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SECRETS FROM COMPETITION EXPERTS

HIGH  
PERFORMANCE  
HOW-TO

CLYMER  
**SUZUKI**

PE175-400 SINGLES • 1977-1981  
SERVICE • REPAIR • PERFORMANCE



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COVER

*Photographed by Mike Brown/Visual Imagery, Los Angeles, CA.  
Motorcycle owned and ridden by Brad Zimmerman  
Motorcycle courtesy of Brad Zimmerman/U.S. Suzuki Motor Corp.  
Helmet courtesy of Simpson Helmets, Torrance, Ca.  
Boots courtesy of Scott U.S.A., Sun Valley, Idaho*

# CONTENTS

QUICK REFERENCE DATA .....	XI
----------------------------	----

<b>CHAPTER ONE</b> <b>GENERAL INFORMATION .....</b>	<b>1</b>
--	----------

How to use this manual	Special tips
Chapter organization	General maintenance hints
Notes, cautions and warnings	Tools
Photos, drawings and tables	Expendable supplies
Model identification	Safety first

<b>CHAPTER TWO</b> <b>TROUBLESHOOTING .....</b>	<b>8</b>
--	----------

Operating requirements	Engine noises
Starting difficulties	Piston seizure
Poor idling	Excessive vibration
Misfiring	Clutch slip or drag
Flat spots	Poor idling
Power loss	Brake problems
Overheating	Troubleshooting guide
Backfiring	

<b>CHAPTER THREE</b> <b>PERIODIC MAINTENANCE AND LUBRICATION .....</b>	<b>12</b>
---	-----------

Air filter servicing	Drive chain guide and tensioner roller servicing
Engine lubrication	Swing arm
Drive chain	Brake pedal lubrication
Frame, suspension, and engine fasteners	Kickstarter lever
Front forks	Brake adjustment
Transmission oil	Spark plugs
Cable lubrication	Ignition timing
Drive chain buffers	Carburetor

**CHAPTER FOUR**  
**ENGINE ..... 41**

- |                                      |                              |
|--------------------------------------|------------------------------|
| General maintenance and repair hints | Reed valve assembly          |
| Cylinder head                        | Engine                       |
| Cylinder                             | Engine cover end             |
|                                      | Bearing and seal replacement |

**CHAPTER FIVE**  
**CLUTCH, TRANSMISSION AND KICKSTARTER ..... 75**

- |                    |              |
|--------------------|--------------|
| Clutch             | Transmission |
| Gearshift          | Kickstarter  |
| Primary drive gear |              |

**CHAPTER SIX**  
**FUEL AND EXHAUST SYSTEMS ..... 114**

- |                          |                        |
|--------------------------|------------------------|
| Fuel tank and fuel valve | Exhaust system         |
| Carburetor servicing     | Exhaust system repairs |

**CHAPTER SEVEN**  
**ELECTRICAL SYSTEM ..... 127**

- |                 |                 |
|-----------------|-----------------|
| Ignition system | Lighting system |
|-----------------|-----------------|

**CHAPTER EIGHT**  
**FRONT SUSPENSION AND STEERING ..... 134**

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| Front wheel removal/installation | Steering head (except "T" models) |
| Forks                            | Steering head ("T" models)        |

**CHAPTER NINE**  
**REAR SUSPENSION ..... 152**

- |                                |                         |
|--------------------------------|-------------------------|
| Rear Wheel                     | Swing arm               |
| Rear sprocket and hub cushions | Shock absorbers/springs |

**CHAPTER TEN**  
**WHEELS, TIRES AND BRAKES ..... 162**

- |                        |                 |
|------------------------|-----------------|
| Brakes                 | Wheel balance   |
| Spoke and wheel runout | Tires and tubes |
| Wheel bearings         |                 |

**CHAPTER ELEVEN**

**PERFORMANCE IMPROVEMENTS ..... 173**

- Suspension
- Engine modifications
- Wheels and tires
- Brakes
- Axles
- Rear brake cable

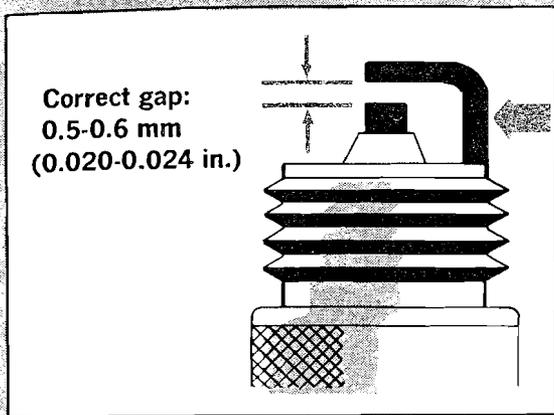
- Tires
- Plastics
- Detail improvements
- Post race clean-up
- The DG PE Suzuki
- Engine modifications (DG)

**INDEX ..... 188**

**WIRING DIAGRAMS ..... END OF BOOK**

# QUICK REFERENCE DATA

## CHAIN ADJUSTMENT\*



Model	mm	in.
PE175C, N	50-60	2-2 3/8
PE175T, X	25-35	1-1 3/8
PE250B	40-45	1 5/8-1 13/16
PE250C, N	50-60	2-2 3/8
PE250T, X; PE400	30-40	1 3/16-1 5/8

\* Measure chain deflection halfway between the front and rear sprockets.

## RECOMMENDED FUEL AND LUBRICANTS

Fuel	Premium (at least 95 octane)
Engine oil	Suzuki CCI Super 2-cycle motor oil Castrol Racing Oil R-30 Golden Spectro synthetic blend Shell Super M B.P. Racing Oil
Transmission oil	SAE 20W/40 motor oil
Fork oil	SAE 5W, 10W or 20W fork oil or A.T.F. (automatic transmission fluid)

## RECOMMENDED SPARK PLUGS\*

	NGK	ND
Standard		
PE250B, C	B-9EV	W24ES-GU
PE175C	B-8EV	W27ES-GU
PE175N; PE250N	B-10EV	W31ES-GU
PE175T, X	B-10EGV	W31ES-GU
PE250T, X; PE400	B-9EGV	W27ES-GU
Hotter (one step past standard)		
PE250B, C	B-8EV	W22ES-GU
PE175C	B-7EV	W24ES-GU
PE175N; PE250N	B-9EV	W29ES-GU
PE175T, X	B-9EGV	W29ES-GU
PE250T, X; PE400	B-8EGV	W24ES-GU
Colder (one step past standard)		
PE250B, C	B-10EV	W27ES-GU
PE175C	B-9EV	W29ES-GU
PE175N; PE250N	----	----
PE175T, X	----	----
PE250T, X; PE400	B-10EGV	W29ES-GU

\*Higher spark plug numbers indicate colder heat range for both NGK and ND spark plugs.

Table 3 FUEL AND OIL MIXTURE RATIO—20:1\*

Gasoline	Oil	Gasoline	Oil
Liters	cc	U.S. qt.	U.S. oz.
0.5	25	0.5	0.8
1.0	50	1.0	1.6
1.5	75	1.5	2.4
2.0	100	2.0	3.2
2.5	125	2.5	4.0
3.0	150	3.0	4.8
3.5	175	3.5	5.6
4.0	200	4.0	6.4
4.5	225	4.5	7.2
5.0	250	5.0	8.0
5.5	275	5.5	8.8
6.0	300	6.0	9.6
6.5	325	6.5	10.4
7.0	350	7.0	11.2
7.5	375	7.5	12.0
8.0	400	8.0	12.8
8.5	425	8.5	13.6
9.0	450	9.0	14.4
9.5	475	9.5	15.2
10.0	500	10.0	16.0

\* NOTE: If gasoline is measured in liters, oil must be measured in cc's. If gasoline is measured in U.S. quarts, oil must be measured in U.S. ounces.

AIR FORK SPECIFICATIONS  
(ALL "T" AND "X" MODELS)

Fork oil level <sup>1</sup>	
Standard level	Level range
180 mm (7.0 in.)	165-195 mm (6.5-7.7 in.)
Fork air pressure <sup>2,3</sup>	
Standard pressure	Pressure range
0.6 kg/cm <sup>2</sup> (8.5 psi)	0.5-0.7 kg/cm <sup>2</sup> (7.1-10.0 psi)

1. The maximum allowable difference in oil level between the right and left fork tubes is 1 mm (0.04 in.).
2. Do not exceed 2.5 kg/cm<sup>2</sup> (35 psi) of air pressure in the forks or the seals may be damaged.
3. Maximum allowable difference in air pressure between fork tubes is 0.1 kg/cm<sup>2</sup> (1.4 psi).

Cylinder head nut		
PE250B, C	1.9-2.5	14-18
PE175C, N; PE250N	2.3-2.7	17-20
PE175T, X; PE250T, X; PE400	2.0-2.5	15-18
Drive sprocket nut		
All models	4.0-6.0	29-43
Engine mount bolts		
10 mm	4.5-5.5	33-41
8 mm	2.5-3.2	18-23
Spark plug	2.5-3.0	18-22
Front axle nut		
PE250B, C	4.5-5.2	33-38
PE175C, N; PE250N	3.6-5.2	26-38
PE175T, X; PE250T, X; PE400	3.6-5.2	26-38
Upper front fork clamp bolts		
PE250B, C	2.0-2.5	15-18
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	2.0-3.0	15-22
Lower front fork clamp bolts		
PE250B, C	2.0-2.5	15-18
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	1.5-2.5	11-18
Front fork cap bolt		
PE250B, C, N; PE175C, N	3.5-5.0	26-36
PE175T, X; PE250T, X; PE400	1.5-3.0	11-22
Steering stem pinch bolt		
PE250B	2.0-2.5	15-18
PE250C	1.5-2.3	11-17
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	1.5-2.5	11-18
Steering stem head bolt		
PE250B, C	4.5-5.5	33-40
PE250N	3.5-5.5	26-40
PE175C, N	3.5-5.0	26-36
PE175T, X; PE250T, X; PE400	3.5-5.0	26-36
Handlebar clamp bolt		
PE250B, C	1.6-2.0	12-15
PE175C, N; PE250N	1.2-2.0	9-15
PE175T, X; PE250T, X; PE400	1.2-2.0	9-15
Swing arm pivot bolt		
PE250B, C	6.5-8.0	47-58
PE175C	3.0-4.5	22-33
PE175N	4.5-7.0	33-51
PE250N	5.0-8.0	36-58
PE175T, X; PE250T, X	4.5-7.0	33-51
PE400	5.0-8.0	36-58
Shock absorber nut		
PE250B, C; PE175C	2.5-3.0	18-22
PE175N; PE250N	2.0-3.0	15-22
PE175T, X; PE250T, X (right side)	1.5-2.5	11-18
PE175T, X; PE250T, X (left side)	2.0-3.0	15-22
PE400	1.0-1.5	8-11

(continued)

**ENGINE AND FRAME  
TORQUE SPECIFICATIONS (continued)**

Item	mkg	ft.-lb.
Rear axle shaft nut		
PE250B, C	6.5-8.0	47-58
PE175C	3.6-5.2	26-38
PE175N; PE250N	5.0-8.0	36-58
PE175T, X; PE250T, X; PE400	5.0-8.0	36-58
Rear axle sleeve nut		
PE175T, X; PE250T, X; PE400	7.0-9.0	51-65
Torque link bolt		
PE250B, C	1.2-1.5	9-11
PE175C	2.0-3.0	15-22
Front and rear brake lever bolts		
PE250B, C	0.6-0.8	3-6
PE175C, N; PE250N	0.5-0.8	4-6
PE175T, X; PE250T, X; PE400	0.5-0.8	4-6

**CAPACITIES**

<b>Fuel tank</b>			
PE250B, C; PE175C	12 liters	3.2 U.S. gal.	2.6 Imp. gal.
PE175N; PE250N	11.5 liters	3.0 U.S. gal.	2.5 Imp. gal.
PE175T, X; PE250T, X; PE400	10.6 liters	2.8 U.S. gal.	2.3 Imp. gal.
<b>Transmission oil</b>			
<b>Oil change</b>			
PE175C, N, T, X	800 cc	1.7 U.S. pt.	1.4 Imp. pt.
PE250B, C, N	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
PE250T, X; PE400	800 cc	1.7 U.S. pt.	1.4 Imp. pt.
<b>After overhaul</b>			
PE175C, T, X	900 cc	1.9 U.S. Pt.	1.6 Imp. pt.
PE175N	850 cc	1.8 U.S. pt.	1.5 Imp. pt.
PE250B, C, N	950 cc	2.0 U.S. pt.	1.7 Imp. pt.
PE250T, X; PE400	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
<b>Front forks</b>			
PE250B	243 cc	8.2 U.S. oz.	8.6 Imp. oz.
PE175C, N; PE250C, N	274 cc	9.3 U.S. oz.	9.6 Imp. oz.
PE175T, X; PE250T, X; PE400	308 cc	10.4 U.S. oz.	10.8 Imp. oz.

**RECOMMENDED TIRE SIZES**

Model	Tire Size
PE175	
Front	3.00-21
Rear	4.00-18
PE250	
Front	3.00-21
Rear	4.50-18
PE400	
Front	3.00-21
Rear	5.10-18

NOTE: Recommended tire pressure for most type of terrain is 10-14 psi (0.7-1.0 kg/cm<sup>2</sup>).

# CHAPTER ONE

## GENERAL INFORMATION

This book provides service and maintenance procedures for the following models of the Suzuki PE series production enduro racing machines:

PE175C, N, T, X  
PE250B, C, N, T, X  
PE400T, X

### HOW TO USE THIS MANUAL

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

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

information can help prevent serious and expensive mechanical errors.

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

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

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

### CHAPTER ORGANIZATION

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

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

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

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

### NOTES, CAUTIONS, AND WARNINGS

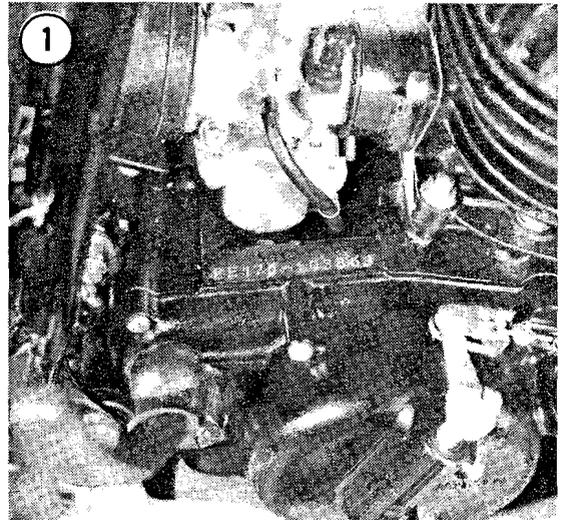
NOTES, CAUTIONS and WARNINGS appear throughout this manual and provide specific and important information to the reader. A NOTE usually provides extra or special information to make a step or procedure clearer. Disregarding a NOTE might cause inconvenience but will not cause damage or personal injury.

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

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

### PHOTOS, DRAWINGS, AND TABLES

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



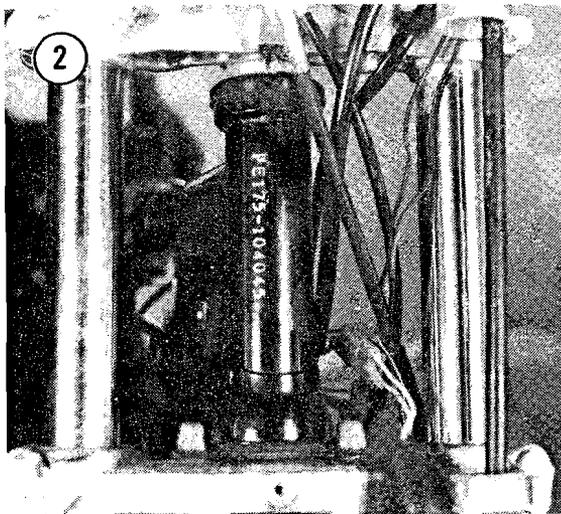
### MODEL IDENTIFICATION

All PE machines are designed specifically for enduro or desert off-road racing. However, because of their reliability and good manners, the PEs have also been widely accepted as excellent sport and trail bikes.

In order to keep a machine as competitive and reliable as possible, Suzuki often makes improvements and refinements during a production run. Major design changes are usually, though not exclusively, introduced with a new model. New models, when introduced, are given a letter suffix, for example, PE175T. The first production PE, the PE250B, was introduced in 1977. The PE175C was added the following year. A "big-bore" size was introduced to the PE family in 1980 with PE400T.

In order to take advantage of the improvements and changes, many of which can be incorporated on earlier machines, each owner should keep a written record of the engine number (Figure 1) and the frame number (Figure 2).

Improved part changes are usually identified by engine and/or frame numbers. If possible, try to make arrangements with your local Suzuki service department to examine and copy the factory PE Service Bulletins as they are released. These bulletins are very complete and announce all changes in parts, specifications, repair procedures and special



tools. All applicable Suzuki PE Service Bulletins released prior to the copyright date of this book have been incorporated in this book.

### SPECIAL TIPS

Competition machines are subjected to loads and wear far beyond those encountered in normal sport or trail riding. One enduro race may take as much out of a machine as several days of trail riding. Because of the extraordinary demands placed on a racing machine, several points should be kept in mind when performing service and repair. The following items are general suggestions that may improve the overall life of the machine and help avoid costly failures.

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

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

2. Use a hammer driven impact tool to remove and install all screws, particularly

engine cover screws. This tool will help prevent rounding the screw heads as well as ensure a tight installation.

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

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

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

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

5. When replacing missing or broken bolts, particularly on the engine, suspension or frame components, always use the proper Suzuki replacement bolt. Each bolt is specially hardened for each application. The wrong 25 cent bolt could easily cause many dollars worth of serious damage, not to mention possible rider injury.

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

### GENERAL MAINTENANCE HINTS

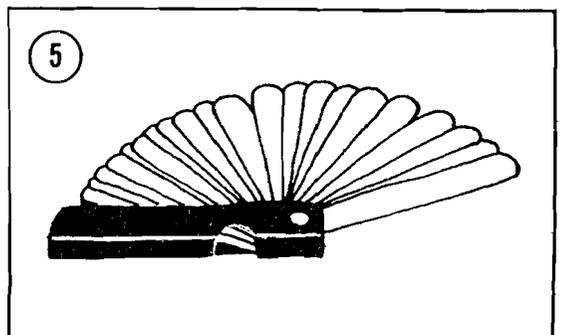
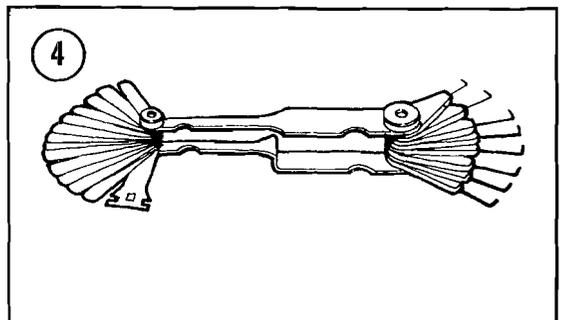
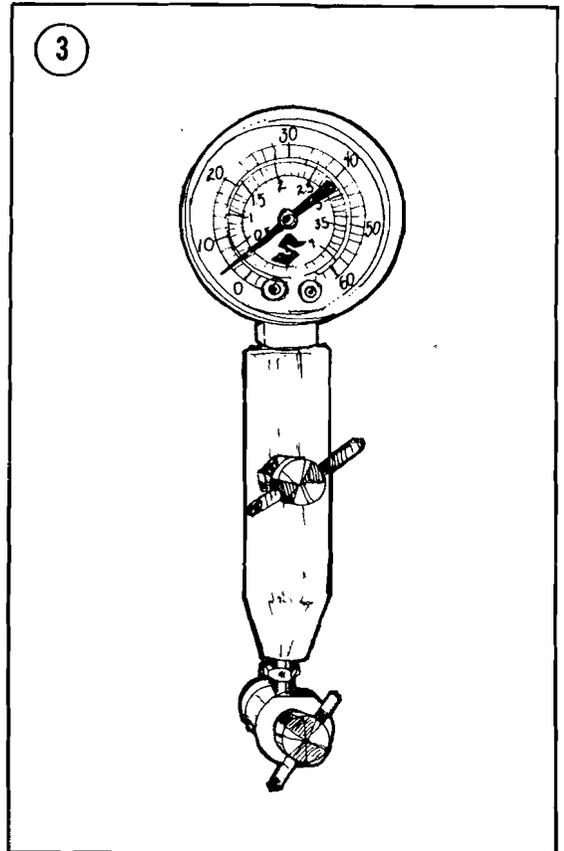
Most of the service procedures provided in this book can be performed by any one reasonably handy with tools. It is suggested, however, that you carefully consider your own

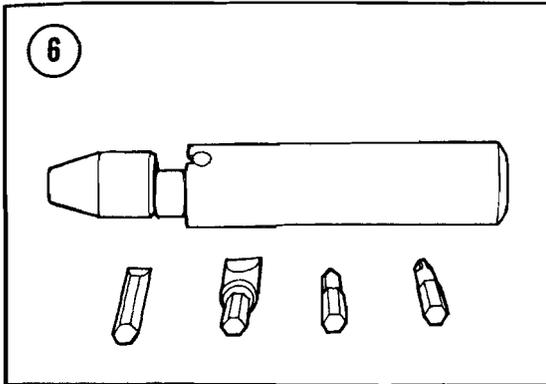
capabilities before attempting any repair task which involves major disassembly of the engine and transmission.

Crankshaft repairs, for example, require the use of a heavy hydraulic press. It is wiser to have a competent machine shop or authorized dealer perform the actual crankshaft work than to try to do the job yourself with makeshift equipment. Other procedures require precision measurements, and unless you have the skills and equipment to make them, it would be better to have a motorcycle shop do the work. Repairs can be made faster and easier if the motorcycle is clean before you begin work. Good soap and pressurized water is usually the best to clean all but the most stubborn dirt or grease. High-pressure coin operated car washes do a good job of cleaning, however, the bike must be completely dried and lubricated after cleaning. High-pressure water and detergent can easily enter the wheels, swing arm and other critical areas and cause corrosion if not treated immediately after cleaning.

Clean all oily and greasy parts with cleaning solvent. An approved solvent is usually available in bulk form from many automobile service stations and parts stores. *Never use gasoline as a cleaning agent.* It presents an extreme fire hazard. Always work in a well ventilated area when using cleaning solvent. Keep a fire extinguisher, rated for gasoline and oil fires, handy just in case. If you are not used to working with cleaning solvent use rubber gloves, if possible, or treat your hands with a good skin lotion immediately after cleaning parts. Solvent will remove the skin oils from your hands and cause painful and irritating "solvent burns" if left untreated.

Special tools are required for some service procedures. All special tools necessary are referenced by Suzuki part number and are available from an authorized dealer. If you are on good terms with the dealer's service department or know a professional motorcycle mechanic you may be able to borrow what you need. Naturally much of the labor charge made for repairs by a dealer is for removal and disassembly of other parts to reach the defective area. It is usually possible to perform





much of the preliminary work yourself and then take the affected part or assembly to the dealer for repair.

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

## TOOLS

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

- a. Combination wrenches (metric)
- b. Socket wrenches (metric)
- c. Plastic or compothane mallet
- d. Small ballpeen hammer
- e. Snap ring pliers
- f. Screwdrivers (standard and Phillips)
- g. "T" handle Phillips screwdrivers
- h. Hammer driven impact tool

- i. Pliers
- j. Feeler gauges
- k. Spark plug gauge
- l. Spark plug wrench
- m. Drift
- n. Vernier calipers
- o. Flywheel puller
- p. Torque wrench (mkg/ft.-lb.)

### Special Pressure Gauge

This is Suzuki part number 09940-44110, (Figure 3). This tool is available from Suzuki to service air forks. It allows air pressure to be set exactly without air loss when the gauge is removed. Since the price of the gauge is rather high, you may wish to get together with two or three fellow racers and share the cost.

### Ignition Gauge

This tool (Figure 4) combines round wire spark plug gap gauges with narrow feeler gauges in popular sizes. This type of wire gauge is best for setting the gap on spark plugs and is available at most auto parts stores.

### Feeler Gauge

This tool (Figure 5) is available in most auto parts and tool stores and can be purchased with a variety of different sized gauges. Most gauges presently available list both metric and American sizes.

### Hammer Driven Impact

This tool (Figure 6) makes removal of Phillips and standard screws easy without screw head damage. These tools are available at most tool or hardware stores.

### Compothane Mallet

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

## EXPENDABLE SUPPLIES

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

## SAFETY FIRST

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

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

## STORAGE

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

your motorcycle. This is especially important in areas with cold winters. During the winter, you should prepare your motorcycle carefully for "hibernation."

## Selecting a Storage Area

Most cyclists store their motorcycles in their home garage. If you do not have a garage, there are other facilities for rent or lease in most areas. When selecting an area, consider the following points.

1. The storage area must be dry; there should be no dampness or excessive humidity. A heated area is not necessary, but it should be insulated to minimize extreme temperature variations.
2. Avoid buildings with large window areas. If this is not possible, mask the window to keep direct sunlight off the bike.
3. Avoid buildings in industrial areas where factories are liable to emit corrosive fumes. Also avoid buildings near large bodies of salt water.
4. Select an area where there is minimum risk of fire, theft, or vandalism. Check with your insurance agent to make sure that your insurance covers the motorcycle where it is stored.

## Preparing Motorcycle for Storage

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

1. Wash the bike thoroughly. Make certain you remove all the dirt and mud which may have accumulated during the season. Thoroughly clean all plastic and metal components. Apply a plastic preservative such as Armor All to all the plastic parts as well as the tires. Make sure you follow the manufacturer's instructions when applying the plastic preservative.
2. Run the engine until it achieves operating temperature. Drain the transmission oil regardless of the riding time since the last change. Fill the transmission with the recommended type and quantity of fresh oil.
3. Drain all the gasoline from the fuel tank, fuel line and carburetor.

4. Remove the spark plug and add a small quantity of engine oil to the cylinder. Place a rag over the cylinder head and slowly roll the engine over a few times to distribute the oil, then reinstall the spark plug.
5. Check the tire pressures and move the machine to the storage area.

**After Storage**

1. Before returning the motorcycle to service, thoroughly check all fasteners, suspension components and brake components. Move the front suspension through several complete strokes to make sure the fork seals are not leaking.
2. Fill the fuel tank with a fresh batch of fuel/oil mixture.

3. Check all controls and cables. Replace any cables that are frayed or kinked.

4. Make sure both brakes, the clutch and throttle operate smoothly. Adjust the controls if necessary.

5. Ensure that all the wiring is correctly routed and all connections are tight and corrosion-free. Check that the kill button will stop the engine.

6. Before starting the engine, remove the spark plug and kick the engine over a few times to blow out the excess storage oil. Place a rag over the cylinder head to keep the oil off the engine. Install a new spark plug and connect the spark plug lead.

## CHAPTER TWO

### TROUBLESHOOTING

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

Never assume anything. Do not overlook the obvious. If you are riding along and the engine suddenly quits, check the easiest, most accessible problem spots first. Is there gasoline in the tank and is the fuel valve in the ON position? Has the spark plug wire fallen off or the kill button shorted out?

If nothing obvious turns up in a cursory check, look a little further. Learning to recognize and describe symptoms will make repairs easier for you or a mechanic at a shop. Describe problems accurately and fully. Saying that "it won't run" is not nearly as descriptive as saying "it quit at high speed" or that "it sat in my garage for 3 months and now it won'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.

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 bike sits in a dealer's service department. On the other hand, be realistic and do not attempt repairs beyond your abilities. Service departments tend to charge heavily for putting together a disassembled engine that may have been abused. Some will not even take on such a job. Use common sense, and do not get in over your head.

#### OPERATING REQUIREMENTS

An engine needs 3 basics to run properly: correct gas/air mixture, compression, and a spark at the right time. If one or more are missing, the engine will not run. The electrical system is usually the weakest link of the three. More problems result from electrical breakdowns than from any other source. Keep that in mind before you begin tampering with carburetor adjustments and related procedures.

If a bike has been sitting for any length of time and refuses to start, check the gasoline delivery system. This includes the tank, fuel valve, line and carburetor.

Dirt or gummy deposits may have clogged carburetor jets and air passages. Pre-mix gasoline tends to lose its potency if left standing for anything more than a few weeks. This is why it is important not to mix more fuel than can be used in a short time. Condensation may have contaminated the fuel with water. Drain all the old gas and try starting with a fresh tankful. Do not forget to drain the old fuel from the carburetor as well.

Compression, or the lack of it, usually enters the picture only in the case of older machines. Worn or broken pistons, rings and cylinder bores could prevent starting. Generally, gradual power loss and increasingly difficult starting will be readily apparent in this case.

### STARTING DIFFICULTIES

Check the gas flow first. Move the motorcycle side to side and listen for the slosh of fuel to make sure there is gas in the tank. If the tank contains gas, pull off the fuel line at the carburetor and see if fuel flows freely. Make sure the valve is in the ON position. If no fuel flows, the valve may be blocked by deposits or foreign matter. If the carburetor is getting usable fuel, turn to the electrical system next.

Pull off the spark plug cap, remove the spark plug, and reconnect the cap. Lay the plug against the cylinder head so its base makes a good connection, and turn the engine over with the kickstarter. A fat, blue spark should jump across the electrodes. If there is no spark, or a weak one, you have electrical system trouble. Check for a defective plug by replacing it with a known good one. Do not assume a plug is good just because it's new.

Once the plug has been cleared of guilt, but there's still no spark, start backtracking through the system. If the contact at the end of the spark plug wire can be exposed, it can be held about 1/8 inch from the head while the engine is turned over to check for a spark. Remember to hold the wire only by its insulation to avoid a nasty shock. If the plug wires are dirty, greasy, or wet, wrap a rag around them so you do not get shocked. If you do feel a shock or see sparks along the wire,

clean or replace the wire and/or its connections. If there is no spark at the plug wire, look for loose connections at the coil. If all seems in order there, check the magneto. Note that spark plugs of an incorrect heat range (too cold) may cause difficult starting. Set the gap to specifications. If you have just ridden through a puddle or washed the bike and it will not start, dry off the plug and plug wire. Water may have entered the carburetor and fouled the fuel, but a wet plug and wire are the more likely problems. If a healthy spark occurs at the right time, and there is adequate gas flow to the carburetor, check the carburetor itself. Make sure all jets and air passages are clean, check the float level, and adjust it if necessary. Shake the float to check for gasoline inside it and replace it if necessary. Check that the carburetor is mounted snugly, and no air is leaking past the mounting flange. Check for a clogged air filter.

Compression may be checked in the field by operating the kickstarter by hand and noting that an adequate resistance is felt, or by removing the spark plug and placing a finger over the plug hole and feeling for pressure.

An accurate compression check gives a good idea of the condition of the basic working parts of the engine. To perform this test, you need a compression gauge.

1. Warm up the engine and remove the spark plug.
2. Insert the tip of the compression gauge into the hole. Make sure it is seated correctly.
3. Open the throttle fully and crank the engine over several times until the gauge indication ceases to increase. If the compression is low (100 psi or less), it is likely a piston ring is broken or the piston and bore are very worn. In either case repair work is required. A normal indication is approximately 140 psi.

### POOR IDLING

Poor idling may be caused by incorrect carburetor adjustment, incorrect timing, or ignition system defects. Check the gas cap vent for an obstruction. Also check for loose carburetor mounting at the engine or the air box.

### MISFIRING

Misfiring can be caused by a weak spark or dirty spark plug. Check also for fuel contamination. Run the machine at night or in a darkened garage to check for spark leaks along the plug wire and under the plug cap. If misfiring occurs only at certain throttle settings, the problem may be a specific circuit in the carburetor. Misfiring under load, as in hill climbing and accelerating, is usually caused by a defective spark plug.

### FLAT SPOTS

If the engine seems to die momentarily when the throttle is opened and then recovers, check the carburetor pilot air screw adjustment. Also the fuel may be contaminated with water or have lost its potency after extended storage.

### POWER LOSS

Poor condition of rings, piston, or cylinder will cause a lack of power and speed. Also check the type and condition of the spark plug.

### OVERHEATING

If the engine seems to run too hot all the time, be sure you are not idling it for long periods. Air-cooled motorcycle engines are not generally designed to operate at a standstill for any length of time. A spark plug of the wrong heat range can burn a piston. An excessively lean gas mixture may cause overheating. Check the ignition timing. Do not ride in too high a gear so the machine is lugging. Broken or worn rings may permit compression gases to leak past them, causing an extra heat load in the head and cylinder.

### BACKFIRING

Check that the timing is not advanced too far. Check the fuel for contamination.

### ENGINE NOISES

Experience is needed to diagnose accurately in this area. Noises are hard to differentiate and harder yet to describe. Deep knocking noises usually mean main bearing failure. A

slapping noise generally comes from a loose piston. Pinging, which sounds like marbles being shaken in a tin can, is caused by the ignition advanced too far or gasoline with too low an octane rating. Pinging should be corrected immediately or piston damage will result. Compression leaks at the head/cylinder joint will sound like a rapid on and off squeal.

### PISTON SEIZURE

Piston seizure is caused by incorrect piston clearances when fitted, fitting rings with improper end gap or incorrect type or quantity of oil mixed in the fuel. Seizure may also be caused by excessive heat due to an improper heat range plug or incorrect ignition timing. Overheating of any type can lead to piston seizure.

### EXCESSIVE VIBRATION

Excessive vibration may be caused by loose motor mounts, worn engine or transmission bearings, loose wheels, worn swing arm bearings, a generally poor running engine, broken or cracked frame, or one that has been damaged in a collision or spill. Also see *Poor Handling*.

### CLUTCH SLIP OR DRAG

Clutch slip may be due to worn or glazed plates, improper adjustment, weak springs or the wrong transmission oil. A dragging clutch could be caused by damaged or bent plates, improper adjustment, excessive spring pressure or the wrong transmission oil.

### POOR HANDLING

Poor handling may be caused by improper tire pressures, a damaged frame or swing arm, worn shocks or front forks, weak fork springs, a bent or broken steering stem, misaligned wheels, loose or missing spokes, worn tires, bent handlebars, worn wheel bearings, or dragging brakes.

### BRAKE PROBLEMS

Sticking brakes may be caused by broken or weak return springs, improper cable adjustment, or dry pivot and cam bushings.

Grabbing brakes may be caused by greasy linings (which must be replaced). Brake grab may also be due to out-of-round drums or brake linings that have broken loose from the shoes. Glazed linings will cause loss of stopping power.

### TROUBLESHOOTING GUIDE

The following summarizes the troubleshooting process. Use this guide to outline possible problem areas, then refer to the specific chapter or section involved.

#### Loss of Power

1. *Poor compression*—Check piston rings and cylinder, cylinder head gasket, and crankcase leaks.
2. *Overheated engine*—Check pre-mix oil type and ratio, air leaks, ignition timing, clogged cooling fins, and carbon in combustion chamber.
3. *Improper mixture*—Check for dirty air cleaner, restricted fuel flow, clogged gas cap vent.

#### Gearshifting Difficulties

1. *Clutch*—Check clutch adjustment, clutch

springs, friction plates, steel plates, and oil quantity and type.

2. *Transmission*—Check oil quantity and type, and gearshift mechanism, and gearshift forks.

#### Brake Troubles

1. *Poor brakes*—Check brake adjustment, brake drum out-of-round, oil or water on linings, and loose cables.
2. *Noisy brakes*—Check for worn linings, scratched drums or dirt in brakes.
3. *Unadjustable brakes*—Check for worn linings, drums and brake cams.
4. *Miscellaneous*—Check for dragging brakes, tight wheel bearings, and defective chain.

#### Steering Problems

1. *Hard steering*—Check steering head bearings, steering stem head, and tire pressure.
2. *Pulls to one side*—Check for worn swing arm bearings, bent swing arm, bent frame, bent forks, and damaged steering head.
3. *Shimmy*—Check for improper drive chain adjustment, loose or missing spokes, deformed wheel rims, worn wheel bearings, and improper wheel balance.

June 28, 2007

Thanks to James Grooms, editor, Clymer Publications who granted copyright permission to provide access to the out of print manual, Suzuki PE175-400 Singles, 1977-1981. Other Clymer manuals may be viewed at <http://clymer.com> .

## CHAPTER THREE

### PERIODIC MAINTENANCE AND LUBRICATION

A motorcycle, like any other precision machine, requires a certain amount of routine and preventive maintenance to ensure its safety, reliability and performance.

The service and lubrication intervals specified in **Table 1** are recommended by Suzuki for the competitive enduro rider. Each owner will have to determine his own maintenance requirements based on the type and frequency of use that each machine is subjected to. Full-time racing each weekend naturally requires a much more stringent maintenance schedule than occasional trail or sport riding.

This chapter describes all periodic maintenance required to keep your motorcycle running properly. Plan ahead for all maintenance and lubrication tasks. Make sure you have all the supplies such as transmission and fork oil, chain lubricant and a spark plug before starting the service work. Nothing is more aggravating or time consuming than having to stop in the middle of a job and pick up some forgotten item.

**Tables 1-7** are found at the end of the chapter.

#### AIR FILTER SERVICING

The air filter removes dust and abrasive

particles from the air before they can enter the engine. Even very fine particles entering the engine will cause rapid wear of the piston rings, cylinder and bearings as well as clog the small passages in the carburetor. NEVER operate the motorcycle without an air filter.

Proper air filter servicing can do more to ensure engine longevity than nearly any other single item. The air filter should be cleaned at least as frequently as recommended in **Table 1**. If you use your machine for enduro racing, it is a good idea to have a second filter element on hand to be able to make a quick change should the filter become clogged with dust or mud.

1. Remove seat mounting bolts (**Figure 1**).

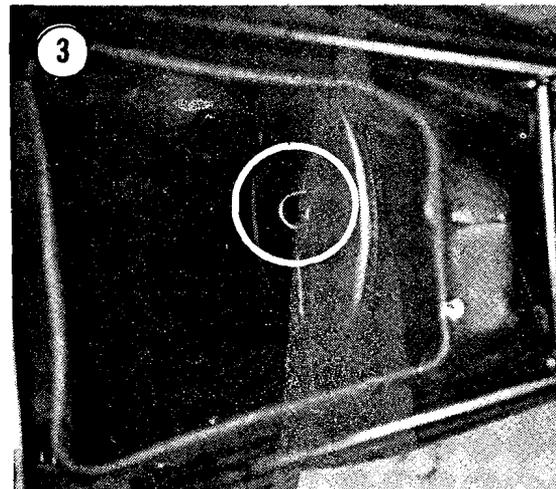
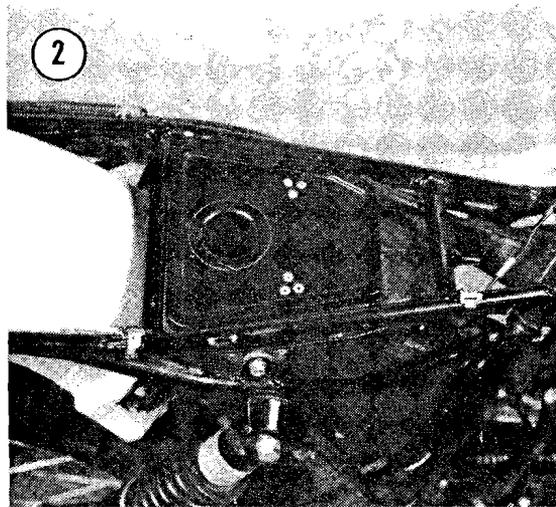
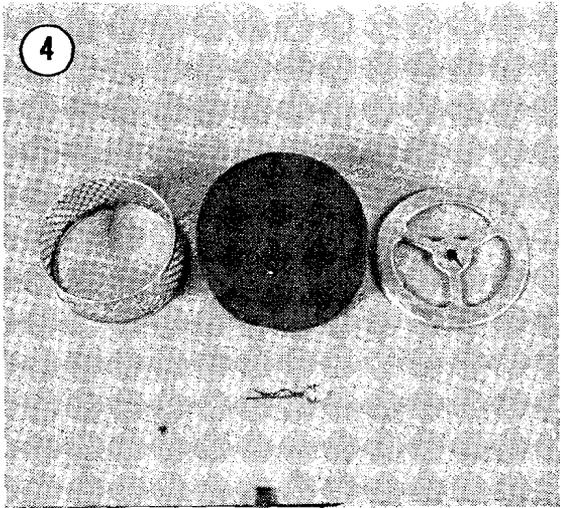
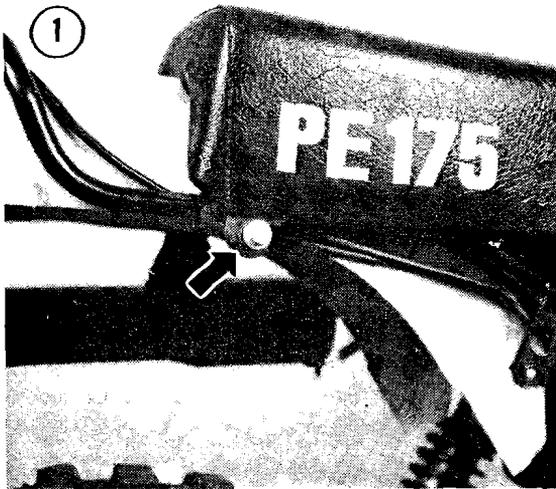
#### NOTE

*On some models it is only necessary to loosen the left-hand mounting bolt as the mount is slotted.*

2. Pull back on the seat to disengage the seat hook and lift off the seat.

3. Lift off the air box cover (**Figure 2**).

4. Remove the retaining pin or wing nut (**Figure 3**) securing the air filter to the air box and remove the filter.



3

**NOTE**

*Stuff a clean rag into the engine intake to prevent any dirt from getting into the carburetor and engine.*

5. Separate the foam filter element from the metal or plastic frame (**Figure 4**).

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

**CAUTION**

*Never wring or twist the foam element during the cleaning or reoiling process, the foam can easily be damaged.*

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

8. Apply engine oil or special air filter oil to the element and gently work the foam in your hands until the element is completely saturated with oil. Squeeze the element between your palms to remove all the excess oil.

**NOTE**

*A good grade of special air filter oil provides better protection against dirt and water than plain engine oil.*

9. Thoroughly clean the inside of the air box and the filter sealing flange. Make sure the drain fitting in the bottom of the air box (**Figure 5**) is clean and open.

10. Carefully assemble the filter element on the metal or plastic frame.

11. Apply a light coat of grease to the sealing edge of the filter element. Make sure the sealing edge is not pulled back from the filter frame.

12. Remove the rag stuffed in the air intake and carefully install the filter. Rotate the element one full turn after installing to make sure the edge of the element is properly seated. Secure the filter with the wing nut or retaining pin.

#### CAUTION

*Make sure the filter is installed correctly. An improperly installed filter will allow dirt and grit to enter the engine, causing expensive damage.*

13. Install the air box cover and secure with the large rubber band.

14. Install the seat.

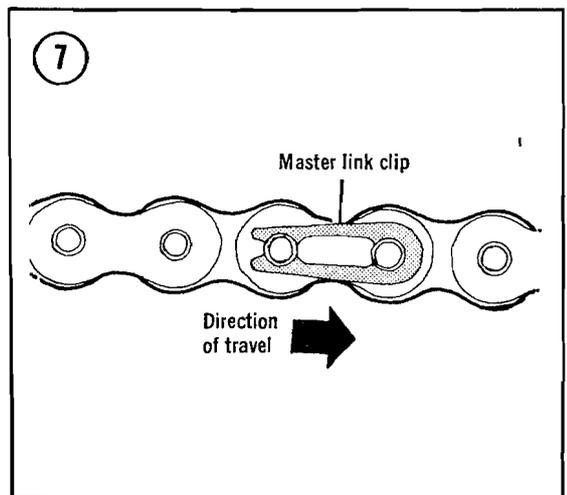
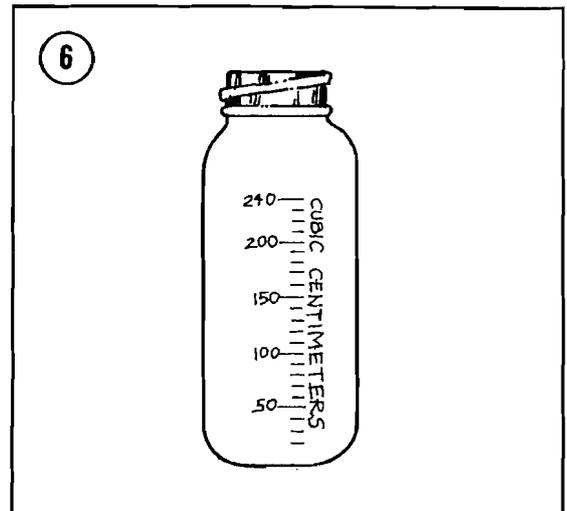
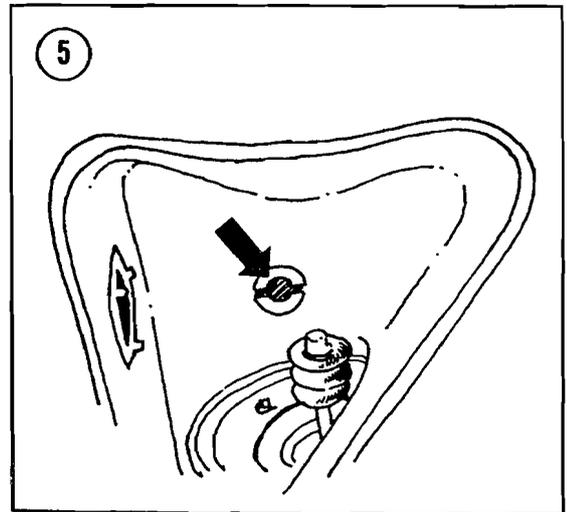
### ENGINE LUBRICATION

#### WARNING

*Serious fire hazards always exist around gasoline. Do not allow any smoking in the areas where fuel is being mixed or while refueling your machine.*

The engines on all PE models are lubricated by oil mixed with gasoline. Refer to **Table 2** for recommended oils and fuel. Mix the oil and gasoline thoroughly in a separate clean container larger than the quantity being mixed to allow room for agitation. Always measure the quantities exactly. Refer to **Table 3** for quantities using a 20:1 mixing ratio. Fuel capacities for the various models are given in **Table 4**.

Never use more than one brand or type of oil when mixing a particular batch of fuel. The different brands of oil may not be compatible with each other, resulting in a lack of lubrication or excessive carbon deposits. It is suggested that once one brand of oil is used successfully, brands not be changed, unless



mechanical problems arise or availability becomes difficult. Avoid using more than one type of pre-mix in the motorcycle fuel tank at one time.

Use a graduated measuring device such as a baby bottle (**Figure 6**) or a Ratio Rite to ensure a precise measurement of oil. Pour the required amount of oil into the mixing container and add approximately 1/2 the required amount of gasoline. Thoroughly shake the container to mix the oil and gasoline then add the remaining gasoline. Agitate the container just prior to adding fuel to the motorcycle. If possible, always use a funnel with a filter when pouring fuel into the motorcycle.

### DRIVE CHAIN

#### WARNING

*Always check the master link retaining clip after the motorcycle has been rolled backwards as when unloaded from a truck or trailer. The master link clip may have snagged on the chain guide or tensioner assembly and become disengaged. Obviously, losing a chain while riding can cause a serious spill resulting in injury as well as equipment damage.*

Clean, lubricate and adjust the drive chain at least as frequently as specified in **Table 1**. A properly lubricated and adjusted chain will provide maximum service life and reliability.

#### Cleaning and Lubrication (All "T" and "X" Models Only)

#### CAUTION

*The drive chain fitted on all "T" and "X" models is equipped with sintered metal bushings impregnated with a special grease. Never use gasoline or commercial parts washing solvents on the chain or the special grease will be removed. Failure to clean and lubricate the drive chain correctly will result in rapid wear and failure of the chain.*

1. Remove the master link retaining clip and remove the master link. Roll the drive chain off the motorcycle.
2. Brush the links and rollers with a stiff brush to remove the dirt and grit.

3. If the chain shows signs of rust or is extremely dirty, wash the chain thoroughly in kerosene and hang it up to dry.

4. When the chain is completely dry, saturate the links and rollers with SAE 90 heavy gear oil.

5. Install the chain on the motorcycle. Use a new master link and install the retaining clip in the direction of rotation shown in **Figure 7**.

#### NOTE

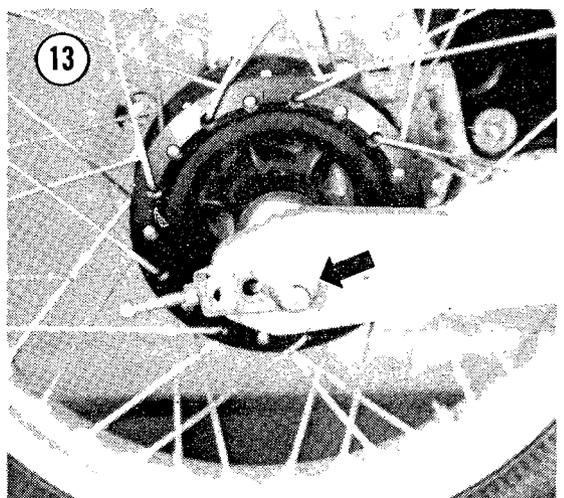
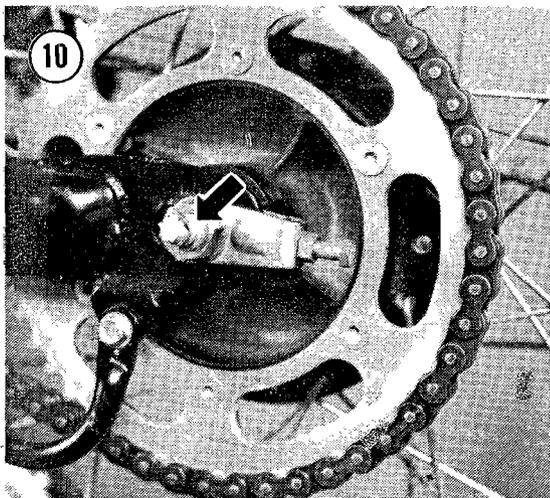
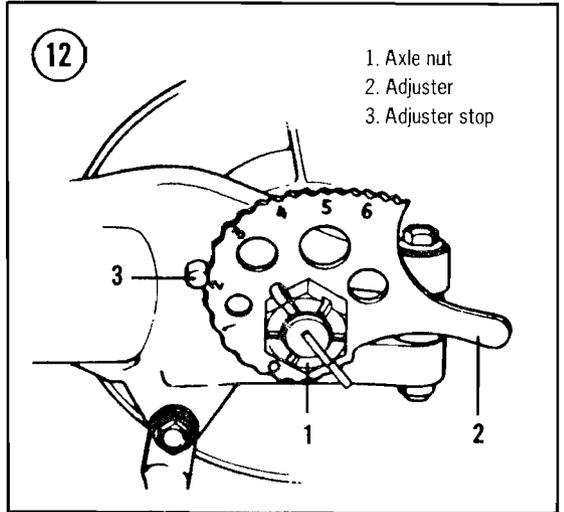
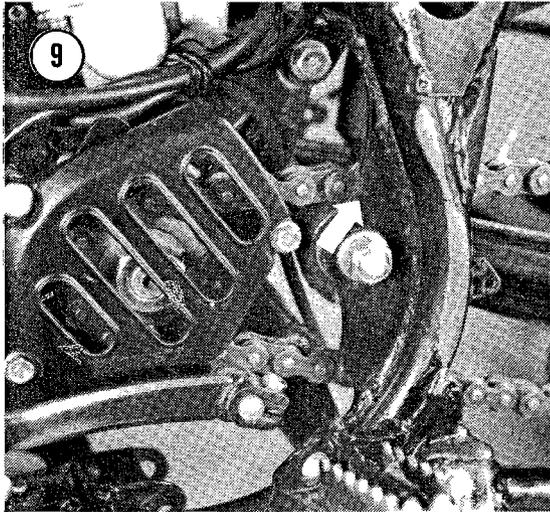
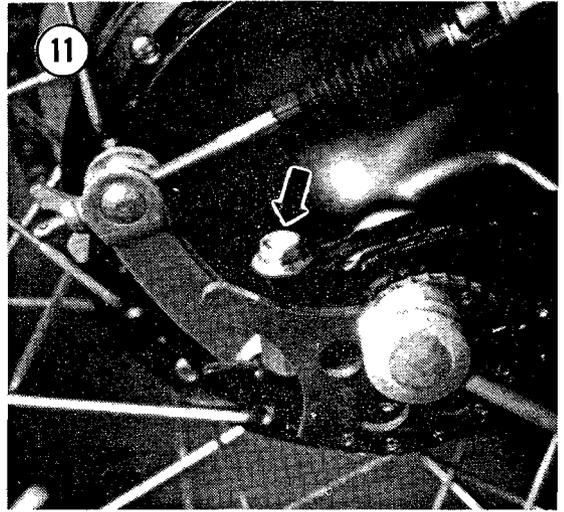
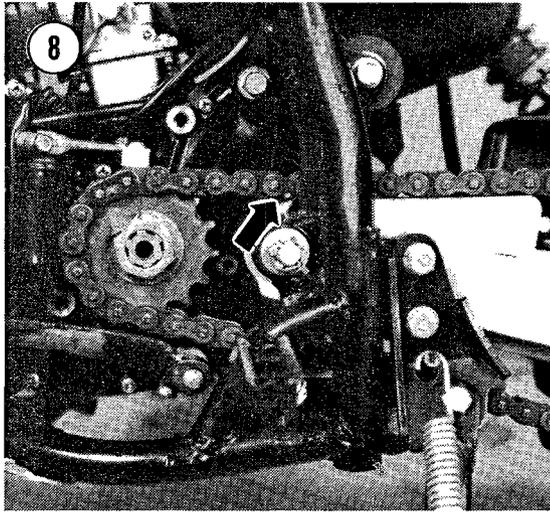
*Roll both ends of the drive chain over the rear sprocket before attempting to install the master link. The sprocket will hold the ends, easing the installation of the master link.*

#### Cleaning and Lubrication (All 1979 and Earlier Models)

1. Remove the master link retaining clip and remove the master link. Roll the drive chain off the motorcycle.
2. Immerse the chain in a pan of cleaning solvent and allow it to soak for about a half hour.
3. Scrub the rollers and side plates with a stiff brush. Rinse the chain thoroughly in clean solvent to flush off all remaining dirt and grit. Hang up the chain and allow it to dry thoroughly. Use compressed air, if available, to help dry the chain.
4. Lubricate the chain with a good grade of chain lubricant that contains molybdenum disulfide. Apply the lubricant according to the manufacturer's instructions. If special chain lubricant is not available, soak the chain in SAE 10W/40 engine oil (not 2-stroke engine oil).
5. Install the chain on the motorcycle. Use a new master link and install the retaining clip in the direction of rotation shown in **Figure 7**.

#### NOTE

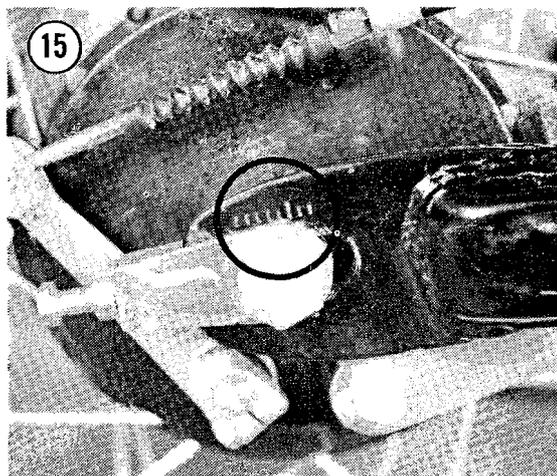
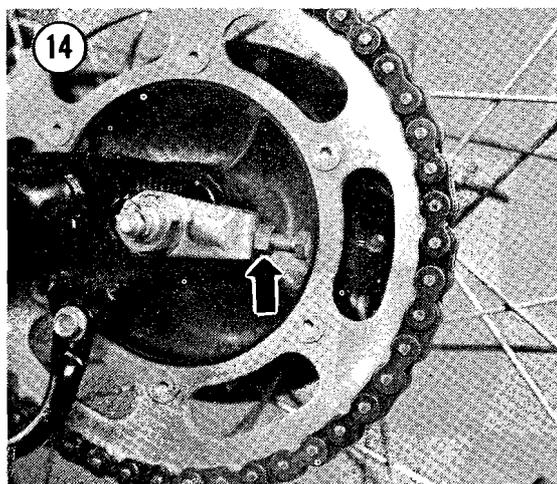
*Roll both ends of the drive chain over the rear sprocket before attempting to install the master link. The sprocket will hold the ends, easing the installation of the master link.*



### Adjustment

When the chain is adjusted properly, it should just barely touch the drive chain buffer without any weight on the motorcycle. See **Figure 8** for all "T" and "X" models, and **Figure 9** for all earlier models. When adjusting the chain, check the deflection (slack) at several places along its length by rotating the rear wheel. The chain will rarely stretch uniformly and as a result will be tighter at some places than others. Measure the chain deflection half way between both sprockets and make sure the chain deflection at the tightest place on the chain is not less than specified in **Table 5**.

1. Remove the cotter pin securing the axle nut (**Figure 10**) and loosen the nut.



2. On all "N" models perform the following:
  - a. Loosen the axle support bolts on each side (**Figure 11**).
  - b. Turn the "snail" adjusters (**Figure 12**) until the specified amount of chain slack is achieved. Make sure the adjusters are positioned on the same number on each side (**Figure 12**).
  - c. Torque the axle nut then the axle support bolts as specified in **Table 6**. Secure the axle nut with a new cotter pin.
3. On all "T" and "X" models, loosen the large axle sleeve nuts on each side (**Figure 13**).
4. Loosen the locknuts securing the axle adjuster bolts (**Figure 14**) on each side of the machine.
5. Tighten or loosen both adjuster bolts an equal amount until the chain deflection is as specified in **Table 5**. Make sure the marks on both adjusters align with the same marks on each end of the swing arm (**Figure 15**).
6. Tighten the locknuts securing the adjuster bolts. Recheck the chain deflection and readjust if necessary.
7. On all "T" and "X" models, torque the axle sleeve nuts as specified in **Table 6**.
8. Refer to **Table 6** and torque the rear axle nut. Secure the nut with a new cotter pin.

### FRAME, SUSPENSION AND ENGINE FASTENERS

Before each ride or race, thoroughly check the entire motorcycle for loose bolts, nuts, cotter pins and other fasteners. Refer to **Table 6** and check the torque of all frame, suspension and engine component fasteners.

#### CAUTION

*Do not exceed the specified torque values or thread damage, metal fatigue and stretched fasteners will result.*

### FRONT FORKS

The front forks are the most adjustable component of the motorcycle. A properly "dialed-in" front suspension can transform an ill-handling motorcycle into one that is a pleasure to ride, besides being very competitive. To obtain the best performance from your front suspension, proper

maintenance and tuning is a must, particularly on standard air forks, or non-air models fitted with air caps.

Change fork oil frequently, at least as often as specified in **Table 1**, and keep all fork components scrupulously clean. Do not be afraid to experiment with different oil weights, oil levels and air pressures (within the specified ranges). Refer to **Table 4** for recommended capacities and **Table 7** for air fork specifications.

Different terrain, rider weights and weather conditions can drastically alter the handling properties of the front suspension. The goal is to obtain the best combination of oil weight, oil level and air pressure necessary to achieve maximum traction and handling ease for each riding situation.

#### CAUTION

*Never exceed the adjustment ranges specified in **Table 7** or fork damage may occur.*

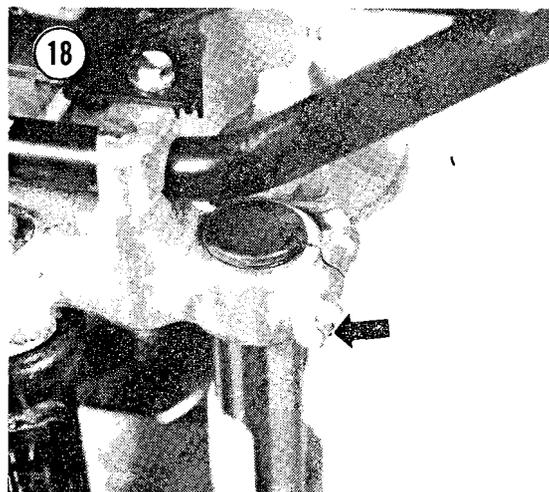
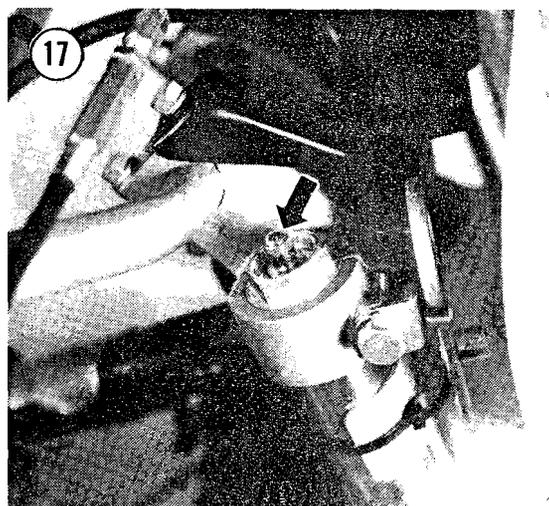
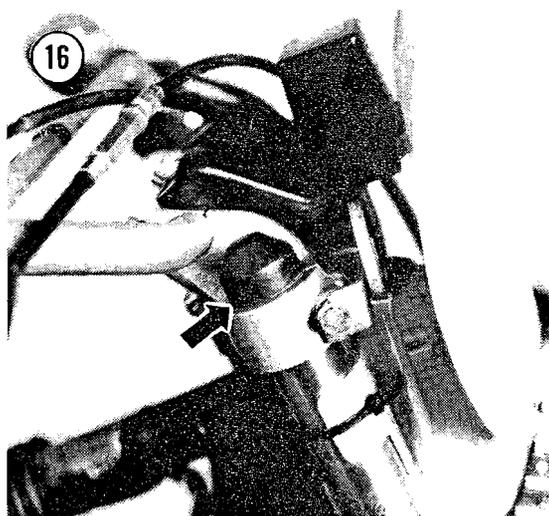
Keep the following points in mind when adjusting the front forks:

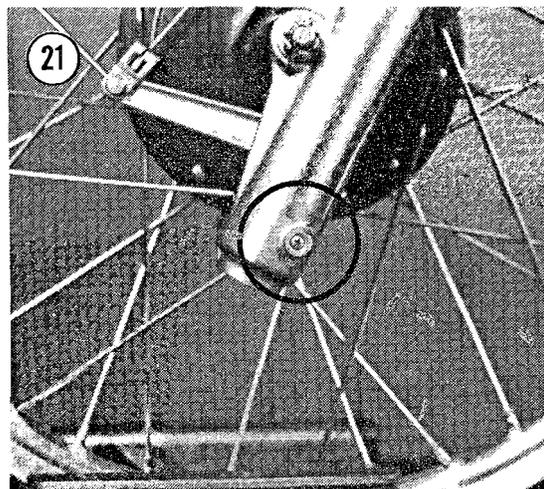
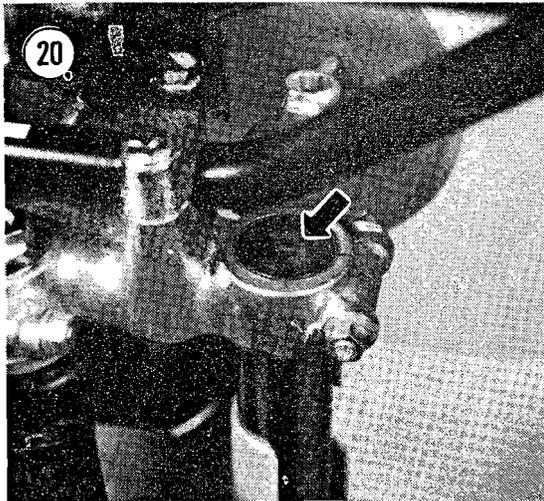
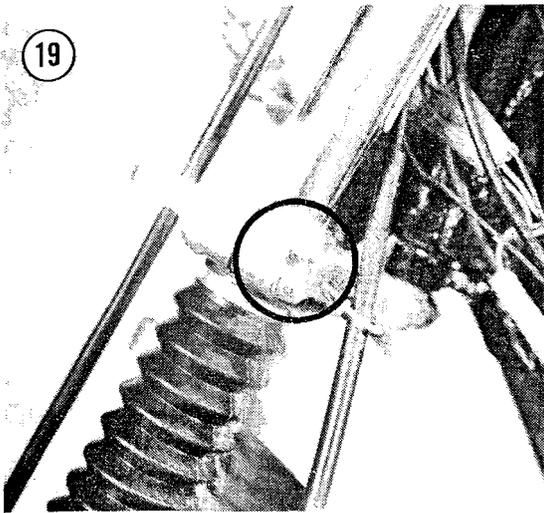
- a. Increasing or decreasing the air pressure (within the specified range) will raise or lower the over-all effective compression rate.
- b. Changing oil level (within the specified range) will alter the "shape" of the compression rate curve. The change is most noticeable in the second half of the fork tube travel.
- c. A change in the oil viscosity (oil weight) affects the damping or speed with which the fork tubes move.

If fork oil has been lost through a leaky seal, the forks must be drained, flushed and a new seal installed. Refer to Chapter Eight and perform *Front Forks, Inspection and Seal Replacement*.

#### Changing Oil

The following procedure describes how to change the fork oil with the forks still installed on the motorcycle. However, it is generally





easier to flush and accurately fill the forks (particularly on models with air forks), when both the fork tubes are removed from the motorcycle. If fork removal is desired refer to Chapter Eight.

1. Place the motorcycle on a stand such as a milk crate so the front wheel is clear of the ground.
2. Remove the rubber protection cap (**Figure 16**).
3. On models equipped with air caps remove the protective cap from the air valve (**Figure 17**) and gently bleed off the air pressure.

*NOTE*

*If you bleed off the fork air pressure too quickly you will squirt fork oil everywhere.*

4. Loosen the upper fork clamp bolt (**Figure 18**).
5. On models where the fork cap bolt will not clear the handlebars, perform the following:
  - a. Loosen the lower fork clamp bolts (**Figure 19**).
  - b. Slide the fork tubes out of the upper steering stem until there is sufficient room to remove the cap bolt.
  - c. Tighten the lower fork clamp bolts to secure the fork tubes in the lower steering stem.
6. Remove the cap bolt from the top of the fork tube. Use a 1/2 in. socket drive to remove the cap bolt on models equipped with a flush-mounted cap bolt (**Figure 20**).
7. Remove any spacers, if so equipped, and remove the fork springs.
8. Place a drain pan under each fork tube and remove the drain screw (**Figure 21**). Slowly pump each fork tube through several complete strokes to help pump out the old oil. Allow each fork to drain completely.
9. Temporarily install both drain screws and pour approximately 150 cc (5 oz.) of clean solvent in each fork tube.
10. Install the fork cap bolts finger-tight and pump each fork tube through several complete strokes. Remove the cap bolts and drain screws and drain the solvent. Allow several minutes for the solvent to drain completely.

11. Apply a small amount of blue Loctite (Lock 'N' Seal No. 2114) to each drain screw and install the drain screws.
12. On non-air forks, install the fork springs and add the specified amount of new fork oil (**Table 4**).
13. On models with air forks, perform the following:
  - a. Remove each fork tube or raise the rear of the motorcycle until the fork tubes are perfectly vertical. Compress the fork tubes completely.
  - b. Add the specified quantity of oil (**Table 4**) and slowly pump the tubes up and down to distribute the oil.
  - c. Fully compress the forks and measure the oil level from the fork tube seating surface. Use an accurate ruler or the Suzuki oil level gauge (part number 09943-74110) to ensure the oil level is as specified in **Table 7**. The fork springs must be removed when measuring the oil level.
  - d. Allow the oil to settle completely and recheck the measurement. Adjust the oil level if necessary.
  - e. Install the fork springs. Install the fork tubes if they were removed.
14. Install any spacers on the models so equipped and install the fork cap bolts. Torque the cap bolts as specified in **Table 6**.
15. Make sure the fork tubes are properly positioned in the upper and lower steering stems and torque the stem clamp bolts as specified in **Table 6**.
16. Pressurize the air forks.

### Pressurizing Air Forks

It is necessary to maintain proper air pressure in the forks to obtain the best possible performance and to prevent premature fork tube wear. The spring and air pressure support the weight of the motorcycle. The oil quantity and viscosity control the dampening rate.

Pressurizing the air forks is best performed with the Suzuki air gauge (part number 09940-44110) as shown in **Figure 23** and as described in Chapter One. This gauge allows air to be pumped into or bled from the fork tubes in a very precise manner. No pressure is lost from the fork tube when the gauge is removed.

#### NOTE

*If the Suzuki special gauge is not available, air pressure can be set reasonably accurately with the small air gauge supplied with the motorcycle (**Figure 24**). When using the small gauge make sure it is placed squarely on the air valve and removed quickly to prevent as much air loss as possible.*

1. Raise the front of the motorcycle off the ground.
2. Remove the rubber protection caps and the dust caps from the air valves (**Figure 25**).
3. If using the Suzuki special air gauge (**Figure 23**) perform the following:
  - a. Close the center valve on the air gauge.
  - b. Back out the stem on the end valve.
  - c. Carefully install the gauge on the air fork valve.
  - d. Screw in the end valve stem. This opens the gauge chamber to the fork tube.

#### NOTE

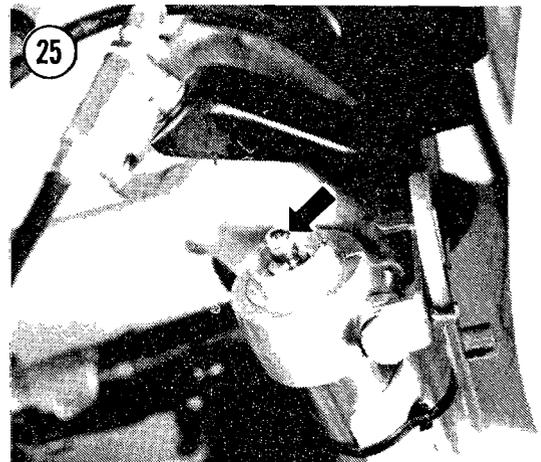
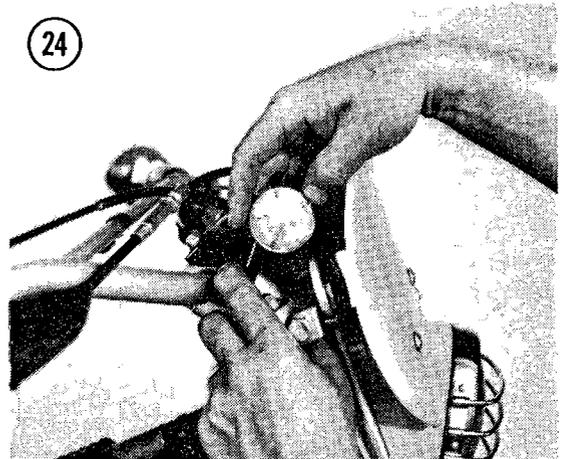
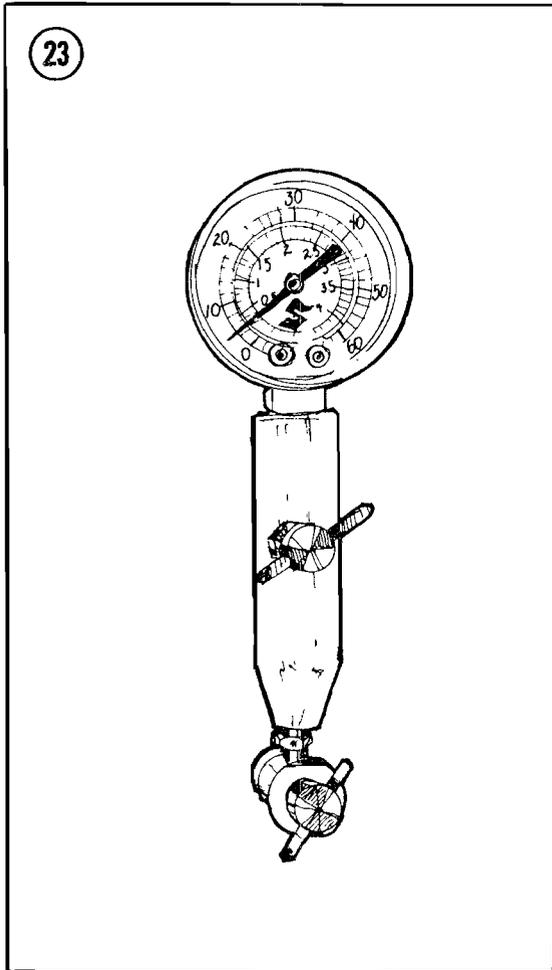
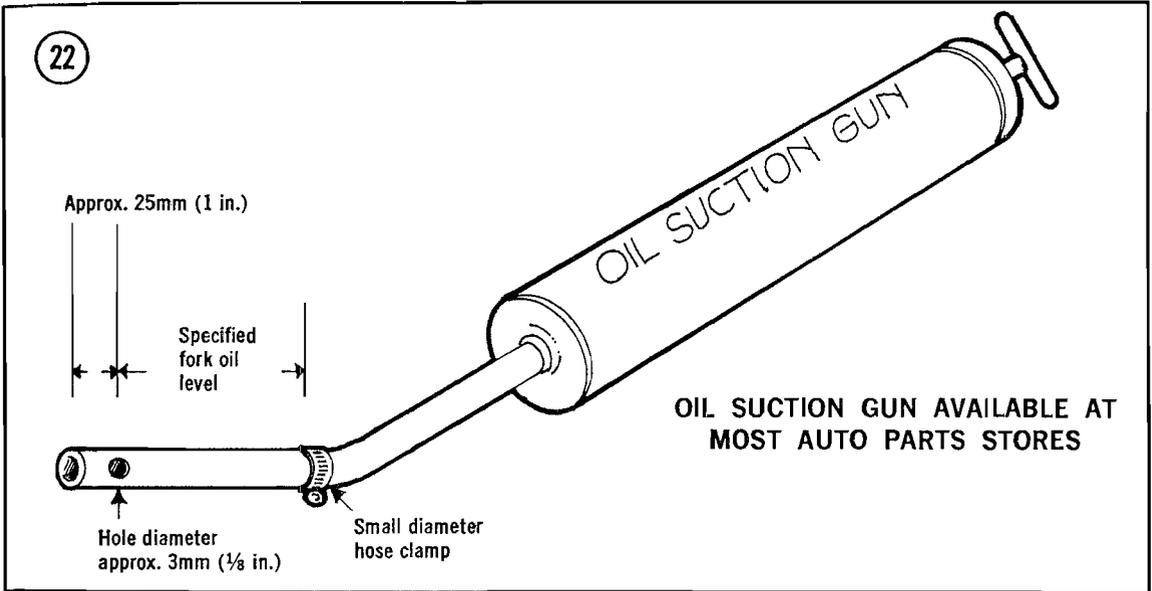
*Temporarily install the cap bolt or hold your hand over the fork tube to prevent the oil from pumping out when the tube is pumped up and down.*

#### CAUTION

*The oil level is critical and must not vary more than 1 mm (0.04 in.) between the right and left fork tubes or overstressing of the front axle may result. An overstressed front axle can be easily bent, leading to damaged fork tubes.*

#### NOTE

*An oil level measuring device can be fabricated as shown in **Figure 22**. Position the small hose clamp on the suction tube so that the specified oil level is between the clamp and the small hole in the tube. Fill each fork tube with a few cc's more than the required amount of oil. Position the hose clamp on the top edge of the fork tube and draw out the excess oil. Oil is sucked out until the level reaches the small diameter hole. - With this type of device a precise level for both fork tubes can be achieved.*



4. Connect a bicycle tire pump to the fork air valve or the center valve on the special air gauge.

**CAUTION**

*Never use a high pressure air supply to pressurize the air forks or the seals will be damaged. Use a hand-operated type bicycle pump for the best results.*

5. Pump up pressure in the fork tube to approximately 25 psi (1.8 kg/cm<sup>2</sup>).

**CAUTION**

*Do not exceed 35 psi (2.5 kg/cm<sup>2</sup>) or the fork seals may be damaged.*

6. Slowly bleed air from the fork tubes until the desired pressure is achieved. Refer to **Table 7**. Use the center valve on the special air gauge to bleed off the excess air pressure. Maximum allowable difference between fork tubes is 1.4 psi (0.1 kg/cm<sup>2</sup>).

7. Remove the special air gauge as follows:

- Close the center bleed valve.
- Back out the stem on the end valve.
- Carefully unscrew the gauge from the fork air valve.

8. Install the dust caps and the rubber protection caps.

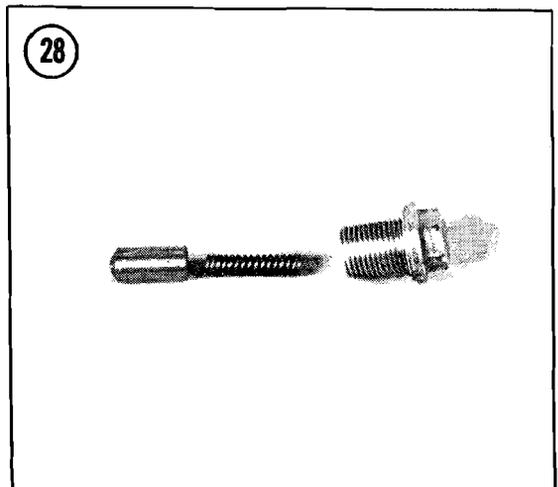
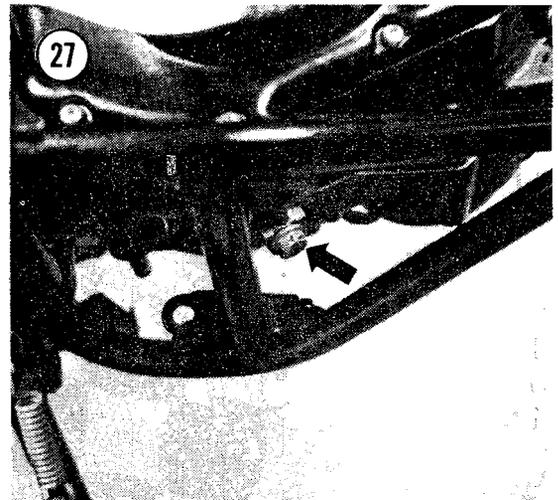
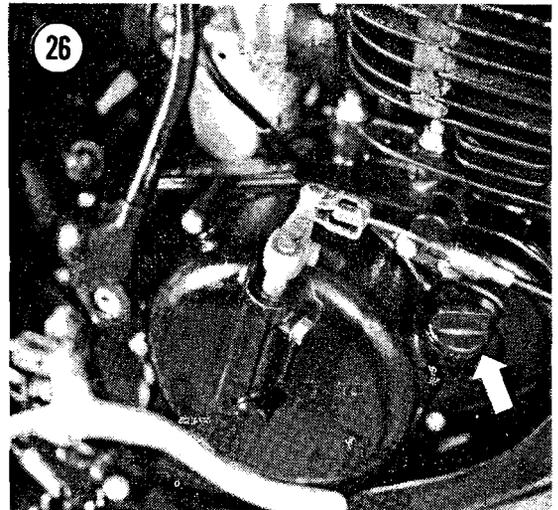
### TRANSMISSION OIL

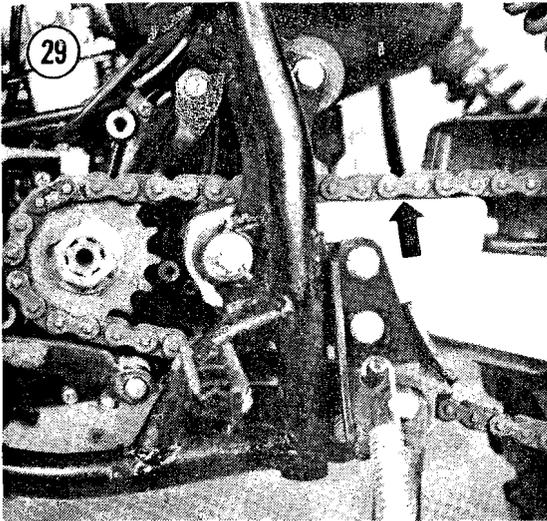
For proper operation and longevity, the clutch and transmission require clean oil. Oil should be changed at intervals suggested in **Table 1**. Refer to **Table 2** for recommended transmission oil and **Table 4** for transmission capacities.

**CAUTION**

*Never use a non-recommended oil such as ATF (automatic transmission fluid) in the transmission. The right-hand crankshaft bearing on most engines is lubricated by the transmission oil. Use of a non-recommended oil such as ATF may result in crankshaft bearing failure.*

1. Start the engine and warm it up thoroughly then stop the engine. Remove the oil fill plug (**Figure 26**).





3. Install the drain plug. Make sure the cam stopper and spring are also installed on the models so equipped.

4. Pour in the recommended type and quantity of oil and install the oil fill plug.

### CABLE LUBRICATION

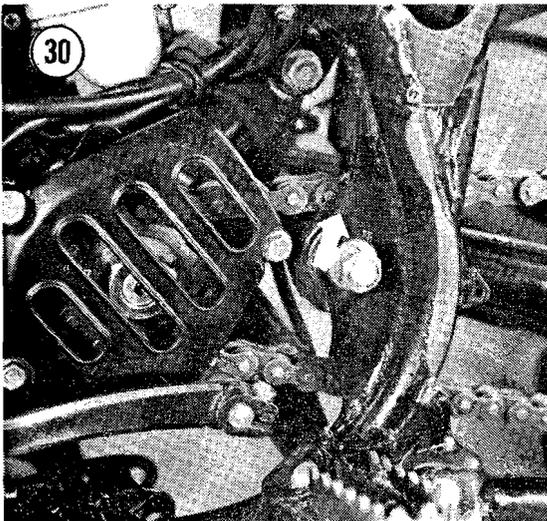
The clutch, brake and throttle cables should be lubricated and replaced at intervals recommended in **Table 1**. The cables should be frequently checked for kinks and signs of damage or wear that could cause them to fail or stick. Cables are expendable items. Replace any cable that is kinked or damaged in any way. A sticking cable can cause a loss of control resulting in a serious spill.

The most positive method of cable lubrication is achieved with a cable lubricator available from most motorcycle shops. Disconnect the cable at the control and attach the lubricator to the exposed end. Inject a cable lubricant with molybdenum disulfide into the outer cable until it runs out the other end. When lubricating the throttle cable in this manner, disconnect the cable from the carburetor as well as the throttle control.

If a special cable lubricator is not available a small funnel can be fabricated from stiff paper and taped to the end of the cable. Hold the cable upright and inject the lubricant into the funnel. Work the inner cable in and out to assist the lubricant down the entire length of the cable.

### DRIVE CHAIN BUFFERS

Routine inspection and replacement of the drive chain buffer is essential to prevent chain and swing arm damage. See **Figure 29** for all "T" and "X" models and **Figure 30** for all other models. A chain too loosely adjusted will cause excessive buffer wear and possible swing arm damage in a very short period of time. To replace the buffer it is necessary to remove the swing arm. Refer to *Swing Arm Removal* as outlined in Chapter Nine. Whenever the swing arm is removed for buffer replacement, carefully inspect and lubricate the swing arm bearings. Use a good grade of waterproof grease such as marine wheel bearing grease.



2. Place a drain pan under the engine. Use a socket and remove the transmission drain plug (**Figure 27**). Keep the motorcycle as level as possible and allow several minutes for the oil to drain completely.

#### NOTE

*On all but the PE250B, C, N models, the drain plug is also the gearshift cam stopper housing. Make sure the cam stopper and spring (**Figure 28**) are not lost in the oil drain pan. On PE250B, C, N models, use a 13/16 in. spark plug socket and remove the rearmost plug from the transmission to drain the oil.*

## DRIVE CHAIN GUIDE AND TENSIONER ROLLER SERVICING

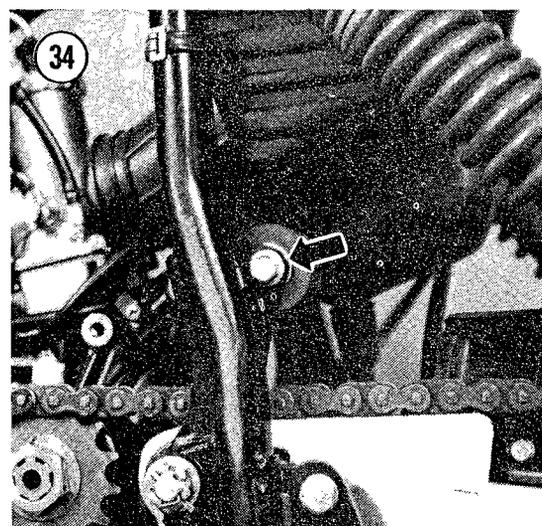
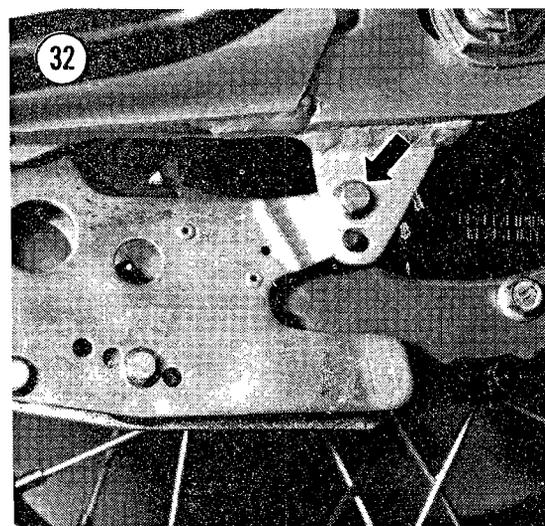
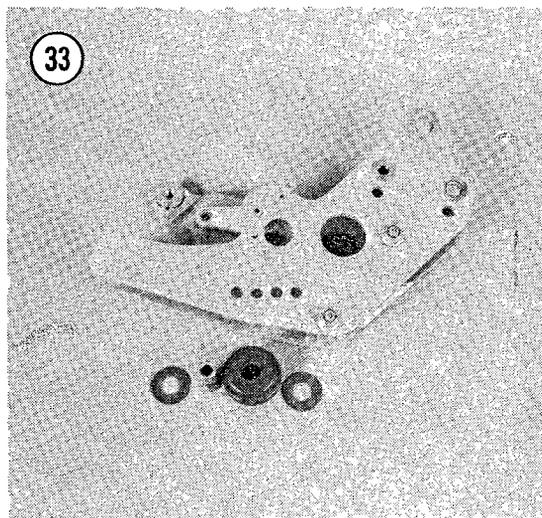
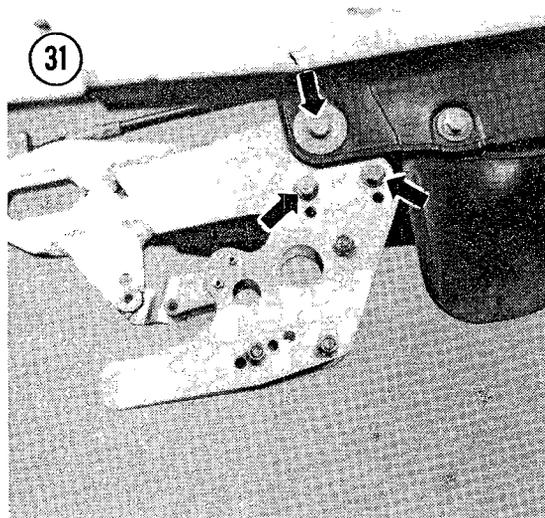
Proper care and maintenance of chain guide and tensioner rollers is necessary to obtain maximum service life of the components. All rollers are considered expendable and should be replaced at least as frequently as specified in **Table 1**. An improperly maintained roller may seize and cause chain and/or chain tensioner damage. Such damage could ultimately lead to a thrown chain.

### NOTE

Aftermarket rollers with sealed bearings are available at most dealers and motorcycle accessory shops. These replacement parts, while more expensive initially, usually have a demonstrated longer life than stock items.

### Removal/Installation (All "T" and "X" Models)

1. Remove the inner and outer bolts (Figures 31 and 32) securing the chain guide assembly to the swing arm and remove the assembly.

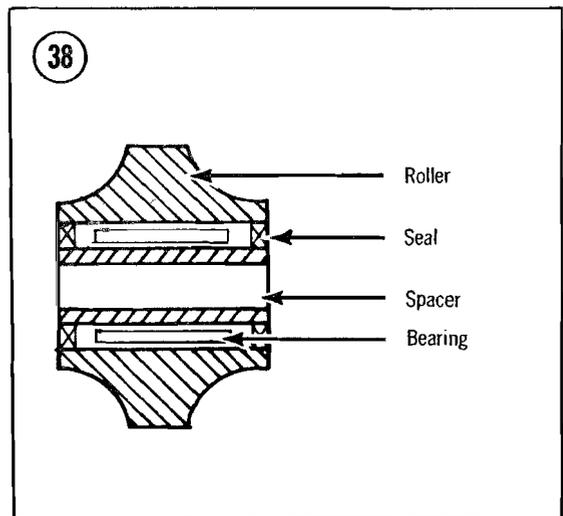
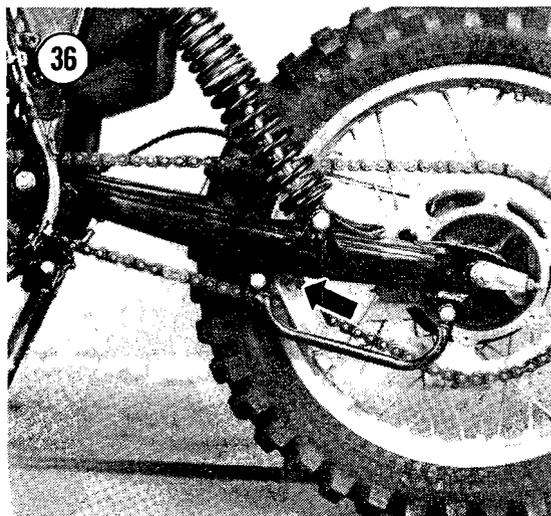
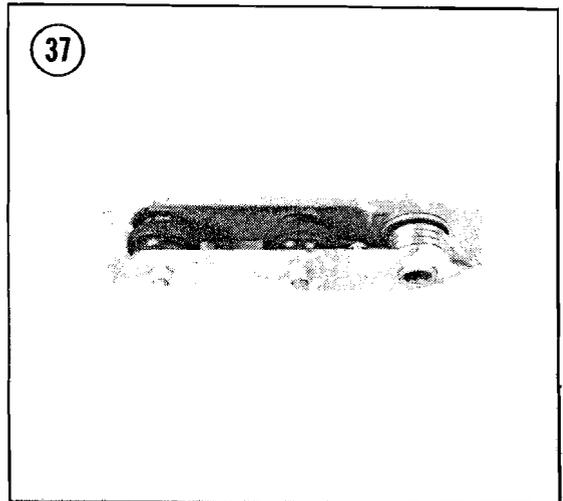
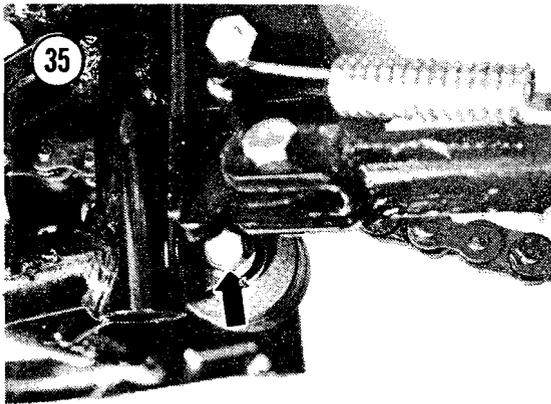


2. Remove the bolts securing the rollers to the chain guide assembly (Figure 33) and remove the rollers and flat washers.
3. Clean the rollers, spacers and washers in solvent. Examine the rollers and replace if worn excessively.
4. Install the rollers in the chain guide assembly and install the assembly.
5. Remove the bolts securing the upper and lower rollers (Figure 34 and Figure 35) and remove the rollers.
6. Clean the upper and lower rollers and mounting bolts in solvent and inspect them. If the rollers are still serviceable, lubricate the bolts with grease and install the rollers.

**Removal/Installation  
(All 1979 and Earlier Models)**

1. Remove the bolt securing the chain tensioner assembly to the swing arm (Figure 36). Disconnect the tensioner spring and remove the tensioner.
2. Remove the bolts securing each roller to the tensioner assembly and remove the rollers (Figure 37).
3. Refer to Figure 38 and remove the seals from the ends of each roller. Push out the center spacer and clean all the parts in solvent.

