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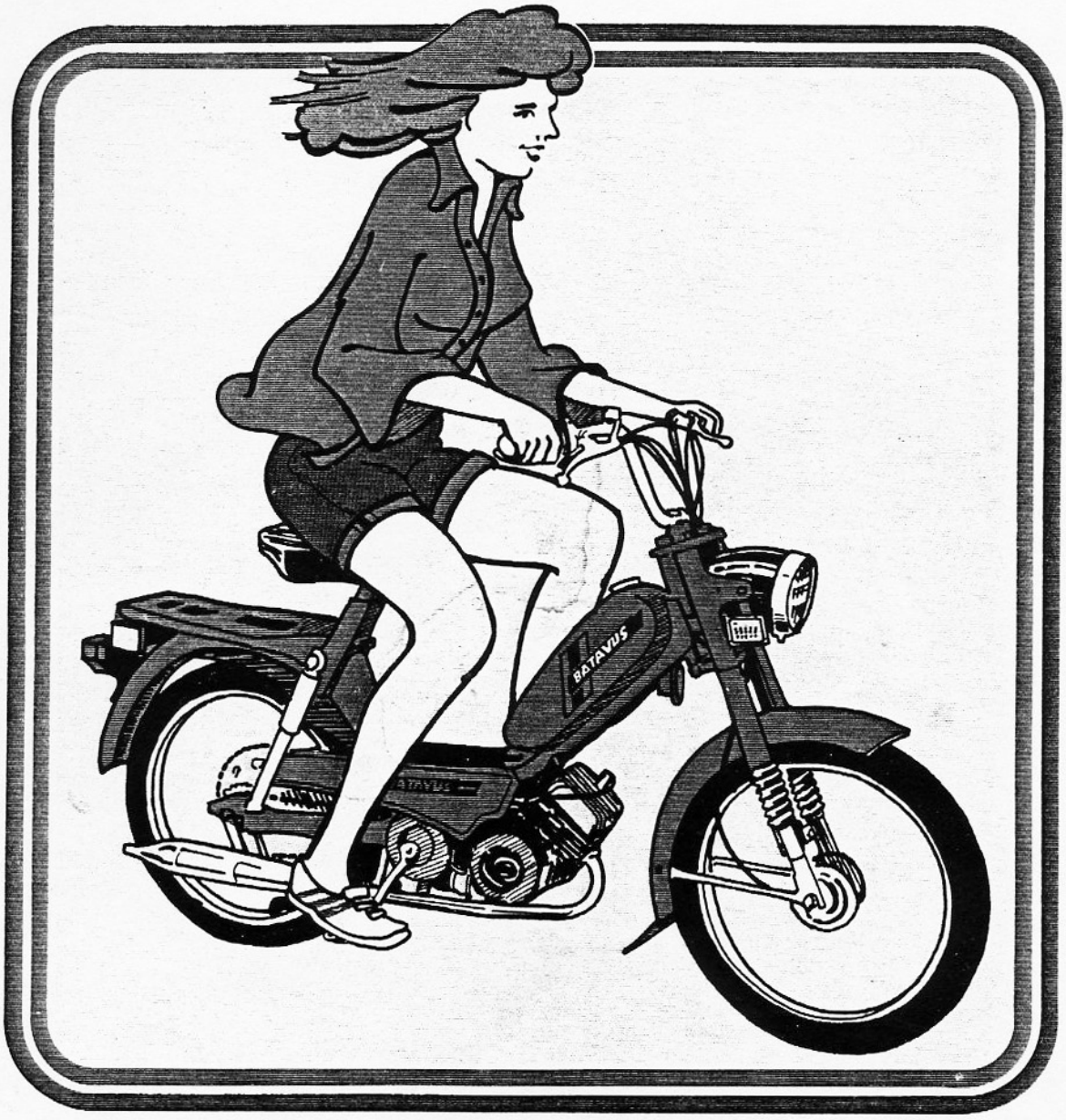
BATAVUS
MOPED
OWNER SERVICE / REPAIR
1976-1978



BATAVUS MOPED

OWNER SERVICE / REPAIR

1976-1977

By
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CLYMER PUBLICATIONS

World's largest publisher of books devoted exclusively to automobiles, motorcycles, and boats.

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CHAPTER ONE

GENERAL INFORMATION

Although mopeds have long been a favorite in Europe, it is only recently that they have become popular in the United States. Today they are more numerous and are ridden more often than ever before.

The majority of moped dealers also sell bicycles or motorcycles. The number of competent mechanics available cannot keep pace with the demand. Moped owners must often do their own maintenance and repair.

Moped maintenance and repair is not difficult if you know what tools to use and what to do. Anyone not afraid to get his or her hands dirty, of average intelligence, and with enough mechanical ability to change a light bulb can perform most of the procedures in this book.

In some cases, a repair job may require tools or skills not reasonably expected of the home mechanic. These instances are noted in each chapter and it is recommended that you take the job to your dealer, competent mechanic or machine shop.

BASIC COMPONENTS

Basically the moped is an engine-powered bicycle. It has two pedals and can be ridden as an ordinary bicycle without running the engine. **Figure 1** shows the major components of the Batavus moped.

Frame

A heavy duty, step through bicycle frame with provisions for an engine.

Engine

The engine is a very simple one cylinder, 2-stroke engine, cooled by air. It produces approximately two horsepower. This is the same type of engine used on outboard motors, lawn mowers, and many motorcycles. It is very reliable and easy to maintain.

Clutch/Transmission

The clutch/transmission is automatic, that is, there are no gears to shift and no clutch pedal or lever to worry about. The engine power is transferred to the rear wheel by a drive chain just like on a bicycle or motorcycle.

Suspension

Spring type front forks and rear shock absorbers smooth out rough roads. These are similar to those used on motorcycles but are simpler and require very little maintenance.

Brakes

The brakes are operated by levers on the handlebars, similar to those used on bicycles

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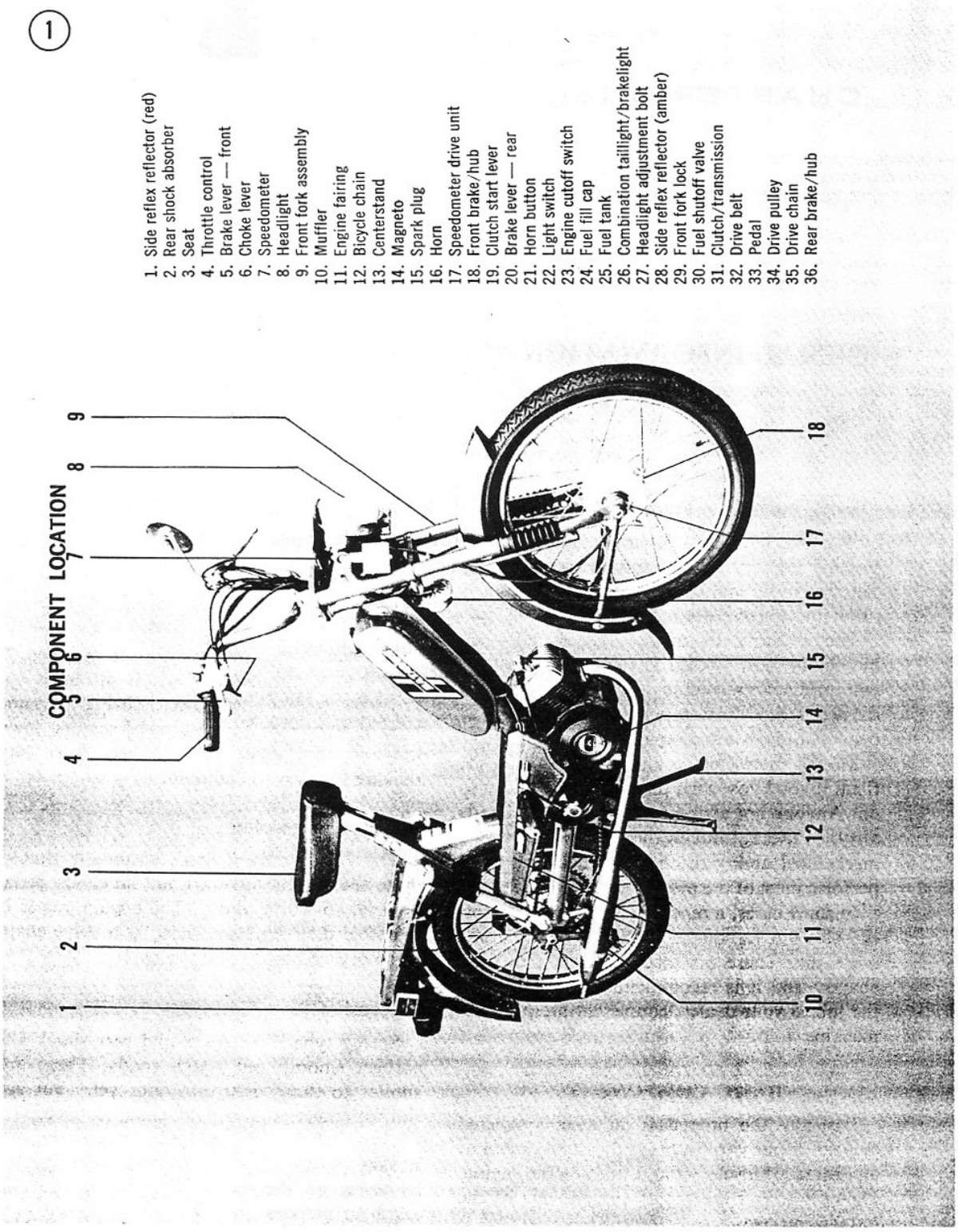
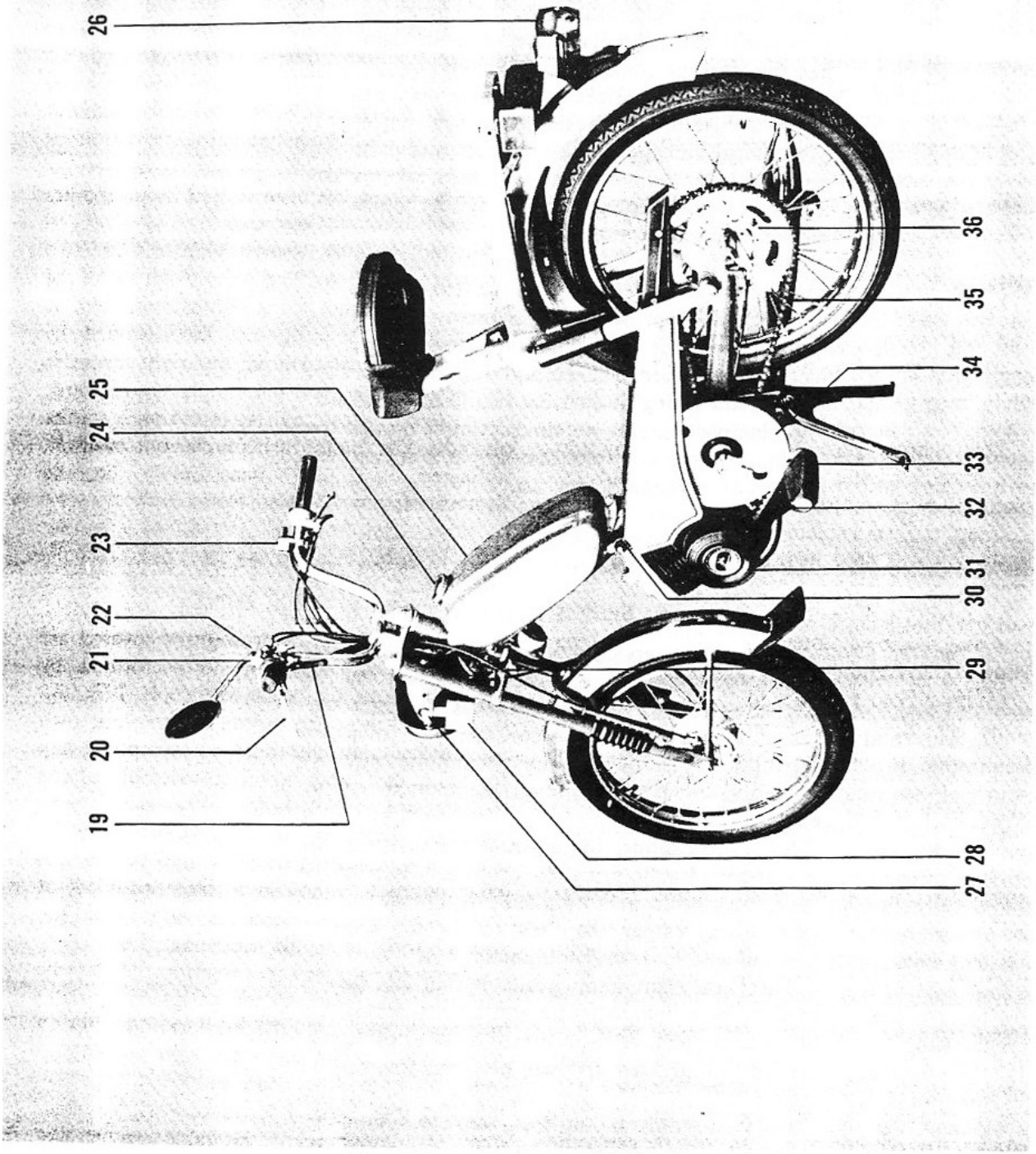


1. Side reflex reflector (red)
2. Rear shock absorber
3. Seat
4. Throttle control
5. Brake lever — front
6. Choke lever
7. Speedometer
8. Headlight
9. Front fork assembly
10. Muffler
11. Engine fairing
12. Bicycle chain
13. Centerstand
14. Magneto
15. Spark plug
16. Horn
17. Speedometer drive unit
18. Front brake/hub
19. Clutch start lever
20. Brake lever — rear
21. Horn button
22. Light switch
23. Engine cutoff switch
24. Fuel fill cap
25. Fuel tank
26. Combination taillight/brakelight
27. Headlight adjustment bolt
28. Side reflex reflector (amber)
29. Front fork lock
30. Fuel shutoff valve
31. Clutch/transmission
32. Drive belt
33. Pedal
34. Drive pulley
35. Drive chain
36. Rear brake/hub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and motorcycles. The left hand operates the rear brakes and the right hand, the front brake.

Wheel and Tires

Wheels and tires are basically the same as those used on bicycles except that they are a little heavier in order to accommodate the additional weight of the moped.

Lighting and Instruments

There is no battery to be concerned with on a moped. The electricity for lights and spark plug is provided by a small generator called a magneto. It is similar to the generator on an automobile. The only instrument is the speedometer and it is illuminated for use at night.

MANUAL ORGANIZATION

This manual provides service information and instructions for your moped. All dimensions and capacities are expressed in English units familiar to U. S. mechanics as well as in metric units.

This chapter provides general information and specifications. It also identifies and explains all of the major components.

Chapter Two explains selection and use of tools you will need in order to work on your moped.

Chapter Three explains all periodic lubrication and routine maintenance necessary to keep your moped running well.

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

Subsequent chapters describe specific systems such as the engine, clutch/transmission, and electrical system. Each chapter provides disassembly, repair and assembly procedures in simple step-by-step form. If repair is impractical for a home mechanic, it is indicated. It is usually faster and less expensive to take such repairs to a dealer or competent repair shop.

Some of the procedures in this manual specify special tools. In all cases, the tool is illustrated either in actual use or alone. A well-equipped mechanic may find that he can substitute similar tools already on hand or can fabricate his own.

The terms NOTE, CAUTION, and WARNING have specific meaning 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 result. Disregarding a CAUTION could cause permanent equipment damage; however, personal injury is unlikely.

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

Throughout this manual keep in mind two conventions. "Front" refers to the front of the moped. The front of any component, such as the engine, is the end which faces toward the front of the moped. The left and right side refer to a person sitting on the seat facing forward. For example, the clutch/transmission is on the left side. These rules are simple, but even experienced mechanics occasionally become disoriented.

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 of the engine.

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

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

Before starting on your task, work Vaseline, soap, or a commercially available product like

ProTek into your hands and under your fingernails and cuticles. This will make cleanup a lot easier.

For cleanup use a waterless hand soap, like Sta-Lube, and then finish up with powdered Boraxo and a fingernail brush.

Repairs go much easier and faster if your moped is clean before you begin work. There are special cleaners, like Gunk Cycle Degreaser, for washing the engine and related parts. Follow the manufacturer's instructions. Clean all oily or greasy parts with cleaning solvent as you remove them.

WARNING

Never use gasoline as a cleaning solvent. 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.

Special tools are required for some repairs. These may be purchased from a dealer, rented from a tool rental dealer, or fabricated by a mechanic or machinist, often at a considerable savings.

Much of the labor charge for repairs made by dealers is for the removal and disassembly of other parts to reach the defective unit. It is frequently possible to perform the preliminary operations yourself and then take the defective unit to the dealer for repair at considerable savings.

Once you have decided to tackle the job yourself, read the entire section in this manual which pertains to it. Study the illustrations, photos, and text until you have a good idea of what is involved in completing the job satisfactorily. 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.

During disassembly of parts, keep a few general cautions in mind. Force is rarely needed to get things apart. If parts have a tight fit, like a bearing in a case, there is usually a tool designed to separate them. Never use a screwdriver to pry apart parts with machined surfaces such as crankcase halves. You will mar the surfaces and end up with leaks.

Make drawings and diagrams whenever similar-appearing parts are found. For instance, the engine support bracket bolts are different lengths. You may think you can remember where everything came from — but mistakes could be costly. There is also the possibility you may be sidetracked and not return to work for days or even weeks — in which interval, carefully laid out parts may have become disturbed.

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

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

Protect finished surfaces from physical damage or corrosion. Keep gasoline off of painted surfaces.

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

Avoid flames or sparks when working near flammable liquids such as gasoline.

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

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

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

Clutch/transmission parts, wiring connections, and brake shoes should be kept clean and free of grease and oil.

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

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. Generally you should apply gasket cement to one mating surface only so

the parts may be disassembled in the future. A thin coat of oil on gaskets helps them seal effectively.

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, brake, and clutch parts.

Carbon can be removed from the head and top of the piston with a dull screwdriver. *Do not* scratch either surface. Then wipe off the surfaces with a clean cloth.

Carburetors are best cleaned by disassembling them and soaking the parts in a commercial carburetor cleaner. Never soak gaskets, or plastic or rubber parts in these cleaners. Never use wire to clean out the jet and air passages; they are easily damaged. Use compressed air to blow out the carburetor only if the float has been removed first.

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

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 moped. You could hurt yourself or damage the moped if you ignore these rules.

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. Use the proper sized wrenches to avoid damage to nuts and injury to yourself.
4. When loosening a tight or stuck nut, be guided by what would happen if the wrench should slip. Protect yourself accordingly.
5. Keep your work area clean and uncluttered.
6. Wear safety goggles during all operations involving drilling, grinding, or use of a cold chisel.
7. Never use worn tools.
8. Keep a fire extinguished handy and be sure it is rated for gasoline and electrical fires.

PARTS REPLACEMENT

Manufacturers make frequent changes during the model year; some relatively major. When you order parts from a dealer or other parts distributor, always order by engine and frame number. 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.

EXPENDABLE SUPPLIES

Certain expendable supplies are also required. These include grease, oil, gasket cement, wiping rags, and cleaning solvent. Ask your dealer for the special locking compounds, silicone lubricants, and commercial chain cleaners and lubrication products which make moped maintenance easier. Solvent is available at most service stations.

CHAPTER TWO

BASIC HAND TOOLS

A number of tools are required to maintain a moped in top condition. You may already have some around for other work such as home and car repairs. There are also tools made especially for moped repair; these you will have to purchase. In any case, a wide variety of quality tools will make moped repairs more effective and convenient.

Top quality tools are essential — and also more economical. Poor grade tools are made of inferior materials, and are thick, heavy, and clumsy. Their rough finish makes them difficult to clean and they usually don't stand up long.

Quality tools are made of alloy steel and are heat treated for greater strength. They are lighter and better balanced than inferior ones. Their surface is smooth, making them a pleasure to work with and easy to clean. The initial cost of top quality tools may be relatively high, but longer life and ease of use make them less expensive in the long run.

It is aggravating to search for a certain tool in the middle of a repair, only to find it covered with grime. Keep your tools in a tool box. Keep wrench sets, socket sets, etc., together. After using a tool, wipe off dirt and grease with a clean cloth and replace the tool in its correct place.

This chapter describes various hand tools required to perform virtually any repair job on a moped. Each tool is described and recommendations as to proper size are made for those not familiar with hand tools. **Table 1** includes tools for emergency repairs on the road. **Table 2** includes tools which should be on hand at home for simple repairs or major overhaul.

FASTENERS

In order to better understand and select basic hand tools, a knowledge of various fasteners used on mopeds is important. This knowledge will also aid selecting replacements when fasteners are damaged or corroded beyond use.

Threads

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

The best way to insure that threads on two fasteners are compatible is to turn the nut on the bolt with fingers only. If much force is required, check the thread condition on both fasteners. If thread condition is good, but the fasteners jam, the threads are not compatible. Take the fasteners to a hardware store or moped dealer for proper mates.

Table 1 EMERGENCY TOOL KIT

Tool	Size or Specification
Common screwdriver Combination wrench 8x10mm Cone wrenches Tire levers Tire patch kit	Choose smallest tools possible to fit small carrying pouch.

Table 2 HOME WORKSHOP TOOLS

Tool	Size or Specification
Screwdrivers	
Slot	5/16 x 8 in. blade
Slot	3/8 x 12 in. blade
Phillips	Size 2 tip, 6 in. blade
Pliers	
Gas pliers	6 in. overall
Vise Grips	10 in. overall
Needle nose	6 in. overall
Channel lock	12 in. overall
Snap ring	—
Wrenches	
Box-end set	8 to 19mm; 32mm
Open-end set	8 to 19mm; 32mm
Crescent (adjustable)	6 and 12 in. overall
Socket set	½ in. drive ratchet with 10 to 19mm sockets
Allen set	2 to 10mm
Cone wrenches	—
Spoke wrench	—
Other Special Tools	
Cable cutter	V-shaped cutting jaws
Impact driver	½ in. drive with assorted tips
Torque wrench	½ in. drive — 0 to 100 ft.-lb.
Tire levers	For moped or motorcycle tires

Most fasteners are cut so that a fastener must be turned clockwise to tighten it. These are called right-hand threads. Some moped components, such as pedals, have left-hand thread; they must be turned counterclockwise to tighten them.

NOTE: *When replacing threaded components, rely on your dealer's experience; take the old part in for replacement.*

Machine Screws

There are many different types of machine screws. **Figure 1** 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).

When replacing a damaged screw, take it to a hardware store or moped dealer. Match the head type, diameter, and threads exactly. In addition, match the type of metal used. For example, if the old screw is chrome plated, the new one must be chrome plated also to resist corrosion and rust.

Bolts

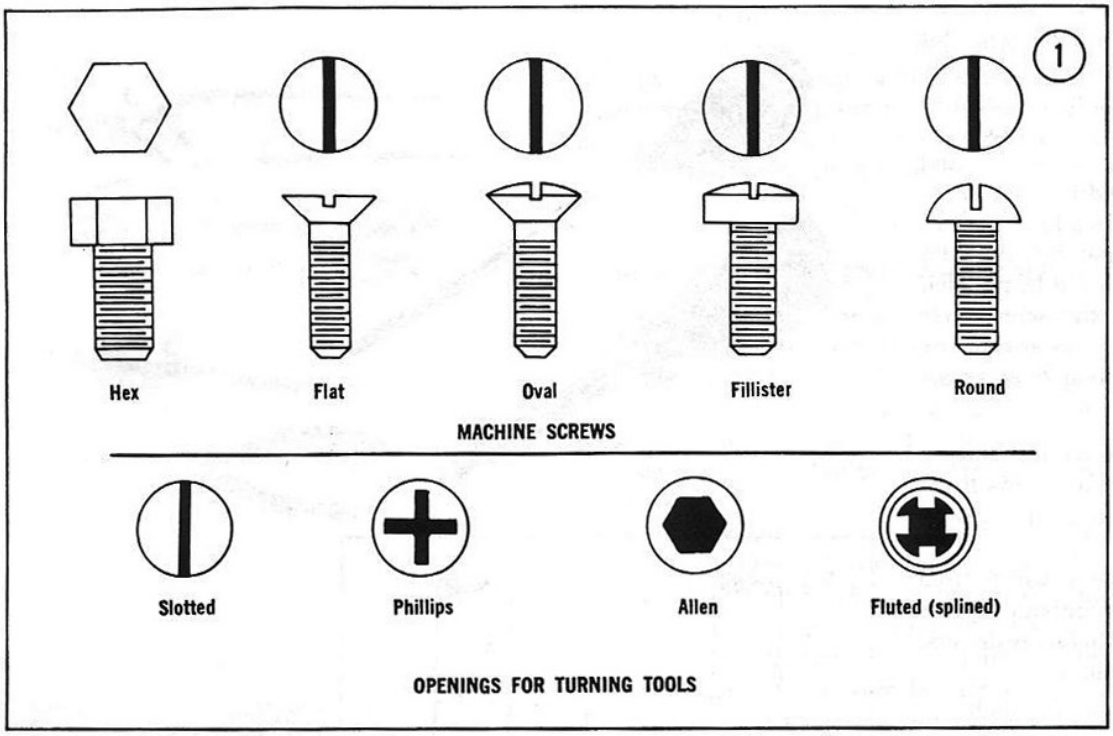
Commonly called bolts, the technical name for these fasteners is cap screws. They are normally specified by diameter, threads-per-inch (tpi), and length, e.g., ¼- 20 x 1 specifies a bolt ¼ in. diameter with 20 tpi 1 in. long.The measurement across two flats on the head of the bolt indicates the proper wrench size to be used.

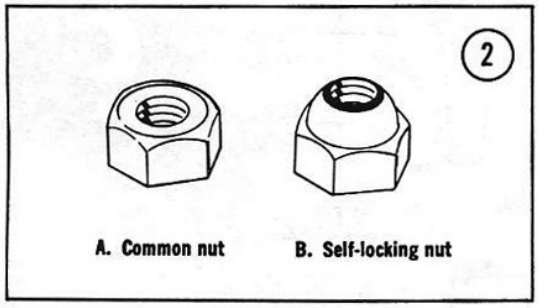
When replacing damaged bolts, follow the same advice given for machine screws.

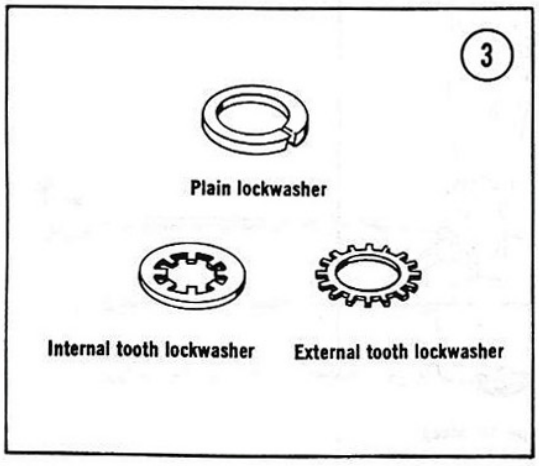
Nuts

Nuts are manufactured in a variety of types and sizes. Most nuts on mopeds are hexagonal (six sided) and fit on the bolts, screws, and studs with the same diameter and threads-per-inch.

Figure 2 shows several nuts usually found on mopeds. The common nut (A), is normally used with a lockwasher. The nut (B) has a nylon insert which prevents the nut from loosening and does not require a locknut. To indicate the size of the nut, manufacturers specify the diameter of the opening and the threads-per-inch (tpi), e.g., ¼-20 indicates a ¼ in. opening and 20 tpi.







This is, of course, the same as for bolts, but with no length dimension given. In addition, the measurement across two flats on the nut indicates the proper wrench size to be used.

When replacing a damaged nut, take it to a hardware store or moped dealer. Match the type, diameter, and threads exactly. In addition, match the type of metal used, e.g., chrome plating to resist rust and corrosion.

Washers

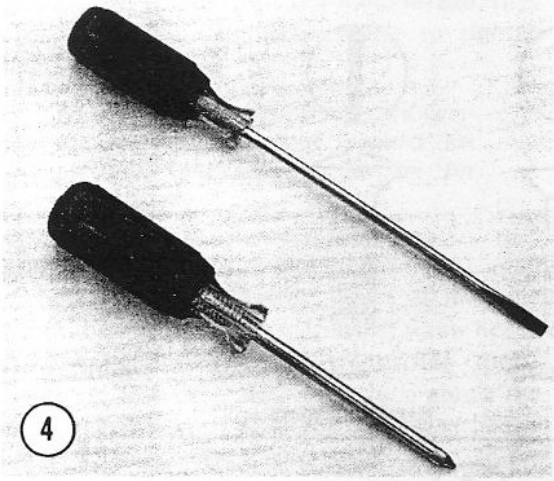
There are two major types of washers — flat washers and lockwashers. Flat washers are simple discs with a hole to fit a screw or bolt. Lockwashers are designed to prevent a fastener from working loose due to vibration, expansion, and contraction. **Figure 3** shows several washers. Note that flat washers are often used between a lockwasher and a fastener to act as a smooth bearing surface. This permits the fastener to be turned easily with a tool.

SCREWDRIVERS

The screwdriver is a very basic tool, but many people don't use it properly and conse-

quently, do more damage than good. The slot on a screw has a definite dimension and shape. A screwdriver must be selected to conform to that shape. A small screwdriver in a large slot will twist the screwdriver out of shape and damage the slot. A large screwdriver in a small slot will also damage the slot. In addition, since the sides of the screw slot are parallel, the sides of the screwdriver near the tip must be parallel. if the tip sides are tapered, the screwdriver wedges itself out of the slot; this makes the screw difficult to remove and may damage the slot.

Two basic types of screwdrivers are required to repair the moped — a common screwdriver and a Phillips screwdriver. Both types are illustrated in **Figure 4**.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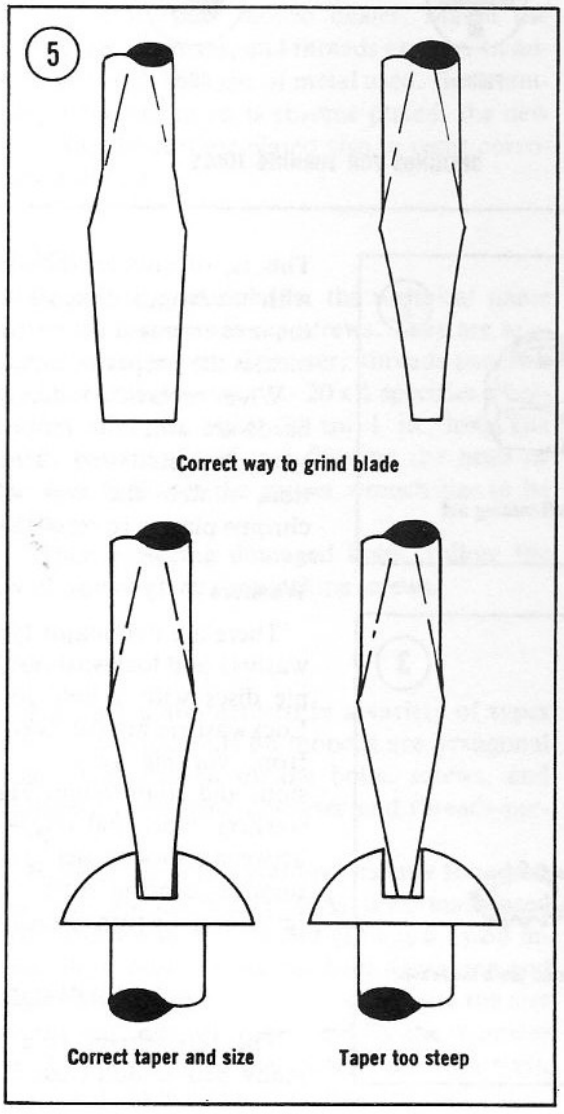
Screwdrivers are available in sets which often include an assortment of common and Phillips blades. If you purchase individual screwdrivers, obtain the following as a minimum:

a. Common screwdriver, 5/16 x 6 in. blade
b. Common screwdriver, 3/8 x 12 in. blade
c. Phillips screwdriver, size 2, 6 in. blade

Use screwdrivers only for driving screws. Never use a screwdriver for prying or chiseling. In addition, never use a common screwdriver to remove a Phillips or Allen head screw; you can damage the head so that even the proper tool cannot remove the screw.

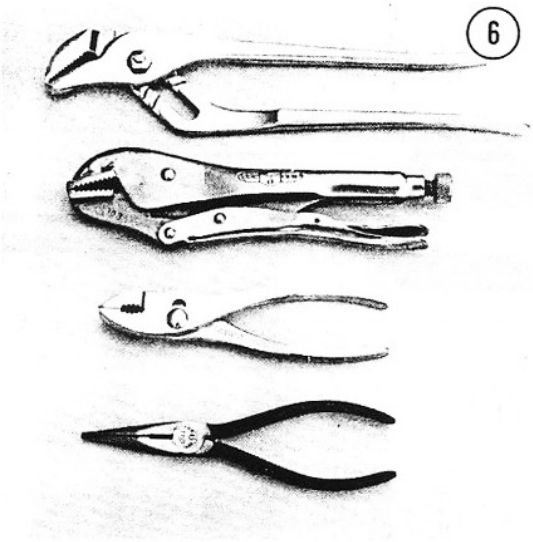
Keep screwdrivers in proper condition and they will last longer and perform better. always keep the tip in good condition. **Figure 5** shows how to grind the tip to the proper shape if it is damaged. Note the parallel sides at the tip.



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 nuts or bolts. **Figure 6** shows several pliers useful in moped repairs.

Each type of pliers has a specialized function. Gas pliers are general purpose and are used mainly for holding things and bending. Vise Grips are used as pliers or to grip objects very tightly like a vise. Needle-nose pliers are



used to hold or bend small objects. Channel lock pliers can be adjusted to hold various size objects; the jaws remain parallel to grip round objects such as pipe or tubing. There are many more types of pliers. The ones described here are most suitable for moped repairs.

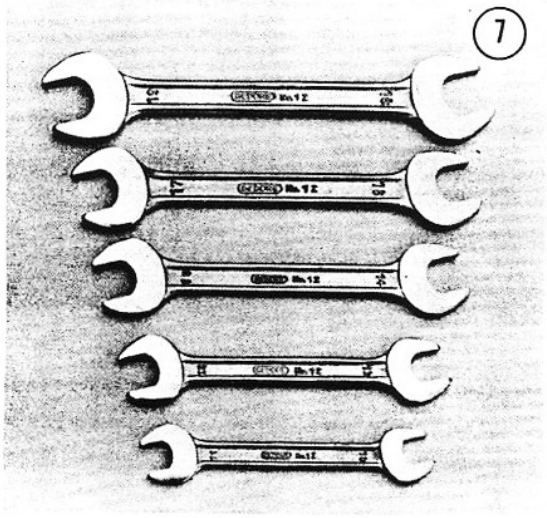
BOX AND OPEN-END WRENCHES

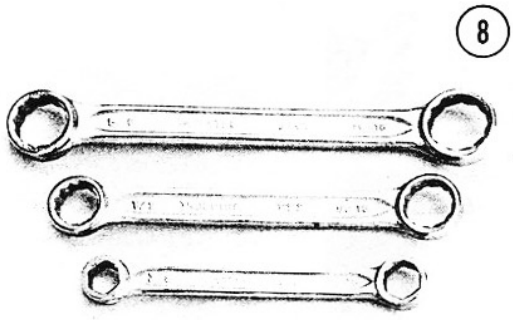
Box wrenches and open-end wrenches are available in sets or separately in a variety of sizes. See **Figure 7 and 8**. The size stamped near the end refers to the distance between two parallel flats on a hex head bolt or nut.

A set covering 8-19mm and 32mm is adequate for service on the moped.

Box wrenches are usually superior to open-end wrenches. Open-end wrenches grip a nut on only two flats. Unless it fits well, it may slip and round off the points on the nut. The box wrench grips all six flats. Both 6-point and 12-point openings on box wrenches are available. The 6-point gives superior holding power; the 12-point allows a shorter swing.

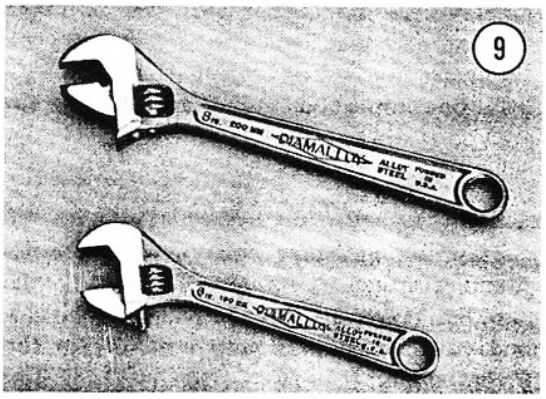
Combination wrenches which are open on one end and boxed on the other are also available. Both ends are the same size.





ADJUSTABLE WRENCHES

A Crescent or any other brand of adjustable wrench can be adjusted to fit nearly any nut or bolt head. See **Figure 9**. However, it can loosen and slip, causing damage to the bolt or nut. Use only when fixed-opening wrenches are not available.



Adjustable wrenches come in sizes ranging from 4 in. to 18 in. overall length. A 6 or 8 in. adjustable wrench is recommended as an all-purpose wrench.

SOCKET WRENCHES

This type is undoubtedly the fastest, safest, and most convenient to use. See **Figure 10**. Sockets which attach to a ratchet handle are available with 6-point or 12-point openings and ¼, ⅜, ½ and ¾ inch drives. The drive size indicates the size of the square hole which mates with the ratchet handle. Sockets are available in metric and inch sizes.

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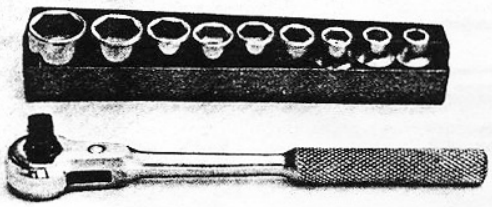

CONE WRENCHES

Cone wrenches are nothing more than especially thin open-end wrenches. See **Figure 11**. These wrenches are available separately or in sets of metric or inch sizes. Obtain size required for your moped; they are available at most moped and bicycle dealers.

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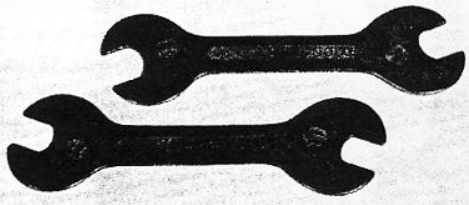

TORQUE WRENCH

Torque wrench is used with a socket to measure how tight a nut or bolt is installed. See **Figure 12**. They come in a wide price range and with either ⅜ or ½ in. square drive. The drive size indicates the size of the square drive which mates with the socket. An inexpensive one that measures from 1-100 ft.-lb. (0-140 N•m) retails for about $15.

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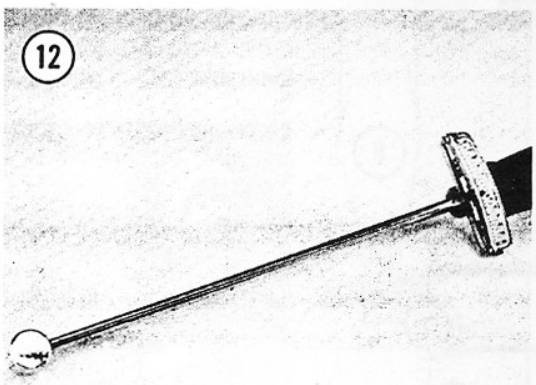
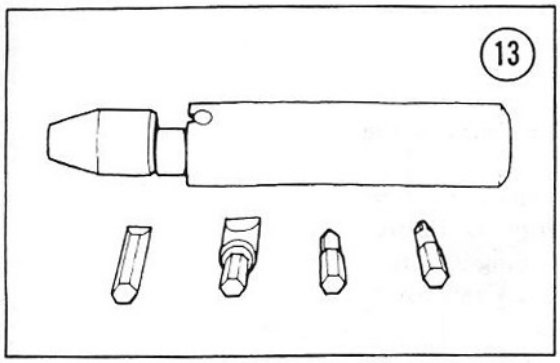


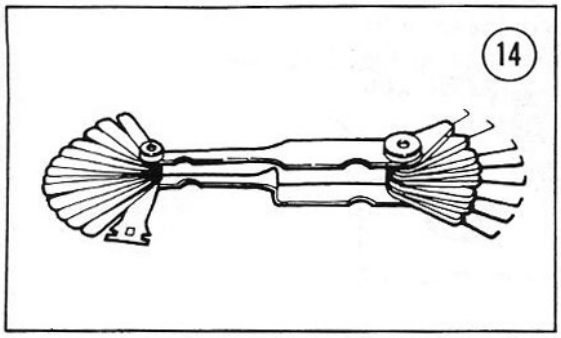
IMPACT DRIVER

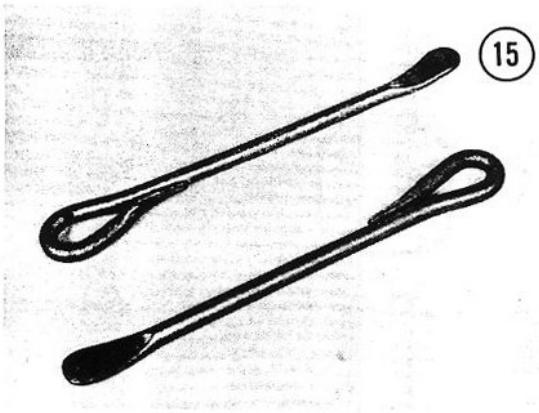
This tool might have been designed with the moped in mind. See **Figure 13**. It makes removal of engine and clutch parts easy and eliminates damage to bolts and screw slots. A good one runs about $15 at large hardware or auto parts stores.

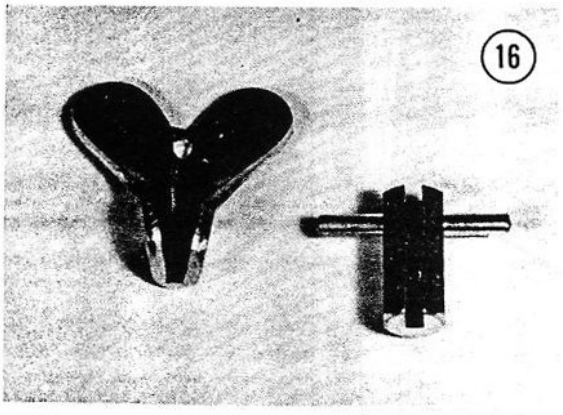
IGNITION GAUGE

This tool measures point gap. It also has round wire gauges for measuring spark plug gap. See **Figure 14**. A good one runs about $3 and is available at most auto or motorcycle supply stores.









