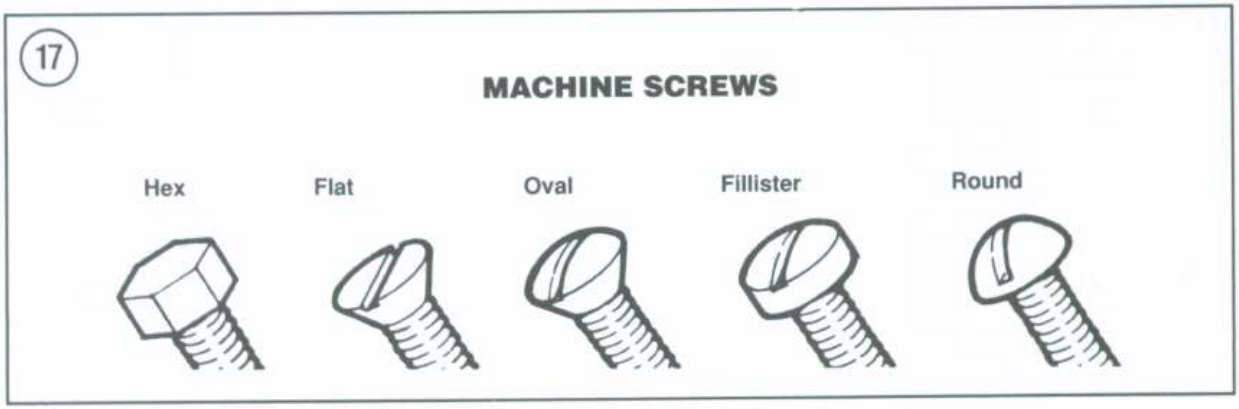
Washers

There are 2 basic types of washers: flat washers and lockwashers. Flat washers are simple discs with a hole to fit a screw or bolt. Lockwashers are designed to prevent a fastener from working loose due to vibration, expansion and contraction. **Figure 19** shows several types of washers. Washers are also used in the following functions:

a. As spacers.







b. To prevent galling or damage of the equipment by the fastener.
c. To help distribute fastener load during torquing.
d. As seals.

Note that flat washers are often used between a lockwasher and a fastener to provide a smooth bearing surface. This allows the fastener to be turned easily with a tool.

Cotter Pins

Cotter pins are used in critical areas where a loosened fastener could cause severe component damage or result in personal injury. When using a cotter pin, the threaded stud, shaft or bolt must have a hole in it. The mating nut or lock nut normally has castellations around its outer edge (**Figure 20**). When the nut is tightened, the castellations on the edge of the nut must align with the hole in the stud or bolt. The cotter pin is then inserted through the nut and the threaded part.

NOTE

If after tightening a nut to a specific torque specification you find that the nut castellations do not align with the hole in the threaded part, tighten the nut so that the holes align. Do not loosen the nut.

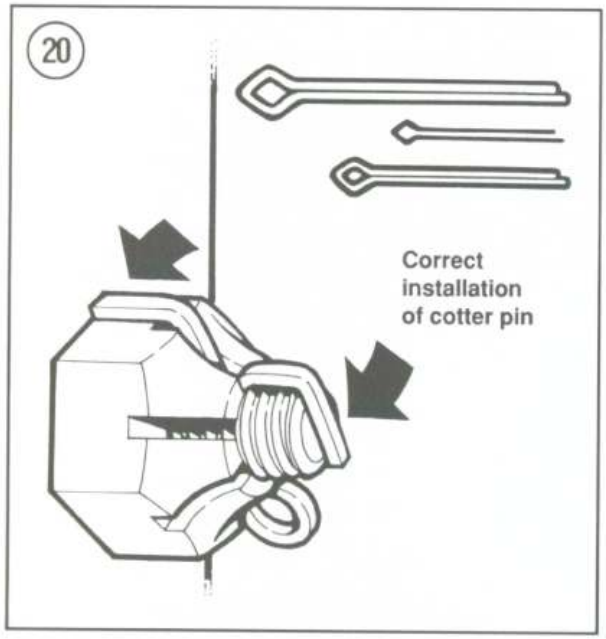
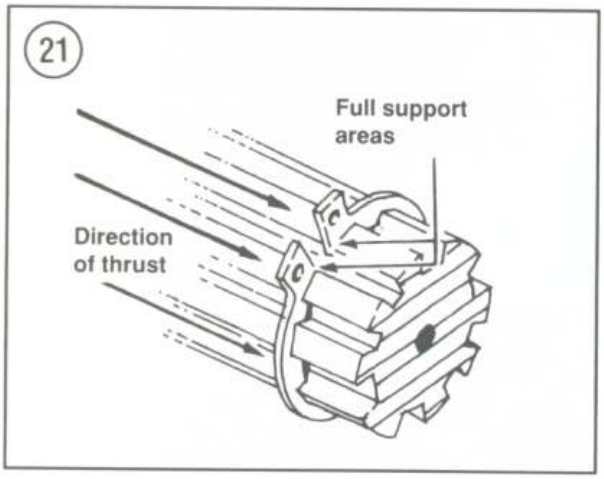


Figure 20 shows a correctly installed cotter pin. Note how the head of the cotter pin fits into the nut and how the legs are bent. An improperly installed cotter pin will have less holding power. During reassembly, do not reuse a cotter pin. The legs could break and allow the cotter pin to fall out and perhaps the fastener to unscrew itself. If a cotter pin is too long, trim the legs with wire cutters before locking it in place.



Circlips

Circlips (or snap rings) can be of internal or external design. They are used to retain items on shafts (external type) or within tubes (internal type). In some applications, circlips of varying thicknesses are used to control the end play of parts assemblies. These are often called selective circlips. Circlips should be replaced during installation, as removal weakens and deforms them.

Two basic styles of circlips are available: machined and stamped circlips. Machined circlips (**Figure 21**) can be installed in either direction (shaft or housing) because both faces are machined, thus creating two sharp edges. Stamped circlips (**Figure 22**) are manufactured with one sharp edge and one rounded edge. When installing stamped circlips in a thrust situation, the sharp edge must face away from the part producing the thrust. When installing circlips, observe the following:

a. Compress or expand circlips only enough to install or remove them.
b. After the circlip is installed, make sure it is completely seated in its groove.
c. Transmission circlips become worn with use and increase gear side play. For this reason, it

is generally better to replace all transmission circlips whenever the transmission is disassembled.

LUBRICANTS

Periodic lubrication assures long life for any type of equipment. The *type* of lubricant used is just as important as the lubrication service itself, although in an emergency the wrong type of lubricant is better than none at all. The following paragraphs describe the types of lubricants most often used on motorcycle equipment. Be sure to follow the manufacturer's recommendations for lubricant types.

Generally, all liquid lubricants are called "oil." They may be mineral-based (including petroleum bases), natural-based (vegetable and animal bases), synthetic-based or emulsions (mixtures). "Grease" is an oil to which a thickening base has been added so that the end product is semi-solid. Grease is often classified by the type of thickener added; lithium soap is commonly used.

Engine Oil

Four-cycle oil for motorcycle and automotive engines is graded by the American Petroleum Institute (API) and the Society of Automotive Engineers (SAE) in several categories. Oil containers display these ratings on the top or label.

API oil grade is indicated by letters; oils for gasoline engines are identified by an "S".

Viscosity is an indication of the oil's thickness. The SAE assigns numbers which indicate viscosity; thin oils have low numbers while thick oils have high numbers. A "W" after the number, such as 5W or 10W, indicates that the viscosity testing was done at a low temperature to simulate cold weather operation.

Multi-grade oil, such as 10W-40, can vary its viscosity to suit different temperatures. This allows the oil to perform efficiently across a wide range of temperatures; thin at cold temperatures and thick at hot temperatures.

Four-cycle oil used in your KX lubricates the transmission and clutch components. Gears tend to shear the polymers within the oil which control viscosity. For this reason, you should always use an oil designed specifically for motorcycles. Motorcycle gear oil contains additional amounts of EP (extreme pressure) additives to prevent oil shear. The SAE and API oil ratings do not address this unique need.

NOTE

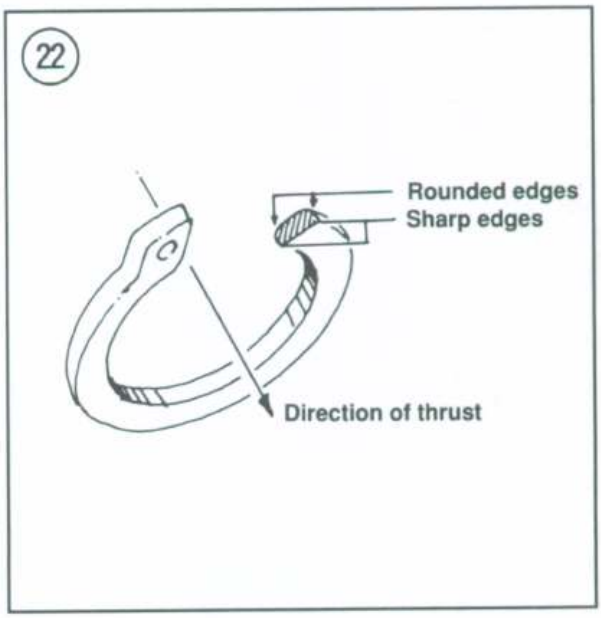
The oil viscosity numbers on motorcycle designated gear oils differ from regular SAE numbers. Refer to the application numbers on the back of the oil can (specified for motorcycle use) when cross-referencing oil viscosity.

2-stroke Engine Oil

Lubrication for a 2-stroke engine is provided by oil mixed with the incoming fuel-air mixture. Some of the oil mist settles out in the crankcase, lubricating the crankshaft and the connecting rod lower end. The rest of the oil enters the combustion chamber to lubricate the piston rings and cylinder walls. This oil is burned during the combustion process.

Engine oil must have several special qualities to work well in a 2-stroke engine. It must mix easily and stay in suspension in gasoline. When burned, it can't leave behind excessive deposits. It must be appropriate for the high temperatures associated with 2-stroke engines.

In addition to oil grade, manufacturers specify the ratio of gasoline to oil required during break-in and normal engine operation. Using too little oil will cause excessive engine wear and overheating and result in seizure. Too much oil will cause spark plug



fouling and excessive carbon buildup in the combustion chamber and exhaust port.

Grease

Greases are graded by the National Lubricating Grease Institute (NLGI). Greases are graded by number according to the consistency of the grease; these range from No. 000 to No. 6, with No. 6 being the most solid. A typical multipurpose grease is NLGI No. 2. For specific applications, equipment manufacturers may require grease with an additive such as molybdenum disulfide (MOS2). See **Figure 23**.

RTV GASKET SEALANT

Room temperature vulcanizing (RTV) sealant is used on some pre-formed gaskets and to seal some components. RTV is a silicone gel supplied in tubes and can be purchased in a number of different colors.

Moisture in the air causes RTV to cure. Always place the cap on the tube as soon as possible when using RTV. RTV has a shelf life of one year and will not cure properly when the shelf life has expired. Check the expiration date on RTV tubes before using and keep partially used tubes tightly sealed.

(23)

(24)

Applying RTV Sealant

Clean all gasket residue from mating surfaces. Surfaces should be clean and free of oil and dirt. Remove all RTV gasket material from blind attaching holes, as it can cause a "hydraulic" effect and affect bolt torque.

Apply RTV sealant in a continuous bead 2-3 mm (0.08-0.12 in.) thick. Circle all mounting holes unless otherwise specified. Torque mating parts within 10 minutes after application.

THREADLOCK

A threadlock should be used to help secure many of the fasteners used on your bike. A threadlock will lock fasteners against vibration loosening and seal against leaks. Loctite 242 (blue) and 271 (red) are recommended for many threadlock requirements described in this manual (**Figure 24**).

Loctite 242 (blue) is a medium strength threadlock and component disassembly can be performed with normal hand tools. Loctite 271 (red) is a high strength threadlock and heat or special tools, such as a press or puller, may be required for component disassembly.

Applying Threadlock

Surfaces should be clean and free of oil and dirt. If a threadlock was previously applied to the component, this residue should also be removed.

Shake the Loctite container thoroughly and apply to both parts. Assemble parts and/or tighten fasteners.

PARTS REPLACEMENT

Kawasaki makes frequent changes during a model year, some minor, some relatively major. When you order parts from the dealer or other parts distributor, always order by frame and engine numbers. The frame number is stamped on the frame steering neck (**Figure 25**). The engine number is stamped on the crankcase (**Figure 26**, typical). Keihin carburetors

can be identified by the number stamped on the carburetor housing (**Figure 27**). Write the numbers down and carry them with you. Compare new parts to old before purchasing them. If they are not alike, have the parts manager explain the difference to you. **Table 1** lists engine serial numbers for all KX models covered in this manual.

OPTIONAL PARTS

Depending on model year and availability, Kawasaki sells optional cylinder head gaskets, carburetor jets, sprockets and suspension components through their dealer parts departments. Contact your dealer for additional information.

BASIC HAND TOOLS

Many of the procedures in this manual can be carried out with simple hand tools and test equipment familiar to the average home mechanic. Keep your tools clean and in a tool box. Keep them organized with the sockets and related drives together, the open-end combination wrenches together, etc. After using a tool, wipe off dirt and grease with a clean cloth and return the tool to its correct place.

Top quality tools are essential; they are also more economical in the long run. If you are now starting to build your tool collection, stay away from the "advertised specials" featured at some parts houses, discount stores and chain drug stores. These are usually a poor grade tool that can be sold cheaply and that is exactly what they are—*cheap*. They are usually made of inferior material, and are thick, heavy and clumsy. Their rough finish makes them difficult to clean and they usually don't last very long. If it is ever your misfortune to use such tools, you will probably find out that the wrenches do not fit the heads of bolts and nuts correctly and damage the fastener.

Quality tools are made of alloy steel and are heat treated for greater strength. They are lighter and better balanced than cheap ones. Their surface is smooth, making them a pleasure to work with and easy to clean. The initial cost of good quality tools may be more but they are cheaper in the long run. Don't try to buy everything in all sizes in the beginning; do it a little at a time until you have the necessary tools.

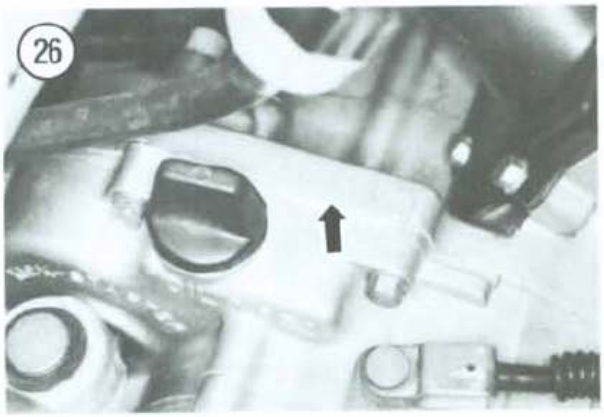
The following tools are required to perform virtually any repair job. Each tool is described and the recommended size given for starting a tool collection. Additional tools and some duplicates may be added as you become familiar with the vehicle. Your KX model is built with metric standard fasteners—so if you are starting your collection now, buy metric sizes.

Screwdrivers

The screwdriver is a very basic tool, but if used improperly it will do more damage than good. The slot on a screw has a definite dimension and shape. A screwdriver must be selected to conform with that shape. Use a small screwdriver for small screws and a large one for large screws or the screw head will be damaged.

Two basic types of screwdriver are required: common (flat-blade) screwdrivers (**Figure 28**) and Phillips screwdrivers (**Figure 29**).

Screwdrivers are available in sets which often include an assortment of common and Phillips



blades. If you buy them individually, buy at least the following:

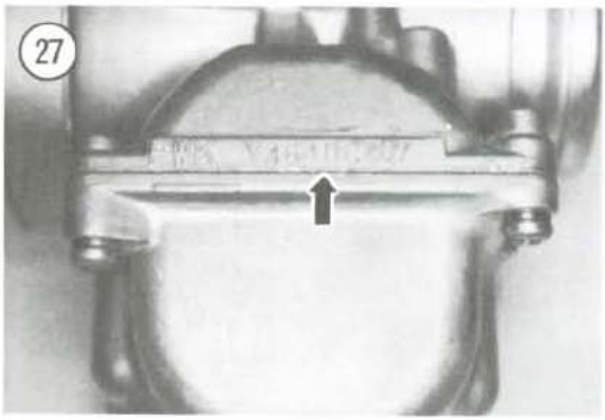
a. Common screwdriver—5/16 × 6 in. blade.

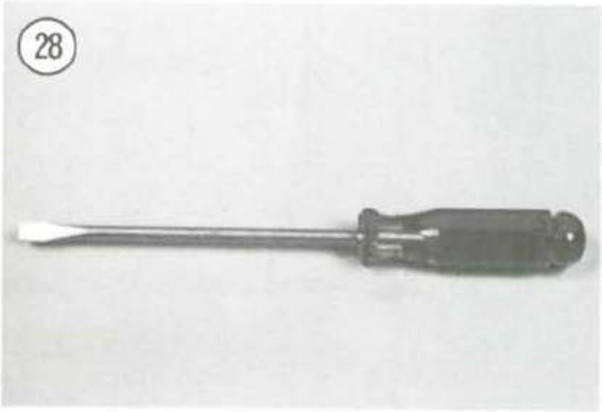
b. Common screwdriver—3/8 × 12 in. blade.

c. Phillips screwdriver—size 2 tip, 6 in. blade.

Use screwdrivers only for driving screws. Never use a screwdriver for prying or chiseling metal. Do not try to remove a Phillips or Allen head screw with a common screwdriver (unless the screw has a combination head that will accept either type); you can damage the head so that the proper tool will be unable to remove it.

Keep screwdrivers in the proper condition and they will last longer and perform better. Always keep the tip of a common screwdriver in good condition. **Figure 30** shows how to grind the tip to the proper shape if it becomes damaged. Note the symmetrical sides of the tip.





Pliers

Pliers come in a wide range of types and sizes. Pliers are useful for cutting, bending and crimping. They should never be used to cut hardened objects or to turn bolts or nuts. **Figure 31** shows several pliers useful in motorcycle repair.

Each type of pliers has a specialized function. Slip-joint pliers and are used mainly for holding things and for bending. Needlenose pliers are used to hold or bend small objects. Waterpump pliers (commonly referred to as channel locks) can be adjusted to hold various sizes of objects; the jaws remain parallel to grip around objects such as pipe or tubing. There are many more types of pliers.

CAUTION

Pliers should not be used for loosening or tightening nuts or bolts. The pliers sharp teeth will ground off the nut or bolt corners and damage the fastener.

CAUTION

If slip-joint pliers are going to be used to hold an object with a finished surface that can be easily damaged, wrap the object with tape or cardboard for protection.

Vise-Grip Pliers

Vise-grip pliers (**Figure 32**) are used to hold objects very tightly while another task is performed on the object. While Vise-grips work well, caution should be followed with their use. Because Vise-grip pliers exert more force than regular pliers, their sharp jaws will permanently scar the object. In addition, when Vise-grip pliers are locked in position, they can crush or deform thin wall material.

Vise-grips are available in many types for more specific tasks.

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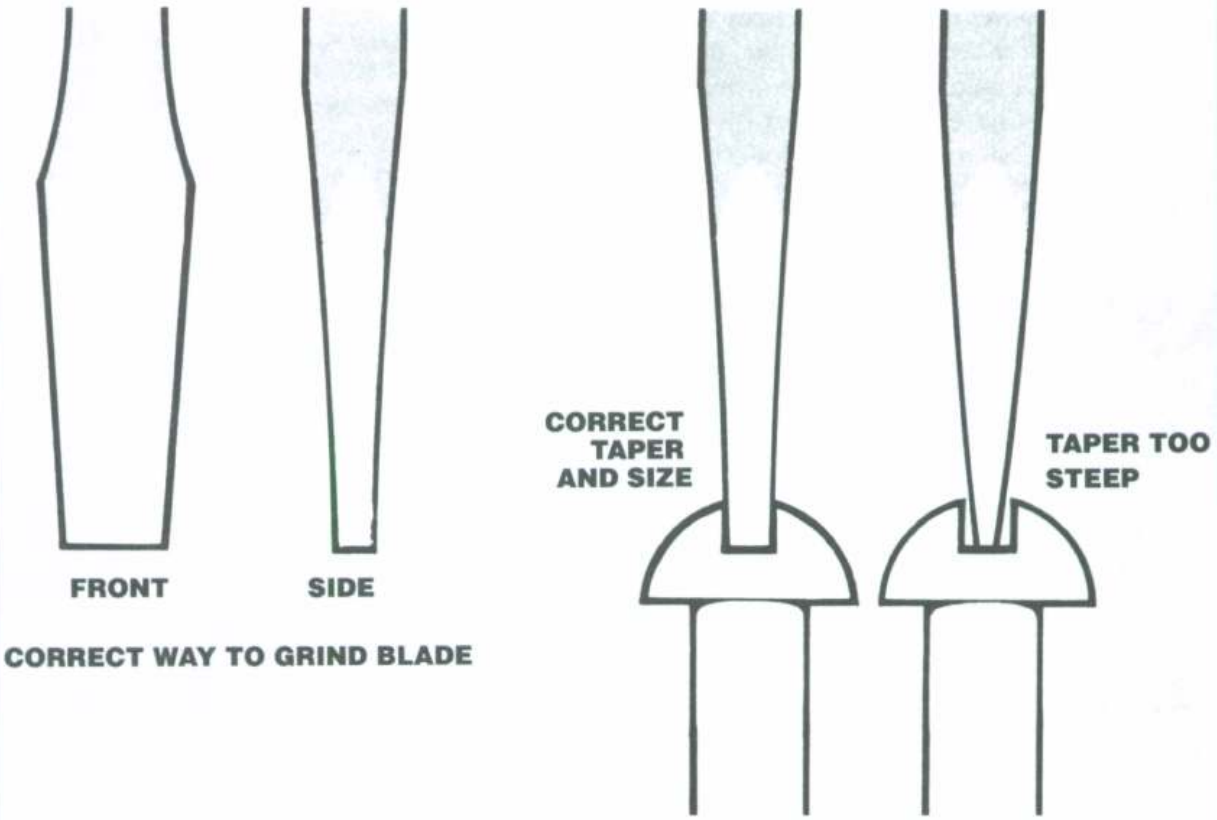
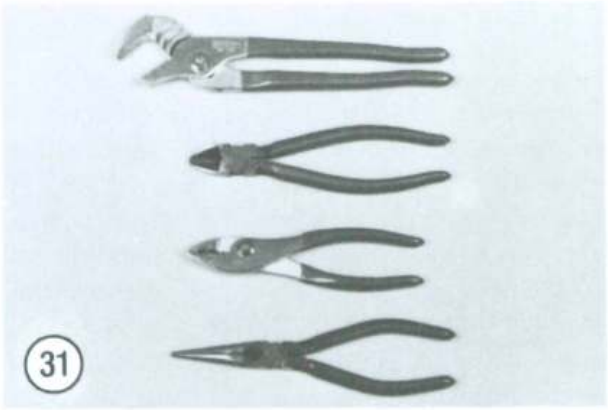

FRONT
SIDE
CORRECT WAY TO GRIND BLADE
CORRECT TAPER AND SIZE
TAPER TOO STEEP



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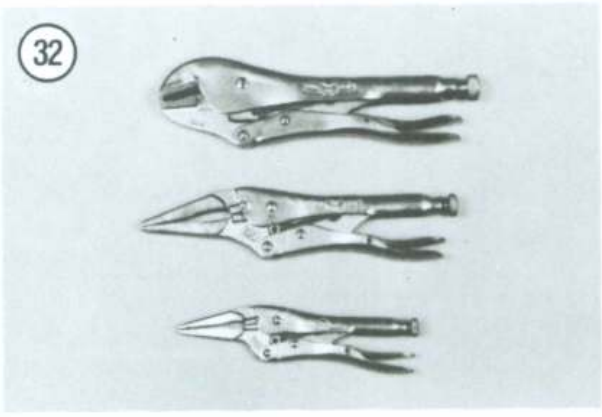

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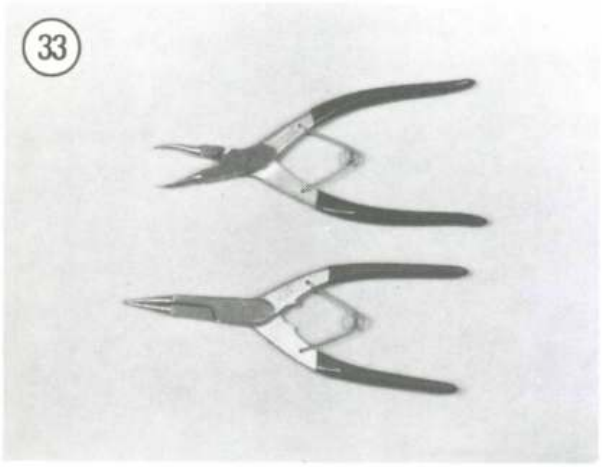
Circlip Pliers

Circlip pliers (**Figure 33**) are special in that they are only used to remove circlips from shafts or within engine or suspension housings. When purchasing circlip pliers, there are two kinds to distinguish from. External pliers (spreading) are used to remove circlips that fit on the outside of a shaft. Internal pliers (squeezing) are used to remove circlips which fit inside a housing.



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35

Box-end, Open-end and Combination Wrenches

Box and open-end wrenches are available in sets or separately in a variety of sizes. On open and box-end wrenches, the number stamped near the end refers to the distance between 2 parallel flats on the head of a nut or bolt. On combination wrenches, the number is stamped near the center.

Box-end wrenches require clear overhead access to the fastener but can work well in situations where the fastener head is close to another part. They grip on all six edges of a fastener for a very secure grip. They are available in either 6-point or 12-point. The 6-point gives superior holding power and durability but requires a greater swinging radius. The 12-point works better in situations with limited swinging radius.

Open-end wrenches are speedy and work best in areas with limited overhead access. Their wide jaws make them unsuitable for situations where the bolt or nut is sunken in a well or close to the edge of a casting. These wrenches only grip on two flats of a fastener so it either the fastener head or wrench jaws are worn, the wrench may slip off.

Combination wrenches (**Figure 34**) have an open end on one side and a box-end on the other with both ends being the same size. These wrenches are favored by professionals because of their versatility.

No matter what style of wrench you choose, proper use is important to prevent personal injury. When using a wrench, get in the habit of pulling the wrench toward you. This reduces the risk of injuring your hand should the wrench slip. If you have to push the wrench away from you to loosen or tighten a fastener, open and push with the palm of your hand. This technique gets your fingers and knuckles out of the way should the wrench slip. Before using a wrench, always think ahead as to what could happen if the wrench should slip or if the bolt should strip out or break.

Adjustable Wrenches

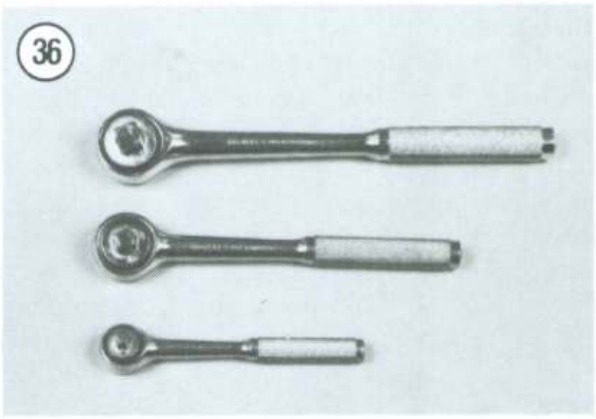
An adjustable wrench (sometimes called a Crescent wrench) can be adjusted to fit nearly any nut or bolt head which has clear access around its entire perimeter. Adjustable wrenches are best used as a

backup wrench to keep a large nut or bolt from turning while the other end is being loosened or tightened with a proper wrench. See **Figure 35**.

Adjustable wrenches have only two gripping surfaces which makes them more subject to slipping off the fastener and damaging the part and possibly your hand. Refer to *Box-end, Open-end and Combination Wrenches* in this chapter.

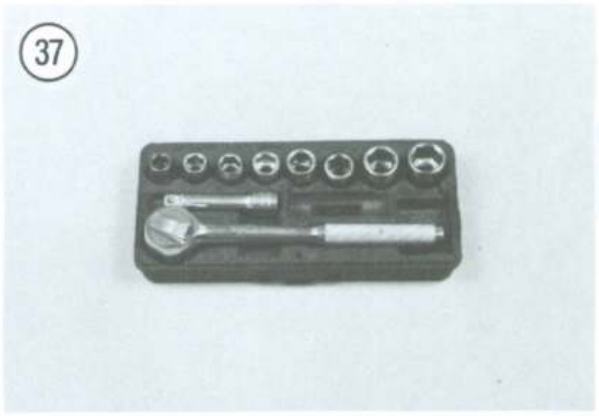
These wrenches are directional; the solid jaw must be the one transmitting the force. If you use the adjustable jaw to transmit the force, it will loosen and possibly slip off.

Adjustable wrenches come in all sizes but something in the 6 to 8 inch range is recommended as an all-purpose wrench.



Socket Wrenches

This type is undoubtedly the fastest, safest and most convenient to use. Sockets which attach to a ratchet handle (**Figure 36**) are available with 6-point or 12-point openings and 1/4, 3/8 and 3/4 in. drives (**Figure 37**). The drive size indicates the size of the square hole which mates with the ratchet handle.

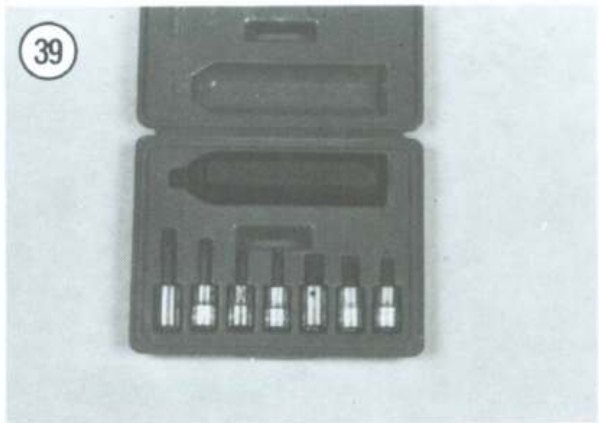


Torque Wrench

A torque wrench (**Figure 38**) is used with a socket to measure how tightly a nut or bolt is installed. They come in a wide price range and with either 3/8 or 1/2 in. square drive. The drive size indicates the size of the square drive which mates with the socket.

Impact Driver

This tool makes removal of tight fasteners easy and eliminates damage to bolts and screw slots. Impact drivers and interchangeable bits (**Figure 39**) are available at most large hardware and motorcycle dealers. Sockets can also be used with a hand impact driver. However, make sure the socket is designed for impact use. Do not use regular hand type sockets, as they may shatter.



Hammers

The correct hammer (**Figure 40**) is necessary for repairs. Use only a hammer with a face (or head) of rubber or plastic or the soft-faced type that is filled

with buckshot. These are sometimes necessary in engine teardowns. *Never* use a metal-faced hammer on engine or suspension parts, as severe damage will result in most cases. You can always produce the same amount of force with a soft-faced hammer. A metal-faced hammer, however, will be required when using a hand impact driver.

PRECISION MEASURING TOOLS

Measurement is an important part of motorcycle service. When performing many of the service procedures in this manual, you will be required to make a number of measurements. These include basic checks such as engine compression and spark plug gap. As you get deeper into engine disassembly and service, measurements will be required to determine the condition of the piston and cylinder bore, crankshaft runout and so on. When making these measurements, the degree of accuracy will dictate which tool is required. Precision measuring tools are expensive. If this is your first experience at engine service, it may be more worthwhile to have the checks made at a dealer. However, as your skills and enthusiasm increase for doing your own service work, you may want to begin purchasing some of these specialized tools. The following is a description of the measuring tools required in order to perform engine and suspension service on your KX.

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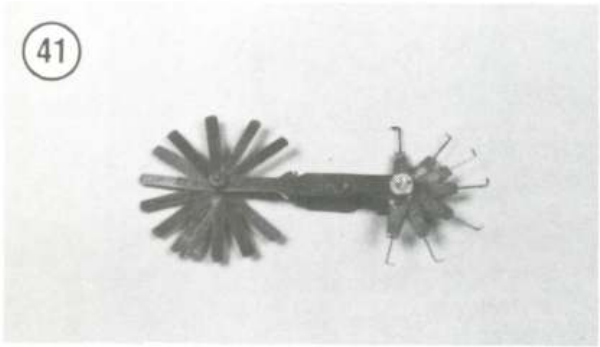

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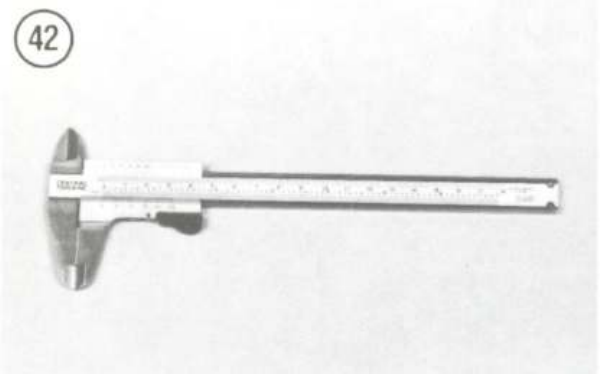

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Feeler Gauge

The feeler gauge (**Figure 41**) is made of either a piece of a flat or round hardened steel of a specified thickness. Wire gauges are used to measure spark plug gap. Flat gauges are used for all other measurements.

Vernier Caliper

This tool is invaluable when reading inside, outside and depth measurements to within close precision. See **Figure 42**.

Outside Micrometers

One of the most reliable tools used for precision measurement is the outside micrometer. Outside micrometers will be required to measure piston and wrist pin outside diameters. Outside micrometers are also used with other tools to measure various bore diameters. Micrometers can be purchased individually or as a set.

Dial Indicator

Dial indicators (**Figure 43**) are precision tools used to check ignition timing and runout limits. For motorcycle repair, select a dial indicator with a continuous dial face (**Figure 44**). This type of dial is required to accurately measure ignition timing.

Cylinder Bore Gauge

The cylinder bore gauge is a very specialized precision tool.

The gauge set shown in **Figure 45** is comprised of a dial indicator, handle and a number of length adapters to adapt the gauge to different bore sizes. The bore gauge can be used to make cylinder bore measurements such as bore size, taper and out-of-round. An outside micrometer must be used together with the bore gauge to determine bore dimensions.

Small Hole Gauges

A set of small hole gauges (**Figure 46**) allow you to measure a hole, groove or slot ranging in size up to 13 mm (0.500 in.). An outside micrometer must be used together with the small hole gauge to determine bore dimensions.

Telescoping Gauges

Telescoping gauges (**Figure 47**) can be used to measure hole diameters from approximately 8 mm (5/16 in.) to 150 mm (6 in.). For example, they could be used to measure caliper bore and cylinder bore diameters. Like the small hole gauge, the telescoping gauge does not have a scale for direct readings. An outside micrometer must be used together with the telescoping gauge to determine bore dimensions.

Compression Gauge

An engine with low compression cannot be properly tuned and will not develop full power. A compression gauge (**Figure 48**) measures engine compression. The one shown has a flexible stem

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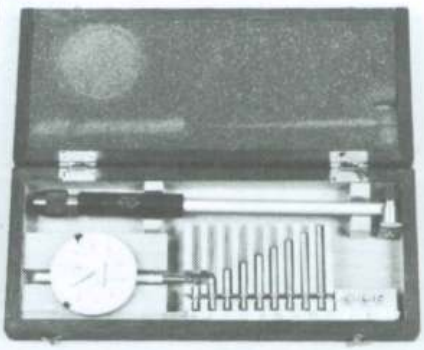

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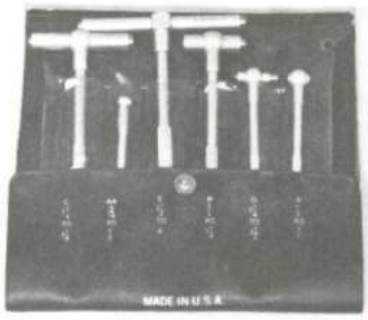

with an extension that can allow you to hold it while kicking the engine over. Open the throttle all the way when checking engine compression. See Chapter Three.

Multimeter or VOM

This instrument (**Figure 49**) is invaluable for electrical system troubleshooting. See Chapter Nine for its use.

48

Screw Pitch Gauge

A screw pitch gauge (**Figure 50**) determines the thread pitch of bolts, screws, studs, etc. The gauge is made up of a number of thin plates. Each plate has a thread shape cut on one edge to match one thread pitch. When using a screw pitch gauge to determine a thread pitch size, try to fit different blade sizes onto the thread until both threads match.

Magnetic Stand

A magnetic stand is used to securely hold a dial indicator when checking the runout of a round object or when checking the end play of a shaft.

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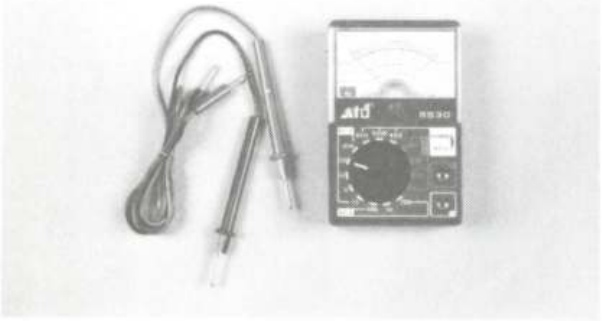

V-Blocks

V-blocks (**Figure 51**) are precision ground blocks used to hold a round object when checking its runout or condition.

SPECIAL TOOLS

This section describes special tools unique to motorcycle service and repair.

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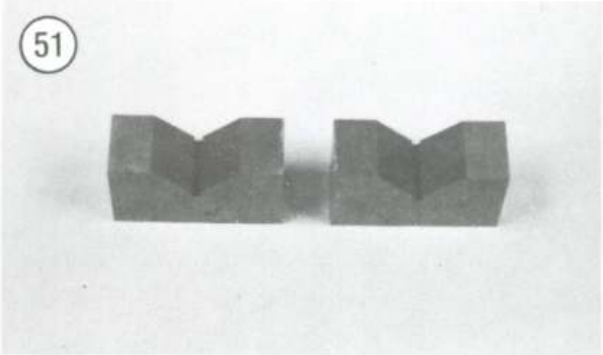
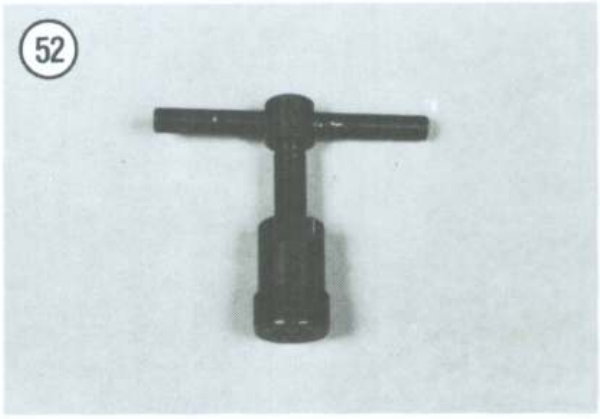


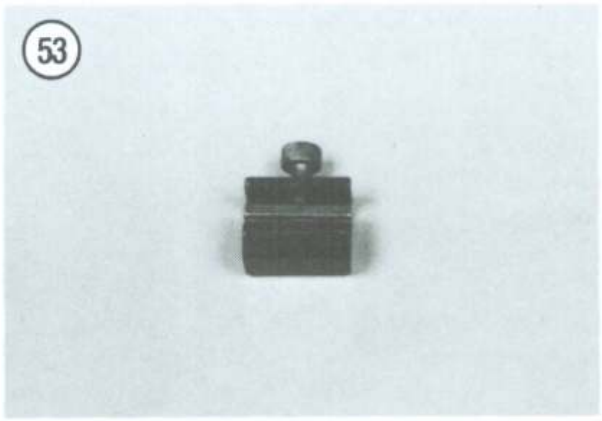
Flywheel Rotor Puller

A flywheel rotor puller (**Figure 52**) will be required whenever it is necessary to remove the flywheel rotor and service the stator plate assembly or when adjusting the ignition timing. In addition, when disassembling the engine, the flywheel rotor must be removed before the crankcases can be split. There is no satisfactory substitute for this tool. Because the flywheel rotor is a taper fit on the crankshaft, makeshift removal often results in crankshaft and flywheel damage. Don't think about removing the flywheel rotor without this tool.



Flywheel Holder

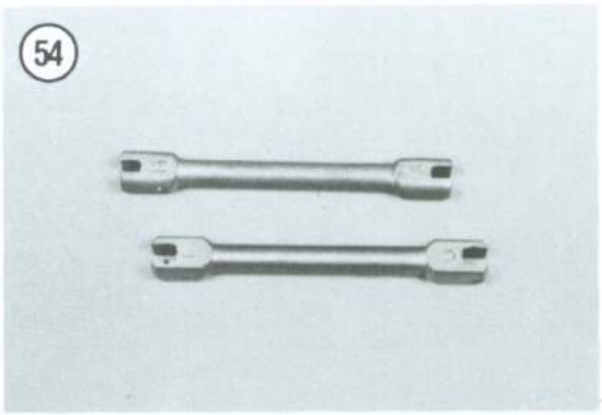
The flywheel holder is used to hold the flywheel rotor during flywheel removal. While most flywheel pullers are of a universal design that allows their use on a number of different models, the Kawasaki flywheel puller designed for use on KX models in this manual is pretty much non-universal. This is due mainly to the design of the KX flywheel. Substitute tools are described in Chapter Nine.



Pressure Cable Lube Tool

A cable lube tool is used to help force cable lubricant throughout a control cable.

This tool (**Figure 53**) is clamped to one end of a control cable and has a tube fitting to allow a cable lubricant to be forced throughout the length of the cable.

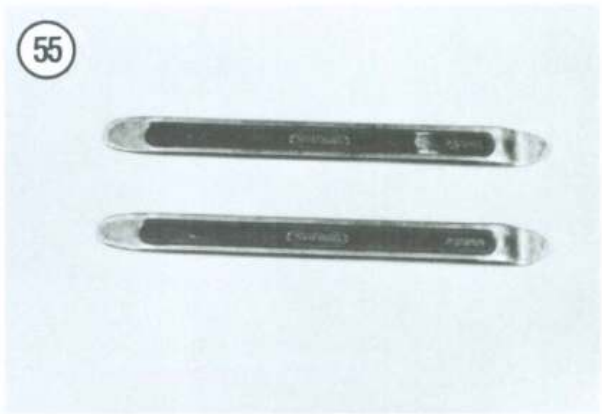


Spoke Wrench

This special wrench is used to tighten wheel spokes (**Figure 54**). Always use the correct size spoke wrench to avoid rounding out and damaging the spoke nipple.

Tire Levers

When riding and maintaining a dirt bike, get use to changing tires. To avoid pinching tubes during tire changing, purchase a good set of tire levers (**Figure 55**). Never use a screwdriver in place of a tire lever; refer to Chapter Eleven for its use. Before using a tire lever, check the working end of the tool and



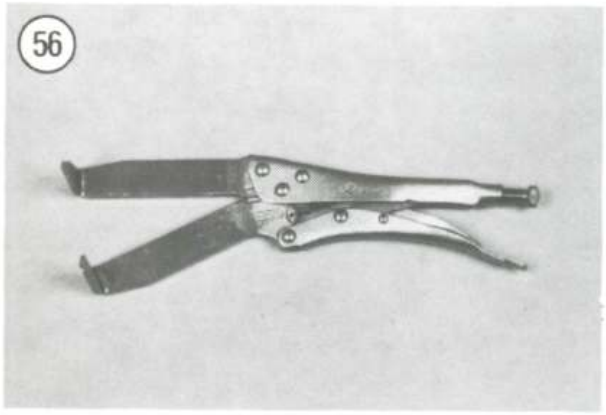
remove any burrs with a file. Don't use a tire lever for prying anything but tires.

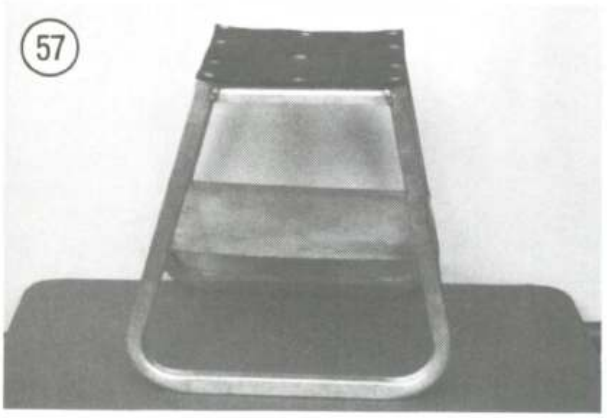
The Grabbit

This is a special tool that is very useful as a holding tool, especially in the removal and installation of the clutch nut and the drive sprocket nut. It is called the Grabbit (**Figure 56**) and can be ordered through your Kawasaki dealer.

Bike Stand

One of the most important tools you can own for servicing your bike at home and race track is a portable bike stand. A good stand will be both lightweight and sturdy. These features will allow you to remove both wheels when the stand is in use as well as preventing the bike from toppling over when major parts are being serviced. The bike stand shown in **Figure 57** has a tool shelf that can be used to hold tools and parts during service.





Special Tools

A few special tools may be required for major service. These are described in the appropriate chapters and are available either from Kawasaki dealers or other manufacturer's as indicated.

FABRICATING TOOLS

Some of the procedures in this manual require the use of special tools. The resourceful mechanic can, in many cases, think of acceptable substitutes for special tools. This can be as simple as using a few pieces of threaded rod, washers and nuts to remove or install a bearing or fabricating a tool from scrap material. However, using a substitute for a special tool is not recommended as it can be dangerous to and may damage the part. If you find that a tool can be designed and safely made, but will require some type of machine work, you may want to search out a local community college or high school that has a machine shop curriculum. Some shop teachers welcome outside work that can be used as practical shop applications for advanced students.

EXPENDABLE SUPPLIES

Certain expendable supplies are also required. These include grease, oil, gasket cement, shop rags and cleaning solvent. Ask your dealer for the special locking compounds, silicone lubricants and lube products which make vehicle maintenance simpler and easier. Cleaning solvent is available at some service stations.

WARNING

Having a stack of clean shop rags on hand is important when performing engine work. However, oil and solvent soaked rags can become a fire hazard. To prevent spontaneous combustion from a pile of solvent soaked rags, store them in a lid sealed metal container until they can be washed or discarded.

NOTE

To prevent the absorption of solvent and other chemicals into your skin while cleaning parts or when using contact or brake cleaner, wear a pair of petroleum-resistant rubber gloves. These can be purchased through industrial supply

houses or well-equipped hardware stores.

MECHANIC'S TIPS

Removing Frozen Nuts and Screws

When a fastener rusts and cannot be removed, several methods may be used to loosen it. First, apply penetrating oil such as Liquid Wrench or WD-40 (available at hardware or auto supply stores). Apply it liberally and let it penetrate for 10-15 minutes. Rap the fastener several times with

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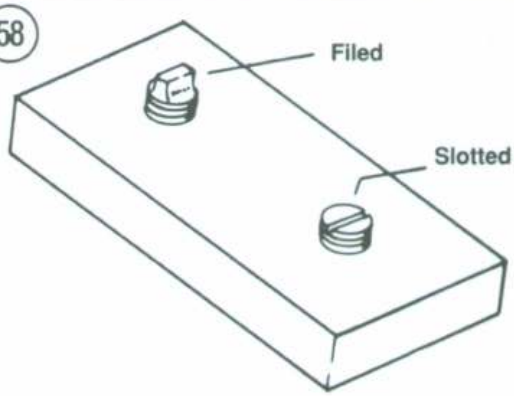

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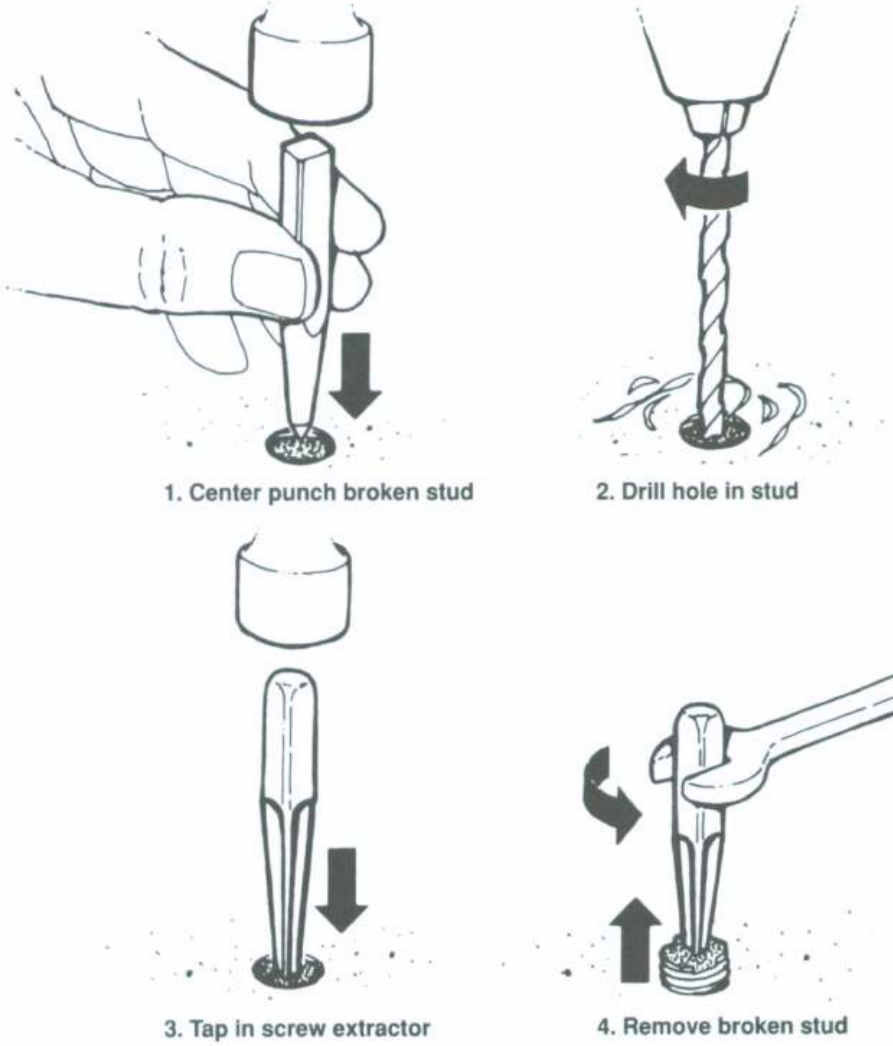
REMOVING BROKEN SCREWS AND BOLTS



1. Center punch broken stud
2. Drill hole in stud
3. Tap in screw extractor
4. Remove broken stud

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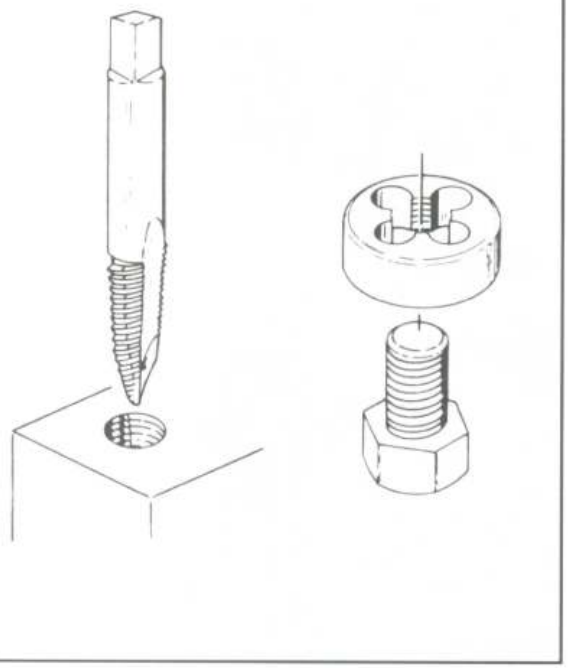

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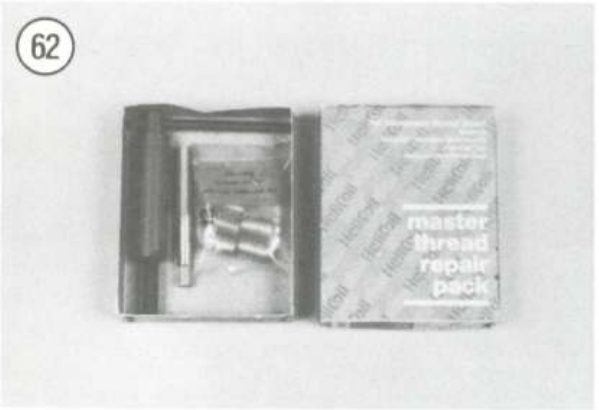


a small hammer; do not hit it hard enough to cause damage. Reapply the penetrating oil if necessary.

For frozen screws, apply penetrating oil as described, then insert a screwdriver in the slot and rap the top of the screwdriver with a hammer. This loosens the rust so the screw can be removed in the normal way. If the screw head is too chewed up to use this method, grip the head with Vise-grip pliers and twist the screw out.

Avoid applying heat unless specifically instructed, as it may melt, warp or remove the temper from parts.

Removing Broken Screws or Bolts

When the head breaks off a screw or bolt, several methods are available for removing the remaining portion.

If a large portion of the remainder projects out, try gripping it with Vise-grip pliers. If the projecting portion is too small, file it to fit a wrench or cut a slot in it to fit a screwdriver. See **Figure 58**.

If the head breaks off flush, use a screw extractor. To do this, centerpunch the exact center of the remaining portion of the screw or bolt. Drill a small hole in the screw and tap the extractor into the hole. Back the screw out with a wrench on the extractor. See **Figure 59**.

Remedying Stripped Threads

Occasionally, threads are stripped through carelessness or impact damage. Often the threads can be cleaned up by running a tap (for internal threads on nuts) or die (for external threads on bolts) through the threads. See **Figure 60**. To clean or repair spark plug threads, a spark plug tap can be used.

NOTE
Tap and dies can be purchased individually or in a set as shown in ***Figure 61****.*

If an internal thread is damaged, it may be necessary to install a Helicoil (**Figure 62**) or some other type of thread insert. Follow the manufacturer's instructions when installing their insert.

If it is necessary to drill and tap a hole, refer to **Table 7** for metric tap drill sizes.

BALL BEARING REPLACEMENT

Ball bearings (**Figure 63**) are used throughout the motorcycle engine and chassis to reduce power loss, heat and noise resulting from friction. Because ball bearings are precision made parts, they must be maintained by proper lubrication and maintenance. When a bearing is found to be damaged, it should be replaced immediately. However, when installing a new bearing, care should be taken to prevent damage to the new bearing. While bearing replacement is described in the individual chapters where applicable, the following should be used as a guideline.

NOTE
Unless otherwise specified, install bearings with the manufacturer's mark or number facing outward.

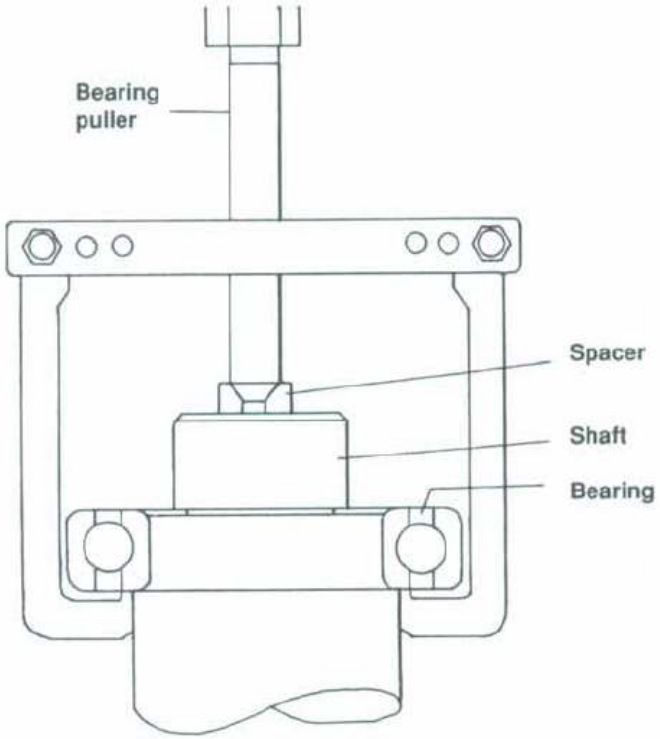
Bearing Removal

While bearings are normally removed only when damaged, there may be times when it is necessary to remove a bearing that is in good condition. However, improper bearing removal will damage the bearing and maybe the shaft or case half. Note the following when removing bearings.

1. When using a puller to remove a bearing on a shaft, care must be taken so that shaft damage does not occur. Always place a piece of metal between the end of the shaft and the puller screw. In addition, place the puller arms next to the inner bearing race. See **Figure 64**.

(63)

(64)



2. When using a hammer to remove a bearing on a shaft, do not strike the hammer directly against the shaft. Instead, use a brass or aluminum rod between the hammer and shaft (**Figure 65**).In addition, make sure to support both bearing races with wood blocks as shown in **Figure 65**.

3. The most ideal method of bearing removal is with a hydraulic press. However, certain procedures must be followed or damage may occur to the bearing, shaft or bearing housing. Note the following when using a press:

a. Always support the inner and outer bearing races with a suitable size wood or aluminum ring (**Figure 66**). If you only support the outer race, pressure applied against the balls and/or the inner race will damage them.

b. Always make sure the press ram (**Figure 66**) aligns with the center of the shaft. If the ram is not centered, it may damage the bearing and/or shaft.

c. The moment the shaft is free of the bearing, it will drop to the floor. Secure or hold the shaft to prevent it from falling.

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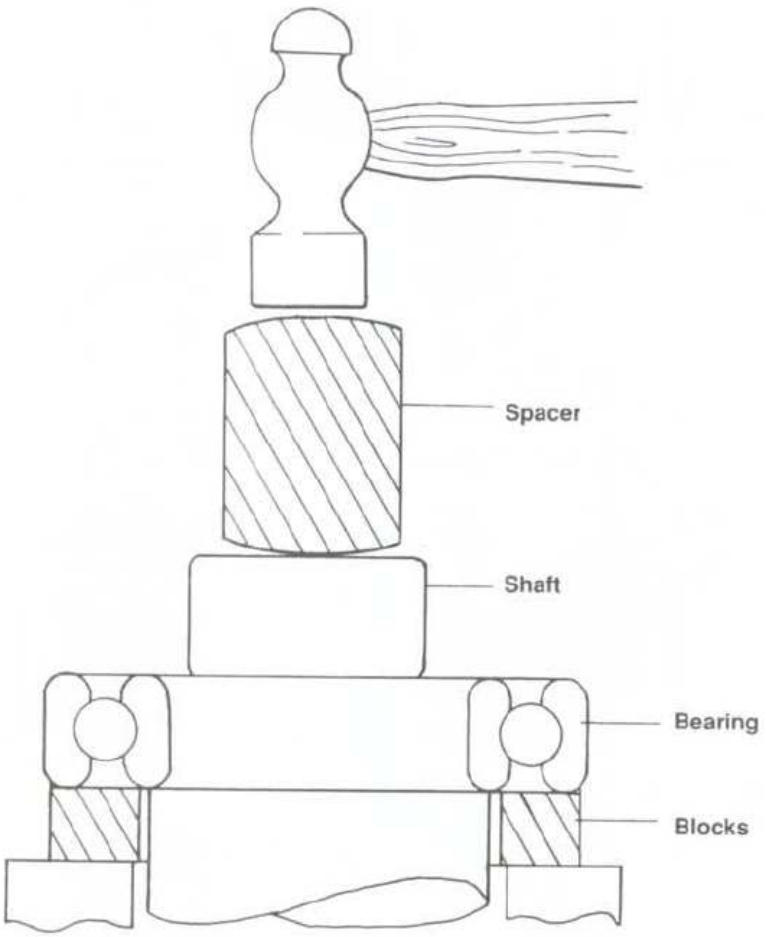

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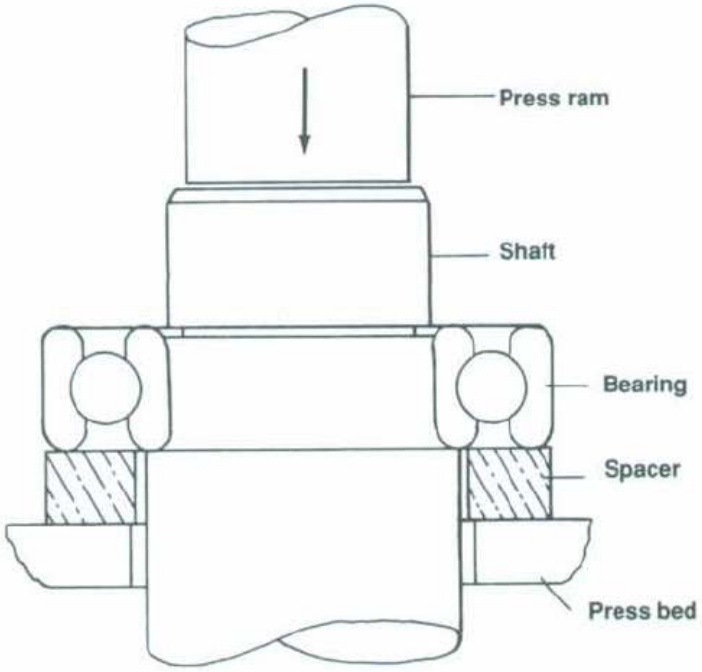
Press ram
Shaft
Bearing
Spacer
Press bed

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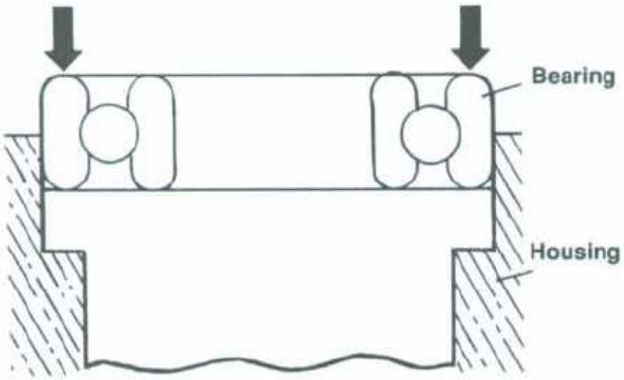
Bearing
Housing

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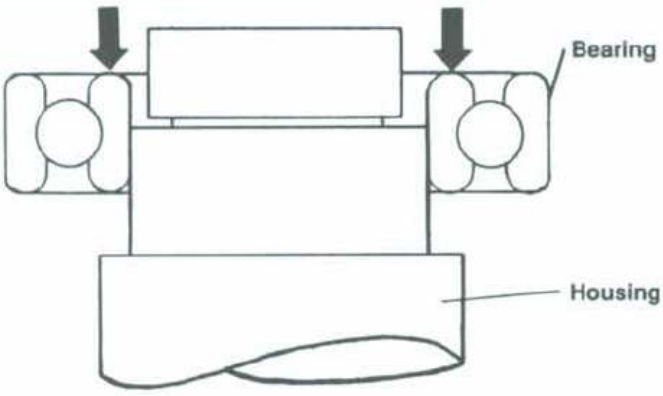
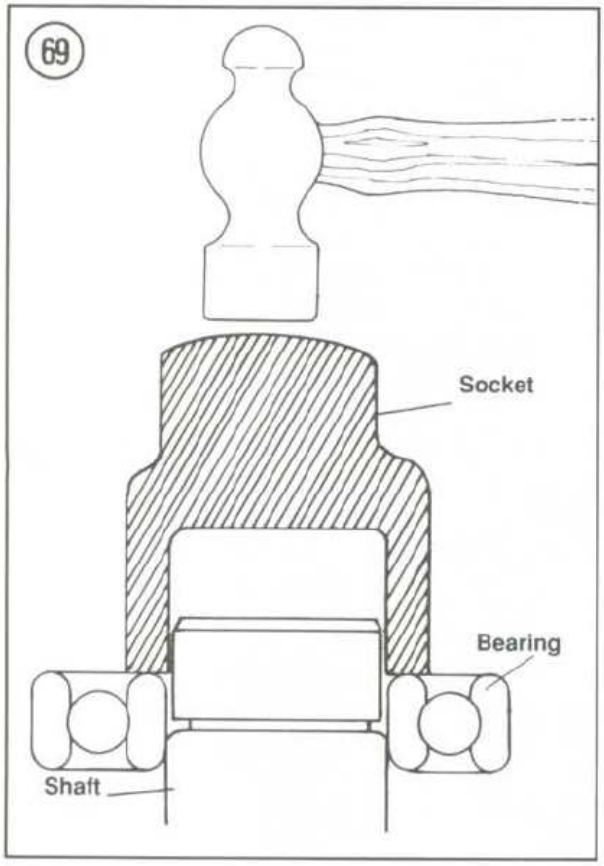

Bearing
Housing

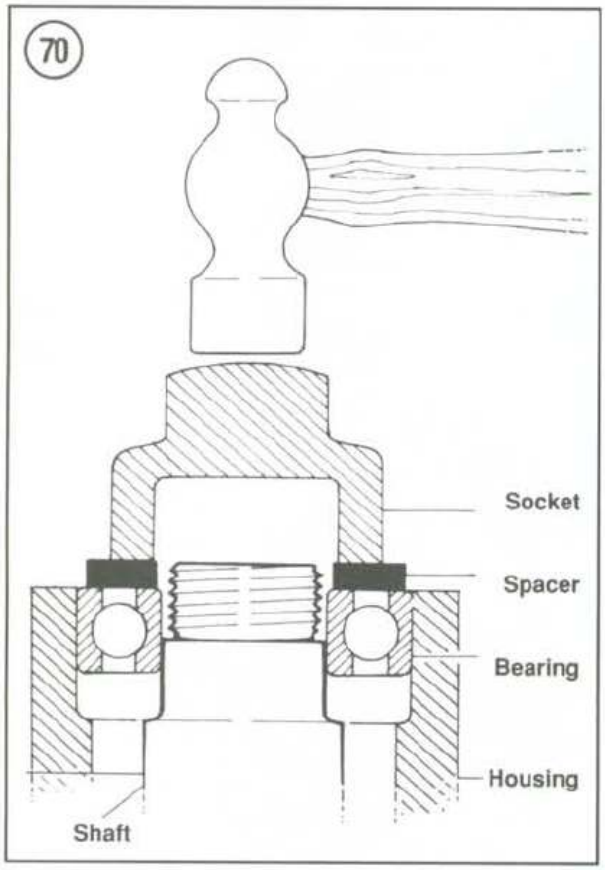


Bearing Installation

1. When installing a bearing in a housing, pressure must be applied to the *outer* bearing race (**Figure 67**). When installing a bearing on a shaft, pressure must be applied to the *inner* bearing race (**Figure 68**).

2. When installing a bearing as described in Step 1, some type of driver will be required. Never strike the bearing directly with a hammer or the bearing will be damaged. When installing a bearing, a piece of pipe or a socket with an outer diameter that matches the bearing race will be required. **Figure 69** shows the correct way to use a socket and hammer when installing a bearing.

3. Step 1 describes how to install a bearing in a case half or over a shaft. However, when installing a bearing over a shaft and into a housing at the same time, a snug fit will be required for both outer and inner bearing races. In this situation, a spacer must be installed underneath the driver tool so that pressure is applied evenly across *both* races. See **Figure 70**. If the outer race is not supported as shown in **Figure 70**, the balls will push against the outer bearing track and damage it.



Shrink Fit

1. *Installing a bearing over a shaft*: When a tight fit is required, the bearing inside diameter will be smaller than the shaft. In this case, driving the bearing on the shaft using normal methods may cause bearing damage. Instead, the bearing should be heated before installation. Note the following:

   a. Secure the shaft so that it can be ready for bearing installation.

   b. Clean the bearing surface on the shaft of all residue. Remove burrs with a file or sandpaper.

   c. Fill a suitable pot or beaker with clean mineral oil. Place a thermometer (rated higher than 120° C [248° F]) in the oil. Support the thermometer so that it does not rest on the bottom or side of the pot.

   d. Remove the bearing from its wrapper and secure it with a piece of heavy wire bent to hold it in the pot. Hang the bearing in the pot so that it does not touch the bottom or sides of the pot.

e. Turn the heat on and monitor the thermometer. When the oil temperature rises to approximately 120° C (248° F), remove the bearing from the pot and quickly install it. If necessary, place a socket on the inner bearing race and tap the bearing into place. As the bearing chills, it will tighten on the shaft so you must work quickly when installing it. Make sure the bearing is installed all the way.

2. *Installing a bearing in a housing*: Bearings are generally installed in a housing with a slight interference fit. Driving the bearing into the housing using normal methods may damage the housing or cause bearing damage. Instead, the housing should be heated before the bearing is installed. Note the following:

CAUTION

Before heating the crankcases in this procedure to remove the bearings, wash the cases thoroughly with detergent and water. Rinse and rewash the cases as required to remove all traces of oil and other chemical deposits.

a. The housing must be heated to a temperature of about 212° F (100° C) in an oven or on a hot plate. An easy way to check to see that it is at the proper temperature is to drop tiny drops of water on the case; if they sizzle and evaporate immediately, the temperature is correct. Heat only one housing at a time.

CAUTION

Do not heat the housing with a torch (propane or acetylene)—never bring a flame into contact with the bearing or housing. The direct heat will destroy the case hardening of the bearing and will likely warp the housing.

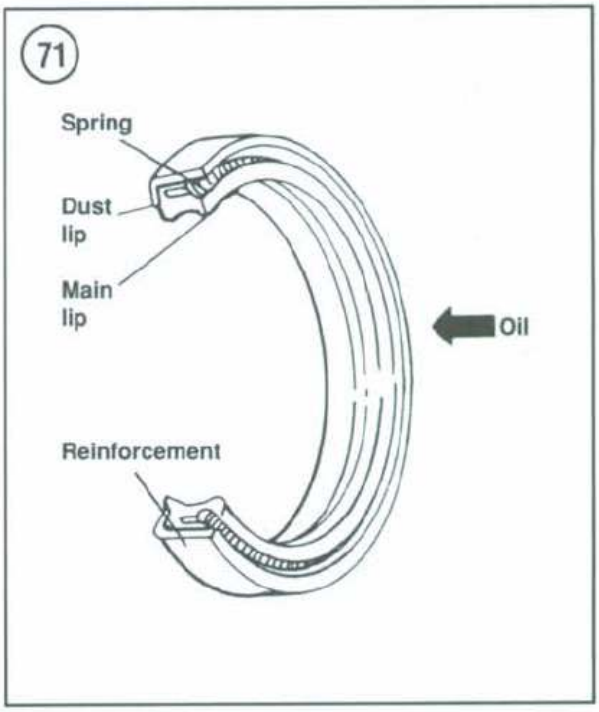
b. Remove the housing from the oven or hot plate and hold onto the housing with a kitchen pot holder, heavy gloves, or heavy shop cloths—*it is hot.*

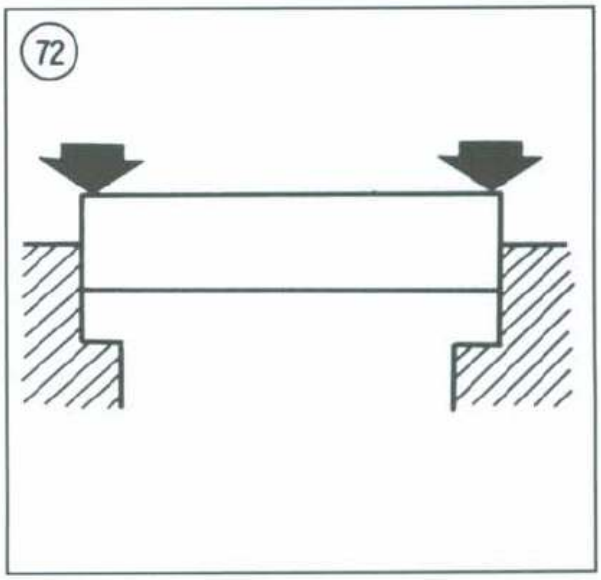
NOTE

A suitable size socket and extension works well for removing and installing bearings.

c. Hold the housing with the bearing side down and tap the bearing out. Repeat for all bearings in the housing.

d. Prior to heating the bearing housing, place the new bearing in a freezer, if possible. Chilling a bearing will slightly reduce its outside diameter while the heated bearing housing assembly is slightly larger due to heat expansion. This will make bearing installation much easier.





NOTE

Always install bearings with the manufacturer's mark or number facing outward.

e. While the housing is still hot, install the new bearing(s) into the housing. Install the bearings by hand, if possible. If necessary, lightly tap the bearing(s) into the housing with a socket placed on the outer bearing race. *Do not* install new bearings by driving on the inner bearing race. Install the bearing(s) until it seats completely.

OIL SEALS

Oil seals (**Figure 71**) are used to contain oil, water, grease or combustion gasses in a housing or shaft. Improper removal of a seal can damage the housing or shaft. Improper installation of the seal can damage the seal. Note the following:

a. Prying is generally the easiest and most effective method of removing a seal from a housing. However, always place a rag underneath the pry tool to prevent damage to the housing.
b. Waterproof grease should be packed in the seal lips before the seal is installed.
c. Oil seals should always be installed so that the manufacturer's numbers or marks face out.
d. Oil seals should be installed with a socket placed on the outside of the seal as shown in **Figure 72**. Make sure the seal is driven squarely into the housing. Never install a seal by hitting against the top of the seal with a hammer.

SAFETY

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 all state, federal and local laws concerning your vehicle's operation.

NOTE

Kawasaki models covered in this manual are designed and manufactured for ***off-road use only****. It does not conform to Federal Motor Vehicle Safety Standards and it is illegal to operate it on public streets, roads or highways.*

5. Never ride on private property without having received permission.
6. Never add fuel while anyone is smoking in the area or when the engine is running.
7. Never wear loose scarves, belts or boot laces that could catch on moving parts or tree limbs.
8. Always wear appropriate riding clothing, eye protection and a helmet.
9. Never allow anyone to operate the motorcycle without proper instruction.
10. Use the "buddy system" for long trips, just in case you have a problem or run out of gas.
11. Never attempt to repair your machine with the engine running.
12. Check all machine components and hardware frequently, especially wheels and steering.
13. All of the KX models covered in this manual are designed for a rider only. Do not carry a passenger.

Tables 1-7 are on the following pages.

Table 1 ENGINE SERIAL NUMBERS (continued)

Year and model number	Engine serial no. start to end
1982 KX125-B1	KX125BE000001-004200
1983 KX125-B2	KX125BE004201-008750
1984 KX125-C1	KX125BE008751-014600
1985 KX125-D1	KX125DE000001-008400
1986 KX125-E1	KX125DE008401-017200
1987 KX125-E2	KX125DE017201-ON
1988 KX125-F1	KX125FE000001-006500
1989 KX125-G1	KX125FE006501-ON
1990 KX125-H1	KX125FE006501-ON
1991 KX125-H2	KX125HE000001-ON
1982 KX250-B1	KX250AE010801-012846
1983 KX250-C1	KX250CE000001-002800
1984 KX250-C2	KX250CE002801-12388
1985 KX250-D1	KX250DE000001-004200
1986 KX250-D2	KX250DE004201-ON
1987 KX250-E1	KX250EE000001-004800
1988 KX250-F1	KX250EE004801-010700
1989 KX250-G1	KX250EE010701-ON
1990 KX250-H1	KX250HE000001-ON
1991 KX250-H2	KX250HE000001-ON
1983 KX500-A1	KX500AE000001-001500
1984 KX500-A2	KX500AE001501-002400
1985 KX500-B1	KX500BE000001-001800
1986 KX500-B2	KX500BE001801-004100
1987 KX500-C1	KX500BE004101-006600
1988 KX500-D1	KX500BE006601-008500
1989 KX500-E1	KX500BE008501-ON
1990 KX500-E2	KX500BE010701-004000
1991 KX500-E3	KX500BE013001-ON
1992 KX500-E4	KX500BE013001-ON
1993 KX500-E5	KX500BE013001-ON
1994 KX500-E6	JKAKXVE1-RA01001*
1995 KX500-E7	JKAKXVE1-SA011001*
1996 KX500-E8	JKAKXVE1-TA015001*
1997 KX500-E9	JKAKXVE1-VA017001*
1998 KX500-E10	JKAKXVEC-WA020001*
1999 KX500-E11	JKAKXVEC-YA023001*
2000 KX500-E12	JKAKXVEC-XA028001*
2001 KX500-E13	JKAKXVEC-1A030001*
2002 KX500-E14	JKAKXVEC-2A032001*
2003 KX500-E15	JKAKXVEC-3A035001*
2004 KX500-E16	NA

*Starting frame number.

Table 2 DRY WEIGHT SPECIFICATIONS

	kg	lbs.
KX125		
1982-1983	88	194
1984-1991	86.5	191
KX250		
1982-1983	98	216
1984-1991	96.5	213
KX500		
1983	103	227
1984	101	223
1985-on	100	220

Table 3 GENERAL TIGHTENING TORQUES*

Nut	Bolt	Ft.-lb.	N•m
10 mm	6 mm	4.5	6
12 mm	8 mm	11	15
14 mm	10 mm	22	30
17 mm	12 mm	40	55
19 mm	14 mm	61	85
22 mm	16 mm	94	130

* This table lists general torque for standard fasteners with standard I.S.O. pitch threads

Table 4 CONVERSION FORMULAS

Multiply:	By:	To get the equivalent of:
Length		
Inches	25.4	Millimeter
Inches	2.54	Centimeter
Miles	1.609	Kilometer
Feet	0.3048	Meter
Millimeter	0.03937	Inches
Centimeter	0.3937	Inches
Kilometer	0.6214	Mile
Meter	0.0006214	Mile
Fluid volume		
U.S. quarts	0.9463	Liters
U.S. gallons	3.785	Liters
U.S. ounces	29.573529	Milliliters
Liters	0.2641721	U.S. gallons
Liters	1.0566882	U.S. quarts
Liters	33.814023	U.S. ounces
Milliliters	0.033814	U.S. ounces
Milliliters	1.0	Cubic centimeters
Milliliters	0.001	Liters

(continued)

Table 4 CONVERSION FORMULAS (CONTINUED)

Multiply:	By:	To get the equivalent of:
Torque		
Foot-pounds	1.3558	Newton-meters
Foot-pounds	0.138255	Meters-kilograms
Inch-pounds	0.11299	Newton-meters
Newton-meters	0.7375622	Foot-pounds
Newton-meters	8.8507	Inch-pounds
Meters-kilograms	7.2330139	Foot-pounds
Volume		
Cubic inches	16.387064	Cubic centimeters
Cubic centimeters	0.0610237	Cubic inches
Temperature		
Fahrenheit	(F − 32°) × 0.556	Centigrade
Centigrade	(C × 1.8) + 32	Fahrenheit
Weight		
Ounces	28.3495	Grams
Pounds	0.4535924	Kilograms
Grams	0.035274	Ounces
Kilograms	2.2046224	Pounds
Pressure		
Pounds per square inch	0.070307	Kilograms per square centimeter
Kilograms per square centimeter	14.223343	Pounds per square inch
Kilopascals	0.1450	Pounds per square inch
Pounds per square inch	6.895	Kilopascals
Speed		
Miles per hour	1.609344	Kilometers per hour
Kilometers per hour	0.6213712	Miles per hour

Table 5 TECHNICAL ABBREVIATIONS

ABDC	After bottom dead center
ATDC	After top dead center
BBDC	Before bottom dead center
BDC	Bottom dead center
BTDC	Before top dead center
C	Celsius (Centigrade)
cc	Cubic centimeters
CDI	Capacitor discharge ignition
cu. in.	Cubic inches
F	Fahrenheit
ft.-lb.	Foot-pounds
gal.	Gallons
hp	Horsepower
in.	Inches
kg	Kilogram
kg/cm^2	Kilograms per square centimeter
kgm	Kilogram meters
km	Kilometer
l	Liter
m	Meter
mm	Millimeter
N·m	Newton meters
oz.	Ounce
psi	Pounds per square inch
pts.	Pints
qt.	Quarts
rpm	Revolutions per minute

Table 6 METRIC, INCH AND FRACTIONAL EQUIVALENTS

mm	in.	Nearest fraction	mm	in.	Nearest fraction
1	0.0394	1/32	26	1.0236	1 1/32
2	0.0787	3/32	27	1.0630	1 1/16
3	0.1181	1/8	28	1.1024	1 3/32
4	0.1575	5/32	29	1.1417	1 5/32
5	0.1969	3/16	30	1.1811	1 3/16
6	0.2362	1/4	31	1.2205	1 7/32
7	0.2756	9/32	32	1.2598	1 1/4
8	0.3150	5/16	33	1.2992	1 5/16
9	0.3543	11/32	34	1.3386	1 11/32
10	0.3937	13/32	35	1.3780	1 3/8
11	0.4331	7/16	36	1.4173	1 13/32
12	0.4724	15/32	37	1.4567	1 15/32
13	0.5118	1/2	38	1.4961	1 1/2
14	0.5512	9/16	39	1.5354	1 17/32
15	0.5906	19/32	40	1.5748	1 9/16
16	0.6299	5/8	41	1.6142	1 5/8
17	0.6693	21/32	42	1.6535	1 21/32
18	0.7087	23/32	43	1.6929	1 11/16
19	0.7480	3/4	44	1.7323	1 23/32
20	0.7874	25/32	45	1.7717	1 25/32
21	0.8268	13/16	46	1.8110	1 13/16
22	0.8661	7/8	47	1.8504	1 27/32
23	0.9055	29/32	48	1.8898	1 7/8
24	0.9449	15/16	49	1.9291	1 15/16
25	0.9843	31/32	50	1.9685	1 31/32

TABLE 7 METRIC TAP AND DRILL SIZES

Metric tap (mm)	Drill size	Decimal equivalent	Nearest fraction
3×0.50	No. 39	0.0995	3/32
3×0.60	3/32	0.0937	3/32
4×0.70	No. 30	0.1285	1/8
4×0.75	1/8	0.125	1/8
5 0.80	No. 19	0.166	11/64
5×0.90	No. 20	0.161	5/32
6×1.00	No. 9	0.196	13/64
7×1.00	16/64	0.234	16/64
8×1.00	J	0.277	9/32
8×1.25	17/64	0.265	17/64
9×1.00	5/16	0.3125	5/16
9×1.25	5/16	0.3125	5/16
10×1.25	11/32	0.3437	11/32
10×1.50	R	0.339	11/32
11×1.50	3/8	0.375	3/8
12×1.50	13/32	0.406	13/32
12×1.75	13/32	0.406	13/32

CHAPTER TWO

TROUBLESHOOTING

Diagnosing mechanical problems is relatively simple if you use orderly procedures and keep a few basic principles in mind. The first step in any troubleshooting procedure is to define the symptoms as closely as possible and then localize the problem. Subsequent steps involve testing and analyzing those areas which could cause the symptoms. A haphazard approach may eventually solve the problem, but it can be very costly in terms of wasted time and unnecessary parts replacement.

Proper lubrication, maintenance and periodic tune-ups as described in Chapter Three will reduce the necessity for troubleshooting. Even with the best of care, however, all motorcycles are prone to problems which will require troubleshooting.

Never assume anything. Do not overlook the obvious. If the engine won't start, is the kill switch shorted out? Is the engine flooded with fuel from using the choke too much?

If the engine suddenly quits, what sound did it make? Consider this and check the easiest, most accessible problem first. If the engine sounded like it ran out of fuel, check to see if there is fuel in the tank. If there is fuel in the tank, is it reaching the carburetor? If not, the fuel tank vent hose may be plugged, preventing fuel from flowing from the fuel tank to carburetor.

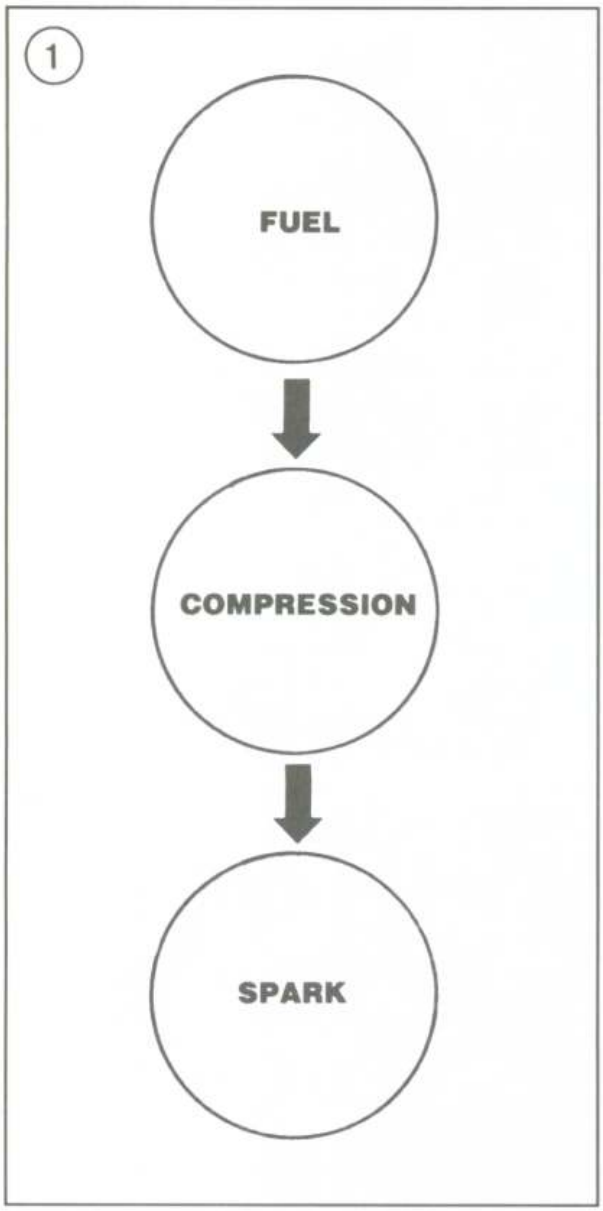
If nothing obvious turns up in a quick check, look a little further. Learning to recognize and describe symptoms will make repairs easier for you or a mechanic at the shop. Describe problems accurately and fully.

Gather as many symptoms as possible to aid in diagnosis. Note whether the engine lost power gradually or all at once, what color smoke 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 problems are tested and analyzed. Guessing at the cause of a problem may provide the solution, but it can 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 lost time while the bike sits in a dealer's service department. On the other hand, be realistic and do not attempt repairs beyond your abilities. Service departments tend to charge heavily for putting together a disassembled engine that may have been abused. Some won't even take on such a job—so use common sense, don't get in over your head.



OPERATING REQUIREMENTS

An engine needs 3 basics to run properly: correct fuel/air mixture, compression and a spark at the right time (**Figure 1**). If one basic requirement is missing, the engine will not run. Two-stroke engine operating principles are described in Chapter One under *Engine Principles*.

If the bike has been sitting for any length of time and refuses to start, check and clean the spark plug. If the plug is not fouled, look to the fuel delivery system. This includes the fuel tank, fuel shutoff valve, in-line fuel filter (if used) and fuel line. If the bike sat for a while with fuel in the carburetor, fuel deposits may have gummed up carburetor jets and air passages. Gasoline tends to lose its potency after standing for long periods, and as it evaporates the mixture becomes richer. Condensation may contaminate it with water. Drain the old gas and try starting with a fresh tankful.

TROUBLESHOOTING INSTRUMENTS

Chapter One lists the instruments needed and instruction on their use.

STARTING THE ENGINE

When your engine refuses to start, frustration can cause you to forget basic starting principles and procedures. The following outline will guide you through basic starting procedures. In all cases, make sure that there is an adequate supply of properly mixed fuel in the tank.

Starting a Cold Engine

1. Shift the transmission into NEUTRAL.
2. Apply the front brake and rock the bike back and forth. This will help to mix the fuel in the tank.
3. Turn the fuel valve on (**Figure 2**).

4. Pull the choke knob up (**Figure 3**) or push the choke lever down.
5. With the throttle completely *closed*, kick the engine over.
6. When the engine starts, work the throttle slightly to keep it running.
7. Idle the engine approximately for a minute or until the throttle responds cleanly and the choke can be closed. On liquid-cooled models, the engine should be sufficiently warmed to prevent cold seizure.

Starting a Warm or Hot Engine

1. Shift the transmission into NEUTRAL.
2. Turn the fuel valve on (**Figure 2**).
3. Make sure the choke is closed. The choke knob should be pushed all the way down or the choke lever pulled all the way up.
4. Open the throttle slightly and kick the engine over.

Starting a Flooded Engine

If the engine will not start and there is a strong gasoline smell, the engine may be flooded. If so, open the throttle all the way and kick the engine over until it starts. Do *not* open the choke.

NOTE

*If the engine refuses to start, check the carburetor overflow hose attached to the fitting at the bottom of the float bowl (**Figure 4**). If fuel is running out of the hose, the float is stuck open, allowing the carburetor to overfill.*

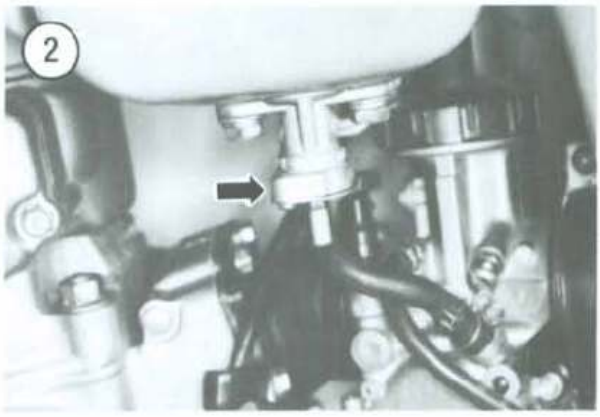
STARTING DIFFICULTIES

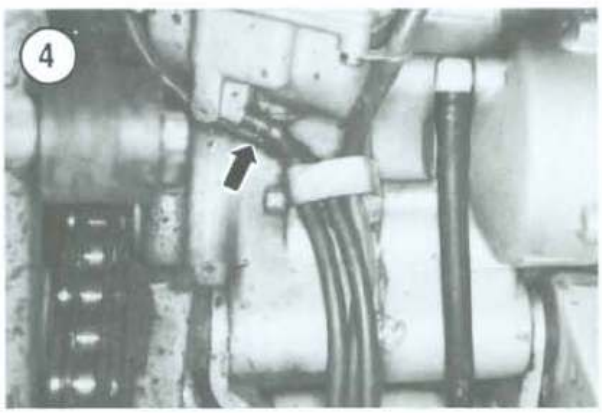
When the engine turns over but is difficult to start, or won't start at all, it doesn't help to wear out your leg on the kick starter, especially on KX500 models. Check for obvious problems even before getting out your tools. Go down the following list step-by-step. Do each one while remembering the 3 engine operating requirements that were described under *Operating Requirements* earlier in this chapter.

If the bike still will not start, refer to the appropriate troubleshooting procedures which follow in this chapter.

1. Is the choke in the right position? The choke knob should be pulled *up* for a cold engine and pushed *down* for a warm or hot engine (**Figure 3**). If your carburetor has been replaced with one that has a choke lever, the choke lever should be pushed *down* for a cold engine and pulled *up* for a warm or hot engine.

2. Is there fuel in the tank? Remove the filler cap and rock the bike from side to side. Listen for fuel sloshing around. Is the gas-oil mixture correct? Has the bike been sitting long enough for the fuel mixture to deteriorate? If in doubt, drain the fuel and fill with a fresh, correctly mixed fuel-oil mixture. Check that

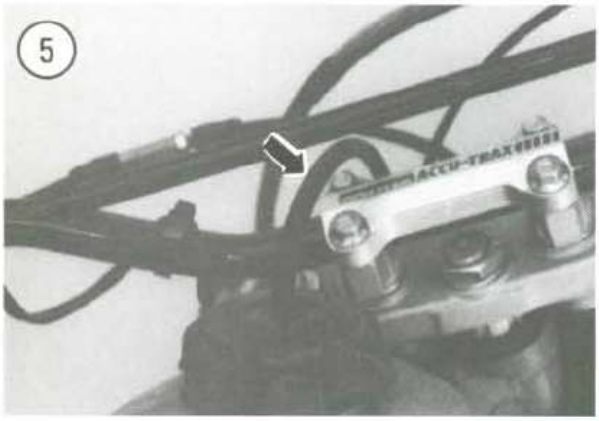


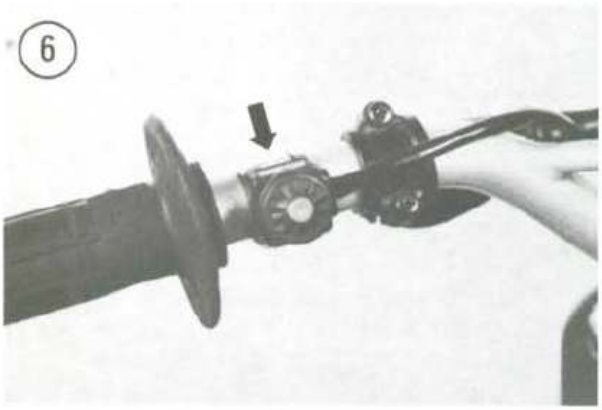


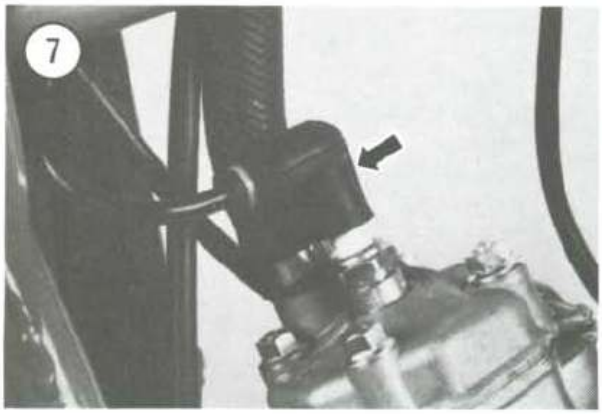
the fuel tank vent tube (**Figure 5**) is not clogged. Remove the tube from the filler cap, wipe off one end and blow through it.

NOTE

On models in this manual, mix the fuel in the correct ratio as listed in Chapter Three. Too little oil will cause premature wear and engine damage. Too much oil will cause excessive smoking, spark plug fouling or engine damage.







WARNING

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

3. If the tank has fuel and the mixture is fresh, pull off the fuel line at the carburetor and insert the end of it into a clear, glass container. Turn the fuel valve on (**Figure 2**) and see if fuel flows freely. If fuel does not flow out.and there is a fuel filter installed in the fuel line, remove the filter and turn the fuel valve to ON again. If fuel flows, the filter is clogged and should be replaced. If no fuel comes out, the fuel valve may be shut off, blocked by foreign matter, or the fuel cap vent may be plugged.

4. If you suspect that the cylinder is flooded, or there is a strong smell of gasoline, open the throttle all the way and kick the engine over several times. If the cylinder is severely flooded (fouled or wet spark plug), remove the plug and dry the base and electrode thoroughly with a soft cloth. Reinstall the plug and attempt to start the engine.

5. Check the carburetor overflow hose on the bottom of the float bowl (**Figure 4**). If fuel is running out of the hose, the float is stuck open. Turn the fuel valve off and tap the carburetor a few times. Then turn the fuel valve back on. If fuel continues to run out of the hose, remove and service the carburetor as described in Chapter Eight. Check the carburetor vent hoses to make sure they are clear. Check the end of the hoses for contamination.

NOTE

Now that you have determined that fuel is reaching the carburetor, the fuel system could still be the problem. The jets (pilot and main) could be clogged or the air filter could be severely restricted. However, before removing the carburetor, continue with Step 6 to make sure that the bike has an adequate spark.

6. Make sure the kill switch button (**Figure 6**) is not stuck or working improperly or that the wire is broken and shorting out. If you have recently fallen on the kill switch side, the crash may have damaged the switch.

7. Is the spark plug wire on tight (**Figure 7**)? Push it on and slightly rotate it to clean the electrical connection between the plug and the connector. Also check that the high-tension lead ends at the coil and plug cap are pushed in all the way.

NOTE

If the engine will still not start, proceed with the following.

8. Perform a spark test as described under *Engine Fails to Start (Spark Test)* in this chapter. If there is a strong spark, perform Step 9. If there is no spark or if the spark is very weak, test the ignition system as described in this chapter.

NOTE

Now that you have established that the fuel and ignition system are working properly, the one remaining area to check is the mechanical system. Unless the engine seized or there was some other type of mechanical problem, mechanical problems affecting the top end generally occur over a period of time. What you want to do is to isolate the mechanical problem to one of these areas: top end, bottom end, clutch or transmission. The top and bottom end (as they relate to engine compression) will be covered in Step 9. Clutch and transmission problems are covered elsewhere in this chapter.

9. Check cylinder compression as follows:
   a. Turn the fuel valve off.
   b. Remove and ground the spark plug shell against the cylinder head as shown in **Figure 8**.

CAUTION

The spark plug must be grounded when performing the following steps or the ignition system may be permanently damaged.

   c. Put your finger tightly over the spark plug hole.
   d. Operate the kickstarter. As the piston comes up on the compression stroke, rising pressure in the cylinder should force your finger off of the spark plug hole. This indicates that the cylinder probably has sufficient cylinder compression to start the engine.

NOTE

You may still have a compression problem even though it seems okay with the previous test. Engine compression can be checked more accurately with a compression gauge as described under ***Tune-up*** *in Chapter Three.*

NOTE

If the cylinder compression is sufficient, the engine may be suffering from a loss of crankcase pressure. During two-stroke operation, the air-fuel mixture is compressed twice, first in the crankcase and then in the combustion chamber. Crankcase pressure forces the air-fuel mixture to flow from the crankcase chamber through the transfer ports and into the combustion chamber. Before continuing, you should perform a crankcase pressure check as described in this chapter.

ENGINE STARTING TROUBLES

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 (Spark Test)

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

CAUTION

Before removing the spark plug in Step 1, clean all dirt and debris away from the plug base. Dirt that falls into the cylinder will cause rapid piston, piston ring and cylinder wear.

NOTE

If you are checking the spark plug while at the track or on the trail, dirt has probably collected underneath the fuel tank. When the spark plug is removed, some of this dirt could fall into the cylinder. If you do not have time to remove the fuel tank, wrap a large clean cloth (or a riding jacket) around the fuel tank. Then remove the spark plug and check or replace it as required. Remove the cloth after reinstalling the spark plug.

1. Disconnect the plug wire and remove the spark plug (**Figure 7**).
2. Insert the spark plug into its cap and touch the spark plug base against the cylinder head to ground it (**Figure 8**). Position the spark plug so you can see the electrode.

NOTE

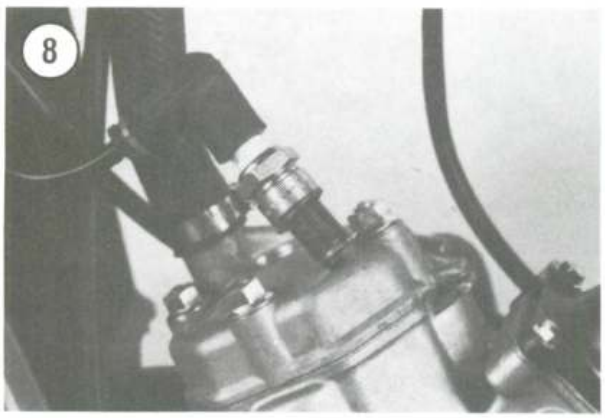
If the spark plug appears fouled, use a new spark plug.

3. Crank the engine over with the kickstarter. A fat blue spark should be evident across the spark plug electrode. If there is strong sunlight on the plug, shade the plug with your hand so that you can see the plug better.

WARNING

Do not hold the spark plug, wire or connector or a serious electrical shock may result.

4. If the spark is good, check for one or more of the following possible malfunctions:
   a. Obstructed fuel line or fuel filter.
   b. Low compression or engine damage.
   c. Flooded engine.
5. If the spark is weak or if there is no spark, check for one or more of the following:
   a. Fouled or wet spark plug.
   b. Loose or damaged spark plug cap connection.
   c. Loose or damaged high tension wiring connections (at coil and plug cap).
   d. Faulty ignition coil or faulty ignition coil ground wire connection.
   e. Faulty I.C. igniter.
   f. Sheared flywheel key.
   g. Loose flywheel nut or bolt.



NOTE

If the engine backfires when you are attempting to start it, the ignition timing is probably incorrect. Incorrect ignition timing can be caused by a loose flywheel (rotor), loose stator plate mounting screws or a faulty ignition component.

   h. Loose electrical connections.
   i. Dirty electrical connections.

Engine is Difficult to Start

If the bike has spark, compression and fuel, but it is difficult to start, check for one or more of the following possible malfunctions:

1. Incorrect fuel-air mixture:
   a. Clogged air filter element.
   b. Incorrect carburetor adjustment.
   c. Clogged pilot jet.
   d. Clogged air passage.
2. Engine flooded:
   a. Incorrect starting procedures.
   b. Incorrect fuel level (too high).
   c. Worn fuel valve and seat assembly.
   d. Fuel valve stuck open.
   e. Damaged float.
3. No fuel flow:
   a. Clogged fuel line.
   b. Clogged fuel filter (if used).
   c. Clogged fuel valve.
   d. Clogged or restricted fuel valve.
   e. Clogged fuel tank cap vent hose.
   f. Fuel valve turned off.
   g. No fuel.
4. Weak spark:
   a. Fouled or wet spark plug.
   b. Loose or damaged spark plug cap connection.
   c. Loose or damaged high tension wiring connections (at coil and plug cap).
   d. Faulty ignition coil.
   e. Faulty I.C. igniter.
   f. Faulty stator plate coils.
   g. Sheared flywheel key.
   h. Loose flywheel nut or bolt.
   i. Loose electrical connections.
   j. Dirty electrical connections.
5. Low engine compression:
   a. Loose spark plug or missing spark plug gasket.
   b. Stuck piston ring.

c. Excessive piston ring wear.
d. Excessively worn piston and/or cylinder.
e. Loose cylinder head fasteners.
f. Cylinder head incorrectly installed and/or torqued down.
g. Warped cylinder head.
h. Blown head gasket.
i. Blown base gasket.
j. Loose cylinder nuts.
k. Severely damaged reed valve assembly.

6. Excessively worn or broken reed valve(s).

Engine Will Not Turn Over

If the engine will not turn over because of a mechanical problem, check for one or more of the following possible malfunctions.

NOTE
*After referring to the following list, refer to **Drive Train Noise** in this chapter for additional information.*

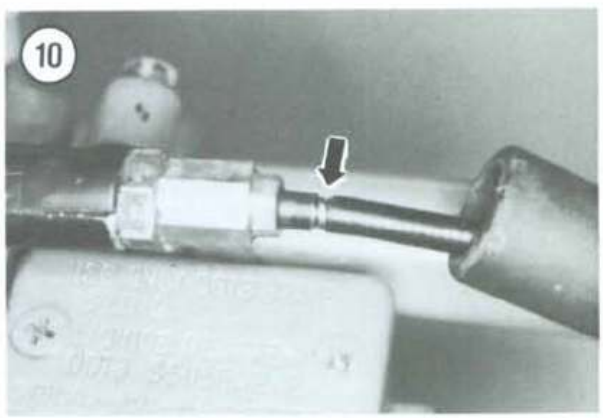
a. Defective kickstarter and/or gear.
b. Broken kick shaft return spring.
c. Damaged kickstarter ratchet gear.
d. Seized or damaged idler gear.
e. Seized piston.
f. Broken piston skirt (**Figure 9**) where pieces of the piston are wedged between the crankshaft and crankcase. This condition can crack the cases.
g. Seized crankshaft bearings.
h. Seized connecting rod small end bearing.
i. Seized connecting rod big end bearing.
j. Broken connecting rod.
k. Seized primary drive gear/clutch assembly.

ENGINE PERFORMANCE

In the following check list, 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.

Engine Will Not Idle or the Throttle Appears Stuck Open

a. Damaged throttle cable. **Figure 10** shows a throttle cable where a portion of the outer cable sheath, located near the throttle, has pulled apart. This type of cable damage will cause an erratic idle or stuck throttle, depending on the throttle and handlebar position. For example, when the handlebar is turned from side to side, the damaged portion of the cable will stretch and pull the inner cable out farther, causing the idle or engine rpm to increase.
b. Damaged throttle grip. Check for this condition, especially if the bike was dropped on the right-hand side of the handlebar. Look at the throttle grip. The grip may have been pushed into the handlebar, or the grip was torn and dirt was forced into the grip and throttle housing, holding it open.
c. Incorrect throttle cable routing. If this condition occurs after replacing the throttle cable, it is routed incorrectly or improperly installed.
d. On Keihin carburetors, the throttle cable clip, shown in **Figure 11**, is either missing or damaged.
e. The throttle cable adjuster (**Figure 12**), located on the carburetor cap, may have backed out, pulling the cable with it.



Engine Will Not Idle

Most of the stock carburetors installed on the KX models in this manual are equipped with a throttle stop screw that allows the engine idle to be set at a certain rpm; see *Carburetor Adjustment* in Chapter Three. If you cannot get the engine to idle as described in Chapter Three, check for one or more the following problem areas:

a. Carburetor incorrectly adjusted.

b. Clogged pilot jet.

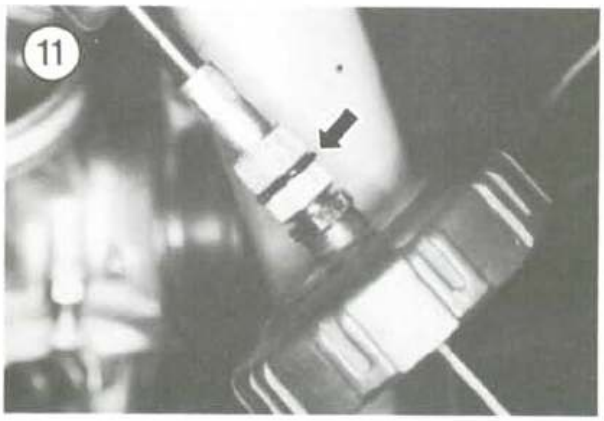
NOTE

If the engine starts with the choke on but cuts out when the choke is closed, or will not idle unless the choke is on, the pilot jet is probably clogged with dirt.

c. Obstructed fuel line or fuel shutoff valve.

d. Fouled or improperly gapped spark plug.

e. Head gasket leaking.



Poor Low Speed Performance

Check for one or more of the following possible malfunctions:

1. Incorrect fuel-air mixture:
   a. Clogged air filter element.
   b. Incorrect carburetor adjustment.
   c. Restricted pilot jet.
   d. Clogged air passage.
   e. Loose or cracked air cleaner duct hose.
   f. Loose carburetor holder clamps.
   g. Clogged fuel tank cap vent hose.
   h. Carburetor choke stuck open.
   i. Incorrect fuel level (too high or too low).
2. Weak spark:
   a. Fouled or wet spark plug.
   b. Incorrect spark plug heat range.
   c. Loose or damaged spark plug cap connection.
   d. Loose or damaged high tension wiring connections (at coil and plug cap).
   e. Faulty ignition coil.
   f. Faulty I.C. igniter.
   g. Faulty stator coils.
   h. Loose electrical connections.
   i. Dirty electrical connections.
3. Low engine compression:
   a. Loose spark plug or missing spark plug gasket.
   b. Stuck piston ring.
   c. Excessive piston ring wear.
   d. Excessively worn piston and/or cylinder.
   e. Loose cylinder head fasteners.
   f. Cylinder head incorrectly installed and/or torqued down.
   g. Warped cylinder head.
   h. Blown head gasket.
   i. Blown base gasket.
   j. Loose cylinder nuts.
   k. Severely damaged reed valve assembly.
4. KIPS valve(s) stuck open:
   a. KIPS exhaust valve stuck open due to carbon seizure.
   b. Worn or damaged exhaust advancer spring.
   c. Seized exhaust valve operating rod.
   d. Damaged KIPS component(s).
   e. Incorrectly assembled KIPS assembly.
5. Excessively worn or broken reed valve(s).
6. Dragging brakes. Refer to *Brakes* in this chapter for additional information.

Poor High Speed Performance

Check for one or more of the following possible malfunctions:

1. Incorrect fuel-air mixture:
   a. Clogged air filter element.
   b. Clogged carburetor air vent tubes.
   c. Incorrect jet needle clip position.
   d. Incorrect main jet.
   e. Clogged main jet.
   f. Worn jet needle and/or needle jet.
   g. Clogged air jet or air passage.
   h. Loose or cracked air cleaner duct hose.
   i. Loose carburetor holder clamps.
   j. Clogged fuel tank cap vent hose.
   k. Worn fuel valve and seat.
   l. Incorrect fuel level (too high or too low).
   m. Clogged fuel line.
   n. Clogged fuel filter.
   o. Clogged fuel valve.
   p. The fuel mixture is contaminated with water.
2. If the engine rpm drops off of cuts out abruptly:
   a. Clogged air filter element.
   b. Restricted muffler.
   c. Clogged exhaust system.
   d. Clutch slippage.
   e. Clogged main jet.
   f. Incorrect fuel level (too high or too low).
   g. Choke valve partially stuck.
   h. Throttle valve does not open all the way.
   i. Dragging brakes.
   j. Engine overheating.
   k. The fuel mixture is contaminated with water.
3. Low engine compression:
   a. Loose spark plug or missing spark plug gasket.
   b. Stuck piston ring.
   c. Excessive piston ring wear.
   d. Excessively worn piston and/or cylinder.
   e. Loose cylinder head fasteners.
   f. Cylinder head incorrectly installed and/or torqued down.
   g. Warped cylinder head.
   h. Blown head gasket.
   i. Blown base gasket.
   j. Loose cylinder nuts.
   k. Broken reed valve(s).
4. KIPS valve(s) stuck closed:
   a. KIPS exhaust valve stuck closed due to carbon seizure.
   b. Excessive carbon accumulation in KIPS ports.
   c. Worn or damaged exhaust advancer spring.
   d. Seized exhaust valve operating rod.
   e. Damaged KIPS component(s).
   f. Incorrectly assembled KIPS assembly.

Engine Overheating

Check for one or more of the following possible malfunctions:

1. Low coolant level. This is probably due to a leak in the system. Visually check the system for leaks.
2. Coolant deterioration:
   a. Engine coolant contains additives to prevent cooling system corrosion. Because these anti-corrosion additives weaken in time, the coolant must be replaced periodically to prevent corrosion build-up. Replace the coolant at the intervals specified in Chapter Three.
   b. Coolant has a unique smell that doesn't change unless it has become contaminated. When the engine is cold, drain some coolant into a clean, clear container (see Chapter Three). If the coolant gives off an abnormal smell, exhaust gas may be leaking into the engine water jacket.

CAUTION

A blown or defective cylinder head gasket will allow exhaust gas to leak into the engine water jacket. Acids, formed by the mixing of coolant water and gas, corrode the cylinder head and cylinder mating surfaces. During acceleration, leaking exhaust gases force coolant away from the damaged gasket area, causing the effected area to overheat. When the engine speed is reduced, coolant that was diverted during acceleration, returns to the overheated area. This abrupt temperature change can warp the cylinder head and cylinder mating surfaces. Extra pressure in the radiator will also cause the pressure valve in the radiator cap to open and release coolant.

3. Faulty cooling system:
   a. Faulty radiator cap.
   b. Defective water pump.
   c. Clogged radiator and engine coolant passages.
   d. Collapsed coolant hoses.

4. Other causes of engine overheating that have nothing to do with the cooling system are:
   a. Excessive carbon buildup in the combustion chamber.
   b. Incorrect air-fuel mixture.
   c. Clutch slippage.
   d. Brake drag.
   e. Transmission oil level too high.

Black Exhaust and Engine Runs Roughly

   a. Clogged air filter element.
   b. Carburetor adjustment incorrect—mixture too rich.
   c. Carburetor floats damaged or incorrectly adjusted.
   d. Choke not operating correctly.
   e. Water or other contaminants in fuel.
   f. Excessive piston-to-cylinder clearance.

Engine Loses Power

   a. Carburetor incorrectly adjusted.
   b. Engine overheating.
   c. Ignition timing incorrect due to improper timing or defective ignition component(s).
   d. Incorrectly gapped spark plug.
   e. Obstructed silencer.
   f. Dragging brake.

Engine Lacks Acceleration

   a. Carburetor adjustment incorrect.
   b. Clogged fuel line.
   c. Ignition timing incorrect due to improper timing or faulty ignition component(s).
   d. Dragging brake.

ENGINE

Engine problems are generally symptoms of something wrong in another system, such as ignition, fuel or starting.

Preignition

Preignition is the premature burning of fuel and is caused by hot spots in the combustion chamber. The fuel actually ignites before it is supposed to. Glowing deposits in the combustion chamber, inadequate cooling or an overheated spark plug can all cause preignition. This is first noticed in the form of a power loss but will eventually result in extended damage to the internal parts of the engine because of higher combustion chamber temperatures.

Detonation

Commonly called "spark knock" or "fuel knock," detonation is the violent explosion of fuel in the combustion chamber prior to the proper time of combustion. Severe damage can result. Use of low octane gasoline is a common cause of detonation.

Even when high octane gasoline is used, detonation can still occur if the engine is improperly timed. Other causes are over-advanced ignition timing, lean fuel mixture at or near full throttle, inadequate engine cooling, or the excessive accumulation of deposits on piston and combustion chamber.

Power Loss

Several factors can cause a lack of power and speed. Look for a clogged air filter or a fouled or damaged spark plug. A piston or cylinder that is galling, incorrect piston clearance or worn or stuck piston rings may be responsible. Look for loose bolts, defective gaskets or leaking machined mating surfaces on the cylinder head, cylinder or crankcase. Also check the crankshaft seals; refer to *Two-Stroke Pressure Testing* in this chapter.

If the engine seems to operate correctly but you are experiencing performance related problems, check the front and rear brakes for signs of dragging.

Piston Seizure

This is caused by incorrect bore clearance, piston rings with an improper end gap, compression leak, incorrect engine oil, spark plug of the wrong heat range, incorrect ignition timing or the use of an incorrect fuel-oil mixture. Overheating from any cause may result in piston seizure.

Piston Slap

Piston slap is an audible slapping or rattling noise resulting from excessive piston-to-cylinder clear-

ance. When allowed to continue, piston slap will eventually cause the piston skirt to shatter. In some cases, a shattered piston will cause some form of secondary engine damage.

For example, **Figure 9** shows a shattered piston from a 1989 KX500. After the skirt shattered, pieces of the piston fell into the crankcase, where they wedged between the crankshaft wheels and the engine cases, severely cracking both cases. Pieces of the piston also traveled through the transfer ports, where they then became trapped between the piston crown and cylinder head when the piston arrived at TDC, damaging the cylinder head. The connecting rod, as well as the small and big end bearings, were also damaged.

This type of damage can be prevented by measuring the cylinder bore and piston diameter at specified intervals (see Chapter Three), and by close visual inspection of all top end components, checking each part for scuff marks, scoring, cracks and other signs of abnormal wear. Replace parts that exceed wear limits or show damage.

ENGINE NOISES

1. *Knocking or pinging during acceleration*— Caused by using a lower octane fuel than recommended. May also be caused by poor fuel available at some "discount" gasoline stations. Pinging can also be caused by a spark plug of the wrong heat range and incorrect carburetor jetting. Refer to *Correct Spark Plug Heat Range* in Chapter Three. Check also for excessive carbon buildup in the combustion chamber or a faulty I.C. igniter.
2. *Slapping or rattling noises at low speed or during acceleration*— May be caused by piston slap, i.e., excessive piston-cylinder wall clearance. Check also for a bent connecting rod or worn piston pin and/or piston pin holes in the piston.
3. *Knocking or rapping while decelerating*— Usually caused by excessive rod bearing clearance.
4. *Persistent knocking and vibration or other noise*— Usually caused by worn main bearings. If the main bearings are okay, consider the following:
   a. Loose engine mounts.
   b. Cracked frame.
   c. Leaking cylinder head gasket.
   d. Exhaust pipe leakage at cylinder head.
   e. Stuck piston ring.
   f. Broken piston ring.
   g. Partial engine seizure.
   h. Excessive small end connecting rod bearing clearance.
   i. Excessive big end connecting rod bearing clearance.
   j. Excessive crankshaft runout.
   k. Work or damaged primary drive gear.
5. *Rapid on-off squeal*— Compression leak around cylinder head gasket or spark plug.

TWO-STROKE PRESSURE TESTING

Many owners of 2-stroke bikes are plagued by hard starting and generally poor running, for which there seems to be no cause. Carburetion and ignition may be good, and compression tests may show that all is well in the engine's upper end.

What a compression test does not show is lack of primary compression. The crankcase in a 2-stroke engine must be alternately under pressure and vacuum. After the piston closes the intake port, further downward movement of the piston causes the entrapped mixture to be pressurized so that it can rush quickly into the cylinder when the scavenging ports are opened. Upward piston movement creates a slight vacuum in the crankcase, enabling the fuel/air mixture to be drawn in from the carburetor.

NOTE

The operational sequence of a two-stroke engine is illustrated in ***Chapter One*** *under* ***Engine Principles****.*

If crankcase seals or cylinder gaskets leak, the crankcase cannot hold pressure or vacuum, and proper engine operation becomes impossible. Any other source of leakage such as a defective cylinder base gasket or porous or cracked crankcase castings will result in the same conditions. See **Figure 13**.

It is possible, however, to test for and isolate engine pressure leaks. The test is simple but requires special equipment. A typical two-stroke pressure test kit is shown in **Figure 14**. Briefly, what is done is to seal off all natural engine openings, then apply air pressure. If the engine does not hold air, a leak or leaks is indicated. Then it is only necessary to locate and repair all leaks.

NOTE

A pressure tester can be constructed from parts purchased from welding and hardware stores.

The following procedure describes a typical pressure test.

1. Remove the flywheel rotor (Chapter Nine) and stator plate to gain access to the left-hand oil seal (**Figure 15**).
2. Remove the carburetor.

NOTE

Do not remove the intake manifold. The manifold should remain on the engine during this test as it may be causing the leak.

NOTE

Steps 3-5 describe the blocking off of the engine openings (intake, exhaust and spark plug). The tester assembly shown in this procedure blocks off the intake manifold completely, while the tester gauge is installed in the spark plug hole. You can purchase or fabricate a tester gauge that is installed in the intake manifold, leaving the spark plug in place. Some tuners favor this method—installing the tester gauge into the intake manifold—as the spark plug can be the source of the problem.

3. Take a rubber plug and push it tightly into the intake manifold (**Figure 16**). Then tighten the carburetor clamp screw securely.

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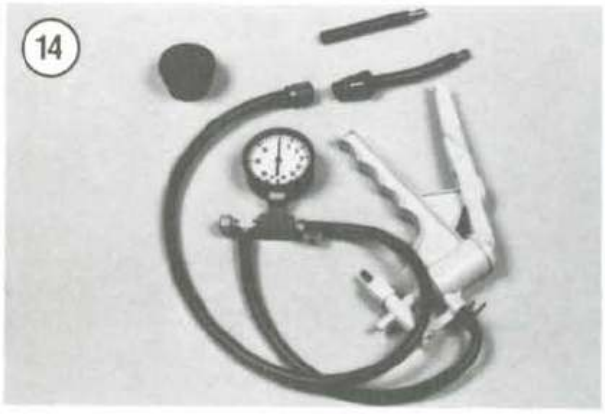
TWO-STROKE CRANKCASE PRESSURE TESTING

Excessive exhaust smoke, oil fouled spark plug or transmission and clutch oil loss	Check: *Leaking right-hand crankshaft seal *Leaking crankcase mating seal *Porous crankcase casting
White spark plug reading, pinging or pre-ignition, power surging, piston seizure or holed piston	Check: *Leaking spark plug seal *Leaking left-hand side crankshaft seal *Leaking intake manifold *Leaking crankcase mating seal *Porous crankcase casting *Porous cylinder head casting
Difficult starting, white spark plug reading or low compression	Check: *Leaking spark plug seal *Leaking head gasket *Porous cylinder head casting

14



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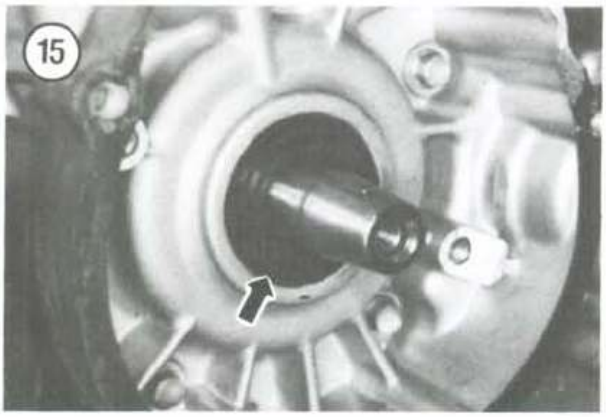


4. Remove the exhaust pipe and block off the exhaust port, using suitable adapters and fittings.

NOTE

***Figure 17** shows the exhaust port blocked off with a plumbers expandable rubber plug. These plugs come in a number of different sizes, so purchase one that is slightly smaller than the exhaust manifold on your bike. For this plug to work properly, the exhaust port must be fairly clean (free of carbon that can prevent the plug from sealing off the port). To use the plug, insert the expandable portion of the plug into the exhaust port. The outer washer on the plug should not contact the port opening. Then tighten the wingnut securely, watching how the plug seals around the port opening (**Figure 18**). You may have to loosen the wingnut and reposition the plug a few times to get it to seal properly.*

5. Remove the spark plug and install the pressure gauge adaptor into the spark plug hole. Connect the pressurizing lever and gauge to the pressure fitting, then squeeze the lever until the gauge indicates approximately 6-7 psi.

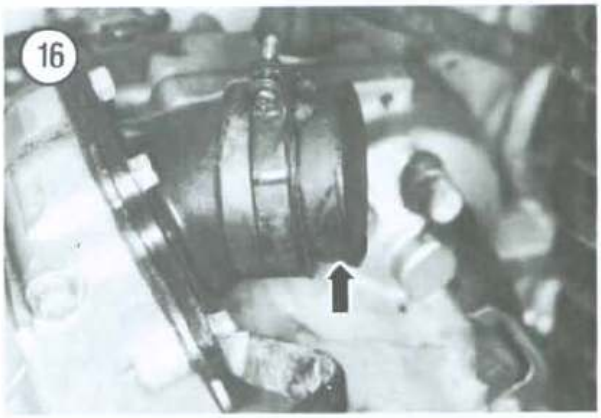
CAUTION

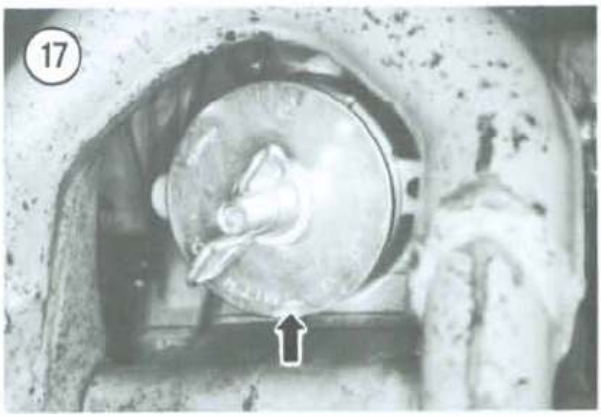
Do not apply more than 7 psi, or the crankcase seals may be damaged.

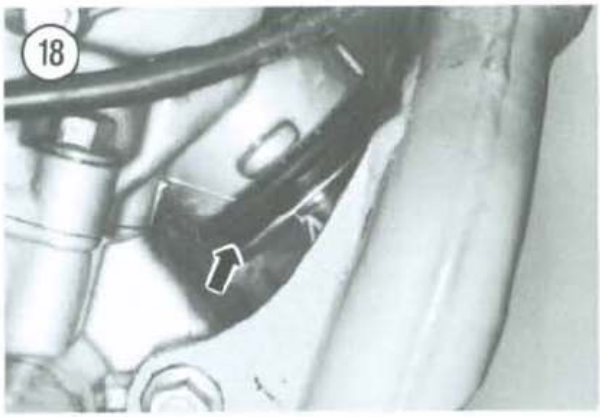
6. Read the pressure gauge. If the engine is in good condition, pressure should not drop more than 1 psi in several minutes. A good rule of thumb is that an engine should hold six pounds of air for six minutes. Any immediate pressure loss or a pressure loss of 1 psi in 1 minute indicates serious sealing problems.

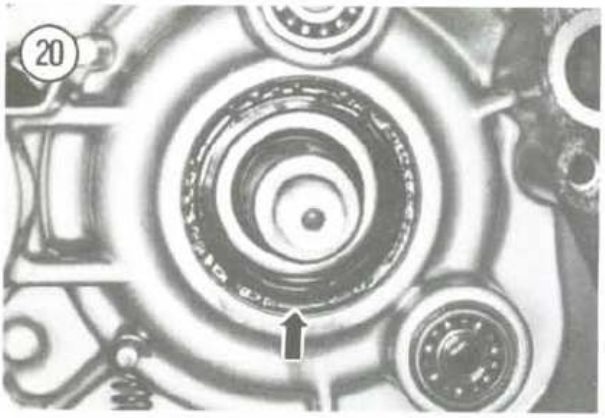
Before condemning the engine, first be sure that there are no leaks in the test equipment or sealing plugs. Check the equipment sealing points with a small brush and soap suds solution. For example, the bubbles in **Figure 19** show that air is leaking past the tester plug. To stop this leak, the tester plug was removed and a new plug gasket installed. When all of the test equipment is air tight, go over the entire engine carefully. You may be able to hear large leaks, but generally, leaks are found by applying the soap suds solution to all sealing areas on the engine. Possible leakage points are listed below:

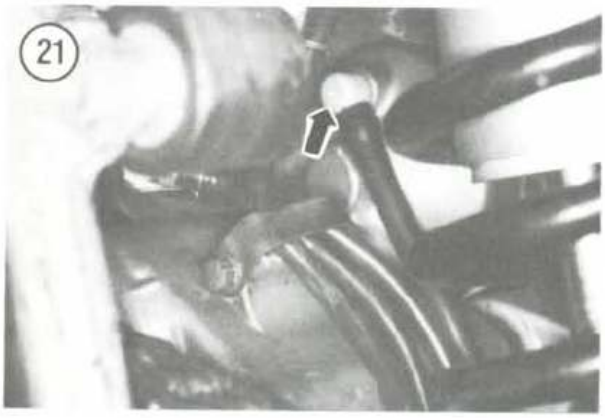
a. Left-hand crankshaft seal (**Figure 15**).

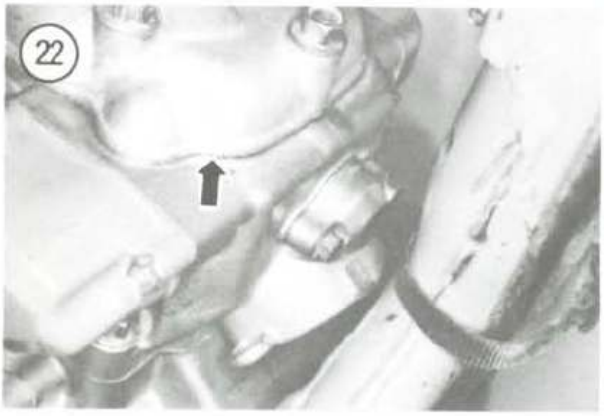


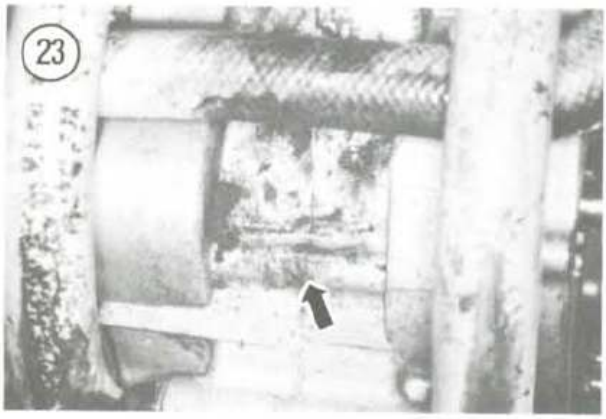












b. Right-hand crankshaft seal (**Figure 20**). Apply the soap suds solution to the transmission breather tube (**Figure 21**). If the tube blows bubbles, the right-hand crankshaft seal is leaking. A damaged seal will allow oil to be drawn into the crankcase, causing excessive smoking and spark plug fouling. Before tearing the engine down, confirm the seal's condition by removing the clutch (do not remove the primary drive gear assembly) as described in Chapter Six and pressure check the engine again with the seal exposed.

c. Spark plug.

d. Cylinder head joint (**Figure 22**).

e. Intake manifold (**Figure 16**).

f. Cylinder base joint.

g. Carburetor base joint.

h. Crankcase joint (**Figure 23**).

i. Porous crankcase, cylinder or cylinder head casting.

7. When a leak is detected, it must be repaired or the damaged part replaced. Then, perform this test again.

FUEL SYSTEM

Many riders automatically assume that the carburetor is at fault when the engine does not run properly. While fuel system problems are not uncommon, carburetor adjustment is seldom the answer. In many cases, adjusting the carburetor only compounds the problem by making the engine run worse.

Fuel system troubleshooting should start at the gas tank and work through the system, reserving the carburetor as the final point. Most fuel system problems result from an empty fuel tank, a plugged fuel filter or fuel valve, or sour fuel. Fuel system troubleshooting is covered thoroughly under *Starting Difficulties*, *Engine Starting Troubles* and *Engine Performance* in this chapter.

Carburetor chokes can also present problems. A choke stuck open will show up as a hard starting problem; one that sticks closed will result in a flooding condition. Check the choke operation; push and pull the choke knob in the carburetor (**Figure 24**, typical). The choke should move between its OFF and ON positions without binding or sticking in one position. If necessary, remove the choke (Chapter Eight) and inspect its plunger and spring for severe wear or damage.

IGNITION SYSTEM

All models are equipped with a capacitor discharge ignition (CDI) system. This solid state system uses no contact breaker point or other moving parts. Because of the solid state design, problems with the capacitor discharge system are relatively few. However, when problems arise they stem from one of the following:

a. Weak spark.
b. No spark.

It is possible to check CDI systems that:

a. Do not spark.
b. Have broken or damaged wires.
c. Have a weak spark.

It is difficult to check CDI system that malfunction due to:

a. Vibration problems.
b. Components that malfunction only when the engine is hot or under a load.

The troubleshooting procedures in **Figure 25** will help you isolate the ignition problem fast. When troubleshooting the ignition system, consider the following:

1. Remove the fuel tank and locate the kill switch connectors at the ignition coil. Disconnect the kill switch electrical connectors and see if the problem still exists.
2. Remove the flywheel cover and check that the flywheel (rotor) nut or bolt is tight (**Figure 26**). A loose flywheel will cause the engine to backfire. If the flywheel backs all the way out, it will generally crack the flywheel cover. If the flywheel nut or bolt backed out and the flywheel came off its taper, it probably sheared the flywheel key. Replace the key and reinstall the flywheel as described in Chapter Nine.
3. Make sure the stator plate screws (**Figure 27**) are tight (remove the flywheel if necessary). If the screws are loose, recheck the ignition timing as described in Chapter Three.
4. With the fuel tank removed, disconnect all of the electrical connectors, first confirming that each connector is plugged into a wire with the same color code. Clean the connectors with electrical contact cleaner and reconnect. Refer to the wiring diagram for your model (end of book) for wire color codes and routing.
5. Check the left- and right-hand crankshaft bearings for excessive play. See **Figure 15** and **Figure 20**. Remove the flywheel rotor as described in Chapter Nine. Grab the end of the crankshaft and try to move it up and down. Any noticeable play indicates worn crankshaft bearings. Refer to Chapter Five.
6. Check the stator plate (**Figure 27**, typical) for cracks or damage that would cause the coils to be out of alignment.

CLUTCH

The three basic clutch troubles are:

a. Clutch noise.
b. Clutch slipping.
c. Improper clutch disengagement.

All clutch troubles, except adjustments, require partial engine disassembly to identify and cure the problem. Refer to Chapter Six for procedures.

The troubleshooting procedures outlined in **Figure 28** will help you solve the majority of clutch troubles in a systematic manner.

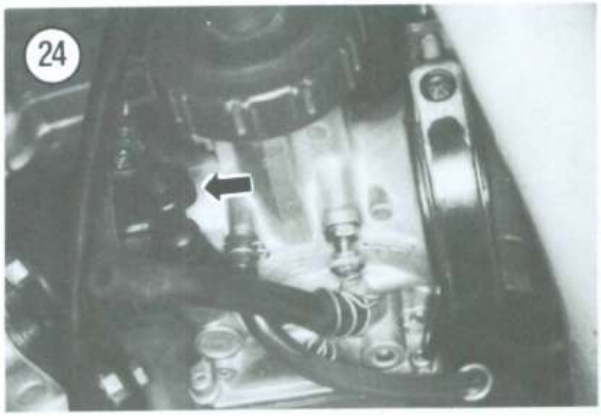
TRANSMISSION

The basic transmission troubles are:

a. Excessive gear noise.
b. Difficult shifting.
c. Gears pop out of mesh.
d. Incorrect shift lever operation.

Transmission symptoms are sometimes hard to distinguish from clutch symptoms. Be sure that the clutch is not causing the trouble before working on the transmission.

The troubleshooting procedures outlined in **Figure 29** will help you solve the majority of transmission troubles.



DRIVE TRAIN NOISE

This section deals with noises that are restricted to the drive train assembly—drive chain, clutch and transmission. While some drive train noises have little meaning, abnormal noises are a good indicator of a developing problem. The problem is recognizing the difference between a normal and abnormal noise.

One thing that is in your favor, however, is that by maintaining and riding your bike, you become accustomed to the normal noises that occur during engine starting and when riding the bike. A new noise, no matter how minor, should be investigated.

1. *Drive chain noise*— Normal drive chain noise can be considered a low-pitched, continuous whining sound. The noise will vary, depending on the speed of the bike and the terrain you are riding on, as well as proper lubrication, wear (both chain and sprocket) and alignment. When checking abnormal drive chain noise, consider the following:

a. Inadequate lubrication—a dry chain will give off a loud whining sound. Clean and lubricate the drive chain at regular intervals; see Chapter Three.
b. Incorrect chain adjustment—check and adjust the drive chain as described in Chapter Three.
c. Worn chain—chain wear should be checked at regular intervals, and replaced when its overall length exceeds the wear limit specified in Chapter Three.
d. Worn or damaged sprockets—Worn or damaged sprockets will accelerate chain wear. Inspect the sprockets carefully as described in Chapter Three.
e. Worn, damaged or missing drive chain rollers—Chain rollers (**Figure 30**) are in constant contact with the chain. They should be checked often, for loose, damaged or missing parts. A missing chain roller will increase chain slack and may cause rapid wear against the frame or swing arm.
f. Worn swing arm/chain protector—A damaged or worn through protector (**Figure 31**) will allow the chain to act much like a chain saw and grind away at the swing arm or frame. Chain wear will also increase rapidly. A new, regular clicking or grinding noise may point to a worn through protector. Inspect the protector(s) regularly. Replace worn protectors before the chain wears through and causes expensive secondary damage.

2. *Clutch noise*— Any noise that develops in the clutch should be investigated. First, drain the clutch/transmission oil, checking for bits of metal or clutch plate material. If the oil looks and smells okay, remove the clutch cover and clutch (Chapter Six) and check for the following:

a. Worn or damaged clutch housing gear teeth.
b. Excessive clutch housing axial play.
c. Excessive clutch housing-to-friction plate clearance.
d. Excessive clutch housing gear-to-primary drive gear backlash.

3. *Transmission noise*— The transmission will exhibit more normal noises than the clutch, but like the clutch, a new noise in the transmission should be investigated. Drain the clutch/transmission oil into a clean container. Wipe a small amount of oil on a finger and rub the finger and thumb together. Check for the presence of metallic particles. Inspect the drain container for signs of water separation from the oil. Some transmission associated noises are caused by:

a. Insufficient transmission oil level.
b. Contaminated transmission oil.
c. Transmission oil viscosity too thin. A too thin "oil viscosity" will raise the transmission operating temperature and increase its operating temperature.
d. Worn transmission gear(s).
e. Chipped or broken transmission gear(s).
f. Excessive gear side play.
g. Worn or damaged crankshaft-to-transmission bearing(s).
h. Worn or damaged kickstart idle gear.
i. Kickstarter ratchet gear does not disengage from the kick gear.

NOTE

If metallic particles are found in Step 2 or Step 3, remove and inspect the clutch, then, if necessary, remove and inspect the transmission.

FRONT SUSPENSION AND STEERING

Poor handling may be caused by improper front or rear tire pressure, a damaged or bent frame or front

steering components, worn swing arm bushings, worn wheel bearings or dragging brakes.

1. Excessive handlebar vibration: Check for the following:

a. Loose or damaged handlebar clamps (**Figure 32**).

b. Incorrect handlebar clamp installation. Some models use clamps that are machined with offset surfaces (**Figure 33**). Theses clamps have an arrow cast into them that must point toward the front of the bike when installed.

c. Bent or cracked handlebar.

d. Worn handlebar rubber dampers (**Figure 34**) if so equipped.

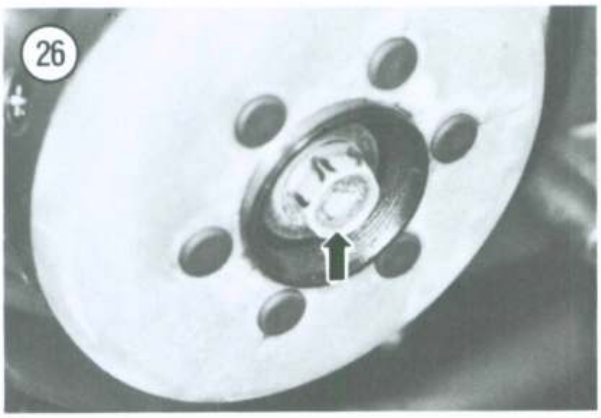
e. Loose steering stem nut.

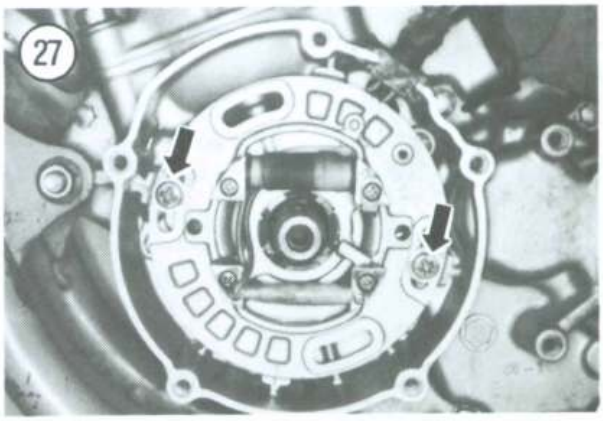
f. Worn front wheel bearing(s).

g. Bent axle.

h. Dry rotted tire.

i. Severely worn front tire.





28

CLUTCH TROUBLESHOOTING

Clutch slipping	Check: *Worn clutch plates *Weak clutch springs *Incorrect clutch adjustment *Damaged pressure plate
Clutch dragging	Check: *Incorrect clutch adjustment *Worn clutch housing or boss assemblies *Worn or uneven clutch springs *Worn clutch plates
Excessive clutch noise	Check: *Damaged gear teeth *Worn clutch plates *Excessive backlash between the primary drive and driven gears

j. Damaged rim.
k. Loose, missing or broken engine mount bolts and mounts.
l. Cracked frame, especially at the steering head.
m. Incorrect tire pressure for prevailing riding conditions.

2. Difficult steering (handlebar is hard to turn): Check for the following:
a. Front tire air pressure is too low.
b. Incorrect throttle cable routing.
c. Incorrect clutch cable routing.
d. Incorrect kill switch routing.
e. Steering stem adjustment is too tight.
f. Bent steering stem.
g. Improperly lubricated steering bearings.
h. Damaged steering bearings.
i. Bearing race in steering stem severely worn or dented.

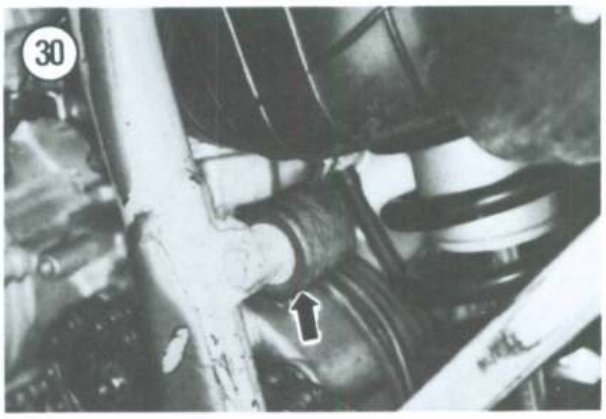
REAR SUSPENSION

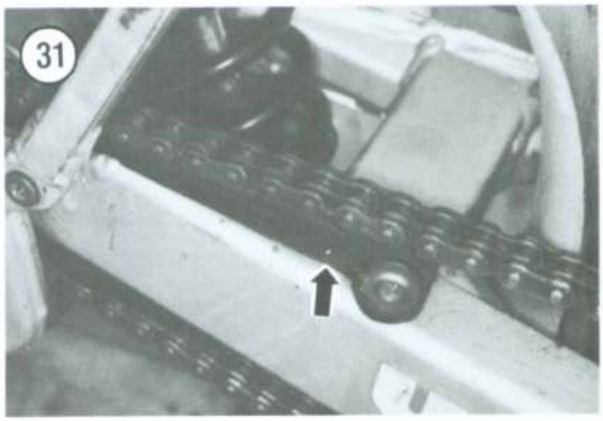
1. If the rear suspension is too soft, check for the following:
a. Incorrect shock absorber adjustment.
b. Leaking shock absorber.

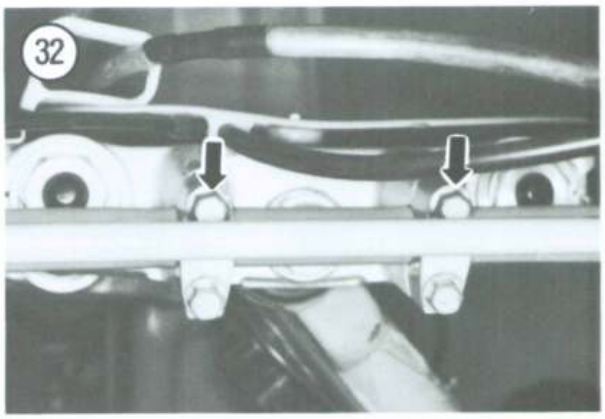
2. If the rear suspension is too hard, check for the following:
a. Incorrect shock absorber adjustment.
b. Rear tire pressure too high.

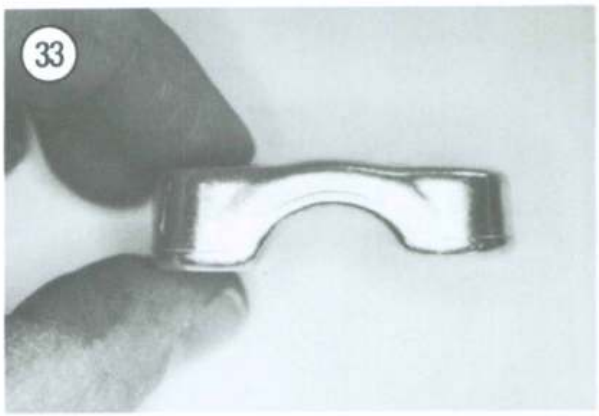
FRAME NOISE

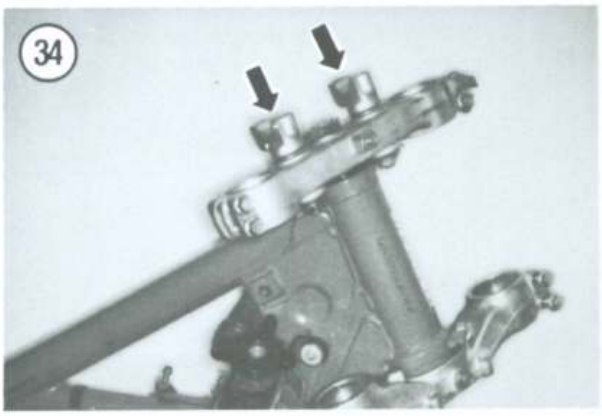
Noises that can be traced to the frame or suspension are usually caused by loose, worn or damaged parts. Various noises that are related to the frame are listed below:











1. *Disc brake noise*— A screeching sound during braking is the most common disc brake noise. Some other disc brake associated noises can be caused by:
   a. Glazed brake pad surface.
   b. Severely worn brake pads.
   c. Warped brake disc.
   d. Loose brake disc mounting bolts.
   e. Loose or missing caliper mounting bolts.
   f. Damaged caliper.
   g. Cracked wheel, where the brake disc mounts to the wheel.
2. *Front fork noise*— Check for the following:
   a. Contaminated fork oil.
   b. Fork oil level too low.
   c. Broken fork spring.
   d. Worn front fork bushings.
3. *Rear shock absorber noise*— Check for the following:
   a. Loose shock absorber mounting bolts.
   b. Cracked or broken shock spring.
   c. Damaged shock absorber.
4. Some other frame associated noises are caused by:
   a. Broken frame.
   b. Broken swing arm.
   c. Loosen engine mounting bolts.
   d. Damaged steering bearings.
   e. Loose mounting bracket(s).

BRAKES

Disc Brakes

The disc brake is critical to riding performance and safety. It should inspected frequently and any problems located and repaired immediately. When replacing or refilling the brake fluid, use only DOT 3 brake fluid from a closed and sealed container. See Chapter Thirteen for additional information of brake fluid and disc brake service. The troubleshooting procedures in **Figure 35** will help you isolate the majority of front disc brake troubles.

When checking brake pad wear, check that the brake pads in each caliper contact the disc squarely. If one of the brake pads is wearing unevenly, suspect a warped or bent brake disc, damaged caliper or backing plate.

Drum Brakes

The front and rear drum brakes are relatively simple in design and operation. However many riders do not get full stopping power because of a glaze residue that builds on the linings surface. To work properly, the drum brakes must be cleaned and serviced weekly. Periodic maintenance will also allow inspection of parts so that they can be replaced before a part fails.

Refer to the troubleshooting chart in **Figure 36** for drum brake problems and checks to make.

Figures 35-36 are on the following pages.

(35)

DISC BRAKE TROUBLESHOOTING

Disc brake fluid leakage

Check:
- *Loose or damaged line fittings
- *Worn caliper piston seals
- *Scored caliper piston and/or bore
- *Loose banjo bolts
- *Damaged washers
- *Leaking master cylinder diaphragm
- *Leaking master cylinder secondary seal
- *Cracked master cylinder housing
- *Too high brake fluid level
- * Loose master cylinder cover

Brake overheating

Check:
- *Warped brake disc
- *Incorrect brake fluid
- *Caliper piston and/or brake pads hanging up
- *Riding brakes during riding

Brake chatter

Check:
- *Warped brake disc
- *Loose brake disc
- *Incorrect caliper alignment
- *Loose caliper mounting bolts
- *Loose front axle nut and/or clamps
- *Worn wheel bearings
- *Damaged front hub
- *Restricted brake hydraulic line
- *Contaminated brake pads

Brake locking

Check:
- *Incorrect brake fluid
- *Plugged passages in master cylinder
- *Incorrect front brake adjustment
- *Caliper piston and/or brake pads hanging up
- *Warped brake disc

Insufficient brakes

Check:
- *Air in brake lines
- *Worn brake pads
- *Low brake fluid level
- *Incorrect brake fluid
- *Worn brake disc
- *Worn caliper piston seals
- *Glazed brake pads
- *Leaking primary cup seal in master cylinder
- *Contaminated brake pads and/or disc

Brake squeal

Check:
- *Contaminated brake pads and/or disc
- *Dust or dirt collected behind brake pads
- *Loose parts

(36)

DRUM BRAKE TROUBLESHOOTING

Brakes do not hold	Check: *Worn brake linings *Glazed brake linings *Worn brake drum *Glazed brake drum *Incorrect brake adjustment *Worn or damaged brake cable *Worn or defective brake return springs
Brakes grab	Check: *Worn or damaged brake return springs *Incorrect brake adjustment *Brake drum out of round *Warped brake lining web *Loose or worn wheel bearings
Brake squeal or scrape	Check: *Worn brake linings *Brake drum out of round *Contaminated brake linings and/or drum *Broken, loose or damaged brake components *Loose or worn wheel bearings
Brake chatter	Check: *Brake drum out of round *Brake linings worn unevenly *Warped brake lining web *Incorrect brake adjustment *Loose or worn wheel bearing *Worn or damaged brake return springs

CHAPTER THREE

LUBRICATION, MAINTENANCE AND TUNE-UP

DNF (did not finish) is a very unpopular but nonetheless often repeated phrase heard throughout race tracks world wide. The cause of a rider's DNF could have been from a crash, but usually it is caused by a mechanical breakdown or failure. This chapter covers all of the regular maintenance required to keep your KX in top shape. Regular maintenance is something you can't afford to ignore if you are racing competitively or trail riding on the weekends. Because your KX is designed and built primarily for motocross competition, it is rugged and reliable and will handle difficult terrain at fast speeds. However, because competition motorcycles are subjected to tremendous heat, stress and vibration, they must be inspected and serviced at regular intervals.

When neglected, any bike becomes unreliable and actually dangerous to ride. By maintaining a routine service schedule as described in this chapter, costly mechanical problems and unexpected breakdowns (DNF's) can be prevented.

This chapter explains lubrication, maintenance and tune-up procedures required for KX models described in this manual. **Table 1** is a suggested maintenance schedule. **Tables 1-17** are at the end of the chapter.

NOTE

Due to the number of models and years covered in this book, be sure to follow the correct procedure and specifications for your specific model and year. Also use the correct quantity and type of fluid as indicated in the tables.

PRE-RIDE CHECKLIST

The following checks should be performed prior to each race or before the first ride of the day. All of these checks are described in this chapter. If a component requires service, refer to the appropriate section.

At the end of each riding day, clean your bike thoroughly and inspect it carefully. Then give it a good general lubrication and make any adjustments necessary.

WARNING

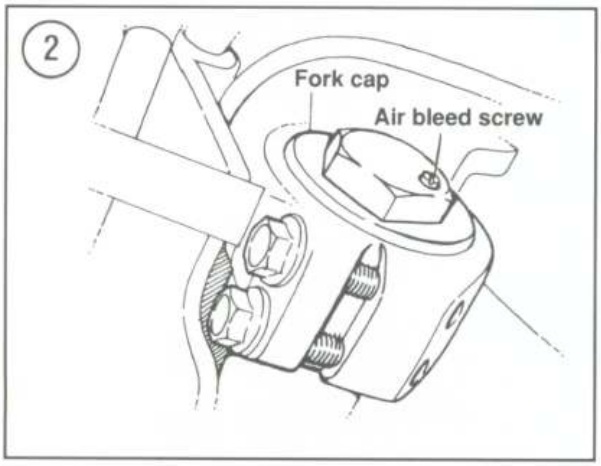
When performing any service work to the engine or cooling system, never remove the radiator cap, coolant drain screws or disconnect any hose while the engine and radiator are hot. Scalding

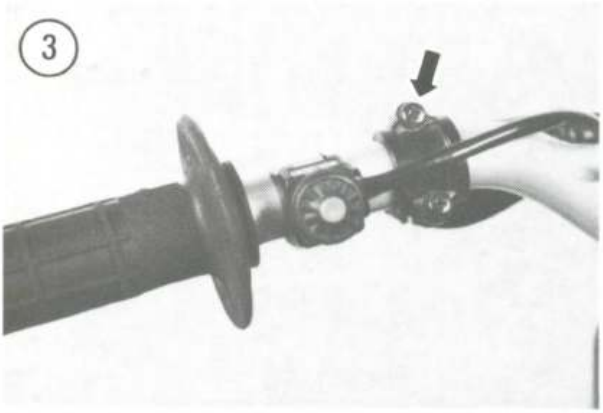
fluid and steam may be blown out under pressure and cause serious injury.

1A. *Liquid cooled models:* Check the coolant level with the engine cold. Check the cooling system for leaks.

1B. *Air cooled models:* Check for clogged or damaged cylinder head and cylinder cooling fins.

2. Check the clutch/transmission oil level.





3. Place the bike on a stand so that the front wheel clears the ground and check steering play.

4A. *1982-1988:* With the front wheel off the ground, remove the air valve cap from each fork tube and depress the air valve (**Figure 1**) to bleed off the air pressure in the fork. Reinstall the cap.

4B. *1989-on:* With the front wheel off the ground, remove the bleed screw (**Figure 2**) in each fork tube to bleed off the air pressure in the fork. Reinstall the screw.

5. With the front wheel off the ground, turn the handlebar from side to side. Check that the control cables are routed properly and do not interfere with the handlebar or the handlebar controls.

6. Check the throttle for proper operation. Open the throttle all the way and release it. The throttle should close quickly with no binding or roughness. Repeat this step with the handlebar facing straight ahead and at both full lock positions.

7. Check the operation of the clutch and adjust if necessary.

8. Check that the clutch and brake levers operate properly with no binding. Replace broken levers. Check the lever housings (**Figure 3**) for damage.

WARNING

*When checking the brake and clutch levers, check the ball on the end of the lever (**Figure 4**). If the ball is broken off, replace the lever immediately. The lever balls help to prevent the lever from puncturing your hand or arm during a crash.*

9. Inspect the front and rear suspension. They should have a good solid feel with no looseness.

10. Check for loose or damaged spokes.

11. Check the drive chain for wear and correct tension.

12. Lubricate the drive chain.

13. Check the front and rear brake adjustment. Check the brake fluid level.

14. Make sure the air filter is clean and that the air box and carburetor boots are secured tightly.

15. Check tire pressure (**Table 2**).

NOTE

*While checking tire pressure, also check the position of the valve stem. If the valve stem is cocked sideways like that shown in (**Figure 5**), your riding time could end quickly because of a flat tire.*

Refer to ***Tires and Wheels*** *in this chapter.*

16. Check the exhaust system for looseness or damage.
17. Check the tightness of all fasteners, especially engine, steering and suspension mounting hardware.
18. Check the rear sprocket bolts and nuts for tightness.
19. Inspect the fuel hose and fittings for wetness, checking that each hose is secured with a hose clamp.
20. Make sure the fuel tank is full and has the correct fuel/oil mixture. Refer to *Engine Lubrication* in this chapter.
21. Remove the spark plug and check its condition. Clean and regap the plug, if necessary.
22. Before trail riding, check your tool belt to make sure that all of your tools and spare parts are in place.
23. After arriving at the track or your riding area, consider whether or not the bike is set up for prevailing track and weather conditions—carburetor jetting, tire pressure, front and rear suspension adjustment, etc. Ask yourself specific questions; for example, if it is raining, "is your bike sufficiently waterproofed?"

MAINTENANCE SCHEDULE

Table 1 is a recommended maintenance schedule. However, you will have to determine your own maintenance requirements based on the type of riding you do and the terrain you ride on, whether it be dry desert dust or wet sand and mud. Full-time racing every weekend naturally requires more stringent maintenance than occasional sport and trail riding. When running long races or events, perform the required maintenance more often.

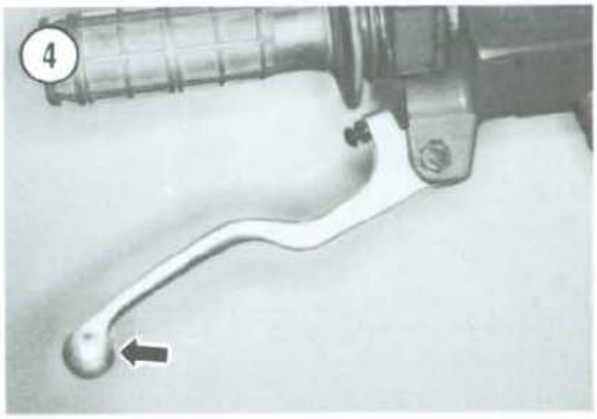
TIRES AND WHEELS

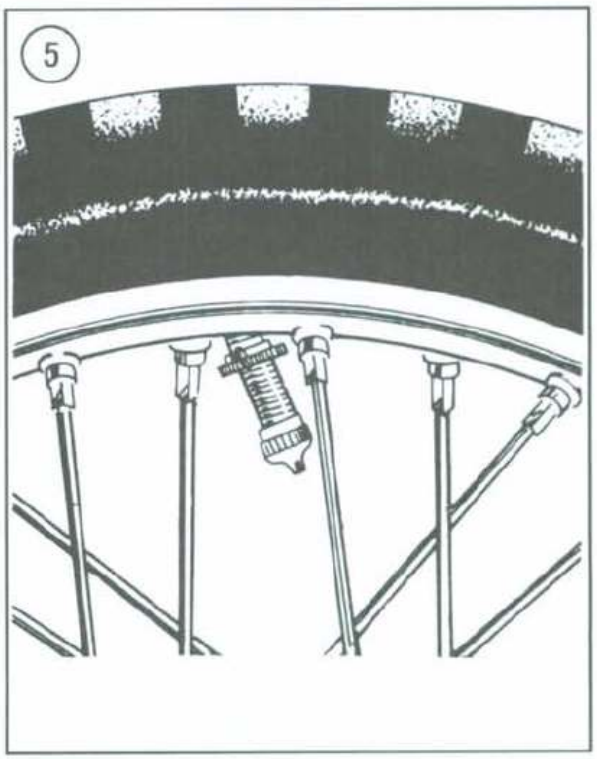
Tire Pressure

Tire pressure should be checked and adjusted to maintain good traction and handling and to prevent rim damage. An accurate gauge should be carried in your tool box. The approximate tire inflation pressure specification for all models is listed in **Table 2**. When racing, track conditions will dictate air pressure requirements. Lower air pressures can be used for soft, smooth or muddy track conditions. If the track is rougher with a number of big jumps or rocks, you may need a higher air pressure.

Tire Inspection

The tires take a lot of punishment due to the variety of terrain they are subject to. Inspect them weekly for excessive wear, cuts, abrasions, etc. Sidewall tears are the most common cause of tire failure in motocross. This type of damage is usually caused by sharp rocks or other riders' footpegs. Often times, sidewall tears cannot be seen from the outside. If necessary, remove the tire from the rim as described





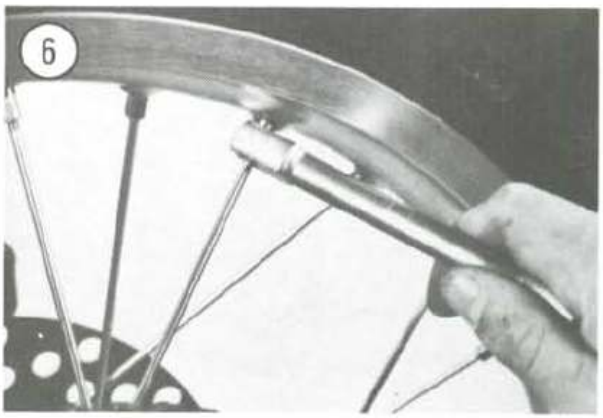
in Chapter Eleven. Run your hand around the inside tire casing, checking for tears or sharp objects imbedded in the casing. The outside of the tire can be inspected visually.

If you race, one way to cut tire costs is to remove your competition tires after each event and replace them with worn tires for practice. If you have two sets of wheels, this method becomes a bit easier. If not, you will get plenty of practice changing tires.

NOTE

If a regular standard inner tube is used, replace it every 10 races. A stronger heavy-duty tube will last longer and is not as easy to puncture. The stronger tube weighs more but it's a sacrifice that's worth the durability.

While checking the tires, also check the position of the valve stem. If a valve stem is cocked sideways (**Figure 5**), you stand a good chance of having to replace a damaged tube. Refer to *Valve Stem Alignment* in this chapter.



Wheel Spoke Tension

CAUTION

During break-in for a new or a respoked wheel, check the spoke tension at the end of each 15 minute interval for the first hour of riding. Most spoke seating takes place during initial use.

Check the spokes for tightness before each race or trail ride. The "tuning fork" method for checking spoke tightness is simple and works well. Support the bike so that the wheel clears the ground. Tap each spoke with a spoke wrench or the shank of a screwdriver and listen to the tone. A tight spoke will emit a clear, ringing tone, and a loose spoke will sound flat. All of the spokes in a correctly tightened wheel will sound approximately the same pitch.

Tighten any loose spokes with the correct size spoke wrench (**Figure 6**). If one or more spokes are loose, tighten them as described under *Wheels* in Chapter Eleven.

NOTE

Most spokes loosen as a group rather than individually. Extra-loose spokes should be tightened carefully. Burying just a few spokes tight into the rim will put improper pressure across the wheel. Never tighten spokes to where the spoke wrench rounds off the nipple flats. Refer to ***Wheels*** *in Chapter Eleven.*

Rim Inspection and Runout

Inspect the rims for cracks, warpage or dents (**Figure 7**). A damaged rim should be replaced.

Wheel rim runout is the amount of "wobble" a wheel shows as it rotates. You can check runout with the wheels on the bike by simply supporting the wheel off the ground and turning the wheel slowly while you hold a pointer solidly against a fork leg or the swing arm (**Figure 8**). Just be sure any wobble you observe isn't caused by your own hand.

NOTE

A more accurate method of measuring runout is described in Chapter Eleven.

The maximum allowable runout with the tire installed on the rim is:

a. 2 mm (1/16 in.) axial play (side-to-side).
b. 2 mm (1/16 in.) radial play (up-and-down).

If the runout is excessive, refer to Chapter Eleven for adjustment.

Tube Alignment

Check the tube's valve stem alignment. **Figure 5** shows a valve stem that has slipped with the tire. If the tube is not repositioned, the valve stem will eventually pull away from the tube, causing a flat. To realign the tube and tire:

1. Wash the tire and rim if it is very dirty or caked with mud. Dry with compressed air, if available.
2. Remove the valve stem core and release all air pressure from the tube.
3. Loosen the rim lock nuts (**Figure 9**).
4. With an assistant steadying the bike, squeeze the tube and break the tire-to-rim seal all the way around the wheel.
5. After the tire seal is broken, put the bike on a stand so that the wheel clears the ground.
6. Apply a mixture of soap and water from a spray container (like that used when changing a tire) along the tire bead on both sides of the tire.
7. Have an assistant apply the rear brake "hard." If the wheel turns on drum brakes, tighten brake adjuster.
8. Using both of your hands, grab hold of the tire and turn it and the tube until the valve stem is straight up (90°). See **Figure 10**.
9. When the valve stem is straight up, install the valve stem core and inflate the tire. If the soap and water solution has dried, reapply it to help the tire seat on the rim. Check the tire to make sure it seats all the way around the rim.

WARNING

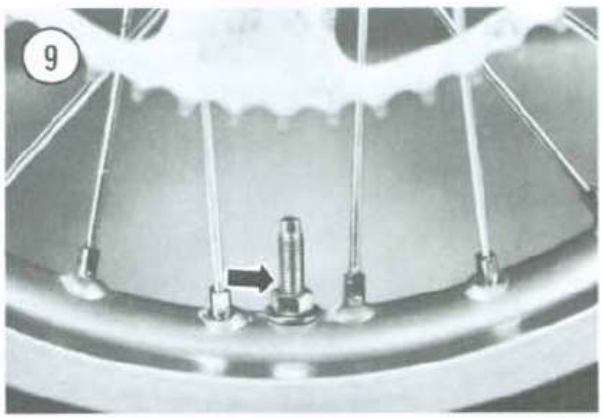
Do not overinflate the tire and tube. If the tire will not seat properly remove the valve stem core and re-lubricate the tire.

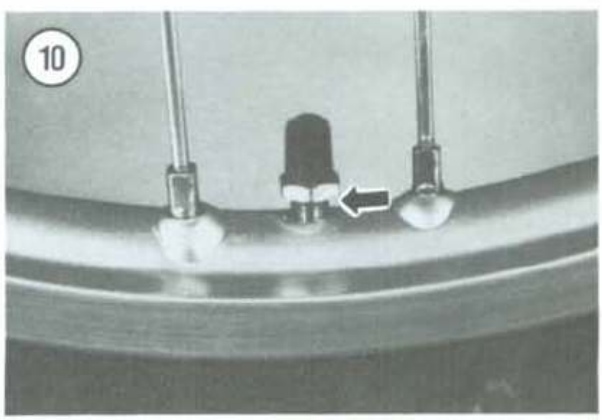
10. Tighten the rim lock(s) securely.
11. Adjust the tire pressure (**Table 2**). When installing the valve stem nut, do not tighten it against the rim. This will prevent the tube from tearing at the valve if it should slip with the tire again. Instead, tighten the nut against the valve cap as shown in **Figure 10**. This will allow the valve stem to slip without damage until you can reposition the tire and tube.

LUBRICANTS

Transmission 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, called "weights." Thick (heavy) oils have higher viscosity numbers than thin (light) oils. For example, a 5 weight (SAE 5) oil is a light oil while a 90 weight (SAE 90) oil is relatively





heavy. The viscosity of the oil has nothing to do with its lubricating properties.

Grease

A good quality grease—preferably waterproof—should be used for many of the parts on the KX. Water does not wash grease off parts as easily as it washes off oil. In addition, grease maintains its lubricating qualities better than oil on long and strenuous events.

CLEANING SOLVENT

A number of solvents can be used to remove old dirt, grease, and oil. See your dealer or an auto parts store.

WARNING

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

ENGINE LUBRICATION

WARNING

Serious fire hazards always exist around gasoline. Do not allow any smoking in areas where fuel is being mixed or while refueling your machine. Always have a fire extinguisher, rated for gasoline and electrical fires, within reach just to play it safe.

The engines in all KX models are lubricated by oil mixed with gasoline. Refer to **Table 3** for recommended oils and fuel types. Mix the oil and gasoline thoroughly in a separate clean, sealable container larger than the quantity being mixed to allow room for agitation. Always measure the quantities exactly. **Table 4** lists fuel/oil mixture ratios for all models. Fuel capacity for the various models is given in **Table 5**. Use a good grade of premium fuel rated at 90+ octane.

Use a *discarded* baby bottle with graduations in both cubic centimeters (cc) or fluid ounces (oz.) on the side. Pour the required amount of oil into the mixing container and add approximately 1/2 the required amount of gasoline. Agitate the mixture thoroughly, then add the remaining fuel and agitate again until all is mixed well.

NOTE

Always mix a fresh amount of fuel the morning of the race or ride; do not mix more than you will use that day. Do not keep any fuel overnight. Dispose of any excess fuel properly.

To avoid any contaminants entering into the fuel system, use a funnel with a filter when pouring the fuel into the bike's tank.

CAUTION

Do not mix castor bean oils with petroleum lubricants. A gum will form and may cause serious engine damage.

PERIODIC LUBRICATION

Transmission Oil
Checking and Changing

The transmission oil lubricates both the transmission and the clutch. Proper operation and long service for the clutch and transmission require clean oil. Oil should be changed at the intervals indicated in **Table 1**. Check the oil level frequently and add as necessary to maintain the correct level. Refer to **Table 6** for oil capacities for the various models.

Try to use the same brand of oil. Do not mix 2 brand types at the same time as they all vary slightly in their composition. Use of oil additives is not recommended as it may cause clutch slippage.

Checking

1. Start the engine and let it warm up approximately 2-3 minutes. Shut it off. Wait a few minutes to allow the oil to drain down into the engine.
2. Place the bike in an upright position.

3A. *Check bolt*: The oil level is checked by removing the oil check bolt on the clutch cover (B, **Figure 11**). When the bolt is removed, a small amount of oil should trickle out of the hole. If a large amount of oil pours out, there is too much oil; allow the oil to run out of the hole until it just starts to trickle out. If there is not enough oil, remove the oil fill cap (A, **Figure 11**) and add oil (**Table 3**) until it starts to

trickle out of the hole. Reinstall the check bolt and washer.

3B. *Level inspection window*: Locate the oil level inspection window on the clutch cover. The oil level should come to the middle of the window (B, **Figure 12**). If necessary remove the oil fill cap (A, **Figure 12**) and add oil (**Table 3**) to correct the level.

NOTE

If the oil level is too high, remove the oil fill cap and remove excess oil with a siphon.

Changing

To drain the oil you will need the following:

a. Drain pan.
b. Funnel.
c. 1 quart 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 half-gallon plastic bleach or milk bottle. Tighten the cap and take the oil to a service station or oil retailer for recycling. *Do not* discard the oil in your household trash or pour it onto the ground.

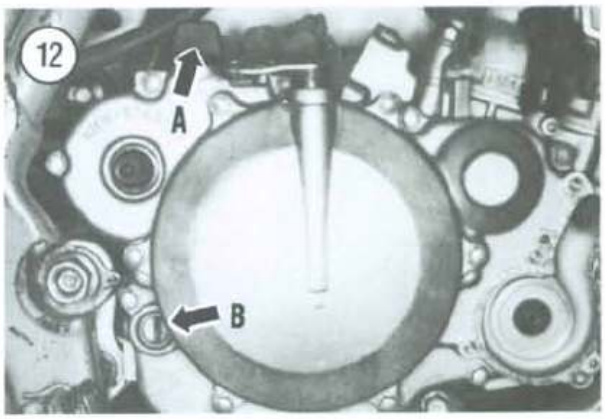
1. Start the engine and let it reach operating temperature.
2. Shut the engine off and put a one quart or larger drain pan under the engine.
3. Wipe all dirt and debris from around the drain plug. Then remove the drain plug (**Figure 13**) and washer. If the washer is not on the drain plug, it may have dropped into the oil pan or it's stuck to the crankcase. Remove the oil fill cap to help speed up the flow of oil.
4. Let the oil drain out. Tilt the engine if the bike is supported on a sidestand.
5. Replace the sealing washer if crushed or damaged.
6. Replace the drain plug if the if the hex portion on the plug is starting to round off.
7. Install the drain plug and washer and tighten securely.
8. Fill the transmission with the correct weight and quantity oil (**Table 3** and **Table 6**).
9. Screw in the oil fill cap and start the engine. Let it idle for 2-3 minutes. Check for leaks.
10. Turn the engine off and check the oil level as described in this chapter. Adjust the level if necessary.

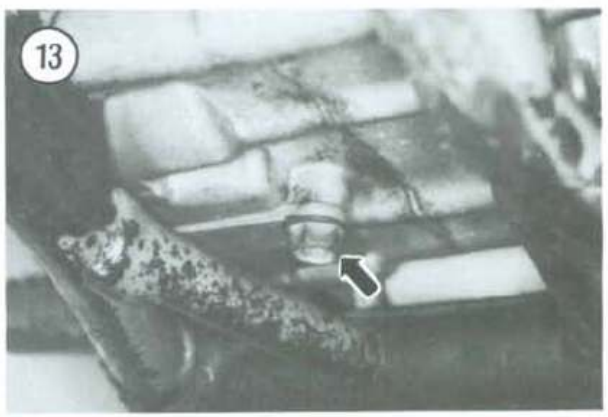
Front Fork Oil Change (1982-1987)

This procedure tells how to change the fork oil without removing the forks from the motorcycle.

The fork oil should be changed at the interval described in **Table 1**.

1. Support the bike so that the front wheel clears the ground.
2. Remove the fork tube air valve cap (**Figure 1**). Depress the air valve (A, **Figure 14**) to release all air pressure in the fork tube.





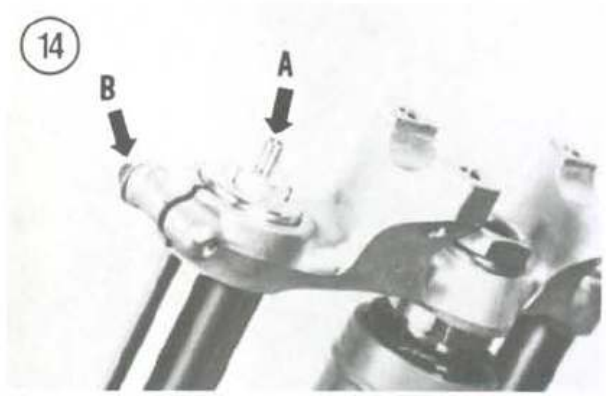
CAUTION

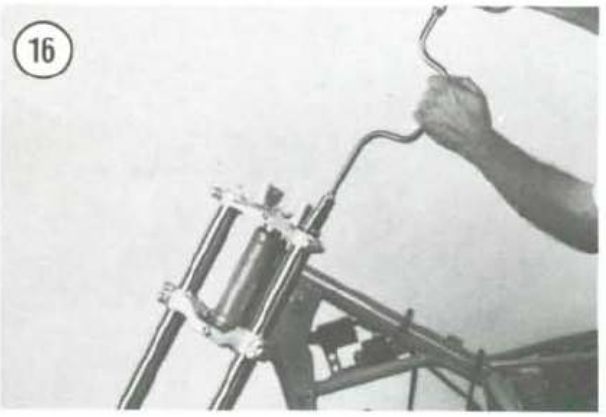
Release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

3. Place a drain pan underneath the fork tube drain screw (**Figure 15**). Remove the drain screw and washer and allow the oil to drain.

CAUTION

Do not allow the fork oil to contact any of the brake components or to run onto the front tire.





4. Remove the stand from underneath the bike and place both wheels on the ground. Then apply the front brake and pump the forks to force out the remaining oil.

5. Replace the drain screw washer if crushed or damaged.

6. Replace the drain screw if the threads or screw head are stripped.

7. Reinstall the drain screw and washer and tighten securely.

8. Repeat Steps 2-8 for the opposite fork tube.

9. Place the motorcycle on a stand so that the front wheel clears the ground.

10. If necessary, remove the handlebars clamp bolts and position the handlebar away from the fork caps. Position the handlebar so that the control cables are not pinched or kinked.

11. Loosen the upper fork tube pinch bolts (B, **Figure 14**).

12. Spread some newspapers or clean shop cloths on your workbench to place the fork spring assembly after removing it.

NOTE

*The fork cap is under spring pressure. Remove the cap slowly (**Figure 16**) and don't let it fly off when it is released from the fork tube.*

WARNING

If the fork tubes are bent the fork cap may be under considerable spring pressure. Do not attempt to remove the fork cap. Allow a qualified mechanic to remove the cap and repair the forks for you.

NOTE

*A number of different spring seat (**Figure 17**), spacer (**Figure 18**) and fork spring (**Figure 19**) combinations are used on the KX models covered in this manual. After removing the fork cap in Step 10, remove the spring assembly, laying out parts in order removed to avoid confusion during reassembly. Then compare their alignment with the exploded view drawing found under **Fork Service** for your model in Chapter Eleven.*

13. Loosen and remove the upper fork cap with a socket and speeder bar or long T-handle (**Figure 16**).

14A. On KX125 models, perform the following:
a. 1982-1983: Remove the spacer, spring seat and fork spring.
b. 1984: Remove the upper spring seat, spacer, lower spring seat and fork spring.
c. 1985: Remove the washer, spacer, upper spring seat, spring and lower spring seat.
d. 1986: Remove the spring seat, fork spring and valve assembly.
e. 1987: Remove the fork spring and valve assembly.

14B. On KX250 models, perform the following:
a. 1982-1983: Remove the spacer, spring seat and spring.
b. 1984-1985: Remove the upper spring seat, spacer, lower spring seat and spring.
c. 1986: Remove the spring seat, spring and valve assembly.
d. 1987: Remove the spring and valve assembly.

14C. On KX500 models, perform the following:
a. 1983: Remove the spacer, spring seat and spring.
b. 1984-1985: Remove the upper spring seat, spacer, lower spring seat and spring.
c. 1986: Remove the spring seat, spring and valve assembly.
d. 1987: Remove the spring and valve assembly.

15. Clean the fork spring assembly in solvent and dry thoroughly.

16. Inspect the spring seat(s)s for nicks, burrs or damage.

17. Fill the fork tube with slightly less than the specified quantity of oil (**Table 7**).

NOTE

The amount of oil poured in is not as accurate a measurement as the actual level of the oil. You may have to add more oil later in this procedure.

18. Repeat for the opposite fork.

19. After filling both tubes, slowly pump the forks up and down several times to distribute the oil throughout the fork.

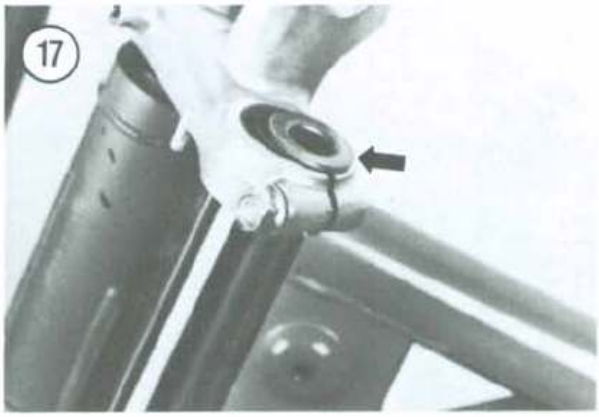
20. Allow the oil to settle for a few minutes. With an assistant's help, roll the bike off of the stand and position it so that both fork tubes are bottomed in a vertical position.

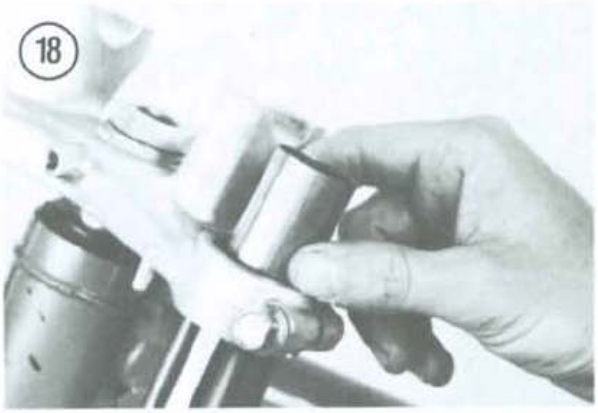
21. Measure the distance from the top of the fork tube to the top of the fork oil with a fork oil level gauge or ruler. See **Figure 20** and **Figure 21**. Refer to **Table 7** for the correct fork oil level specification for your model. Repeat for the opposite fork.

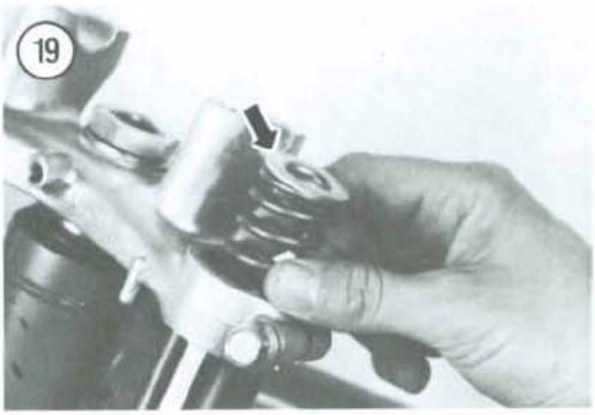
22. Add or remove enough oil to meet your bike's fork oil level specification in both fork tubes. The fork oil level gauge can be used to siphon out fork oil.

23. Place the bike on its stand so that the front wheel clears the ground. Push the front wheel down so that the forks are completely extended.

24. Replace the fork cap O-ring if worn or damaged.







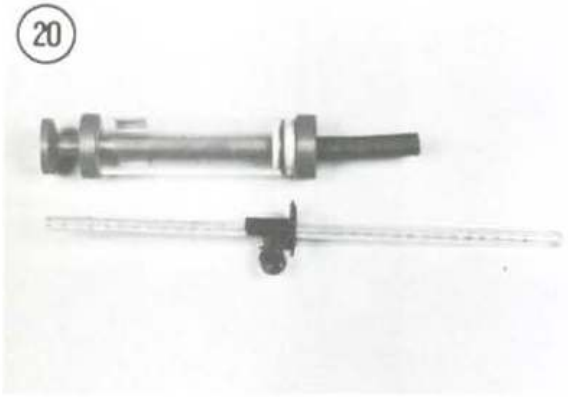
25. Reverse Step 14 to install the fork spring assembly for your model.

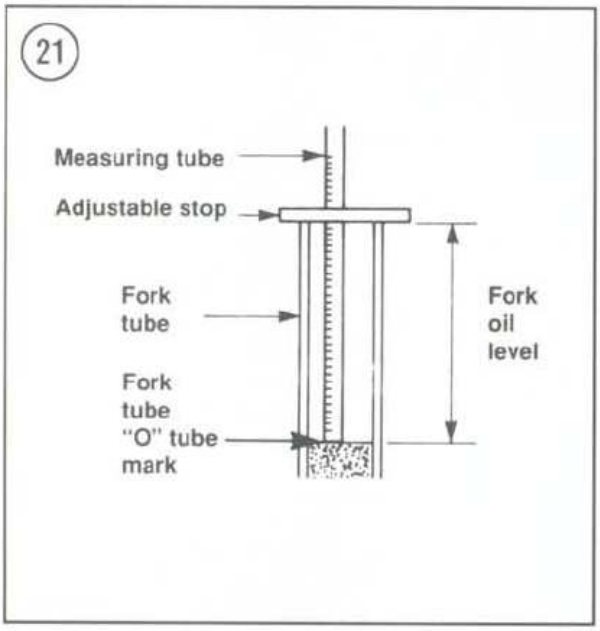
26. Wipe the fork cap threads with fork oil.

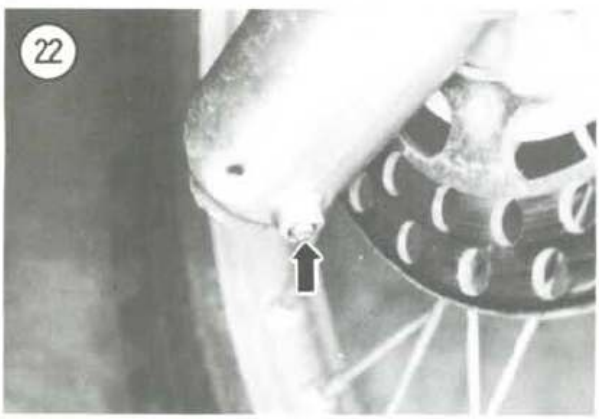
27. Place the fork cap in position and push it down with a speeder bar and sprocket (**Figure 16**). Install the fork cap by carefully threading it into the fork. Don't cross thread it. Tighten the fork cap securely.

28. Tighten the fork tube pinch bolts to the torque specification in **Table 8**.

29. Install the handlebars, if removed, as described in Chapter Eleven.







Front Fork Oil Change (1988 and 1989 U.S. and Canadian Models)

This procedure tells how to change the fork oil without removing the forks from the motorcycle.

The fork oil should be changed at the interval described in **Table 1**.

1. Support the motorcycle so that the front wheel clears the ground.

2. Remove the fork tube air valve cap (**Figure 2**). Depress the air valve or loosen the bleed screw to release all air pressure in the fork tube.

CAUTION

Release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

3. Place a drain pan underneath the fork tube drain screw (**Figure 22**). Remove the drain screw and washer and allow the oil to drain.

CAUTION

Do not allow the fork oil to contact any of the brake components or to run onto the front tire.

4. Remove the stand from underneath the bike and place both wheels on the ground. Then apply the front brake and pump the forks to force out the remaining oil.

5. Replace the drain screw washer if crushed or damaged.

6. Replace the drain screw if the threads or screw head are stripped.

7. Reinstall the drain screw and washer and tighten securely.

8. Repeat Steps 2-7 for the opposite fork tube.

9. Place the motorcycle on a stand so that the front wheel clears the ground.

10. Remove the handlebar clamp bolts and move the handlebar away from the fork caps. Position the handlebar so that the control cables are not pinched or kinked.

11. Loosen the upper fork tube pinch bolts (**Figure 23**).

12. Spread some newspapers or clean shop rags on your workbench to place the fork spring assembly after removing it.

13. Perform the following to loosen and remove the fork cap:

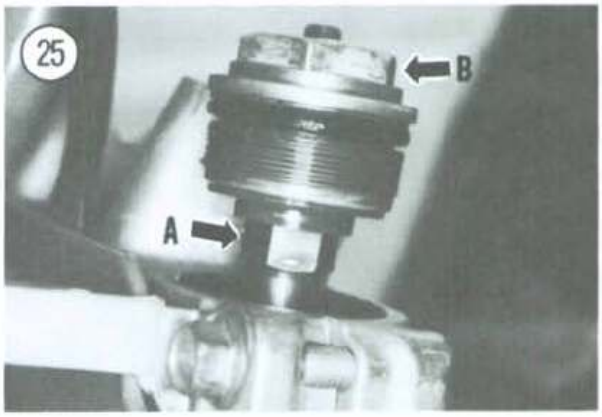
a. Loosen the fork cap (**Figure 24**) and slide it out of the fork tube.

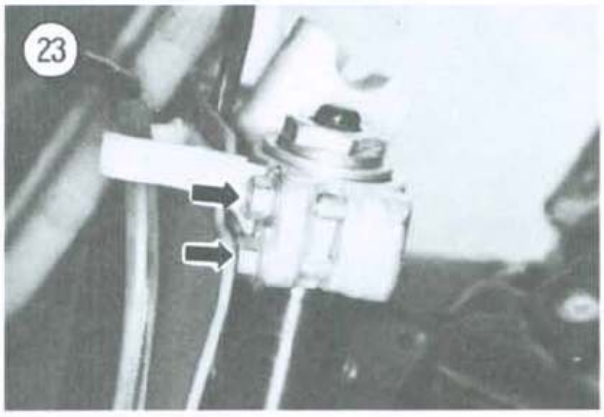
b. Hold the pushrod nut (A, **Figure 25**) with a wrench to keep it from turning and loosen the fork cap (B, **Figure 25**) with a wrench or socket. Unscrew and remove the fork cap from the end of the pushrod (**Figure 26**). Do not remove the pushrod nut.

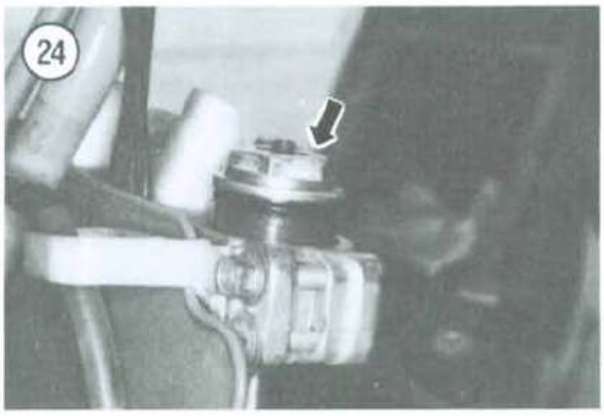
NOTE

It is normal for the pushrod to slide down into the fork tube after you release it. You can slide it up later in this procedure.

c. Remove the upper spring seat and spacer (**Figure 27**) and then the lower spring seat and spring (**Figure 28**) out of the fork tube.

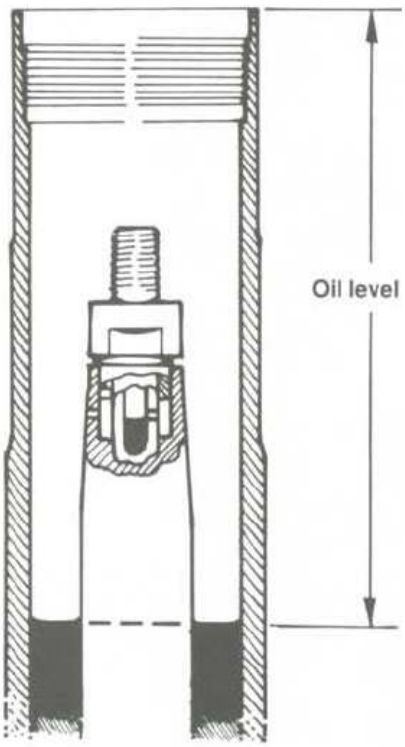






29

OIL LEVEL



NOTE

The bottom of the spring is equipped with a seal. Check for it after removing the spring.

d. Repeat to remove the opposite fork cap and spring assembly.

14. Clean the fork spring assembly in solvent and dry thoroughly.

15. Inspect the spring seats and spacer for nicks, burrs or damage.

16. Replace the fork cap O-ring if worn or damaged.

17. Fill the fork tube with slightly less than the specified quantity of oil (**Table 7**).

NOTE

The amount of oil poured in is not as accurate a measurement as the actual level of the oil. You may have to add more oil later in this procedure.

18. Repeat for the opposite fork.

19. After filling both fork tubes, slowly pump the forks up and down several times to distribute the oil throughout the fork.

20. Allow the oil to settle for a few minutes. With an assistant's help, roll the bike off of the stand and position it so that both fork tubes are bottomed in a vertical position.

21. Measure the distance from the top of the fork tube to the top of the fork oil with a rod. See **Figure 29**. Refer to **Table 7** for the correct specifications. Repeat for the opposite fork.

22. Add or remove enough oil to meet your bike's fork oil level specification in both fork tubes. A siphon or fork oil level gauge can be used to siphon out fork oil.

23. Place the bike on its stand so that the front wheel clears the ground. Push the front wheel down so that the forks are completely extended. Hold onto the pushrod (**Figure 30**) to prevent it from sliding into the fork tube.

24. Install the spring/fork cap assembly as follows:

a. Lift the pushrod (**Figure 30**) all the way up.

NOTE

*After installing the spring in sub-step b, use it to hold the pushrod in place until the fork cap can be installed. If not, the pushrod (**Figure 30**) will slide down into the fork tube.*

b. Install the spring (**Figure 28**) over the pushrod so that the seal on the bottom of the spring faces *down* (**Figure 31**).
c. Install the lower spring seat onto the top of the spring (**Figure 28**).
d. Install the spacer onto the lower spring seat (**Figure 27**).
e. Install the upper spring seat onto the spacer (**Figure 27**).
f. Thread the fork cap (B, **Figure 25**) onto the pushrod (A, **Figure 25**).
g. Hold the pushrod nut with a wrench and tighten the fork cap securely.
h. Wipe the fork cap threads with fork oil.
i. Place the fork cap in position and push it down with a speed bar and socket (**Figure 16**), carefully threading the cap into the fork tube. Tighten the fork cap securely.

25. Tighten the fork tube pinch bolts (**Figure 23**) to the torque specification listed in **Table 8**.
26. Install the handlebar as described in Chapter Eleven.

Front Fork Oil Change (1989 European Models and All 1990 and Later Models)

The cartridge forks used on these models are not designed for having their fork oil drained and replaced while the forks are assembled or installed on the bike. These forks must be partially disassembled to completely drain and refill the fork oil.

Front Fork Oil Level Adjustment (1989 European Models and All 1990 KX125 and KX250)

1. Support the bike so that the front wheel is off the ground.
2. Remove the front disc cover.
3. Remove the brake hose holder and front fork protector.
4. Remove the front fender.
5. Remove the handlebar as described in Chapter Eleven.

CAUTION
When performing Step 6, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

6A. On 1989 models, remove the screw installed in the center of the fork cap, then reinstall it.

6B. On 1990 models, remove the screw mounted off-center in the fork cap, then reinstall it.

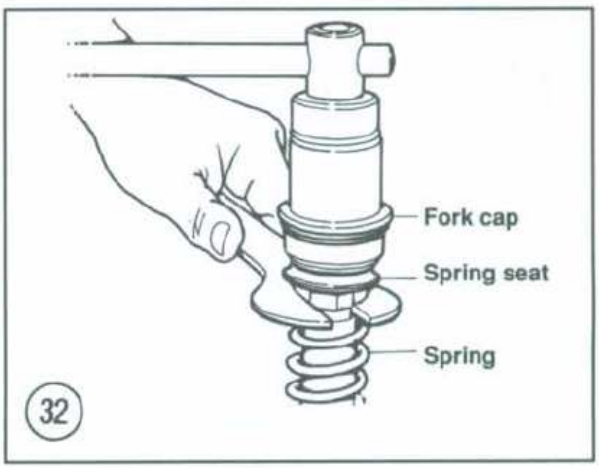
7. Loosen the upper fork tube pinch bolts.

8. Place a block underneath the front wheel to support it when removing the fork caps in Step 9.

9. Unscrew both front fork caps. Then slowly compress the front forks completely and block the front wheel in this position.

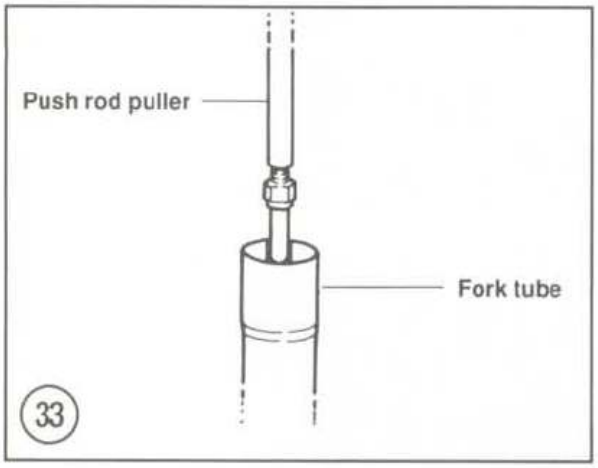
10. To remove the fork cap from the pushrod, perform the following:

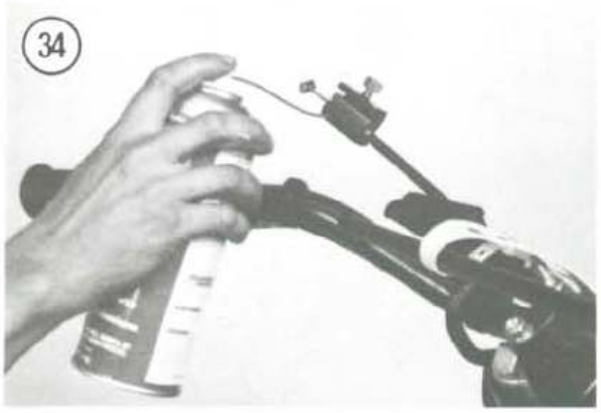
a. Pull the fork spring down and install the Kawasaki fork spring holder (part No. 57001-1286) or equivalent under the pushrod nut (**Figure 32**), effectively holding the fork spring away from the pushrod nut.
b. Hold the pushrod nut with a wrench.

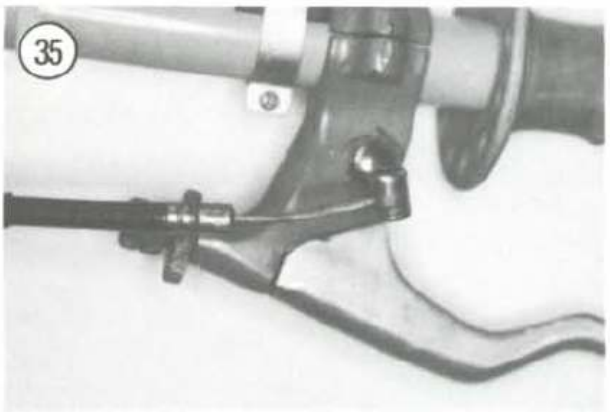


c. While holding the spring and pushrod nut with the 2 wrenches, loosen the fork cap with a socket or wrench (**Figure 32**).
d. Remove the fork cap and the spring seat(s); see **Figure 32**.
e. Remove 2 wrenches used to hold the spring and pushrod nut.

11. Remove the fork spring (**Figure 32**).
12. Measure the oil level (fork bottomed out) with an oil level tool. Adjust the oil level, maintaining it within the oil level range specified in **Table 9**. If necessary, add fork oil to obtain the correct oil level.
13. Thread the fork pushrod puller onto the end of the pushrod (**Figure 33**) and pull the pushrod up.
14. Install the fork spring over the pushrod (**Figure 32**).
15. Install the fork spring seats onto the fork spring (**Figure 32**).
16. Remove the pushrod holder and install the fork cap (**Figure 32**).
17. Install the spring holder underneath the pushrod nut (**Figure 32**).
18. Hold the fork cap with a wrench and tighten the pushrod nut against the fork cap (**Figure 32**) to the torque specification listed in **Table 8**.
19. Remove the fork spring holder.
20. Tighten the fork cap securely. Now tighten the upper fork tube pinch bolts to the torque specification in **Tables 8.**
21. Reverse Steps 1-5 to complete reassembly.







Front Fork Oil Level Adjustment (1990-on KX500 and 1991 KX125 and KX250)

The cartridge forks used on these models are not designed for having their fork oil level checked and adjusted while the forks are assembled or installed on the bike. These forks must be partially disassembled as described in Chapter Eleven.

Control Cables

The clutch and throttle cables should be cleaned and lubricated at the intervals indicated in **Table 1**. In addition, the cables should be checked for kinks and signs of wear and damage or fraying that could cause the cables to fail or stick. Cables are expendable items and won't last forever under the best of conditions.

The most positive method of control cable lubrication involves the use of a cable lubricator like the one shown in **Figure 34**. A can of cable lube or a general lubricant will also be required.

1. Loosen the clutch cable adjuster at the handlebar and disconnect the clutch cable (**Figure 35**).
2. Disconnect the throttle cable at the handlebar (**Figure 36**) and at the carburetor slide (**Figure 37**).
3. Attach a cable lubricator following the manufacturer's instructions (**Figure 34**).

4. Insert the nozzle of the lubricant can in the lubricator, press the button on the can and hold down until the lubricant begins to flow out of the other end of the cable. If you cannot get the cable lube to flow through the cable at one, remove the lubricator and try at the opposite cable end (**Figure 38**).

NOTE

Place a shop cloth at the end of the cable to catch the oil as it runs out.

5. Disconnect the lubricator.
6. Apply a light coat of grease to the cable balls before reconnecting them.
7. Reconnect the cables and adjust the cables as described in this chapter.
8. Operate the throttle, checking that it opens and closes smoothly with no binding.

Drive Chain Lubrication

The drive chain should be lubricated before each ride and then throughout the day as required. A properly maintained chain will provide maximum service life and reliability.

1. Support the bike so that the rear wheel is off the ground.
2. Shift the transmission into NEUTRAL.
3. Spray chain lube onto the sprocket side of the chain and rotate the chain for one complete rotation. Repeat for both sides of the chain. Then lube the outer sides of the rollers. Do not overlubricate as this will cause dirt to collect on the chain and sprockets.

CAUTION

Only a commercial lubricant that is formulated for O-ring chains should be used to lubricate O-ring chains.

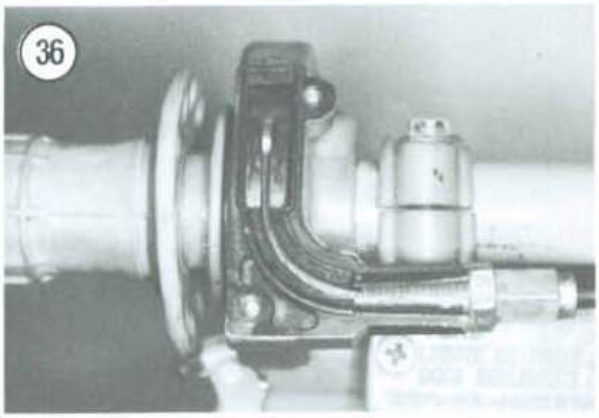
4. Wipe off all excess oil from the rear hub, wheel and tire.
5. Check that the master link is properly installed and secured.

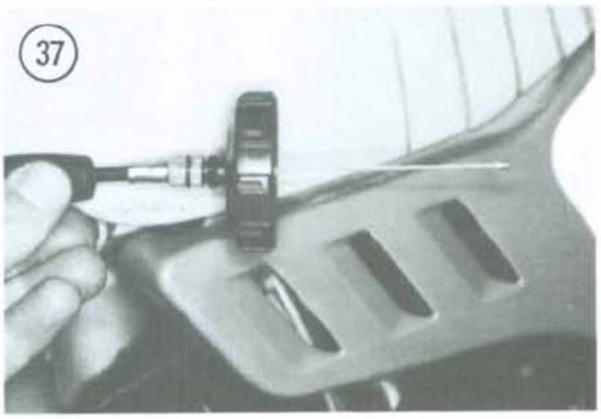
Swing Arm Bushing and Needle Bearing Lubrication

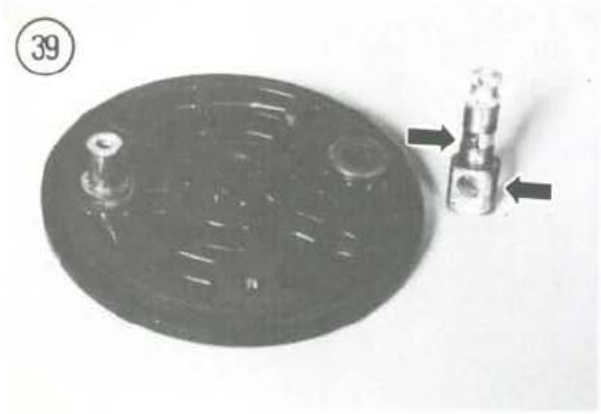
The swing arm needle bearings and bushings should be lubricated at the intervals specified in **Table 1**. The swing arm must be removed and partially disassembled to lubricate the bushings and bearings. Refer to Chapter Twelve.

Uni-Trak Linkage Lubrication

The Uni-Trak linkage pivot bearings should be lubricated at the intervals indicated in **Table 1**. The Uni-Trak suspension components must be removed and disassembled to lubricate the bearings. Refer to Chapter Twelve.







Rear Shock Absorber Bearing Lubrication

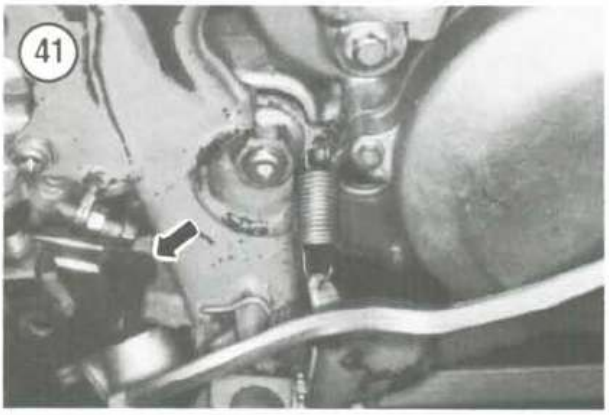
The rear shock absorber spherical bearings, collars and pivot bolts should be cleaned and lubricated at the intervals specified in **Table 1**. The rear shock absorber must be removed to lubricate these parts. Refer to Chapter Twelve.

Rear Brake Cam and Pivot Lubrication

The brake cam and pivot (**Figure 39**) should be cleaned and lubricated at the intervals specified in **Table 1**. The rear brake backing plate must be removed to lubricate these parts. Refer to Chapter Thirteen.

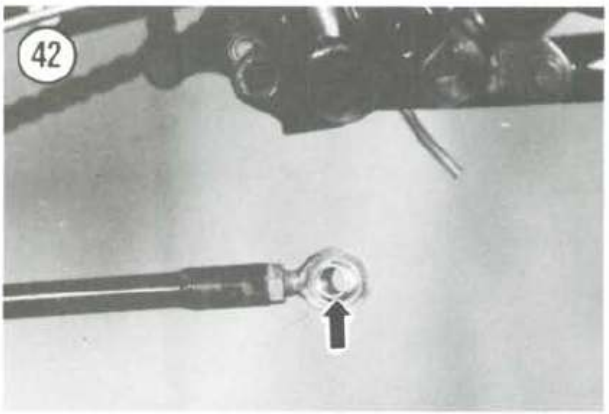
Rear Brake Backing Plate Axle Bushings and Torque Link Bearing Lubrication

These parts (**Figure 40**) should be cleaned and lubricated at the intervals specified in **Table 1**. The rear brake plate must be removed to lubricate these parts. Refer to Chapter Thirteen.



Rear Brake Pedal Pivot Shaft Lubrication

Remove the rear brake pedal and lubricate the pivot shaft (**Figure 41**) with waterproof grease. Reverse to install. Inspect the pedal's return spring for weakness or damage.



Drum Brake Torque Link Bearing Lubrication

The rear torque link is equipped with bearings at both ends (**Figure 42**). Remove the link and lubricate the bearings with waterproof grease.

Kickstarter Spline Lubrication (Early Models)

Remove the kickstarter pinch bolt and remove the kickstarter (**Figure 43**). Clean the kick shaft and kickstarter splines with solvent or contact cleaner and lubricate the splines sparingly with waterproof grease. Reverse to install.

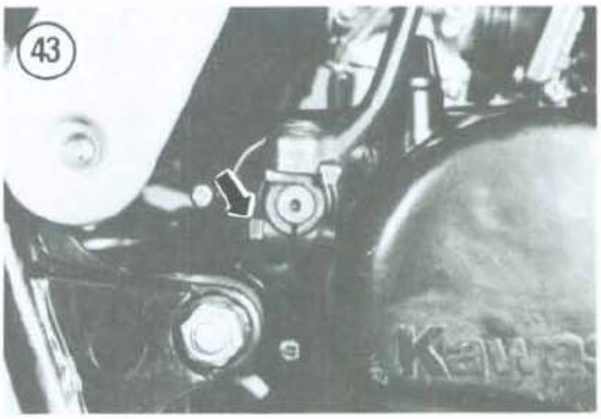
Kickstarter Spline Lubrication (Late Models)

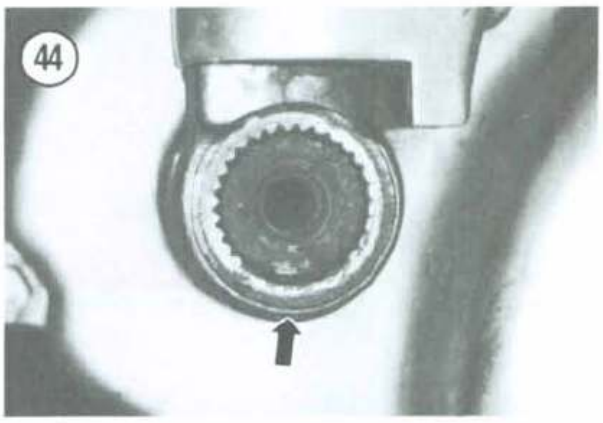
On these models, the kickstarter pivot boss is a close fit on the kick shaft (**Figure 44**); the kickstarter is secured with a single screw that threads into the kick shaft instead of the pinch bolt used on earlier models. Failure to clean and lubricate the mating splines will allow rust to form between both parts and make it difficult to remove the kickstarter.

NOTE

If the kickstarter is difficult to remove, do not attempt to pry it off as you may crack the clutch cover. Instead, mount a small 2-jaw puller (like a battery cable puller) onto the kickstarter and pull it off. Block the threaded hole in the kick shaft to prevent the puller from damaging it.

Remove the kickstarter holding screw and remove the kickstarter. Clean the kick shaft (**Figure 45**) and kickstarter splines with solvent or contact cleaner and lubricate the splines sparingly with waterproof grease. Reverse to install.



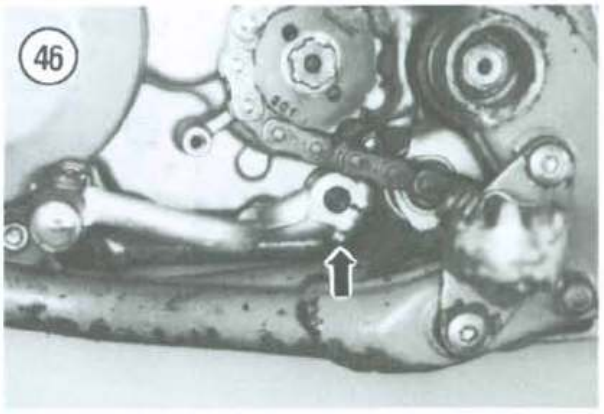


Shift Lever Lubrication

Remove the shift lever pinch bolt and remove the lever (**Figure 46**). Clean the lever and shift shaft splines with solvent or contact cleaner and lubricate the splines sparingly with waterproof grease. Check the shift lever pinch bolt for thread damage or other defects. This bolt receives a fair amount of abuse and should be replaced before it damages the shift lever threads. Reverse to install.

Control Lever Pivot Bolt Lubrication

The brake and clutch lever pivot bolts (**Figure 47**) should be removed and lubricated with waterproof grease.



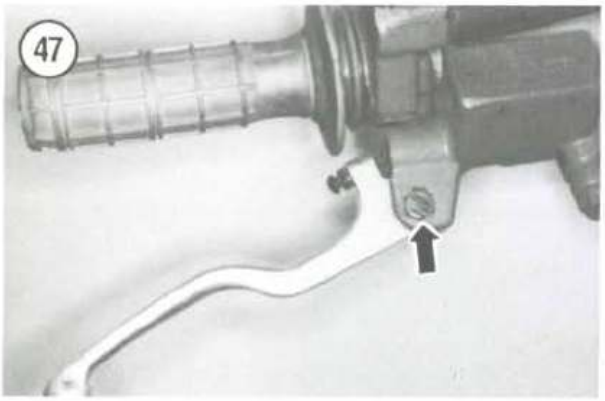
Footpeg Pivot Pin Lubrication

Remove the left- and right-hand footpeg assemblies (**Figure 48**). Clean the pivot pin of all rust and

dirt and lubricate sparingly with waterproof grease. Reverse to install, using a new cotter pin.

Wheel Bearings

Non-sealed wheel bearings should be cleaned and repacked at the intervals specified in **Table 1**. Sealed bearings should be inspected at the same intervals for leaking or damaged seals. Service procedures are described in Chapter Eleven (front) and Chapter Twelve (rear).



PERIODIC MAINTENANCE

Drive Chain
Cleaning

The drive chain should be cleaned after each race or weekend trail ride. The chain should be lubricated before each ride and throughout the day as required. A properly maintained chain will provide maximum service life and reliability.

1. Support the bike on a stand so that the rear wheel clears the ground.
2. Shift the transmission into NEUTRAL.

NOTE

If the drive chain is equipped with a press fit master link, remove and install it as described under ***Drive Chain*** *in Chapter Twelve.*

3. Disconnect the master link (**Figure 49**) and remove the chain from the motorcycle.

CAUTION

*If your bike is equipped with an O-ring drive chain (**Figure 50**), clean the chain with a cleaner that has been recommended by the chain manufacturer. Most solvents and gasoline will cause the O-rings to swell and deteriorate.*

4. Immerse the chain in a pan of cleaning solvent and allow it to soak for about a half hour. Move it around and flex it during this period so that the dirt between the pins and rollers can work its way out.
5. Scrub the rollers and side plates with a stiff brush and rinse away loosened dirt. Rinse it a couple of times to make sure all dirt and grit are washed out. Hang up the chain and allow the solvent to drip off.
6. Lubricate the chain with a good grade of chain lubricant, carefully following the manufacturer's instructions.
7. Reinstall the chain on the motorcycle. Use a new master link clip and install it so that the closed end of the clip is facing the direction of chain travel (**Figure 51**).

WARNING

Always check the master link clip after the bike has been rolled backwards such as unloading from a truck or trailer. The master link clip may have snagged on the chain guide or tensioner and be-

come disengaged. Obviously, losing a chain while riding can cause a serious spill not to mention the chain damage which may occur.

Drive Chain/Sprocket Wear Inspection

Kawasaki recommends replacing the drive chain when it has worn longer than 2% of its original length.

A quick check will give you an indication of when to actually measure chain wear. At the rear sprocket, pull one of the links away from the sprocket. If the link pulls away more than 1/2 the height of a sprocket tooth, the chain has probably worn out (**Figure 52**).

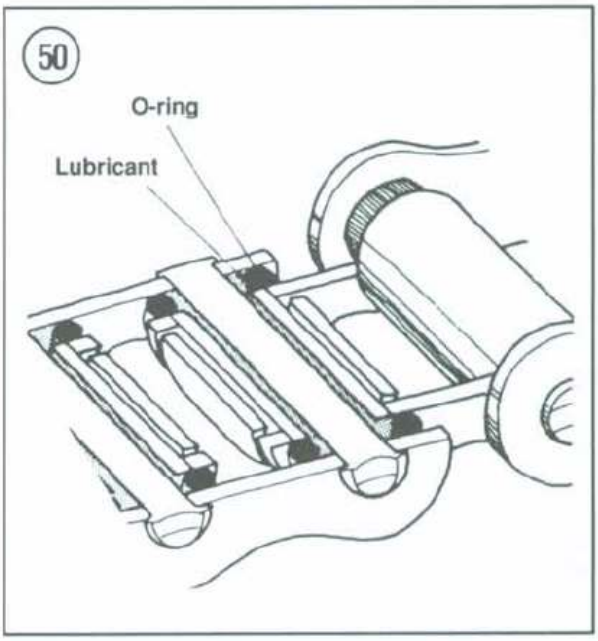
To measure chain wear, perform the following:

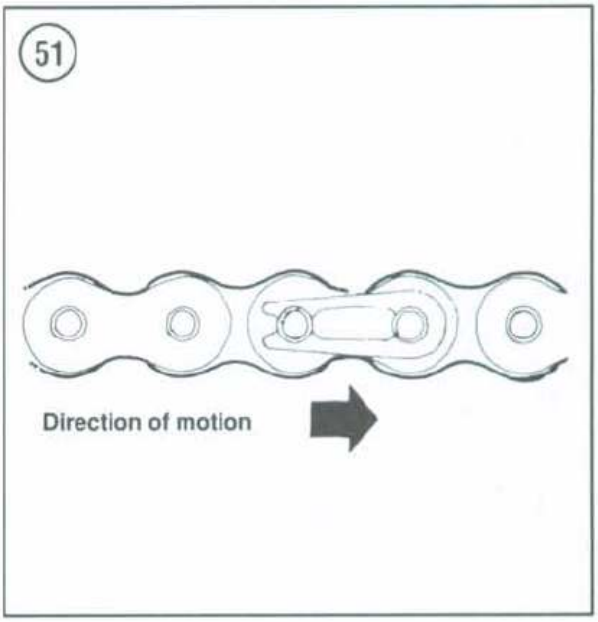
1. Loosen the axle nut and tighten the chain adjusters to move the wheel rearward until the chain is tight (no slack).
2. Lay a scale along the top chain run (**Figure 53**), and measure the length of any 20 links in the chain, from the center of the first pin you select to the 21st pin. If the link length is more than the limit given in **Table 10**, install a new drive chain.
3. Check the inner plate chain faces (**Figure 54**). They should be lightly polished on both sides. If they show considerable uneven wear on one side, the sprockets are not aligned. Severe wear requires chain and sprocket replacement.
4. If the drive chain is worn, inspect the rear wheel and engine sprockets for the following defects:
   a. Undercutting or sharp teeth (**Figure 55**).
   b. Broken teeth (**Figure 56**).
5. If wear is evident, replace the chain and sprockets as a set, or you'll soon wear out a new drive chain.

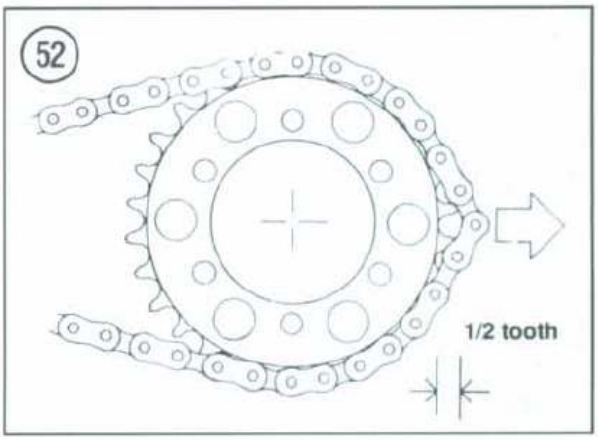
Drive Chain Adjustment

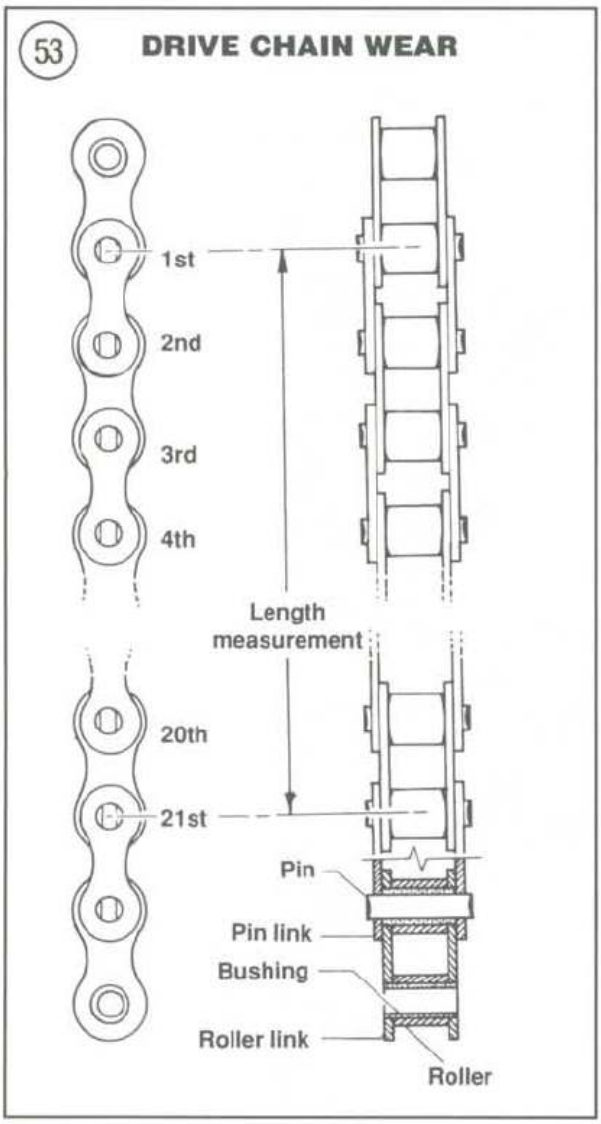
The drive chain must have adequate play so that the chain is not strung tight when the swing arm is horizontal. On the other hand, too much play may cause the chain to jump off the sprockets with potentially disastrous results. **Figure 57** illustrates an engine case which was damaged from a thrown chain.

When riding in mud and sand, the dirt buildup will make the chain tighter. Recheck chain play and readjust as required.









The drive chain should be checked and adjusted prior to each race or weekend ride. Drive chain free play is listed in **Table 11**.

1. Place the bike on a stand so that the rear wheel clears the ground. Spin the wheel and check the chain for tightness at several spots. Check and adjust the chain at its tightest point (the chain wears unevenly).

2. Lower the bike so that both wheels are on the ground. Support the bike by the sidestand. There should not be a rider on the bike when performing this adjustment.

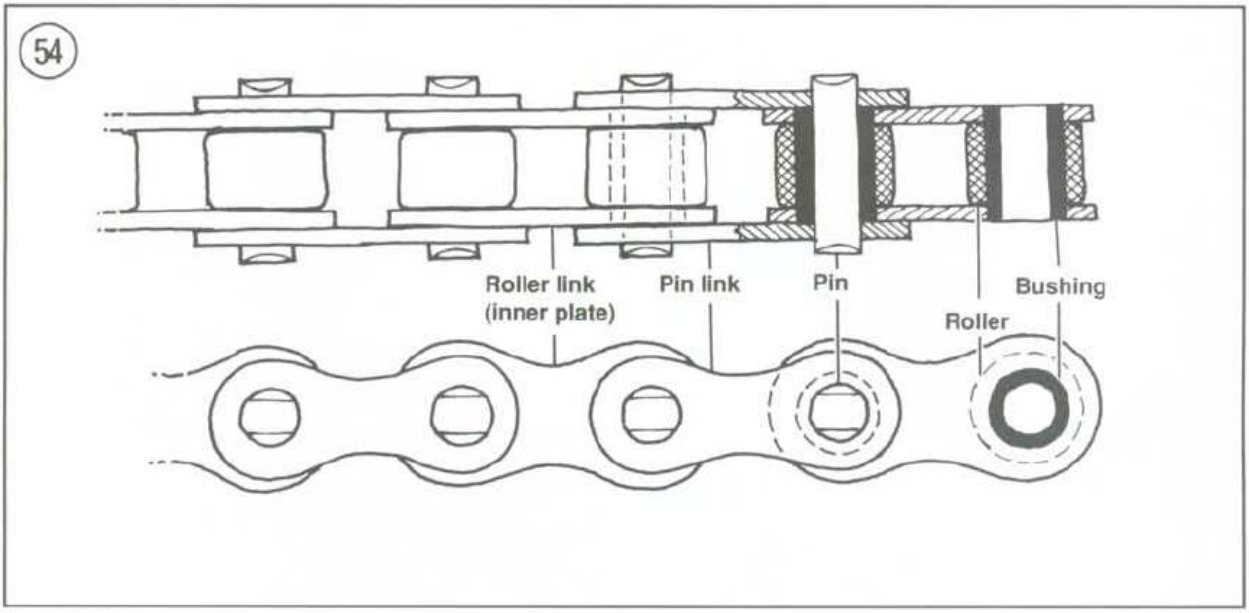
3A. On all 1983-1987 models and on 1990-1991 KX125 and KX250 models, push the middle of the upper chain run up away from the swing arm. Measure free play between the chain and swing arm at the rear of the rubber swing arm protector (**Figure 58**).

3B. On 1988-1989 KX125 and KX250 and 1988-on KX500 models, measure free play at the middle of the chain as shown in **Figure 59**.

4. Compare the drive chain free play with the specifications for your model listed in **Table 11**. If necessary, adjust the drive chain as follows.

NOTE

When adjusting the drive chain, you must also maintain rear wheel alignment. A misaligned rear wheel can cause poor handling and pulling to one side or the other, as well as increased chain and sprocket wear. All models



have wheel alignment marks on the swing arm and chain adjusters.

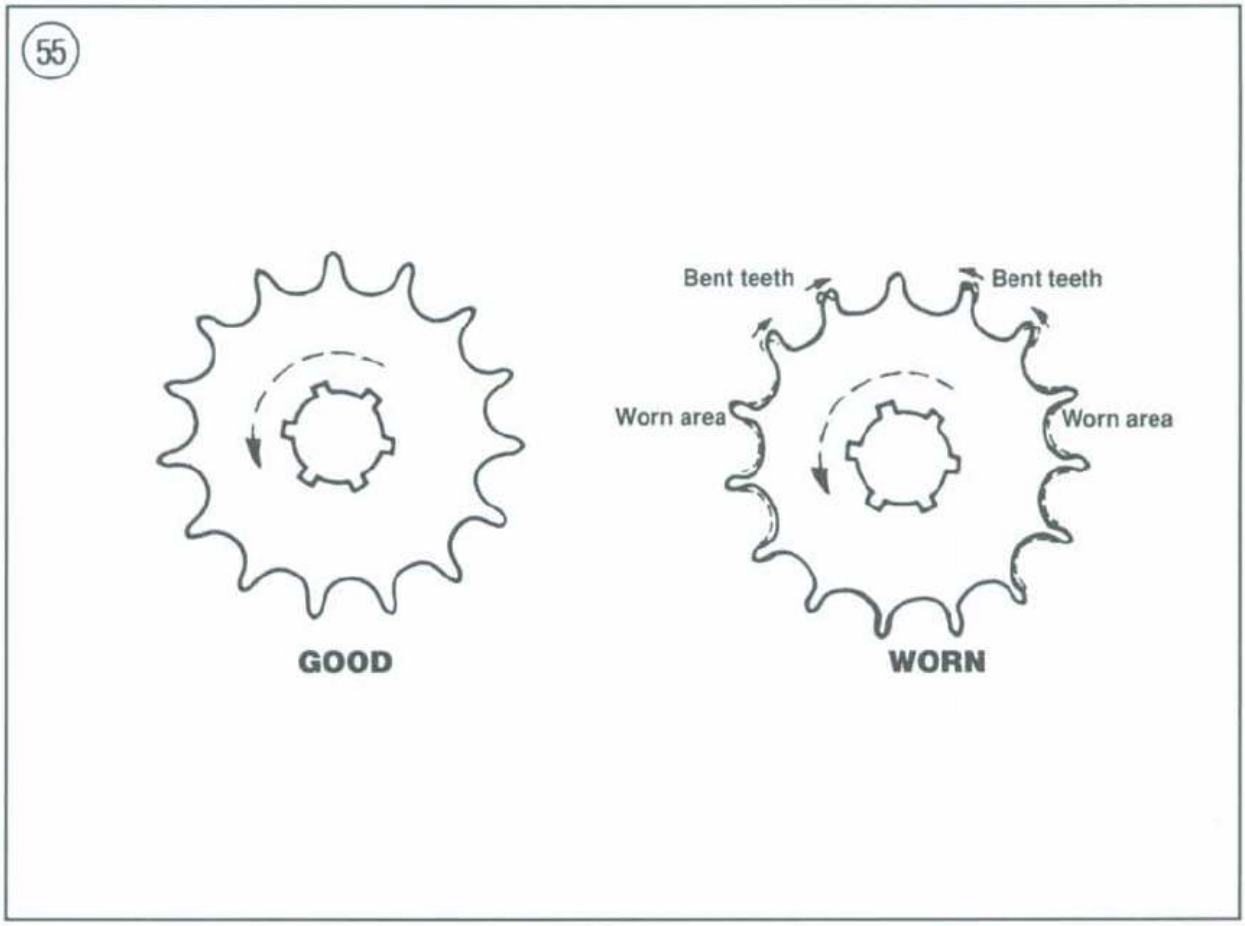
5. On models with rear drum brake, loosen the rear torque link nut/bolt (**Figure 60**).

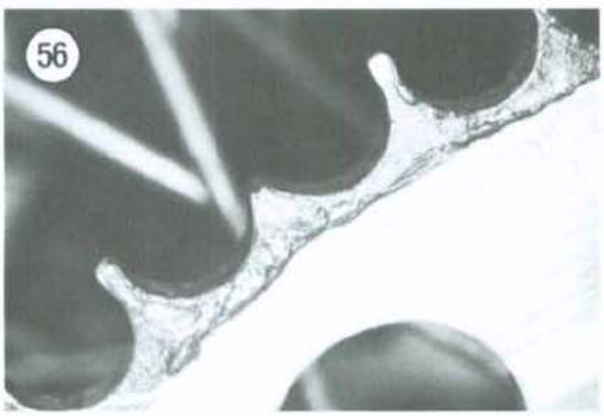
6. Remove the axle nut cotter pin (if used) and loosen the axle nut.

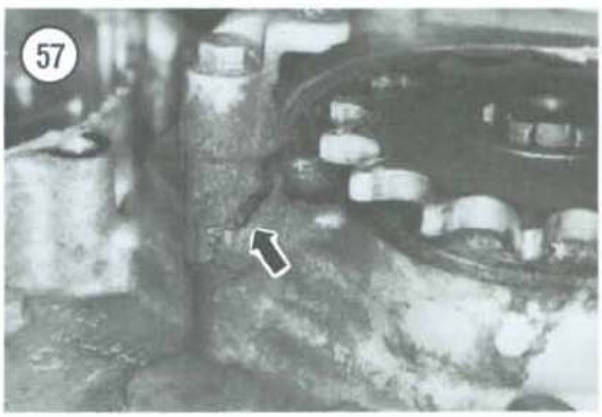
7. Loosen the adjuster locknuts. See **Figure 60**, **Figure 61** or **Figure 62** for the different adjusters used on these models.

8. Loosen the axle adjuster locknut (A, **Figure 63**) and turn the adjuster bolt (B, **Figure 63**). Turn the adjuster in or out as required in equal amounts. Be sure the marks on both adjusters align with the same marks on each side of the swing arm or adjuster plate.

9. When chain play is correct, check wheel alignment by sighting along the chain from the rear sprocket. It should leave the sprocket in a straight





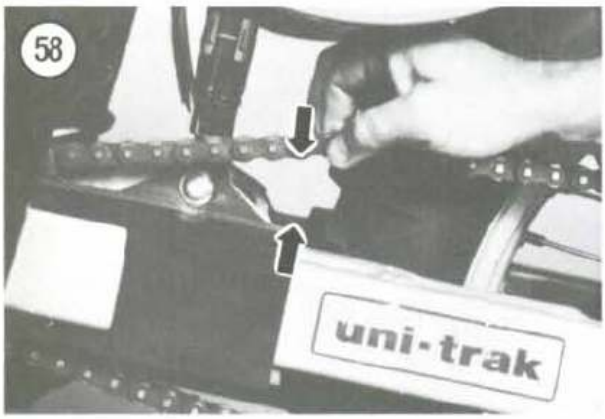


line (A, **Figure 64**). If it is cocked to one side or the other (B and C, **Figure 64**), adjust wheel alignment by turning one adjuster or the other. Recheck chain play.

NOTE

To prevent a "spongy" feeling drum brake: partially tighten the axle nut, spin the wheel and stop it forcefully with the brake pedal. Then tighten the axle nut. This method centers the brake shoes in the drum.

10. Tighten the rear axle nut to the torque specification in **Table 8**. Install a new cotter pin, if equipped.
11. Tighten the rear torque link nut on drum brake models.
12. Adjust the rear brake as described in this chapter.

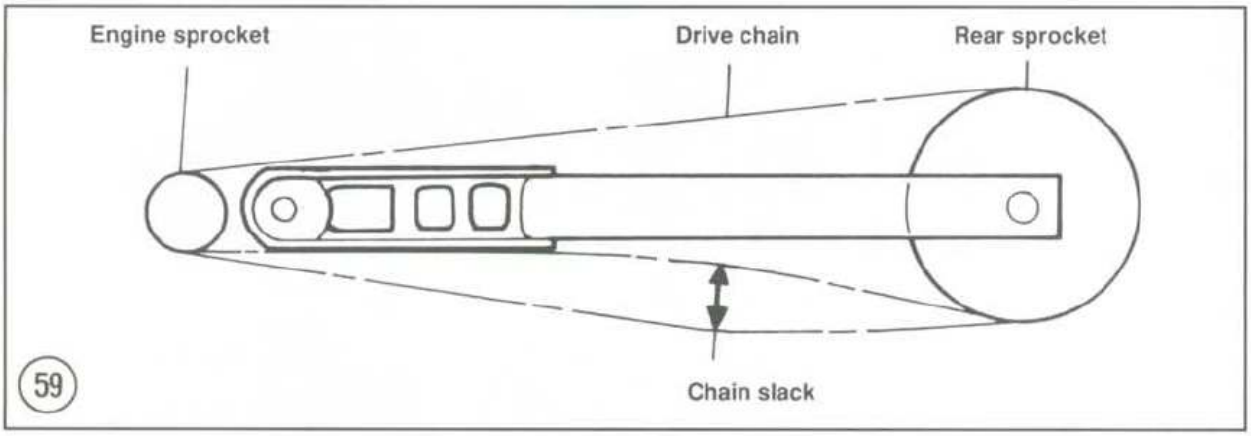


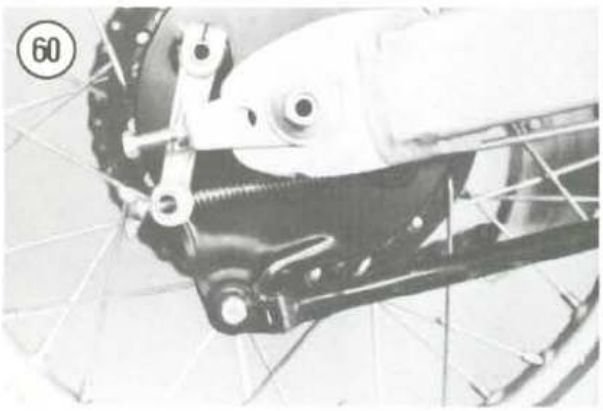
Drive Chain Guard and Rollers Replacement

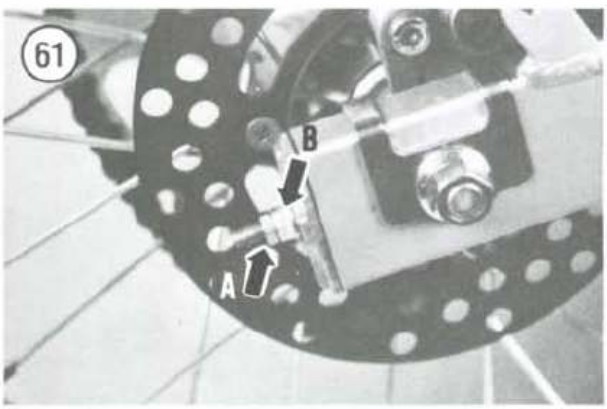
Visually inspect the chain guide, rollers (**Figure 65**) and swing arm cover (**Figure 66**) and replace them when excessively worn. A worn or damaged part will allow the drive chain to damage the swing and rear swing arm.

Front Brake Lever Adjustment

Brake pad wear in the caliper is automatically adjusted as the piston moves forward in the caliper. However, the brake lever should be checked for







adequate clearance between the adjuster bolt and piston. Reduced clearance can cause brake drag and premature brake pad wear.

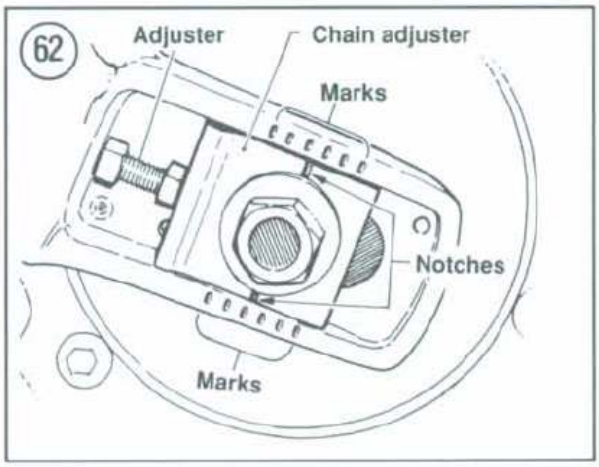
1. Loosen the locknut and turn the adjuster bolt (A, **Figure 67**) in or out to achieve a free play that best suits your riding style, but not so tight that brake drag would result.

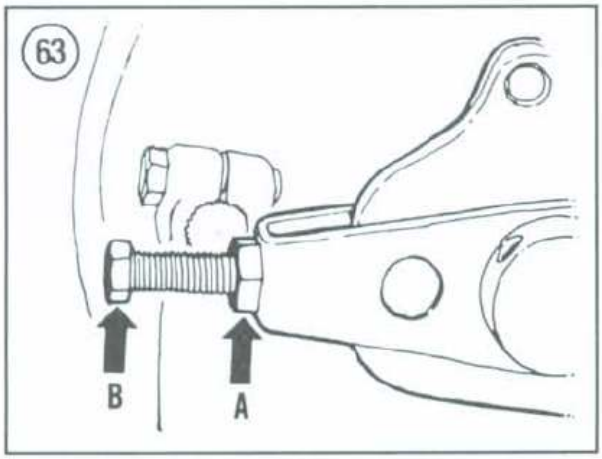
2. Tighten the locknut.

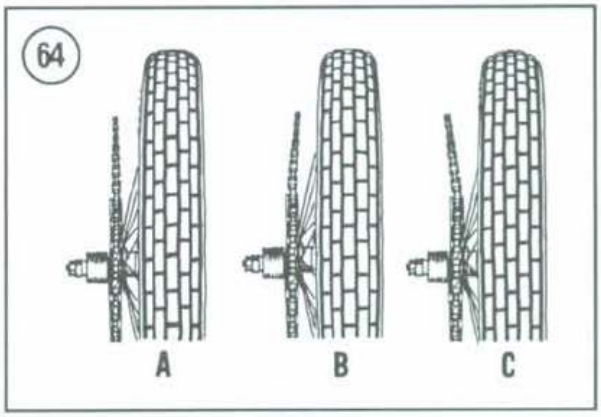
Rear Brake Pedal Adjustment (Drum Brake)

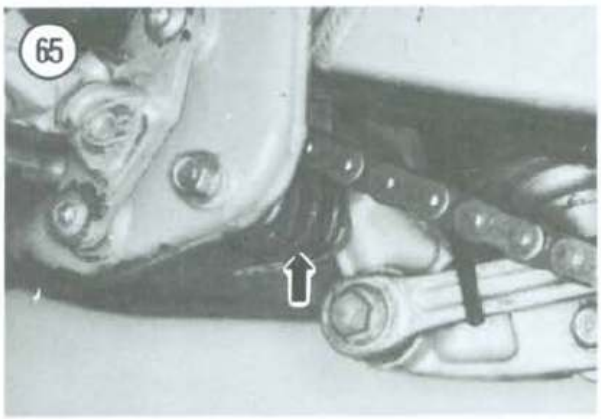
The rear drum brake can be adjusted two ways: (1) rear brake pedal travel and (2) rear brake pedal height. Both adjustments are largely a matter of personal preference.

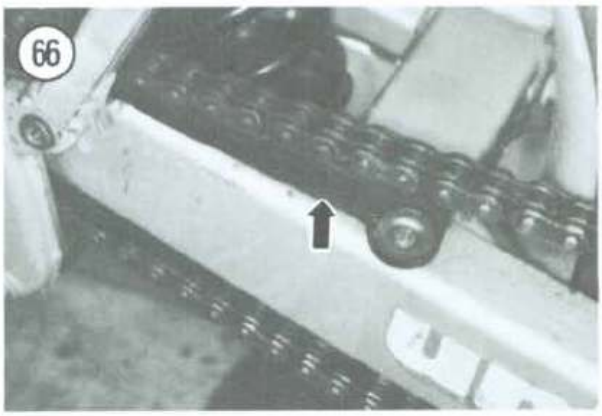
To adjust the rear brake, turn the brake adjusting nut on the brake arm at the rear wheel (**Figure 60**). Normal pedal travel is approximately 20-30 mm (25/32-1 3/16 in.).

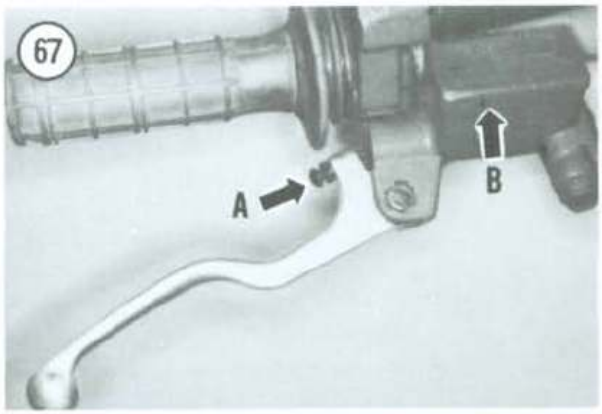






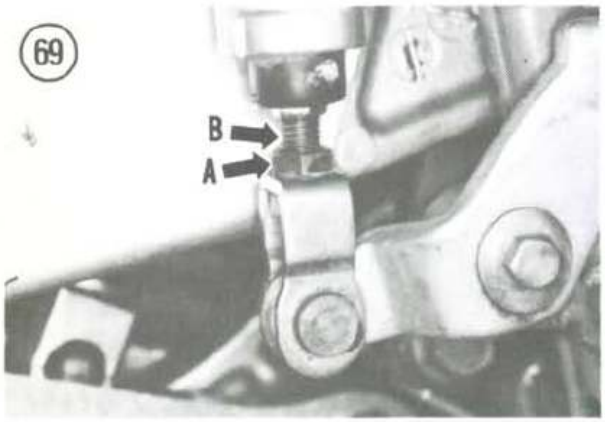






The brake pedal height (**Figure 68**, typical) is adjustable with a bolt and locknut. Loosen the locknut and turn the bolt as required to reposition the brake pedal. Tighten the locknut. Rotate the rear wheel and check for brake drag. Also operate the pedal several times to make sure it returns to the at-rest position immediately after release.

Rotate the rear wheel and check for brake drag. Also operate the pedal several times to make sure it returns to the at-rest position immediately after release.



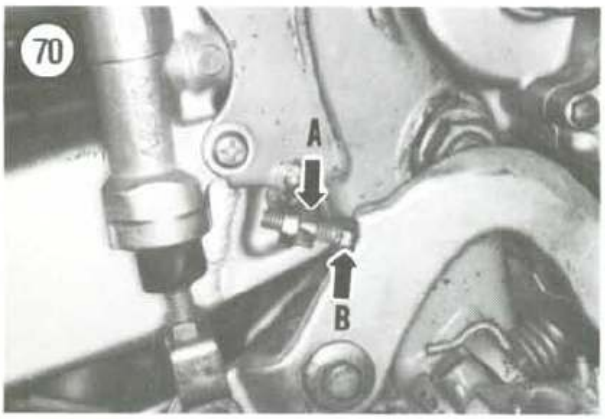
Rear Brake Pedal Adjustment (Disc Brake)

The rear disc brake pedal can be adjusted two ways: (1) rear brake pedal play and (2) rear brake pedal height. Both adjustments are largely a matter of personal preference.

To adjust the rear brake pedal play, loosen the master cylinder locknut (A, **Figure 69**) and turn the adjust bolt (B, **Figure 69**) as necessary. Tighten the locknut.

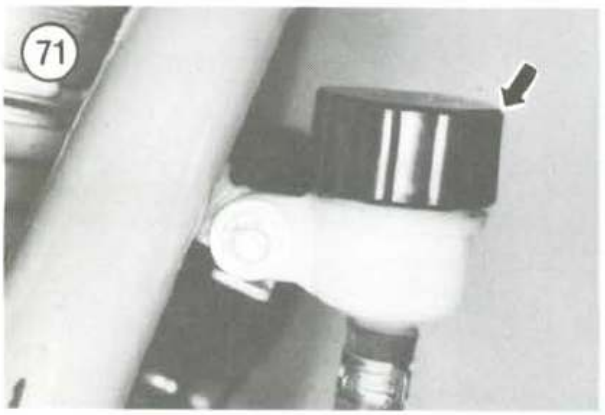
To adjust the rear brake pedal height position, loosen the pedal locknut (A, **Figure 70**) and turn the adjuster (B, **Figure 70**) as necessary. Tighten the locknut.

Rotate the rear wheel and check for brake drag. Also operate the pedal several times to make sure it returns to the at-rest position immediately after release.



Brake Fluid Level Check

The brake fluid level in the reservoir should always be kept more than half full. See B, **Figure 67** (front) and **Figure 71** (rear). If the brake fluid drops below half-full, correct by adding fresh DOT 3 brake fluid.



NOTE

If the brake fluid level lowers rapidly, check the brake hose and fittings.

1. Place the bike on level ground.
2. Clean any dirt from the cover prior to removing the cover.

3A. *Front*: Perform the following:

a. Turn the handlebar so that the master cylinder reservoir is level.

b. Remove the 2 top cover screws and remove the cover and diaphragm (B, **Figure 67**).

3B. *Rear*: Perform the following:

a. Remove the reservoir cover, if equipped.

b. Unscrew the cover and remove it and the diaphragm (**Figure 71**) or remove the cover screws and remove the cover and diaphragm.

4. Add fresh DOT 3 brake fluid from a sealed container.

WARNING

Use brake fluid clearly marked DOT 3 and specified for disc brakes. Others may vaporize and cause brake failure. Do not intermix different brands or types of brake fluid as they may not be compatible. Do not intermix a silicone based (DOT 5) brake fluid as it can cause brake component damage leading to brake system failure.

CAUTION

Be careful when handling brake fluid. Do not spill it on painted or plastic surfaces as it will destroy the surface. Wash the area immediately with soap and water and thoroughly rinse it off.