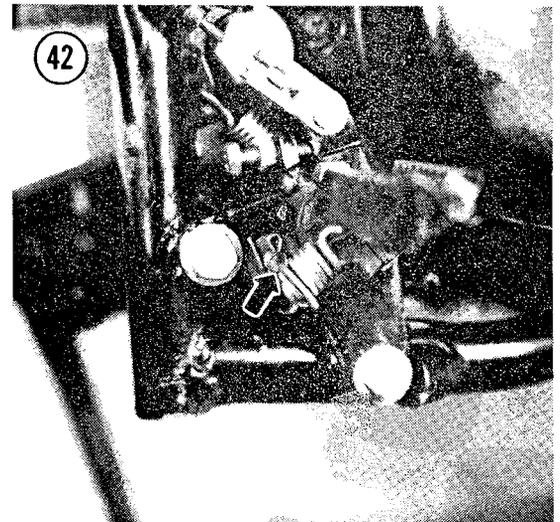
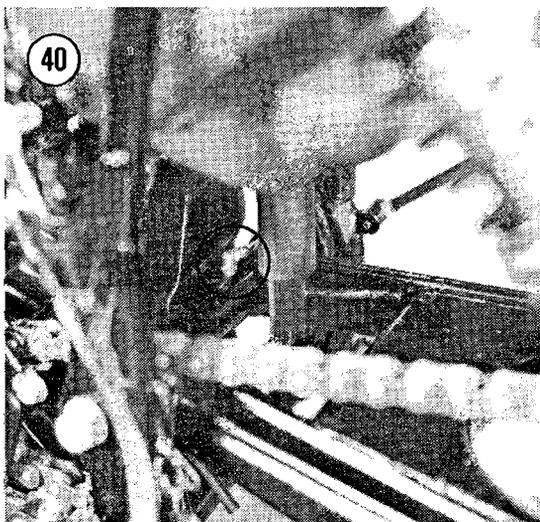
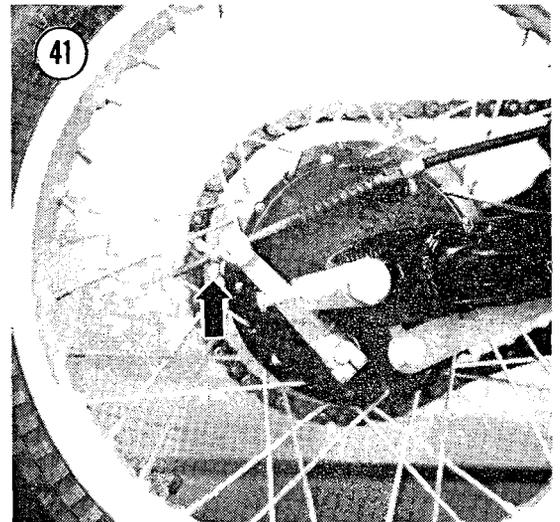
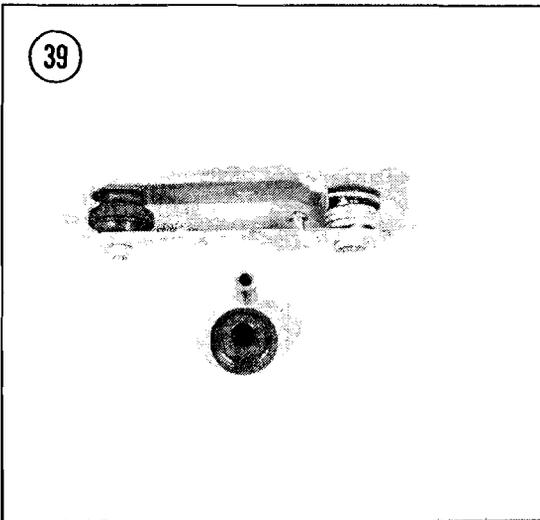
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## NOTE

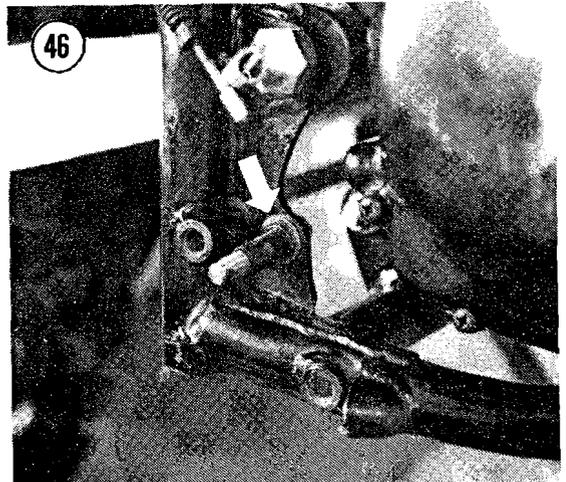
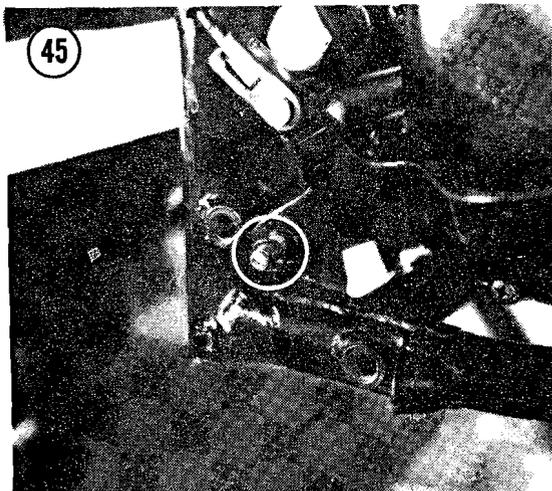
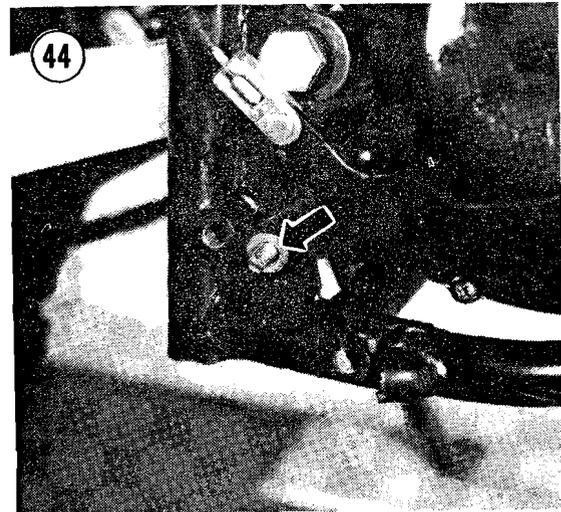
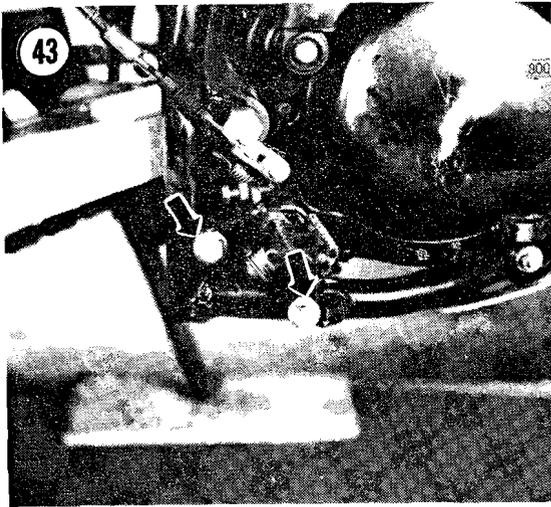
On PE175C models, frame number 103383 and subsequent, and on PE250C models, frame number 21827 and subsequent, an improved rubber roller with rubber seals is installed. All replacement parts available are of the new design. Earlier model rollers were equipped with spacers only (Figure 39).

4. Lubricate the spacer with grease and assemble the roller with the grooves in the seals facing out.
5. Install the rollers on the tensioner assembly or the chain guide.



## SWING ARM

The swing arm on most models is equipped with a grease fitting (Figure 40). Frequent lubrication of the swing arm bearings is vital to maintain the rear suspension in peak condition. Use a good grade of waterproof grease such as boat trailer wheel bearing grease in a grease gun and pump several shots of grease into the swing arm at least every 2 races, more frequently if the motorcycle has been run in mud and water. Do not forget to lubricate the swing arm after each trip to the coin-operated car wash.



To clean and examine the swing arm bearings, refer to *Swing Arm Removal* as outlined in Chapter Nine. Clean, inspect and lubricate the bearings while they are still installed in the swing arm. The bearings are usually destroyed when they are removed.

### BRAKE PEDAL LUBRICATION

Routine lubrication of the brake pedal pivot will prevent excessive wear and ensure smooth operation of the rear brake.

1. Remove the rear brake adjuster nut (Figure 41) and disconnect the brake cable from the brake arm.
2. On all "T" and "X" models perform the following:
  - a. Remove the cotter pin and washer securing the brake pedal to the footpeg bracket (Figure 42).
  - b. Remove the 2 bolts securing the right footpeg and remove the footpeg (Figure 43). Disconnect and remove the pedal return spring.
  - c. Remove the flat washer (Figure 44) and O-ring (Figure 45) from the pedal shaft.
  - d. Disconnect the cable end from the brake pedal and slide the pedal off the shaft. Make sure that the inner O-ring and flat washer are not lost (Figure 46).
3. On all 1979 and earlier models perform the following:
  - a. Remove the circlip inside the frame

securing the pedal to the pedal bracket (**Figure 47**).

- b. Unhook the return spring from the pedal (**Figure 48**) and disconnect the cable end. Slide the pedal out of the frame.
4. Thoroughly clean and inspect all the brake pedal components. Replace any damaged O-rings or metal parts worn excessively.
  5. Lubricate the brake pivot with a good grade of heavy grease such as marine wheel bearing grease.
  6. Installation is the reverse of these steps. Keep the following points in mind:
    - a. Ensure that the O-rings and flat washers are properly positioned on all "T" and "X" models.
    - b. On all earlier models, secure the brake pedal with a new circlip if possible. Close the circlip with pliers after installation to prevent its possible loss due to vibration.

### KICKSTARTER LEVER

The pivot point in the kickstarter lever should be disassembled, cleaned and greased at least as frequently as specified in **Table 1**. Use a good grade of waterproof grease such as boat trailer wheel bearing grease.

1. Remove the kickstarter lever assembly. On "T" models, remove the bolt in the end of the shaft (**Figure 49**). On all other models, completely remove the pinch bolt (**Figure 50**).
2. Slide off the rubber boot.
3. Refer to **Figure 51** and remove the circlip securing the lever to the pivot joint.
4. Slide the assembly apart. Take care not to lose the 2 steel balls and spring.
5. Thoroughly clean all the parts in solvent.
6. Liberally grease the pivot joint and reassemble the lever assembly.
7. Install the rubber boot over the pivot joint.

#### NOTE

Use 2 rubber boots (one over the other) to ensure a tight seal and help prevent looseness in the pivot joint.

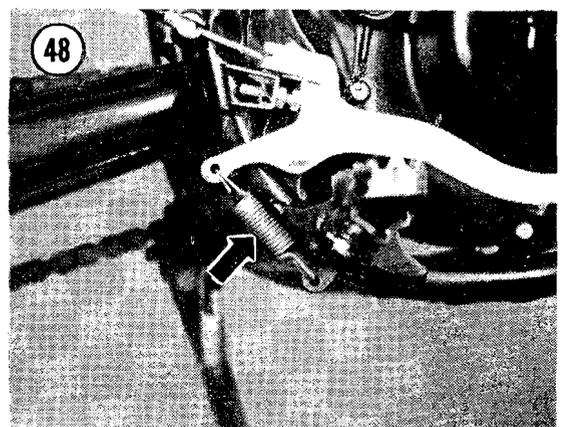
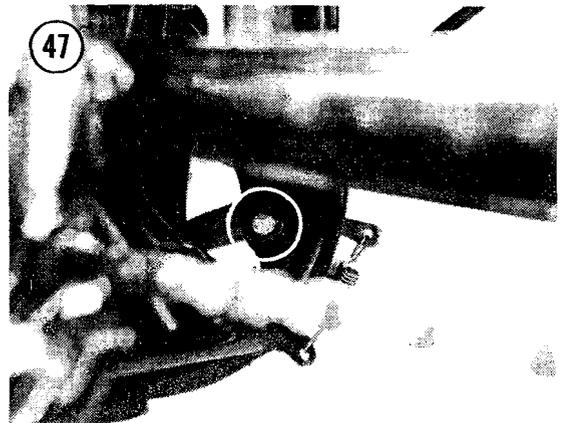
### CLUTCH ADJUSTMENT

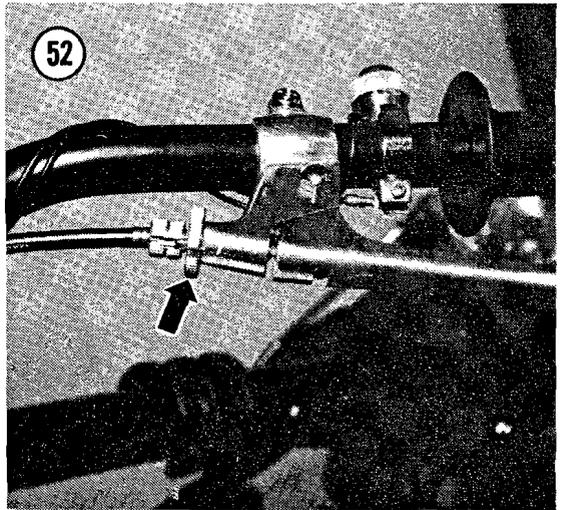
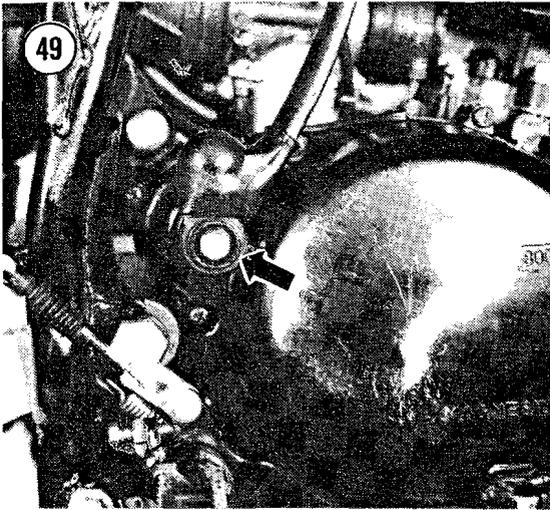
#### CAUTION

On PE250T, X and PE400 models, perform the **Clutch Internal Adjustment** as outlined in Chapter Five. Clutch

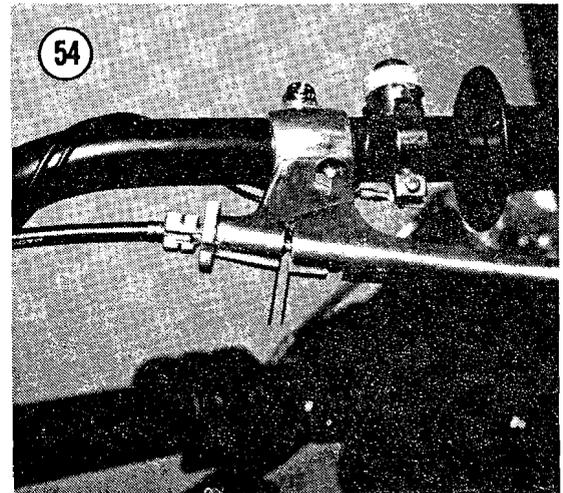
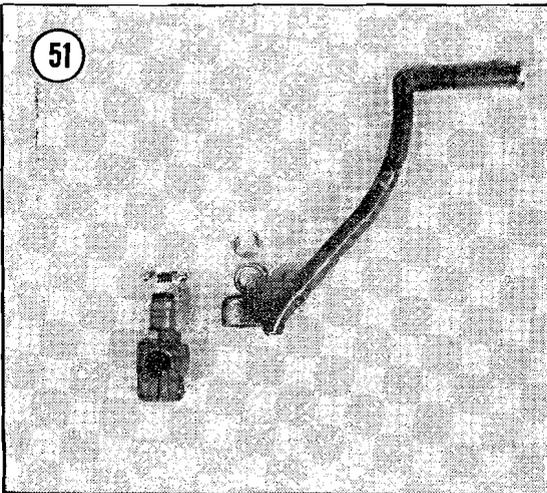
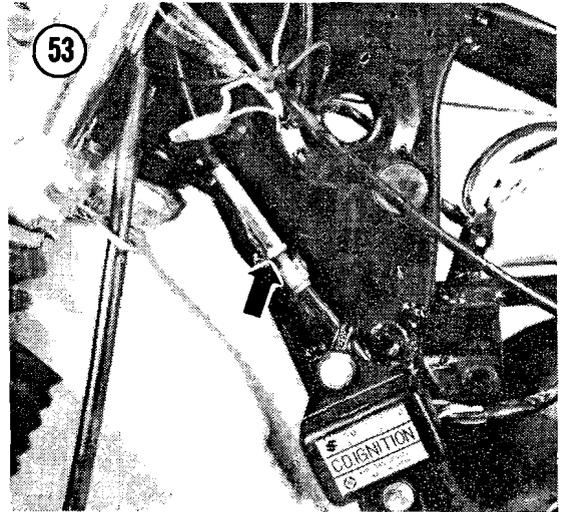
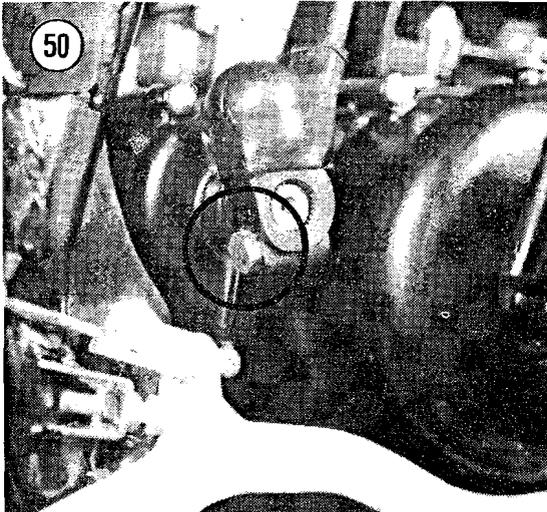
damage could result if the internal adjustment is incorrect. Once the internal adjustment is correct, it should need only occasional attention.

1. Loosen the large knurled locknut (**Figure 52**) on the clutch lever and turn the adjuster in all the way.
2. Loosen the locknut securing the main cable adjuster (**Figure 53**).
3. Rotate the cable adjuster until all slack is removed from the cable.
4. Slowly back off the adjuster until there is 4 mm (1/8 in.) of free play measured at the clutch lever as shown in **Figure 54** for all but PE175T models. For PE175T models set the cable free play at 2-3 mm (1/16-3/32 in.).
5. Future clutch adjustments can be made at the clutch lever until, due to clutch wear and cable stretch, it is necessary to readjust the free play at the main cable adjuster.





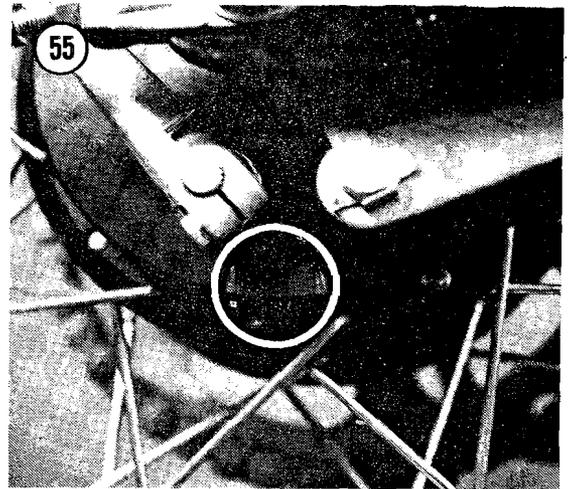
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## BRAKE ADJUSTMENT

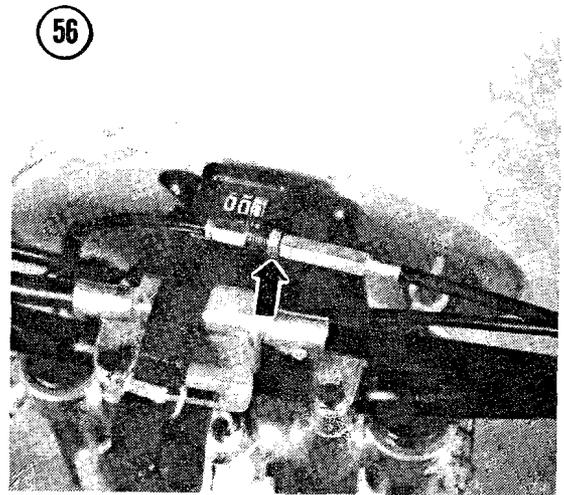
Frequently check front and rear brake cables for kinks or damage and replace them if necessary. Make sure both brakes operate smoothly and release completely. The brake adjustments outlined in the following procedures are recommended for most riders, however, brake adjustment on competition motorcycles is largely a matter of personal preference.

When the brakes are actuated, check the brake limit indicators embossed on each brake backing plate (**Figure 55**). If either brake arm operates past the limits on the backing plate, the brake shoes need to be replaced; refer to Chapter Ten.



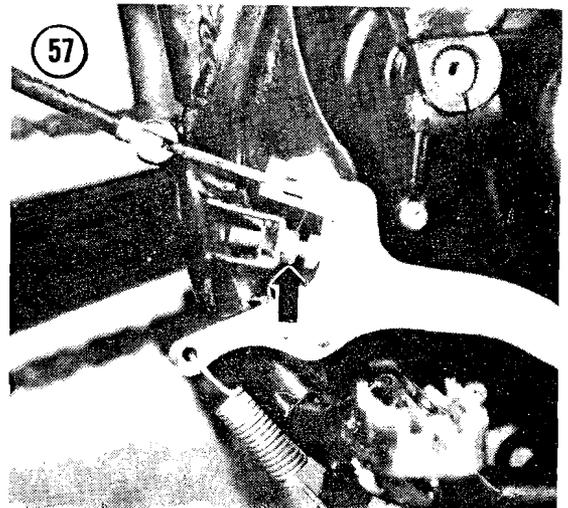
### Front Brake

1. Loosen the large knurled locknut on the brake lever and turn the adjuster in all the way.
2. Loosen the locknut securing the main brake cable adjuster (**Figure 56**).
3. Turn the cable adjuster until there is approximately 20-30 mm (13/16 - 1-3/16 in.) measured between the brake lever and the hand grip when the brake is fully applied. Tighten the locknut to secure the cable adjuster.



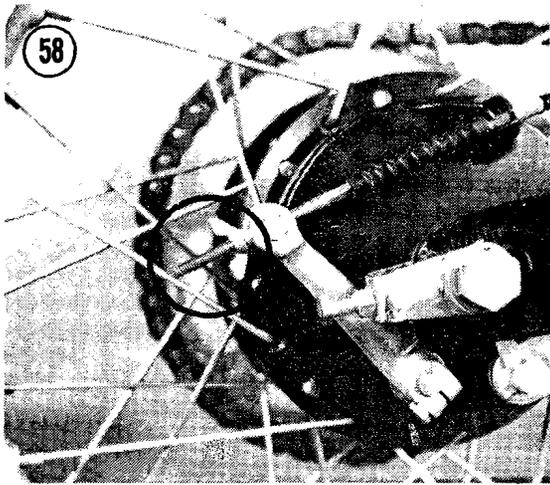
### Rear Brake

1. Loosen the locknut securing the pedal return stop bolt (**Figure 57**). Adjust the stop bolt until the pedal is in a comfortable position relative to the foot peg. Tighten the locknut securing the stop bolt.
2. Adjust the rear brake adjustment hex or wing nut (**Figure 58**) until the brake pedal moves approximately 20-30 mm (13/16-1-3/16 in.) when the brake is fully applied.



## SPARK PLUGS

The proper spark plug is very important in obtaining maximum performance and reliability. The condition of a used spark plug can tell much about engine condition and carburetion.



The proper heat range for the spark plug is very important. An incorrect heat range plug may cause a loss of performance or engine damage. The correct heat range is determined by the requirement that the plug operate hot enough to burn off unwanted deposits, but not so hot that it burn itself or cause preignition. **Figure 59** illustrates the construction differences in cold and hot type spark plugs. Refer to **Table 8** for recommended spark plugs.

**Removal/Installation**

1. Use compressed air, if available, or a brush and remove the dirt and grit from around the area of the spark plug to prevent any foreign material from entering the cylinder.
2. Grasp the spark plug cap and remove the cap from the spark plug.

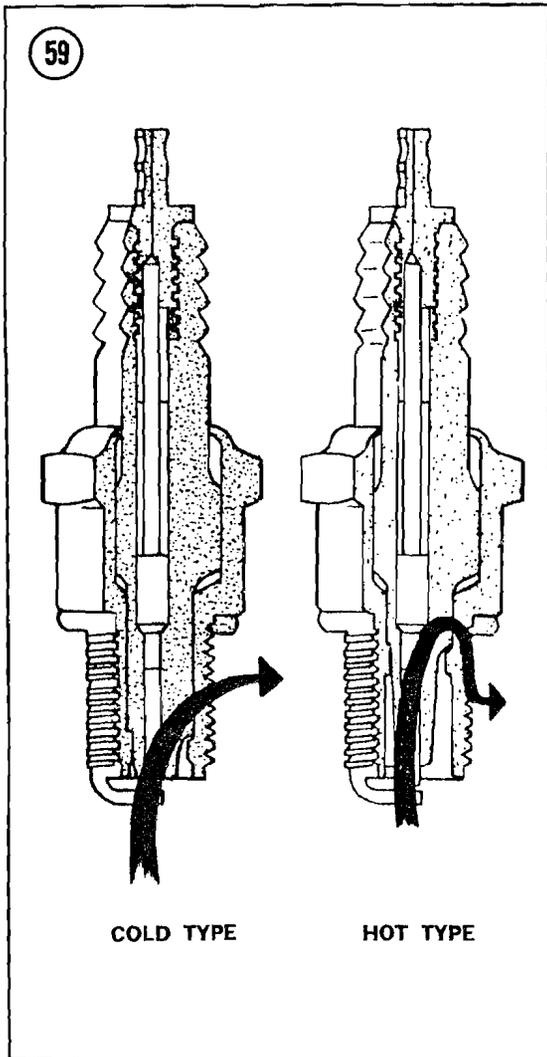
*CAUTION*

*Never pull on the spark plug lead itself or the plug lead may be damaged.*

3. Use a 13/16 in. spark plug socket or the PE tool and remove the spark plug. Compare the condition of the plug to **Figure 60**. Replace the plug if there is any doubt as to its serviceability. If the plug appears abnormal, refer to the following descriptions to determine the reason for the abnormal condition.
4. If the spark plug is serviceable, file the center electrode square and measure the gap with a round wire spark plug gauge as shown in **Figure 61**. Adjust the gap, if necessary, by bending the outer electrode only. The correct gap is 0.5-0.6 mm (0.020-0.024 in.). Always check the gap on all new plugs as well.

*CAUTION*

*Always use spark plugs recommended in **Table 8** to ensure that the plug has the correct thread reach. A thread reach too short will cause the exposed threads in the cylinder head to accumulate carbon, resulting in stripped cylinder head threads when the proper plug is installed.*

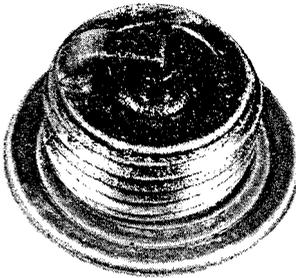


SPARK PLUG CONDITIONS

60



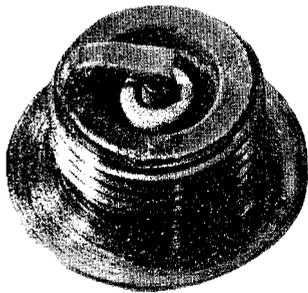
NORMAL USE



OIL FOULED



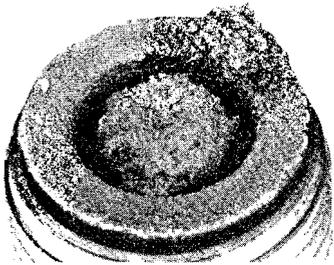
CARBON FOULED



OVERHEATED



GAP BRIDGED

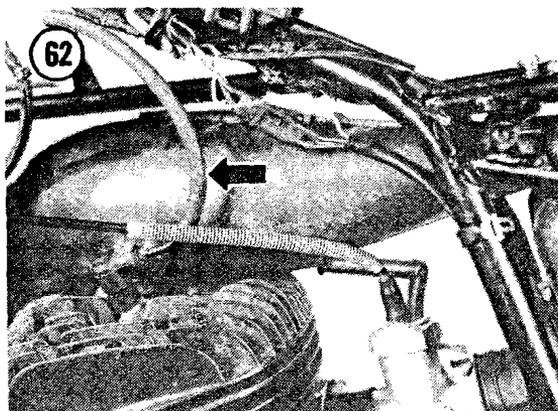
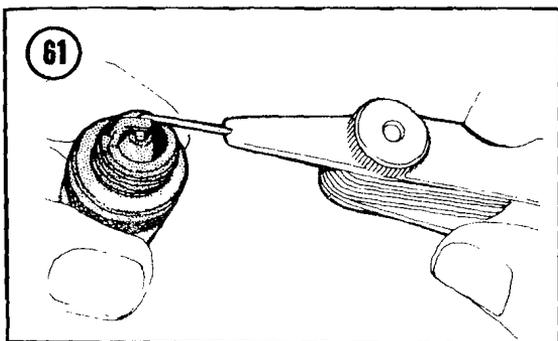


SUSTAINED PREIGNITION



WORN OUT

Photos courtesy of Champion Spark Plug Company.



5. Make sure the seating area on the cylinder head is clean. Use a new gasket on used spark plugs if the gaskets are available. Install the plug finger-tight and then tighten an additional 1/4-1/2 turn. If a torque wrench is available, torque the plug to 2.5-3.0 mkg (18-22 ft.-lb.).

6. When installing the spark plug lead make sure the cap snaps securely over the end of the plug and that the lead is positioned clear of the exhaust pipe as shown in **Figure 62**.

### Normal Condition

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

### Carbon Fouled

Soft, dry, sooty deposits are evidence of incomplete combustion and can usually be attributed to "rich" carburetion. This

condition can also be caused by weak ignition, retarded timing, or low compression. A carbon fouled plug can usually be cleaned and reused, but the condition causing the fouling must be corrected.

### Oil Fouled

An oil fouled plug exhibits a black insulator tip, damp oily film over the firing end, and a carbon layer over the entire nose. Electrodes will not be worn. Common causes for this condition are shown in **Table 9**.

An oil fouled spark plug may be cleaned and reused in an emergency, however, it is better to replace it. It is important to correct the cause of the oil fouling before the engine is run again.

### Gap Bridging

A spark plug with this condition exhibits a gap shorted out by combustion chamber deposits between the electrodes. If this condition is encountered, check for an improper fuel/oil mixture or a clogged exhaust. Be sure to locate and correct the cause of this spark plug condition. A gap bridged plug must be replaced.

### Overheated

Overheated spark plugs exhibit burned electrodes. The insulator tip will be light gray or even chalk white. The most common cause for this condition is using a spark plug of the wrong heat range (too hot). If it is known that the correct plug is being used, other causes are: lean fuel mixture, engine overloading or lugging, loose carburetor mounting, or timing advanced too far. Always correct the fault before putting the bike back into service. Such plugs cannot be salvaged; replace them with new ones.

### Worn Out

Corrosive gases formed by combustion and high voltage sparks have eroded the electrodes. Spark plugs in this condition require more voltage to fire under hard acceleration, often more than the ignition system can supply. Replace worn out plugs with new ones of the same heat range.

## Preignition

If the electrodes are melted, preignition is almost certainly the cause. Check for carburetor mounting or intake air leaks as well as over-advanced ignition timing. It is also possible that a plug of the wrong heat range (too hot) is being used. Find the cause of preignition before placing the engine back into service. Refer to **Table 8** for recommended spark plugs.

## IGNITION TIMING

All PE models are equipped with PEI (pointless electronic ignition). The absence of breaker points makes the ignition system much less susceptible to failures caused by dirt and moisture.

The ignition timing is preset and does not need routine adjustments. The timing should only need to be set if the ignition stator assembly has been removed for engine repair or ignition repair. The flywheel must be removed before the timing can be set. Refer to *Stator Assembly, Removal/Installation* as outlined in Chapter Seven to perform ignition timing.

## CARBURETOR

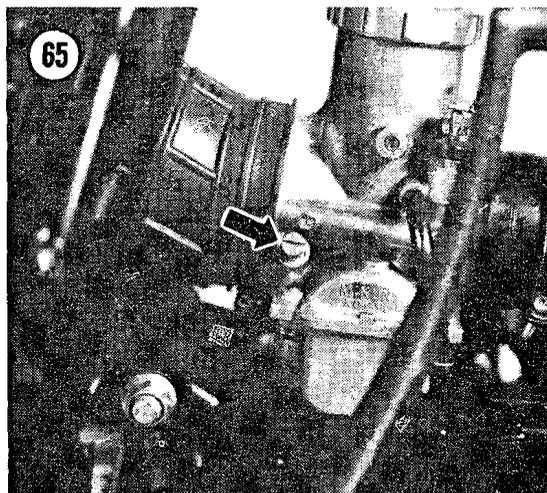
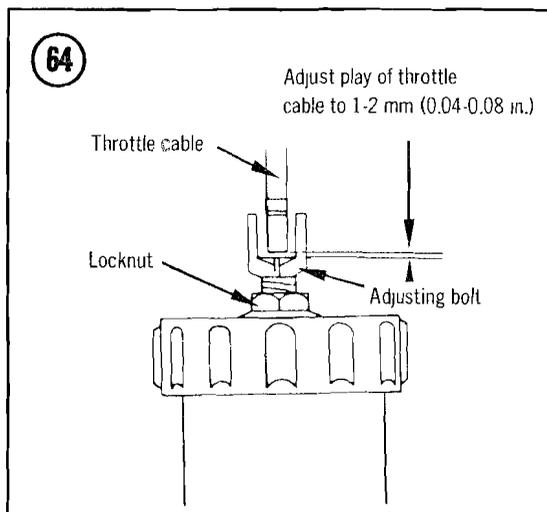
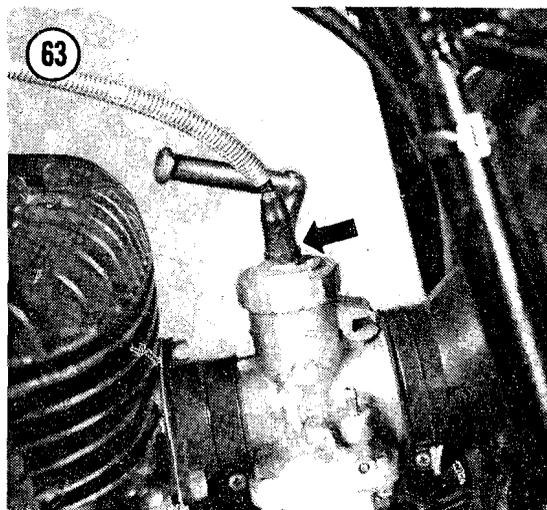
Carburetor adjustments should only be made when the engine is fully warmed up and after the spark plug and float level have been checked and properly set. Set the float level as outlined in Chapter Six.

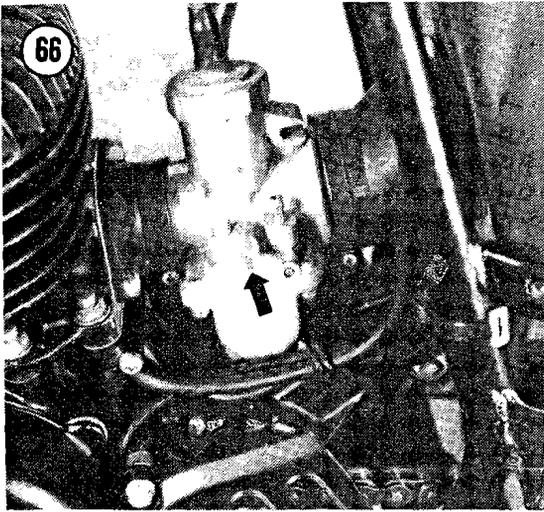
### Throttle Cable Adjustment

1. Pull back the rubber boot covering the cable adjuster (**Figure 63**).
2. Loosen the locknut securing the cable adjuster. Turn the adjuster until there is approximately 1-2 mm (0.04-0.08 in.) of free play in the throttle cable (**Figure 64**).
3. Tighten the locknut securing the adjuster and cover the adjuster with the rubber boot.

### Pilot Air Screw Adjustment

1. Carefully turn in on the pilot air screw (**Figure 65**) until it just bottoms out. Do not tighten the screw or it will be damaged.





Adjust the idle screw (Figure 66) for the smoothest possible idle consistent with even firing.

### Speed Range (Main Jet) Adjustments

To obtain maximum performance, it is necessary to frequently check the jetting of the carburetor. Changes in temperature, humidity, and altitude can noticeably affect engine performance. It is suggested that the jetting be checked before each competition event.

#### CAUTION

*A too lean mixture caused by running a too small main or pilot jet can cause serious engine damage in a matter of seconds. When attempting to determine proper jetting always start out rich and progress toward a more lean mixture, one step at a time. The engine must be at full operating temperature achieved by riding hard for approximately 5 minutes. Attempting to jet an engine not up to temperature can result in a too lean mixture when the engine reaches full operating temperature.*

2. Back the screw out the number of turns specified in Table 10.

3. Start and warm up the engine to operating temperature. Adjust the pilot air screw in or out approximately 1/4 turn to obtain smooth acceleration without any hesitation when the throttle is applied.

### Idle Speed Adjustment

If the machine is used primarily for racing, it is recommended that the idle speed adjustment screw be backed out enough to prevent an idle. If the engine is set to idle, the throttle may not back off sufficiently on deceleration to provide adequate engine braking. An engine set to idle may also hesitate slightly on throttle application due to a momentarily richer mixture.

If the machine is used mainly for trail or sport riding, an idle is usually desirable.

Make several high speed runs for at least 5 minutes. Stop the engine with the kill button while still under nearly full throttle. Pull in on the clutch lever and coast to a stop. Remove and examine the spark plug after each test. The insulator should be a light tan color.

If spark plug examination shows that the mixture is too lean, try a main jet with a higher number. Conversely, if the mixture appears too rich, use a smaller jet. As a general rule, the main jet should be reduced approximately 5 percent for each 3,300 feet above sea level.

*Tables are found on the following pages.*

Table 1 MAINTENANCE AND LUBRICATION  
SCHEDULE (See Notes)

Piston rings	
All models	Replace every 2 races
Transmission oil	
All "T" and "X" models	Change every 3 races
All other models	Change every 2 races
Engine sprocket	
All "T" and "X" models	Replace every 5 races
All other models	Replace every 10 races
Drive chain	
All models	Lubricate and adjust before each race
All "T" and "X" models	Replace every 3 races
All other models	Replace every 5 races
Drive chain buffer	
All "N" models	Replace every 2 races
All other models	Replace every 5 races
Drive chain guide rollers	
All "T" and "X" models	Replace every 3 races
All other models	Replace every 2 races
Front fork oil	
All "T" and "X" models	Change every 3 races
All other models	Change every 5 races
Rear sprocket	
All "T" and "X" models	Replace every 3 races
All other models	Replace every 5 races
Spoke nipples	
All models	Tighten before each race
Air cleaner	
All models	Clean before each race
Kickstarter lever	
All "B" and "C" models	Grease pivot every 2 races
All other models	Grease pivot before every race
Control cables	
All models	Lubricate and adjust before each race
All frame and engine fasteners	Replace every 5 races
All models	Retighten before every race
Swing arm bearings	
All models	Lubricate every 2 races
Spark plug	
All models	Clean and check before every race
All models	Replace every 10 races
Piston	
All models	Replace every 5 races
<b>NOTES</b>	
1. This maintenance schedule is based on the minimum maintenance requirements as specified by Suzuki. Harder than normal use as well as exposure to mud, water, sand, etc., will naturally dictate more frequent attention to most maintenance items.	
2. Each race equals approximately 100 km (60 miles).	

Table 2 RECOMMENDED FUEL AND LUBRICANTS

Fuel	Premium (at least 95 octane)
Engine oil	Suzuki CCI Super 2-cycle motor oil Castrol Racing Oil R-30 Golden Spectro synthetic blend Shell Super M B.P. Racing Oil
Transmission oil	SAE 20W/40 motor oil
Fork oil	SAE 5W, 10W or 20W fork oil or A.T.F. (automatic transmission fluid)

Table 3 FUEL AND OIL MIXTURE RATIO—20:1\*

Gasoline	Oil	Gasoline	Oil
Liters	cc	U.S. qt.	U.S. oz.
0.5	25	0.5	0.8
1.0	50	1.0	1.6
1.5	75	1.5	2.4
2.0	100	2.0	3.2
2.5	125	2.5	4.0
3.0	150	3.0	4.8
3.5	175	3.5	5.6
4.0	200	4.0	6.4
4.5	225	4.5	7.2
5.0	250	5.0	8.0
5.5	275	5.5	8.8
6.0	300	6.0	9.6
6.5	325	6.5	10.4
7.0	350	7.0	11.2
7.5	375	7.5	12.0
8.0	400	8.0	12.8
8.5	425	8.5	13.6
9.0	450	9.0	14.4
9.5	475	9.5	15.2
10.0	500	10.0	16.0

\*NOTE: If gasoline is measured in liters, oil must be measured in cc's. If gasoline is measured in U.S. quarts, oil must be measured in U.S. ounces.



Table 4 CAPACITIES

<b>Fuel tank</b>			
PE250B, C; PE175C	12 liters	3.2 U.S. gal.	2.6 Imp. gal.
PE175N; PE250N	11.5 liters	3.0 U.S. gal.	2.5 Imp. gal.
PE175T, X; PE250T, X; PE400	10.6 liters	2.8 U.S. gal.	2.3 Imp. gal.
<b>Transmission oil</b>			
<b>Oil change</b>			
PE175C, N, T, X	800 cc	1.7 U.S. pt.	1.4 Imp. pt.
PE250B, C, N	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
PE250T, X; PE400	800 cc	1.7 U.S. pt.	1.4 Imp. pt.
<b>After overhaul</b>			
PE175C, T, X	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
PE175N	850 cc	1.8 U.S. pt.	1.5 Imp. pt.
PE250B, C, N	950 cc	2.0 U.S. pt.	1.7 Imp. pt.
PE250T, X; PE400	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
<b>Front forks</b>			
PE250B	243 cc	8.2 U.S. oz.	8.6 Imp. oz.
PE175C, N; PE250C, N	274 cc	9.3 U.S. oz.	9.6 Imp. oz.
PE175T, X; PE250T, X; PE400	308 cc	10.4 U.S. oz.	10.8 Imp. oz.
<b>After overhaul</b>			
PE175C, T, X	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
PE175N	850 cc	1.8 U.S. pt.	1.5 Imp. pt.
PE250B, C, N	950 cc	2.0 U.S. pt.	1.7 Imp. pt.
PE250T, X; PE400	900 cc	1.9 U.S. pt.	1.6 Imp. pt.
<b>Front forks</b>			
PE250B	243 cc	8.2 U.S. oz.	8.6 Imp. oz.
PE175C, N; PE250C, N	274 cc	9.3 U.S. oz.	9.6 Imp. oz.
PE175T, X; PE250T, X; PE400	308 cc	10.4 U.S. oz.	10.8 Imp. oz.

Table 5 CHAIN ADJUSTMENT \*

Model	mm	in.
PE175C, N	50-60	2-2 3/8
PE175T, X	25-35	1-1 3/8
PE250B	40-45	1 5/8-1 13/16
PE250C, N	50-60	2-2 3/8
PE250T, X; PE400	30-40	1 3/16-1 5/8

\* Measure chain deflection halfway between the front and rear sprockets.

Table 6 ENGINE AND FRAME TORQUE SPECIFICATIONS

Item	mkg	ft.-lb.
<b>Cylinder head nut</b>		
PE250B, C	1.9-2.5	14-18
PE175C, N; PE250N	2.3-2.7	17-20
PE175T, X; PE250T, X; PE400	2.0-2.5	15-18
<b>Drive sprocket nut</b>		
All models	4.0-6.0	29-43
<b>Engine mount bolts</b>		
10 mm	4.5-5.5	33-41
8 mm	2.5-3.2	18-23
<b>Spark plug</b>		
	2.5-3.0	18-22
<b>Front axle nut</b>		
PE250B, C	4.5-5.2	33-38
PE175C, N; PE250N	3.6-5.2	26-38
PE175T, X; PE250T, X; PE400	3.6-5.2	26-38

(continued)

Table 6 ENGINE AND FRAME  
TORQUE SPECIFICATIONS (continued)

Item	mkg	ft.-lb.
Upper front fork clamp bolts		
PE250B, C	2.0-2.5	15-18
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	2.0-3.0	15-22
Lower front fork clamp bolts		
PE250B, C	2.0-2.5	15-18
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	1.5-2.5	11-18
Front fork cap bolt		
PE250B, C, N; PE175C, N	3.5-5.0	26-36
PE175T, X; PE250T, X; PE400	1.5-3.0	11-22
Steering stem pinch bolt		
PE250B	2.0-2.5	15-18
PE250C	1.5-2.3	11-17
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	1.5-2.5	11-18
Steering stem head bolt		
PE250B, C	4.5-5.5	33-40
PE250N	3.5-5.5	26-40
PE175C, N	3.5-5.0	26-36
PE175T, X; PE250T, X; PE400	3.5-5.0	26-36
Handlebar clamp bolt		
PE250B, C	1.6-2.0	12-15
PE175C, N; PE250N	1.2-2.0	9-15
PE175T, X; PE250T, X; PE400	1.2-2.0	9-15
Swing arm pivot bolt		
PE250B, C	6.5-8.0	47-58
PE175C	3.0-4.5	22-33
PE175N	4.5-7.0	33-51
PE250N	5.0-8.0	36-58
PE175T, X; PE250T, X	4.5-7.0	33-51
PE400	5.0-8.0	36-58
Shock absorber nut		
PE250B, C; PE175C	2.5-3.0	18-22
PE175N; PE250N	2.0-3.0	15-22
PE175T, X; PE250T, X (right side)	1.5-2.5	11-18
PE175T, X; PE250T, X (left side)	2.0-3.0	15-22
PE400	1.0-1.5	8-11
Rear axle shaft nut		
PE250B, C	6.5-8.0	47-58
PE175C	3.6-5.2	26-38
PE175N; PE250N	5.0-8.0	36-58
PE175T, X; PE250T, X; PE400	5.0-8.0	36-58
Rear axle sleeve nut		
PE175T, X; PE250T, X; PE400	7.0-9.0	51-65
Torque link bolt		
PE250B, C	1.2-1.5	9-11
PE175C	2.0-3.0	15-22
Front and rear brake lever bolts		
PE250B, C	0.6-0.8	3-6
PE175C, N; PE250N	0.5-0.8	4-6
PE175T, X; PE250T, X; PE400	0.5-0.8	4-6

3

Table 7 AIR FORK SPECIFICATIONS  
(ALL "T" AND "X" MODELS)

Fork oil level <sup>1</sup>	
Standard level	Level range
180 mm (7.0 in.)	165-195 mm (6.5-7.7 in.)
Fork air pressure <sup>2,3</sup>	
Standard pressure	Pressure range
0.6 kg/cm <sup>2</sup> (8.5 psi)	0.5-0.7 kg/cm <sup>2</sup> (7.1-10.0 psi)
<p>1. The maximum allowable difference in oil level between the right and left fork tubes is 1 mm (0.04 in.).</p> <p>2. Do not exceed 2.5 kg/cm<sup>2</sup> (35 psi) of air pressure in the forks or the seals may be damaged.</p> <p>3. Maximum allowable difference in air pressure between fork tubes is 0.1 kg/cm<sup>2</sup> (1.4 psi).</p>	

Table 8 RECOMMENDED SPARK PLUGS\*

	NGK	ND
Standard		
PE250B, C	B-9EV	W24ES-GU
PE175C	B-8EV	W27ES-GU
PE175N; PE250N	B-10EV	W31ES-GU
PE175T, X	B-10EGV	W31ES-GU
PE250T, X; PE400	B-9EGV	W27ES-GU
Hotter (one step past standard)		
PE250B, C	B-8EV	W22ES-GU
PE175C	B-7EV	W24ES-GU
PE175N; PE250N	B-9EV	W29ES-GU
PE175T, X	B-9EGV	W29ES-GU
PE250T, X; PE400	B-8EGV	W24ES-GU
Colder (one step past standard)		
PE250B, C	B-10EV	W27ES-GU
PE175C	B-9EV	W29ES-GU
PE175N; PE250N	---	---
PE175T, X	---	---
PE250T, X; PE400	B-10EGV	W29ES-GU
* Higher spark plug numbers indicate colder heat range for both NGK and ND spark plugs.		

Table 9 CAUSES OF FOULED SPARK PLUGS

Improper fuel/oil mixture
Wrong type of fuel
Idle speed too low
Clogged air filter
Weak ignition
Excessive idling
Wrong spark plugs (too cold)

Table 10 PILOT AIR SCREW ADJUSTMENTS

Model	Turns open
PE175C, N	1 1/4
PE175T, X	1 1/2
PE250B	1 1/2
PE250C, N	1
PE250T, X	1 1/2
PE400	1 1/2

June 28, 2007

Thanks to James Grooms, editor, Clymer Publications who granted copyright permission to provide access to the out of print manual, Suzuki PE175-400 Singles, 1977-1981. Other Clymer manuals may be viewed at <http://clymer.com> .

## CHAPTER FOUR

### ENGINE

The PE engine is an air-cooled, single cylinder, 2-cycle model equipped with a cylinder reed valve assembly. The crankshaft is supported by 2 ball bearings in a vertically split crankcase.

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

This chapter provides complete service and overhaul procedures for the PE engine. All engine upper end repairs, including piston, rings and reed valve, can be performed with the engine installed in the motorcycle. Engine removal is necessary to perform repair on the crankshaft, transmission, and certain components of the gearshift and kickstarter mechanisms. Refer to Chapter Five for transmission, gearshift and clutch repairs. The procedures are presented in the sequence that would be employed to totally dismantle the engine beginning with the cylinder head and continuing on through the disassembly of the crankcases.

Routine engine-related lubrication and maintenance items are covered in Chapter Three. **Tables 1-5** are at the end of this chapter.

#### GENERAL MAINTENANCE AND REPAIR HINTS

Competition machines such as the PE are subjected to loads and wear far beyond those encountered in normal trail or sport riding. One race may take as much out of a machine as several long trail rides. Because of the extraordinary demands placed on a racing machine, several points should be kept in mind when performing service and repair. Whether you use your PE for full enduro racing or just occasional trail rides, before performing any engine maintenance, carefully read the suggestions under *General Maintenance and Repair Hints* as outlined in Chapter One. These hints are particularly helpful for the mechanic performing any engine repair for the first time.

#### CYLINDER HEAD

The cylinder head should be removed periodically and all carbon deposits wiped or scraped away before they have a chance to adversely affect engine performance. The head can be removed without removing the engine from the frame.

**Removal**

Thoroughly clean the motorcycle with a good grade of liquid detergent and a water hose. Ensure that all engine and frame fasteners and cable connections are clean.

1. If the engine is still installed in the motorcycle, refer to Chapter Six and remove the exhaust pipe.
2. Pull the spark plug cap from the spark plug. Always pull on the cap, not the lead, or the lead can be damaged. Ensure that the area around the spark plug is free of dirt and remove the spark plug.
3. Loosen the cylinder head nuts gradually and evenly in a crisscross pattern until all nuts can be completely removed (Figure 1).
4. Gently tap around the cylinder head with a plastic or rubber mallet and remove the cylinder head.

**CAUTION**

*Never attempt to pry the head off or the head and/or the cylinder may be damaged.*

5. Remove the old head gasket from the top of the cylinder.
6. Remove all carbon deposits from the combustion chamber.

**Removing Carbon Deposits**

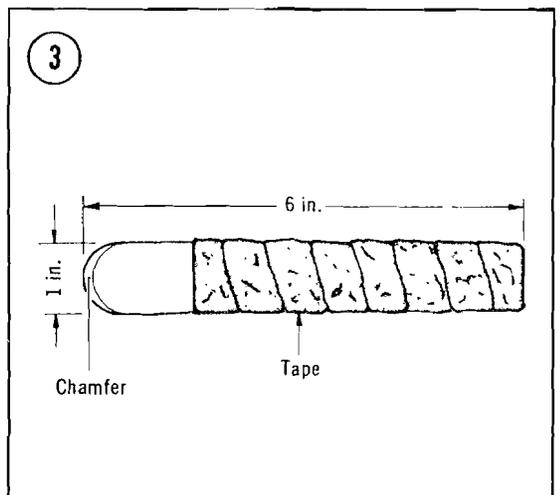
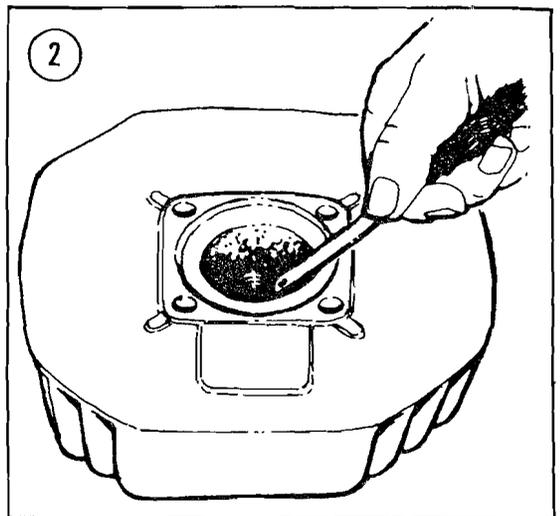
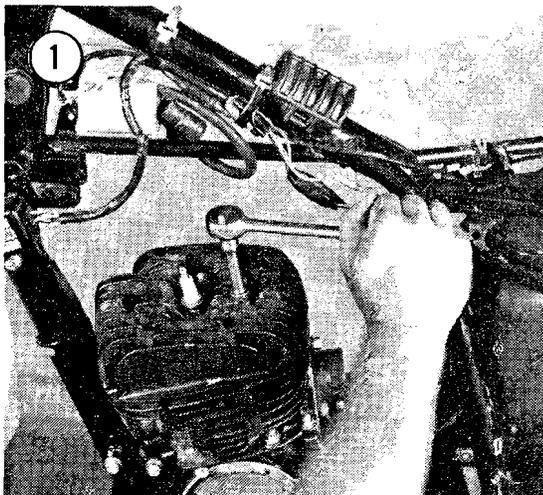
1. Wipe the carbon deposits out of the combustion chamber with a clean rag soaked in solvent. If hard deposits have formed, it may be necessary to scrape them loose with an

aluminum scraper (Figure 2). Refer to Figure 3 for an example of a typical scraper.

**CAUTION**

*Never use a steel scraper to remove carbon from the cylinder head or the machined surfaces of the head may be damaged.*

2. Carefully clean the spark plug threads with a wire brush.
3. Thoroughly rinse the head in clean solvent.
4. Closely examine the head for damage in the combustion chamber or on the sealing surface. The head must be replaced if any damage is detected.



## Installation

1. Install a new head gasket. On models with a recess in the head, use a small amount of grease to help hold the gasket in the head (**Figure 4**). On PE400 models make sure the word "TOP" on the gasket faces up.

### CAUTION

*A new head gasket must always be used on the PE400. The head gasket for these models has a carbon film on both sides. This carbon film is damaged whenever the gasket is removed. Failure to use a new head gasket will result in a compression leak with subsequent power loss and hard starting.*

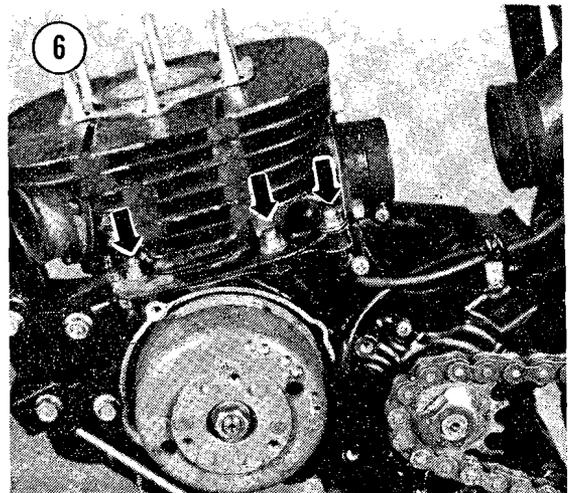
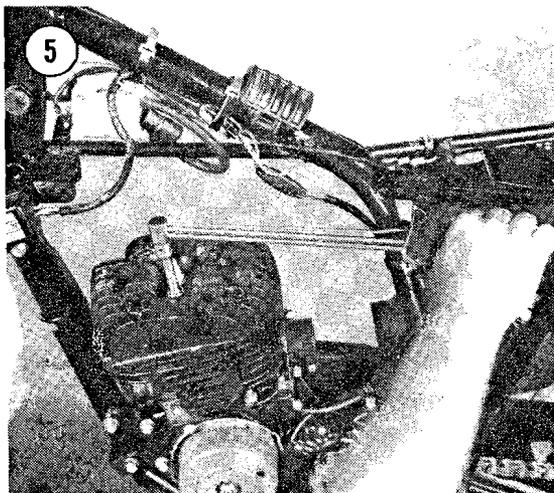
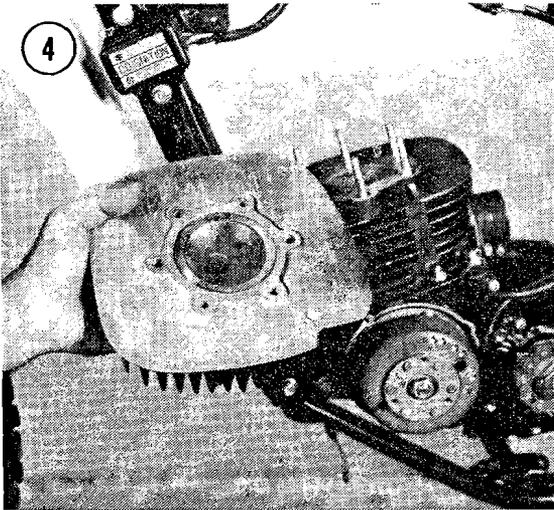
2. Tighten all head nuts gradually and evenly in a crisscross pattern. Torque the head nuts as specified in **Table 1 (Figure 5)**.
3. Install the exhaust pipe if it was removed.
4. Carefully thread the spark plug in finger tight. Torque the spark plug as specified in **Table 1**.
5. Connect the spark plug cap.

## CYLINDER

The cylinder is constructed of a steel alloy capable of being bored 2 times to accommodate for wear. The cylinder and piston can be removed with the engine installed in the motorcycle.

### Removal

1. If the engine is still installed in the motorcycle, refer to Chapter Six and remove the carburetor and exhaust pipe.
2. Remove the cylinder head as previously outlined in this chapter.
3. Remove and discard the old head gasket.
4. Remove the nuts securing the cylinder to the crankcase (**Figure 6**).
5. Tap around the base of the cylinder with a rubber mallet or plastic hammer to break the cylinder loose from the crankcase.
6. Rotate the crankshaft until the piston is at the bottom of the stroke and lift off the



4

cylinder. Note that the arrow on the piston points forward (**Figure 7**).

#### CAUTION

*Do not twist or rotate the cylinder during removal or the piston rings may be damaged or broken.*

*Place the cylinder upside down on a flat surface. Do not set the cylinder on the reed assembly or the reed stops may be bent or damaged.*

7. Stuff clean rags into the crankcase opening around the connecting rod to prevent dirt and piston pin snap rings from falling into the engine.
8. Remove and discard the cylinder base gasket.

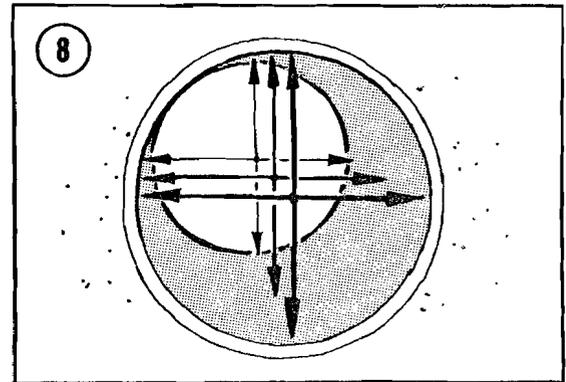
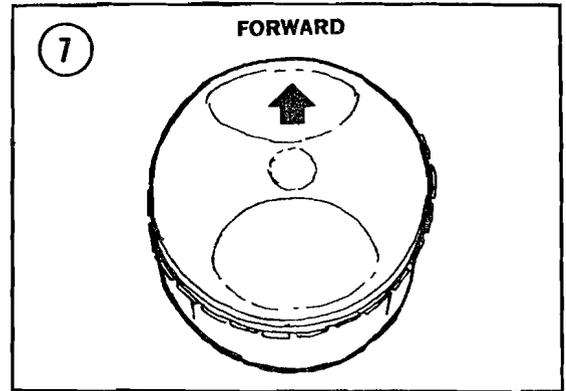
### Cylinder Inspection

The following procedure requires the use of highly specialized and expensive measuring equipment. If such equipment is not available, have a dealer or machine shop perform the measurements.

1. Use an inside micrometer or cylinder bore gauge and measure the cylinder bore. Measure the bore at 3 locations as shown in **Figure 8** and in 2 positions, 90 degrees apart. Compare the measurements with the specifications in **Table 2** and rebore the cylinder if necessary.
2. Examine the condition of the cylinder bore. The cylinder should be rebored if the surface is scored or abraded. Pistons are available in oversize increases of 0.25 mm and 0.5 mm. Purchase the oversize piston before having the cylinder bored. The piston must first be measured and the cylinder bored to match it in order to maintain the specified piston-to-cylinder clearance. Remove and measure the piston as outlined under *Piston Removal* and *Piston Inspection*.
3. If the cylinder has been bored, radius the edges of the transfer, intake, and exhaust ports (**Figure 9**) to prevent the sharp edges from snagging the piston rings.

#### CAUTION

*Proper radius and relief of ports is necessary to avoid possible piston seizure.*



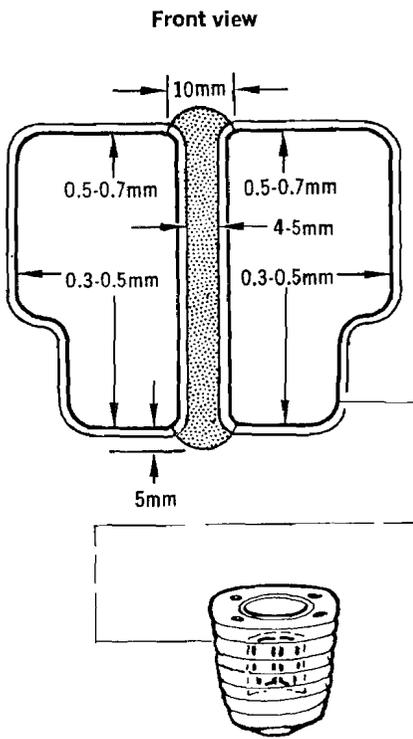
### Piston-to-Cylinder Clearance (Quick Method)

With the cylinder upside down on a workbench, install the piston (without rings) into the cylinder bore. Refer to **Figure 10** and insert the thickest possible feeler gauge between the piston and cylinder wall on the intake side. If a feeler gauge larger than the wear limit specified in **Table 2** can be inserted between the piston and the cylinder bore, a new piston or a rebore is necessary.

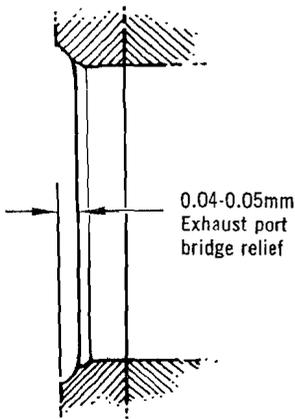
### Installation

1. Make sure the gasket surfaces on the crankcase and cylinder are clean. Install a new cylinder base gasket on the crankcase.
2. Check that the piston rings are seated in the ring grooves and the ring ends are correctly lined up with the locating pins as shown in **Figure 11**.
3. Install a piston holding fixture under the piston (**Figure 12**) to hold the piston in position while installing the cylinder.

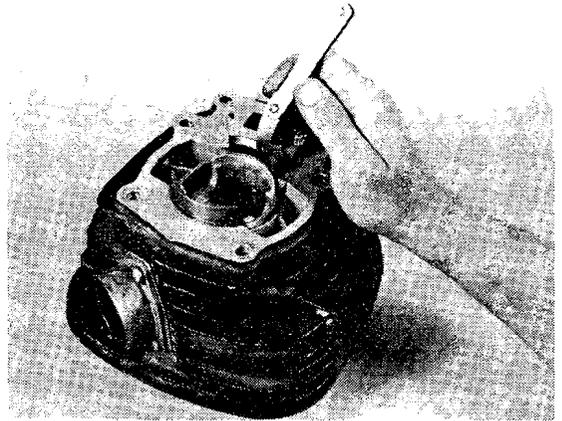
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Side view

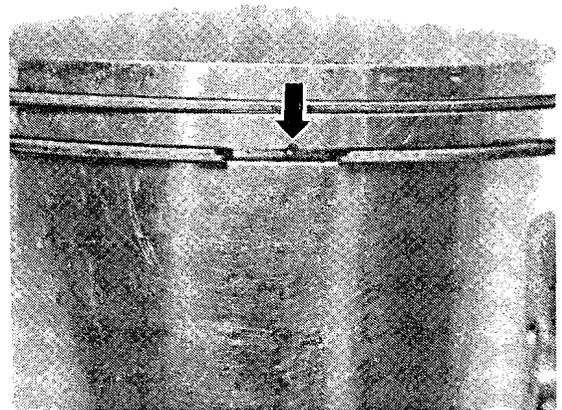


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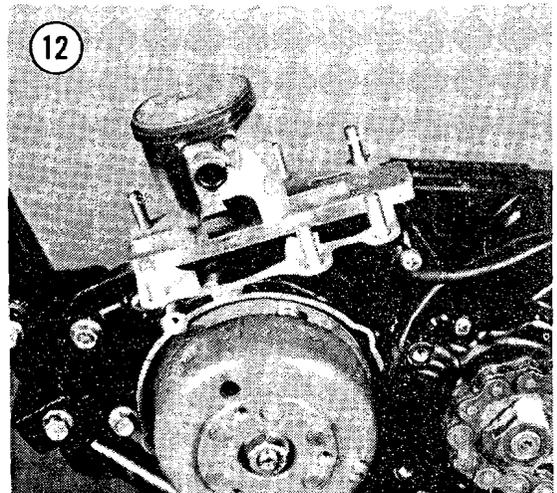


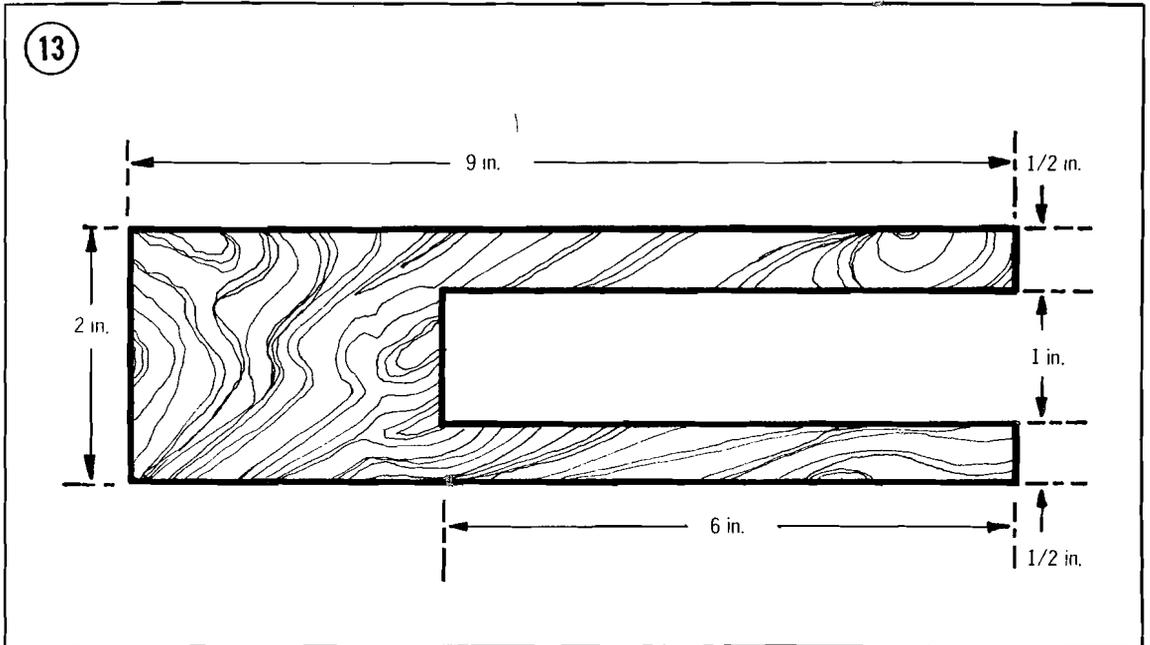
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**NOTE**  
A simple homemade holding fixture can be made of wood. Refer to **Figure 13** for approximate dimensions.

4. Oil the piston and the cylinder bore with assembly oil or engine oil and start the cylinder onto the piston. Make sure the cylinder is properly positioned with the intake port to the rear.

**CAUTION**  
Do not twist or rotate the cylinder while sliding it down over the piston or the rings will be damaged.

5. Compress the piston rings with your thumbs and gently slide the cylinder down over the piston (**Figure 14**). Remove the piston holding fixture and slide the cylinder down until it seats on the crankcase.  
6. Install the nuts securing the cylinder and tighten them gradually and evenly in a crisscross pattern (**Figure 15**).  
7. Install the cylinder head as previously outlined.

## PISTON AND RINGS

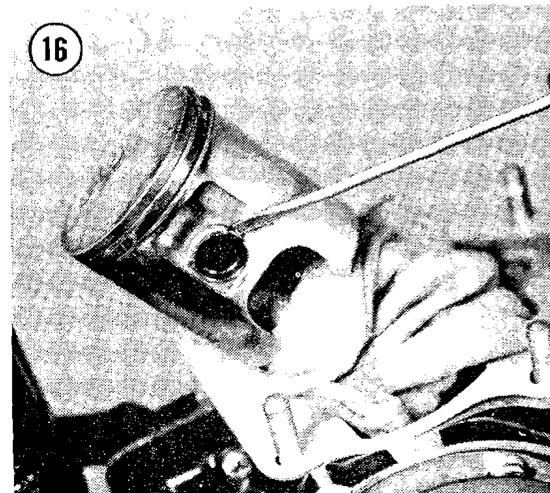
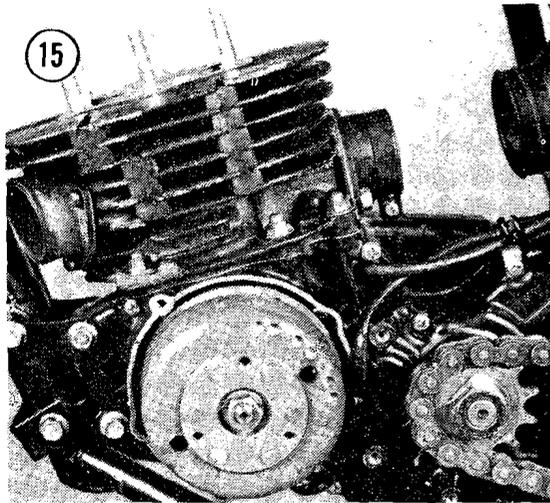
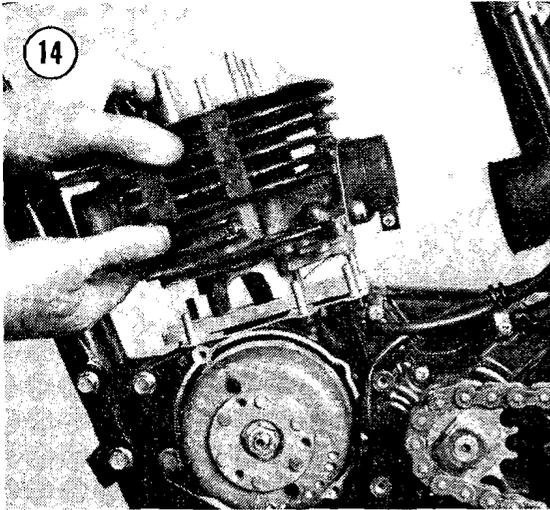
Suzuki pistons are made of aluminum alloy. The piston pin is precision fitted and retained

in the piston by 2 wire-type snap rings. A caged needle bearing is used on the small end of the connecting rod. The piston can be removed with the engine still installed in the motorcycle.

## Removal

1. Perform *Cylinder Removal* as previously outlined in this chapter.
2. Stuff clean rags into the crankcase opening around the connecting rod to prevent dirt and piston pin snap rings from falling into the engine.
3. Use a small screwdriver or awl and carefully pry out the snap ring through the notch in the piston (**Figure 16**). Partially cover the opening in the piston with your thumb to prevent the snap ring from flying out. Discard the old snap ring.
4. Use a wooden dowel or socket extension and push out the piston pin. Remove the pin and lift off the piston.

**CAUTION**  
On some engines (particularly those with considerable use) the piston pin may be difficult to remove. Do not attempt to drive out the pin or connecting rod damage may result.

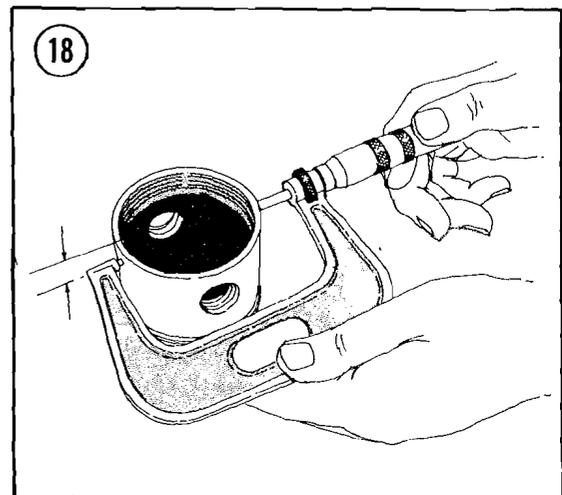
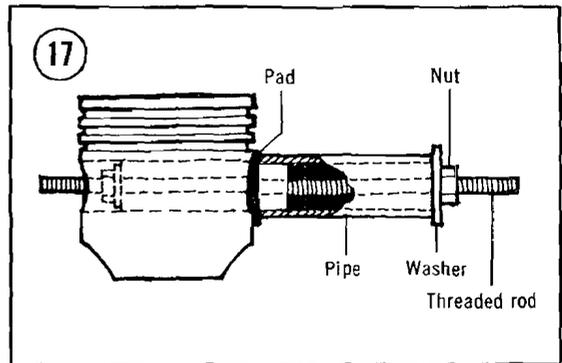


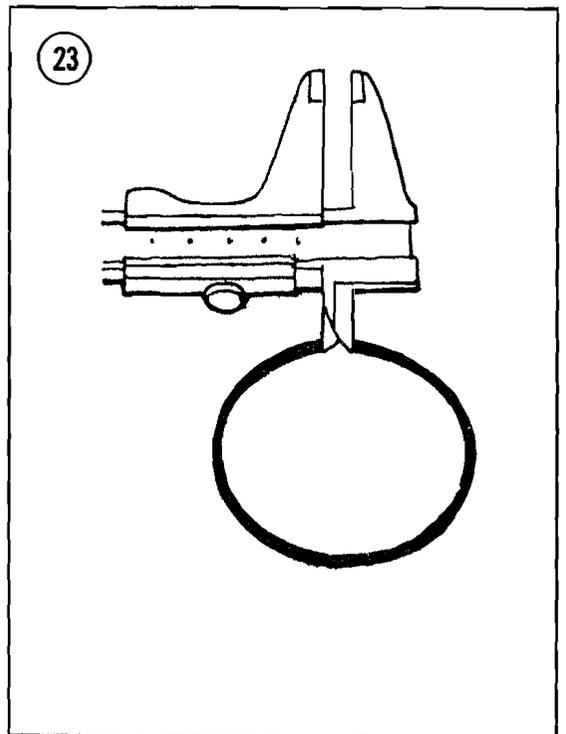
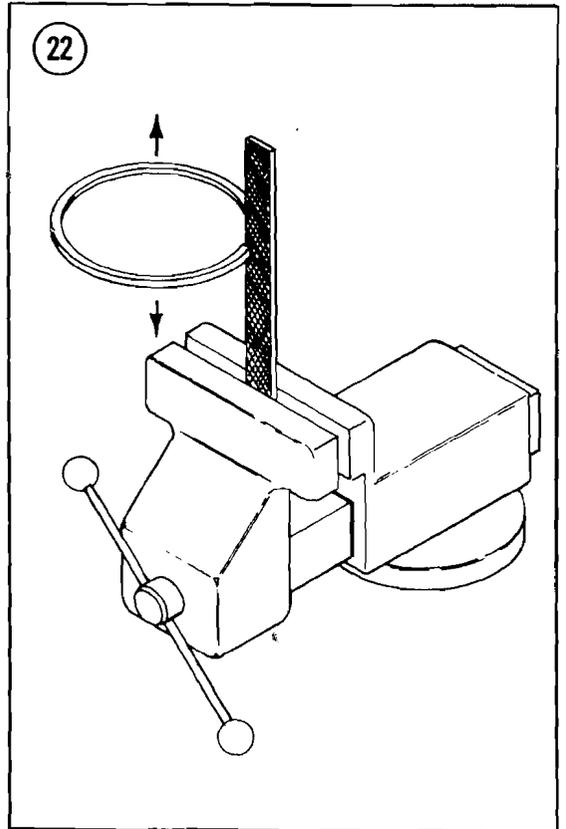
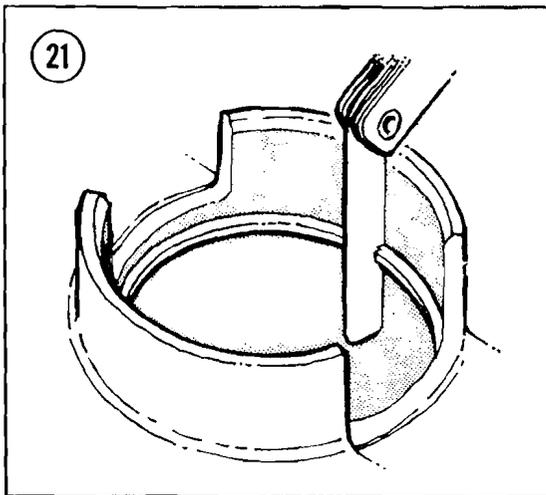
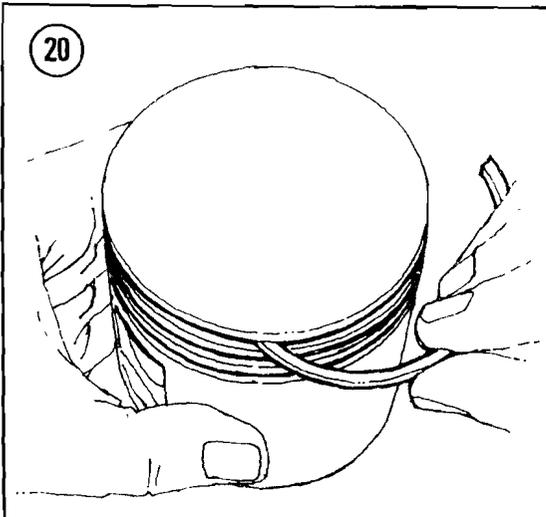
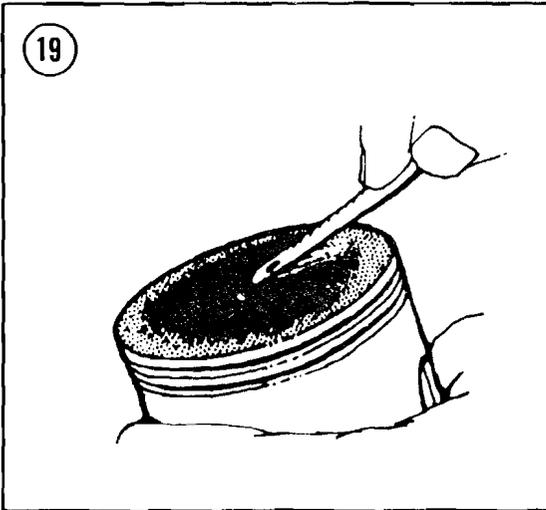
If the piston pin can not be pushed or gently tapped out, use a piston pin extractor tool. **Figure 17** shows one that is easily fabricated type. If such a tool is not available, have a dealer remove the piston pin. With the right tools it is a quick and inexpensive job and it will prevent possible expensive engine damage.

5. Carefully remove the needle bearing from the connecting rod.
6. Perform *Cylinder Inspection* and *Piston and Ring Inspection*.

### Piston and Ring Inspection

1. Measure the outside diameter of the piston skirt at right angles to the piston pin. **Table 2** specifies the distance from the bottom of the piston skirt (**Figure 18**) where the measurement should be made. If the piston is not within the tolerance specified in **Table 2** it must be replaced.





2. Clean the top of the piston with a soft metal scaper to remove carbon (Figure 19). Use a piece of old piston ring to clean the ring grooves (Figure 20). Thoroughly clean the piston in solvent or detergent and hot water.

3. Place the piston rings, one at a time, into the cylinder bore and measure the ring end gap (Figure 21). Use the piston to push the ring squarely into the cylinder bore approximately 25 mm (1 in.). This measurement is required for new rings as well

as old ones. Compare the actual ring gap to Table 3 and replace the old rings if their gap is greater than the specified standard. For new rings it is more likely that the gap will be less than minimum. If such is the case, clamp a fine file in a vise and carefully file the ring ends as shown in Figure 22.

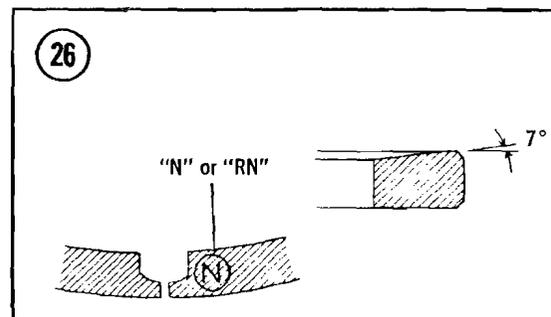
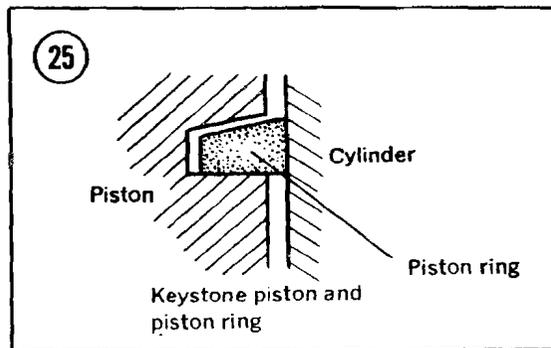
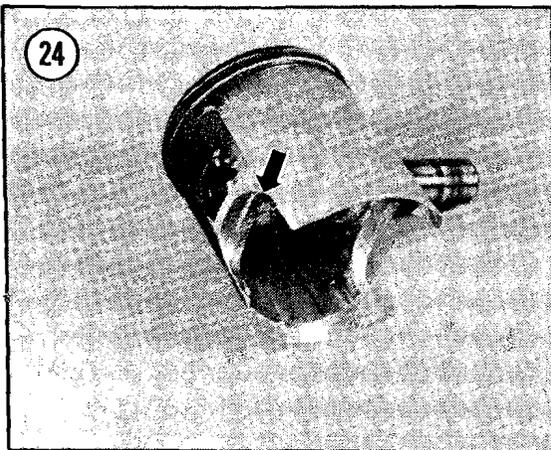
4. Measure the free-state ring gap as shown in Figure 23. If the free-state ring gap is less than specified, the ring will not seal well and should be replaced.

5. Carefully examine the piston around the area of the skirt, pin and ring grooves for signs of cracks, stress or metal fatigue. Check around the top edge of the transfer cutaways (Figure 24) for hairline cracks. Replace the piston if any signs of abnormal wear are present or if there is any doubt as to its serviceability.

6. Check the top of the piston for erosion of the metal and replace it if any is found. Erosion of the piston crown is very often caused by an extremely lean fuel/air mixture. This condition should be corrected immediately after a new piston has been installed and the engine reassembled.

7. Check the skirt of the piston for brown varnish deposits. More than a slight amount is evidence of worn or sticking rings in which case the rings should be replaced.

8. Examine the piston skirt for galling and abrasion—a common symptom of piston seizure. If light galling is present, smooth the affected area with No. 400 emery cloth or sand paper. If the galling is severe or if the piston is deeply scored, it must be replaced.



### Piston Rings

All PE models are equipped with Keystone style piston rings as shown in Figure 25. All piston rings are stamped with a letter designation on the left end of the ring (Figure 26). When the rings are installed, the stamped letter must always be positioned UP toward the top of the piston.

Always check the end gap and free state gap of the rings as described under *Piston and Ring Inspection* and replace them if they are not within specifications.

Always install new rings when installing a new piston or when there is any doubt as to the condition of the rings. Racing demands much from a machine. Do not jeopardize your chances or the durability of your engine by trying to get by with marginal parts.

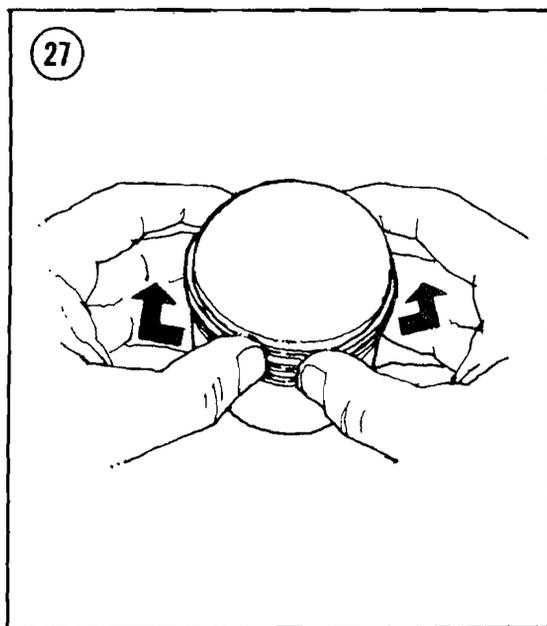
#### CAUTION

*Worn piston rings will cause a substantial power loss as well as rapid and excessive engine wear.*

*Rapid and excessive engine wear can easily lead to expensive engine failure. Suzuki recommends changing piston rings every 2 races if the machine is used for competition.*

### Piston and Ring Installation

1. Carefully spread the piston rings with your thumbs as shown in **Figure 27** and install the rings—first the bottom one, then the top. The identifying letters on the ring ends (**Figure 26**) always face toward the top of the piston. Make sure the rings seat completely in the grooves and that the ring ends are aligned with the locating pins.
2. Install one new snap ring into one side of the piston.



#### CAUTION

*If possible, always use new snap rings to secure the piston pin. An old snap ring could work out and cause serious and expensive engine damage.*

3. Lubricate the piston pin, the caged needle bearing and the connecting rod with assembly oil or engine oil. Install the needle bearing in the upper end of the connecting rod.
4. Align the piston over the connecting rod. Make sure that the arrow on the piston points forward toward the front of the engine.

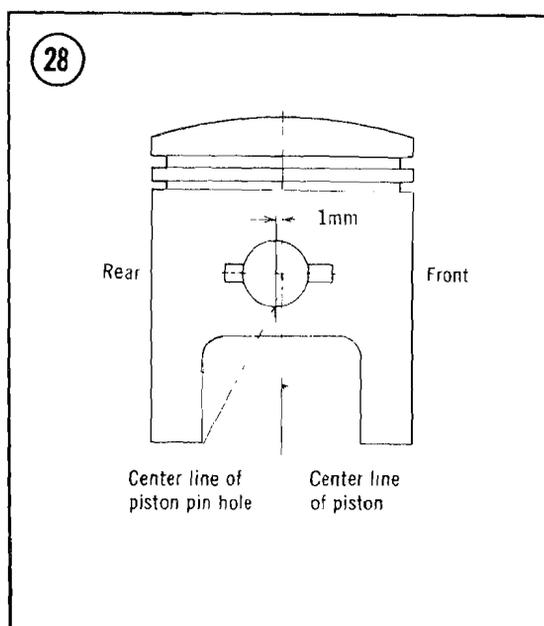
#### CAUTION

*The piston pin hole is offset slightly as shown in **Figure 28**. Failure to install the piston with the arrow pointing forward will cause piston slap.*

5. Align the piston pin bosses in the piston with the connecting rod and install the piston pin until the far end of the pin has reached the snap ring.

#### CAUTION

*If it is necessary to tap the piston pin into the connecting rod, do so gently with a rubber or plastic mallet. Make sure you support the piston to prevent the lateral shock from being transmitted to the lower connecting rod bearing.*

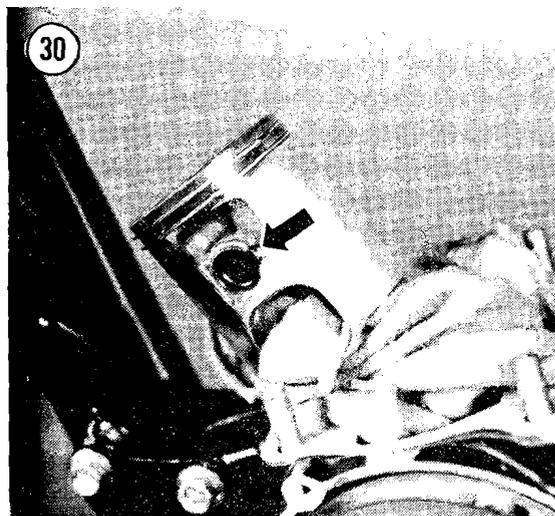
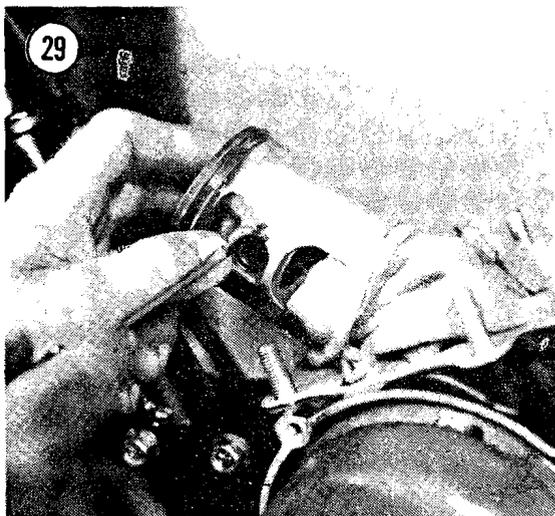


6. Partially hold a new snap ring in position with your thumb and install the snap ring into the piston groove (**Figure 29**). Make sure the snap ring locks into the groove. Rotate the snap ring so that a solid portion of the snap ring is exposed in the piston notch (**Figure 30**).

7. Install the cylinder as previously described in this chapter.

### REED VALVE ASSEMBLY

All PE models are equipped with a power reed valve assembly installed in the cylinder.



Particular care must be taken when handling and repairing the reed valve assembly. A malfunctioning reed valve will cause a severe performance loss as well as contribute to early engine failure due to a too-lean fuel mixture.

### Removal/Installation

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

#### CAUTION

*Do not set the cylinder down on the reed assembly or the curved reed stops may be damaged.*

2. Remove the screws securing the reed valve assembly to the cylinder (**Figure 31**).

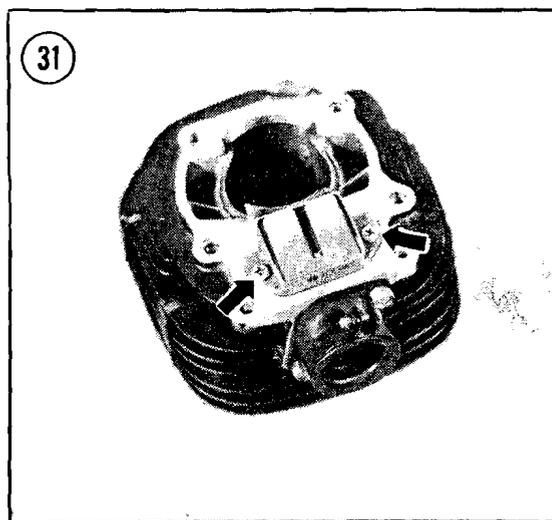
3. Lift off the reed assembly. If the assembly is difficult to remove, use a drift or socket extension and gently tap the side of the reed body to help break it loose from the cylinder.

4. Perform *Reed Valve Inspection*.

5. Installation is the reverse of these steps. Ensure that the reed body gasket is in place on the cylinder.

### Inspection

1. Carefully examine the reed valve assembly for visible signs of distortion or damage.



2. Use calipers and measure the distance from each reed stop to the surface of the reed as shown in **Figure 32**. All the reed stops should be the same distance from the reed plates.

3. If the reed stops are not equally spaced from the reed plates, pad the jaws of a pliers with a rag and gently bend the stops as necessary. If the reed stops were accidentally bent, use the following measurements as a reference to check the stops:

- a. Two petal reed stops—7-8 mm (0.28-0.31 in.)
- b. Three petal reed stops—9-10 mm (0.35-0.40 in.)

4. With a feeler gauge, check the clearance between each reed plate and the seat as shown in **Figure 33**. If the clearance exceeds 0.2 mm (0.008 in.) the reed plate must be replaced or turned over.

#### NOTE

*Reed plates (fiberglass or steel) can be turned over if the clearance exceeds 0.2 mm (0.008 in.). If a reed plate is defective, Suzuki replacement parts are limited to the entire reed valve assembly. However, aftermarket reed plates are available from most Suzuki shops and are considerably less expensive than an entire assembly.*

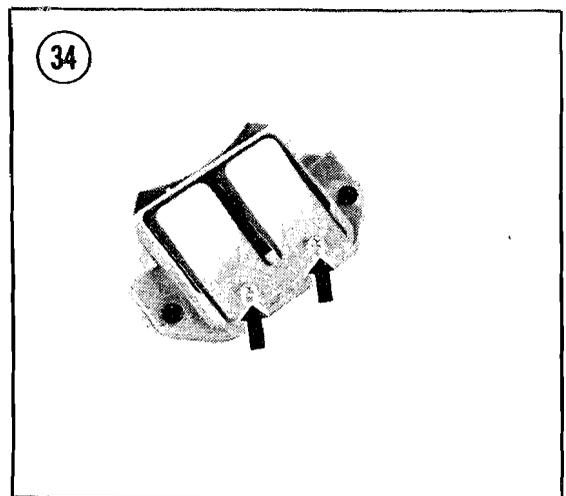
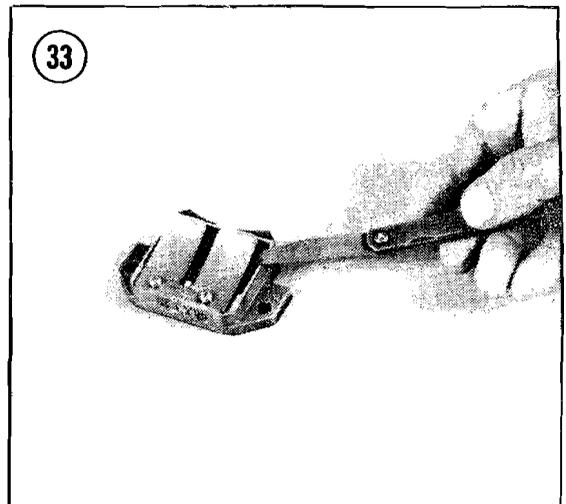
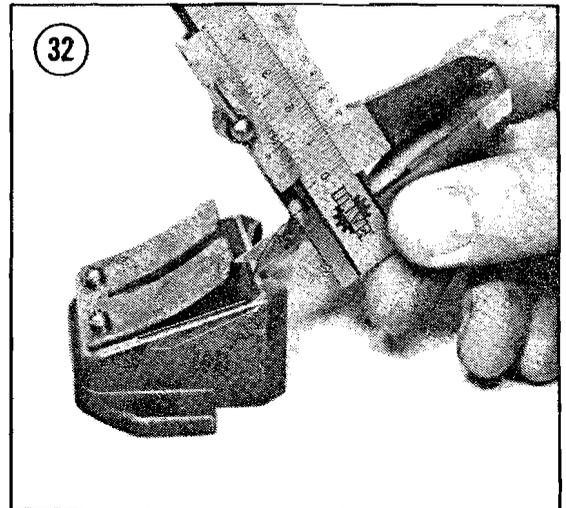
#### CAUTION

*Steel reed plates can be turned over when out of tolerance; however, bear in mind an out-of-tolerance condition is caused by metal fatigue. It is suggested that steel reeds not be turned more than once. Metal fatigue may cause the reed plate to break. The pieces of the broken reed may then enter the lower end of the engine and cause serious and expensive damage.*

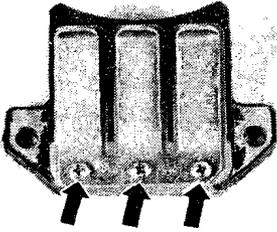
5. Remove the screws securing the reed stops to the reed body (**Figure 34** or **Figure 35**). Take care that the screwdriver does not slip off and damage the reed plate.

