1975

KX 250



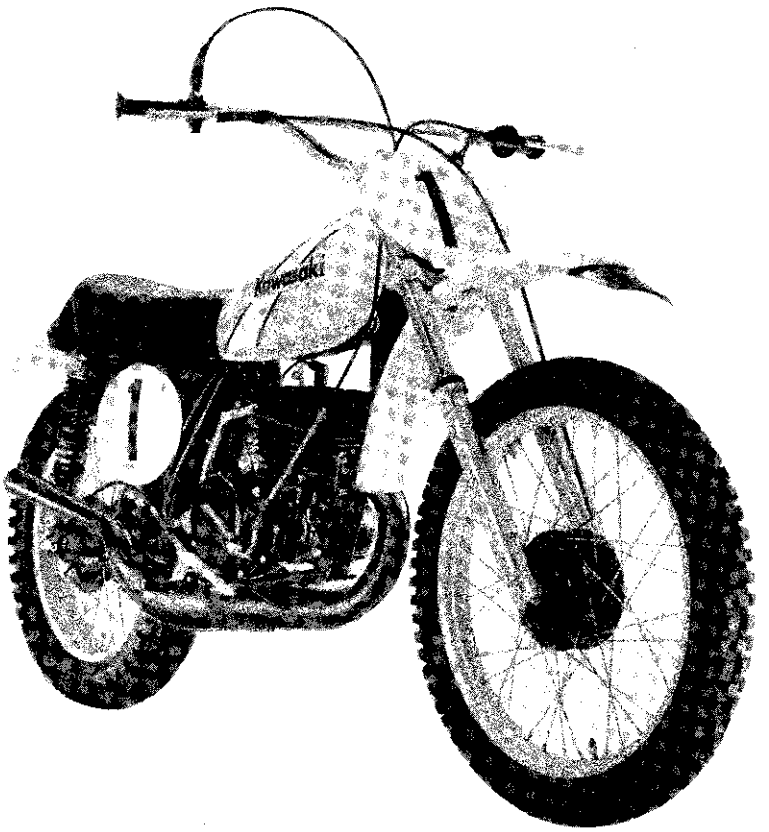
SHOP MANUAL

FOREWORD

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-250 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 your KX-250 properly tuned and adjusted.

Since the KX-250 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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SPECIFICATIONS

Dimensions

Overall Length	2,108 mm (83 in.)
Overall Width	875 mm (34.5 in.)
Overall Height	1,128 mm (44.5 in.)
Wheelbase	1,417 mm (55.8 in.)
Ground Clearance	195 mm (7.7 in.)
Dry Weight	94 kg (209.3 lbs.)
Fuel Tank Capacity	9 ℓ (2.38 U.S. gal.)

Engine

Type	2 Stroke, Single Cylinder, Piston Valve
Bore & Stroke	69.5 x 64.9 mm (2.74 x 2.56 in.)
Displacement	246 cc (15.01 cu.in.)
Compression Ratio	7.9 : 1
Max. Horsepower	34 PS @8,000 rpm
Max. Torque	3.26 kg-m @7,000 rpm
Carburetor	Mikuni VM34SC
Lubrication System	Petroil Mix
Transmission Oil Type	SAE 10W30 or 10W40
Transmission Oil Capacity	1,000 cc (0.95 U.S. qt.)
Starting System	Primary Kick
Ignition System	Magneto CDI
Ignition Timing	22° @6,000 rpm
Spark Plug	NGK B-9EV