5. Reinstall the diaphragm and top cover. Install the screws and tighten securely.

Disc Brake Hoses

Check the brake hoses between the master cylinder and the brake caliper. If there is any leakage, tighten the banjo bolts and then bleed the brake as described in Chapter Thirteen. If this does not stop the leak or if a brake line is obviously damaged, cracked or chafed, replace the brake hose and bleed the system (Chapter Thirteen).

Replace the brake hoses at the intervals specified in **Table 1**.

Disc Brake Pad Wear

Replace the brake pads when the lining thickness (**Figure 72**) is worn to the wear limit specified in Chapter Thirteen, when the pads shows uneven wear and scoring, or if there is grease or oil on the friction surface. Check the disc for scoring and warpage. Refer to Chapter Thirteen.

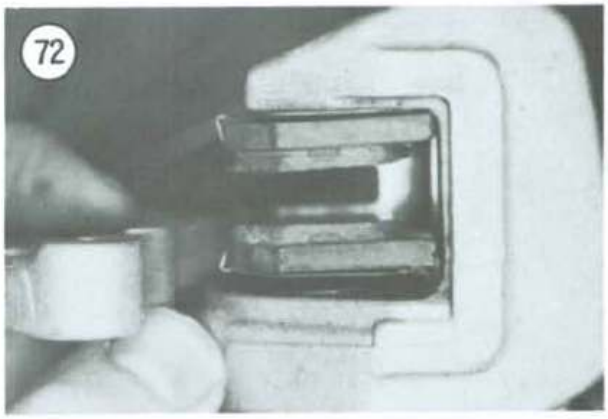
Disc Brake Fluid Change

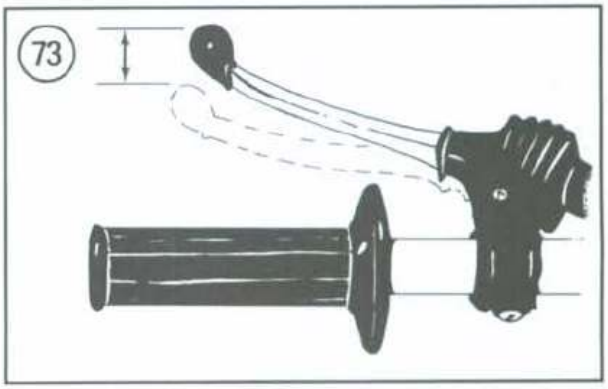
Every time the reservoir cap is removed, a small amount of dirt and moisture enters the brake fluid. The same thing happens if a leak occurs or any part of the hydraulic system is loosened or disconnected. Dirt can clog the system and cause unnecessary wear. Water in the brake fluid vaporizes at high temperature, impairing the hydraulic action and reducing the brake's stopping ability.

To maintain peak performance, change the brake fluid every year and when rebuilding a caliper or master cylinder. To change brake fluid, follow the brake bleeding procedure in Chapter Thirteen.

WARNING

Use brake fluid clearly marked DOT 3 only. Others may vaporize and cause brake failure. Dispose of any unused fluid according to local EPA regulations—never reuse brake fluid. Contaminated brake fluid can cause brake failure.



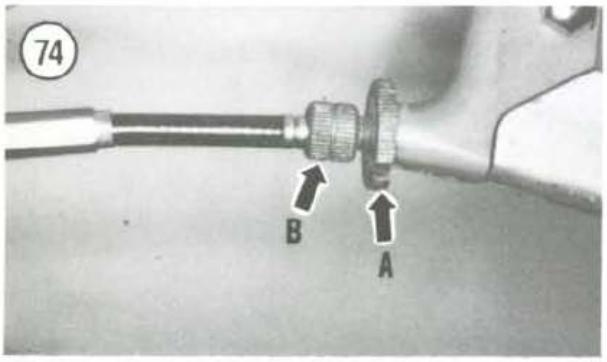


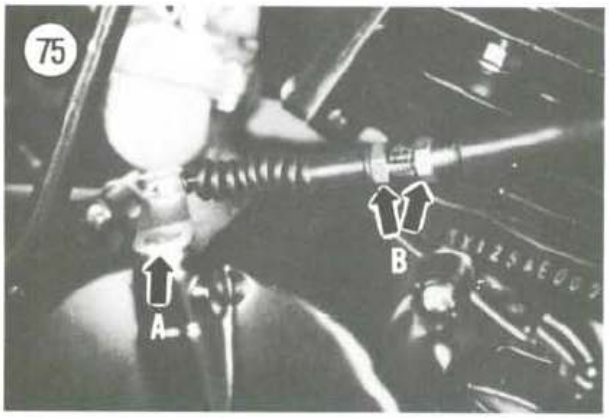
Brake Master Cylinder (Front and Rear)

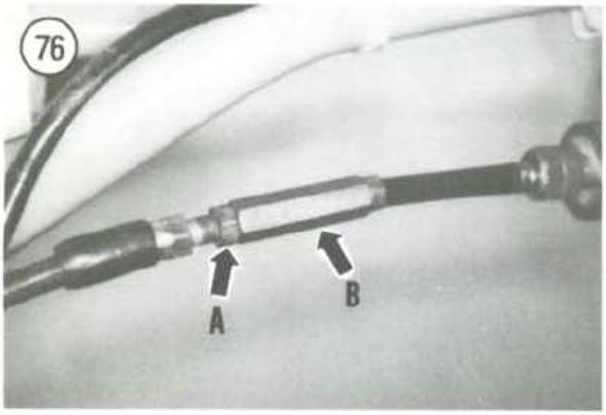
The master cylinder piston assembly should be replaced at the intervals indicated in **Table 1**. Refer to Chapter Thirteen for service procedure.

Brake Caliper (Front and Rear)

The brake caliper piston seals (dust and piston) should be replaced at the intervals indicated in **Table 1**. Refer to Chapter Thirteen for service procedures.







Clutch Adjustment

The clutch adjustment takes up slack caused by cable stretch. Clutch release mechanism adjustments are provided for 1982-1985 KX125 and 1982 KX250 models.

Clutch cable free play (**Figure 73**) must be maintained at 2-3 mm (3/32-1/8 in.). Insufficient free play will cause clutch slippage and rapid clutch disc wear.

1. Pull the clutch lever toward the handlebar. When cable resistance is felt, hold the lever and measure the gap shown in **Figure 73**; this is clutch cable free play. If resistance was felt as soon as you pulled the clutch lever, there is no cable free play.

2. See **Figure 74**. At the hand lever loosen the locknut (A) and turn the adjuster (B) in or out to obtain the correct amount of free play. Tighten the locknut.

3. If the proper amount of free play cannot be achieved at the clutch lever adjuster, perform the following:

   a. At the clutch lever, loosen the locknut (A, **Figure 74**) and turn the adjuster (B, **Figure 74**) in all the way. Tighten the locknut.

   b. *1982-1985 KX125*: Loosen the clutch cable nuts at the right-hand side of the cylinder (A, **Figure 75**). Turn the adjuster (B, **Figure 75**) until the clutch adjustment is correct at the clutch lever; tighten the nuts securely. If necessary, fine-tune the adjustment at the lever adjuster (B, **Figure 74**).

   c. *All other models*: Loosen the mid-cable adjuster locknut (A, **Figure 76**) and turn the adjuster (B, **Figure 76**) as required. Tighten the locknut. If necessary, fine-tune the adjustment at the lever adjuster (B, **Figure 74**).

4A. 1982-1985 KX125 and 1982 KX250 models: If the clutch slips, or if the lever feels stiff in spite of proper cable lubrication, adjust the clutch as described under *Clutch Release Adjustment* in Chapter Six.

4B. All other models: If the proper amount of free play cannot be achieved by using this adjustment procedure, either the cable has stretched to the point that it needs to be replaced or the friction discs are worn and need replacing. Refer to Chapter Six for cable and clutch plate replacement.

Throttle Cable Adjustment and Operation

Some throttle cable play is necessary to prevent changes in the idle speed when you turn the handlebars. Kawasaki specifies a throttle cable free play of 2-3 mm (1/8 in.).

In time, the throttle cable free play will become excessive from cable stretch. This will delay throttle response and affect low speed operation. On the other hand, if there is no throttle cable free play, an excessively high idle can result.

Minor adjustments can be made at the throttle grip adjuster. Major adjustments can be made at the throttle cable adjuster that attaches to the carburetor cap.

1. Start the engine and allow it to idle.
2. With the engine at idle, twist the throttle to raise engine speed.
3. Determine the amount of movement (free play) required to raise the engine speed from idle. If the free play is incorrect, perform the following.
4. If adjustment is necessary, slide back the rubber boot at the throttle grip, loosen the locknut and turn the adjuster (**Figure 77**) in or out to achieve proper free play rotation. Tighten the locknut.
5. If the adjustment cannot be corrected at the throttle grip adjuster, turn the throttle grip adjuster all the way in. Then slide back the rubber boot and loosen the locknut at the carburetor (**Figure 78**). Turn the adjuster out as required; tighten the locknut. If the adjustment is still incorrect, readjust at the throttle grip adjuster. Tighten the locknut.
6. Slide the rubber boot(s) back into position over the adjuster(s).
7. If the throttle cable cannot be adjusted properly, the cable has stretched excessively and must be replaced.
8. Make sure the throttle grip rotates freely from a fully closed to fully open position.
9. Start the engine and allow it to idle. Turn the handlebar from side-to-side. If the idle increases, the throttle cable is routed incorrectly or there is not enough cable free play.

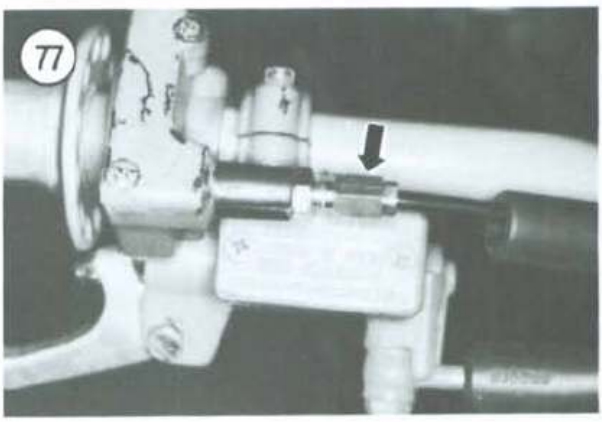
NOTE

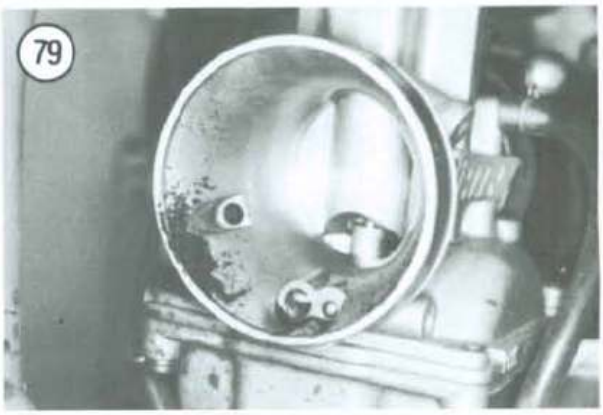
A damaged throttle cable will prevent the bike from idling properly.

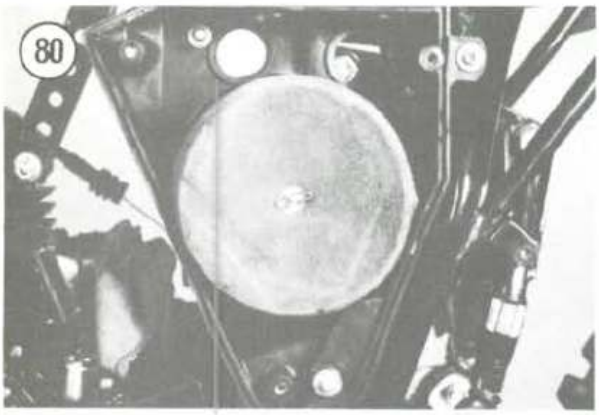
Throttle Grip

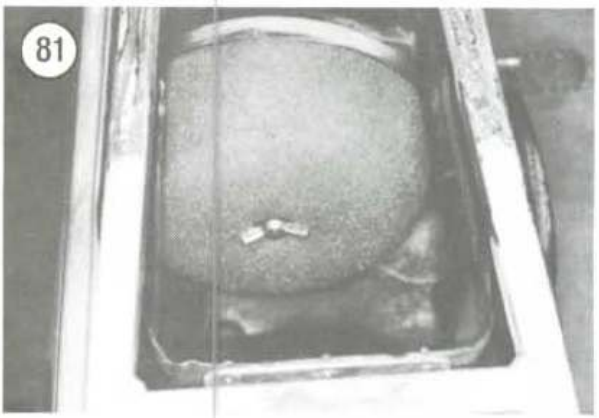
After each race, the throttle grip and throttle housing should be cleaned and serviced.

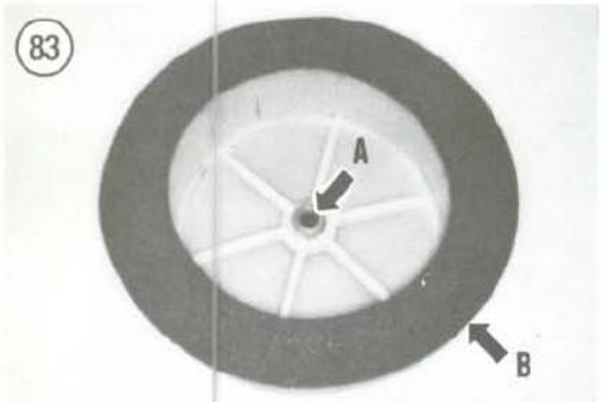
1. Remove the Phillips screws securing the throttle housing.
2. Separate the throttle housings.
3. Disconnect the throttle cable at the twist grip.
4. Clean the inner twist grip bore with electrical contact cleaner.
5. Clean the throttle housings thoroughly.











6. Check the end of the handlebar for burrs or other damage that would cause the twist grip to stick or operate sluggishly. If necessary, smooth the end of the handlebar with a file.
7. Install by reversing these steps. Make sure the throttle grip rotates freely from a fully closed to fully open position.

Air Filter

A clogged air filter will decrease the efficiency and life of the engine. Never run the bike without an air filter properly installed. Even minute particles of dust can cause severe internal engine wear and clogging of carburetor passages. **Figure 79** illustrates the dirt that can pass through an improperly installed or damaged air filter. Frequent air filter inspection and cleaning is especially important on KX models because of the Electro-Fuse cylinders; once the cylinder's Electro-Fuse coating is damaged, the cylinder can not be rebored. It must be replaced or rebuilt.

On 1982-1983 models, Kawasaki recommends replacing the air filter elements after cleaning them 5 times, because the cleaning process enlarges the filter pores of foam elements. On all models, handle them carefully and replace them at the first sign of tearing or any other damage.

Due to the number of different KX models covered in this manual, the following should be used as a basic guide to removal and installation.
1. Remove the side panel or the seat to access the air filter.
2. Remove the wingnut securing the air filter to the housing and remove the filter. See **Figure 80** or **Figure 81**.
3. Wipe the air box out with a clean rag. If you cannot clean the air box with it mounted on the bike, remove and clean it with soap and water.
4. Cover the air box opening with a clean shop rag (**Figure 82**).
5. Inspect all fittings, hoses and connections from the air box to the carburetor. Check each hose clamp for tightness.
6. Pull the foam element off its frame (A, **Figure 83**).

CAUTION

Do not clean the air filter element with gasoline. Besides being a fire hazard, gasoline will break down the filter's seam glue and corrode the seam stitching.

6. Clean the filter element in a filter solvent to remove oil and let it dry. If you are using an accessory air filter, the manufacturer may sell a special air filter cleaner.
7. Fill a clean pan with liquid cleaner and warm water.
8. Submerge the filter into the cleaning solution and gently work the cleaner into the filter pores. Soak and squeeze (gently) the filter to clean it.

CAUTION

Do not wring or twist the filter when cleaning it. This harsh action could damage a filter pore or tear the filter loose at a seam. This would allow unfiltered air to enter the engine and cause severe and rapid wear.

9. Rinse the filter under warm water while soaking and gently squeezing it.
10. Repeat Step 8 and Step 9 two or three times or until there are no signs of dirt being rinsed from the filter.
11. After cleaning the element, inspect it (**Figure 84**). If it is torn or broken in any area it should be replaced. Do not run with a damaged element as it may allow dirt to enter the engine and cause severe engine wear.
12. Set the filter aside and allow it to dry thoroughly.

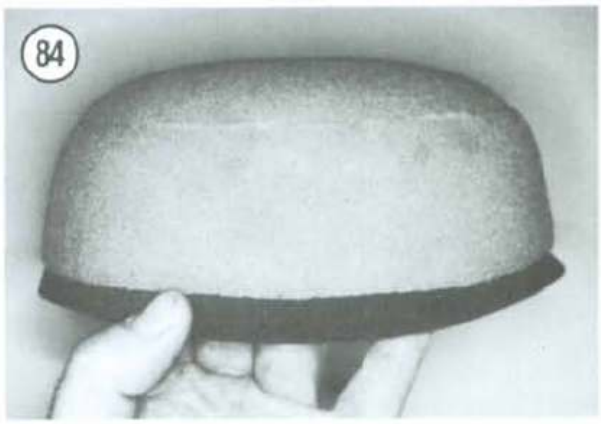
CAUTION

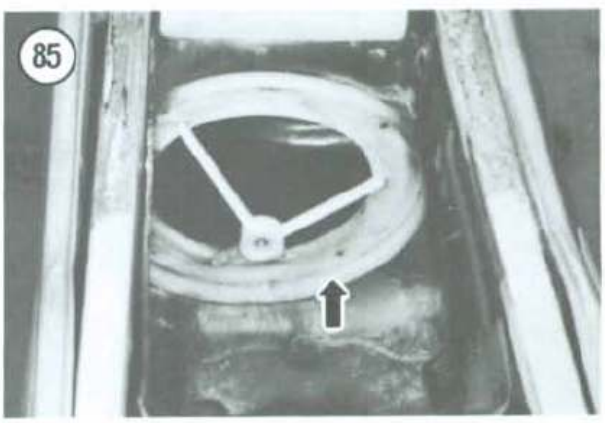
A damp filter will not trap fine dust. Make sure the filter is completely dry before oiling it.

13. Properly oiling an air filter element is a messy job. You may want to wear a pair of disposable rubber gloves when performing this procedure. Oil the filter as follows:
    a. Purchase a box of gallon size reclosable storage bags. The bags can be used when cleaning the filter as well as for storing engine and carburetor parts during disassembly.
    b. Place the air filter into a storage bag.
    c. Pour foam air filter oil onto the filter to soak it.
    d. Gently squeeze and release the filter to soak filter oil into the filter's pores. Repeat until all of the filter's pores are discolored with the oil.
    e. Remove the filter from the bag and check the pores for uneven oiling. This is indicated by light or dark areas. If necessary soak the filter and squeeze it again.
    f. When the filter oiling is even, squeeze the filter a final time.
14. Remove the filter from the bag. Install the filter frame (A, **Figure 83**) inside the filter, if so equipped.
15. Apply a coat of thick wheel bearing grease onto the filter's sealing surface (B, **Figure 83**).
16. Apply a light coat of grease onto the filter's air box sealing surface (**Figure 85**).
17. Install the air filter into the air box and secure it with the wingnut. Make sure the filter element doesn't crimp or slip off the air box sealing surface when you install it.
18. Pour the left over filter oil from the bag back into the bottle for reuse.
19. Dispose of the plastic bag and rubber gloves.
20. Install the side panel or seat.

Engine Maintenance

The following components should decarbonized and/or inspected at the interval listed in **Table 1**, or whenever engine performance decreases at either





end of the rpm range. Refer to Chapter Four for service procedures.

a. Cylinder head.
b. Cylinder.
c. Exhaust valves.
d. Piston.
e. Piston rings.
f. Small end bearing.

Exhaust System

The exhaust system should be inspected at the interval listed in **Table 1**. Refer to Chapter Eight for service and repair procedures.

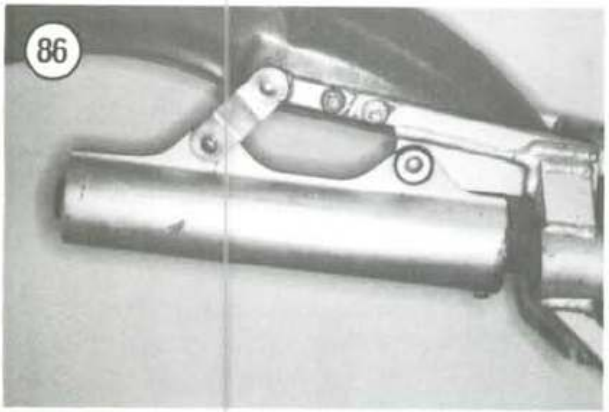
1. Remove the exhaust pipe and inspect the O-ring for cracks or other defects. Replace if necessary.
2. Inspect the exhaust pipe for cracks or dents which could alter performance.
3. Decarbonize the exhaust pipe when servicing the engine top end and exhaust valve.
4. Check all of the exhaust pipe fasteners and mounting points for loose or damaged parts. Check for sagged or damaged springs.

Muffler

Clean and inspect the muffler (**Figure 86**) and repack the glass wool at the interval listed in **Table 1**. Refer to Chapter Eight.

Fuel Line Inspection

Inspect the fuel line from the fuel tank to the carburetor. If it is cracked or starting to deteriorate it must be replaced. Make sure the small hose clamps are in place and holding securely. Check that the overflow and vent tubes are in place.



WARNING

A damaged or deteriorated fuel line presents a very dangerous fire hazard to both the rider and the machine if fuel should spill onto a hot engine or exhaust pipe.

Wheel Bearings

The front and rear wheel oil seals and bearings should be routinely inspected for excessive wear or damage. Non-sealed bearings should be cleaned and repacked once a year or more often if the vehicle is operated often in wet, muddy conditions. The correct service procedures are covered in Chapter Eleven (front) or Chapter Twelve (rear).

Steering Head Adjustment Check

The steering head on all models consists of upper and lower tapered roller bearings. Because the KX models are subjected to rough terrain and conditions, bearing play should be checked and adjusted weekly. A loose bearing adjustment will hamper steering and cause premature bearing and race wear. In severe conditions, a loose bearing adjustment can cause loss of control.

1. Place the bike on a stand so that the front wheel clears the ground.
2. Hold onto the front fork tubes and gently rock the fork assembly back and forth. If you can feel looseness, adjust the steering head bearings as described in Chapter Eleven.

Cooling System Inspection

Once a year, or whenever troubleshooting the cooling system, the following items should be checked. If you do not have the test equipment, the tests can be done by a Kawasaki dealer, radiator shop or service station.

WARNING

When performing any service work to the engine or cooling system, never remove the radiator cap, coolant drain screws or disconnect any hose while the engine and radiator are hot. Scalding

fluid and steam may be blown out under pressure and cause serious injury.

1. With the engine cold, remove the radiator cap (**Figure 87**).

2. Check the rubber washers on the radiator cap (**Figure 88**). Replace the cap if the washers show signs of deterioration, cracking or other damage. If the radiator cap is okay, perform Step 3.

CAUTION

Do not exceed 1.25 kg/cm^2 (17.8 psi) when performing Steps 3 and 4 or damage to the cooling system will occur.

3. Have the radiator cap pressure tested (**Figure 89**). The specified radiator cap relief pressure is 0.95-1.25 kg/cm^2 (13.5-17.8 psi). The cap must be able to sustain this pressure for 6 seconds. Replace the radiator cap if it does not hold pressure.

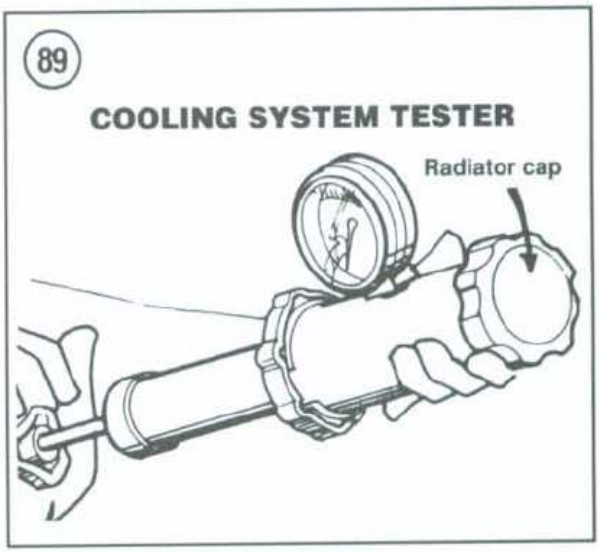
4. Leave the radiator cap off and have the entire cooling system pressure tested. The entire cooling system should be pressurized to 0.95-1.25 kg/cm^2 (13.5-17.8 psi). The system must be able to hold this pressure for 10 seconds. Replace or repair any components that fail this test.

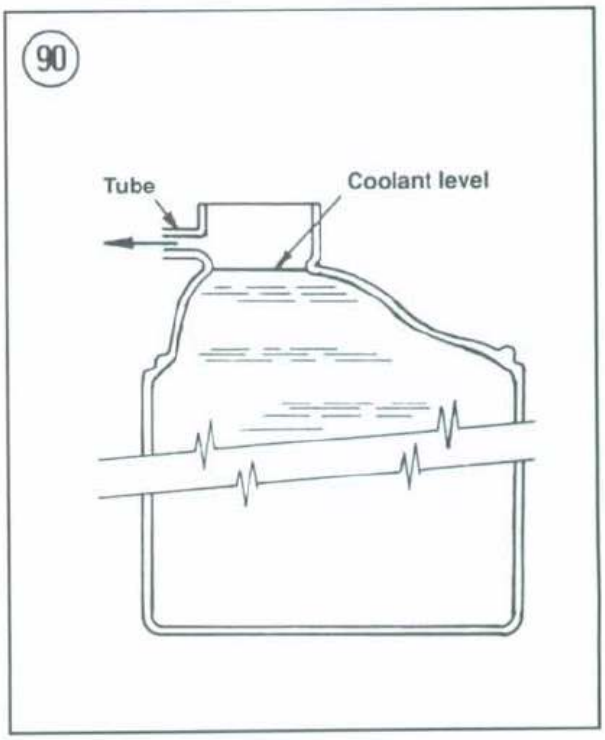
5. Check all cooling system hoses for damage or deterioration. Replace any hose that is questionable. Make sure all hose clamps are tight.

6. Carefully clean any dirt, mud, bugs, etc. from the radiator core. Use a whisk broom, compressed air or low-pressure water. Straighten bent radiator fins with a screwdriver.

NOTE

If the radiator has been damaged across 20% or more of the frontal area, the radiator should be replaced.



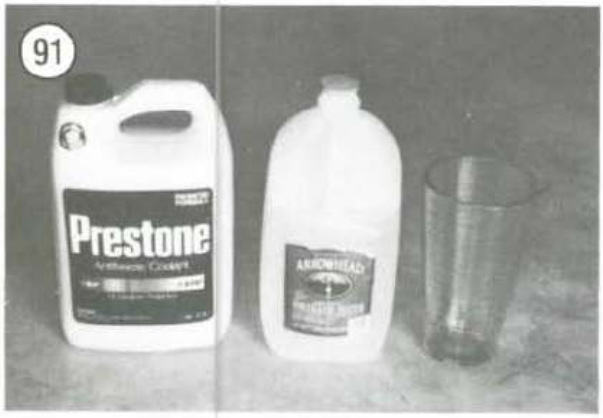


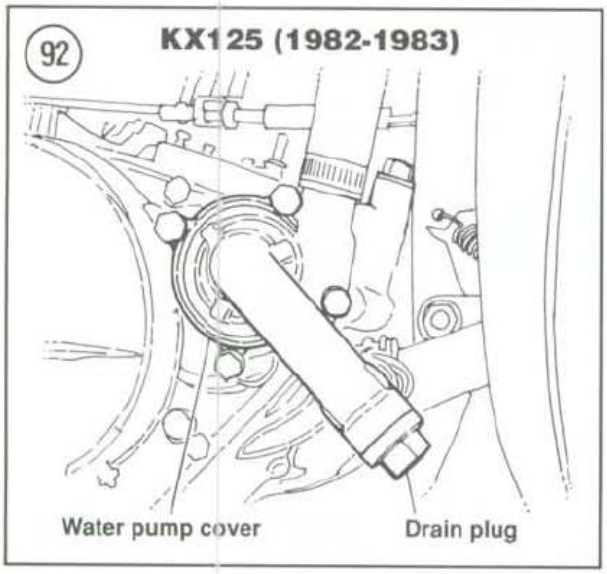
Coolant Check

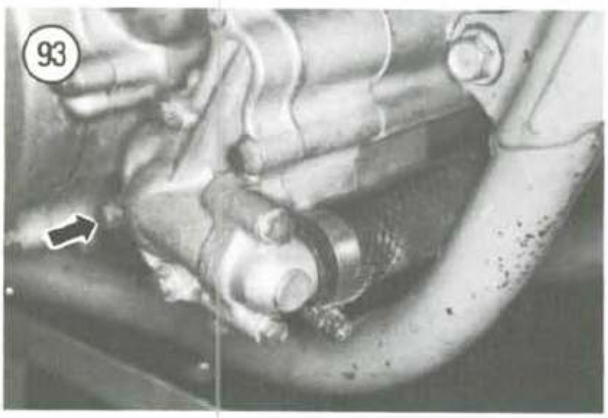
WARNING

Do not remove the radiator cap when the engine is hot.

Before starting the bike, check the coolant level in the radiator. Remove the radiator cap (**Figure 87**).







The coolant should at the bottom of the radiator filler neck as shown in **Figure 90**. If the level is low, add a sufficient amount of antifreeze and water (in a 50/50 ratio) as described under *Coolant*. Reinstall the radiator cap.

Coolant

Only a high quality ethylene glycol-based coolant compounded for aluminum engines should be used. The coolant should be mixed with water in a 50/50 ratio. Coolant capacity is listed in **Table 12**. When mixing antifreeze with water, make sure to use only soft or distilled water. Never use tap or salt water as this will damage engine parts. Distilled water can be purchased at supermarkets in gallon containers. See **Figure 91**.

Coolant Change

The cooling system should be completely drained and refilled at the intervals indicated in **Table 1**.

CAUTION

Use only a high quality ethylene glycol antifreeze specifically labeled for use with aluminum engines. Do not use an alcohol-based antifreeze.

WARNING

Antifreeze has been classified as an environmental toxic waste by the EPA and cannot be legally disposed of by flushing down a drain or pouring it onto the ground. Place antifreeze in a suitable container and dispose of it according to local EPA regulations. Do not store coolant where it is accessible to children or animals.

The following procedure must be performed when the engine is *cold*.

CAUTION

Be careful not to spill antifreeze on painted surfaces as it will destroy the surface. Wash immediately with soapy water and rinse thoroughly with clean water.

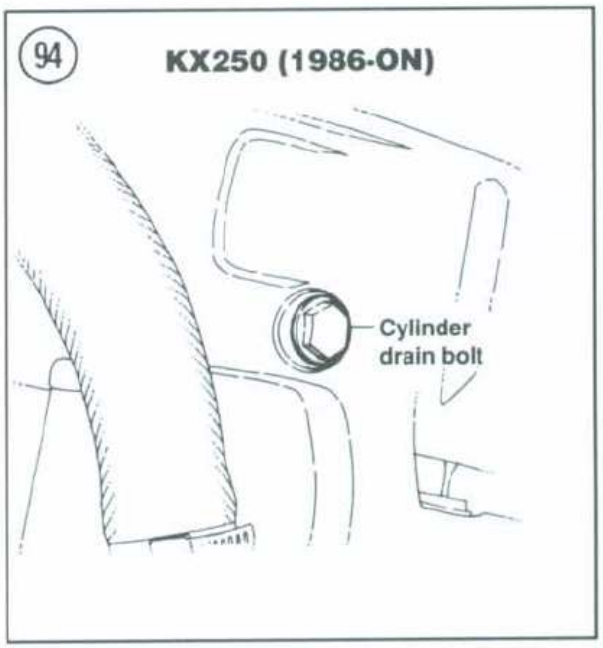
1. Place a clean container under the water pump.
2. Remove the radiator cap (**Figure 87**). This will speed up the draining process.

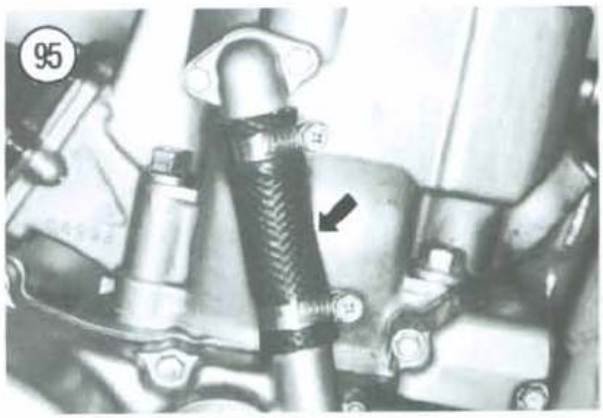
3. Remove the water pump drain bolt and allow the coolant to drain into a pan. See **Figure 92** (1982-1983 KX125) or **Figure 93** (typical for other models).
4. On 1986 and later KX250 models, remove the cylinder drain bolt and gasket (**Figure 94**) and drain the cylinder coolant.
5. On 1986 and later KX500 models, disconnect the cylinder drain hose at the cylinder (**Figure 95**) and drain the cylinder coolant.
6. Do not install the drain bolts or hose (KX500).
7. Flush the cooling system with clean tap water directed through the radiator filler neck. Allow this water to drain completely.
8. Install the drain bolt(s) and washer(s). Tighten securely.
9. On 1986 and later KX500 models, reconnect the cylinder drain hose at the cylinder (**Figure 95**). Tighten the hose clamp securely.
10. On 1982-1983 KX models, loosen the air bleed bolt at the top of the cylinder head (**Figure 96**).
11. Refill the radiator. Add coolant slowly through the radiator filler neck. Use a 50/50 mixture of antifreeze and distilled water. Radiator capacity for all models is listed in **Table 12**. Do not install the radiator cap at this time.

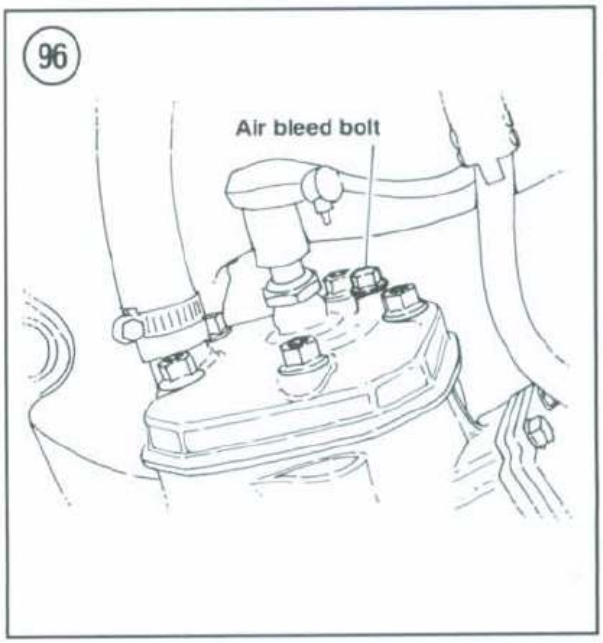
NOTE

*When coolant flows out of the cylinder head air bleed bolt hole on 1982 and 1983 models (**Figure 96**), tighten the bolt securely.*

12. Start the engine and let it run at idle speed until the engine reaches normal operating temperature. Make sure there are no air bubbles in the coolant and that the coolant level stabilizes at the correct level (**Figure 90**). Add coolant as necessary.
13. Install the radiator cap.
14. After the engine has cooled, remove the radiator cap and check the cooling level. Add coolant up to the filler neck, if necessary. Reinstall the radiator cap.







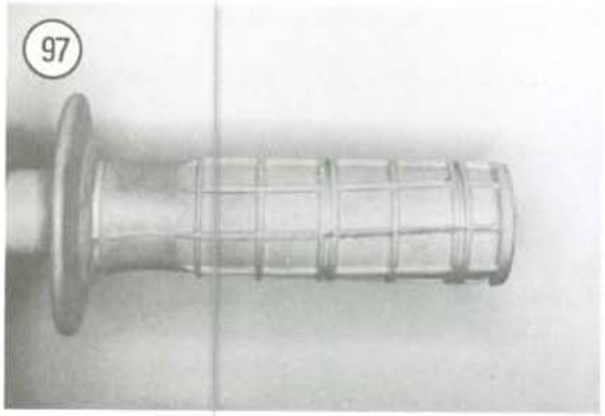
Handlebars

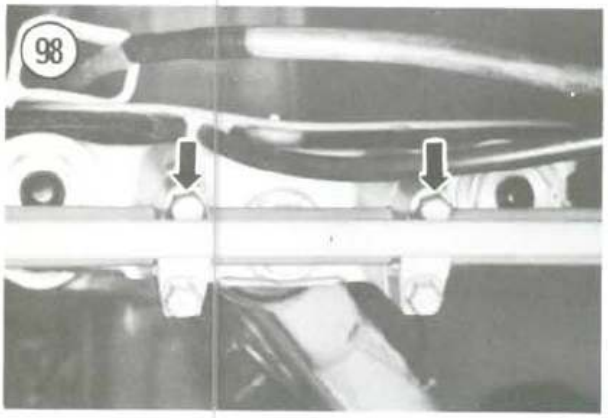
Inspect the handlebars weekly for any sign of damage. A bent or damaged handlebar should be replaced. The knurled section of your bars should be very rough. Keep the clamps clean with a wire brush. Any time that the bars slip in the clamps they should

be removed and wire brushed clean to prevent small balls of aluminum from gathering in the clamps and reducing gripping abilities.

Handlebar Grips

Inspect the handlebar grips (**Figure 97**) for tearing, looseness or severe wear. Install new grips when required, safety wiring the grips to prevent them from slipping.





Front Suspension Check

1. Apply the front brake and pump the forks up and down as vigorously as possible. Check fork movement, paying attention for any abnormal noise or resulting oil leaks.
2. Check that the upper and lower fork tube pinch bolts are tight.
3. Check that the handlebar holder bolts (**Figure 98**) are tight.
4. Check that the front axle and the axle holder fasteners are tight.

NOTE

If any of the previously mentioned fasteners are loose, refer to Chapter Eleven for correct procedures and torque specifications.

Rear Suspension Check

1. Support the bike on a stand with the rear wheel off the ground.
2. Check swing arm bearing play as described in Chapter Twelve.
3. Check the tightness of all rear suspension mounting bolts.
4. Check that the rear axle nut is tight.

NOTE

If any of the previously mentioned fasteners are tight, refer to Chapter Twelve for correct procedures and torque specifications.

Nuts, Bolts, and Other Fasteners

Constant vibration can loosen many of the fasteners on the motorcycle. Check the tightness of all fasteners, especially those on:

a. Engine mounting hardware.
b. Cylinder head stay bolts (**Figure 99**).
c. Engine crankcase covers.
d. Handlebar and front forks.
e. Gearshift lever.
f. Kickstarter lever.
g. Brake pedal and lever.
h. Exhaust system.

ENGINE TUNE-UP

The number of definitions of the term "tune-up" is probably equal to the number of people defining it. For the purposes of this book, a tune-up is general adjustment and maintenance to insure peak engine performance.

The following paragraphs discuss each facet of a proper tune-up which should be performed in the order given. Unless otherwise specified, the engine should be thoroughly cool before starting any tune-up procedure.

Have the new parts on hand before you begin.

To perform a tune-up on your KX, you will need the following tools and equipment:

a. 14 mm spark plug wrench.
b. Socket wrench and assorted sockets.
c. Phillips head screwdriver.
d. Spark plug wire feeler gauge and gapper tool.

Cylinder Head Nuts

The engine must be at room temperature for this procedure.

1. Support the bike with a stand.
2. Tighten each nut (**Figure 100**) equally in a crisscross pattern to the tightening torque in **Table 8**.

Cylinder Compression

A cylinder cranking compression check is one of the quickest ways to check the internal condition of the engine: rings, head gasket, etc. It's a good idea to check compression at each tune-up, write it down, and compare it with the reading you get at the next tune-up. This will help you spot any developing problems.

1. Warm the engine to normal operating temperature.
2. Remove the spark plug. Then insert the plug into the plug cap and ground the plug against the cylinder head (**Figure 101**).
3. Insert the tip of a gauge into the hole. Make sure the gauge is seated properly.

NOTE

You may have to remove the fuel tank to provide clearance for the gauge. See Chapter Eight.

NOTE

Press the kill switch while performing Step 4.

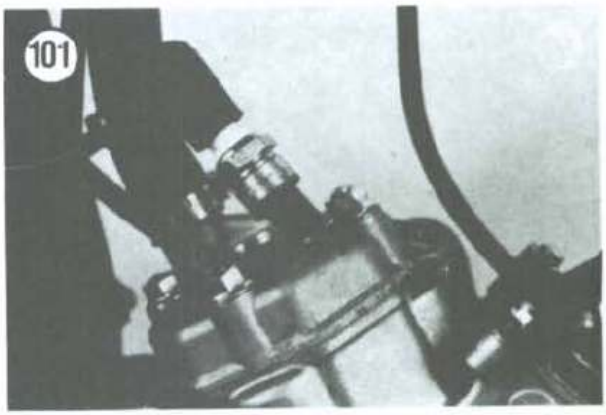
4. Hold the throttle wide open and crank the engine several revolutions until the gauge gives its highest reading. Record the figure. Refer to **Table 13** for compression readings. If the reading is only slightly below normal, ring or cylinder wear is likely. If the compression is very low, it's likely that a ring is broken or there is a hole in the piston.

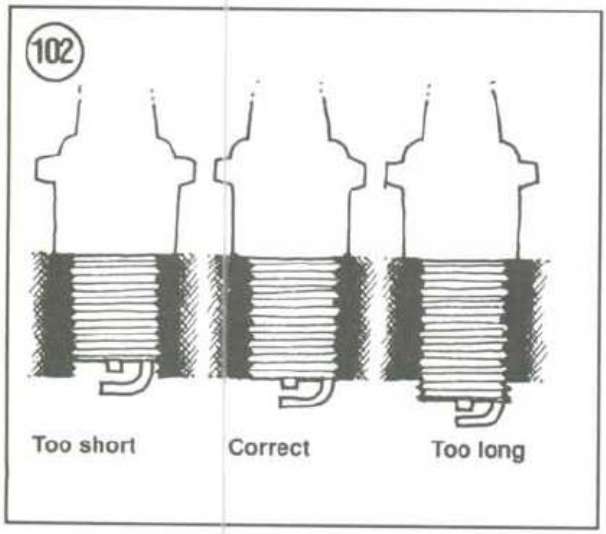
Correct Spark Plug Heat Range

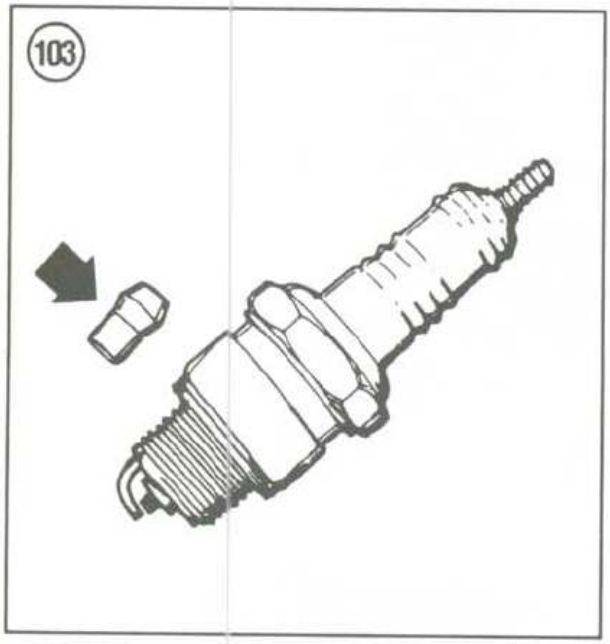
Spark plugs are available in various heat ranges, hotter or colder than the plugs originally installed at the factory.

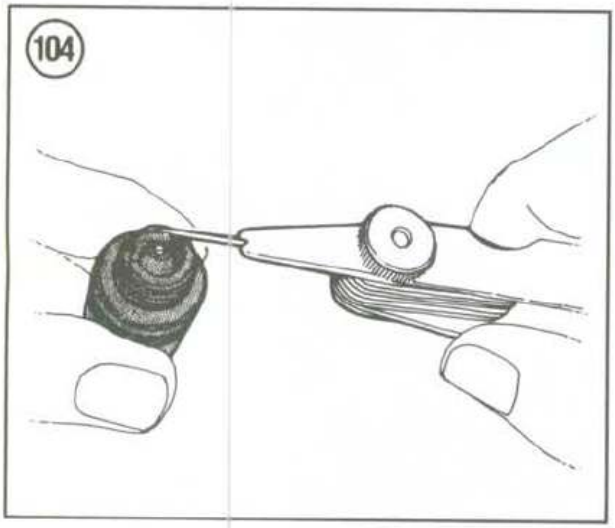
Select plugs of the heat range designed for the loads and conditions under which the KX will be run. Use of incorrect heat ranges can cause the plug to foul, overheating and piston damage.

In general, use a hot plug for low speeds and low temperatures. Use a cold plug for high speeds, high engine loads and high temperatures. The plug should









operate hot enough to burn off unwanted deposits, but not so hot that they burn themselves or cause preignition. A spark plug of the correct heat range will show a light tan color on the portion of the insulator within the cylinder after the plug has been in service.

The reach (length) of a plug is also important. A too short plug will cause excessive carbon build-up, hard starting and plug fouling (**Figure 102**).

The standard heat range spark plug for the various models is listed in **Tables 14-16**.

Spark Plug Removal

CAUTION

Whenever the spark plug is removed, dirt around it can fall into the plug hole. This can cause expensive engine damage.

1. Grasp the spark plug lead (**Figure 100**) as near the plug as possible and pull it off the plug. If it is stuck to the plug, twist it slightly to break it loose.
2. Blow away any dirt that has collected around the spark plug.
3. Remove the spark plug with a 14 mm spark plug wrench.

NOTE

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

4. Inspect the plug carefully. Look for a broken center porcelain, excessively eroded electrodes, and excessive carbon or oil fouling.

Gapping and Installing the Plug

A new spark plug should be carefully gapped to ensure a reliable, consistent spark. You must use a special spark plug gapping tool and a wire feeler gauge.

1. Remove the new spark plug from the box. If necessary, screw the small adapter onto the end of the plug (**Figure 103**).
2. Insert a wire feeler gauge between the center and side electrode (**Figure 104**). The correct gap is listed in **Tables 14-16**. If the gap is correct, you will feel a slight drag as you pull the wire through. If there is

no drag, or the gauge won't pass through, bend the side electrode with a gapping tool (**Figure 105**) to set the proper gap.

3. Apply anti-seize to the plug threads before installing the spark plug. Do not use engine oil on the plug threads.

NOTE

Anti-seize can be purchased at most automotive parts stores.

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

5. Use a spark plug wrench and tighten the plug to 27 N·m (20 ft.-lb.).

NOTE

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

6. Install the spark plug wire. Make sure it is on tight.

CAUTION

Make sure the spark plug wire is pulled away from the exhaust pipe.

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 bike a short distance at full throttle.
2. Push on the kill switch before closing the throttle and simultaneously pull in the clutch or shift to neutral; coast and brake to a stop.
3. Remove the spark plug and examine it. Compare it to **Figure 106** and note the following:

Normal condition

If the plug has a light tan- or gray-colored deposit and no abnormal gap wear or erosion, good engine, carburetion and ignition condition are indicated. The plug in use is of the proper heat range and may be serviced and returned to use.

Carbon fouled

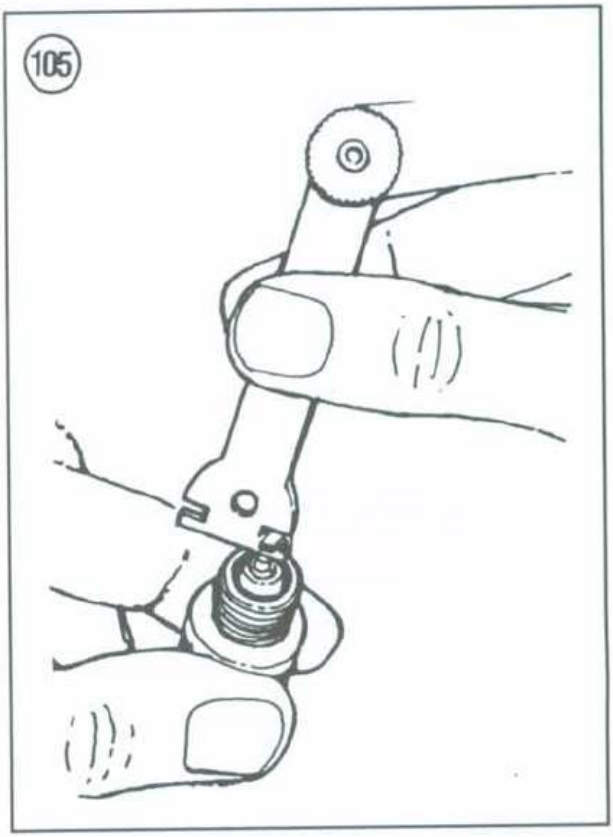
Soft, dry, sooty deposits covering the entire firing end of the plug are evidence of incomplete combustion. Even though the firing end of the plug is dry, the plug's insulation decreases. An electrical path is formed that lowers the voltage from the ignition system. Engine mis-firing is a sign of carbon fouling. Carbon fouling can be caused by one or more of the following:

a. Too rich fuel mixture.
b. Spark plug heat range too cold.
c. Clogged air filter.
d. Over-retarded ignition timing.
e. Ignition component failure.
f. Low engine compression.
g. Prolonged idling.

Oil fouled

The tip of an oil fouled plug has a black insulator tip, a damp oily film over the firing end and a carbon layer over the entire nose. The electrodes will not be worn. Common causes for this condition are:

a. Too much oil in the fuel.



106

SPARK PLUG CONDITIONS

Normal

Gap Bridged

Carbon Fouled

Overheated

Oil Fouled

Sustained Preignition

b. Poorly mixed fuel.
c. Wrong type of oil.
d. Low idle speed or prolonged idling.
e. Ignition component failure.
f. Spark plug heat range too cold.
g. Engine still being broken in.

Oil fouled spark plugs may be cleaned in an emergency, but is better to replace them. It is important to correct the cause of fouling before the engine is returned to service.

Gap bridging

Plugs with this condition exhibit gaps shorted out by combustion deposits between the electrodes. If this condition is encountered, check for an improper oil type, excessive carbon in combustion chamber or a clogged exhaust port and pipe. Be sure to locate and correct the cause of this condition.

Overheating

Badly worn electrodes and premature gap wear are signs of overheating, along with a gray or white "blistered" porcelain insulator surface. The most common cause for this condition is using a spark plug of the wrong heat range (too hot). If you have not changed to a hotter spark plug and the plug is overheated, consider the following causes:

a. Lean fuel mixture.
b. Ignition timing too advanced.
c. Cooling system malfunction.
d. Engine air leak.
e. Improper spark plug installation (overtightening).
f. No spark plug gasket.

Worn out

Corrosive gases formed by combustion and high voltage sparks have eroded the electrodes. Spark plugs in this condition require more voltage to fire under hard acceleration. Replace with a new spark plug.

Preignition

If the electrodes are melted, preignition is almost certainly the cause. Check for carburetor mounting or intake manifold leaks and overadvanced ignition timing. It is also possible that a plug of the wrong heat range (too hot) is being used. Find the cause of the preignition before returning the engine into service.

Ignition Timing (CDI)

All KX motorcycles in this manual use a CDI (Capacitive Discharge Ignition) system. The solid state CDI has no wearing parts, and once assembled properly with the stator plate marks aligned, should not require adjustment unless you want to alter the engine's performance characteristics. If you want to inspect or adjust the timing, refer to *Ignition Timing* in Chapter Nine.

NOTE

If your bike is hard to start and backfires, the flywheel rotor nut has probably loosened, allowing the rotor to loosen and shear the Woodruff key.

Carburetor Idle Speed Adjustment (1982-1987 KX125)

Proper idle speed is a balance between a low enough idle to give adequate compression braking and a high enough idle to prevent engine stalling (if desired). The idle air/fuel mixture affects transition from idle to part throttle openings.

The factory carburetors on these models are not equipped with pilot air screws.

1. Make sure that the throttle cable free play is correct.
2. Warm up the engine completely. Then turn the idle adjust screw (**Figure 107**) to set the idle at the desired speed.

NOTE

After this adjustment is completed, test ride the bike. Throttle response from idle should be rapid and without any hesitation. If there is any hesitation, the pilot jet may be slightly clogged.

WARNING

With the engine idling, move the handlebar from side to side. If idle speed increases during this movement, the throttle cable needs adjusting or it may

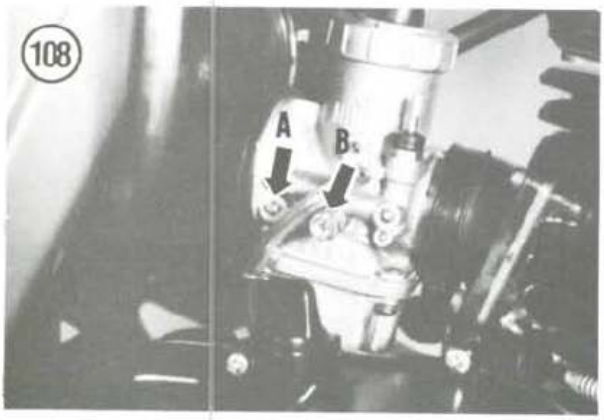
be incorrectly routed throughthe frame. Correct this problem immediately. Do not ride the bike in this unsafe condition.

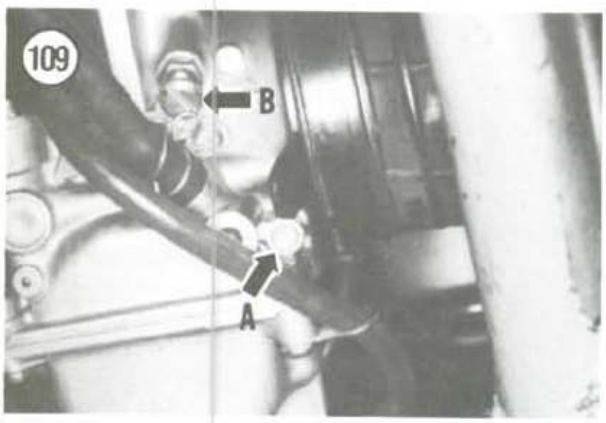
Idle Speed and Mixture Adjustment (1988-on KX125 and all KX250 and KX500)

Proper idle speed is a balance between a low enough idle to give adequate compression braking and a high enough idle to prevent engine stalling (if desired). The idle air/fuel mixture affects transition from idle to part throttle openings.

Turning the pilot air screw "in" enriches the fuel mixture and turning it "out" leans the mixture.

1. Make sure that the throttle cable free play is correct. Check and adjust as described in this chapter.
2. Turn the pilot air screw in until it seats lightly, then back it out the number of turns indicated in **Table 17**. See A, **Figure 108** (Mikuni) or A, **Figure 109** (Keihin).





CAUTION

Never turn the pilot air screw in tight. You'll damage the screw or the soft aluminum seat in the carburetor.

3. Warm up the engine completely. Then turn the idle speed screw to set the idle as low as possible without stalling the engine. See B, **Figure 108** (Mikuni) or B, **Figure 109** (Keihin).

NOTE

There is no idle speed screw on 1984 KX500 factory carburetors.

4. Turn the pilot air screw until the engine drops off quickly one way and then where the idle shoots up when its turned the other way. The midpoint between high and low engine idle is the correct pilot air screw adjustment.

NOTE

The pilot air screw should not be opened more than 3 turns or it may vibrate out. If you cannot get the bike to idle properly, check that the air filter is clean. If air filter is okay and other engine systems are operating correctly, the pilot jet size may be incorrect. Refer to Chapter Eight.

5. Reset the idle speed as desired. Tighten the locknut securely.

NOTE

After this adjustment is completed, test ride the bike. Throttle response from idle should be rapid and without any hesitation. If there is any hesitation, turn the pilot air screw in or out in 1/4 turn increments until this problem is solved.

WARNING

With the engine idling, move the handlebar from side to side. If idle speed increases during this movement, the throttle cable needs adjusting or it may be incorrectly routed through the frame. Correct this problem immediately. Do not ride the bike in this unsafe condition.

Carbon Removal

Carbon buildup should be removed from the engine and exhaust system at the intervals indicated in **Table 1**.

On a 2-stroke engine, carbon builds up quickly in the combustion chamber, on the piston crown, in the cylinder's exhaust port, on the exhaust valve assembly and in the exhaust pipe. The carbon deposits will increase the compression ratio and decrease engine performance. Overheating and preignition from carbon deposits can cause engine damage. Carbon buildup on the exhaust valve assembly can cause carbon seizure and damage the system's gear teeth.

If the carbon is removed at the specified times and the carburetor is adjusted properly with the correct fuel-oil mixture, the carbon buildup will rarely amount to more than a thick film which can be removed easily.

Remove and decarbonize the following components as described in Chapter Four:

a. Cylinder head.
b. Cylinder.
c. Piston.
d. Piston ring(s).
e. Exhaust valve assembly.
f. Exhaust pipe
g. Muffler.

STORAGE

Several months of inactivity can cause serious problems and a general deterioration of the bike's condition. This is especially true in areas of weather extremes. During the winter months it is advisable to specially prepare the bike for lay-up.

Selecting a Storage Area

Most riders store their bikes in their home garages. If you do not have a home garage, facilities suitable for long-term motorcycle storage are readily 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 (also a good security measure) if direct sunlight can fall on the bike.

Preparing Bike for Storage

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

1. Wash the bike completely. Make certain to remove all dirt in all the hard to reach parts like the cooling fins on the head and cylinder (early models). Completely dry all parts of the bike to remove all moisture.
2. Run the bike for about 20-30 minutes to warm up the oil in the clutch and transmission. Drain the oil, regardless of the time since the last oil change. Refill with the normal quantity and type of oil.
3. Drain all gasoline from the fuel tank, interconnecting hose, and the carburetor.
4. Clean and lubricate the drive chain and control cables; refer to specific procedures in this chapter.
5. Remove the spark plug and add about one teaspoon of two-stroke engine oil into the cylinder. Reinstall the spark plug and turn the engine over to distribute the oil to the cylinder walls and piston. Depress the engine kill switch while doing this to prevent it from starting.
6. Tape or tie a plastic bag over the end of the silencer to prevent the entry of moisture.
7. Check the tire pressure, inflate to the correct pressure and move the bike to the storage area. Place it securely on a bike stand with both wheels off the ground.
8. Cover the bike with a tarp, blanket or heavy plastic drop cloth. Place this cover over the bike mainly as a dust cover—do not wrap it tightly, especially any plastic material, as it may trap moisture causing

condensation. Leave room for air to circulate around the bike.

Inspection During Storage

Try to inspect the bike weekly while in storage. Any deterioration should be corrected as soon as possible. For example, if corrosion is observed, cover it with a light coat of grease or silicone spray.

Turn the engine over a couple of times. Don't start it; use the kickstarter and hold the kill switch on. Pump the front forks to keep the seals lubricated.

Restoring Bike to Service

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

1. Before removing the bike from the storage area, reinflate the tires to the correct pressures. Air loss during storage may have nearly flattened the tires, and moving the bike can cause damage to tires, tubes and rims.
2. When the bike is brought to the work area, refill the fuel tank with the correct fuel/oil mixture.
3. Install a fresh spark plug and start up the engine.
4. Perform the standard tune-up as described earlier in this chapter.
5. Check the operation of the engine kill switch. Oxidation of the switch contacts during storage may make it inoperative.
6. Clean and test ride the motorcycle.

Table 1 PERIODIC MAINTENANCE*

Before each race
Check clutch adjustment
Check throttle cable adjustment
Check spark plug gap
Check carburetor adjustment
Clean air filter element
Check radiator hoses and connections
Check front and rear brake adjustment
Check spoke tightness and rim runout
Lubricate drive chain
Check drive chain slack
Check front fork operation and condition
Clean the fuel system
Check steering play
Lubricate clutch and throttle cables
Check brake fluid level
Every 3 races
Change transmission oil
Check piston and cylinder condition
Check piston clearance
Decarbonize top end
Check top end bearing
Every 5 races
Check clutch plate condition
Replace the exhaust pipe O-ring/inspect the exhaust system
Check the front and rear sprockets
Check drive chain wear
Change the front fork oil
Grease the steering stem
Grease the brake camshafts
Grease the rear shock sleeve
Check the Uni-trak link bearing and sleeve for wear
Lubricate the swing arm/shock bearing/ brake backing plate
Check brake wear

(continued)

Table 1 PERIODIC MAINTENANCE (continued)*

Every 10 races
Check the crankshaft main bearings
Check the connecting rod lower bearing
Grease the wheel bearings
Change rear shock oil
Every year
Change brake fluid
Every 2 years
Replace brake master cylinder cup and dust seal
Replace brake caliper piston and dust seals
Every 4 years
Replace brake hose
Replace fuel hose
As required
Change coolant
Replace the air filter element
Replace swing arm chain protectors and pads

* Consider this maintenance schedule as a guide to service intervals. Typical race conditions often include exposure to mud, water or extremely dusty conditions; all if which may require the need for more frequent maintenance.

Table 2 TIRE INFLATION PRESSURE

Front	100 kPa (14 psi)
Rear	100 kPa (14 psi)

Table 3 RECOMMENDED LUBRICANTS AND FUEL

Engine oil	Kawasaki 2-stroke racing oil
Transmission oil	SAE 10W/30 or 10W/40 oil
API classification	
1991-1999	SE
2000-on	SE, SF, SG (SH, SJ with JASO MA)
Front fork oil	
1982-1983	KYB G-10 or SAE 10
1984	10 wt.
1985	10W/20
1986	10 wt.
1987-on	5 wt.
Air filter	Foam air filter oil
Drive chain	Chain lube
Brake fluid	DOT 3
Fuel	Premium grade-research octane 90 or higher
Control cables	Cable lube

Table 4 FUEL/OIL PREMIX RATIO*

Model	Premix ratio
1982-1983	20:1
1984	30:1
1985-on	32:1

*See QRD at the front of the manual for fuel/oil ratio conversions.

Table 5 FUEL TANK CAPACITY

Model	U.S. gal.	Liters
KX125		
1982-1983	2.0	7.6
1984	2.1	8.0
1985-1987	2.0	7.6
1988-1989	2.3	8.7
1990-1991	2.2	8.3
KX250		
1982	2.4	9.1
1983-1986	2.1	8.0
1987	2.0	7.6
1988	2.6	9.8
1989-1991	2.2	8.3
KX500		
1983	2.4	9.1
1984	2.7	10.2
1985-1986	2.5	9.5
1987	2.4	9.1
1988-on	2.6	9.8

Table 6 CLUTCH/TRANSMISSION OIL CAPACITY

Model	cc	ounces
KX125		
1982-1984	550	18.6
1985-1987	600	20.3
1988	650	22.0
1989-1991	700	23.7
KX250		
1982	900	30.4
1983-1984	700	23.7
1985-1991	800	27.1
KX500		
1983-on	800	27.1

Table 7 FRONT FORK OIL SPECIFICATIONS (1982-1989)

	Capacity cc (oz.)	Oil level mm (in.)	Range mm (in.)
KX125			
1982	526-534	158-166	—
	(17.8-18.1)	(6.22-6.53)	—
1983	625-633	158-162	—
	(21.1-21.4)	(6.22-6.38)	—
1984-1985	602-610	178-182	—
	(20.4-20.6)	(7.01-7.17)	—
1986	550-558	178-182	150-210
	(18.6-18.9)	(7.0-7.2)	(5.9-8.3)
1987	581-589	138-142	110-170
	(19.6-19.9)	(5.4-5.6)	(4.3-6.7)
1988	531-539	128-132	100-160
	(18.0-18.2)	(5.0-5.2)	(3.9-6.3)
1989			
U.S. & Can.	601-609	148-152	120-180
	(20.32-20.60)	(5.83-5.98)	(4.72-7.09)
All other	421-429	113-117	80-140
	(14.23-14.50)	(4.45-4.61)	(3.15-5.51)

(continued)

Table 7 FRONT FORK OIL SPECIFICATIONS (1982-1989) (continued)

	Capacity cc (oz.)	Oil level mm (in.)	Range mm (in.)
KX250			
1982	633-641	148-152	—
	(21.4-21.7)	(5.83-5.98)	—
1983-1986	550-558	178-182	—
	(18.6-18.9)	(7.01-7.17)	—
1987	581-589	138-142	—
	(19.6-19.9)	(5.4-5.6)	—
1988	531-539	128-132	100-160
	(18.0-18.2)	(5.0-5.2)	(3.9-6.3)
1989			
U.S. & Can.	601-609	148-152	120-180
	(20.32-20.60)	(5.83-5.98)	(4.72-7.09)
All other	421-429	113-117	80-140
	(14.23-14.50)	(4.45-4.61)	(3.15-5.51)
KX500			
1983	587-595	164-165	—
	(19.85-20.12)	(6.46-6.50)	—
1984	587-595	169-171	—
	(19.85-20.12)	(6.65-6.73)	—
1985	587-595	179-181	—
	(19.85-20.12)	(7.05-7.13)	—
1986	513-521	178-182	—
	(17.3-17.6)	(7.0-7.2)	—
1987	581-589	138-142	—
	(19.6-19.9)	(5.4-5.6)	—
1988	593-601	118-122	90-150
	(20.0-20.3)	(4.6-4.8)	(3.5-5.9)
1989			
U.S. & Can.	601-609	148-152	120-180
	(20.32-20.60)	(5.83-5.98)	(4.72-7.09)
All other	421-429	113-117	80-140
	(14.23-14.50)	(4.45-4.61)	(3.15-5.51)

Table 8 MAINTENANCE TORQUE SPECIFICATIONS

	N•m	ft.-lb.
Fork tube pinch bolts		
KX125		
1982-1988	20	15
1989		
U.S. and Canada	21	16
All other		
Upper	21	16
Lower	20	15
1990-1991	20	15
KX250	21	16
KX500	20	15
Pushrod nut	20	15
Rear axle nut	98	72
Cylinder head nuts		
1982 KX250	35	26
All other models	25	18
Cylinder head bolts	25	18
Spark plug	27	20

(continued)

Table 8 MAINTENANCE TORQUE SPECIFICATIONS (continued)

	N•m	ft.-lb.
Oil drain plug		
1982	13	115 in.-lb.
1983-on	20	15
Cylinder coolant drain bolt	15	11

Table 9 FRONT FORK OIL SPECIFICATIONS (1990-ON)

	Oil change* ml (oz.)	After disassembly ml (oz.)	Oil level mm (in.)	Adjustable Range mm (in.)
KX125				
1990				
U.S.	375 (12.7)	435-443 (14.7-15.0)	100 (3.9)	70-120 (2.8-4.7)
Eur.	375 (12.7)	439-447 (14.8-15.1)	95 (3.7)	70-120 (2.8-4.7)
1991				
All	440 (14.9)	513-521 (17.3-17.6)	115 (4.5)	100-150 (3.9-5.9)
KX250				
1990				
U.S.	375 (12.7)	435-443 (14.7-15.0)	100 (3.9)	70-120 (2.8-4.7)
Eur.	375 (12.7)	443-451 (15.0-15.2)	90 (3.5)	70-120 (2.8-4.7)
1991				
U.S.	440 (14.9)	517-525 (17.5-17.7)	110 (4.3)	100-150 (3.9-5.9)
Eur.	440 (14.9)	509-517 (17.2-17.5)	120 (4.7)	100-150 (3.9-5.9)
KX500				
1990				
U.S.	370 (12.51)	435-443 (14.7-15.0)	128-132 (5.0-5.2)	100-150 (3.9-5.9)
Eur.	375 (12.7)	439-447 (14.8-15.1)	123-127 (4.8-5.0)	100-150 (3.9-5.9)
1991-1993				
U.S.	445 (15.0)	516-525 (17.4-17.8)	108-112 (4.2-4.4)	100-150 (3.9-5.9)
Eur.	435 (14.7)	509-517 (17.2-17.5)	118-122 (4.6-4.8)	100-150 (3.9-5.9)
1994-1995	430 (14.5)	504-512 (17.0-17.3)	118-122 (4.6-4.8)	NA
1996	435 (14.7)	510-518 (17.2-17.5)	113-117 (3.8-4.0)	NA
1997	520 (17.6)	600-618 (20.3-20.9)	108-112 (3.7-3.8)	NA

*Quantity is approximate.
NA – Spcification not designated.

Table 10 DRIVE CHAIN LENGTH MEASUREMENT*

	Standard mm (in.)	Wear limit mm (in.)
KX125		
1982-1987	317.5 (12.5)	323 (12.7)
1988	307.5 (12.1)	314 (12.4)
1989-1991	317.5 (12.5)	323 (12.7)
KX250		
1982-1987	317.5 (12.5)	323 (12.7)
1988-1991	317.5 (12.5)	314 (12.4)
KX500		
1983-1987	317.5 (12.5)	323 (12.7)
1988-on	317.5 (12.5)	314 (12.4)

* 20-link length; see text for measurement procedures.

Table 11 DRIVE CHAIN FREE PLAY

Model	mm	in.
1982-on	50-60	1.96-2.36

Table 12 COOLANT CAPACITY

	Liters	qt.
KX125		
1982-1983	0.70	0.74
1984	0.90	0.95
1985-1989	0.88	0.93
1990-1991	0.96	1.0
KX250		
1983-1984	1.05	1.1
1985-1991	1.1	1.2
KX500		
1985-on	1.3	1.4

Table 13 ENGINE COMPRESSION

Model	Standard kg/cm^2 (psi)	Range kg/cm^2 (psi)
KX125		
1982-1987	10-12 (142-171)	7.7-12 (109-171)
1988-1991	— —	7.7-12 (109-171)
KX250		
1982-1987	11.0-13.0 (156-185)	8.4-13.0 (119-185)
1988-1991	— —	8.4-13.0 (119-185)
KX500		
1983-1986	11.0-13.0 (156-185)	8.4-13.0 (119-185)
1987	9.5-11.5 (135-164)	7.35-11.5 (105-164)
1988-on	— —	7.35-11.5 (105-164)

Table 14 SPARK PLUG TYPE AND GAP (KX125)

	Type	Gap mm (in.)
1982		
U.S.	NGK B9EV	0.6-0.7 (0.024-0.028)
All except U.S.	NGK BR9EV	0.6-0.7 (0.024-0.028)
1984-1985		
U.S.	NGK B10EV	0.6 (0.024)
All except U.S.	NGK BR10EV	0.6 (0.024)
1986		
U.S.	NGK B10EG	0.6-0.7 (0.024-0.028)
All except U.S.	NGK BR10EG	0.6-0.7 (0.024-0.028)
1986-1990		
U.S.	NGK B10EG	0.5-0.6 (0.020-0.024)
All except U.S.	NGK BR10EG	0.5-0.6 (0.020-0.024)
1991		
U.S.	NGK R6254-E-105	0.7-0.8 (0.027-0.031)
All other models	NGK R6252E-105	0.7-0.8 (0.027-0.031)

Table 15 SPARK PLUG TYPE AND GAP (KX250)

	Type	Gap mm (in.)
1982		
U.S.	NGK B9EV	0.6 (0.024)
All other models	NGK BR9EV	0.6 (0.024)
1983		
U.S.	NGK B8EG	0.6 (0.024)
All other models	NGK BR8EG	0.6 (0.024)
1984		
U.S.	NGK B9EG	0.6 (0.024)
All other models	NGK BR9EG	0.6 (0.024)
1985		
U.S.	NGK B8EG	0.6 (0.024)
All other models	NGK BR8EG	0.6 (0.024)
1986-1988		
U.S.	NGK B9EG	0.6-0.7 (0.024-0.028)
All other models	NGK BR9EG	0.6-0.7 (0.024-0.028)

(continued)

Table 15 SPARK PLUG TYPE AND GAP (KX250) (continued)

	Type	Gap mm (in.)
1989-1991		
U.S.	NGK B9EG	0.5-0.6 (0.020-0.024)
All other models	NGK BR9EG	0.5-0.6 (0.020-0.024)

Table 16 SPARK PLUG TYPE AND GAP (KX500)

	Type	Gap mm (in.)
1983-1984		
U.S.	NGK B9EG	0.6 (0.024)
All other models	NGK BR9EG	0.6 (0.024)
1985-1988		
U.S.	NGK B8EG	0.6-0.7 (0.024-0.027)
All other models	NGK BR8EG	0.6-0.7 (0.024-0.027)
1989-on	NGK B8EG or NGK BR8EG	0.5-0.6 (0.020-0.024)

Table 17 CARBURETOR PILOT AIR SCREW ADJUSTMENT

Model	Turns out
KX125	
1982-1987	*
1988-1991	1 1/2
KX250	
1982-1986	1 1/2
1987	1
1988-1991	1 1/2
KX500	
1983-1999	1 1/2
2000-on	2

* The stock carburetors on these models were not equipped with a pilot air screw.

CHAPTER FOUR

ENGINE TOP END

This chapter covers information to service the cylinder head, KIPS valve, cylinder, piston, piston rings and reed valve. Engine lower end service (crankshaft, transmission removal, shift drum and shift forks) is covered in Chapter Five. Clutch, primary drive and kickstarter service is covered in Chapter Six. Transmission disassembly is covered in Chapter Seven.

Prior to removing and disassembling the engine top end, clean the entire engine and frame with a good grade commercial degreaser, like Gunk or Bel-Ray engine degreaser or equivalent. It is easier to work on a clean engine and you will do a better job.

Make certain that you have all the necessary tools available and purchase replacement parts prior to disassembly. Also make sure you have a clean place to work.

It is a good idea to identify and mark parts as they are removed so that errors will be avoided during assembly and installation. Clean all parts thoroughly upon removal, then place them in trays or boxes with their associated mounting hardware. Do not rely on memory alone as it may be days or weeks before you complete the job. In the text there is frequent mention of the left-hand and right-hand side of the engine. This refers to the engine as it sits in the bike's frame, not as it sits on your workbench.

Engine specifications are listed in **Tables 1-7** at the end of the chapter. The tables are:

a. **Table 1**: General Engine Specifications (KX125).

b. **Table 2**: General Engine Specifications (KX250).

c. **Table 3**: General Engine Specifications (KX500).

d. **Table 4**: Engine Service Specifications (KX125).

e. **Table 5**: Engine Service Specifications (KX250).
f. **Table 6**: Engine Service Specifications (KX500).
g. **Table 7**: Engine Tightening Torques.

ENGINE PRINCIPLES

Figure 1 explains how a typical two-stroke engine works. This will be helpful when troubleshooting or repairing the engine.

ENGINE LUBRICATION

Engine lubrication is provided by the fuel/oil mixture used to power the engine. Refer to Chapter Three for oil and ratio recommendations.

CLEANLINESS

Repairs go much faster and easier if your engine is clean before you begin work. This is especially important when servicing your engine's top end. If the top end is being serviced while the engine is installed in the frame, note that dirt trapped underneath the fuel tank or upper frame tube can fall into cylinder or crankcase opening; remove the fuel tank and wrap the frame with a large, clean towel. There are special cleaners for washing the engine and related parts. Just spray or brush on the cleaning solution, let it stand, then rinse it away with a garden hose; see Chapter One.

SERVICING ENGINE IN FRAME

Some of the components can be serviced while the engine is mounted in the frame (the bike's frame is a great holding fixture—especially for breaking loose stubborn bolts and nuts):

a. Cylinder head.
b. KIPS valve.
c. Cylinder.
d. Piston.
e. Carburetor.
f. Reed valve.
g. Flywheel rotor/stator plate.
h. Water pump.
i. Clutch.
j. External shift mechanism.
k. Primary drive gear.
l. Kickstarter.

CYLINDER HEAD

The cylinder head is bolted to the top of the cylinder with nuts and/or bolts. A gasket separates the cylinder head and cylinder.

Removal/Installation (Air-Cooled)

CAUTION

To prevent warpage and damage to any component, remove the cylinder head only when the engine is at room temperature.

1. Remove the seat, side covers and fuel tank.
2. Remove the exhaust system as described in Chapter Eight.
3. Remove the cylinder head stay, if so equipped.
4. Disconnect the spark plug wire and move it out of the way.
5. Loosen the spark plug if you are going to remove it later.
6. Loosen the cylinder head nuts 1/2 turn at a time in a crisscross pattern until they are all loose. Remove the nuts and washers (**Figure 2**).
7. Loosen the head by tapping around the perimeter with a rubber or plastic mallet.

CAUTION

Remember, the cooling fins are fragile and may be damaged if tapped or pried on too hard. Never use a metal hammer.

NOTE

Do not pry the head if it is stuck. Sometimes it is possible to loosen the head with engine compression. Rotate the engine with the kickstarter (with the spark plug installed). As the piston reaches TDC on the compression stroke, it will pop the head loose.

8. Remove the cylinder head by pulling straight up and off the cylinder studs (**Figure 3**). Store the cylinder head with the gasket surface placed on a thick piece of cardboard.
9. Remove the cylinder head gasket and discard it.

1

2-STROKE OPERATING PRINCIPLES

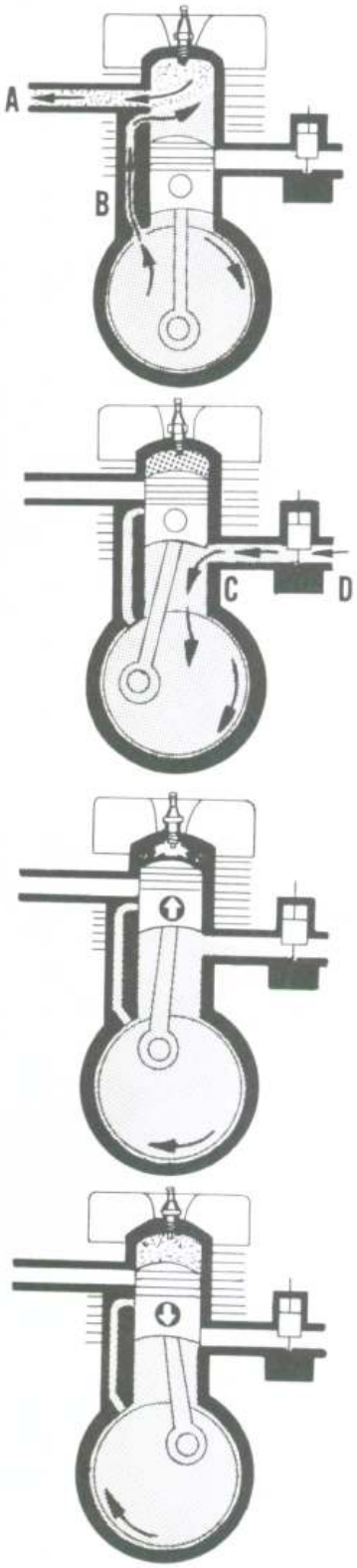
The crankshaft in this discussion is rotating in a clockwise direction.

As the piston travels downward, it uncovers the exhaust port (A) allowing the exhaust gases, which are under pressure, to leave the cylinder. A fresh fuel/air charge, which has been compressed slightly, travels from the crankcase into the cylinder through the transfer port (B). Since this charge enters under pressure, it also helps to push out the exhaust gases.

While the crankshaft continues to rotate, the piston moves upward, covering the transfer port (B) and exhaust port (A). The piston is now compressing the new fuel/air mixture and creating a low pressure area in the crankcase at the same time. As the piston continues to travel, it uncovers the intake port (C). A fresh fuel/air charge, from the carburetor (D) is drawn into the crankcase through the intake port, because of the low pressure within it.

Now, as the piston almost reaches the top of its travel, the spark plug fires, thus igniting the compressed fuel/air mixture. The piston continues to top dead center (TDC) and is pushed downward by the expanding gases.

As the piston travels down, the exhaust gases leave the cylinder and the complete cycle starts all over again.



10. Lay a rag over the cylinder to prevent dirt from falling into the cylinder.
11. Inspect the cylinder head as described in this chapter.

Installation (Air-cooled)

1. Remove all gasket residue from the cylinder head and cylinder mating surfaces.
2. Clean the cylinder studs and nuts with electrical contact cleaner.
3. Install a new head gasket.
4. Install the cylinder head onto the cylinder (**Figure 3**).
5. Install the nuts and washers finger-tight.
6. Tighten the cylinder head nuts, in several stages, using a crisscross pattern, to the torque specification listed in **Table 7**.
7. Install the cylinder head stay, if so equipped.
8. Install the spark plug and connect the spark plug lead.
9. Install the exhaust system as described in Chapter Eight.
10. Install the fuel tank, side covers and seat.

Removal (Liquid-cooled)

CAUTION

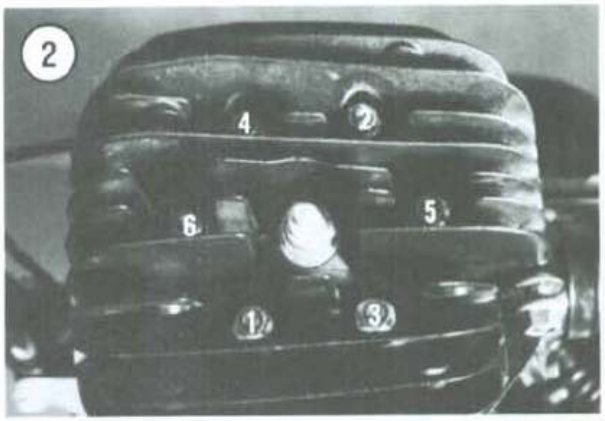
To prevent warpage and damage to any component, remove the cylinder head only when the engine is at room temperature.

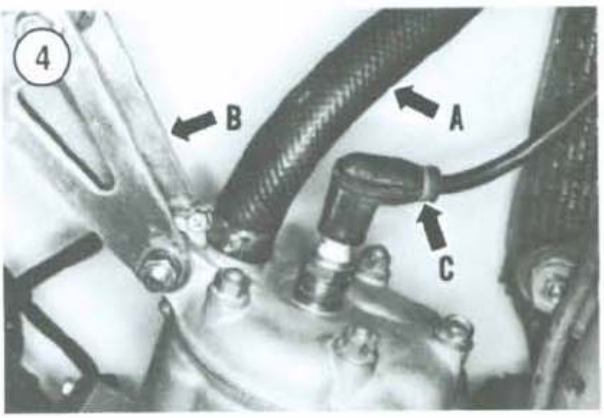
1. Remove the seat, side covers and fuel tank.
2. Remove the radiator shroud if it interferes with cylinder head removal.
3. Remove the exhaust system as described in Chapter Eight.
4. Drain the cooling system as described under *Coolant Change* in Chapter Three.
5. Disconnect the coolant hose(s) at the cylinder head. See A, **Figure 4**, typical.
6. Disconnect the spark plug wire at the plug (C, **Figure 4**).
7. Loosen the spark plug if you are going to remove it later.
8. Remove the cylinder head stay, if so equipped. See B, **Figure 4**, typical.

9A. On 1988-1989 KX125 models, loosen the cylinder head nuts (A, **Figure 5**) and bolt (B, **Figure 5**) in a crisscross pattern. Remove the nuts and bolt.
9B. On all other models, loosen the cylinder head nuts (**Figure 6**, typical) in a crisscross pattern. Remove the nuts.
10. Loosen the head by tapping around the perimeter with a rubber or plastic mallet.

NOTE

Do not pry the head if it is stuck. Sometimes it is possible to loosen the head



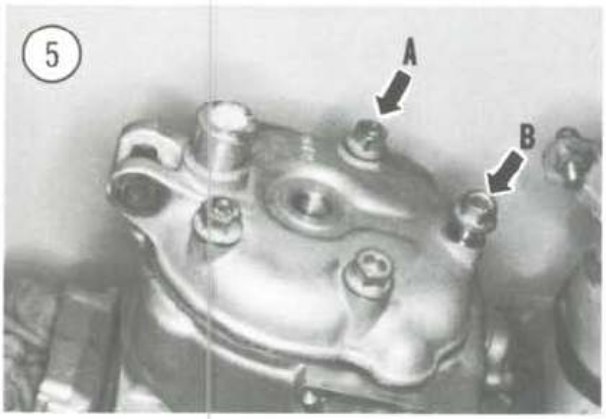


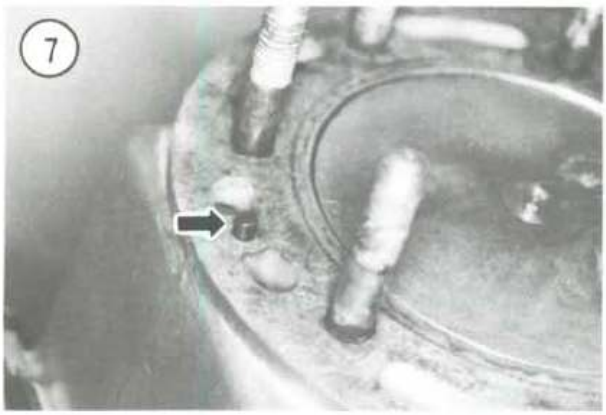
with engine compression. Rotate the engine with the kickstarter (with the spark plug installed). As the piston reaches top dead center (TDC) on the compression stroke, it will pop the head loose.

11. Remove the cylinder head by pulling it straight up and off the cylinder studs. Set the head aside so that the gasket surface is protected.

12. Visually check the head and gasket for signs of coolant leakage.

13. Remove the cylinder head gasket and discard it.





14. Remove the cylinder head dowel pin (**Figure 7**), if equipped.

NOTE

You do not have to remove the exhaust valve assembly on 1985 and later models when removing the cylinder head. If you do remove the exhaust valve assembly, it must be installed in a specific manner to assure proper operation. Refer to ***Cylinder*** *in this chapter.*

15. Bring the piston to top dead center (TDC). Lay a clean rag over the cylinder to prevent dirt from falling into the cylinder.

16. Inspect the cylinder head as described in this chapter.

Head Gaskets (Liquid-cooled)

Depending on model and year, there may be one or more optional thick or thin head gaskets for your KX. These are listed by part number on Kawasaki microfiche cards and their use explained on Kawasaki racing support and race tuning bulletins.

Thinner head gaskets are used to raise an engines compression ratio. For example, if you replace the stock 1.0 mm head gasket on 1989 and later KX500 models with the optional 0.26 mm head gasket, engine compression is raised from 7:1 to 7:8.

Thicker head gaskets are available for use on some KX125 models to reduce the engines compression ratio (to prevent pinging) when recommended racing fuels are not available or for other tuning purposes.

For additional information on head gaskets, racing fuels and engine modifications, consult with your Kawasaki dealer.

Installation (Liquid-cooled)

1. Remove all gasket residue from the cylinder head and cylinder mating surfaces.

2. Clean the cylinder studs and nuts with electrical contact cleaner.

3. Install the dowel pin (**Figure 7**), if equipped.

4. Install a new head gasket over the cylinder head studs, making sure the gasket fits correctly. If the

gasket is marked with "UP" on one side, install the gasket so that the marked side faces up.

NOTE

*On 1989 and later KX500 models, the metal ring in the center of the head gasket (located next to the bore) has a short and long side (**Figure 8**). When installing this gasket, install it so that the short side faces up.*

5. Install the cylinder head onto the cylinder.
6A. On 1988-1989 KX125 models, install the cylinder head nuts (A, **Figure 5**) and bolt (B, **Figure 5**). Tighten finger-tight.
6B. On all other models, install the cylinder head nuts (**Figure 6**, typical). Tighten finger-tight.
7. Tighten the cylinder head nuts (and bolt), in several stages, using a crisscross pattern, to the torque specification listed in **Table 7**.
8. Install the cylinder head stay (B, **Figure 4**), if so equipped.
9. Install the spark plug and connect the spark plug lead.
10. Reconnect the coolant hose(s) (A, **Figure 4**) at the cylinder head. Tighten the hose clamp securely.
11. Install the exhaust system as described in Chapter Eight.
12. Install the fuel tank, side covers and seat.
13. Fill and bleed the cooling system as described in Chapter Three.
14. Start the engine and check for coolant leaks.

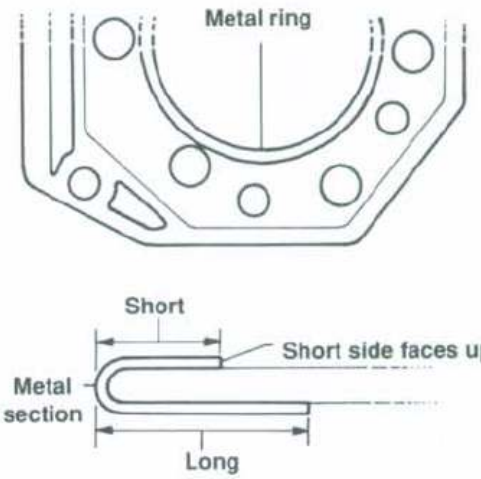
Inspection (All Models)

1. Clean the cylinder head as described under *Engine Decarbonizing* in this chapter.
2. Use a straightedge and feeler gauge and measure the flatness of the cylinder head (**Figure 9**). If the cylinder head warpage exceeds 0.03 mm (0.0012 in.), resurface the cylinder head as follows:
   a. Tape a piece of 400-600 grit wet emery sandpaper onto a piece of thick plate glass or surface plate.
   b. Slowly resurface the head by moving it in figure-eight patterns on the sandpaper.
   c. Rotate the head several times to avoid removing too much material from one side. Check progress often with the straightedge and feeler gauge.
   d. If the cylinder head warpage still exceeds the service limit excessively, it will be necessary to have the head resurfaced by a machine shop. Note that removing excessive amounts of material from the cylinder head mating surface will change the compression ratio. Consult with the machinist on how much material was removed.

3. With the spark plug removed, check the spark plug threads in the cylinder head (**Figure 10**) for carbon buildup or thread damage. The carbon can be removed with a 14 mm spark plug tap.

8

CYLINDER HEAD GASKET (1989-ON KX500)



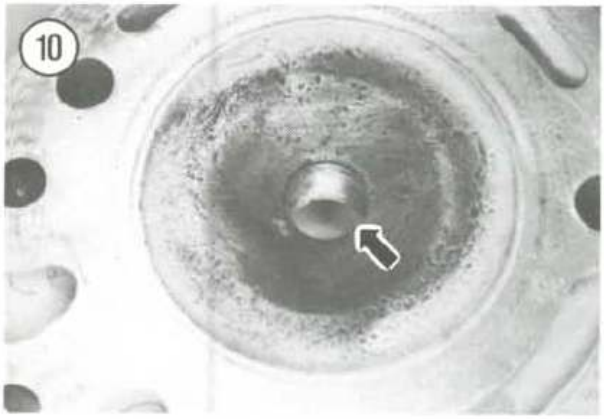
9

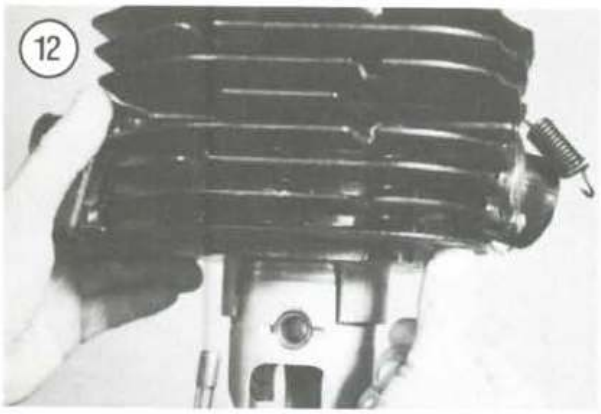
NOTE

Always use an aluminum thread fluid or Kerosene on the tap and threads when performing Step 3.

4. Check the flatness of the cylinder head nut and bolt surfaces. Remove any burrs with a file or sandpaper.

5. Check the dowel pin hole (**Figure 11**) in the cylinder head, if used, for cracks or other damage. Check the pin for damage.





6. Inspect the cylinder head nuts (and bolt) for stripping or other defects. Replace fasteners in sets, as required.

7. On cylinder heads with detachable water hose nozzles, check the nozzles for leaking or corrosion buildup. When reinstalling a hose nozzle, use a new O-ring or gasket.

8. Wash the cylinder head in hot soapy water and rinse thoroughly before installation.

CYLINDER (1982-1984 KX125 AND KX250; 1983-1985 KX500)

Removal/Installation

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

2. Remove the carburetor as described in Chapter Eight.

3. On liquid-cooled models, disconnect the coolant hose at the cylinder block.

4. Loosen the cylinder base nuts in a crisscross pattern and remove the nuts.

5. Loosen the cylinder by tapping around the perimeter with a rubber or plastic mallet.

CAUTION

When removing the cylinder in Step 6, do not twist the cylinder so far that the piston rings could snap into the intake port. This would cause the cylinder to bind and may damage the pistons rings and piston. If this should happen, remove the reed valve assembly and push the rings back into position.

6. Rotate the engine so the piston is at the bottom of its stroke. Pull the cylinder straight up and off the crankcase studs and piston (**Figure 12**), making sure to hold the piston when released from the cylinder so that the rod doesn't fall against the engine case.

7. Remove the cylinder base gasket and discard it.

8. Place a clean shop cloth into the crankcase opening to prevent the entry of foreign material.

Installation

1. Clean the cylinder bore as described under *Cylinder Inspection* in this chapter.

2. Check that the top surface of the crankcase and both cylinder surfaces are clean prior to installation.
3. Install a new base gasket.
4. Make sure the end gaps of the piston rings are lined up with the locating pins in the ring grooves (A, **Figure 13**). Lightly oil the piston rings and the inside of the cylinder bore.
5. Check that the piston pin clips (B, **Figure 13**) are seated in the piston grooves completely.
6. Install a piston holding fixture under the piston. Then rotate the crankshaft until the piston skirt seats against the fixture.

NOTE

A piston holding fixture can be made out of wood as shown in ***Figure 14****.*

CAUTION

Do not rotate the cylinder while installing it. A piston ring could snag in the cylinder intake port and break. If a ring does snag, try to reach through the intake port to push it back in place.

7. Start the cylinder down over the piston *with the exhaust port facing forward.* See **Figure 12**.
8. Compress each ring, first the top and then the bottom, with your fingers, as the cylinder starts to slide over it.

NOTE

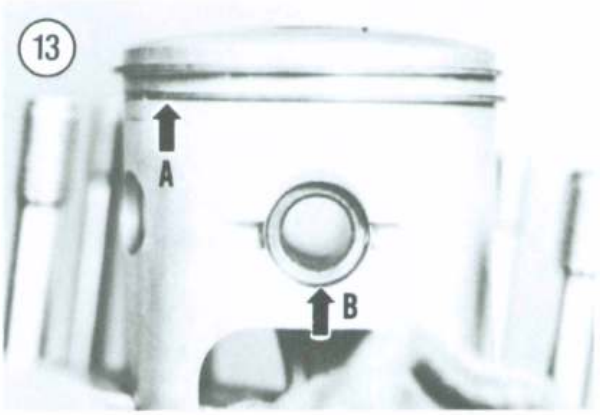
Make sure the rings are still aligned with the piston locating pins (A, ***Figure 13****).*

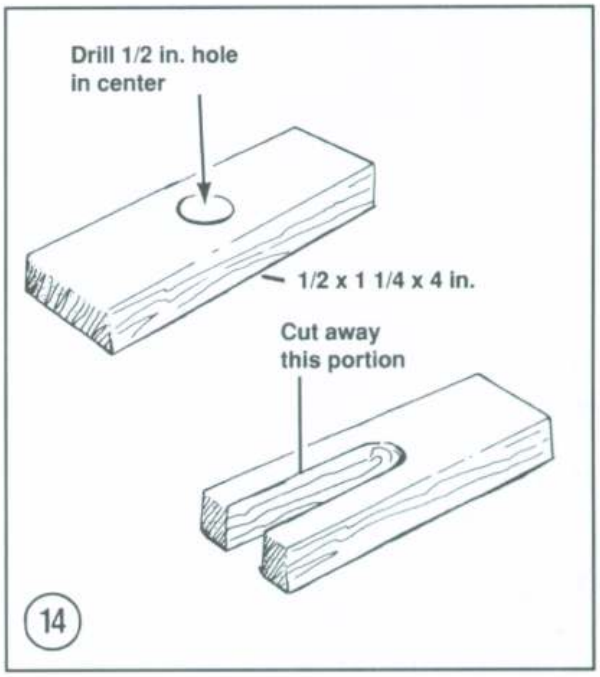
9. Slide the cylinder down until it bottoms on the piston holding fixture.
10. Remove the piston holding fixture and slide the cylinder into place on the crankcase.
11. Hold the cylinder in place with one hand and operate the kickstarter lever with your other hand. If the piston catches or stops in the cylinder, the piston rings were not lined up properly. The piston should move up and down the cylinder bore smoothly.

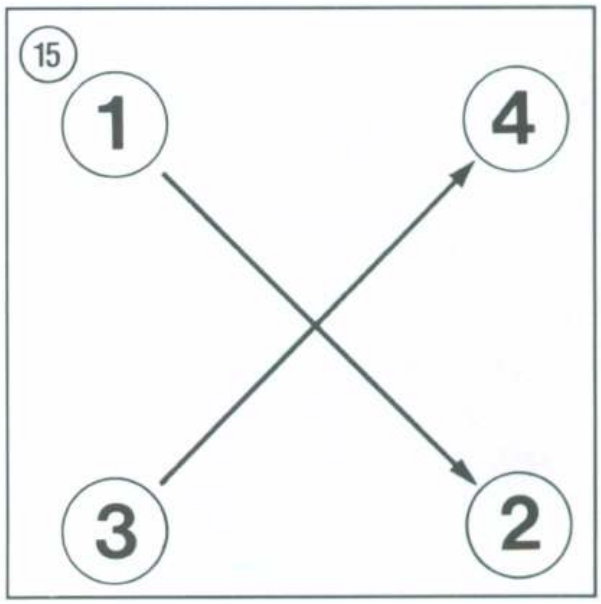
NOTE

If the rings were not lined up, remove the cylinder and check for damage.

12. Install the cylinder base nuts and tighten them in a crisscross pattern (**Figure 15**) to the torque specification in **Table 7**.







13. On liquid-cooled models, reconnect the coolant hose at the cylinder. Tighten the hose clamp securely.

14. Install the cylinder head as described in this chapter.

15. Install the carburetor as described in Chapter Eight.

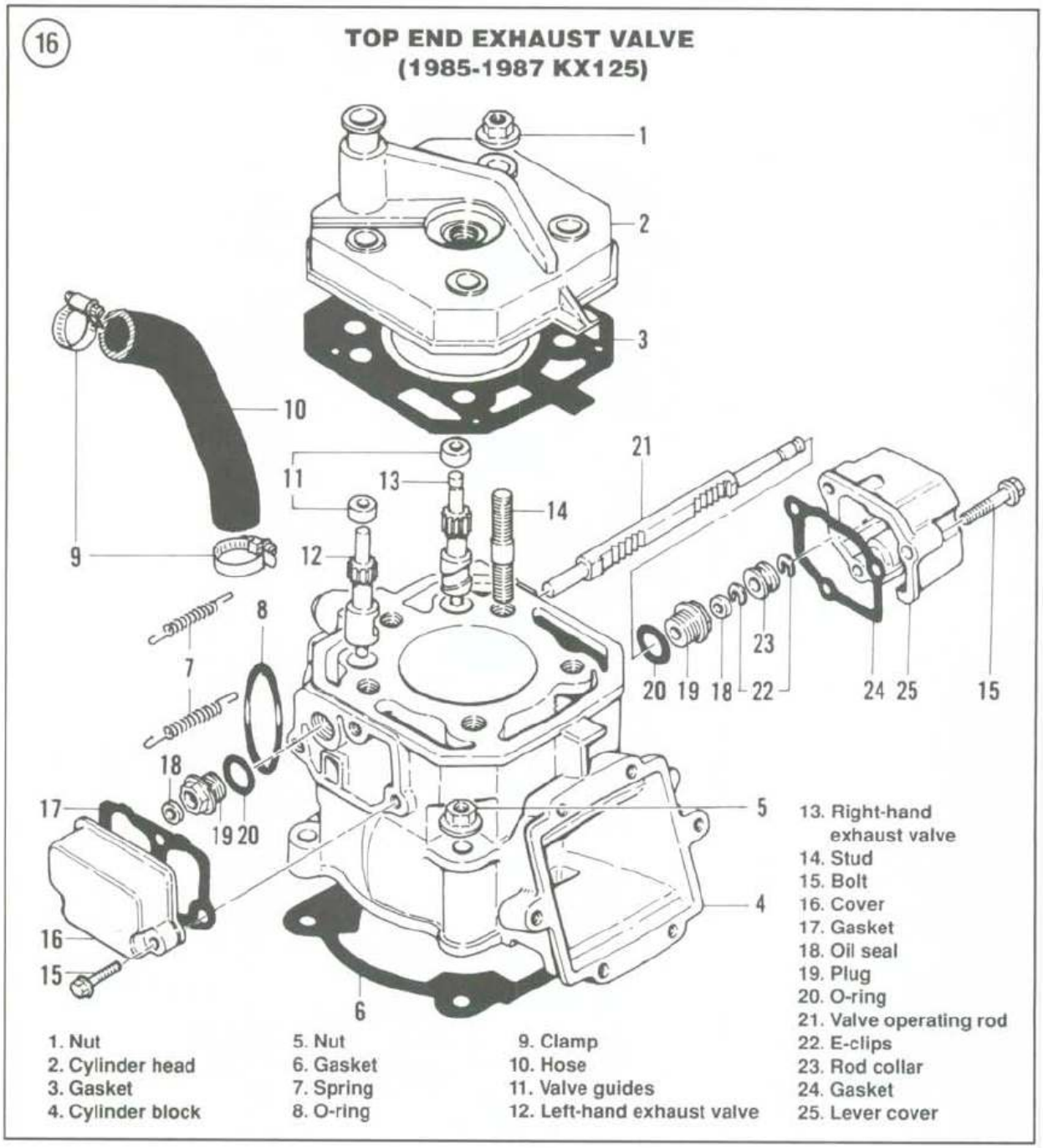
16. Follow the *Break-in Procedure* in this chapter if new parts were installed (piston, rings, cylinder, etc.).

CYLINDER AND EXHAUST VALVE (1985-1987 KX125)

Refer to **Figure 16** when performing procedures in this section.

Removal

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



2. Remove the carburetor as described in Chapter Eight.
3. Remove the left-hand port cover and gasket (16, **Figure 16**).
4. Remove the right-hand lever cover and gasket (25, **Figure 16**).
5. Remove the shaft lever bolt (**Figure 17**).
6. Remove the shaft lever (**Figure 17**) from the cylinder.
7. Loosen the cylinder base nuts in a crisscross pattern. Then remove the nuts.
8. Loosen the cylinder by tapping around the perimeter with a rubber or plastic mallet.

CAUTION

When removing the cylinder in Step 9, do not twist the cylinder so far that the piston rings could snap into the intake port. This would cause the cylinder to bind and may damage the pistons rings and piston. If this should happen, remove the reed valve assembly and push the rings back into position.

9. Rotate the engine so the piston is at the bottom of its stroke. Pull the cylinder straight up and off the crankcase studs and piston.
10. Remove the cylinder base gasket and discard it.
11. Place a clean shop cloth into the crankcase opening to prevent the entry of foreign material.
12. Inspect the cylinder as described under *Cylinder Inspection* in this chapter.

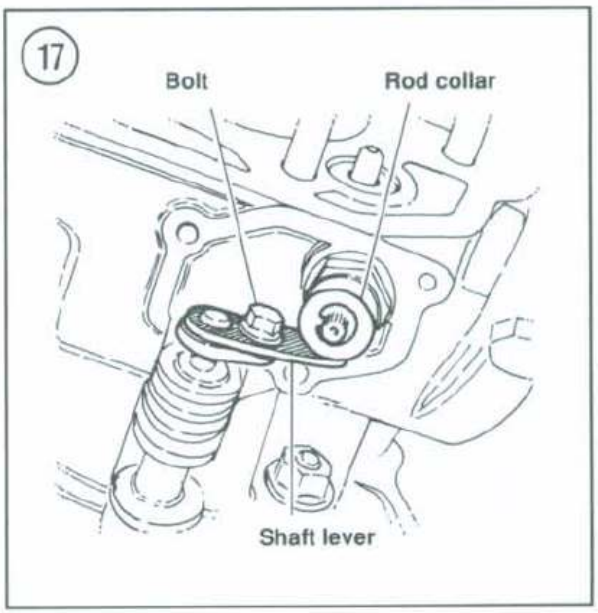
Exhaust Power Valve Removal/Inspection/Installation

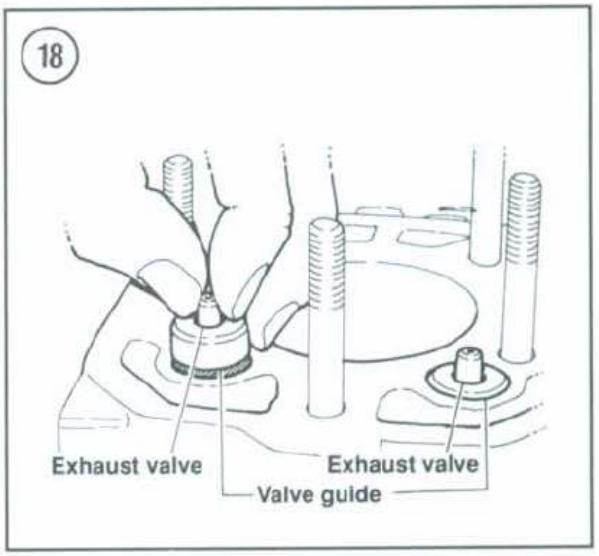
Refer to **Figure 16** for this procedure.

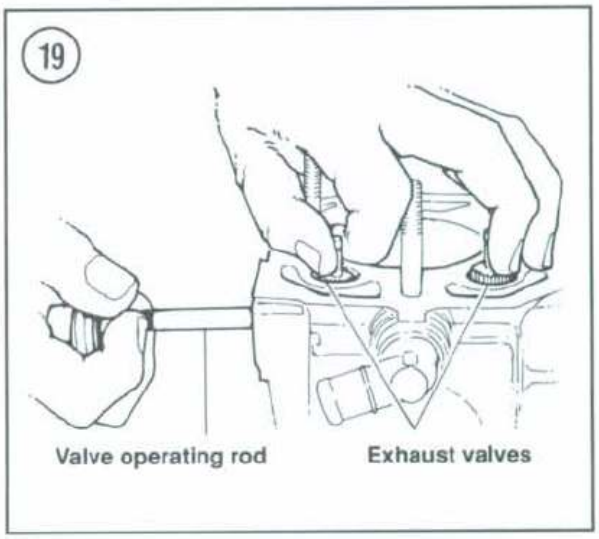
1. Remove the outer circlip and slide the rod collar (**Figure 17**) off of the valve operating rod. Remove the inner circlip.
2. Loosen and remove the right-hand cylinder plug (19, **Figure 16**) and gasket.
3. Remove the valve guides from the exhaust valves (**Figure 18**).

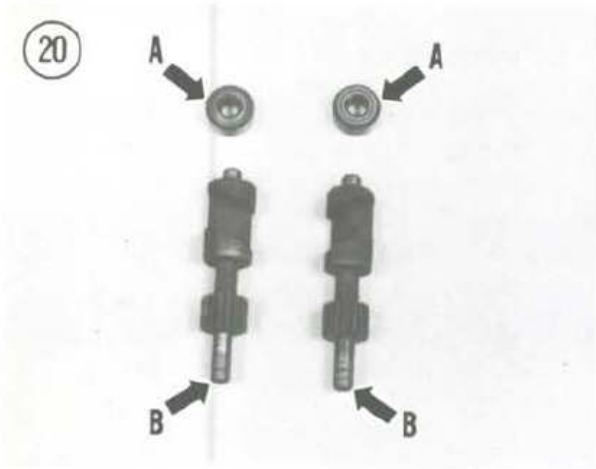
NOTE

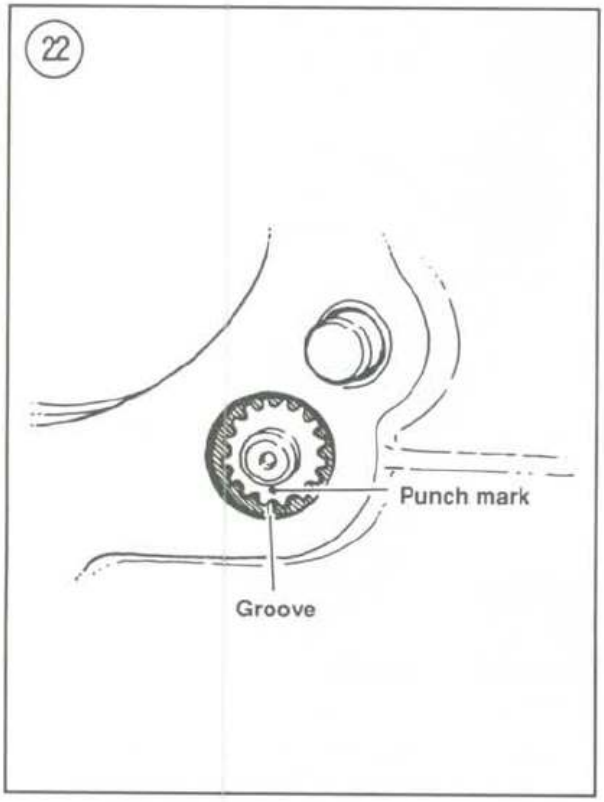
Before removing the valve operating rod, slide the rod all the way to the left. Check that the punch mark in the top of each exhaust valve aligns with a groove machined into the valve operating rod.











This alignment must be maintained during reassembly.

4. Lift the exhaust valves up and slide the valve operating rod (**Figure 19**) out of the cylinder.
5. Remove the exhaust valves.

Exhaust Power Valve Cleaning and Inspection

1. Using a small wire brush, clean the 2 cylinder port holes thoroughly of all oil and carbon residue.
2. Clean all exhaust valve parts in solvent to remove all traces of oil and carbon buildup.
3. Check the valve guides (A, **Figure 20**) for scoring or other damage.
4. Check the exhaust valves (B, **Figure 20**) for scoring or gear damage.
5. Check the valve operating rod (**Figure 21**) for bending or gear damage.
6. Check the oil seals in each cylinder plug (18, **Figure 16**) for wear and damage. Replace if necessary.
7. Replace all worn or damaged parts.

Exhaust Power Valve Installation

Refer to **Figure 16** when performing this procedure.

1. Apply molybdenum disulfide grease to the valve operating rod teeth and the exhaust valve teeth.
2. If removed, install the left-hand cylinder plug (19, **Figure 16**) with a new gasket. Tighten the plug securely.
3. Before installing the exhaust valves (B, **Figure 20**), note the following:
   a. The exhaust valves (B, **Figure 20**) are different. The right-hand exhaust valve (13, **Figure 16**) has a groove cut into the top of the valve's shaft. The left-hand exhaust valve (12, **Figure 16**) does not have a groove.
   b. The top of each exhaust valve has a punch mark (**Figure 22**) for alignment with the valve operating rod.
   c. The valve operating rod has 2 grooves for alignment with the exhaust valves.
   d. The left- and right-hand valve guides (A, **Figure 20**) are identical.

4. Install the left- and right-hand exhaust valves (**Figure 19**) into their correct port (see Step 3 for valve identification).

5. Turn each exhaust valve so that its punch mark faces forward (**Figure 22**).

6. See **Figure 19**. Lift both exhaust valves slightly and install the valve operating rod. The teeth on the valve operating rod should point to the back of the cylinder. Push the valve operating rod all the way to the left, while at the same time aligning each exhaust valve punch mark with the respective groove on the valve operating rod (**Figure 22**). If the marks do not line up when the valve operating rod is pushed all the way to the left, remove the valve operating rod and reinstall it.

7. Install the right-hand cylinder plug (19, **Figure 16**) and a new gasket. Tighten the plug securely.

8. Slide the valve operating rod in and out of the cylinder a few times, then check that the valve and operating rod marks line up when the rod is moved all the way to the left (**Figure 22**).

9. Install the valve guides onto the exhaust valves (**Figure 18**).

10. Install the circlip, rod collar (**Figure 17**) and circlip onto the valve operating rod. Make sure each circlip seats in the valve operating rod groove completely.

Installation

1. Clean the cylinder bore as described under *Cylinder Inspection* in this chapter.

2. Check that the top surface of the crankcase and the bottom surface of the cylinder are clean prior to installation.

3. Install a new base gasket.

4. Make sure the piston ring end gaps line up with the locating pins in the ring grooves (A, **Figure 13**). Lightly oil the piston rings and the inside of the cylinder bore.

5. Check that the piston pin clips (B, **Figure 13**) are seated in the piston grooves completely.

6. Install a piston holding fixture under the piston. Then rotate the crankshaft until the piston skirt seats against the fixture.

NOTE

A piston holding fixture can be easily made out of wood as shown in ***Figure 14****.*

CAUTION

Do not rotate the cylinder while installing it. A piston ring could snag in the cylinder intake port and break. If a ring does snag, try to reach through the intake port to push it back in place.

7. Start the cylinder down over the piston *with the exhaust port facing forward.*

8. Compress each ring, with your fingers, as the cylinder starts to slide over it (**Figure 23**).

NOTE

Make sure the rings are still aligned with the piston locating pins.

9. Slide the cylinder down until it bottoms on the piston holding fixture.

10. Remove the piston holding fixture and slide the cylinder into place on the crankcase.

11. Hold the cylinder in place with one hand and push the kickstarter lever down with the other hand. If the piston catches or stops in the cylinder, the piston rings were not lined up properly. The piston should move up and down the cylinder bore smoothly.

NOTE

If the rings were not lined up, remove the cylinder and check for damage.

12. Install the cylinder base nuts and tighten them securely in a crisscross pattern (**Figure 15**) to the torque specification in **Table 7**.

13. Install the shaft lever onto the lever shaft. Then engage the shaft lever with the collar on the valve operating rod. Install the mounting bolt and tighten securely. See **Figure 17**.

14. Install the right-hand cover and gasket. Tighten the bolts securely.

15. Install the left-hand cover and gasket. Tighten the bolts securely.

16. Install the cylinder head as described in this chapter.

17. Install the carburetor as described in Chapter Eight.

18. Follow the *Break-in Procedure* in this chapter if new top end components were installed.

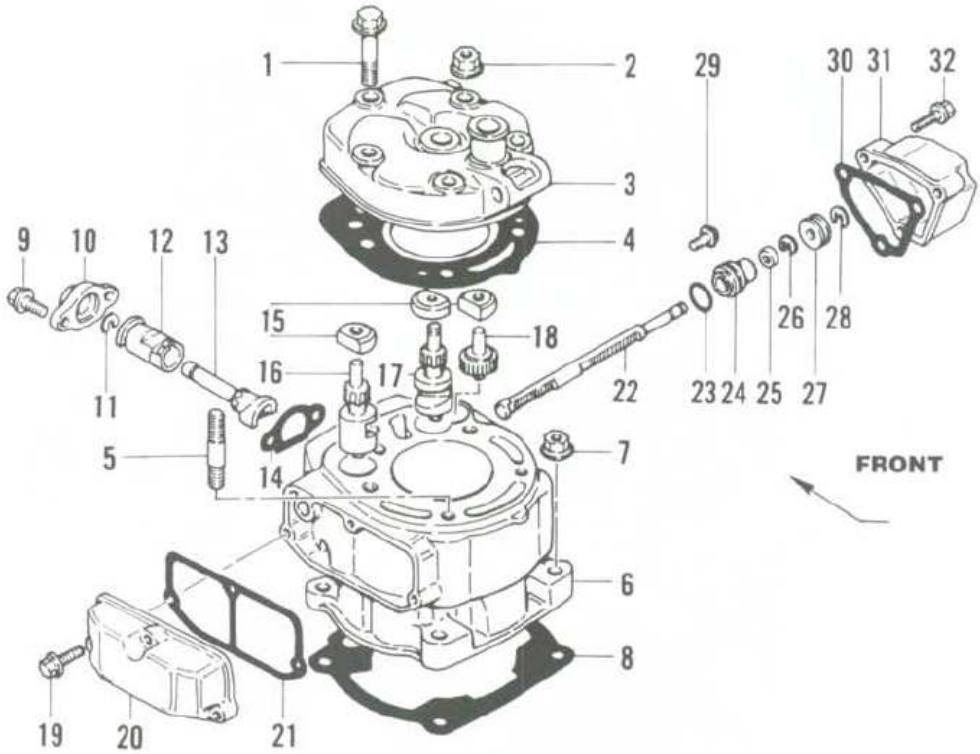
CYLINDER AND EXHAUST VALVE (1988-1991 KX125)

Refer to **Figure 24** (1988), **Figure 25** (1989) or **Figure 26** (1990-1991) when performing procedures in this section.

Cylinder Removal

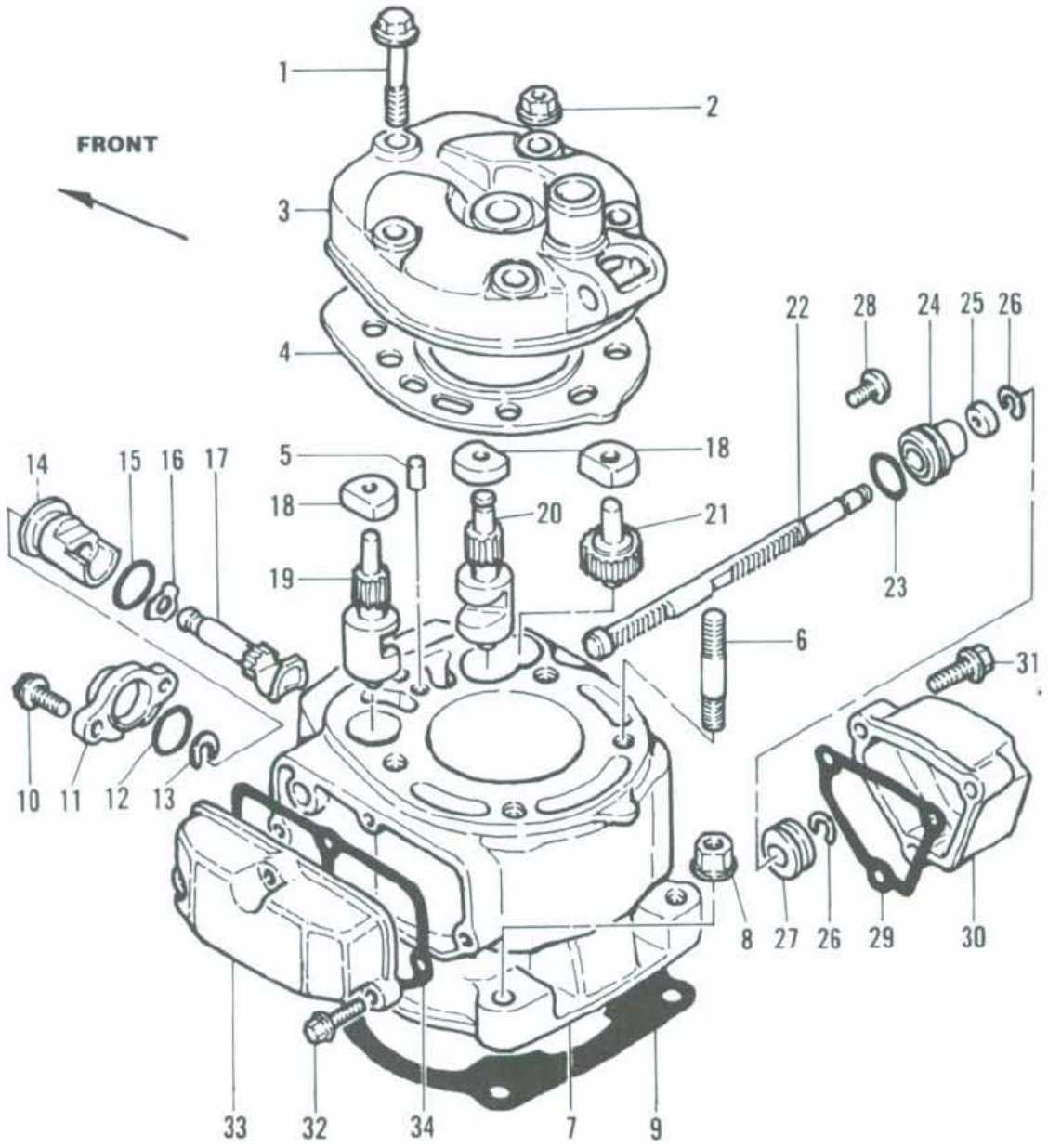
1. Remove the right-hand governor cover and gasket.

TOP END AND EXHAUST VALVE ASSEMBLY (1988 KX125)



1. Bolt
2. Nut
3. Cylinder head
4. Gasket
5. Stud
6. Cylinder block
7. Nut
8. Gasket
9. Bolt
10. Main exhaust valve cover
11. Clip
12. Valve bushing
13. Main exhaust valve
14. Gasket
15. Collars
16. Left-hand exhaust valve
17. Right-hand exhaust valve
18. Idler gear
19. Bolt
20. Resonator cover
21. Gasket
22. Valve operating rod
23. O-ring
24. Valve guide
25. Oil seal
26. E-clip
27. Collar
28. E-clip
29. Bolt
30. Gasket
31. Right-hand governor cover
32. Bolt

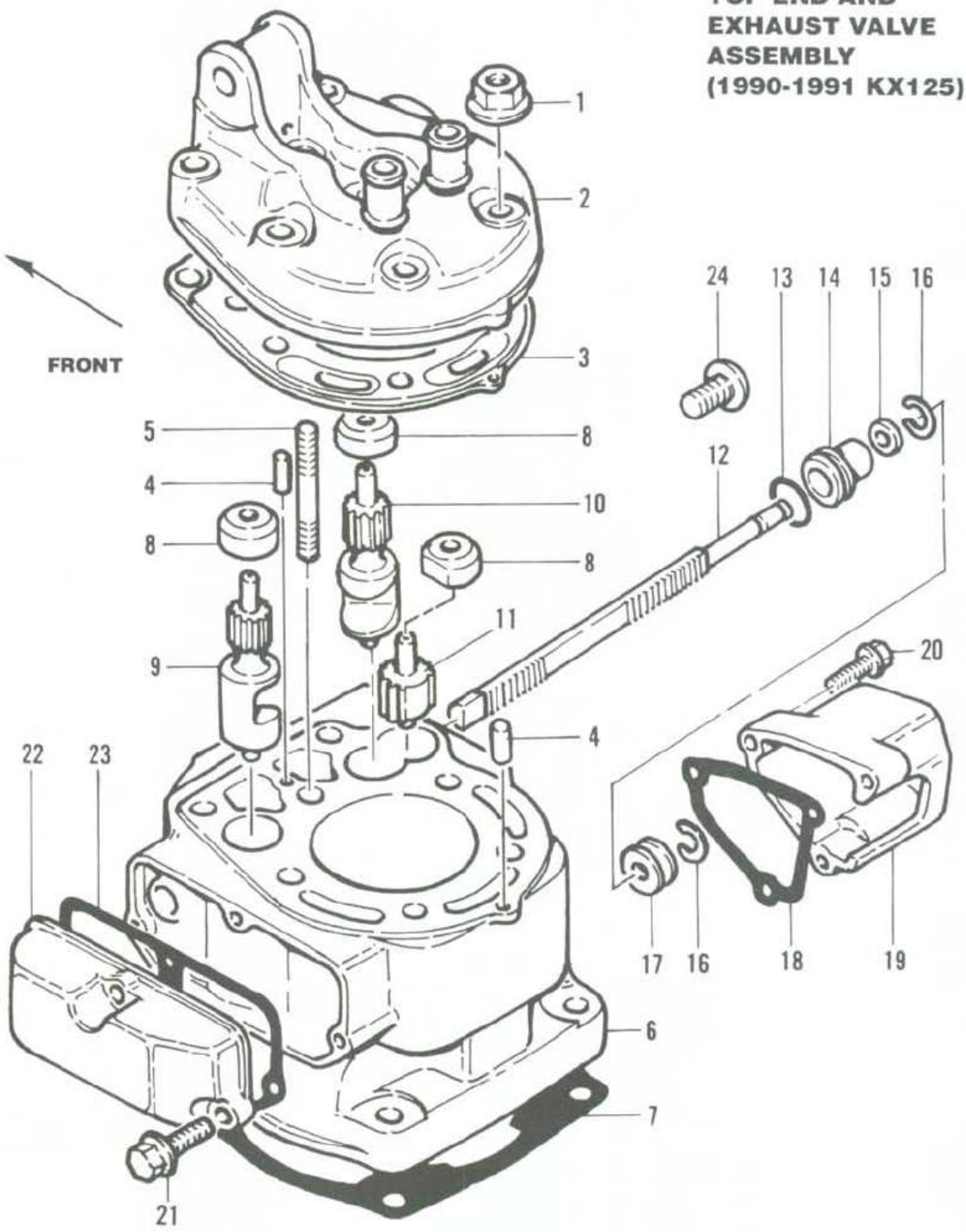
(25) TOP END AND EXHAUST VALVE ASSEMBLY (1989 KX125)



1. Bolt
2. Nut
3. Cylinder head
4. Gasket
5. Pin
6. Stud
7. Cylinder block
8. Nut
9. Gasket
10. Bolt
11. Main exhaust valve cover
12. O-ring
13. Clip
14. Valve bushing
15. O-ring
16. Wave washer
17. Main exhaust valve
18. Collars
19. Left-hand exhaust valve
20. Right-hand exhaust valve
21. Idler gear
22. Valve operating rod
23. O-ring
24. Valve guide
25. Oil seal
26. E-clip
27. Collar
28. Screw
29. Gasket
30. Right-hand governor cover
31. Bolt
32. Bolt
33. Cover
34. Gasket

(26)

TOP END AND EXHAUST VALVE ASSEMBLY (1990-1991 KX125)



1. Nut
2. Cylinder head
3. Gasket
4. Pin
5. Stud
6. Cylinder block
7. Gasket
8. Collars
9. Left-hand exhaust valve
10. Right-hand exhaust valve
11. Idler gear
12. Valve operating rod
13. O-ring
14. Valve guide
15. Oil seal
16. E-clip
17. Collar
18. Gasket
19. Right-hand governor cover
20. Bolt
21. Bolt
22. Resonator cover
23. Gasket
24. Screw

NOTE

The governor lever nut uses left-hand threads.

2. Turn the governor lever nut (A, **Figure 27**) clockwise to loosen it. Remove the nut and governor lever (B, **Figure 27**).

3. Remove the cylinder head as described in this chapter.

4. Remove the exhaust system as described in Chapter Eight.

5. Loosen the cylinder base nuts (**Figure 28**) in a crisscross pattern (**Figure 29**). Then remove the nuts.

6. Loosen the cylinder by tapping around the perimeter with a rubber or plastic mallet.

CAUTION

When removing the cylinder in Step 7, do not twist the cylinder so far that the piston rings could snap into the intake port. This would cause the cylinder to bind and may damage the piston, rings and cylinder.

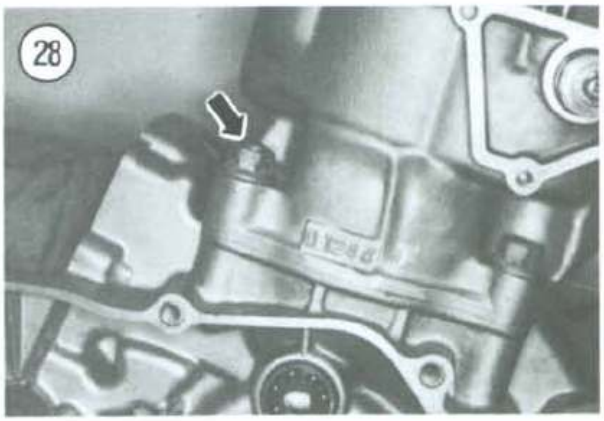
7. Rotate the engine so the piston is at the bottom of its stroke. Pull the cylinder (**Figure 30**) straight up and off the crankcase studs and piston.

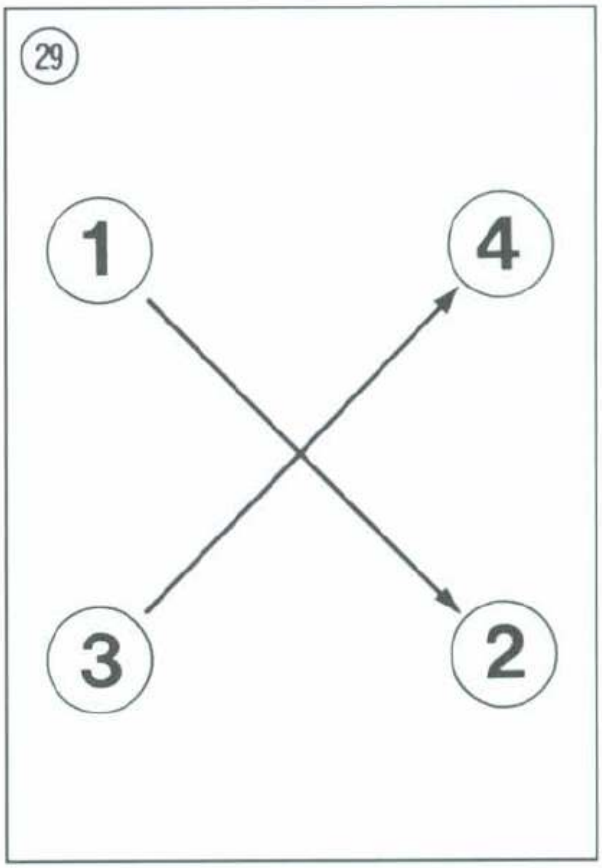
8. Remove the cylinder base gasket and discard it.

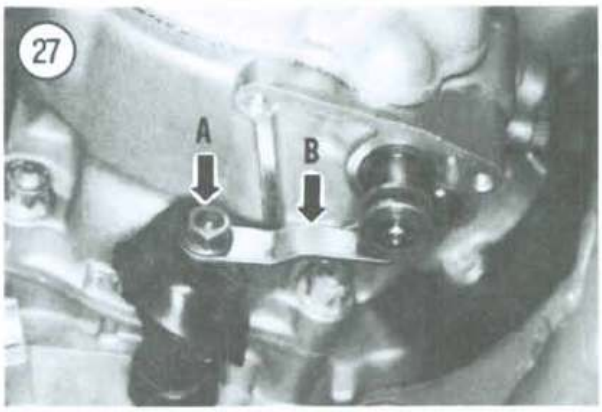
9. Place a clean shop cloth into the crankcase opening to prevent the entry of foreign material.

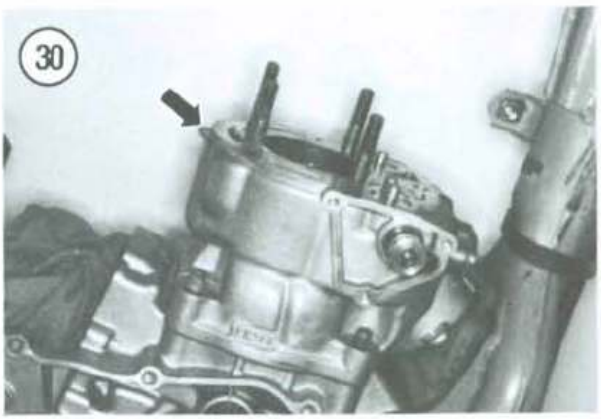
Exhaust Valve
Removal

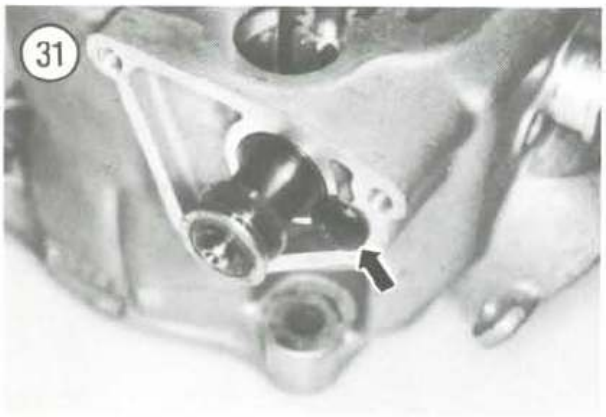
Refer to **Figure 24**, **Figure 25** or **Figure 26** for this procedure.

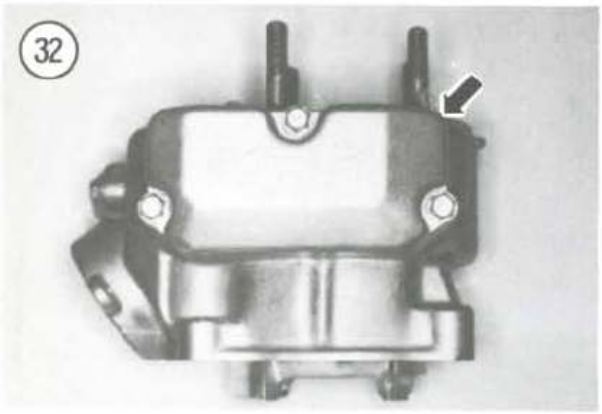


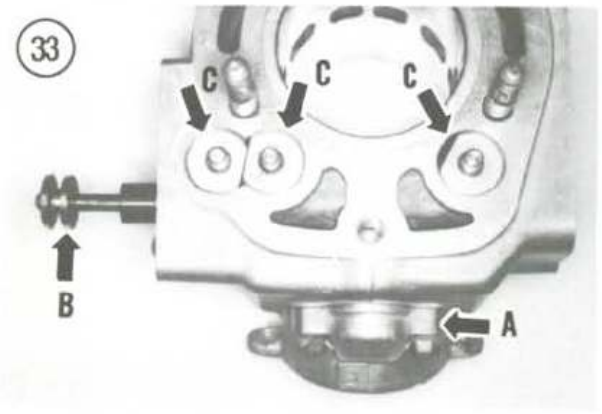






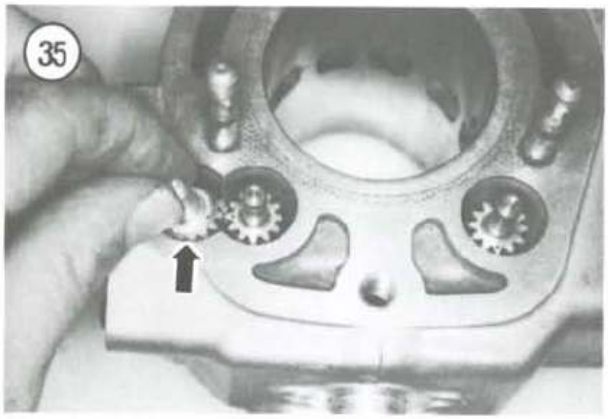


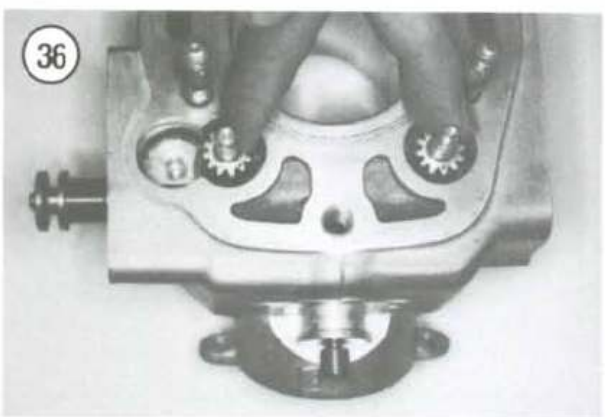




NOTE
Steps 1-9 can be performed with the cylinder mounted in the frame.

1. Remove the screw (**Figure 31**) holding the exhaust valve operating rod to the cylinder.
2. Remove the resonator cover bolts and remove the cover (**Figure 32**) and gasket.
3. On 1988-1989 models, remove the main exhaust cover bolts and remove the cover (A, **Figure 33**).
4. Pull the operating rod out until it stops (B, **Figure 33**).
5. Remove the 3 valve collars (C, **Figure 33**) from the cylinder. All 3 collars have the same part number.
6. On 1988-1989 models, pull the main exhaust valve out of the cylinder until the groove on the valve bushing aligns with the edge of the cylinder as shown in **Figure 34**.
7. Lift the idler gear (**Figure 35**) out of the cylinder.
8. Lift the left- and right-hand exhaust valves until both gear surfaces are flush with the top of the cylinder (**Figure 36**), then remove the valve operating rod (**Figure 37**).





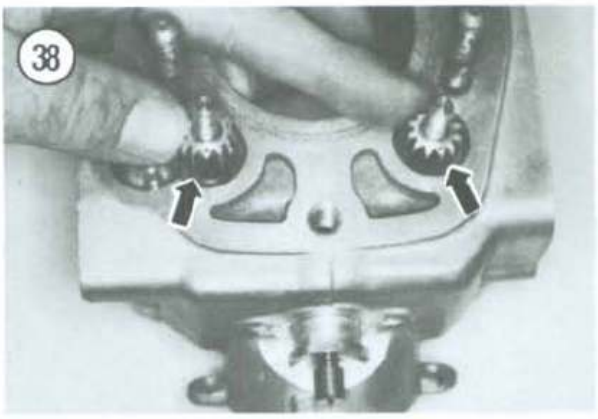
9. Remove the left- and right-hand exhaust valves (**Figure 38**).

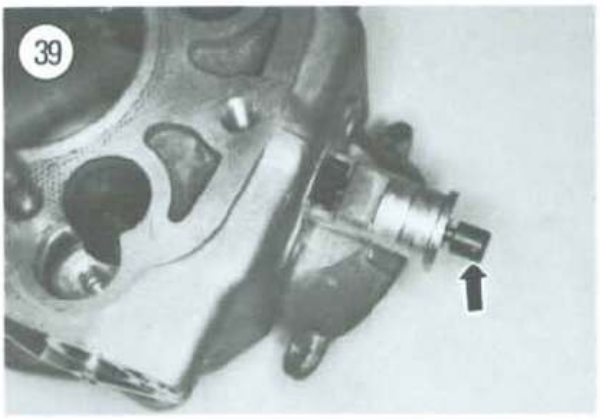
NOTE
On 1988-1989 models, the cylinder must be removed from the bike in order to remove the main exhaust valve in Step 10.

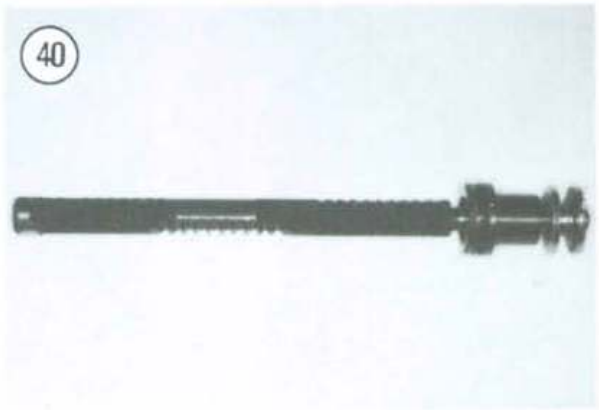
10. On 1988-1989 models, remove the main exhaust valve from the front of the cylinder (**Figure 39**). Disassemble the main exhaust valve in the order shown in **Figure 24** or **Figure 25**.

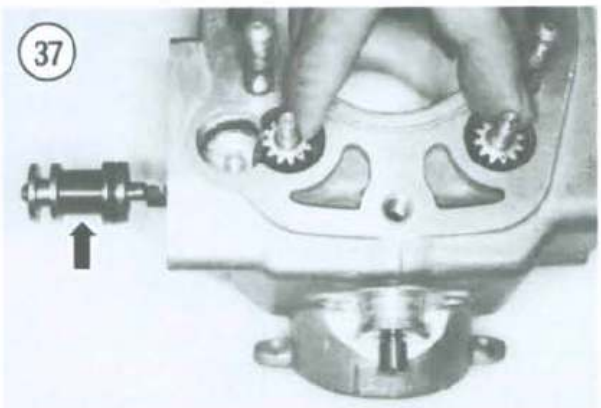
Exhaust Valve Inspection

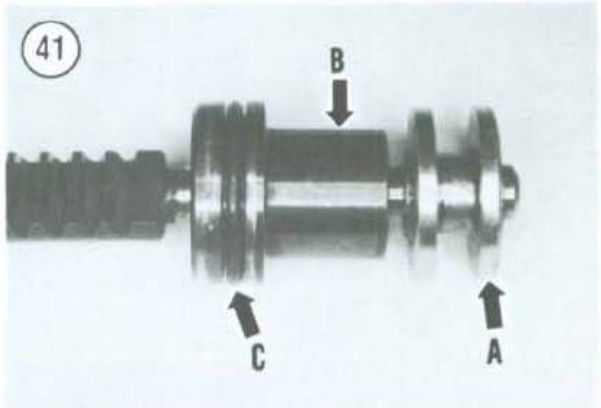
1. Clean the exhaust valve assembly as described under *Exhaust Valve Decarbonizing* in this chapter.
2. Inspect the valve operating rod (**Figure 40**) for nicks, burrs or damage. Check the rod teeth for damage.
3. To disassemble and inspect the valve operating rod (**Figure 40**) assembly:
   a. Remove the outer E-clip, collar (A, **Figure 41**), inner E-clip and valve guide (B, **Figure 41**).
   b. Inspect the collar and valve guide for nicks, burrs or damage.
   c. Replace the valve guide (B, **Figure 41**) oil seal if worn, damaged or leaking.
   d. Replace the valve guide O-ring (C, **Figure 41**) if worn or damaged.
4. To assemble the valve operating rod assembly:
   a. Apply a high temperature grease to the oil seal lip on the valve guide.
   b. Install a new O-ring (C, **Figure 41**) onto the valve guide, if necessary.





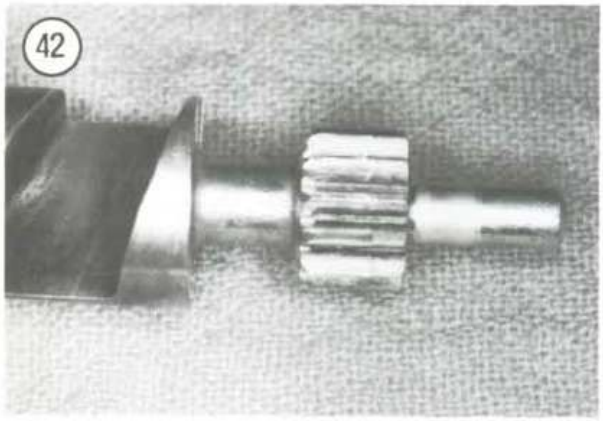


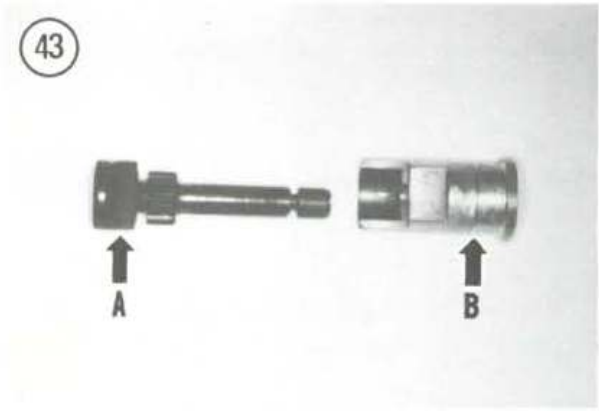


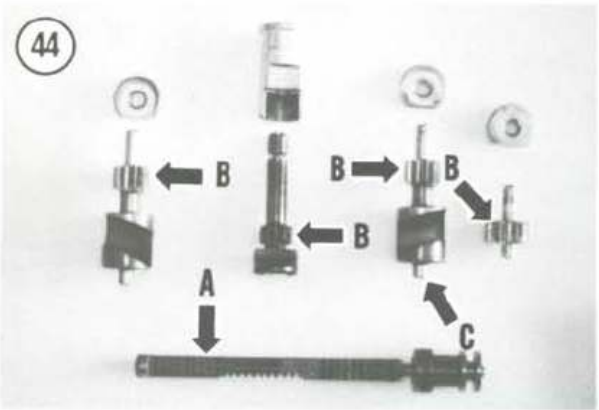


c. Slide the valve guide onto the rod as shown in B, **Figure 41**).
d. Install the inner E-clip.
e. Slide on the collar (A, **Figure 41**).
f. Install the outer E-clip.
g. Check that both E-clips seat in the rod groove completely.

5. Inspect the exhaust valves for scoring, nicks, burrs or gear damage (**Figure 42**).
6. Inspect the idler gear for nicks, burrs or gear damage.







7A. On 1988 models, inspect the main exhaust valve (**Figure 43**) as follows:
a. Inspect the main exhaust valve (A, **Figure 43**) for nicks, burrs or gear damage.
b. Inspect the bushing (B, **Figure 43**) for cracks, nicks or other defects.

7B. On 1989 models, inspect the main exhaust valve (**Figure 25**) as follows:
a. Inspect the main exhaust valve for nicks, burrs or gear damage.
b. Inspect the bushing for cracks, nicks or other defects.
c. Inspect the wave washer for damage.
d. Replace the O-rings if worn or damaged.

8. Replace worn or damaged parts.

Exhaust Valve Reassembly

Patience is the name of the game when installing and timing the exhaust valve assembly. While you may fumble the first one or two times, it will come together and seem fairly easy. Because the parts must be lubricated with moly lube, you may want to make a couple of dry runs—assemble without lubing the parts—and then, when you get the hang of assembling and timing the parts, remove everything, lube the parts as described in the text and then reinstall a final time.

1. Check that all of the parts have been thoroughly cleaned of all carbon and oil residue.
2. Clean the cylinder as described under *Cylinder Inspection* in this chapter.
3. Apply molybdenum disulfide grease to the following parts:
a. Valve operating rod rack and journals (A, **Figure 44**).
b. Exhaust valve and idler gears (B, **Figure 44**).
c. Upper and lower exhaust valve journals.
d. Valve guides in the cylinder block.

4A. On 1988 models, assemble and install the main exhaust valve as follows:
a. Slide the main exhaust valve (A, **Figure 43**) into the bushing (B, **Figure 43**). Position the exhaust valve so that its dished side (A, **Figure 45**) aligns with the flat face (B, **Figure 45**) on the bushing.
b. Insert the main exhaust valve assembly into the cylinder so that the bushing's flat face side faces up (**Figure 46**).

c. Push the main exhaust valve into the cylinder until the groove on the bushing (C, **Figure 45**) aligns with the edge of the cylinder as shown in **Figure 47**.

4B. On 1989 models, assemble and install the main exhaust valve as follows (refer to **Figure 25** and **Figure 48**):

a. Slide the wave washer onto the main exhaust valve.
b. Slide the O-ring onto the main exhaust valve.
c. Slide the main exhaust valve into the bushing. Position the main exhaust valve so that its stepped side aligns with the flat face on the bushing.
d. Insert the main exhaust valve assembly into the cylinder so that the bushing's flat face side faces up (**Figure 46**).
e. Push the main exhaust valve into the cylinder until the groove on the bushing (C, **Figure 45**) aligns with the edge of the cylinder as shown in **Figure 47**.

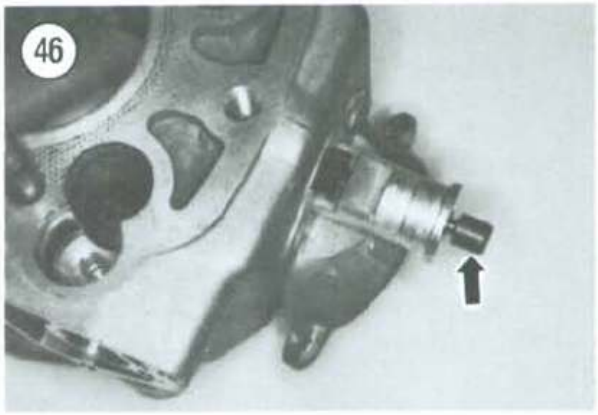
NOTE

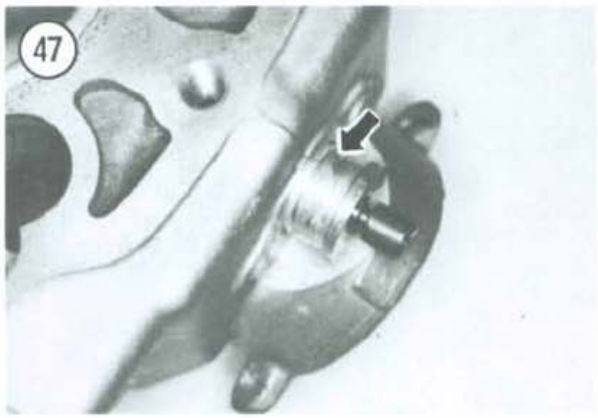
*Refer to **Figure 49** when installing and indexing the exhaust valve assembly in the following steps.*

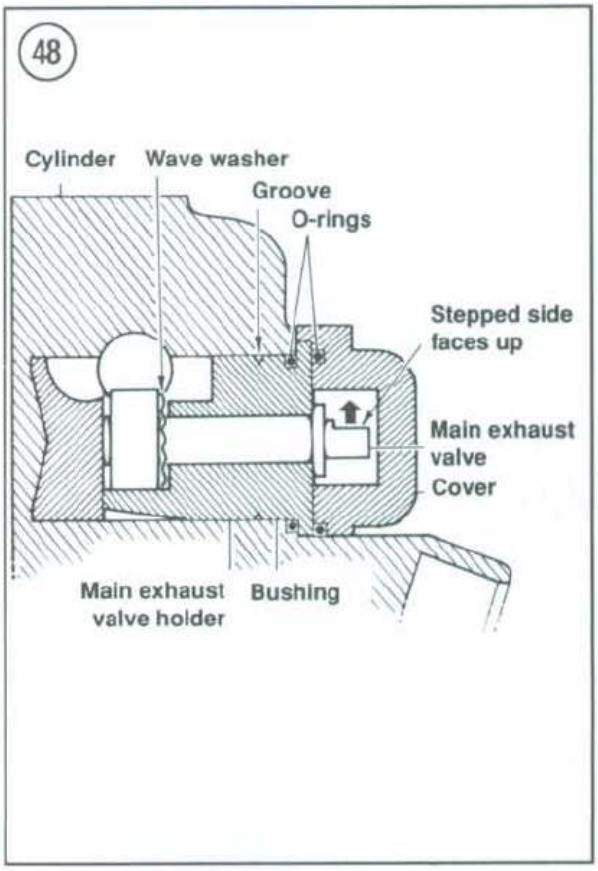
NOTE

*The left- and right-hand exhaust valves are different. The right-hand exhaust valve (B, **Figure 50**) has a groove machined at the top of the valve shaft; see C, **Figure 50**.*

5. Install the left-hand exhaust valve (A, **Figure 50**) into the cylinder. See A, **Figure 51**.
6. Install the right-hand exhaust valve (B, **Figure 50**) into the cylinder. See B, **Figure 51**.







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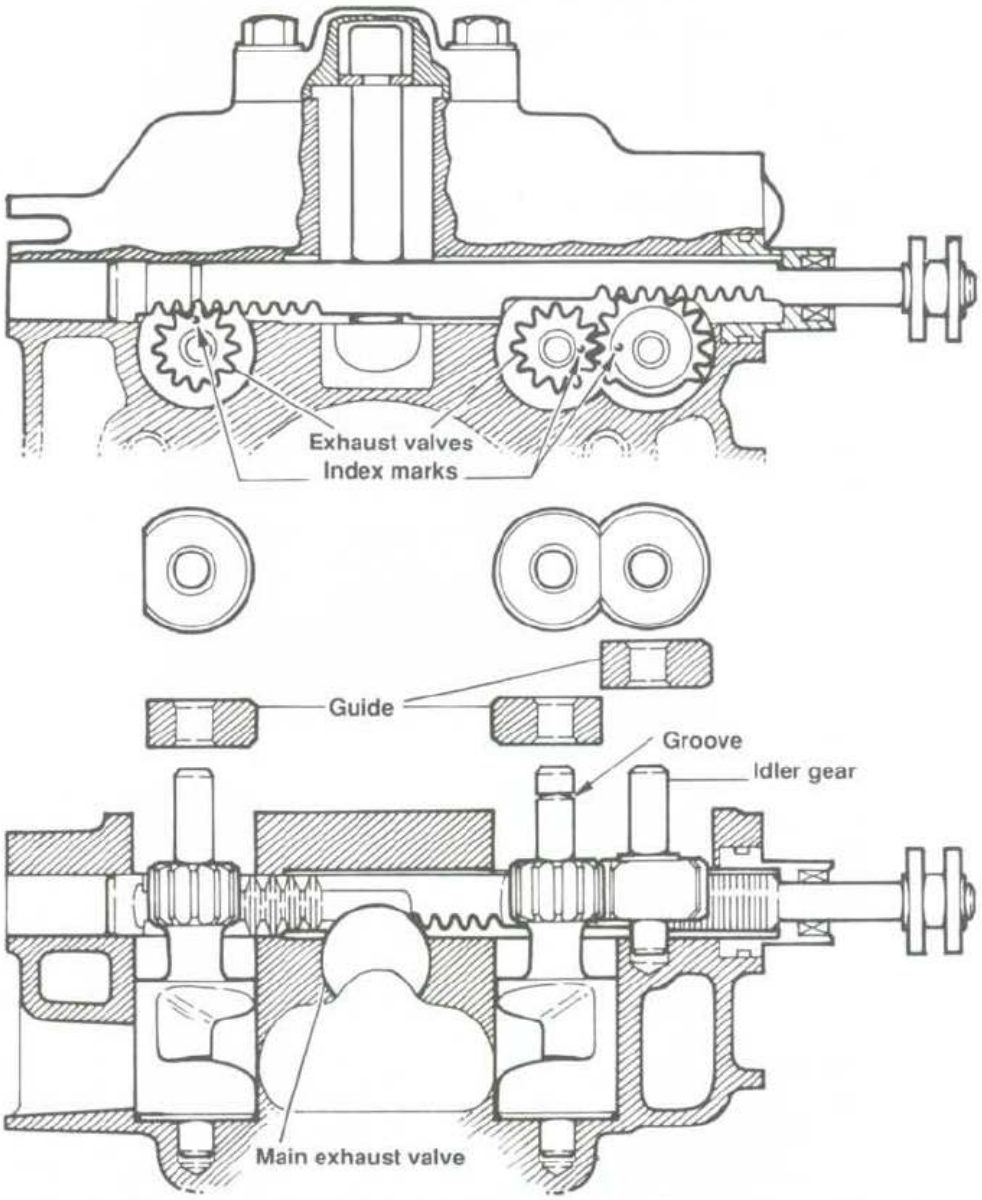
1988-ON KX125 EXHAUST VALVE ASSEMBLY



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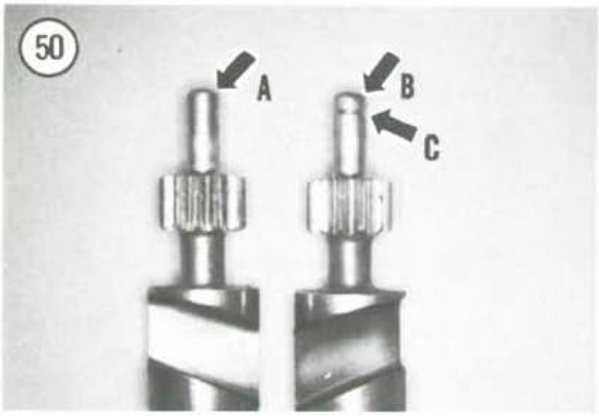

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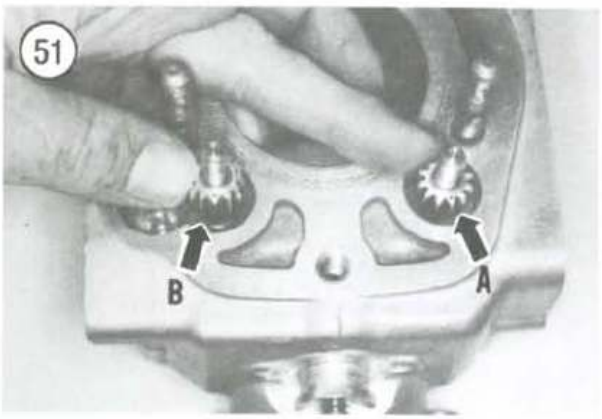
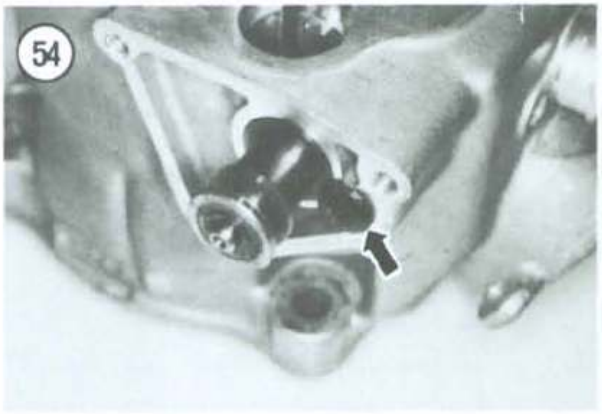
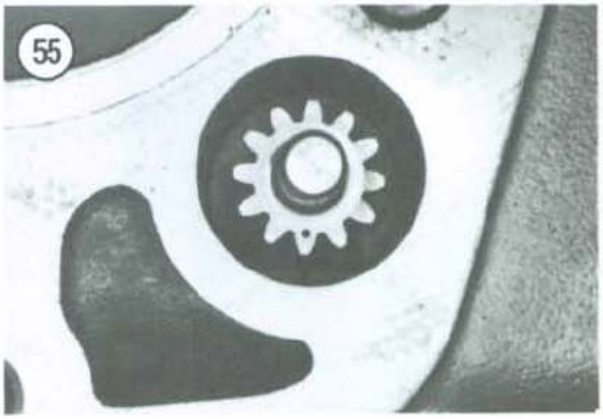
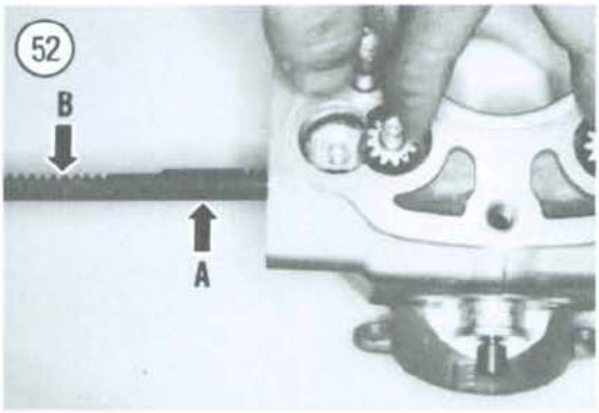
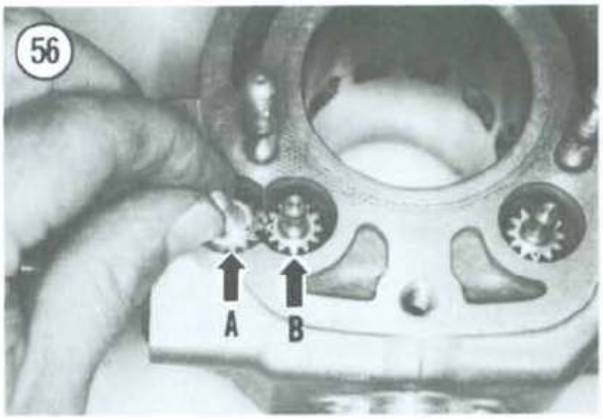


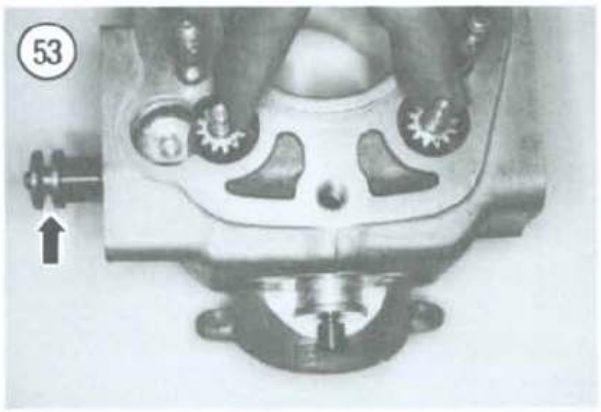
7. Turn each exhaust valve so that its index mark faces toward the front of the cylinder (**Figure 51**).
8. Lift both exhaust valves slightly and insert the valve operating rod (A, **Figure 52**) into the cylinder. The rack portion of the rod should face toward the back of the cylinder; see B, **Figure 52**.
9. Continue by inserting the valve operating rod all the way into the cylinder, passing it through both exhaust valves and the main exhaust valve (1988-1989) (**Figure 53**).
10. When the valve operating rod is pushed in all the way into the cylinder, seat the valve guide into the cylinder and secure it with the mounting screw (**Figure 54**). Now pull the valve operating rod back out as far as it will go.
11. Position the left-hand exhaust valve so that its index mark aligns with the groove in the valve operating rod. See **Figure 49** and **Figure 55**.
12. Install the idler gear (A, **Figure 56**), aligning its index mark with the index mark on the right-hand exhaust valve (B, **Figure 56**). See **Figure 49** and **Figure 57**.
13. Now slide the valve operating rod back and forth and check the index marks when the rod is pushed

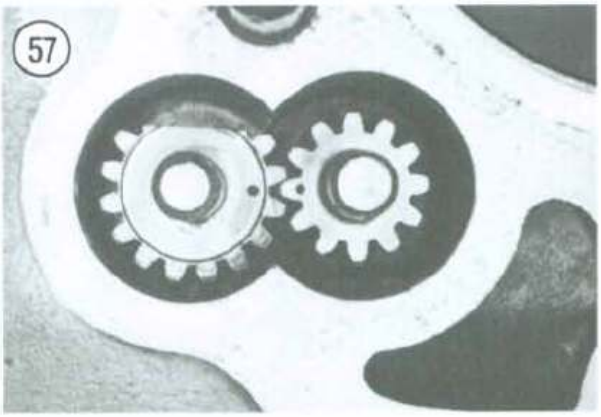


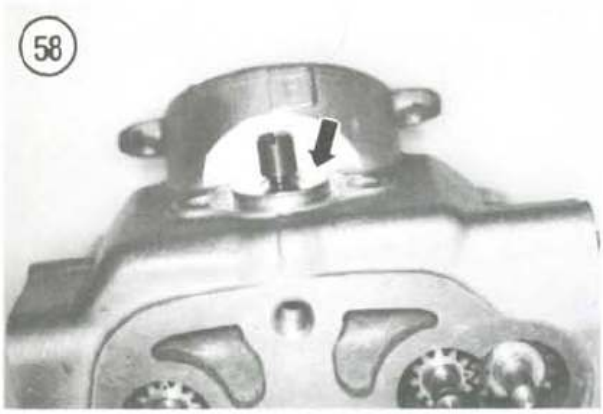


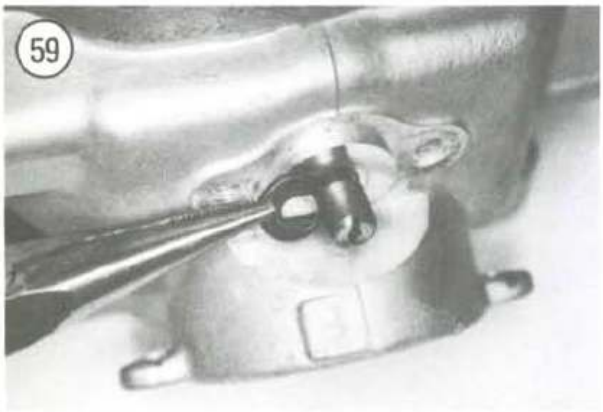






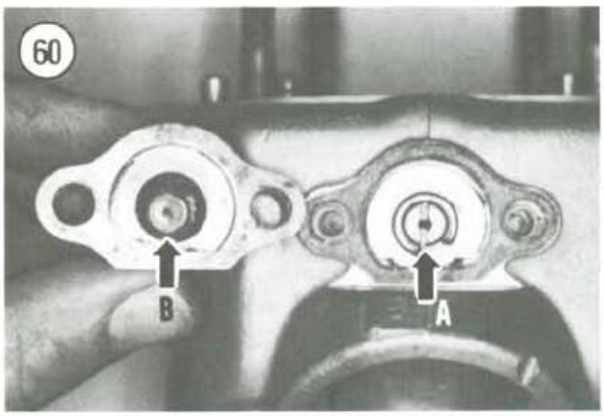






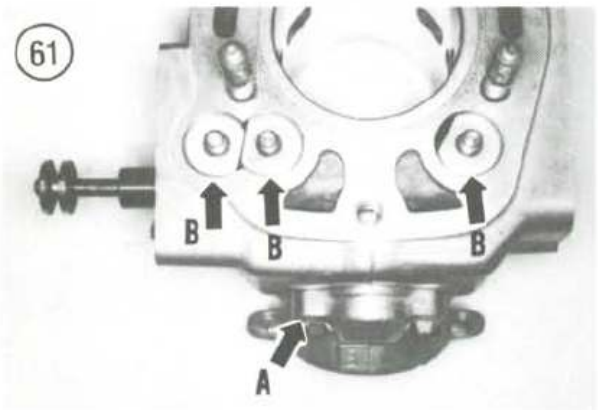
all the way into the cylinder. They index marks should align as described in Steps 11 and 12. When the index marks are properly aligned, proceed to Step 14 or Step 15. If the marks do not align, reposition the exhaust valves and idler gear.

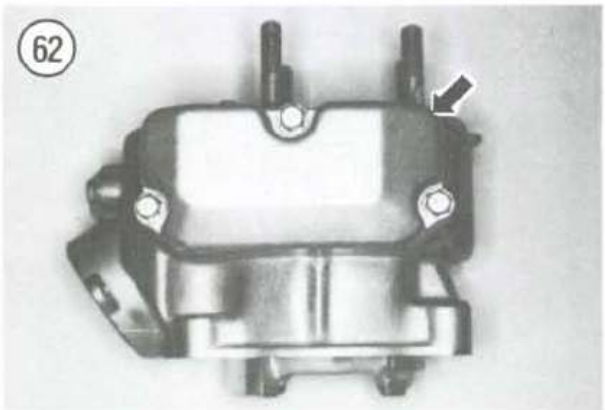
14. On 1988-1989 models, install the main exhaust valve as follows:
    a. Push the main exhaust valve and bushing all the way into the cylinder (**Figure 58**). Install the spacer in the groove between the bushing and exhaust valve shoulder (**Figure 59**).
    b. Position the spacer so that the flat portion on the front of the spacer faces down (A, **Figure 60**). This will align the spacer with the step inside the valve's cover (B, **Figure 60**).
    c. Install a new cover gasket (1988) or O-ring (1989) and install the front cover (A, **Figure 61**) and its mounting screws. Tighten the screws securely.
15. Install the 3 collars onto the idler gear and exhaust valves as shown in B, **Figure 61**.
16. Install a new resonator cover gasket and install the cover (**Figure 62**) and its mounting screws. Tighten the screws securely.



Cylinder Installation

1. Clean the cylinder bore as described under *Cylinder Inspection* in this chapter.
2. Install the exhaust valve assembly as described in this chapter.
3. Check that the top surface of the crankcase and the bottom surface of the cylinder are clean prior to installation.
4. Install a new base gasket onto the crankcase.
5. Make sure the end gaps of the piston rings are lined up with the locating pins in the ring grooves





(**Figure 63**). Lightly oil the piston rings and the cylinder bore.

6. Check that the piston pin clips are seated in the piston grooves completely.

7. Install a piston holding fixture under the piston. Then rotate the crankshaft until the piston skirt seats against the fixture.

NOTE

A piston holding fixture can be easily made out of wood as shown in ***Figure 64****.*

CAUTION

Do not rotate the cylinder while installing it. A piston ring could snag in the cylinder intake port and break.

8. Start the cylinder down over the piston *with the exhaust port facing forward* (**Figure 65**).

9. Compress each ring, with your fingers, as the cylinder starts to slide over it.

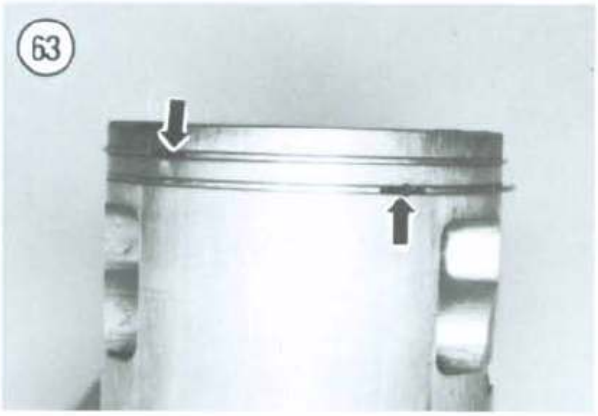
NOTE

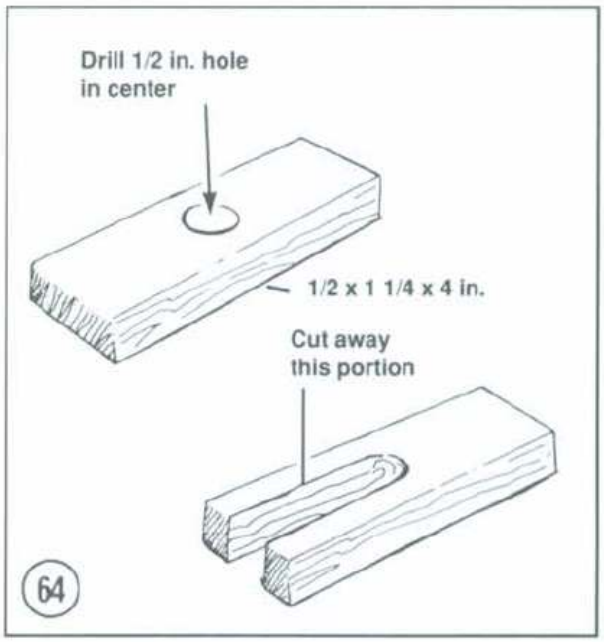
Make sure the rings are still properly aligned with the locating pins in the piston.

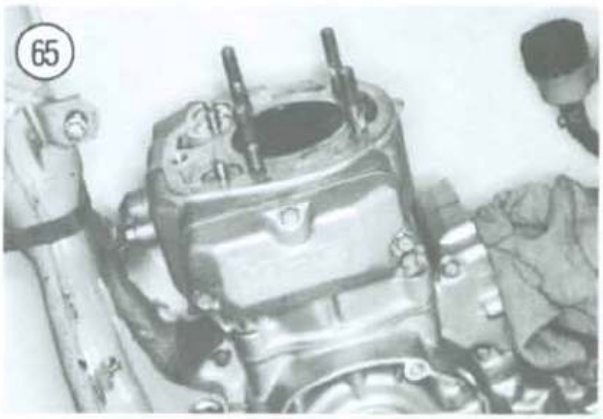
10. Slide the cylinder down until it bottoms on the piston holding fixture.

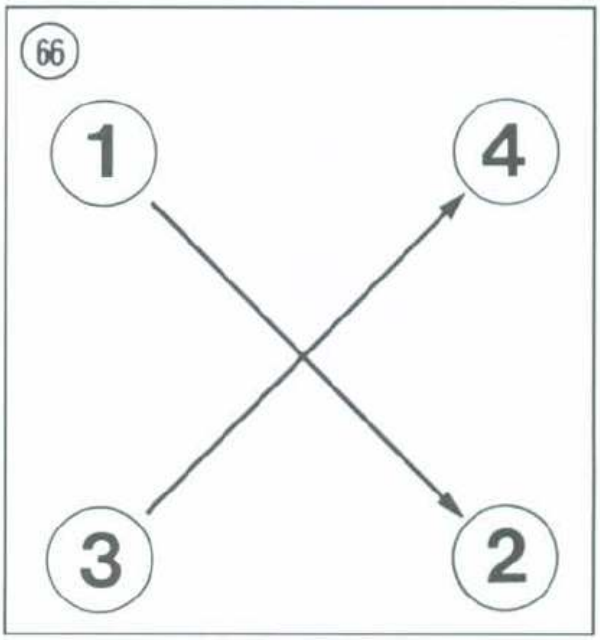
11. Remove the piston holding fixture and slide the cylinder into place on the crankcase.

12. Hold the cylinder in place with one hand and push the kickstarter lever down with the other hand. If the piston catches or stops in the cylinder, the piston rings were not lined up properly. The piston should move up and down the cylinder bore smoothly.









NOTE

If the rings were not lined up, remove the cylinder and check for damage.

13. Install the cylinder base nuts and tighten them securely in a crisscross pattern (**Figure 66**) to the torque specification in **Table 7**.

14. Install the cylinder head as described in this chapter.

15. Set the governor lever (A, **Figure 67**) onto the governor shaft, with the end of the lever centered in the collar groove.

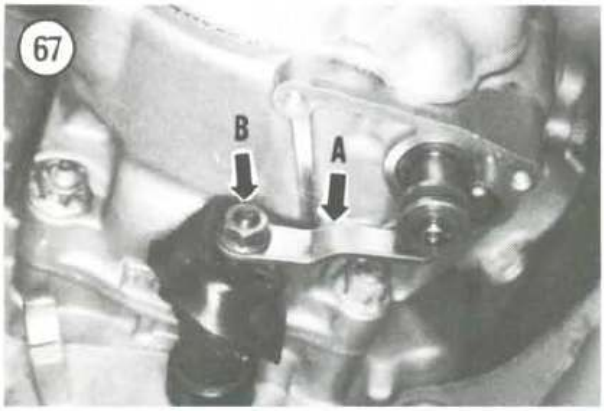
NOTE

*The lever nut (B, **Figure 67**) has left-hand threads.*

16. Thread the lever nut counterclockwise onto the governor shaft (B, **Figure 67**). Tighten the nut securely.

17. Pull the governor boot up and install the right-hand cover and gasket, fitting the boot into the cover (**Figure 68**). Install and tighten cover bolts securely.

18. Follow the *Break-in Procedure* in this chapter if new top end components were installed.



CYLINDER AND EXHAUST VALVE (1985-1987 KX250 AND 1986-1988 KX500)

Refer to the illustration for your model when performing the following procedures:

a. **Figure 69**: 1985 KX250.
b. **Figure 70**: 1986 KX250.
c. **Figure 71**: 1987 KX250.
d. **Figure 72**: 1986-1987 KX500.
e. **Figure 73**: 1988 KX500.

Cylinder Removal

1. On 1987 KX250 and 1986-1988 KX500, perform the following:
   a. Remove the right-hand governor cover and gasket.
   b. Remove the governor lever bolt or nut and remove the governor lever. See **Figure 74** or **Figure 75**.
2. Remove the cylinder head as described in this chapter.
3. Remove the exhaust system as described in Chapter Eight.
4. Disconnect the coolant hose at the cylinder, if used.
5. Loosen the cylinder base nuts in a crisscross pattern (**Figure 66**). Then remove the nuts.
6. Loosen the cylinder by tapping around the perimeter with a rubber or plastic mallet.

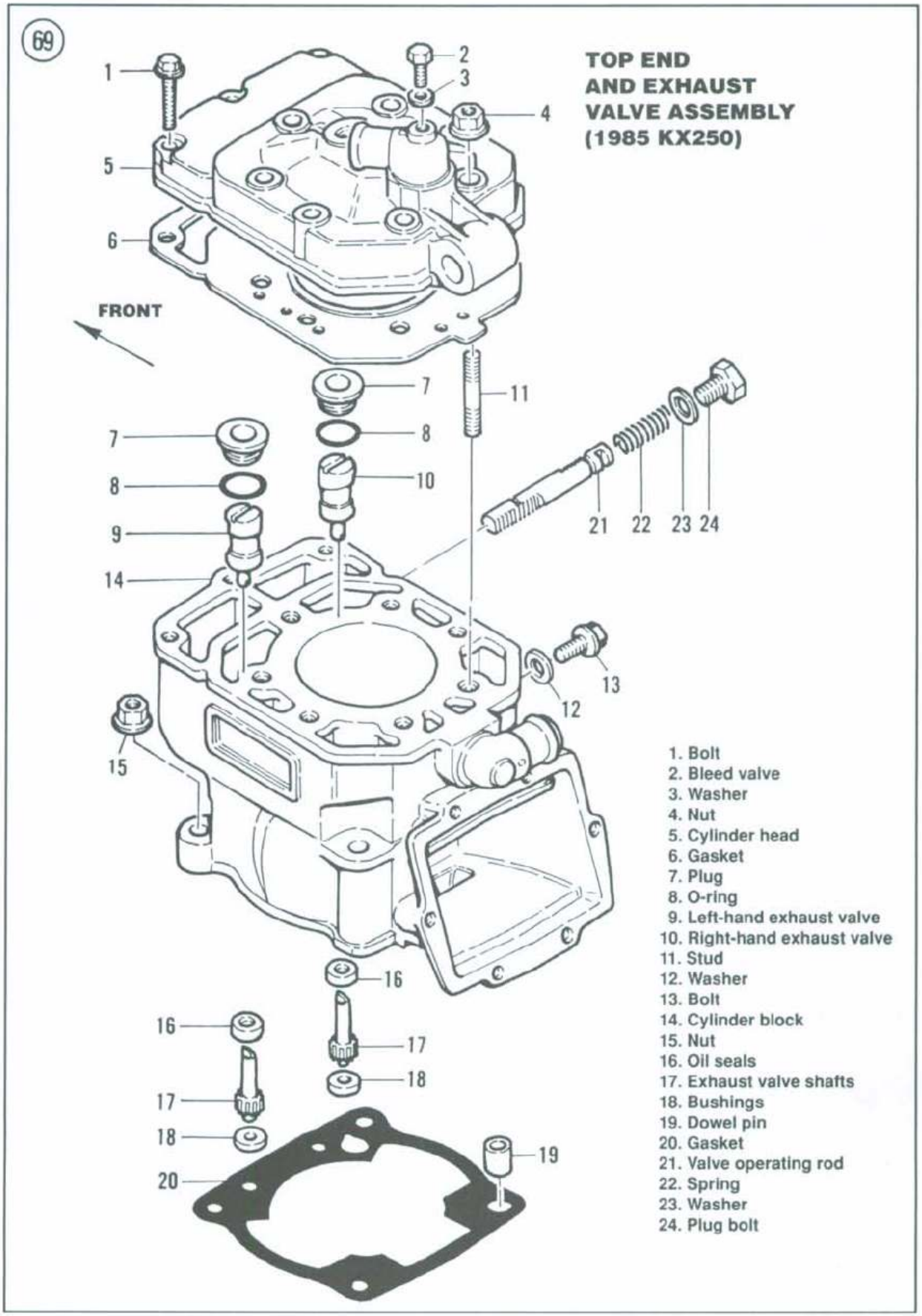
CAUTION

When removing the cylinder in Step 7, do not twist the cylinder so far that the piston rings could snap into the intake port. This would cause the cylinder to bind and may damage the piston, rings and cylinder.

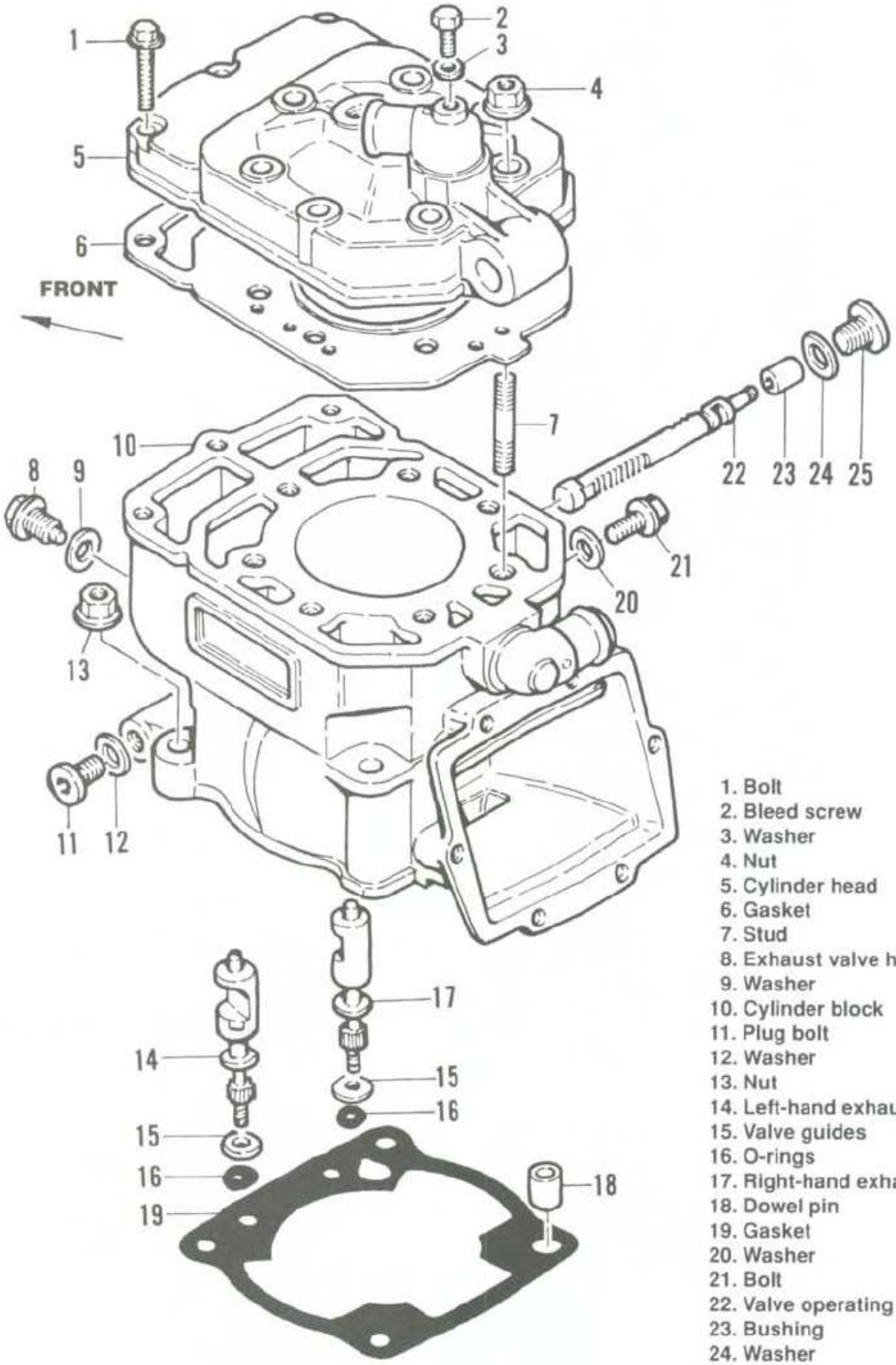
7. Rotate the engine so the piston is at the bottom of its stroke. Pull the cylinder straight up and off the crankcase studs and piston.
8. Remove the cylinder base gasket and discard it.
9. Place a clean shop cloth into the crankcase opening to prevent dirt from entering the engine.

Exhaust Valve Removal

1. Remove the cylinder as described in this chapter.

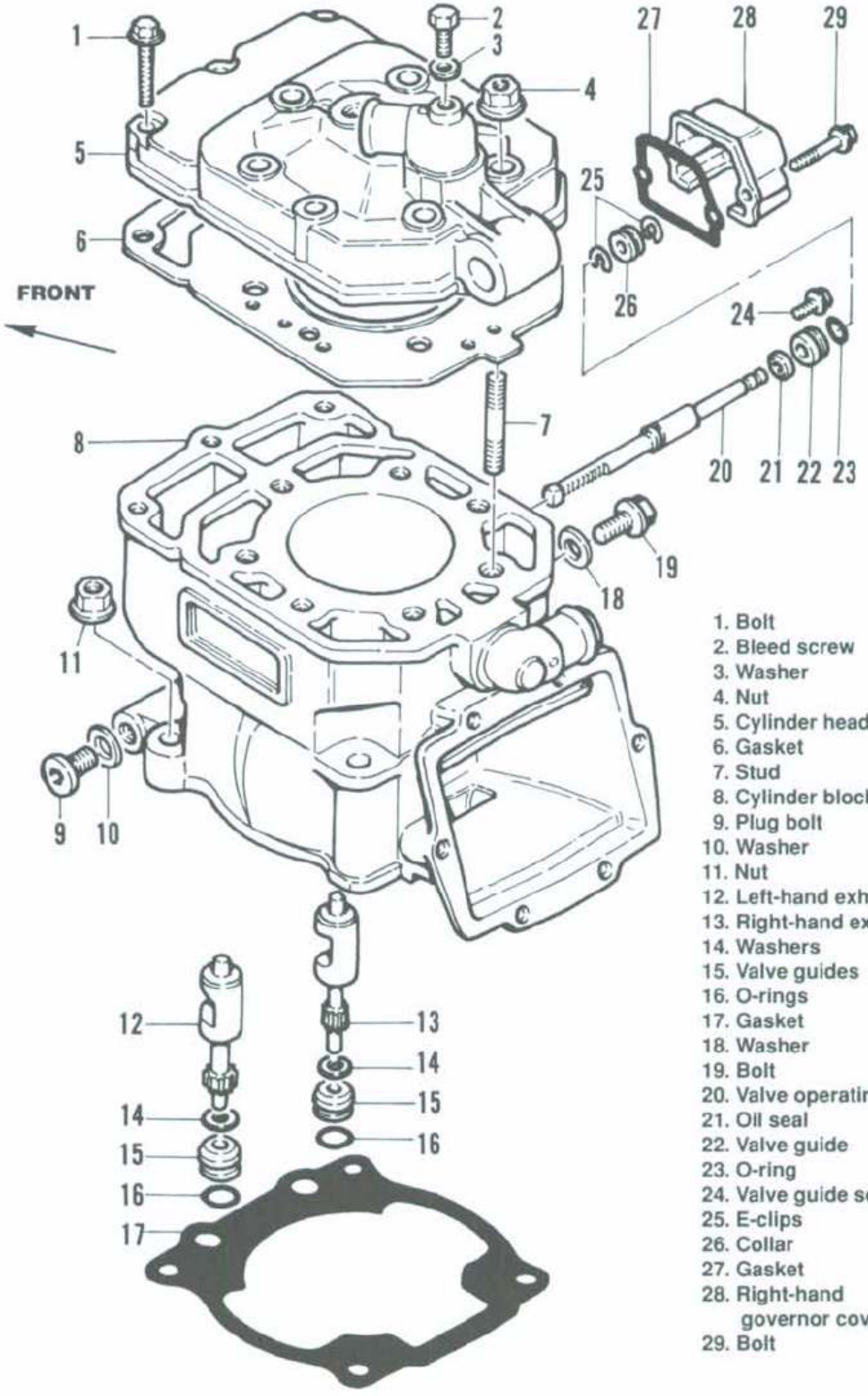

69
TOP END
AND EXHAUST
VALVE ASSEMBLY
(1985 KX250)
FRONT
1. Bolt
2. Bleed valve
3. Washer
4. Nut
5. Cylinder head
6. Gasket
7. Plug
8. O-ring
9. Left-hand exhaust valve
10. Right-hand exhaust valve
11. Stud
12. Washer
13. Bolt
14. Cylinder block
15. Nut
16. Oil seals
17. Exhaust valve shafts
18. Bushings
19. Dowel pin
20. Gasket
21. Valve operating rod
22. Spring
23. Washer
24. Plug bolt

(70) TOP END AND EXHAUST VALVE ASSEMBLY (1986 KX250)



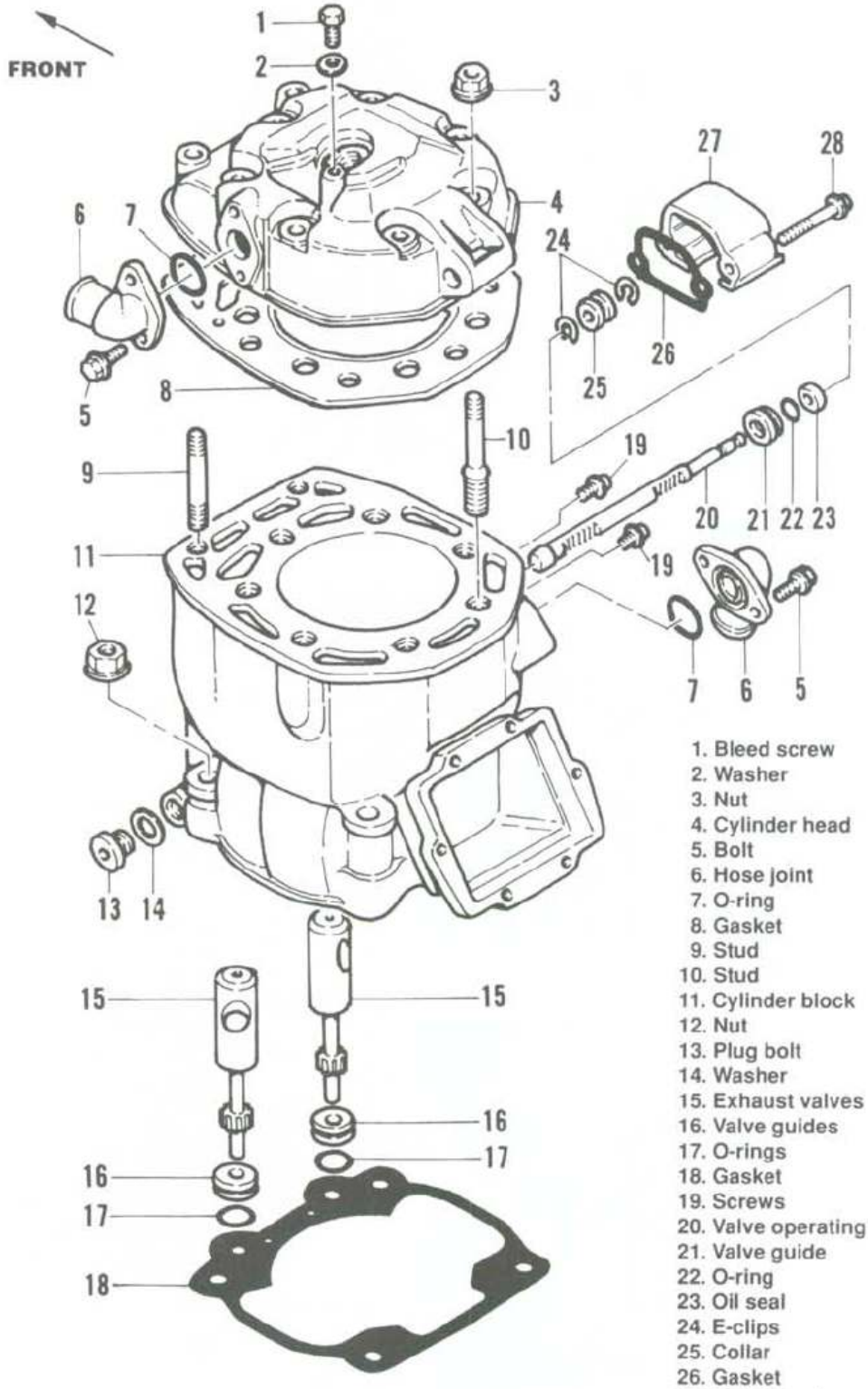
1. Bolt
2. Bleed screw
3. Washer
4. Nut
5. Cylinder head
6. Gasket
7. Stud
8. Exhaust valve holder bolts
9. Washer
10. Cylinder block
11. Plug bolt
12. Washer
13. Nut
14. Left-hand exhaust valve
15. Valve guides
16. O-rings
17. Right-hand exhaust valves
18. Dowel pin
19. Gasket
20. Washer
21. Bolt
22. Valve operating rod
23. Bushing
24. Washer
25. Plug bolt

(71) TOP END AND EXHAUST VALVE ASSEMBLY (1987 KX250)



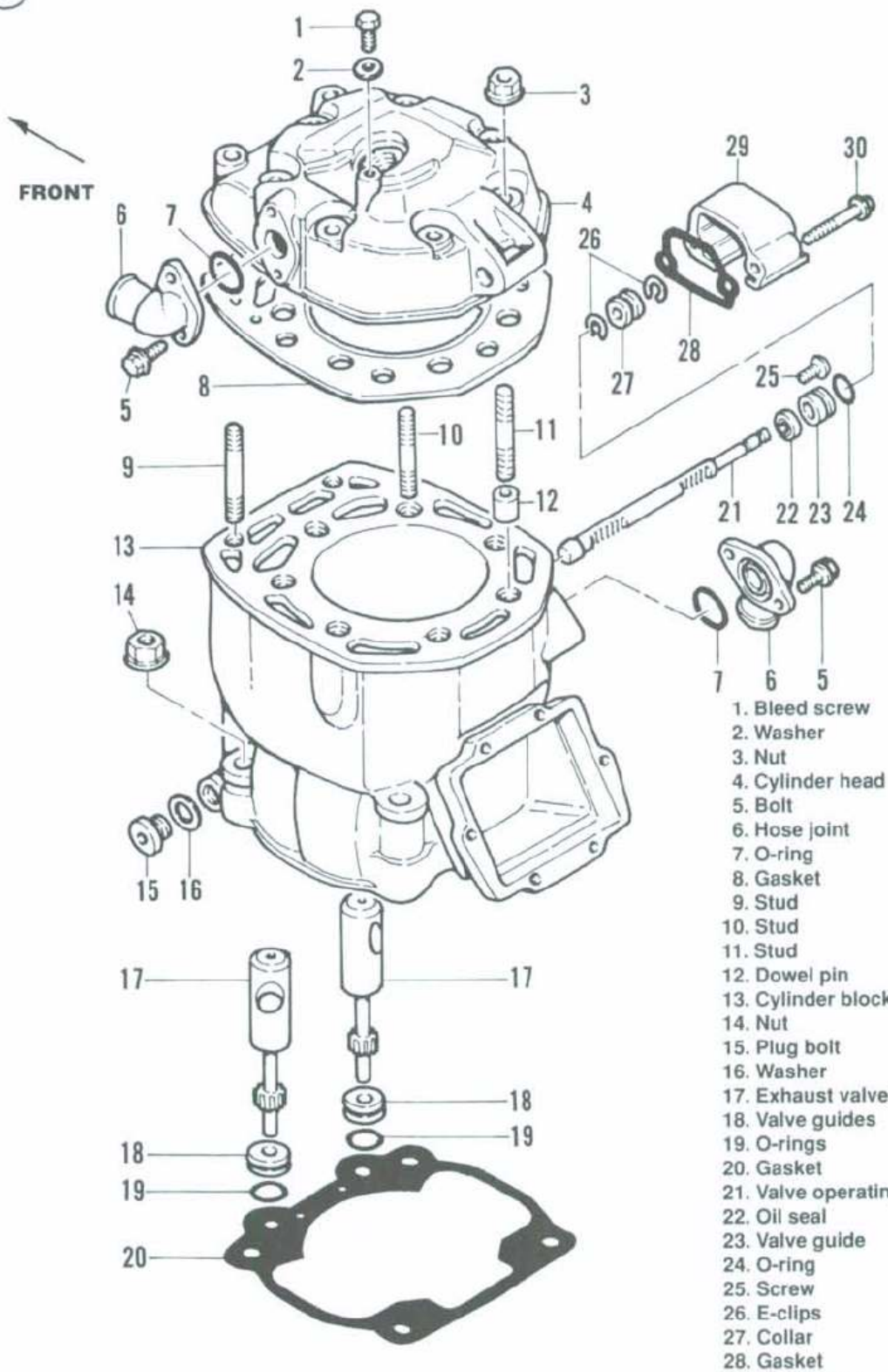
1. Bolt
2. Bleed screw
3. Washer
4. Nut
5. Cylinder head
6. Gasket
7. Stud
8. Cylinder block
9. Plug bolt
10. Washer
11. Nut
12. Left-hand exhaust valve
13. Right-hand exhaust valve
14. Washers
15. Valve guides
16. O-rings
17. Gasket
18. Washer
19. Bolt
20. Valve operating rod
21. Oil seal
22. Valve guide
23. O-ring
24. Valve guide screw
25. E-clips
26. Collar
27. Gasket
28. Right-hand governor cover
29. Bolt

(72) TOP END AND EXHAUST VALVE ASSEMBLY (1986-1987 KX500)



1. Bleed screw
2. Washer
3. Nut
4. Cylinder head
5. Bolt
6. Hose joint
7. O-ring
8. Gasket
9. Stud
10. Stud
11. Cylinder block
12. Nut
13. Plug bolt
14. Washer
15. Exhaust valves
16. Valve guides
17. O-rings
18. Gasket
19. Screws
20. Valve operating rod
21. Valve guide
22. O-ring
23. Oil seal
24. E-clips
25. Collar
26. Gasket
27. Right-hand governor cover
28. Bolt

(73) TOP END AND EXHAUST VALVE ASSEMBLY (1988 KX500)



1. Bleed screw
2. Washer
3. Nut
4. Cylinder head
5. Bolt
6. Hose joint
7. O-ring
8. Gasket
9. Stud
10. Stud
11. Stud
12. Dowel pin
13. Cylinder block
14. Nut
15. Plug bolt
16. Washer
17. Exhaust valves
18. Valve guides
19. O-rings
20. Gasket
21. Valve operating rod
22. Oil seal
23. Valve guide
24. O-ring
25. Screw
26. E-clips
27. Collar
28. Gasket
29. Right-hand governor cover
30. Bolt

2A. On 1985 KX250 models (**Figure 69**), perform the following:

a. Loosen and remove the left- and right-hand exhaust valve plugs and O-rings.

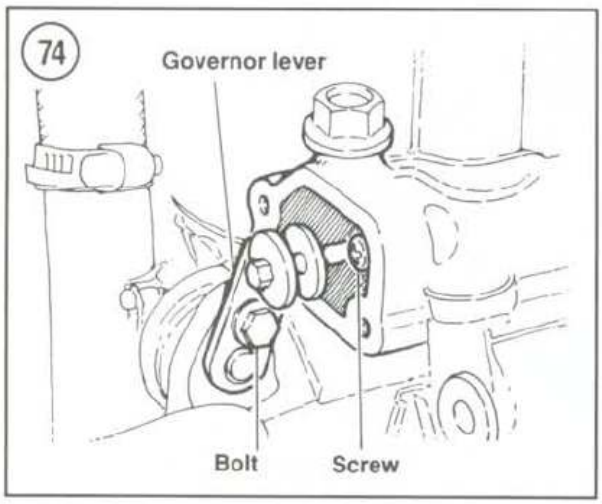
NOTE

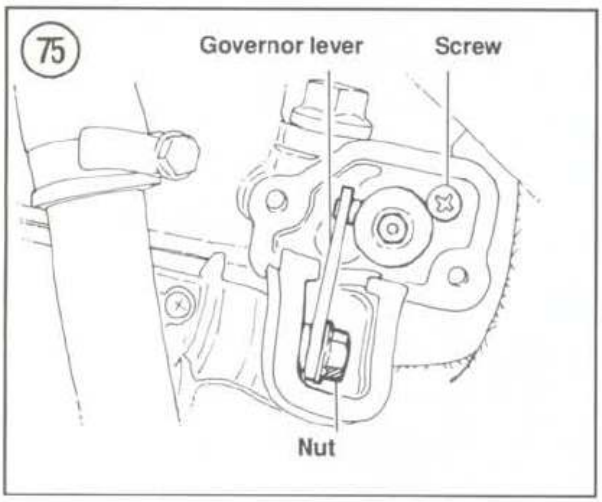
The left- and right-hand exhaust valves have different part numbers. Tag each valve so you don't mix them up during reassembly.

b. Remove the left- and right-hand exhaust valves from the cylinder.

c. Insert an aluminum drift through the exhaust valve opening in the top of the cylinder and tap the exhaust valve shafts to free the bushings and shafts. The left- and right-hand bushings and shafts have the same part number.

d. Remove the bushings and shafts.





NOTE

*Before removing the oil seals (16, **Figure 69**) from the cylinder, note and record the direction in which the lip of each seal faces for proper reinstallation.*

e. Remove the 2 oil seals (16, **Figure 69**) from the cylinder.

f. Remove the plug bolt and washer from the right-hand side of the cylinder. Then remove the spring and valve operating rod from the cylinder.

2B. On 1986 KX250 models, (**Figure 70**), perform the following:

a. Loosen and remove the 2 exhaust valve holder bolts and washers from the front of the cylinder.

b. Remove the left- and right-hand valve operating rod bolt plugs and washers.

c. Turn the cylinder over so that the bottom side faces up, then lift both exhaust valves slightly and remove the valve operating rod through the right-hand side of the cylinder.

d. Remove both exhaust valve assemblies.

e. Remove the O-ring and valve guide from each exhaust valve.

2C. On 1987 KX250 (**Figure 71**), 1986-1987 KX500 (**Figure 72**) and 1988 KX500 (**Figure 73**) models, perform the following:

a. Remove the valve guide holding screw from the cylinder. See **Figure 74** or **Figure 75**.

b. Remove the valve guides from each exhaust valve.

c. Remove the left-hand cylinder plug and washer.

d. Remove the exhaust valves.

e. On 1987 KX250 models, remove the valve guide, O-ring and washer from each exhaust valve.

f. On all other models, remove the valve guide and O-ring from each exhaust valve.

g. Remove the E-clip, collar, E-clip and valve guide from the valve operating rod.

Exhaust Valve Inspection

1. Clean the exhaust valve assembly as described under *Exhaust Valve Decarbonizing* in this chapter.
2. Inspect the valve operating rod for nicks, burrs or damage. Check the rod teeth for damage.

3. Inspect the valve guide for nicks, burrs or damage.
4. Replace the valve guide oil seal if worn, damaged or leaking.
5. Replace worn or damaged O-rings.
6. Inspect the exhaust valves for scoring, nicks, burrs or gear damage.
7. Replace worn or damaged parts.

Exhaust Valve Reassembly

Patience is the name of the game when installing and timing the exhaust valve assembly. While you may fumble the first one or two times, it will come together and seem fairly easy. Because the parts must be lubricated with moly lube, you may want to make a couple of dry runs—assemble without lubing the parts—and then, when you get the hang of assembling and timing the exhaust valves, remove everything, lube the parts as described in the text and then reinstall a final time.

1. Check that all of the parts have been thoroughly cleaned of all carbon and oil residue.
2. Apply molybdenum disulfide grease to the following parts:
   a. Valve operating rod rack and journals.
   b. Exhaust valve shafts

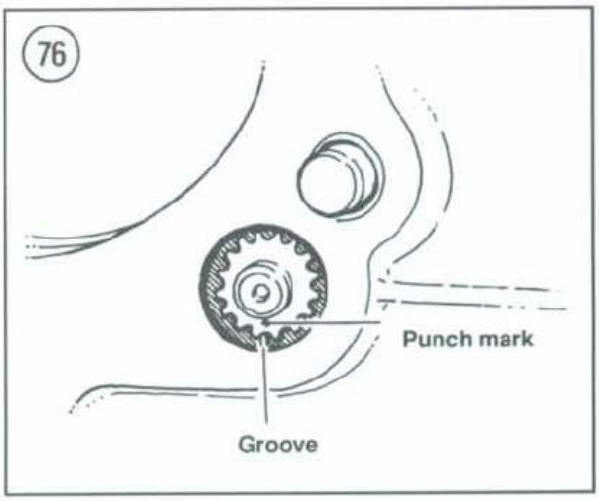
3A. On 1985 KX250 models (**Figure 69**), perform the following:
   a. Install the valve operating rod into the cylinder.
   b. Install new exhaust valve shaft oil seals (16, **Figure 69**) into the cylinder so that their lips face in the direction recorded during disassembly.
   c. Install the exhaust valve shafts into the cylinder.
   d. Align the punch mark each exhaust valve shaft with its respective punch mark on the valve operating rod (**Figure 76**).
   e. Install the left- and right-hand exhaust valves into their respective valve hole in the top of the cylinder, following your I.D. marks made during removal.
   f. Engage the tang on the valve operating shaft with the groove in the end of the exhaust valves. The index mark on both exhaust valves must point to the front of the cylinder.
   g. Install the left- and right-hand exhaust valve plugs and O-rings. Tighten securely.
   h. Press the exhaust valve shaft bushings (18, **Figure 69**) into the bottom of the cylinder so that they are flush with the cylinder base surface.

3B. On 1986 KX250 models (**Figure 70**), perform the following:
   a. Install the left-hand valve operating rod bolt plug (11, **Figure 70**) and washer. Tighten securely.

NOTE

The left- and right-hand exhaust valves are different. The right-hand exhaust valve has a groove machined at the bottom of the valve's shaft.

   b. Install the left-hand exhaust valve into the cylinder.
   c. Install the right-hand exhaust valve into the cylinder.
   d. Turn each exhaust valve so that its index mark (on top of the exhaust valve gear) faces toward the front of the cylinder.
   e. Lift both exhaust valves slightly and insert the valve operating rod into the cylinder. Push the rod all the way in.
   f. Align the index mark on each exhaust valve with its respective groove in the valve operating rod (**Figure 76**).
   g. Install the valve guides onto the exhaust valves.
   h. Install the O-rings onto the exhaust valves and slide them down until they contact the valve guides.
   i. Install the right-hand governor plug and washer. Tighten securely.



j. Install the exhaust valve holder bolts and washers into the front of the cylinder, making sure the bolts engage the exhaust valves correctly. Tighten securely.

3C. On 1987 KX250 (**Figure 71**), 1986-1987 KX500 (**Figure 72**) and 1988 KX500 (**Figure 73**) models, perform the following:

a. Install the left-hand plug bolt and washer. Tighten securely.

NOTE

The left- and right-hand exhaust valves are different. The right-hand exhaust valve has a groove machined on the valve's shaft.

b. Install the left-hand exhaust valve into the cylinder.
c. Install the right-hand exhaust valve into the cylinder.
d. Turn each exhaust valve so that the index mark on top of its gear faces forward.
e. Lift both exhaust valves slightly and insert the valve operating rod into the cylinder. Push the rod all the way into the cylinder.
f. Align the index mark on each exhaust valve with its respective groove in the valve operating rod (**Figure 76**).
g. On 1987 KX250 models, install the washer (14, **Figure 71**) onto each exhaust valve.
h. Install the valve guides and O-rings onto the exhaust valves.
i. Install the oil seal, E-clip, collar and E-clip onto the valve operating rod. The short side of the collar should face toward the cylinder.
j. Secure the valve guide with the holding screw. See **Figure 74** or **Figure 75**.

Cylinder Installation

1. Clean the cylinder bore as described under *Cylinder Inspection* in this chapter.
2. Install the exhaust valve assembly as described in this chapter.
3. Check that the top surface of the crankcase and the bottom surface of the cylinder are clean prior to installation.
4. Install a new base gasket onto the crankcase.
5. Make sure the end gaps of the piston rings are lined up with the locating pins in the ring grooves (**Figure 63**). Lightly oil the piston rings and the inside of the cylinder bore.
6. Check that the piston pin clips are seated in the piston grooves completely.
7. Install a piston holding fixture under the piston. Then rotate the crankshaft until the piston skirt seats against the fixture.

NOTE

A piston holding fixture can be easily made out of wood as shown in ***Figure 64****.*

CAUTION

Do not rotate the cylinder while installing it. A piston ring could snag in the cylinder intake port and break.

8. Start the cylinder down over the piston *with the exhaust port facing forward.*
9. Compress each ring, with your fingers, as the cylinder starts to slide over it.

NOTE

Make sure the rings are still properly aligned with the locating pins in the piston.

10. Slide the cylinder down until it bottoms on the piston holding fixture.
11. Remove the piston holding fixture and slide the cylinder into place on the crankcase.
12. Hold the cylinder in place with one hand and push the kickstarter lever down with the other hand. If the piston catches or stops in the cylinder, the piston rings were not lined up properly. The piston should move up and down the cylinder bore smoothly.

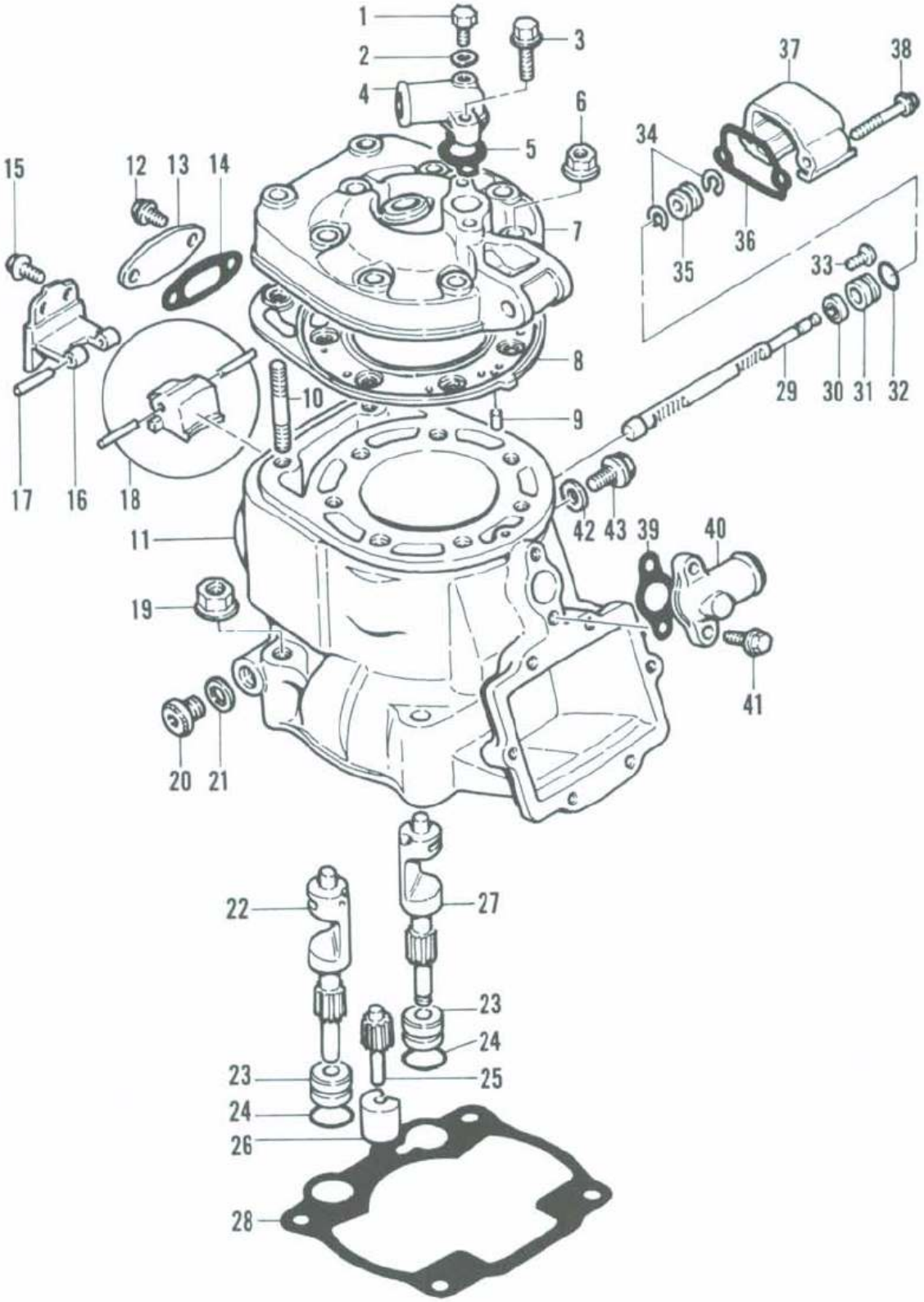
NOTE

If the rings were not lined up, remove the cylinder and check for damage.

13. Install the cylinder base nuts and tighten them securely in a crisscross pattern (**Figure 66**) to the torque specification in **Table 7**.
14. Install the cylinder head as described in this chapter.
15. Set the governor lever onto the governor shaft, with the end of the lever centered in the collar groove. See **Figure 74** or **Figure 75**.
16. Secure the governor lever with the nut or bolt. Tighten securely.

77

TOP END AND EXHAUST VALVE ASSEMBLY (1988-1989 KX250)



1. Bleed screw
2. Washer
3. Bolt
4. Hose nozzle
5. Gasket
6. Nut
7. Cylinder head
8. Gasket
9. Dowel pin
10. Stud
11. Cylinder block
12. Screw
13. Cover
14. Gasket
15. Bolt
16. Bracket
17. Pin
18. Main exhaust valve
19. Nut
20. Plug bolt
21. Washer
22. Left-hand exhaust valve
23. Valve guides
24. O-ring
25. Idler gear
26. Valve guide
27. Right-hand exhaust valve
28. Gasket
29. Valve operating rod
30. Oil seal
31. Valve guide
32. O-ring
33. Screw
34. E-clips
35. Collar
36. Gasket
37. Right-hand governor cover
38. Bolt
39. Gasket
40. Hose nozzle
41. Bolt
42. Washer
43. Bolt

17. Pull the governor boot up and install the right-hand cover and gasket, fitting the boot into the cover. Install and tighten cover bolts securely.
18. Follow the *Break-in Procedure* in this chapter if new top end components were installed.

CYLINDER AND EXHAUST VALVE (1988-1991 KX250 AND 1989-ON KX500)

Refer to the following illustration for your model when performing the following procedures:

a. **Figure 77**: 1988-1989 KX250.
b. **Figure 78**: 1990-1991 KX250.
c. **Figure 79**: 1989-on KX500.

Cylinder Removal

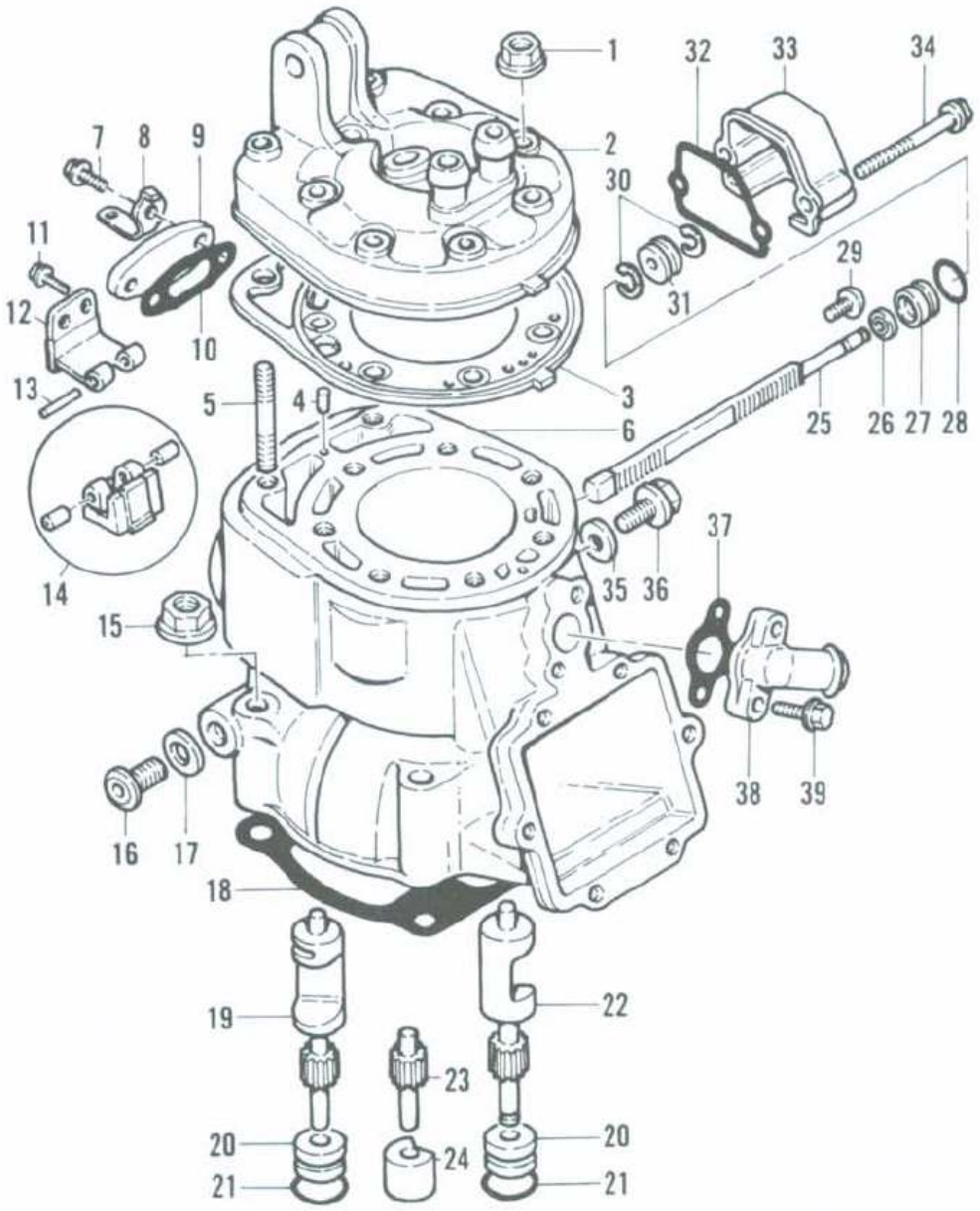
1. Remove the right-hand governor cover (**Figure 80**) and gasket.
2. Remove the governor lever nut (A, **Figure 81**) and the lever (B, **Figure 81**).
3. Remove the cylinder head as described in this chapter.
4. Remove the exhaust system as described in Chapter Eight.
5. Remove the carburetor as described in Chapter Eight.
6. Disconnect the cooling hose at the cylinder. See **Figure 82**, typical.
7. Loosen the cylinder base nuts in a crisscross pattern (**Figure 66**). Remove the nuts.
8. Loosen the cylinder by tapping around the perimeter with a rubber or plastic mallet.

CAUTION

When removing the cylinder in Step 9, do not twist the cylinder so far that the piston rings could snap into the intake port. This would cause the cylinder to bind and may damage the piston, rings and cylinder.

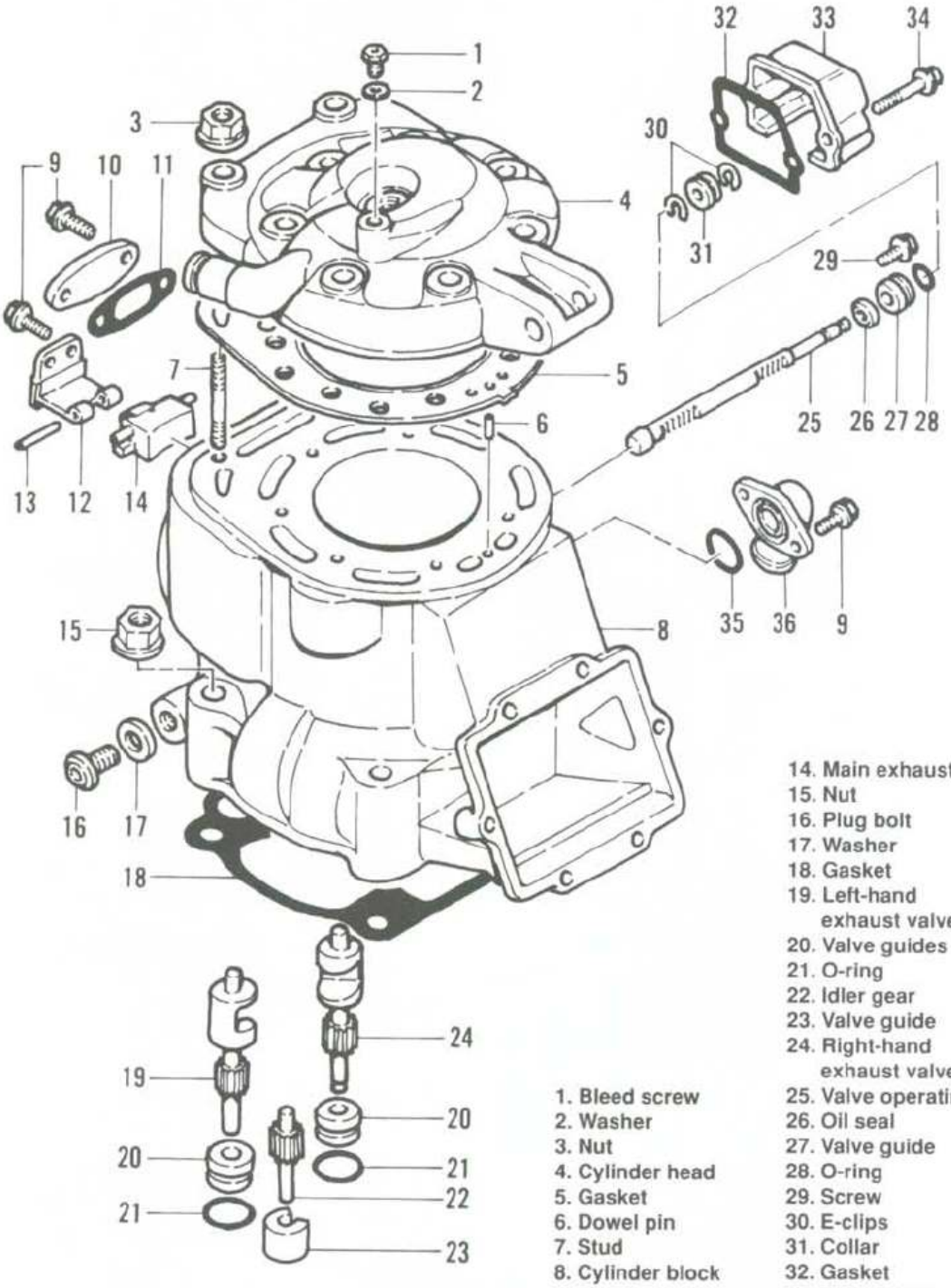
9. Rotate the engine so the piston is at the bottom of its stroke. Pull the cylinder straight up and off the crankcase studs and piston.
10. Remove the cylinder base gasket and discard it.
11. Place a clean shop cloth into the crankcase opening to prevent the entry of foreign material.

(78) TOP END AND EXHAUST VALVE ASSEMBLY (1990-1991 KX250)

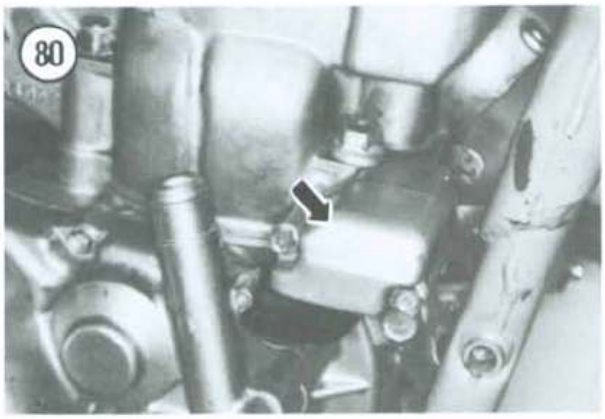


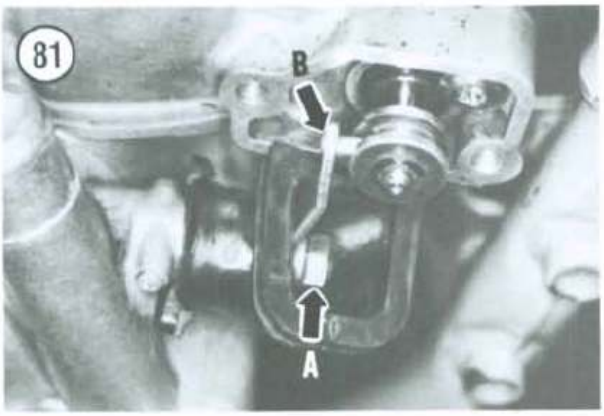
1. Nut
2. Cylinder head
3. Gasket
4. Dowel pin
5. Stud
6. Cylinder block
7. Bolt
8. Bracket
9. Cover
10. Gasket
11. Bolt
12. Bracket
13. Pin
14. Main exhaust valve
15. Nut
16. Plug bolt
17. Washer
18. Gasket
19. Left-hand exhaust valve
20. Valve guide
21. O-ring
22. Right-hand exhaust valve
23. Idler gear
24. Valve guide
25. Valve operating rod
26. Oil seal
27. Valve guide
28. O-ring
29. Screw
30. E-clips
31. Collar
32. Gasket
33. Right-hand governor cover
34. Bolt
35. Washer
36. Bolt
37. Gasket
38. Hose nozzle
39. Bolt

(79) TOP END AND EXHAUST VALVE ASSEMBLY (1989-1993 KX500)

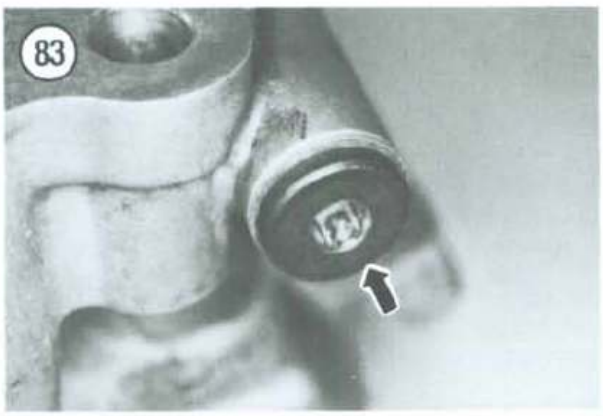


1. Bleed screw
2. Washer
3. Nut
4. Cylinder head
5. Gasket
6. Dowel pin
7. Stud
8. Cylinder block
9. Bolts
10. Cover
11. Gasket
12. Bracket
13. Pin
14. Main exhaust valve
15. Nut
16. Plug bolt
17. Washer
18. Gasket
19. Left-hand exhaust valve
20. Valve guides
21. O-ring
22. Idler gear
23. Valve guide
24. Right-hand exhaust valve
25. Valve operating rod
26. Oil seal
27. Valve guide
28. O-ring
29. Screw
30. E-clips
31. Collar
32. Gasket
33. Right-hand governor cover
34. Bolt
35. O-ring
36. Hose nozzle


80


81
B
A


82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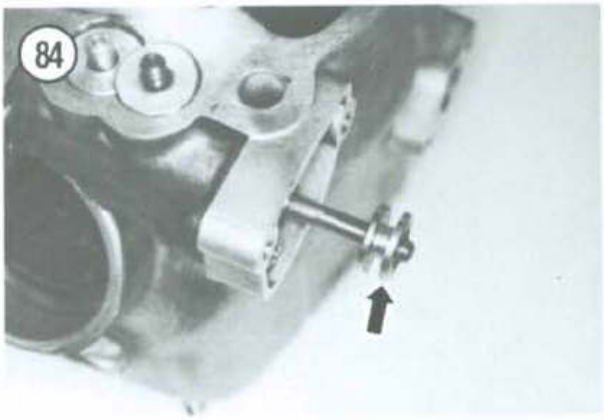
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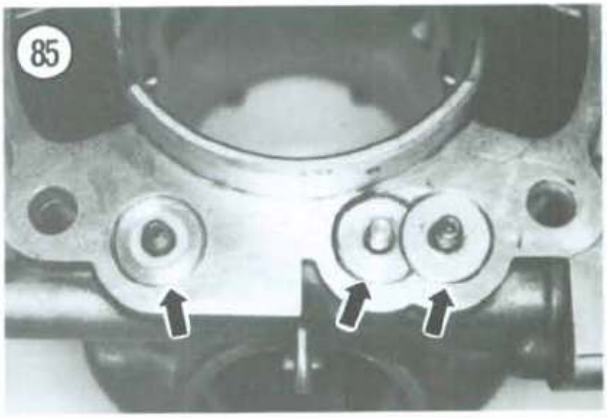
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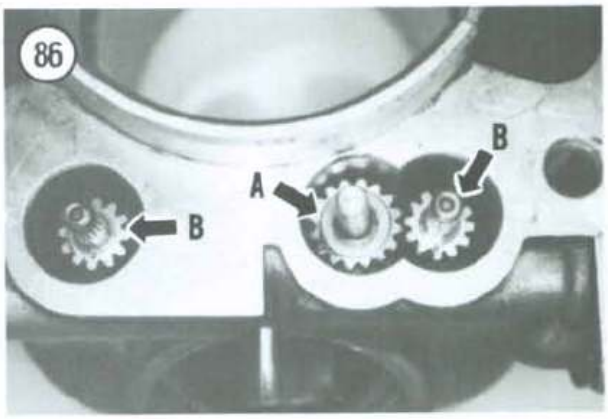
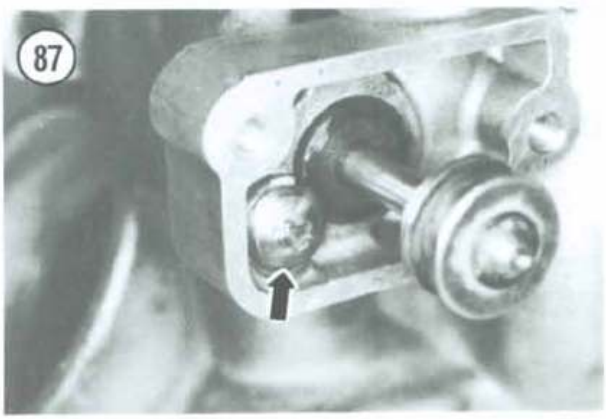

86
A
B
B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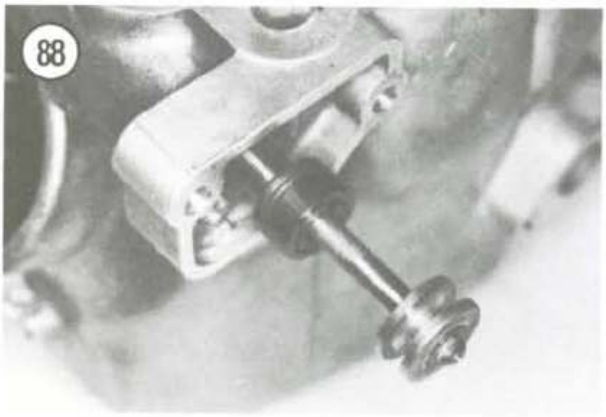
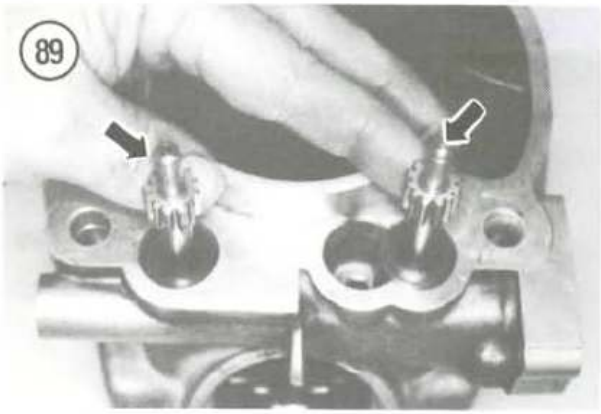
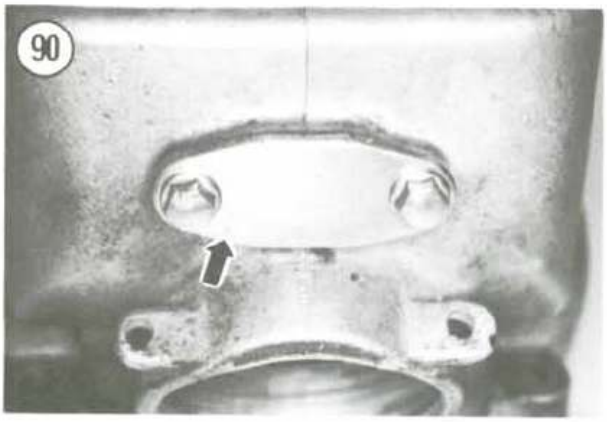
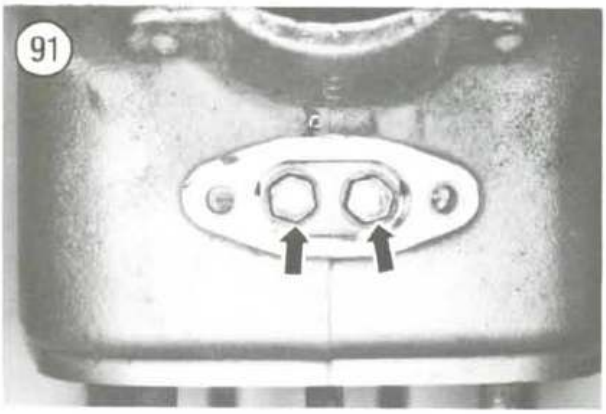
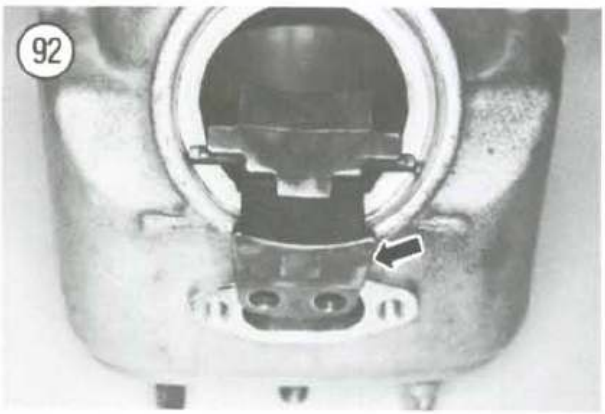










Exhaust Valve Removal

Refer to **Figure 77**, **Figure 78** or **Figure 79** for this procedure.

1. Place the cylinder on the workbench so that the base surface faces up.
2. Remove the valve operating rod plug bolt and gasket (**Figure 83**).
3. Push the valve operating rod in as far as it will go (**Figure 84**). This will align the exhaust valve index marks with the index marks on the operating rod.
4. Remove the 3 valve guides (**Figure 85**).
5. Remove the idler gear (A, **Figure 86**).
6. Remove the valve operating rod retaining screw (**Figure 87**).
7. Lift the 2 exhaust valves (B, **Figure 86**) slightly and remove the valve operating rod (**Figure 88**) from the cylinder.
8. Remove the exhaust valves (**Figure 89**).
9. Remove the main exhaust valve cover bolts and remove the cover and gasket (**Figure 90**).
10. Remove the main exhaust valve mounting bolts (**Figure 91**). Lift the main exhaust valve out of the cylinder and remove it (**Figure 92**).

Exhaust Valve Inspection

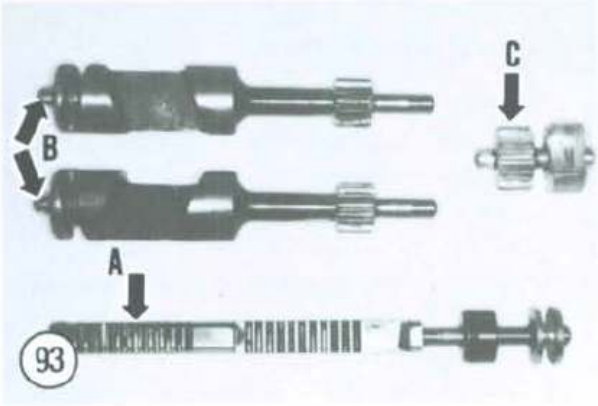
1. Clean the exhaust valve assembly as described under *Exhaust Valve Decarbonizing* in this chapter.
2. Inspect the valve operating rod (A, **Figure 93**) for nicks, burrs or damage. Check the rack teeth for damage.
3. To disassemble and inspect the valve operating rod (**Figure 94**) assembly:
   a. Remove the outer E-clip, collar, inner E-clip and valve guide.

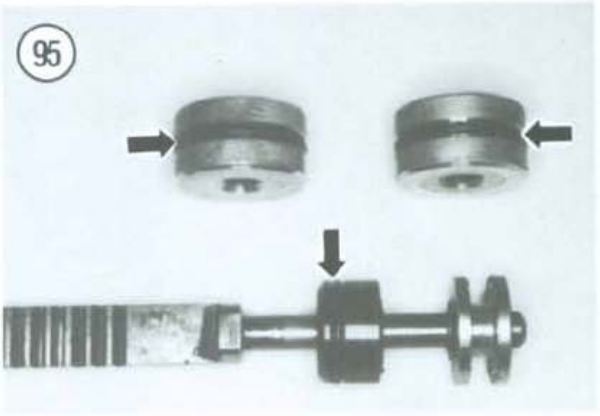
b. Inspect the collar and valve guide for nicks, burrs or damage.
c. Replace the valve guide oil seal if worn, damaged or leaking.
d. Replace the valve guide O-ring (**Figure 95**) if worn or damaged.

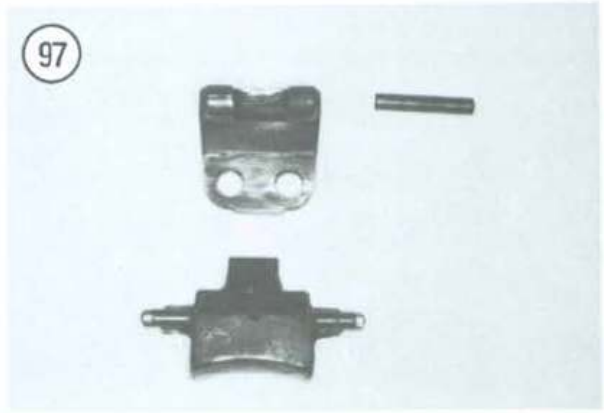
4. To assemble the valve operating rod assembly:
a. Apply a high temperature grease to the oil seal lip on the valve guide.
b. Install a new O-ring onto the valve guide (**Figure 95**), if necessary.
c. Slide the valve guide onto the rod so that the O-ring side is next to the rack teeth (**Figure 95**).
d. Install the inner E-clip.
e. Slide on the collar.
f. Install the outer E-clip.
g. Check that both E-clips seat in the rod grooves completely.

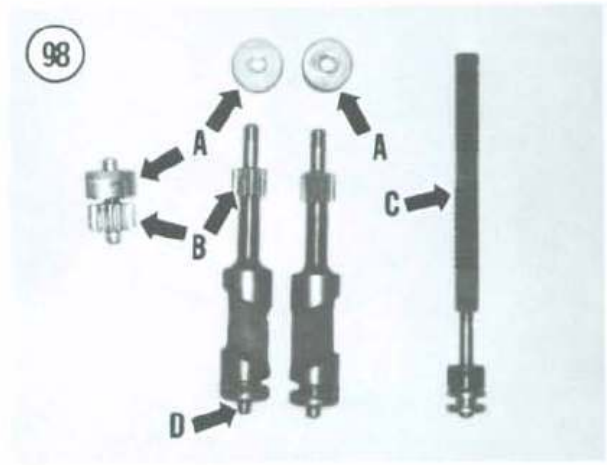
5. Inspect the exhaust valves (B, **Figure 93**) for scoring, nicks, burrs or gear damage.

6. Inspect the idler gear (C, **Figure 93**) for nicks, burrs or gear damage.









7. Replace worn or damaged O-rings (**Figure 95**) as required.
8. To service the main exhaust valve assembly (**Figure 96**):
   a. Remove the pin and separate the valve assembly (**Figure 97**).
   b. Inspect the valve for cracks or damage.
   c. Inspect the pins for wear or damage.
   d. Align the valve halves and install the pin.
9. Replace worn or damaged parts as required.

Exhaust Valve Reassembly

Patience is the name of the game when installing and timing the exhaust valve assembly. While you may fumble the first one or two times, it will come together and seem fairly easy. Because the parts must be lubricated with moly lube, you may want to make a couple of dry runs—assemble without lubing the parts—and then, when you get the hang of assembling and timing the parts, remove everything, lube the parts as described in the text and then reinstall a final time.

1. Check that all of the parts have been thoroughly cleaned of all carbon and oil residue.
2. Apply molybdenum disulfide grease to the following parts:
   a. Inside the valve guides (A, **Figure 98**).
   b. Exhaust valve and idler gear pinions (B, **Figure 98**).
   c. Valve operating rod rack and journals (C, **Figure 98**).
   d. Idler gear and exhaust valve upper and lower journals (D, **Figure 98**).
3. Install the main exhaust valve (**Figure 92**) into the cylinder. Install the main exhaust valve mounting bolts (**Figure 91**) and tighten securely. Make sure that there is no clearance between the main exhaust valve bracket and cylinder as shown in **Figure 99**.

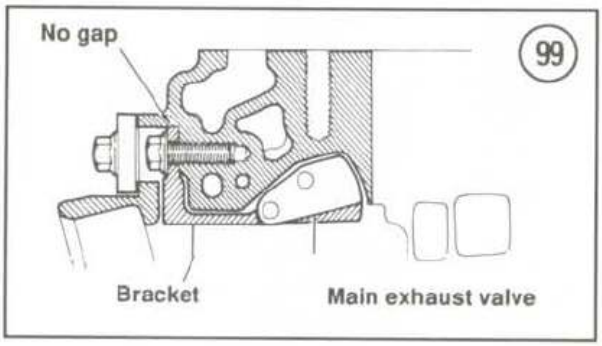
NOTE

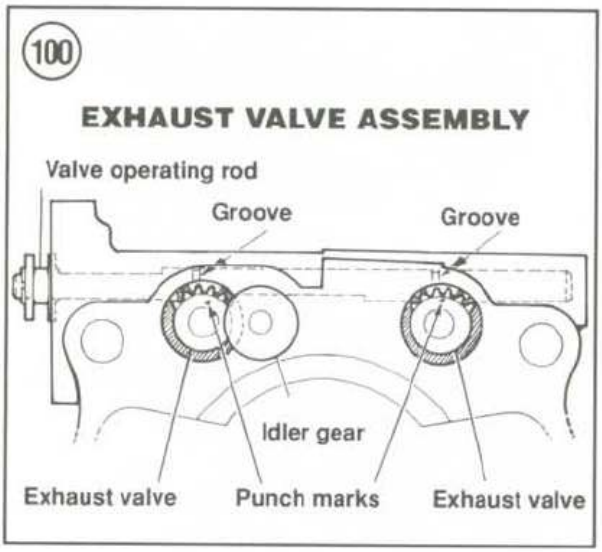
*Refer to **Figure 100** when installing and indexing the exhaust valve assembly in the following steps.*

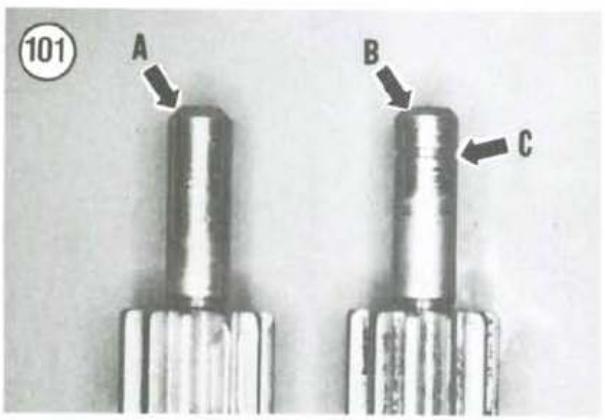
NOTE

*The left- and right-hand exhaust valves are different. The right-hand exhaust valve (B, **Figure 101**) has a groove machined at the top of the valve's shaft; see C, **Figure 101**.*

4. Install the left-hand exhaust valve (A, **Figure 101**) into the cylinder. See A, **Figure 102**.
5. Install the right-hand exhaust valve (B, **Figure 101**) into the cylinder. See B, **Figure 102**.
6. Turn each exhaust valve so that its index mark (**Figure 103**) faces forward. See **Figure 104**.
7. Lift both exhaust valves slightly (**Figure 102**) and insert the valve operating rod (**Figure 105**) into the







cylinder. The rack portion of the rod should face toward the back of the cylinder.