6. Carefully examine the reed plate, reed body and reed stop (**Figure 36** or **37**). Check for signs of cracks, metal fatigue, distortion, or foreign object damage.

7. Closely examine the rubber seat around the edge of the reed body (**Figure 38**).



35



8. Apply a small amount of blue Loctite (Lock N' Seal No. 2114) to the screws securing the reed plate and install the reed plate and reed stops. Recheck the clearance between the reed plate and its seat.

## ENGINE

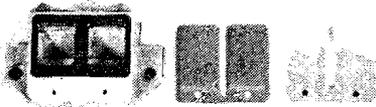
### Engine Removal and External Disassembly

The engine must be removed from the motorcycle to perform repair on the crankshaft, transmission and most of the gearshifting mechanism.

#### NOTE

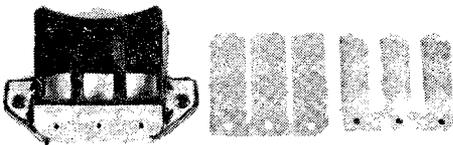
*The following procedure contains several steps that are only necessary if complete engine disassembly is necessary. Certain components on the engine are more easily removed while the engine is still mounted in the frame, as the frame makes an excellent holding device for the engine. Perform the full procedure if disassembly is desired.*

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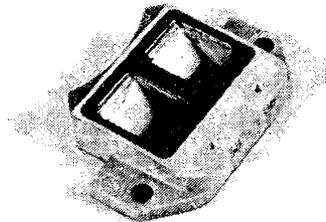


1. Thoroughly clean the motorcycle at a coin-operated car wash or with detergent and a hose. Make sure the engine and all nuts and bolts are as clean as possible. A clean motorcycle is not only more pleasant to work on, it helps prevent contamination of vital moving parts. Make sure you clean between the engine and the skid plate to expose the engine mounting bolts and the transmission drain plug.

37



38



2. Place a drain pan under the engine. Use a socket and remove the transmission drain plug. Keep the motorcycle as level as possible and allow several minutes for the oil to drain completely.

**NOTE**

*On all but the PE250B, C, N models, the drain plug is also the gearshift cam stopper housing. Make sure the cam stopper and spring (Figure 39) are not lost in the oil drain pan. On PE250B, C, N models, use a 13/16 in. spark plug socket and remove the rearmost plug from the transmission to drain the oil.*

3. Refer to Chapter Six and remove the carburetor and the exhaust system.

**NOTE**

*If the engine is to be disassembled, remove the head, cylinder and piston as outlined in this chapter.*

4. Disconnect the clutch cable at the handlebar lever. If the cylinder is still installed, the cable can be wrapped around the cylinder as shown in Figure 40 to keep it out of the way.

**NOTE**

*If desired, the clutch cable may be disconnected by removing the clutch arm from the clutch pinion shaft. The pinch bolt (Figure 41) securing the clutch arm must be removed completely before the arm can be removed.*

5. On PE250T, X and PE400 models, perform the following:

- a. Loosen the cable adjuster locknut (Figure 42) and turn in on the adjuster to provide maximum cable slack.
- b. Disconnect the cable end from the clutch arm (Figure 43).
- c. Back out the cable adjuster and remove the cable from the engine.

6. Disconnect the spark plug lead from the spark plug.

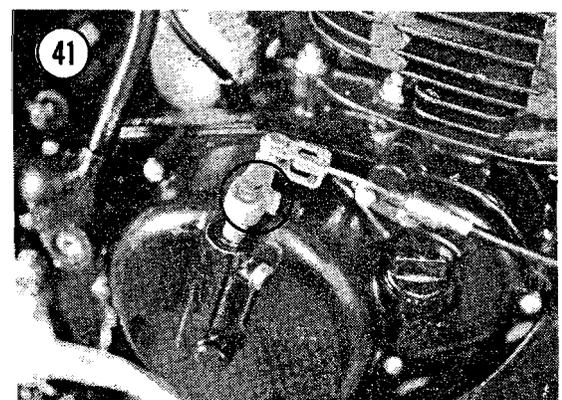
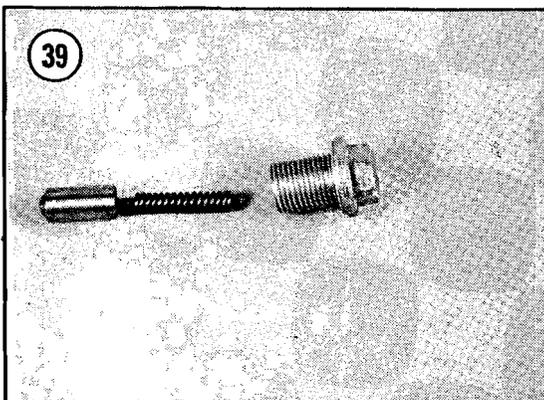
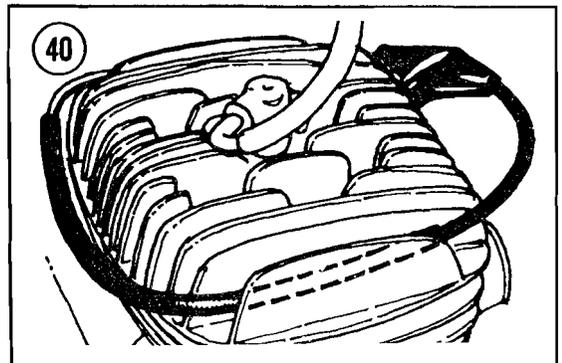
7. Disconnect the PEI ignition lead wires from the connector on the frame tube (Figure 44).

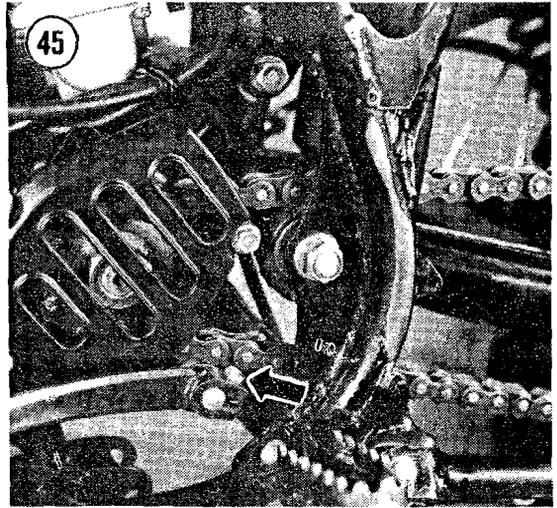
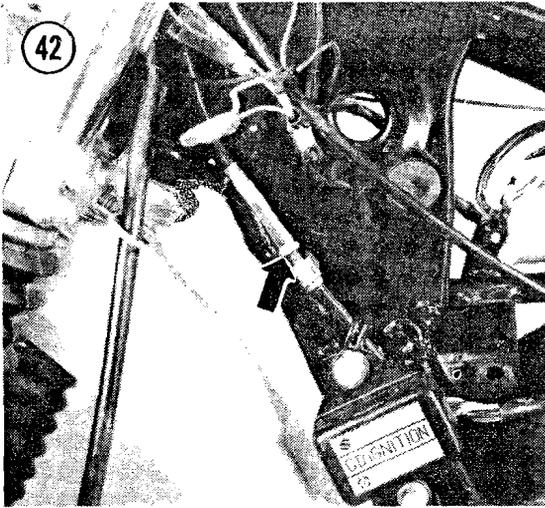
8. Remove the pinch bolt securing the gearshift lever (Figure 45). The bolt must be removed completely before the lever can be removed. Make sure the plastic chain protector (Figure 46) is not lost.

**NOTE**

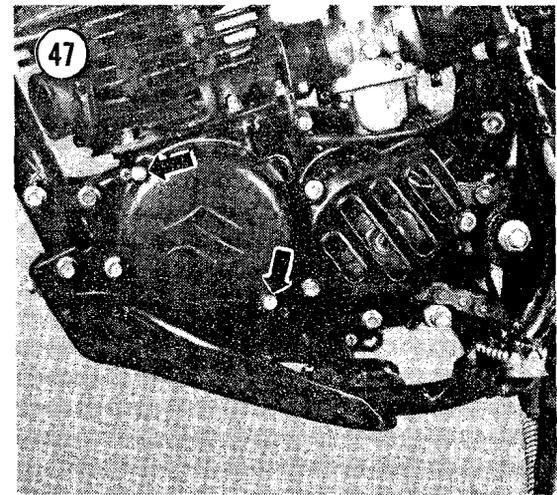
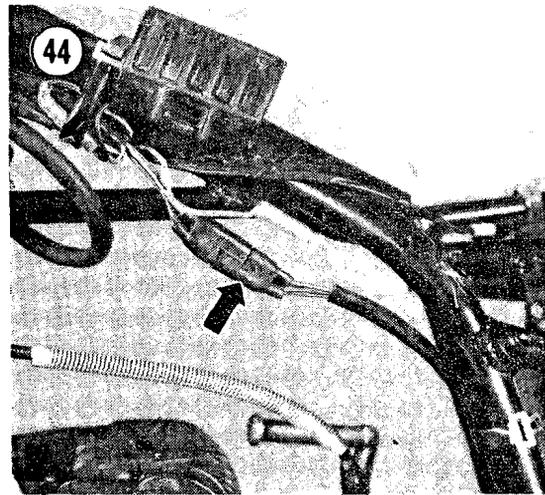
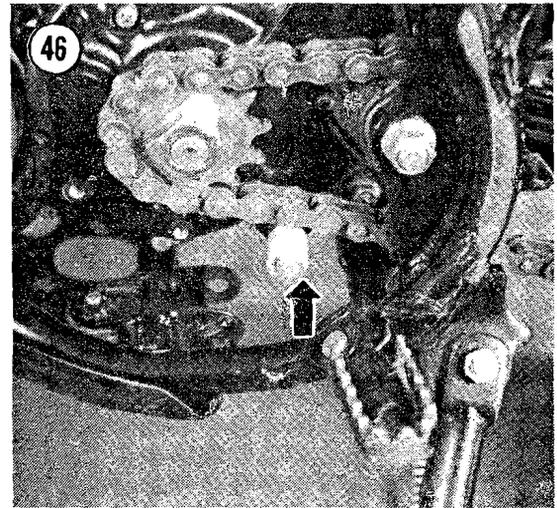
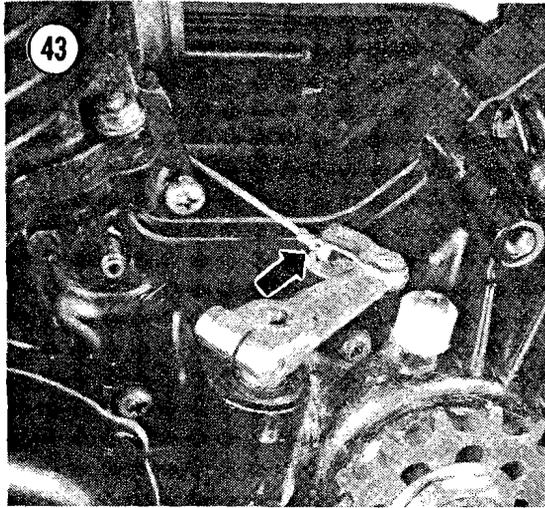
*If engine disassembly is not desired, proceed to Step 20.*

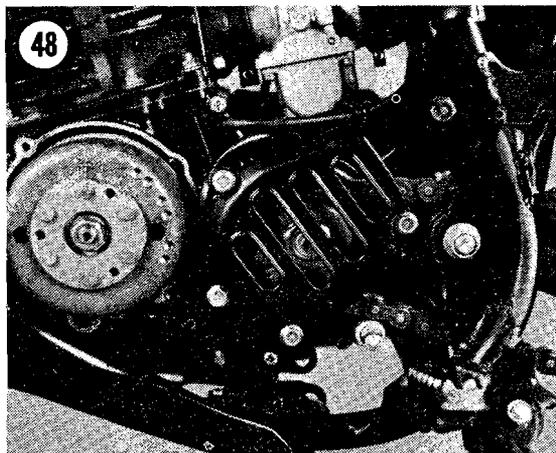
9. Use a hammer driven impact tool and loosen the screws securing the magneto cover (Figure 47). Remove the screws and the cover.





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10. Use a hammer driven impact tool and remove the screws securing the sprocket cover (**Figure 48**). Remove the sprocket cover. Note the arrangement of the spacers and the chain guide plate.

11. Bend back the folded locking washer securing the sprocket nut (**Figure 49**).

12. Have an assistant hold on the rear brake and loosen the sprocket nut. Do not remove the nut at this time.

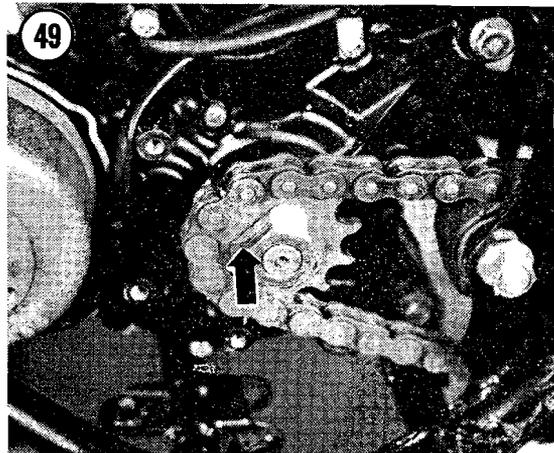
#### NOTE

*An alternate method of holding the engine while loosening the sprocket nut and flywheel nut is shown in **Figure 50**. Use 2 blocks of wood that are the same size and a steel rod such as a socket extension. Stuff rags into the crankcase opening and make sure the blocks of wood are clean and free of sawdust debris. Before loosening the nut, slowly rotate the flywheel counterclockwise until the crankshaft is firmly held as shown in **Figure 50**.*

13. Temporarily install the shift lever and shift the transmission into gear. Have an assistant hold on to the rear brake and loosen the nut securing the magneto flywheel (**Figure 51**). Do not remove the nut at this time.

14. Remove the nut and locking washer securing the drive sprocket and slide the sprocket off the engine drive shaft. Disengage the chain from the sprocket and remove the sprocket.

15. Remove the drive shaft spacer (**Figure 52**). Note the chamfer on the spacer (**Figure**



**53**) is positioned in toward the engine. Remove and discard the O-ring from the drive shaft (**Figure 54**).

16. Remove the nut, flat washer and lockwasher securing the magneto flywheel (**Figure 55**).

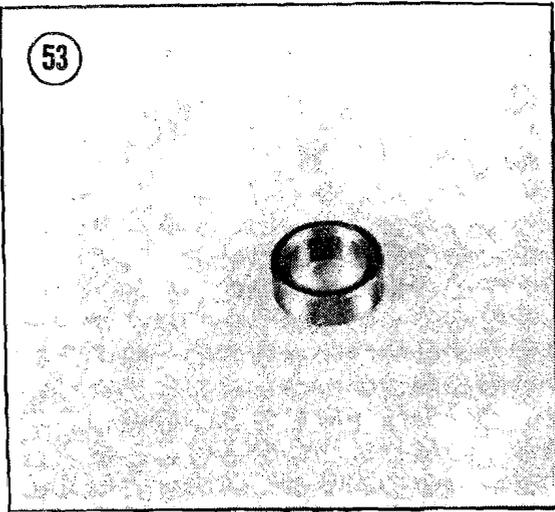
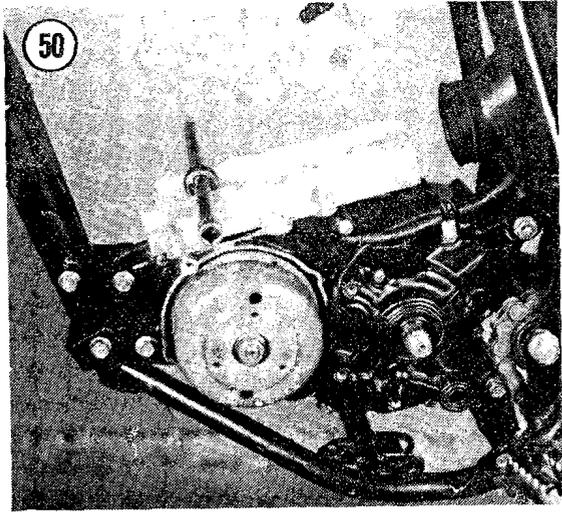
#### NOTE

*On PE250T and PE400T models, it is not necessary to remove the flywheel or stator assembly unless the crankshaft must be removed. Since no crankcase screws are located behind the stator assembly on these models, the crankcases can be separated with the flywheel and stator assembly installed.*

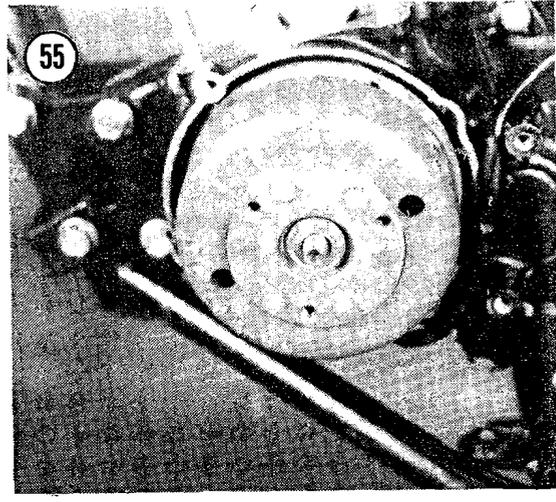
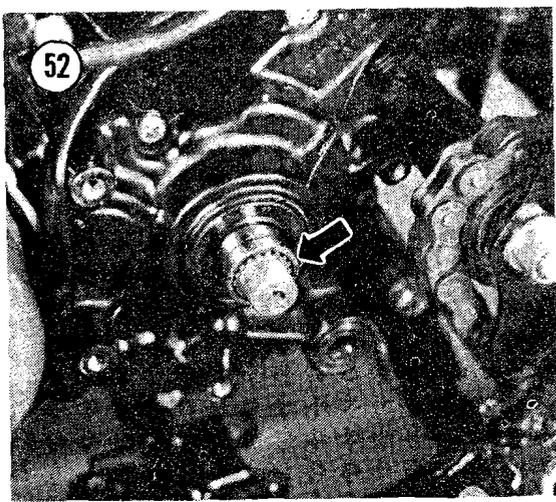
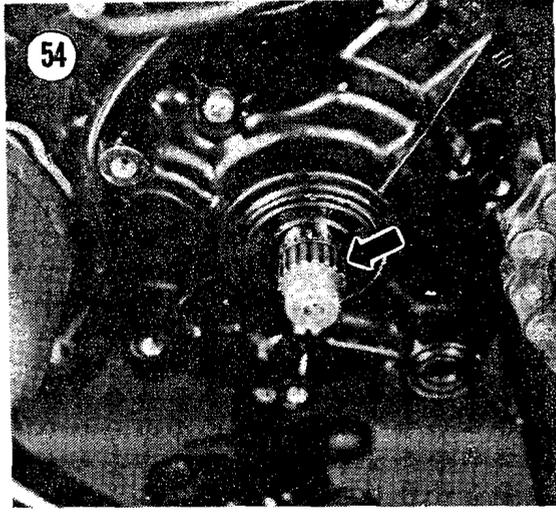
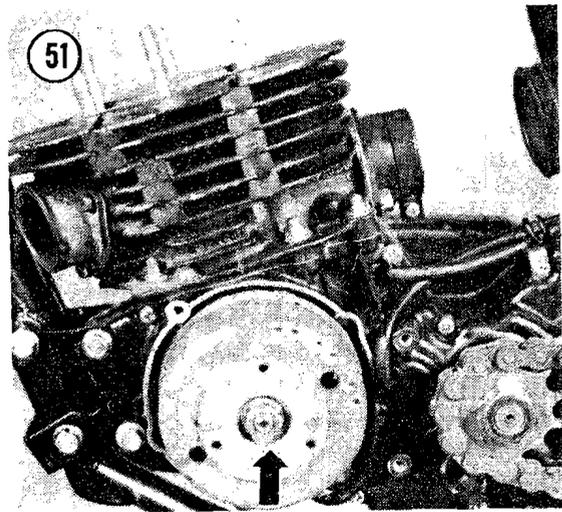
17. Install a 3-bolt puller on the flywheel. Tighten the center bolt on the puller until the flywheel is loose on the crankshaft. Remove the puller and the flywheel. If the Suzuki slide hammer (part number 09930-30102) is available, use attachment "F" (part number 09930-30190) to remove the flywheel.

#### CAUTION

*Aftermarket pullers are available from most motorcycle shops or tool suppliers. The cost of such a puller is usually nominal and they make an excellent addition to any mechanic's tool box. If you cannot buy or borrow a puller, have a dealer remove the flywheel. Do not try to get by without the necessary puller. Any attempt to remove the flywheel without the proper tool will ultimately lead to some form of engine or flywheel damage.*



4



**NOTE**

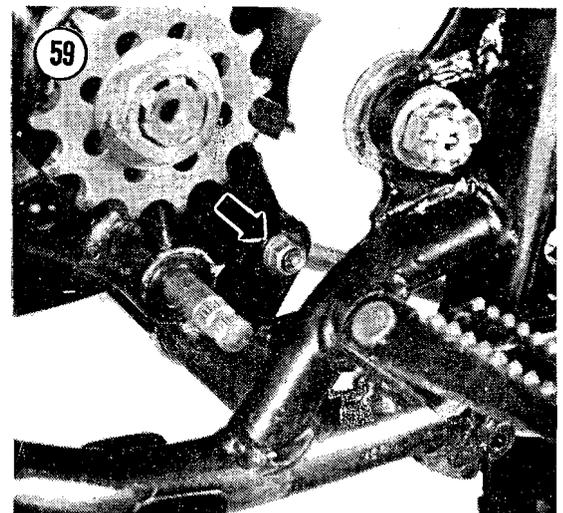
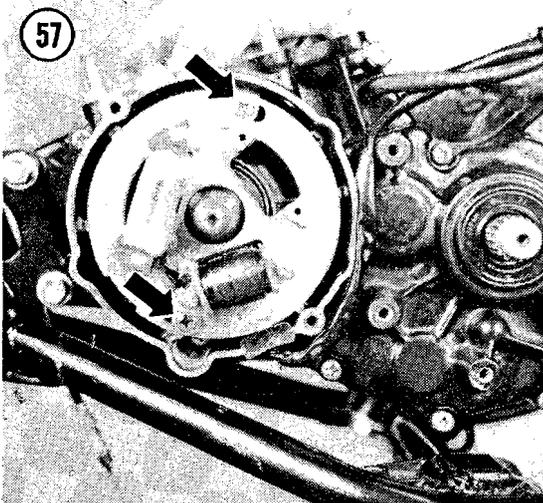
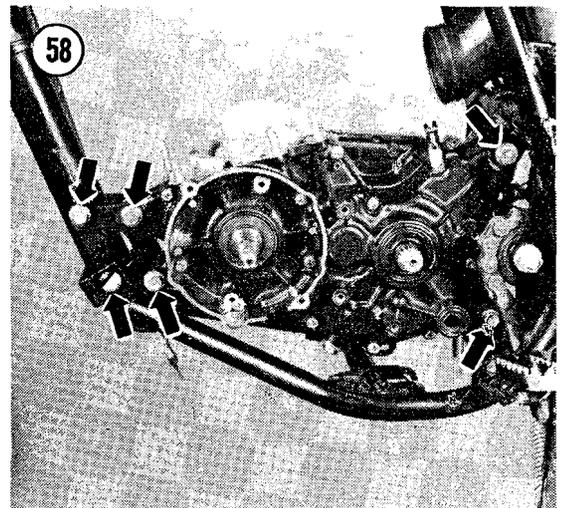
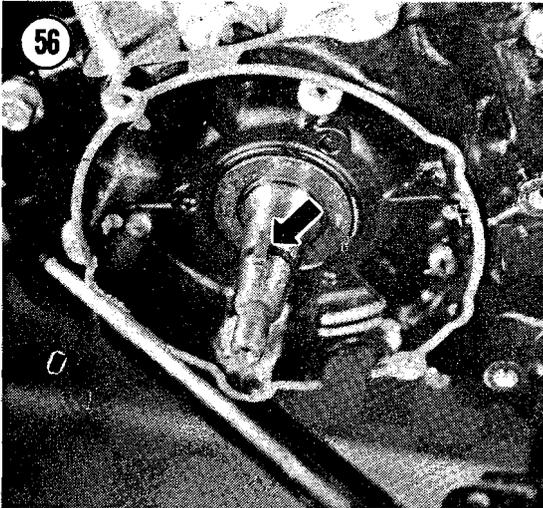
*If the flywheel is difficult to remove, tighten the puller bolt to apply pressure then strike the puller bolt smartly with a hammer. This technique will remove most stubborn flywheels.*

18. Remove the Woodruff key from the crankshaft (**Figure 56**).
19. Remove the screws securing the stator assembly (**Figure 57**) and remove the assembly. Note how the wiring is routed.
20. If chain removal is desired, disconnect the

clip securing the master link. Remove the master link and chain.

21. Remove the bolts securing the engine to the frame (**Figure 58**). The number of mounting bolts varies slightly between models. Note the location of the different length bolts as well as the bushings and spacers. On "T" and "X" models, make sure the mounting bolt behind the footpeg is removed (**Figure 59**).

22. Use the kickstarter lever as a handle and carefully lift the engine out of the frame.

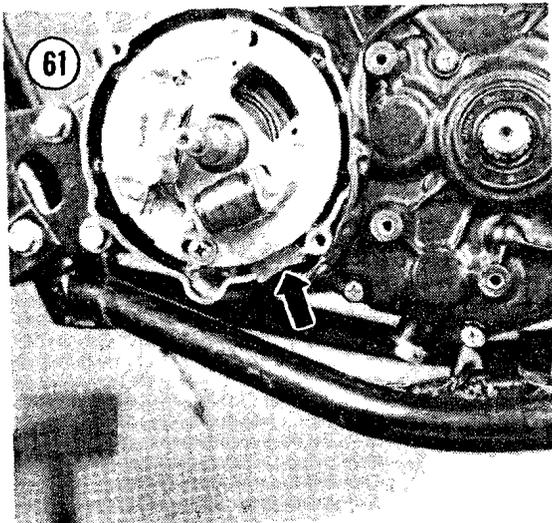
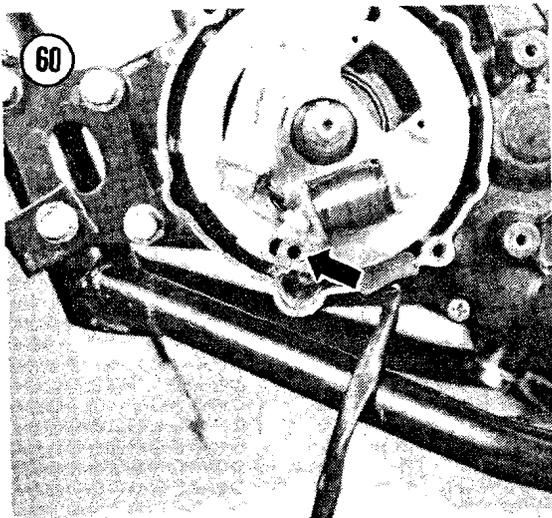


**NOTE**

Some models may be fitted with adjustment shims of differing thickness installed between the engine mounts and the frame. When removing the engine, carefully note the position of each shim, if any, so the shims can be correctly installed during engine installation.

### Engine Installation and External Assembly

1. Tape some rags to the frame to protect the frame and engine paint from scratches. Carefully lift the engine into the frame.
2. Install all mounting bolts from the left side.

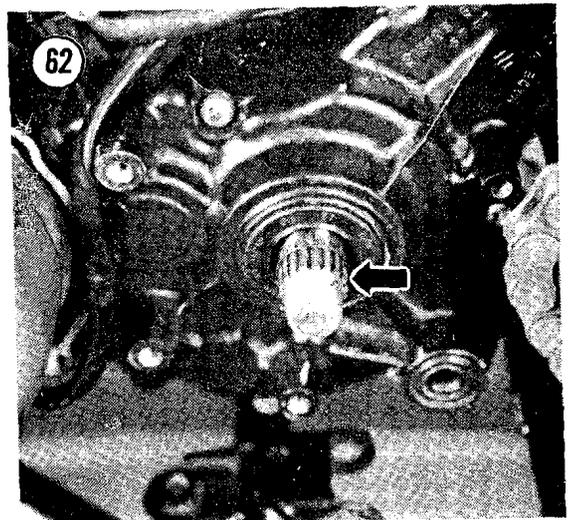


Make sure all bushings and spacers are in place and the correct length bolts are used as noted during removal.

**NOTE**

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

3. Use a feeler gauge and check the clearance between the engine and mounts before tightening the mounting bolts. The maximum allowable clearance is 0.6 mm (0.023 in.). If clearance is greater than specified, refer to **Table 4** and install the required shims.
4. Tighten all engine mounting bolts to the torque specified in **Table 1**.
5. Install the Woodruff key in the crankshaft (**Figure 56**).
6. Install the magneto stator with the timing mark aligned with the center of the screw hole as shown in **Figure 60**. Cinch the stator plate screws with a hammer driven impact tool. Make sure the magneto wires are correctly routed and the grommet is positioned in the crankcase notch as shown in **Figure 61**.
7. Lightly grease the lips of the drive shaft seal. Install a new O-ring over the drive shaft (**Figure 62**). Lightly grease the inside and outside of the spacer and install it with the chamfered end in toward the engine.



8. Install the drive shaft sprocket, folding lockwasher and nut. Install the nut with the recess toward the engine (**Figure 63**). The sprocket nut can be tightened and secured with the folding lockwasher after the drive chain is installed. The drive chain can be used as a holding fixture to keep the engine from turning.

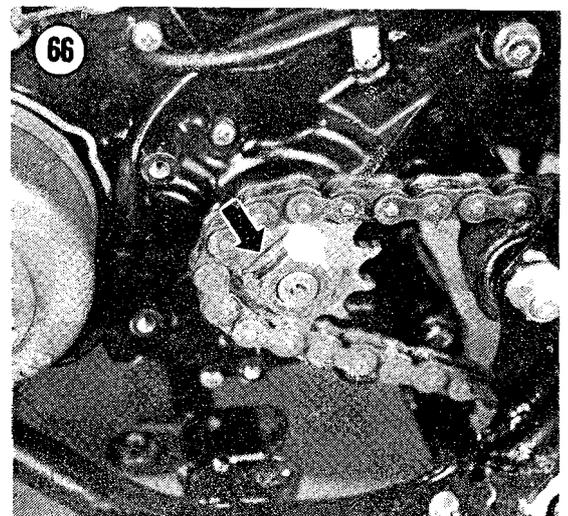
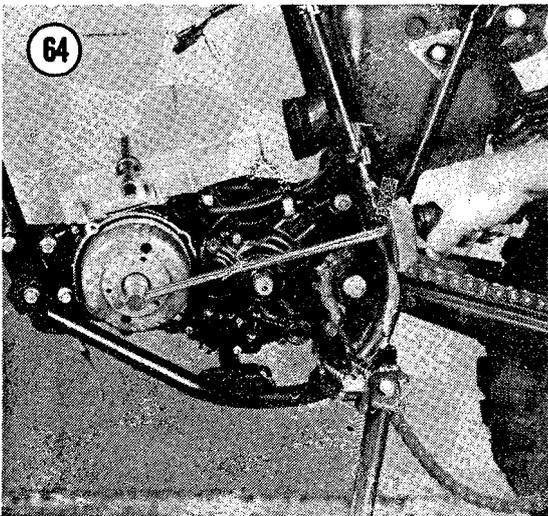
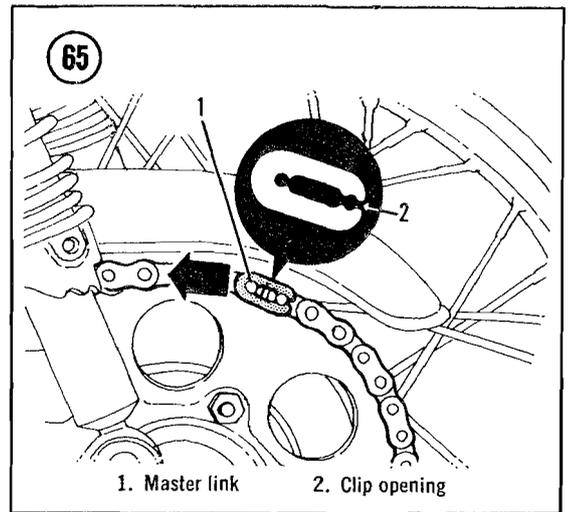
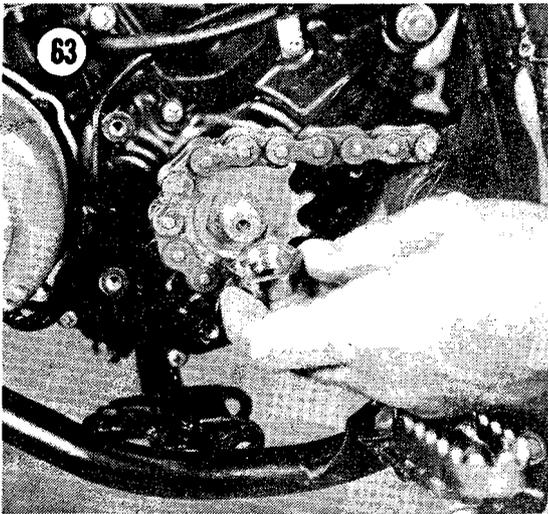
9. Wipe the tapered flywheel end of the crankshaft clean with solvent or lacquer thinner.

10. Install the magneto flywheel and secure it with the lockwasher and nut. Make sure that

the Woodruff key is properly positioned and has not slipped out of the keyway and become lodged between the flywheel and the engine seal. If an air or electric impact tool is not available, set up a crankshaft holding device as outlined earlier in the *Removal* procedure and torque the flywheel nut as specified in **Table 1**. See **Figure 64**.

#### CAUTION

*Before installing the flywheel, carefully examine the magnets. Remove all foreign objects, metal filings, etc. that may have*



*been picked up by the magnets. A small washer or bit of metal "trash" stuck to the flywheel can easily cause serious magneto damage.*

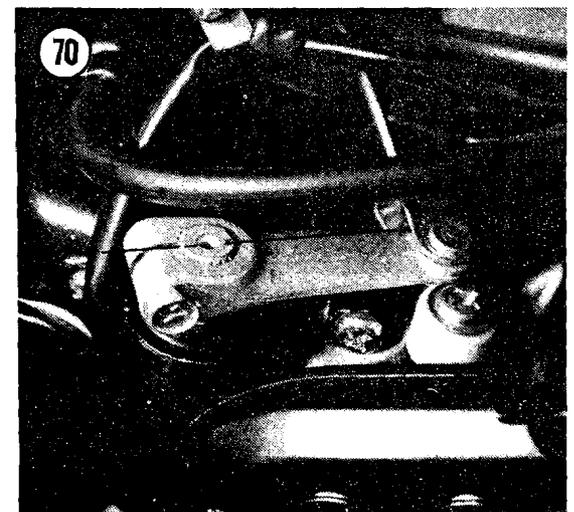
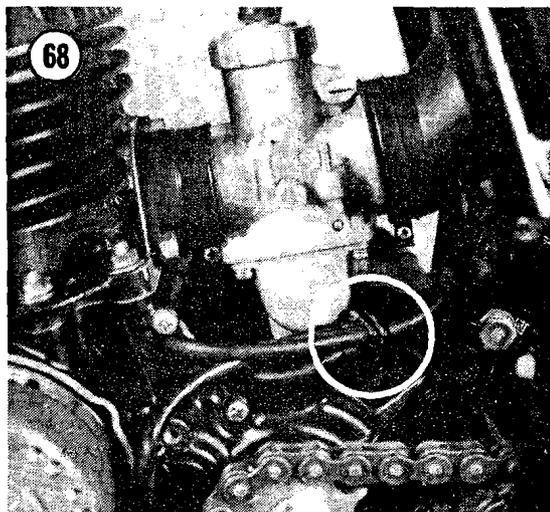
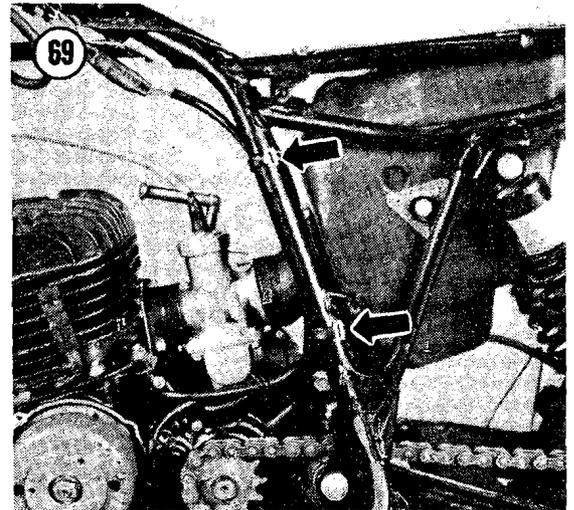
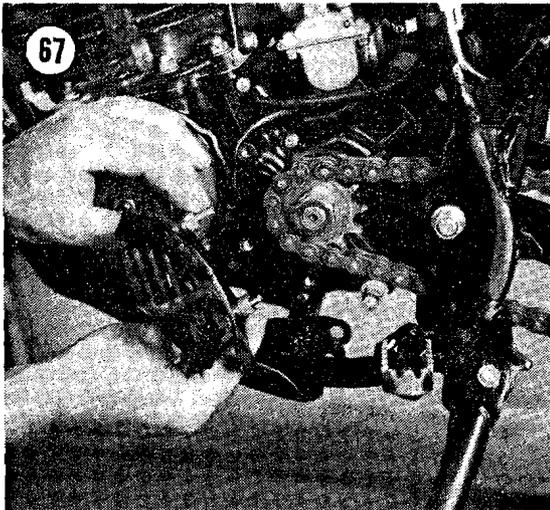
11. Install the drive chain, if removed. Install the master link retaining clip facing forward as shown in **Figure 65**.
12. Torque the engine sprocket nut as specified in **Table 1**. Fold over the locking washer on the sprocket nut as shown in **Figure 66**.
13. Install the sprocket cover. Make sure the

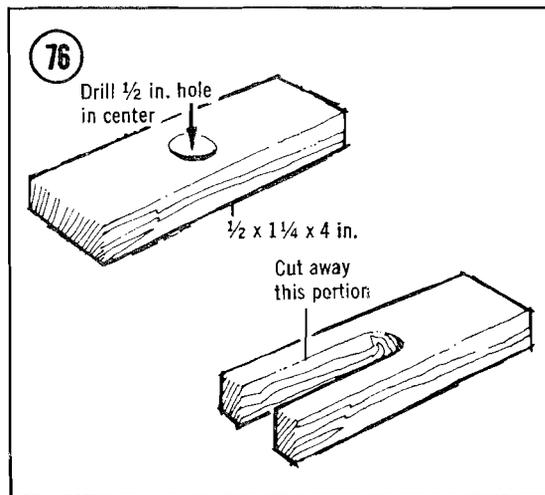
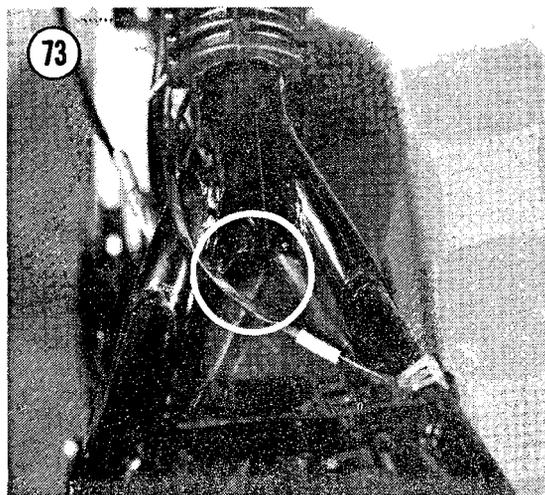
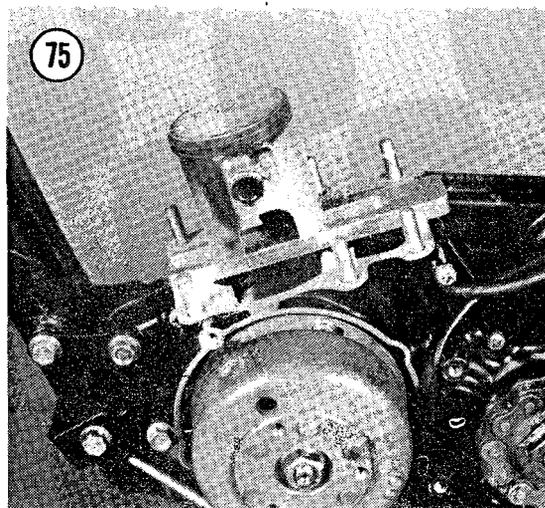
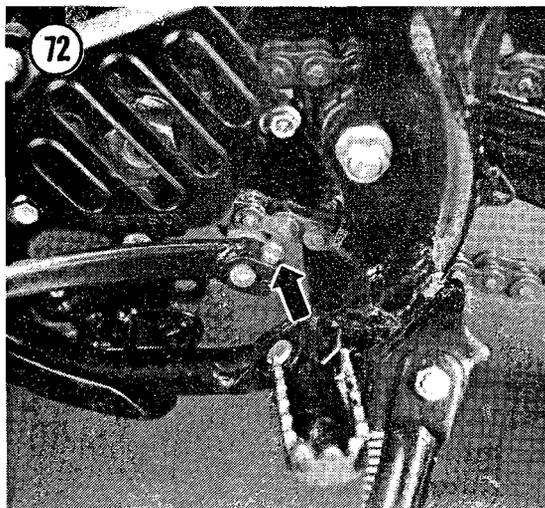
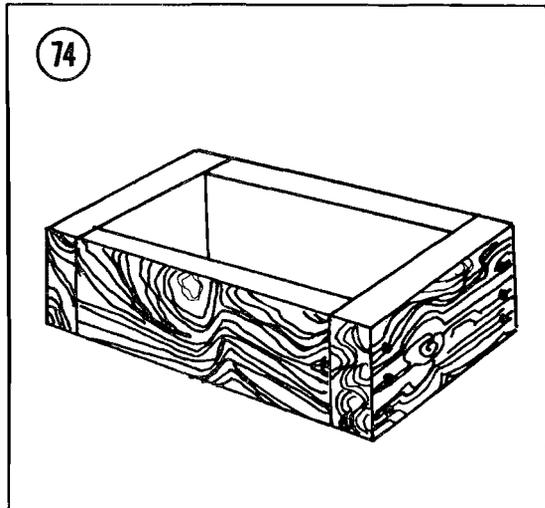
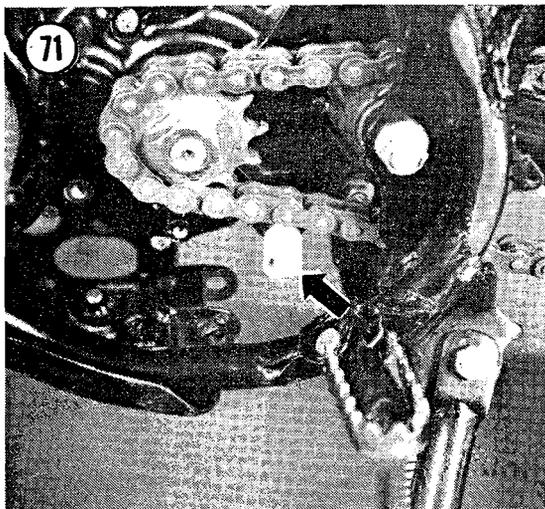
spacers and chain guide plate are correctly positioned (**Figure 67**).

14. Install the magneto cover. Make sure the cover gasket is in good condition and that the grommet is correctly positioned in the cover notch.

15. Secure the magneto lead to the engine and frame as shown in **Figure 68** and **Figure 69**.

16. On PE250T, X and PE400 models, if the clutch release arm was removed, make sure it is installed with the slot aligned with the marks on the pinion shaft (**Figure 70**).





17. Slide the plastic chain protector (**Figure 71**) on the gearshift shaft and install the gearshift lever. Secure the lever with the pinch bolt (**Figure 72**).
18. Install the carburetor and exhaust system as outlined in Chapter Six. Route the main vent tube into the frame tube as shown in **Figure 73**.
19. On applicable models, when installing the oil drain plug, make sure that the gearshift cam stopper and spring are correctly installed.
20. Refer to Chapter Three and perform the following:
  - a. Fill the transmission with recommended oil.
  - b. Perform *Clutch Adjustment*.
  - c. Adjust throttle cable free play.
  - d. Perform *Drive Chain Adjustment*.

#### WARNING

*DO NOT hurry to start or ride the motorcycle. If repairs or a complete overhaul have been performed, you have invested a lot of time and money at this point. Do not take a chance on serious injury or mechanical damage. THOROUGHLY check and recheck all components, systems, and controls on the motorcycle. Make sure all cables are correctly routed, adjusted, and secured. Make sure all bolts and nuts are properly tightened and wires are positioned away from the control levers and the exhaust system. A stuck throttle cable or mis-adjusted drive chain, for example, can easily cause a dangerous spill, resulting in serious injuries as well as expensive damage to the motorcycle.*

### ENGINE LOWER END

#### NOTE

Refer to *Special Tips and General Maintenance Hints* in Chapter One before performing the following procedures.

The crankshaft assembly is made up of 2 full-circle flywheels pressed together on a crankpin. The connecting rod big-end bearing on the crankpin is a needle bearing assembly. The crankshaft assembly is supported in 2 roller bearings.

The 2-piece crankcase splits vertically along the centerline of the connecting rod. Disassembly or splitting of the crankcase provides access to the crankshaft, transmission, gearshifting components and kickstarter assembly.

The following procedures represent a complete, step-by-step process that should be followed if an engine is to be completely reconditioned. However, if you are replacing a known failed part, the disassembly need only to be carried out until the failed part is accessible. Further disassembly is unnecessary as long as you know that the remaining components are in good condition and that they were not affected by the failed part.

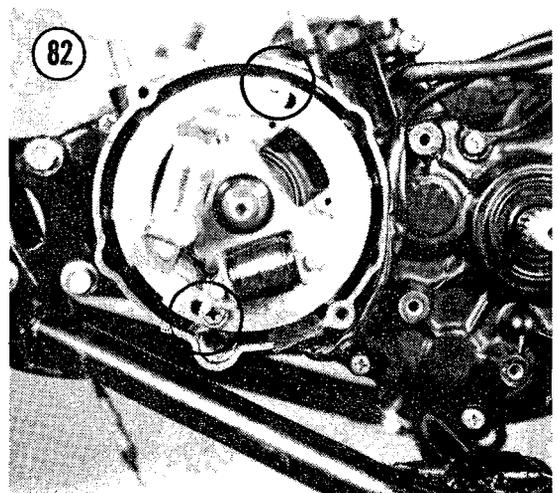
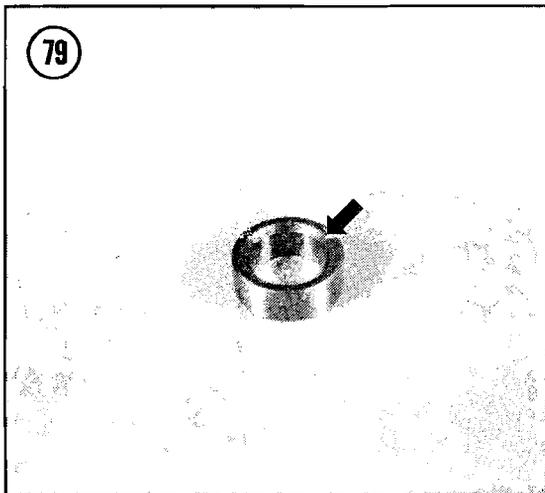
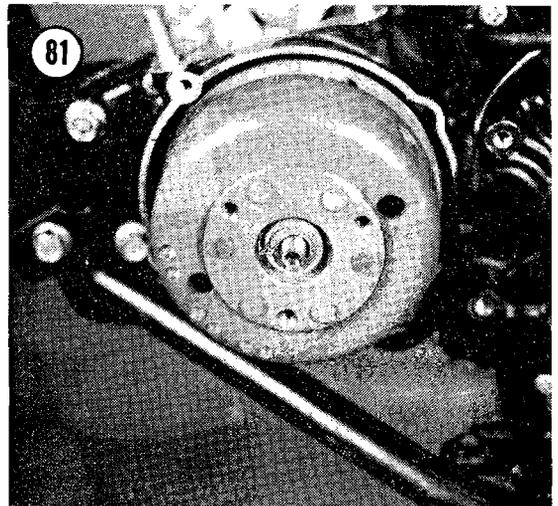
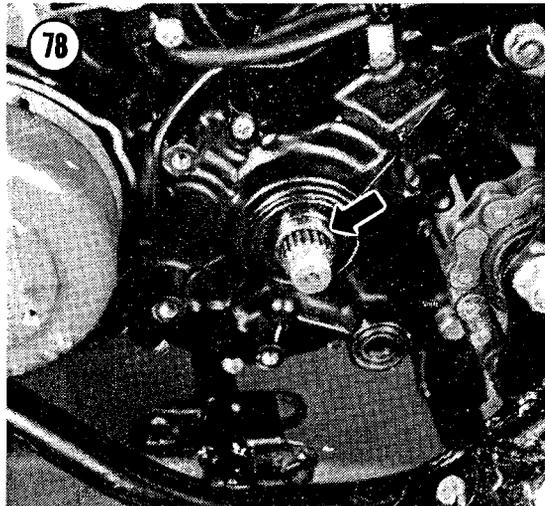
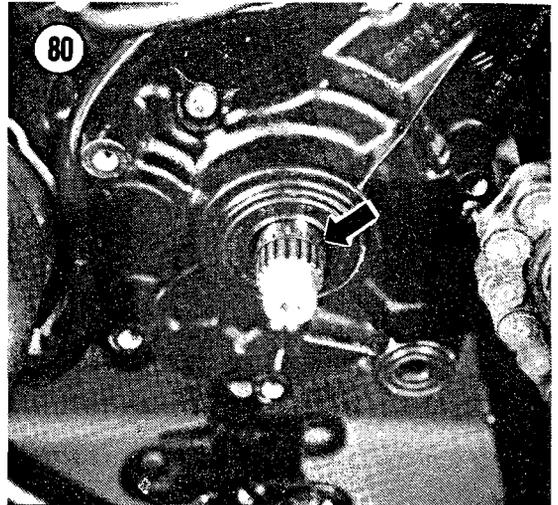
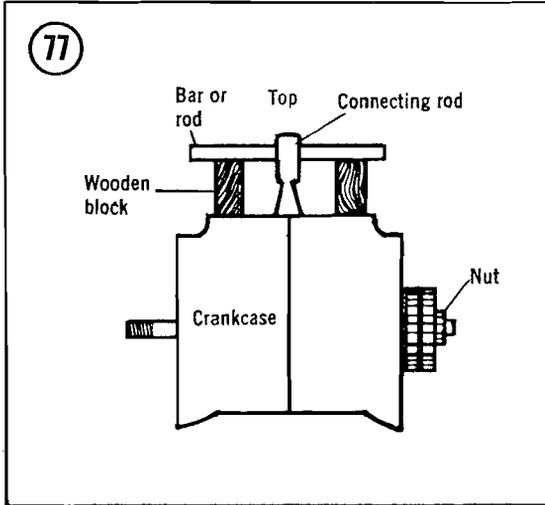
#### Disassembly

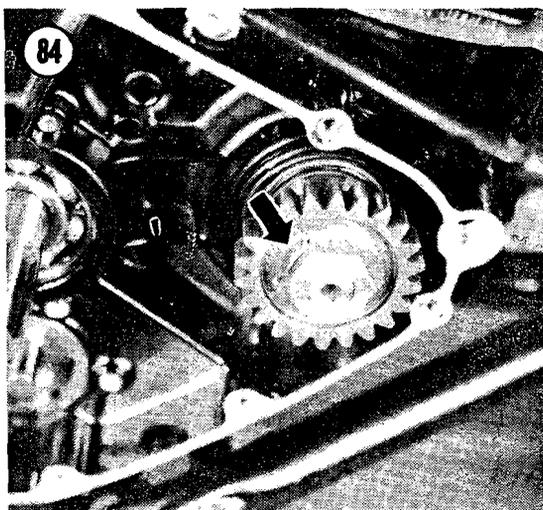
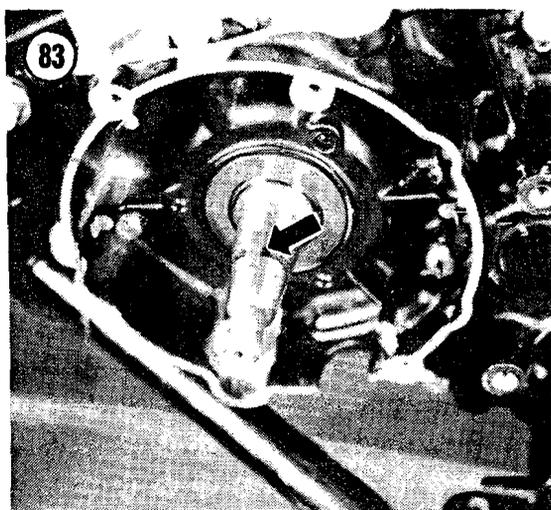
1. Perform the complete engine removal procedure as outlined in this chapter. Several preliminary disassembly steps are performed during engine removal.
2. Remove the cylinder head, cylinder and piston as described earlier in this chapter, if not previously removed.
3. Install the engine on an engine stand or use a holding fixture. If an engine stand is not available a holding fixture can easily be fabricated from 2x4 inch wood as shown in **Figure 74**.

#### NOTE

*If the engine drive sprocket, magneto flywheel and stator assembly were removed during the engine removal procedure, proceed to Step 10.*

*If the sprocket and/or the magneto flywheel securing nuts were not loosened during engine removal, 2 methods may be used to hold the crankshaft from turning. Either of these methods will work to remove the magneto nut, however the clutch must still be installed before these methods can be used to remove the drive sprocket nut. A simple piston holding fixture (**Figure 75**) can be used to hold the connecting rod. Such a holding fixture can easily be made from wood as shown in **Figure 76**. If desired, the connecting rod can also be held as shown in **Figure 77**.*





4. If the holding device shown in **Figure 77** is used, insert the socket extension or bar through the piston pin hole in the connecting rod and rotate the crankshaft counterclockwise (viewed from the left side of the engine) to bring the bar into contact with the 2 blocks of wood set over the crankcase. Make sure the blocks of wood are the same thickness and reach fully across the crankcase opening.

5. Remove the nut securing the drive sprocket and remove the sprocket with the locking washer and spacer (**Figure 78**). Note that the chamfer on the spacer is installed toward the engine (**Figure 79**). Remove and discard the O-ring behind the spacer next to the bearing and seal (**Figure 80**).

6. Remove the nut, flat washer and lockwasher securing the magneto flywheel (**Figure 81**).

#### NOTE

*On PE250T, X and PE400 models, it is not necessary to remove the flywheel or stator assembly unless the crankshaft must be removed. Since no crankcase screws are located behind the stator assembly on these models, the crankcases can be separated with the flywheel and stator assembly installed.*

7. Install a 3-bolt puller on the flywheel. Tighten the center bolt on the puller until the flywheel is loose on the crankshaft. Remove the puller and the flywheel. If the Suzuki slide hammer (part number 09930-30102) is

available, use attachment "F" (part number 09930-30190) to remove the flywheel.

#### CAUTION

*Aftermarket pullers are available from most motorcycle shops or tool suppliers. The cost of such a puller is usually nominal and they make an excellent addition to any mechanic's tool box. If you can not buy or borrow a puller, have a dealer remove the flywheel. Do not try to get by without the necessary puller. Any attempt to remove the flywheel without the proper tool will ultimately lead to some form of engine or flywheel damage.*

#### NOTE

*If the flywheel is difficult to remove, tighten the puller bolt to apply pressure then strike the puller bolt smartly with a hammer. This technique will remove most stubborn flywheels.*

8. Remove the screws securing the stator assembly (**Figure 82**) and remove the assembly. Note how the wiring is routed.

9. Remove the Woodruff key from the crankshaft (**Figure 83**).

10. Refer to Chapter Five and perform *Clutch Removal*. If gearshift mechanism repair is required, the external gearshift components can also be removed at this time.

11. If an air or electric impact tool is not available, set up a crankshaft holding device as outlined earlier in this procedure.

12. On models so equipped, bend back the fold on the locking washer (**Figure 84**) securing the primary drive gear nut.

**CAUTION**

The primary drive gear nut on all PE250 and PE400 models has a left-hand thread and must be turned clockwise to be removed. Failure to turn the nut correctly may result in over-torquing and possible crankshaft thread damage.

13. Remove the nut securing the primary drive gear (Figure 85). Note that the left-hand thread nut on most, but not all, models is stamped with the letter "L" indicating it is a left-hand thread.

14. Remove the folding or spring steel washer next to the primary gear.

**NOTE**

Models not equipped with folding lockwashers are equipped with a spring steel washer behind the primary gear nut. The spring steel washer has a slight cone shape. The cone (raised center) of the washer is installed toward the nut (away from the engine).

15. Slide the primary drive gear off the crankshaft (Figure 86).

16. Gently tap out the Woodruff key on models so equipped (Figure 87).

17. Remove the spacer (Figure 88). Note the spacer used on "T" and "X" models has a machined bevel (Figure 89) on each side.

18. On all "T" and "X" models, remove the O-ring from the crankshaft (Figure 90).

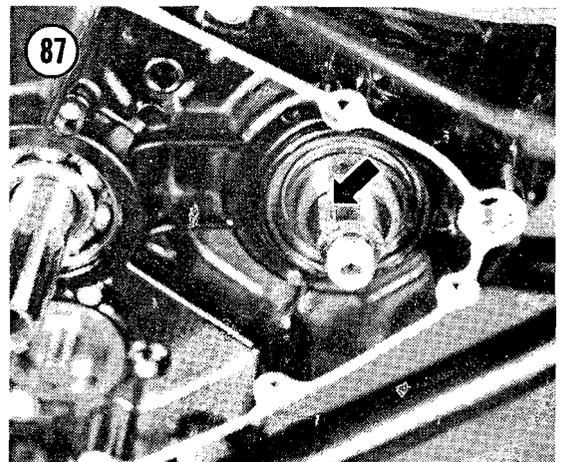
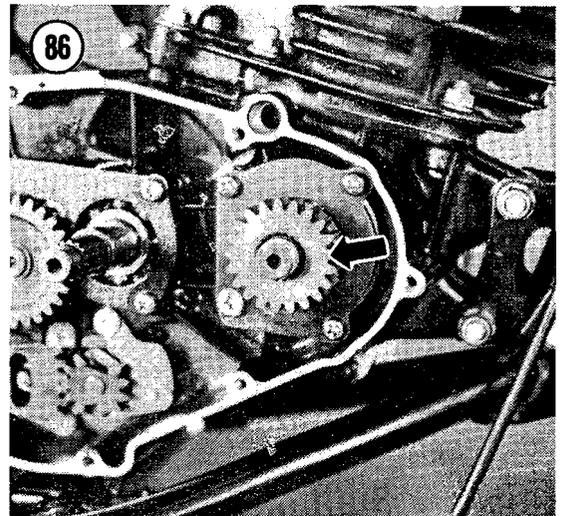
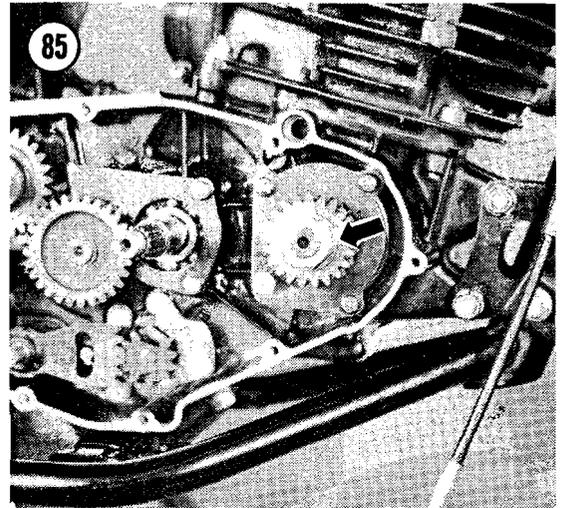
19. Remove the large washer next to the crankshaft bearing on models so equipped (Figure 91).

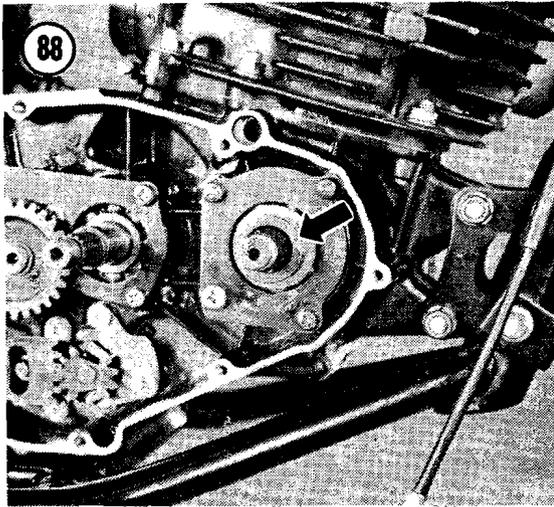
20. Use a hammer driven impact tool and remove the screws securing the crankcase halves (Figure 92).

**NOTE**

Before separating the crankcases, cut a cardboard template approximately the size of the crankcase and punch holes in the template for each screw location. Place the screws in the template holes as they are removed. This will greatly speed up the assembly time by eliminating the search for the correct length screw.

21. Use a plastic or rubber mallet and tap around the seam of the crankcase halves to



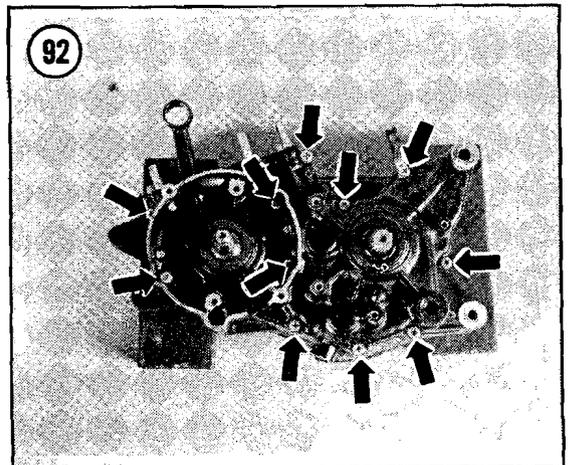
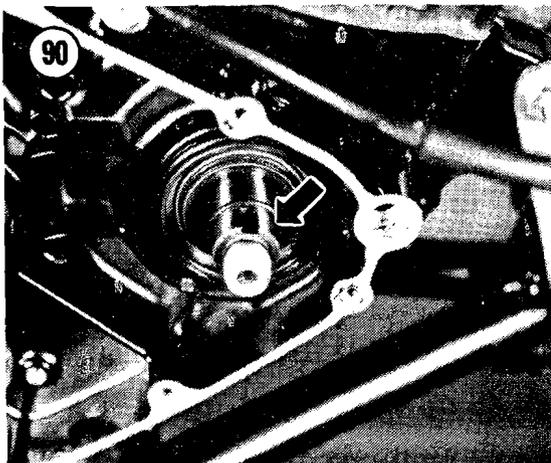
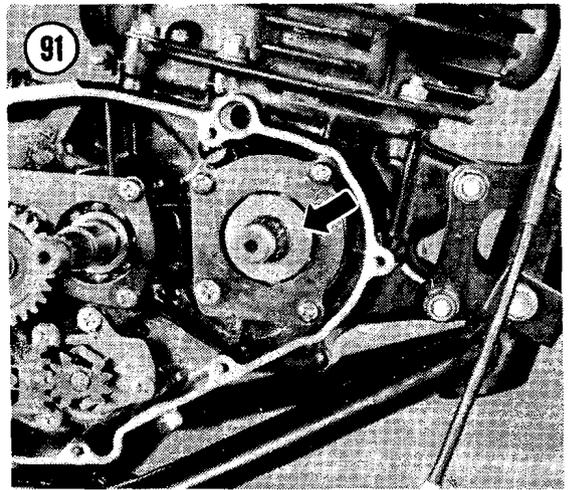
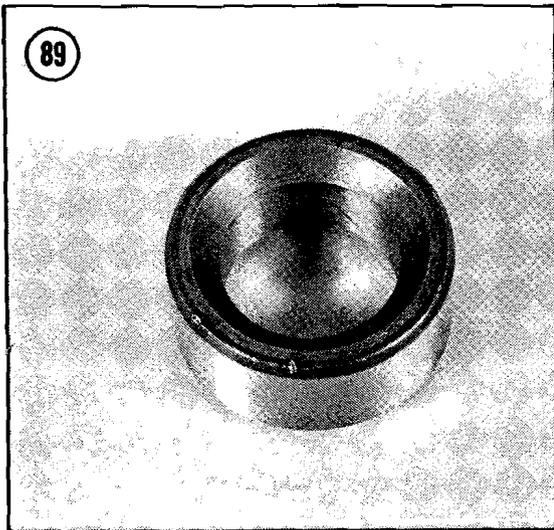


help break the seal loose. If the crankcase halves are difficult to separate, it may be necessary to use a puller to remove the right crankcase half. Many universal type pullers will work or use the recommended Suzuki puller (part No. 09920-13111). If the proper tools are not available, have the crankcases separated by a dealer. Do not risk expensive crankcase damage with improper tools or techniques.

**CAUTION**

*Never attempt to pry the crankcase halves apart with a screwdriver or similar sharp instrument or the sealing surfaces of the crankcases will be damaged. The crankcases are a matched set and are very expensive. Damage to only one crankcase half necessitates replacing the entire set.*

4



The crankcase puller can be installed on either half of the crankcase, however, it is generally preferred and easier to remove the right crankcase half and leave the transmission and gearshift mechanism installed in the left crankcase half.

**NOTE**

*If the gearshift shaft is still installed and the crankcase halves are difficult to separate, check the condition of the shift shaft on the left side of the engine. If the motorcycle has ever been in a hard spill, the gearshift shaft may be slightly bent. If the shaft is bent it is very difficult to straighten without subjecting the left case to abnormal stress where the shaft enters the case.*

*If the shaft is bent enough to prevent the cases from separating, there is little recourse but to cut the shaft off with a hacksaw very close to the case. It is much cheaper in the long run to replace the shaft than risk damaging a very expensive set of matched crankcases.*

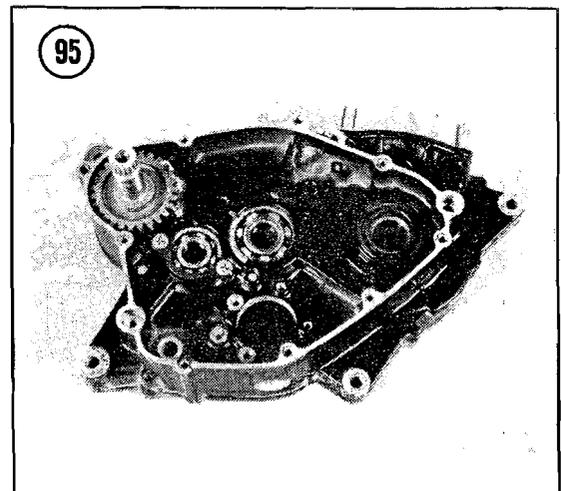
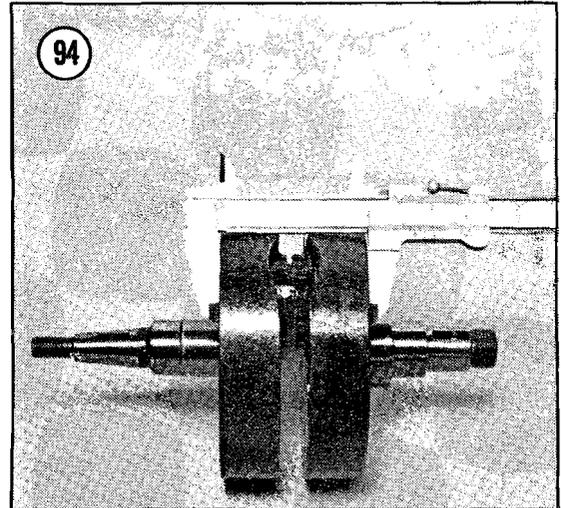
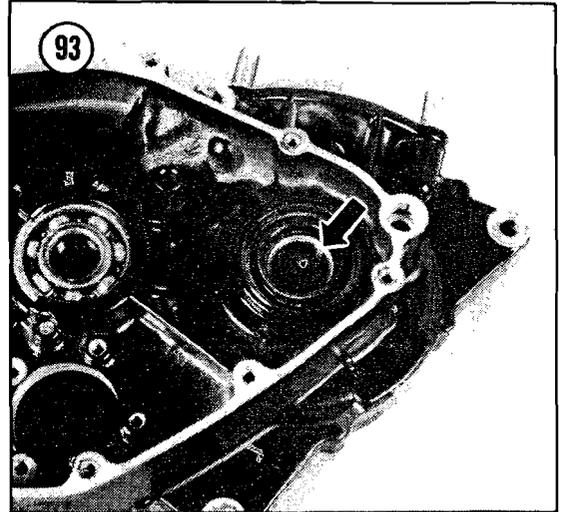
*Also check for slight burrs on the shaft that may have been caused by a broken chain wrapping around the gearshift shaft. A chain adjusted too loosely may also cause slight burrs. Such burrs can usually be removed with a small file.*

22. The crankshaft can be removed at this time, if desired, by tapping it out with a rubber or plastic mallet. It is not necessary to remove any transmission or gearshift mechanism components unless desired for inspection and/or repair.

**CAUTION**

*If the crankshaft is difficult to tap out with a rubber or plastic mallet, refer the task to a dealer. Improper techniques or excessive force may damage the crankshaft or cause crankshaft misalignment.*

23. At this point of disassembly, major service can be performed on all internal engine parts. Crankshaft and transmission seals and bearings can be removed and installed and all critical inspections can be performed. The crankshaft seals should always be routinely replaced each time the



crankcase is disassembled. Refer to *Bearing and Seal Replacement* in this chapter.

24. Perform *Inspection*.

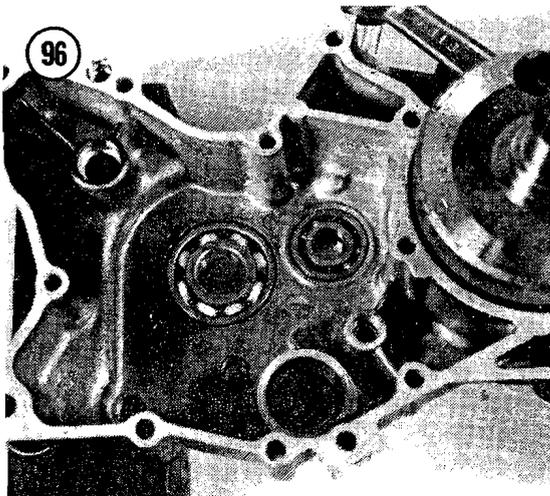
### Inspection

Except for preliminary checks, all crankshaft service and repair should be entrusted to a dealer. The crankshaft is pressed together and requires a heavy duty hydraulic press to separate it and assemble it as well as considerable expertise to correctly align it.

1. Carefully examine the condition of the crankshaft bearings (**Figure 93**). The bearings must spin freely without excessive play or roughness. If there is any doubt as to the condition of the bearings, have them inspected and/or replaced by a dealer. Refer to *Bearing and Seal Replacement* as outlined in this chapter.

2. Measure the big end side clearance on the connecting rod by measuring the overall width of the crankshaft. Use accurate calipers and measure the outside dimension of the crank halves as shown in **Figure 94**. Refer to **Table 5**. If the outside dimension is not as specified, have the crank halves repositioned by a dealer or competent machine shop.

3. Have a dealer or machine shop check the connecting rod deflection and crankshaft runout with a dial indicator and V-blocks. Refer to **Table 5** for crankshaft service specifications.



4. Check the crankcase halves outside and inside (**Figure 95** and **Figure 96**) for cracks or fractures in the stiffening webs, around the bearing bosses, and at threaded holes. While the likelihood of such damage is rare, it should be checked for, particularly following a major malfunction such as a bearing, piston or gear failure or after a collision or hard spill. If cracks or fractures are found, they should be repaired (if possible) by a welding shop experienced in and equipped to perform repairs on precision aluminum castings.

### WARNING

*While the crankcase halves are aluminum and repairable, the magneto covers and clutch covers on most models are magnesium and are marked as such. No attempt should be made to repair magnesium parts unless special welding equipment for magnesium is used. Magnesium can ignite and burn like a flare causing an extremely dangerous fire hazard.*

5. Refer to Chapter Five for inspection procedures on all clutch, transmission, gearshift, kickstarter and primary gear components.

### Assembly

### CAUTION

*During all phases of engine assembly, frequently rotate the crankshaft and other moving parts. If any binding or stiffness is present, find out why and correct the problem before continuing the assembly. An engine that feels rough when rotated by hand will not "wear in." Such an engine will likely cause expensive damage to itself if run.*

1. Make sure all engine parts are clean and all fasteners are in good condition. Replace all bolts, nuts, and screws with damaged heads or threads.

2. Carefully remove all traces of old gasket from the sealing surfaces on both crankcase halves. Use a wooden scraper or similar device to clean off the old sealant. Never use a metal scraper or the sealing surfaces can be damaged. Wipe the surfaces clean with solvent or lacquer thinner.

3. Lightly grease the lips of the crankshaft seals. Use a soft faced hammer or a block of wood and tap the crankshaft into place in the right crankcase half (**Figure 97**).

**CAUTION**

*The crankshaft must be gently tapped into place or the crankshaft alignment will be disturbed.*

4. If transmission, internal gearshift, or kickstarter components were removed for repair, install them at this time. Refer to Chapter Five for applicable installation procedures.

5. Check that all components are correctly installed and the thrust washer on the end of the drive shaft is in place (**Figure 98**).

6. Install a new gasket on the crankcase and align it with the dowel pins (**Figure 99**).

**CAUTION**

*Do not use gasket sealer on the crankcase gasket or oil leaks may occur. Suzuki gaskets are designed to swell when in contact with oil.*

7. Carefully install the right crankcase half and tap it gently into place. The dowel pins should align and both sealing surfaces should fit together. If the crankcase half does not fit down fully, stop and investigate the interference.

**CAUTION**

*The crankcase halves should fit together without force. If they do not fit together fully, do not attempt to pull them together with the crankcase screws or the crankcases will be damaged.*

8. When the crankcases are properly fitted, install the crankcase screws. Tighten the screws gradually and evenly in a crisscross pattern. Cinch the screws with a hammer driven impact tool, however, take care not to overtighten them.

**NOTE**

*Use a small amount of a thread locking compound such as blue Loctite (Lock 'N' Seal No. 2114) on all crankcase assembly and external gearshift fasteners.*

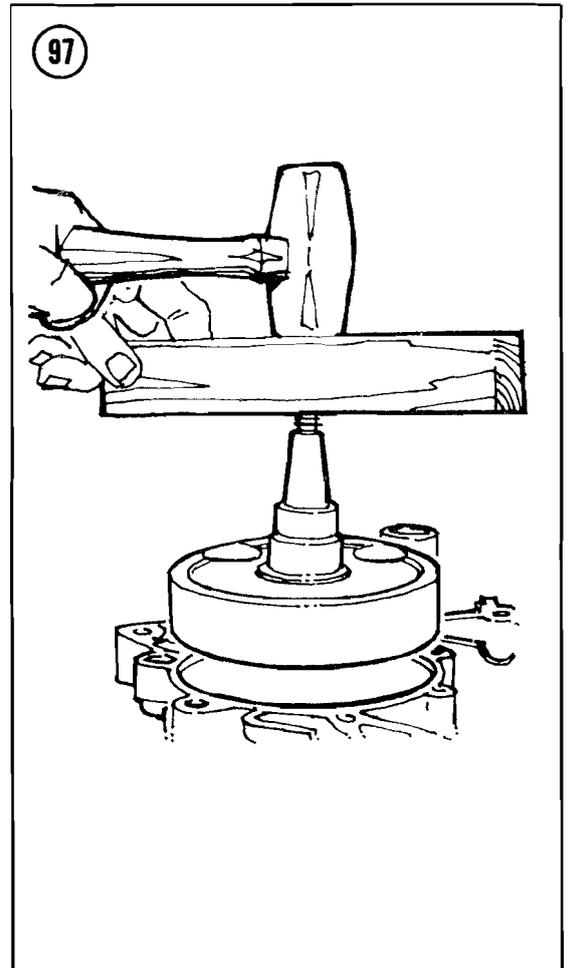
9. On all "T" and "X" models, lightly grease and install a new O-ring on the crankshaft next to the bearing (**Figure 100**). Install the spacer with the bevel positioned in toward the bearing.

10. Install the flat washer next to the bearing on models so equipped (**Figure 101**).

11. Install the Woodruff key if so equipped.

12. Install the spacer and primary drive gear. Install the spring steel washer or the folding lockwasher. Make sure the spring steel washer is installed with the cone facing toward the nut.

13. If an air or electric impact tool is not available, set up a crankshaft holding device as outlined earlier in the *Disassembly* procedure.



Install the nut securing the primary drive gear. The nut on all PE250 and PE400 models has left-hand threads. The nut is stamped with the letter "L" indicating it is a left-handed thread on most, but not all models. The nut must be turned counterclockwise to be installed. Torque the primary drive gear nut as specified in **Table 1**.

14. Refer to *Engine Installation* and complete the assembly of the external components after the engine is installed in the frame.

### BEARING AND SEAL REPLACEMENT

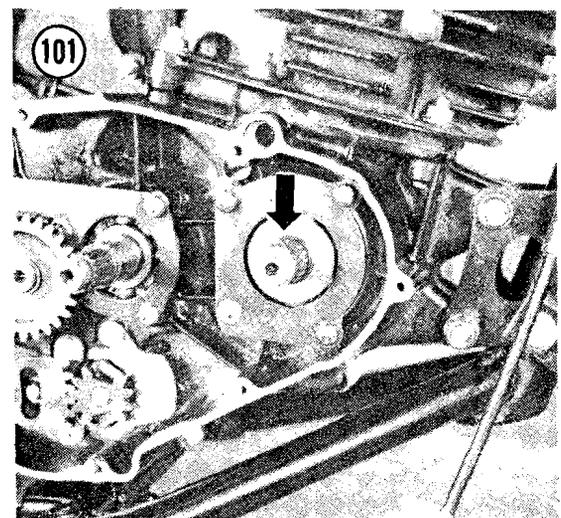
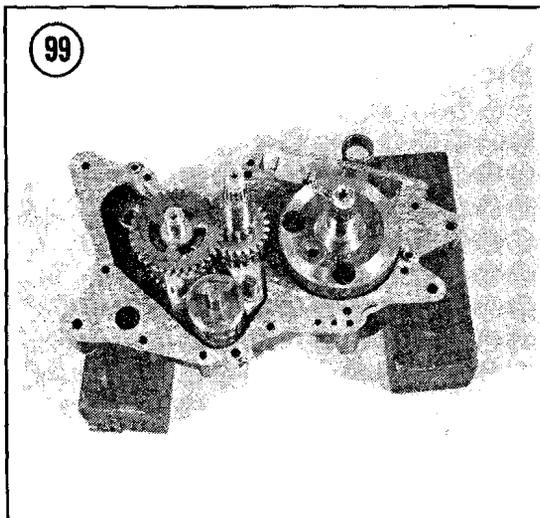
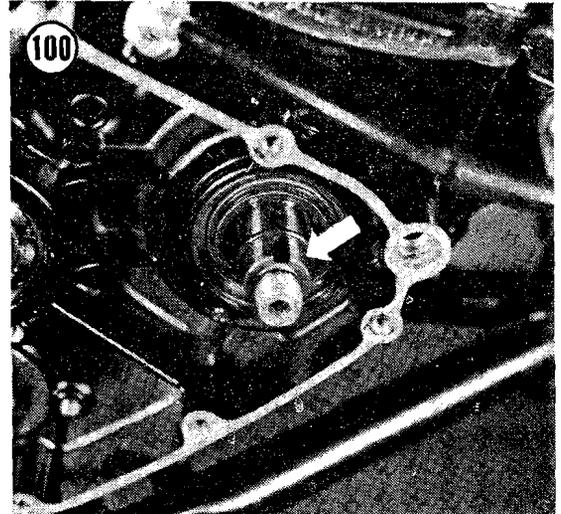
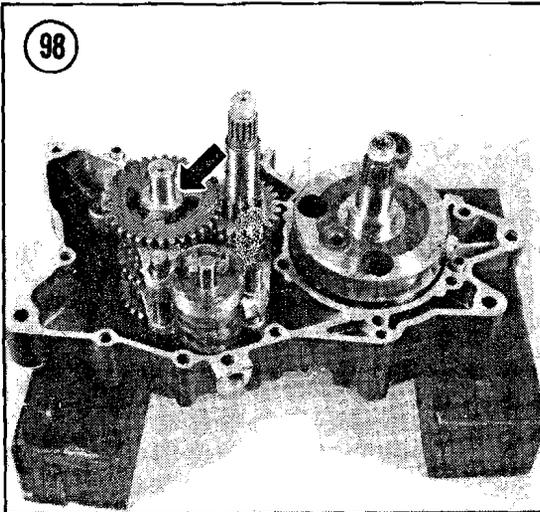
The crankshaft seals should always be replaced whenever the engine is

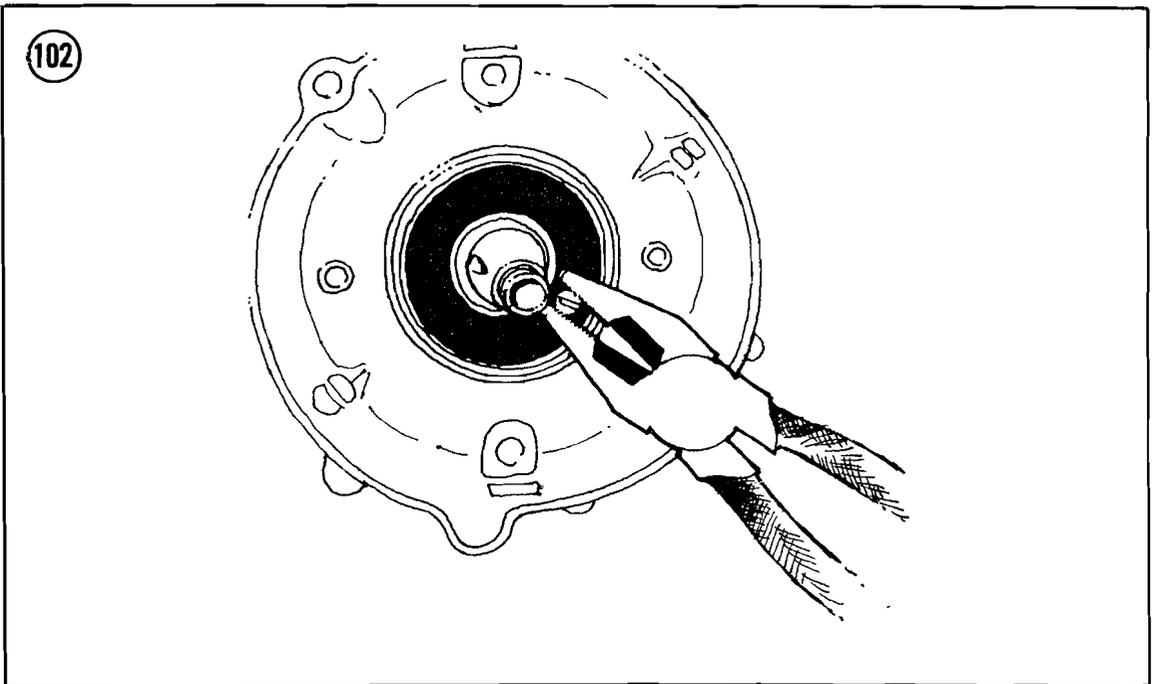
disassembled. Crankshaft and transmission bearings should be replaced if there is any doubt as to their condition.

The bearings and seals are installed in the crankcases with an interference fit. If possible, heat the crankcases in an oven to about 100 degrees C (212 degrees F) to aid in removing the bearings and/or seals.

#### CAUTION

*Heating crankcases should only be done in an oven, not with a torch. It is virtually impossible to obtain an overall and uniform heating with a torch, and the likelihood of warping the crankcase is great.*





When the crankcase is properly heated, pry out the old seal. If the seal is particularly stubborn to remove, use an awl to punch a small hole in the steel backing of the seal. Install a small sheet metal screw into the seal and lever the seal out as shown in **Figure 102**. Make sure you do not install the screw too deep or it may contact the bearing behind it.

When removing bearings, it is necessary to first remove the applicable bearing retainers. Heat the case as described and rap the case sharply on a soft wooden surface to release the bearing from the bore.

If the bearings are stubborn to remove, they can be gently tapped out with a socket or piece of pipe the same size as the bearing outer race. Install the new bearings while the crankcases are still hot.

Installation of new seals and bearings is best performed with special tools, however, a proper sized socket or piece of pipe can be substituted. Make sure that bearings and seals are not cocked in the hole and that they are seated properly. If bearing and/or seals are difficult to remove or install, do not take a chance on expensive crankcase damage. Have the work performed by a dealer or competent machine shop.

Table 1 ENGINE  
TORQUE SPECIFICATIONS

Item	mkg	ft.-lb.
Cylinder head nut		
PE250B, C	1.9-2.5	14-18
PE175C, N; PE250N	2.3-2.7	17-20
PE175T, X; PE250T, X; PE400	2.0-2.5	15-18
Magneto flywheel nut		
All models	3.0-4.0	22-29
Primary drive gear nut		
All models	4.0-6.0	29-43
Clutch sleeve hub nut		
All models	4.0-6.0	29-43
Engine sprocket nut		
All models	4.0-6.0	29-43
Spark plug	2.5-3.0	18-22

Table 2 PISTON AND  
CYLINDER SPECIFICATIONS

	Standard	Limit
Cylinder inner diameter		
PE175	62.000-62.015 mm (2.4409-2.4415 in.)	62.070 mm (2.4436 in.)
PE250	67.000-67.015 mm (2.6378-2.6383 in.)	67.070 mm (2.6405 in.)
PE400	85.000-85.015 mm (3.3465-3.3470 in.)	85.070 mm (3.3492 in.)
Piston diameter		
PE175C	61.935-61.950 mm (2.4383-2.4389 in.)	61.800 mm (2.4330 in.)
PE175N, T, X	61.935-61.950 mm (2.4383-2.4389 in.)	61.880 mm (2.4362 in.)
PE250B, C	66.935-66.950 mm (2.6352-2.6358 in.)	66.800 mm (2.6299 in.)
PE250N, T, X	66.935-66.950 mm (2.6352-2.6358 in.)	66.880 mm (2.6330 in.)
PE400	84.935-84.950 mm (3.3438-3.3444 in.)	84.880 mm (3.3417 in.)
Piston-to-cylinder clearance		
All models	0.060-0.070 mm (0.0023-0.0280 in.)	-----
Piston measuring point (measure from the bottom of the piston)		
PE175	26 mm (1.02 in.)	
PE250	22 mm (0.87 in.)	
PE400	26 mm (1.02 in.)	

Table 3 PISTON RING SPECIFICATIONS

	Standard
Ring-to-groove clearance	
PE175C	0.01-0.016 mm (0.0004-0.0006 in.)
PE175N; PE250N	0.01-0.05 mm (0.0004-0.0019 in.)
PE175T, X	0.02-0.06 mm (0.0008-0.0024 in.)
PE250B, C	0.01-0.02 mm (0.0004-0.0008 in.)
PE250T, X	0.01-0.05 mm (0.0004-0.0019 in.)
PE400	0.03-0.07 mm (0.0011-0.0028 in.)
Ring end gap	
PE400	0.3-0.5 mm (0.0118-0.0196 in.)
All other models	0.2-0.4 mm (0.0078-0.0157 in.)
Ring free end gap	
PE175; PE250B, C, T, X	approximately 6.5 mm (0.26 in.)
PE250N	approximately 7.5 mm (0.30 in.)
PE400	approximately 9.5 mm (0.37 in.)

Table 4 ENGINE MOUNTING SHIMS

Shim	Suzuki part number
1 mm for 8 mm bolt	09169-08022
0.6 mm for 8 mm bolt	09169-08023
1 mm for 10 mm bolt	09169-10011
0.6 mm for 10 bolt	09169-10012

Table 5 CRANKSHAFT AND CONNECTING ROD SPECIFICATIONS

Crankshaft runout	
Standard	0.0-0.05 mm (0.0-0.0020 in.)
Service limit	0.05 mm (0.0020 in.)
Connecting rod deflection (small end)	
Service limit	3.0 mm (0.118 in.)
PE175 connecting rod small end bore	
Standard	21.003-21.011 mm (0.8269-0.8272 in.)
Service limit	21.040 mm (0.8283 in.)
PE250 connecting rod small end bore	
Standard	23.003-23.011 mm (0.9056-0.9059 in.)
Service limit	23.040 mm (0.9071 in.)
PE400 connecting rod small end bore	
Standard	25.003-25.011 mm (0.9844-0.9847 in.)
Service limit	25.040 mm (0.9858 in.)
Connecting rod big end wear	
Service limit	0.08 mm (0.003 in.)
Crankshaft web width	
PE175	55.9-56.1 mm (2.201-2.209 in.)
PE250B, C, N	59.9-60.1 mm (2.358-2.366 in.)
PE250T, X	61.9-62.1 mm (2.437-2.445 in.)
PE400	69.9-70.1 mm (2.756-2.764 in.)

June 28, 2007

Thanks to James Grooms, editor, Clymer Publications who granted copyright permission to provide access to the out of print manual, Suzuki PE175-400 Singles, 1977-1981. Other Clymer manuals may be viewed at <http://clymer.com> .

## CHAPTER FIVE

### CLUTCH, TRANSMISSION, AND KICKSTARTER

5

This chapter provides maintenance procedures for the clutch, transmission, gearshift mechanism and the kickstarter.

All clutch components and some gearshift and kickstarter components can be removed with the engine installed in the motorcycle. To remove the transmission, kickstarter and internal components of the gearshift mechanism, it is necessary to remove and disassemble the engine. Refer to Chapter Four for engine removal and disassembly procedures. **Tables 1 and 2** are at the end of the chapter.

#### CLUTCH

The clutch can be removed, inspected and installed with the engine installed in the motorcycle.

Special preparation should be made before performing a complete clutch removal. A locally fabricated holding tool or an impact tool (air or electric) is necessary to remove the nut securing the clutch sleeve hub. Read the *Clutch Removal* procedure first to determine what option is best suited to your situation.

#### Removal/Installation

Refer to **Figures 1 and 2** for this procedure.

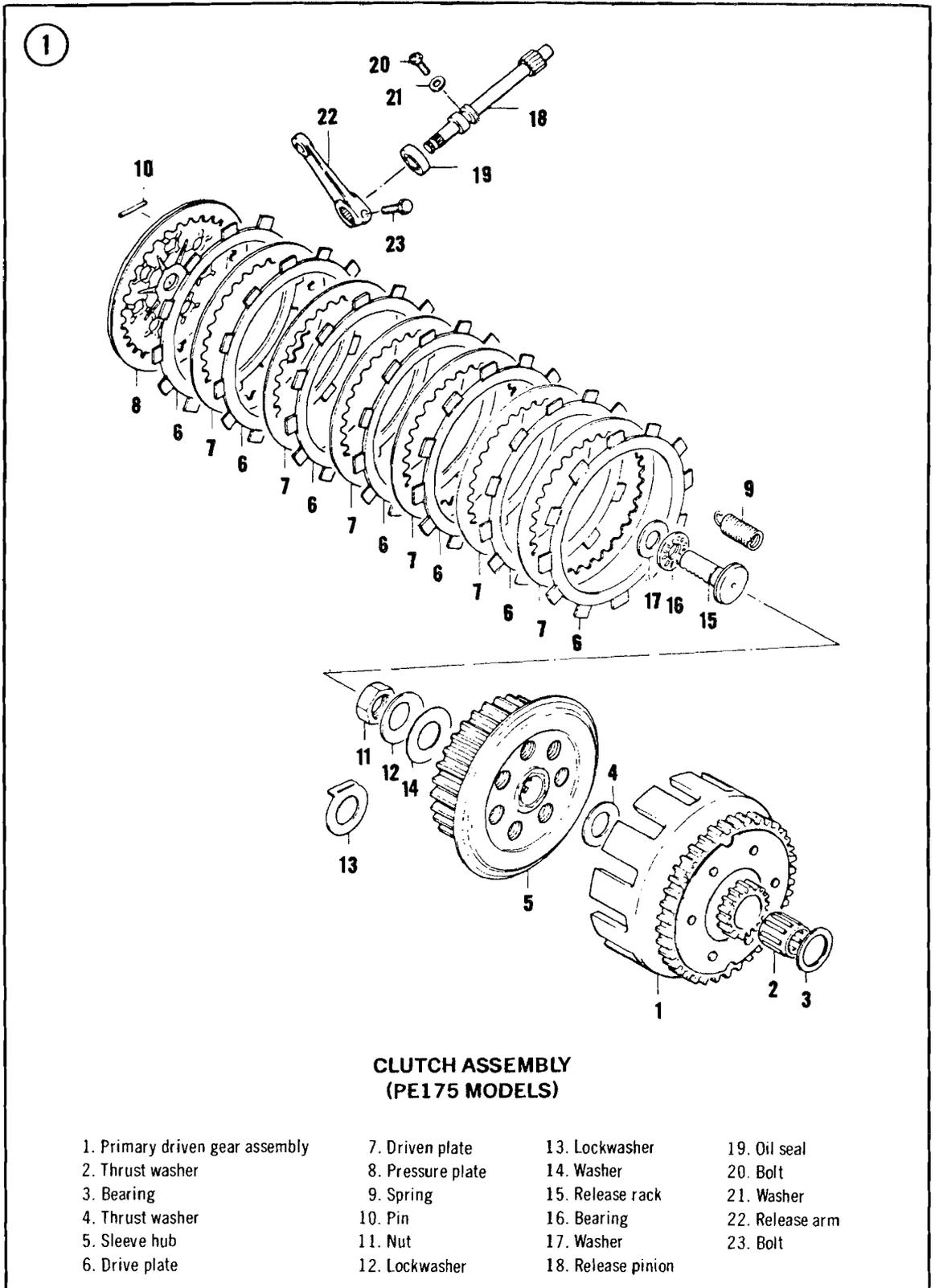
Pay particular attention to the location of thrust washers and spacers.

