# KX 125



# SHOP MANUAL

## FOREWARD

Congratulations for choosing this KAWASAKI Motorcycle, which has been developed through Kawasaki engineering to produce a light weight, high performance machine with superb handling and stability for racing and sporting use.

Your new KX—125 is a highly tuned production racer, and thus does not require tuning modification for participation in racing events. However, as with any mechanical device, proper care and maintenance are important for trouble-free operation and top performance. This guide is written to enable you to keep you KX—125 properly tuned and adjusted.

Since the KX—125 is constructed as a specialized motocross machine, it does not conform to the regulations for operation on public streets and highways. It may only be operated in special areas, Check the regulations that apply to your locality regarding its operation.




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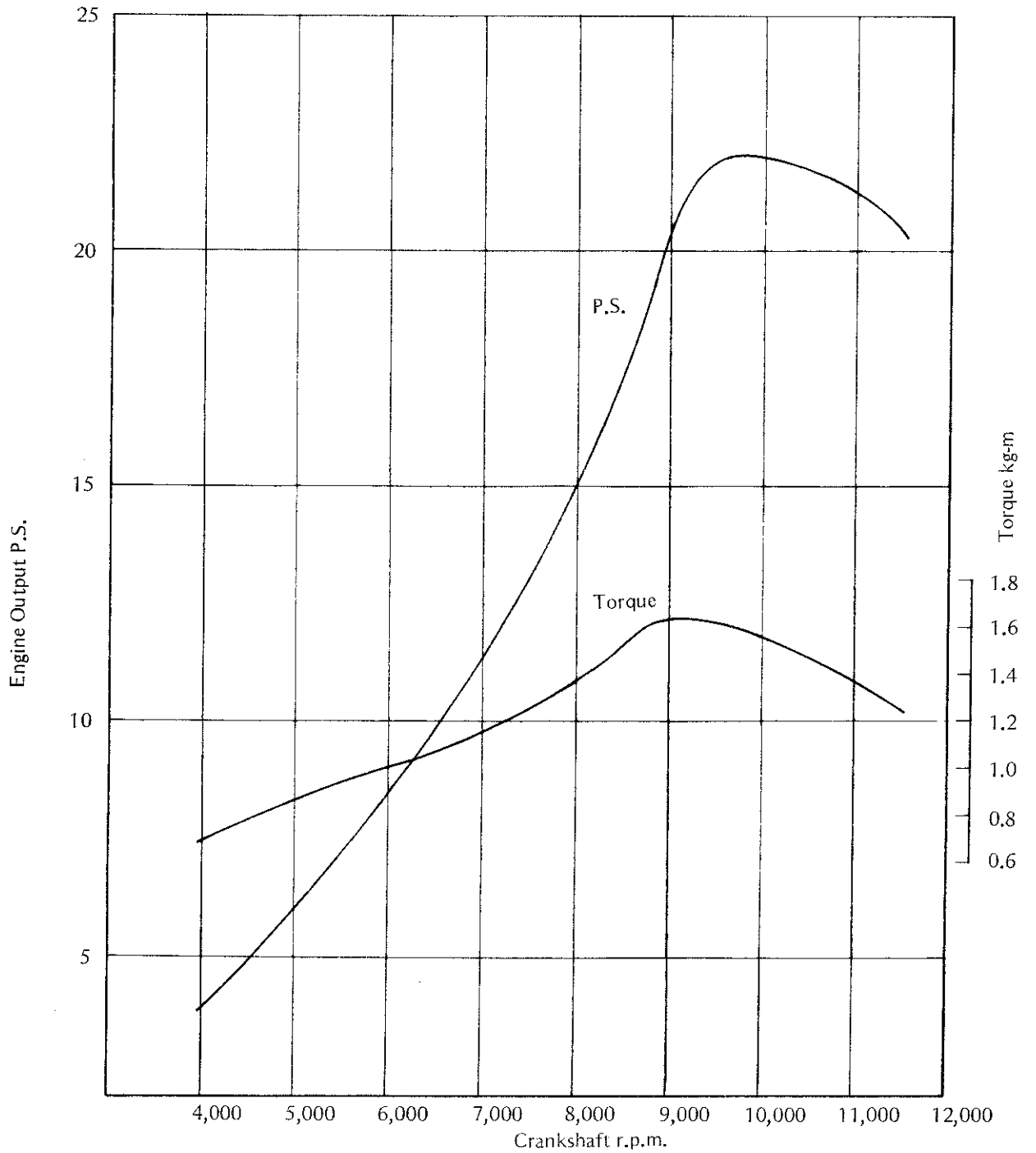
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## SPECIFICATIONS

| | |
|---|---|
| **Dimensions** | |
| Overall Length | 2,020 mm (79.5 in.) |
| Overall Width | 875 mm (34.5 in.) |
| Overall Height | 1,120 mm (44.1 in.) |
| Wheelbase | 1,340 mm (52.8 in.) |
| Ground Clearance | |
| Dry Weight | 81 kg (178 lbs.) |
| Fuel Tank Capacity | 6.5 ℓ (1.7 U.S. gal.) |
| **Engine** | |
| Type | 2-Stroke, Single Cylinder, Rotary Disc Valve |
| Bore & Stroke | 56.0 x 50.6 mm (2.20 x 1.99 in.) |
| Displacement | 124.8 cc (7.62 cu.in.) |
| Compression Ratio | 8.0 : 1 |
| Max. Horsepower | 22PS @9,750 rpm |
| Max. Torque | 1.75 kg-m @9,000 rpm |
| Carburetor | Mikuni VM26SC |
| Lubrication System | Petroil Mix |
| Transmission Oil Type | SAE 10W30 or 10W40 |
| Transmission Oil Capacity | 650 cc (0.71 U.S. qt.) |
| Starting System | Primary Kick |
| Ignition System | Magneto CDI |
| Ignition Timing | 20° @6,000 rpm |
| Spark Plug | NGK B-9EV |
| **Transmission** | |
| Type | 6 Speed, Constant Mesh, Retorn Shift |
| Clutch | Wet, Multi-disc |
| Gear Ratios: 1st | 2.27 (25/11) |
| 2nd | 1.69 (22/13) |
| 3rd | 1.33 (20/15) |
| 4th | 1.14 (24/21) |
| 5th | 1.00 (18/18) |
| 6th | 0.89 (17/19) |
| Primary Reduction Ratio | 3.14 (69/22) |
| Final Reduction Ratio | 4.61 (60/13) |
| Overall Drive Ratio | 12.95 |
| **Frame** | |
| Type | Tubular, Single Down Tube |
| Steering Angle | Left 50° Right 50° |
| Castor | 59° |
| Trail | 129.3 mm (5.09 in.) |
| Tire Size: Front | 3.00-21 4PR |
| Rear | 4.10-18 4PR |
| Suspension: Front | Telescopic Fork |
| Rear | Swing Arm |
| Suspension Stroke: Front | 160 mm (6.3 in.) |
| Rear | 90 mm (3.54 in.) |
| Front Fork Oil (per shock absorber) | SAE 5W20 153cc (5.17 U.S. fl.oz.) |
| Brake: Front | 120 x 28 mm (4.72 x 1.1 in.) |
| Rear | 130 x 28 mm (5.12 x 1.1 in.) |

## ENGINE PERFORMANCE CURVE



## GENERAL INFORMATION

### 1. Break-in

To obtain the proper operating clearances in the engine and transmission that are necessary for smooth engine performance, a brief break-in procedure must be carried out. For the first hour of operation, run the engine at low and moderate rpm.

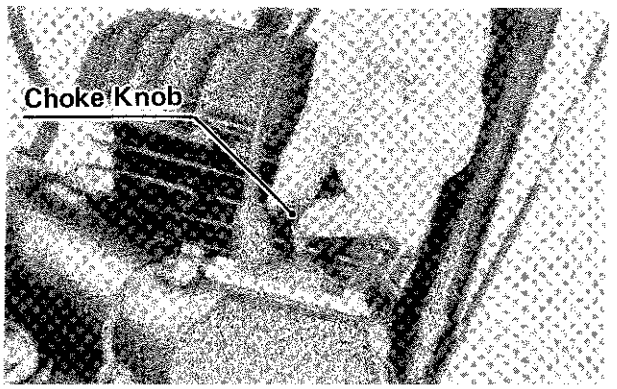
- Start the engine, and let it run at idle until the engine is thoroughly warmed up. Race the engine slightly, but never open to full throttle.
- Next, move off and run at half throttle.
- Occasionally stop and make a general inspection. Check bolt and nut tightness. In particular, check and, if necessary, adjust chain slack and spoke tightness. Also, check the condition of the spark plug. If it is excessively black or sooty, change to the lower heat range B-8EV spark plug for the remainder of the break-in.
- After the break-in procedure has been properly carried out, the motorcycle is ready for regular operation. However, since recklessly high rpm will lead to engine trouble, take care to use the necessary skill and technique in operating the motorcycle in the power band and rpm range for which it was designed.

**NOTE:** After break-in, switch back to the standard B-9EV spark plug, and change the transmission oil.

### 2. Engine Starting

**Cold Engine:**

- Open the fuel tap.
- Pull up the choke knob.




- Leave the throttle grip fully closed.
- Kick the engine over strongly.
- Wait until the engine warms up, and then push the starter plunger back down.

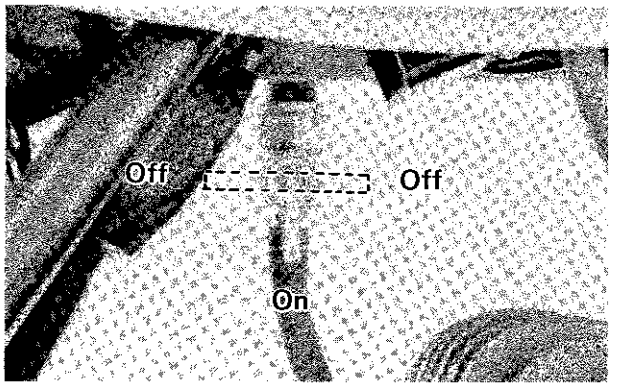
**Warm Engine:**

- Do not use the choke knob.
- Open the throttle grip slightly, and then kick the engine over.

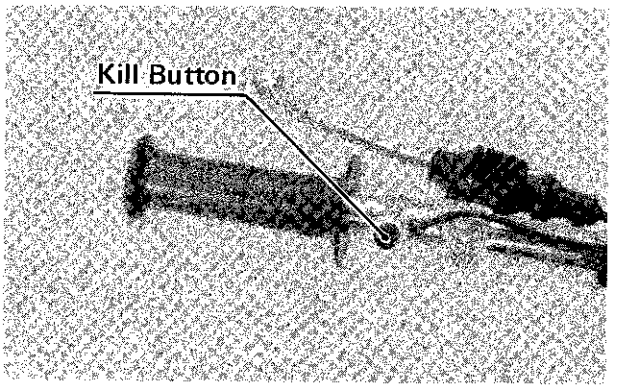
**NOTE:** Since the starter is a primary kick type, the engine can be started even if the transmission is in gear by pulling in the clutch lever and kicking the engine over.

### 3. Engine Stopping

- Shift the transmission into neutral.
- Close the fuel tap.

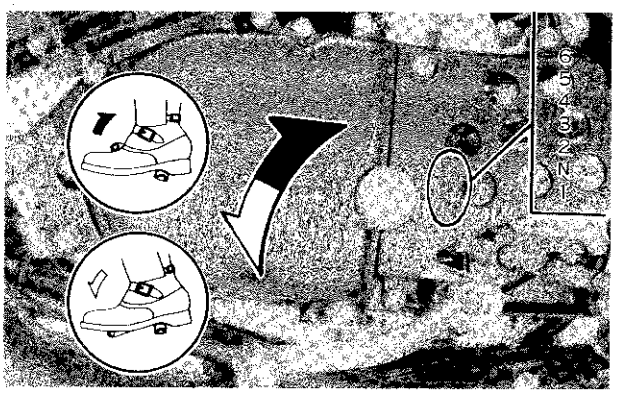



- After racing the engine slightly, release the throttle or push the kill button to stop the engine.




### 4. Transmission

The transmission is a 6 speed, return shift type. Neutral is located between 1st and 2nd gears; 1st gear is reached by shifting down from neutral, and 2nd through 6th gears are reached by shifting up from neutral. The shift pattern is given on the engine sprocket cover.



## 5. Fuel

The fuel is a mixture of gasoline and oil.

| | |
|---|---|
| Gasoline | High Octane Gasoline |
| Recommended Oil | Two Stroke Racing Oil |
| Mixture Ratio | 20 : 1 |

- Throughly mix the gasoline and oil

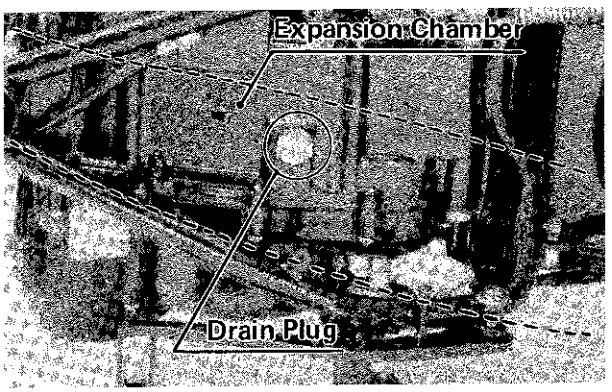
**NOTES:** 1. The lubricative quality of this mixture deteriorates rapidly; use a fresh mixture for each day of operation.
2. Do not mix a vegetable oil with a mineral oil.

## 6. Transmission Oil

### (1)Oil Change

Change the oil immediately after break-in and after every 5th race.

- If the engine is not already warm, warm the engine up thoroughly so that the oil will flow freely and drain completely.
- Remove the expansion chamber.
- Place an oil pan beneath the engine, remove the drain plug, and position the vehicle off its side stand so that it is fully perpendicular to the ground to allow all the oil to drain out.

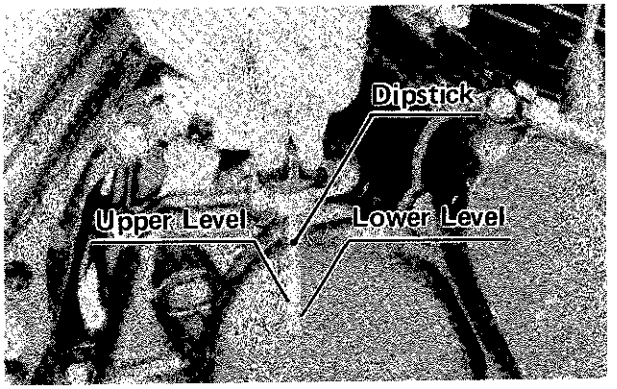



- Replace the drain plug, remove the dipstick, and pour in slowly 650 cc (0.69 US qt) of fresh SAE 10W30 or 10W40 oil.
- After 2-3 minutes, check the oil level to make sure that the amount of oil is correct.
- Replace the dipstick and the expansion chamber.

### (2)Oil level

Check the oil level with the dipstick on the oil filler plug. When checking the oil, have the vehicle off its side stand so that it is fully perpendicular to the ground.

- Remove the dipstick, and wipe off any oil on the end.
- Insert the dipstick without screwing it in, and pull it back out. The oil should be above the lower and below the upper dipstick marks.




- If the amount of oil is insufficient, pour in oil until the level will reach the upper dipstick mark.
- Replace the dipstick making sure that the **O** ring is in place and that the dipstick is fully screwed in.

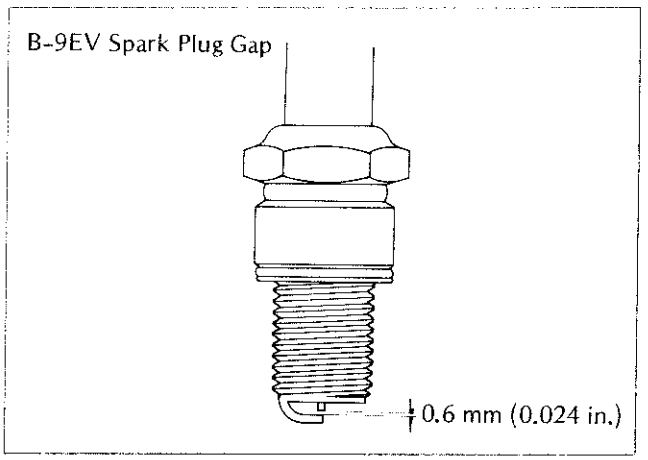
## ADJUSTMENT & MAINTENANCE —ENGINE

### 1. Spark Plug

Inspection of the spark plug is the simpliest means of judging the condition of the engine. From inspection of the spark plug, a spark plug of the proper heat range can be determined and the carburetor settings altered.

The standard spark plug is the long reach NGK B-9EV. If the spark plug is burned to a light brown color, the correct plug is being used. However, if the plug becomes black, switch to the hotter B-8EV plug; if the plug is burned white, switch to the colder B-10EV.

The proper spark plug gap is 0.6 mm (0.024 in.). If the gap is incorrect, bend the outer electrode to obtain the proper gap.



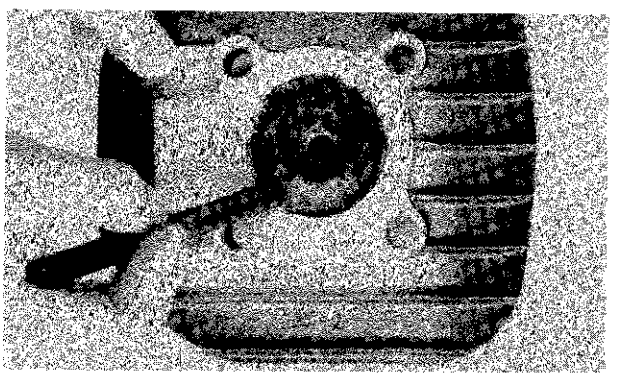

### 2. Cylinder & Cylinder Head

If carbon is allowed to accumulate in the combus-

If carbon is allowed to accummulate in the combustion chamber, the compression ratip will rise, causing Preignition, detonation, and overheating. Periodically, decarbonization must be carried out.

Inspect the inside of the cylinder for scratches and abnormal wear. In case the cylinder is damaged or badly worn, replace the cylinder for a new one.

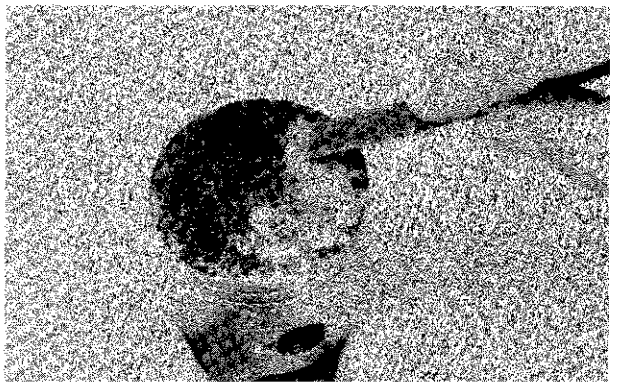
The ELEX cylinder cannot be bored or honed. If altering the cylinder ports, take ample care that the region around the ports and the cylinder wall itself do not get scratched or otherwise damaged.

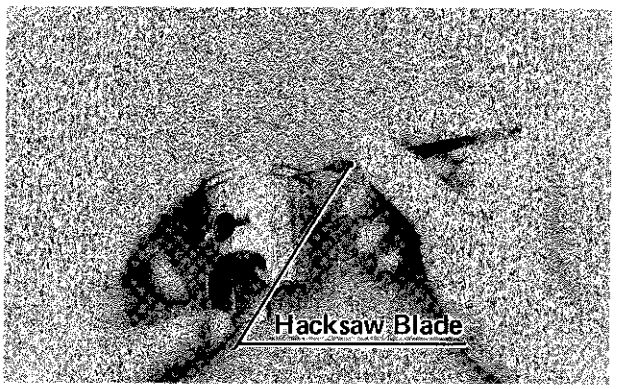


### 3. Piston

Remove the carbon from the head of the piston, Inspect for sticking rings, scratches or other damage on the piston skit, and damage to the piston pin holes.