8. Insert the valve operating rod all the way into the cylinder, passing it through both exhaust valves and the main exhaust valve.

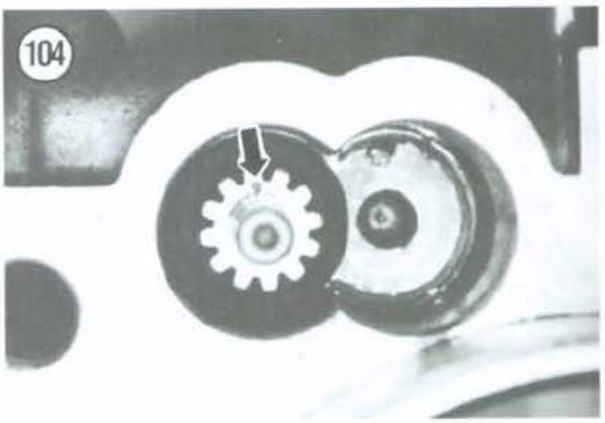
9. When the valve operating rod is pushed in all the way into the cylinder, seat the valve guide into the cylinder (**Figure 106**) and secure it with its mounting screw (**Figure 107**).

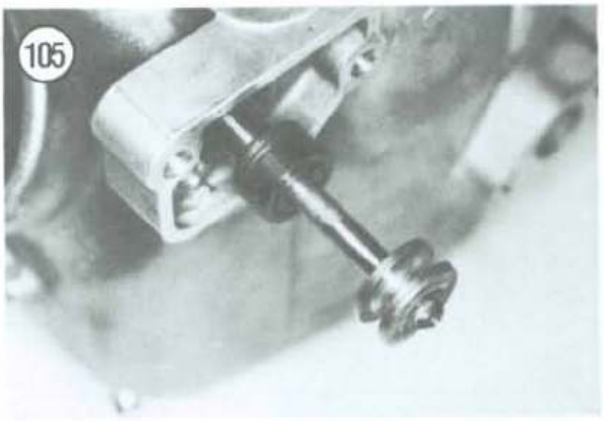
10. Position the left-hand exhaust valve so that its index mark aligns with the groove in the valve operating rod. See **Figure 100** and **Figure 108**.

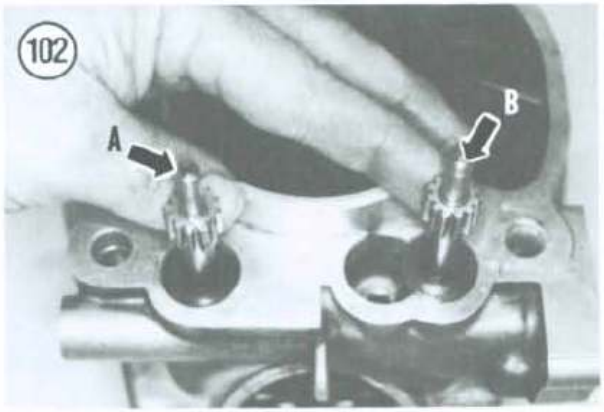
11. Position the right-hand exhaust valve so that its index mark aligns with the groove in the valve operating rod. See **Figure 100** and **Figure 109**.

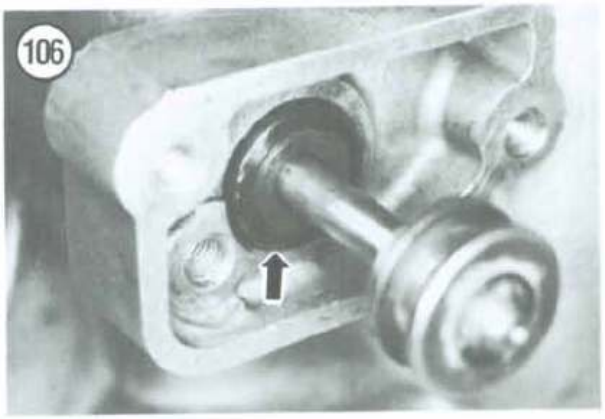
12. Install the idler gear, meshing it with the right-hand exhaust valve pinion and valve operating rod rack. See **Figure 110**.

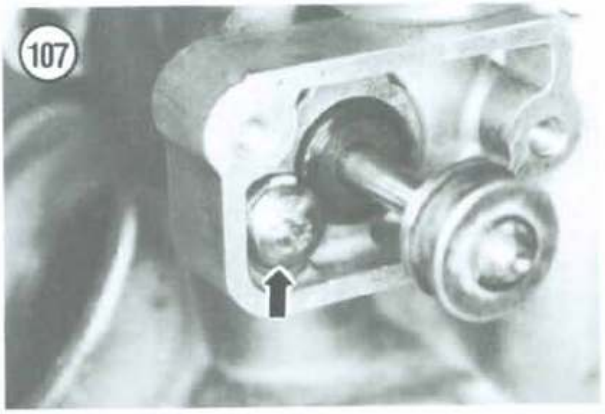
13. Now slide the valve operating rod back and forth and check the timing marks when the rod is pushed all the way in. The timing marks should align as described in Steps 10-12. When the timing marks align properly, proceed to Step 14. If the marks do

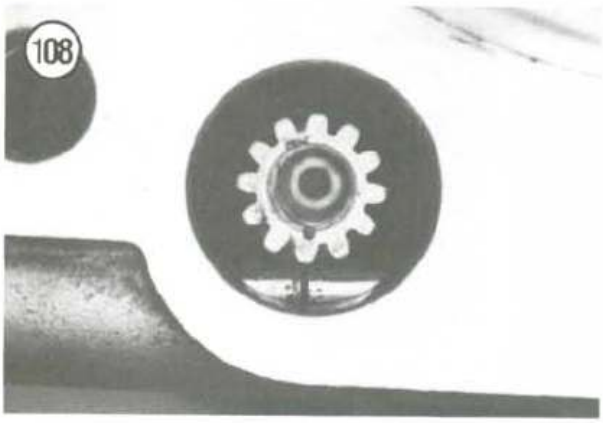


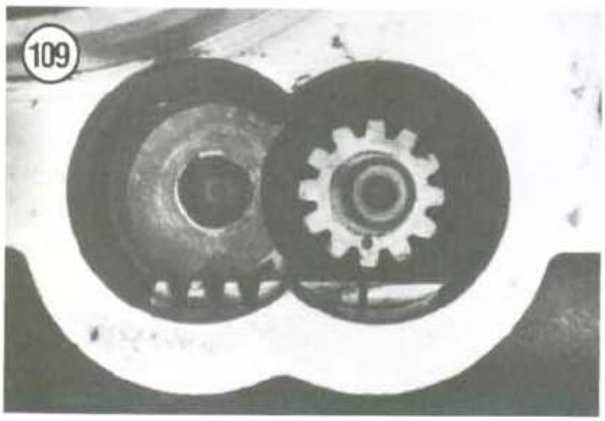


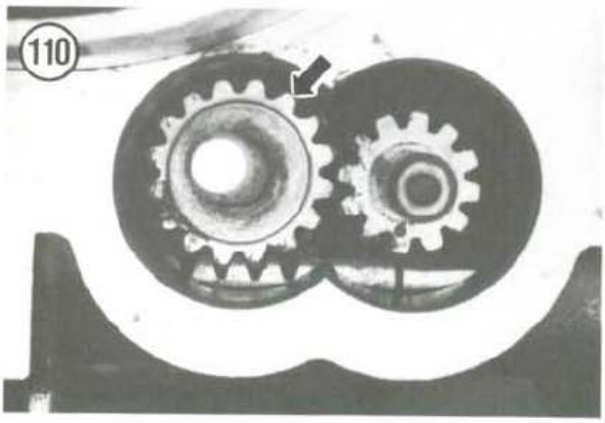


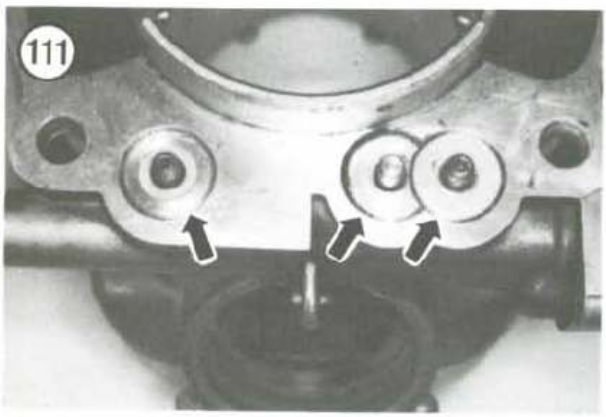












not align, reposition the exhaust valves and idler gear.

14. Install the 3 valve guides as shown in **Figure 111**. O-rings must be installed on the 2 outer valve guides.

15. Install the valve operating plug and gasket (**Figure 83**). Tighten securely.

16. Install the main exhaust valve cover, gasket and mounting bolts (**Figure 90**). Tighten securely.

Cylinder Installation

1. Clean the cylinder bore as described under *Cylinder Inspection* in this chapter.

2. Install the exhaust valve assembly as described in this chapter.

3. Install the reed valve, if removed, as described in this chapter.

4. Check that the top surface of the crankcase and the bottom surface of the cylinder are clean prior to installation.

5. Install a new base gasket onto the crankcase.

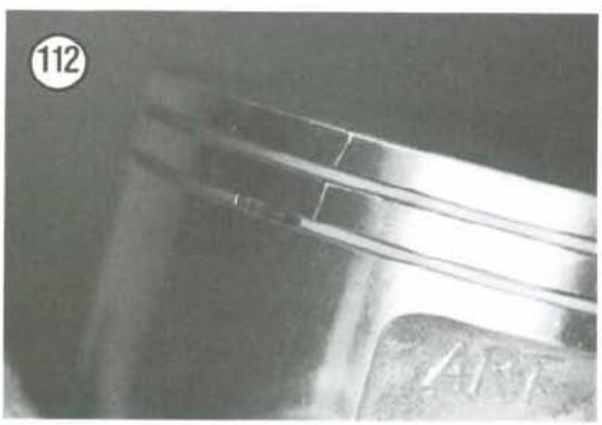
6. Make sure the end gaps of the piston rings are lined up with the locating pins in the ring grooves (**Figure 112**). Lightly oil the piston rings and the inside of the cylinder bore.

7. Check that the piston pin clips are seated in the piston grooves completely.

8. Install a piston holding fixture under the piston (**Figure 113**). Then rotate the crankshaft until the piston skirt seats against the fixture.

NOTE

A piston holding fixture can be easily made out of wood as shown in ***Figure 114****.*



CAUTION

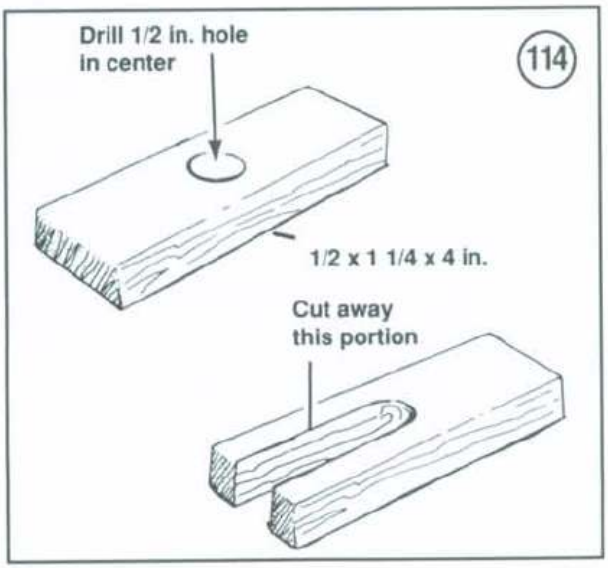
Do not rotate the cylinder while installing it. A piston ring could snag in the cylinder intake port and break.

9. Start the cylinder down over the piston *with the exhaust port facing forward.*
10. Compress each ring, with your fingers, as the cylinder starts to slide over it.

NOTE

Make sure the rings are still properly aligned with the locating pins in the piston.

11. Slide the cylinder down until it bottoms on the piston holding fixture.
12. Remove the piston holding fixture and slide the cylinder into place on the crankcase.
13. Hold the cylinder in place with one hand and push the kickstarter lever down with the other hand.

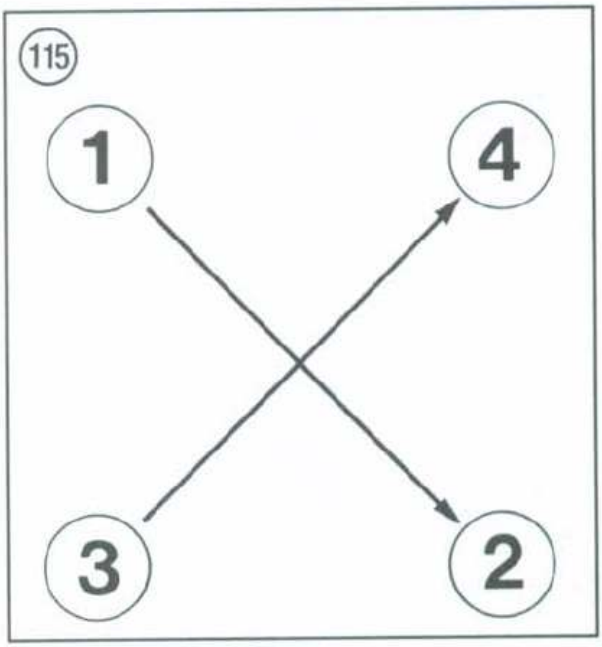


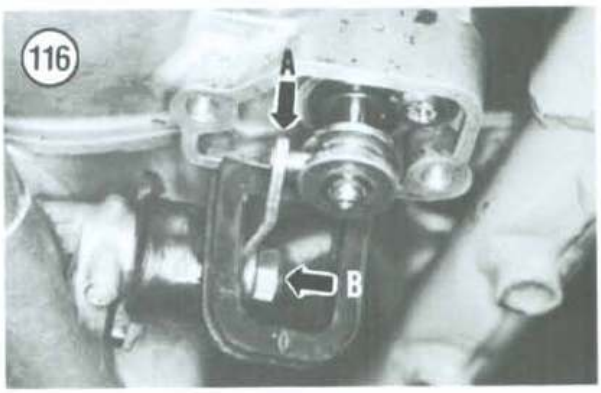
If the piston catches or stops in the cylinder, the piston rings were not lined up properly. The piston should move up and down the cylinder bore smoothly.

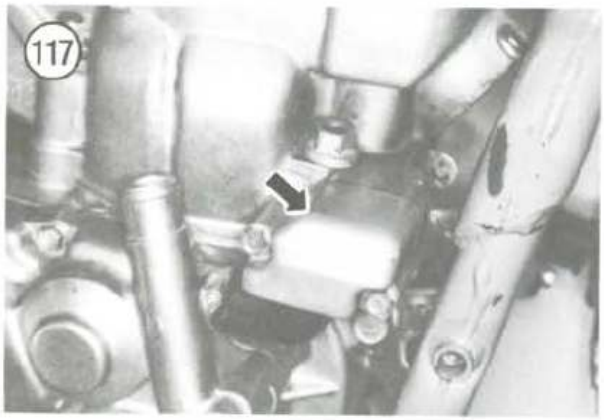
NOTE

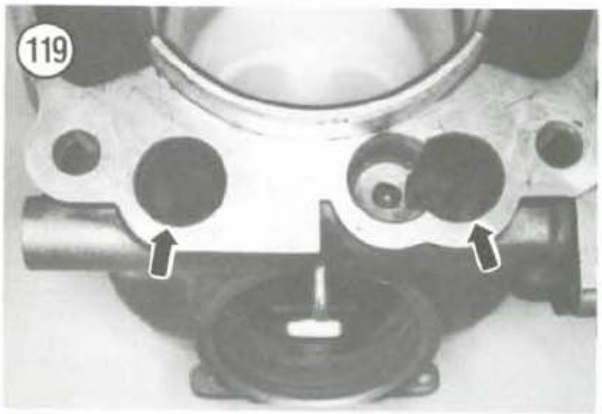
If the rings were not lined up, remove the cylinder and check for damage.

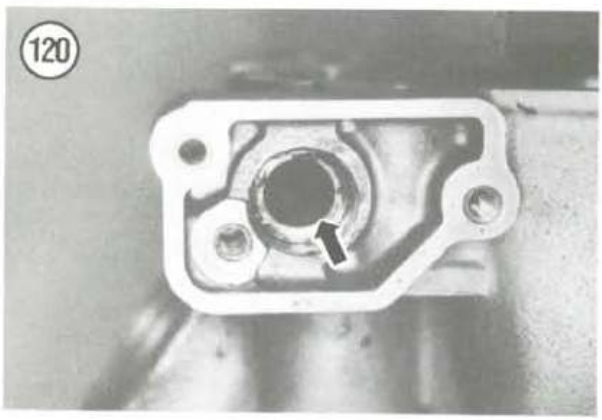
14. Install the cylinder base nuts and tighten them securely in a crisscross pattern (**Figure 115**) to the torque specification in **Table 7**.
15. Install the cylinder head as described in this chapter.
16. Set the governor lever (A, **Figure 116**) onto the governor shaft, with the end of the lever centered in the collar groove.
17. Install and tighten the governor lever nut securely (B, **Figure 116**).











18. Pull the governor boot up and install the right-hand cover and gasket, fitting the boot into the cover (**Figure 117**). Install and tighten cover bolts securely.

19. Follow the *Break-in Procedure* in this chapter if new top end components were installed.

CYLINDER INSPECTION (ALL MODELS)

All of the Kawasaki cylinders covered in this manual are aluminum with a molybdenum coated bore called Electro-Fuse. Cylinder measurement requires a precision inside micrometer or equivalent. If you don't have the right tools, have your dealer or a machine shop take the measurements.

NOTE

The Electro-Fuse cylinder bore is extremely hard and durable and should last a long time. The quickest way to damage the bore surface, however, is to run the bike with a dirty or damaged air filter. To insure long service life from your engine's top end, service the air filter as described in Chapter Three.

1. Remove and inspect the reed valve as described in this chapter.

2. Remove the exhaust valve assembly, if equipped, as described in this chapter.

3. Remove all carbon residue from the exhaust port (**Figure 118**).

4. Remove all carbon residue from the exhaust valve mounting and operating areas. See **Figure 119** and **Figure 120**, typical.

5. Remove all gasket residue from the top and bottom gasket surfaces with a gasket scraper.

6. Wash the cylinder block in solvent and then with soap and water to remove any oil and carbon particles. The cylinder bore must be cleaned thoroughly before attempting any measurement as incorrect readings may be obtained.

7. Measure the cylinder bore with a bore gauge or an inside micrometer (**Figure 121**). Then measure the bore gauge with a micrometer to determine the bore diameter. Measure the cylinder bore at the points shown in **Figure 122**. Measure in 3 axes—in line with the wrist pin and at 90° to the pin. If the bore exceeds the wear limit in **Tables 4-6** for your model,

the cylinder must be replaced or a new sleeve installed.

8. When installing a new cylinder or sleeve, give the bike the same break-in procedure you would use on a new machine.

CAUTION

Electro-fuse cylinders cannot be bored oversize. The cylinder coating would be removed, and the engine would quickly seize.

9. Check the cylinder studs (**Figure 123**) for thread damage or looseness. If thread damage is minor, they may be cleaned up with the correct size metric die. If the studs are damaged or loose, remove them with a stud remover. Coat the bottom half of a new stud with Loctite 271 (red). Follow Loctite's directions on cure time before installing the cylinder head and cylinder head nuts.

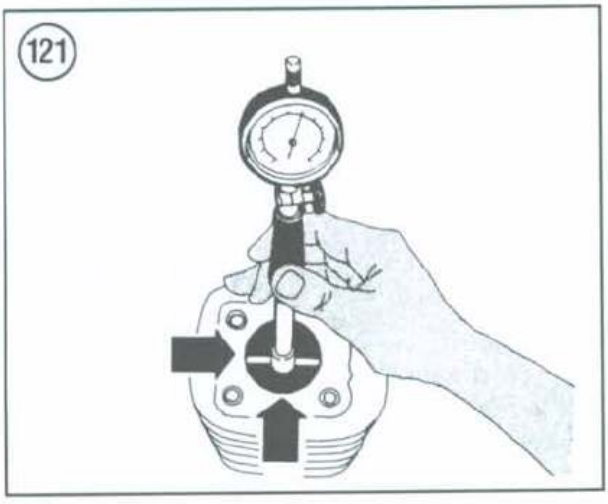
10. Flush the cylinder coolant passages (**Figure 124**) to remove all sludge and other residue.

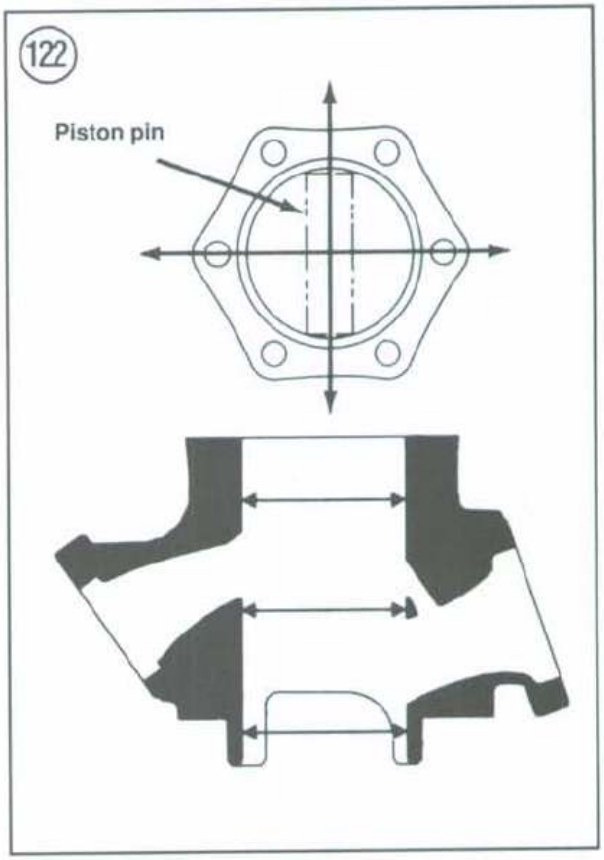
11. Check the cylinder mating surface with a feeler gauge and straightedge (**Figure 125**). Check for low spots around the mating surface. Kawasaki does not list a cylinder warp limit.

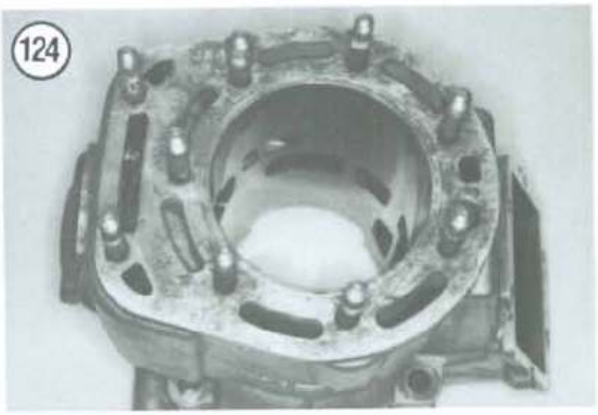
12. Before installing the cylinder, wash the bore in hot soapy water, then rinse with clear water. Dry the cylinder with compressed air, then lubricate the bore with two-stroke oil.

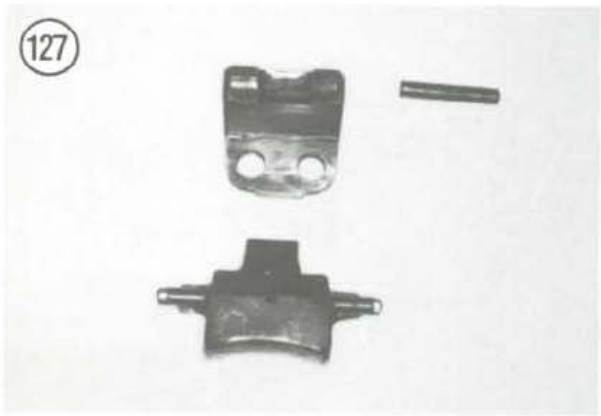
EXHAUST VALVE DECARBONIZING

The exhaust valve assembly should be removed and cleaned of all oil and carbon residue at the









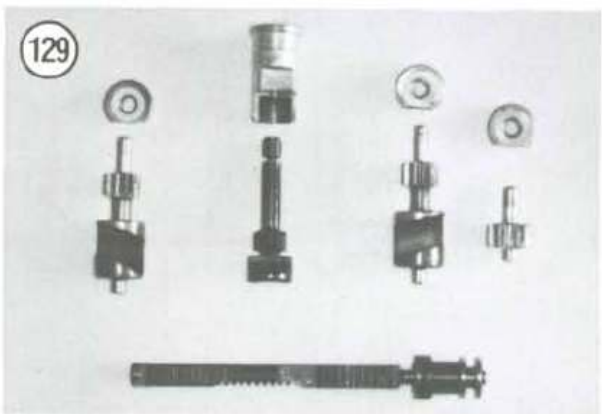
intervals specified in Chapter Three. Carbon seizure is a common problem, resulting in reduced engine performance, that occurs from a lack of periodic maintenance. **Figure 126** shows a carbon seized main exhaust valve from a 1989 KX500. Compare this with the same decarbonized valve in **Figure 127**.

1. Remove the cylinder for your model as described in this chapter.
2. Remove the exhaust valve assembly for your model as described in this chapter.
3. Remove all O-rings from the exhaust valve parts, if used, prior to cleaning the parts in the following steps. See **Figure 95**, typical.
4. Place all of the parts on a paper towel or old newspaper.

NOTE

Follow the manufacturer's safety directions when using a commercial oven cleaner in Step 5.

5. Spray the exhaust valve assembly with a commercial oven cleaner to soften carbon deposits (**Figure 128**). Allow the chemical to stay on the parts for approximately 30 minutes.
6. Carefully hand clean the parts (**Figure 129**, typical) with a soft brush to remove all carbon. Clean and rinse in solvent.
7. Thoroughly clean the resonator chamber (**Figure 130**) and cover of all oil and carbon residue, if used.
8. Remove all gasket residue from all mating gasket surfaces.
9. Using a small wire brush, clean the exhaust and idler valve port holes (**Figure 119**) thoroughly of all oil and carbon residue.
10. After the parts have been cleaned, inspect for wear and damage as described in this chapter. Carb-



on seizure can cause gear damage so inspect all of the parts carefully.

11. Lubricate and reassemble the exhaust valve and cylinder as described in this chapter.

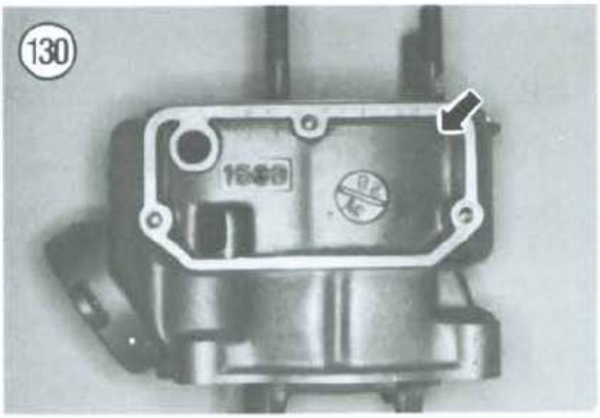
PISTON, WRIST PIN AND PISTON RINGS

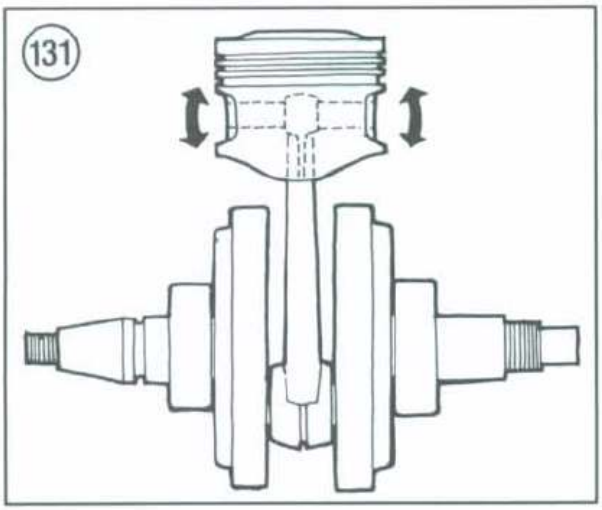
The piston is made of an aluminum alloy. The wrist pin is a precision fit and is held in place by a clip at each end. A caged needle bearing is used on the small end of the connecting rod.

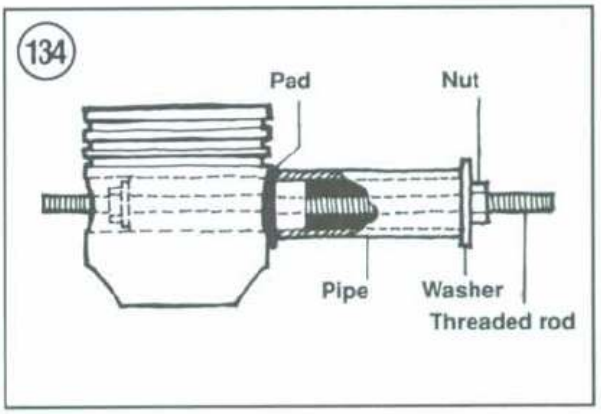
Piston and Piston Ring Removal

1. Remove the cylinder head and cylinder as described in this chapter.

2. Before removing the piston, hold the rod tightly and rock the piston as shown in **Figure 131**. Any rocking motion (do not confuse with the normal







sliding motion) indicates wear on the wrist pin, needle bearing, wrist pin bore, or more likely a combination of all three.

2. Wrap a clean shop cloth under the piston so that the clip will not fall into the crankcase (**Figure 132**).

WARNING

Safety glasses should be worn when performing Step 3.

3. Remove the clips from each side of the wrist pin bore (**Figure 133**). Hold your thumb over one edge of the clip when removing it to prevent it from springing out.

4. Use a proper size wooden dowel or socket extension and push out the wrist pin.

CAUTION

If the engine ran hot or seized, the wrist pin may be difficult to remove. However, do not drive the wrist pin out of the piston. This will damage the piston, needle bearing and connecting rod. If the wrist pin will not push out by hand, remove it as described in Step 5.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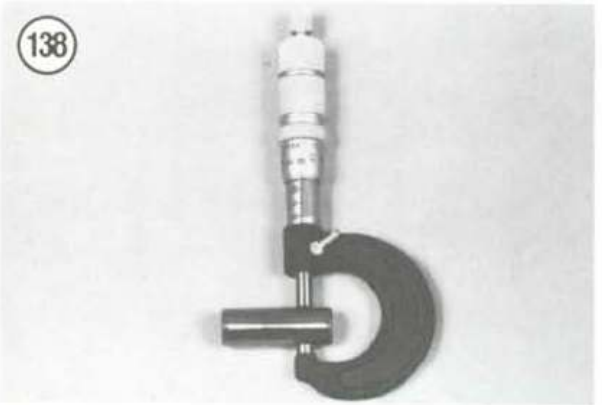
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5. If the wrist pin is tight, fabricate the tool shown in **Figure 134**. Assemble the tool onto the piston and pull the wrist pin out of the piston. Make sure to install a pad between the piston and piece of pipe to avoid scoring the side of the piston.

6. Lift the piston off the connecting rod.

7. Remove the needle bearing from the connecting rod (**Figure 135**).

8. If the piston is going to be left off for some time, place a piece of foam insulation tube, or shop cloth, over the end of the rod to protect it.

9. Before removing the piston rings, check the piston ring(s) for sticking in the piston ring lands. The piston rings should have free movement. If not, excessive carbon may have caused the ring(s) to stick. This reduces engine compression and can cause piston and cylinder bore damage.

10. Remove the top ring by spreading the ends with your thumbs just enough to slide it up over the piston (**Figure 136**). Repeat for the bottom ring, if equipped. Identify the rings after removal so that they can be reinstalled into the same position.

Wrist Pin and Needle Bearing Inspection

1. Clean the needle bearing in solvent and dry thoroughly. Use a magnifying glass and inspect the bearing cage for cracks at the corners of the needle slots (**Figure 137**) and inspect the needles themselves for cracking. If any cracks are found, the bearing must be replaced.

2. Check the wrist pin for wear, scoring or chrome flaking. Also check the wrist pin for cracks along the top and side. Replace the wrist pin if necessary.

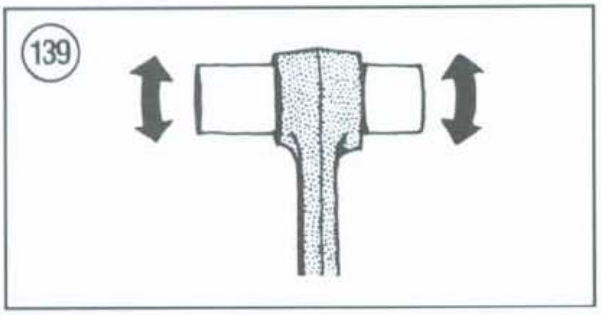
3. Measure the wrist pin outside diameter with a micrometer (**Figure 138**) and compare to the wear

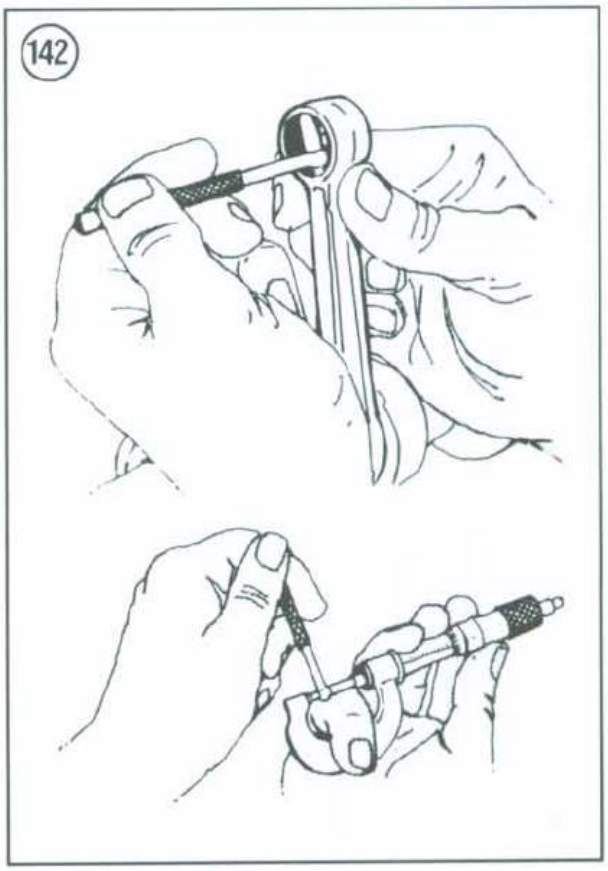
limit in **Tables 4-6** for your model. If the wrist pin outside diameter is too small, replace it.

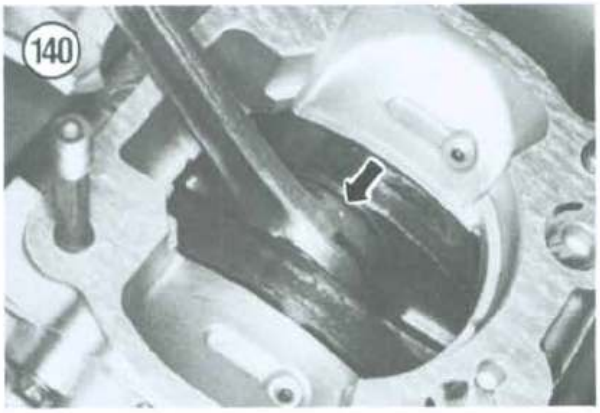
4. Oil the needle bearing and pin and install them in the connecting rod. Slowly rotate the pin and check for radial and axial play (**Figure 139**). If any play exists, the pin and bearing should be replaced, providing the rod bore is in good condition; refer to *Connecting Rod Inspection*. If the condition of the rod bore is in question, the old pin and bearing can be checked with a new connecting rod.

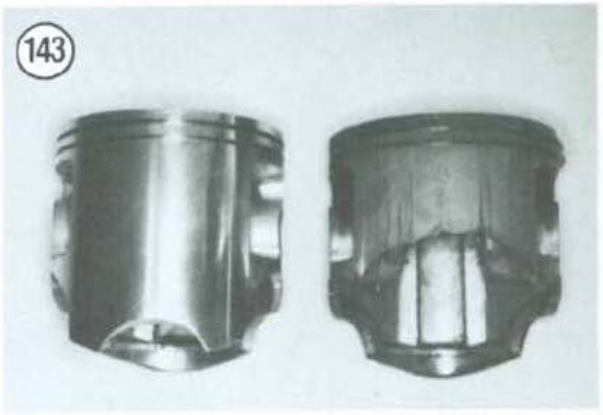
CAUTION

If there are signs of piston seizure or overheating, replace the wrist pin and bearing. These parts have been weak-









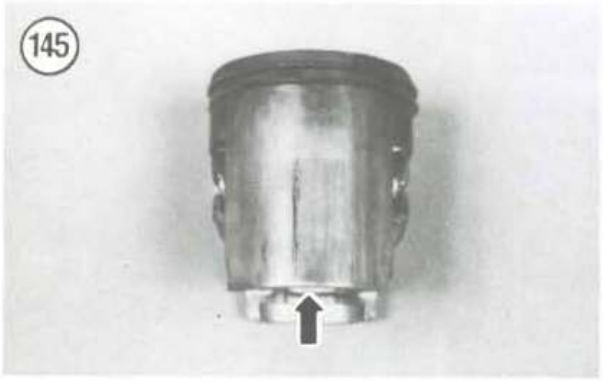
ened from excessive heat and may fail later.

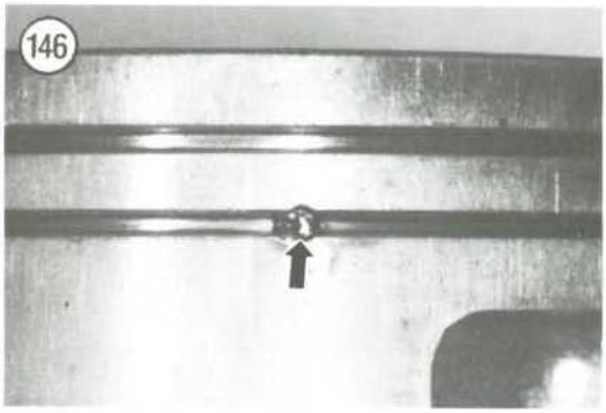
Connecting Rod Inspection

1. Wipe the wrist pin bore in the connecting rod with a clean rag and check it for galling, scratches, or any other signs of wear or damage. If any of these conditions exist, replace the connecting rod as described in Chapter Five.

2. Measure the connecting rod side clearance (**Figure 140**) with a feeler gauge. **Figure 141** shows the bearing play being checked with the crankshaft removed from the engine. Compare to specifications in **Tables 4-6**. If side clearance is excessive, replace the connecting rod and the lower bearing assembly as described in Chapter Five.

3. Measure the inside diameter of the small end of the connecting rod with a snap gauge and a micrometer (**Figure 142**). If the inside diameter is larger than the limit given in **Tables 4-6**, install a new connecting rod and bearing (Chapter Five).





Piston Inspection

The piston should be removed and measured at the intervals specified in Chapter Three. **Figure 143** illustrates a piston damaged from excessive piston skirt clearance.

1. Carefully check the piston for cracks at the top edge of the transfer cutaways (**Figure 144**) and replace if found. Check the piston skirt (**Figure 145**) for brown varnish buildup. More than a slight amount is an indication of worn or sticking rings which should be replaced.

2. Check the piston skirt (**Figure 145**) for galling and abrasion which may have resulted from piston seizure. If light galling is present, smooth the affected area with No. 400 emery paper and oil or a fine oilstone. However if galling is severe or if the piston is deeply scored, replace it.

3. Check the piston ring locating pin(s) in the piston (**Figure 146**). The pins should be tight and the piston should show no signs of cracking around the pin. If any one locating pin is loose, replace the piston. A loose pin will eventually fall out and cause severe engine damage.

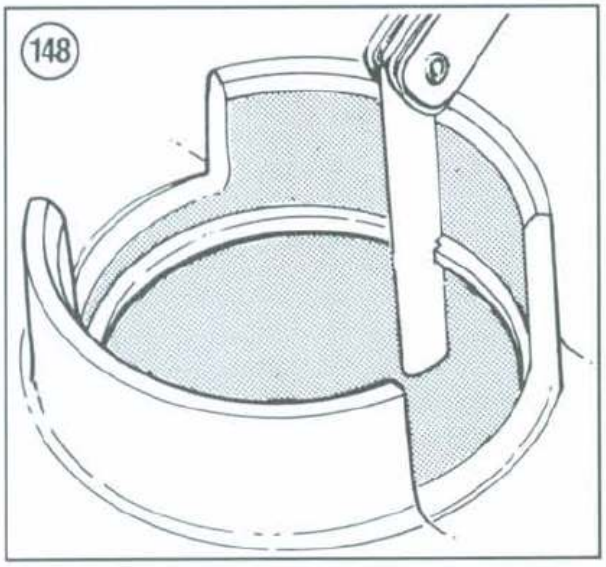
4. Check the wrist pin clip grooves in the piston for cracks or other damage that could allow a wrist pin clip to fall out. This would cause severe engine damage. Replace the piston if either groove shows signs of wear or damage.

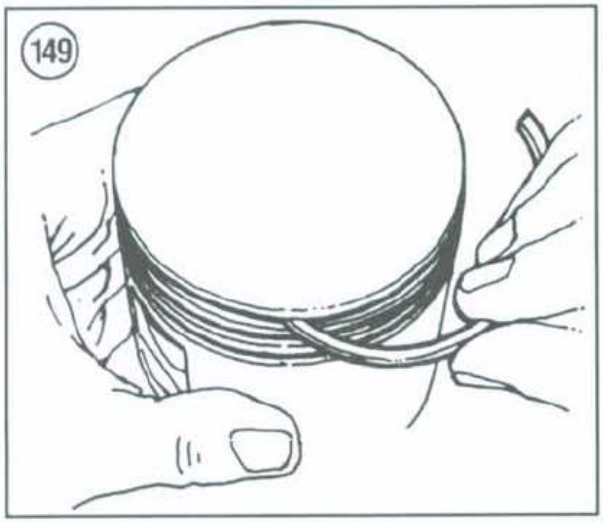
5. Observe the condition of the piston crown (**Figure 147**). Normal carbon buildup can be removed with a wire wheel mounted on a drill press. If the piston shows signs of overheating, pitting or other abnormal conditions, the engine may be experiencing preignition or detonation; both conditions are discussed in Chapter Two.

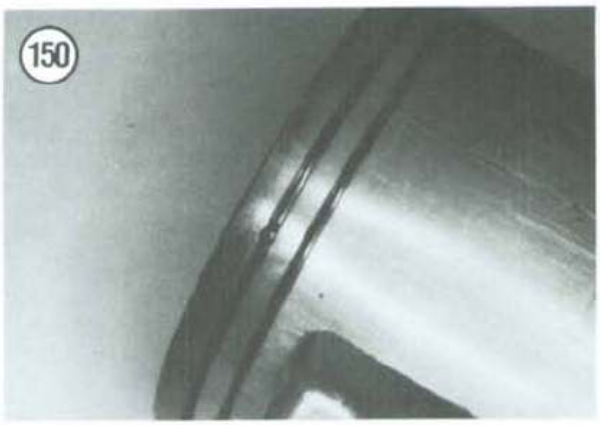
NOTE

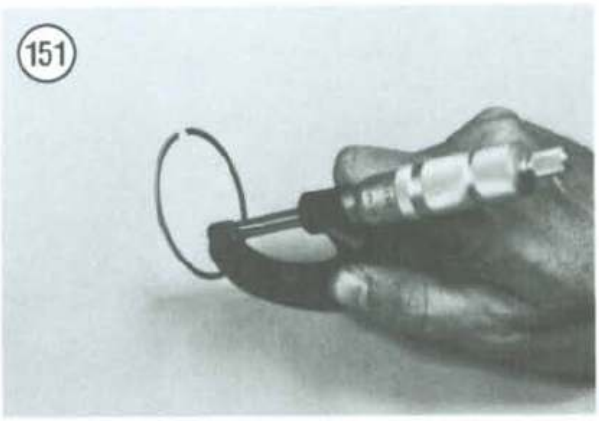
Maintaining proper piston ring end gap helps to ensure peak engine performance. Always check piston ring end gap at the intervals specified in Chapter Three. Excessive ring end gap reduces engine performance and can cause overheating. Insufficient ring end gap will cause the ring ends to butt together and cause the ring to break. This would cause severe engine damage. So that you don't have to wait for parts, always order extra cylinder head and base gaskets to have on hand for routine top end inspection and maintenance.

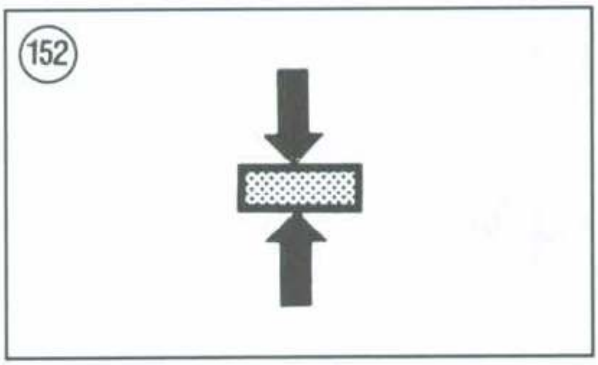
6. Measure piston ring end gap. Place a ring into the cylinder and push it in to a point where cylinder wear

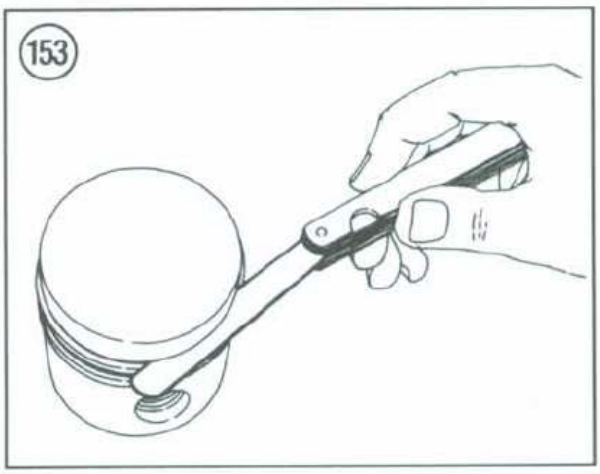










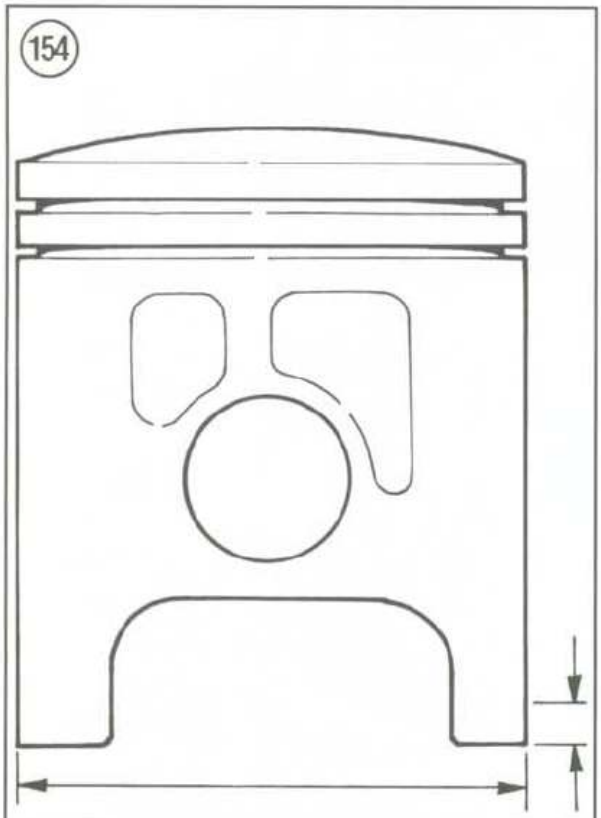


is minimal. Measure the gap with a flat feeler gauge (**Figure 148**) and compare to the wear limit in **Tables 4-6** for your model. If the gap is greater than specified, the rings should be replaced.

NOTE

When installing new rings, measure their end gap in the same manner as for old ones.

7. Carefully remove all carbon buildup from the ring grooves with a broken ring (**Figure 149**). Inspect the grooves (**Figure 150**) carefully for burrs, nicks, or broken and cracked lands. Recondition or replace the piston if necessary.



Year	KX125 mm (in.)	KX250 mm (in.)	KX500 mm (in.)
1982	15 (0.6)	20 (0.8)	–
1983	17.5 (0.7)	17.5 (0.7)	25.5 (1.0)
1984	17.5 (0.7)	45 (1.8)	26.5 (1.04)
1985	17.5 (0.7)	45 (1.8)	25.5 (1.0)
1986	18 (0.7)	45 (1.8)	26.5 (1.04)
1987	18 (0.7)	20.5 (0.8)	26.5 (1.04)
1988	18 (0.7)	20.5 (0.8)	26.5 (1.04)
1989	18 (0.7)	20.5 (0.8)	26.5 (1.04)
1990-on	16 (0.6)	20.5 (0.8)	26.5 (1.04)

8. Measure the thickness of each ring with a micrometer (**Figure 151**) at the points indicated in **Figure 152**. If the thickness at any point is less than the wear limit (**Tables 4-6**), replace the piston rings as a set.

9. Install the piston rings onto the piston as described in this chapter. Then measure the side clearance of each ring in its groove with a flat feeler gauge (**Figure 153**) and compare to the wear limit in **Tables 4-6**. If the clearance is greater than specified, the rings must be replaced, and if the clearance is still excessive with the new rings, the piston must also be replaced.

10. If the piston appears okay, measure the piston outside diameter as described under *Piston/Cylinder Clearance* in this chapter.

11. If new piston rings are required, the engine should be broken in as if it were new. Refer to *Engine Break-In* in this chapter.

Piston/Cylinder Clearance

A micrometer and bore gauge or inside micrometer are required to accurately measure piston-to-cylinder clearance. If these tools are not available, have the measurements performed by a dealer or machine shop.

1. Wash the piston and cylinder bore in solvent and then with soap and water to remove any oil and carbon particles. The cylinder bore and piston skirt must be cleaned thoroughly before attempting any measurement as incorrect readings may be obtained.

2. Measure the outside diameter of the piston with a micrometer at the point above the bottom of the piston skirt, at a 90° angle to the piston pin specified in **Figure 154**. If the diameter is less than the wear limit in **Tables 4-6** for your model, install a new piston.

3. Measure the cylinder bore with a bore gauge or an inside micrometer (**Figure 155**) at the height distance shown in **Figure 156**. Measure in 3 axes—in line with the wrist pin and at 90° to the pin. If the bore exceeds the wear limit in **Tables 4-6** for your model, the cylinder must be replaced or a new liner installed.

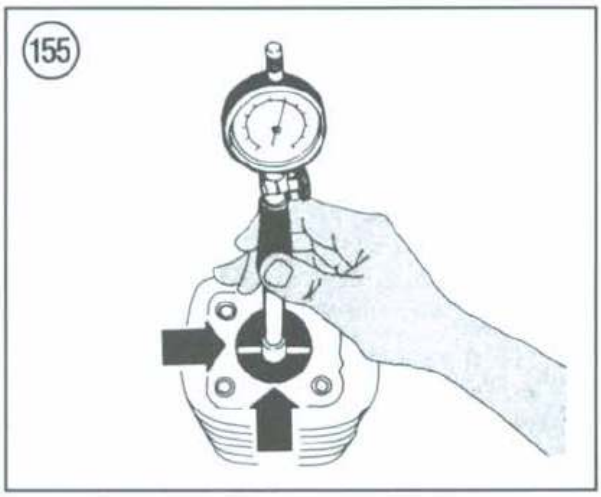
4. Piston clearance is the difference between the maximum piston diameter and the minimum cylinder diameter. For a run-in (used) piston and cylinder, subtract the piston diameter from the cylinder bore diameter. If the clearance exceeds the maximum

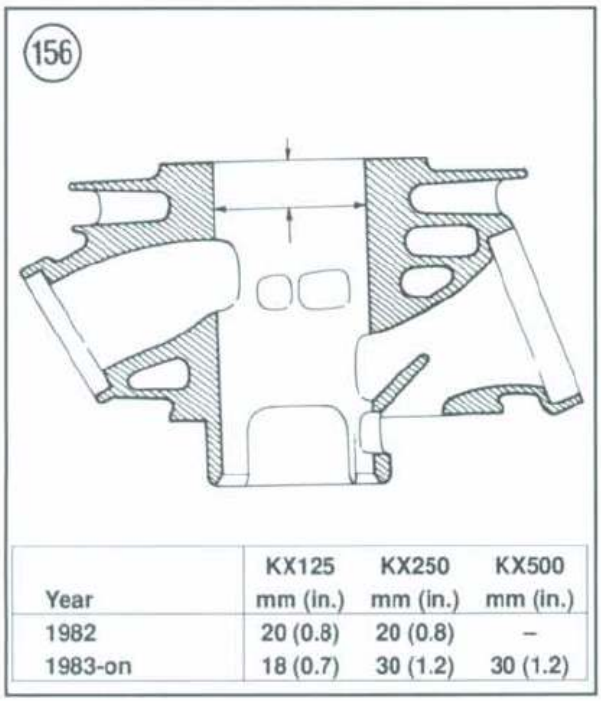
dimension in **Tables 4-6** for your model and the piston diameter is within specification, the cylinder should be replaced.

NOTE

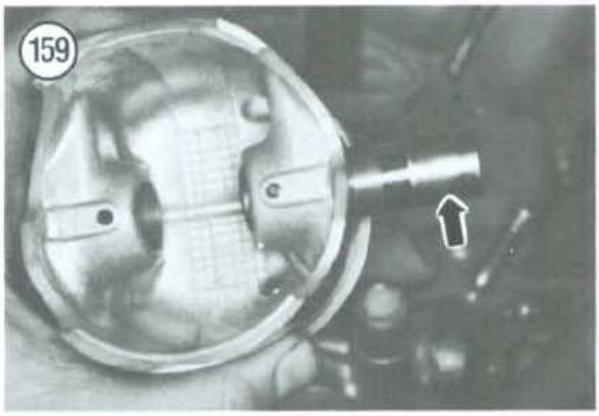
*As described under **Cylinder Inspection**, all cylinders described in this manual use a coated bore called Electro-Fuse. Electro-Fuse cylinders cannot be bored oversize. The cylinder coating would be removed, and the engine would quickly seize.*

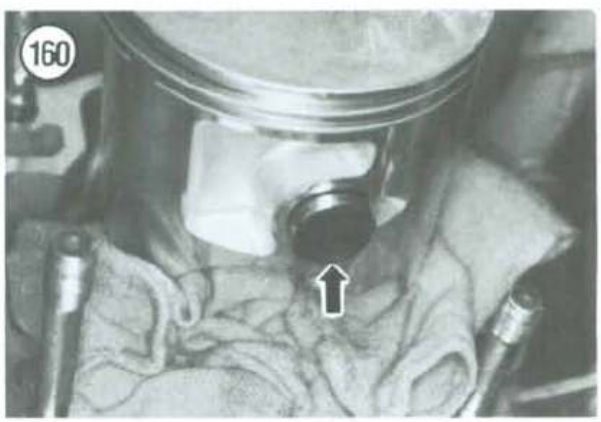
5. When installing a new cylinder (or liner), piston and rings, give the bike the same break-in procedure





Year	KX125 mm (in.)	KX250 mm (in.)	KX500 mm (in.)
1982	20 (0.8)	20 (0.8)	–
1983-on	18 (0.7)	30 (1.2)	30 (1.2)





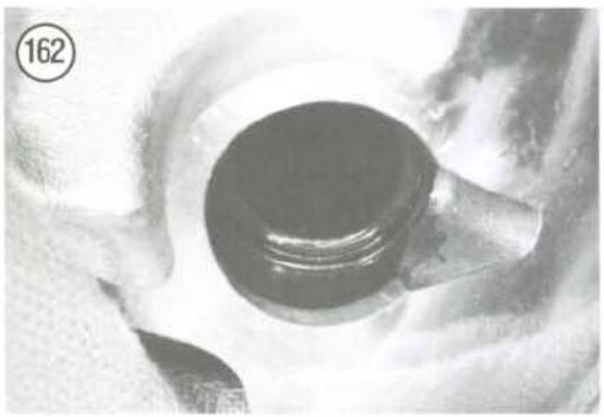
you would use on a new machine. Refer to *Engine Break-In* in this chapter. When replacing a cylinder or liner, always install a new piston and ring(s).

Piston Ring Installation

Install the piston rings—first the bottom one, then the top—by carefully spreading the ends of the ring with your thumbs and slipping the ring over the top of the piston (**Figure 157**). Make sure that the marks on the piston rings are toward the top of the piston. If you are installing used rings, install them by referring to your identification marks made during removal.

Piston Installation

1. Apply assembly oil to the needle bearing and install it in the connecting rod (**Figure 158**).
2. Oil the wrist pin and install it in the piston until the end of it extends slightly beyond the inside of the boss (**Figure 159**).
3. Place the piston over the connecting rod with the arrow on the piston crown pointing forward. Line up the pin with the bearing and push the pin (**Figure 160**) into the piston until it is even with the wrist pin clip grooves.



CAUTION

If the wrist pin will not slide in the piston smoothly, use the home-made tool described during ***Piston Removal*** *to install the wrist pin. When using the home-made tool, the pipe and pad is not required. Instead, run the threaded rod through the wrist pin. Secure the end of the wrist pin next to the piston with the small washer and nut. Slide the large washer onto the threaded rod so that it is next to the wrist pin. Install the nut next to the large washer and tighten the nut to push the wrist pin into the piston. Do not drive the wrist pin into the piston or you may damage the needle bearing and connecting rod.*

4. Wrap a clean shop cloth under the piston so that the clips cannot fall into the crankcase.

WARNING

Safety glasses should be worn when performing Step 5.

5. Install *new* wrist pin clips (**Figure 161**) in the piston grooves. Make sure they are seated in the grooves completely (**Figure 162**).
6. Check the installation by rocking the piston back and forth around the pin axis and from side to side along the axis. It should rotate freely back and forth but not from side to side.
7. Make sure the rings are seated completely in the grooves, all the way around the circumference, and that the ends are aligned with the locating pins.
8. Follow the *Break-in Procedure* in this chapter if new piston or ring(s) were installed.

REED VALVE ASSEMBLY

All models are equipped with a reed valve assembly installed in the intact tract between the carburetor and crankcase. Particular care must be taken when handling and repairing the reed valve assembly.

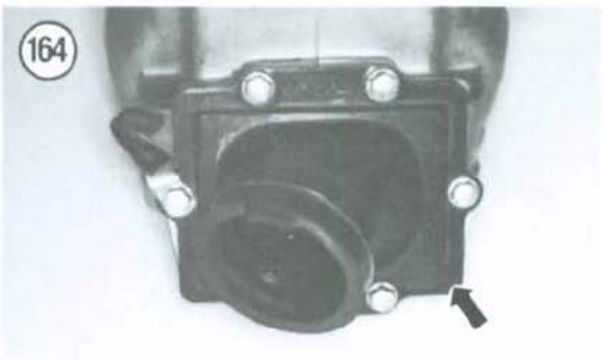
NOTE

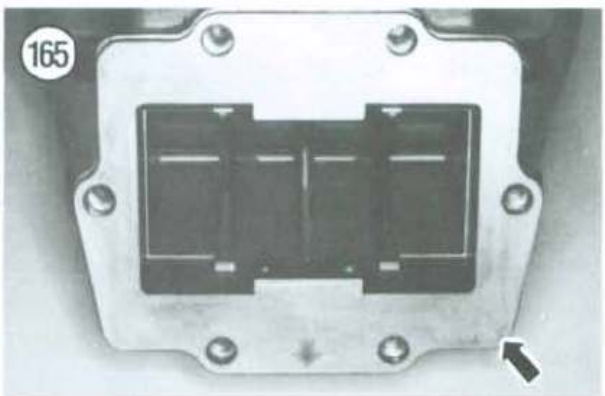
If your model is equipped with an aftermarket reed valve, refer to the manufac-

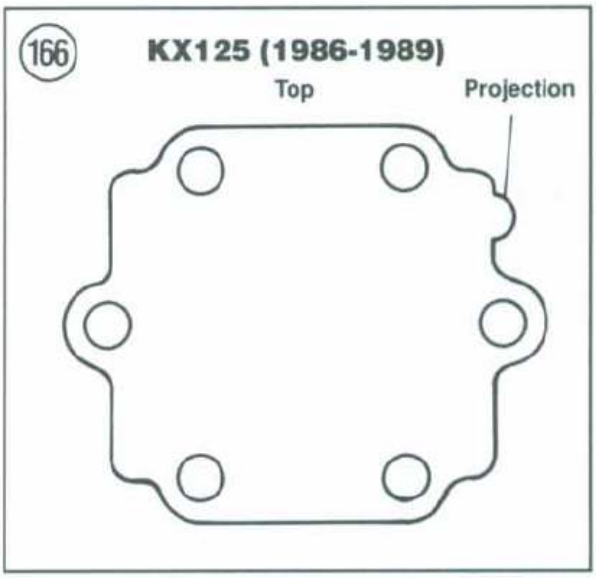
turer's instructions on removal, installation and inspection procedures.

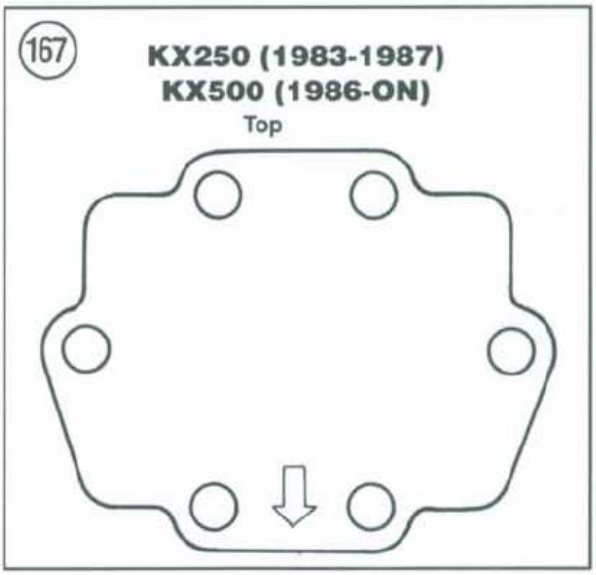
Removal/Installation

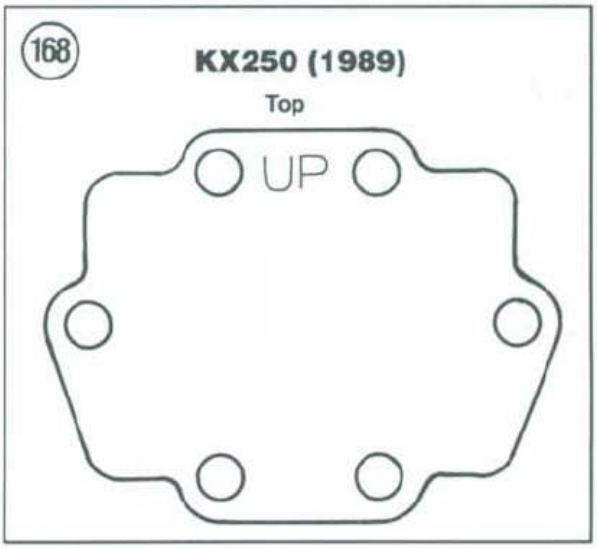
1. Perform the following:
   a. Clean the area around the reed valve and cylinder.
   b. Remove the carburetor as described in Chapter Eight.
2. Note the position of any hose clamps or guides mounted on the reed valve for reassembly.
3. Remove the bolts securing the intake manifold to the crankcase (**Figure 163**) or cylinder (**Figure 164**).









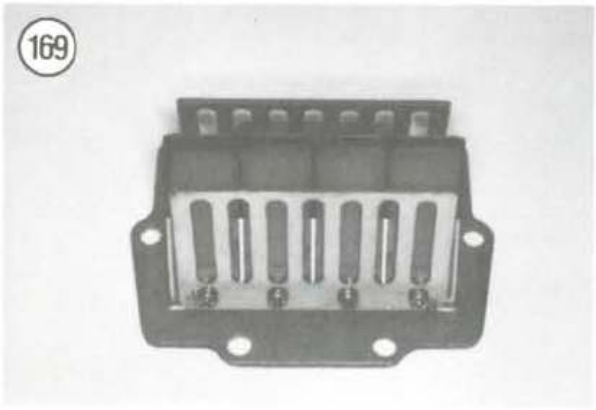


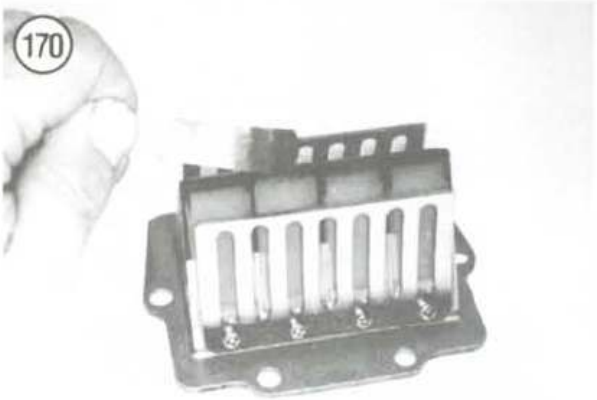
4. Remove the reed cage assembly (**Figure 165**).

NOTE

Some mechanics seal the reed cage against the cylinder with a chemical sealer. If the reed cage on your model is secured with a sealer, and depending on the type of sealer used, it may be a tight fit and difficult to remove. Do not pry the cage off as this may damage the mating surfaces and cause an air leak. Instead, tap the side (non-gasket area) of the cage with a rubber mallet or soft-faced drift until the cage breaks free of the sealer. Do not use a hard-faced drift or screwdriver to tap the reed cage off; this will flare the edge of the reed cage surface and cause an air leak. If you are working on a bike in which a sealer was used, check the reed cage carefully for pry marks or other damage.

5. Remove and discard the reed cage gasket. If a sealer was used, carefully remove gasket residue from all mating surfaces.





6. Inspect the reed valve assembly as described in this chapter.

7. Install a new gasket onto the reed cage.

NOTE

On some models, the reed cage is directional and should be installed so that one side is always facing up. Refer to Step 8 for your model.

8A. On 1982-1985 KX125 models, the reed cage is not directional. Install the reed cage into the cylinder.

8B. On 1986-1989 KX125 models, install the reed cage so that the projection on the right-hand side of the cage faces up (**Figure 166**).

8C. On 1990-1991 KX125 models, Kawasaki does not specify which way to install the reed cage. Install the reed cage into the cylinder.

8D. On 1982 KX250 models, the reed cage is not directional. Install the reed cage into the cylinder.

8E. On 1983-1987 KX250 models, install the reed cage so that the arrow mark on the reed cages faces *down* (**Figure 167**).

8F. On 1988 KX250 models, Kawasaki does not specify which way to install the reed cage. Install the reed cage into the cylinder.

8G. On 1989 KX250 models, install the reed cage so that the "UP" mark on the cage faces up (**Figure 168**).

8H. On 1990-1991 KX250 models, Kawasaki does not specify which way to install the reed cage. Install the reed cage into the cylinder.

8I. On 1983-1985 KX500 models, the reed cage is not marked. Install the reed cage into the cylinder.

8J. On 1986-on KX500 models, install the reed cage so that the arrow mark on the reed cage faces *down* (**Figure 167**).

9. Install the intake manifold and tighten the mounting bolts evenly in a crisscross pattern. See **Figure 163** or **Figure 164**.

Inspection/Reed Replacement

1. Carefully examine the reed valve assembly (**Figure 169**) for visible signs of wear, distortion or damage.

2. Use a flat feeler gauge and measure the reed valve warpage between the reed plate and the gasket (**Figure 170**). Refer to the service limit in **Tables 4-6** for your model. If the clearance exceeds this dimension the reed plate(s) must be replaced.

3. Remove the screws securing the reed stop to the reed cage. Be careful that the screwdriver does not slip off and damage the reed plate.

4. Carefully examine the reed plate, reed stop, and gasket. Check for signs of cracks, metal fatigue, distortion, or foreign matter damage. Pay particular attention to the rubber gasket seal on the reed cage. The reed stops and reed plates are available as replacement parts, but if the rubber gasket seal is damaged the reed cage should be replaced.

5. Check the threaded holes in the reed cage. If the threads are stripped, do not repair the threads. Instead, it will be safer to replace the reed cage. Loose screws can fall into the engine and cause expensive damage.

6. Reassemble the unit. Apply Loctite 242 (blue) to the screw threads prior to installation and tighten securely.

NOTE

Make sure that all parts are clean and free of any small dirt particles or lint from a shop cloth as they may cause a small amount of distortion in the reed plate.

7. Reinstall the reed valve assembly as previously described.

ENGINE BREAK-IN

If the rings were replaced, a new piston installed or the cylinder replaced or repaired, the engine must be run in at moderate speeds and loads for no less than 2 hours. Don't exceed 75 percent of normal allowable rpm during run in. After the first half hour, remove the spark plug and check its condition. The electrode should be dry and clean and the color of the insulation should be light to medium tan. If the insulation is white (indicating a too lean fuel/air mixture) or if it is dark and oily (indicating a too rich fuel/air mixture ratio), correct the condition with a main jet change; both conditions produce excessive engine heat and can lead to damage to the rings, piston, and cylinder before they have had a chance to seat in.

Refer to Chapter Three for further information on how to read a spark plug and to Chapter Eight for carburetor jet change.

Table 1 GENERAL ENGINE SPECIFICATIONS (KX125)

Bore × stroke	56.0 × 50.6 mm (2.20 × 1.99 in.)
Displacement	124.6 cc (7.60 cu. in.)
Compression ratio	
1982-1983	8.2:1
1984	8.8:1
1985-1987	9.35:1
1988	8.39:1
1989	
High-speed	7.8:1
Low-speed	8.5:1
1990	8.2:1
1991	
High-speed	
U.S.	7.9:1
Eur.	7.6:1
Low-speed	
U.S.	8.2:1
Eur.	7.8:1

(continued)

Table 1 GENERAL ENGINE SPECIFICATIONS (KX125) (continued)

Port timing	
1982	
Intake open	—
Intake close	—
Transfer open	64° BBDC
Transfer close	64° ABDC
Exhaust open	94° BBDC
Exhaust closes	94° ABDC
Port timing	
1983	
Intake open	—
Intake close	—
Transfer open	64° BBDC
Transfer close	64° ABDC
Exhaust open	96° BBDC
Exhaust closes	96° ABDC
1984-1986	
Intake open	—
Intake close	—
Transfer open	64° BBDC
Transfer close	64° ABDC
Exhaust open	93° BBDC
Exhaust closes	93° ABDC
1987	
Intake open	—
Intake close	—
Transfer open	64° BBDC
Transfer close	64° ABDC
Exhaust open	91° BBDC
Exhaust closes	91° ABDC
1988	
Intake open	—
Intake close	—
Transfer open	61° BBDC
Transfer close	61° ABDC
Exhaust open	95.5° BBDC
Exhaust closes	95.5° ABDC
1989	
Intake open	—
Intake close	—
Transfer open	61° BBDC
Transfer close	61° ABDC
Exhaust open	
High-speed	90° BBDC
Low-speed	95.5° BBDC
Exhaust close	
High-speed	90° ABDC
Low-speed	95.5° ABDC
1990	
Intake open	Full open
Intake close	—
Transfer open	65.5° BBDC
Transfer close	65.5° ABDC
Exhaust open	93.5° BBDC
Exhaust close	93.5° ABDC

(continued)

Table 1 GENERAL ENGINE SPECIFICATIONS (KX125) (continued)

1991	
Intake open	Full open
Intake close	—
Transfer open	65.5° BBDC
Transfer close	65.5° ABDC
Exhaust open	
High-speed	95.5° BBDC
Low-speed	93.5° BBDC
Exhaust close	
High-speed	95.5° ABDC
Low-speed	93.5° ABDC

Table 2 GENERAL ENGINE SPECIFICATIONS (KX250)

Bore × stroke	
1982-1986	70.0 × 64.9 mm (2.76 × 2.56 in.)
1987-on	67.4 × 70.0 mm (2.65 × 2.76)
Displacement	249 cc (15.25 cu. in.)
Compression ratio	
1982	8.4:1
1983	8.8:1
1984-1986	9.1:1
1987-1988	10.1:1
1989	
U.S.	
High-speed	9.8:1
Low-speed	11.3:1
Eur.	
High-speed	9.4:1
Low-speed	10.8:1
1990	
High-speed	9.4:1
Low-speed	10.8:1
1991	
U.S.	
High-speed	10.1:1
Low-speed	11.7:1
Eur.	
High-speed	9.6:1
Low-speed	11.2:1
Port timing	
1982	
Intake open	—
Intake close	—
Transfer open	62° BBDC
Transfer close	62° ABDC
Exhaust open	93.5° BBDC
Exhaust closes	93.5° ABDC
1983-1985	
Intake open	—
Intake close	—
Transfer open	62° BBDC
Transfer close	62° ABDC
Exhaust open	91° BBDC
Exhaust closes	91° ABDC
1986	
Intake open	—
Intake close	—
Transfer open	61° BBDC
Transfer close	61° ABDC
Exhaust open	87° BBDC
Exhaust closes	87° ABDC

(continued)

Table 2 GENERAL ENGINE SPECIFICATIONS (KX250) (continued)

Port timing	
1987	
Intake open	—
Intake close	—
Transfer open	59.5° BBDC
Transfer close	59.5° ABDC
Exhaust open	86.5° BBDC
Exhaust closes	86.5° ABDC
1988	
Intake open	—
Intake close	—
Transfer open	59.5° BBDC
Transfer close	59.5° ABDC
Exhaust open	90° BBDC
Exhaust closes	90° ABDC
1989	
Intake open	—
Intake close	—
Transfer open	60.5° BBDC
Transfer close	60.5° ABDC
Exhaust open	
High-speed	81.5° BBDC
Low-speed	92° BBDC
Exhaust close	
High-speed	81.5° ABDC
Low-speed	92° ABDC
1990	
Intake open	Full open
Intake close	—
Transfer open	60.5° BBDC
Transfer close	60.5° ABDC
Exhaust open	
High-speed	92° BBDC
Low-speed	81.5° BBDC
Exhaust close	
High-speed	92° ABDC
Low-speed	81.5° ABDC
1991	
Intake open	Full open
Intake close	—
Transfer open	58° BBDC
Transfer close	58° ABDC
Exhaust open	
High-speed	90.5° BBDC
Low-speed	78.5° BBDC
Exhaust close	
High-speed	90.5° ABDC
Low-speed	78.5° ABDC

Table 3 GENERAL ENGINE SPECIFICATIONS (KX500)

Bore × stroke	86 × 86 mm (3.39 × 3.39 in.)
Displacement	499 cc (30.45 cu. in.)
Compression ratio	
1983	7.0:1
1984	
U.S.	6.7:1
All other	7.0:1
1985	7.9:1
1986	8.4:1
1987	7.4:1

(continued)

Table 3 GENERAL ENGINE SPECIFICATIONS (KX500) (continued)

Compression ratio	
1988	7.1:1
1989	
High-speed	6.8:1
Low-speed	7.7:1
1990-on	
High-speed	7.4:1
Low-speed	8.3:1
Port timing	
1983	
Intake open	—
Intake close	—
Transfer open	62° BBDC
Transfer close	62° ABDC
Exhaust open	92° BBDC
Exhaust closes	92° ABDC
1984	
Intake open	—
Intake close	—
Transfer open	58.5° BBDC
Transfer close	58.5° ABDC
Exhaust open	89° BBDC
Exhaust closes	89° ABDC
1985	
Intake open	—
Intake close	—
Transfer open	62° BBDC
Transfer close	62° ABDC
Exhaust open	92° BBDC
Exhaust closes	92° ABDC
1986	
Intake open	—
Intake close	—
Transfer open	59° BBDC
Transfer close	59° ABDC
Exhaust open	96° BBDC
Exhaust closes	96° ABDC
1987	
Intake open	—
Intake close	—
Transfer open	59.5° BBDC
Transfer close	59.5° ABDC
Exhaust open	86.5° BBDC
Exhaust closes	86.5° ABDC
1988	
Intake open	—
Intake close	—
Transfer open	60° BBDC
Transfer close	60° ABDC
Exhaust open	90° BBDC
Exhaust closes	90° ABDC
1989-on	
Intake open	—
Intake close	—
Transfer open	60° BBDC
Transfer close	60° ABDC
Exhaust open	
High-speed	83.5° BBDC
Low-speed	93.5° BBDC
Exhaust close	
High-speed	83.5° ABDC
Low-speed	93.5° ABDC

Table 4 ENGINE SERVICE SPECIFICATIONS (KX125)

	New mm (in.)	Service limit mm (in.)
Cylinder head warp limit	—	0.03
	—	(0.00118)
Cylinder diameter		
1982-1988	56.011-56.026	56.10
	(2.2052-2.2057)	(2.209)
1989-1990	56.020-56.035	56.10
	(2.2055-2.2061)	(2.209)
1991	56.020-56.035	56.12
	(2.2055-2.2061)	(2.210)
Piston diameter		
1982-1987	55.945-55.960	55.80
	(2.2026-2.2031)	(2.197)
1988-1989	55.940-55.955	55.79
	(2.2023-2.2030)	(2.196)
1990-1991	55.935-55.950	55.79
	(2.2021-2.2027)	(2.196)
Piston-to-cylinder clearance		
1982-1983	0.054-0.064	—
	(0.0021-0.0025)	
1984-1987	0.065-0.085	—
	(0.0026-0.0033)	
1988	0.071-0.091	—
	(0.0028-0.0036)	
1989	0.071-0.081	—
	(0.0028-0.0032)	
1990-1991	0.071-0.091	—
	(0.0028-0.0036)	
1982-1985	0.025-0.065	0.16
	(0.0010-0.0026)	(0.006)
1986-1987	0.013-0.035	0.12
	(0.0005-0.0014)	(0.005)
1988-1991	0.04-0.08	0.18
	(0.0016-0.0031)	(0.007)
Piston ring thickness		
1982-1987	0.97-0.99	0.90
	(0.0382-0.0390)	(0.035)
1988-1990	0.77-0.79	0.7
	(0.0303-0.0311)	(0.028)
1991	0.97-0.99	0.9
	(0.038-0.039)	(0.035)
Piston ring groove width		
1982-1985	1.015-1.035	1.12
	(0.0400-0.0407	(0.044)
1986-1987	1.03-1.05	1.1
	(0.0406-0.0413)	(0.043)
1988	0.83-0.85	0.93
	(0.0323-0.0335)	(0.037)
1989		
Top	0.83-0.85	0.93
	(0.0327-0.0335)	(0.037)
Bottom	0.815-0.835	0.92
	(0.0321-0.0329)	(0.0362)
1990	0.83-0.85	0.93
	(0.0327-0.0335)	(0.037)
1991	1.03-1.05	1.13
	(0.040-0.041)	(0.044)
Piston ring end gap	0.15-0.35	0.7
	(0.006-0.014)	(0.028)

(continued)

Table 4 ENGINE SERVICE SPECIFICATIONS (KX125) (continued)

	New mm (in.)	Service limit mm (in.)
Wrist pin diameter	15.995-16.000 (0.6297-0.6299)	15.96 (0.628)
Wrist pin hole diameter		
1982-1989	16.000-16.006 (0.6299-0.6302)	16.07 (0.633)
1990-1991	16.000-16.020 (0.6299-0.6307)	16.07 (0.633)
Connecting rod small end I.D.	21.003-21.014 (0.8269-0.8273)	21.05 (0.8287)
Connecting rod side clearance		
1982	0.40-0.45 (0.016-0.018)	0.70 (0.028)
1983-on	0.40-0.50 (0.016-0.020)	0.70 (0.028)
Reed valve warp limit		
1982-1985	*	
1986-1987	—	0.7
	—	(0.028)
1988-on	—	0.2
	—	(0.008)

* Not specified.

Table 5 ENGINE SERVICE SPECIFICATIONS (KX250)

	New mm (in.)	Service limit mm (in.)
Cylinder head warp limit	—	0.03
	—	(0.001)
Cylinder diameter		
1982-1985	70.015-70.030 (2.7565-2.7571)	70.10 (2.760)
1986	70.020-70.035 (2.7567-2.7573)	70.10 (2.760)
1987-on	67.400-67.415 (2.6535-2.6541)	67.48 (2.657)
Piston diameter		
1982	69.960-69.975 (2.7543-2.7549)	69.81 (2.748)
1983-1986	69.870-69.995 (2.7508-2.7557)	69.75 (2.746)
1987-1989	67.341-67.356 (2.6512-2.6518)	67.23 (2.647)
1990-1991	67.336-67.351 (2.6510-2.6516)	67.23 (2.647)
Piston-to-cylinder clearance		
1982-1983	0.049-0.059 (0.0019-0.0023)	—
1984-1985	0.140-0.160 (0.0055-0.0063)	—
1986	0.145-0.165 (0.0057-0.0065)	—
1987-1988	0.054-0.074 (0.0021-0.0029)	—
1989	0.054-0.064 (0.0021-0.0025)	—
1990-1991	0.054-0.074 (0.0021-0.0029)	—

(continued)

Table 5 ENGINE SERVICE SPECIFICATIONS (KX250) (continued)

	New mm (in.)	Service limit mm (in.)
Piston ring/groove clearance		
1982-1986	—	—
1987-on	0.04-0.08 (0.0016-0.0031)	0.18 (0.007)
Piston ring thickness		
1982-1986	—	—
1987-1990	0.97-0.99 (0.0382-0.0390)	0.90 (0.035)
1991	1.17-1.19 (0.046-0.047)	1.1 (0.043)
Piston ring groove width		
1982-1986	—	—
1987	1.03-1.05 (0.0406-0.0413)	1.13 (0.0445)
1988-1990	1.03-1.05 (0.0406-0.0413)	1.10 (0.0433)
1991	1.23-1.25 (0.048-0.049)	1.33 (0.052)
Piston ring end gap		
1982	0.20-0.40 (0.008-0.016)	0.7 (0.028)
1983-on	0.15-0.35 (0.006-0.014)	0.7 (0.028)
Wrist pin O.D.		
1982-1989	18.000-18.006 (0.7087-0.7089)	18.07 (0.711)
1990-1991	18.000-18.020 (0.7087-0.7094)	18.07 (0.711)
Connecting rod small end I.D.	22.003-22.014 (0.8663-0.8666)	22.05 (0.868)
Connecting rod side clearance		
1982	0.45-0.50 (0.018-0.020)	0.70 (0.028)
1983-on	0.45-0.55 (0.018-0.022)	0.70 (0.028)
Reed valve warp limit		
1982-1985	*	
1986-1987	—	0.7 (0.028)
1988-on	—	0.2 (0.008)

* Not specified.

Table 6 ENGINE SERVICE SPECIFICATIONS (KX500)

	New mm (in.)	Service limit mm (in.)
Cylinder head warp limit	—	0.03 (0.001)
Cylinder diameter		
1983	86.000-86.015 (3.3858-3.3864)	86.10 (3.390)
1984	86.010-86.025 (3.3862-3.3868)	86.10 (3.390)
1985-on	86.020-86.035 (3.3866-3.3872)	86.10 (3.390)

(continued)

Table 6 ENGINE SERVICE SPECIFICATIONS (KX500) (continued)

	New mm (in.)	Service limit mm (in.)
Piston diameter		
1983-1986	85.950-85.965 (3.3839-3.3844)	85.815 (3.3785)
1987-1989	85.910-85.925 (3.3823-3.3829)	85.800 (3.3779)
1990-on	85.905-85.920 (3.3821-3.3827)	85.76 (3.3764)
Piston-to-cylinder clearance		
1983	0.045-0.055 (0.0018-0.0022)	—
1984-1986	0.055-0.075 (0.0022-0.0030)	—
1987-1989	0.105-0.125 (0.0041-0.0049)	—
1990-on	0.100-0.130 (0.0039-0.0051)	—
Piston ring/groove clearance		
1983-1986	0.05-0.09 (0.0020-0.0035)	0.19 (0.0075)
1987	0.08-0.12 (0.0031-0.0047)	0.18 (0.0071)
1988-on	0.05-0.09 (0.0020-0.0035)	0.19 (0.0075)
Piston ring thickness		
1983-1986	1.17-1.19 (0.046-0.047)	1.10 (0.043)
1987	1.47-1.49 (0.058-0.059)	1.40 (0.055)
1988-on	1.17-1.19 (0.046-0.047)	1.10 (0.043)
Piston ring groove width		
1983-1986	1.24-1.26 (0.049-0.050)	1.34 (0.053)
1987	1.57-1.59 (0.062-0.063)	1.67 0.066)
1988-on	1.24-1.26 (0.049-0.050)	1.34 (0.053)
Piston ring end gap		
1983-1986	0.20-0.40 (0.008-0.016)	0.7 (0.028)
1987-on	0.15-0.35 (0.006-0.014)	0.7 (0.028)
Wrist pin O.D.	18.995-19.000 (0.7478-0.7480)	18.96 (0.746)
Wrist pin hole I.D.		
1983-1989	19.000-19.006 (0.7480-0.7483)	19.07 (0.751)
1990-on	19.000-19.020 (0.7480-0.7488)	19.07 (0.751)
Connecting rod small end I.D.	24.002-24.013 (0.9450-0.9454)	24.05 (0.947)
Connecting rod side clearance	0.40-0.50 (0.016-0.020)	0.7 (0.028)

(continued)

Table 6 ENGINE SERVICE SPECIFICATIONS (KX500) (continued)

	New mm (in.)	Service limit mm (in.)
Reed valve warp limit		
1983-1985	*	
1986-1987	—	0.7 (0.028)
1988-on	—	0.2 (0.008)

* Not specified.

Table 7 ENGINE TIGHTENING TORQUES

	N•m	ft.-lb.
Cylinder head nuts		
1982 KX250	35	25
All other models	25	18
Cylinder head bolts	25	18
Cylinder nuts (KX125)	25	18
Cylinder (KX250 & KX500)		
Nuts	35	25
Bolts*	10	87 in.-lb.
Spark plug	27	20
Plug bolts (KX125)	27	20
Plug bolts (KX250 & KX500)		
1983-1985	—	—
Plug bolts (KX250 & KX500)		
1986		
Left side	26	20
Right side	15	11
1987-on	15	11
Operating rod left side plug bolt		
1990 KX250	15	11

* If so equipped.

CHAPTER FIVE

ENGINE LOWER END

This chapter describes service procedures for the following lower end components:

a. Crankcases.
b. Crankshaft.
c. Connecting rod.
d. Transmission (removal and installation).
e. Internal shift mechanism (removal and installation).

Before removing and disassembling the crankcase, clean the engine and frame with a good grade commercial degreaser, like Gunk or Bel-Ray engine degreaser or equivalent. It is easier to work on a clean engine and you will do a better job.

Make certain that you have all the necessary tools available, especially any special tool(s), and purchase replacement parts prior to disassembly. Also make sure you have a clean place to work.

It is a good idea to identify and mark parts as they are removed so that errors will be avoided during assembly and installation. Clean all parts thoroughly upon removal, then place them in trays or boxes with their associated mounting hardware. Do not rely on memory alone as it may be days or weeks before you complete the job. In the text there is frequent mention of the left-hand and right-hand side of the engine. This refers to the engine as it sits in the bike's frame, not as it sits on your workbench.

Crankshaft specifications are listed in **Table 1**. **Table 1** and **Table 2** are at the end of the chapter.

SERVICING ENGINE IN FRAME

Some of the components can be serviced while the engine is mounted in the frame (the bike's frame is

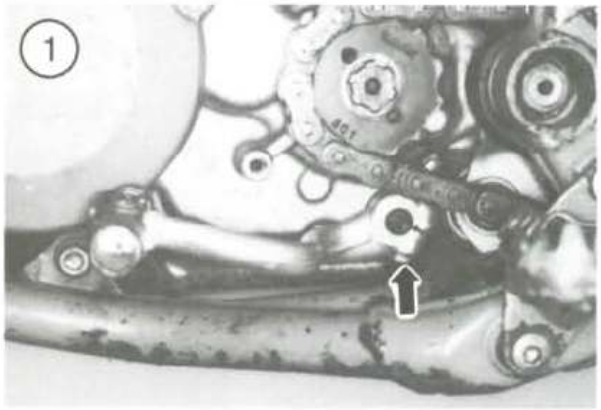
a great holding fixture—especially for breaking loose stubborn bolts and nuts):

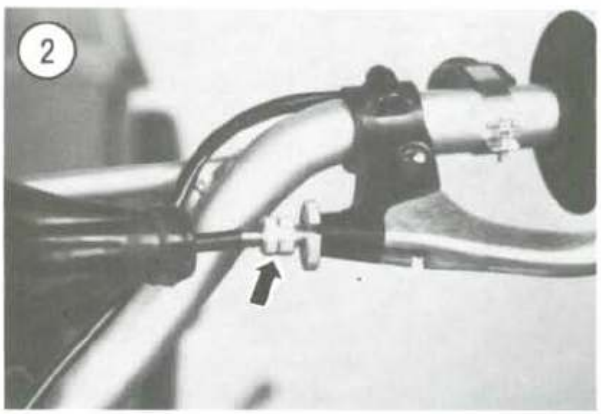
a. Cylinder head.
b. KIPS valve.
c. Cylinder.
d. Piston.
e. Carburetor.
f. Reed valve.
g. Flywheel rotor/stator plate.
h. Water pump.
i. Clutch.
j. External shift mechanism.
k. Primary drive gear.
l. Kickstarter.

ENGINE

Removal/Installation

If the engine is going to be removed for non-engine related service, engine disassembly is not required. Instead, remove the engine as a unit. If service requires crankcase disassembly, use the frame as a holding tool and remove all of the engine sub-assemblies while the engine is mounted in the frame. After the sub-assemblies are removed, the crankcase can be removed as a unit and then serviced as required.





Because of the number of different models covered in this manual, the following procedure should be used as general guideline for engine removal and installation.

1. If the engine is going to be disassembled, drain the clutch/transmission oil as described in Chapter Three.
2. Support the bike on a bike stand.
3. Remove the seat and both side covers.
4. Remove the fuel tank as described in Chapter Eight.
5. Remove the exhaust system as described in Chapter Eight.
6. Remove the carburetor as described in Chapter Eight.
7. *Liquid-cooled engines*: Perform the following:
   a. Drain the engine coolant as described in Chapter Three.
   b. Disconnect the water hose(s) at the cylinder head.
   c. Disconnect the water hose at the cylinder.
   d. Disconnect the water hose at the water pump.
8. Remove the shift lever pinch bolt and slide the lever (**Figure 1**) off of the shift shaft. If the lever is tight, pry the lever slot open with a screwdriver and pull the lever off.
9. Remove the drive sprocket as described in this chapter.
10. Loosen the clutch cable adjuster locknut at the handlebar and turn the adjuster to loosen the clutch cable (**Figure 2**).
11. Disconnect the clutch cable at the engine. See **Figure 3**, typical.
12. If you are going to disassemble the crankcases, remove the following engine sub-assemblies:
    a. Cylinder head (Chapter Four).
    b. Cylinder (Chapter Four).
    c. Piston (Chapter Four).
    d. Flywheel rotor (Chapter Nine).
    e. Water pump (Chapter Ten).
    f. Clutch (Chapter Six).
    g. Kickstarter and idler gear (Chapter Six).
    h. Primary drive gear (Chapter Six).

13A. If you are going to remove the stator plate, disconnect all of the stator plate electrical connec-

tors (**Figure 4**). Note the routing of the stator coil wiring harness (**Figure 5**) and disconnect all of its plastic wiring bands so that the coil can be removed with the engine.

13B. If you are going to leave the stator plate connected and routed along the frame, remove the stator plate screws and remove the stator plate. Set it on top of the frame.

14. If the cylinder head was not removed, remove the upper engine hanger (**Figure 6**).

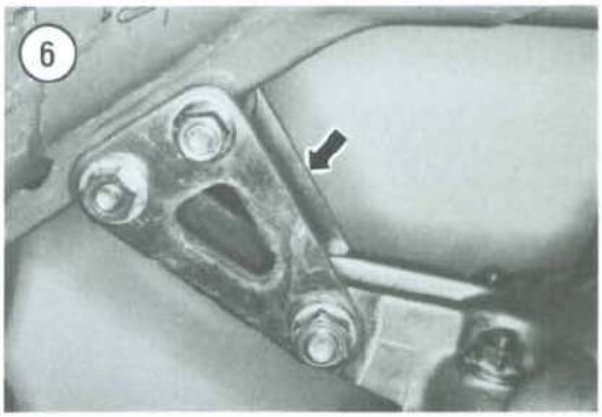
15. Remove the front and lower engine mount bolts (**Figure 7**). Remove the hanger plates (**Figure 8**), if used.

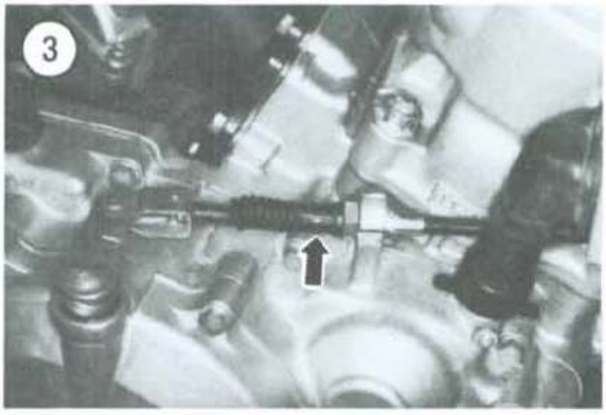
NOTE

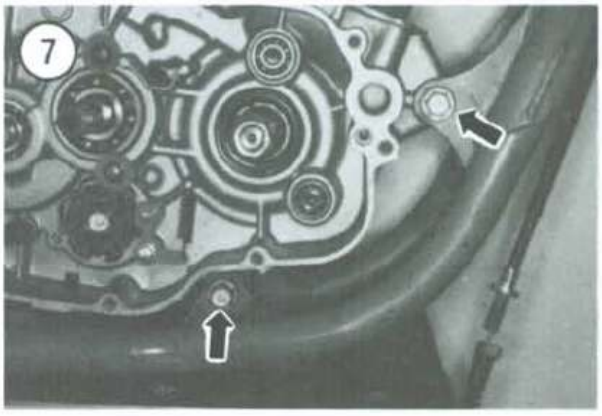
*Some lower hanger plates have arrow marks that should point to the mounting bolt position (**Figure 9**). Note this for reassembly.*

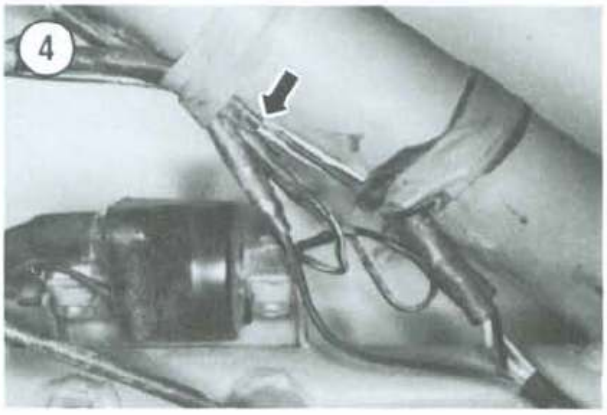
NOTE

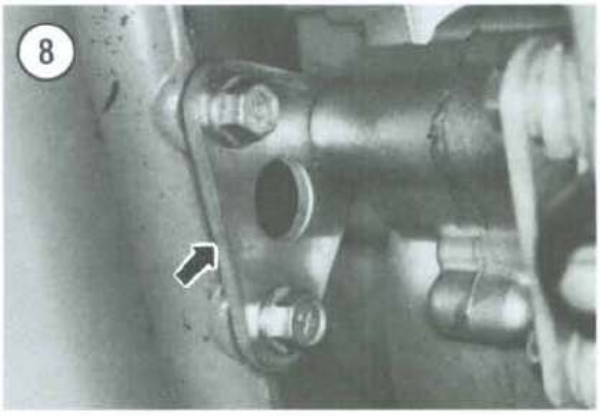
On some models, it will be necessary to remove the rear brake pedal before removing the swing arm pivot shaft. If the brake pedal is in the way, remove it now.

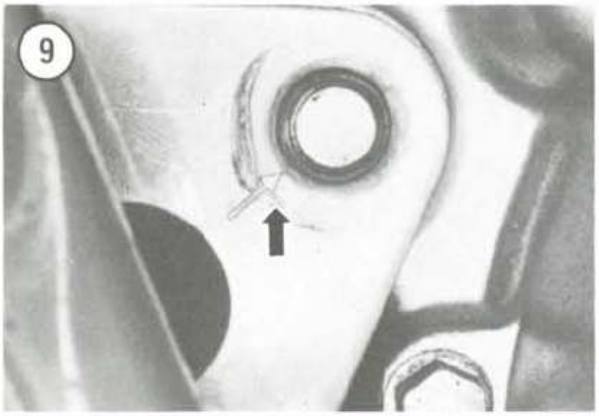


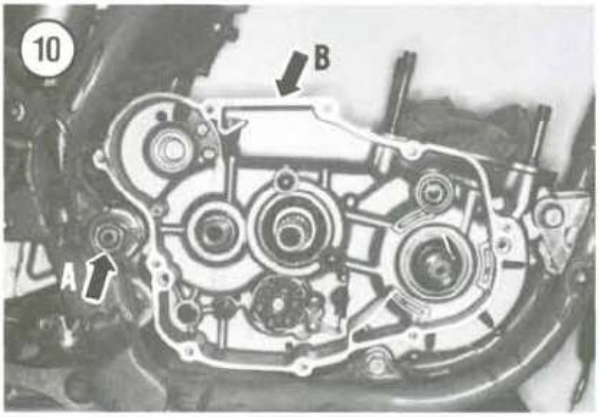


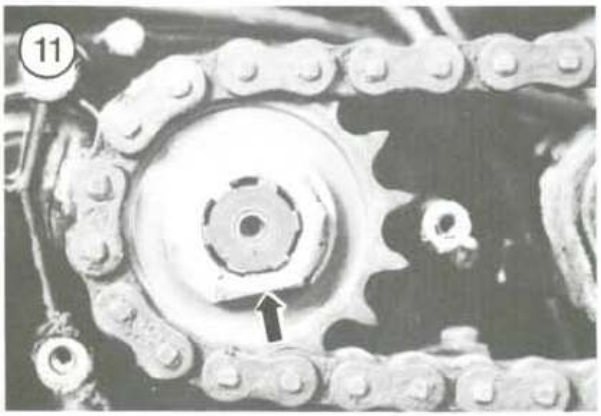


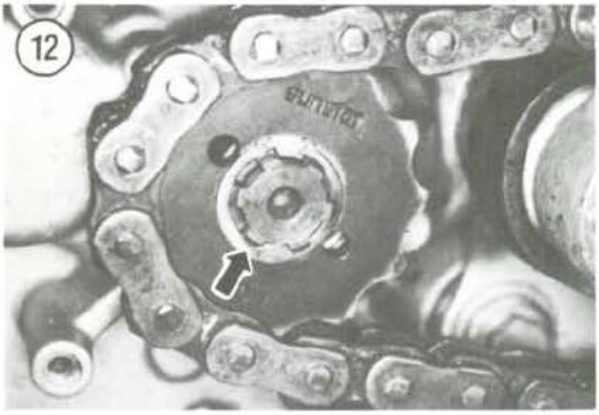












16. Remove the engine-to-swing arm pivot shaft nut (A, **Figure 10**) and withdraw the pivot shaft.
17. Lift the engine (B, **Figure 10**) out of the frame from the right-hand side.

NOTE

After the engine has been removed, reinstall the swing arm pivot shaft through the frame and into the swing arm. This will keep the swing in position and steady the bike.

18. Check the front and lower engine mount brackets on the frame for damage.
19. Check the engine mount fasteners for cracks or thread damage and corrosion. Clean the fasteners in solvent before reinstalling the engine.
20. Install the engine by reversing these steps. Note the following.
21. Install the pivot shaft through the left-hand side.
22. Tighten the pivot shaft nut to the torque specification in **Table 2**.
23. Tighten the engine mount bolts to the torque specification in **Table 2**.
24. Before starting the engine, check the following items as described in Chapter Three:
    a. Clutch/transmission oil level.
    b. Coolant level.
    c. Clutch adjustment.
    d. Throttle adjustment.
    e. Drive chain adjustment.
25. Start the engine and check for leaks.

ENGINE SPROCKET

The countershaft engine sprocket is mounted on the left end of the transmission countershaft, with a sleeve and O-ring(s) inside of it.

Removal/Installation

1. Remove the engine sprocket cover and chain plate, if used.
2A. On 1983-1987 KX500 models, flatten the bent-up lockplate, lock the rear wheel with the brake and remove the engine sprocket nut and washer (**Figure 11**). If the engine is not mounted in the frame, hold the sprocket with a sprocket holder or similar tool.
2B. On all other models, remove the sprocket circlip with circlip pliers (**Figure 12**).
3. Remove the engine sprocket.

4. Remove the spacer (**Figure 13**) and O-ring(s) (**Figure 14**).
5. Replace the circlip if bent or damaged (**Figure 15**).
6. Inspect the O-ring(s) and replace if worn or damaged.
7. Check the countershaft oil seal for damage and replace, if required, as described in the following procedure.
8. Install by reversing these steps. Note the following.
9. Check the spacer (**Figure 13**) for any burrs or rough spots that could tear the oil seal when the spacer is installed. Remove any roughness with a fine grit sandpaper and then clean thoroughly.
10. Turn the spacer (**Figure 13**) when passing it through the oil seal.

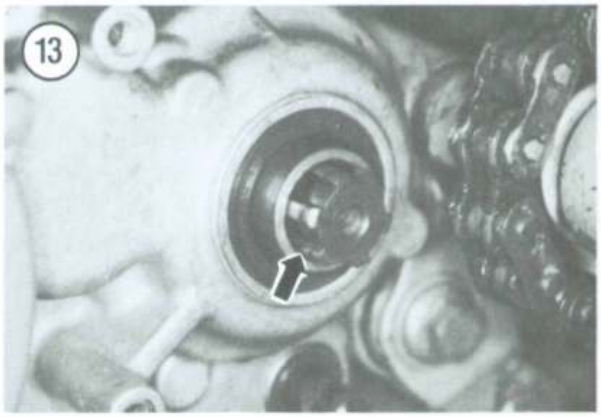
NOTE

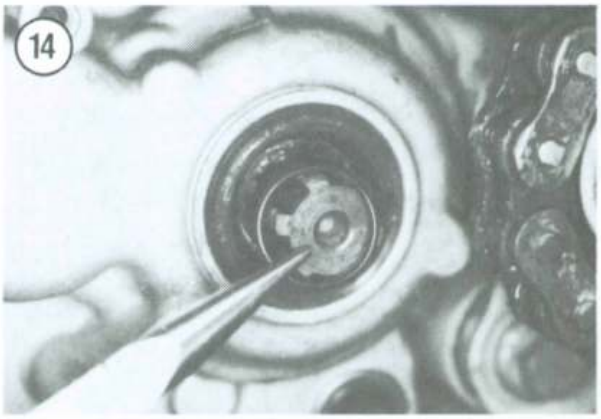
Install the sprocket so that the sprocket teeth number stamped into the sprocket faces out.

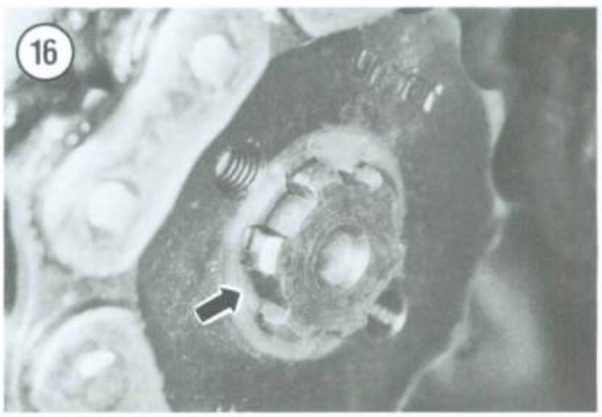
11. If you didn't disconnect the drive chain, fit the chain over the sprocket and slide the sprocket onto the countershaft.
12A. On 1983-1987 KX500 models, replace the lockplate if damaged. Tighten the engine sprocket nut to the torque specification listed in **Table 2**. Bend the lockplate over the nut.
12B. On all other models, slide the sprocket over the countershaft, making sure the circlip groove is exposed (**Figure 16**). Install a new circlip (**Figure 12**) into the countershaft groove. Check that the circlip seats in the groove completely.

COUNTERSHAFT OIL SEAL REPLACEMENT

The countershaft oil seal, because of its location behind the engine sprocket, is susceptible to damage from rocks, dirt and other debris that is thrown off of the chain and sprocket. An oil leak from this area is a dead giveaway that the seal is damaged. **Figure 17** illustrates a damaged countershaft oil seal. With care, you can replace the oil seal without having to split the cases.
1. Remove the engine sprocket as described in the previous section.
2. Clean the engine case around the countershaft oil thoroughly. If the seal damage is severe, hand clean







the area with a spray cleaner and rag. Do not force any water past the seal.

3. Remove the spacer (**Figure 13**) and O-ring(s) (**Figure 14**) from the countershaft.

4. With a screwdriver, carefully work the oil seal out of the crankcase. Do not pry between crankcase and oil seal, but instead, apply pressure to the inside of the seal, between the seal and countershaft. If the seal is tight, and it may be if sealer was used on the seal when it was installed, thread 1 or 2 small sheet metal screws into the oil seal and pull the seal out with a pair of pliers. Do not install the screws to deeply or you may touch and score the countershaft bearing.

5. Wipe the oil seal sealing area in the crankcase with a clean rag. Check the crankcase for cracks or other damage. If the case half is damaged, the engine will have to be split and the case repaired or the crankcases replaced as a set.

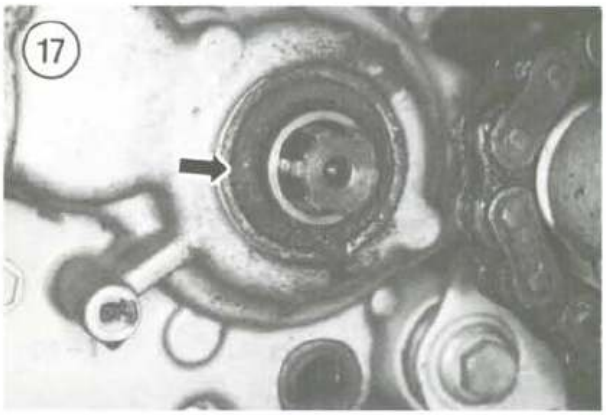
6. Pack the inner oil seal lip with wheel bearing grease.

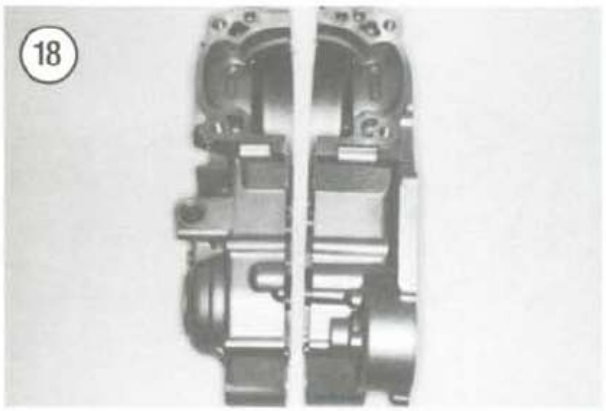
7. Slide the oil seal over the countershaft with its manufacturer's marks facing out, and tap it squarely into the crankcase bore with a long, hollow driver. Seat the seal so that it is flush with the crankcase. If you do not have a driver, carefully tap the seal into the crankcase with a soft faced hammer or a large, flat-nose aluminum or brass rod.

8. Install the O-ring(s) (**Figure 14**) and spacer (**Figure 13**). Turn the spacer when passing it through the oil seal.

9. Install the engine sprocket as described in the previous section.

10. Recheck the clutch/transmission oil level as described in Chapter Three and top-off as required.





CRANKCASE AND CRANKSHAFT

Disassembly of the crankcase—splitting the cases—and removal of the crankshaft assembly require that the engine be removed from the frame. However, the cylinder head, cylinder and all other attached assemblies should be removed with the engine in the frame.

The crankcase is made in 2 halves of precision diecast aluminum alloy and is of the "thin-walled" type. To avoid damage to them do not hammer or pry on any of the interior or exterior projected walls. These areas are easily damaged if stressed beyond what they are designed for. They are assembled without a gasket; only gasket sealer is used while dowel pins align the crankcase halves when they are bolted together. The crankcase halves are sold as a matched set only (**Figure 18**). If one crankcase half is damaged, both must be replaced.

The crankshaft assembly is made up of 2 full-circle flywheels pressed together on a hollow crankpin. The connecting rod big end bearing on the crankpin is a needle bearing assembly. The crankshaft assembly is supported by 2 ball bearings in the crankcase.

Special Tools

When splitting the crankcase assembly, a few special tools will be required. These tools allow easy disassembly and reassembly of the engine without prying or hammer use. Remember, the crankcase halves can be easily damaged by improper disassembly or reassembly techniques. If you are not equipped to reassemble the engine, refer service to a Kawasaki dealer.

a. Kawasaki crankcase separating tool (part No. 57001-1098) (**Figure 19**) or equivalent. This tool threads into the crankcase and is used to

separate the crankcase halves and to press the crankshaft out of the crankcase. The tool is very simple in design and a similar type of tool, such as a steering wheel puller can be substituted.

b. A hydraulic press and suitable adapters will be required to assemble the crankcase assembly.

c. Kawasaki crankshaft jig (part No. 57001-1174) (**Figure 20**). This tool is used to prevent the crankshaft halves from pressing inward when reassembling the crankcase halves.

d. When handling the engine cases, 2 wood blocks or a fixture made out of 2 × 4 in. wood (**Figure 21**) will assist in engine disassembly and reassembly and will help to prevent damage to the crankshaft and transmission shafts.

Crankcase Disassembly (All Models)

The procedure which follows is presented as a complete, step-by-step major lower end rebuild that should be followed if an engine is to be completely reconditioned. Because of the number of models covered, it would be confusing in trying to incorporate individual procedures for all models. The following illustrations show the complete disassembly and reassembly procedures on a 1988 KX125. Where major differences occur, they will be pointed out in the text.

Remember that the right- and left-hand side of the engine relates to the engine as it sits in the bike's frame, not as it sits on your workbench.

Refer to the crankcase illustration for your model when servicing the engine:

a. **Figure 22**: 1982-1987 KX125.
b. **Figure 23**: 1988-1989 KX125.
c. **Figure 24**: 1990-1991 KX125.
d. **Figure 25**: 1982-1986 KX250.
e. **Figure 26**: 1987 KX250.
f. **Figure 27**: 1988-1991 KX250.
g. **Figure 28**: 1983-1987 KX500.
h. **Figure 29**: 1988-on KX500.

This procedure describes disassembly of the crankcase halves and removal of the crankshaft, transmission and internal shift mechanism.

1. Remove all exterior engine assemblies as described in this chapter and other related chapters.

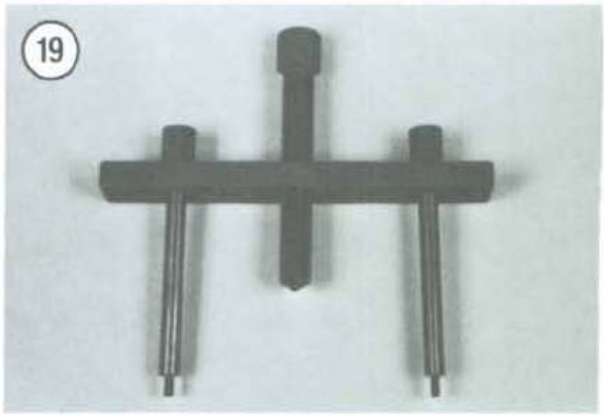
NOTE

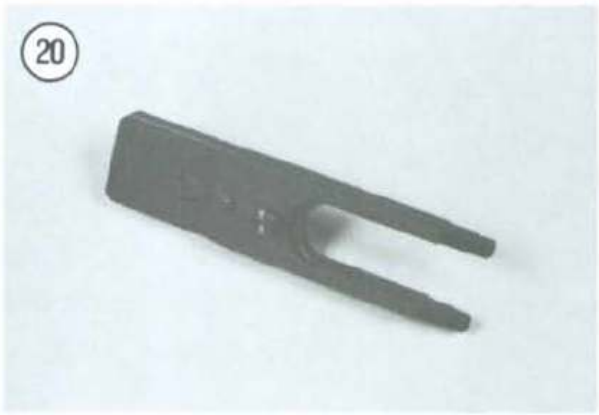
Drain the clutch/transmission oil as described in Chapter Three. To avoid misplacing the drain bolt, reinstall it after the oil is completely drained.

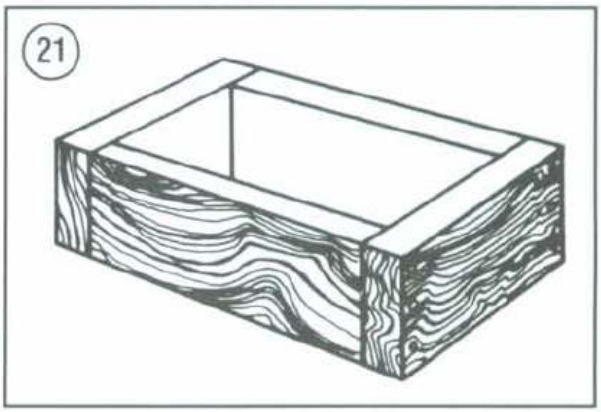
2. Remove the spacer (**Figure 13**) and O-ring(s) (**Figure 14**) from the countershaft if they were not removed when the engine sprocket was removed.

CAUTION

Make sure to remove the entire external shift mechanism assembly as described

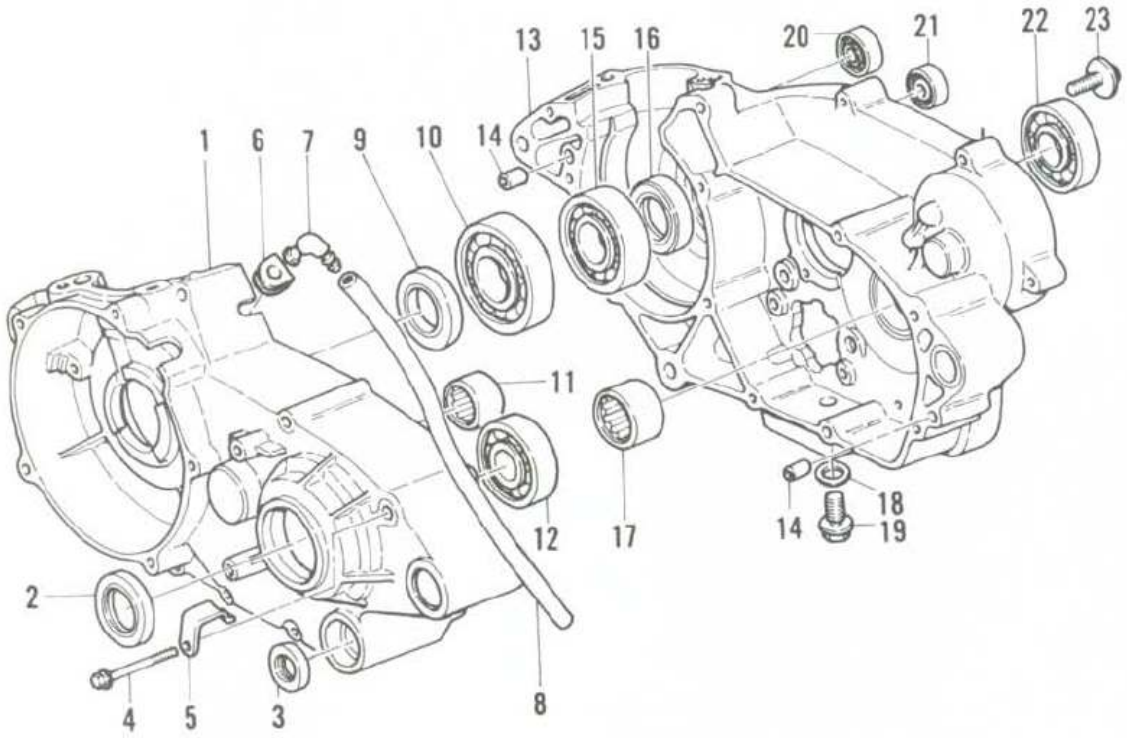






(22)

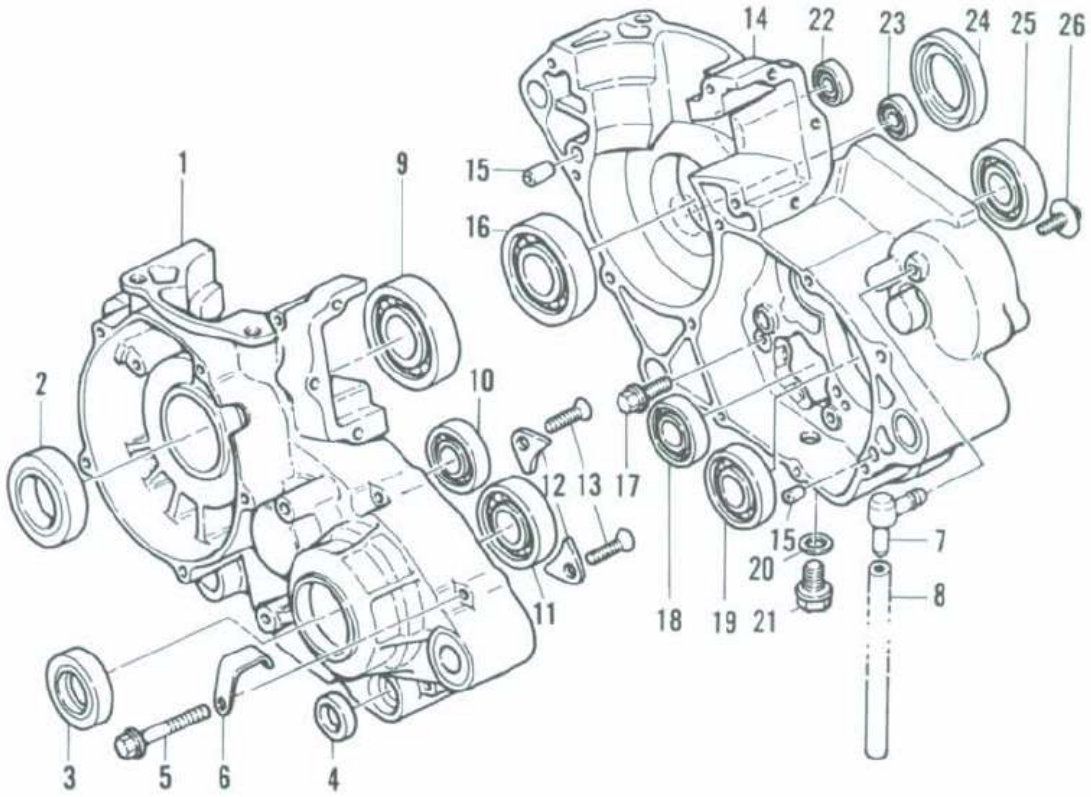
CRANKCASE
(1982-1987 KX125)



1. Left-hand crankcase
2. Oil seal
3. Oil seal
4. Bolt
5. Hose guide
6. Grommet
7. Hose nozzle
8. Hose
9. Oil seal
10. Bearing
11. Needle bearing
12. Bearing
13. Right-hand crankcase
14. Dowel pin
15. Bearing
16. Oil seal
17. Needle bearing
18. Gasket
19. Drain plug
20. Bearing
21. Bearing
22. Bearing
23. Bolt

(23)

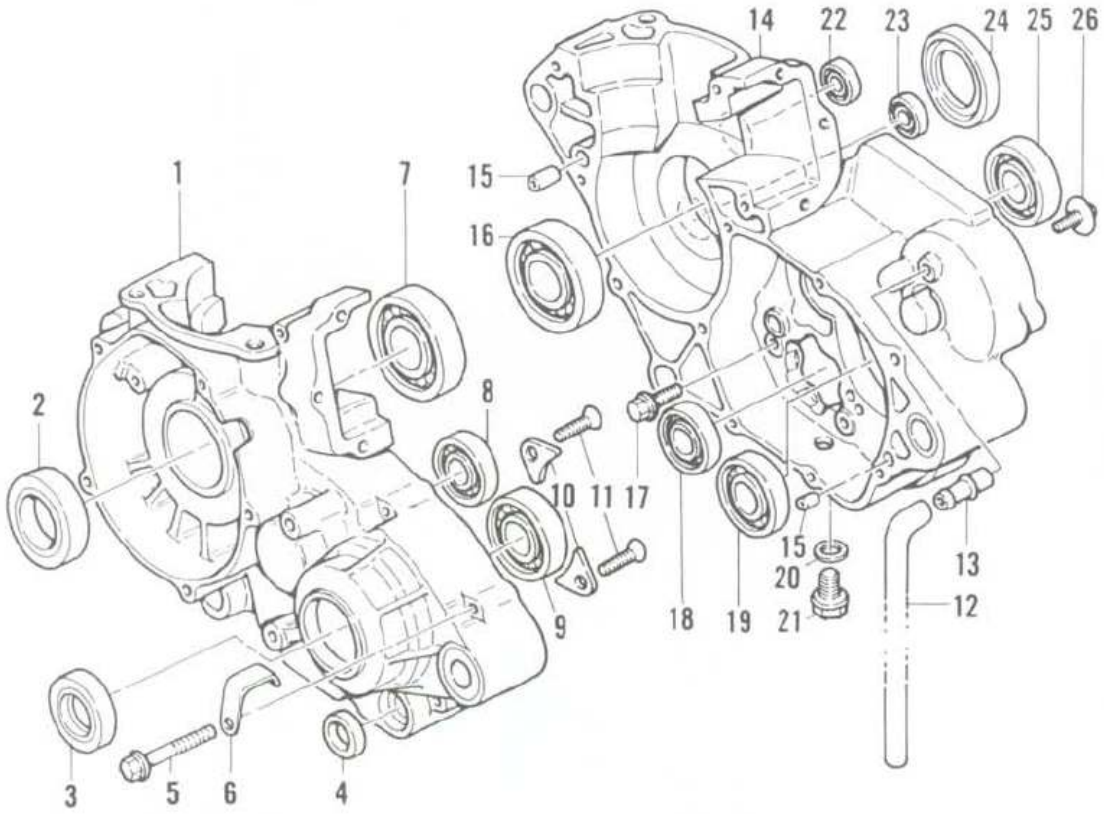
CRANKCASE
(1988-1989 KX125)



1. Left-hand crankcase
2. Oil seal
3. Oil seal
4. Oil seal
5. Bolt
6. Hose guide
7. Hose nozzle
8. Hose
9. Bearing
10. Bearing
11. Bearing
12. Holders
13. Screws
14. Right-hand crankcase
15. Dowel pin
16. Bearing
17. Bolt
18. Bearing
19. Bearing
20. Washer
21. Drain bolt
22. Bearing
23. Bearing
24. Oil seal
25. Bearing
26. Screw

(24)

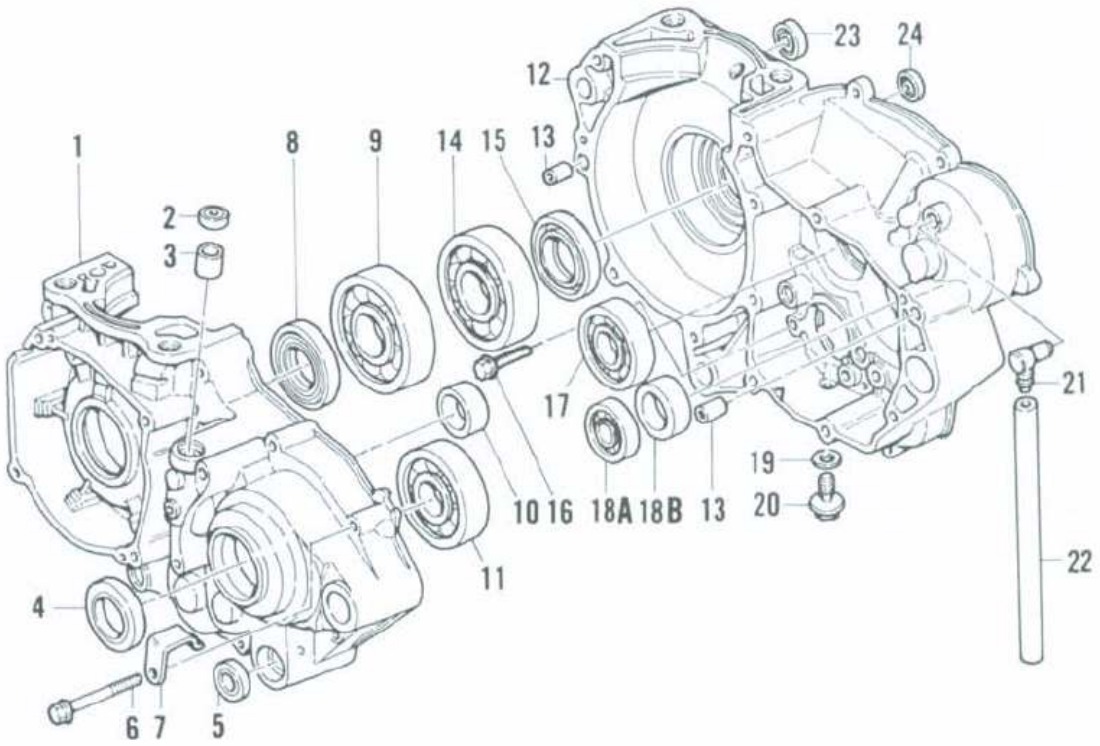
CRANKCASE
(1990-1991 KX125)



1. Left-hand crankcase
2. Oil seal
3. Oil seal
4. Oil seal
5. Bolt
6. Hose guide
7. Bearing
8. Bearing
9. Bearing
10. Holders
11. Screws
12. Hose
13. Hose nozzle
14. Right-hand crankcase
15. Dowel pin
16. Bearing
17. Screw
18. Bearing
19. Bearing
20. Gasket
21. Drain bolt
22. Bearing
23. Bearing
24. Oil seal
25. Bearing
26. Screw

(25)

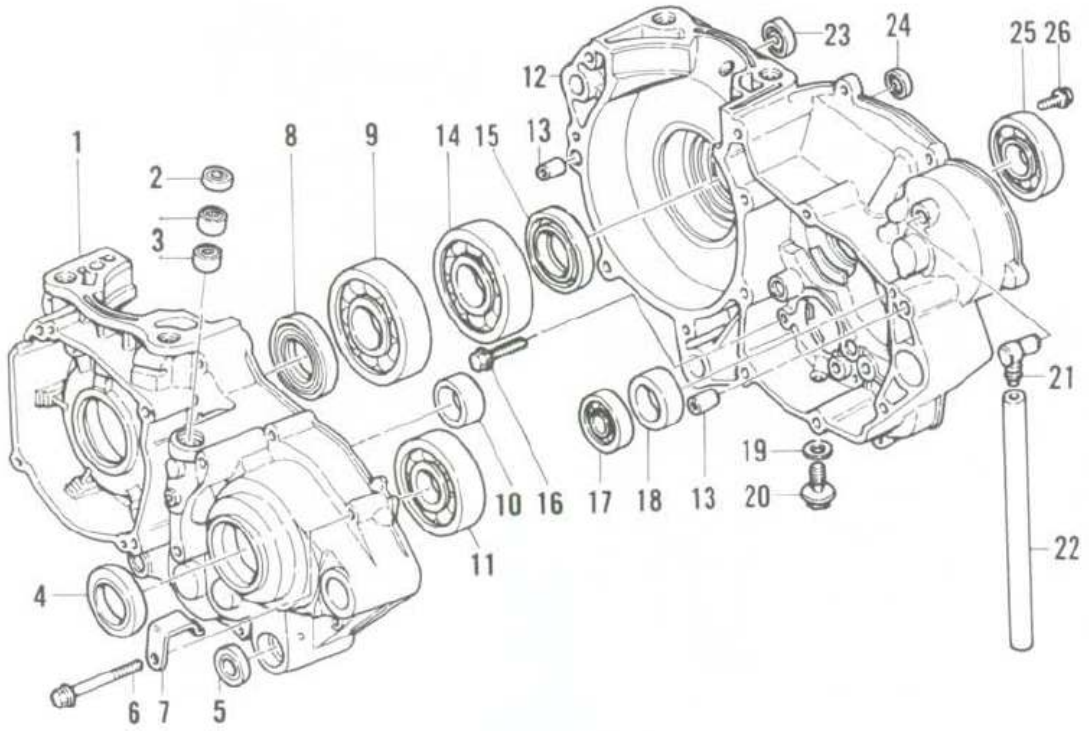
CRANKCASE
(1982-1986 KX250)



1. Left-hand crankcase
2. Oil seal
3. Bearing
4. Oil seal
5. Oil seal
6. Bolt
7. Hose guide
8. Oil seal
9. Bearing
10. Bushing
11. Bearing
12. Right-hand crankcase
13. Dowel pin
14. Bearing
15. Oil seal
16. Bolt
17. Bearing
18A. Bearing
18B. Bushing
19. Gasket
20. Drain bolt
21. Hose nozzle
22. Hose
23. Bearing
24. Bearing

(26)

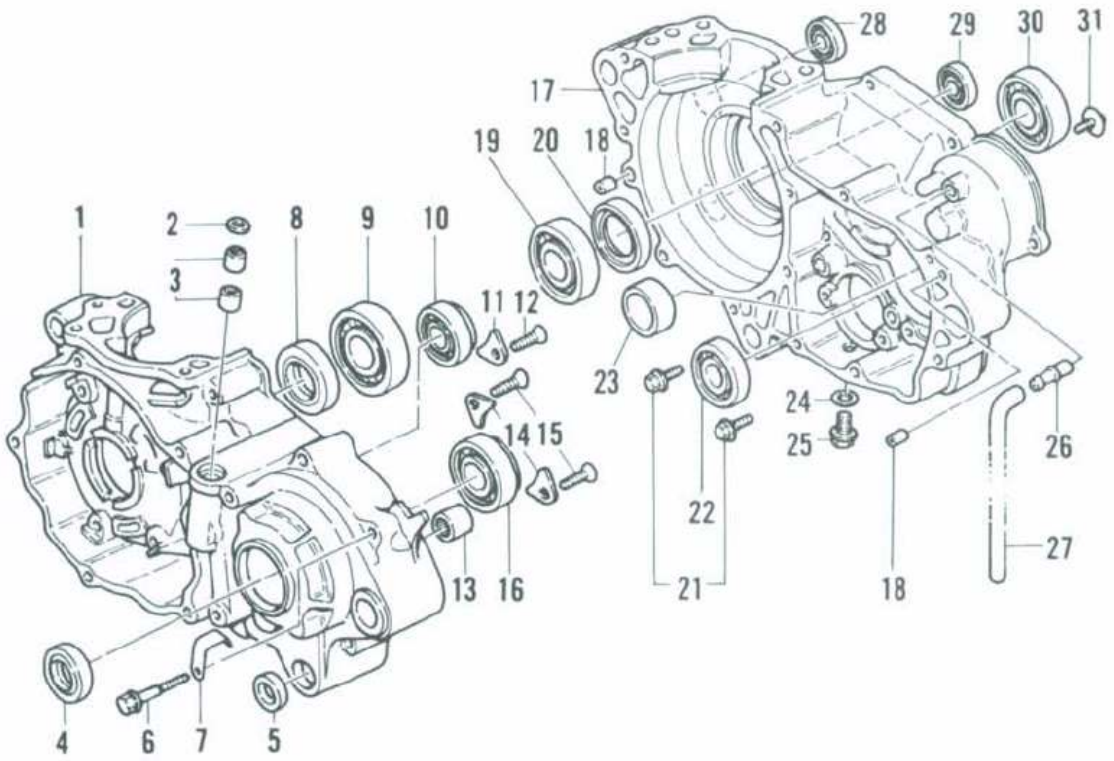
CRANKCASE
(1987 KX250)



1. Left-hand crankcase
2. Oil seal
3. Bearings
4. Oil seal
5. Oil seal
6. Bolt
7. Hose guide
8. Oil seal
9. Bearing
10. Bushing
11. Bearing
12. Right-hand crankcase
13. Dowel pin
14. Bearing
15. Oil seal
16. Bolt
17. Bearing
18. Bushing
19. Gasket
20. Drain bolt
21. Hose nozzle
22. Hose
23. Bearing
24. Bearing
25. Bearing
26. Screw

(27)

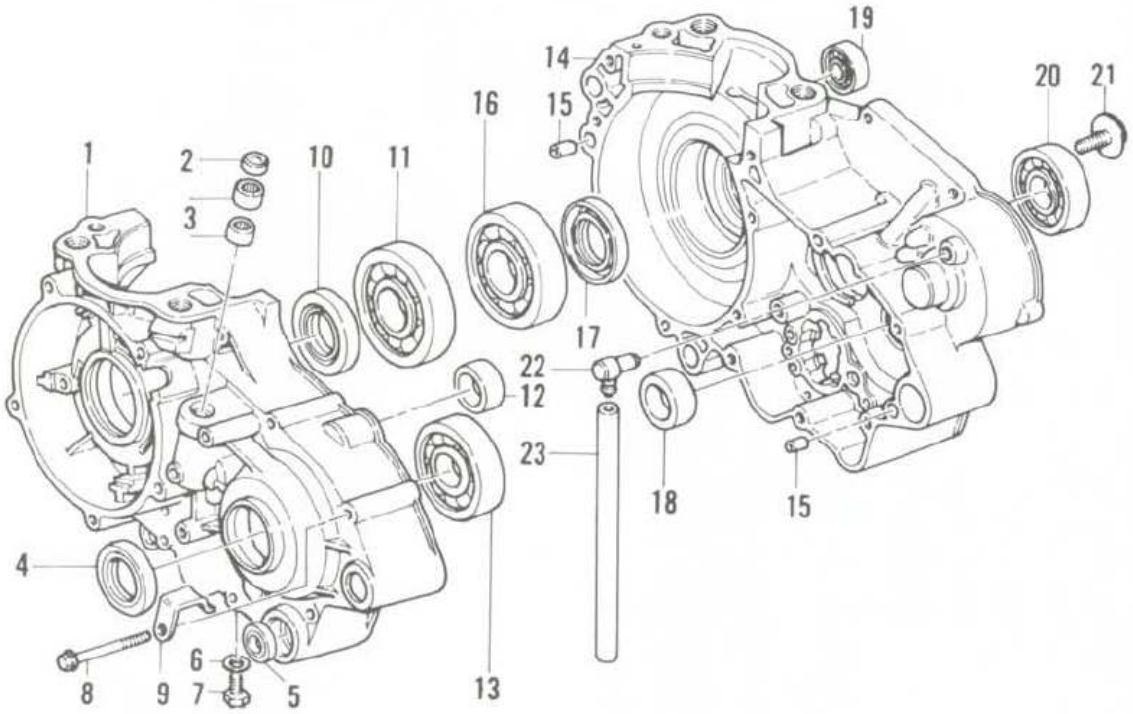
CRANKCASE
(1988-1991 KX250)



1. Left-hand crankcase
2. Oil seal
3. Bearings
4. Oil seal
5. Oil seal
6. Bolt
7. Hose guide
8. Oil seal
9. Bearing
10. Bearing
11. Holder
12. Screw
13. Bearing
14. Holders
15. Screws
16. Bearing
17. Right-hand crankcase
18. Dowel pin
19. Bearing
20. Oil seal
21. Bolts
22. Bearing
23. Bushing
24. Gasket
25. Bolt
26. Hose nozzle
27. Hose
28. Bearing
29. Bearing
30. Bearing
31. Screw

(28)

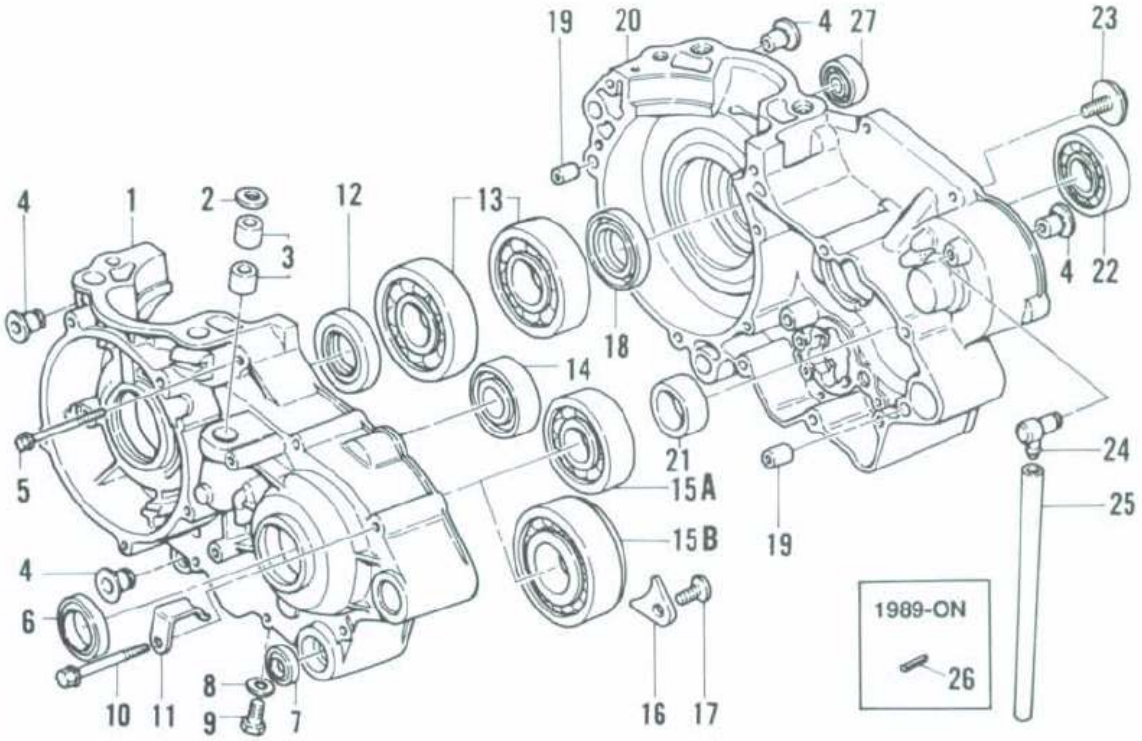
CRANKCASE
(1983-1987 KX500)



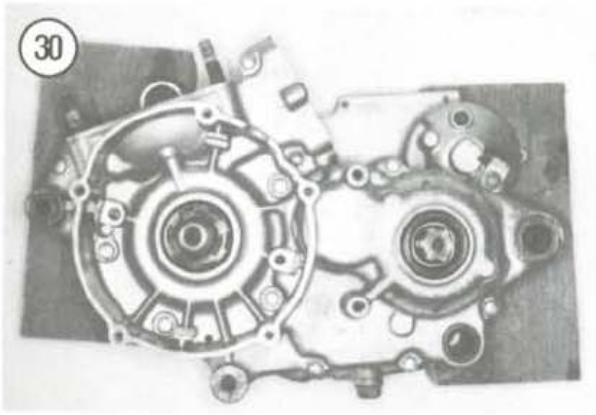
1. Left-hand crankcase
2. Oil seal
3. Bearings
4. Oil seal
5. Oil seal
6. Gasket
7. Drain bolt
8. Bolt
9. Hose guide
10. Oil seal
11. Bearing
12. Bushing
13. Bearing
14. Right-hand crankcase
15. Dowel pin
16. Bearing
17. Oil seal
18. Bushing
19. Bearing
20. Bearing
21. Screw
22. Hose nozzle
23. Hose

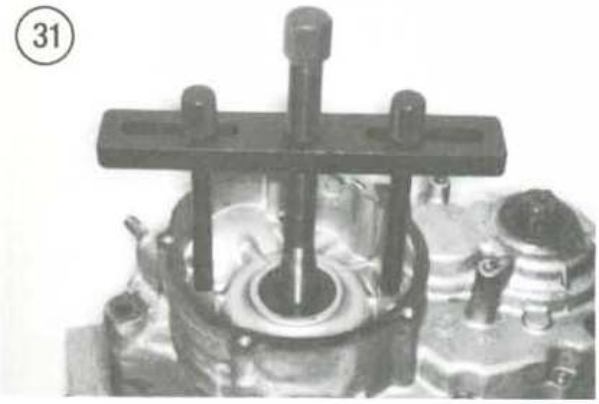
(29)

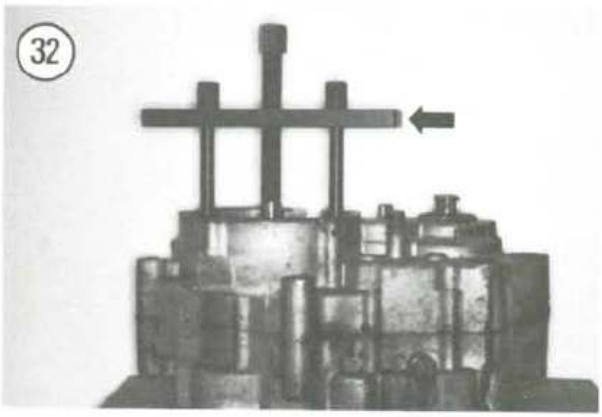
CRANKCASE
(1988-ON KX500)

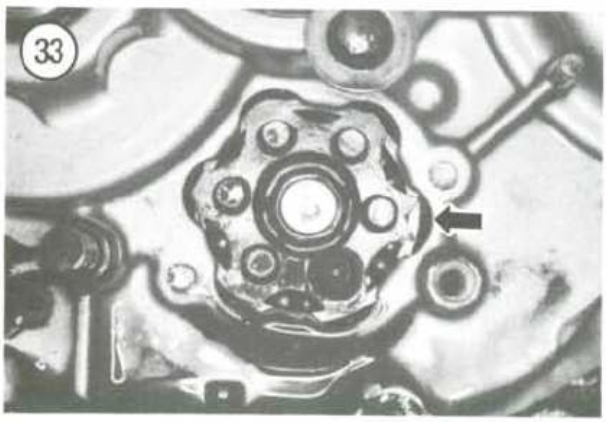


1. Left-hand crankcase
2. Oil seal
3. Bearings
4. Plug
5. Bolt
6. Oil seal
7. Oil seal
8. Washer
9. Drain bolt
10. Bolt
11. Hose guide
12. Oil seal
13. Bearings
14. Bearing
15A. Bearing (1988)
15B. Shoulder bearing (1989-on)
16. Bearing plate (1989-on)
17. Screw (1989-on)
18. Oil seal
19. Dowel pin
20. Right-hand crankcase
21. Bushing
22. Bearing
23. Bolt
24. Vent
25. Hose
26. Pin (1989-on)
27. Bearing









in Chapter Six. If a part is left in place, it may hang up when the cases are being split and crack the case half.

3. Place the engine assembly on a couple of wood blocks with the left-hand side facing up (**Figure 30**).

4. Loosen the crankcase mounting screws one-quarter turn at a time in a crisscross pattern.

NOTE

Before removing the crankcase screws in Step 5, first draw an outline of the crankcase on cardboard, and then punch a hole along the outline to represent the position of each screw. Then, as you remove the screws from the case, install them into the appropriate hole location in the cardboard. You can also mark the position of any clip or guide that is used to hold electrical wires or drain tubes.

5. Remove the crankcase screws loosened in Step 4. Be sure to remove all of them.

CAUTION

Perform this operation over and close down to the work bench as the crankcase halves may easily separate. ***Do not*** *hammer on the crankcase halves.*

6. Apply a dab of grease onto the end of the crankshaft.

7. The crankcase separator (puller) consists of 3 bolts (**Figure 19**); the 2 outer bolts thread into the crankcase while the center bolt is centered against the end of the crankshaft. Bolt the separator onto the left-hand crankcase; see **Figure 31**, typical. Thread the 2 outer bolts into the crankcase until they bottom out, then back out 1/2 turn. Run the center bolt down and center it against the end of the crankshaft. Step back and visually check that the separator body is parallel with the crankcase (**Figure 32**). If necessary, back out one of the outer bolts to level it.

CAUTION

If the separator body is not parallel with the crankcase surface, it will put an uneven stress on the case halves and may damage them.

8. Align the shift drum lobes with the crankcase lobe openings as shown in **Figure 33**, if this type of shift drum is used on your model.

CAUTION

Failure to properly align the shift drum (Step 8) will cause crankcase damage.

9. Turn the center bolt *clockwise* until both cases begin to separate. You may hear a small pop when the case halves separate. This is normal, but stop and investigate all the way around the case halve mating surfaces (**Figure 34**). If everything is normal, continue with Step 10. If there is a problem, release tension from the center bolt and make sure all of the screws have been removed.

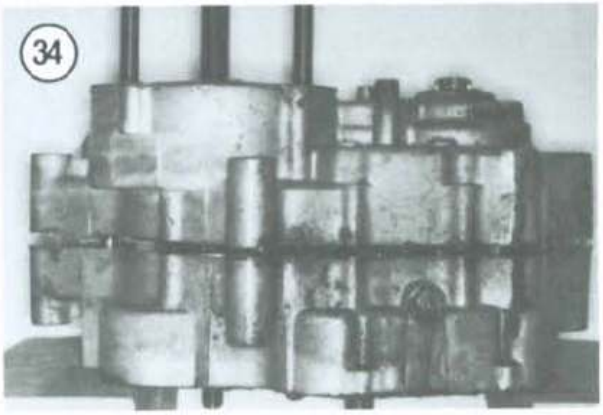
NOTE

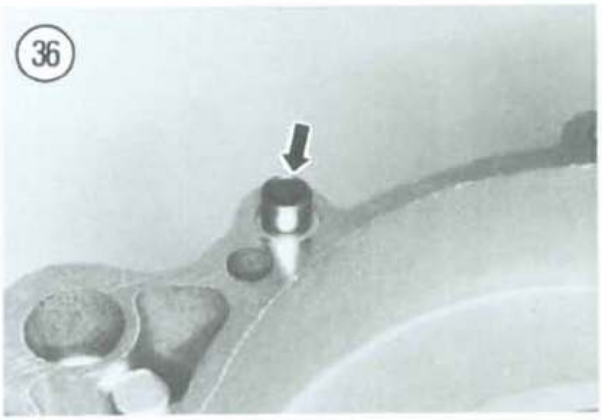
*As the left-hand case half is pulled up, the countershaft oil seal will tend to pull the countershaft up with it. After every turn of the separator center bolt, tap the countershaft down softly with a plastic or rubber mallet (**Figure 35**) and check for binding at the mainshaft. The mainshaft should turn freely by hand. If not, the countershaft is binding and should be tapped down.*

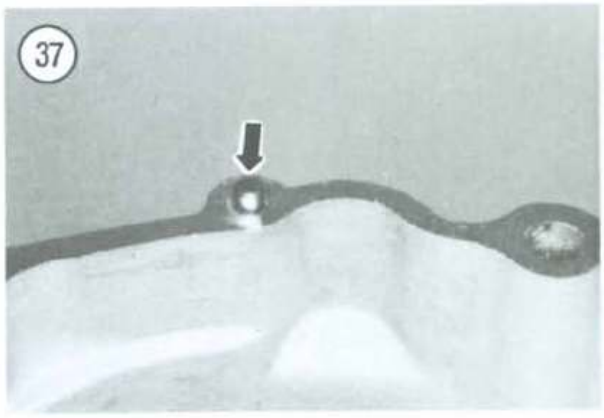
CAUTION

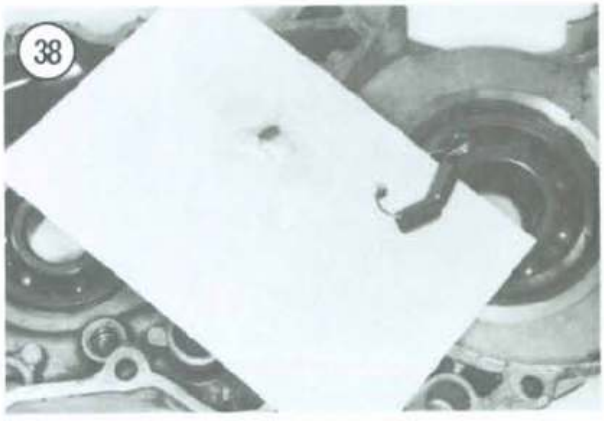
*Crankcase separation requires only hand pressure on the separator screw. If extreme pressure seems to be needed, or if both halves will not remain parallel, **stop immediately.** Check for crankcase screws not removed, or any part that is still attached, or transmission shafts hung up in a bearing. Relieve separator pressure immediately.*

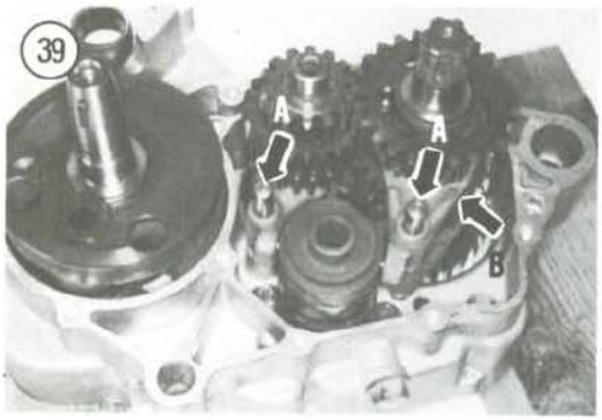
10. Continue to operate the separator until the left-hand crankcase half is free. Remove the separator and lift the left-hand crankcase half off of the lower crankcase. Make sure the left-hand case oil seal

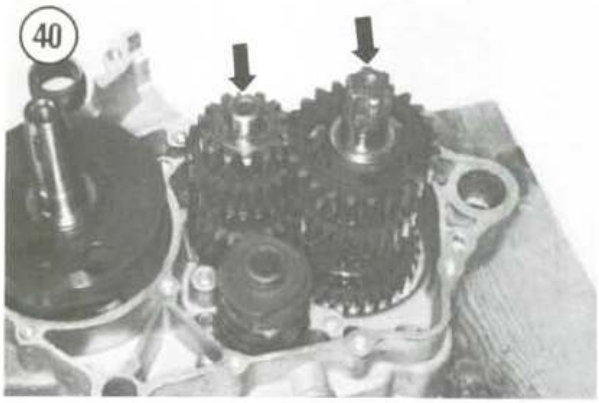


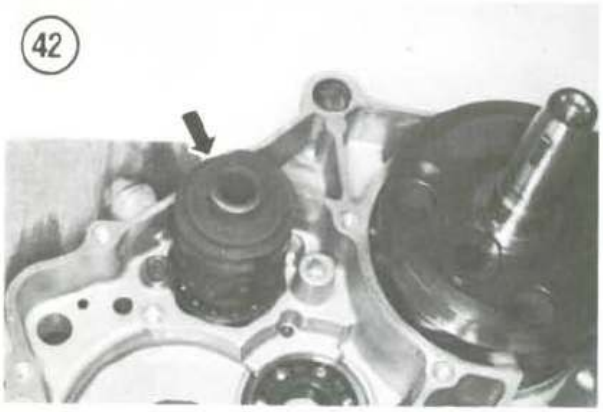












doesn't grab and pull the countershaft assembly up when removing the case half.

11. Check the left-hand crankcase bearings for shims or washers.

12. Remove the dowel pins (**Figure 36**).

13. Remove the small roll pin (**Figure 37**), if used.

14. Secure the dowel and roll pins to a piece of paper so that you don't lose them (**Figure 38**).

15. Remove the transmission assembly (**Figure 39**) as follows:

a. Remove the 2 shift fork shafts (A, **Figure 39**).

b. Remove the 3 shift forks (B, **Figure 39**)

c. Remove the mainshaft and countershaft assemblies (**Figure 40**) together from the crankcase half. See **Figure 41**.

d. Unbolt and remove the shift drum (**Figure 42**).

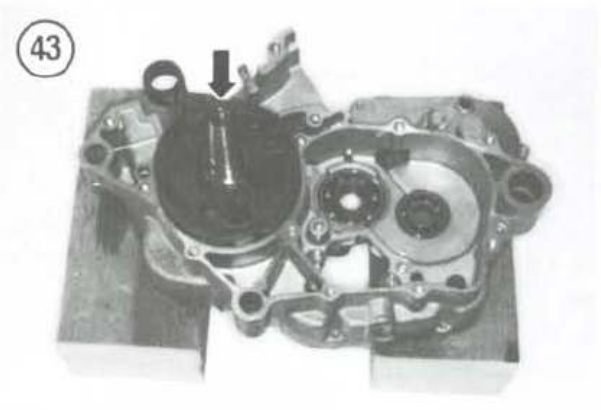
16. Remove the breather grommet from the crankcase.

NOTE

*Step 17 describes crankshaft removal. As explained under **Special Tools** in this chapter, a press will be required to remove and install the crankshaft. If you do not have a press or access to one, have the crankshaft removed by a dealer or machine shop.*

17. Remove the crankshaft (**Figure 43**) as follows:

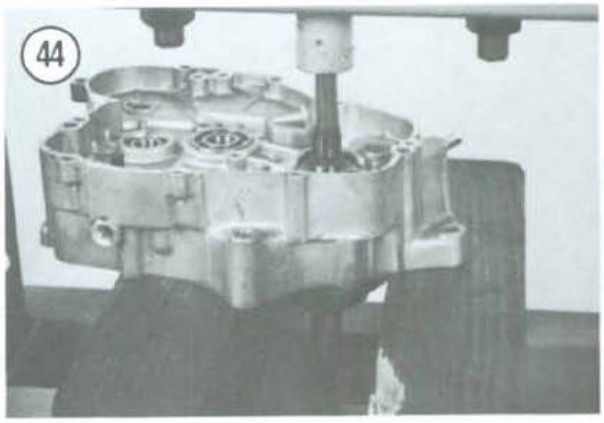
a. Support the right-hand crankcase/crankshaft assembly in a press bed. Make sure the blocks used underneath the crankcase half are wide enough to allow complete removal of the crankshaft. Check that the connecting rod cannot catch on a support block as the crankshaft is pressed out.



b. Insert a soft metal spacer (aluminum or brass) between the press ram and the end of the crankshaft. Press the crankshaft out of the crankcase (**Figure 44**). Make sure to catch the crankshaft as it is pressed out or it may fall to the floor.

18. Clean and inspect the crankcase and crankshaft as described in this chapter.

19. Service to the transmission and internal shift mechanism is described in Chapter Seven.

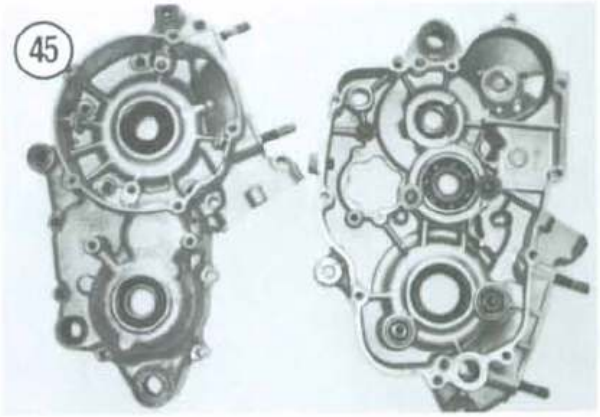


Crankcase
Cleaning and Inspection

1. Remove the crankcase oil seals as described under *Bearing and Oil Seal Replacement* in this chapter.

NOTE

On some models, the left-hand crankshaft oil seal must be removed at the same time the left-hand bearing is removed. Remove the bearing and oil seal at this time; see ***Bearing and Oil Seal Replacement****.*



2. Remove gasket and gasket residue from all mating surfaces.

3. Clean both crankcase halves (**Figure 45**) with cleaning solvent.

4. Clean the crankcase bearings with solvent.

5. After cleaning in solvent, clean the cases and bearings in hot soapy water and then rinse in clear cold water.

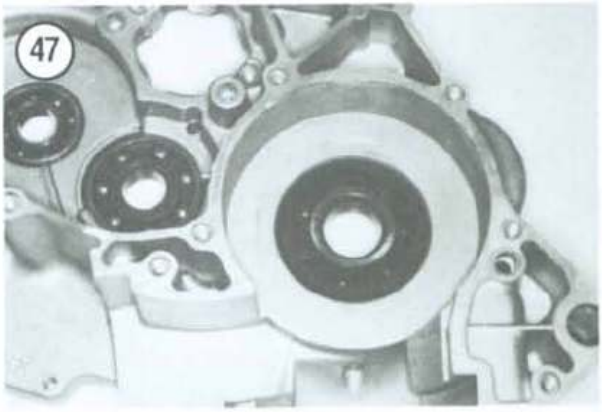
6. Dry the case halves and bearings with compressed air if available. When drying the bearings with compressed air, do not allow the air jet to spin the bearings, but instead, hold the inner bearing races to prevent them from turning. When the bearings are dry, lubricate them as described in Step 7.

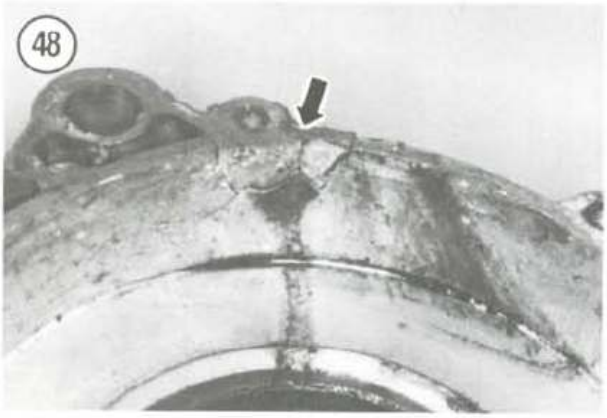
NOTE

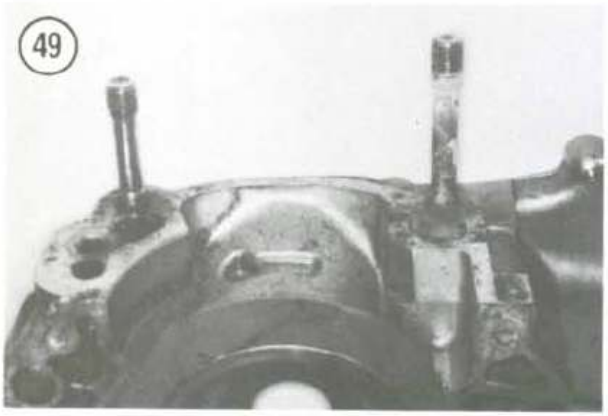
*If the right-hand main bearing (**Figure 46**) came off with the crankshaft, remove it with a bearing puller and then clean and dry it separately.*

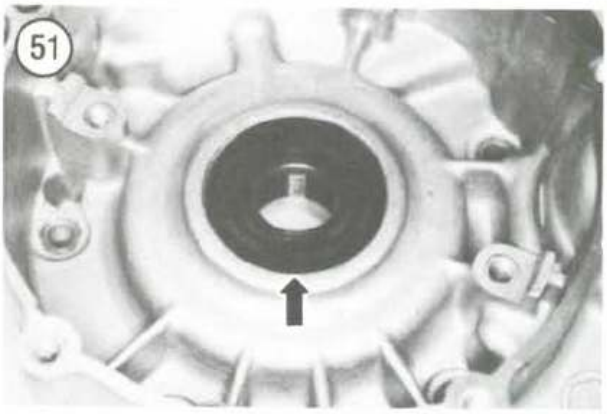
7. Lubricate the bearings and bushings with clean oil. Distribute the oil thoroughly through the bearings.

8. Check the crankshaft main bearings and the transmission bearings in both case halves (**Figure 47**) for roughness and play by rotating them slowly by hand.









If any roughness or play can be felt in a bearing, it must be replaced. Refer to *Bearing and Oil Seal Replacement* in this chapter for the correct procedure.

9. Carefully inspect the cases for cracks and fractures (**Figure 48**), especially in the lower areas where they are vulnerable to rock damage. Also check the areas around the stiffening ribs, around bearing bosses, threaded holes and next to the drive sprocket area on the left-hand case. If any are found, have them repaired by a shop specializing in the welding and machining of precision aluminum castings or replace them. If the damaged cases cannot be repaired, they must be replaced as a set.

10. Inspect machined surfaces for burrs, cracks or other damage. You may be able to repair minor damage with a fine-cut file or oilstone. Otherwise, the mating surface will have to be welded and then machined flat.

11. Check studs (**Figure 49**) and threaded holes for stripping, cross-threading or deposit buildup. Threaded holes should be blown out with compressed air as dirt and sealer in the bottom of the hole may prevent the screw from being torqued properly. If necessary, use a tap or die to true up threads and to remove deposits.

12. Cylinder studs on liquid-cooled models are susceptible to corrosion damage (**Figure 50**). Replace damaged or questionable studs. Remove studs with a stud remover.

13. Check all bearing holder bolts, shift shaft pin bolts and kickstarter ratchet guides for damage or looseness. Remove, clean and reinstall with Loctite 242 (blue). Tighten bolts securely.

Bearing and Oil Seal Replacement

When removing oil seals from the case halves, note and record the direction in which the lip of each seal faces for proper reinstallation (**Figure 51**). Likewise, when removing bearings, note and record the direction of the bearing manufacturer's mark or any bearing shield for proper reinstallation.

Refer to **Figures 22-29** for your model when replacing oil seals and bearings.

1. Pry out old seals with a screwdriver, taking care not to damage the crankcase bore. Pad the pry area under the screwdriver with a shop cloth to avoid damaging the crankcase. See **Figure 52**. If a seal is difficult to remove, heat the cases as described later

and use an awl and punch a small hole in the steel backing of the seal. Install a small sheet metal screw into the seal and pull the seal out with a pair of pliers.

CAUTION

Do not install the screw too deep or it may contact and damage the bearing behind it.

2. Some transmission bearings are held in position by a retainer plate (**Figure 53**) or with bolts and washers. Remove the bolts and/or retainers before removing the bearings. If it is not necessary to remove the bearings, check the retainer plate bolts for tightness.

CAUTION

Before heating the crankcases in this procedure to remove the bearings, wash the cases thoroughly with detergent and water. Rinse and rewash the cases as required to remove all traces of oil and other chemical deposits.

3A. The bearings are installed with a slight interference fit. The crankcase must be heated to a temperature of about 212° F (100° C) in a shop oven or on a hot plate (**Figure 54**). An easy way to check to see that it is at the proper temperature is to drop tiny drops of water on the case; if they sizzle and evaporate immediately, the temperature is correct. Heat only one case at a time.

CAUTION

Do not heat the cases with a torch (propane or acetylene)—never bring a flame into contact with the bearing or case. The direct heat will destroy the case hardening of the bearing and will likely warp the case half.

3B. If you have access to a press, it can be used instead of heat to remove and install the bearings and oil seals.

4. Remove the case from the oven or hot plate and hold onto the 2 crankcase studs with a kitchen pot holder, heavy gloves, or heavy shop cloths—*it is hot.*

5. Remove the oil seals if not already removed.

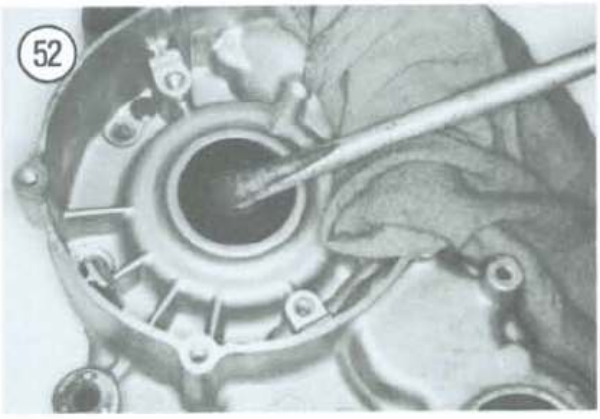
NOTE

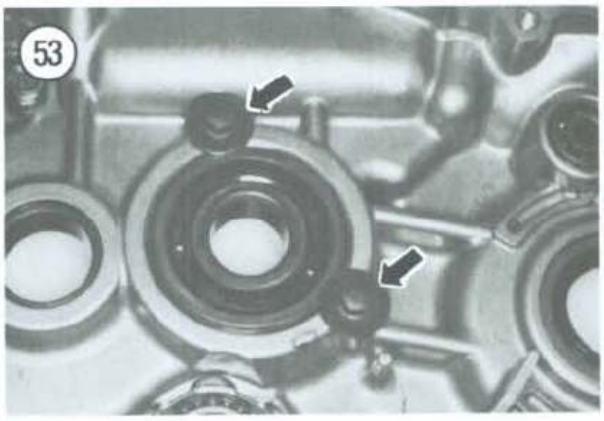
Suitable size sockets and extensions works well for removing and installing bearings.

6. Hold the crankcase with the bearing side down and tap the bearing out (**Figure 55**). Repeat for all bearings in that case half.

NOTE

A special bearing remover may be required to remove blind bearings installed in the crankcases. Occasionally you can remove a blind bearing by heating the crankcase and then tapping the crankcase on a soft wooden surface. If the bearing does not fall out, remove it



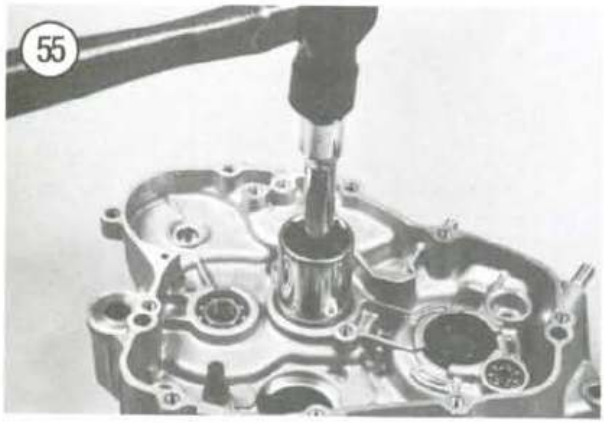


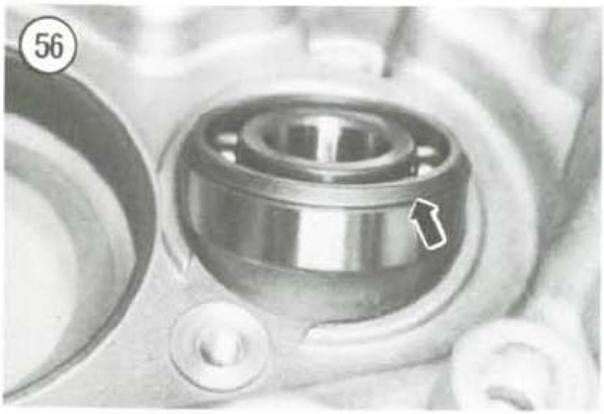
with the proper tool. Do not force or pry the bearing out or you may damage the case half.

NOTE

*If the right-hand main bearing (**Figure 46**) came off with the crankshaft, remove it with a bearing puller.*

7. Clean and dry the case halves as described in this chapter.





8. While heating up the case halves, place new bearings in a freezer if possible. Chilling them will slightly reduce their overall diameter while the hot crankcase is slightly larger due to heat expansion. This will make installation much easier.

NOTE

Prior to installing new bearing(s) or oil seal(s) apply a light coat of lithium based grease to the inside and outside to aid in installation. Be sure to apply the same grease to the lips of new grease seals.

NOTE

*When installing new bearings into the crankcase, their manufacturer's marks should face in the direction recorded during disassembly. If you did not note this, install the bearings with the manufacturer's mark facing outward or so that after the crankcase is assembled you can still see these marks. Transmission bearings with a "step" should be installed with the stepped side facing toward the inside of the case; see **Figure 56**, typical.*

NOTE

On some models, the left-hand crankshaft oil seal must be installed before installing the bearing.

9. While the crankcase is still hot, install the new bearing(s) into the crankcase. Install the bearings by hand, if possible. If necessary, lightly tap the bearing(s) into the case with a socket placed on the outer bearing race. *Do not* install new bearings by driving on the inner bearing race. Install the bearing(s) until it seats completely.

NOTE

Pack all crankcase oil seals with a heat durable grease before installation.

10. Oil seals can be installed with a suitable size socket and extension. When installing oil seals, drive them in squarely until they are flush with the case.

NOTE

When installing the crankshaft oil seals, do not drive them past the oil drain holes in the crankcase; both seals

should be flush with the bottom of the holes as shown in ***Figure 57****.*

11. Align the bearing retainers with the crankcase. Apply Loctite 242 (blue) to the retainer screws and tighten them securely.

Crankshaft Inspection

Because the crankshaft operates under severe stress, service tolerances are critical and must be maintained. A worn connecting rod and lower end bearing or out-of-true crankshaft can cause severe engine damage if a failure occurs.

Table 1 lists tolerances and wear limits for the crankshaft. If you do not have all of the measuring tools as described in this section, take the crankshaft to a dealer and have them check it for you.

If you have disassembled the engine because of secondary damage that is not related to the crankshaft (e.g., piston seizure, piston skirt damage, etc.), the lower end bearing may have been damaged or contaminated with pieces of the piston. Check the rod and low end bearing carefully.

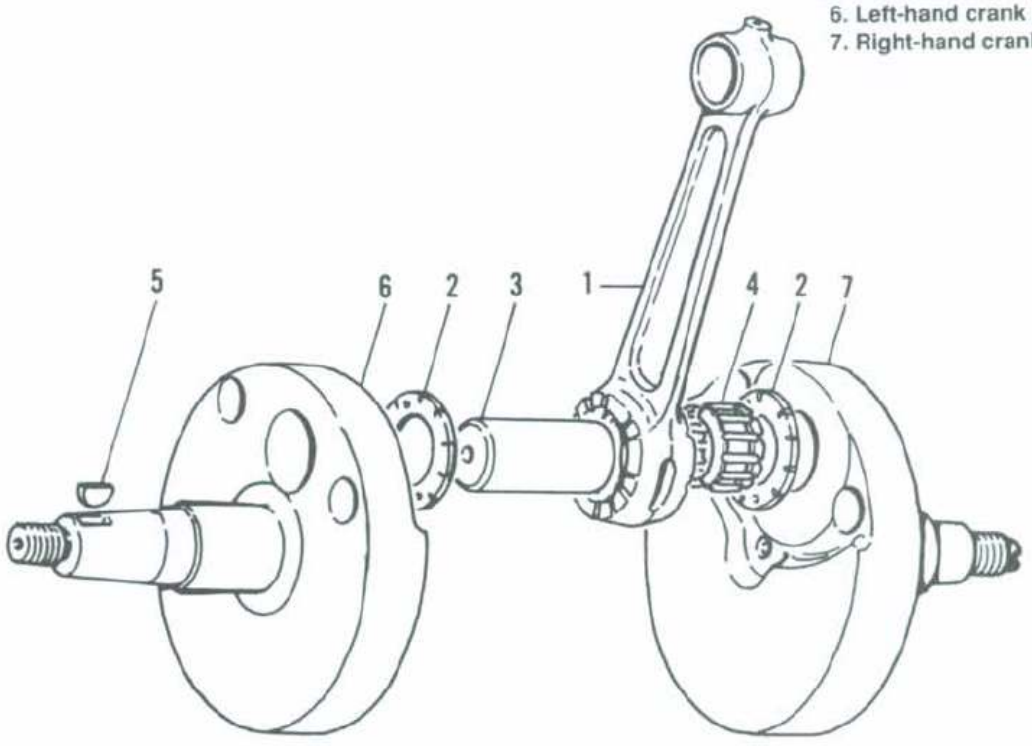
A typical crankshaft is shown in **Figure 58**.

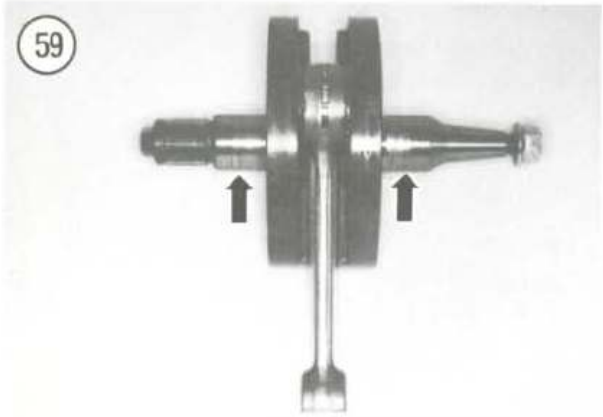
1. Dip the crankshaft in solvent, then clean with hot soapy water and rinse with clear cold water. Dry with compressed air, if available. When the crankshaft is dry, lubricate the bottom end bearing and crankshaft journals with a light coat of two-cycle engine oil.

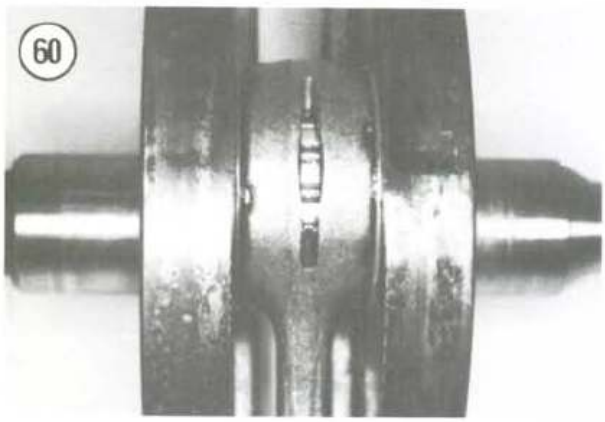
58

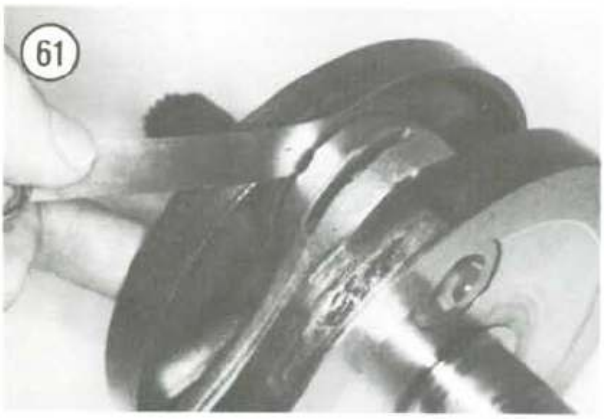
CRANKSHAFT

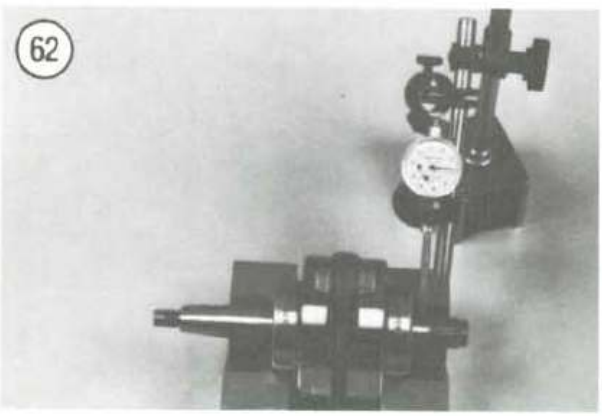
1. Connecting rod
2. Shims
3. Pin
4. Needle bearing
5. Woodruff key
6. Left-hand crank half
7. Right-hand crank half











2. Check the crankshaft journals (**Figure 59**) for scratches, heat discoloration or other defects.

3. Check flywheel taper, threads and keyway for damage. If one crankshaft half is damaged, the crankshaft can be disassembled and the damaged part replaced by a dealer.

4. Check crankshaft oil seal surfaces (**Figure 59**) for grooving, pitting or scratches.

5. Check crankshaft bearing surfaces for chatter marks and excessive or uneven wear. Minor cases of chatter mark may be cleaned up with 320 grit carborundum cloth. If 320 cloth is used, clean crankshaft in solvent and check surfaces. If they did not clean up properly, disassemble the crankshaft and replace the damaged part.

6. Check the lower end bearing and connecting rod (**Figure 60**) for signs of heat or damage. Check the needles and cage for visible damage.

7. Measure the connecting rod side clearance between the connecting rod and thrust washer with a feeler gauge (**Figure 61**). Compare to the service limit in **Table 1**. If the clearance is greater than specified the crankshaft assembly must be disassembled and the connecting rod and bearing replaced.

8. Check crankshaft runout with a dial indicator and V-blocks as shown in **Figure 62**. Have a dealer retrue the crankshaft if the runout exceeds the service limit in **Table 1**.

9. Place the crankshaft in V-blocks and attach a dial indicator to the bottom of the connecting rod big end as shown in **Figure 63**. While holding the crankshaft in position, push the connecting rod forward and then push it in the opposite direction. The difference in the high and low readings is crankshaft radial clearance. If the radial clearance exceeds the service limit in **Table 1**, replace the connecting rod.

10. If necessary, have the crankshaft rebuilt by a dealer.

Crankcase Assembly

1. Install the crankcase bearings, if removed, as described in this chapter.

2. Install new crankcase oil seals as described in this chapter.

3. Perform the inspection procedures to make sure all worn or defective parts have been repaired or replaced. All parts should be thoroughly cleaned before assembly.

4. Pack all of the crankcase oil seals with a heat durable grease.
5. Apply engine oil to both crankshaft main bearings.
6. Place the right-hand crankcase (A, **Figure 64**) into the press bed and support it so that it is square with the press ram.
7. Center the crankshaft (B, **Figure 64**) into the right-hand main bearing. The left-hand side of the crankshaft (flywheel rotor side) should be facing up.
8. Position the connecting rod at BDC and install the Kawasaki crankshaft jig between the crank wheels (**Figure 65**).

CAUTION

If the crankcase jig is not used, the crankshaft may be forced out of alignment during installation.

NOTE

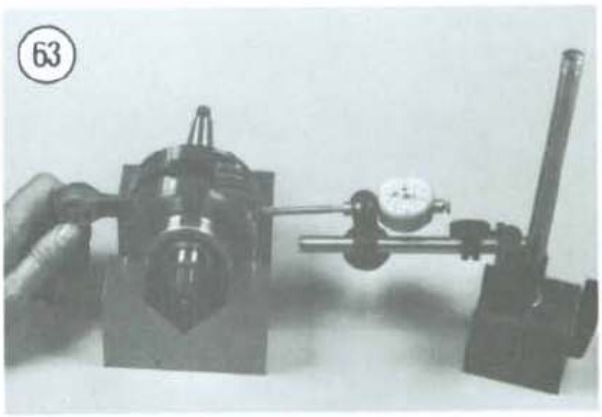
When installing the crankshaft in Step 9, make sure that the crankshaft is pressed into the bearing evenly. After aligning the crankshaft with the crankcase half, apply pressure from the press so that the crankshaft moves a small amount and then stops. Recheck crankshaft alignment. If the crankshaft is pinched to one side, stop and release pressure from the crankshaft. Realign the crankshaft before continuing. When the crankshaft is aligned correctly, reapply pressure so that the crankshaft moves a small amount. Then stop and recheck the alignment. Continue until the crankshaft is pressed in all the way.

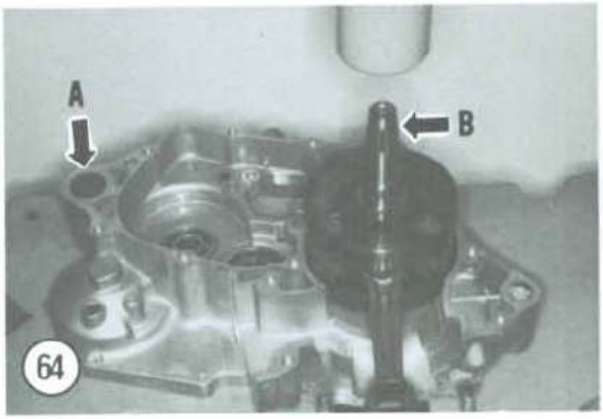
9. Press the crankshaft into the right-hand crankcase with the hydraulic press until it bottoms out against the bearing inner race.
10. Remove the crankshaft jig (**Figure 65**) from the crankshaft.

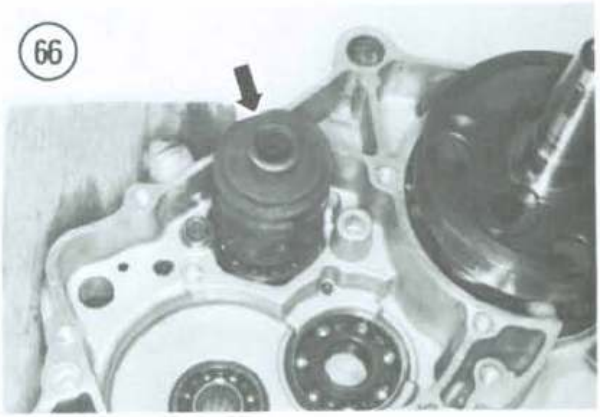
CAUTION

If you do not have access to a press, have the crankshaft installed by a dealer or machine shop. Do not drive the crankshaft into the bearing. Do not drive the crankshaft into the crankcase with a hammer.

11. Remove the right-hand crankcase assembly from the press and place it onto wood blocks (**Figure 43**).
12. Apply transmission oil to the inner race of all bearings in the right-hand crankcase half.



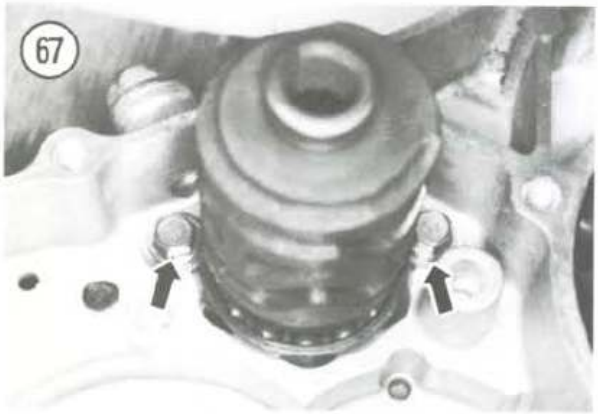




13. Install the shift drum into the right-hand crankcase (**Figure 66**).

14. Apply Loctite 242 (blue) onto the shift drum mounting bolts or screws, then install holding plate and screws or the bolts and washers, making sure the holding plate or washers contact the shift drum. See **Figure 67**, typical. Tighten the bolts securely.

15. Coat transmission oil onto the transmission shaft bearing surfaces.



16. Mesh the mainshaft and countershaft assemblies together (**Figure 68**) and install them into the right-hand crankshaft at the same time. See **Figure 69**.

16A. On KX125 models, identify the shift forks as follows:

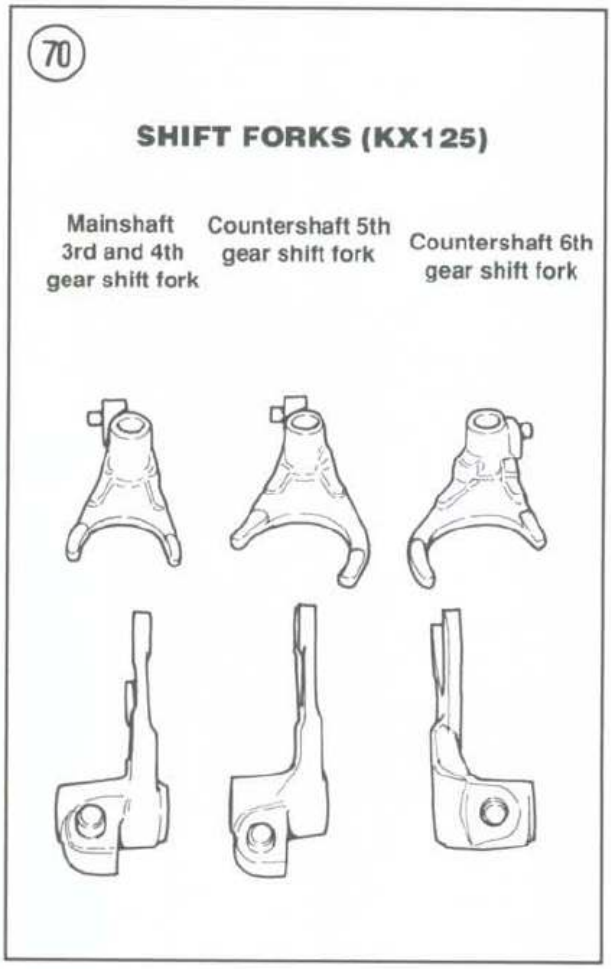
a. Mainshaft 3rd and 4th gear shift fork: The fork fingers are shorter than the fingers on the other 2 shift forks. See **Figure 70**.

b. Countershaft 5th gear shift fork: The guide pin is positioned on the left-hand side of the fork fingers. See **Figure 70**.

c. Countershaft 6th gear shift fork: The guide pin is positioned to the right-hand side of the fork fingers. See **Figure 70**.

16B. On 1982 KX250 models, identify the shift forks as follows:

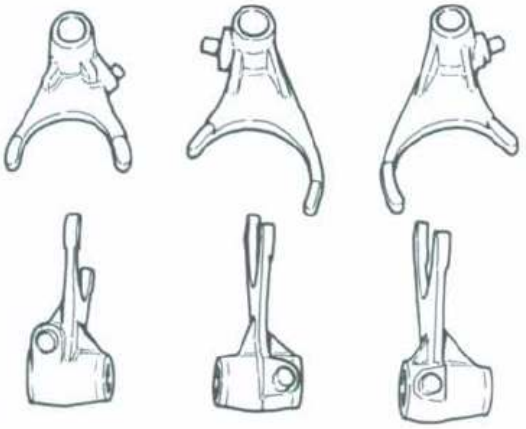
a. Mainshaft 3rd gear shift fork: The fork fingers are shorter than the fingers on the other 2 shift forks. See **Figure 71**.



71

SHIFT FORKS (1982 KX250)

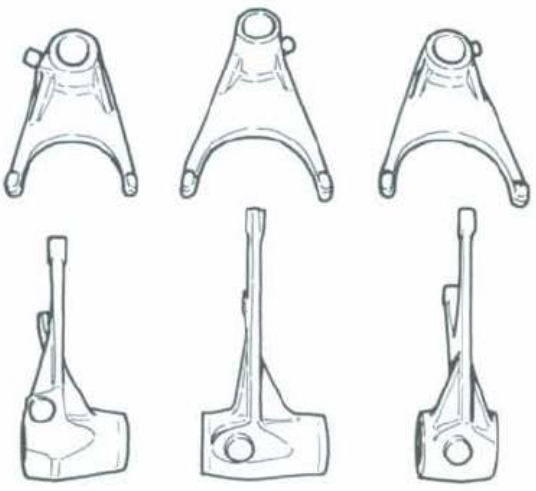
Mainshaft 3rd gear shift fork | Countershaft 5th gear shift fork | Countershaft 4th gear shift fork



72

SHIFT FORKS (1983-1991 KX250)

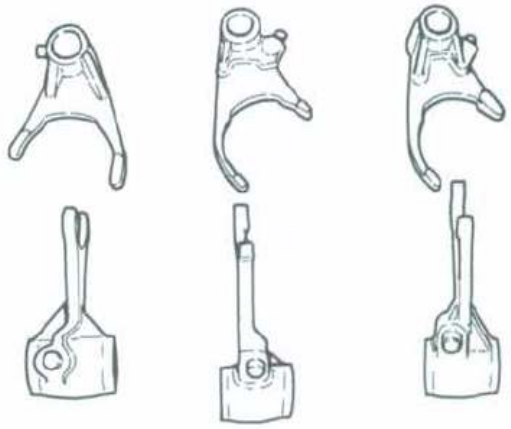
Mainshaft 3rd gear shift fork | Countershaft 4th gear shift fork | Countershaft 5th gear shift fork

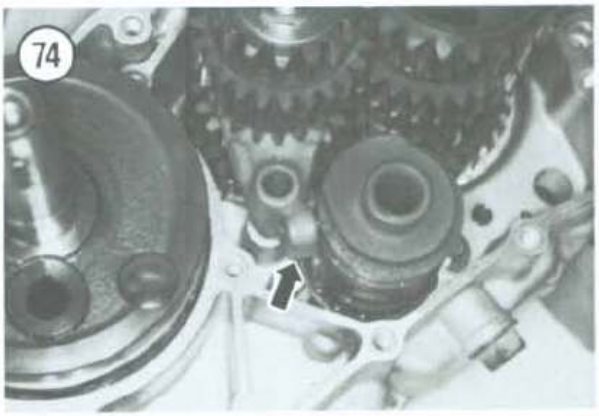


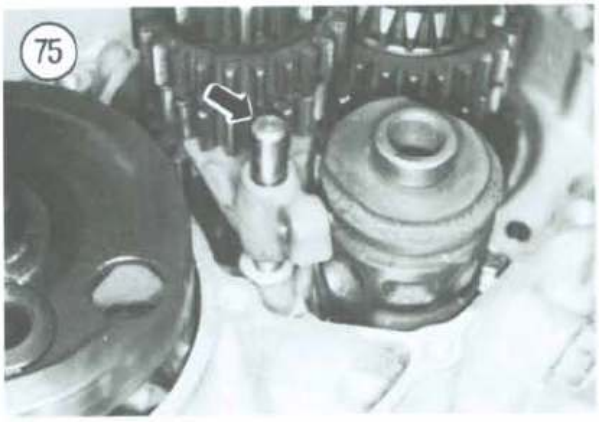
73

SHIFT FORKS (KX500)

Mainshaft 3rd gear shift fork | Countershaft 4th gear shift fork | Countershaft 5th gear shift fork





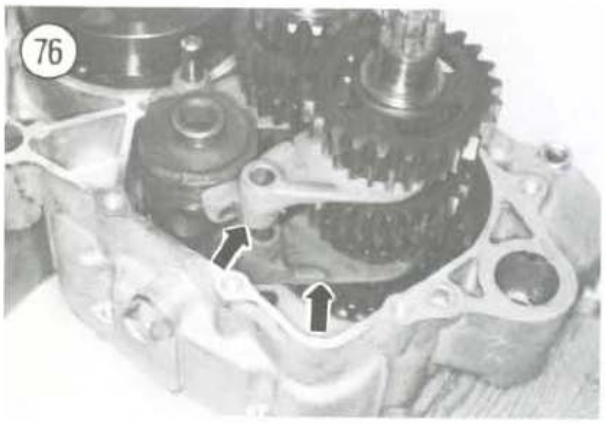


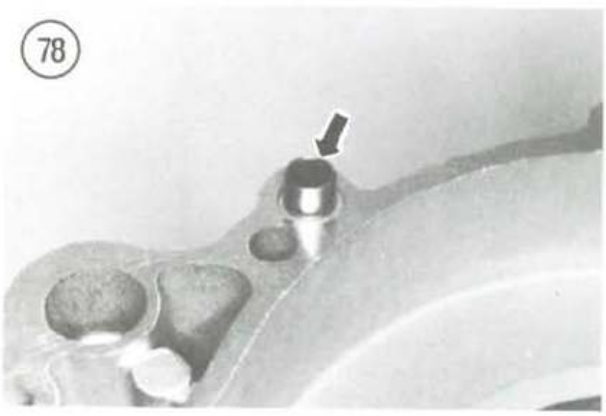
b. Countershaft 4th gear shift fork: The guide pin is positioned on the left-hand side of the fork fingers. See **Figure 71**.

c. Countershaft 5th gear shift fork: The guide pin is positioned on the right-hand side of the fork fingers. See **Figure 71**.

16C. On 1983-1991 KX250 models, identify the shift forks as follows:

a. Mainshaft 3rd gear shift fork: The fork fingers are shorter than the fingers on the other 2 shift forks. See **Figure 72**.





b. Countershaft 4th gear shift fork: The guide pin is positioned on the left-hand side of the fork fingers. See **Figure 72**.

c. Countershaft 5th gear shift fork: The guide pin is centered on the shift fork boss. See **Figure 72**.

16D. On KX500 models, identify the shift forks as follows:

a. Mainshaft 3rd gear shift fork: The fork fingers are shorter than the fingers on the other 2 shift forks. See **Figure 73**.

b. Countershaft 4th gear shift fork: The guide pin is centered on the shift fork boss. See **Figure 73**.

c. Countershaft 5th gear shift fork: The guide pin is positioned on the left-hand side of the fork fingers. See **Figure 73**.

17. Install the mainshaft shift fork (**Figure 74**) and shift fork shaft (**Figure 75**).

18. Install the 2 countershaft shift forks (**Figure 76**) and shift fork shaft (**Figure 77**).

NOTE

Step 19 is best done with the aid of a helper as the assemblies are loose and don't want to spin very easily. Have the helper spin the transmission shaft while you turn the shift drum through all the gears.

19. Spin the transmission shafts and shift through the gears using the shift drum. Make sure you can shift into all gears. This is the time to find that something may be installed incorrectly—not after the crankcase is completely assembled.

20. Shift the transmission assembly into NEUTRAL.

21. Set the crankcase assembly in the press bed.

22. Install the locating dowels into the right-hand crankcase half (**Figure 78**).

23. Install the roll pin (**Figure 79**), if used.

24. Install the breather grommet.

25. Apply a light coat of *non-hardening liquid gasket* such as 4-Three Bond or equivalent to the mating surfaces of both crankcase halves.

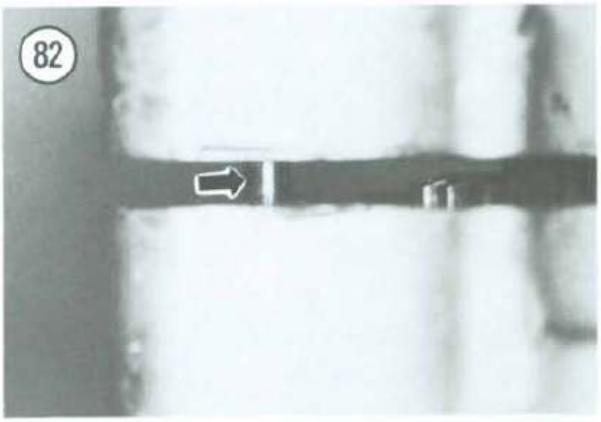
NOTE

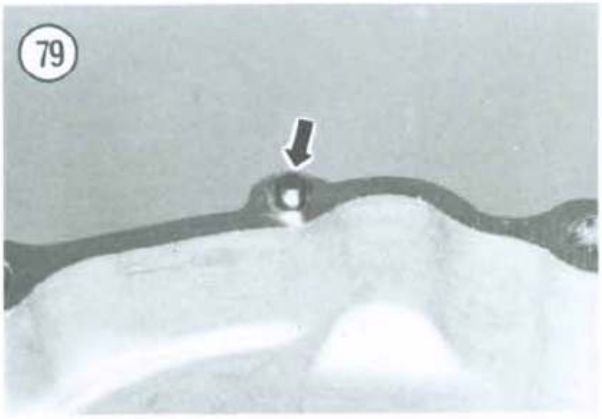
Make sure the mating surfaces are clean and free of all old sealer residue. This is to make sure you get a leak free seal.

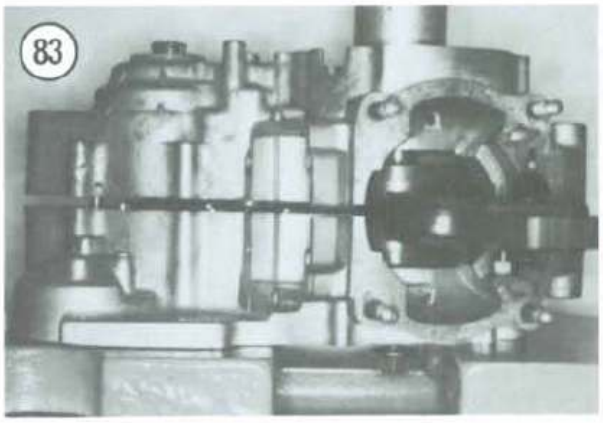
26. Install the upper crankcase half over the crankshaft. Push it down squarely into place until it reaches the crankshaft bearing, usually with about 1/2 inch left to go.

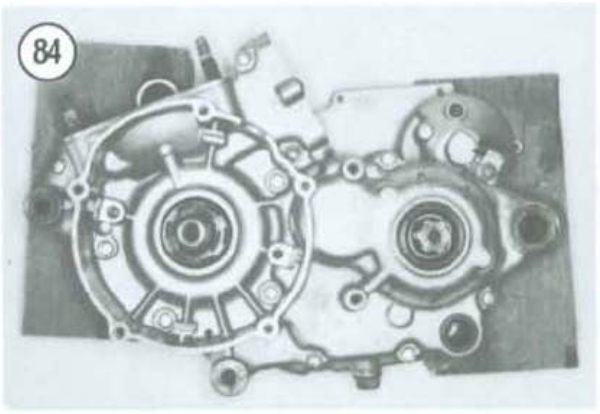
27. Install the engine assembly into a press bed so that the left-hand case half faces up.

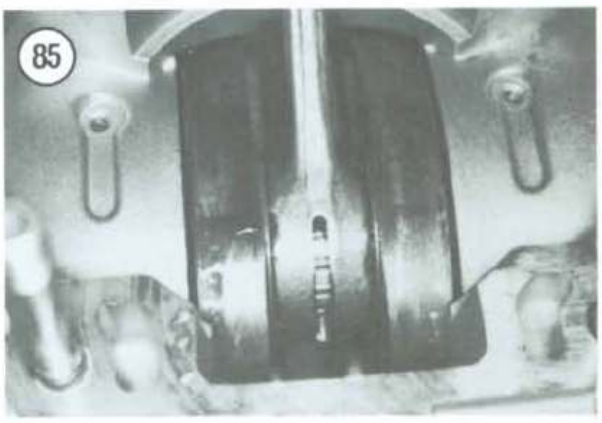
28. Install the Kawasaki crankshaft jig onto the crankshaft (**Figure 80**). Center the crankshaft jig so that it does not contact the case halves.











29. Install a hollow adapter over the crankshaft and center it with the crankcase and press arm (**Figure 81**).

30. Press the upper crankcase half over the main bearing, checking that the dowel pins and roll pin (if used) engage their mating holes (**Figure 82**) and that the left-hand case is pressed on evenly (**Figure 83**) with no binding of the mainshaft, shift fork shafts or shift drum. After the cases are assembled make sure each shaft rotates smoothly.

CAUTION

Crankcase halves should fit together without force. If the crankcase halves do not fit together completely, do not attempt to pull them together with the crankcase screws. Separate the crankcase halves and investigate the cause of the interference. If the transmission shafts were disassembled, recheck to make sure that a gear is not installed backwards. Also check that the shift drum neutral detent is not installed—it must be removed during this procedure. Crankcase halves are a matched set and are very expensive. Do not risk damage by trying to force the cases together.

31. Remove the crankcase jig (**Figure 80**).

32. Install all the crankcase screws (**Figure 84**) and tighten only finger-tight at first. Place any clips under the screws in the locations recorded during disassembly.

33. Securely tighten the screws in 2 stages in a crisscross pattern until they are firmly hand-tight.

34. After the crankcase halves are completely assembled, rotate the crankshaft and check for binding; the crankshaft should rotate freely. If the crankshaft is tight, it is not centered correctly (**Figure 85**). Center the crankshaft as follows:

a. Carefully tap the appropriate end of the crankshaft with a plastic mallet to center it.
b. Repeat until the crankshaft is centered and rotates freely.

35. Install the external shift mechanism (Chapter Six) and spin the countershaft while operating the shift drum and check that the shafts turn smoothly and all gears engage properly.

36. Install all exterior engine assemblies as described in this chapter and other related chapters.

Table 1 CRANKSHAFT SPECIFICATIONS

	New mm (in.)	Service limit mm (in.)
Connecting rod big end radial clearance		
KX125	0.026-0.043 (0.0010-0.0017)	0.10 (0.04)
KX250	0.037-0.049 (0.0015-0.0019)	0.10 (0.04)
KX500	0.034-0.047 (0.0013-0.0018)	0.10 (0.04)
Connecting rod side clearance		
KX125		
1982	0.40-0.45 (0.016-0.018)	0.70 (0.028)
1983-on	0.40-0.50 (0.016-0.020)	0.70 (0.028)
KX250		
1982	0.45-0.50 (0.018-0.020)	0.70 (0.028)
1983-on	0.45-0.55 (0.018-0.022)	0.70 (0.028)
KX500	0.40-0.50 (0.016-0.020)	0.70 (0.028)

(continued)

Table 1 CRANKSHAFT SPECIFICATIONS (continued)

	New mm (in.)	Service limit mm (in.)
Crankshaft runout		
KX125		
1982-1985	0-0.03 (0-0.001)	0.10 (0.004)
1986-on	0-0.03 (0-0.001)	0.05 (0.002)
KX250		
1982-1985	0-0.03 (0-0.001)	0.10 (0.004)
1986-on	0-0.03 (0-0.001)	0.05 (0.002)
KX500		
1983-1984	0-0.03 (0-0.001)	0.075 (0.003)
1985-on	0-0.03 (0-0.001)	0.10 (0.004)

Table 2 TIGHTENING TORQUES

	N•m	ft.-lb.
Engine mount bolts		
KX125		
1982-1988		
Front		
1982	40	30
1983-1988	24	18
Center	24	18
1989		
Engine mounting nut		
8 mm	26	19
10 mm	34	25
1990-1991		
Engine nuts	34	25
Engine bracket nuts		
Frame side	26	19
Engine side	34	25
KX250		
1982	40	29
1983-1984	24	18
1985-1986	25	19
1987		
Bracket bolts		
M8	26	19
M10	59	14
Mount bolts	26	19
1988		
Mount and bracket bolts	26	19
1989		
Bracket bolts and nuts	26	19
Mount nut	34	25
1990-1991		
Engine nuts	34	25
Engine bracket nuts		
Frame side	26	19
Engine side	34	25

(continued)

Table 2 TIGHTENING TORQUES (continued)

	N•m	ft.-lb.
Engine mount bolts		
KX500		
1983-1984		
Bracket bolts	27	20
Upper mount bolts	39	29
Lower mount bolts	24	18
1985		
Bracket bolts	39	29
Mount bolts	24	18
1986		
Bracket bolts	59	44
Mount bolts	26	19
1987		
Bracket bolts		
M8	25	19
M10	59	43
Mount bolts	26	19
1988		
Mount and bracket bolts	26	19
1989		
Bracket bolts and nuts	26	19
Mount nut	34	25
1990-1999		
Engine mounting		
M10 nut	34	25
Engine bracket		
M8 nut	26	19
M8 bolt	26	19
2000-on		
Engine mounting		
M10 nut	44	33
Engine bracket		
M8 nut	29	21
M8 bolt	29	21
Swing arm pivot shaft		
KX125		
1982-on	78	58
KX250 & KX500		
1983-1987	78	58
1988-1989	81	60
1990-on		
KX250	78	58
KX500	81	60
Engine sprocket nut		
1983-1987 KX500	78	58

CHAPTER SIX

CLUTCH, KICKSTARTER AND EXTERNAL SHIFT MECHANISM

This chapter contains removal, inspection and installation of the clutch, kickstarter and external shift mechanism. These sub-assemblies can be removed with the engine in the frame. Clutch specifications are listed in **Table 1** (KX125) and **Table 2** (KX250 and KX500). **Tables 1-4** are found at the end of the chapter.

CLUTCH COVER

Removal/Installation

1. Drain the clutch/transmission oil as described in Chapter Three.

2. Support the bike with a bike stand.

3. On water-cooled models, drain the engine coolant as described in Chapter Three.

4. On KX125 models, disconnect the clutch cable at the clutch cover as follows:

   a. See **Figure 1**. Loosen the clutch cable adjuster locknut (A) and loosen the adjuster (B).

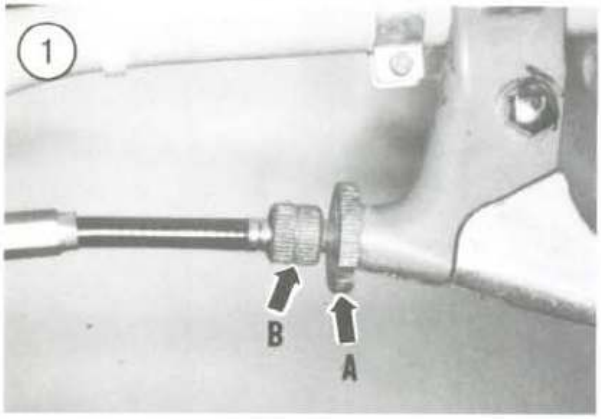
   b. Loosen the lower clutch cable nut and disconnect the clutch cable at the clutch cover (A, **Figure 2**), and release lever (B, **Figure 2**).

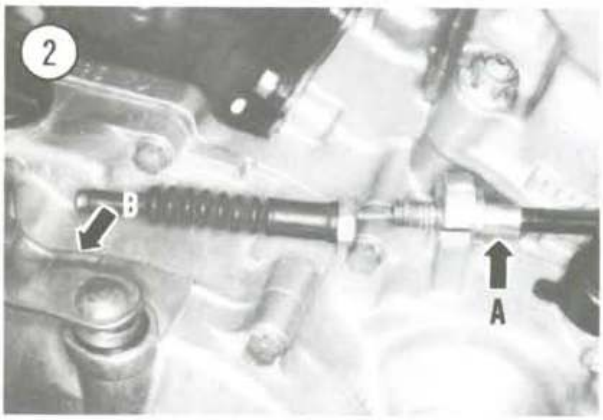
5. Disconnect and remove the rear brake pedal if it interferes with clutch cover removal.

6A. On early models, remove the kickstarter pinch bolt and remove the kickstarter (**Figure 3**). If necessary, spread the kickstarter slot with a screwdriver when removing it.

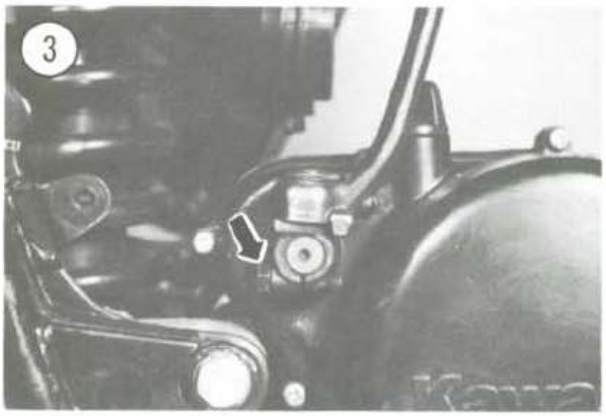
6B. On late models, remove the kickstarter screw and remove the kickstarter (**Figure 4**).

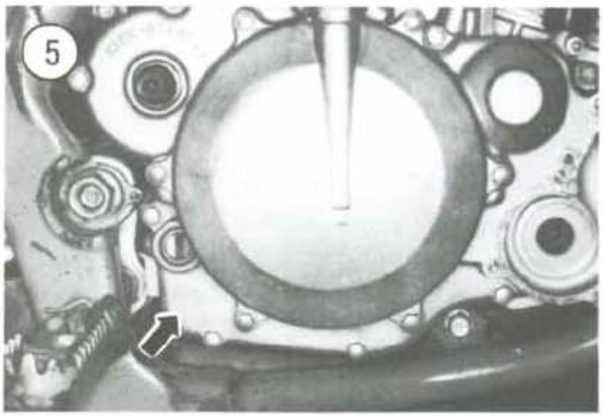
7. Disconnect the exhaust valve lever at the cylinder as described under *Cylinder Removal* in Chapter Four, if so equipped.

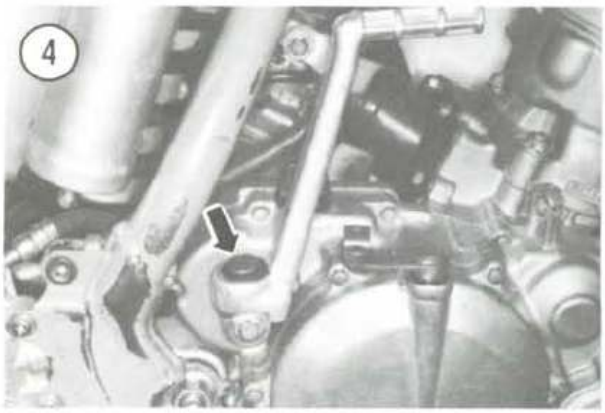


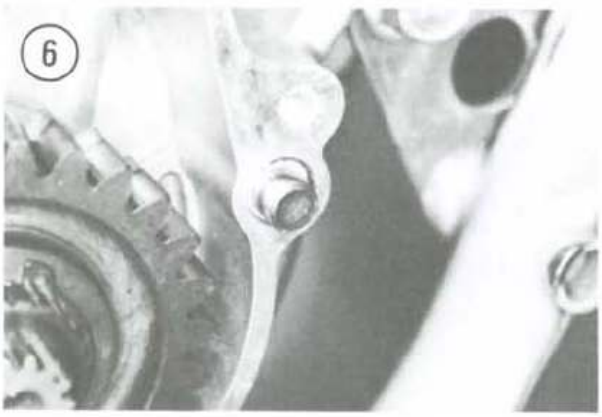


8. Remove the water pump cover as described in Chapter Ten.
9. If necessary, remove the impeller as described in Chapter Ten.
10. Remove the clutch cover mounting screws and remove the clutch cover (**Figure 5**).
11. Remove the 2 dowel pins (**Figure 6**) and gasket.
12. On KX125 models, remove the O-ring (**Figure 7**), mounted between the clutch cover and case half, if used.
13. The exhaust advancer assembly is installed in the clutch cover. If necessary, service it as described in this chapter.
14. Service the water pump, oil seal(s) and bearing as described in Chapter Ten.
15. Remove all gasket residue from the cover and case half mating surfaces. Then clean the cover in solvent and dry thoroughly.
16. Clean the oil check window in the cover (**Figure 8**), if equipped.
17. Inspect the clutch cover (**Figure 9**) for cracks or other damage.
18. Installation is the reverse of these steps. Note the following.









19. Make sure to install the 2 dowel pins and a new cover gasket. Install the O-ring (**Figure 7**) on KX125 models, if equipped.

20. Install the exhaust advancer assembly as described in this chapter, making sure to turn the gear so that the drive pin holding the gear in place is level when the cover is installed. See **Figure 10**.

CAUTION

If the drive pin is not positioned correctly, it may fall out when the cover is installed.

21. Install the water pump assembly, if removed, as described in Chapter Ten.

22. Refill the clutch/transmission oil as described in Chapter Three.

23. Refill the engine cooling system as described in Chapter Three.

24. Adjust the clutch as described in Chapter Three.

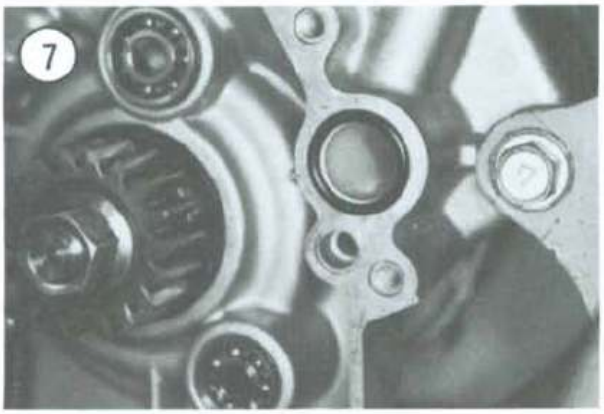
Clutch Cover Oil Seal Inspection/Replacement (All Models)

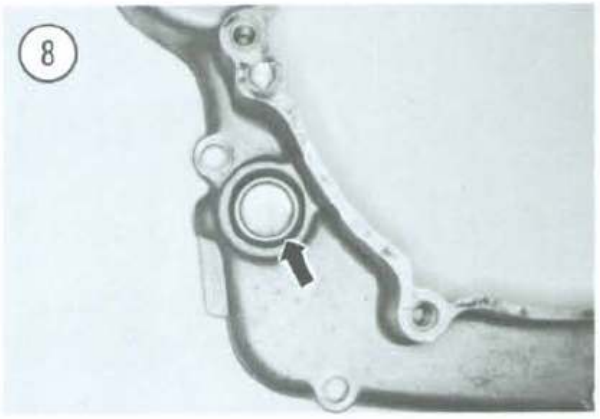
1. Check the clutch cover oil seal (**Figure 11**) for damage. If the seal is torn or leaking, replace it as follows.

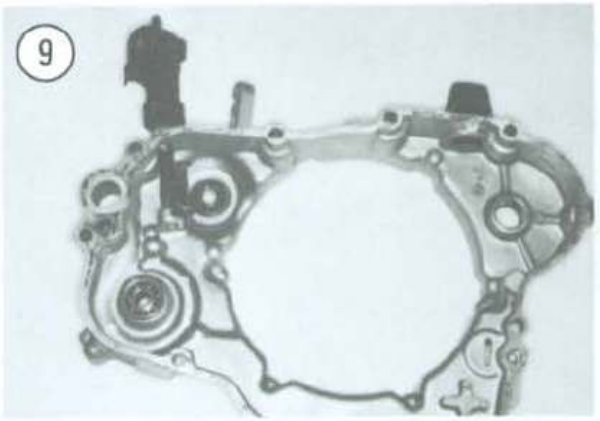
2. Pry the oil seal out of the cover with a wide-blade screwdriver (**Figure 12**). Place a rag underneath the screwdriver to avoid damaging the cover.

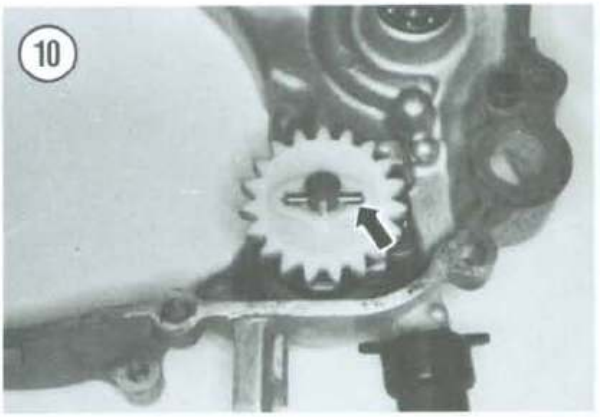
3. Pack the seal lip cavity in the new oil seal with a multipurpose grease.

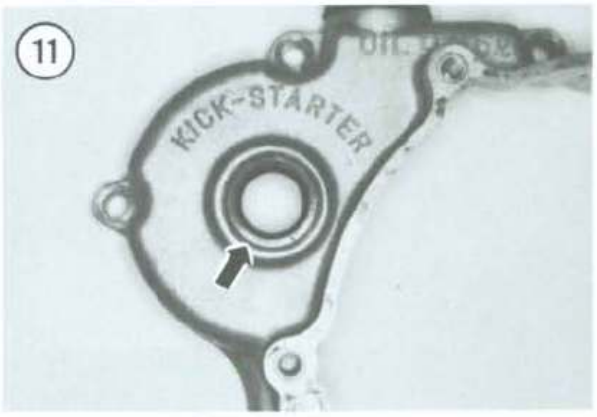
4. Align the new oil seal with the seal bore in the clutch cover and drive it into place with a bearing driver or socket. Install the oil seal so that it is flush with the cover.

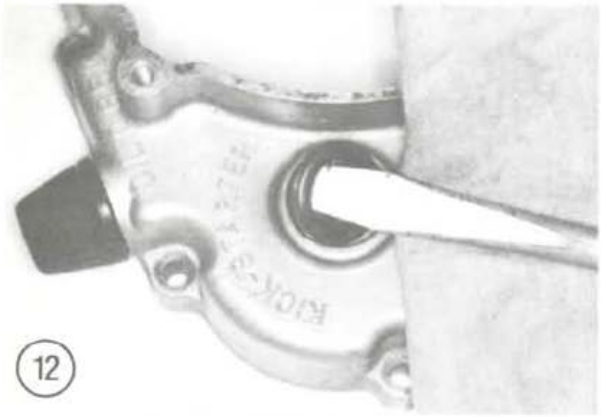












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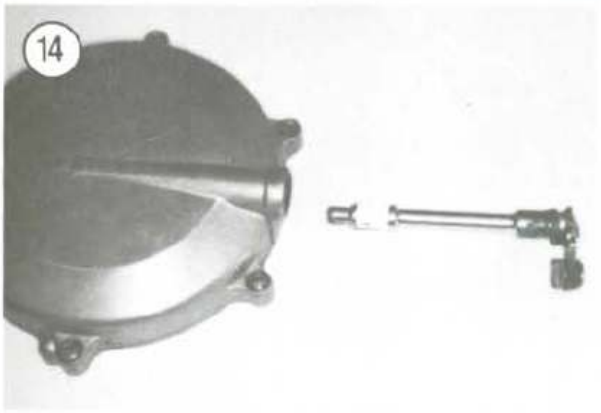

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15

CLUTCH RELEASE ARM (KX125)

Removal/Installation

1A. On 1982-1987 models, remove the clutch cover as described in this chapter.

1B. On 1988-1991 models, perform the following:

a. See **Figure 1**. Loosen the clutch cable adjuster locknut (A) and loosen the adjuster (B).

b. Loosen the lower clutch cable nut and disconnect the clutch cable at the clutch cover (A, **Figure 2**).

c. Pivot the clutch release lever (B, **Figure 2**) toward the rear of the cover to free the release shaft from the clutch spring plate pusher inside the cover.

d. Remove the clutch access cover mounting bolts and remove the cover (**Figure 13**), gasket and dowel pins.

2. Remove the clutch release arm (**Figure 14**) and spring, if equipped.

3A. On 1982 models, remove the 2 O-rings from the arm.

3B. On 1983-1987 models, remove the O-ring from the arm.

3C. On 1988-1991 models, remove the spring from the arm.

4. Inspect the release arm assembly as described in the following procedure.

5. Installation is the reverse of these steps. Note the following.

6. On 1988-1991 models, engage the spring with the cover as shown in **Figure 15**.

7. The flat surface on the bottom of the lever should face toward the clutch (**Figure 16**).

8. Make sure the clutch pusher assembly is installed in the clutch as described under *Clutch Installation* in this chapter.

9. Adjust the clutch as described in Chapter Three.

Inspection

1. Visually inspect the release arm (**Figure 17**) for cracks, deep scoring or excessive wear.

2. On 1982-1987 models, replace the O-ring(s) if worn or damage.

3. On 1988-1991 models, replace the spring if stretched or damaged.

4. On 1988-1991 models, inspect the oil seal (A, **Figure 18**) for damage. If the seal is torn or leaking, replace it as described in the following procedure.

5. On 1988-1991 models, inspect the needle bearing (B, **Figure 18**) for damage. Replace the bearing, if necessary, as described in the following procedure.

Oil Seal/Bearing Replacement (1988-1991)

1. Carefully pry the oil seal (**Figure 19**) out of the cover with a screwdriver.

2. Remove the bearing (B, **Figure 18**) with a bearing puller.

3. Clean the cover in solvent and dry with compressed air, if available.

4. Install the new bearing with a bearing driver or socket.

5. Pack the oil seal lips with bearing grease and install the seal into the cover until it is flush with the cover (**Figure 19**).

CLUTCH RELEASE ARM (KX250 AND KX500)

The clutch release arm (**Figure 20**) is mounted in the left-hand crankcase.

Removal/Installation

1. See **Figure 1**. Loosen the clutch cable adjuster locknut (A) and loosen the adjuster (B).

2. Disconnect the clutch cable at the release arm.

3. Remove the clutch pushrod as described in this chapter.

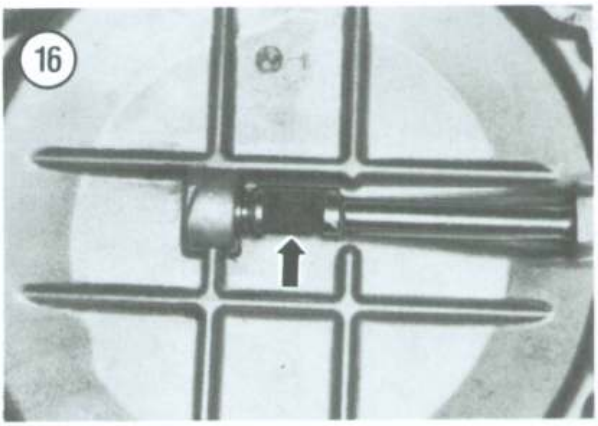
4. Remove the clutch release arm screw and washer, if used.

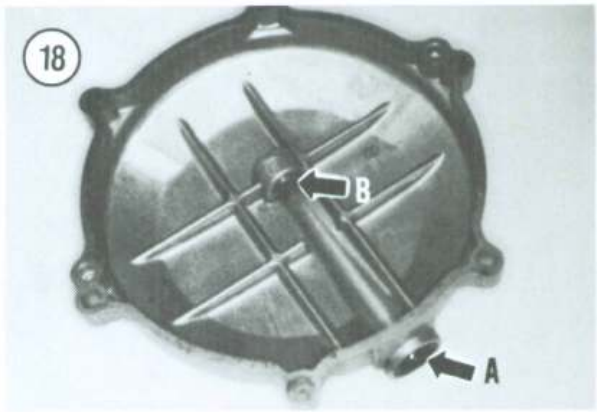
5. Lift the clutch release arm (**Figure 20**) out of the engine and remove it. Remove the O-ring, if used.

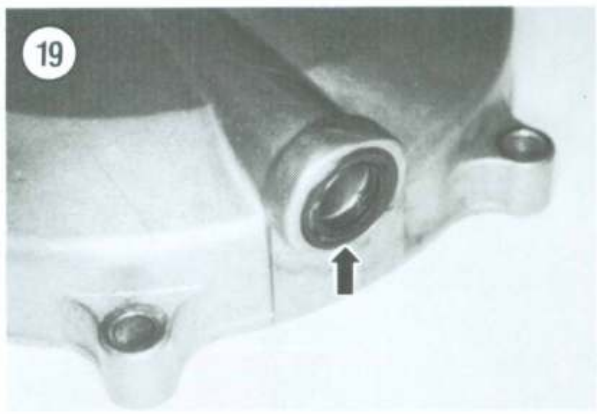
6. Install by reversing these steps. Note the following.

7. If the clutch release arm is secured with a screw and washer, make sure the screw engages the notch in the arm when installing the screw. Tighten the screw securely.

8. Adjust the clutch as described in Chapter Three.





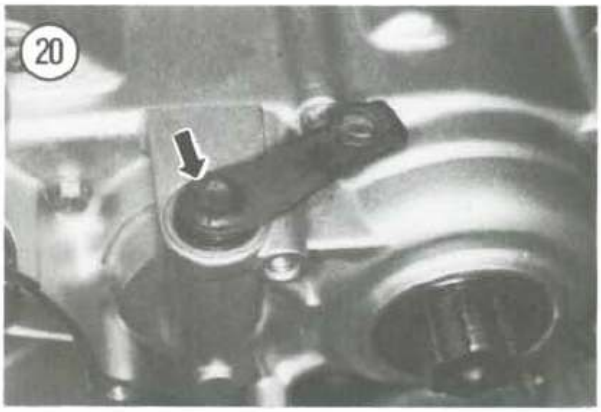


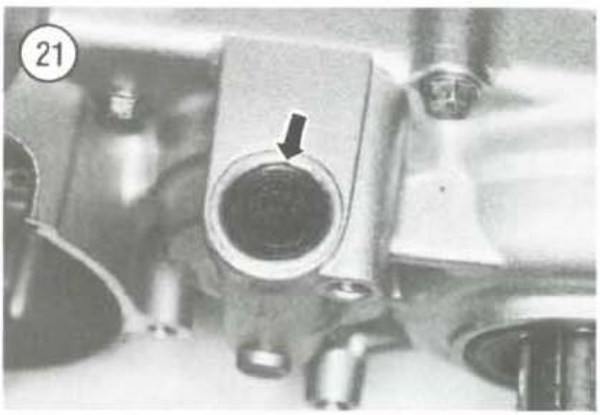
Inspection

1. Visually inspect the release arm (**Figure 17**) for cracks, deep scoring or excessive wear.
2. On 1982-1987 models, replace the O-ring(s) if worn or damage.
3. On 1988 and later models, inspect the oil seal (**Figure 21**) for damage. If the seal is torn or leaking, replace it as described in the following procedure.
4. On 1988 and later models, inspect the needle bearings in the case half for damage. Replace the bearings, if necessary, as described in the following procedure.

Oil Seal/Bearing Replacement (1988-on)

1. Carefully pry the oil seal (**Figure 21**) out of the case with a screwdriver.
2. Remove the bearings with a bearing puller. If necessary, remove the engine from the frame as described in Chapter Five.
4. Install the new bearings with a bearing driver or socket.





5. Pack the oil seal lips with bearing grease and install the seal into the cover until it is flush with the cover (**Figure 21**).

EXHAUST ADVANCER ASSEMBLY (1985-1991 KX125, 1987-1991 KX250 AND 1986-ON KX500)

Refer to **Figure 22** (KX125), **Figure 23** (KX250) or **Figure 24** (KX500) when performing the following.

Removal/Installation

1. Remove the clutch cover as described in this chapter.
2. Turn the advance lever and lift the exhaust advancer assembly (**Figure 25**) out of the clutch cover.
3. Remove the advance lever bolts and remove the advance lever (**Figure 26**).
4. Remove the screw (A, **Figure 27**) and pull the advance shaft (B, **Figure 27**) out of the cover.
5. Installation is the reverse of these steps. When installing the advancer assembly, align the advance lever with the groove in the exhaust advancer (**Figure 28**). Tighten all bolts securely.

Advancer Assembly Disassembly/Inspection/Assembly

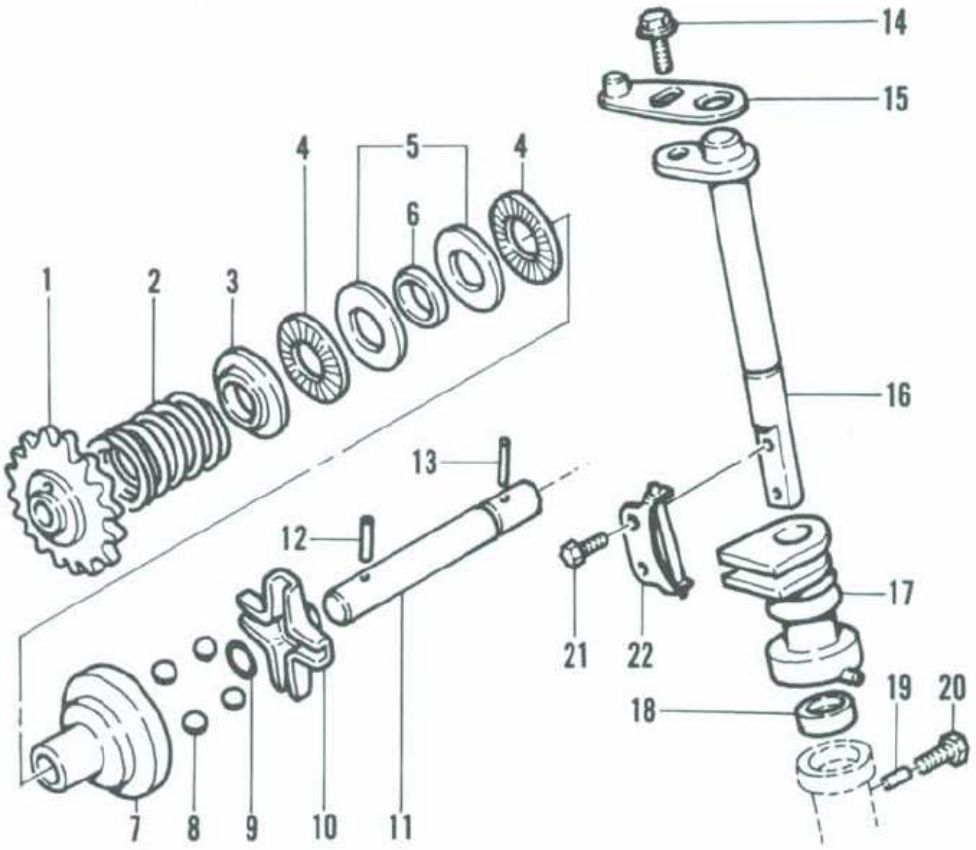
NOTE

*The advancer assembly is comprised of a number of parts. Make sure to store parts in their order of removal to ease assembly. **Figure 29** shows one method of organizing parts during removal.*

1. Compress the gear assembly and remove the pin (**Figure 30**).
2. Remove the gear (**Figure 31**).
3. On 1989 and later KX250 models, remove the washer (**Figure 23**).
4. Remove the spring (**Figure 32**).
5. Remove the spring seat (**Figure 33**).
6. On 1989 and later KX500 models, remove the spacer (**Figure 24**).
7. Remove the needle bearing (**Figure 34**).
8. Remove the spacer (**Figure 35**).
9. Remove the collar (**Figure 36**).
10. Remove the spacer (**Figure 37**).

(22)

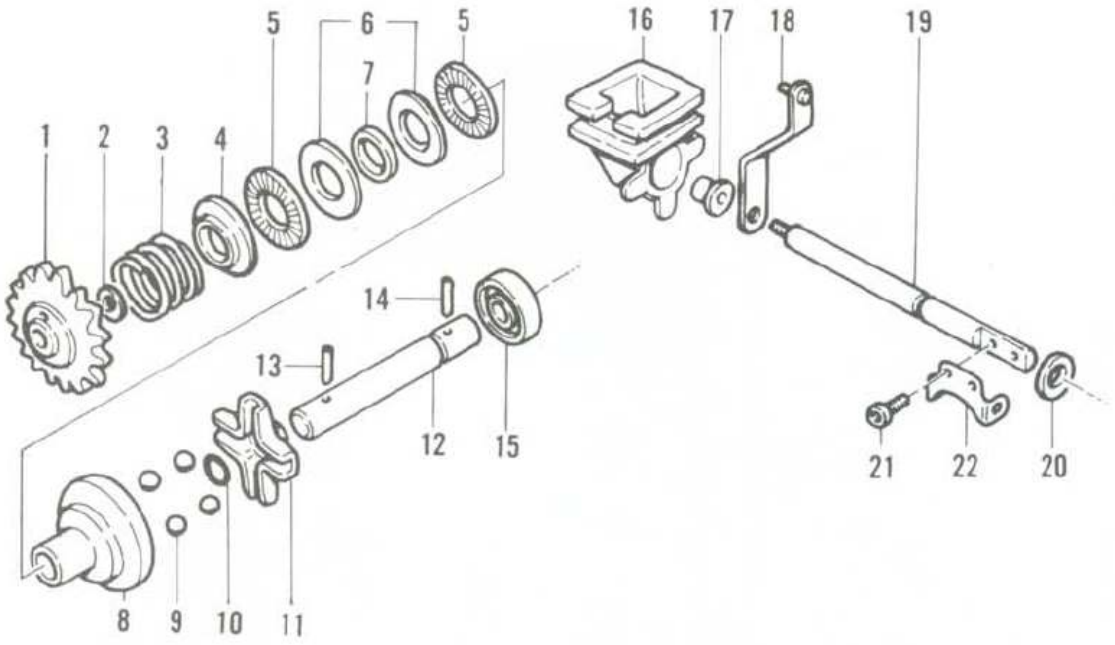
EXHAUST ADVANCER ASSEMBLY (KX125)



1. Gear
2. Spring
3. Spring seat
4. Needle bearings
5. Spacers
6. Collar
7. Holder
8. Balls
9. O-ring
10. Guide
11. Shaft
12. Pin (long)
13. Pin (short)
14. Bolt
15. Shaft lever
16. Advance shaft
17. Boot
18. Oil seal
19. Pin
20. Bolt
21. Bolt
22. Advance lever

(23)

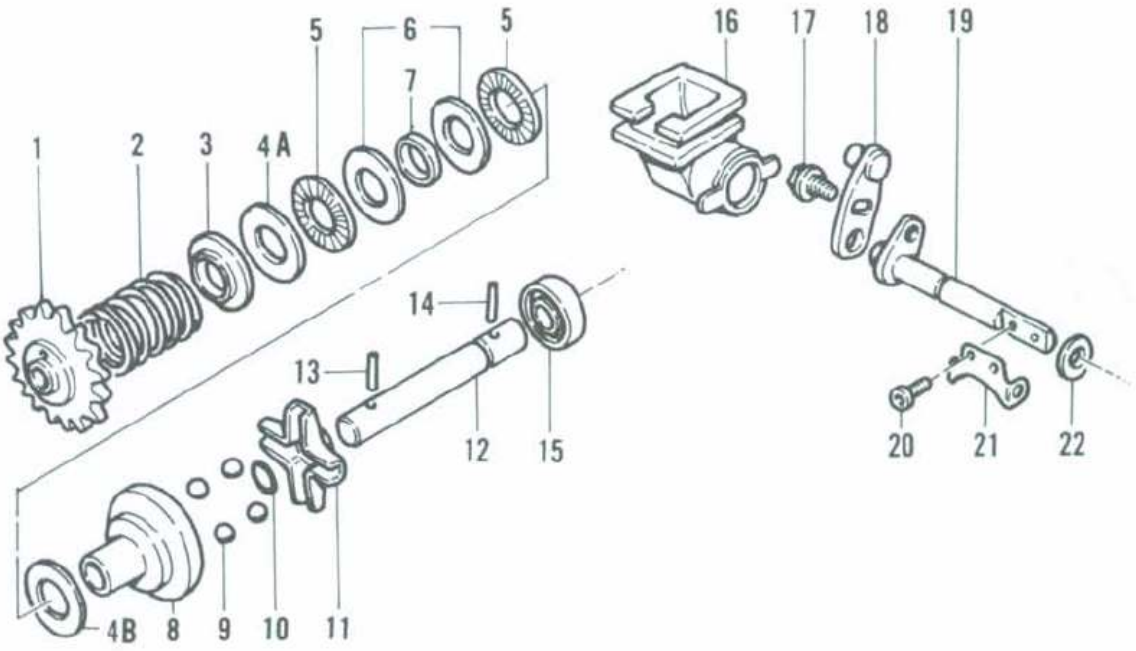
EXHAUST ADVANCER ASSEMBLY (1987-1991 KX250)



1. Gear
2. Washer (1989-1991)
3. Spring
4. Spring seat
5. Needle bearings
6. Spacers
7. Collar
8. Holder
9. Balls
10. O-ring
11. Guide
12. Shaft
13. Pin (long)
14. Pin (short)
15. Bearing
16. Cover
17. Collar
18. Shaft lever
19. Advance shaft
20. Washer
21. Bolt
22. Advance lever

(24)

EXHAUST ADVANCER ASSEMBLY
(1986-ON KX500)



1. Gear
2. Spring
3. Spring seat
4A. Spacer (1989-on)
4B. Spacer
5. Needle bearings
6. Spacers
7. Collar
8. Holder
9. Balls
10. O-ring
11. Guide
12. Shaft
13. Pin (long)
14. Pin (short)
15. Bearing
16. Boot
17. Bolt
18. Shaft lever
19. Advance shaft
20. Bolt
21. Advance lever
22. Washer

25

26

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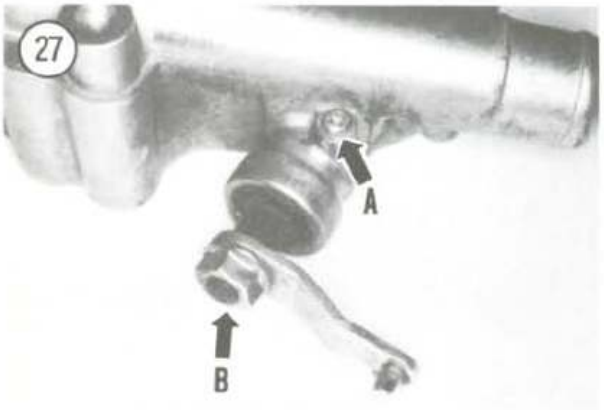

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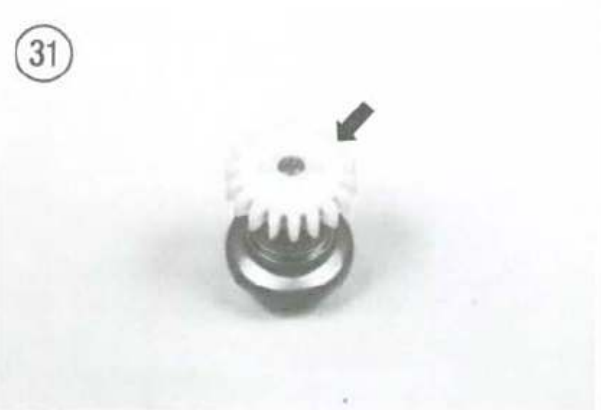


32

6

11. Remove the needle bearing (**Figure 38**).

12. On KX500 models, remove the spacer (4B, **Figure 24**) if used.

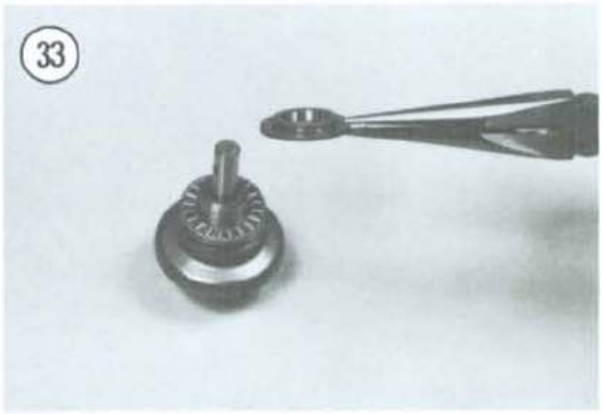
13. Remove the holder (**Figure 39**).

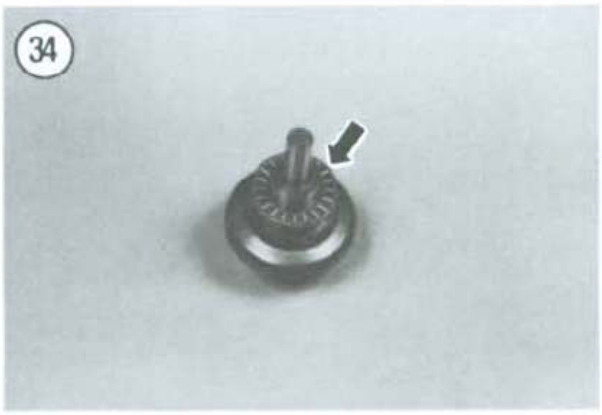
14. Remove the 4 steel balls (**Figure 40**).

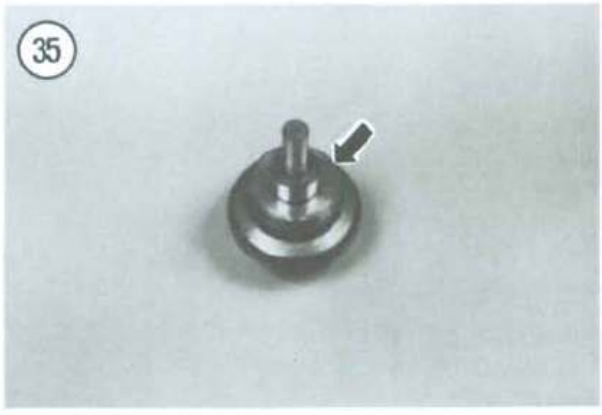
15. Remove the pin (**Figure 41**) at the bottom of the guide.

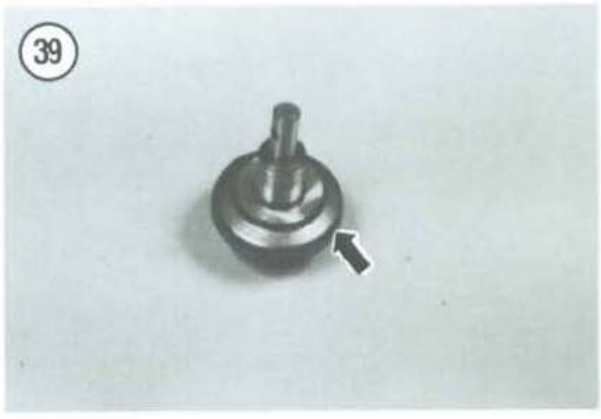
16. Remove the guide (**Figure 42**).

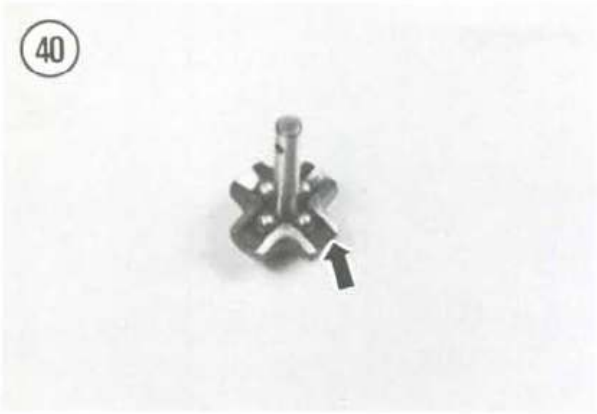
17. Remove and discard the O-ring (A, **Figure 43**), if used.