1. Thoroughly clean the motorcycle at a coin-operated car wash or with detergent and a hose. Make sure the engine and all nuts and bolts are as clean as possible. A clean motorcycle is not only more pleasant to work on, it helps prevent contamination of vital moving parts. Make sure you clean between the engine and the skid plate to expose the clutch cover screws and the transmission drain plug. Clean around all the brake pedal mounting hardware.

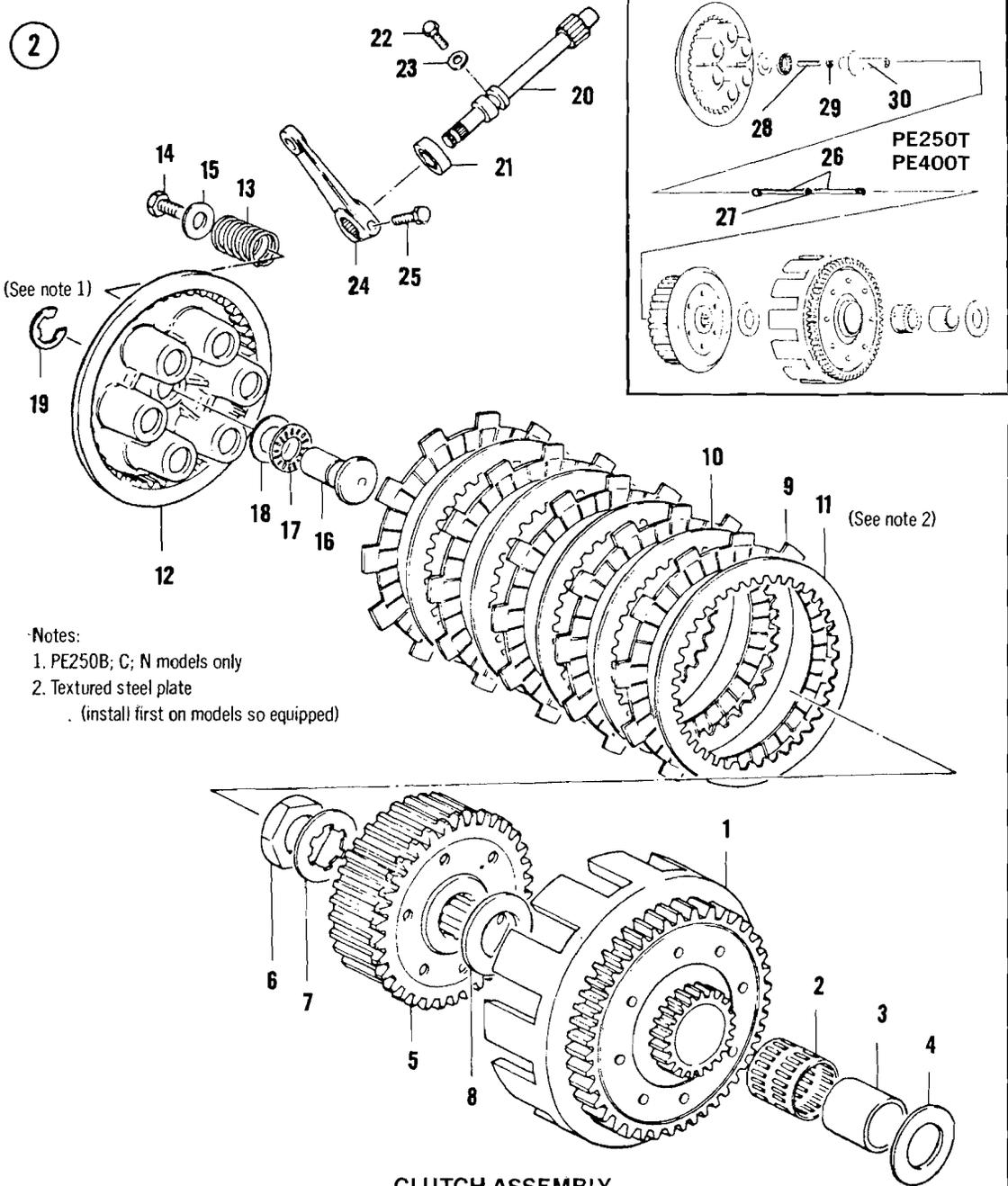
2. Place a drain pan under the engine. Use a socket and remove the transmission drain plug (**Figure 3**). Keep the motorcycle as level as possible and allow several minutes for the oil to drain completely.

#### NOTE

*On all but the PE250B, C, N models, the drain plug is also the gearshift cam stopper housing. Make sure the cam stopper and spring (Figure 4) are not lost in the oil drain pan. On PE250B, C, N models, use a 13/16 in. spark plug socket and remove the rearmost plug from the transmission to drain the oil.*



5



Notes:

- 1. PE250B; C; N models only
- 2. Textured steel plate  
(install first on models so equipped)

**CLUTCH ASSEMBLY  
(PE250 AND PE400 MODELS)**

- |                                 |                          |                    |                      |
|---------------------------------|--------------------------|--------------------|----------------------|
| 1. Primary driven gear assembly | 9. Drive plate           | 16. Release rack   | 23. Washer           |
| 2. Bearing                      | 10. Driven plate         | 17. Thrust bearing | 24. Release arm      |
| 3. Spacer                       | 11. Driven plate (steel) | 18. Thrust washer  | 25. Bolt             |
| 4. Thrust washer                | 12. Pressure plate       | 19. Circlip        | 26. Pushrod          |
| 5. Sleeve hub                   | 13. Spring               | 20. Release pinion | 27. Steel ball       |
| 6. Nut                          | 14. Bolt                 | 21. Oil seal       | 28. Adjuster bolt    |
| 7. Washer                       | 15. Washer               | 22. Bolt           | 29. Adjuster locknut |
| 8. Thrust washer                |                          |                    | 30. Push piece       |

3. On all but "T" and "X" models, remove the pinch bolt securing the kickstarter lever (Figure 5) and remove the lever. On "T" and "X" models, remove the bolt in the end of the kickstarter shaft (Figure 6) and slide off the kickstarter.

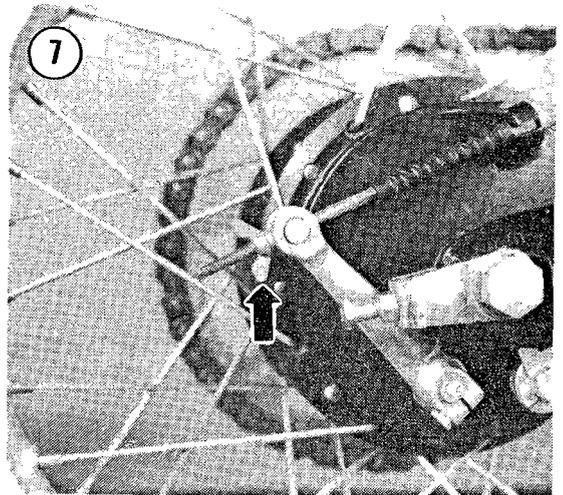
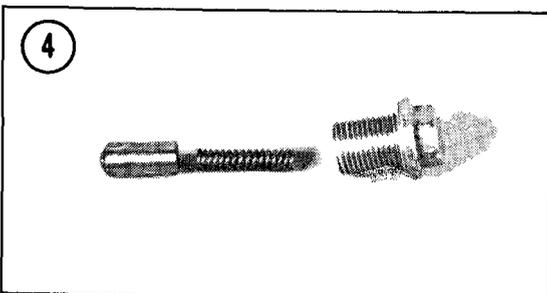
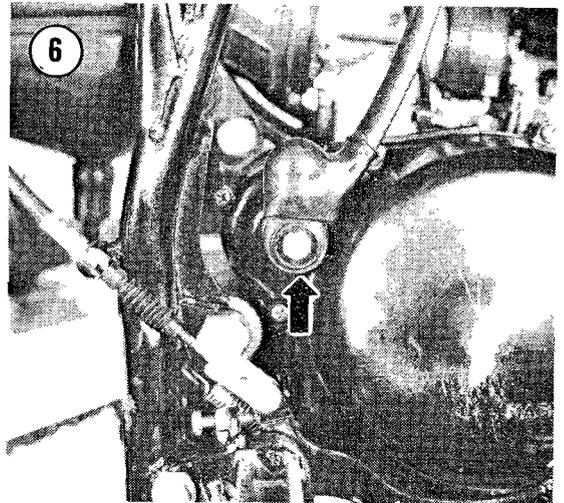
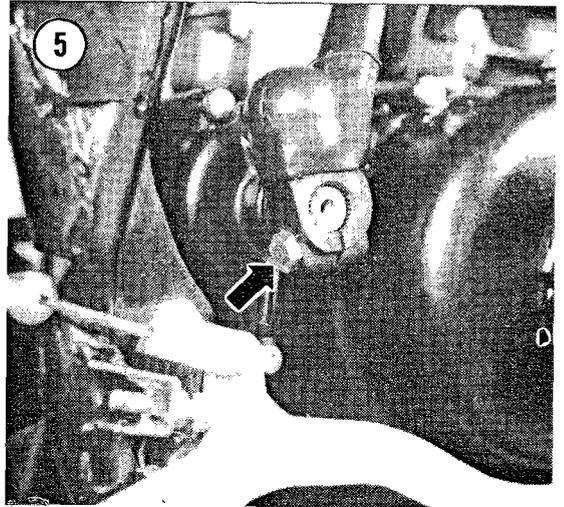
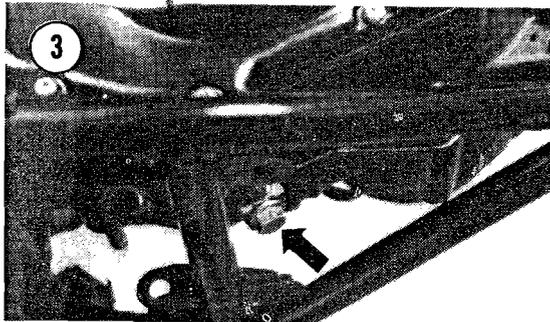
4. Remove the rear brake adjuster nut (Figure 7) and disconnect the brake cable from the brake arm.

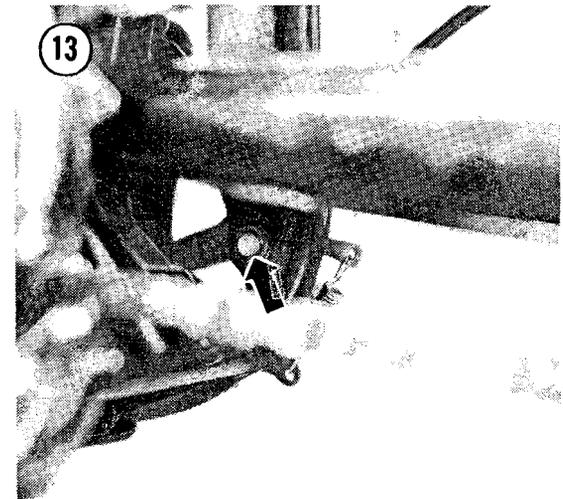
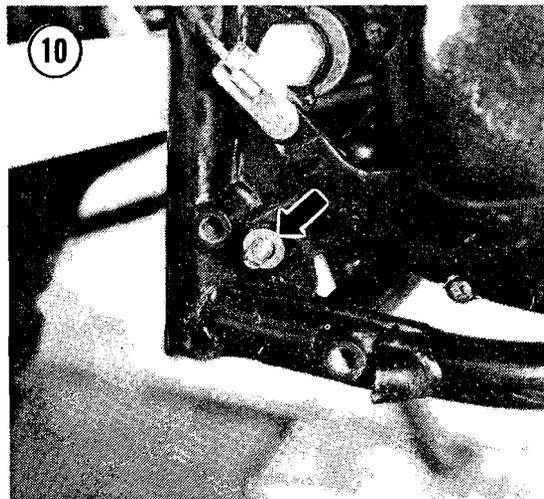
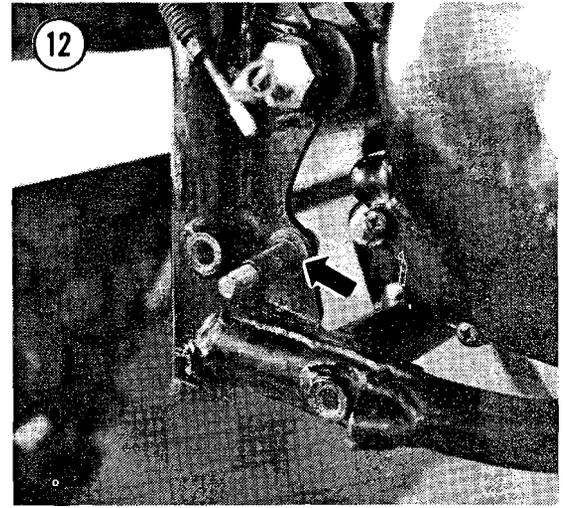
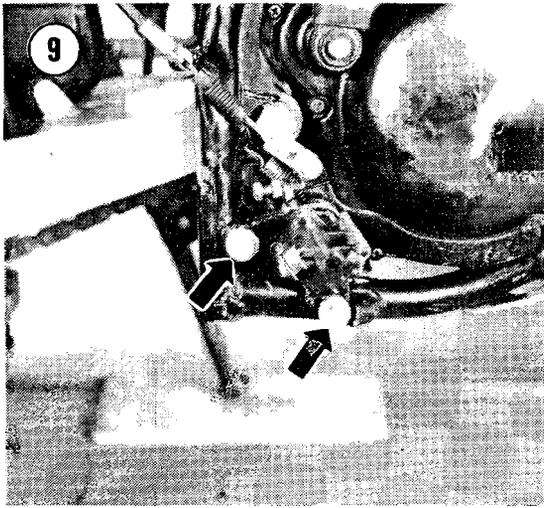
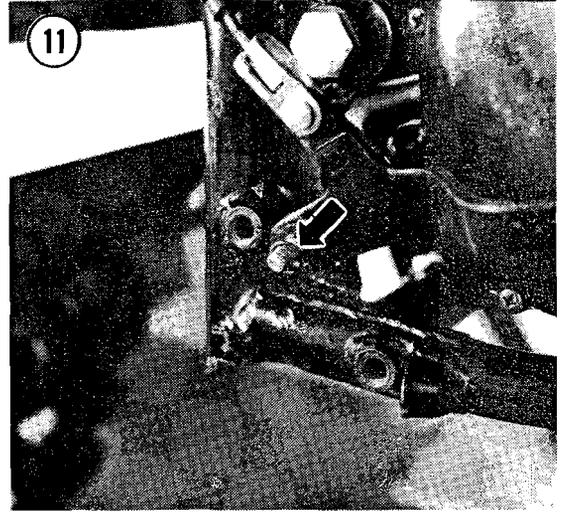
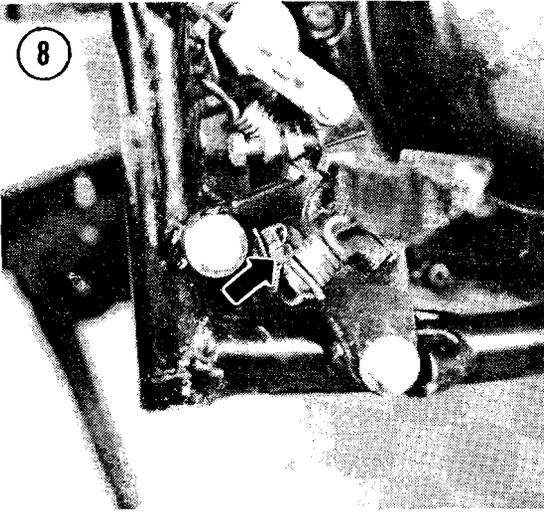
5. On all "T" and "X" models perform the following:

- a. Remove the cotter pin and washer securing the brake pedal to the footpeg bracket (Figure 8).
- b. Remove the 2 bolts securing the right footpeg and remove the footpeg (Figure 9). Disconnect and remove the pedal return spring.
- c. Remove the flat washer (Figure 10) and O-ring (Figure 11) from the pedal shaft.
- d. Disconnect the cable end from the brake pedal and slide the pedal off the shaft. Make sure that the inner O-ring and flat washer are not lost (Figure 12).

6. On all 1979 and earlier models perform the following:

- a. Remove the circlip inside the frame securing the pedal to the pedal bracket (Figure 13).





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- b. Unhook the return spring from the pedal (Figure 14) and disconnect the cable end. Slide the pedal out of the frame.
7. On all but PE250T, X and PE400 models, disconnect the clutch cable from the handlebar lever. Pull on the cable to provide some slack and disconnect the cable end from the clutch release arm (Figure 15). Slide the cable out of the bracket on the clutch cover.
8. Use a hammer driven impact tool and remove the screws securing the clutch cover (Figure 16). On some models it may be necessary to loosen the skid plate mounting bolts and lower the skid plate to gain access to the lower clutch cover screws.

**NOTE**

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

9. Tap around the edge of the clutch cover with a rubber or plastic mallet to help break the cover loose from the engine and remove the cover. Have a few rags handy as some oil is bound to run out.

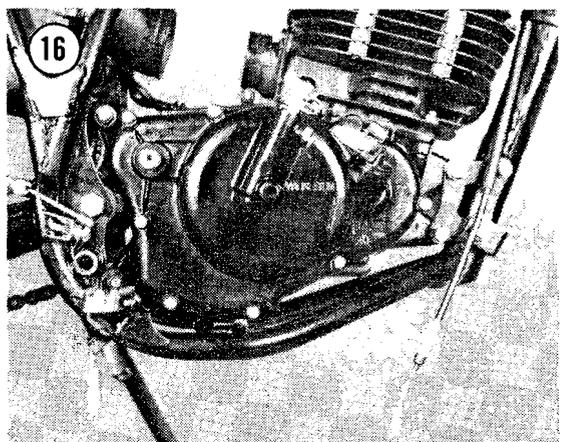
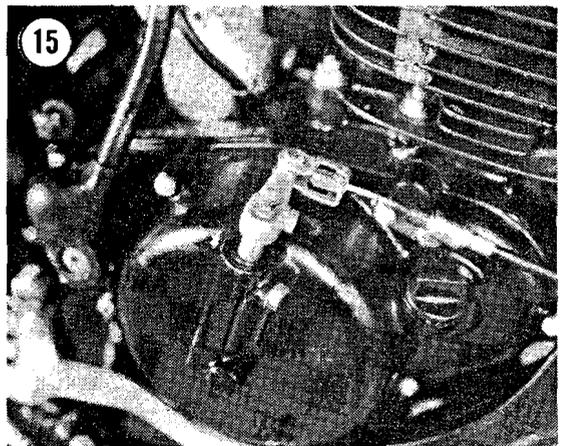
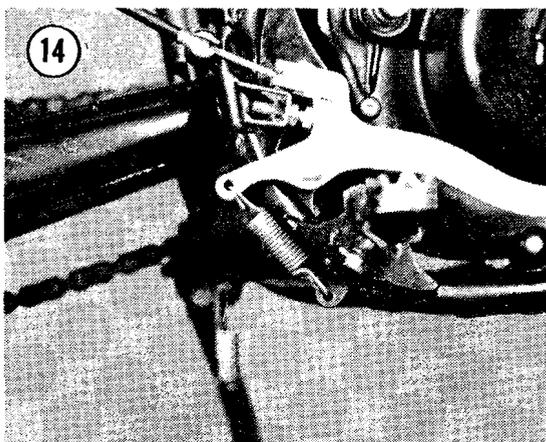
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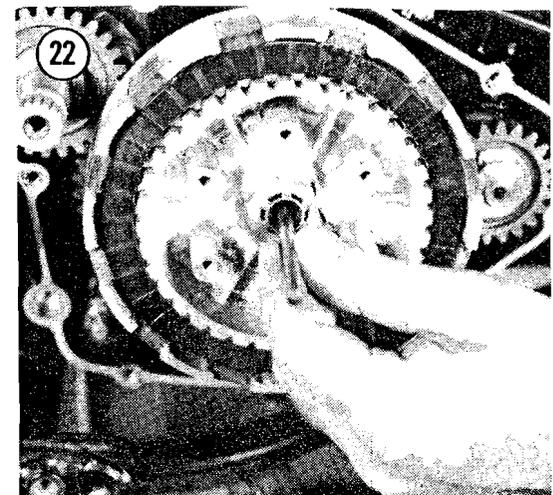
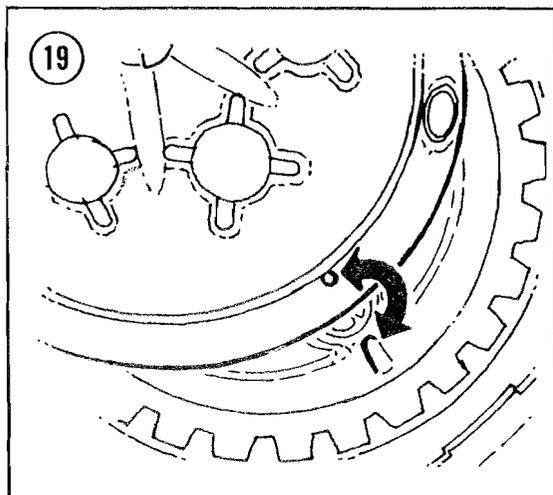
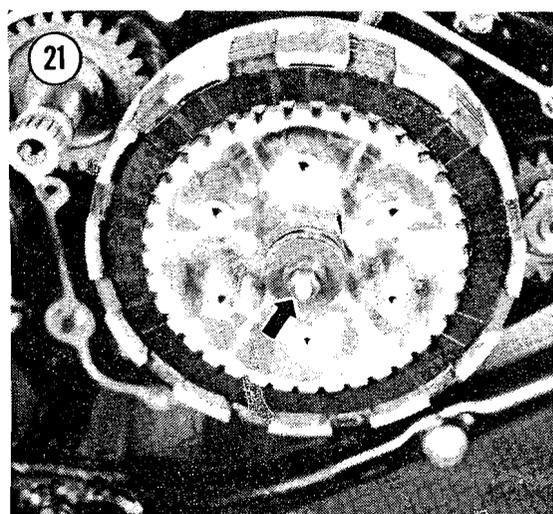
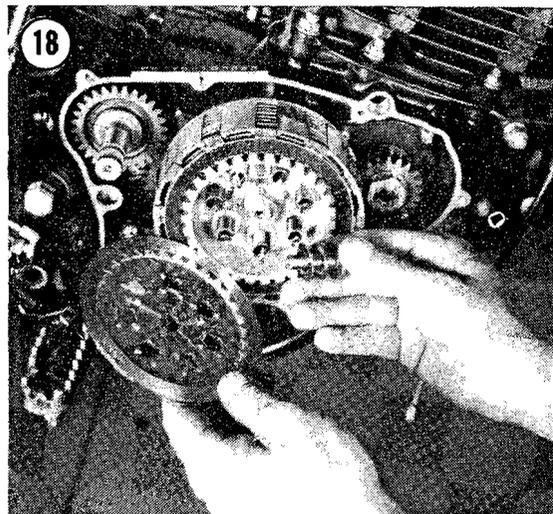
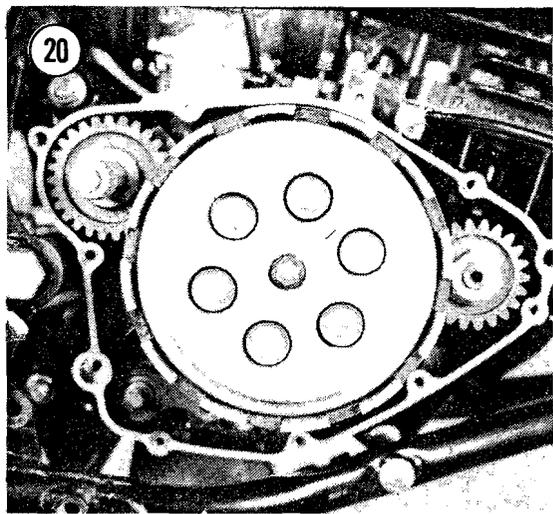
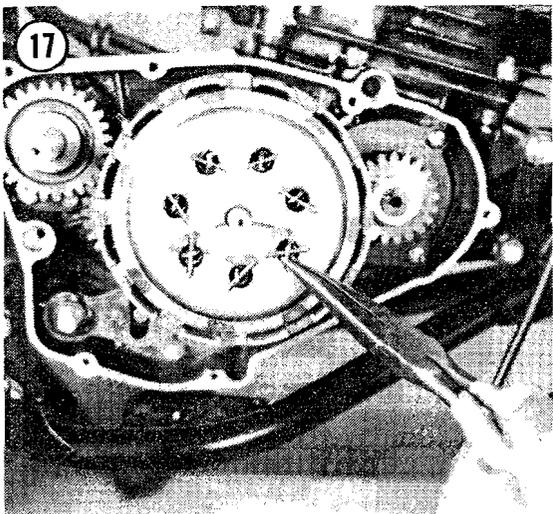
*On all but PE250T, X and PE400 models, actuate the clutch release arm in the direction of the cable pull to help break the cover loose from the engine.*

10. On PE175 models, use a clutch spring hook (Suzuki part number 09920-20310) or needlenose pliers with good teeth and remove the pins securing the clutch springs as shown in Figure 17. Hold your hand over the pressure disc while removing the pins to keep the pins from snapping out and getting lost. Remove the pressure plate with the release bearing assembly (Figure 18). Note how the small "O" mark on the pressure plate aligns with the ridge inside the sleeve hub (Figure 19).

11. On all other models, gradually and evenly remove the 6 bolts, washers and springs securing the clutch pressure disc (Figure 20) and remove the disc.

12. On PE250T, X and PE400 models, remove the thrust washer, thrust bearing, and push piece (Figure 21). If desired, one or both pushrods can be removed (Figure 22).





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**CAUTION**

*Do not lose the steel ball located between the 2 pushrods.*

13. Remove all the drive and driven plates (**Figure 23**). Note that on PE250B, C, N and PE400 models, the innermost plate is a textured steel plate. If only clutch plate inspection or replacement is desired, further disassembly is unnecessary.

14. Use a chisel or screwdriver and bend back the fold on the locking washer (**Figure 24**).

**NOTE**

*To remove the sleeve hub nut it is necessary to use a special holding tool or an impact tool (air or electric).*

*A simple tool can be locally fabricated by welding a steel rod to a steel clutch plate as shown in **Figure 25**. If such a tool can not be built, make arrangements with a motorcycle shop or service station to have the nut loosened with an impact tool. A special holding tool (Suzuki part No. 09920-53710) can be purchased from Suzuki, however, the tool is quite expensive.*

15. Use the impact tool or sleeve hub holding tool and remove the nut and locking washer securing the sleeve hub. Remove the sleeve hub (**Figure 26**).

**CAUTION**

*If using the sleeve hub holding tool, make sure it is held securely in place. Do not rely on the clutch housing to support the holding tool or the clutch housing will be damaged.*

16. Remove the thrust washer (**Figure 27**) and lift out the clutch housing/primary driven gear assembly (**Figure 28**).

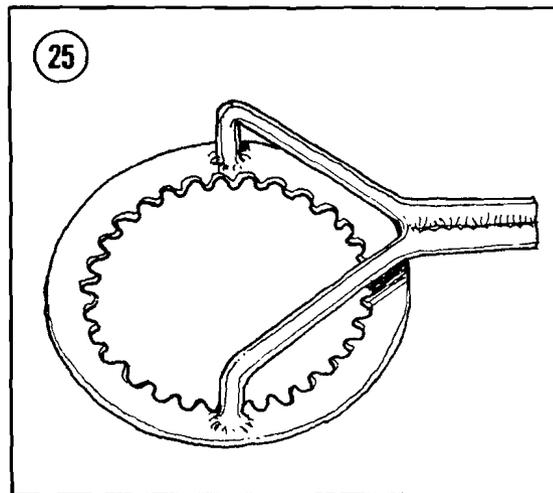
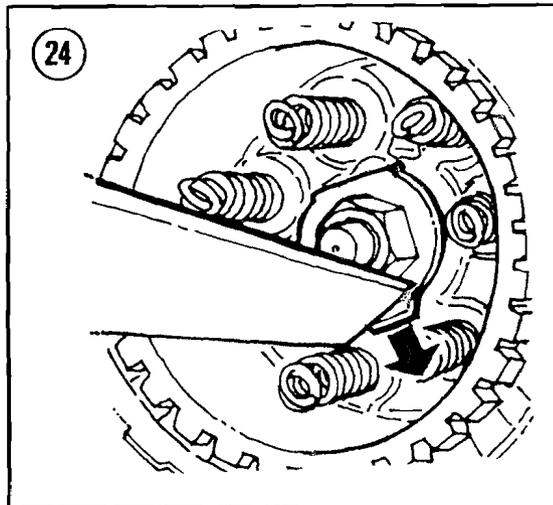
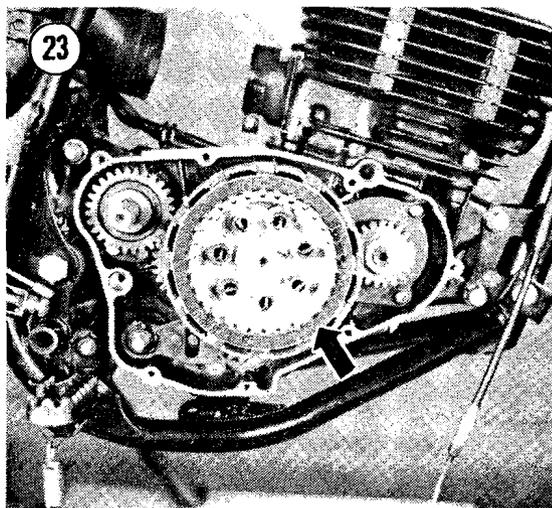
17. Remove the bearing (**Figure 29**) and inner spacer (**Figure 30**) from the clutch shaft.

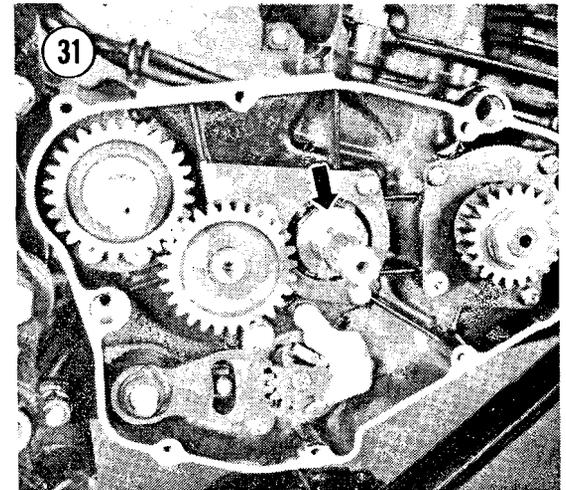
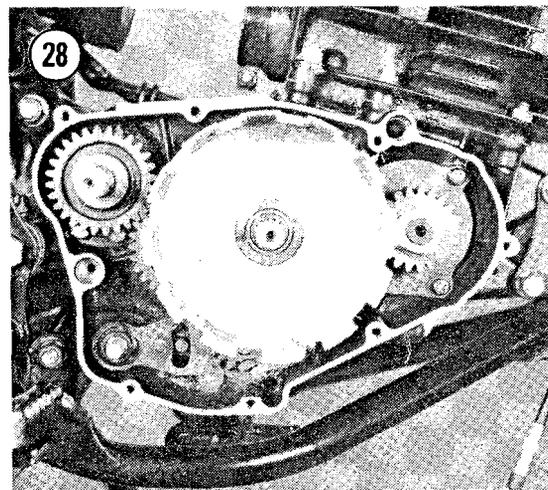
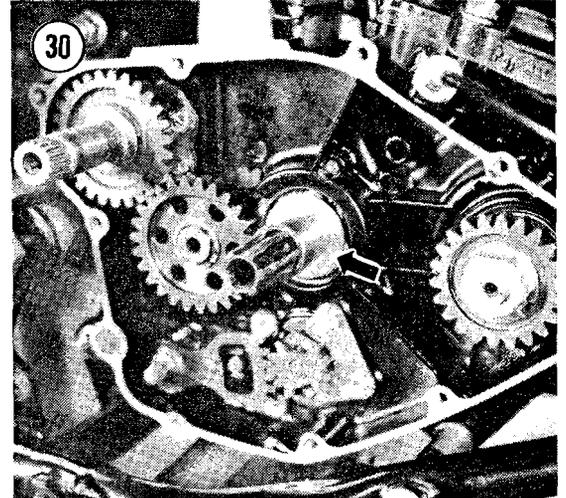
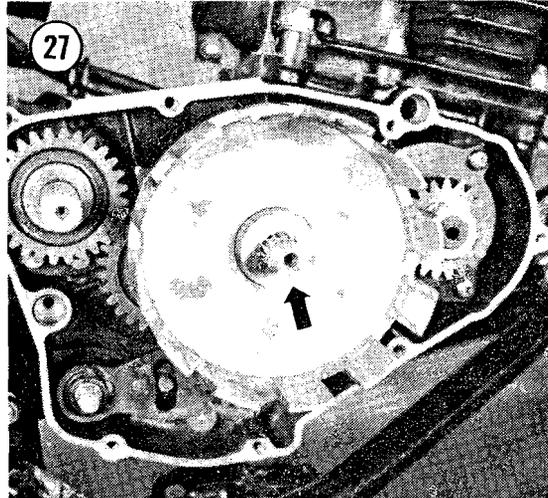
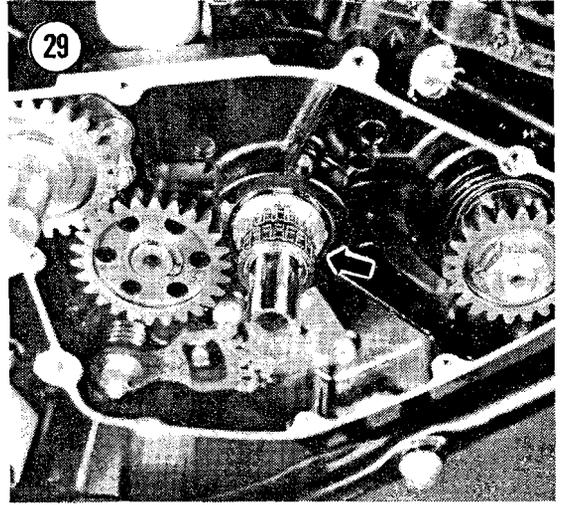
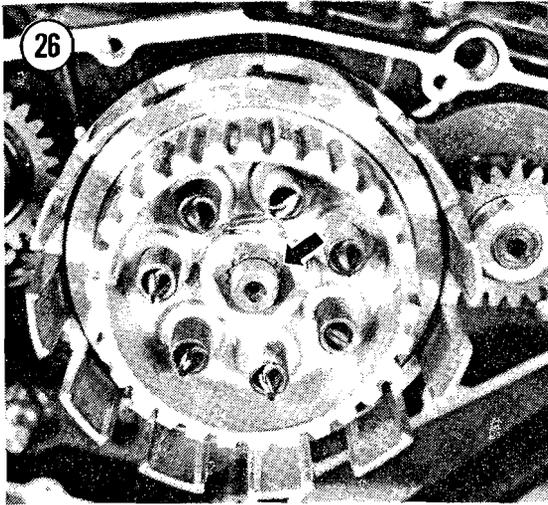
18. Remove the thrust washer next to the bearing (**Figure 31**).

19. Perform *Inspection*.

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

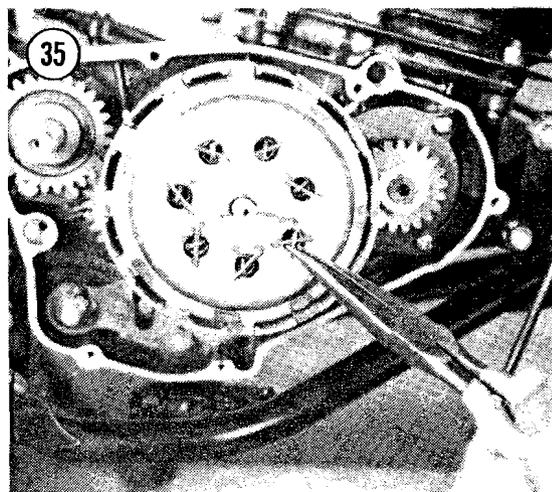
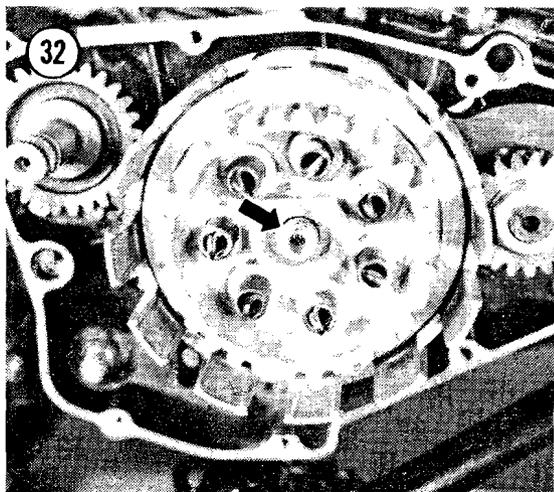
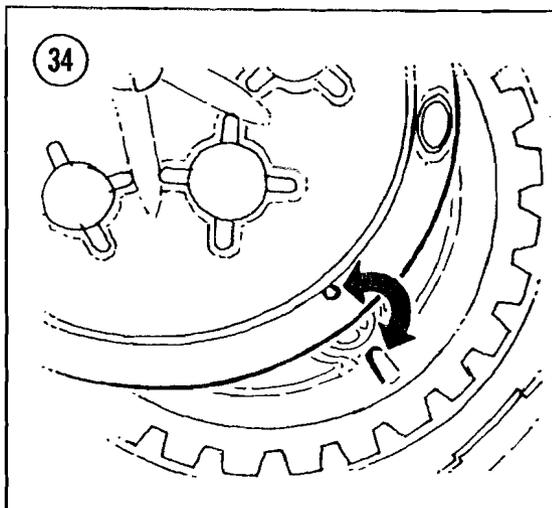
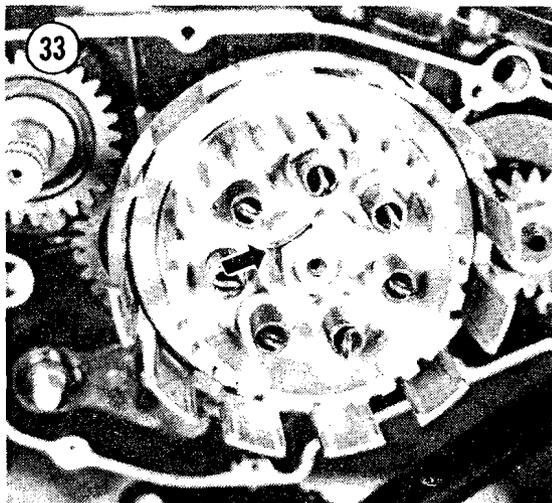
- a. Ensure that the thrust washer is installed next to the transmission bearing (**Figure 31**).





5

- b. Install the spacer and the bearing (Figures 29 and 30).
- c. Install the thrust washer between the clutch housing and the sleeve hub (Figure 27).
- d. Install the locking washer with the flat over the sleeve hub as shown in Figure 32. Install the sleeve hub nut and tighten the nut using an impact tool or the special holding tool. Torque the sleeve hub nut to 4.0-6.0 mkg (29-43 ft.-lb.).
- e. Make sure the tab on the locking washer is folded over securely as shown in Figure 33.
- f. On PE250B, C, N and PE400 models, install the steel innermost driven plate. It is identified by its textured surface.
- g. Alternately install the driven and drive plates.
- h. On all PE250T, X and PE400 models, perform *Clutch Internal Adjustment* before completing clutch assembly procedure.
- i. On PE175 models, align the "O" mark on the pressure disc with the ridge inside the sleeve hub (Figure 34). Use the clutch spring hook or needlenose pliers and lever each spring out enough to slip the pin through the spring (Figure 35). Make sure that all pins are correctly set in the grooves in the pressure disc as shown in Figure 36.



- j. On all other models, install the pressure disc and secure it with the springs, washers and bolts (Figure 37). Apply a small amount of blue Loctite (Lock N' Seal No. 2114) to each bolt before installing it in the clutch. Tighten all 6 bolts gradually and evenly in a crisscross manner. Torque the bolts to 1.1-1.3 mkg (8-9 ft.-lb.).

**CAUTION**

*If it is necessary to replace a clutch spring retaining bolt, always use the correct replacement Suzuki bolt as they are specially hardened for that particular application. Using an incorrect bolt may cause a clutch failure resulting in serious and expensive damage.*

- k. Use a new gasket when installing the clutch cover. Cinch the screws with a

hammer driven impact tool, however, do not overtighten or screw damage may result.

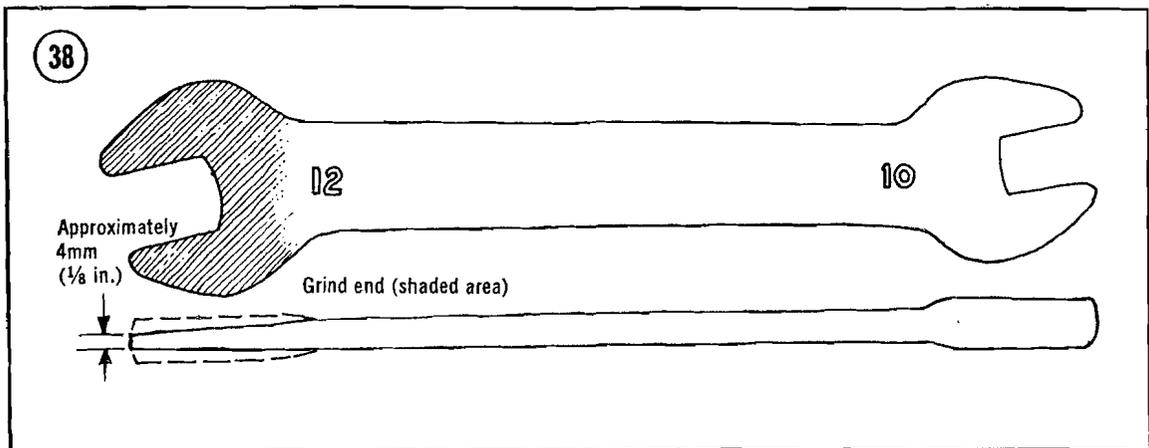
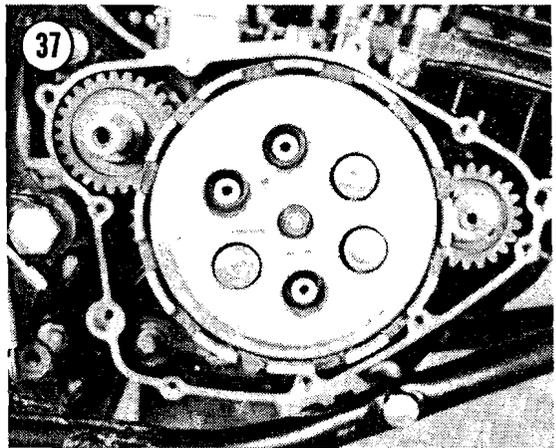
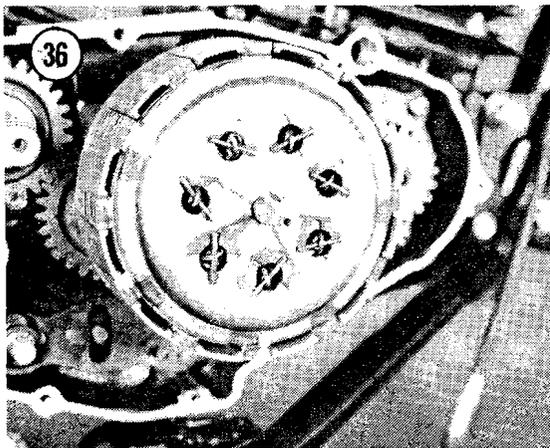
- m. Perform *Clutch Adjustment* and fill the transmission with oil as outlined in Chapter Three.

**Clutch Internal Adjustment  
(PE250T, X and PE400 Models)**

**NOTE**

*To perform this procedure a thin open-end wrench is needed. One can be easily fabricated by grinding the end of an old 12 mm wrench. The wrench usually supplied in an old motorcycle tool kit is ideal for this purpose. Grind the end of the wrench to approximately 4 mm (1/8 in.) thick as shown in Figure 38.*

5



*A thin bicycle hub bearing wrench can also be used. These wrenches are usually not available smaller than 13 mm, however, that size is small enough for the required application.*

1. If the clutch has been removed, proceed to the next step. If the clutch has not been removed, perform Steps 1-12 of *Clutch Removal*, then proceed to Step 6 in this procedure.

2. Lightly lubricate the first clutch pushrod with engine oil. Install the pushrod with the rounded end towards the left side of the engine (**Figure 39**).

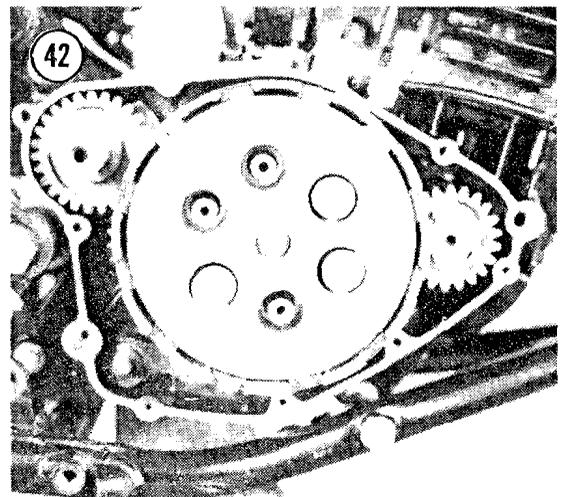
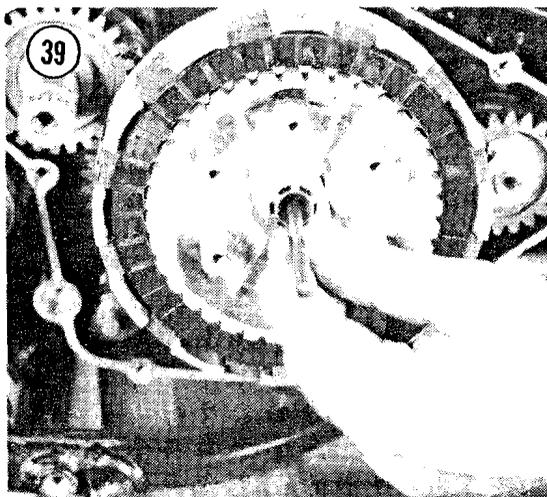
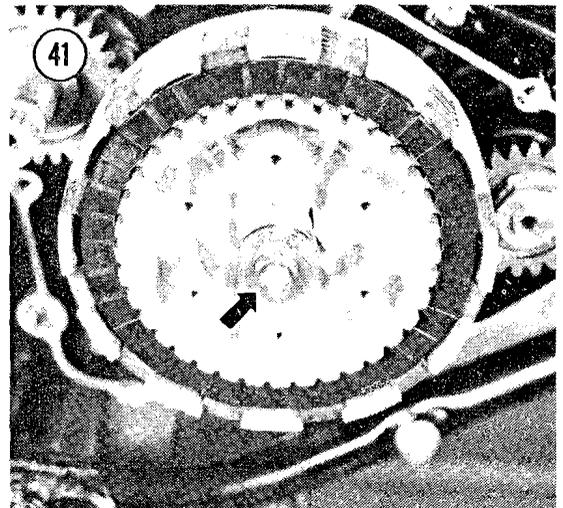
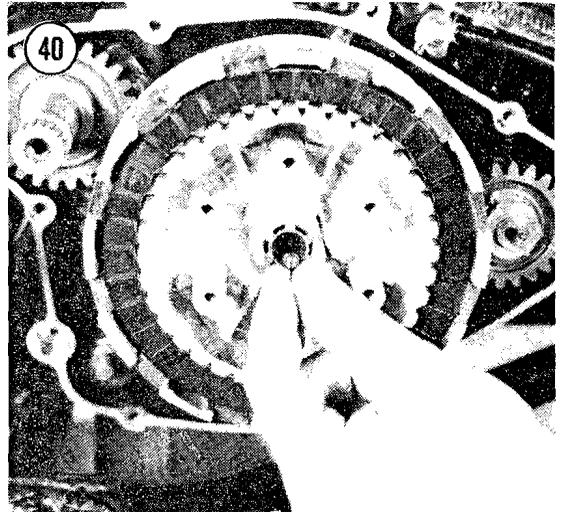
3. Install the steel ball (**Figure 40**). Lubricate and install the second pushrod with the rounded end out.

4. Install the push piece and thrust bearing. Ensure that the thrust washer is positioned over the bearing (**Figure 41**).

5. Install the pressure disc. Apply a small amount of blue Loctite (Lock 'N' Seal No. 2114) to each retaining bolt and install the bolts with the clutch springs and washers (**Figure 42**). Tighten the bolts in a crisscross manner to 1.1-1.3 mkg (8-9 ft.-lb.).

6. Hold the push piece with the thin wrench and loosen the adjuster locknut (**Figure 43**). Back off the locknut about 2 turns.

7. Hold the push piece with the thin wrench and back out the adjuster bolt with a screwdriver.



8. Carefully turn in on the adjuster bolt until contact with the pushrod can just be felt. Back out the adjuster bolt approximately 1/4 turn and tighten the locknut (Figure 44). When the locknut has been tightened, grasp the end of the adjuster and check for free play. A "just perceptible" amount of free play in the push piece should be evident. If too little or too much free play exists, readjust as necessary.

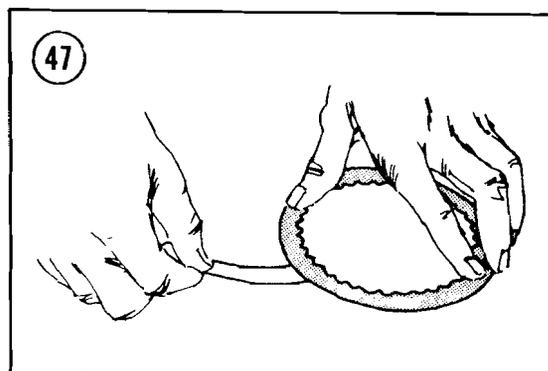
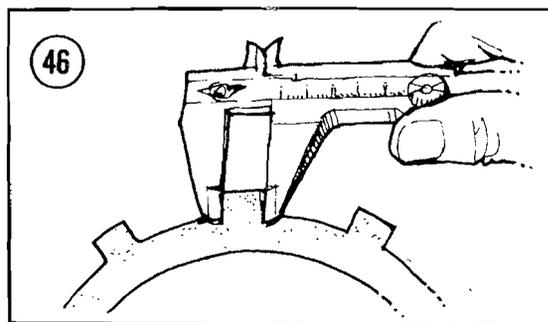
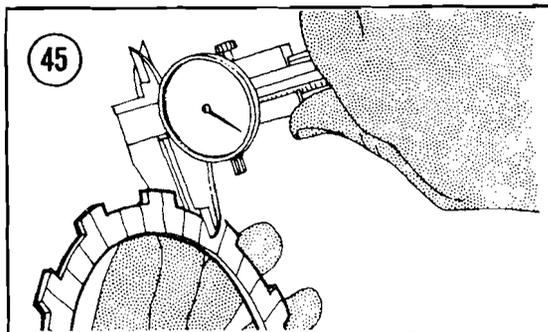
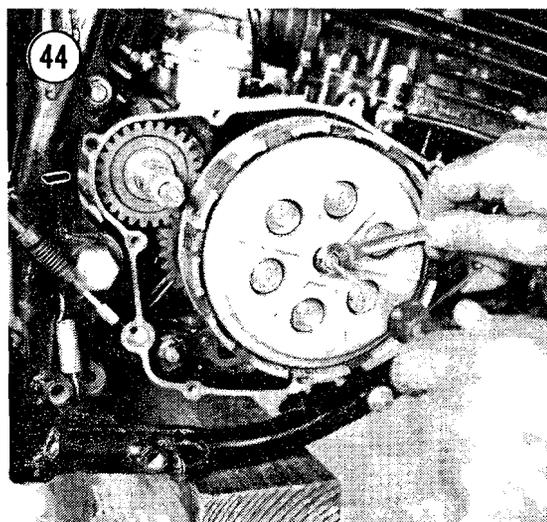
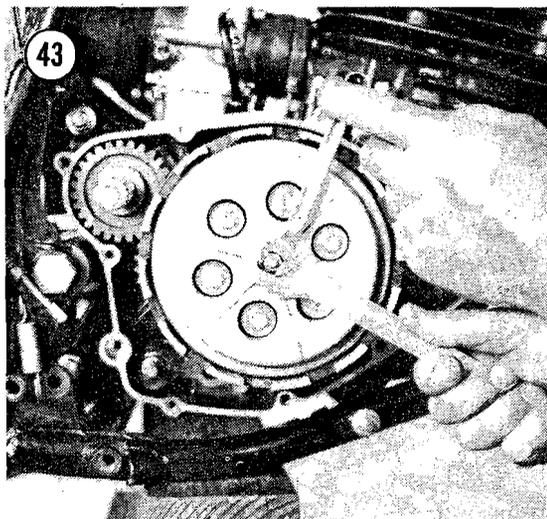
9. Complete the clutch installation as described in this chapter. Fill the transmission with oil and adjust the clutch cable free play as outlined in Chapter Three.

### Inspection

1. Measure the thickness of each drive plate in several places as shown in Figure 45. Replace any plate that is worn unevenly or is worn or warped beyond the wear limits specified in Table 1.

2. Measure the drive plate claw width with calipers as shown in Figure 46. Replace any drive plates worn beyond the service limits (Table 1).

3. Check driven plates for warps as shown in Figure 47 on a surface plate such as a piece of plate glass. Replace any driven plate worn or warped beyond the limits specified in Table 1.



4. Measure the clutch spring free length as shown in **Figure 48** for PE175 models and **Figure 49** for all other models. Springs not within the service limits specified in **Table 1** should be replaced. It is recommended that all springs be replaced as a set if any one is found out of tolerance.

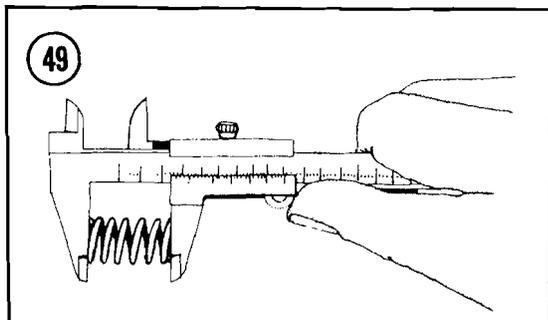
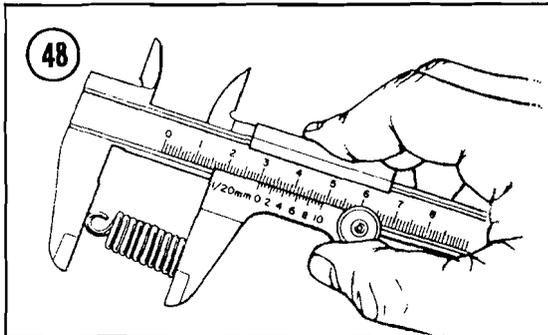
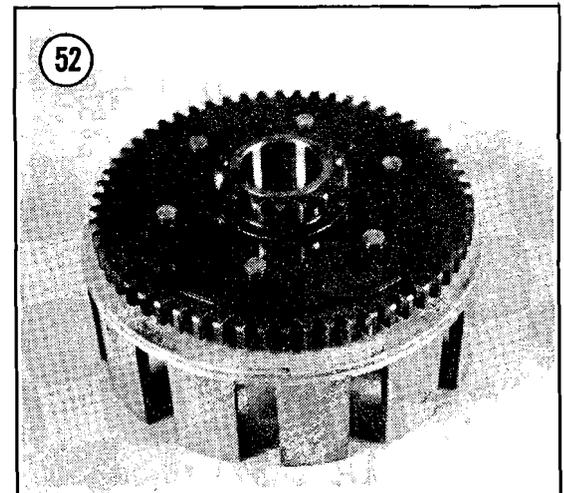
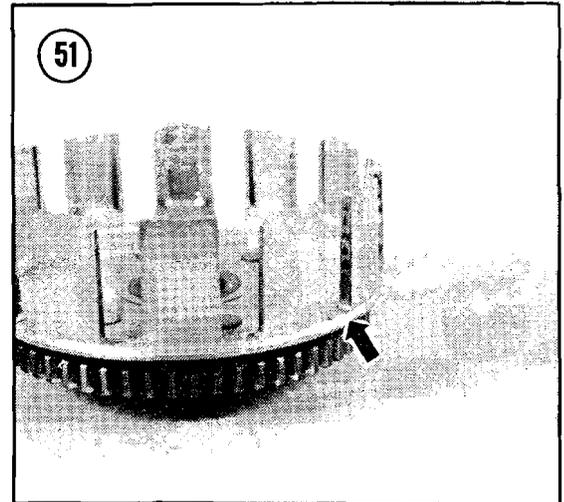
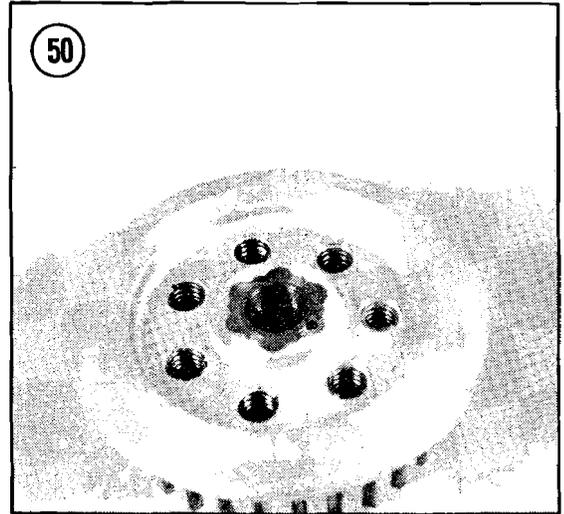
**NOTE**

*On all PE175 models, the clutch springs can be removed from the clutch sleeve hub by turning them out with pliers.*

*When installing new springs, ensure that the springs are at least even with, but do not protrude beyond, the back edge of the sleeve hub (**Figure 50**).*

5. Check the condition of the clutch housing/primary driven gear assembly. Check for deep grooves in the housing edges (**Figure 51**) caused by the drive plates. Such grooves will prevent proper clutch operation. Also check for loose rivets on the primary driven gear (**Figure 52**). Replace the housing/driven gear assembly if any signs of damage or excessive wear are present. Clutch failure at high rpm can cause expensive engine damage.

6. Clean and carefully inspect the clutch release bearing assembly. See **Figure 53** for



PE250T, X and PE400 models and **Figure 54** for all other models. Replace the bearing or push piece if worn or damaged.

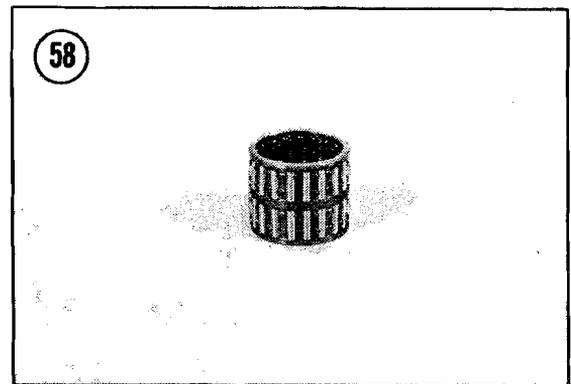
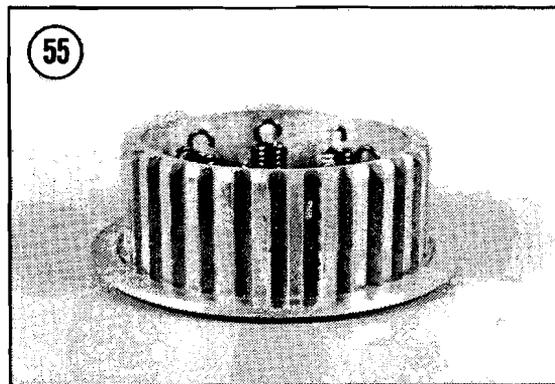
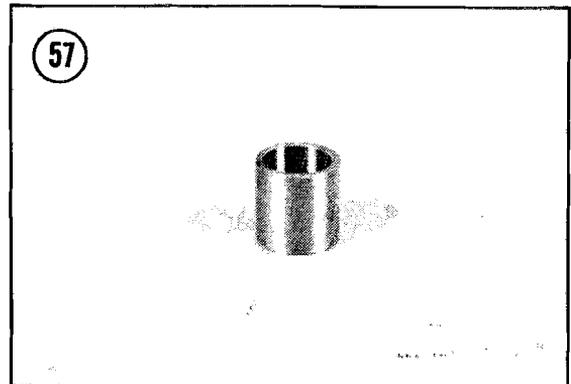
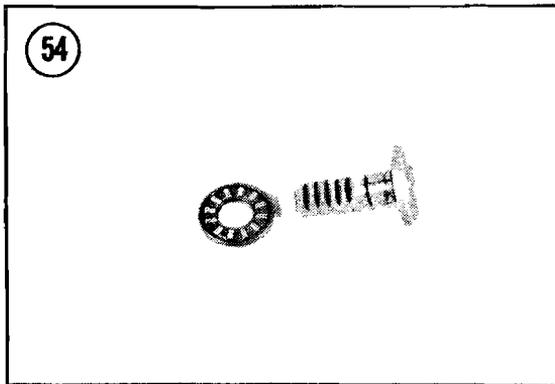
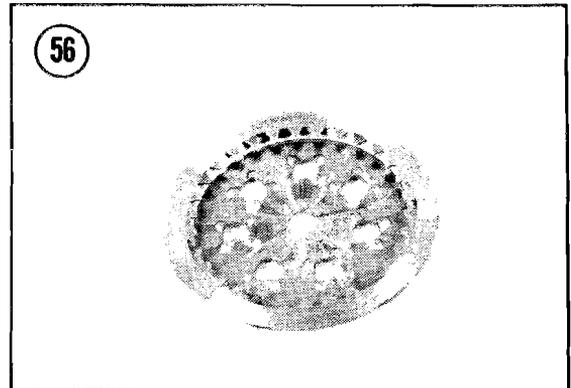
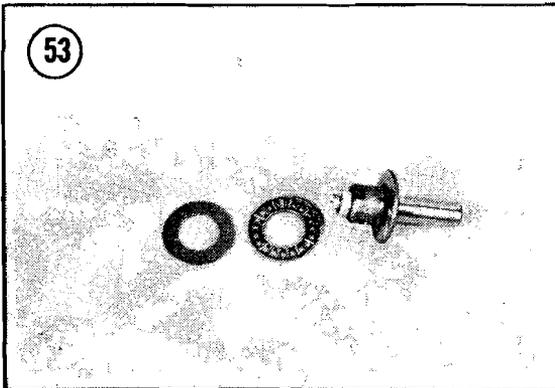
**NOTE**

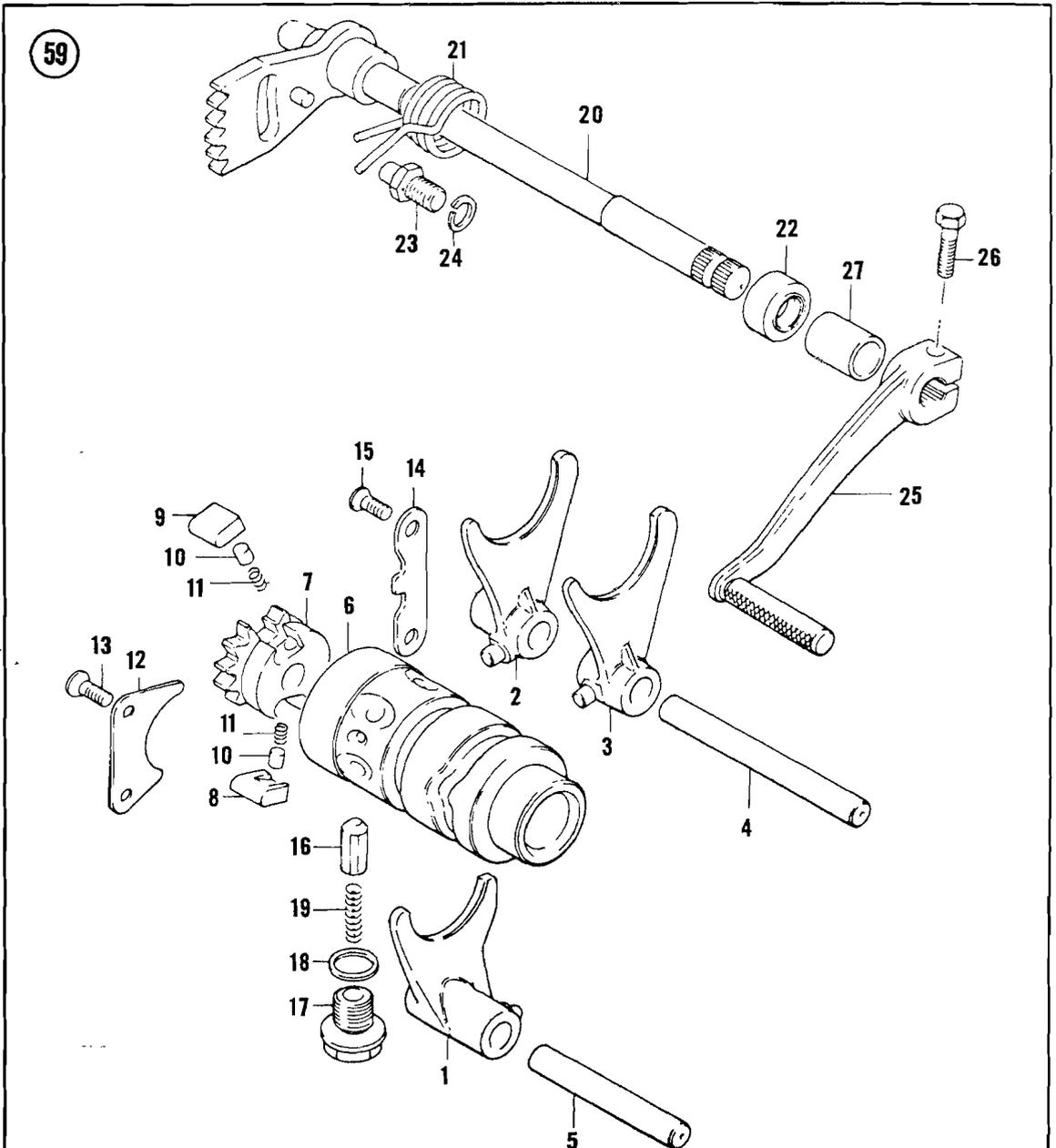
*Some models are equipped with a thrust washer between the release bearing and the pressure disc.*

7. Check the sleeve hub (**Figure 55**) and the pressure disc (**Figure 56**) for signs of

excessive wear or damage. Examine the grooves in the hub for notches or excessive wear caused by the driven plates. Replace the sleeve hub if such wear is present. Notches or excessive wear will prevent smooth clutch action.

8. Carefully examine the clutch housing spacer (**Figure 57**) and bearing (**Figure 58**). These components should be replaced as a set if either shows signs of wear or damage.





## GEARSHIFT ASSEMBLY

- |                                  |                               |                         |
|----------------------------------|-------------------------------|-------------------------|
| 1. No. 1 gear shifting fork      | 10. Pin                       | 19. Spring              |
| 2. No. 2 gear shifting fork      | 11. Spring                    | 20. Gear shifting shaft |
| 3. No. 3 gear shifting fork      | 12. Gear shifting pawl lifter | 21. Spring              |
| 4. No. 1 gear shifting shaft     | 13. Screw                     | 22. Oil seal            |
| 5. No. 2 gear shifting shaft     | 14. Gear shifting cam guide   | 23. Arm stopper         |
| 6. Gear shifting cam             | 15. Screw                     | 24. Lockwasher          |
| 7. Gear shifting cam driven gear | 16. Gear shifting cam stopper | 25. Gear shifting lever |
| 8. No. 1 gear shifting pawl      | 17. Cam stopper housing       | 26. Bolt                |
| 9. No. 2 gear shifting pawl      | 18. Gasket                    | 27. Cushion             |

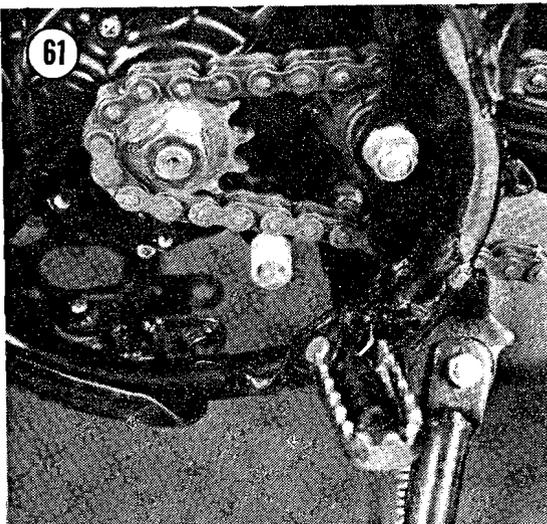
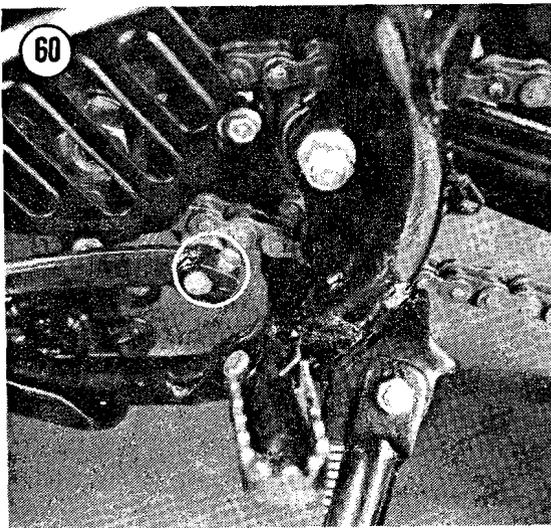
## GEARSHIFT

Gearshift repair work, except the shifting cam and shift forks, can be carried out with the engine in the motorcycle. To remove the shifting cam and shift forks, it is necessary to remove the engine and separate the crankcase halves.

## Disassembly/Assembly

Refer to **Figure 59** for this procedure.

1. Perform *Clutch Removal* as outlined in this chapter.
2. Remove the pinch bolt securing the gearshift lever (**Figure 60**) and remove the



lever; the bolt must be removed completely. Do not lose the plastic protector sleeve on the gearshift shaft (**Figure 61**). It is used to protect the shaft from the drive chain.

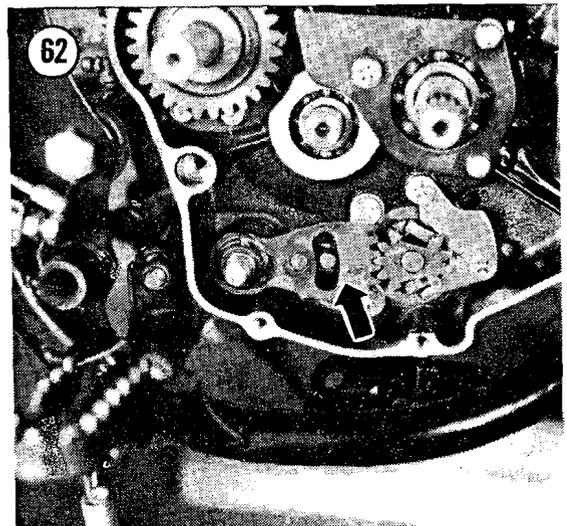
3. Slide out the gearshift shaft (**Figure 62**).

## NOTE

*The gearshift shaft should slide out of the engine with just a small amount of resistance. If the shaft is difficult to remove, check the condition of the shaft exposed on the left side of the engine. If the motorcycle has ever been in a hard spill, the gearshift shaft may be slightly bent. If the shaft is bent, it is very difficult to straighten without subjecting the crankcases to abnormal stress where the shaft enters the case.*

*If the shaft is bent enough to prevent its removal, there is little recourse but to cut the shaft off with a hacksaw very close to the crankcase. It is much cheaper in the long run to replace the shaft than risk damaging a very expensive crankcase. Also check for slight burrs on the shaft that may have been caused by a broken chain wrapping around the shaft. A chain adjusted too loosely will also cause slight burrs. Such burrs can usually be removed with a small file.*

4. Use a hammer driven impact tool to remove the screws then remove the cam guide (**Figure 63**) and pawl lifter (**Figure 64**).



5. Compress the spring-loaded shifting pawls with your fingers and lift out the pawl holder assembly (Figure 65).

**NOTE**

Store the pawl holder assembly in a spray paint can top to keep all the components together (Figure 66).

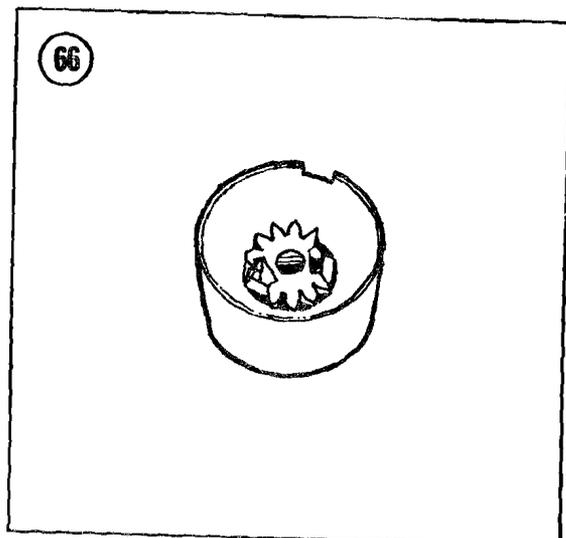
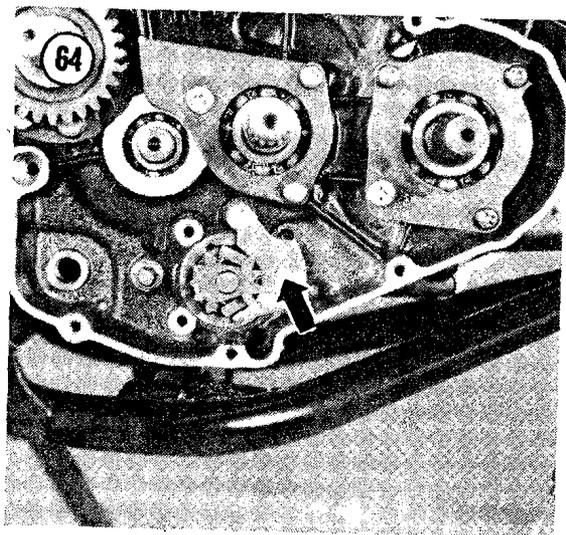
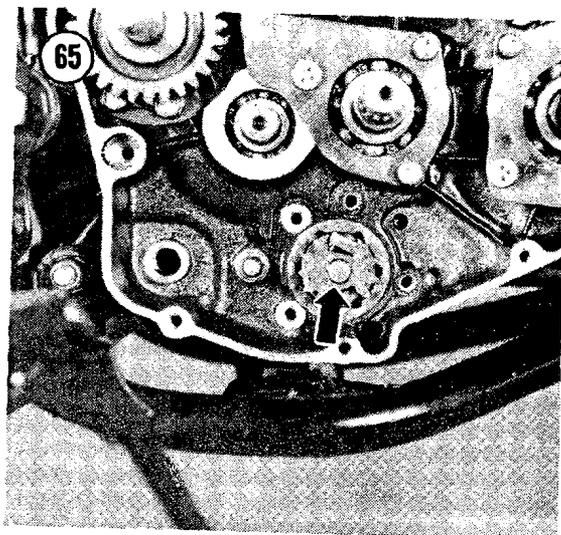
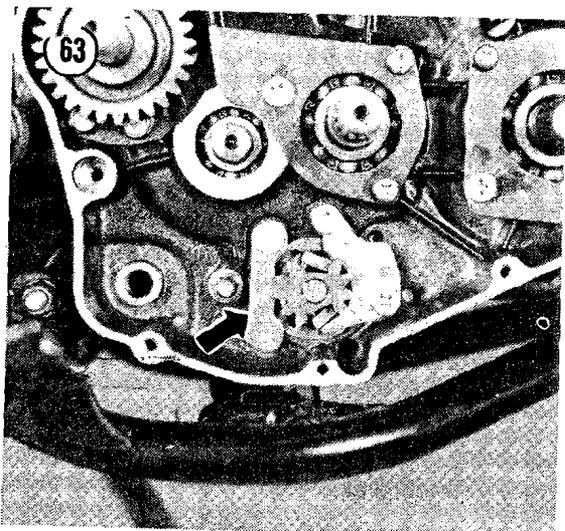
Further disassembly is not required except for the gearshifting cam and the shift forks. If shifting cam and shift fork removal is required, it is necessary to remove and disassemble the engine. Refer to **Engine Removal and External Disassembly and Engine Lower End**,

*Disassembly, as outlined in Chapter Four.*

*If further disassembly is not required, proceed to Step 12.*

6. On PE250B, C models, remove the stopper plug securing the neutral cam stopper. Withdraw the spring and the cam stopper from the engine (Figure 67).

7. Carefully lift up on each shift fork shaft until it is just clear of the crankcase. Swing each fork shaft outward until the shift forks are disengaged from the shifting cam (Figure 68).



8. Lift up and remove the shifting cam (Figure 69).

9. Slide out both shift fork shafts (Figure 70) and remove the 3 shift forks. Keep the shift forks and the shafts together in the proper order to avoid errors during installation.

**NOTE**

*Carefully note and write down the position and location of each shift fork. The forks are not interchangeable and must be installed exactly as removed.*

10. If transmission removal is required, refer to *Transmission* in this chapter for detailed

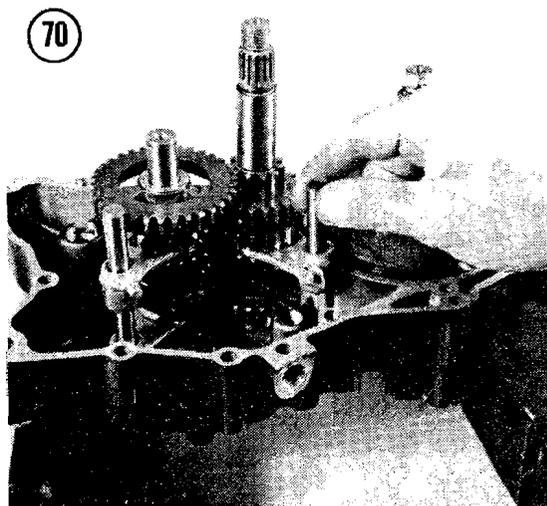
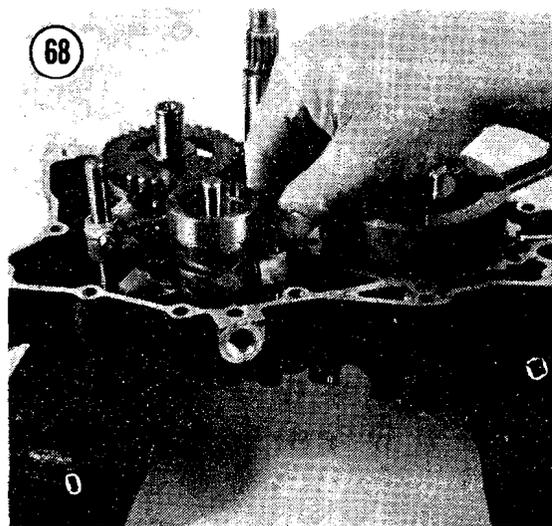
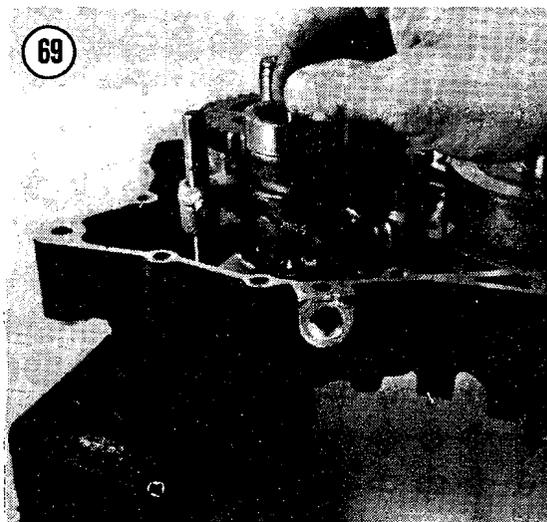
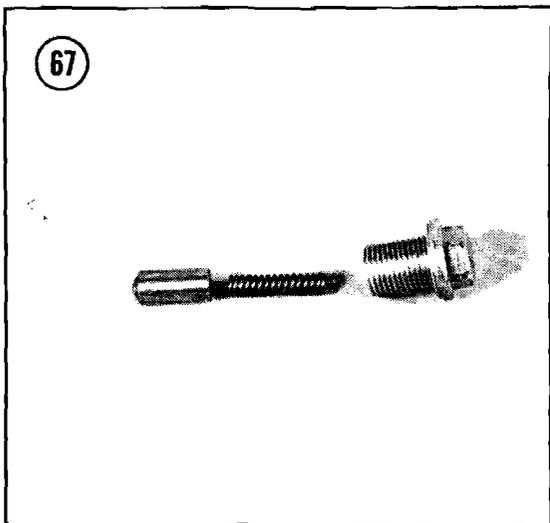
transmission removal and installation information.

11. Inspect all the removed gearshift components as described in *Inspection*.

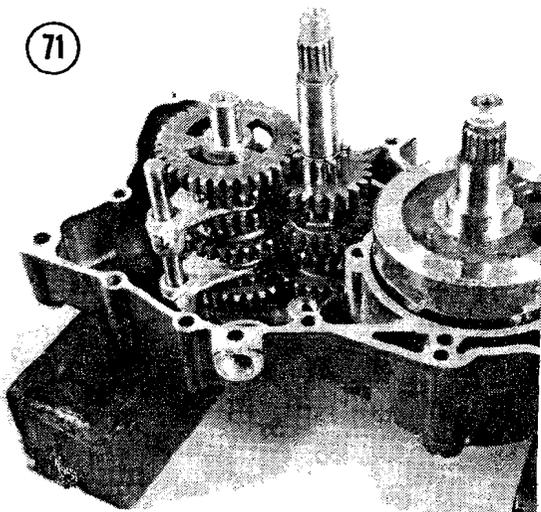
12. Assembly is the reverse of these steps. Keep the following points in mind:

**CAUTION**

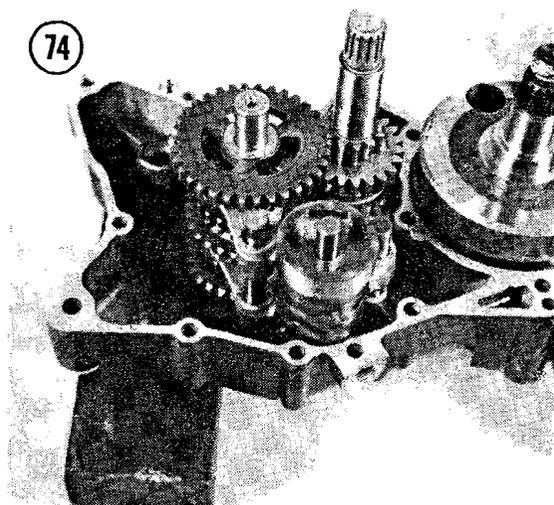
*Use blue Loctite (Lock N' Seal No. 2114) or equivalent, on the screws securing the pawl lifter and cam guide. A loose fastener adrift in the engine can cause serious and expensive engine damage.*



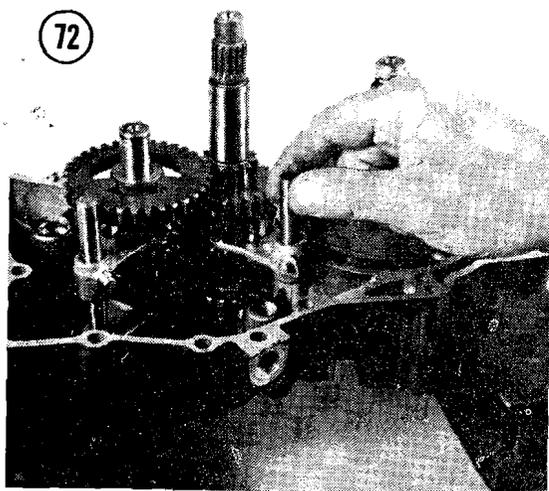
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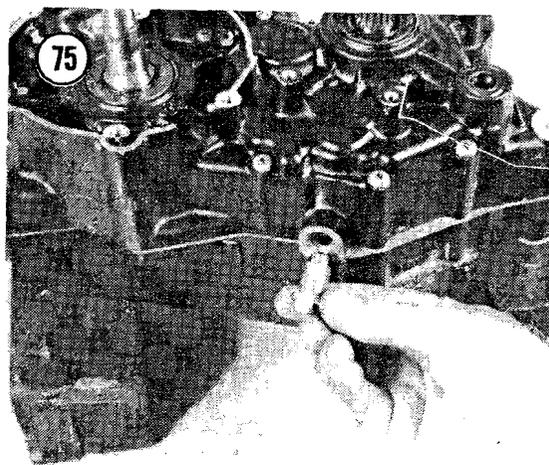
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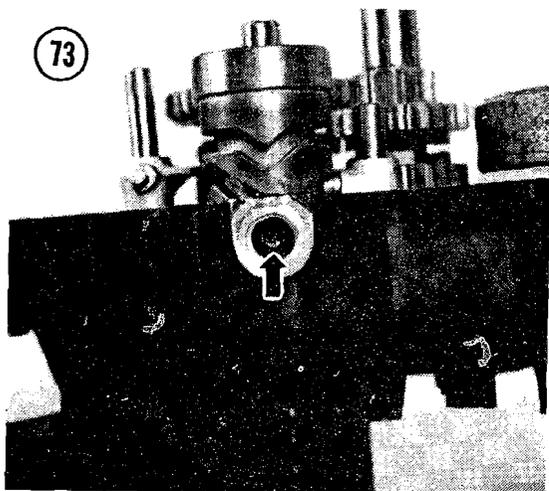
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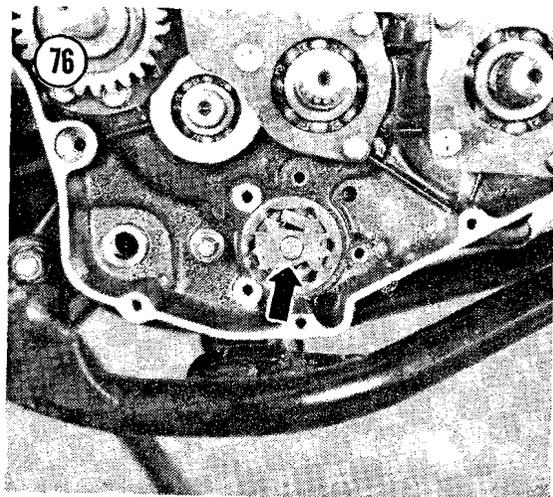
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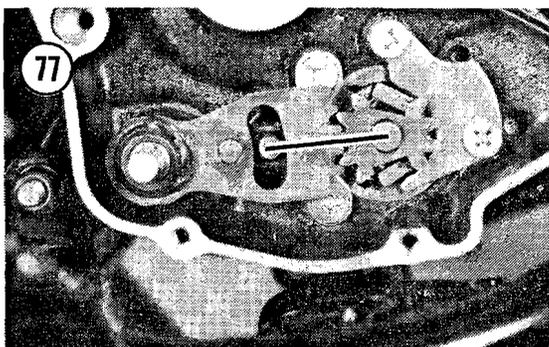
76



- a. Position the No. 1 and No. 2 shift fork on the fork shaft and install the forks into the gears as shown in **Figure 71**.
- b. Install No. 3 shift fork on the second shift fork shaft (**Figure 72**).
- c. Carefully install the shifting cam into the engine with the large recess for the cam stopper detent facing toward the opening in the bottom of the engine (**Figure 73**).

**NOTE**

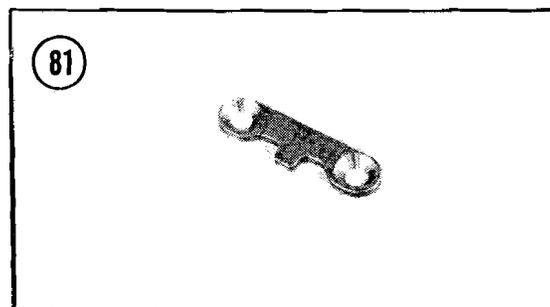
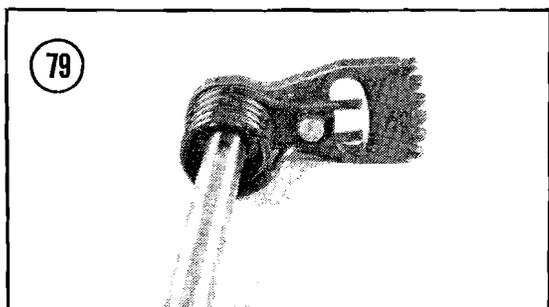
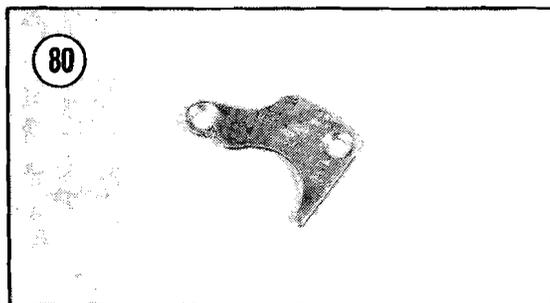
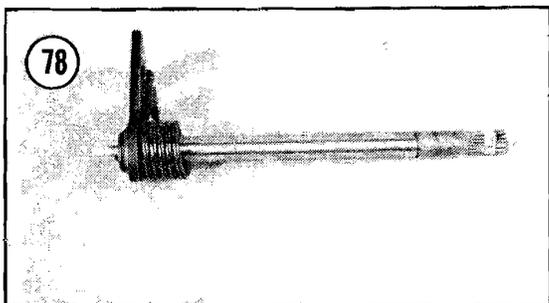
*Do not install the neutral cam stopper at this time. The spring-loaded stopper will force the shifting cam slightly off center, making engine assembly very difficult.*



- d. Swing both shift fork shafts inward and set the shaft ends into the crankcase holes. Make sure that the ends of the shift forks engage the slots in the shifting cam (**Figure 74**).
- e. Refer to Chapter Four and assemble the engine crankcases.
- f. Install the neutral cam stopper and spring and secure them both with the cam stopper plug (**Figure 75**).
- g. Install the pawl holder assembly with the 5 teeth pointing toward the rear of the engine as shown in **Figure 76**.
- h. Use blue Loctite (Lock N' Seal No. 2114) on the cam guide and pawl lifter screws and cinch the screws with a hammer driven impact tool.
- i. Install the shift shaft so the teeth are centered with the teeth on the pawl holder assembly as shown in **Figure 77**.

**Inspection**

1. Examine the gearshift shaft for signs of damage or excessive wear (**Figure 78**). Ensure that the shaft spring is correctly centered on the shaft as shown in **Figure 79**.
2. Carefully inspect the pawl lifter (**Figure 80**) and cam guide (**Figure 81**) for signs of wear and replace them if necessary.



3. Disassemble the pawl holder and inspect the rollers, springs and pawls for wear or damage (**Figure 82**). When reassembling the pawl holder assembly, make sure the rounded ends of the pawl rollers fit in the grooves as shown in **Figure 83**. The grooves in the pawls are offset. When the pawls are installed, the rear edge of the pawls must be flush with the rear edge of the pawl holder as shown in **Figure 84**.

**NOTE**

*When reassembling pawl holder components, use a piece of tape to hold one of the spring-loaded pawls in position while installing the second pawl.*

4. Refer to **Figure 85** and examine the neutral cam stopper components for wear or damage.
5. Carefully examine the grooves in the shifting cam for wear or roughness (**Figure 86**).
6. Inspect all 3 shift forks for damage or excessive wear (**Figure 87**). Measure the thickness of the shift forks with a micrometer or calipers as shown in **Figure 88**. Refer to **Table 2** for standard dimensions and service limits.
7. Install each shift fork in its respective gear. Use a feeler gauge to measure the clearance between the fork and the gear as shown in **Figure 89**. Refer to **Table 2** for fork clearance specifications.