Transmission

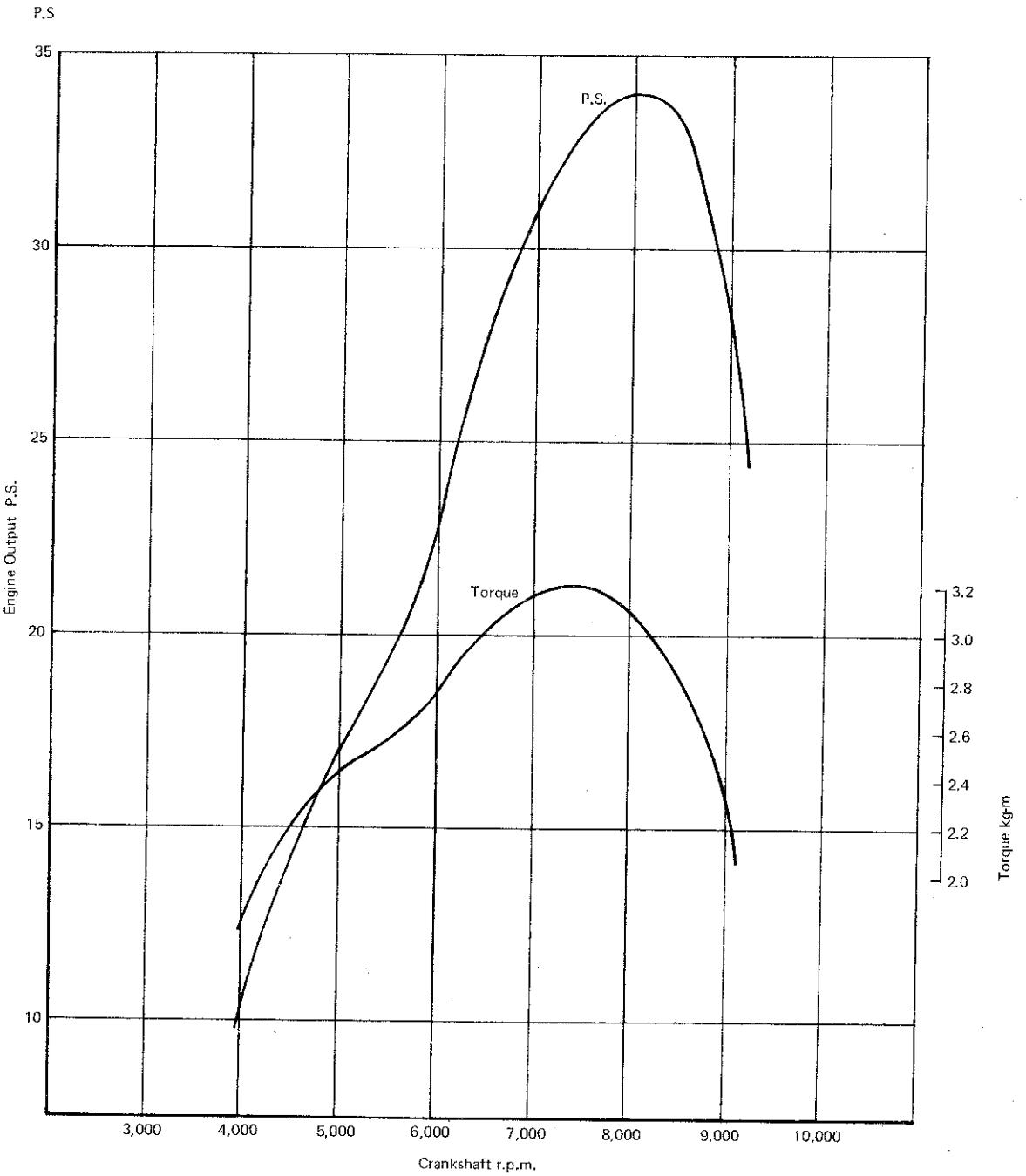
Type		5 Speed, Constant Mesh, Return Shift
Clutch		Wet, Multi-disc
Gear Ratios:	1st	2.33 (28/12)
	2nd	1.73 (26/15)
	3rd	1.41 (24/17)
	4th	1.16 (22/19)
	5th	1.00 (20/20)
Primary Reduction Ratio		2.68 (59/22)
Final Reduction Ratio		3.69 (48/13)
Overall Drive Ratio		9.90

Frame

Type		Tubular, Single Cradle
Steering Angle		Left 45° Right 45°
Castor		59°
Trail		142.5 mm (5.6 in.)
Tire Size:	Front	3.00-21 4PR
	Rear	4.60-18 4PR
Suspension:	Front	Telescopic Fork
	Rear	Swing Arm
Suspension Stroke:	Front	185 mm (7.28 in.)
	Rear	90 mm (3.54 in.)
Front Fork Oil (per shock absorber)		SAE 10W 220 cc (7.44 U.S. fl.oz.)
Brake:	Front	130 x 28 mm (5.12 x 1.1 in.)
	Rear	150 x 28 mm (5.9 x 1.1 in.)