TIRE LEVER

These are used to remove or install moped tires. See **Figure 15**. Check the working end of the tool before use and remove any burrs. Never use a screwdriver in place of a tire lever. Chapter Ten explains its use.

SPOKE WRENCH

This special wrench is used to tighten spokes. See **Figure 16**. It is available at most moped, bicycle, or motorcycle supply shops.

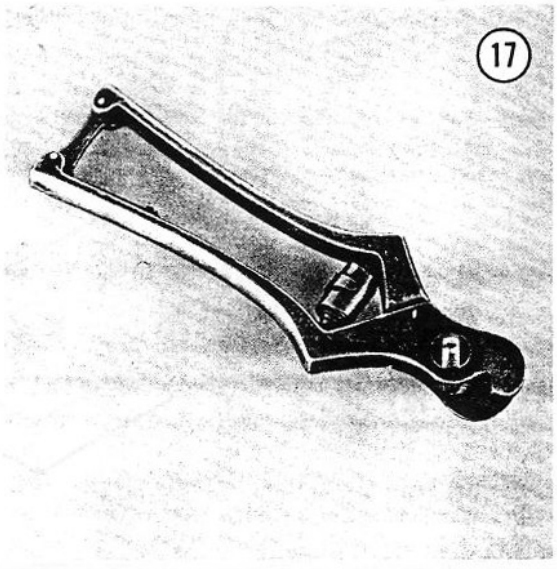
CABLE CUTTER

A cable cutter is useful for cutting brake and accelerator cables. See **Figure 17**. Use the type with V-shaped jaws which shear the cable cleanly. Wire cutters which pinch the cable can be used, but they flatten the ends of the cable making it almost impossible to thread it into its housing.

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 any hardware or auto supply store). Apply it liberally. Rap the fastener several times with a small hammer; don't hit it hard enough to cause damage.



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 a screwdriver, grip the head with Vise-Grip pliers and twist the screw out.

Remedying Stripped Threads

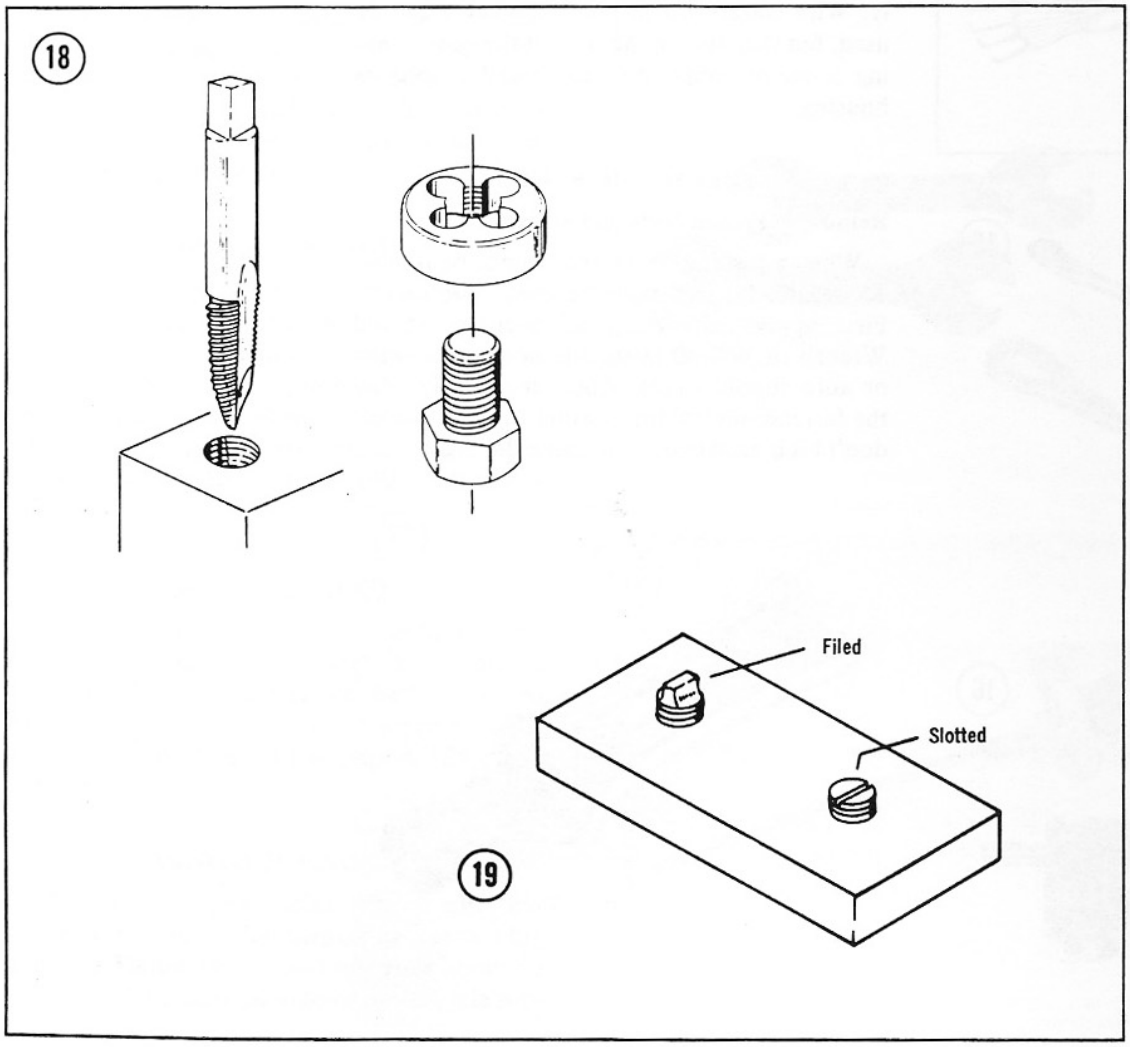
Occasionally, threads are stripped through carelessness or impact damage. Often the threads can be cleaned up by running a tap (for internal threads on nuts) or die (for external threads on bolts) through the threads. See **Figure 18**.

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 Grips. If the projecting portion is too small, try filing it to fit a wrench or cut a slot in it to fit a screwdriver. See **Figure 19**.

If the head breaks off flush, try using 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 20**.



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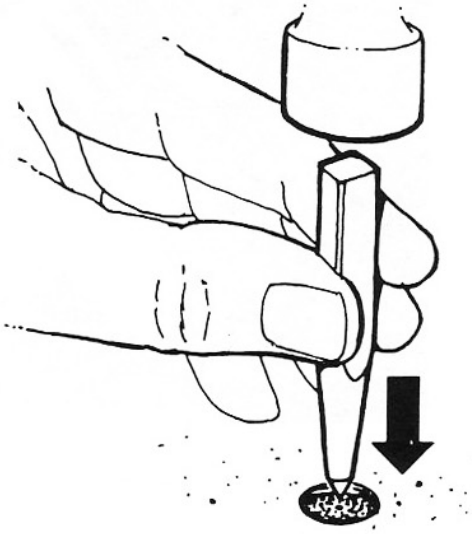
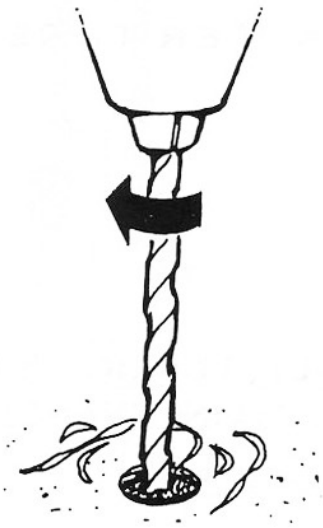
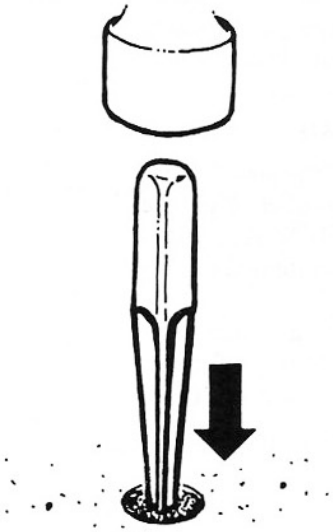


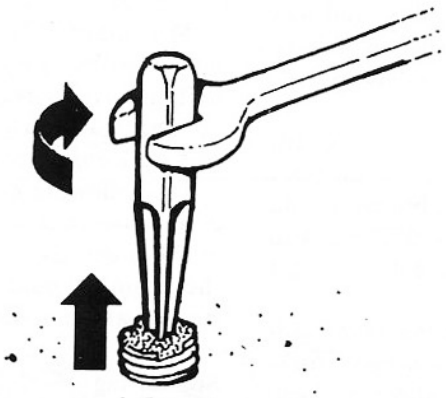
1. Center punch broken stud



2. Drill hole



3. Tap in extractor



4. Remove

CHAPTER THREE

TUNE-UP, LUBRICATION, AND MAINTENANCE

If this is your first experience with an engine-powered vehicle, you should become acquainted with products that are available in auto or motorcycle parts and supply stores. Look into the tune-up tools and parts, check out the different lubricants such as 2-stroke motor oil, chain cleaner, and oils and greases. Also check engine degreaser, like Gunk Cycle Degreaser, for cleaning your moped prior to working on it. See what is available to maintain the appearance properly such as polish and wax for the painted surfaces, Armor All for rubber and vinyl, and Simichrome for all plated, polished, and stainless parts.

The more you get involved with your moped, the more you will want to work on it. Start out by doing the simple tune-up, lubrication and maintenance. Tackle more involved jobs as you gain experience so that you will not get frustrated and discouraged.

A moped is a relatively simple machine but it does require periodic attention to keep it working properly. Without proper attention, you may soon face a number of expensive repairs.

Most expensive repairs can be prevented. A regular program of periodic inspection, lubrication, and maintenance will help find trouble before it becomes major and actually prevent most trouble due to wear.

This chapter explains tune-up, periodic adjustments, maintenance, inspection, and lubrication required on all mopeds.

You can perform all of the procedures in less than one day. Considering the number of carefree, safe, and enjoyable hours of riding possible with a well-maintained moped, maintenance time represents a "bargain" investment.

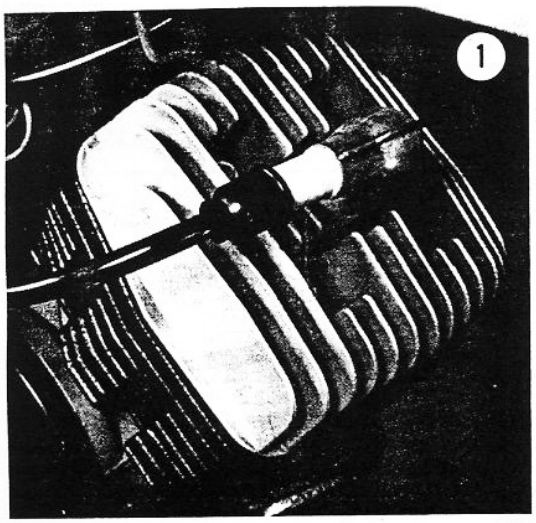
ENGINE TUNE-UP

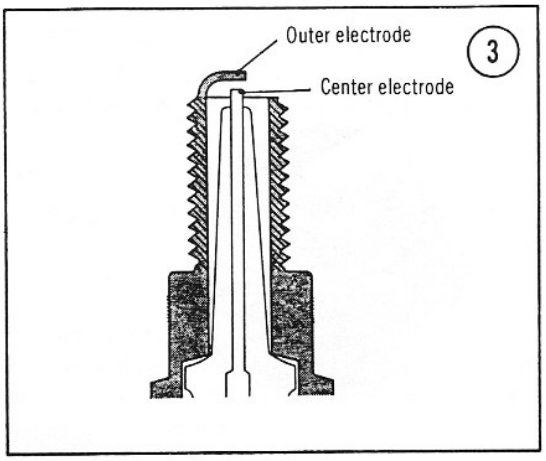
The number of definitions of the term "tune-up" is probably equal to the number of people defining it. For purposes of this book, a tune-up is general adjustment and maintenance to insure peak engine power.

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 service.

Spark Plug

Every 1,000 miles, or sooner if necessary, remove the spark plug. To remove the spark plug, first clean the area around its base to prevent dirt or other material from entering the cylinder. Next remove the spark plug wire from the top of the spark plug (**Figure 1**) by pulling



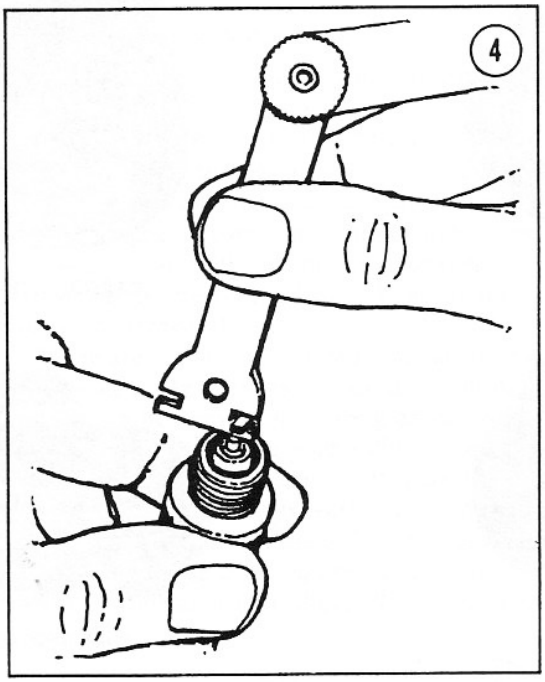


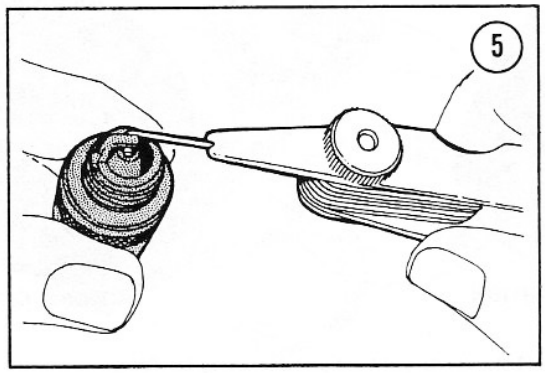
straight off. Unscrew the spark plug, using the spark plug wrench furnished with your moped or use a 13/16 in. deep socket wrench. If difficulty is encountered removing the spark plug, apply penetrating oil like Liquid Wrench or WD-40 to its base and allow about 20 minutes for the oil to work in.

After removing the spark plug, check its condition with those shown in **Figure 2**. If the spark plug has a light tan or gray colored deposit and no abnormal gap wear or electrode erosion is evident, the engine is running properly. Clean the end that goes into the cylinder head with a wire brush. Inspect it for worn or eroded electrode. These are the two points which the spark jumps (**Figure 3**). Replace the spark plug if there is any doubt about its condition. If the spark plug is OK, file the center electrode square, then adjust the gap by bending the outer electrode only with a spark plug gapper tool (**Figure 4**). Measure the gap with a round wire spark plug gauge as shown in **Figure 5**. Do not use a flat gauge as it will indicate an incorrect reading. The proper gap is 0.020 in. (0.5mm).

Before installing the spark plug, clean the seating area on the cylinder head and always use a new gasket. Install the plug only finger-tight, then tighten it an additional one-half turn with a spark plug wrench. Wipe off the top tip of the spark plug and install the spark plug wire.

It is a good idea to carry a spare spark plug





SPARK PLUG CONDITIONS

(2)

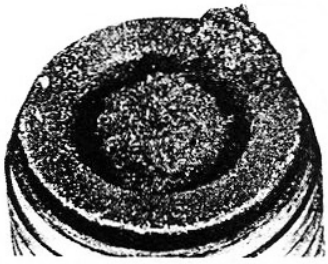
NORMAL USE

OIL FOULED

CARBON FOULED

OVERHEATED

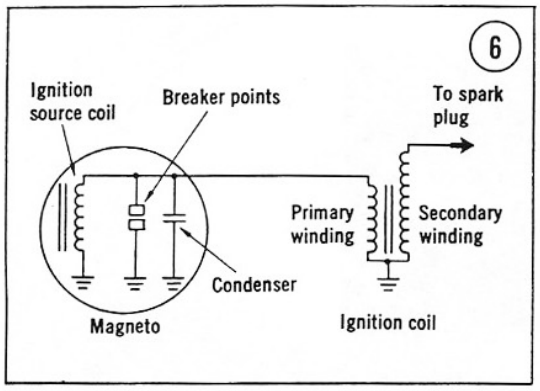
GAP BRIDGED



SUSTAINED PREIGNITION

WORN OUT

Photos courtesy of Champion Spark Plug Company.

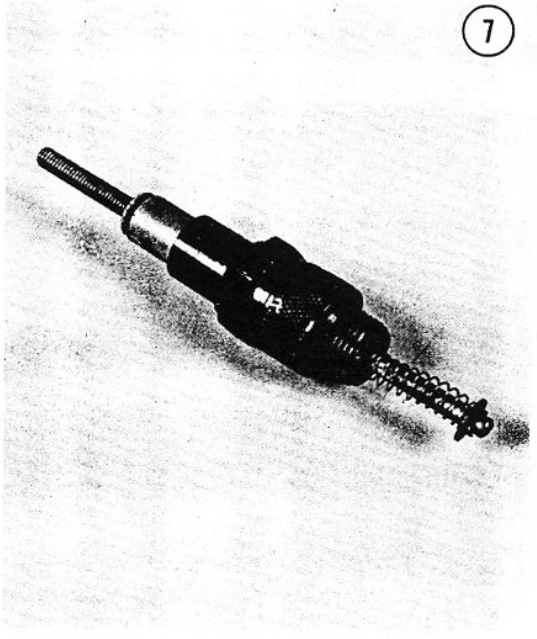


with you at all times. Keep it in its original package to protect it. The proper spark plug is a Bosch 175T1 for the 20 and 25 mph version, and a Bosch W240T1 for the 30 mph version.

Magneto

The engine-mounted magneto generates electricity for the lights and spark plug. It works similar to a generator or alternator on an automobile, but is more compact and is attached directly to the engine.

Figure 6 illustrates the typical ignition circuit leading to the spark plug. Chapter Eight describes how it works in more detail.

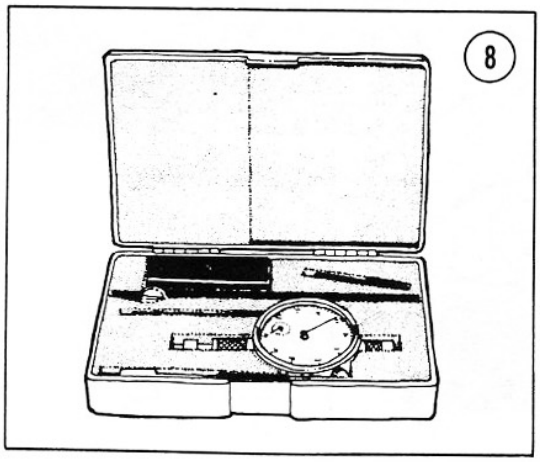


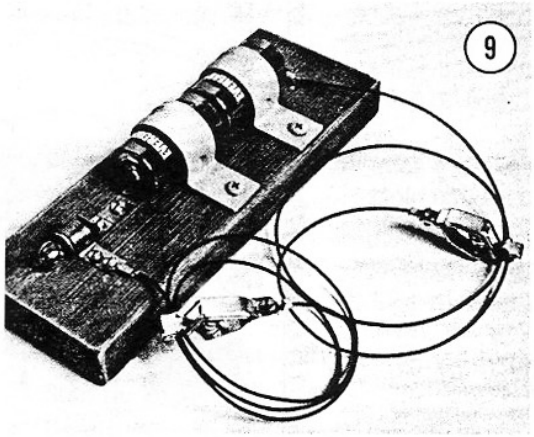
Magneto Ignition Timing and Breaker Point Adjustment

For the most accurate setting of magneto timing, it is necessary to know the exact position of the piston in the cylinder. This can be measured with a timing tool that screws into the spark plug hole in the cylinder head. It has a rod that goes down into the cylinder and touches the top of the piston. Outside there is a measuring device that indicates how far down the rod has traveled.

There are different types available at quite a wide price range. The one discussed in this procedure is a homemade unit using an old spark plug, some metal tubing, and a sliding rod with 1mm increments scribed onto it (**Figure 7**). The most accurate but most expensive, is the dial indicator which retails for about $30 (**Figure 8**).

This procedure also requires a test light. It can be a homemade unit (**Figure 9**) that consists





of two "C" or "D" size flashlight batteries and a lightbulb, all mounted on a piece of wood, some light gauge electrical wire, and alligator clips. These items can be purchased from any hardware store.

The following procedure is based on the test units shown in **Figure 7 and 9**. If other types are used, follow the manufacturer's instructions.

1. Remove the 4 screws securing the engine fairing (**Figure 10**) and remove it.

2. Remove the magneto cover, right-hand side of moped, by pulling both rubber straps from the lugs on the engine (**Figure 11**).

3. Rotate the rotor clockwise until the gap is open to maximum. The correct gap is 0.016 in. (0.4mm). Insert a flat feeler gauge between the points, if the setting is incorrect slightly loosen the breaker points attachment screw "A" (**Figure 12**) and insert a screwdriver between the adjusting notches "B" and turn slightly until the breaker points start to drag on the feeler gauge, then tighten the adjusting screw "A" securely. Recheck the setting after securing the adjusting screw. The points are now adjusted correctly.

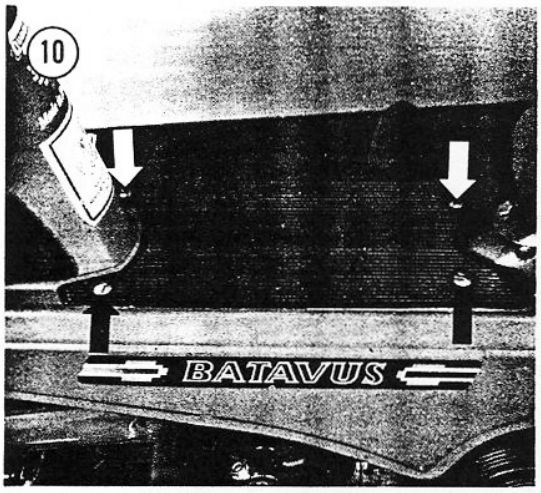
4. Clean the area around the spark plug and remove the spark plug. Screw the timing tool all the way in by hand; it is not necessary to tighten it with a wrench.

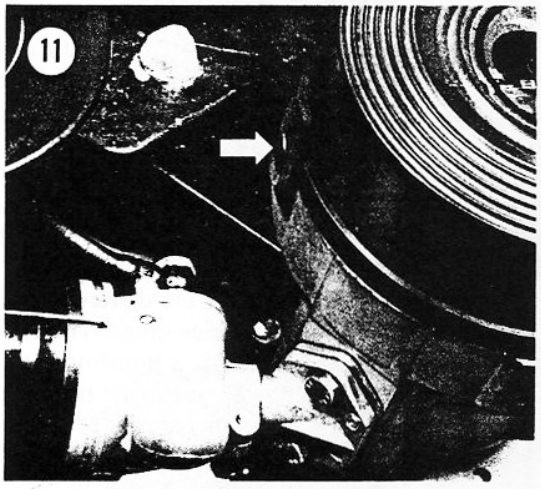
5. Find the top dead center position of the piston by rotating the rotor *clockwise in the direction of normal engine rotation* (arrow on the magneto rotor indicates this direction). Top dead center is reached when the rod stops its upward travel (**Figure 13**).

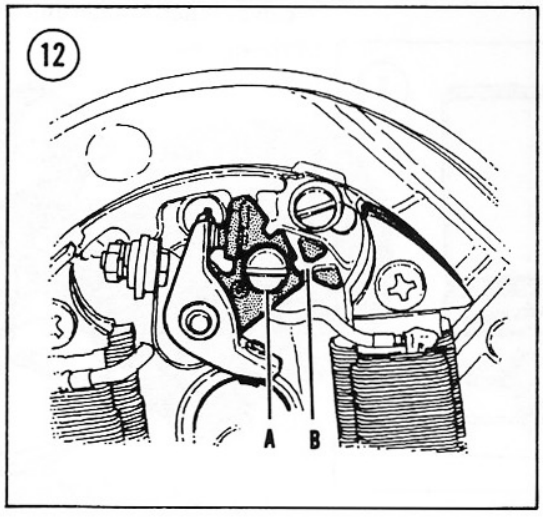
6. Rotate the rotor *counterclockwise in the opposite direction* and let the rod travel down with the piston until it has traveled 0.079 in. (2.0mm).

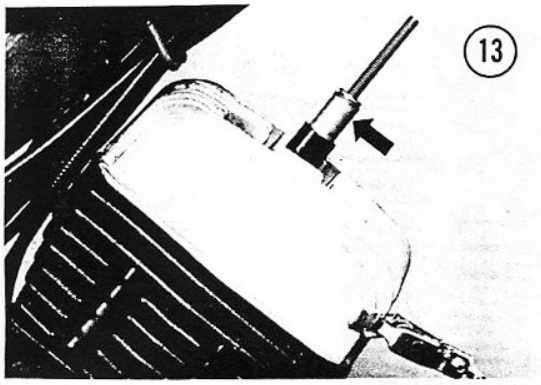
7. Disconnect the black magneto wire going to the engine cutoff switch at the terminal block.

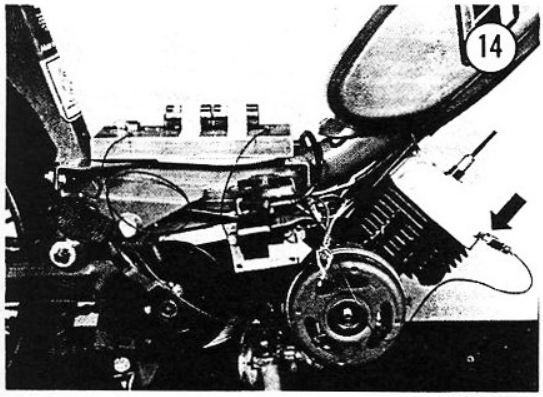
NOTE: *Prior to attaching the tester, check the condition of the batteries by touching the two test leads together. The light should be* ON. *If not, replace the batteries and/or check all connections on the tester. Be sure the tester is operating correctly before using it.*

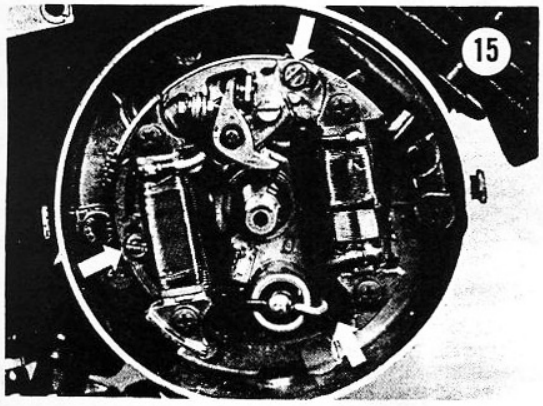


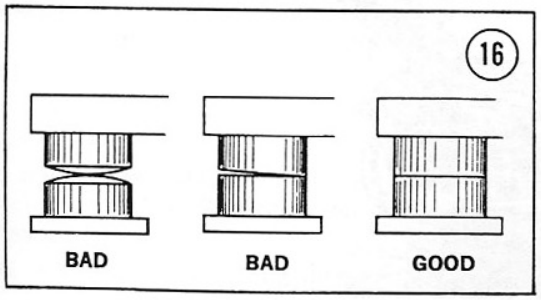












8. Connect one lead of the test light (**Figure 9**) to a good ground like one of the cooling fins on the cylinder, and the other to the black magneto wire disconnected in Step 6 (**Figure 14**). The test light should now be ON and should be bright.

> NOTE: ***Figure 15*** *is shown with the magneto rotor removed for clarity. Do not remove it to perform this adjustment procedure.*

9. Now turn the rotor a little *counterclockwise*. The test light should now dim. If it does not, the base plate has to be adjusted. Loosen the three screws (**Figure 15**) securing the base plate to the stator and rotate it slightly. Tighten the three screws and recheck. Repeat this step until the points begin to open when the piston is at 0.79 in. (2.0mm) before top dead center (BTDC).

10. Disconnect the test leads and connect the black magneto wire to the terminal block.

11. Replace the spark plug, spark plug wire, magneto side cover and engine fairing.

Breaker Point Inspection and Cleaning

Through normal use the surfaces of the breaker points gradually pit and burn. If they are not too badly pitted, they can be dressed with a few strokes of a clean point file or Flexstone (available at any auto parts store). Do not use emery cloth or sandpaper, as particles remain on the points and cause arcing and burning. If a few strokes of the files do not smooth the points completely, replace them.

If points are still serviceable after filing, remove all residue with lacquer thinner. Close the points on a piece of clean white paper such as a business card. Continue to pull the card through the closed points until no particles or discoloration are transferred to the card. Finally, rotate the engine and observe the points as they open and close. If they do not meet squarely (**Figure 16**), replace them as described under *Breaker Point Removal/Installation* in Chapter Eight.

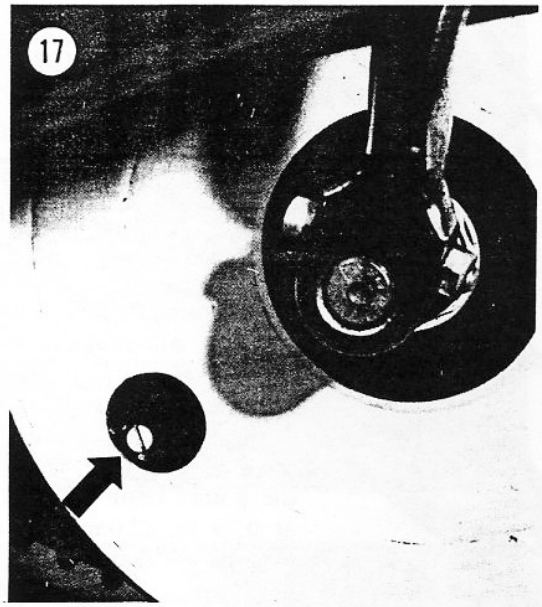
Carburetor Idle Adjustment

1. Start the engine.
2. Rotate the drive pulley until the idle adjust-

ment screw is visible (**Figure 17**) through one of the pulley holes.

3. When the engine has warmed up, turn the idle adjustment screw with a screwdriver to reduce engine speed as much as possible so that the rear wheel does not turn. Speed up the engine a couple of times and let it slow down. Recheck to make sure the rear wheel does not turn.

4. The engine should not stall when coming to a complete stop on the road, if it does, readjust the idle adjustment screw to a higher engine speed.

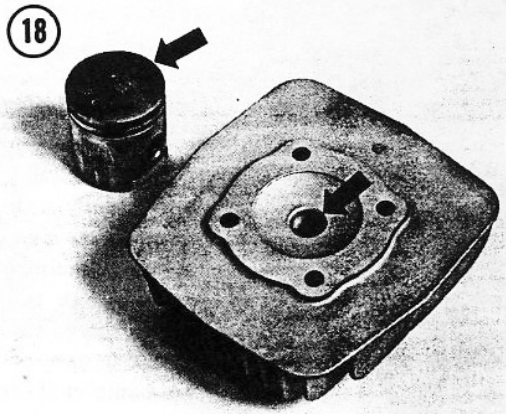


Carburetor Overhaul

The carburetor should be overhauled every time the engine is decarbonized. Refer to *Carburetor Overhaul* in Chapter Seven.

Air Filter

The air filter should be removed and cleaned every 4,000 miles. Refer to *Air Filter Removal/Installation* in Chapter Seven.



Decarbonizing

Every 1,500 miles, the carbon deposits should be removed from the piston, cylinder head, and muffler. If it is not cleaned off it will cause preignition (ping), overheating, and high fuel consumption.

Engine Decarbonizing

1. Remove the cylinder head as described under *Cylinder Head Removal/Installation* in Chapter Five.

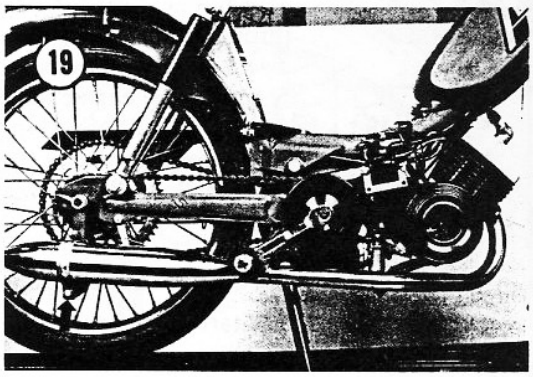
2. Gently scrape off carbon deposits from the top of piston and cylinder head (**Figure 18**) with a dull screwdriver. Do not scratch the surface.

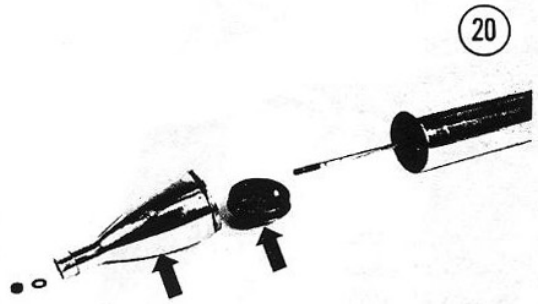
3. Wipe the surfaces clean with a cloth dipped in cleaning solvent.

4. Remove the spark plug, clean and regap to 0.020 in. (0.5mm).

5. Remove the exhaust pipe and muffler as described under *Muffler Decarbonizing* in this chapter.

6. Scrape off the carbon in the exhaust port with a dull screwdriver. Do not scratch the surfaces.





NOTE: *Prior to scraping, rotate the engine until the piston covers the inside of the exhaust port. Avoid letting any of the carbon residue enter the crankcase.*

Muffler Decarbonizing (VA, HS 50, MoBat)

1. Remove the muffler and exhaust pipe by unscrewing the two bolts securing the exhaust pipe to the cylinder and loosen the bolt on the rear clamp securing the muffler (**Figure 19**).
2. Slide the muffler forward and out of the rear mounting clamp and remove the muffler and exhaust pipe.
3. Separate the exhaust pipe and the muffler by sliding them apart at the joint just forward of the muffler.
4. Remove the nut and washer from the rear cap of the muffler.
5. Remove the rear cap and inner disc (**Figure 20**).
6. Scrape carbon from all accessible areas with a screwdriver blade.
7. Clean out inside of forward portion of muffler and exhaust pipe by running a piece of used drive chain through it. Another way is to chuck a length of wire cable, with one end frayed, in an electric drill. Run it through a couple of times.
8. Blow out all loose carbon deposits with compressed air.
9. Inspect the body to make sure it is not dented or cracked. Straighten out if possible or replace.
10. Assemble by reversing the removal steps. Always use a new gasket between the exhaust pipe and the cylinder.

Muffler Decarbonizing (Bronco)

1. Remove the two cap screws and washers securing the muffler heat shield to the muffler and remove.
2. Remove the two bolts securing the exhaust pipe to the cylinder.
3. Remove the bolt, washer, and nut securing the rear of the muffler to the muffler bracket. Pull the muffler and exhaust pipe forward to clear the rear shock absorber and remove.
4. Separate the exhaust pipe and the muffler by sliding them apart at the joint just forward of the muffler.
5. Remove the nut and washer from the rear cap of the muffler.
6. Remove the rear cap and inner disc (only the 20 and 25 mph versions have the inner disc).
7. Follow Steps 6 through 9 of *Muffler Decarbonizing, (VA, HS 50, MoBat)* in this chapter.
8. Assemble by reversing the removal steps. Always use a new gasket between the exhaust pipe and the cylinder.

LUBRICANTS

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 an oil has nothing to do with its lubricating properties.

In this manual, many procedures specify light oil. This means an SAE 5 oil or equivalent.

Grease

Molybdenum disulphide grease is preferable as a lubricant for many parts of a moped. Water does not wash grease off parts as easily as it washes off oil. In addition, grease main-

tains its lubricating qualities better than oil on long rides. In a pinch, though, the wrong lubricant is better than none at all. Correct the situation as soon as possible.

A number of procedures in this manual specify thin grease. Lubriplate, a white grease, is highly satisfactory for mopeds and comes in a small tube for easy application.

CLEANING SOLVENTS

A number of solvents can be used to remove old dirt, grease, and oil. Kerosene is readily available and comparatively inexpensive. Another inexpensive solvent similar to kerosene is ordinary diesel fuel. Both of these solvents have a very high temperature flash point and can be used safely in any adequately ventilated area away from open flames.

WARNING

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

PERIODIC LUBRICATION

Front and Rear Wheel Hubs

Every 2,500 miles, completely disassemble, clean, inspect, lubricate, and reassemble the hubs as described under *Front and Rear Hubs Removal/Installation/Inspection* in Chapter Ten.

Front and Rear Brake Cams

Every 2,500 miles, remove the front and rear wheels, remove brake plate assemblies and lubricate cams and pivot pins as described under *Brake Lining Removal/Installation* in Chapter Nine.

Speedometer Drive

Every 1,500 miles, squirt in a few drops of SAE 20 oil into the oil fitting.

Cables

Every 1,500 miles, squirt a few drops of light oil on the brake, choke lever, and start lever cables where they enter the cable housings.

Chains

Every 500 miles (more often in dusty areas), remove the chains. Clean and lubricate them as described under *Chain Cleaning and Lubrication* in Chapter Six.

Headset (Fork Bearings)

Every 2,500 miles, remove the upper and lower headset bearings. Clean, inspect, and lubricate them as described under *Headset Removal/Installation/Inspection* in Chapter Ten.

Front Forks

Every 500 miles, the front forks should be lubricated with multipurpose grease. The grease fittings (**Figure 21**) require the use of a small grease gun. These are available from most motorcycle or automotive supply stores for about $5.

Drive Pulley

Every 1,500 miles, remove the drive pulley, clean and lubricate the bearings as described under *Drive Pulley Removal/Installation* in Chapter Ten.

Pedals

Every month, squirt a few drops of 30 weight oil at the point where the pedal attaches to the crank arm.

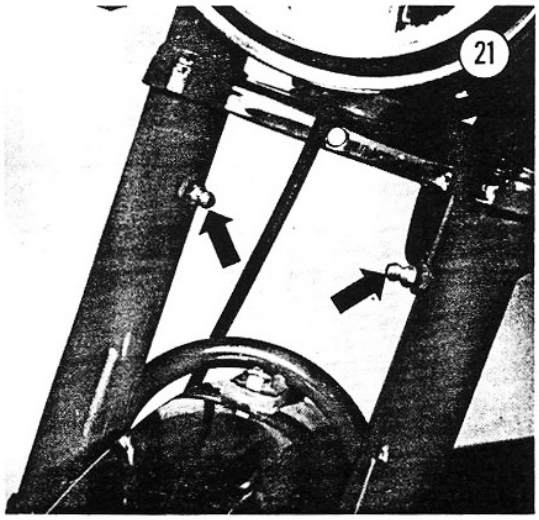
PERIODIC MAINTENANCE

Drive Chain Adjustment

Every 2,000 miles, the drive chain should be adjusted. Proper chain tension is important. If the tension is too loose, the chain may skip while traveling at high speed. If tension is too tight, pedaling, engine effort, and chain wear increase.

The correct chain tension is measured by pressing up on the bottom of the chain at midpoint. The slack should be ½ in. (12.5mm). See **Figure 22**. If the tension is incorrect, use the following adjustment procedure.

1. Loosen the rear axle locknuts "A". See **Figure 23**.
2. Turn the adjusting nuts "B" (**Figure 23**) an equal number of turns. Turning the nut *clock-*

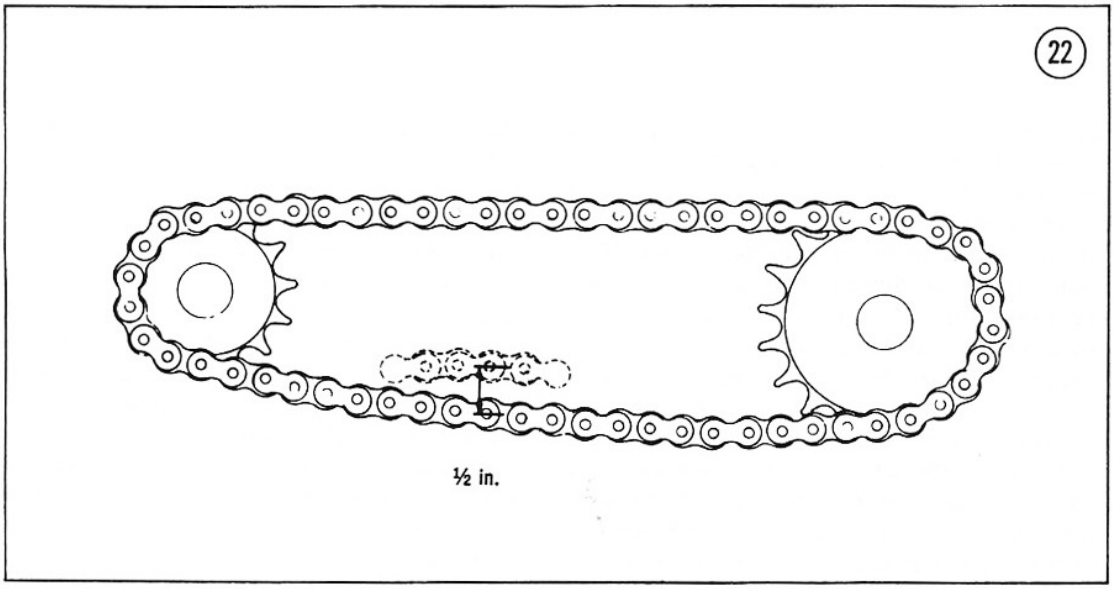


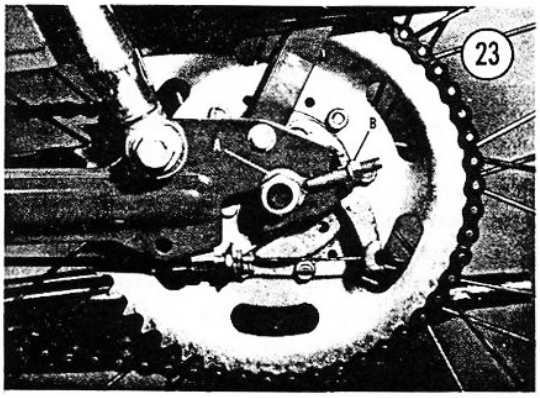
wise will increase tension and *counterclockwise* will decrease tension.