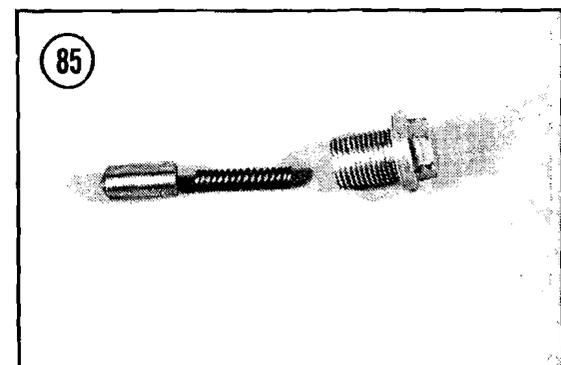
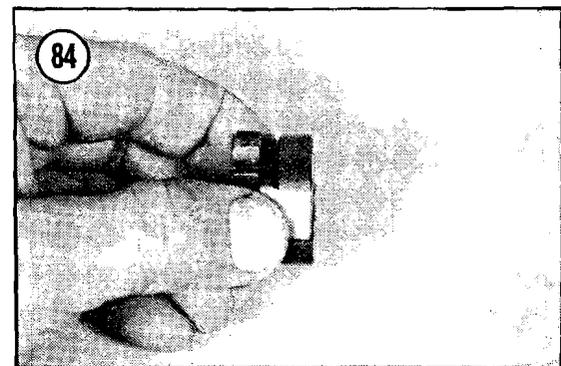
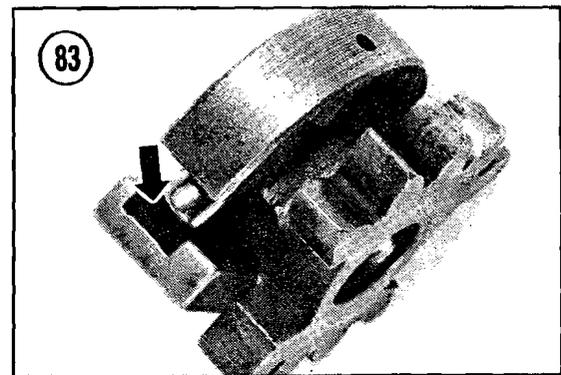
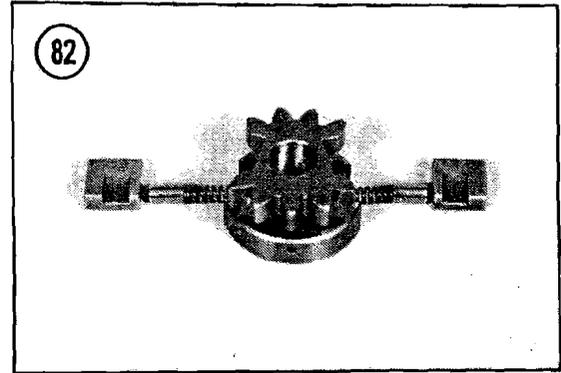
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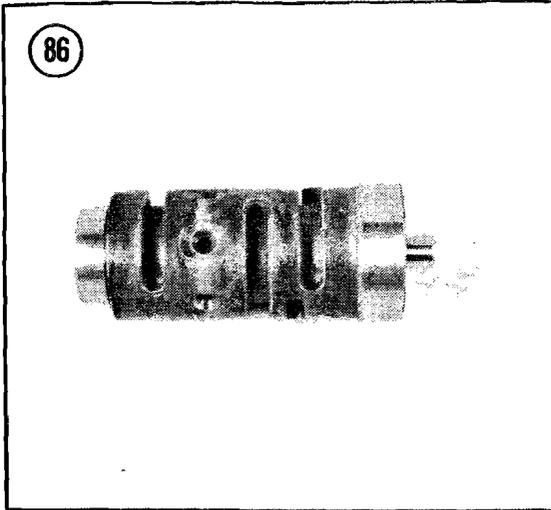
*It is recommended that marginal shift forks be replaced. Worn forks can cause the transmission to slip out of gear, leading to more serious and expensive damage.*

**NOTE**

*If the width of a shift fork is within tolerance, but the clearance between the fork and the gear is excessive, use calipers and measure the gear groove width. If the groove width exceeds the dimensions specified in **Table 2**, the gear must be replaced.*

8. Slide the shift forks on the fork shafts and make sure the forks slide freely, but without excessive play (**Figure 90**).



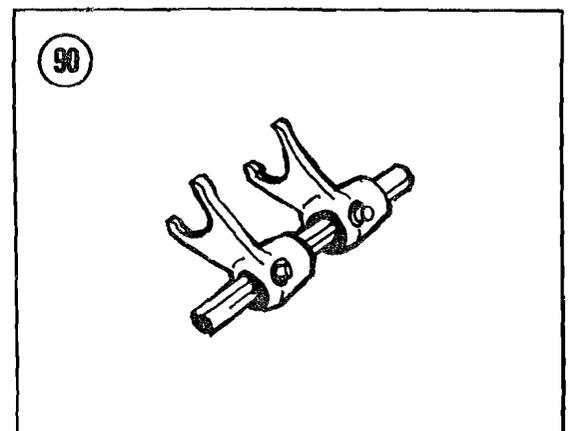
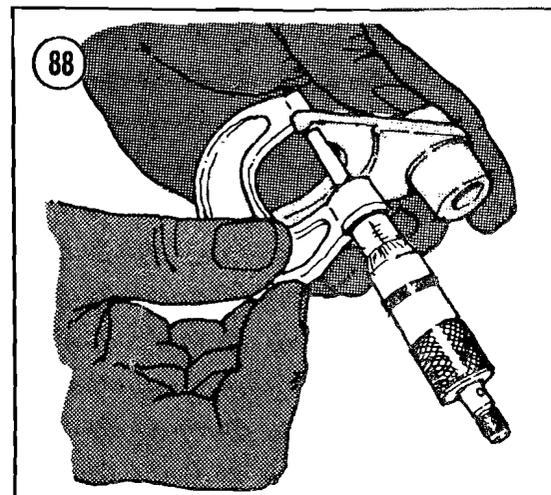
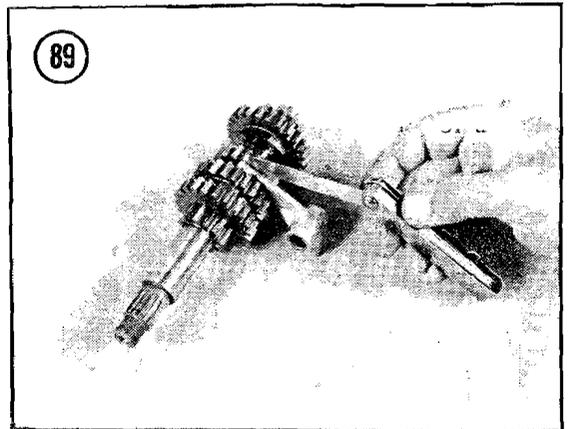
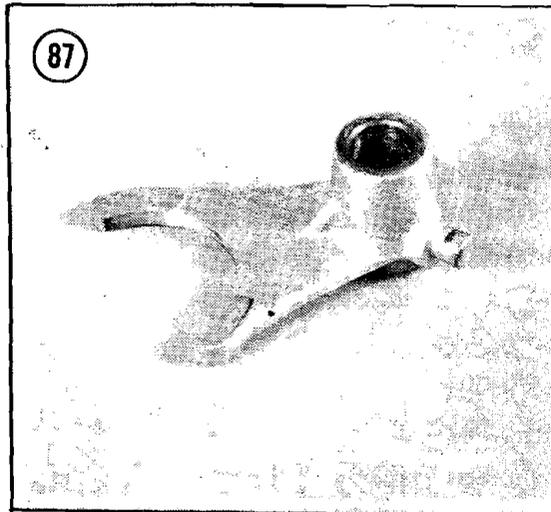


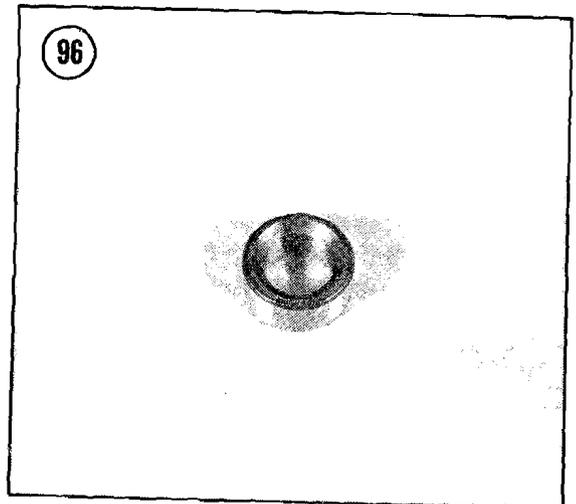
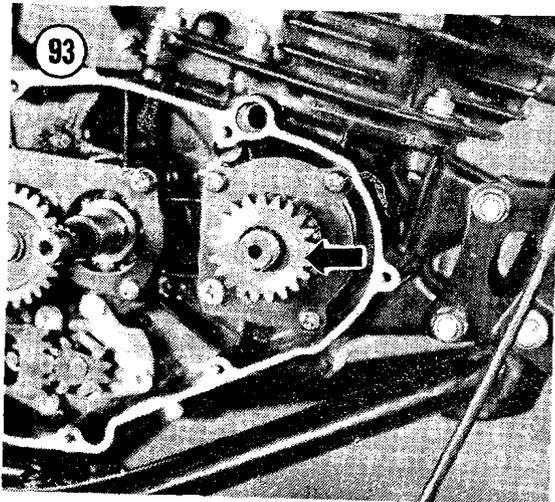
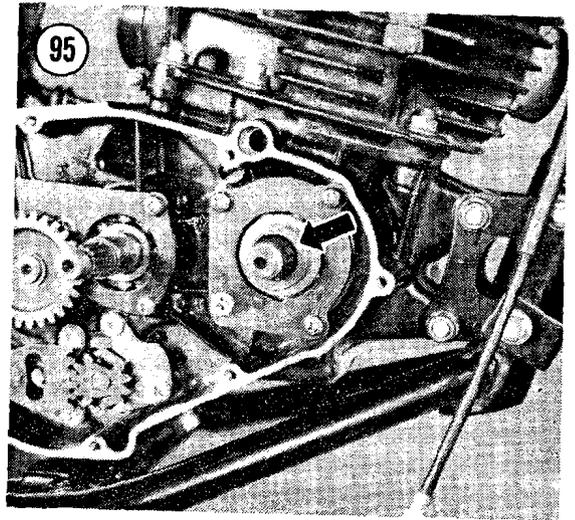
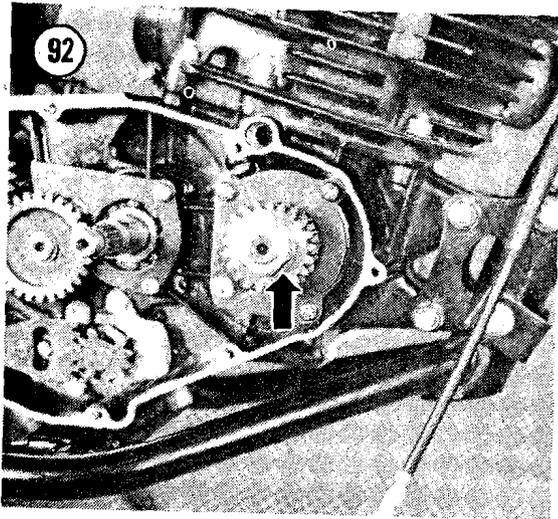
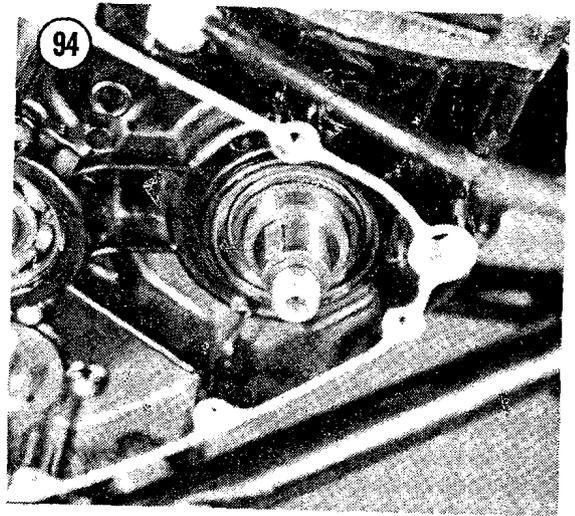
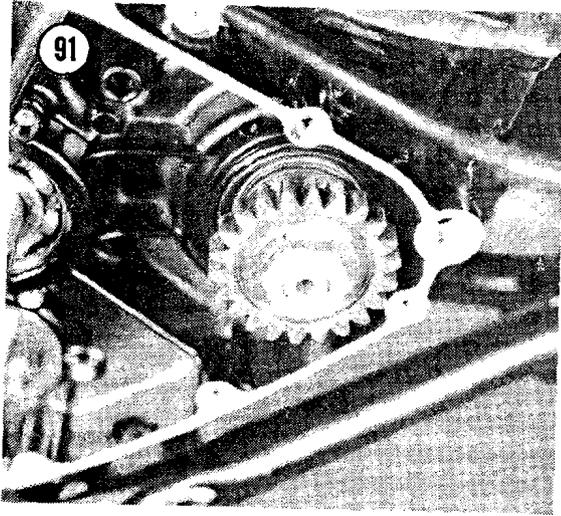
### PRIMARY DRIVE GEAR

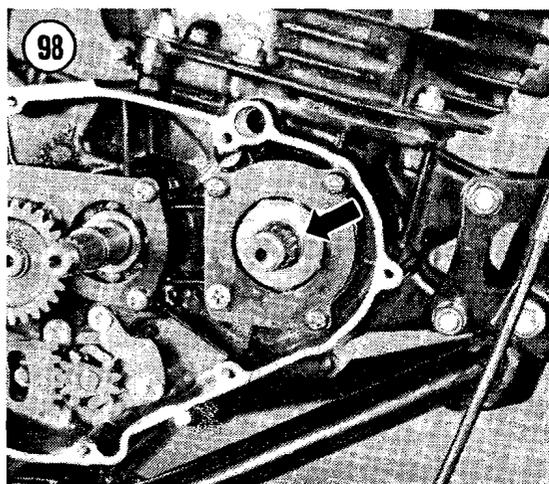
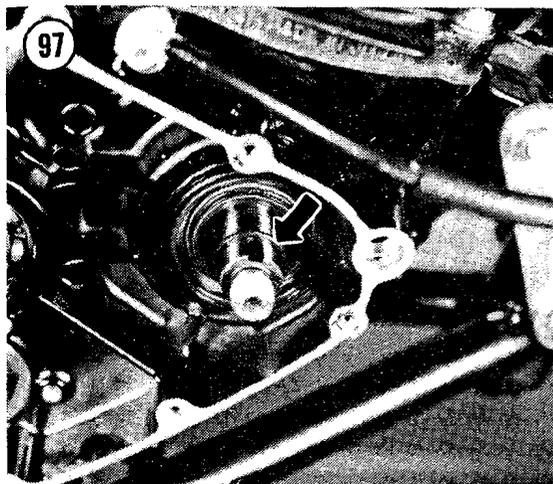
Removal of the primary drive gear is usually only required during complete engine disassembly unless specific replacement is necessary. The drive gear can be removed while the engine is still installed in the motorcycle. An air or electric impact tool is the preferred method to loosen the nut. However, if the clutch is still installed, the rear brake can be used to help hold the engine. The clutch, however must then be removed before the gear can be removed.

#### Removal/Installation

1. If an air or electric impact tool is available perform *Clutch Removal* as outlined in this chapter. If an air or electric impact tool is not available, perform only Steps 1 through 9 of the *Clutch Removal* procedure to gain access to the primary drive gear nut.





**NOTE**

If an impact tool is not available, shift the transmission into gear and step on the rear brake pedal. This will hold the engine from turning while the drive gear nut is loosened.

2. On models so equipped, bend back the fold on the locking washer (Figure 91) securing the primary nut.

**CAUTION**

The primary drive gear nut on all PE250 and PE400 models has a left-hand thread and must be turned clockwise to be removed. Failure to turn the nut correctly may result in over-torquing and possible crankshaft thread damage.

3. Remove the nut securing the primary drive gear (Figure 92). Note that the left-hand thread nut on most, but not all, models is stamped with the letter "L" indicating it is a left-hand thread.
4. Remove the folding or spring steel washer next to the primary gear.

**NOTE**

Models not equipped with folding lockwashers are equipped with a spring steel washer behind the primary gear nut. The spring steel washer has a slight cone shape. The cone (raised center) of the washer is installed toward the nut (away from the engine).

5. Complete the clutch removal at this time. The clutch housing/primary driven gear assembly must be removed completely before

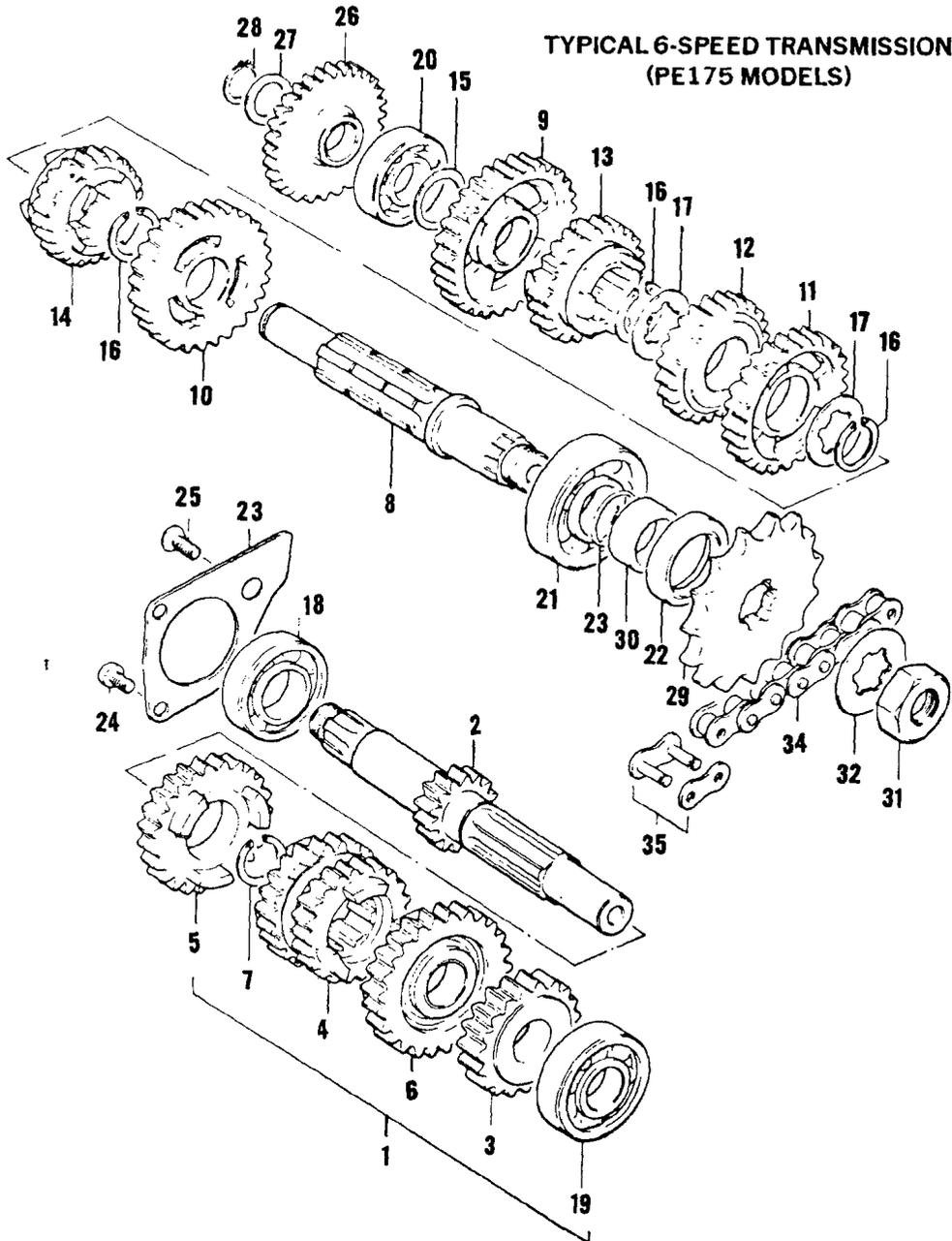
the primary drive gear can be removed from the end of the crankshaft.

6. Slide the primary drive gear off the crankshaft (Figure 93).
  7. Gently tap out the Woodruff key on models so equipped (Figure 94).
  8. Remove the spacer (Figure 95) on models so equipped. Note the spacer used on "T" and "X" models has a machined bevel (Figure 96) on each side.
  9. On all "T" and "X" models, remove the O-ring from the crankshaft (Figure 97).
  10. Remove the large washer next to the crankshaft bearing on models so equipped (Figure 98).
  11. Installation is the reverse of these steps.
- Keep the following points in mind:

- a. On all "T" and "X" models, install a new O-ring on the crankshaft next to the bearing. Install the spacer with the bevel positioned in toward the crankshaft bearing.
- b. Install the spring steel washer with the cone (raised center) out toward drive gear nut.
- c. Apply a small amount of blue Loctite (Lock 'N' Seal No. 2114) to the drive gear nut before installation.
- d. The drive gear nut on all PE250 and PE400 models has left-hand threads and must be turned counterclockwise to be tightened.
- e. Install the clutch as outlined in this chapter.

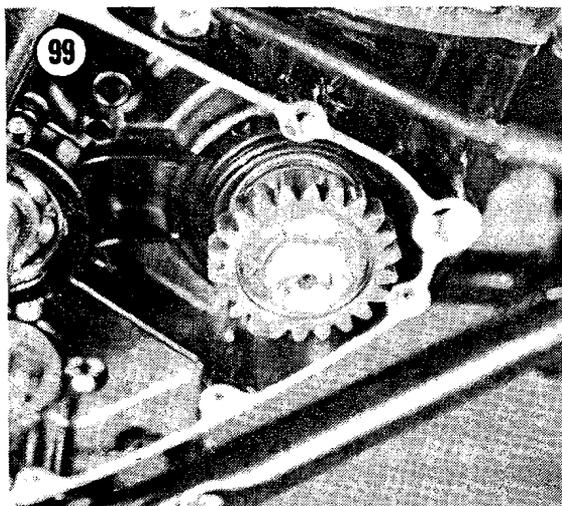
101

### TYPICAL 6-SPEED TRANSMISSION (PE175 MODELS)



- |                          |                        |                           |                          |
|--------------------------|------------------------|---------------------------|--------------------------|
| 1. Countershaft assembly | 10. 2nd driven gear    | 19. Left hand bearing     | 28. Circlip              |
| 2. Countershaft          | 11. 3rd driven gear    | 20. Right hand bearing    | 29. Engine sprocket      |
| 3. 2nd drive gear        | 12. 4th driven gear    | 21. Left hand bearing     | 30. Spacer               |
| 4. 3rd drive gear        | 13. 5th driven gear    | 22. Oil seal              | 31. Nut                  |
| 5. 5th drive gear        | 14. 6th driven gear    | *23. Bearing holder       | 32. Washer               |
| 6. 6th drive gear        | 15. Washer             | *24. Screw                | 33. O-ring               |
| 7. Circlip               | 16. Circlip            | *25. Screw                | 34. Drive chain assembly |
| 8. Driveshaft            | 17. Washer             | 26. Kickstarter idle gear | 35. Chain joint          |
| 9. 1st driven gear       | 18. Right hand bearing | 27. Washer                |                          |

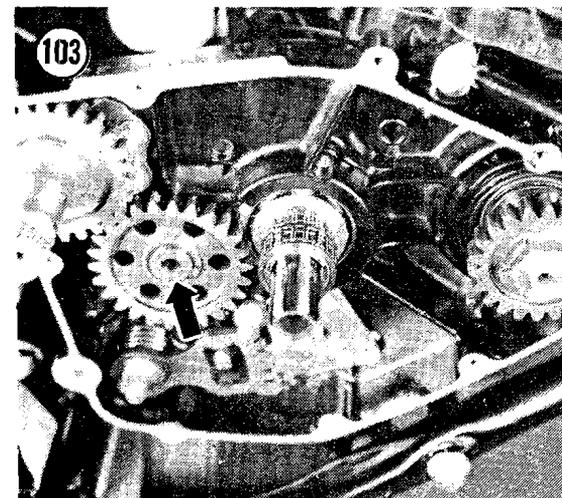
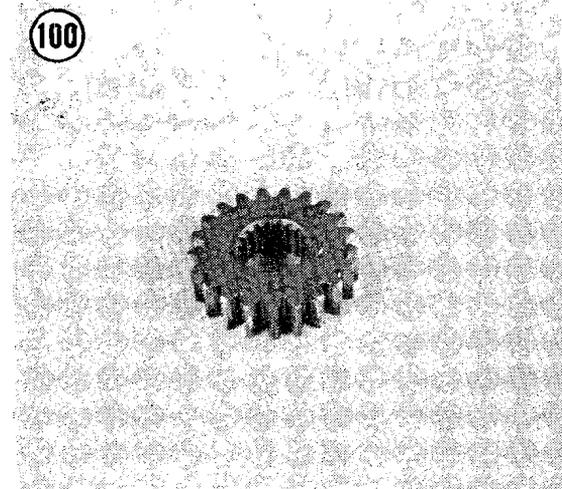
\*Omitted on "T" and "X" models



- f. Torque the drive gear nut to 4.0-6.0 mkg (29-43 ft.-lb.).
- g. Fold the locking washer over the drive gear nut as shown in **Figure 99**.

### Inspection

Carefully inspect the gear teeth on the primary drive gear (**Figure 100**). While damage is unlikely under normal conditions, a failure of an internal engine part may have caused gear tooth damage.



## TRANSMISSION

The engine must be removed and the crankcases separated to perform repair on the transmission. Refer to *Engine Lower End Disassembly* in Chapter Four. It is not necessary to remove the crankshaft to perform transmission removal. The transmissions on all models are very similar, however, minor differences are present in the number of gears and the arrangement of shift forks. Pay particular attention to the location and position of gears and thrust washers during disassembly. Write down the order in which all parts are removed to simplify assembly and ensure the correct placement of components.

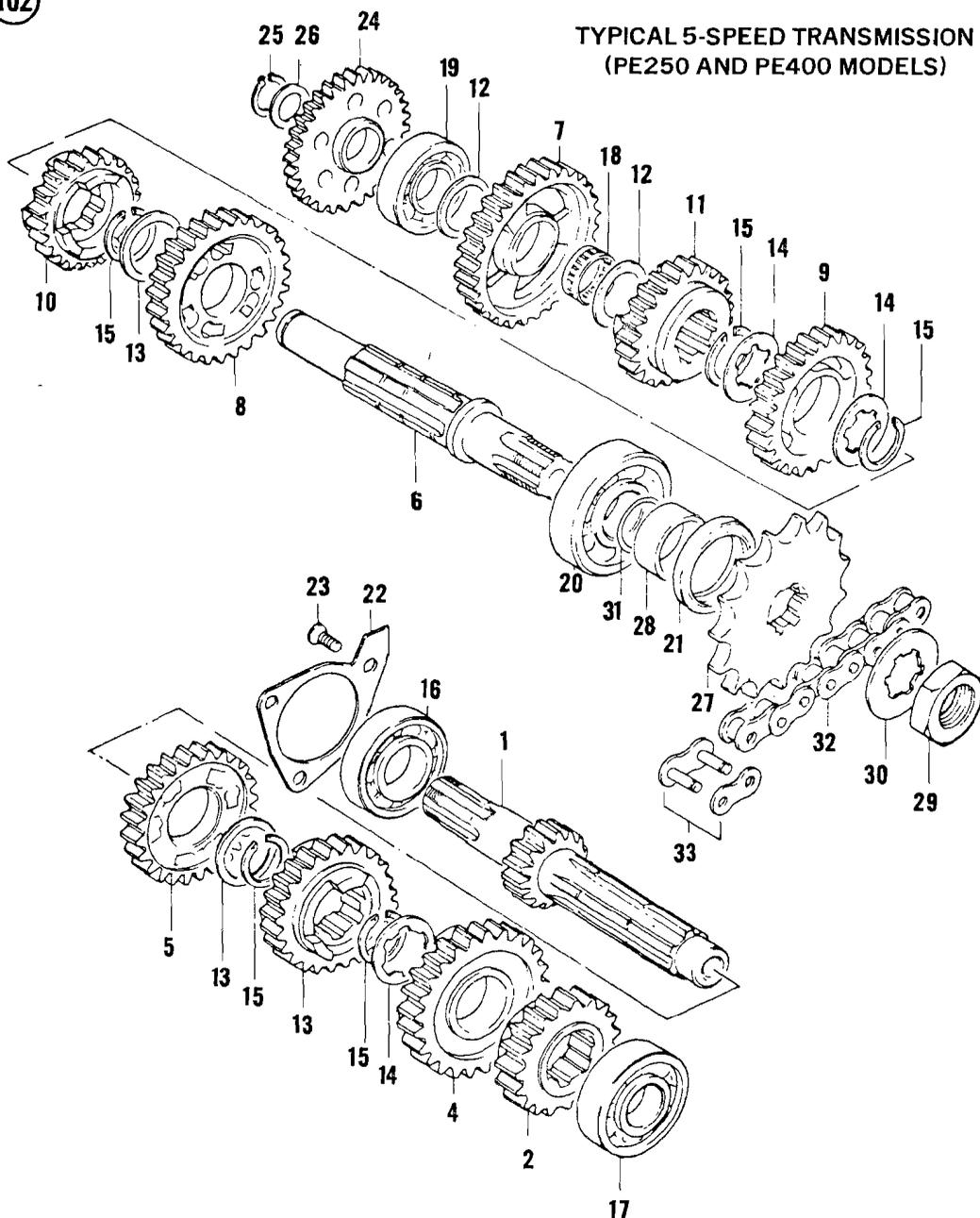
Refer to **Figure 101** for a layout of a typical PE175 6-speed transmission, and **Figure 102** for a typical PE250, PE400 5-speed transmission. The 6-speed transmission used in the PE250T, X model is a slight variation of the 5-speed shown in **Figure 102**. The countershaft (also known as the input shaft) is connected to the clutch. All the gears on the countershaft are identified as "drive" gears. The drive shaft (also known as the output shaft) is connected to the drive chain. All the gears on the drive shaft are identified as "driven" gears.

### Removal/Installation

1. Remove the clutch and external gearshift components as outlined in this chapter.
2. Remove the snap ring securing the kickstarter idler gear (**Figure 103**) and remove the gear.

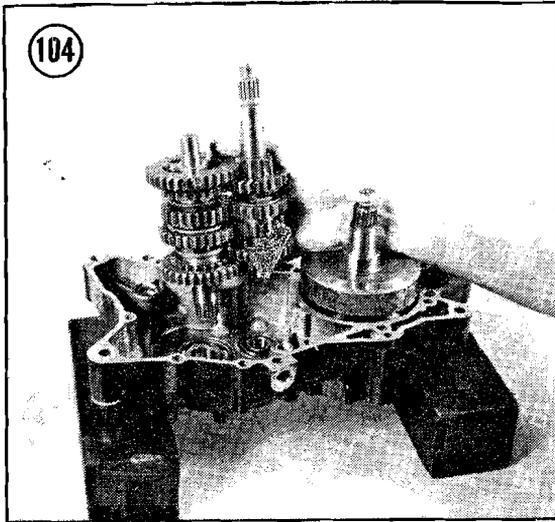
102

TYPICAL 5-SPEED TRANSMISSION  
(PE250 AND PE400 MODELS)



- |                    |                     |                           |                          |
|--------------------|---------------------|---------------------------|--------------------------|
| 1. Countershaft    | 10. 4th driven gear | 18. Bearing               | 26. Washer               |
| 2. 2nd drive gear  | 11. 5th driven gear | 19. Bearing               | 27. Engine sprocket      |
| 3. 3rd drive gear  | 12. Thrust washer   | 20. Bearing               | 28. Spacer               |
| 4. 4th drive gear  | 13. Thrust washer   | 21. Oil seal              | 29. Nut                  |
| 5. 5th drive gear  | 14. Washer          | 22. Bearing holder        | 30. Lockwasher           |
| 6. Driveshaft      | 15. Circlip         | 23. Screw                 | 31. O-ring               |
| 7. 1st driven gear | 16. Bearing         | 24. Kickstarter idle gear | 32. Drive chain assembly |
| 8. 2nd driven gear | 17. Bearing         | 25. Circlip               | 33. Joint                |

3. Refer to Chapter Four and remove and disassemble the engine. Do not remove the crankshaft unless crankshaft repair is required.
4. Refer to *Gearshift, Removal* as outlined in this chapter and remove the shifting cam and shift forks.
5. Hold the countershaft and drive shaft gear sets together as shown in **Figure 104** and carefully lift out both gear sets. Place both gear sets on clean rags.
6. Perform *Inspection*. If gear replacement is required, refer to the applicable gear set disassembly procedure following.

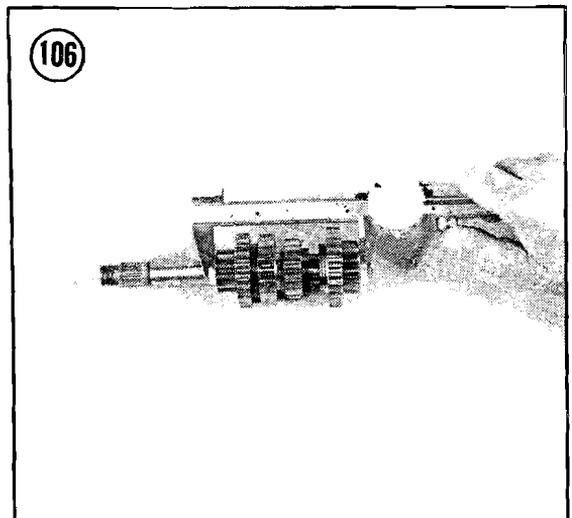
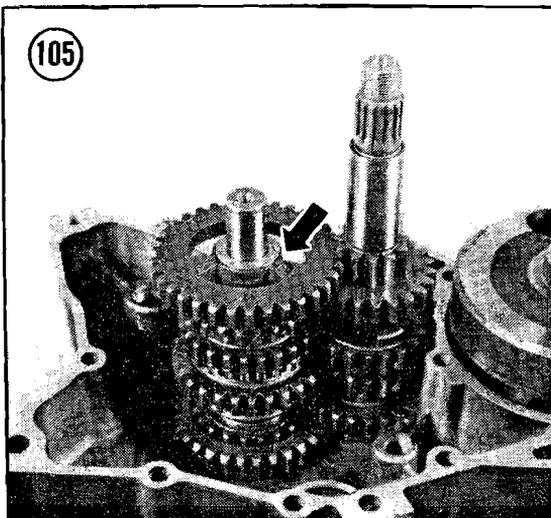


*NOTE*  
If gear replacement is required due to excessive wear, it is recommended that the respective shift forks also be replaced.

7. Installation is the reverse of these steps. Keep the following points in mind:
  - a. Mesh both gear sets together and install them as a unit (**Figure 104**).
  - b. Ensure that the thrust washer is installed on the end of the drive shaft (**Figure 105**).
  - c. Refer to *Gearshift* and install the shift forks and shifting cam.
  - d. Install the kickstarter idler gear and secure the gear with the snap ring.

#### Countershaft Gear Set Disassembly/Assembly (PE175 Models)

On PE175 models, the 3rd driven gear (the outer gear opposite the spline end) is pressed on the shaft. Replacing gears on the countershaft requires special tools and expertise, therefore, this task should be referred to a competent machine shop or authorized dealer. If gear replacement is performed, ensure that the distance between the 2 outer gears is 91.8-91.9 mm (3.614-3.618 in.) as shown in **Figure 106**.



### Countershaft Gear Set Disassembly/Assembly (All Except PE175)

#### NOTE

When disassembling the countershaft gear set, place all the parts in an egg carton as shown in **Figure 107**. The egg carton helps keep all the gears, washers and circlips in the correct order and proper position.

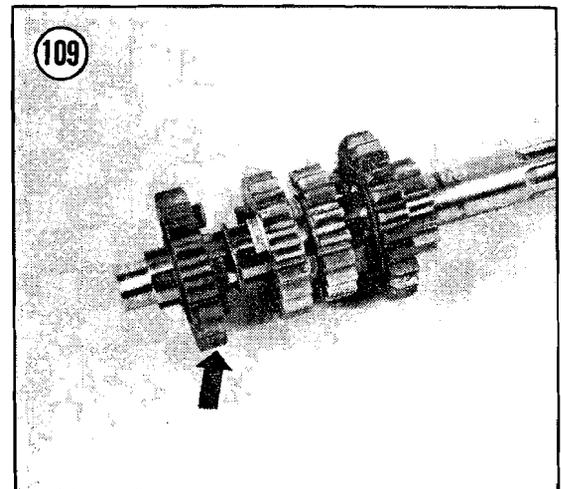
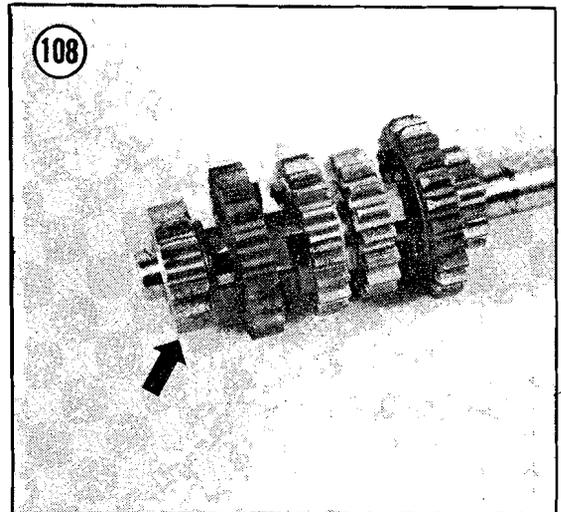
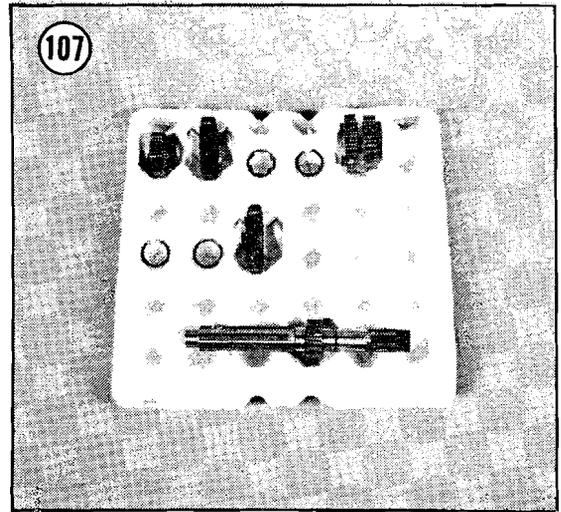
1. Remove the 2nd drive gear (**Figure 108**). Slide off the 4th drive gear (5th drive gear on PE250T, X models) as shown in **Figure 109**.
2. Refer to **Figure 110** and slide off the thrust washer then remove the circlip securing the 3rd drive gear (3rd/4th drive gear on PE250T, X models) and remove the gear.
3. Remove the circlip and thrust washer securing the 5th drive gear (6th drive gear on PE250T, X models) and remove the gear (**Figure 111**).
4. Examine the gear set components as outlined in *Inspection*.
5. Assembly is the reverse of these steps. Ensure that the all circlips snap securely into the shaft grooves.

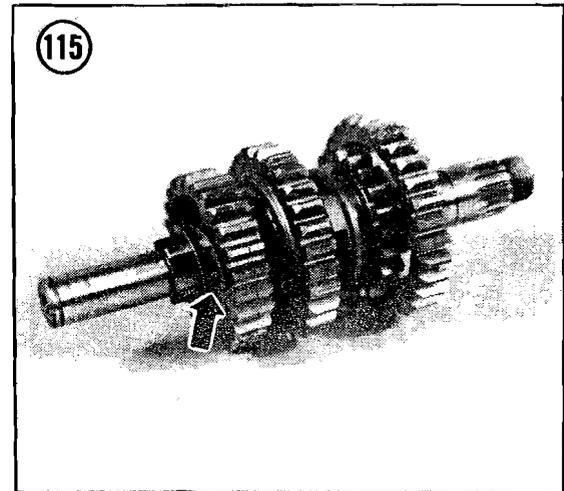
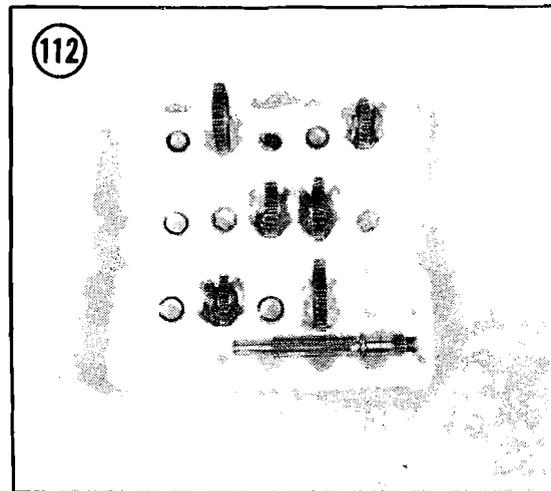
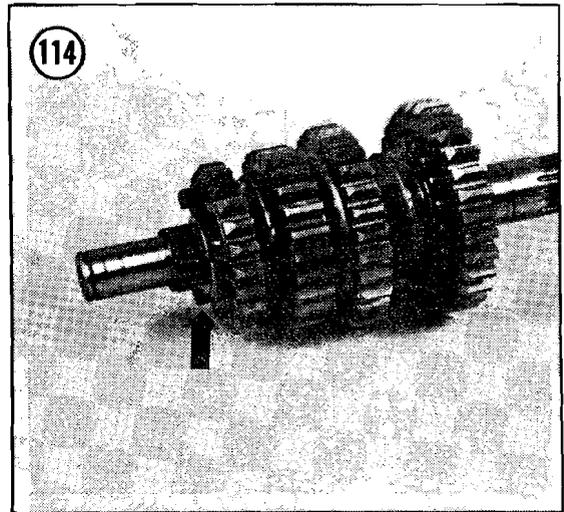
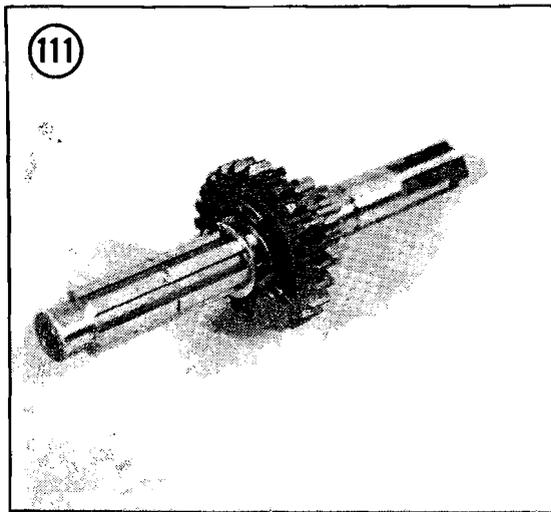
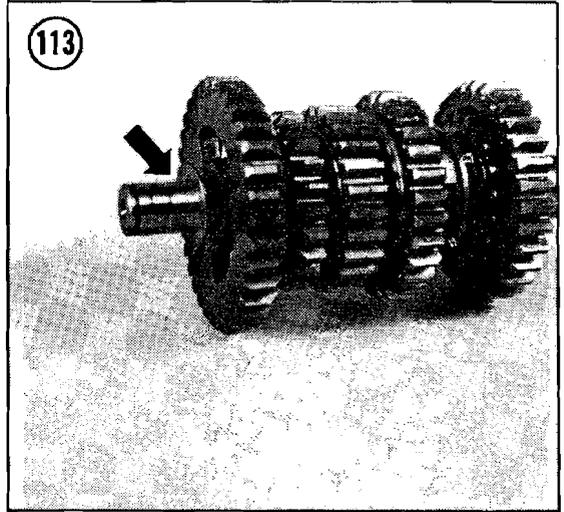
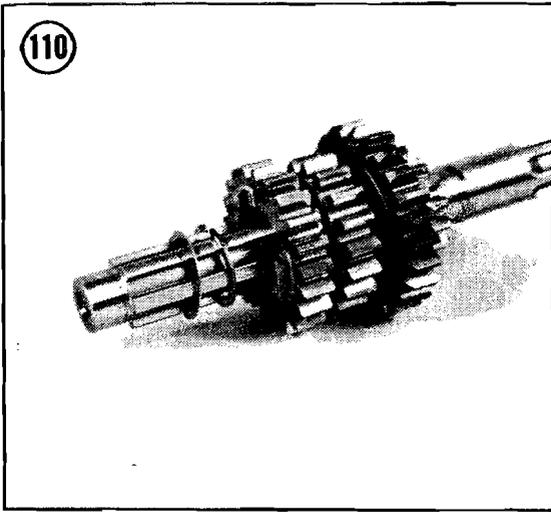
### Drive Shaft Gear Set Disassembly/Assembly (PE175 Models)

#### NOTE

When disassembling the drive shaft gear set, place all the parts in an egg carton as shown in **Figure 112**. The egg carton helps keep all the gears, washers and circlips in the correct order and proper position.

1. Remove the thrust washer and slide off the 1st driven gear (**Figure 113**).
2. Remove the small roller bearing (**Figure 114**) and the thrust washer and slide off 5th driven gear.
3. Remove the circlip and thin thrust washer securing the 4th/3rd driven gear (**Figure 115**) and remove the gear.





5

4. Remove the thrust washer and circlip securing the 6th driven gear and remove the gear (**Figure 116**).
5. Remove the circlip then slide off the 2nd driven gear (**Figure 117**).
6. Examine the gear set components as outlined in *Inspection*.
7. Assembly is the reverse of these steps. Ensure that all circlips are fully installed in the shaft grooves. Make sure all thrust washers are installed as removed.

**Drive Shaft Gear Set  
Disassembly/Assembly  
(All Except PE175 Models)**

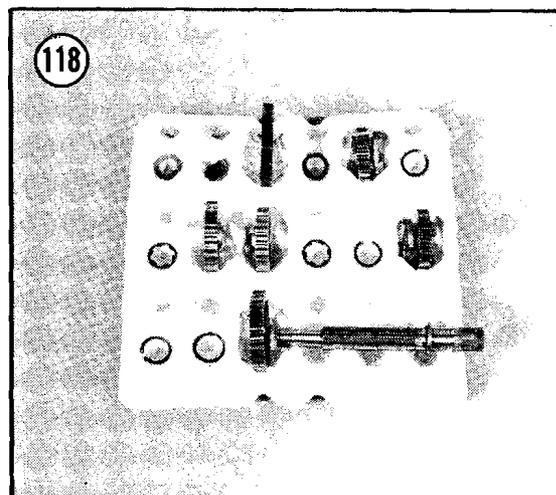
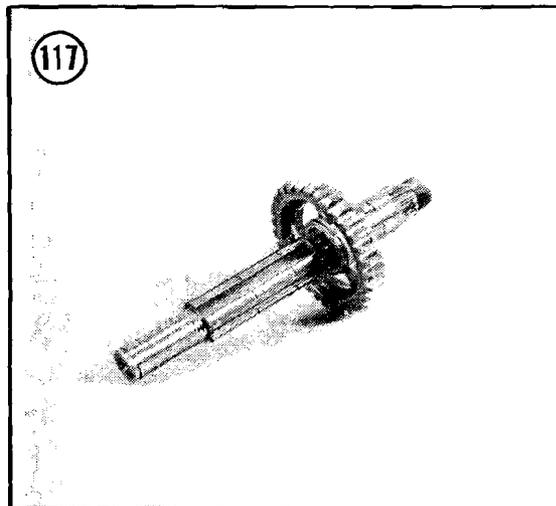
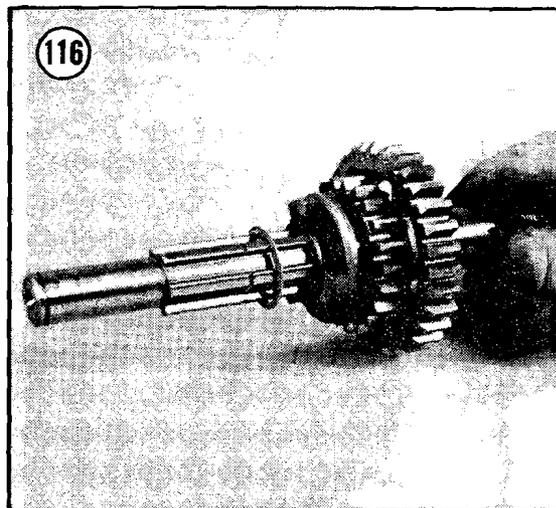
*NOTE*

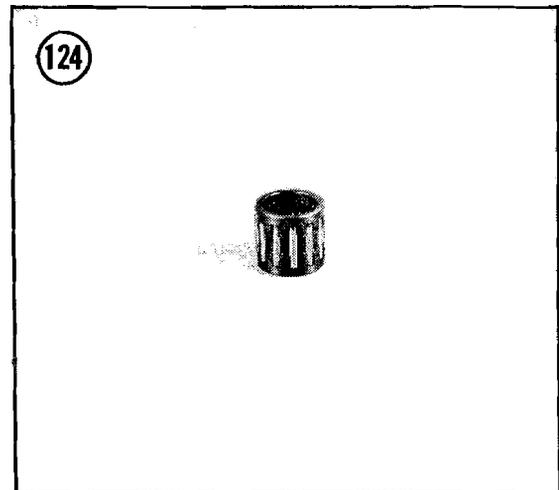
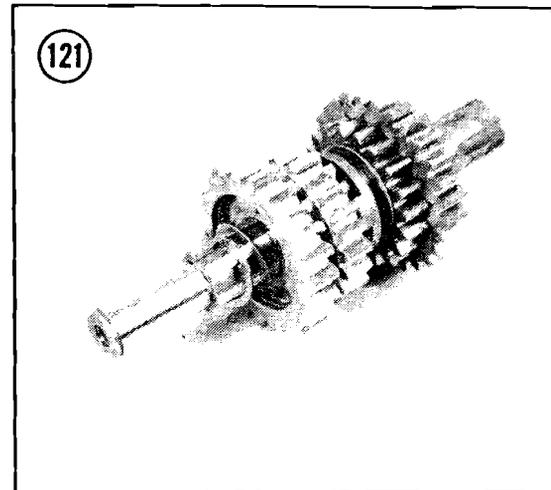
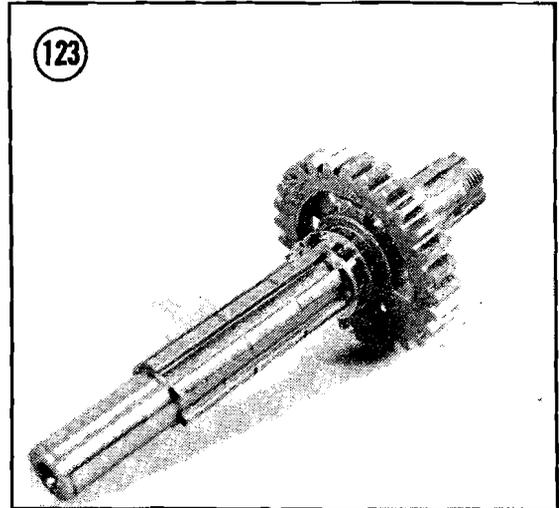
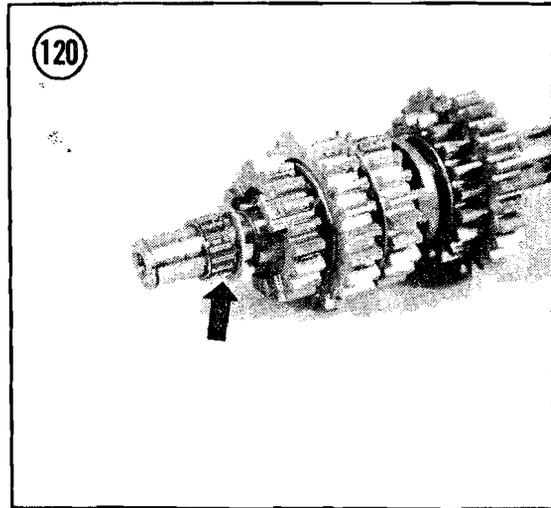
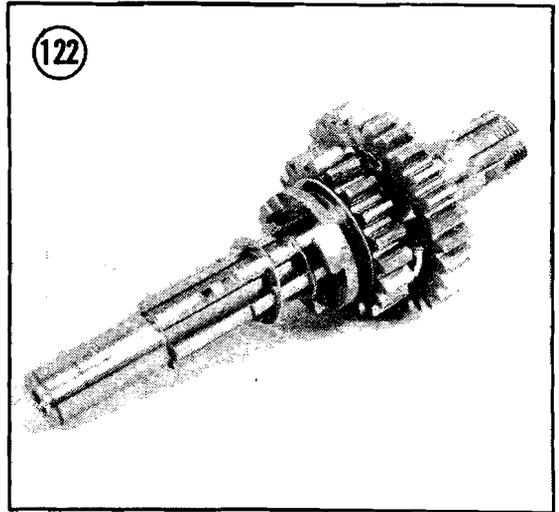
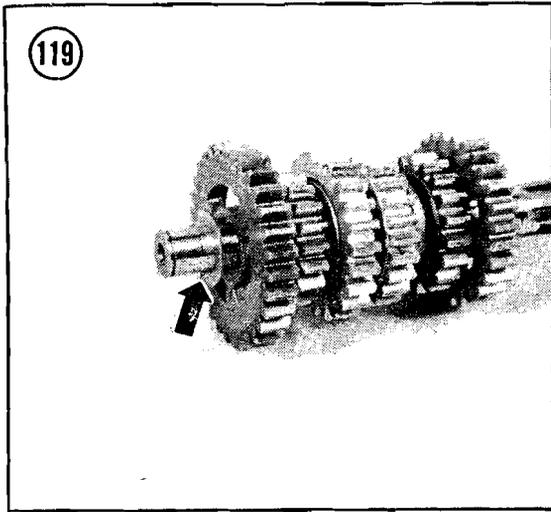
*When disassembling the drive shaft gear set, place all the parts in an egg carton as shown in **Figure 118**. The egg carton helps keep all the gears, washers and circlips in the correct order and proper position.*

1. Remove the thrust washer and slide off the 1st driven gear (**Figure 119**).
2. Remove the small roller bearing (**Figure 120**) and the thrust washer and slide off 5th driven gear (6th driven gear on PE250T, X models).
3. Remove the circlip and thin thrust washer securing the 3rd driven gear (3rd/4th driven gear on PE250T, X models) as shown in **Figure 121** and remove the gear.
4. Remove the thrust washer and circlip securing the 4th driven gear (5th driven gear on PE250T, X models) and remove the gear (**Figure 122**).
5. Remove the circlip and thrust washer and slide off the 2nd driven gear (**Figure 123**).
6. Examine the gear set components as outlined in *Inspection*.
7. Assembly is the reverse of these steps. Ensure that all circlips are fully installed in the shaft grooves. Make sure all thrust washers are installed as removed.

**Inspection**

1. Clean and carefully inspect all gears for burrs, chips, or roughness on the teeth.
2. Closely examine the drive shaft roller bearing (**Figure 124**) and the shaft bearings in



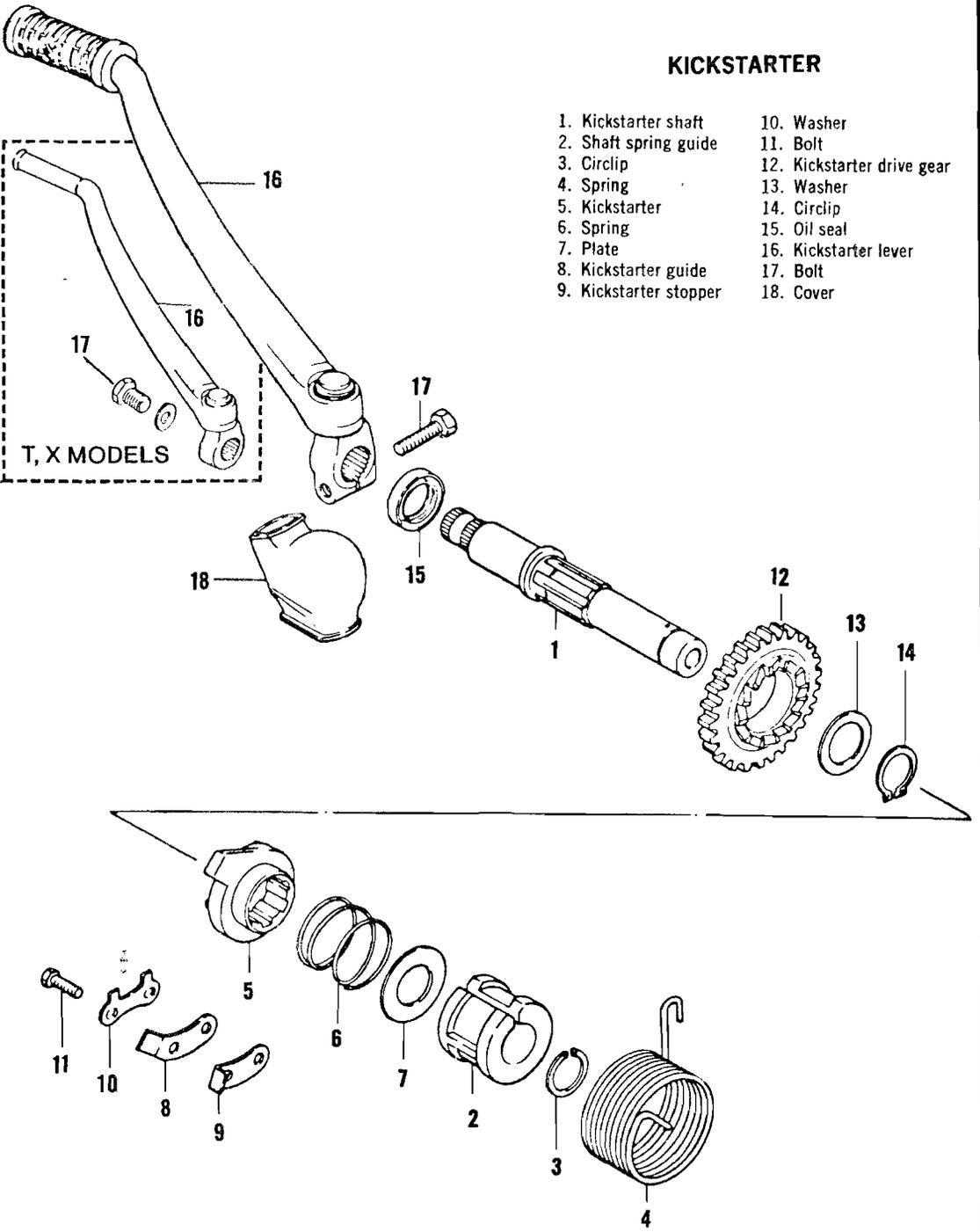


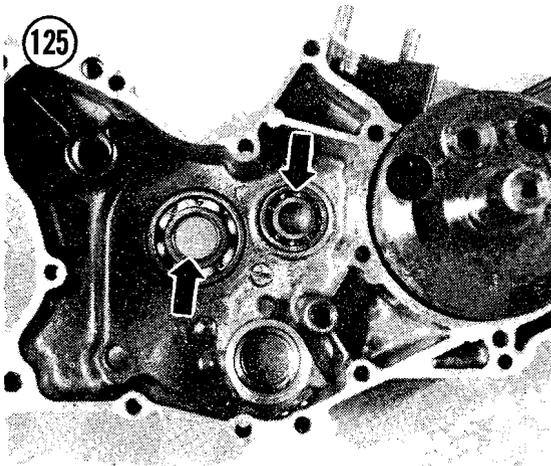
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128

**KICKSTARTER**

- |                        |                            |
|------------------------|----------------------------|
| 1. Kickstarter shaft   | 10. Washer                 |
| 2. Shaft spring guide  | 11. Bolt                   |
| 3. Circlip             | 12. Kickstarter drive gear |
| 4. Spring              | 13. Washer                 |
| 5. Kickstarter         | 14. Circlip                |
| 6. Spring              | 15. Oil seal               |
| 7. Plate               | 16. Kickstarter lever      |
| 8. Kickstarter guide   | 17. Bolt                   |
| 9. Kickstarter stopper | 18. Cover                  |





the crankcase (**Figure 125**) for excessive wear or cracks. To replace the bearings in the crankcase refer to *Bearing and Seal Replacement* in Chapter Four.

3. Carefully inspect all the gear engagement dogs. See **Figure 126** for external dogs and **Figure 127** for internal dogs. Replace any gears with rounded or damaged edges on the dogs. Gears should be replaced in sets to ensure proper mating and even wear.

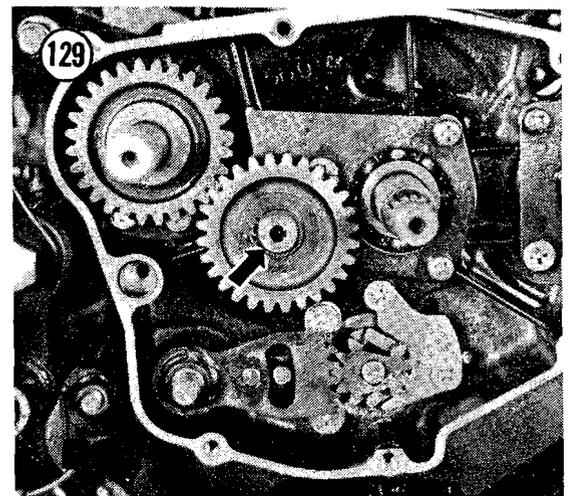
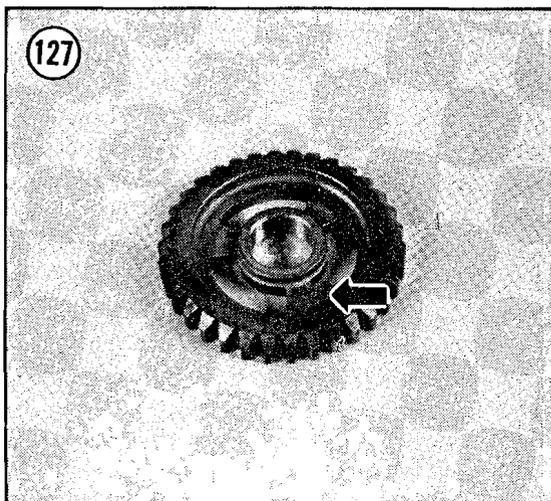
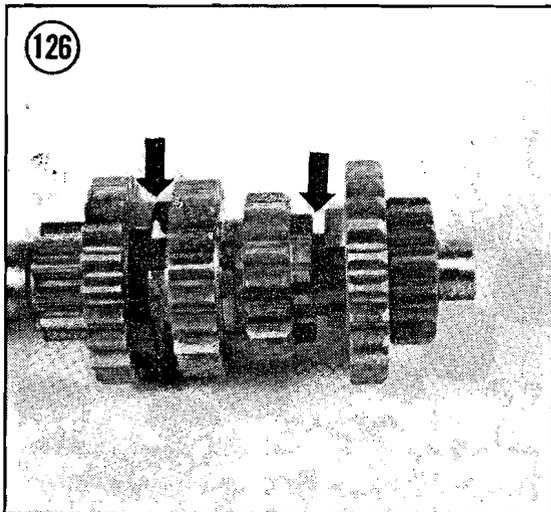
4. Clean and carefully inspect both gear set shafts. Ensure that the splines are not damaged and there are no signs of galling or fatigue.

### KICKSTARTER

To remove the kickstarter assembly it is necessary to remove and disassemble the engine. Refer to *Lower End, Disassembly* as outlined in Chapter Four. See **Figure 128** for a typical example of a kickstarter assembly.

#### Removal/Installation

1. Remove the clutch as outlined in this chapter.
2. Use snap ring pliers and remove the snap ring securing the kickstarter idler gear (**Figure 129**).
3. Refer to Chapter Four and separate the crankcase halves as outlined in *Lower End, Disassembly*.



4. Use pliers and disconnect the kickstarter return spring from the lug in the crankcase (**Figure 130**).

5. Remove the snap ring securing the spring guide to the kickstarter shaft (**Figure 131**) and slide out the spring guide. Disconnect the return spring from the shaft and remove the spring.

6. Turn over the crankcase half and rotate the kickstarter shaft counterclockwise until the end of the kickstarter unit is disengaged from under the guide and stopper (**Figure 132**). Lift out the kickstarter shaft assembly (**Figure 133**).

7. If kickstarter guide and stopper removal is desired, remove the 2 bolts securing the components to the crankcase half (**Figure 134**).

8. Disassemble and inspect the kickstarter components.

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

- a. If the stopper and guide (**Figure 134**) were removed from the crankcase, use blue Loctite (Lock N' Seal No. 2114) on the bolts when installing the components.
- b. Ensure that kickstarter components are positioned correctly on the shaft as shown in **Figure 135** before installing the shaft into the right crankcase half.
- c. Rotate the end of the kickstarter unit clockwise until it is started under the stopper and guide as shown in **Figure 136**. Press down and continue to turn the

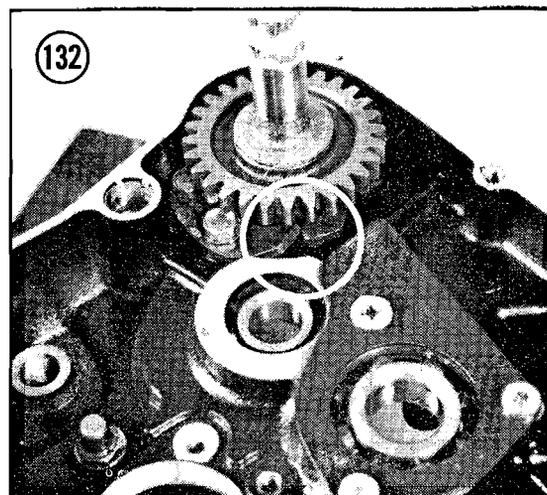
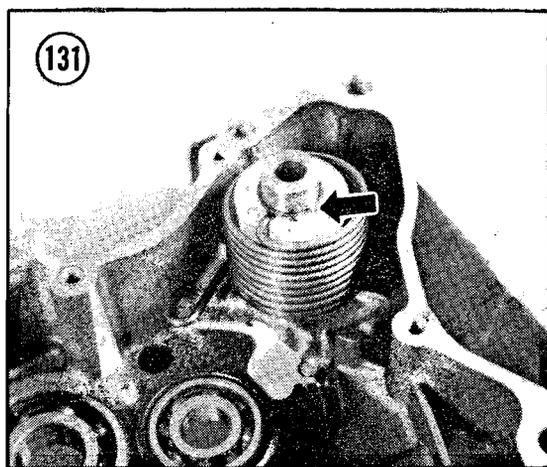
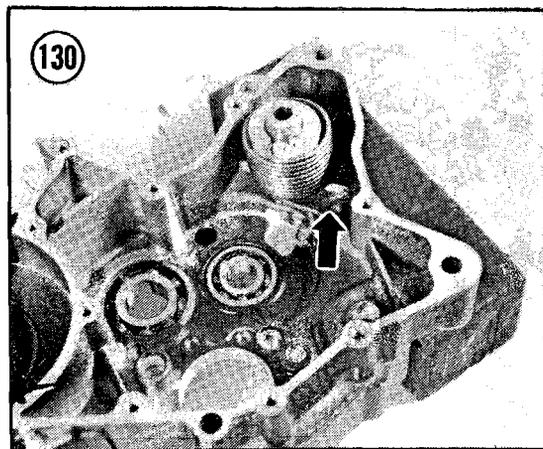
shaft clockwise until the kickstarter unit is completely engaged under the stopper and guide.

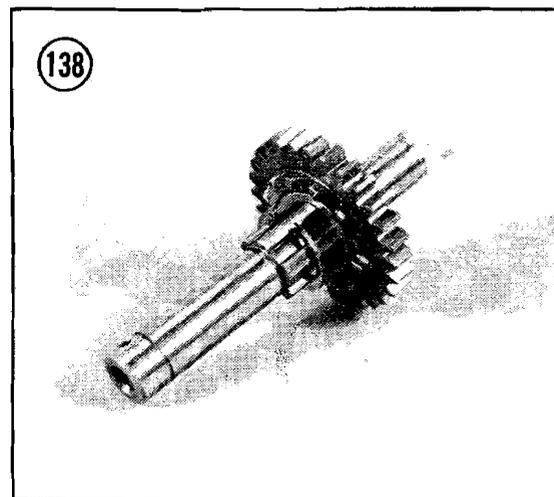
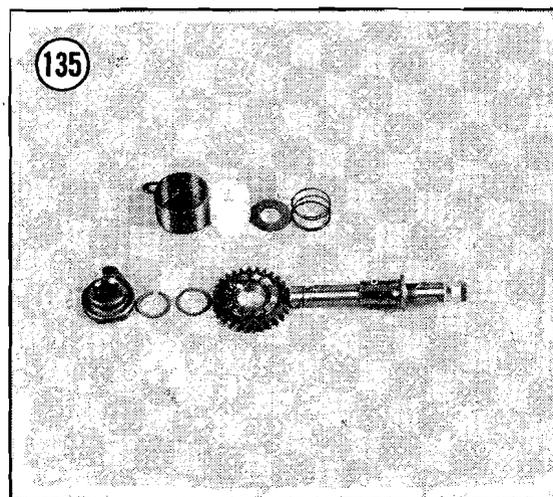
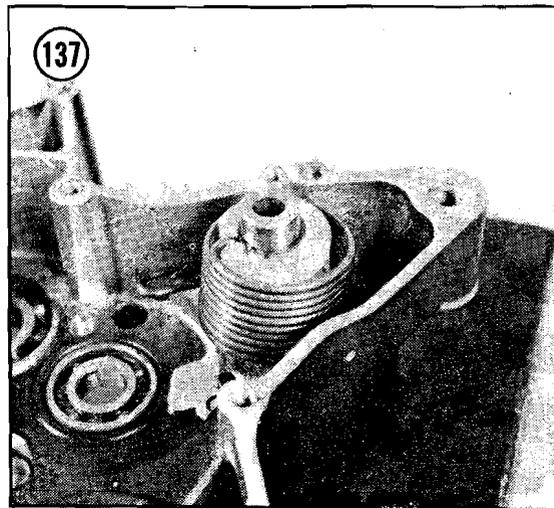
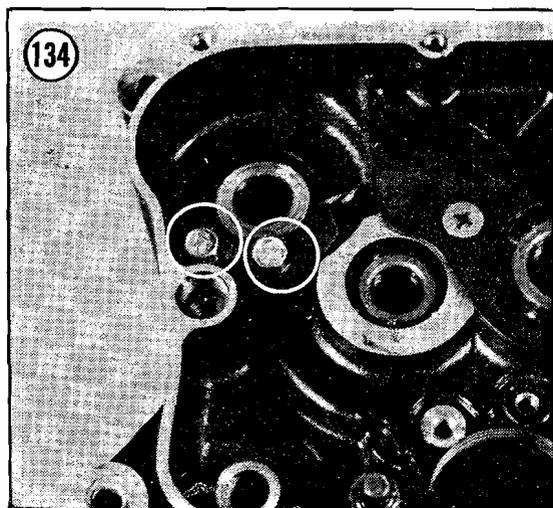
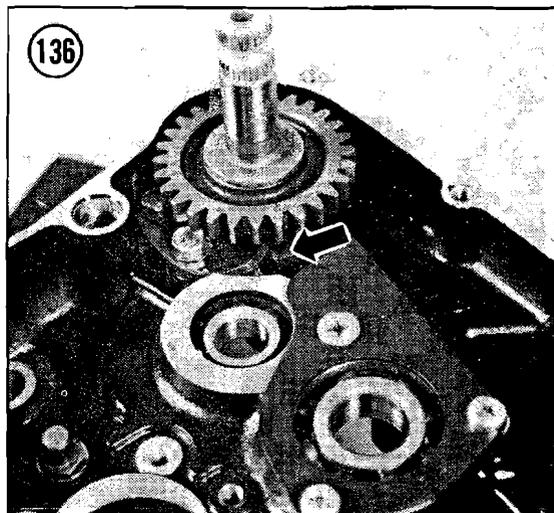
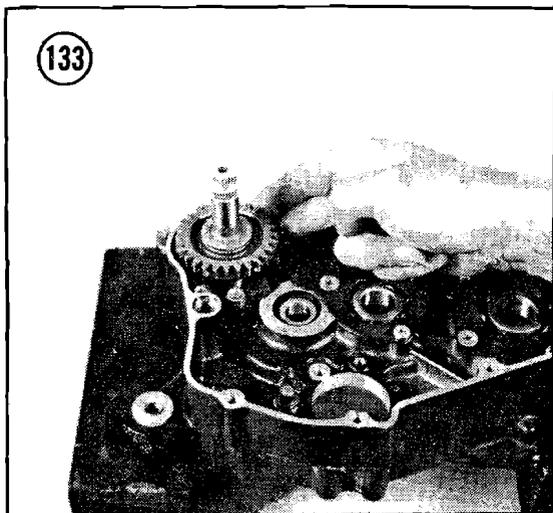
d. Install the return spring, spring guide and snap ring as shown in **Figure 137**. Use pliers and connect the return spring to the lug in the crankcase.

e. Assemble the crankcases as outlined in Chapter Four and install the clutch as outlined in this chapter.

### Disassembly/Inspection/Assembly

1. Refer to **Figure 135** and remove the large washer, spring and kickstarter unit.
2. Remove the circlip securing the thrust washer and kickstarter drive gear to the shaft (**Figure 138**). Remove the thrust washer and drive gear.





5

3. Examine the kickstarter shaft for damaged splines or other signs of wear. Replace the shaft if necessary.
4. Inspect the gear teeth and ratchet teeth on the kickstarter drive gear (Figure 139) and the mating ratchet teeth on the kickstarter unit. Replace both parts as a set, if necessary.
5. Check the condition of the idler gear (Figure 140). Replace the gear if it is worn or damaged.
6. When installing the drive gear and thrust washer on the shaft, make sure that the circlip securing the components is completely installed in the shaft groove (Figure 141).
7. Install the kickstarter unit on the shaft with the punch marks aligned as shown in Figure 142.
8. Install the large spring and washer on the shaft.

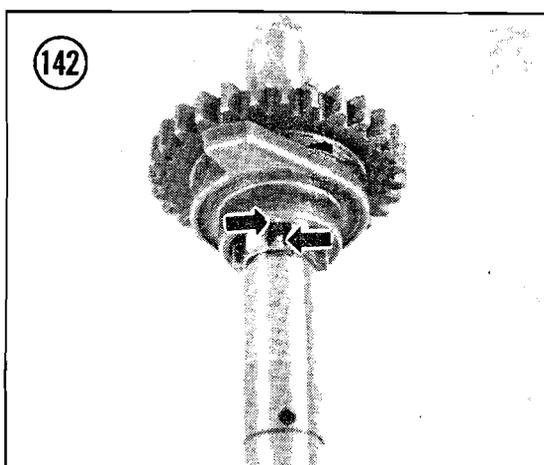
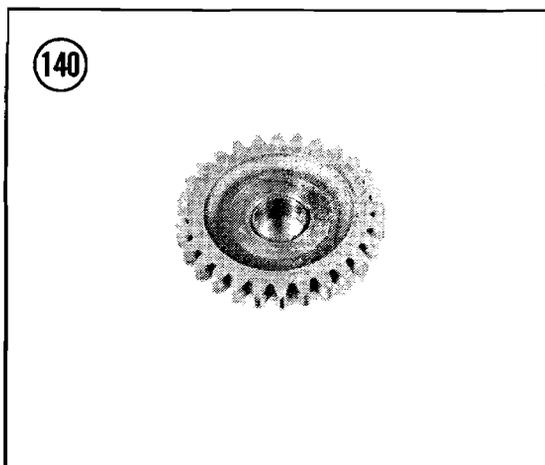
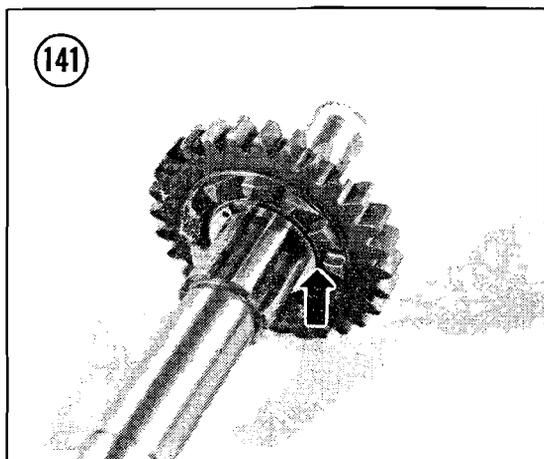
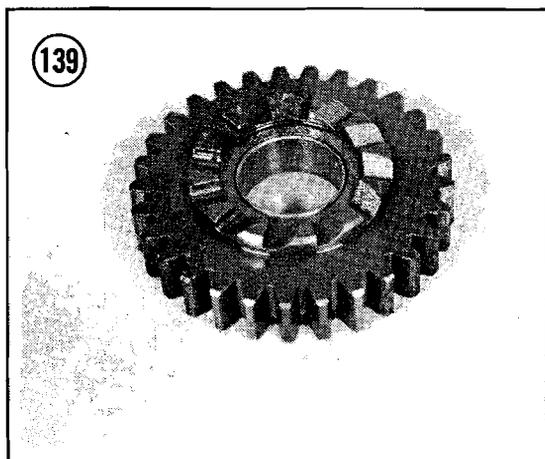


Table 1 CLUTCH SPECIFICATIONS

Item	Standard	Limit
<b>Clutch spring free length</b>		
PE175C	29.3 mm (1.153 in.)	30.3 mm (1.192 in.)
PE175N, T, X	31.1 mm (1.224 in.)	32.6 mm (1.283 in.)
PE250; PE400	40.5 mm (1.594 in.)	38.5 mm (1.515 in.)
<b>Drive plate thickness</b>		
PE175C, N, T, X	2.9-3.1 mm (0.114-0.122 in.)	2.6 mm (0.102 in.)
PE250B, C, N	3.4-3.6 mm (0.134-0.141 in.)	3.1 mm (0.122 in.)
PE250T, X; PE400	2.9-3.1 mm (0.114-0.122 in.)	2.6 mm (0.102 in.)
<b>Drive plate claw width</b>		
PE175T, X	11.8-12.0 mm (0.46-0.47 in.)	11.0 mm (0.43 in.)
PE250T, X; PE400	15.8-16.0 mm (0.62-0.63 in.)	15.0 mm (0.59 in.)
<b>Driven plate thickness</b>		
PE175C, N, T, X	1.54-1.66 mm (0.060-0.065 in.)	-----
PE250B, C, N	1.9-2.1 mm (0.075-0.082 in.)	-----
PE250T, X; PE400	1.94-2.06 mm (0.076-0.081 in.)	-----
<b>Driven plate distortion</b>		
All models	-----	0.10 mm (0.004 in.)

Table 2 SHIFT FORK SPECIFICATIONS

<b>Shift fork-to-gear clearance*</b>	
PE175 (all forks)	0.45 mm (0.018 in.)
PE250B, C, N	
Fork No. 1	0.8 mm (0.031 in.)
Fork No. 2	0.6 mm (0.024 in.)
PE250T, X; PE400 (all forks)	0.6 mm (0.024 in.)
<b>Fork thickness</b>	
PE175C, N	
Fork No. 1	4.30-4.40 mm (0.169-0.173 in.)
Fork No. 2	5.30-5.40 mm (0.208-0.213 in.)
PE175T, X (all forks)	4.30-4.40 mm (0.169-0.173 in.)
PE250 (all forks)	3.95-4.05 mm (0.156-0.160 in.)
PE400	
Fork No. 1	3.95-4.05 mm (0.156-0.160 in.)
Fork No. 2	4.95-5.05 mm (0.195-0.199 in.)
<b>Gear groove width</b>	
PE175C, N	
Fork No. 1	4.45-4.55 mm (0.175-0.179 in.)
Fork No. 2	5.45-5.55 mm (0.124-0.217 in.)
PE175T, X (all forks)	4.45-4.55 mm (0.175-0.179 in.)
PE250B, C, N	
Fork No. 1	4.45-4.55 mm (0.175-0.179 in.)
Fork No. 2	4.25-4.35 mm (0.167-0.171 in.)
PE250T, X (all forks)	4.25-4.35 mm (0.167-0.171 in.)
PE400	
Fork No. 1	4.25-4.35 mm (0.167-0.171 in.)
Fork No. 2	5.25-5.35 mm (0.206-0.210 in.)

\*The countershaft is fitted with only one No. 1 shift fork. Two No. 2 shift forks are fitted on the drive shaft.

June 28, 2007

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## CHAPTER SIX

### FUEL AND EXHAUST SYSTEMS

For correct operation a gasoline engine must be supplied with fuel and air mixed in proper proportions by weight. A mixture with an excess of fuel is described as rich. A mixture with an insufficient amount of fuel is described as lean. It is the function of the carburetor to supply the correct fuel/air mixture to the engine under all operating conditions.

This chapter includes removal and maintenance for the fuel tank, fuel valve, carburetor, and exhaust system. Refer to Chapter Three for carburetor adjustments. Carburetor specifications (**Table 1**) are at the end of this chapter.

#### FUEL TANK AND FUEL VALVE

The fuel tank and fuel valve strainer should be routinely cleaned after 3 or 4 races or every couple of months. Remove the tank as outlined in the following procedure and discard the old fuel in the tank. Pour about a pint of clean fuel (without oil) into the tank, install the cap and slosh the fuel around thoroughly and pour it out. Remove the fuel valve and clean the strainer in clean gasoline. Make sure the gasket or O-ring on the fuel valve is in good condition before installing the valve.

#### Fuel Tank Removal/Installation

1. To gain access to the rear tank mount it is necessary to remove the seat. Remove the 2 bolts (one on each side) securing the rear of the seat (**Figure 1**).

#### NOTE

*On some models it is only necessary to remove the right-hand bolt and loosen the left-hand bolt. The left-hand seat mount is slotted.*

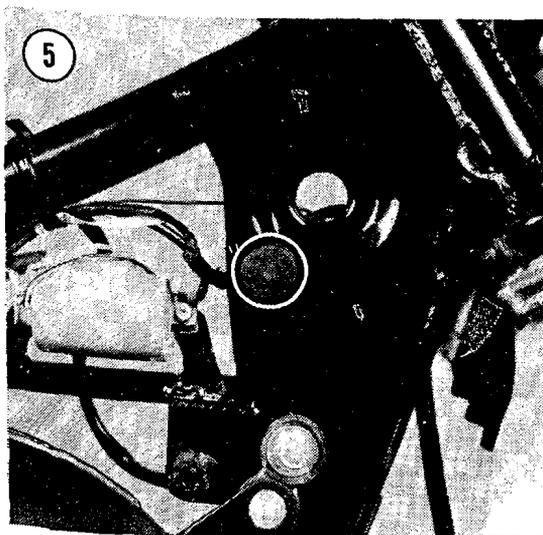
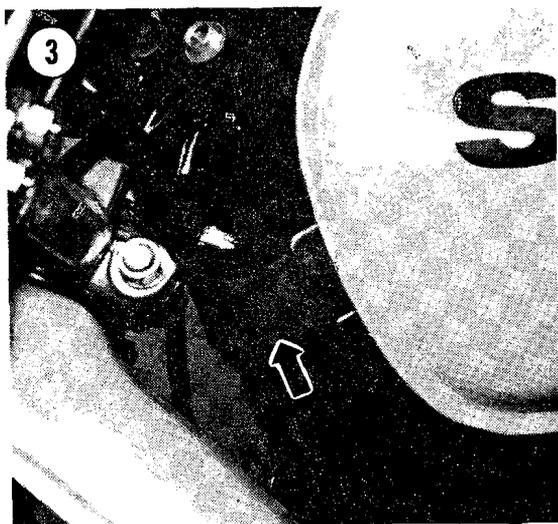
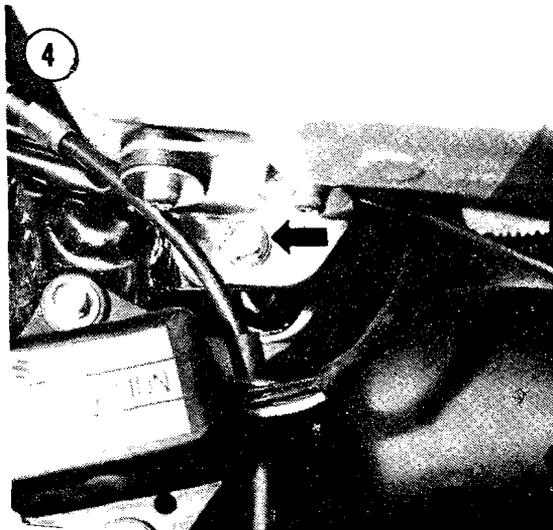
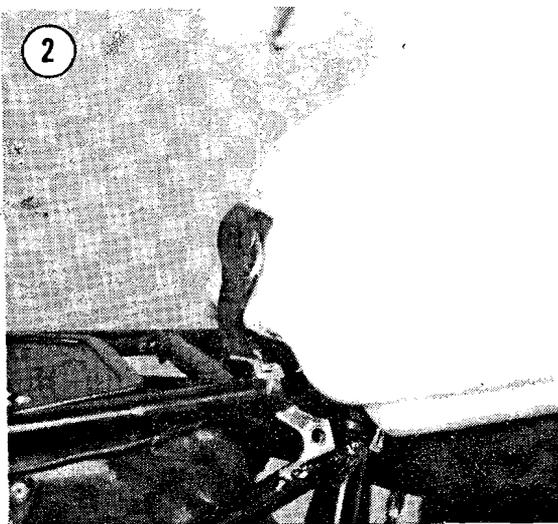


2. Pull the seat toward the rear of the machine and disengage the seat hook from the frame.
3. Disconnect the fuel line from the tank valve or carburetor.
4. Pull up and disconnect the tank mounting strap (Figure 2).
5. On PE250B models, disconnect the rubber strap securing the front of the tank (Figure 3). On all other models, remove the bolt securing the front of the tank to the frame (Figure 4).
6. Lift up on the rear of the fuel tank and slide the tank back to disengage the front rubber mounting pads (Figure 5). Lift off the fuel tank.

7. Installation is the reverse of these steps. Before installing the tank make sure that the tank mounting pads on the frame are in good condition and are securely mounted to the frame. Lightly lubricate the tank mounting pads with rubber lubricant or WD-40 to help the tank slide over the pads.

**Fuel Valve  
Removal/Installation**

1. Remove the fuel tank. Turn the fuel valve to ON and drain the fuel into a suitable container.



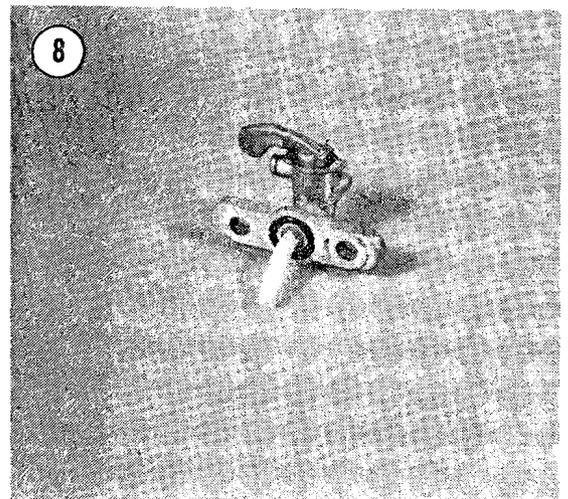
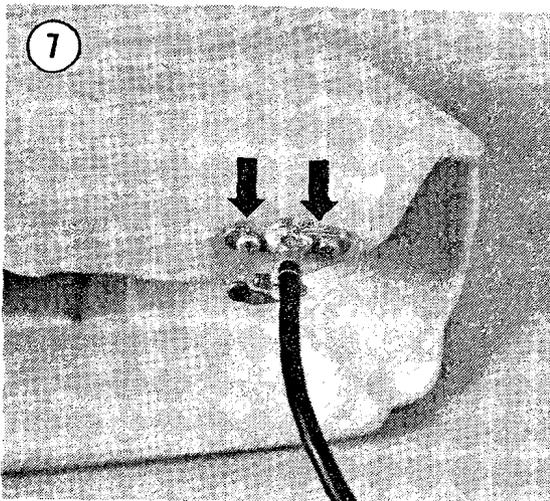
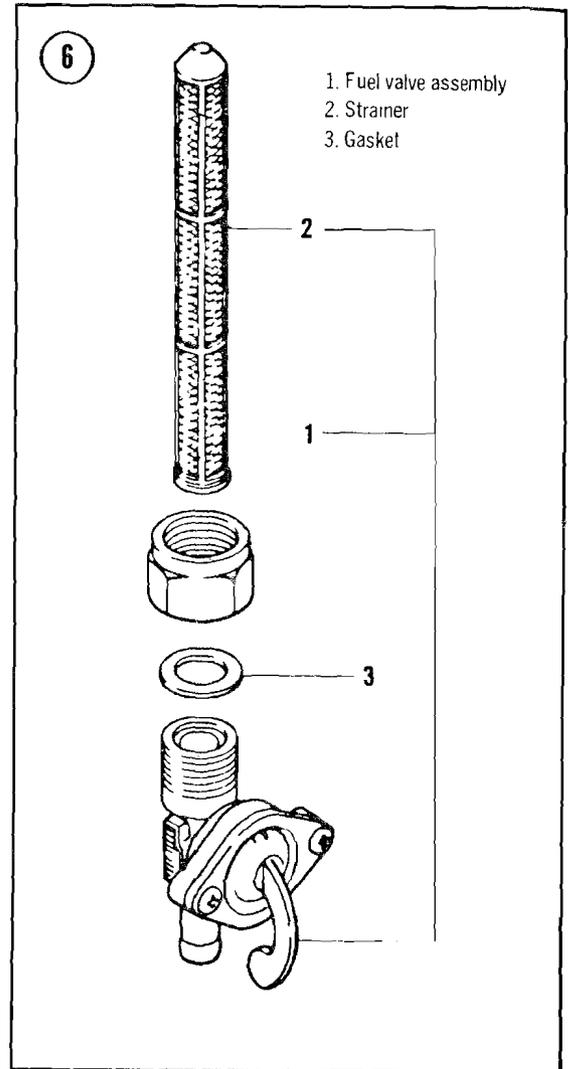
2. On PE250B models, refer to **Figure 6** and remove the large nut securing the valve body to the tank. Remove the valve carefully so the strainer is not damaged.
3. On all other models, remove the screws (**Figure 7**) securing the valve to the tank and carefully remove the valve.
4. Carefully flush the fuel strainer on the valve with clean gasoline (**Figure 8**). Carefully examine the strainer for clogging or damage. Replace the strainer or valve if necessary.
5. Installation is the reverse of these steps. Make sure that the gasket or O-ring on the valve body is in good condition. After installing the tank, partially fill the tank with a fresh fuel/oil mixture and check for leaks around the valve and the fuel line connections.

### CARBURETOR SERVICING

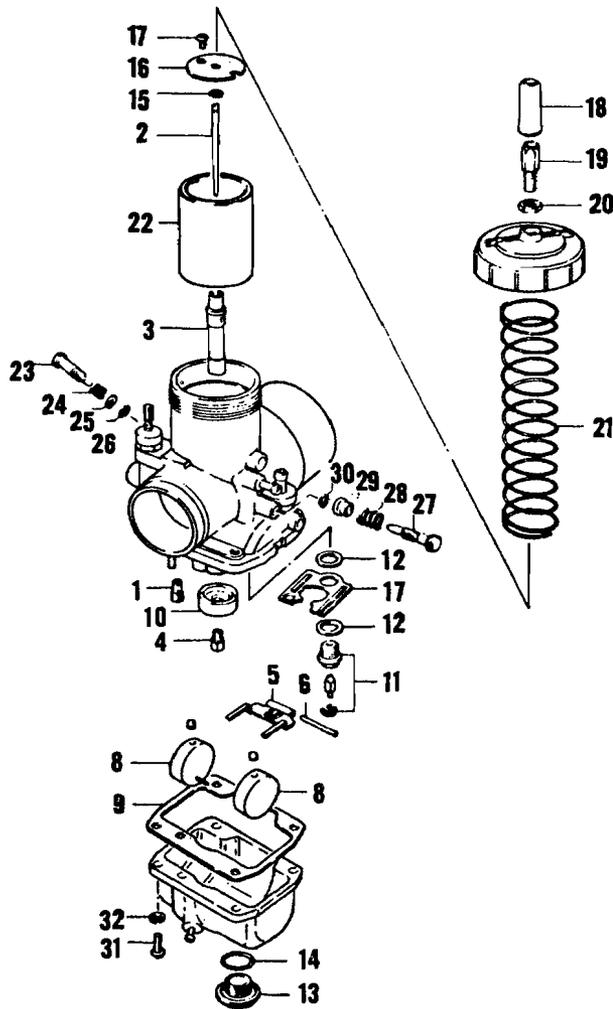
Major carburetor service intervals depend on the use of the motorcycle. The carburetor on a machine that is used weekly in rigorous competition should be serviced frequently to ensure that it is always in top working condition.

All models are equipped with Mikuni carburetors. Refer to **Figure 9** for a typical carburetor. **Table 1** contains all carburetor specifications.

Slight variations exist between different model carburetors. Pay particular attention to the location and order of parts during carburetor disassembly.



9



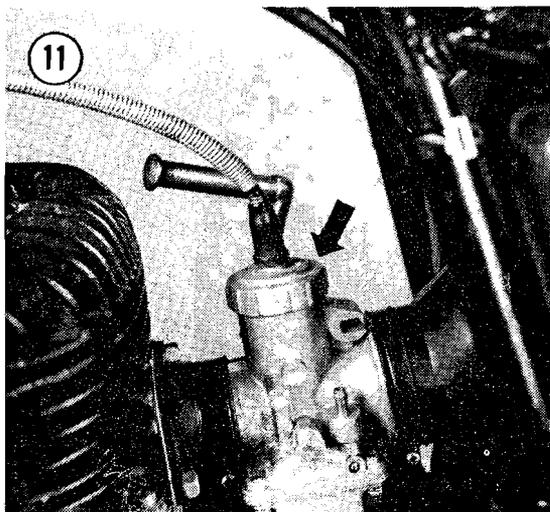
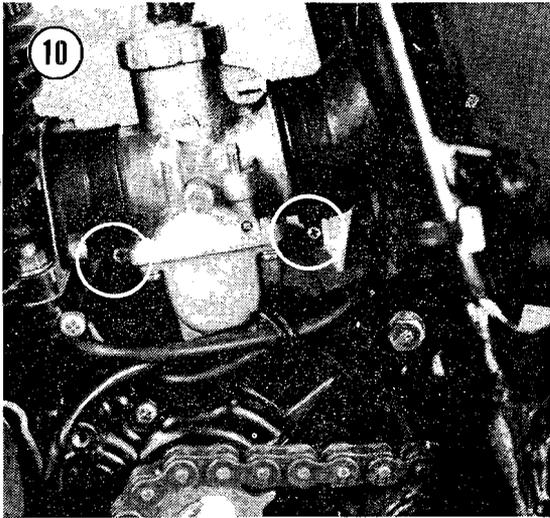
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**TYPICAL CARBURETOR**

- |                               |                                  |  |
|-------------------------------|----------------------------------|--|
| 1. Pilot jet                  | 12. Gasket                       | 23. Pilot air screw                        |
| 2. Jet needle                 | 13. Drain plug                   | 24. Spring                                 |
| 3. Needle jet (needle nozzle) | 14. O-ring                       | 25. Washer                                 |
| 4. Main jet                   | 15. Needle "E" clip              | 26. O-ring                                 |
| 5. Float arm                  | 16. Plate                        | 27. Idle speed screw (throttle stop screw) |
| 6. Float hinge pin            | 17. Screw                        | 28. Spring                                 |
| 7. Float chamber              | 18. Rubber boot                  | 29. Cover                                  |
| 8. Float                      | 19. Cable adjuster               | 30. O-ring                                 |
| 9. Gasket                     | 20. Adjuster lock nut            | 31. Screw                                  |
| 10. Ring                      | 21. Throttle valve return spring | 32. Lock washer                            |
| 11. Needle valve assembly     | 22. Throttle valve               |  |

### Carburetor Removal/Installation

1. Disconnect the fuel line from the carburetor or the fuel valve.
2. Loosen the clamp screws securing the carburetor to the air box and the engine flange (**Figure 10**).
3. Unscrew the mixing chamber cap and lift out the throttle slide valve (**Figure 11**). The throttle slide valve can be removed from the cable at this time if desired. If the slide valve is not to be removed, carefully swing the throttle cable up and out of the way. Make sure the jet needle is not damaged.
4. Carefully turn and pull the carburetor back



out of the engine intake flange then the air box flange.