Remove the carbon from the piston ring grooves with part of an old piston ring or a hacksaw blade. Even if the piston tings look good with no wear, replace every 3rd race.






### 4. Air Cleaner

The air cleaner box is specially designed for operation under wet conditions. The element is a large size, special fabric unit for effective protection against dirt and dust.

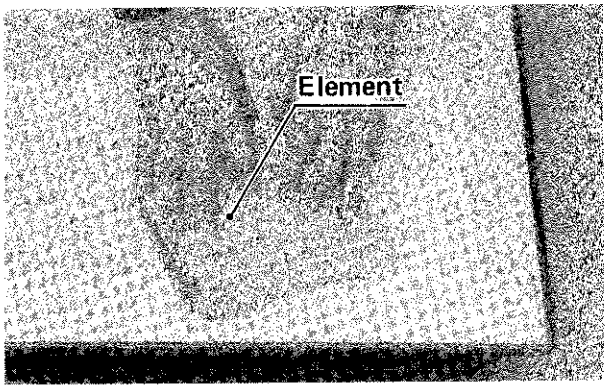
Some masking may be necessary depending on the course, but be sure not to reduce appreciably the amount of air intake.

**(1)Element removal**

- Push in on the lower rear portion of the right side cover, and free the rubber retainer on the underside of the cover pull off the right side cover.
- Remove the element cap wing nut and washer, and pull out the element.

**(2)Element maintenance**

- Inspect the element after each race or practice session without fail, and clean if necessary.
- Clean a dirty element by emersing it in a bath of solvent, squeezing it gently.
- After the element is clean, shake it dry.




●Soak the element in a 10:1 gasoline/oil (SAE 30) mixture (10 parts of gasoline to 1 part of oil), and then, after it is dry, fit the element back in the air cleaner box properly so that no unfiltered air will enter the engine.

**NOTE:** Replace the element after cleaning it 5 times or if it is damaged.

**CAUTION: Clean the element in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash point solvents to clean the element.**

## 5. Ignition Timing

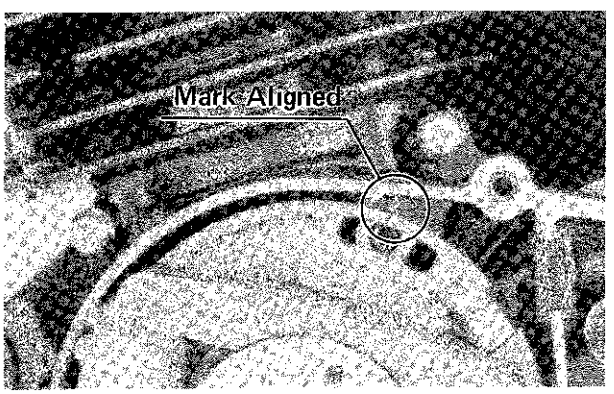
Because CDI ignition is used on this motorcycle, the ignition timing should never reuqire adjustment unless the magneto base is incorrectly installed during engine reassembly. However, if there is any doubt is any doubt as to correct timing, inspect and adjust if necessary as follows:

●Remove the engine sprocket cover screws (3), and remove the cover.

●Remove the clutch cable holder and left engine cover screws (4), drop down the cover, and remove the gasket.

●Remove the upper magneto base screw so that the magneto base timing mark can be seen.

●Check to see whether or not the magneto base timing mark is aligned with the crankcase timing mark.




●If the marks are not aligned, loosen the lower magneto base screw, shift the position of the base so that the marks are aligned, and tighten both screws securely.

**NOTE:** Be sure that the correct crankcase timing mark is referred to. The crankcase timing projection is used only for the point ignition on the street model.

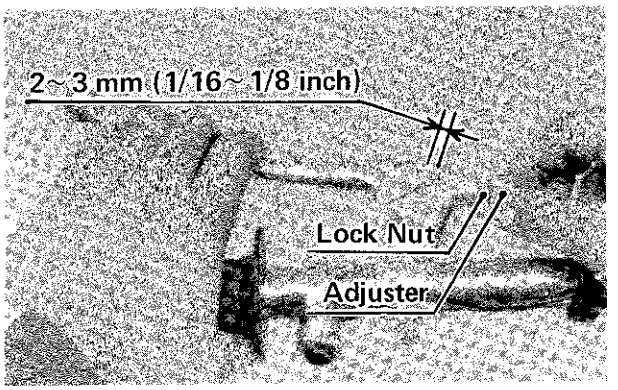
## 6. Clutch

Proper clutch play is a 2 ~ 3 mm (1/16 ~ 1/8 in) distance that the inner cable travels before the cable begins to disengage the clutch. The play increases with cable stretch, necessitating periodic adjustment.

**(1) Lever adjuster**

When lever play has become excessive, first try adjusting the cable at the clutch lever.

●Loosen the lock nut, screw out the adjuster to obtain the proper amount of cable play, and tighten the lock nut.



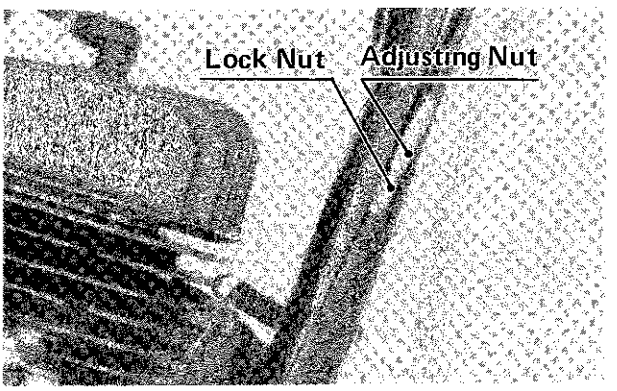

**(2) Cable center adjuster**

If the adjuster at the clutch lever has reached its limit, adjust the cable with the adjuster which is halfway down the cable.

●Loosen the lever adjuster lock nut, and fully screw in the lever adjuster.

●Back out the lever adjuster 2~3 turns, and then tighten its lock nut.

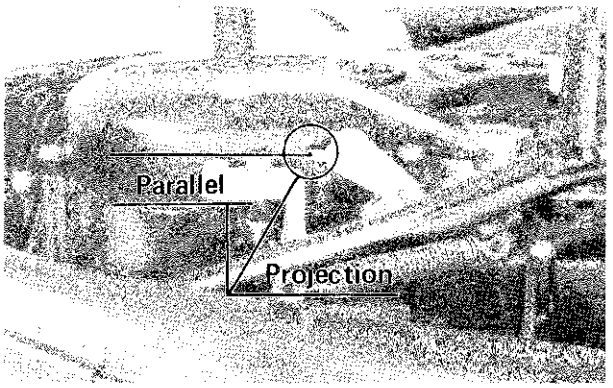
●Loosen the lock nut on the cable center adjuster, turn the adjuster until the proper amount of cable play is the adjuster until the proper amount of cable play is reached, and tighten the lock nut.



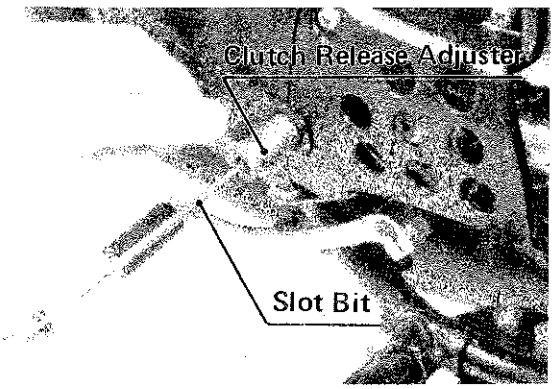
**(3)Clutch release mechanism**

If the clutch slips or the action at the lever feels heavy despite proper clutch cable adjustment, inspect the clutch release mechanism, and adjust if necessary.

- Slide the clutch lever dust cover out of place.
- Loosen the lock nut just enough so that the adjuster will turn freely, and then turn the adjuster to make a 5 ~ 6 mm (0.20~0.24 in) gap between the adjuster and lock nut.
- Loosen the lock nut at the center of the clutch cable, and screw in the adjusting nut to give the cable plenty of play.
- Unscrew and remove the clutch adjusting hole cap and gasket.
- Loosen the lock nut. If the clutch adjusting screw does not turn loosely already, back it out until it does.
- Turn the adjusting nut at the center of the clutch cable so that the clutch release lever projection becomes parallel to the seam between the left engine cover and left crankcase half.



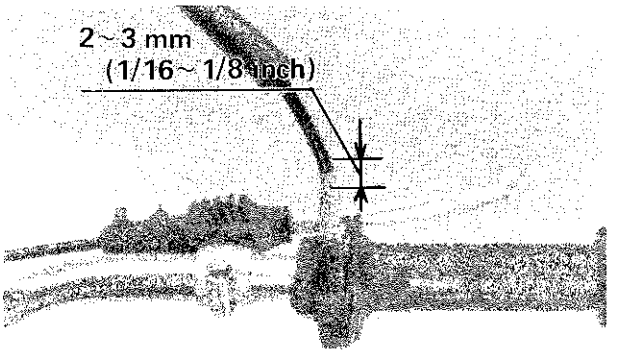

- Turn the clutch adjusting screw in to just where a resistance is felt, and then tighten the lock nut.




- Take up any play at the clutch lever by turning the adjusting nut at the center of the clutch cable, and tighten the lock nut.
- Turn the adjuster at the clutch lever so that the clutch lever will have 2 ~ 3 mm ($^1/_{16}$ ~ $^1/_8$ in) of play, and tighten the lock nut.
- Screw in the clutch adjusting hole cap together with its gasket.
- Slide back the clutch lever dust cover.

## 7. Throttle Grip

- Lightly move the outer cable up and down the distance which it moves without resistance. This distance (play) should be 2 ~ 3 mm ($^1/_{16}$ ~ $^1/_8$ in).
- If the play is incorrect, loosen the lock nut, turn the adjuster to obtain the correct amount of play, and tighten the lock nut.

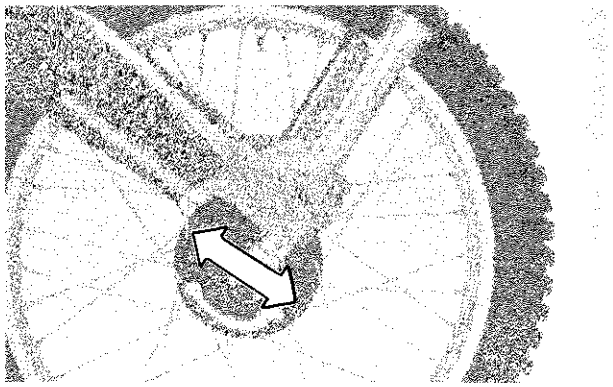


## 1. Steering

The steering must be adjusted so that the handlebar will turn freely but not have excessive play.

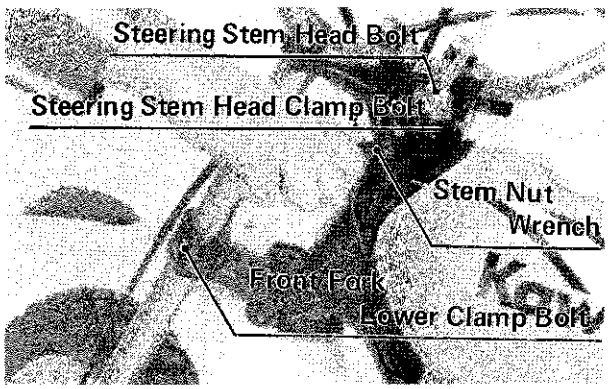
**Inspection**

- With the front wheel off the ground, push the handlebar lightly to either side. If it continues under its own momentum, the steering is not adjusted too tight.
- Squatting in front of the vehicle, grasp the lower ends of the front fork at the axle, and push and pull the front end back and forth. If no play is felt, the steering is not too loose.



**Adjustment**

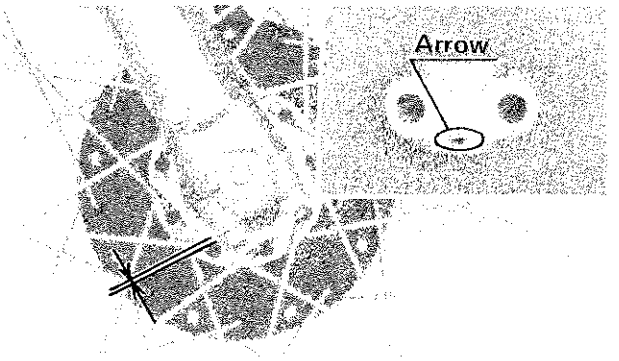
- Place a stand under the frame to raise the front wheel off the ground.
- Loosen the clamp bolt at the top of the steering stem.
- Loosen the steering stem head bolt and the front fork lower clamp bolts (4).
- Turn the steering stem lock nut with a hook spanner to obtain the proper adjustment.
- Tighten the steering stem head bolt and the clamp bolt at the top of the steering stem.




- Tighten the front fork lower clamp bolts (4).

**2. Front wheel installation note**

Each axle clamp should be tightened so that the gap between the clamp and the shock absorber is at the rear of the clamp. Install each clamp with the arrow on the bottom to the front, and tighten the front nut pointing bottom pointing to the front, and tighten the front nut before tightening the rear nut.

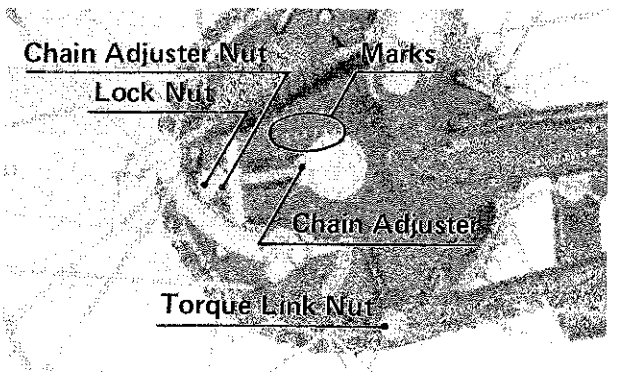



## 3. Drive Chain

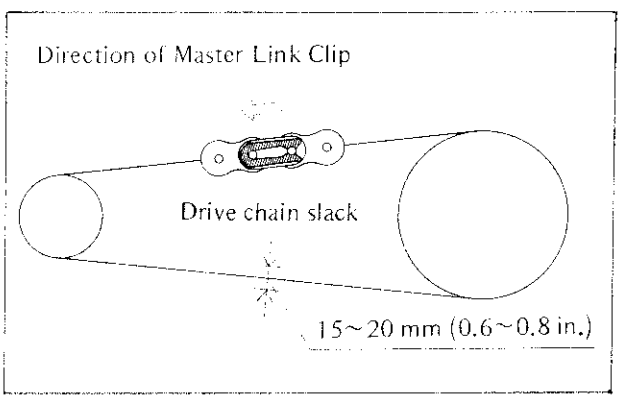
Drive chain link action stiffens if the chain runs out of oil. This not only shortens the service life of the chain but may adversely affect the sprockets and the engine itself. After each day of operation, clean the chain thoroughly and lubricate with a suitable lubricant such as SAE 90 oil. If possible, boil the chain in grease.

**Chain Adjustment**

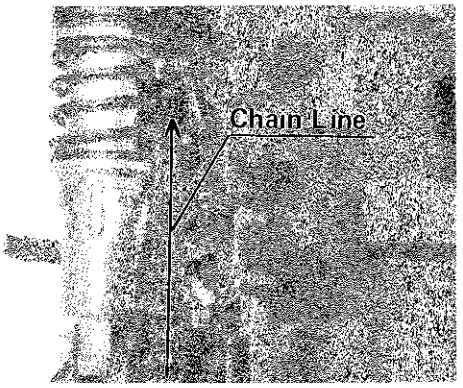
- Place a stand under the frame to raise the rear wheel off the ground.
- Loosen the torque link nut.
- Remove the cotter pin, and loosen the axle nut.
- Loosen both chain adjuster lock nut.




- With the chain adjusters, adjust the chain slack to 15~20 mm (0.6~0.8 in.). Adjust so that the mark on the left chain adjuster comes to the same swing arm mark that the right chain adjuster mark comes to.



●Tighten the chain adjuster lock nuts and the axle nut.
●Rotate the rear wheel and sight along the drive chain from the rear to check wheel alignment.



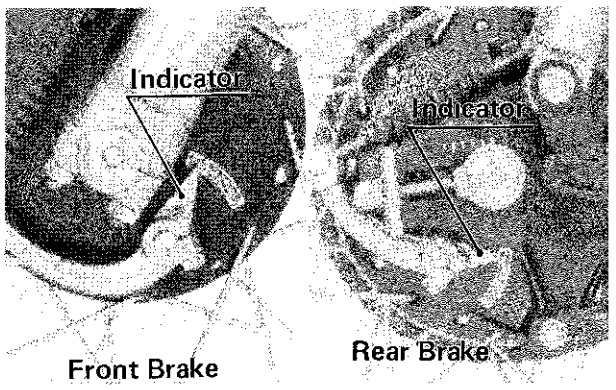

●Insert a new cotter pin into the axle, and tighten the torque link nut.
●Check the rear brake pedal travel.

**NOTE:** In wet and muddy conditions, mud sticks to the chain and sprockets resulting in an overly tight chain. Such a condition may possibly cause the chain to break. To prevent such an occurance, adjust the chain to 30 ~ 40 mm (1.2 ~ 1.6 in.) of slack whenever necessary.

## 4. Brakes

### (1) Brake Lining Wear Indicator

On both the front and rear brake panels is a brake lining indicator. If an indicator points beyond wear lining wear indicator. If an indicator points beyond USABLE RANGE into the red zone when the brake is fully applied, the brake linings for that brake have worn past the service limit. In such case, the brake shoes must be replaced and the drum and other brake parts examined.

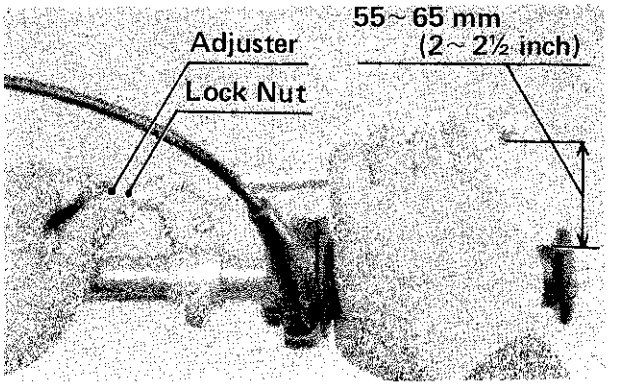



### (2) Front Brake

The front brake is adjusted so that when the brake is fully applied there is 55 ~ 65 mm (2 ~ 2½ in) of space left between the throttle grip and the end of the brake lever.

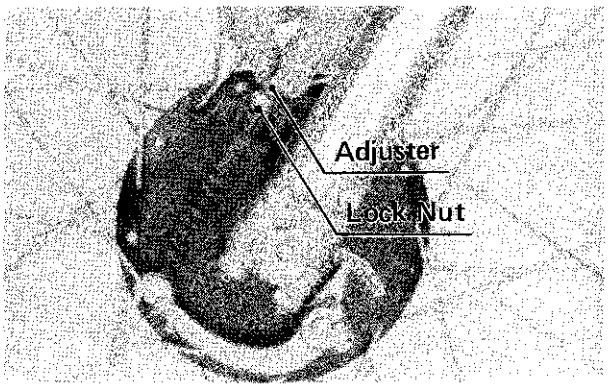
If the lever play is incorrect, first try adjusting the play at the brake lever.