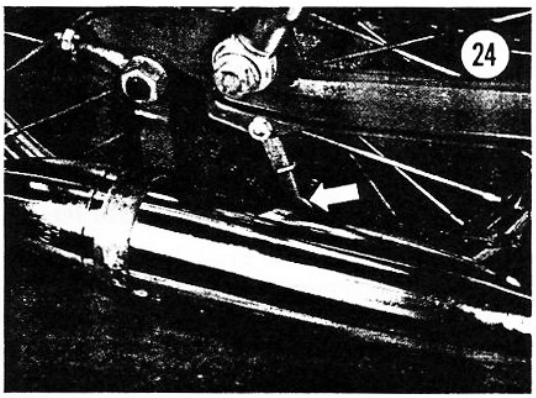
3. Check to see that the wheel is aligned within the center of the chainstays.
4. Rotate the wheel to make sure the tension in the chain is constant.
5. Tighten the rear axle locknuts "A" securely.
6. Check the rear brake operation as it may have to be adjusted. Refer to *Rear Brake Adjustment* in Chapter Nine.

Bicycle Chain Adjustment

No adjustment is necessary due to the automatic chain tensioner (similar to a bicycle derailleur). Squirt a few drops of lightweight oil on the idler wheel axle (**Figure 24**).







fairings, lights, fenders, etc., to make sure they are tight.

Extended Storage

If you store the moped for an extended period of time, prepare your moped in the following way:

a. Empty the fuel tank completely.
b. Run the engine until the carburetor is empty.
c. Remove the spark plug and put a few drops of oil into the cylinder.
d. Turn the engine over by pedaling to spread the oil around in the cylinder.
e. Install the spark plug, only finger-tight and connect the spark plug wire.
f. Clean and lubricate all parts.
g. Dampen a cloth with light weight oil and wipe all metal parts or spray them with a light coat of WD-40. This will help protect against rust.
h. Cover the moped with a tarp or blanket.

After Storage

Before starting the engine after storage, remove the spark plug and squirt a small amount of fuel into the cylinder to help remove the oil coating. Install the spark plug but do not connect the spark plug wire. Pedal the engine over a few times, then reconnect the spark plug wire and start the engine.

CHAPTER FOUR

TROUBLESHOOTING

4

Diagnosing mechanical problems is relatively simple if you use orderly procedures and keep a few basic principles in mind.

The troubleshooting procedures in this chapter analyze typical symptoms, and show logical methods of isolating causes. These are not the only methods. There may be several ways to solve a problem, but only a systematic, methodical approach can guarantee success.

Never assume anything. Do not overlook the obvious. If you are riding along and the moped suddenly quits, check the easiest, most accessible problem spots first. Is there gasoline in the tank? Is the fuel shutoff valve in the ON or RESERVE position? Has the spark plug wire fallen off? Check the ignition switch to make sure it is in the RUN position.

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. Saying "it won't run" is not the same as saying "it quit on the road at low speed and won't start," or that "it sat in my garage for three months and then wouldn't start."

Gather as many symptoms together as possible to aid in diagnosis. Note whether the engine lost power gradually or all at once, what color smoke (if any) came from the exhaust, and so on. Remember that the more complicated a machine is, the easier it is to troubleshoot because symptoms point to specific problems.

After the symptoms are defined, areas which could cause the problems are tested and analyzed. Guessing at the cause of a problem may provide the solution, but it can easily lead to frustration, wasted time, and a series of expensive, unnecessary parts replacement.

You do not need fancy equipment or complicated test gear to determine whether repairs can be attempted at home. A few simple checks could save a large repair bill and time lost while the moped is 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 is 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 three basics to run properly: correct fuel/air mixture, compression, and a spark at the right time. If one or more are missing, the engine won't run. The electrical system is the weakest link of the three basics. More

problems result from electrical breakdowns than from any other source. Keep that in mind before you begin tampering with carburetor adjustment and the like.

If a moped has been sitting for any length of time and refuses to start, check and clean the spark plug and then look to the gasoline delivery system. This includes the tank cap, tank, fuel shutoff valve, lines, and the carburetor. Rust may have formed in the tank, obstructing fuel flow. Gasoline deposits may have gummed up the carburetor jet and air passages. Gasoline tends to lose its potency after standing for long periods. Condensation may contaminate it with water. Drain old gas and try starting with fresh gasoline; don't forget to add the proper amount of 2-stroke oil.

EMERGENCY TROUBLESHOOTING

When the moped is difficult to start or won't start at all, it does not help to continue kicking the pedal down or kick the tires. Check the obvious problems even before getting out your tools. Go down the following list step-by-step. Do each one; you may be embarrassed to find your cutoff switch in the OFF position, but that is better than wearing out your legs trying to get it started. If the moped still won't start, refer to the appropriate troubleshooting procedures which follow in this chapter.

1. Is there fuel in the tank? Remove the filler cap and rock the moped, listen for the fuel sloshing around.

WARNING

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

2. Is the fuel shutoff valve in the ON position? Turn it to RESERVE to be sure that you get the last remaining gas.
3. Is the choke in the right position? It should be squeezed in for a cold engine and released for a warm engine.
4. Is the engine cutoff switch in the ON position?

Engine Starting Problems

Check first to see if there is sufficient gas. Open the gas cap and check for gas in the tank by rocking the moped and listening for the gas to slosh around. If gas is present in tank, remove the fuel line from the carburetor and see if the gas is flowing through the line. If not check the fuel shutoff valve to make sure it is in the ON or RESERVE position. With the fuel shutoff valve in the ON position and still no gas is present there may be dirt or foreign matter in the fuel line or it may be kinked.

There may also be water in the fuel or the jet in the carburetor may be clogged. Check to see that the area around the neck of the fuel cap is clean and that the fuel shutoff valve filter is clean. Do not forget to use the choke in trying to start a cold engine. If there is sufficient fuel to the carburetor, next check out the electrical system.

Check that the engine cutoff switch is in the RUN position and that the spark plug is on tight. If both are OK, remove the spark plug and inspect it, either clean and regap or replace it with a new one. Connect the spark plug wire to the spark plug and lay the spark plug on the cylinder head, make sure that the base of the plug makes good contact. Kick the pedal as though you were trying to start the moped, there should be a big bright blue spark at the tip of the electrode. If there isn't a spark or if the spark is small, then there is an electrical problem.

Check that the spark plug wire is not broken, frayed, or has a loose connection at the spark plug or magneto. If these seem to be alright then check the magneto. The timing may be off, the contacts may be dirty, the condenser worn out, or the wire grounded, or the ignition coil may be shorted or open. If any of these problems are evident, refer to *Electrical,* Chapter Eight for procedures and adjustments.

If there is a good healthy spark and fuel to the carburetor, check to make sure the air cleaner is clean and that the carburetor jet is clean. Make sure that the intake manifold nuts are tight and the carburetor clamp to intake manifold is tight. Check that the gasket between the carburetor and intake manifold is not broken or cracked, replace if necessary.

Check that the belt is not slipping on the drive pulley when kickstarting and that the clutch cable is adjusted properly to engage the clutch start spring arm to the clutch mechanism.

Rough Idle

Rough idle is probably caused by incorrect ignition timing, carburetor adjustment, a clogged muffler, or a vacuum leak from loose connections at the carburetor.

Power Loss

The ignition system may have a defective spark plug, ignition coil, or condenser or the timing may be off. The carburetor may be dirty, misadjusted, or it may have the wrong jet size or a dirty air filter. The engine may have worn piston rings, a damaged cylinder, or it may need decarbonization. The muffler opening may be clogged by mud or it may need to be decarbonized. Check also for improper chain tension and/or a slipping drive belt.

If the engine runs alright when on the centerstand but has no power when riding, check the rear wheel bearings for lack of lubrication or damage. See *Front and Rear Wheel Hubs Removal/Installation* in Chapter Ten.

Misfires

This is usually caused by a weak or fouled spark plug or a breakdown of the spark plug wire. Check to see if a spark "jumps" out from the plug wire to any part of the frame before it gets to the plug. This is best done at night or in a dark garage.

Smoking or Sputtering

This is usually caused by insufficient burning of the fuel or an improper gasoline/oil mixture. Check for a fouled spark plug, clogged muffler, or air filter, or too much oil in the fuel mixture.

Overheating

This can be caused by too high a spark plug heat range, the percentage of oil in fuel mixture too low, clogged or dirty cooling fins on the engine cylinder and cylinder head, incorrect ignition timing or carbonized engine or muffler. Also check for dragging brakes, a slipping clutch or a drive chain that needs oil or is adjusted too tight.

Piston and Engine Seizure

Piston seizure is caused by improper piston to cylinder clearance, broken piston rings or insufficient oil in the fuel/oil mixture. Engine seizure may be caused by a seized piston, broken or seized crankshaft bearings, a broken intake valve, smashed flywheel magneto cover, buckled magneto or magneto stator screw caught between coil and rotor.

Backfiring

Ignition timing incorrect, engine too cold, a defective spark plug or contaminated fuel may be the cause of backfiring. Also check for heavy carbon buildup on the piston and cylinder head.

Engine Noises

Abnormal engine noises are very difficult to describe and diagnose. Knocking may indicate a loose crankshaft assembly caused by bad bearings or a loose or broken engine to frame bracket. Also the clutch drum may be loose on the crankshaft. A slapping noise usually comes from a loose piston. A slamming noise may be caused by an unrivetted flywheel magneto cam, damaged cylinder caused by overheating, or faulty clutch parts. A rubbing noise may be from the flywheel magneto rotor being bent or out of true, or the cover and rotor touching each other. Pinging is caused by improper ignition timing or gasoline octane rating too low. If pinging occurs it should be corrected immediately as it will cause piston damage. A whistling noise may come from a defective crankcase seal, loose or damaged bearings, air leaking around the carburetor, or intake manifold or magneto breaker cam needing lubrication.

Engine Vibration

Check to see if the engine mounting bracket is loose or broken. Vibration may be caused by worn engine and clutch bearings or an unbalanced rotor in the magneto.

CLUTCH

Slippage or Dragging

Clutch slippage may be due to oil or grease on the linings. Dragging may be due to a warped or defective clutch pressure plate spring. It may also be caused by the engine idle being set too high.

If the clutch fails to release when coming to a stop — kick start it with the pedal; this will release it.

BRAKES

Loss of braking power is due to worn out linings or improper cable adjustment. If brakes grab, there is probably oil or grease on the linings and they will have to be replaced. If they stick, the return springs may be weak or broken, the pivot cams may need lubrication or the cables need adjusting. Brake grabbing may also be caused by out-of-round drums, broken or glazed brake shoes or no "lead angle" on the leading edges of the brake lining (**Figure 1**). Refer to *Brake Lining Removal/Installation* in Chapter Nine.

ELECTRICAL

Lighting and Horn

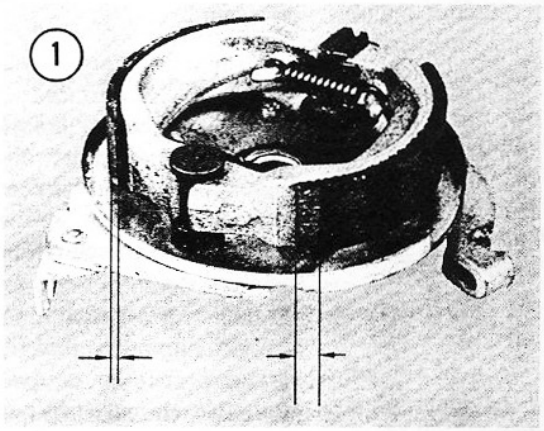
Dimness of lights is usually caused by a loose bulb in the socket, corroded bulb contacts, loose or corroded electrical terminal connections, incorrect bulb size, bare wires which will short out, or an improperly working magneto.

Check the horn for loose or corroded electrical connections.

Be sure to thoroughly check all electrical and ground connections before replacing light bulb or horn.

SUSPENSION

Hard steering may be caused by improper tire inflation, improper adjustment or lack of lubrication of the steering head bearings. Wheel shimmy or vibration is caused by misaligned wheels loose or broken spokes, or worn wheel bearings. Poor handling may be caused by worn shock absorbers, front forks needing lubrication, or damaged frame and rear swing arm.



CHAPTER FIVE

ENGINE

The engine in the moped is a single cylinder, 2-stroke, reed valve-piston port, air-cooled unit with a displacement of 2.93 cu. in. (48cc). See **Figure 1**. This chapter contains information for removal, inspection, service, and reassembly of the engine. The majority of the work can be accomplished without removing the entire engine from the frame, with the exception of a complete overhaul.

ENGINE PRINCIPLES

Figure 2 explains how the engine works. This is helpful when troubleshooting or repairing your engine.

ENGINE LUBRICATION

Lubrication for the engine is provided by the fuel/oil mixture used to power the engine. There is no oil supply in the crankcase as it would be drawn into the cylinder, causing the spark plug to foul. There is sufficient oil in the fuel/oil mixture to lubricate the engine bearings as it is drawn into the crankcase. The proper fuel/oil mixture for the first 500 miles (brake-in period) is 40 parts of *regular gasoline* to one part of *2-stroke motor oil* (40:1 ratio). Thereafter it is 50 parts of *regular gasoline* to one part of *2-stroke motor oil* (50:1 ratio).

ENGINE COOLING

Cooling is provided by air passing over the cooling fins on the engine cylinder head or cylinder. Therefore it is very important to keep these fins free from a buildup of dirt, oil, grease, and other foreign matter. Brush out the fins with a whisk broom or small stiff paintbrush.

CAUTION

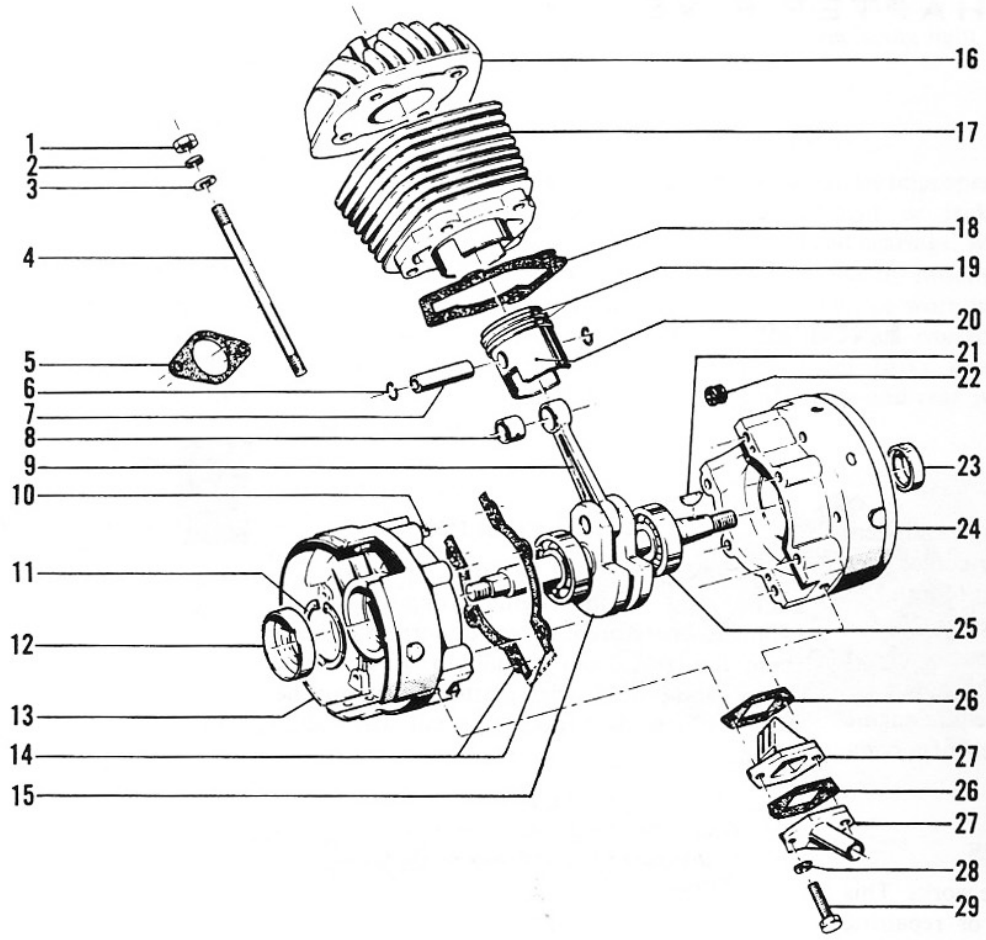
Remember, these fins are thin, in order to dissipate heat, and may be damaged if struck hard.

ENGINE REMOVAL/INSTALLATION

Prior to removal or disassembly of any major part of the engine, clean the entire area of all dirt, oil, grease, and other foreign matter with Gunk Cycle Degreaser or equivalent. Follow the manufacturer's directions and avoid using too high of a water pressure when rinsing off the engine. Keep water and dirt from entering into the clutch and brake areas.

1. Place the moped on the centerstand.

2a. On all models except Bronco, remove 4 screws securing the engine fairing (**Figure 3**) and remove it.

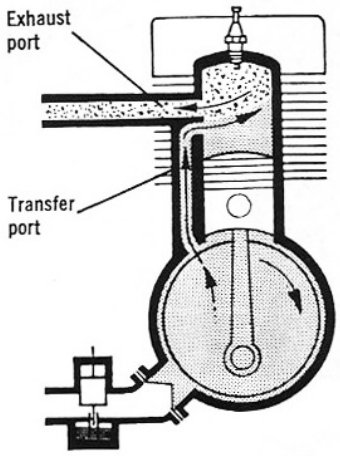


ENGINE COMPONENTS

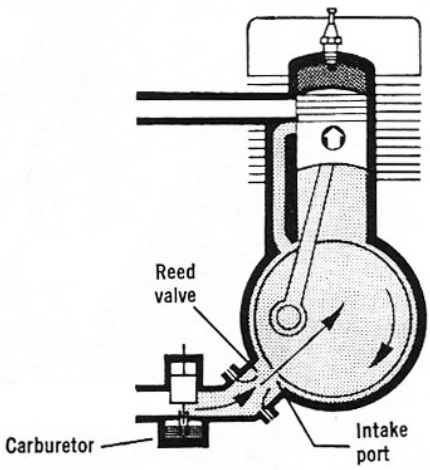
1. Nut
2. Lockwasher
3. Washer
4. Crankcase stud (4)
5. Exhaust pipe gasket
6. Circlip (2)
7. Wristpin
8. Connecting rod bearing
9. Connecting rod
10. Alignment dowels
11. Circlip
12. Bearing seal — clutch side
13. Crankcase half — clutch housing
14. Crankcase gasket
15. Crankshaft
16. Cylinder head
17. Cylinder
18. Cylinder base gasket
19. Piston rings
20. Piston
21. Woodruff key
22. Rubber grommet
23. Bearing seal — magneto side
24. Crankcase half — magneto housing
25. Crankcase bearings (2)
26. Intake gasket
27. Reed valve
28. Lockwasher (2)
29. Bolt (2)

2-STROKE OPERATING PRINCIPLES

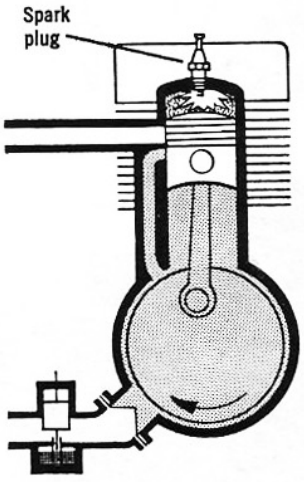
(2)



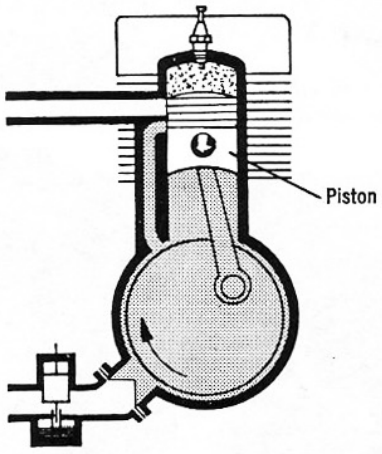
As the piston travels downward, it uncovers the **exhaust port** allowing the exhaust gases, that are under pressure, to leave the cylinder. A fresh fuel/air charge, which has been compressed slightly, travels from the crankcase into the cylinder through the **transfer port**. Since this charge enters under pressure, it also helps push out the exhaust gases.



While the crankshaft continues to rotate, the piston moves upward, covering the transfer port and exhaust port. The piston compresses the new fuel/air mixture and creates a low pressure area in the crankcase at the same time. This low pressure allows the **reed valve** to open, allowing a new fuel/air charge from the **carburetor** to enter into the crankcase through the **intake port**.



Now, as the piston almost reaches the top of its travel, the **spark plug** fires, 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 pressure increases in the crankcase which closes the **reed valve (C)**.

5

NOTE: *There are rubber spacers on the attachment screws under the fairing. Do not lose them.*

2b. On Bronco models, remove 2 bolts securing drive chain guard and remove it.

3. Remove the spark plug wire and spark plug (**Figure 4**).

4. Remove the clutch cover by removing the rubber straps from the lugs on the clutch housing (**Figure 5**).

5. Loosen the cable locking screw on the start lever located on the handlebar and relax the cable (**Figure 6**).

6. Push in on the start spring arm (**Figure 7**) and remove the end of the cable from the arm (**Figure 8**). Pull the cable out through the back side of the clutch housing.

7. Remove the 3 bolts securing the engine dirt shield (**Figure 9**). These bolts also secure the clutch start spring, so it will be removed at the same time.

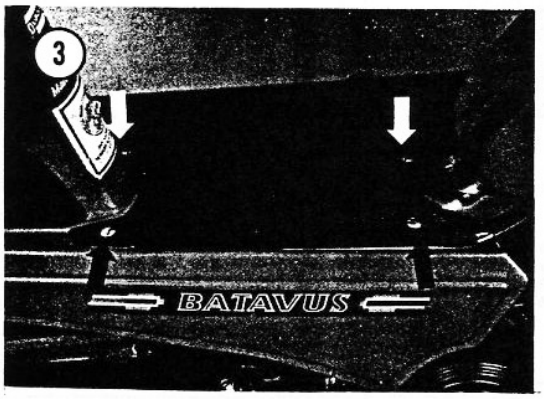
8. Remove the air filter from the carburetor by prying off the retaining clip (**Figure 10**) with your finger.

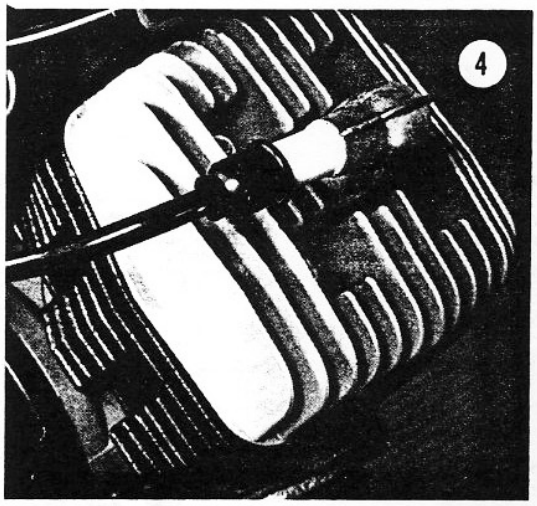
9. Remove the 2 bolts securing the intake manifold to the cylinder (**Figure 11**). Pull down on carburetor and intake manifold until the vinyl intake tube is clear of the frame.

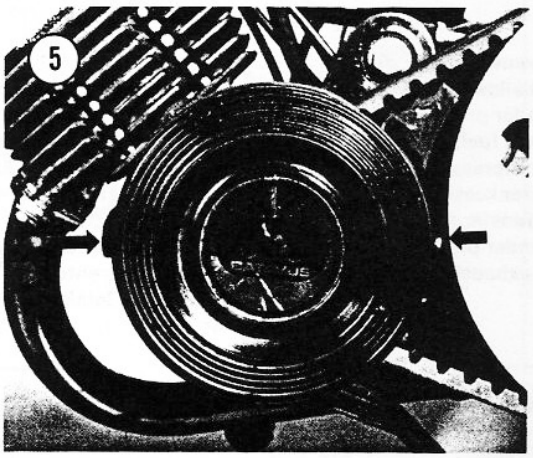
CAUTION

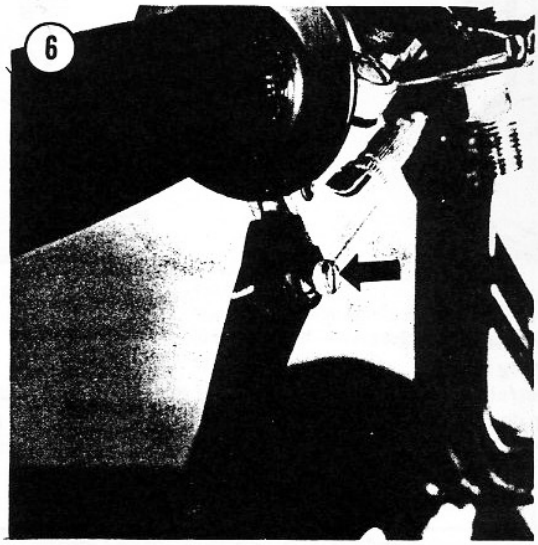
As you remove the intake manifold the reed valve will also come out; be sure to catch it to avoid damage.

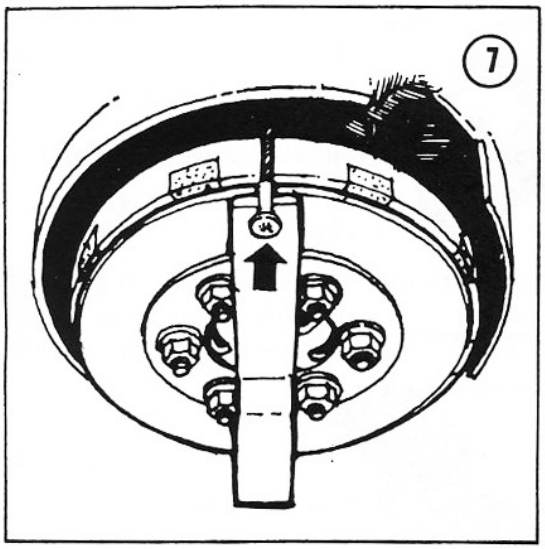
10. Pry off the choke retu .ing (**Figure 12**) from the choke valve and remove the cable from behind spring.

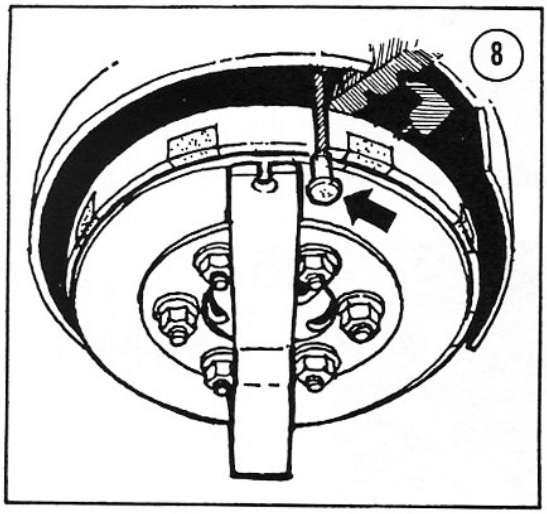


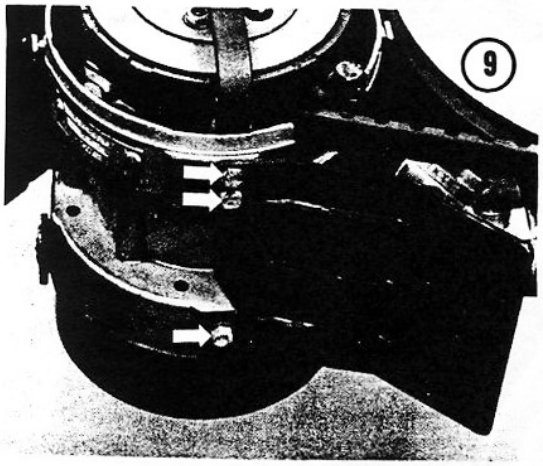


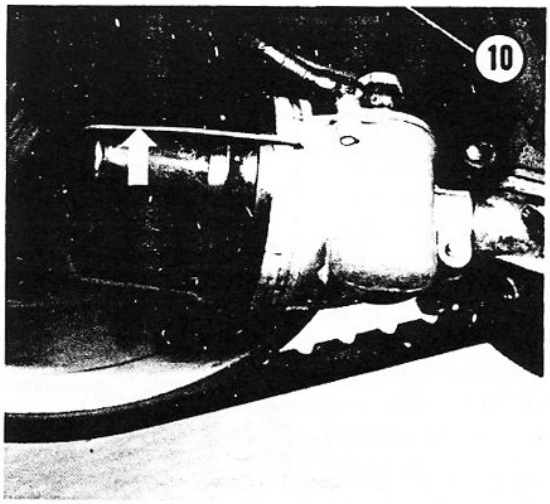


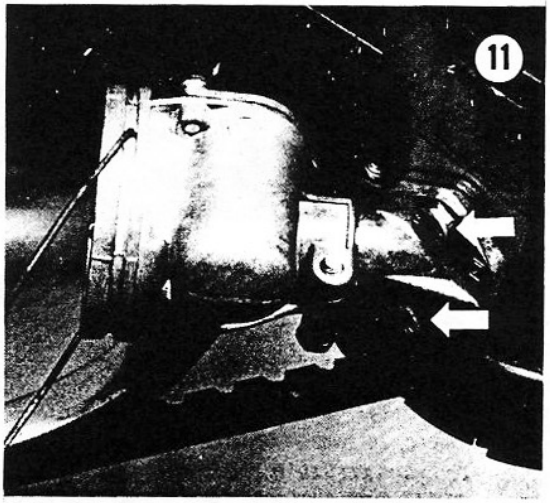


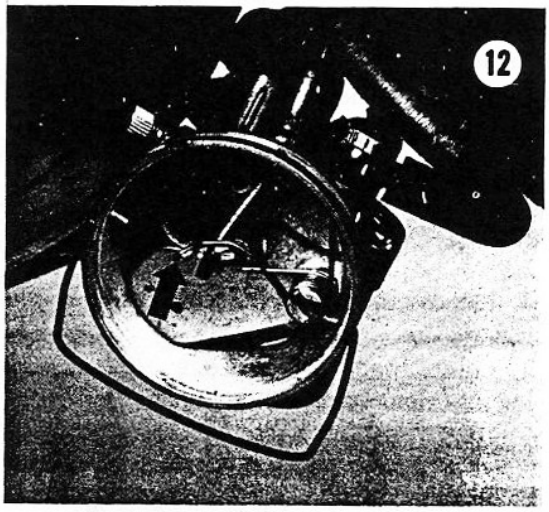












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11. Unscrew the throttle cable cap from the carburetor. The spring and throttle valve will stay with the throttle cable (**Figure 13**).

12. On Models VA, HS 50, and MoBat, remove the 2 bolts securing the exhaust pipe to the cylinder and loosen the bolt securing the muffler clamp at the rear axle (**Figure 14**). Slide the muffler out of the clamp and remove it.

13. Remove the magneto as described under *Magneto Removal/Installation* in Chapter Eight.

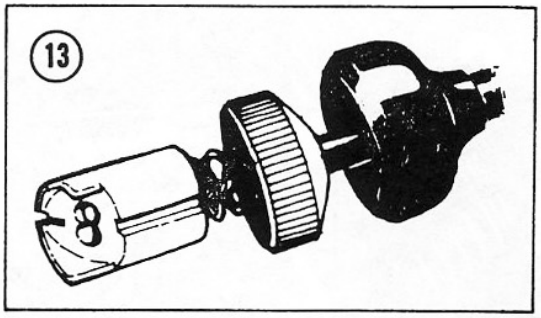
14. Remove clutch assembly as described under *Clutch Removal/Installation* in Chapter Six.

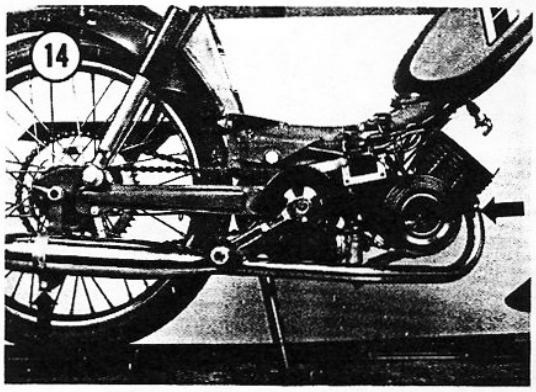
15. Remove the 4 bolts securing the engine to the engine support bracket. There are 2 on each side in the clutch and magneto housing.

NOTE: *The upper bolt in the clutch housing is shorter than the others, remember this when installing the engine.*

16. Remove the engine and take to workbench for further disassembly.

17. Install by reversing the removal steps.





CYLINDER HEAD

Removal/Installation

The cylinder head may be removed for service without removing the engine from frame.

NOTE: *If the cylinder head is to be replaced, be sure to order the correct one for your particular model. The 20, 30, and 35 mph versions of the moped have their own specific head configuration.*

1. Place the moped on the centerstand.

2. Remove the 4 screws securing the engine fairing (**Figure 15**) and remove it. (Does not apply to Bronco models.)

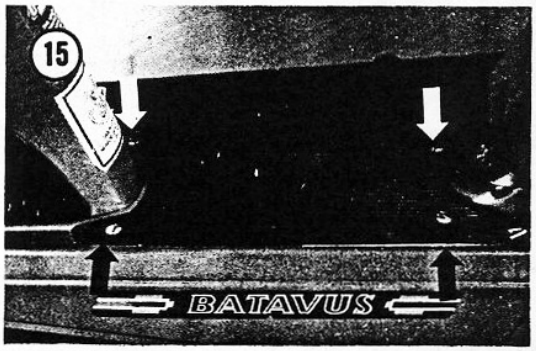
NOTE: *There are rubber spacers on the attachment screws under the fairing. Do not lose them.*

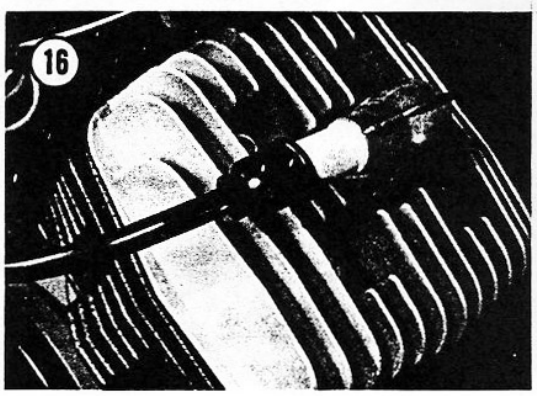
3. Remove the spark plug wire and spark plug (**Figure 16**).

4. Loosen, but do not remove, the 4 nuts securing the cylinder head to the engine.

CAUTION

*To prevent warping the head, loosen the 4 nuts in a sequence shown in **Figure 17**.*





After all nuts have been loosened, remove the nuts and washers.

5. Gently wiggle the head and pull it off the cylinder.

6. Install by reversing the removal steps.

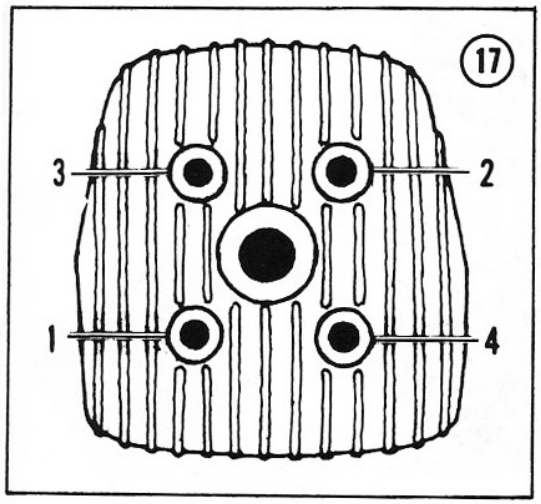
NOTE: *The engine does not use a head gasket. Do not try to install one.*

7. Install the washers with the serrated side *up* toward the nuts. Finger-tighten all nuts snug and then torque all nuts to 11 ft.-lb. (15 N•m).

CYLINDER

Removal

The cylinder can be removed for service without removing the engine assembly from frame.



1. Remove cylinder head as described under *Cylinder Head Removal/Installation* in this chapter.

2. Unscrew the 2 bolts securing the exhaust pipe to the cylinder. Just let it down; there is no need to remove it.

3. Remove the cylinder from the crankcase. If it is stuck, rotate the crank pedal to position the piston to the bottom of its stroke. Gently tap on the exhaust port with a rubber or plastic mallet. If engine assembly has been removed from the frame, place cylinder and crankcase assembly upside down on the crankcase studs. Tap the exhaust port with a rubber or plastic mallet.

CAUTION

Do not tap on the cooling fins as they are fragile and may be damaged.

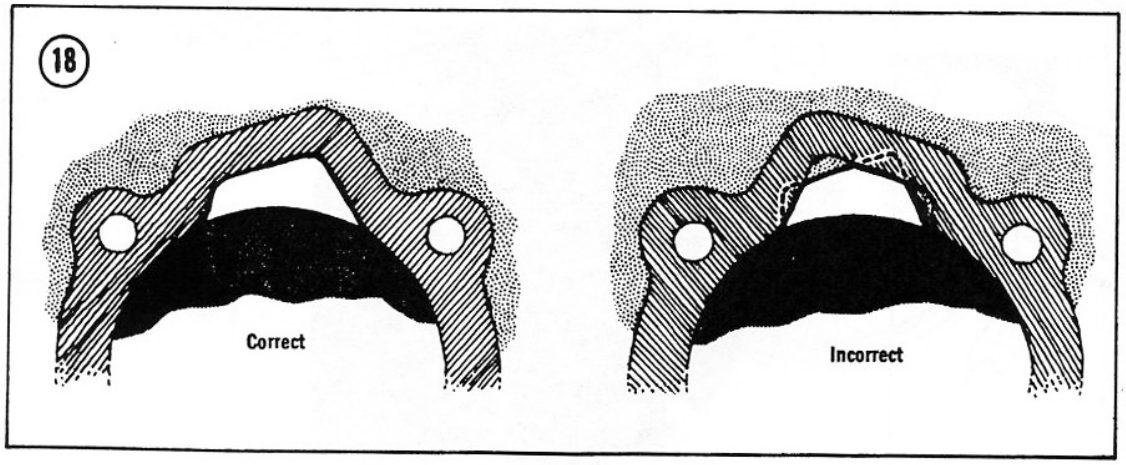
4. Pull the cylinder straight off of the crankcase studs.

5. Remove the cylinder gasket and discard. Place clean rags into the crankcase opening to prevent the entry of small parts and foreign matter.

Installation

1. Clean off the surfaces of the base of the cylinder and the top of the crankcase prior to installing the new base gasket.

2. Apply gasket cement to only one side of gasket and place onto the crankcase. Make sure the gasket aligns properly with the transfer ports **(Figure 18)**, if this is positioned incorrectly it will reduce power.



NOTE: *To make cylinder installation easier, use a wood block holding fixture (**Figure 19**) to hold the piston in position. Slide the fixture between the crankcase studs and the connecting rod fitting into the slot.*

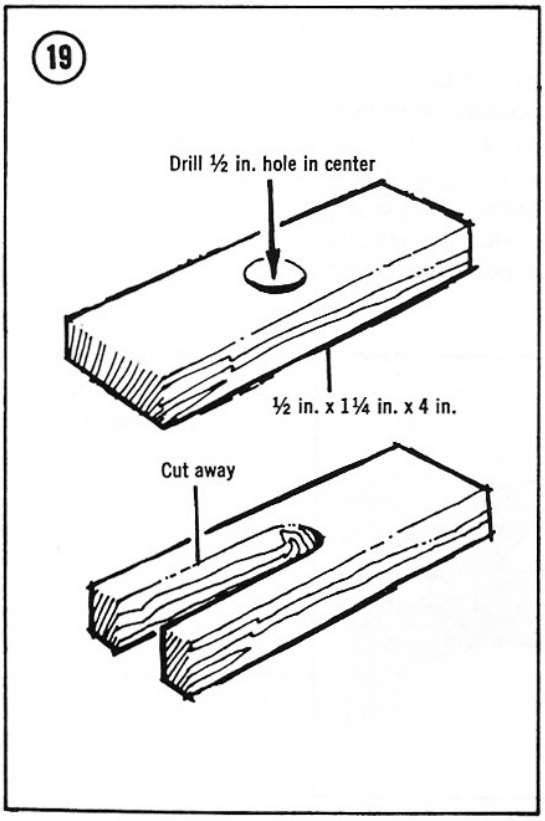
3. Make sure the piston ring gap aligns with the stop in the piston ring groove (**Figure 20**).

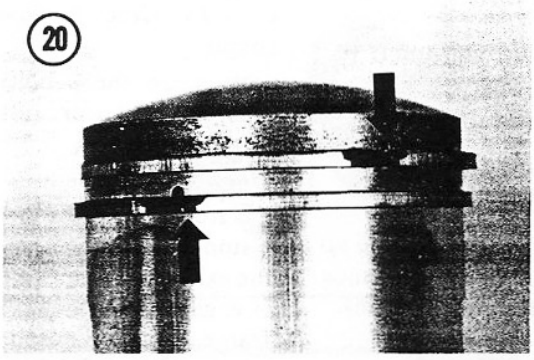
4. Push the cylinder down over the piston by hand only, do not use a hammer or mallet. Compress each ring as it enters the cylinder. If the engine has been removed, turn the engine upside down onto the cylinder and slide the piston into the cylinder (**Figure 21**). Also make sure the exhaust port is facing away from the engine mounting bolt holes (**Figure 22**).

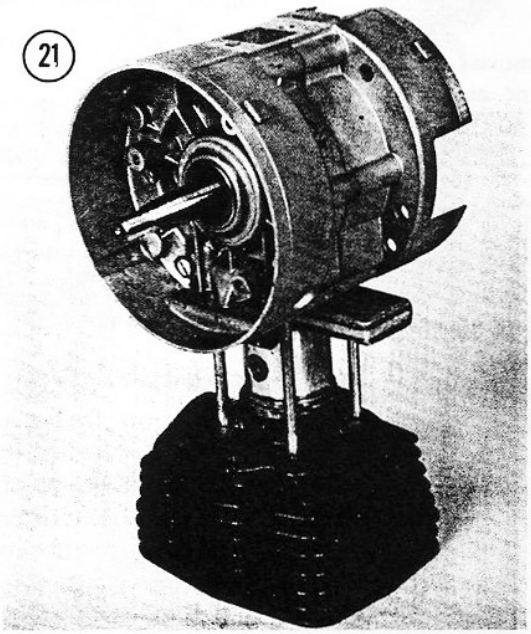
5. Remove the wood holding fixture and push the cylinder down until it bottoms.