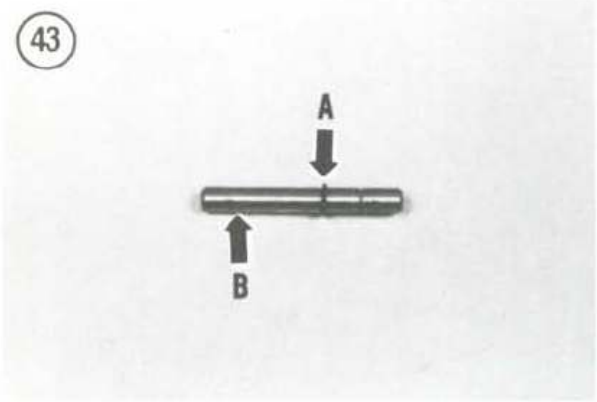




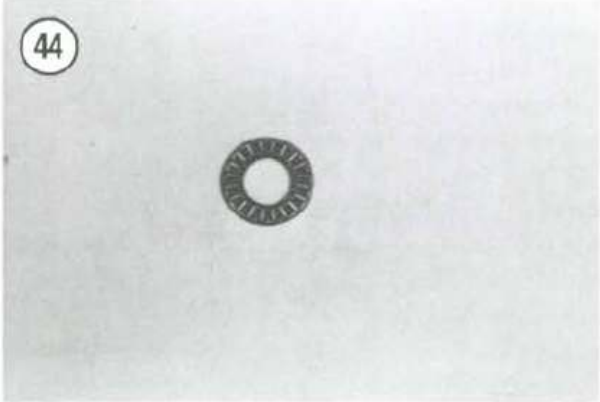








18. Clean all of the parts in solvent and thoroughly dry.
19. Check the shaft (B, **Figure 43**) for scoring or deep wear marks.
20. Check the needle bearings (**Figure 44**) for loose needles or other damage.
21. Check the gear (**Figure 45**) for worn or broken teeth. Check the pin slot in the gear for damage.
22. Check the guide (**Figure 46**) for deep scoring or other damage.
23. Check the holder (**Figure 47**) for deep scoring or other damage.
24. Replace worn or damaged parts.
25. Install a new O-ring (A, **Figure 43**) onto the shaft.
26. Slide the guide (**Figure 42**) onto the shaft. Secure the guide to the shaft with the pin (**Figure 41**).
27. Set the assembly upright so that the guide faces as shown in **Figure 48**.
28. Install the 4 steel balls into the guide (**Figure 40**).
29. Install the holder (**Figure 39**) over the guide/ball assembly.
30. Install the needle bearing (**Figure 38**).
31. On KX500 models, install the spacer, if used.
32. Install the spacer (**Figure 37**).
33. Install the collar (**Figure 36**).
34. Install the spacer (**Figure 35**).
35. Install the needle bearing (**Figure 34**).
36. On 1989 and later KX500 models, install the spacer (**Figure 24**).
37. Install the spring seat (**Figure 33**).
38. Install the spring (**Figure 32**).
39. On 1989 and later KX250 models, install the washer (**Figure 23**).
40. Install the gear (**Figure 31**) so that the pin slot faces up.



41. Compress the gear and install the pin (**Figure 30**).

EXHAUST ADVANCER ASSEMBLY (1985 KX250)

Refer to **Figure 49** when performing the following.

Removal/Installation

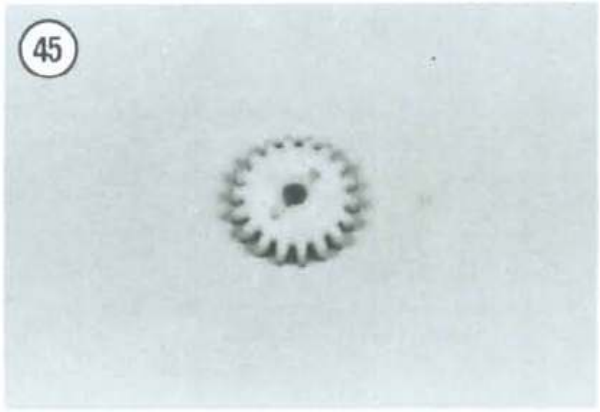
1. Remove the cylinder as described in Chapter Four.
2. Remove the clutch cover as described in this chapter.
3. Remove the rod arm from the crankcase and remove the exhaust advancer assembly (**Figure 50**).
4. Service the exhaust advancer assembly as described in this chapter.
5. Install the exhaust advancer assembly into the crankcase (**Figure 50**).
6. Insert the rod arm pin into the hole in the right-hand case half hole. Then place the rod arm on the rod arm pin and insert the rod arm into the groove in the exhaust advance lever.
7. Install the clutch cover as described in this chapter.
8. Install the cylinder as described in Chapter Four.

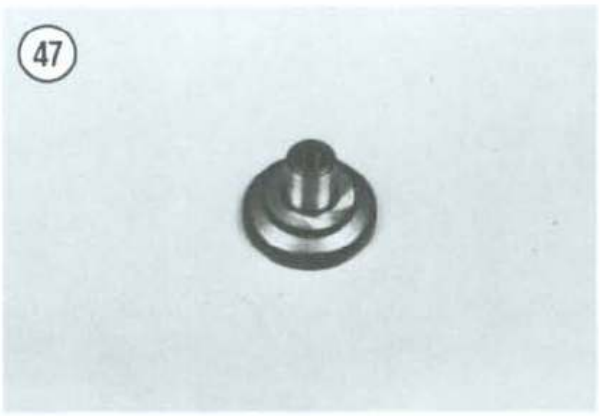
Advancer Assembly Disassembly/Inspection/Assembly

NOTE

The advancer assembly is comprised of a number of parts. Make sure to store parts in their order of removal to ease assembly.

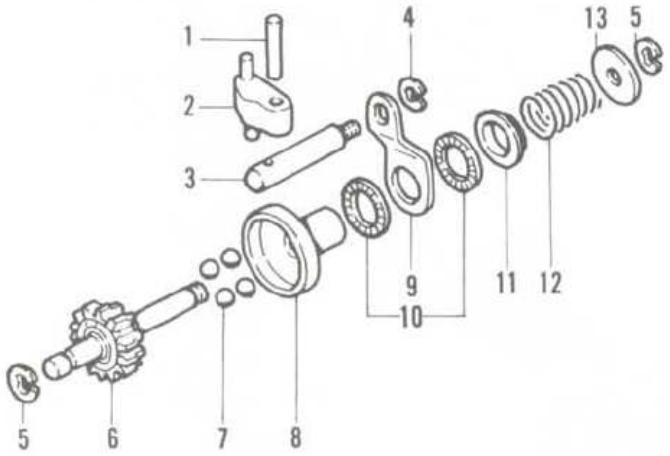
1. Remove the circlips and disassemble the exhaust advancer assembly in the order shown in **Figure 49**.
2. Clean all of the system parts in solvent and thoroughly dry.
3. Check the rod for scoring or deep wear marks.
4. Check the needle bearings for loose needles or other damage.
5. Check the gear for worn or broken teeth. Check the pin slot in the gear for damage.
6. Check the holder for deep scoring or other damage.
7. Replace worn or damaged parts.
8. Install one circlip and reassemble in the reverse order of disassembly. Install the opposite circlip.





49

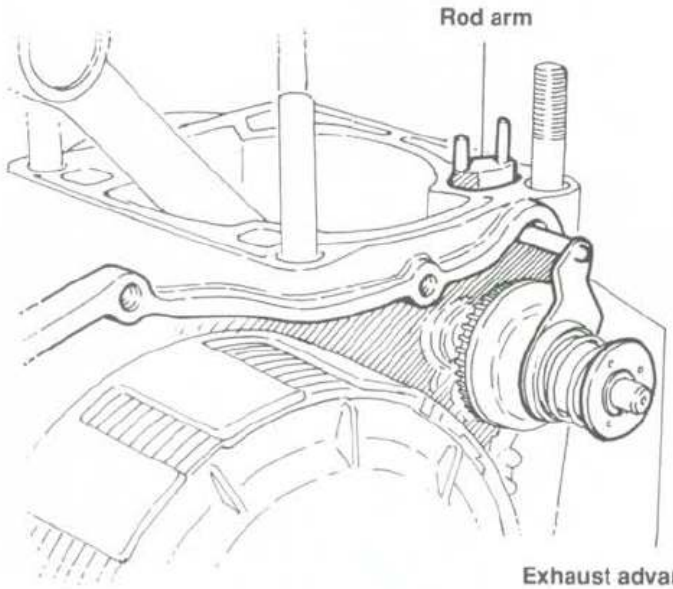
EXHAUST ADVANCER ASSEMBLY (1985 KX250)



1. Pin
2. Rod arm
3. Rod
4. Circlip
5. Circlip
6. Exhaust advancer shaft
7. Balls
8. Holder
9. Plate
10. Needle bearings
11. Collar
12. Spring
13. Washer

6

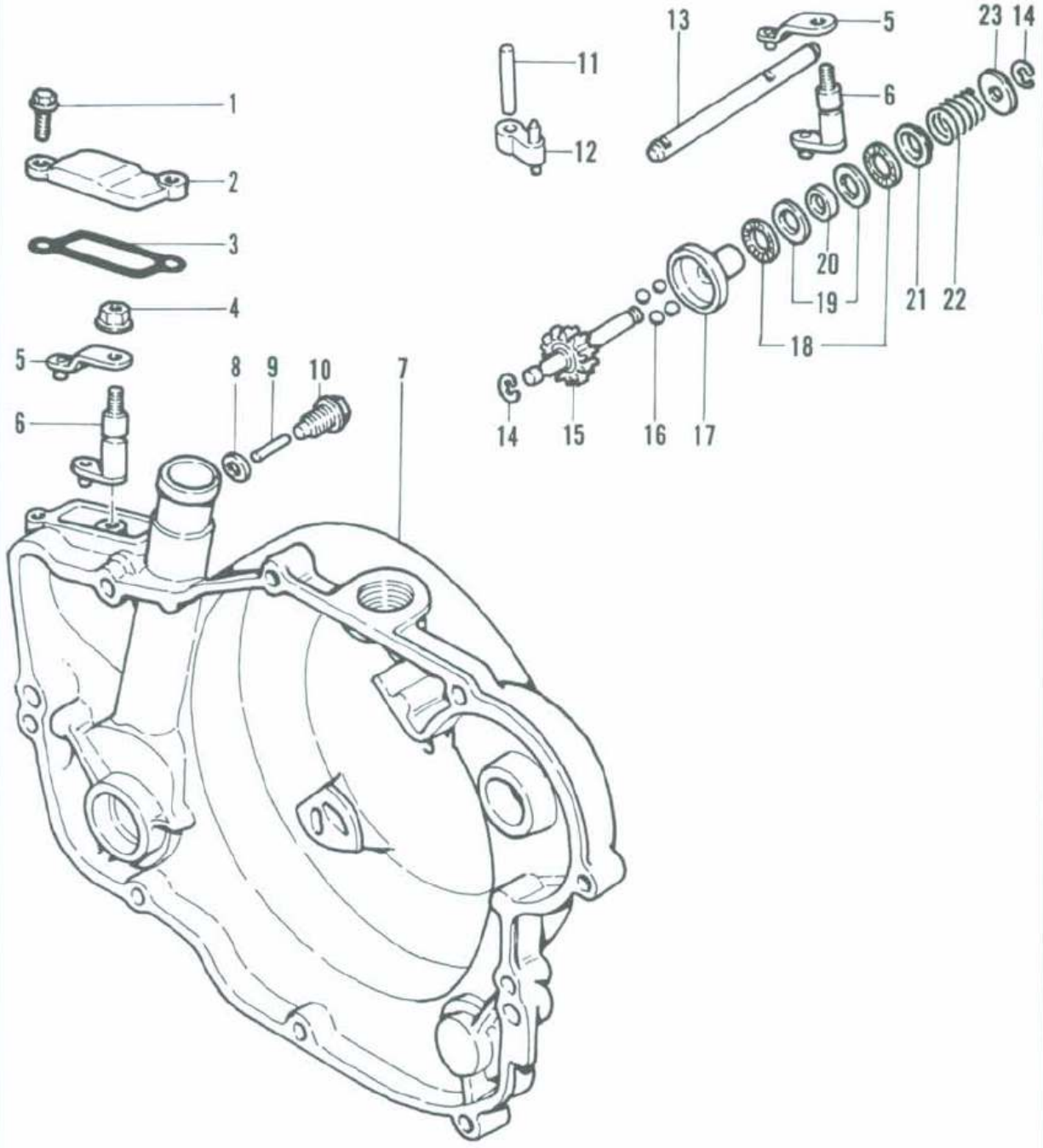
50



Exhaust advancer assembly

(51)

EXHAUST ADVANCER ASSEMBLY (1986 KX250)



1. Bolt
2. Cover
3. Gasket
4. Nut
5. Shaft lever
6. Advancer lever
7. Cover
8. Washer
9. Pin
10. Pin bolt
11. Pin
12. Rod arm
13. Rod
14. Circlip
15. Exhaust advancer shaft
16. Balls
17. Holder
18. Needle bearings
19. Spacers
20. Collar
21. Collar
22. Spring
23. Washer

Make sure both circlips seat in their grooves completely. Secure the rod to the plate with its circlip.

EXHAUST ADVANCER ASSEMBLY (1986 KX250)

Refer to **Figure 51** when performing the following.

Removal/Installation

1. Remove the clutch cover as described in this chapter.
2. Remove the exhaust advancer cover bolts and remove the cover and gasket from the top of the clutch cover.
3. Remove the shaft lever mounting nut and remove the shaft lever.
4. Remove the rod from the clutch cover.
5. Remove the pin bolt and washer from the clutch cover and remove the pin.
6. Remove the advancer lever and remove the exhaust advancer assembly.
7. Service the exhaust advancer assembly as described in this chapter.
8. Insert the advancer lever into the shaft hole in the clutch cover.
9. Insert the exhaust advancer assembly into the clutch cover.
10. Insert the advancer lever into the advancer assembly groove.
11. Insert the pin through the hole in the clutch cover and engage it with the groove in the advancer shaft. Install the pin bolt and washer and tighten securely.
12. Insert the rod through the clutch cover hole, then install the shaft lever onto the advancer lever so that the arm fits into the rod groove. Install and tighten the nut securely.
13. Apply molybdenum disulfide grease onto the exposed rod end.
14. Install the clutch cover as described in this chapter.

Advancer Assembly Disassembly/Inspection/Assembly

NOTE

The advancer assembly is comprised of a number of parts. Make sure to store parts in their order of removal to ease assembly.

1. Remove the circlips and disassemble the exhaust advancer assembly in the order shown in **Figure 51**.
2. Clean all of the system parts in solvent and thoroughly dry.
3. Check the rod for scoring or deep wear marks.
4. Check the needle bearings for loose needles or other damage.
5. Check the gear for worn or broken teeth. Check the pin slot in the gear for damage.
6. Check the holder for deep scoring or other damage.
7. Replace worn or damaged parts.
8. Install one circlip and reassemble in the reverse order of disassembly. Install the opposite circlip. Make sure both circlips seat in their grooves completely.

CLUTCH

The clutch is a wet multiplate type which operates immersed in the oil supply it shares with the transmission. The clutch boss is splined to the transmission mainshaft and the clutch housing can rotate freely on the mainshaft. The clutch housing is geared to the primary drive gear attached to the crankshaft.

The clutch release mechanism is mounted within the left-hand crankcase cover on the opposite side of the clutch mechanism.

The clutch can be removed with the engine in the frame.

CLUTCH SERVICE (KX125)

Refer to the clutch illustration for your model when performing the following:

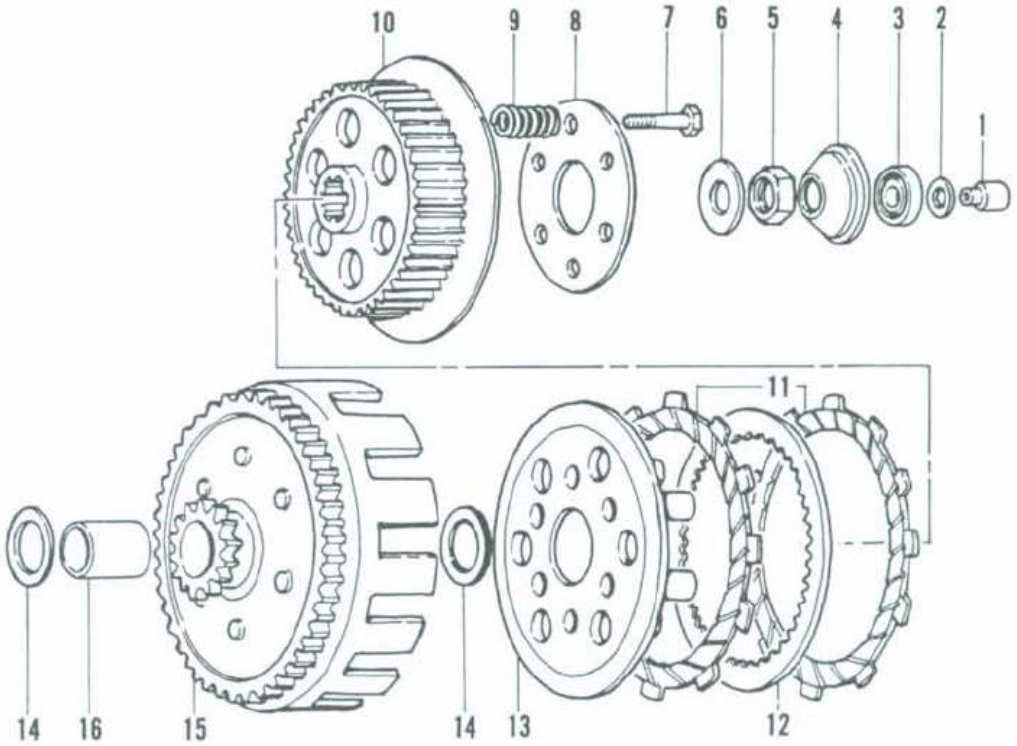
a. **Figure 52**: 1982-1984.
b. **Figure 53**: 1985-1987.
c. **Figure 54**: 1988-1989.
d. **Figure 55**: 1990-1991.

Removal/Disassembly

1. Remove the clutch cover as described in this chapter. On 1988-1991 models, remove the clutch access cover.

(52)

CLUTCH (1982-1984 KX125)



1. Pusher rod
2. Shim
3. Bearing
4. Pusher plate
5. Nut
6. Washer
7. Bolt
8. Spring plate
9. Spring
10. Clutch hub
11. Friction plates
12. Steel clutch plates
13. Clutch wheel
14. Washer
15. Clutch housing
16. Sleeve

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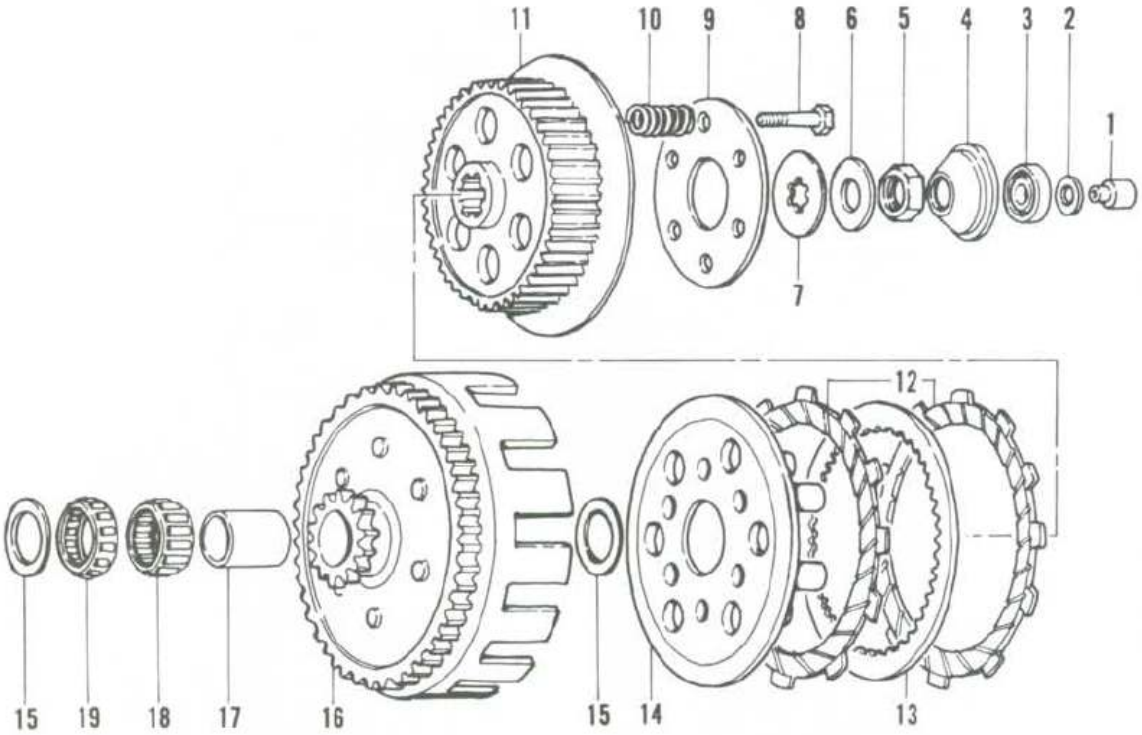
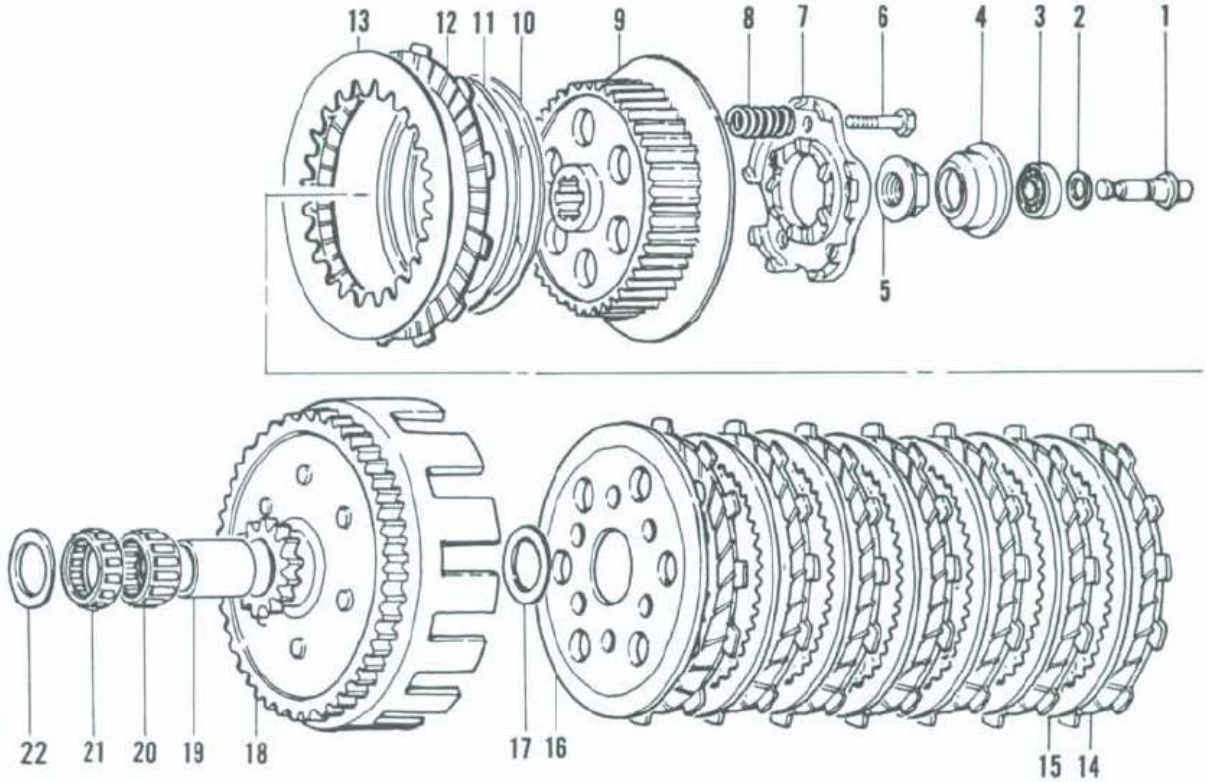
CLUTCH (1985-1987 KX125)



1. Pusher rod
2. Shim
3. Bearing
4. Pusher plate
5. Nut
6. Washer
7. Lockwasher
8. Bolt
9. Spring plate
10. Spring
11. Clutch hub
12. Friction plates
13. Steel clutch plates
14. Clutch wheel
15. Washer
16. Clutch housing
17. Sleeve
18. Needle bearing (long)
19. Needle bearing (short)

(54)

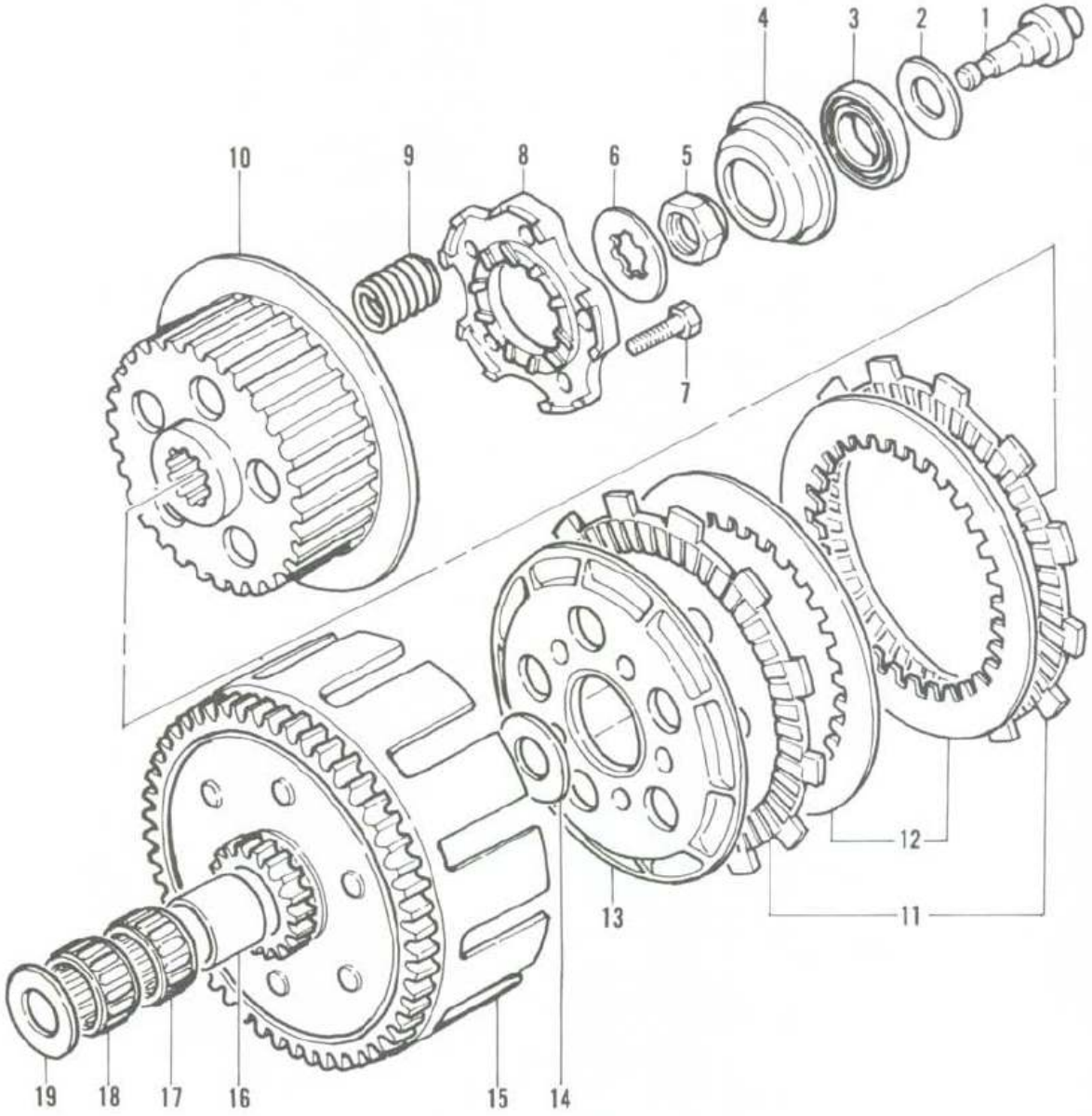
CLUTCH (1988-1989 KX125)



1. Pusher rod
2. Washer
3. Bearing
4. Pusher plate
5. Nut
6. Bolt
7. Spring plate
8. Spring
9. Clutch hub
10. Washer
11. Spring washer
12. Friction plate (I.D. 99 mm [3.89 in.])
13. Steel clutch plate (smooth surface)
14. Friction plates (I.D. 95 mm [3.74 in.])
15. Steel clutch plates (knurled surface)
16. Clutch wheel
17. Washer
18. Clutch housing
19. Sleeve
20. Needle bearing (long)
21. Needle bearing (short)
22. Washer

55

CLUTCH (1990-1991 KX125)

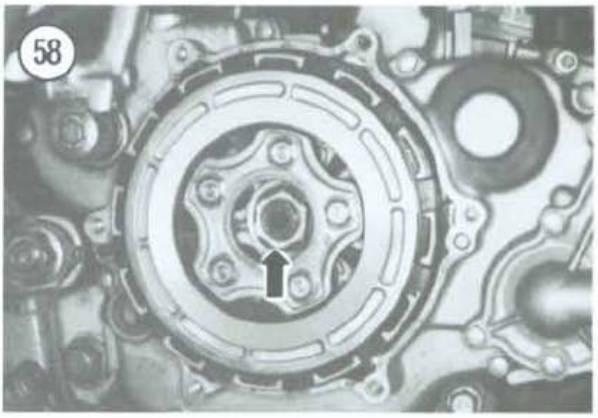


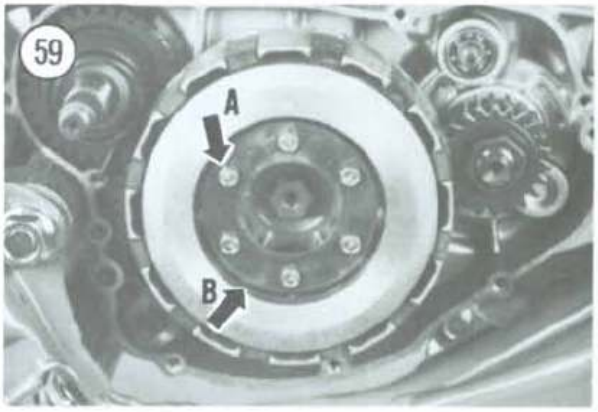
1. Pusher rod
2. Washer
3. Bearing
4. Pusher plate
5. Nut
6. Lockwasher
7. Bolt
8. Spring plate
9. Spring
10. Clutch hub
11. Friction plates
12. Steel clutch plates
13. Clutch wheel
14. Washer
15. Clutch housing
16. Sleeve
17. Needle bearing (long)
18. Needle bearing (short)
19. Washer

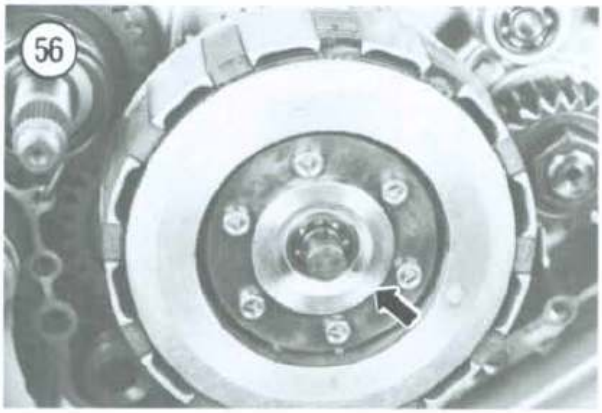
2. Remove the pusher rod, washer, bearing and pusher plate from the spring plate. See **Figure 56** (1982-1987) or **Figure 57** (1988-1991).
3. Flatten the bent up portion of the clutch hub nut lockplate, if used.
4. Remove the flywheel rotor cover and hold the flywheel rotor with a holding tool to prevent the clutch nut from turning when loosening it in Step 5. Refer to *Flywheel Rotor Removal* in Chapter Nine.
5A. On 1988-1989 models, loosen and remove the clutch nut (**Figure 58**).
5B. On all other models, loosen and remove the clutch nut (**Figure 58**) and washer(s).
6. Loosen the spring plate bolts (A) gradually in a crisscross pattern, then remove the bolts and spring plate (B). See **Figure 59** (1982-1987) or **Figure 60** (1988-1991).
7. Remove the clutch springs.

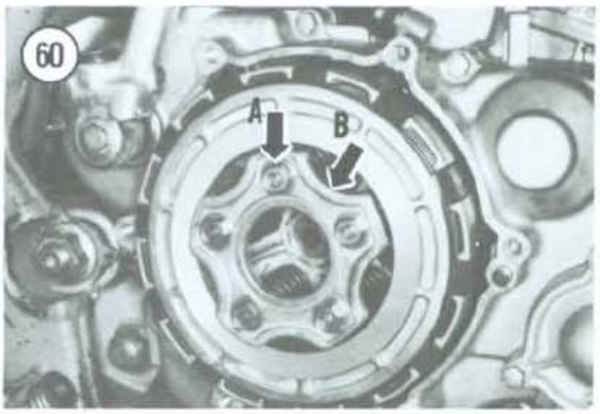
NOTE

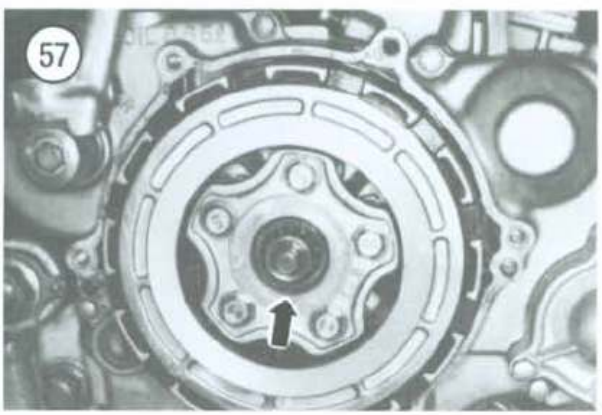
If it is not necessary to disassemble the clutch hub/plate assembly, install the clutch springs, a large washer and the spring plate bolts as shown in ***Figure 61****. The bolts will allow you to remove*

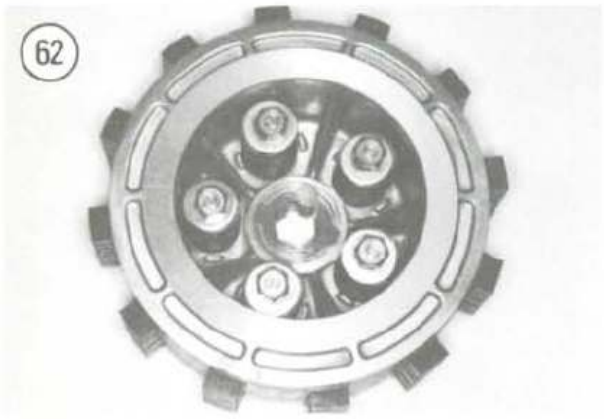


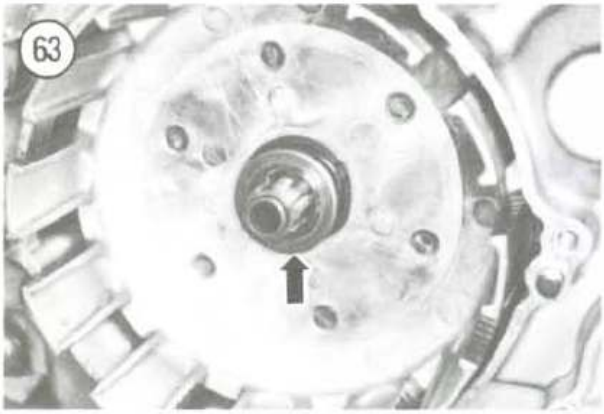












the hub assembly without having to align the plates during assembly.

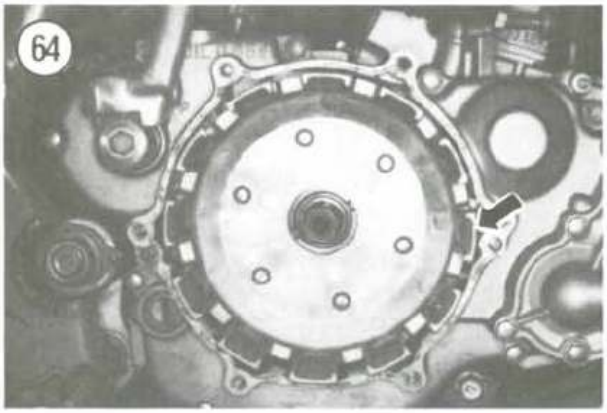
8. Remove the clutch/plate assembly (**Figure 61**). See **Figure 62**.
9. Remove the thrust washer (**Figure 63**).
10. Remove the clutch housing (**Figure 64**).
11. On 1985-1991 models, remove the 2 needle bearings (**Figure 65**).
12. Remove the sleeve (**Figure 66**).
13. Remove the washer (**Figure 67**).
14. If necessary, disassemble the clutch hub/plate assembly in the order shown in **Figures 52-55** for your model.
15. Inspect the clutch assembly as described under *Clutch Inspection* in this chapter.

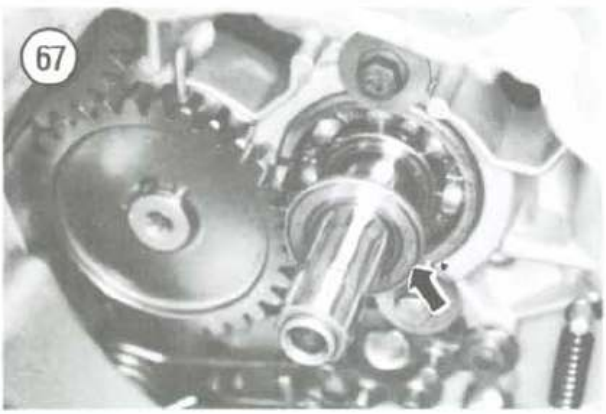
6

Assembly/Installation

Refer to **Figures 52-55** for your model when assembling and installing the clutch.

1. Coat all clutch parts with transmission oil before reassembly.





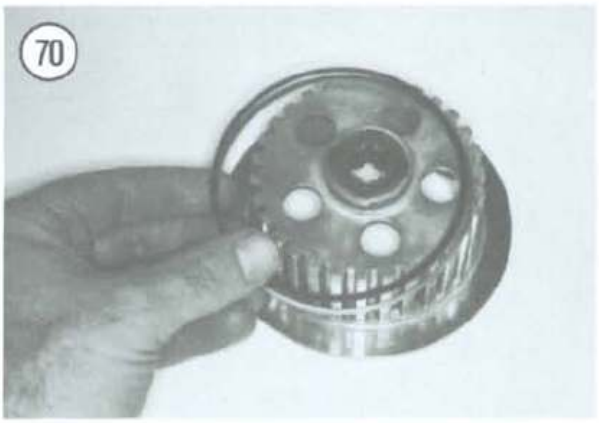
2. Assemble the clutch hub/plate assembly as follows:

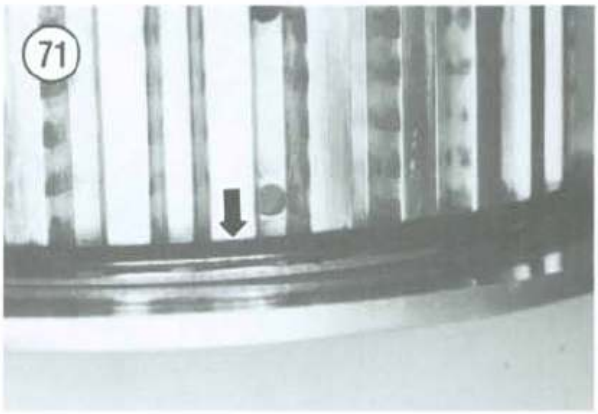
a. Place the clutch hub onto the workbench so that it faces in the direction shown in **Figure 68**.

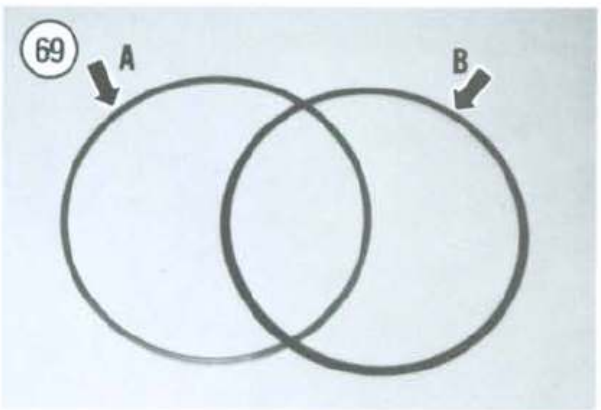
b. On 1988-1989 models, identify the flat spring (A, **Figure 69**) and the spring washer (B, **Figure 69**). Then install the flat spring and the spring washer over the clutch hub (**Figure 70**). The concave side of the spring washer should face to the inside as shown in **Figure 71**.

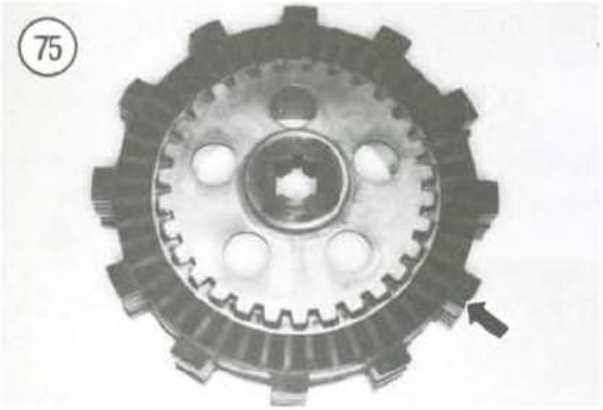
c. On 1988-1989 models, the inside diameter of one friction plate is larger than the other friction plates (99 mm and 95 mm). Install the larger inner diameter friction plate (99 mm) first (**Figure 72**). On all other models, the inside diameter of all friction plates is the same. Install a friction plate now (**Figure 73**).

d. Install a steel plate (**Figure 74**). On 1988-1989 models, first install the steel plate with the smooth surface (all other steel plates have a knurled surface).









e. Alternate until all of the clutch plates are installed. The last plate installed should be a friction plate (**Figure 75**).

f. Position the friction plates so that all of the plate tabs align as shown in **Figure 75**.

g. Install the clutch wheel (**Figure 76**).

h. Install a clutch spring bolt, spring and washer as shown in **Figure 77**. The bolt will hold the assembly together during installation.

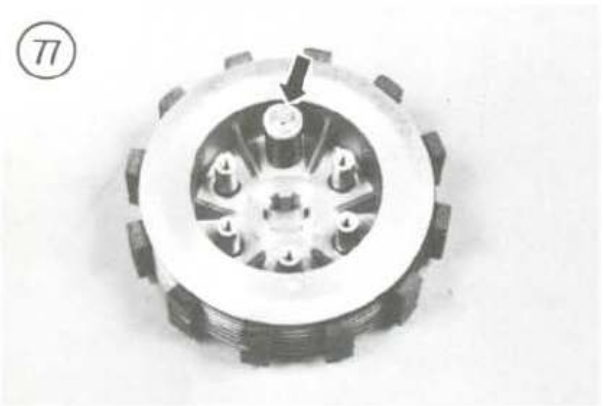
i. Install the clutch plate assembly into the clutch housing, aligning all of the friction plates as shown in **Figure 78**, then remove the plate assembly and set it aside.

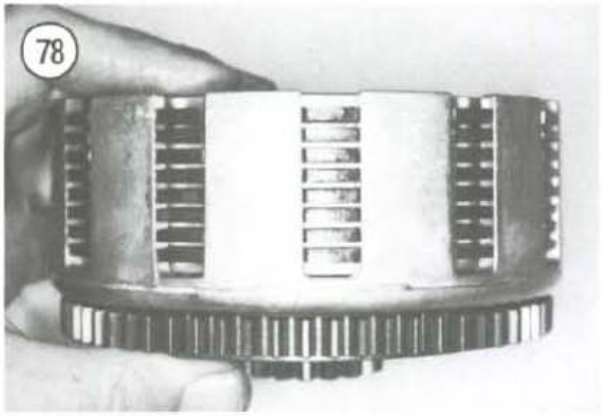
3. Slide the washer (**Figure 67**) onto the mainshaft.

4. Apply molybdenum disulfide grease to the outside of the sleeve and slide the sleeve onto the mainshaft (**Figure 66**). Seat it against the washer.

NOTE

*The 2 bearings (**Figure 79**) installed in Step 5 are different—one bearing is shorter than the other.*





5. On 1985-1991 models, install the shorter bearing, then the longer bearing over the spacer. See **Figure 65**.

6. Install the clutch housing (**Figure 64**).

7. Install the thrust washer (**Figure 63**).

8. Align the clutch hub/plate assembly with the clutch housing and install the hub assembly (**Figure 61**).

9. Remove the bolts, springs and washers installed previously. Set the washers aside as they are not used in the final assembly.

10. Install the clutch springs.

11. Install the clutch spring holder and the clutch spring bolts (**Figure 60**). Tighten the bolts in a crisscross pattern.

NOTE

On 1988-1991 models, install a new clutch nut. Do not reuse the old nut.

NOTE

If the clutch assembly does not use a lockwasher, apply Loctite 242 (blue) to the clutch nut before installing and tightening it in Step 12.

12. Referring to **Figures 52-55** for your model, install the clutch nut and washer(s).

13. Secure the clutch housing with the same tool used during removal. Tighten the clutch nut to the torque specification in **Table 3**.

14. Bend the lockwasher tab to lock the washer against the clutch nut, if used.

15. On 1991 models, stake the clutch hub nut at 3 alternate spline grooves on the nut.

CAUTION

When staking the nut in Step 15, do not shock the shaft with the punch or you may damage the shaft and bearings.

16. Assemble the pusher plate, bearing, washer and pusher as shown in **Figures 52-55** for your model.

17. Install the pusher plate assembly. See **Figure 56** (1982-1987) or **Figure 57** (1988-1991).

18. Install the clutch cover as described in this chapter.

CLUTCH SERVICE (KX250 AND KX500)

Refer to **Figure 80** (1982-1986) or **Figure 81** (1987-on) when servicing the clutch.

Removal

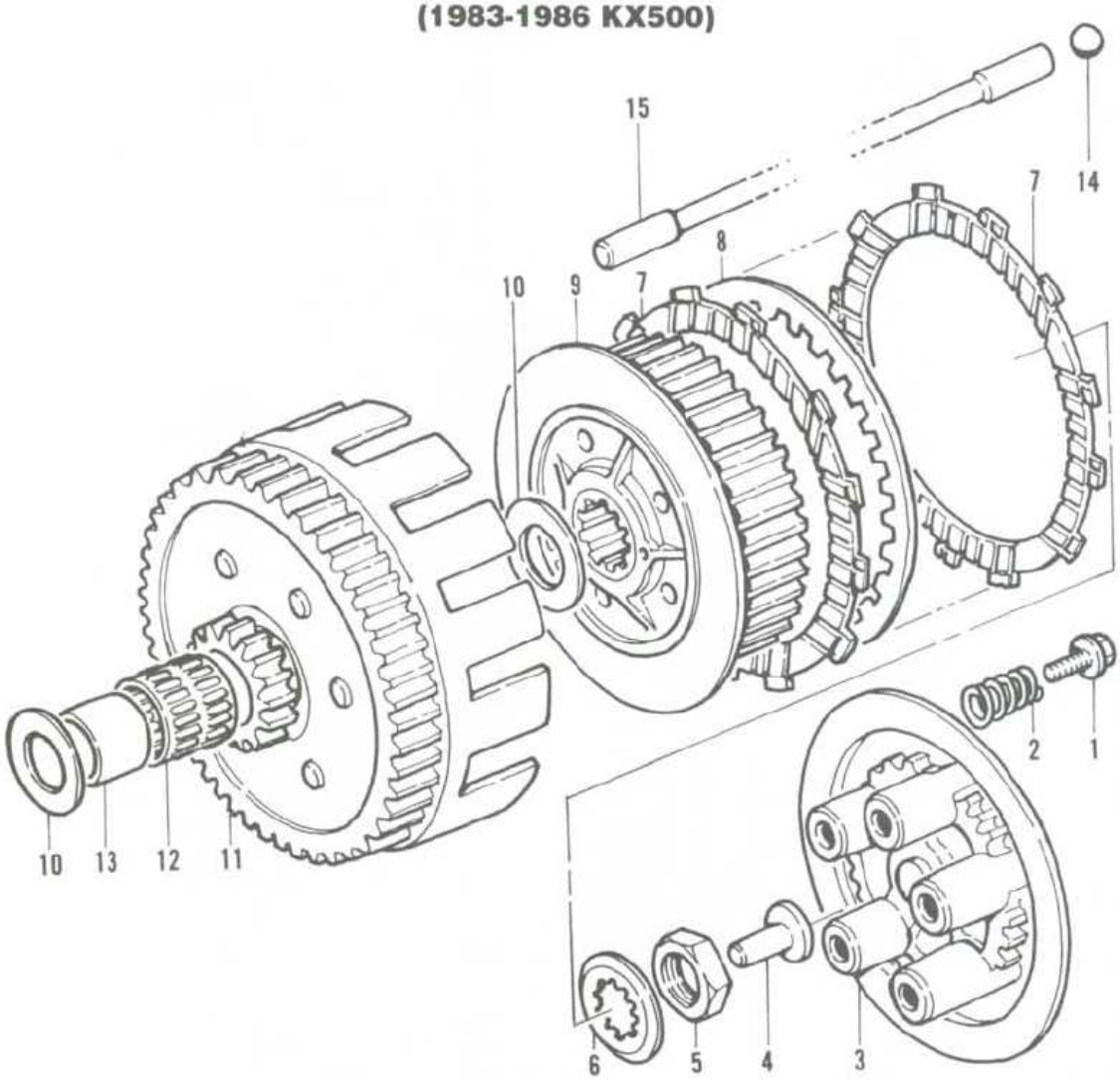
1. Remove the clutch cover as described in this chapter. On 1988-1991 KX250 models, remove the clutch access cover.
2. Loosen and remove the clutch spring bolts (**Figure 82**) in a crisscross pattern.
3. Remove the clutch springs (**Figure 83**).
4. Remove the pressure plate (**Figure 84**).
5A. On 1982-1986 models, remove the pusher rod and ball.
5B. On 1987 and later models, remove the pusher rod and washer (if used).
6. Remove the clutch plates as an assembly (**Figure 85**).
7. Hold the clutch hub with a clutch holder (**Figure 86**). Then loosen and remove the clutch hub nut and washer.
8. Remove the clutch hub (**Figure 86**).
9. Remove the washer (**Figure 87**).
10. Remove the clutch housing (**Figure 88**).
11. Remove the bearing and sleeve (**Figure 89**).
12. Remove the washer (**Figure 90**).
13A. On 1988-1990 KX250 models, remove the pushrod and the pushrod bushing.
13B. On all other models, remove the pushrod (**Figure 91**).
14. Inspect the clutch assembly as described under *Clutch Inspection* in this chapter.

Installation

1. Coat all clutch parts with transmission oil before reassembly.
2. On all models except 1988-1990 KX250 models, install the pushrod into the mainshaft (**Figure 91**).
3. Install the washer (**Figure 90**).
4. Apply molybdenum disulfide grease to the outside of the sleeve and install the sleeve and bearing (**Figure 89**).
5. Install the clutch housing (**Figure 88**).
6. Install the washer (**Figure 87**).
7. Install the clutch hub (**Figure 86**).
8. Install the splined washer (**Figure 92**).

(80)

CLUTCH
(1982-1986 KX250)
(1983-1986 KX500)

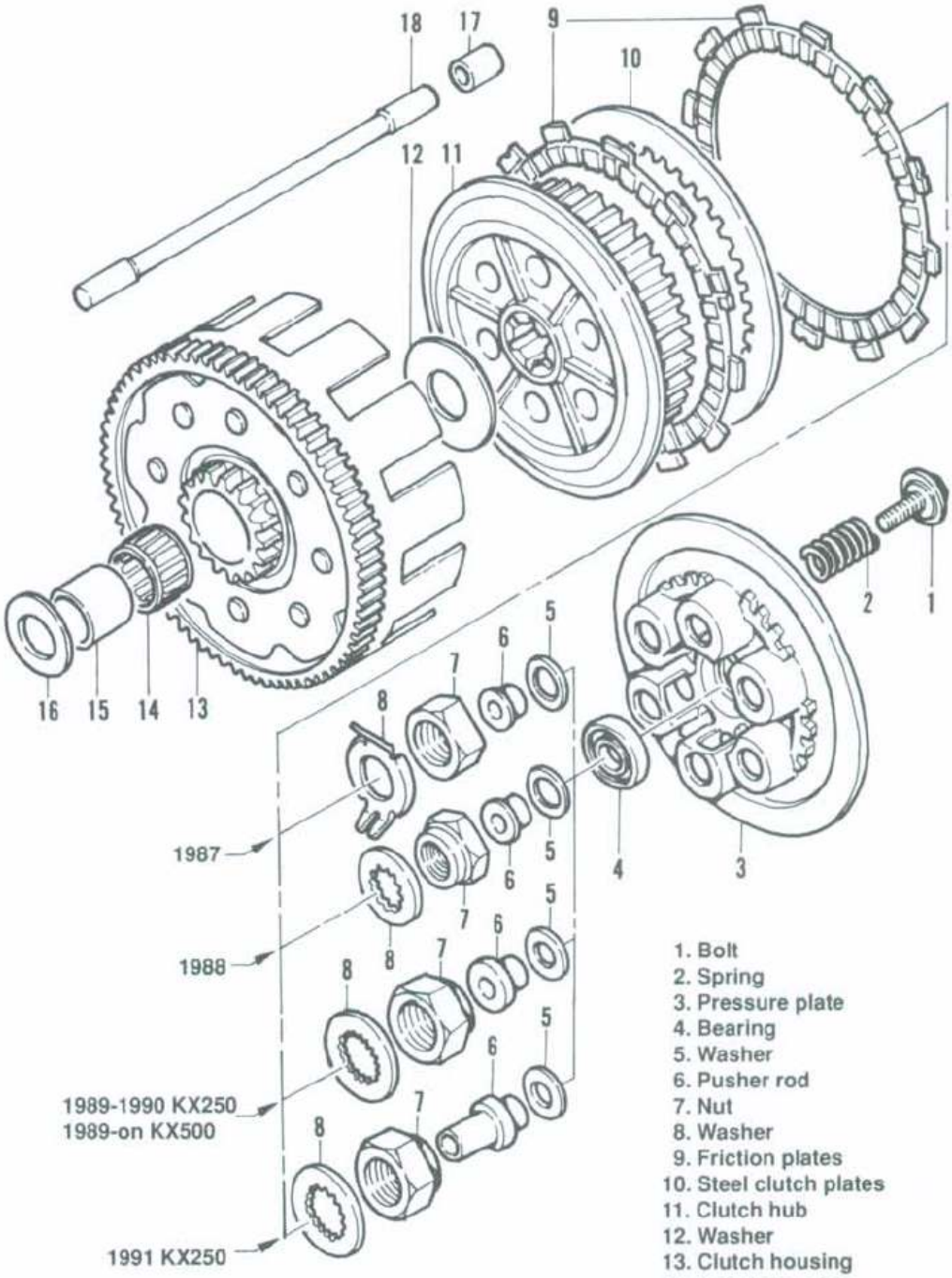


1. Bolt
2. Spring
3. Pressure plate
4. Pusher rod
5. Nut
6. Lockwasher
7. Friction plate
8. Steel clutch plates
9. Clutch boss
10. Washer
11. Clutch housing
12. Needle bearing*
13. Sleeve
14. Ball
15. Pushrod

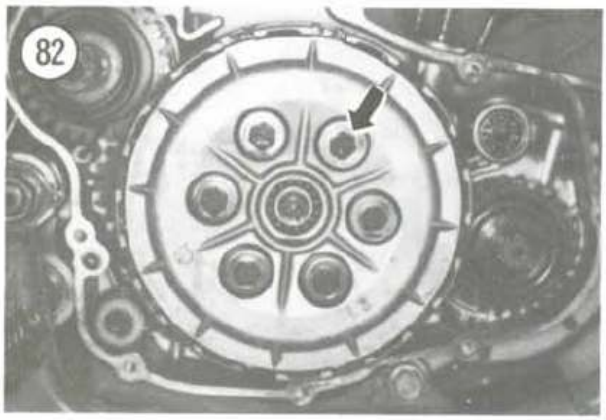
* The needle bearing (part No. 12) is used on 1983-1986 KX250 models. On 1983 KX500 models, there was an early and late style clutch housing. The early style did not use the needle bearing while the late style did. When replacing the clutch housing, and especially when looking at used engine parts, make sure you select the correct clutch housing, sleeve and needle bearing (if used). See your Kawasaki dealer for appropriate part numbers when replacing these parts.

(81)

CLUTCH
(1987-1991 KX250)
(1987-ON KX500)



1. Bolt
2. Spring
3. Pressure plate
4. Bearing
5. Washer
6. Pusher rod
7. Nut
8. Washer
9. Friction plates
10. Steel clutch plates
11. Clutch hub
12. Washer
13. Clutch housing
14. Needle bearing
15. Sleeve
16. Washer
17. Bushing (1988-1990 KX250)
18. Pushrod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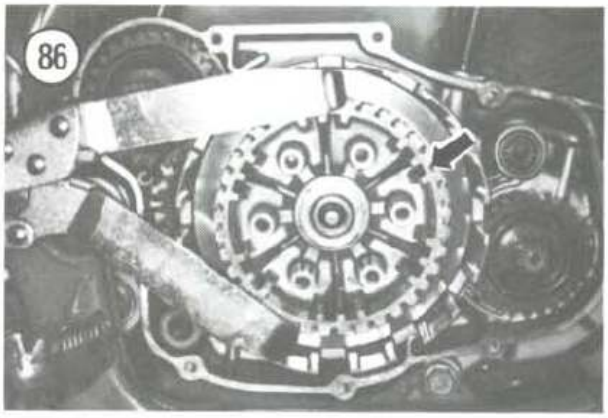
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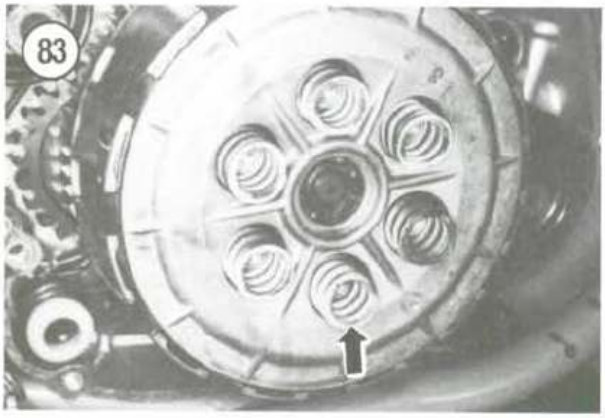
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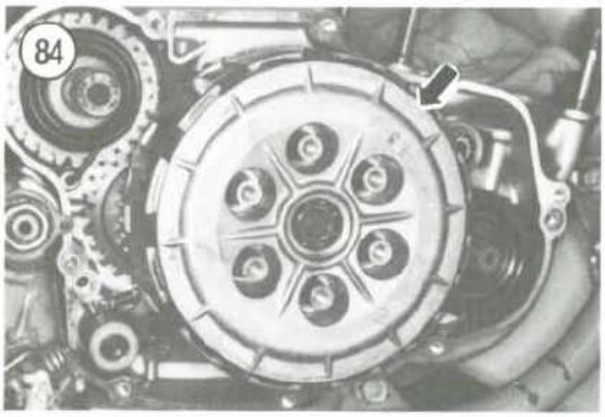
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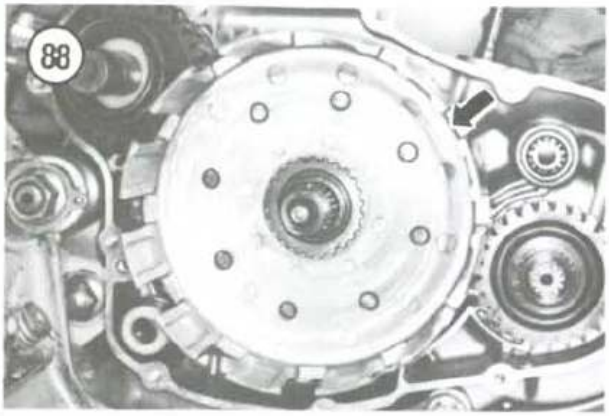
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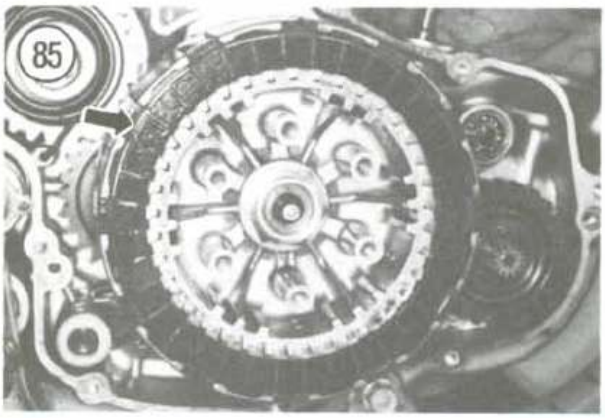
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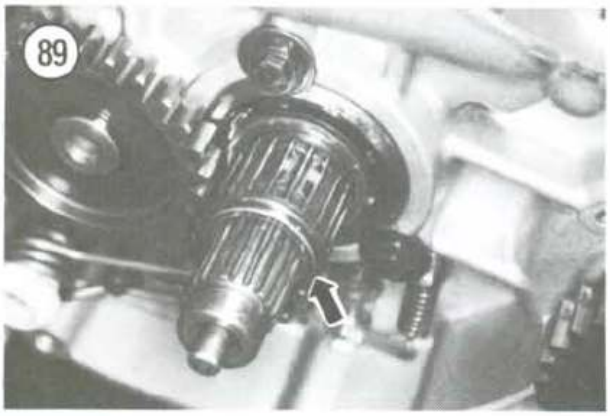
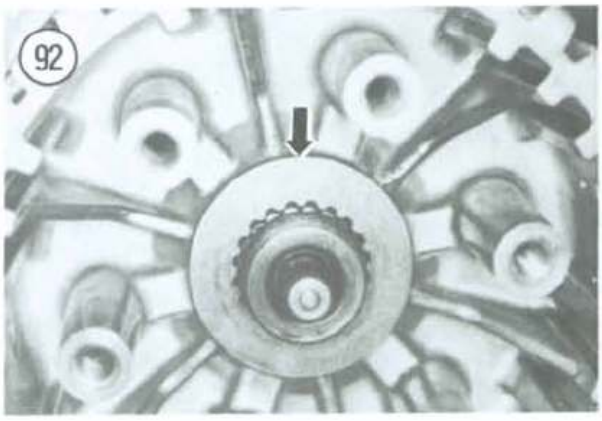
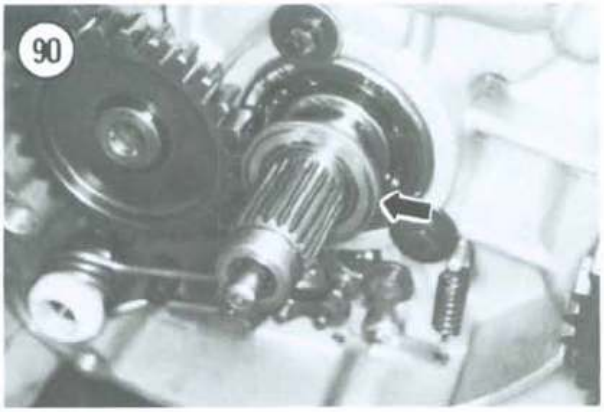

89

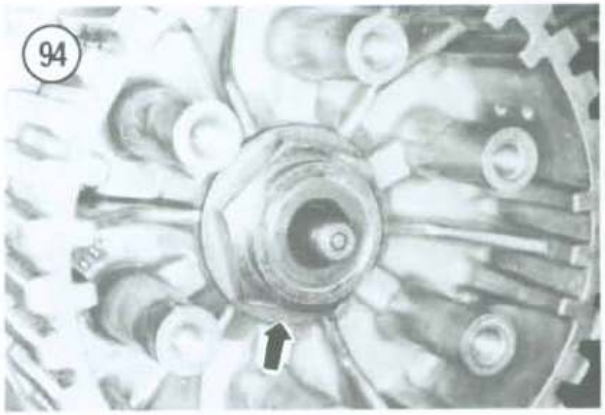
NOTE

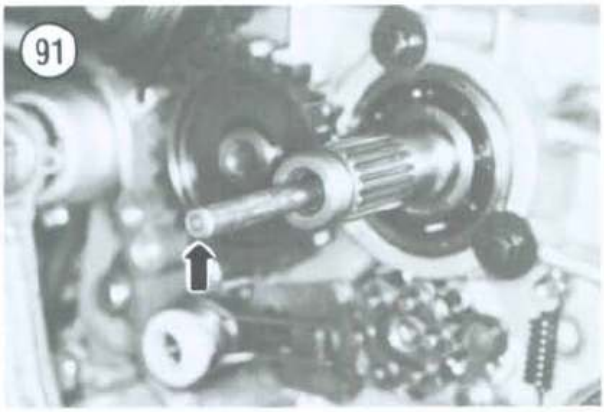
*If the clutch nut on your model has a shoulder (**Figure 93**), install the nut so that the shoulder faces out (**Figure 94**).*

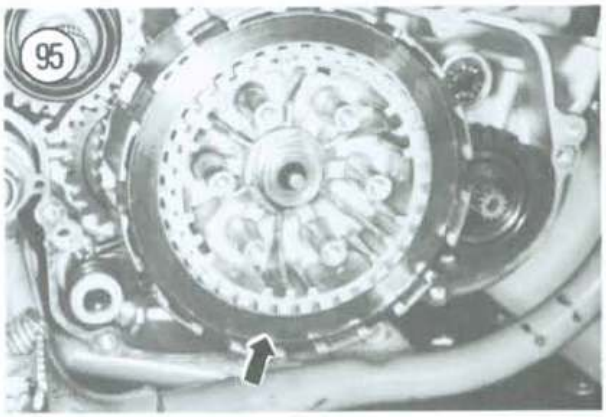
9. Hold the clutch hub with a clutch holder (**Figure 86**). Then install the clutch nut and tighten to the torque specification listed in **Table 4**.
10. If the washer used on your model is used as a lockplate, bend the washer against one flat on the clutch nut.
11. Install the friction discs and the clutch plates alternately, beginning with a friction disc (**Figure 85**), then a clutch plate (**Figure 95**). The last plate installed should be a friction disc.
12. On 1988-1990 KX250 models, set the pushrod bushing length and install the pushrod as follows:
    a. Insert the pushrod bushing (**Figure 96**), chamfer end in first, into the end of the mainshaft until it stops. Do not install the pushrod at this time.
    b. Measure the distance between the end of the mainshaft and the bushing as shown in **Figure 96**. The measured distance should be more than 1.5 mm (0.059 in.).











c. If the measured bushing distance is 1.5 mm (0.059 in.) or less, the bushing may be worn or cracked. Replace the bushing and repeat sub-steps a and b.

d. If the measured bushing distance is more than 1.5 mm (0.059 in.), tap the bushing squarely into the mainshaft (with a brass hammer) until the measured distance is 1.5 mm (0.059 in.). Tap the bushing carefully so as not to mushroom the end of it.

CAUTION

If the bushing is pressed in too far (measured distance is less than 1.5 mm/0.059 in.), the chamfer on the end of the bushing will ride over the stepped portion in the mainshaft, thus reducing the bushings inside diameter. This will prevent the pushrod from being installed through the bushing or will cause the pushrod to drag through the bushing when the clutch is operated.

e. Insert the pushrod (**Figure 96**) through the bushing and into the mainshaft. If there is a slight drag on the pushrod and the measured distance of 1.5 mm (0.059 in.) is correctly maintained, check for a bent pushrod by rolling it on a flat surface or use a V-block and dial indicator. If the pushrod is not bent, sand it lightly. Then wash the pushrod in solvent, dry thoroughly and reinstall. Repeat until the pushrod slides smoothly through the bushing.

13. Apply molybdenum disulfide grease to the pusher rod and ball (if used). See **Figure 80**.

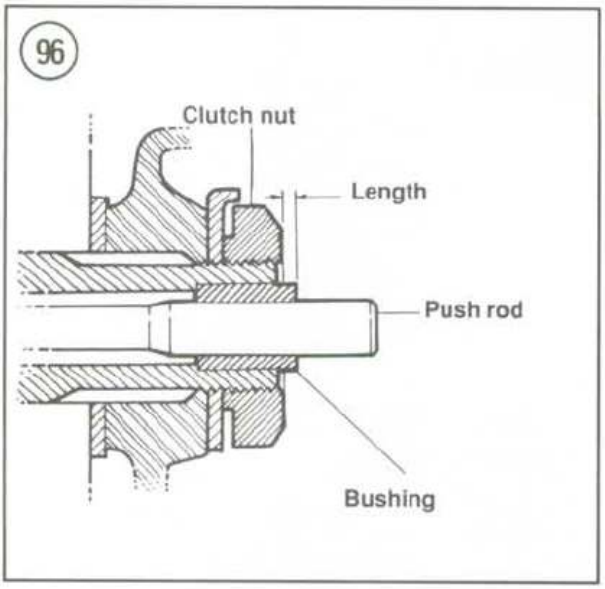
14A. On 1982-1986 models, install the ball and pusher rod.

14B. On 1987 and later models, install the pusher rod and washer. See **Figure 81**.

15. Install the pressure plate (**Figure 84**).

16. Install the clutch springs (**Figure 83**) and bolts (**Figure 82**). Tighten the bolts securely in a crisscross pattern in 2 or 3 stages.

17. Install the clutch cover as described in this chapter.



CLUTCH INSPECTION (ALL MODELS)

Clutch service specifications and wear limits are listed in **Table 1** (KX125) and **Table 2** (KX250 and KX500).

1. Clean all parts in solvent thoroughly dry with compressed air, if available.

2. Measure the free length of each clutch spring (**Figure 97**) with a vernier caliper. Replace the springs as a set if any one spring is too short.

3. The friction material used on the friction plates (**Figure 98**) is made of cork that is bonded onto an aluminum plate for warp resistance and durability. Measure the thickness of each friction plate at several places around the disc (**Figure 99**) with a vernier caliper. Replace all friction plates if any one is found too thin. Do not replace only 1 or 2 plates.

4. Place each friction plate on a flat surface (like a piece of thick plate glass) and check for warpage with a feeler gauge (**Figure 100**). If any plate is warped more than specified, replace the entire set of plates. Do not replace only 1 or 2 plates.

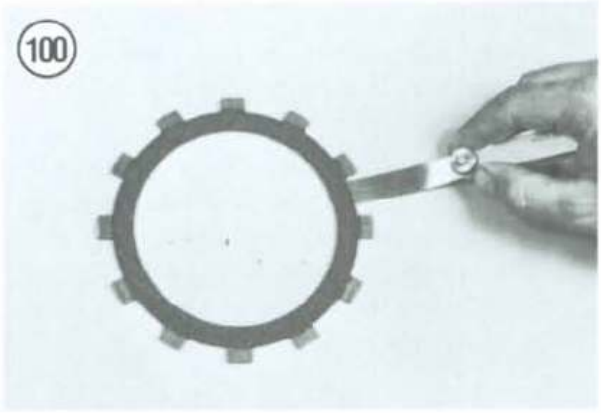
5. Place each clutch metal plate (**Figure 101**) on a flat surface and check for warpage with a feeler gauge (**Figure 102**). If any plate is warped more than specified, replace the entire set of plates. Do not replace only 1 or 2 plates.

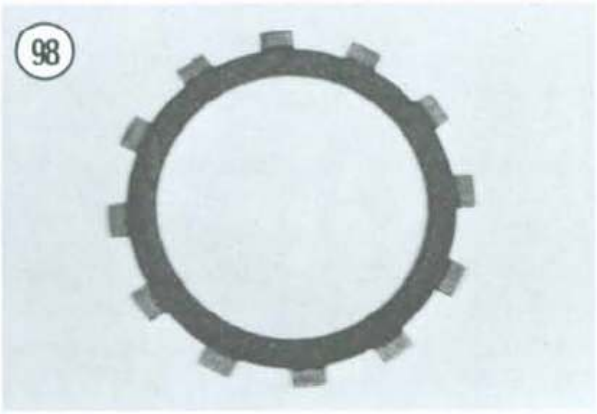
6. The clutch metal plate inner teeth (**Figure 101**) mesh with the clutch hub splines (A, **Figure 103**). Check the splines for cracks or galling. They must be smooth for chatter-free clutch operation. If the clutch hub splines are worn, check the clutch metal plate teeth for wear or damage.

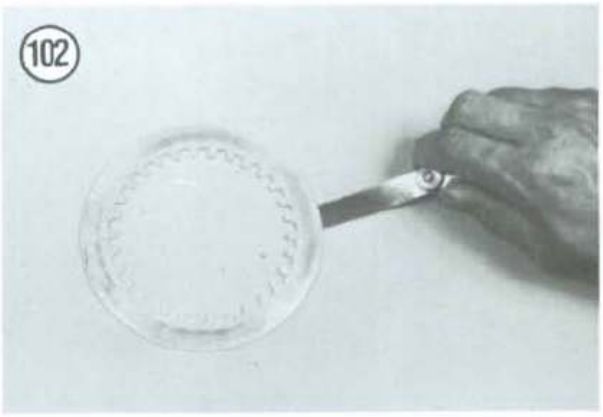
7. Inspect the shaft splines (B, **Figure 103**) in the clutch hub assembly. Repair minor damage with a fine cut file. If damage is severe, replace the assembly.

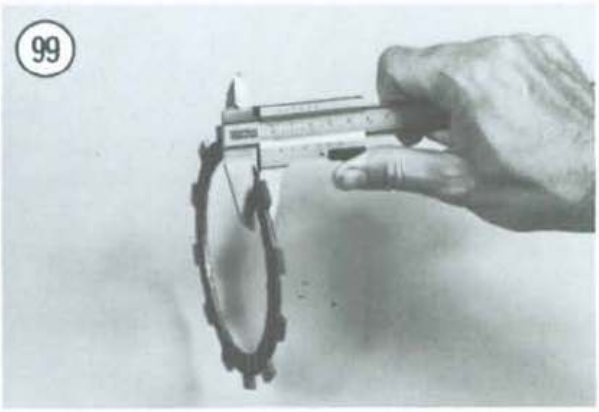
8. On KX125 models, inspect the clutch wheel bolt studs (**Figure 104**) for thread damage or cracks at the base of the studs. Thread damage may be repaired with the correct size metric tap. Use kerosene on the tap threads. If a bolt stud is cracked, the clutch wheel must be replaced.

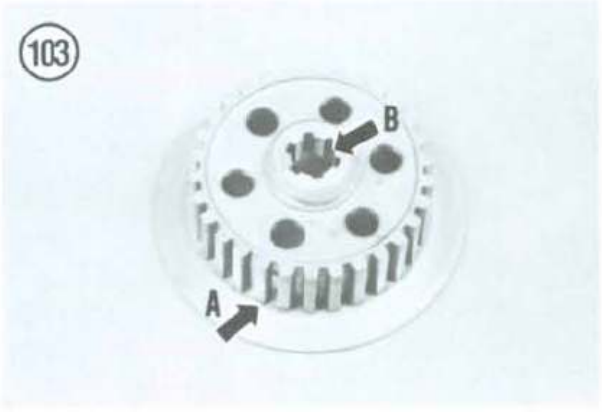
9. On KX250 and KX500 models, check the pressure plate spring towers (**Figure 105**) for damage.











Then inspect the clutch boss studs (**Figure 106**) as described in Step 8.

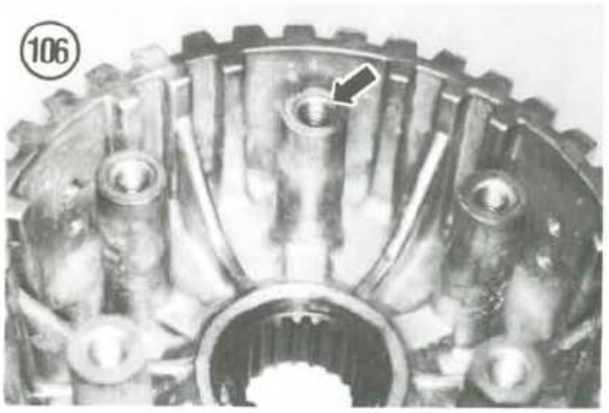
10. The friction plates (**Figure 98**) have tabs that slide in the clutch housing grooves (**Figure 107**). Inspect the tabs for cracks or galling in the grooves. They must be smooth for chatter-free clutch operation. Light damage can be repaired with an oilstone. Replace the clutch housing if damage is severe.

11. Check the clutch housing bearing bore (A, **Figure 108**) for cracks, deep scoring, excessive wear or heat discoloration. If the bearing bore is damaged, also check the mainshaft for damage. Replace worn or damaged parts.

12. Check the clutch housing gear teeth (B, **Figure 108**) for tooth wear, damage or cracks. Replace the clutch housing if necessary.

NOTE

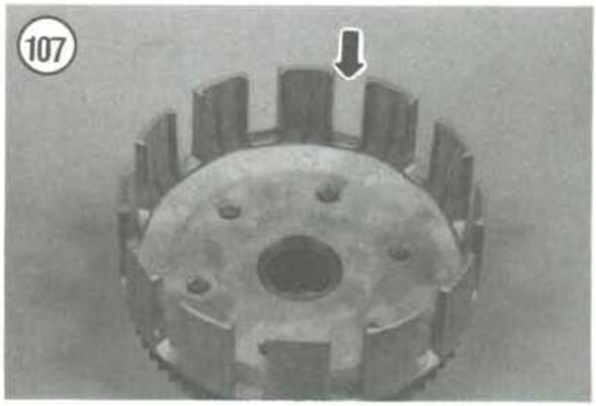
If the clutch housing gear teeth are damaged, the gear teeth on the primary drive gear and the kickstarter idler gear may also be damaged.



13. Check the pusher plate bearing for roughness or damage. Replace the bearing if necessary. See **Figure 109** or **Figure 110**.

14. Check the bearing and spacer assembly (**Figure 111**) for severe wear or damage.

15. Place a friction disc into the clutch housing and measure the clearance between the friction disc tang and the clutch housing finger with a feeler gauge (**Figure 112**). Check the clearance at each friction disc tang. If the clearance exceeds service limit in **Table 1** or **Table 2**, replace the friction discs as a set.



PRIMARY DRIVE PINION GEAR

The primary drive pinion gear is part of the primary drive gear system where power flows from the crankshaft to the transmission.

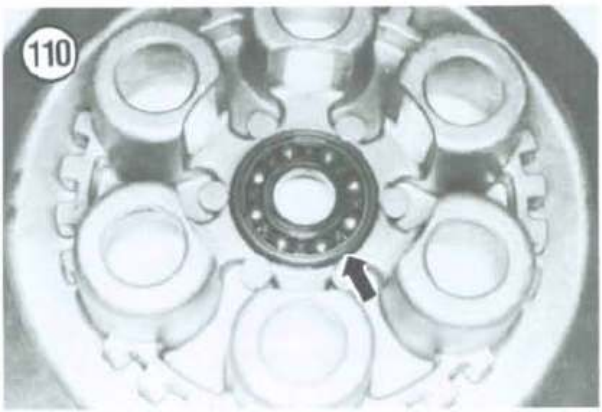
Removal/Installation (1982-1987 KX125)

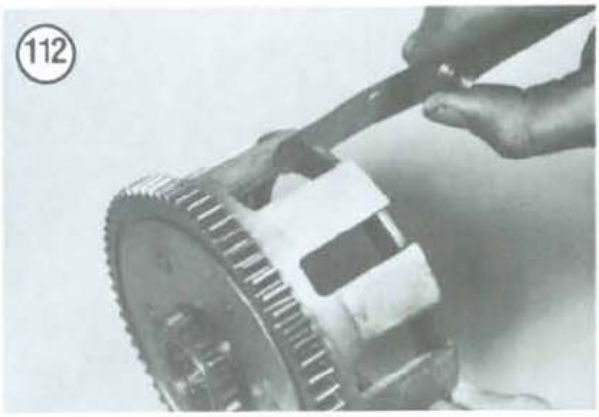
1. Remove the clutch as described in this chapter.
2. Remove the flywheel rotor cover and secure the flywheel rotor with a holding tool (to prevent the crankshaft from turning when loosening the primary drive gear nut) as described under *Rotor Removal/Installation* in Chapter Nine.

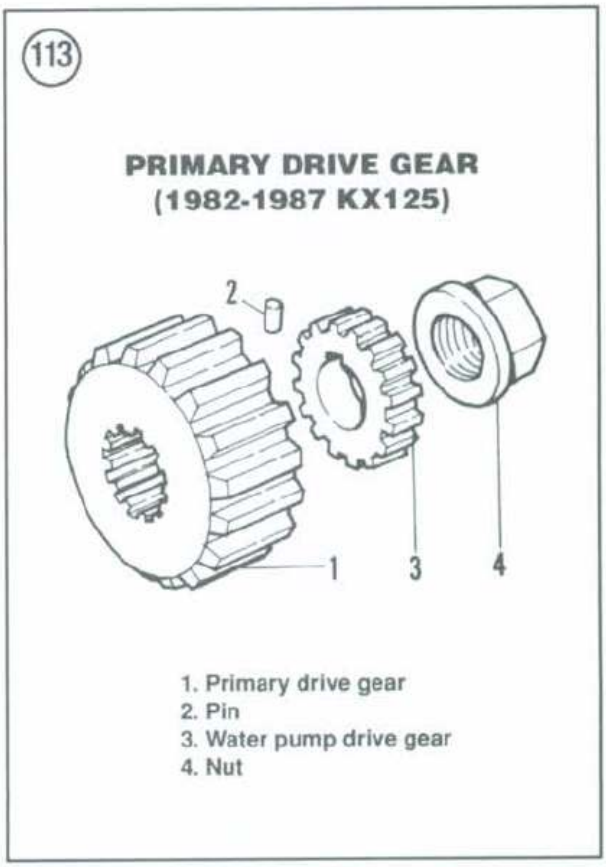
NOTE

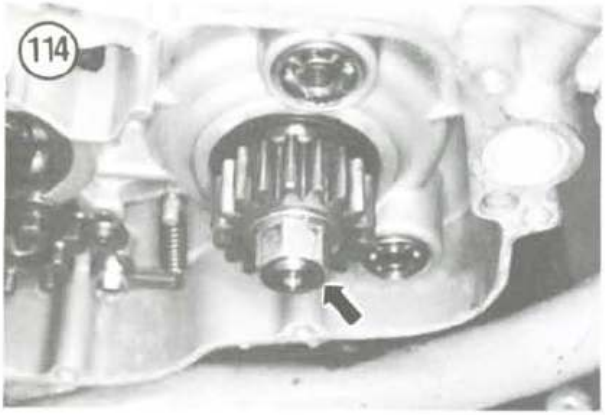
The primary drive gear nut uses left-hand threads.

3. Turn the primary drive gear nut clockwise and remove it from the crankshaft.
4. Remove the water pump drive gear.
5. Remove the pin (**Figure 113**) from the hole in the crankshaft.









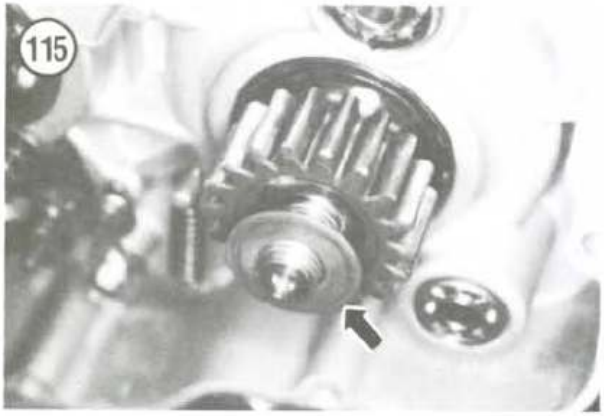
6. Remove the primary drive gear.

7. On 1982-1984 models, remove the Woodruff key from the crankshaft.

8. Install by reversing these steps. Note the following.

9. On 1985-1987 models, the primary drive gear teeth are chamfered on one side only. Install the gear so that the chamfered side faces "in."

10. Turn the primary drive gear nut counterclockwise when tightening it. Tighten to the torque specification listed in **Table 3**.



Removal/Installation (1988-1991 KX125)

1. Remove the clutch as described in this chapter.

2. Remove the flywheel rotor cover and secure the flywheel rotor with a holding tool (to prevent the crankshaft from turning when loosening the primary drive gear nut) as described under *Flywheel Rotor Removal/Installation* in Chapter Nine.

3. Loosen and remove the primary drive gear nut (**Figure 114**) and washer (**Figure 115**).

4. Remove the primary drive gear (**Figure 116**).

5. Remove the Woodruff key (**Figure 117**).

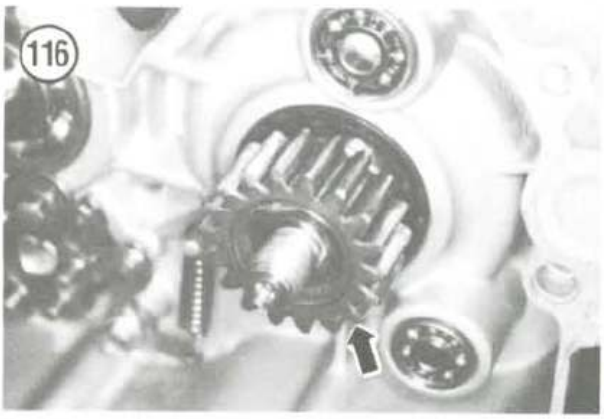
6. Remove the O-ring (**Figure 118**).

7. Install by reversing these steps. Note the following.

8. Replace the O-ring (**Figure 118**) if worn or damaged.

9. Install the washer (**Figure 115**) so that the concave side faces "in."

10. Tighten the primary drive gear nut to the torque specification listed in **Table 3**.



Removal/Installation (1982 KX250)

1. Remove the clutch as described in this chapter.
2. Remove the flywheel rotor cover and secure the flywheel rotor with a holding tool (to prevent the crankshaft from turning when loosening the primary drive gear nut) as described under *Flywheel Rotor Removal/Installation* in Chapter Nine.
3. Loosen and remove the primary drive gear nut and lockwasher (**Figure 119**).
4. Remove the Woodruff key (**Figure 120**).
5. Install by reversing these steps. Note the following.
6. Install a new lockwasher.
7. Install the primary drive gear so that the side with the hole faces out.
8. Install the lockwasher, engaging the lockwasher tooth into the hole in the gear.
9. Tighten the primary drive gear nut to the torque specification listed in **Table 4**.

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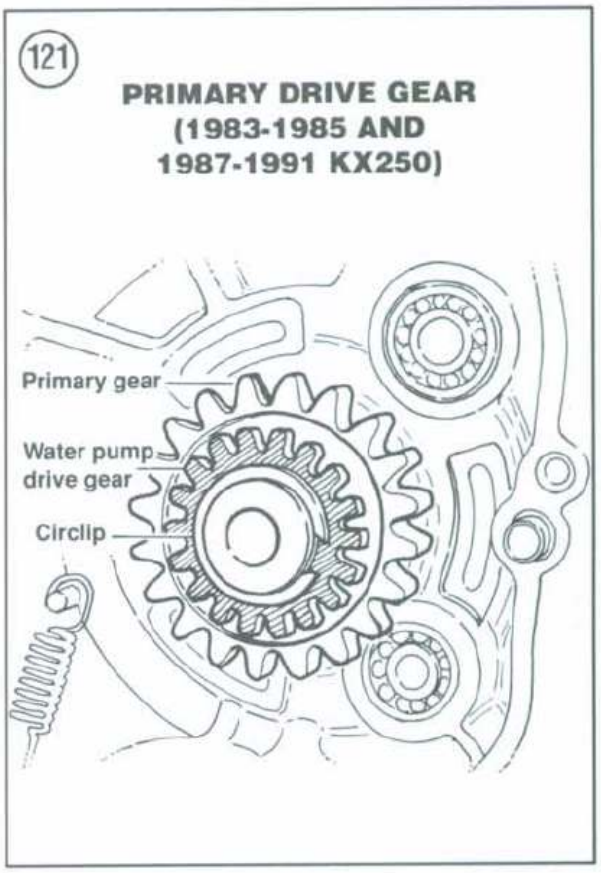

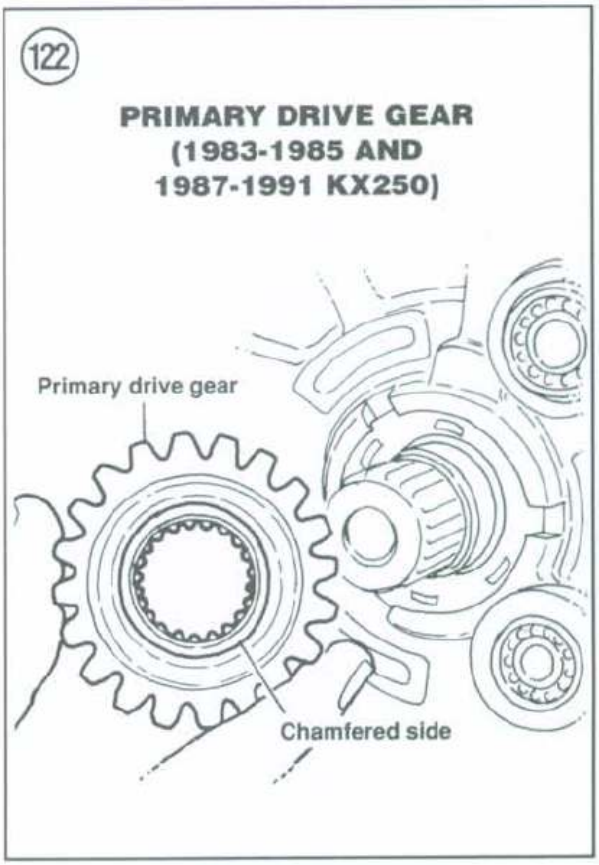

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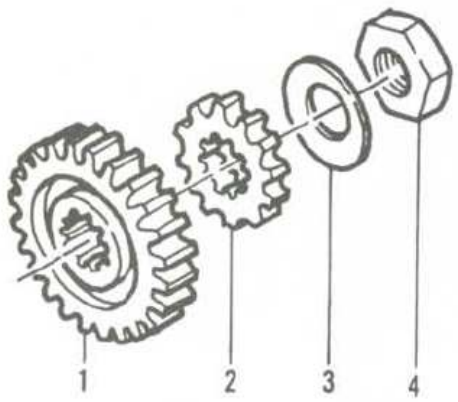
PRIMARY DRIVE GEAR (1986 KX250)



1. Primary drive gear
2. Water pump drive gear
3. Washer
4. Nut

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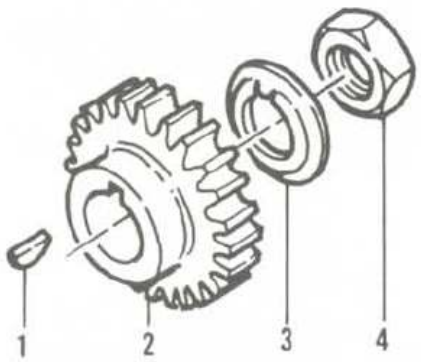
PRIMARY DRIVE GEAR (1983-1984 KX500)



1. Woodruff key
2. Primary drive gear
3. Washer
4. Nut

Removal/Installation (1983-1985 and 1987-1991 KX250)

1. Remove the clutch as described in this chapter.
2. Remove the circlip (**Figure 121**).
3. Remove the water pump drive gear.
4. Remove the primary drive gear.
5. Install by reversing these steps. Note the following.
6. Install the primary drive gear so that the chamfered side (**Figure 122**) faces "out."
7. Install a new circlip.

Removal/Installation (1986 KX250)

Refer to **Figure 123** when performing this procedure.

1. Remove the clutch as described in this chapter.
2. Remove the flywheel rotor cover and secure the flywheel rotor with a holding tool (to prevent the crankshaft from turning when loosening the primary drive gear nut) as described under *Flywheel Rotor Removal/Installation* in Chapter Nine.
3. Remove the primary drive gear nut and washer.
4. Remove the water pump drive gear.
5. Remove the primary drive gear.
6. Install by reversing these steps. Note the following.
7. Install the primary drive gear so that the chamfered side (**Figure 122**) faces "out."
8. Tighten the primary drive gear nut to the torque specification listed in **Table 4**.

Removal/Installation (1983-1984 KX500)

Refer to **Figure 124** when performing this procedure.

1. Remove the clutch as described in this chapter.
2. Remove the flywheel rotor cover and secure the flywheel rotor with a holding tool (to prevent the crankshaft from turning when loosening the primary drive gear nut) as described under *Flywheel Rotor Removal/Installation* in Chapter Nine.
3. Remove the primary drive gear nut and washer.
4. Remove the primary drive gear.
5. Remove the Woodruff key.
6. Install by reversing these steps. Note the following.

7. Install the primary drive gear so that the shoulder side faces "in." See **Figure 120**.
8. Install a new washer so that the tooth on the washer fits into the hole in the Woodruff key groove.
9. Tighten the primary drive gear nut to the torque specification listed in **Table 4**.

Removal/Installation (1985-1987 KX500)

Refer to **Figure 125** when performing this procedure.

1. Remove the clutch as described in this chapter.
2. Remove the flywheel rotor cover and secure the flywheel rotor with a holding tool (to prevent the crankshaft from turning when loosening the primary drive gear nut) as described under *Flywheel Rotor Removal/Installation* in Chapter Nine.
3. Remove the primary drive gear nut and washer.
4. Remove the primary drive gear.
5. Remove the Woodruff key.
6. Install by reversing these steps. Note the following.
7. Install the primary drive gear so that the shoulder side faces "in." See **Figure 120**.
8. Install a new washer so that the tooth on the washer fits into the hole in the Woodruff key groove.
9. Tighten the primary drive gear nut to the torque specification listed in **Table 4**.

Removal/Installation (1988-on KX500)

1. Remove the clutch as described in this chapter.
2. Remove the circlip and remove the primary drive gear (**Figure 126**).
3. Install by reversing these steps. Note the following.
4. Install a new circlip.

Inspection

1. Wash the primary drive gear assembly in solvent and dry thoroughly.
2. Inspect the primary drive gear for excessive gear wear, cracks or other damage. See **Figure 127**, typical. If the gear is damaged, check the mating gear on the clutch housing (**Figure 128**) for damage.

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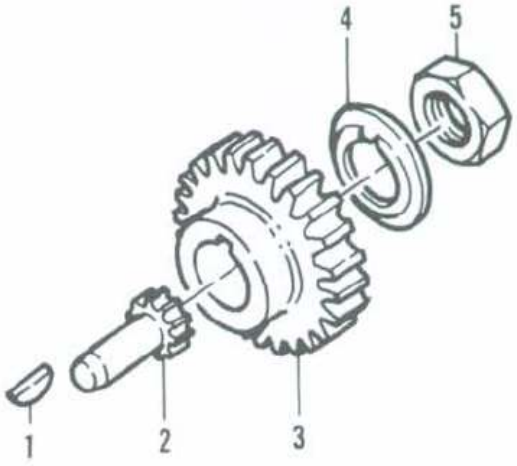
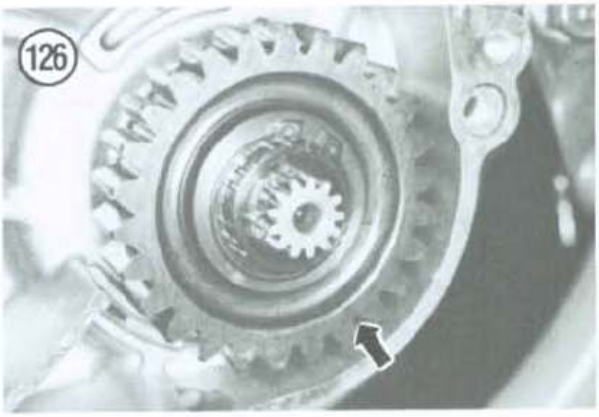
PRIMARY DRIVE GEAR (1985-1987 KX500)



1. Woodruff key
2. Water pump drive gear
3. Primary drive gear
4. Washer
5. Nut

126



127

3. Inspect the nut (if used) and replace if stripped or if the hex corners are starting to round off.

4. Replace the O-ring (if used) if worn or damaged.

5. Replace the concave washer (if used) if worn or damaged.

6. Replace the Woodruff key (if used) for cracks or damage.

CLUTCH CABLE

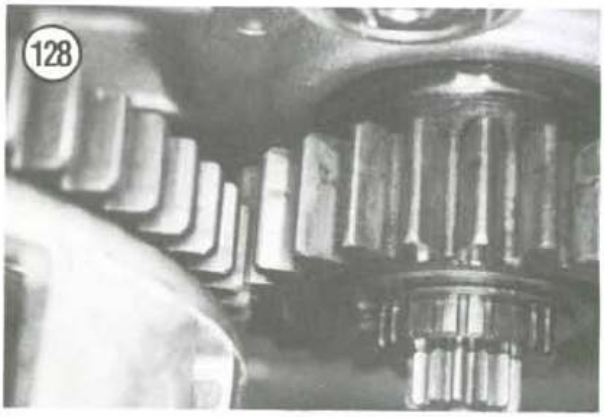
Replacement

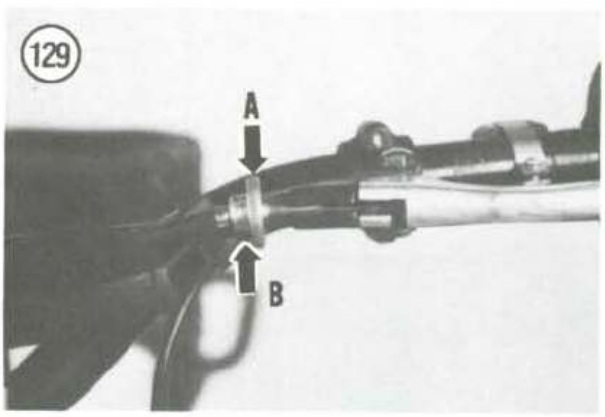
In time the clutch cable will stretch to the point that it is no longer useful and will have to be replaced.

1. Remove the fuel tank.

NOTE

Some of the following figures are shown with the engine partially disassembled for clarity. It is not necessary to remove these components for cable replacement.





2. Pull the protective boot away from the clutch lever and loosen the locknut (A, **Figure 129**) and adjusting barrel (B, **Figure 129**).

3. Slip the cable end out of the hand lever.

4. Disconnect the clutch cable at the clutch release mechanism on the right-hand side of the engine.

NOTE

Prior to removing the cable make a drawing (or take a Polaroid picture) of the cable routing through the frame. It is very easy to forget its routing after it has been removed. Replacethe cable exactly as it was, avoiding any sharp turns.

5. Pull the cable out of any retaining clips on the frame.

6. Remove the cable and replace it with a new one.

7. Install by reversing these removal steps. Make sure it is correctly routed with no sharp turns. Adjust the clutch cable as described in Chapter Three.

KICKSTARTER

Refer to **Figure 130** when servicing the kickstarter assembly.

Removal/Installation

1. Remove the clutch as described in this chapter.

2. Using a pair of needlenose pliers, remove the kickstarter return spring from its post position in the crankcase (**Figure 131**). Release the spring and allow it to relax. Then rotate the kickstarter (**Figure 132**) and remove it from the crankcase.

NOTE

*On some models a washer is installed on one or both ends of the kickstarter shaft (**Figure 133**). Don't loose the washer(s) when removing the kickstarter.*

3A. On 1982-1987 KX125 models, remove the idler gear assembly in the following order:

a. Circlip.
b. Washer.
c. Idler gear (**Figure 134**).
d. Washer.
e. Circlip.

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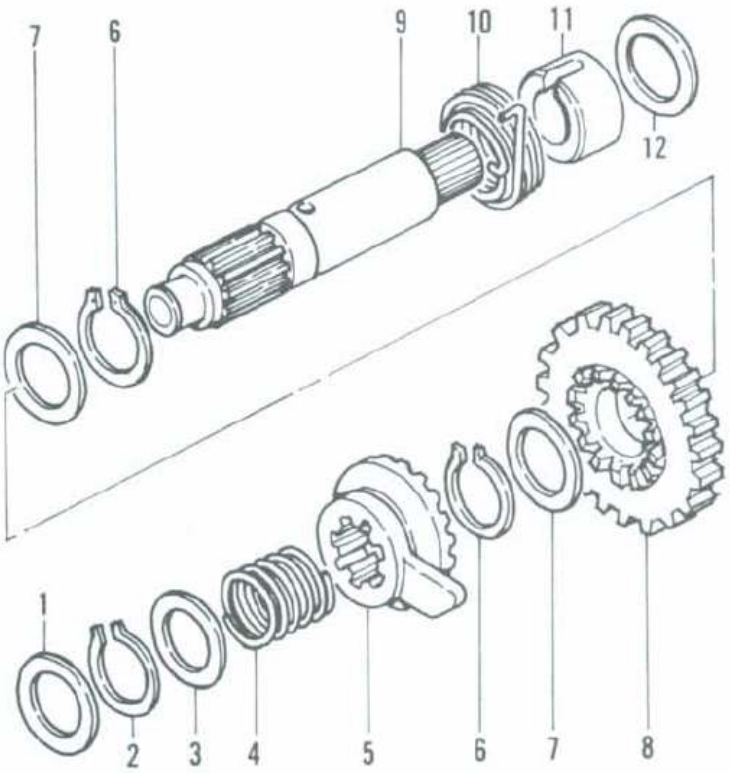
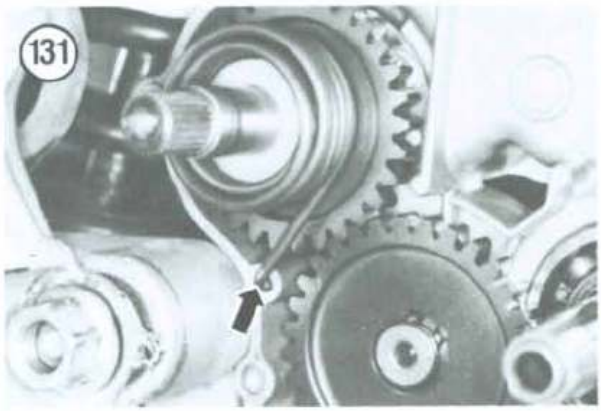
KICKSTARTER



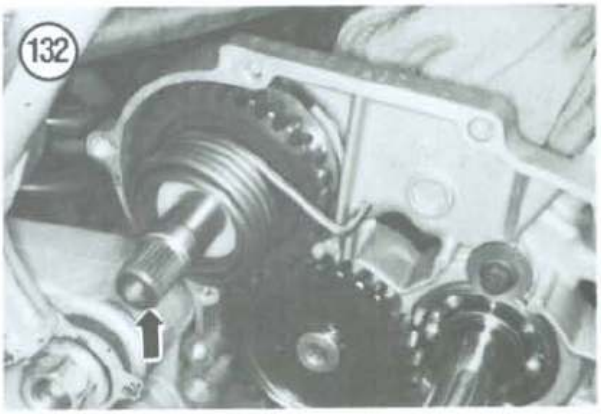
1. Washer*
2. Circlip
3. Washer
4. Spring
5. Ratchet
6. Circlip
7. Washer
8. Kick gear
9. Kick shaft
10. Return spring
11. Spring guide
12. Washer*

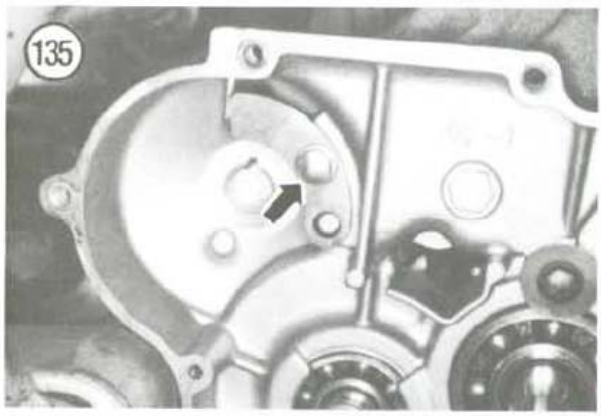
*Not used on all models.

131



132





3B. On 1988 and later KX125 models, remove the idler gear assembly in the following order:
a. Circlip.
b. Idler gear (**Figure 134**).

3C. On 1982-1987 KX250 models, remove the idler gear assembly in the following order:
a. Circlip.
b. Washer.
c. Idler gear (**Figure 134**).
d. Washer.

3D. On 1988 and later KX250 models, remove the idler gear assembly in the following order:
a. Circlip.
b. Idler gear (**Figure 134**).

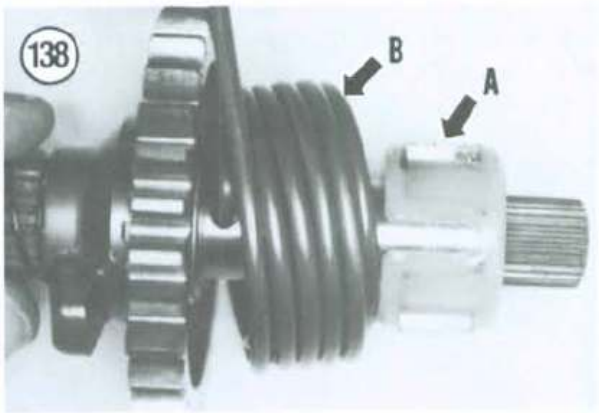
3E. On 1983 and later KX500 models, remove the idler gear assembly in the following order:
a. Circlip.
b. Washer.
c. Idler gear (**Figure 134**).
d. Washer.

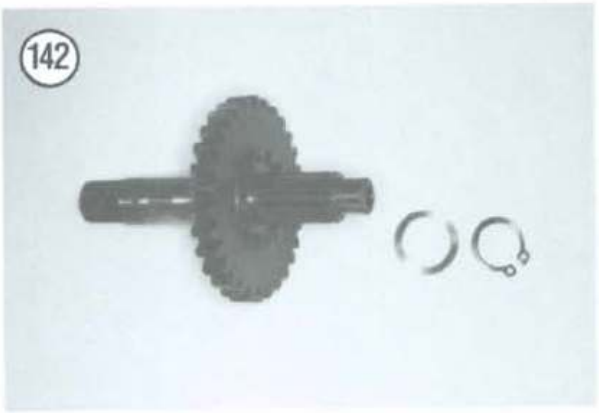
4. If necessary, service the kickstarter assembly as described in this chapter.
5. Install by reversing these steps. Note the following.
6. Install a new idler gear circlip(s). Make sure the clip(s) seat in the countershaft groove(s) completely.
7. If the ratchet guide (**Figure 135**) was removed, apply Loctite 242 (blue) to the mounting bolt(s) and tighten securely.
8. Install the kickstarter assembly as follows.
a. With the kickstarter stopper positioned at the top, insert the kickstarter into the crankcase (**Figure 132**).
b. Using needlenose pliers, hook the return spring into the hole in the crankcase (**Figure 131**).
9. After installing the kickstarter and idler gear assembly, fit the kickstarter lever onto the shaft and operate the kickstarter (**Figure 136**), checking that the ratchet gear engages properly.

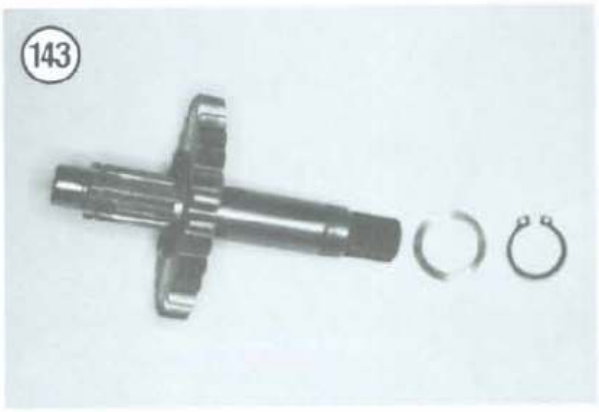
Disassembly/Inspection/Assembly

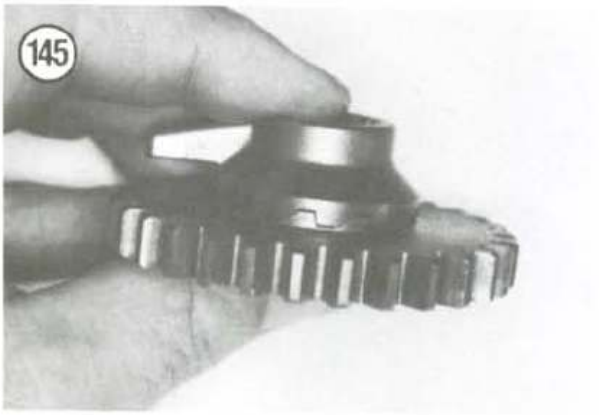
Refer to **Figure 130** when performing the following.
1. On KX250 models, remove the washer installed next to the spring guide (**Figure 137**).
2. Remove the plastic spring guide (A, **Figure 138**).
3. Remove the return spring (B, **Figure 138**).
4. Remove the washer (A, **Figure 139**), if used.

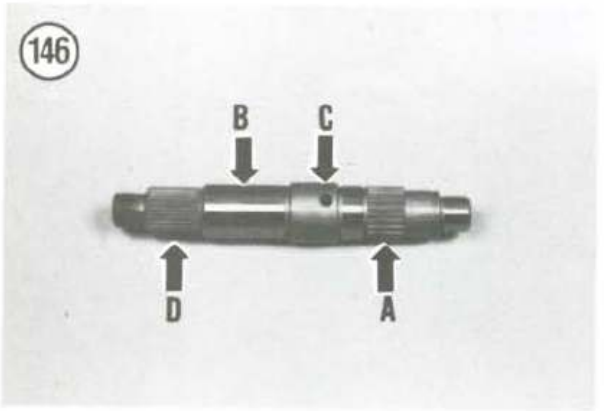
5. Remove the circlip (B, **Figure 139**).
6. Remove the washer (C, **Figure 139**), if used.
7. Remove the spring (**Figure 140**).
8. Remove the ratchet (**Figure 141**).
9. Remove the circlip and washer (**Figure 142**).
10. On KX125 models, remove the circlip and washer on the opposite side of the kick gear (**Figure 143**).
11. Remove the kick gear (**Figure 144**).
12. Wash all parts thoroughly in solvent.

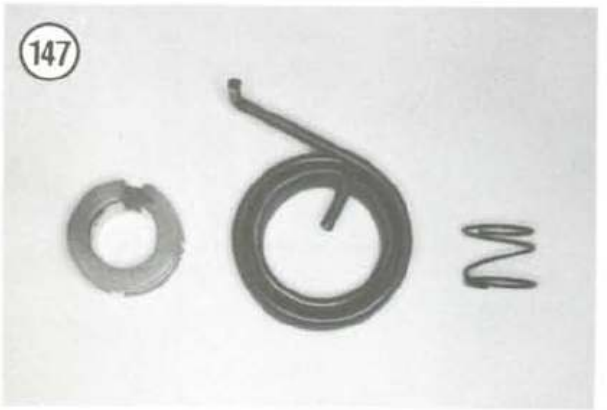








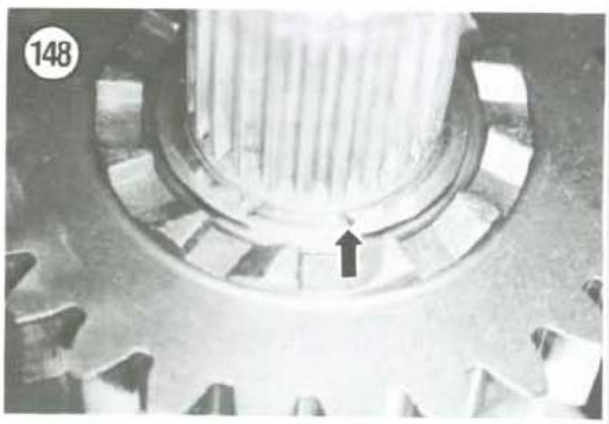




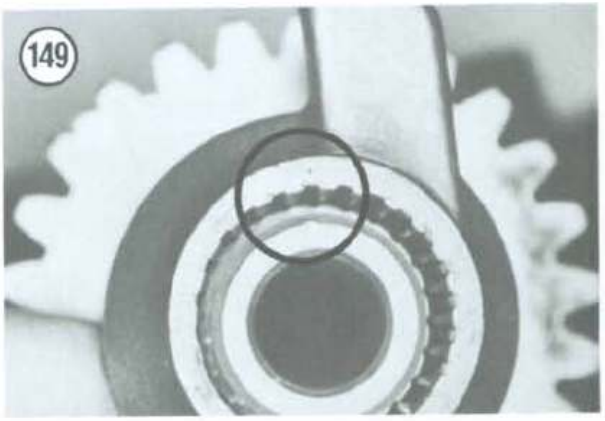
13. Check for broken, chipped, or missing teeth on the kick gear and ratchet (**Figure 145**).
14. Check the kickstarter shaft (**Figure 146**) as follows:
    a. Check the kickstarter lever splines (A) for damage that would allow the lever to slip when the kickstarter is used.
    b. Check the shaft surface (B) for cracks, deep scoring or other damage.
    c. Check the return spring hole (C) in the shaft for cracks or other conditions that would allow the spring to slip out when using the kickstarter.
    d. Install the kick gear onto the shaft and check that the gear operates smoothly on the shaft. Check the shaft splines (D) for cracks or other damage.
    e. Replace the kickstarter shaft if necessary.
15. Check the springs and spring guide (**Figure 147**) for cracks, breakage or other damage. Replace if necessary.
16. Apply transmission oil to the sliding surfaces of all parts.
17. Install the kick gear so that the splines face in the direction shown in **Figure 144**.
18. On KX125 models, install the washer and circlip (**Figure 143**) on the front side of the kickstarter.
19. Install the washer (if used) and circlip (**Figure 142**).

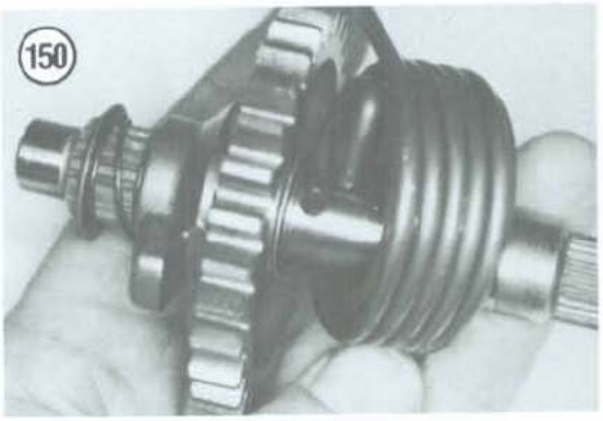
NOTE
*Make sure the circlip(s) seat in the groove(s) completely (**Figure 148**).*

20. Align the index (dot) mark on the shaft with the index (dot) mark on the ratchet and install the ratchet. See **Figure 149**.
21. Install the spring (**Figure 140**).



22. Install the washer (C, **Figure 139**), if used.
23. Install the circlip (B, **Figure 139**).
24. Install the washer (A, **Figure 139**), if used.
25. Install the return spring onto the kickstarter shaft in the direction shown **Figure 150**. Insert the end of the spring into the hole in the shaft as shown in **Figure 151**.
26. Install the spring guide (A, **Figure 138**) as follows:
    a. Align the notch in the spring guide (A, **Figure 138**) with the portion of the return spring that fits into the shaft and install the spring guide.
    b. Push the spring guide all the way down until it bottoms out (**Figure 152**).
27. On KX250 models, install the washer (**Figure 137**).



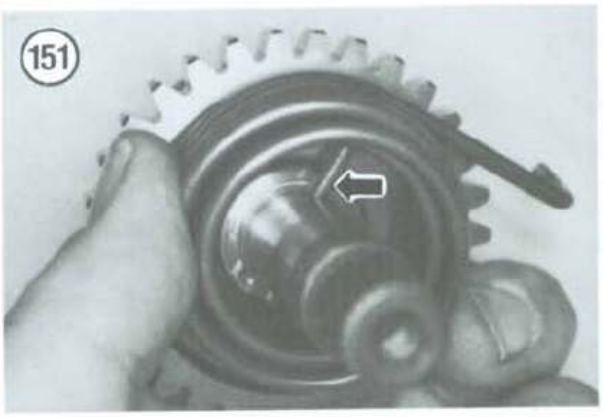


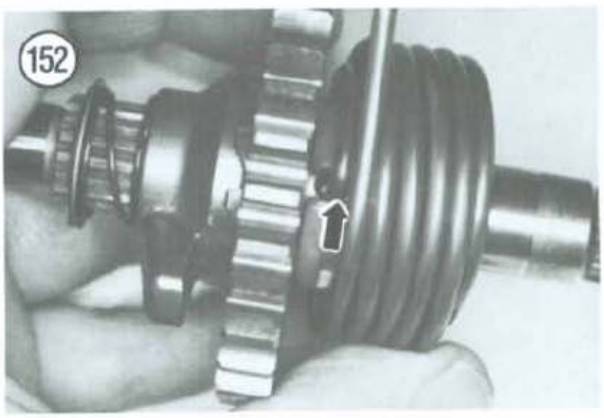
EXTERNAL SHIFT MECHANISM

The external shift mechanism is located on the same side of the crankcase as the clutch assembly and can be removed with the engine in the frame. To remove the shift drum and shift forks it is necessary to remove the engine and split the crankcases.

NOTE

The shift shaft is subject to a lot of abuse. If the motorcycle has been in a hard spill, the shift pedal may have been hit and the shaft may have been bent. If the shaft is bent, it is very hard to straighten without subjecting the crankcase to abnormal stress where the shaft enters the case. If the shaft is bent enough to prevent it from being withdrawn from the crankcase, there is little recourse but to cut the shaft off with a hacksaw very close to the crankcase. You will have to remove the engine from the frame to do this. It is much cheaper in the long run to replace the shaft than risk damaging a set of expensive crankcases. After cutting off the end of the shaft, use a file or rotary grinder to remove all burrs from the shaft before removing it.



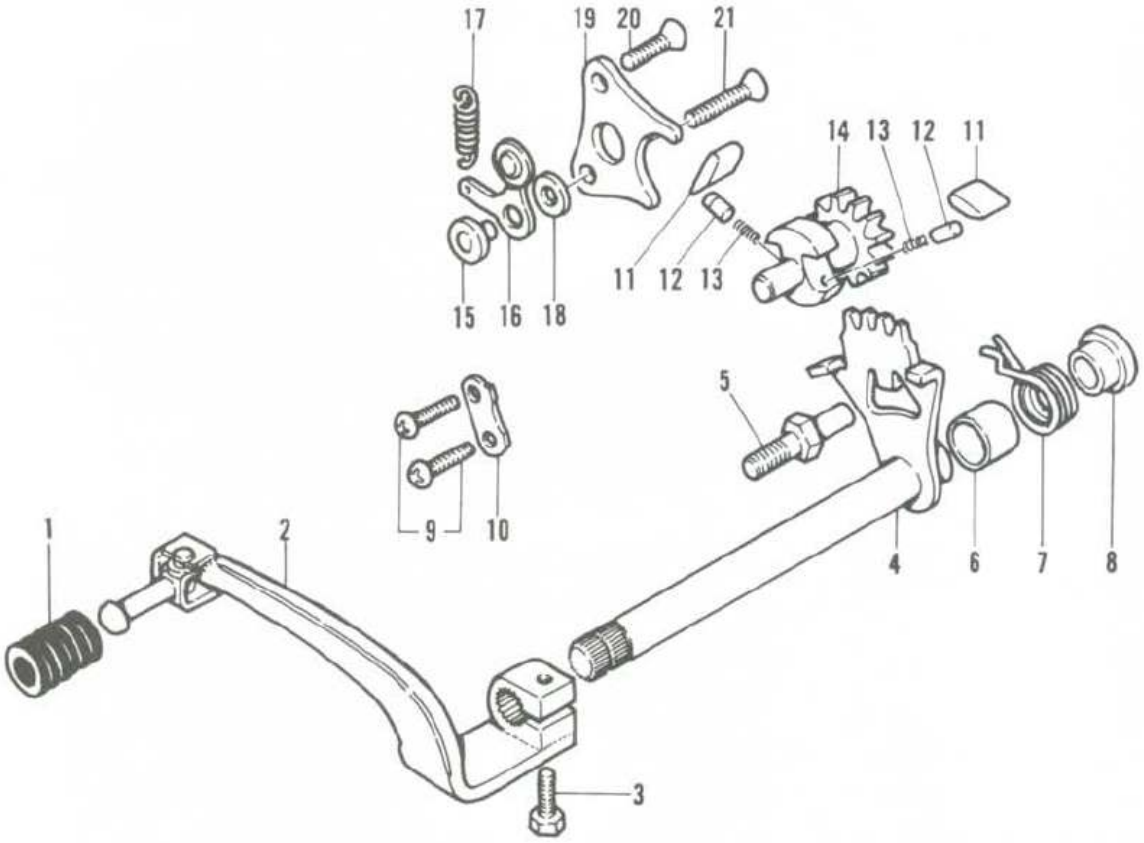


Removal/Installation (1982-1983 KX125; 1982 KX250; 1983 KX500)

Refer to **Figure 153** for this procedure.

153

EXTERNAL SHIFT MECHANISM
(1982-1983 KX125)
(1982 KX250)
(1983 KX500)



1. Boot
2. Shift shaft
3. Bolt
4. Shift shaft
5. Stud
6. Collar (KX125 and KX250)
7. Return spring
8. Collar (KX500)
9. Screws
10. Plate
11. Ratchet pawl
12. Pin
13. Spring
14. Gear drum
15. Collar
16. Stopper
17. Spring
18. Washer
19. Plate
20. Screw
21. Screw

1. Remove the shift pedal (**Figure 154**); remove the bolt and spread the pedal slot open with a screwdriver if necessary.

2. Remove the clutch as described in this chapter.

3. Pull the shift shaft out of the crankcase (**Figure 155**).

NOTE

One of the screws removed in Step 4 may be longer than the other. Note the length of each screw when removing them for reassembly.

4. Remove the shift drum detent assembly screws and the detent assembly (B and C, **Figure 156**).

NOTE

The bottom detent plate is also the shift drum guide plate.

5. The shift pawls are under spring pressure; remove the shift drum ratchet and pawl assembly (**Figure 157**). Be careful not to lose the pawls, springs or pins (**Figure 158**).

6. Clean and inspect the components as described under *Inspection* in this chapter.

7. To install the shift linkage, reverse the removal steps. Note the following.

CAUTION

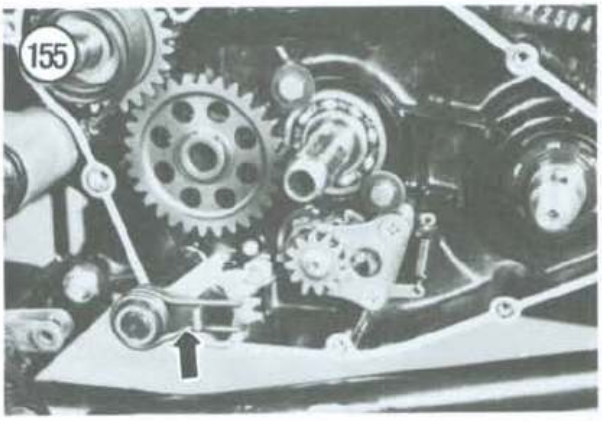
Use Loctite 242 (blue) on all shift linkage screws. A loose shift mechanism will cause missed shifts and serious engine damage.

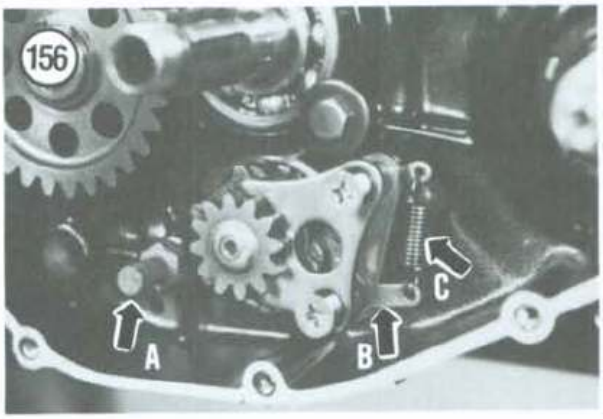
8. Check that the shift shaft return spring pin is tight (A, **Figure 156**). If loose, remove it; apply Loctite 242 (blue) and reinstall.

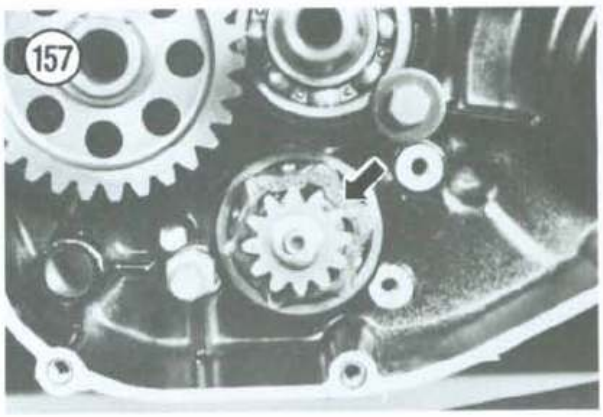
9. Be sure that the return spring is in place on the shift shaft (**Figure 155**).

10. Assemble the pawl, pin and spring assemblies into the ratchet (**Figure 158**). See **Figure 159**.

11. Turn the shift drum to put the transmission in neutral, then install the ratchet and pawl assembly with the ratchet punch mark in the middle of the shift shaft gear sector (**Figure 160**). Install the shift shaft, making sure the return spring is positioned correctly on the pin.



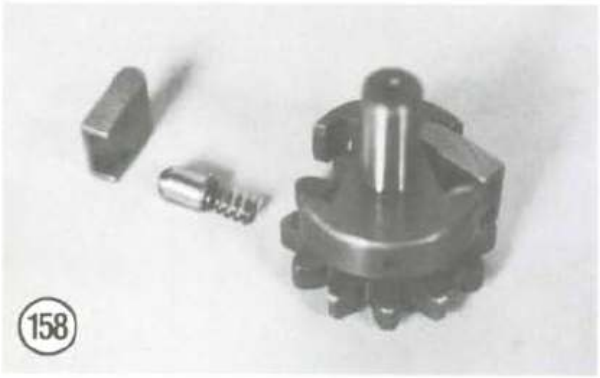




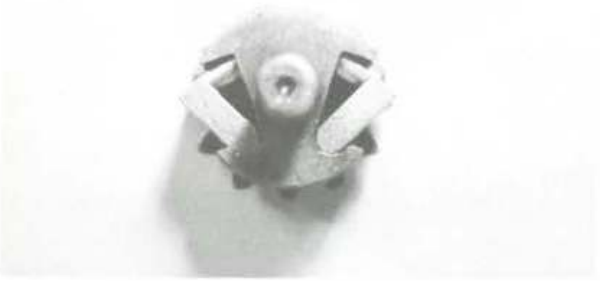
Removal/Installation (1983 KX250 and All 1984-on Models)

Refer to **Figure 161** (1983 KX250) or **Figure 162** (1984-on) for this procedure.

1. Remove the shift pedal (**Figure 163**); remove the bolt and spread the pedal slot open with a screwdriver if necessary.
2. Remove the clutch as described in this chapter.
3. Pull the shift shaft out of the crankcase (**Figure 164**).
4. Disconnect the spring (A, **Figure 165**) and remove the bolt and gear set lever (B, **Figure 165**).


158

159

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5. Clean and inspect the components as described under *Inspection* in the following procedure.
6. To install the shift linkage, reverse the removal steps. Note the following.

CAUTION

*Use Loctite 242 (blue) on the gear set lever bolt (B, **Figure 165**). A loose shift mechanism will cause missed shifts and serious engine damage.*

7. Check that the shift shaft return spring pin is tight (C, **Figure 165**). If loose, remove it; apply Loctite 242 (blue) and reinstall.
8. Be sure that the return spring (A, **Figure 166**) is in place on the shift shaft.
9. On all models except 1983 KX250 models, check that the positioning lever spring (B, **Figure 166**) is in place.
10. On all models except 1983 KX250 models, check that the positioning lever is centered with the pin as shown in **Figure 167**.

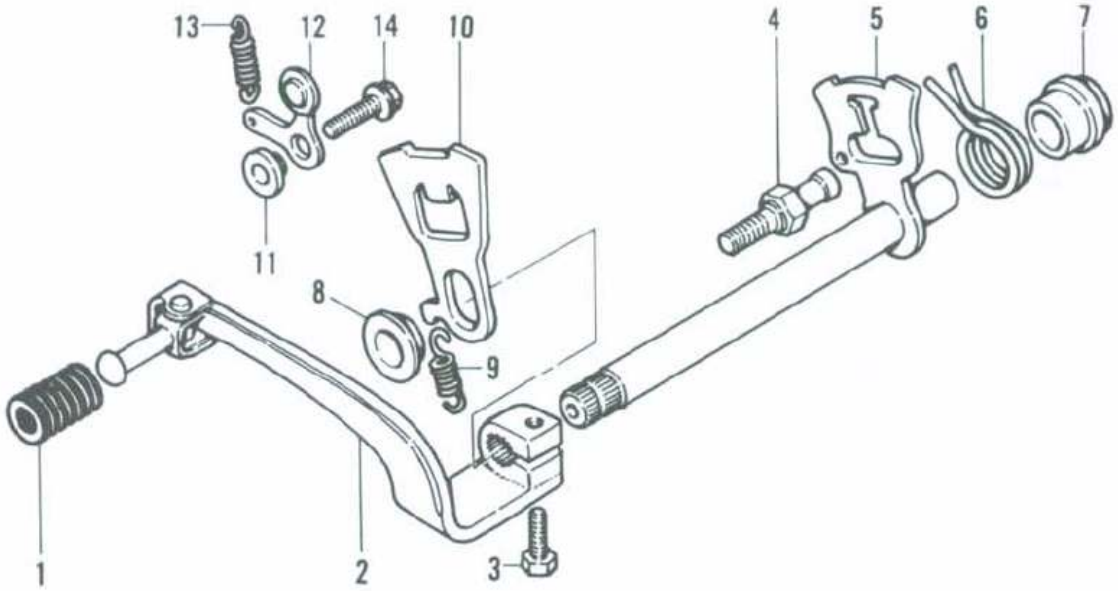
Inspection (All Models)

Worn or damaged shift linkage components will cause missed shifts and wear to the transmission gears, shift forks and shift drum. Replace questionable parts as necessary.

1. Wash the components in solvent and dry thoroughly.
2. Check the shift shaft (**Figure 168**) for cracks or bending. Check the splines on the end of the shaft for damage.
3. Examine the shift pedal for cracks or bending. Check the shift pedal bolt for damaged threads.
4. On early models, check the ratchet pawls, pins and springs for wear (**Figure 158**). Replace the ratchet pawl assembly as a set.
5. Check for a weak or broken return spring (A, **Figure 166**).
6. Check for a weak or broken gear positioning lever spring (B, **Figure 166**).
7. Check the engagement arms on the shift pawl for wear or damage.
8. Check the shift shaft oil seal in the left-hand crankcase for severe wear or damage. If the oil seal was leaking, carefully pry it out of the case with a wide-blade screwdriver, making sure not to damage the case. Wipe the case seal bore out with a clean

(161)

EXTERNAL SHIFT MECHANISM
(1983 KX250)



1. Boot
2. Shift lever
3. Bolt
4. Stud
5. Shift shaft
6. Return spring
7. Collar
8. Collar
9. Spring
10. Pawl
11. Collar
12. Gear positioning lever
13. Spring
14. Bolt

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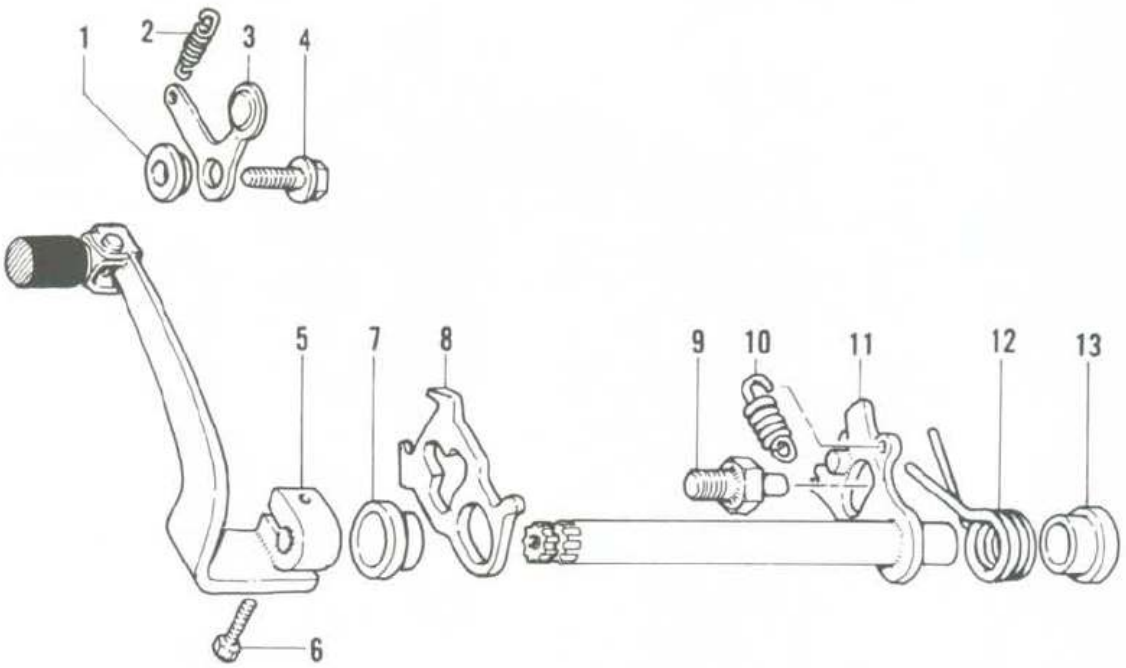
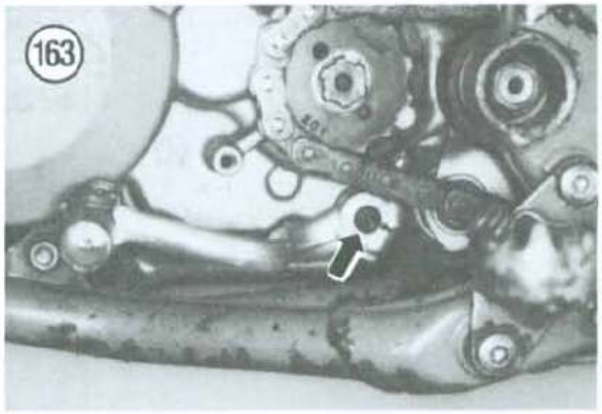
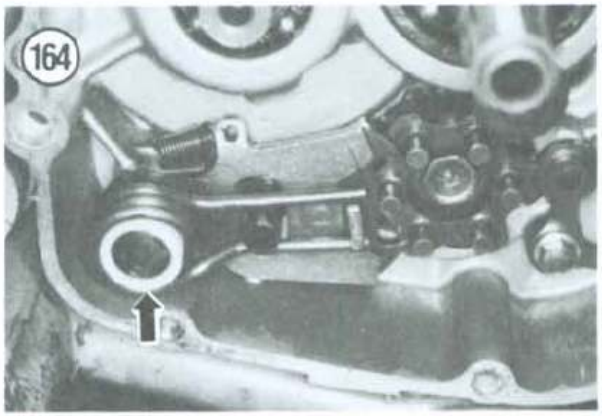
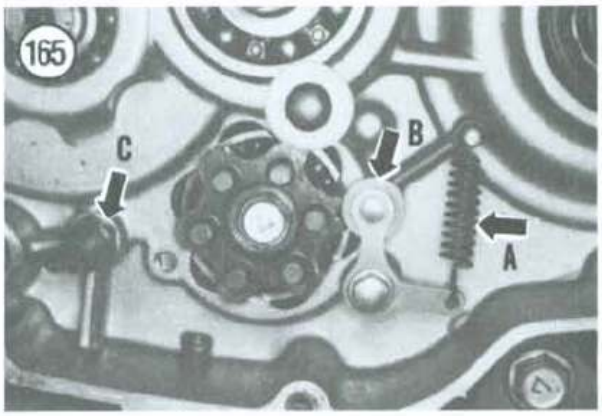
EXTERNAL SHIFT MECHANISM (1984-ON)

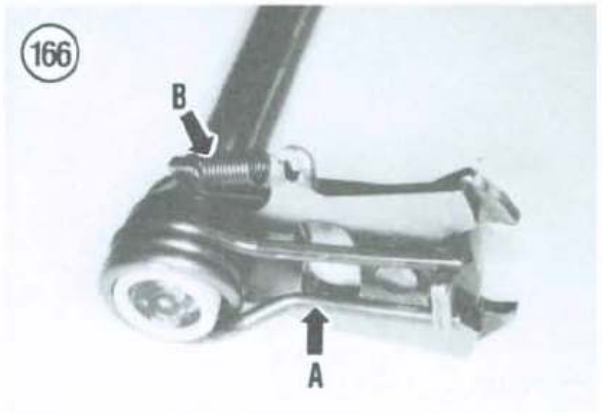


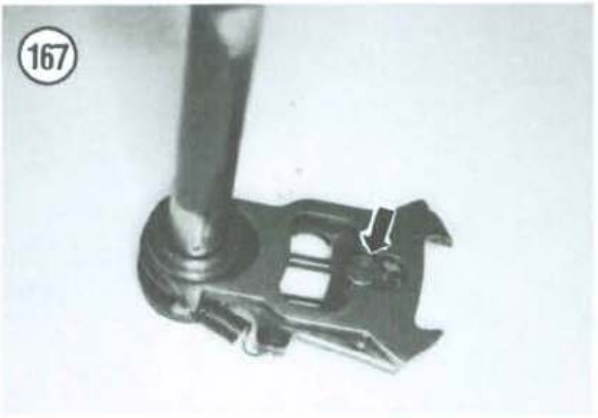
1. Collar
2. Spring
3. Gear positioning lever
4. Bolt
5. Shift lever
6. Screw
7. Collar
8. Pawl
9. Bolt
10. Spring
11. External shift shaft
12. Spring
13. Collar


163


164


165
C
B
A


166
B
A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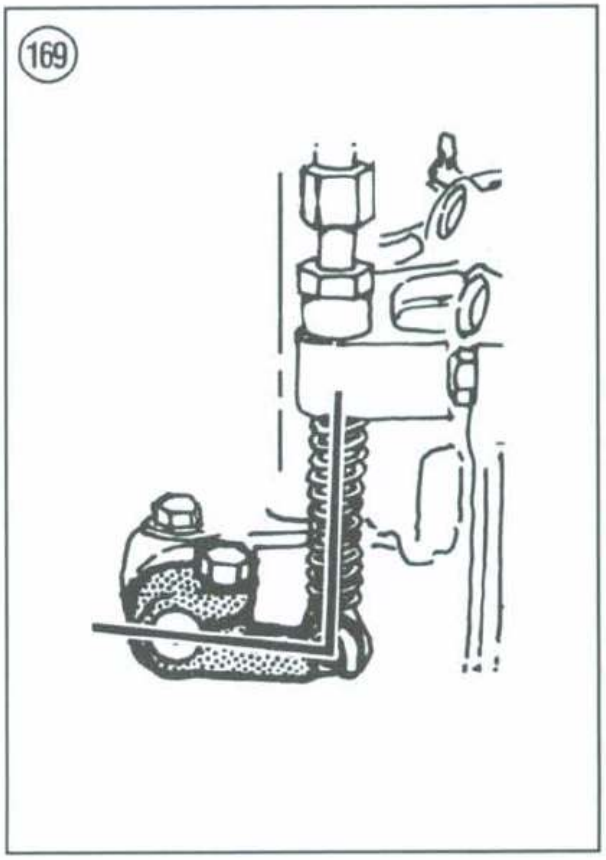
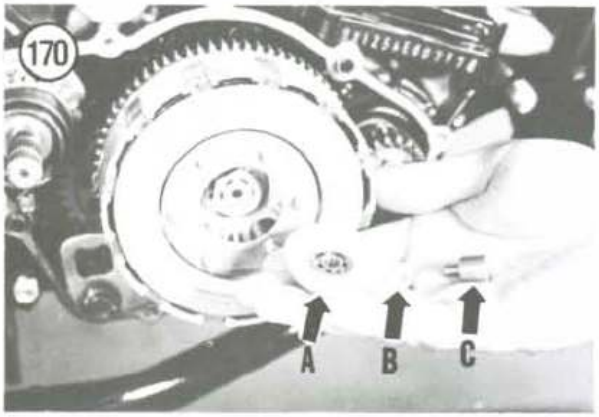
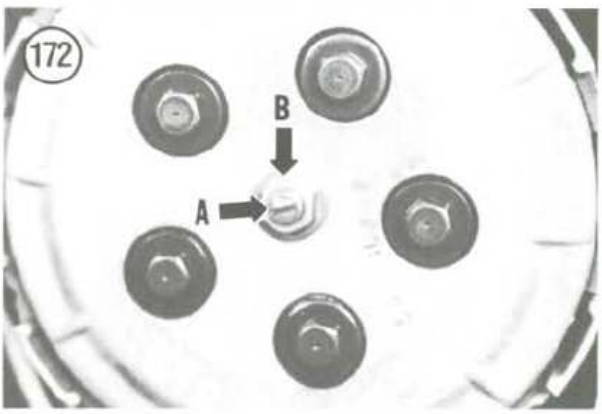
168


169

rag. Pack the new seal lips with wheel bearing grease and press the seal into the case—closed side facing out—by hand or use a small socket and extension. Install the seal so that it seats squarely in the case bore.





CLUTCH RELEASE ADJUSTMENT (1982-1985 KX125)

If the clutch slips or if the clutch operation does not feel normal after adjusting the clutch cable in Chapter Three, perform the following.

1. At the clutch lever, loosen the locknut and turn the adjuster all the way to get maximum cable free play.
2. Turn the clutch release arm by hand until you feel it become hard to turn. Check the angle between the arm and the clutch cable. It should be 80-90° (**Figure 169**).
3. If the angle is not 80-90° when the arm becomes hard to turn, remove the clutch cover as described in this chapter.
4. Add washers (B, **Figure 170**) between the clutch pusher (C, **Figure 170**) and pusher bearing (A, **Figure 170**) as required to get the 80-90° arm angle when the cover is installed. See your Kawasaki dealer for the correct size washers.
5. Install the clutch cover and adjust the clutch cable as described in Chapter Three.
6. Test the clutch operation.

CLUTCH RELEASE ADJUSTMENT (1982 KX250)

If the clutch slips or if the clutch operation does not feel normal after adjusting the clutch cable in Chapter Three, perform the following.

1. Loosen the lower clutch cable locknuts and turn the adjuster to get maximum cable free play.
2. Turn the clutch release arm by hand until you feel it become hard to turn. Check the angle between the arm and the clutch cable. It should be 80-90° (**Figure 171**).
3. If the angle is not 80-90° when the arm becomes hard to turn, remove the clutch cover as described in this chapter.
4. Bend the lockwasher tab away from the internal clutch adjuster locknut (B, **Figure 172**) and then loosen the locknut. Turn the adjuster (A, **Figure 172**) as required to get the 80-90° arm angle and tighten the locknut. If the adjuster is hard to turn, remove it and the locknut and clean them both with solvent or contact cleaner. Readjust if necessary. Bend the lockwasher tab over the nut.
5. Install the clutch cover and adjust the clutch cable as described in Chapter Three.
6. Test the clutch operation.

Table 1 CLUTCH SPECIFICATIONS (KX125)

	New mm (in.)	Service limit mm (in.)
Friction plate thickness		
1982-1987	2.92-3.08 (0.115-0.121)	2.8 (0.11)
1988-on	2.92-3.08 (0.115-0.121)	2.7 (0.106)
Friction plate tab width		
1982-1988	*	*
1989-on	11.8-12.0 (0.465-0.472)	11.3 (0.445)
Steel plate thickness		
1982-1988	*	*
1989-on	1.41-1.59 (0.056-0.063)	1.31 (0.052)
Clutch plate warpage		
Friction plate	0-0.20 (0-0.008)	0.30 (0.012)
Steel plate	0-0.15 (0-0.006)	0.30 (0.012)
Friction plate/clutch housing clearance		
1982-1987	0.05-0.45 (0.002-0.018)	0.6 (0.02)
1988-on	0.35-0.60 (0.014-0.024)	0.9 (0.04)
Clutch spring free length		
1982-1987	*	*
1988-1989	39.4 (1.55)	37.9 (1.49)
1990-on	37.5 (1.48)	36.1 (1.42)

* Specification not provided by Kawasaki.

Table 2 CLUTCH SPECIFICATIONS (KX250 AND KX500)

	New mm (in.)	Service limit mm (in.)
Friction plate thickness		
KX250		
1982-1986	3.12-3.28 (0.123-0.129)	3.0 (0.12)
1987-on	2.92-3.08 (0.11-0.12)	2.7 (0.11)
KX500		
1983-1985	2.92-3.08 (0.11-0.12)	2.7 (0.11)
1986	3.1-3.3 (0.12-0.13)	2.9 (0.11)
1987-on	2.92-3.08 (0.11-0.13)	2.7 (0.11)
Friction plate tab width		
1982-1988	*	*
1989-on	13.6-13.8 (0.535-0.543)	13.1 (0.516)
Steel plate thickness		
1982-1988	*	*
1989-on	1.41-1.59 (0.056-0.063)	1.31 (0.052)

(continued)

Table 2 CLUTCH SPECIFICATIONS (KX250 AND KX500) (continued)

	New mm (in.)	Service limit mm (in.)
Friction plate to clutch housing clearance		
KX250		
1982-1987	0.05-0.45 (0.002-0.018)	0.6 (0.024)
1988-on	0.35-0.60 (0.014-0.024)	0.9 (0.04)
KX500		
1983-1986	0.10-0.40 (0.004-0.016)	0.6 (0.02)
1987	0.3-0.6 (0.012-0.024)	0.8 (0.031)
1988-on	0.35-0.60 (0.014-0.024)	0.9 (0.04)
Clutch plate warpage limit	—	0.30 (0.012)

* Specification not provided by Kawasaki.

Table 3 TIGHTENING TORQUES (KX125)

	N•m	ft.-lb.
Clutch nut		
1982-1984	60	43
1985-1988	78	58
1989-1990	88	65
1991	98	72
Primary drive gear nut		
1982	30	21.5
1983	44	32.5
1984-1989	49	36
1990-1991	59	43
Engine drain plug		
1982	13	9.5
1983-on	20	14.5
Return spring pin locknut		
1986-on	20	14.5
Shift drum plate bolt		
1986-on	22	16

Table 4 TIGHTENING TORQUES (KX250 AND KX500)

	N•m	ft.-lb.
Clutch nut		
1982-1985	59	43
1986-1987	78	58
1988-on	98	72
Primary drive gear nut		
KX250		
1982-1985	—	—
1986	78	58
1987-on	—	—
KX500		
1983-1985	78	58
1986-1987	88	65
1988-on	—	—

(continued)

Table 4 TIGHTENING TORQUES (KX250 AND KX500) (continued)

	N•m	ft.-lb.
Engine drain plug		
KX250		
1982	13	9.5
1983-on	20	14.5
KX500	20	14.5

CHAPTER SEVEN

TRANSMISSION AND INTERNAL SHIFT MECHANISM

The transmission and internal shift mechanism (shift drum and forks) are all basically the same. To gain access to the transmission and internal shift mechanism it is necessary to remove the engine and split the crankcase (Chapter Five). Once the crankcase has been split, removal of the transmission and shift drum and forks is a simple task of pulling the assemblies up and out of the crankcase.

Transmission ratios are listed in **Table 1**. Service specifications are listed in **Tables 2-4**. **Tables 1-4** are found at the end of the chapter.

NOTE

If disassembling a used, well run-in engine for the first time by yourself, pay particular attention to any additional shims that may have been added by a previous owner. These may have been added to take up the tolerance of worn components and must be reinstalled in the same position since the shims have developed a wear pattern. If new parts are going to be installed these shims may be eliminated. This is something you will have to determine upon reassembly.

TRANSMISSION OPERATION

The basic transmission has 5 (KX250 and KX500) or 6 (KX125) pairs of constantly meshed gears (**Figure 1**) on the mainshaft (A) and countershaft (B). Each pair of meshed gears gives one gear ratio. In each pair, one of the gears is locked to its shaft and always turns with it. The other gear is not locked to its shaft and can spin freely on it. Next to each free spinning gear is a third gear which is splined to the same shaft, always turning with it.

This third gear can slide from side to side along the shaft splines. The side of the sliding gear and the free spinning gear have mating "dogs" and "slots". When the sliding gear moves up against the free spinning gear, the 2 gears are locked together, locking the free spinning gear to its shaft. Since both meshed mainshaft and countershaft gears are now locked to their shafts, power is transmitted at that gear ratio.

Shift Drum and Forks

Each sliding gear has a deep groove machined around its outside (**Figure 2**). The curved shift fork arm rides in this groove, controlling the side-to-side sliding of the gear, and therefore the selection of different gear ratios. Each shift fork (A, **Figure 3**) slides back and forth on a guide shaft, and has a peg (B, **Figure 3**) that rides in a groove machined in the shift drum. When the shift linkage rotates the shift drum, the zigzag grooves move the shift forks and sliding gears back and forth.

TRANSMISSION TROUBLESHOOTING

Refer to *Transmission* in Chapter Two.

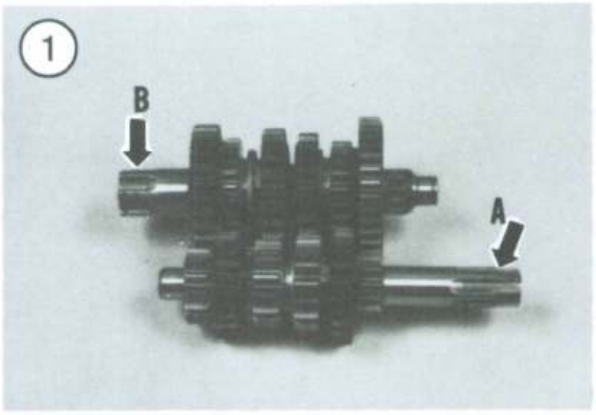
TRANSMISSION

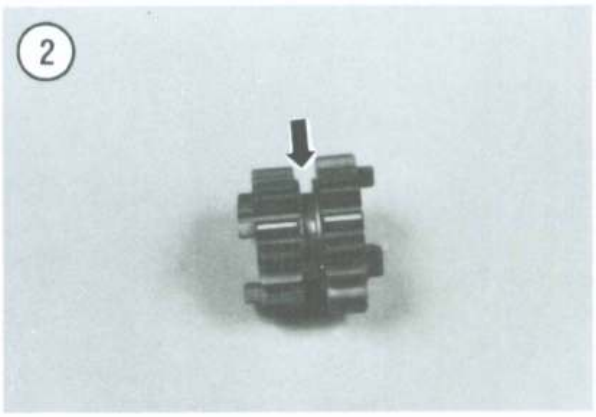
Removal/Installation

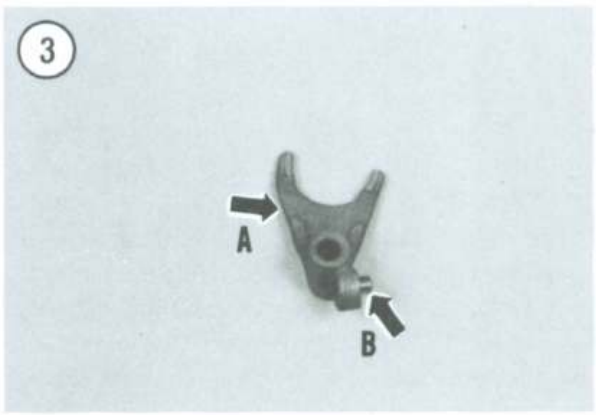
Remove and install the transmission and internal shift mechanism as described under *Crankcase Disassembly/Reassembly* in Chapter Five.

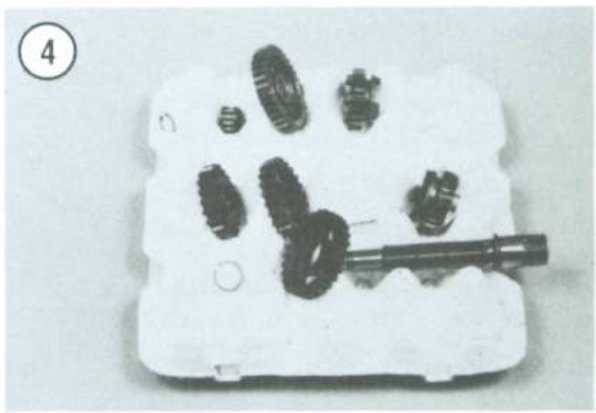
Transmission Service Notes

1. After removing the transmission shafts, place one of the shafts into a large can or plastic bucket and clean with solvent. Dry with compressed air or let sit on rags to drip dry. Repeat for the opposite shaft.
2. If you have intermixed gears from both shafts (mainshaft and countershaft), use the gear ratio information in **Table 1** and the transmission illustration for your model (found in this chapter under *Transmission Overhaul*) to identify the gears.
3. A divided container such as an egg carton (**Figure 4**) can be used to help maintain correct alignment and position of the parts as they are removed from the transmission shafts.







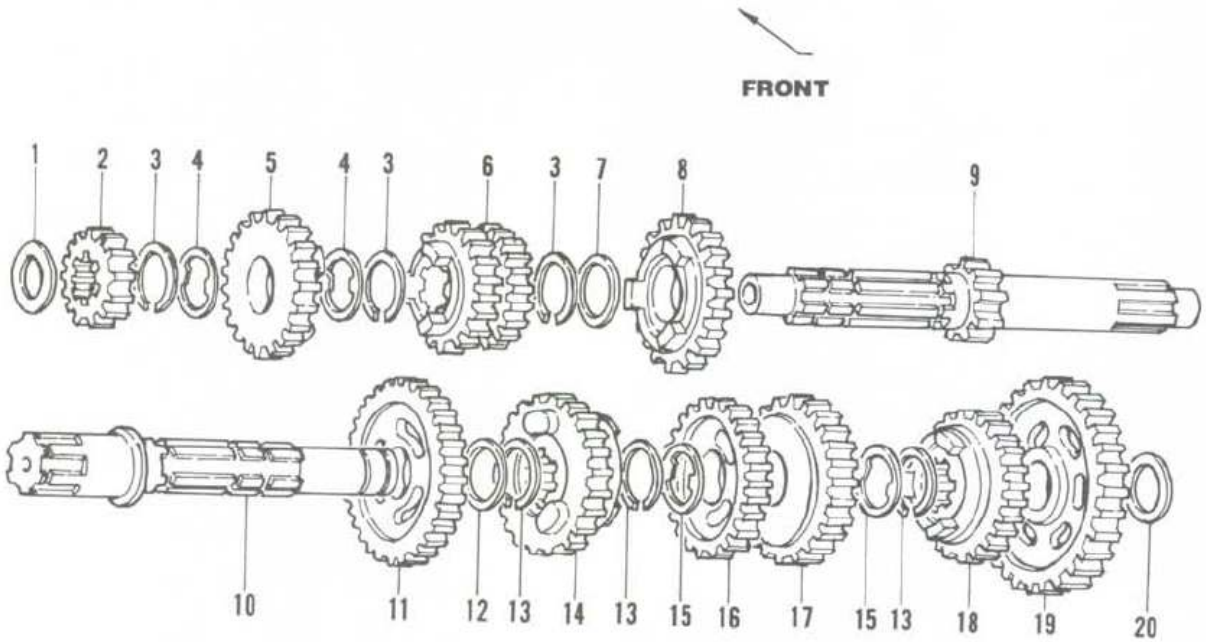


4. All of the circlips should be replaced during reassembly. Do not reuse circlips. See **Figure 5**, typical.

TRANSMISSION OVERHAUL (KX125)

Refer to **Figure 6** (1982), **Figure 7** (1983-1987) or **Figure 8** (1988-1991) when servicing the transmission shafts.

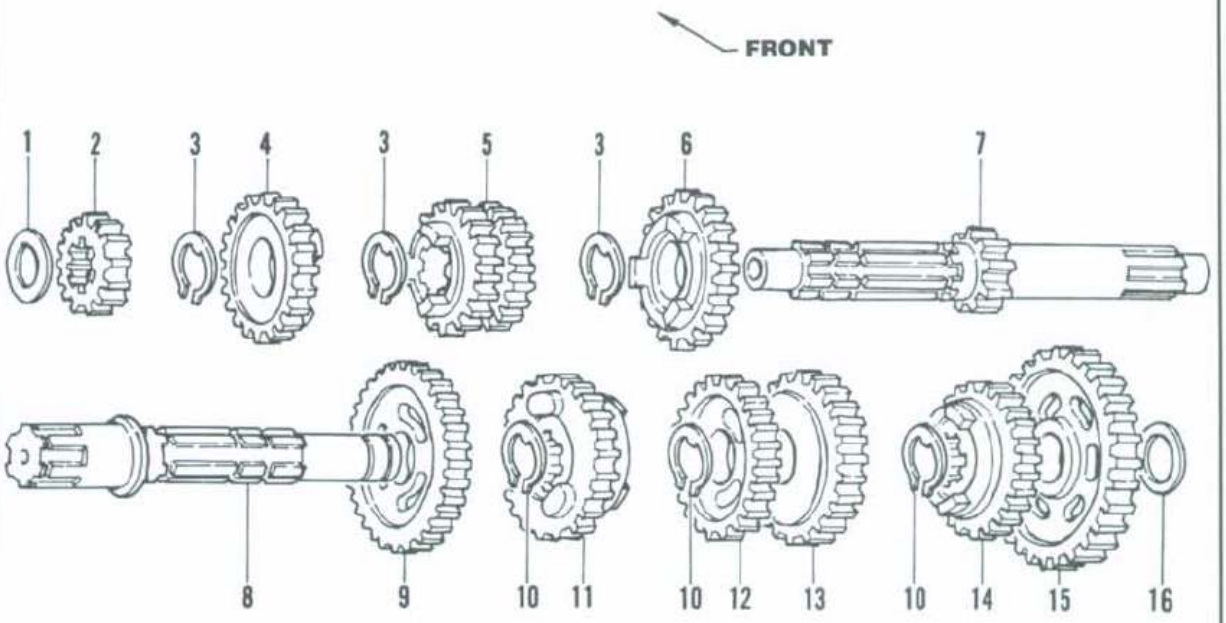
TRANSMISSION (1982 KX125)



1. Washer
2. Mainshaft 2nd gear
3. Circlip
4. Washer
5. Mainshaft 5th gear
6. Mainshaft 3rd/4th gear
7. Washer
8. Mainshaft 6th gear
9. Mainshaft/1st gear
10. Countershaft
11. Countershaft 2nd gear
12. Washer
13. Circlip
14. Countershaft 5th gear
15. Washer
16. Countershaft 3rd gear
17. Countershaft 4th gear
18. Countershaft 6th gear
19. Countershaft 1st gear
20. Washer

(7)

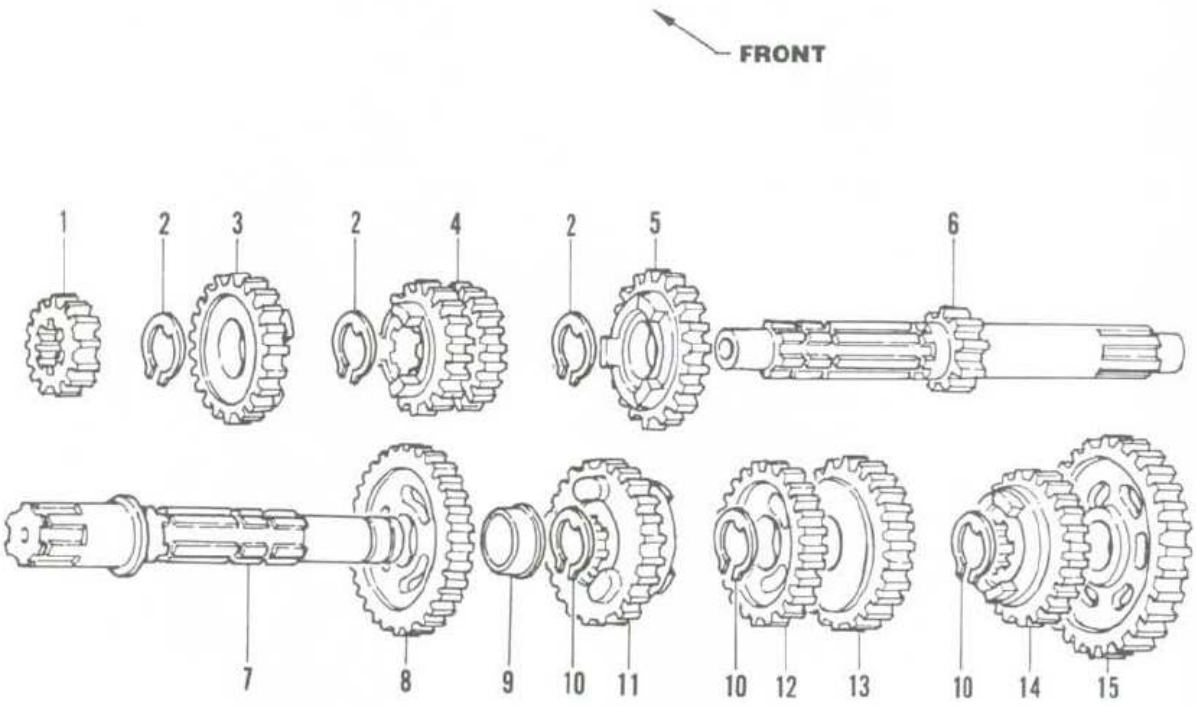
TRANSMISSION (1983-1987 KX125)



1. Washer
2. Mainshaft 2nd gear
3. Circlip
4. Mainshaft 5th gear
5. Mainshaft 3rd/4th gear
6. Mainshaft 6th gear
7. Mainshaft/1st gear
8. Countershaft
9. Countershaft 2nd gear
10. Circlip
11. Countershaft 5th gear
12. Countershaft 3rd gear
13. Countershaft 5th gear
14. Countershaft 6th gear
15. Countershaft 1st gear
16. Washer

8

TRANSMISSION (1988-1991 KX125)



1. Mainshaft 2nd gear
2. Circlip
3. Mainshaft 5th gear
4. Mainshaft 3rd/4th gear
5. Mainshaft 6th gear
6. Mainshaft/1st gear
7. Countershaft
8. Countershaft 2nd gear
9. Bushing (1989-1991)
10. Circlip
11. Countershaft 5th gear
12. Countershaft 3rd gear
13. Countershaft 4th gear
14. Countershaft 6th gear
15. Countershaft 1st gear

Mainshaft
Disassembly/Assembly

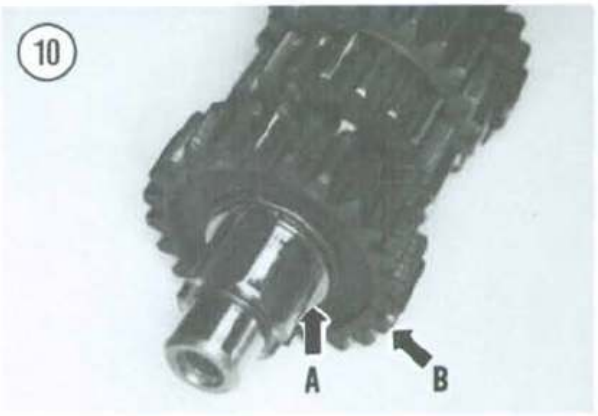
1. On 1982-1987 models, remove the washer. See 1, **Figure 6** or 1, **Figure 7**.
2. Remove second gear (**Figure 9**).
3. Remove the circlip (A, **Figure 10**).
4. On 1982 models, remove the washer (4, **Figure 6**).
5. Remove fifth gear (B, **Figure 10**).
6. On 1982 models, remove the washer (4, **Figure 6**).
7. Remove the circlip (A, **Figure 11**).
8. Remove third/fourth gear (B, **Figure 11**).
9. Remove the circlip (A, **Figure 12**).
10. On 1982 models, remove the washer (7, **Figure 6**).
11. Remove sixth gear (B, **Figure 12**).

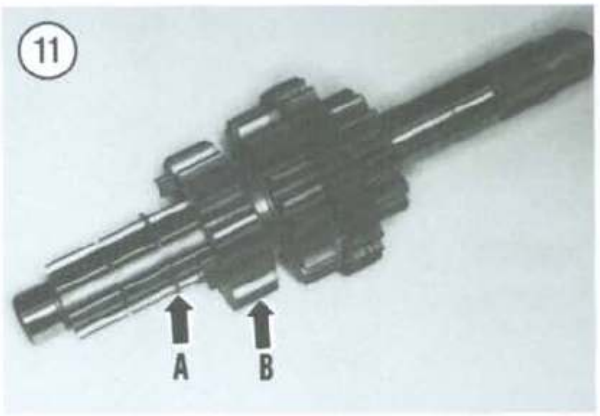
NOTE
*First gear is an integral part of the mainshaft (**Figure 13**).*

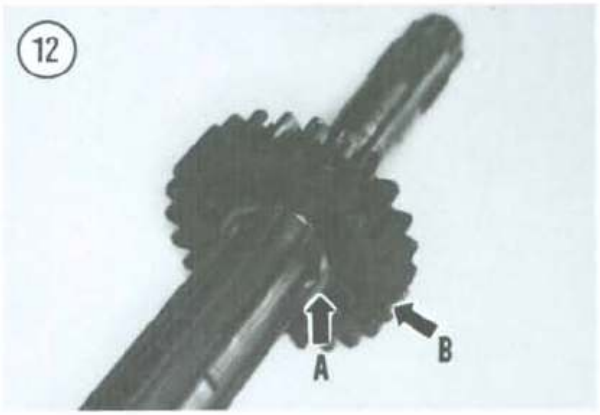
12. Inspect the mainshaft parts as described under *Transmission Inspection* in this chapter.

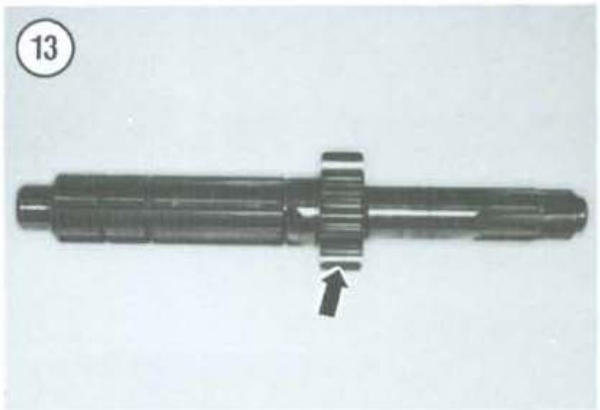
NOTE
*When installing the circlips during transmission assembly, make sure to align the notch in the bottom of each circlip (**Figure 14**) with the transmission shaft groove.*

13. Install sixth gear (B, **Figure 12**) so that its gear dogs face toward the left-hand side.
14. On 1982 models, install the washer (7, **Figure 6**).
15. Install the circlip (A, **Figure 12**).

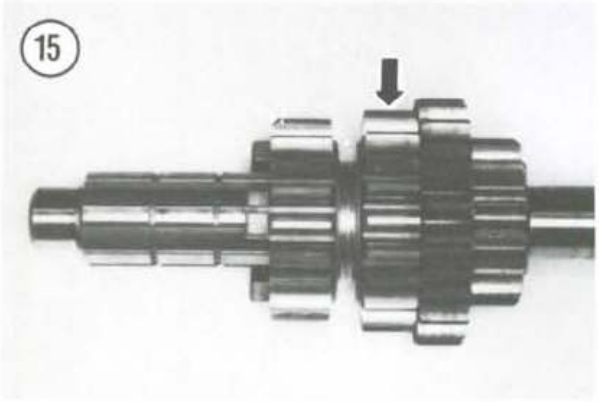








16. Install third/fourth gear (B, **Figure 11**) so that the larger gear faces to the right-hand side. See **Figure 15**.
17. Install the circlip (A, **Figure 11**).
18. On 1982 models, install the washer (4, **Figure 6**).
19. Install fifth gear (B, **Figure 10**) so that its gear dogs face to the right-hand side.
20. On 1982 models, install the washer (4, **Figure 6**).
21. Install the circlip (A, **Figure 10**).
22. Install second gear (**Figure 9**) as follows:

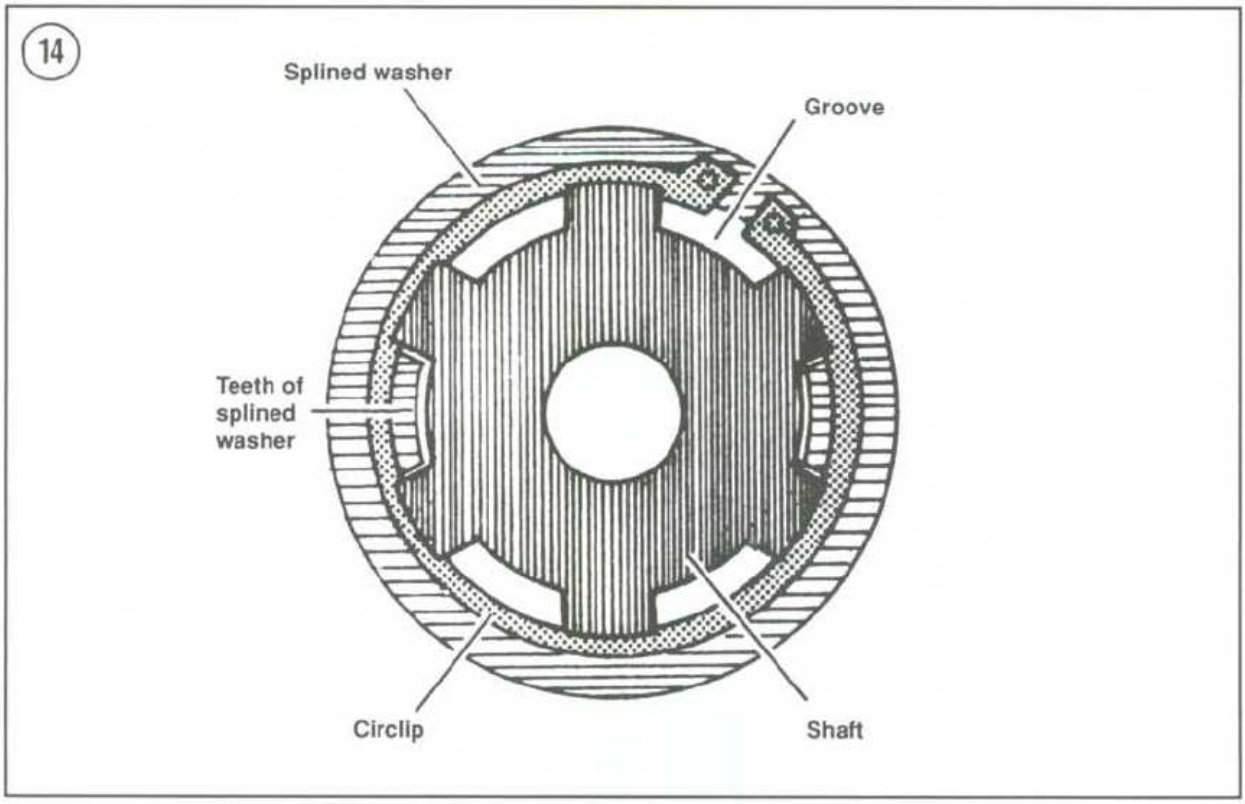


a. 1982-1987: Install second gear so that its plain side faces to the left-hand side.
b. 1988-1991: Install second gear so that its chamfered side faces to the right-hand side.

23. On 1982-1987 models, install the washer. See 1, **Figure 6** or 1, **Figure 7**.
24. After assembly is complete refer to **Figures 6-8** for the correct placement of all gears.

Countershaft Disassembly/Assembly

1. On 1982-1987 models, remove the washer. See 20, **Figure 6** or 16, **Figure 7**.
2. Remove first gear (**Figure 16**).
3. Remove sixth gear (**Figure 17**).
4. Remove the circlip (**Figure 18**).
5. On 1982 models, remove the washer (15, **Figure 6**).
6. Remove fourth gear (**Figure 19**).
7. Remove third gear (**Figure 20**).
8. On 1982 models, remove the washer (15, **Figure 6**).
9. Remove the circlip (**Figure 21**).
10. Remove fifth gear (**Figure 22**).



11. Remove the circlip (**Figure 23**).

12A. On 1982-1988 models, remove second gear (**Figure 24**).

12B. On 1989-1991 models, remove second gear (**Figure 24**) and its bushing (9, **Figure 8**).

13. Check the countershaft assembly as described under *Transmission Inspection* in this chapter.

NOTE

*When installing the circlips during transmission assembly, make sure to align the notch in the bottom of each circlip (**Figure 14**) with the transmission shaft groove.*

14A. On 1982-1988 models, install second gear (**Figure 24**) so that its dog recess faces toward the right-hand side.

14B. On 1989-1991 models, install second gear (**Figure 24**) so that its dog recess faces toward the right-hand side. Install the bushing so that its shoulder faces toward the right-hand side (9, **Figure 8**).

15. Install the circlip (**Figure 23**).

16. Install fifth gear (**Figure 22**) so that the fork groove is on the right-hand side.

17. Install the circlip (**Figure 21**).

18. On 1982 models, install the washer (15, **Figure 6**).

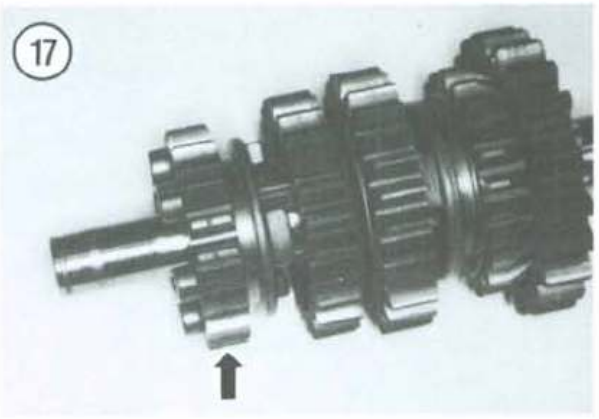
19. Install third gear (**Figure 20**) so that its dog recess faces toward the left-hand side.

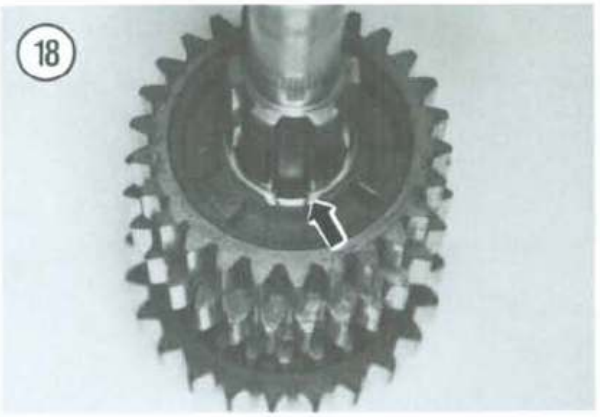
20. Install fourth gear (**Figure 19**) so that its dog recess faces toward the right-hand side.

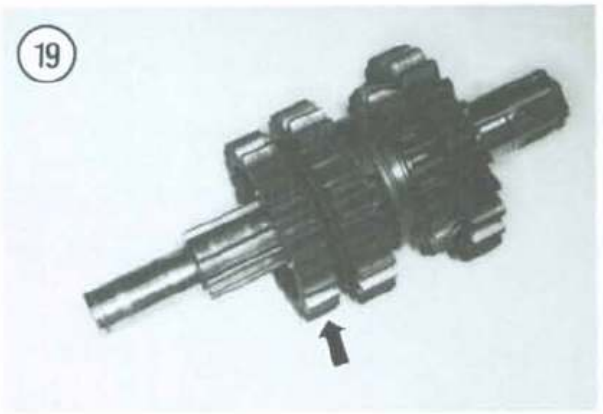
21. On 1982 models, install the washer (15, **Figure 6**).

22. Install the circlip (**Figure 18**).

23. Install sixth gear (**Figure 17**) so that the fork groove is on the left-hand side.







24. Install first gear (**Figure 16**) so that its plain side is on the right-hand side.
25. On 1982-1987 models, install the washer. See 20, **Figure 6** or 16, **Figure 7**.
26. After assembly is complete refer to **Figures 6-8** for the correct placement of all gears.

TRANSMISSION OVERHAUL (KX250)

Refer to **Figure 25** (1982-1987) or **Figure 26** (1988-1991) when servicing the transmission shafts.

Mainshaft Disassembly/Assembly

1. On 1982-1987 models, remove the circlip and bearing (**Figure 27**).
2. On 1985-1987 and 1989 models, remove the washer.
3. Remove second gear.
4. Remove the circlip.
5. On 1982 models, remove the washer.
6. Remove fourth gear.
7. On 1982 models, remove the washer.
8. Remove the circlip.
9. Remove third gear.
10. Remove the circlip.
11. On 1982 models, remove the washer.
12. Remove fifth gear.

NOTE

First gear is an integral part of the mainshaft.

13. Inspect the mainshaft parts as described under *Transmission Inspection* in this chapter.

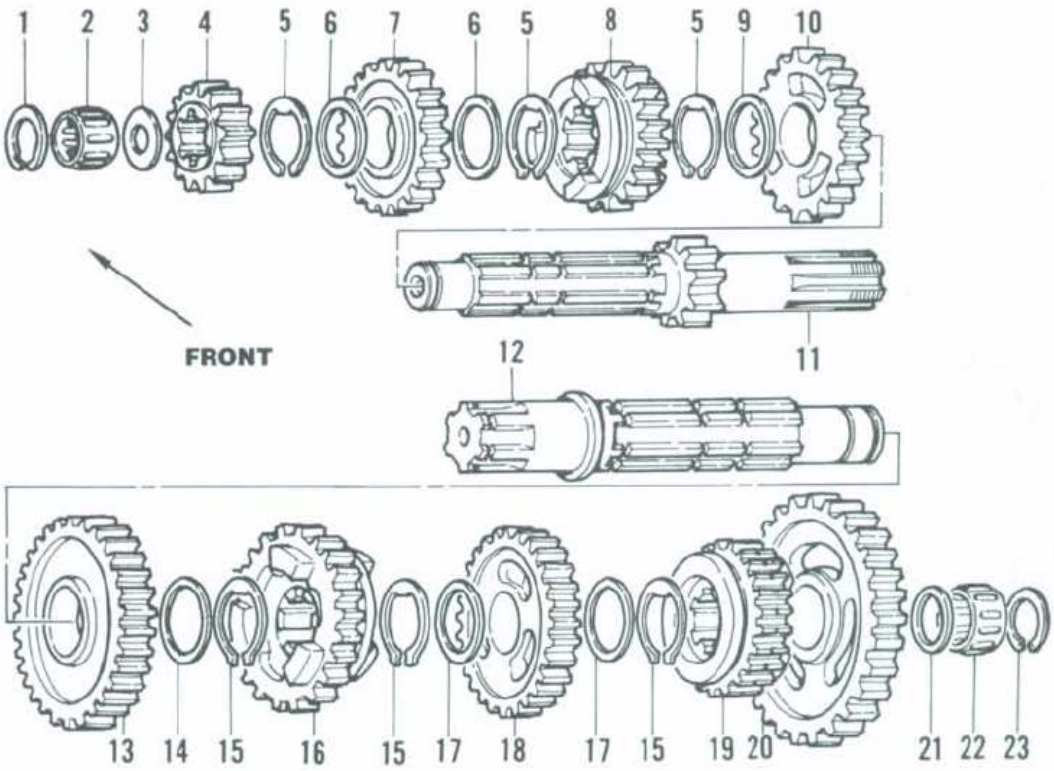
NOTE

*When installing the circlips during transmission assembly, make sure to align the notch in the bottom of each circlip (**Figure 28**) with the transmission shaft groove.*

14. Install fifth gear so that its dog recess faces toward the left-hand side (**Figure 29**).
15. On 1982 models, install the washer.
16. Install the circlip.
17. Install third gear so that the fork groove is on the left-hand side (**Figure 29**).

(25)

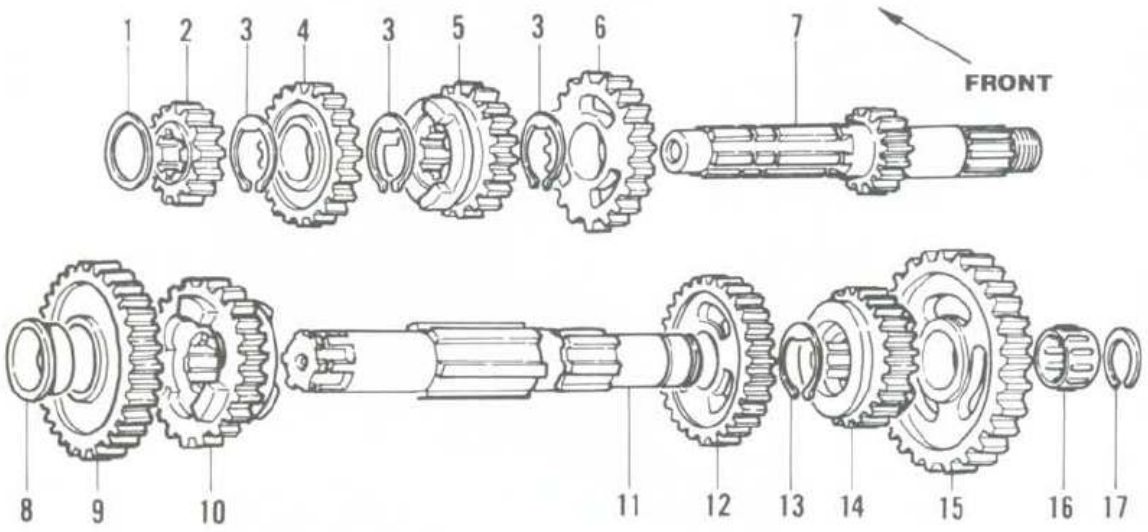
TRANSMISSION (1982-1987 KX250)



1. Circlip
2. Bearing
3. Washer (1985-1987)
4. Mainshaft 2nd gear
5. Circlip
6. Washer (1982)
7. Mainshaft 4th gear
8. Mainshaft 3rd gear
9. Washer (1982)
10. Mainshaft 5th gear
11. Mainshaft/1st gear
12. Countershaft
13. Countershaft 2nd gear
14. Washer (1982)
15. Circlip
16. Countershaft 4th gear
17. Washer (1982)
18. Countershaft 3rd gear
19. Countershaft 5th gear
20. Countershaft 1st gear
21. Washer (1982)
22. Bearing
23. Circlip

(26)

TRANSMISSION (1988-1991 KX250)



1. Washer (1989)
2. Mainshaft 2nd gear
3. Circlip
4. Mainshaft 4th gear
5. Mainshaft 3rd gear
6. Mainshaft 5th gear
7. Mainshaft/1st gear
8. Bushing
9. Countershaft 2nd gear
10. Countershaft 4th gear
11. Countershaft
12. Countershaft 3rd gear
13. Circlip
14. Countershaft 5th gear
15. Countershaft 1st gear
16. Needle bearing
17. Circlip

18. Install the circlip.
19. On 1982 models, install the washer.
20. Install fourth gear so that its dog recess faces toward the right-hand side (**Figure 29**).
21. On 1982 models, install the washer.
22. Install the circlip.
23. Install second gear (**Figure 29**).
24. On 1982-1987 models, install the circlip and bearing (**Figure 27**)
25. On 1985-1987 and 1989 models, install the washer.
26. After assembly is complete refer to **Figure 25** or **Figure 26** for the correct placement of all gears.

Countershaft Disassembly/Assembly

1. Remove the circlip and bearing (**Figure 30**).
2. On 1982 models, remove the washer.
3. Remove first gear.
4. Remove fifth gear.
5. Remove the circlip.
6. On 1982 models, remove the washer.
7. Remove third gear.

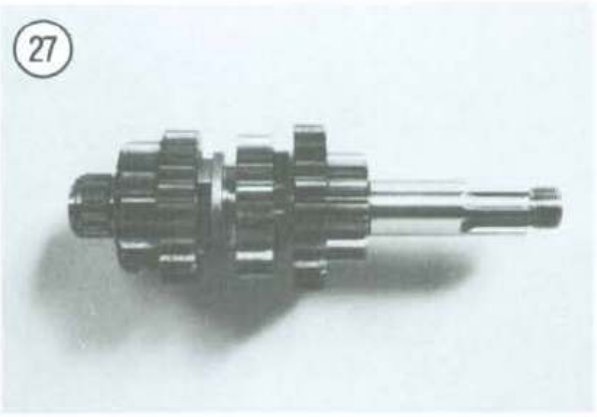
8A. On 1982-1987 models:
   a. On 1982 models, remove the washer.
   b. Remove the circlip.
   c. Remove fourth gear.
   d. Remove the circlip.
   e. Remove second gear.

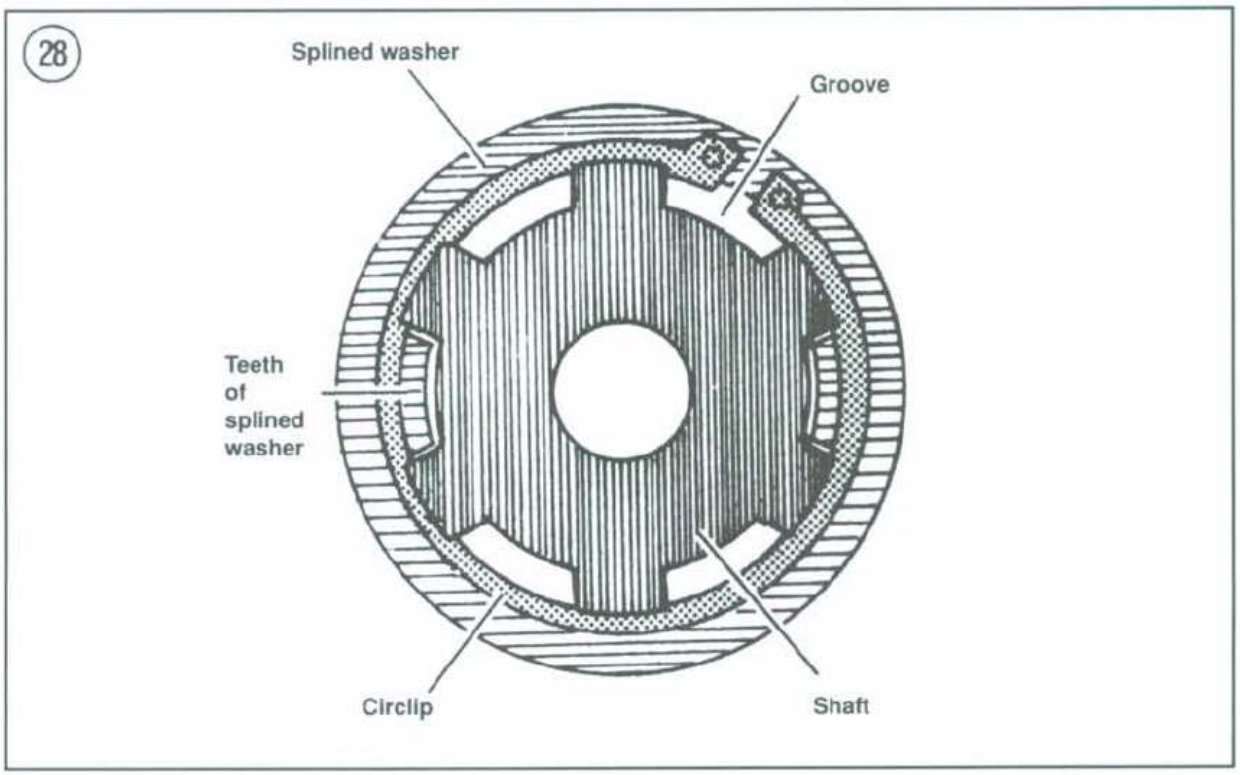
8B. On 1988-1991 models:
   a. Remove the bushing and second gear.
   b. Remove fourth gear.

9. Check the countershaft assembly as described under *Transmission Inspection* in this chapter.

NOTE

When installing the circlips during transmission assembly, make sure to align the notch in the bottom of each



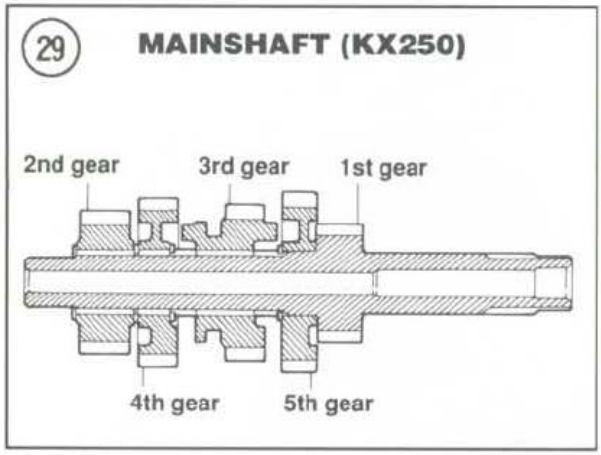


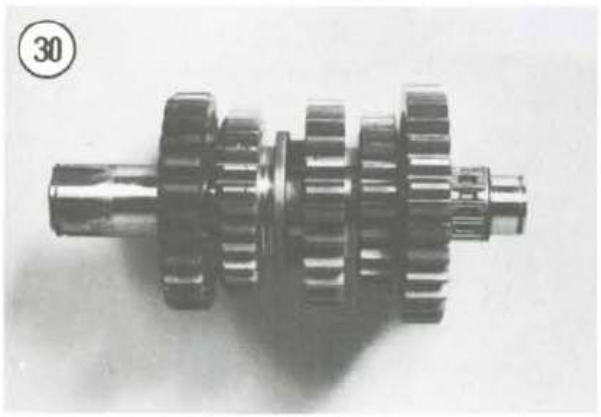
*circlip (**Figure 28**) with the transmission shaft groove.*

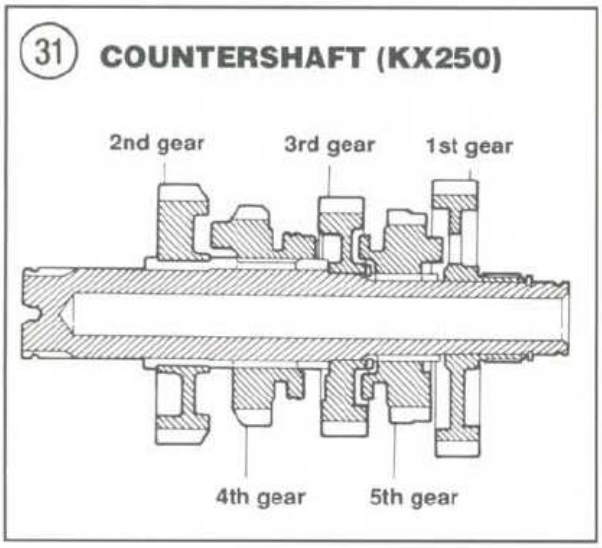
10A. On 1982-1987 models:

a. Install second gear so that its dog recess faces toward the right-hand side (**Figure 31**).

b. On 1982 models, install the washer.







c. Install the circlip.

d. Install fourth gear so that its shift fork groove faces toward the right-hand side (**Figure 31**).

e. Install the circlip.

f. On 1982 models, install the washer.

10B. On 1988-1991 models:

a. Install fourth gear so that its shift fork groove faces toward the right-hand side (**Figure 31**).

b. Install second gear so that its dog recess faces toward the right-hand side.

11. Install third gear so that its dog recess faces toward the left-hand side (**Figure 31**).

12. On 1982 models, install the washer.

13. Install the circlip.

14. Install fifth gear so that its dog recess faces toward the right-hand side (**Figure 31**).

15. Install first gear so that its dog recess faces toward the left-hand side (**Figure 31**).

16. On 1982 models, install the washer.

17. Install the needle bearing and circlip.

18. After assembly is complete refer to **Figure 25** or **Figure 26** for the correct placement of all gears.

TRANSMISSION OVERHAUL (KX500)

Refer to **Figure 32** (1983-1987) or **Figure 33** (1988-on) when servicing the transmission shafts.

Mainshaft Disassembly/Assembly

1. On 1983-1987 models, remove the circlip and bearing.

2. Remove the washer (**Figure 34**).

3. Remove second gear (**Figure 35**).

4. Remove the circlip (**Figure 36**).

5. On 1983-1987 models, remove the washer.

6. Remove fourth gear (**Figure 37**).

7. On 1983-1987 models, remove the washer.

8. Remove the circlip (**Figure 38**).

9. Remove third gear (**Figure 39**).

10. Remove the circlip (**Figure 40**).

11. On 1983-1987 models, remove the washer.

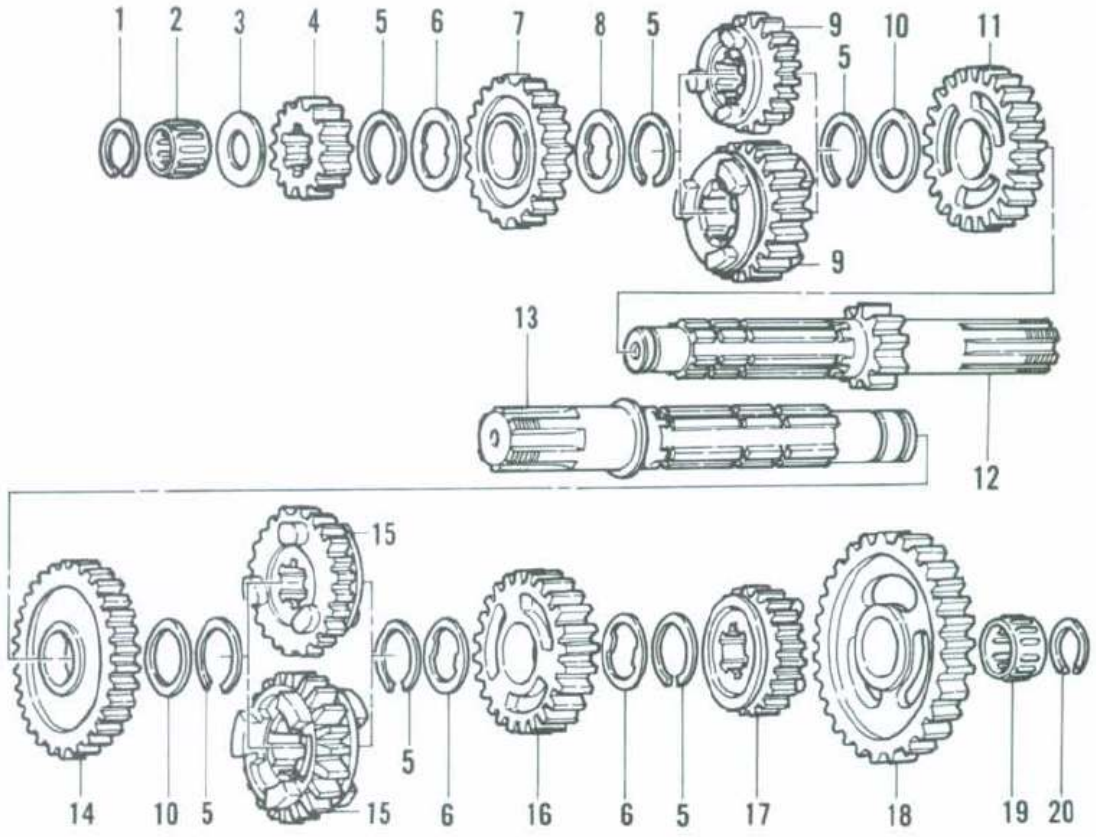
12. Remove fifth gear (**Figure 41**).

NOTE

*First gear is an integral part of the mainshaft (**Figure 42**).*

(32)

TRANSMISSION (1983-1987 KX500)



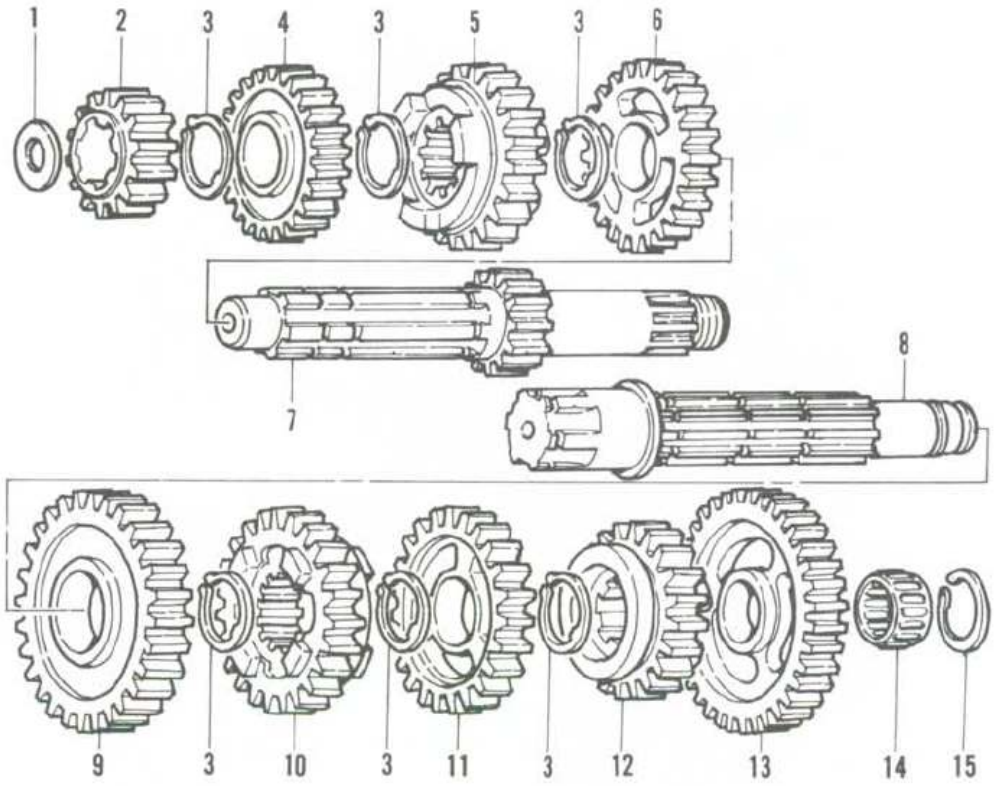
1. Circlip
2. Bearing
3. Washer
4. Mainshaft 2nd gear
5. Circlip
6. Washer
7. Mainshaft 4th gear
8. Washer

9A. Mainshaft 3rd gear (1983-1985)
9B. Mainshaft 3rd gear (1986-1987)
10. Washer
11. Mainshaft 5th gear
12. Mainshaft/1st gear
13. Countershaft
14. Countershaft 2nd gear

15A. Countershaft 4th gear (1983-1985)
15B. Countershaft 4th gear (1986-1987)
16. Countershaft 3rd gear
17. Countershaft 5th gear
18. Countershaft 1st gear
19. Bearing
20. Circlip

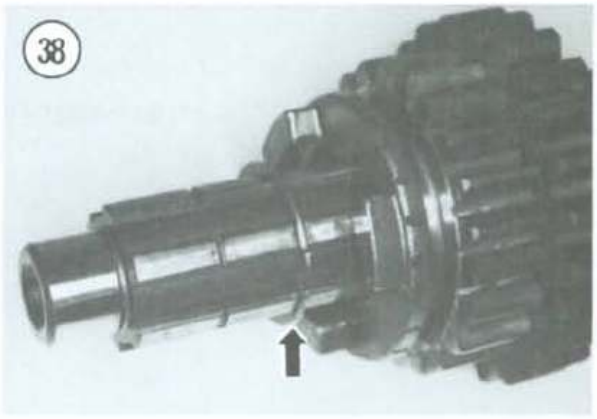
33

TRANSMISSION (1988-ON KX500)



1. Washer
2. Mainshaft 2nd gear
3. Circlip
4. Mainshaft 4th gear
5. Mainshaft 3rd gear
6. Mainshaft 5th gear
7. Mainshaft/1st gear
8. Countershaft
9. Countershaft 2nd gear
10. Countershaft 4th gear
11. Countershaft 3rd gear
12. Countershaft 5th gear
13. Countershaft 1st gear
14. Bearing
15. Circlip


34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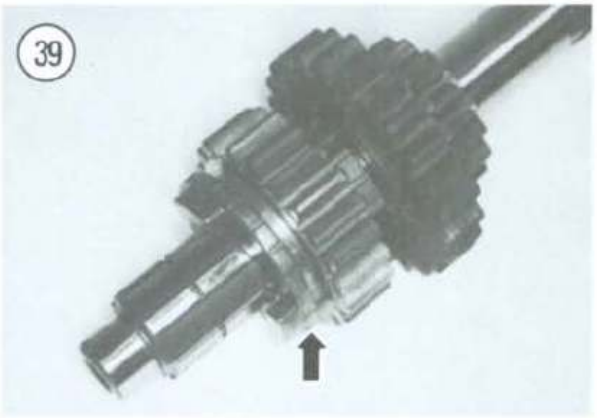
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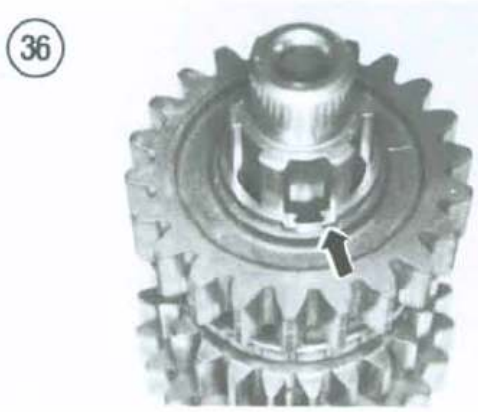
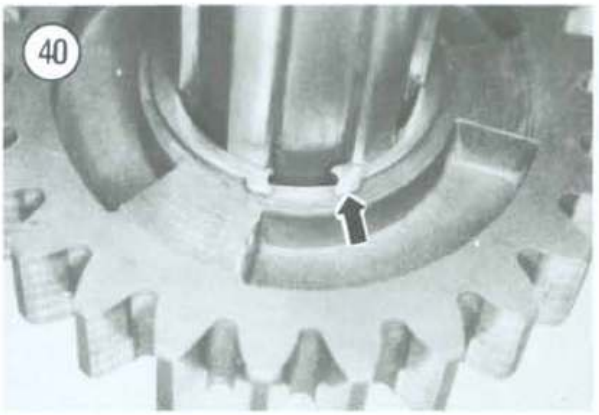
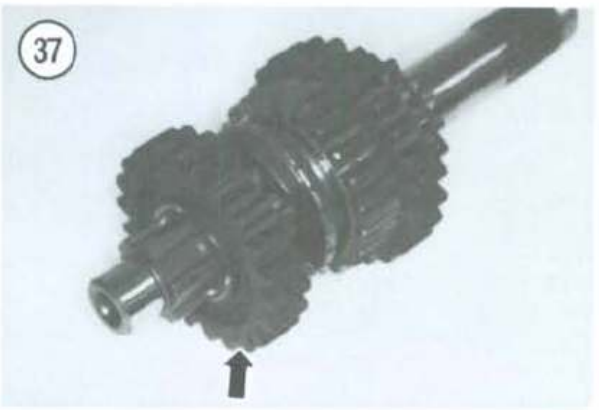

36


40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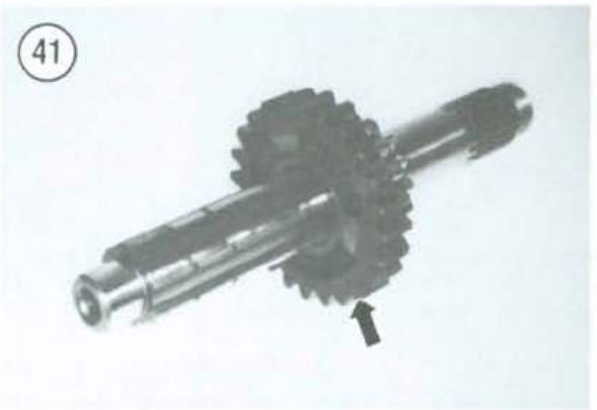

41

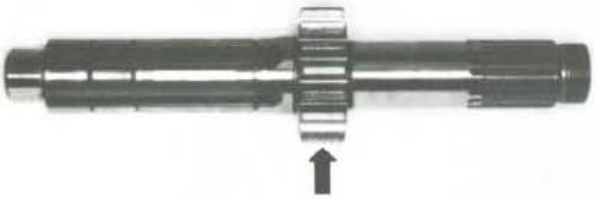
13. Inspect the mainshaft parts as described under *Transmission Inspection* in this chapter.

NOTE

*When installing the circlips during transmission assembly, make sure to align the notch in the bottom of each circlip (**Figure 43**) with the transmission shaft groove.*

14. Install fifth gear (**Figure 41**) so that its dog recess faces toward the left-hand side.
15. On 1983-1987 models, install the washer.

(42)

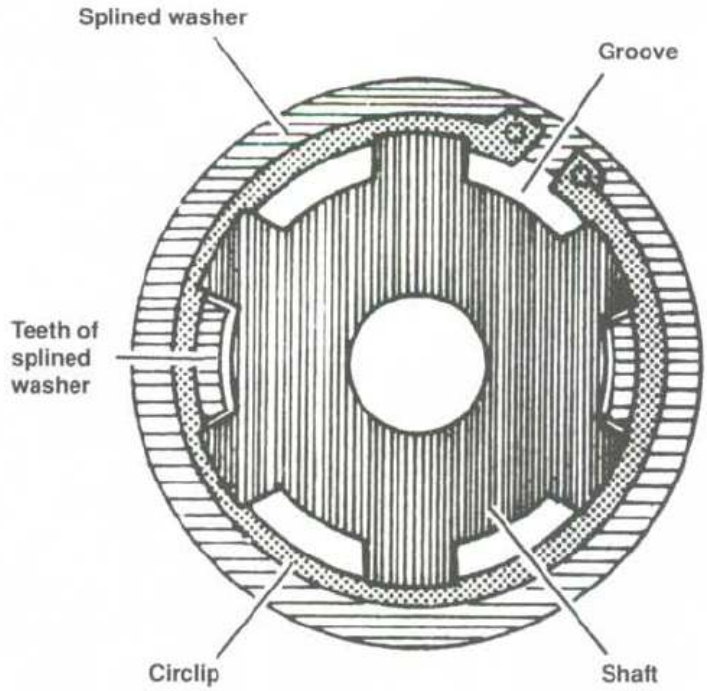


16. Install the circlip (**Figure 40**).
17. Install third gear (**Figure 39**) so that its fork groove faces toward the left-hand side.
18. Install the circlip (**Figure 38**).
19. On 1983-1987 models, install the washer.
20. Install fourth gear (**Figure 37**) so that its dog recess faces toward the right-hand side.
21. On 1983-1987 models, install the washer.
22. Install the circlip (**Figure 36**).
23. Install second gear (**Figure 35**) with either side facing out.
24. Install the washer (**Figure 34**).
25. On 1983-1987 models, install the bearing and circlip.
26. After assembly is complete refer to **Figure 32** or **Figure 33** for the correct placement of all gears.

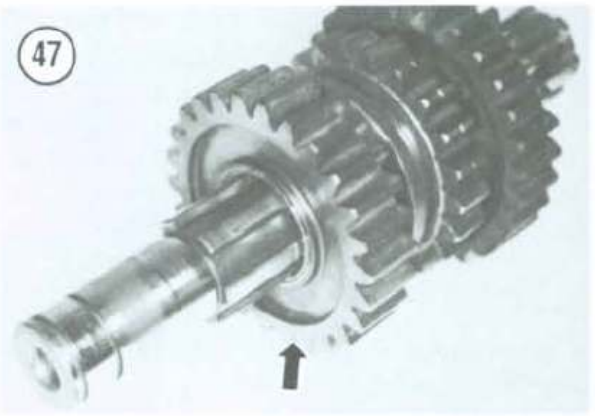
Countershaft Disassembly/Assembly

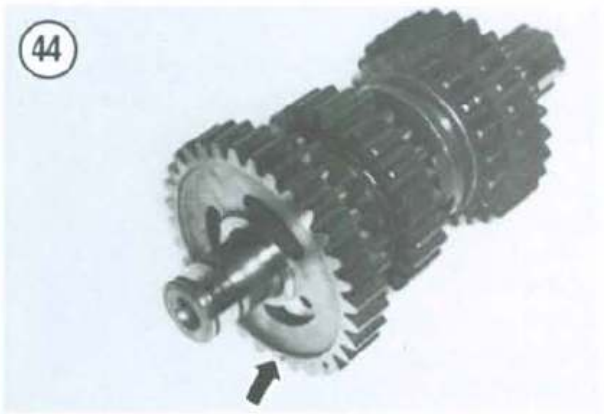
1. Remove the circlip and bearing.
2. Remove first gear (**Figure 44**).
3. Remove fifth gear (**Figure 45**).
4. Remove the circlip (**Figure 46**).
5. On 1983-1987 models, remove the washer.

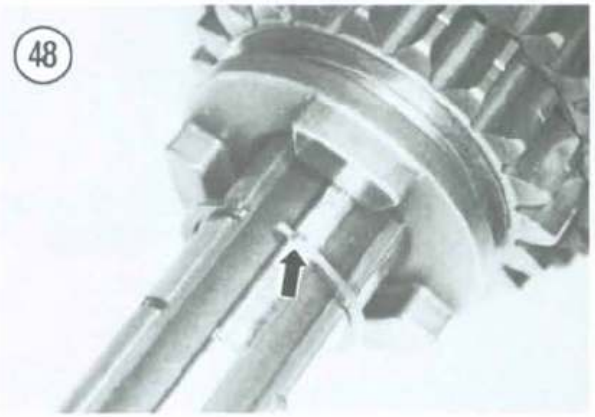
(43)

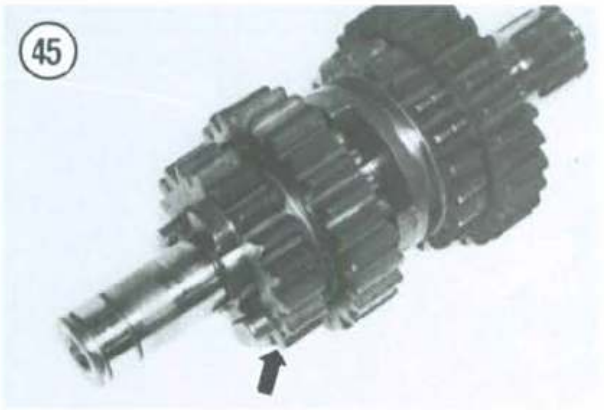


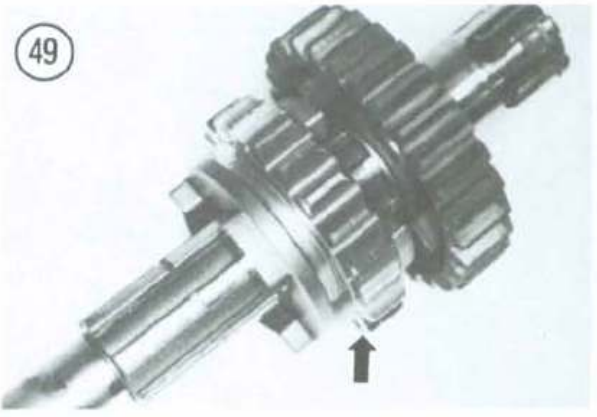
6. Remove third gear (**Figure 47**).
7. On 1983-1987 models, remove the washer
8. Remove the circlip (**Figure 48**).
9. Remove fourth gear (**Figure 49**).
10. Remove the circlip (**Figure 50**).
11. On 1983-1987 models, remove the washer.
12. Remove second gear (**Figure 51**).
13. Check the countershaft assembly as described under *Transmission Inspection* in this chapter.

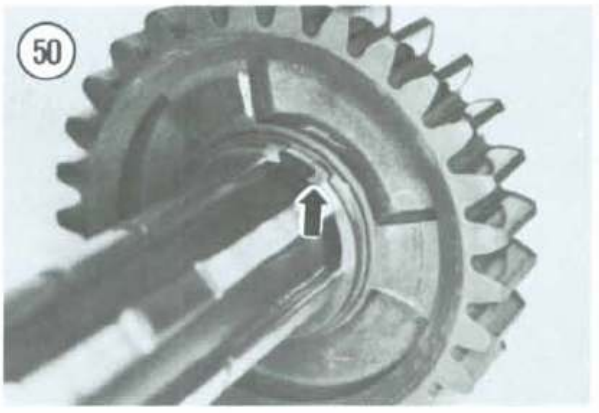


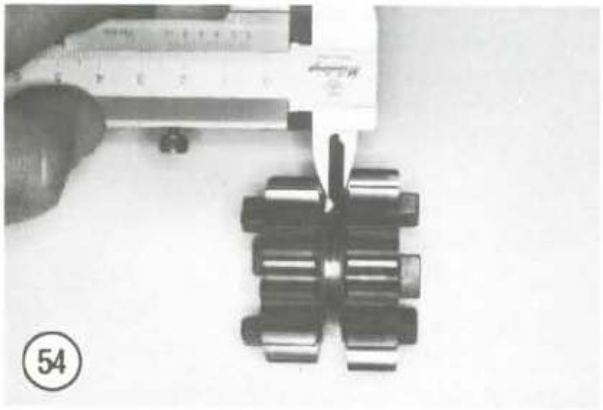












NOTE

*When installing the circlips during transmission assembly, make sure to align the notch in the bottom of each circlip (**Figure 44**) with the transmission shaft groove.*

14. Install second gear (**Figure 51**) so that its dog recess faces toward the right-hand side.
15. On 1983-1987 models, install the washer.
16. Install the circlip (**Figure 50**).
17. Install fourth gear (**Figure 49**) so that its shift fork grooves faces toward the right-hand side.
18. Install the circlip (**Figure 48**).
19. On 1983-1987 models, install the washer.
20. Install third gear (**Figure 47**) so that its dog recess faces toward the left-hand side.
21. On 1983-1987 models, install the washer.
22. Install the circlip (**Figure 46**).
23. Install fifth gear (**Figure 45**) so that its shift fork grooves faces toward the left-hand side.
24. Install first gear (**Figure 44**) so that its dog recess faces toward the left-hand side.
25. Install the bearing and circlip.
26. After assembly is complete refer to **Figure 32** or **Figure 33** for the correct placement of all gears.

TRANSMISSION INSPECTION

1. Check each gear for excessive wear, burrs, pitting, or chipped or missing teeth.
2. Make sure the dogs (lugs) on the gears are in good condition. See **Figure 52**.
3. Check each stationary gear dog slot (**Figure 53**) for cracks, rounding or other damage.
4. Measure each sliding gear groove width (**Figure 54**) with a vernier caliper and compare to the wear limit specification in **Tables 2-4**.
5. Make sure that all gears slide on their respective shafts smoothly.

NOTE

Defective gears should be replaced, and it is a good idea to replace the mating gear even though it may not show as much wear or damage.

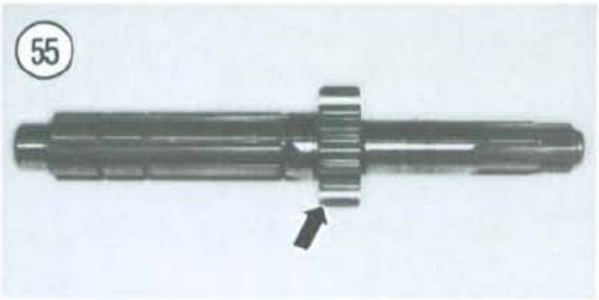
6. Check the mainshaft (**Figure 55**) and countershaft (**Figure 56**) splines for wear, cracks or other damage. Also check the mainshaft first gear (**Figure 55**). If the gear is damaged, replace the mainshaft assembly.

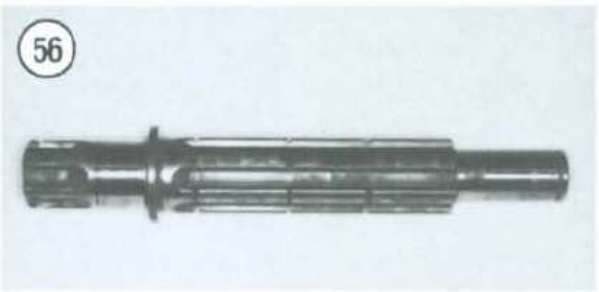
7. Check the gear bushings (**Figure 57**) for severe wear, cracks or other damage.
8. Check the circlip grooves in each shaft (**Figure 58**) for cracks or other damage. The grooves should be square to prevent the circlip from coming out.
9. Replace all circlips during reassembly. In addition, check the washers for burn marks, scoring or cracks. Replace if necessary.

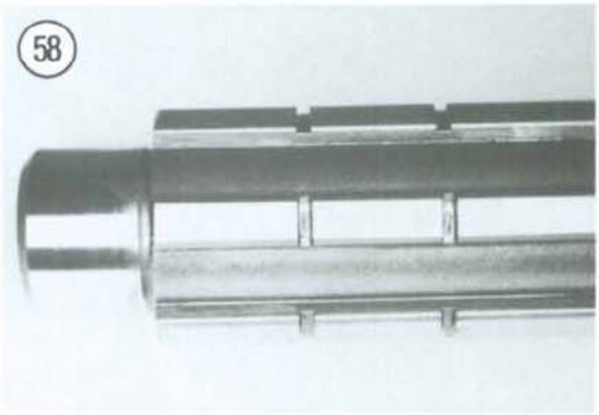
INTERNAL SHIFT MECHANISM

Refer to the illustration for your model when servicing the internal shift mechanism:

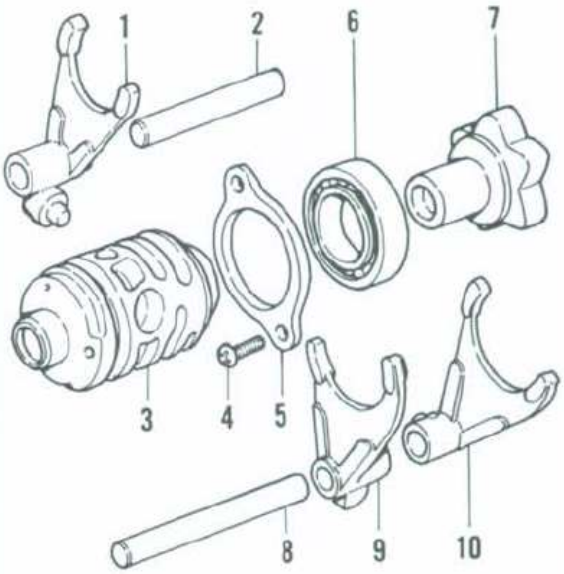
a. **Figure 59**: 1982-1984 KX125.
b. **Figure 60**: 1985-1991 KX125, 1985-1991 KX250 and 1986-on KX500.
c. **Figure 61**: 1983-1984 KX250.
d. **Figure 62**: 1982 KX250 and 1983-1985 KX500.







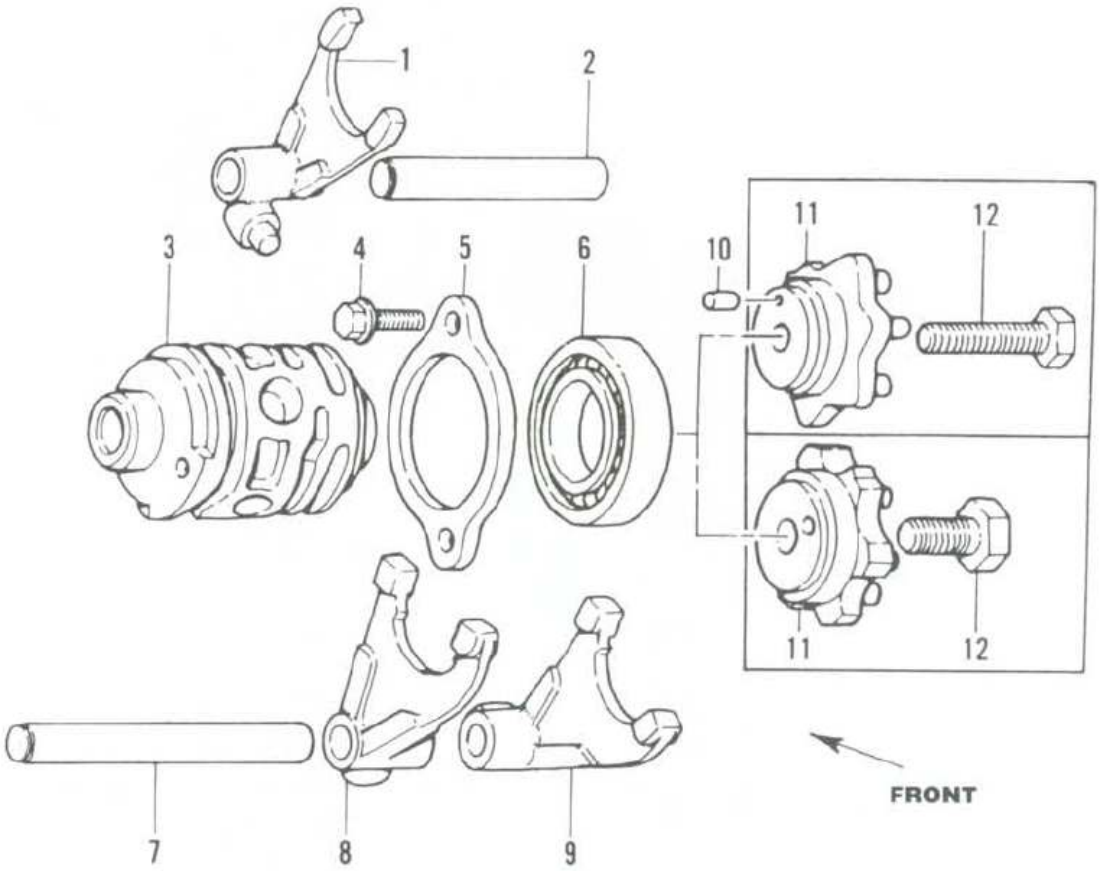
INTERNAL SHIFT MECHANISM (1982-1984 KX125)



1. Shift fork
2. Shaft
3. Shift drum
4. Screw
5. Holder
6. Bearing
7. Detent
8. Shaft
9. Shift fork
10. Shift fork

60

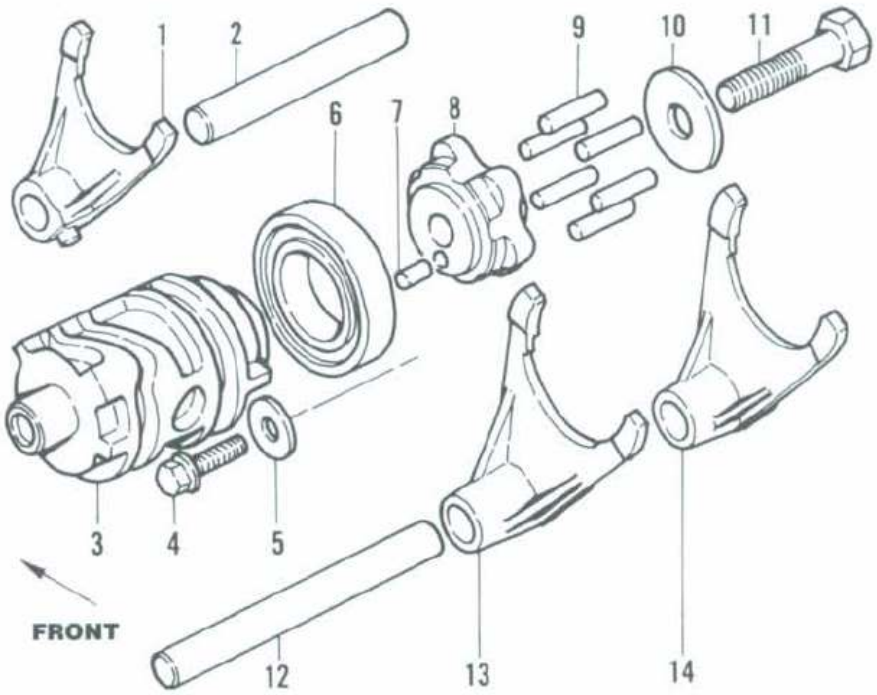
INTERNAL SHIFT MECHANISM
(1985-1991 KX125; 1985-1991 KX250; 1986-ON KX500)



1. Shift fork
2. Shaft
3. Shift drum
4. Bolt
5. Holder (1985-1987 KX125)
6. Bearing
7. Shaft
8. Shift fork
9. Shift fork
10. Pin
11. Detent
12. Bolt

(61)

INTERNAL SHIFT MECHANISM
(1983-1984 KX250)



1. Shift fork
2. Shaft
3. Shift drum
4. Bolt
5. Washer
6. Bearing
7. Pin
8. Detent
9. Pins
10. Washer
11. Bolt
12. Shaft
13. Shift fork
14. Shift fork

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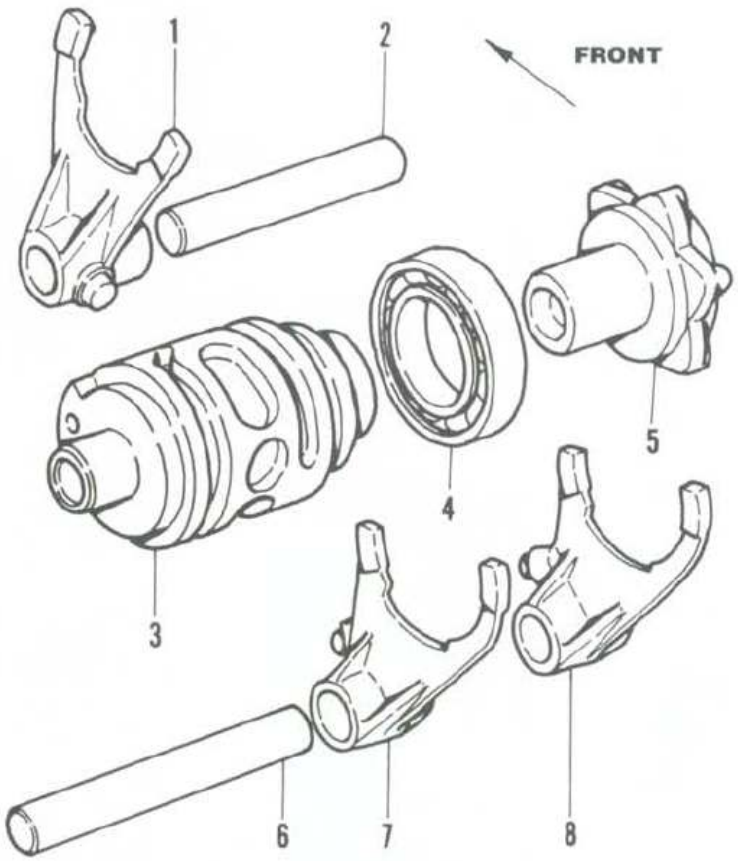
INTERNAL SHIFT MECHANISM (1982 KX250 AND 1983-1985 KX500)



1. Shift fork
2. Shaft
3. Shift drum
4. Bearing
5. Segment
6. Shaft
7. Shift fork
8. Shift fork

63

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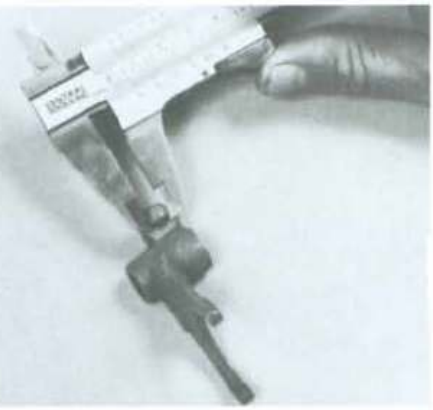

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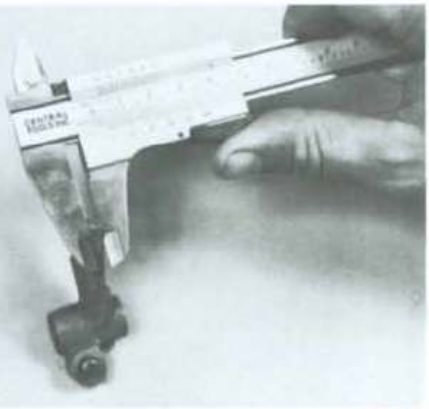

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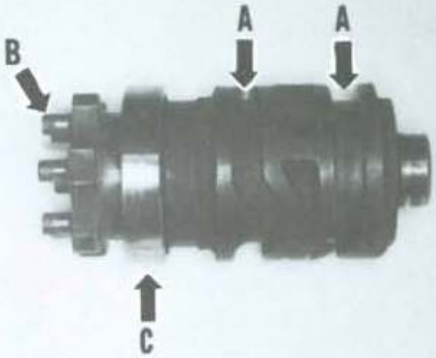

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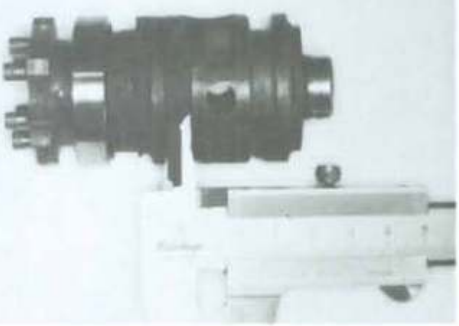

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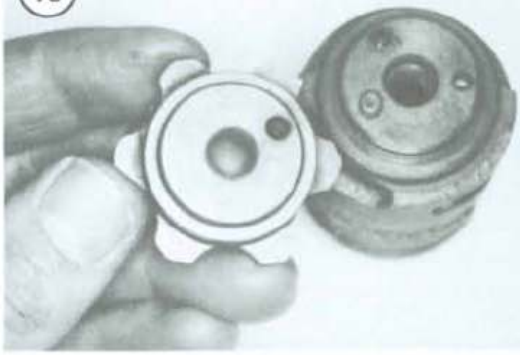


Removal/Installation

Remove and install the transmission and internal shift mechanism as described under *Crankcase Disassembly/Reassembly* in Chapter Five.

Inspection

1. Inspect each shift fork (A, **Figure 63**) for signs of wear or cracking. Examine the shift forks at the points where they contact the slider gear (B, **Figure 63**). This surface should be smooth with no signs of wear or damage. Make sure the forks slide smoothly on their respective shaft (**Figure 64**). Check for bent shafts by rolling the shaft on a piece of glass. Any clicking or wobbling indicates a bent shaft.
2. Check for any arc-shaped wear or burn marks on the shift fork fingers. This indicates that the shift fork has come in contact with the gear. The fork fingers have become excessively worn and the fork must be replaced.
3. Measure the diameter of each shift fork guide pin with a vernier caliper (**Figure 65**) and compare to the wear limit in **Tables 2-4**.
4. Measure the width of each shift fork finger with a vernier caliper (**Figure 66**) and compare to the wear limit in **Tables 2-4**.
5. Check the shift drum grooves (A, **Figure 67**) for wear or roughness. Then measure each groove width with a vernier caliper (**Figure 68**) and compare to the wear limit in **Tables 2-4**.
6. Check the shift drum segment (B, **Figure 67**) for worn or damaged pins. Check the segment ramps (**Figure 69**) for severe wear.
7. Check the shift drum bearing (B, **Figure 67**, typical) for roughness, excessive noise or damage.
8. To disassemble the shift drum, remove the center bolt and separate the parts. On 1983-1984 KX250 models (**Figure 61**), remove the 5 large pins and the 1 short pin. On 1985 and later models, remove the small pin (**Figure 70**). Replace worn or damaged parts and reassemble. Insert the pin into the shift drum and align it with the mating hole in the segment (**Figure 70**). Apply Loctite 242 (blue) onto the shift drum bolt, then reinstall and tighten securely.
9. Replace worn or damaged parts as required.

Table 1 TRANSMISSION GEAR RATIOS

KX125	
1982	
1st	2.307 (30/13)
2nd	1.750 (28/16)
3rd	1.400 (28/20)
4th	1.181 (26/22)
5th	1.041 (25/24)
6th	0.954 (21/22)
Final reduction ratio	3.500 (63/18)
Overall drive ratio	13.106 (top)
1983-1984	
1st	2.307 (30/13)
2nd	1.750 (28/16)
3rd	1.400 (28/20)
4th	1.181 (26/22)
5th	1.041 (25/24)
6th	0.954 (21/22)
Final reduction ratio	3.263 (62/19)
Overall drive ratio	12.978 (top)
1985-1986	
1st	2.307 (30/13)
2nd	1.750 (28/16)
3rd	1.400 (28/20)
4th	1.181 (26/22)
5th	1.041 (25/24)
6th	0.954 (21/22)
Final reduction ratio	3.500 (63/18)
Overall drive ratio	13.085 (top)

(continued)

Table 1 TRANSMISSION GEAR RATIOS (continued)

KX125	
1987	
1st	2.307 (30/13)
2nd	1.750 (28/16)
3rd	1.400 (28/20)
4th	1.181 (26/22)
5th	1.041 (25/24)
6th	0.920 (23/25)
Final reduction ratio	3.500 (63/18)
Overall drive ratio	12.611 (top)
1988-on	
1st	2.142 (30/14)
2nd	1.714 (24/14)
3rd	1.400 (28/20)
4th	1.181 (26/22)
5th	1.041 (25/24)
6th	0.920 (23/25)
Final reduction ratio	
1988-1989	3.916 (47/12)
1990-1991	4.000 (48/12)
Overall drive ratio	
1988-1989	12.611 (top)
1990-1991	12.880 (top)
KX250	
1982	
1st	2.133 (32/15)
2nd	1.687 (27/16)
3rd	1.388 (25/18)
4th	1.160 (29/25)
5th	1.000 (24/24)
Final reduction ratio	3.428 (48/14)
Overall drive ratio	9.428 (top)
1983-1987	
1st	2.133 (32/15)
2nd	1.764 (30/17)
3rd	1.388 (25/18)
4th	1.136 (25/22)
5th	1.000 (24/24)
Final reduction ratio	
1983-1984	3.571 (50/14)
1985	3.500 (49/14)
1986	3.428 (48/14)
1987	3.357 (47/14)
1988-on	
1st	2.133 (32/15)
2nd	1.687 (27/16)
3rd	1.388 (25/18)
4th	1.136 (25/22)
5th	1.000 (24/24)
Final reduction ratio	
1988-1989	3.357 (47/14)
1990-1991	3.428 (48/14)
KX500	
1983-1985	
1st	2.000 (32/16)
2nd	1.454 (32/22)
3rd	1.181 (26/22)
4th	0.954 (21/11)
5th	0.791 (19/24)

(continued)

Table 1 TRANSMISSION GEAR RATIOS (continued)

KX500	
Final reduction ratio	
1983	3.071 (43/14)
1984	3.066 (46/15)
1985	2.285 (46/14)
1986-on	
1st	2.000 (32/16)
2nd	
1986-1989	1.450 (29/20)
1990-on	1.444 (26/18)
3rd	1.181 (26/22)
4th	0.954 (21/11)
5th	0.791 (19/24)
Final reduction ratio	
1986	3.428 (48/14)
1987-on	3.357 (47/14)

Table 2 SHIFT FORK/SHIFT DRUM SERVICE SPECIFICATIONS (KX125)

	New mm (in.)	Service limit mm (in.)
Shift fork finger thickness	3.90-4.00 (0.154-0.157)	3.80 (0.150)
Sliding gear groove width	4.05-4.15 (0.159-0.163)	4.25 (0.167)
Shift fork guide pin diameter		
1982-1987	5.990-6.005 (0.2358-0.2364)	5.95 (0.234)
1988-1989	5.98-6.00 (0.235-0.236)	5.88 (0.231)
1990-1991	5.90-6.00 (0.232-0.236)	5.80 (0.228)
Shift drum groove width		
1982-on	6.05-6.20 (0.238-0.244)	6.25 (0.246)

Table 3 SHIFT FORK/SHIFT DRUM SERVICE SPECIFICATIONS (KX250)

	New mm (in.)	Service limit mm (in.)
Shift fork finger thickness		
1982	4.4-4.5 (0.173-0.177)	4.3 (0.169)
1983-1985	3.90-4.00 (0.154-0.157)	3.80 (0.150)
1986-on	4.4-4.5 (0.173-0.177)	4.30 (0.169)
Sliding gear groove width		
1982	4.55-4.65 (0.179-0.183)	4.75 (0.187)
1983-1985	4.05-4.15 (0.159-0.163)	4.25 (0.167)
1986-on	4.55-4.65 (0.179-0.183)	4.75 (0.187)

(continued)

Table 3 SHIFT FORK/SHIFT DRUM SERVICE SPECIFICATIONS (KX250) (continued)

	New mm (in.)	Service limit mm (in.)
Shift fork guide pin diameter		
1982	5.90-6.00 (0.232-0.236)	5.85 (0.230)
1983-1987	5.98-6.00 (0.235-0.236)	5.95 (0.234)
1988-1989	5.98-6.00 (0.235-0.236)	5.88 (0.231)
1990-1991	5.90-6.00 (0.232-0.236)	5.80 (0.228)
Shift drum groove width	6.05-6.20 (0.238-0.244)	6.25 (0.246)

Table 4 SHIFT FORK/SHIFT DRUM SERVICE SPECIFICATIONS (KX500)

	New mm (in.)	Service limit mm (in.)
Shift fork finger thickness	4.4-4.5 (0.173-0.177)	4.30 (0.169)
Sliding gear groove width	4.55-4.65 (0.179-0.183)	4.75 (0.187)
Shift fork guide pin diameter		
1983-1987	5.98-6.00 (0.235-0.236)	5.95 (0.234)
1988-on	5.98-6.00 (0.235-0.236)	5.88 (0.231)
Shift drum groove width	6.05-6.20 (0.238-0.244)	6.25 (0.246)

CHAPTER EIGHT

FUEL AND EXHAUST SYSTEMS

The fuel system consists of the fuel tank, shutoff valve, and a single Mikuni or Keihin carburetor and air cleaner. There are slight differences among the various models and they are noted in the various procedures.

The exhaust system consists of an exhaust pipe assembly and a silencer.

This chapter includes service procedures for all parts of the fuel system and exhaust system.

Carburetor specifications are listed in **Tables 1-6** (end of chapter).

AIR CLEANER

The air cleaner must be cleaned frequently. Refer to Chapter Three for specific procedures and service intervals.

CARBURETOR OPERATION

For proper operation, a gasoline engine must be supplied with fuel and air mixed in proper proportions by weight. A mixture in which there is an excess of fuel is said to be rich. A lean mixture is one which contains insufficient fuel. A properly adjusted carburetor supplies the proper mixture to the engine under all operating conditions.

The carburetor consists of several major systems. A float and float valve mechanism maintain a constant fuel level in the float bowl. The pilot system supplies fuel at low speeds. The main fuel system supplies fuel at medium and high speeds. Finally a starter (choke) system supplies a rich mixture needed to start a cold engine.

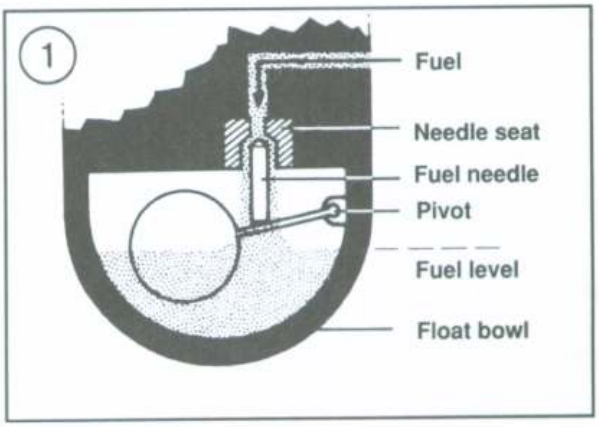
Float Mechanism

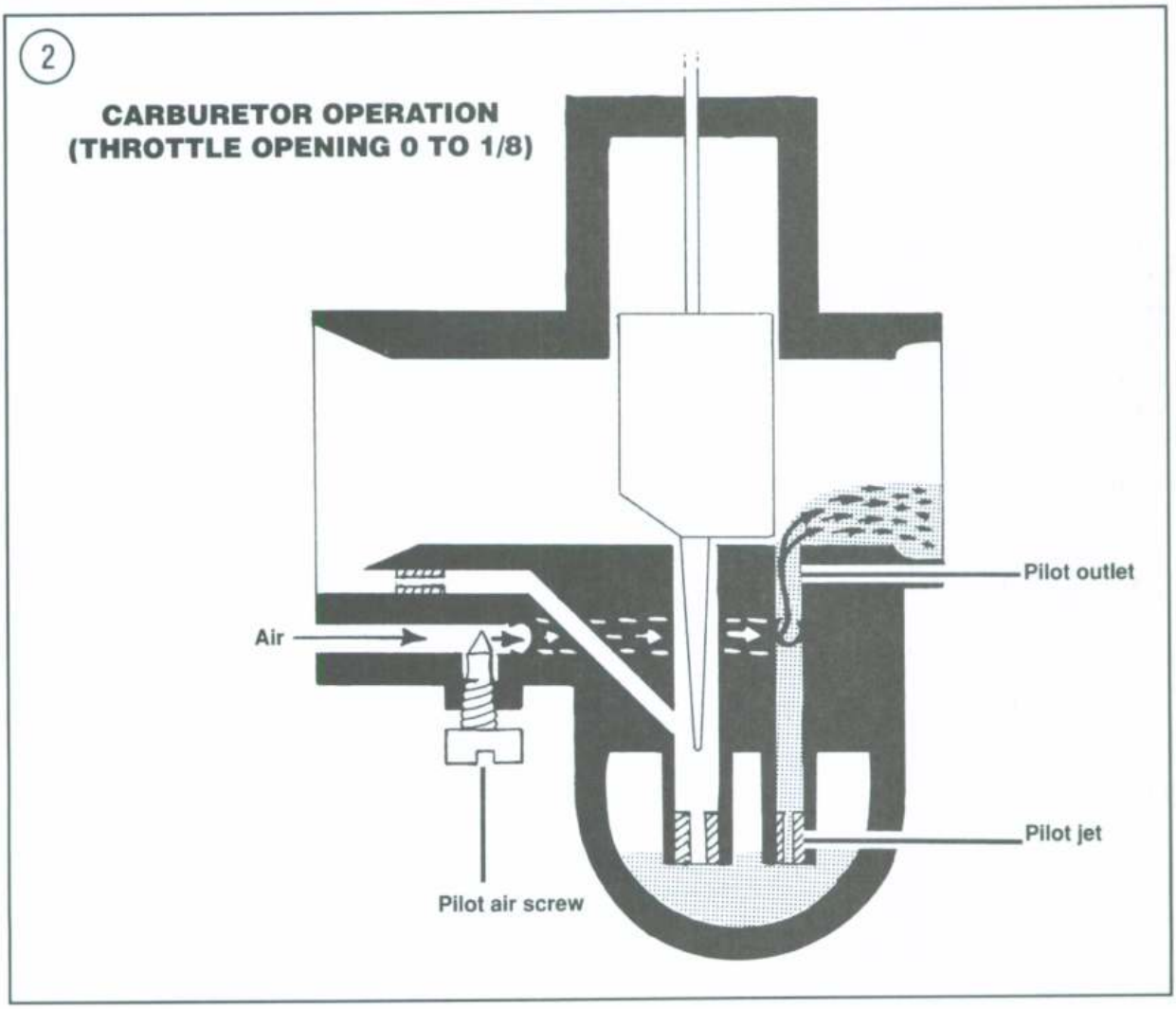
To assure a steady supply of fuel, the carburetor is equipped with a float valve through which fuel flows by gravity from the fuel tank into the float bowl (**Figure 1**). Inside the bowl is a combined float assembly that moves up and down with the fuel level. Resting on the float arm is a fuel valve, which rides inside the fuel valve. The fuel valve regulates fuel flow into the float bowl. The fuel needle and fuel

valve contact surfaces are machined very accurately to insure correct fuel flow calibration. As the float rises, the fuel needle rises inside the fuel valve and blocks it, so that when the fuel has reached the required level in the float bowl, no more fuel can enter.