●Loosen the lock nut at the front brake lever, turn the adjuster to obtain the proper amount of play, and tighten the lock nut.




If the adjuster at the brake lever has reached its limit, adjust the cable with the adjuster on the lower end of the cable.

●Loosen the lock nut at the front brake lever, screw the adjuster at the lever fully in, and tighten lock nut.
●Loosen the lock nut for the adjuster at the lower end of the cable, turn the adjuster to obtain the proper amount of play, and tighten the lock nut.

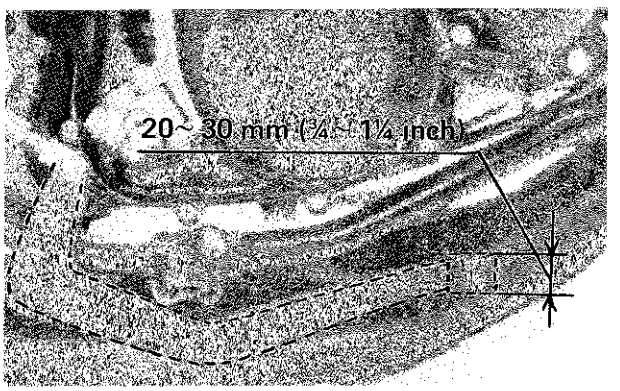



### (3) Rear Brake

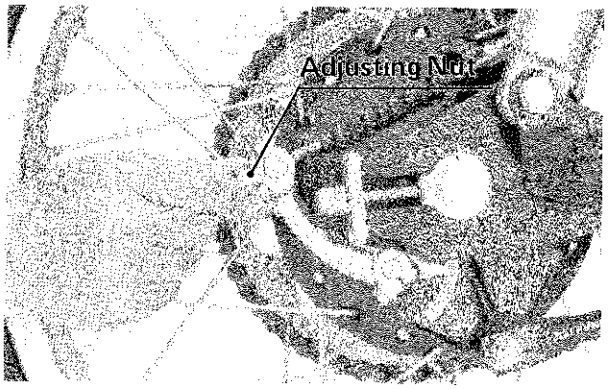
Adjust the rear brake cable with the cable adjuster on the rear brake panel so that the brake pedal has 20 ~ 30 mm (¾ ~ 1¼ in.) of travel from the rest position to the fully applied position.

**NOTE:** Since the brakes must always function for top braking performance, replace the shoes whenever the linings have worn down to ½ their original thickness.

The rear is brake adjusted so that the brake pedal has 20 ~ 30 mm (¾ ~ 1¼ in) of travel from the rest position to the fully applied position.




●Turn the adjuster at the rear of the brake cable to obtain the proper amount of play.

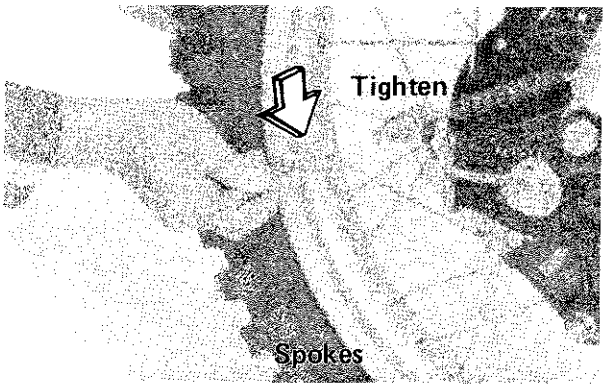



## 5. Spokes & Rims

**(1)Spokes and rims**

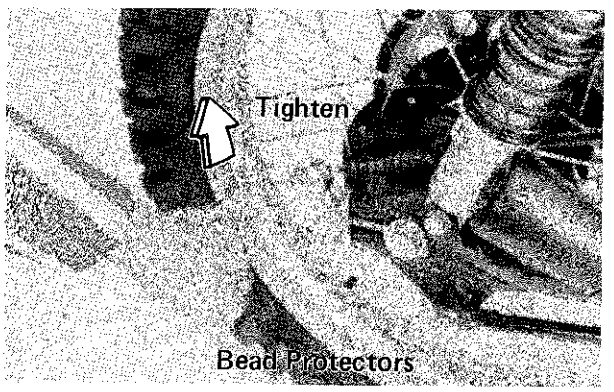
The spokes on both wheels must be all tightened securely and evenly and not allowed to become loose. Unevenly tightened or loose spokes will cause the rim to warp, hasten nipple and overall spoke fatigue, and may result in spoke breakage.

The rim axial runout should be under 3 mm (0.012 in.), and the rim radial runout should be under 2 mm (0.008 in.).




**(2)Bead protectors**

There is a bead protector on the front wheel and two on the rear. The use of bead protectors is to prevent severe stress from causing the tire and tube from slipping on the rim and damaging the valve stem. Valve stem damage may cause the tube to leak, necessitating tube replacement. In order that the tire and tube will remain in fixed in their position on the rim, inspect before riding bead protectors, and tighten if necessary.

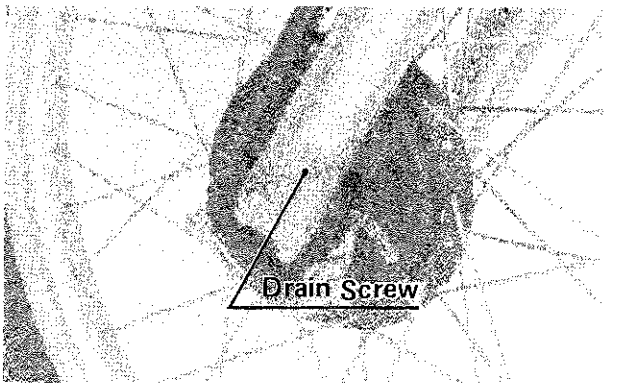



## 6. Front Fork

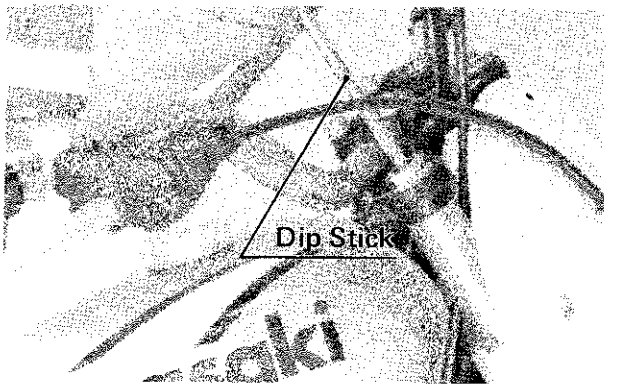
The condition of the front fork is very important for steering stability, and front fork performance is dependent on front fork oil viscosity, quantity, and quality. Deteriorated oil may foam when violent fork action causes the oil to heat, resulting in unsatisfactory fork performance. When the motorcycle is used for racing, change the oil every 5th race.

**Oil Change**

- Remove the drain screw that is near the base of each shock absorber, and pump the shock absorbers as necessary to completely drain out the oil. After the oil has drained out, replace and tighten the drain screws.




- Remove the bolt at the top of each shock absorber.
- Pour in 120 cc (4.16 U.S. fl.oz.) of SAE 5W20 oil.
- To check the oil level, first place a stand under the frame to raise the front wheel off the ground.
- With the shock absorbers thus fully extended, see if the oil level is 390 mm ( 15.21 in.) below the top os the tube.

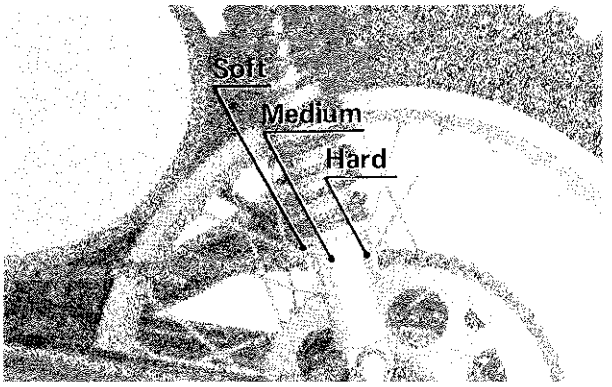



- If the quantity of oil is insufficient, add oil a little at a time until the proper oil level is reached.
- Tighten each shock absorber top bolt.

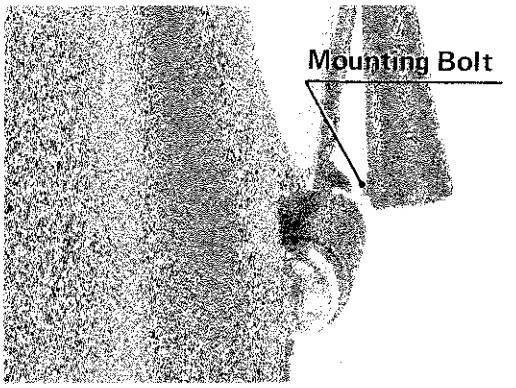
**NOTE:** Sand or dirt left on the outside of the shock absorber inner tube will damage the oil seal and cause oil leaks. Make it a point to always wipe the inner tube clean.

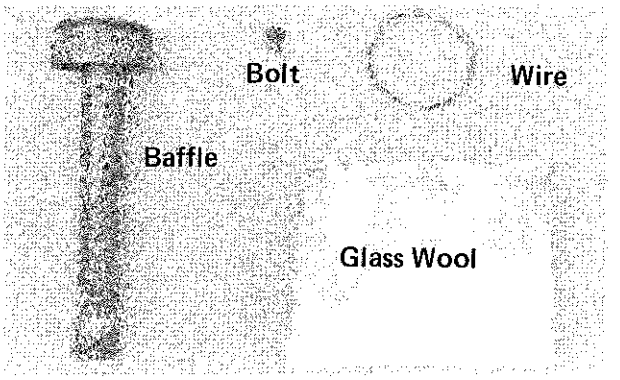
### 7 Rear Shock Absorbers

The rear shock absorbers may be adjusted to any of positions to suit rider preference and course conditions.



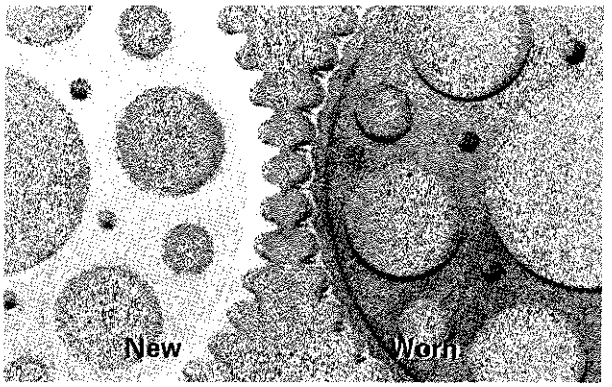

**NOTE:** Adjust both rear shock absorbers to the same position.




### 8. Sprockets

There are 2 sprockets, the engine sprocket and the rear sprocket. The sprockets may be exchanged with sprockets of a different tooth ratio to adapt to course conditions.




**NOTE:** Inspect the sprockets for wear, warp, and cracks.

### 9. Expansion Chamber

The expansion chamber is the most important part affecting engine performance.

Large dents, breaks, or other damage may cause a drop in horsepower. Repair a damaged expansion chamber with sheet metal welding or replace it for a new one.

Clean out the expansion chamber every 2nd or 3rd race. Carbon built up in the baffle will cause less efficiency in noise reduction, and the resulting increase of back pressure inside the chamber will reduce horsepower.

## PRE–RACE CHECK POINTS

### 1. Engine

- Transmission oil at proper level
- Spark plug tightened to correct torque
- Cylinder, cylinder head tightened to correct torque
- Clutch functioning properly
- Carburetor, air cleaner connected properly
- Ignition timing correct
- Expansion chamber not damaged
- Piston, cylinder head free from carbon build-up
- Clutch friction plates not worn

### 2. Frame

- Tires of correct specification and inflated to correct pressure
- Spokes not loose
- Bead protectors not loose
- Drive chain at proper slack
- Steering properly adjusted
- Fuel tank mounted securely
- Torque link tightened properly
- Pivot shaft tightened to correct torque
- Engine mounting nuts tightened to correct torque
- Engine and rear sprockets not worn or damaged
- Brakes function properly and both cables with proper play or travel.

## ALTERATIONS

### 1. Tires

Tire patterns differ considerably from one maker to the next. Choose tires according to personal preference and the suggestions given below:

**Pebbles sand**

Choose tires which have a relatively shallow pattern so that the tires will not dig a hole in the ground and have extra width to reduce pressure per unit of ground contact. Inflate to a reduced air pressure.

**Grass**

Choose tires which have large blocks even if the width is not large. To increase tire response, inflate to slightly higher than standard air pressure.

**Hard surfaces**

In the case of hard surfaces, the pattern depth is not so important, but generally a wide pattern is preferred. Since too high a response may cause the tire to bource, inflate to slightly below standard air pressure.

**Mud**

Choose broader than average tires with widely spaced, large, protrusive blocks. Inflate to as low an air pressure as feasible.

### 2. Front Fork

Alteration of the stiffness or softness of the shock absorption can be achieved by using fork oil of a different viscosity. It may be desirable to change from the standard viscosity somewhat in order to suit individual body weight, riding technique, or other factors.

- The oil capacity per shock absorber is 153 cc (5.17 U.S. fl.oz.) and the standard oil is SAE 5W20.
- Add only 120 cc (4.16 U.S. fl.oz.) of fresh oil when changing the oil since about 30 cc (1.0 U.S. fl.oz.) remains inside the shock absorber.
- After adding the oil, measure the oil level, and adjust the quantity if necessary.
- To stiffen shock absorption, use oil of a higher viscosity.
- To soften shock absorption, use oil of a lower viscosity.

**NOTE:** Since oil quantity greatly influences damping performance do not change from the specified quantity.

### 3. Sprockets

- Choose sprockets to obtain the rear sprocket to engine sprocket tooth ratio that is appropriate for the course.
- High speed courses generally require a lower ratio and low speed courses a higher ratio.

| Engine Sprocket | Rear Sprocket | Fianl Reduction Ratio |
|---|---|---|
| 12 | 56 | 4.67 |
| 12 | 58 | 4.83 |
| 12 | 60 | 5.00 |
| 13 | 56 | 4.31 |
| 13 | 58 | 4.46 |
| STD 13 | 60 | 4.61 |

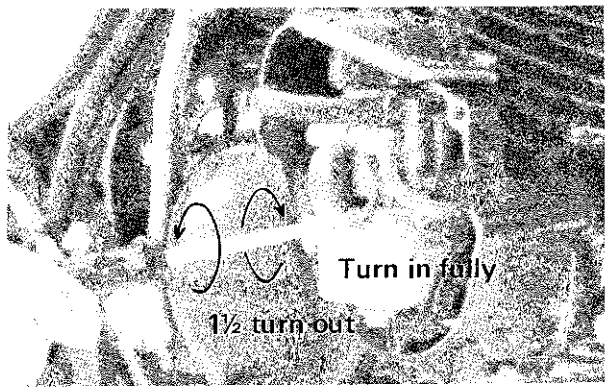
### 4. Carburetor

- Before carrying out any adjustments on the carburetor, thoroughly warm up the engine. Use the standard B-9EV spark plug when making adjustments.

**(1)0 ~ 1/8 throttle**

The fuel is metered by the pilot jet in this throttle range, which provides the rich mixture necessary at low rpm. Alteration of this mixture is effected by the position of the air screw. As the air screw is turned in, the mixture enrichens.

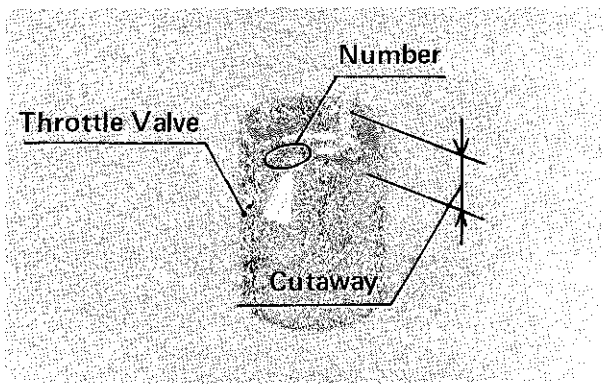
To achieve the standard air screw setting, turn in the air screw lightly until it stops, and then back it out 1½ turns.




**NOTE:** Do not screw in the air screw forcefully; turn it just until it stops.

**(2)1/8 ~ 1/2 throttle**

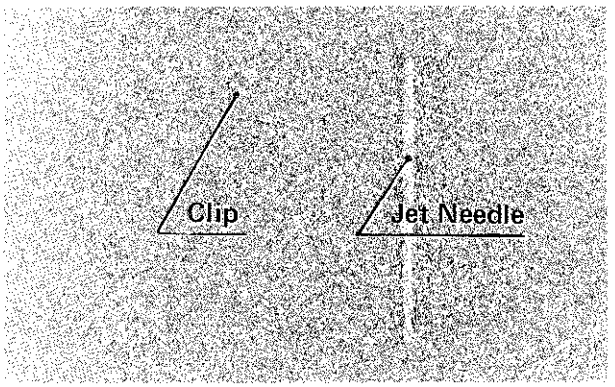
Alteration of the fuel mixture within this range is effected largely by the amount of throttle valve cutaway. The greater the amount of the cutaway, the leaner the mixture in this throttle range.




**(3)¼~¾ throttle**

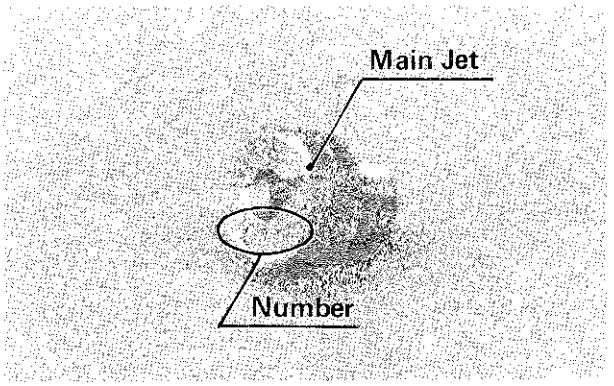
Alteration of the mixture in this range is effected by repositioning jet needle in the needle jet. The bottom part of the jet needle is tapered; as the throttle is opened, the cross sectional area of the jet needle/needle jet clearance becomes greater, increasing the fuel flow.

To change the position of the jet needle in the needle jet at a given throttle opening, move the clip, which is in one of 5 grooves at the upper part of the needle, to a higher or lower groove. Moving the clip to a higher groove makes the fuel/air mixture leaner; conversely, moving it lower makes the mixture richer.




**(4)¾~1 throttle**

Alteration of the mixture in this range is effected by main jet size. The larger the main jet, the greater the flow of fuel at a given throttle.




**(5)Standard Setting**

| | |
|---|---|
| Main Jet | 107.5R |
| Air Jet | 0.5 |
| Jet Needle | 4EJ3-3 |
| Needle Jet | P-O |
| Cutaway | 2.5 |
| Pilot Jet | 40 |
| Air screw (turn out) | 1½ |
| Fuel level | 28 ± 1 mm |

**(6)Influence of atmospheric pressure and temperature on carburetor settings**

- In areas at high altitude, where the air density is low due to the lower atmospheric pressure, less air enters the carburetor resulting in too rich a mixture for a carburetor that was adjusted properly at low altitude. To obtain the proper carburetor fuel/air mixture, it may be necessary to raise the clip on the jet needle and to exchange the main jet for one a size smaller.
- In particularly cold weather, the increased density of the air may necessitate a lower clip position on the jet needle and a size larger main jet to avoid an overly lean fuel/air mixture.
- Rainy weather also may influence the fuel/air mixture. As the temperature drops and the moisture content of the air rises, the air density decreases, which may result in too rich a fuel/air mixture.