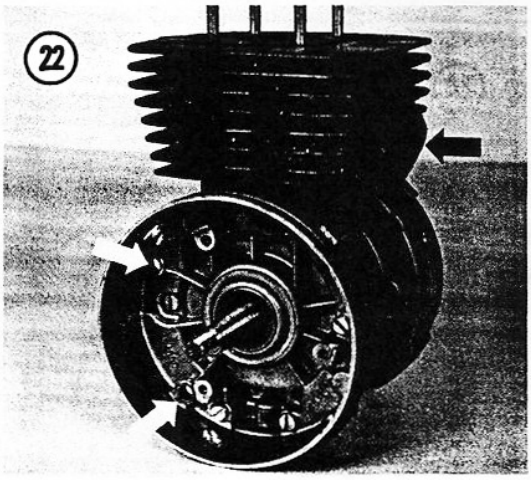
6. Install the 2 bolts securing the exhaust pipe to the cylinder.

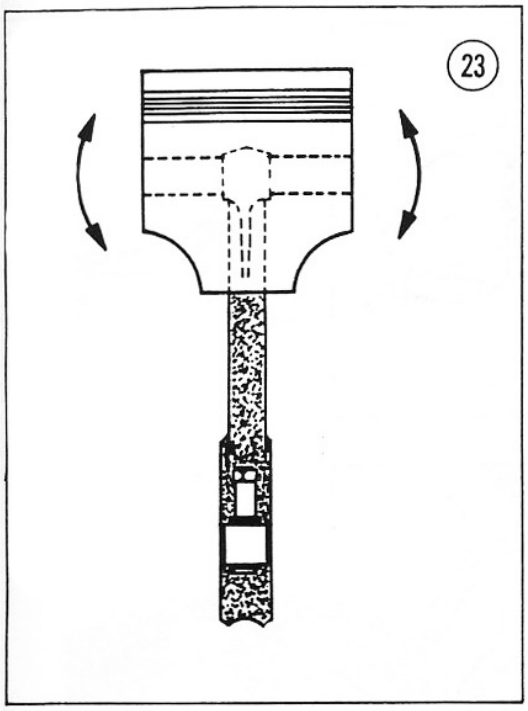
7. Install the cylinder head as described under *Cylinder Head Removal/Installation* in this chapter.

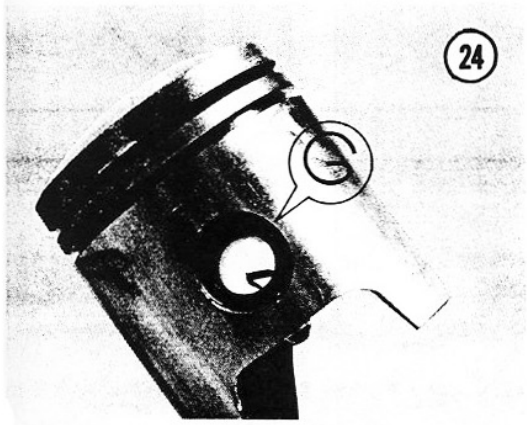


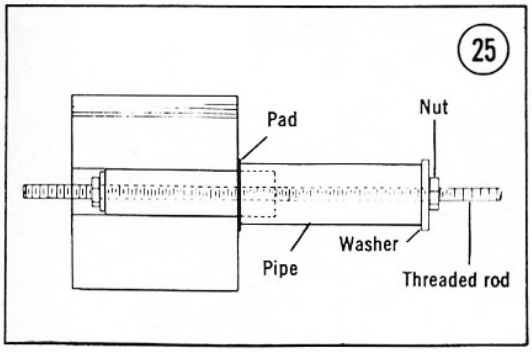












PISTON AND WRIST PIN

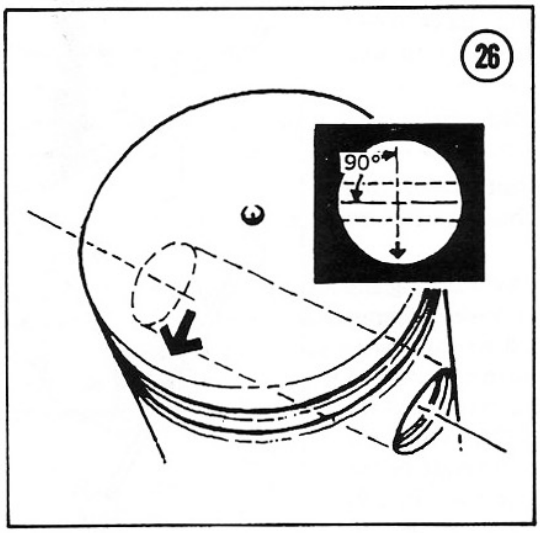
Removal/Installation

Prior to removal of wrist pin, hold the rod tightly and rock the piston as shown in **Figure 23**. Any rocking movement (do not confuse with a sliding motion which is normal) indicates wear to the wrist pin, rod bearing, wrist pin bore, or more likely, a combination of all three.

1. Remove the 2 wrist pin snap rings (**Figure 24**) with needle-nose pliers.
2. Push out the wrist pin with a small socket or dowel. If pin is difficult to push out, use the homemade tool as shown in **Figure 25**. If wrist pin is to be reused it should be marked so it will be reinstalled in the same position.
3. Push out the needle bearing race from the connecting rod, clean and inspect it. If it is OK, thoroughly oil with light weight oil and fit it back into the connecting rod. If the condition is doubtful, replace it.
4. Install by reversing the removal steps, make sure the arrow (**Figure 26**) on top of the piston is toward the exhaust port when repositioning it on the connecting rod.

NOTE: *Install wrist pin with the same tool used for removal (**Figure 25**). Eliminate the piece of pipe.*

5. Carefully align the piston to the connecting rod when installing the wrist pin to avoid damage to the needle bearings. Install the wrist



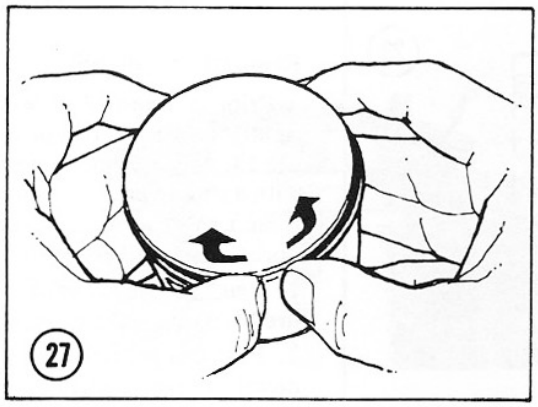
5

pin; refer to the mark made in Step 2 if reusing the old wrist pin.

6. As the wrist pin is being pushed back into the piston and connecting rod bearing, observe its travel, from underneath the piston, to prevent any binding.

NOTE: *Make sure the snap rings are seated correctly in the piston.*

7. After installing the wrist pin, check the surface of the piston where the installation tool came in contact with it. If there are any scuff marks, clean them off with a *fine* cut file. *File as little as possible. Be careful not to remove too much metal.*



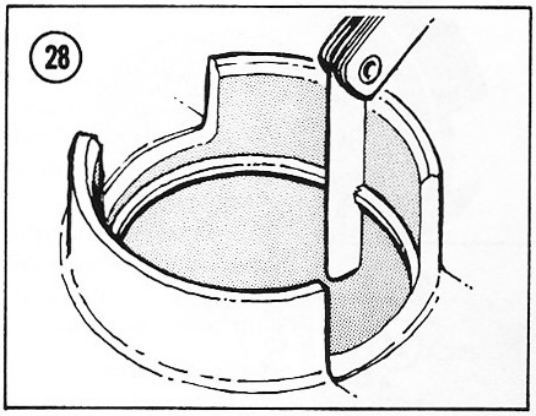
PISTON CLEANING AND INSPECTION

1. Scrape all carbon from the top of piston with a dull screwdriver; be careful not to scratch the surface.

2. Clean out the grooves with a broken ring or sharp, small screwdriver.

3. Clean out the wrist pin snap ring grooves.

4. Inspect the piston top and skirt for cracks or damage; replace if necessary.



PISTON RING REPLACEMENT

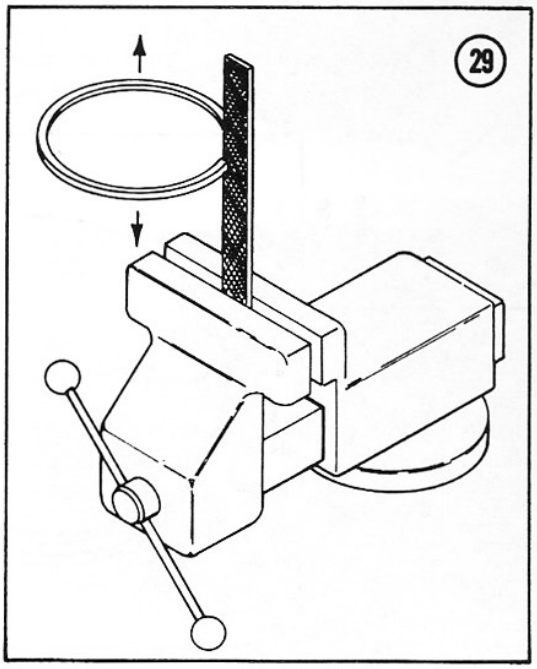
Piston rings can be replaced without removing the piston from the connecting rod.

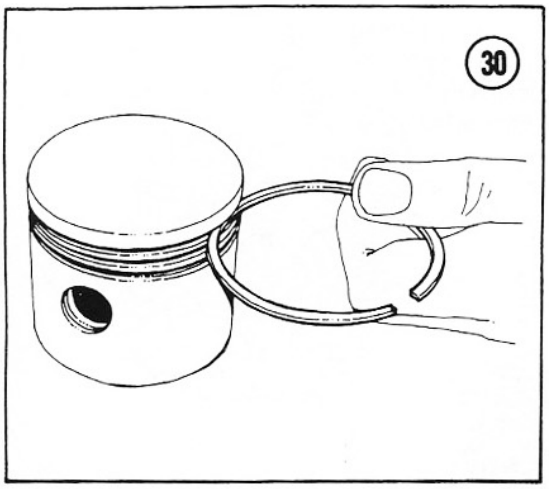
1. Remove top ring first by spreading each end with your thumbs just enough to slide it up and over the piston (**Figure 27**).

2. Repeat the same procedure for the second ring.

3. Clean out all carbon deposits from ring grooves. Inspect grooves for burrs, nicks, or broken and cracked surfaces.

4. Check the gap of each ring by inserting the ring into the bottom of the cylinder bore about ⅝ inch and square it to the wall by tapping it with the piston. Insert feeler gauge as shown in **Figure 28**. The gap should not exceed 0.014 in. (0.36mm). If the gap is smaller than specified, hold a small file in a vise, grip the ends of the ring with your fingers and move ring up and down on the file slowly and enlarge the gap





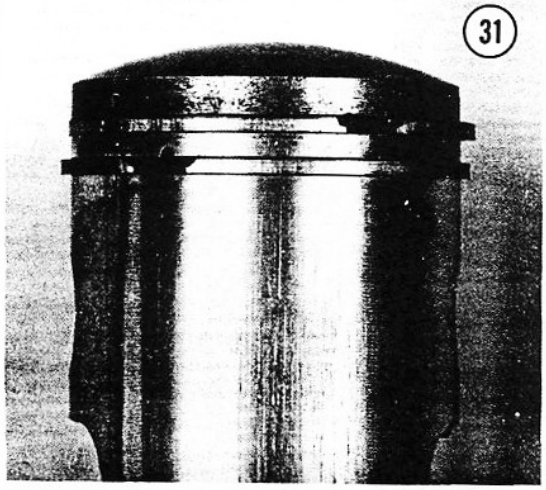
(**Figure 29**). *Do a little at a time to avoid removing too much and ruining the ring.*

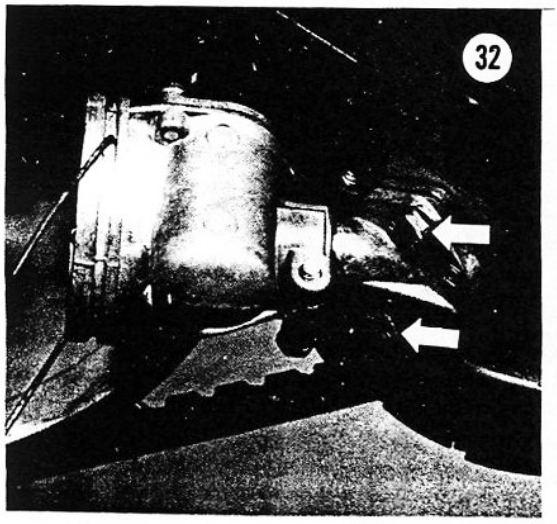
5. Prior to installation in the piston, roll each ring around its groove as shown in **Figure 30** to check for binding. Minor binding may be cleaned up with a fine cut file.

6. Spread the rings carefully with your thumbs — just enough to slip them down and over the piston.

NOTE: *Install the lower ring first and then the top.*

7. Align the end gaps of the rings with the locating pins in each ring groove as shown in **Figure 31**.





INTAKE REED VALVE

Removal/Installation

1. Remove the 2 bolts securing the intake manifold to the crankcase (**Figure 32**) and remove the manifold.

CAUTION

As you remove the intake manifold, the reed valve will also come out, be sure to catch it to avoid damage.

2. It is not necessary to completely remove the carburetor and intake manifold. Let them hang in the frame from the throttle cable.

3. Remove the reed valve and gaskets from the intake manifold.

4. Install by reversing the removal steps.

Reed Valve Inspection

The reed valve is manufactured to very close tolerances and in order for it to function properly it must be clean and free of any distortion and dirt.

1. Clean the reed valve with a *soft* brush and kerosene.

2. Dry thoroughly with a soft, lint-free cloth; be careful not to bend the reeds (**Figure 33**). Make sure there is no lint or fuzz left between the reeds and the housing as this will reduce the operation of the valve.

CAUTION

Do not dry out with compressed air, as it will damage the reeds.

3. Test the reed valve action by putting the valve up to your mouth with the *pointed side away*. You should be able to exhale easily. Now turn valve around with *pointed side into* your mouth. Try to exhale; if air passes through, the valve is leaking and should be replaced. *Never inhale.*

CAUTION

Never try the elastic qualities of the reeds by prying them with a screwdriver, knife, or other instrument.

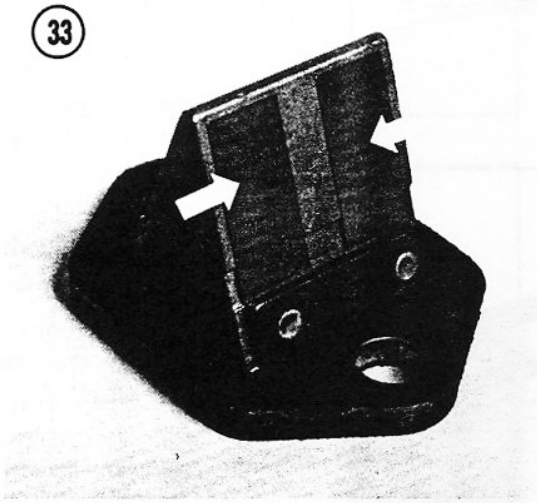
4. If light can be seen between the reeds and the housing, the valve should be replaced.

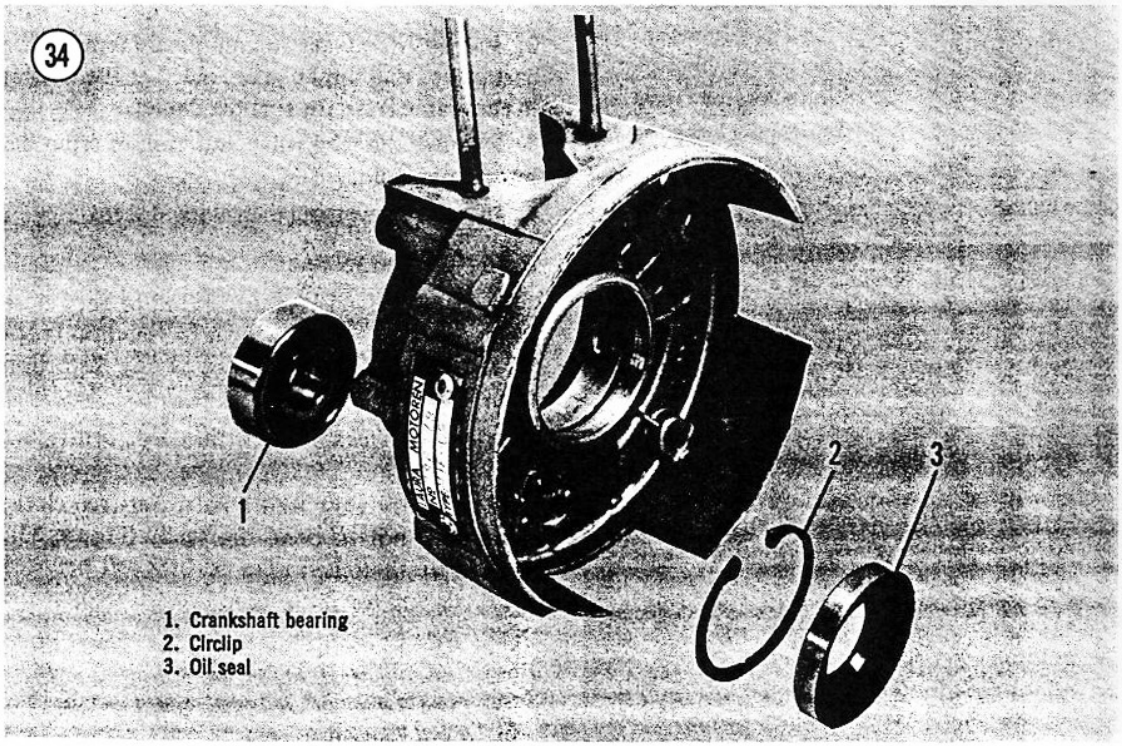
5. When installing, use new gaskets between the reed valve, crankcase, and intake manifold.

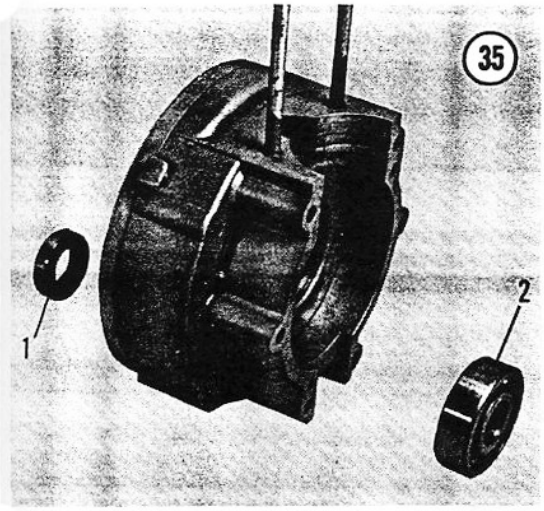
CRANKCASE

In order to gain access to the crankshaft, connecting rod, and the crankshaft bearings and seals, it is necessary to split the crankcase halves. This procedure requires considerable care as the parts are easily damaged. If you feel not qualified to accomplish it, considerable money can be saved by removing the engine as described under *Engine Removal/Installation* in this chapter. Take the crankcase assembly to your moped dealer or motorcycle machine shop and have them perform any operation necessary.

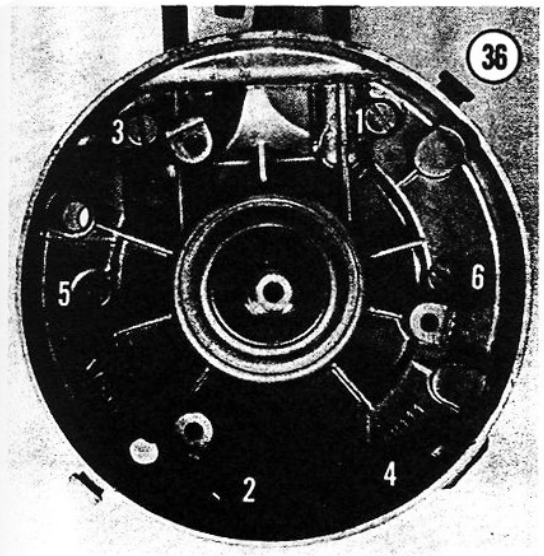
Figure 34 shows all parts of the crankcase half on the clutch side and **Figure 35** shows the magneto side.

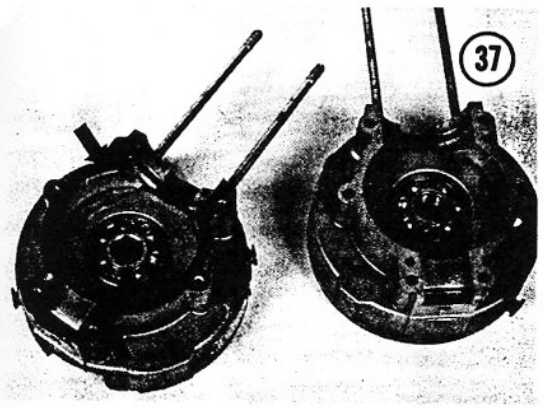






1. Oil seal
2. Crankshaft bearing





Disassembly

1. Remove the cylinder head and cylinder as described under *Cylinder Removal/Installation* in this chapter.
2. Remove the piston as described under *Piston Removal/Installation* in this chapter.
3. Remove the engine as described under *Engine Removal/Installation* in this chapter.
4. Loosen and remove the 6 bolts securing the crankcase halves together. Use the sequence as shown in **Figure 36**.
5. Place the entire crankcase in an oven and heat to 212°F (100°C). An easy way to check to see that it is at proper temperature is to drop some tiny drops of water on the case. If they sizzle and evaporate immediately, the temperature is correct.
6. Remove from oven and hold 2 of the studs on one side of the crankcase housing.

WARNING

Use kitchen pot holders, heavy gloves, or heavy shop rags to hold studs — they are hot.

Separate the 2 halves by tapping with a plastic mallet around the outside of the housing you are holding.

CAUTION

Never use a metal hammer as the crankcase will be damaged.

Do this over a workbench; the other case half may come off quite easily and drop onto the floor.

7. The crankshaft and connecting rod will stay on one of the halves. Tap on the end of the crankshaft with a plastic mallet to remove it.
8. Remove the bearings and seals from the crankcase halves.

Assembly

1. Be sure the case alignment dowels are in position (**Figure 37**).
2. Always use new gaskets — apply oil or gasket cement to only one side of gasket; apply both gaskets to the same crankcase half (**Figure 37**). Make sure the gaskets extend fully

downward (**Figure 38**) so they will make contact with the reed valve gasket. If it does not extend fully, the cankcase will have an air leak allowing fuel/air to leak out.

3. Heat the crankcase halves to the same temperature as required for disassembly.

NOTE: *Be sure the crankshaft is cool before trying to install it.*

4. Install the crankshaft into the clutch side of the crankcase half (**Figure 34**). Apply assembly oil or SAE 20 oil to the bearings and oil seals prior to installation. This makes installation much easier.

NOTE: *The clutch side of the crankshaft* ***does not*** *have a taper and* ***does not*** *have a Woodruff key.*

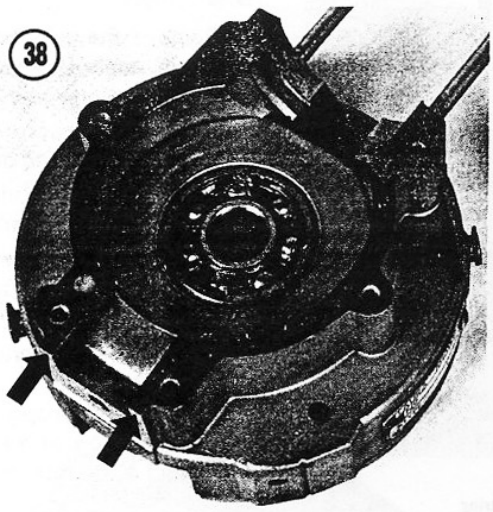
5. It may be necessary to gently tap the crankshaft into place with a plastic mallet.

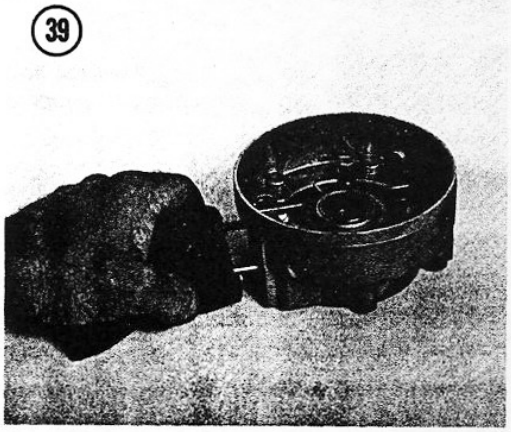
6. Install the magneto side of the crankcase and install the 6 bolts securing the crankcase together.

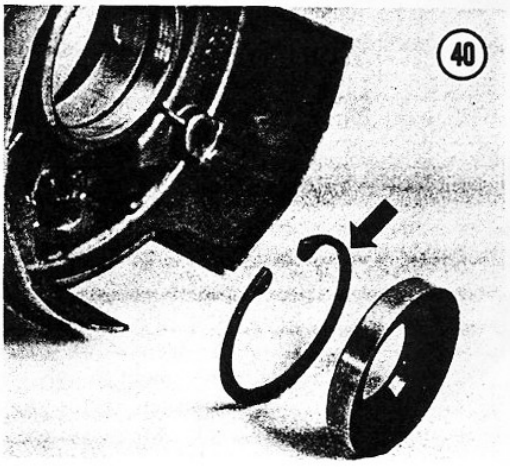
CAUTION

Use the torque pattern shown in ***Figure 36*** *for this step.*

After the crankcase has thoroughly cooled, go back and retighten the 6 bolts.







CRANKSHAFT

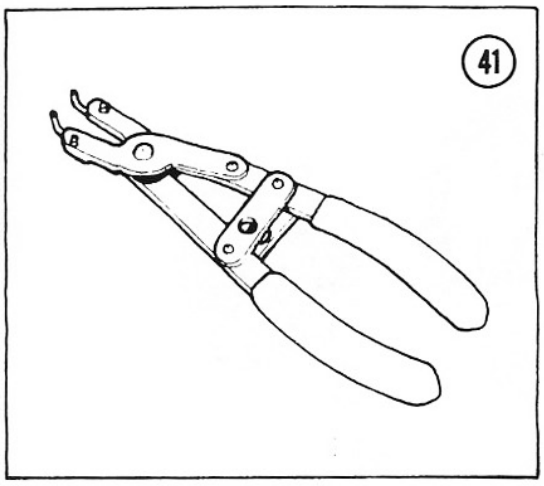
If the crankshaft or the connecting rod needs to be replaced, it must be replaced as a unit. This assures that the accuracy of the fit between them is correct.

Bearing and Seal Replacement

1. Disassemble the crankcase as described under *Crankcase Disassembly/Assembly* in this chapter.

2. Place the crankcase halves in an oven and heat to 212°F (100°C). An easy way to check to see that it is at proper temperature is to drop tiny drops of water on the cases; if they sizzle and evaporate immediately, the temperature is correct.

3. Remove from oven and hold 2 studs with a kitchen pot holder, heavy gloves, or heavy shop cloths — they are *hot*.



4. Hold the crankcase half with the bearing side down (**Figure 39**) and tap it on a piece of soft wood. Continue to tap until the bearing falls out. Repeat for the other half.

CAUTION

Be sure to tap the crankcase squarely on the piece of wood. Avoid damaging the surface of the crankcase as it forms a seal when the 2 halves are assembled.

5. Let the crankcase halves cool so that they are easier to handle. Remove the seals by pressing them out with a suitable size socket, pipe, or piece of wood.

NOTE: *On the clutch side (**Figure 40**), it is necessary to remove the circlip with a pair of circlip pliers (**Figure 41**) prior to removal of the seal.*

6. After removal of the bearings and seals, thoroughly clean both crankcase halves with cleaning solvent and dry completely.

7. Install the circlip into the clutch side, press the seal into place — make sure that the flush side of the seal is *in* toward the center of the engine.

8. Reheat the crankcase halves to the same temperature as in Step 2 and insert the bearings. They should slip right into place; if not, tap them in with a plastic mallet — very gently all around the outer perimeter of the bearing. Make sure they are completely seated.

9. Assemble the crankcase halves as described under *Crankcase Assembly/Disassembly* in this chapter.

CHAPTER SIX

CLUTCH/TRANSMISSION

The engine power is transmitted to the rear wheel through a primary and secondary clutch/transmission. The primary transmission consists of a drive belt running from the clutch housing pulley to the drive pulley, located on the bottom bracket axle. The secondary transmission consists of a chain, driven by the drive pulley, to the sprocket at the rear wheel.

The centrifugal clutch automatically engages at 2,500 rpm, for transmitting engine power to the drive pulley.

The clutch is used for starting the engine — by pedaling the moped and pulling on the start lever on the left handlebar. The lever pulls the start spring arm into the clutch mechanism compressing the clutch components together.

Prior to removing the clutch, clean off all dirt, grease, oil, and foreign matter with Gunk Cycle Degreaser or equivalent. Follow the manufacturer's directions and avoid using too high of a water pressure when rinsing off. Keep water and dirt from entering into the clutch area.

CLUTCH

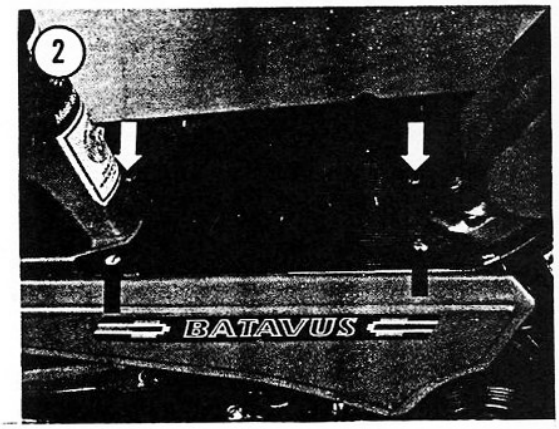
Refer to **Figure 1** during these procedures.

Removal

1. Place the moped on the centerstand.
2. Remove the 4 screws securing engine fairing **(Figure 2)** and remove it. (Does not apply to Bronco models.)

> NOTE: *There are rubber spacers on the attachment screws under the fairing. Do not lose them.*

3. Remove the clutch cover by removing the rubber straps from the lugs on the clutch housing **(Figure 3)**.
4. Loosen the cable locking screw on the start lever on the handlebar and slacken the cable **(Figure 4)**.
5. Push in on the start spring arm **(Figure 5)** and remove the end of the cable from the arm **(Figure 6)**.



CLUTCH COMPONENTS

1. Nut
2. Tab washer
3. Clutch hub assembly
4. Flat steel washer
5. Saucer spring washer
6. Flat washer (20 and 30 mph version only)
7. Oil seal
8. Clutch housing
9. Start spring arm
10. Threaded bar
11. Nut and washer (6 each)
12. Locking plate
13. End plate
14. Leaf spring
15. Clutch lining
16. Pressure spring
17. Pressure plate

6. Remove the 2 bolts securing the start spring arm to the clutch housing (**Figure 7**) and remove it along with the threaded bar.

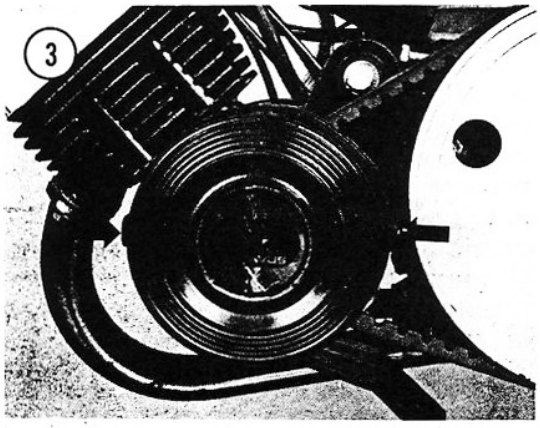
7. Remove 6 nuts and washers securing the locking plate to the clutch hub (**Figure 8**).

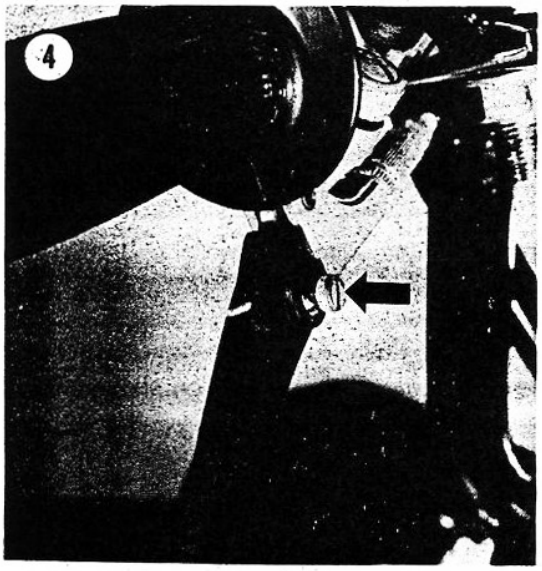
8. Remove the locking plate, end plate, and pressure spring (**Figure 9**).

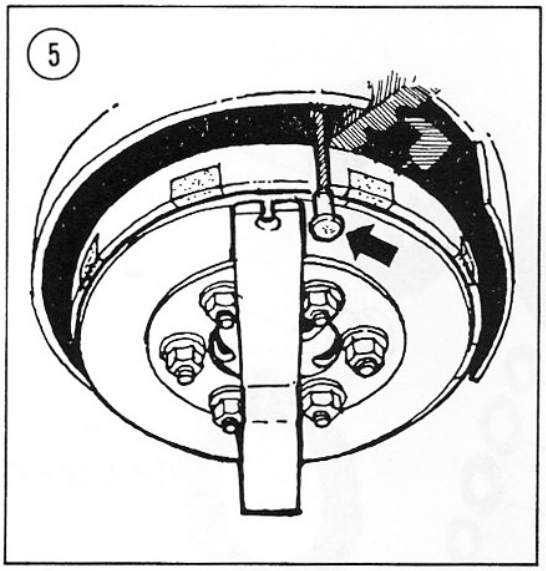
9. Remove the clutch lining and the leaf spring (**Figure 10**).

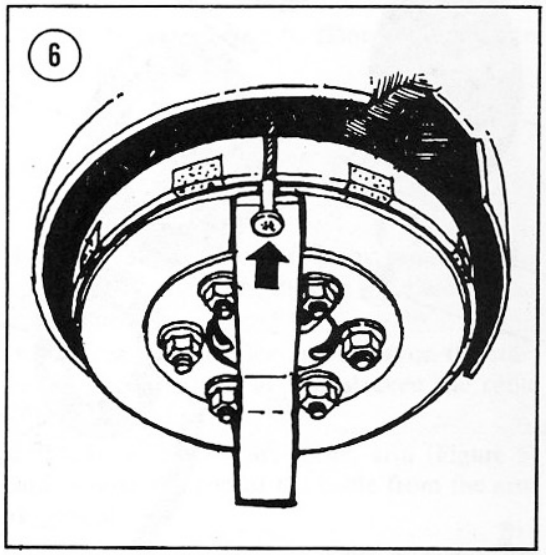
10. Flatten the tab on the tab washer (**Figure 11**) and remove nut (**Figure 12**). Place a screwdriver blade between 2 of the lugs on the clutch hub and rest the handle on the crank arm as shown in **Figure 12**. This will prevent the clutch hub from rotating while removing nut.

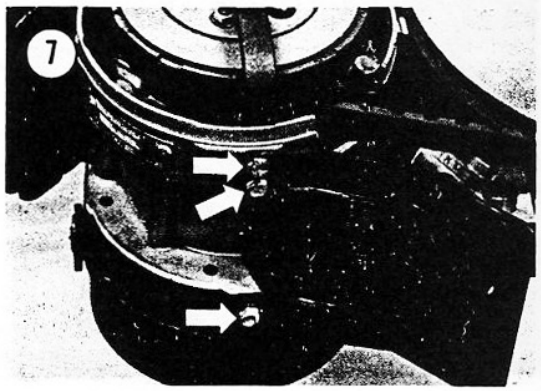
11. Remove the pressure plate (**Figure 13**).

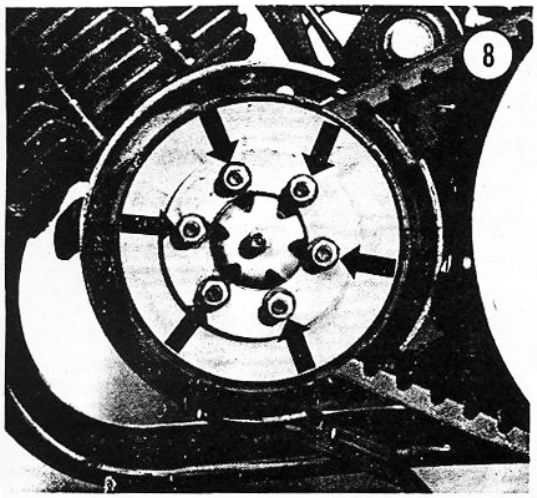








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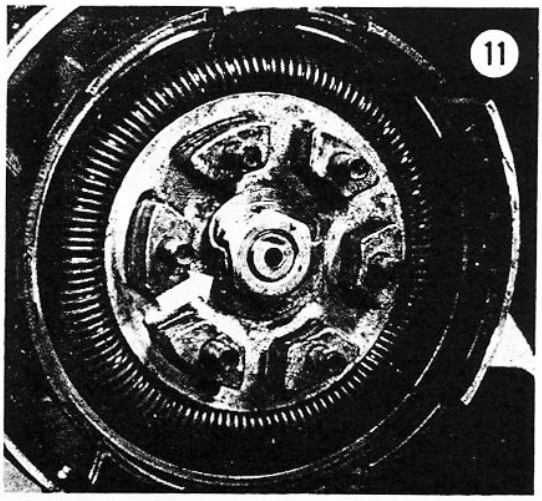
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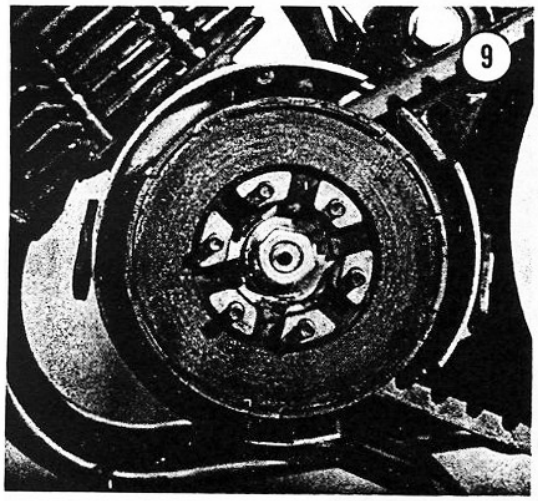
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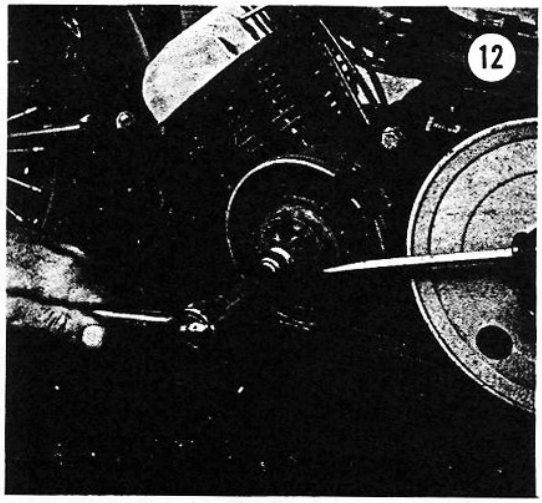
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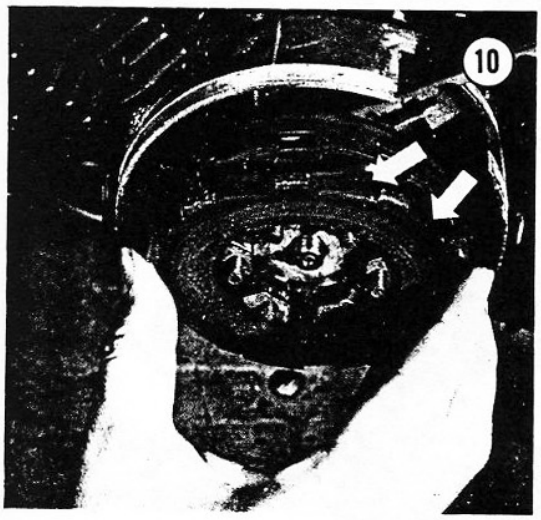
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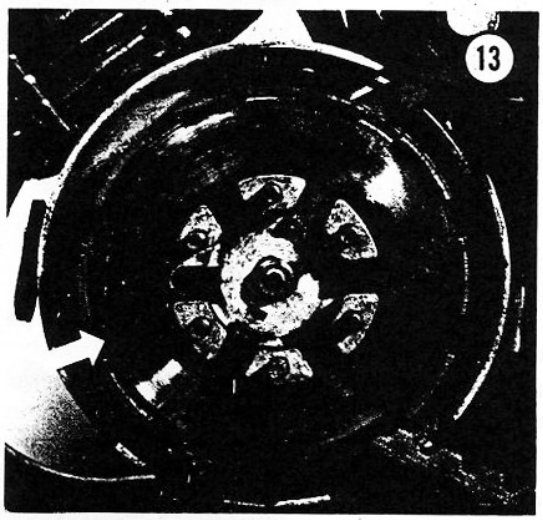
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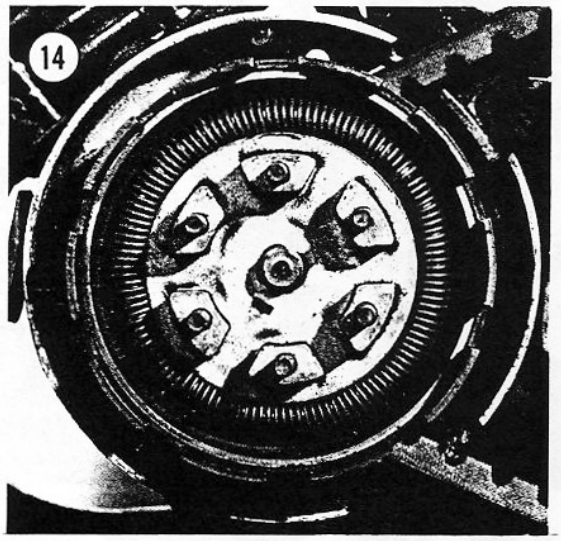
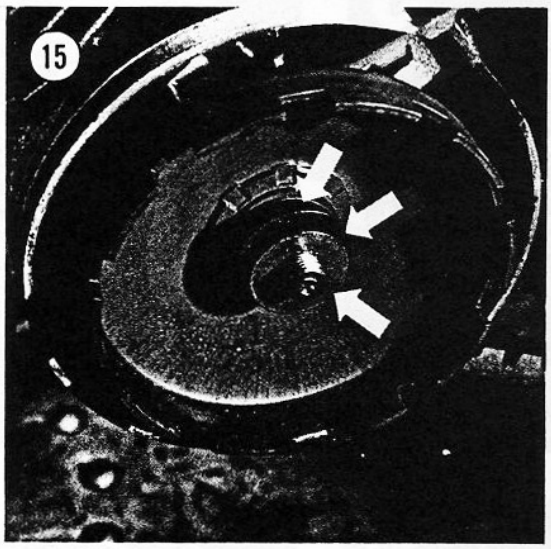
12. Remove the clutch hub (**Figure 14**).