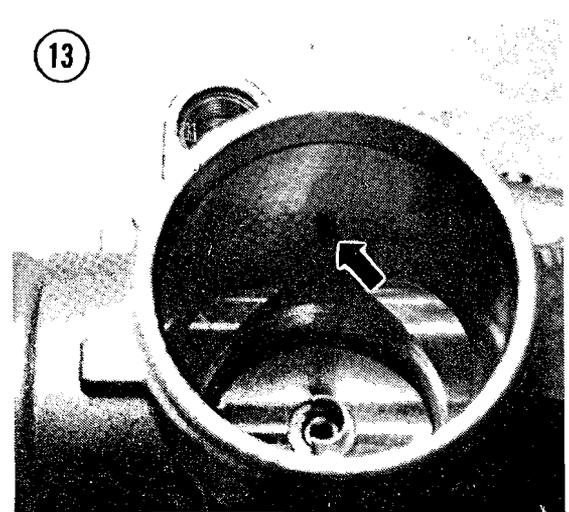
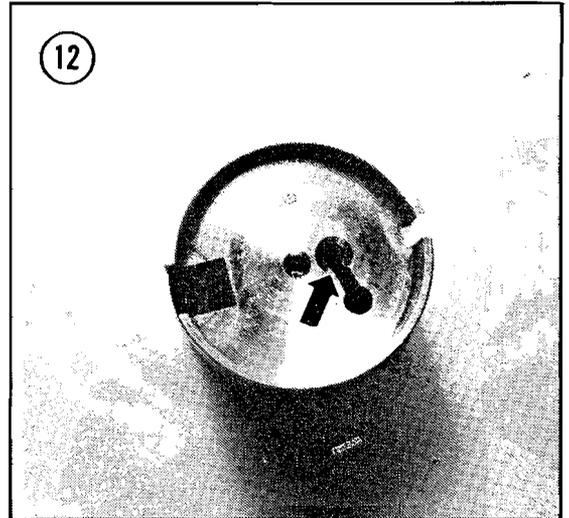
5. Disconnect the vent tubes and lift out the carburetor.

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

- a. On all "T" and "X" models, ensure that the intake manifold is properly positioned on the cylinder and the carburetor. Tighten both clamps evenly and securely.

#### CAUTION

*Make sure that all carburetor mounting points are well secured and air tight. Any leaks around the engine intake flange,*



manifold or air box can easily cause serious engine damage due to ingestion of dirt as well as a "too-lean" fuel mixture.

- b. When connecting the throttle cable to the throttle slide valve, make sure that the cable end is securely positioned in the recess in the throttle slide (Figure 12).
- c. When installing the throttle slide valve in the carburetor body, make sure the groove in the slide engages the locating pin in the carburetor (Figure 13).

**CAUTION**

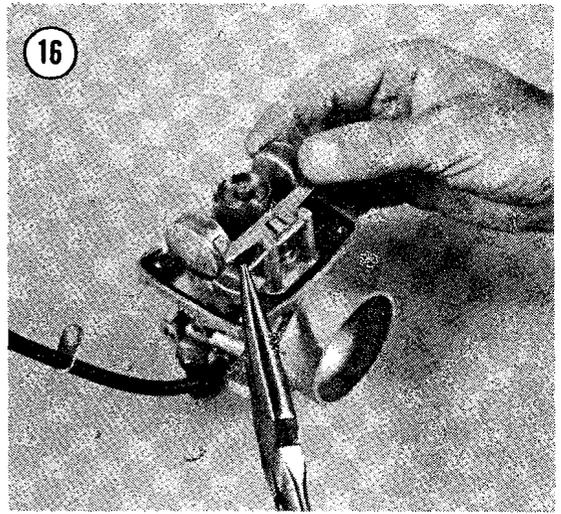
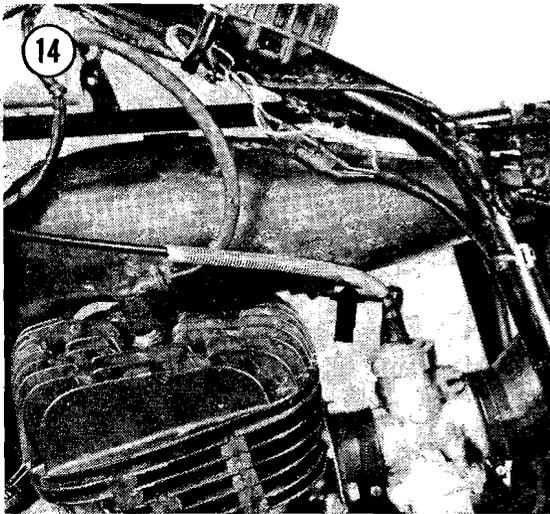
Make sure that the cable protection spring is positioned next to the exhaust pipe as

shown in Figure 14 or the throttle cable may be damaged by a hot pipe.

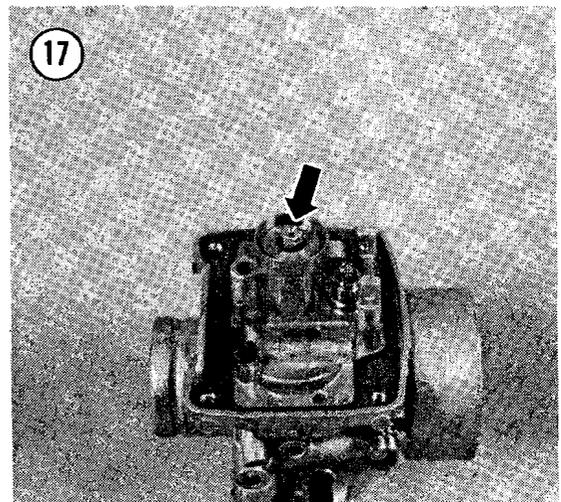
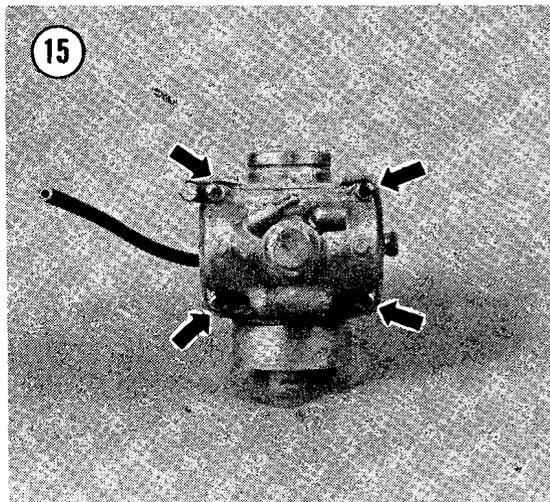
- d. Refer to Chapter Three and perform *Carburetor Adjustments*.

**Disassembly/Assembly**

1. Remove the 4 screws securing the float chamber (Figure 15) and lift off the chamber.
2. Slide out the hinge pin (Figure 16) securing the float (on models with one-piece float) or the float arm. Lift off the float or float arm.
3. Use a jet tool or 6 mm socket and remove the main jet with the jet ring (Figure 17).

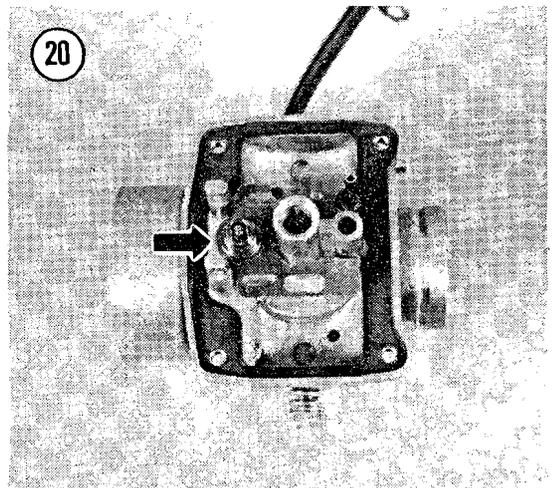
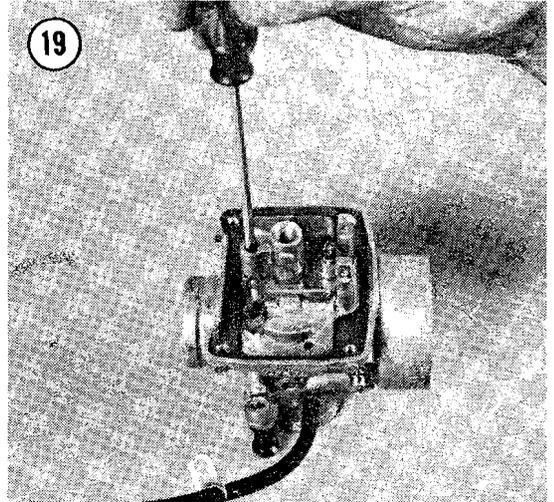
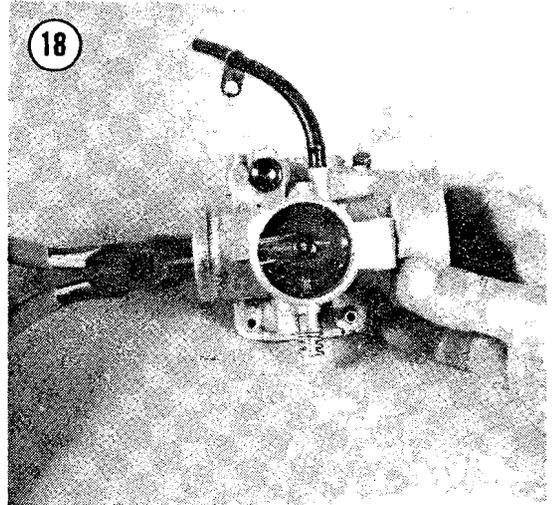


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4. Use needlenose pliers and carefully lift out the needle jet as shown in **Figure 18**.
5. Use a small screwdriver with a good tip and remove the pilot jet (**Figure 19**).
6. Use a socket and carefully remove the needle valve assembly complete with the float chamber plate (**Figure 20**).
7. Remove the choke plunger from the carburetor body (**Figure 21**).
8. To remove the jet needle from the throttle valve on "T" and "X" models, remove the 2 screws securing the needle retainer and remove the retainer (**Figure 22**).
9. Perform *Cleaning and Inspection and Float Adjustment*.
10. Assembly is the reverse of these steps. Keep the following points in mind:

- a. On carburetors with separate floats, make sure that the floats are installed with the brass pins toward the bottom of the float chamber (**Figure 23**).
- b. When installing the needle valve assembly, make sure a gasket is installed on each side of the float chamber plate (**Figure 24**).
- c. Install the needle jet with the groove in the jet aligned with the locating pin in the carburetor body (**Figure 25**).
- d. When assembling the throttle valve, position the cable retainer over the needle clip as shown in **Figure 26**.



### Cleaning and Inspection

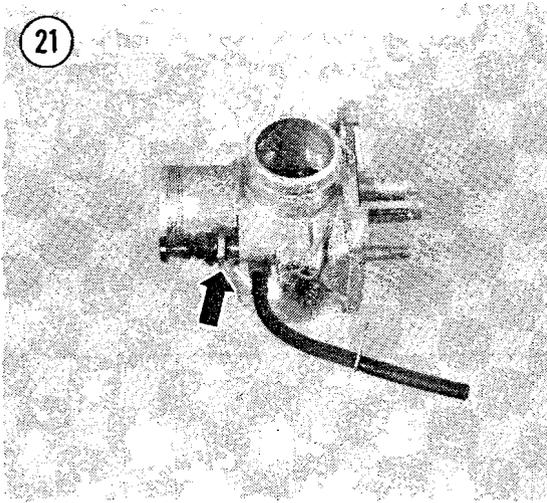
1. Soak all of the metal components of the carburetor in special carburetor cleaning solution. This solution is available through automotive parts and supply stores in a small resealable tank with a dip basket.

#### CAUTION

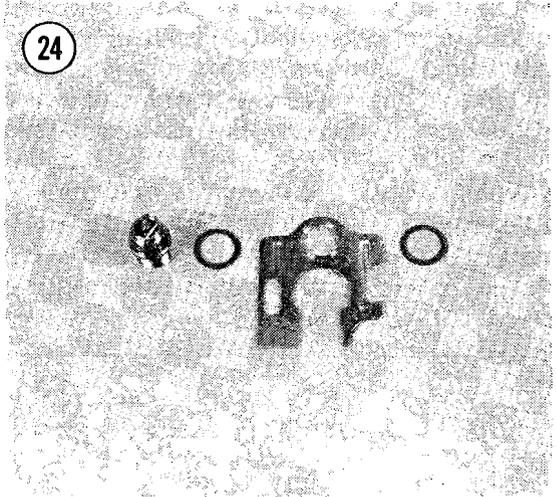
*Do not put non-metallic parts such as floats, gaskets, and O-rings in the carburetor solution. The caustic nature of the solution will damage these parts. Clean these components in common solvent.*

2. Blow out all the jets and passages in the carburetor body with compressed air.

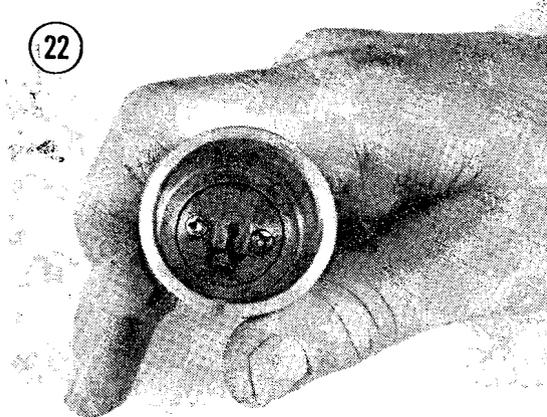
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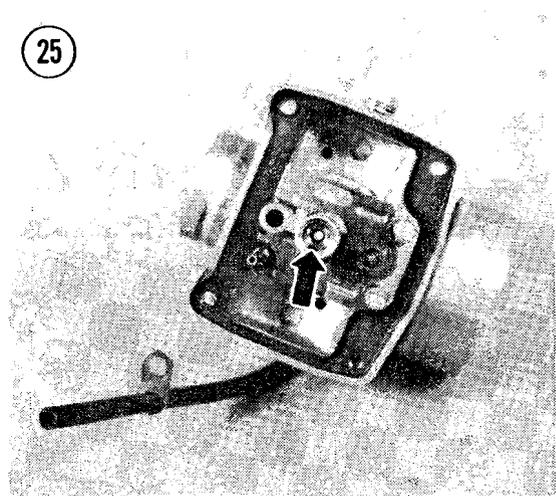
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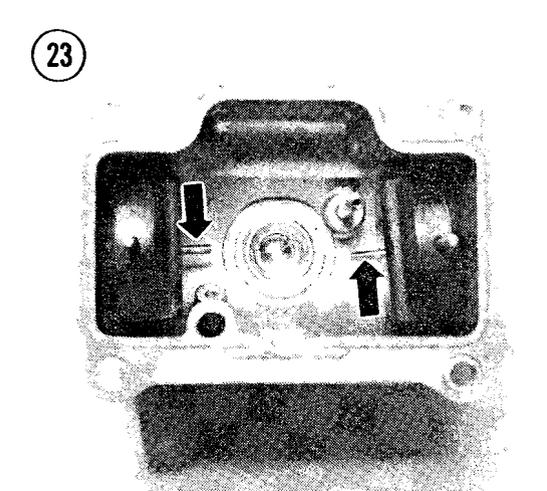


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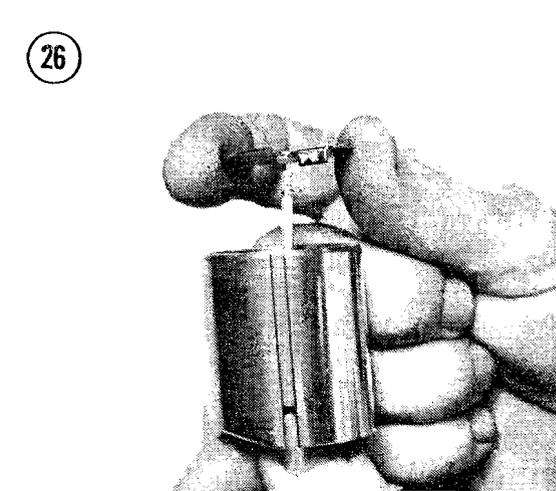


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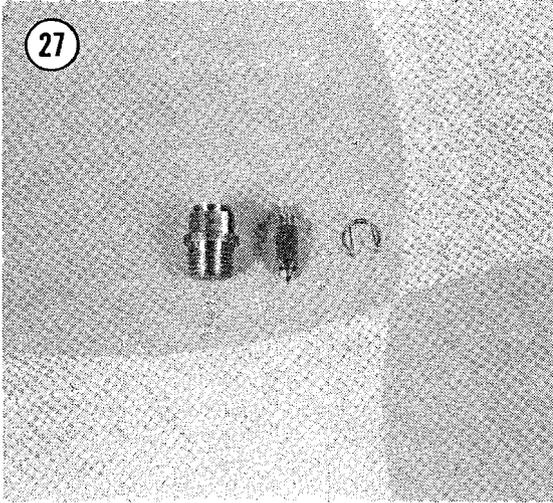
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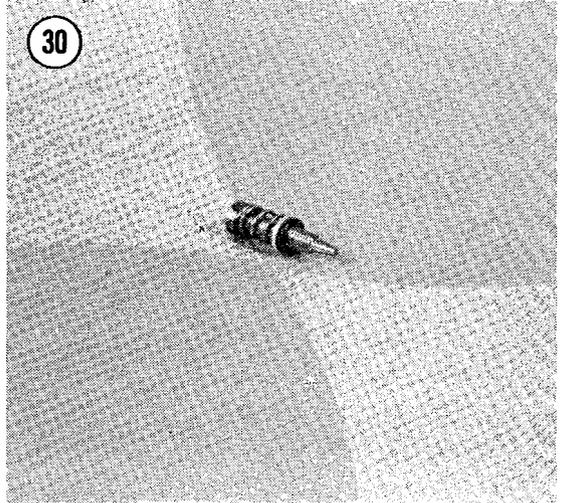
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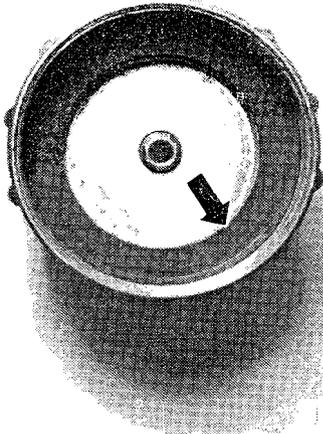
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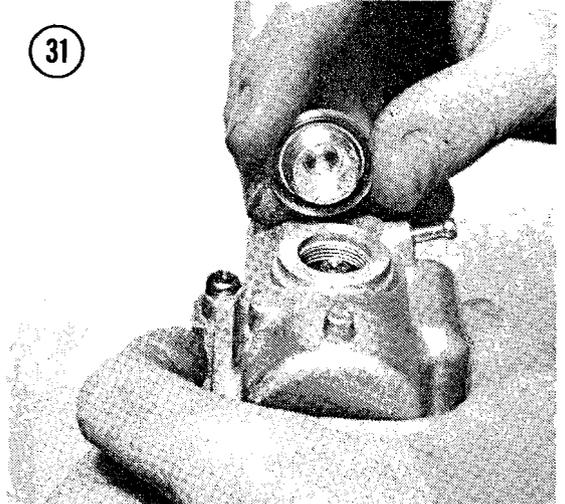
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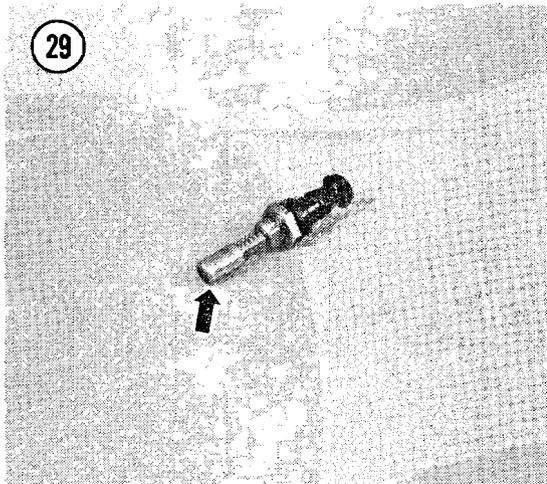
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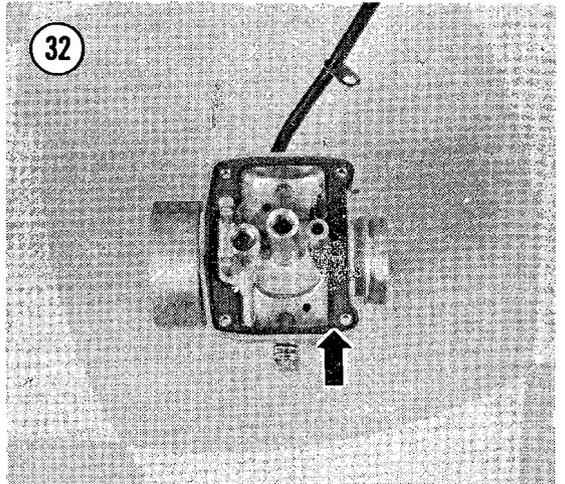
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**CAUTION**

*Never use wire to clean any jets or orifices in the carburetor body. The wire could enlarge and damage the precise sizes of jets or openings, resulting in improper operation of the carburetor.*

3. Check the cone end of the needle valve; replace it if it is scored or pitted (Figure 27).
4. If the float is all brass, shake it to determine if there is any fuel in it. If there is, the float must be replaced.
5. Inspect the throttle slide valve for scoring or galling. Replace it if necessary.
6. Check the gasket in the top of the mixing chamber cap (Figure 28). Replace the cap if the gasket is damaged.
7. Examine the rubber seat in the end of the choke plunger (Figure 29). Replace the

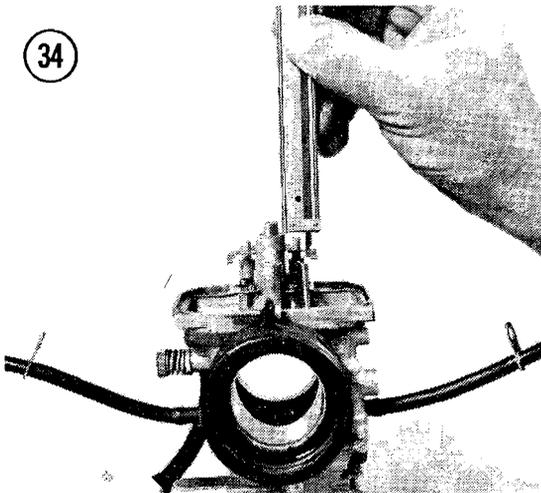
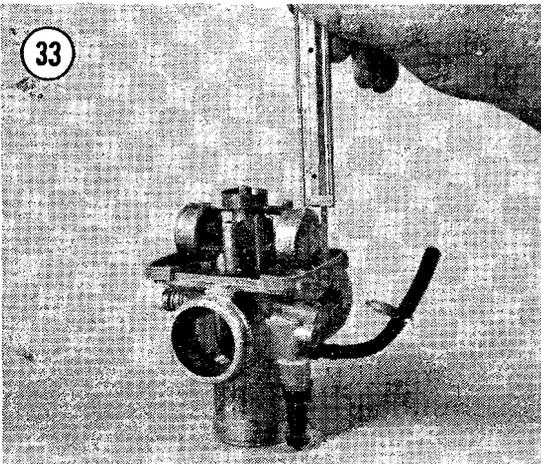
plunger if the rubber seat is scored or compressed.

8. Examine the end of the pilot air screw (Figure 30). Replace the air screw if any grooves or roughness are present. Ensure that the O-ring is in good condition.
9. Check the gasket or O-ring on the float chamber drain plug (Figure 31). Replace the gasket or O-ring if damaged.
10. Examine the float chamber gasket for damage (Figure 32). Replace the gasket if there is any doubt as to its serviceability.

**Float Adjustment**

A precise float adjustment is important for proper engine operation. The float level should be set carefully with a caliper or locally fabricated gauge. The float level on all PE models is set quite high, so do not be alarmed if some fuel runs from the float chamber overflow tube when the machine is not running or is on the sidestand. The level is set to provide proper fuel flow when the engine is running. Float levels are specified in Table 1.

1. Remove the carburetor and remove the float chamber.
2. On all models using measurement "A" as specified in Table 1, measure the float level from the carburetor body to the top of the float as shown in Figure 33. The float tang should just touch, but not compress, the spring-loaded needle valve. It is often best to hold the carburetor on its side while measuring the level to prevent the weight of the float from compressing the needle valve. Carefully bend the tang on the float arm to achieve the specified level. The float level should be set without the float chamber gasket installed. If the gasket is not removed, subtract approximately 1 mm from the specified float level.
3. On all models using measurement "B" as specified in Table 1, measure the float level from the carburetor main jet body to the float arm as shown in Figure 34. The float level can be set more easily if the main jet and jet ring are first removed. Carefully bend the tang on the float arm to achieve the specified level.
4. Install the float chamber and the carburetor.

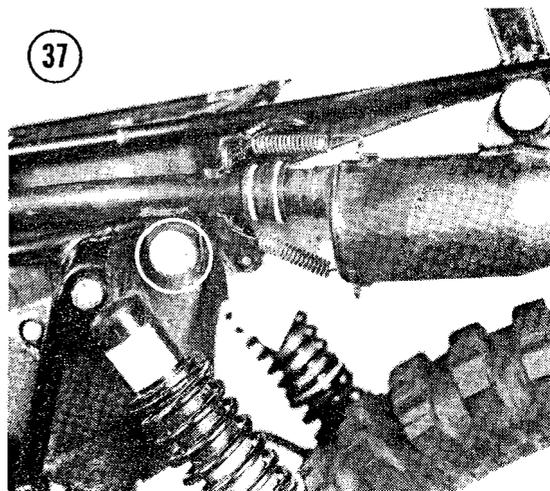
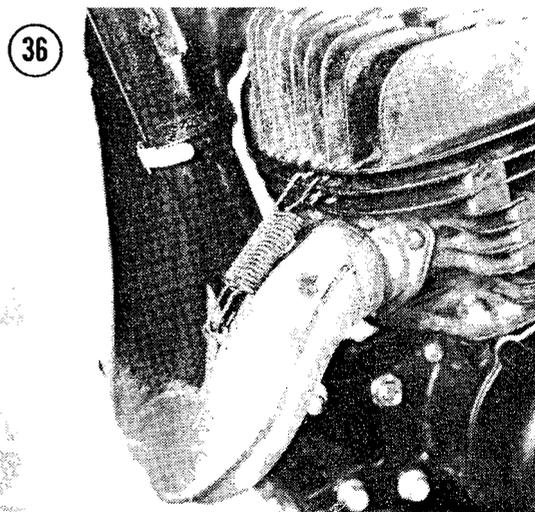
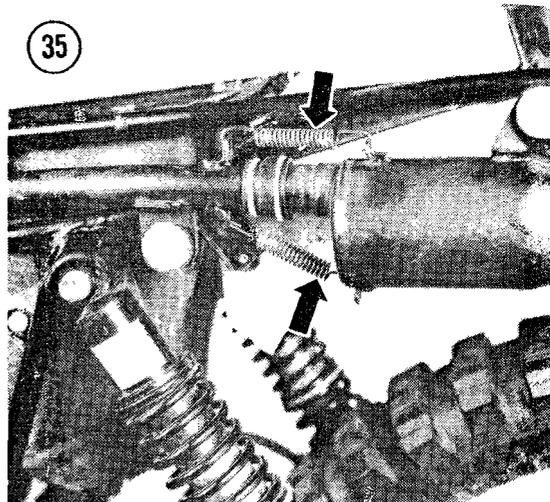


## EXHAUST SYSTEM

The exhaust system on a 2-stroke motorcycle engine is much more than a means of routing exhaust gases to the rear of the motorcycle. It is a vital performance component and frequently, because of its design, it is a very vulnerable piece of equipment. Check the exhaust system for deep dents and fractures and repair them. Check the expansion chamber mounting for fractures and loose bolts and bushings. Check the cylinder mounting flange for tightness. A loose headpipe connection will not only rob the engine of power, it could also damage the piston and the cylinder.

### Removal/Installation

1. Remove the fuel tank.
2. Remove the left side cover.
3. On models so equipped, remove the springs securing the silencer to the exhaust pipe (Figure 35).
4. Remove the bolts securing the silencer to the frame. Gently twist the silencer and pull it away from the exhaust pipe. Take care not to damage the high-temperature rubber coupler.
5. Disconnect the springs securing the exhaust pipe to the cylinder flange (Figure 36).
6. Remove the bolt securing the rear of the pipe to the frame (Figure 37).
7. Refer to Figure 38 and remove the bolt securing the exhaust pipe to the upper mounting bracket.
8. Turn the front wheel fully to the right. Pull the exhaust pipe out of the cylinder flange and route the pipe forward out of the frame.
9. Installation is the reverse of these steps. Keep the following points in mind:
  - a. Use the spring mounting holes in each cylinder fin to provide maximum spring tension on the exhaust pipe.
  - b. Do not fully tighten the pipe and silencer mounting bolts until the pipe and silencer are in proper position and the exhaust pipe springs are installed. Make sure that the silencer and pipe completely clear the frame, all wires and plastic parts.



- c. Ensure that the spark plug lead and the throttle cable protection spring are properly positioned to prevent damage from a hot exhaust pipe (Figure 39).
- d. Install the fuel tank and side cover.

**EXHAUST SYSTEM REPAIRS**

A dent in the headpipe or expansion chamber will alter the system's flow characteristics and degrade performance. Minor damage can be easily repaired if you have access to welding equipment, some simple body tools, and a bodyman's slide hammer.

**Small Dents**

- 1. Drill a small hole in the center of the dent. Screw the end of the slide hammer into the hole.
- 2. Heat the area around the dent evenly with a torch.

- 3. When the dent is heated to a uniform orange-red, use the slide hammer to raise the dent.
- 4. When the dent has been removed, unscrew the hammer and weld or braze the hole shut.

**Large Dents**

Large dents that are not crimped can be removed with heat and a slide hammer as previously described, however, several holes must be drilled along the center of the dent so that it can be pulled out evenly.

If the dent is sharply crimped along the edges, the affected section should be cut out with a hacksaw, straightened with a body dolly and hammer, and welded back into place. Before cutting the exhaust pipe apart, scribe alignment marks over the area where the cuts will be made to aid correct alignment when the pipe is rewelded.

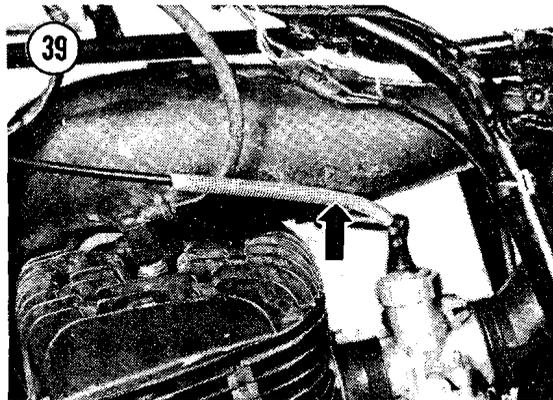
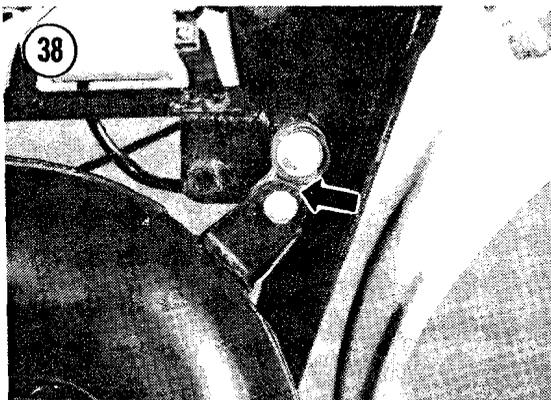


Table 1 CARBURETOR SPECIFICATIONS

Carburetor type	
PE175C	Mikuni VM32SS
PE175N, T, X	Mikuni VM34SS
PE250; PE400	Mikuni VM36SS
Float level*	
PE175C (measurement A)	31-33 mm (1.22-1.30 in.)
PE175N (measurement A)	27-29 mm (1.06-1.14 in.)
PE175T, X (measurement A)	28.2-30.2 mm (1.11-1.19 in.)
PE250B (measurement B)	12.9-14.9 mm (0.51-0.59 in.)
PE250C (measurement A)	32-34 mm (1.26-1.34 in.)
PE250N (measurement B)	12.9-14.9 mm (0.51-0.59 in.)
PE250T, X (measurement B)	10.2-11.2 mm (0.40-0.44 in.)
PE400 (measurement B)	10.2-11.2 mm (0.40-0.44 in.)
Pilot air screw (turns open)	
PE175C, N	1 1/4
PE175T, X	1 1/2
PE250B	1 1/2
PE250C, N	1
PE250T, X	1 1/2
PE400	1 1/2
Jet needle (clip position from top of needle)	
PE175	JDP17 (3)
PE250B	6DH3 (2)
PE250C	6PH3 (2)
PE250N	6DH3 (2)
PE250T, X	6DH20 (2)
PE400	6DH20 (2)
Main jet	
PE175C	190
PE175N	220
PE175T, X	250
PE250B, C	260
PE250N	250
PE250T, X	280
PE400	300
Pilot jet	
PE175C, N	25
PE175T, X	27.5
PE250B, C	40
PE250N, T, X	37.5
PE400	45
Throttle slide cut-away	
PE175T, X; PE400	2.0
All other models	2.5
Needle jet	
PE175C	R-2
PE175N	R-1
PE175T, X	R-4
PE250B, C	0-0
PE250N	P-6
PE250T, X	0-0
PE400	P-9

\*Measurement A is between the top of the float and the float bowl surface. Measurement B is between the float tongue and the base of the needle jet.

All settings and specifications are standard and are supplied only as a point of reference. Each carburetor may have to be fine tuned and jetted for a specific application.

## CHAPTER SEVEN

### ELECTRICAL SYSTEM

The electrical system on all PE models consists of an ignition system and an off-road lighting system. Alternating current produced by the flywheel magneto supplies power for both the ignition and the lighting system.

Troubleshooting and repair of most electrical system component malfunctions requires special test equipment and expertise and should be entrusted to a dealer. To troubleshoot the motorcycle wiring, refer to the wiring diagrams at the end of the book. The following procedures provide for removal and installation of all ignition components as well as the off-road lights.

#### IGNITION SYSTEM

The ignition system contains a permanent magnet flywheel, a primary/pulser coil, a CDI unit and an ignition coil. Refer to **Figure 1** for a typical flywheel magneto assembly.

As the flywheel is rotated by the engine, the permanent magnets within the flywheel cause a pulse to develop in the primary/pulser coil of the stator assembly. This pulse is then routed to the CDI unit where it is amplified and used to trigger the ignition coil. The output of the ignition coil fires the spark plug.

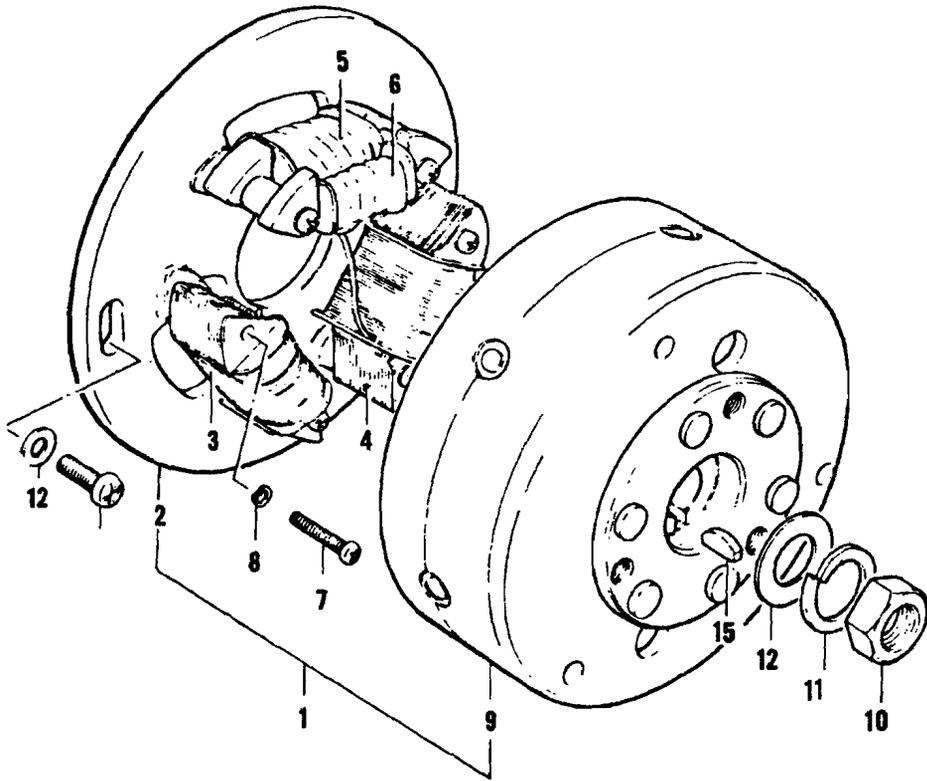
#### Flywheel Removal/Installation

1. Use a hammer driven impact tool to loosen the screws securing the magneto cover (**Figure 2**). Remove the screws and carefully remove the cover so the cover gasket will not be damaged. Note the locations of the different length screws.
2. Shift the transmission into gear. Have an assistant step on and hold the rear wheel brake pedal. Remove the nut, lockwasher and flat washer securing the flywheel (**Figure 3**).
3. Install a 3-bolt flywheel puller into the bolt holes provided in the flywheel. Tighten the center bolt on the puller until the flywheel is loose on the crankshaft. Remove the puller and the flywheel. If the Suzuki slide hammer (part number 09930-30102) is available, use attachment "F" (part number 09930-30190) to remove the flywheel.

#### NOTE

*If the flywheel is difficult to remove, tighten the puller bolt to apply pressure then strike the puller bolt smartly with a hammer. This technique will remove most stubborn flywheels.*

①



### TYPICAL FLYWHEEL MAGNETO

- |                        |                     |
|------------------------|---------------------|
| 1. Magneto assembly    | 9. Flywheel (rotor) |
| 2. Stator assembly     | 10. Nut             |
| 3. No. 1 lighting coil | 11. Lock washer     |
| 4. No. 2 lighting coil | 12. Washer          |
| 5. Primary coil        | 13. Screw           |
| 6. Pulser coil         | 14. Washer          |
| 7. Screw               | 15. Woodruff key    |
| 8. Lock washer         |                     |

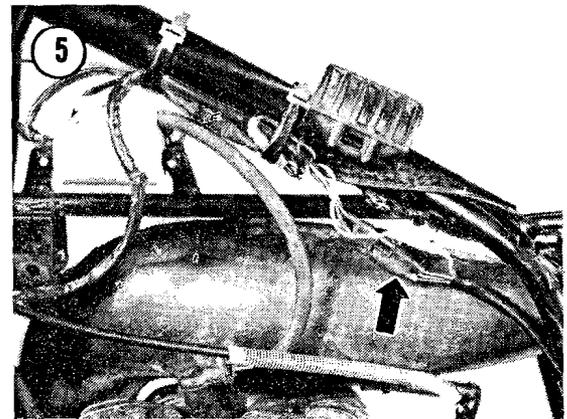
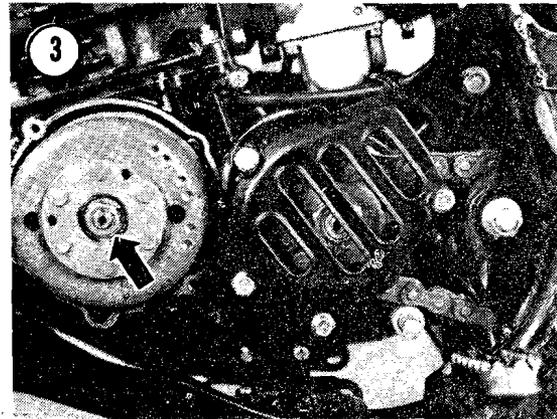
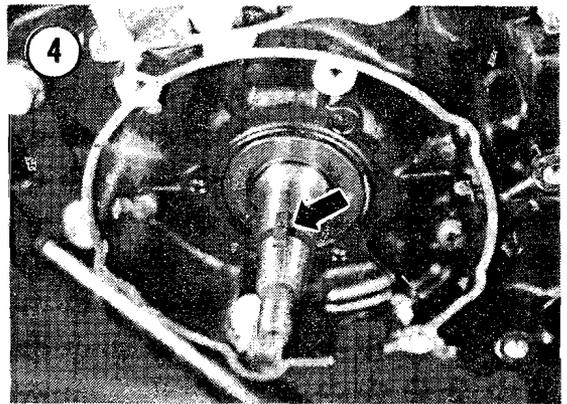
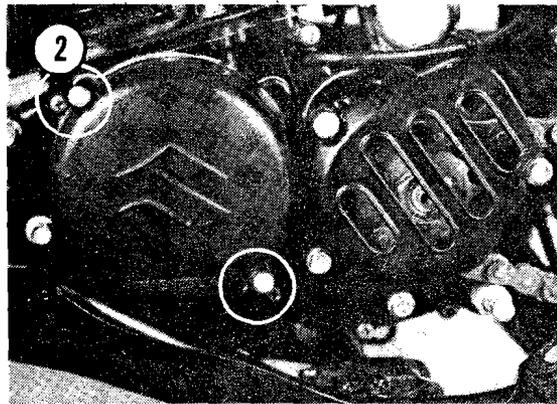
**CAUTION**

Aftermarket pullers are available from most motorcycle shops or tool suppliers. The cost of such a puller is usually nominal and they make an excellent addition to any mechanic's tool box. If you cannot buy or borrow a puller, have a dealer remove the flywheel. Do not try to get by without the necessary puller. Any attempt to remove the flywheel without the proper tool will ultimately lead to some form of engine or flywheel damage.

If normal flywheel removal attempts fail, do not force the puller or improvise "new" methods or expensive damage may result. Have a dealer remove the flywheel.

4. Remove the flywheel and cover it with a clean rag. If desired, remove the Woodruff key from the crankshaft (**Figure 4**).

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

**CAUTION**

Carefully inspect the flywheel for small bolts, washers, or other metal "trash" that may have been picked up by the magnets. An unnoticed piece of metal "trash" can cause serious damage to the magneto stator assembly.

- a. Ensure that the Woodruff key is correctly seated and has not slipped out behind the flywheel.
- b. Torque the flywheel nut to 3.0-4.0 mkg (22-29 ft.-lb.).

### Stator Assembly Removal/Installation

1. Remove the flywheel as previously described.
2. Refer to Chapter Six and remove the fuel tank.
3. Disconnect the ignition lead wires from the connectors near upper frame tube (**Figure 5**).

4. Remove the screws securing the magneto stator assembly to the engine crankcase (Figure 6) and remove the stator assembly. Observe the following during removal:

- a. Ignition timing mark is aligned with the center of the mounting screw hole (Figure 7).
- b. The stator assembly wires are routed correctly.
- c. The rubber grommet in the crankcase notch is positioned correctly.

5. Refer all stator assembly testing and repair to an authorized dealer. They are equipped with the tools and expertise to perform these tasks.

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

- a. When installing the stator assembly ensure that the timing mark is aligned over the center of mounting screw hole as shown in Figure 7.

#### CAUTION

*Failure to properly align the timing mark over the screw hole as shown in Figure 7 will result in incorrect ignition timing. Incorrect timing can easily cause serious engine damage as well as lack of performance.*

- b. Ensure that the stator wires are correctly routed and secured to the engine and frame as shown in Figures 8 and 9.

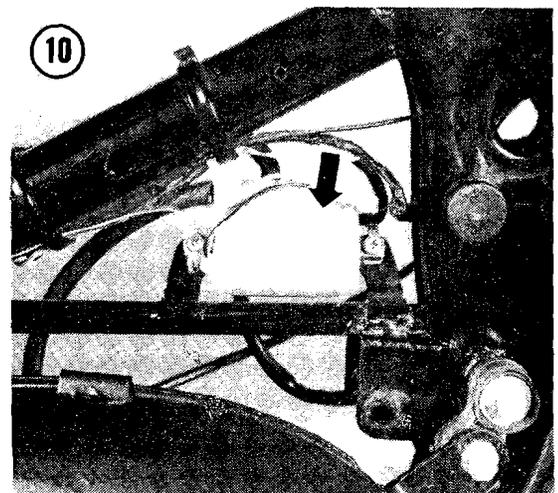
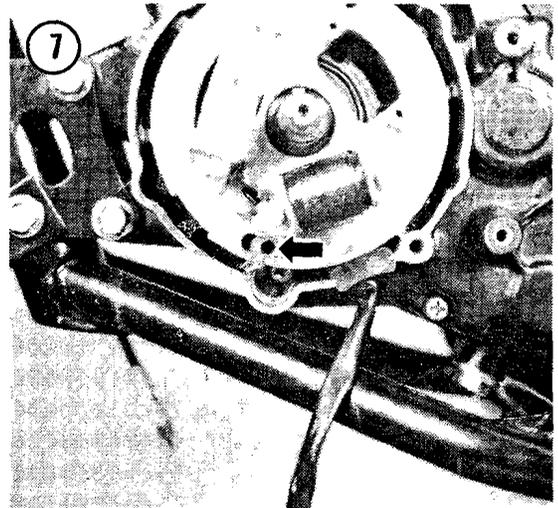
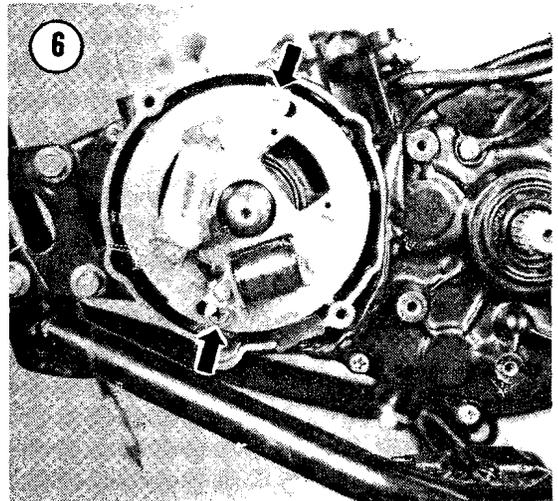
### Ignition Timing

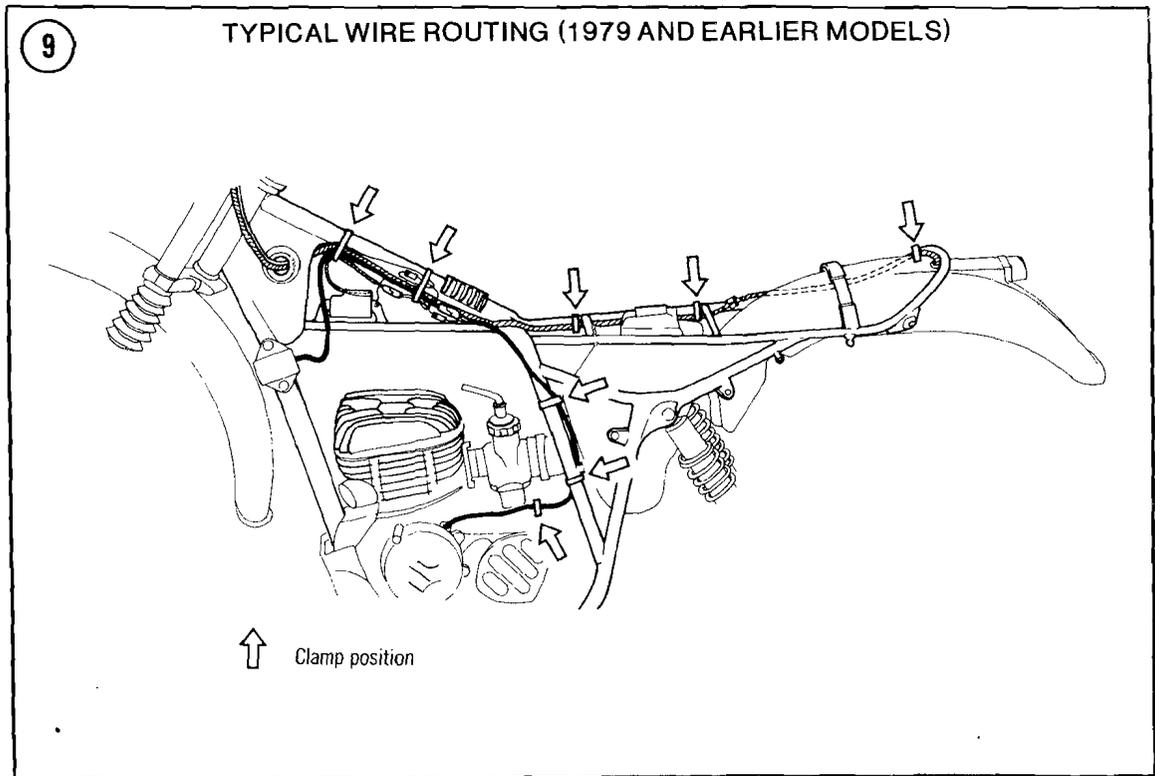
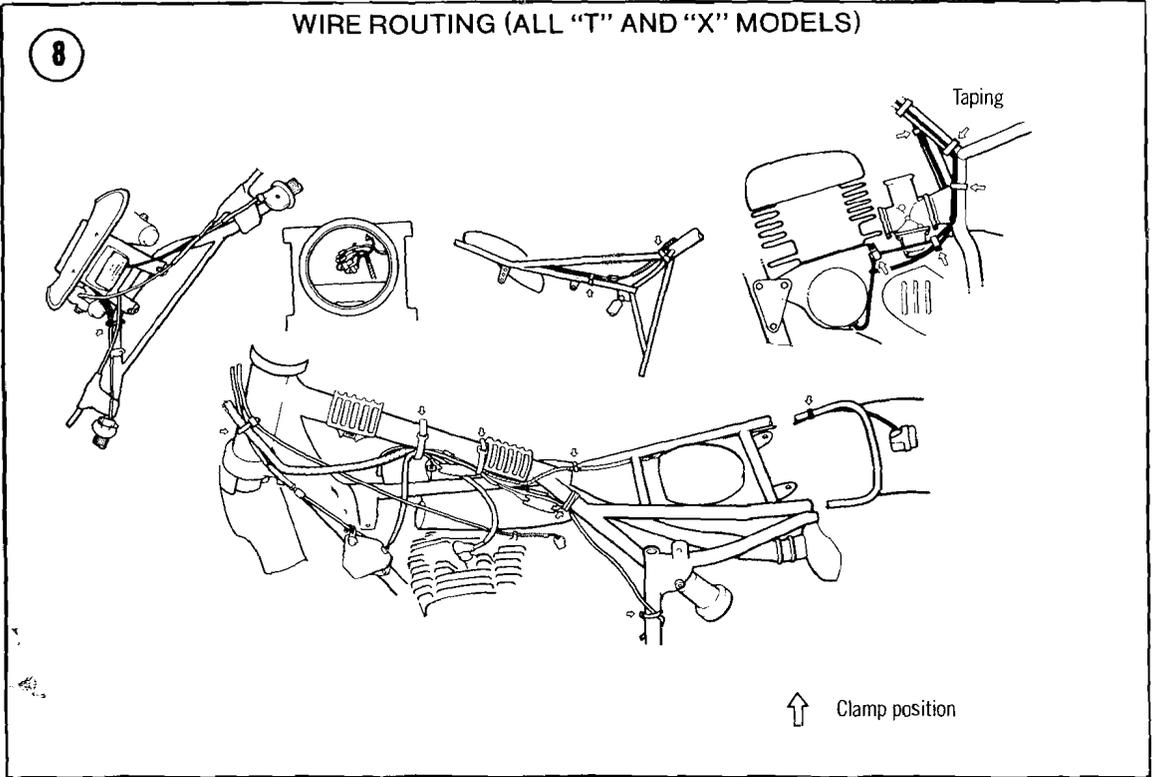
The ignition timing is preset and does not need routine adjustments. The timing should only need to be set if the ignition stator assembly has been removed for engine repair or ignition repair. Refer to *Stator Assembly, Installation* to perform ignition timing.

### Ignition Coil Removal/Installation

Refer to Figure 10 for this procedure.

1. Refer to Chapter Six and remove the fuel tank.
2. Disconnect the spark plug lead from the spark plug.
3. Disconnect the primary wires from the coil.





4. Remove the screws securing the coil to the frame and remove the coil.
5. Installation is the reverse of these steps.

### CDI Unit

#### Removal/Installation

1. Refer to Chapter Six and remove the fuel tank.
2. Disconnect the wires from the CDI unit (**Figure 11**).
3. Remove the bolts securing the CDI unit to the frame (**Figure 12**) and remove the unit.
4. Installation is the reverse of these steps.

### LIGHTING SYSTEM

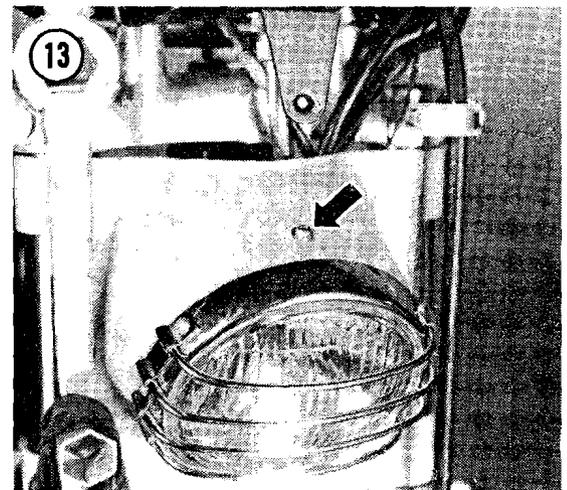
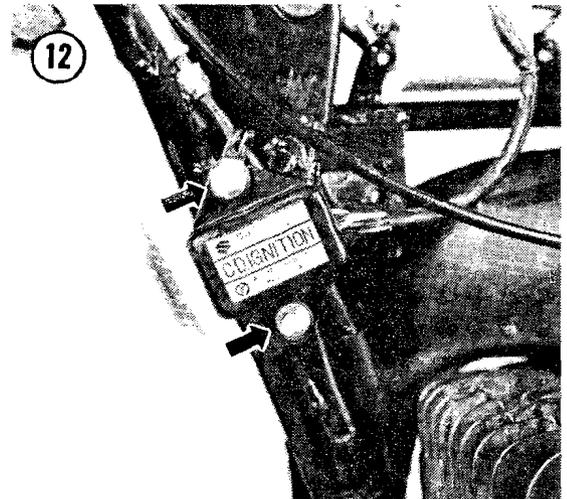
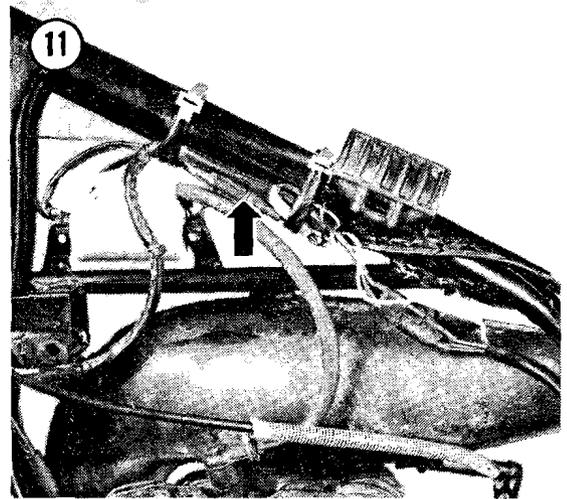
The lighting system for all PE models consists of a headlight with high and low beam, and a taillight. The PE250B models are equipped with a brake light and brake light switch actuated by the rear brake pedal. The lighting system is intended for off-road use only and is not street legal in the U.S.A.

The alternating current (AC) for the lighting system is generated by the magneto lighting coil. If complete light failure is experienced, have the lighting coil output tested by a dealer. If the lighting coil is defective, perform *Stator Assembly Removal* as described in this chapter and have the lighting coil replaced by a dealer.

When performing repair or troubleshooting on the motorcycle wiring refer to the wiring diagrams at the end of the book. If the wiring is removed or repaired for any reason make sure that it is correctly routed and secured to the frame as shown in **Figures 8 and 9**.

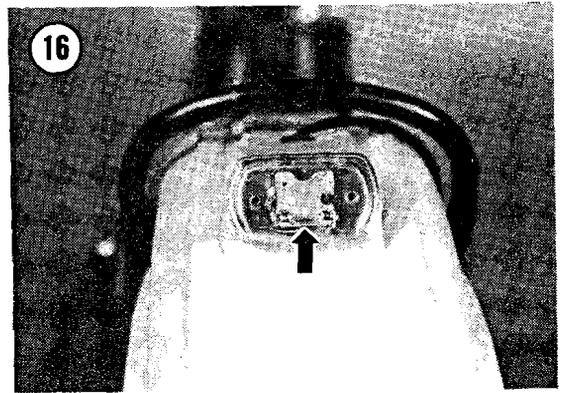
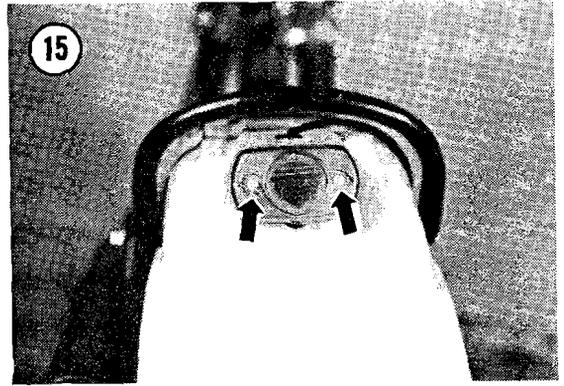
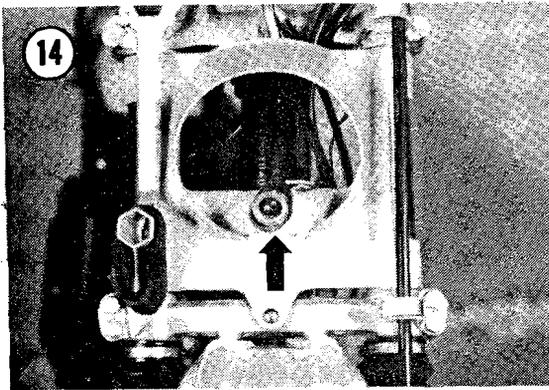
#### Headlight Bulb Replacement

1. Remove the screws securing the light unit (**Figure 13**) and pull the light unit forward out of the housing.
2. Remove the connector from the rear of the light (**Figure 14**).
3. Replace the bulb with a motorcycle replacement lamp rated 6 volts, 15 watts high beam/15 watts low beam. Do not use an automobile bulb as they are not designed to withstand the vibration of a motorcycle and will quickly fail.



### Taillight Bulb Replacement

1. Remove the screws securing the taillight lens and remove the lens (**Figure 15**).
2. Carefully unsnap the taillight bulb from the retaining clips (**Figure 16**).
3. Replace the taillight bulb with a motorcycle bulb rated 6 volts, 5 watts. On all PE250B models, use a 6 volt, 10 watt bulb for the brake light. Do not use an automobile bulb or it will quickly fail due to the vibration. When installing the lens, do not overtighten the screws or the lens may crack.



## CHAPTER EIGHT

### FRONT SUSPENSION AND STEERING

All PE models are equipped with oil-dampened telescopic forks. The dampening rate is determined by the amount and viscosity of the oil used. The fork springs support the weight of the motorcycle and rider. The forks on all "T" and "X" models are equipped with air caps to allow air pressure to be used for "fine tuning" of the front suspension.

Fork service procedures such as changing oil and adding air pressure are outlined in Chapter Three. **Tables 1 and 2** are found at the end of the chapter.

#### FRONT WHEEL REMOVAL/INSTALLATION

1. Jack up the motorcycle or place it on a box such as a milk crate to raise the front wheel off the ground.

#### NOTE.

*If it is not necessary to remove the brake backing plate and brakes, proceed to Step 6.*

2. Loosen the locknut securing the brake cable adjuster (**Figure 1**).  
3. Screw in on the cable adjuster to provide maximum cable slack. Remove the cotter pin securing the clevis pin (**Figure 2**) and disconnect the brake cable from the brake lever.

4. Slide down the rubber cable boot (**Figure 3**) and slide the cable out of the brake backing plate.

5. Disconnect the speedometer/odometer cable (**Figure 4**) from the front wheel.

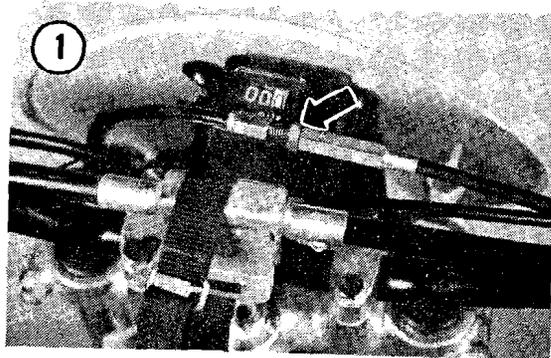
6. Remove the cotter pin securing the axle nut (**Figure 5**). Hold the axle to keep it from turning and remove the axle nut.

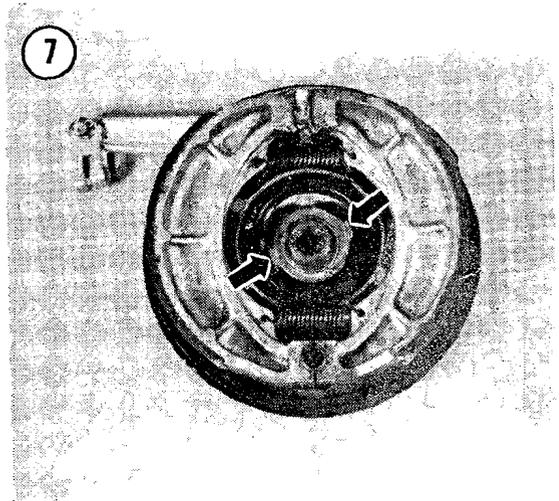
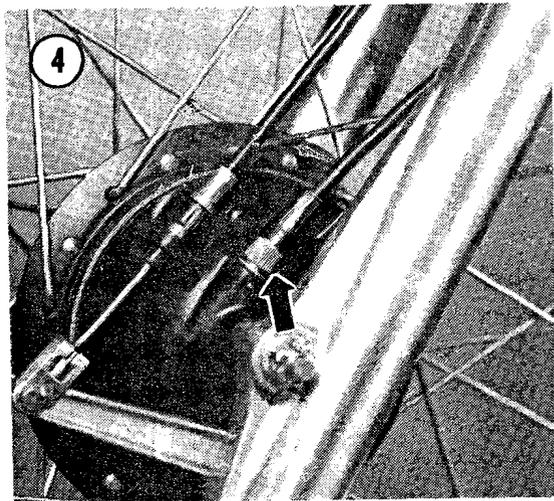
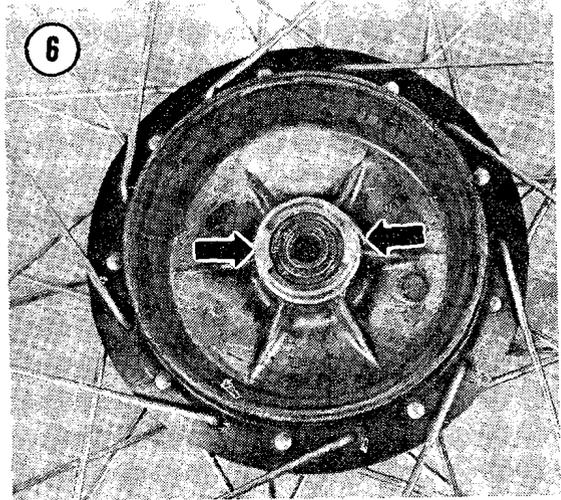
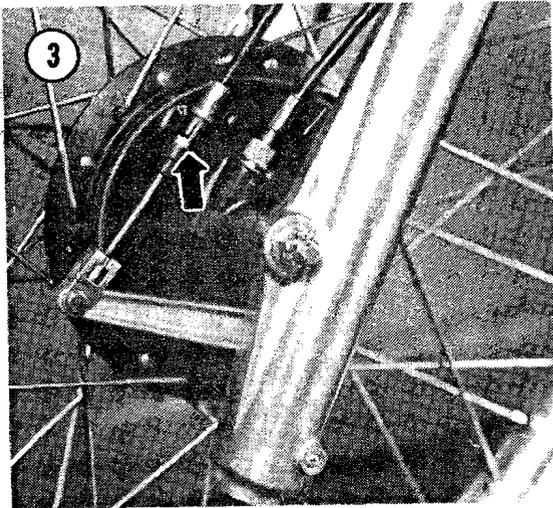
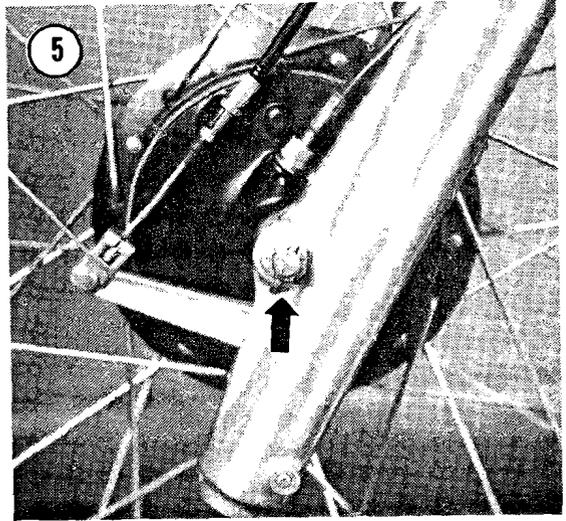
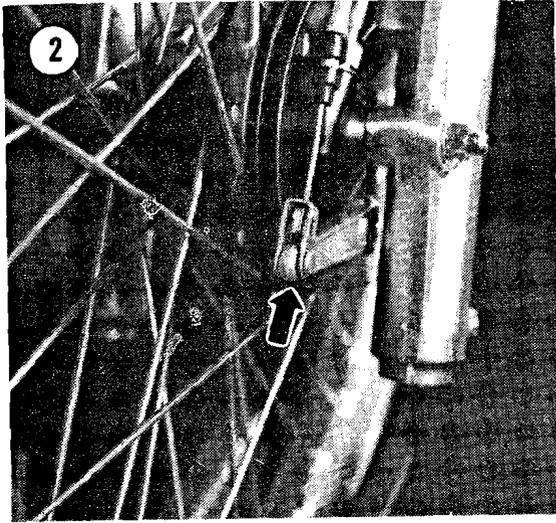
7. Pull out the front axle and disengage the wheel from the brake backing plate. Remove the front wheel.

8. Refer to Chapter Ten to inspect the wheel bearings and brake components.

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

- a. Ensure that the 2 "ears" on the speedometer/odometer drive unit properly engage the notches in the front hub (**Figures 6 and 7**).





- b. Lightly grease the front axle to ease its installation.
- c. Hold the axle to keep it from turning and torque the axle nut as specified in **Table 1**. Secure the nut with a new cotter pin.
- d. If the front brake cable was disconnected, refer to Chapter Three and perform *Brake Adjustment*.

## FORKS

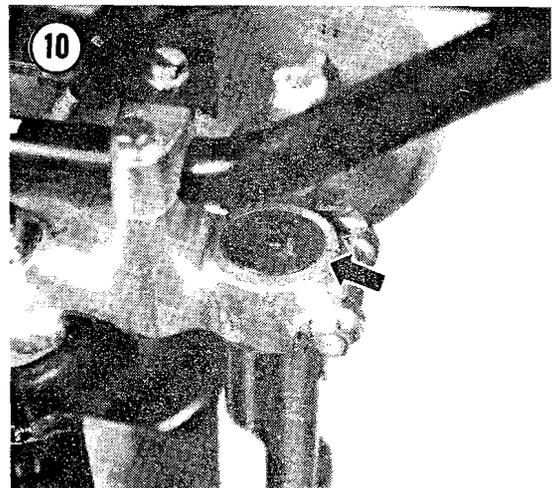
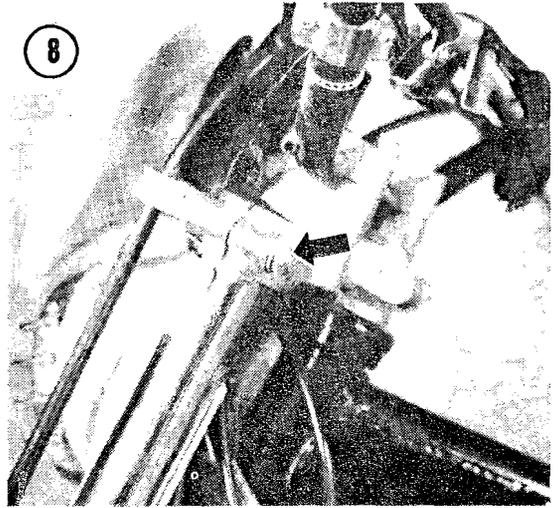
### Removal/Installation

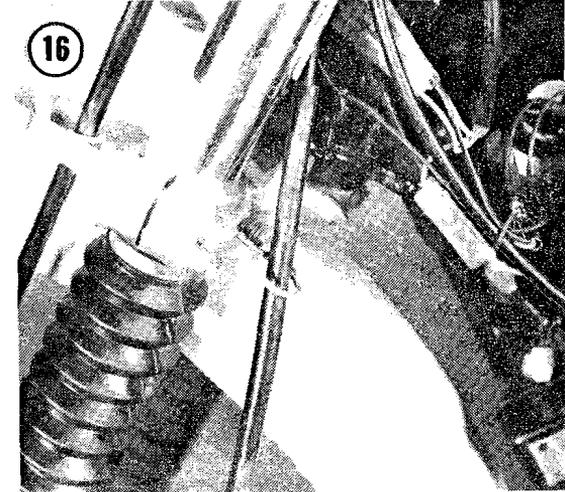
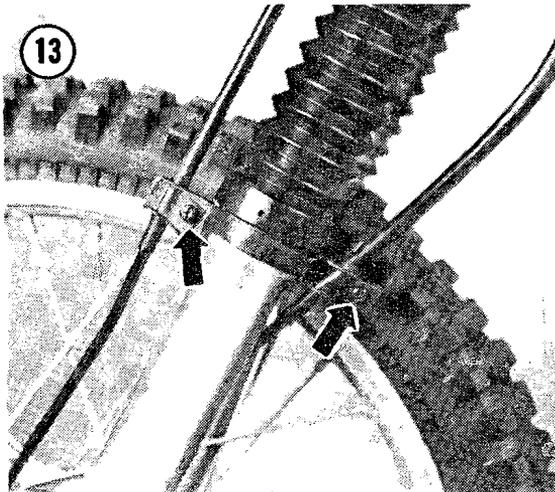
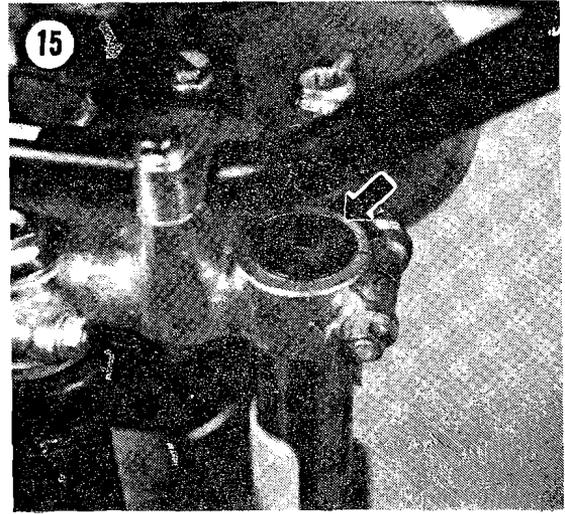
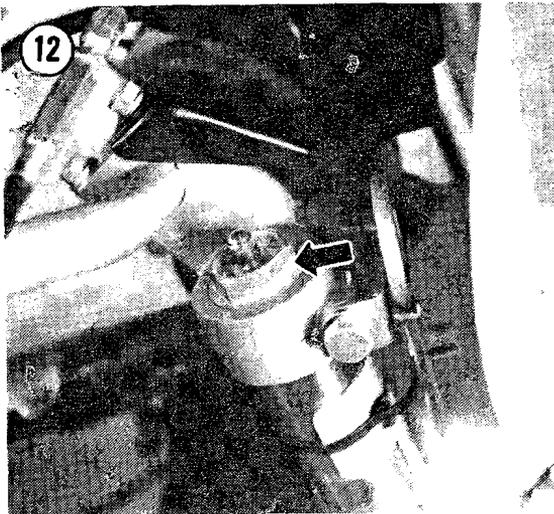
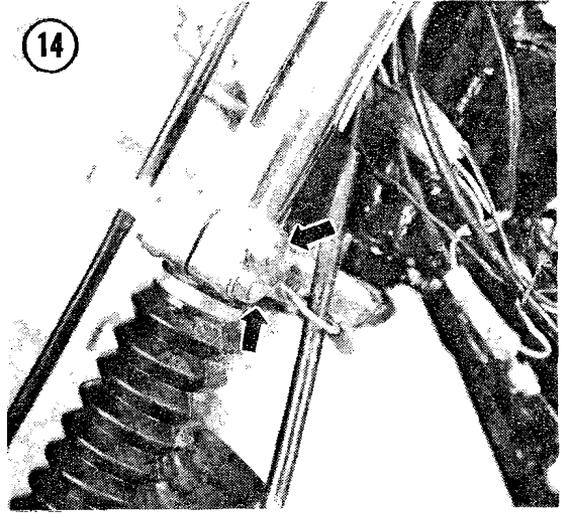
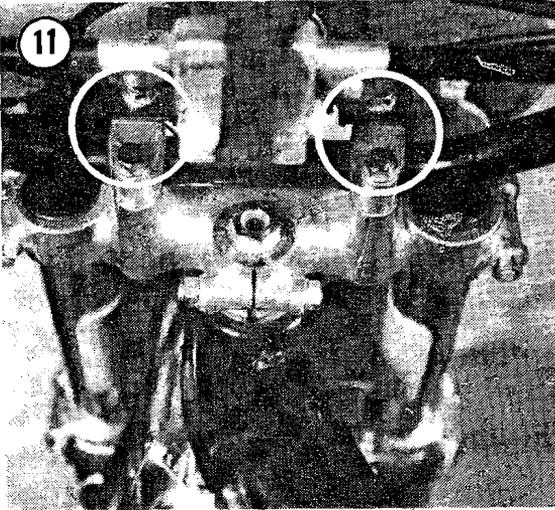
1. Remove the front wheel as previously described.
2. Loosen the upper pinch bolt securing the fork tube to the upper steering head (**Figure 8**).
3. If forks are to be disassembled, perform the following:
  - a. Remove the rubber plug from the top of each fork leg (**Figure 9**).
  - b. On all but 1979 and earlier models, use a 1/2 in. socket drive and loosen each fork leg cap (**Figure 10**).

#### NOTE

*If your 1/2 in. socket drive is too large to fit between the handlebars and the fork cap, it will be necessary to remove the 4 handlebar bolts (**Figure 11**) and remove the handlebars.*

- c. On all "T" and "X" models, remove the protective cap from the air valve and slowly bleed off the air pressure. Use a socket and loosen the fork cap (**Figure 12**).
4. Loosen the clamps securing the brake cable and speedometer/odometer cable to the fork tube (**Figure 13**).
5. Loosen the lower pinch bolts (**Figure 14**) securing each fork leg.
6. Pull each fork leg down and out of the upper and lower steering clamps.
7. Installation is the reverse of these steps. Keep the following points in mind:
  - a. Install each fork tube so that the fork cap is even with the top edge of the upper steering clamp (**Figure 15**).
  - b. Make sure the upper and lower cable guides are properly positioned as shown in **Figures 16 and 17**.



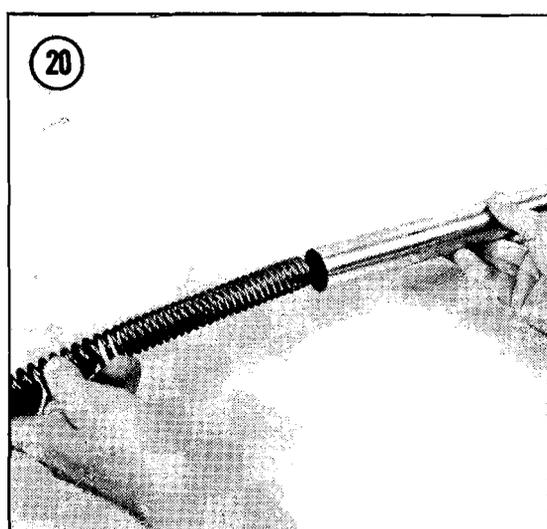
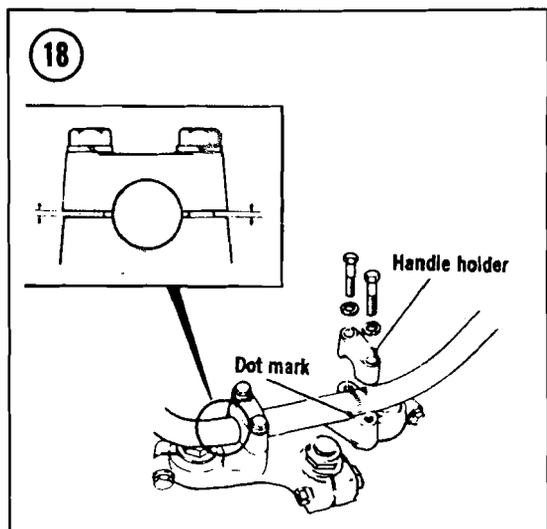
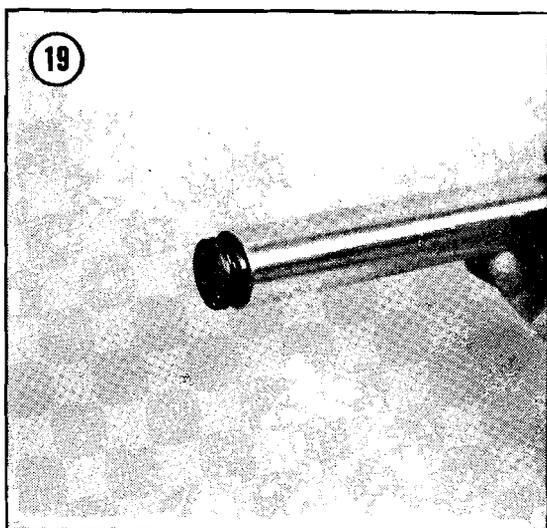
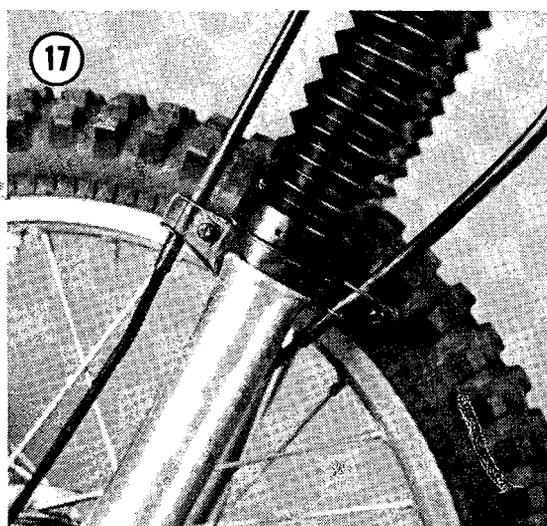


- c. Torque the upper and lower steering clamp pinch bolts as specified in **Table 1**.
- d. If the handlebars were removed, install them so the punch mark is positioned as shown in **Figure 18**. Ensure that the punch mark is properly aligned and equal clearance is present on both sides of the handlebar holders. Torque the bolts as specified in **Table 1**.

### Disassembly/Assembly

The following procedure presents a typical fork disassembly and assembly. Minor differences may exist between some models.

Pay particular attention to the location and positioning of spacers, washers and springs to make assembly easier. Preparation should be made prior to starting the disassembly as an impact tool (air or electric) or a special holding tool is necessary to remove the 8 mm Allen retaining bolt in the bottom of the fork leg. The Allen bolt is secured with a thread locking compound (such as Loctite) and is often difficult to remove because the cylinder (dampening rod) will turn inside the fork tube. Have a local dealer remove the Allen bolts with an impact tool or with an Allen wrench and the special holding tool. Use Suzuki part number 09940-34580 (attachment



“F”) inside the fork tube to hold the dampening rod. Attachment “F” can be used with the Suzuki handle (Suzuki part number 09940-34520) or with one or 2 long 3/8 in. socket extensions.

1. Remove the fork cap (Figure 19).
2. Remove the fork spring (Figure 20). Note the closer coils are installed toward the bottom of the fork tube.
3. Remove the 8 mm Allen retaining bolt (Figure 21) and copper washer.
4. Slide off the outer fork tube (Figure 22). To replace the fork seal, further disassembly is unnecessary. Refer to *Inspection and Seal Replacement*.

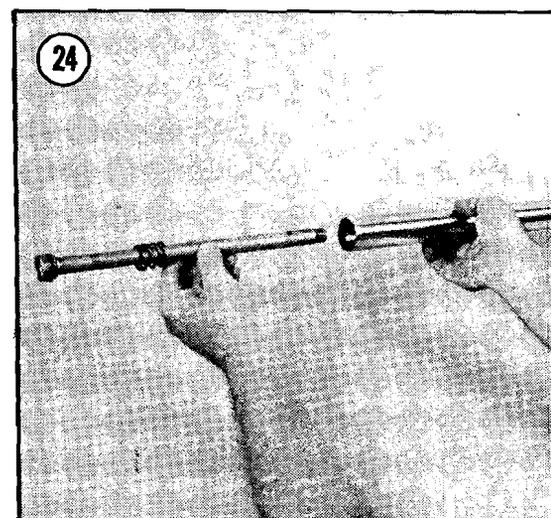
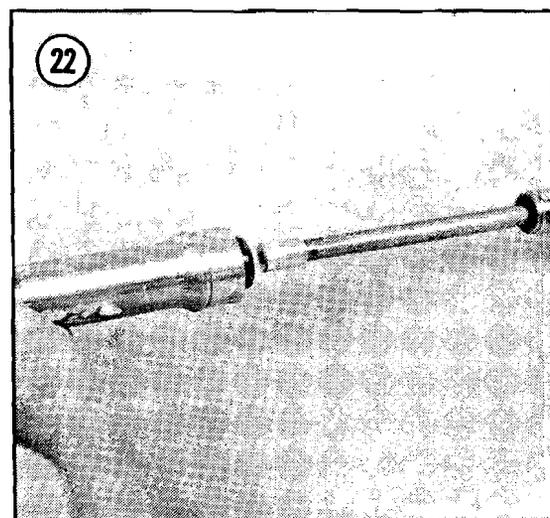
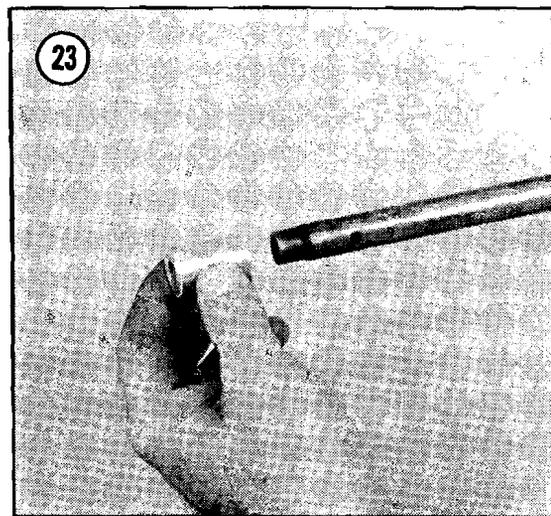
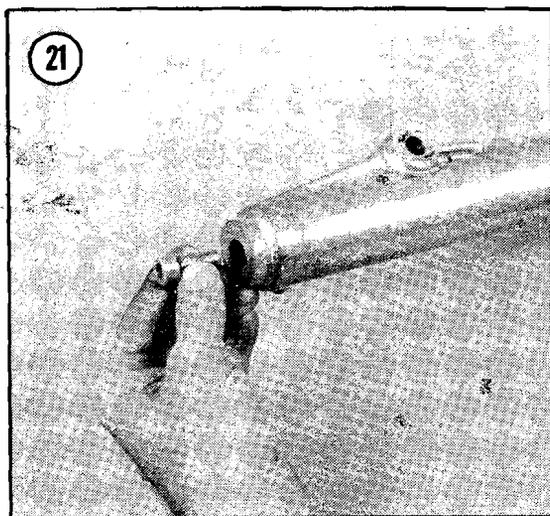
5. Remove the oil lock piece from the end of the dampener rod (Figure 23).

6. Tip up the inner fork tube and remove the dampener rod assembly (Figure 24).

7. Perform *Inspection and Seal Replacement*.

8. Assembly is the reverse of the preceding steps. Keep the following points in mind:

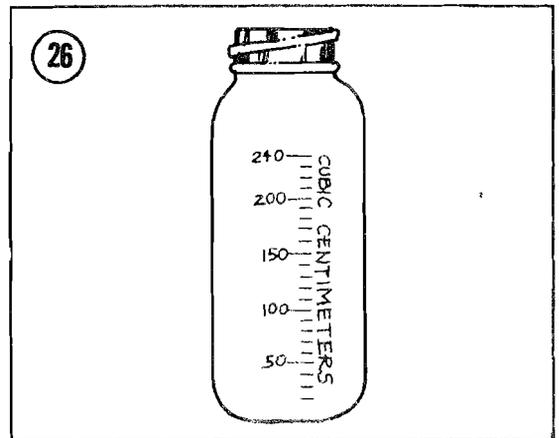
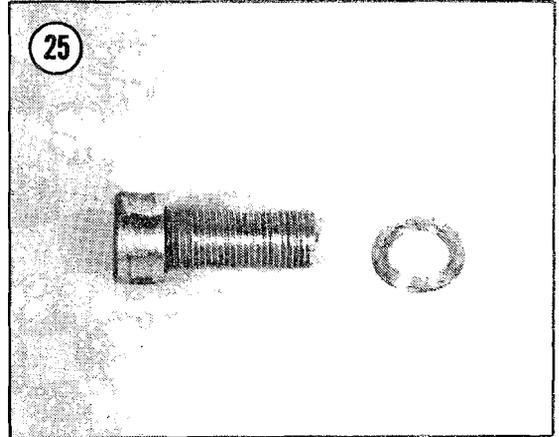
- a. Thoroughly clean all parts in solvent before assembly.
- b. Make sure the top-out spring is installed on the dampener rod before installing the rod in the inner fork tube (Figure 24).



c. Apply blue Loctite (Lock N' Seal No. 2114) to the 8 mm Allen retaining bolt before installing the bolt. Ensure that the copper washer is fitted to the bolt (Figure 25).

d. Oil all sliding parts being assembled.

9. Refer to Table 2 and add the specified amount and type of fork oil to each fork tube. Use a graduate or a baby bottle (Figure 26) to ensure the oil amount is correct for each fork tube. Oil level can also be measured from the top of the fork tube. Use an accurate ruler or the Suzuki oil level gauge (part number 09943-74110) to ensure the oil level is as specified in Table 2. Measure the oil level with the forks completely compressed and without the springs.

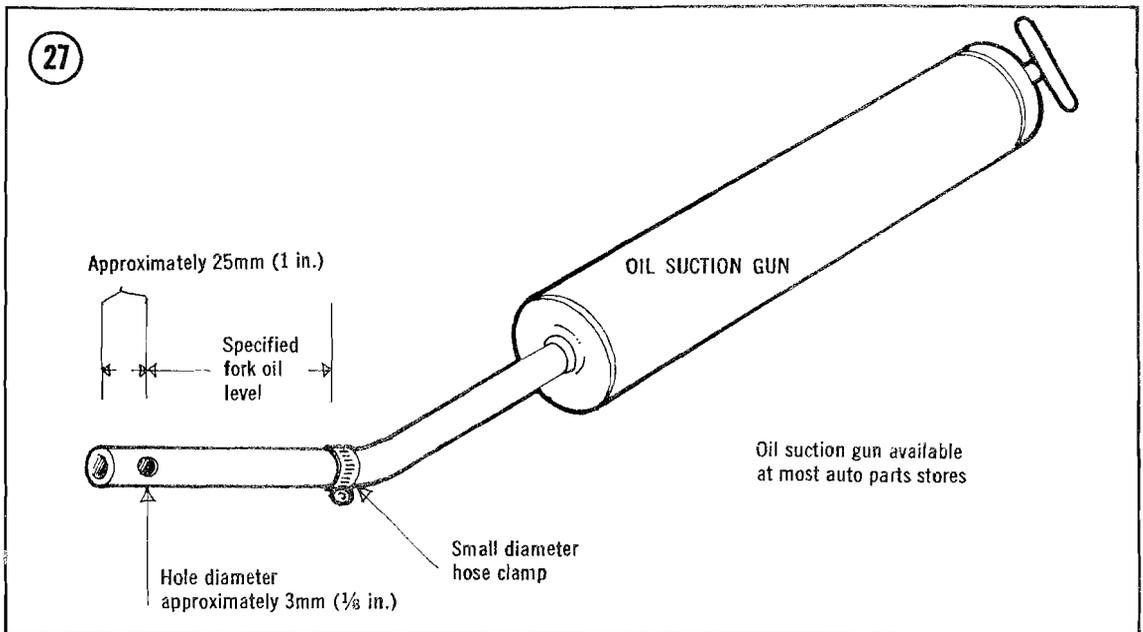


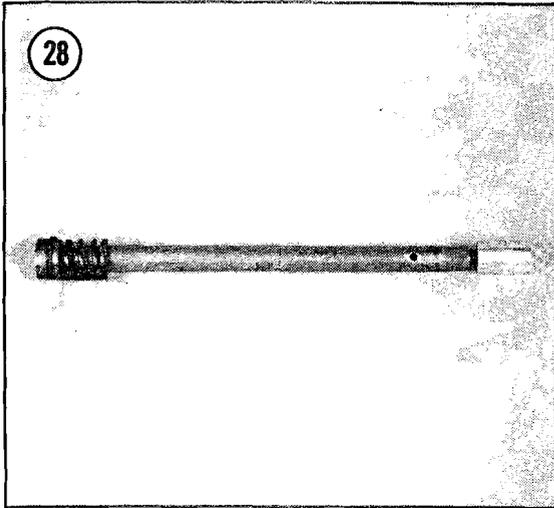
**CAUTION**

*Oil level is critical and must not vary more than 1 mm (0.04 in.) between the right and left fork tubes or overstressing of the front axle may result during aggressive riding.*

**NOTE**

*An oil level measuring device can be locally fabricated as shown in Figure 27. Fill the fork with a few cc's more than the required amount of oil. Position the hose*





*clamp on the top edge of the fork tube and draw out the excess oil. Oil is sucked out until the level reaches the small diameter hole. A precise oil level can be achieved with this simple device.*

10. Install the fork spring with the closer coils pointing down (**Figure 20**).

11. Ensure the O-ring on the fork cap is in good condition. Install the fork cap finger-tight. The cap can be tightened after the forks have been installed on the motorcycle.

**Inspection and Seal Replacement**

1. Thoroughly clean all parts in solvent and dry them completely. Lightly oil and assemble the inner and outer fork tubes, then slide the tubes together. Check for looseness, noise, or binding. Replace any defective parts.

2. Carefully examine the area of the inner fork tube that passes through the fork seal. Any scratches or roughness on the tube in this area will damage the oil seal. If the inner fork tube is scratched or pitted it should be replaced.

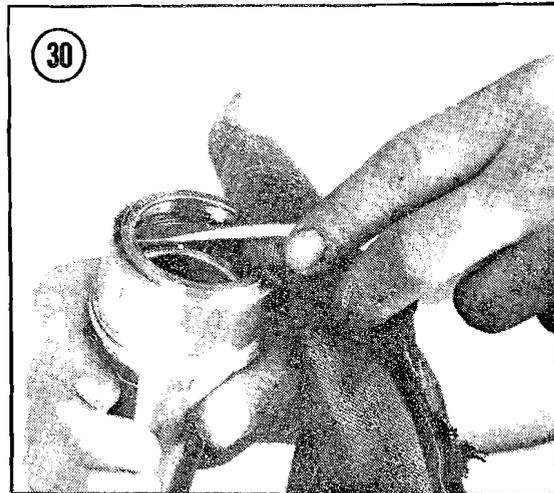
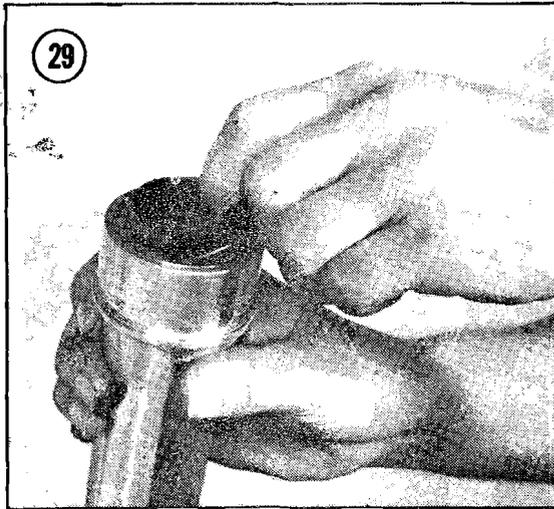
3. Inspect the dampener rod assembly (**Figure 28**) for damage or roughness. The oil passages must be clean and free of any sludge or oil residue.

4. Inspect the rubber boot on the fork tube for holes or abrasive damage. A damaged boot may allow dirt and moisture to pack up next to the fork seal. Packed in dirt can scratch the surface of the fork tubes as well as damage the fork seal. Install new rubber fork boots if any damage exists.

5. Accurately measure both fork springs. If either spring is shorter than the length specified in **Table 2** replace both springs as a set.

6. Replace oil seals routinely whenever the fork tubes are disassembled. To replace seals perform the following:

- a. Gently lift out the rubber wiper ring (**Figure 29**).
- b. Use a rag to protect the fork tube and carefully pry out the wiper ring retainer (**Figure 30**).