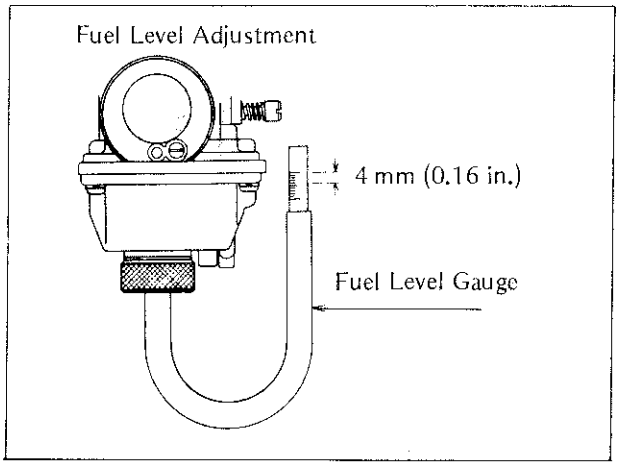
**(7)Selecting the correct main jet**

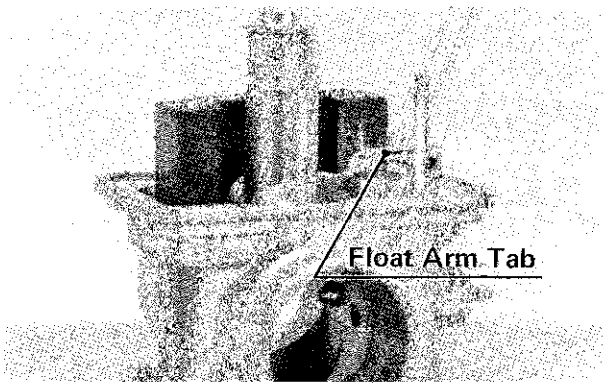
Choose a main jet that fulfills the following conditions:

- Highest rpm.
- Smooth transmission when accelerating from low rpm.
- Spark plug burning properly.
- Engine lugs without knocking.

**(8)Adjusting the fuel level**

- Close the fuel tap, and remove the main jet cover.
- Fit the fuel level gauge (special tool) into place.
- Open the fuel tap so that fuel will flow into the carburetor.
- Line up the uppermost part of the ruled portion of the gauge hose where the bottom edge of the carburetor body connects to the float bowl. The proper fuel level is 4 mm (0.16 in.) from the top of the ruled portion.
- If the fuel level is incorrect, open the float chamber, bend the tab on the float arm a slight amount, and then recheck the level readjusting if necessary.

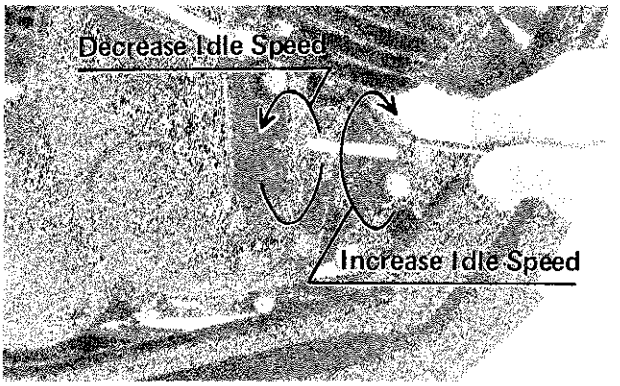



**(9)Idling adjustment**

Idling adjustment is carried out by turning the idling screw. Turning the screw clockwise increases idling speed by raising the height of the throttle valve at zero throttle. Conversely, turning the screw counterclockwise lowers decreases idling speed. Ordinarily for motocross the idling screw is backed out so that the engine stops at zero throttle whenever the machine is not in motion.

- Thoroughly warm up the engine.
- Pull out the plug on the idling screw grommet.
- Insert a solt screwdriver, and turn the idling screw to obtain the desired idling speed. If zero idling is desired, turn out the screw until the engine stops.




## 5. Handlebar

Alter or replace the handlebar for preference in height and width, and adjust the handlebar angle to attain the best riding position.

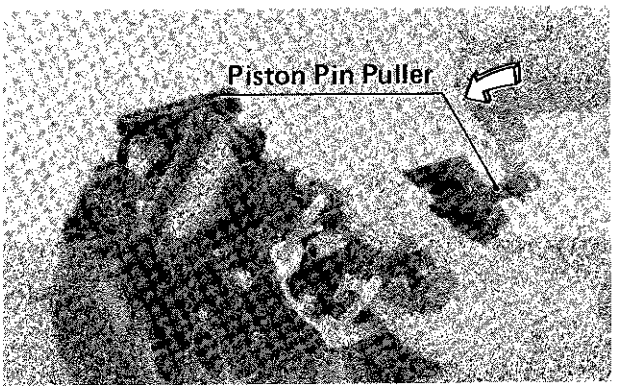
## ENGINE REMOVAL

- Put the transmission into neutral.
- Remove the muffler springs (5) and mounting bolt (13 mm), and remove the muffler.
- Undo the clip carefully from the drive chain master link using pliers, remove the master link, and free the chain from the engine sprocket.
- Place an oil pan beneath the engine, and remove the engine drain plug (19 mm) so that all the transmission oil drains out.
- Undo the magneto lead harness strap, remove the harness connector tape, and then disconnect the connector,
- Turn the fuel tap off, slide down the fuel hose clamp, and pull the hose off the tap.
- Remove the choke knob cotter pin, and remove the choke knob.
- Remove the bolts (4) from the carburetor rim, remove the carburetor cover screws (3), and remove the cover and gasket.
- Slide the rim and rubber cap up the cable.
- Pull the fuel hose off the carburetor.
- Pull off the carburetor, and prop it up out of the way.
- Loosen the air cleaner tube clamp screw.
- Remove the engine sprocket cover screws (3), and remove the cover.
- Remove the engine sprocket chain guard screws (2), and remove the guard.
- Remove the clutch cable holder and left engine cover screws (4), drop down the cover, and remove the gasket.
- Remove the shift pedal bolt and then the shift pedal.
- Remove the brake pedal spring.
- Remove the cotter pin from the tip of the brake pedal.
- Remove the engine mounting bolts (4).
- Lifting up on the front part of the engine, move the engine a little forward and then out the right side of the frame.

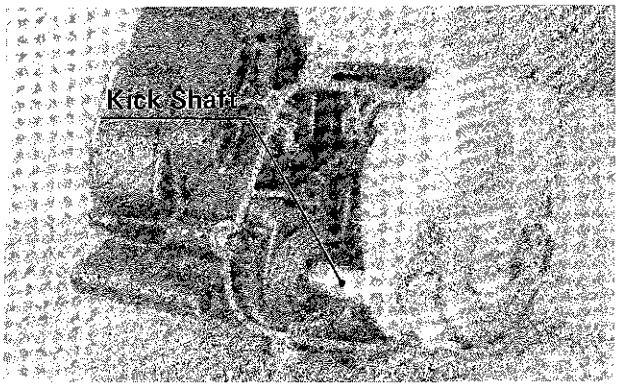
**NOTE:** Engine installation is the reverse of engine removal.

## ENGINE DISASSEMBLY

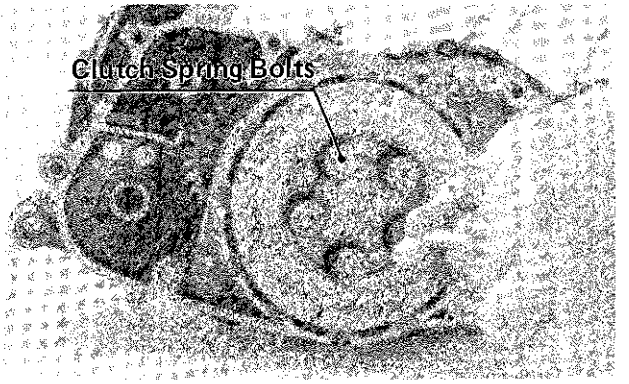
- Remove the kick pedal bolt (14 mm) and kick pedal.
- Take out the air cleaner tube screws (3), and remove the tube and gasket.
- Remove the cylinder head nuts (17 mm) (4), and remove the cylinder head and gasket.
- Lift off the cylinder.
- Remove the piston ring (2).
- Remove one of the piston pin snap rings with needle nose pliers.
- Using the piston pin puller (special tool), remove the piston pin from the side the snap ring was removed.



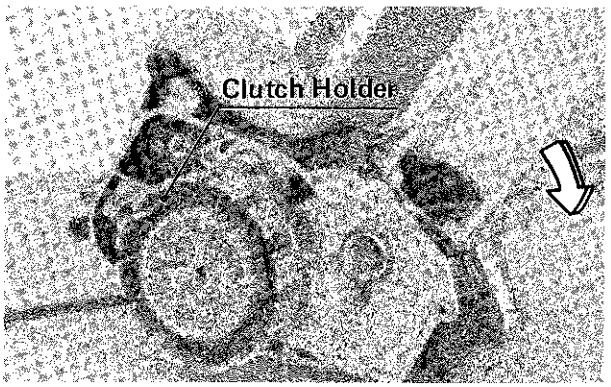

- Remove the piston and con-rod small end needle bearing.
- Remove the right engine cover screws (9).
- Remove the right engine cover and gasket.
- Remove the end of the kick spring from its stopper, and pull out the kickstarter assembly rotating the shaft counterclockwise.



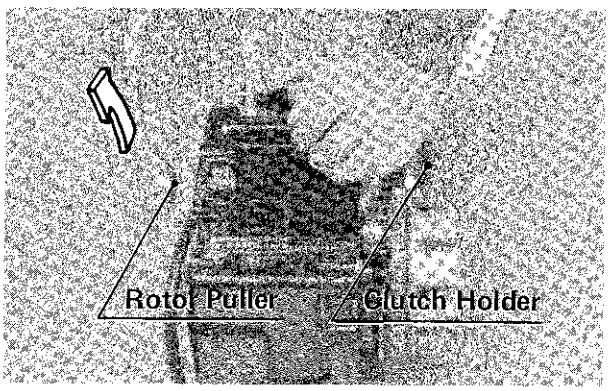

- Take out the clutch spring bolts (5).



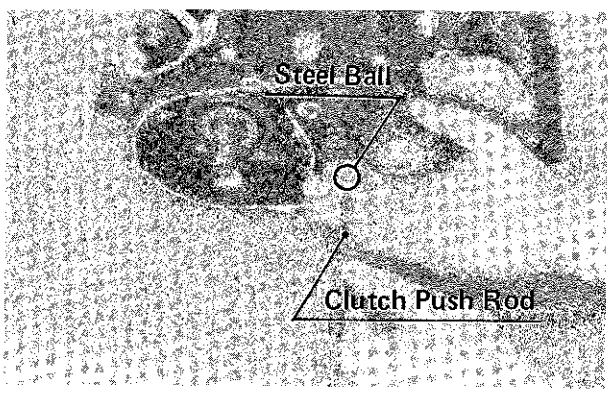
- Take off the spring plate and clutch pusher.
- Pull out the friction plates (5), steel plates (4), and steel rings (5).
- Fit the clutch holder (special tool) into the clutch housing.
- Remove the magneto rotor bolt (13 mm).



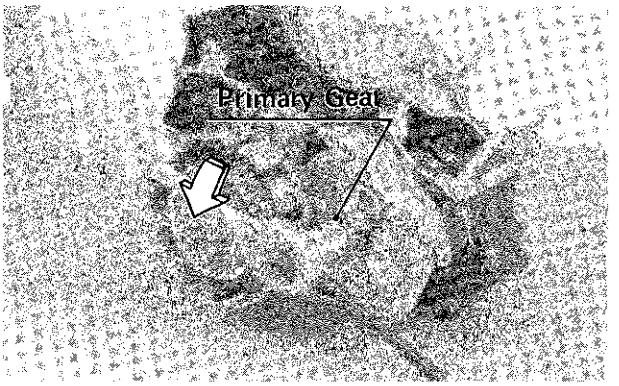

- Using the magneto puller (special tool), remove the magneto rotor, and then remove the woodruff key.



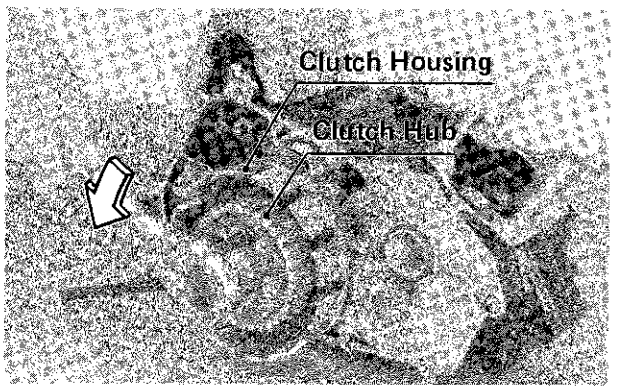

- Remove the magneto base screws (2) and then the magneto base.
- Remove the clutch push rod and the ball bearing from inside the drive shaft.



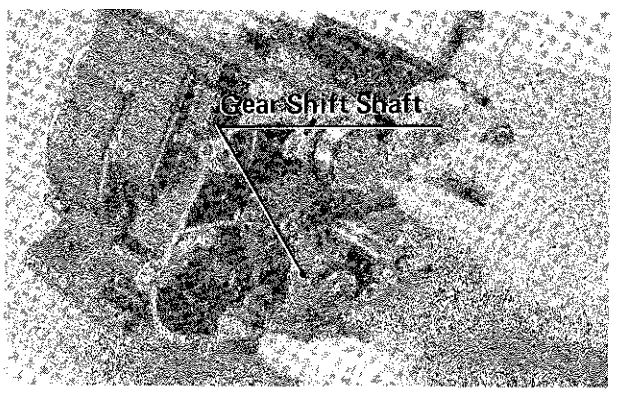

- Straighten the bent portion of the primary gear washer, and remove the primary gear nut (19 mm).



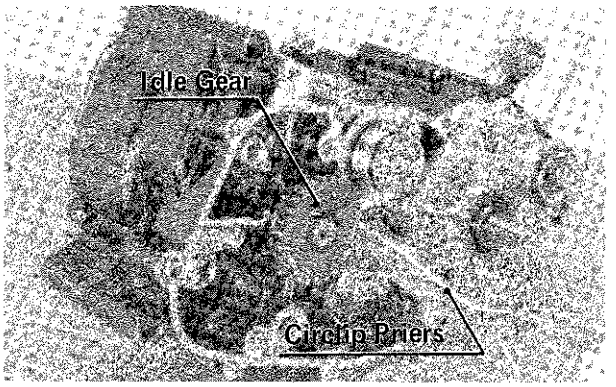

- Straighten the bent portion of the clutch hub washer, and remove the clutch hub nut (19 mm).



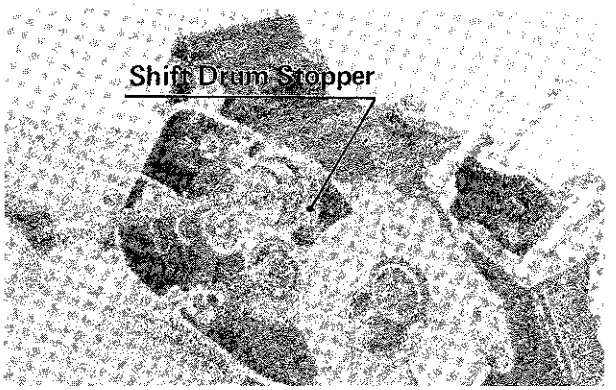

- Remove the clutch holder.
- Remove the tooth washer, clutch hub, thrust washer, clutch housing, drive shaft idle gear, and then thrust washer.
- Remove the tooth washer, primary gear, and woodruff key.
- Move the external shift mechanism pawl out of its position on the end of the shift drum, and pull the external shift mechanism shaft out of the crankcase.



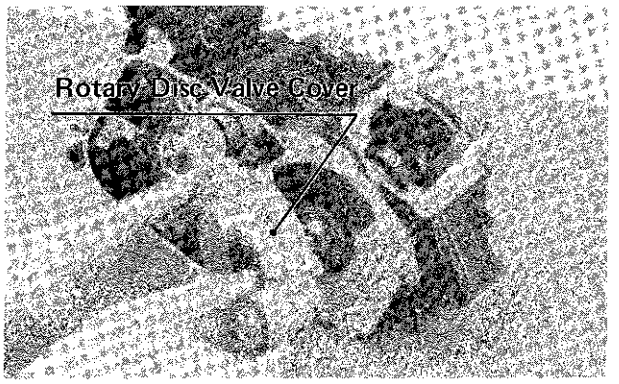

- Remove the circlip, thrust washer, output shaft idle gear, and thrust washer.



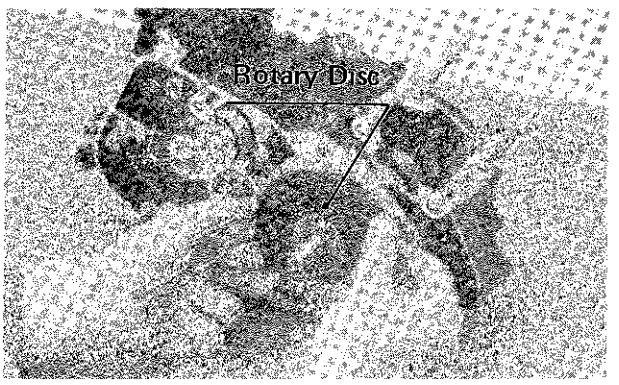

- Remove the shift drum stopper screws (2) and then the stopper.



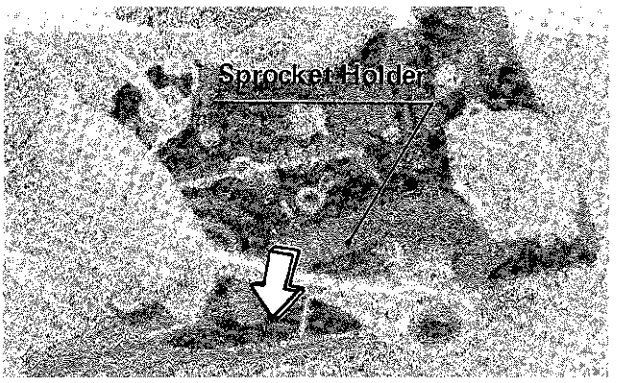

- Remove the rotary disc valve cover screws (5) and then the cover.



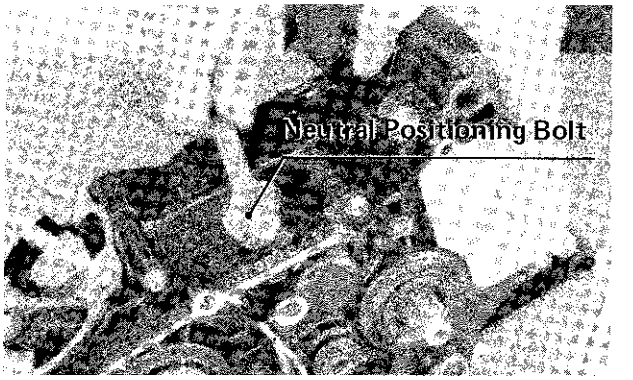

- Remove the rotary disc.



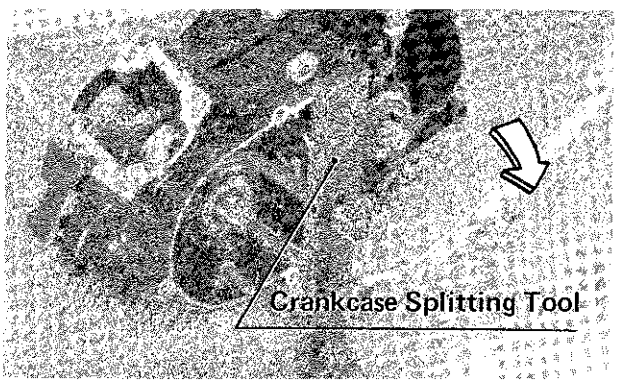

- Pull off the sleeve, **O** ring, and crankshaft pin.
- Straighten the bent portion of the engine sprocket tooth washer.
- Using the engine sprocket holder (speical tool) to keep the engine sprocket steady, remove the engine sprocket nut (19 mm) and tooth washer.