Specifications subject to change without notice.

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.

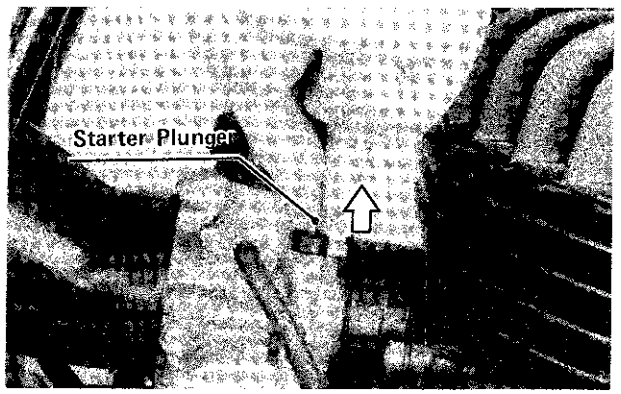
- Start the engine, and let it run at idle until the engine is thoroughly warmed up. Race the engine slightly, but never open to full throttle.
- Next, move off and run at half throttle.
- Occasionally stop and make a general inspection. Check bolt and nut tightness. In particular, check and, if necessary, 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 starter plunger.



- 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.

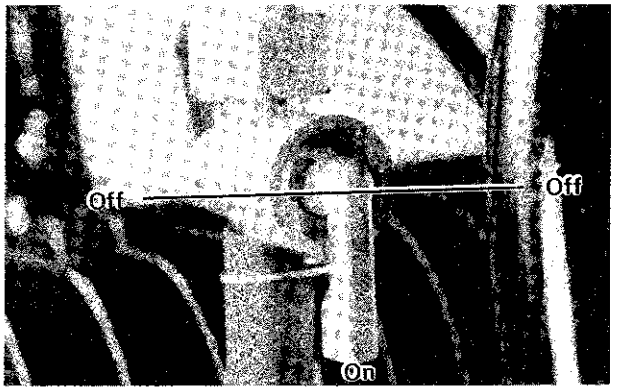
Warm Engine:

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

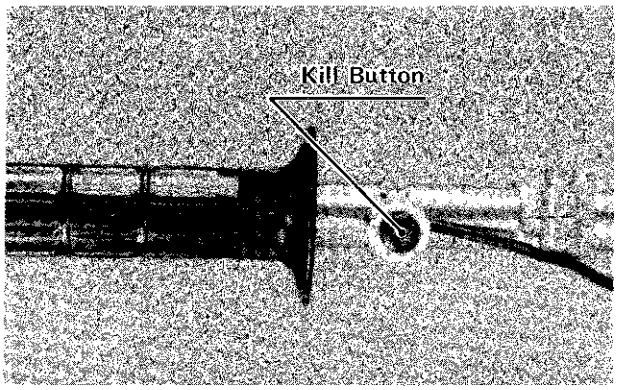
NOTE: Since the starter is a primary kick type, the engine can be started even if the transmission is in gear by pulling in the clutch lever and kicking the engine over.

3. Engine Stopping

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

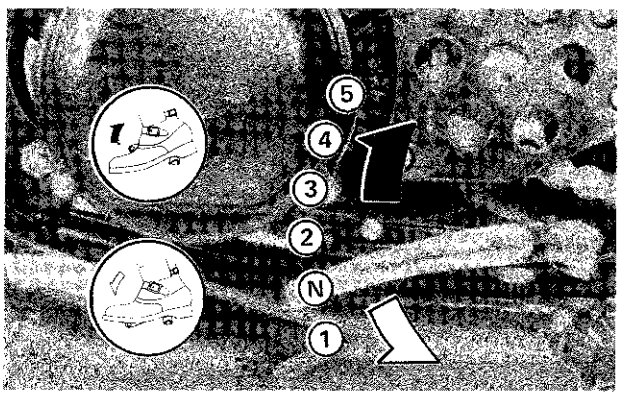


- After racing the engine slightly, release the throttle or push the kill button to stop the engine.