Pilot and Main Fuel Systems

The carburetor's purpose is to supply and atomize fuel and mix it in correct proportions with air that is drawn in through the air intake. At primary throttle openings (from idle to 1/8 throttle) a small amount of fuel is siphoned through the pilot jet by suction from the incoming air (**Figure 2**). As the throttle is opened further, the air stream begins to siphon fuel through the main jet and needle jet. The tapered needle increases the effective flow capacity of the needle jet as it rises with the throttle slide, in that it occupies decreasingly less of the area of the needle jet (**Figure 3**). In addition, the amount of cutaway in the leading edge of the throttle slide aids in controlling the fuel/air mixture during partial throttle openings.





At full throttle, the carburetor venturi is fully open and the needle is lifted far enough to permit the main jet to flow at full capacity. See **Figure 4** and **Figure 5**.

Starting System

The starting system consists of a choke plunger, mixing tube, starter jet and air passage (**Figure 6**). When the choke valve is lifted, it opens the air passage permitting air to flow through the passage where it siphons fuel through the starter jet, into the mixing tube and then into the air passage where it is mixed (fuel-rich) and discharged into the throttle bore.

CARBURETOR SERVICE (1982-1987 KX125)

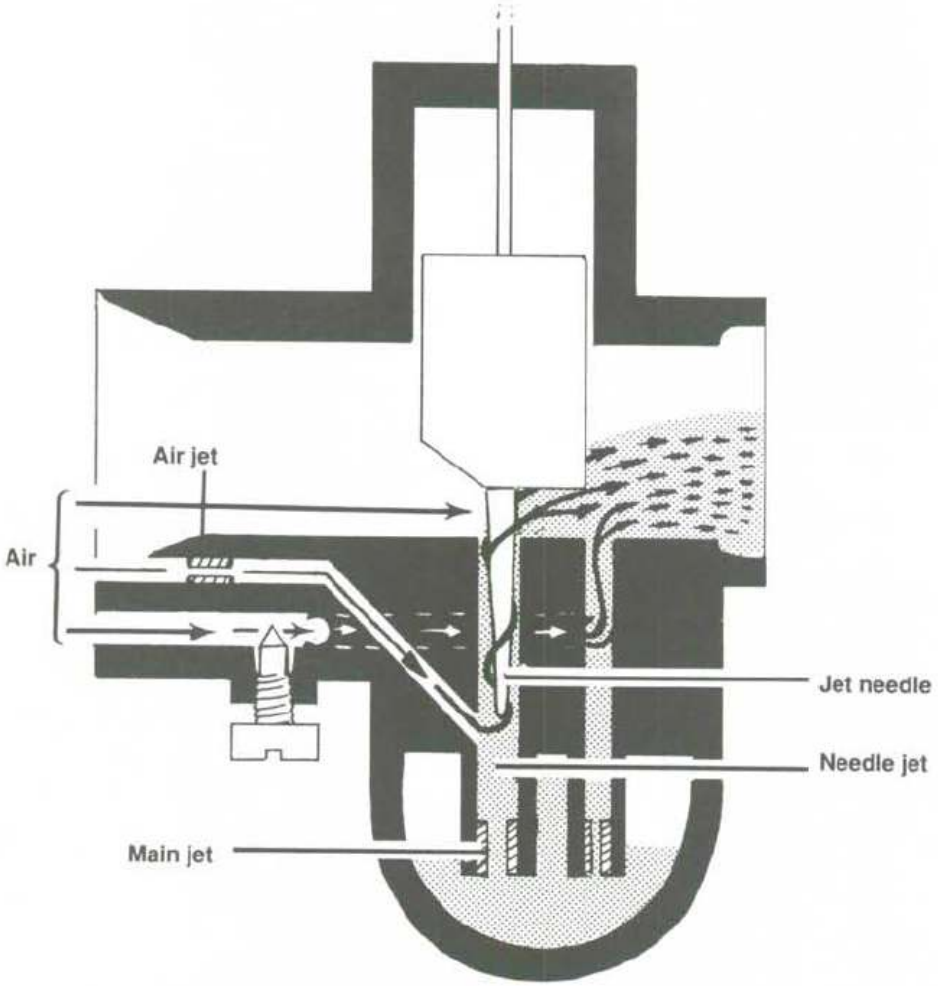
Major carburetor service (removal and cleaning) should be performed after every race on competition bikes. Otherwise, service should be performed whenever the engine is decarbonized or when poor engine performance, hesitation, and little or no response to mixture adjustment is observed. The service interval time will become natural to you after owning and running the bike for a period of time.

Carburetor Identification

All 1982-1987 KX125 models were equipped with Mikuni carburetors. Refer to **Table 1** at the end of this chapter for carburetor specifications.

3

CARBURETOR OPERATION (THROTTLE OPENING 1/8 TO 1/4)



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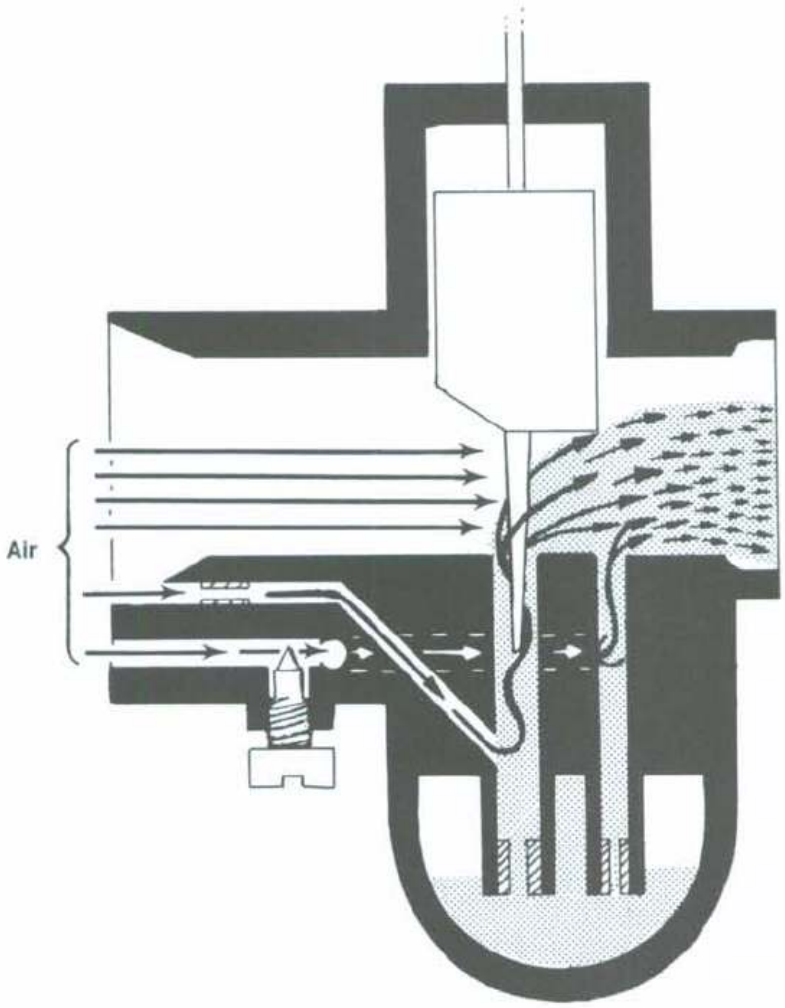
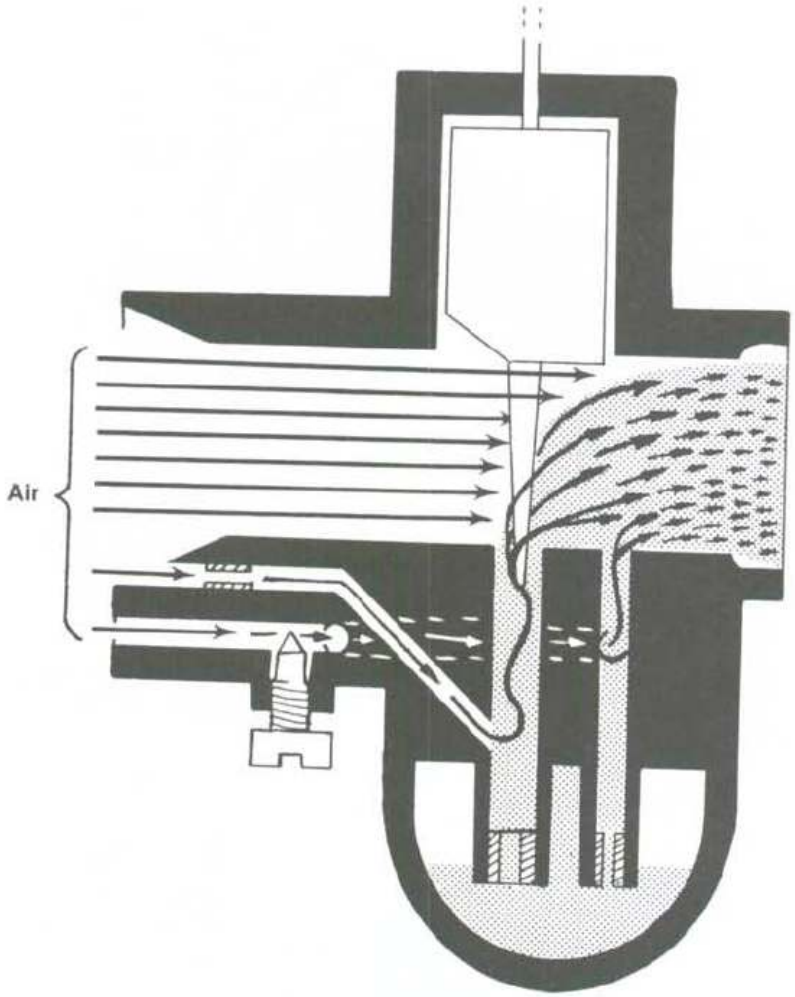
4

CARBURETOR OPERATION
(THROTTLE OPENING 1/4 TO 3/4)



5

CARBURETOR OPERATION (THROTTLE OPENING 3/4 TO FULL)



Removal/Installation

1. Support the bike securely.
2. Turn the fuel valve off and disconnect the fuel line at the carburetor.
3. If necessary, remove the fuel tank as described in this chapter.

NOTE

Prior to removing the top cap, thoroughly clean the area around it so no dirt will fall into the carburetor.

4. Unscrew the carburetor top cap and pull the throttle valve assembly up and out of the carburetor.

NOTE

If the top cover and slide assembly are not going to be removed for cleaning, wrap them in a clean shop cloth or place them in a plastic bag to help keep them clean.

5. Loosen the carburetor clamp screws. Slide the clamps away from the carburetor.
6. Make sure all overflow and drain tubes are free.
7. Carefully work the carburetor (**Figure 7**) free from the rubber boots and remove it.
8. Take the carburetor to a workbench for disassembly and cleaning.
9. Install by reversing these removal steps. Check throttle cable adjustment as described in Chapter Three.

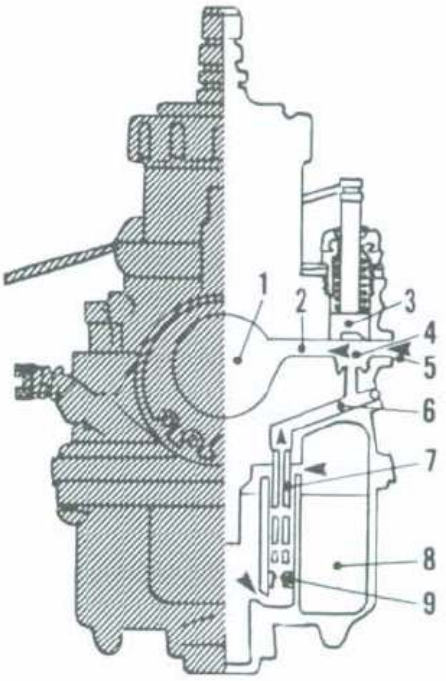
Throttle Valve Disassembly/Assembly

Refer to **Figure 8** (1982-1983) or **Figure 9** (1984-1987) for this procedure.

1. Loosen the carburetor clamp screws and pivot the carburetor (**Figure 7**) toward you.
2. Unscrew the carburetor cap and pull the throttle valve assembly out of the carburetor. Be careful not to damage the jet needle.
3. Compress the throttle valve spring into the cap and remove the throttle cable clip (**Figure 10**).
4. Push down and then lift out the throttle cable (**Figure 11**).
5. Remove the 2 screws (**Figure 12**) securing the jet needle holder to the throttle valve. Remove the screws, washers (if used), holder and jet needle (**Figure 13**).

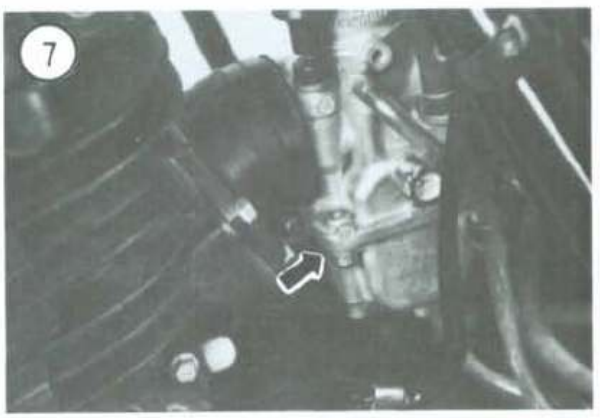
6

STARTING SYSTEM



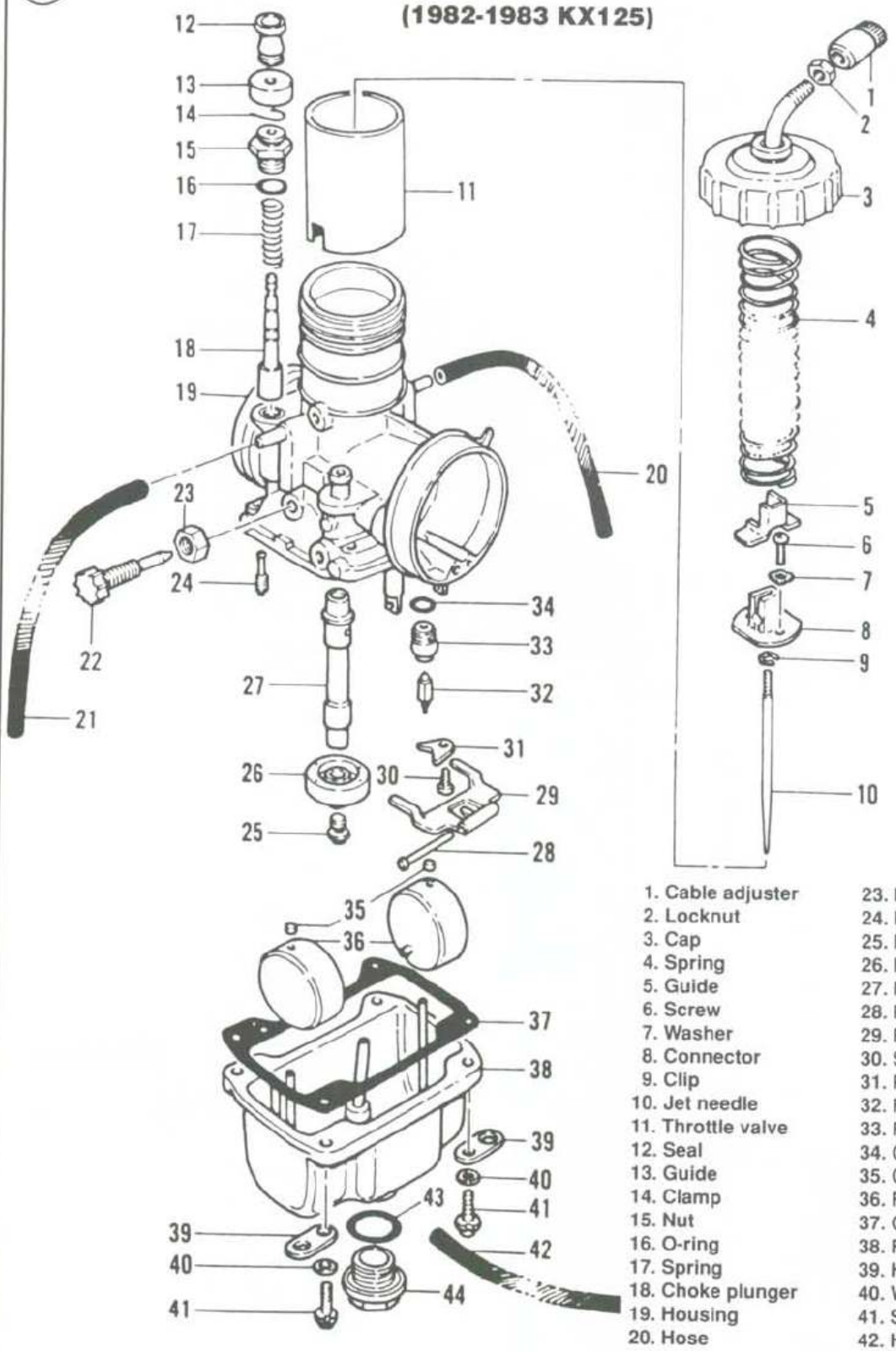
1. Carburetor bore
2. Mixture passage
3. Starter plunger
4. Plunger chamber
5. Air passage
6. Fuel passage
7. Mixing tube
8. Float chamber
9. Starter jet

7



8

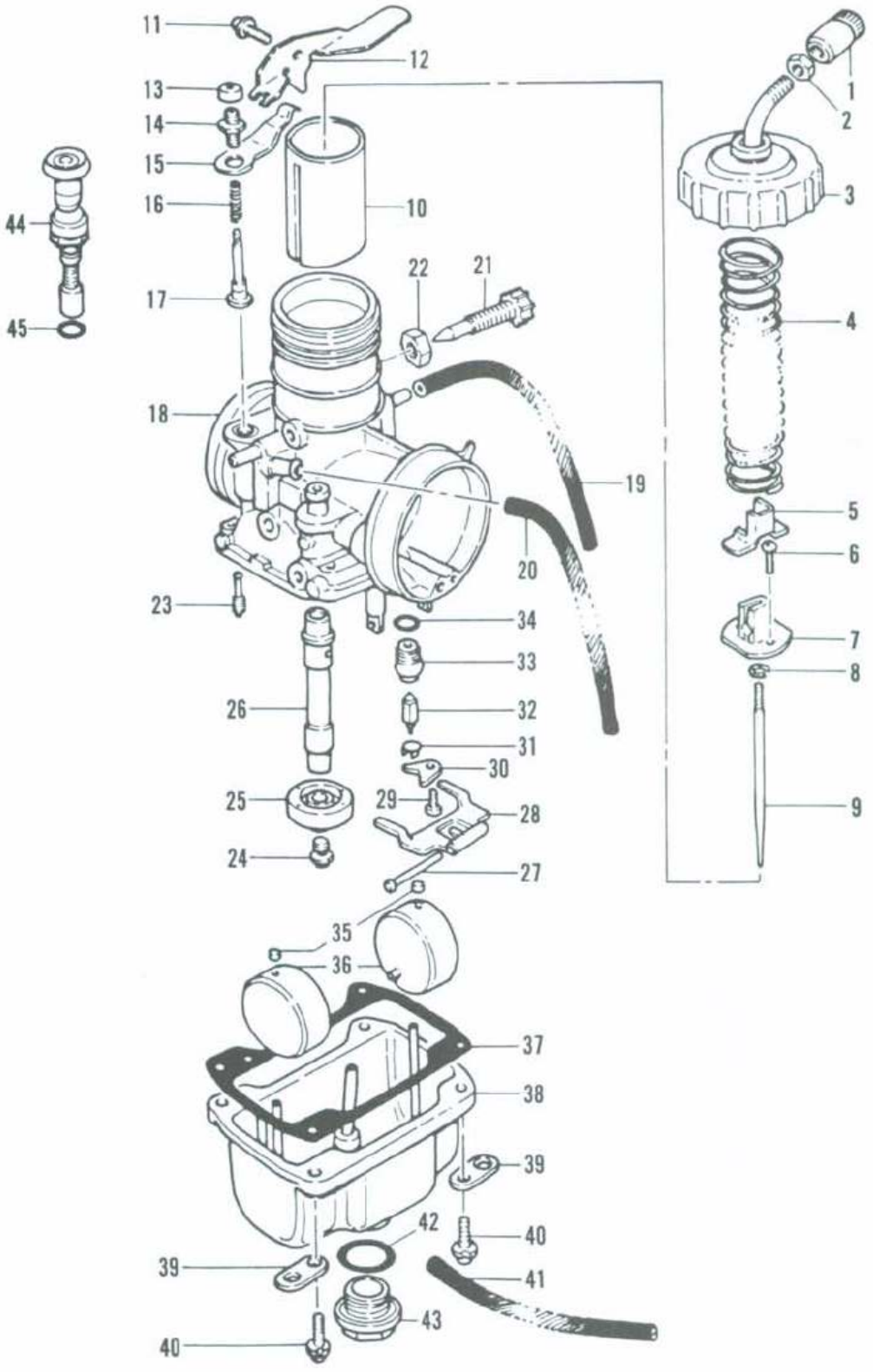
CARBURETOR
(1982-1983 KX125)



1. Cable adjuster
2. Locknut
3. Cap
4. Spring
5. Guide
6. Screw
7. Washer
8. Connector
9. Clip
10. Jet needle
11. Throttle valve
12. Seal
13. Guide
14. Clamp
15. Nut
16. O-ring
17. Spring
18. Choke plunger
19. Housing
20. Hose
21. Hose
22. Throttle stop screw
23. Nut
24. Pilot jet
25. Main jet
26. Main jet holder
27. Needle jet
28. Pivot pin
29. Float arm
30. Screw
31. Plate
32. Fuel valve
33. Fuel valve seat
34. O-ring
35. Cap
36. Floats
37. Gasket
38. Float bowl
39. Hose guide
40. Washer
41. Screw
42. Hose
43. O-ring
44. Drain bolt

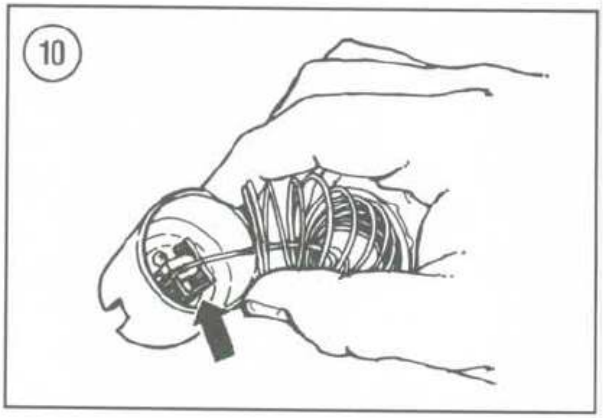
(9)

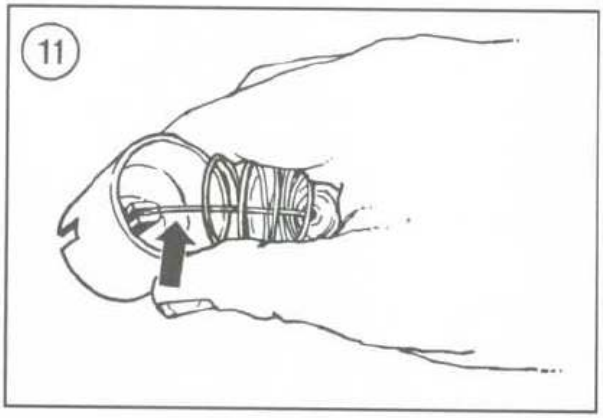
CARBURETOR
(1984-1987 KX125)

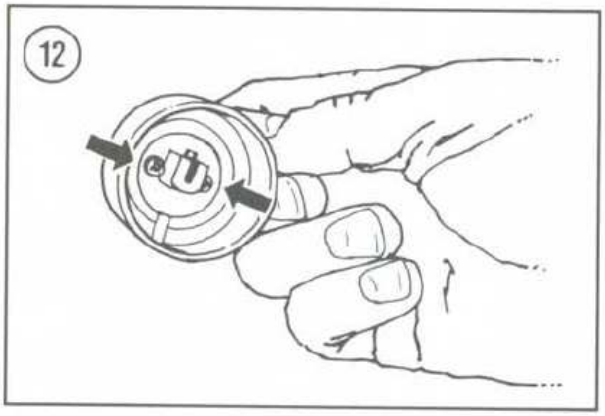


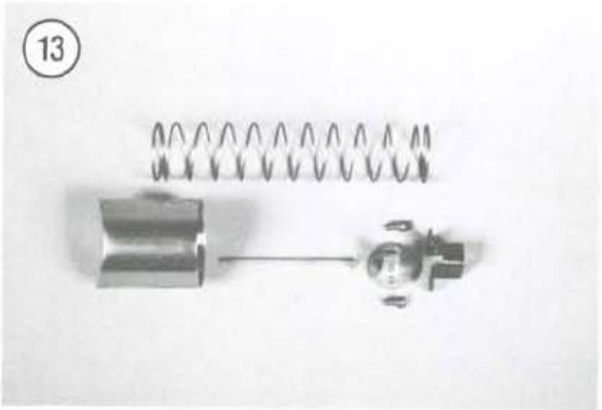
1. Cable adjuster
2. Locknut
3. Cap
4. Spring
5. Cover
6. Screw
7. Connector
8. Clip
9. Jet needle
10. Throttle valve
11. Screw (1984-1985)
12. Choke lever (1984-1985)
13. Seal (1984-1985)
14. Bolt (1984-1985)
15. Lever lock (1984-1985
16. Spring (1984-1985)
17. Choke plunger (1984-1985)
18. Housing
19. Hose
20. Hose
21. Throttle stop screw
22. Nut
23. Pilot jet
24. Main jet
25. Main jet holder
26. Needle jet
27. Pivot pin
28. Float arm
29. Screw (1984)
30. Plate (1984)
31. Hook (1985-1987)
32. Fuel valve
33. Fuel valve seat
34. O-ring
35. Cover
36. Floats
37. Gasket
38. Float bowl
39. Hose guide
40. Screw
41. Hose
42. O-ring
43. Drain bolt
44. Choke (1986-1987)
45. O-ring (1986-1987)

Note:
(1) On 1984 models, Kawasaki microfiche shows that part No. 14 is installed under part No. 15.
(2) On 1985-1987 models, parts 21 and 22 are installed on the left-hand side.









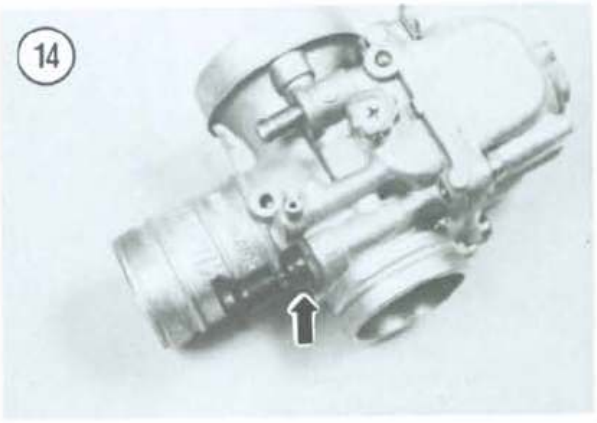
6. If the jet needle clip is going to be removed, record the clip position before removal. The standard clip position is listed in **Table 1**. If you are jetting the carburetor, refer to *Jet Needle Adjustment* in this chapter.
7. Install by reversing these steps. Note the following.
8. Check that the clip is seated securely on the jet needle clip groove.
9. When installing the throttle valve into the carburetor, align the groove on the throttle valve with the pin in the carburetor bore, while at the same time making sure the jet needle enters the needle jet correctly.
10. After installing the throttle valve into the carburetor and tightening the carburetor cap, operate the throttle a few times, checking that the throttle valve moves through the carburetor smoothly and seats completely when the throttle is released.

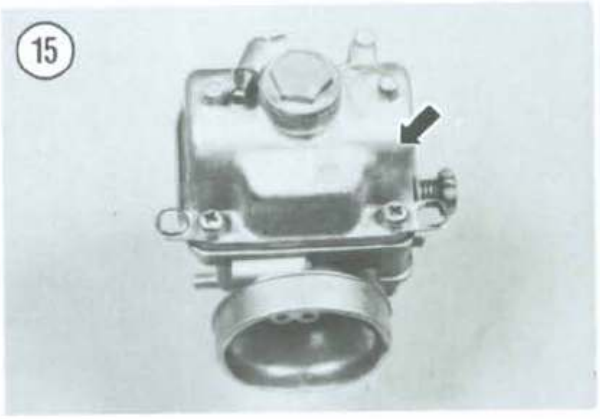
Disassembly/Assembly

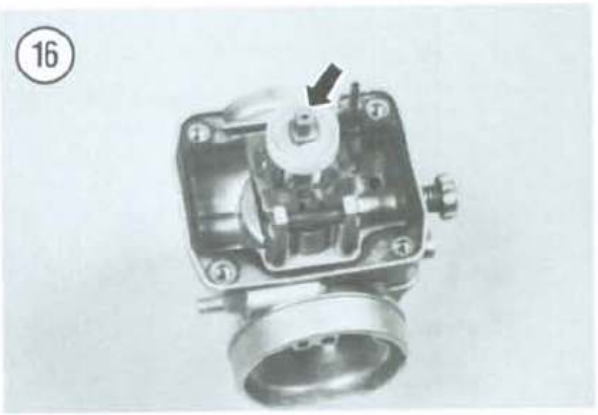
Refer to **Figure 8** (1982-1983) or **Figure 9** (1984-1987) for this procedure.

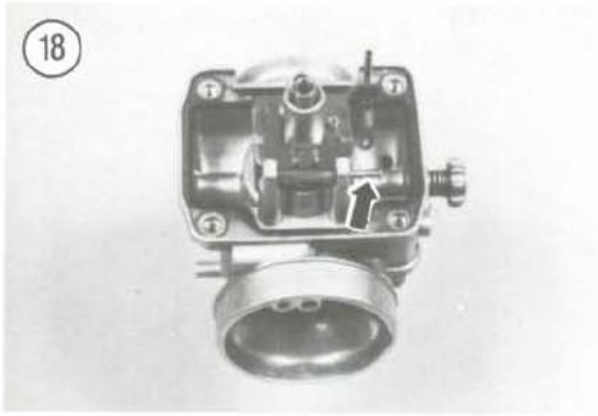
The carburetors are basically the same even though minor variations exist between different models. Where differences occur they are identified.

1. Remove the fuel line and all drain and overflow tubes.
2A. On 1982-1983 and 1986-1987 models, unscrew the nut and remove the choke assembly (**Figure 14**).
2B. On 1984-1985 models, remove the screw securing the choke lever. Then remove the starter plunger cap and remove the spring and plunger (**Figure 9**).
3. Remove the screws securing the float bowl (**Figure 15**) and remove it.
4. Unscrew and remove the main jet (**Figure 16**).
5. Lift the main jet holder (**Figure 17**) off of the needle jet.
6. Remove the float pin (**Figure 18**).
7. Remove the fuel valve Phillips screw (**Figure 19**). Then remove the holder and the fuel valve assembly (**Figure 20**).
8. Push the jet needle down (**Figure 21**) and remove it through the top of the carburetor (**Figure 22**).
9. Unscrew and remove the pilot jet (**Figure 23**).
10. Remove the float bowl gasket (A, **Figure 24**).
11. Unscrew and remove the idle stop screw (B, **Figure 24**).









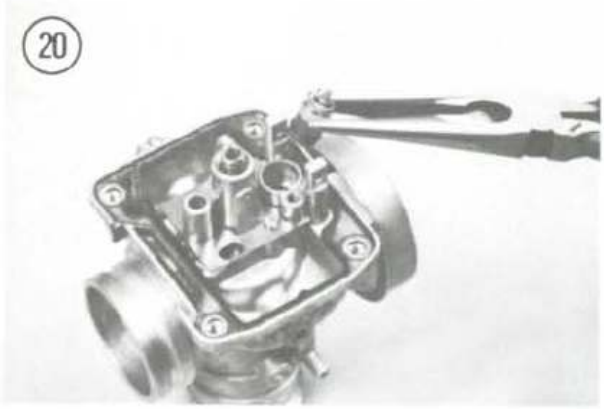
12. Label and remove the floats from the float bowl, if required.

13. Clean and inspect the carburetor components as described in this chapter.

14. After all parts have been cleaned and dried, reverse these steps to assemble the carburetor. Note the following.

15. Check that a locking cap (**Figure 25**) is installed over the end of each float rod in the float bowl.

16. Check the float height and adjust if necessary. Refer to *Float Adjustment* in this chapter.



17. When installing the jet needle, align the slot in the side of the needle jet with the pin in the carburetor bore (**Figure 26**).

18. After the carburetor has been assembled adjust the idle speed. Refer to *Idle Speed Adjustment* in Chapter Three.

CARBURETOR SERVICE (1982, 1984-1987 KX250 AND 1983, 1985-1987 KX500)

Major carburetor service (removal and cleaning) should be performed after every race on competition bikes. Otherwise, service should be performed whenever the engine is decarbonized or when poor engine performance, hesitation, and little or no response to mixture adjustment is observed. The service interval time will become natural to you after owning and running the bike for a period of time.

Carburetor Identification

All of these models are equipped with a single Mikuni carburetor. Refer to **Table 3** (KX250) or **Table 5** (KX500) at the end of this chapter for carburetor specifications.

Removal/Installation

1. Support the bike securely.
2. Turn the fuel valve off and disconnect the fuel line at the carburetor.
3. If necessary, remove the fuel tank as described in this chapter.

NOTE

Prior to removing the top cap, thoroughly clean the area around it so no dirt will fall into the carburetor.

4. Unscrew the carburetor top cap and pull the throttle valve assembly up and out of the carburetor.

NOTE

If the top cover and slide assembly are not going to be removed for cleaning, wrap them in a clean shop cloth or place them in a plastic bag to help keep them clean.

5. Loosen the carburetor clamp screws. Slide the clamps away from the carburetor.
6. Make sure all overflow and drain tubes are free.
7. Carefully work the carburetor (**Figure 27**) free from the rubber boots and remove it.

NOTE

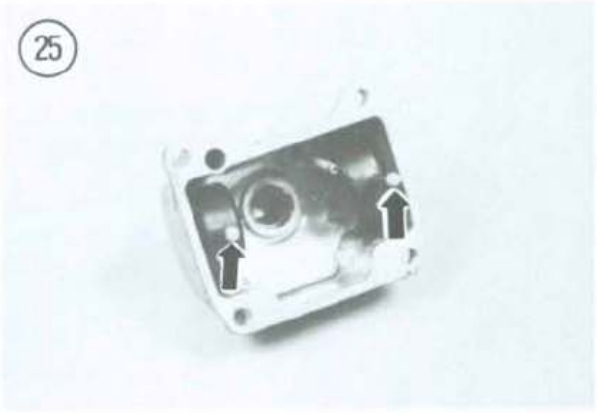
*To keep the throttle valve clean, cover it with a plastic bag (**Figure 28**).*

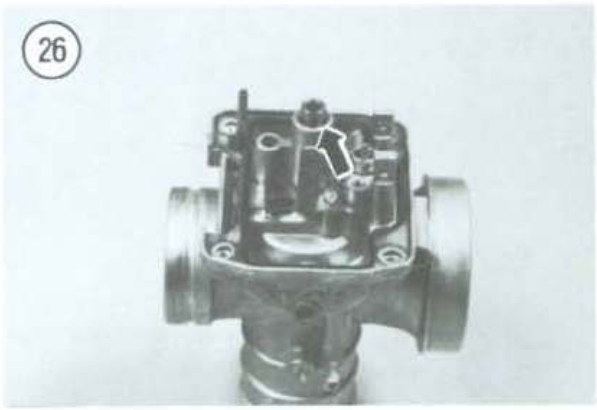
8. Take the carburetor to a workbench for disassembly and cleaning.
9. Install by reversing these removal steps. Check throttle cable adjustment as described in Chapter Three.

Throttle Valve Disassembly/Assembly

Refer to **Figure 29** or **Figure 30** when performing the following procedures.

1. Loosen the carburetor clamp screws and pivot the carburetor (**Figure 27**) toward you or remove the carburetor.





2. Unscrew the carburetor cap and pull the throttle valve assembly out of the carburetor (**Figure 31**). Be careful not to damage the jet needle.

3. Compress the throttle valve spring into the cap and remove the throttle cable clip (**Figure 32**).

4. Push down and then lift out the throttle cable (**Figure 33**).

5. Remove the 2 screws (**Figure 34**) securing the jet needle holder to the throttle valve. Remove the screws, washers (if used), holder and jet needle (**Figure 35**).

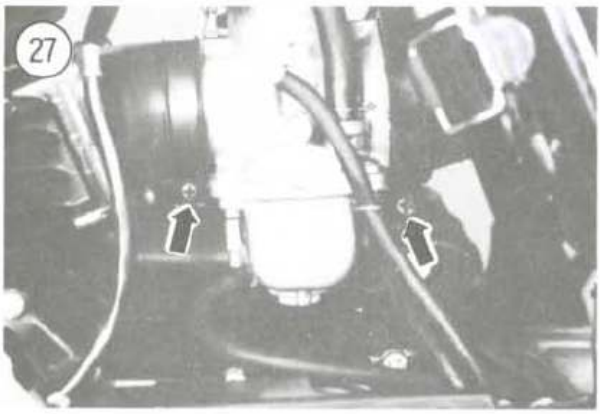
6. If the jet needle clip is going to be removed, record the clip position before removal. The standard clip position is listed in **Table 3** and **Table 5**. If you are jetting the carburetor, refer to *Jet Needle Adjustment* in this chapter.

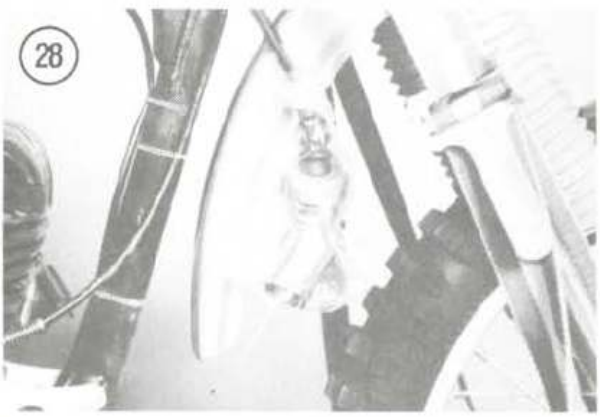
7. Install by reversing these steps. Note the following.

8. Check that the clip is seated securely on the jet needle clip groove.

9. When installing the throttle valve into the carburetor, align the groove on the throttle valve with the pin in the carburetor bore, while at the same time making sure the jet needle enters the needle jet correctly.

10. After installing the throttle valve into the carburetor and tightening the carburetor cap, operate the throttle a few times, checking that the throttle valve moves through the carburetor smoothly and seats completely when the throttle is released.





Disassembly/Assembly

Refer to **Figure 29** (1982 and 1984 KX250 and 1983 KX500) or **Figure 30** (1985-1987 KX250 and KX500).

The following procedure is shown on a basic Mikuni carburetor. While the carburetors are basically the same, minor variations exist between different models. Refer to the exploded view drawing (**Figure 29** or **Figure 30**) for your model when performing the following.

1. Remove the fuel line and all drain and overflow tubes.

2. Remove the screws securing the float bowl (**Figure 36**) and remove it.

4. Unscrew and remove the main jet (**Figure 37**) and the main jet holder.

5. Push the needle jet (**Figure 38**) up and remove it through the top of the carburetor (**Figure 39**).

6A. Models with single float: Remove the float pivot pin and remove the float.

6B. Models with individual floats: Remove the float arm pivot pin (**Figure 40**) and float arm.

7. Remove the fuel valve clip (**Figure 41**), if used, and the fuel valve (**Figure 42**).

8A. If the fuel valve screws into the carburetor body, remove it as follows:

a. Unscrew and remove the fuel valve seat (**Figure 43**) and the lower washer.
b. Remove the plate and the upper washer (**Figure 44**).

8B. If the fuel valve is secured with a screw and clamp, remove it as follows:

a. Remove the screw and clamp.
b. Remove the fuel valve seat and O-ring.

9. Remove the pilot jet (**Figure 45**).

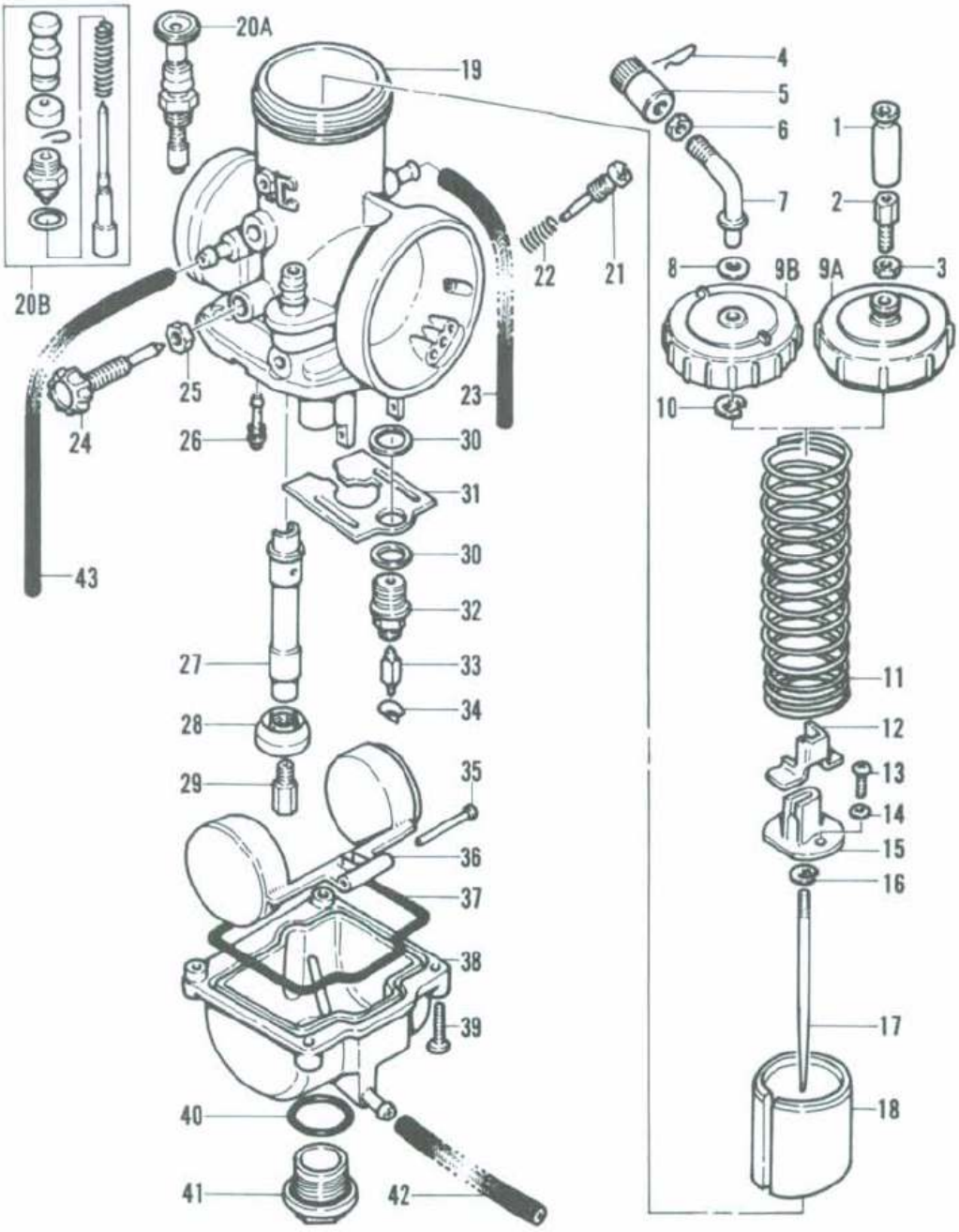
10. Remove the throttle adjust screw and its nut or washer.

NOTE

Before removing the pilot air screw, carefully screw it in until it lightly seats.

(29)

CARBURETOR
(1982 AND 1984 KX250 AND 1983 KX500)



1. Cable boot (KX250)
2. Cable adjuster (KX250)
3. Nut (KX250)
4. Cable clip (KX500)
5. Cable adjuster (KX500)
6. Nut (KX500)
7. Cable guide (KX500)
8. Washer (KX500)
9A. Cap (KX250)
9B. Cap (KX500)
10. E-clip (KX500)
11. Spring
12. Cover
13. Screw
14. Washer
15. Connector
16. E-clip
17. Jet needle
18. Throttle valve
19. Housing
20A. Choke (KX250)
20B. Choke (KX500)
21. Pilot air screw
22. Spring
23. Hose
24. Idle stop screw
25. Nut
26. Pilot jet
27. Needle jet
28. Main jet holder
29. Main jet
30. Washer
31. Plate
32. Fuel valve seat
33. Fuel valve
34. Clip
35. Pivot pin
36. Floats
37. Gasket
38. Float bowl
39. Screws
40. O-ring
41. Drain bolt
42. Hose
43. Hose

Count and record the number of turns so it can be installed in the same position.

11. Remove the pilot air screw and spring.
12. On models with separate floats, label and remove the floats from the float bowl (**Figure 46**), if required.
13. Clean and inspect the carburetor components as described in this chapter.
14. After all parts have been cleaned and dried, reverse these steps to assemble the carburetor. Note the following.
15. On models with separate floats, check that a locking cap (**Figure 25**) is installed over the end of each float rod in the float bowl.
16. Check the float height and adjust if necessary. Refer to *Float Adjustment* in this chapter.
17. When installing the jet needle, align the slot in the side of the needle jet with the pin in the carburetor bore (**Figure 21**).
18. Set the pilot air screw to the same number of turns noted during disassembly.
19. After the carburetor has been assembled adjust the idle speed. Refer to *Idle Speed Adjustment* in Chapter Three.

CARBURETOR SERVICE (1983 KX250)

Major carburetor service (removal and cleaning) should be performed after every race on competition bikes. Otherwise, service should be performed whenever the engine is decarbonized or when poor engine performance, hesitation, and little or no response to mixture adjustment is observed. The service interval time will become natural to you after owning and running the bike for a period of time.

Carburetor Identification

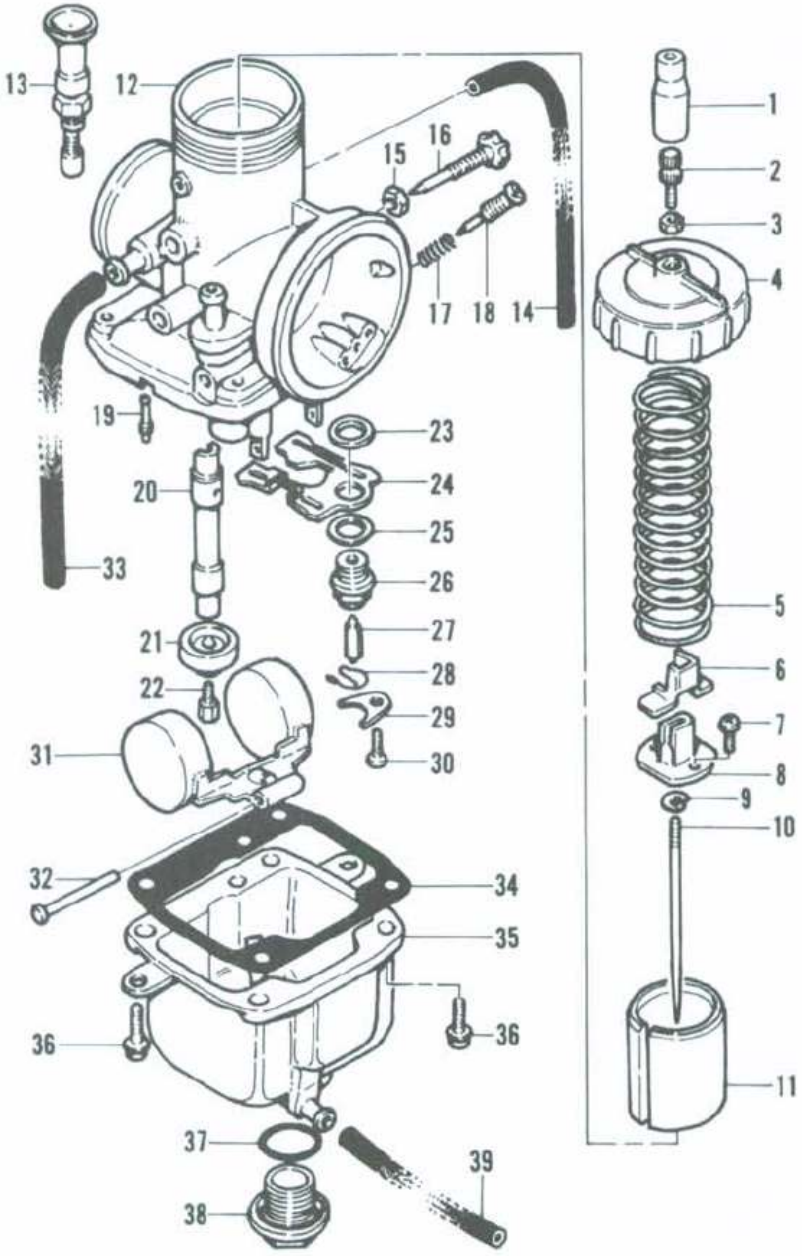
The 1983 KX250 is equipped with a single Keihin carburetor. Refer to **Table 4** at the end of this chapter for carburetor specifications.

Removal/Installation

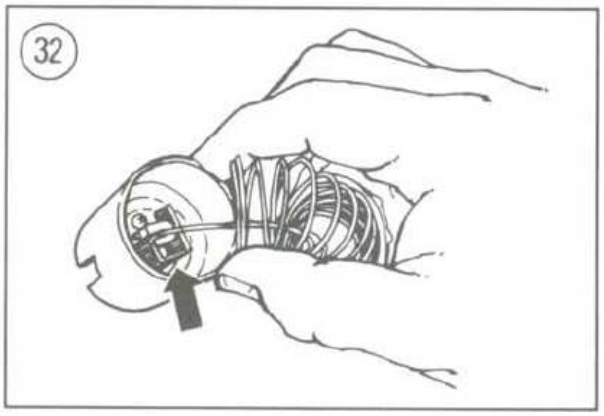
1. Support the bike securely.
2. Turn the fuel valve off and disconnect the fuel line at the carburetor.

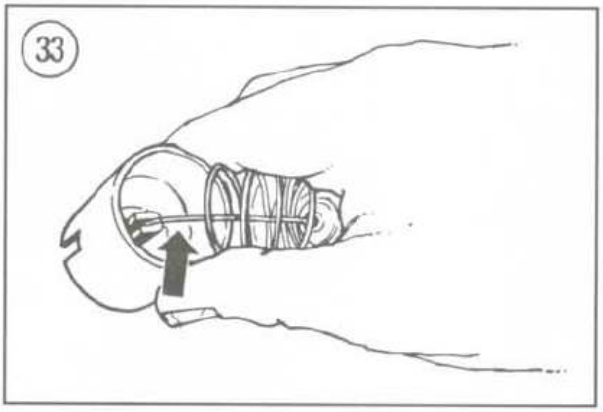
(30)

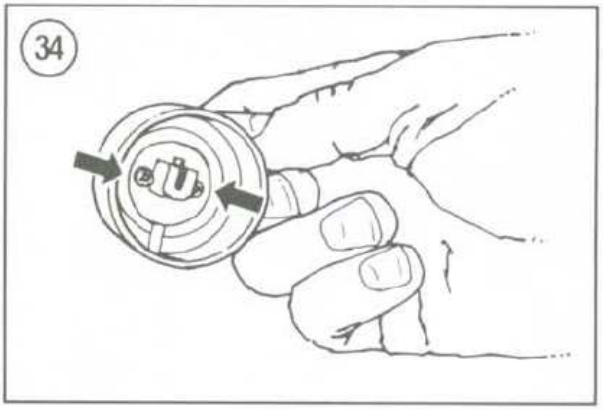
CARBURETOR
(1985-1987 KX250 AND KX500)

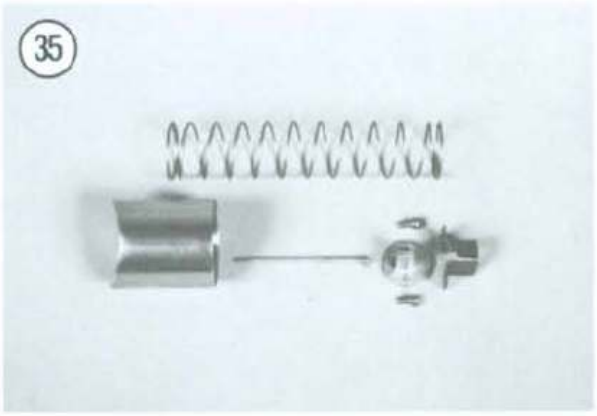


1. Cover
2. Cable adjuster
3. Nut
4. Cap
5. Spring
6. Cover
7. Screw
8. Connector
9. E-clip
10. Jet needle
11. Throttle valve
12. Housing
13. Choke
14. Hose
15. Nut
16. Throttle valve screw
17. Spring
18. Pilot air screw
19. Pilot jet
20. Needle jet
21. Main jet holder
22. Main jet
23. Gasket
24. Plate
25. Gasket
26. Fuel valve seat
27. Fuel valve
28. Clip
29. Plate
30. Screw
31. Floats
32. Pivot pin
33. Hose
34. Gasket
35. Float bowl
36. Screw
37. O-ring
38. Drain bolt
39. Hose





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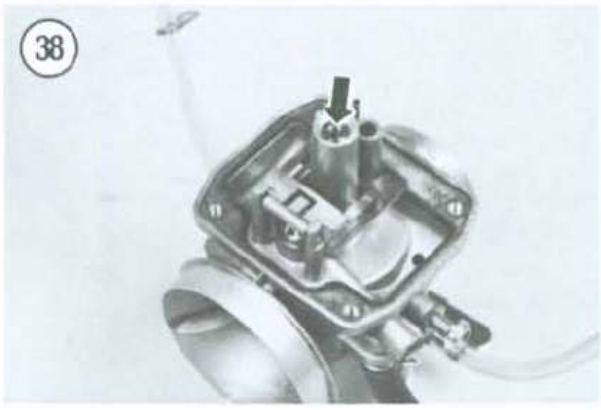
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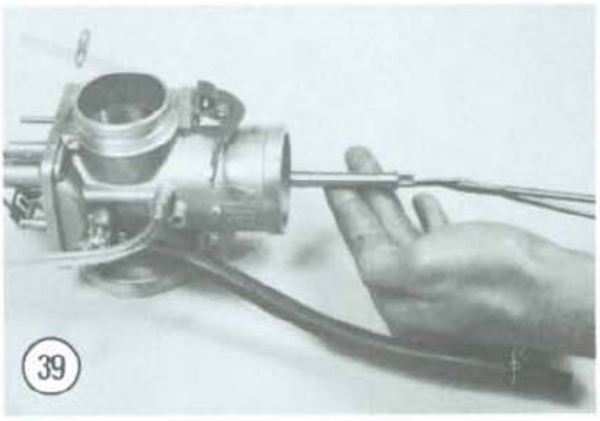
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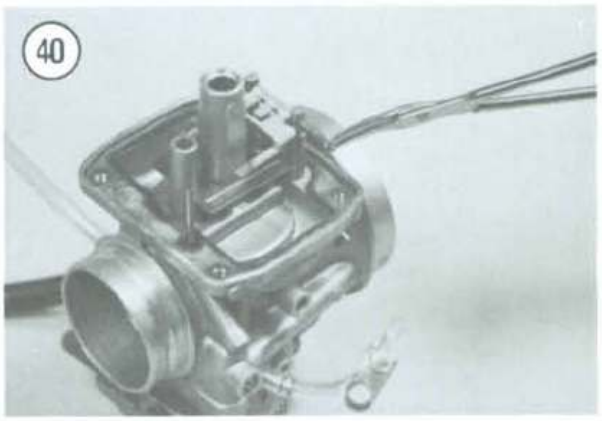
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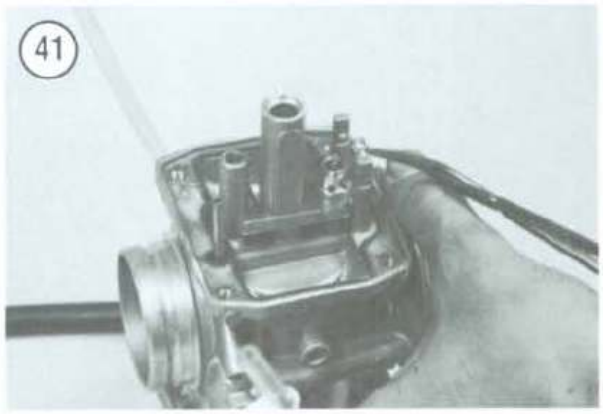
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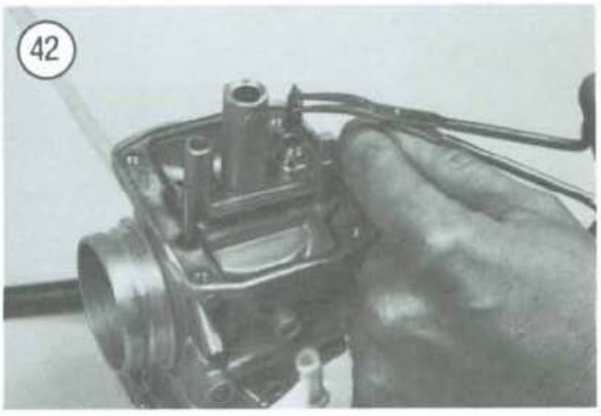
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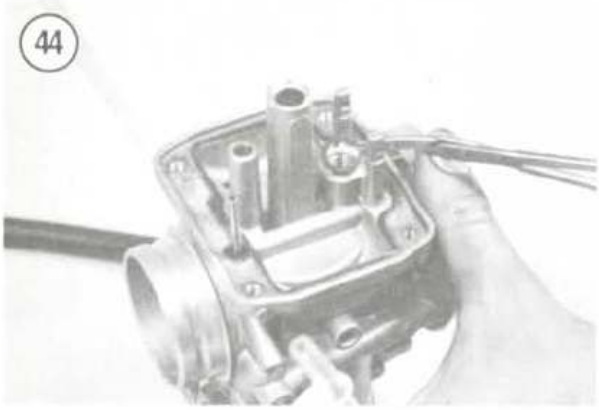
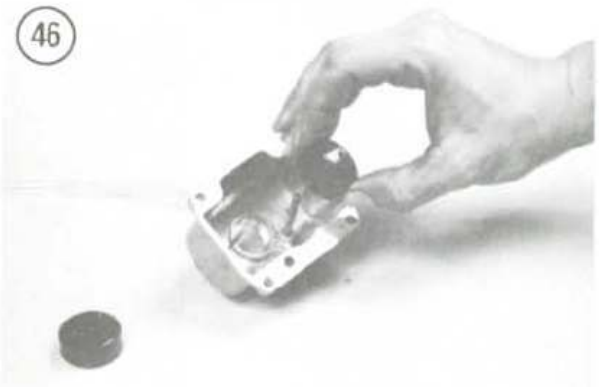




3. If necessary, remove the fuel tank as described in this chapter.

NOTE

Prior to removing the top cap, thoroughly clean the area around it so no dirt will fall into the carburetor.

4. Unscrew the carburetor top cap and pull the throttle valve assembly up and out of the carburetor.

NOTE

If the top cover and slide assembly are not going to be removed for cleaning, wrap them in a clean shop cloth or place them in a plastic bag to help keep them clean.

5. Loosen the carburetor clamp screws. Slide the clamps away from the carburetor.
6. Make sure all overflow and drain tubes are free.
7. Carefully work the carburetor (**Figure 27**) free from the rubber boots and remove it.
8. Take the carburetor to a workbench for disassembly and cleaning.
9. Install by reversing these removal steps. Check throttle cable adjustment as described in Chapter Three.

Throttle Valve Disassembly/Assembly

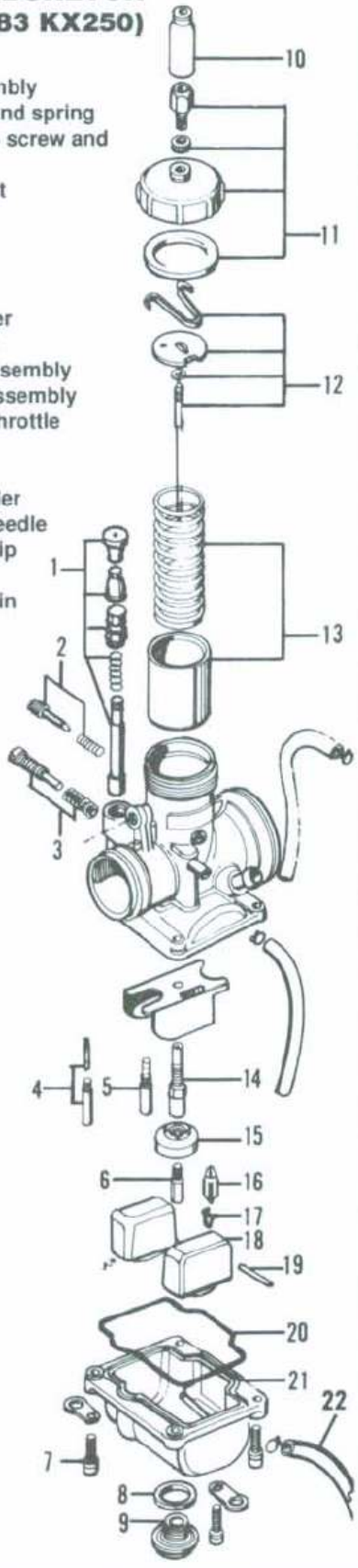
Refer to **Figure 47** for this procedure.

1. Loosen the carburetor clamp screws and pivot the carburetor (**Figure 27**) toward you or remove the carburetor.
2. Unscrew the carburetor cap and pull the throttle valve assembly out of the carburetor. Be careful not to damage the jet needle.
3. Compress the throttle valve spring in your hand and remove the throttle cable clip and plate (**Figure 48**).
4. Push down and then lift out the throttle cable.
5. Remove the jet needle (**Figure 49**).
6. If the jet needle clip is going to be removed, record the clip position before removal. The standard clip position is listed in **Table 4**. If you are jetting the carburetor, refer to *Jet Needle Adjustment* in this chapter.
7. Install by reversing these steps. Note the following.

8

(47) CARBURETOR (1983 KX250)

1. Choke assembly
2. Pilot screw and spring
3. Throttle stop screw and spring
4. Starter jet set
5. Pilot jet
6. Main jet
7. Screw
8. Gasket
9. Main jet cover
10. Rubber boot
11. Top cover assembly
12. Jet needle assembly
13. Spring and throttle valve
14. Needle jet
15. Main jet holder
16. Fuel valve needle
17. Fuel valve clip
18. Float
19. Float pivot pin
20. Gasket
21. Float bowl
22. Hose



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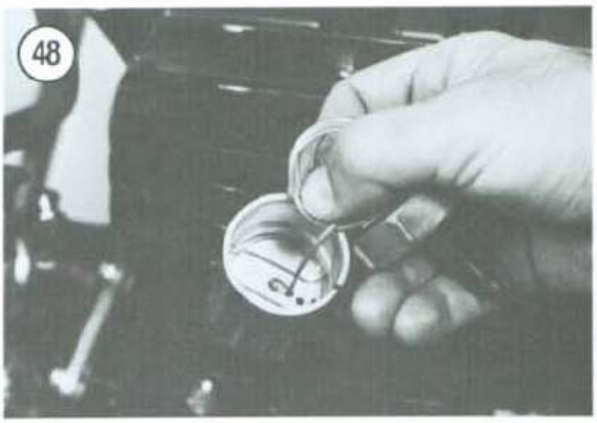

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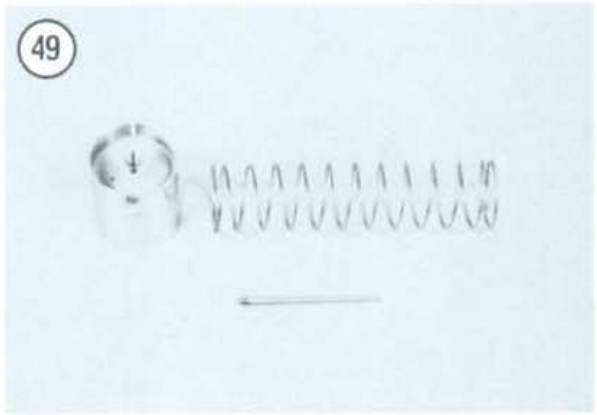

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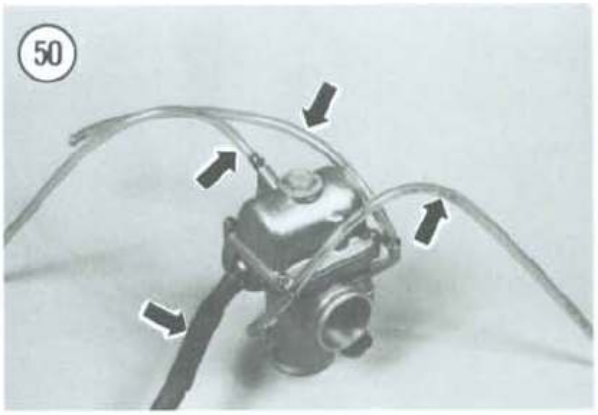


(51)

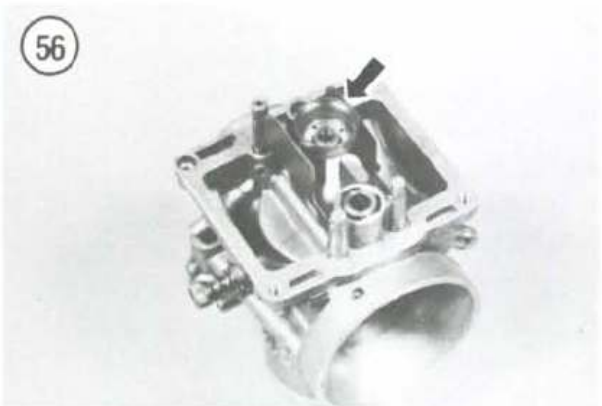
8. Check that the clip is seated securely on the jet needle clip groove.
9. When installing the throttle valve into the carburetor, align the groove on the throttle valve with the pin in the carburetor bore, while at the same time making sure the jet needle enters the needle jet correctly.
10. After installing the throttle valve into the carburetor and tightening the carburetor cap, operate the throttle a few times, checking that the throttle valve moves through the carburetor smoothly and seats completely when the throttle is released.

Disassembly/Reassembly

Refer to **Figure 47** for the following procedure.
1. Remove the fuel, vent and overflow tubes (**Figure 50**).
2. Remove the choke assembly (**Figure 51**) from the main body.
3. Remove the screws (**Figure 52**) securing the float bowl and remove the float bowl. Note the location of vent and overflow clips as they must be reinstalled in the same location.
4. Remove the float pivot pin (**Figure 53**) and remove the float and fuel valve needle (**Figure 54**).
5. Remove the main jet (**Figure 55**) and the main jet holder (**Figure 56**).
6. Remove the needle jet (A, **Figure 57**) and the baffle plate (B, **Figure 57**).
7. Remove the pilot jet (**Figure 58**).

NOTE

Before removing the pilot air screw, carefully screw it in until it lightly seats. Count and record the number of turns so it can be installed in the same position.



8. Unscrew the pilot air screw (A, **Figure 59**) and remove the spring and the air screw.
9. Unscrew the throttle stop screw (B, **Figure 59**) and remove the spring and the throttle adjust screw.
10. Remove the O-ring from the float bowl (**Figure 60**). Unscrew the main jet cover and O-ring seal from the bottom of float bowl.
11. Clean and inspect the carburetor components as described in this chapter.
12. After all parts have been cleaned and dried, reverse these steps to assemble the carburetor. Note the following.
13. Check the float height and adjust if necessary. Refer to *Float Adjustment* in this chapter.
14. Set the pilot air screw to the same number of turns noted during disassembly.
15. After the carburetor has been assembled adjust the idle speed. Refer to *Idle Speed Adjustment* in Chapter Three.

CARBURETOR SERVICE (1984 KX500)

Major carburetor service (removal and cleaning) should be performed after every race on competition bikes. Otherwise, service should be performed whenever the engine is decarbonized or when poor engine performance, hesitation, and little or no response to mixture adjustment is observed. The service interval time will become natural to you after owning and running the bike for a period of time.

Carburetor Identification

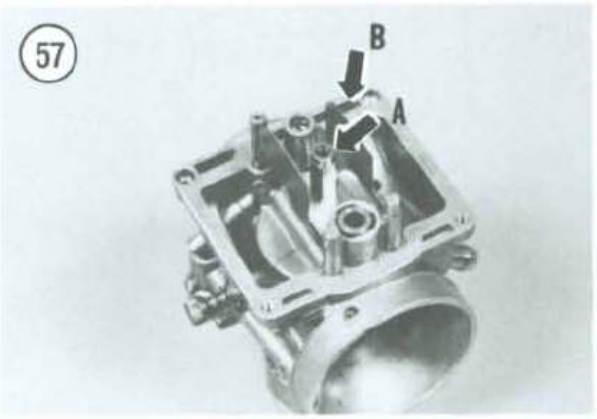
The 1984 KX500 is equipped with a flat-slide Mikuni carburetor. Refer to **Table 5** at the end of this chapter for carburetor specifications.

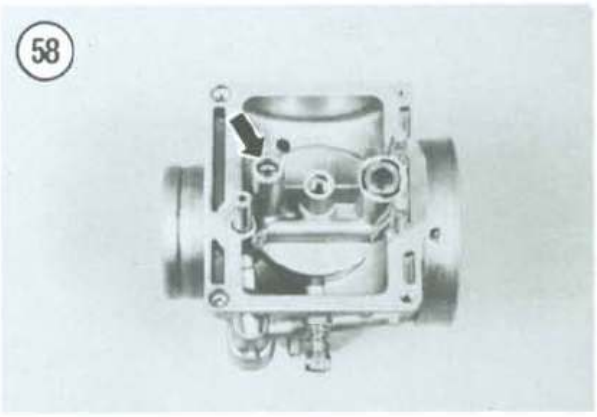
Removal/Installation

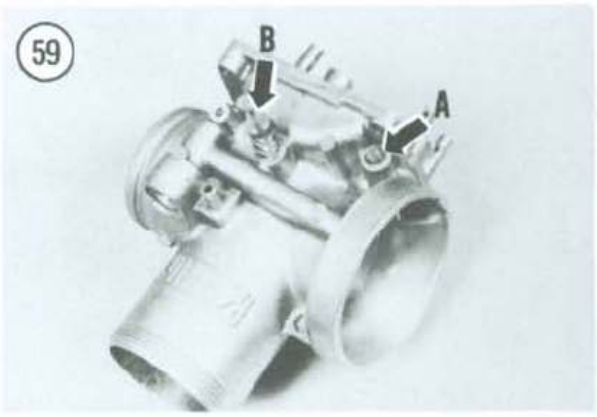
1. Support the bike securely.
2. Turn the fuel valve off and disconnect the fuel line at the carburetor.
3. If necessary, remove the fuel tank as described in this chapter.

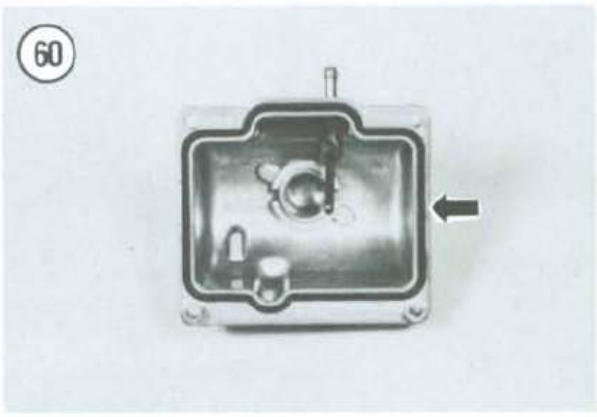
NOTE

Prior to removing the top cap, thoroughly clean the area around it so no dirt will fall into the carburetor.









4. Remove the small screws securing the cap to the carburetor body (**Figure 62**) and carefully lift out the throttle valve.

NOTE

If the top cover and throttle valve assembly are not going to be removed, wrap them in a clean shop cloth or place them in a plastic bag to help keep them clean.

5. Loosen the carburetor clamp screws. Slide the clamps away from the carburetor.
6. Make sure all overflow and drain tubes are free.
7. Carefully work the carburetor free from the rubber boots and remove it.
8. Take the carburetor to a workbench for disassembly and cleaning.
9. Install by reversing these removal steps while noting the following.
10. Apply a small amount of Loctite 242 (blue) to the screws securing the carburetor cap.
11. Check throttle cable adjustment as described in Chapter Three.

Throttle Valve Disassembly/Assembly

Refer to **Figure 61** for this procedure.

1. Loosen the carburetor clamp screws and pivot the carburetor toward you or remove the carburetor.
2. Remove the small screws securing the cap to the carburetor body (**Figure 62**) and carefully lift out the throttle slide valve.
3. Compress the throttle valve spring to obtain as much throttle cable slack as possible. Disengage the cable end from the throttle valve as shown in **Figure 63**.
4. Remove the throttle valve.
5. Remove the plastic plate and the spring from the throttle valve.
6. Remove the throttle cable holder mounting screws and remove the holder and the jet needle.
7. If the jet needle clip is going to be removed, record the clip position before removal. The standard clip position is listed in **Table 5**. If you are jetting the carburetor, refer to *Jet Needle Adjustment* in this chapter.
8. Install by reversing these steps. Note the following.
9. When connecting the throttle cable to the throttle valve, make sure that the cable end is securely positioned in the recess in the throttle slide.
10. After installing the throttle valve into the carburetor and tightening the carburetor cap screws, operate the throttle a few times, checking that the throttle valve moves through the carburetor smoothly and seats completely when the throttle is released.

Disassembly/Reassembly

Refer to **Figure 61** for the following procedure.

CAUTION

*Do not attempt to remove the special fasteners securing the rear half of the carburetor body (**Figure 64**). These fasteners are not intended to be removed since the carburetor body cannot be serviced.*

1. Remove the fuel, vent and overflow tubes.

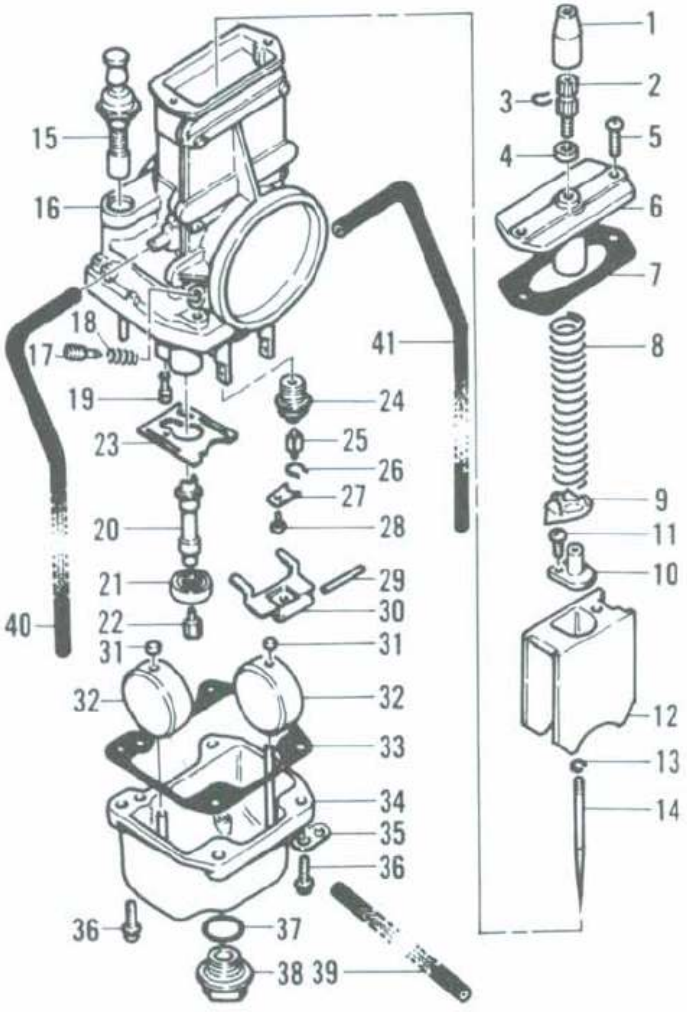
NOTE

Before removing the pilot air screw, carefully screw it in until it lightly seats. Count and record the number of turns so it can be installed in the same position.

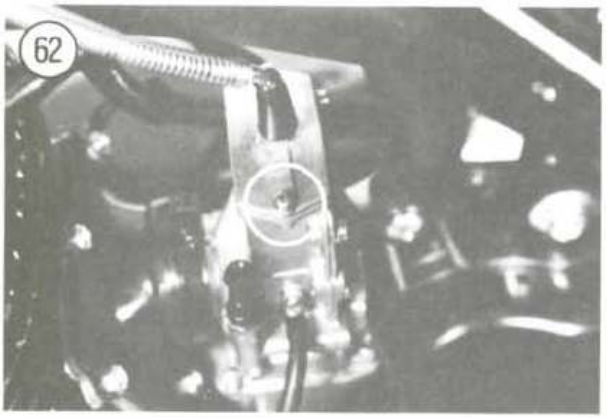
2. Unscrew the pilot air screw and remove the spring and the air screw (**Figure 65**).
3. Remove the float bowl screws and remove the float bowl (**Figure 66**).
4. Slide out the float arm pin (**Figure 67**) securing the float arm and lift off the float arm.
5. Remove the fuel valve wire clip and remove the fuel valve.
6. Remove the screw securing the fuel valve assembly retaining clip and remove the clip (**Figure 68**).
7. Loosen and remove the pilot jet (**Figure 69**).
8. Loosen and remove the main jet and the main jet holder (**Figure 70**).
9. Remove the needle jet.
10. Unscrew and remove the choke valve assembly.
11. Clean and inspect the carburetor components as described in this chapter.
12. After all parts have been cleaned and dried, reverse these steps to assemble the carburetor. Note the following.

(61)

CARBURETOR (1984 KX500)



1. Boot
2. Cable adjuster
3. Cable clip
4. Nut
5. Screw
6. Cap
7. Gasket
8. Spring
9. Ring
10. Connector
11. Screw
12. Throttle valve
13. E-clip
14. Jet needle
15. Choke
16. Housing
17. Pilot air screw
18. Spring
19. Pilot jet
20. Needle jet
21. Main jet holder
22. Main jet
23. Plate
24. Fuel valve seat
25. Fuel valve
26. Clip
27. Plate
28. Screw
29. Pivot pin
30. Float arm
31. Caps
32. Floats
33. Gasket
34. Float bowl
35. Hose guide
36. Screw
37. O-ring
38. Drain bolt
39. Hose
40. Hose
41. Hose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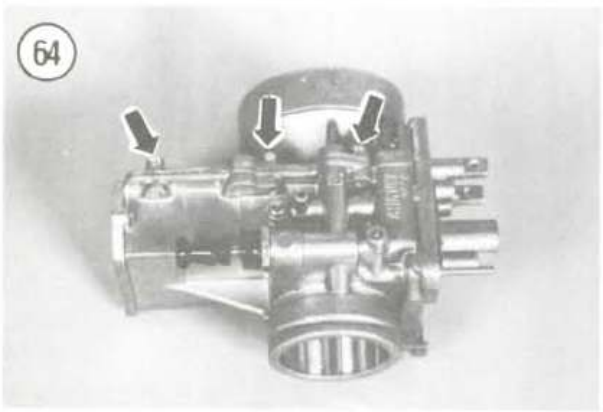
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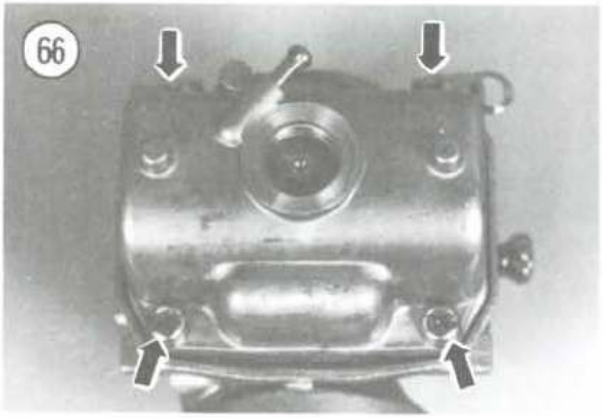
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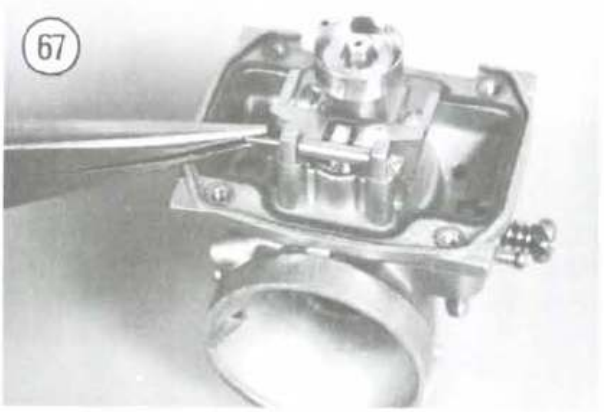
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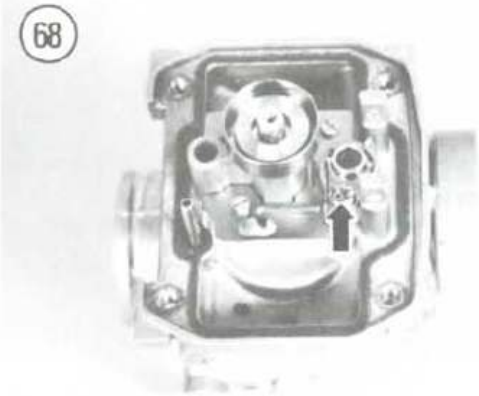
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69

13. Check that a locking cap is installed over the end of each float rod in the float bowl.
14. Check the float height and adjust if necessary. Refer to *Float Adjustment* in this chapter.
15. When installing the needle jet, align the slot in the side of the needle jet with the pin in the carburetor bore.
16. Set the pilot air screw to the same number of turns noted during disassembly.
17. After the carburetor has been assembled adjust the idle speed. Refer to *Idle Speed Adjustment* in Chapter Three.

CARBURETOR SERVICE (1988-ON)

Major carburetor service (removal and cleaning) should be performed after every race on competition bikes. Otherwise, service should be performed whenever the engine is decarbonized or when poor engine performance, hesitation, and little or no response to mixture adjustment is observed. The service interval time will become natural to you after owning and running the bike for a period of time.

Carburetor Identification

All 1988 and later models are equipped with a single Keihin carburetor. Refer to **Table 2** (KX125), **Table 4** (KX250) or **Table 6** (KX500) at the end of this chapter for carburetor specifications.

Removal/Installation

1. Place a milk crate or wood block(s) under the engine to support it securely.
2. Turn the fuel valve off and disconnect the fuel line at the carburetor.
3. If necessary, remove the fuel tank as described in this chapter.

NOTE

Prior to removing the top cap, thoroughly clean the area around it so no dirt will fall into the carburetor.

4. Unscrew the carburetor top cap (**Figure 71**) and pull the throttle valve assembly up and out of the carburetor.

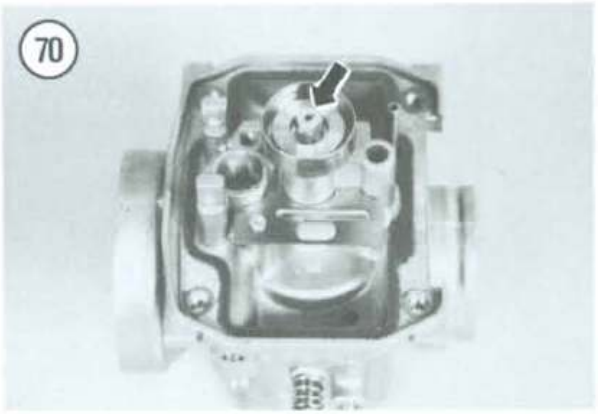
NOTE

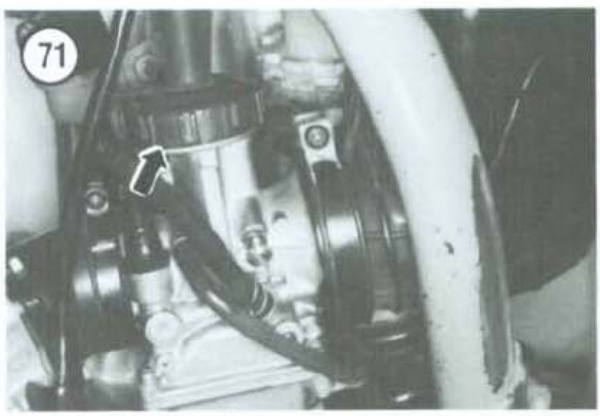
If the top cover and slide assembly are not going to be removed for cleaning, wrap them in a clean shop cloth or place them in a plastic bag to help keep them clean.

5. Loosen the carburetor clamp screws (**Figure 71**). Slide the clamps away from the carburetor.
6. Make sure all overflow and drain tubes are free.
7. Carefully work the carburetor free from the rubber boots and remove it.
8. Take the carburetor to a workbench for disassembly and cleaning.
9. Install by reversing these removal steps.

Throttle Valve Disassembly/Assembly

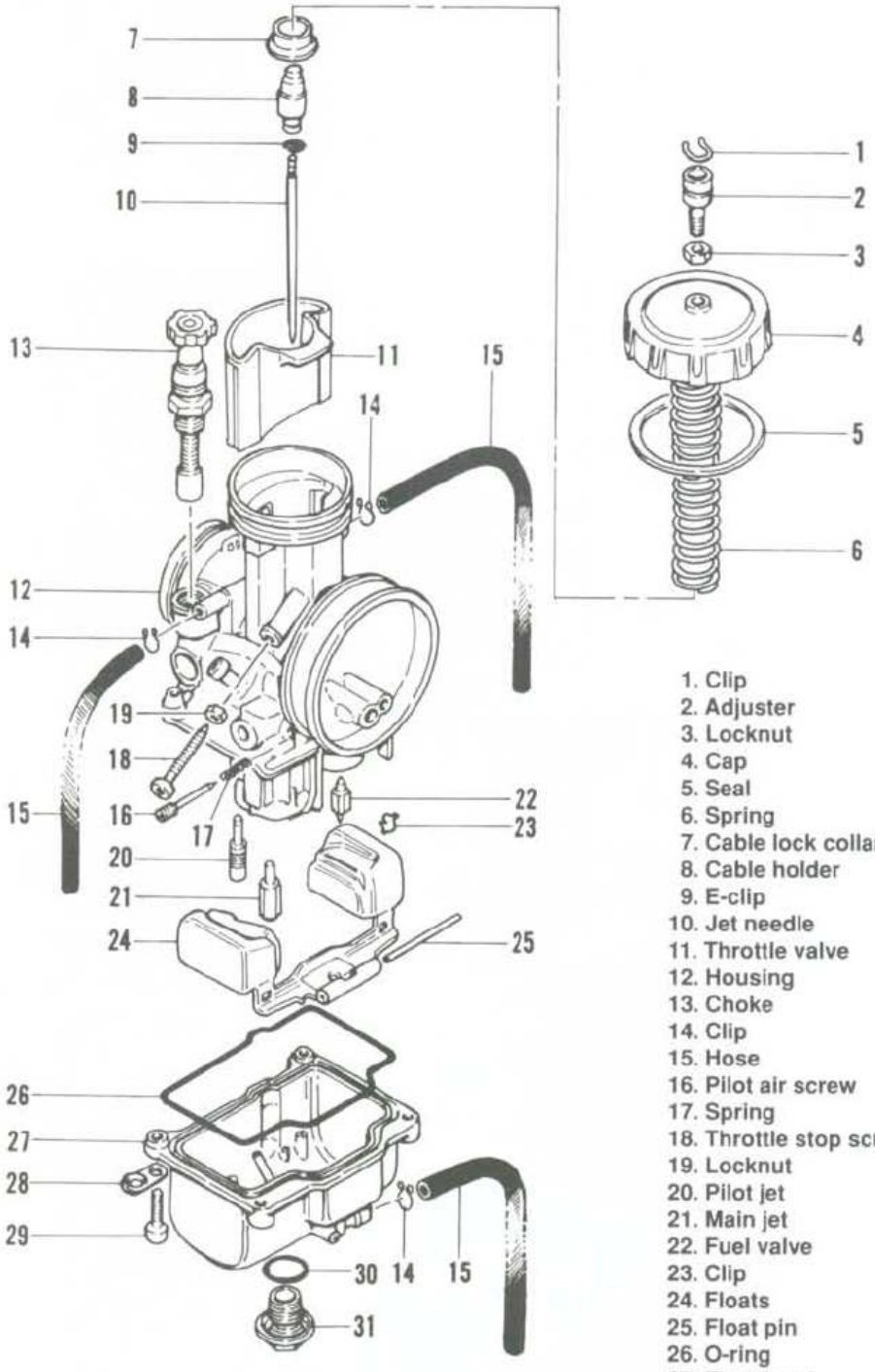
Refer to **Figure 72** for this procedure.
1. Compress the throttle valve spring and the cable lock collar (**Figure 73**) and slide the throttle cable out of the cable holder groove.
2. Remove the spring and cable lock collar (**Figure 74**).





(72)

CARBURETOR (1988-ON)



1. Clip
2. Adjuster
3. Locknut
4. Cap
5. Seal
6. Spring
7. Cable lock collar
8. Cable holder
9. E-clip
10. Jet needle
11. Throttle valve
12. Housing
13. Choke
14. Clip
15. Hose
16. Pilot air screw
17. Spring
18. Throttle stop screw
19. Locknut
20. Pilot jet
21. Main jet
22. Fuel valve
23. Clip
24. Floats
25. Float pin
26. O-ring
27. Float bowl
28. Hose guide
29. Screw
30. O-ring
31. Drain bolt

3. Push the cable holder (**Figure 75**) slightly with a 6 mm socket and rotate it 90° counterclockwise.

4. Remove the cable holder and jet needle (**Figure 76**).

5. If the jet needle clip is going to be removed, record the clip position before removal. The standard clip position is listed in **Table 2**, **Table 4** and **Table 6**.

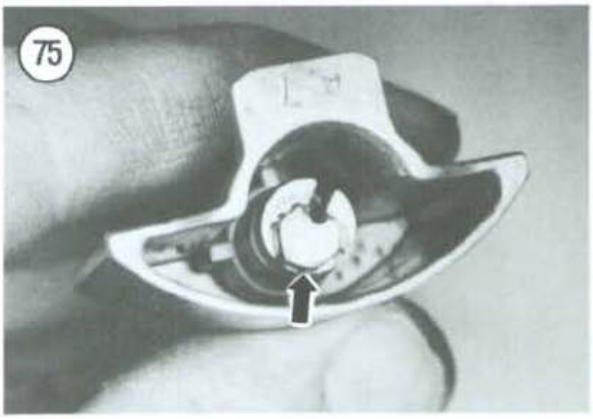
6. Inspect the cable holder (**Figure 77**) for a stripped hex head or other damage.

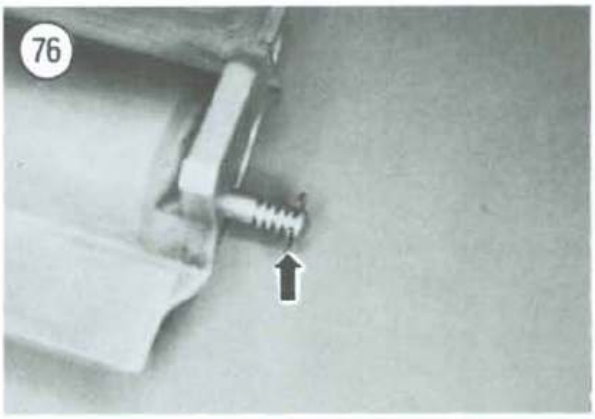
7. Inspect the cable lock collar for cracks or damage. Check that the tab on the lock collar fits into the cable holder as shown in **Figure 78**. If the tab is worn or damaged, replace the lock collar.

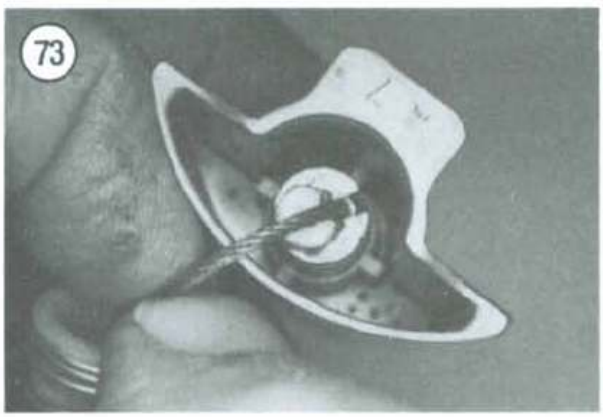
8. Install by reversing these steps. Note the following.

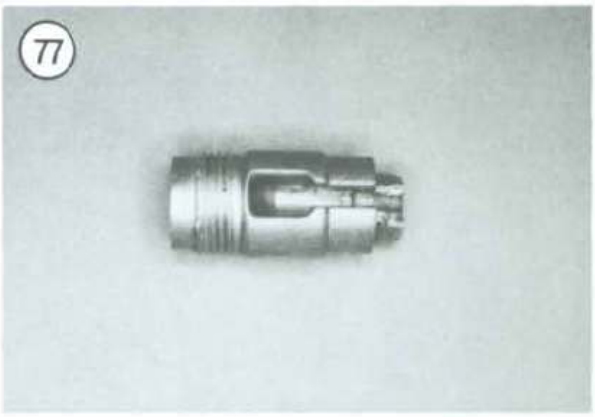
9. Drop the jet needle into the throttle valve so that the jet needle clip is centered as shown in **Figure 79**. Install the cable holder (**Figure 75**) and rotate it 90° clockwise.

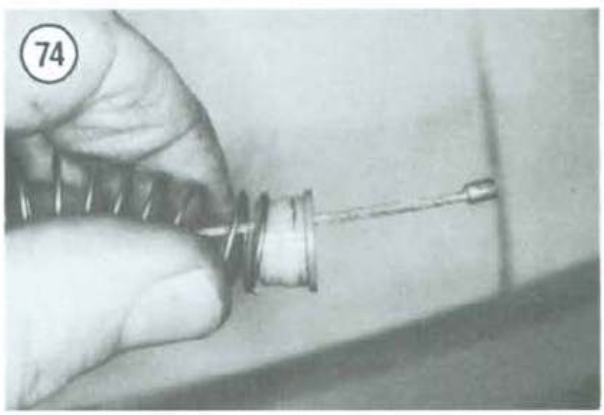
10. Install the spring and the cable lock collar over the throttle cable. The shoulder on the cable lock collar should face away from the spring as shown in **Figure 74**.

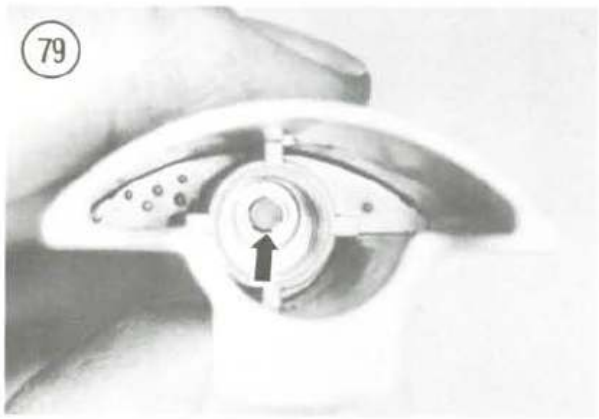












11. Compress the lock collar and spring and slip the end of the cable into the cable holder groove (**Figure 73**). Release the spring and lock collar, making sure the tab inside the lock collar engages with the cable groove in the cable holder; see **Figure 80**.

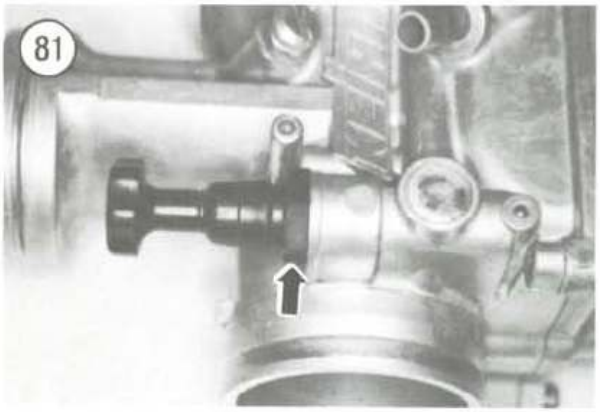
Disassembly/Reassembly

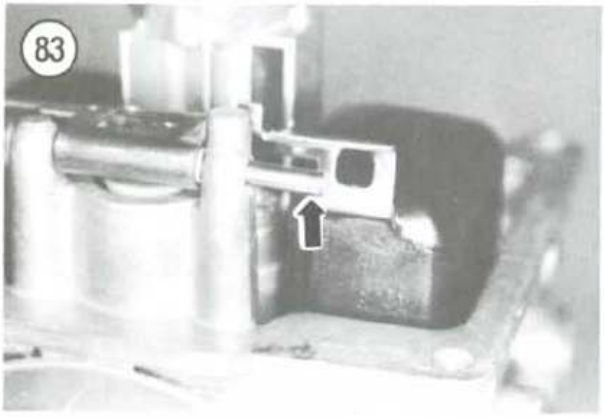
Refer to **Figure 72** for this procedure.

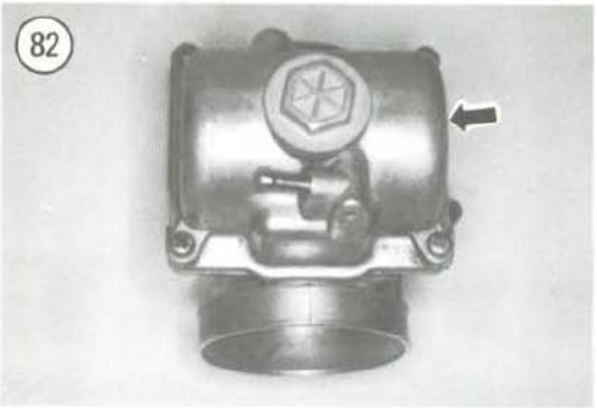
1. Remove the fuel line and all drain and overflow tubes.
2. Remove the choke (**Figure 81**).
3. Remove the screws securing the float bowl and remove it (**Figure 82**).
4. Remove the float pin (**Figure 83**) and lift the float assembly (**Figure 84**) out of the housing.
5. Unscrew and remove the pilot jet (**Figure 85**).
6. Unscrew and remove the main jet (**Figure 86**).

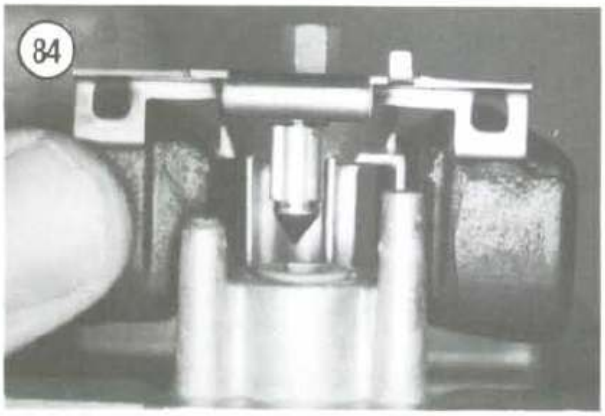
NOTE

*The needle jet (**Figure 87**) is pressed into the carburetor housing and cannot be removed.*





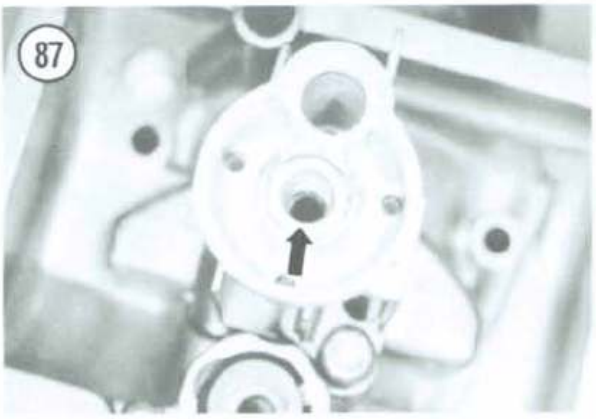


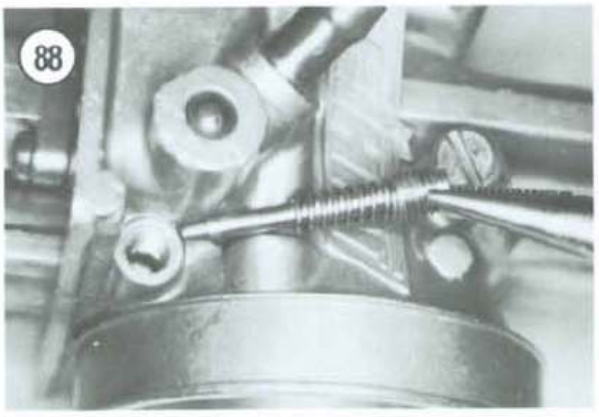


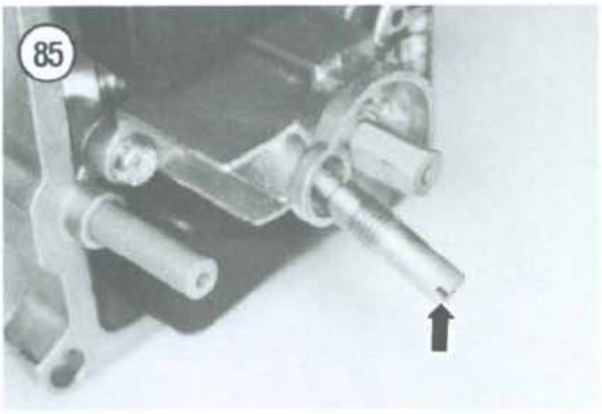
NOTE

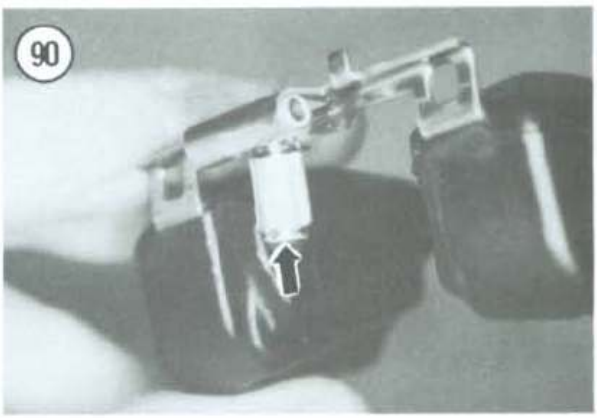
Before removing the pilot air screw, carefully screw it in until it lightly seats. Count and record the number of turns so it can be reinstalled in the same position.

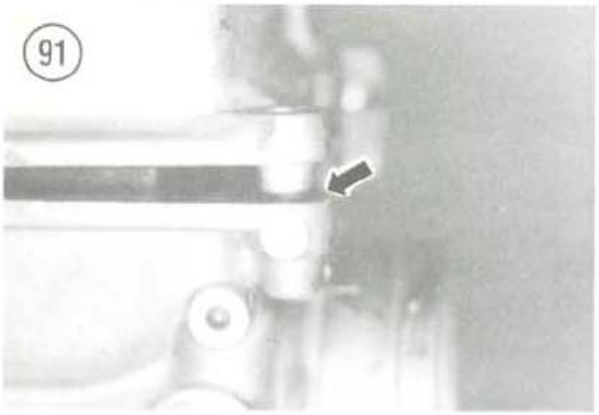
7. Unscrew the pilot air screw and remove the spring and air screw (**Figure 88**).
8. Loosen the throttle stop screw locknut and remove the screw (**Figure 89**).
9. Remove the carburetor float bowl O-ring.
10. Clean and inspect the carburetor components as described in this chapter.
11. After all parts have been cleaned and dried, reverse these steps to assemble the carburetor. Note the following.
12. Install the fuel valve onto the float (**Figure 90**) and install both parts at the same time.
13. Check the float height and adjust if necessary. Refer to *Float Adjustment* in this chapter.
14. Index the float bowl with the main body as shown in **Figure 91**.
15. Set the pilot air screw to the same number of turns noted during disassembly.

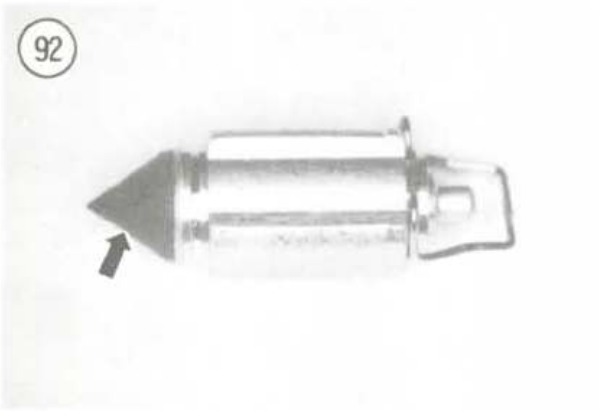


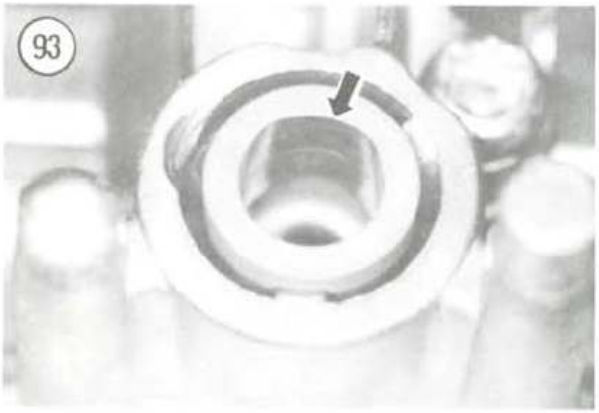












16. After the carburetor has been assembled adjust the idle speed and the pilot air screw. Refer to Chapter Three.

CARBURETOR CLEANING AND INSPECTION (ALL MODELS)

1. Disassemble the carburetor as described in this chapter.
2. Wash all of the carburetor parts with a solution of liquid detergent or a biodegradable soap cleaner and warm water. Rinse with clean water and dry thoroughly with compressed air, if available. If not, allow the parts to air dry.

CAUTION

Cleaning rubber and plastic parts in carburetor cleaner will damage them.

3. If the carburetor has been sitting for some time with gasoline in the bowl, or if you cannot clean it thoroughly as described in Step 2, soak all of the parts, except rubber or plastic parts, in a good grade of carburetor cleaner. This solution is available at most automotive or motorcycle supply stores, in a small, resealable tank with a dip basket. If it is tightly sealed when not in use, the solution will last for several cleanings. Follow the manufacturer's instructions for correct soak time (usually about 1/2 hour). Remove all parts from the cleaner and wash thoroughly with soap and warm water. Rinse with clean water and dry thoroughly.
4. Blow out the jets with compressed air. *Do not* use a piece of wire to clean them as minor gouges in the jet can alter flow rate and upset the fuel/air mixture.
5. Be sure to clean out the float bowl overflow tube.
6. Inspect the tip of the fuel valve (**Figure 92**) and seat (**Figure 93**, typical) for wear or damage. On Mikuni carburetors, the fuel valve and seat must be replaced as a set (**Figure 94**). On Keihin carburetors, the fuel valve and seat can be replaced separately of each other. However, the seat (**Figure 93**) is an integral part of the carburetor body; if the seat is damaged, the body must be replaced.

NOTE

A worn or damaged fuel valve and seat assembly will cause flooding, hard starting and a rich fuel mixture. Check these parts carefully if your bike is ex-

periencing these types of engine conditions.

7. O-ring seals tend to become hardened after prolonged use and heat and therefore lose their ability to seal properly. Inspect all O-rings and replace if necessary.

8. Some models use gaskets to seal the fuel valve seat. Replace the gaskets as a set if worn or damaged.

9. Check the floats (**Figure 95**) for leaks. Fill the float bowl or a container with water and push the floats down. There should be no signs of bubbles. Replace the floats if they leak.

10. Check the choke valve assembly (**Figure 96**) for wear or damage. Check the plunger (**Figure 96**) for deep scratches or other wear patterns. The choke valve assembly can be disassembled on some Mikuni carburetors and individual parts replaced; see the carburetor illustration for your model at the beginning of the appropriate carburetor disassembly/reassembly procedure in this chapter. On some Mikuni and all Keihin carburetors, the choke valve assembly should not be disassembled; if a part on the valve is worn or damaged, replace the choke valve assembly.

11. Check the end of the pilot air screw (**Figure 97**). Replace the pilot air screw if any grooves or roughness are present. A damaged end will prevent smooth low-end engine operation.

12. Check the throttle stop screw for tip wear or thread damage. Replace the screw and/or spring as required.

13. Reassemble the carburetor as described for your model in this chapter.

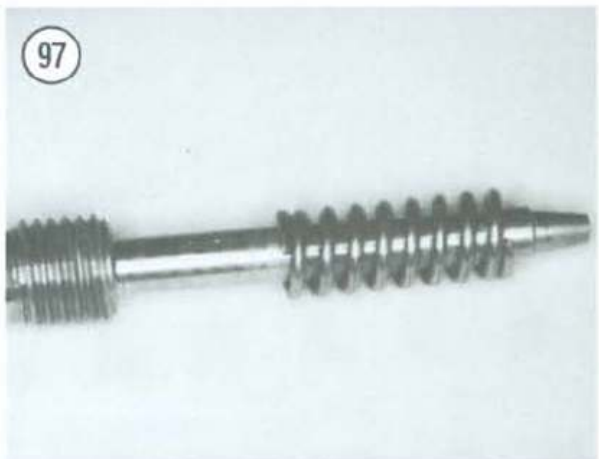
CARBURETOR FUEL LEVEL AND FLOAT HEIGHT ADJUSTMENT

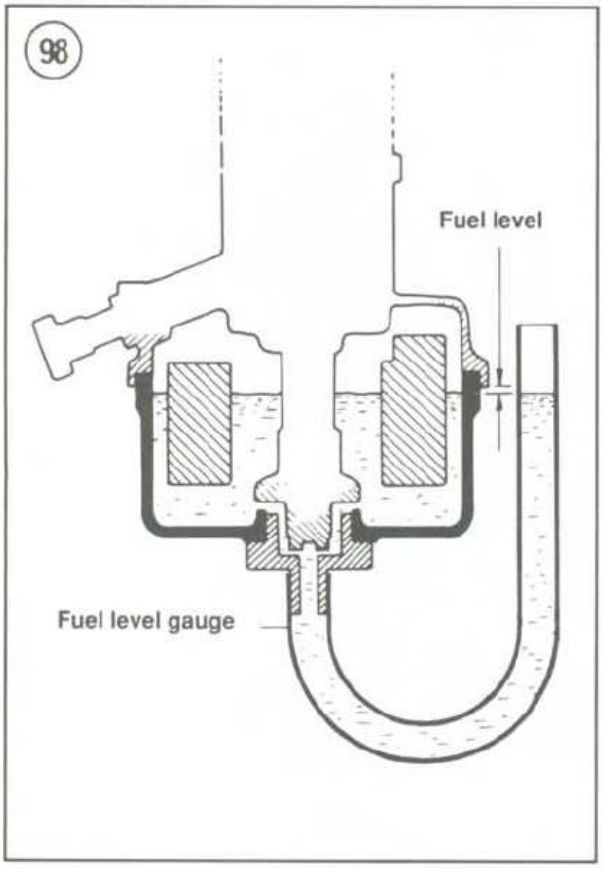
Fuel Level Check/Adjustment

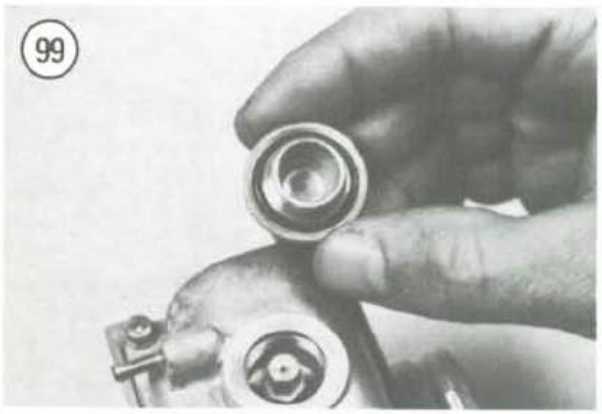
The fuel level in the carburetor float bowl is critical to proper performance. The fuel flow rate from the bowl up to the carburetor bore depends not only on the vacuum in the throttle bore and the size of the jets, but also upon the fuel level. Kawasaki gives a specification of actual *fuel level*, measured from the top edge of the float bowl with the carburetor held level (**Figure 98**).

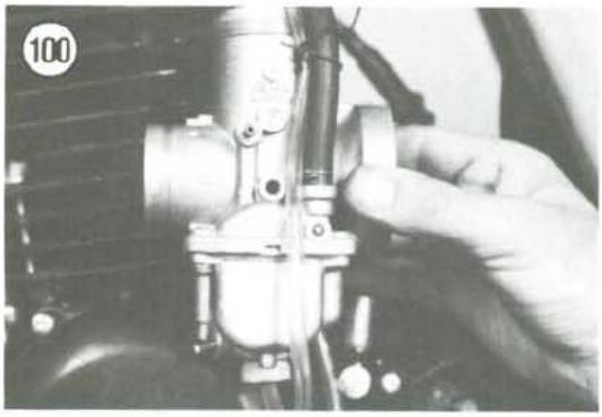
The measurement is more useful than a simple float height measurement because the actual fuel level can vary from bike to bike, even when their floats are set at the same height. However, fuel level inspection requires a special fitting that screws into the bottom of the carburetor. You can get the proper fitting at your Kawasaki dealer.

The fuel level is adjusted by bending the float arm tang.









WARNING

Some fuel may spill from the carburetor when performing this procedure. Because gasoline is an extremely flammable and explosive petroleum, perform this procedure away from all open flames (including pilot lights) and sparks. Do not smoke or allow someone who is smoking in the work area. Always work in a well ventilated area. Wipe up any spills immediately.

1. Turn the fuel valve off and remove the carburetor from its mounts so that it can be held level. Leave the fuel line connected to the tank and carburetor.
2. Remove the drain plug (**Figure 99**) from the bottom of the float bowl and install the special tool onto the carburetor. See **Figure 98** and **Figure 100**.
3. Hold the clear tube against the carburetor body so that the "0" line on the gauge is several millimeters higher than the bottom edge on the carburetor housing.
4. Turn the fuel valve on. Do not lower the gauge until the fuel level in the gauge settles.
5. When the fuel level in the gauge settles, slowly lower the gauge until the "0" line is even with the bottom edge on the carburetor housing (**Figure 98**). Read the fuel level in the gauge and compare it to the fuel level specifications in **Tables 1-6** for your model.

NOTE

Do not lower the "0" line on the gauge below the bottom edge on the carburetor housing and then raise it again as the level will be higher than the actual fuel level in the carburetor. If the gauge is lowered, turn the fuel valve OFF and pour the fuel in the gauge into a suitable fuel container. Then repeat this procedure.

6. If the fuel level is incorrect, adjust the float/arm height setting as described in Step 7 for your model. Then recheck the fuel level. Readjust if necessary.

NOTE

Increasing the float height lowers the fuel level. Decreasing the float height raises the fuel level.

7A. On models with separate floats, adjust the float arm as follows:

a. Remove the float bowl.

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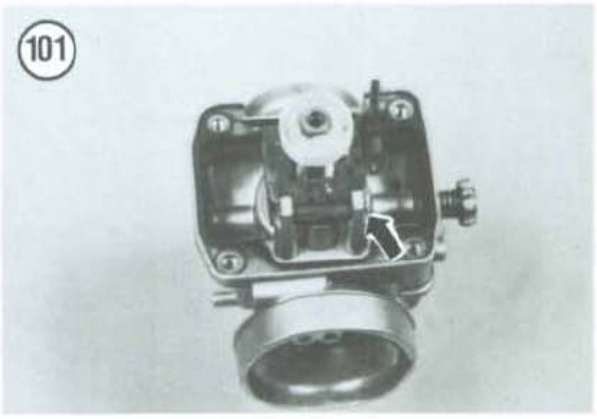
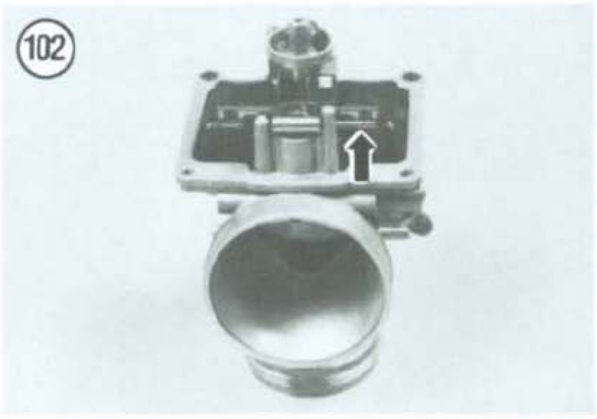
b. Remove the pivot pin and float arm (**Figure 101**) out of the carburetor.
c. Adjust the float arm by bending the tang with a screwdriver.
d. Reverse to install the float and float bowl.

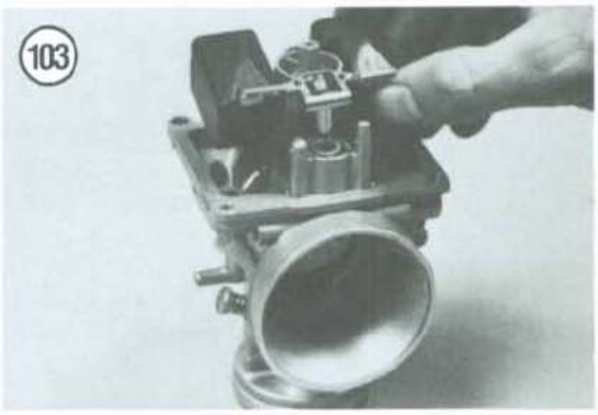
7B. On models with a single float assembly, adjust the float as follows:

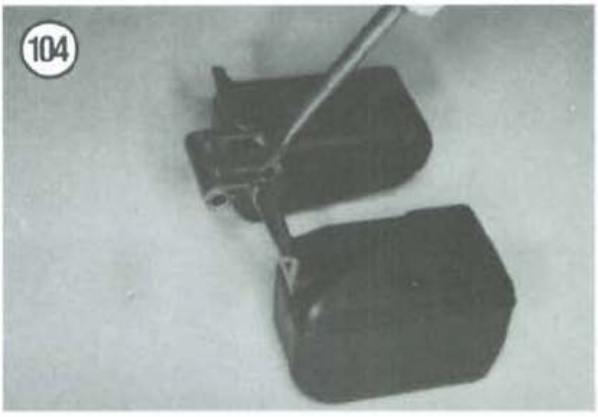
a. Remove the float bowl.
b. Remove the pivot pin (**Figure 102**) and lift the float assembly (**Figure 103**) out of the housing.
c. Remove the fuel valve from the float.
d. Adjust the float by bending the tang (**Figure 104**) with a screwdriver.
e. Reverse to reinstall the float and float bowl.

8. Repeat until the fuel level is correct.
9. Turn the fuel valve off. Then turn the gauge down and drain the fuel into a suitable fuel container. Remove the fuel gauge and reinstall the drain plug.
10. Reinstall the carburetor onto the bike as described in this chapter.









Float Height Check/Adjustment

Kawasaki lists a float height specification for most models. See **Tables 1-6** for available specifications. While the float height adjustment is not as accurate as the fuel level adjustment previously described, knowing how to check the float height may prove useful should it become necessary to adjust, service or troubleshoot the carburetor while at the track or when trail riding.

1. Remove the carburetor as described in this chapter.
2. Remove the float bowl mounting screws and remove the float bowl and its gasket or O-ring.
3. Hold the carburetor so that the float arm just contacts the fuel valve needle *without* compressing the needle; see **Figure 105** (separate floats) or **Figure 106** (single float). You will have to pivot the carburetor back and forth a few times to get the proper float arm to fuel valve needle contact pressure. Then measure the distance from the float bowl mating surface (without gasket or O-ring) to the top of the float arm (**Figure 105**) or float (**Figure 106**). Refer to **Tables 1-6** for the correct float height measurement for your model. If the float height is incorrect, adjust it as described in Step 4.

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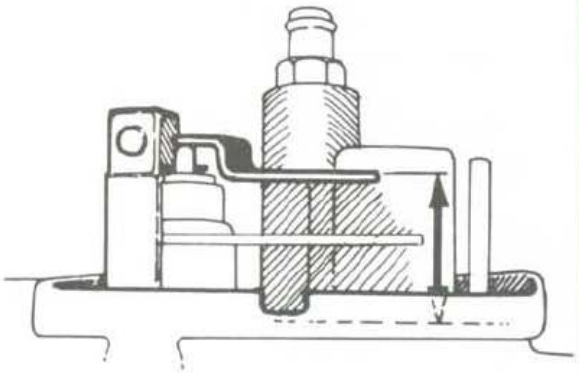
FLOAT HEIGHT



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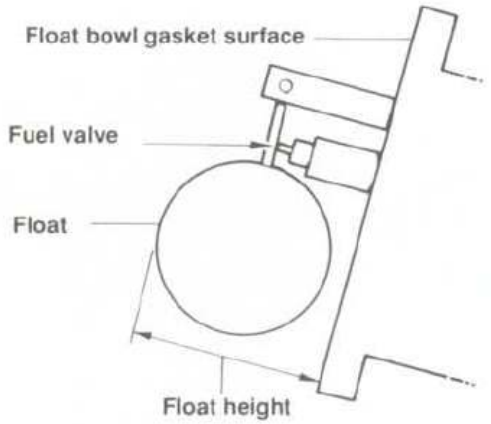

NOTE

Increasing the float height lowers the fuel level. Decreasing the float height raises the fuel level.

4A. On models with separate floats, adjust the float arm as follows:

a. Remove the pivot pin and float arm (**Figure 101**) out of the carburetor.
b. Adjust the float arm by bending the tang with a screwdriver.
c. Reverse to install the float and float bowl.

4B. On models with a single float assembly, adjust the float arm as follows:

a. Remove the pivot pin (**Figure 102**) and lift the float assembly (**Figure 103**) out of the housing.
b. Remove the fuel valve from the float.
c. Adjust the float by bending the tang (**Figure 104**) with a screwdriver.
d. Reverse to reinstall the float and float bowl.

5. Install by reversing these steps.

CARBURETOR REJETTING

Changes in altitude, temperature, humidity and track conditions can noticeably affect engine performance. To obtain maximum performance from your KX, jetting changes may be necessary. Before attempting to jet your engine, be sure the engine is in good running condition.

NOTE

If your bike is now running poorly under the same weather, altitude and track conditions where it once ran properly, it is unlikely the carburetor jetting is at fault. Attempting to tune the engine by rejetting the carburetor would only complicate matters.

NOTE

Changes in port shape and smoothness, expansion chamber, carburetor, etc., will also require jetting changes because these factors alter the engine's ability to breathe. When installing aftermarket equipment or when the engine has been modified, equipment manufacturers often include a tech sheet listing suitable jetting changes to correspond to their equipment or modification. This information should be taken into ac-

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count along with the altitude, temperature, humidity and track conditions previously mentioned.

If your bike shows evidence of one of the following conditions, rejetting may be necessary:

a. Poor acceleration (too rich).
b. Excessive exhaust smoke (too rich).
c. Fouling spark plugs (too rich).
d. Engine misfire at low speeds (too rich).
e. Erratic acceleration (too lean).
f. Ping or rattle (too lean).

NOTE

Engine ping can also be caused by old gasoline or by using a gasoline with a too low octane rating. See Chapter Three.

g. Running hot (too lean).
h. Engine revs okay then cuts out like it is running out of fuel (too lean).

Before checking the carburetor for one of the previously listed operating conditions, consider the following maintenance procedures:

a. The float level in the carburetor must be properly adjusted. If the float level is incorrect, it will difficult to accurately jet the carburetor.
b. The air filter element should be clean. A dirty air filter element will cause the engine to run rich. Attempting to jet the engine with a dirty air filter element will only complicate engine tuning.
c. The ignition timing should be correct.
d. The engine top end should be routinely decarbonized.

If the previously mentioned service items are correctly performed, carburetor rejetting may be required if any of the following conditions hold true:

a. A nonstandard air filter element is being used.
b. A nonstandard exhaust system is being used.
c. Any of the top end parts (piston, porting, compression ratio, etc.) have been modified.
d. The motorcycle is in use at considerably higher or lower altitudes, or in a markedly hotter or colder, or wetter or drier climate than in the past.
e. The motorcycle is being operated at considerably higher speeds than before (faster track conditions) and changing to a colder spark plug does not solve the problem.
f. A previous owner changed the jetting or the needle positions in your motorcycle.
g. The motorcycle has never held a satisfactory engine tune.

The original jets, jet needle and throttle slide are listed in **Tables 1-6**.

Carburetor Variables

The following parts of the carburetor may be changed to vary the fuel mixture.

Pilot Jet

The pilot jet (**Figure 85**) and pilot air screw setting (if so equipped) control the fuel mixture from 0 to about 1/8 throttle. As the pilot numbers increase, the fuel mixture gets richer.

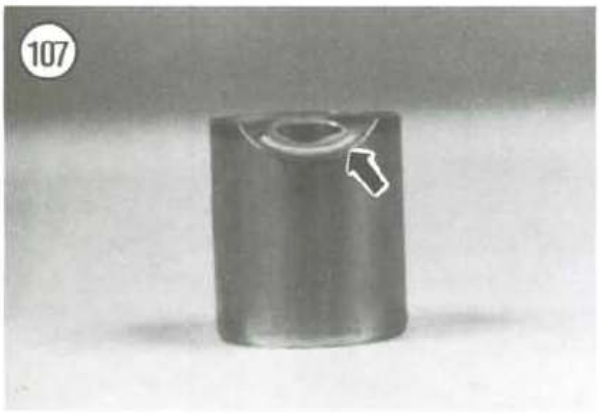
Throttle Valve

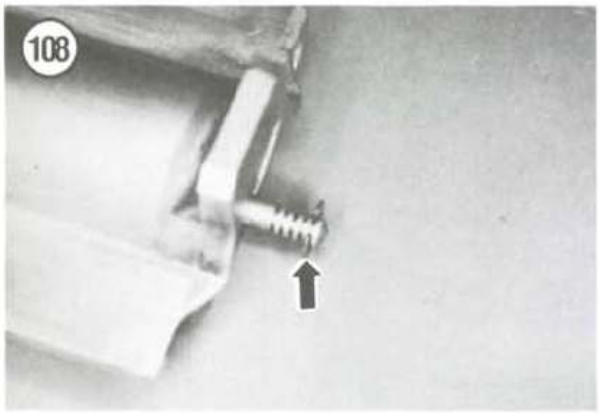
The throttle valve cutaway (**Figure 107**) affects airflow at small throttle openings. Cutaway sizes are numbered, and larger numbers result in a leaner mixture.

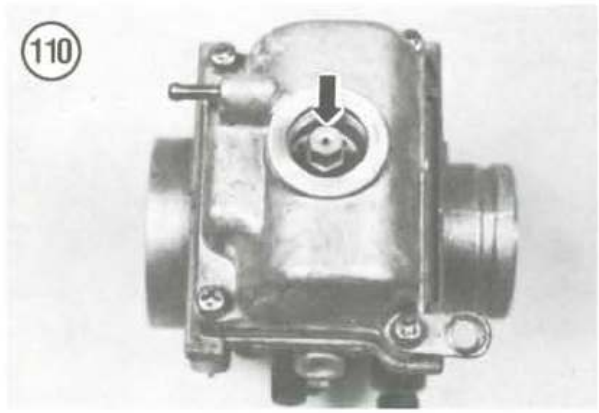
Jet Needle

The jet needle controls the mixture at medium speeds, from approximately 1/4 to 3/4 throttle. The jet needle has 2 operating ends. The top of the needle has 5 evenly spaced clip grooves (**Figure 108**). The bottom half of the needle is tapered (**Figure 109**); this portion extends into the needle jet. While the jet needle is fixed into position by the clip, fuel cannot flow through the space between the needle jet and jet needle until the throttle valve is raised approximately 1/4 open. As the throttle valve is raised, the jet needles tapered portion moves out of the needle jet. The grooves permit adjustment of the mixture ratio. If the clip is raised (thus dropping the needle deeper into the jet), the mixture will be leaner; lowering the clip (raising the needle) will result in a rich mixture.

If changing the jet needle clip position does not provide the desired results, it may be necessary to change to a smaller or larger needle jet.







Needle Jet

The needle jet works in conjunction with the jet needle.

On Mikuni carburetors, the letter and number stamped on the side of the needle jet indicates the jet's inside diameter. The mixture gets richer in large steps as the letter increases (from "N" through "R"), and in small steps within the letter range as the number increases (from "0" through "9"). Some needle jets have a tab extending 2 to 8 mm into the throttle bore, indicated by "/2" through "/8" following the letter and number mark. This is called the primary choke, and it causes the mixture to be leaner at low speeds and richer at high speeds.

On Keihin carburetors installed on models in this manual, the needle jet is an integral part of the carburetor housing.

Main Jet

The main jet controls the mixture from 3/4 to full throttle, and has some effect at lesser throttle openings. Each main jet is stamped with a number. Larger numbers provide a richer mixture, smaller numbers a leaner mixture. Most main jets can be reached by removing the float bowl drain plug (**Figure 110**).

Rejetting

CAUTION

A too-lean mixture caused by running a too small main jet can cause serious engine damage in a matter of seconds. When determining proper jetting, always start out rich and progress toward a more lean mixture, one step at a time.

The engine must be at full operating temperature when checking jetting. Attempting to jet an engine not up to temperature can result in a too-lean mixture when the engine reaches full operating temperature.

When jetting a carburetor, basic procedures must be followed to assure consistent results. Note the following before carburetor jetting:

a. Referring to **Figure 111**, note the different jetting circuits and how they overlap with each other in regards to throttle position. Then determine the throttle position at which the adjustment should be made at. Too often, the

main jet is changed when the adjustment calls for a jet needle adjustment.

b. An accurate way to determine throttle position is by marking the throttle housing and throttle grip with tape and a marking pen (**Figure 112**). The mark on the throttle grip can be used as a pointer to align with the throttle positions marked on the throttle housing when riding the bike. Make 4 marks on the throttle housing to represent closed, 1/4, 3/4 and full open throttle positions.

c. When checking the jetting, the bike should be run on a track or on a private road where it can be run at top speed for a distance of 1/2 to 1 mile. Keep accurate records as to weather, altitude and track conditions.

d. The jetting should checked in the following order: Pilot air screw, main jet and jet needle.

1. Adjust the pilot air screw (if so equipped) and idle as described in Chapter Three.

2. Because the main jet controls the mixture from 3/4 to full throttle, the bike should be run a full throttle for a long distance. Stop the engine with the kill button while still under full throttle. Pull in on the clutch lever and coast to a stop. Remove and examine the spark plug after each test. The insulator should be a light tan color. If the insulator is soot black, the mixture is too rich; install a smaller main jet as described in this chapter. If the insulator is white, or blistered, the mixture is too lean; install a larger main jet. See **Figure 113**.

Refer to *Main Jet Replacement* in this chapter.

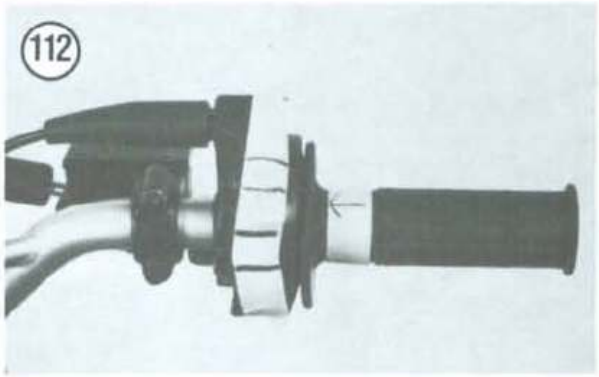
3. Using the marked throttle housing, repeat the jetting check in Step 2 at different throttle positions. You may find that the full open throttle position is correct but that the 1/4 to 3/4 position is too rich or too lean. Refer to *Carburetor Variables*. If it is necessary to change the jet needle clip position, refer to *Jet Needle Adjustment* in this chapter.

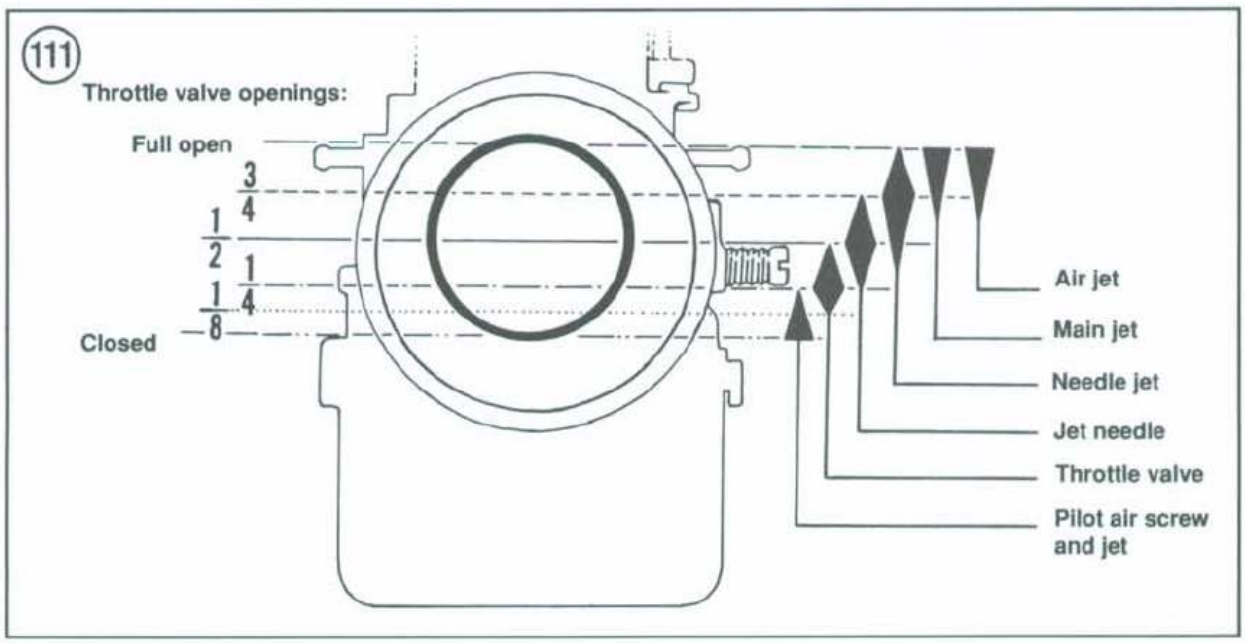
Main Jet Replacement

Refer to **Tables 1-6** at the end of this chapter, for standard main jet sizes.

WARNING

If you are taking spark plug readings, the engine will be HOT! Use caution as





(113)

SPARK PLUG CONDITIONS

Normal

Gap Bridged

Carbon Fouled

Overheated

Oil Fouled

Sustained Preignition

the fuel in the float bowl will spill out when the main jet cover is removed from the bottom of the float bowl. Have a fire extinguisher and an assistant standing by when performing this procedure.

1. If you have never removed the main jet while the carburetor is mounted on the bike, practice removing the main jet while the engine is cold. When taking spark plug readings, the engine will be hot.
2. Turn the fuel shutoff valve to the OFF position.
3. Loosen the main jet cover (float bowl plug) and drain out all fuel in the bowl. See **Figure 99**.
4. The main jet is directly under the cover (**Figure 110**). Remove it and replace it with a different one. Remember, change only one jet size at a time.
5. Install the main jet cover; tighten it securely.

Jet Needle Adjustment

1. Remove the throttle valve for your model as described in this chapter.

NOTE

The clip securing the jet needle can be easily lost. Before making a series of spark plug readings, order a few replacement clips from your Kawasaki dealer to have on hand.

2. Note the position of the clip. Raising the needle (lowering the clip) will enrich the mixture during mid-throttle opening, while lowering it (raising the clip) will lean the mixture. Refer to **Figure 114**.
3. Refer to **Tables 1-6** at the end of the chapter for standard clip positions.
4. Installation is the reverse of these steps.

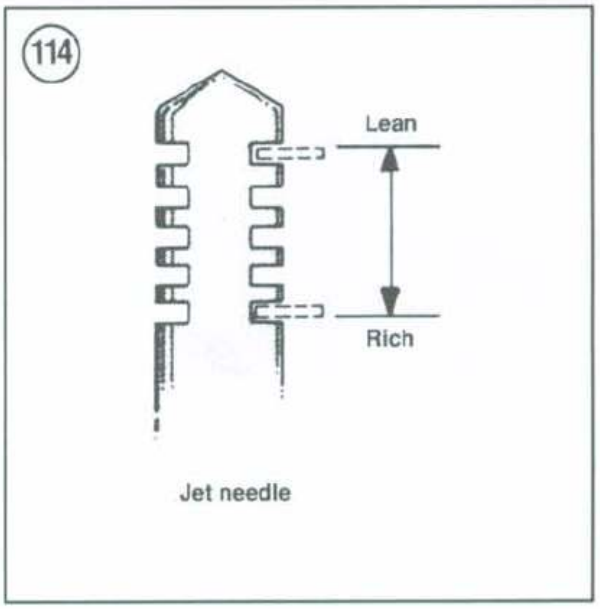
FUEL TANK

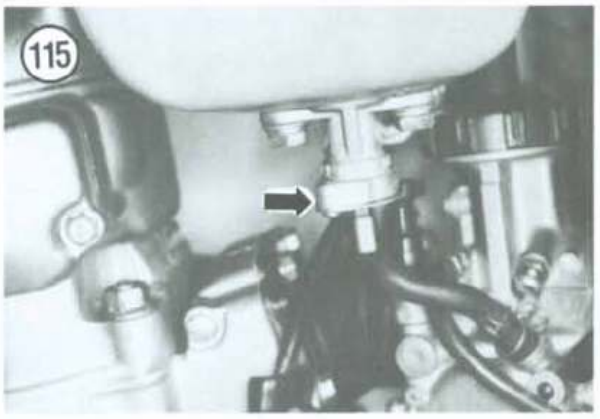
Removal/Installation

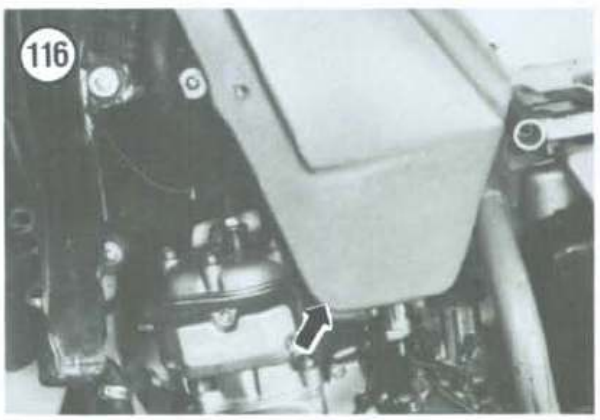
WARNING

Some fuel may spill from the carburetor when performing this procedure. Because gasoline is an extremely flammable and explosive petroleum, perform this procedure away from all open flames (including pilot lights) and sparks. Do not smoke or allow someone who is smoking in the work area. Always work in a well ventilated area. Wipe up any spills immediately.

1. Support the bike securely.
2. Turn the fuel valve off and disconnect the fuel line (**Figure 115**) at the carburetor.







3. Remove the seat.

4. Pull the fuel fill cap vent tube free from the steering head area.

5. Remove any radiator shrouds, as required.

6. Remove the bolts and strap securing the fuel tank and remove it. See **Figure 116**, typical.

7. Check for loose, missing or damaged fuel tank brackets and rubber dampers. See **Figure 117**, typical. Tighten or replace parts as required.

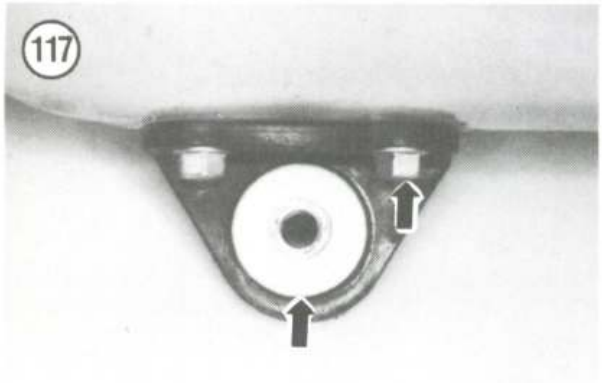
8. Install by reversing these removal steps.

FUEL SHUTOFF VALVE

Removal/Installation

WARNING

Some fuel may spill from the carburetor when performing this procedure. Because gasoline is an extremely flammable and explosive petroleum, perform this procedure away from all open flames (including pilot lights) and sparks. Do not smoke or allow someone who is smoking in the work area. Always work in a well ventilated area. Wipe up any spills immediately.



1. Remove the fuel tank as described in this chapter.

2. Drain the fuel into a fuel storage container.

3. Remove the bolts and remove the fuel shutoff valve (**Figure 118**).

4. Remove the screw above the handle or on the handle and disassemble the valve. Clean all parts in solvent with a medium soft toothbrush, then dry. Check the small O-ring within the valve and the O-ring gasket; replace if they are starting to deteriorate or get hard. Make sure the spring is not broken or getting soft; replace if necessary.

5. Reassemble the valve and install it on the tank. Don't forget the O-ring gasket between the valve and the tank.

EXHAUST SYSTEM

The exhaust system (**Figure 119**, typical) on a 2-stroke motorcycle engine is much more than a means of routing the exhaust gases to the rear of the bike. It's a vital performance component and frequently, because of its design, it is a vulnerable piece of equipment.

Check the exhaust system for deep dents and fractures and repair them as described under *Exhaust System Repair* at the end of this chapter. Check the exhaust pipe frame mounting flanges for fractures and loose bolts and bushings. Check the cylinder mounting flange or collar for tightness. A loose headpipe connection will not only rob the engine of power, it could also damage the piston and cylinder.

The exhaust system consists of an exhaust pipe assembly (head pipe and expansion chamber) and a silencer. This system varies slightly with different models and years. All attachments are basically the same but they all vary a little.

Removal/Installation

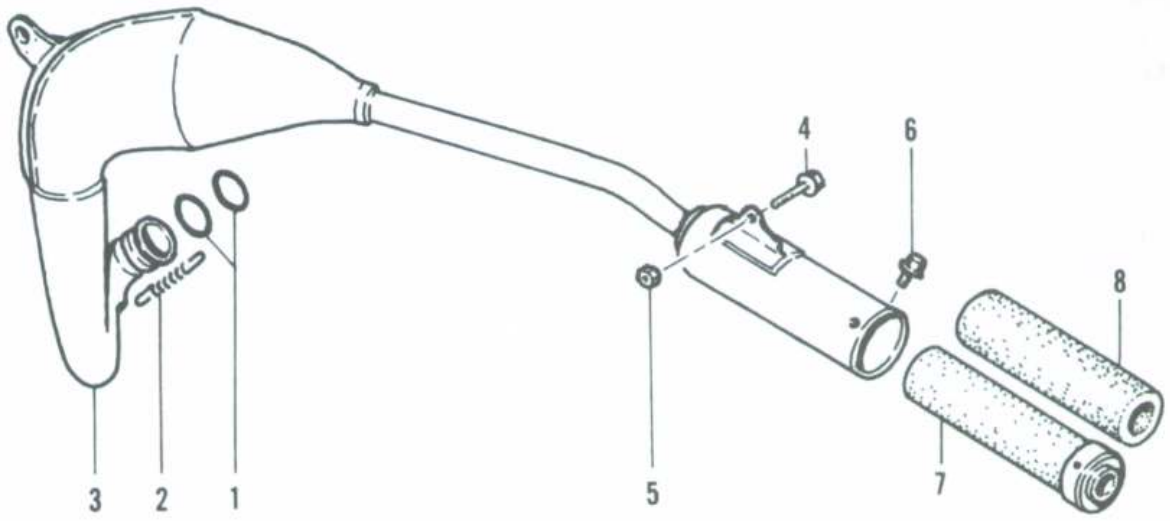
1. Support the bike on a bike stand.

2. Remove the seat, fuel tank and both side cover/number plates.

3. Remove the bolts securing the muffler (**Figure 120**) and remove it. Disconnect the rear muffler springs, if used. On some models, loosen the rubber damper clamp at the exhaust pipe/muffler joint.

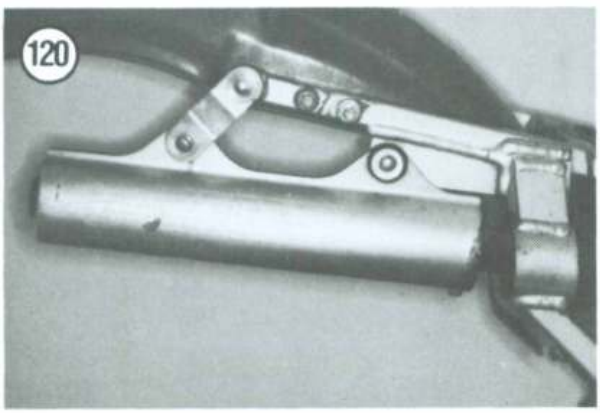
119

EXHAUST SYSTEM



1. O-rings
2. Spring
3. Exhaust pipe
4. Bolt
5. Nut
6. Bolt
7. Packing
8. Packing

120



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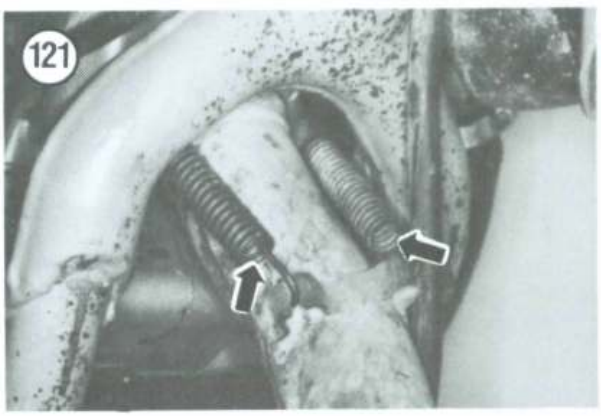
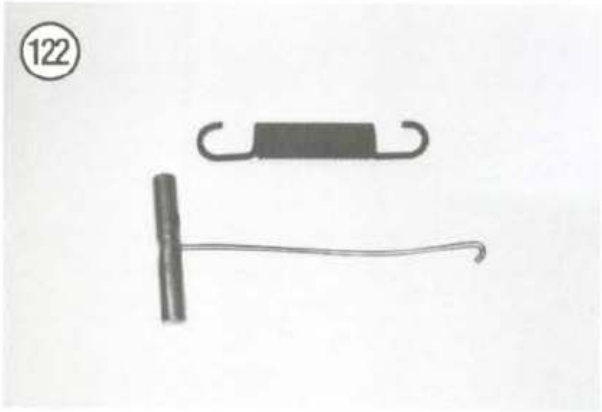


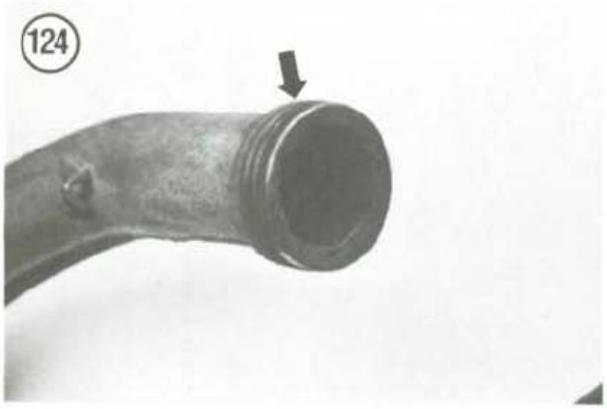
4. Use a spring tool and disconnect the springs at the front of the exhaust pipe (**Figure 121**).

NOTE
***Figure 122** shows a typical spring tool.*

5. Remove the bolts securing the exhaust pipe bracket(s) (**Figure 123**) and remove the exhaust pipe.

6. Installation is the reverse of these steps. Note the following.





7. Replace the exhaust pipe gasket in the cylinder's exhaust port.

8. If O-rings are used on the exhaust pipe:
   a. Replace the exhaust pipe O-rings (**Figure 124**) if severely worn or damaged.
   b. Apply a small amount of grease to the O-rings before installing the pipe.

9. Check all of the mounting bracket rubber dampers (**Figure 123**) for tearing, separation or other damage. Replace if necessary.

10. Make sure the spark plug wire, fuel line, clutch cable and are properly positioned to prevent damage from a hot exhaust pipe.

Repacking the Muffler

1. Remove the muffler case bolt and slide the outer cover off of the inner pipe.

2. Pull the glass wool packing off the inner pipe (**Figure 119**, typical).

3. Remove the O-ring, if used.

4. Using a wire brush, clean the carbon deposits from the inner pipe.

5. Install a new O-ring and glass wool. On some models, the glass wool will be in 2 pieces.

6. Slide the outer cover over the inner pipe assembly and secure with the bolt.

EXHAUST SYSTEM REPAIR

A dent in the headpipe or expansion chamber of a 2-stroke exhaust system will alter the system's flow characteristics and degrade performance. Minor damage can be easily repaired if you have welding equipment, some simple body tools, and a bodyman's slide hammer.

Small Dents

1. Drill a small hole in the center of the dent. Screw the end of the slide hammer into the hole.

2. Heat the area around the dent evenly with a torch.

3. When the dent is heated to a uniform orange-red color, operate the slide hammer to raise the dent.

4. When the dent is removed, unscrew the slide hammer and weld or braze the drilled hole closed.

Large Dents

Large dents that are not crimped can be removed with heat and a slide hammer as previously described. However, several holes must be drilled along the center of the dent so that it can be pulled out evenly.

If the dent is sharply crimped along the edges, the affected section should be cut out with a hacksaw, straightened with a body dolly and hammer and welded back into place.

Before cutting the exhaust pipe apart, scribe alignment marks over the area where the cuts will be made to aid correct alignment when the pipe is rewelded.

After the welding is completed, wire brush and clean up all welds. Paint the entire pipe with a high-temperature paint to prevent rusting.

Table 1 MIKUNI CARBURETOR SPECIFICATIONS (KX125)

	1982	1983
Size	VM34SS	VM34SS
Main jet	165R	152.5R
Jet needle/clip position	5E31/3	5DH92/3
Needle jet	R-6	R-2
Slide cutaway	3.0	3.0
Pilot jet	20	35
Float height	—	23.8 mm (0.94 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)
	1984	**1985**
Size	VM34SS	VM34SS
Main jet	280	270
Jet needle/clip position	6FL52/3	6FL52/3
Needle jet	Q-8	Q-8
Slide cutaway	3.0	3.0
Pilot jet	40	25
Float height	23.8 mm (0.94 in.)	25.7 mm (1.01 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)
	1986	**1987**
Size	VM35SS	VM35SS
Main jet	340	370
Jet needle/clip position	6J7/3	6DK1/3
Needle jet	R-8	R-2
Slide cutaway	3.0	3.0
Pilot jet	35	35
Float height	17.1 mm (0.67 in.)	17.1 mm (0.67 in.)
Fuel level	1-3 mm (0.04-0.12 in.)	0-2 mm (0-0.08 in.)

Table 2 KEIHIN CARBURETOR SPECIFICATIONS (KX125)

	1988	1989
Size	PWK39	PWK39
Main jet	148	166
Slide cutaway	6	6
Jet needle/clip position	R1368J/3	R2067N/4
Pilot jet	52	52
Air screw	1 1/2 turns	1 1/2 turns
Float height	15-17 mm (0.590-0.670 in.)	15-17 mm (0.590-0.670 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)
	1990	**1991**
Size	PWK35	PWK35
Main jet	155	158
Slide cutaway	6	5
Jet needle/clip position	N84C/3	N0EJ/2
Pilot jet	52	48
Air screw	1 1/2 turns	1 1/2 turns
Float height	15-17 mm (0.590-0.670 in.)	15-17 mm (0.590-0.670 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)

Table 3 MIKUNI CARBURETOR SPECIFICATIONS (KX250)

	1982	1984*
Type	Mikuni	Mikuni
Size	VM38SS	VM38SS
Main jet	165	320
Jet needle/clip position	6I2/3	6J4/3
Needle jet	R-8	R-2
Slide cutaway	3.0	2.5
Pilot jet	15	30
Float height	**	27 mm (1.06 in.)
Fuel level	5-7 mm (0.20-0.28 in.)	5-7 mm (0.20-0.28 in.)
	1985	**1986**
Type	Mikuni	Mikuni
Size	VM40SS	VM40SS
Main jet	350	340
Jet needle/clip position	6DJ1/2	6DJ1/23
Needle jet	R-4	R-4
Slide cutaway	3.0	3.0
Pilot jet	30	35
Float height	19.1 mm (0.75 in.)	19.1 mm (0.75 in.)
Fuel level	1-3 mm (0.04-0.12 in.)	1-3 mm (0.04-0.12 in.)

(continued)

Table 3 MIKUNI CARBURETOR SPECIFICATIONS (KX250) (continued)

	1987
Type	Mikuni
Size	VM38SS
Main jet	350
Jet needle/clip position	6FJ58/2
Needle jet	R-2
Slide cutaway	3.0
Pilot jet	45
Float height	27 mm (1.06 in.)
Fuel level	5-7 mm (0.20-0.28 in.)

* 1983 KX250 models were equipped with a Keihin carburetor. Refer to Table 4.
** Not specified.

Table 4 KEIHIN CARBURETOR SPECIFICATIONS (KX250)

	1983
Size	PE38
Main jet	160
Slide cutaway	3.5
Jet needle/clip position	N13A/*
Pilot jet	60
Air screw (turns out)	1 1/2
Float height	22.5 mm (0.89 in.)
Fuel level	3-5 mm (0.12-0.20 in.)

	1988	1989
Size	PWK39	PWK38
Main jet	172	172
Slide cutaway	7	7
Jet needle/clip position	R1368J/3	R1368J/3
Pilot jet	52	55
Float height	15-17 mm (0.590-0.670 in.)	15-17 mm (0.590-0.670 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)

	1990	1991
Size	PWK38	PWK38
Main jet	175	160
Slide cutaway	7	6
Jet needle/clip position	N85C/3	N85C/3
Pilot jet	55	58
Air screw (turns out)	1 1/2	1 1/2
Float height	15-17 mm (0.590-0.670 in.)	15-17 mm (0.590-0.670 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)

* Not specified

Table 5 MIKUNI CARBURETOR SPECIFICATIONS (KX500)

	1983	1984
Type	Mikuni	Mikuni
Size	VM38SS	VM38SS
Main jet	152.5	320
Jet needle/clip position		
All models	6CG5/3	—
U.S. and Canada	—	6FL4/2
Except U.S. and Canada	—	6FL4/3
Needle jet	S-2	R-4
Slide cutaway		
All models	3.0	—
U.S. and Canada	—	2.0
Except U.S. and Canada	—	1.0
Pilot jet	70	70
Float height	—	24.6-26.6 mm (0.97-1.05 in.)
Fuel level	5-7 mm (0.20-0.28 in.)	0-2 mm (0-0.08 in.)
	1985	**1986**
Type	Mikuni	Mikuni
Size	VM40SS	VM40SS
Main jet	380	380
Jet needle/clip position	6FJ51/3	6J6/2
Needle jet	R-2	R-0
Slide cutaway	3.0	3.0
Pilot jet	40	40
Float height	19.1 mm (0.75 in.)	19.1 mm (0.75 in.)
Fuel level	1-3 mm (0.04-0.12 in.)	1-3 mm (0.04-0.12 in.)
	1987	
Type	Mikuni	
Size	VM38SS	
Main jet	360	
Jet needle/clip position	6DJ6/3	
Needle jet	R-0	
Slide cutaway	3.0	
Pilot jet	35	
Float height	27 mm (1.06 in.)	
Fuel level	5-7 mm (0.20-0.28 in.)	

Table 6 KEIHIN CARBURETOR SPECIFICATIONS (KX500)

	1988	1989
Size	PWK39	PWK39
Main jet	175	170
Slide cutaway	7	7
Jet needle/clip position	R1369N/3	R1369N/4
Pilot jet	62	60
Float height	15-17 mm (0.590-0.670 in.)	15-17 mm (0.590-0.670 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)

(continued)

Table 6 KEIHIN CARBURETOR SPECIFICATIONS (KX500) (continued)

	1990-1999	2000-on
Size	PWK39	PWK39
Main jet	168	168
Slide cutaway	7	7
Jet needle/clip position	N82M/3	N82M
Pilot jet	60	58
Air screw (turns out)	1 1/2	2
Float height	15-17 mm (0.590-0.670 in.)	15-17 mm (0.590-0.670 in.)
Fuel level	0-2 mm (0-0.08 in.)	0-2 mm (0-0.08 in.)

CHAPTER NINE

IGNITION SYSTEM

This chapter describes service procedures for the ignition system.

Electrical system test specifications are found in **Table 1** and **Table 2**. **Tables 1-5** are found at the end of the chapter.

ELECTRICAL COMPONENT REPLACEMENT

Most motorcycle dealerships and parts suppliers will not accept the return of any electrical part. If you cannot determine the *exact* cause of any electrical system malfunction, have a Kawasaki dealership retest that specific system to verify your test results. If you purchase a new electrical component(s), install it, and then find that the system still does not work properly, you will probably *not* be able to return the unit for a refund.

Consider any test results carefully before replacing a component that tests slightly out of specification, especially resistance. A number of variables can effect test results dramatically. These include the testing meter's internal circuitry, ambient temperature and conditions under which the machine has been operated. All instructions and specifications have been checked for accuracy; however, successful test results depend to a great degree upon individual accuracy.

CAPACITOR DISCHARGE IGNITION

All models are equipped with a capacitor discharge ignition (CDI) system. This solid state system, unlike conventional ignition system, uses no contact breaker points or other moving parts.

Alternating current from the magneto is rectified and used to charge the capacitor. As the piston approaches the firing position, a pulse from the pulser coil is rectified, shaped, and then used to trigger the silicone controlled rectifier. This in turn allows the capacitor to discharge quickly into the primary side of the high-voltage ignition coil where it is increased, or stepped up, to a high enough voltage to jump the gap between the spark plug electrodes.

CDI Cautions

Certain measures must be taken to protect the capacitor discharge system. Damage to the semiconductors in the system may occur if the following is not observed.

1. Keep all connections between the various units clean and tight. Be sure that the wiring connectors are pushed together firmly (**Figure 1**).

2. Never disconnect any of the electrical connections while the engine is running.

3. When kicking the bike over with the spark plug removed, make sure the spark plug is installed in the plug cap and grounded against the cylinder head (**Figure 2**). If not, excessive resistance will damage the ignition system.

4. The CDI unit is mounted on a rubber vibration isolator or rubber dampers. Always be sure that the CDI unit is mounted correctly.

CDI Troubleshooting

Problems with the capacitor discharge system are usually limited to the production of a weak spark or no spark at all.

1. Untape the electrical connectors (**Figure 1**) and check for moisture and dirt buildup. Clean the connectors with electrical contact cleaner and reconnect. Retape the connectors with electrical tape.

2. Disconnect the kill switch and try to restart the engine. Refer to *Engine Kill Switch* in this chapter.

NOTE

If the engine starts with the kill switch disconnected, use the choke to turn the engine off.

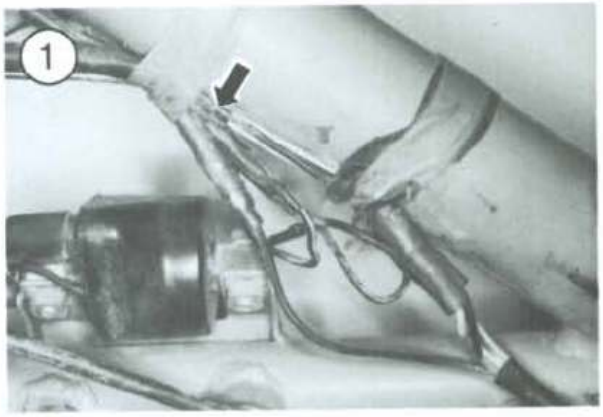
3. Check to see that the ignition coil high tension wire is connected securely to the ignition coil and spark plug cap.

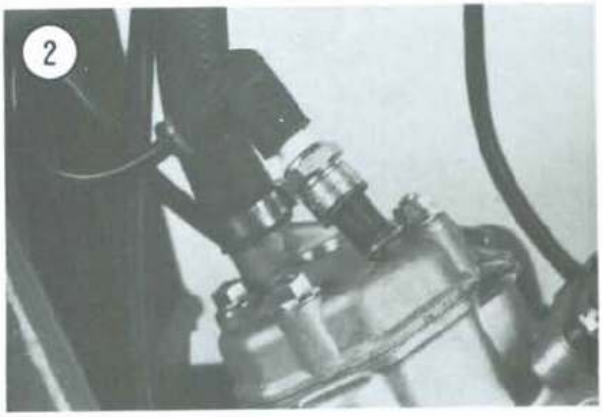
4. Make sure that all stator plate screws are tight. If not, retighten the screws and reset the ignition timing as described in this chapter.

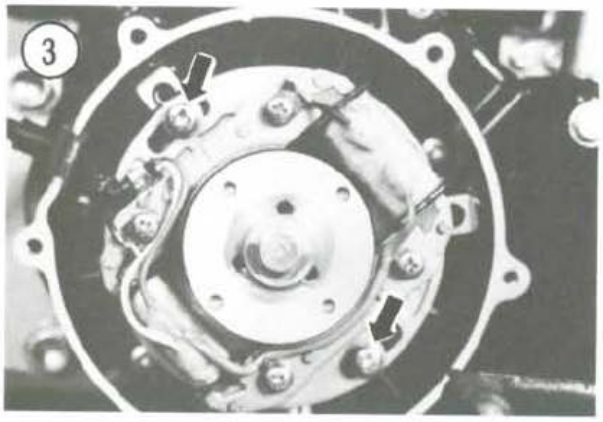
5. Check the crankshaft bearings for excessive wear as this could cause ignition problems. With the flywheel rotor removed, grab the end of the crankshaft and try to move it up and down. Any noticeable play indicates worn crankshaft bearings.

FLYWHEEL ROTOR

There are 2 types of flywheel rotors: internal and external. Both types must be removed to separate the engine cases. The internal rotor does not have to be removed to service the stator coils and adjust the ignition timing. Rotor replacement is usually neces-







sary only if the rotor magnets have been damaged by mechanical shock or heat.

CAUTION

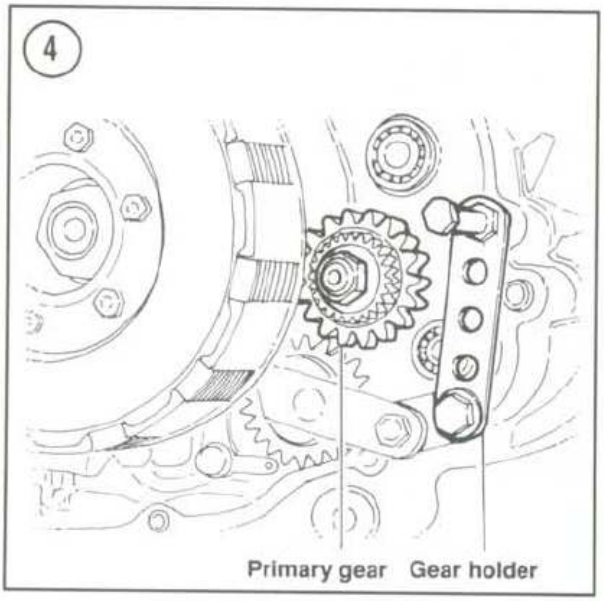
Flywheel rotor removal requires a puller such as the one illustrated in the procedures below. Don't pry or hammer on the rotor itself. Damage is sure to result, and you may destroy the rotor magnetism. Use the proper type of puller described for your bike.

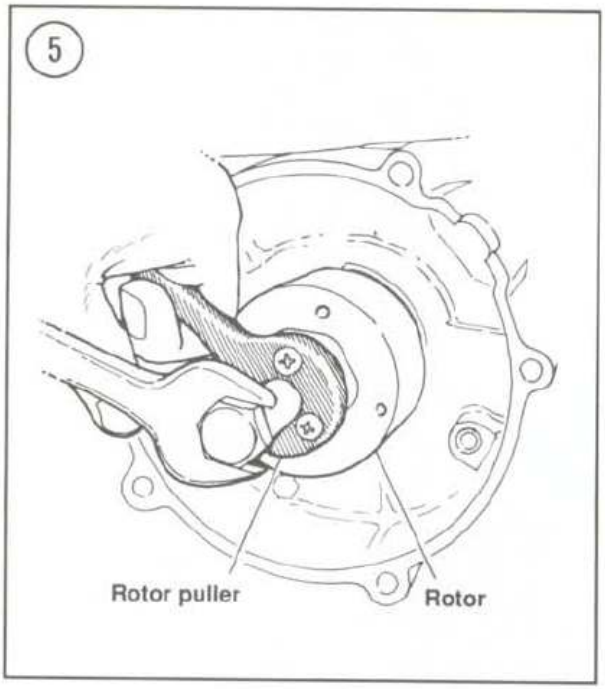
Internal Flywheel Rotor Removal/Installation

1. Place the bike on a stand to support it securely.
2. Remove the shift lever.
3. Remove the left-hand side cover.
4. Remove the stator plate mounting screws and remove the stator plate (**Figure 3**). Set the plate aside.
5. Remove the rotor bolt and washer.

NOTE

*You can lock the engine by shifting the transmission into gear and stepping on the brake pedal, or by using the Kawasaki gear holder (part No. 57001-1015) or equivalent to lock the primary drive gear (**Figure 4**) after removing the clutch cover. If you have access to compressed air, an air gun and socket will generally remove the bolt without having to lock the crankshaft.*





6A. On 1982-1985 KX125 models, Kawasaki rotor puller (part No. 57001-1093) is required (**Figure 5**). Back out the puller center bolt and mount the puller onto the rotor. Then screw in the center bolt to pull the rotor off the crankshaft.

6B. On 1986 KX125 models, Kawasaki rotor puller (part No. 57001-1093) is required (**Figure 5**). Install a M8 × 1.25 mm Allen bolt into the crankshaft so that the bolt head is flush with the rotor as shown in **Figure 6**. Back out the puller center bolt and mount the puller onto the rotor. Then screw in the center bolt to pull the rotor off the crankshaft.

CAUTION

Don't pry or hammer on the rotor in any way. Damage is sure to result, and you may destroy the rotor magnetism. Use

the proper type of puller assembly described.

CAUTION

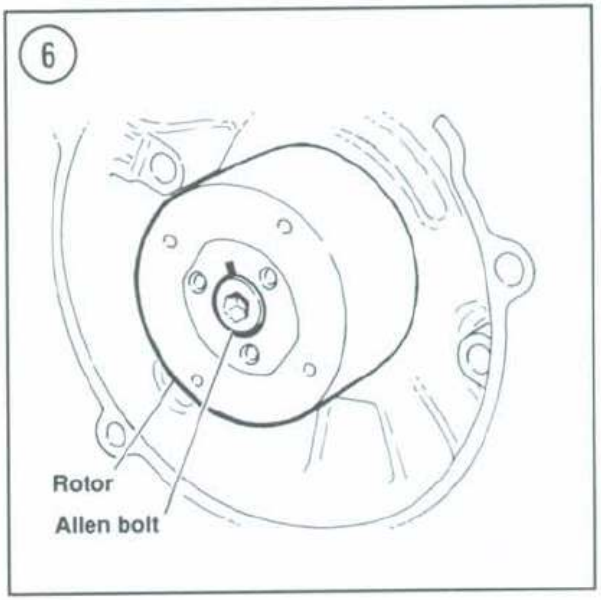
If normal rotor removal attempts fail, do not force the puller as the threads may be stripped out of the rotor causing expensive damage. Take it to a dealer and have them remove it.

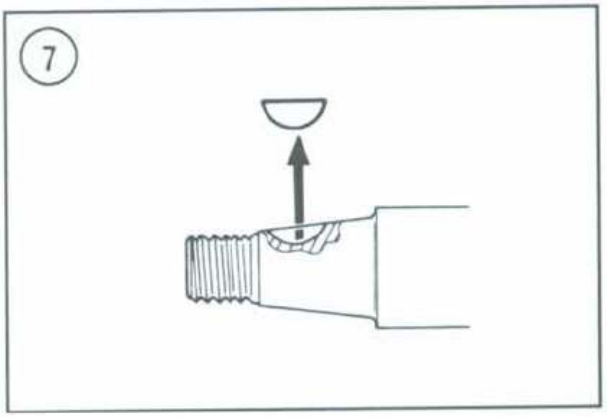
7. Remove the rotor and puller. Don't loose the Woodruff key (**Figure 7**) on the crankshaft.

CAUTION

Carefully inspect the outside of the rotor for small bolts, washers or other metal "trash" that may have been picked up by the magnets. These small metal bits can cause severe damage to the stator plate components.

8. Install by reversing these removal steps, while noting the following:
   a. Make sure the Woodruff key (**Figure 7**) is in place on the crankshaft and align the keyway in the rotor with the key when installing the rotor.
   b. Install and tighten the rotor nut to the torque specification in **Table 3**. To keep the rotor from turning, lock the crankshaft with the same tool used during removal.



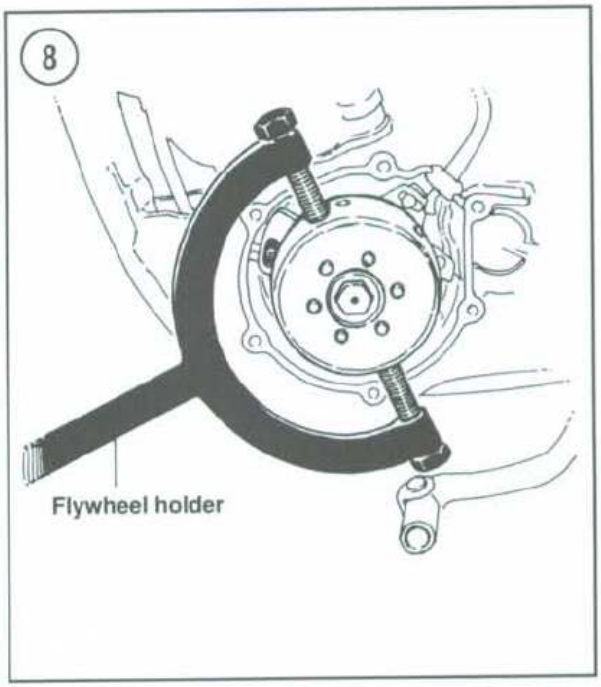


External Rotor Removal/Installation

1. Place the bike on a stand to support it securely.
2. Remove the shift lever, if necessary.
3. Remove the left-hand side cover.
4. On 1989 and later models with an exposed pickup coil, remove the coil screws and set the coil aside so that the strap wrench doesn't damage it when loosening the rotor bolt or nut.
5. Secure the rotor with a flywheel holder or strap wrench.

NOTE

You can lock the engine by shifting the transmission into gear and stepping on the brake pedal, or by using a suitable Kawasaki gear holder or equivalent to lock the primary drive gear after removing the clutch cover. If you have access to compressed air, an air gun and socket

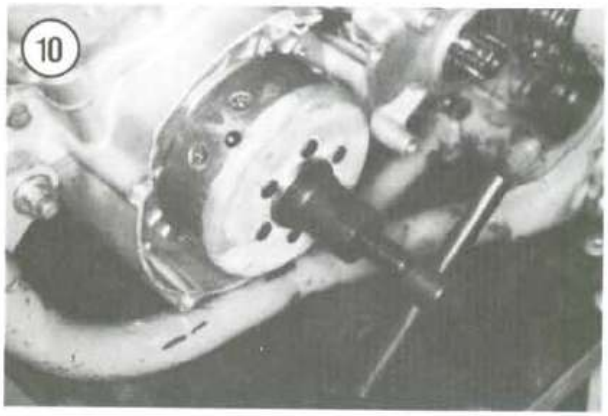


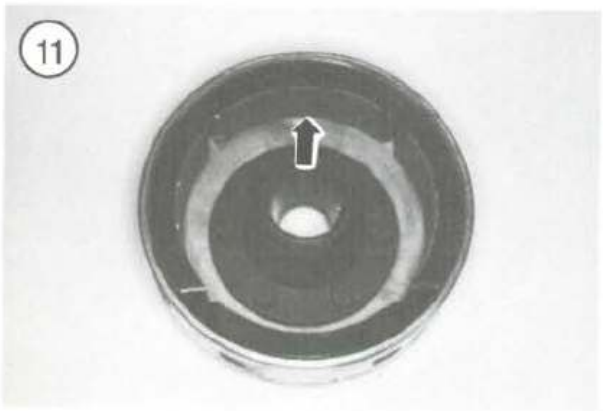
will generally remove the bolt without having to lock the crankshaft.

NOTE

*The Kawasaki flywheel holder (part No. 57001-308) can be used on some late models where the rotor is machined to accept the holder bolts (**Figure 8**).*

6. Remove the rotor bolt and washer or nut.





CAUTION

Don't pry or hammer on the rotor in any way. Damage is sure to result, and you may destroy the rotor magnetism. Use the proper type of puller assembly described.

7. Thread a rotor (flywheel) puller (**Figure 9**) for your model into the rotor. Screw the rotor puller into the rotor threads until its stops, then back it out 1/2 turn (**Figure 10**).

CAUTION

Don't try to remove the rotor without the correct puller for your model. Any attempt to do so will ultimately lead to some form of damage to the engine and rotor. Many aftermarket pullers are available from motorcycle dealers or mail order houses. If you can't buy or borrow one, have a dealer remove the rotor.

8. Turn the outer bolt on the rotor puller clockwise while holding the puller with a wrench until the rotor is free (**Figure 10**).

CAUTION

If normal rotor removal attempts fail, do not force the puller as the threads may be stripped out of the rotor causing expensive damage. Take it to a dealer and have them remove it.

9. Remove the rotor and puller. Don't lose the Woodruff key (**Figure 7**) on the crankshaft.

CAUTION

*Carefully inspect the inside of the rotor (**Figure 11**) for small bolts, washers or other metal "trash" that may have been picked up by the magnets. These small metal bits can cause severe damage to the stator plate components.*

10. Install by reversing these removal steps while noting the following:

a. Make sure the Woodruff key (**Figure 7**) is in place on the crankshaft and align the keyway in the rotor with the key when installing the rotor.

b. Install and tighten the rotor nut or bolt and washer to the torque specification in **Table 3**.

To keep the rotor from turning, hold it with the same tool used during removal.

Rotor Inspection

The rotor is permanently magnetized and cannot be tested except by replacement with a rotor known to be good. A rotor can lose magnetism from old age or a sharp blow. If defective, the rotor must be replaced; it cannot be remagnetized.

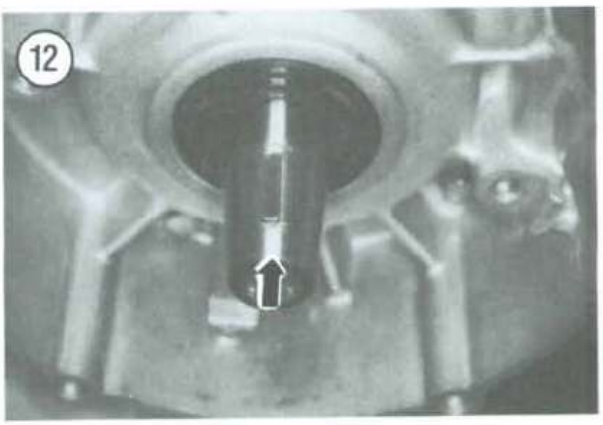
1. Check the rotor carefully for cracks or breaks.
2. Check the tapered bore of the rotor and the crankshaft taper (**Figure 12**) for cracks or other abnormal conditions.

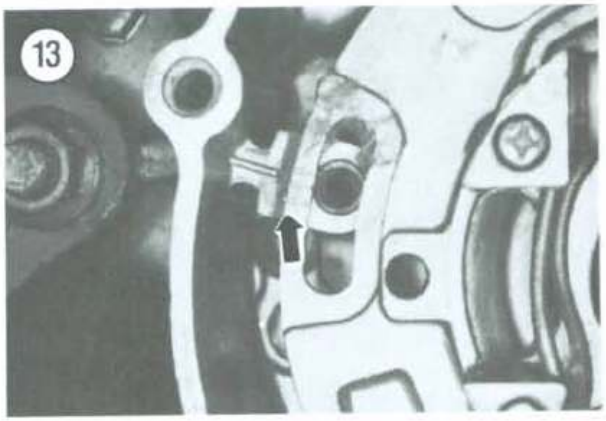
Stator Assembly Removal/Installation

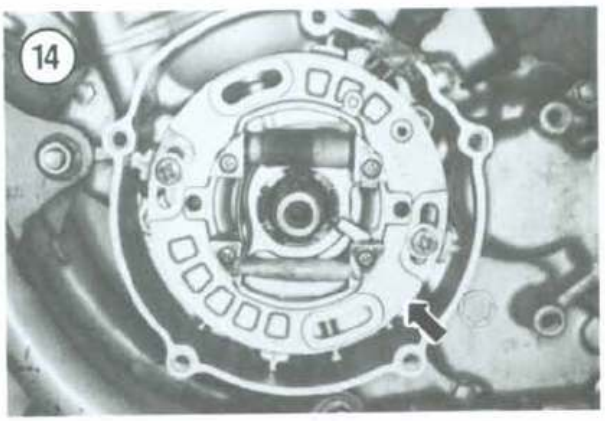
1. Remove the flywheel rotor as described in this chapter.
2. Remove the fuel tank as described in Chapter Eight.
3. Disconnect the electrical wire connectors from the magneto to the CDI unit. See **Figure 1**.
4. Note the timing marks on the stator plate and on the crankcase. These must be realigned during installation. See **Figure 13**, typical.
5. Remove the screws securing the stator plate.
6. Carefully pull the electrical harness out along with the rubber grommet from the crankcase and any holding clips on the engine.
7. Remove the stator assembly. See **Figure 14**, typical.
8. Install by reversing these removal steps while noting the following.
9. Route the electrical wires along the same path, keeping them away from the exhaust system.
10. Realign the stator plate and crankcase timing marks for preliminary ignition timing.
11. Check and adjust the ignition timing as described in this chapter.

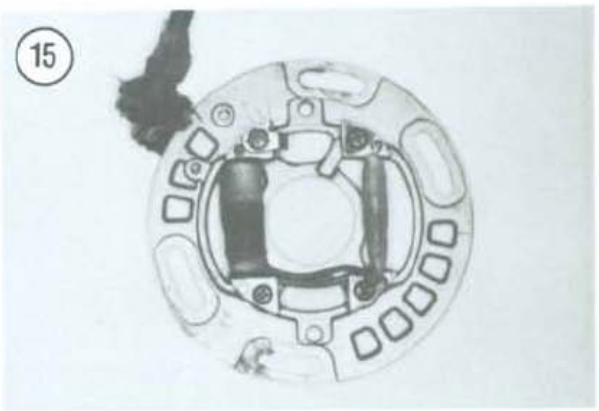
Stator Coil Testing

The stator coils (**Figure 15**) can be inspected for continuity without removing them from the bike. With the engine off, disconnect the stator plate electrical connectors (**Figure 1**) and measure the resistance between the pairs of leads listed in **Table 1**. If









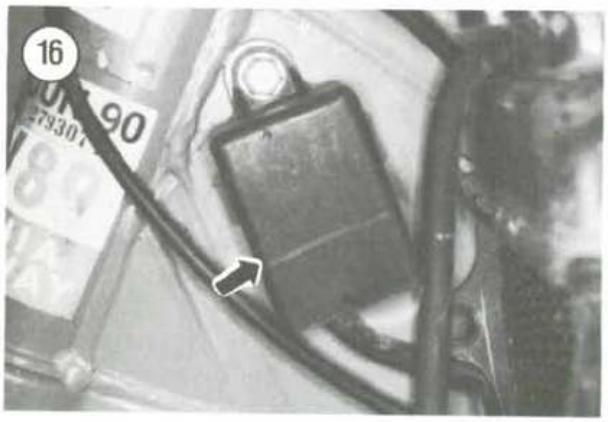
the resistance is zero (short circuit) or infinite (open circuit), check the wiring to the coils, and replace the coils if the wiring is okay.

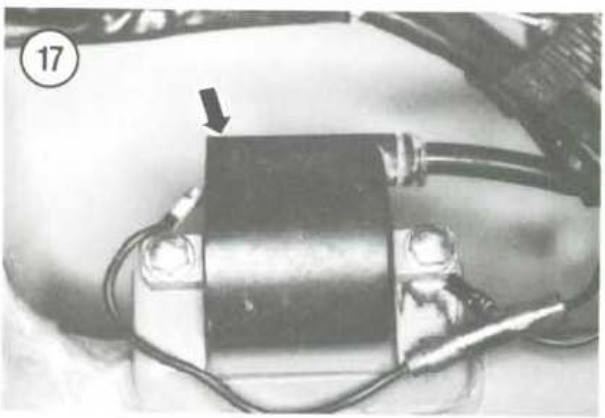
I.C. IGNITER UNIT

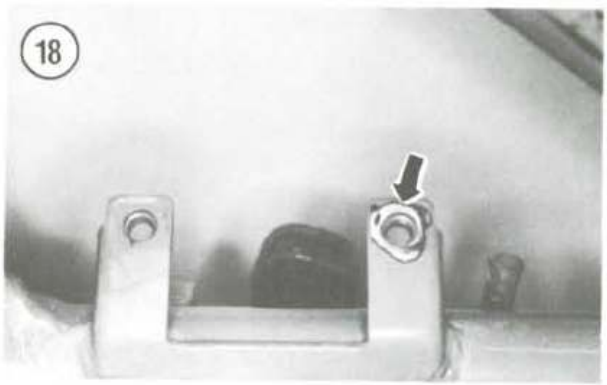
Kawasaki commonly refers to the CDI units on their models as the I.C. Igniter.

Removal/Installation

1. Support the bike on the sidestand.







2. Remove the seat and fuel tank.
3. Disconnect the igniter electrical connectors (**Figure 1**).
4. Remove the igniter mounting bolt(s) and remove it (**Figure 16**, typical).
5. Installation is the reverse of these steps.

Testing

The I.C. Igniter can only be tested with special electrical equipment and improper testing may damage it. Refer all testing to a Kawasaki dealer.

IGNITION COIL

The ignition coil is mounted on the upper frame rail, but the actual locating position varies among the different models.

Removal/Installation

1. Support the bike on the sidestand.
2. Remove the seat and fuel tank.
3. Disconnect the spark plug lead.
4. Disconnect the electrical wires to the ignition coil.
5. Remove the screws securing the ignition coil to the frame and remove it. See **Figure 17**, typical.
6. Install by reversing these removal steps. Make sure all electrical connectors are tight and free of corrosion. Make sure the ground wire connection point on the frame is free of rust and corrosion. See **Figure 18**, typical.

Testing

If the functional condition of the coil is in doubt, there are several checks which should be made. Disconnect the coil wires before testing.

1. Measure the coil primary resistance using an ohmmeter set at R × 1 (**Figure 19**). Measure the resistance between the primary terminal and the mounting flange. See **Table 2** for test specifications.
2. Measure the secondary resistance using an ohmmeter set at R × 1,000 (**Figure 19**). Measure the resistance between the secondary lead (spark plug lead) and the mounting flange. See **Table 2** for test specifications.
3. If the meter indicates an open circuit (no continuity) in Step 2, unplug the high-tension lead from the

coil and test it again with the meter lead connected directly to the contact pin in the coil cap. If there is continuity, the trouble is in the high-tension lead. It may be a bad connection at the spark plug or an internal break in the wire. Make sure the connection is good and check the lead for continuity. If an open circuit is still indicated, replace the high-tension lead.

4. If the high tension lead has continuity, the coil itself is defective and must be replaced.

NOTE

Continuity in both the primary and secondary windings in the coil is not a guarantee that the unit is in top working order; only an operational test can tell if a coil is producing an adequate spark from the input voltage. Your motorcycle dealer or auto electrical repair shop may have the equipment to test the coil's output. If not, substitute a known good coil to see if the problem goes away.

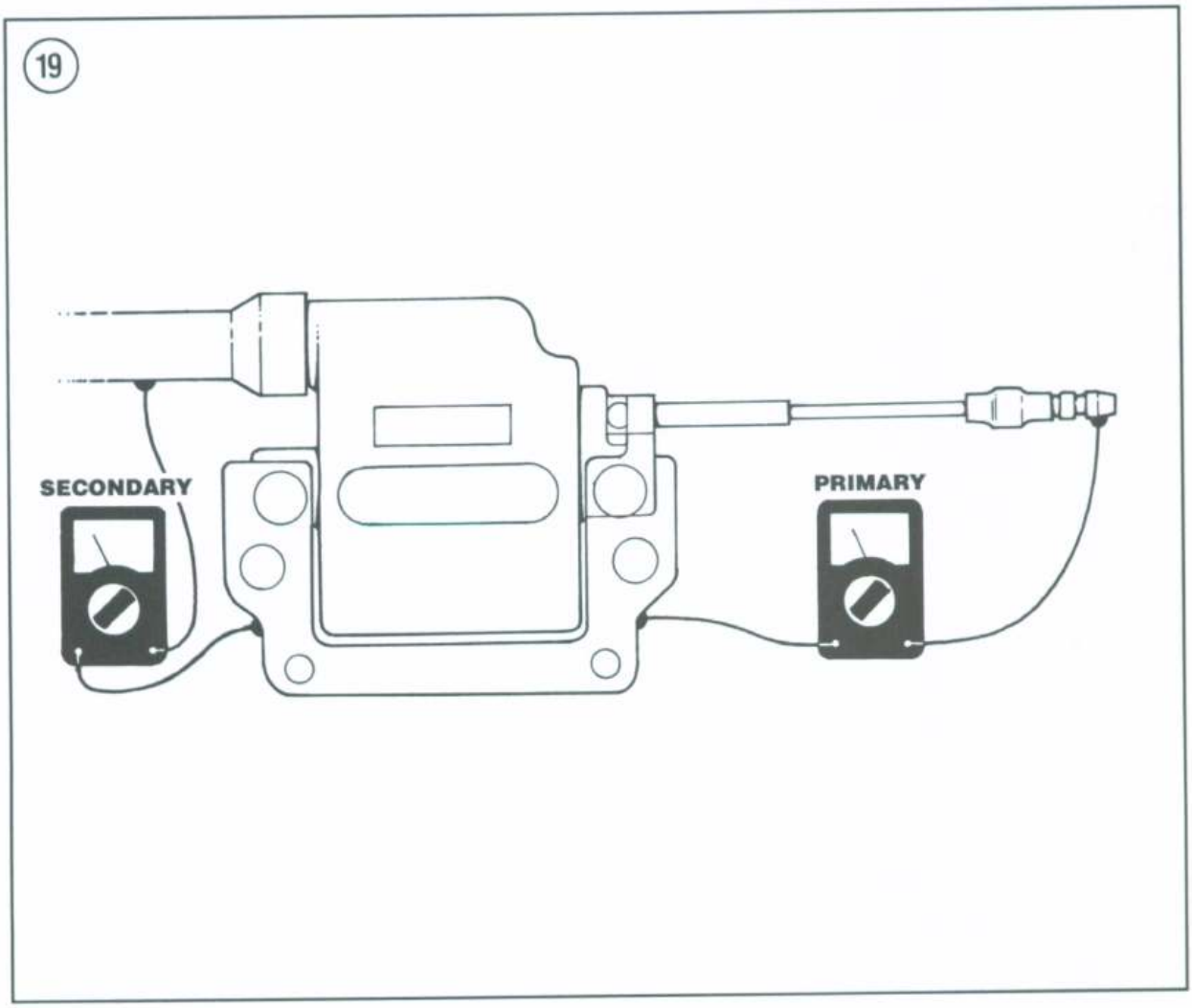
SPARK PLUG

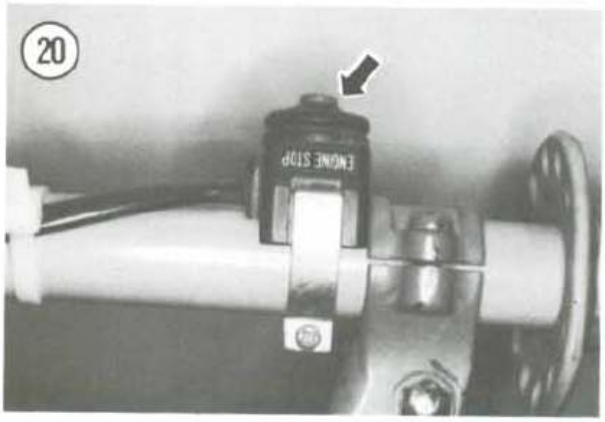
The spark plugs recommended by the factory are usually the most suitable for your machine. If riding conditions are mild, it may be advisable to go to spark plugs one step hotter than normal. Unusually severe riding conditions may require slightly colder plugs. See Chapter Three for details.

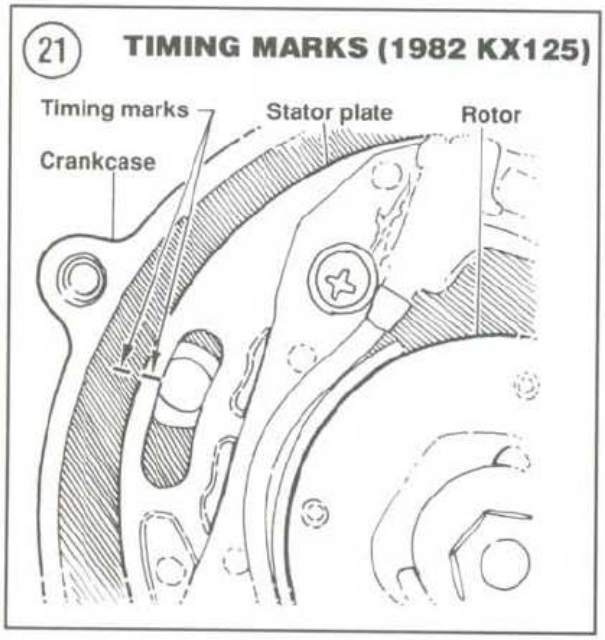
ENGINE STOP SWITCH

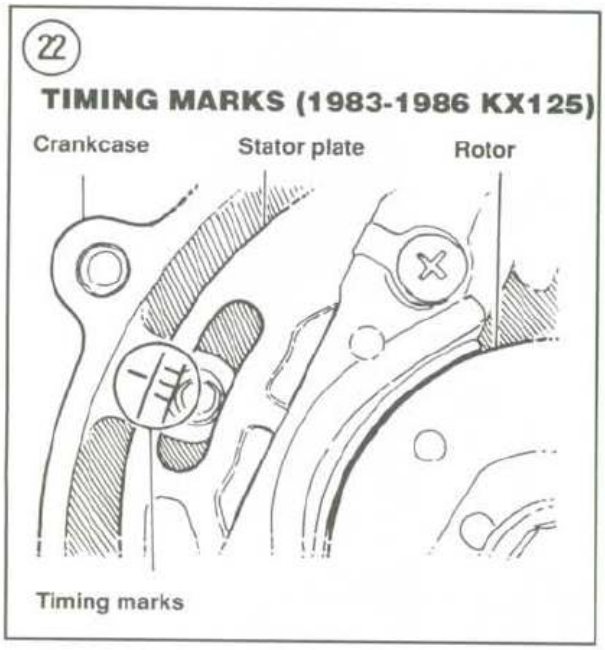
Testing

1. Remove the fuel tank as described in Chapter Eight.









2. Disconnect the black stop switch connector at the CDI unit.

3. Use an ohmmeter set at R × 1 and connect the 2 leads of the ohmmeter to the 2 electrical wires of the switch.

4. Push the stop switch button (**Figure 20**)—if the switch is good there will be continuity (resistance).

5. If the needle does not move (no continuity) the switch is faulty and must be replaced.

6. Remove the screw securing the switch (**Figure 20**) and remove it. Reverse to install a new switch.

IGNITION TIMING

Ignition timing specifications are listed in **Table 4** and **Table 5**.

Ignition Timing (1982-1986 KX125)

These models are equipped with an internal flywheel rotor.

1. Place the bike on the sidestand.

2. Remove the left-hand side cover.

3. Remove the stator plate screw that is in line with the crankcase timing mark. Do not loosen or remove the remaining stator plate screws.

4A. On 1982 models, check the mark on the stator plate with the crankcase timing mark; both marks should align as shown in **Figure 21**.

4B. On 1983-1986 models, check that the center mark on the stator plate aligns with the crankcase timing mark as shown in **Figure 22**.

NOTE

On 1983-1986 models, there are 3 timing marks on the stator plate. The center timing mark indicates standard ignition timing. The 2 outer marks represent an adjustable range for advancing or retarding the ignition timing. Refer to ***Ignition Timing Adjustment*** *in this chapter.*

5. If the marks are not aligned, loosen the stator plate screws and turn the stator plate to align the marks (**Figure 23**). Tighten the screws and recheck.

6. Reinstall the left-hand side cover.

Ignition Timing
(1987-on KX125; all KX250 and KX500)

The models use an outer flywheel rotor.

1. Place the bike on the sidestand.
2. Remove the left-hand side cover.
3. If necessary, remove the stator plate screw that is in line with the crankcase timing mark. Do not loosen or remove the remaining stator plate screws.

NOTE

If you cannot see the stator plate timing marks, remove the rotor as described in this chapter.

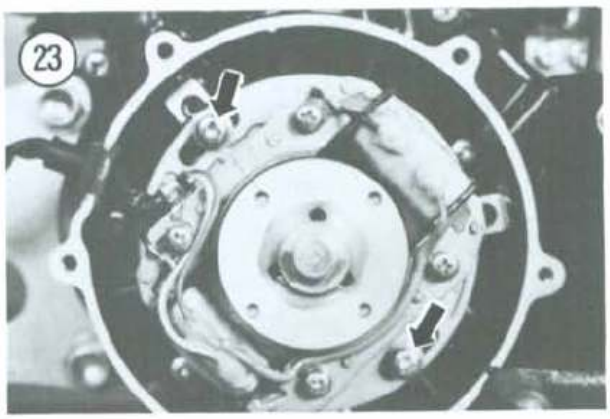
4A. Stator plates with 1 timing mark: The ignition timing is correct when the stator plate timing mark aligns with the crankcase timing mark. See **Figure 24**, typical.

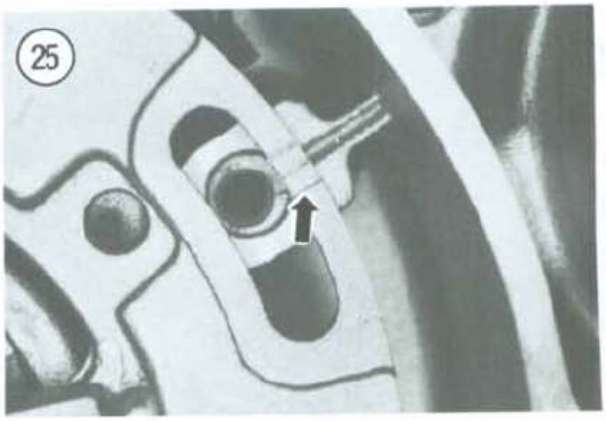
4B. Stator plates with 3 timing marks: The ignition timing is correct when the center stator plate timing marks aligns with the crankcase timing mark. See **Figure 25**, typical.

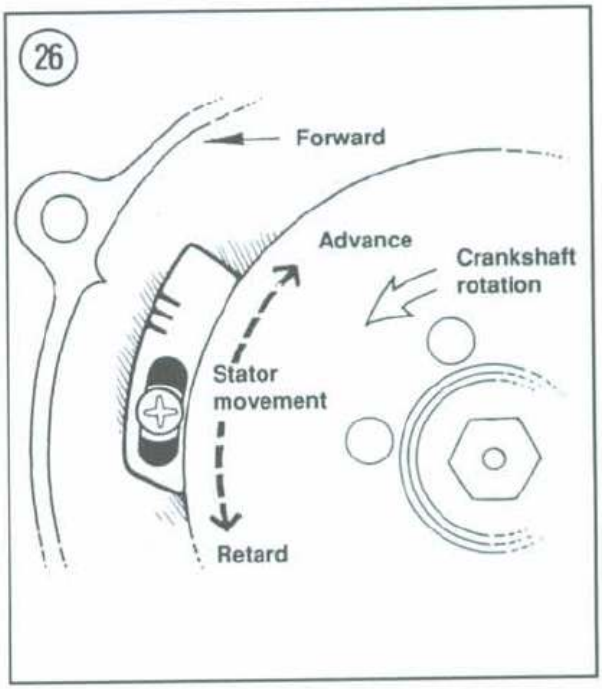
NOTE

On stator plates with 3 timing marks, the center timing mark indicates standard ignition timing. The 2 outer marks represent an adjustable range for advancing or retarding the ignition timing. Refer to ***Ignition Timing Adjustment*** *in this chapter.*

5. If the marks are not aligned, loosen the stator plate screws and turn the stator plate to align the marks. See **Figure 24**, typical. Tighten the screws and recheck the timing.
6. Reinstall the left-hand side cover.







Ignition Timing Adjustment

If the stator plate on your model is scribed with 3 timing marks, the ignition timing can be retarded or advanced from the stock setting to change the power band to suit race conditions.

1. Place the bike on the sidestand.
2. Remove the left-hand side cover.
3. The stator plate has a 3 timing marks (**Figure 25**). The center timing mark indicates standard ignition timing. The 2 outer marks represent an adjustable range for advancing or retarding the ignition timing.
4. The timing can be adjusted by loosening the stator plate mounting screws and moving the stator plate so that the crankcase mark aligns within the area outlined by the 2 outer marks. Moving the stator plate clockwise advances the ignition timing; moving the stator plate counterclockwise retards ignition timing. See **Figure 26**.

CAUTION

Do not adjust the ignition timing outside of the range listed above or engine damage may occur.

5. Reinstall the left-hand side cover.

WIRING DIAGRAMS

Wiring diagrams for all models are located at the end of this book.

Table 1 STATOR COIL TEST SPECIFICATIONS*

Connector test points	Ohms
KX125	
1982	
Black to blue	215-275
Black to white/blue	46-66
Blue to white/red	67-87
Black to white/red	287-357
1983	
Black to blue	122-182
Black to white/blue	44-66
Blue to white/red	63-95
Black to white/red	178-266
1984-1987	
Black to blue	122-182
Blue to white/red	63-95
Black to white/red	178-266
1988	
Black/white to black/yellow	422-648
White/red to white/green	4.0-6.0
1989	
Black/white to black/yellow	376-564
White/red to white/green	176-264
1990-1991	
White/red to white/green	188-283
Red to black/red	417-627
White to ground	14.3-21.5
KX250	
1982	**
1983-1985	
Black/red to black/yellow	432-648
White/red to black/yellow	4.0-6.0
1986-1987	
Black/red to black/yellow	432-648
White/red to white/green	7.7-11.5
1988	
Black/white to black/yellow	432-648
White/red to white/green	7.7-11.5

(continued)

Table 1 STATOR COIL TEST SPECIFICATIONS (continued)*

Connector test points	Ohms
KX250	
1989	
Black/white to black/yellow	376-564
White/red to white/green	176-264
1990	
White/red to white/green	188-283
Red to black/red	417-627
White to ground	14.3-21.5
1991	
White/red to white/green	188-283
Red to black/red	359-539
KX500	
1983-1985	
Black/red to black/yellow	336-504
Red to black/yellow	14.2-21.4
White/red to black/yellow	10.4-15.6
1986	
Black/red to black/yellow	432-648
White/red to white/green	4.0-6.0
1987-1989	
Black/white to black/yellow	432-648
White/red to white/green	4.0-6.0
1990-on	
Black/white to black/yellow	153-230
White/red to black/yellow	7.9-11.9

* Ohmmeter readings should be made when the engine is cold (20° C [68° F]).
** Not specified.

Table 2 IGNITION COIL TEST SPECIFICATIONS*

Primary	
KX125	
1982	**
1983-1989	0.8-1.2 ohms
1990	0.26-0.36 ohms
1991	0.11-0.15 ohms
KX250	
1982	**
1983-1989	0.85-1.15 ohms
1990	0.26-0.36 ohms
1991	0.11-0.15 ohms
KX500	
1983-1986	0.85-1.15 ohms
1987	0.8-1.2 ohms
1988-1989	0.85-1.15 ohms
1990-on	0.26-0.36 ohms
Secondary	
KX125	
1982	**
1983-1987	6.0-8.1 K ohms
1988-1989	5.0-6.8 K ohms
1990-1991	3.5-4.7 K ohms
KX250	
1982	**
1983-1989	5.0-6.8 K ohms
1990-1991	3.5-4.7 K ohms

(continued)

Table 2 IGNITION COIL TEST SPECIFICATIONS (continued)*

Secondary	
KX500	
1983-1986	5.0-6.8 K ohms
1987	5.6-8.4 K ohms
1988-1989	5.0-6.8 K ohms
1990-on	2.6-3.6 K ohms

* Ohmmeter readings should be made when the engine is cold (20° C [68° F]).
** Not specified.

Table 3 FLYWHEEL (ROTOR) TIGHTENING TORQUE

	N•m	ft.-lb.
KX125	22	16
KX250		
1982-1984	22	16
1985-1989	27	20
1990-1991	78	58
KX500	78	58

Table 4 IGNITION TIMING WITH DIAL INDICATOR (1982-1985)*

Model	mm	in.
KX125		
1982	2.38	0.094
1983	1.15	0.045
1984-1985	1.004	0.0395
KX250		
1982	1.22	0.048
1983	1.40	0.055
1984	2.97	0.117
1985	1.79	0.070
KX500		
1983	2.8	0.110
1984		
U.S.	1.1	0.040
All other	1.5	0.060
1985	1.5	0.060

* All dimensions taken before top dead center (BTDC).

Table 5 IGNITION TIMING (1986-ON)

Model	Ignition timing
KX125	
1986	13° BTDC @ 11,000 rpm
1987	11° BTDC @ 11,000 rpm
1988	13° BTDC @ 11,000 rpm
1989	13.8° BTDC @ 11,000 rpm
1990	14° BTDC @ 11,000 rpm
1991	15.8° BTDC @ 11,000 rpm
KX250	
1986	15° BTDC @ 6,000 rpm
1987-1988	13° BTDC @ 6,000 rpm
1990-1991	14° BTDC @ 6,000 rpm
KX500	
1986	15° BTDC @ 6,000 rpm
1987-1989	17° BTDC @ 6,000 rpm
1990-on	19° BTDC @ 6,000 rpm

CHAPTER TEN

LIQUID COOLING SYSTEM

The liquid cooling system used on all KX125, 1983-on KX250 and 1985 KX500 models consists of one or two radiators, water pump, radiator cap and hoses (**Figure 1**, typical). During operation, the coolant heats up and expands, thus pressuring the system. The radiator cap is used to seal the system. Water cooled in the radiator is pumped down through the radiator and into the cylinder head where it passes through the cylinder water passages and back into the radiator at the top. The water then drains down through the radiator where it is cooled and the cycle is repeated.

The water pump requires no routine maintenance and can be overhauled (replacement parts are available) after removing the clutch cover. There is no thermostat or cooling fan and all cooling system serviced can be performed with the engine in the frame.

This chapter describes repair and replacement of cooling system components. Chapter Three describes maintenance of the system.

Cooling system specifications are listed in **Table 1** at the end of the chapter.

SAFETY PRECAUTIONS

Certain safety precautions must be kept in mind to protect yourself from injury and the engine from damage. For your own safety, the cooling system must be cool before removing any part of the system, including the radiator cap (**Figure 2**).

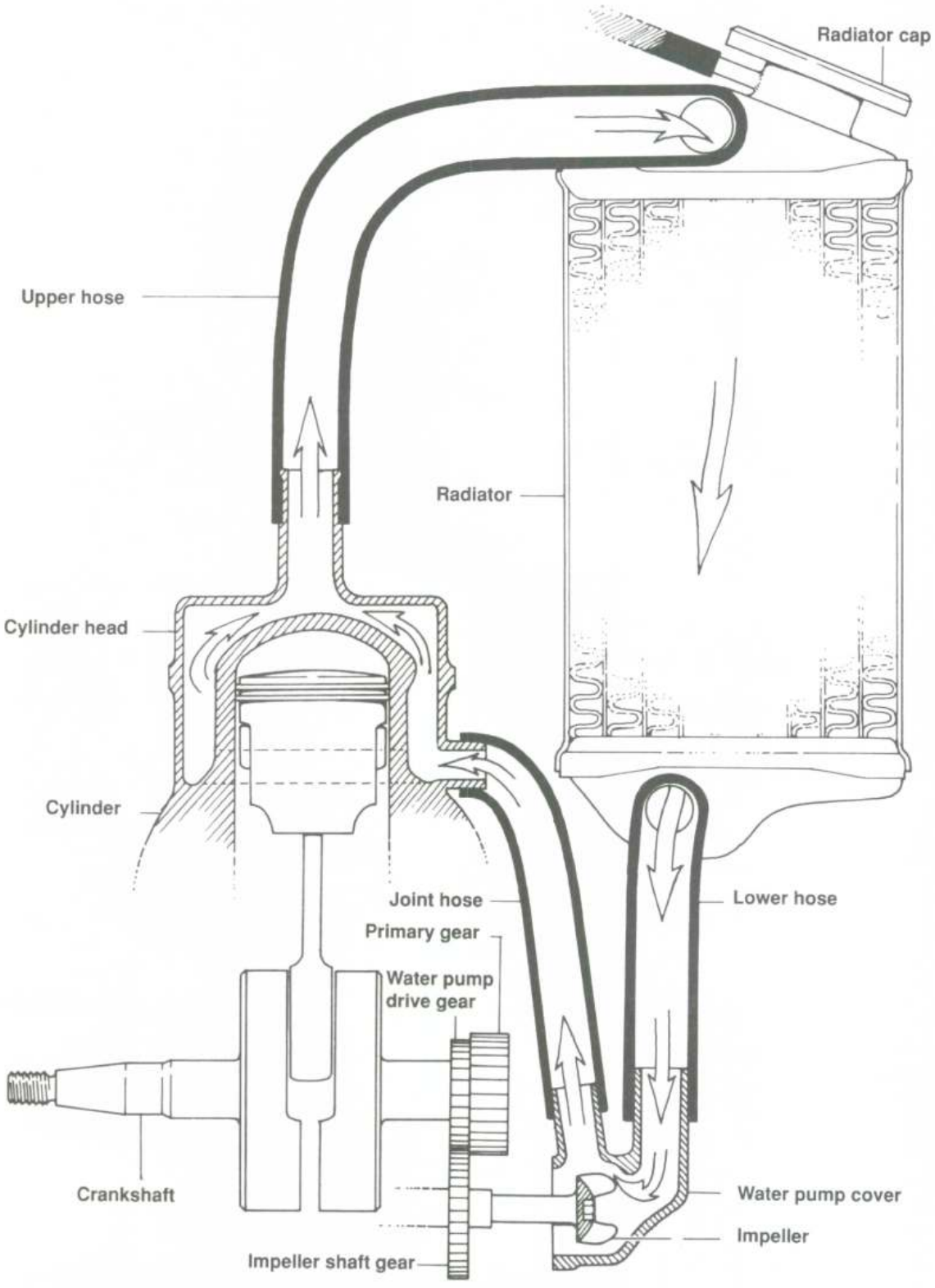
WARNING

*Do not remove the radiator cap (**Figure 2**) when the engine is hot. The coolant is very hot and is under pressure. Severe scalding could result if the coolant comes in contact with your skin.*

To protect the engine and cooling system, drain and flush the cooling system at least once a year. Of course, the coolant will have to be drained when servicing the engine top end and when removing the

1

COOLING SYSTEM



clutch cover; both services will be required throughout the riding season if you are following the maintenance schedule in Chapter Three. When draining the cooling system, drain the coolant into a clean container so that you can reuse it. Because coolant deteriorates with age, replace it at least once a year or after rebuilding the engine. Refer to *Coolant Change* in Chapter Three. Refill with a mixture of ethylene-glycol antifreeze (formulated for aluminum engines) and distilled water.

CAUTION

Never operate the cooling system with water only, even in climates where antifreeze protection is not required. The all-aluminum engine will oxidize internally.

WARNING

Antifreeze has been classified as an environmental toxic waste by the EPA. Dispose of it according to local regulations. Antifreeze is poisonous and may attract animals. Do not store coolant where it is accessible to children or pets.

COOLING SYSTEM INSPECTION

1. Check the radiator for clogged or damaged fins. If more than 20% of the radiator fin area is damaged, repair or replace the radiator.

2. To clean a clogged radiator, blow compressed air from the rear (engine side), keeping the air nozzle at least 0.5 m (20 in.) away from the radiator. Blow air directly through the radiator fins (perpendicular); never blow air at an angle against the fins.

3. Check all coolant hoses for cracks or damage. Replace all questionable parts. Make sure the hose clamps are tight, but not so tight that they cut the hoses.

4. Pressure test the cooling system as described in Chapter Three.

5. If coolant loss is noted, the head gasket (**Figure 3**) may be leaking or the cylinder head warped, allowing coolant to leak into the cylinder. If necessary, remove and service the cylinder head and gasket as described in Chapter Four.

6. Visually check the area underneath the water pump for signs of leakage or corrosion.

RADIATOR(S)

Removal/Installation

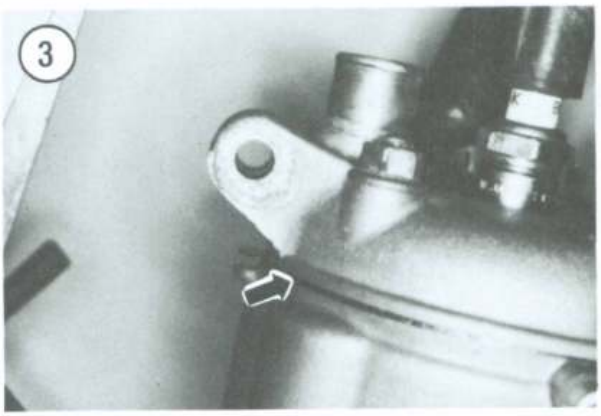
1. Place the bike on a bike stand.

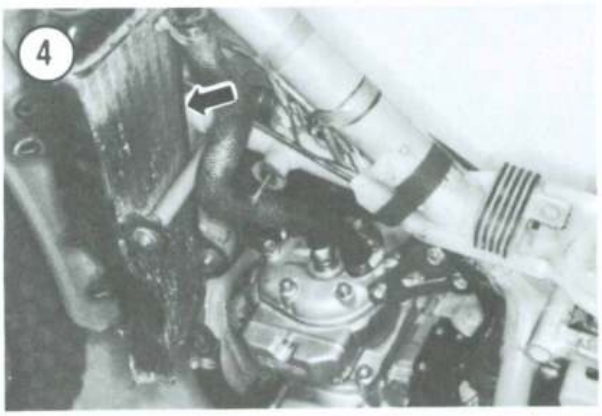
2. Remove the fuel tank.

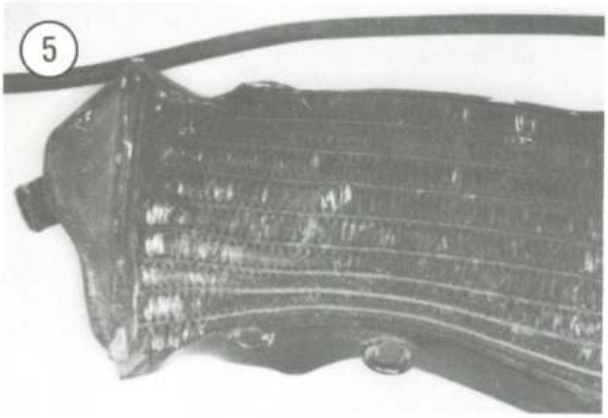
3. Drain the cooling system as described in Chapter Three.

4. Remove the radiator covers.

5. Loosen the hose clamps and disconnect the hoses at the radiator. When removing the lower hose, place







your coolant drain pan underneath the radiator to catch any residual coolant.

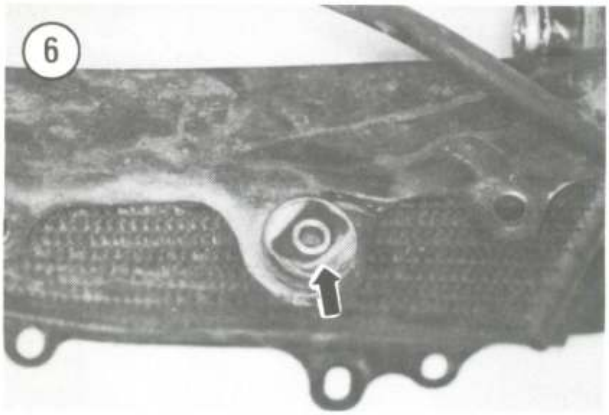
6. Remove the bolts securing the radiator and remove the radiator (**Figure 4**). Again, hold the radiator over the coolant drain pan and drain out as much residual coolant as possible.

7. Repeat for the other radiator, if equipped.

8. Perform the *Inspection* procedures in this section.

9. Installation is the reverse of these steps.

10. Refill the coolant as described in Chapter Three.



Inspection

1. Flush off the exterior of the radiator with a low-pressure stream of water from a garden hose. Spray both the front and back to remove all dirt and debris. Carefully use a whisk broom or stiff paint brush to remove any stubborn dirt.

CAUTION
Do not press too hard or the cooling fins and tubes may be damaged.

2. Examine the radiator cooling surface for damage (**Figure 5**). Also check along the sides. If the radiator is damaged, refer repair to a radiator repair shop. If damage is severe, replace the radiator.

3. Carefully straighten out any bent cooling fins with a wide-blade screwdriver. If the radiator has been damaged across approximately 20% or more of the frontal area, the radiator should be replaced.

4. Check for cracks or leakage (usually a moss-green colored residue) at the filler neck, the inlet and outlet hose fittings and the upper and lower tank seams.

5. Check for missing or damaged radiator mounting bushings and collars (**Figure 6**). Replace if necessary.

6. Inspect the radiator cap (**Figure 7**). Check the rubber cap seal surfaces for tears or cracks. Check for a bent or distorted cap. Raise the vacuum valve and rubber seal and rinse the cap under warm tap water to flush away any loose rust or dirt particles.

7. Check the coolant hoses (**Figure 8**) for cracks, bulges or other damage and replace if necessary.

8. Check the hose clamps for excessive rust or damage; replace if necessary.

WATER PUMP

The water pump is mounted in the clutch cover on all models. Under normal operating conditions, disassembly of the water pump should not be necessary. However, if the engine overheats or if the coolant level changes, the water pump should be removed and examined.

The water pump consists of an impeller, gear/shaft assembly, oil seal(s) and bearing(s).

Figure 9 (KX125 and KX250) and **Figure 10** (KX500) are exploded views of the water pump. The oil seal(s) and bearing(s) need be removed only if they require replacement. The impeller can be inspected and removed without removing the clutch cover.

Water Pump Cover Removal/Installation

Water pump covers and gaskets vary according to year and model. While the following photos were taken from a 1988 KX125, they are applicable to all KX models described in this manual.

Because the water pump cover gaskets are generally damaged during removal, make sure to have on hand all of the gaskets required for your model.

1. Drain the cooling system as described under *Coolant Change* in Chapter Three.
2. Disconnect the coolant hose(s) on the water pump; see **Figure 11**, typical.
3. If necessary, remove the hose joint bolts at the water pump (if used) and remove the hose joint (**Figure 12**).

NOTE

*On some models, one of the water pump cover mounting bolts will be longer than the other bolts (**Figure 13**). Record the bolt's mounting hole position for reassembly.*

4. Loosen the water pump cover mounting bolts and remove them. Then remove the water pump cover (**Figure 14**) and dowel pins (A, **Figure 15**, typical).
5. Removal all gasket residue from the water pump, hose joint and clutch cover gasket surfaces.

NOTE

*Some of the covers, because of their shape and size, are hard to hold when cleaning the gasket surfaces with a scraper. If this is a problem, select a wooden dowel rod with the same approximate O.D. as the cover's hose I.D. (you can sand the end of the dowel rod or wrap it with duct tape for a snug fit) and slide the cover onto the rod as shown in **Figure 16**.*

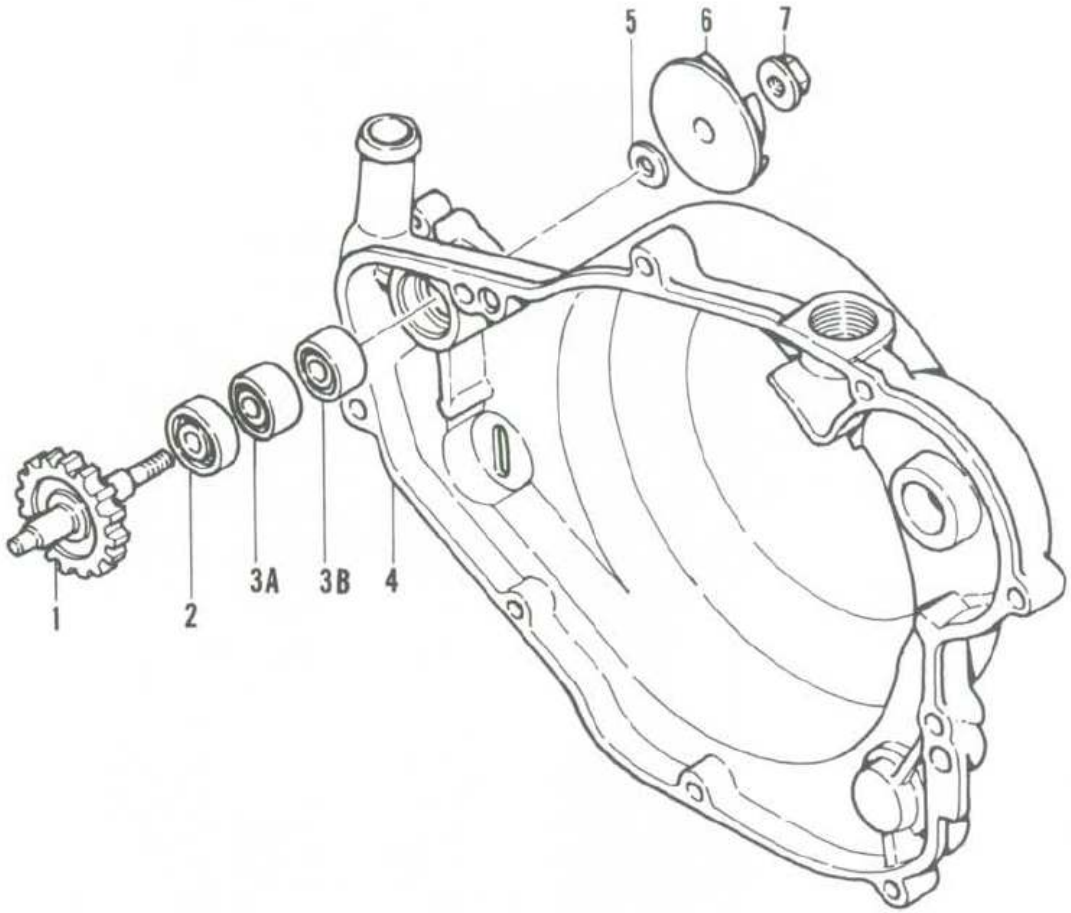
6. Clean the cover in solvent and dry thoroughly.
7. Inspect the impeller as described in this chapter.
8. Install the dowel pins (A, **Figure 15**, typical).
9. Install the water pump cover and a new gasket. Then install the mounting bolts and tighten securely.
10. Install the hose joint (if used) and a new gasket (**Figure 12**). Install the mounting bolts and tighten securely.
11. Slide the hose(s) onto the water pump cover. Then fit the hose clamp into position and tighten securely.
12. Refill the cooling system as described under *Coolant Change* in Chapter Three.

Impeller Removal/Inspection/Installation

1. Remove the water pump cover as described in this chapter.
2. Remove the left-hand side cover.
3. Hold the flywheel rotor with your hand or a suitable holding tool and loosen the impeller mounting bolt. Then remove the impeller bolt or nut, impeller (B, **Figure 15**) and washer (**Figure 17**).
4. Check the impeller blades for damage; See **Figure 18** and **Figure 19**, typical. Replace the impeller if necessary.
5. Clean the impeller, bolt and washer in solvent and dry thoroughly.
6. Visually inspect the oil seal(s) (**Figure 20**) for damage. If the seal is torn or if there are signs of oil leakage, replace the seal(s) as described in this chapter.
7. Install the impeller bolt through the impeller and place the washer behind the impeller (**Figure 17**) or install the washer on water pump shaft.
8. Hold the flywheel rotor and tighten the impeller bolt or nut securely.
9. Reverse Steps 1 and 2 to complete installation.

9

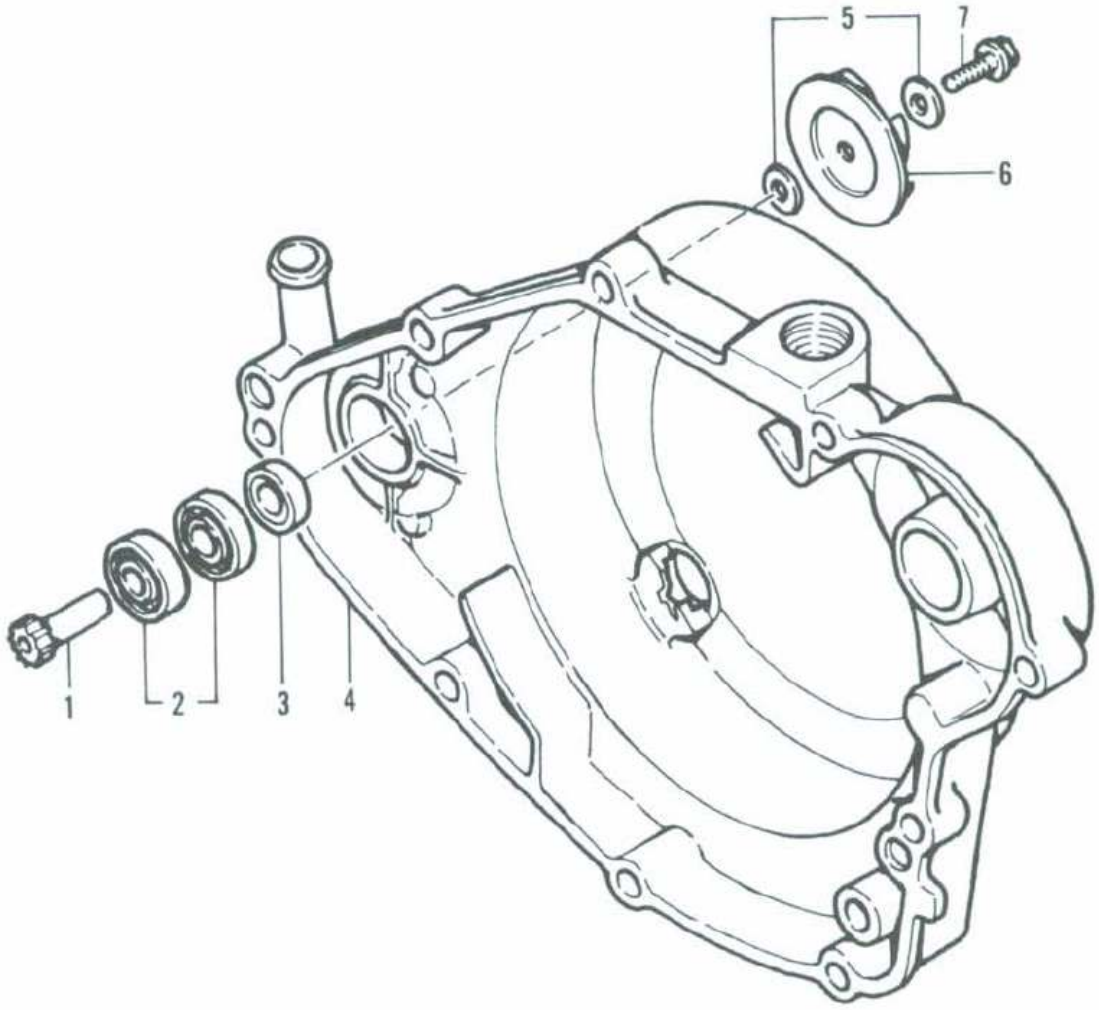
WATER PUMP (KX125 AND KX250)



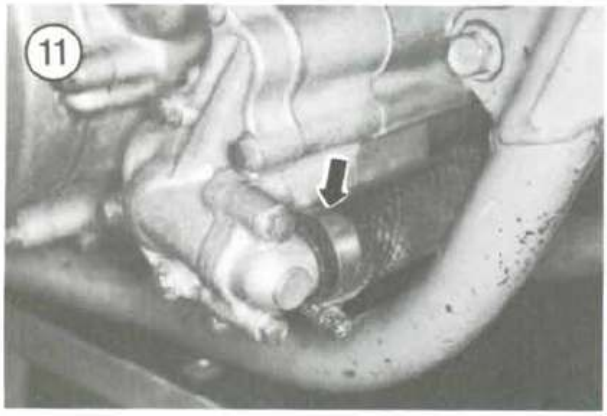
1. Drive gear
2. Bearing
3A. Mechanical oil seal (1991)
3B. Oil seal
4. Clutch cover
5. Washer
6. Impeller
7. Nut (or bolt)

(10)

WATER PUMP (KX500)



1. Drive gear
2. Bearings
3. Oil seal
4. Clutch cover
5. Washer(s)
6. Impeller
7. Bolt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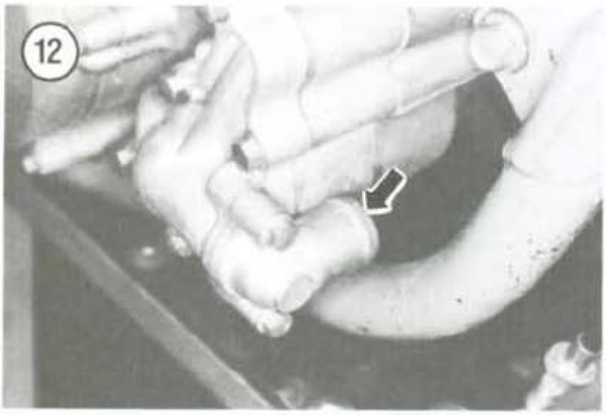
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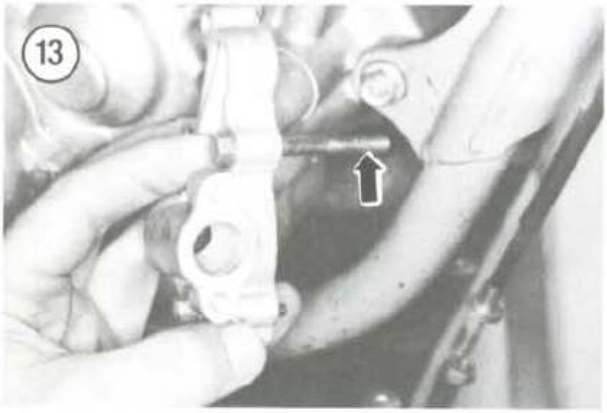
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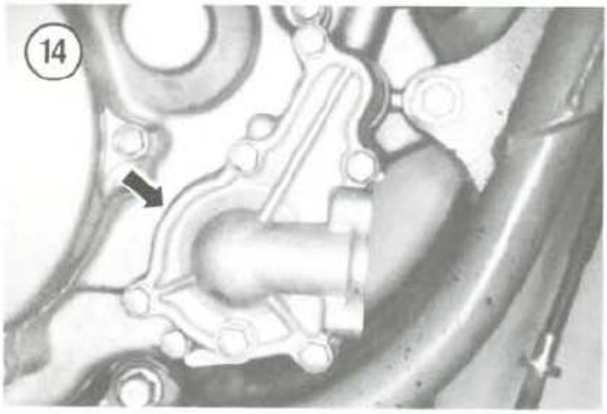
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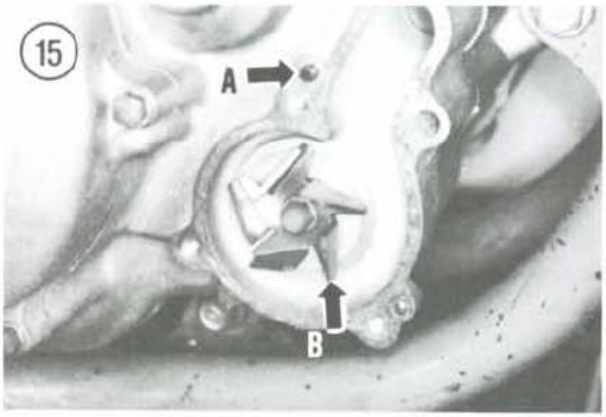
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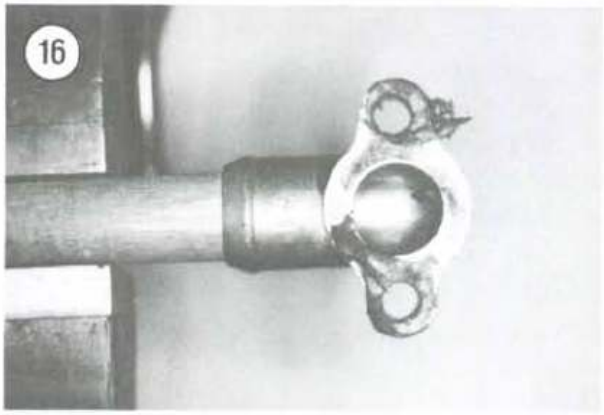
A
B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17


18

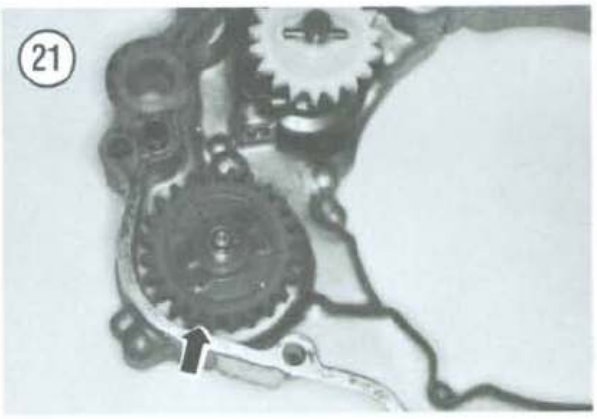
Water Pump Shaft Removal/Inspection/Installation

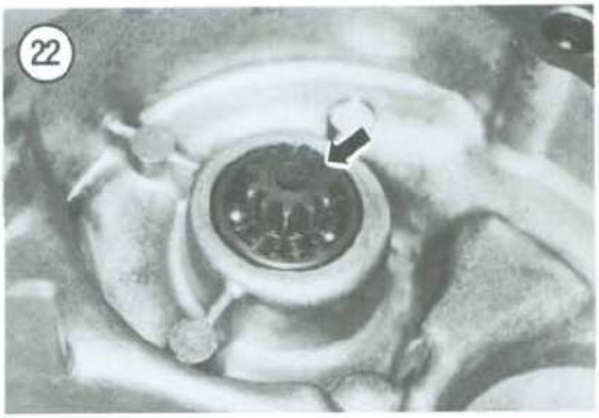
1. Remove the impeller as described in this chapter.
2. Remove the clutch cover as described in Chapter Six.

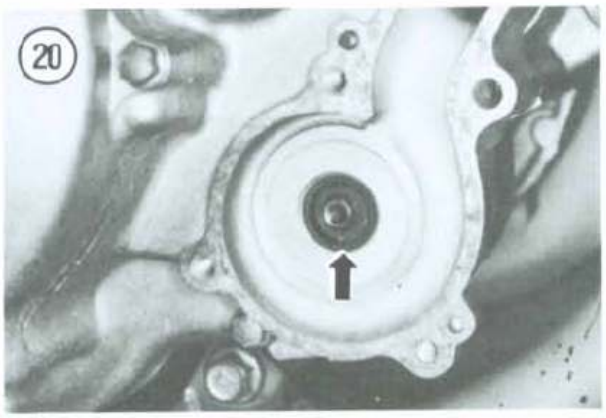
CAUTION

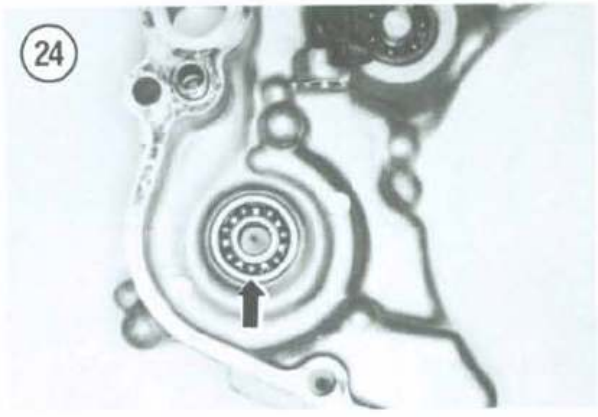
When removing the water pump shaft in Step 3, pull the shaft straight out to prevent it from tearing the oil seal.

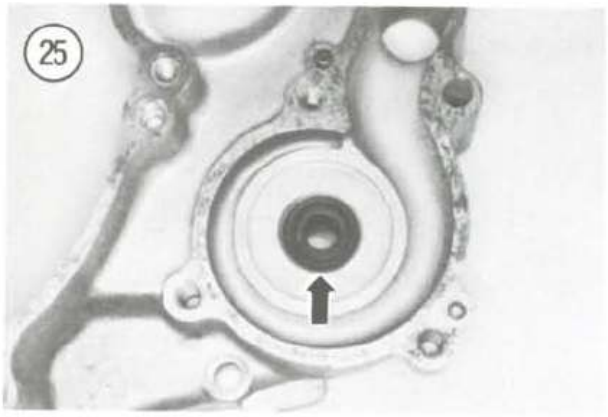
3. Remove the water pump shaft from inside the cover. See **Figure 21** (KX125 and KX250) or **Figure 22** (KX500).
4. Inspect the water pump shaft gear for broken or worn teeth (**Figure 23**, typical). Inspect the gear's shaft for scoring or damage. Replace the gear/shaft assembly if necessary.
5. Inspect the water pump shaft bearing(s) (**Figure 24**) in the clutch cover for damage.
6. Inspect the oil seal(s) (**Figure 25**) for damage.
7. If the bearing(s) and/or oil seal(s) are damaged, replace them at the same time as described in this chapter.

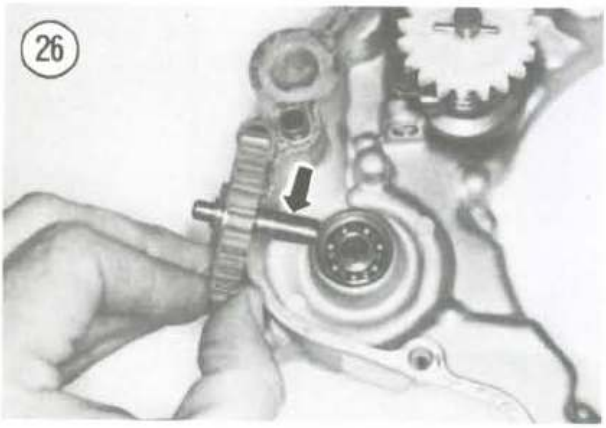


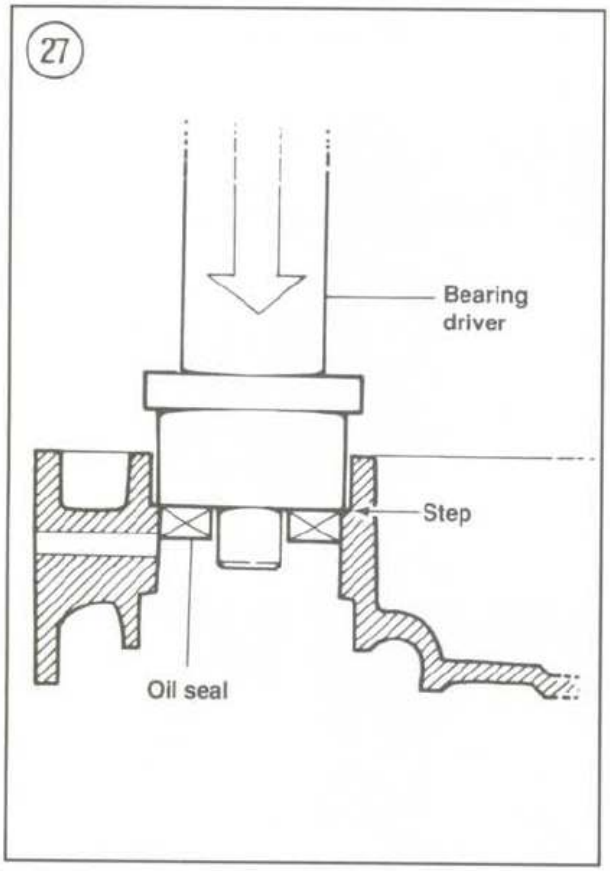












8. Install by reversing these steps, plus the following.
9. Apply molybdenum disulfide grease to the water pump shaft (**Figure 26**) before installing it.
10. Install the water pump shaft from inside the clutch cover; see **Figure 21** or **Figure 22**.
11. Install the clutch cover as described in Chapter Six.

Water Pump
Bearing and Seal Replacement (1982-1990 KX125 and KX250 and 1985-on KX500)

When removing the oil seal and bearing(s) from the clutch cover, note and record the direction in which the manufacturer's marks or numbers face for proper reinstallation.

1. Remove the water pump as described in this chapter.
2. Insert a drift through the outside of the clutch cover and remove the bearing (**Figure 24**) by tapping evenly around the bearing's inner race. On KX500 models, remove both bearings.
3. Insert a drift through the inside of the clutch cover and remove the oil seal (**Figure 25**) by tapping evenly around the seal's lips.
4. Clean the cover in solvent and dry thoroughly.
5. Pack the seal lips and seal lip cavity with a high temperature grease.
6. Support the clutch cover so that the inside of the cover (bearing side) faces up; see **Figure 24**.

NOTE

When installing the new oil seal in Step 7, the seal should face in the direction recorded during disassembly. If you did not record the seal's direction, install it so that its marked side (manufacturer's marks or numbers) face toward the inside of the clutch cover.

7. Align the new oil seal with clutch cover and press it into the cover until it is flush with the step for the ball bearing (**Figure 27**) or until it bottoms out on its own step.

NOTE

When installing the bearing(s) in Step 8, the bearing(s) should face in the direction recorded during disassembly.

8A. On KX125 and KX250 models, press the new bearing in to the clutch cover until it bottoms out against its step.

8B. On KX500 models, press the inner bearing into the clutch cover until it bottoms out against its step. Press the outer bearing into the cover until it bottoms out against the inner bearing (**Figure 28**).

Water Pump
Bearing and Seal Replacement (1991 KX125 and KX250)

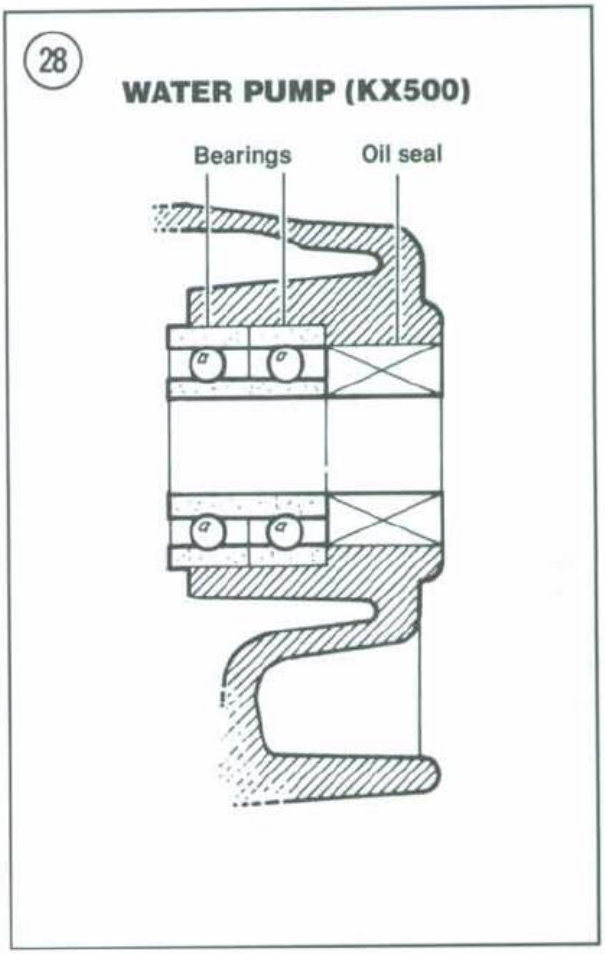
When removing the bearing from the clutch cover, note and record the direction in which its manufacturer's marks or numbers face for proper reinstallation.

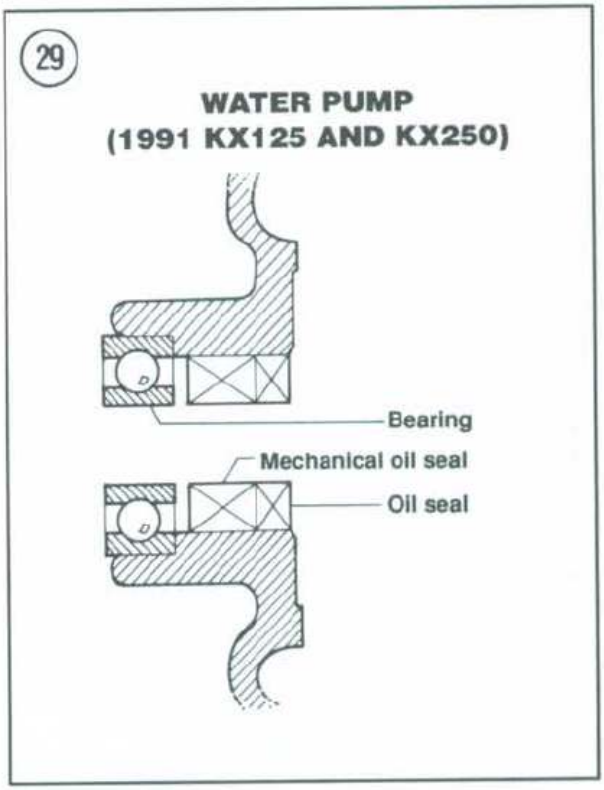
1. Remove the water pump as described in this chapter.
2. Insert a drift through the outside of the clutch cover and remove the bearing (**Figure 29**) by tapping evenly around the bearing's inner race.
3. Insert a drift through the inside of the clutch cover and remove the mechanical oil seal and then the oil seal (**Figure 29**) by tapping evenly around the seals lips.
4. Clean the cover in solvent and dry thoroughly.
5. Pack the seal lips and seal lip cavity of both oil seals with a high temperature grease (**Figure 30**).
6. Support the clutch cover so that the inside of the cover faces up; see **Figure 30**.
7. Align the mechanical oil seal so that its lips face in the direction shown in **Figure 30** and press it partway into the clutch cover.
8. Align the oil seal so that its lips face in the direction shown in **Figure 30** and position it on top of the mechanical oil seal. Then press both oil seals into the cover until the edge of the oil seal is located 0.5 mm (0.020 in.) below the surface of the seal hole (**Figure 30**).