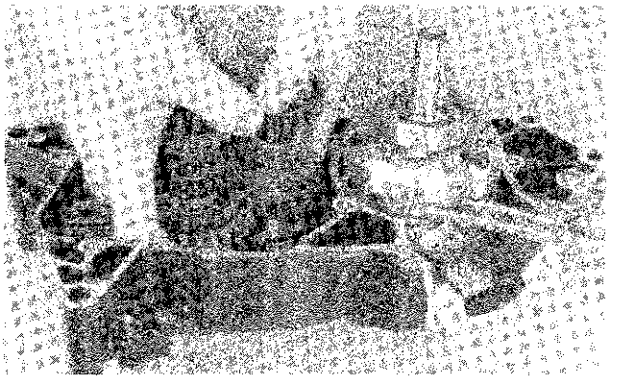

- Pull off the engine sprocket, collar, and **O** ring.
- Remove the shift drum positioning bolt, gasket, spring, and pin.



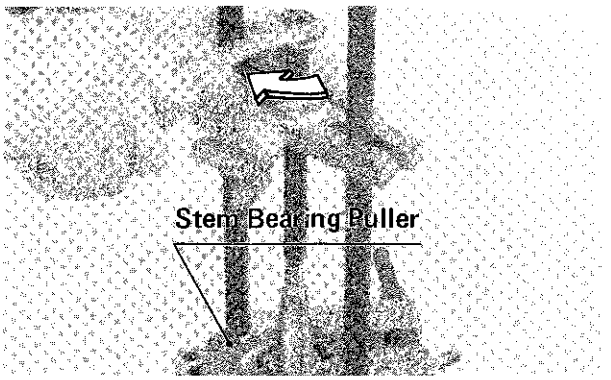

- Remove the Oil Pump Cover Screw & Cover.
- Remove the crankcase screws (12) with an impact driver. The dummy screws (2) need not be removed.
- Screw the crankcase splitting tool (special tool) into the left side of the crankcase.
- After making sure that the tool is screwed in all the way, tighten the bolt on the tool to split the crankcase.



- Pull out the shift fork rods (2).
- Slipping the shift fork guide pins out of the shift drum grooves, pull out the shift drum.
- Remove the shift forks (3).
- Remove the drive shaft and output shaft assemblies.



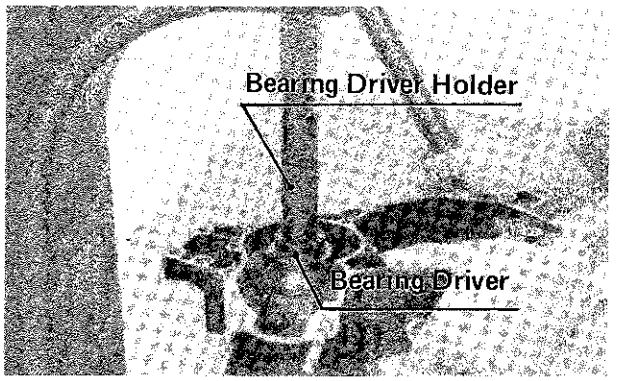
- Remove the left crankshaft bearing from the crankshaft using the stem bearing puller (special tool).



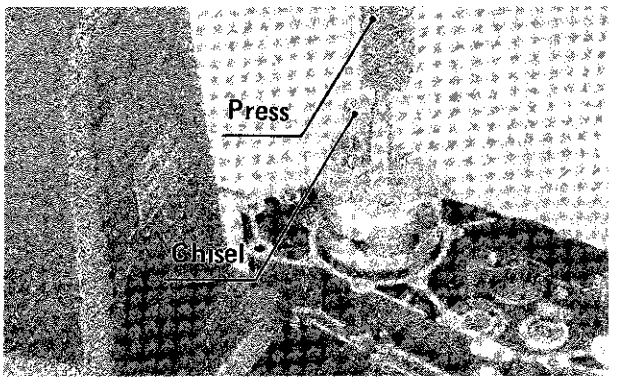

- Striking the end of the crankshaft with a plastic, soft brass, or lead hammer, remove the crankshaft from the right crankcase half.

## ENGINE ASSEMBLY

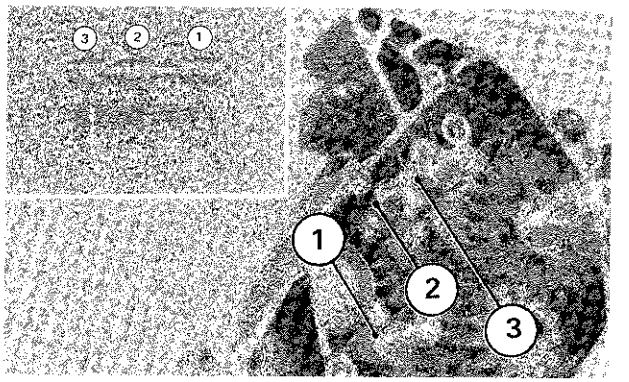
- Using a press and the bearing driver and driver holder (special tools), press the left crankcase bearing into the left crankcase half.



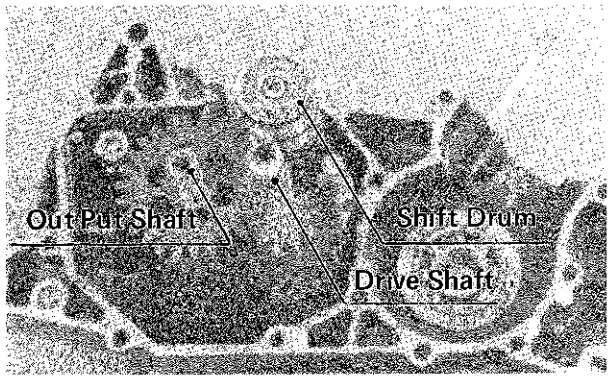

- Insert a chisel or wedge between the crankshaft flywheels opposite the con-rod big end to protect flywheel alignment as shown in the figure, and fit the crankshaft into the right crankcase half using a press.



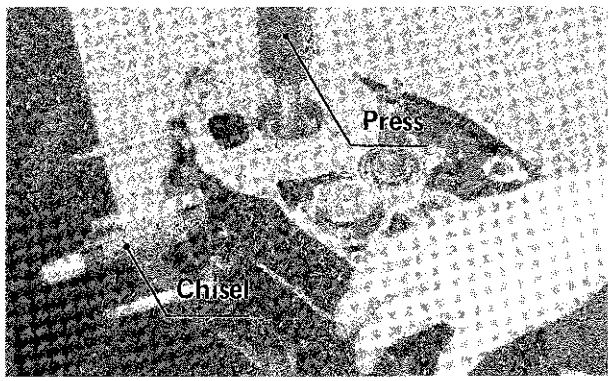

- Mesh the output shaft groove and drive shaft gears together, and fit this assembly into the left crankcase half.
- Fit each shift fork into the groove on its gear. Be sure that the shift forks don't get mixed up.



- Fit the shift drum into the left crankcase half fitting each shift fork guide pin into its shift drum groove.
- Insert the shift fork rods.

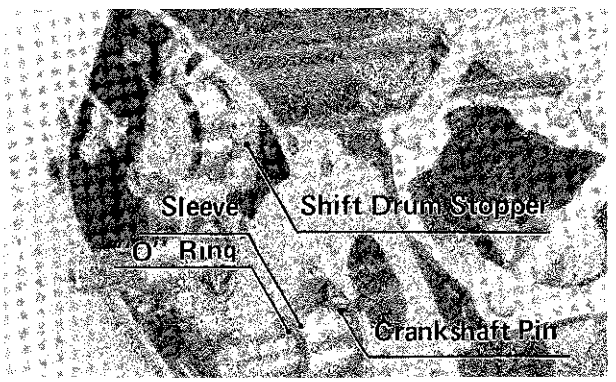



- Apply liquid gasket to the engine fitting surface of the left crankcase half, and fit the crankcase halves together using a press on the end of the crankshaft.



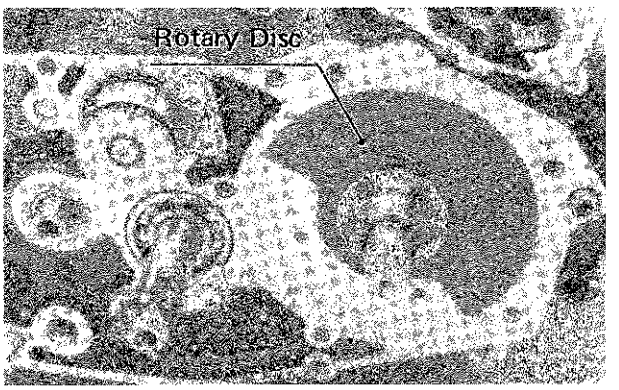

**CAUTION: To avoid damage to the crankcase, be sure that the crankcase halves fit together straight onto the knock pins.**

- **Tighten the crankcase screws (12).**
- **Replace the shift drum positioning pin, spring, gasket, and bolt.**
- **Replace the shift drum stopper.**

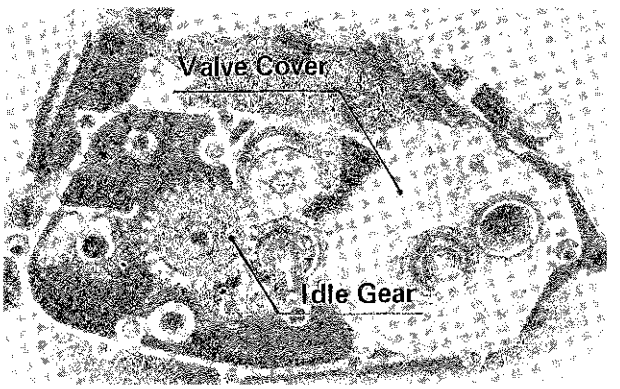



- Check to see that the crankshaft, driveshaft, and output shaft all turn freely.

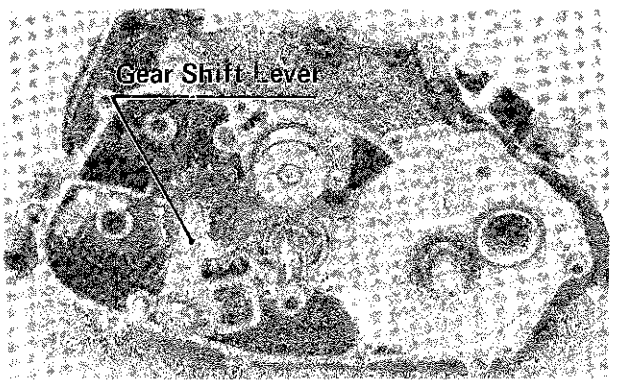
- Replace the crankshaft pin and sleeve onto the right side of the crankshaft. The O ring goes between the sleeve and the crankshaft.
- Fit the rotary disc back in place, replace the cover, and tighten its screws.




- Replace the thrust washer, output shaft idle gear, thrust washer, and then circlip back on the output shaft.

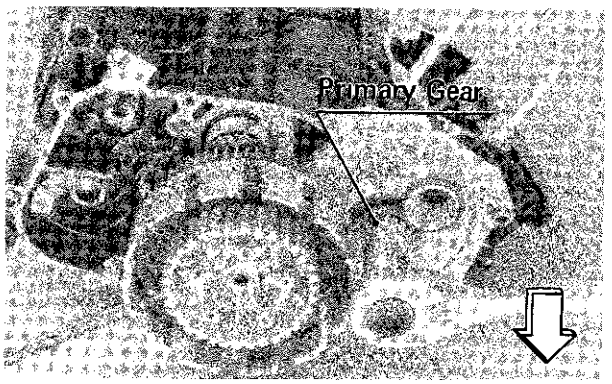



- Run the external shift mechanism shaft back through the crankcase, and fit its pawl back on the shift drum pins.

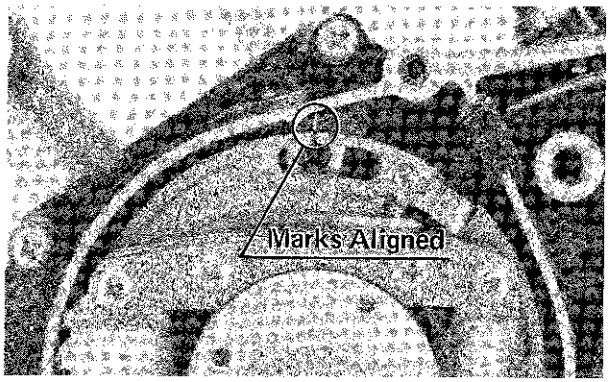



- Replace the woodruff key onto the right side of the crankshaft, and replace the primary gear, tooth washer, and nut, tightening the nut loosely.
- Replace the thrust washer, sleeve, and drive shaft idle gear back on the drive shaft.

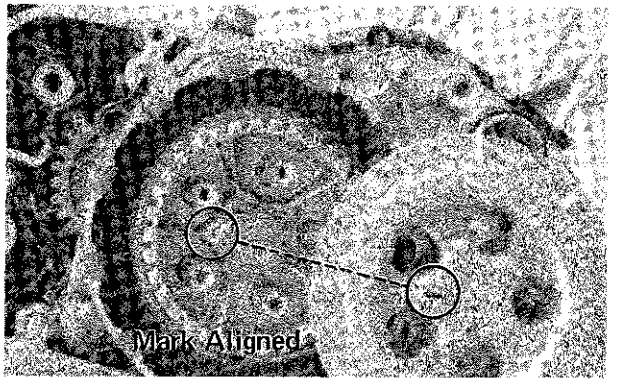
- Fit the clutch housing back on the drive shaft so that the rear of the housing will fit into the side of the idle gear.
- Replace the thrust washer, clutch hub, tooth washer, and then nut, tightening the nut loosely.
- Fit the clutch holder (special tool) into the clutch housing.
- Tighten the clutch hub nut and primary gear nut, and bend back a portion of each tooth washer on one side of its nut.



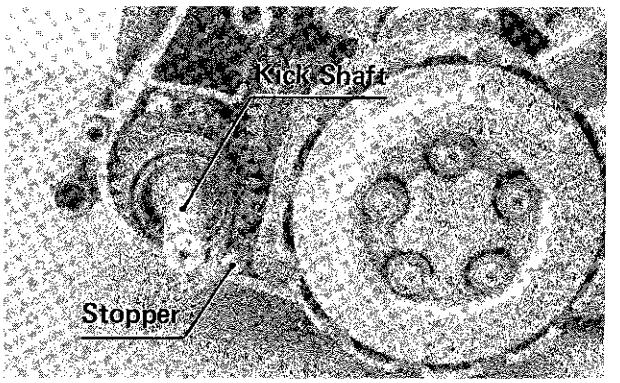

- Replace the woodruff key on the left side of the crankshaft, and replace the magneto rotor and lock washer.
- Tighten the rotor bolt.
- Replace the magneto base so that the base timing mark and the crankcase timing mark are aligned. Tighten its screws, and remove the clutch holder.



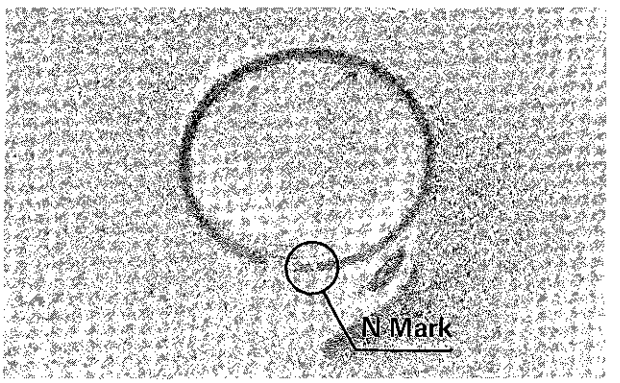

- Replace the clutch plates. The sequence is friction plate, steel ring, steel plate, friction plate, steel ring, etc. finishing with a steel ring.
- Replace the clutch pusher, and fit the spring plate back into place aligning the mark on the plate with the washer tooth hole in the hub.



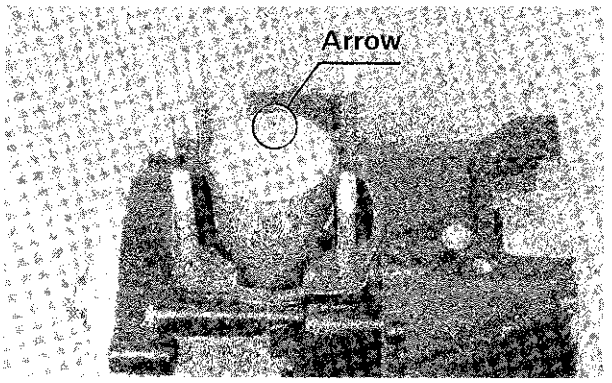

- Replace the spring bolts (5), each with its washer and spring.
- Push the kickstarter assembly back into place, and fit the kick spring back onto the stopper.




- Replace the right engine cover and gasket, and tighten its screws (9).
- Replace the ball bearing and then the clutch push rod into the drive shaft.
- Replace the piston rings with the "N" mark facing up.



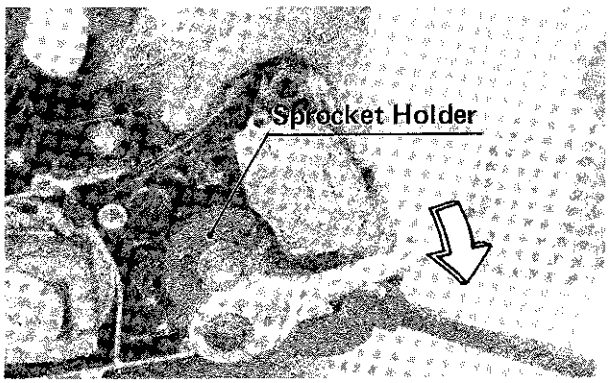

- Fit the con-rod small end needle bearing into the con-rod.
- Replace the piston and piston pin. The arrow on the top of the piston must point towards the front.




- Fit the piston pin snap ring into the side of the piston.
- Fit a new cylinder base gasket into place.
- Set the piston at BDC, and fit the base of the cylinder on the rings, pressing in on the rings as necessary. Each ring must remain in its proper position with the piston ring groove pin between the ends of its ring.
- Replace the cylinder head gasket, cylinder head, and nuts (4).

**CAUTION: Be sure that the gasket holes perfectly match the cylinder holes.**

- Tighten the cylinder head nuts evenly in a cross pattern.
- Replace the Oil Pump Cover Screw & Cover.
- Replace on the output shaft the O ring and collar.
- Replace the engine sprocket, tooth washer, and nut. Tighten the nut while holding the sprocket steady with the engine sprocket holder (special tool).




- Bend one portion of the engine sprocket tooth washer over one side of its nut.
- Replace the air cleaner gasket and tube, tightening its its screws (3).
- Replace the kick pedal and bolt.

## MAINTENANCE

**(1)Cylinder, Piston**

**Cylinder wear**

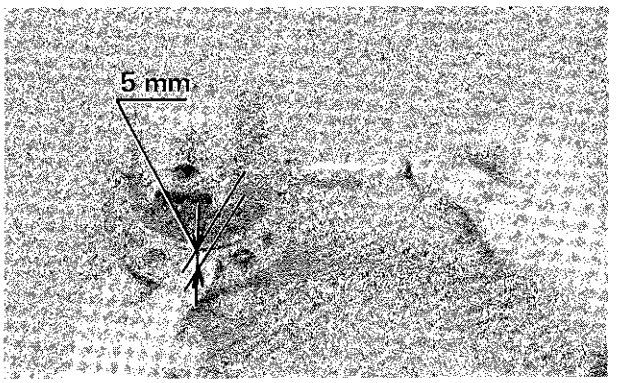
Since there is a difference in cylinder wear in different directions, take a side to side and a front to back measurement at each of three locations (total of six measurements) using an inside micormeter or a cylinder gauge. If any measurement exceeds the service limit, or if there is a difference of more than 0.05 mm (0.002 in) between any two measurements, the cylinder must be replaced for a new one.