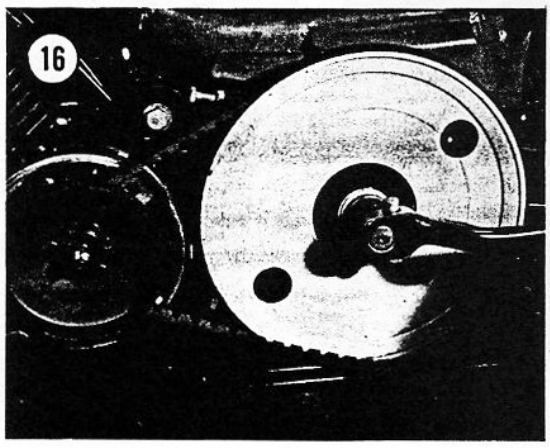
13. Remove the flat steel washer, saucer spring washer, and another flat washer (**Figure 15**). The last flat washer is used only on the 20 and 30 mph versions of the moped.

14. Remove the drive belt by prying it off at the bottom (**Figure 16**) and continue to rotate until the belt is free (**Figure 17**).

15. Pull out on the back side of clutch housing and slide it off of the crankshaft along with the drive belt.







Installation

1. Place drive belt onto the clutch housing and install onto the crankshaft.

2. Install the drive belt by starting it onto the groove on top of the drive pulley. Rotate the pulley until the belt runs completely into place.

3. Install the flat washer (20 and 30 mph version only), spring washer (make sure that the hollow or concave side of the washer is facing away from the engine), and flat steel washer (**Figure 15**).

4. Apply a small amount of grease to the large holed flat washer, *center* it on the *back side* of the clutch hub (**Figure 18**) and install it on the crankshaft.

5. Install the pressure plate (**Figure 13**).

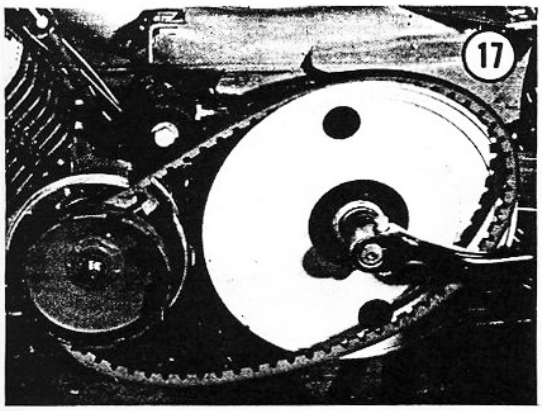
6. Install the nut and new tab washer, tighten to 22 ft.-lb. (30 N•m). Bend up tab on washer to lock nut in place. Always use a new tab washer.

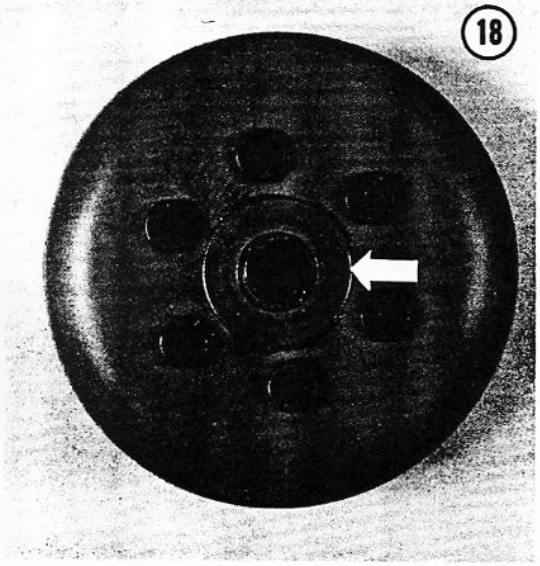
> NOTE: *To prevent the clutch hub from rotating while tightening the nut, place a screwdriver blade between two of the lugs on the clutch hub and rest the handle on the crank arm as shown in Figure 12.*

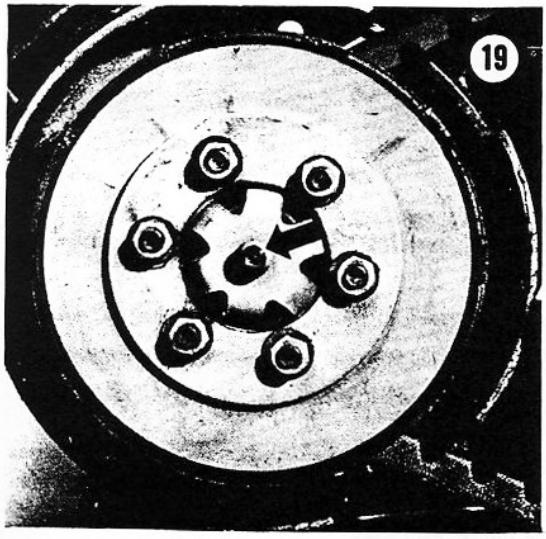
7. Install the leaf spring onto one of the tabs of the clutch lining, any tab is alright. The purpose of this spring is to reduce clutch noise while the engine is idling. Install the lining (**Figure 10**).

8. Install the pressure spring, end plate, and locking plate (**Figure 9**). Install the washers and nuts (**Figure 8**).

> NOTE: *After the clutch has been completely assembled, the clutch housing*







and clutch lining should be able to rotate freely from the rest of the clutch mechanism. Test by rotating the drive pulley by hand; the end plate and locking plate should remain stationary. If not, the position of the large holed flat washer installed in Step 4 is incorrect. Disassemble, reposition the washer and reassemble.

9. Apply a small amount of grease to the raised stud on the end plate where it comes in contact with the start spring arm (**Figure 19**). Install the start spring arm and threaded bar.

10. Install end of cable into the start spring arm (**Figure 5**).

11. Adjust the clutch as described under *Clutch Start Spring Adjustment* in this chapter.

12. Install the engine fairing. (Does not apply to Bronco models.)

Inspection

1. Check the lining for traces of oil and grease. If the lining is contaminated, it should be replaced.

2. If the lining is glazed it may be cleaned off with a wire brush or fine cut file. Make sure to clean off any residue from the filing from both sides prior to installation.

3. The lining should be replaced if the thickness is less than 1/16 in. (1.6mm).

4. Check the inside surface of the end plate and the pressure plate for roughness, scoring, or cracks, replace if necessary.

5. Check the coil spring, containing the ball bearings, in the clutch hub assembly. It should be taut in the recess of the clutch hub. If not, it should be replaced.

6. Inspect the locking tabs of the clutch lining, if any are broken or cracked, the lining should be replaced.

7. Make sure the pressure spring and leaf spring are not broken, bent, or stretched, replace if necessary.

If there is oil in the clutch housing, check the crankshaft oil seals for damage and replace if necessary. Refer to *Crankshaft Bearing and Seal Removal/Installation* in Chapter Five.

Also check the oil seal in the clutch housing. After prolonged storage, it may dry out.

NOTE: *The factory installs a felt ring in place of the new recommended oil seal. Be sure to replace it with a new oil seal prior to reassembly.*

CLUTCH START SPRING

Adjustment

After the clutch has been removed for service and reinstalled, the start spring arm has to be adjusted.

1. Remove the clutch cover by removing the rubber straps from the studs on the clutch housing (**Figure 20**).
2. Unscrew the cable locking screw on the start lever and loosen the cable (**Figure 21**).
3. Make sure that the cable is completely relaxed at the start spring arm. Insert a flat feeler gauge between the stud on the end plate and the start spring arm (**Figure 22**). The correct distance between these two parts is 0.020-0.039 in. (0.5-1.0mm).
4. To adjust the clearance, bend the start spring arm. If the adjustment is small, it can be done in place but if a greater change is necessary, remove it from the clutch housing (**Figure 23**) and remove it along with thread bar.

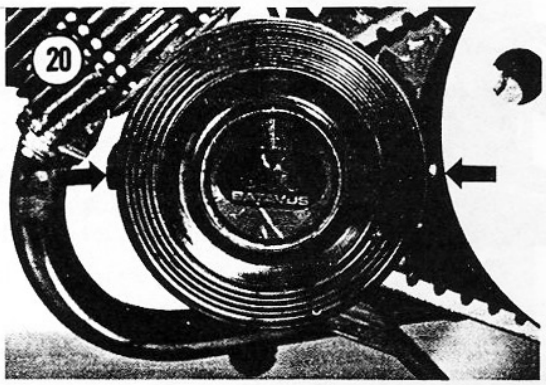
NOTE: *Adjustment to spring arm can be accomplished by tapping with a hammer or bending with Vise Grips.*

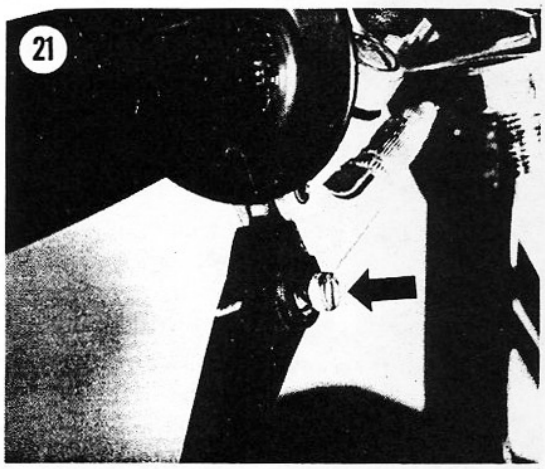
5. Place the start spring arm in a vise and bend it the correct amount. Do a little at a time and continue to check it by reinstalling.
6. Be sure to apply a small amount of multipurpose grease to the stud on the end plate (**Figure 18**) prior to installing start spring arm.
7. Pull on the cable to remove the slack and tighten the cable locking screw on the start lever (**Figure 21**). After doing this, recheck the clearance at the start spring arm to make sure that the clearance has not changed. If it has, readjust.
8. Replace the clutch cover.

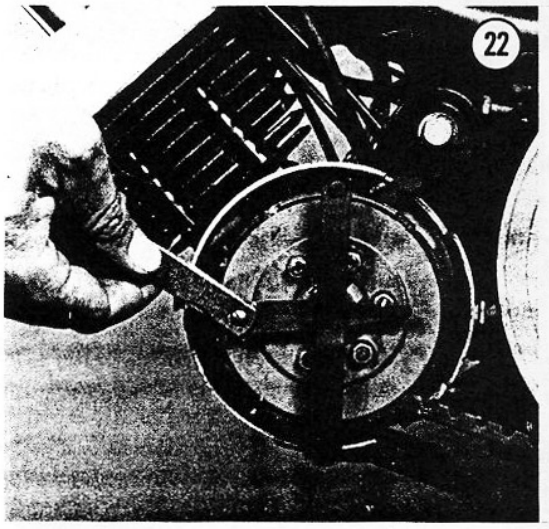
PEDALS

Removal/Installation

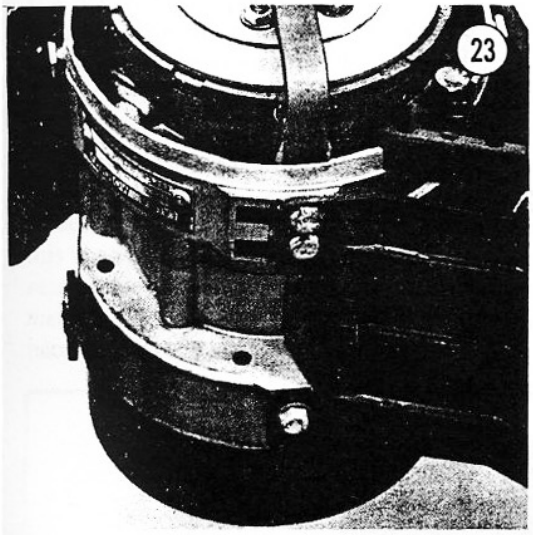
A bent or broken pedal is very dangerous. Replace it immediately. To remove the right pedal, use a wrench on the spindle (**Figure 24**) and loosen it *counterclockwise*. On a left pedal, loosen *clockwise*; the left pedal has special left-hand threads.

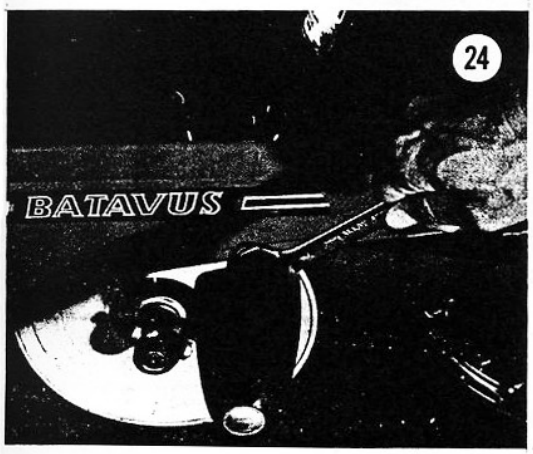


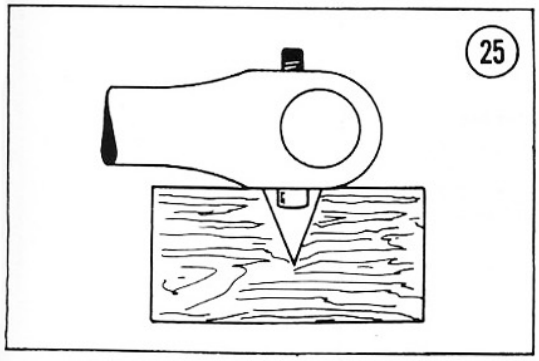




Take the defective pedal to your dealer. Carefully match the threads with the new pedal to guarantee an exact replacement. The threaded portion must be the same diameter and have the same number of threads-per-inch.







Install the pedal(s) by tightening the right pedal *clockwise* and the left pedal *counterclockwise*.

CRANK ARM

Removal/Installation

1. Make a cut-out in a hardwood block (**Figure 25**). Set it on a block of wood and hold the crankarm in a horizontal position.
2. Remove the nut and washer on cotter pin.
3. Rest the crank on the hardwood block so that the end of the cotter pin is over the cut-out (**Figure 25**). Have someone hold the opposite pedal securely.
4. Rap on the threaded end of the cotter pin with a brass or aluminum rod and a hammer.

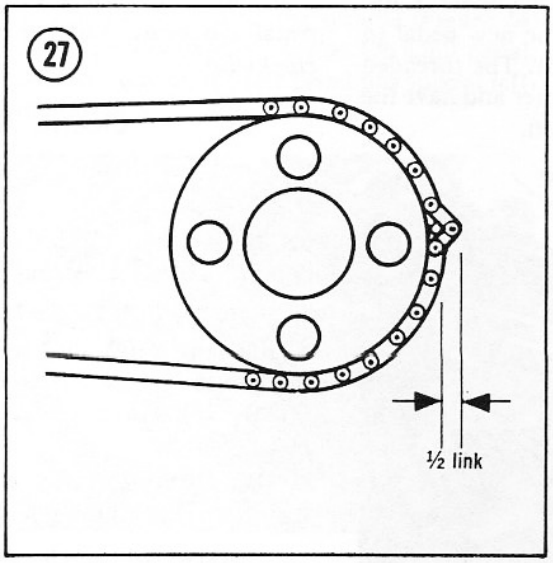
> NOTE: *It may be necessary to use penetrating oil, like Liquid Wrench or WD-40, on the cotter pin to aid in removal.*
>
> CAUTION
>
> *Do not attempt this unless the crank is firmly supported on the hardwood block. If you pound on the cotter pin without support, the bottom bracket bearings will be damaged. In addition, do not hit the cotter pin directly with a metal hammer or steel drift as the threaded end will be damaged.*

5. When the cotter pin is loose, remove it.
6. Pull off the crank.
7. Check each crank for straightness by sighting down its length. If bent, replace it with an exact duplicate.
8. Slide the crank(s) onto the axle with the cotter pin hole aligned with the axle slot.
9. Install the cotter pin with a washer and nut. tighten the nut finger-tight.
10. Support the crank on the hardwood block as in Step 3 except with the threaded end of the cotter pin over the cut-out.
11. Drive the cotter pin in by pounding with a plastic mallet or hammer and brass or aluminum rod. Two or three blows should be sufficient.
12. Tighten the cotter nuts.
13. After about 100 miles, repeat Steps 10 through 12.

CHAINS

Inspection

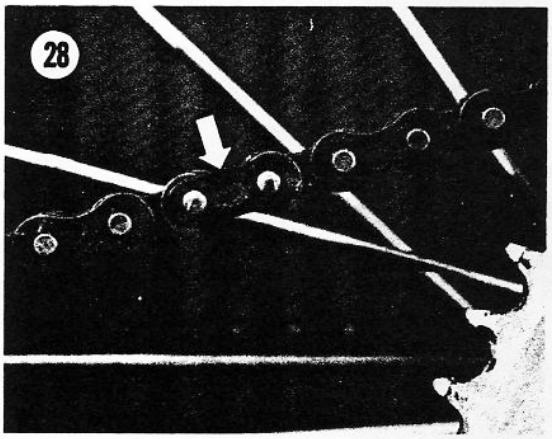
The chain is one of the most severely stressed parts of the moped. Inspect the chain carefully whenever it is removed for cleaning. Pay particular attention to cracks in the rollers and pin and link plates (**Figure 26**). Wear on these parts will cause the chain to stretch. As a quick check of chain wear, refer to **Figure 27**. Replace the chain if it can be pulled away from the rear sprocket by more than ½ the length of a link.

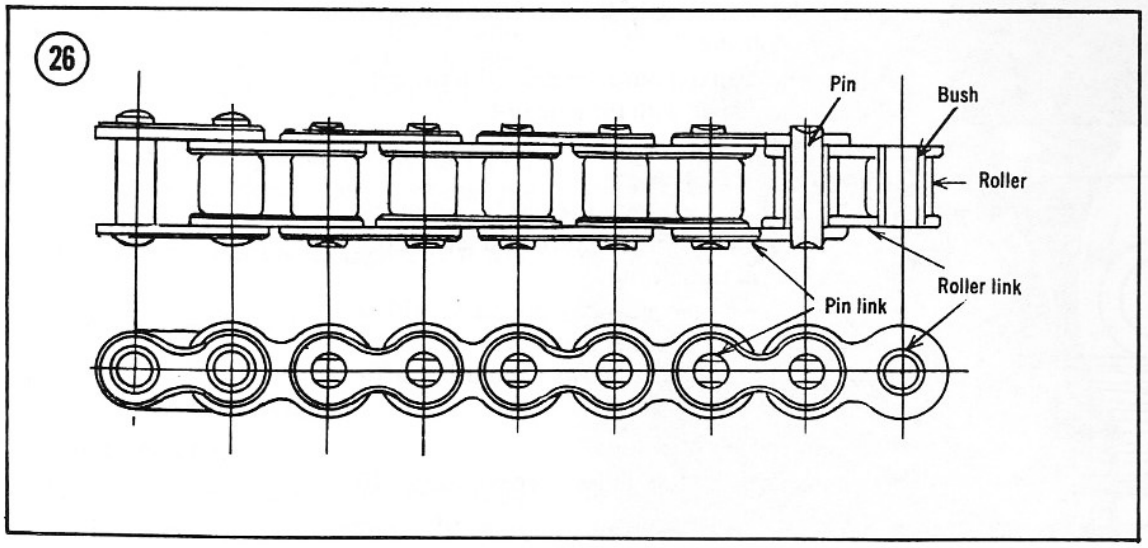


Drive and Bicycle Chain Cleaning and Lubrication

Chain removal is accomplished by removing the master link (**Figure 28**). There are master links on both chains and removal and installation procedures are the same for both.

1. Remove the master link outer clip by prying it off with a thin bladed screwdriver.
2. Remove the outside plate and push the inside plate, complete with pins, out through the back of the chain.
3. Remove chain and soak it in cleaning solvent for about 30 minutes to remove dirt, grease, and old chain oil. Move it around and flex it during this period so that dirt between the pins and rollers may work its way out.
4. Scrub rollers and side plates with a stiff brush, then rinse in clean solvent to carry away loosened dirt.



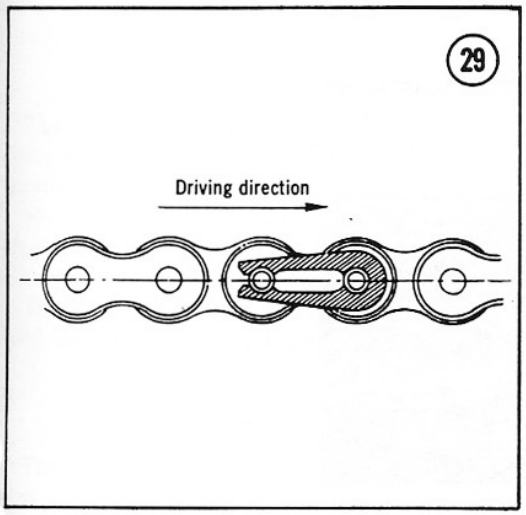


5. Hang chain and allow to dry thoroughly.

6. Lubricate chain with a good grade of commercial chain lubricant. Follow the lubricant manufacturer's application instructions.

7. Install by reversing the removal steps. Use a new master link clip and install it with the opening facing the opposite direction of chain travel (**Figure 29**). Incorrect installation will result in the loss of the clip and may result in chain breakage.

8. After installation of the old or new drive chain it is necessary to adjust the chain tension as described under *Drive Chain Adjustment* in this chapter. It is also necessary to adjust the rear brakes as described under *Brake Adjustment* in Chapter Nine. There is no adjustment necessary for the bicycle chain.



Drive Chain Adjustment

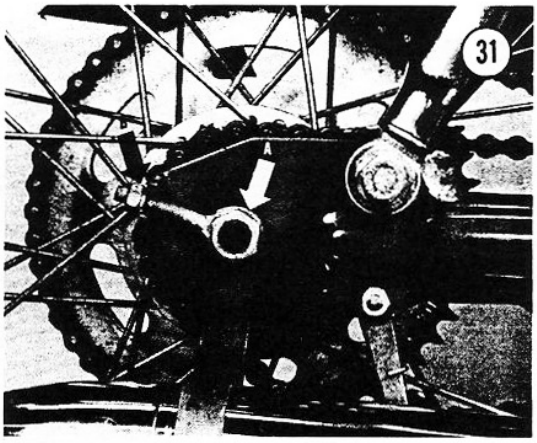
Proper chain tension is important. If the tension is too loose, the chain may skip while traveling at high speed. If tension is too tight, pedaling, engine effort, and chain wear increase.

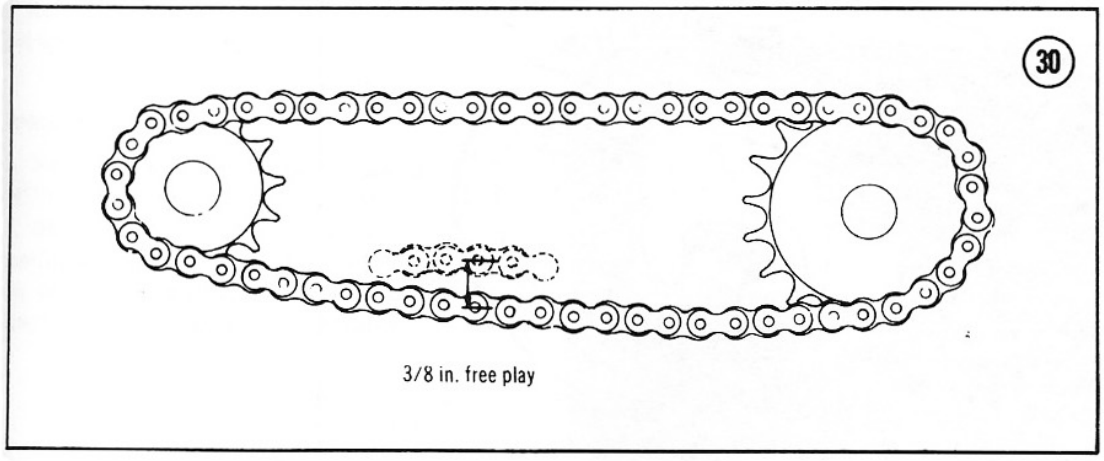
The correct chain tension is measured by pressing up on the bottom of the chain at midpoint. The slack should be ⅜ inch (10mm). See **Figure 30**. If the tension is incorrect, use the following adjustment procedure.

1. Loosen the rear axle locknuts "A" (**Figure 31**).

2. Turn the adjusting nuts "B" (**Figure 31**) of chain tensioners, an equal amount of turns. Turning the nut *clockwise* will increase tension and *counterclockwise* will decrease tension.

3. Check to see that the wheel is aligned within the center of the chain stays.



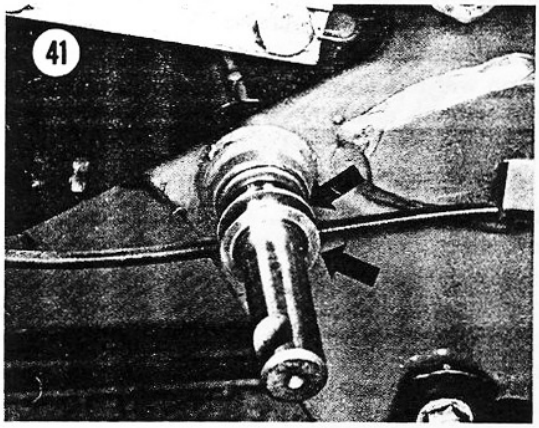


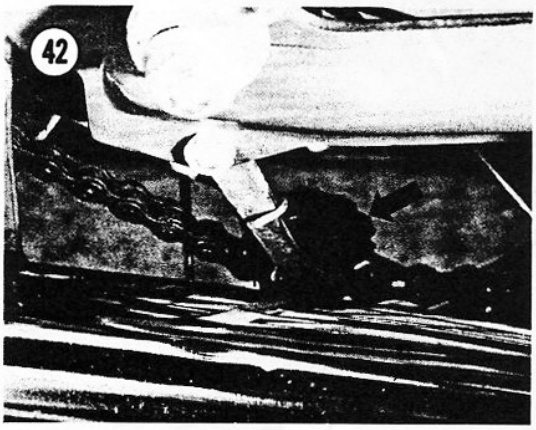
Alignment

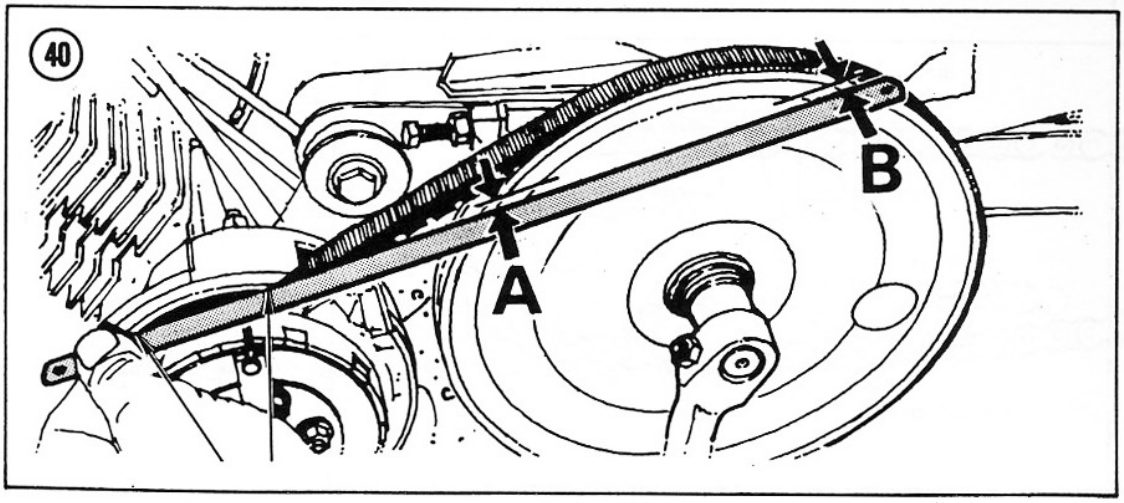
1. After installing the drive pulley, check to make sure it is running true to the engine. Remove the clutch cover and place along straight edge against the face of the crankcase of the clutch housing, let it extend back to the drive pulley (**Figure 40**). Hold it tight against the engine and measure the distance from the face of the pulley at points "A" and "B." This distance should be 0.31-0.39 in. (8-10mm) and it should be the same at both points.
2. If the distance is incorrect, it may be adjusted by adding to or taking from the thickness of the washer(s) shown in **Figure 41**.
3. If the distance between points "A" and "B" is not the same, this can be corrected by slightly loosening the 4 nuts on the bolts securing the engine to the frame and shifting it until this alignment is correct. Tighten the 4 nuts securely and install the drive belt.

Crank Axle
Removal/Installation

1. Follow Steps 4 through 6 of *Drive Pulley Removal/Installation* in this chapter.
2. Remove the 2 washers on axle between the pulley and the frame (**Figure 41**).
3. Pull up on bicycle chain tensioner (**Figure 42**) and move chain off of it.
4. Pull bicycle chain off of front sprocket. There is enough slack in the chain that it is not necessary to remove the master link.
5. Pull the crank axle, complete with the right-hand crank arm, pedal, and black plastic dust protector, out from the frame.
6. Install by reversing the removal steps.







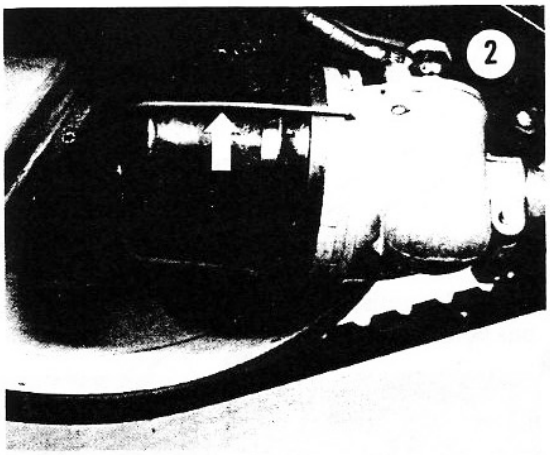
CHAPTER SEVEN

FUEL AND EXHAUST SYSTEMS

The fuel system consists of the fuel tank, fuel shutoff valve, fuel filter, Encarwi-Bing carburetor, and an air filter.

The exhaust system consists of an exhaust pipe and muffler that can be taken apart for carbon removal.

This chapter includes service procedures for both fuel and exhaust systems.



CARBURETOR

The carburetor is a single barrel, side draft type that can be taken apart for service (**Figure 1**).

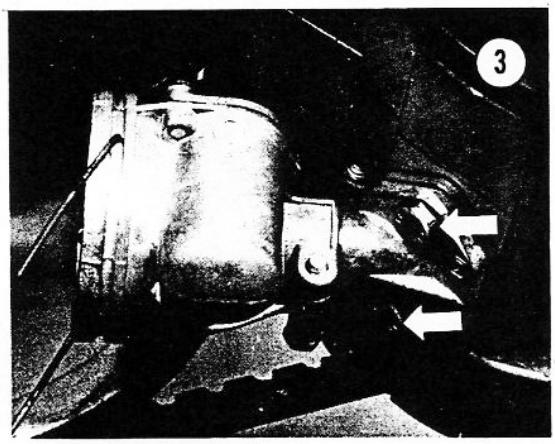
Refer to **Table 1** for carburetor model number and jet size for your particular model.

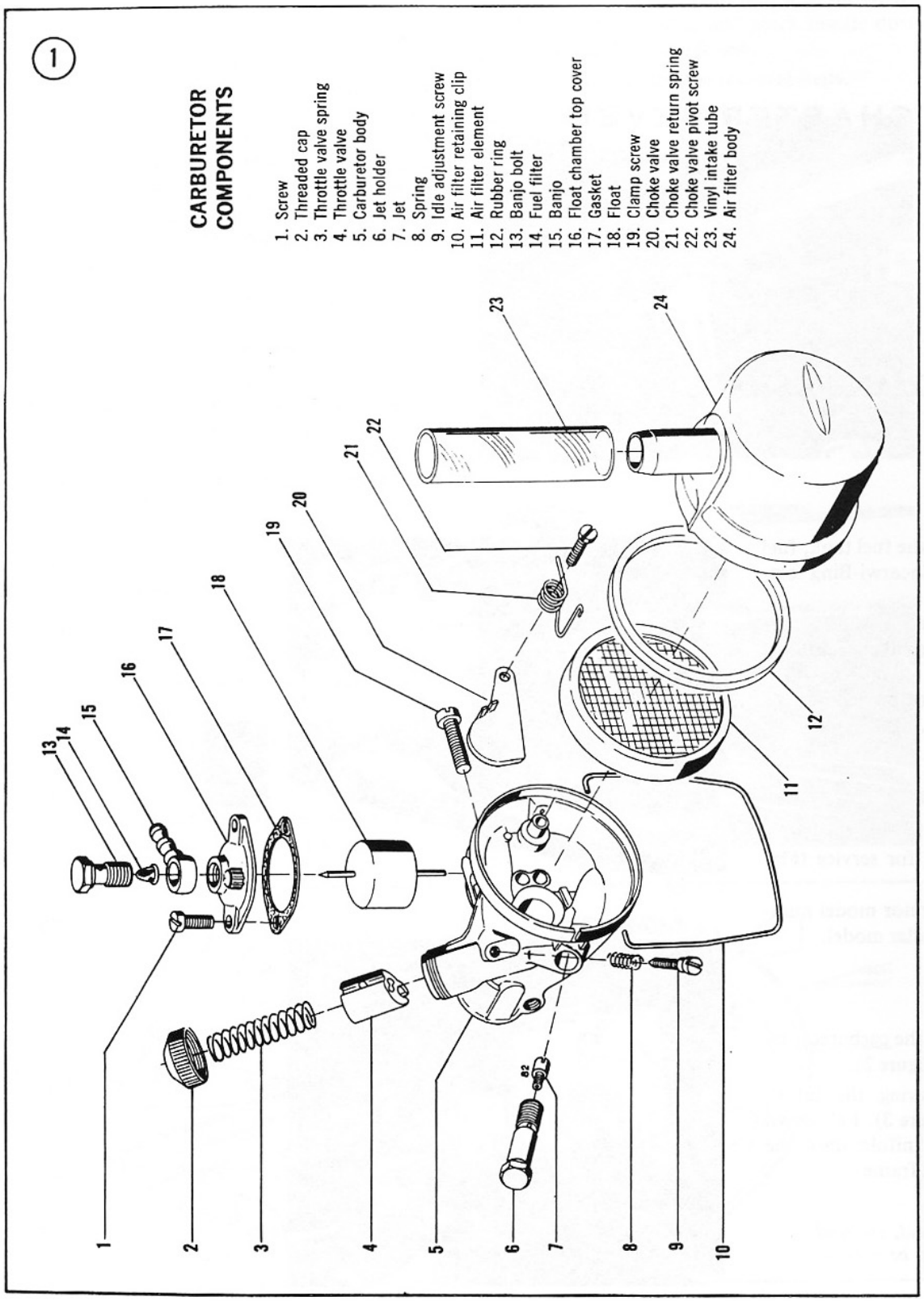
Removal/Installation

1. Remove the air filter from the carburetor by prying off the retaining clip (**Figure 2**).
2. Remove the 2 bolts securing the intake manifold to the cylinder (**Figure 3**). Pull down on carburetor and intake manifold until the vinyl intake tube is clear of the frame.

CAUTION

As you remove the manifold, the reed valve will also come out; be sure to catch it to avoid damage.

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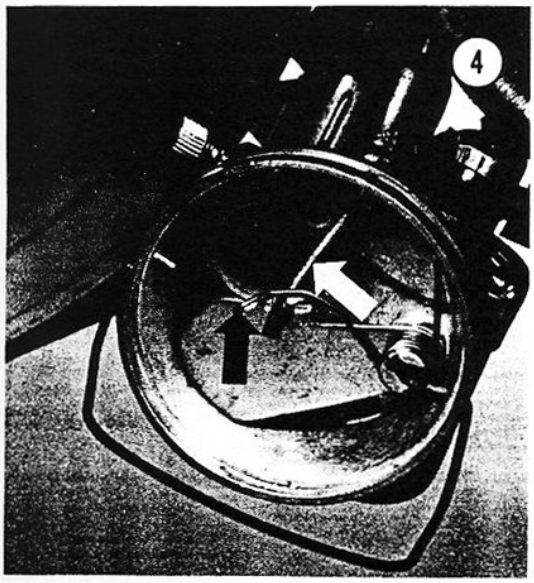
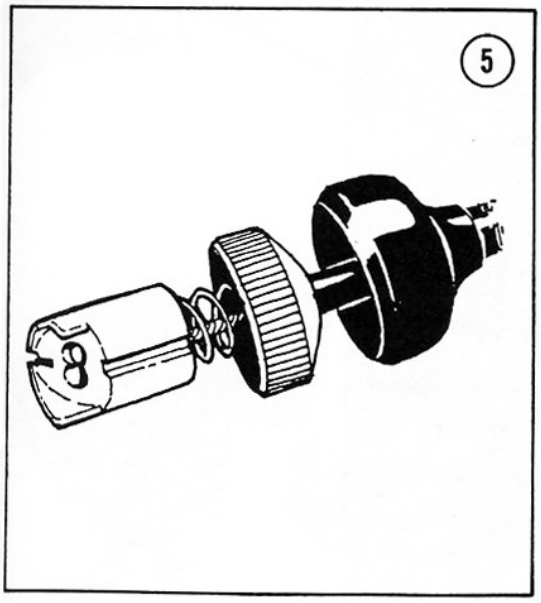
CARBURETOR COMPONENTS
1. Screw
2. Threaded cap
3. Throttle valve spring
4. Throttle valve
5. Carburetor body
6. Jet holder
7. Jet
8. Spring
9. Idle adjustment screw
10. Air filter retaining clip
11. Air filter element
12. Rubber ring
13. Banjo bolt
14. Fuel filter
15. Banjo
16. Float chamber top cover
17. Gasket
18. Float
19. Clamp screw
20. Choke valve
21. Choke valve return spring
22. Choke valve pivot screw
23. Vinyl intake tube
24. Air filter body

Table 1 CARBURETOR MODEL NUMBERS

	Engine Version 20 mph	25 mph	30 mph
Carburetor model number	Encarwi-Bing S 23	Encarwi-Bing S 8 A	Encarwi-Bing S 22/25
Jet size (used for break-in period—first 500 miles)	52	54	58
Jet size (Normal)	50	52	56





3. Pry off the choke return spring (**Figure 4**) from the choke valve and remove the cable from behind the spring.

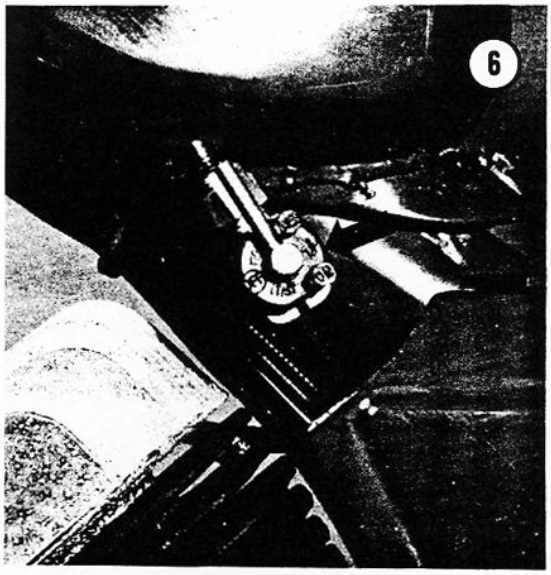
4. Unscrew the throttle cable from the carburetor. The threaded cap, spring, and throttle valve will stay with the throttle cable (**Figure 5**).

5. Turn the fuel shutoff valve (**Figure 6**) to the OFF position and remove the fuel line from the carburetor banjo fitting.