4. Transmission

The transmission is a 5 speed, return shift type. 1st is at the bottom end of the shifting range and 5th is at the top. When the transmission is in neutral, push down the shift pedal to reach 1st. Next, shift to 2nd, 3rd, 4th, and 5th gears by repeatedly pushing up the shift pedal.



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

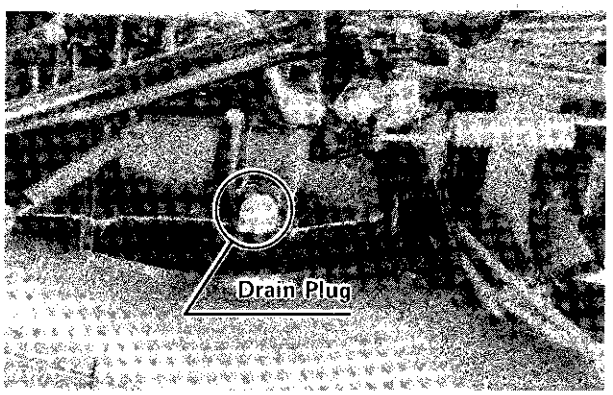
- Throughly mix the gasoline and oil

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

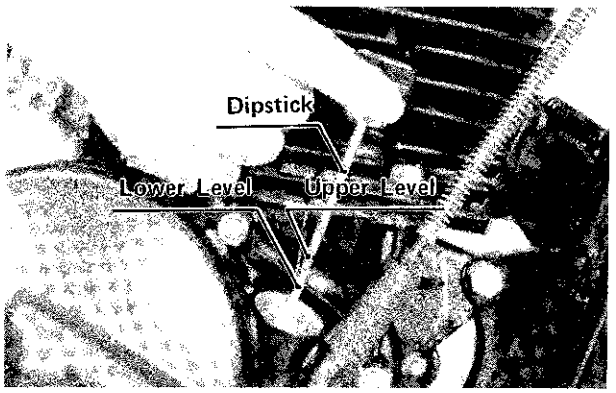
- Use SAE 10W30 or 10W40 oil.
- Transmission oil capacity is 1,000 cc.
- Drain the oil after the engine has been thoroughly warmed up so that it will flow freely and drain completely.



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

(2) Oil level

- Determine the oil level by inserting the dipstick without screwing it in, and check to see whether or not the oil level is between the upper and lower dipstick marks.
- If the amount of oil is insufficient, pour in oil until the level will reach the upper dipstick mark.



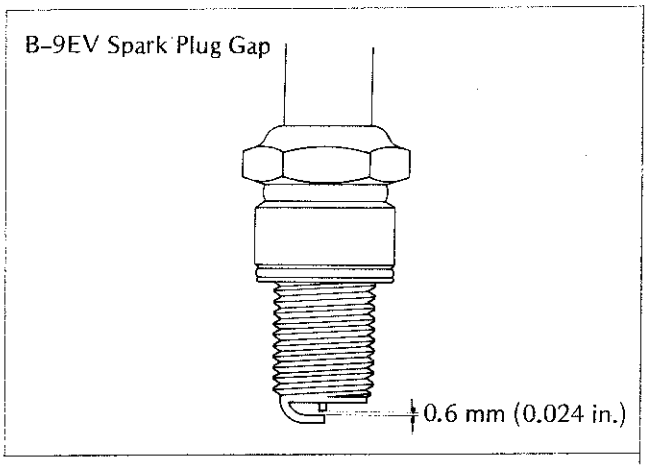
ADJUSTMENT & MAINTENANCE — ENGINE

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.

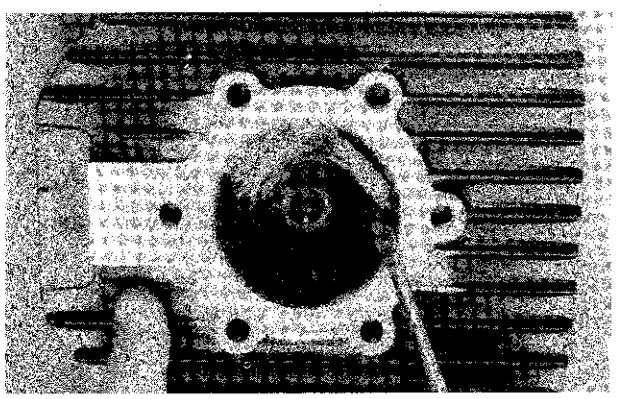
The proper spark plug gap is 0.6 mm (0.024 in.). If the gap is incorrect, bend the outer electrode to obtain the proper gap.