**Cylinder Inside Diameter**

| Standard | Service Limit |
|---|---|
| 56.000~56.020 mm<br>(2.20~2.21 in) | 56.100<br>2.205 in |

**Piston wear**

Measure the outside diameter of the piston 5 mm (0.2 in) up from the bottom of the piston at a right angle to the direction of the piston pin using a micrometer. If the measurement is under the service limit, replace the piston.




**Piston Diameter**

| Standard 980 | Service Limit |
|---|---|
| 55.950~55.980 mm<br>(2.203~2.204 in) | 55.80 mm<br>(2.197 in) |

**Piston/cylinder clearance**

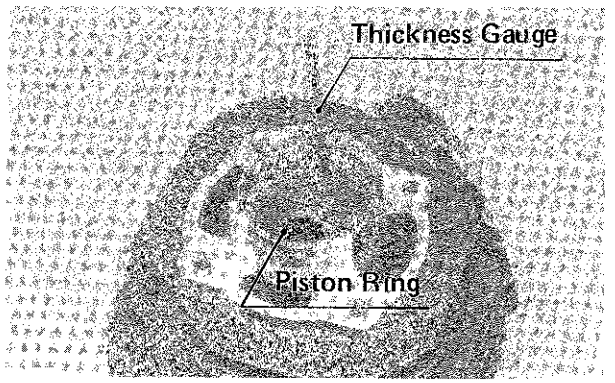
In order to maintain proper piston/cylinder clearance, the piston/cylinder clearance is determined whenever the piston or cylinder is replaced for a new one. The most accurate way to find the clearance is to make separate piston and cylinder measurements and then compute the difference between the two calues. Measure the piston diameter as just described, and measure the cylinder diameter at the very bottom of the cylinder.

**Piston/Cylinder Clearance**

| Standard |
|---|
| 0.030~0.060 mm<br>(0.001~0.002 in) |

**Piston ring end gap**

Place the piston ring being checked inside the cylinder close to the bottom where the wear is low. Measure the gap between the ends of the rings with a thickness gauge. If the gap is wider than the service limit, the ring is overworn and must be replaced.



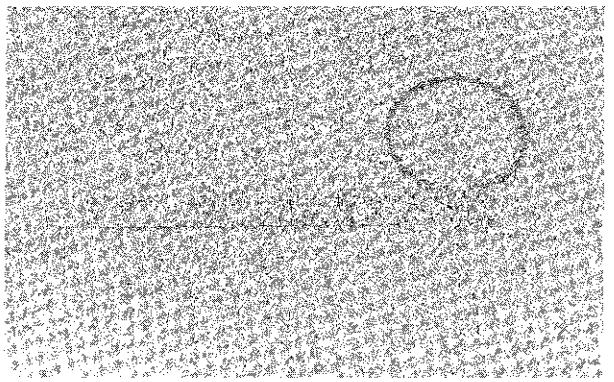

**Ring End Gap**

| Standard | Service Limit |
|---|---|
| 0.15~0.35 mm (0.006~0.014 in) | 0.6 mm (0.256 in) |

**Piston ring tension**

Piston ring tension can be evaluated by measuring the gap between the ends of the ring with the ring free of any restraint. If the gap is less than the service limit, the ring is weak and must be replaced.

**NOTE:** The top ring and second ring are identical.



**Ring Free Gap**

| Standard | Service Limit |
|---|---|
| 5 mm (0,197 in) | 2 mm (0.079 in) |

**Piston, piston pin, con-rod small end wear**

Measure the diameter of the piston pin with a micrometer. If the piston pin diameter is less than the service limit at any point, replace the piston pin.

Using a cylinder gauge, measure the diameter of both piston pin holes in the piston and the inside diameter of the con-rod small end. If either piston pin hole diameter exceeds the service limit, replace the piston. If the con-rod small and diameter exceeds the service limit, replace the con-rod.

**Piston Pin, Pin Hole, Small End Dia**

| Standard | | Service Limit |
|---|---|---|
| Piston Pin | 13.994~14.000 mm (0.5510~0.5512 in) | 13.96 mm (0.550 in) |
| Pin Hole | 13.9985~14.0065 mm (0.5511~0.5514 in) | 14.08 mm (0.554 in) |
| Small End | 18.003~18.014 mm (0.7075~0.7079 in) | 18.05 mm (0.711 in) |

**(2)Crankshaft**

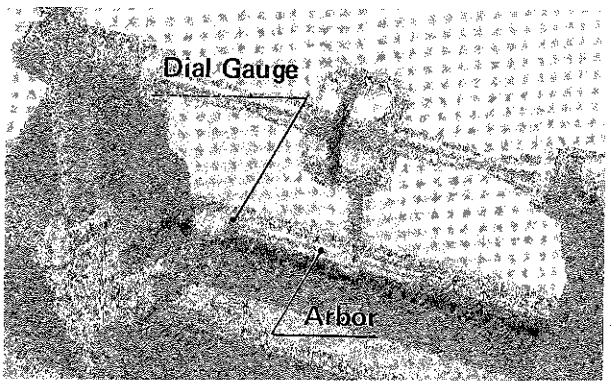
**Conrod bending, twisting**

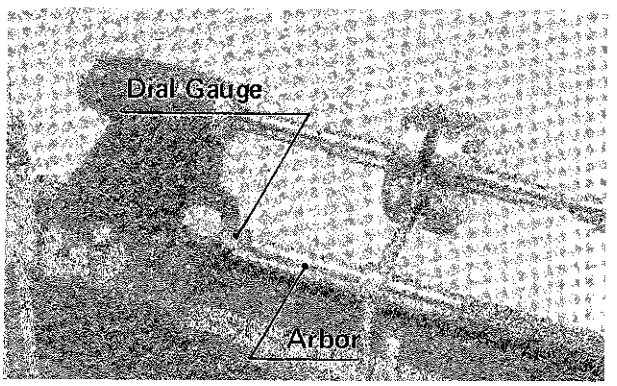
Set the crankshaft in a flywheel alignment jig or on V blocks on a surface plate. Select an arbor of the same diameter as the piston pin and of optional length, and insert it through the small end of the con-rod.

Using a height gauge or dial gauge, measure the difference in the height of the rod above the surface plate over a 100 mm (4 in) length to determine the amount the con-rod is bent.

Using the arrangement shown in the figure, measure the amount that the arbor varies from being parallel with the crankshaft over a 100 mm (4 in) length of the arbor to determine the amount the con-rod is twisted.

If either of the above measurements exceeds the service limit, the crankshaft assembly must be replaced.



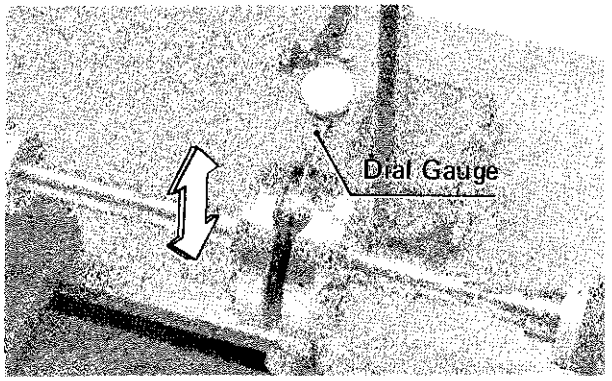

**Con-rod Bend, Twist**

| | Standard | Service Limit |
|---|---|---|
| Bend | 0.05/100 mm (0.002/3.93 in) | 0.2 mm (0.008 in) |
| Twist | 0.05/100 mm (0.002/3.93 in) | 0.2 mm (0.008 in) |

**Con-rod big end radial clearance**

Set the crankshaft in a flywheel alignment jig or on V blocks. Placing a dial gauge against the con-rod big end, push the con-rod first towards the gauge and then in the opposite direction. The difference between the high and low reading is the radial clearance.

If the radial clearance exceeds the service limit, replace the crankshaft assembly.

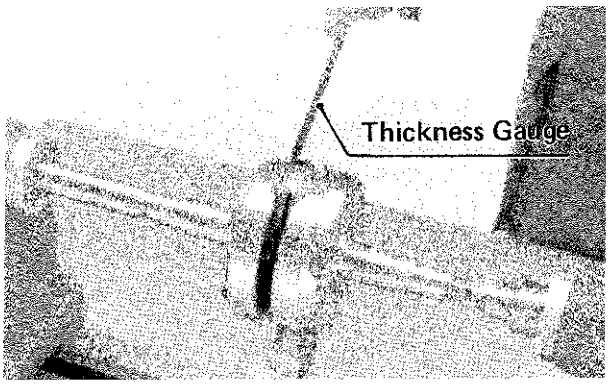



**Radial Clearance**

| Standard | Service Limit |
|---|---|
| 0.0192~0.035 mm1<br>(0.0008~0.0014 in) | 0.080 mm<br>(0.0031 in) |

**Crankshaft big end side clearance**

Measure the side clearance of the con-rod with a thickness gauge. If the clearance exceeds the service limit, replace the crankshaft assembly.

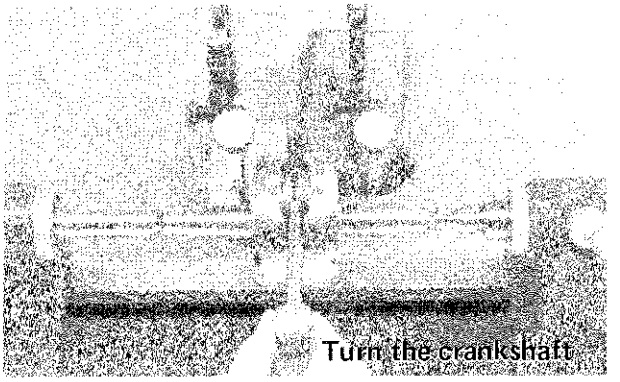



**Side Clearance**

| Standard | Service Limit |
|---|---|
| 0.35~0.40 mm<br>(0.014~0.016 in) | 0.6 mm<br>(0.024 in) |

**Crankshaft runout**

Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge on each side of the crankshaft. Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout. If the runout exceeds the service limit, replace the crankshaft assembly.




**Crankshaft Runout**

| Standard | Service Limit |
|---|---|
| 0.04 mm<br>(0.0016 in) | 0.1 mm<br>(0.0039 in) |

**(3)Clutch**

**Clutch spring tension**

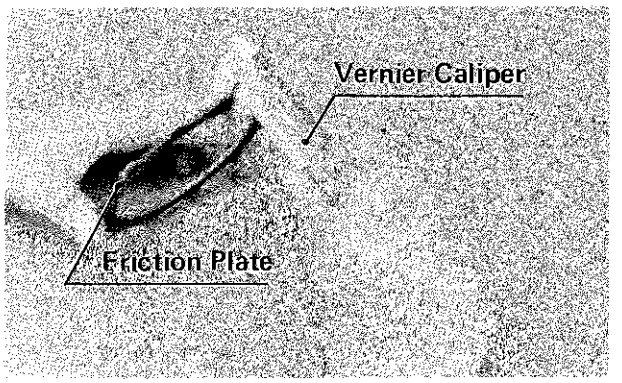
Measure the free length of the clutch springs with venier calipers. If any spring is shorter than the service limit, replace all the springs as a set to ensure even tension on the clutch plates.

**Clutch Spring Free Length**

| Standard | Service Limit |
|---|---|
| 33.1 mm<br>(1.303 in) | 31.6 mm<br>(1.244 in) |

**Friction plate wear, damage**

Visually inspect the friction plates to see whether or not they show any signs of heat seizure or have become rough or unevenly worn. Measure the thickness of the plates with vernier calipers. If any plates show signs of damage, or if they have worn past the service limit, replace them for new ones.

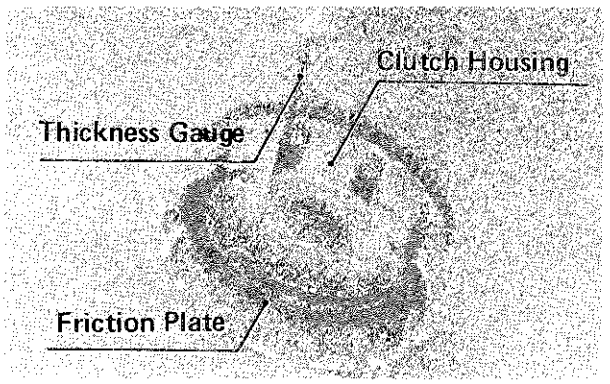



**Friction Plate Thickness**

| Standard | Service Limit |
|---|---|
| 2.9~3.1 mm<br>(0.114~0.122 in) | 2.5 mm<br>(0.098 in) |

**Friction plate/clutch housing clearance**

Measure the clearance between the tangs on the friction plates and the fingers of the clutch housing. If this clearance is excessive, the clutch will be noisy. If the clearance exceeds the service limit, replace the friction plates.

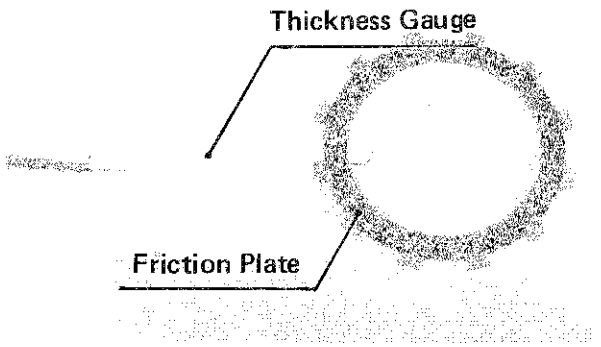



**Friction Plate/Clutch Housing Clearance**

| Standard | Service Limit |
|---|---|
| 0.05~0.35 mm (0.0020~0.0138 in) | 0.65 mm (0.0256 in) |

**Clutch plate warp**

Place each friction plate and each steel plate on a surface plate, and measure the gap between each clutch plate and the surface plate, This gap is the amount of clutch plate warp. Replace any plates warped over the service limit.




**Clutch Plate Warp**

| Standard | Service Limit |
|---|---|
| under 0.3 mm (under 0.0118 in) | 0.050 mm (0.0197 in) |

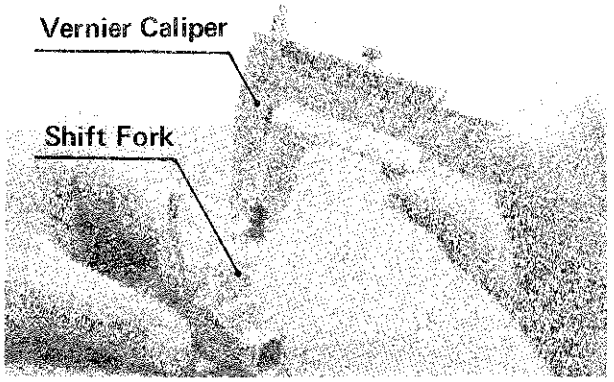
**(4) Transmission**

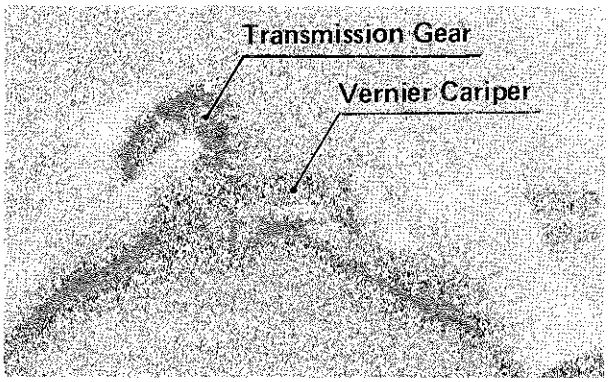
**Shift fork bending**

Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting or allow the transmission when under power to lump out of gear.

**Shift fork, gear groove wear**

Measure the thickness of the ears of each shift fork, and measure the width of the shift fork groove on 3rd and 4th gears (drive) and 5th and 6th gears (output). If the thickness of a shift fork ear is under the service limit, the shift fork must be replaced. If a gear shift fork groove is worn over the service limit, the gear must be replaced.




**Shift Fork Thickness**

| | Standard | Service Limit |
|---|---|---|
| #1 | 4.9~5.0 mm (0.193~0.197 in) | 4.8 mm (0,189 in) |
| | 3.9~4.0 mm (0.154~0.157 in) | 3.8 mm (0.150 in) |

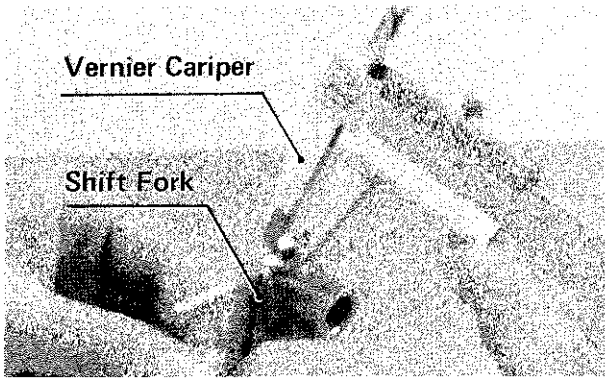
**Gear Shift Fork Grove Width**

| | Standard | Service Limit |
|---|---|---|
| #1 | 5.08~5.17 mm (0.200~0.204 in) | 5.27 mm (0.207 in) |
| #2 | 4.08~4.17 mm (0.161~0.164 in) | 4.27 mm (0.168 in) |

**NOTE:** #1 Valves are for drive shaft 5th & 6th gear shift fork & gear shift fork grooves. #2 Valves are for the remaining two shift forks and shift fork grooves.

**Shift fork guide pin/shift drum groove wear**

Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove. Replace any shift fork on which the guide pin has worn past the service limit. If a shift drum groove is worn past the service limit, replace the shift drum.




**Shift Fork Guide Pin Diameter**

| Standard | Service Limit |
|---|---|
| 5.9~6.0 mm (0.232~0.236 in) | 5.85 mm (0.230 in) |

**Shift Drum Groove Width**

| Standard | Service Limit |
|---|---|
| 6.05~6.20 mm (0.238~0.244 in) | 6.25 mm (0.246 in) |

**(5)Rotary disc valve**

**Rotary disc wear, damage**

With the rotary disc in place on the side of the crankcase, see whether or not the disc hub fits firmly on the crankshaft. Visually inspect the disc. If the disc is loose on the crankshaft or if it is cracked or warped, replace it.

Measure the thickness of the disc. Replace it if it is worn past the service limit.

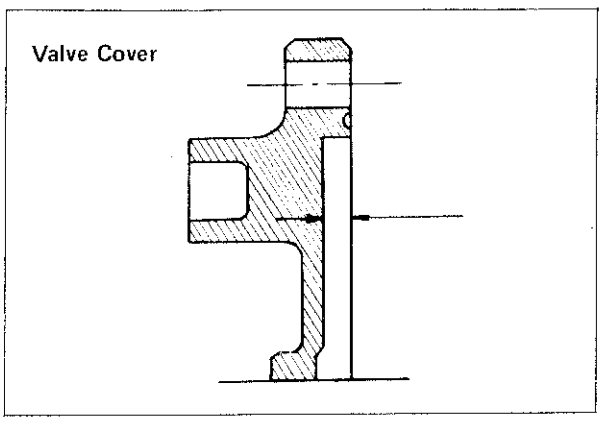
**Rotary Disc Thickness**

| Standard | Service Limit |
|---|---|
| 0.36~0.44 mm (0.0142~0.0173 in) | 0.25 mm (0.0098 in) |

**Valve cover wear, damage**

Visually inspect the valve cover. If it has abrasions or scratches, replace it.