NOTE

When installing the bearing in Step 9, the bearing should face in the direction recorded during disassembly.

9. Turn the clutch cover over and support it so that the outside of the cover faces up. Align the new bearing with the cover and press it in until it bottoms out against its step.





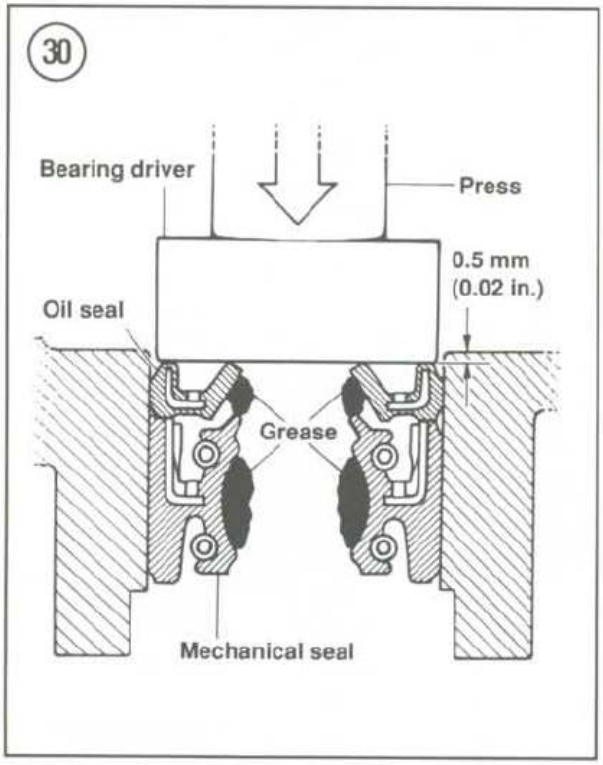
HOSES

Hoses deteriorate with age and should be replaced periodically or whenever they show signs of cracking or leakage. To be safe, replace the hoses every 2 years. The spray of hot coolant from a cracked hose can cause rider injury. Loss of coolant will also cause the engine to overheat and result in severe damage.

Whenever any component of the cooling system is removed, inspect the hoses(s) and determine if replacement is necessary.

Inspection

1. With the engine cool, check the cooling hoses for brittleness or hardness. A hose in this condition will usually show cracks and must be replaced.
2. With the engine hot, examine the hoses for swelling along the entire hose length. Eventually a hose will rupture at this point.



3. Check area around hose clamps. Signs of rust around clamps indicate possible hose leakage.

Replacement

Hose replacement should be performed when the engine is cool.

1. Drain the cooling system as described under *Coolant Change* in Chapter Three.
2. Loosen the hose clamps from the hose to be replaced. Slide the clamps along the hose and out of the way.
3. Twist the hose end to break the seal and remove from the connecting joint. If the hose has been on for some time, it may have become fused to the joint. If so, cut the hose parallel to the joint connections with a knife or razor. The hose then can be carefully pried loose with a screwdriver.

CAUTION

Excessive force applied to the hose during removal could damage the connecting joint.

4. Examine the connecting joint for cracks or other damage. Repair or replace parts as required. If the joint is okay, remove rust with sandpaper.
5. Inspect hose clamps and replace as necessary.
6. Slide hose clamps over outside of hose and install hose to inlet and outlet connecting joint. Make sure hose clears all obstructions and is routed properly.

NOTE

If it is difficult to install a hose on a joint, soak the end of the hose in hot water for approximately 2 minutes. This will soften the hose and ease installation.

7. With the hose positioned correctly on joint, position clamps back away from end of hose slightly. Tighten clamps securely, but not so much that hose is damaged.
8. Refill cooling system as described under *Coolant Change* in Chapter Three. Start the engine and check for leaks. Retighten hose clamps as necessary.

10

Table 1 COOLING SYSTEM SPECIFICATIONS

Radiator cap specifications	0.95-1.25 kg/cm^2 (13.5-17.8 psi)
Cooling system pressure specifications	0.95-1.25 kg/cm^2 (13.5-17.8 psi)

CHAPTER ELEVEN

FRONT SUSPENSION AND STEERING

This chapter describes repair and maintenance on the front wheel, forks, and steering components.

Steering and front suspension specifications are listed in **Table 1** and **Table 2**. **Tables 1-10** are at the end of the chapter.

FRONT WHEEL

While the front wheel assemblies are similar, there are minor axle, axle nut and axle collar variations between the different models. On 1982-1983 models, the front axle threads into the left-hand fork tube. On 1984 and later models, an axle nut is used; you can remove the front wheel without having to remove the front axle. On 1982-1983 models, the front axle must be removed prior to removing the front wheel.

Removal

1. Support the motorcycle with the front wheel off the ground.

2A. On 1982-1983 models:

a. Loosen the front axle clamp nuts (**Figure 1**).
b. Loosen the front axle and remove it from the right-hand side.
c. Lower the front wheel and remove it from between the front forks.
d. The left- and right-hand axle collars have different part numbers. Label the collars so that you don't mix them up during reassembly.

2B. On 1984 and later models:

a. Remove the axle clamp nuts (A, **Figure 2**) from the holders on both sliders.
b. Remove both holders (B, **Figure 2**).
c. Remove the front wheel and axle shaft as an assembly (A, **Figure 3**).

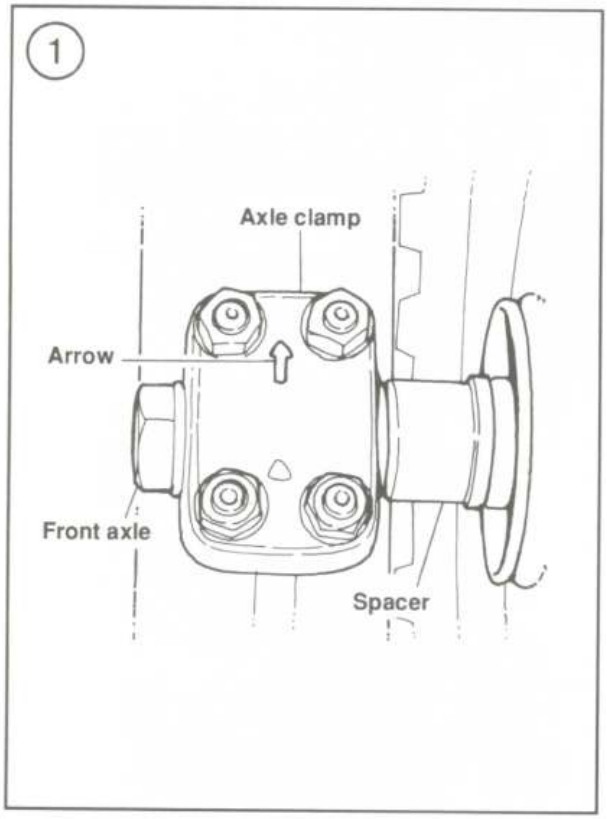
d. Hold the axle and remove the axle nut (**Figure 4**).

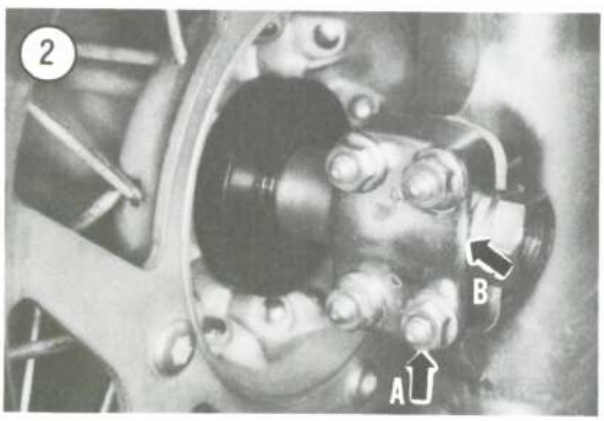
e. Remove the axle spacer(s), if used.

f. Remove the dust covers, if used.

NOTE

Insert a wood or plastic spacer in the caliper in place of the disc. That way, if the brake lever is inadvertently squeezed, the piston will not be forced out of the caliper. If it does happen, the caliper might have to be disassembled to reseat the piston. By using the spacer, bleeding the brake is not necessary when installing the wheel.





Inspection

1. Clean the axle and axle spacers in solvent and thoroughly dry.
2. Clean the axle clamp studs on the slider and the nuts with solvent or contact cleaner.
3. Check wheel runout and spoke tension as described under *Wheel Spokes* in this chapter.

Installation

1. Make sure the axle bearing surfaces on the fork slider and axle holder(s) are free from dirt or small burrs.
2. Apply a light coat of grease to the axle, bearings and grease seals.
3. Remove the piece of wood or plastic from the caliper assembly.

4A. On 1982-1983 models, perform the following:

a. Install the left- and right-hand axle collars onto the front hub.
b. Carefully insert the disc between the brake pads and hold the wheel in position.
c. Install the front axle from the right-hand side and thread it into the left-hand slider.
d. Install the axle holder clamp with the arrow mark pointing up (**Figure 1**).
e. Install the axle holder clamp nuts finger-tight.
f. Tighten the front axle to the torque specification in **Tables 3-5** for your model.
g. Tighten the upper clamp nuts securely.
h. Tighten the lower axle clamp nuts securely.

4B. On 1984 models, perform the following:

a. Install the axle through the front wheel from the right-hand side and install the axle nut/collar assembly.
b. Hold the axle and tighten the axle nut to the torque specification in **Tables 3-5** for your model.
c. Carefully insert the disc between the brake pads and hold the wheel in position.
d. Install the axle holder clamps with the arrow mark pointing up (**Figure 1**).
e. Install the axle holder clamp nuts finger-tight.
f. Tighten the upper clamp nuts securely.
g. Tighten the lower axle clamp nuts securely.

4C. On 1985 and later models, perform the following:

a. Install the axle spacers and bearing caps. On some models the caps will have to be installed after the axle and axle nut are installed, seating the bearing cap in the axle nut groove.
b. Install the axle through the front wheel from the right-hand side and install the axle nut.
c. Hold the axle and tighten the axle nut to the torque specification in **Tables 3-5** for your model.
d. Carefully insert the disc between the brake pads and hold the wheel in position on the sliders. If the axle has a shoulder on the left-hand side, seat the shoulder to the outside of the slider as shown in B, **Figure 3**.
e. Install the axle holder clamps with the arrow mark pointing up (**Figure 5**).
f. Install the axle holder clamp nuts finger-tight.
g. Tighten the upper clamp nuts securely.
h. Tighten the lower axle clamp nuts securely.

5. After the wheel is completely installed, rotate it several times and apply the brake a couple of times to make sure that the wheel rotates freely and that the brake is operating correctly.

FRONT HUB

Refer to the illustration for your model when servicing the front hub:

a. **Figure 6**: 1982-1983.
b. **Figure 7**: 1984.
c. **Figure 8**: 1985-1988.
d. **Figure 9**: 1989 KX125 and KX250.
e. **Figure 10**: 1990-1991 KX125 and KX250; 1989-on KX500.

Inspection

Inspect each wheel bearing before removing it from the wheel hub.

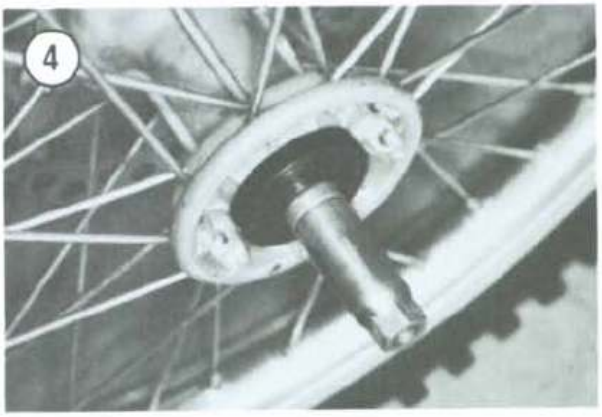
CAUTION

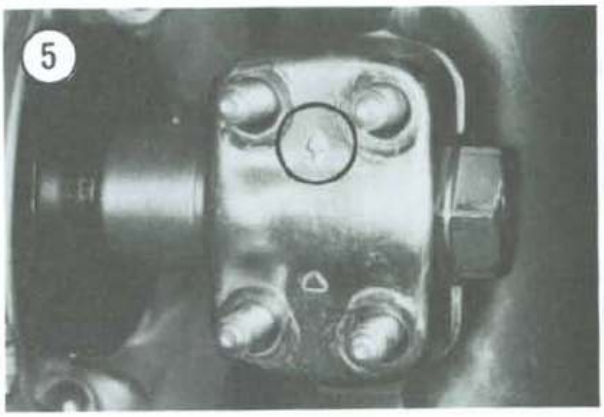
Do not remove the wheel bearings for inspection purposes as they will be damaged during removal process. Remove the wheel bearing only if they are to be replaced.

1. Perform Steps 1-3 of *Disassembly* in this chapter.
2. Turn the bearing inner race with your finger. The bearing should turn smoothly with no sign of roughness or excessive noise.
3. On non-sealed bearings, check the balls for evidence of wear, pitting or excessive heat (bluish tint). Replace the bearings if necessary; replace as a complete set.

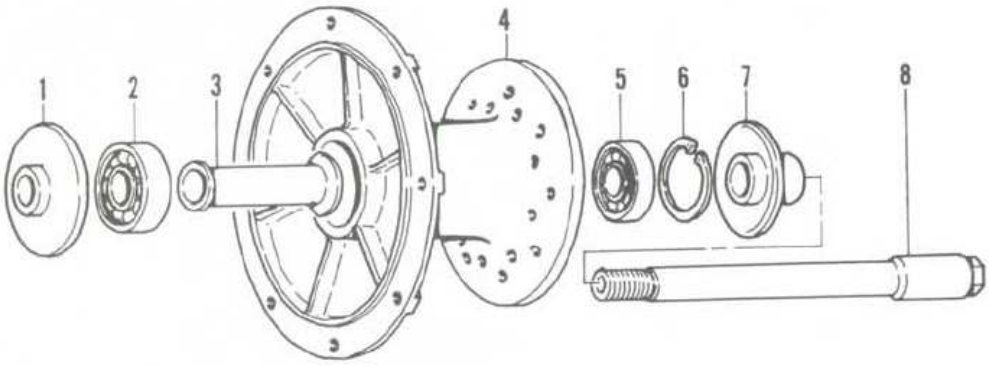
NOTE

Fully sealed bearings are available from bearing specialty shops. Fully sealed bearings provide better protec-



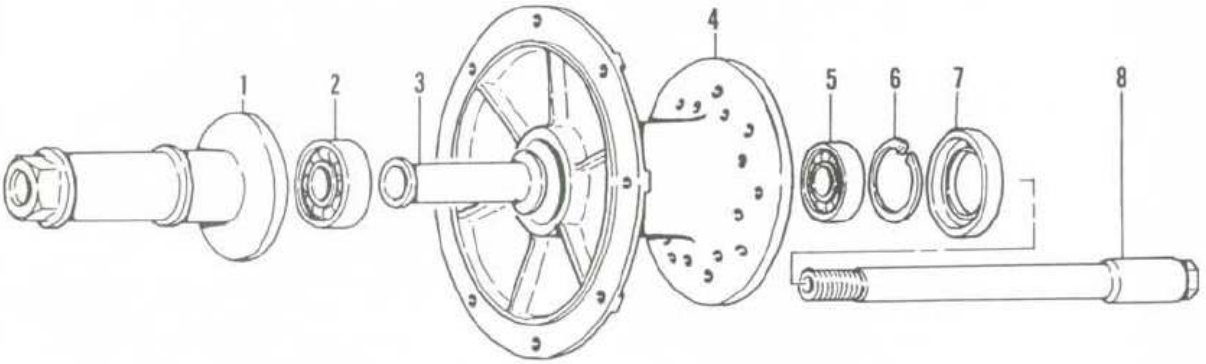


6 FRONT HUB (1982-1983)



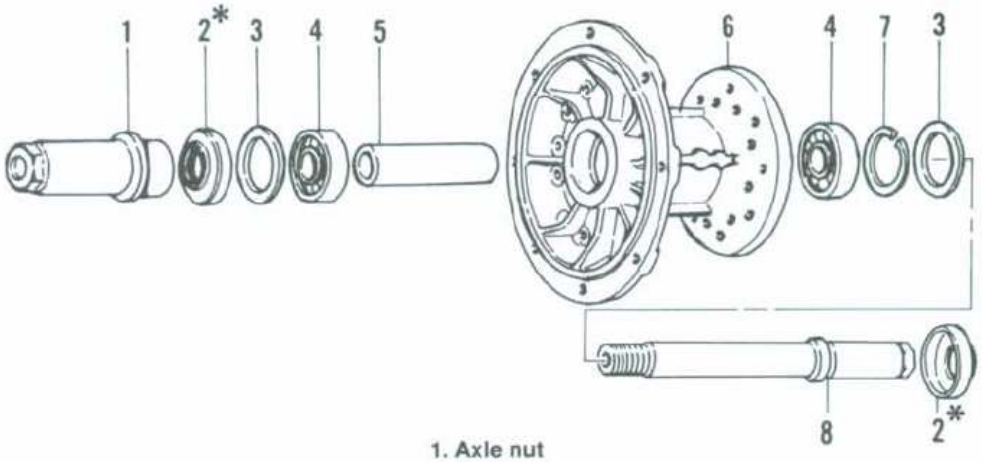
1. Cover
2. Bearing
3. Distance collar
4. Hub
5. Bearing
6. Circlip
7. Cover
8. Axle

7 FRONT HUB (1984)



1. Axle nut
2. Bearing
3. Distance collar
4. Hub
5. Bearing
6. Circlip
7. Oil seal
8. Axle

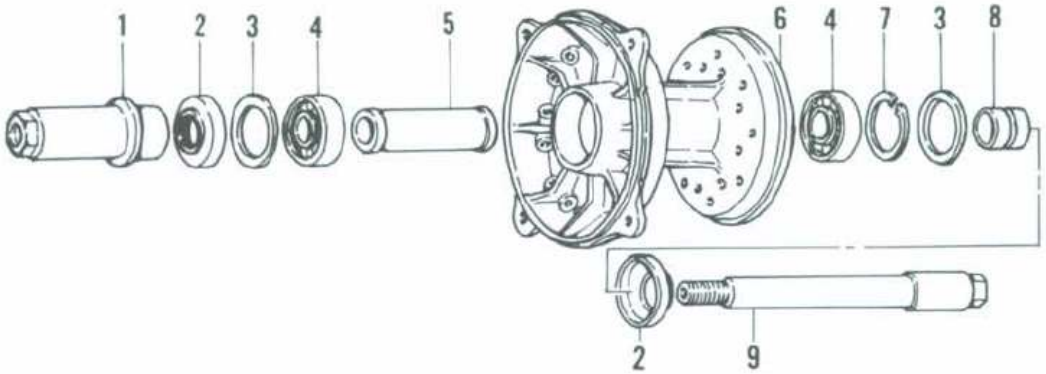
8 FRONT HUB (1985-1988)



1. Axle nut
2. Cover
3. Oil seal
4. Bearing
5. Distance collar
6. Hub
7. Circlip
8. Axle

*1987 only

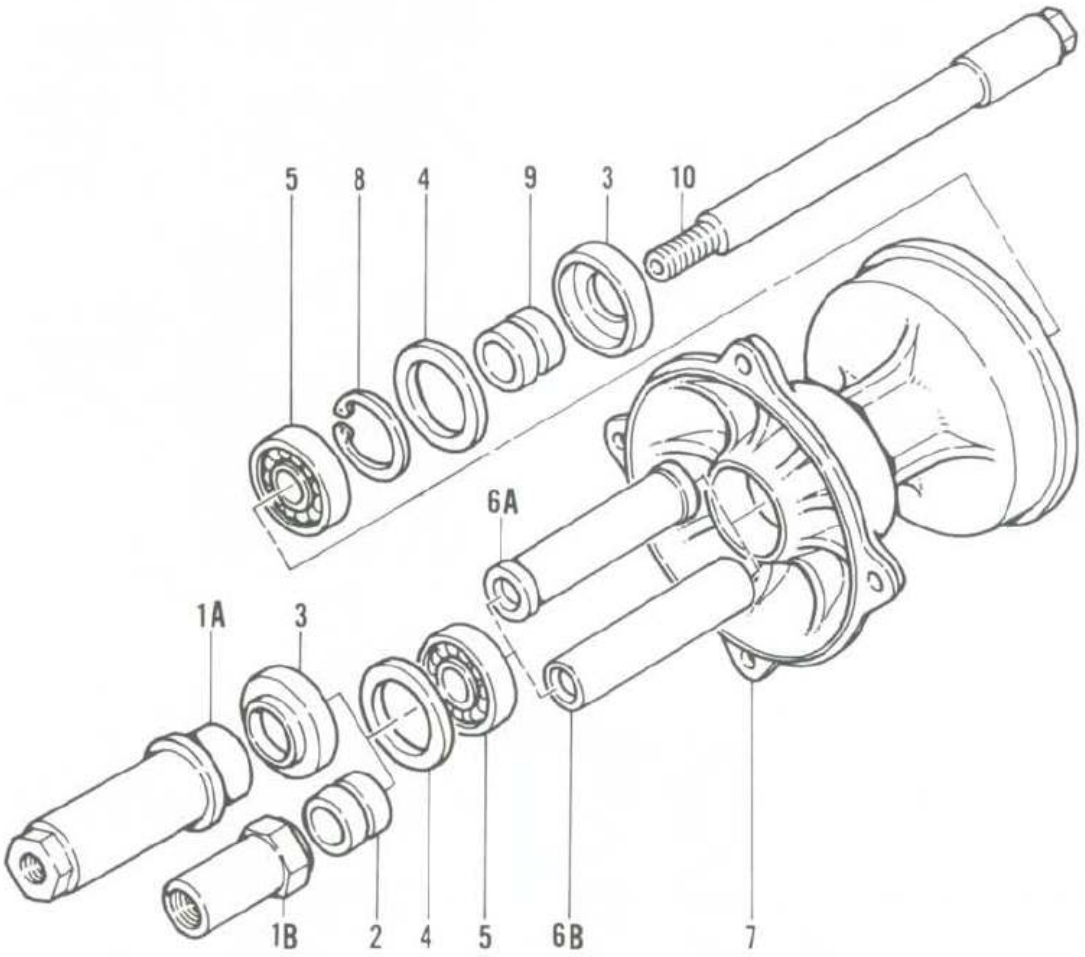
9 FRONT HUB (1989 KX125 AND KX250)



1. Axle nut
2. Cover
3. Oil seal
4. Bearing
5. Distance collar
6. Hub
7. Circlip
8. Spacer
9. Axle

(10)

FRONT HUB
(1990-1991 KX125 AND KX250, 1989-ON KX500)



1A. Axle nut (1989)
1B. Axle nut (1990-on)
2. Spacer (1990-on)
3. Dust cover
4. Oil seal
5. Bearing
6A. Distance collar (1989)
6B. Distance collar (1990-on)
7. Hub
8. Circlip
9. Spacer
10. Rear axle

tion form dirt and moisture that passes through worn or damaged oil seals.

4. On sealed bearings, check the seal for damage (**Figure 11**). The seal should show no sign of buckling or other conditions that would allow dirt to enter the bearing. Replace the bearings as a complete set, if necessary.

NOTE

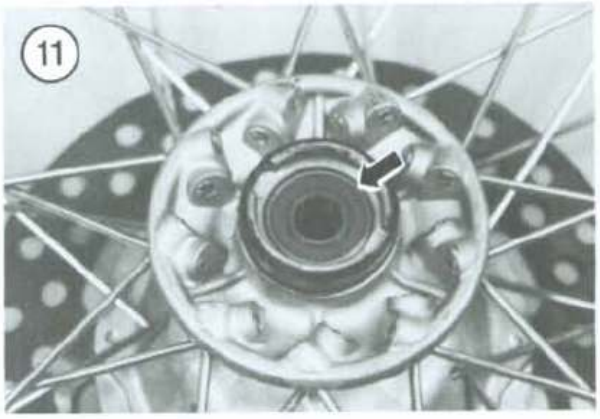
*When checking the axle runout with V-blocks in Step 5, place the V-blocks 100 mm (4.0 in.) apart, measuring from the center of each V-block as shown in **Figure 12**.*

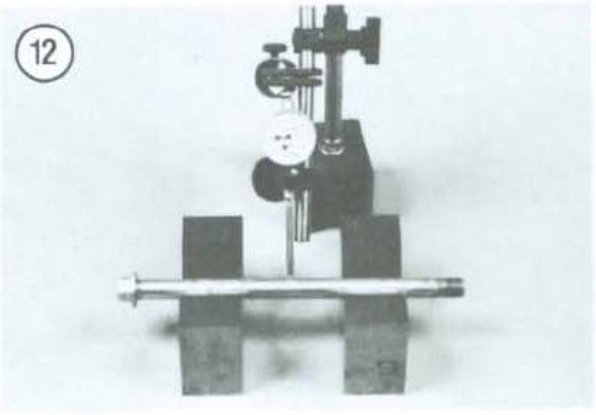
5. Check the axle for wear and straightness. Use V-blocks and a dial indicator as shown in **Figure 12**. If the runout exceeds the service limit in **Table 2**, straighten the axle with a press.

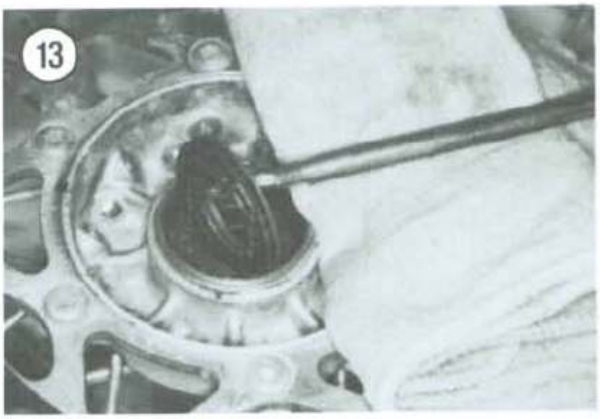
Disassembly

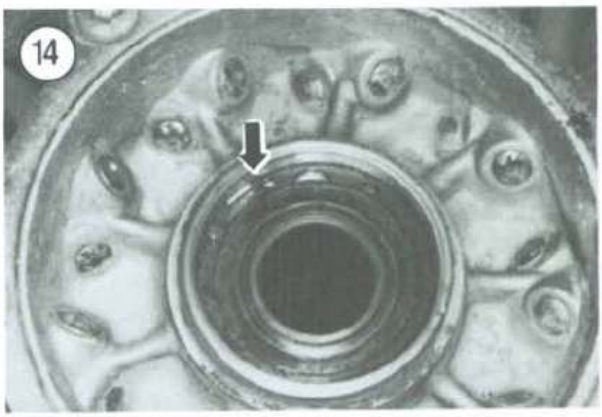
Do not remove bearings for periodic inspection as bearing removal normally damages the first bearing removed. Always replace bearings as a set.

1. Remove the front wheel as described in this chapter.
2. Remove the left-hand oil seal(s) by carefully prying it out of the hub with a long screwdriver (**Figure 13**). Prop a piece of wood or rag underneath the screwdriver to avoid damaging the hub.
3. Remove the circlip (**Figure 14**) from the right-hand side of the hub.
4. Before proceeding further, inspect the wheel bearings as described under *Inspection* in this chapter. If they must be replaced, proceed as follows.
5. To remove the left- and right-hand bearings (**Figure 11**) and distance collar, insert a soft aluminum or brass drift into one side of the hub. Push the distance collar over to one side and place the drift on the inner race of the lower bearing (**Figure 15**). Tap the bearing out of the hub with a hammer, working around the perimeter of the inner race.
6. Remove the distance collar and tap out the opposite bearing.
7. Thoroughly clean out the inside of the hub with solvent and dry with compressed air or a shop cloth.
8. Clean the distance collar with solvent and dry thoroughly.









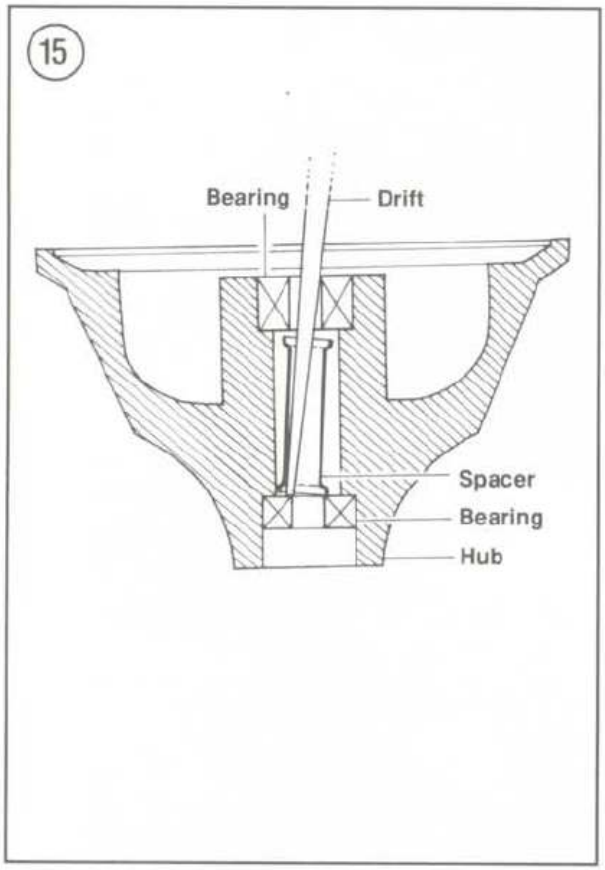
CAUTION

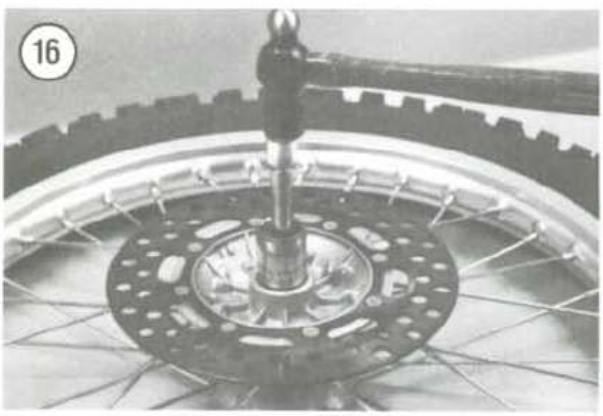
Avoid getting any greasy solvent residue on the brake disc. If this happens, clean it off with a shop cloth and lacquer thinner.

Assembly

CAUTION

Always reinstall new bearings, as the removal process will generally damage them, especially the first bearing removed. Purchase and replace the wheel bearings in pairs.





1. On non-sealed bearings or bearings that are sealed on one side only, pack the bearings with a good-quality bearing grease. Work the grease in between the balls thoroughly. Turn the bearing by hand a couple of times to make sure the grease is distributed evenly inside the bearing.
2. Blow any dirt or foreign matter out of the hub before installing the bearings.
3. Apply grease to the distance collar.
4. When installing new bearings:
   a. If the bearing is sealed on one side only, install the bearing so that the sealed side faces out.
   b. If the bearing is sealed on both sides, install the bearing so that the manufacturer's marks face out.
   c. When installing non-sealed bearings, install the bearing so that the manufacturer's marks face out.

CAUTION

*When installing the bearings in the following procedures, tap the bearings squarely into place and tap on the outer race only. Use a socket (**Figure 16**) that matches the outer race diameter. Do not tap on the inner race or the bearing might be damaged. Be sure that the bearings are completely seated.*

5. Install the right-hand bearing.
6. Install the circlip in the hub groove next to the right-hand bearing. Make sure the circlip seats in the groove completely.
7. Turn the hub over and install the distance collar.
8. Install the left-hand bearing until it seats in the hub.
9. Check to make sure the bearings are installed squarely. Turn each bearing's inner race with your finger. The bearing should turn smoothly with no sign of roughness or binding. If a bearing does not turn smoothly, it was damaged during installation.

NOTE

Always install new oil seals.

10. Coat the lips of the new oil seals with grease before installing them.
11. Align the oil seal with the hub and tap it squarely into place with a bearing driver or socket (**Figure**

17). Install the oil seal until it is at least flush with the hub (**Figure 18**).

12. Clean the brake disc surface of all grease and cleaner residue.

RIM AND SPOKE SERVICE

The wheel assembly consists of a rim, spokes, nipples and hub (containing the bearing assembly, distance collar and oil seals, if used).

Loose or improperly tightened spokes can cause hub damage. The wheel assembly should be checked for loose, broken or missing spokes, rim damage and runout. Wheel bearing service is described under *Front Hub* in this chapter.

Inspection/Replacing Individual Spokes

Spokes loosen with use and should be checked prior to each race or a weekend ride. The "tuning fork" method for checking spoke tightness is simple and works well. Tap each spoke with a spoke wrench or the shank of a screwdriver and listen for a tone. A tightened spoke will emit a clear, ringing tone, and a loose spoke will sound flat. All the spokes in a correctly tightened wheel will emit tones of similar pitch but not necessarily the same precise tone.

Bent, stripped or broken spokes should be replaced as soon as they are detected, as they can cause the destruction of an expensive hub.

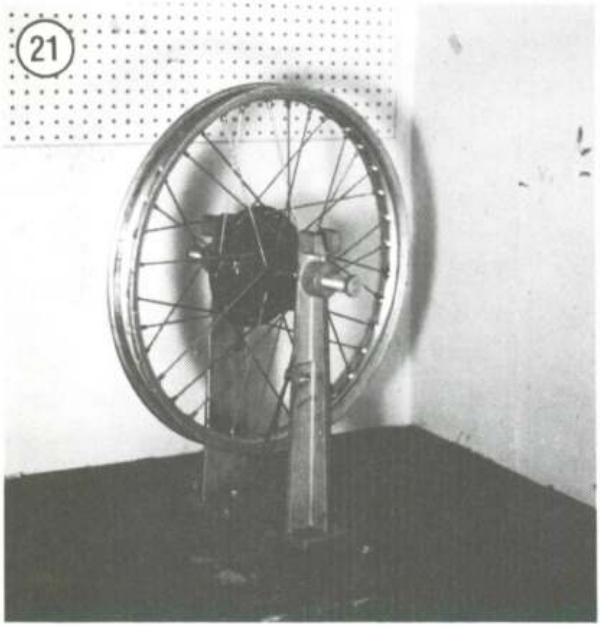
1. Unscrew the nipple from the spoke and depress the nipple into the rim far enough to free the end of the spoke, taking care not to push the nipple all the way in.

2. Remove the damaged spoke from the hub and use it to match the new spoke.

CAUTION

When replacing one or more spokes, do not bend the new spokes when installing them. If you cannot install a new spoke without bending it, remove some of the spokes, as required, to provide clearance for the new spoke.

3. Install the new spoke in the hub and screw on the nipple; tighten it until the spoke's tone is similar to the tone of the other spokes in the wheel. Periodically check the new spoke; it will stretch and



must be retightened several times before it takes its final set.

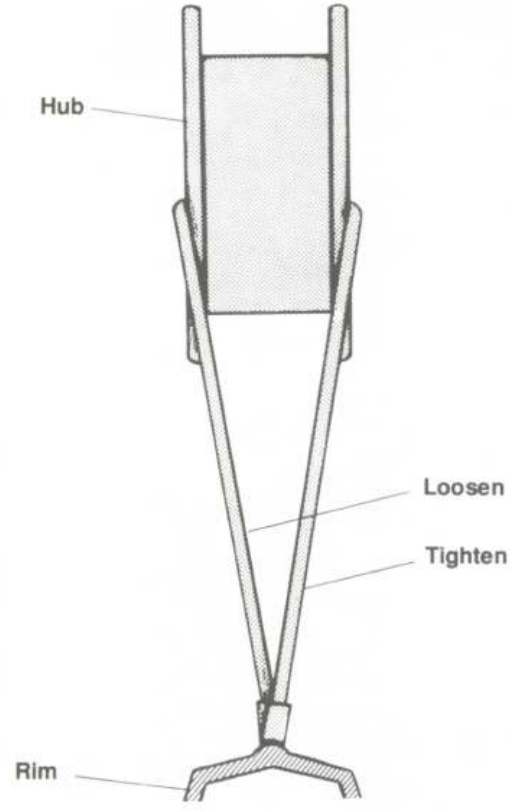
Rim Inspection and Runout

Inspect the rims for cracks, warpage or dents (**Figure 19**). A damaged rim should be replaced.

Wheel rim runout is the amount of "wobble" a wheel shows as it rotates. You can check runout with the wheels on the bike by simply supporting the wheel off the ground and turning the wheel slowly while you hold a pointer solidly against a fork leg or swing arm (**Figure 20**). Just be sure any wobble you observe isn't caused by your own hand. Off the motorcycle, runout can be checked with the wheel installed on a truing stand (**Figure 21**).

The maximum allowable axial (side-to-side) and radial (up and down) play is listed in **Table 2**. Tighten or replace any bent or loose spokes.

1. Draw the high point of the rim toward the centerline of the wheel by loosening the spokes in the area of the high point and on the same side as the high point, and tightening the spokes on the side opposite the high point (**Figure 22**).
2. Rotate the wheel and check runout. Continue adjusting until the runout is within specification. Be patient and thorough, adjusting the position of the rim a little at a time. If you loosen 2 spokes at the high point 1/2 turn, loosen the adjacent spokes 1/4 turn. Tighten the spokes on the opposite side equivalent amounts.



TIRE CHANGING

Removal

1. Remove the valve core (**Figure 23**) and deflate the tire.
2. Loosen the rim lock nuts (**Figure 24**).
3. Press the entire bead on both sides of the tire into the center of the rim.
4. Lubricate the beads with soapy water.

NOTE

*Use only quality tire irons without sharp edges (**Figure 25**). If necessary, file the ends of the tire irons to remove rough edges.*

5. Insert the tire iron under the bead next to the valve (**Figure 26**). Force the bead on the opposite side of the tire into the center of the rim and pry the bead over the rim with the tire iron.
6. Insert a second tire iron next to the first to hold the bead over the rim. Then work around the tire with the first tire iron, prying the bead over the rim. Be careful not to pinch the inner tube with the tire irons.
7. Remove the valve from the hole in the rim and remove the tube from the tire.

NOTE

Step 8 is required only if it is necessary to completely remove the tire from the rim, such as for tire replacement.

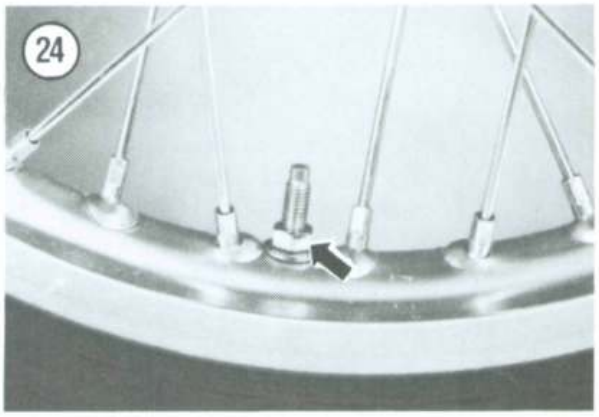
8. Stand the tire upright. Insert the tire iron between the second bead and the side of the rim that the first bead was pried over (**Figure 27**). Force the bead on the opposite side from the tire iron into the center of the rim. Pry the second bead off of the rim, working around as with the first.

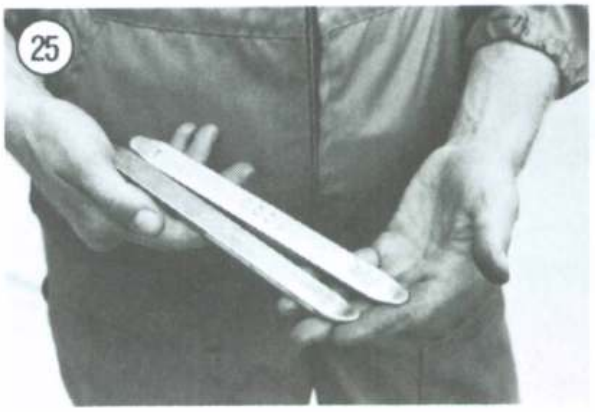
Installation

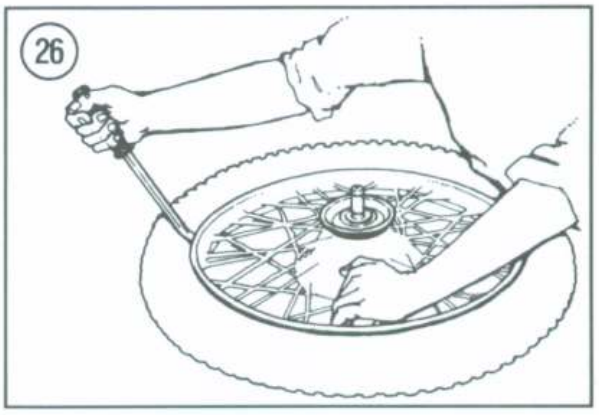
1. Carefully check the tire for any damage, especially inside. On the front tire carefully check the sidewall as it is very vulnerable to damage from rocks and other riders footpegs.
2. Check that the spoke ends do not protrude through the nipples into the center of the rim to puncture the tube. File off any protruding spoke ends.

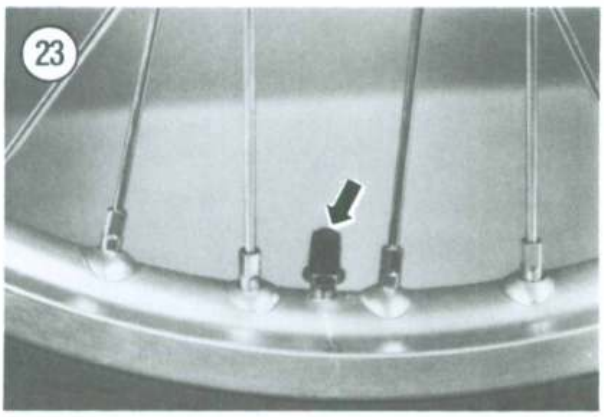
NOTE

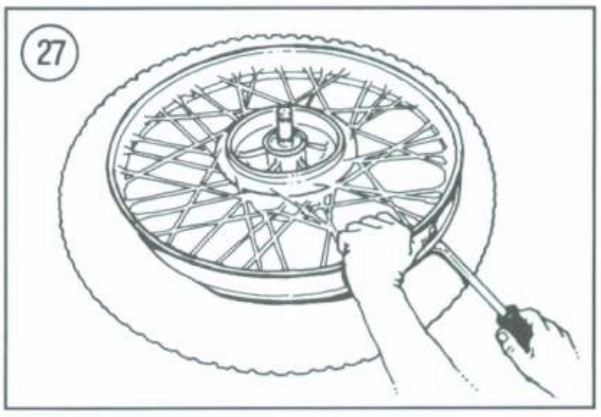
If you are having trouble with water and dirt from entering the wheel, remove and discard the rubber rim band. Then wrap the rim center with 2 separate revolutions of duct tape. Punch holes









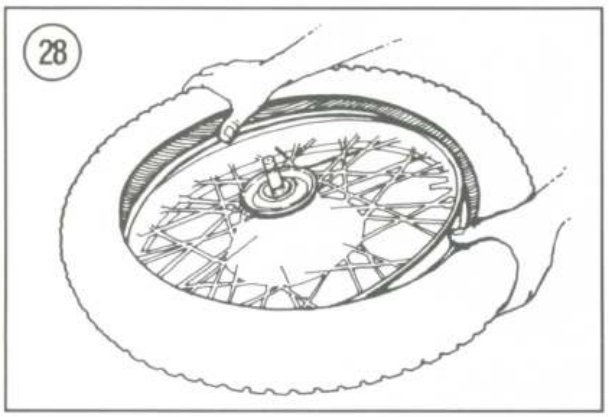


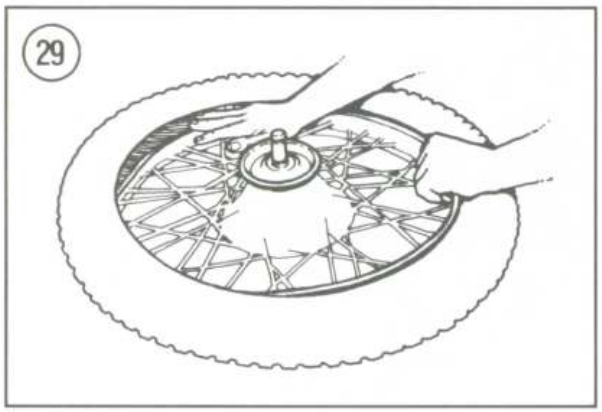
through the tape at the rim lock and valve stem mounting areas.

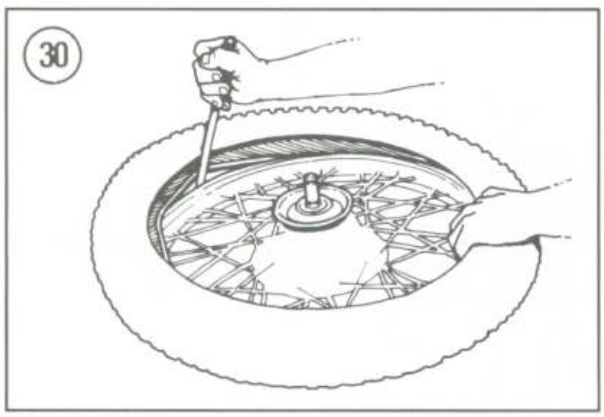
3. Install the rim lock if removed.

4. If you are using the rubber rim band, be sure the band is in place with the rough side toward the rim. Align the holes in the band with the holes in the rim.

5. Liberally sprinkle the inside tire casing with baby power. This helps to minimize tube pinching and tearing because the power reduces chafing between the tire and tube.







6. If the tire was removed, lubricate one bead with soapy water. Then align the tire with the rim and push the tire onto the rim (**Figure 28**). Work around the tire in both directions (**Figure 29**).

7. Install the core into the inner tube valve. Put the tube in the tire and insert the valve stem through the hole in the rim. Inflate just enough to round it out. Too much air will make installing it in the tire difficult, and too little will increase the chances of pinching the tube with the tire irons.

8. Lubricate the upper tire bead and rim with soapy water.

9. Press the upper bead into the rim opposite the valve. Pry the bead into the rim on both sides of the initial point with your hands and work around the rim to the valve. If the tire wants to pull up on one side, either use a tire iron or one of your knees to hold the tire in place. The last few inches are usually the toughest to install and it is also where most pinched tubes occur. If you can, continue to push the tire into the rim with your hands. Relubricate the bead if necessary. If the tire bead wants to pull out from under the rim use both of your knees to hold the tire in place. If necessary, use a tire iron for the last few inches (**Figure 30**).

10. Wiggle the valve to be sure the tube is not trapped under the bead. Set the valve squarely in its hole before screwing on the valve nut.

NOTE

*Make sure the valve stem is not cocked in the rim as shown in **Figure 31**.*

11. Check the bead on both sides of the tire for even fit around the rim. Inflate the tire to approximately 25-30 psi to insure the tire bead is seated properly on the rim. If the tire is hard to seat, relubricate both sides of the tire and reinflate.

12. Tighten the rim lock nut (**Figure 24**).

13. Bleed the tire back down to between 10 and 14 psi. Never tighten the valve stem nut against the rim. It should always be installed finger-tight, near the valve stem cap rather than flush against the rim (**Figure 23**).

TIRE REPAIRS

Every dirt rider eventually experiences trouble with a tire or tube. Repairs and replacement are fairly simple, and every rider should know how to patch a tube.

Patching a motorcycle tube is only a temporary fix, especially on a dirt bike. The tire flexes too much and the patch could rub right off.

NOTE

If a regular standard inner tube is used replace it every 10 races. A stronger heavy-duty tube will last longer and is not as easy to puncture. The stronger tube weighs more where you least need it (unsprung weight) but it's a sacrifice that's worth the durability.

Tire Repair Kits

Tire repair kits can be purchased from motorcycle dealers and some auto supply stores. When buying, specify that the kit you want is for motorcycles.

There are 2 types of tire repair kits:

a. Hot patch.
b. Cold patch.

Hot patches are stronger because they actually vulcanize to the tube, becoming part of it. However, they are far too bulky to carry for trail repairs, and the strength is unnecessary for a temporary repair.

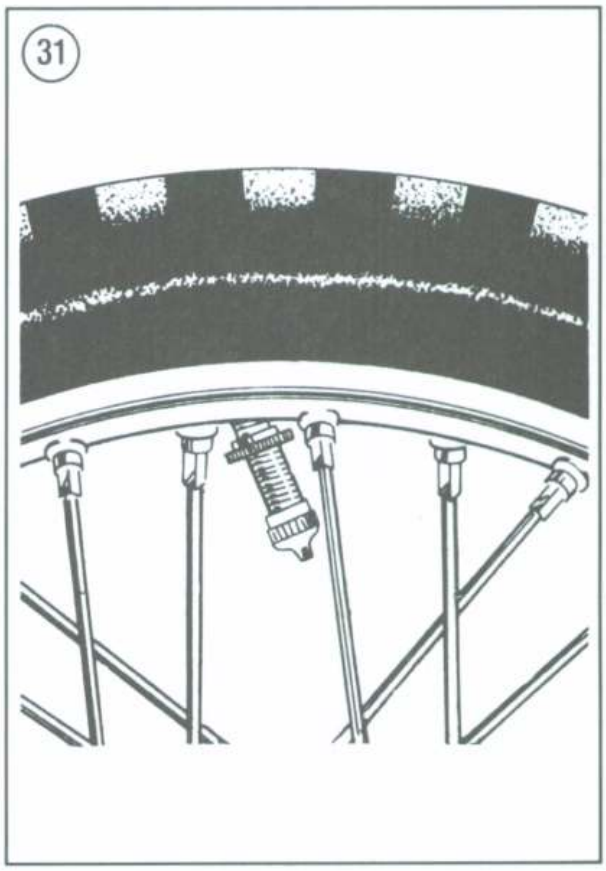
Cold patches are not vulcanized to the tube; they are simply glued to it. Though not as strong as hot patches, cold patches are still very durable. Cold patch kits are less bulky than hot and more easily applied out on a dusty trail or in the pits. A cold patch kit contains everything necessary and tucks easily in with your emergency tool kit.

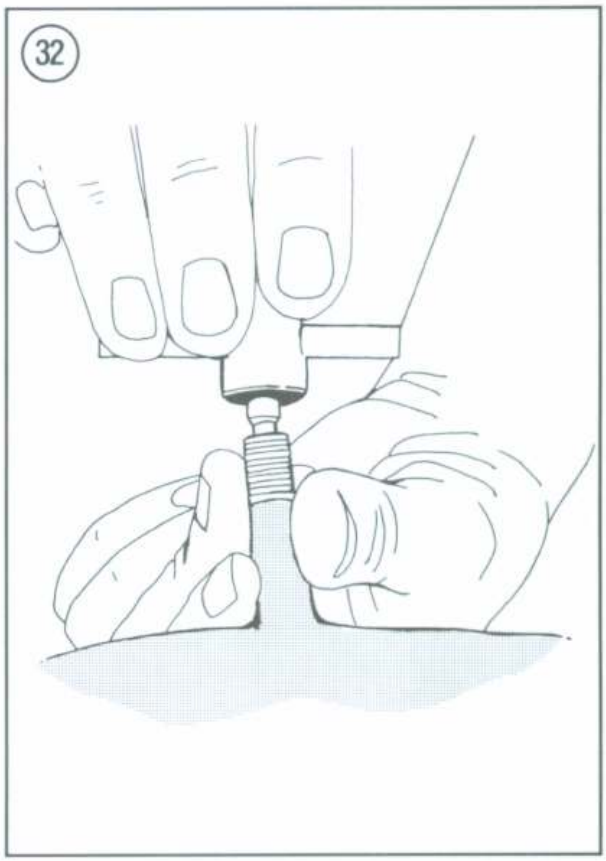
Tube Inspection

1. Remove the tube as described under *Tire Changing* in this chapter.
2. Install the valve core into the valve stem (**Figure 32**) and inflate the tube slightly. Do not overinflate.
3. Immerse the tube in water a section at a time (**Figure 33**). Look carefully for bubbles indicating a hole. Mark each hole and continue checking until you are certain that all holes are discovered and marked. Also make sure that the valve core is not leaking. Tighten it if necessary.

NOTE

If you do not have enough water to immerse sections of the tube, try running your hand over the tube slowly and very close to the surface. If your hand is





damp, it works even better. If you suspect a hole anywhere, apply some saliva to the area to verify it.

4. Apply a cold patch using the techniques described under *Cold Patch Repair*, following.
5. Dust the patch area with talcum powder to prevent it from sticking to the tire.
6. Carefully check the inside of the tire casing for small rocks, sand or twigs which may have damaged the tube. If the inside of the tire is split, apply a patch to the area to prevent it from pinching and damaging the tube again.
7. Check the inside of the rim. Make sure the rubber rim band is in place, with no spoke ends protruding, which could puncture the tube.
8. Deflate the tube prior to installation in the tire.

Cold Patch Repairs

1. Remove the tube from the tire as previously described.
2. Roughen an area around the hole slightly larger than the patch, using a cap from the tire repair kit or a pocket knife. Do not scrape too vigorously or you may cause additional damage.
3. Apply a small amount of the special cement from the kit to the puncture and spread it evenly with your finger.
4. Allow the cement to dry until tacky—usually 30 seconds or so is sufficient.
5. Remove the backing from the patch.

CAUTION

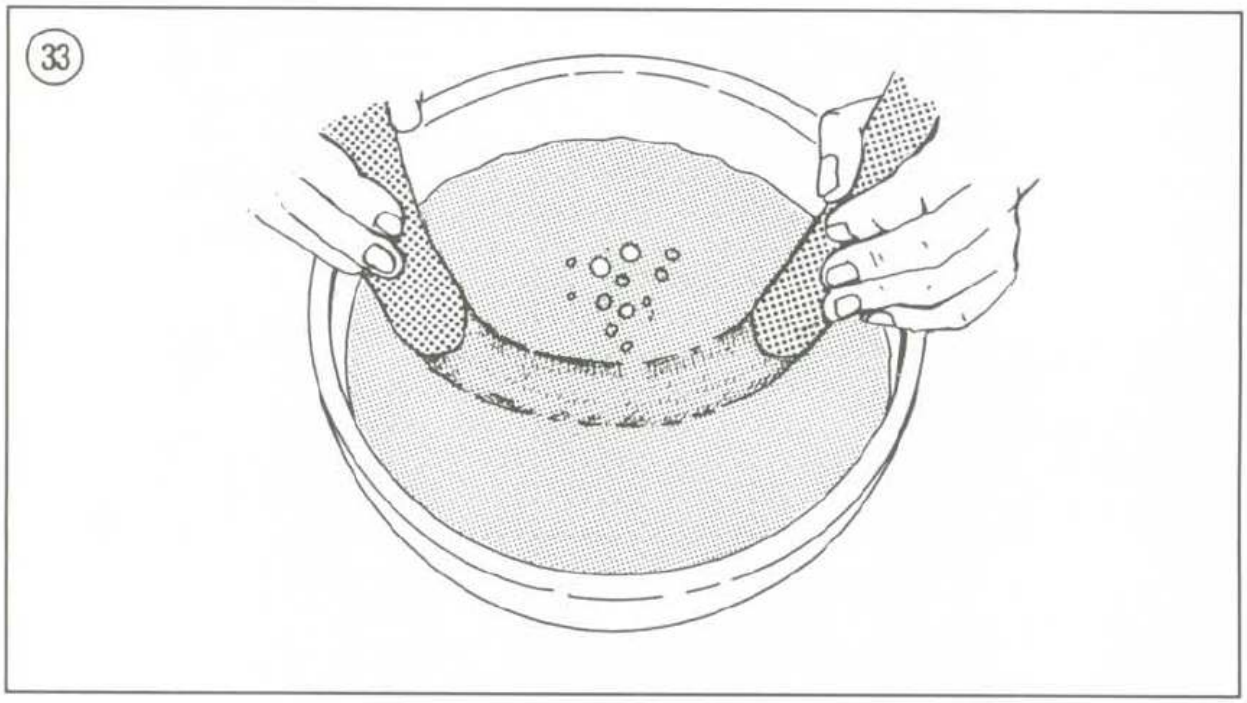
Do not touch the newly exposed rubber with your fingers or the patch will not stick firmly.

6. Center the patch over the hole. Hold patch firmly in place for about 30 seconds to allow the cement to set.
7. Dust the patched area with talcum powder to prevent sticking.
8. Install the tube as previously described.

HANDLEBAR

Removal/Installation

1. Remove the number plate.
2. Cut or disconnect the plastic straps securing the engine kill switch wire to the handlebar.
3. Remove the kill switch and the clutch lever assembly from the handlebar (**Figure 34**). It is not necessary to disconnect the clutch cable from the clutch lever unless you are going to replace the cable or clutch lever assembly.



NOTE

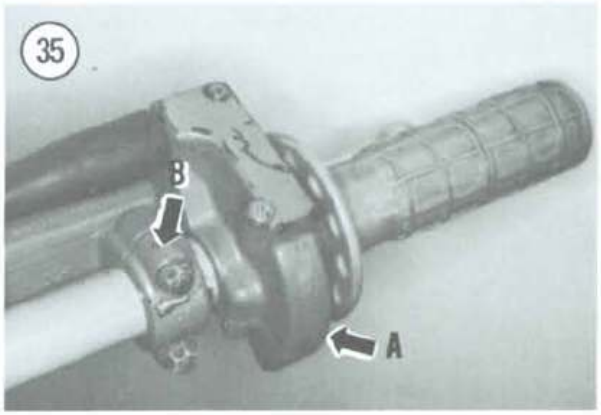
Step 4 describes disassembly and removal of the throttle assembly. If it is not necessary to disassemble the throttle assembly when removing the handlebar, loosen the throttle assembly screws only. When the handlebar bolts and handlebar are removed from the steering stem, slide the throttle assembly off the handlebar.

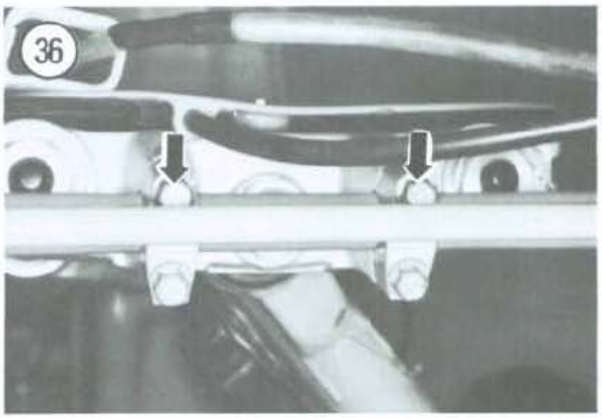
4. Loosen the throttle housing (A, **Figure 35**) screws or remove the screws and disassemble the housing assembly.

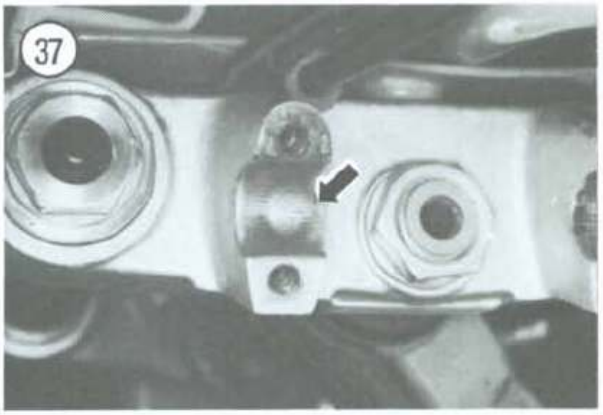
NOTE

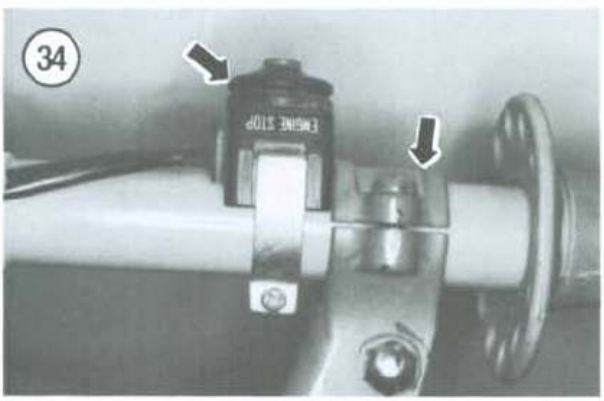
Carefully lay the throttle assembly and cable over the front fender, or back over the frame, so the cable does not get crimped or damaged.

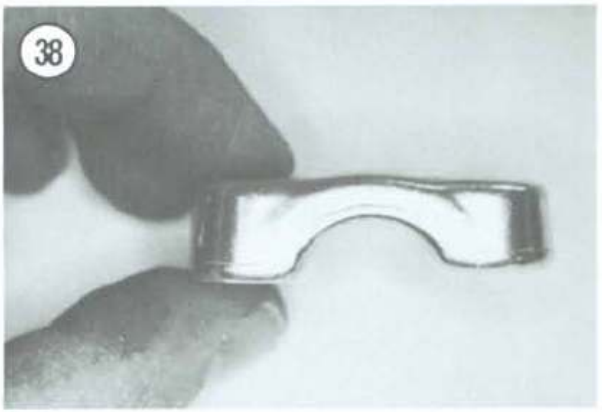
5. Remove the bolts securing the master cylinder to the handlebar and remove the master cylinder (B, **Figure 35**). Support the master cylinder so that it does not hang by the hydraulic hose.
6. Remove the handlebar holder bolts and remove the holders and handlebar (**Figure 36**).
7. Install by reversing these removal steps while noting the following.
8. To maintain a good grip on the handlebar, clean the handlebar holders (**Figure 37**) and the knurled section on steel handlebars with a brush and solvent or electrical contact cleaner. If you are using an aluminum handlebar, clean the holder area on the bar with contact cleaner and check for cracks or other damage.
9. Position the handlebar in the lower holders and install the upper holders (**Figure 36**), bolts and lockwashers. Some models use holders that are machined with offset surfaces (**Figure 38**). These







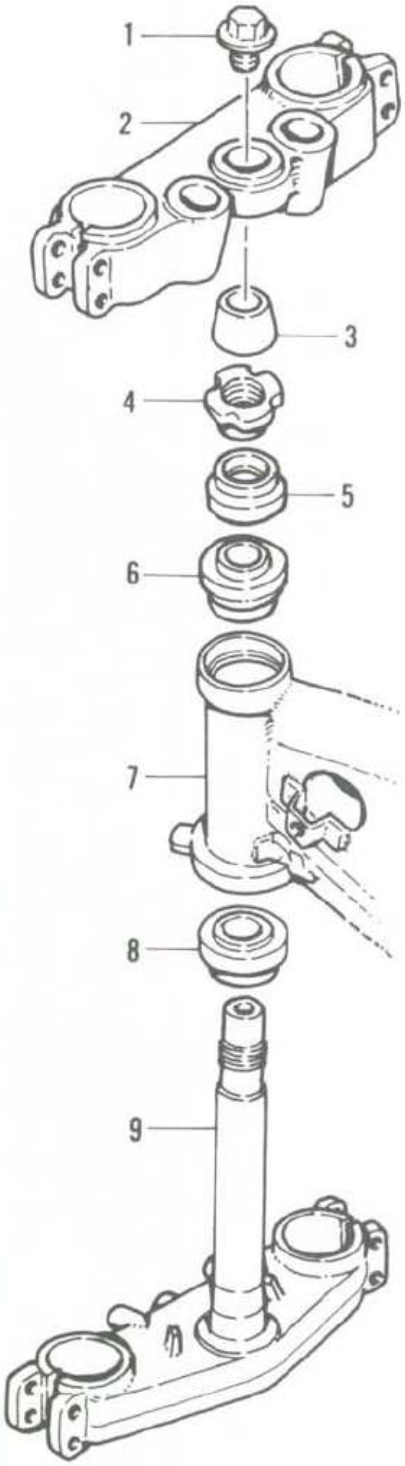




39

STEERING ASSEMBLY (1982-1987)

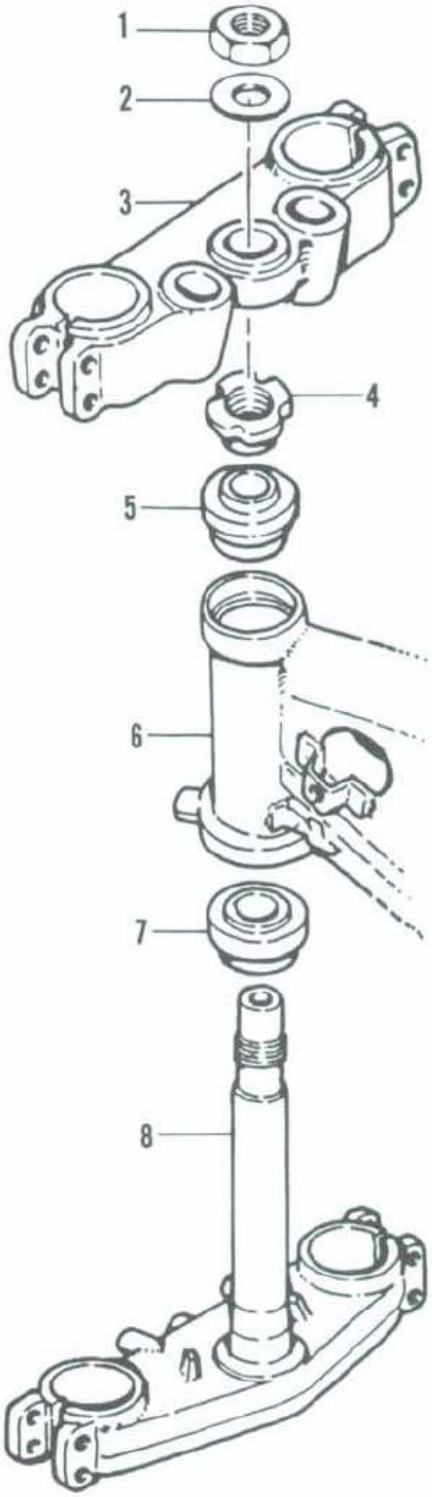
1. Steering stem bolt
2. Upper fork bracket
3. Collar
4. Adjust nut
5. Cover
6. Upper bearing
7. Frame neck
8. Lower bearing
9. Steering stem

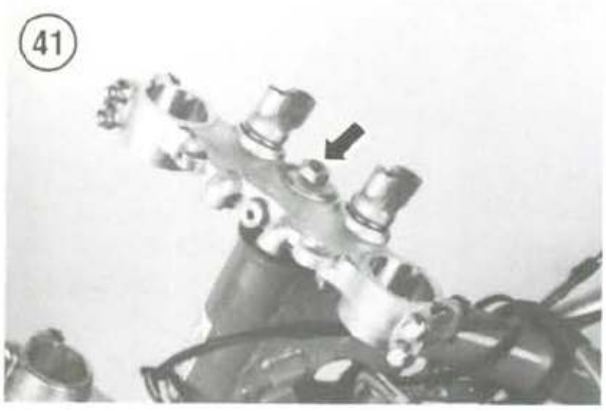


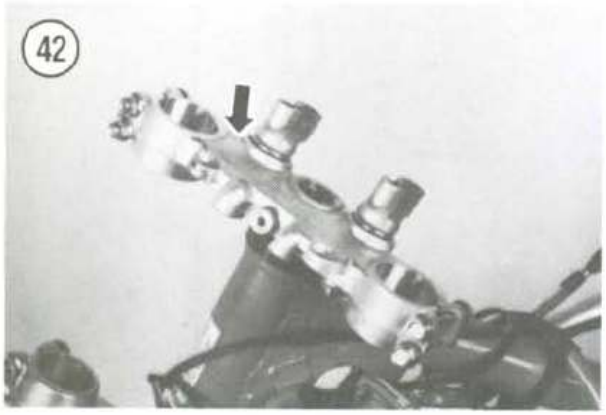
(40)

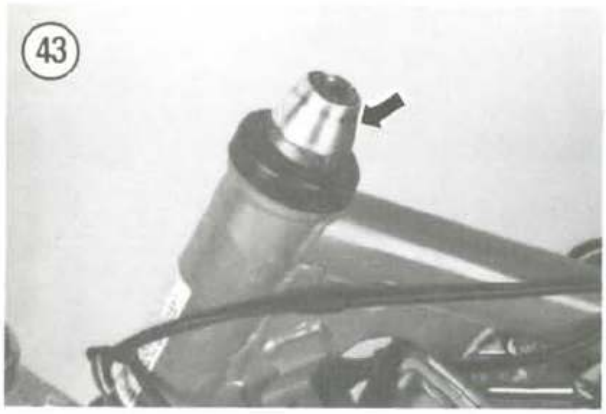
STEERING ASSEMBLY (1988-ON)

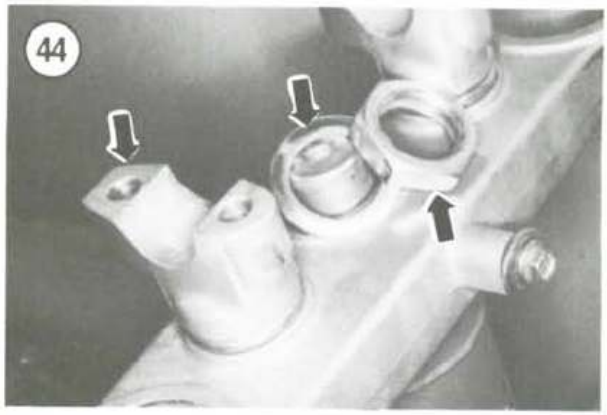
1. Steering nut
2. Washer
3. Upper fork bracket
4. Adjust nut
5. Upper bearing
6. Frame neck
7. Lower bearing
8. Steering stem











clamps have an arrow cast into them that must point toward the front of the bike when installed.

10. Tighten the handlebar mounting bolts to the torque specification listed in **Tables 3-4**.

11. Apply a light coat of light machine oil to the throttle grip area on the handlebar prior to installation.

WARNING

After installation is completed, make sure the brake lever does not come in contact with the throttle grip assembly when it is pulled on fully.

12. If the clutch cable was disconnected, adjust the clutch as described in Chapter Three.

WARNING

Make sure the front brake and clutch operate properly before riding the bike.

STEERING HEAD

The steering head on these models uses tapered roller bearings at the top and bottom pivot positions. Refer to **Figure 39** (1982-1987) or **Figure 40** (1988-on) when servicing the steering head assembly. The tapered roller bearing inner races (mounted in the frame) and the lower bearing (mounted on the steering stem) need be removed only if they require replacement.

Disassembly

1. Remove the front wheel as described in this chapter.
2. Remove the front fender.
3. Remove the handlebar as described in this chapter.
4. Remove the front forks as described in this chapter.

5A. On 1982-1987 models, perform the following:

a. Loosen and remove the steering stem bolt (**Figure 41**).
b. Remove the upper fork bracket (**Figure 42**).
c. Remove the collar (**Figure 43**).

5B. On 1988 and later models, perform the following:

a. Loosen and remove the steering stem nut and washer (**Figure 44**).
b. Remove the upper fork bracket (**Figure 44**).

NOTE

*Use a spanner wrench (**Figure 45**) or a large drift and hammer to loosen the steering stem adjust nut in Step 6.*

6. Loosen the steering stem adjust nut. See A, **Figure 46** (1982-1987) or **Figure 47** (1988-on).

7. Hold onto the steering stem and remove the steering stem adjust nut. Remove the bearing cap (B, **Figure 46**) on 1982-1987 models.

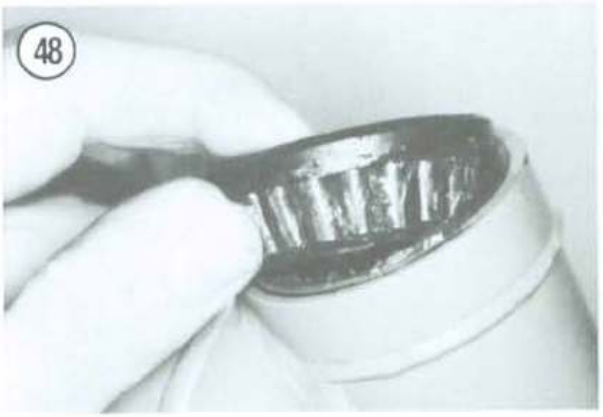
8. Remove the upper bearing (**Figure 48**).

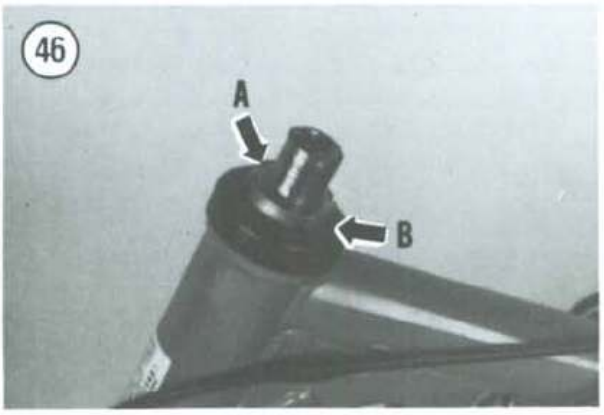
9. Lower the steering stem (**Figure 49**) and remove it.

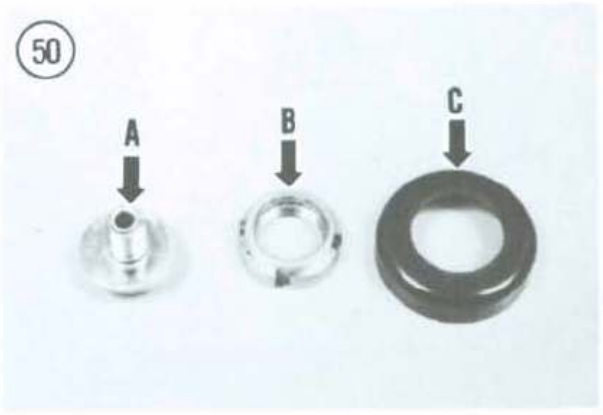
Inspection

1. Clean the bearing races in the steering head, the steering stem races, ball bearings and the tapered roller bearing with solvent.

2. Check the welds around the steering head for cracks and fractures. If any are found, have them repaired by a competent frame shop or welding service.







3A. On 1982-1987 models (**Figure 50**), check the steering bolt (A), adjust nut (B) and the upper bearing cover (C) for cracks or damage. Check the collar for severe wear or damage (**Figure 51**). Replace if necessary.

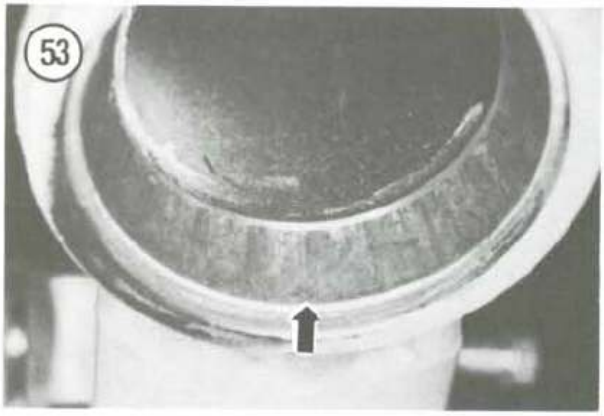
3B. On 1988 and later models, check the steering stem nut and washer for damage.

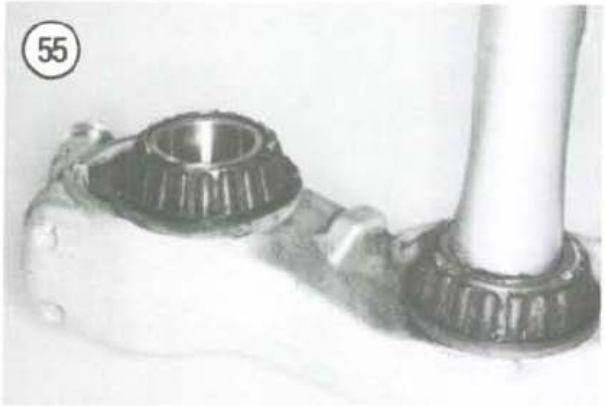
4. Check the steering stem assembly (**Figure 52**) for cracks and damage.

5. Check the bearing races for pitting, galling and corrosion. Compare the severely worn race in **Figure 53** with the new race in **Figure 54**. If a race is worn or damaged, replace both races (and bearings) as described under *Bearing Race Replacement* in this chapter.

6. Check the tapered roller bearings for pitting, scratches or discoloration that indicate wear or corrosion damage. Compare the worn bearings in **Figure 55** with the new bearing in **Figure 56**.

7. If the old bearings can be reused, clean them thoroughly with a bearing degreaser, following the manufacturer's directions. Make sure the bearing degreaser is compatible with the rubber covers on each bearing. When the bearings are clean and dry,





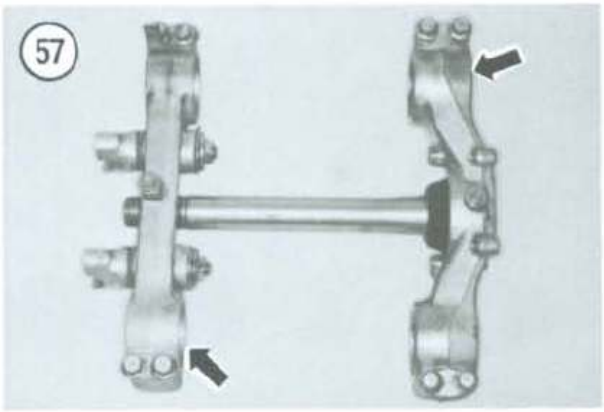
pack them thoroughly with a good quality waterproof bearing grease.

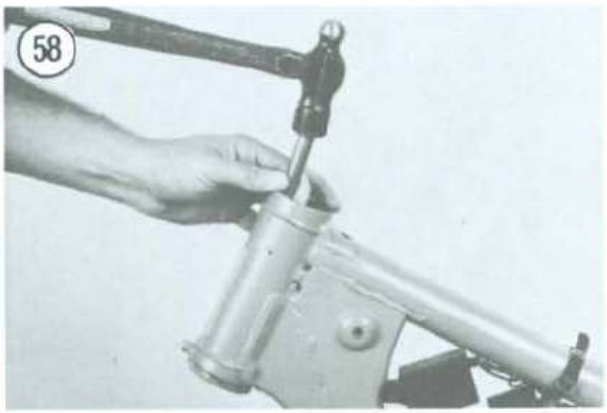
8. Check the upper and lower fork bracket (**Figure 57**) for cracks or damage, especially where the fork tubes mount.

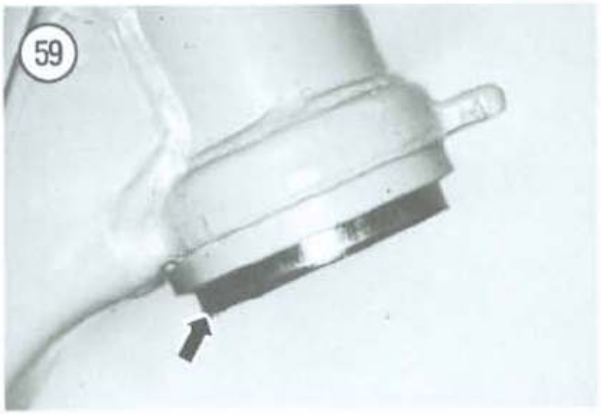
Outer Bearing Race Replacement

The upper and lower outer bearing races (**Figure 53**) should not be removed unless they are going to be replaced. Replace both bearings and races at the same time.

1. Insert an aluminum drift into the frame tube (**Figure 58**) and carefully tap the race out from the inside (**Figure 59**). Repeat for the other race.
2. Clean the race seats (**Figure 60**) in the frame tube and check for cracks or other damage.
3. Insert the new race into the frame tube with the tapered side facing out (**Figure 61**) and square the race with the race bore (**Figure 62**).
4. To avoid damaging the races when installing them, assemble a puller assembly, using material found at most hardware stores, and install the races as follows:

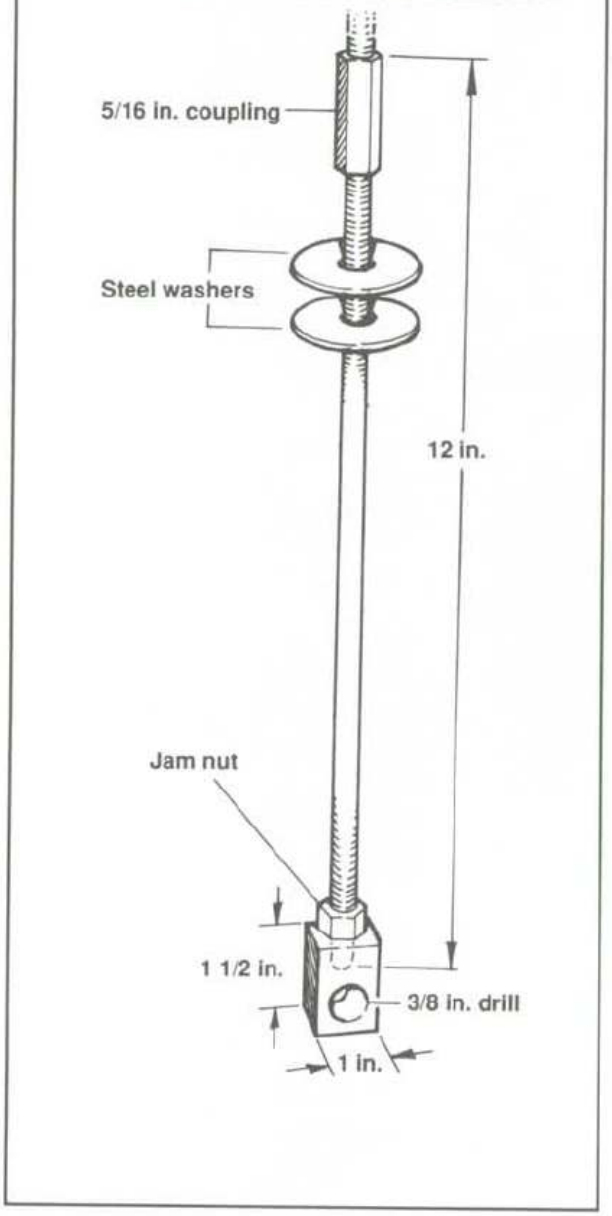






63

BEARING RACE PULLING TOOL



a. Assemble the puller tool shown in **Figure 63**. The threaded rod and coupling can be purchased at most hardware stores. The block mounted at the bottom of the threaded rod is used as a T-handle to hold the rod stationary when the bearing race is being installed from the opposite end. If you don't want to make the handle, you can hold the bottom of the rod with 2 nuts locked together. The block should be made out of cold-roll steel. The hole drilled horizontally through the block should be large enough to accept a suitable rod for the T-handle. Two or more thick washers that are wider than each bearing race will also be required.

CAUTION

When using the threaded rod or a similar tool to install the bearing races in the following steps, do not allow the rod or tool to contact the face of the bearing race and damage it.

b. To install the upper race, insert the puller through the bottom of the frame tube (A, **Figure 64**). Seat the lower washer or plate against the frame as shown in B, **Figure 64**.

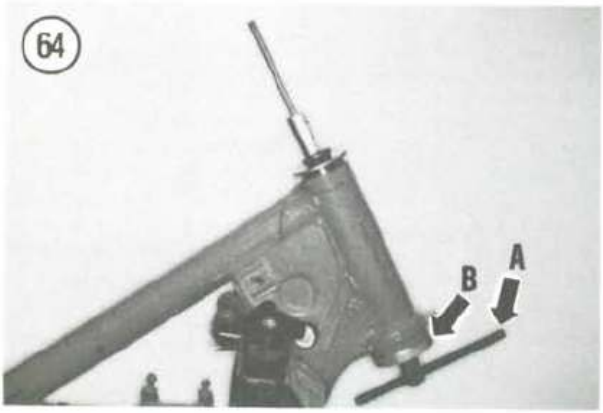
c. At the top of the puller, slide the large washer down and seat it squarely on top of the bearing race (A, **Figure 65**). Then install the required washers and coupling nut (B, **Figure 65**) that will work on your puller.

d. Hand tighten the coupling nut (B, **Figure 65**), checking that the washer is centered on the bearing race.

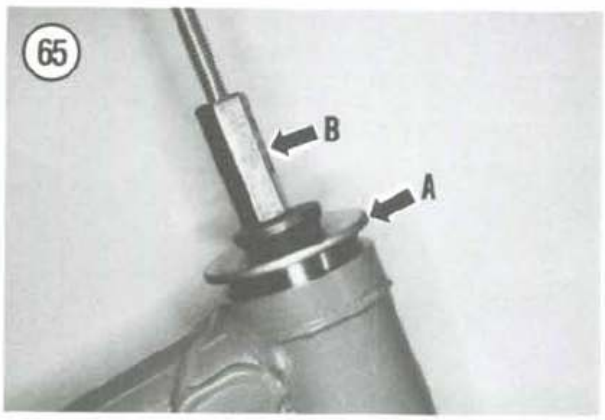
e. Hold the threaded rod to prevent it from turning and tighten the coupling nut with a wrench (**Figure 66**). Continue until the race is drawn into the frame tube and the washer seats

11

64



65



against frame tube. Remove the puller assembly and inspect the bearing race. It should have bottomed out in the frame tube as shown in **Figure 67**.

f. Repeat for the bottom race. See **Figure 54**.

5. Apply a light coat of bearing grease to the upper and lower bearing races.

Steering Stem Bearing Replacement

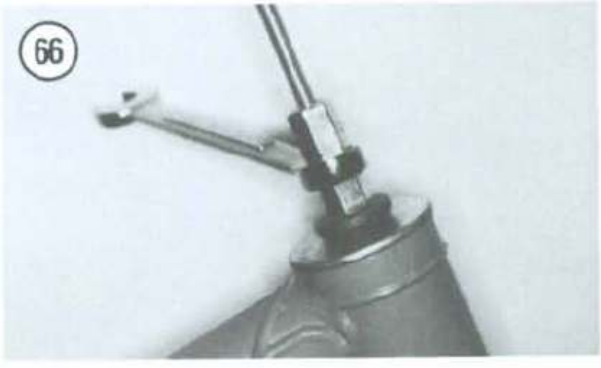
The steering stem bearing (**Figure 68**) can be difficult to remove. If you cannot remove it as described in the following steps, have your dealer replace the bearing.

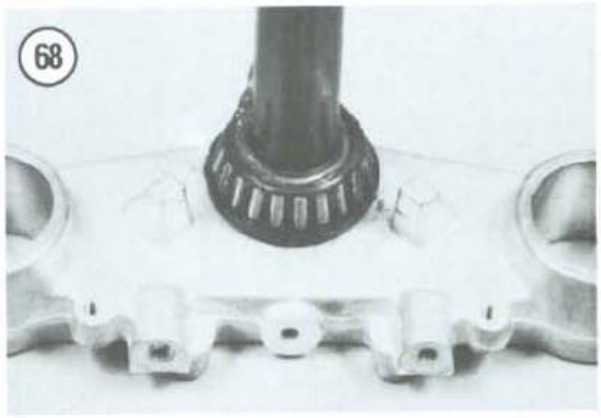
1. Using suitable pry bars, pry the steering stem bearing off of the steering stem.
2. Clean the steering stem with solvent and dry thoroughly.
3. Slide a new bearing onto the steering stem until it stops.
4. Align the bearing with the machined portion of the shaft and slide a long hollow pipe over the steering stem until it seats against the *inner* bearing race (**Figure 69**). Drive the bearing onto the steering stem until it bottoms out.
5. Pack the bearing rollers with a good quality waterproof bearing grease.

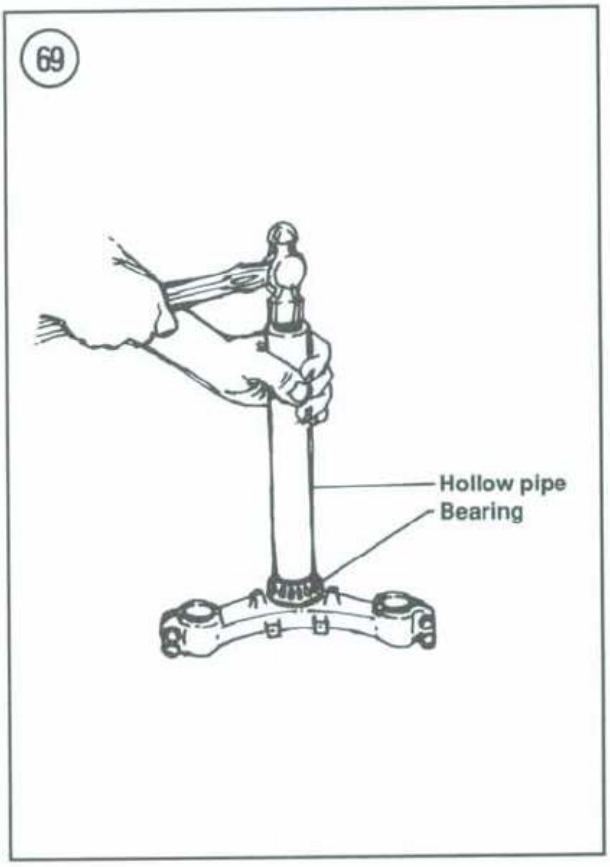
Assembly

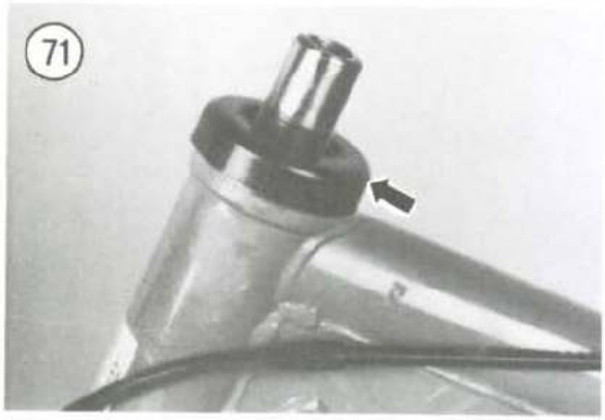
Refer to **Figure 39** (1982-1987) or **Figure 40** (1988-on) for this procedure.

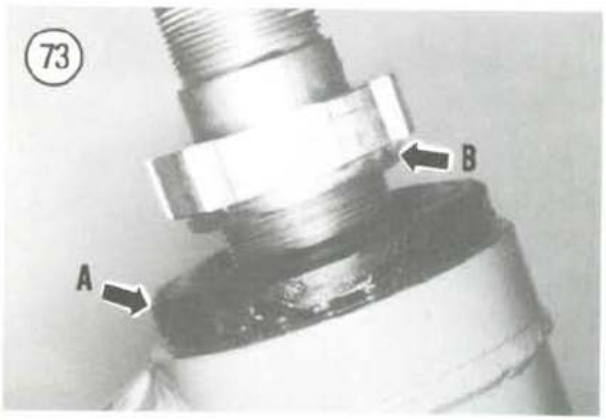
1. Make sure the steering head and stem races are properly seated.
2. Lubricate the bearings and races with a good quality waterproof bearing grease if you did not lubricate them during previously.











3. Install the steering stem (**Figure 49**) into the frame tube and hold it firmly in place.

4A. On 1982-1987 models, perform the following:

a. Install the upper bearing over the steering stem and seat it into the race (**Figure 70**).
b. Install the dust cover over the bearing (**Figure 71**).
c. Install the steering stem adjust nut finger-tight (**Figure 72**).

4B. On 1988 and later models, perform the following:

a. Install the upper bearing over the steering stem and seat it into the race (A, **Figure 73**).
b. Install the steering stem adjust nut finger-tight. Install the nut so that its shoulder faces down as shown in B, **Figure 73**.

5. Install and tighten the steering stem adjusting nut as follows:

a. Tighten the adjust nut securely to seat the bearings.
b. Back off the adjust nut while checking bearing play. The adjust nut should be just tight enough to remove play, both horizontal and vertical yet loose enough so that the assembly will turn to both lock positions under its own weight after an assist.

6. On 1982-1987 models, install the collar (**Figure 74**).
7. Install the upper fork bracket.
8A. On 1982-1987 models, install the steering stem bolt (**Figure 75**).
8B. On 1988 and later models, install the steering stem washer and nut (**Figure 76**).

NOTE

Steps 9-11 must be performed in this order to assure proper upper and lower fork bracket to fork alignment.

9. Slide both fork tubes into position and tighten the lower fork tube pinch bolts to the torque specification in **Tables 3-5**.
10. Tighten the steering stem bolt or nut to the torque specification in **Tables 3-5**.
11. Tighten the upper fork tube pinch bolts to the torque specification in **Tables 3-5**.
12. Complete assembly by reversing Steps 1-3 under *Disassembly*.
13. After 30 minutes to 1 hour of riding time, check and adjust the steering adjustment as described in the following procedure.

Steering Adjustment

1. Raise the front wheel off the ground. Support the motorcycle securely under the engine.
2. Loosen the lower fork tube pinch bolts on both sides (**Figure 77**).
3. Loosen the steering stem bolt or nut.
4. Turn the steering stem adjust nut (**Figure 78**) with a spanner wrench or punch until you just feel the steering play taken up.
5. Tighten all steering bolts to the torque specifications in **Tables 3-5**.
6. Recheck the steering play.

FRONT FORK

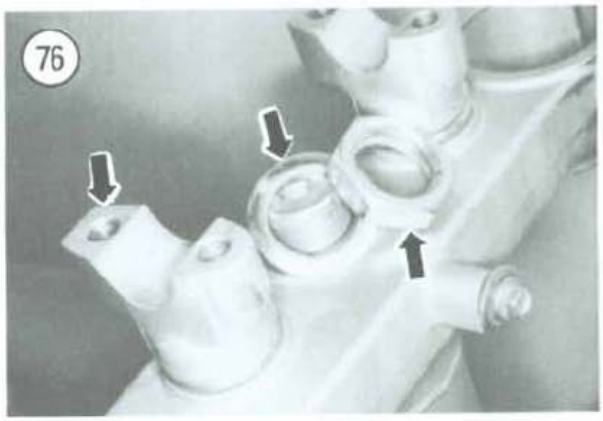
Before suspecting major trouble with the front fork, drain the fork oil and refill with the proper type and quantity. If you still have trouble, such as poor damping, tendency to bottom out or top out, or leakage around the rubber seals, then follow the service procedures in this section.

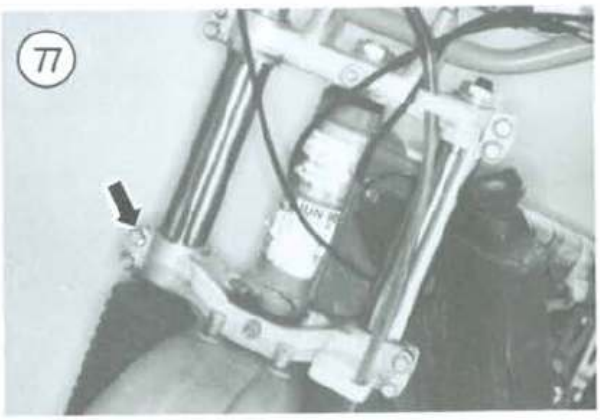
To simplify fork service and to prevent the mixing of parts, the legs should be removed, serviced and reinstalled individually.

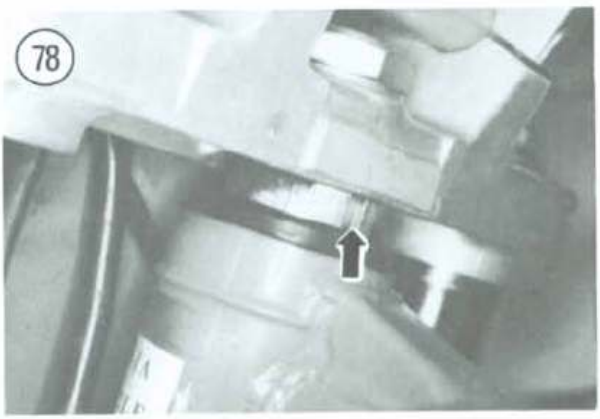
FORK SERVICE (1982-1987)

Refer to parts illustration for your model when servicing the front fork:

a. **Figure 79**: 1982-1984.
b. **Figure 80**: 1985.
c. **Figure 81**: 1986.
d. **Figure 82**: 1987.

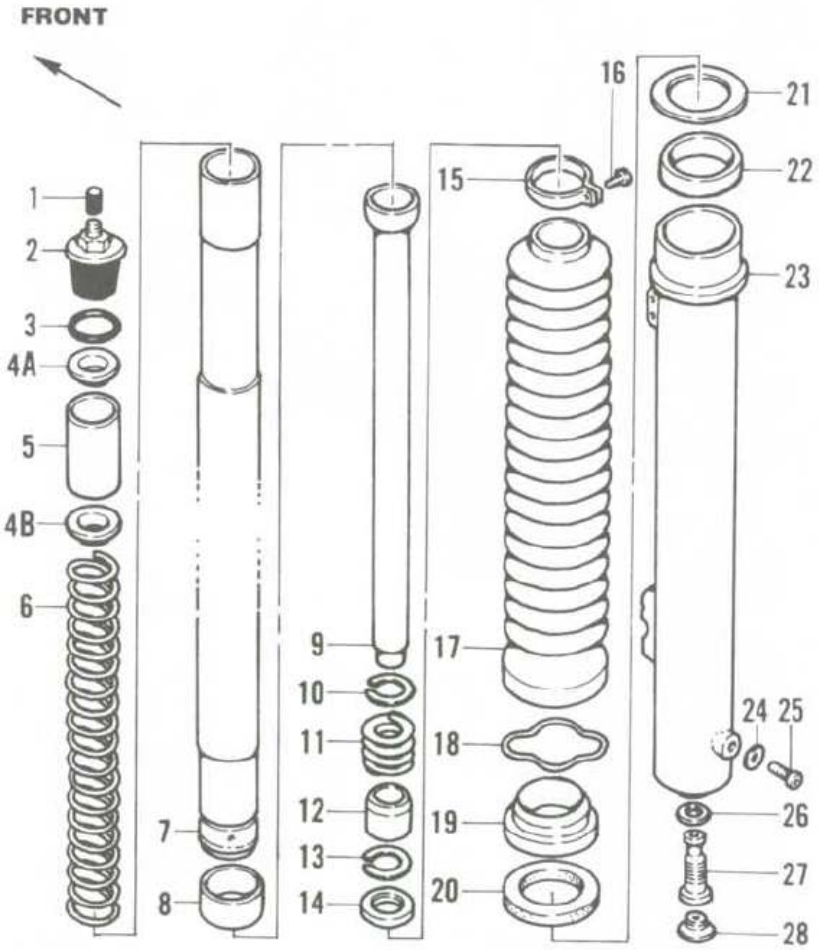






(79)

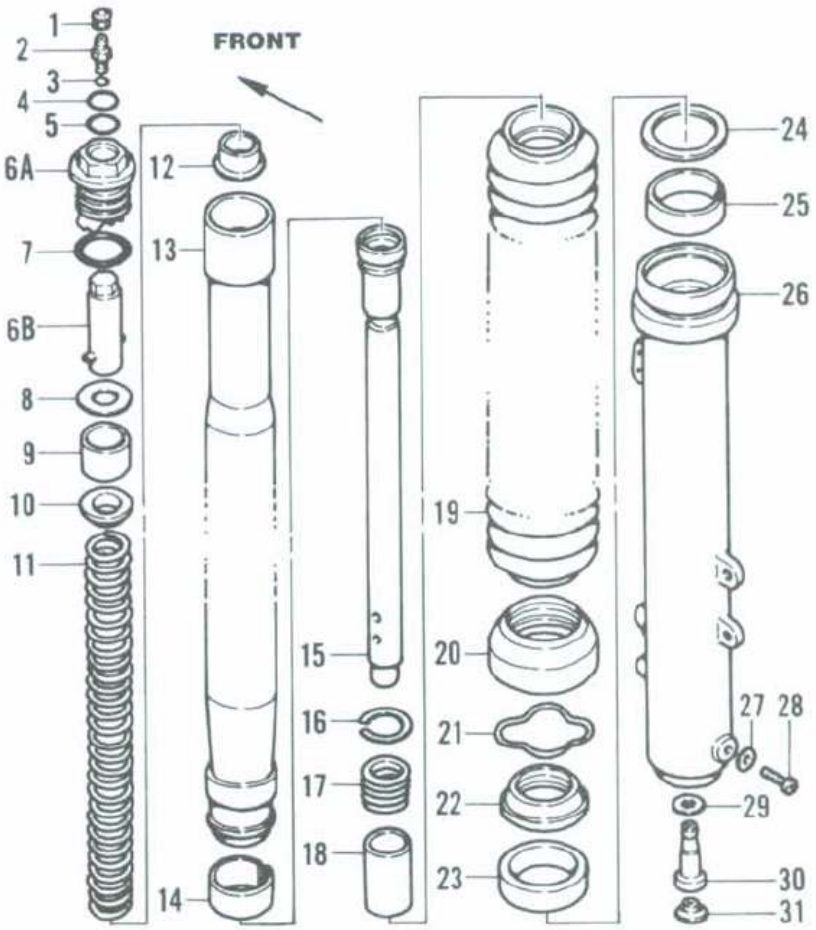
FRONT FORK (1982-1984)



1. Cap
2. Fork cap
3. O-ring
4A. Spring seat (1984 only)
4B. Spring seat (all models)
5. Spacer
6. Spring
7. Fork tube
8. Bushing
9. Damper rod
10. Piston ring
11. Spring
12. Oil lock piece
13. Circlip
14. Floating stepped washer (1984 KX250 and KX500 only)
15. Clamp
16. Screw
17. Boot
18. Snap ring
19. Dust seal
20. Oil seal
21. Washer
22. Bushing
23. Slider
24. Washer
25. Screw
26. Washer
27. Allen bolt
28. Plug

(80)

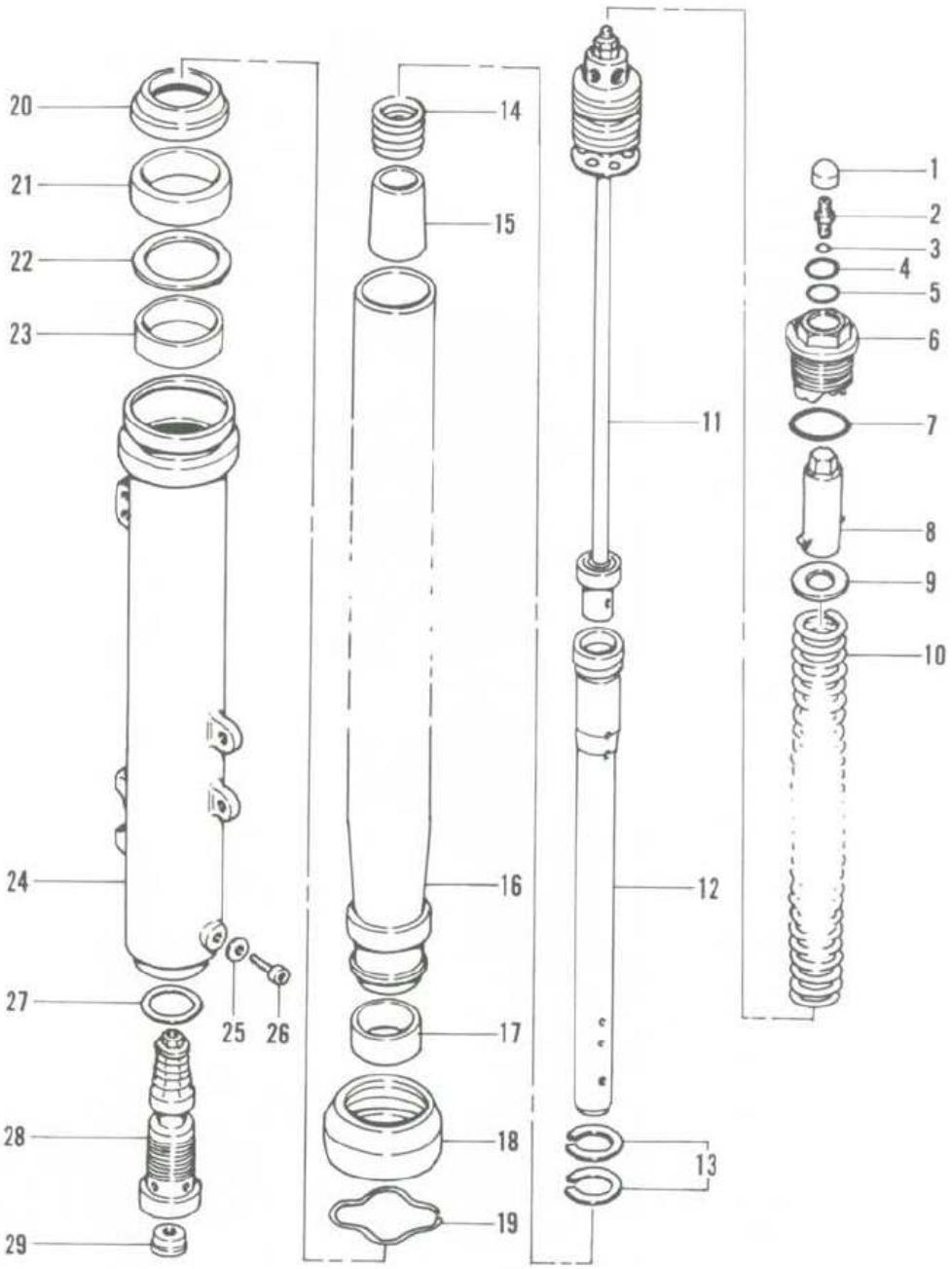
FRONT FORK (1985)



1. Cap
2. Air valve
3. O-ring
4. O-ring
5. O-ring
6A. Fork cap
6B. Fork spring adjuster
7. O-ring
8. Washer
9. Spacer
10. Spring seat
11. Fork spring
12. Spring seat
13. Fork tube
14. Bushing
15. Damper rod
16. Piston ring
17. Rebound spring
18. Oil lock piece
19. Fork boot
20. Dust boot
21. Snap ring
22. Dust boot
23. Oil seal
24. Washer
25. Bushing
26. Slider
27. Washer
28. Screw
29. Washer
30. Allen bolt
31. Plug

(81)

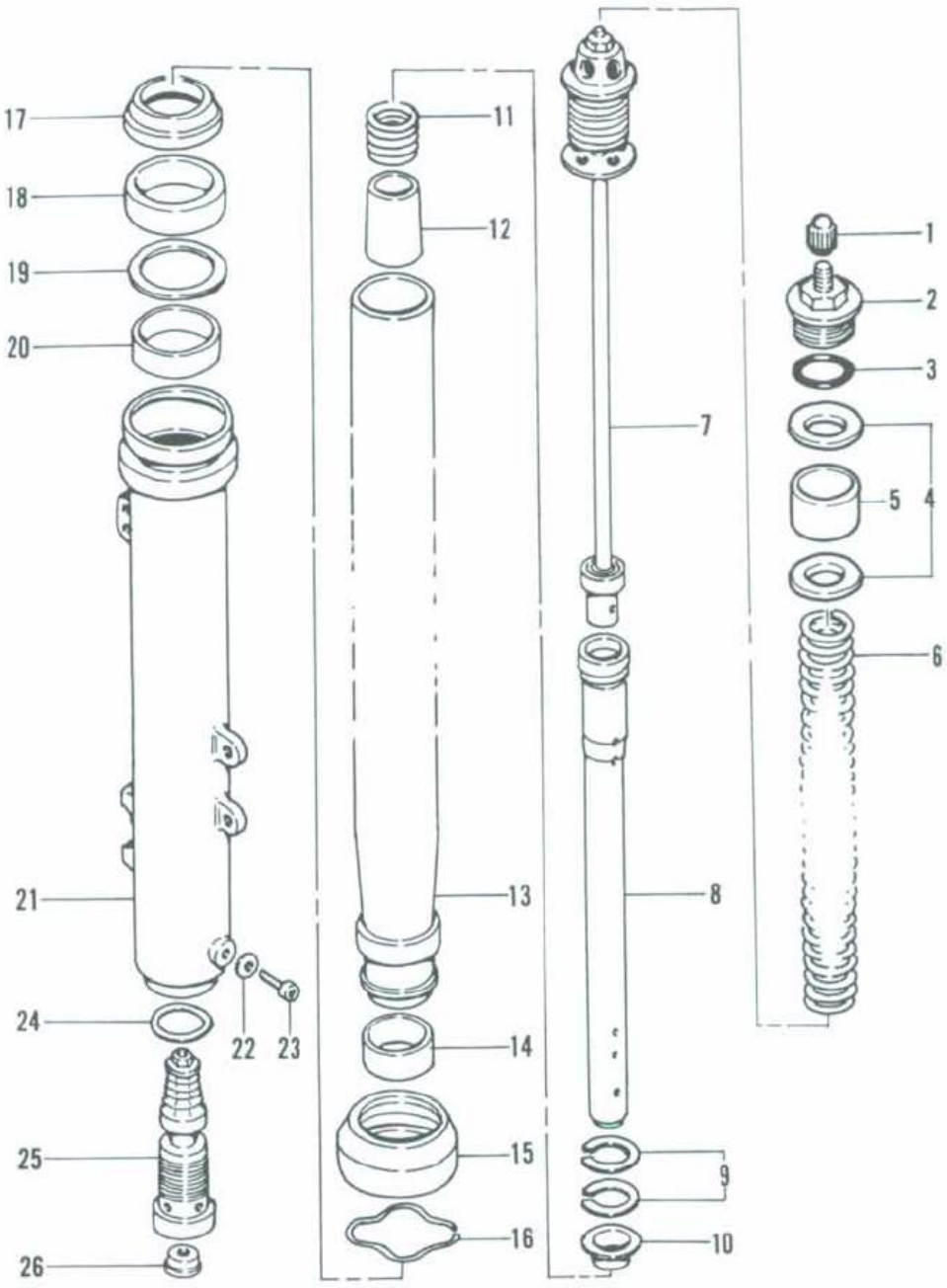
FRONT FORK (1986)



1. Cap
2. Air valve
3. O-ring
4. O-ring
5. O-ring
6. Fork cap
7. O-ring
8. Spring adjuster
9. Spring seat
10. Spring
11. Valve assembly
12. Damper rod
13. Piston rings
14. Spring
15. Oil lock piece
16. Fork tube
17. Bushing
18. Dust boot
19. Snap ring
20. Dust boot
21. Oil seal
22. Washer
23. Bushing
24. Slider
25. Washer
26. Screw
27. O-ring
28. Cylinder valve
29. Plug

(82)

FRONT FORK (1987)



1. Cap
2. Air valve
3. O-ring
4. Spring seat
5. Spacer
6. Spring
7. Valve assembly
8. Damper rod
9. Piston rings
10. Spring seat
11. Spring
12. Oil lock piece
13. Fork tube
14. Bushing
15. Dust boot
16. Snap ring
17. Dust boot
18. Oil seal
19. Washer
20. Bushing
21. Slider
22. Washer
23. Screw
24. O-ring
25. Cylinder valve
26. Plug

Air Pressure Adjustment

Air pressure will increase or decrease pressure through the entire fork travel range (**Figure 83**). Because air pressure makes the forks hard, many riders do not pressurize their forks. Instead, they use the air valves on the fork caps to bleed off air that builds up inside the forks after each ride. When bleeding off air pressure, prop the front wheel up so that it clears the ground. Then depress the air valve (**Figure 84**) and bleed off all air pressure. Raising the front wheel off the ground prevents a vacuum from building in the fork tubes.

If your front forks seem soft and are bottoming harshly, you may want to add a small amount of air pressure. Consider the following when adjusting fork air pressure:

a. Decreasing air pressure will soften fork travel.
b. Increasing air pressure will stiffen fork travel.

CAUTION

Do not exceed the air pressure specifications in ***Table 6****.*

1. Place the bike on a stand so that the forks are fully extended and the front wheel clears the ground.
2. Remove the air valve caps.
3. Use a small manual air pump. Attach it to the air fitting and inflate the fork to the desired setting.
4. Repeat for the opposite side.

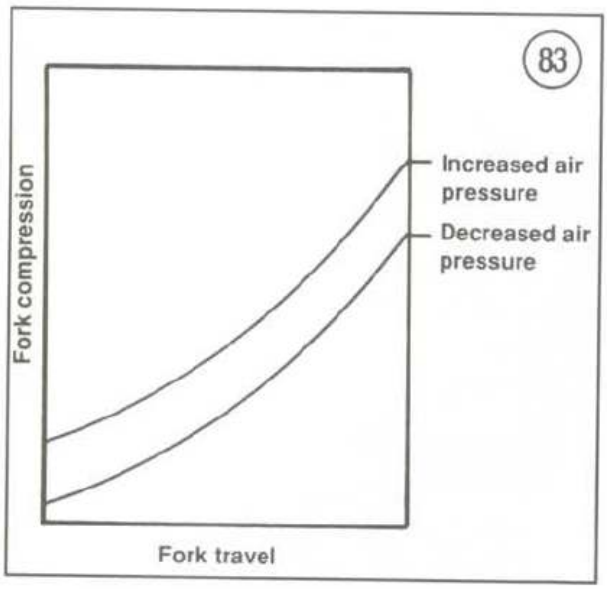
WARNING

Use only compressed air or nitrogen—DO NOT use any other type of compressed gas as an explosion may result. Never heat the front forks with a torch or place them near an open flame or extreme heat.

NOTE

The air pressure difference between the 2 fork tubes should be 0.1 kg/cm^2 (1.4 psi) or less.

5. Reinstall the air caps.
6. Test ride the bike.



Compression Damping Adjustment (1984-1987)

Compression damping affects how quickly the front forks compress. Compression damping adjustments are made by turning the adjuster screw in the bottom of the fork tube (**Figure 85**, typical) with a straight tipped screwdriver. Adjust as follows.

1. Clean the bottom of both fork tubes and remove the rubber caps (**Figure 86**).

2A. *1984*: Compression damping can be adjusted to 8 different settings. The standard setting is 4 clicks

after turning the adjuster clockwise to its full stop. To make the compression damping stiffer, turn the compression adjuster *clockwise* as viewed from the front of the fork tube (**Figure 85**). For softer damping, turn the adjuster *counterclockwise*. Each adjuster click represents 1 adjustment position.

2B. *1985-on*: Compression damping can be adjusted to 8 (1985-1986) or 22 (1987) different settings. The standard setting is 4 (1985-1986) or 11 (1987) clicks after turning the adjuster counterclockwise to its full stop. To make the compression damping stiffer, turn the compression adjuster *clockwise* as viewed from the front of the fork tube (**Figure 85**). For softer damping, turn the adjuster *counterclockwise*. Each adjuster click represents 1 adjustment position.

CAUTION

Always adjust both fork tubes to the same setting.

3. Install the rubber caps to prevent dirt and mud from obstructing the adjustment hole and screw head.

Spring Pre-load Adjustment (1985-1986)

On these models, the fork cap is designed to allow adjustment of the fork spring pre-load. By turning the adjuster with a wrench (**Figure 87**), the spring pre-load can be set to 1 of 3 positions: standard (1), hard (2) or harder (3). Turning the adjuster clockwise sets a harder pre-load position.

WARNING

The left- and right-hand fork tubes must be set to the same pre-load adjustment. If the adjusters are not set to the same adjustment, handling may become unsteady and cause loss of control.

Removal/Installation

1. Remove the front wheel as described in this chapter.
2. Disconnect the front brake hose at the left-hand fork tube.
3. Remove the brake caliper as described in Chapter Thirteen.

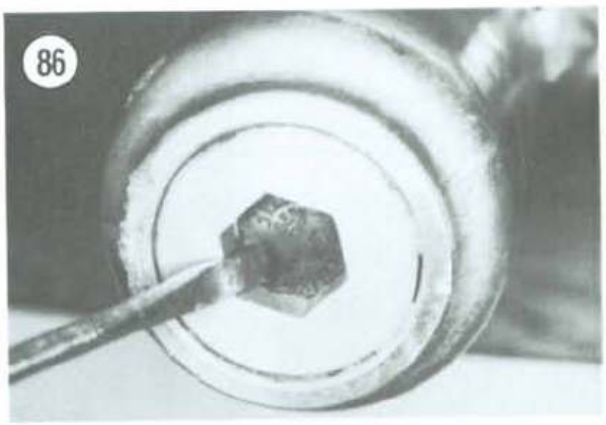
NOTE

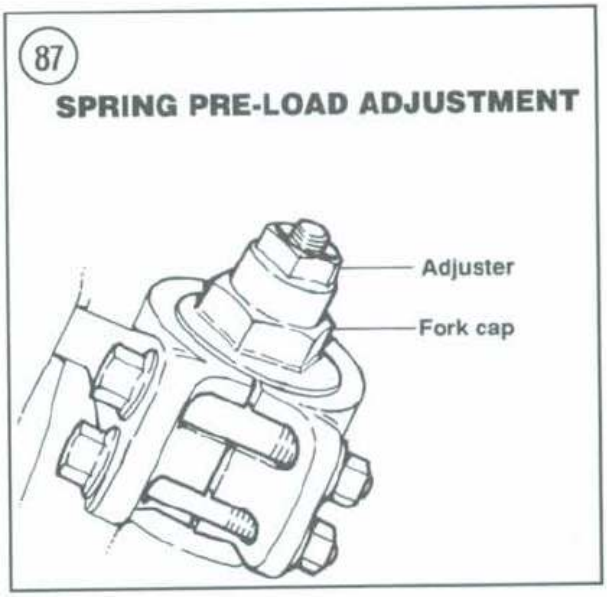
Insert a wood or plastic spacer in the caliper in place of the disc. That way, if the brake lever is inadvertently squeezed, the piston will not be forced out of the caliper. If it does happen, the caliper might have to be disassembled to reseat the piston. By using the spacer, bleeding the brake is not necessary when installing the wheel.

CAUTION

When performing Step 4, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

4. Remove the air valve cap and depress the valve (**Figure 84**) to release fork air pressure from both fork tubes.
5. Loosen the upper and lower fork tube pinch bolts.





6. Twist the fork tube and remove it.
7. Install by reversing these removal steps. Note the following.
8. Tighten the fork tube pinch bolts to the torque specification in **Tables 3-5**.
9. Install and tighten the brake caliper as described in Chapter Thirteen.
10. After installing the front wheel, squeeze the front brake lever. If the brake lever feels spongy, bleed the brake as described under *Bleeding the System* in Chapter Thirteen.
11. If necessary, apply air pressure to the front forks as described at the beginning of this section.

Disassembly

CAUTION

When performing Step 1, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

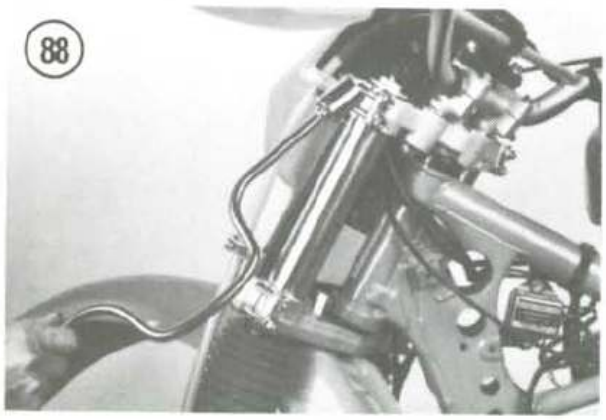
1. Depress the air valve(s) to release all fork air pressure.
2. Spread some newspapers or clean shop cloths on your workbench to place the fork spring assembly after removing it.

NOTE

The fork cap is under spring pressure. Remove the cap slowly and don't let if fly off when it is released from the fork tube.

WARNING

If the fork tubes are bent the fork cap may be under considerable spring pressure. Do not attempt to remove the fork cap. Allow a qualified mechanic remove the cap and repair the forks for you.



NOTE

*A number of different spring seat, spacer and fork spring combinations are used on the KX models covered in this manual. After removing the fork cap in Step 3, remove the spring assembly, laying out parts in order removed to avoid confusion during reassembly. Then compare their alignment with the parts illustration for your model (**Figures 79-82**).*

3. Slide the fork tube back into the steering stem and tighten the pinch bolts. Loosen and remove the fork cap with a socket and speeder bar or long T-handle (**Figure 88**).

4A. On KX125 models, perform the following:
   a. 1982-1983: Remove the spacer, spring seat and fork spring.
   b. 1984: Remove the upper spring seat, spacer, lower spring seat and fork spring.
   c. 1985: Remove the washer, spacer, upper spring seat, spring and lower spring seat.
   d. 1986: Remove the spring seat, fork spring and valve assembly.
   e. 1987: Remove the fork spring and valve assembly.

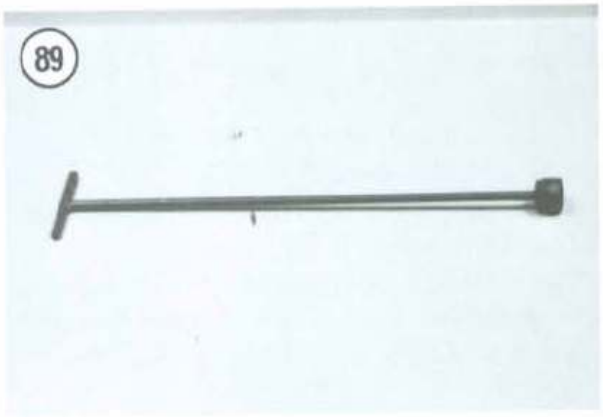
4B. On KX250 models, perform the following:
   a. 1982-1983: Remove the spacer, spring seat and spring.
   b. 1984-1985: Remove the upper spring seat, spacer, lower spring seat and spring.
   c. 1986: Remove the spring seat, spring and valve assembly.
   d. 1987: Remove the spring and valve assembly.

4C. On KX500 models, perform the following:
   a. 1983: Remove the spacer, spring seat and spring.
   b. 1984-1985: Remove the upper spring seat, spacer, lower spring seat and spring.
   c. 1986: Remove the spring seat, spring and valve assembly.
   d. 1987: Remove the spring and valve assembly.

NOTE

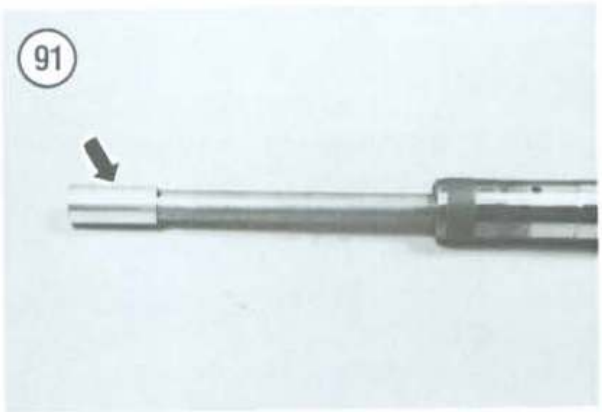
The bottom Allen bolt or cylinder valve is secured with Loctite and is hard to remove. If air tools are available, try them first. If necessary, you may be able

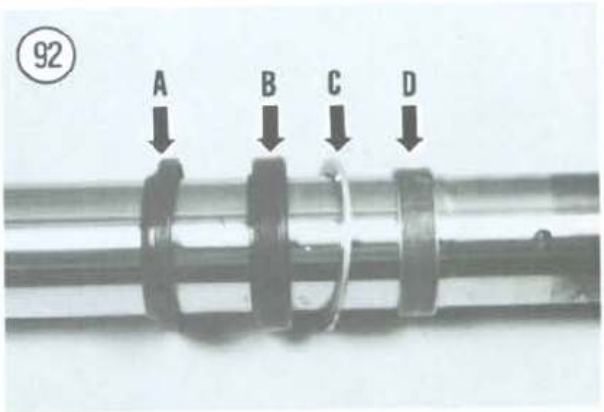
to keep the damper rod inside from turning by temporarily installing the fork spring, spring seat, spacer and fork cap, and having an assistant compress the fork while you try to loosen the Allen bolt or cylinder valve bolt. It may be easier to attempt this method while the fork tubes are installed on the bike. If these methods are not successful, you will have to keep the damper rod from turning with a special tool. Kawasaki sells a long T-handle (part No. 57001-183) and adapter (part No. 57001-1057). See ***Figure 89.*** *You can substitute the long T-handle with a T-handle and one or more 3/8 in. drive extensions.*



5. Turn the fork tube over and pour out the fork oil.
6. Remove the Allen bolt and washer or the cylinder valve assembly and O-ring from the bottom of the slider.
7. Remove the clamps and remove the outer fork tube boot.
8. Remove the dust seal from the slider.
9. Remove the snap ring from the groove inside the slider.
10. There is an interference fit between the bushing in the fork slider and the bushing on the fork tube. In order to remove the slider from the fork tube, pull hard on the slider using quick in-and-out strokes. Doing this will withdraw the dust seal, oil seal, washer and bushing (**Figure 90**).

11. Remove the oil lock piece from the end of the damper rod (**Figure 91**).
12. Slide the damper rod and spring out of the fork tube.
13. See **Figure 92**. Slide the following parts off of the fork tube:
    a. Dust seal (A).
    b. Oil seal (B).
    c. Washer (C).
    d. Bushing (D).





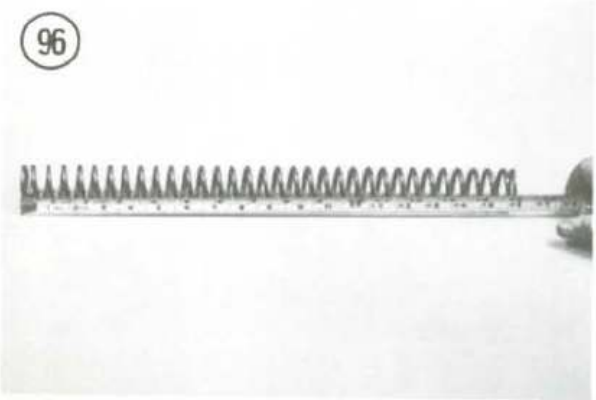
Inspection

1. Thoroughly clean all parts in solvent and dry them.
2. Check both fork tubes for wear or scratches. Check the upper fork tube for straightness. If bent, refer service to a Kawasaki dealer.

93

94

96



3. Check the upper fork tube for chrome flaking or creasing; this condition will damage oil seals. Replace the fork tube if necessary.

4. Check the slider oil seal bore (**Figure 93**) for dents or other damage that would allow oil leakage. Replace the fork tube if necessary.

5. Check the damper rod (**Figure 94**) for straightness by rolling it on a surface plate or thick piece of glass. Any clicking noise indicates a bent rod.

6. Check the damper rod piston ring assembly for tearing, cracks or damage.

7. Check the guide bushing on the fork tube (**Figure 95**) for scoring, nicks or damage. Replace if necessary by pulling off the fork tube.

8. Check the mating guide bushing (D, **Figure 92**) for scoring, nicks or damage. Replace if necessary.

9. Measure the uncompressed length of the fork spring (**Figure 96**) with a tape measure and compare to specifications in **Table 2**. Replace any spring(s) that are too short.

NOTE

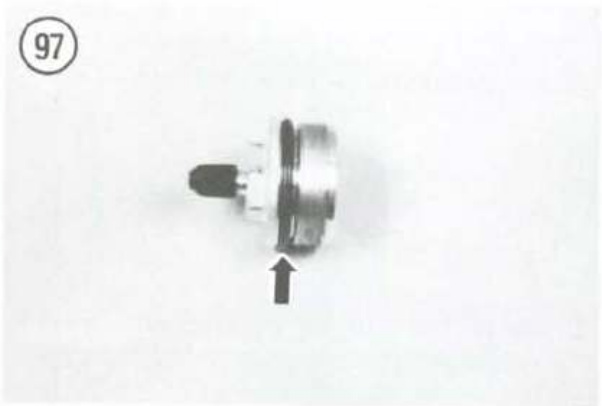
If one fork spring is replaced, compare the measurement of the new and the remaining old spring. If the length difference is great between a new spring and the old usable spring, it is best to replace both springs to keep the forks balanced.

10. Replace the fork cap O-ring (**Figure 97**) if severely worn or damaged.

11. Replace the cylinder valve O-rings(s) if severely worn damaged.

12. Check the oil and dust seals for wear or damage. Replace if necessary.

97



11

Assembly

1. Assemble the damper rod assembly as shown in **Figures 79-82** for your model.
2. Slide the spring onto the damper rod and insert the damper rod and spring into the upper fork tube.
3. On 1986-1987 models, install the valve assembly into the fork tube, seating the end of the valve assembly into the top of the damper rod.
4. Slide the oil lock piece (**Figure 91**) onto the end of the damper rod.
5. Insert the damper rod/fork tube into the slider (**Figure 98**).
6. Install the gasket on the Allen bolt or the O-ring on the cylinder valve.
7. Apply Loctite 242 (blue) to the threads on the Allen bolt or cylinder valve. Install and tighten securely.

NOTE

Use the same tool and procedure as during disassembly to prevent the damper rod from turning when tightening the Allen bolt or cylinder valve.

NOTE

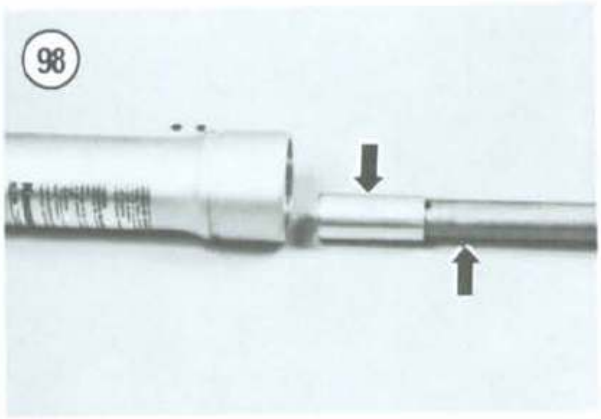
*The guide bushing can be installed with an oil seal driver (**Figure 99**) or a piece of tubing and suitable plate that fits over the fork tube. Oil seal drivers can be purchased through Kawasaki dealers.*

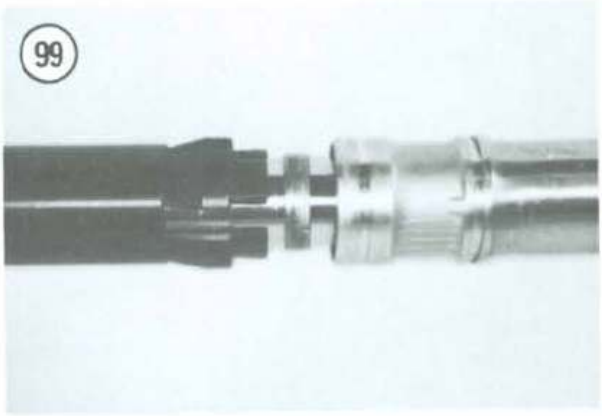
8. Slide the guide bushing (**Figure 100**) over the fork tube. Tap the guide bushing into the slider until it bottoms out.
9. Slide the washer (**Figure 101**) down the fork tube until it rests against the bushing.
10. Position the oil seal with its manufacturer's marks facing upward and slide down onto the fork tube (A, **Figure 102**). Drive the seal into the lower fork tube with the same tool used in Step 8. Drive the oil seal in until it rests against the washer.
11. Press the dust seal (B, **Figure 102**) into the slider.

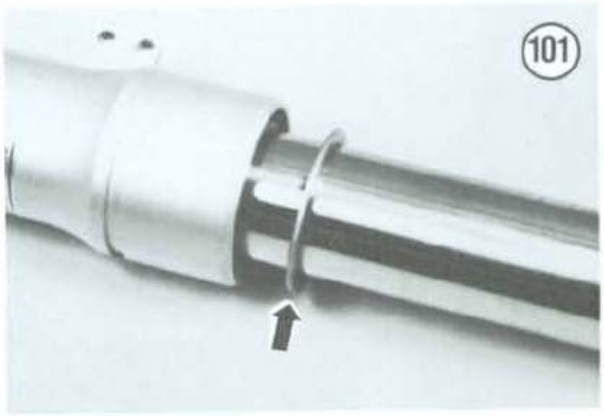
NOTE

*Make sure the groove in the slider can be seen above the dust seal (**Figure 103**). If not, the bushing and oil seal will have to driven farther into the slider.*

12. Slide the snap ring down the fork tube and seat it in the slider groove. Make sure the snap ring is completely seated in the groove.







13. Fill the fork tube with the correct quantity and weight fork oil; see **Table 7** and **Table 8**. Check the oil level as described in Chapter Three under *Front Fork Oil Change*.
14. Install the fork tube onto the motorcycle as described in this chapter. Reverse disassembly Steps 4 and 5 to install the spring assembly. Install the fork spring so that the closer wound oils face toward the top of the fork tube.

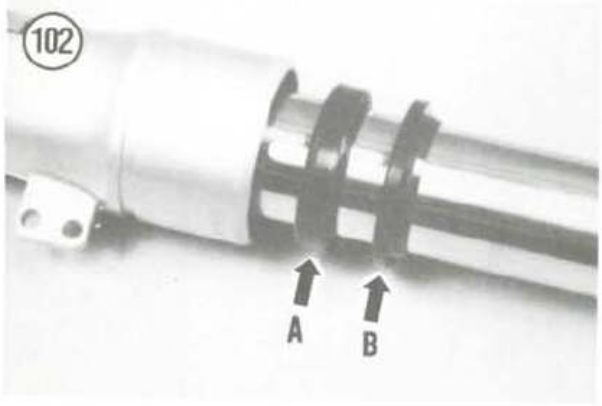
FORK SERVICE (1988 AND 1989 MODELS SOLD IN THE U.S. AND CANADA)

Refer to parts illustration for your model when servicing the front forks:

a. **Figure 104**: 1988 models.
b. **Figure 105**: 1989 models sold in the U.S. and Canada.

NOTE

If you are servicing a 1989 European model, refer to ***Fork Service (1989 European Models and All 1990 and Later Models)***.



Air Pressure Adjustment (1988)

Air pressure will increase or decrease pressure through the entire fork travel range (**Figure 106**). Because air pressure makes the forks hard, many riders do not pressurize their forks. Instead, they use the air valves on the fork caps to bleed off air that builds up inside the forks after each ride. When bleeding off air pressure, prop the front wheel up so that it clears the ground. Then depress the air valve (**Figure 107**) and bleed off all air pressure. Raising the front wheel off the ground prevents a vacuum from building in the fork tubes.

If your front forks seem soft and are bottoming harshly, you may want to add a small amount of air pressure. Consider the following when adjusting fork air pressure:

a. Decreasing air pressure will soften fork travel.
b. Increasing air pressure will stiffen fork travel.

CAUTION

Do not exceed the air pressure specifications in ***Table 6***.

1. Place the bike on a stand so that the forks are fully extended and the front wheel clears the ground.
2. Remove the air valve caps.
3. Use a small manual air pump. Attach it to the air fitting and inflate the fork to the desired setting.
4. Repeat for the opposite side.

WARNING

Use only compressed air or nitrogen—DO NOT use any other type of compressed gas as an explosion may result. Never heat the front forks with a torch or place them near an open flame or extreme heat.

NOTE

The air pressure difference between the 2 fork tubes should be 0.1 kg/cm^2 (1.4 psi) or less.

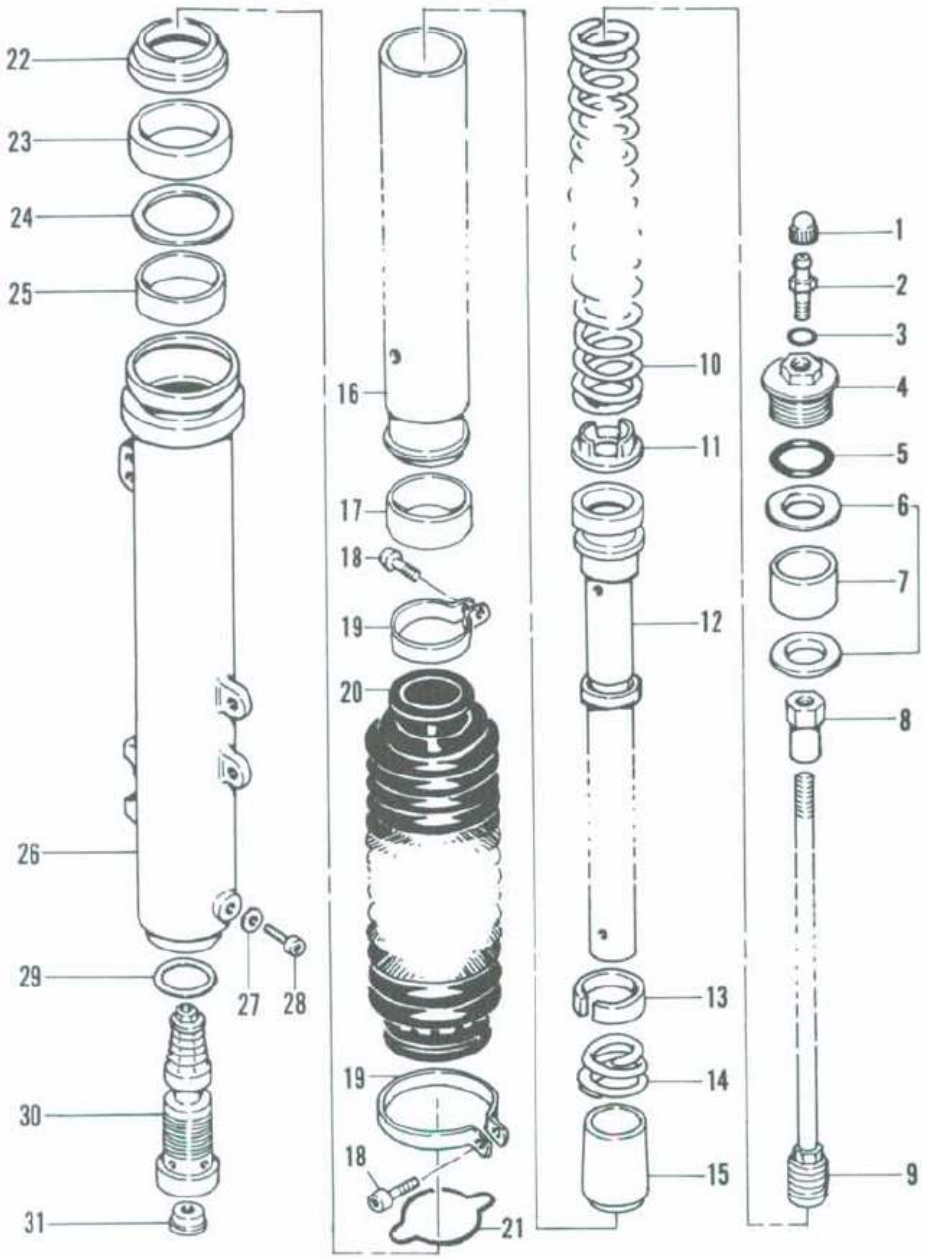
5. Reinstall the air caps.
6. Test ride the bike.

Compression Damping Adjustment

Compression damping affects how quickly the front forks compress. Compression damping adjustments are made by turning the adjuster screw in the

(104)

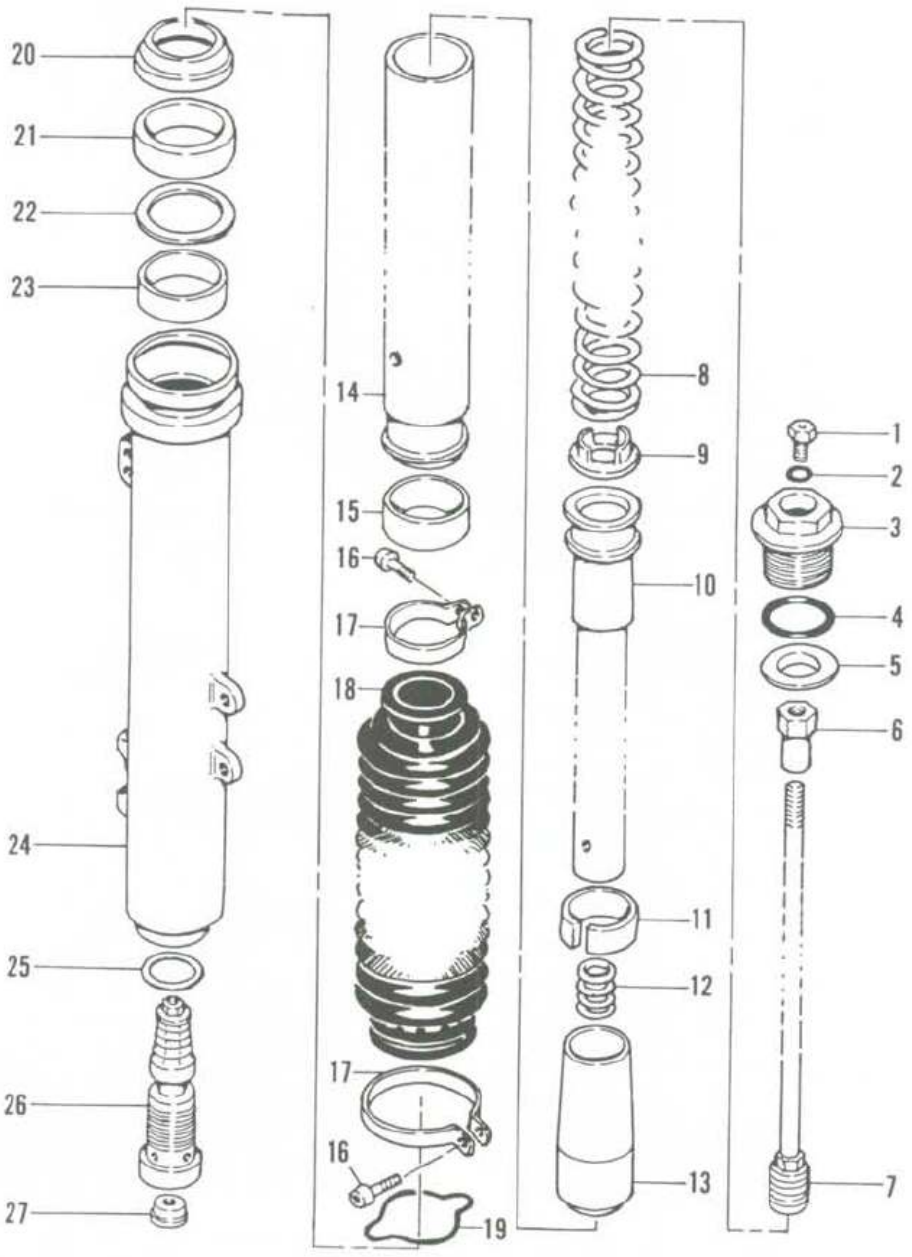
FRONT FORK (1988)



1. Cap
2. Air valve
3. O-ring
4. Cap
5. O-ring
6. Spring seats
7. Spacer
8. Pushrod nut
9. Pushrod
10. Spring
11. Seal
12. Cylinder
13. Piston ring
14. Spring
15. Oil lock piece
16. Fork tube
17. Bushing
18. Screw
19. Clamp
20. Boot
21. Snap ring
22. Dust boot
23. Oil seal
24. Washer
25. Bushing
26. Fork tube
27. Washer
28. Screw
29. O-ring
30. Cylinder valve
31. Plug

(105)

FRONT FORK (1989 U.S. AND CANADA)



1. Bleed bolt
2. O-ring
3. Cap
4. O-ring
5. Spring seat
6. Pushrod nut
7. Pushrod
8. Spring
9. Seal
10. Cylinder
11. Piston ring
12. Spring
13. Oil lock piece
14. Fork tube
15. Bushing
16. Screw
17. Clamp
18. Boot
19. Snap ring
20. Dust boot
21. Oil seal
22. Washer
23. Bushing
24. Slider
25. O-ring
26. Cylinder valve
27. Plug

bottom of the fork tube (**Figure 108**, typical) with a straight tipped screwdriver. Adjust as follows.

1. Clean the bottom of both fork tubes and remove the rubber caps (**Figure 109**).

2. Compression damping can be adjusted to 16 different settings. The standard setting is 8 clicks after turning the adjuster counterclockwise to full stop. To make the compression damping softer, turn the compression adjuster *counterclockwise* as viewed from the front of the fork tube (**Figure 108**). For harder damping, turn the adjuster *clockwise*. Each adjuster click represents 1 adjustment position.

CAUTION

Always adjust both fork tubes to the same setting.

3. Install the rubber caps to prevent dirt and mud from obstructing the adjustment hole and screw head.

Front Fork Tube Height

Varying the fork tube height in the steering stem will change your bike's steering characteristics. When the fork tubes are raised, the steering becomes quicker but is less stable on tracks with long straights. When the fork tubes are lowered, the steering is slower but the bike is more stable on long tracks with long straights.

1. Place the bike on a stand so that the front wheel clears the ground.

2. Loosen the fork tube pinch bolts.

3. Raise or lower the fork tubes in 5 mm (0.2 in.) increments (**Figure 110**). Make sure the front tire does not rub against the fender when the fork tubes are bottomed out.

4. Tighten the fork tube pinch bolts to the torque specifications in **Tables 3-5**.

Removal/Installation

1. Remove the front wheel as described in this chapter.

2. Disconnect the front brake hose at the left-hand fork tube.

3. Remove the brake caliper as described in Chapter Thirteen.

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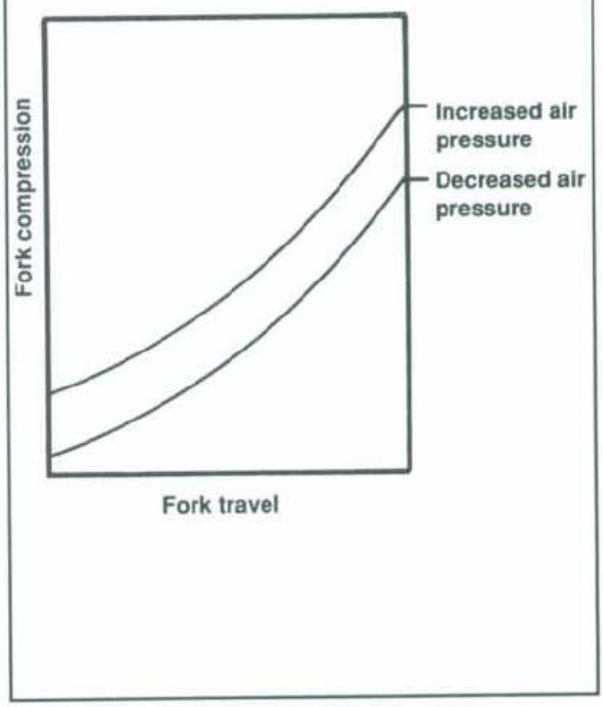

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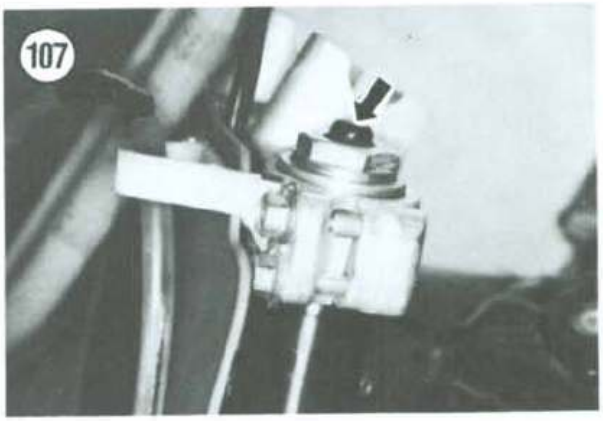
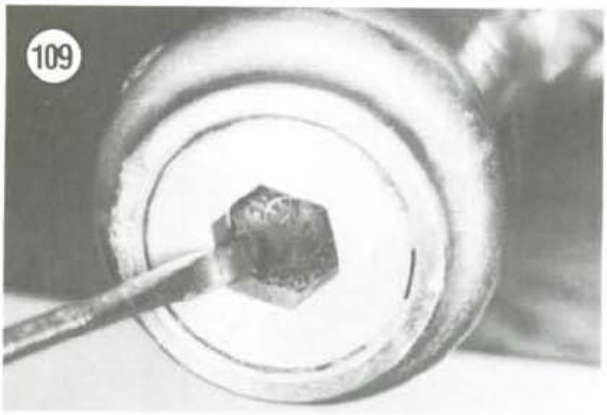


108

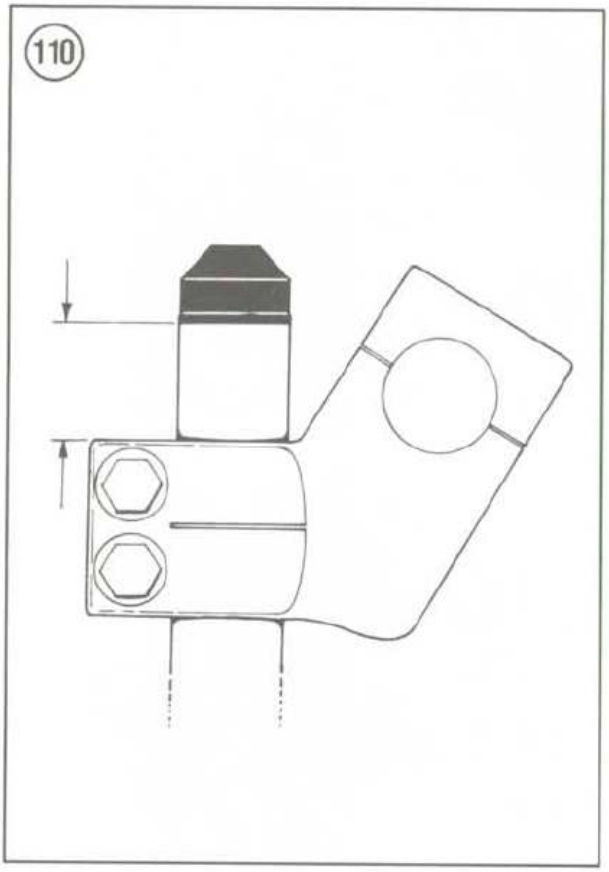


NOTE

Insert a wood or plastic spacer in the caliper in place of the disc. That way, if the brake lever is inadvertently squeezed, the piston will not be forced out of the calipers. If it does happen, the calipers might have to be disassembled to reseat the piston. By using the spacer, bleeding the brake is not necessary when installing the wheel.

CAUTION

When performing Step 4, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.



4A. On 1988 models, remove the air valve cap and depress the valve (**Figure 107**) to release fork air pressure from both fork tubes.

4B. On 1989 models, loosen the screw in the center of the fork cap to allow any air pressure to escape and then retighten the screw (**Figure 111**).

5. Loosen the upper and lower fork tube pinch bolts (**Figure 112**).

6. Twist the fork tube and remove it.

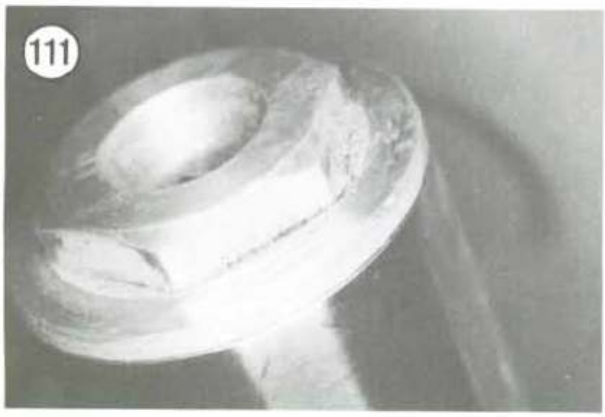
7. Install by reversing these removal steps. Note the following.

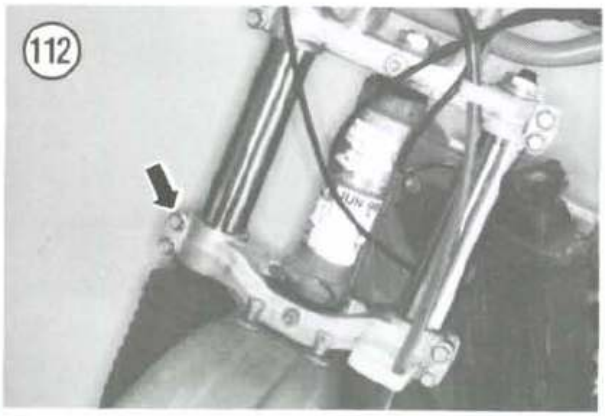
8. Tighten the fork tube pinch bolts to the torque specification in **Tables 3-5**.

9. Install and tighten the brake caliper as described in Chapter Thirteen.

10. After installing the front wheel, squeeze the front brake lever. If the brake lever feels spongy, bleed the brake as described under *Bleeding the System* in Chapter Thirteen.

11. If necessary on 1988 models, apply air pressure to the front forks as described at the beginning of this section.





Disassembly

The following tools will be required to disassemble and reassemble the fork tubes:

a. Front fork oil seal driver (A, **Figure 113**): Kawasaki part No. 57001-1219.
b. Front fork cylinder holder (B, **Figure 113**): Kawasaki part No. 57001-1245.
c. 14 mm Allen hex head socket (C, **Figure 113**).
d. Pushrod rod puller: Kawasaki part No. 57001-1289.

CAUTION

When performing Step 1, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

1A. On 1988 models, remove the air valve cap and depress the valve (**Figure 107**) to release fork air pressure from both fork tubes.
1B. On 1989 models, loosen the screw in the center of the fork cap to allow any air pressure to escape and then retighten the screw (**Figure 111**).
2. Spread some newspapers or clean shop cloths on your workbench to place the fork spring assembly after removing it.

NOTE

The fork cap is under spring pressure. Remove the cap slowly and don't let if fly off when it is released from the fork tube.

WARNING

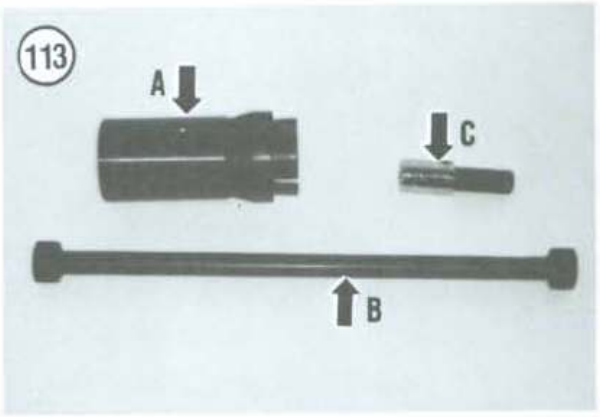
If the fork tubes are bent the fork cap may be under considerable spring pressure. Do not attempt to remove the fork cap. Allow a qualified mechanic to remove the cap and repair the forks for you.

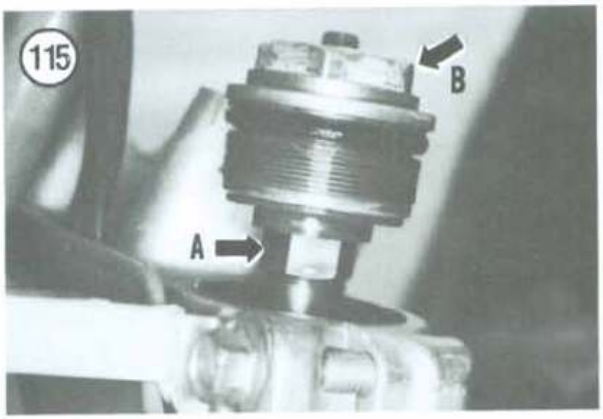
3. Slide the fork tube back into the steering stem and tighten the lower pinch bolts.

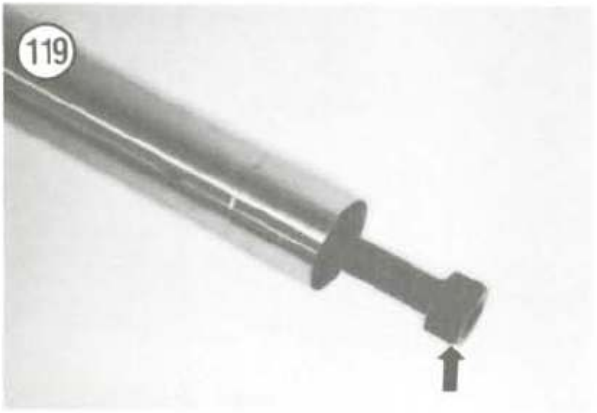
NOTE

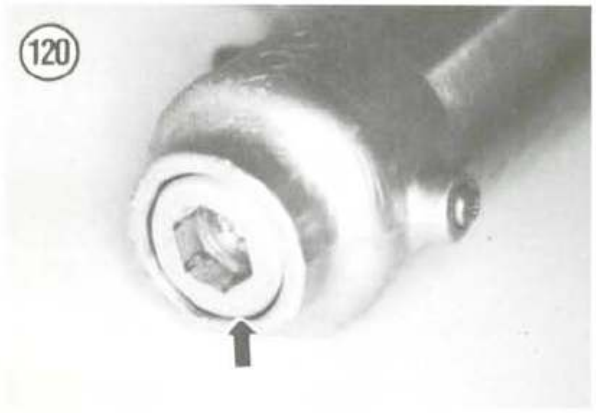
It is easier to remove the fork spring with the fork assembly mounted on the bike.

4. Remove the handlebar clamp bolts and move the handlebar away from the fork caps. Position the handlebar so that the control cables are not pinched or kinked.









5. Loosen the fork cap (**Figure 114**) and slide it out of the fork tube.

6. Hold the pushrod nut (A, **Figure 115**) with a wrench to keep it from turning and loosen the fork cap (B, **Figure 115**) with a wrench or socket. Unscrew and remove the fork cap from the end of the pushrod (**Figure 116**). Do not remove the pushrod nut.

NOTE

It is normal for the pushrod to slide down into the fork tube after you release it.

7A. On 1988 models, remove the upper spring seat, spacer (**Figure 117**) and lower spring seat (**Figure 118**).

7B. On 1989 models, remove the spring seat (**Figure 118**).

8. Remove the fork spring.

9. Remove the fork tube from the steering stem.

10. Turn the fork tube over and pour the oil into a container.

11. Insert the front fork cylinder holder into the fork tube (**Figure 119**) and engage it into the top of the cylinder.

12. Hold the fork cylinder holder with a wrench, then loosen and remove the cylinder valve assembly (and gasket) with the 14 mm Allen hex head socket (**Figure 120**). See **Figure 121**.

13. Remove the holder (**Figure 119**) from the fork tube.

14. Remove the cylinder unit (A, **Figure 122**) and push rod (B, **Figure 122**) from the top of the fork tube.

15. Remove the snap ring from the groove in the top of the slider (**Figure 123**).

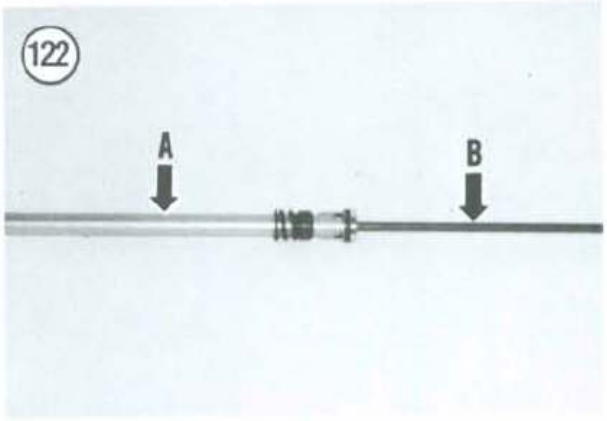
16. There is an interference fit between the bushing in the fork slider and the bushing on the fork tube. In order to remove the slider from the fork tube, pull hard on the slider using quick in-and-out strokes. Doing this will withdraw the dust seal, oil seal, washer and bushing (**Figure 124**).
17. Remove the oil lock piece from inside the slider.
18. See **Figure 124**. Slide the following parts off of the fork tube:
    a. Dust seal (A).
    b. Oil seal (B).
    c. Washer (C).
    d. Bushing (D).

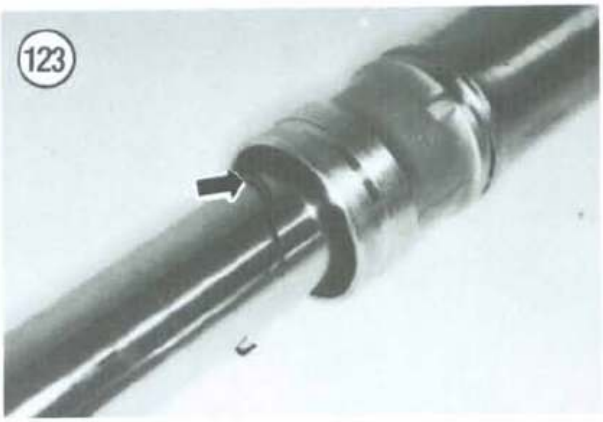
Inspection

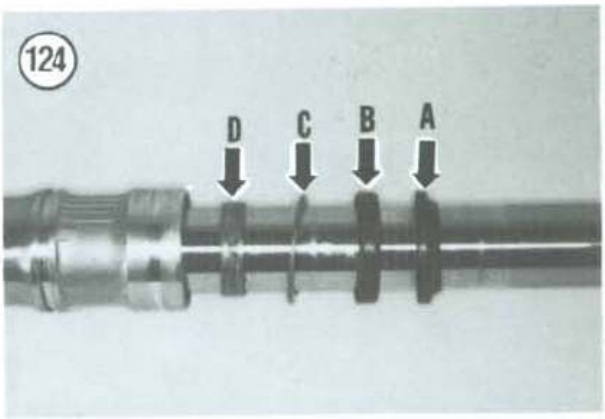
NOTE

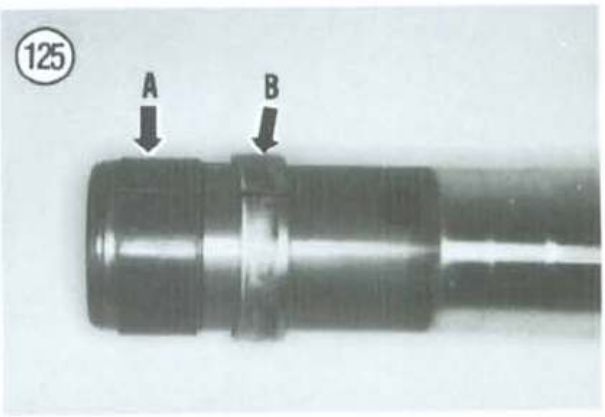
*When cleaning the guide bushings (**Figure 125**) in Step 1, handle them carefully to avoid scratching or removing any of their Teflon coating. If there is any metal powder clinging to the guide bushings, clean them with fork oil and a nylon brush.*

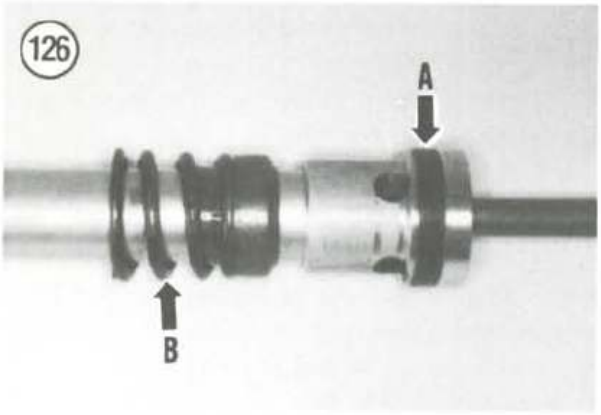
1. Initially clean all of the fork parts in solvent, first making sure that the solvent will not damage the rubber parts. Then clean with soap and water and rinse with plain water. Dry thoroughly.
2. Check the fork tube for straightness. If bent, refer service to a Kawasaki dealer.
3. Check the upper fork tube for nicks, rust, chrome flaking or creasing; these conditions will damage oil seals. Replace the fork tube if necessary.
4. Check the slider oil seal bore for dents or other damage that would allow oil leakage. Check the circlip groove in the slider for damage; replace if necessary.
5. Check the cylinder (A, **Figure 122**) for straightness by rolling it on a surface plate or thick piece of glass. Any clicking noise indicates a bent cylinder.
6. Check the piston ring (A, **Figure 126**) on the top of the cylinder for tearing, cracks or damage; replace if necessary.
7. Check the guide bushing (A, **Figure 125**) on the lower end of the fork tube and the guide bushing mounted in the slider (B, **Figure 125**) for scoring, scratches or severe wear. The guide bushings are worn when the Teflon coating is worn to a point where the bushing is discolored. Replace the guide bushings in both fork tubes as a set.





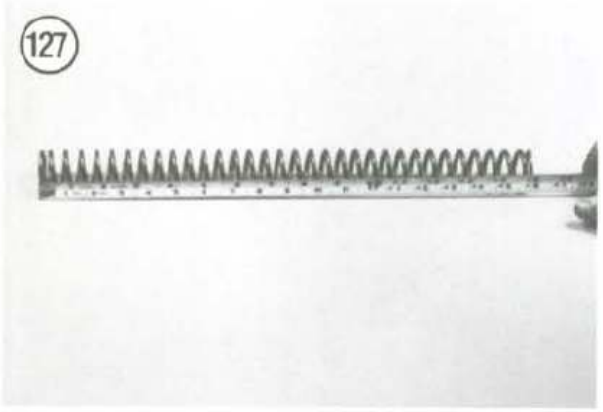






8. To replace the guide bushings on the lower end of the fork tube (A, **Figure 125**), open the bushings's slot with a screwdriver and slide the bushing off of the fork tube. Lubricate the new bushing (inside and out) with fork oil (**Table 7**) and slide the bushing onto the fork tube. The slider guide bushing (B, **Figure 125**) will be installed during fork assembly.

9. Measure the uncompressed length of the fork spring (**Figure 127**) with a tape measure and compare to specifications in **Table 2**; replace if necessary.



NOTE

If one fork spring is replaced, compare the measurement of the new and the remaining old spring. If the length difference is great between a new spring and the old usable spring, it is best to replace both springs to keep the forks balanced.

10. Replace the fork cap O-ring if severely worn or damaged.

11. Check the pushrod for bending or damage. Check the valve unit on the end of the pushrod (**Figure 128**) for looseness or damage.

12. Replace the cylinder valve O-ring(s) (A, **Figure 129**) if severely worn or damaged.

13. Check the cylinder valve threads (C, **Figure 129**) for damage; replace if necessary.

14. Check the oil and dust seals (**Figure 130**) for wear or damage. Replace if necessary.

11

Assembly

1. Prior to assembly, perform the *Inspection* procedure to make sure all worn or defective parts have

been repaired or replaced. All parts should be thoroughly cleaned before assembly.

2. Coat all parts with the fork oil recommended in **Table 7**.

3. Slide the pushrod into the cylinder so that the valve unit on the bottom of the pushrod is at the bottom of the cylinder as shown in **Figure 128**.

4. Slide the oil lock piece (A, **Figure 131**) over the pushrod. The shoulder on the oil lock piece should be facing down as shown in B, **Figure 131**.

5. Slide the small rebound spring onto the cylinder as shown in B, **Figure 126**.

6. Slide the cylinder (A, **Figure 132**) into the fork tube (B, **Figure 132**).

7. Slide the fork tube (B, **Figure 132**) into the slider (C, **Figure 132**).

8. Install the cylinder valve assembly (**Figure 129**) as follows:

a. Apply a liquid gasket sealer to both sides of the cylinder valve gasket (B, **Figure 129**) and slide the gasket onto the cylinder valve.

b. Apply Loctite 242 (blue) onto the cylinder valve threads (C, **Figure 129**).

c. Install the front fork cylinder holder into the fork tube (**Figure 119**) and engage it into the top of the cylinder.

d. Apply some pressure to the front fork cylinder holder and thread the cylinder valve (**Figure 121**) into the end of the cylinder.

e. Hold the fork cylinder holder with a wrench and tighten the front fork cylinder valve (**Figure 120**) to the torque specification listed in **Tables 3-5**. Remove the fork cylinder holder.

NOTE

*The guide bushing can be installed with an oil seal driver (A, **Figure 133**) or a piece of tubing and suitable plate that fits over the fork tube. Oil seal drivers can be purchased from Kawasaki dealers.*

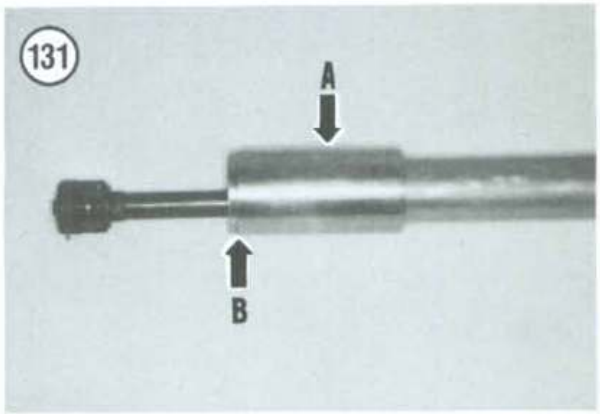
9. Slide the guide bushing (D, **Figure 124**) over the fork tube and position it so that the slit in the bushing (B, **Figure 133**) faces toward the front wheel when slider is mounted on the bike.

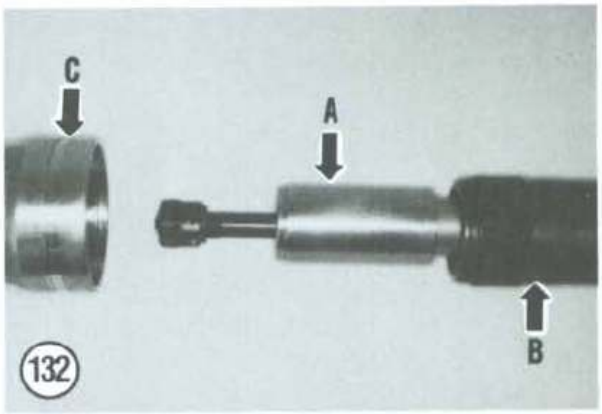
10. Drive the bushing (gently) into the slider with the Kawasaki front fork oil seal driver or equivalent (A, **Figure 133**) until it bottoms out. If you have an old bushing, place it between the new bushing and the oil seal driver during installation; remove the old bushing when the new one is installed.

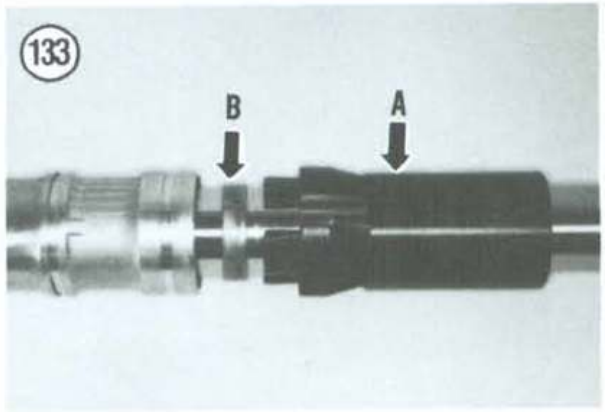
11. Slide the washer (C, **Figure 124**) down the fork tube until it sets on top of the bushing.

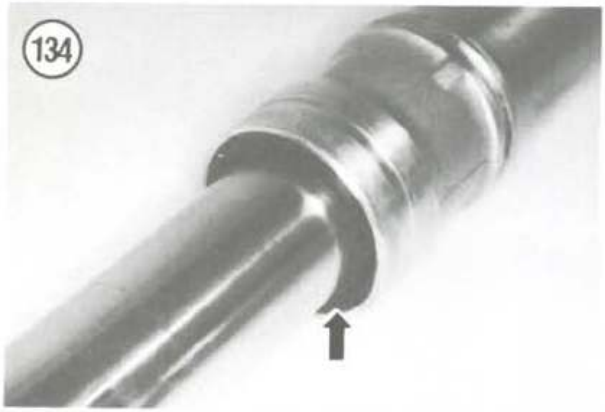
12. To prevent damage to the inner surface of the oil seal, place a plastic bag over the end of the tube.

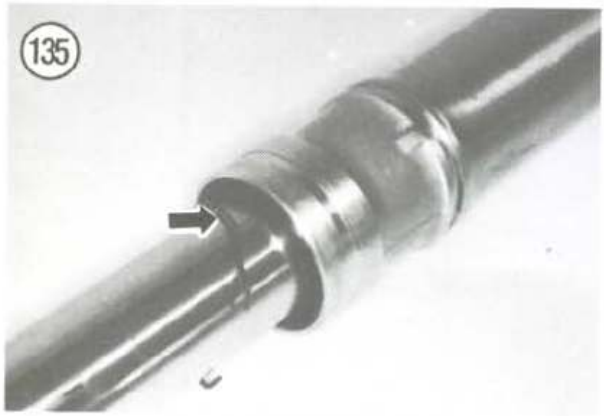
13. Coat the new oil seal with fork oil. Position the seal (B, **Figure 124**) with its manufacturer's marks facing up and slide it over the plastic bag and down the fork tube. Drive the seal into the fork slider with the same tool used in Step 10 until the snap ring

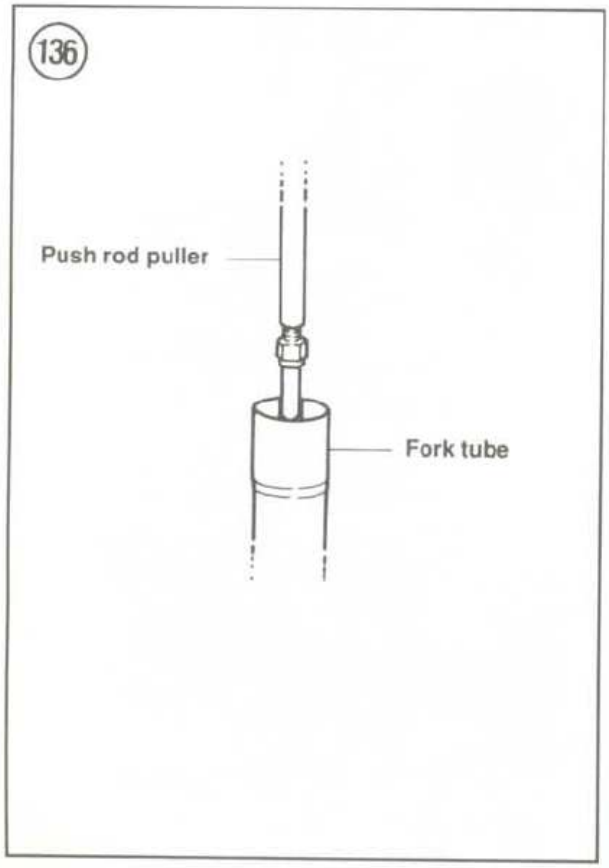












groove in the slider can be seen above the top surface of the oil seal (**Figure 134**).

14. Install the snap ring (**Figure 135**). Make sure the snap ring is completely seated in the groove in the slider.

15. Slide the dust seal (A, **Figure 124**) over the plastic bag and seat it into the top of the slider.

NOTE

Refill the forks with oil and adjust the fork oil level before installing the forks as described in Steps 16-21.

16. Compress the fork tube completely.

17. Thread the Kawasaki pushrod puller (part No. 57001-1289) or equivalent onto the end of the pushrod (**Figure 136**).

18. Fill the fork tube with slightly less than the specified quantity of oil (**Table 8**).

NOTE

The amount of oil poured in is not as accurate a measurement as the actual level of the oil. You may have to add more oil later in this procedure.

19. Slowly pump the pushrod up and down until the pushrod moves smoothly.

20. Allow the oil to settle for a few minutes. Then measure the distance from the top of the fork tube to the top of the fork oil with a rod (**Figure 137**). Refer to **Table 8** for the correct specifications.

21. Add or remove enough oil to meet your bike's fork oil level specification in both fork tubes. A siphon or fork oil level gauge can be used to siphon out fork oil.

22. Slide the fork tube into the steering stem and tighten the lower pinch bolts.

23. Remove the push rod puller from the end of the pushrod (**Figure 136**).

24. Thread the pushrod nut onto the pushrod as shown in **Figure 138**.

NOTE

*After installing the spring in (A, **Figure 139**), use it to hold the pushrod in place until the fork cap can be installed. If not, the pushrod (**Figure 138**) will slide down into the fork tube.*

25. Install the spring (A, **Figure 139**) over the pushrod so that the seal on the bottom of the spring faces *down* (**Figure 140**).

26A. On 1988 models, perform the following:

a. Install the lower spring seat (B, **Figure 139**).

b. Install the spacer and the upper spring seat (**Figure 141**).

26B. On 1989 models, install the spring seat (B, **Figure 139**).

27. Thread the fork cap (B, **Figure 142**) onto the pushrod (A, **Figure 142**). Then hold the pushrod nut with a wrench and tighten the fork cap securely.

28. Wipe the fork cap threads with fork oil.

29. Place the fork cap in position and push it down with a speed bar and socket, carefully threading the cap into the fork tube. Tighten the fork cap securely.

30. Tighten the fork tube pinch bolts to the torque specification listed in **Tables 3-5**.

31. Install the handlebar as described in this chapter.

FORK SERVICE (1989 EUROPEAN AND ALL 1990 KX125 AND KX250 MODELS)

Refer to **Figure 143** when servicing the front fork in the following section.

NOTE

*If you are servicing a 1989 U.S. or Canadian model, refer to **Fork Service (1988 and 1989 Models Sold In The U.S. And Canada)**.*

Air Pressure Release

These forks are designed to operate without adding air pressure to them. And because air pressure in the forks increase as the forks heat up, each fork should be bled of all air pressure before each practice session and moto.

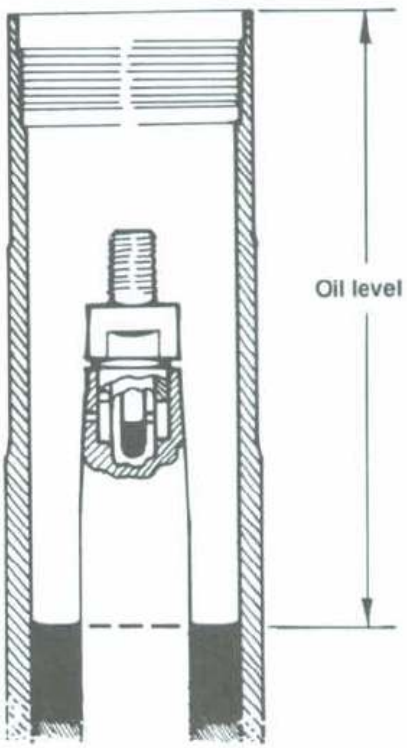
1. Support the bike so that the front wheel clears the ground.

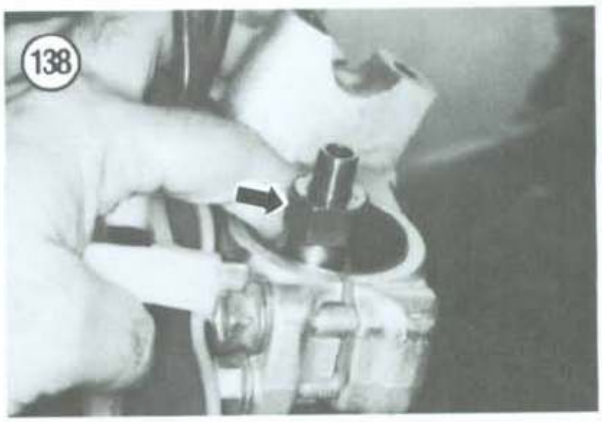
2A. On 1989 models, remove the screw installed in the center of the fork cap (**Figure 144**), then reinstall it.

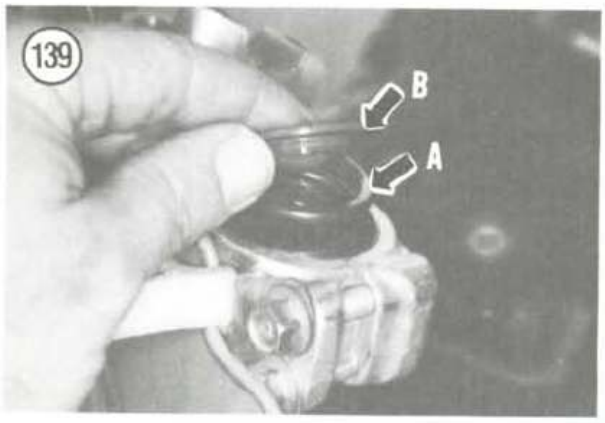
2B. On 1990 models, remove the screw mounted off-center in the fork cap (**Figure 145**), then reinstall it.

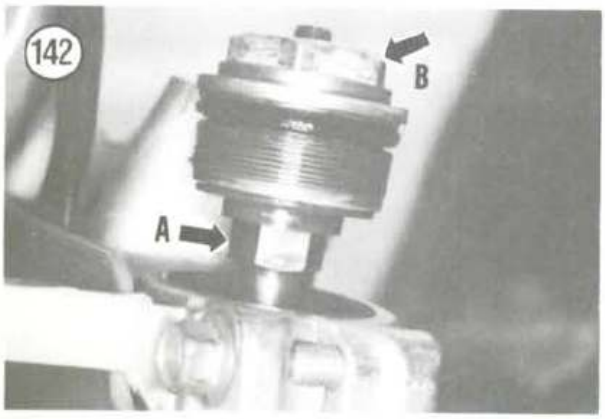
3. Repeat for the opposite side.

137









Rebound Damping Adjustment (1990)

Rebound damping affects how quickly the forks rebounds. Rebound damping adjustments are made by turning the adjuster screw in the top center of each fork cap (**Figure 145**) with a straight tipped screw driver.

1. Rebound damping can be adjusted to 16 different settings. The standard settings after turning the adjuster full counterclockwise are 8-9 clicks.
2. To make the rebound damping softer, turn the rebound adjuster *counterclockwise* (**Figure 145**). For harder rebound damping, turn the adjuster *clockwise*. Each adjuster clip represents 1 adjustment position.

CAUTION

Always adjust both fork tubes to the same setting. If you are unsure of the forks rebound damping adjustment setting, turn the adjuster all the way clockwise (full soft). This locates the adjuster at its seated position. Then count the clicks as you turn the adjuster counterclockwise.

Compression Damping Adjustment

Compression damping affects how quickly the front forks compress. Compression damping adjustments are made by turning the adjuster screw in the bottom of the fork tube (**Figure 146**, typical) with a straight tipped screwdriver. Adjust as follows:

1. Clean the bottom of both fork tubes and remove the rubber cap from each fork tube.
2. Compression damping can be adjusted to 16 different settings. The standard setting is 8 clicks after turning the adjuster clockwise to full stop. To make the compression damping softer, turn the compression adjuster *counterclockwise* as viewed from the front of the fork tube (**Figure 146**). For harder damping, turn the adjuster *clockwise*. Each adjuster click represents 1 adjustment position.

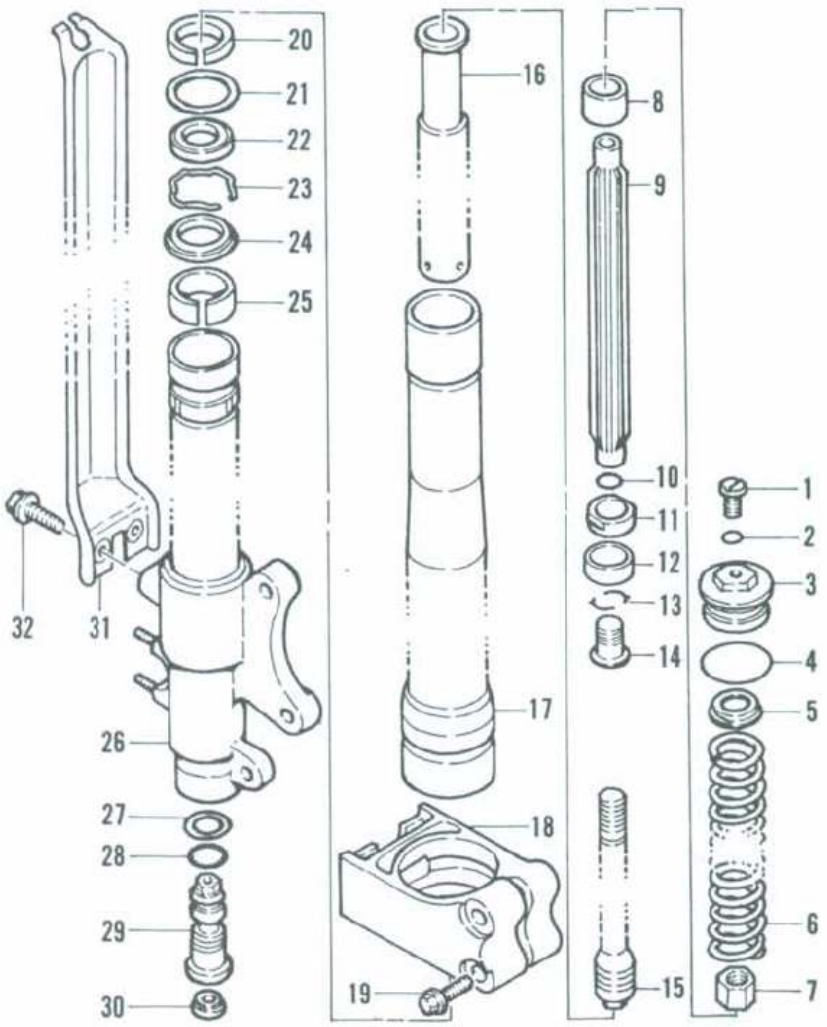
CAUTION

Always adjust both fork tubes to the same setting.

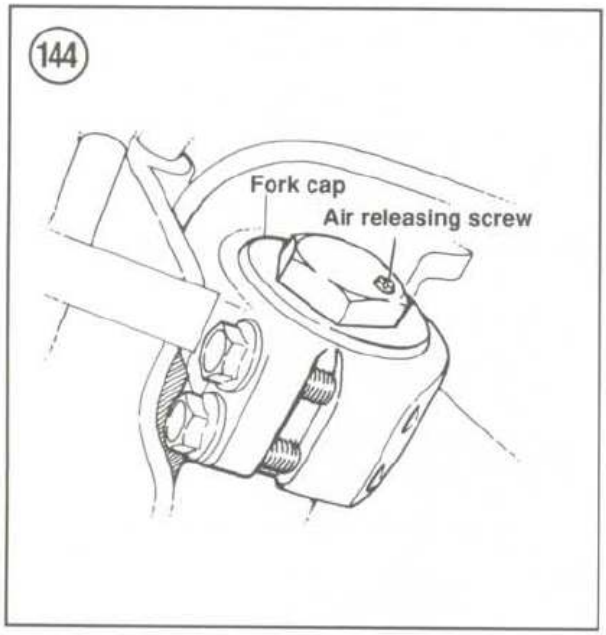
3. Install the rubber caps to prevent dirt and mud from obstructing the adjustment hole and screw head.

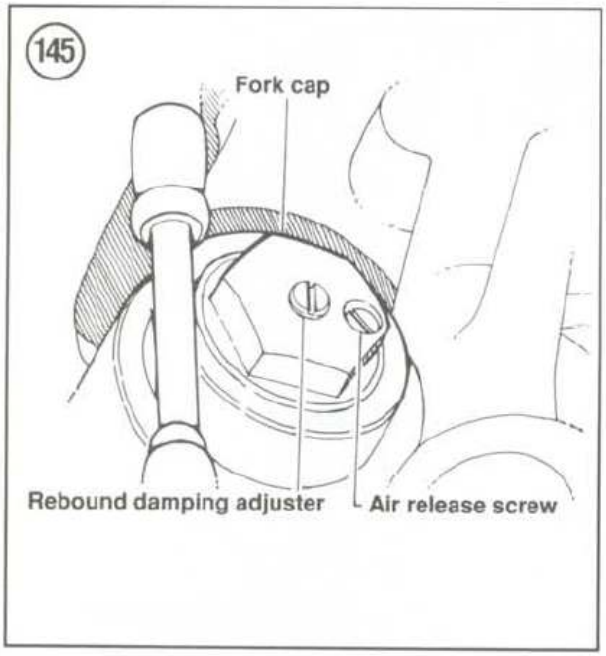
(143)

FRONT FORK
(1989 EUROPEAN MODELS; 1990 KX125 AND KX250)



1. Air bleed screw
2. O-ring
3. Fork cap
4. O-ring
5. Spring seat(s)
6. Fork spring
7. Pushrod nut
8. Collar
9. Spring guide
10. O-ring
11. Guide stay nut
12. Oil lock piston
13. Split ring keepers
14. Piston holder
15. Pushrod
16. Inner cylinder
17. Outer tube
18. Fork guide
19. Bolt
20. Outer tube bushing
21. Washer
22. Oil seal
23. Snap ring
24. Dust seal
25. Inner tube bushing
26. Inner tube
27. Gasket
28. O-ring
29. Cylinder valve
30. Plug
31. Protector
32. Bolt





Front Fork Tube Height

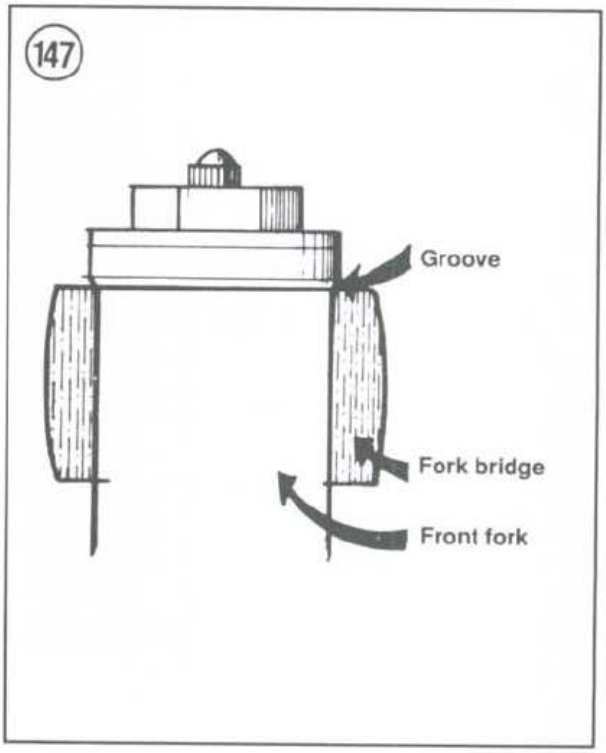
Varying the fork tube height in the steering stem will change your bike's steering characteristics. When the fork tubes are raised, the steering becomes quicker but is less stable on tracks with long straights. When the fork tubes are lowered, the steering is slower but the bike is more stable on long tracks with long straights.

The standard fork tube height is when the groove in the top of each fork tube aligns with the top of the steering stem (**Figure 147**).

1. Place the bike on a stand so that the front wheel clears the ground.
2. Loosen the fork tube pinch bolts.
3. Raise or lower the fork tubes in 5 mm (0.2 in.) increments (**Figure 147**). Make sure the front tire does not rub against the fender when the fork tubes are bottomed out.
4. Tighten the fork tube pinch bolts to the torque specifications in **Tables 3-5**.

Removal/Installation

1. Remove the front wheel as described in this chapter.



2. Disconnect the front brake hose at the left-hand fork tube.

3. Remove the front fork protectors.

4. Remove the brake caliper as described in Chapter Thirteen.

NOTE

Insert a wood or plastic spacer in the caliper in place of the disc. That way, if the brake lever is inadvertently squeezed, the piston will not be forced out of the caliper. If it does happen, the caliper might have to be disassembled to reseat the piston. By using the spacer, bleeding the brake is not necessary when installing the wheel.

CAUTION

When performing Step 5A or 5B, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

5A. On 1989 models, remove the screw installed in the center of the fork cap (**Figure 144**), then reinstall it.

5B. On 1990 models, remove the screw mounted off-center in the fork cap (**Figure 145**), then reinstall it.

6. Loosen the upper and lower fork tube pinch bolts.

7. If the fork tubes are to be disassembled, perform the following at this time:

a. Pull the fork tubes down approximately 100 mm (3.9 in.) and tighten the lower fork tube pinch bolt.

b. Loosen, but do not remove, the fork cap assemblies.

8. Loosen the lower fork tube pinch bolt.

9. Pull the fork tubes down and remove them.

10. Install by reversing these removal steps. Note the following.

11. Tighten the fork tube pinch bolts to the torque specification in **Tables 3-5**.

12. Install and tighten the brake caliper as described in Chapter Thirteen.

13. After installing the front wheel, squeeze the front brake lever. If the brake lever feels spongy, bleed the brake as described under *Bleeding the System* in Chapter Thirteen.

Disassembly

The following tools will be required to disassemble and reassemble the fork tubes:

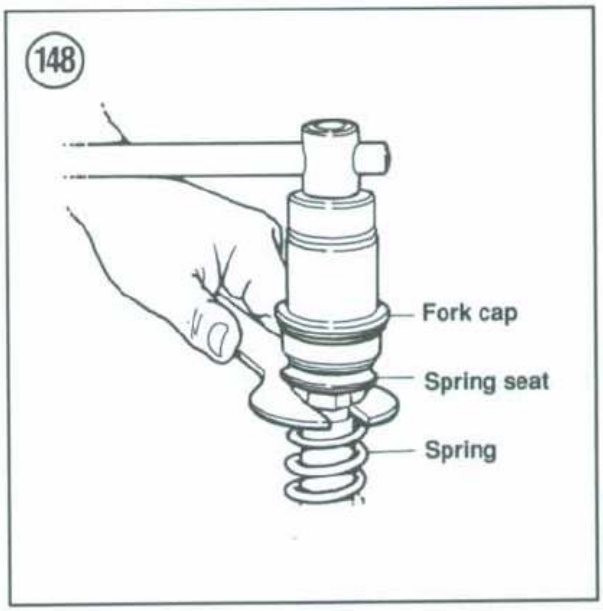
a. Front fork oil seal driver: Kawasaki part No. 57001-1288.

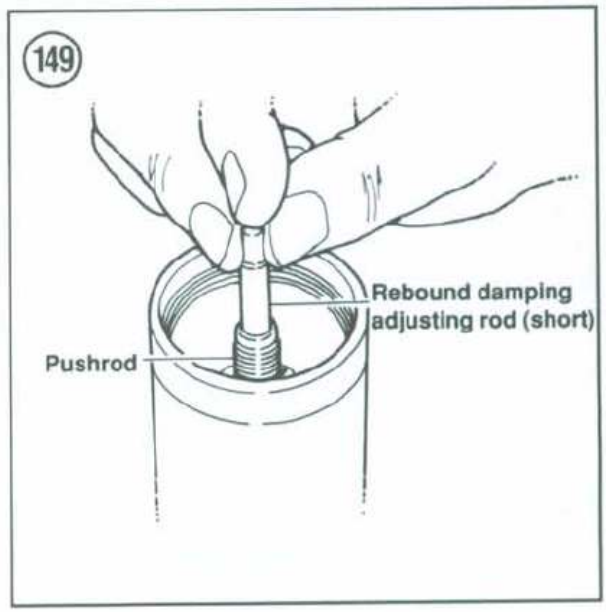
b. Front fork cylinder holder (B, **Figure 113**): Kawasaki part No. 57001-1287.

c. 14 mm hex head socket.

d. Pushrod rod puller: Kawasaki part No. 57001-1289.

e. Pushrod rod puller rubber plug: Kawasaki part No. 92066-1189.





CAUTION

When performing Step 1, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

1A. On 1989 models, remove the screw installed in the center of the fork cap (**Figure 144**), then reinstall it.

1B. On 1990 models, remove the screw mounted off-center in the fork cap (**Figure 145**), then reinstall it.

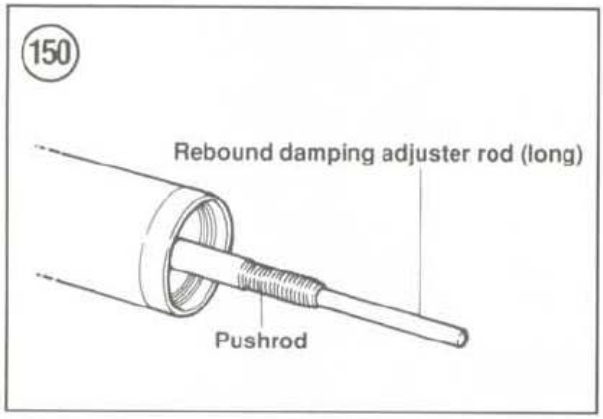
2. Spread some newspapers or clean shop cloths on your workbench to place the fork spring assembly after removing it.

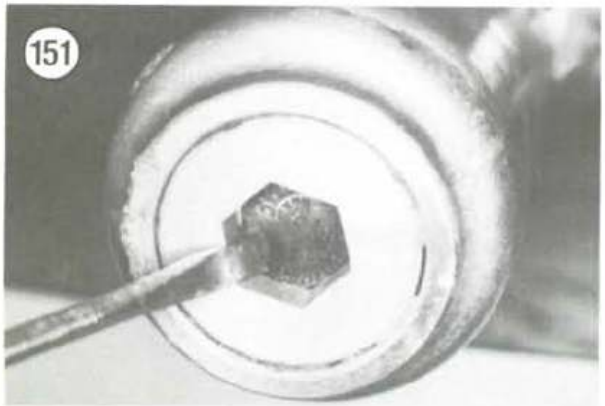
NOTE

The fork cap is under spring pressure. Remove the cap slowly and don't let if fly off when it is released from the fork tube.

WARNING

If the fork tubes are bent the fork cap may be under considerable spring pressure. Do not attempt to remove the fork cap. Allow a qualified mechanic to remove the cap and repair the forks for you.





3. The fork cap should have been loosened during fork removal. If not, reinstall the fork tube into the steering stem and tighten the lower fork tube pinch bolt. Loosen the fork cap and remove the fork tube.

4. Loosen the fork cap and release it from the fork tube.

5. To remove the fork cap from the pushrod, perform the following:

a. Pull the fork spring down and install the Kawasaki fork spring holder (part No. 57001-1286) or equivalent under the pushrod nut (**Figure 148**), effectively holding the fork spring away from the pushrod nut.
b. Hold the pushrod nut with a wrench.
c. While holding the spring and pushrod nut with the 2 wrenches, loosen the fork cap with a socket or wrench (**Figure 148**).
d. Remove the fork cap and the spring seat(s).
e. Remove 2 wrenches used to hold the spring and pushrod nut.

6. Remove the fork spring.

7. Remove the rebound damping adjuster rod (short) from the end of the pushrod (**Figure 149**).

8. Turn the fork over a drain pan and pump the pushrod up and down to drain the fork oil. While doing this, the rebound damping adjuster rod (long) may slide out of the pushrod (**Figure 150**).

9. Remove the rebound damping adjuster rod (long) from the pushrod if it did not slide out in Step 8.

10. Remove the pushrod nut from the end of the pushrod. Then remove the collar and spring guide.

11. Disassemble and remove the oil lock piston assembly as follows:

a. Slide the O-ring away from the guide stay nut.
b. Hold the piston holder with a wrench and unscrew the guide stay nut. Separate both parts.
c. Slide the piston back slightly and remove the 2 split ring keepers.
d. Remove the O-ring, guide stay nut, oil lock piston and piston holder from the pushrod.

12. To loosen and remove the cylinder valve from the inner tube, perform the following:

a. Remove any dirt from the cylinder valve and then remove the rubber plug (**Figure 151**).
b. Push the inner tube into the outer tube slowly until it bottoms out.

c. Slowly push the pushrod into the inner tube until the end of the pushrod is no longer exposed.
d. Slide the fork cylinder holder into the inner tube and engage it with the top of the inner cylinder (**Figure 152**).
e. Apply pressure to the fork cylinder holder and loosen the cylinder valve with a hex head socket.
f. Remove the cylinder valve and its gasket.

13. Slide the inner cylinder/pushrod assembly out of the inner tube.
14. Carefully remove the dust seal from the outer tube and slide it up the inner tube.
15. Remove the snap ring from the groove in the outer tube. Discard the snap ring as a new one should be installed.

NOTE

There is an interference fit between the inner tube guide bushing and the outer tube guide bushing. Separate the inner and outer tubes as described in Step 16.

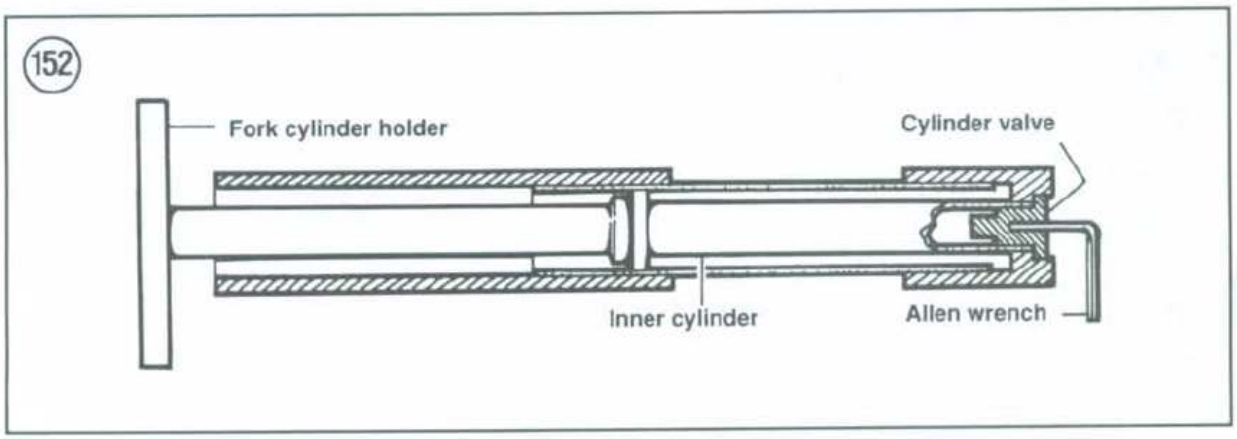
16. Hold the outer tube securely and pull hard on the inner tube using quick in-and-out strokes. This will withdraw the oil seal, washer and bushing (**Figure 153**) and separate the tubes.
17. Insert a screwdriver into the inner tube guide bushing slot, open the bushing slightly and slide it off of the inner tube.
18. Remove the following parts from the inner tube:
    a. Outer tube guide bushing.
    b. Washer.
    c. Oil seal.
    d. Snap ring.
    e. Dust seal.

Inspection

NOTE

*When cleaning the guide bushings (**Figure 154**) in Step 1, handle them carefully to avoid scratching or removing any of their Teflon coating. If there is any metal powder clinging to the guide bushings, clean then with fork oil and a nylon brush.*

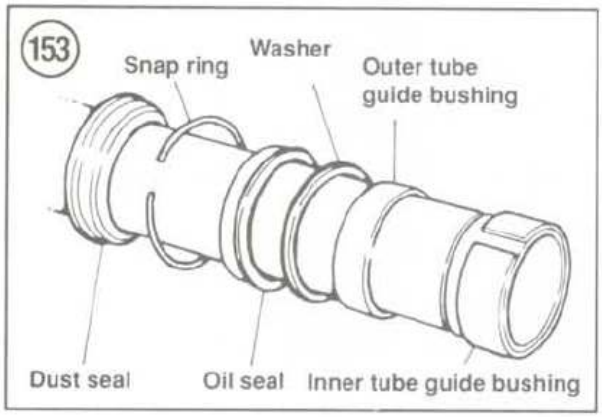
1. Initially clean all of the fork parts in solvent, first making sure that the solvent will not damage the rubber parts. Then clean with soap and water and rinse with plain water. Dry thoroughly.
2. Check the inner tube for straightness. If bent, refer service to a Kawasaki dealer.
3. Check the inner tube for nicks, rust, chrome flaking or creasing that will damage the oil seals.; this condition will damage oil seals. Replace the inner tube if necessary.
4. Check the outer tube oil seal bore for dents or other damage that would allow oil leakage. Check the circlip groove for damage; replace if necessary.
5. Check the inner cylinder for straightness by rolling it on a surface plate or thick piece of glass. Any clicking noise indicates a bent rod.
6. Check the guide bushings (A and B, **Figure 154**) for scoring, scratches or severe wear. The guide bushings are worn when the Teflon coating is worn to a point where the bushing is discolored. Replace the guide bushings in both fork tubes as a set.
7. Measure the uncompressed length of the fork spring (**Figure 155**) with a tape measure and compare to specifications in **Table 2**; replace if necessary.

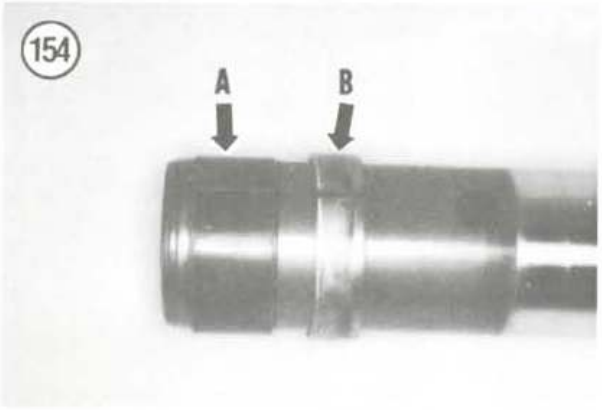


NOTE

If one fork spring is replaced, compare the measurement of the new and the remaining old spring. If the length difference is great between a new spring and the old usable spring, it is best to replace both springs to keep the forks balanced.

8. Check the pushrod for bending or damage. Check the valve unit on the end of the pushrod for looseness or damage.





9. Replace worn or damaged O-rings.
10. Check the cylinder valve threads for damage; replace if necessary.
11. Check the oil and dust seals for wear or damage. Replace if necessary.

Assembly

1. Prior to assembly, perform the *Inspection* procedure to make sure all worn or defective parts have been repaired or replaced. All parts should be thoroughly cleaned before assembly.
2. Coat all parts with the fork oil recommended in **Table 7**.
3. Assemble the oil lock piston assembly as follows (**Figure 156**):
   a. Slide the pushrod through the bottom of the inner cylinder. Locate the groove machined in the pushrod.
   b. Slide the piston holder onto the pushrod.
   c. Slide the oil lock piston onto the pushrod so that its notched side faces toward the piston holder installed in sub-step b.
   d. Slide the oil lock piston onto the piston holder.
   e. Install the 2 split ring keepers into the groove in the pushrod and hold them in place with your fingers. Then slide the piston holder over the keepers, locking them in place.
   f. Slide the guide stay nut onto the pushrod and thread it onto the piston holder. Hold the piston holder and tighten the guide stay nut to the torque specification in **Tables 3-5**.
   g. Wipe the pushrod O-ring with fork oil and slide it onto the pushrod until it is seated against the guide stay nut.
   h. Set the inner cylinder/pushrod assembly aside for now.
4. Install the following parts onto the inner tube as follows (**Figure 153**):

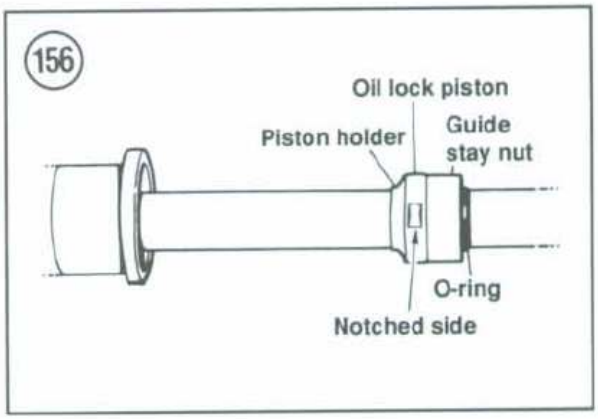
NOTE

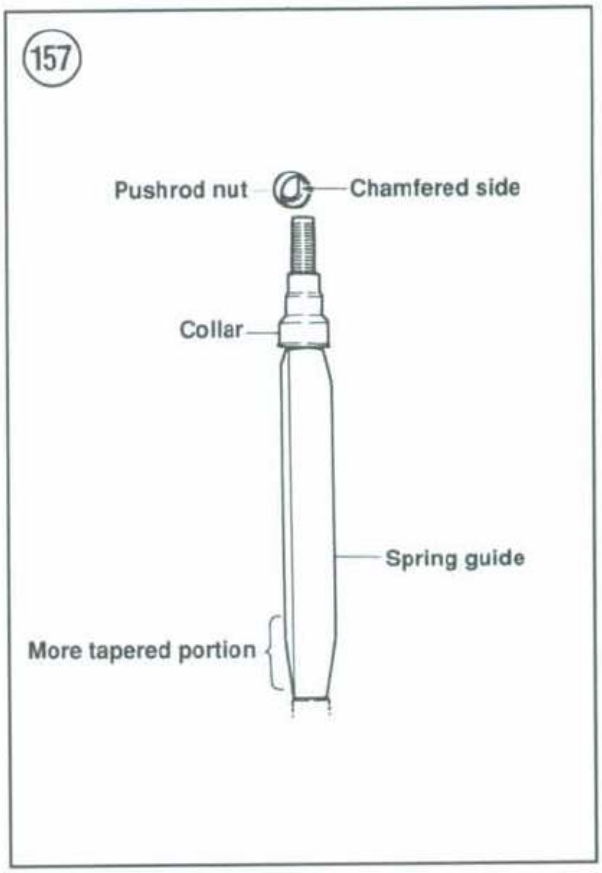
To avoid damaging the dust and oil seals when installing them over the inner fork tube in the following steps, place a plastic bag over the end of the tube. Then coat the bag with fork oil and slide the seals over the bag and onto the inner tube.

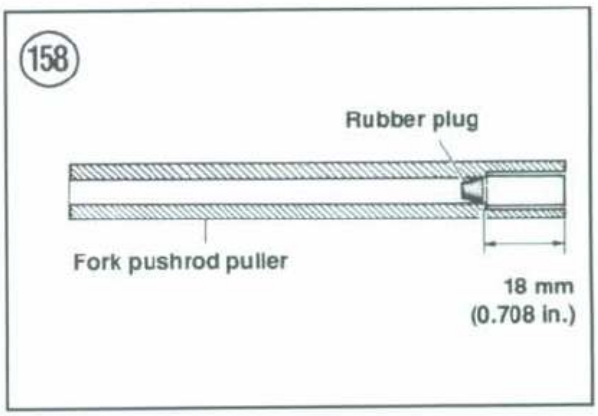
   a. Dust seal.
   b. Circlip.

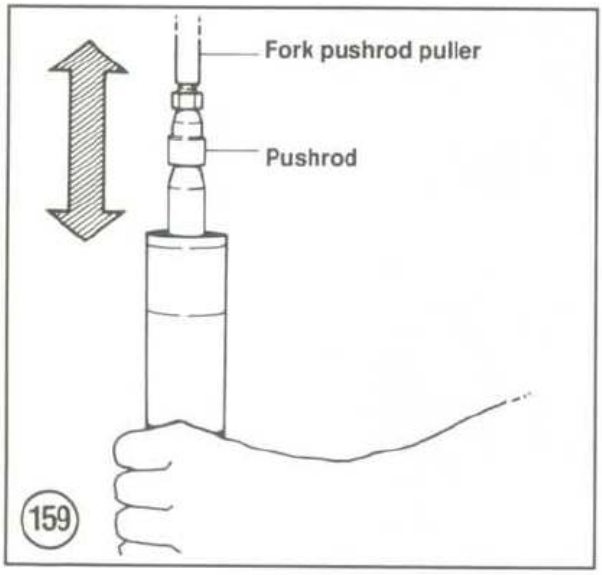
c. Oil seal.
d. Washer.
e. Outer tube guide bushing.
f. Inner tube guide bushing. Seat the bushing into the groove in the end of the inner tube.

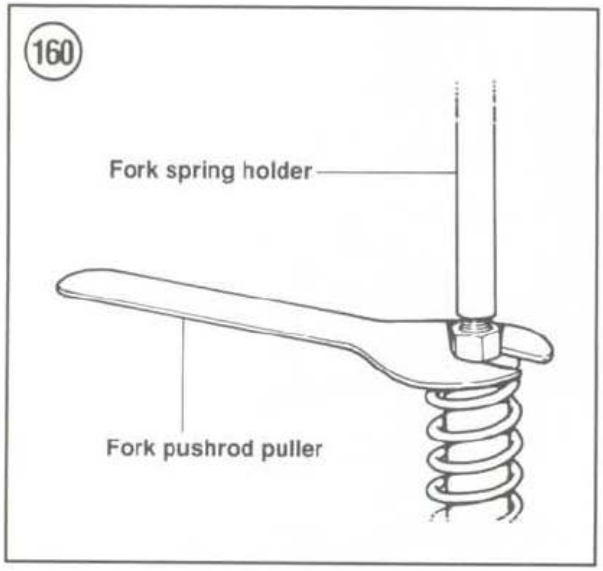
5. Install the inner cylinder into the inner tube and carefully bottom it out. Slowly push the pushrod into the inner tube until the end of the pushrod is no longer exposed.
6. Install and tighten the cylinder valve as follows:
   a. Install a new copper washer onto the cylinder valve. Coat the cylinder valve O-rings with fork oil.
   b. Apply Loctite 242 (blue) to the cylinder valve threads prior to installation.
   c. Slide the fork cylinder holder into the inner tube and engage it with the top of the inner cylinder (**Figure 152**).
   d. Apply pressure to the fork cylinder holder and thread the cylinder valve into the end of the inner cylinder.
   e. Hold the fork cylinder holder securely and tighten the cylinder valve to the torque specification listed in **Tables 3-5**. Remove the fork cylinder holder.
7. Install the inner tube into the outer tube.
8. Install the outer tube guide bushing as follows:
   a. Turn the fork assembly so that the outer tube is at the bottom.
   b. Slide the outer tube guide bushing down the inner tube until it rests against the outer tube. Slide the washer down so that it rests against the guide bushing.
   c. Drive the bushing (with the washer on top of it) into the outer tube until it bottoms out. Use the Kawasaki fork oil seal driver (part No. 57001-1340) or equivalent to install the bushing.
9. Install the oil seal as follows:
   a. Drive the oil seal into the outer tube with the same tool used in Step 8.
   b. Drive the seal into place until the snap ring groove in the outer tube is visible above the oil seal.
10. Install a *new* snap ring into the outer tube groove. Make sure the snap ring is completely seated in the groove in the outer tube.
11. Slide the dust seal down the inner tube and seat it into the outer tube.

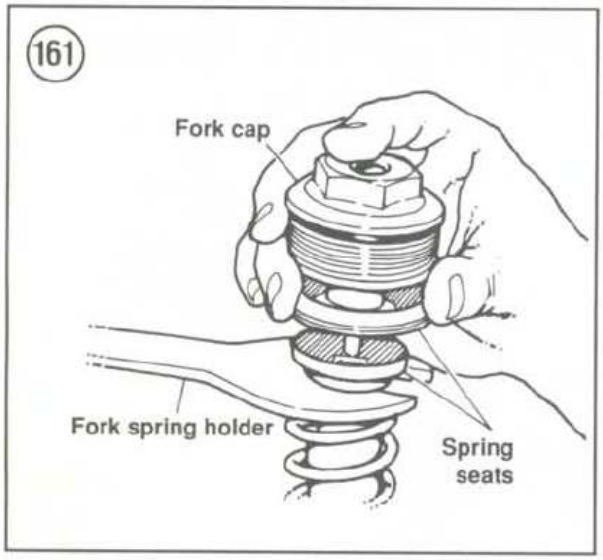








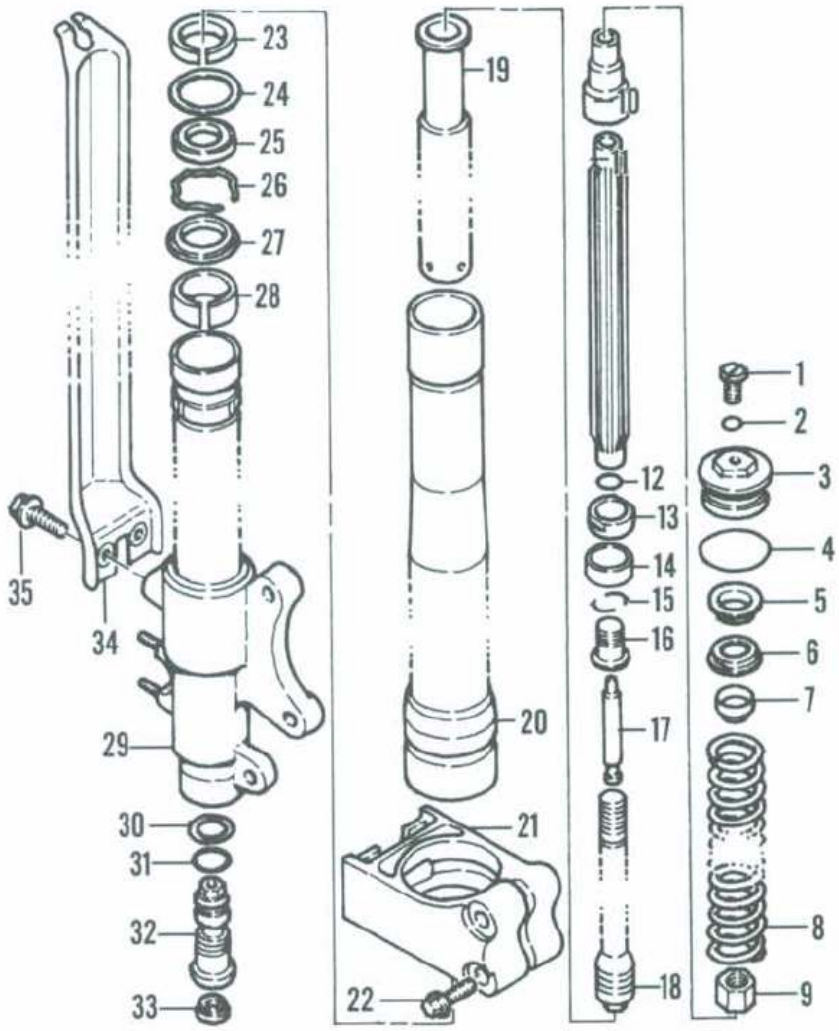




12. Install the spring guide over the pushrod so that its tapered part is at the bottom (**Figure 157**).
13. Install the collar onto the spring guide (**Figure 157**).
14. Install the pushrod nut so that its chamfered side faces toward the collar (**Figure 157**). Tighten the pushrod nut to the torque specification listed in **Table 3** and **Table 4.**
15. Insert the rebound damping adjuster rod (long) into the pushrod (**Figure 150**).
16. Insert the rebound damper adjuster rod (short) into the pushrod (**Figure 149**) so that the holder part faces toward the adjuster pipe.
17. Add fork oil, bleed and adjust its level as follows. The Kawasaki fork pushrod puller (part No. 57001-1289) and rubber plug (part No. 92066-1189) will be required.
    a. Fill the fork tube with the amount of fork oil specified in **Table 8** or **Table 9**.
    b. Compress the front fork and measure the oil level with an oil level tool. Adjust the oil level, maintaining it within the oil level range specified in **Table 8** or **Table 9**.
    c. Insert the rubber plug into the fork pushrod puller to the depth shown in **Figure 158**. The rubber plug will prevent oil from spilling out the top of the fork pushrod puller during the bleeding process.
    d. Thread the fork pushrod puller onto the end of the pushrod (**Figure 159**).
    e. Slowly work the pushrod up and down until it moves smoothly, indicating all air has been bled out of the fork tube. Work carefully so that you don't spill any of the fork oil.
    f. When the pushrod moves smoothly, proceed to Step 18. Do not remove the fork pushrod puller.
18. Install the fork spring over the pushrod (**Figure 160**).
19. Pull the fork spring down and install the fork spring holder underneath the pushrod nut (**Figure 160**).
20. Remove the fork spring holder (**Figure 160**).
21. Install the spring seats as shown in **Figure 161**.
22. Thread the fork cap (**Figure 161**) onto the pushrod.
24. Remove the fork spring holder.
25. Install the fork tube into the steering stem and tighten the lower fork tube pinch bolts to the torque specification in **Tables 3-5**.

(162)

FRONT FORK
(1991 KX125 AND KX250; 1990-ON KX500)



1. Air bleed screw
2. O-ring
3. Fork cap
4. O-ring
5. Spring seat (1991-on)
6. Spring seat (1990)
7. Guide (1990)
8. Fork spring
9. Pushrod nut
10. Collar (1992 only)
11. Spring guide
12. O-ring
13. Guide stay nut
14. Oil lock piston
15. Split ring keeper
16. Piston holder
17. Rebound damping adjuster (short)
18. Pushrod
19. Inner cylinder
20. Outer tube
21. Fork guide
22. Bolt
23. Outer tube bushing
24. Washer
25. Oil seal
26. Snap ring
27. Dust seal
28. Inner tube bushing
29. Inner tube
30. Gasket
31. O-ring
32. Cylinder valve
33. Plug
34. Protector
35. Bolt

25. Install the fork tube into the steering stem and tighten the lower fork tube pinch bolts to the torque specification in **Tables 3-5**.
26. Thread the fork cap into the outer tube and tighten it to the torque specification in **Tables 3-5**.
27. Tighten the upper fork tube pinch bolts to the torque specification in **Tables 3-5**.

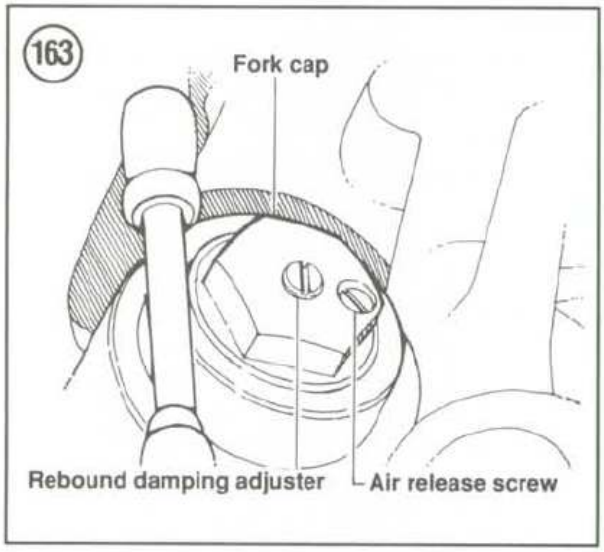
FORK SERVICE (1991 KX125 AND KX250; 1990-ON KX500)

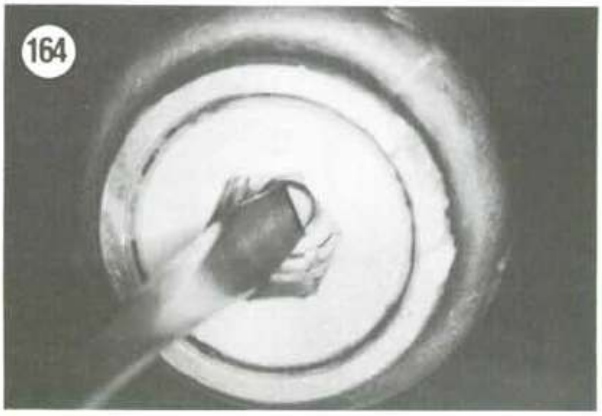
Refer to **Figure 162** when servicing the front fork in the following section.

Air Pressure Release

These forks are designed to operate without adding air pressure. And because air pressure in the forks increase as the forks heat up, each fork should be bled of all air pressure before each practice session and moto.

1. Support the bike so that the front wheel clears the ground.
2. Remove the screw mounted off-center in the fork cap (**Figure 163**), then reinstall it.
3. Repeat for the opposite side.





Rebound Damping Adjustment

Rebound damping affects how quickly the forks rebound. Rebound damping adjustments are made by turning the adjuster screw in the top center of each fork cap (**Figure 163**) with a straight tipped screw driver.

1. Rebound damping can be adjusted to different settings. The standard settings after truning the adjuster full counterclockwise are listed in **Table 10**.
2. To make the rebound damping softer, turn the rebound adjuster *counterclockwise* (**Figure 163**). For harder rebound damping, turn the adjuster *clockwise*. Each adjuster clip represents 1 adjustment position.

CAUTION

Always adjust both fork tubes to the same setting.

Compression Damping Adjustment

Compression damping affects how quickly the front forks compress. Compression damping adjustments are made by turning the adjuster screw in the bottom of the fork tube (**Figure 164**) with a straight tipped screwdriver. Adjust as follows:

1. Clean the bottom of both fork tubes and remove the rubber cap from each fork tube.
2. Compression damping can be adjusted to different settings. The standard setting (**Table 10**) is the number of clicks after turning the adjuster clockwise to full stop. To make the compression damping softer, turn the compression adjuster *counterclockwise* as viewed from the front of the fork tube (**Figure 164**). For harder damping, turn the adjuster *clockwise*. Each adjuster click represents 1 adjustment position.

CAUTION

Always adjust both fork tubes to the same setting.

3. Install the rubber caps to prevent dirt and mud from obstructing the adjustment hole and screw head.

Front Fork Tube Height

Varying the fork tube height in the steering stem will change your bike's steering characteristics. When the fork tubes are raised, the steering becomes quicker but is less stable on tracks with long straights. When the fork tubes are lowered, the steering is slower but the bike is more stable on long tracks with long straights.

The standard fork tube height is when the top of each fork tube aligns with the top of the steering stem (**Figure 165**).

1. Place the bike on a stand so that the front wheel clears the ground.
2. Loosen the fork tube pinch bolts.
3. Raise or lower the fork tubes in 5 mm (0.2 in.) increments (**Figure 165**). Make sure the front tire does not rub against the fender when the fork tubes are bottomed out.
4. Tighten the fork tube pinch bolts to the torque specifications in **Tables 3-5**.

Front Fork Oil Change and Oil Level Adjustment

The front forks must be removed from the bike and partially disassembled to change the fork oil and to check and adjust the oil level. When this type of service is required, refer to the front fork *Disassembly* and *Reassembly* procedures in this chapter.

Removal/Installation

1. Remove the front wheel as described in this chapter.
2. Disconnect the front brake hose at the left-hand fork tube.
3. Remove the front fork protectors.
4. Remove the brake caliper as described in Chapter Thirteen.

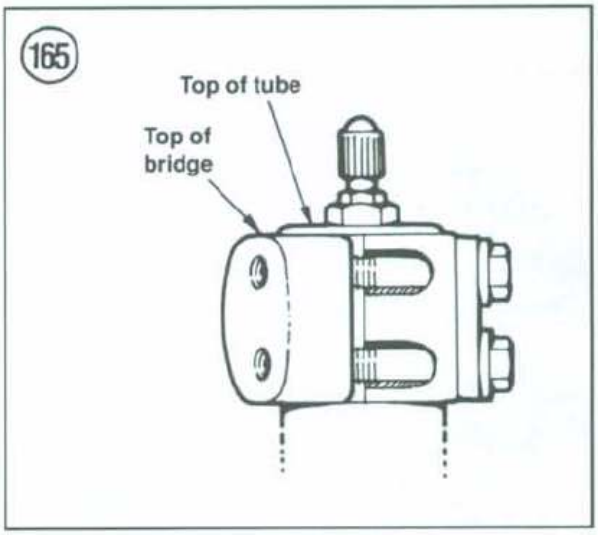
NOTE

Insert a wood or plastic spacer in the caliper in place of the disc. That way, if the brake lever is inadvertently squeezed, the piston will not be forced out of the caliper. If it does happen, the caliper might have to be disassembled to reseat the piston. By using the spacer, bleeding the brake is not necessary when installing the wheel.

CAUTION

When performing Step 4, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

5. Remove the screw mounted off-center in the fork cap (**Figure 163**), then reinstall it.
6. Loosen the upper and lower fork tube pinch bolts.
7. If the fork tubes are to be disassembled, perform the following at this time:
   a. Pull the fork tubes down approximately 100 mm (3.9 in.) and tighten the lower fork tube pinch bolt.
   b. Loosen, but do not remove, the fork cap assemblies.
8. Loosen the lower fork tube pinch bolt.
9. Pull the fork tubes down and out to remove.
10. Install by reversing these removal steps. Note the following.
11. Tighten the fork tube pinch bolts to the torque specification in **Tables 3-5**.
12. Install and tighten the brake caliper as described in Chapter Thirteen.
13. After installing the front wheel, squeeze the front brake lever. If the brake lever feels spongy, bleed the brake as described under *Bleeding the System* in Chapter Thirteen.



Disassembly

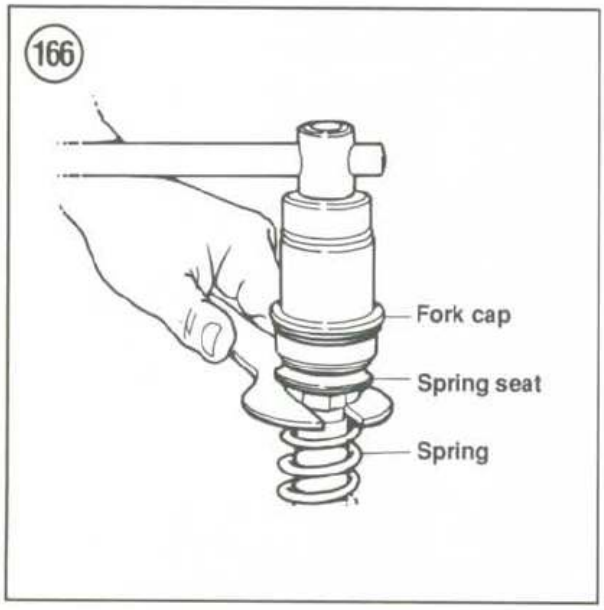
This section describes complete disassembly of the front fork assembly. If the only service required is to change the fork oil, perform Steps 1-9.

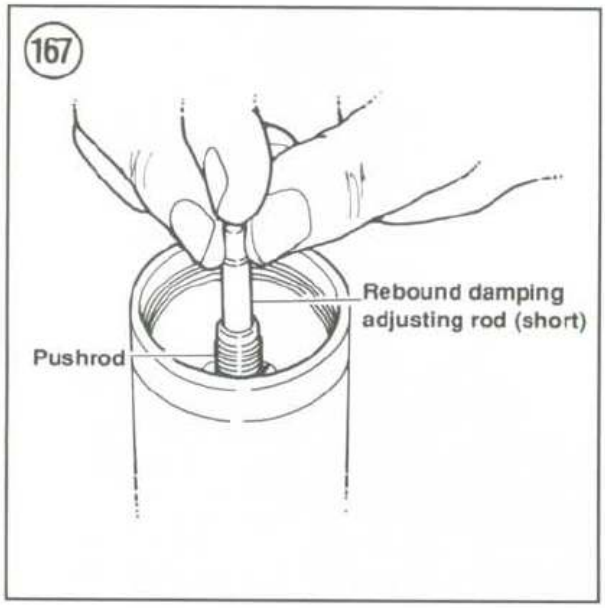
The following tools will be required to disassemble and reassemble the fork tubes:

a. Front fork oil seal driver: Kawasaki part No. 57001-1340.

b. Front fork cylinder holder: Kawasaki part No. 57001-1287.

c. 14 mm hex head socket.





d. Pushrod rod puller: Kawasaki part No. 57001-1289.

CAUTION

When performing Step 1, release the air pressure gradually. If released too fast, oil may spurt out with the air. Protect your eyes accordingly.

1. Remove the screw mounted off-center in the fork cap (**Figure 163**), then reinstall it.
2. Spread some newspapers or clean shop cloths on your workbench to place the fork spring assembly after removing it.

NOTE

The fork cap is under spring pressure. Remove the cap slowly and don't let if fly off when it is released from the fork tube.

WARNING

If the fork tubes are bent the fork cap may be under considerable spring pressure. Do not attempt to remove the fork cap. Allow a qualified mechanic to remove the cap and repair the forks for you.

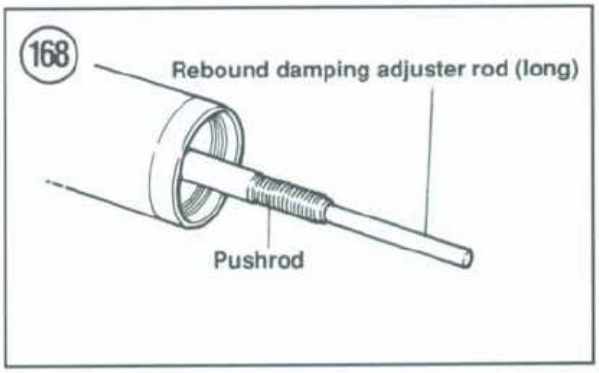
3. The fork cap should have been loosened during fork removal. If not, reinstall the fork tube into the steering stem and tighten the lower fork tube pinch bolt. Loosen the fork cap and remove the fork tube.
4. Loosen the fork cap and release it from the fork tube.
5. To remove the fork cap from the pushrod, perform the following:
   a. Pull the fork spring down and install the Kawasaki fork spring holder (part No. 57001-1286) or equivalent on top of the spring seat and underneath the pushrod nut (**Figure 166**), effectively holding the fork spring away from the pushrod nut.
   b. Hold the pushrod nut with a wrench.
   c. While holding the spring and pushrod nut with the 2 wrenches, loosen the fork cap with a socket or wrench (**Figure 166**).
   d. Remove the fork cap and the spring seat(s).
   e. Remove 2 wrenches used to hold the spring and pushrod nut.
6. Remove the fork spring.
7. Remove the rebound damping adjuster rod (short) from the end of the pushrod (**Figure 167**).

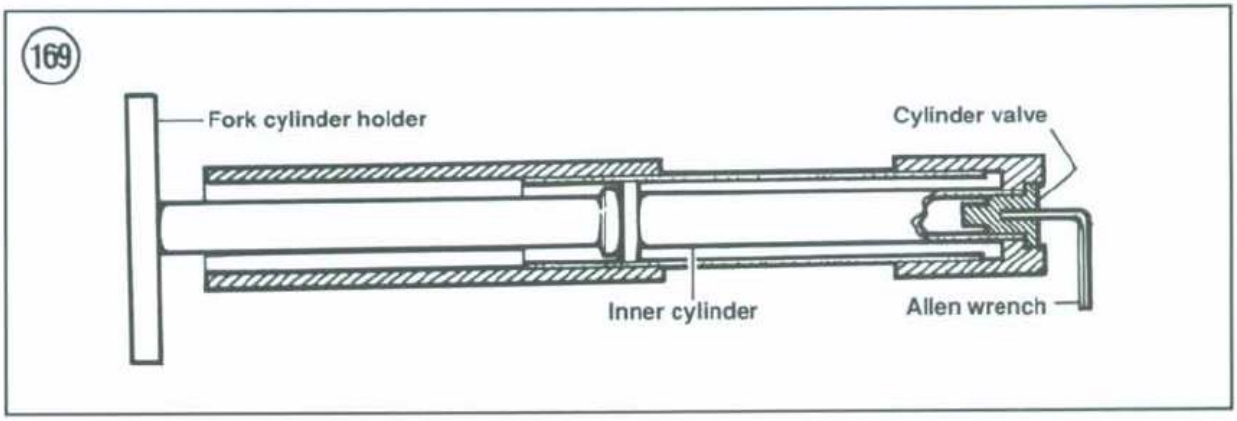
8. Remove the rebound damping adjuster rod (long) from inside the pushrod (**Figure 168**).
9. Turn the fork over a drain pan and pump it to drain the fork oil. Then push the pushrod up and down approximately 10 times to discharge the remaining fork oil.

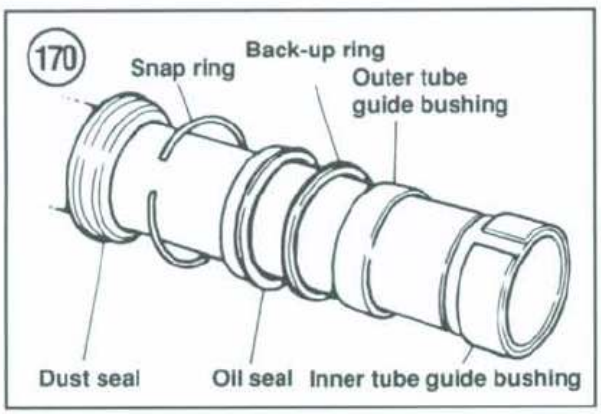
NOTE

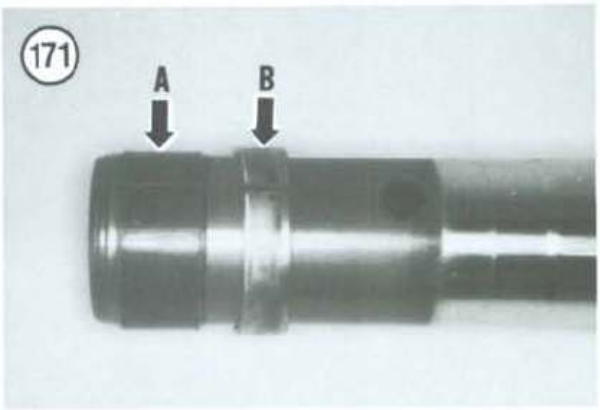
If you are changing the fork oil only, proceed to Step 19 under ***Assembly.*** *If you are disassembling the fork, continue with Step 10.*

10. Remove the pushrod nut from the end of the pushrod. Then remove the collar and spring guide.
11. Disassemble and remove the oil lock piston assembly as follows:
    a. Slide the O-ring away from the guide stay nut.
    b. Hold the piston holder with a wrench and unscrew the guide stay nut. Separate both parts.
    c. Slide the piston back slightly and remove the 2 split ring keepers.
    d. Remove the O-ring, guide stay nut, oil lock piston and piston holder from the pushrod.
12. To loosen and remove the cylinder valve from the inner tube, perform the following:
    a. Remove any dirt from the cylinder valve and then remove the rubber plug (**Figure 151**).
    b. Push the inner tube into the outer tube slowly until it bottoms out.
    c. Slowly push the pushrod into the inner tube until the end of the pushrod is no longer exposed.
    d. Slide the fork cylinder holder into the inner tube and engage it with the top of the inner cylinder (**Figure 169**).









e. Apply pressure to the fork cylinder holder and loosen the cylinder valve with a hex head socket.

f. Remove the cylinder valve and its gasket.

13. Slide the inner cylinder/pushrod assembly out of the inner tube.

14. Carefully remove the dust seal from the outer tube and slide it up the inner tube.

15. Remove the snap ring from the groove in the outer tube. Discard the snap ring as a new one should be installed.

NOTE

There is an interference fit between the inner tube guide bushing and the outer tube guide bushing. Separate the inner and outer tubes as described in Step 16.

16. Hold the outer tube securely and pull hard on the inner tube using quick in-and-out strokes. This will withdraw the oil seal, washer and bushing (**Figure 170**) and separate the tubes.

17. Insert a screwdriver into the inner tube guide bushing slot, open the bushing slightly and slide it off of the inner tube.

18. Remove the following parts from the inner tube:

a. Outer tube guide bushing.

b. Washer.

c. Oil seal.

d. Snap ring.

e. Dust seal.

Inspection

NOTE

*When cleaning the guide bushings (**Figure 171**) in Step 1, handle them carefully to avoid scratching or removing any of their Teflon coating. If there is any metal powder clinging to the guide bushings, clean then with fork oil and a nylon brush.*

1. Initially clean all of the fork parts in solvent, first making sure that the solvent will not damage the rubber parts. Then clean with soap and water and rinse with plain water. Dry thoroughly.

2. Check the inner tube for straightness. If bent, refer service to a Kawasaki dealer.

3. Check the inner fork tube for nicks, rust, chrome flaking or creasing; these conditions will damage the oil seals. Replace the fork tube if necessary.

4. Check the outer tube oil seal bore for dents or other damage that would allow oil leakage. Check the circlip groove in the slider for damage; replace if necessary.

5. Check the inner cylinder for straightness by rolling it on a surface plate or thick piece of glass. Any clicking noise indicates a bent rod.

6. Check the guide bushings (A and B, **Figure 171**) for scoring, scratches or severe wear. The guide bushings are worn when the Teflon coating is worn to a point where the bushing is discolored. Replace the guide bushings in both fork tubes as a set.

7. Measure the uncompressed length of the fork spring (**Figure 172**) with a tape measure and compare to specifications in **Table 2**; replace if necessary.

NOTE

If one fork spring is replaced, compare the measurement of the new and the remaining old spring. If the length difference is great between a new spring and the old usable spring, it is best to replace both springs to keep the forks balanced.

8. Check the pushrod for bending or damage. Check the valve unit on the end of the pushrod for looseness or damage.

9. Replace worn or damaged O-rings.

10. Check the cylinder valve threads for damage; replace if necessary.

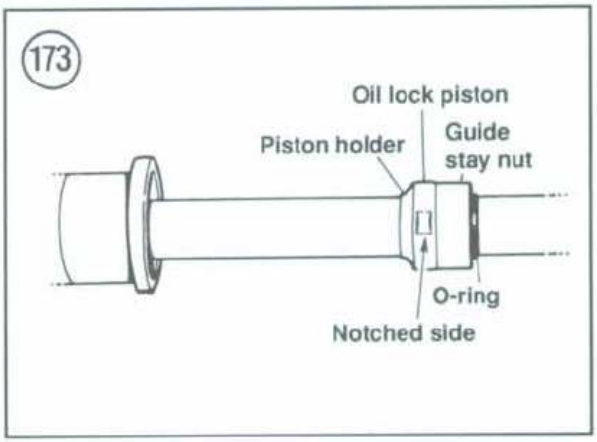
11. Check the oil and dust seals for wear or damage. Replace if necessary.