6. Install by reversing the removal steps; be sure to use a new gasket between the intake manifold and the cylinder.

Disassembly/Assembly

1. Remove the throttle valve, throttle valve spring, and threaded cap from the throttle cable. Push the throttle valve up on the cable until the end of the cable is visible, slide the cable over to the other hole and withdraw the



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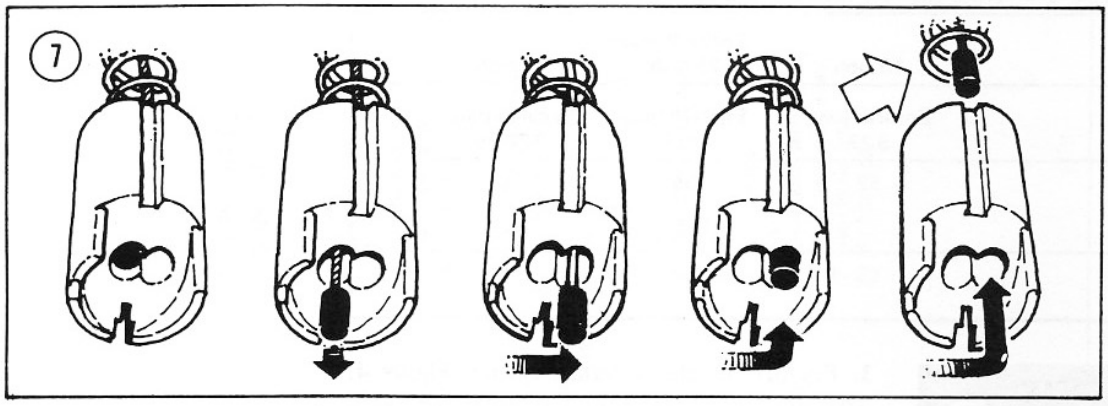
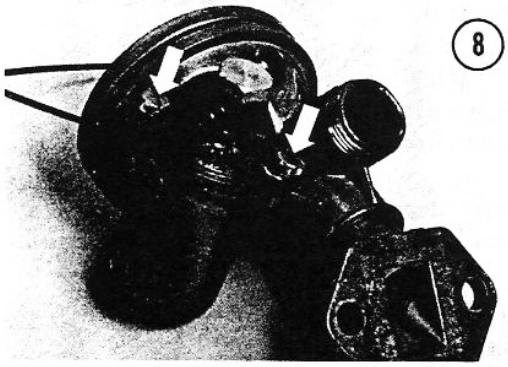


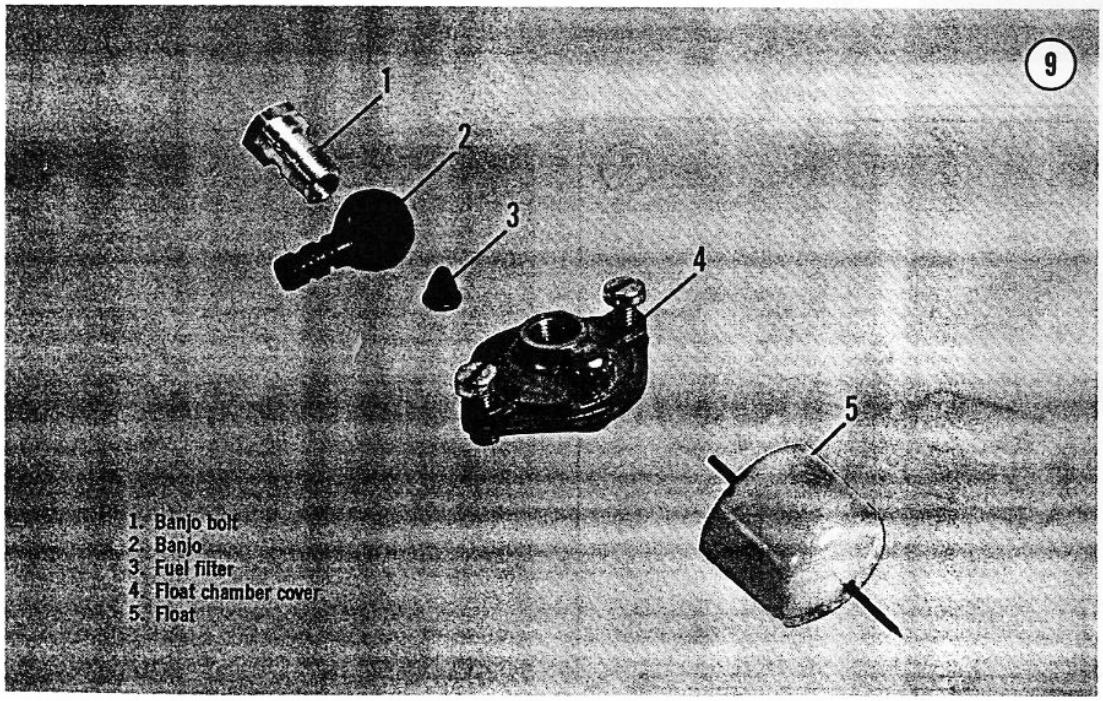


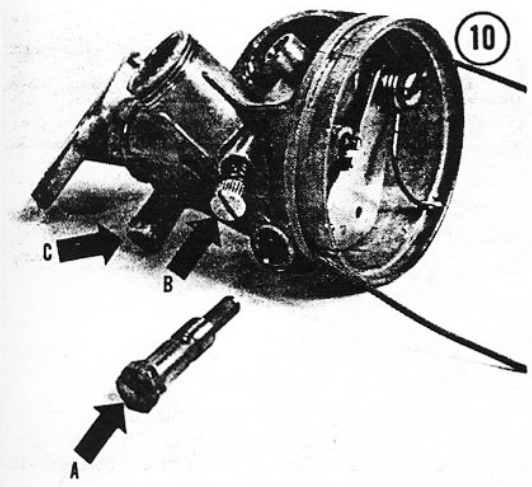
throttle valve, spring, and top cap from the cable (**Figure 7**).

2. Remove the 2 screws securing the float chamber top cover to the carburetor body (**Figure 8**).

3. Remove the banjo bolt, banjo, fuel filter, float chamber cover, and float from the carburetor body (**Figure 9**).

4. Remove the jet holder and jet "A" and the idle adjustment screw "B", and loosen the carburetor clamp screw "C" (**Figure 10**) and remove the intake manifold.



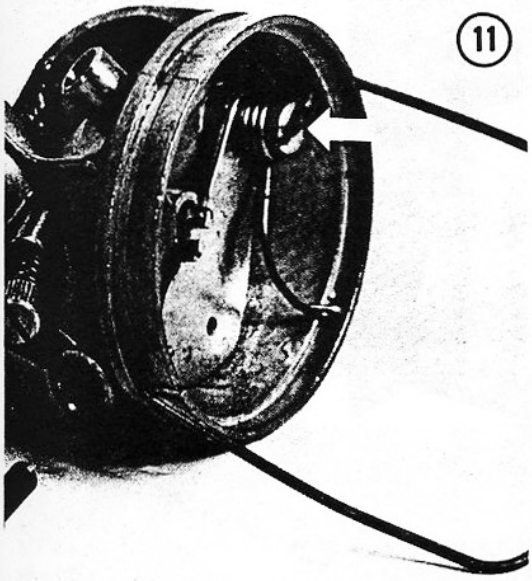


5. Remove the pivot screw securing the choke valve and return spring (**Figure 11**).

6. Assemble by reversing the disassembly steps using new gaskets.

7. Be sure to install the float with the pointed end of the needle valve *up* toward the float chamber cover (**Figure 12**).

8. When assembling the banjo fitting, do not tighten it completely until the carburetor has been installed on the engine. Position the banjo so that it aligns with the fuel line. The fuel line should have no sharp bends that would allow it to "kink" and shut off fuel flow. Securely tighten the banjo fitting.



Overhaul

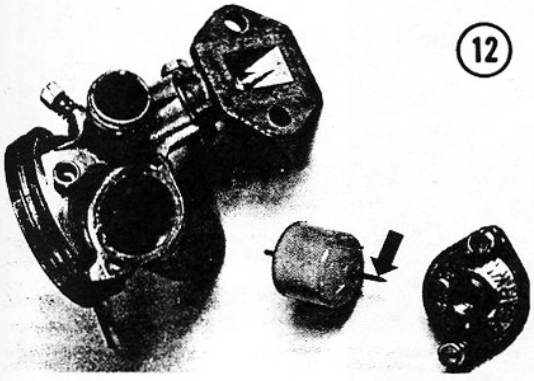
It is difficult to determine exactly how often a carburetor should be overhauled. As a rule of thumb, it is a good idea to overhaul the carburetor every time the engine is decarbonized. If your moped is used in dusty conditions, the overhaul should be performed more often.

Cleaning

1. Clean all parts including the intake manifold (except the float, fuel filter, banjo, reed valve, and gaskets) in a good grade of carburetor cleaner. Follow the manufacturer's instructions for correct soaking time (usually about ½ hour).

2. Remove parts from cleaner and blow dry with compressed air. Blow out the jet with compressed air; *do not* use a piece of wire to clean it, as minor gouges in the jet can alter the flow rate and upset the fuel/air ratio.

3. Shake the float to see if there is gasoline inside. If there is, the float has a leak and must be replaced.



Fuel Filter
Removal/Installation

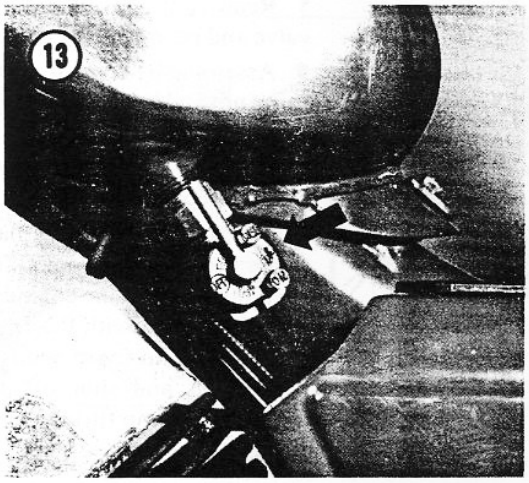
The fuel filter can be removed without the carburetor. Unscrew the banjo bolt and remove the banjo and filter. Clean out the filter with a medium soft toothbrush and blow out with compressed air. If filter is cracked or broken, it should be replaced.

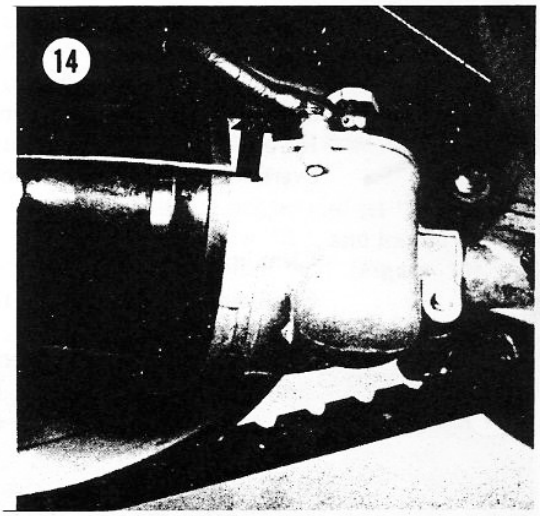
Install by inserting the filter into the banjo *with the dome side up* and install into float chamber top.

FUEL SHUTOFF VALVE

Removal/Installation

1. Turn the shutoff valve to the OFF position (**Figure 13**).
2. Remove the flexible fuel line from the carburetor (**Figure 14**) and place the loose end into a clean, sealable metal container. This fuel can be reused if it is kept clean. Do not drain it into your gasoline can as this fuel already has engine oil added to it.
3. Open the fuel valve to the RESERVE position and remove the fuel fill cap. This will allow air to enter the tank and speed up the flow of fuel. Drain the tank completely.
4. Remove the fuel shutoff valve by unscrewing the fitting from the tank (**Figure 15**); leave the shutoff valve screwed into the fitting. Use a 14mm open-end wrench.
5. After removing the valve, insert a corner of a clean shop rag into the opening in the tank to stop the dribbling of fuel onto the frame.
6. Clean out the filter with a medium soft toothbrush and blow out with compressed air. Replace if any part is defective.
7. Install by reversing the removal steps; do not forget the gasket.

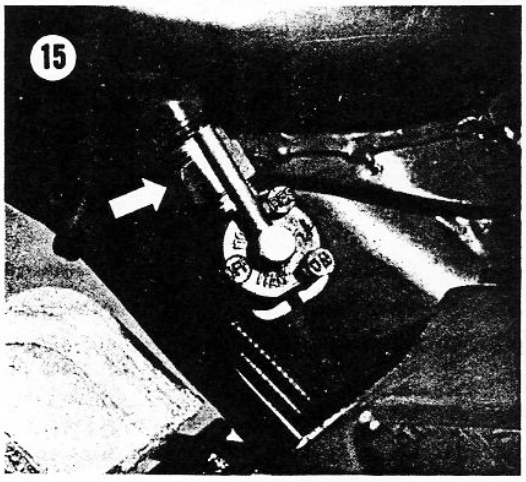




AIR FILTER

CAUTION

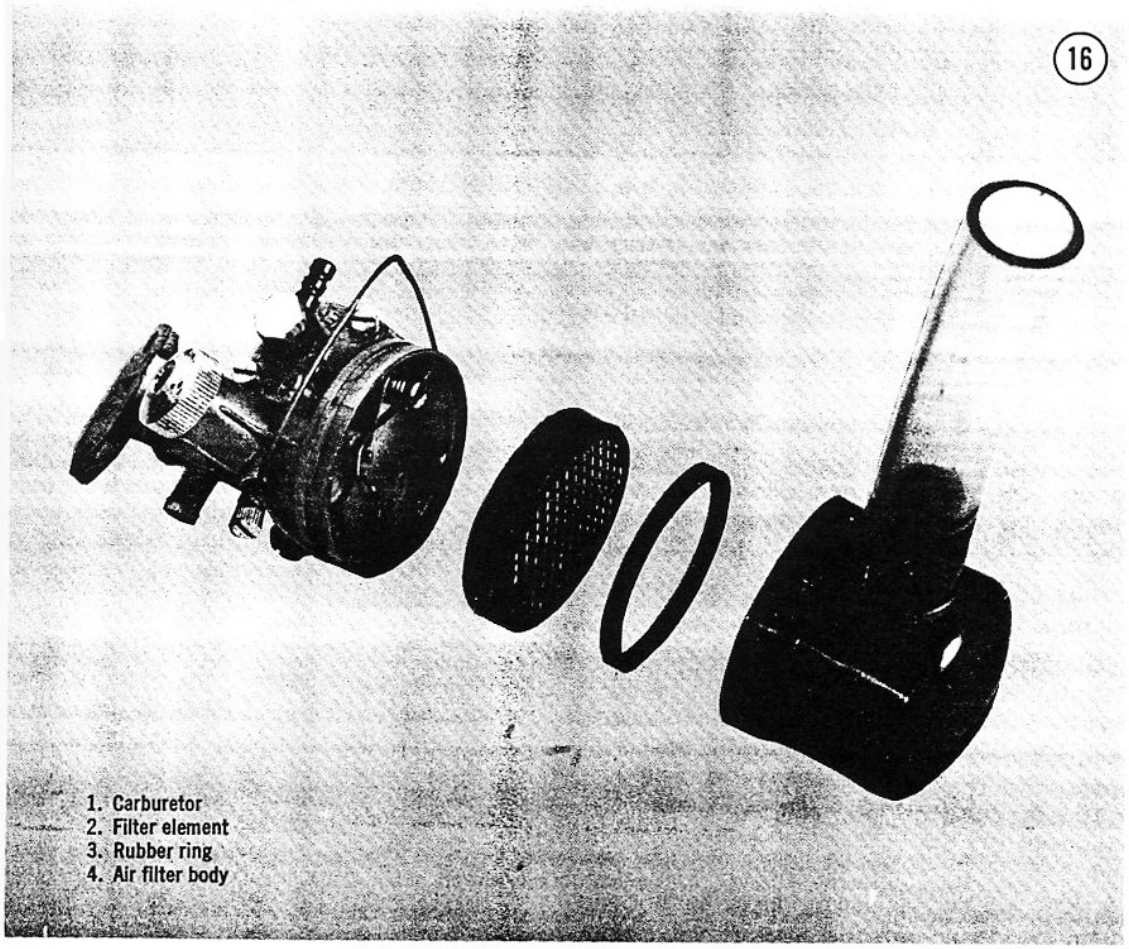
Do not ride the moped without the air filter installed or without the intake tube in place. Damage may occur to the carburetor and/or the engine if any small objects are drawn into the carburetor throat.

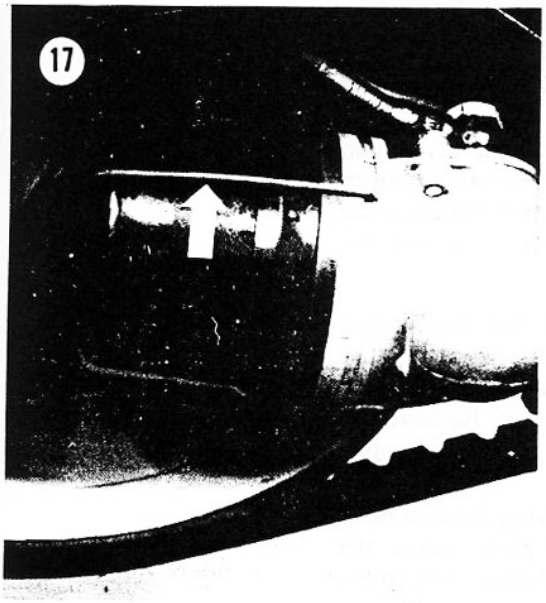


Removal/Cleaning/Installation

Figure 16 shows the relationship of the air filter to the carburetor. It is not necessary to remove the carburetor to service the air filter.

The intake tube diameter is 0.55 in. (14mm) on the 20 and 25 mph version and 0.63 in. (16mm) on the 30 mph version.





1. Remove the air filter from the carburetor by prying off the retaining clip (**Figure 17**) and pulling back and down until the vinyl intake tube clears the frame.

2. Pull the air filter element and rubber ring from the air filter body (**Figure 16**).

3. Wash out the element and dry thoroughly with compressed air or tap vigorously into a dry clean cloth until all of the cleaning solvent is out. After it is thoroughly dry, apply some light weight oil to it. Do not saturate it as it will restrict the air flow and pull the excess oil into the carburetor.

4. Wash the inside of the air filter body and the intake tube in cleaning solvent and thoroughly dry with a clean, lint-free cloth.

5. Wipe off the rubber seal with a cloth saturated in cleaning solvent.

6. Install by reversing the removal steps. Do not forget to install the rubber seal.

FUEL TANK

Removal/Installation

1. Turn the fuel shutoff valve (**Figure 18**) to the OFF position and remove the fuel line from the carburetor.
2. Place the loose end of the fuel line into a metal can that can be sealed.

NOTE: *Do not put it in your gasoline can as this fuel already has oil added.*

3. Remove the fuel tank fill cap, turn the shutoff valve to the RESERVE position and drain the fuel.
4. After draining is completed, turn the fuel shutoff valve to the OFF position, replace the fuel fill cap and seal the metal container.

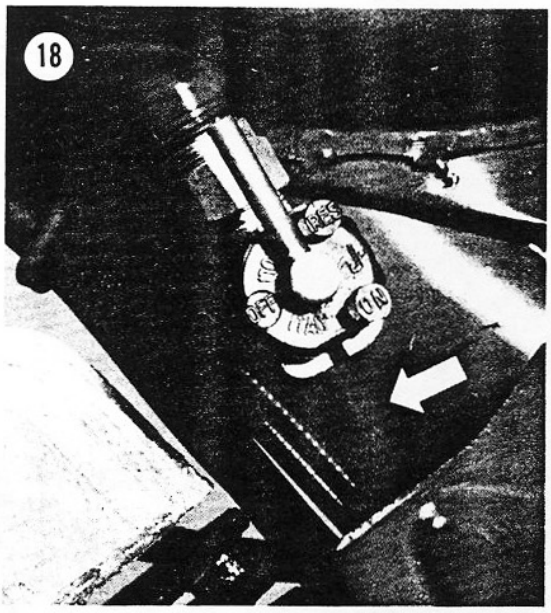
WARNING

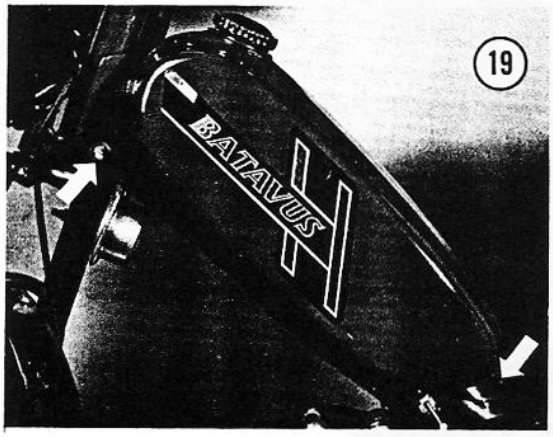
Do not smoke or have any open flame in the area while performing this procedure. Also have a fire extinguisher suitable for gasoline fires within reach.

5. Reinstall the fuel line on the carburetor and remove it from the fuel shutoff valve (**Figure 18**).

NOTE: *There are three different tank configurations used on the Batavus. The Model VA, as shown in the following procedure, and the Bronco have their tanks mounted at an angle as they are used with the step-through type frame. The Model HS 50 and MoBat have their tank mounted similar to a motorcycle in a horizontal format. There are only slight differences in removal and installation as noted in the following procedure.*

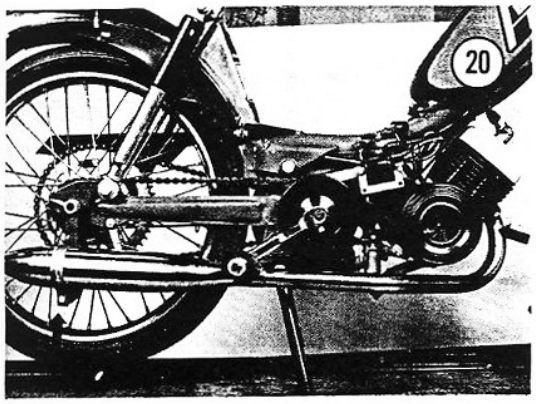
6. On Model VA, loosen and remove one of the cap nuts and washers from the front horizontal threaded rod, slide the threaded rod out the other side. Remove the rear vertical bolt, washer, and locknut (**Figure 19**). Pull up and remove tank from frame.





7. On Bronco models, remove one of the cap nuts and washers from the top and bottom threaded rod and slide the threaded rod out the other side. It is not necessary to remove the safety bars.

8. On Model HS 50 and MoBat, loosen and remove one of the cap nuts and washers from the front horizontal threaded rod, slide the threaded rod out the other side. Remove the rear horizontal bolt, washer, and locknuts just forward of the saddle.
9. Remove the seat by removing the two bolts securing the rear mounting plate, under the seat, to the luggage carrier. Pull the seat to the rear and remove it.



10. Pull the tank up and off the frame.
11. Pour a small quantity of clean gasoline into the empty tank and slosh it around. Remove the fill cap, then pour it out. If any sediment comes out, continue this procedure with fresh gasoline until it drains out clean.
12. If there is a leak in the tank, take it to your dealer and have the problem corrected. Do not attempt this yourself.

EXHAUST SYSTEM

The muffler is a very important part of the 2-cycle engine in regard to operating performance. It must be cleaned periodically to remove the normal carbon buildup. This is described under *Muffler Decarbonizing* in Chapter Three.

Muffler Removal/Installation (VA, HS 50, MoBat)

1. Remove the 2 bolts securing the exhaust pipe to the cylinder and loosen the bolt on the rear clamp securing the muffler (**Figure 20**).
2. Slide the muffler forward and out of the rear mounting clamp and remove muffler and exhaust pipe.
3. Install by reversing the removal steps, using a new gasket between the exhaust pipe and the cylinder.

Muffler Removal/Installation (Bronco)

1. Remove the two cap screws and washers securing the muffler heat shield to the muffler and remove it.
2. Remove the two bolts securing the exhaust pipe to the cylinder.
3. Remove the bolt, washer, and nut securing the rear of the muffler to the muffler bracket. Pull the muffler and exhaust pipe forward to clear the rear shock absorber and remove it.
4. Install by reversing the removal steps.

CHAPTER EIGHT

ELECTRICAL SYSTEM

This chapter discusses the operating principles and maintenance of the ignition and lighting systems.

MAGNETO

The engine-mounted magneto generates electricity for the lights and spark plug. It works similar to a generator or alternator on an automobile, but is more compact and is attached directly to the engine (**Figure 1**).

The stator is stationary and consists of two coils of specially wound wire attached to the engine crankcase. The rotor has built-in permanent magnets which rotate with the engine crankshaft. As the magnets move past the stationary coils they induce a voltage within these coils which powers the lights, horn, and spark plug.

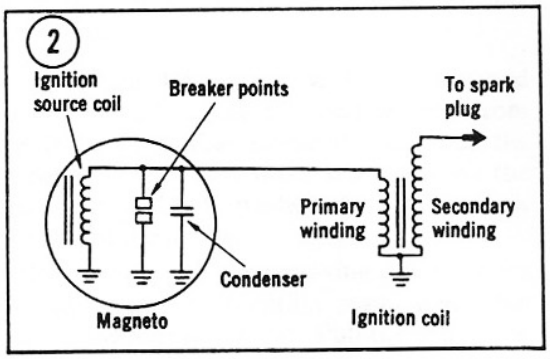
The ignition breaker points, in the magneto, are used to regulate current flow from the ignition coil to the spark plug, at just the right time, when the piston reaches firing position. This is called *Magneto Ignition Timing*. When the breaker points are closed, the current is grounded, thus no current to the spark plug. When they open, the current that has built up in the coil is no longer grounded and is allowed to flow from the coil directly to the spark plug, bypassing the breaker points. This sudden burst of current jumps the spark plug gap creating the spark for igniting the fuel mixture. To prevent the points from arcing when they open, a condenser is placed in the circuit.

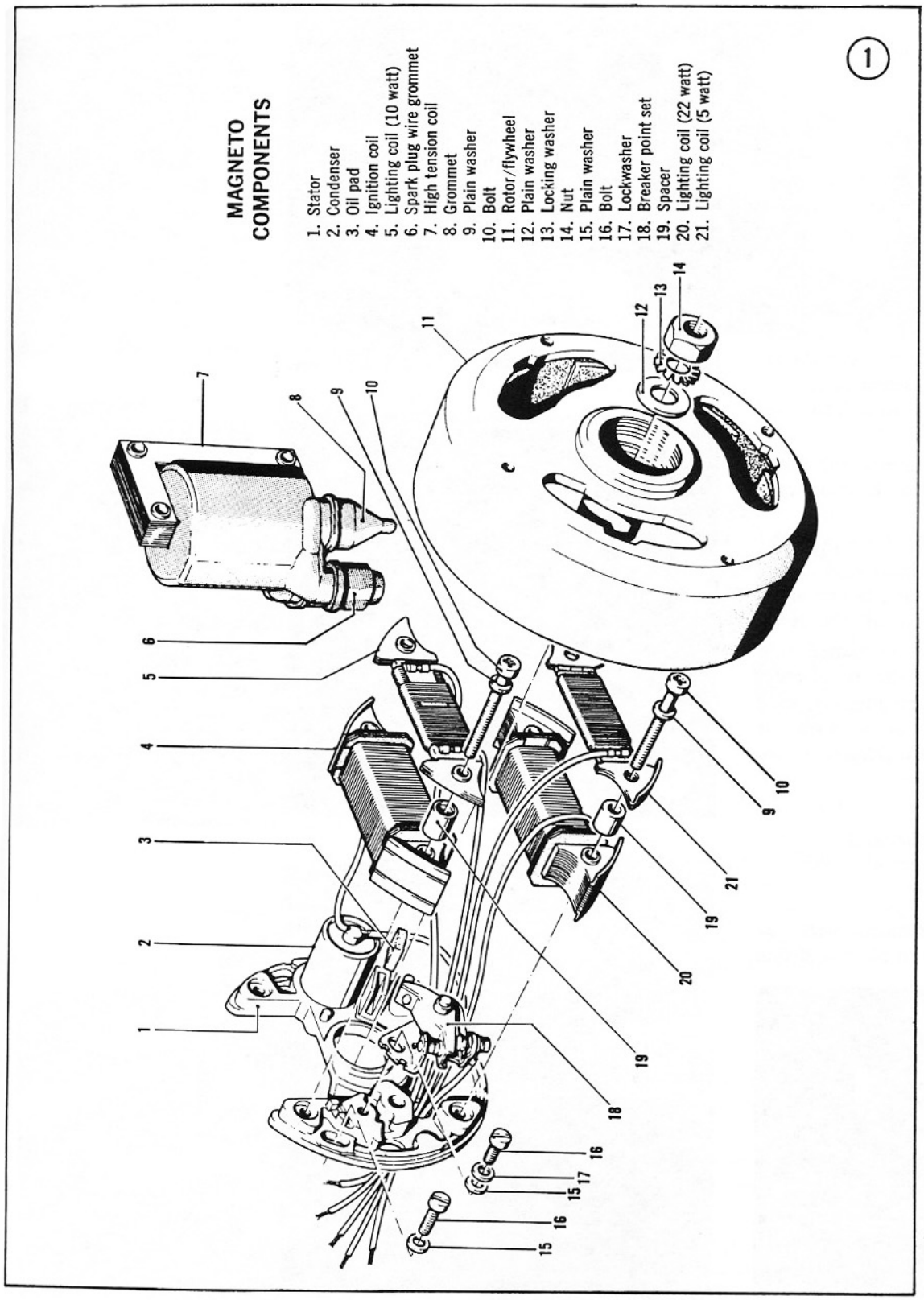
Figure 2 illustrates the breaker points and condenser in the ignition circuit leading to the spark plug. An electrical wiring diagram is provided at the end of this chapter.

Removal/Installation

1. Remove the 4 screws securing the engine fairing (**Figure 3**) and remove the fairing. (Does not apply to Bronco models.)

NOTE: *There are rubber spacers on the attachment screws under the fairing. Do not lose them.*




MAGNETO COMPONENTS
1. Stator
2. Condenser
3. Oil pad
4. Ignition coil
5. Lighting coil (10 watt)
6. Spark plug wire grommet
7. High tension coil
8. Grommet
9. Plain washer
10. Bolt
11. Rotor/flywheel
12. Plain washer
13. Locking washer
14. Nut
15. Plain washer
16. Bolt
17. Lockwasher
18. Breaker point set
19. Spacer
20. Lighting coil (22 watt)
21. Lighting coil (5 watt)
1

2. Remove the magneto cover by removing the rubber straps from the lugs on the magneto housing (**Figure 4**).

NOTE: *The following procedure requires two people to remove the rotor.*

3. Remove the nut, washer, and locknut securing the rotor with an impact driver while your helper holds the rotor to keep it from turning (**Figure 5**).

4. Remove the rotor with a flywheel puller (**Figure 6**). Screw the outer body of the puller into the rotor until it stops. Hold the outer body stationary with a wrench and turn the inner bolt with the crossbar attached to it until the rotor disengages from the crankshaft (**Figure 7**). Remove the rotor.

5. Remove the 3 machine screws and lockwashers securing the stator to the crankcase (**Figure 8**).

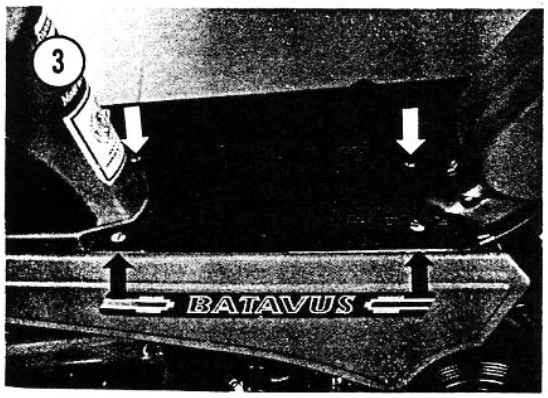
6. Remove all 4 electrical wires from the front side of the terminal connector located above the magneto. Remove screw securing the magneto ground cable to the high-tension coil (**Figure 9**).

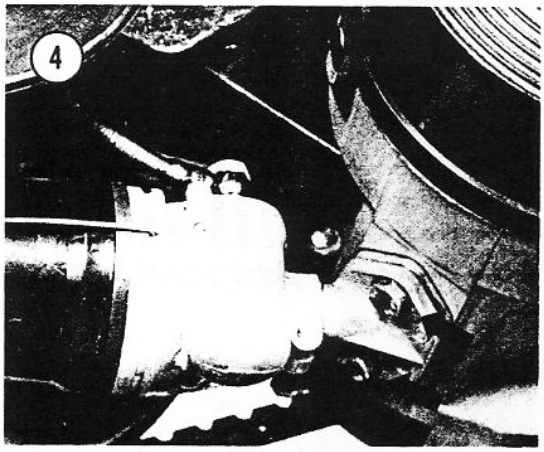
7. Carefully push the rubber grommet, that surrounds the electrical wires where they enter the magneto, down into the magneto housing along with the wires. Continue to push the wires while pulling on the stator (**Figure 10**) until the wires are through the hole.

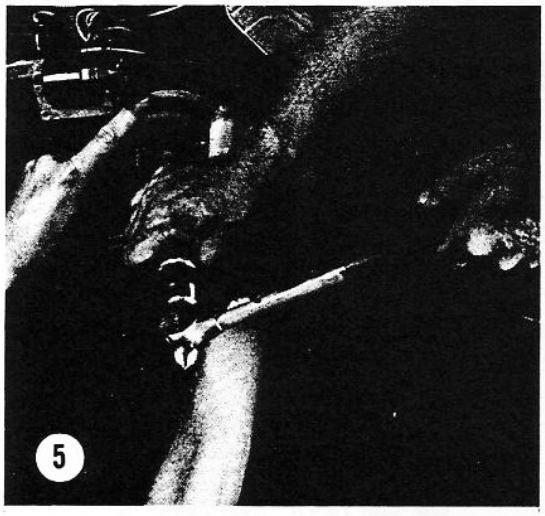
CAUTION

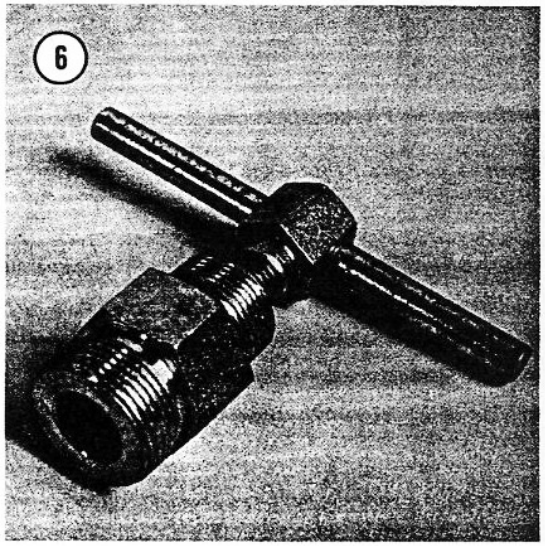
Do not pull hard on the stator as it may damage electrical connections where the wires attach to the stator.

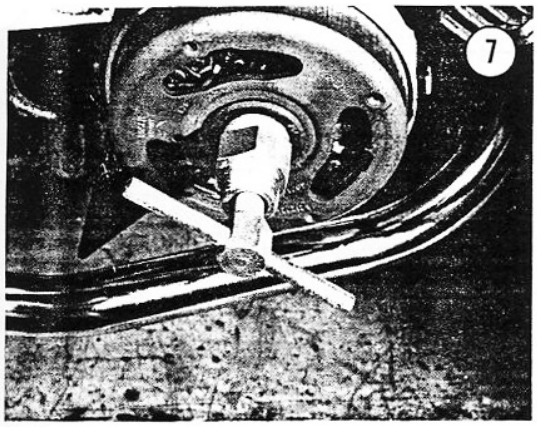
8. Install by reversing the removal steps. Be sure the grommet is securely in place and that

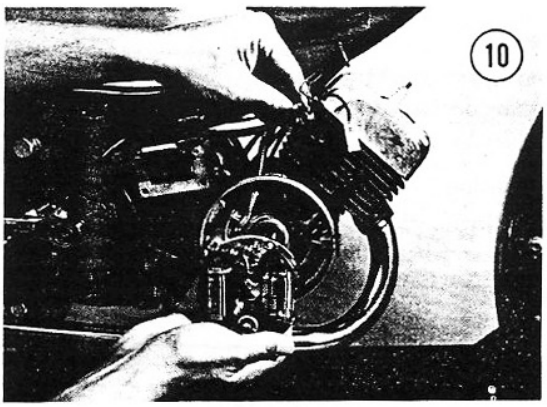


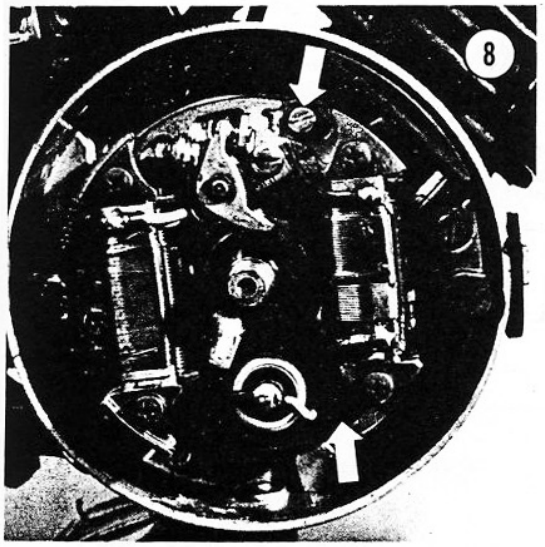


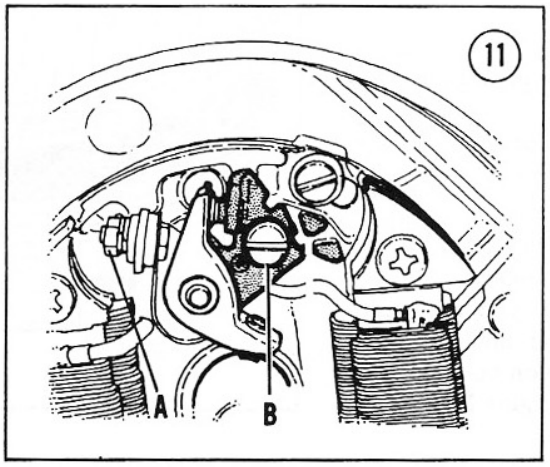


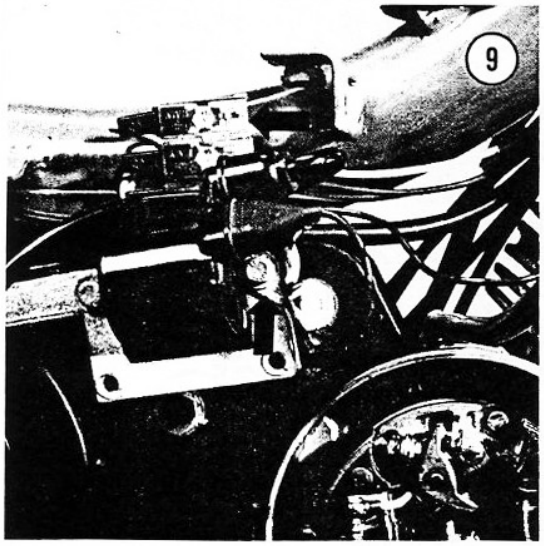












none of the wires are pinched between the stator and the magneto housing. Use an impact driver for the final tightening of the rotor nut.

9. Be sure to reconnect the electrical wires in the same location in the terminal connector. Refer to the electrical schematic, at the end of this chapter if you have any questions.

Breaker Points
Removal/Installation

1. Remove the magneto rotor as described under *Magneto Removal/Installation* in this chapter.

2. Remove nut "A" attaching electrical terminal and screw "B" securing point assembly to stator (**Figure 11**).

3. Install by reversing the removal steps and adjust timing as described under *Magneto Ignition Timing* in Chapter Three.

ELECTRICAL SYSTEM

Power for the lighting system is provided by the magneto. The electrical system consists of:

a. Headlight
b. Taillight/brakelight combination
c. Speedometer illumination light
d. Horn
e. Switches for the ignition, lights, brakes, and horn.

Table 1 lists the bulb numbers for replacement.

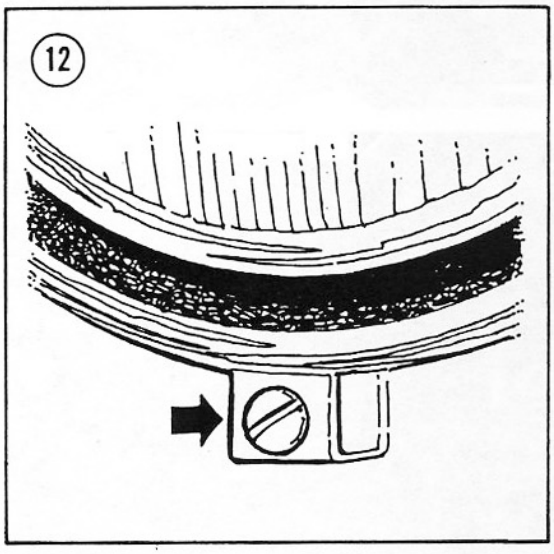
Table 1 LIGHT BULB REPLACEMENT

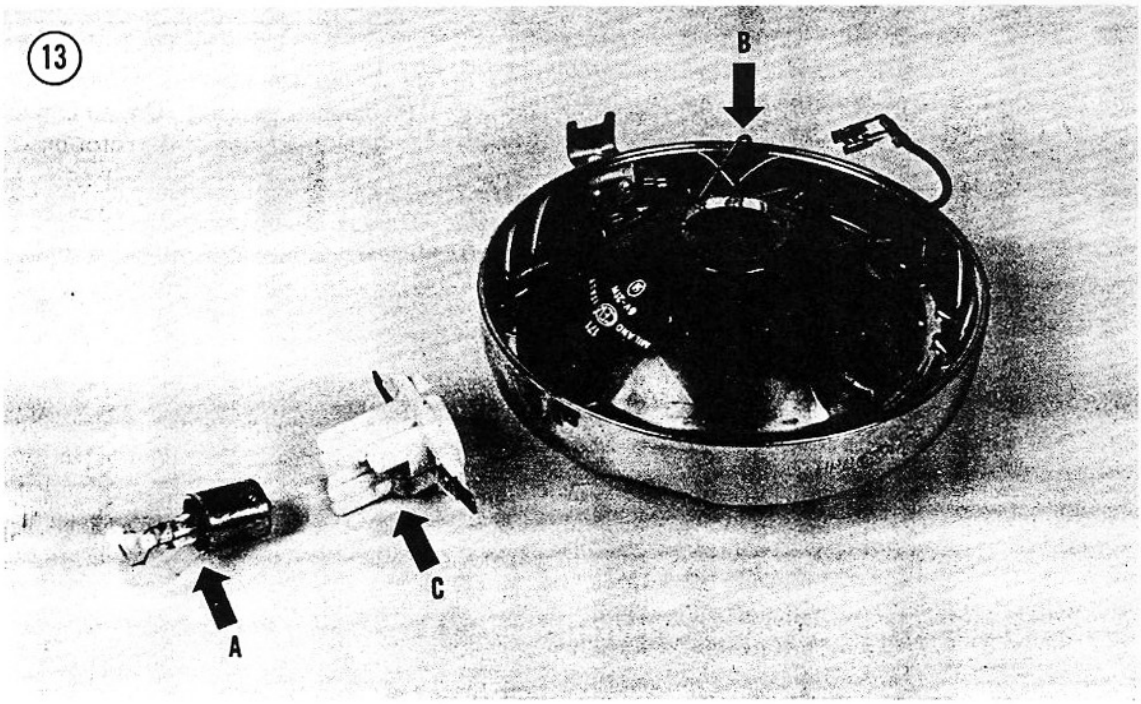
Light	Type
Headlight	6 volt, 21 watt, single element
Taillight	6 volt, 5 watt, single element
Brakelight	6 volt, 10 watt, single element
Speedometer light	6 volt, 1.2 watt, single element

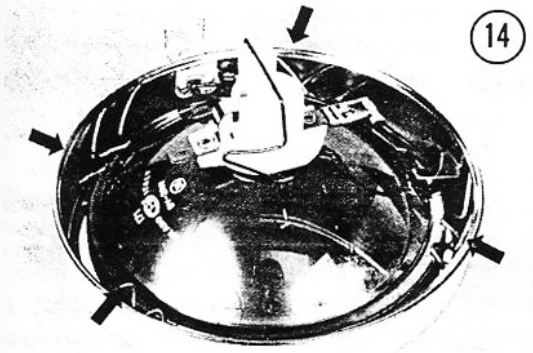
HEADLIGHT

Replacement

1. Remove screw at bottom of chrome trim bezel (**Figure 12**).
2. Pull out on the bottom of the lens and chrome trim bezel and pull up and away from the base.
3. Disconnect the electrical wire from the terminal on the back of the bulb holder.
4. Replace the bulb "A" by prying off retaining clip "B" on bulb holder and pull bulb holder "C" out of lens. Push on bulb and turn to remove from bulb holder (**Figure 13**).