2. Cylinder & Cylinder Head

If carbon is allowed to accummulate in the combustion chamber, the compression ratio 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, rebore or replace the cylinder for a new one.

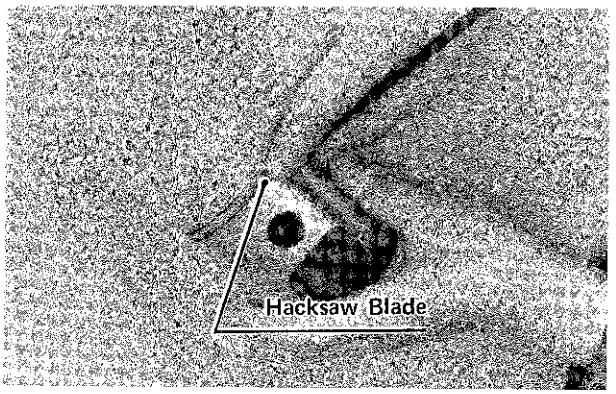


NOTE: If the cylinder is rebored, be sure to chamfer the exhaust and scavenge ports so that the rings will not get caught.

3. Piston & Piston Rings

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

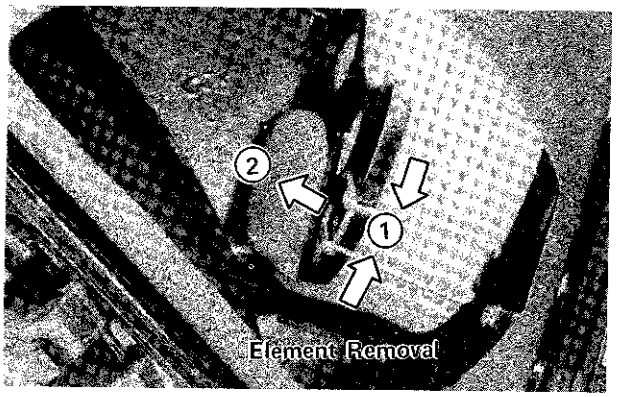
Remove the carbon from the piston ring grooves with part of an old piston ring or a hacksaw blade. Even if the piston rings look good with no wear, replace every 3rd race.



4. Air Cleaner

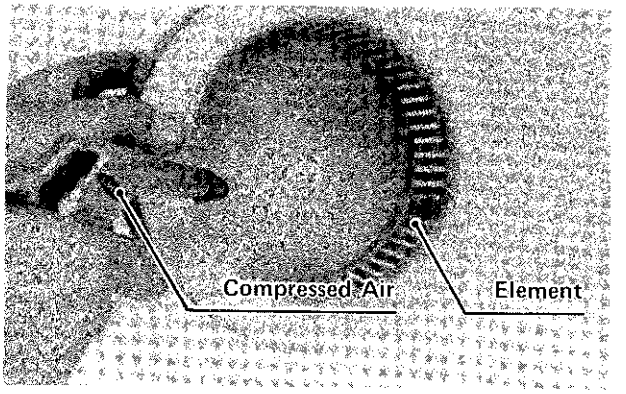
The air cleaner box is specially designed for operation under wet conditions. The element is a large size, special fabric unit for effective protection against dirt and dust.

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



Clean the element after each race or practive session without fail.

- When the element is only slightly dirty, clean with compressed air.
- Clean with solvent whenever compressed air is insufficient. Do not wring the element or squeeze more than is necessary.
- After cleaning the element in solvent, dry it with compressed air or by shaking it.



- Dampen the element with a mixture of gasoline and SAE 30 oil (10:1 ratio, 10 parts of gasoline to 1 part of oil). Shake off excess, and replace the element properly so that no unfiltered air will leak pass the element to the engine.