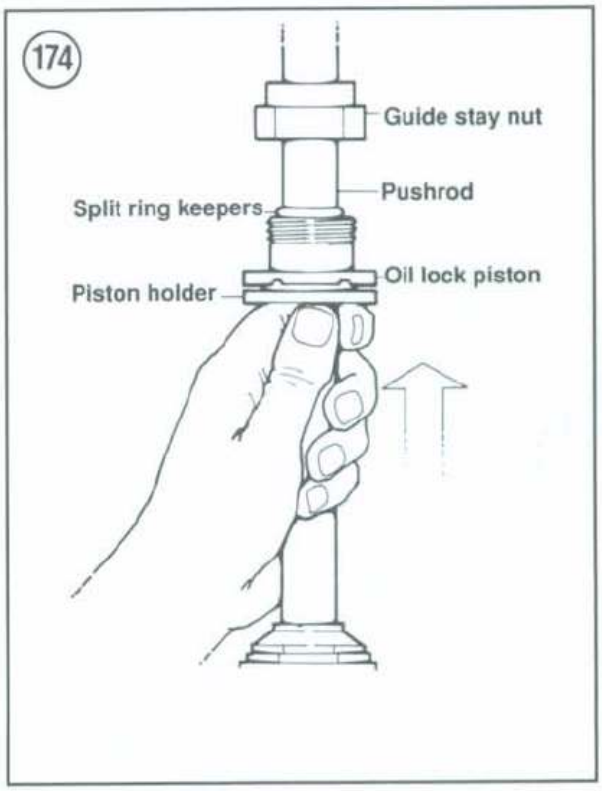
Assembly

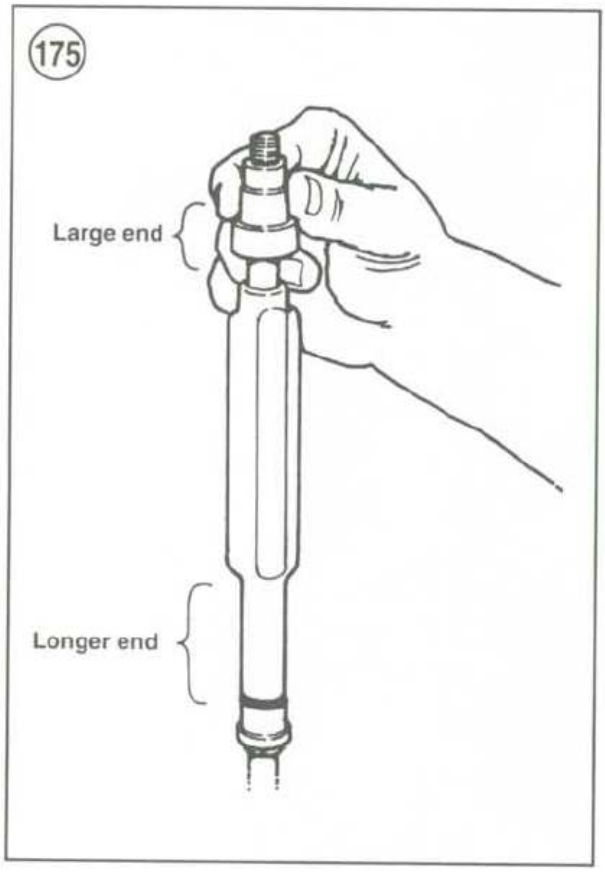
1. Prior to assembly, perform the *Inspection* procedure to make sure all worn or defective parts have been repaired or replaced. All parts should be thoroughly cleaned before assembly.
2. Coat all parts with the fork oil recommended in **Table 7**.
3. Assemble the oil lock piston assembly as follows (**Figure 173**):
   a. Slide the pushrod through the bottom of the inner cylinder. Locate the groove machined in the pushrod.
   b. Slide the piston holder onto the pushrod.
   c. Slide the oil lock piston onto the pushrod so that its notched side faces toward the piston holder installed in sub-step b.
   d. Slide the oil lock piston onto the piston holder.
   e. Install the 2 split ring keepers into the groove in the pushrod and hold them in place with your fingers. Then slide the piston holder over the keepers, locking them in place.
   f. Slide the guide stay nut onto the pushrod and thread it onto the piston holder. Hold the piston holder (**Figure 174**) and tighten the guide stay nut to the torque specification in **Tables 3-5**.
   g. Wipe the pushrod O-ring with fork oil and slide it onto the pushrod until it is seated against the guide stay nut.
   h. Set the inner cylinder/pushrod assembly aside for now.
4. Install the following parts onto the inner tube as follows (**Figure 170**):

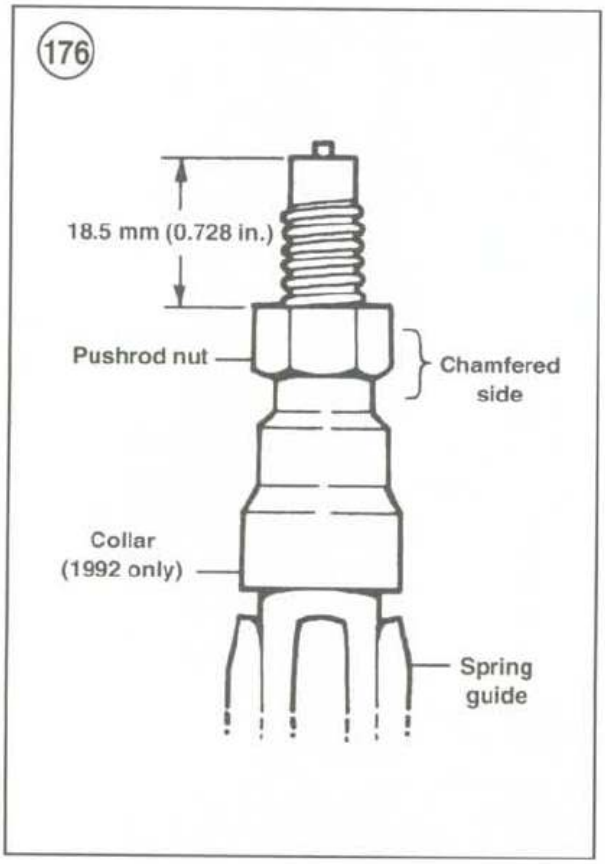
> *NOTE*
>
> *To avoid damaging the dust and oil seals when installing them over the inner fork tube in the following steps, place a plastic bag over the end of the tube. Then coat the bag with fork oil and slide the seals over the bag and onto the inner tube.*

   a. Dust seal.
   b. Circlip.
   c. Oil seal.
   d. Washer.
   e. Outer tube guide bushing.
   f. Inner tube guide bushing. Seat the bushing into the groove in the end of the inner tube.
5. Install the inner cylinder into the inner tube and carefully bottom it out. Slowly push the pushrod into the inner tube until the end of the pushrod is no longer exposed.
6. Install and tighten the cylinder valve as follows:
   a. Install a new copper washer onto the cylinder valve. Coat the cylinder valve O-rings with fork oil.
   b. Apply Loctite 242 (blue) to the cylinder valve threads prior to installation.
   c. Slide the fork cylinder holder into the inner tube and engage it with the top of the inner cylinder (**Figure 169**).









d. Apply pressure to the fork cylinder holder and thread the cylinder valve into the end of the inner cylinder.

e. Hold the fork cylinder holder securely and tighten the cylinder valve to the torque specification listed in **Tables 3-5**. Remove the fork cylinder holder.

7. Install the inner tube into the outer tube.

8. Install the outer tube guide bushing as follows:

a. Turn the fork assembly so that the outer tube is at the bottom.

b. Slide the outer tube guide bushing down the inner tube until it rests against the outer tube. Slide the washer down so that it rests against the guide bushing.

c. Drive the bushing (with the washer on top of it) into the outer tube until it bottoms out. Use the Kawasaki fork oil seal driver (part No. 57001-1340) or equivalent to install the bushing.

9. Install the oil seal as follows:

a. Drive the oil seal into the outer tube with the same tool used in Step 8.

b. Drive the seal into place until the snap ring groove in the outer tube is visible above the oil seal.

10. Install a *new* snap ring into the outer tube groove. Make sure the snap ring is completely seated in the groove in the outer tube.

11. Slide the dust seal down the inner tube and seat it into the outer tube.

12. Install the spring guide over the pushrod so that the side with the longer round shoulder faces down (**Figure 175**).

13. If so equipped, install the collar so that its larger outer diameter end faces down (**Figure 175**).

14. Install the pushrod nut so that its chamfered side faces toward the spring guide (**Figure 176**). Then position the locknut so that it is 18.5 mm (0.728 in.) from the top of the pushrod as shown in **Figure 176**.

NOTE

If you are changing the fork oil only, continue with Step 15.

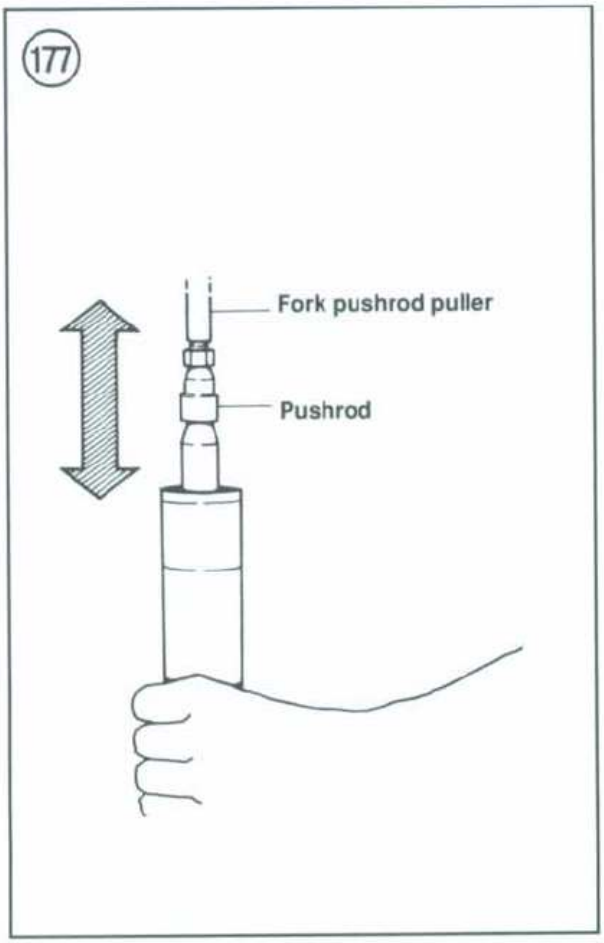
15. Insert the rebound damping adjuster rod (long) into the pushrod (**Figure 168**).

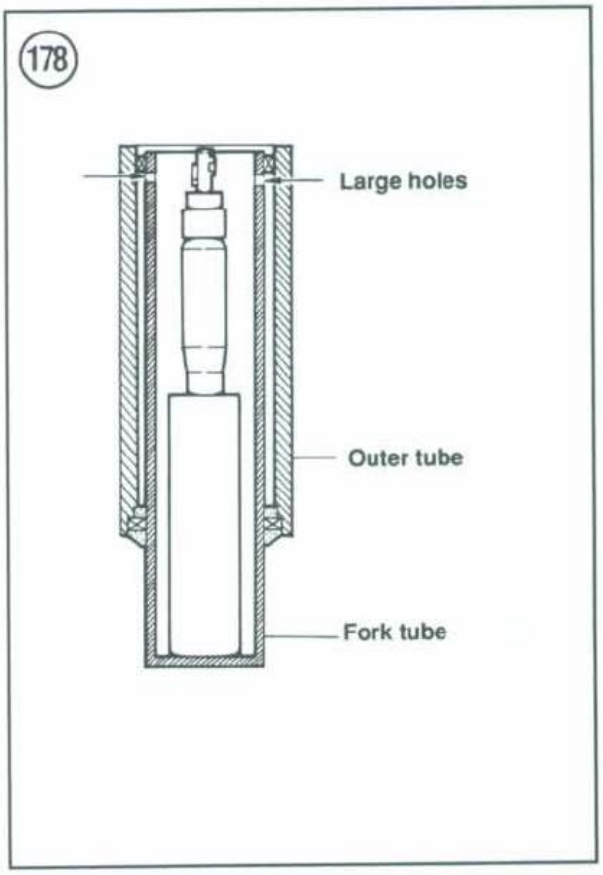
16. Insert the rebound damper adjuster rod (short) into the pushrod (**Figure 167**) so that the holes in the rod face down.

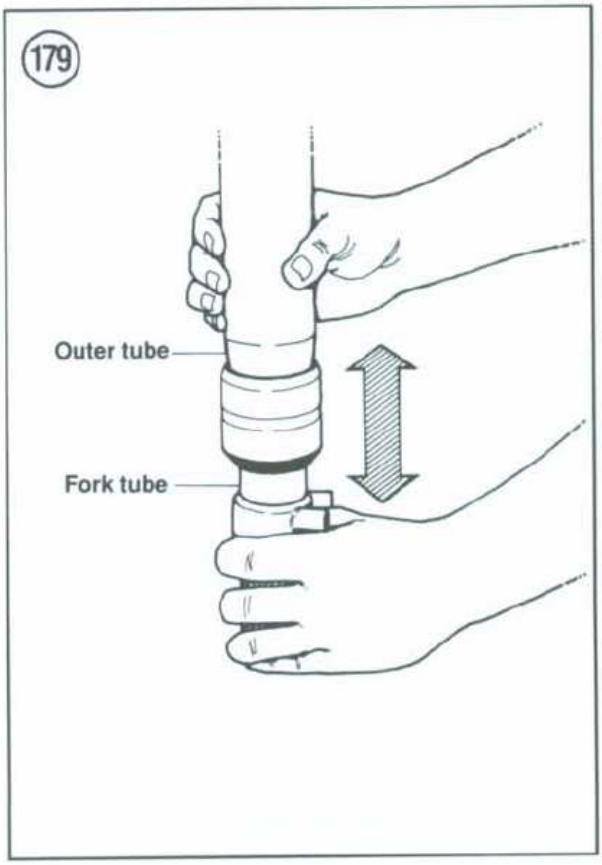
17. Add fork oil, bleed and adjust the oil level as follows. The Kawasaki fork pushrod puller (part No. 57001-1289) will be required.
   a. With the fork tube standing vertical, push the outer fork tube and the pushrod all the way down.
   b. Fill the fork tube to the top with the oil specified in **Table 7**.
   c. Thread the fork pushrod puller onto the end of the pushrod (**Figure 177**).
   d. Slowly pump the pushrod up and down 5 times (**Figure 177**).

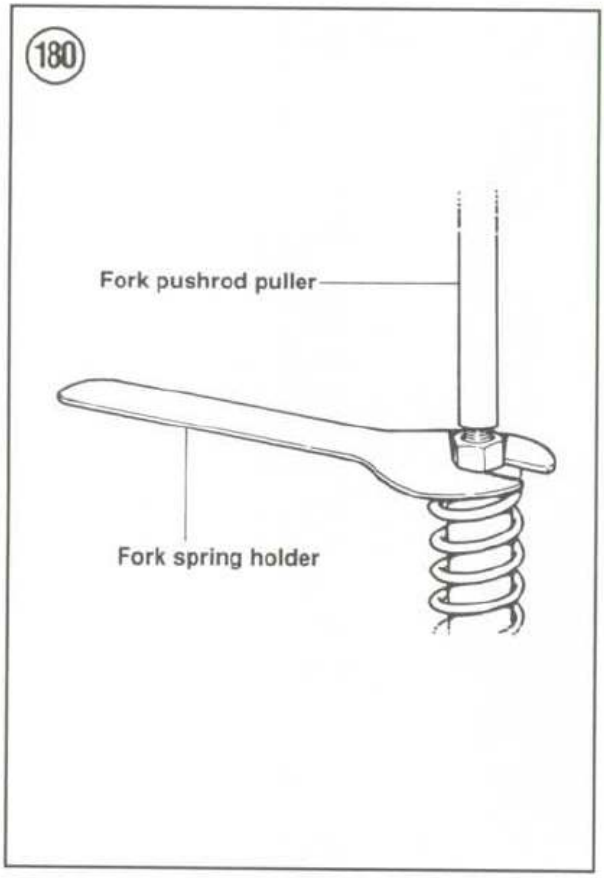
NOTE

*When performing sub-step e, check the oil level in the fork tubes often, adding oil as required to keep the level above the 2 holes near the top of the inner tube (**Figure 178**). Don't worry about the oil capacity or oil level at this point, your final step will be to adjust the oil level, which will at the same time provide the correct amount of oil in the fork.*









CAUTION

When performing sub-step e, do not extend the outer tube fully as this will force oil that is located between the inner and outer tubes through the holes at the top of the inner and raise the oil level in the inner tube by approximately 30 mm (1.181 in.).

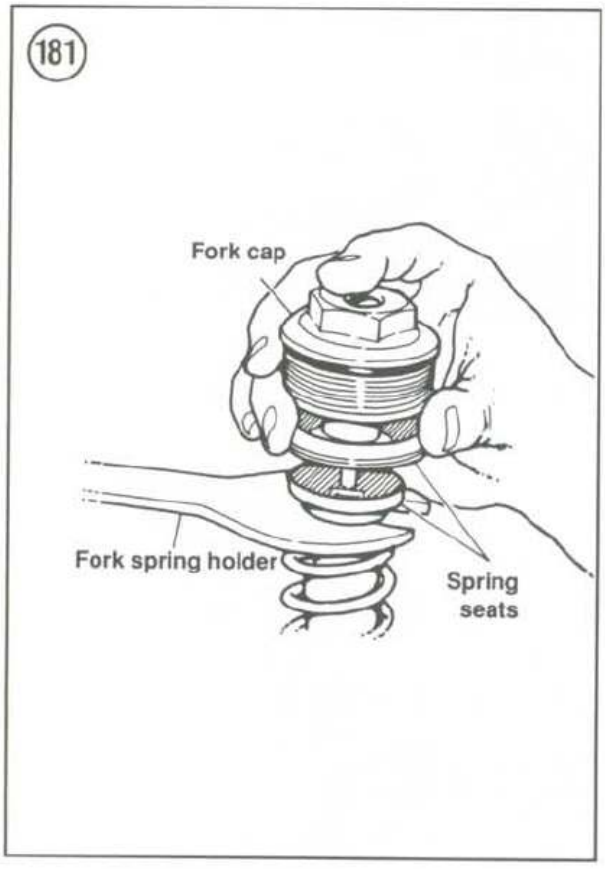
e. With the fork leg in a secure vertical position, pump the outer tube up and down to purge air from between the inner and outer tubes (**Figure 179**).

f. Set the fork assembly aside for approximately 5 minutes to allow any suspended air bubbles in the oil to surface.

g. With the front fork compressed in a vertical position, measure the oil level, from the top of the fork tube with an oil level gauge. Using the oil level gauge, adjust the oil level, maintaining it within the oil level range specified in **Table 9**.

NOTE

Make a note of the fork oil level so the opposite fork leg can be refilled to the same level.



18. Install the fork spring over the pushrod (**Figure 180**) and install the spring seat(s) on top of the spring.

19. Pull the fork spring down while pulling up on the pushrod puller and install the fork spring holder underneath the pushrod nut (**Figure 180**).

20. Remove the fork pushrod puller from the end of the pushrod (**Figure 180**).

21. Unscrew the rebound damping adjuster in the fork cap fully. Then, screw the fork cap onto the pushrod (**Figure 181**).

22. Hold the fork cap with a wrench and tighten the pushrod nut against the fork cap to the torque specification listed in **Tables 3-5**.

23. Remove the fork spring holder.

24. Install the fork tube into the steering stem and tighten the lower fork tube pinch bolts to the torque specification in **Tables 3-5**.

25. Thread the fork cap into the outer tube and tighten it to the torque specification in **Tables 3-5**.

26. Tighten the upper fork tube pinch bolts to the torque specification in **Tables 3-5**.

Table 1 STEERING SPECIFICATIONS

Steering angle	45°
Castor	
KX125	
1982-1983	28°
1984-1987	27.5°
1988	27°
1989	26.5°
1990-1991	25.5°
KX250	
1982	30°
1983	28.5°
1984-1988	28°
1989	27°
1990	26.5°
1991	25.5°
KX500	
1983-1984	29°
1985-1988	28°
1989-on	27°
Trail	
KX125	
1982-1983	121 mm (4.76 in.)
1984-1987	116 mm (4.57 in.)
1988	122 mm (4.80 in.)
1989	
U.S.	116 mm (4.57 in.)
All other	109 mm (4.30 in.)
1990-1991	108 mm (4.25 in.)
KX250	
1982	129 mm (5.08 in.)
1983	118 mm (4.65 in.)
1984-1987	120 mm (4.72 in.)
1988	129 mm (5.08 in.)
1989	
U.S.	119 mm (4.68 in.)
Canada	112 mm (4.41 in.)
1990	113 mm (4.45 in.)
1991	118 mm (4.65 in.)
KX500	
1983-1984	122 mm (4.80 in.)
1985-1987	120 mm (4.72 in.)
1988	129 mm (5.08 in.)
1989	
U.S.	119 mm (4.68 in.)
Canada	112 mm (4.41 in.)
1990-on	116 mm (4.57 in.)
Front fork travel	
1982-1989	300 mm (11.81 in.)
1990-on	310 mm (12.20 in.)

Table 2 FRONT SUSPENSION SERVICE SPECIFICATIONS

	New mm (in.)	Service limit mm (in.)
Axle runout	0-0.1 (0-0.004)	0.2 (0.008)
Rim runout		
Axial play	0-0.5 (0-0.02)	2.0 (0.08)
Radial play	0-0.8 (0-0.03)	2.0 (0.08)

(continued)

Table 2 FRONT SUSPENSION SERVICE SPECIFICATIONS (continued)

	New mm (in.)	Service limit mm (in.)
Front fork spring free length		
KX125		
1982	533.5 (21.00)	523 (20.60)
1983-1985	550.5 (21.67)	539.5 (21.24)
1986	535.5 (21.1)	525 (20.7)
1987	553.0 (21.8)	542 (21.3)
1988	548 (21.6)	537 (21.1)
1989		
U.S. and Canada	560 (22.05)	549 (21.61)
All other	505 (19.88)	495 (19.49)
1990	533 (20.98)	522 (20.55)
1991	514 (20.25)	504 (19.84)
KX250		
1982	581.5 (22.89)	571.1 (22.5)
1983-1985	553 (21.77)	542 (21.34)
1986	535.5 (21.1)	525 (20.7)
1987	553 (21.77)	542 (21.34)
1988	548 (21.6)	537 (21.1)
1989		
U.S. and Canada	560 (22.05)	549 (21.61)
All other	505 (19.88)	495 (19.49)
1990	533 (20.98)	522 (20.55)
1991	514 (20.25)	504 (19.84)
KX500		
1983	581.5 (22.89)	571.1 (22.5)
1984-1985	539.5 (21.24)	530 (20.87)
1986	535.5 (21.1)	525 (20.7)
1987-1988	553 (21.8)	542 (21.3)
1989		
U.S. and Canada	560 (22.05)	549 (21.61)
All other	505 (19.88)	495 (19.49)
1990	533 (20.98)	522 (20.55)
1991-1993	514 (20.25)	504 (19.84)
1994-1996	490 (19.29)	480 (18.90)
1997-on	470 (18.50)	461 (18.15)

Table 3 FRONT SUSPENSION TIGHTENING TORQUES (KX125)

	N•m	ft.-lb.
Front axle		
1982-1984	65	48
1985-1991	54	40
Front fork pinch bolts		
1982-1988	20	15
1989		
U.S. and Canada	21	16
All other		
Top	21	16
Lower	20	15
1990-1991	20	15
Front fork cap		
1982-1988	23	17
1989		
U.S. and Canada	27	20
All other	29	21
1990-1991	29	21

(continued)

Table 3 FRONT SUSPENSION TIGHTENING TORQUES (KX125) (continued)

	N•m	ft.-lb.
Front fork Allen bolt		
1982-1984	37	27
1985-1987	71	52
1988-1991	—	—
Front fork cylinder valve		
1982-1987	—	—
1988-1991	54	40
Handlebar clamp bolts		
1982-1985	21	16
1986-1988	24	17
1989-1991	25	18
Steering stem head bolt or nut		
1982-1984	45	33
1985-1987	54	40
1988-1991	44	33
Push rod stopper		
1989		
U.S. and Canada	—	—
All other	26	19
Guide stay nut	27	20
Pushrod nut	20	15

Table 4 FRONT SUSPENSION TIGHTENING TORQUES (KX250)

	N•m	ft.-lb.
Front axle		
1982-1984	64	47
1985	98	72
1986	69	51
1987-1991	54	40
Front fork pinch bolts	21	16
Front fork cap	29	22
Handlebar clamp bolts		
1982-1986	21	16
1987-1991	25	18
Front fork Allen bolts		
1982-1984	36	27
1985	71	52
Front fork cylinder valve		
1986-1987	71	52
1988-1991	54	40
Steering stem head bolt or nut		
1982-1984	45	33
1985-1987	54	40
1988-1991	44	32
Guide stay nut	27	20
Pushrod nut	20	15

Table 5 FRONT SUSPENSION TIGHTENING TORQUES (KX500)

	N•m	ft.-lb.
Front axle		
1983-1984	64	47
1985	98	72
1986-1999	79	58
2000-on	54	40

(continued)

Table 5 FRONT SUSPENSION TIGHTENING TORQUES (KX500) (continued)

	N•m	ft.-lb.
Front fork pinch bolts	20	14.5
Front fork cap	29	22
Handlebar clamp bolts		
1983-1985	21	16
1986-1987	24	17
1988-on	25	18
Front fork Allen bolts		
1983-1984	36	27
1985	71	52
Front fork cylinder valve		
1986-1987	71	52
1988-on	54	40
Steering stem head bolt or nut		
1983-1984	45	33
1985-1987	54	40
1988-on	44	33
Steering stem adjusting nut		
2000-on	4.9	43 in.-lb.
Guide stay nut	27	20
Pushrod nut		
1983-1999	20	15
2000-on	28	21

Table 6 FRONT FORK AIR PRESSURE

	kg/cm^2	psi
Maximum suggested for tuning purposes	0.4	6.0
Maximum allowable	2.5	36

Table 7 FRONT FORK OIL WEIGHT RECOMMENDATIONS

Year	Oil weight
1982-1983	KYB G-10 or SAE 10
1984	10 wt.
1985	10W/20
1986	10 wt.
1987-on	5 wt.

Table 8 FRONT FORK OIL SPECIFICATIONS (1982-1989)

	Capacity cc (oz.)	Oil level mm (in.)	Range mm (in.)
KX125			
1982	526-534 (17.8-18.1)	158-166 (6.22-6.53)	–
1983	625-633 (21.1-21.4)	158-162 (6.22-6.38)	–
1984-1985	602-610 (20.4-20.6)	178-182 (7.01-7.17)	–
1986	550-558 (18.6-18.9)	178-182 (7.0-7.2)	150-210 (5.9-8.3)

(continued)

Table 8 FRONT FORK OIL SPECIFICATIONS (1982-1989) (continued)

	Capacity cc (oz.)	Oil level mm (in.)	Range mm (in.)
KX125 (continued)			
1987	581-589 (19.6-19.9)	138-142 (5.4-5.6)	110-170 (4.3-6.7)
1988	531-539 (18.0-18.2)	128-132 (5.0-5.2)	100-160 (3.9-6.3)
1989			
U.S. & Can.	601-609 (20.32-20.60)	148-152 (5.83-5.98)	120-180 (4.72-7.09)
All other	421-429 (14.23-14.50)	113-117 (4.45-4.61)	80-140 (3.15-5.51)
KX250			
1982	633-641 (21.4-21.7)	148-152 (5.83-5.98)	—
1983-1986	550-558 (18.6-18.9)	178-182 (7.01-7.17)	—
1987	581-589 (19.6-19.9)	138-142 (5.4-5.6)	—
1988	531-539 (18.0-18.2)	128-132 (5.0-5.2)	100-160 (3.9-6.3)
1989			
U.S. & Can.	601-609 (20.32-20.60)	148-152 (5.83-5.98)	120-180 (4.72-7.09)
All other	421-429 (14.23-14.50)	113-117 (4.45-4.61)	80-140 (3.15-5.51)
KX500			
1983	587-595 (19.85-20.12)	164-165 (6.46-6.50)	—
1984	587-595 (19.85-20.12)	169-171 (6.65-6.73)	—
1985	587-595 (19.85-20.12)	179-181 (7.05-7.13)	—
1986	513-521 (17.3-17.6)	178-182 (7.0-7.2)	—
1987	581-589 (19.6-19.9)	138-142 (5.4-5.6)	—
1988	593-601 (20.0-20.3)	118-122 (4.6-4.8)	90-150 (3.5-5.9)
1989			
U.S. & Can.	601-609 (20.32-20.60)	148-152 (5.83-5.98)	120-180 (4.72-7.09)
All other	421-429 (14.23-14.50)	113-117 (4.45-4.61)	80-140 (3.15-5.51)

Table 9 FRONT FORK OIL SPECIFICATIONS (1990-ON)

	Oil change* ml (oz.)	After disassembly ml (oz.)	Oil level mm (in.)	Adjustable Range mm (in.)
KX125				
1990				
U.S.	375 (12.7)	435-443 (14.7-15.0)	100 (3.9)	70-120 (2.8-4.7)
Eur.	375 (12.7)	439-447 (14.8-15.1)	95 (3.7)	70-120 (2.8-4.7)
1991				
All	440 (14.9)	513-521 (17.3-17.6)	115 (4.5)	100-150 (3.9-5.9)

(continued)

Table 9 FRONT FORK OIL SPECIFICATIONS (1990-ON) (continued)

	Oil change* ml (oz.)	After disassembly ml (oz.)	Oil level mm (in.)	Adjustable Range mm (in.)
KX250				
1990				
U.S.	375 (12.7)	435-443 (14.7-15.0)	100 (3.9)	70-120 (2.8-4.7)
Eur.	375 (12.7)	443-451 (15.0-15.2)	90 (3.5)	70-120 (2.8-4.7)
1991				
U.S.	440 (14.9)	517-525 (17.5-17.7)	110 (4.3)	100-150 (3.9-5.9)
Eur.	440 (14.9)	509-517 (17.2-17.5)	120 (4.7)	100-150 (3.9-5.9)
KX500				
1990				
U.S.	370 (12.51)	435-443 (14.7-15.0)	128-132 (5.0-5.2)	100-150 (3.9-5.9)
Eur.	375 (12.7)	439-447 (14.8-15.1)	123-127 (4.8-5.0)	100-150 (3.9-5.9)
1991-1993				
U.S.	445 (15.0)	516-525 (17.4-17.8)	108-112 (4.2-4.4)	100-150 (3.9-5.9)
Eur.	435 (14.7)	509-517 (17.2-17.5)	118-122 (4.6-4.8)	100-150 (3.9-5.9)
1994-1995	430 (14.5)	504-512 (17.0-17.3)	118-122 (4.6-4.8)	NA
1996	435 (14.7)	510-518 (17.2-17.5)	113-117 (3.8-4.0)	NA
1997	520 (17.6)	600-618 (20.3-20.9)	108-112 (3.7-3.8)	NA

*Quantity is approximate.
NA – Specification not designated.

Table 10 FORK ADJUSTMENT 1991 KX125 AND KX250; 1990-ON KX500*

Model/Adjustment	Standard setting (number of clicks)	Adjustment range
KX125 (1991)		
Rebound damping	9	16
Compression damping	8	16
KX250 (1991)		
Rebound damping	10	16
Compression damping	8	16
KX500		
Rebound damping		
1990	10	16
1991-1993	9	16
1994-1995	12	16
1996-on	10	18
Compression damping		
1990-1993	8	16
1994-1995	10	16
1996	8	18
1997-on	10	18

*Refer to text procedures for other models

CHAPTER TWELVE

REAR SUSPENSION

This chapter contains repair and replacement procedures for the rear wheel and hub and rear suspension components. Service to the rear suspension consists of periodically checking bolt tightness, lubrication of all pivot points, swing arm bushing replacement and rear shock service.

Rear suspension specifications are listed in **Tables 1-3**. **Tables 1-10** are found at the end of the chapter.

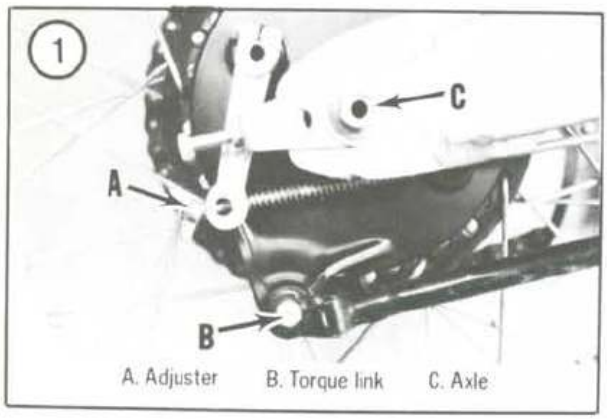
REAR WHEEL

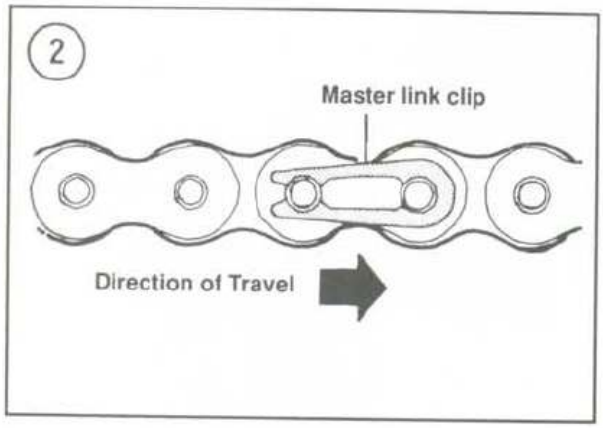
Removal/Installation (Drum Brake Models)

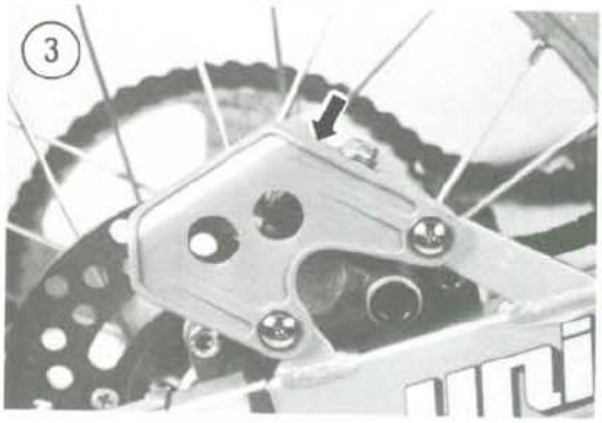
WARNING

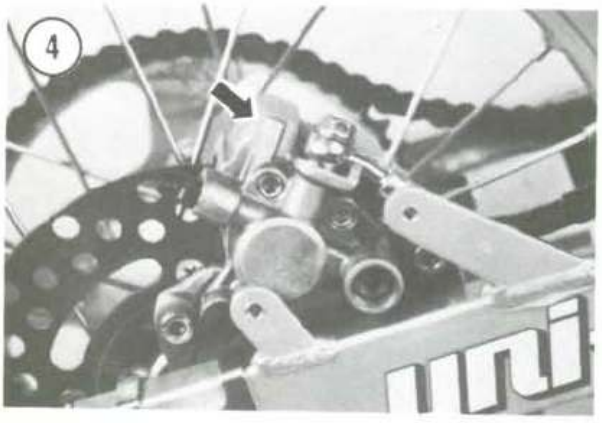
When working on brake drum and brake shoes, do ***not*** *inhale brake dust. It may contain asbestos, which can cause lung injury and cancer. Wear a disposable face mask and wash your hands thoroughly after completing the work. Vacuum up or wet down the brake dust on brake components before working on them. Secure and dispose of all brake dust and cleaning materials properly. Do* ***not*** *use compressed air to blow off brake parts. High speed air tools should not be used around the brake components unless they are fitted with appropriate dust extraction or removal devices.*

1. Support the bike so that the rear wheel is off of the ground.
2. Unscrew the rear brake adjusting nut completely from the brake rod (**Figure 1**). Withdraw the brake rod from the brake lever and pivot it down and out of the way. Reinstall the adjusting nut to avoid misplacing it.
3. Loosen the left- and right-hand chain adjusters.
4. Disconnect the brake rod at the rear hub (**Figure 1**).
5. Loosen and remove the axle nut. Remove the left-hand chain adjuster.









6. Push the wheel forward to provide as much chain slack as possible. Then slip the drive chain off of the sprocket.
7. Remove the axle and remove the rear wheel.
8. Remove the axle spacer from the left-hand side.
9. Remove the brake panel from the right-hand side.
10. Install by reversing these removal steps. Note the following:

a. Take a minute and check the wheel bearings for severe wear or damage. Turn the inner bearing race (both bearings) with your finger. The bearings should turn smoothly with no sign of roughness or damage. Replace damaged bearings as described under *Rear Hub* in this chapter.
b. Clean the axle and axle spacer in solvent and thoroughly dry. Make sure all axle contact surfaces are clean and free of dirt and old grease prior to installation. If these surfaces are not cleaned, the axle may be difficult to remove later on.
c. Apply a light coat of grease to the axle, bearings and grease seals.
d. Be sure to install the axle spacer on the left-hand side of the wheel.
e. If the drive chain was disconnected, install the drive chain master link so that its closed end is facing the direction of chain travel (**Figure 2**).
f. Adjust the drive chain as described in Chapter Three.
g. Tighten the axle nut to the torque specification in **Tables 4-6**.
h. After the wheel is completely installed, rotate it several times to make sure it rotates smoothly. Apply the brakes several times to make sure it operates correctly.
i. Adjust the rear brake as described in Chapter Three.

Removal/Installation (Disc Brake Models)

1. Support the bike so that the rear wheel is off of the ground.
2. Remove the brake caliper cover (**Figure 3**).
3. Remove the caliper mounting bolts and lift the brake caliper (**Figure 4**) off of the brake disc. If the front mounting bolt is blocked by the caliper cover mounting tab, loosen the rear axle adjusters after

loosening the axle nut and push the rear wheel forward. Support the brake caliper with a Bunjee cord.

CAUTION

Do not allow the caliper to hang by the brake hose or damage to the hose may occur.

NOTE

After removing the brake caliper. Insert a piece of wood or hose in the caliper between the brake pads. That way, if the brake lever is squeezed, the piston will not be forced out of the brake caliper cylinder. If the brake lever is operated and the piston comes out, the caliper might have to be disassembled to reseat the piston and the system will have to be bled.

4A. On 1986-1989 models, loosen and remove the rear axle nut and washer (**Figure 5**).

4B. On 1990 and later models, remove the cotter pin. Then loosen and remove the rear axle nut and washer.

5. Push the wheel forward to provide as much chain slack as possible and slip the drive chain off of the sprocket.

6. Remove the axle (**Figure 6**) and slide the rear wheel assembly out of the swing arm.

7. Remove the left- (**Figure 7**) and right-hand (**Figure 8**) axle spacers and covers.

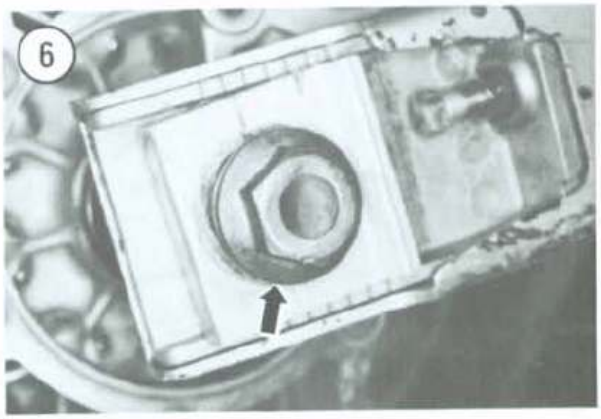
8. Remove the rear brake holder (**Figure 9**), if necessary.

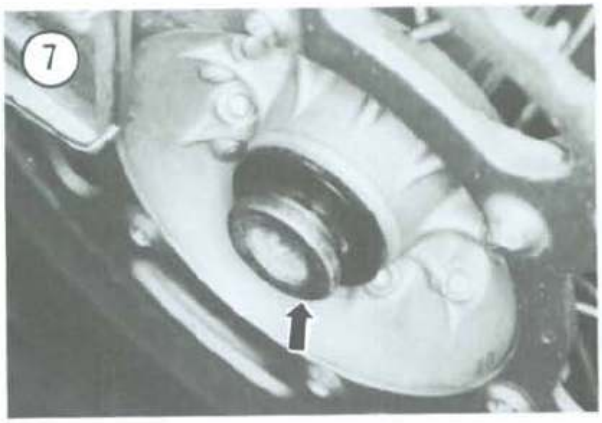
9. Install the axle spacers and axle nut on the axle to prevent their loss when servicing the wheel.

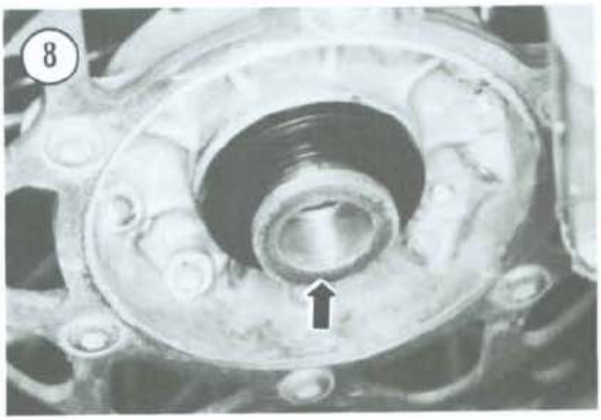
10. To install the rear wheel, reverse the removal steps. Note the following:

a. Check the wheel bearings for severe wear or damage. Turn the inner bearing race (both bearings) with your finger. The bearings should turn smoothly with no sign of roughness or damage. Replace damaged bearings as described under *Rear Hub* in this chapter.

b. Clean the axle and axle spacers in solvent and thoroughly dry. Make sure all axle contact surfaces are clean and free of dirt and old grease prior to installation. If these surfaces are not cleaned, the axle may be difficult to remove later on.







c. Apply a light coat of grease to the axle, bearings and grease seals.

d. Install the brake holder (**Figure 9**) onto the swing arm.

e. Install the chain adjusters (**Figure 10**), if removed.

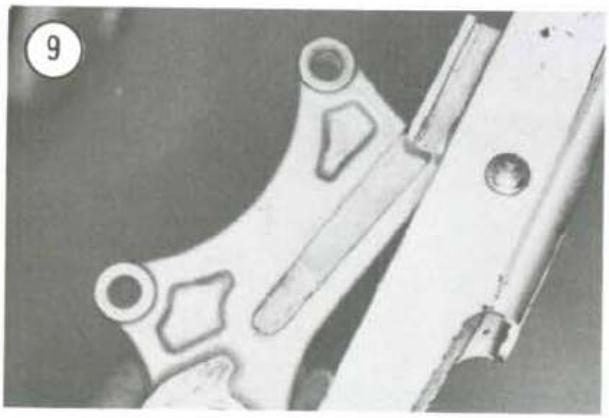
f. Carefully insert the brake pads between the disc when installing the brake caliper. Tighten the brake caliper mounting bolts to the torque specification shown in Chapter Thirteen.

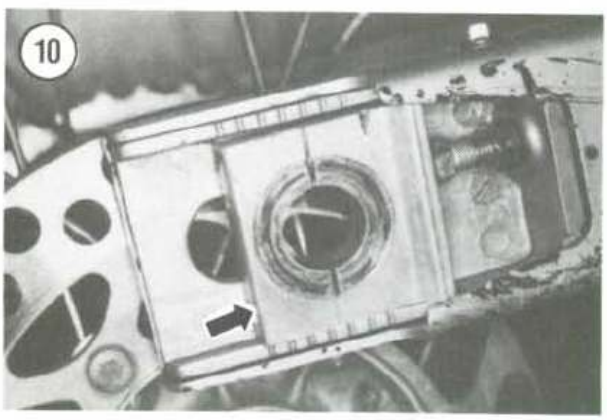
g. If the drive chain was disconnected, install the drive chain master link so that its closed end is facing the direction of chain travel (**Figure 2**).

h. Tighten the axle nut to the torque specification in **Tables 4-6**.

i. On 1990 and later models, install a new rear axle cotter pin. Bend the ends of the cotter pin over to lock it.

j. After the wheel is completely installed, rotate the rear wheel and apply the brake. Do this a couple of times to make sure the rear wheel and brake are operating correctly.





Inspection

1. Clean the axle and axle spacers in solvent and thoroughly dry.

2. Check wheel runout and spoke tension as described in Chapter Eleven.

REAR HUB

Refer to **Figure 11** or **Figure 12** when servicing the rear hub.

Inspection

Inspect each wheel bearing before removing it from the wheel hub.

CAUTION

Do not remove the wheel bearings for inspection purposes as they will be damaged during removal process. Remove the wheel bearing only if they are to be replaced.

1. Remove the rear wheel as described in this chapter.

2. Remove the oil seals by carefully prying them out of the hub with a long screwdriver (**Figure 13**). Prop a piece of wood or rag underneath the screwdriver to avoid damaging the hub.

3. Turn the inner bearing race (**Figure 14**) with your finger. The bearing should turn smoothly with no sign of roughness or excessive noise.

4. On non-sealed bearings, check the balls for evidence of wear, pitting or excessive heat (bluish tint). Replace the bearings if necessary; replace as a complete set.

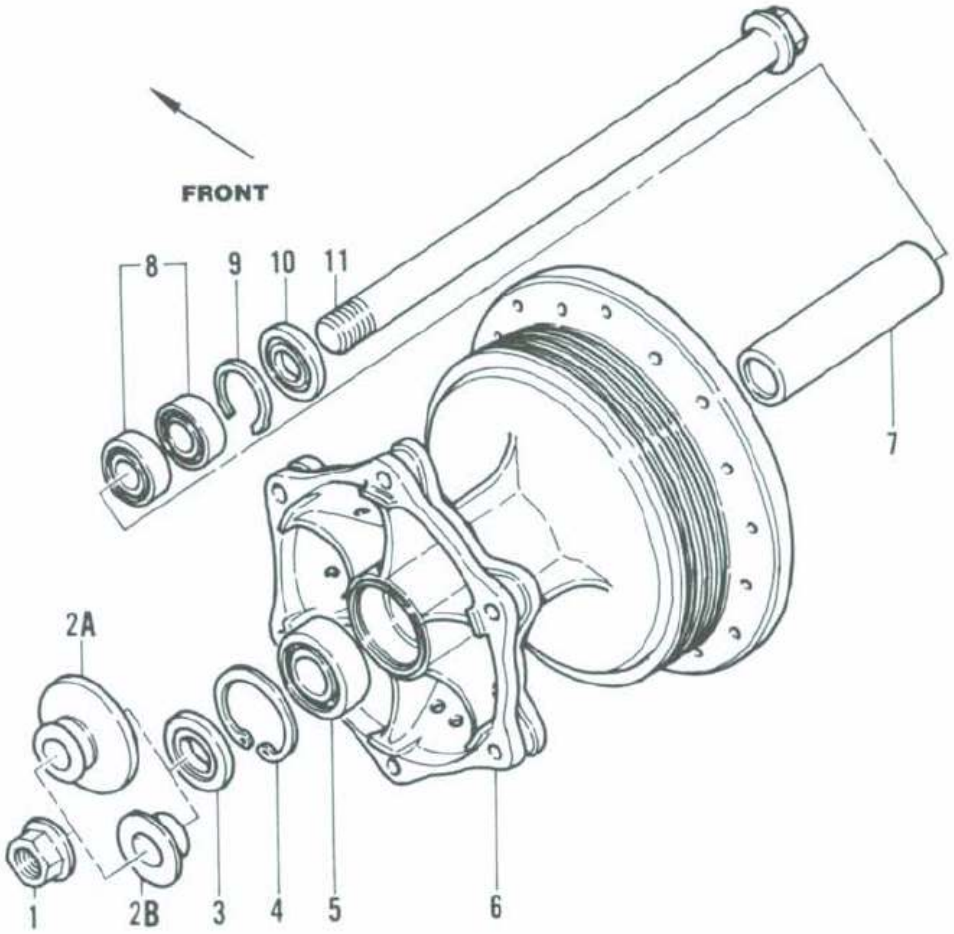
NOTE

Fully sealed bearings are available from bearing specialty shops. Fully sealed bearings provide better protection form dirt and moisture that passes through worn or damaged oil seals.

5. On sealed bearings, check the seal for damage (**Figure 15**). The seal should show no sign of buckling or other conditions that would allow dirt to enter the bearing. Replace the bearings as a complete set, if necessary.

(11)

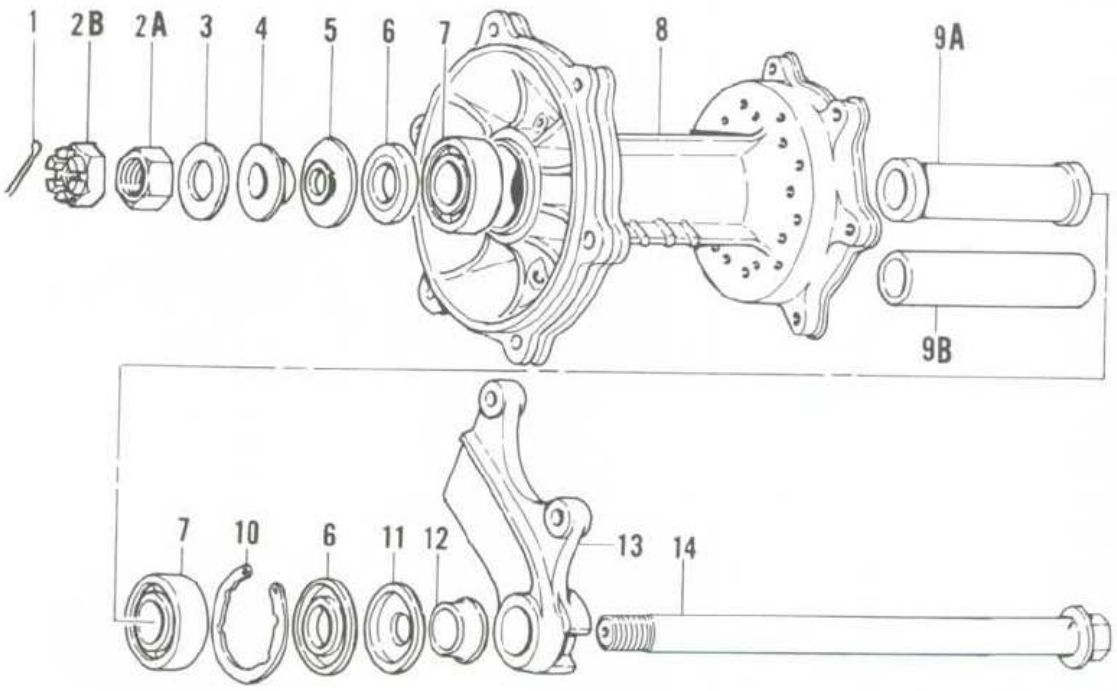
REAR HUB (1982-1985)



1. Axle nut
2A. Spacer (1982-1984)
2B. Spacer (1985)
3. Oil seal
4. Circlip
5. Bearing
6. Hub
7. Distance collar
8. Ball bearings
9. Circlip
10. Oil seal (1984-1985)
11. Real axle

(12)

REAR HUB (1986-ON)



1. Cotter pin (1990-1991)
2A. Axle nut (1986-1989)
2B. Axle nut (1990-1991)
3. Washer
4. Spacer
5. Dust cover (1987-1991)
6. Oil seal
7. Bearing
8. Hub
9A. Distance collar
9B. Distance collar
10. Circlip
11. Dust cover (1987-1991)
12. Spacer
13. Brake plate
14. Rear axle

NOTE

When checking the axle runout with V-blocks in Step 6, place the V-blocks 100 mm (4.0 in.) apart, measuring from the center of each V-block as shown in ***Figure 16****.*

6. Check the axle for wear and straightness. Use V-blocks and a dial indicator as shown in **Figure 16**. If the runout exceeds the service limit in **Table 2** or **Table 3**, straighten the axle with a press.
7. Install the oil seals as described under *Reassembly* in this chapter.

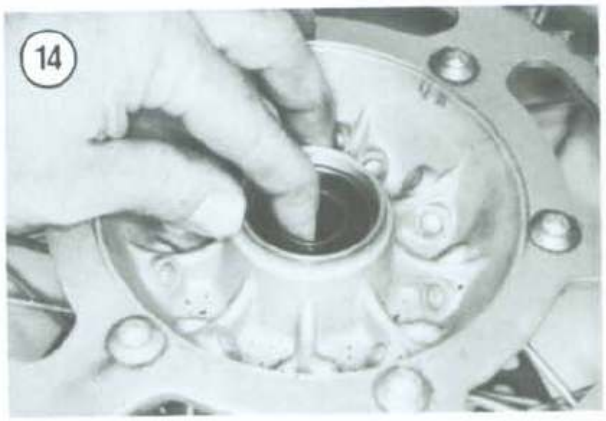
Disassembly

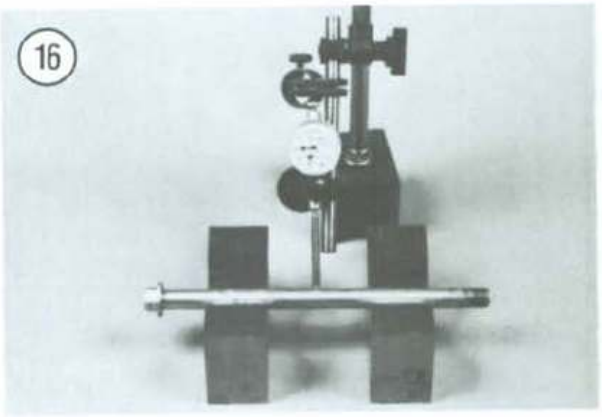
Do not remove bearings for periodic inspection as the first bearing removed is normally damaged. Always replace bearings as a set.
1. Remove the rear wheel as described in this chapter.
2. Remove the oil seals by carefully prying them out of the hub with a long screwdriver (**Figure 13**). Prop a piece of wood or rag underneath the screwdriver to avoid damaging the hub.
3. Remove the circlip(s) (**Figure 17**) from the hub.
4. Before proceeding further, inspect the wheel bearings as described under *Inspection* in this chapter. If they must be replaced, proceed as follows.

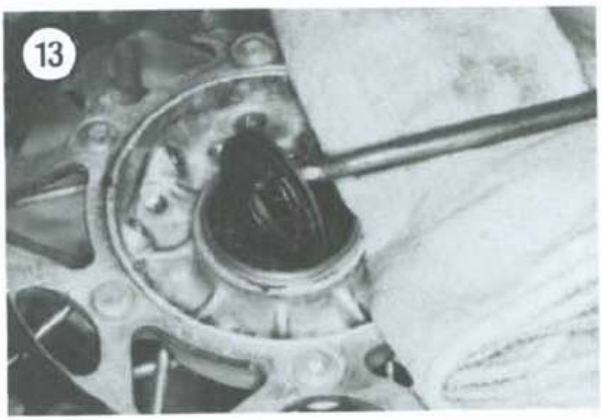
NOTE

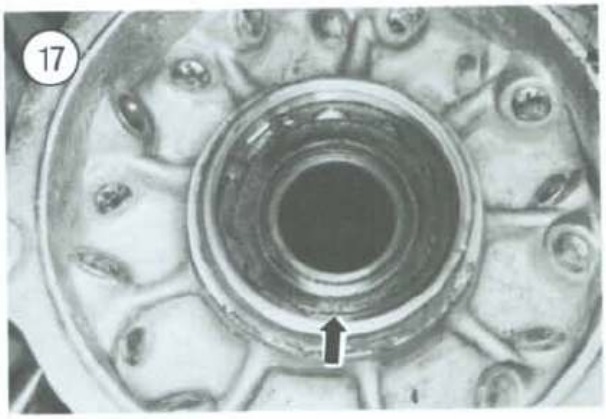
On 1986 and later models, the first bearing removed should be the bearing that is located next to the circlip. On some models, this bearing is a looser fit in the hub.

5. To remove the left- and right-hand bearings (**Figure 15**) and distance collar, insert a soft aluminum









or brass drift into one side of the hub. Push the distance collar over to one side and place the drift on the inner race of the lower bearing (**Figure 18**). Tap the bearing out of the hub with a hammer, working around the perimeter of the inner race.

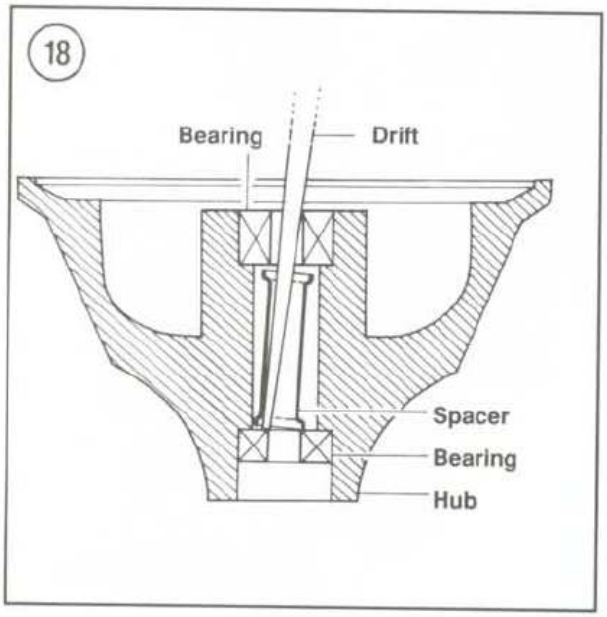
6. Remove the distance collar and tap out the opposite bearing.

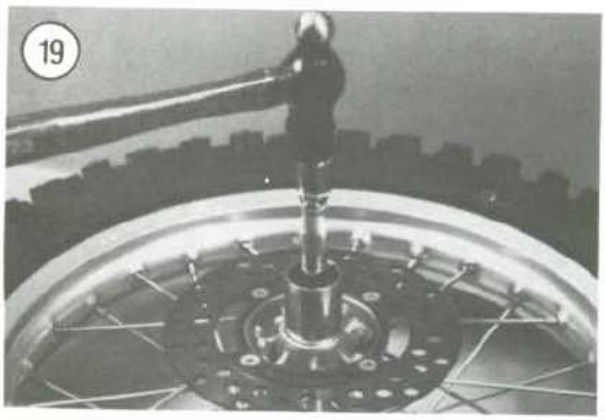
NOTE

On models with drum brakes, there are 2 bearings installed in the right-hand side of the hub.

7. Thoroughly clean out the inside of the hub with solvent and dry with compressed air or a shop cloth.

8. Clean the distance collar with solvent and dry thoroughly.





CAUTION

Avoid getting any greasy solvent residue on the brake disc. If this happens, clean it off with a shop cloth and lacquer thinner.

Assembly

CAUTION

Always reinstall new bearings, as the removal process will generally damage them, especially the first bearing removed. Purchase and replace the wheel bearings in sets of 2 or 3.

1. On non-sealed bearings or bearings that are sealed on one side only, pack the bearings with a good-quality bearing grease. Work the grease in between the balls thoroughly. Turn the bearing by hand a couple of times to make sure the grease is distributed evenly inside the bearing.
2. Blow any dirt or foreign matter out of the hub before installing the bearings.
3. Apply grease to the distance collar.
4. When installing new bearings:
   a. If the bearing is sealed on one side only, install the bearing so that the sealed side faces out.
   b. If the bearing is sealed on both sides, install the bearing so that the manufacturer's marks face out.
   c. When installing non-sealed bearings, install the bearing so that the manufacturer's marks face out.

NOTE

When installing the bearing on the side opposite the brake disc, place the brake disc on a piece of wood to avoid damaging it. These brake discs are thin and can be damaged easily.

CAUTION

*When installing the bearings in the following procedures, tap the bearings squarely into place and tap on the outer race only. Use a socket (**Figure 19**) that matches the outer race diameter. Do not tap on the inner race or the bearing might be damaged. Be sure that the bearings are completely seated.*

5. Install the right-hand bearing(s).

6. Install the circlip in the hub groove next to the right-hand bearing. Make sure the circlip seats in the groove completely.
7. Turn the hub over and install the distance collar.
8. Install the left-hand bearing until it seats in the hub.
9. Install the left-hand circlip, if used.
10. Check to make sure the bearings are installed squarely. Turn each bearing's inner race with your finger. The bearing should turn smoothly with no sign of roughness or binding. If a bearing does not turn smoothly, it was damaged during installation.

NOTE
Always install new oil seals.

11. Coat the lips of the new oil seals with grease before installing them.
12. Align the oil seal with the hub and tap it squarely into place with a bearing driver or socket (**Figure 20**). Install the oil seal until it is at least flush with the hub (**Figure 21**).
13. Clean the brake drum or disc surface of all grease and cleaner residue.

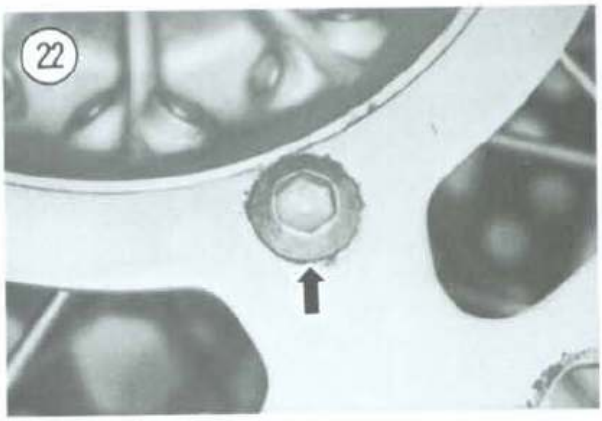
DRIVEN SPROCKET

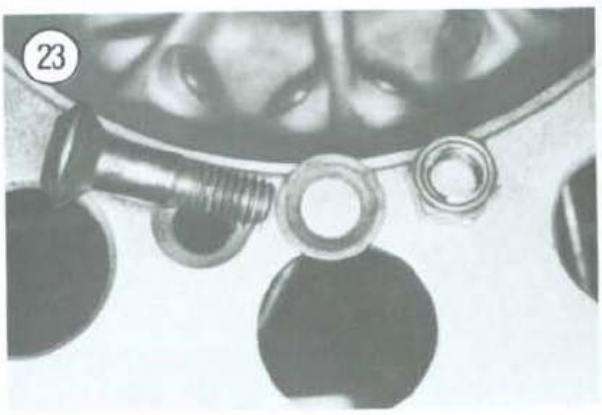
Removal/Installation

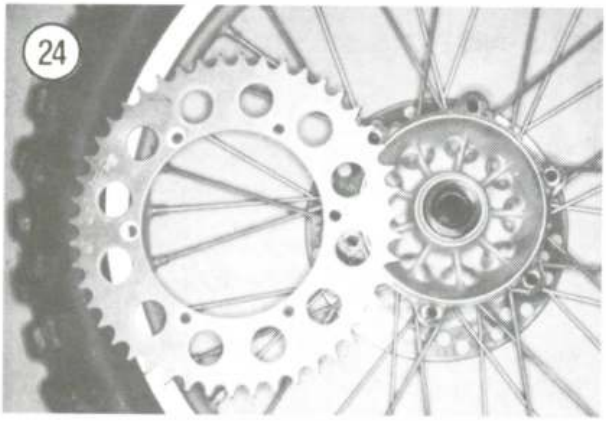
1. Remove the rear wheel as described in this chapter.

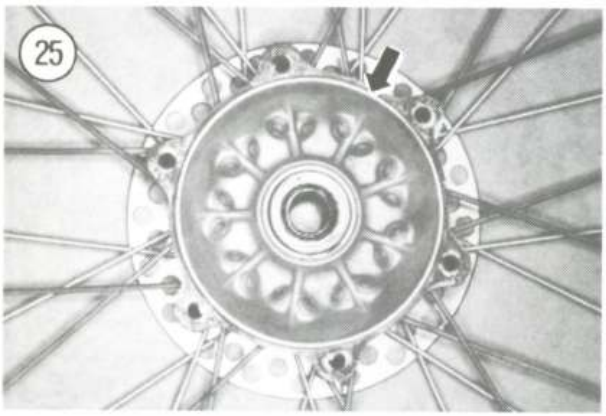
NOTE
*If Allen head bolts (**Figure 22**) are used to secure the driven sprocket, hold the bolts with an Allen wrench and loosen the mounting nuts. Do not attempt to loosen the bolt while holding the nut as this will probably round out the hex portion of the bolt, making it difficult to remove.*

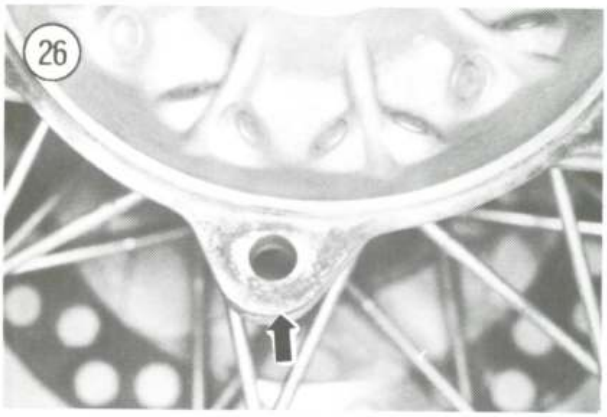
2. Remove the sprocket bolts, nuts and washers (if used). See **Figure 23**.
3. Remove the sprocket (**Figure 24**) from the hub.
4. Clean the sprocket mounting area on the hub (**Figure 25**) thoroughly.
5. Check the sprocket mounting tabs (**Figure 26**) for cracks or other damage. If necessary, replace the hub.

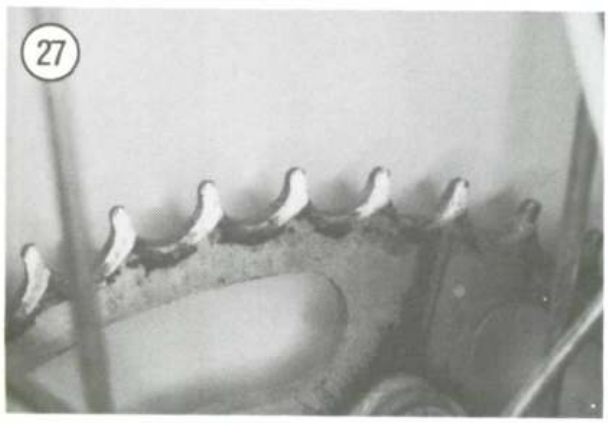












6. Clean the bolts, nuts and washers (if used) in solvent or with contact cleaner and dry thoroughly.
7. Replace bolts that have damaged heads or threads.
8. Replace washers (if used) that are cracked or otherwise damaged.
9. Assemble by reversing these disassembly steps. Tighten nuts to the torque specification in **Tables 4-6**.

Inspection

Inspect the sprocket teeth (**Figure 27**). If they are visibly worn, replace the sprocket.

If the sprocket requires replacement, the drive chain is probably worn also and may need replacement. Refer to *Drive Chain/Cleaning, Inspection, and Lubrication* in Chapter Three.

DRIVE CHAIN

Removal/Installation

1. Support the bike so that the rear wheel is off the ground.
2. Turn the rear wheel and drive chain until the master link is accessible.

NOTE

If the drive chain is equipped with a press fit master link, remove and install it as described under ***Press Fit Master Link*** *in this section.*

3. Remove the master link spring clip with a pair of pliers (**Figure 28**). Then remove the side plate and connecting link and separate the chain. When dis-

connecting an O-ring chain, remove the 4 O-rings (**Figure 29**, typical).

4. Slowly rotate the rear wheel and pull the drive chain off the drive sprocket.

5. Install by reversing these removal steps while noting the following.

6. If you are using an O-ring chain, install the 4 O-rings following the chain manufacturer's instructions (**Figure 29**, typical).

7. Install the spring clip on the master link so that the closed end of the clip is facing the direction of chain travel (**Figure 30**).

Press Fit Master Link

Many of the new drive chains are designed so that the master link side plate is installed with a press fit. To disconnect the chain, first remove the outer clip from the master link, then use a chain breaker to separate the side plate from the master link; see **Figure 31.** To install this type of master link, a press-fit chain tool is required; **Figure 32** illustrates one type of chain press tool that is available on the aftermarket.

NOTE

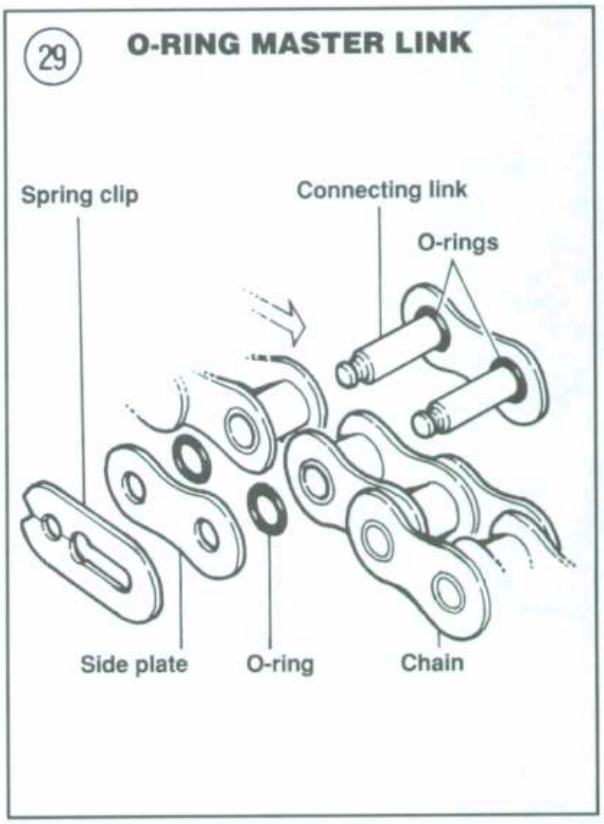
Most commercial press-fit chain tools are designed to press the side plate onto the connecting link to its correct depth. If the side plate is pressed in too far, it will bind the chain where it is joined at the master link. If the side plate is not pressed on far enough, the spring clip cannot be installed correctly and will probably come off. What you are looking to do is press the side plate onto the connecting link so that the slide plate is flush with both pin seating grooves in the connecting link.

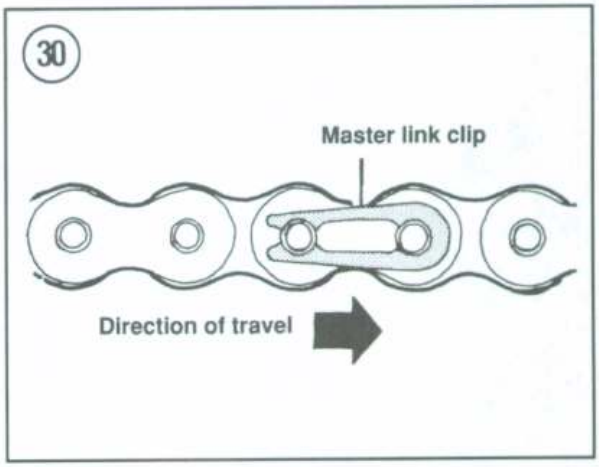
CAUTION

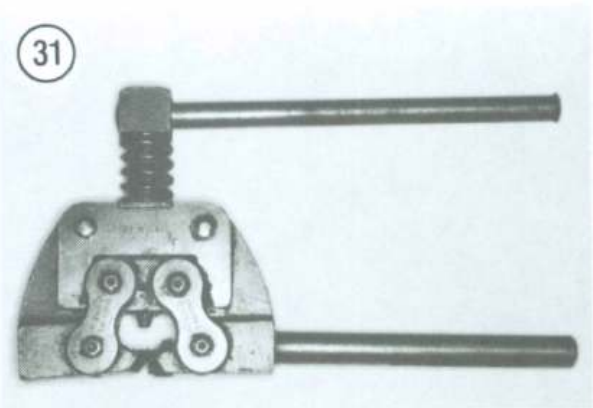
Attempting to install a press-fit master link without the proper tools will generally damage the master link and chain.

Cutting A Drive Chain To Length

Table 7 lists the correct number of chain links required for stock gearing. If your replacement drive chain is too long, cut it to length as follows.





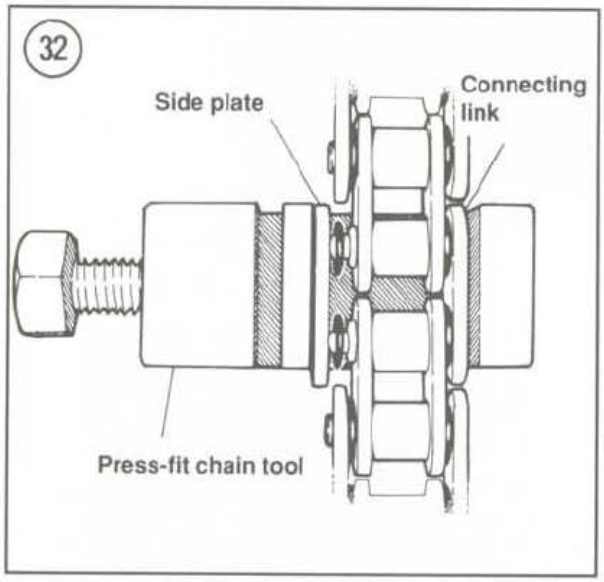


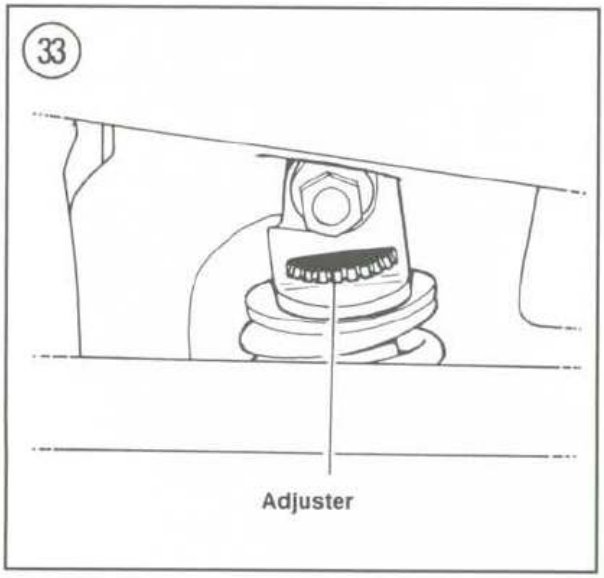
1. Remove the new chain from its box and stretch it out on your workbench. Set the master link aside for now.

2. Refer to **Table 7** for the correct number of links for your chain, then count the links out on the new chain. Make a chalk mark on the 2 chain pins where you want to cut it. Count the chain links one more time just to make sure you are correct.

WARNING

A bench grinder or hand-operated high-speed grinding tool will be required to grind the chain pins when cutting the chain. When using this equipment in the following steps, safety glasses must be worn.





3. Grind the head of two pins flush with the face of the side plate with a grinder or suitable grinding tool.

4. Next, use a chain breaker or a punch and hammer and lightly tap the pins out of the side plate; support the chain carefully when doing this. If the pins are still tight, grind more material from the end of the pins and then try again.

5. Remove the side plate and push out the connecting link.

Service and Inspection

For service and inspection of the drive chain, refer to *Drive Chain/Cleaning, Inspection and Lubrication* in Chapter Three.

TIRE CHANGING AND TIRE REPAIRS

Refer to Chapter Eleven.

SHOCK ABSORBER

All models use a single rear shock absorber and spring unit with a remote nitrogen gas/oil reservoir for better fade resistance.

Rebound Damping Adjustment

1982-1984

Rebound damping can be adjusted to 4 different settings. The adjuster wheel is located at the top of the shock absorber (**Figure 33**). The adjuster wheel is marked with the numbers 1, 2, 3 and 4 at the adjustment positions.

For the softest setting, turn the adjuster wheel to the No. 1 adjustment position. For the stiffest position, turn the adjuster wheel to the No. 4 adjustment position.

Make sure that the adjuster is located in one of the adjustment positions and not in between any 2 settings.

1985 and 1986 KX250 and KX500

Rebound damping can be adjusted to 22 different settings. The adjuster knob is located at the base of the shock absorber (**Figure 34**).

For the softest setting, turn the adjuster counterclockwise until it stops, then turn it clockwise to the first click. For the stiffest setting, turn the adjuster all the way clockwise.

Make sure that the adjuster is located in one of the detents and not in between any 2 settings.

1986 KX125 and all 1987 models

Rebound damping can be adjusted to 22 (1986 KX125) or 16 (all 1987) different settings. The adjuster knob is located at the base of the shock absorber (**Figure 35**). The adjuster base is marked with the letters S (soft) and H (hard).

For the softest setting, turn the adjuster counterclockwise until it stops, then turn it clockwise to the first click. For the stiffest setting, turn the adjuster all the way clockwise.

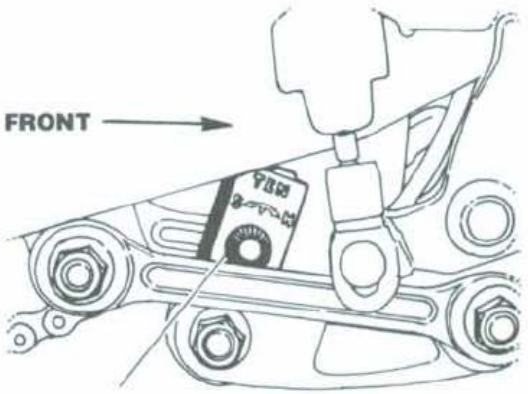
Make sure that the adjuster is located in one of the detents and not in between any 2 settings.

1988-on

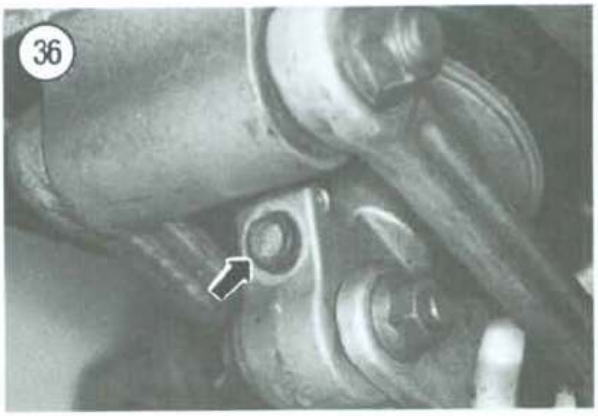
Rebound damping can be adjusted to different settings. The adjuster screw is located at the base of the shock absorber. See **Figure 36** (1988) or **Figure 37** (1989-on). Refer to **Table 10**.

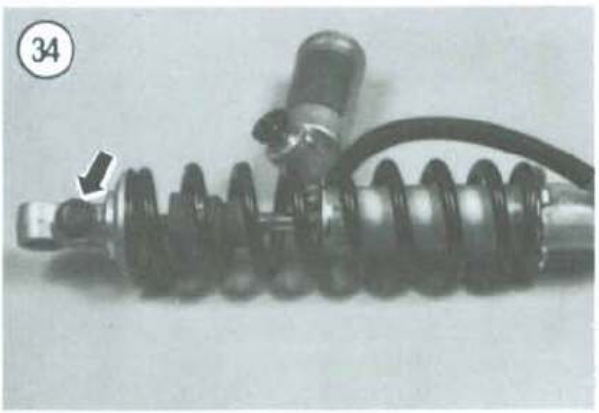
For the softest setting, turn the adjuster counterclockwise until it stops, then turn it clockwise to the first click. For the stiffest setting, turn the adjuster all the way clockwise.

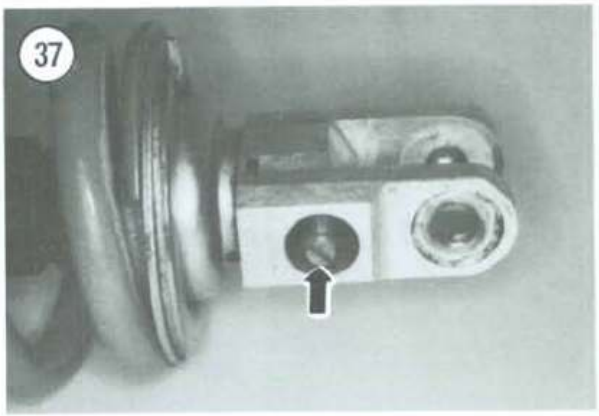
35

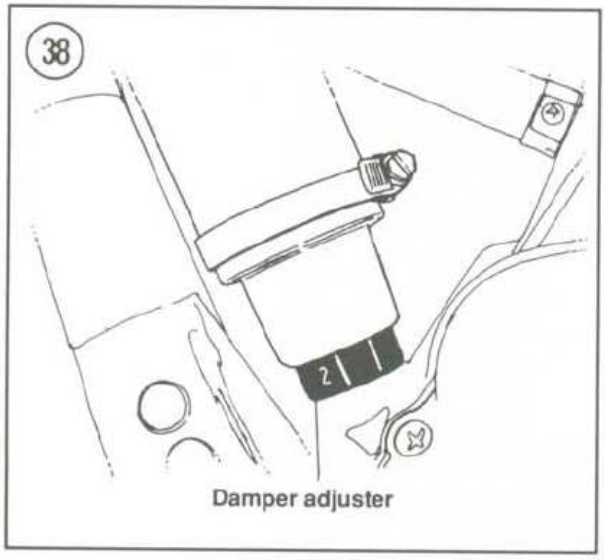


Rebound damping adjuster









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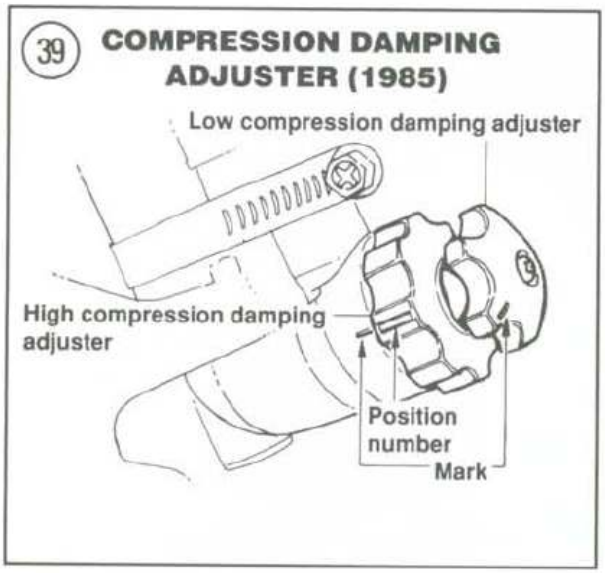
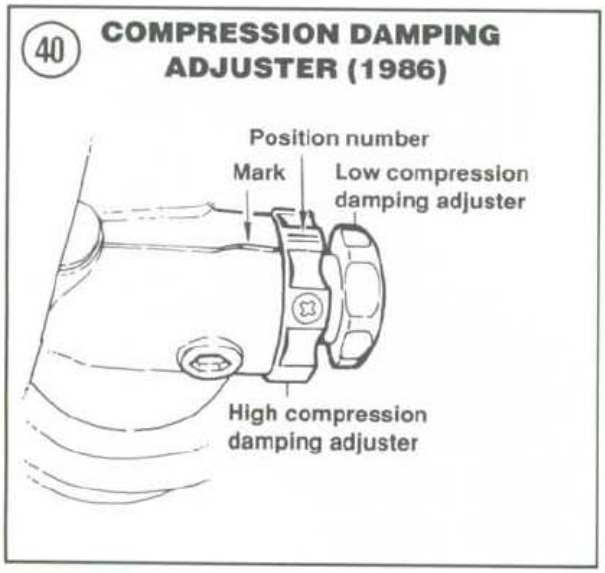


39 COMPRESSION DAMPING ADJUSTER (1985)



40 COMPRESSION DAMPING ADJUSTER (1986)

Make sure that the adjuster is located in one of the detents and not in between any 2 settings.

Compression Damping Adjustment

1984

Compression damping can be adjusted to 4 different settings. The adjuster knob is located at the base of the reservoir housing (**Figure 38**).

For the softest setting, turn the adjuster to the No. 1 position. For the stiffest setting, turn the adjuster to the No. 4 position.

Make sure the adjuster is located in one of the detents and not in between any 2 settings.

1985-1986

These shock absorbers are equipped with both high- and low-speed compression damping adjusters. Both adjusters are mounted at the base of the reservoir housing. See **Figure 39** (1985) or **Figure 40** (1986).

High-speed compression damping can be adjusted to 4 different settings. For the softest setting, turn the adjuster to the No. 1 position. For the stiffest setting, turn the adjuster to the No. 4 position.

Low-speed compression damping can be adjusted to 14 different settings. Turn the adjuster counterclockwise until it stops for the softest setting or clockwise until it stops for the stiffest setting.

Make sure the adjuster is located in one of the detents and not in between any 2 settings.

1987-1989

Compression damping can be adjusted to 20 (1987) or 16 (1988-1989) different settings. The adjuster knob (1987) or screw (1988-1989) is located near the top end of the shock reservoir. See **Figure 41**, typical.

For the softest setting, turn the adjuster counterclockwise until it stops, then turn it clockwise to the first click. For the stiffest setting, turn the adjuster all the way clockwise.

Make sure that the adjuster is located in one of the detents and not in between any 2 settings.

1990-on

Compression damping can be adjusted to different settings. The adjuster screw is located near the top end of the shock reservoir (**Figure 41**).

For the softest setting, turn the adjuster clockwise until it stops, then turn counterclockwise to the first click. For the stiffest setting, turn the adjuster all the way counterclockwise. The standard setting (**Table 10**) is the number as clicks counterclockwise after turning the adjuster clockwise to its full stop.

Shock Spring Pre-load Adjustment (1982-1985)

The shock absorber on these models must be removed to adjust spring pre-load.

1. Remove the shock absorber as described in this section.
2. Clean the threads at the bottom of the shock absorber.

CAUTION

Handle the shock carefully to avoid damaging the reservoir hose or reservoir.

NOTE

*Shock pre-load is adjusted by changing the position of the adjuster on the shock absorber. Depending on model, each turn of the adjust nut will change the pre-load setting by a set amount; See **Table 8**.*

3. The spring pre-load is measured from the center of the bottom shock mounting hole to the top of the adjuster (**Figure 42**). Measure the spring pre-load for your shock. See **Table 8** for spring pre-load specifications.
4. To adjust, loosen the locknut and turn the adjuster in the desired direction, making sure to maintain the pre-load within the dimensions listed in **Table 8**. Tightening the adjust nut increases spring pre-load and loosening it decreases pre-load.

NOTE

*Spanner wrenches, like the ones shown in **Figure 43**, should be used to adjust spring pre-load.*

CAUTION

*Remember, the spring pre-load adjustment must be maintained between the minimum and maximum dimensions listed in **Table 8**.*

5. After the desired spring pre-load is achieved, tighten the locknut securely.

Shock Spring Pre-load Adjustment (1986-on)

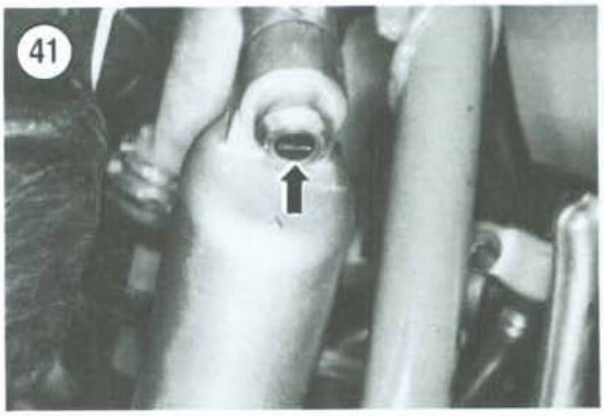
The spring pre-load adjustment can be performed with the shock mounted on the bike.

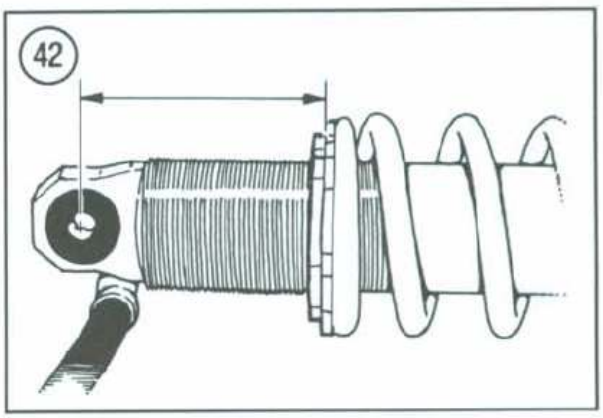
1. Remove the sub-frame as described in this chapter.

CAUTION

After the air box is removed, the carburetor throat is exposed. Close off the opening with a clean shop cloth so dirt or foreign matter will not enter into the carburetor.

2. Clean the threads at the bottom of the shock absorber.

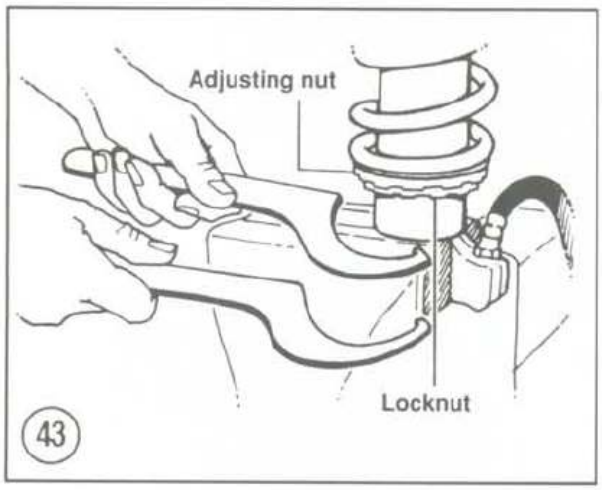


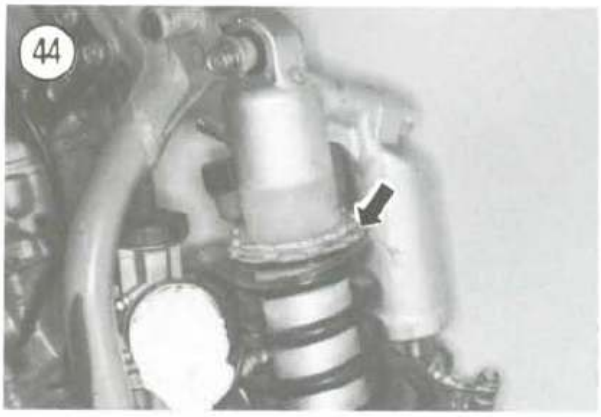


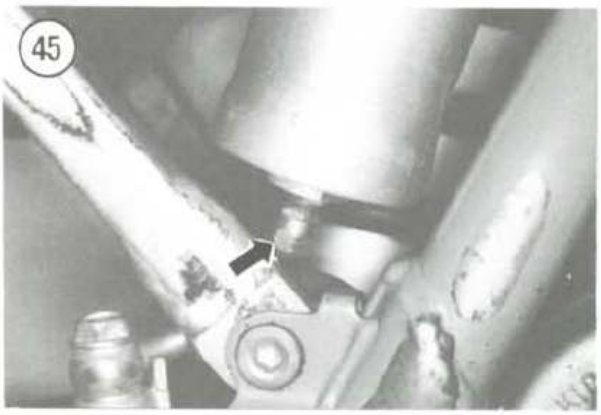
NOTE

Shock pre-load is adjusted by changing the position of the adjuster on the shock absorber. Depending on model, each turn of the adjust nut will change the pre-load setting by a set amount; See ***Table 8.***

3. The spring pre-load is measured from the center of the bottom shock mounting hole to the top of the adjuster (**Figure 42**). Measure the spring pre-load for your shock. See **Table 8** for spring pre-load specifications.







4. To adjust, loosen the locknut (**Figure 44**) and turn the adjuster in the desired direction, making sure to maintain the pre-load within the dimensions listed in **Table 8**. Tightening the adjust nut increases spring pre-load and loosening it decreases pre-load.

NOTE

Spanner wrenches, like the ones shown in ***Figure 43****, should be used to adjust spring pre-load.*

CAUTION

Remember, the spring pre-load adjustment must be maintained between the minimum and maximum dimensions listed in ***Table 8****.*

5. After the desired spring pre-load is achieved, tighten the locknut securely.
6. Remove the rag from the carburetor throat and install the sub-frame as described in this chapter.

Nitrogen Pressure Adjustment

An air valve is mounted at the bottom of the gas reservoir to allow adjustment of the shock's nitrogen pressure to better suit track and riding conditions. **Table 9** lists the standard, minimum and maximum nitrogen pressures.

1. Support the bike so that the rear wheel is off the ground.
2. Remove the valve cap at the bottom of the gas reservoir (**Figure 45**, typical).
3. Check the nitrogen pressure with an air pressure gauge.
4. If necessary, add nitrogen gas from a suitable tank.

NOTE

The shock's nitrogen pressure should be checked and adjusted when the gas reservoir is cold (before riding the bike).

WARNING

Use only nitrogen or air—DO NOT use any other type of compressed gas as an explosion may result. Never heat the shock absorber with a torch or place them near an open flame or extreme heat.

WARNING

Do not exceed the maximum nitrogen pressure listed in ***Table 9*** *when filling the shock absorber.*

5. Recheck the air pressure.
6. Reinstall the air valve cap before riding the bike.

Shock Absorber Removal/Installation (1982-1985)

1. Support the bike so that the rear wheel is off the ground.
2. Remove the seat and both side covers.
3. Remove the air box.

CAUTION

After the air box is removed, the carburetor throat is exposed. Close off the opening with a clean shop cloth so dirt or foreign matter will not enter into the carburetor.

4. Disconnect the clamp securing the reservoir to the frame, then carefully position the reservoir so that it is not damaged. See **Figure 46**, typical.
5. Loosen the top (**Figure 47**, typical) and bottom shock mounting bolts and nuts, then remove them.
6. Remove shock absorber and reservoir through the left-hand side of the frame.
7. Install by reversing these steps. Tighten the rear shock bolts and nuts to the torque specification listed in **Tables 4-6**.

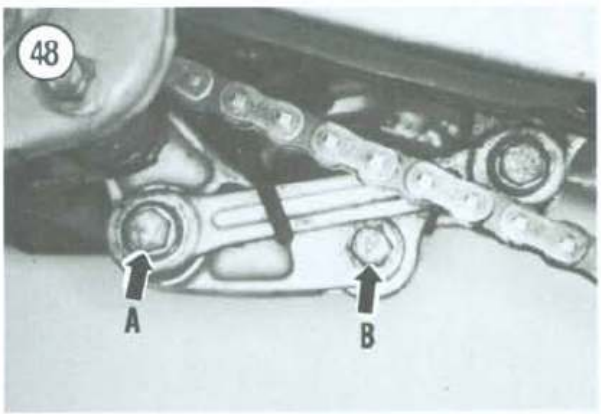
Shock Absorber Removal/Installation (1986-on)

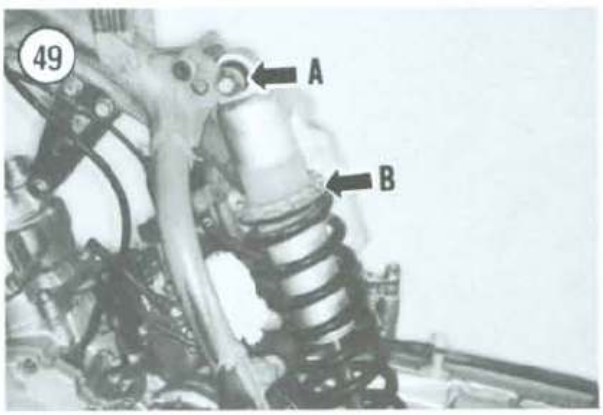
1. Remove the sub-frame as described in this chapter.

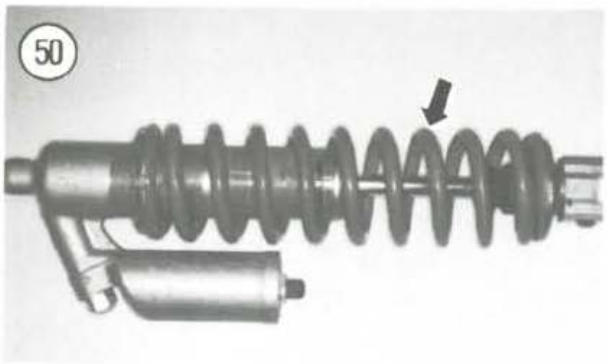
CAUTION

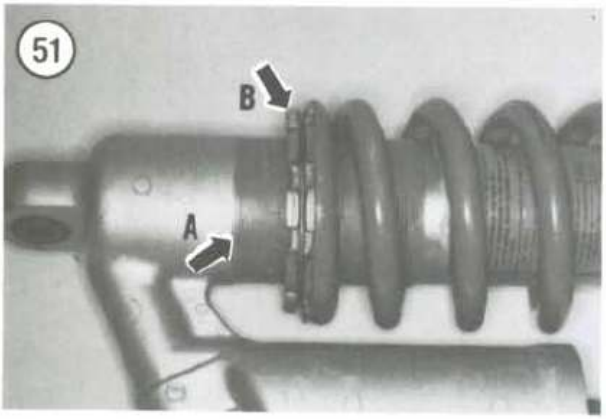
After the air box is removed, the carburetor throat is exposed. Close off the opening with a clean shop cloth so dirt or foreign matter will not enter into the carburetor.

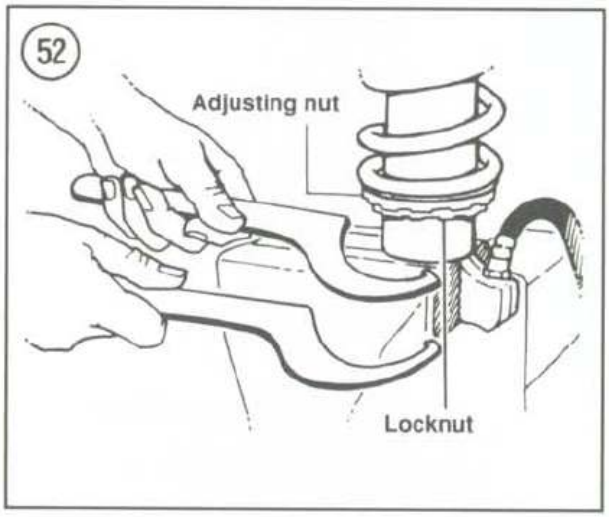
2. If the tie-rod is blocking the lower shock mounting bolt, remove the tie-rod bolt (A, **Figure 48**) and allow the tie-rods to hang down.

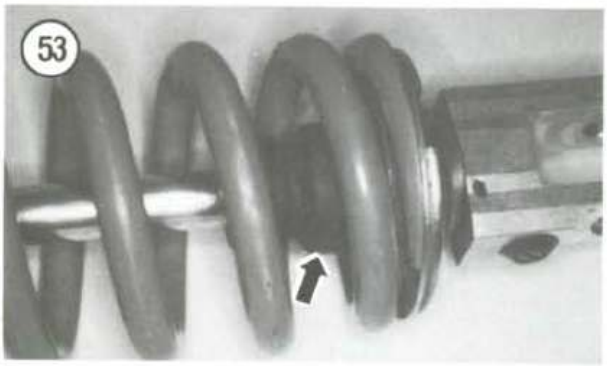












3. Remove the lower shock absorber mounting bolt (B, **Figure 48**).
4. Place a block of wood underneath the rear wheel.
5. Loosen the upper shock absorber mounting bolt (A, **Figure 49**).
6. Lift the rear wheel slightly and remove the upper mounting bolt and shock absorber (B, **Figure 49**).
7. Install by reversing these removal steps while noting the following.
8. On 1987 and later models, install the shock absorber so that the reservoir is on the right-hand side.
9. Apply a light coat of molybdenum disulfide grease to all pivot areas of the shock absorber and tie-rod (if removed).
10. Install all bolts that use a nut from the left-hand side.
11. Tighten the shock absorber bolts to the torque specification in **Tables 4-6**.
12. Tighten the tie-rod bolt and nut to the torque specification in **Tables 4-6**.
13. Install the sub-frame as described in this chapter.

Spring
Removal/Installation

In addition to the standard spring (**Figure 50**) that came on your shock, you can purchase replacement shock springs, from Kawasaki and aftermarket suspension specialists, in a variety of spring rates. To service the spring, perform the following.
1. Remove the shock absorber as described in this chapter.
2. If you are satisfied with the existing spring preload setting and want to maintain it, measure and record the spring pre-load position as described under *Shock Spring Pre-load Adjustment* in this chapter.
3. Clean the threads (A, **Figure 51**) at the bottom of the shock absorber.
4. Secure the upper or lower mounting portion of the shock in a vise with soft jaws.
5. Loosen the spring locknut (B, **Figure 51**) with a spanner wrench (**Figure 52**) and turn it all the way down. Then do the same for the adjust nut to reduce spring pre-load.
6. Slide the rubber shock bumper (**Figure 53**) down the shock shaft.
7. Remove the retainer clip and spring seat (if used) at the top of the spring and remove the spring (**Figure 54**).

8. Install by reversing these steps, while noting the following.
9. On 1988 and later models, install the spring so that the tapered end (small diameter) of the spring coil faces upward.
10. Adjust the spring pre-load as described under *Shock Pre-load Adjustment* in this chapter.

Inspection

1. Measure the free length of the spring (**Figure 55**). Replace the spring if it has sagged to the service limit in **Table 2** or **Table 3**.
2. Check the shock oil seals (**Figure 56**), bushings and bearings (**Figure 57**, typical) for severe wear and damage. Replace if necessary.

Shock Disassembly/Assembly

Refer shock overhaul to a Kawasaki dealer or aftermarket suspension specialist.

WARNING

*The shock unit contains highly compressed nitrogen gas. Do not tamper with or attempt to open the shock assembly (**Figure 58**). Do not place it near an open flame or other extreme heat. Do not weld on the frame near it.*

UNI-TRAK LINKAGE (1982)

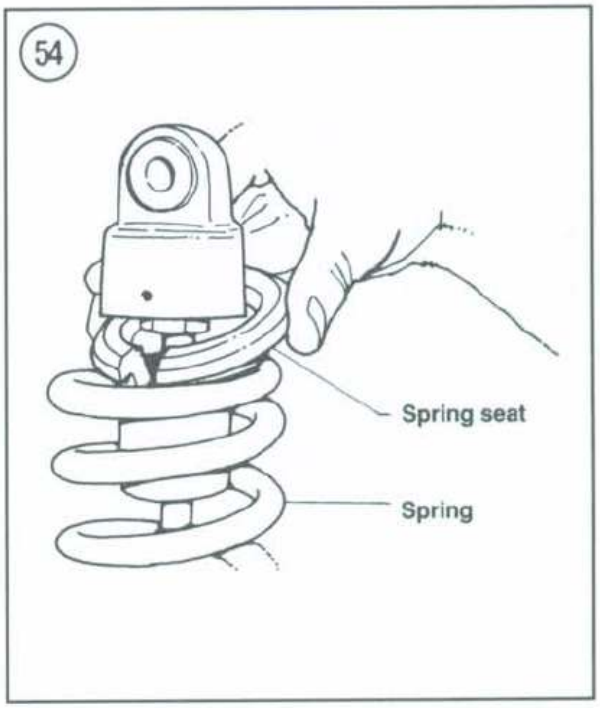
The Uni-Trak linkage (**Figure 59**) has a rocking arm mounted on the frame, connecting the top of the shock to the vertical links. The vertical links connect the rocking arm to the swing arm.

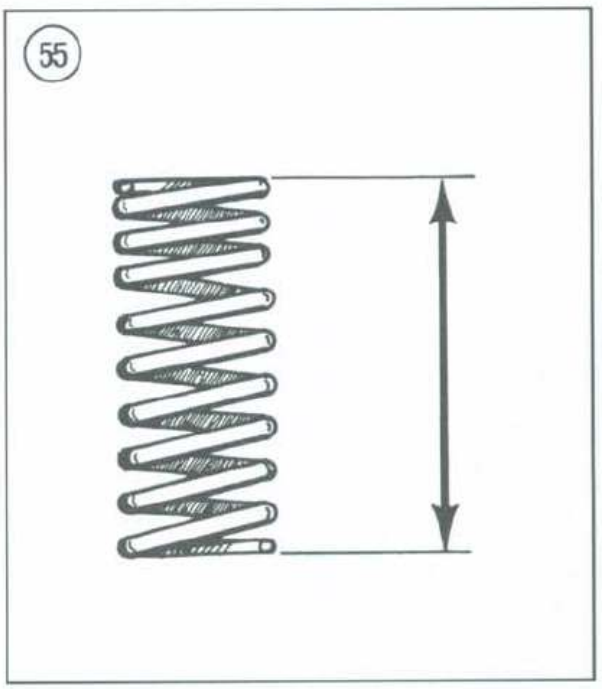
The bearings and pivot bolts at all of the linkage joints must be inspected and lubricated according to the maintenance schedule in Chapter Three, and replaced when worn past the specified service limits. Abnormal play may be detectable without disassembling the linkage, but thorough bushing lubrication requires disassembly to expose the bearings.

Uni-Trak Linkage Disassembly/Reassembly

Refer to **Figure 59** for this procedure.

1. Support the bike with the rear wheel off the ground.
2. Remove the seat and side covers.
3. Place a wood block underneath the wheel.
4. Loosen and remove the lower link mounting bolt nuts at the swing arm. Then remove the bolts and dust seals.





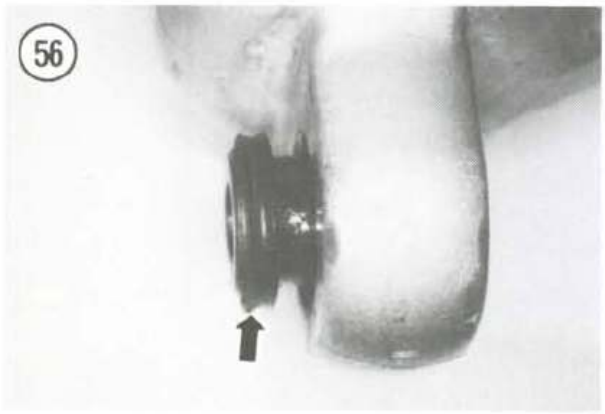
5. Loosen and remove the link assembly mounting bolt and nut at the rocking arm.

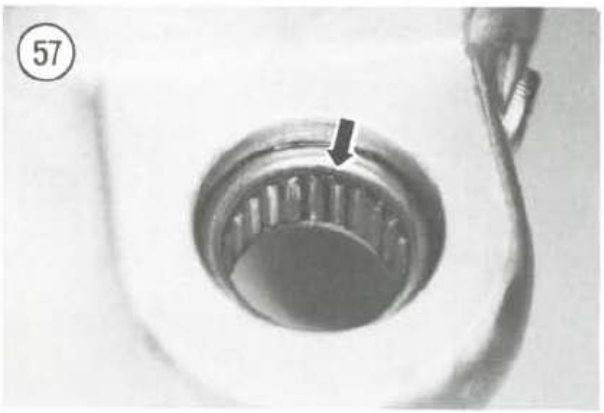
6. Remove both links. Remove the seal located between each link and the rocking arm.

7. Remove the rocking arm bolt and nut at the upper shock mount.

8. Loosen and remove the rocking arm pivot bolt nut. Then remove the pivot bolt, shims and rocking arm. Remove the sleeve from inside the rocking arm.

9. Clean and inspect the linkage assembly as described in the following procedure.





10. Install by reversing these removal steps, while noting the following.

11. Coat the following components with molybdenum disulfide grease:

a. Rocking arm needle bearings, sleeve, shims and pivot bolt.
b. Spherical bearings (ball-joint) mounted in the rocking arm and vertical links. Work the grease into the bearing by pivoting the ball back and forth.
c. All dust seals.
d. Shock absorber and both vertical link mounting bolts.

12. Tighten the following bolts and nuts to the torque specifications listed in **Tables 4-6**:

a. Rocking arm pivot bolt and nut.
b. Upper link bolt and nut.
c. Lower link bolts and nut.
d. Upper shock absorber bolt and nut.

Inspection

1. Remove the rubber boot from each vertical link ball-joint assembly.

2. Clean all parts in solvent and dry thoroughly with compressed air.

3. Inspect the rocking arm needle bearings for severe wear or damage.

4. Inspect the spherical bearings in the rocking arm and vertical links (**Figure 60**). Maximum wear is 0.7 mm (0.028 in.).

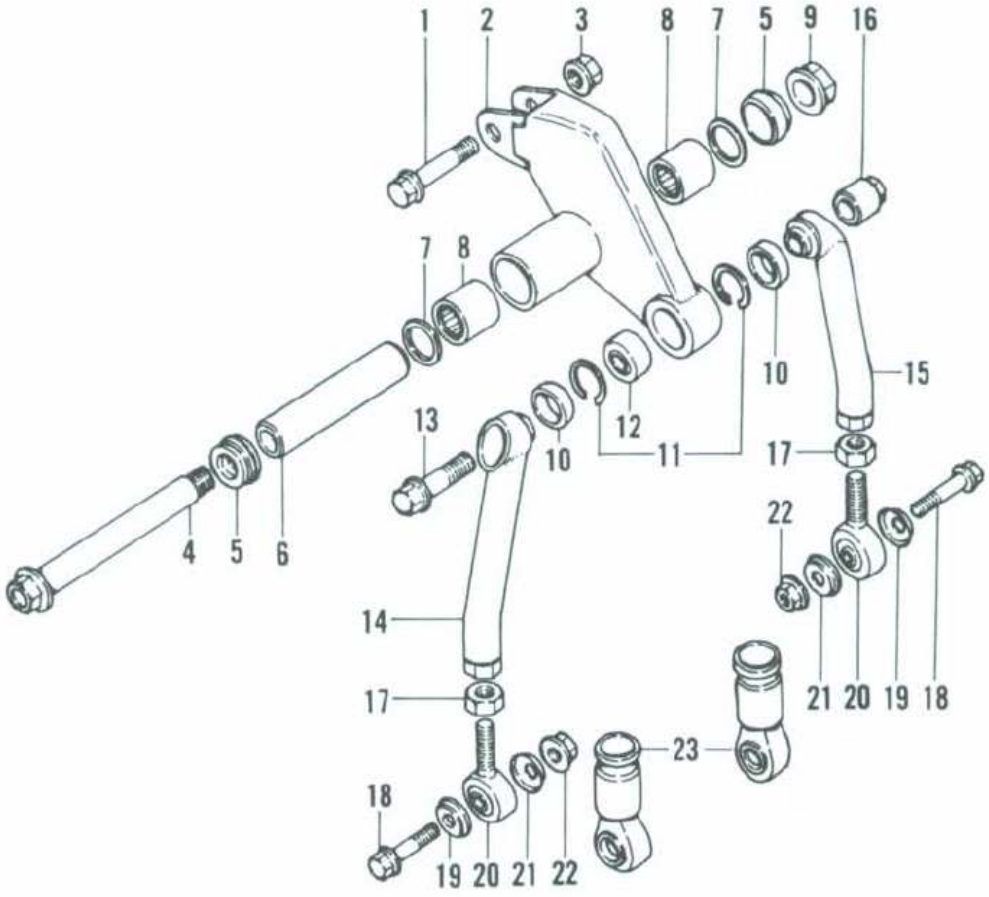
5. Replace needle bearings and spherical bearings with a press. Note the following:

a. Do not remove bearings for routine cleaning and inspection as removal may damage them.
b. Remove the 2 circlips from the rocking arm before removing the spherical bearing. Then, after installing the new bearing, install the circlips into the rocking arm grooves, checking that they seat in the grooves completely.
c. Replace both rocking arm needle bearings as a set.
d. When installing new spherical bearings in the vertical links, the center line of the bearing should be 33 mm (1.30 in.) from the edge of the link nut as shown in **Figure 60**.

6. Inspect the dust seals and dust boots for age deterioration, cracks or other damage. Replace if necessary. Always install new dust seals when installing new bearings.

(59)

REAR SUSPENSION (1982)



1. Bolt
2. Rocker arm
3. Nut
4. Pivot shaft
5. Dust cap
6. Sleeve
7. Shim
8. Bearing
9. Nut
10. Cap
11. Circlips
12. Spherical bearing
13. Bolt
14. Left-hand link
15. Right-hand link
16. Nut
17. Nut
18. Bolt
19. Cap
20. Ball-joint
21. Cap
22. Nut
23. Cover

7. Lubricate all parts as described under *Removal/Installation*.
8. Install a rubber boot over each vertical link ball-joint.

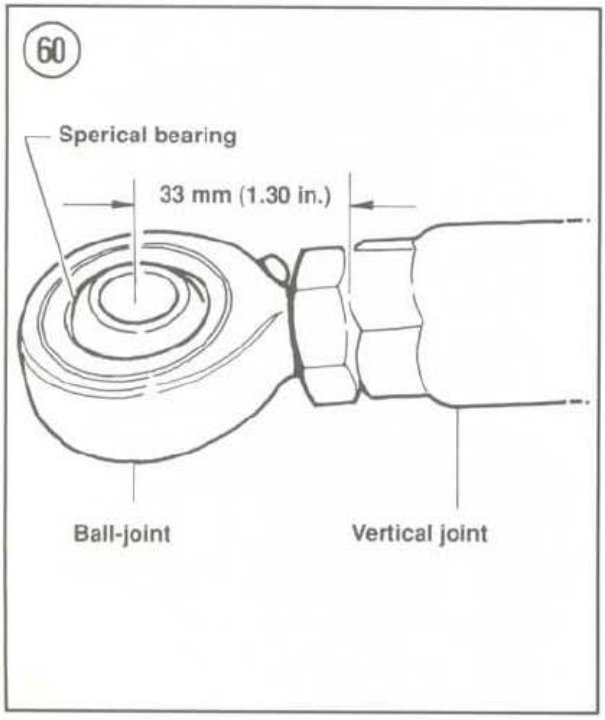
UNI-TRAK LINKAGE (1983-1984)

The Uni-Trak linkage has a rocking arm mounted on the frame, connecting the top of the shock to a vertical link. The vertical link connects the rocking arm to the swing arm. See **Figure 61** (1983) or **Figure 62** (1984).

The bearings and pivot bolts at all of the linkage joints must be inspected and lubricated according to the maintenance schedule in Chapter Three, and replaced when worn past the specified service limits. Abnormal play may be detectable without disassembling the linkage, but thorough bushing lubrication requires disassembly to expose the bearings.

Uni-Trak Linkage Disassembly/Reassembly

Refer to **Figure 61** or **Figure 62** when performing this procedure.
1. Support the bike with the rear wheel off the ground.



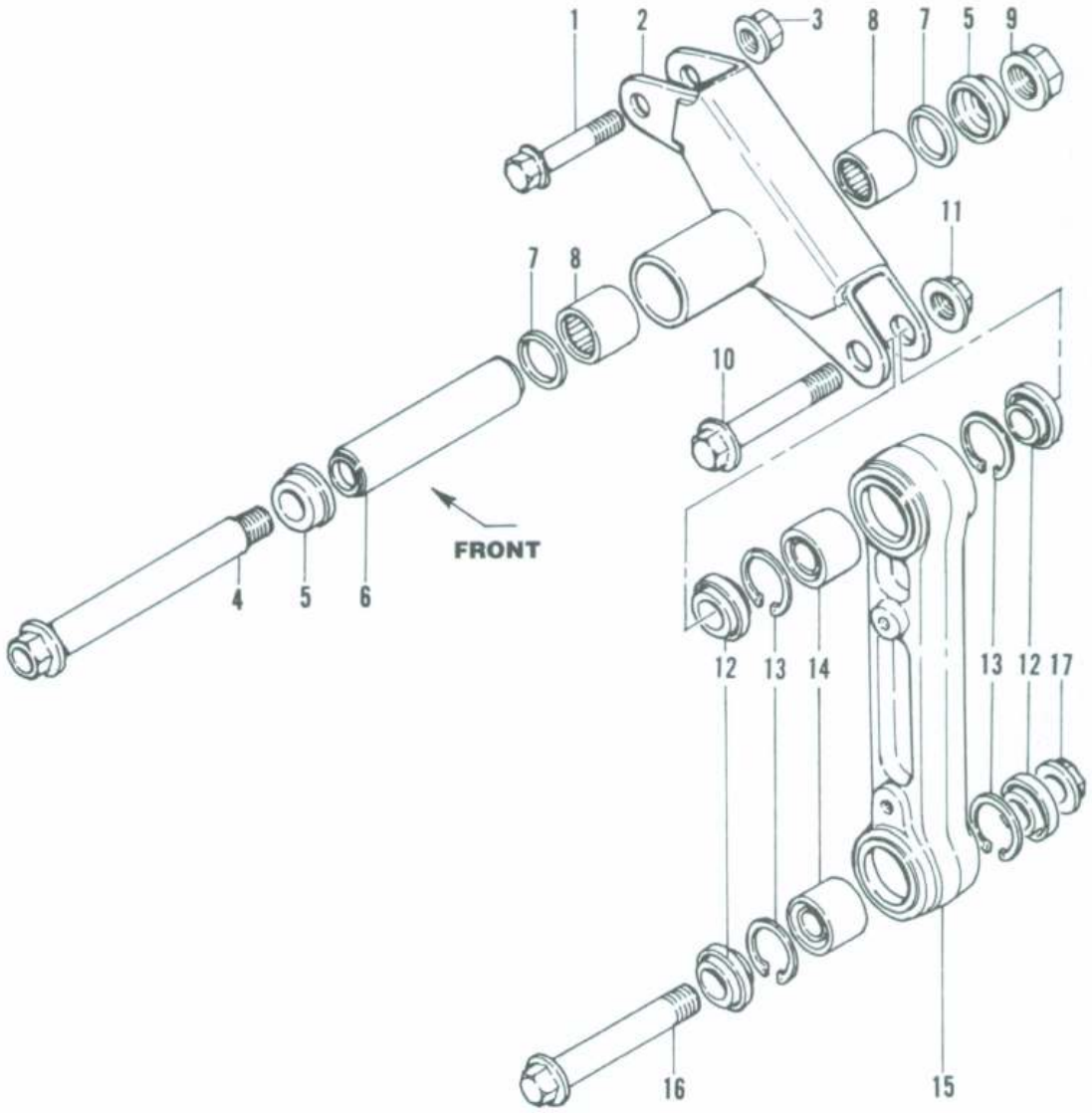
2. Remove the seat and side covers.
3. Remove the air box.
4. Place a wood block underneath the wheel.
5. Remove the vertical link as follows:
   a. Remove the 2 vertical link bolts (A, **Figure 63**).
   b. Remove the link (B, **Figure 63**) and the 4 dust seals.
6. Remove the rocking arm as follows:
   a. Remove the pivot bolt plugs from the frame.
   b. Remove the upper link bolt at the rocking arm (A, **Figure 64**).
   c. Remove the upper shock absorber pivot bolt and shaft (B, **Figure 64**) at the rocking arm.
   d. Remove the rocking arm pivot shaft nut and bolt (C, **Figure 64**) and remove the rocking arm.
7. Clean and inspect the linkage assembly as described in the following procedure.
8. Install by reversing these removal steps, while noting the following.
9. Coat the following components with molybdenum disulfide grease:
   a. Rocking arm needle bearings, sleeve, shims and pivot bolt.
   b. Spherical bearings (ball-joint) mounted in the vertical link. Work the grease into the bearing by pivoting the ball back and forth.
   c. All dust seals.
   d. Shock absorber and link mounting bolts.
10. Tighten the following bolts and nuts to the torque specifications listed in **Tables 4-6**:
   a. Rocking arm pivot bolt and nut.
   b. Upper link bolt and nut.
   c. Vertical link bolts and nuts.
   d. Upper shock absorber bolt and nut.

Inspection

1. Disassemble the rocking arm assembly (**Figure 65**) as follows:
   a. Remove the dust caps (A, **Figure 66**) and shims (B, **Figure 66**).
   b. Remove the sleeve (C, **Figure 66**).
2. Remove the dust caps (A, **Figure 67**) from the vertical link.
3. Clean all parts in solvent and dry thoroughly with compressed air.
4. Inspect the rocking arm needle bearings (**Figure 68**) for severe wear or damage.

(61)

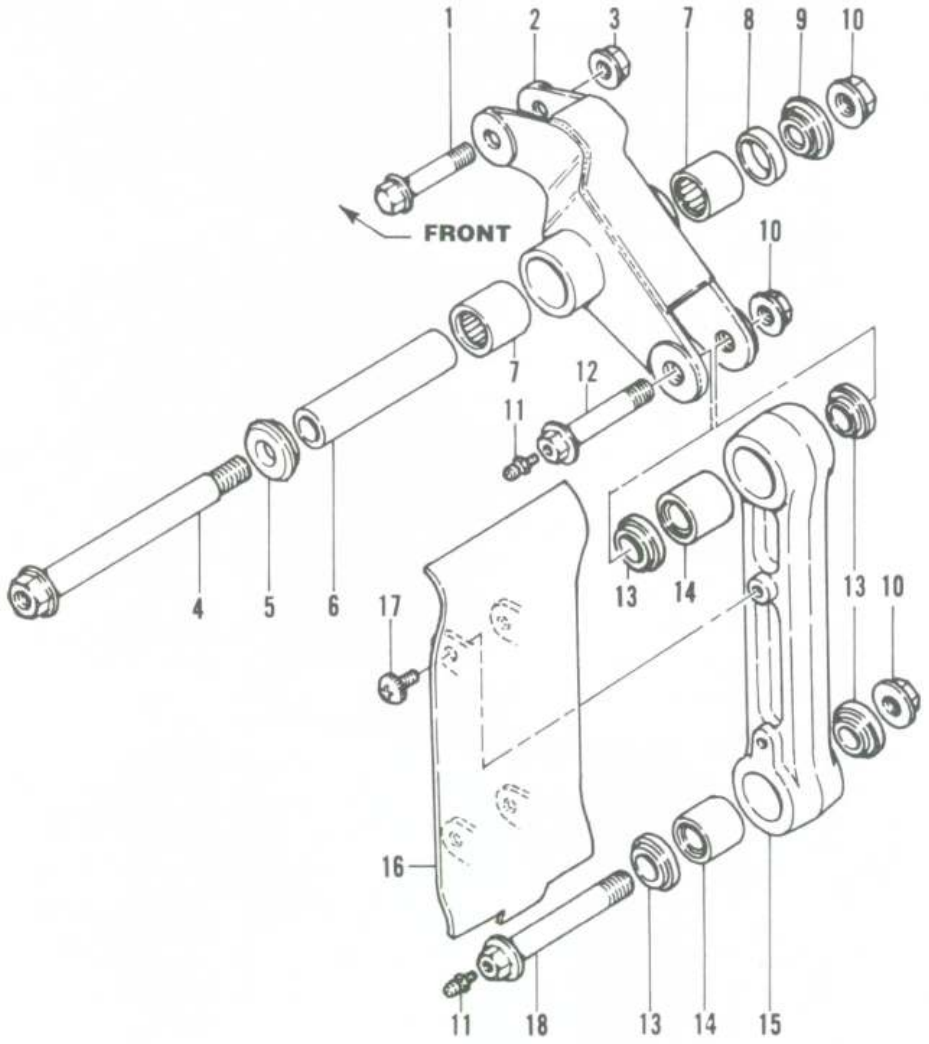
REAR SUSPENSION (1983)



1. Bolt
2. Rocking arm
3. Nut
4. Pivot bolt
5. Dust cap
6. Sleeve
7. Shim
8. Bearing
9. Nut
10. Bolt
11. Nut
12. Dust cap
13. Circlip
14. Bearing
15. Link
16. Bolt
17. Nut

(62)

REAR SUSPENSION (1984)



1. Bolt
2. Rocking arm
3. Nut
4. Pivot bolt
5. Dust cover
6. Sleeve
7. Bearing
8. Spacer
9. Dust cover
10. Nut
11. Grease nipple
12. Bolt
13. Dust cover
14. Bearing
15. Link
16. Cover
17. Screw
18. Bolt

5. Measure the rocking arm sleeve (C, **Figure 66**) and replace if worn to the service limit in **Table 2** or **Table 3**.

6. Inspect the spherical bearings in the vertical link (**Figure 69**). Maximum wear is 0.7 mm (0.028 in.).

7. Replace needle bearings and spherical bearings with a press. Note the following:

a. Do not remove bearings for routine cleaning and inspection as removal may damage them.

b. On 1983 models, remove the 4 circlips (B, **Figure 67**) from the vertical link before removing the spherical bearings. Then, after installing the new bearings, install the circlips into the vertical link grooves, checking that they seat in the grooves completely.

c. Replace both rocking arm needle bearings as a set.

d. Replace both vertical link spherical bearings as a set.

8. Inspect the dust seals for age deterioration, cracks or other damage. Replace if necessary. Always install new dust seals when installing new bearings.

9. Lubricate all parts as described under *Removal/Installation*.

10. Assemble the rocking arm assembly (**Figure 65**) as follows:

a. Install the sleeve (C, **Figure 66**).

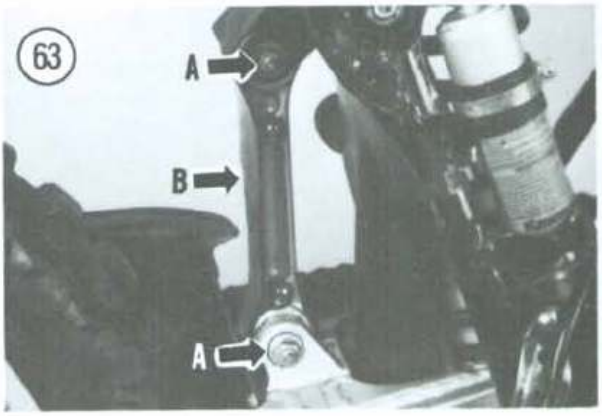
b. Install the shims (B, **Figure 66**) and dust caps (A, **Figure 66**).

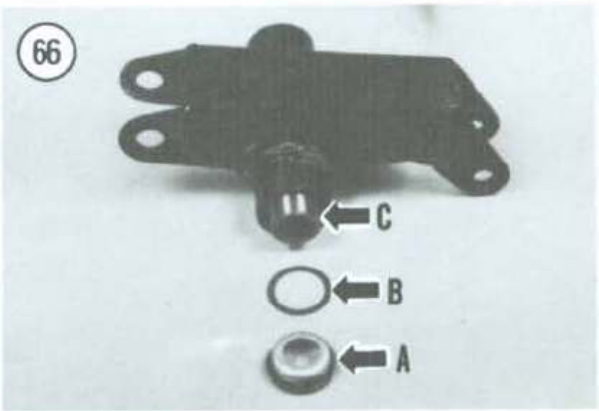
11. Install the dust caps (A, **Figure 67**) into the vertical link.

UNI-TRAK LINKAGE (ALL 1985 AND 1986 KX250 AND KX500)

The Uni-Trak linkage has a rocking arm mounted on the frame, connecting the top of the shock to a vertical link. The vertical link is adjustable connects the rocking arm to the swing arm. See **Figure 70**.

The bearings and pivot bolts at all of the linkage joints must be inspected and lubricated according to the maintenance schedule in Chapter Three, and replaced when worn past the specified service limits. Abnormal play may be detectable without disassembling the linkage, but thorough bushing lubrication requires disassembly to expose the bearings.



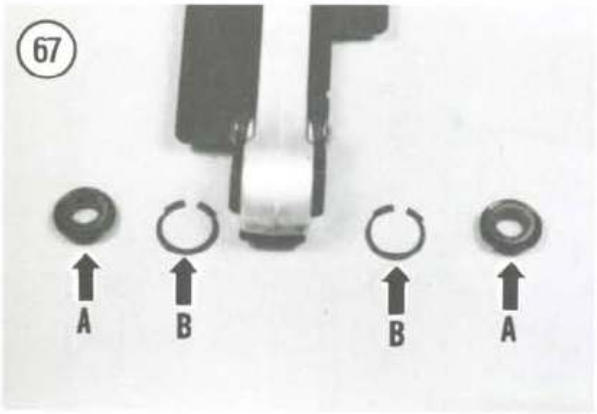


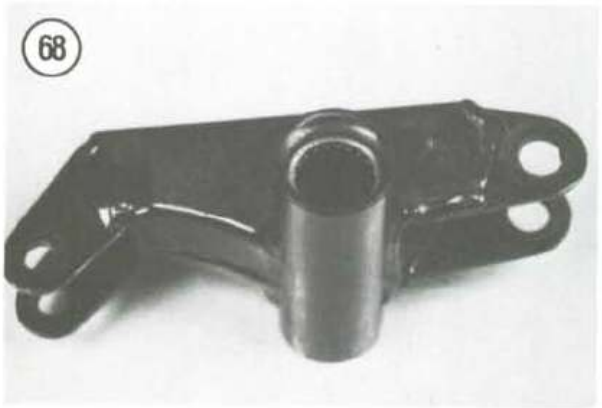
Vertical Link Height Adjustment

The vertical link can be adjusted to best suit an individual riders height and weight or to change the bikes front to rear height ratio. To adjust the vertical link:

NOTE

When adjusting the vertical length, maintain the 2 length measurements within the adjustment range specified in ***Figure 71****.*





1. Measure the 2 vertical length measurements indicated in **Figure 71**. Record both measurements on a piece of paper so that you have a record to work from.
2. Loosen the upper and lower vertical link locknuts.
3. Turn the center bolt until the desired length is reached. Turning the bolt one full turn changes the vertical length by 3 mm (0.12 in.).
4. Tighten the locknuts and recheck the vertical length measurement. Again, make sure both measurements are within the adjustment range specified in **Figure 71**.

Seat Height Adjustment

1. Remove all dirt from underneath the rear fender.
2. Make a few practice laps and then pit the bike. Check the condition of the rear fender so see whether or not the tire made contact with it (bottoming out). If there is no tire contact, you can lower the seat height to ensure that the suspension is working at full suspension compression.
3. To lower the seat height, you can shorten the vertical length height and install 1 or more spacers on the rear shock absorber (**Figure 72**). Note the following:
   a. **Figure 73** lists standard and maximum seat height specifications.
   b. To change the vertical link height (B, **Figure 71**), refer to *Vertical Link Height Adjustment* in this section.
   c. To remove or add spacers onto the shock absorber, the spring must be removed as described in this chapter.

Front To Rear Height Relationship

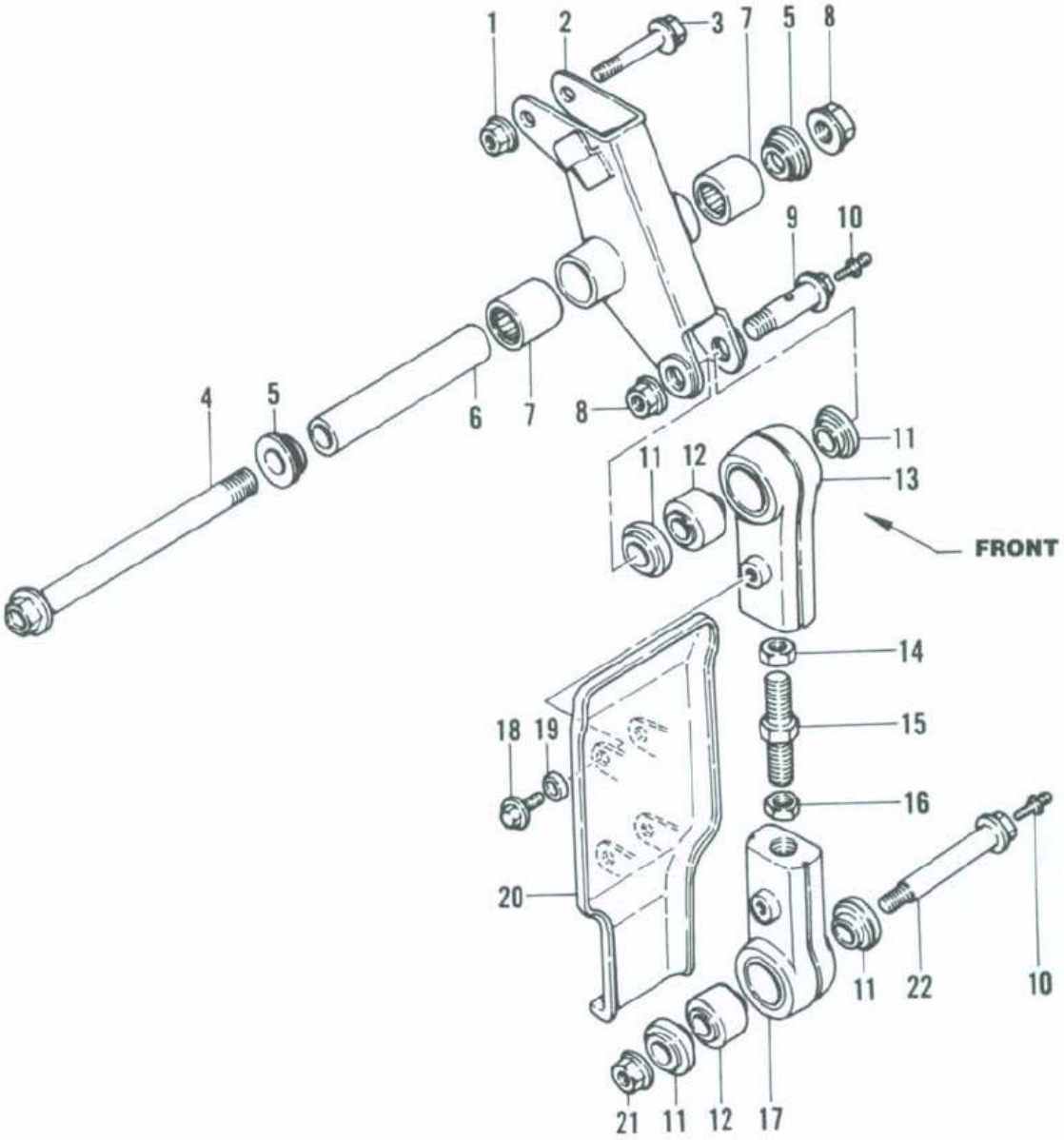
The front-to-rear height relationship can be adjusted by changing the following:

a. Adjusting the vertical link length.
b. Altering lengths C and D in **Figure 73** by changing the front fork and rear shock spring pre-load or by installing a heavier or lighter spring.

When changing the height, maintain the height measurements within the range listed in **Figure 73**.

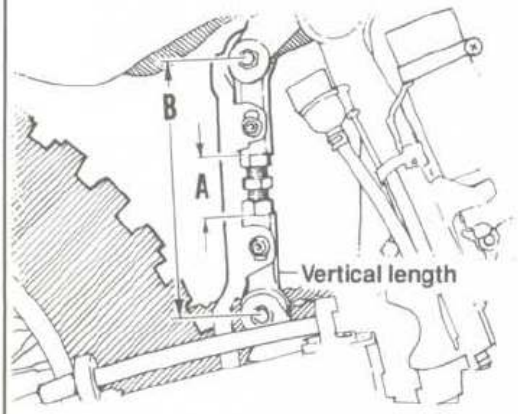
(70)

REAR SUSPENSION (ALL 1985 MODELS AND 1986 KX250 AND KX500)



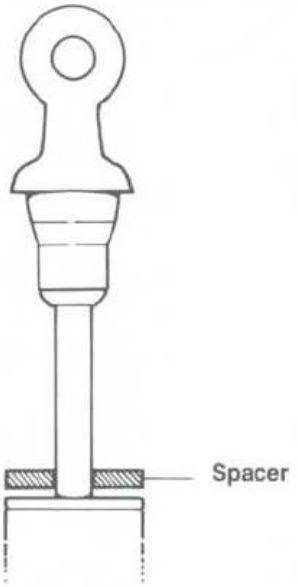
1. Nut
2. Rocker arm
3. Bolt
4. Pivot bolt
5. Dust cover
6. Sleeve
7. Bearing
8. Nut
9. Bolt
10. Grease fitting
11. Dust cover
12. Ball joint
13. Upper rod
14. Nut
15. Adjuster
16. Nut
17. Lower rod
18. Screw
19. Spacer
20. Cover
21. Nut
22. Bolt

71

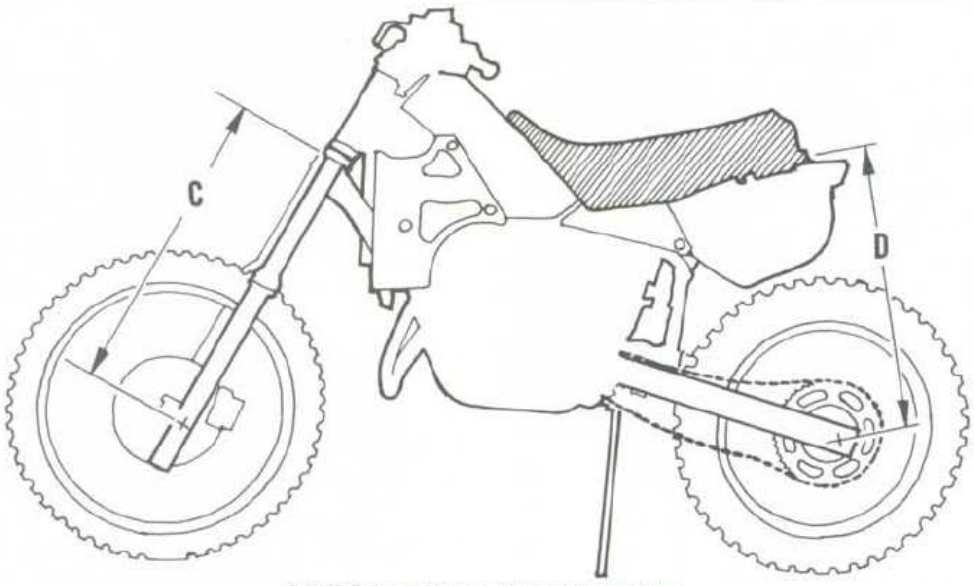


ADJUSTMENT RANGE:
A: 29-39 mm (1.14-1.57 in.)
B: 195-205 mm (7.68-8.07 in.)

72



73



HEIGHT MEASUREMENT

WITHOUT RIDER:
C: 674 mm (26.5 in)
D: 636 mm (25.0 in.)

WITH RIDER:
C: 614-644 mm (24.17-25.25 in.)
D: 536-576 mm (21.10-22.68 in.)

Uni-Trak Linkage Disassembly/Reassembly

Refer to **Figure 70** when performing this procedure.

1. Support the bike with the rear wheel off the ground.
2. Remove the seat and side covers.
3. Remove the air box.
4. Place a wood block underneath the wheel.
5. Remove the vertical link as follows:
   a. Remove the 2 vertical link mounting bolts and nuts.
   b. Remove the link and the 4 dust seals.
6. Remove the rocking arm as follows:
   a. Remove the upper shock absorber pivot bolt at the rocking arm.
   b. Remove the rocking arm pivot bolt nut and sleeve and remove the rocking arm.
7. Clean and inspect the linkage assembly as described in the following procedure.
8. Install by reversing these removal steps, while noting the following.
9. Coat the following components with molybdenum disulfide grease:
   a. Rocking arm needle bearings, sleeve, shims and pivot bolt.
   b. Spherical bearings (ball-joint) mounted in the vertical link. Work the grease into the bearing by pivoting the ball back and forth.
   c. All dust seals.
   d. Shock absorber and vertical link mounting bolts.
10. Tighten the following bolts and nuts to the torque specifications listed in **Tables 4-6**:
   a. Rocking arm pivot bolt and nut.
   b. Vertical link bolts and nuts.
   c. Upper shock absorber bolt and nut.

Inspection

1. Disassemble the rocking arm assembly as follows:
   a. Remove the dust caps.
   b. Remove the sleeve.
2. Remove the dust caps from the vertical link.
3. Remove the grease nipples from the vertical link bolts.
4. Clean all parts in solvent and dry thoroughly with compressed air. Make sure to flush the vertical link bolts thoroughly to remove all old grease.
5. Inspect the rocking arm needle bearings (**Figure 68**) for severe wear or damage.
6. Measure the rocking arm sleeve (C, **Figure 66**, typical) and replace if worn to the service limit in **Table 2** or **Table 3**.
7. Inspect the spherical bearings in the vertical link. Maximum wear is 0.7 mm (0.028 in.).
8. Replace needle bearings and spherical bearings with a press. Note the following:
   a. Do not remove bearings for routine cleaning and inspection as removal may damage them.
   b. Replace both rocking arm needle bearings as a set.
   c. Replace both vertical link spherical bearings as a set.
9. Inspect the dust seals for age deterioration, cracks or other damage. Replace if necessary. Always install new dust seals when installing new bearings.
10. Install the grease nipples into the vertical link bolts.
11. Lubricate all parts as described under *Removal/Installation*.
12. Assemble the rocking arm assembly as follows:
   a. Install the sleeve.
   b. Install the dust caps.
13. Install the dust caps into the vertical link.

UNI-TRAK LINKAGE (1986 KX125 AND ALL 1987-ON MODELS)

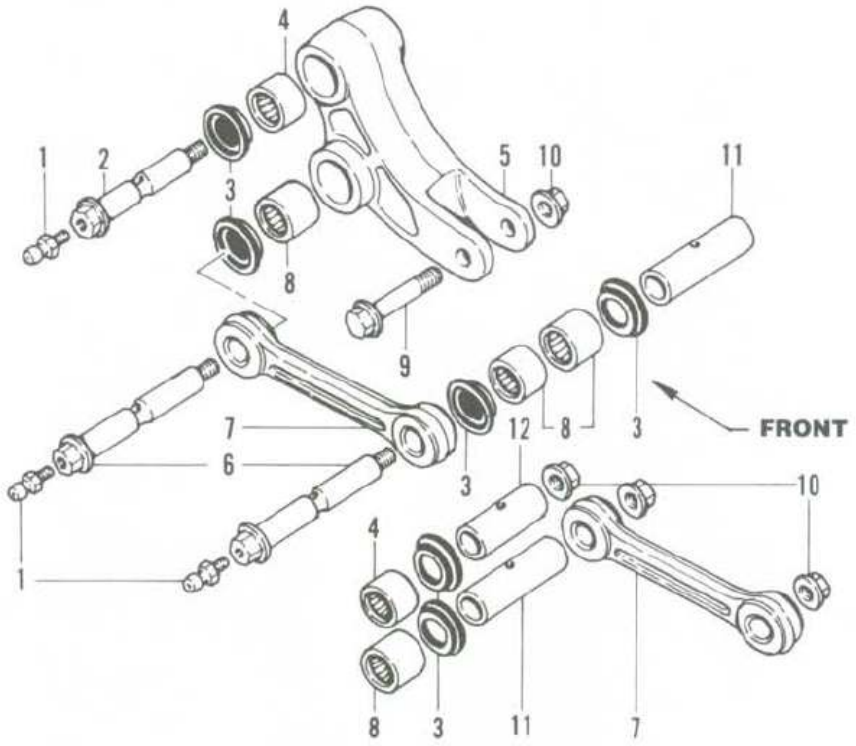
The Uni-Trak linkage has a rocking arm mounted on the frame, connecting the bottom of the shock to 2 tie-rods that are connected to the swing arm.

The bearings and pivot bolts at all of the linkage joints must be inspected and lubricated according to the maintenance schedule in Chapter Three, and replaced when worn past the specified service limits. Abnormal play may be detectable without disassembling the linkage, but thorough bushing lubrication requires disassembly to expose the bearings.

Uni-Trak linkage designs vary slightly according to year and model. Refer to **Figure 74** (1986 KX125), **Figure 75** (1987), **Figure 76** (1988) or **Figure 77** (1989-on).

(74)

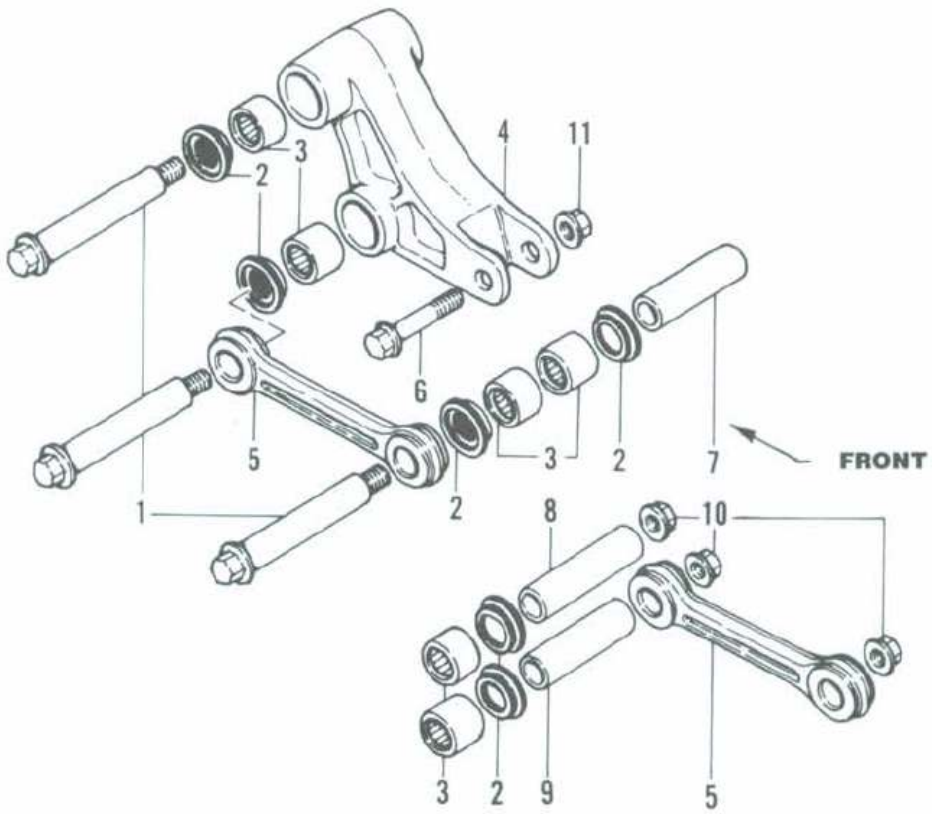
REAR SUSPENSION
(1986 KX125)



1. Grease nipple
2. Pivot bolt
3. Dust caps
4. Bearing
5. Rocker arm
6. Pivot bolt
7. Tie-rod
8. Bearing
9. Bolt
10. Nut
11. Sleeve
12. Sleeve

(75)

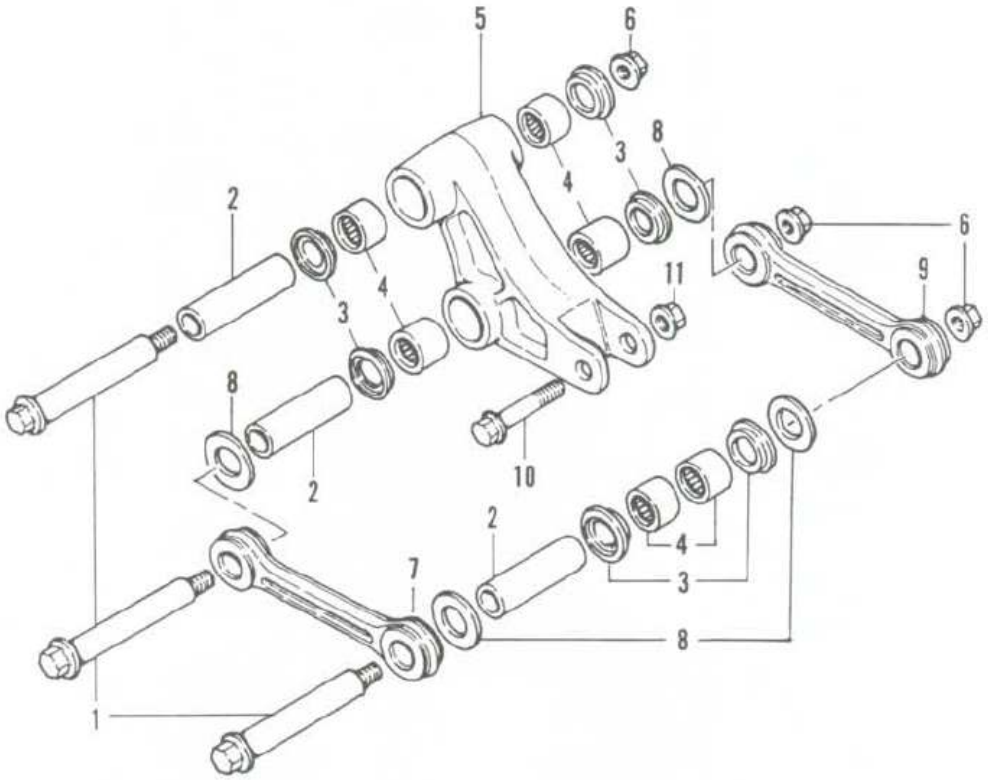
REAR SUSPENSION (1987)



1. Pivot bolt
2. Dust caps
3. Bearing
4. Rocker arm
5. Tie-rod
6. Bolt
7. Sleeve
8. Sleeve
9. Sleeve
10. Nut
11. Nut

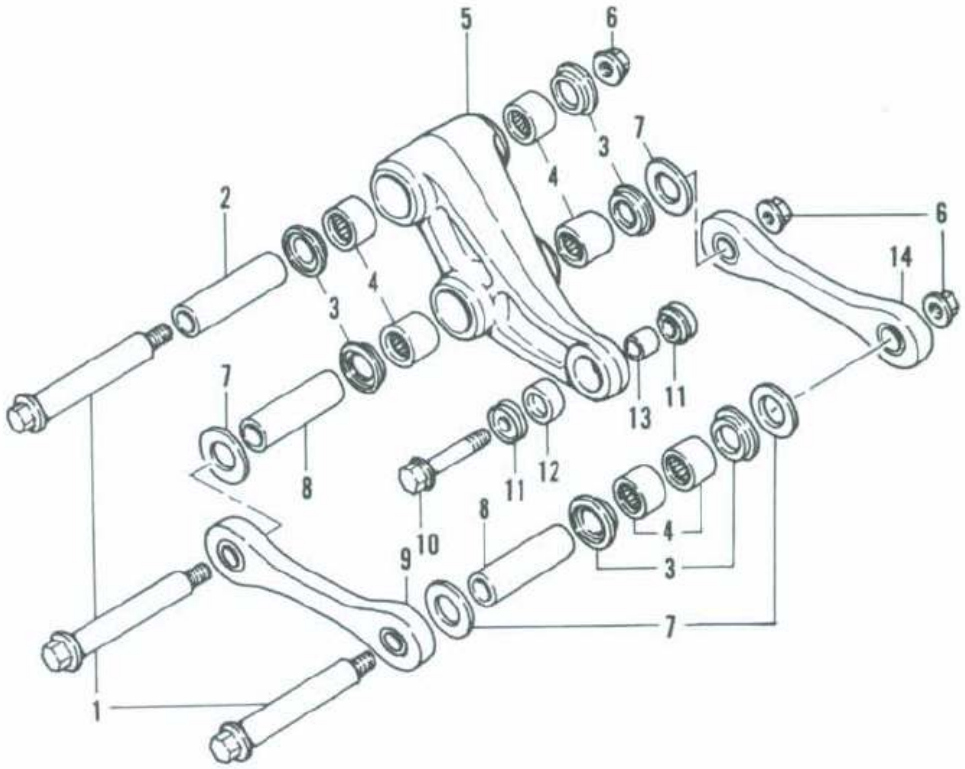
(76)

REAR SUSPENSION (1988)

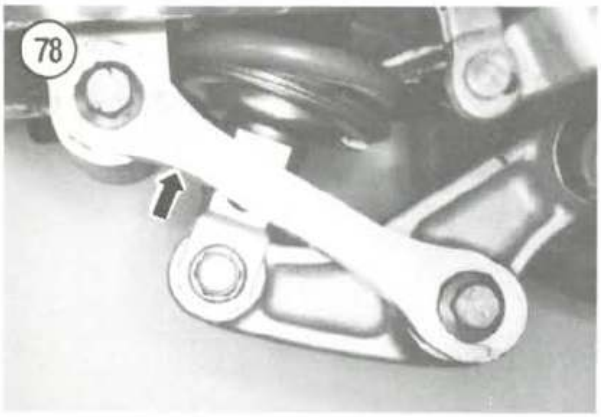


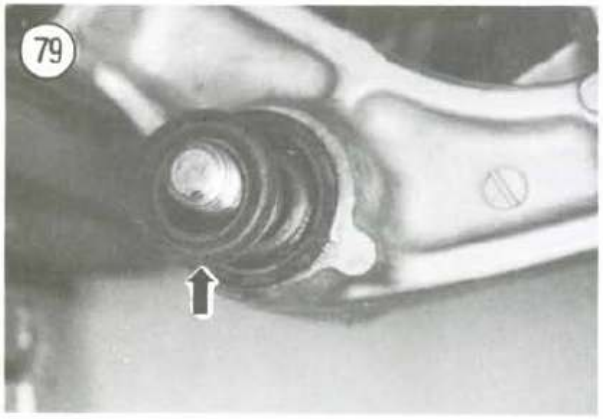
1. Pivot bolt
2. Sleeve
3. Dust caps
4. Bearing
5. Rocker arm
6. Nut
7. Tie-rod
8. Washer
9. Tie-rod
10. Bolt
11. Nut

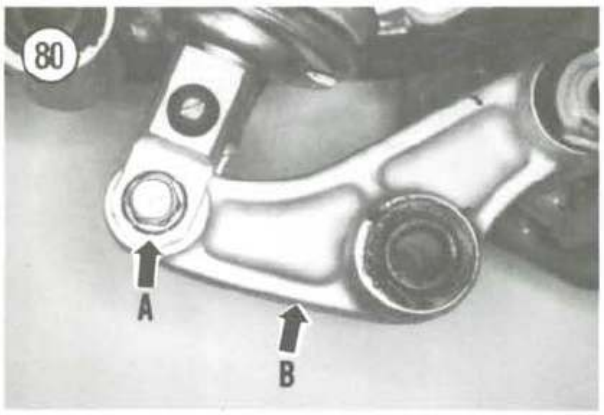
REAR SUSPENSION (1989-ON)



1. Pivot bolt
2. Sleeve
3. Dust caps
4. Bearing
5. Rocker arm
6. Nut
7. Washer
8. Sleeve
9. Tie-rod
10. Bolt
11. Dust cap
12. Bearing
13. Sleeve
14. Tie-rod







Uni-Trak Linkage Disassembly/Reassembly

1. Support the bike with the rear wheel off the ground.
2. Remove the seat and side covers.
3. Place a wood block underneath the wheel.
4. Remove the tie-rods as follows:
   a. Loosen and remove the tie-rod (**Figure 78**) mounting bolt nuts.
   b. Then remove the bolts and tie-rods (**Figure 78**).
   c. On 1988 and later models, remove the 4 washers (**Figure 79**) installed between the tie-rods and rocker arm.
5. Remove the rocker arm as follows:
   a. Loosen and remove the shock absorber mounting bolt (and nut). See A, **Figure 80**.
   b. Remove the rocker arm mounting bolt (and nut) at the frame and remove the rocker arm (B, **Figure 80**).
6. Clean, inspect and lubricate the linkage assembly as described in the following procedure.
7. Install by reversing these removal steps, while noting the following.
8. Tighten the bolts and nuts to the torque specifications listed in **Tables 4-6**.

Inspection

1. Remove the sleeves from the rocking arm (**Figure 81**).
2. Remove the dust caps from the rocking arm (**Figure 82**).
3. Remove the dust caps from the tie-rods (if used).
4. Remove the needles (**Figure 83**) from their outer cage, making sure not to intermix them from other

bearings; all of the bearing needles must remain with their original bearing assembly. Do not remove the cage unless the bearing is going to be replaced.

5. Clean all parts in solvent and dry thoroughly with compressed air.

6. Inspect the rocking arm needle bearings for severe wear or damage. Check the bearing cage for cracks or damage.

7. Check the tie-rod bearings or bushings (**Figure 84**) and replace if necessary.

8. Measure the rocking arm sleeves (**Figure 85**) and replace if worn to the service limit in **Table 2** or **Table 3**.

9. Replace needle bearings with a press. Note the following:

a. Do not remove bearings for routine cleaning and inspection as removal may damage them.

b. Measure and record depth of installed bearings before removing them (**Figure 86**). Install new bearings to same depth.

10. Check the pivot bolts (**Figure 87**) for scoring or damage.

11. Measure the runout of each pivot bolt with a V-block and dial indicator (**Figure 88**). Replace the bolt if the runout exceeds the service limit in **Table 2** or **Table 3**. If you don't have these tools, roll each bolt on a piece of plate glass to detect any visual runout damage.

12. Inspect the dust seals for age deterioration, cracks or other damage. Replace if necessary. Always install new dust seals when installing new bearings.

13. Lubricate the following parts with molybdenum disulfide grease:

a. Needle bearings and bushings.

b. Pivot bolts.

c. Dust seals.

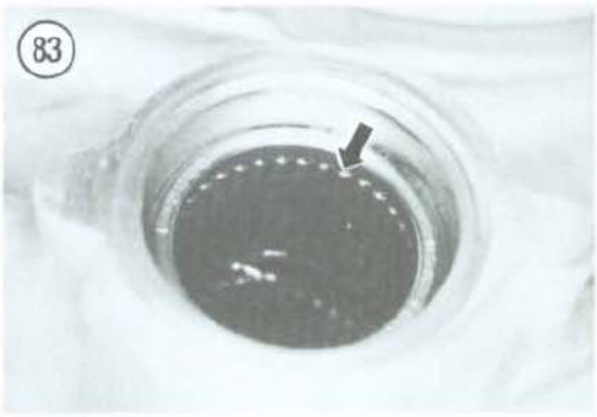
d. Sleeves.

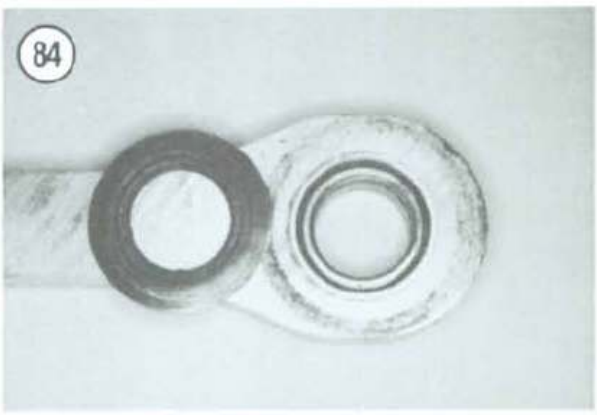
14. Reassemble the bearing needles, if removed, into their original race.

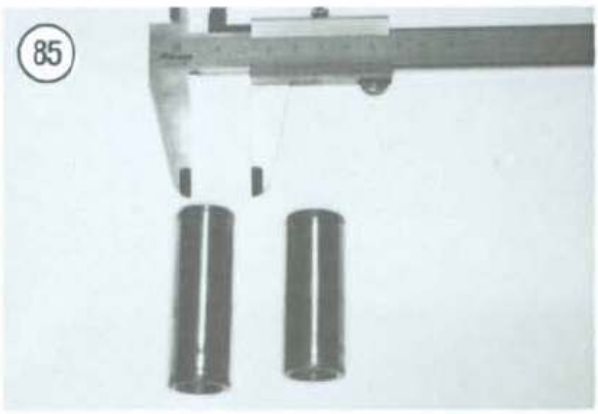
15. Install the dust caps onto the tie-rods, if used.

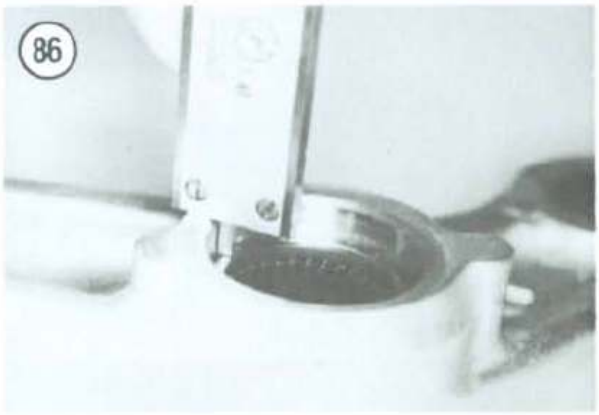
16. Install the dust caps onto the rocking arm (**Figure 89**).

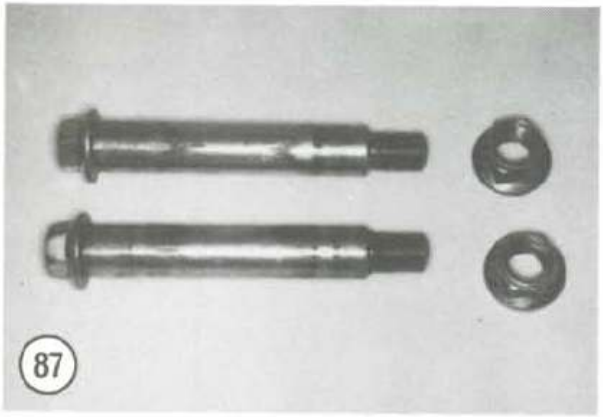
17. Install the sleeves into the rocking arm (**Figure 81**). Note that the sleeves are different lengths. The sleeves will fit flush with the dust caps when properly installed (**Figure 90**).

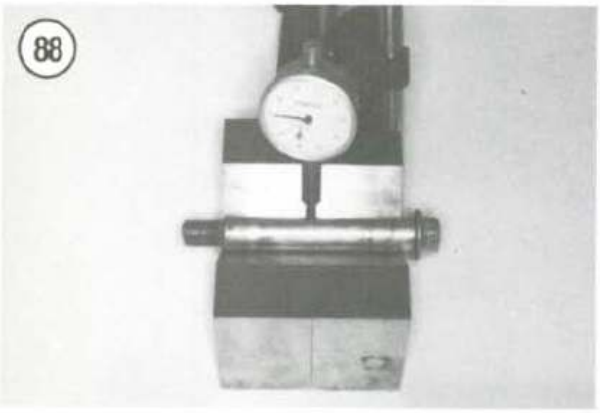


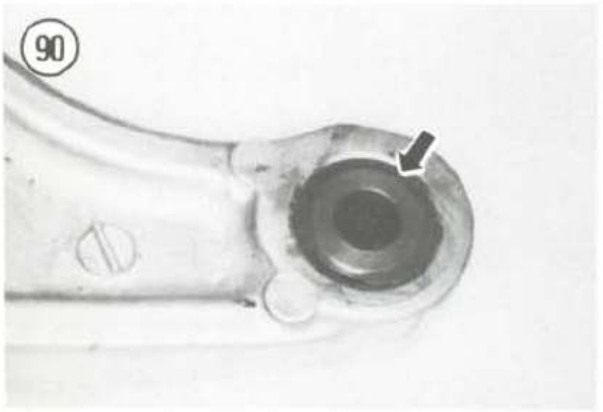












REAR SWING ARM

In time the bearings will wear beyond service limits and must be replaced. The condition of the bearings can greatly affect handling performance and if not replaced they can produce erratic and dangerous handling.

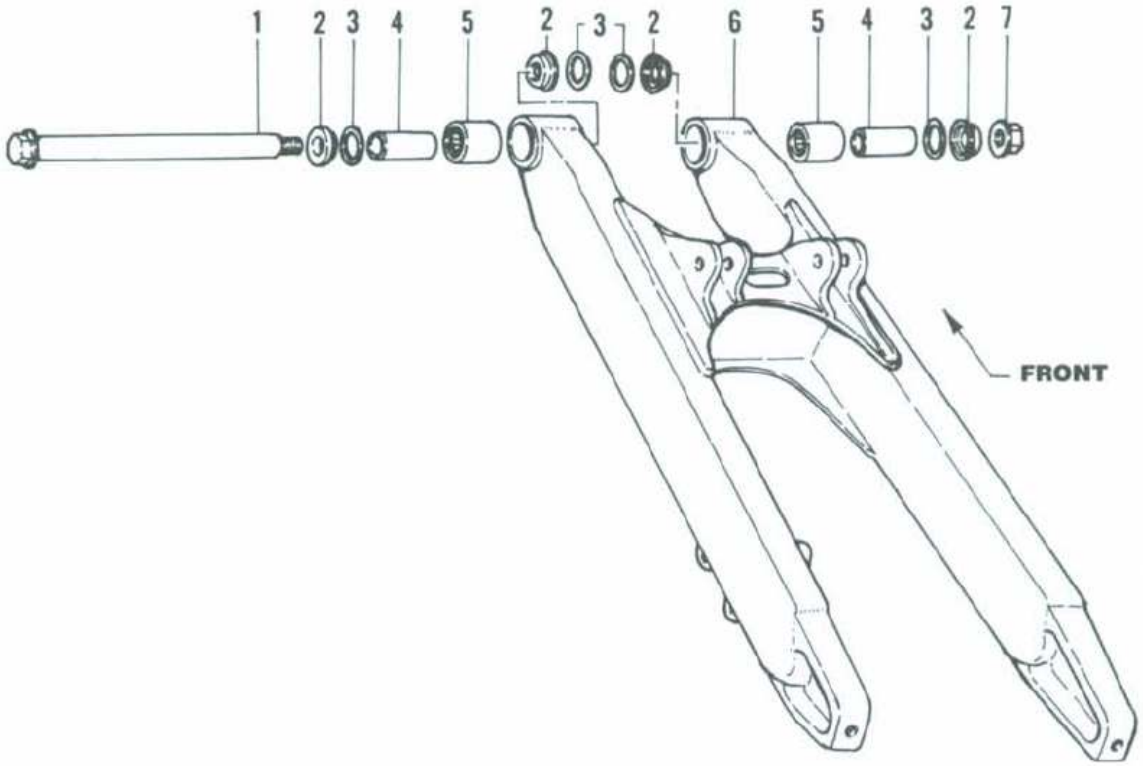
Swing arm designs vary slightly according to year and model. Refer to **Figure 91** (1982) or **Figure 92** (1983-on).

Removal/Installation

1. Remove the bolts securing the seat and remove it.
2. Remove both number/side panels.
3. Remove the rear wheel and drive chain as described in this chapter.
4. Remove the rear brake pedal if it interferes with removal of the swing arm pivot bolt.
5. Remove the Uni-trak linkage bolts and nuts at the swing arm as required. Do not loosen the swing arm pivot bolt nut.
6. Grasp the rear end of the swing arm and try to move it from side to side in a horizontal arc. There should be no noticeable side play. If play is evident and the pivot bolt nut is tightened correctly, the swing arm sleeves and bearings should be inspected and replaced.
7. Loosen the swing arm pivot shaft nut (**Figure 93**) and remove it.
8. Remove the pivot bolt from the left-hand side. If the pivot bolt is tight, you may have to drive it out with a brass or aluminum drift. Tap on the pivot bolt carefully, however, as you may damaged the threads on the end of the bolt.
9. Pull back on the swing arm, free it from the frame and remove it.
10. On 1982 models, remove the 2 shims located on the inside of the swing arm.
11. Clean, inspect and lubricate the swing arm bearings as described under *Inspection* in this section.
12. Installation is the reverse of these steps. Note the following.
13. Tighten the swing arm pivot shaft nut to the torque specification in **Tables 4-6**.
14. Tighten the Uni-trak linkage bolts to the torque specification listed in **Tables 4-6**.
15. Adjust the drive chain as described in Chapter Three.

(91)

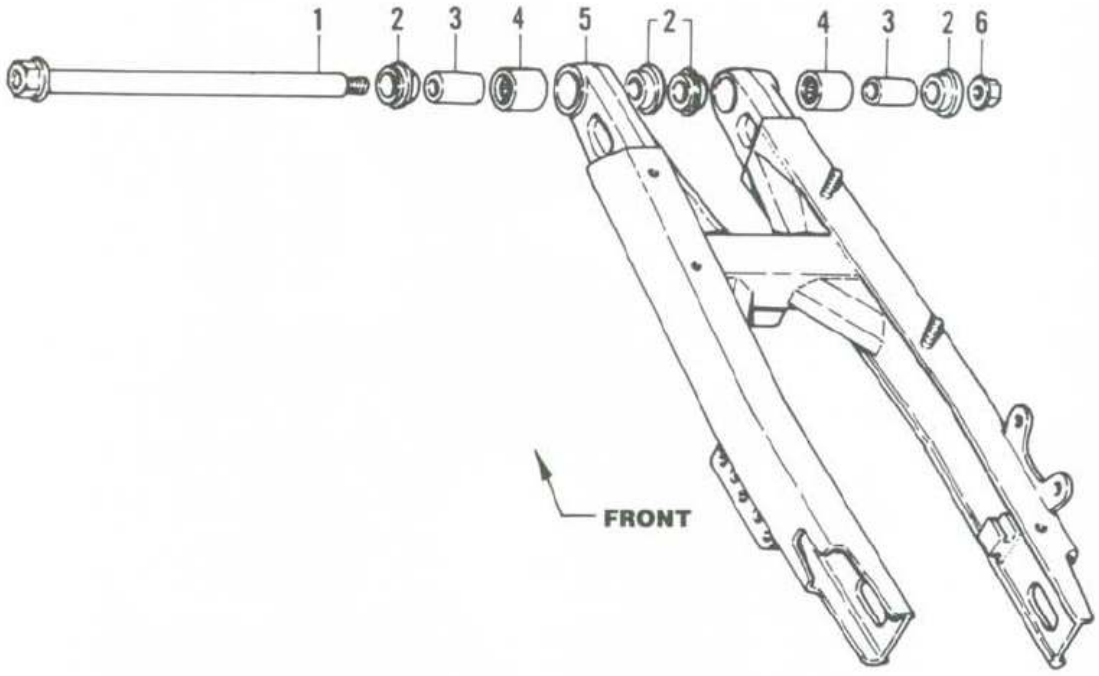
REAR SWING ARM (1982)



1. Pivot shaft
2. Dust seal
3. Shim
4. Collar
5. Bearing
6. Swing arm
7. Nut

92

REAR SWING ARM (1983-ON)



1. Pivot shaft
2. Dust seal
3. Sleeve
4. Bearing
5. Swing arm
6. Nut

Inspection

1. Remove the dust seals, sleeves and shims (1982) from the swing arm (**Figure 94**, typical).

2. Wash parts in solvent and dry thoroughly with compressed air.

3. Wipe off any excess grease from the needle bearings at each end of the swing arm (**Figure 95**). The needle bearings wear very slowly and wear is very difficult to measure. Turn each bearing with your fingers. Make sure it rotates smoothly. Check the rollers for evidence of wear, pitting or rust from lack of lubrication. Then repeat with the sleeve installed in its bearing (**Figure 96**).

4. Check the bearing sleeves (**Figure 94**) for scoring, cracks or severe wear. If the sleeves are severely worn or damaged, they should be replaced along with the bearings.

5. Replace the dust seals if severely worn or damaged. Install new seals when replacing bearings.

6. Replace the chain slider if severely worn or damaged.

7. Check the swing arm for cracks. Refer repair to a Kawasaki dealer or welding shop or replace the swing arm.

8. Replace needle bearings with a press. Note the following:

   a. Do not remove bearings for routine cleaning and inspection as removal may damage them.

   b. Measure and record depth of installed bearings before removing them. Install new bearings to same depth.

9. Check for a bent, cracked or scored pivot shaft. Replace if necessary.

10. Lubricate the following parts with molybdenum disulfide grease:

   a. Needle bearings.

   b. Swing arm pivot shaft.

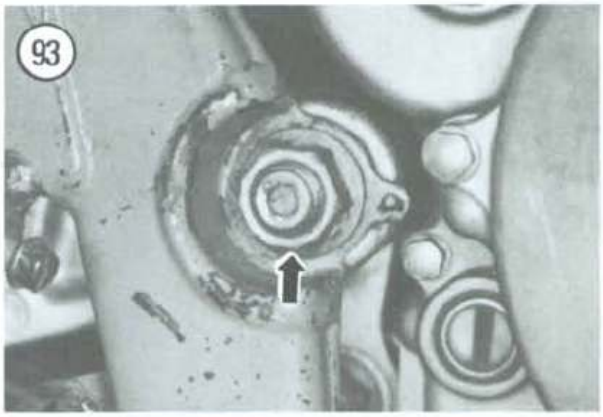
   c. Dust seals.

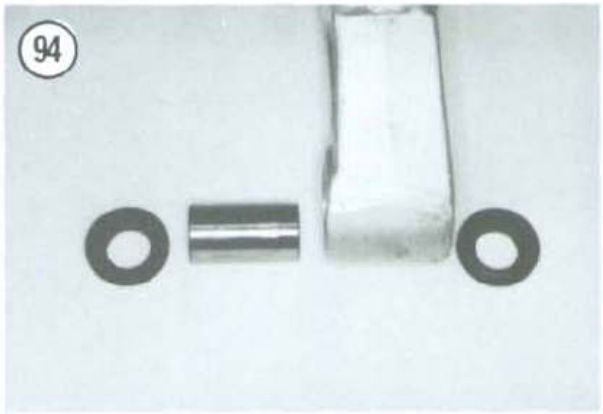
   d. Sleeves.

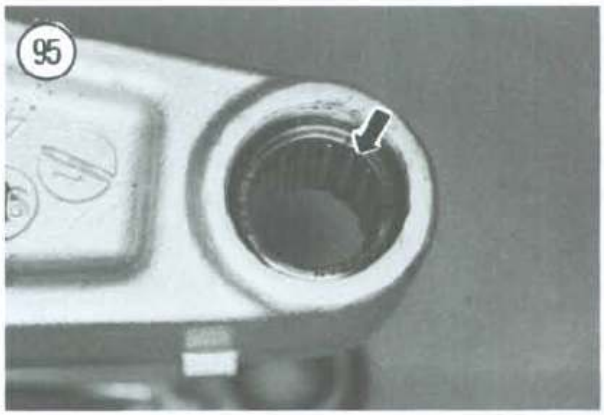
   e. Shims (1982 models).

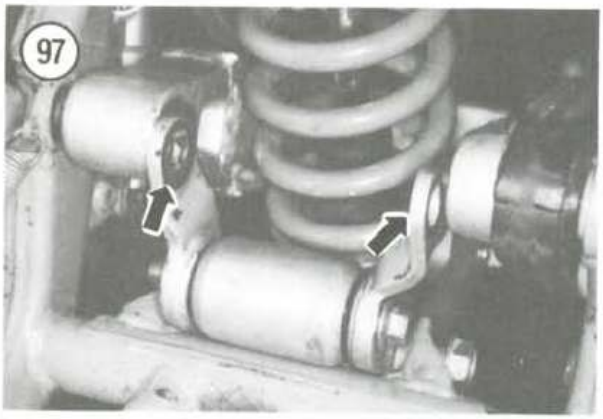
11. Install the sleeve into its bearing (**Figure 94**).

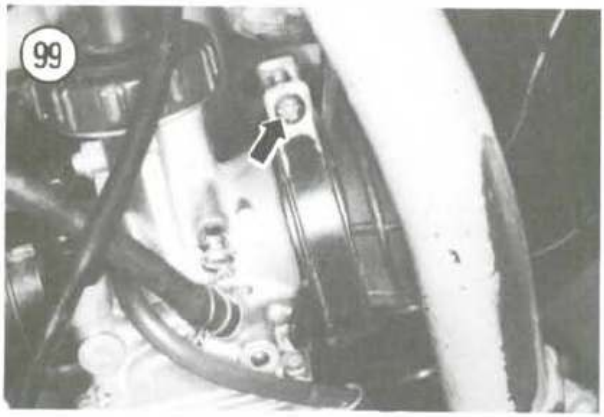
12. Install the dust seals. On 1982 models, install the shims as shown in **Figure 91**.











SHOCK ABSORBER BRACKETS

Removal/Installation

Some models are equipped with shock absorber brackets (**Figure 97**). To remove these brackets, remove the swing arm and rocker arm. Reverse to install. Inspect the brackets (**Figure 98**) for cracks or damage; replace if necessary.

SUB-FRAME (1986 KX125 AND ALL 1987-ON MODELS)

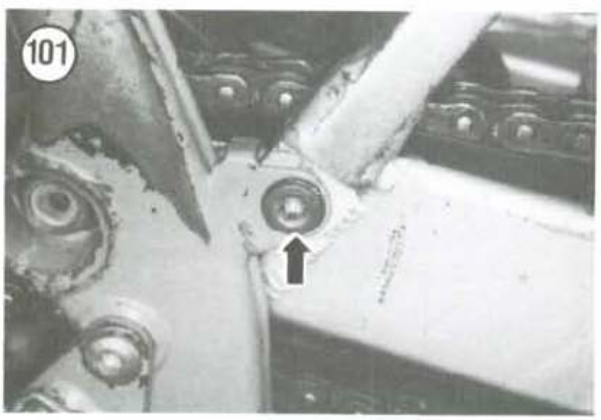
Removal/Installation

1. Support the bike securely.
2. Remove the seat and both side covers.
3. Remove the silencer.
4. Loosen the carburetor clamp screw (**Figure 99**) securing the air cleaner boot to the carburetor throat.
5. Remove the upper bolts securing the sub-frame to the main frame (**Figure 100**).
6. Remove the lower bolts securing the sub-frame to the main frame (**Figure 101**).
7. Pull the sub-frame (**Figure 102**) toward the back and remove it.

CAUTION

After the air cleaner box is removed, the carburetor throat is exposed. Close off the opening with a clean shop cloth so dirt or other foreign matter will not enter into the carburetor.

8. Clean the sub-frame mounting bolts (**Figure 103**) in solvent and dry thoroughly. Inspect the bolts for damage; replace if necessary.



9. Inspect and/or clean the air box (**Figure 104**), if required. Service the air filter as described in Chapter Three.
10. Apply grease onto the sub-frame bolts (**Figure 103**).

NOTE
Remove the shop cloth from the carburetor.

11. Align the lower bolt holes (**Figure 105**) and install the lower bolts finger-tight.
12. Slowly move the sub-frame up while aligning the air cleaner boot.
13. When the sub-frame is aligned at the top, install the upper mounting bolts finger-tight.
14. Tighten the sub-frame mounting bolts to the torque specification listed in **Tables 4-6**.

15. Install the air cleaner rubber boot onto the carburetor throat (**Figure 106**) and tighten the carburetor clamp screws securely.

16. Install the muffler, side covers and seat.

Table 1 REAR WHEEL TRAVEL

KX125	
1982-1983	300 mm (11.81 in.)
1984	310 mm (12.20 in.)
1985	320 mm (12.60 in.)
1986	340 mm (13.40 in.)
1987-on	330 mm (13.00 in.)
KX250	
1982-1984	315 mm (12.4 in.)
1985-1986	320 mm (12.6 in.)
1987-on	330 mm (13.0 in.)
KX500	
1983	305 mm (12.01 in.)
1984	315 mm (12.4 in.)
1985-1986	325 mm (12.8 in.)
1987-on	330 mm (13.0 in.)

Table 2 REAR SUSPENSION SERVICE SPECIFICATIONS (KX125)

	New mm (in.)	Wear limit mm (in.)
Axle runout	0-0.1 (0-0.004)	0.2 (0.008)
Rim runout		
Axial play	0-0.5 (0-0.02)	2.0 (0.08)
Radial play	0-0.8 (0-0.03)	2.0 (0.08)
Rear shocks spring free length		
1982	*	*
1983-1984	270.0 (10.63)	264.6 (10.42)
1985	290.0 (11.42)	285.0 (11.22)
1986	256 (10.1)	251 (9.9)
1987-on	275 (10.8)	270 (10.6)
Rocking arm sleeve OD		
1982	*	*
1983	23.987-24.000 (0.9444-0.9449)	23.95 (0.943)
1984-1985	19.987-20.000 (0.7869-0.7874)	19.85 (0.781)
1986	15.987-16.000 (0.6294-0.6299)	15.85 (0.624)
1987-on	21.987-22.000 (0.8656-0.8661)	21.85 (0.860)
Rocking arm pivot bolt runout	0-0.1 (0-0.004)	0.2 (0.008)

* Specification not available from Kawasaki.

Table 3 REAR SUSPENSION SERVICE SPECIFICATIONS (KX250 AND KX500)

	New mm (in.)	Wear limit mm (in.)
Axle runout	0-0.1 (0-0.004)	0.2 (0.008)
Rim runout		
Axial play	0-0.5 (0-0.02)	2.0 (0.08)
Radial play	0-0.8 (0-0.03)	2.0 (0.08)

(continued)

Table 3 REAR SUSPENSION SERVICE SPECIFICATIONS (KX250 AND KX500) (continued)

	New mm (in.)	Wear limit mm (in.)
Rear shock spring free length		
KX250		
1982	*	*
1983-1984	280 (11.02)	274 (10.8)
1985	290 (11.42)	285 (11.22)
1986	256 (10.1)	251 (9.9)
1987	275 (10.8)	270 (10.6)
1988-1989	*	*
1990-1991	275 (10.83)	270 (10.63)
KX500		
1983-1984	280 (11.02)	274 (10.8)
1985	290 (11.42)	285 (11.22)
1986	256 (10.1)	251 (9.9)
1987	275 (10.8)	270 (10.6)
1988-on	*	*
Rocking arm sleeve O.D.		
KX250		
1982	*	*
1983	23.987-24.000 (0.9444-0.9449)	23.95 (0.943)
1984-1985	19.987-20.000 (0.7869-0.7874)	19.85 (0.781)
1986	*	*
1987-on	21.987-22.000 (0.8656-0.8661)	21.85 (0.860)
KX500		
1983	23.987-24.000 (0.9444-0.9449)	23.95 (0.943)
1984-1985	19.987-20.000 (0.7869-0.7874)	19.85 (0.781)
1986	*	*
1987-on	21.987-22.000 (0.8656-0.8661)	21.85 (0.860)
Rocking arm pivot bolt runout	0-0.1 (0-0.004)	0.2 (0.008)

* Not available.

Table 4 REAR SUSPENSION TIGHTENING TORQUES (KX125)

	N•m	ft.-lb.
Pivot shaft nut		
1982-1987	79	58
1988-1989	81	60
1990-1991	79	58
Rear axle nut	98	72
Rear shock absorber nuts and bolts		
1982-1984	70	51
1985-1987	59	44
1988-1989	34	25
1990-1991	39	29
Rear sprocket bolts		
1982-1984	21	15
1985	25	18
1986-1989	26	19
1990-1991	29	21

(continued)

Table 4 REAR SUSPENSION TIGHTENING TORQUES (KX125) (continued)

	N•m	ft.-lb.
Torque link bolt and nut		
1982-1984	29	21
1985-on	24	17
Uni-Trak (1982)		
Rocking arm pivot bolt	110	81
Vertical link pivot bolts		
Upper	70	52
Lower	42	30
Uni-Trak (1983-1985)		
Rocking arm pivot bolt		
1983-1984	110	81
1985	78	58
Vertical link pivot bolts		
1983-1984	70	52
1985	59	44
Uni-Trak (1986-1987)		
Rocker arm pivot shaft	59	44
Tie-rod nuts	59	44
Uni-Trak (1988-on)		
All pivot bolts	81	60
Sub-frame bolts		
1986-1988	25	18
1989		
Upper	34	25
Lower	25	18
1990-1991	26	19

Table 5 REAR SUSPENSION TIGHTENING TORQUES (KX250)

	N•m	ft.-lb.
Pivot shaft		
1982-1987	78	58
1988-1989	81	60
1990-1991	78	58
Rear axle nut	98	72
Rear shock absorber nuts and bolts		
1982-1986	69	51
1987	59	44
1988-1989	34	25
1990-1991	39	30
Rear sprocket		
1982-1986	21	15
1987	25	18
1988-1989	26	19
1990-1991	29	21
Uni-Trak (1982)		
Torque link	30	22
Rocking arm pivot bolt	110	81
Link bolts		
Upper	70	52
Lower	42	31
Uni-Trak (1983-1984)		
Rocking arm pivot bolt	108	80
Vertical link pivot bolt	69	51
Uni-Trak (1985)		
Rocking arm pivot bolt	108	80
Vertical link pivot bolt	69	51

(continued)

Table 5 REAR SUSPENSION TIGHTENING TORQUES (KX250) (continued)

	N•m	ft.-lb.
Uni-Trak (1986)		
Rocking arm pivot bolt	78	58
Tie-rod pivot bolt	59	44
Uni-Trak (1987)		
Rocking arm pivot bolt	59	44
Tie-rod pivot bolt	59	44
Uni-Trak (1988-on)		
All pivot bolts	81	60
Sub-frame bolts		
1986-1988	25	18
1989		
Upper	34	25
Lower	25	18
1990-1991	26	19

Table 6 REAR SUSPENSION TIGHTENING TORQUES (KX500)

	N•m	ft.-lb.
Pivot shaft		
1983-on	78	58
Rear axle nut		
1983-1999	98	72
2000-on	110	81
Rear shock absorber nuts and bolts		
1983-1985	69	51
1986-1987	59	44
1988-1999	34	25
2000-on	39	29
Rear shock hose banjo bolt		
1983-1985	18	13
1986-on	*	*
Rear sprocket		
1983-1985	21	15
1986-1987	25	18
1988-1999	26	19
2000-on	34	25
Uni-Trak (1983-1984)		
Rocking arm pivot bolt	108	80
Vertical link pivot bolt	69	51
Uni-Trak (1985)		
Rocking arm pivot bolt	108	80
Vertical link mounting bolt	69	51
Uni-Trak (1986)		
Rocking arm pivot bolt	78	58
Tie-rod pivot bolts		
Upper	59	44
Lower	78	58
Uni-Trak (1987)		
All pivot bolts	59	44
Uni-Trak (1988-on)		
All pivot bolts	81	60
Sub-frame bolts		
1986-1988	25	18
1989		
Upper	34	25
Lower	25	18
1990-1999	26	19
2000-on	34	25

* Not specified.

Table 7 DRIVE CHAIN SIZE AND LINK NUMBER*

Year	KX125	KX250	KX500
1982	114	114	—
1983	114	114	112
1984	112	114	112
1985	110	114	112
1986	112	112	114
1987	110	114	114
1988	112	114	114
1989	112	114	114
1990	112	114	114
1991	112	114	114
1992	—	—	114
1993-on	—	—	114

* All models are equipped with 520 drive chains.

Table 8 REAR SHOCK SPRING PRE-LOAD LENGTH

Model	Standard spring preload kg (lbs.)	Preload change per 1 turn kg (lbs.)	Standard position mm (in.)	Adjustable range mm (in.)
KX125				
1982	60 (132)	12 (26.5)	65 (2.56)	60-70 (2.36-2.76)
1983	47 (103)	7.8 (17)	82 (3.23)	75-93 (2.95-3.66)
1984	47 (103)	7.8 (17)	84 (3.32)	75-93 (2.95-3.66)
1985	44 (97)	8.8 (19)	77 (3.03)	67-92 (2.64-3.62)
1986	54 (119)	10.8 (24)	84 (3.32)	79-99 (3.1-3.9)
1987	55 (122)	6.9 (15)	103 (4.1)	93-113 (3.7-4.4)
1988-1989	72 (159)	7.2 (16)	114 (4.5)	104-124 (4.1-4.9)
1990				
(1)	46 (101)	7.2 (16)	118.5 (4.6)	109-134 (4.3-5.3)
(2)	48 (106)	6.9 (15)	119.5 (4.7)	109-132 (4.3-5.2)
1991				
(1)	78 (172)	6.9 (15)	123 (4.8)	109-134 (4.3-5.3)
(2)	67 (148)	7.2 (16)	126 (4.9)	109-132 (4.3-5.2)
KX250				
1982	78 (172)	13 (29)	68 (2.68)	60-75 (2.36-2.95)
1983	74 (162)	6.9 (15)	76 (2.99)	65-85 (2.56-3.35)
1984	74 (162)	6.9 (15)	76 (2.99)	65-83 (2.56-3.27)
1985	55 (122)	6.9 (15)	82 (3.23)	75-93 (2.95-3.66)
1986	54 (119)	10.8 (24)	84 (3.32)	79-99 (3.1-3.9)
1987	62 (138)	7.8 (17)	103 (4.1)	93-113 (3.7-4.4)
1988-1989	72 (159)	7.2 (16)	111 (4.4)	104-124 (4.1-4.9)
1990				
(1)	74 (163)	7.8 (17.2)	118.5 (4.6)	109-132 (4.3-5.2)
(2)	79 (174)	7.5 (17.1)	119.5 (4.7)	109-130 (4.3-5.1)
1991				
(1)	82 (180)	7.2 (16)	124 (4.8)	109-134 (4.3-5.3)
(2)	75 (165)	7.5 (17.1)	126 (4.9)	109-130 (4.3-5.1)
KX500				
1983	77 (169)	7.2 (16)	76 (2.99)	65-83 (2.56-3.27)
1984				
(3)	77 (169)	7.2 (16)	76 (2.99)	65-85 (2.56-3.35)
(4)	80 (176)	7.5 (17.1)	76 (2.99)	65-85 (2.56-3.35)

(continued)

Table 8 REAR SHOCK SPRING PRE-LOAD LENGTH (continued)

Model	Standard spring preload kg (lbs.)	Preload change per 1 turn kg (lbs.)	Standard position mm (in.)	Adjustable range mm (in.)
KX500 (continued)				
1985	60 (132)	7.5 (17)	79 (3.11)	72-92 (2.83-3.62)
1986	56 (123)	11.2 (25)	84 (3.3)	79-99 (3.1-3.9)
1987	65 (143)	8.1 (18)	103 (4.1)	93-113 (3.7-4.4)
1988-1989	72 (159)	7.2 (16)	111 (4.4)	104-124 (4.1-4.9)
1990-1995	NA	NA	122.5 (4.8)	109-130 (4.3-5.1)
1996-on	NA	NA	117.5 (4.6)	107-127 (4.1-5.0)

(1) U.S. and Canadian models.
(2) All other models.
(3) 1984 U.K. models only.
(4) All 1984 models except U.K.

Table 9 REAR SHOCK ABSORBER NITROGEN PRESSURE

Year	Standard kg/cm^2 (psi)	Minimum kg/cm^2 (psi)	Maximum kg/cm^2 (psi)
1982-1985	*	*	*
1986	10.0 (142)	10.0 (142)	15.0 (213)
1987-1990	12.0 (170)	10.0 (142)	15.0 (213)
KX125/KX250	10.0 (142)	10.0 (142)	15.0 (213)
1991			
KX500	10.0 (142)	10.0 (142)	15.0 (213)

* Not specified.

Table 10 REAR SHOCK REBOUND AND COMPRESSION ADJUSTMENTS (KS500 1990-ON)

Adjustment/Year	Standard setting (number of clicks)	Range
Rebound		
1990	9	16
1991-1995	14	16
1996	10	20
1997-on	11	20
Compression		
1990	13	16
1991-1993	10	16
1994-1995	14	16
1996	14	18
1997-on	10	18

CHAPTER THIRTEEN

BRAKES

This chapter describes service procedures for the drum and disc brakes used on the KX models covered in this manual. All 1982 and later models use a front disc brake. Rear drum brakes were used on 1982-1985 models; rear disc brakes were first used on 1986 models.

Brake specifications are listed in **Tables 1-7** at the end of this chapter.

REAR DRUM BRAKES (1982-1985)

Rear drum brakes were used on all 1982-1985 models. **Figure 1** illustrates the major components of a typical drum brake assembly. Activating the foot pedal pulls the cable or rod (**Figure 2**) which in turn rotates the camshaft. This forces the brake shoes out into contact with the brake drum.

Rear brake pedal free play must be maintained to minimize brake drag and premature brake wear and to maximize braking effectiveness. Refer to *Rear Brake Pedal Free Play* in Chapter Three, for complete adjustment procedures.

Glaze buildup on the brake shoes reduces braking effectiveness. The brake shoes should be removed and cleaned regularly to assure maximum brake shoe contact.

The rear brake cable or rod should be inspected regularly and replaced if bent or damaged.

WARNING

When working on brake drum and brake shoes, do ***not*** *inhale brake dust. It may contain asbestos, which can cause lung injury and cancer. Wear a disposable face mask and wash your hands thoroughly after completing the work. Vacuum up or wet down the brake dust on brake components before working on them. Secure and dispose of all brake dust and cleaning materials properly. Do* ***not*** *use compressed air to blow off brake parts. High speed air tools should not be used around the brake components unless they are fitted with appropriate dust extraction or removal devices.*

Pre-inspection

Before removing the rear wheel and brake, perform the following.

1. Support the bike on a stand so that the rear wheel clears the ground.
2. Spin the rear wheel and apply the rear brake. Check for any grinding or scraping noises at the brake drum.
3. Spin the rear wheel and apply the rear brake hard while watching the backing plate. Look for excessive flexing or cracks at the cam and pivot post positions.
4. Spin the rear wheel and apply the rear brake while watching the brake rod where it attaches to the backing plate. There should be no excessive play between the backing plate and brake rod when the brake is applied.

Disassembly

Refer to **Figure 3** or **Figure 4** when performing this procedure.

1. Remove the rear wheel as described in Chapter Twelve.
2. Pull the rear brake panel out of the wheel. Check the brake linings for glaze buildup or contamination. Check the brake drum for rust or contamination.
3. Mark the web portion on both shoes (**Figure 5**) with an "O" (outside) so that the shoes can be reinstalled in their original position.

NOTE

Place a clean shop rag on the linings to protect them from oil and grease during removal.

WARNING

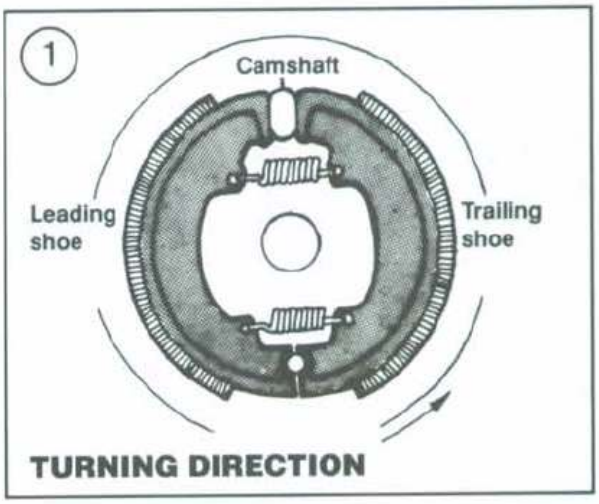
Safety glasses should be worn when removing the brake shoes in Step 3.

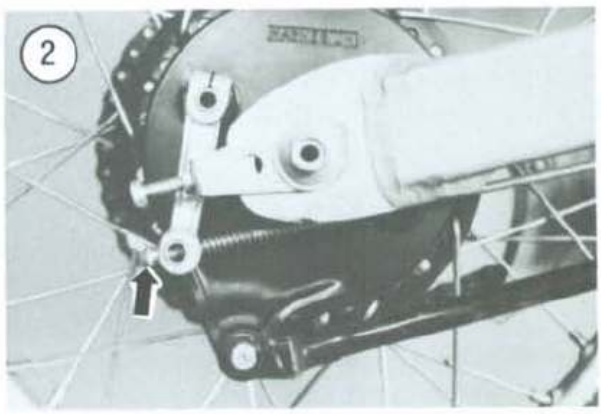
4. Grasp the shoes, one in each hand, and pull them off of the camshaft. Then spread the shoes at the pivot post and remove them from the backing plate, with the spring attached. See **Figure 6**.
5. Disconnect the return springs (A, **Figure 7**) and separate the shoes.
6. The brake lever and camshaft are indexed for proper brake operation. If there are no marks, make your own with a punch as shown in **Figure 8**.
7. Remove the bolt and washer (if used) securing the brake lever to the camshaft and remove the camshaft. If the brake lever is tight, insert a wide-blade screwdriver in the brake lever's slot and slide the lever off.
8. Remove the spring, if so equipped, from the camshaft.

Inspection

Drum brake specifications are listed in **Table 1** and **Table 2**.

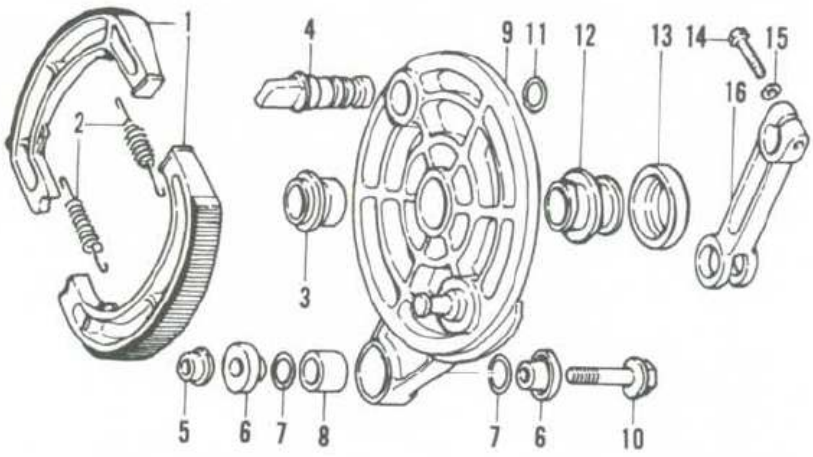
1. Read the *Warning* in the introduction of this section. Wear a dust mask when handling the brake shoes and linings.
2. Check for a hard glaze formation on the surface of each lining; some glaze will be normal, but if the glaze is hard or heavy, the brake linings may have been dragging on the drum. To remove glaze from the linings:





3

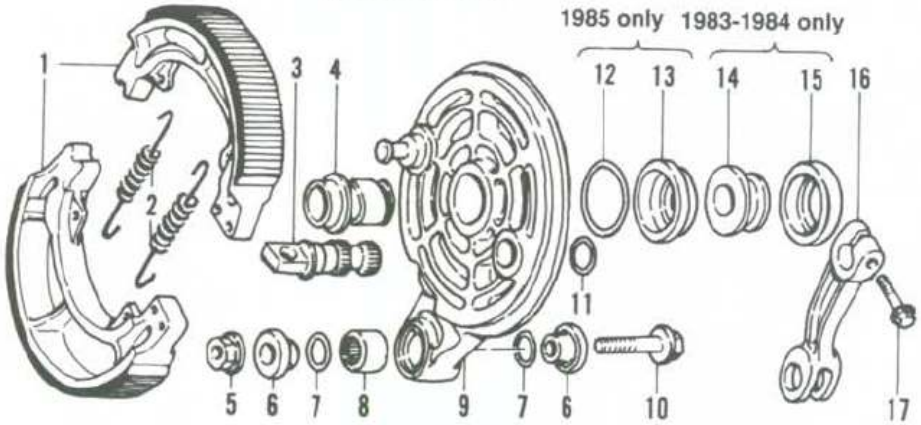
REAR DRUM BRAKE (1982)



1. Brake shoes
2. Springs
3. Sleeve
4. Camshaft
5. Nut
6. Collar
7. O-ring (11 mm [0.433 in.])
8. Bushing
9. Backing plate
10. Bolt
11. O-ring (15 mm [0.590 in.])
12. Sleeve
13. Seal
14. Bolt
15. Washer
16. Brake lever

4

REAR BRAKE DRUM (1983-1985)



1. Brake shoes
2. Springs
3. Camshaft
4. Sleeve
5. Nut
6. Collar
7. O-ring (11 mm [0.433 in.])
8. Bearing
9. Backing plate
10. Bolt
11. O-ring (12 mm [0.472 in.])
12. O-ring (1985)
13. Cap (1985)
14. Sleeve (1983-1984)
15. Seal (1983-1984)
16. Brake lever
17. Bolt

WARNING

Perform this procedure outside and not in your garage or any other enclosed work area.

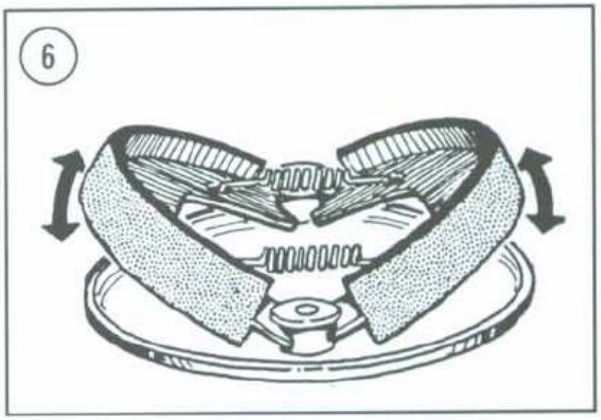
a. Remove glaze from the lining surface with a coarse grade sandpaper (**Figure 9**). Do not over-sand in one spot as this will create a depression in the lining and reduce the lining-to-drum contact area. Sand just enough to remove the glaze.
b. Discard the sandpaper and wash your hands thoroughly.
c. Clean the brake linings and shoes with a commercially available brake cleaner.

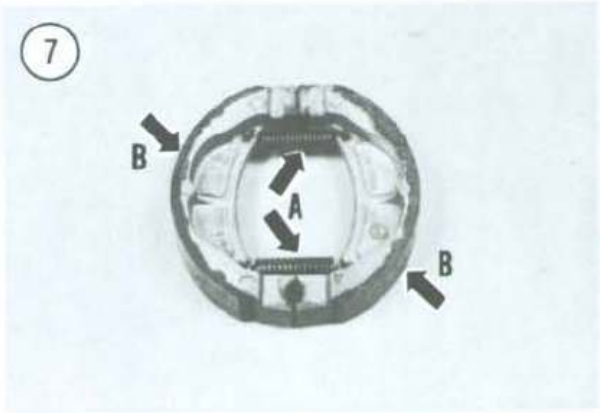
3. Inspect the linings for imbedded foreign material. Dirt can be removed with a stiff wire brush. If the linings are severely worn or grooved, the brake drum may be damaged or out-of-round. Brake linings that are contaminated with oil or grease should be replaced.

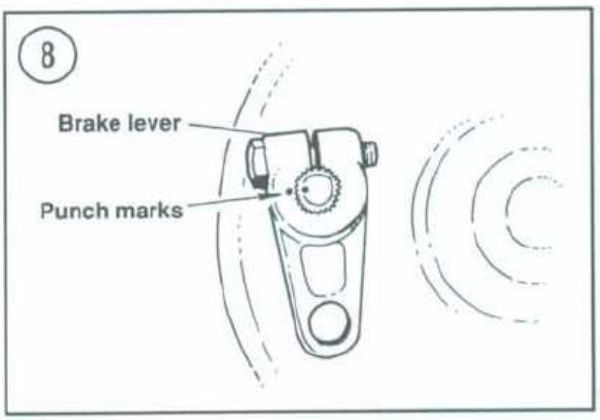
NOTE

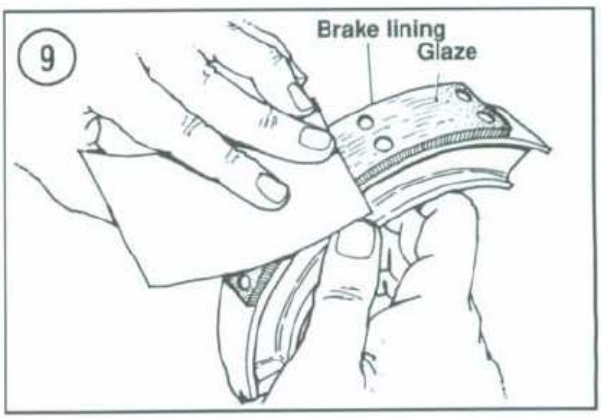
*When measuring the lining thickness in Step 4, measure the lining material only (**Figure 10**).*

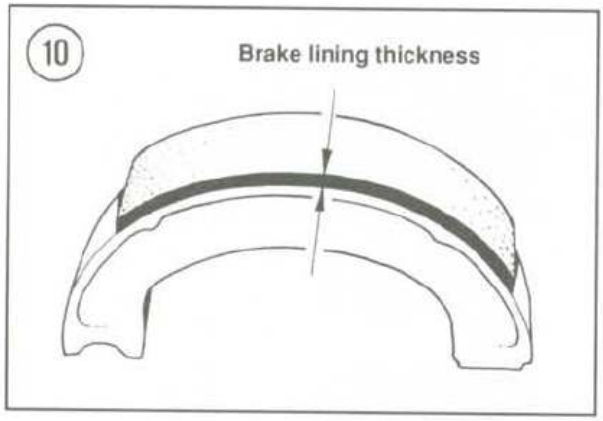
4. Measure the brake shoe lining thickness at both ends and in the center with a vernier caliper; see **Figure 11**. Replace the brake shoes if the thinnest measurement is worn to or less than the wear limit specified in **Table 1** or **Table 2**.
5. To clean the brake drum, perform the following:
a. Turn the wheel over and pour any accumulated brake dust into a garbage bag. Tie the bag closed and discard it.
b. Don't clean the brake drum with compressed air. Instead, wash the drum with a garden hose and then wipe the drum surface dry with a

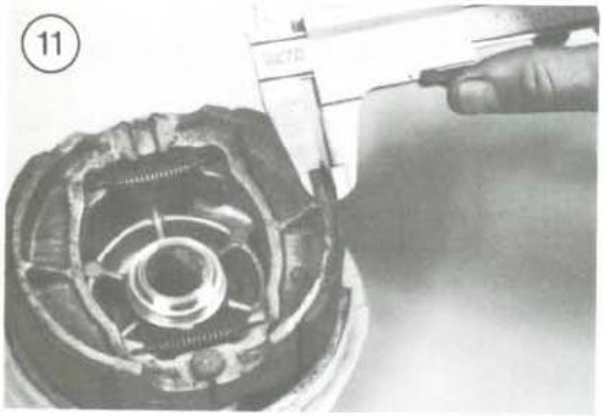


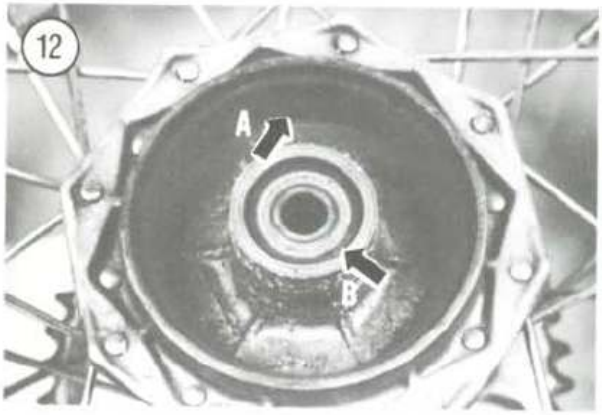


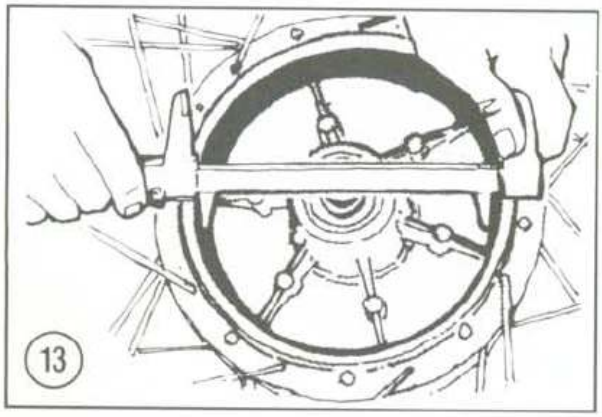












clean cloth. Do not direct the water onto or through the bearing, but instead, plug the bearing.

c. If the bike has been sitting for some time, rust may have formed on the drum surface. Remove rust with a fine-to-medium grade sandpaper and then reclean with water and wipe dry.

6. Spray the backing plate with water or brake cleaner.

7. Inspect the brake drum (A, **Figure 12**) for roughness, scores, excessive glaze, cracks and distortion. Service the drum as follows:

a. Light roughness, glaze and scores can be removed with a fine-to-medium grade sandpaper.

b. Drums that are cracked or distorted require replacement of the hub/drum assembly.

c. The brake drum can not be replaced in the hub. If the drum is severely worn or damaged, the hub/drum must be replaced as an assembly. Deep grooves will cause rapid lining wear.

NOTE

If oil or grease is on the drum surface, clean it off with a clean rag soaked in lacquer thinner—do not use any solvent that may leave an oil residue.

8. Check the hub bearing (B, **Figure 12**) for damage or wear that would allow grease to enter the brake drum and contaminate the drum and brake shoes. If necessary, replace the bearing as described in Chapter Twelve.

9. Measure the brake drum inner diameter with a vernier caliper (**Figure 13**). Replace the hub/brake drum if the inner diameter exceeds the wear limit in **Table 1** or **Table 2**.

10. Inspect the camshaft pivot lobe and the backing plate pivot shaft for severe wear and corrosion. Minor roughness can be removed with fine emery cloth.

11. Measure the length of each brake shoe spring with a vernier caliper as shown in **Figure 14**. Replace the springs if they exceed the wear limit in **Table 1** or **Table 2**. Replace both springs at the same time. If the brake shoe springs are stretched, they will not fully retract the brake shoes from the drum, resulting in a power-robbing drag on the drums and premature wear of the linings.

12. Check the brake rod bushing or bearing assembly in the backing plate for wear or damage; see **Figure 3** or **Figure 4** for your model. Replace worn or damaged O-rings. Replace a worn or damaged bushing or bearing with a press or suitable bearing driver.
13. Check the brake lever and camshaft splines for severe wear or damage. Check the pinch bolt for damage. Clean the splines and bolt with a commercially available brake or electrical contact cleaner.
14. Replace worn or damaged parts as required.

Assembly

Refer to **Figure 3** or **Figure 4** when performing this procedure.

1. To install the camshaft and brake lever:
   a. Insert the camshaft through the backing plate so that the splines face toward the outside.
   b. Slide a new O-ring over the splines and seat it against the backing plate.
   c. Slide the brake lever (**Figure 15**) over the camshaft, aligning the index marks (**Figure 8**).

WARNING

The angle between the brake lever and brake rod must not exceed 90° when the brake is applied. Aligning the index marks as previously described maintains a correct operational relationship between the brake lever and camshaft. If the brake lever and brake rod exceed 90°, the camshaft could pivot overcenter (turn horizontal) and lock the rear brake and wheel, causing you to loose control. Do not reposition the brake lever to compensate for worn brake linings or a worn brake drum.

   d. Install the pinch bolt and washer (if used) and tighten securely.

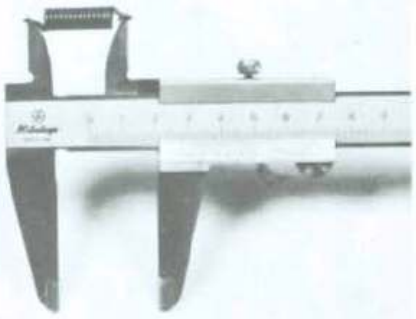
2. Lightly grease the camshaft flat and the pivot post with a thick wheel bearing grease. Avoid getting any grease on the brake plate where the linings come in contact with it.
3. When installing used brake shoes, align them so that their alignment marks, made prior to their removal, face out.
4. Hook the 2 brake springs onto each brake shoe. See A, **Figure 7**.
5. Hold the brake shoes in a V-formation with the return springs attached (**Figure 6**) and snap them in place on the brake panel. Make sure they are firmly seated on it.
6. Install the brake panel assembly into the brake drum.
7. Install the rear wheel as described in Chapter Twelve.
8. Adjust the rear brake as described in Chapter Three.

Brake Rod

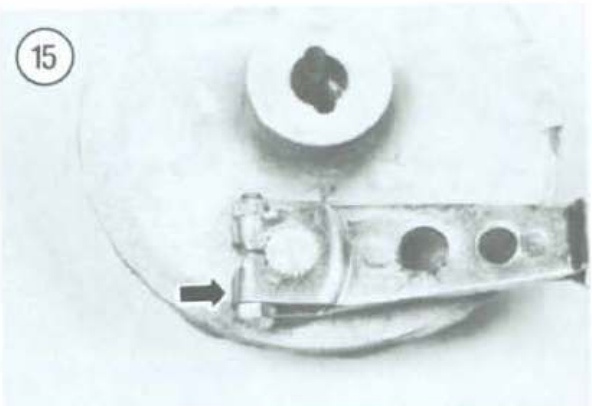
The brake rod (**Figure 16**) is a linkage rod that connects the rear brake pedal to the brake lever on the backing plate. A wing-nut or hex-nut (**Figure 16**) on the brake rod is used to adjust the rear brake free-play.

Various brake rods have been used on KX models with rear drum brake. When servicing the rear brake shoes or whenever the rear wheel is removed, check the rod at both attachment points for loose, missing or damaged parts. During reassembly, install new cotter pins.

(14)



(15)



Brake Torque Rod

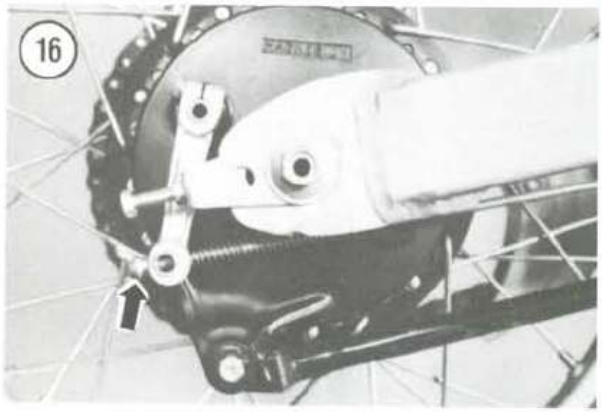
The brake torque rod (**Figure 17**), connected between the backing plate and swing arm, prevents the backing plate from turning. Check both brake torque rod attachment points for loose, missing or damaged parts. During reassembly, install new cotter pins.

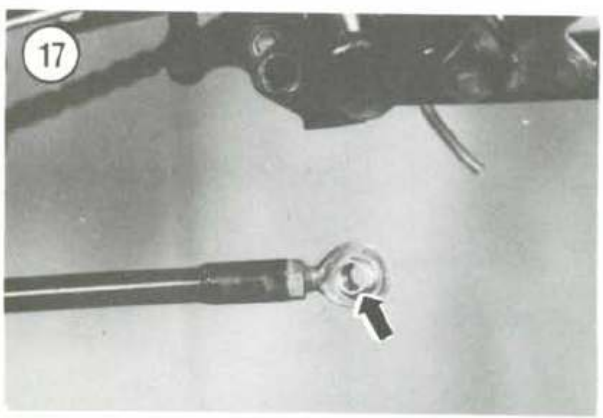
NOTE

On some models, the brake torque rod can be adjusted (lengthened or shortened) by an adjust nut and adjuster at the front of the rod. The torque rod requires adjustment when changing the length of the drive chain (changing the number of teeth on the rear sprocket).

DISC BRAKE

The front and rear disc brake is actuated by hydraulic fluid and controlled by a hand or foot lever on the master cylinder. As the brake pads wear, the brake fluid level drops in the reservoir and automatically adjusts for wear.





When working on hydraulic brake systems, it is necessary that the work area and all tools be absolutely clean. Any tiny particles of foreign matter and grit in the caliper assembly or master cylinder can damage the components.

Consider the following when servicing the front disc brake.

1. Use only DOT 3 brake fluid from a sealed container.
2. Do not allow disc brake fluid to contact any plastic parts or painted surfaces as damage will result.
3. Always keep the master cylinder reservoir and spare cans of brake fluid closed to prevent dust or moisture from entering. This would result in brake fluid contamination and brake problems.
4. Use only disc brake fluid (DOT 3) to wash parts. Never clean any internal brake components with solvent or any other petroleum base cleaners.
5. Whenever *any* component has been removed from the brake system the system is considered "opened" and must be bled to remove air bubbles. Also, if the brake feels "spongy," this usually means there are air bubbles in the system and it must be bled. For safe brake operation, refer to *Bleeding the System* in this chapter for complete details.

CAUTION

Disc brake components rarely require disassembly, so do not disassemble unless absolutely necessary. Do not use solvents of any kind on the brake systems internal components. Solvents will cause the seals to swell and distort. When disassembling and cleaning brake components (except brake pads) use new DOT 3 brake fluid.

CAUTION

Never reuse brake fluid. Contaminated brake fluid can cause brake failure. Dispose of brake fluid according to local EPA regulations.

FRONT BRAKE PAD REPLACEMENT

There is no recommended time interval for changing the friction pads in the front or rear disc brake. Pad wear depends greatly on riding habits and conditions.

To maintain an even brake pressure on the disc always replace both pads in the caliper at the same time.

Replacement
(1982-1986)

Refer to **Figure 18** (1982-1984) or **Figure 19** (1985-1986).

1. Read the information listed under *Disc Brake* in this chapter.
2. Place the bike on a stand so the front wheel clears the ground.
3. Remove the brake caliper mounting bolts (A, **Figure 20**) and pull the brake caliper off of the brake disc (B, **Figure 20**).

NOTE

If the pads are to be reused, handle them carefully to prevent grease contamination.

4. Slide the inboard brake pad (**Figure 21**) off of the holder bracket pins.
5. Remove the outboard brake pad (**Figure 22**).
6. Remove the pad spring (A, **Figure 23**).
7. Measure the brake pad thickness (**Figure 24**) with a vernier caliper or ruler and compare to the specification listed in **Table 3** or **Table 4**. If the pad thickness is equal to or less than the wear limit, replace the pads.
8. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
9. Check the piston assembly as follows:
   a. Remove the support bracket (B, **Figure 23**).
   b. Remove the plug from the end of the piston (**Figure 25**).
   c. Check for a hard, cracked or swollen piston dust seal (**Figure 26**).
   d. Check the end of the piston (**Figure 26**) for fluid leakage. If the dust seal is damaged and/or if there is fluid leakage, overhaul the brake caliper as described in this chapter.
   e. Install the support bracket (B, **Figure 23**).
10. Clean and check the pad spring. Replace if necessary.
11. Check the brake disc for wear as described in this chapter.
12. Install the piston plug, if removed.
13. When the piston is pushed back into the caliper to make room for the new brake pads, brake fluid will be forced back into the master cylinder reservoir. To prevent the reservoir from overflowing, remove some of the brake fluid as follows:
    a. Clean the top of the master cylinder of all dirt.
    b. Remove the cap (**Figure 27**) and diaphragm from the master cylinder.
    c. Temporarily install the outboard brake pad (**Figure 22**) into the caliper and slowly push the caliper piston back into the caliper.
    d. Constantly check the reservoir to make sure brake fluid does not overflow. Siphon fluid, if necessary, before it overflows.

WARNING

Brake fluid is poisonous. Do not siphon with your mouth.

    e. The caliper piston should move freely. If not, the caliper should be removed and rebuilt as described in this chapter.
    f. Push the caliper piston in all the way to allow room for the new pads.
    g. Remove the outboard pad.
14. Install the pad spring (A, **Figure 23**) into the caliper.
15. Install the outboard pad (**Figure 22**) into the caliper, pushing the pad against the pad spring
16. Install the inboard pad (**Figure 21**) into the caliper so that the 2 pad holes face toward the top of the caliper. Then, push the pad against the pad spring and slide it onto the 2 bracket pins.
17. Carefully install the caliper assembly (B, **Figure 20**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
18. Install the brake caliper mounting bolts (A, **Figure 20**) and tighten to the torque specification in **Table 7**.

WARNING

Use new brake fluid clearly marked DOT 3 from a sealed container.

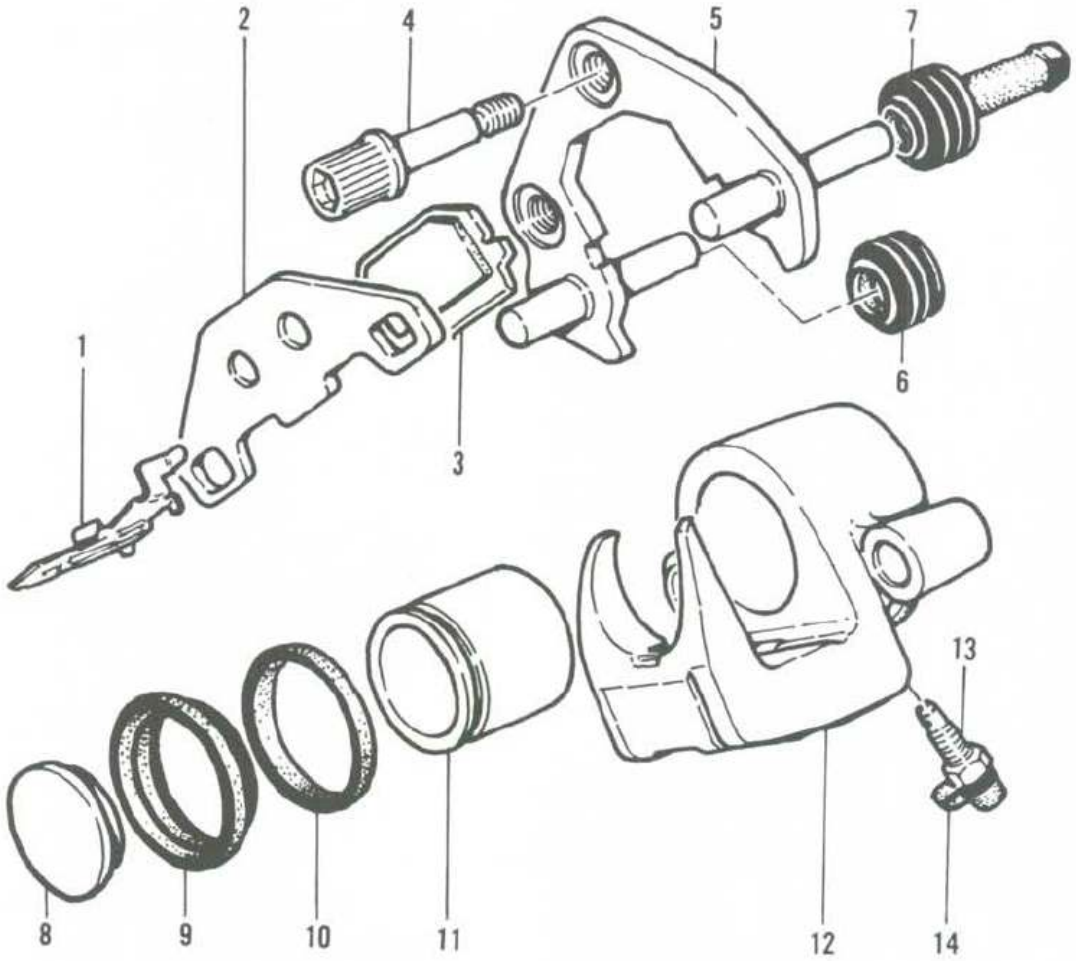
19. Pull and release the brake lever a few times to seat the pads against the disc, then recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.
20. Install the master cylinder reservoir diaphragm and top cover. Tighten the cover screws securely.

WARNING

Do not ride the bike until you are sure the brake is operating correctly with full hydraulic advantage. If necessary, bleed the brake as described in this chapter.

(18)

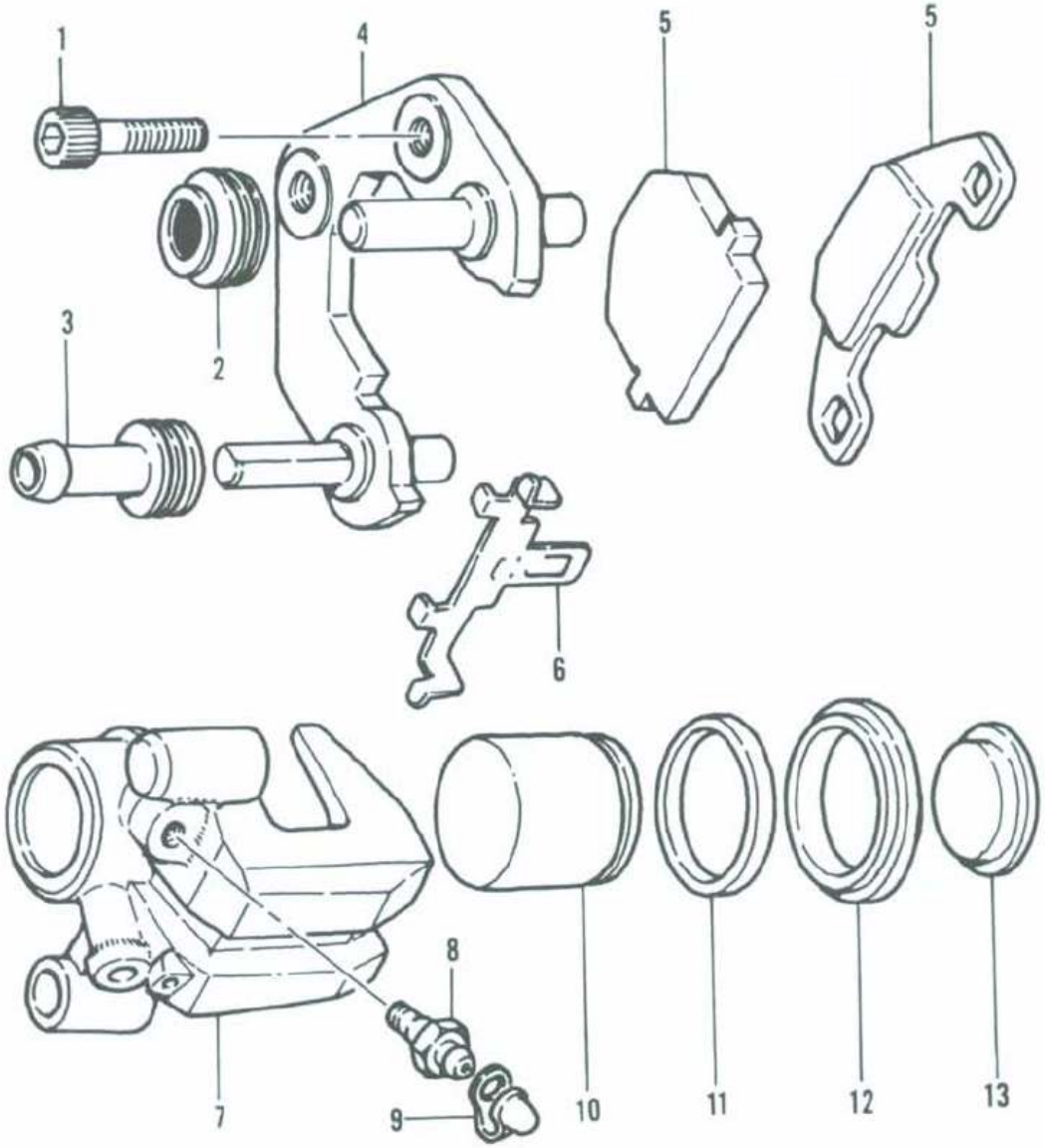
FRONT BRAKE CALIPER (1982-1984)



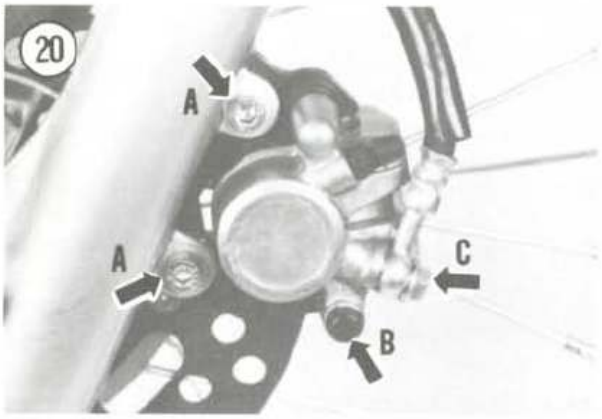
1. Anti-rattle spring
2. Brake pad
3. Brake pad
4. Bolt
5. Support bracket
6. Boot
7. Friction boot
8. Plug
9. Dust seal
10. Piston seal
11. Piston
12. Housing
13. Bleed valve
14. Cover

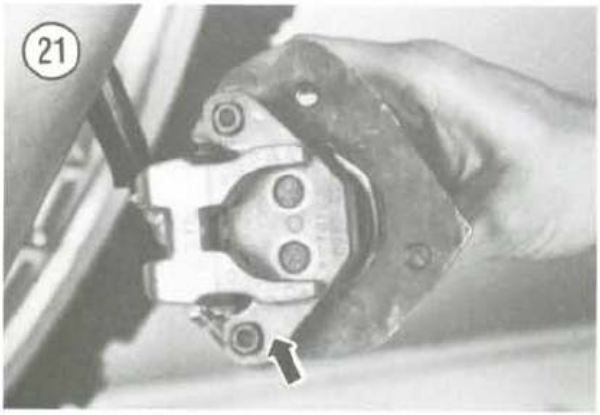
19

FRONT BRAKE CALIPER (1985-1986)



1. Allen bolt
2. Boot
3. Friction boot
4. Support bracket
5. Brake pads
6. Spring
7. Housing
8. Bleed valve
9. Cap
10. Piston
11. Piston seal
12. Dust seal
13. Plug


20
A
A
C
B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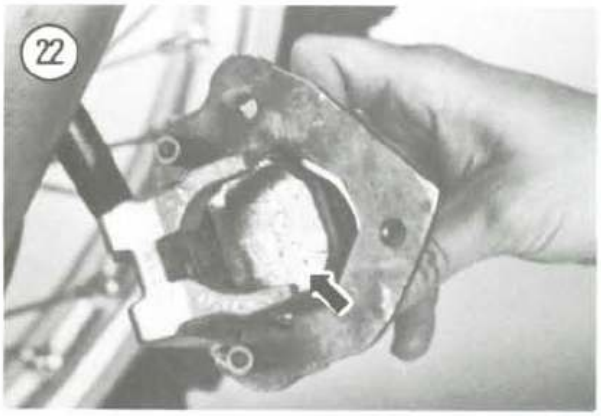
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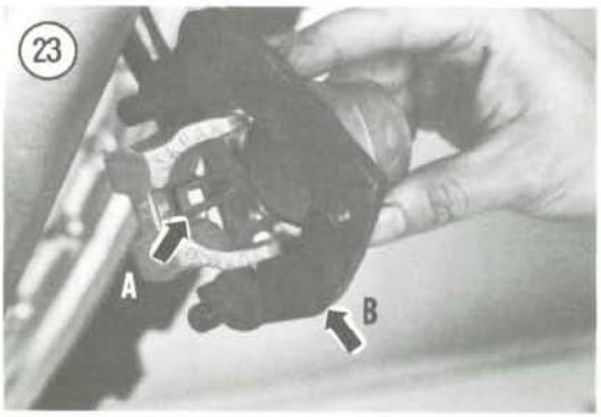
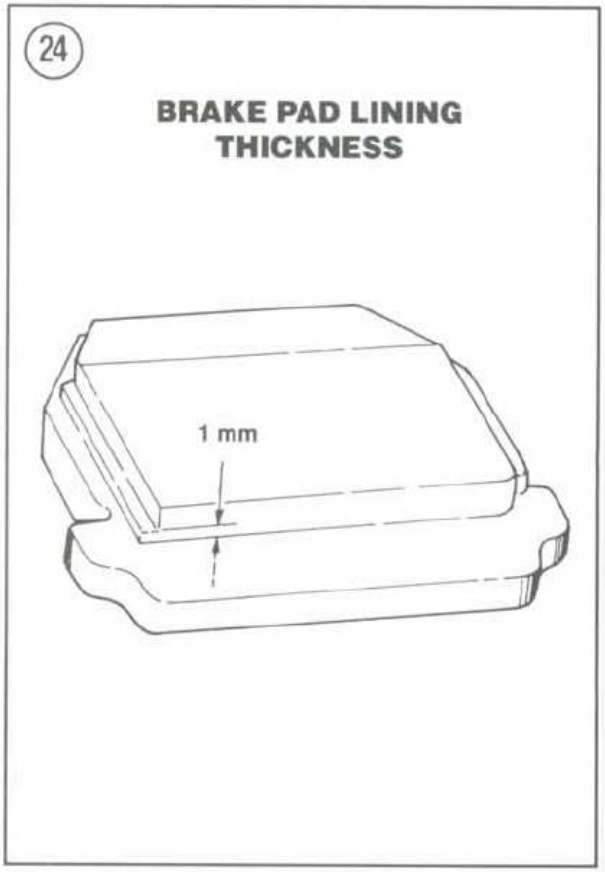
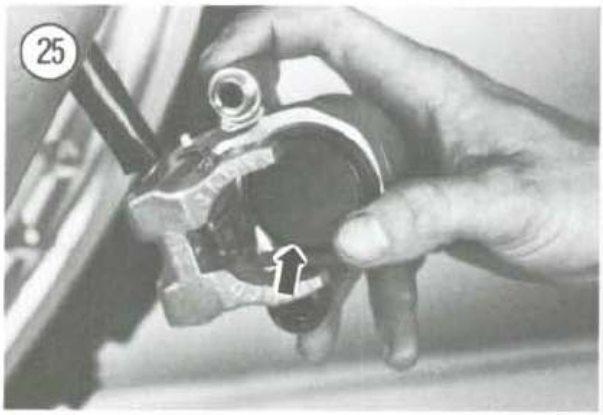

23
A
B


24
BRAKE PAD LINING
THICKNESS
1 mm


25


26

Replacement
(1987-1988)

Refer to **Figure 28** when performing this procedure.

1. Read the information listed under *Disc Brake* in this chapter.
2. Place the bike on a stand so the front wheel clears the ground.
3. Remove the brake caliper mounting bolts (A, **Figure 29**) and pull the brake caliper off of the brake disc (B, **Figure 29**).

NOTE

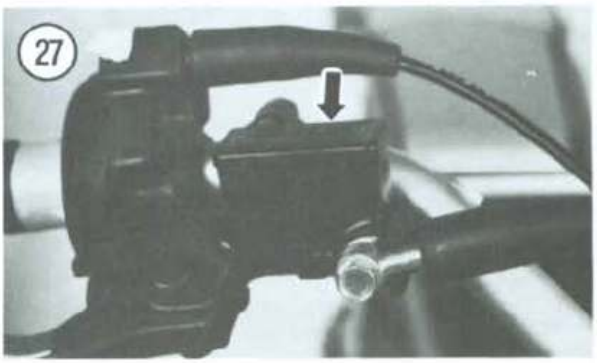
If the pads are to be reused, handle them carefully to prevent grease contamination.

4. Turn the pin clip so that it face up and pull it out of the pin (**Figure 30**). Pull the pin (A, **Figure 31**) out of the caliper with a pair of pliers.
5. Lift out the inboard brake pad (B, **Figure 31**).
6. Push the support bracket toward the piston and remove the outboard pad (**Figure 32**) from the caliper holder.
7. Remove the pad spring (**Figure 33**)
8. Measure the brake pad thickness (**Figure 24**) with a vernier caliper or ruler and compare to the specification listed in **Table 3** or **Table 4**. If the pad thickness is equal to or less than the wear limit, replace the pads.
9. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
10. Check the piston assembly as follows:
    a. Remove the support bracket (A, **Figure 34**) and its clips.
    b. Check for a hard, cracked or swollen piston dust seal.
    c. Check the end of the piston (B, **Figure 34**) for fluid leakage. If the dust seal is damaged and/or if there is fluid leakage, overhaul the brake caliper as described in this chapter.
    d. Install the support bracket (A, **Figure 34**) and clips.
11. Clean and check the pad and bracket springs. Replace if cracked, deformed or corroded.
12. Check the brake disc for wear as described in this chapter.
13. Install the clips onto the support bracket.
14. When the piston is pushed back into the caliper to make room for the new brake pads, brake fluid will be forced back into the master cylinder reservoir. To prevent the reservoir from overflowing, remove some of the brake fluid as follows:
    a. Clean the top of the master cylinder of all dirt.
    b. Remove the cap (**Figure 27**) and diaphragm from the master cylinder.
    c. Slowly push the caliper piston back into the caliper.
    d. Constantly check the reservoir to make sure brake fluid does not overflow. Siphon fluid, if necessary, before it overflows.

WARNING

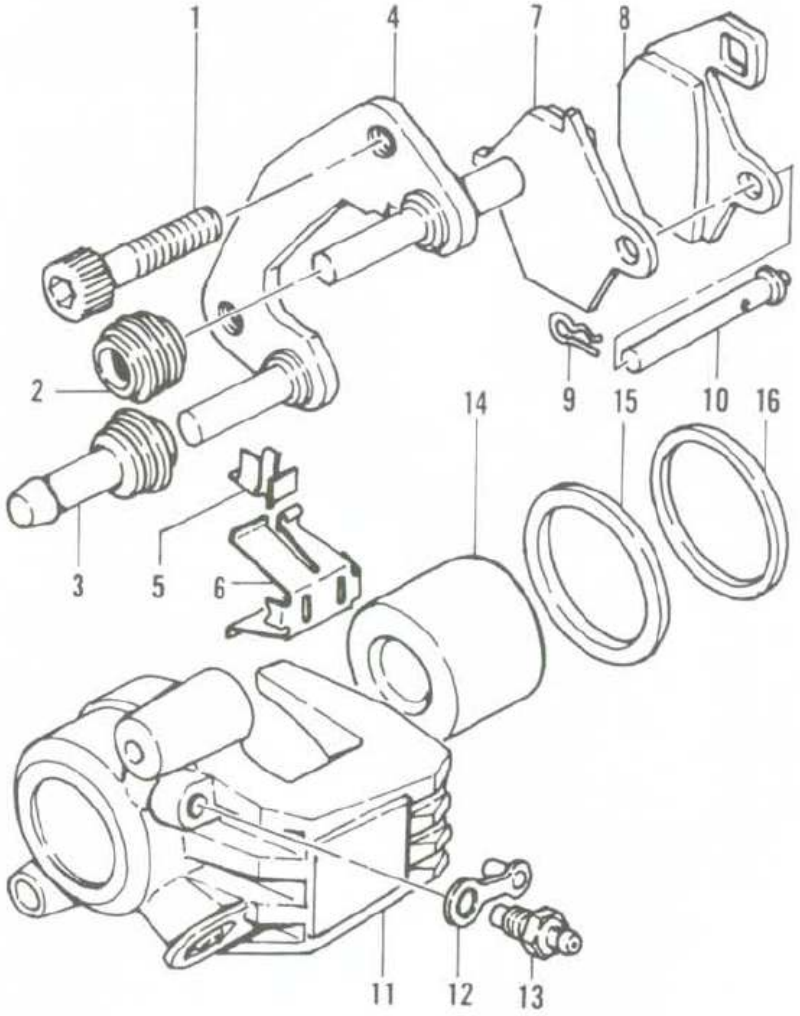
Brake fluid is poisonous. Do not siphon with your mouth.

    e. The caliper piston should move freely. If not, the caliper should be removed and rebuilt as described in this chapter.
    f. Push the caliper piston in all the way to allow room for the new pads.
15. Install the pad spring (**Figure 33**) into the caliper.
16. Install the outboard pad (**Figure 32**) into the caliper.
17. Install the inboard pad (B, **Figure 31**) into the caliper, pushing the pad against the pad spring.
18. Install the pad pin through both pads (A, **Figure 31**) and secure it with its clip. Turn the pin so that the pin cannot fall out (**Figure 35**).
19. Carefully install the caliper assembly (B, **Figure 29**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
20. Install the brake caliper mounting bolts (A, **Figure 29**) and tighten to the torque specification in **Table 7**.



(28)

FRONT BRAKE CALIPER (1987-1988)

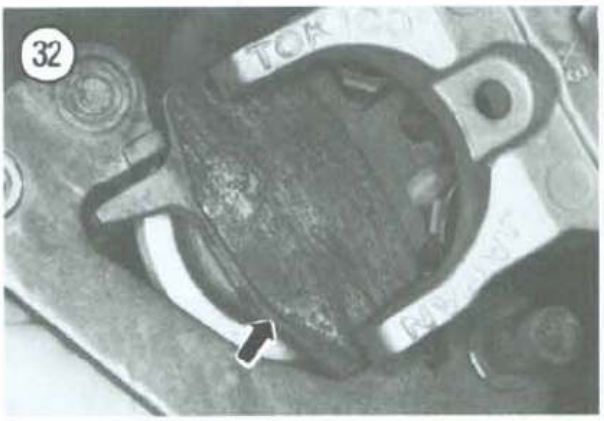


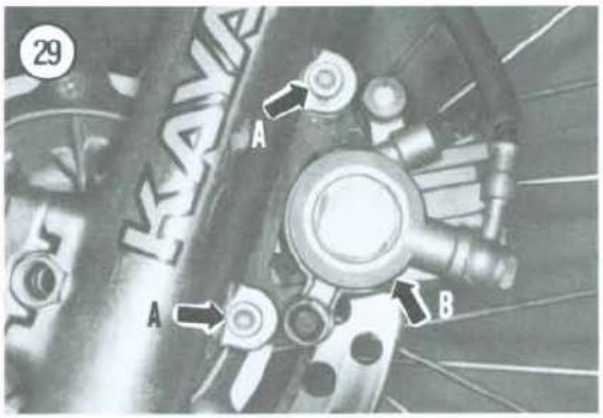
1. Bolt
2. Boot
3. Friction boot
4. Support bracket
5. Spring
6. Anti-rattle spring
7. Brake pad
8. Brake pad
9. Clip
10. Pin
11. Housing
12. Cover
13. Bleed valve
14. Piston
15. Piston seal
16. Dust seal

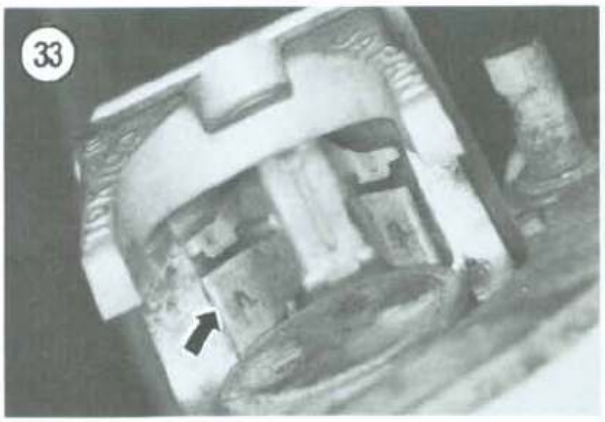
WARNING
Use new brake fluid clearly marked DOT 3 from a sealed container.

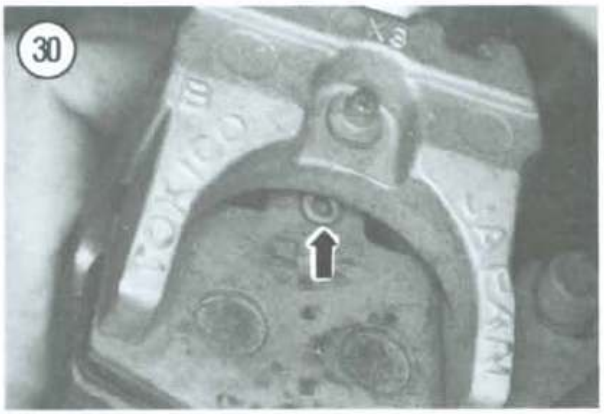
21. Pull and release the brake lever a few times to seat the pads against the disc, then recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.

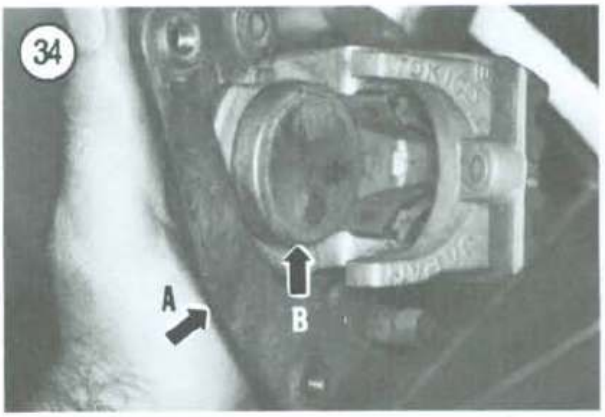
22. Install the master cylinder reservoir diaphragm and top cover. Tighten the cover screws securely.