- c. Use snap ring pliers and remove the snap ring securing the oil seal (**Figure 31**).
- d. On models so equipped, lift out the seal retaining washer (**Figure 32**).
- e. Use a wide-blade screwdriver or a tire tool and gently pry out the old oil seal (**Figure 33**).

#### CAUTION

*If the seal is difficult to remove do not risk damage to the fork tube; refer the task to a dealer. Most dealers are equipped with special seal removal tools.*

*The fork tube may also be heated in an oven to approximately 100 degrees C (212 degrees F). Most seals virtually fall out when the tube is heated.*

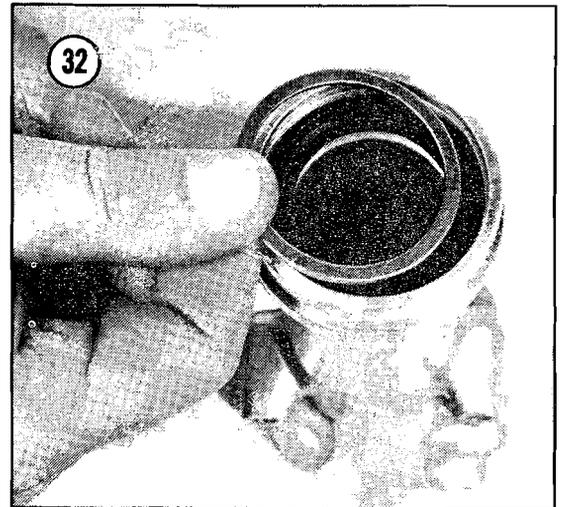
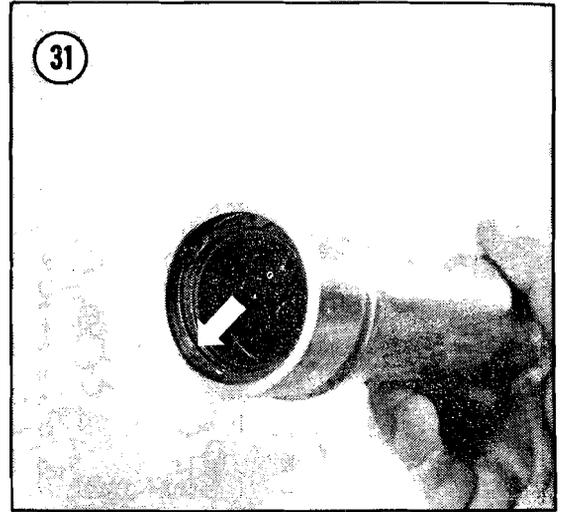
- f. Wipe out the seal bore and install a new seal open end down. Carefully tap in the new seal with a large socket or seal installation tool.
- g. Install the retaining washer and secure with the snap ring.
- h. Install the wiper ring retainer and gently install the rubber wiper ring.

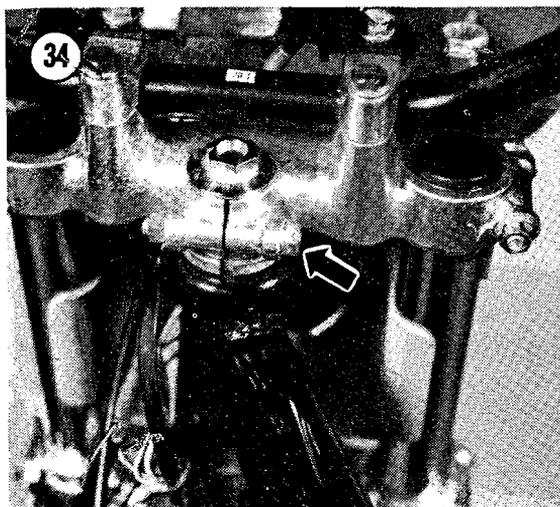
### STEERING HEAD (ALL 1979 AND EARLIER MODELS)

The steering head should be disassembled periodically and the bearings packed with new grease. All models use uncaged ball bearings in both the upper and lower bearing races. Use a good heavy waterproof grease such as a boat trailer wheel bearing grease when lubricating the bearings, since the grease is also used to hold the bearing balls in position during installation.

#### Steering Head Adjustment

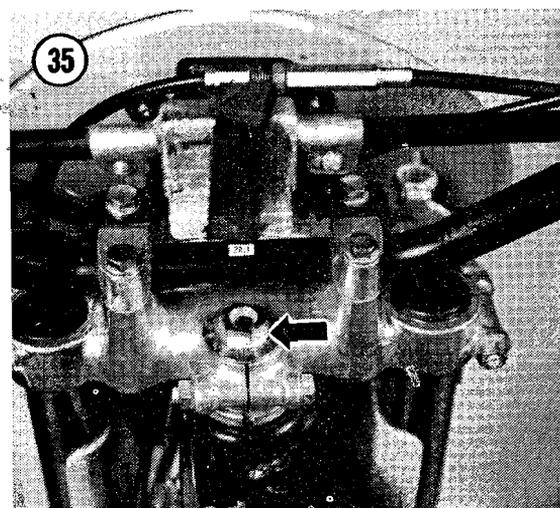
1. Jack up the motorcycle or place it on a box such as a milk crate to get the front wheel off the ground. Grasp each fork leg at the lower end and attempt to move the front end back and forth. If any fore and aft movement of the front end is detected, the steering stem locknut will have to be adjusted.
2. Loosen the pinch bolt securing the steering stem head bolt (**Figure 34**) and loosen the head bolt (**Figure 35**).





3. Use the Suzuki spanner wrench (part number 09940-10122) and adjust the steering stem locknut (**Figure 36**) until all play is removed from the steering head, yet the front end turns freely from side to side, under its own weight. If the Suzuki spanner is not available the steering locknut can be gently tapped with a hammer and a punch or screwdriver. Take care not to damage the locknut.

4. Torque the steering stem head bolt and the steering stem pinch bolt as specified in **Table 1**. Make sure the front end turns freely but without excessive play. Readjust if necessary.



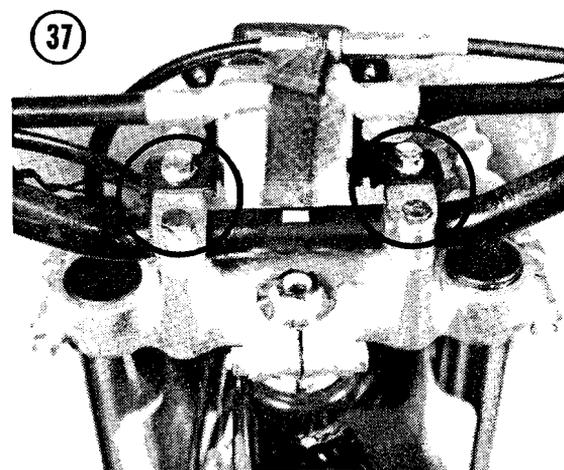
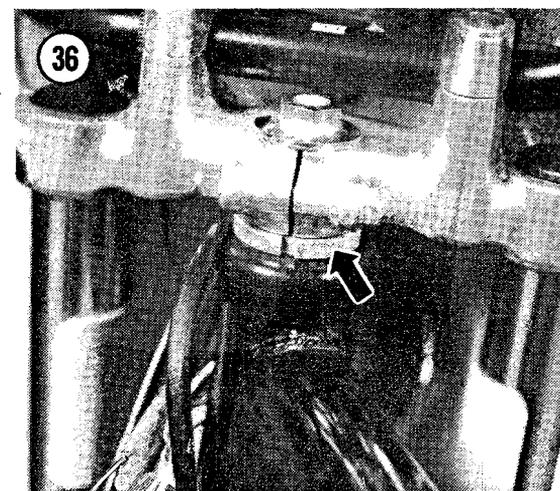
**Disassembly/Lubrication/Assembly**

1. Refer to Chapter Six and remove the fuel tank.

*NOTE*

*If the steering head is being disassembled only for lubrication, it is not necessary to remove the front forks. If the lower steering stem bearings are to be replaced, the forks must be removed. Refer to **Fork Removal** as outlined in this chapter.*

2. Remove the 4 bolts securing the handlebars (**Figure 37**). Gently lift off the speedometer or odometer and lay the handlebars back on the frame tube.

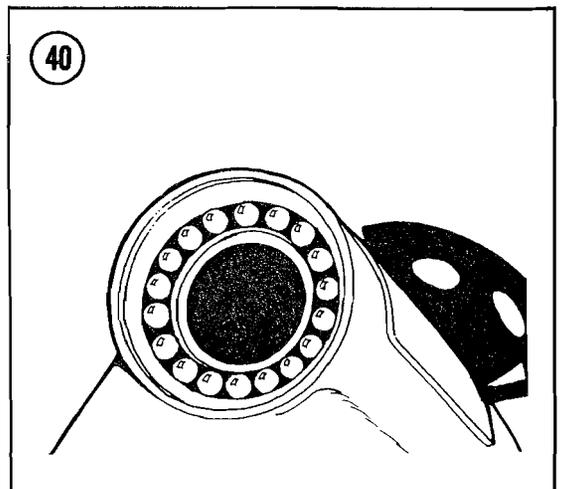
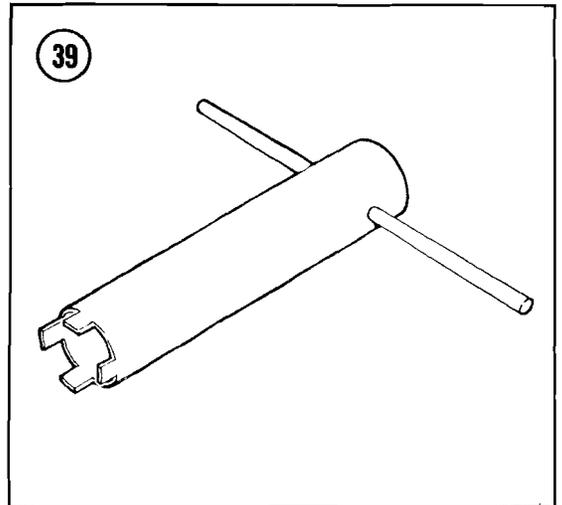
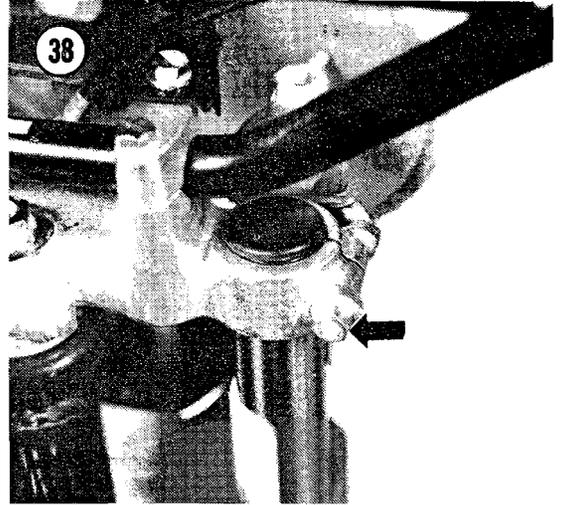


3. Loosen the upper fork leg pinch bolt (Figure 38).
4. Refer to Figure 34 and loosen the pinch bolt securing the steering stem head bolt.
5. Remove the head bolt (Figure 35). Carefully lift off the upper steering stem.
6. Remove the steering stem locknut. To remove the nut use special spanner wrench available from Suzuki (part number 09940-10122). A locally fabricated tool similar to Figure 39 can be made from a piece of tubing or pipe.

*NOTE*

*If care is exercised, the steering stem locknut can also be tapped off with a screwdriver or punch.*

7. Lift off the outer bearing race from the top of the steering head and gently lower the steering stem out of the frame. Be prepared to catch any loose bearing balls that may drop out of the upper or lower bearing races. A total of 18 bearing balls are used in each bearing. Further disassembly is unnecessary if only bearing lubrication is desired.
8. Carefully remove all bearing balls from the upper and lower races.
9. Clean all bearing balls in solvent. Use a rag soaked in solvent to clean both bearing races.
10. Use the heaviest grease available, such as boat trailer wheel bearing grease and pack the balls into the races (Figure 40). Ensure that 18 balls are installed in each race.
11. Carefully slide the lower steering stem up into the frame, taking care not to dislodge any bearing balls.
12. Install the outer bearing race over the top of the steering head and secure it with the steering stem locknut. Tighten the nut fully to seat the balls into the races. Back off the steering stem locknut until there is no play in the steering head but the steering clamps move freely from lock to lock.
13. Install the upper steering stem and secure it with the head bolt. Torque the steering stem head bolt and pinch bolt as specified in Table 1.
14. Install the handlebars with the dot and handlebar clamps positioned as shown in Figure 41.



15. Install the front forks if removed. Torque the handlebar clamp bolts and the fork leg pinch bolts as specified in **Table 1**.
16. Install the fuel tank.

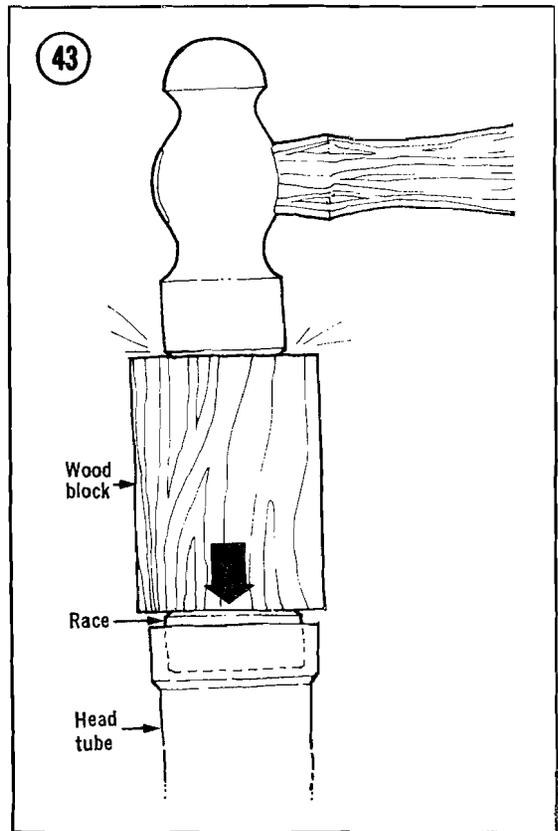
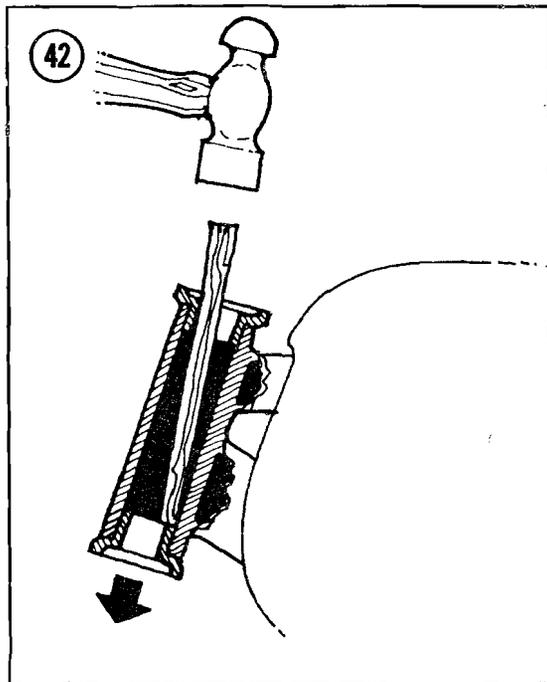
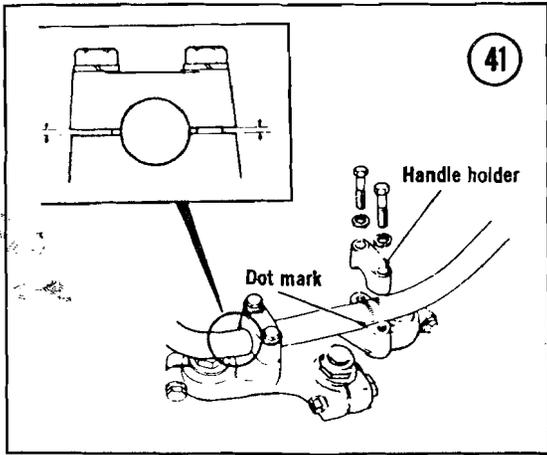
**Inspection**

1. Clean all the bearing races and balls with solvent.
2. Check welds around the steering head for cracks and fractures. If any damage is found, have the frame repaired by a competent frame shop or welding service.

3. Check the bearing balls for pitting, scratches, or signs of corrosion. If they are less than perfect, replace them as a set.
4. Check races for pitting, galling, and corrosion. If any of these conditions exist, replace the races. Refer to *Bearing Race Replacement*.
5. Check the lower steering stem for cracks. Check the lower bearing race on the steering stem for damage or wear. If this race or any of the other races are worn or damaged, they should be replaced as a set.

**Bearing Race Replacement**

1. Insert a hardwood dowel or brass drift into the steering head as shown in **Figure 42** and tap around the race to drive it out. Do the same with the opposite race.
2. Install new races by tapping them into the steering head with a hardwood block (**Figure 43**). Make sure the races are seated squarely before tapping them into place. Tap them in until they are fully seated in the steering head.



3. Use 2 screwdrivers and carefully pry off the lower race from the lower steering stem. Carefully tap a new race into place with a wooden block.

### STEERING HEAD (ALL "T" AND "X" MODELS)

The steering head should be disassembled periodically and the bearings packed with new grease. Use a good grade of waterproof grease such as boat trailer wheel bearing grease.

All "T" and "X" models are equipped with tapered roller bearings in both upper and lower bearing races.

#### Steering Head Adjustment

1. Jack up the motorcycle or place it on a box such as a milk crate to get the front wheel off the ground. Grasp each fork leg at the lower end and attempt to move the front end back and forth. If any fore and aft movement of the front end is detected, the steering stem locknut will have to be adjusted.

2. Loosen the fork leg upper pinch bolts (Figure 44).

3. Remove the 4 bolts securing the handlebars (Figure 45). Carefully lift off the odometer then lay the handlebars back against the tank or the frame.

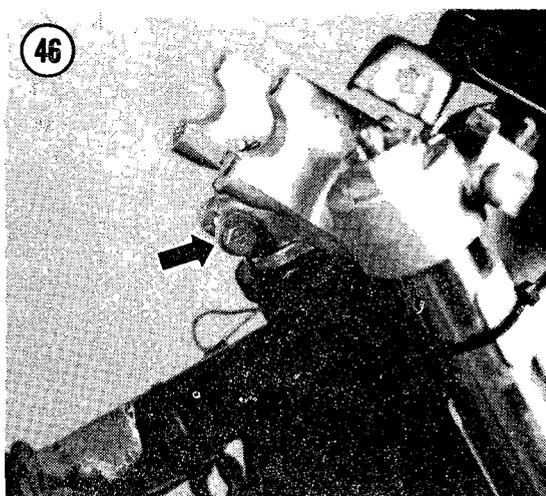
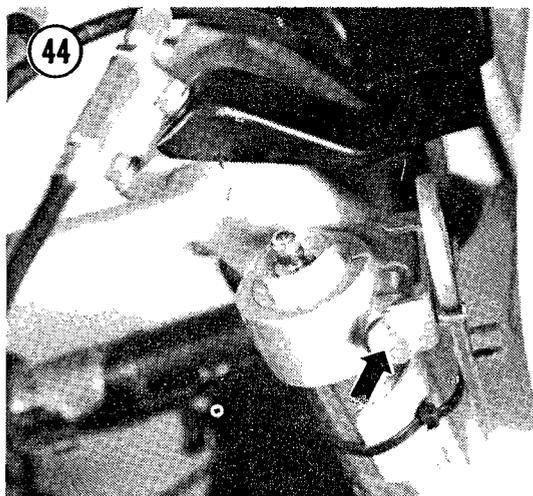
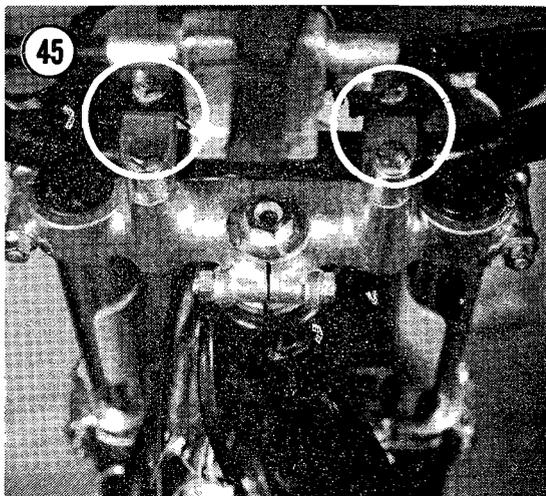
4. Loosen the steering stem pinch bolt (Figure 46).

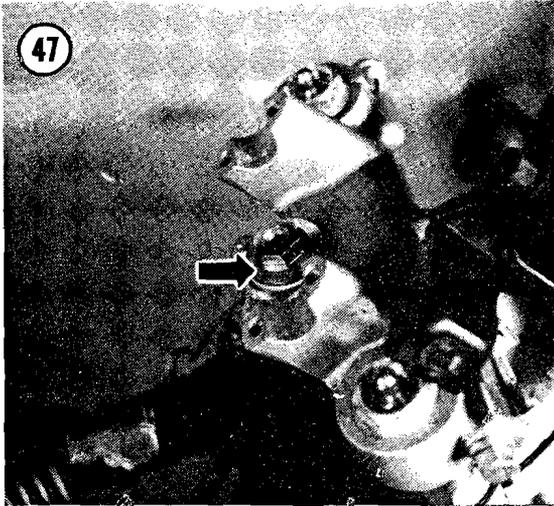
5. Remove the steering stem head bolt (Figure 47). Carefully lift off the upper steering clamp.

6. Use Suzuki steering nut socket wrench (part number 09940-14910) or a locally manufactured equivalent such as the one shown in Figure 48 and torque the steering stem nut (Figure 49) to 4.0-5.0 mkg (29-36 ft.-lb.).

7. Move the front end back and forth from lock to lock 5 or 6 times to make sure the bearings are completely seated.

8. Loosen the steering stem nut and retighten only enough to remove all play from the front end.





9. Install the upper steering clamp and temporarily tighten the steering stem head bolt (Figure 47).

10. Check the movement of the front end. The forks must turn freely from side to side, but without any free play when the forks legs are moved fore and aft. If further adjustment is necessary, the steering stem locknut can be carefully tapped tighter or looser with a screwdriver or punch. When fork movement is correct, torque the steering stem head bolt then the steering stem pinch bolt as specified in Table 1.

11. Install the handlebars with the dot and handlebar clamps positioned as shown in Figure 41. Torque the handlebar clamp bolts and upper fork leg pinch bolts as specified in Table 1.

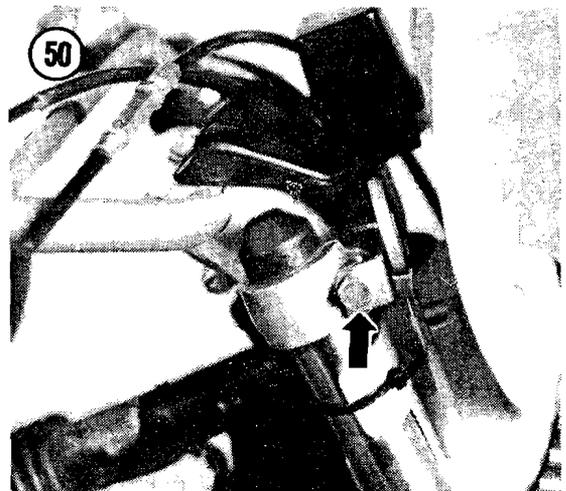
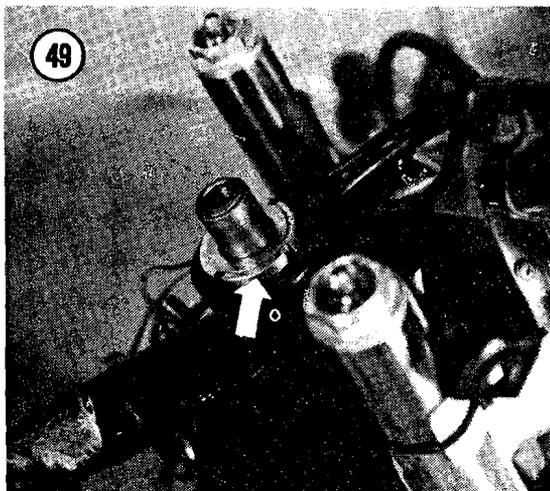
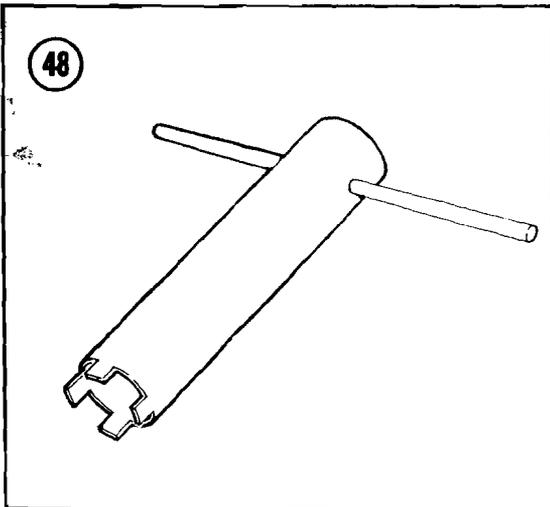
#### Disassembly/Lubrication/Assembly

1. Refer to Chapter Six and remove the fuel tank.

#### NOTE

*If the steering head is being disassembled only for lubrication, it is not necessary to remove the front forks. If the lower steering stem bearing and race are to be replaced, the forks must be removed. Refer to **Fork Removal** as outlined in this chapter.*

2. Loosen the upper fork leg pinch bolts (Figure 50).



3. Remove the 4 bolts securing the handlebars (Figure 51). Carefully lift off the odometer and remove the handlebars. Lay the handlebars back on the upper frame tube.
4. Refer to Figure 46 and loosen the pinch bolt securing the steering stem head bolt.
5. Remove the steering stem head bolt (Figure 52). Carefully lift off the upper steering clamp.
6. Remove the steering stem lock nut (Figure 53). To remove the nut use special spanner wrench available from Suzuki (part number 09940-10122). A locally fabricated tool similar to Figure 54 can be made from a piece of tubing or pipe.

**NOTE**

*If care is exercised, the steering stem lock nut can also be tapped off with a screwdriver or punch.*

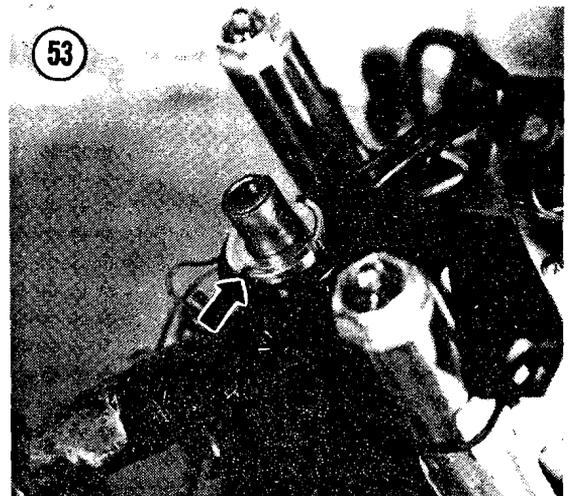
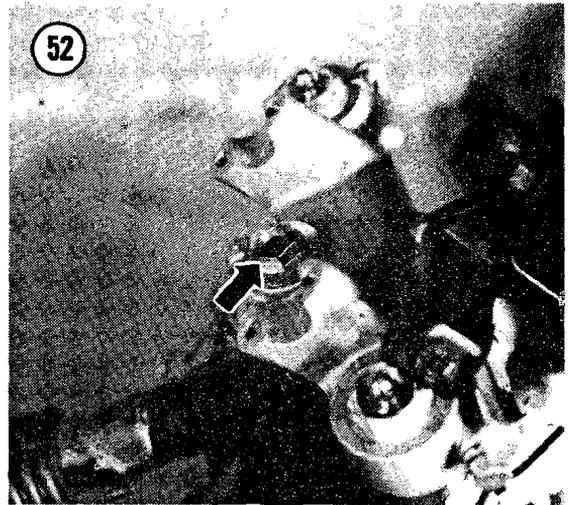
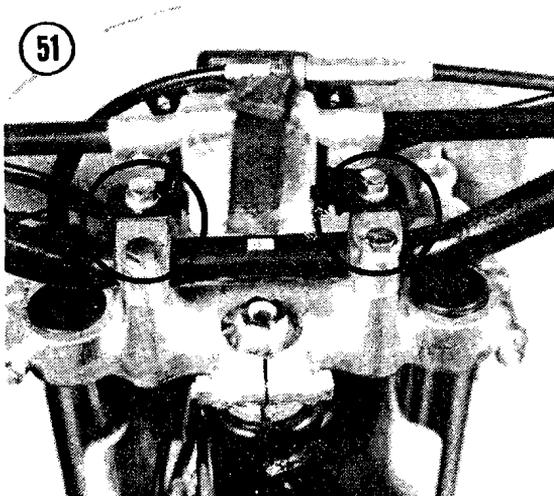
7. Shift the entire steering stem down slightly and lift out the upper tapered bearing (Figure 55).
8. Lower the entire steering stem assembly out of the steering head.
9. Clean the bearings in solvent. Use a rag soaked in solvent to clean both bearing races.
10. Use the heaviest grease available, such as boat trailer wheel bearing grease and pack grease into the races and the bearings.
11. Carefully slide the lower steering stem up into the frame, taking care not to damage the bearings.

12. Install the upper bearing race over the top of the steering stem (Figure 56).

13. Install the steering stem locknut (Figure 57). Use Suzuki steering nut socket wrench (part number 09940-14910) or a locally manufactured equivalent such as the one shown in Figure 54 and torque the steering stem nut (Figure 53) to 4.0-5.0 mkg (29-36 ft.-lb.).

14. Move the front end back and forth from lock to lock 5 or 6 times to make sure the bearings are completely seated.

15. Loosen the steering stem nut and retighten only enough to remove all play from the front end.



16. Install the upper steering clamp and temporarily tighten the steering stem head bolt (Figure 52).

17. Check the movement of the front end. The forks must turn freely from side to side, but without any free play when the forks legs are moved fore and aft. If further adjustment is necessary, the steering stem locknut can be carefully tapped tighter or looser with a screwdriver or punch. When fork movement is correct, torque the steering stem head bolt then the steering stem pinch bolt as specified in Table 1.

18. Install the handlebars with the dot and

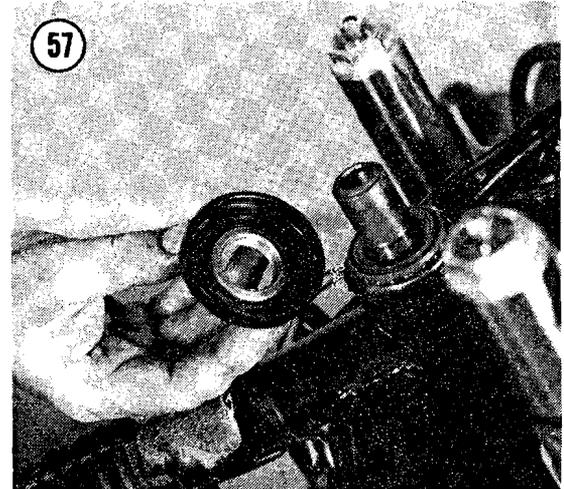
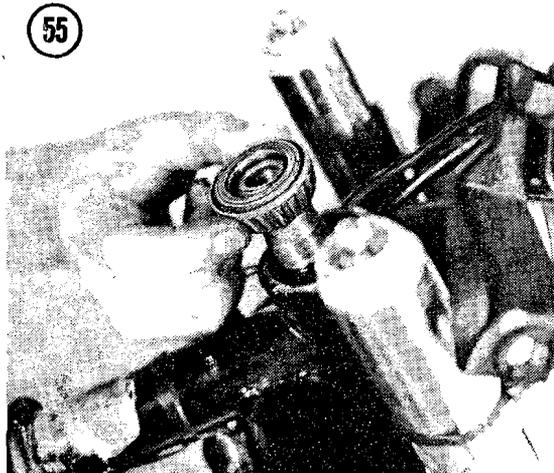
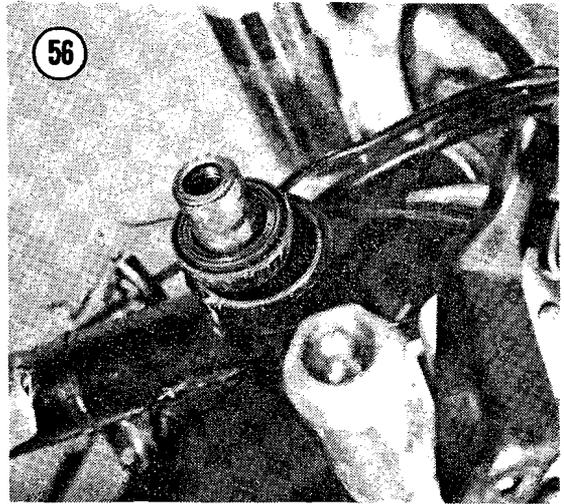
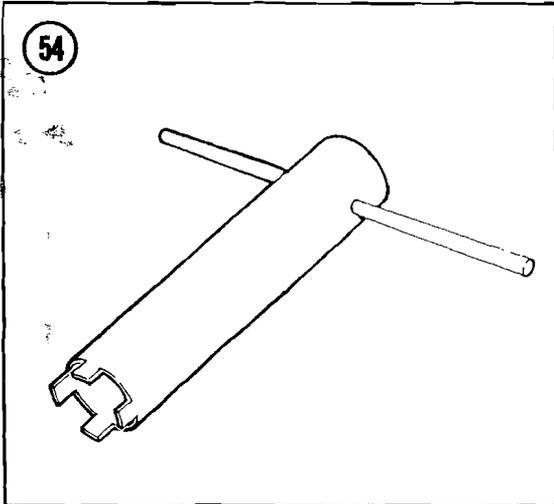
handlebar clamps positioned as shown in Figure 41.

19. Install the front forks if removed. Torque the handlebar clamp bolts and the fork leg pinch bolts as specified in Table 1.

20. Install the fuel tank.

**Inspection**

1. Clean all bearings and races with solvent.
2. Check the welds around the steering head for cracks and fractures. If any are found, have them repaired by a competent frame shop or welding service.



3. Check the bearings for pitting, scratches, roughness or signs of corrosion. If they are less than perfect, replace them as a set.
4. Check races for pitting, galling, and corrosion. If any of these conditions exist, replace the races. Refer to *Bearing Race Replacement*.
5. Check the lower steering stem for cracks or signs of damage.

### Bearing Race Replacement

Several special tools and considerable expertise are required to replace the bearing races in the steering head. It is recommended that this task be referred to a repair shop or authorized dealer with the necessary special tools. Damage to the bearing races and/or the frame could occur if non-approved methods are used to remove or install the new bearing races.

Table 1 FRONT SUSPENSION TORQUE SPECIFICATIONS

Item	mkg	ft.-lb.
Front axle nut		
PE250B, C	4.5-5.2	33-38
PE175C, N; PE250N	3.6-5.2	26-38
PE175T, X; PE250T, X; PE400	3.6-5.2	26-38
Upper front fork clamp bolts		
PE250B, C	2.0-2.5	15-18
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	2.0-3.0	15-22
Lower front fork clamp bolts		
PE250B, C	2.0-2.5	15-18
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	1.5-2.5	11-18
Front fork cap bolt		
PE250B, C, N; PE175C, N	3.5-5.0	26-36
PE175T, X; PE250T, X; PE400	1.5-3.0	11-22
Steering stem pinch bolt		
PE250B	2.0-2.5	15-18
PE250C	1.5-2.3	11-17
PE175C, N; PE250N	1.5-2.5	11-18
PE175T, X; PE250T, X; PE400	1.5-2.5	11-18
Steering stem head bolt		
PE250B, C	4.5-5.5	33-40
PE250N	3.5-5.5	26-40
PE175C, N	3.5-5.0	26-36
PE175T, X; PE250T, X; PE400	3.5-5.0	26-36
Handlebar clamp bolt		
PE250B, C	1.6-2.0	12-15
PE175C, N; PE250N	1.2-2.0	9-15
PE175T, X; PE250T, X; PE400	1.2-2.0	9-15

Table 2 FRONT FORK SPECIFICATIONS

Fork Oil Capacity		
PE250B	243 cc	8.2 U.S. oz.
PE175C, N; PE250C, N	274 cc	9.3 U.S. oz.
PE175T, X; PE250T, X; PE400	308 cc	10.4 U.S. oz.
Fork oil level <sup>1</sup>		
Standard level (All "T" and "X" models)	180 mm (7.0 in.)	
Level Range	165-195 mm (6.5-7.7 in.)	
Fork air pressure <sup>2,3</sup>		
Standard pressure (All "T" and "X" models)	0.6 kg/cm <sup>2</sup> (8.5 psi)	
Pressure range	0.5-0.7 kg/cm <sup>2</sup> (7.1-10.0 psi)	
Fork spring length		
	Standard	Service limit
PE175N; PE250N	650.7 mm (25.6 in.)	621.0 mm (24.5 in.)
PE175T, X	530.5 mm (20.9 in.)	521.0 mm (20.5 in.)
PE250T, X; PE400	580.5 mm (22.9 in.)	571.0 mm (22.5 in.)
NOTES		
1. The maximum allowable difference in oil level between the right and left fork tubes is 1 mm (0.04 in.).		
2. Do not exceed 2.5 kg/cm <sup>2</sup> (35 psi) of air pressure in the forks or the seals may be damaged.		
3. Maximum allowable difference in air pressure between fork tubes is 0.1 kg/cm <sup>2</sup> (1.4 psi).		

June 28, 2007

Thanks to James Grooms, editor, Clymer Publications who granted copyright permission to provide access to the out of print manual, Suzuki PE175-400 Singles, 1977-1981. Other Clymer manuals may be viewed at <http://clymer.com> .

## CHAPTER NINE

### REAR SUSPENSION

The rear suspension consists of a rear wheel, a swing arm supported by 2 spring/shock absorber suspension units and a rear sprocket.

This chapter outlines procedures to remove the rear wheel, replace the suspension units and replace the rear sprocket. **Table 1** is at the end of the chapter.

#### REAR WHEEL

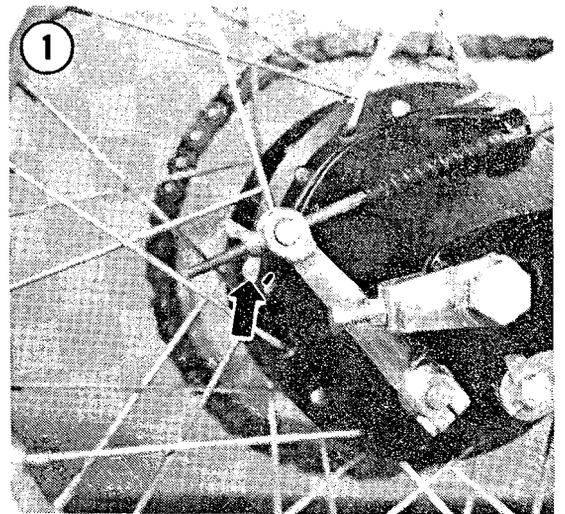
##### Removal/Installation (All 1979 and Earlier Models)

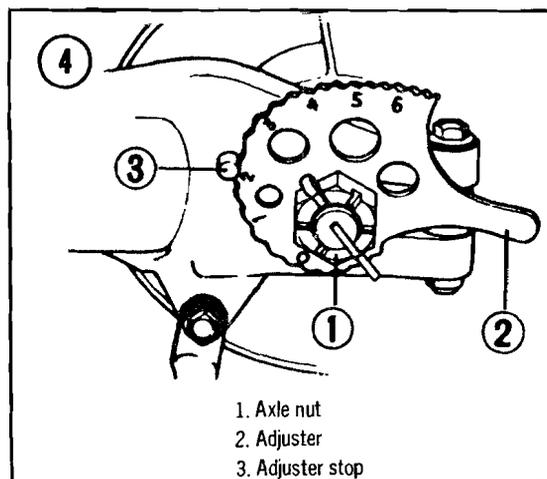
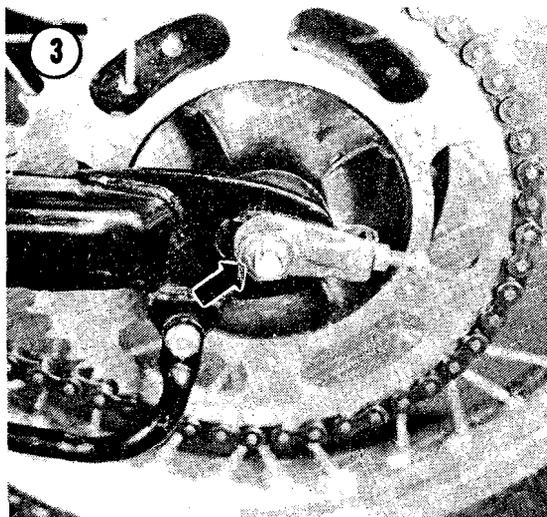
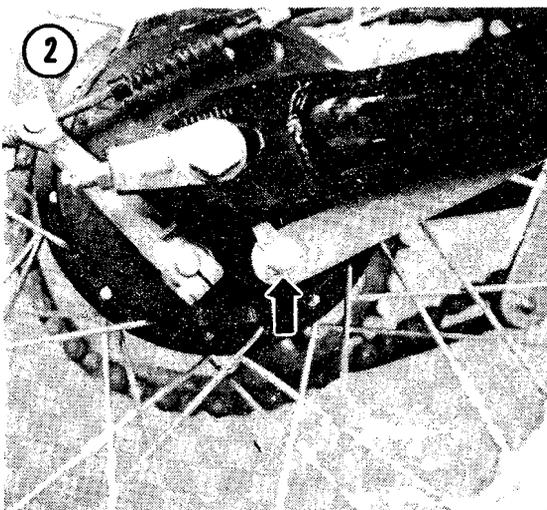
1. Jack up the motorcycle or place it on a box such as a milk crate to raise the rear wheel off the ground.
2. Remove the adjuster nut from the brake cable and disconnect the cable from the brake arm (**Figure 1**).
3. On "B" and "C" models, remove the clip or fold back the tab securing the torque link bolt (**Figure 2**). Disconnect the end of the torque link. Note the location of the washers, if so equipped.
4. Remove the cotter pin securing the axle nut (**Figure 3**). Insert a Phillips screwdriver shaft or the PE tool through the axle head to keep the axle from turning while loosening the axle nut. On "B" and "C" models, the axle nut must be completely removed. On

"N" models it is only necessary to loosen the axle nut.

5. On "B" and "C" models, pull out or gently tap out the rear axle. Note the location of axle spacers. Roll the rear wheel forward and disengage the drive chain from the rear sprocket. Remove the rear wheel.

6. On "N" models, remove the 2 axle support bolts, and rotate the "snail" adjusters to the "O" position to provide maximum chain slack (**Figure 4**). Disengage the drive chain and remove the wheel.





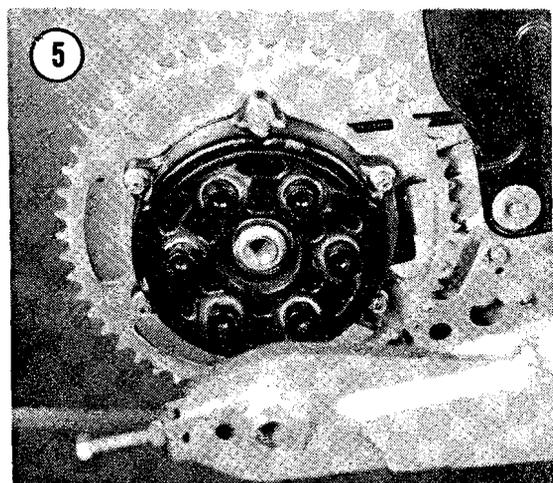
7. Refer to Chapter Ten to inspect the wheel bearings and brake components.

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

- a. Lightly grease the axle and install it from the right side.
- b. Tighten the bolt securing the torque link as specified in **Table 1**. Secure the bolt with the clip or folding lockwasher.
- c. Refer to Chapter Three and adjust the drive chain.
- d. Centralize the rear brake by spinning the wheel and applying the brake a few times. Hold the brake on while tightening the axle nut. Use a Phillips screwdriver shaft or the PE tool to keep the axle from turning and torque the axle nut as specified in **Table 1**. Secure the nut with a new cotter pin.
- e. Perform *Brake Adjustment* as outlined in Chapter Three.

**Removal/Installation**  
(All "T" and "X" Models)

- 1. Jack up the motorcycle or place it on a box such as a milk crate to raise the rear wheel off the ground.
- 2. Remove the cotter pin from axle nut.
- 3. Use a Phillips screwdriver shaft or the PE tool to hold the rear axle from turning and remove the axle nut.
- 4. Pull out the rear axle and remove the spacer. Disengage the wheel from the sprocket drive hub (**Figure 5**) and remove the wheel.



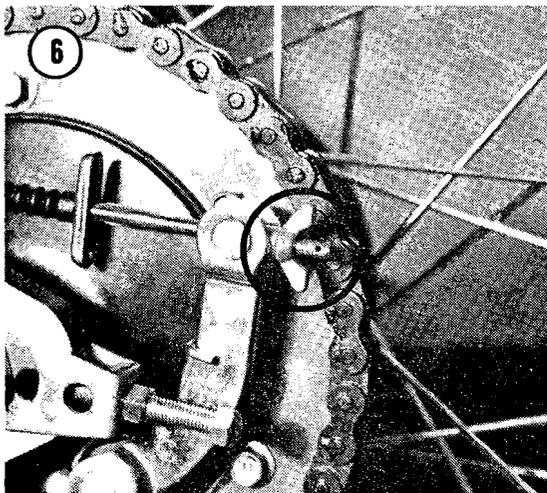
5. If sprocket drive hub and brake component removal is desired, perform the following:

- a. Remove the brake cable adjuster (**Figure 6**).
- b. Disconnect the brake cable from the brake arm and remove the cable from the backing plate.
- c. Remove the clip securing the master link and remove the master link. Remove the drive chain from the rear sprocket.
- d. Remove the axle sleeve nut (**Figure 7**) and remove the sprocket drive hub.

6. Refer to Chapter Ten to inspect and replace the wheel bearings and brake components.

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

- a. Lightly grease the axle and install it from the right side.
- b. If the drive chain was removed, install the master link clip as shown in **Figure 8**.
- c. Refer to Chapter Three and perform *Chain Adjustment* before tightening the axle support nut.
- d. Use a Phillips screwdriver shaft or the PE tool to keep the axle from turning and torque the axle nut as specified in **Table 1**. Secure the nut with a new cotter pin.
- e. Torque the axle sleeve nut as specified in **Table 1**.
- f. Refer to Chapter Three and perform *Brake Adjustment*.

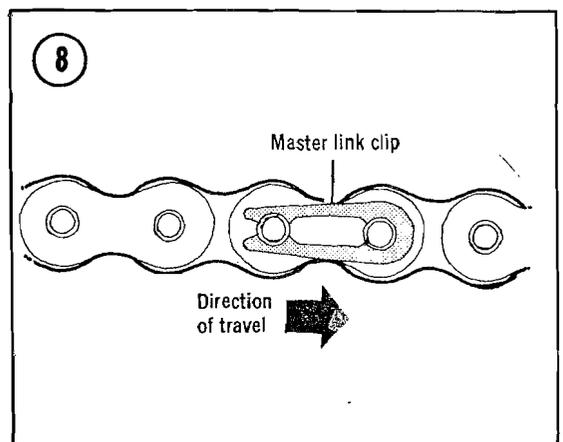
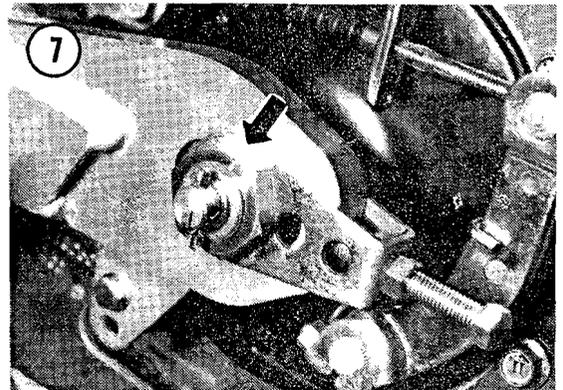


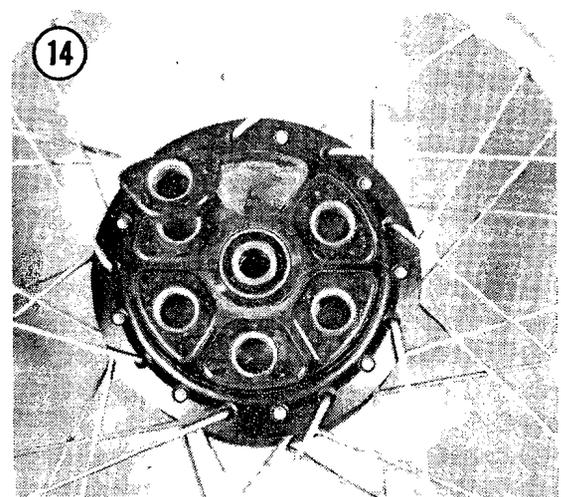
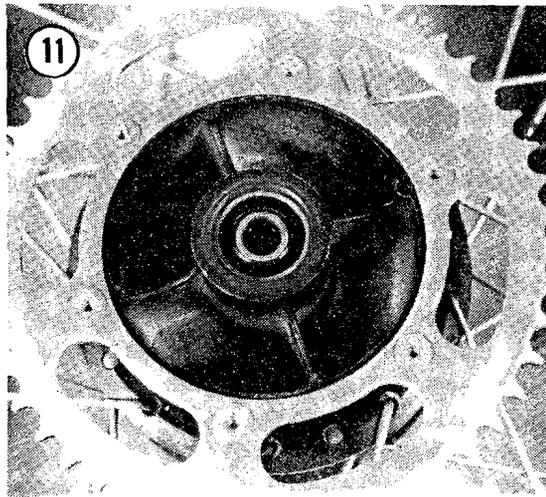
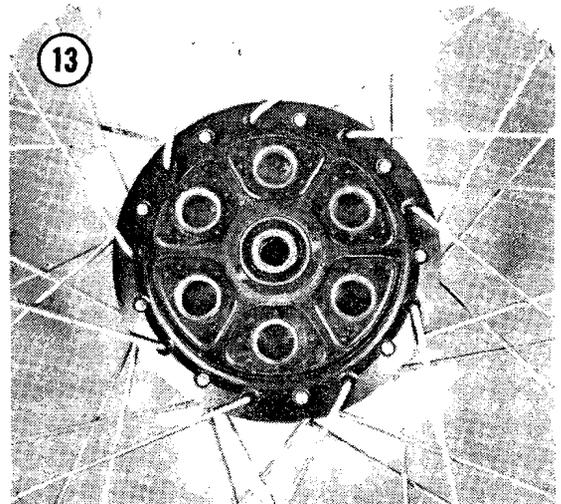
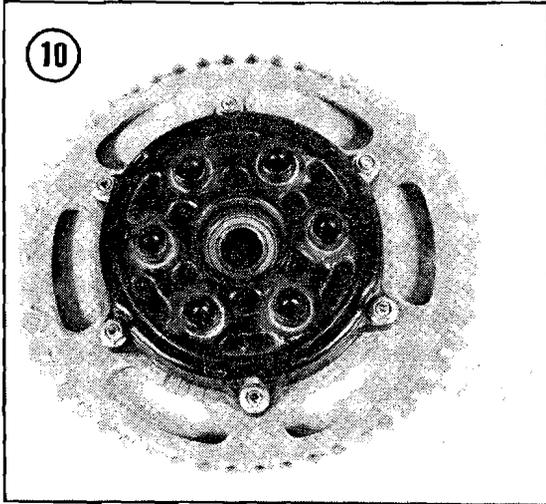
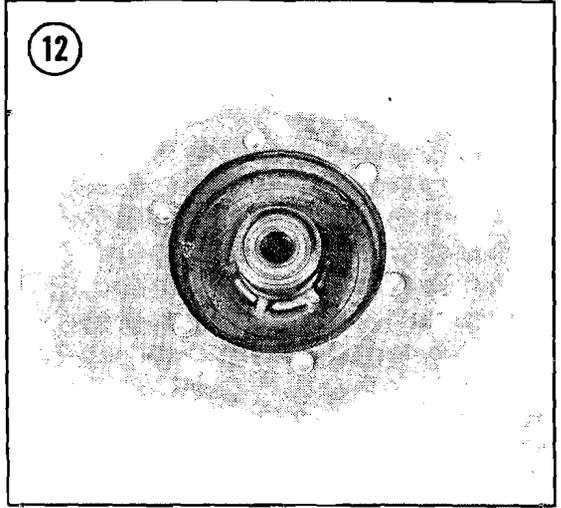
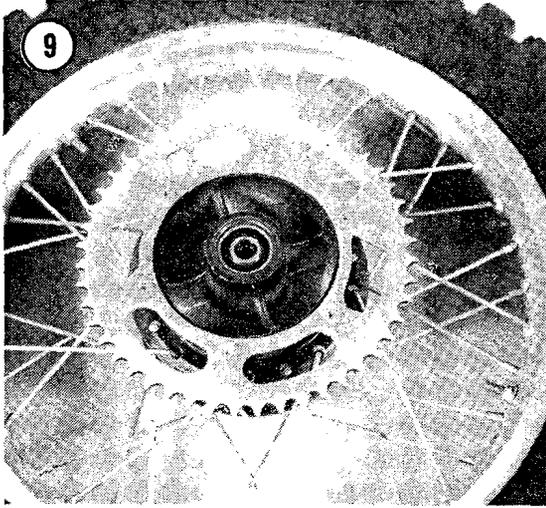
## REAR SPROCKET AND HUB CUSHIONS

On all 1979 and earlier machines, the rear sprocket is mounted directly to the wheel hub (**Figure 9**). On all "T" and "X" models, the sprocket is mounted on a separate sprocket drive hub (**Figure 10**). The sprocket is secured by countersunk Allen or hex-headed fasteners (**Figure 11** or **Figure 12**). On all "T" and "X" models, the sprocket mounting drum is positioned in 6 rubber hub cushions (**Figure 13**). The cushions absorb the shock of acceleration/deceleration on the rear hub and transmission components.

### Removal/Installation

1. Remove the rear wheel as outlined in this chapter.
2. On all "T" and "X" models, to remove the hub cushions carefully pry each cushion out of the wheel hub (**Figure 14**).





9

3. To remove the sprocket, remove the countersunk Allen or hex-headed bolts securing the sprocket (Figure 11 or 12).

#### NOTE

The sprocket bolts on all "T" and "X" models are secured by special self-locking nuts (Figure 10). Suzuki recommends that new self-locking nuts be used when installing the sprocket.

4. Perform *Inspection*.
5. Installation is the reverse of these steps. Keep the following points in mind:
  - a. If old hub cushions are to be reused, thoroughly clean the cushions and cushion cavities in the hub.
  - b. Torque sprocket bolts as specified in Table 1.

#### Inspection

1. Carefully examine the hub cushions (Figure 14) for fatigue and deterioration. Replace the cushions if necessary.
2. Inspect the rear sprocket for bent or worn teeth as shown in Figure 15. Replace the sprocket if necessary.

#### SWING ARM

The swing arm on all models is supported by caged roller bearings on each side. The bearings should be lubricated frequently to provide maximum service life.

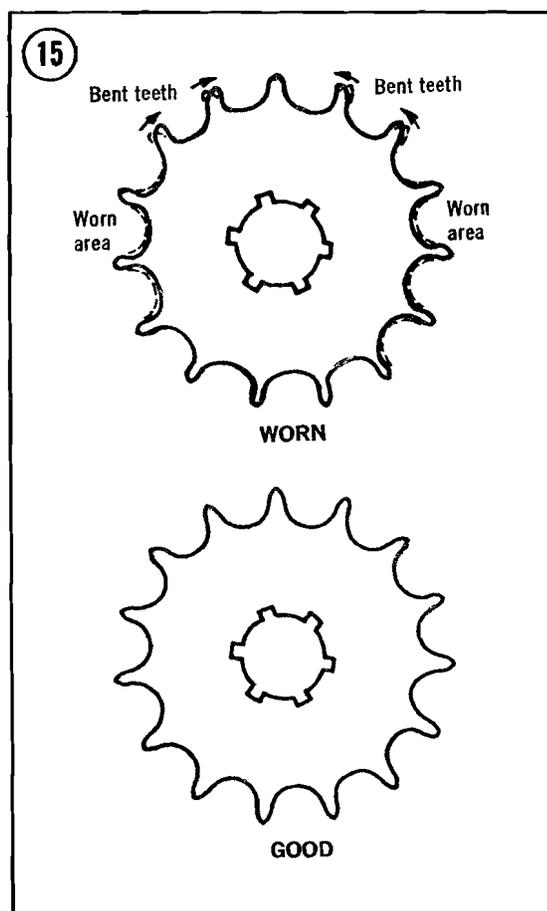
#### Bearing Condition Check

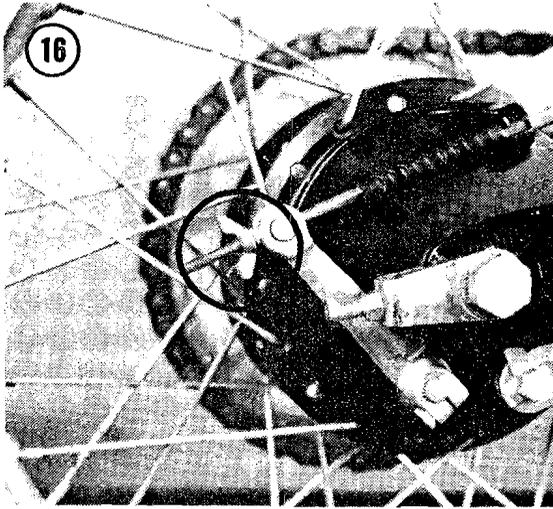
The condition of the bearings can greatly affect the handling performance. Worn bearings will produce wheel hop, pulling to one side under acceleration, and pulling to the other side during braking. If the condition of the bearings is doubtful, perform the following steps.

1. Remove the rear wheel.
2. Torque the swing arm pivot bolt as specified in Table 1.
3. Remove the upper or lower ends of both shock absorbers so the swing arm is free to move under its own weight.
4. Grasp the swing arm and attempt to move it from side to side in a horizontal arc. If more than a very slight movement is felt, the bearings are worn and must be replaced.

#### Swing Arm Removal/Installation

1. Remove the rear brake adjuster nut (Figure 16) and disconnect the cable from the brake arm.
2. Disconnect the brake cable from the brake pedal (Figure 17). Unhook the pedal return spring and swing the pedal down.
3. Remove the master link clip with pliers. Remove the master link and the drive chain.
4. Remove the rear wheel as outlined in this chapter. On "T" and "X" models the sprocket drive hub can be left in place if desired.
5. Route the brake cable back out of the cable guide on the swing arm (A, Figure 18) and remove the brake backing plate.
6. Remove both lower shock absorber bolts (B, Figure 18) and lower the swing arm.



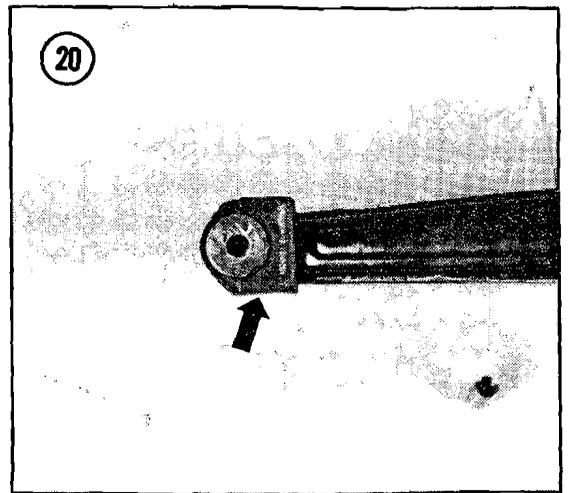
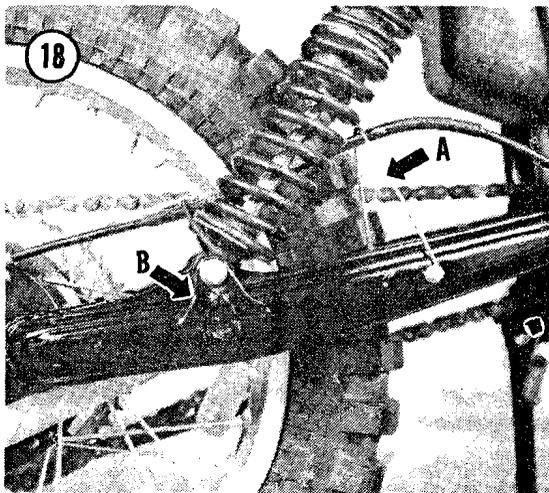
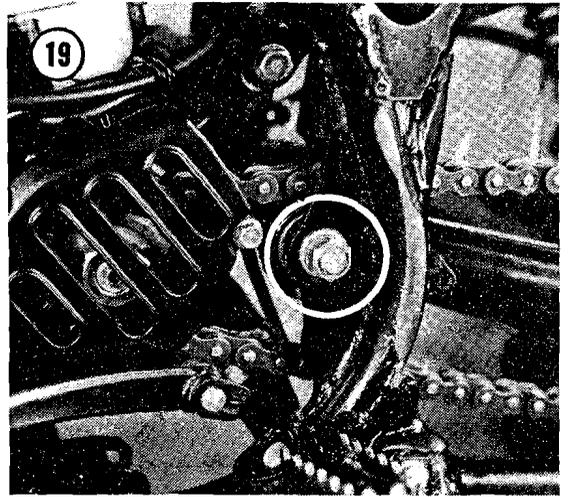
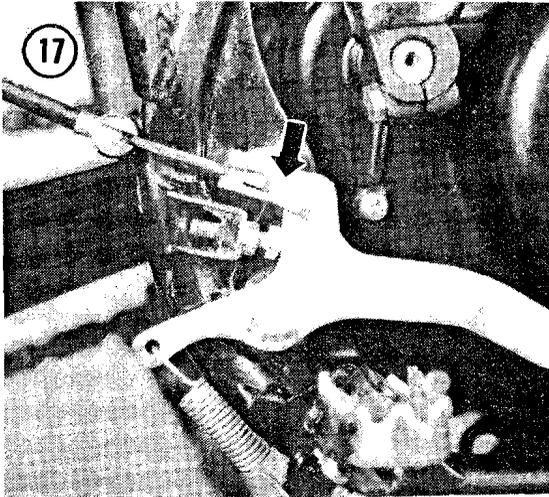


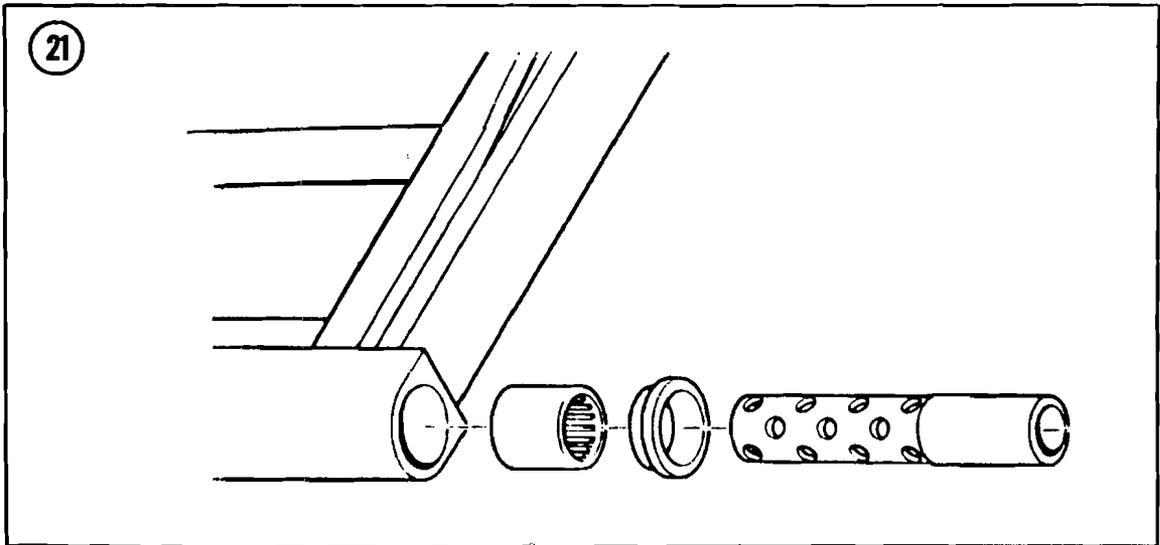
7. Loosen the upper shock absorber bolts and swing the shock absorbers up out of the way. Tighten the bolts to keep the shock absorbers clear of the swing arm.

8. Remove the nut securing the swing arm pivot bolt (Figure 19). Carefully tap out the pivot bolt and withdraw the swing arm from the frame.

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

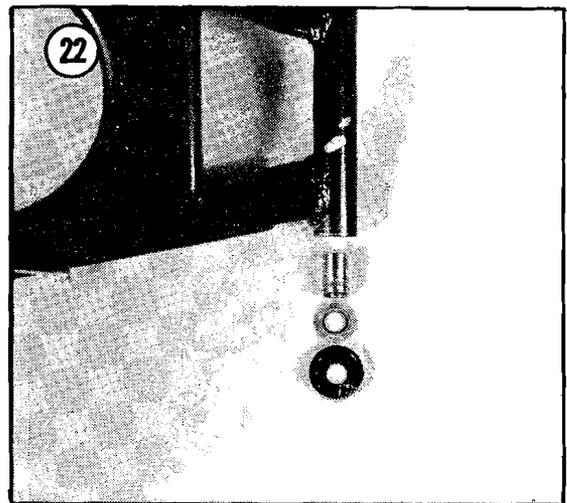
- a. Lubricate both swing arm bearings with heavy grease such as marine wheel bearing grease.
- b. Install a new chain buffer on the swing arm (Figure 20). Make sure that the swing arm components are correctly





positioned as shown in **Figure 21** for all “T” and “X” models, and **Figure 22** for all other models.

- c. Lightly grease the pivot bolt and install it from the right side.
- d. Install the shock absorbers, rear wheel and the drive chain. Use a new master link and install the clip as shown in **Figure 23**.
- e. On “T” and “X” models, make sure the brake cable is routed through the center of the chain buffer as shown in **Figure 24**.
- f. Torque the rear suspension components as specified in **Table 1**.
- g. Refer to Chapter Three and perform *Drive Chain Adjustment* and *Brake Adjustment*.



## Bearing Replacement

### CAUTION

*Do not attempt to remove the bearings just for inspection as they are usually destroyed when removed.*

1. Use a drift and carefully drive out a bearing from one end of the swing arm.
2. Remove the center spacer and drive out the second bearing.

### NOTE

*An O-ring is installed between the left-hand bearing and the large center spacer on PE250B; C models.*

3. Wipe out the bearing bores in the swing arm with a clean rag.
4. Lightly grease the outside of one new bearing. Use a plastic or rubber mallet and carefully tap the bearing into one end of the swing arm. Make sure that the bearing is installed with the closed portion (with stamped markings) of the bearing facing out (**Figure 25**).
5. Install the center spacer. Make sure that the O-ring is correctly positioned between the left-hand bearing and the large center spacer on PE250B, C models. Lightly grease and install the second bearing. Lubricate both bearings with heavy grease.

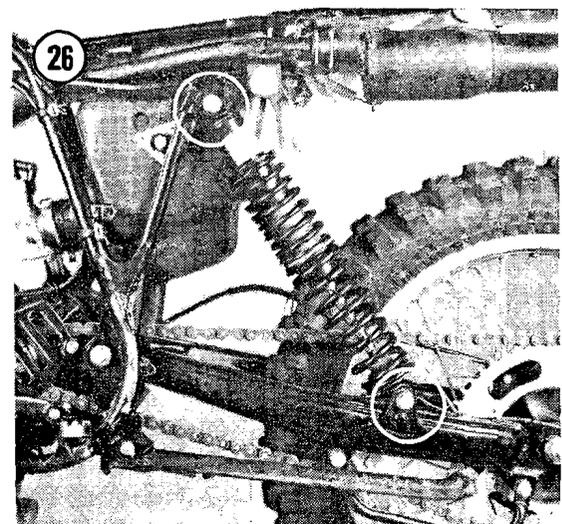
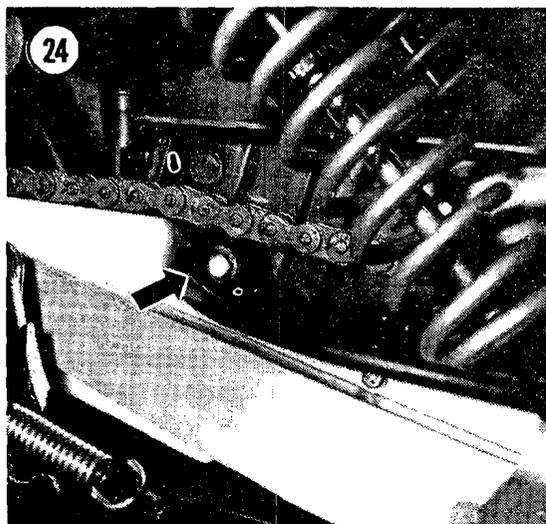
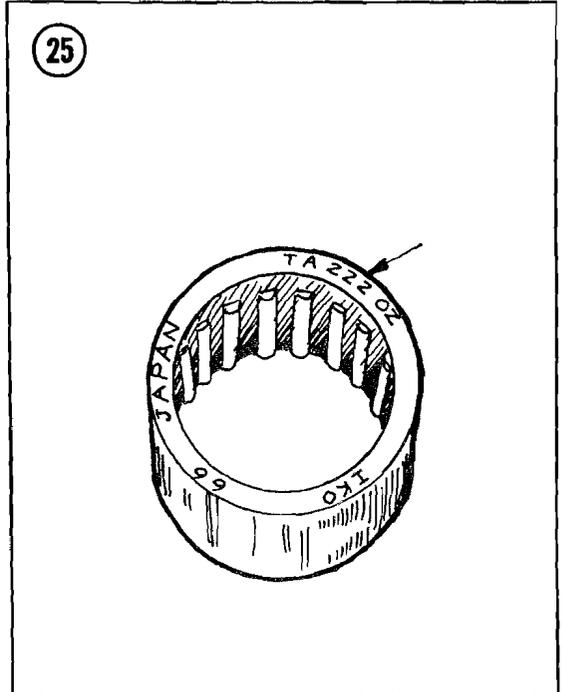
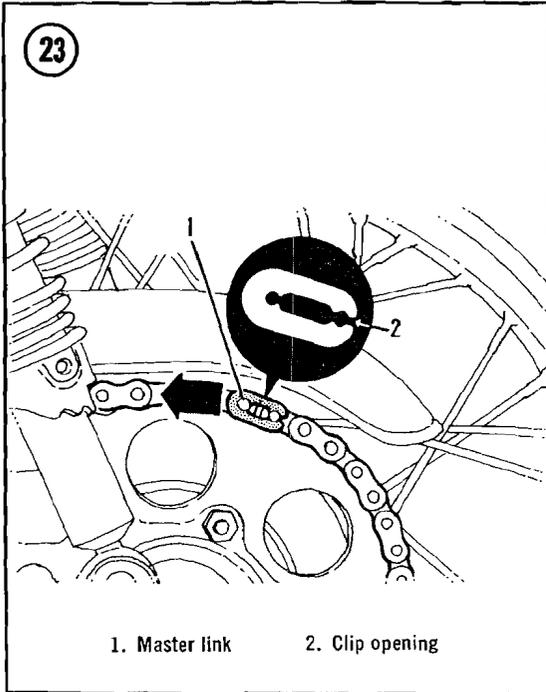
**SHOCK ABSORBER/SPRINGS**

The rear suspension shock absorber/spring units are non-repairable items. If the units fail to dampen adequately, replace them as a set.

The shock absorbers contain nitrogen gas under high pressure. They must be depressurized before they can be safely discarded.

**Removal/Installation**

1. Jack up the motorcycle or place it on a box such as a milk crate. The rear wheel must be off the ground.
2. Remove the side covers.
3. Remove the bolts and nuts securing one shock absorber and remove it from the motorcycle (Figure 26).



**NOTE**

*Removal and installation of one unit at a time makes the task easier. The unit that remains in place will hold the swing arm in the correct position.*

4. Installation is the reverse of these steps. Torque the shock absorber fasteners as specified in **Table 1**.

**CAUTION**

*Do not overtorque the shock absorber mounting fasteners or the shock bushings may seize.*

**Inspection**

1. Clamp the lower eye of the shock absorber in a vise fitted with jaw protectors. With assistance, use 2 bars or large screwdrivers together and compress the spring enough to remove the spring keeper from the top of the unit. Remove the spring.
2. Visually check the damper rod for bending. If bending is apparent, the unit is unserviceable and must be replaced.

3. Grasp the upper mounting eye and repeatedly compress and extend the damper rod to check for damping resistance. Resistance during extension of the rod should be noticeably greater than during the compression stroke. The resistance in both directions should be smooth throughout the stroke. If the shock absorber fails on either of these points, it is unsatisfactory and should be replaced.

4. Before reassembling the spring and shock absorber, accurately measure the free length of the spring and write it down (**Figure 27**). If the free length difference between the springs is greater than 3.0-4.0 mm (1/8-3/16 in.) the springs should be replaced as a set.

5. If a shock absorber is to be discarded, it should first be depressurized. Drill a 3.0 mm (1/8 in.) hole in the shock absorber body as shown in **Figure 28**.

**WARNING**

*Always wear eye protection when drilling a shock absorber to prevent eye damage from the metal filings.*

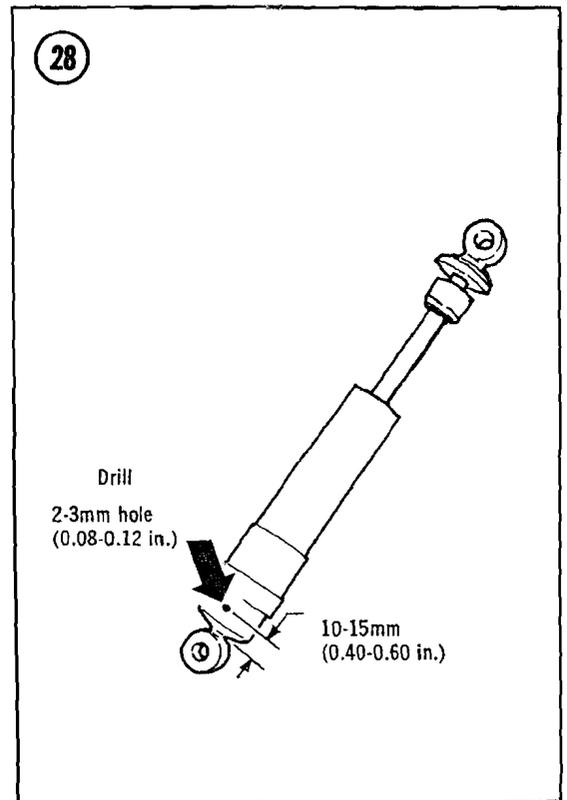
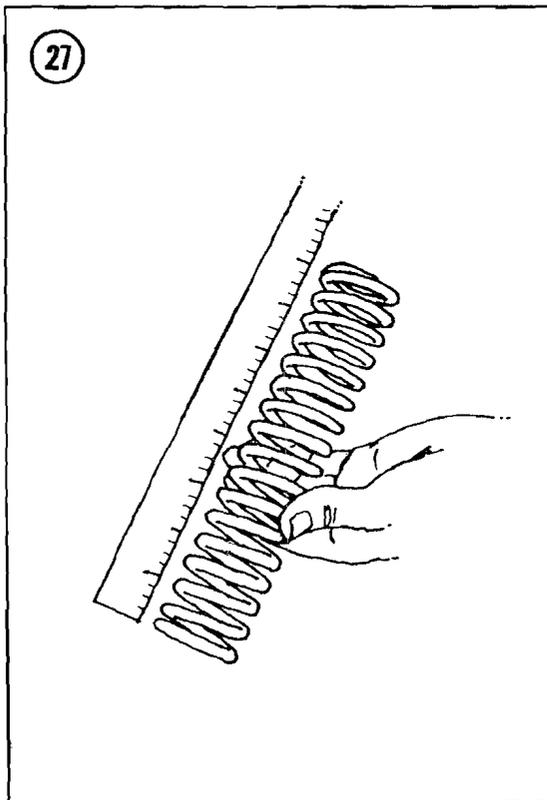


Table 1 REAR SUSPENSION TORQUE SPECIFICATIONS

Item	mkg	ft.-lb.
<b>Swing arm pivot bolt</b>		
PE250B, C	6.5-8.0	47-58
PE175C	3.0-4.5	22-33
PE175N	4.5-7.0	33-51
PE250N	5.0-8.0	36-58
PE175T, X; PE250T, X	4.5-7.0	33-51
PE400	5.0-8.0	36-58
<b>Shock absorber nut</b>		
PE250B, C; PE175C	2.5-3.0	18-22
PE175N; PE250N	2.0-3.0	15-22
PE175T, X; PE250T, X (right side)	1.5-2.5	11-18
PE175T, X; PE250T, X (left side)	2.0-3.0	15-22
PE400	1.0-1.5	8-11
<b>Rear axle shaft nut</b>		
PE250B, C	6.5-8.0	47-58
PE175C	3.6-5.2	26-38
PE175N; PE250N	5.0-8.0	36-58
PE175T, X; PE250T, X; PE400	5.0-8.0	36-58
<b>Rear axle sleeve nut</b>		
PE175T, X; PE250T, X; PE400	7.0-9.0	51-65
<b>Torque link bolt</b>		
PE250B, C	1.2-1.5	9-11
PE175C	2.0-3.0	15-22
<b>Rear brake lever bolt</b>		
PE250B, C	0.6-0.8	3-6
PE175C, N; PE250N	0.5-0.8	4-6
PE175T, C; PE250T, X; PE400	0.5-0.8	4-6
<b>Rear sprocket bolts</b>		
PE175C, N	2.0-3.0	15-22
PE250B, C, N; PE400	2.0-3.0	15-22
PE175T, X; PE250T, X	2.5-4.0	18-29



# CHAPTER TEN

## WHEELS, TIRES, AND BRAKES

This chapter includes inspection and repair of wheel, tire and brake components.

Tire types are largely a matter of personal preference, however, original equipment tire sizes are recommended for most racing or trail riding conditions. Refer to **Table 1** for recommended tire sizes and air pressures. **Tables 1 and 2** are found at the end of the chapter.

### BRAKES

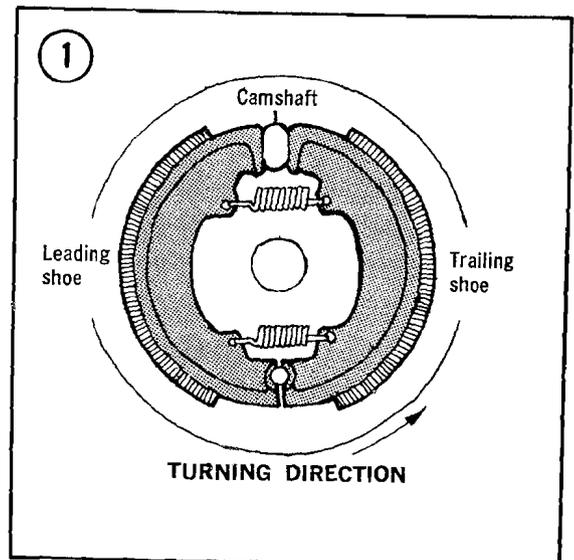
The brakes on both wheels are single-leading shoe type. **Figure 1** illustrates the major brake components. As the brake pedal or brake lever is actuated, the brake camshaft rotates, forcing the brake shoes outward against the brake drum.

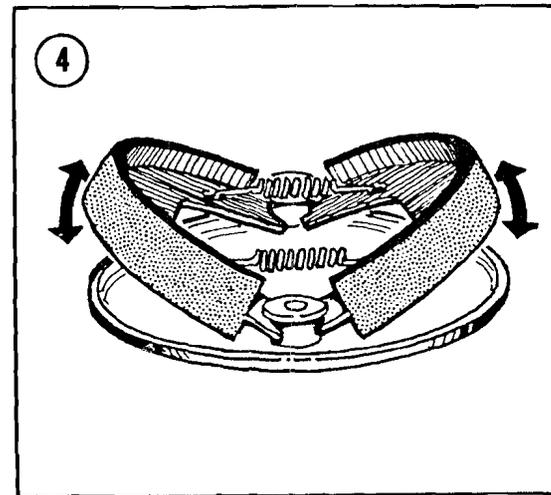
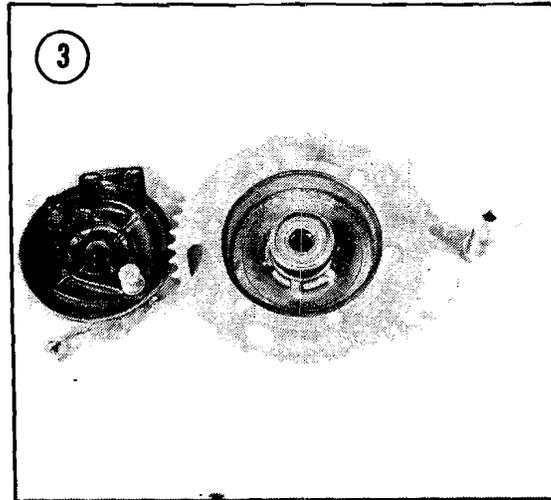
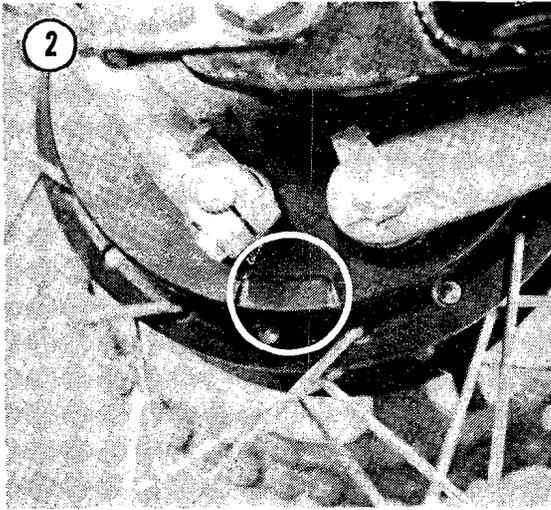
#### Adjustment

Check the front and rear brake lever movement when the brakes are applied. If lever movement exceeds the limit marks on the brake backing plate (**Figure 2**), brake adjustment and/or brake shoe replacement is indicated. Refer to Chapter Three for front and rear brake adjustment procedures.

#### Brake Shoe Removal/Installation

1. Refer to Chapter Eight or Nine and remove the front or rear wheel complete with the brake backing plate. On "T" and "X" models, remove the rear sprocket drive hub as outlined in the rear wheel removal procedure.

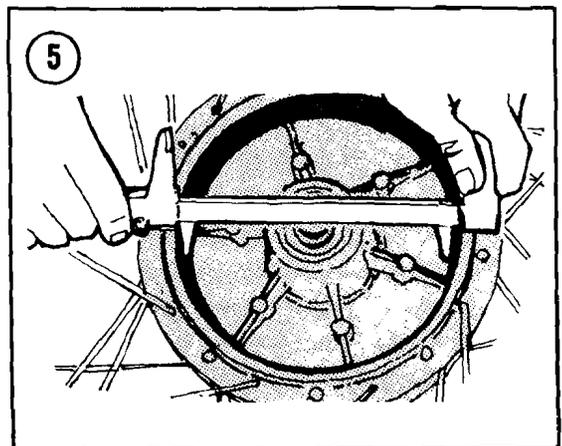




- CAUTION**
- Always handle brake shoes with clean hands. Dirt and grease on hands can contaminate the brake lining material, necessitating brake shoe replacement.*
2. On all "T" and "X" models, carefully tap out the axle sleeve and separate the brake backing plate from the sprocket drive hub (Figure 3).
  3. Grasp brake shoes in each hand and roll shoes off backing plate as shown in Figure 4.
  4. Disconnect the springs from each brake shoe and perform *Inspection*.
  5. Perform *Brake Pivot Lubrication*.
  6. Installation is the reverse of these steps. Connect both springs to the brake shoes before installing shoes on the backing plate. Ensure that all brake components are clean and properly positioned before installing front or rear wheel.

**Inspection**

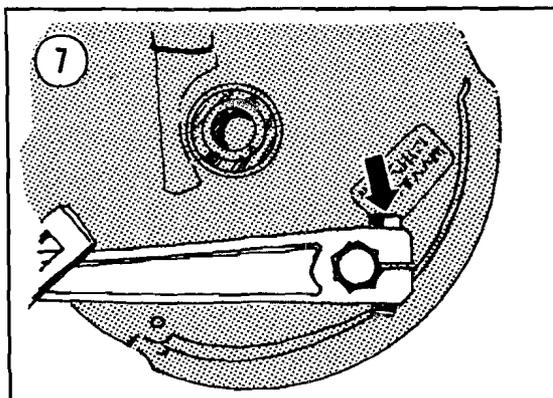
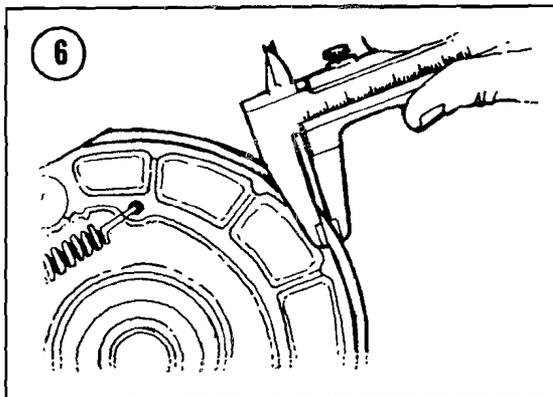
1. Periodically check the brakes for wear and the presence of foreign matter. Grooves in the drum deep enough to snag a fingernail, are an indication that the drum should be turned down on a lathe and new shoes fitted. This type of wear can be avoided to a great extent if the brakes are disassembled and thoroughly cleaned after the motorcycle has been ridden in mud or deep sand.
2. Use vernier calipers and check brake drums for out-of-round or excessive wear (Figure 5). Refer to Table 2 for brake drum specifications.



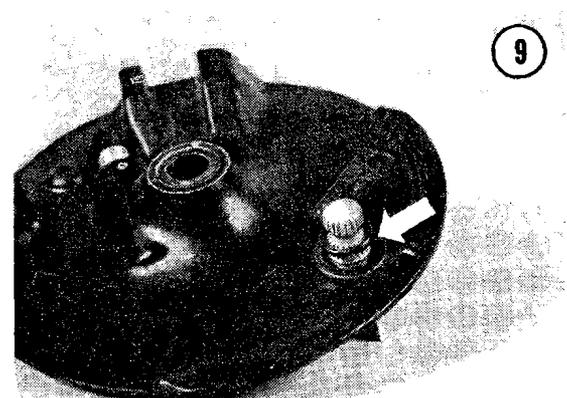
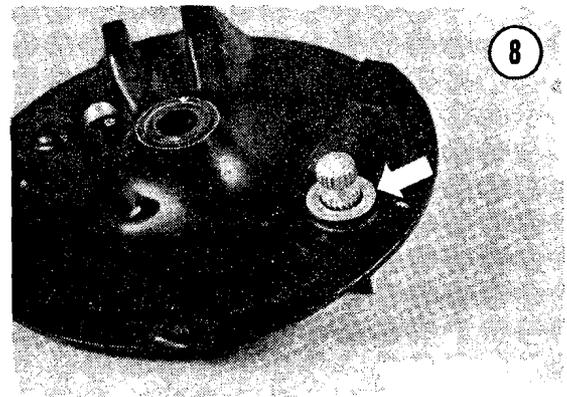
3. Examine the brake linings for oil, grease, or dirt. Oil-soaked linings cannot be satisfactorily rejuvenated; they should be replaced. Dirt imbedded in the lining can be removed with a wire brush.
4. Use a caliper and measure the thickness of both brake linings as shown in **Figure 6**. The wear limit for the brakes linings on both front and rear wheels is 1.5 mm (0.06 in.). Replace both shoes as a set if they are worn beyond the service limit.
5. Check the brake shoe return springs for tension. If the springs are stretched and weak, they will not fully retract the shoes from the drum, resulting in power-robbing drag on the drums and premature wear of the lining material. Replace both springs as a set, if necessary.

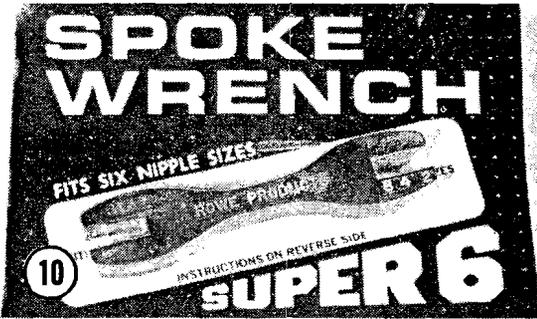
#### Brake Pivot Lubrication

The brake pivot should be cleaned and lubricated periodically to maintain smooth brake operation.



1. Remove the brake shoes.
2. Mark the relative position of the brake arm with the machined line on the end of the pivot shaft so the brake arm can be installed correctly. Remove the pinch bolt securing the brake arm and remove the arm (**Figure 7**).
3. Remove the flat washer from the pivot shaft (**Figure 8**).
4. Remove the O-ring from the pivot shaft (**Figure 9**) and push the shaft out of the brake backing plate.
5. Thoroughly clean the pivot shaft and backing plate.
6. Lubricate the pivot shaft and O-ring with brake grease or high-temperature grease. Use grease sparingly. Too much grease on the pivot bolt may cause the linings to become contaminated. Install the pivot bolt in the backing plate then install the O-ring, washer and brake arm.
7. Install the brake shoes.





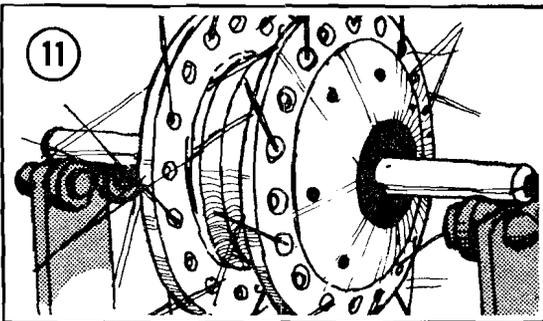
**SPOKES AND WHEEL RUNOUT**

Spokes should be checked for tightness periodically; certainly before each race or long trail ride. The “tuning fork” method for checking spoke tightness is simple and works well. Tap each spoke with a spoke wrench or the shank of a screwdriver and listen to the tone. A tightened spoke will emit a clear, ringing tone, and a loose spoke will sound flat. All of the spokes in a correctly tightened wheel will emit tones of similar pitch but not necessarily the same precise tone.

Bent, broken or stripped spokes should be replaced as soon as they are detected, as they can cause the destruction of an expensive hub.

*NOTE*

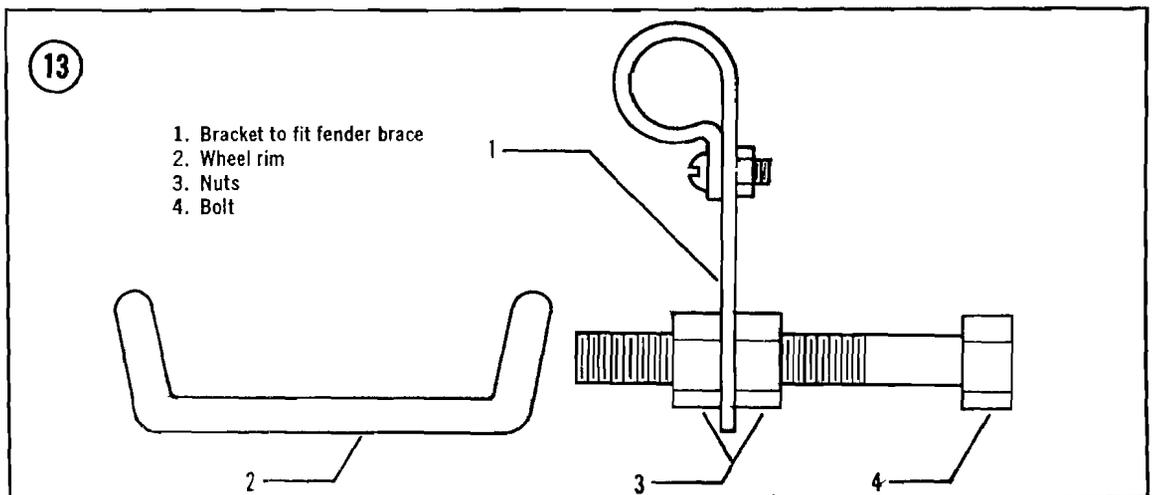
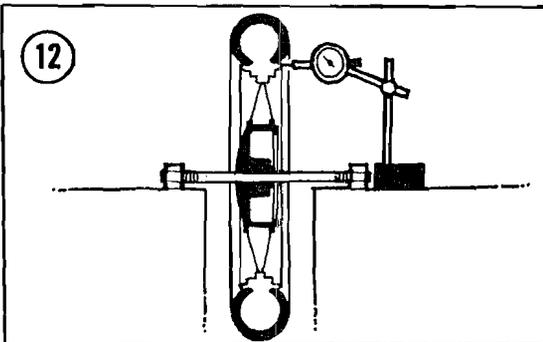
*Most professional motorcycle mechanics use and recommend the Rowe Products spoke wrench (Figure 10). It will not round off the square edges of the spoke nipples and fits virtually all sizes of spokes.*



**Spoke and Wheel Runout Adjustment**

1. To measure the runout of the rim, support the wheel in a stand as shown in Figure 11 or support the motorcycle so that the wheel being checked is free of the ground.

2. Install a dial indicator (Figure 12) or locally fabricated runout indicator (Figure 13). Adjust the position of the bolt until it just clears the rim.



3. Rotate the rim and note whether the clearance between the rim and the indicator increases or decreases. Mark the tire with chalk or crayon at areas where the clearance is large or small. Maximum runout on the edge and/or the face of the rim is 2.0 mm (0.08 in.).

4. To pull or "true" the rim, tighten spokes which terminate on the same side of the hub and loosen the spokes which terminate on the opposite side of the hub as shown in **Figure 14**. In most cases, only a slight amount of adjustment is necessary. After adjustment, rotate the rim and make sure that another area of the rim has not been pulled out of true. Continue adjustment and checking until runout does not exceed 2.0 mm (0.08 in.). Be patient and thorough, adjusting the position of the rim a little at a time.