Measure the depth of the inner surface of the valve cover. Replace the cover if the inner surface is worn past the service limit.




**Valve Cover Inner Surface Depth**

| Standard | Service Limit |
|---|---|
| 0.6~0.7 mm (0.024~0.028 in) | 1.0 mm (0.039 in) |

**(6)Wheel**

**Rim runout**

Set a dial gauge to the side of the rim, and rotate the wheel to measure axial runout. The difference between the highest and lowest dial reading is the amount of runout,

Set the dial gauge to the inner circumference of the rim, and rotate the wheel to measure radial runout. The difference between the highest and lowest dial reading is the amount of runout.

A certain amount of rim warp (runout) can be corrected by recentering the rim, that is, loosen some spokes and tighten others to change the position of different parts of the rim. If the rim is badly bent, however, it should be replaced.

**Rim Runout**

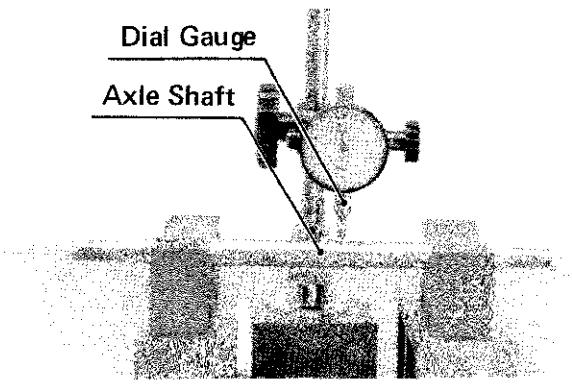
| | Standard | Service Limit |
|---|---|---|
| Axial | under 1.0 mm (under 0.039 in) | 3.0 mm (0.118 in.) |
| Radial | under 1.0 mm (under 0.039 in.) | 2.0 mm (0.079 in.) |

**Axle bend**

A bend axle causes vibration, poor handling, and intability.

To measure axle runout, remove the axle, place it in V blocks that are 100 mm (4.0 in.) apart, and set a dial gauge to the axle at a point halfway between the blocks. Turn the axle to measure the urnout. The amount of runout is the amount of dial variation.

If runout exceeds the service limit, straighten the axle or replace it. If the axle cannot be straightened to within tolerance, or if runout exceeds 0.7 mm (0.028 in.) replace the axle.




**Axle Bend**

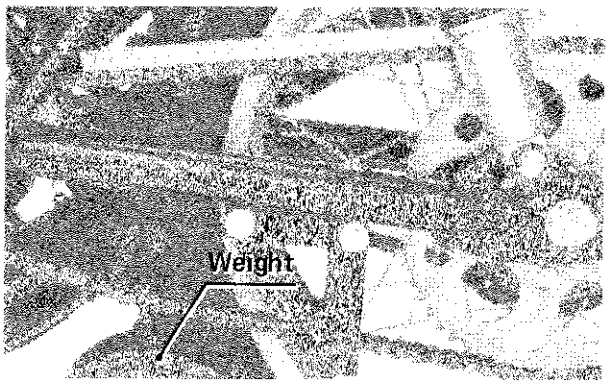
| | Standard | Service Limit |
|---|---|---|
| Front Axle | under 1 mm (under 0.004 in) | 0.2 mm (0.008 in) |
| Rear Axle | under 0.05 mm (under 0.002 in) | 0.2 mm (0.008 in) |

**(7)Drive Chain**

**Drive chain wear**

When the chain has worn so much that it is more than 2% longer than when new, it is no longer safe for use and should be replaced. Whenever the chain is replaced, inspect both the engine and rear sprockets, and replace for new ones if necessary. Overworn sprockets will cause a new chain to wear quickly.

Since it is impractical to measure the entire length of the chain, determine the degree of wear by measuring a 20 link length of the chain. Stretch the chain taut either by using the chain adjuster, or by hanging a 10 kg (20 lb.) weight on the chain. Measure the length of 20 links on a straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. If the length is greater than the service limit, the chain should be replaced.




**Drive Chain Length**

| | Standard | Service Limit |
|---|---|---|
| 20-link Length | 254 mm (10.0 in) | 260 mm (10.21 in) |

**(8)Sprockets**

**Sprocket wear**

Visually inspect the sprocket teeth. If they are worn as illustrated, replace the sprocket.

Measure the diameter of the sprocket at the base of the teeth. If the sprocket is worn down to less than the service limit, replace the sprocket.

**Sprocket Diameter**

| | Standard | Service Limit |
|---|---|---|
| Engine | 44.56 mm (17.54 in) | 44 mm (1.73 in) |
| Rear | 226.09 mm (8.90 in) | 224 mm (8.82 in) |

**(9)Brakes**

**Brake drum wear**

Measure the inside diameter of the brake drum with calipers to determine wear. Since uneven drum wear will decrease braking effectiveness, take measurements at a minimum of two places. If any diameter measurement exceeds the service limit, the hub must be replaced.

**Brake Drum Inside Diameter**

| | Standard | Service Limit |
|---|---|---|
| Front | 120~120.14 mm (4.72~4.73 in) | 120.75 mm (4.75 in) |
| Rear | 130~130.14 mm (5.118~5.124 in) | 130.75 mm (5.15 in) |

**Brake shoe lining wear**

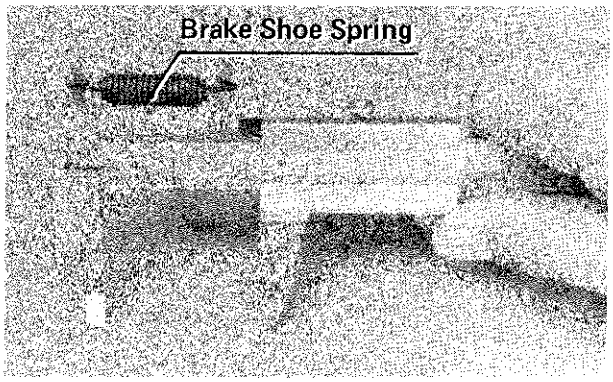
Check the thickness of the brake linings, and replace both shoes as a set if the thickness at any point is less than the service limit. If the thickness of the brake linings is sufficient, check the linings for uneven wear, and file or sand down any high spots. With a wire brush, remove any foreign particles imbedded in the lining surface. Wash off any oil or grease with gasoline. In case the linings are damaged or the surface cannot be restored by sanding and cleaning, the shoes must be replaced.

**Brake Lining Thickness**

| Standard | Service Limit |
|---|---|
| 4 mm (0.16 in) | 2 mm (0.08 in) |

**Brake shoe spring tension**

If the brake springs become stretched, they will not pull the shoes back away from the drum after the brake lever or pedal is released, causing the shoes to drag on the drum. Remove the springs, and check their free length with cernier calipers. If either is stretched beyond the service limit, replace both springs.



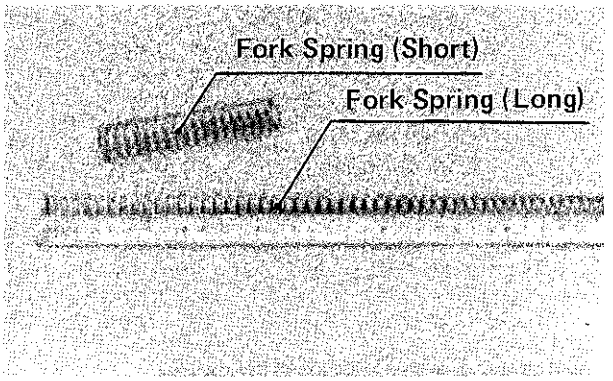

**Brake Spring Free Length**

| | Standard | Service Limit |
|---|---|---|
| Long | 44.5~45.5 mm (1.749~1.788 in) | 48 mm (1.886 in) |
| Short | 30.8~31.2 mm (1.210~1.226 in) | 34 mm (1.336 in) |

**(10) Front Fork**

**Front fork spring tension**

Since the springs become shorter as they weaken, check their free length to determine their condition. Replace any spring which is shorter than its service limit. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the shock absorbers balanced for motorcycle stability.




**Front Spring Free Length**

| | Standard | Service Limit |
|---|---|---|
| Long | 417.5 mm (16.408 in) | 405 mm (15.917 in) |
| Short | 80.5 mm (3.164 in) | 78 mm (3.065 in) |

# APPENDIX

## 1. Troubleshooting

### Engine doesn't start or starting difficulty

**(1) Engine won't turn over**
- Cylinder, piston seizure
- Con-rod small end seizure
- Con-rod big end seizure
- Transmission gear or bearing seizure
- Kick return spring broken
- Kick gear not engaging

**(2) Compression low**
- Cylinder worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal defective

**(3) No spark or spark weak**
- Spark plug defective
- Spark plug cap poorly connected or shorted
- Ignition coil defective
- Wiring open or shorted
- Magneto defective (layer short)

**(4) No fuel flow**
- No gasoline in fuel tank
- Fuel tap clogged
- Fuel hose clogged
- Float valve clogged
- Pilot jet clogged

**(5) Flooded**
- Float level too high
- Float valve worn or stuck open

### Poor running at low speed

**(1) Spark weak**
- Spark plug defective
- Ignition coil defective
- Spark plug cap, high tension cord short
- Spark plug gap excessive

**(2) Mixture too rich or too lean**
- Air screw maladjusted
- Pilot jet or air passage clogged
- Throttle stop screw maladjusted
- Starter plunger stuck open
- Float level too high or too low
- Air cleaner clogged
- Intake manifold loose
- Tank cap air vent obstructed

**(3) Compression low**
- Cylinder worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal defective

**(4) Other**
- Ignition timing incorrect
- Oil viscosity too high

## Poor running or no power at high speed

**(1) Mixture too rich or too lean**
- Air cleaner clogged
- Intake manifold loose
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Starter plunger stuck open
- Tank cap vent obstructed
- Float level too high or too low

**(2) Compression low**
- Cylinder worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal defective

**(3) Firming incorrect**
- Spark plug defective
- Spark plug cap poorly connected or shorted
- Ignition coil defective
- High tension cord defective

**(4) Knocking**
- Ignition timing advanced
- Fuel poor quality
- Carbon built up in combusion chamber

**(5) Other**
- Ignition timing incorrect
- Brakes dragging
- Overheating
- Clutch slipping
- Throttle valve does not fully open
- Transmission oil quantity excessive
- Transmission oil viscosity too high

## Overheating

- Ignition timing retarded
- Carbon built up in combustion chamber
- Brakes dragging
- Clutch slipping
- Intake manifold loose or damaged
- Main jet clogged
- Float level too low

## Clutch not operating smoothly

**(1) Clutch slipping**
- No clutch lever play
- Friction plates worn
- Clutch springs weak
- Clutch inner cable not sliding smoothly

**(2) Clutch does't disengage properly**
- Clutch lever play excessive
- Clutch springs not evenly tightened
- Transmission oil deteriorated or of too high a viscosity
- Clutch inner cable not sliding smoothly

## Shift operation not smooth

**(1) Doesn't go into gear or shift pedal doesn't return**
- Clutch not disengaging
- Shift return spring weak or broken
- Shift return spring pin loose
- Shift lever spring broken
- Shift lever broken
- Shift fork bent or seized
- Shift drum damaged

**(2) Jumps out of gear**
- Shift fork worn
- Gear dog or dog recess worn
- Drive shaft, output shaft, or gear splines worn

## Poor handling or stability

**(1) Handlebar hard to turn**
- Steering stem too nut tight
- Tire pressure too low
- Steering stem lubrication insufficient

**(2) Handlebar vibrates or shakes**
- Swing arm bent
- Front fork bent
- Frame bent
- Wheel alignment incorrect
- Pivot shaft warped
- Right/left front fork oil level uneven

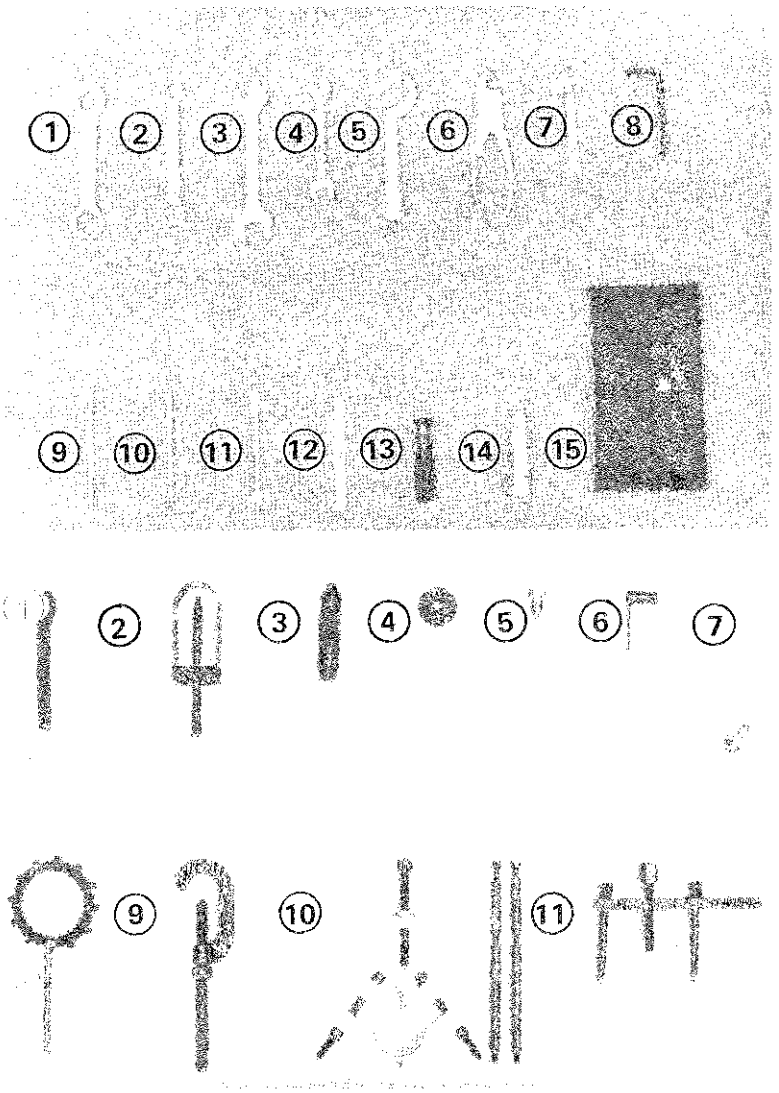
**(3) Shock absorption too stiff**
- Oil quantity excessive
- Oil viscosity too high
- Front fork air pressurized
- Tire air pressure too high

**(4) Shock absorption too soft**
- Oil quantity insufficient
- Oil viscosity too low
- Fork spring wear
- Suspension oil leak

## Brakes don't hold

- Brake maladjustment (cable play excessive)
- Linings or drum worn
- Brakes overheated
- Water in brakes
- Brake cam worn
- Oil on drum

## 2. Tools




### Tool Kit Tools

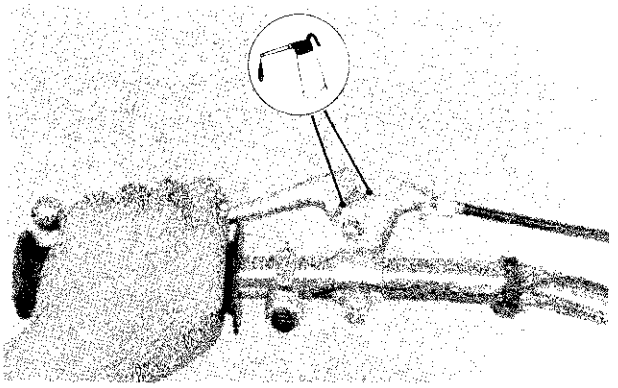
1. Box Wrench 22 x 24 mm
2. Box Wrench 14 x 24 mm
3. Open End Wrench 19 x 22 mm
4. Open End Wrench 12 x 13 mm
5. Hook Spanner
6. Pliers
7. Spoke Wrench #9 x #10
8. Allen Wrench 6 mm
9. Phillips Bit #2
10. Phillips Bit #3
11. Slot Bit
12. Screwdriver Handle
13. Screwdriver Grip
14. Spark Plug Wrench 21 mm
15. Tool Bag

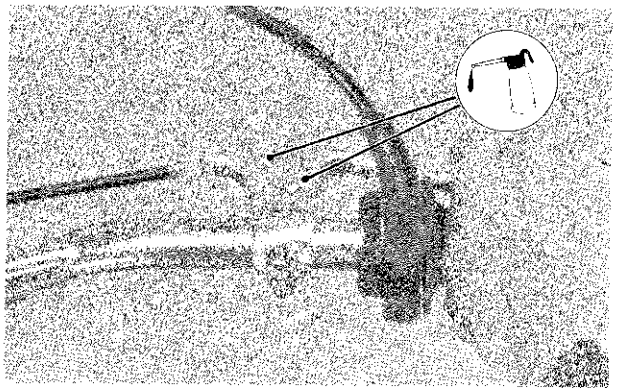
### Special Tools

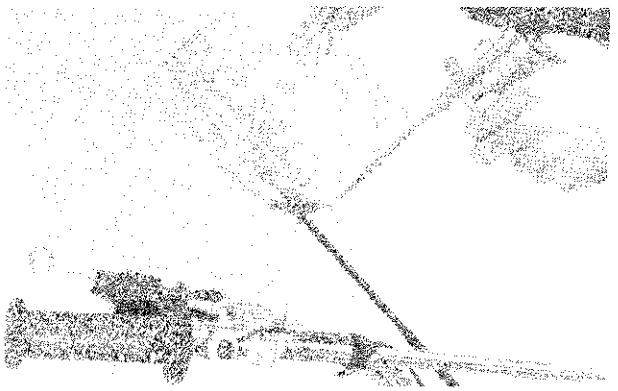
| REF NO. | TOOL NO. | DESCRIPTION |
|---|---|---|
| 1 | 57001—320 | Stem Nut Wrench |
| 2 | 57001—233 | Piston Pin Puller |
| 3 | 57001—139 | Bearing Driver Holder |
| 4 | 57001—140 | Bearing Driver |
| 5 | 57001—251 | Rotor Puller |
| 6 | 57001—159 | Clutch Release Adjuster |
| 7 | 57001—207 | Fuel Level Gauge |
| 8 | 57001—303 | Clutch Holder |
| 9 | 57001—040 | Engine Sprocket Holder |
| 10 | 57001—158 | Stem Bearing Puller |
| 11 | 57001—153 | Crankcase Splitting Tool |

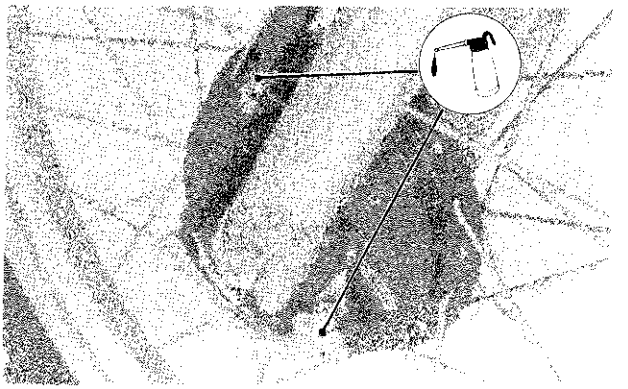
### 3. General Lubrication

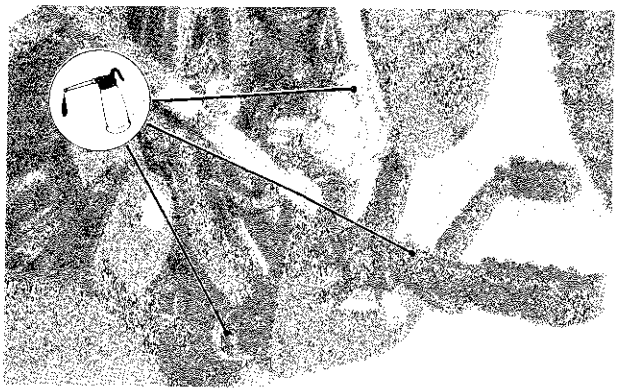
The general lubrication depicted in the following illustrations is important for long service life and for avoiding trouble during vehicle operation. Carry out this lubrication during vehicle inspection and everytime the vehicle is washed. Use SAE 30 oil.