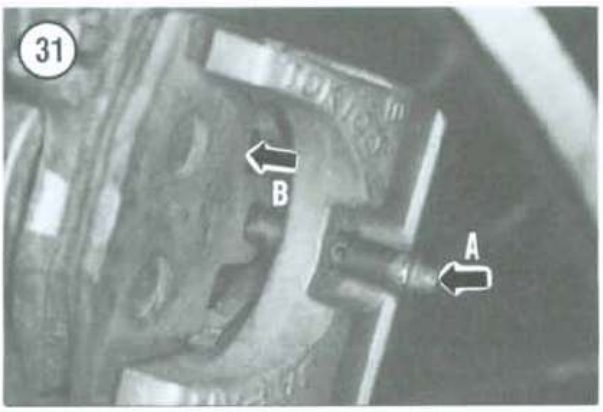


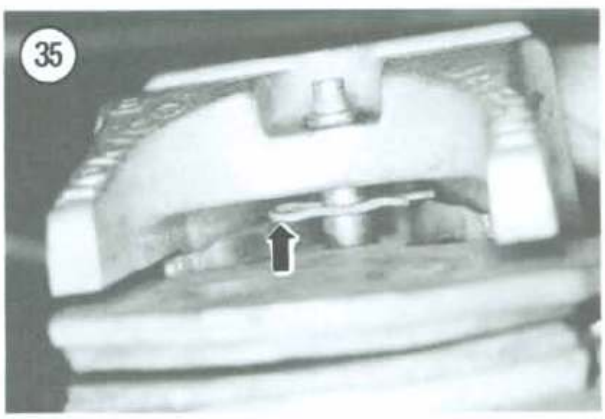






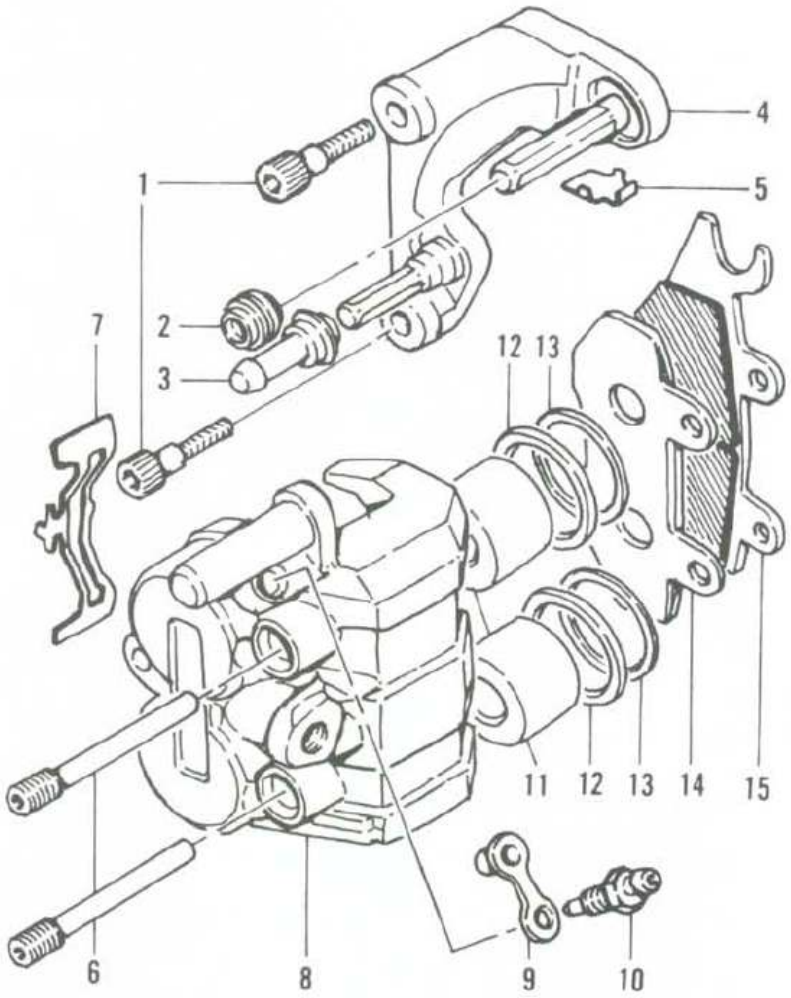






(36)

FRONT BRAKE CALIPER (1989-ON)



1. Bolt
2. Boot
3. Friction boot
4. Support bracket
5. Clip
6. Brake pad mounting bolts
7. Anti-rattle spring
8. Housing
9. Cover
10. Bleed valve
11. Piston
12. Piston seal
13. Dust seal
14. Brake pad
15. Brake pad

WARNING

Do not ride the bike until you are sure the brake is operating correctly with full hydraulic advantage. If necessary, bleed the brake as described in this chapter.

Replacement
(1989-on)

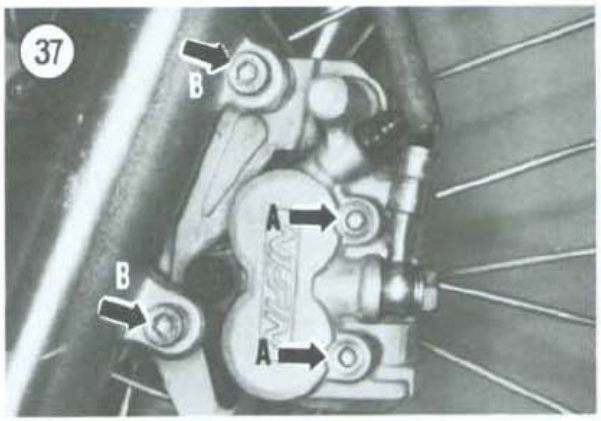
Refer to **Figure 36** when performing this procedure.

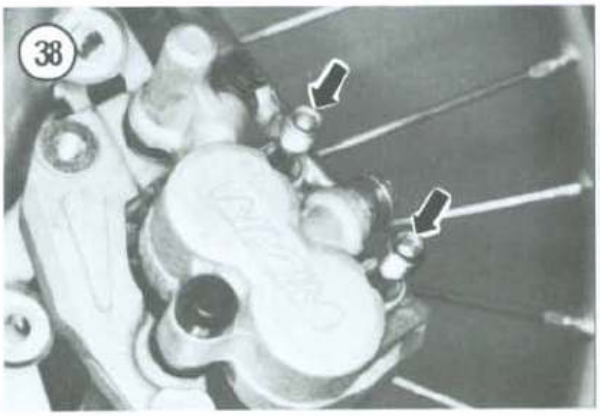
1. Read the information listed under *Disc Brake* in this chapter.
2. Place the bike on a stand so the front wheel clears the ground.
3. Remove the front disc cover, if so equipped.
4. On 1990-1991 models, remove the front brake hose holder bolts.
5. Loosen, but do not remove, the brake pad mounting bolts (A, **Figure 37**).
6. Loosen the brake caliper mounting bolts (B, **Figure 37**) and remove them from the caliper. Lift the caliper off of the brake disc.

NOTE

If the pads are to be reused, handle them carefully to prevent grease contamination.

7. Remove the 2 brake pad mounting bolts (**Figure 38**).
8. Remove the outboard brake pad (**Figure 39**).
9. Remove inboard brake pad (**Figure 40**).
10. Remove the pad spring (**Figure 41**).
11. Measure the brake pad thickness (**Figure 24**) with a vernier caliper or ruler and compare to the specification listed in **Table 3** or **Table 4**. If the pad thickness is equal to or less than the wear limit, replace the pads.
12. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
13. Remove the support bracket clips (**Figure 42**).
14. Check the piston assembly as follows:
    a. Remove the support bracket from the caliper assembly.
    b. Check for hard, cracked or swollen piston dust seals.
    c. Check the end of the pistons for fluid leakage. If the dust seals are damaged and/or if there is





fluid leakage, overhaul the brake caliper as described in this chapter.

d. Install the support bracket.

15. Clean and check the pad and bracket springs. Replace if cracked, deformed or corroded.

16. Check the brake disc for wear as described in this chapter.

17. Install the clips (**Figure 42**) onto the support bracket.

18. When the pistons are pushed back into the caliper to make room for the new brake pads, brake fluid will be forced back into the master cylinder reservoir. To prevent the reservoir from overflowing, remove some of the brake fluid as follows:

a. Clean the top of the master cylinder of all dirt.

b. Remove the cap (**Figure 27**) and diaphragm from the master cylinder.

c. Temporarily install the inboard brake pad (**Figure 40**) into the caliper and slowly push the caliper pistons back into the caliper.

d. Constantly check the reservoir to make sure brake fluid does not overflow. Siphon fluid, if necessary, before it overflows.

WARNING

Brake fluid is poisonous. Do not siphon with your mouth.

e. The caliper pistons should move freely. If not, the caliper should be removed and rebuilt as described in this chapter.

f. Push the caliper pistons in all the way to allow room for the new pads.

g. Remove the inboard pad.

19. Install the pad spring (**Figure 41**) into the caliper.

20. Install the inboard pad (**Figure 40**) into the caliper.

21. Install the outboard pad (**Figure 39**) into the caliper so that the 2 pad holes face toward the top of the caliper. Then, push the pad against the pad spring.

22. Hook the outboard pad onto the bracket pin (**Figure 39**) and pivot it into the caliper. Then, push the pad against the pad spring (**Figure 43**) and insert both pad bolts (**Figure 38**) through the brake pads and thread them into the caliper housing.

23. Carefully install the caliper assembly (**Figure 37**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.

24. Install the brake caliper mounting bolts (B, **Figure 37**) and tighten to the torque specification in **Table 7**.

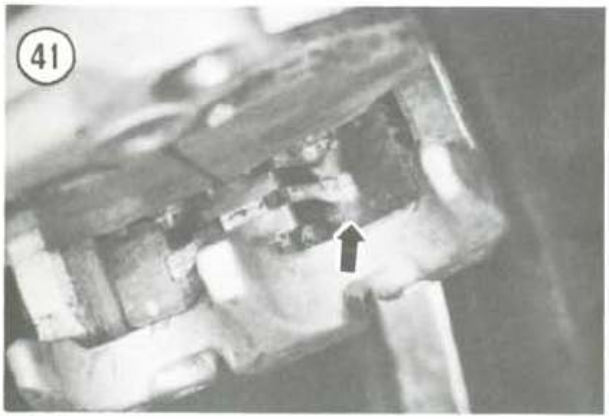
25. Tighten the brake pad mounting bolts (A, **Figure 37**) to the torque specification in **Table 7**.

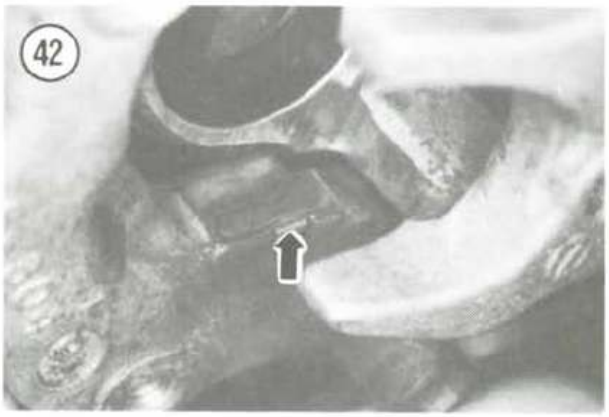
26. On 1990-1991 models, install the front brake hose holder bolts and tighten securely.

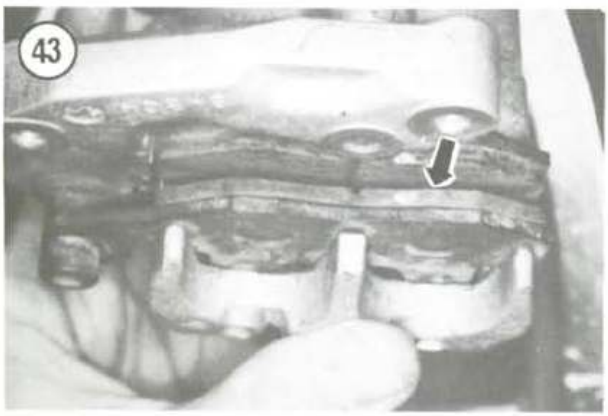
WARNING

Use new brake fluid clearly marked DOT 3 from a sealed container.

27. Pull and release the brake lever a few times to seat the pads against the disc, then recheck the brake







fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.

28. Install the master cylinder reservoir diaphragm and top cover. Tighten the cover screws securely.

WARNING

Do not ride the bike until you are sure the brake is operating correctly with full hydraulic advantage. If necessary, bleed the brake as described in this chapter.

29. Install the front disc cover, if so equipped.

FRONT CALIPER (1982-1988)

Refer to the following illustration for your model when servicing the front caliper in this section:

a. **Figure 44**: 1982-1984.
b. **Figure 45**: 1985-1986.
c. **Figure 46**: 1987-1988.

Read the information listed under *Disc Brake* in this chapter before servicing the front caliper.

Removal/Installation (Caliper Will Not Be Disassembled)

If the brake caliper is to be removed without disassembling it, perform this procedure. If the caliper is to be disassembled, refer to *Caliper Removal/Piston Removal* in this chapter.

1. Place the bike on a stand so the front wheel clears the ground.

2A. If the caliper is to be completely removed from the bike, perform the following:

a. Loosen and remove the brake hose banjo bolt (A, **Figure 47**) and the 2 washers at the caliper.
b. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the bike.
c. Loosen the brake caliper mounting bolts (B, **Figure 47**) and remove them from the caliper. Lift the caliper (C, **Figure 47**) off of the brake disc and remove it.
d. Place the caliper in a plastic bag and tie the bag closed. Position the caliper so that brake fluid cannot run down the side of the caliper and contaminate the pads.

2B. If the caliper is only being partially removed and it is not necessary to disconnect the brake line at the caliper, perform the following:

a. Loosen the brake caliper mounting bolts (B, **Figure 47**) and remove them from the caliper. Lift the caliper (C, **Figure 47**) off of the brake disc.
b. Insert a wooden or plastic spacer block in the caliper between the brake pads.

NOTE

The spacer block prevents the piston from being forced out of the caliper if the brake lever is squeezed while the caliper is removed from the brake disc. If the brake lever is squeezed and the piston comes out, the caliper might have to be disassembled to reseat the piston and the system will have to be bled.

c. Support the partially removed caliper with a Bunjee cord or a wire hook. Do not allow the caliper to hang by its hose.

3. Install the caliper by reversing these steps, while noting the following.

4A. If the caliper was completely removed from the bike:

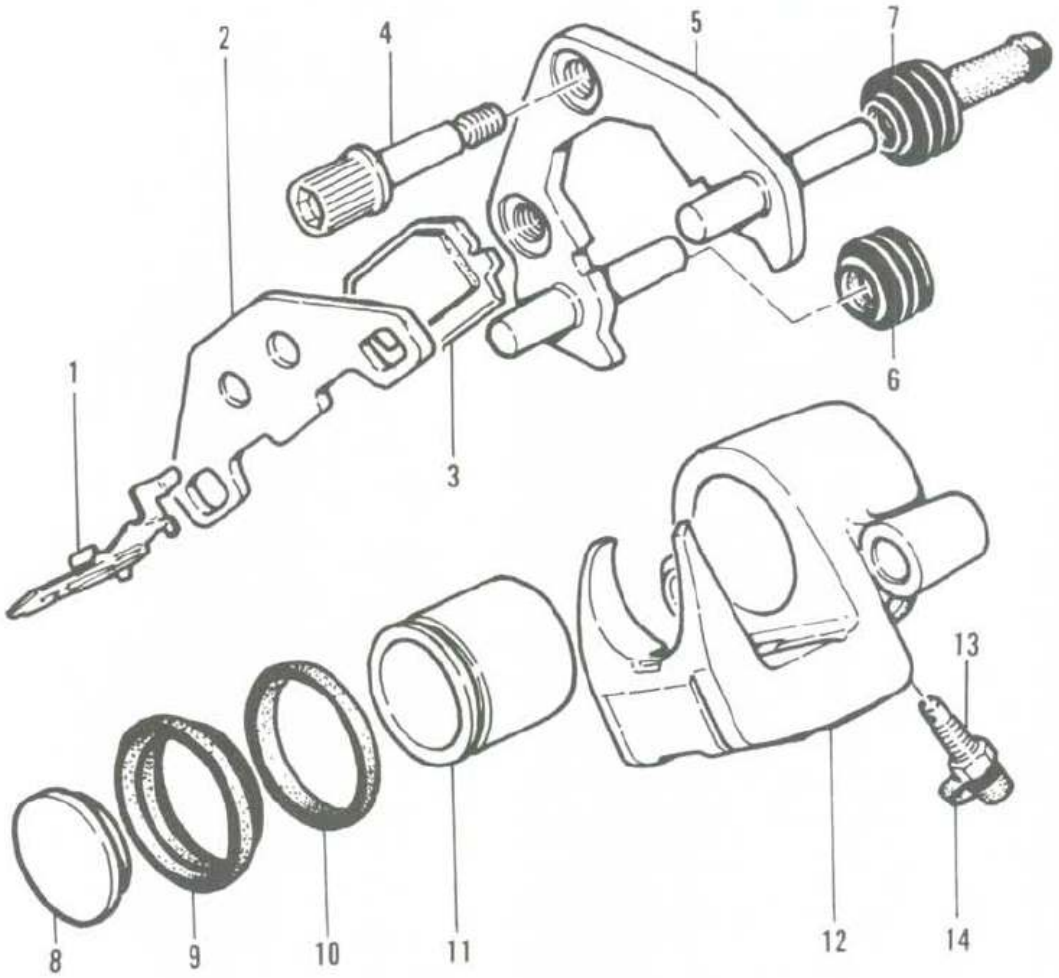
a. Remove the caliper from the bag and check that the brake pads were not contaminated with brake fluid. Wipe the caliper housing off with a clean rag.
b. Carefully install the caliper assembly (C, **Figure 47**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
c. Install the brake caliper mounting bolts (B, **Figure 47**) and tighten to the torque specification in **Table 7**.
d. Install the brake hose (A, **Figure 47**) with the banjo bolt and 2 washers. Place a washer on each side of the brake hose. Tighten the banjo bolt to the torque specification listed in **Table 7**.
e. Refill the master cylinder and bleed the front brake as described in this chapter.

4B. If the caliper was only partially removed from the bike:

a. Remove the spacer block from between the brake pads.
b. Disconnect the caliper from its hanger and carefully install the caliper (C, **Figure 47**)

(44)

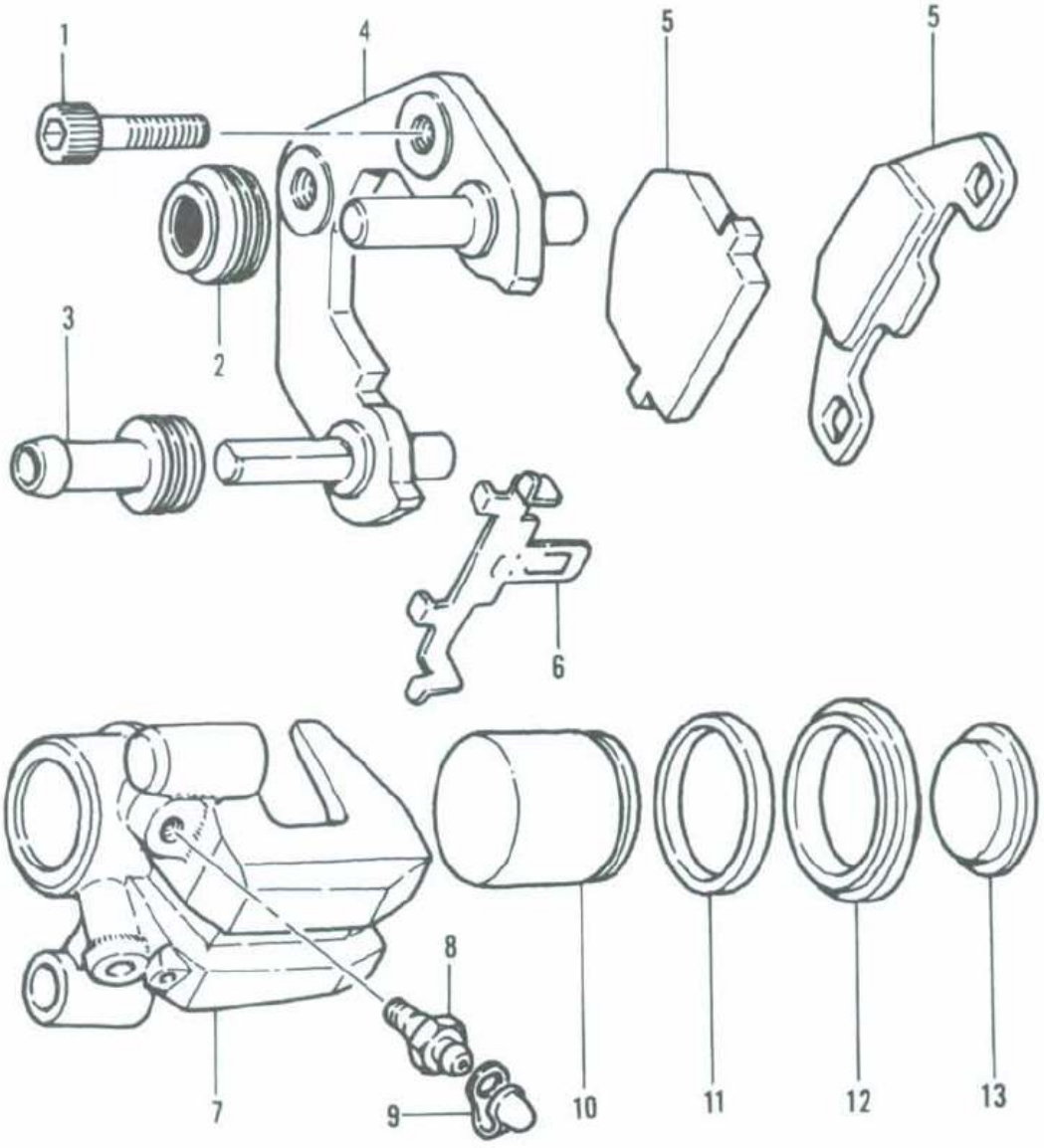
FRONT BRAKE CALIPER (1982-1984)



1. Anti-rattle spring
2. Brake pad
3. Brake pad
4. Bolt
5. Support bracket
6. Boot
7. Friction boot
8. Plug
9. Dust seal
10. Piston seal
11. Piston
12. Housing
13. Bleed valve
14. Cover

(45)

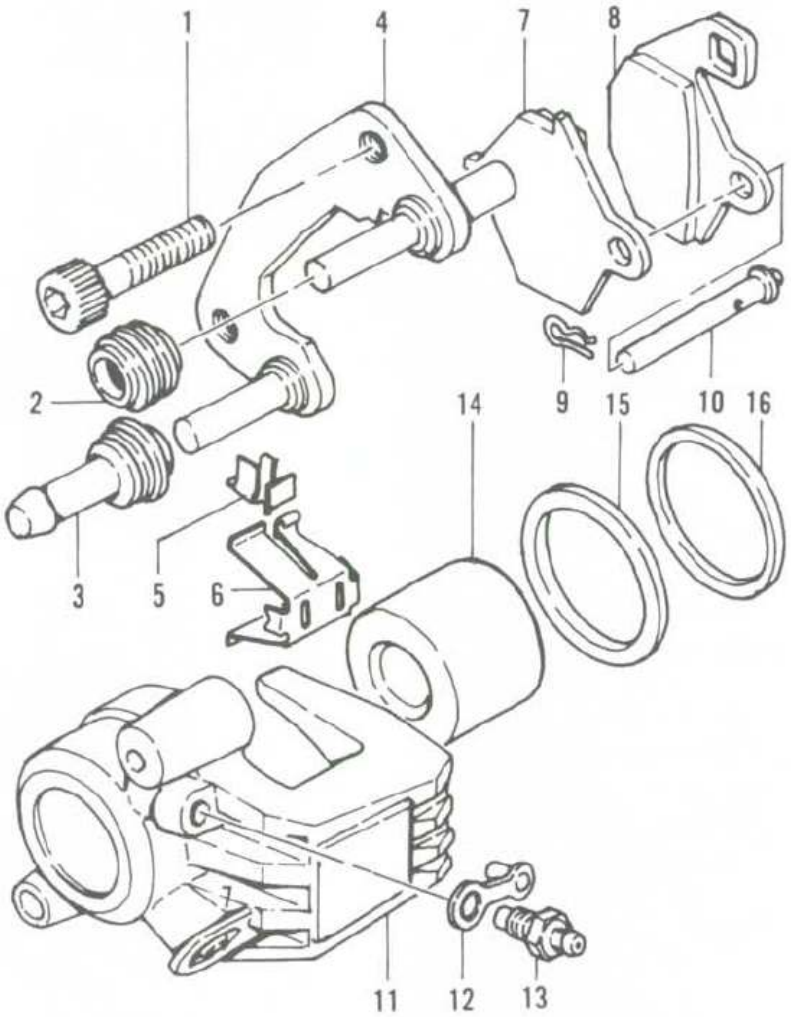
FRONT BRAKE CALIPER (1985-1986)



1. Allen bolt
2. Boot
3. Friction boot
4. Support bracket
5. Brake pads
6. Spring
7. Housing
8. Bleed valve
9. Cap
10. Piston
11. Piston seal
12. Dust seal
13. Plug

(46)

FRONT BRAKE CALIPER (1987-1988)



1. Bolt
2. Boot
3. Friction boot
4. Suppoprt bracket
5. Spring
6. Anti-rattle spring
7. Brake pad
8. Brake pad
9. Clip
10. Pin
11. Housing
12. Cover
13. Bleed valve
14. Piston
15. Piston seal
16. Dust seal

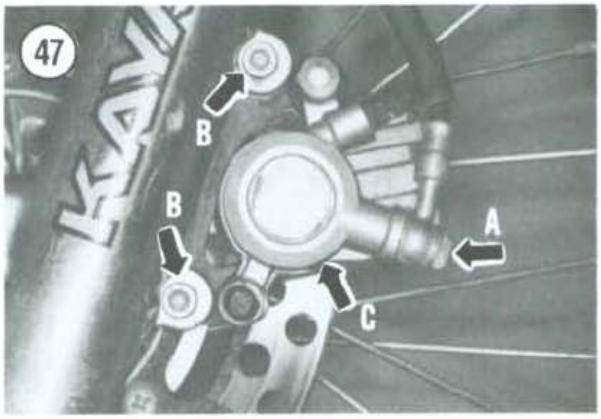
onto the brake disc. Be careful not to damage the leading edge of the pads during installation.

c. Install the caliper mounting bolts (B, **Figure 47**) and tighten to the torque specification in **Table 7**.

d. Operate the brake lever a few times to seat the pads against the brake disc.

WARNING

Do not ride the motorcycle until you are sure the brake is operating properly.



Caliper Removal/Piston Removal (Caliper Will Be Disassembled)

If the caliper is to be completely disassembled, force will be required to remove the piston from the caliper. This can be either the hydraulic pressure in the brake system itself, or compressed air. If you are going to use hydraulic pressure, you must do so before the brake hose is disconnected from the caliper. This procedure describes how to remove the piston while the caliper is still mounted on the bike.

1. Remove the brake pads as described in this chapter.
2. Slide the support bracket out of the caliper.
3. Remove the outer dust seal (**Figure 48**) from around the piston
4. Wrap a large cloth around the brake caliper.
5. Hold the caliper so that your hand and fingers are placed away from the piston/brake pad area.
6. Operate the front brake lever to force the piston out of the caliper cylinder. Remove the piston.

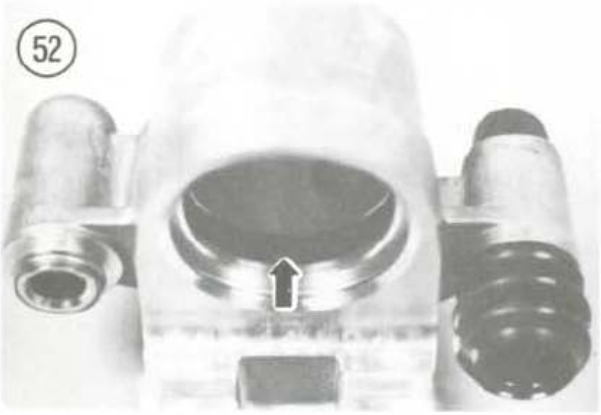
NOTE

If the piston will not come out, you will have to use compressed air to remove it. Refer to ***Disassembly*** *in this chapter.*

7. Support the caliper. Then loosen the caliper banjo bolt and remove the bolt and its 2 washers from the caliper. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the bike.
8. Take the caliper to a workbench for further disassembly.

Disassembly

1. Remove the caliper as described in this chapter.



NOTE

If you have removed the piston, proceed to Step 6.

2. Remove the pad (**Figure 49**) from the piston if you have not previously done so.
3. Pull the support bracket out of the caliper housing (**Figure 49**).
4. Remove the dust seal (**Figure 50**) from around the piston.

WARNING

The piston will be forced out of the caliper with considerable force. Do not try to cushion the piston with your fingers, as injury could result.

5. Cushion the caliper piston with a shop rag, placing your fingers and hand away from the piston area. Then apply compressed air through the brake line port to remove the piston (**Figure 51**).
6. Using a wooden or plastic rod with a flat, narrow tip, remove the piston seal (**Figure 52**) from the groove inside the cylinder. Do not use a screwdriver or other metal tool as this may scratch the cylinder bore.
7. Remove the bleed valve from the caliper.

Inspection

1. Wash the piston and cylinder with clean DOT 3 brake fluid.

NOTE

Make sure the dust and piston seal grooves in the caliper are clean. The dust seal grooves (front) are especially prone to dirt contamination and wear.

2. Check the piston (**Figure 53**) and the cylinder (A, **Figure 54**) for deep scratches or other obvious wear marks. Do not hone the cylinder. If the piston or cylinder are damaged, replace them as a set.
3. Measure the piston outside diameter (**Figure 55**) with a micrometer and compare to the wear limit in **Table 3** or **Table 4**.
4. Measure the cylinder inner diameter with a bore gauge and compare to the wear limit in **Table 3** or **Table 4**.
5. Replace the piston and caliper housing as a set if any one part is not within specification.

6. Clean the bleed valve (**Figure 56**) with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.

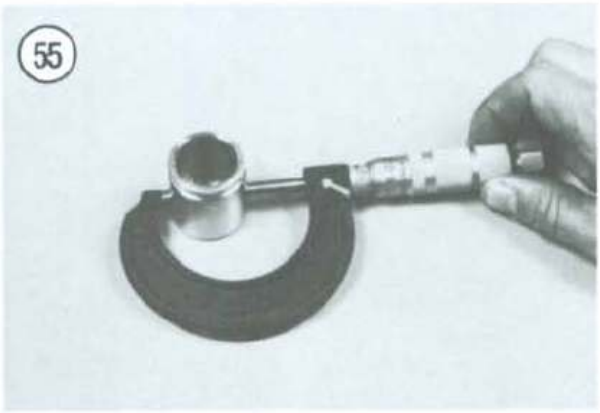
7. Clean the banjo bolt (**Figure 57**) with compressed air. Check the threads for damage. Replace worn or damaged washers.

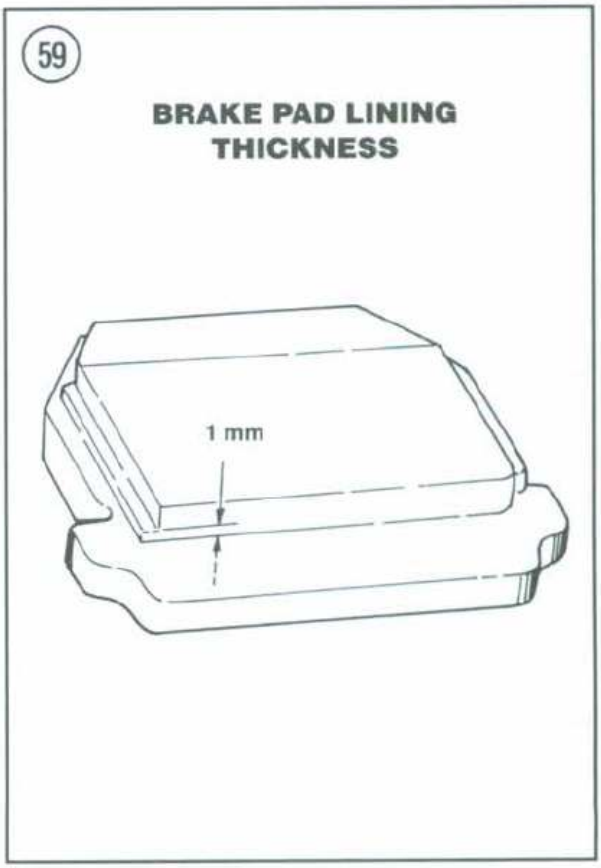
8. Check the caliper boots for wear or damage; replace by pulling out of caliper (B, **Figure 54**) or off of the support bracket (A, **Figure 58**). Reverse to install. Replace both bushings at the same time.

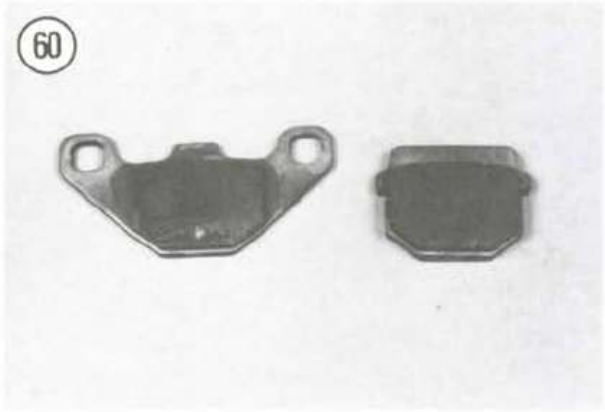
9. Check the support bracket (B, **Figure 58**) shafts for severe wear, damage or uneven wear (steps). The shafts must be in good condition for the caliper to slide back and forth. Remove all grease residue from the bracket. Replace the caliper bracket if the shafts are damaged.

10. Check the pad spring(s) for cracks or damage. Replace if necessary.

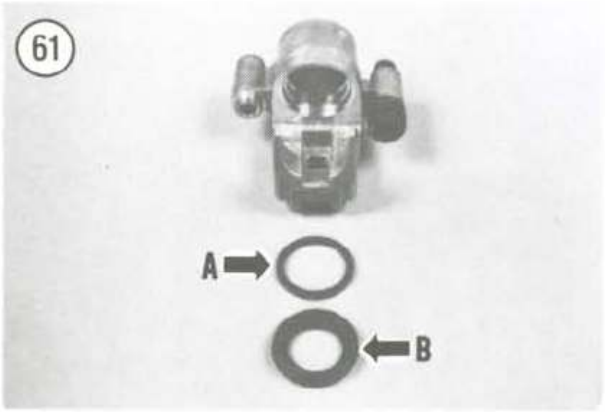
11. Measure the thickness of each brake pad (**Figure 59**) with a vernier caliper or ruler and compare to the specification listed in **Table 3** or **Table 4**. If the pad thickness is equal to or less than the wear limit, replace the pads.







12. Inspect the brake pads (**Figure 60**) for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
13. See **Figure 61**. Replace the piston (A) and dust (B) seals as a set. Kawasaki recommends to replace the seals every other time the pads are replaced.



Assembly

NOTE

Use new, unused DOT 3 brake fluid when it is called for in the following steps.

1. Soak the piston seal in brake fluid for approximately 5 minutes.
2. Lightly coat the piston and cylinder bore with brake fluid.
3. Install the piston seal (A, **Figure 61**) into the second groove in the cylinder bore. See **Figure 52**.

NOTE

Check that the seal fits squarely in the cylinder bore groove. If the seal is not installed properly, the caliper assembly will leak and braking performance will be reduced.

4. The piston has one open (**Figure 62**) and one closed end. Insert the piston into the cylinder so that the open end faces out. Push the piston in all the way.
5. Install the dust seal around the piston (**Figure 63**). Make sure the dust seal fits into the groove completely. See **Figure 50**.
6. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper bracket shafts and caliper housing shaft holes.

CAUTION

PBC grease is a special high temperature, water-resistant grease that can be used in braking systems. Do not use any other kind of lubricant as it may thin out and contaminate the brake pads.

7. Slide the bracket shafts into the caliper holes (**Figure 64**). Then, slide the bracket back and forth. The bracket must not bind in the caliper. Wipe off any excess grease from the outside of the caliper or bracket.
8. Install the pad into the end of the piston (**Figure 49**).
9. Install and tighten the bleed screw,

10. Install the brake caliper assembly and brake pads as described in this chapter.

FRONT CALIPER (1989-ON)

Refer to the **Figure 65** when servicing the front caliper in this section.

Read the information listed under *Disc Brake* in this chapter before servicing the front caliper.

Removal/Installation (Caliper Will Not Be Disassembled)

If the brake caliper is to be removed without disassembling it, perform this procedure. If the caliper is to be disassembled, refer to *Caliper Removal/Piston Removal* in this chapter.

1. Place the bike on a stand so the front wheel clears the ground.

2. Remove the front disc cover, if so equipped.

3. On 1990-1991 models, remove the front brake hose holder bolts.

4A. If the caliper is to be completely removed from the bike, perform the following:

a. Loosen and remove the brake hose banjo bolt (A, **Figure 66**) and the 2 washers at the caliper.

b. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the bike.

c. Loosen the brake caliper mounting bolts (B, **Figure 66**) and remove them from the caliper. Lift the caliper (C, **Figure 66**) off of the brake disc and remove it.

d. Place the caliper in a plastic bag and tie the bag closed. Position the caliper so that brake fluid cannot run down the side of the caliper and contaminate the pads.

4B. If the caliper is only being partially removed and it is not necessary to disconnect the brake line at the caliper, perform the following:

a. Loosen the brake caliper mounting bolts (B, **Figure 66**) and remove them from the caliper. Lift the caliper (C, **Figure 66**) off of the brake disc.

b. Insert a wooden or plastic spacer block in the caliper between the brake pads.

NOTE

The spacer block prevents the piston from being forced out of the caliper if the brake lever is squeezed while the caliper is removed from the brake disc. If the brake lever is squeezed and the pistons come out, the caliper might have to be disassembled to reseat the piston and the system will have to be bled.

c. Support the partially removed caliper with a Bunjee cord or a wire hook. Do not allow the caliper to hang by its hose.

5. Install the caliper by reversing these steps, while noting the following.

6A. If the caliper was completely removed from the bike:

a. Remove the caliper from the bag and check that the brake pads were not contaminated with brake fluid. Wipe the caliper housing off with a clean rag.

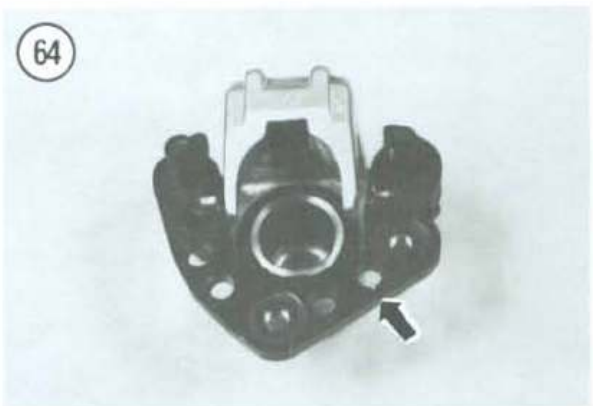
b. Carefully install the caliper assembly (C, **Figure 66**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.

c. Install the brake caliper mounting bolts (B, **Figure 66**) and tighten to the torque specification in **Table 7**.

d. Install the brake hose (A, **Figure 66**) with the banjo bolt and 2 washers. Place a washer on each side of the brake hose. Tighten the banjo bolt to the torque specification listed in **Table 7**.

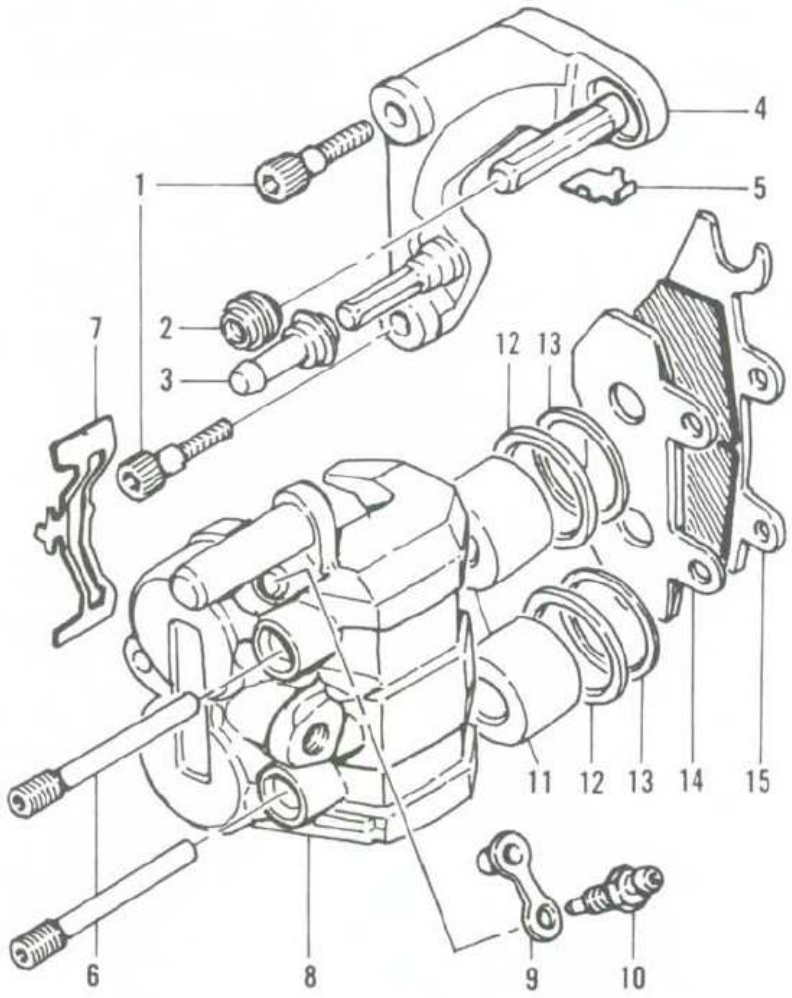
e. Refill the master cylinder and bleed the front brake as described in this chapter.

6B. If the caliper was only partially removed from the bike:



(65)

FRONT BRAKE CALIPER (1989-ON)

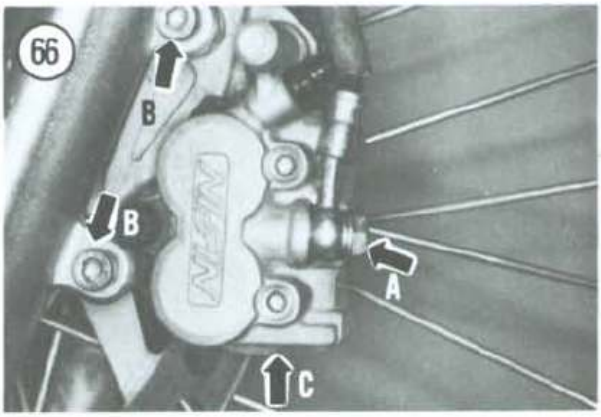


1. Bolt
2. Boot
3. Friction boot
4. Support bracket
5. Clip
6. Brake pad mounting bolts
7. Anti-rattle spring
8. Housing
9. Cover
10. Bleed valve
11. Piston
12. Piston seal
13. Dust seal
14. Brake pad
15. Brake pad

a. Remove the spacer block from between the brake pads.
b. Disconnect the caliper from its hanger and carefully install the caliper (C, **Figure 66**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
c. Install the caliper mounting bolts (B, **Figure 66**) and tighten to the torque specification in **Table 7**.
d. Operate the brake lever a few times to seat the pads against the brake disc.

WARNING

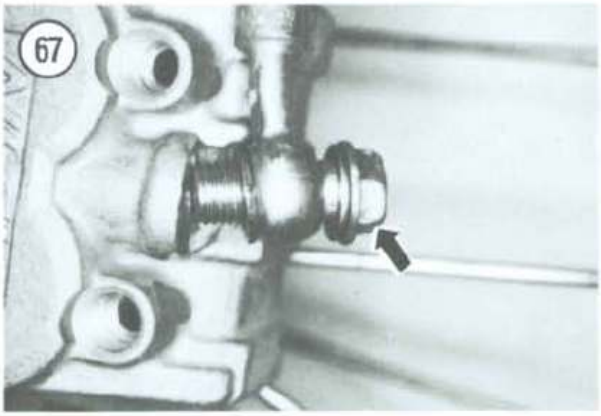
Do not ride the motorcycle until you are sure the brake is operating properly.



Caliper Removal/Piston Removal (Caliper Will Be Disassembled)

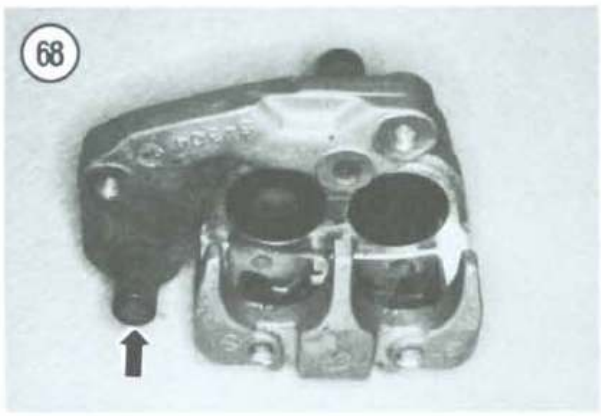
If the caliper is to be completely disassembled, force will be required to remove the pistons from the caliper. This can be either the hydraulic pressure in the brake system itself, or compressed air. If you are going to use hydraulic pressure, you must do so before the brake hose is disconnected from the caliper. This procedure describes how to remove the pistons while the caliper is still mounted on the bike.

1. Remove the brake pads as described in this chapter.
2. Slide the support bracket out of the caliper.
3. Wrap a large cloth around the brake caliper.
4. Hold the caliper so that your hand and fingers are placed away from the 2 piston/brake pad areas.
5. Operate the front brake lever to force the pistons out of the caliper cylinders. Remove the pistons.

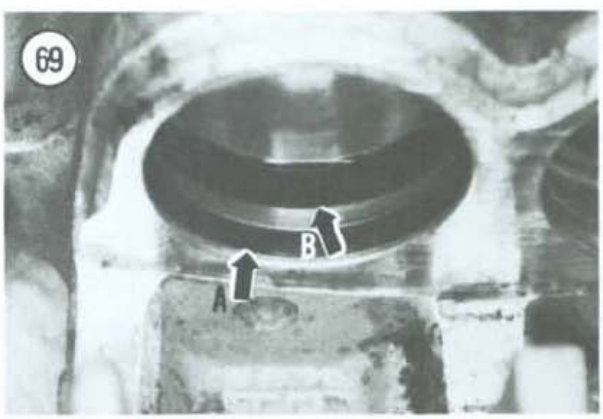


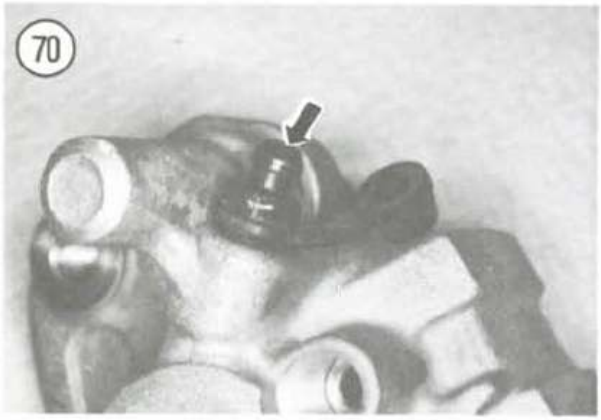
NOTE

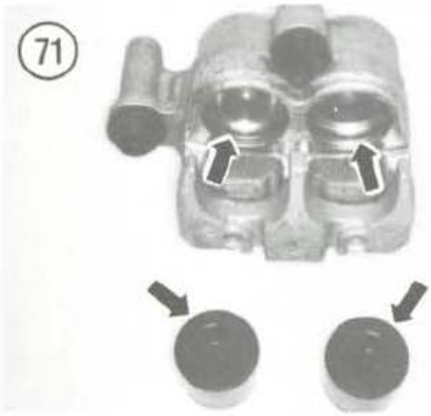
If the pistons will not come out, you will have to use compressed air to remove them. Refer to ***Disassembly*** *in this chapter.*

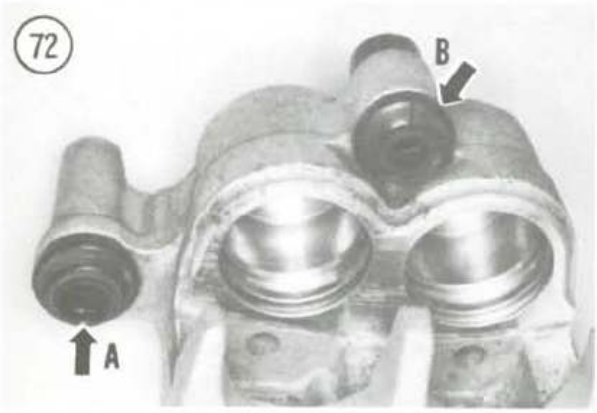


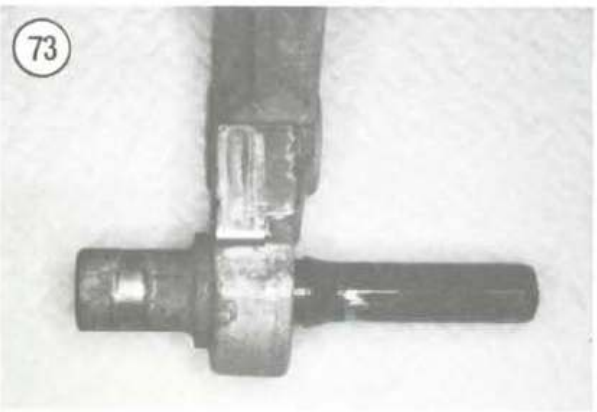
6. Support the caliper. Then loosen the caliper banjo bolt (**Figure 67**) and remove the bolt and its 2 washers from the caliper. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the bike.
7. Take the caliper to a workbench for further disassembly.











Disassembly

1. Remove the caliper as described in this chapter.

NOTE

If you have removed both pistons, proceed to Step 4.

2. Pull the support bracket out of the caliper housing (**Figure 68**).

WARNING

The pistons will be forced out of the caliper with considerable force. Do not try to cushion the pistons with your fingers, as injury could result.

3. Cushion the caliper pistons with a shop rag, placing your fingers and hand away from the piston area. Then apply compressed air through the brake line port to remove the pistons (**Figure 51**).
4. Using a wooden or plastic rod with a flat, narrow tip, remove the dust (A, **Figure 69**) and piston (B, **Figure 69**) seals from the groove inside the cylinder. Do not use a screwdriver or other metal tool as this may scratch the cylinder bore.
5. Remove the bleed valve (**Figure 70**) from the caliper.

Inspection

1. Wash the pistons and cylinders with clean DOT 3 brake fluid.

NOTE

Make sure the dust and piston seal grooves in the caliper are clean. The dust seal grooves (front) are especially prone to dirt contamination and wear.

2. Check each piston (**Figure 71**) and cylinder (**Figure 71**) for deep scratches or other obvious wear marks. Do not hone the cylinder. If the pistons or cylinders are damaged, replace them as a set.
3. Clean the bleed valve (**Figure 56**) with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.
4. Clean the banjo bolt (**Figure 57**) with compressed air. Check the threads for damage. Replace worn or damaged washers.
5. Check the boot (A, **Figure 72**) and friction boot (B, **Figure 72**). Replace if swollen, cracked or severely worn.

6. Check the support bracket shafts (**Figure 73**) for severe wear, damage or uneven wear (steps). The shafts must be in good condition for the caliper to slide back and forth. Remove all grease residue from the bracket. Replace the caliper bracket if the shafts are damaged.

7. Check the pad spring(s) for cracks or damage. Replace if necessary.

8. Measure the thickness of each brake pad (**Figure 59**) with a vernier caliper or ruler and compare to the specification listed in **Table 3** or **Table 4**. If the pad thickness is equal to or less than the wear limit, replace the pads.

9. Inspect the brake pads (**Figure 74**) for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.

NOTE

When the brake system is operating properly, the inboard and outboard brake pads should show the same approximate amount of wear. If there is a large difference in pad wear, the support bracket is not sliding smoothly in the caliper, thus causing one pad to drag against the disc. Worn caliper piston seals will also cause uneven pad wear.

10. See **Figure 75**. Replace the piston (A) and dust (B) seals as a set. Kawasaki recommends to replace the seals every other time the pads are replaced.

Assembly

NOTE

Use new, unused DOT 3 brake fluid when brake fluid is called for in the following steps.

1. Soak the piston and dust seals (**Figure 76**) in brake fluid for approximately 5 minutes.

2. Lightly coat the pistons and cylinder bores with brake fluid.

3. Install a new piston seal (A, **Figure 75**) into the second groove in the cylinder bore. See B, **Figure 69**.

4. Install a new dust seal (B, **Figure 75**) into the front groove in the cylinder bore. See A, **Figure 69**.

5. Repeat Steps 3 and 4 for the other cylinder bore.

NOTE

Check that the seals fits squarely into their respective cylinder bore grooves. If a seal is not installed properly, the caliper assembly will leak and braking performance will be reduced.

6. The piston has 2 different ends; one end is flat and the other end has a large round depression in the center. Insert the piston into the cylinder so that the flat end faces "in" (toward caliper). Push the piston in all the way. See **Figure 77**.

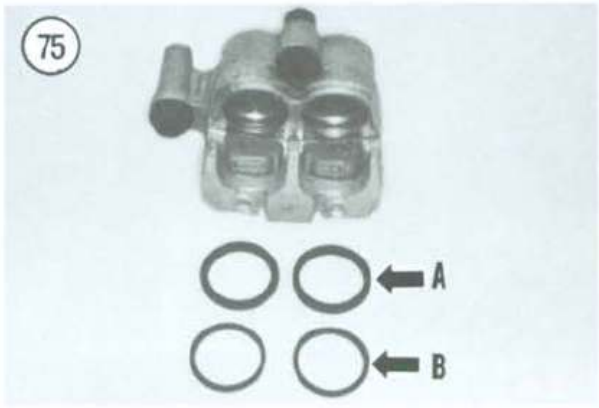
7. Repeat to install the other piston.

8. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper bracket shafts and caliper housing shaft holes.

CAUTION

PBC grease is a special high temperature, water-resistant grease that can be used in braking systems. Do not use any other kind of lubricant as it may thin out and contaminate the brake pads.

9. Slide the bracket shafts into the caliper holes (**Figure 68**). Then, slide the bracket back and forth



without removing it. The bracket must not bind in the caliper. Wipe off any excess grease from the outside of the caliper or bracket.

10. Install and tighten the bleed screw (**Figure 70**).

11. Install the brake caliper assembly and brake pads as described in this chapter.

FRONT MASTER CYLINDER (1982-1986)

Refer to **Figure 78** when servicing the master cylinder in this section.

Read the information listed under *Disc Brake* in this chapter before servicing the front master cylinder.

Removal/Installation

1. Place the bike on a stand so that the front wheel clears the ground.

2A. To remove brake fluid from the reservoir:

a. Remove the master cylinder cap and diaphragm.

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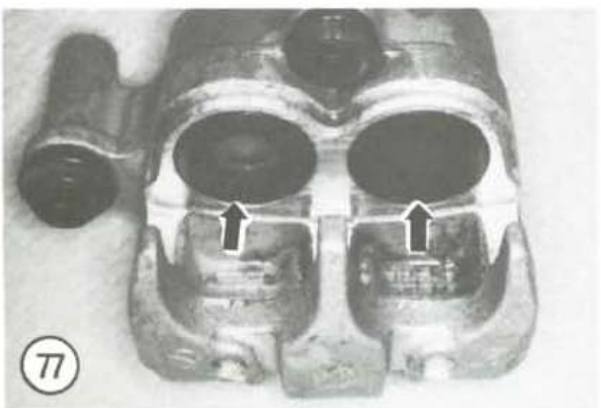
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b. Use a clean syringe and remove the brake fluid from the reservoir. Discard the brake fluid.

2B. To drain the reservoir and brake hose:

a. Insert a tube onto the brake caliper bleed valve. Insert the other end of the tube into a clean container.

b. Open the bleed valve and operate the front brake lever to drain the master cylinder and brake hose of all brake fluid.

c. Close the bleed valve and remove the tube.

d. Discard the brake fluid.

3. Loosen the master cylinder banjo bolt (**Figure 79**) and remove the bolt and its washers. Tie a plastic bag over the end of the brake hose to prevent contamination and fluid leakage.

4. Loosen the master cylinder mounting bolts (**Figure 80**) and remove the bolts, clamp and master cylinder from the handlebar.

5. If necessary, service the master cylinder as described in this chapter.

6. Clean the handlebar, master cylinder and clamp mating surfaces.

7. Mount the master cylinder housing onto the handlebar with the clamp and 2 mounting bolts (**Figure 80**). Tighten the bolts securely.

NOTE

If the master cylinder clamp is marked with an arrow, install the clamp so that the arrow faces "UP."

8. Remove the bag from over the brake hose and discard the bag.

9. Install the brake hose onto the master cylinder, using the banjo bolt and the 2 washers; a washer should be installed on each side of the hose (**Figure 81**). Tighten the banjo bolt to the torque specification listed in **Table 7**.

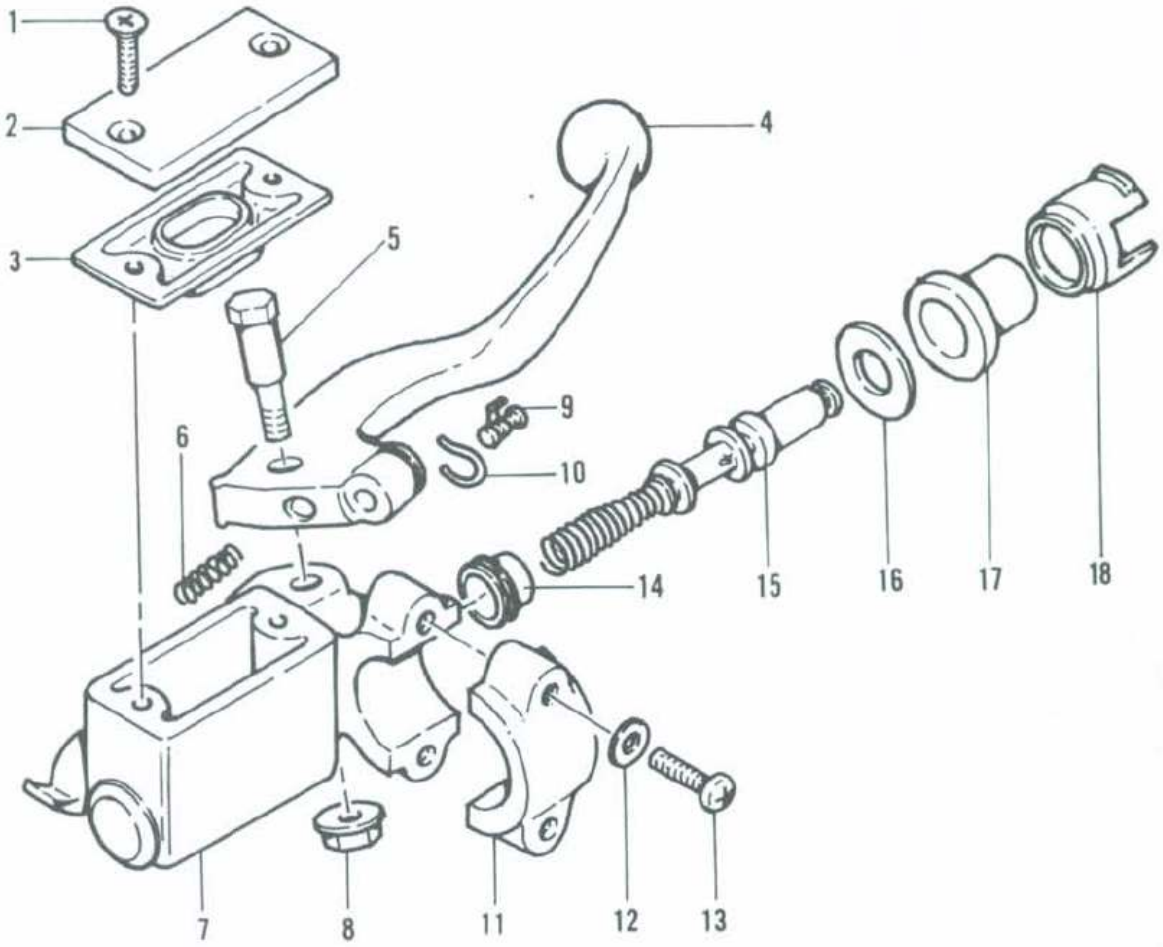
10. Refill the master cylinder with DOT 3 brake fluid and bleed the brake as described in this chapter.

WARNING

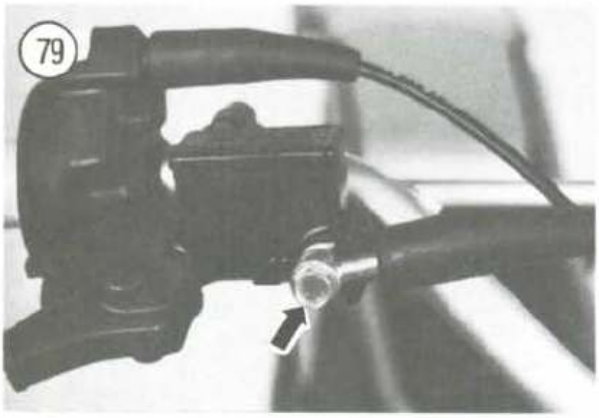
Do not ride the bike until the front brake is working properly. Make sure the that the lever travel is not excessive and that the lever does not feel spongy—both indicate that the bleeding operation needs to be repeated.

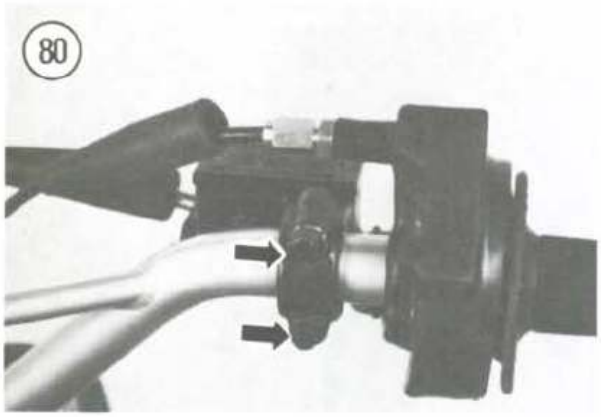
(78)

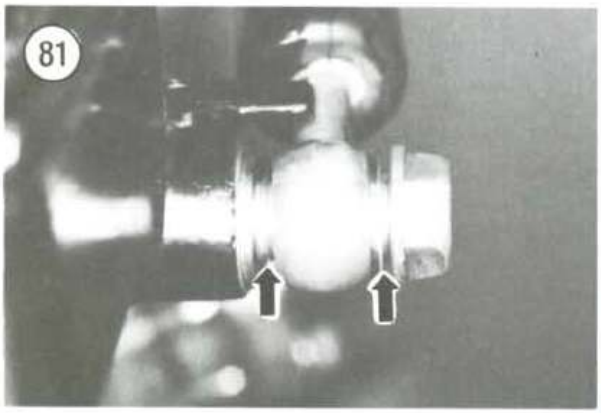
FRONT MASTER CYLINDER (1982-1986)



1. Screw
2. Cover
3. Diaphragm
4. Brake lever
5. Pivot bolt
6. Spring
7. Master cylinder
8. Nut
9. Adjuster
10. Clip
11. Clamp
12. Washer
13. Screw
14. Valve (1985-1986)
15. Piston assembly
16. Piston stop
17. Dust seal
18. Liner







Disassembly

1. Remove the master cylinder as described in this chapter.

2. Remove the master cylinder cap screws and remove the cap and diaphragm from the caliper.

3. Remove the brake lever pivot bolt and nut from the master cylinder.

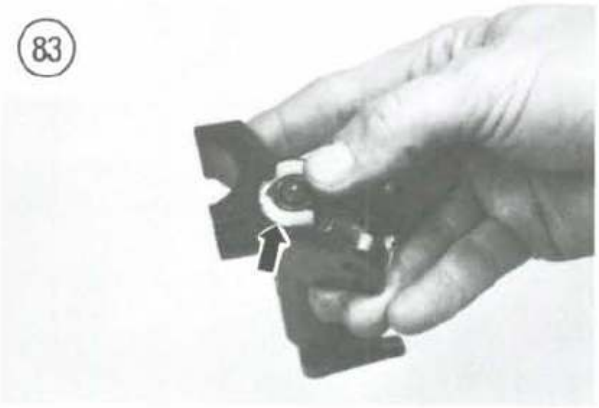
4. Remove the brake lever and spring from the master cylinder.

NOTE

If there is brake fluid leaking at the front of the piston bore, the piston cups are worn or damaged. Replace the piston assembly during reassembly.

5. The piston assembly is held in place by a plastic liner that snaps into grooves machined in the piston bore. Using a small flat-tipped screwdriver (**Figure 82**), press the plastic liner tabs out of the master cylinder grooves and remove the liner (**Figure 83**).

6. Remove the piston assembly (**Figure 84**) from the master cylinder.



Inspection

Worn or damaged master cylinder components will prevent proper brake fluid pressure from building in the brake line. Reduced pressure will cause the break to feel weak and it will not hold properly.

1. Wash the pistons and cylinders with clean DOT 3 brake fluid.
2. The piston assembly is identified in **Figure 85**:
   a. Valve (1985-1986).
   b. Spring.
   c. Piston/primary cup
   d. Secondary cup.
   e. Piston stop.
   f. Dust seal.

CAUTION

*Do not attempt to remove the secondary and primary cups (**Figure 85**) from the piston. Removal will damage the cups, requiring replacement of the piston assembly.*

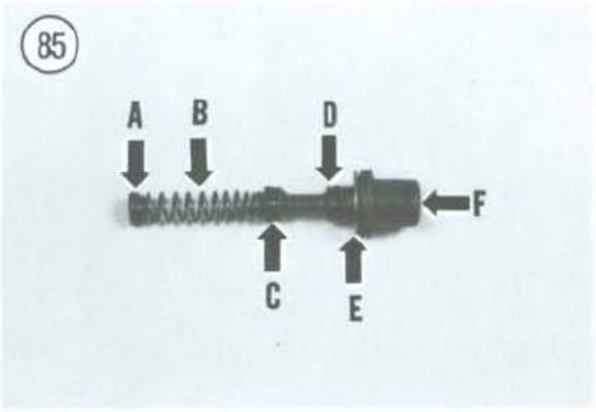
3. Remove the dust seal and piston stop from the piston.
4. Check the piston assembly (**Figure 85**) for the following defects:
   a. Worn or damaged valve (A, **Figure 85** [1985-1986]).
   b. Broken, distorted or collapsed piston return spring (B, **Figure 85**).
   c. Worn, cracked, damaged or swollen primary (C, **Figure 85**) and secondary cups (D, **Figure 85**).
   d. Scratched, scored or damaged piston (**Figure 85**)
   e. Bent, cracked or corroded piston stop (E, **Figure 85**).
   f. Worn or damaged dust seal (F, **Figure 85**).

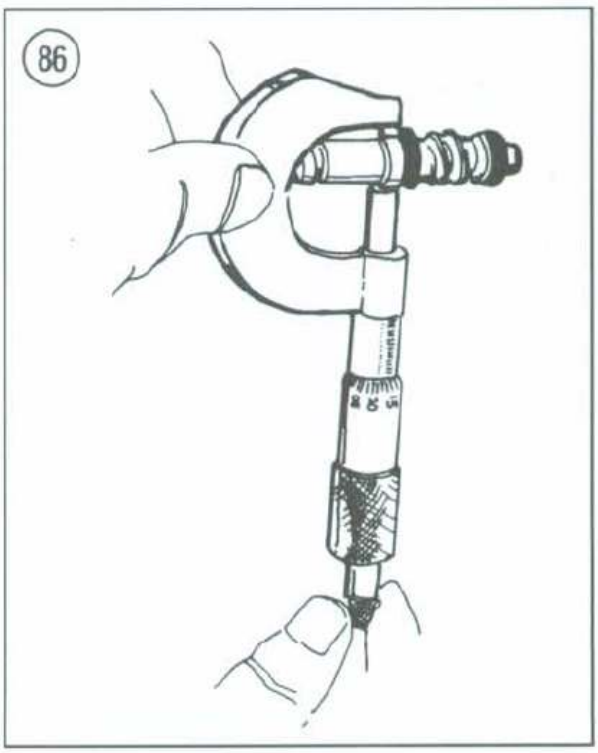
If any of these parts are worn or damaged, replace the piston assembly.

5. Measure the piston return spring free length with a vernier caliper. Replace the piston assembly if the free length exceeds the wear limit in **Table 3** or **Table 4**.
6. Measure the primary cup outer diameter with a micrometer. Replace the piston assembly if the outer diameter is less than the wear limit in **Table 3** or **Table 4**.
7. Measure the piston outer diameter with a micrometer (**Figure 86**). Replace the piston assembly if the outer diameter is less than the wear limit listed in **Table 3** or **Table 4**.
8. Measure the master cylinder bore inner diameter with a small hole gauge and micrometer. Replace the master cylinder if the bore exceeds the wear limit listed in **Table 3** or **Table 4**.
9. Check the liner (18, **Figure 78**) for weakness, damage or worn locking tabs. Replace if necessary.
10. Check for plugged supply and relief ports in the master cylinder (**Figure 87**). Clean with compressed air.

NOTE

A plugged relief port will cause the pads to drag on the disc.



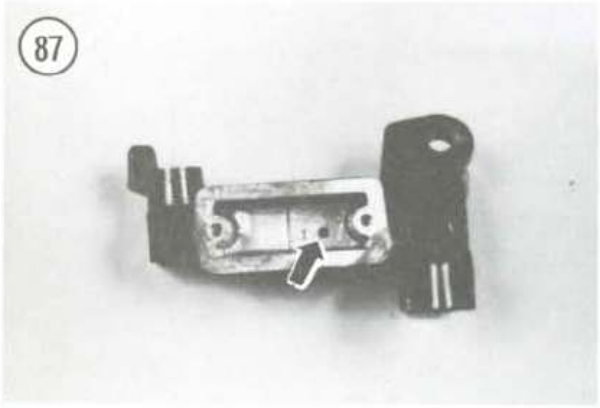


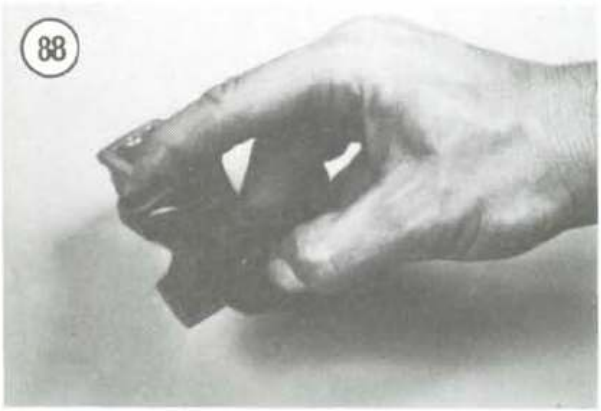
11. Check the brake lever pivot hole in the lever and master cylinder. Replace parts that show severe wear or damage.
12. Check the reservoir cap and diaphragm for damage. Check the diaphragm for cracks or deterioration. Replace damaged parts as required.
13. Check all of the threaded holes in the master cylinder. Clean with compressed air. The small Phillips screws used to secure the reservoir cap strip easily; check the screw head and threads for damage and replace if necessary.

Assembly

Use new, unused DOT 3 brake fluid when brake fluid is called for in the following steps.

1. If you are installing a piston repair kit, note the following:
   a. Check the repair kit to make sure that it contains all of the necessary new parts. Compare to the exploded view in **Figure 78**.
   b. Wash the new parts in new brake fluid.
2. Lightly coat the piston assembly and cylinder bore with brake fluid.





3. Assemble the piston assembly as shown in **Figure 78**.

CAUTION

When installing the piston assembly in Step 4, make sure the primary and secondary cups do not tear or turn inside out; both cups are slightly larger than the bore.

4. Insert the piston assembly into the master cylinder bore in the direction shown in **Figure 84**.
5. Compress the piston assembly (**Figure 88**) and install the liner around the dust seal (**Figure 83**). Push the liner into the bore until it snaps into the cylinder groove. Release the piston, making sure it is held in position by the liner.
6. Insert the spring into the brake lever and install the brake lever onto the master cylinder. Lightly grease the pivot bolt shoulder and install the bolt through the master cylinder and brake lever. Install the nut and tighten securely. Then, operate the hand lever, making sure the lever moves freely with no sign of binding.
7. Install the master cylinder as described in this chapter.

FRONT MASTER CYLINDER (1987-ON)

Refer to **Figure 89** when servicing the master cylinder in this section.

Read the information listed under *Disc Brake* in this chapter before servicing the front master cylinder.

Removal/Installation

1. Place the bike on a stand so that the front wheel clears the ground.

2A. To remove brake fluid from the reservoir:
   a. Remove the master cylinder cap and diaphragm.
   b. Use a clean syringe and remove the brake fluid from the reservoir. Discard the brake fluid.

2B. To drain the reservoir and brake hose:
   a. Insert a tube onto the brake caliper bleed valve. Insert the other end of the tube into a clean container.

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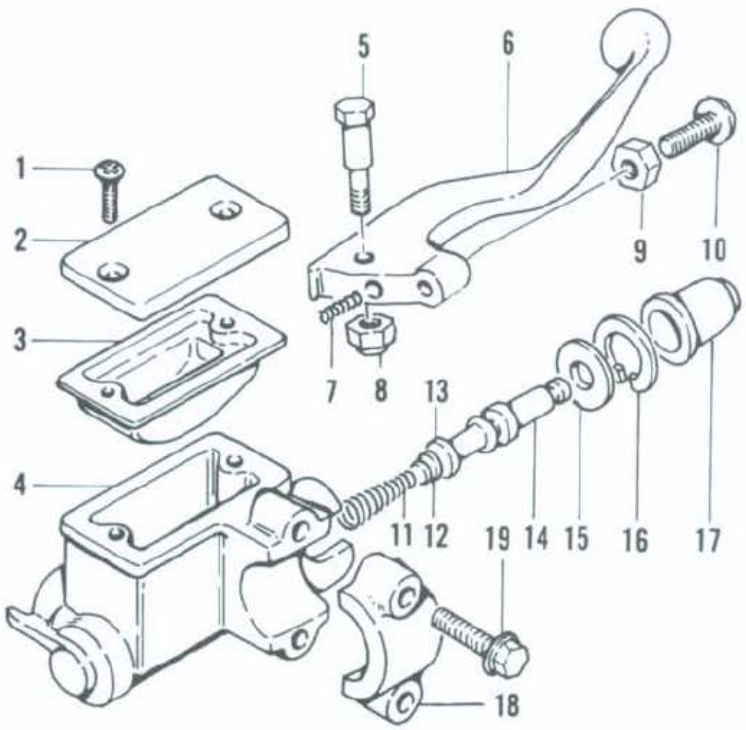
FRONT MASTER CYLINDER (1987-ON)



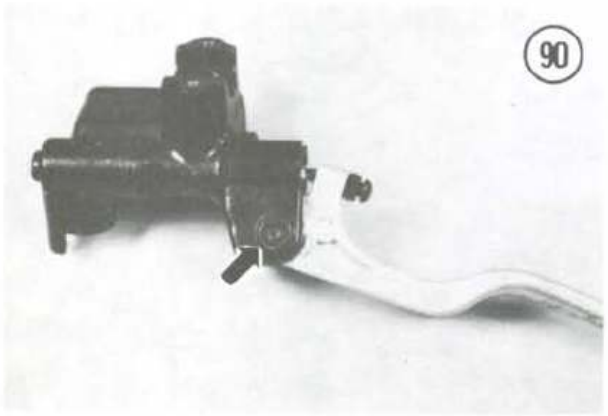
1. Screw
2. Cover
3. Diaphragm
4. Housing
5. Pivot bolt
6. Brake lever
7. Spring
8. Nut
9. Locknut
10. Adjust bolt
11. Spring
12. Primary cup
13. Secondary cup (O-ring)
14. Piston
15. Washer
16. Circlip
17. Dust seal
18. Clamp
19. Bolt

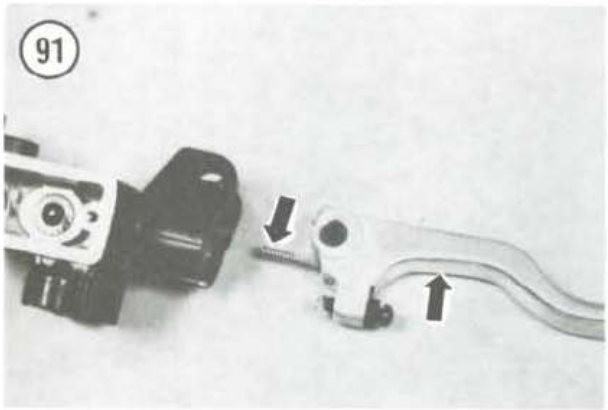
b. Open the bleed valve and operate the front brake lever to drain the master cylinder and brake hose of all brake fluid.

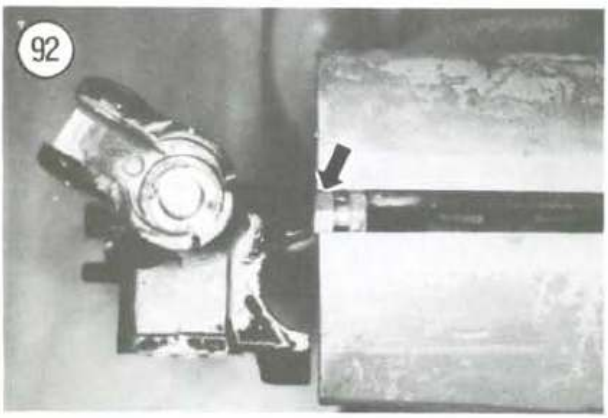
c. Close the bleed valve and remove the tube.

d. Discard the brake fluid.

3. Loosen the master cylinder banjo bolt (**Figure 79**) and remove the bolt and its washers. Tie a plastic bag over the end of the brake hose to prevent contamination and fluid leakage.







4. Loosen the master cylinder mounting bolts (**Figure 80**) and remove the bolts, clamp and master cylinder from the handlebar.

5. If necessary, service the master cylinder as described in this chapter.

6. Clean the handlebar, master cylinder and clamp mating surfaces.

7. Mount the master cylinder housing onto the handlebar with the clamp and 2 mounting bolts (**Figure 80**). Tighten the bolts securely.

NOTE

If the master cylinder clamp is marked with an arrow, install the clamp so that the arrow faces "UP."

8. Remove the bag from over the brake hose and discard the bag.

9. Install the brake hose onto the master cylinder, using the banjo bolt and the 2 washers; a washer should be installed on each side of the hose. Tighten the banjo bolt to the torque specification listed in **Table 7**.

10. Refill the master cylinder with DOT 3 brake fluid and bleed the brake as described in this chapter.

WARNING

Do not ride the bike until the front brake is working properly. Make sure that the lever travel is not excessive and that the lever does not feel spongy—both indicate that the bleeding operation needs to be repeated.

Disassembly

1. Remove the master cylinder as described in this chapter.

2. Remove the master cylinder cap screws and remove the cap and diaphragm from the caliper.

3. Remove the brake lever pivot bolt (**Figure 90**) and nut from the master cylinder.

4. Remove the brake lever and spring (**Figure 91**) from the master cylinder.

NOTE

A bolt, nut and vise can be used to hold the master cylinder when removing and installing the piston assembly. Thread the bolt and nut into the master cylinder and then clamp the bolt and nut in the vise. Position the master cylinder so

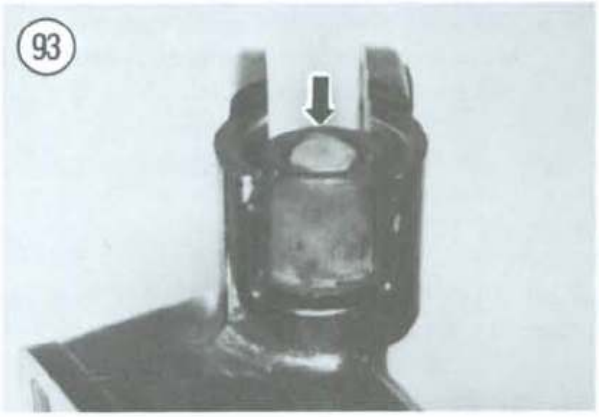
that the piston bore faces up; see ***Figure 92***.

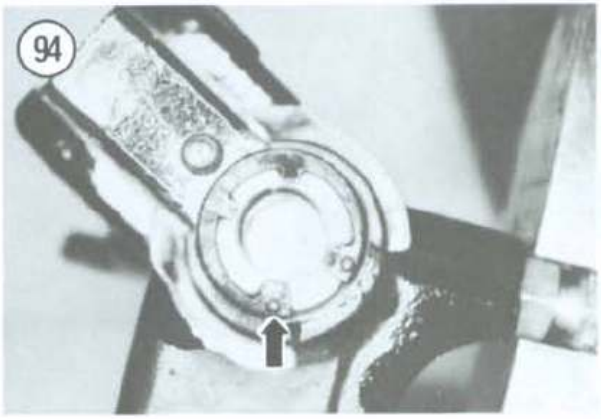
5. Carefully remove the dust cover (**Figure 93**) from the end of the piston.

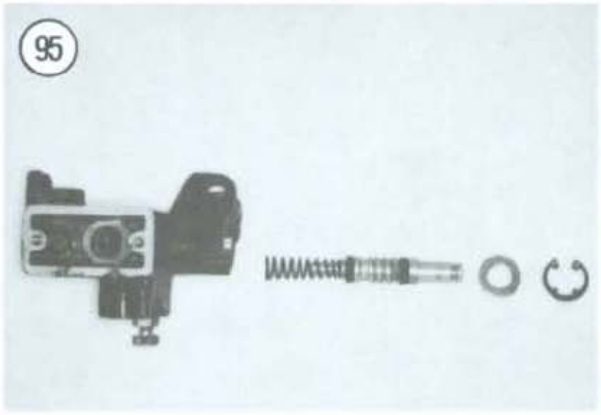
NOTE

If there is brake fluid leaking at the front of the piston bore, the piston cups are worn or damaged. Replace the piston assembly during reassembly.

6. Compress the piston and remove the circlip (**Figure 94**) from the groove in the master cylinder.
7. Remove the circlip, washer and piston assembly (**Figure 95**).







Inspection

Worn or damaged master cylinder components will prevent proper brake fluid pressure from building in the brake line. Reduced pressure will cause the brake to feel weak and it will not hold properly.

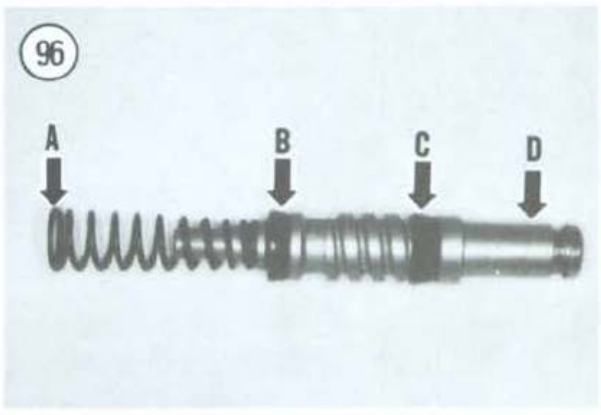
1. Wash the piston and cylinder with clean DOT 3 brake fluid.
2. The piston assembly is identified in **Figure 96**:
   a. Spring.
   b. Primary cup
   c. Secondary cup.
   d. Piston.

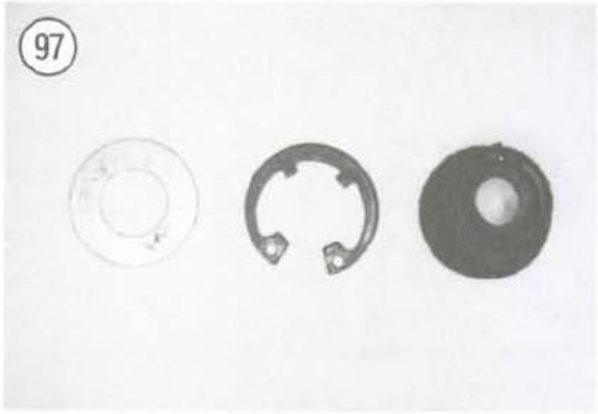
CAUTION

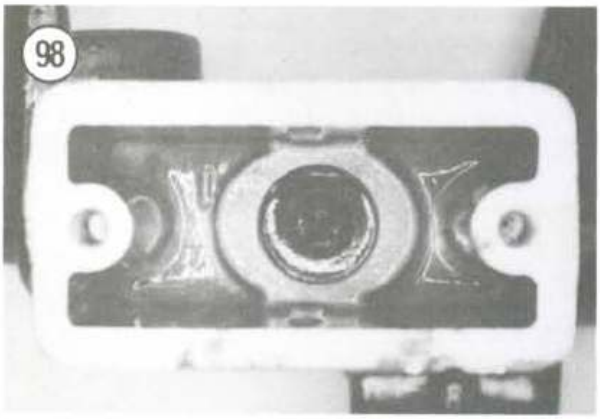
*Do not attempt to remove the secondary and primary cups (**Figure 96**) from the piston. Removal will damage the cups, requiring replacement of the piston assembly.*

3. Check the piston assembly (**Figure 96**) for the following defects:
   a. Broken, distorted or collapsed piston return spring (A, **Figure 96**).
   b. Worn, cracked, damaged or swollen primary (B, **Figure 96**) and secondary cups (C, **Figure 96**).
   c. Scratched, scored or damaged piston (D, **Figure 96**).
   d. Worn or damaged dust cover (**Figure 97**).

If any of these parts are worn or damaged, replace the piston assembly.







4. Check the piston circlip and washer (**Figure 97**) for cracks, distortion or corrosion. Replace if necessary.
5. Check for plugged supply and relief ports in the master cylinder (**Figure 98**). Clean with compressed air.

NOTE
A plugged relief port will cause the pads to drag on the disc.

6. Check the brake lever pivot hole in the lever (**Figure 99**) and master cylinder. Replace parts that show severe wear or damage.
7. Check the brake lever pivot bolt and spring (**Figure 99**) for wear or damage.
8. Check the cylinder bore (**Figure 100**) for scratches or severe wear.
9. Check the reservoir cap and diaphragm for damage. Check the diaphragm for cracks or deterioration. Replace damaged parts as required.
10. Check all of the threaded holes in the master cylinder. Clean with compressed air. The small Phillips screws used to secure the reservoir cap strip easily; check the screw head and threads for damage and replace if necessary.

Assembly

Use new, unused DOT 3 brake fluid when brake fluid is called for in the following steps.
1. If you are installing a piston repair kit, note the following:
   a. Check the repair kit to make sure that it contains all of the necessary new parts. Compare to the exploded view in **Figure 89**.
   b. Wash the new parts in new brake fluid.
2. Lightly coat the piston assembly and cylinder bore with brake fluid.
3. Assemble the piston assembly as shown in **Figure 89**. The return spring is tapered; fit the smaller end onto the piston as shown in **Figure 101**.

CAUTION
When installing the piston assembly in Step 4, make sure the primary and secondary cups do not tear or turn inside out; both cups are slightly larger than the bore.

4. Insert the piston assembly into the master cylinder bore in the direction shown in **Figure 95**.

5. Compress the piston assembly and install the washer and circlip. Make sure the circlip seats in the master cylinder groove completely (**Figure 94**). Push and release the piston a few times to make sure it moves smoothly in the cylinder bore.
6. Slide the dust cover (**Figure 93**) over the piston. Seat the cover in the cylinder bore and in the piston groove.
7. Insert the spring into the brake lever and install the brake lever onto the master cylinder. Lightly grease the pivot bolt shoulder and install the bolt through the master cylinder and brake lever. Install the nut and tighten securely. Then, operate the hand lever, making sure the lever moves freely with no sign of binding and that the adjust screw on the lever contacts the piston correctly (**Figure 102**).
8. Install the master cylinder as described in this chapter.

REAR BRAKE PAD REPLACEMENT

There is no recommended time interval for changing the friction pads in the rear disc brake. Pad wear depends greatly on riding habits and conditions.

To maintain an even brake pressure on the disc always replace both pads in the caliper at the same time.

Replacement (1986-1988)

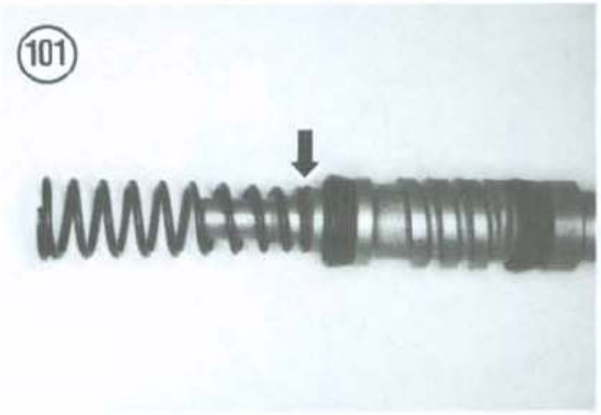
Refer to **Figure 103** when performing this procedure.

1. Read the information listed under *Disc Brake* in this chapter.
2. Place the bike on a stand so the rear wheel clears the ground.
3. Remove the rear brake caliper cover (**Figure 104**), if so equipped.
4. Loosen the brake caliper mounting bolts (A, **Figure 105**) and remove them from the caliper. Lift the caliper (B, **Figure 105**) off of the brake disc.

NOTE

If the pads are to be reused, handle them carefully to prevent grease contamination.

5. Lift out the inboard brake pad (**Figure 106**).
6. Push the caliper holder toward the piston and remove the outboard pad (**Figure 106**) from the caliper holder.
7. Remove the pad spring (**Figure 107**).
8. Measure the thickness of each brake pad (**Figure 108**) with a vernier caliper or ruler. If the pad thickness is less than the wear limit specified in **Table 5** or **Table 6**, replace the pads as a set.
9. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
10. Check the piston assembly as follows:
    a. Remove the support bracket (**Figure 109**) from the caliper.
    b. Check for a hard, cracked or swollen piston dust seal (**Figure 109**).
    c. Check the end of the piston (**Figure 109**) for fluid leakage. If the dust seal is damaged and/or if there is fluid leakage, overhaul the brake caliper as described in this chapter.
    d. Install the support bracket (**Figure 109**) into the caliper.
11. Clean and check the pad spring. Replace if cracked, deformed or corroded.



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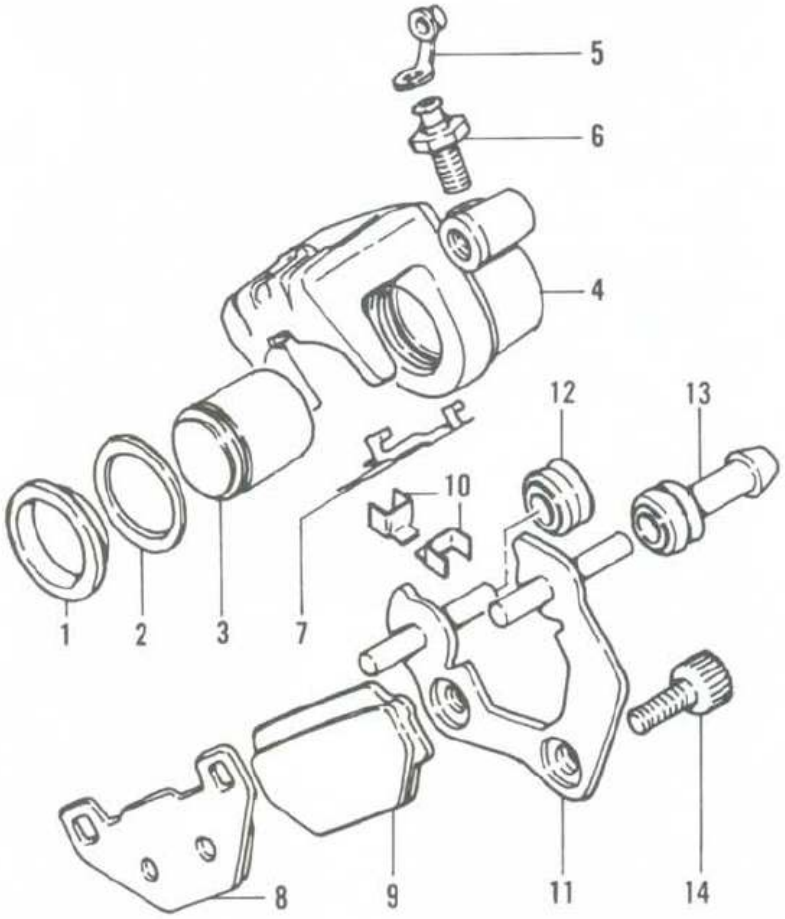
REAR BRAKE CALIPER
(1986-1988)



1. Dust seal
2. Piston seal
3. Piston
4. Housing
5. Cover
6. Bleed valve
7. Anti-rattle spring
8. Brake pad
9. Brake pad
10. Clip
11. Support bracket
12. Boot
13. Friction boot
14. Bolt

12. Check the brake disc for wear as described in this chapter.
13. Install the clips onto the support bracket, if removed.
14. When the piston is pushed back into the caliper to make room for the new brake pads, brake fluid will be forced back into the master cylinder reservoir. To prevent the reservoir from overflowing, remove some of the brake fluid as follows:

a. Clean the top of the master cylinder of all dirt.
b. Remove the cap (**Figure 111**) and diaphragm from the master cylinder.
c. Temporarily install the inboard brake pad (**Figure 106**) into the caliper and slowly push the caliper piston back into the caliper.
d. Constantly check the reservoir to make sure brake fluid does not overflow. Siphon fluid, if necessary, before it overflows.

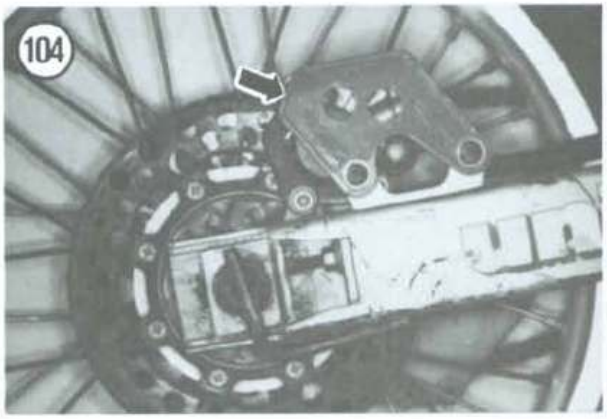
WARNING
Brake fluid is poisonous. Do not siphon with your mouth.

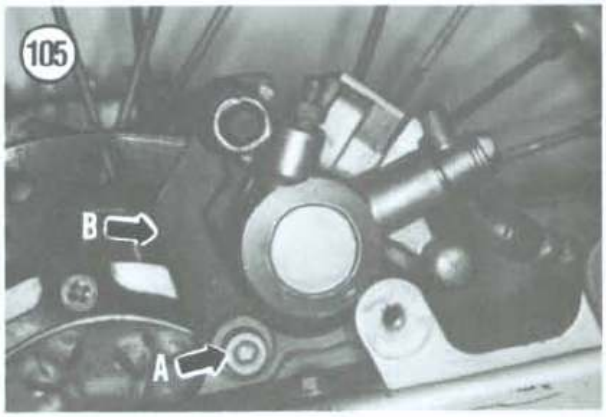
e. The caliper piston should move freely. If not, the caliper should be removed and rebuilt as described in this chapter.
f. Push the caliper piston in all the way to allow room for the new pads.
g. Remove the inboard pad.

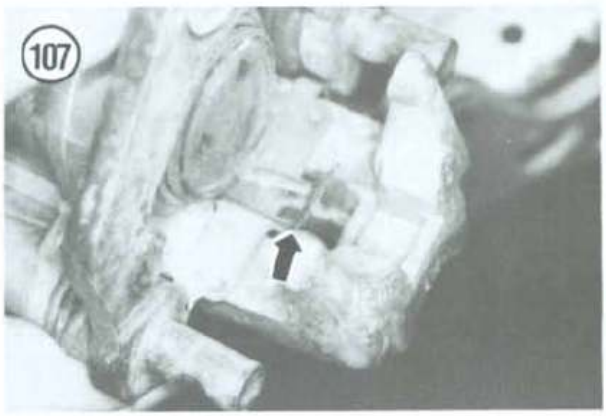
15. Install the pad spring (**Figure 107**) into the caliper.
16. Install the inboard pad (**Figure 106**) into the caliper, pushing the pad against the pad spring.
17. Install the outboard pad (**Figure 106**) into the caliper so that the 2 pad holes face toward the top of the caliper. Then, push the pad against the pad spring and slide it onto the bracket pins. Make sure the pad fits inside the spring tab as shown in **Figure 110**.
18. Carefully install the caliper assembly (B, **Figure 105**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
19. Install the brake caliper mounting bolts (A, **Figure 105**) and tighten to the torque specification in **Table 7**.

WARNING
Use new brake fluid clearly marked DOT 3 from a sealed container.

20. Operate the brake lever a few times to seat the pads against the disc, then recheck the brake fluid



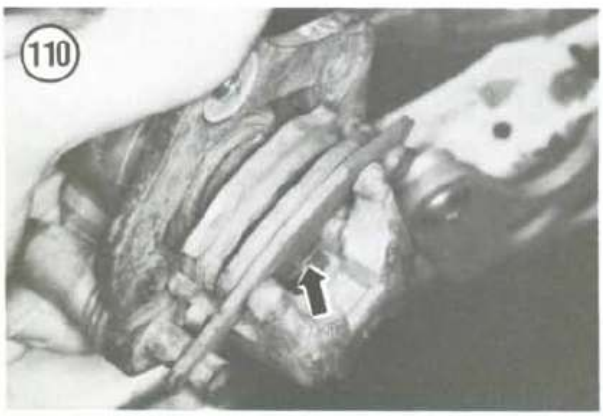




level in the reservoir. If necessary, add fresh DOT 3 brake fluid.

21. Install the master cylinder reservoir diaphragm and top cover. Tighten the cover screws securely.

22. Install the caliper cover, if so equipped.



WARNING

Do not ride the bike until you are sure the brake is operating correctly with full hydraulic advantage. If necessary, bleed the brake as described in this chapter.

Replacement
(1989)

Refer to **Figure 112** when performing this procedure.

2000-on models use a slightly different caliper and mounting bracket. There is only one pad mounting bolt.

1. Read the information listed under *Disc Brake* in this chapter.

2. Place the bike on a stand so the rear wheel clears the ground.

3. Remove the caliper cover, if so equipped.

4. Loosen, but do not remove, the brake pad mounting bolts (A, **Figure 113**).

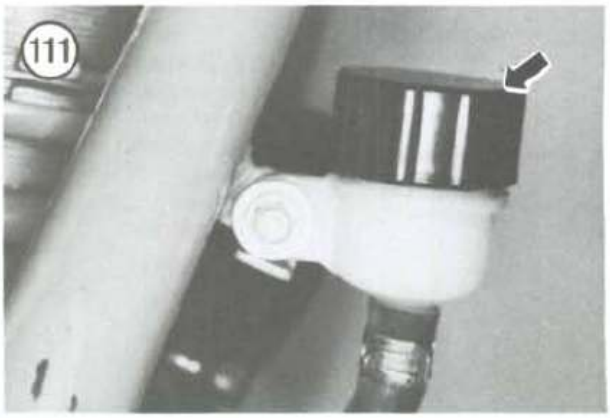
5. Loosen the brake caliper mounting bolts (B, **Figure 113**) and remove them from the caliper. Lift the caliper off of the brake disc.

6. Remove the 2 brake pad mounting bolts (**Figure 114**).

NOTE

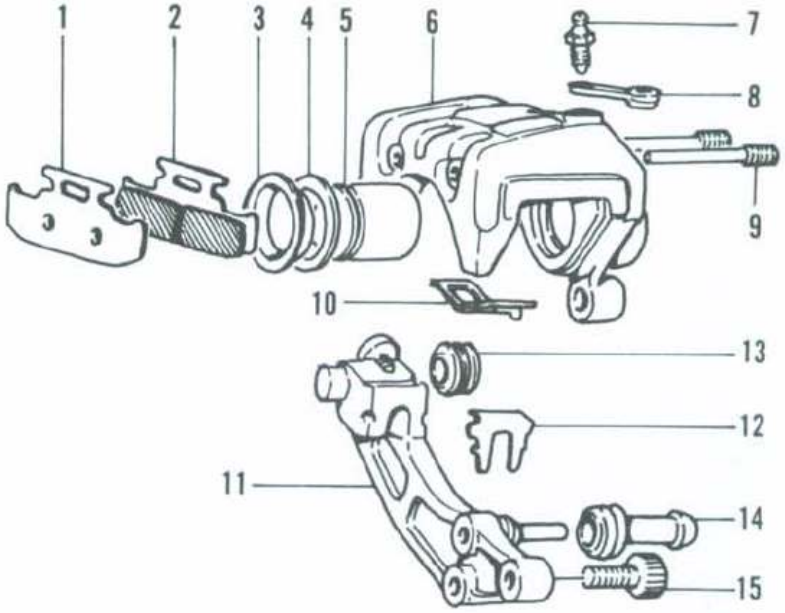
If the pads are to be reused, mark each pad and its original position in the caliper—"I" (inboard) or "O" (outboard). Uneven braking may result if the pad positions are changed.

7. Remove the outboard brake pad (**Figure 115**).

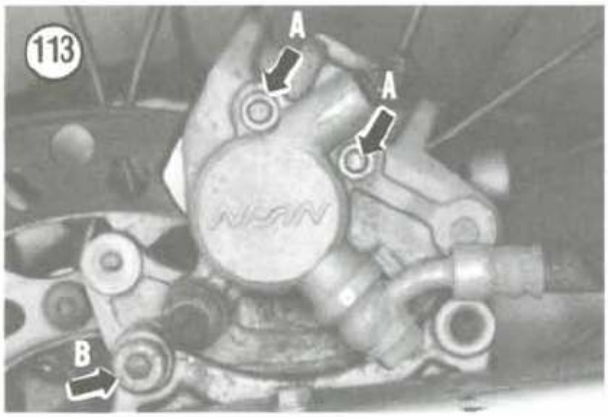


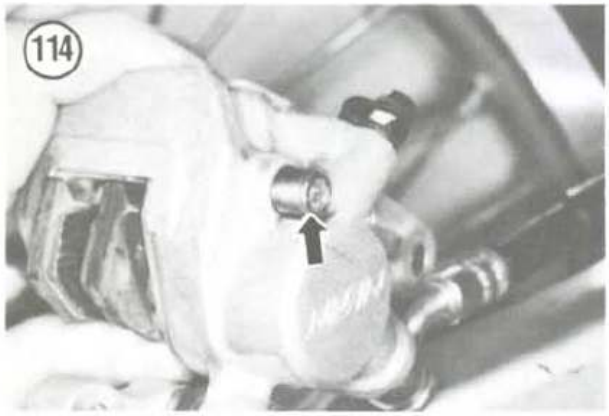
(112)

REAR BRAKE CALIPER (1989-1999)



1. Brake pad
2. Brake pad
3. Dust seal
4. Piston seal
5. Piston
6. Housing
7. Bleed valve
8. Cap
9. Brake pad mounting bolts
10. Anti-rattle spring
11. Support bracket
12. Clip
13. Boot
14. Friction boot
15. Bolt





8. Remove the inboard brake pad (**Figure 116**).

NOTE

*Each pad is equipped with a silencer shim (**Figure 117**). Each shim hooks onto the back of the pad and should not fall off.*

9. Remove the pad spring (**Figure 118**) from the caliper.

10. Measure the thickness of each brake pad (**Figure 108**) with a vernier caliper or ruler. If the pad thickness is less than the wear limit specified in **Table 5** or **Table 6**, replace the pads as a set.

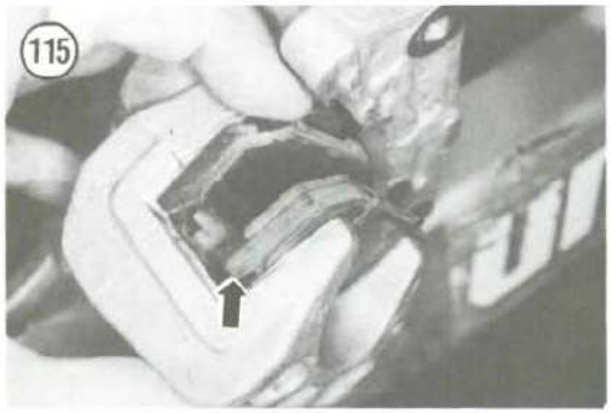
11. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.

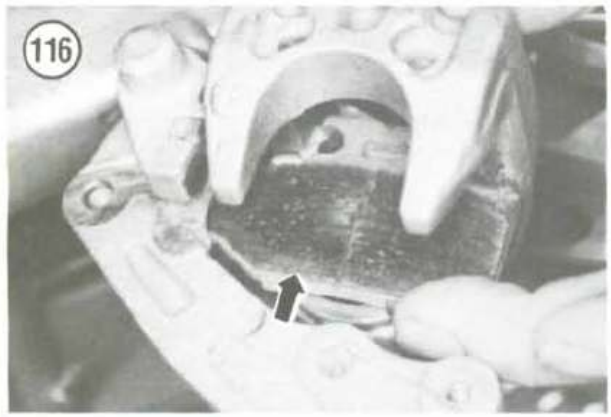
12. Check the piston assembly as follows:

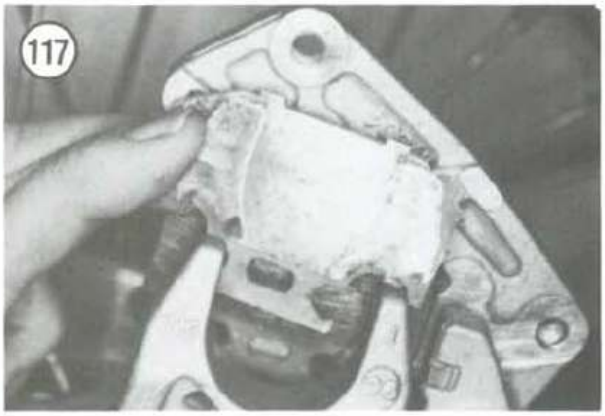
a. Remove the support bracket from the caliper assembly.

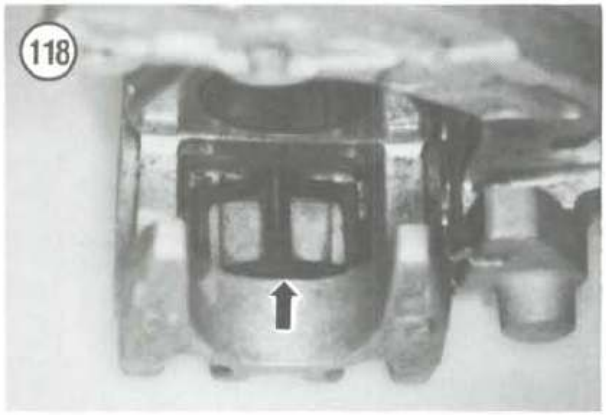
b. Remove the clip spring (**Figure 119**) from the bracket.

c. Check the end of the piston for fluid leakage. If the dust seal is damaged and/or if there is









fluid leakage, overhaul the brake caliper as described in this chapter.

d. Clean and check the clip spring for damage. Replace if necessary.
e. Install the clip spring onto the bracket as shown in **Figure 119**.
f. Install the support bracket into the caliper.

13. Clean and check the pad spring. Replace if necessary.
14. Check the brake disc for wear as described in this chapter.
15. When the piston is pushed back into the caliper to make room for the new brake pads, brake fluid will be forced back into the master cylinder reservoir. To prevent the reservoir from overflowing, remove some of the brake fluid as follows:

a. Clean the top of the master cylinder of all dirt.
b. Remove the cap (**Figure 111**) and diaphragm from the master cylinder.
c. Temporarily install the inboard brake pad (**Figure 116**) into the caliper and slowly push the caliper pistons back into the caliper.
d. Constantly check the reservoir to make sure brake fluid does not overflow. Siphon fluid, if necessary, before it overflows.

WARNING

Brake fluid is poisonous. Do not siphon with your mouth.

e. The caliper piston should move freely. If not, the caliper should be removed and rebuilt as described in this chapter.
f. Push the caliper piston in all the way to allow room for the new pads.
g. Remove the inboard pad.

16. Install the pad spring into the caliper as shown in **Figure 118**.
17. Make sure the piston cover (**Figure 120**) is installed on the piston; see **Figure 121**.

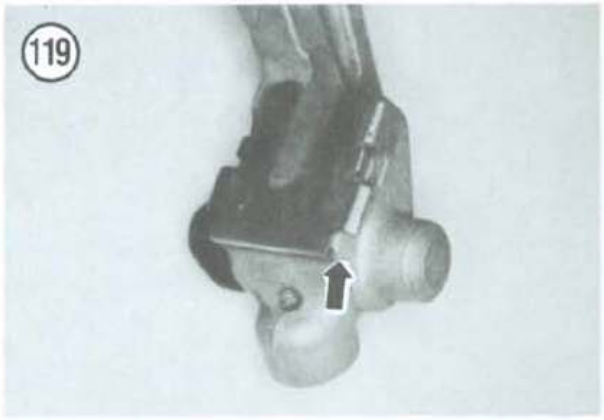
NOTE

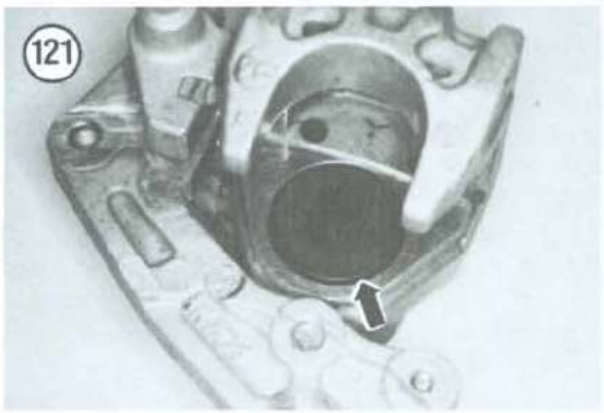
Make sure each pad is equipped with its silencer pad. See ***Figure 122****.*

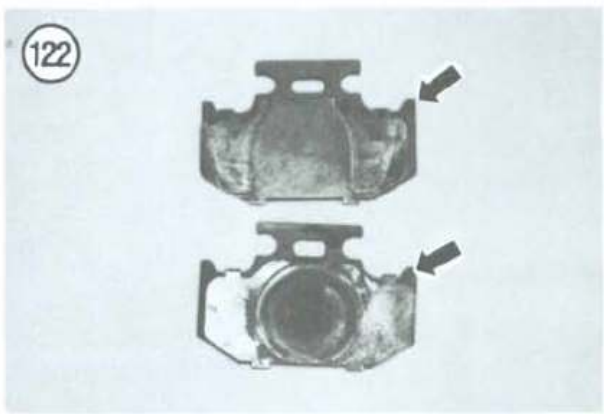
NOTE

Install used pads in their original mounting positions.

18. Install the inboard pad (**Figure 116**) into the caliper.







19. Install the outboard pad (**Figure 115**) into the caliper.
20. Push both pads against the pad spring (**Figure 123**) and install the pad bolts (**Figure 114**) through the pads and thread them into the caliper housing. Tighten the pad bolts hand-tight.
21. Check that the caliper bracket clip spring seats against the brake pads as shown in **Figure 124**.
22. Carefully install the caliper assembly (**Figure 113**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
23. Install the brake caliper mounting bolts (B, **Figure 113**) and tighten to the torque specification in **Table 7**.
24. Tighten the brake pad mounting bolts (A, **Figure 113**) to the torque specification in **Table 7**.

WARNING

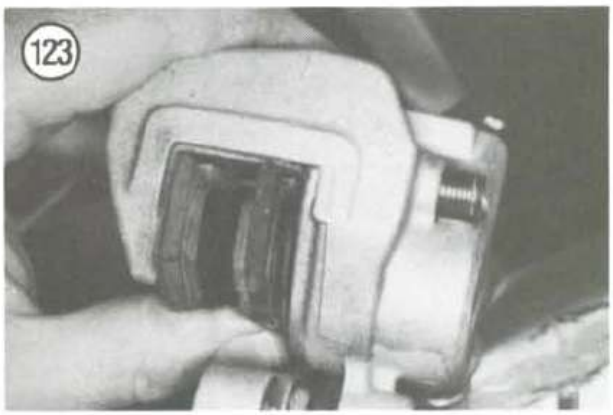
Use new brake fluid clearly marked DOT 3 from a sealed container. Other types may vaporize and cause brake failure.

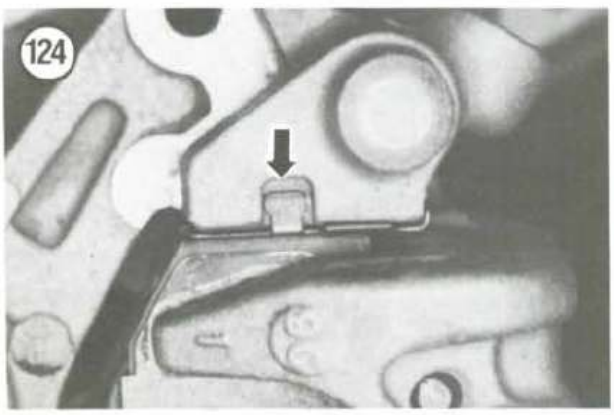
25. Operate the brake lever a few times to seat the pads against the disc, then recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.
26. Install the master cylinder reservoir diaphragm and top cover. Tighten the cover screws securely.
27. Install the caliper cover, if so equipped.

WARNING

Do not ride the bike until you are sure the brake is operating correctly with full hydraulic advantage.

28. Install the front disc cover, if so equipped.





REAR BRAKE CALIPER

Refer to the **Figure 125** (1986-1988) or **Figure 126** (1989-1999) when servicing the rear caliper in this section.

2000-on models use a slightly different caliper and mounting bracket. There is only one pad mounting bolt.

Read the information listed under *Disc Brake* in this chapter before servicing the front caliper.

Removal/Installation (Caliper Will Not Be Disassembled)

If the brake caliper is to be removed without disassembling it, perform this procedure. If the caliper is to be disassembled, refer to *Caliper Removal/Piston Removal* in this chapter.

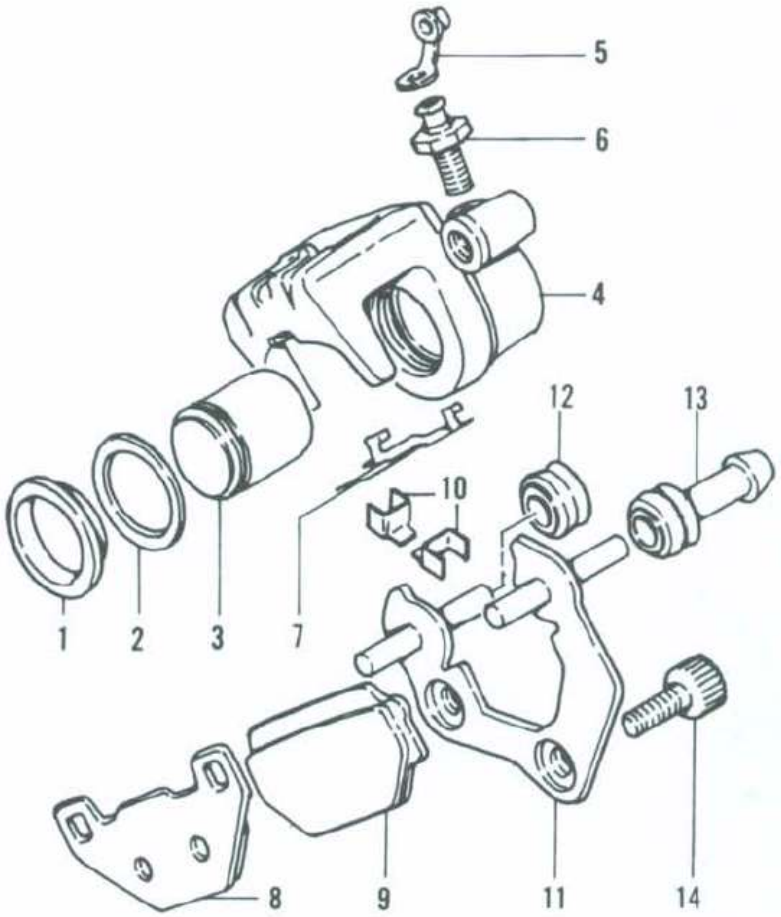
1. Place the bike on a stand so the rear wheel clears the ground.
2. Remove the caliper cover, if so equipped.

3A. If the caliper is to be completely removed from the bike, perform the following:

a. Loosen and remove the brake hose banjo bolt (A, **Figure 127**) and the 2 washers at the caliper.
b. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the bike.
c. Loosen the brake caliper mounting bolts (B, **Figure 127**) and remove them from the caliper. Lift the caliper off of the brake disc and remove it.
d. Place the caliper in a plastic bag and tie the bag closed. Position the caliper so that brake fluid cannot run down the side of the caliper and contaminate the pads.

(125)

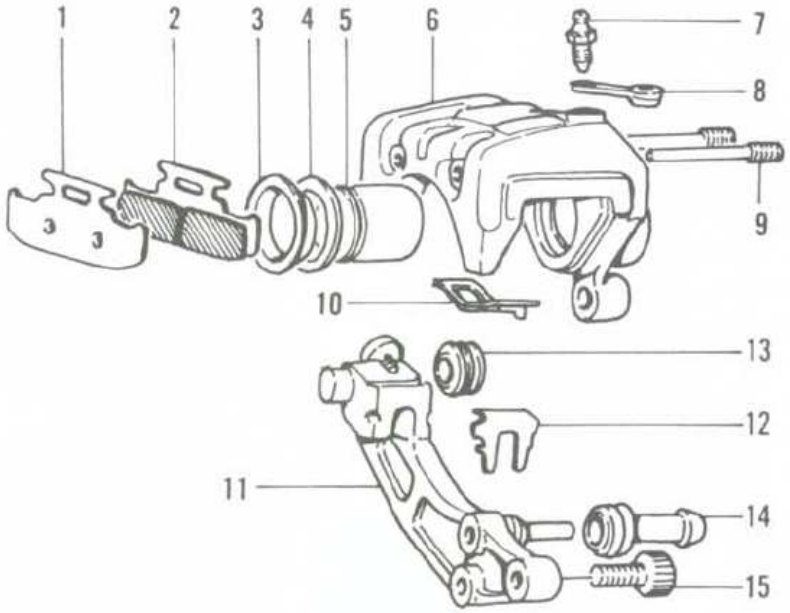
REAR BRAKE CALIPER (1986-1988)



1. Dust seal
2. Piston seal
3. Piston
4. Housing
5. Cover
6. Bleed valve
7. Anti-rattle spring
8. Brake pad
9. Brake pad
10. Clip
11. Support bracket
12. Boot
13. Friction boot
14. Bolt

126

REAR BRAKE CALIPER
(1989-1999)



1. Brake pad
2. Brake pad
3. Dust seal
4. Piston seal
5. Piston
6. Housing
7. Bleed valve
8. Cap
9. Brake pad mounting bolts
10. Anti-rattle spring
11. Support bracket
12. Clip
13. Boot
14. Friction boot
15. Bolt

3B. If the caliper is only being partially removed and it is not necessary to disconnect the brake line at the caliper, perform the following:

a. Loosen the brake caliper mounting bolts (B, **Figure 127**) and remove them from the caliper. Lift the caliper off of the brake disc.
b. Insert a wooden or plastic spacer block in the caliper between the brake pads.

NOTE

The spacer block prevents the piston from being forced out of the caliper if the brake lever is operated while the caliper is removed from the brake disc. If the brake lever is squeezed and the piston comes out, the caliper might have to be disassembled to reseat the piston and the system will have to be bled.

c. Support the partially removed caliper with a Bunjee cord or a wire hook. Do not allow the caliper to hang by its hose.

4. Install the caliper by reversing these steps, while noting the following.

5A. If the caliper was completely removed from the bike:

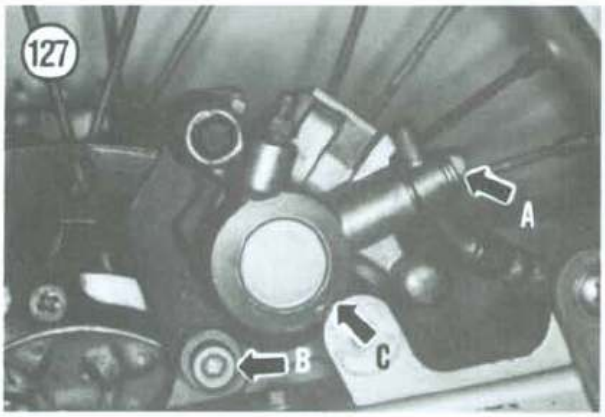
a. Remove the caliper from the bag and check that the brake pads were not contaminated with brake fluid. Wipe the caliper housing off with a clean rag.
b. Carefully install the caliper assembly (C, **Figure 127**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
c. Install the brake caliper mounting bolts (B, **Figure 127**) and tighten to the torque specification in **Table 7**.
d. Place a washer on each side of the brake hose (**Figure 128**) and install the brake hose onto the caliper (A, **Figure 127**). Tighten the banjo bolt to the torque specification listed in **Table 7**.
e. Refill the master cylinder and bleed the rear brake as described in this chapter.

5B. If the caliper was only partially removed from the bike:

a. Remove the spacer block from between the brake pads.
b. Disconnect the caliper from its hanger and carefully install the caliper (C, **Figure 127**) onto the brake disc. Be careful not to damage the leading edge of the pads during installation.
c. Install the caliper mounting bolts (B, **Figure 127**) and tighten to the torque specification in **Table 7**.
d. Operate the brake lever a few times to seat the pads against the brake disc.

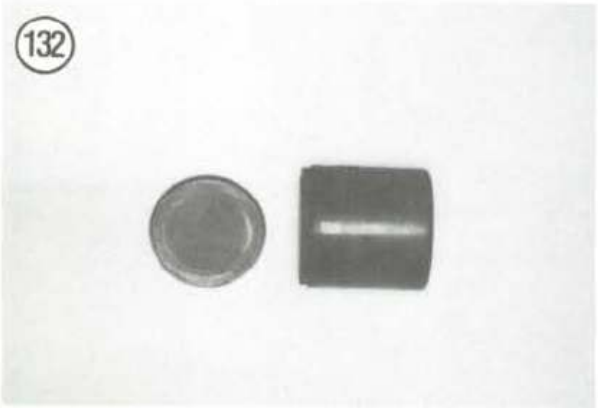
WARNING

Do not ride the motorcycle until you are sure the brake is operating properly.



Caliper Removal/Piston Removal (Caliper Will Be Disassembled)

If the caliper is to be completely disassembled, force will be required to remove the piston from the caliper. This can be either the hydraulic pressure in the brake system itself, or compressed air. If you are going to use hydraulic pressure, you must do so before the brake hose is disconnected from the caliper. This procedure describes how to remove the piston while the caliper is still mounted on the bike.



1. Remove the brake pads as described in this chapter.
2. Slide the caliper bracket out of the caliper.
3. Wrap a large cloth around the brake caliper.
4. Hold the caliper so that your hand and fingers are placed away from the piston/brake pad area.
5. Operate the front brake lever to force the piston out of the caliper cylinder. Remove the piston.

NOTE

If the piston will not come out, you will have to use compressed air to remove it. Refer to ***Disassembly*** *in this chapter.*

6. Support the caliper. Then loosen the caliper banjo bolt (A, **Figure 127**) and remove the bolt and its 2 washers (**Figure 128**) from the caliper. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the bike.
7. Take the caliper to a workbench for further disassembly.

Disassembly

1. Remove the caliper as described in this chapter.

NOTE

If you have removed the piston, proceed to Step 6.

2. Remove the pad spring (**Figure 118**).
3. Pull the support bracket out of the caliper housing (**Figure 129**).
4. On 1986-1988 models, remove the dust seal (**Figure 130**) from around the piston.

WARNING

The piston will be forced out of the caliper with considerable force. Do not try to cushion the piston with your fingers, as injury could result.

5. Cushion the caliper piston with a shop rag, placing your fingers and hand away from the piston area. Then apply compressed air through the brake line port to remove the piston (**Figure 131**). On 1989 and later models, remove the piston cover (**Figure 132**).

NOTE

When removing the seals in Step 6, use a wooden or plastic rod with a flat, narrow tip. Do not use a screwdriver or

other metal tool as this may scratch the cylinder bore.

6A. On 1986-1988 models, remove the piston seal (**Figure 133**) from the groove inside the cylinder.

6B. On 1989 and later models, remove the dust (A, **Figure 134**) and piston (B, **Figure 134**) seals from the grooves inside the cylinder.

7. Remove the bleed valve from the caliper.

Inspection

1. Wash the piston and cylinder with clean DOT 3 brake fluid.

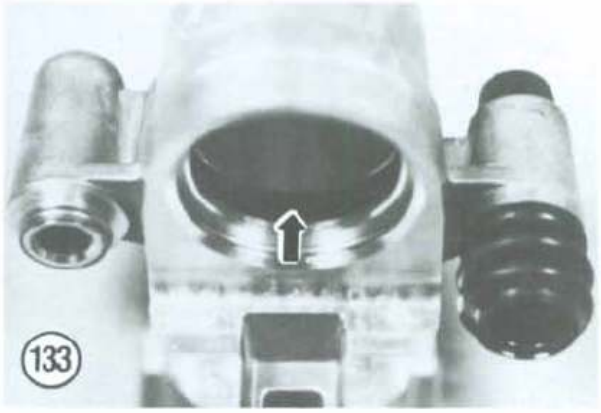
NOTE

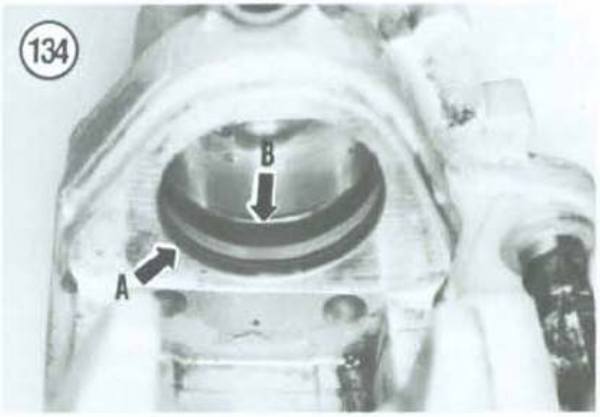
Make sure the dust and piston seal grooves in the caliper are clean. The dust seal grooves (front) are especially prone to dirt contamination.

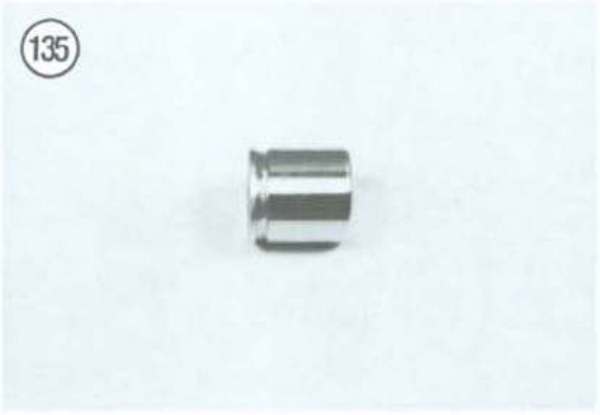
2A. On 1986-1987 models, perform the following:

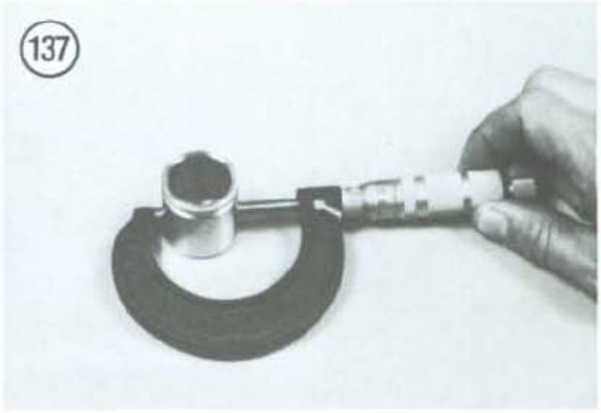
a. Check the piston (**Figure 135**) and cylinder (**Figure 136**) for deep scratches or other obvious wear marks. Do not hone the cylinder. If the piston or cylinder are damaged, replace them as a set.
b. Measure the piston outside diameter (**Figure 137**) with a micrometer and compare to the wear limit in **Table 5** or **Table 6**.
c. Measure the cylinder inner diameter with a bore gauge and compare to the wear limit in **Table 5** or **Table 6**.
d. Replace the piston and caliper housing as a set if any one part is out of tolerance.

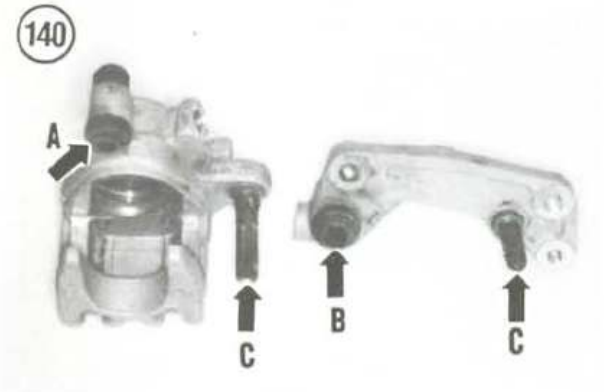
2B. On 1988 and later models, check the piston (**Figure 135**) and cylinder (**Figure 136**) for deep scratches or other obvious wear marks. Do not hone

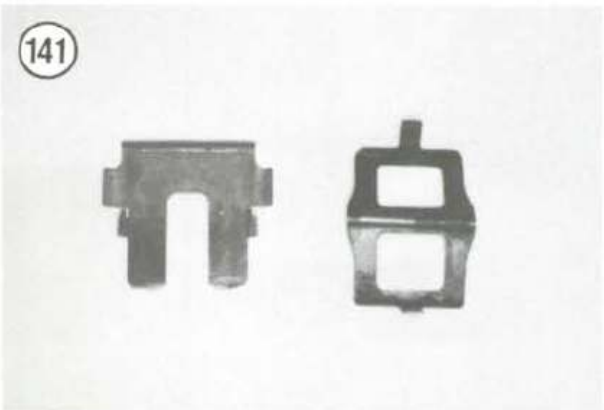












the cylinder. If the piston or cylinder are damaged, replace them as a set.

3. Clean the bleed valve (**Figure 138**) with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.

4. Clean the banjo bolt (**Figure 139**) with compressed air. Check the threads for damage. Replace worn or damaged washers.

5. Check the caliper friction boot (A, **Figure 140**) and the bracket boot (B, **Figure 140**). Replace if swollen, cracked or severely worn.

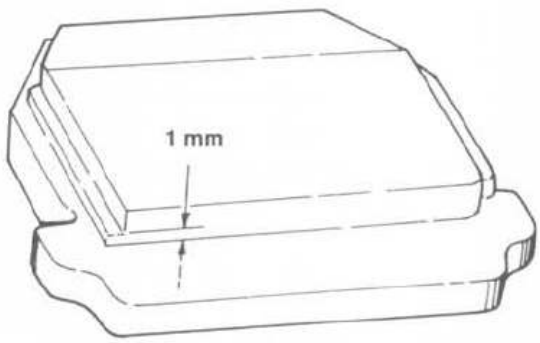
6A. On 1986-1988 models, check the bracket shafts for severe wear, damage or uneven wear. Both shafts must be in good condition for the caliper to slide back and forth. If the caliper cannot slide properly, uneven brake pad wear will result. Remove all grease residue from the bracket shafts.

6B. On 1989 and later models, check the caliper and bracket shafts (C, **Figure 140**) for severe wear, damage or uneven wear (steps). Both shafts must be in good condition for the caliper to slide back and forth. If the caliper cannot slide properly, uneven brake pad wear will result. Remove all grease residue from the caliper and bracket shafts.

7. Check the pad spring(s) for cracks or damage. See **Figure 141**, typical. Replace if necessary.

8. Measure the thickness of each brake pad (**Figure 142**) with a vernier caliper or ruler and compare to the specification listed in **Table 5** or **Table 6**. If the

BRAKE PAD LINING THICKNESS



pad thickness is less than the wear limit, replace the pads.

9. Inspect the brake pads (**Figure 143**, typical) for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.

10. See **Figure 144** (1986-1988) or **Figure 145** (1989-on). Replace the piston (A) and dust (B) seals as a set. Kawasaki recommends to replace the seals every other time the pads are replaced.

11. On 1989 and later models, check the brake pad bolts for corrosion or thread damage. Clean the bolts thoroughly.

Assembly

NOTE

Use new, unused DOT 3 brake fluid when it is called for in the following steps.

1A. On 1986-1988 models, soak the piston seal in brake fluid for approximately 5 minutes.

1B. On 1989 and later models, soak the piston and dust seals in brake fluid for approximately 5 minutes.

2. Lightly coat the piston and cylinder bore with brake fluid.

3A. On 1986-1988 models, perform the following:

a. Install the piston seal (A, **Figure 144**) into the second groove in the cylinder bore. See **Figure 133**.

NOTE

Check that the seal fits squarely in the cylinder bore groove.

If the seal is not installed properly, the caliper assembly will leak and braking performance will be reduced.

b. The piston has one open and one closed end. Insert the piston into the cylinder so that the open end faces out. Push the piston all the way in.

c. Install the dust seal around the piston (B, **Figure 144**). Make sure the dust seal fits into the groove completely. See **Figure 130**.

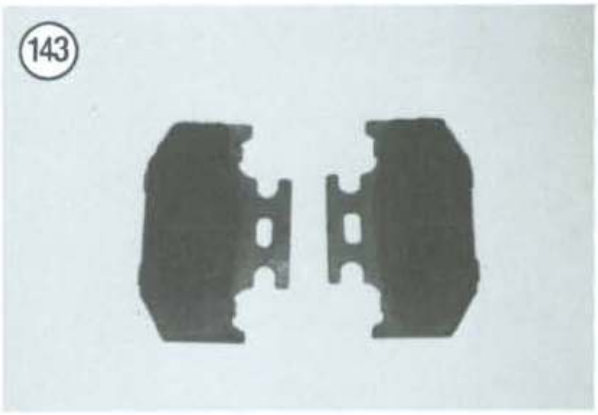
3B. On 1989 and later models, perform the following:

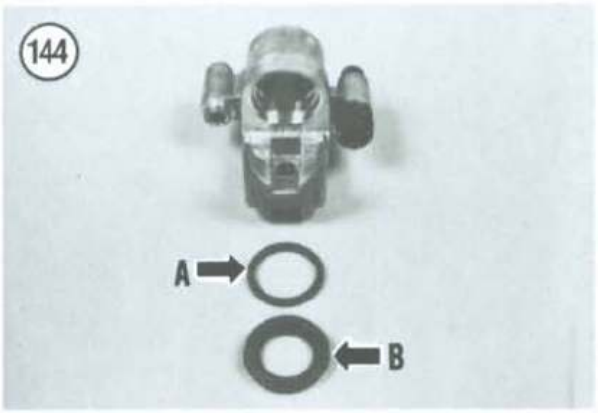
a. Install the piston seal (A, **Figure 145**) into the second groove in the cylinder bore. See B, **Figure 134**.

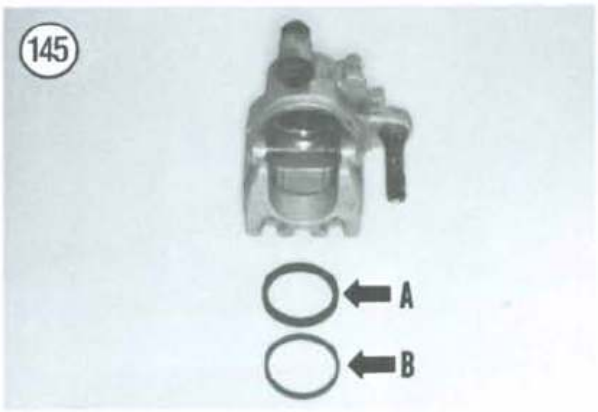
b. Install the dust seal (B, **Figure 145**) into the front groove in the cylinder bore. See A, **Figure 134**.

c. This piston has a removable cover on one end (**Figure 146**) and a depression cut into the center of the other end. Insert the piston into the cylinder so that the cover side faces out (**Figure 147**). Push the piston all the way in.

4. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper bracket shafts and caliper housing shaft holes.







CAUTION

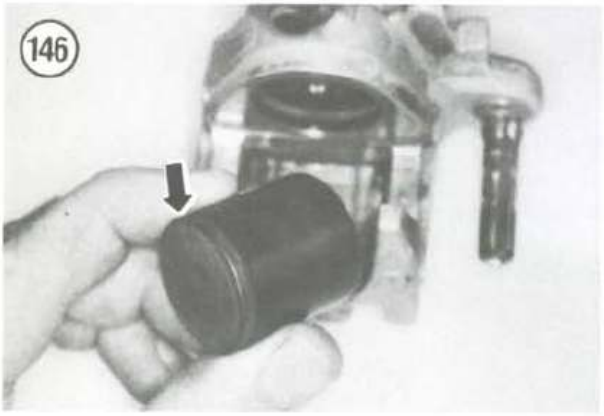
PBC grease is a special high temperature, water-resistant grease that can be used in braking systems. Do not use any other kind of lubricant as it may thin out and contaminate the brake pads.

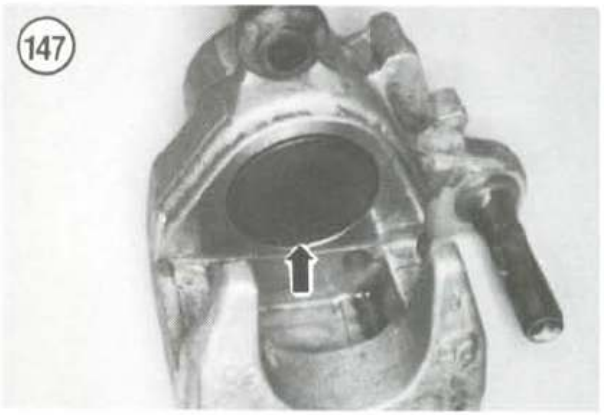
5. Install the clip spring onto the caliper bracket. See **Figure 148**, typical.

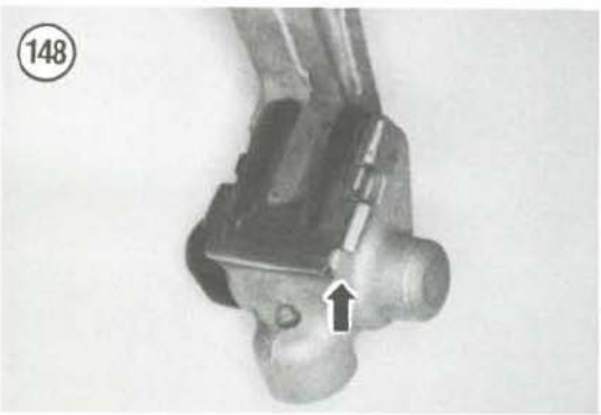
6. Slide bracket into the caliper (**Figure 129**). Then, slide the bracket back and forth. The bracket must not bind in the caliper. Wipe off any excess grease from the outside of the caliper or bracket.

7. Install and tighten the bleed screw.

8. Install the brake caliper assembly and brake pads as described in this chapter.







REAR MASTER CYLINDER

Refer to **Figure 149** when servicing the master cylinder in this section.

Read the information listed under *Disc Brake* in this chapter before servicing the front master cylinder.

Removal/Installation

1. Place the bike on a stand so that the rear wheel clears the ground.
2. Remove the reservoir cover, if so equipped.
3A. To remove brake fluid from the reservoir:
   a. Remove the master cylinder cap and diaphragm. See **Figure 150**, typical.
   b. Use a clean syringe and remove the brake fluid from the reservoir. Discard the brake fluid.
3B. To drain the reservoir and brake hose:
   a. Insert a tube onto the brake caliper bleed valve. Insert the other end of the tube into a clean container.
   b. Open the bleed valve and operate the rear brake lever to drain the master cylinder and brake hose of all brake fluid.
   c. Close the bleed valve and remove the tube.
   d. Discard the brake fluid.
4. Disconnect the brake pedal at the master cylinder pushrod. Remove the cotter pin (**Figure 151**) that locks the clevis pin between the pushrod and brake lever. Then remove the washer and pull out the clevis pin. Discard the cotter pin.
5. Loosen the master cylinder banjo bolt (**Figure 152**) and remove the bolt and its washers. Tie a plastic bag over the end of the brake hose to prevent contamination and fluid leakage.
6. Remove the brake fluid reservoir mounting bolt (**Figure 150**).
7. Remove the master cylinder mounting screws (**Figure 153**) or bolts and remove the master cylinder from the frame. See **Figure 154**.
8. If necessary, service the master cylinder as described in this chapter.

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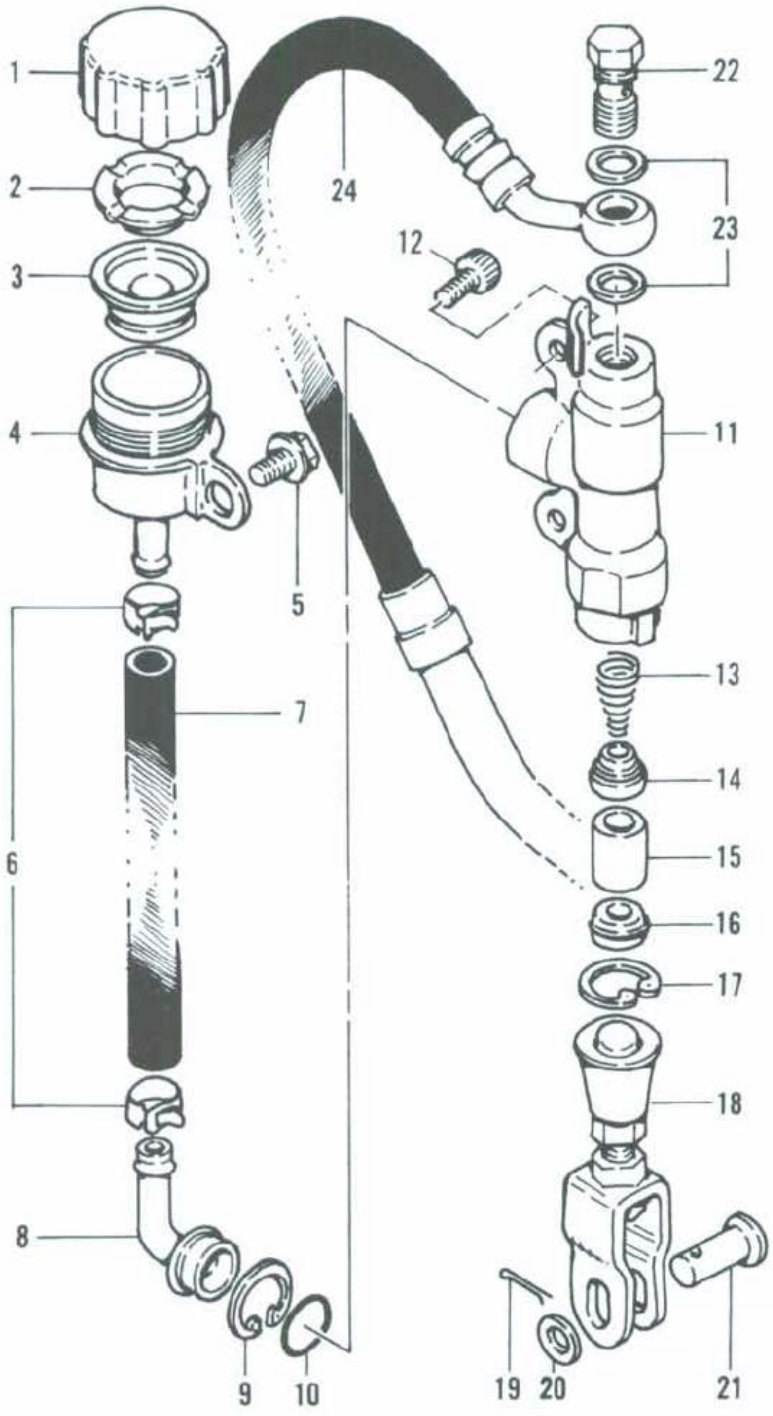
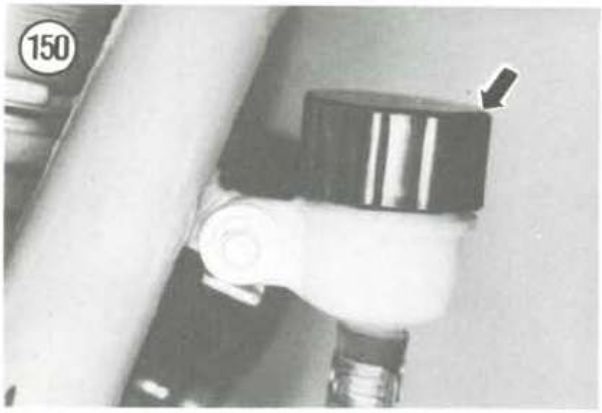
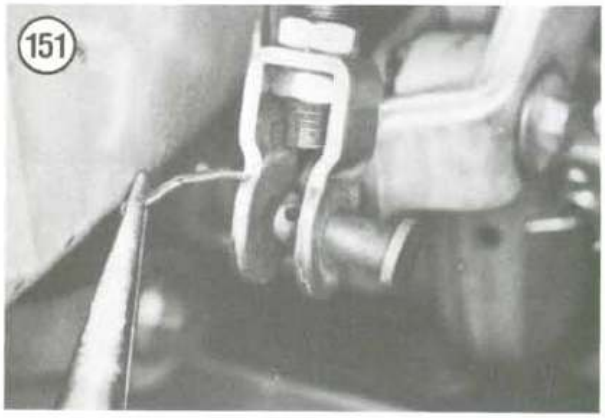
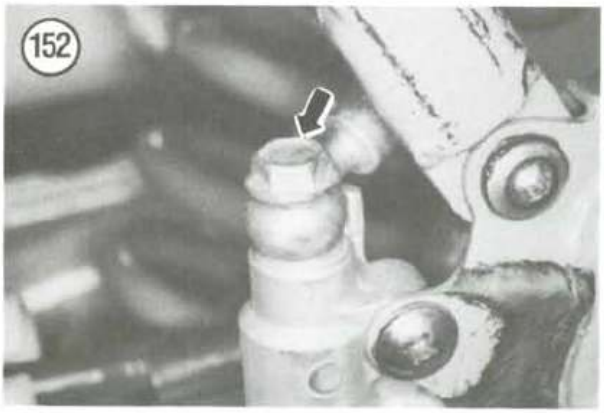
REAR MASTER CYLINDER (1986-ON)

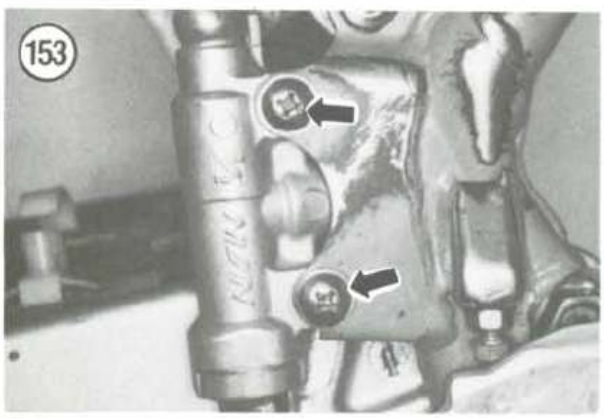


1. Cap (early style)
2. Diaphragm plate (early style)
3. Diaphragm (early style)
4. Reservoir (early style)
5. Bolt
6. Clamps
7. Hose
8. Hose joint
9. Circlip
10. O-ring
11. Master cylinder
12. Bolt
13. Spring
14. Primary cup
15. Piston
16. Secondary cup
17. Circlip
18. Pushrod assembly
19. Cotter pin
20. Washer
21. Clevis pin
22. Banjo bolt
23. Washers
24. Hose









9. Mount the master cylinder housing onto the frame. Install and tighten the screws (**Figure 153**) or bolts tightly.
10. Mount the brake fluid reservoir hose onto the frame and secure with its mounting bolt. See **Figure 150**, typical.
11. Remove the bag from over the brake hose and discard the bag.
12. Install the brake hose onto the master cylinder, using the banjo bolt and the 2 washers (**Figure 152**); a washer should be installed on each side of the hose. Tighten the banjo bolt to the torque specification listed in **Table 7**.
13. Connect the brake lever to the master cylinder pushrod with the clevis pin, washer and a new cotter pin (**Figure 151**). Bend the cotter pin arms over to lock it.
14. Refill the master cylinder with DOT 3 brake fluid and bleed the brake as described in this chapter.
15. Adjust the brake pedal height as described in Chapter Three.

WARNING

Do not ride the bike until the rear brake is working properly. Make sure the that the lever travel is not excessive and that the lever does not feel spongy—both indicate that the bleeding operation needs to be repeated.

Disassembly

1. Remove the master cylinder as described in this chapter.
2. Remove the reservoir hose circlip (**Figure 155**) and pull the reservoir hose joint out of the master cylinder (**Figure 156**).
3. Remove the hose joint O-ring (**Figure 157**).

4. Remove the master cylinder cap screws and remove the cap and diaphragm from the caliper.

5. Loosen the pushrod locknut (A, **Figure 158**) and unscrew the pushrod bracket (B, **Figure 158**).

NOTE

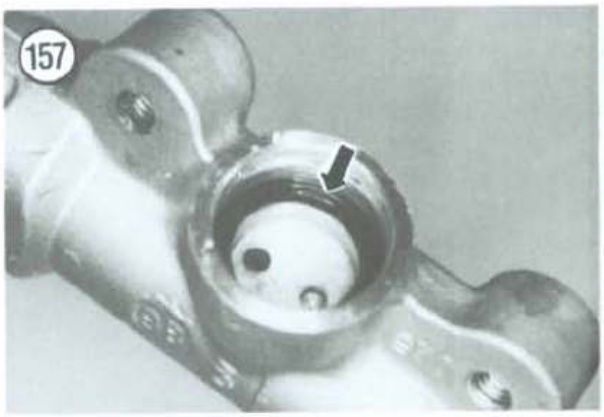
A bolt, nut and vise can be used to hold the master cylinder when removing and installing the piston assembly. Thread the bolt and nut into the master cylinder and then clamp the bolt and nut in the vise. Position the master cylinder so that the piston bore faces up; see ***Figure 159****.*

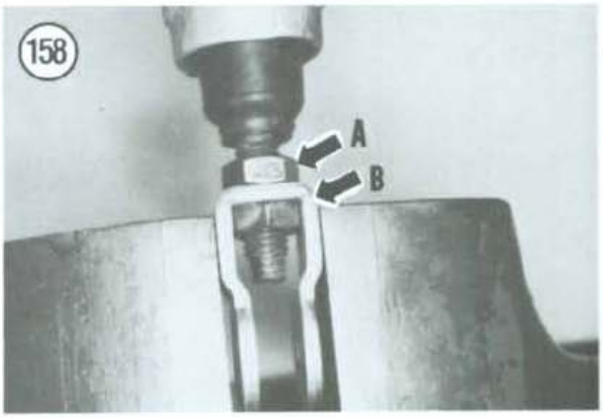
6. Carefully pull the dust cover (**Figure 160**) out of the piston bore.

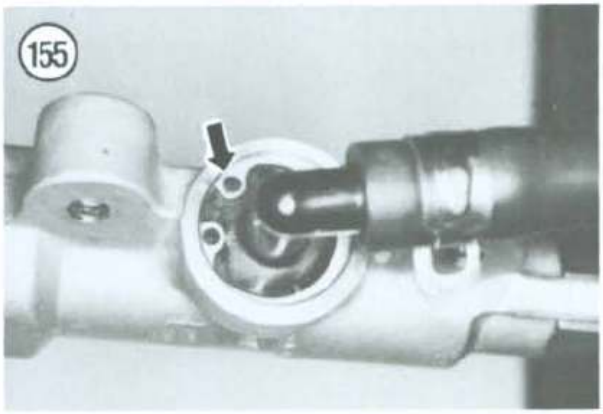
NOTE

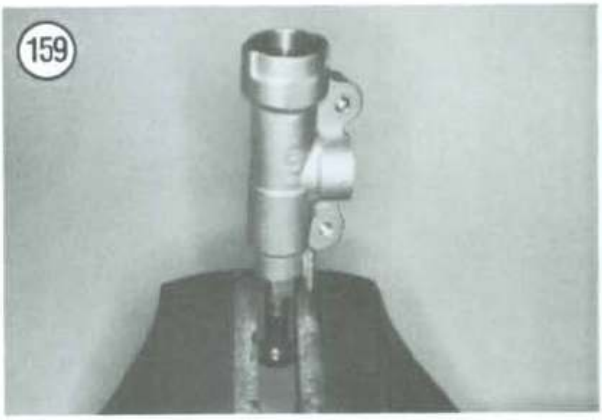
If there is brake fluid leaking at the front of the piston bore, the piston cups are worn or damaged. Replace the piston assembly during reassembly.

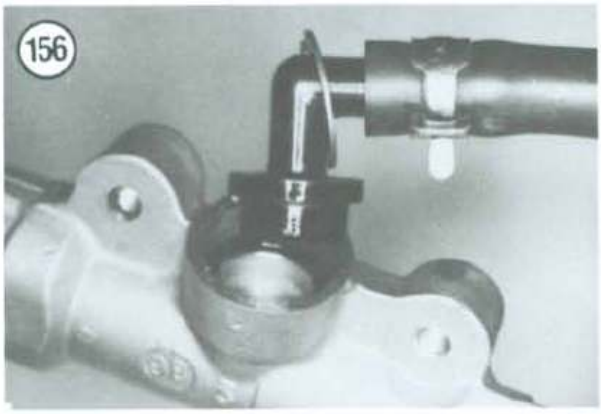
7. Compress the piston and remove the circlip (**Figure 161**) from the groove in the master cylinder.

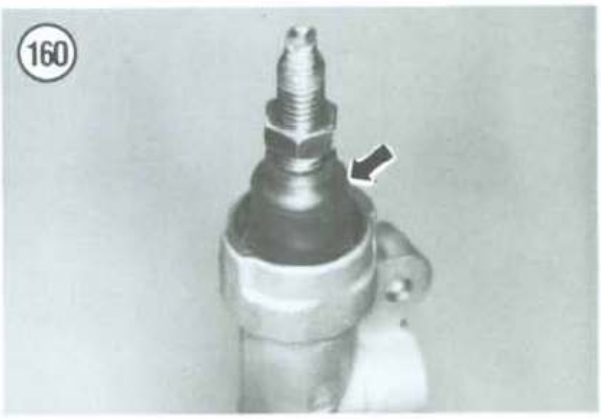


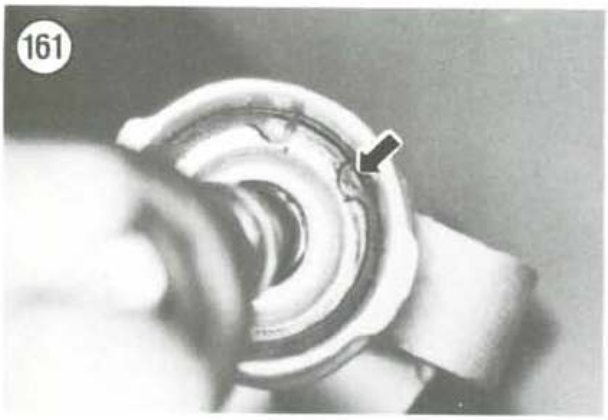


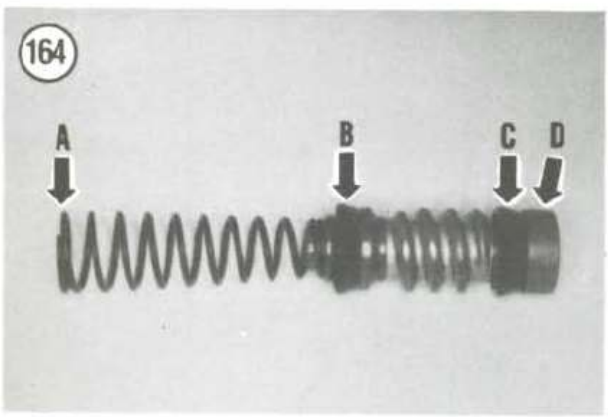












8. Remove the pushrod assembly along with the washer and circlip (**Figure 162**) from the cylinder.
9. Remove the piston assembly (**Figure 163**) from the cylinder.

Inspection

Worn or damaged master cylinder components will prevent proper brake fluid pressure from building in the brake line. Reduced pressure will cause the brake to feel weak and it will not hold properly.
1. Wash the piston and cylinder with clean DOT 3 brake fluid.
2. The piston assembly is identified in **Figure 164**:
   a. Spring.
   b. Primary cup
   c. Secondary cup.
   d. Piston.

CAUTION

*Do not attempt to remove the secondary and primary cups (**Figure 164**) from the piston. Removal will damage the cups, requiring replacement of the piston assembly.*

3. Check the piston assembly (**Figure 164**) for the following defects:
   a. Broken, distorted or collapsed piston return spring (A, **Figure 164**).
   b. Worn, cracked, damaged or swollen primary (B, **Figure 164**) and secondary cups (C, **Figure 164**).
   c. Scratched, scored or damaged piston (D, **Figure 164**).

If any of these parts are worn or damaged, replace the piston assembly.
4. On 1987 models, measure the piston return spring free length with a vernier caliper. Replace the piston assembly if the free length exceeds the wear limit in **Table 5** or **Table 6**.
5. On 1987 models, measure the primary cup outer diameter with a micrometer. Replace the piston assembly if the outer diameter is less than the wear limit in **Table 5** or **Table 6**.
6. On 1987 models, measure the piston outer diameter with a micrometer. Replace the piston assembly if the outer diameter is less than the wear limit listed in **Table 5** or **Table 6**.
7. On 1987 models, measure the master cylinder bore inner diameter with a small hole gauge and

micrometer. Replace the master cylinder if the bore exceeds the wear limit listed in **Table 5** or **Table 6**.

8. Check the master cylinder bore for severe wear, scratches or other damage.

9. The pushrod assembly is identified in **Figure 165**:

a. Bracket.
b. Pushrod.
c. Dust cover.
d. Circlip.
e. Washer.

10. Check the pushrod assembly (**Figure 165**) for the following defects:

a. Cracked or damaged bracket (A, **Figure 165**). Stripped or damaged bracket nut.
b. Severely worn or damaged pushrod (B, **Figure 165**).
c. Worn, cracked or swollen dust cover (C, **Figure 165**).
d. Bent or damaged circlip (D, **Figure 165**).
e. Bent or damaged washer (E, **Figure 165**).

If any of these parts are worn or damaged, replace the pushrod assembly. The circlip can be purchased separately.

11. Check for plugged supply and relief ports in the master cylinder (**Figure 166**). Clean with compressed air.

NOTE

A plugged relief port will cause the pads to drag on the disc.

12. Check the reservoir cap and diaphragm for damage. Check the diaphragm for cracks or deterioration. Replace damaged parts as required.

13. Check all of the threaded holes in the master cylinder. Clean with compressed air.

14. Clean and blow dry the reservoir and hose assembly. Replace the O-ring if worn, cracked or damaged.

Assembly

Use new, unused DOT 3 brake fluid when brake fluid is called for in the following steps.

1. If you are installing a piston repair kit, note the following:

a. Check the repair kit to make sure that it contains all of the necessary new parts. Compare to the exploded view in **Figure 149**.
b. Wash the new parts in new brake fluid.

2. Lightly coat the piston assembly and cylinder bore with brake fluid.

3. Assemble the piston assembly as shown in **Figure 164**. The return spring is tapered; fit the smaller end onto the piston (**Figure 164**).

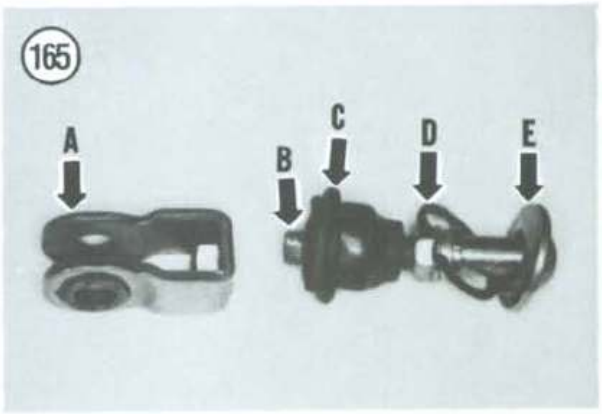
CAUTION

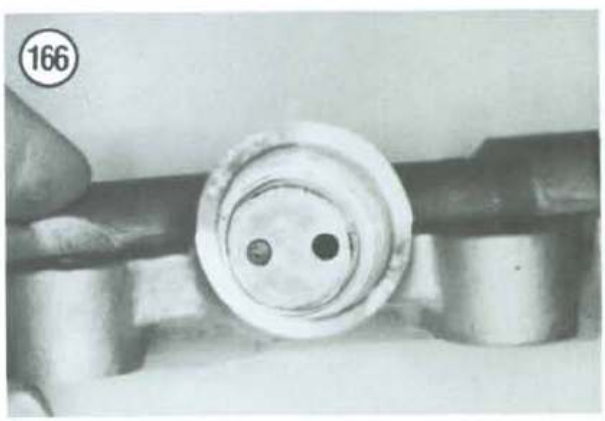
When installing the piston assembly in Step 4, make sure the primary and secondary cups do not tear or turn inside out; both cups are slightly larger than the bore.

4. Insert the piston assembly into the master cylinder bore, spring end first, as shown in **Figure 163**.

5. Install the pushrod ball into the end of the piston (**Figure 162**) and compress the piston slightly. Slide the washer (**Figure 167**) down the pushrod so that it rests below the circlip groove in the cylinder. Install the circlip, making sure it seats in the cylinder groove completely. Push and release the piston a few times to make sure it moves smoothly in the cylinder bore.

6. Pull the dust cover down the pushrod and fit it into the cylinder bore (**Figure 160**).





7. Thread the pushrod into the bracket nut (B, **Figure 158**). Tighten the locknut (A, **Figure 158**) securely.
8. Install the brake hose O-ring into the master cylinder (**Figure 157**).
9. Fit the hose joint (**Figure 156**) into the master cylinder and secure it with the circlip (**Figure 155**). Make sure the circlip seats in the groove completely.
10. Install the master cylinder as described in this chapter.

BRAKE HOSE REPLACEMENT

Under racing conditions, the brake hoses should be replaced once a year or whenever they show signs of wear or damage.

1. Place a container under the brake line at the caliper. Remove the banjo bolt and sealing washers at the caliper assembly.
2. Place the end of the brake hose in a clean container. Operate the front brake lever to drain the master cylinder and brake hose of all brake fluid. Dispose of this brake fluid—never reuse brake fluid.
3. Remove the banjo bolt and sealing washers at the master cylinder.

4. Install a new brake hose in the reverse order of removal. Install new sealing washers and banjo bolts (**Figure 168**) if necessary.
5. Tighten the banjo bolts to torque specification listed in **Table 7**.
6. Refill the master cylinder with fresh brake fluid clearly marked DOT 3. Bleed the brake as described in this chapter.

WARNING

Do not ride the motorcycle until you are sure that the brakes are operating properly.

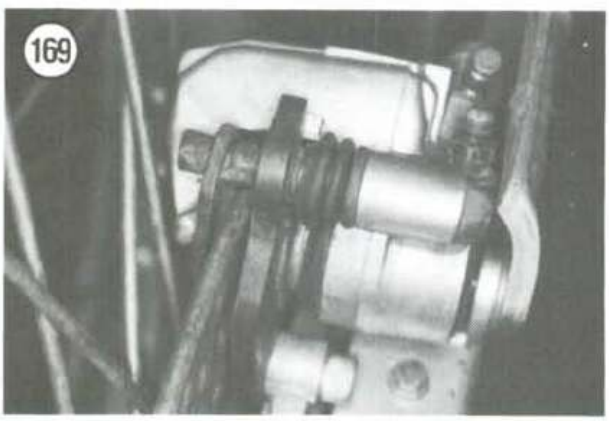
BRAKE DISC

The brake disc (front and rear) are separate from the wheel hubs and can be removed once the wheel is removed from the bike.

Inspection

It is not necessary to remove the disc from the wheel to inspect it. Small marks on the disc are not important, but radial scratches deep enough to snag a fingernail reduce braking effectiveness and increase brake pad wear. If these grooves are evident, and the brake pads are wearing rapidly, the disc should be replaced.

Kawasaki lists standard and wear limit specifications for the brake discs; see **Tables 3-6** for your model. When servicing the brake discs, do not have the discs reconditioned (ground) to compensate for warpage. The discs are thin to begin with and grinding will only reduce their thickness, causing them to warp quite rapidly. If a disc is warped, the brake pads may be dragging on the disc (**Figure 169**), causing

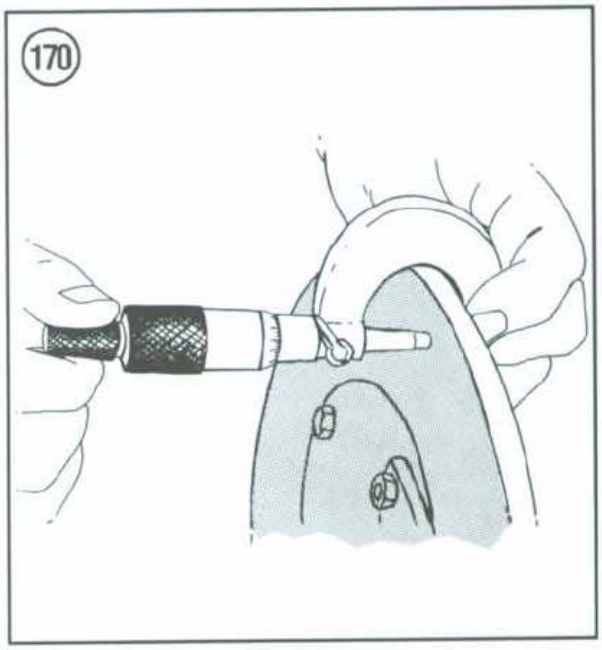


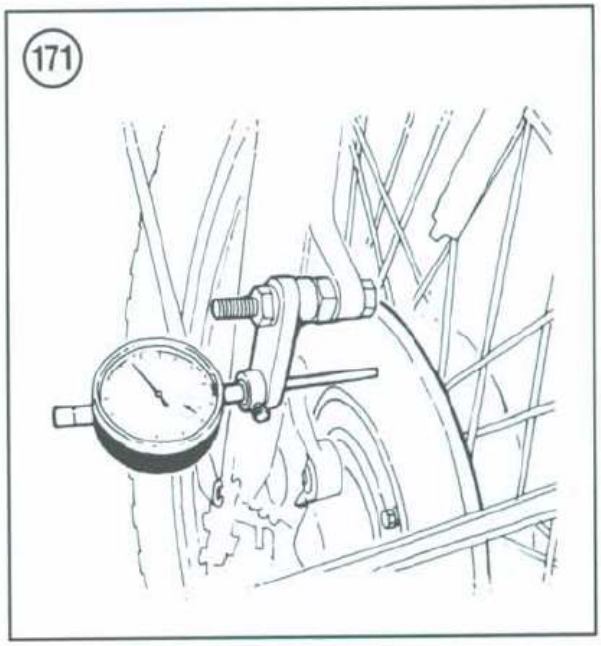
the disc to overheat. Overheating can be caused when there is unequal brake pad pressure on both sides of the disc. Four main causes of unequal pad pressure are: (1) the floating caliper is binding on the caliper bracket shafts, thus preventing the caliper from floating (side-to-side) on the disc; (2) the brake caliper piston seal is worn or damaged; (3) the small master cylinder relief is plugged; and (4) the primary cup on the master cylinder piston is worn or damaged.

1. Measure the thickness around the disc at several locations with vernier calipers or a micrometer (**Figure 170**). The disc must be replaced if the thicknesses at any point is less than the thickness specified in **Tables 3-6**.

2. Make sure the disc bolts are tight prior to performing this check. Check the disc runout with a dial indicator as shown in **Figure 171**. When checking the front disc, turn the handlebar fully to one side. Slowly rotate the wheel and watch the dial indicator. If the runout exceeds the limit in **Tables 3-6**, the disc must be replaced.

3. Clean the disc of any rust or corrosion and wipe clean with lacquer thinner. Never use an oil based solvent that may leave an oil residue on the disc.





Removal/Installation

1. Remove the front (Chapter Eleven) or rear (Chapter Twelve) wheel.

NOTE

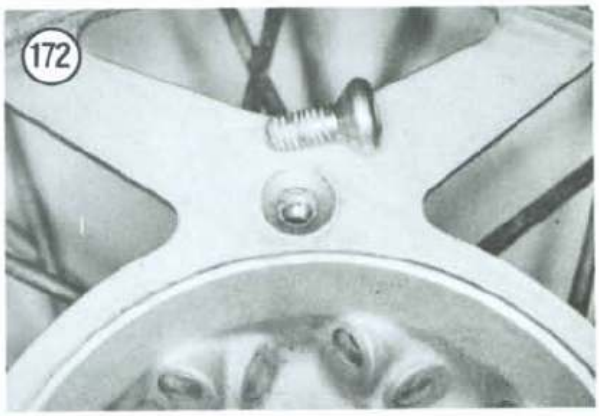
Place a piece of wood in the caliper in place of the disc. This way, if the brake lever is inadvertently squeezed, the piston will not be forced out of the cylinder. If this does happen, the caliper might have to be disassembled to reseat the piston and the system will have to be bled.

2. Remove the screws (**Figure 172**) securing the disc to the wheel and remove the disc (**Figure 173**).

3. Install by reversing these removal steps. Tighten the screws securely.

CAUTION

The disc screws are made out of a harder material than similar screws that are not used in the braking system. When replacing these screws, make sure to purchase the correct type.



BRAKE BLEEDING

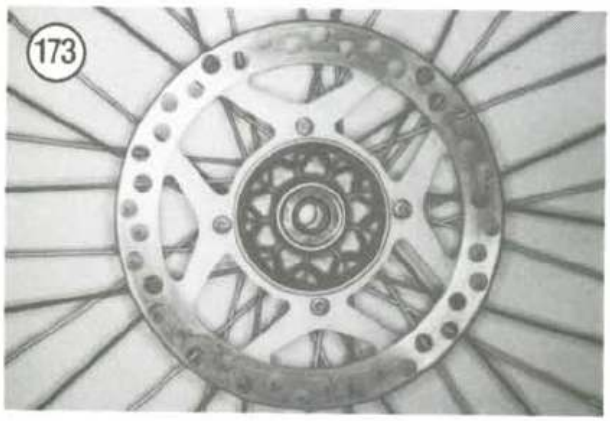
This procedure is necessary only when the brakes feel spongy, there is a leak in the hydraulic system, a component has been replaced or the brake fluid has been replaced.

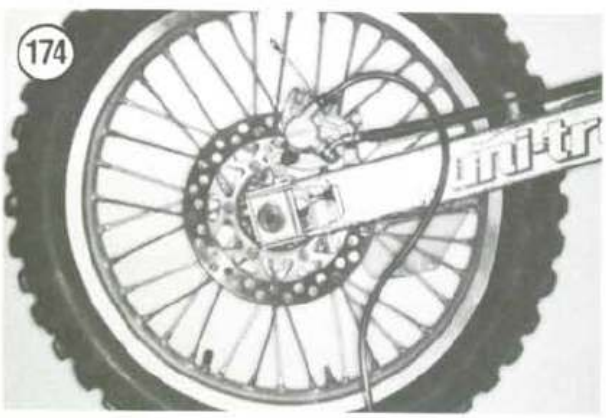
NOTE

During this procedure, all the hose junctions in the brake system will be bled of air. It is important to frequently check the fluid level in the master cylinder. If the reservoir runs dry, air will enter the system which will require starting over.

1. Flip off the dust cap from the brake bleeder valve.

2. Connect a length of clear tubing to the bleeder valve on the caliper (**Figure 174**). Place the other end of the tube into a clean container. Fill the container with enough fresh brake fluid to keep the end submerged. The tube should be long enough so that a loop can be made higher than the bleeder valve to prevent air from being drawn into the caliper during bleeding.





CAUTION

Cover all parts which could become contaminated by the accidental spilling of brake fluid. Wash any spilled brake fluid off of any surface immediately, as it will destroy the finish. Use soapy water and rinse completely.

3. Clean the top of the front master cylinder or the reservoir cap of all dirt and foreign matter. Remove the cap and diaphragm. Fill the reservoir to about 10 mm (3/8 in.) from the top. Insert the diaphragm to prevent the entry of dirt and moisture.

WARNING

Use brake fluid clearly marked DOT 3 only. Others may vaporize and cause brake failure. Always use the same brand name; do not intermix the brake fluids, as many brands are not compatible.

NOTE

During this procedure, it is important to periodically check the reservoir fluid level to make sure it doesn't run dry. If the reservoir should run dry, air will enter the system and you'll have to start over.

4. If the master cylinder was drained, it must be bled before bleeding the entire system. Perform the following:

a. Remove the banjo bolt and hose at the master cylinder.
b. Hold your thumb over the bolt hole and fill the reservoir with DOT 3 brake fluid. Do not remove your thumb.
c. While holding your thumb over the bolt hole, pump the brake lever or brake pedal several times. Then hold the lever or pedal in the depressed position.
d. Reduce thumb pressure on the banjo bolt hole. Some fluid and air bubbles will leak out. Reapply thumb pressure.
e. Repeat sub-steps c and d until no air bubbles bleed out of the banjo bolt hole and you can fell resistance at the lever or pedal.
f. Check the reservoir fluid level and top-off if necessary.
g. Reconnect the hose, installing the 2 washers and banjo bolt. Tighten the banjo bolt to the torque specification in **Table 7**.

h. Turn the handlebar so that the banjo bolt is at its lowest position.
i. Pump the lever or pedal several times and hold it depressed.
j. Loosen the banjo bolt 1/4 turn. Some fluid and air bubbles will leak out. Tighten the banjo bolt.
k. Repeat sub-steps i and j until no more air bubbles bleed out of the banjo bolt hole and you can feel resistance at the lever or pedal.
l. Wipe up any spilled brake fluid before continuing.

5. Slowly apply the brake lever several times. Hold the lever in the applied position and open the bleeder valve about 1/2 turn (**Figure 175**). Allow the lever to travel to its limit. When this limit is reached, tighten the bleeder screw. As the brake fluid enters the system, the level will drop in the master cylinder reservoir. Maintain the level at about 10 mm (3/8 in.) from the top of the reservoir to prevent air from being drawn into the system.
6. Continue to pump the lever and fill the reservoir until the fluid emerging from the hose is completely free of air bubbles. If you are replacing the fluid, continue until the fluid emerging from the hose is clean.

NOTE

If bleeding is difficult, it may be necessary to allow the fluid to stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system settle out.

7. Hold the lever in the applied position and tighten the bleeder valve. Remove the bleeder tube and install the bleeder valve dust cap.
8. If necessary, add fluid to correct the level in the master cylinder reservoir. It must be above the level line.
9. Install the cap and tighten the screws (front master cylinder).
10. Test the feel of the brake lever. It should feel firm and should offer the same resistance each time it's operated. If it feels spongy, it is likely that air is still in the system and it must be bled again. When all air has been bled from the system and the brake fluid level is correct in the reservoir, double-check for leaks and tighten all fittings and connections.

WARNING

Before riding the motorcycle, make certain that the brake is working correctly by operating the lever or pedal several times. Then make the test ride a slow one at first to make sure the brake is working correctly.

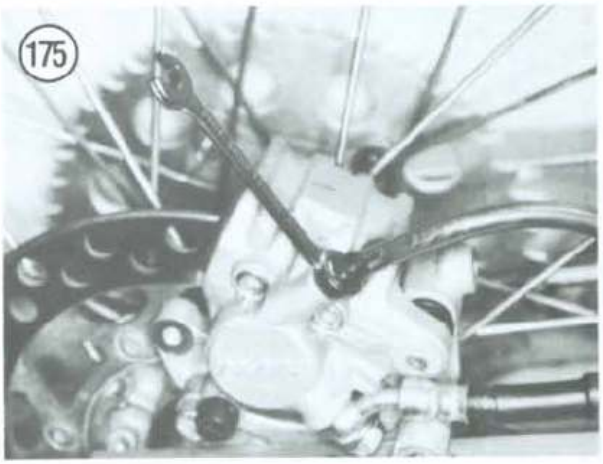


Table 1 REAR DRUM BRAKE SPECIFICATIONS (KX125)

	New mm (in.)	Wear limit mm (in.)
Brake drum ID		
1982	130.00-130.16 (5.118-5.124)	130.75 (5.148)
1983-1985	110.00-110.14 (4.331-4.336)	110.75 (4.36)
Brake shoe lining thickness	4.0 (0.16)	2.0 (0.08)
Brake shoe spring free length		
1982		
Long spring	44.5-45.4 (1.75-1.79)	47.3 (1.86)
Short spring	30.8-31.2 (1.21-1.23)	32.5 (1.28)
1983-1985	30.8-31.2 (1.21-1.23)	32.5 (1.28)

Table 2 REAR DRUM BRAKE SPECIFICATIONS (KX250 AND KX500)

	New mm (in.)	Wear limit mm (in.)
Brake drum ID	130.00-130.16 (5.118-5.124)	130.75 (5.148)
Brake shoe lining thickness	4.0 (0.16)	2.0 (0.08)
Brake shoe spring free length		
KX250		
Long spring		
1982	44.5-45.5 (1.75-1.79)	47.3 (1.86)
1983-1985	44.5-45.4 (1.75-1.79)	46.7 (1.84)
Short spring	30.8-31.2 (1.21-1.23)	32.5 (1.28)
KX500		
Long spring	44.5-45.5 (1.75-1.79)	47.3 (1.86)
Short spring	30.8-31.2 (1.21-1.23)	32.5 (1.28)

Table 3 FRONT DISC BRAKE SPECIFICATIONS (KX125)

	New mm (in.)	Wear limit mm (in.)
Brake pad lining thickness		
1982-1986	3.7 (0.15)	1.0 (0.04)
1987	3.5 (0.14)	1.0 (0.04)
1988	3.7 (0.15)	1.0 (0.04)
1989-on	4.5 (0.177)	1.0 (0.04)
Disc runout	0-0.15 (0-0.006)	0.3 (0.01)
Disc thickness		
1982-1988	3.1-3.3 (0.12-0.13)	2.5 (0.10)

(continued)

Table 3 FRONT DISC BRAKE SPECIFICATIONS (KX125) (continued)

	New mm (in.)	Wear limit mm (in.)
Disc thickness		
1989-on	2.85-3.15 (0.112-0.124)	2.5 (0.10)
Brake caliper		
1982		
Bore I.D.	30.23-30.28 (1.190-1.192)	30.30 (1.193)
Piston O.D.	30.167-30.200 (1.1878-1.1890)	30.13 (1.186)
1983-1986		
Bore I.D.	33.94-33.98 (1.336-1.338)	34.00 (1.339)
Piston O.D.	33.887-33.900 (1.3341-1.3346)	33.85 (1.333)
1987		
Bore I.D.	38.180-38.185 (1.5031-1.5033)	38.20 (1.504)
Piston O.D.	38.116-38.148 (1.5006-1.5019)	38.08 (1.499)
1988-on	*	*
Master cylinder		
1982, 1985-1986		
Bore I.D.	11.000-11.063 (0.4331-0.4356)	11.08 (0.436)
Piston O.D.	10.823-10.850 (0.4261-0.4272)	10.80 (0.425)
Primary cup diameter	11.3-11.7 (0.445-0.461)	11.2 (0.441)
Spring free length	38.3-42.3 (1.51-1.67)	36.4 (1.43)
1983-1984	*	*
1987		
Bore I.D.	11.000-11.043 (0.4331-0.4347)	11.06 (0.435)
Piston O.D.	10.957-10.984 (0.4314-0.4324)	10.90 (0.429)
Primary cup diameter	11.55-11.85 (0.4547-0.4665)	11.3 (0.445)
Spring free length	33 (1.30)	32 (1.26)
1988-on	*	*

* Specification not available from Kawasaki.

Table 4 FRONT DISC BRAKE SPECIFICATIONS (KX250 AND KX500)

	New mm (in.)	Wear limit mm (in.)
Brake pad lining thickness		
1982-1986	3.7 (0.15)	1.0 (0.04)
1987	3.5 (0.14)	1.0 (0.04)
1988	3.7 (0.15)	1.0 (0.04)
1989-on	4.5 (0.177)	1.0 (0.04)

(continued)

Table 4 FRONT DISC BRAKE SPECIFICATIONS (KX250 AND KX500) (continued)

	New mm (in.)	Wear limit mm (in.)
Disc runout	0-0.15 (0-0.006)	0.3 (0.01)
Disc thickness		
1982-1988	3.1-3.3 (0.12-0.13)	2.5 (0.10)
1989-on	2.85-3.15 (0.112-0.124)	2.5 (0.10)
Brake caliper		
KX250		
1982		
Bore I.D.	30.23-30.28 (1.190-1.192)	30.30 (1.193)
Piston O.D.	30.167-30.200 (1.1877-1.1889)	30.13 (1.186)
1983-1986		
Bore I.D.	33.94-33.98 (1.336-1.338)	34.00 (1.339)
Piston O.D.	33.887-33.900 (1.3341-1.3346)	33.85 (1.333)
1987		
Bore I.D.	38.180-38.185 (1.5031-1.5033)	38.20 (1.504)
Piston O.D.	38.116-38.148 (1.5006-1.5019)	38.08 (1.499)
1988-on	*	*
KX500		
1983-1984		
Bore I.D.	34.23-34.28 (1.3476-1.3496)	34.30 (1.350)
Piston O.D.	34.167-34.200 (1.3452-1.3465)	34.13 (1.3437)
1985-1986		
Bore I.D.	33.94-33.98 (1.336-1.338)	34.00 (1.339)
Piston O.D.	33.887-33.900 (1.3341-1.3346)	33.85 (1.333)
1987		
Bore I.D.	38.180-38.185 (1.5031-1.5033)	38.20 (1.504)
Piston O.D.	38.116-38.148 (1.5006-1.5019)	38.08 (1.499)
1988-on	*	*
Master cylinder		
1983-1984	*	*
1982 and 1985-1986		
Bore I.D.	11.000-11.063 (0.4331-0.4356)	11.08 (0.436)
Piston O.D.	10.823-10.850 (0.4261-0.4272)	10.80 (0.425)
Primary cup O.D.	11.3-11.7 (0.445-0.461)	11.2 (0.441)
Spring free length	38.3-42.3 (1.51-1.67)	36.4 (1.43)
1987		
Bore I.D.	11.000-11.043 (0.4331-0.4347)	11.06 (0.435)
Piston O.D.	10.957-10.984 (0.4314-0.4324)	10.90 (0.429)
Primary cup O.D.	11.55-11.85 (0.4547-0.4665)	11.3 (0.445)
Spring free length	33 (1.30)	32 (1.26)
1988-on	*	*

* Not specified.

Table 5 REAR DISC BRAKE SPECIFICATIONS (KX125)

	New mm (in.)	Wear limit mm (in.)
Brake pad lining thickness		
1986	3.7 (0.15)	1.0 (0.04)
1987	4.5 (0.18)	1.0 (0.04)
1988	4.2 (0.165)	1.0 (0.04)
1989-1991	4.7 (0.185)	1.0 (0.04)
Disc runout	0-0.15 (0-0.006)	0.3 (0.01)
Disc thickness	4.35-4.65 (0.17-0.18)	3.8 (0.15)
Brake caliper		
1986		
Bore I.D.	33.94-33.98 (1.336-1.338)	34.00 (1.339)
Piston O.D.	33.887-33.900 (1.3341-1.3346)	33.85 (1.333)
1987		
Bore I.D.	30.230-30.235 (1.1902-1.1904)	30.25 (1.191)
Piston O.D.	30.167-30.200 (1.1877-1.1890)	30.13 (1.186)
1988-on	*	*
Master cylinder		
1986	*	*
1987		
Bore I.D.	12.700-12.743 (0.5000-0.5017)	12.76 (0.502)
Piston O.D.	12.657-12.684 (0.4983-0.4994)	12.60 (0.496)
Primary cup diameter	13.3-13.7 (0.524-0.540)	13.2 (0.520)
Spring free length	38.8 (1.53)	38 (1.50)
1988-on	*	*

* Not specified.

Table 6 REAR DISC BRAKE SPECIFICATIONS (KX250 AND KX500)

	New mm (in.)	Wear limit mm (in.)
Brake pad lining thickness		
1986	3.7 (0.15)	1.0 (0.04)
1987	4.5 (0.18)	1.0 (0.04)
1988	4.2 (0.165)	1.0 (0.04)
1989-on	4.7 (0.185)	1.0 (0.04)
Disc runout	0-0.15 (0-0.006)	0.3 (0.01)
Disc thickness		
KX250 & 1987-on KX500	4.35-4.65 (0.17-0.18)	3.8 (0.15)

(continued)

Table 6 REAR DISC BRAKE SPECIFICATIONS (KX250 AND KX500) (continued)

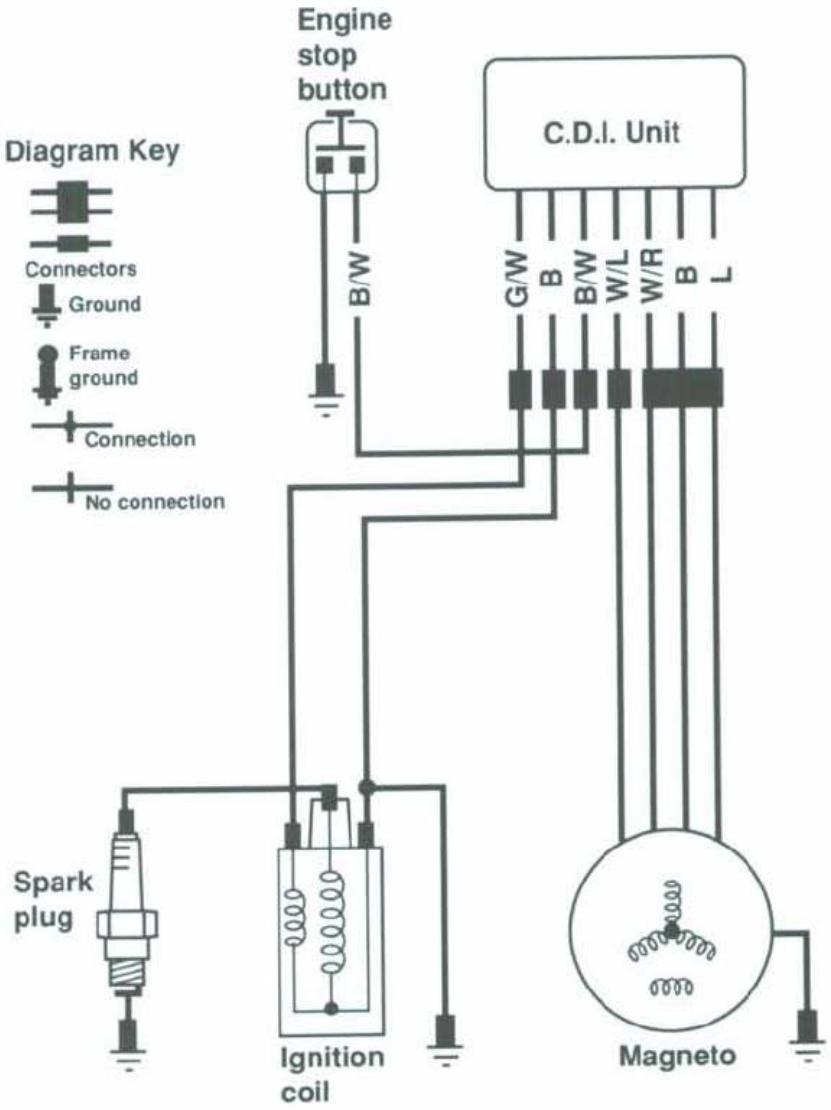
	New mm (in.)	Wear limit mm (in.)
Disc thickness		
1986 KX500	*	*
Brake caliper		
1986	*	*
1987		
Bore I.D.	30.230-30.235 (1.1902-1.1904)	30.25 (1.191)
Piston O.D.	30.167-30.200 (1.1877-1.1890)	30.13 (1.186)
1988-on	*	*
Master cylinder		
1986	*	*
1987		
Bore I.D.	12.700-12.743 (0.5000-0.5017)	12.76 (0.502)
Piston O.D.	12.657-12.684 (0.4983-0.4994)	12.60 (0.496)
Primary cup diameter	13.3-13.7 (0.524-0.540)	13.2 (0.520)
Spring free length	38.8 (1.53)	38 (1.50)
1988-on	*	*

* Not specified.

Table 7 DISC BRAKE TIGHTENING TORQUES

	N•m	ft.-lb.
Banjo bolts		
1982-1987	29	21.7
1988-on	25	18
Brake disc bolts	10	87 in.-lb.
Front master cylinder bolts	8.8	78 in.-lb.
Brake lever pivot nut	5.9	52 in.-lb.
Brake pedal bolt	8.8	78 in.-lb.
Caliper mounting bolts		
Front		
1982-1985	23	16.5
1986-on	25	18
Rear		
1982-1999	25	18
2000-on	28	20
Rear master cylinder bolts		
1986-1988	7.8	69 in.-lb.
Brake pad mounting bolts		
1989-on	18	13

1982 KX125



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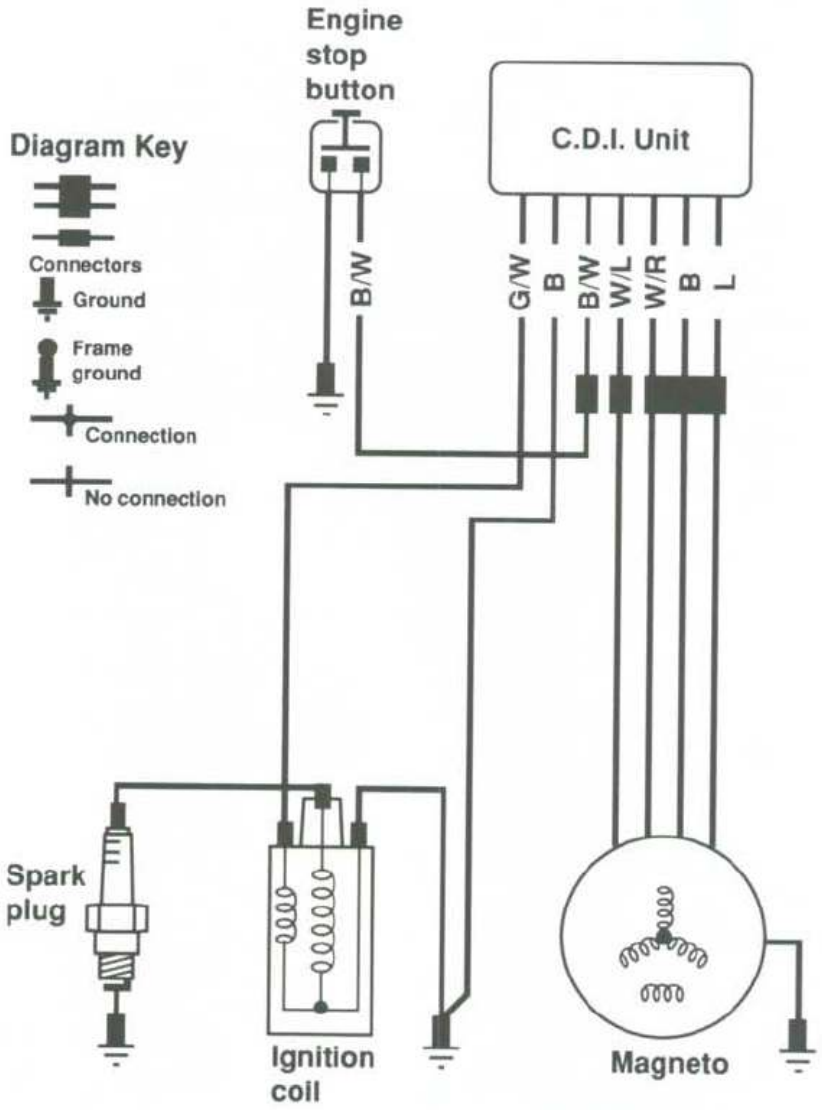
L	Blue	W/R	White/Red
B/W	Black/White	G/W	Green/White

1983 KX125



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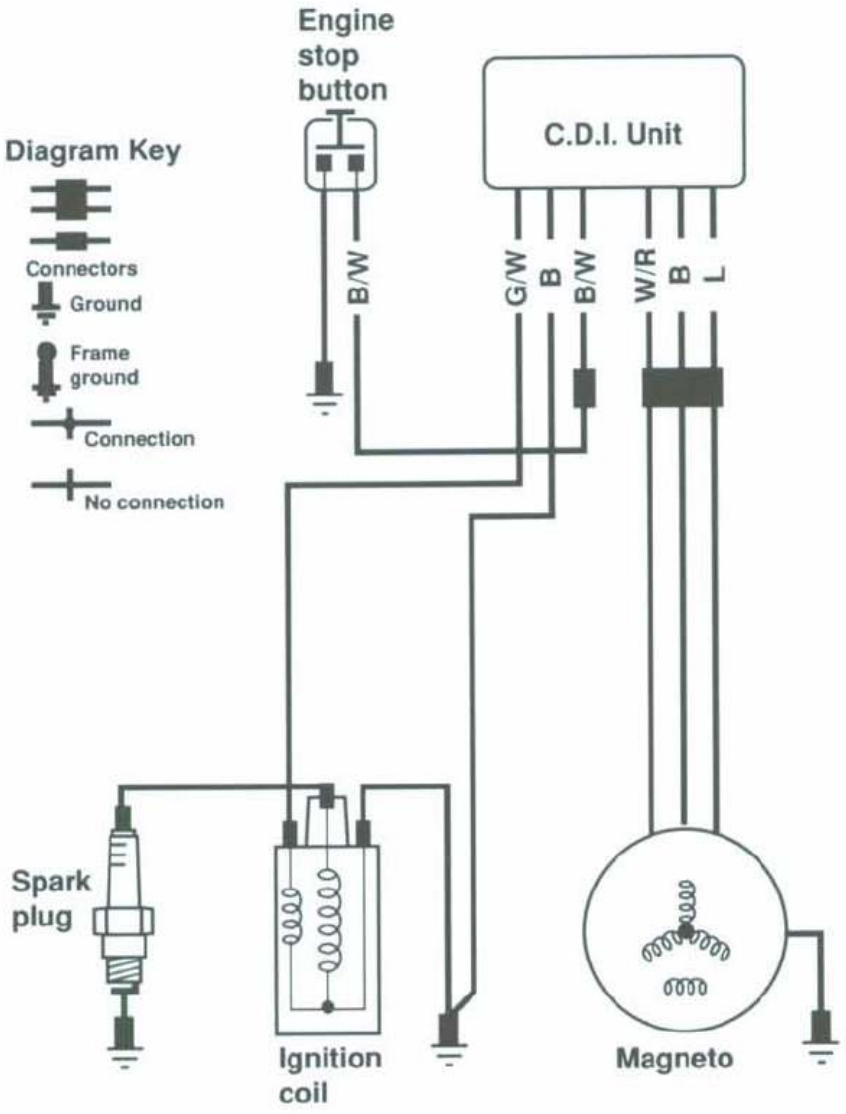
B/W	Black/White	G/W	Green/White

1984-1985 KX125



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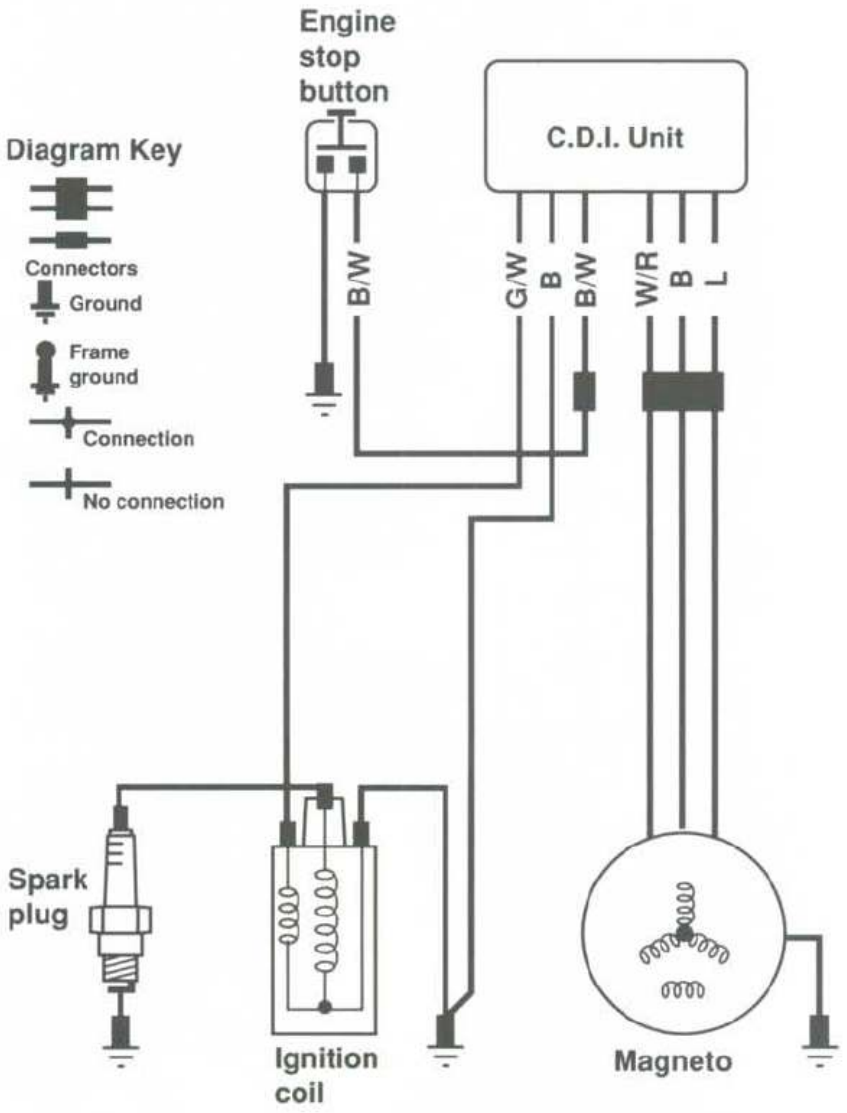
B/W	Black/White		

1986 KX125



Color Code

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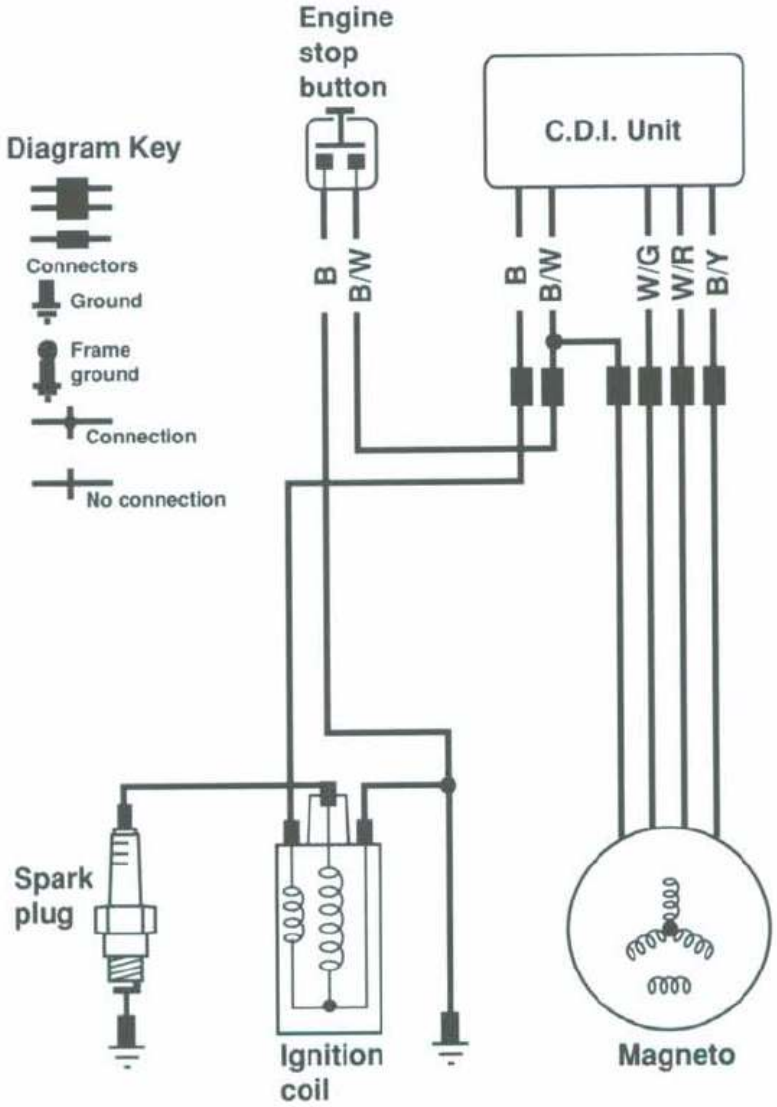
B/W	Black/White		

1987 KX125



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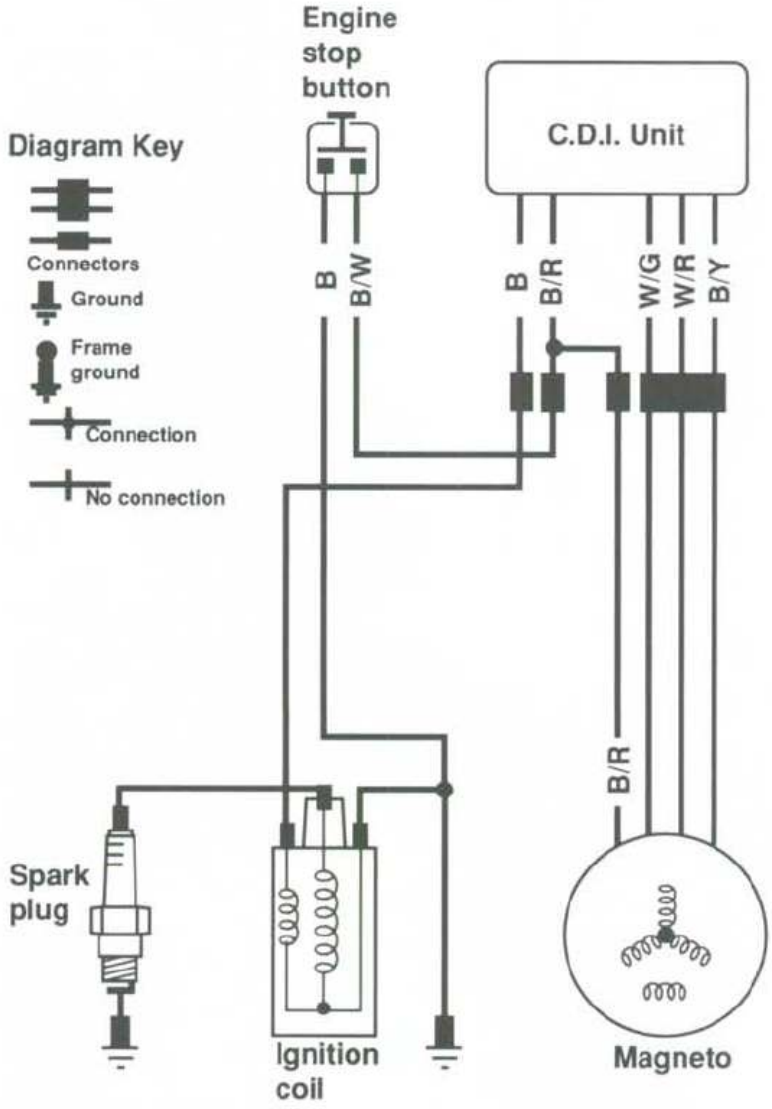
1988 KX125, KX250 and KX500



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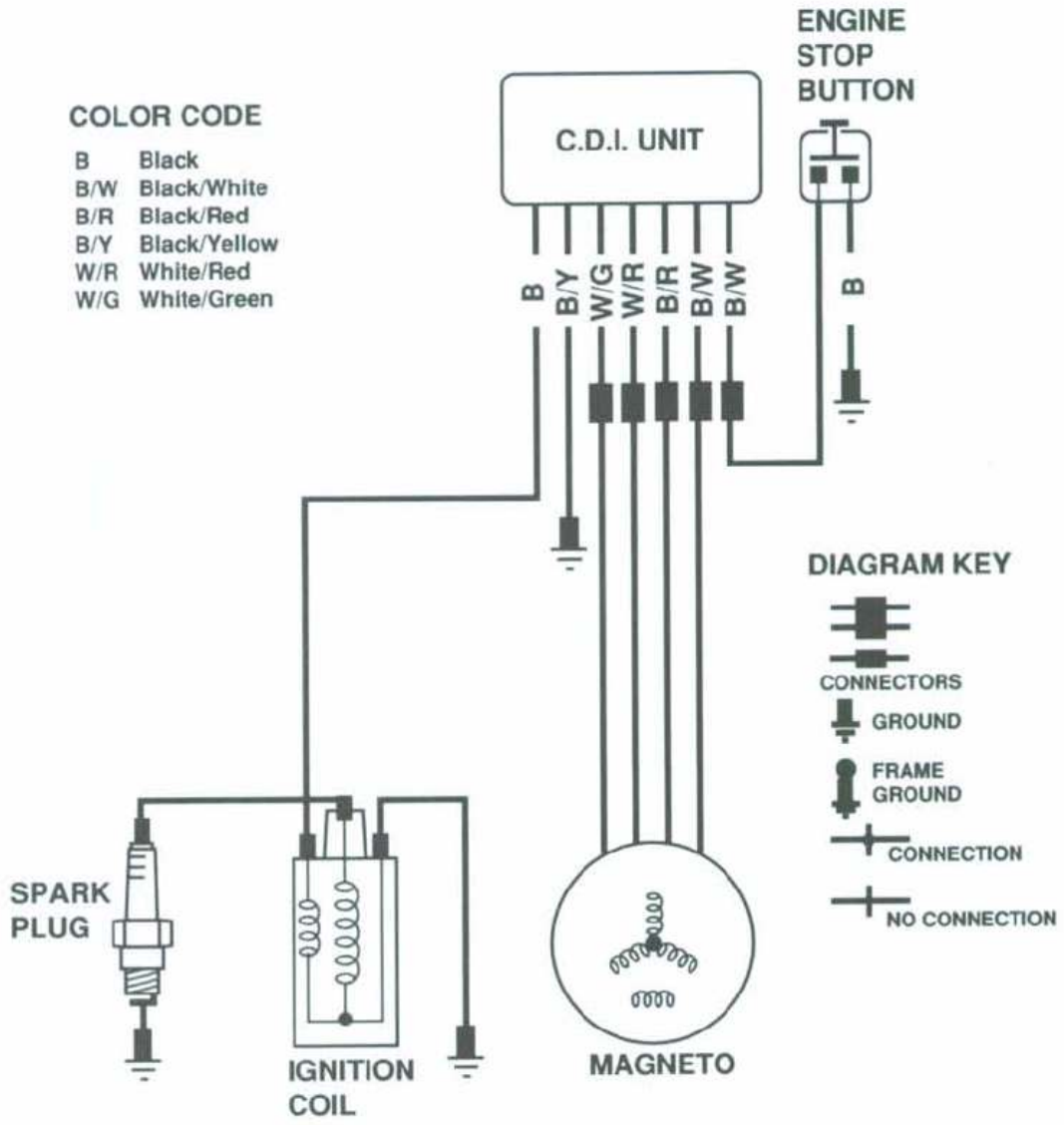
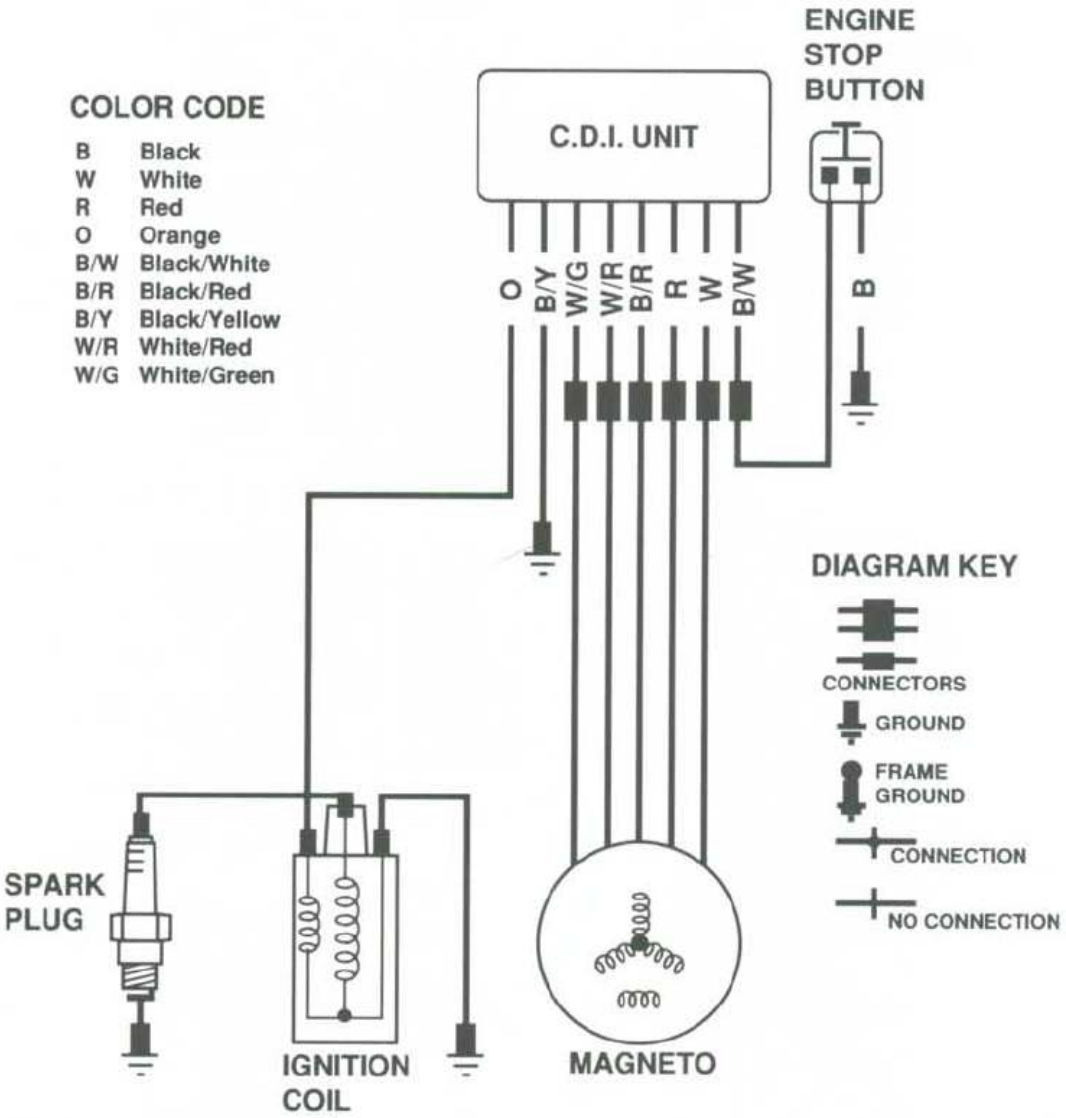
B/Y	Black/Yellow		
B/R	Black/Red		

1989 KX125 and KX250



1990 KX125 and KX250



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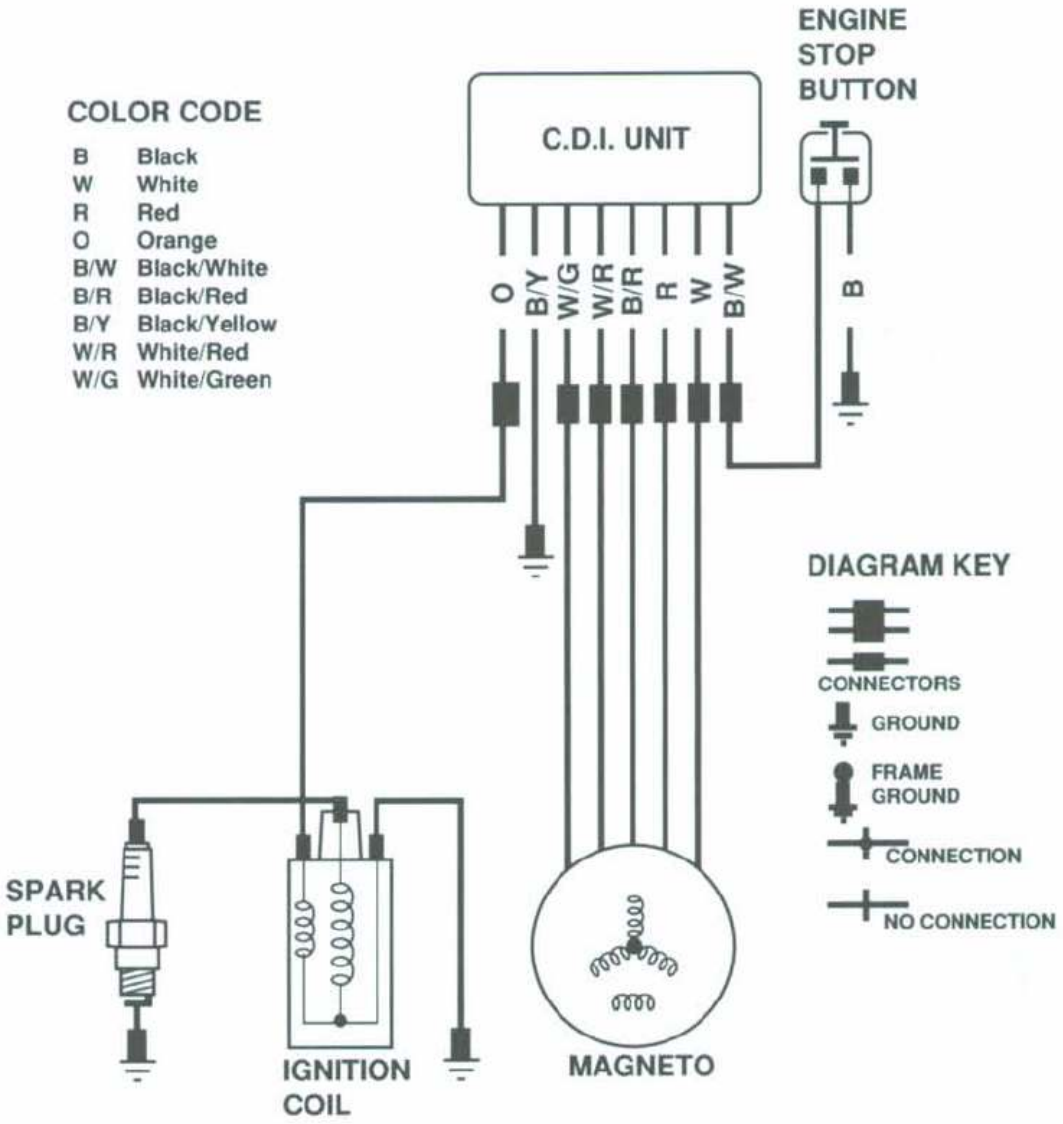
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ENGINE STOP BUTTON
O
B/Y
W/G
W/R
B/R
R
W
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DIAGRAM KEY
CONNECTORS
GROUND
FRAME GROUND
CONNECTION
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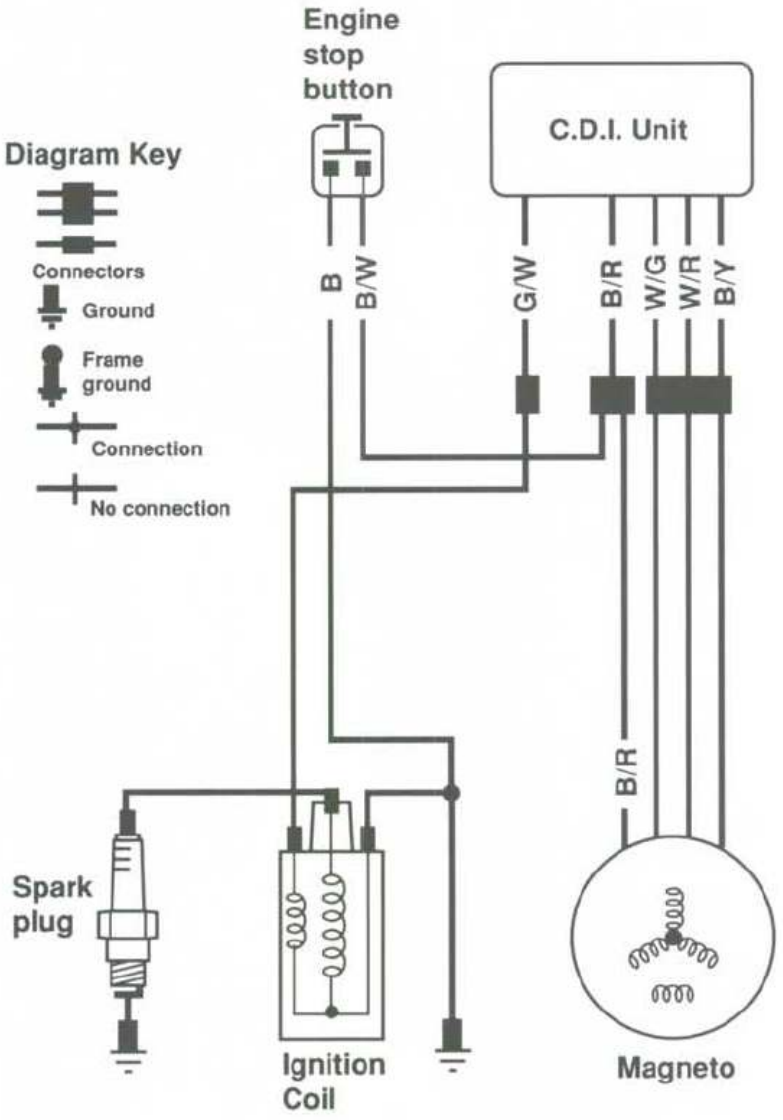
SPARK PLUG
IGNITION COIL
MAGNETO

1982 KX250



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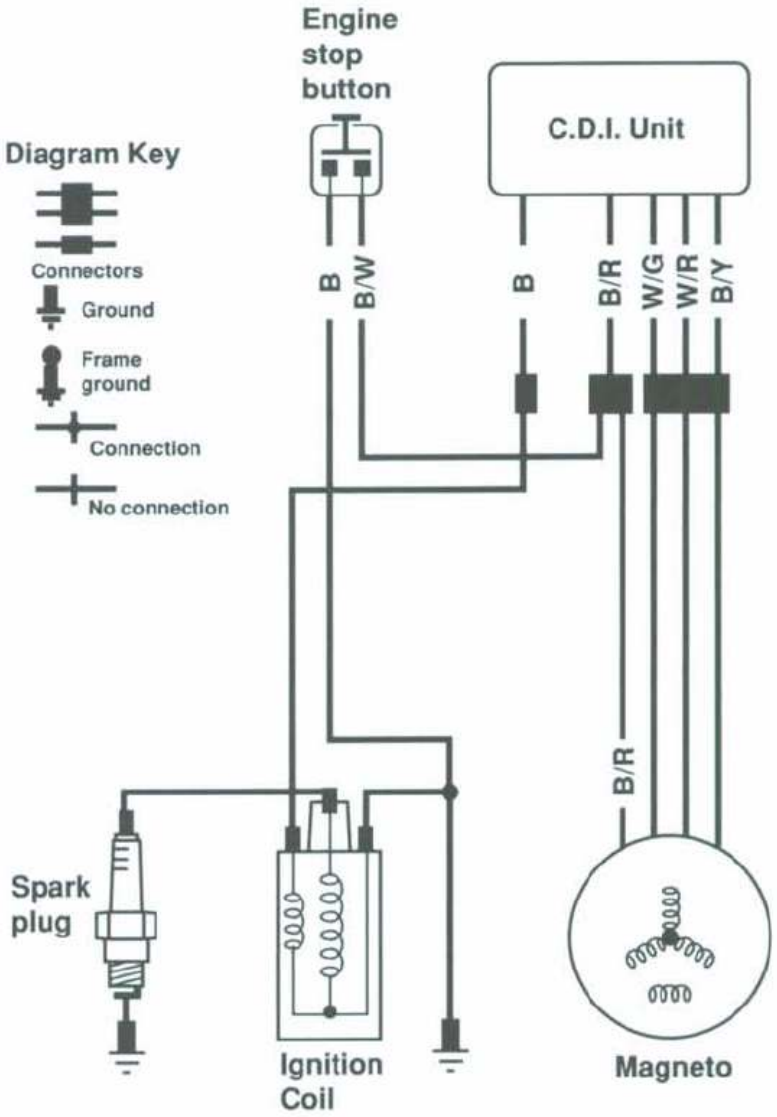
W/R	White/Red		

1983-1985 KX250



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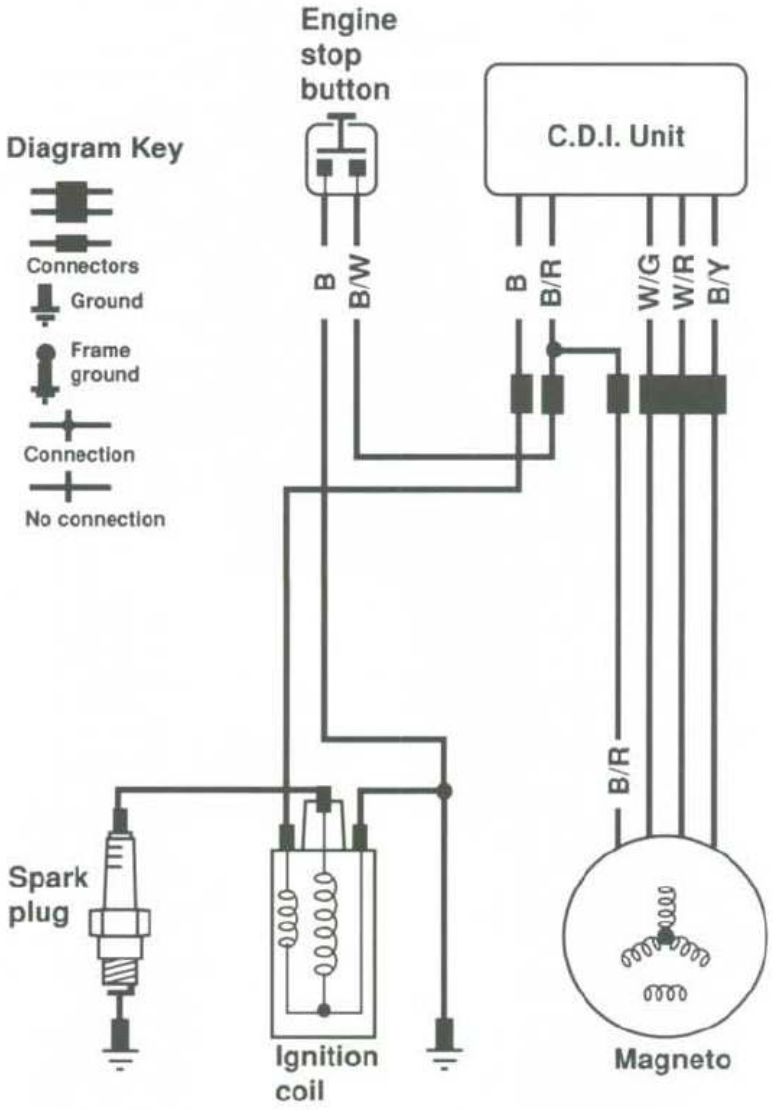
1986 KX250



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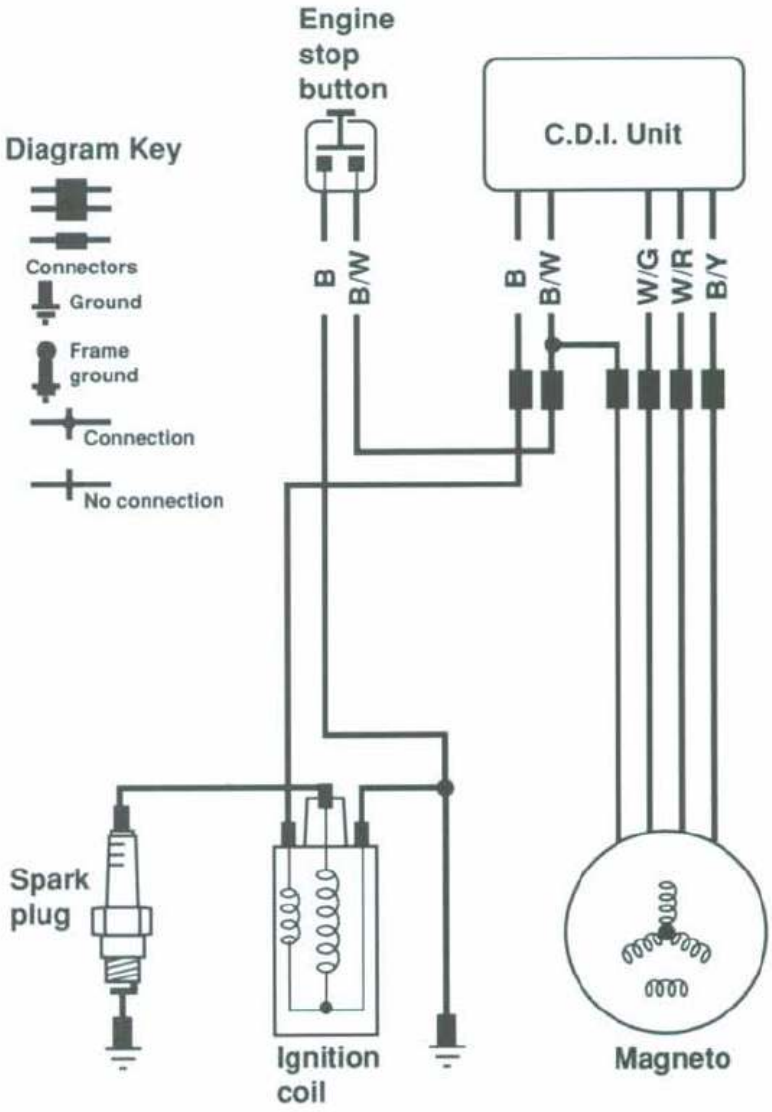
B/R	Black/Red		

1987 KX250



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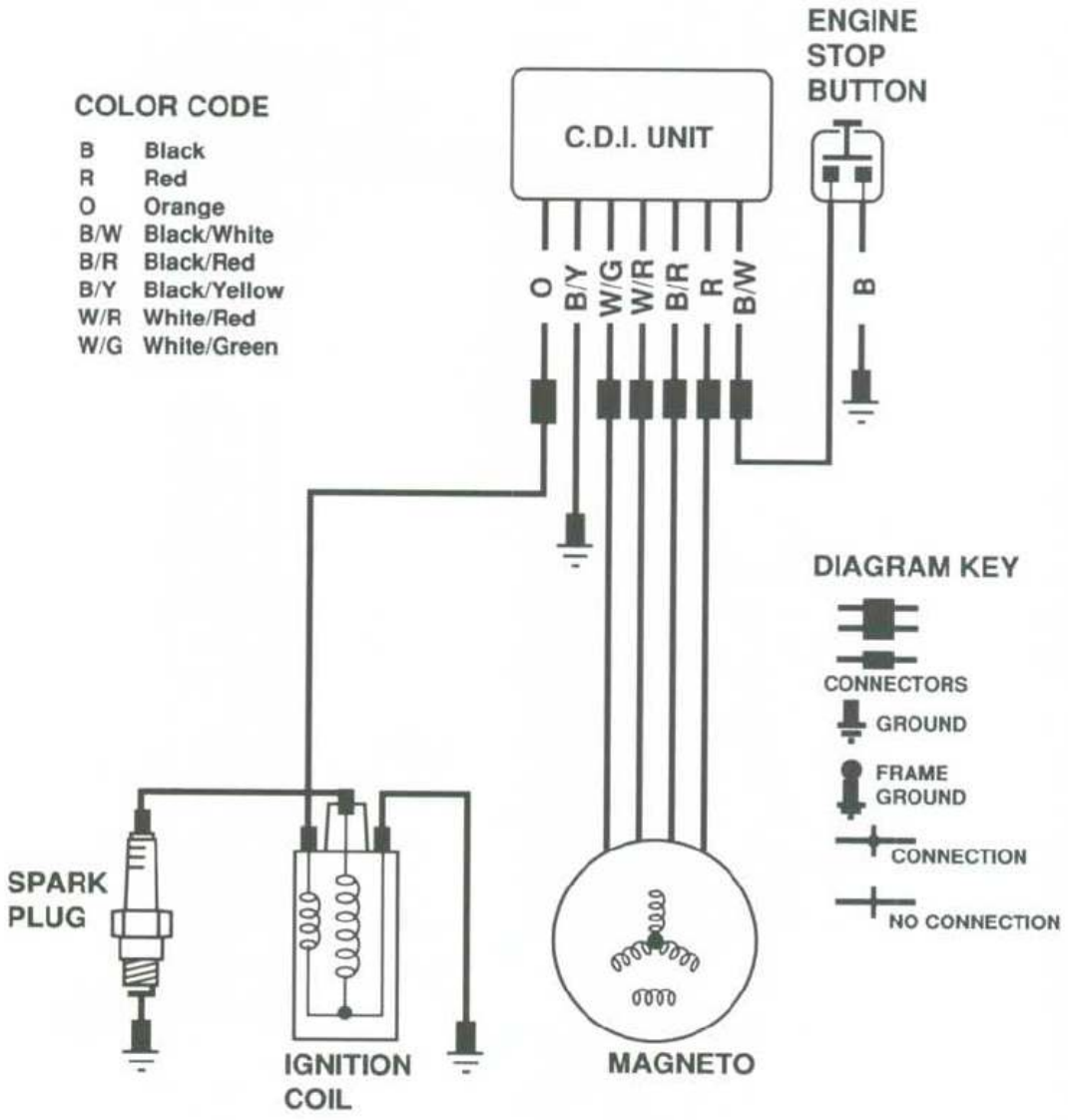
B/Y	Black/Yellow		

1991 KX250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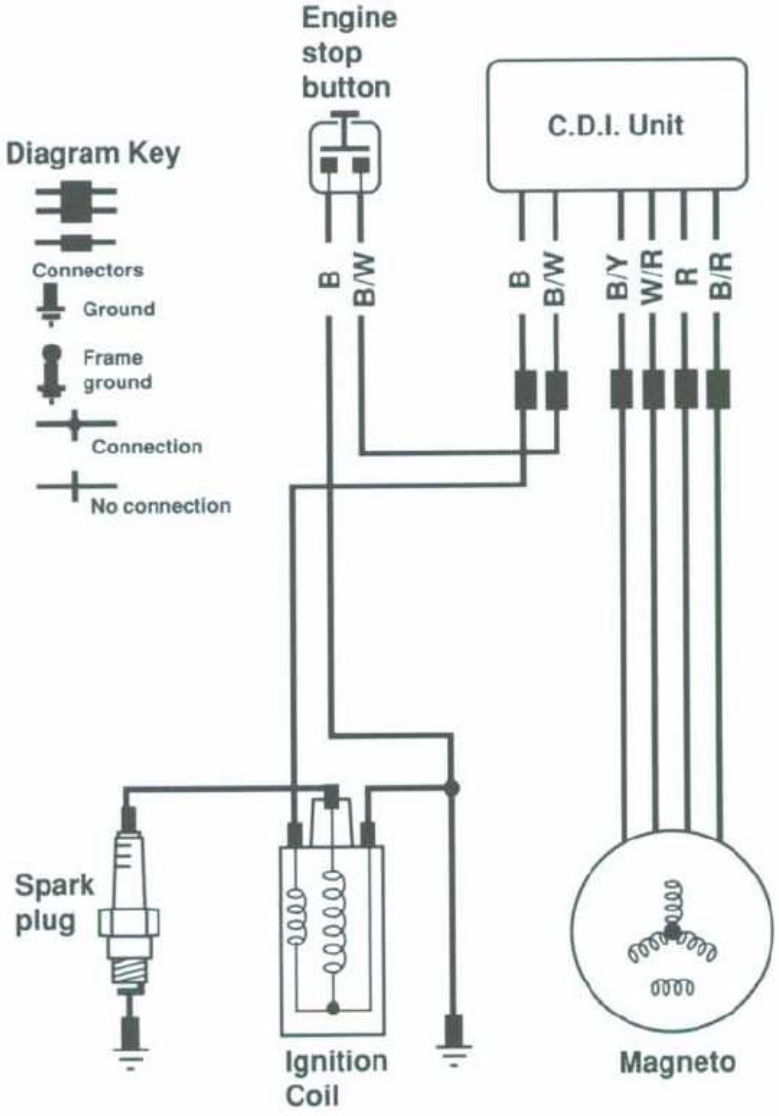
C.D.I. UNIT
ENGINE STOP BUTTON
O
B/Y
W/G
W/R
B/R
R
B/W
B
DIAGRAM KEY
CONNECTORS
GROUND
FRAME GROUND
CONNECTION
NO CONNECTION
SPARK PLUG
IGNITION COIL
MAGNETO

1983-1985 KX500



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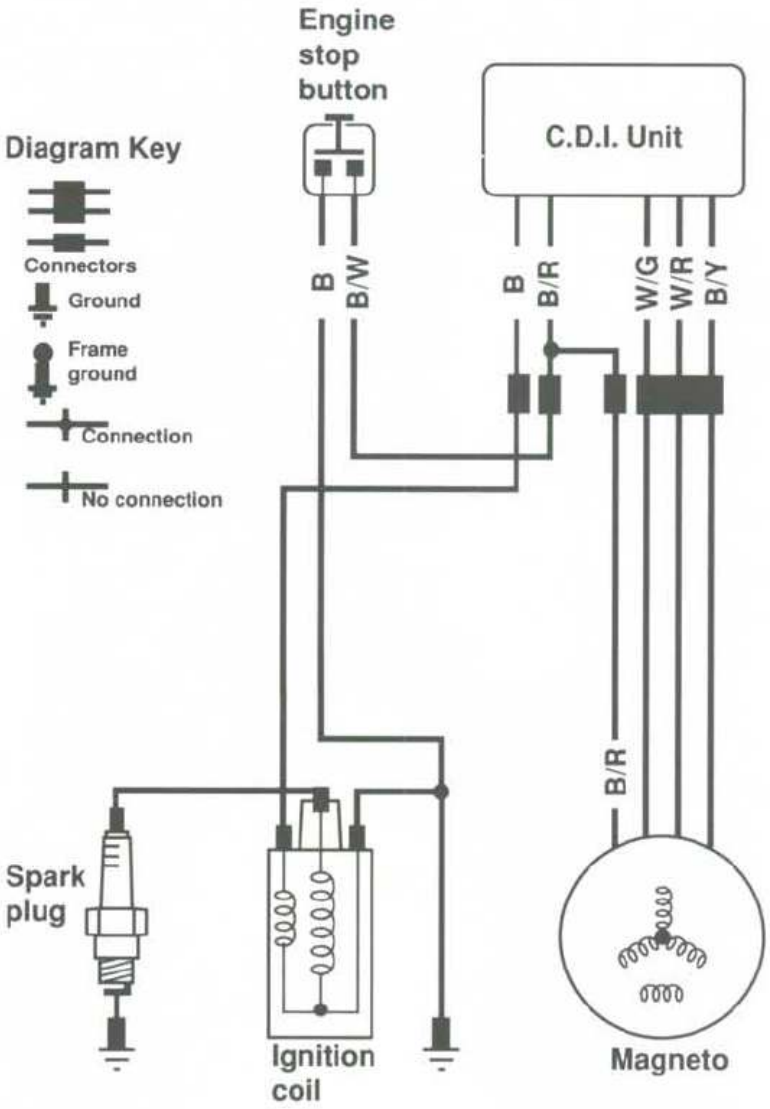
1986 KX500



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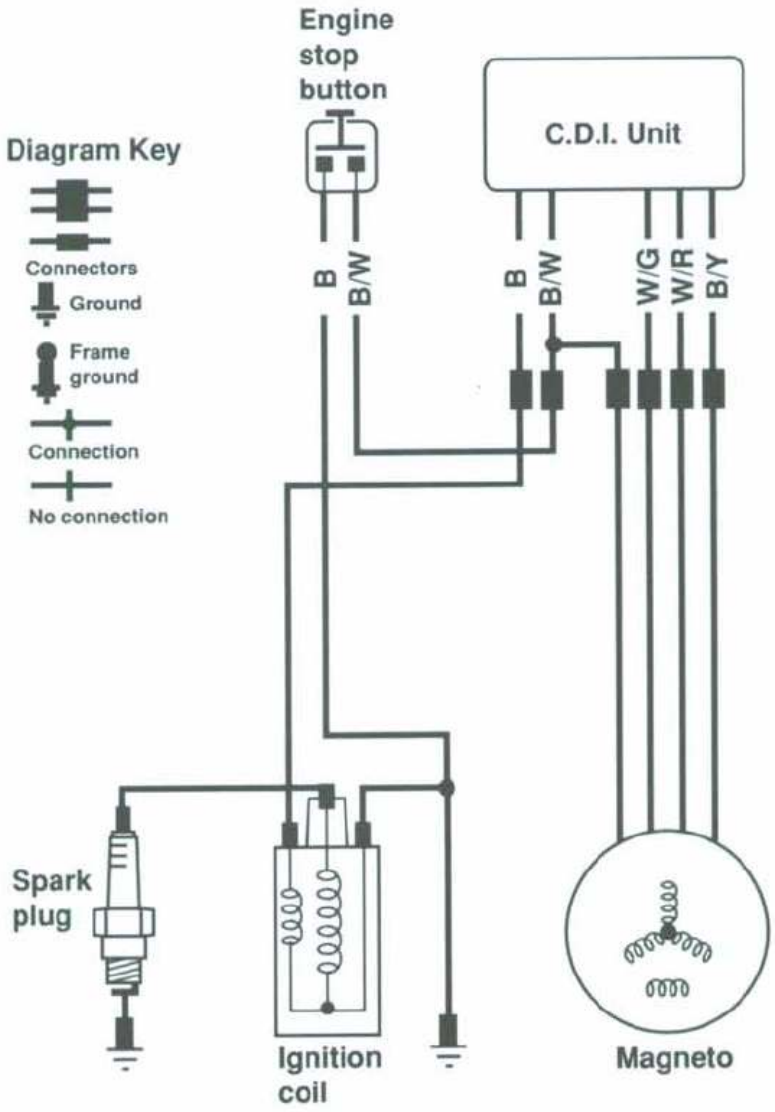
B/R	Black/Red		

1987 KX500



Color Code

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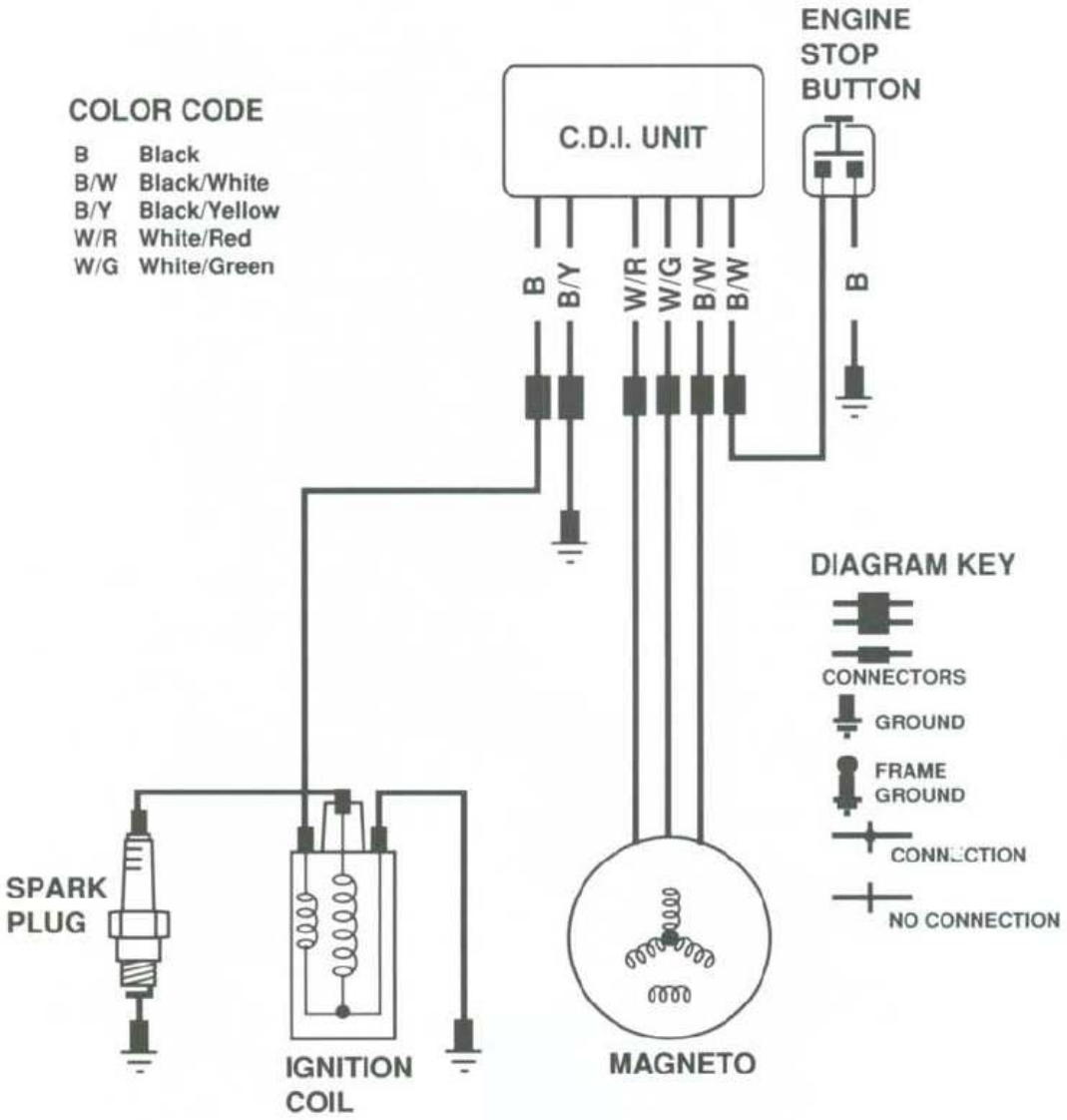
B/W	Black/White	W/G	White/Green
B/Y	Black/Yellow		

1989 KX500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C.D.I. UNIT
ENGINE STOP BUTTON
B
B/Y
W/R
W/G
B/W
B/W
B
DIAGRAM KEY
CONNECTORS
GROUND
FRAME GROUND
CONNECTION
NO CONNECTION
SPARK PLUG
IGNITION COIL
MAGNETO

1990-ON KX500