#### NOTE

*If rims can not trued within 2.0 mm (0.08 in.) of edge or face runout, the rim is damaged and must be replaced. Unless you are experienced in wheel lacing, this task is best left to a dealer or motorcycle shop experienced in wheel repair.*

5. Always tighten spokes gradually and evenly in a crisscross pattern on one side of the hub then the other. One-half to one turn should be sufficient; do not overtighten.

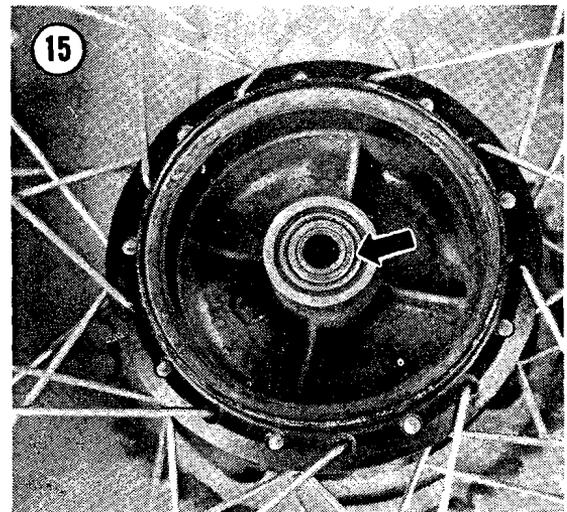
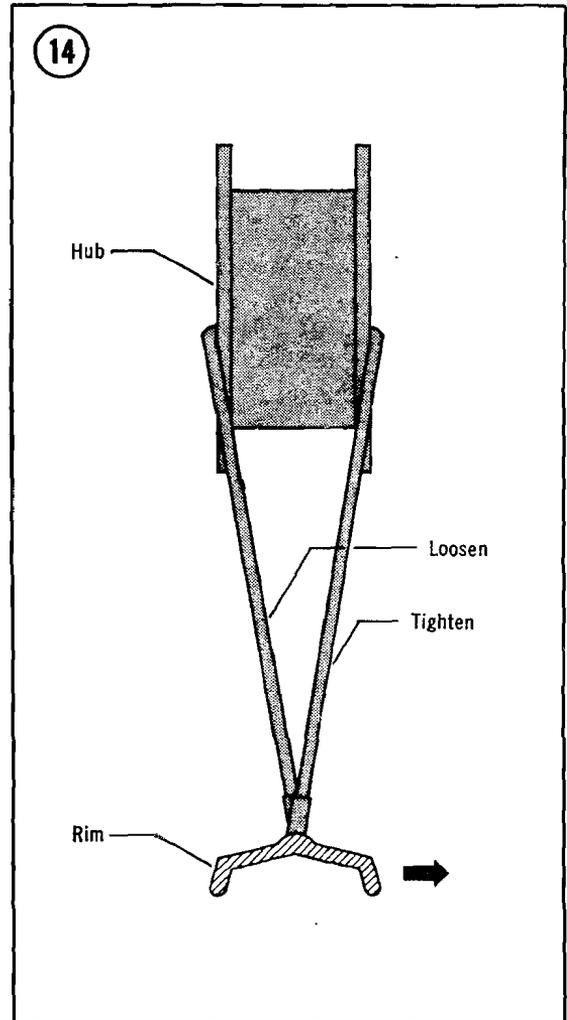
6. After tightening spokes, always check the rim runout to make sure that the rim has not been pulled out of true.

### Spoke Replacement

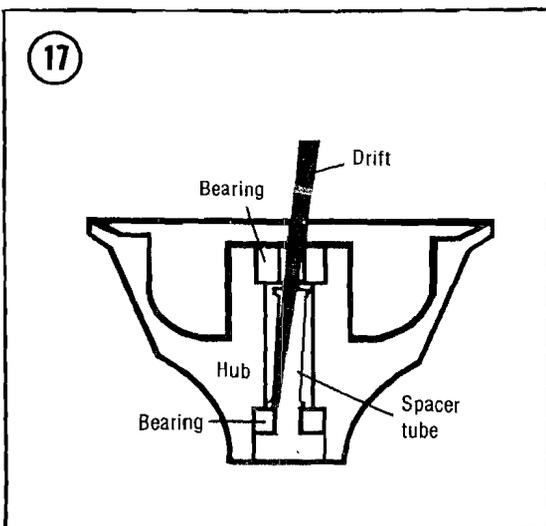
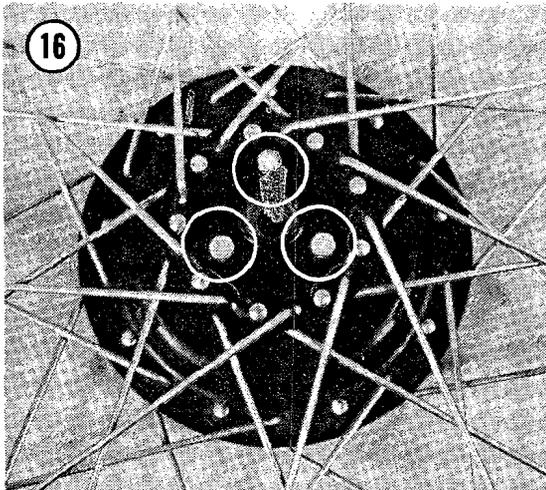
A stripped or broken spoke can usually be replaced with the tire still installed on the wheel, providing the spoke nipple is in good condition. If the nipple is damaged or more than 2 or 3 spokes need replacing, the tire must first be removed from the wheel. If several spokes need replacing, the rim is also probably damaged. Unless you are skilled in wheel lacing and rim replacement, this task may be best left to a dealer or motorcycle shop skilled in wheel repair.

To replace one or 2 damaged spokes with the tire still mounted, perform the following procedure.

1. Inflate the tire to at least 20 psi to help hold the spoke nipple in the rim.



2. Unscrew the nipple from the damaged or broken spoke. If the old spoke is not broken, press the nipple into the rim far enough to free the end of the damaged spoke. Take care not to push the nipple back into the rim. Remove the old spoke.
3. Trim the threaded end of the new spoke so that it is about 2 or 3 turns shorter than the old spoke. This permits the new spoke to stretch without the risk of puncturing the inner tube.
4. Install the new spoke into the hub and gently bow it so it can be inserted into the nipple.
5. Tighten the spoke nipple until the tone of the new spoke is similar to the other spokes in the wheel.



6. The tightness of the new spoke must be checked frequently. The spoke will stretch and must be retightened several times before it takes a final set. Make the first check after 30 minutes to one hour of riding.

## WHEEL BEARINGS

All models are equipped with 2 bearings installed in each hub. Each bearing is sealed on one side (Figure 15). A single grease seal is installed next to the bearing in each backing plate. If bearing replacement is required, fully sealed bearings are available from any good bearing specialty shop. Be sure you take your old bearing along to ensure a perfect match. Fully sealed bearings provide excellent protection from dirt and moisture that may get into the hub.

### Inspection

Support the motorcycle so the wheel being checked is off the ground. Steady the forks or rear suspension unit with one hand and rock the wheel side to side with the other hand. The movement of the wheel should be almost imperceptible. Any movement that can be seen or easily felt is an indication that the bearings are no longer serviceable and should be replaced.

If a dial indicator is available it can be used to measure the lateral play (bearing wear) in the wheel. With a dial indicator positioned against the rim edge, maximum allowable lateral play is 3.0 mm (0.12 in.).

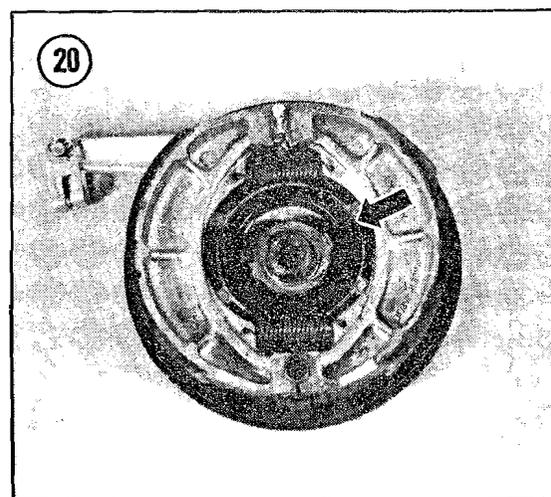
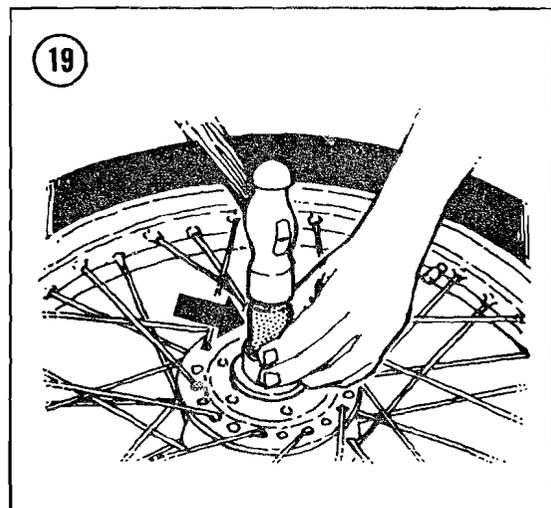
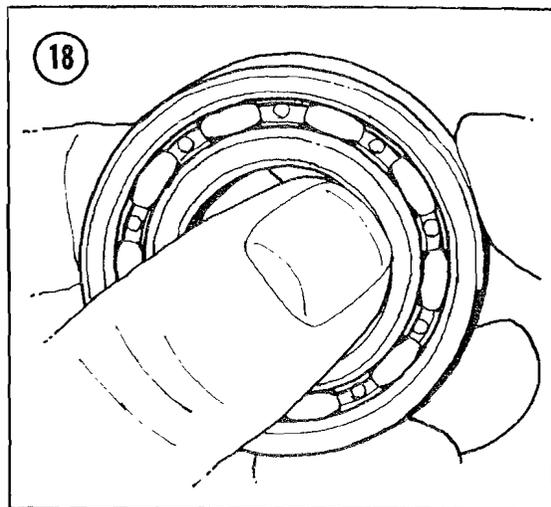
### Bearing Lubrication and Replacement

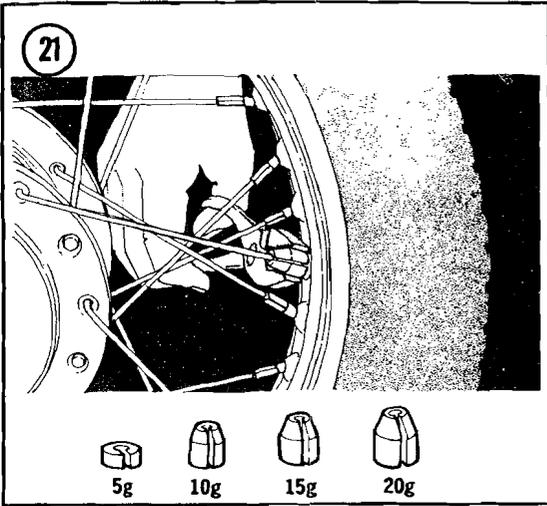
1. Remove the wheel to be serviced as outlined in Chapter Eight or Nine.
2. If front wheel hub bearings are to be removed, it is necessary to first remove the 3 bolts securing the bearing retainer (Figure 16) and remove the retainer.
3. To remove hub bearings perform the following:
  - a. Insert a long drift into one side of the hub. Position the spacer to one side so the drift can be applied to the inner race of the bearing (Figure 17).

- b. Tap the bearing out of the hub by working around the diameter of the inner race.
  - c. Remove the spacer and tap out the opposite bearing.
4. Thoroughly clean all bearing cavities with solvent and a clean rag. Do not clean sealed bearings in solvent.
  5. Rotate the bearings by hand (**Figure 18**) and check for roughness and radial play (some axial play is normal). The bearings should turn smoothly. Replace any bearings with tight spots or excessive play.
  6. If bearings are serviceable, pack them with a good grade of waterproof grease, such as boat trailer wheel bearing grease. To pack the bearings, spread some grease in the palm of your hand and scrape the open side of the bearing across your palm until the bearing is packed completely full of grease. Spin the bearing a few times to determine if there are any open areas and repack if necessary.
  7. To install bearings in the hub perform the following:
    - a. Lightly grease the outside of each bearing. Use a drift or suitable sized socket and carefully tap one of the bearings into the hub bore (**Figure 19**). Ensure that the bearing is installed with the sealed portion facing outward.
    - b. Lightly grease each end of the spacer. Invert the hub and set the spacer in place.
    - c. Install the other bearing on the axle and insert the axle through the spacer then through the bearing that has been installed.
    - d. Carefully tap the other bearing into the hub bore, tapping evenly around the outer race.
    - e. On front hubs, install the bearing retainer and secure the retainer with 3 bolts.
  8. Lightly grease the outside of a new oil seal and install the seal in the brake backing plate (**Figure 20**).
  9. Install the front or rear wheel.

### WHEEL BALANCE

An unbalanced wheel can adversely affect the handling of the motorcycle as well as make the machine very uncomfortable to ride,





particularly on high-speed sections of enduro or desert races.

Wheels are relatively easy to balance without special equipment. Most dealers or motorcycle accessory shops carry an assortment of balance weights that can be crimped on the spokes. Buy a couple of each weight available (Figure 21). If the weights are unused they can usually be returned.

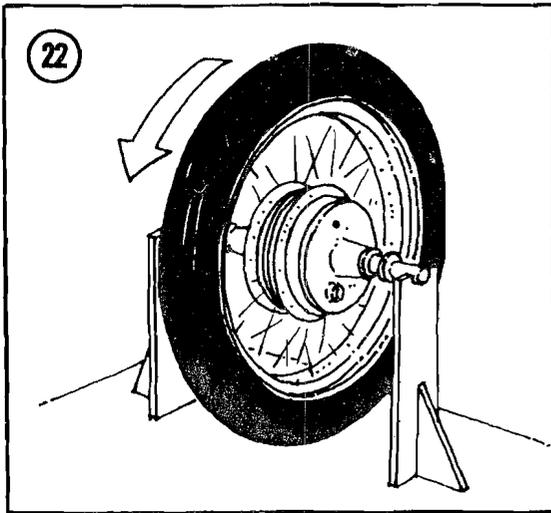
Many dealers now have high-speed spin balancing services available. This type of balancing is very fast and accurate, however, it is generally better suited to road machines and may not be necessary for most PE owners.

Before attempting to balance a wheel, make sure the wheel bearings are in good condition and properly lubricated and the brake does not drag. Before the rear wheel can be balanced, the drive chain must be removed.

1. Rotate the wheel slowly and allow it to come to rest by itself. Make a chalk mark on the tire at the 6 o'clock position and rotate the wheel as before, several times, noting the position of the chalk mark each time the wheel comes to rest. If the wheel stops at different positions each time, the wheel is balanced.

**NOTE**

*If desired, the wheel may be removed from the motorcycle and supported on a stand as shown in Figure 22.*

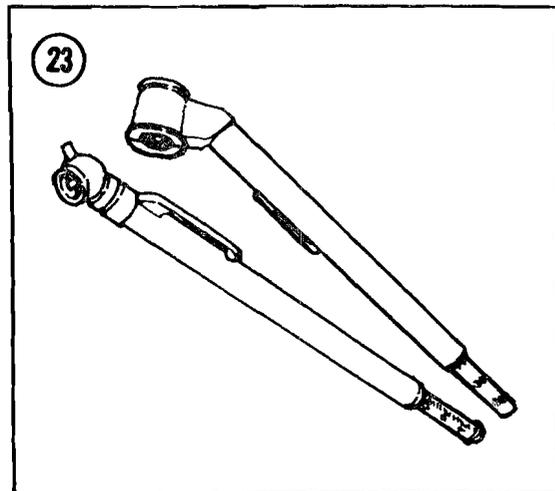


2. If the chalk mark stops at the same position—6 o'clock—each time, add weight to the 12 o'clock position until the chalk mark stops at a different position each time.

3. Install the wheel, if removed, and test the motorcycle on a smooth, straight road. Repeat balance procedure if necessary.

**TIRES AND TUBES**

Tire pressures should be checked and adjusted frequently. Use an accurate tire gauge and check the pressure when the tires are cold. The type of pressure gauge shown in Figure 23 is generally preferred over the "dial" type gauge since the indicator does not automatically return to zero when the gauge is removed. Standard tire pressure for all models is 10-14 psi (0.7-1.0 kg/cm<sup>2</sup>).



The full-knobby tires on the PE models should be changed whenever the edges on the knobs are worn sufficiently to limit traction. Riding style and different types of terrain naturally affect the overall wear of knobby tires. Type and frequency of tire replacement is largely a matter of personal preference, however, tires at least as good as original equipment should be installed to maintain proper traction and handling.

Tire repair should be limited to replacing a defective inner tube. Most dealers and professional mechanics advise against patching a tube except in an emergency. Considering the amount of work involved in changing an inner tube, it is often pointless to install a repaired tube only to have to remove it again should the patch fail.

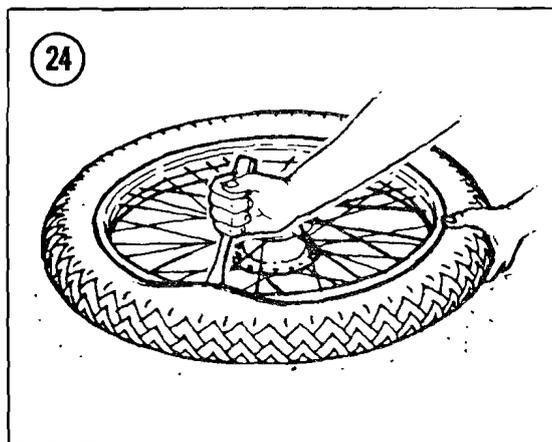
### Tire Removal

1. Refer to Chapter Eight or Nine to remove the front or rear wheel.
2. Unscrew the valve core from the valve stem and deflate the tire.
3. Unscrew the nut securing the rim lock. Back the nut off to the end of the rim lock bolt, but do not remove the nut.
4. Press the entire bead on both sides of the tire away from the rim and into the center of the rim.
5. Lubricate both beads with soapy water or rubber lubricant.
6. 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 24**).
7. Insert a second tire iron next to the first iron to hold the bead over the rim. Then work around the tire with the first tire iron, prying the bead over the rim (**Figure 25**). Be careful not to pinch the inner tube with the tire irons.
8. Remove the valve from the hole in the rim and remove the tube from the tire.

#### NOTE

*Step 9 is required only if it is necessary to completely remove the tire from the rim, such as for tire replacement.*

9. Insert a tire iron between the back bead and the side of the rim that the top bead was pried



over (**Figure 26**). 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 round as with the first.

### Tire Installation

1. Inflate the tube just enough to round it out.
2. Place the tube inside the tire. Position the back side of the tire into the center of the rim and insert the valve stem through the rim hole (**Figure 27**). The lower bead should go into the center of the rim with the upper bead outside the rim.
3. 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 28**).
4. Press the upper bead into the rim opposite the valve (**Figure 29**) and work around the tire in both direction with your hands. Use a tire iron for the last few inches of the bead (**Figure 30**).
5. Wiggle the valve to be sure 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.
6. 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 the tire to pressures recommended in **Table 1**.
7. Screw rim locknut down against the rim. Tighten nut snugly, but do not overtighten.
8. Refer to Chapter Eight or Nine and install the front or rear wheel.

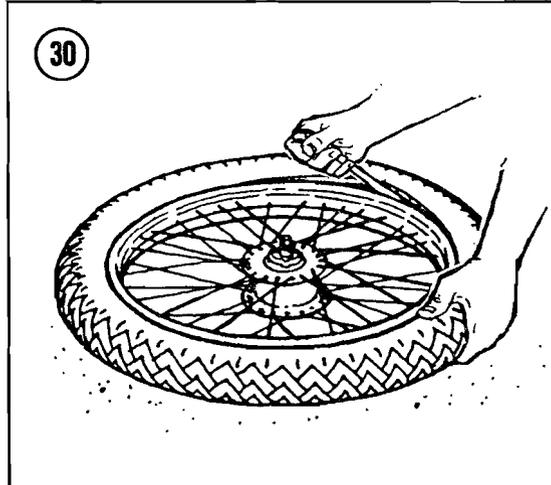
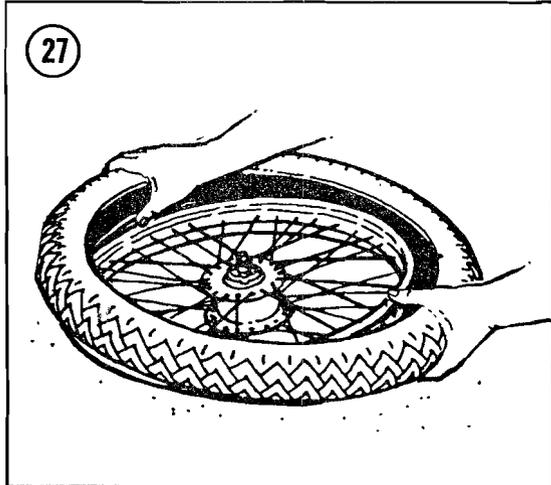
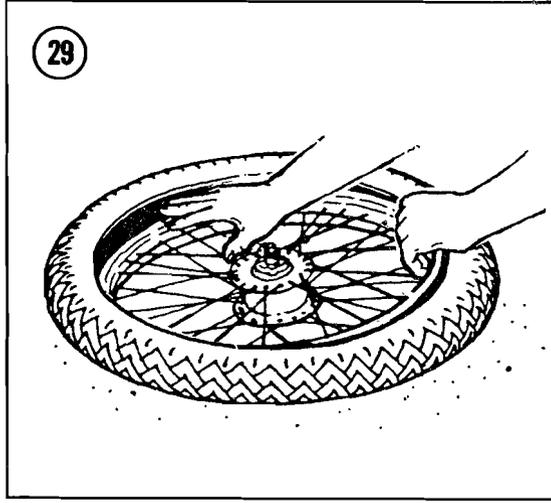
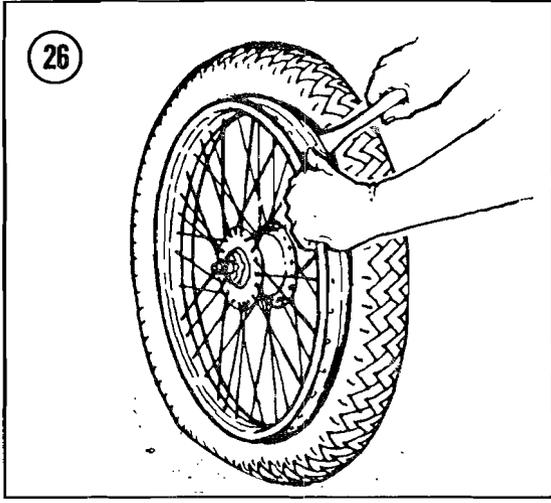
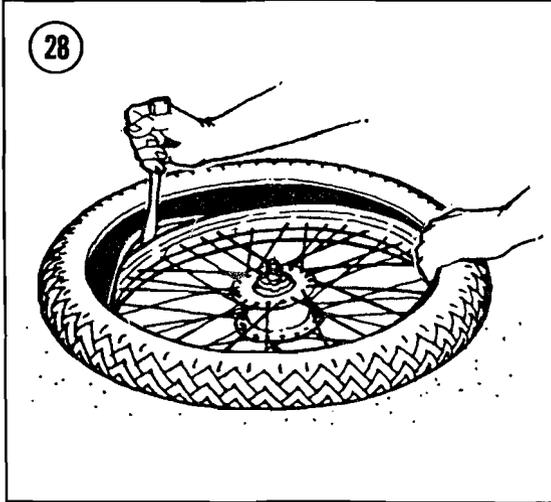
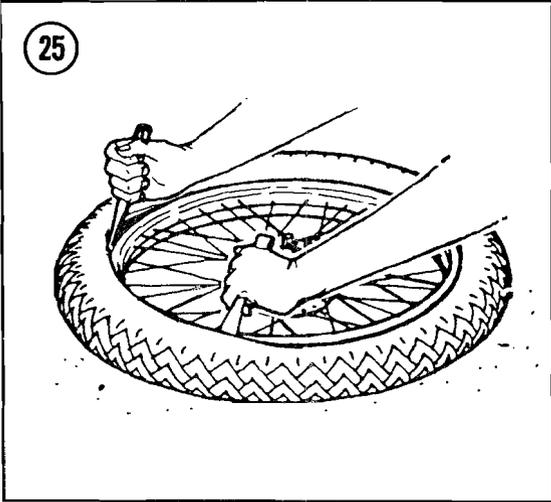


Table 1 RECOMMENDED TIRE SIZES\*

Model	Tire Size
PE175	
Front	3.00-21
Rear	4.00-18
PE250	
Front	3.00-21
Rear	4.50-18
PE400	
Front	3.00-21
Rear	5.10-18

\*Recommended tire pressure for most type of terrain is 10-14 psi (0.7-1.0 kg/cm<sup>2</sup>).

Table 2 BRAKE SPECIFICATIONS

	Standard	Service limit
Front and rear brake drum diameter		
PE175 models	130 mm (5.12 in.)	130.7 mm (5.15 in.)
All other models	150 mm (5.91 in.)	150.7 mm (5.93 in.)
Front and rear brake lining thickness		
Wear limit (all models)		1.5 mm (0.06 in.)

## CHAPTER ELEVEN

### PERFORMANCE IMPROVEMENT

The Suzuki PE enduro machines have proven themselves as serious race bikes in high caliber competition by winning AMA national Enduros and topping their class in Two-Day Qualifier events. Many riders have found that the PE Suzukis are cooperative in competition, and can be race prepped and still ridden on weekends as an excellent trail bike. Although the bike is transformed into a purebred competition tool with the following modifications, it is still easily rideable by less experienced enthusiasts without any added difficulty.

The modifications covered in this performance chapter include information from two different sources. The first section deals with the changes performed on production machinery by Team Suzuki Enduro while preparing their bikes for national competition (Figure 1). The second section covers a complete bike modification by DG Performance Specialties, one of the leaders in motocross and enduro hop-ups.

The performance results of either modification method are extremely beneficial. Each hop-up results in a bike that is equal to (or better than) the national caliber factory race bikes.

Throughout these modifications we will be dealing with four different models: the 1978

PE175-C and PE250-C and the 1979 PE175-N and PE250-N. Unless otherwise specified, each modification applies to all four models.

When making any modifications to the bike, be sure to go slowly and carefully. Top caliber enduro mounts such as the PE Suzukis should be put together properly to insure that they will finish—repeatedly.

#### CAUTION

*Clymer Publications cannot guarantee performance, or be responsible for damage to the motorcycle or personal injury resulting from the performance modification procedures given in this manual. In addition, any modification you make may void all warranties regardless of the motorcycle's age or mileage.*



## SUSPENSION

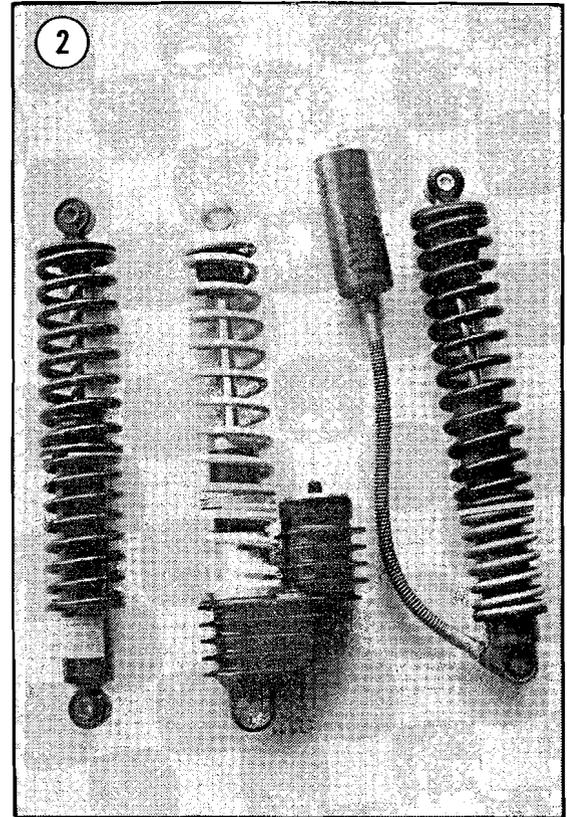
The big key to a good riding enduro or trail bike is suspension. If the bike is able to smoothly work its way down a trail, it puts less stress and strain on the rider and the engine, allowing both to work less, yet go faster. The first place to start improving your PE is in its suspension.

### Rear Shocks

For most riders the standard rear shocks are too soft and compress too quickly when a bump is hit. Team Suzuki Enduro uses two brands of shocks in place of the standard Kayaba units (**Figure 2**). Works Performance Products' Pro Crossers and Ohlin Shocks are used in place of the stock Kayaba units. Both of the aftermarket shocks are 15.5 inches in eyelet to eyelet length, with a 5.5 inch shock stroke. This results in 9 inches of rear wheel travel. Both sets of shocks perform very well and are strongly recommended as the biggest improvement for the PE. Since the shocks are slightly longer than the stock units, they help the bike turn quickly in the tight woods by altering the steering angle slightly.

Before removing your standard shocks, be sure that the bike is propped up on a crate or otherwise has the rear wheel suspended in air so that the motorcycle will not collapse when you take the standard units off. When installing the accessory shocks, be sure to use the nuts and bolts provided, and grease all the pivot points as instructed, so that there is no shock bind.

The rubber O-ring brake cable stay on the left shock should be reinstalled with the accessory shocks (**Figure 3**). This protective rubber band insures that the brake cable doesn't get caught in the rear knobby during full rear suspension compression. Some riders are installing the RM125-C swingarm on the PE175 and RM250-C swingarm on the PE250. This swingarm is made of aluminum and is stronger than the stock unit. The RM series swingarm reduces rear frame flex and allows the machine to be steered more precisely. There are also aftermarket swingarms (**Figure 4**) available that will fit the PE Suzukis.

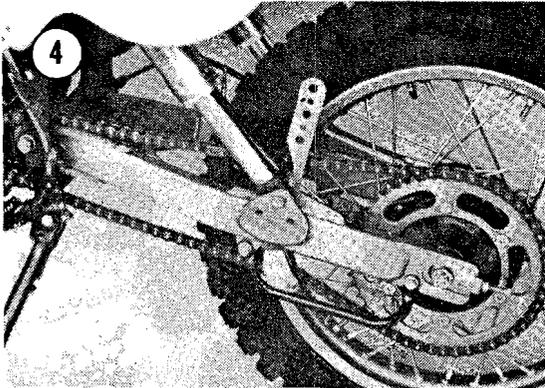
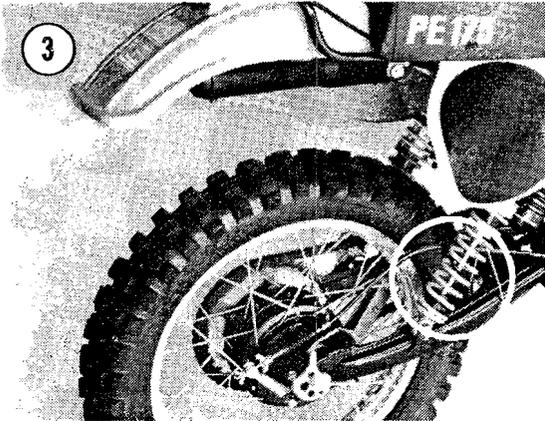


### Front Forks

There is a variety of fork kits available for the PE models (Al Baker's FMF, Terrykit, Number One, S&W) but many riders are getting good results from the stock units with low cost improvements.

The forks must be removed from the machine to be properly serviced. The speedo and front brake cable should be disconnected (1 and 2, **Figure 5**). The front axle should be removed (3, **Figure 5**) and the wheel taken off. Before loosening the triple clamp bolts, the fork cap top (4, **Figure 5**) should be broken loose with the Allen wrench provided in your tool kit. The triple clamp bolts (5 and 6, **Figure 5**) can now be loosened and the forks will slide out.

After removing the fork caps, extract the springs and topping sleeve and drain out the oil. Pump the fork repeatedly to be sure all the trapped oil has drained. Set the forks upside down in a bucket for 20 minutes to drain the oil film off the inner walls of the fork tube.



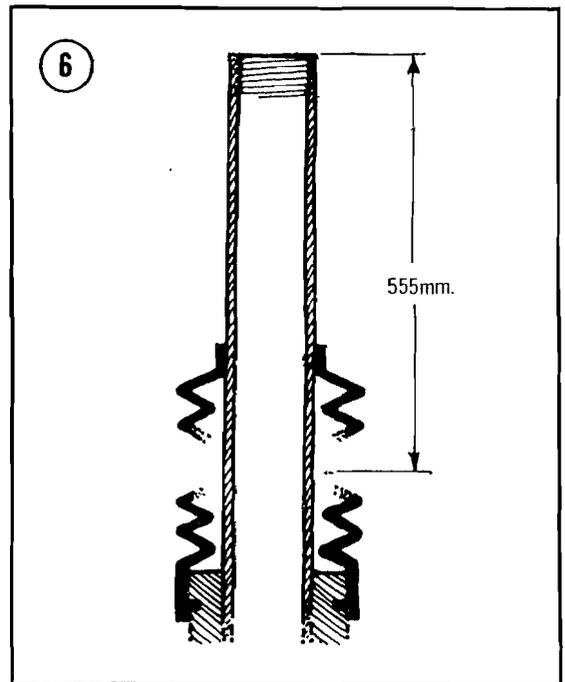
Extend the fork completely and install Bel-Ray LT-200 shock oil. The level should be 555 millimeters (21-3/4 inches) from the top of the tube. Use a wooden dowel or wooden yardstick to measure (Figure 6). Reinstall the springs and topping sleeve and add air fork caps made for the RM-C model (RM125 caps on the PE175 and RM250 caps on the PE250) in place of the standard fork caps. The Suzuki air caps, available at your dealer, or an accessory aftermarket air cap, will work.

These caps are used only to vent built-up pressure from the forks. After reassembling the forks and riding for approximately half an hour, depress the valve stem in the caps to release any air pressure. Do not install any air in the fork unless you are anticipating extremely rugged terrain such as the harsh desert regions.

### ENGINE MODIFICATIONS

#### Exhaust System

Although the PE has an extremely efficient exhaust system, it can be modified safely to allow the engine to perform better. These modifications do not affect the silencer's spark



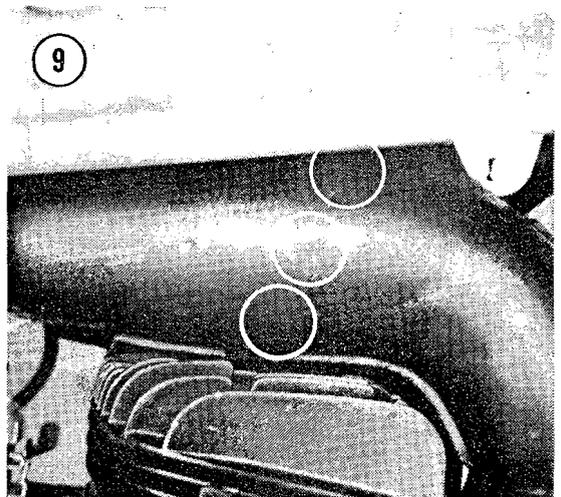
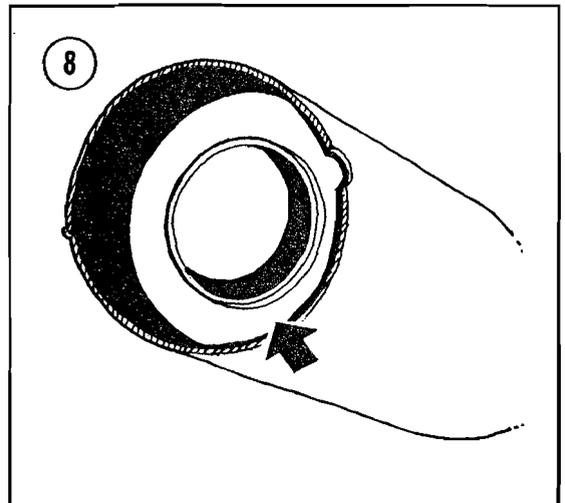
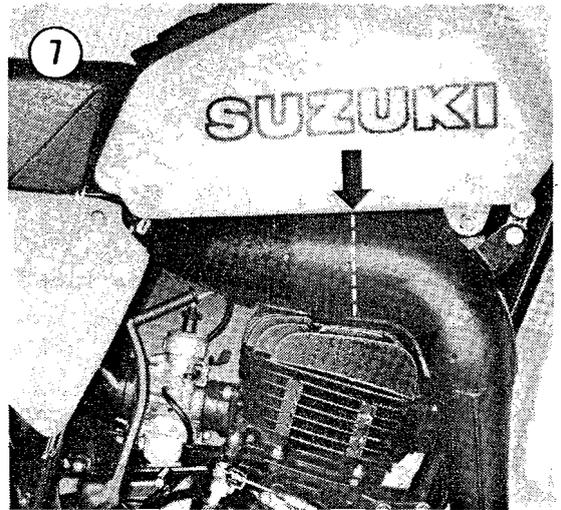
arrestor capabilities. A noise level increase of one decibel results, which is not a significant increase and still allows the machine to easily pass the AMA's official sound test for enduros and Two-Day Qualifiers.

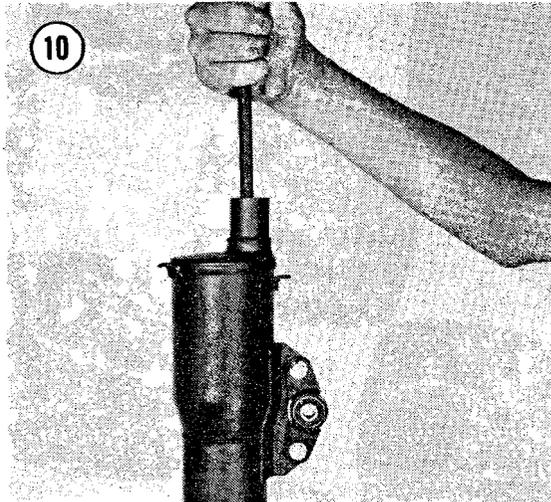
The only exhaust pipe which needs modification is found on the PE175-C. Approximately three inches into the center exhaust chamber (Figure 7) resides a large flat washer with a 20 millimeter diameter hole in its center (Figure 8). By cutting the pipe in half with a hacksaw you can gain access to this flat washer. Using a sharp blade chisel, hammer the washer loose by chiseling the spot welds off that are holding the washer to the pipe wall. These spot welds can be found on the outside of the pipe wall by feeling for slight dimples or impressions in the pipe (Figure 9). The spot welds that correspond to the flat washer are the only ones that require chiseling. The other spot welds hold the screen mesh to the inside of the pipe and should not be broken loose. When all the spot welds holding the washer in place are broken loose, the washer can then be removed.

The pipe must then be welded back together. A local welder can perform this. Request that it be gas welded, using a number 7 rod, 1/16 in. thick. The torch tip should be either a Victor Number 1 or a Smith Number 201. Be sure the welder fills any holes that might have been punched in the pipe while the spot welds were broken loose. The pipe can now be painted black to cover the welds and reinstalled on the machine.

### Exhaust Silencer

On both PE175 models, remove the spark arrestor by taking off the two rear springs and loosening the seat/silencer bolt. Remove the 10 millimeter head screw in the rear cone; then slide the complete spark arrestor component package out of the rear of the silencer core. Stand the spark arrestor on a bench with the inlet side up. Slide a flatnose chisel down into the restrictor plate which is spot welded to the silencer core. Hit the chisel with a hammer (Figure 10) until the spot welds are broken and the flat washer falls out



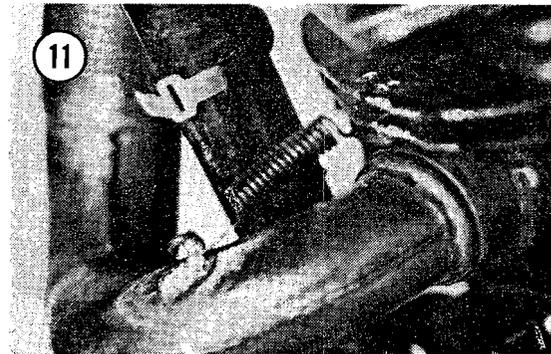


of the exhaust end of the silencer. Reinstall the complete spark arrestor component and attach it to the end of the pipe.

On both PE250 models, this restrictor plate is located on the end of the spark arrestor component package. Remove the packing from the silencer cone by taking out the 10 millimeter head screw. The restrictor plate is located at the very end of the silencer core, and is about 1 1/2 inches in diameter. Saw off this plate and reinstall the unit.

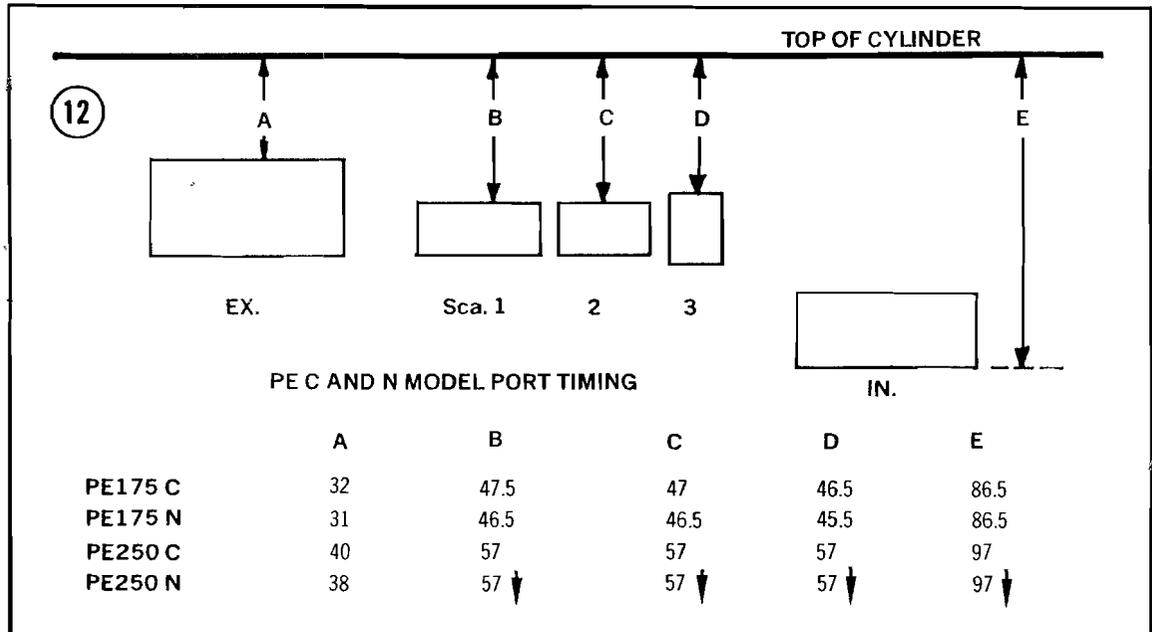
Neither of these modifications affect the silencer's spark arrestor capabilities.

Crimp the two exhaust pipe header and silencer spring hooks closed with a pair of pliers until the hook opening is collapsed (Figure 11). Some riders also wrap duct tape around the exhaust springs to quiet down spring rattle.



**Cylinder**

Most cylinder modifications should be done by a firm specializing in two stroke porting work (Al Baker, DG etc.) however, many established porting firms can sufficiently perform the work. By referring to the porting height specifications (Figure 12) have the porter match those dimensions on the chart that refer to your machine.



These specifications vary from the stock cylinder measurements. The exhaust ports on all the machines are raised over the standard mark. Using these figures your motor will be “blueprinted” and modified to match racing specifications. When the cylinder is reinstalled, be sure that the base gasket is trimmed properly so that none of the transfer ports are restricted. The gasket should be put up against the cylinder base before assembly and then trimmed if necessary to allow complete port flow.

### Cylinder Head

Many riders are increasing the compression of their cylinder by installing the RM250-C2 head on the PE250-C and PE250-N. DG Performance Specialties also manufactures a cylinder head (**Figure 13**) which raises compression and allows for quicker heat dissipation.

### Carburetion

The PE175-C is equipped with a 32 mm Mikuni carburetor that should be replaced with a 34 mm Mikuni (**Figure 14**) which comes stock on the PE175-N. The following jetting specifications are recommended as a starting point:

- 200 main jet
- R-4 needle jet
- 6DP-17 needle (middle notch position)
- 27.5 or 30 pilot jet

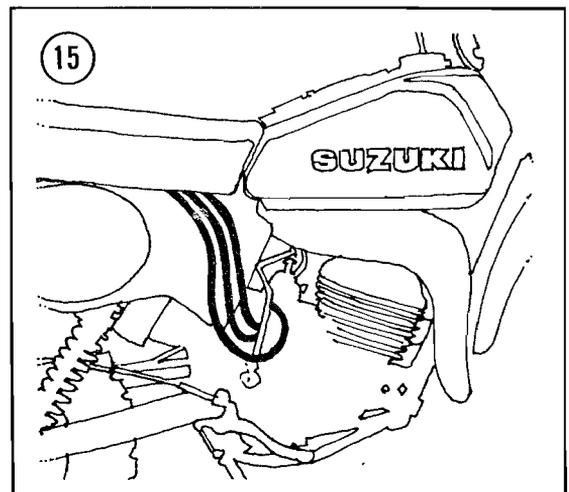
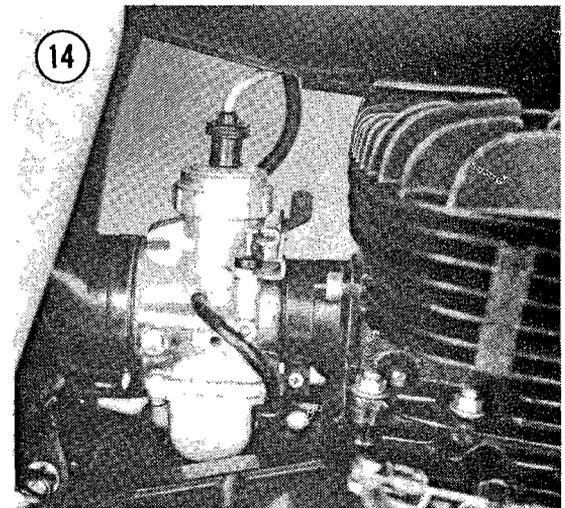
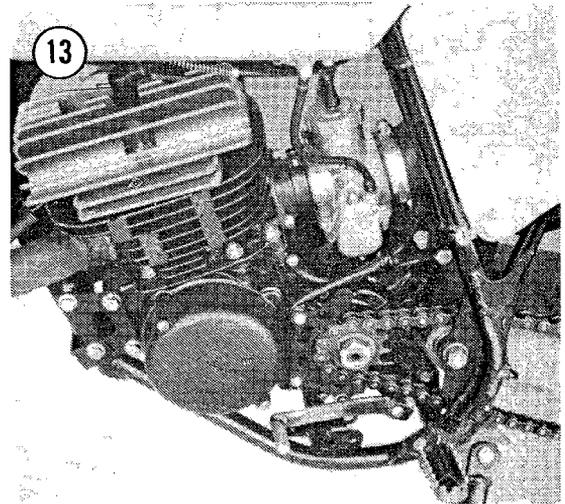
Both models of the PE250 retain the stock carburetor with the following suggested starting jets:

- 260 main jet
- 6DR-17 needle (middle notch position)
- 45 pilot jet

All carburetor overflow hoses are replaced with a longer hose that is routed from the carburetor up to the intake area of the airbox (**Figure 15**) so that water cannot seep into the carburetor during deep stream crossings. An accessory fuel line is also used and is hose clamped to the petcock and carb spigots.

### Gearbox

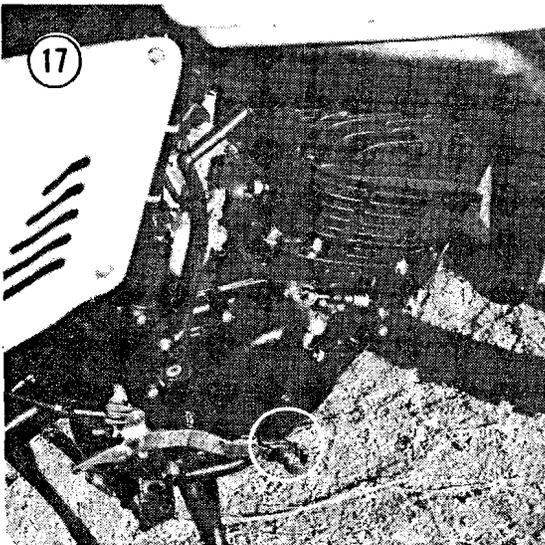
The stock PE175 gearbox is used by Team Suzuki Enduro, after it has been checked for



proper tolerances and clearances. Some riders have used the RM250-C-2 first gear in the PE250 for very tight woods riding. This change doesn't require any modification to other gears, can be done by your dealer and results in a closer ratio between first and second gear on the PE250. The Team Suzuki Enduro riders use Suzuki 80 gearbox oil in all their PE machines.

### Drive Train and Gearing

The PE175-C is equipped with a 12 tooth counter and 48 tooth rear sprocket. The rear should be changed so that there is a 12/46 combination, identical to the PE175-N. This rear sprocket is available from your dealer. The PE250-C and PE250-N retain their stock 13/52 gearing ratio. Stock sprockets are used and checked regularly for wear, irregular tooth pull and tightness.



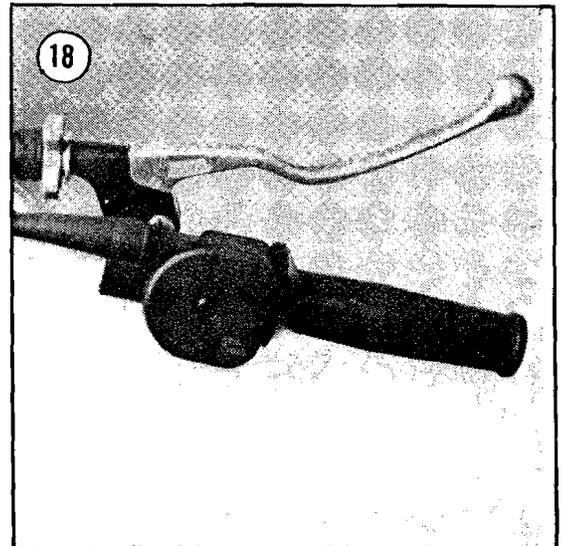
The Suzuki team uses three different chains on their machines, all equal in life and strength. Chains that are recommended include the Jwis RX104, DID UB, and Duckworth 525 HLX (the latter primarily for the PE250 models).

### Engine Levers and Controls

Team Suzuki Enduro uses Malcolm Smith Racing's folding shift lever (Figure 16) and brake pedal (Figure 17). These units are hinged and reduce the chances of breaking off when hit by a tree or rock, and will bend rather than break in a normal fall. The weld-on lever can be installed by any local welding shop by cutting off the existing pedal and installing the Malcolm Smith unit, retaining the original total pedal length. The shift lever slides onto the stock PE shift shaft.

Terrycables are used for the throttle, clutch, and front brake cables after the stock items are worn down. These units are lightweight, teflon-lined and offer smooth precise movement.

The stock handlebars can be used, along with a variety of accessory bars on the market. The Team Suzuki Enduro riders shorten their bars to a width of 31 inches. Magura Six-Day levers (Figure 18) are used, along with a



Magura straight pull throttle (**Figure 18**). Stock Suzuki grips can be used, or replaced by Oury or a comparable soft grip. Safety wire is used to insure that the grips stay on the bars during rainy or muddy events (**Figure 19**).

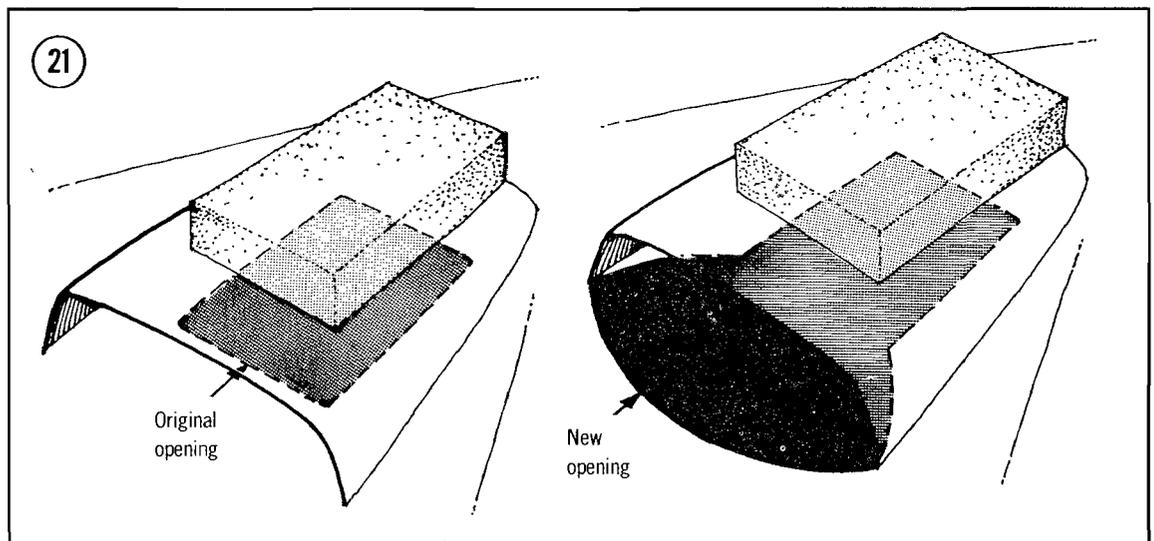
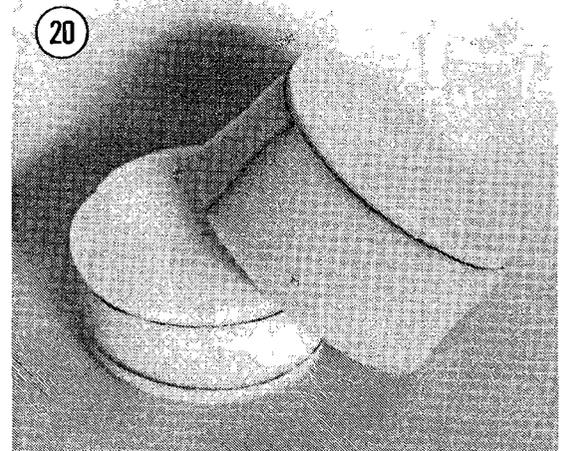
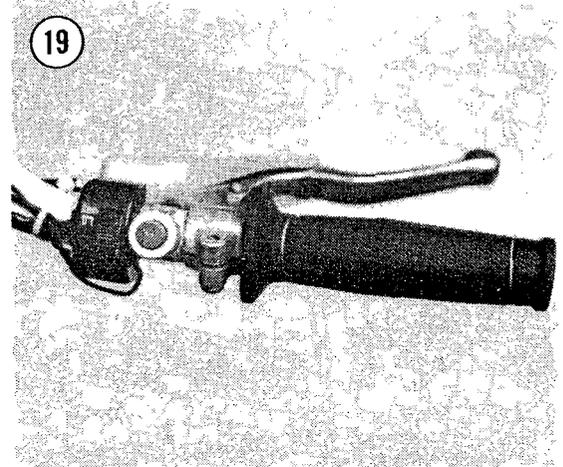
### Airbox and Filter

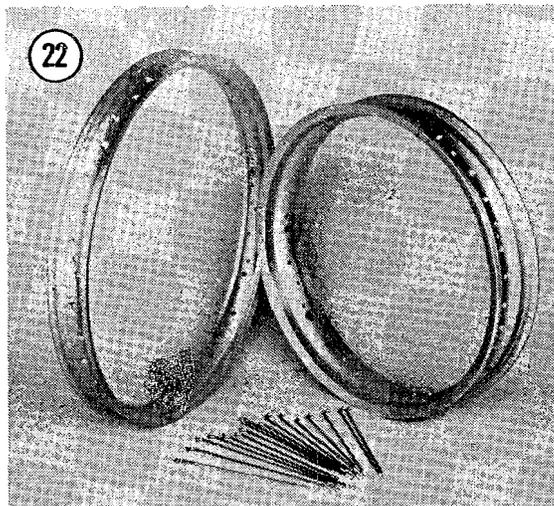
There are two filters currently being used by the Team Suzuki Enduro riders, and both are the dual element type (**Figure 20**). These twin element units should be cleaned after every ride and liberally greased and oiled before reassembly.

The PE250-N air filter splash guard should be opened up to allow better air intake flow. This can be accomplished with tin snips. The rear inch of the rubber air scoop should be removed, along with an inch of the metal top (**Figure 21**) resulting in an almond-shaped hole.

### WHEELS AND TIRES

The stock Tagasako rims and spokes can be used throughout the year by the serious competitor, but many riders are going to stronger rims. Team Suzuki Enduro uses Sun rims (**Figure 22**) installing a 185 x 21 on the front and a 215 x 18 on the rear. The PE 250 receives a 185 x 21 up front and a 215 x 18 on





the rear. Stock spokes and spoke nipples are used. Heavy-duty inner tubes and Metzeler tires are installed.

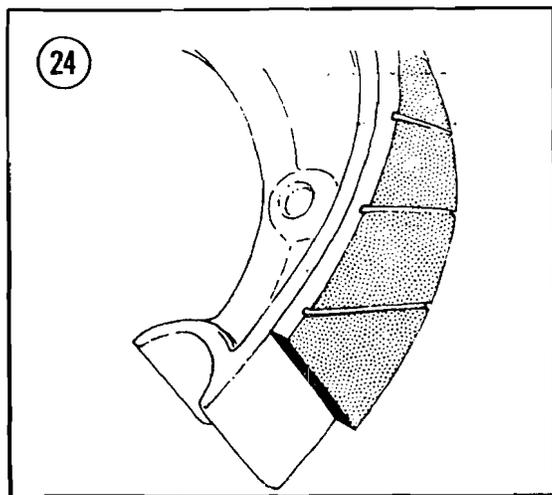
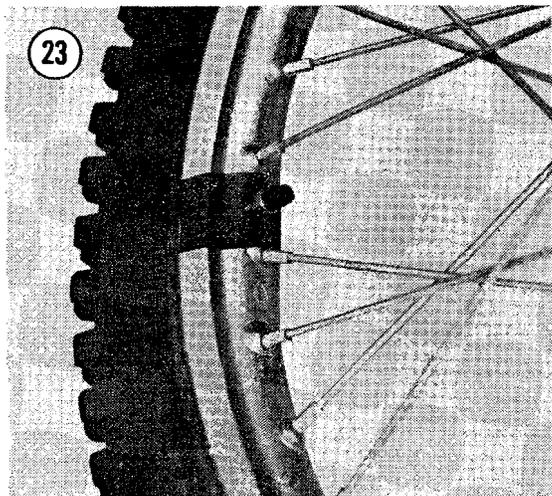
When the new rims are laced up, special care should be taken during break-in. Spokes should be checked every ten minutes for the first hour of riding, until they have seated properly. Sun rims come with retaining darts that are located inside the rim wall to reduce tire slippage under hard breaking or acceleration. Many riders run only half the usual amount of darts in the front wheel, and about 2/3 the normal amount in the rear.

For quick tire changes, as in ISDT competition, one side of the rim wall can be turned down on a machinist's lathe. The front wheel rim can be reduced 0.08 inch on the rim radius. This should be done on the backing plate side of the rim (right side). The rear should also have 0.08 inch of its radius removed, on the side opposite the rear sprocket (right side). This allows the rider to quickly change a tire using only one tire tool and his hands, since the tire will slip over the rim wall and break the bead much easier and quicker. A minimum of 10 pounds of tire pressure is required when competing with the turned down rims.

Most riders also note the location of the valve stem by painting a black band on the rim (**Figure 23**). This allows you to locate the valve stem hole in the rim. This hole can be enlarged to allow easier valve stem installation.

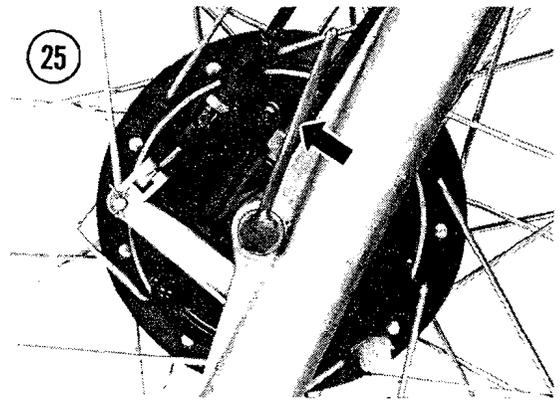
## BRAKES

The stock PE brakes can be used, but serious competitors are using aftermarket brake shoes with a slightly softer compound and stronger braking properties. The Team Suzuki Enduro riders use Aljo brake shoes on their machines after the stock shoes wear down. All brake shoes receive grooves to reduce fade in continual water crossings (**Figure 24**). This can be accomplished on both stock and accessory brake shoes by cutting grooves 1/16 inch deep, an inch apart, cut on an angle starting from the hub side and bending in the direction of wheel rotation. This helps to disperse water.



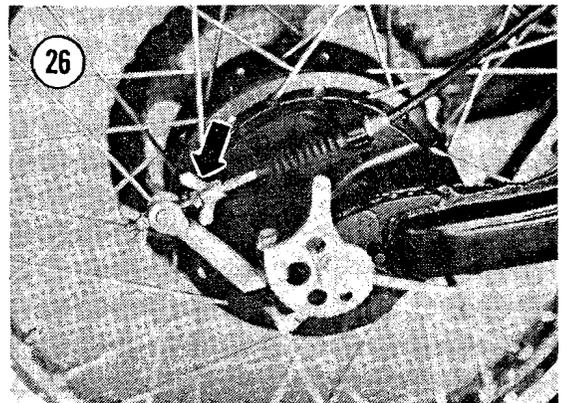
## AXLES

To assist in smooth rolling and easier wheel changes, remove the stock axles and check them for roundness and burrs. Sand down high spots that can interfere with bearing clearances by hand with a fine grit sandpaper (No. 200/220). The PE175-C and PE250-C axles can be shortened 1/2 inch, and should receive a 1/4 inch thick 3 inch long grab tab (Figure 25). This tab or handle can be welded to the existing axle, using the axle hole as a mounting point. The PE175-N and PE250-N come standard with axle grab tabs.



## REAR BRAKE CABLE

On the rear brake cable, a large wingnut (Figure 26) is threaded onto the end of the cable before the actuating barrel hole. This wingnut is used so that the rear brake can be tightened without having the cable twist. The wingnut hits the backing plate, stopping cable rotation.



## TIRES

Most enduro riders are using Metzeler or Dunlop tires. The standard IRC tires on the PE can be used until worn, and then should be replaced with other units. Other good tires include Pirelli Garacross and Pentacross models, along with Barum ISDT tires. Before entering an event where a tire change is probable, many riders take brand new tires and repeatedly install and remove the tire from the rim to break-in the tire for fast and easy changes.

## PLASTICS

### Fenders

The standard rear fender is used, and reinforced by attaching two plastic tie-straps from the fender to the rear frame loop. The front fender on both the PE175 and PE250 is replaced with a Hoss Duckbill fender (Figure 27) or equivalent that gives the rider more splash protection when going through water or mud.

### Sidepanels

DG Performance Specialities FIM style panels are installed, using the two stock mounting bolts. Two plastic tie-straps are employed to secure the side panels to the frame (Figure 28). These tie-straps hold the side panel to the upper frame loop located underneath the seat.

### Headlight

There are a lot of electrical connections found behind the headlight, yet the design doesn't allow quick access. To solve this make three small one inch wide aluminum brackets, bent into an L-shape. These brackets are pop-riveted to the headlight bulge, and the number plate is then riveted to the bracket (Figure 29). The entire assembly is then strapped to the fork legs. To quickly remove the entire headlight, simply cut the plastic straps off.

DETAIL IMPROVEMENTS

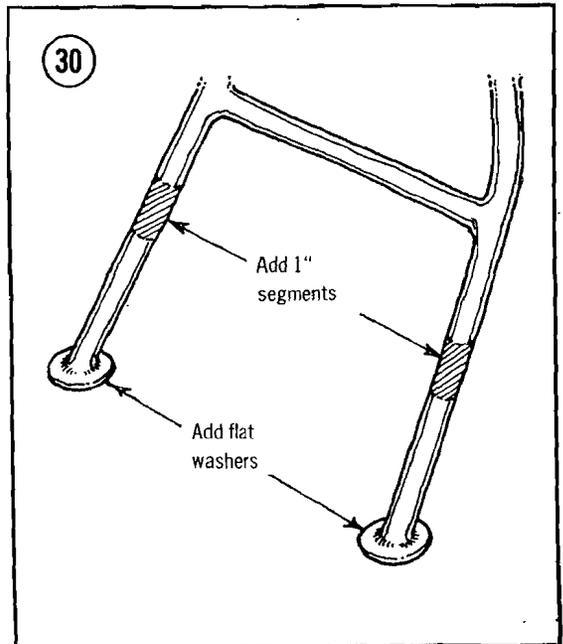
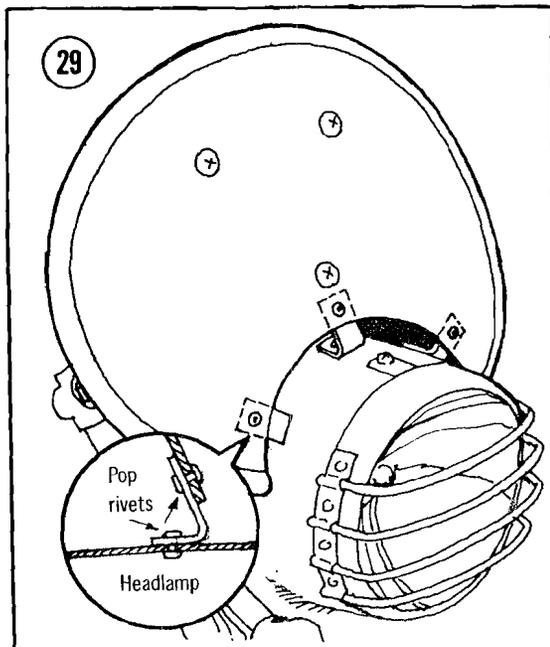
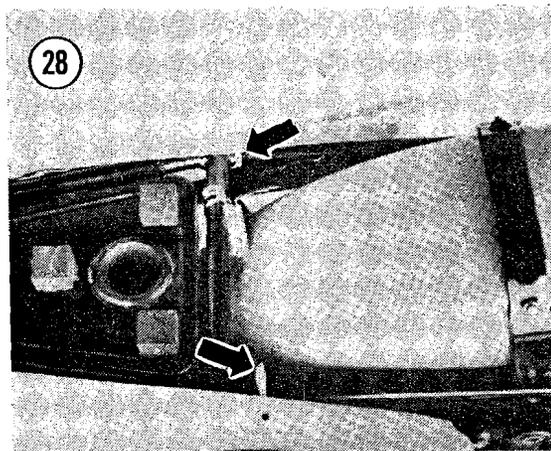
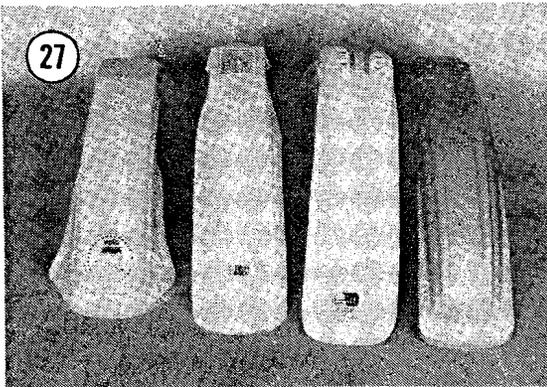
Many of the modifications performed by the Team Suzuki Enduro riders come under the classification of "details," or small changes on a variety of parts to achieve an overall reliable mount. Many of these changes can be done with little or no cost and most parts are available through your Suzuki dealer.

Discard the footpegs from the PE175-C and PE250-C and install RM250-C footpegs which have larger teeth and offer better boot traction. Bolts with locking nuts should replace the standard footpeg pins.

Both the PE175 and PE250 have accessory centerstands available. Due to the suspension changes, the centerstand should be lengthened one inch (Figure 30). Large flat washers can be welded to the bottom of the centerstand to eliminate sinking in soft dirt.

The rear taillight bulb (a 5 watt unit) should be replaced with a 10 watt bulb (Part No. 09471-06007). This will eliminate electrical surging problems and solve burnouts.

Although the stock chain rollers are used by the Suzuki Team, accessory rollers can be used. The needle bearing type roller is the most efficient. All rollers should be relubed after every ride.



Plastic tie-straps are used throughout the bike. In stock trim the machine comes with soft steel wraps which are dipped in plastic. Over a long period of time these ties can sever electrical wires. They should be replaced with soft plastic tie-straps (Figure 31) after the strap's sharp edges have been sanded down smooth.

A route card holder is installed on the gas tank (Figure 32). The Suzuki Team uses the Husqvarna Route Card Holder. There are many others also available (Hi-Point, Clairmont, etc.).

The Team also uses a Countdown Engineering timing system, a clock and route scroll holder contained in a sturdy blue plastic box (Figure 33). The countdown unit is one of the most successful timing pieces and has proven its durability under the pounding of the best enduro riders in the country.

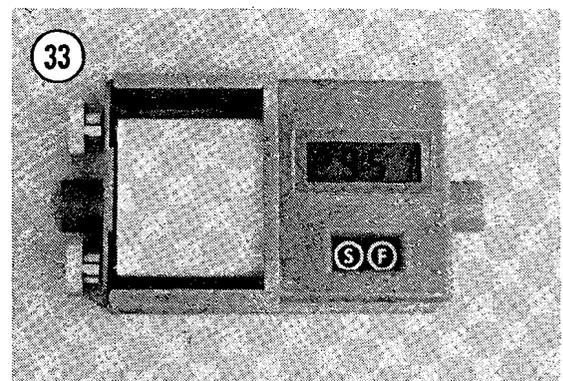
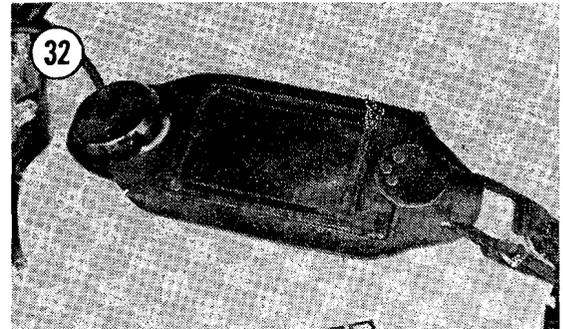
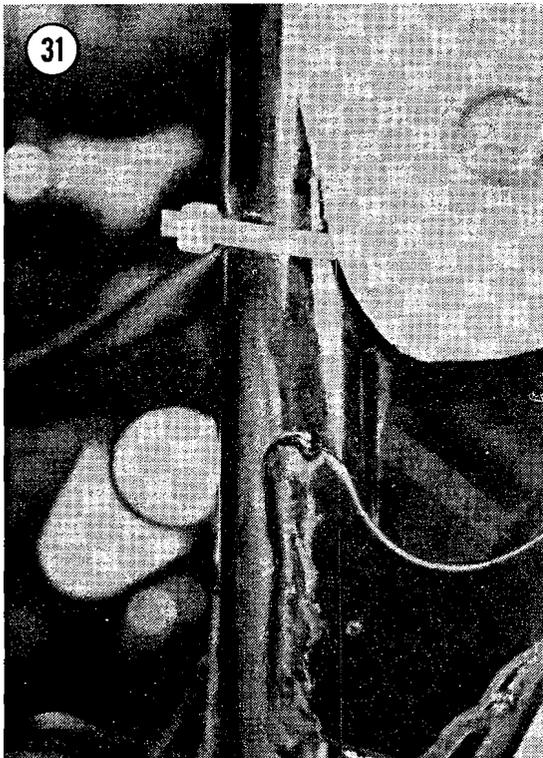
### POST RACE CLEAN-UP

Most enduro events contain a large amount of mud and require that the machine be cleaned at a high pressure self wash. If the

machine is to be washed in this manner, remove the air filter and block the intake hose into the carburetor with a shop rag. Do not spray water directly on the flywheel cover or any electrical connections. The soap contained in many self washers will prematurely corrode electrical connections. They should be cleaned with contact cleaner spray after the bike is washed.

The most thorough and successful way to keep the PE running is to go over the entire machine by hand with a rag and gasoline or solvent, wiping down each component. The wheels should be removed so that the brakes can be cleaned out. The entire bike should be wiped clean, checked for cracks in the frame, loose nuts or bolts and breakdowns in wiring connections.

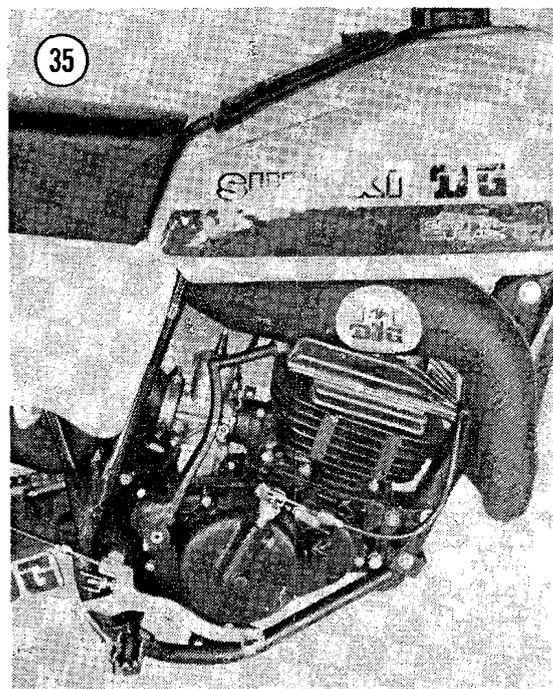
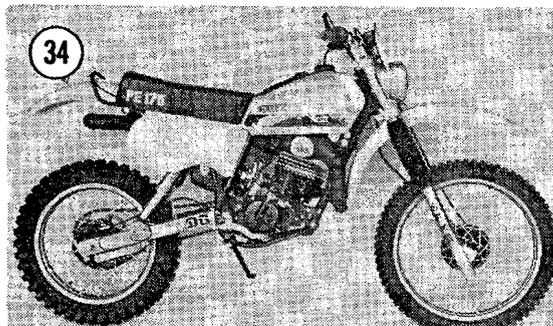
Transmission oil should be changed after every two events. Ring clearance gap should be checked on a bi-race schedule. Fork oil should be changed every four races and air filter elements are discarded if there is any sign of a rip or tear in the unit.



### THE DG PE SUZUKI

Pictured here is the DG Performance Specialities version of the PE175 (Figure 34). These modifications laid out here are also available for the PE250, on both C and N models. The DG machine is a simple bolt-on, and all components come with ample instructions for mounting.

The DG modified machine, in terms of performance, is equal to and in some cases better than the modifications that Team Suzuki performs. The DG bike is expensive, but in many cases, you can decide which components are highest on your list of priorities. We suggest that you first perform



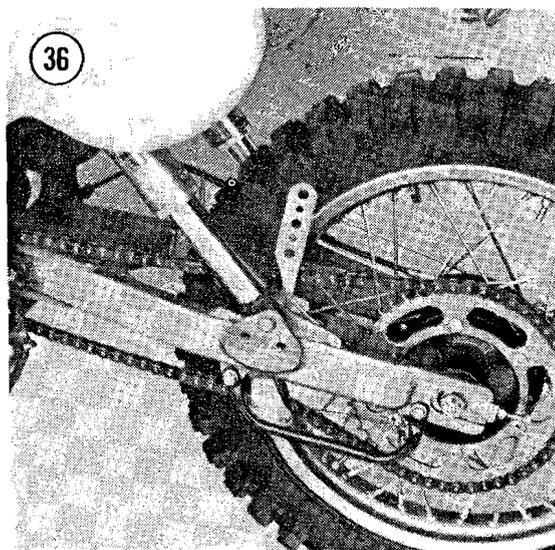
the modifications laid out in the previous section then, when you want to upgrade, turn to the DG equipment. For starters, we recommend the pipe first, followed by the head, porting work, and swingarm.

### ENGINE MODIFICATIONS

DG installs a 19 fin gold radial head on their racer which has a higher compression ratio than stock and dissipates heat more quickly and easily. The DG head makes the bike run cooler resulting in more reliability and in some cases, a leaner jet setting and a little more speed. Below the head, DG performed their Stage 5 porting to the cylinder. It primarily consists of enlarging the intake port and "eyebrowing" the exhaust port. A DG reed block is then installed, using a six pedal unit made of fiber reeds.

A 36 mm Mikuni carburetor is used, and the same DG air filter as Suzuki's riders buy. The engine is topped off with a single walled exhaust pipe, with a larger center dwell chamber (Figure 35).

The DG gold anodized swingarm is installed (Figure 36). This unit is about the same weight as the stock swingarm, but is much stronger and greatly enhances the steering properties. Kayaba air/oil F-series shocks are installed, resulting in 10.5 inches of rear wheel travel.



The front receives Kayaba Pro-Line forks with 10.5 inches of travel (**Figure 37**). The forks come with handmade aluminum triple clamps and are equipped with air fork caps.

DG installed the same side panels as the Suzuki riders use, along with RM-N style handlebars, DeHandler levers, Oakley grips, and a headlight cover (**Figure 38**).

### Result

In comparison with the Team Suzuki machine, the DG bike is in some ways an advantage. The powerband of the engine, a result of a different porting method, has lost 500 rpm off the bottom of the torque curve, but gained a healthy 1,500 rpm at the top end power. The mid range is greatly increased and the machine has actually picked up about 10% more torque.

Suspension is much better than what the Suzuki team uses and is infinitely more adjustable. The only drawback may be in the reliability of the air shocks which have small springs inside, yet still rely on air pressure as the major "spring rate." Handling is greatly improved and the machine is much more rigid feeling than the modified stocker. This results in a more secure riding feeling, along with more definite wheel placement and suspension movement while riding.

We suggest the DG modifications to the serious competitor who wants a Suzuki PE that is capable of running with the factory backed equipment. The components are expensive, but are made from very high quality materials and greatly enhance both the power and performance of the Suzuki PE model.

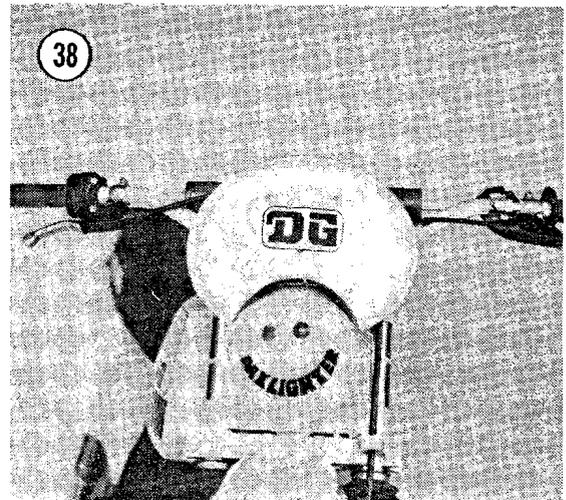
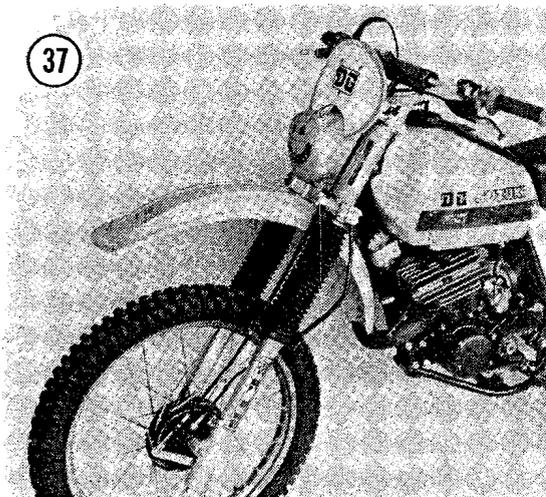


Table 1 LIST OF MANUFACTURERS AND SERVICES

<b>Al Baker's FMF</b> 6878 Santa Fe Avenue East Hesperia, CA 92345	Suspension and engine components
<b>Barnett Tool and Engineering</b> 4915 Pacific Blvd. Vernon, CA 90058	Heavy duty clutch
<b>DG Performance Specialties</b> 1230 La Loma Circle Anaheim, CA 92806	Suspension and engine components
<b>GSM</b> 3026 Raymer St. North Hollywood, CA 91605	Handlebars, side panels filters
<b>Mark Charles</b> P.O. Box 205 Sunland, CA 91040	Bike stands
<b>S &amp; W Engineering</b> 7051 Village Dr. Buena Park, CA 90621	Suspension components
<b>Terry Cable</b> P.O. Box 1321 Hesperia, CA 92345	Cables
<b>H &amp; S ACCESSORIES LTD.</b> Unit 14, Bordon Trading Estate Bordon, Hampshire GU35 9HH, England	D.I.D. chain, other performance items
For information and assistance on PE and RM model Suzuki, owners can contact:	
U.S. Suzuki Motor Corp. Suzuki Racing Services 3251 East Imperial Highway Brea, CA 92621	



# INDEX

## A

Air filter .....	14-15
Axles .....	182

## B

Bearing and seal replacement .....	71-72
Brakes	
Adjustment .....	162
Cable, rear .....	182
Inspection .....	163-164
Performance improvement .....	181
Pivot lubrication .....	164
Shoes .....	162-165
Specification .....	172

## C

Carburetor	
Cleaning/inspection .....	120-123
Disassembly/assembly .....	119-120
Float adjustment .....	123
Removal/installation .....	118-119
Specifications .....	126
Clutch	
Gearshift .....	91-97
Inspection .....	87-90
Internal adjustment .....	85-87
Removal/installation .....	75-85
Specifications .....	113
Countershaft gear set .....	103-104
Cylinder/cylinder head .....	43-46

## D

Drive gear (primary) .....	97-101
Drive shaft gear set .....	104-107

## E

Electrical system	
Ignition coil .....	130-132
Ignition system .....	127-129
Ignition timing .....	130
Lighting system .....	132-133
Stator .....	129-130
Engine	
Bearing/seal replacement .....	71-72
Cylinder .....	43-46
Cylinder head .....	41-43
Lower end .....	63-71
Modifications (PE-DG) .....	175-180, 185-186
Pistons/rings .....	46-51
Reed valves .....	51-53
Removal/installation .....	53-63
Torque specifications .....	73
Exhaust system	
Removal/installation .....	124-125
Repair .....	125

## F

Forks (front)	
Disassembly/assembly .....	138-141
Inspection .....	141-142
Removal/installation .....	136-138
Seal replacement .....	141-142

- Fuel system  
 Carburetor servicing ..... 116-124  
 Tank ..... 114-115  
 Valve ..... 115-116
- G**
- Gearshift ..... 91-96  
 General information  
 Chapter organization ..... 1-2  
 Expendable supplies ..... 6  
 General maintenance hints ..... 3-5  
 Model identification ..... 2-3  
 Storage ..... 6-7  
 Tools ..... 5
- I**
- Ignition system  
 CDI unit ..... 132  
 Coil ..... 130-132  
 Flywheel ..... 127-129  
 Stator ..... 129-130  
 Timing ..... 130
- K**
- Kickstarter  
 Disassembly/inspection/  
 assembly ..... 110-112  
 Lubrication ..... 28  
 Maintenance ..... 28  
 Removal/installation ..... 109-110
- L**
- Lighting system  
 Headlight bulb replacement ..... 132  
 Taillight bulb replacement ..... 133
- Lubrication  
 Brake pedal ..... 27-28  
 Brake pivot ..... 164  
 Cable ..... 23  
 Drive chain ..... 15-16  
 Engine ..... 14-15  
 Kickstarter ..... 28  
 Schedule ..... 36-37  
 Steering head ..... 147-149
- M**
- Maintenance  
 Air filter servicing ..... 12-14  
 Brake adjustment ..... 30
- Brake pedal lubrication ..... 27-28  
 Cable lubrication ..... 23  
 Carburetor ..... 34-35  
 Clutch adjustment ..... 28  
 Drive chain ..... 15-17, 23-26  
 Engine lubrication ..... 14-15  
 Front forks ..... 17-22  
 Ignition timing ..... 34  
 Kickstarter lever ..... 28  
 Spark plug ..... 30-34  
 Swing arm ..... 26-27  
 Transmission oil ..... 22-23  
 Model identification ..... 2-3
- O**
- Operating requirements ..... 8-9
- P**
- Performance improvements  
 Axles ..... 182  
 Brakes ..... 181  
 Detail improvements ..... 183-184  
 DG-PE Suzuki ..... 185  
 Engine modifications (DG) ..... 185-186  
 Engine modifications (PE) ..... 175-180  
 Plastics ..... 182  
 Post race clean-up ..... 184  
 Rear brake cable ..... 182  
 Suspension ..... 174-175  
 Tires ..... 180-182  
 Wheels ..... 180-181  
 Piston/piston rings ..... 46-51
- R**
- Reed valve assembly ..... 51-53
- S**
- Shock absorbers ..... 159-160  
 Sprocket and hub cushions ..... 154-156  
 Steering head (all except "T" models)  
 Adjustment ..... 142-145  
 Bearing replacement ..... 145-146  
 Inspection ..... 145  
 Steering head ("T" models)  
 Adjustment ..... 146-147  
 Bearing race replacement ..... 150  
 Disassembly/assembly ..... 147-149  
 Inspection ..... 149-150  
 Storage ..... 6-7

Suspension, front	
Forks .....	136-142
Steering head .....	142-150
Wheel .....	134-136
Suspension, rear	
Shock absorber/springs .....	159-160
Sprocket/hub cushions .....	154-156
Swing arm .....	156-158
Torque specifications .....	161
Wheel .....	152-154
Swing arm .....	156-158

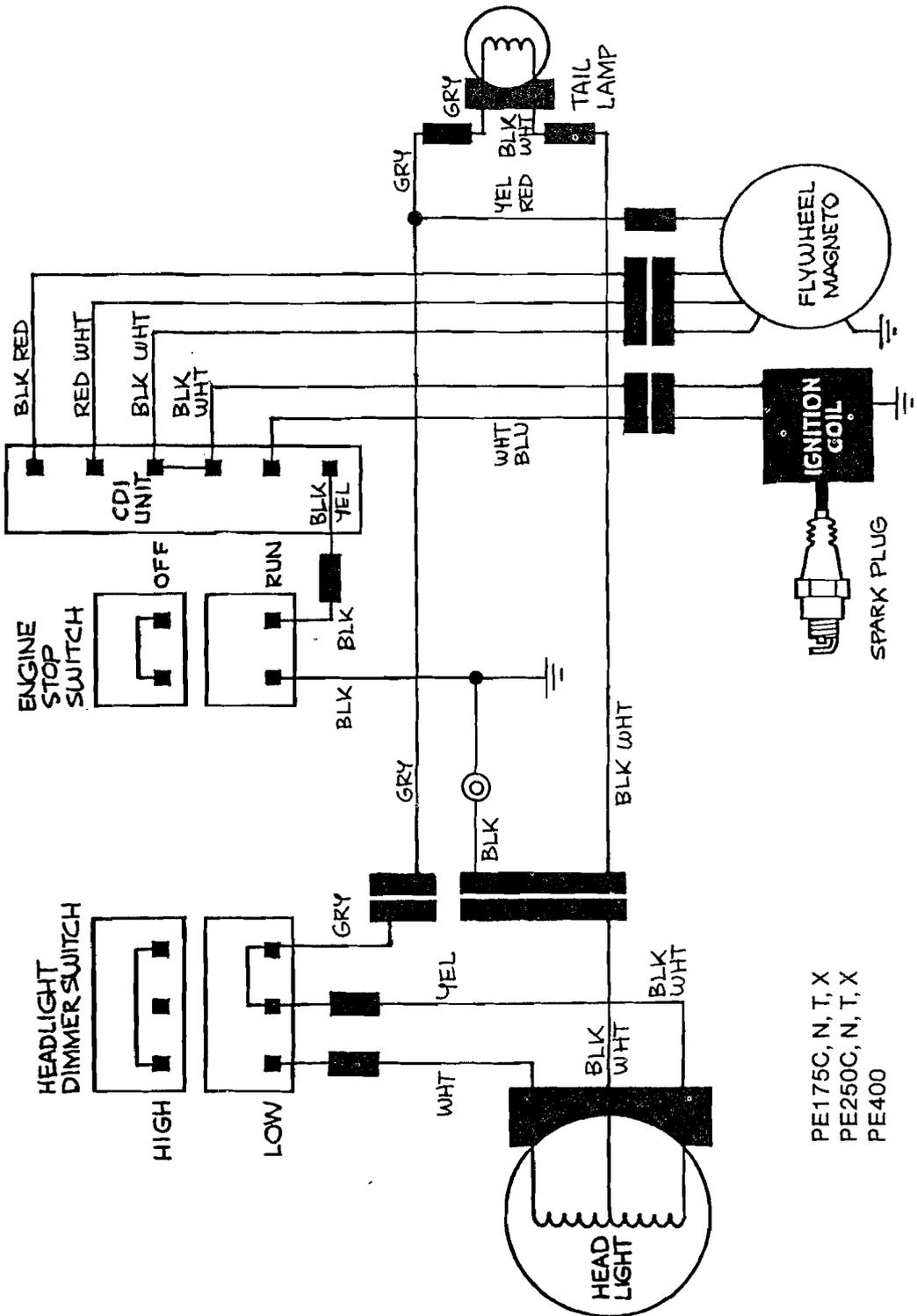
## T

Tires .....	169-171, 180-182
Transmission	
Countershaft gear set .....	103-104
Drive shaft gear set .....	104-109
Primary drive gear .....	97-101
Removal/installation .....	101-103
Tools	
Compothane mallet .....	5
Feeler gauge .....	5
Hammer driven impact .....	5
Ignition gauge .....	5
Special pressure gauge .....	5
Troubleshooting	
Backfiring .....	10
Brake problems .....	10
Clutch slip or drag .....	10
Engine noises .....	10
Excessive vibration .....	10
Flat spots .....	10
Guide .....	10

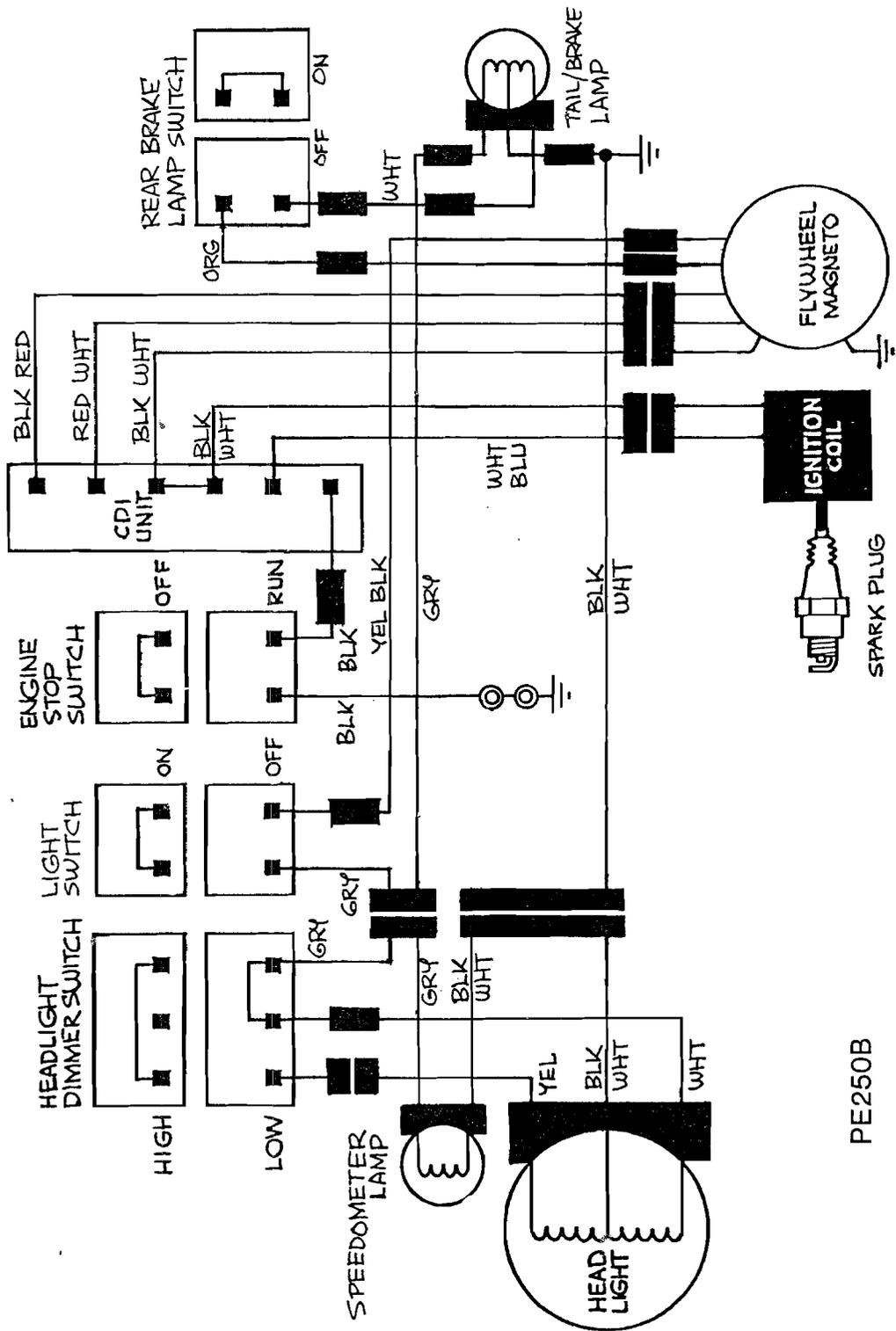
Misfiring .....	10
Overheating .....	10
Piston seizure .....	10
Poor idling .....	9
Power loss .....	10
Starting difficulties .....	9
Tune-up	
Air filter servicing .....	12-14
Brake adjustment .....	30
Brake pedal lubrication .....	27-28
Cable lubrication .....	23
Carburetor .....	34-35
Clutch adjustment .....	28
Drive chain .....	15-17, 23-26
Engine lubrication .....	14-15
Front forks .....	17-22
Ignition timing .....	34
Kickstarter lever .....	28
Spark plug .....	30-34
Swing arm .....	26-27
Transmission oil .....	22-23

## W

Wheel	
Balance .....	168-169
Bearings .....	167-168
Front .....	134-136
Performance improvements .....	180-181
Rear .....	152-154
Runout .....	165-167
Spokes .....	165-167
Wiring diagrams .....	end of book



PE175C, N, T, X  
 PE250C, N, T, X  
 PE400



PE250B