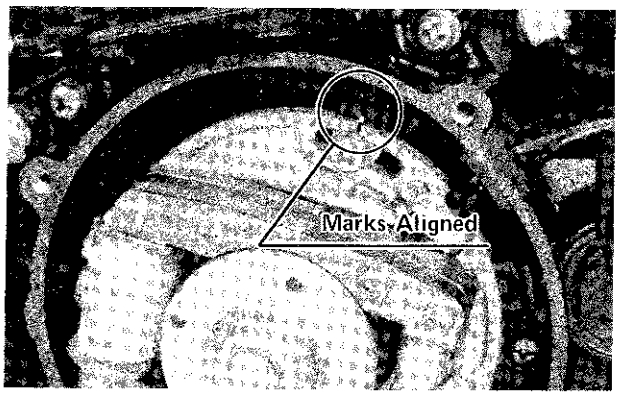
CAUTION: Clean the element in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area.

NOTE: Replace the element for a new one if it has already been cleaned 5 times or if the element has any damage.

5. Ignition Timing

(1) Static inspection

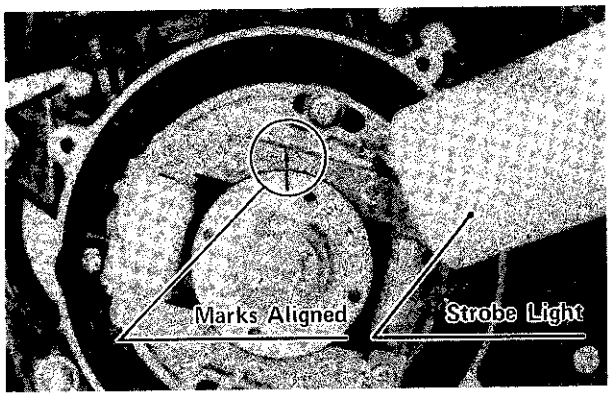
- Remove the magneto cover.
- Check to see if the mark on the crankcase is aligned with the mark on the magneto base.
- If the marks are not lined up, loosen both magneto base screws, shift the magneto base to where the marks will be lined up, and tighten the screws.



(2) Dynamic inspection

- Remove the magneto cover.
- Start the engine.
- Apply a hand tachometer to the center of the rotor, and set the engine speed at 6,000 rpm.
- Connect up a strobe light, and direct the light at the magneto base mark (different from the magneto base mark used for static inspection) to see if it aligns with the mark on the magneto rotor.
- If the marks do not align, stop the engine, loosen the magneto base screws, and shift the base appropriately.

●After retightening the screws, start the engine and check again.



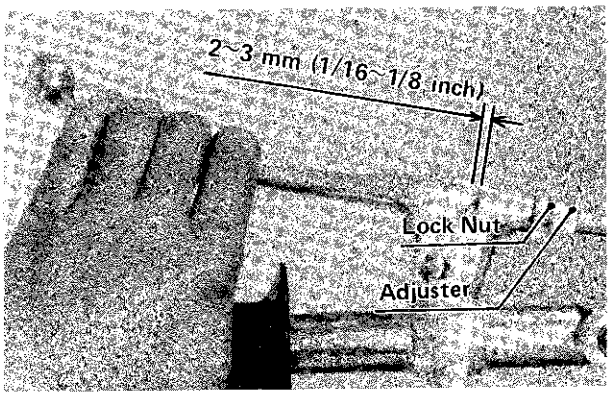
NOTE: Two people are necessary to carry out dynamic inspection.

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. This play increases with cable stretch and friction plate wear necessitating clutch adjustment.

When lever play has become excessive, adjust as follows:

●Loosen the lock nut, screw out the adjuster at the clutch lever to obtain the proper play, and retighten the lock nut.