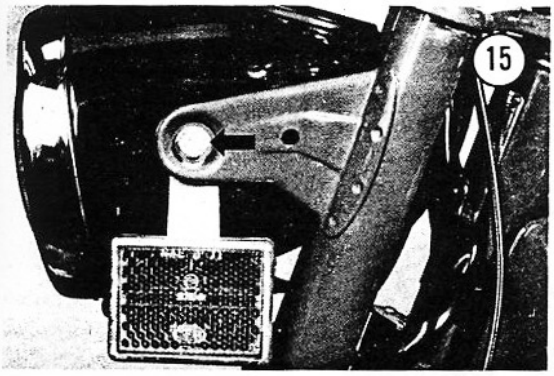




5. To remove the lens and reflector remove the retaining clips with a screwdriver. They secure the lens to the chrome trim bezel (**Figure 14**).

6. Check the rubber grommet, at the back of the base, for cracks or deterioration, replace if necessary.

7. Install by reversing the removal steps.



Adjustment

This procedure is best accomplished at night or at dusk.

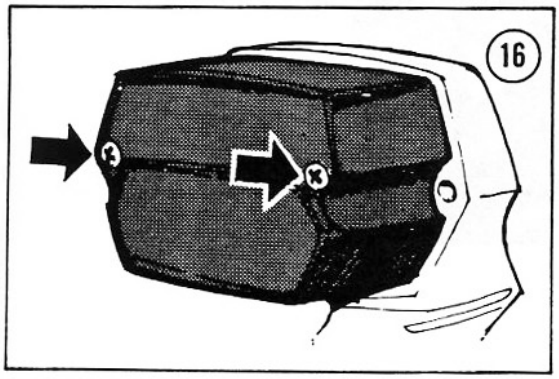
1. On a garage door or flat wall, stick a 12 inch piece of masking tape to it horizontally 19¼ inches up from the ground.

2. Place the moped so that the front of the headlight is 33 feet back from this surface and pointed directly at it.

3. Sit on the moped with the center stand raised.

4. Turn the headlight on. It should hit directly on this line. If not, loosen the adjusting bolts (**Figure 15**), one on each side of the headlight, and rotate the light assembly with your hands until it is correct.

5. Tighten the adjusting bolts securely.



TAILLIGHT/BRAKELIGHT

Lightbulb and Lens Replacement

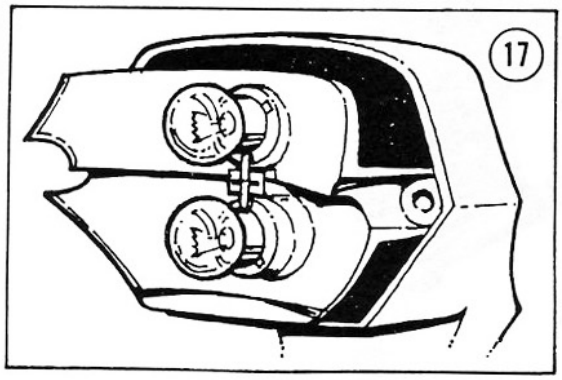
1. Remove the 2 lens attachment screws (**Figure 16**), and remove the lens.

2. Push the bulb in slightly and twist it counterclockwise and remove the bulb.

3. If necessary, clean the 2 contact points at the base of the bulb socket with a small piece of 180 grit sandpaper wrapped over the end of a pencil.

4. Wash out the inside and outside of the lens with a mild detergent and wipe dry.

5. Wipe off reflective base surrounding the bulb with a soft cloth (**Figure 17**).



CAUTION

This part is chrome plated plastic — do not use an abrasive to clean it as it will scratch and dull the surface, thus reducing the effectiveness of the taillight and brakelight.

6. Check the sealing gasket and rubber grommet for cracks or deterioration, replace if necessary.

7. Install by reversing the removal steps; be sure to install the gasket.

SPEEDOMETER ILLUMINATION LIGHT

Replacement (VA, HS 50, MoBat)

1. Remove screw at bottom of headlight trim bezel (**Figure 18**).

2. Pull out on the bottom of the lens and chrome trim bezel and pull up and away from the base.

3. Pull the bulb support down and out of the bulb housing. Remove the bulb and replace it.

Replacement (Bronco)

Pull the bulb support down and out of the bulb housing in the base of the speedometer housing. Remove bulb and replace.

BRAKELIGHT SWITCHES

Removal/Installation

1. Pull back rubber boot (**Figure 19**).

2. Pull electrical connectors off of switch terminals.

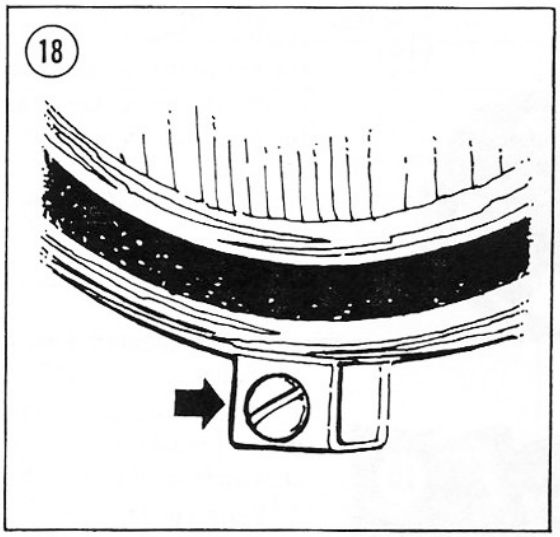
3. Unscrew locknut and switch from hand lever base.

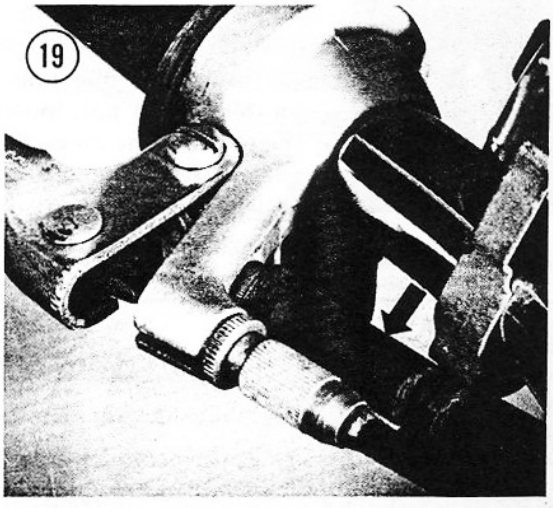
4. Install by reversing the removal steps. Make sure the switch is screwed in all the way before tightening the locknut. If rubber boot is deteriorated, it should be replaced at this time.

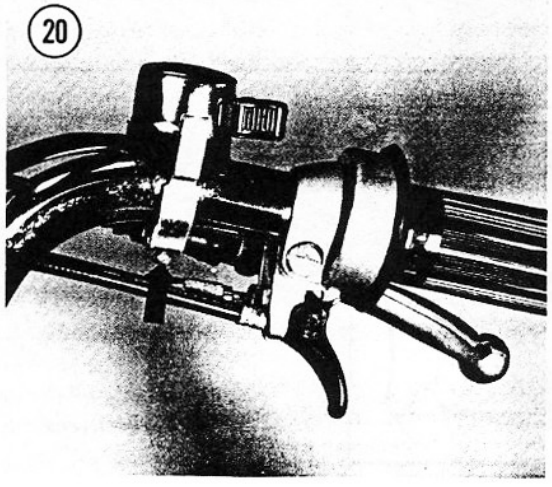
HEADLIGHT, HORN AND CUTOFF SWITCHES

Removal/Installation

Remove the screw on the underside of the clamp securing the clamp to the handlebar (**Figure 20**). Remove switch and electrical wires. Prior to removal, make a drawing of the routing of the wires through the frame. It is very easy to forget how it was once they have





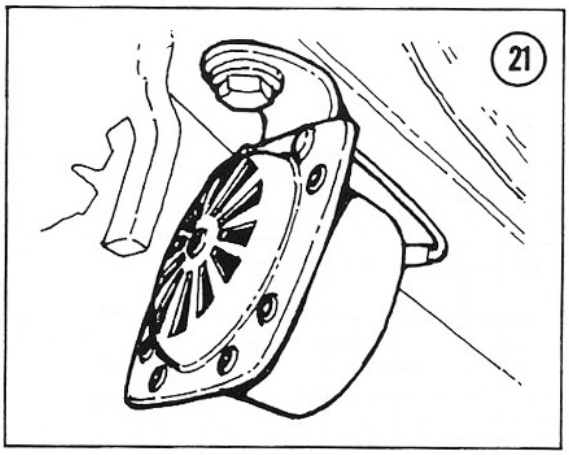


been removed. Replace them exactly as they were. Do not allow any electrical wires to come in contact with the engine as the heat will melt the insulation and eventually short out the wire.

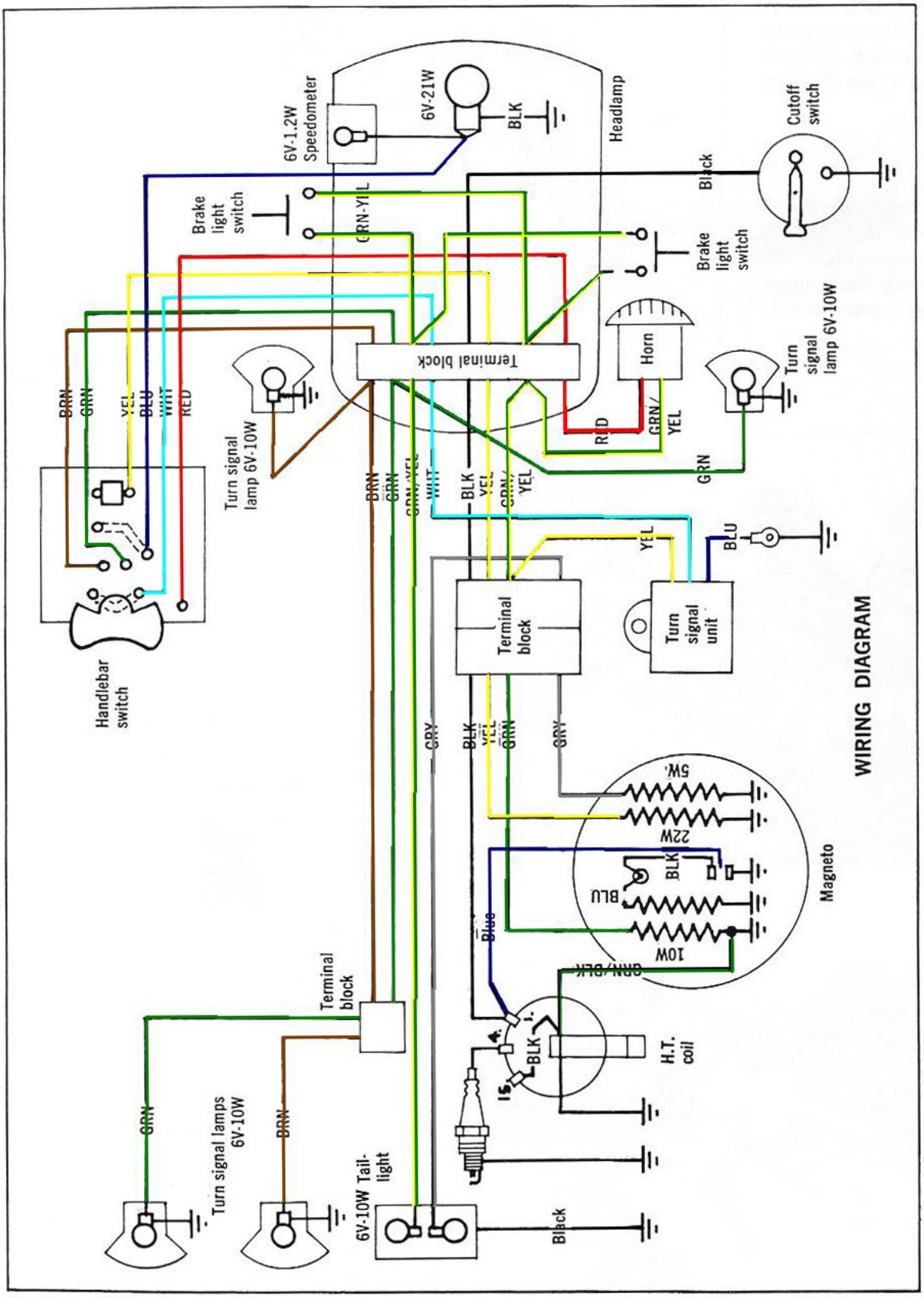
HORN

Removal/Installation

Remove the 2 electrical connections from the terminals on the horn. Remove bolt and nut securing horn bracket to the frame (**Figure 21**) and remove. Install by reversing the removal steps. Make sure the electrical connections do not touch any metal parts.



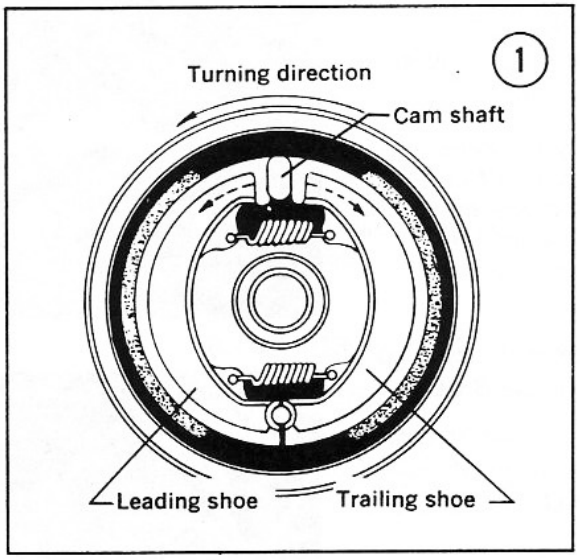
See next page for wiring diagram.


WIRING DIAGRAM
6V-1.2W Speedometer
6V-21W
BLK
Headlamp
Cutoff switch
Brake light switch
GRN-YEL
Brake light switch
Black
Terminal block
Horn
Turn signal lamp 6V-10W
Turn signal lamp 6V-10W
BRN
GRN
YEL
BLU
WHT
RED
RED
GRN/YEL
GRN
BLK
YEL
GRN/YEL
Handlebar switch
Terminal block
Turn signal unit
YEL
BLU
GRY
BLK
YEL
GRN
GRY
5W
22W
BLK
BLU
10W
Magneto
Blue
GRN/BLK
Terminal block
H.T. coil
BLK
GRN
Turn signal lamps 6V-10W
BRN
6V-10W Tail-light
Black

CHAPTER NINE

BRAKES

Figure 1 illustrates the major parts of the brakes. Squeezing the brake lever on the handlebar rotates the cam which, in turn, forces the brake shoes out into contact with the brake drum.

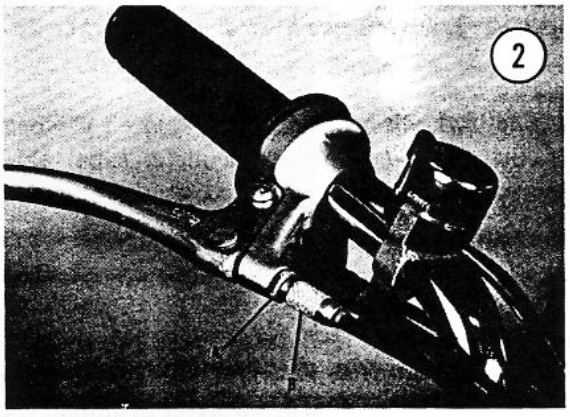


BRAKE CABLE

Brake cable adjustment should be checked periodically as the cables stretch out with use and increase brake lever free play. Free play is the distance the brake lever travels between the released position and the point when the brake shoes come in contact with the drum. This should be kept to a minimum.

Adjustment

1. Loosen the locknut "A" and turn the adjusting barrel "B" clockwise to reduce slack in the cable (**Figure 2**).
2. If the cable has stretched enough that this adjustment is not enough, the cable will have to be adjusted at the brake plate.
3. Screw the adjusting barrel "B" all the way in toward the hand grip.
4. At the brake plate, loosen the locknut "A", turn the adjustment nut "B" on the end of the outer cable housing toward the end of the housing (**Figure 3**). Tighten the locknut. This will take out the necessary slack.



NOTE: *If proper adjustment cannot be achieved by using both of these methods the cable will have to be replaced. See* ***Brake Cable Removal/Installation*** *in this chapter.*

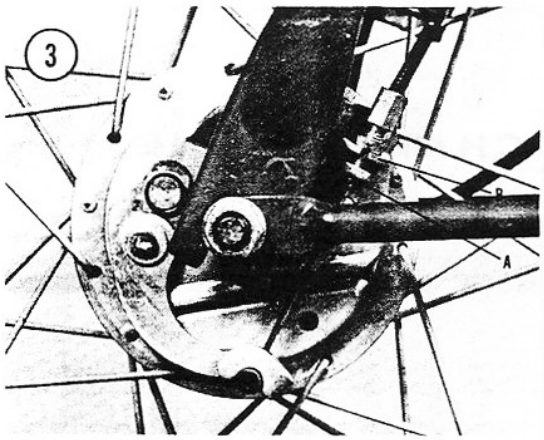
Removal/Installation

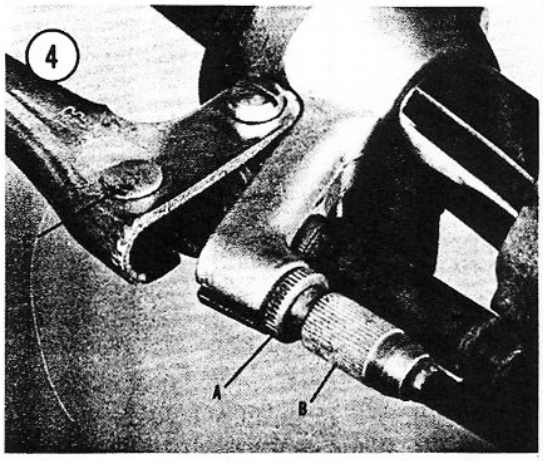
In time, the cable will stretch to the point where it is no longer useful and will have to be replaced.

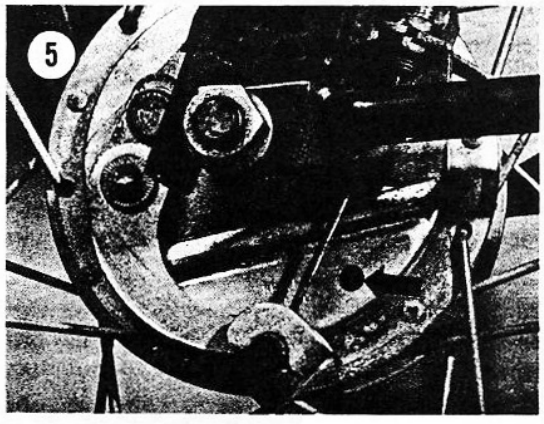
1. Remove the locknut "A" at the brake plate (**Figure 3**).
2. Push up on the brake arm and slip the end of the cable out. Pull up on the outer cable housing to remove the threaded end from the brake plate.
3. Loosen the locknut "A" and completely unscrew the adjusting barrel "B" (**Figure 4**) from the hand lever.
4. Pull the hand lever all the way back to the grip, remove the cable nipple holder "C" (**Figure 4**) and remove the cable from the lever.
5. Remove the cable from the frame.

NOTE: *Prior to removal of the cable, make a drawing of the routing of the cable through the frame. It is very easy to forget how it was once it has been removed. Replace it exactly as it was, avoiding any sharp turns.*

6. Install by reversing the removal steps, adjusting the brakes as described under *Brake Adjustment* in this chapter.







BRAKE LINING

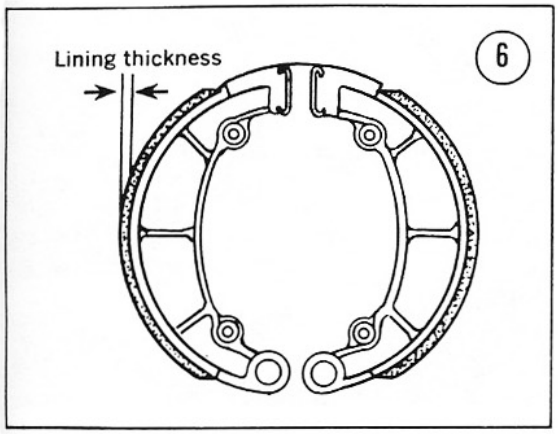
Inspection

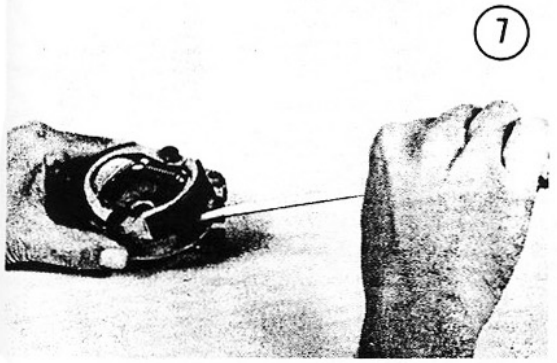
Both the front and rear wheel hubs have inspection holes (**Figure 5**) to check the brake lining thickness without removing and disassembling the hubs.

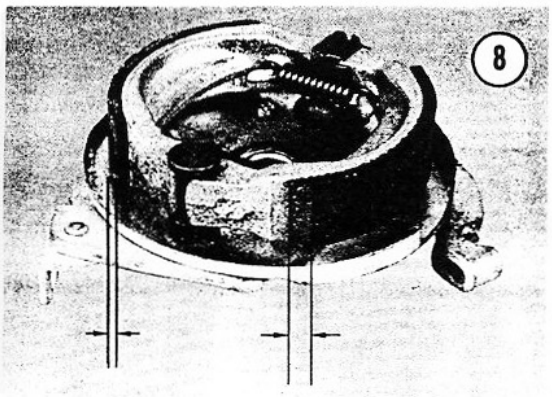
The brake lining should be replaced if worn within 1/64 in. (2mm) of the metal shoe table (**Figure 6**). This is measured at the thinnest part.

Removal/Installation

1. Remove front and/or rear wheel as described under *Front or Rear Wheel Removal/Installation* in Chapter Ten.
2. Pull brake assembly off of hub.
3. Remove the brake shoe assembly, including the return springs form the brake plate. Pry each shoe from the brake plate (**Figure 7**) using a screwdriver or similar tool.







4. Inspect the linings for any traces of oil or grease. If they are contaminated they should be replaced. Dirt embedded in the lining may be removed with a wire brush.

5. The linings should be replaced if worn within $\frac{1}{64}$ in. (2.0mm) of the metal shoe table (**Figure 6**). Measure it at the thinnest part.

6. Check the cam and pivot pin for wear and corrosion. Clean off any corrosion with fine emery cloth. Check that the cam rotates freely. If cam or pivot pin is worn, the brake plate should be replaced.

7. Inspect the brake return springs for wear. If they are stretched, they will not fully retract the brake shoes and they will drag and wear out prematurely. Replace if necessary.

8. Install by reversing the removal steps. Apply a light coat of grease to the cam and pivot pin. Avoid getting any grease on the brake plate where the linings may come in contact with it. Hold the shoes in a V-formation with the springs attached and snap them in place on the brake plate.

NOTE: *If new linings are being installed, file off the leading edge of each shoe a little (**Figure 8**) so that the brakes will not grab when applied.*

BRAKE DRUM

Removal/Installation and Inspection

1. Remove front and/or rear wheels as described under *Front or Rear Wheel Removal/Installation* in Chapter Ten.

2. Pull the brake assembly out of hub.

3. Inspect the drum for deep grooves, roughness, or scoring. Replace if necessary.

4. Install by reversing the removal steps.

CHAPTER TEN

SUSPENSION AND FRAME

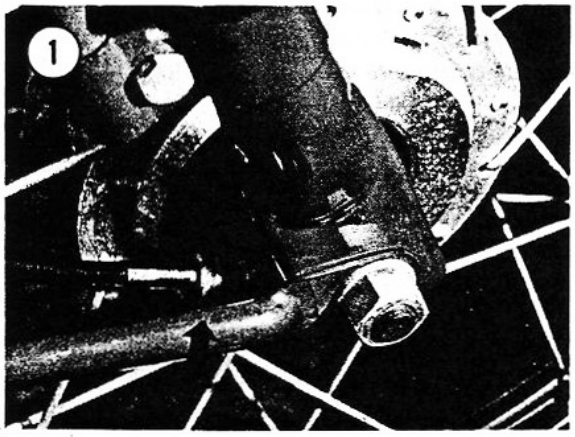
This chapter discusses service and repairs of wheels, tires, steering, and suspension.

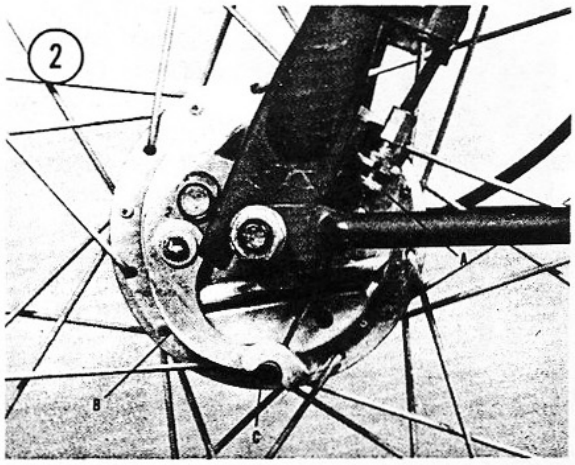
FRONT WHEEL

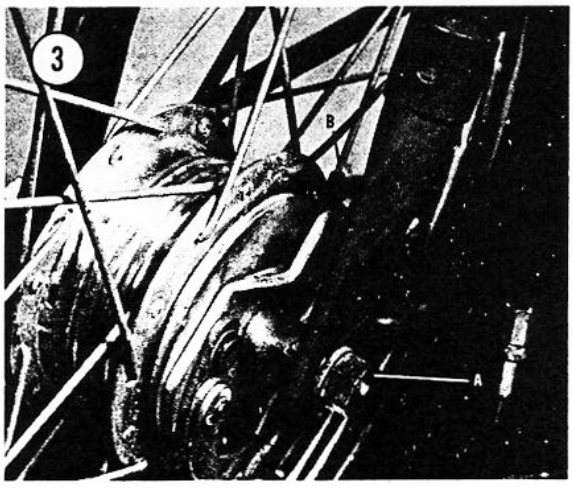
Removal/Installation

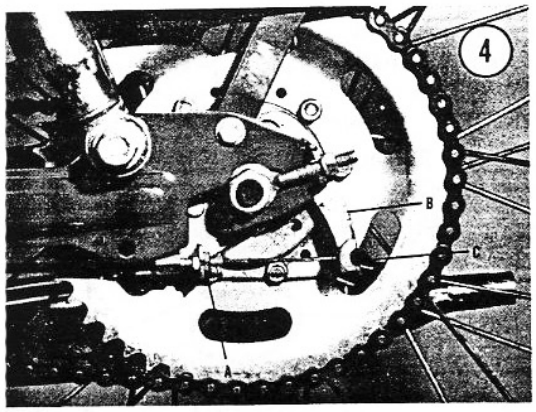
1. Unscrew the knurled nut holding the speedometer cable onto the drive unit (**Figure 1**) and remove.

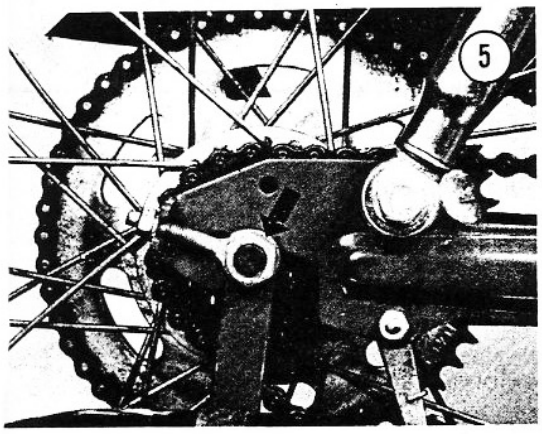
2. Disconnect the brake cable by unscrewing the locknut "A" on the end of the outer cable housing at the brake plate (**Figure 2**). Push up on the brake arm "B" and slip the end of the cable "C" out. Pull up on the outer cable housing to remove the threaded end from the brake plate.

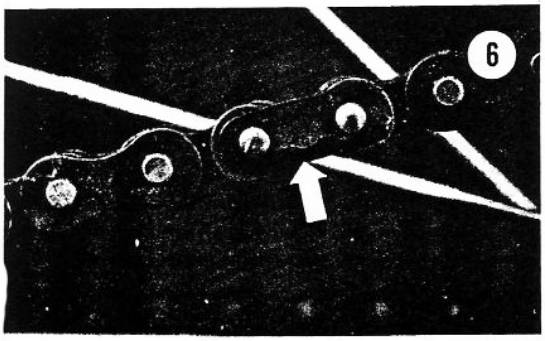


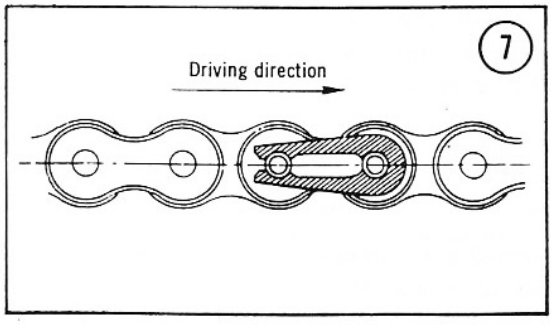












3. Loosen the axle locknuts "A" (**Figure 3**) and remove the wheel.

4. Install by reversing the removal steps. Position the speedometer drive unit to align with the cable before tightening the axle locknuts.

CAUTION

*Be sure to insert the slot in the brake plate onto the tab "B" on the left-hand fork (**Figure 3**). This is necessary for proper brake operation.*

REAR WHEEL

Removal/Installation

1. Disconnect the rear brake cable by unscrewing the locknut "A" on the end of the outer cable housing at the brake plate (**Figure 4**). Push forward on the brake arm "B" and slip the end of the cable "C" out. Pull forward on the outer cable housing to remove the threaded end from the brake plate.

2. Remove the axle locknuts (**Figure 5**).

3. Lift the bicycle chain, right-hand side, off of the rear sprocket. It is not necessary to completely remove the chain.

4. Remove the drive chain, left-hand side, by removing the master link (**Figure 6**) as follows: Pry the outer clip off with a thin-bladed screwdriver. Remove the outside plate and push the inside plate, complete with pins, out through the back of the chain and remove the chain.

5. Pull the wheel forward and remove. Support moped by placing the rear swing arm on a wooden box or block of wood.

6. Install by reversing the removal steps.

CAUTION

Be sure to insert slot in brake plate onto the stud on the rear swing arm. This is necessary for proper brake operation.

7. Make sure the master link clip is installed with the opening facing in the opposite direction of chain travel (**Figure 7**). Incorrect installation will result in the loss of the clip and may result in chain breakage.

8. After the wheel and chain have been reinstalled it is necessary to adjust the chain

tension as described under *Drive Chain Adjustment* in Chapter Six. It is also necessary to adjust the rear brakes as described under *Brake Adjustment* in Chapter Nine.

FRONT AND REAR WHEEL HUBS

The wheel hubs consist of a locknut, washer, adjusting cone ball retaining washer, axle, ball bearings, and hub/drum (**Figure 8**).

The front and rear hubs are basically the same except for the number of balls used. The disassembly and assembly are the same.

Removal

1. Remove the wheel as described under *Front* or *Rear Wheel Removal/Installation* in this chapter.
2. Remove the brake plate assembly and speedometer unit on front wheel.
3. Place the wheel horizontally in a vise with the brake drum facing up. Securely grip the lockwasher and cone in the vise jaws.
4. Hold the adjusting cone, with a cone wrench, and loosen the locknut and remove both locknut and adjusting cone.
5. Remove from vise and slide the axle out of the hub assembly.
6. Leave the remaining cone and locknut on the axle unless one of these parts is damaged. If it is necessary to remove either of these, measure the distance from the end of the axle to the top of cone (**Figure 9**) so that the cone can be reinstalled in the same position.
7. To remove balls, pry out retaining washer wiht a wide-bladed screwdriver. Remove balls and count them, 11 on each side on the front and 13 on each side on the rear, so that the same number installed. Turn the hub over and repeat the steps on the other side.

Inspection

1. Clean all parts thoroughly in solvent.
2. Check cone and hub cups for pitting and excessive wear. If the cups are damaged, they should be removed as follows: Insert a hardwood stick in from the opposite side and with a hammer carefully tap the cup out from the inside. Tap all the way around the cup so that neither the cup nor the hub will be damaged. Install the cup by placing it into the hub and tap it gently and squarely in with a block of hard wood and a hammer. Make sure it seats completely.
3. Check the balls for pitting or wear. Replace the complete set of balls if any are defective.
4. Check the retaining washers for distortion or cracks, replace if necessary.
5. Check the axle for damaged threads or if it is bent, replace if necessary.
6. Check adjusting cone and locknut threads for damage, replace if necessary.

Installation

1. Pack the ball cups with wheel bearing grease and replace the correct number of balls. The front has 11 on each side and the rear has 13 on each side. There will be a little space left over as the balls are not real snug against each other. Replace the ball retaining washer by tapping into place with a plastic mallet.
2. Insert the axle and install the remaining cone and locknut.
3. Tighten cone until all axle end play has been removed but the axle will still rotate freely.
4. Tighten the locknut and recheck.
5. Install the wheel as described under *Front* or *Rear Wheel Removal/Installation* in this chapter.

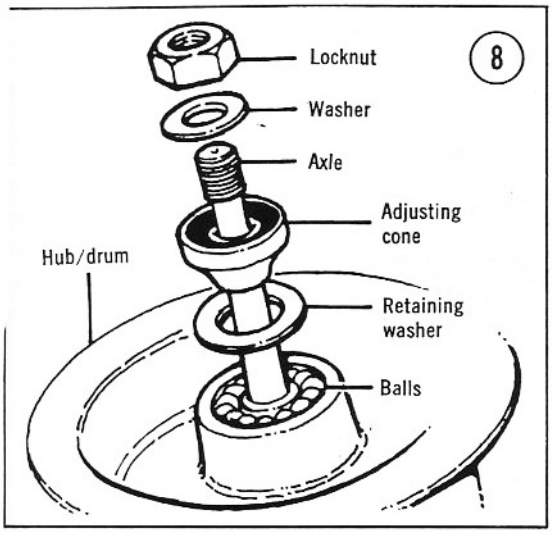
SPOKES

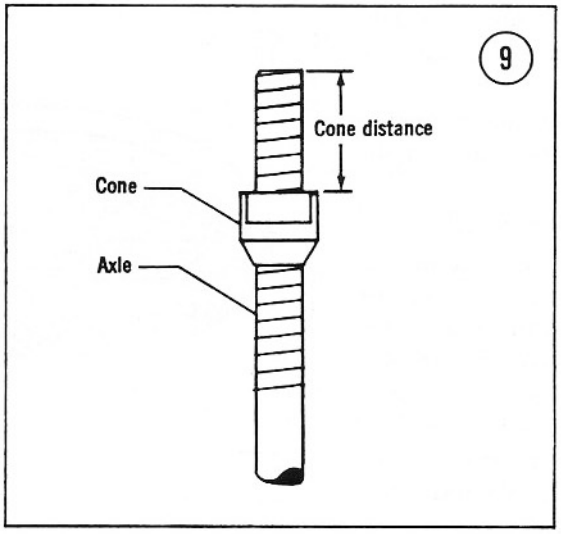
Bent, stripped, or otherwise damaged spokes should be replaced as soon as they are detected. Unscrew the nipple from the spoke at the rim, then push the nipple far enough into the rim to free the end of the spoke, taking care not to push the spoke all the way in. Remove the defective spoke from the hub, then use it to match a new one of the same length. Install by reversing the removal steps. Check the new spoke periodically, as it will stretch and must be retightened several times until it takes its final set.

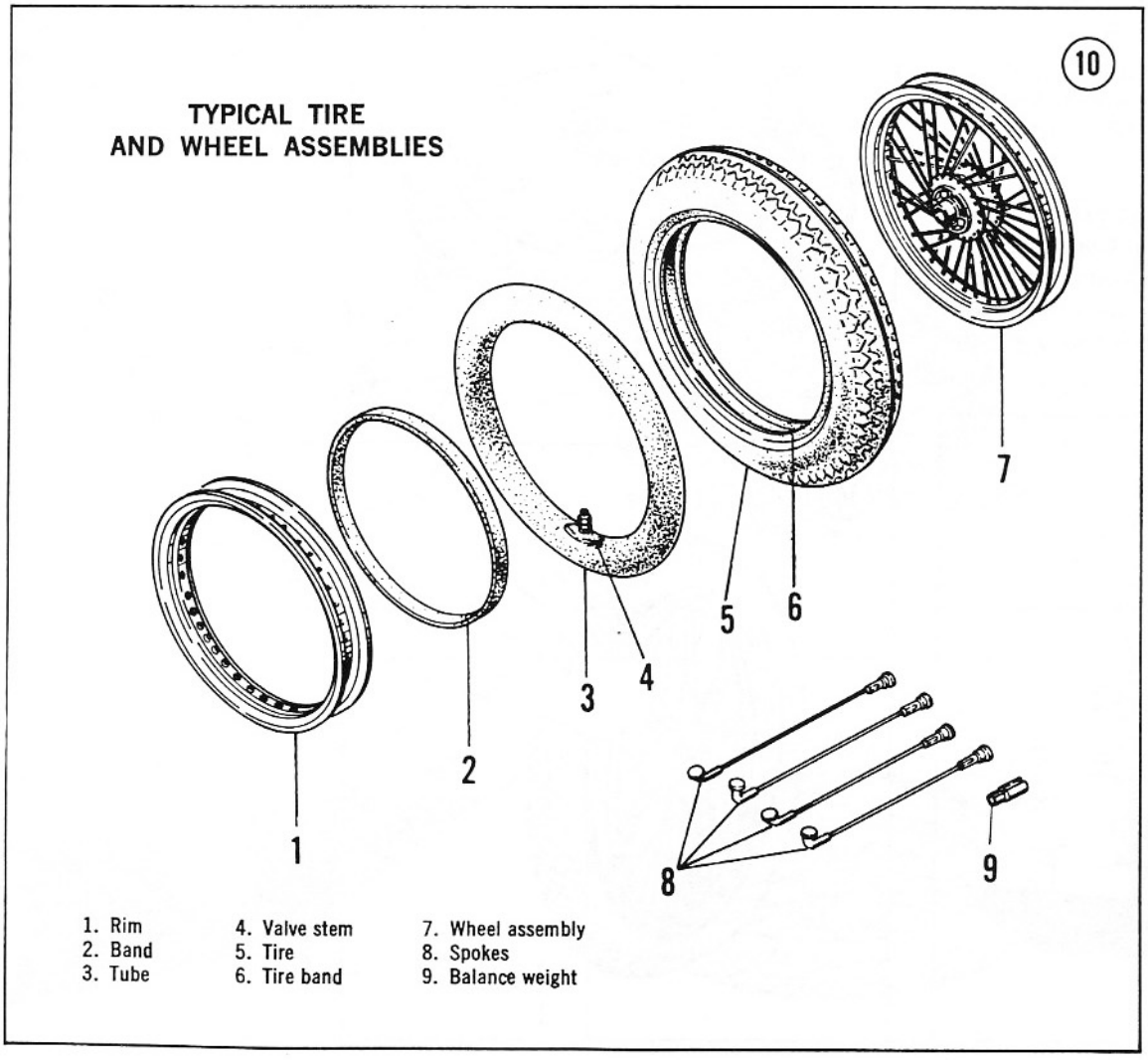
TIRES AND TUBES

Tire Removal

Refer to **Figure 10** for this procedure. Always leave the locknuts on the axle to protect the threads during tire removal/installation.


8
Locknut
Washer
Axle
Adjusting cone
Hub/drum
Retaining washer
Balls

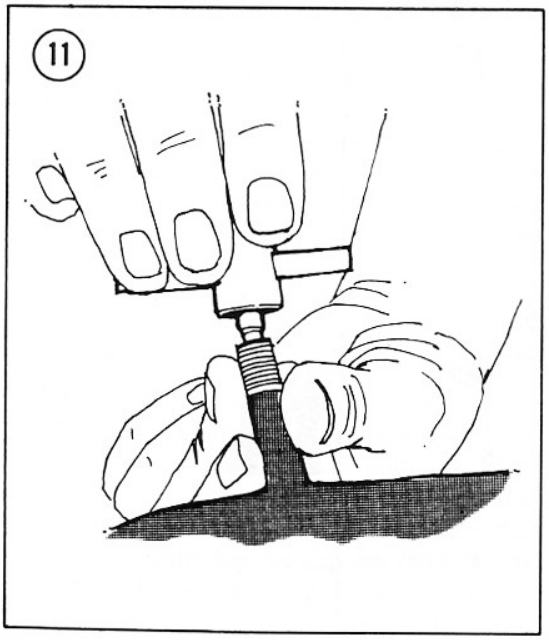

9
Cone distance
Cone
Axle

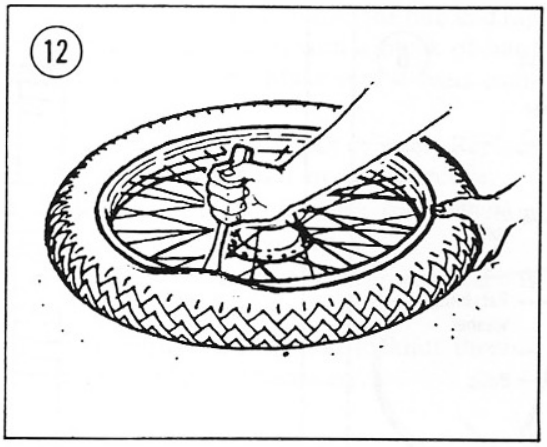

10
TYPICAL TIRE AND WHEEL ASSEMBLIES
1
2
3
4
5
6
7
8
9
1. Rim
2. Band
3. Tube
4. Valve stem
5. Tire
6. Tire band
7. Wheel assembly
8. Spokes
9. Balance weight

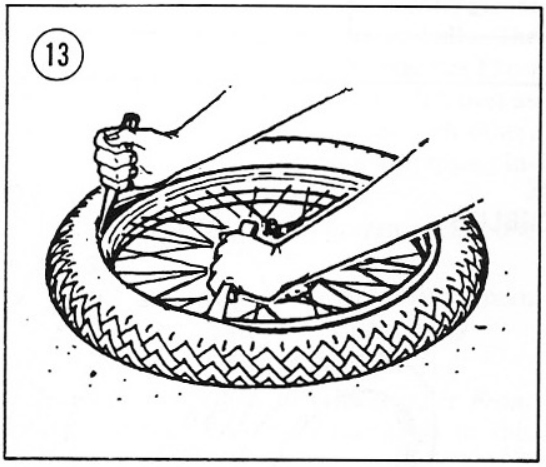
1. Unscrew the valve core from the valve stem with a special tool (**Figure 11**) and deflate the tire.
2. Press the entire bead on both sides of the tire away from the rim and into the center of the rim.
3. Lubricate the beads with soapy water.
4. Insert a tire iron under the top bead next to the valve. 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 (**Figure 12**).
5. 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 (**Figure 13**). Be careful not to pinch the inner tube with the tire irons.
6. Remove the valve from the hole in the rim and remove the tube from the tire.