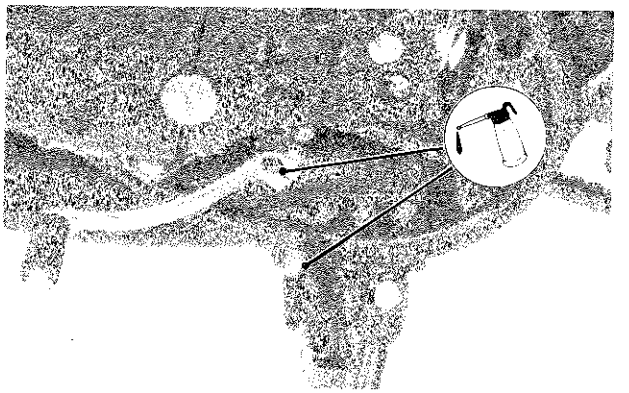




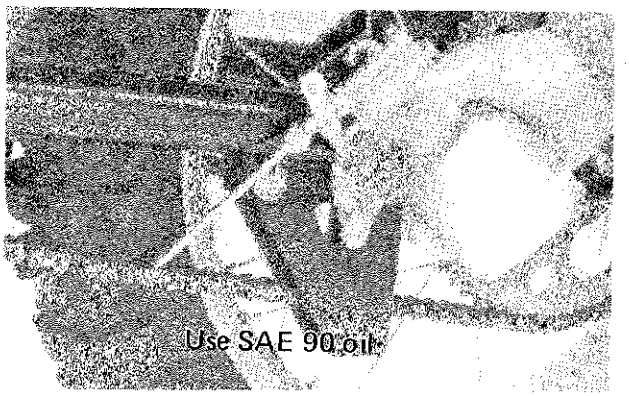




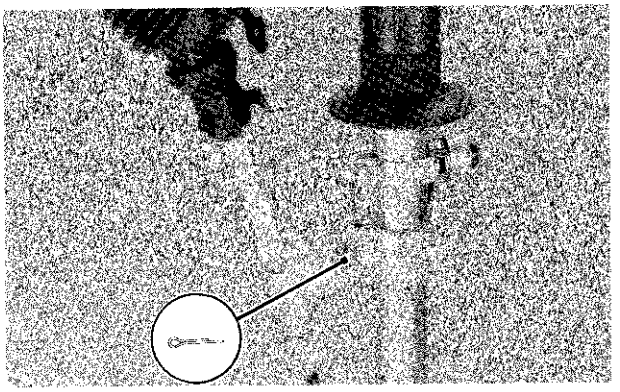


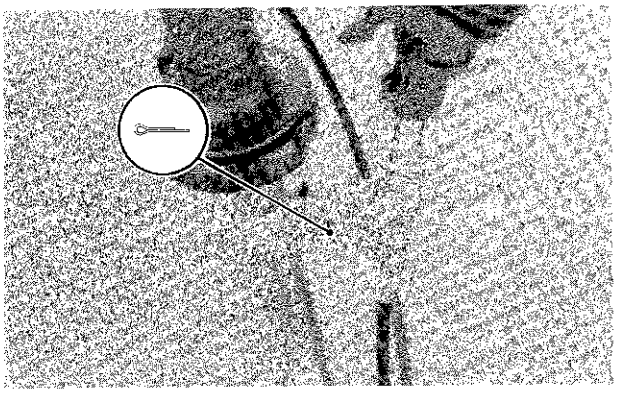


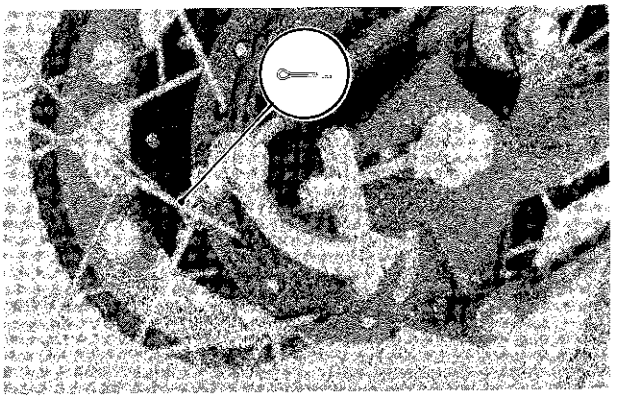


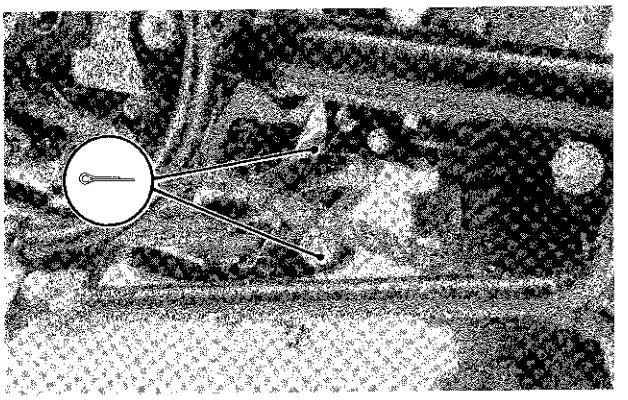


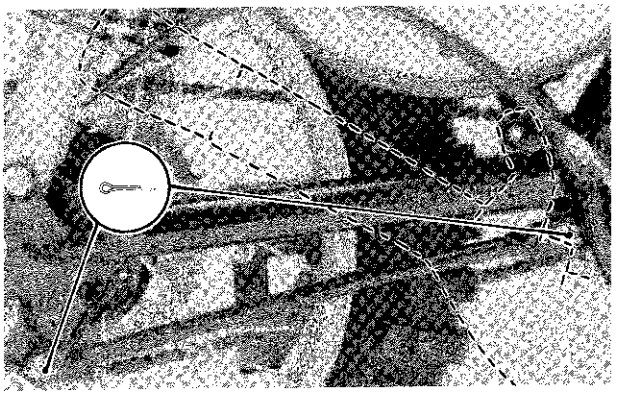
## 4. Cotter Pin Locations

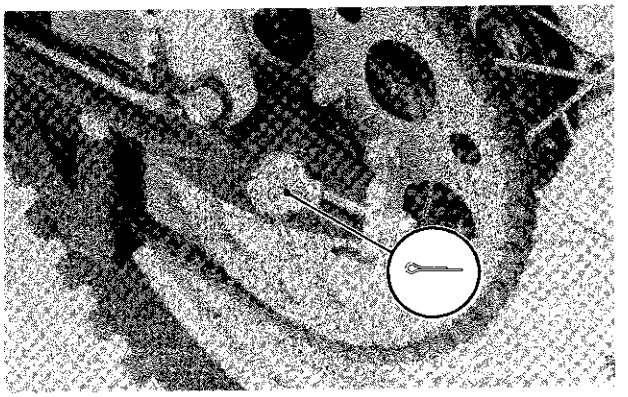




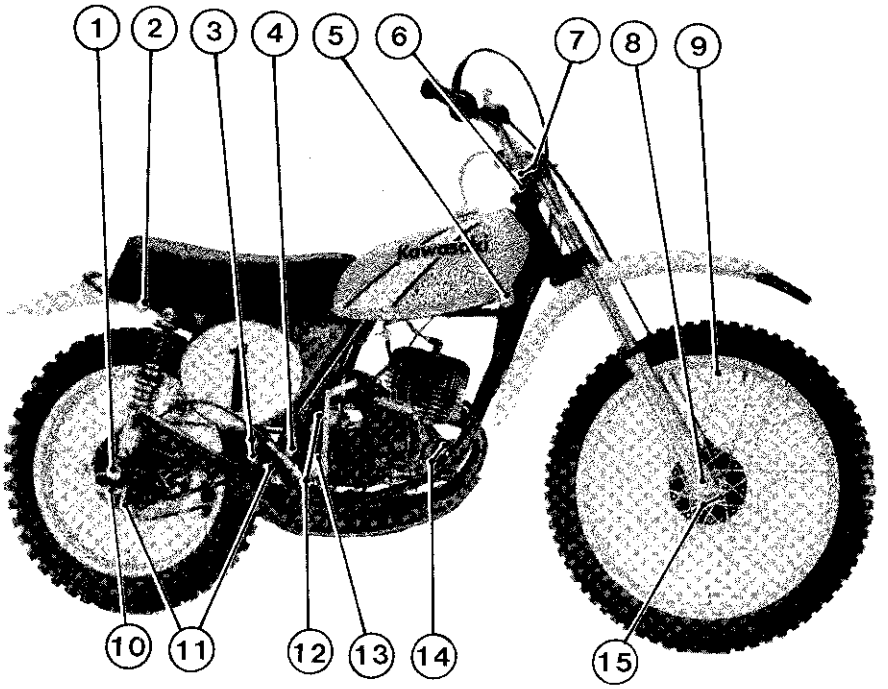


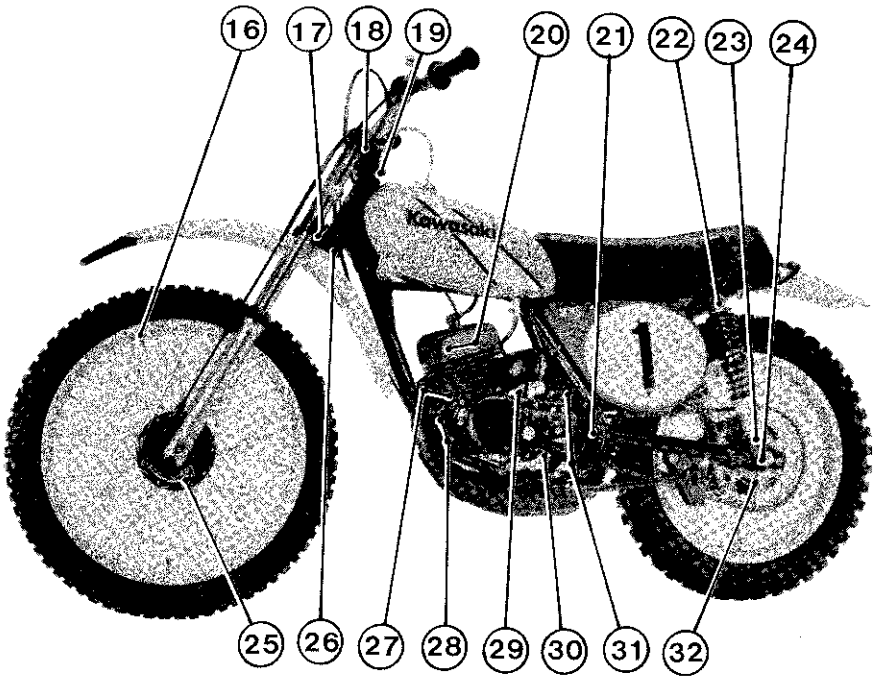






## 5. Bolt & Nut Tightening



| | PART | TOOL SIZE (mm) | TORQUE |
|---|---|---|---|
| 1. | Rear Axle | 19 | |
| 2. | Seat Mounting Bolts (2) | 13 | |
| 3. | Muffler Mounting Bolts (2) | 13 | |
| 4. | Swing Arm Pivot Shaft Nut | 19 | 7~7.5 kg-m (51~54 ft-lbs) |
| 5. | Fuel Tank Mounting Bolts (2) | 10 | |
| 6. | Steering Stem Head Clamp Bolt | 6 (Allen) | |
| 7. | Handleber Clamp Bolts (4) | 13 | 2~2.2 kg-m (14.5~16 in-lbs) |
| 8. | Front Axle Nuts (2) | 22 | 2~2.2 kg-m (14.5~16 ft-lbs) |
| 9. | Spokes | #10 | 0.25~0.3 kg-m (22~26 in-lbs) |
| 10. | Rear Brake Cam Lever Bolt | 10 | 0.7~0.8 kg-m (61~69 in-lbs) |
| 11. | Torque Rink Nuts (2) | 12 | 2.0~2.2 kg-m (14.5~16 ft-lbs) |
| 12. | Engine Mounting Bolts (2) | 14 | |
| 13. | Kick Pedal Bolt | 12 | |
| 14. | Engine Mounting Bolts (2) | 13 | |
| 15. | Front Axle Holder Nuts (4) | 14 | 1.8~2.0 kg-m (13.0~14.5 ft-lbs) |
| 16. | Bend Protector Nuts (1) (2) | 12 | |
| 17. | Front Fork Lower Clamp Bolts (4) | 6 (Allen) | 2~2.2 kg-m (14.5~16 ft-lbs) |
| 18. | Front Fork Upper Clamp Bolts (2) | 6 (Allen) | 2~2.2 kg-m (14.5~16 ft-lbs) |
| 19. | Steering Stem Head Bolt | 22 | |
| 20. | Cylinder Head Nuts (4) | 17 | 2.2 kg-m (16 ft-lbs) |
| 21. | Swing Arm Pivot Shaft | 19 | |
| 22. | Rear Shock Absorber Nuts (2) | 17 | 3.1~4.2 kg-m (20~30 ft-lbs) |
| 23. | Rear Shock Absorber Bolts (2) | 14 | 3.0~3.5 kg-m (22~25 ft-lbs) |
| 24, | Rear Axle Nut | 24 | 8.5~11.5 kg-m (61~83 ft-lbs) |
| 25. | Front Brake Cam Lever Bolt | 10 | 0.7~0.8 kg-m (61~69 in-lbs) |
| 26. | Steering Stem Base Bolt | 8 (Allen) | |
| 27. | Exhaust Screws (2) | | |
| 28. | Engine Mounting Nuts (2) | 13 | |
| 29. | Neutral Positioning Bolt | 14 | |
| 30. | Shift Pedal Bolt | 10 | |
| 31. | Engine Mounting Nuts (2) | 17 | 3.1~4.2 kg-m (23~30 ft-lbs) |
| 32. | Rear Sprocket Nuts (6) | 13 | 2.0~2.2 kg-m (14.5~16 ft-lbs) |

## 6. Torque Table

Torque value listed below should be used in tightening all nuts and bolts. Where a different value is prescribed in the Shop Manual text, the text supersedes this table.

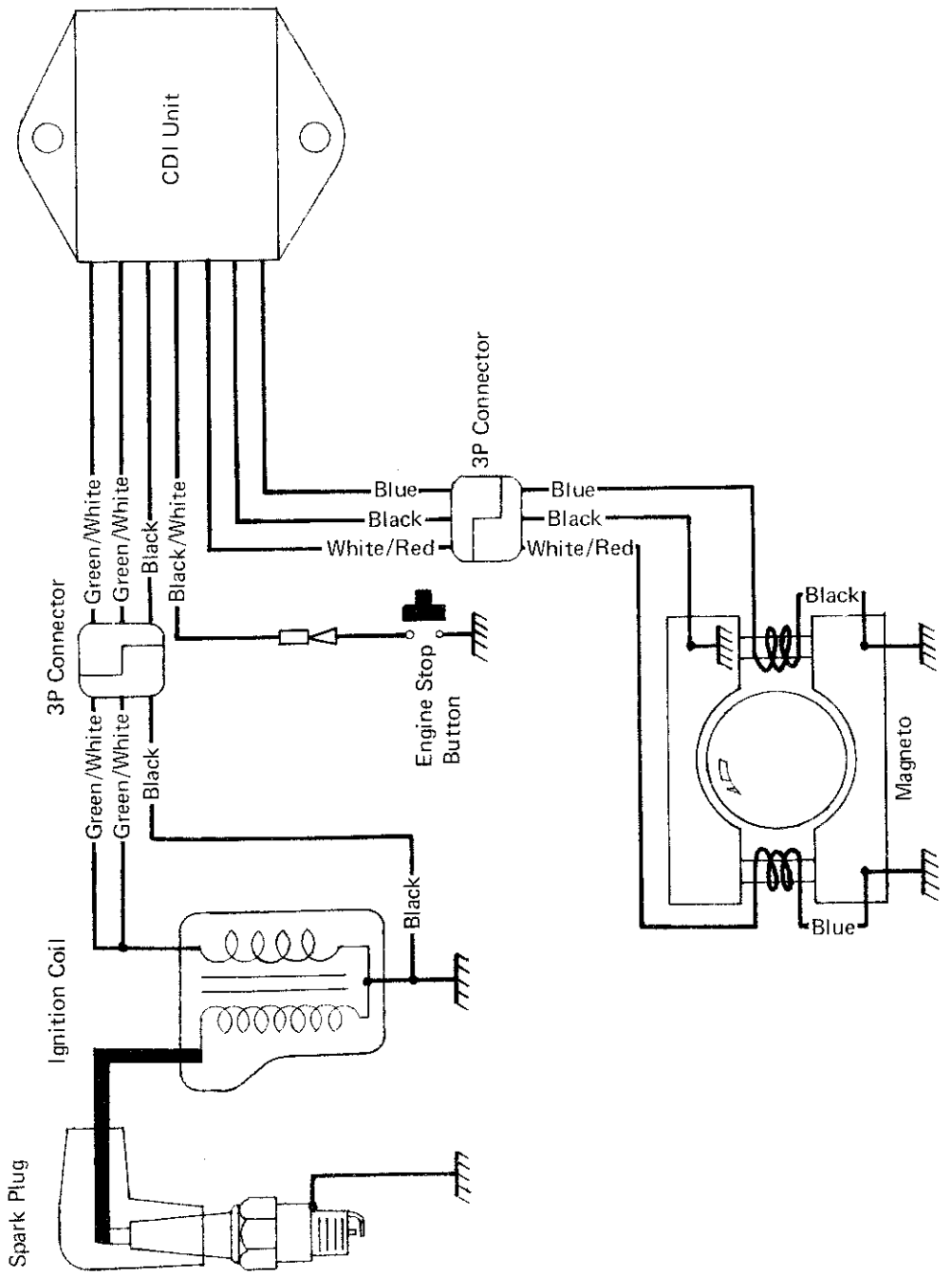
Coarse threads

| dia (mm) | Pitch (mm) | ft-lbs | kg-m |
|---|---|---|---|
| 5 | 0.90 | 2.53~3.47 | 0.35~0.48 |
| 6 | 1.00 | 4.56~6.37 | 0.63~0.88 |
| 8 | 1.25 | 11.6~15.9 | 1.6~2.2 |
| 10 | 1.50 | 22.4~30.4 | 3.1~4.2 |
| 12 | 1.75 | 39.1~54.2 | 5.4~7.5 |
| 14 | 2.00 | 60.0~83.2 | 8.3~11.5 |
| 16 | 2.00 | 94.0~130 | 13~18 |
| 18 | 2.50 | 130~181 | 18~25 |
| 20 | 2.50 | 188~253 | 26~35 |

Fine threads

| dia (mm) | Pitch (mm) | ft-lbs | kg-m |
|---|---|---|---|
| 5 | 0.50 | 2.53~3.47 | 0.35~0.48 |
| 6 | 0.75 | 3.98~5.57 | 0.55~0.77 |
| 8 | 1.00 | 9.76~13.4 | 1.35~1.85 |
| 10 | 1.25 | 18.4~25.3 | 2.55~3.5 |
| 12 | 1.50 | 32.5~44.8 | 4.5~6.2 |
| 14 | 1.50 | 53.5~73.8 | 7.4~10.2 |
| 16 | 1.50 | 83.2~116 | 11.5~16 |
| 18 | 1.50 | 123~166 | 17~23 |
| 20 | 1.50 | 166~239 | 23~33 |

## 7. Wiring Diagram



KAWASAKI
HEAVY INDUSTRIES, LTD.
MOTORCYCLE DIVISION

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