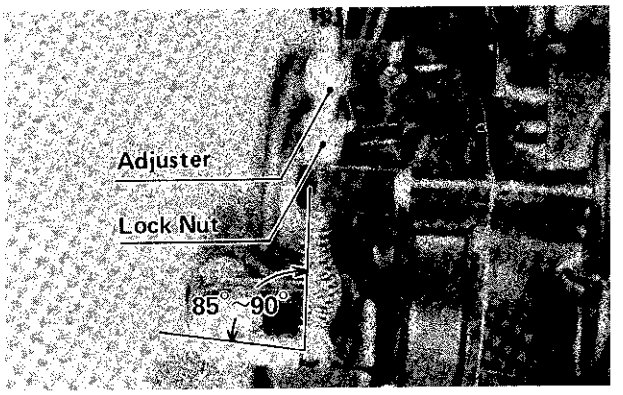


●If the adjuster at the clutch lever has reached its limit, first screw in fully the adjuster at the clutch lever, and then screw out the adjuster at the lower end of the clutch cable to obtain the 2~3 mm of play. Whenever the angle between the release lever and cable exceeds 90°, cuasing clutch action to deteriorate and lever operation to become difficult, adjust as follows:

●To give the inner cable play, loosen the lock nut at the upper end and the lock nut at the lower end of the clutch cable, and screw in the adjusters.

●Remove the release lever mounting bolt, and remove the release lever from the release shaft.

●Replace the release lever at a new position on the release shaft so that the angle between the release lever and the cable will be 85~90°. Tighten the mounting bolt.



●Set the adjuster at the lower end of the cable so that there will be 2~3 mm ($^1/_{16}$~$^1/_8$ in.) of play at the clutch lever, and then tighten the lock nut.

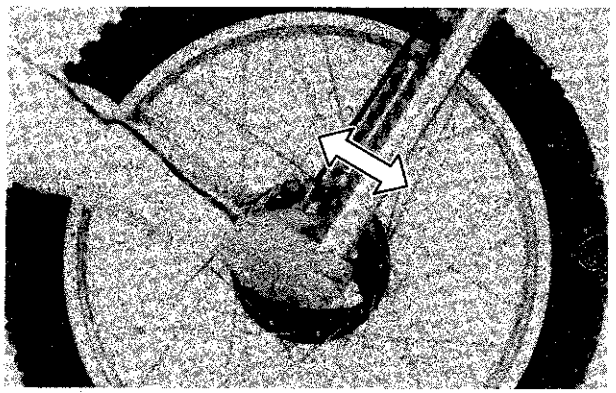
●Tighten the lock nut on the adjuster at the upper end of the cable.

1. Steering

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

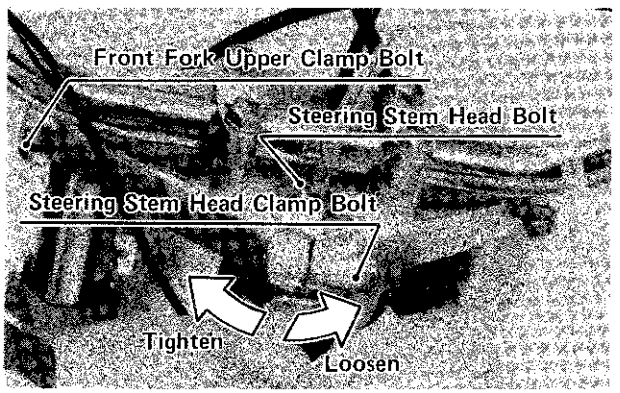
Inspection

- 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.

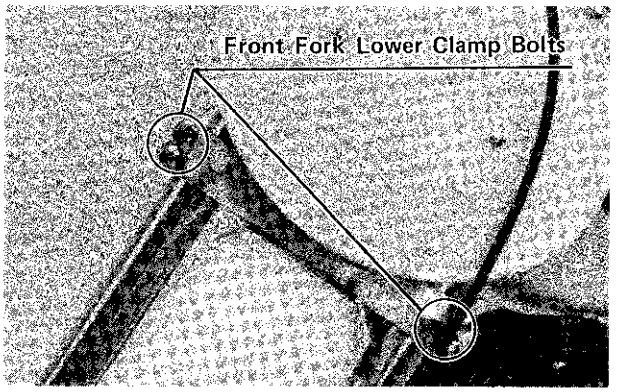


Adjustment

- 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).