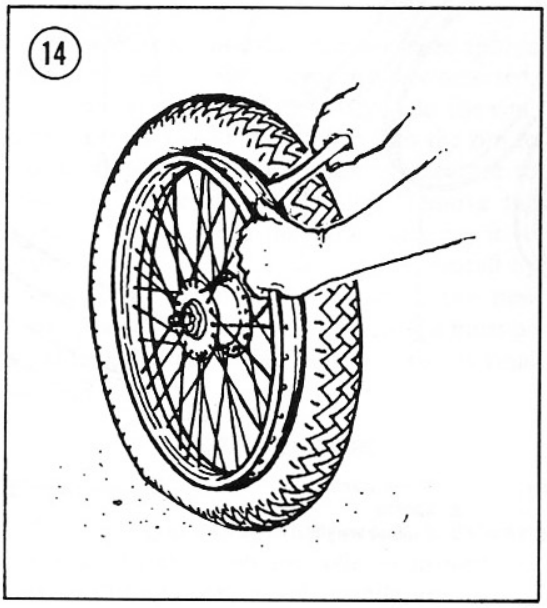
NOTE: *Step 7 is required only if it is necessary to completely remove the tire from the rim such as for tire replacement.*

7. Insert a tire iron between the back bead and the side of the rim that the top bead was pried over (**Figure 14**). Force the bead on the opposite side from the tire iron into the center of the rim. Pry the back bead off the rim working around as with the first.









Tube Inspection

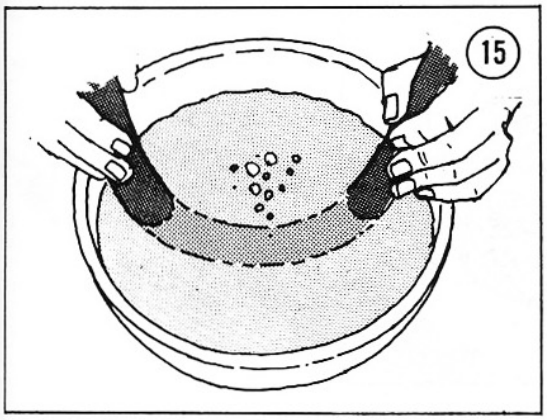
1. Install the valve core into the valve stem and inflate the tube slightly. Do not overinflate.
2. Immerse the tube in water a section at a time. See **Figure 15**. Look carefully for bubbles indicating a hole. Mark each hole and continue checking until you are certain that all holes are discovered and marked. Also make sure that the valve core is not leaking; tighten it if necessary.

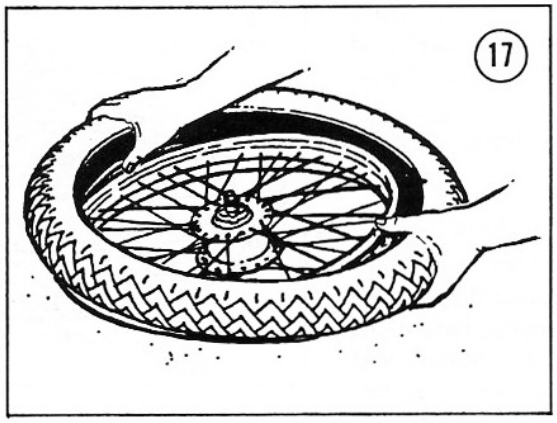
> NOTE: *If you do not have enough water to immerse sections of the tube, try running your hand over the tube slowly and very close to the surface. If your hand is damp, it works even better. If you suspect a hole anywhere, apply some saliva to the area to verify it (**Figure 16**).*

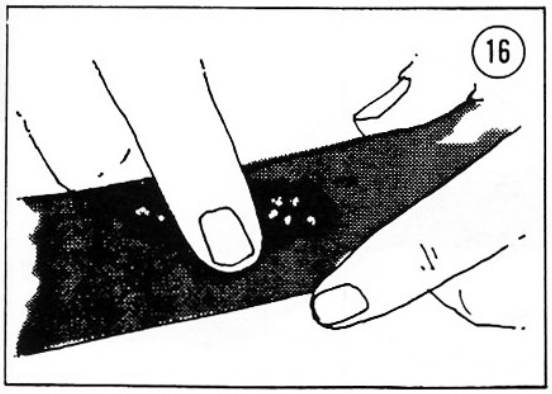
3. Apply a patch using either the hot or cold patch techniques described under *Tire Repairs* in this chapter.
4. Dust the patch area with talcum powder to prevent it from sticking to the tire.
5. Carefully check inside the tire casing for glass particles, nails, or other objects which may have damaged the tube. If inside of tire is split, apply a patch to the area to prevent it from pinching and damaging the tube again.
6. Check the inside of the rim. Make sure the rim band is in place and no spoke ends protrude through which could puncture the tube.
7. Deflate tube prior to installation in the tire.

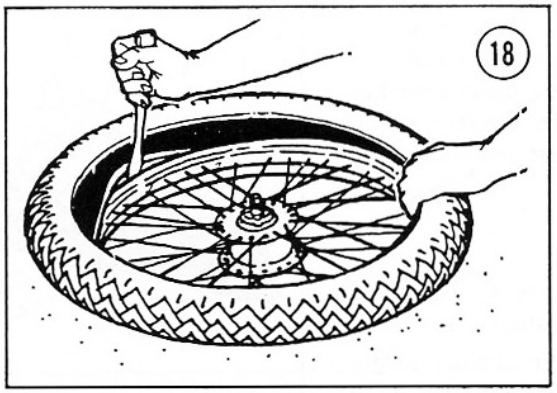
Tire Installation

1. Inflate the tube just enough to round it out. Too much air will make installation difficult.
2. Place the tube inside the tire.
3. Place back side of the tire into center of rim and insert the valve stem through the rim hole (**Figure 17**). The lower bead should go into the center of the rim with the upper bead outside it.
4. Starting opposite the valve stem, press the lower bead into the rim center working around the tire in both directions. Use a tire iron for the last few inches of bead (**Figure 18**).









5. Press the upper bead into rim opposite the valve (**Figure 19**) and work around the tire in both directions with yout hands. Use a tire iron for the last few inches of bead (**Figure 20**).

6. Wiggle the valve to be sure that the tube is not under the bead. Set the valve squarely in its hole before screwing in the valve nut to hold it against the rim.

7. Check the bead on both sides of the tire for even fit around the rim. Inflate the tire slowly to seat the beads in the rim. It may be necessary to bounce the tire to complete the seating. Inflate to correct pressure: front tire 28lbs., rear tire 34 lbs. *Persons weighing over 175 lbs. should add 2 lbs. to each tire.*

TIRE REPAIRS

Tire/tube damage will eventually strike even the most careful rider. Repair is fairly simple on all tires.

Tire Repair Kits

Tire repair kits can be purchased from moped or motorcycle dealers and some auto supply stores. When buying, specify that the kit you want is for moped tires.

There are two types of tire repair kits for mopeds:

a. Hot patch
b. Cold patch

Hot patches are stronger because they actually vulcanize to the tube, becoming part of it. The repair kit for hot patching is bulkier and heavier than cold patch kits, therefore, hot patch kits are more suited for home repairs.

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 under adverse conditions. Cold patch kits are best for emergency repairs on the road.

Hot Patch Repair

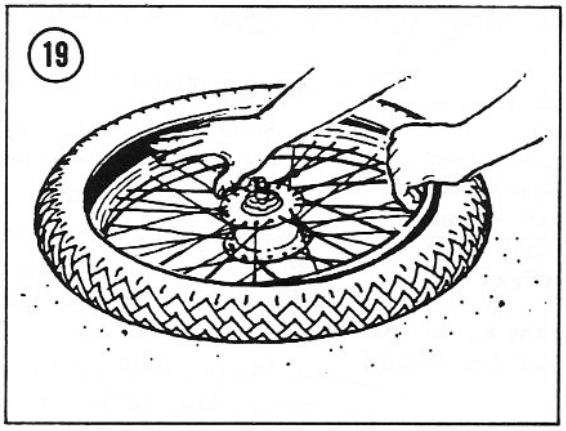
1. Remove the tube from tire as described under *Tire Removal* in this chapter.

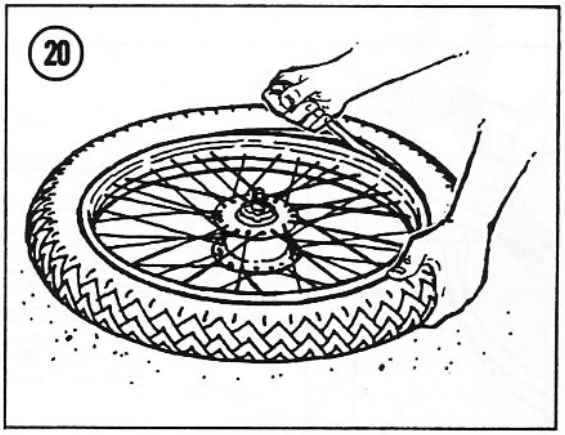
2. Roughen area around hole slightly larger than the patch (**Figure 21**). Use a pocket knife or similar tool to scrape the tube; be careful that you don't cause further damage.

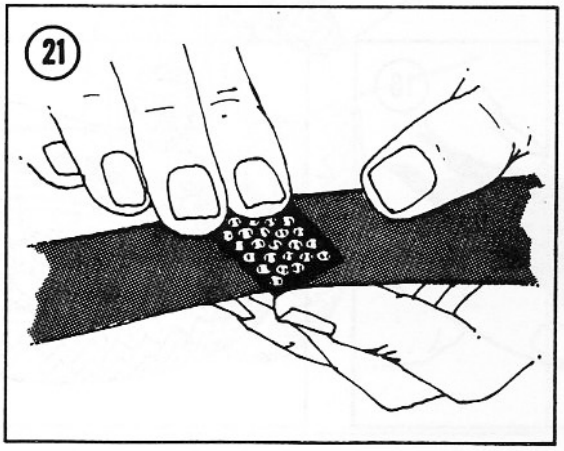
3. Remove the backing from patch.

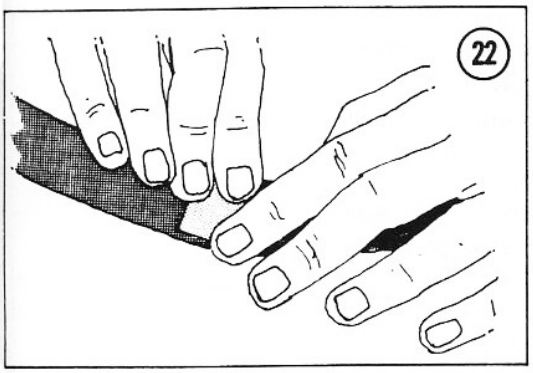
CAUTION

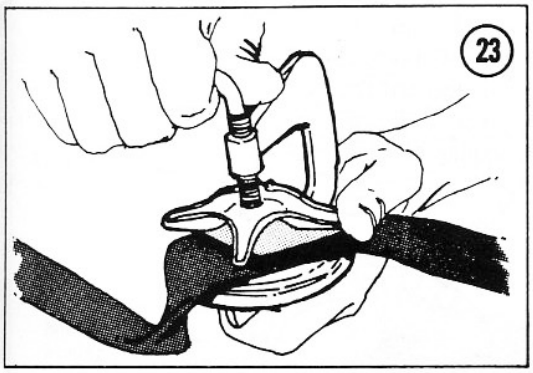
Do not touch newly exposed rubber with your fingers. This will prevent a good seal.

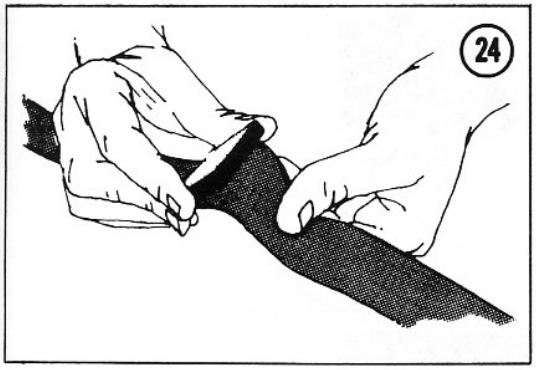


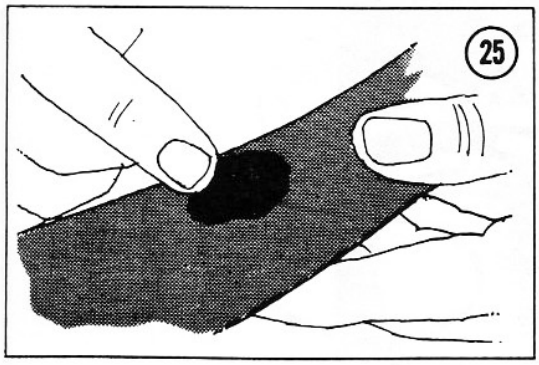












4. Center the patch over hole (**Figure 22**).

5. Install clamp around tube so that it holds the fuel container over the patch (**Figure 23**).

6. Pry up a corner of the fuel and light it. Let all of the fuel burn away.

CAUTION

The clamp gets hot, so don't touch it until it cools.

7. Remove the clamp and peel the tube off the fuel container (**Figure 24**).

Cold Patch Repair

1. Remove the tube from tire as described under *Tire Removal* in this chapter.

2. Roughen area around hole slightly larger than the patch, use a cap from tire repair kit or pocket knife. Do not scrape too vigorously or you may cause additional damage.

3. Apply a small quantity of special cement to the puncture and spread it evenly with a finger (**Figure 25**).

4. Allow the cement to dry until tacky — usually 30 seconds or so is sufficient.

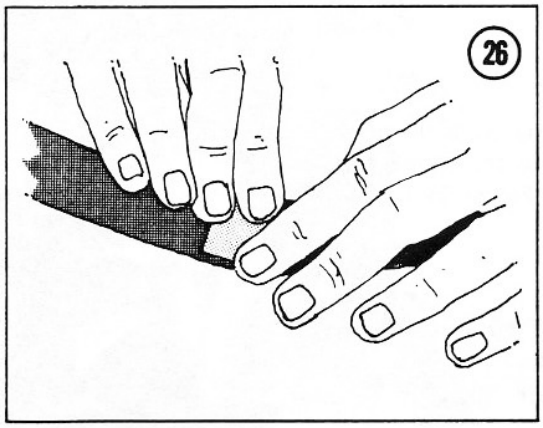
5. Remove the backing from the patch.

CAUTION

Do not touch the newly exposed rubber with your fingers or the patch will not stick firmly.

6. Center patch over hole. Hold patch firmly in place for about 30 seconds to allow the cement to set (**Figure 26**).

7. Dust the patched area with talcum powder to prevent sticking.



HANDLEBAR

There are three different configurations of handlebars used on the Batavus. There are only slight differences in the removal/installation as noted in the following procedure.

Removal/Installation

1. Loosen, but do not remove, the screw "A" securing the hand grips to the handlebar (**Figure 27**).
2. Slide off both hand grip assemblies, it is not necessary to remove the cables from the grips. Lay the grip assemblies over the fuel tank hooking them on the fill cap. Be carefull not to kink the cables.
3. Remove the switches by removing the screw "B" on the underside of the clamp (**Figure 27**).
4. On models VA and HS 50, remove the 4 nuts and lockwashers on the U-bolts securing the handlebar to the upper fork plate (**Figure 28**).
5. On the Bronco model, remove the 2 Allen head screws securing the speedometer housing to the handlebar. Remove the housing and lay it over the front fender. Do not kink the cable. Remove the 4 nuts and lockwashers on the U-bolts securing the handlebar to the upper fork plate (**Figure 28**).
6. On Mobat models, remove the screws securing the crown plate to the upper fork plate. Remove the steering head locknut and crown plate.
7. Remove the handlebar.
8. Install by reversing the removal steps. Adjust the handlebar and hand grip assemblies to your comfort.

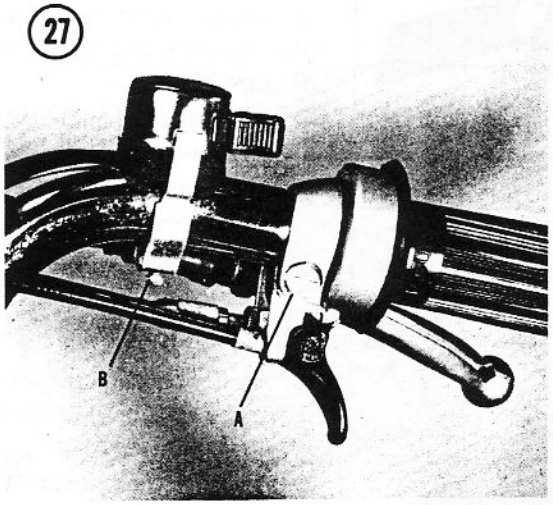
HEADSET

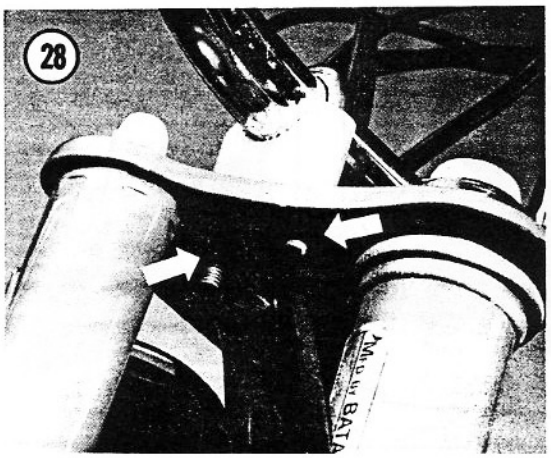
The headset consists of parts inside the head tube which secure the fork to the frame and permit it to turn. Refer to **Figure 29** for all related parts.

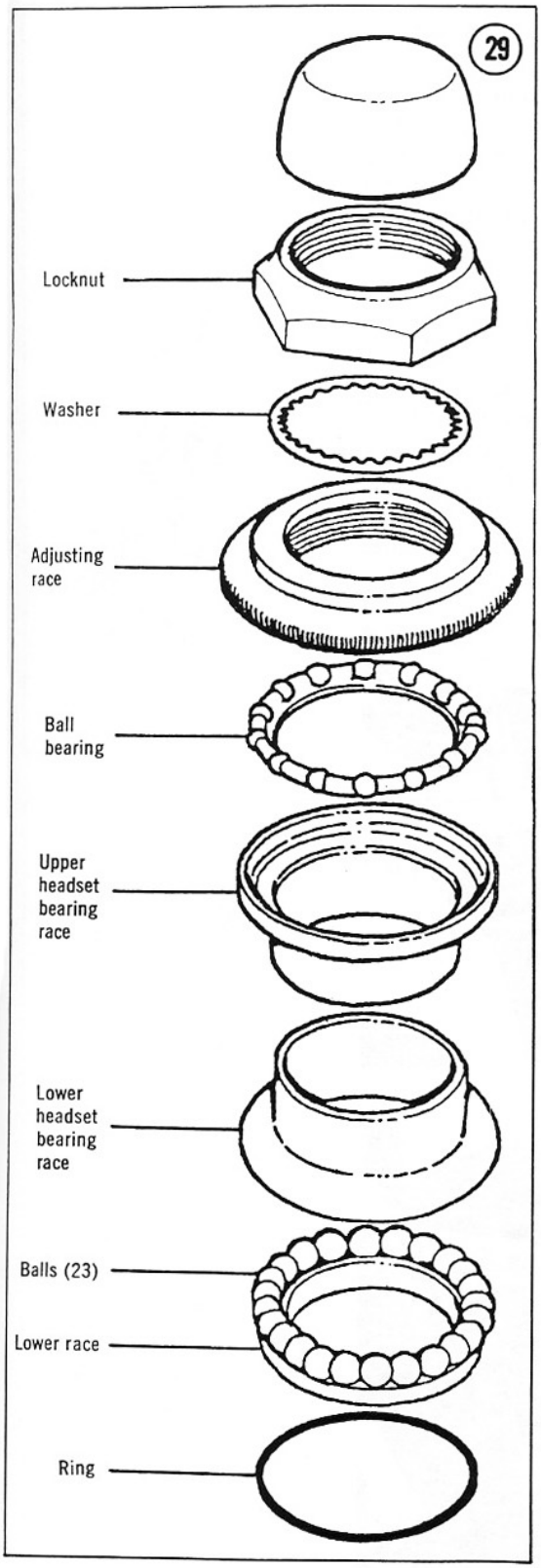
Adjustment

If the fork turns stiffly or feels overly loose, it probably requires adjustment.

1. Loosen the locknut (**Figure 30**). Use a 1¼ in. socket.
2. Loosen the adjusting race, tighten it handtight (**Figure 31**) then back it off (counterclockwise) ¼ turn. Tighten the locknut.
3. Turn the wheel back and forth. If it feels stiff, loosen the locknut and loosen the adjusting race another ¼ turn. Tighten the locknut. If it still feels stiff, it requires overhauling as described under *Headset Disassembly/Assembly/Inspection* in this chapter.
4. Check the fork for excessive play. Lift the front wheel clear of the ground, then set it down; look for vertical play. Now hold the handlebar with one hand and a fork tube with the other. Try to wiggle the assembly from side to side, looking for horizontal play. If there is any vertical or horizontal play, loosen the locknut, tighten the adjusting race ¼ turn. Tighten the locknut and recheck play. If it is





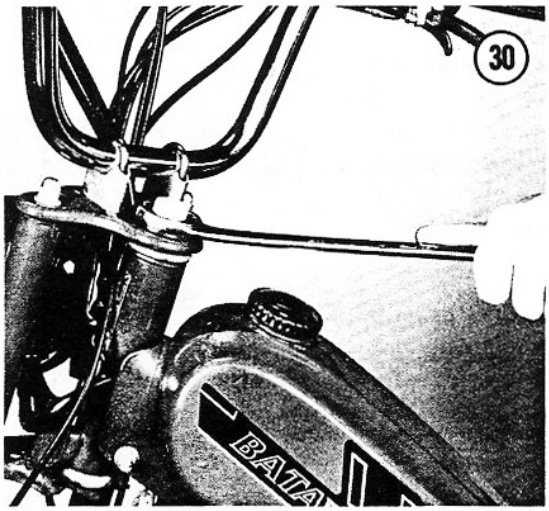


still present, it requires overhauling as described under *Headset Disassembly/Assembly/Inspection* in this chapter.

Disassembly

Headset disassembly requires the removal of the front wheel and front forks. The headset assembly is the same on all models and is used with both fork configurations. This procedure may be done with the moped on the centerstand, with the rear end tied down, or it may be laid down on its side on a blanket or thick pad.

1. Remove the front wheel as described under *Front Wheel Removal/Installation* in this chapter.



2. Remove the 2 cap nuts "A" and washers securing the top fork plate (**Figure 32**) this does not apply to MoBat models.

3. Remove the steering head locknut "B" (**Figure 32**). On MoBat models, also remove 4 bolts securing the handlebar crown plate.

4. Turn the handlebar, complete with the top fork plate, upside down and lay back over the fuel tank. Be careful not to kink any of the cables.

NOTE: *Cover the fuel tank with a cloth prior to placing the handlebar assembly on it.*

5. Remove the 2 bolts securing the headlight housing and side reflectors (**Figure 33**). Lay the headlight housing on top of the fuel tank.

6. Unscrew the adjusting race. Remove the caged ballbearing.

7. Slowly pull the fork assembly and steering stem out from the head tube. The lower bearing has loose balls (23 of them) and some may fall out during removal. *Be prepared to catch them.*

Assembly

1. Coat lower bearing race with cold multipurpose grease and install the 23 balls. If grease is too warm, balls will not stay in place. It may be necessary to turn moped upside down.

NOTE: *Prior to turning the moped upside down, it is necessary to drain the fuel tank. Turn the fuel shutoff valve to the OFF position and remove the fuel line from the carburetor. Place the loose end of the fuel line into a metal can that can be sealed. Do not put it into your gasoline can as it already has oil added to it. Remove the fuel tank fill cap, turn the fuel shutoff valve to RESERVE and drain fuel. After draining the tank turn the fuel shutoff valve to OFF, replace fill cap and seal the metal container.*

WARNING

Do not smoke or have any open flame in the area while performing this procedure. Also have a fire extinguisher suitable for gasoline fires within reach.

2. Install fork assembly and steering stem from the bottom being careful not to dislodge any balls. Replace the upper caged bearing.

3. Continue the assembly by reversing the removal steps.

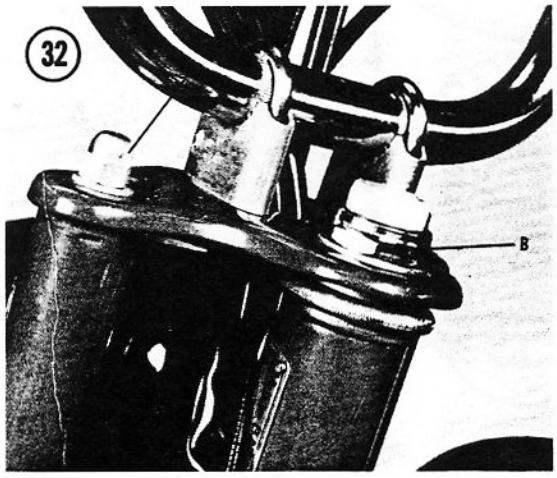
4. After assembly steps are completed, it is necessary to readjust the headset as described under *Headset Adjustment* in this chapter. Also readjust the headlight as described under *Headlight Adjustment* in Chapter Eight.

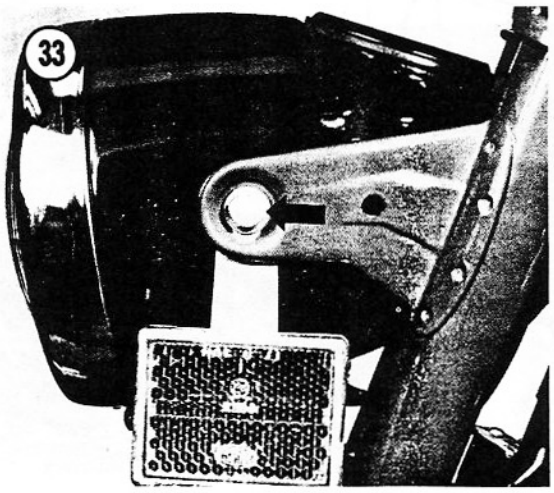
Inspection

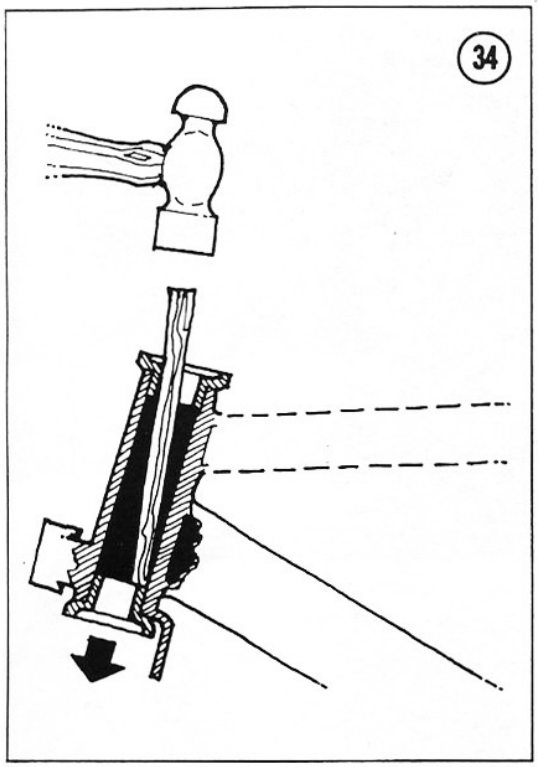
1. Clean all parts in cleaning solvent.

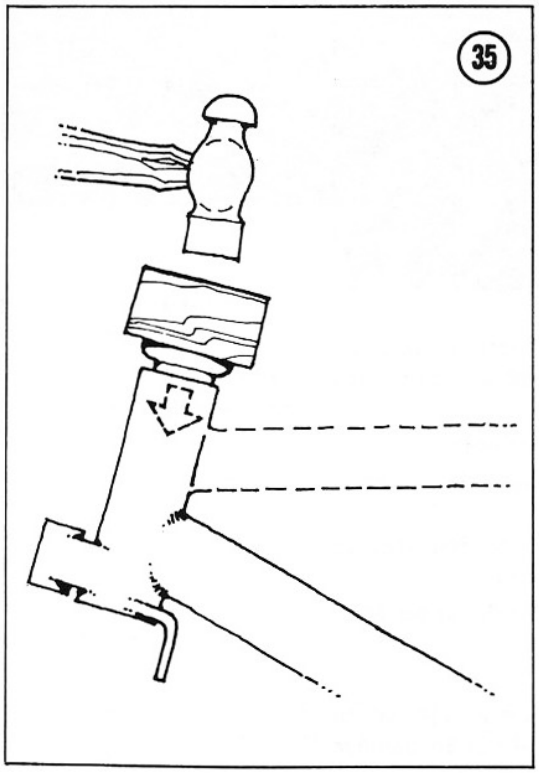
2. Check bearings for pitting, scratches, or discoloration which indicates wear. Replace them if necessary; take old bearings to dealer to ensure exact replacement.

3. Check upper and lower headset bearing races and top adjusting race for pitting, scratches and discoloration which indicates wear. Replace if necessary.









Bearing Race Replacement

The headset bearing races are pressed into place. Because they are easily bent, do not remove them unless they are worn and require replacement. Take old races to dealer to ensure exact replacement.

To remove a headset race, insert a hardwood stick into the head tube and carefully tap the race out from the inside (**Figure 34**). Tap all the way around the race so that neither the race nor the head tube are bent. To install the race, fit it into the end of the tube. Tap it slowly and squarely with a block of wood as shown in **Figure 35**.

NOTE: *The upper and lower races are different. See* ***Figure 29*** *to be sure that you install them at the proper end of the head tube.*

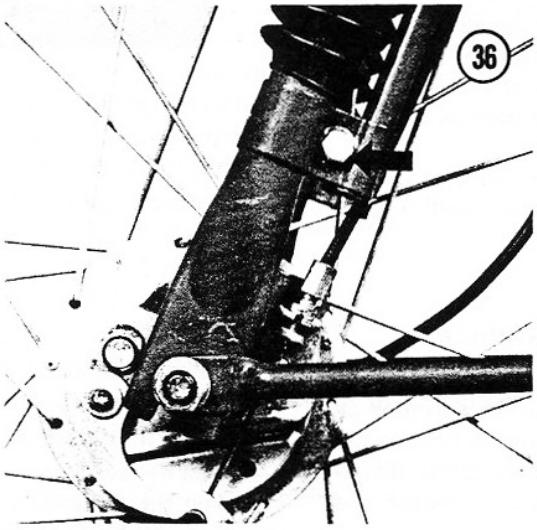
FRONT FORK

This procedure may be done with the moped on the centerstand, with the rear end tied down, or laid on its side on a blanket or thick pad.

It is suggested that you disassemble one side at a time.

Removal/Installation (VA, HS 50, Bronco)

1. Remove the front wheel as described under *Front Wheel Removal/Installation* in this chapter.
2. Remove the fender bracket bolts (**Figure 36**).



3. Remove the clips securing the black boot to the lower fork tubes. Let the boot remain with the upper fork tubes.

4. Remove the cap nut and lockwasher (**Figure 37**) while holding the lower fork tube.

5. Slide off the lower fork tube complete with the internal spring.

6. Install by reversing the removal steps.

Removal/Installation (MoBat)

1. Remove the front wheel as described under *Front Wheel Removal/Installation* in this chapter.

2. Remove the 2 fender bracket bolts on each side.

3. Remove the clips securing the black boot to the upper fork tube. Let the boot remain with the lower fork tube.

4. Unscrew the fork tube by turning it clockwise until it is free from the upper tube, pull down and remove it.

5. Install by reversing the removal steps.

Inspection

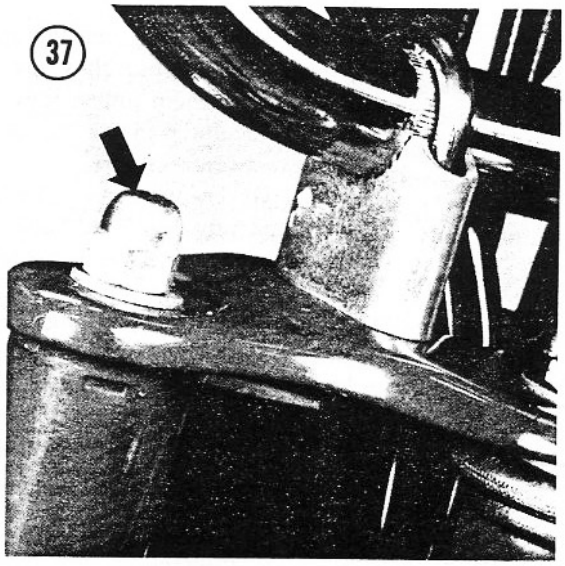
Remove the coil spring and inspect it. If the grease looks as though it is not contaminated, do not remove it. Add a good grade of multipurpose grease to it if necessary.

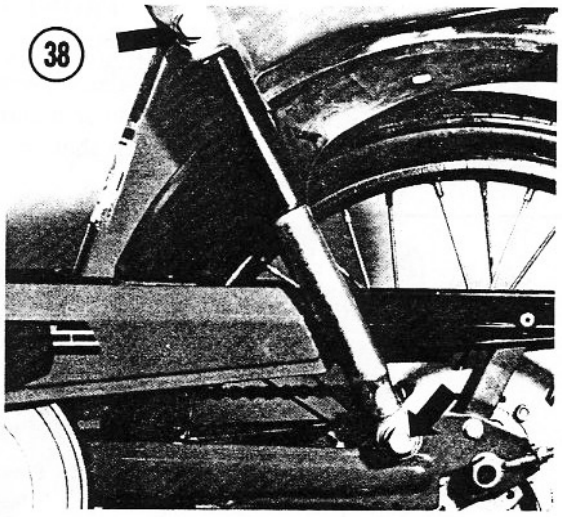
If the grease packed around the spring has been contaminated with dirt or water, the spring should be thoroughly cleaned with cleaning solvent. Wipe out the inside of the upper fork tube with rags on a long rod, avoid pouring cleaning solvent into the tube as it is difficult to thoroughly dry out.

Repack the spring, coat the inside of the upper tube with a good grade of multipurpose grease.

REAR SHOCK ABSORBERS

The rear shock absorbers on all models are basically the same except that the spring is on the outside of the upper tube on the Bronco and MoBat models. There are only slight differences on the removal/installation steps as noted in the following procedure.





Always replace shock absorbers as a pair; do not replace only one as this will affect the road handling of the moped.

1. Place the moped on the centerstand.

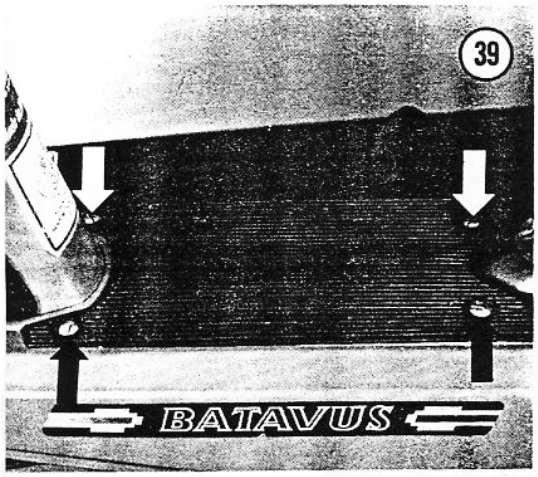
2. Remove the lower bolt and washer on each side (**Figure 38**).

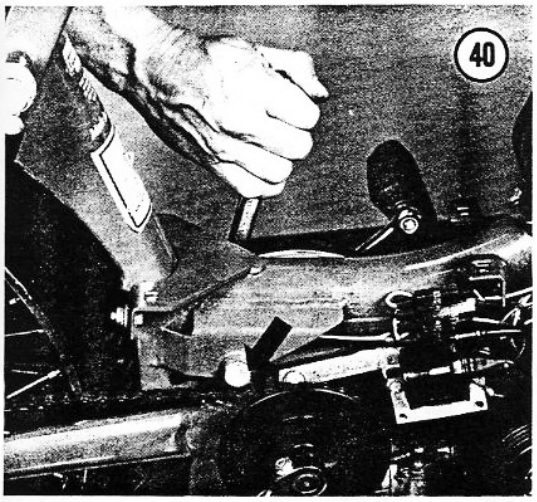
3. On models VA, HS 50, and MoBat, remove the upper bolt washer (**Figure 38**).

4. On Bronco models, remove the upper bolt, washer, lockwasher, and nut.

5. Remove the old shocks.

6. Install by reversing the removal steps. When installing the bolts, be careful not to damage the rubber bushings of the new shocks.





REAR SWING ARM

Removal/Installation (VA, HS 50, MoBat)

1. Remove the 4 screws securing the engine fairing **(Figure 39)** and remove it.
2. Remove the engine as described under *Engine Removal/Installation* in Chapter Five.
3. Remove drive pulley as described under *Drive Pulley Removal/Installation* in Chapter Six.
4. Remove the rear wheel as described under *Rear Wheel Removal/Installation* in this chapter.
5. Remove the lower end of both rear shock absorbers as described under *Shock Absorber Removal/Installation* in this chapter.
6. Remove the centerstand as described under *Centerstand Removal/Installation* in this chapter.
7. Remove the thru-bolt, bushings, washer, and locknut **(Figure 40)** and remove swing arm from frame.
8. Install by reversing the removal steps.

NOTE: *Mount the shock absorbers to the swing arm prior to tightening the thru-bolt. Torque the nut to 58 ft.-lb. (79 N•m).*

CAUTION

After 500 miles, check nut and retorque. If this torque is not maintained the bushings will rotate and begin to wear.

Removal/Installation (Bronco)

1. Place the moped on the centerstand.
2. Remove drive pulley as described under *Drive Pulley Removal/Installation* in Chapter Six.
3. Remove the rear wheel as described under *Rear Wheel Removal/Installation* in this chapter.
4. Remove lower shock absorber bolts and washers; do not remove shocks.
5. Remove the thru-bolt, bushings, washers, and locknut. Remove swing arm from the frame.
6. Install by reversing the removal steps.

NOTE: *Mount the shock absorbers to the swing arm prior to tightening the thru-bolt. Torque the nut to 58 ft.-lb. (79 N•m).*

CAUTION

After 500 miles check nut and retorque. If this torque is not maintained the bushing will rotate and begin to wear.

CENTERSTAND

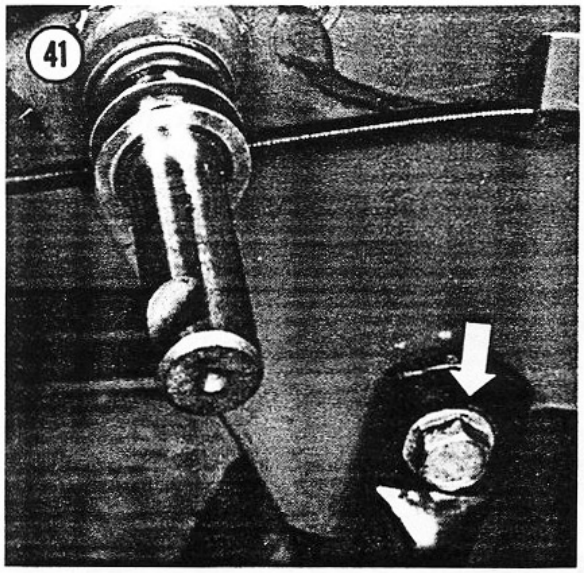
Removal/Installation

1. Place old blanket or pad on floor and lay moped down on its side.
2. Place the centerstand in the raised position and remove return spring using a pair of pliers to pull the hook off of the attachment loop.

3. Remove bolt, washer, and nut (**Figure 41**) on each side and remove the centerstand.

NOTE: *Figure 41 is shown with the drive pulley removed for clarity. It is not necessary to remove it for this procedure.*

4. Install by reversing removal steps, apply a small amount of multipurpose grease to the points where the centerstand rotates on the rear swing arm.



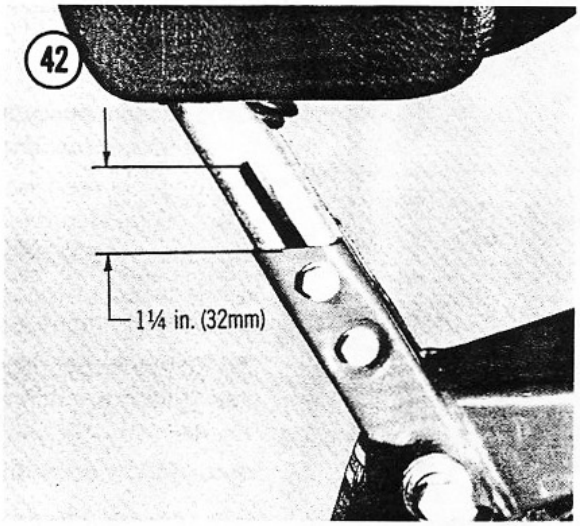
SEAT

Removal/Installation (VA, Bronco)

Loosen, but do not remove, the 2 bolts and nuts securing seat and stem into the seat support unit of the frame. Pull the seat and stem up and out to remove.

Install by reversing the removal steps, adjust the seat to the proper height.

NOTE: *On Model VA only, the slot on the seat stem should not stick out of the seat support unit (**Figure 42**) by more than 1¼ in. (32mm).*



Removal/Installation (HS 50, MoBat)

Remove the 2 bolts, washers, lockwashers, and nuts securing the rear mounting plate, under the seat, to the luggage carrier. Pull seat to the rear and remove.

Install by reversing the removal steps.

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BATAVUS
MOPED
OWNER SERVICE / REPAIR
1976-1978

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HS50	Bronco

This manual is part of the first professionally-written do-it-yourself repair series for moped enthusiasts. Fully detailed procedures on tune-up, troubleshooting, lubrication, and major maintenance enable owners to perform virtually any repair required.

The text is by an expert technical writer, and has been illustrated by scores of photos and drawings prepared especially for this book. Emphasis throughout is on simple step-by-step procedures and the remedies needed for reliable operation.

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