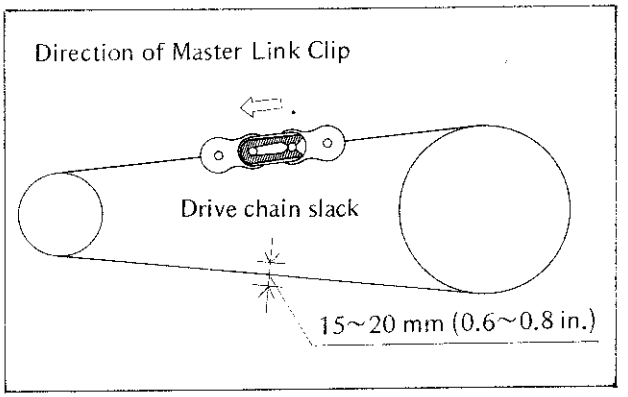


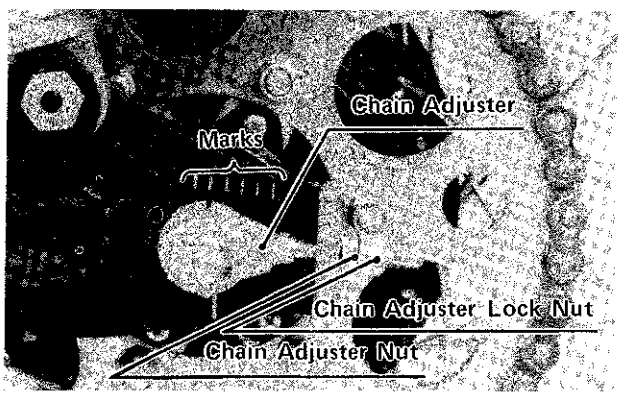
2. Drive Chain

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.

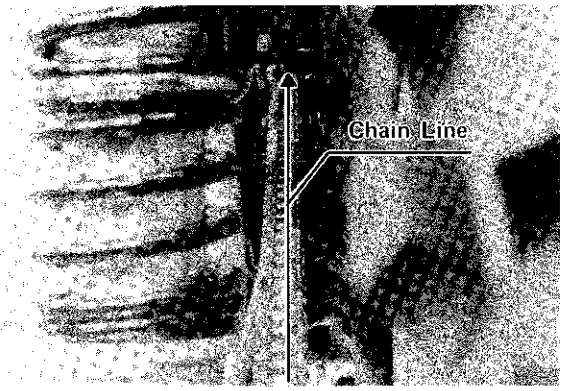
Chain Adjustment

- 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 nuts.
- 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.



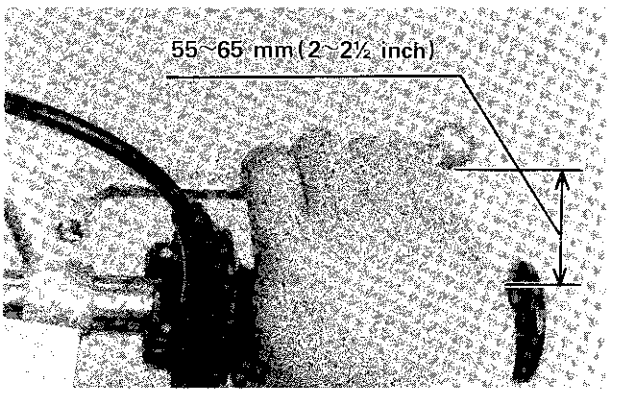
- Insert a new cotter pin into the axle, and tighten the torque link nut.
- Check the rear brake pedal travel.

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.

3. Brakes

(1) Front Brake

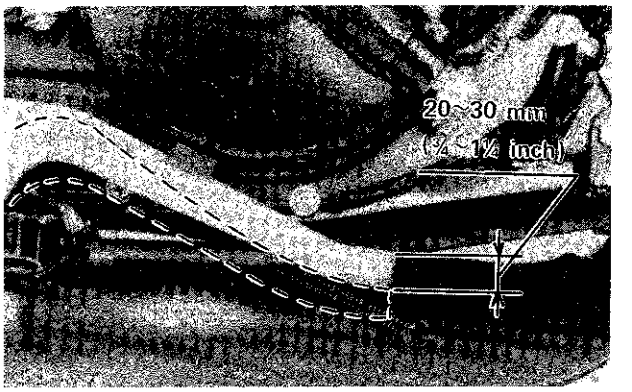
Adjust the front brake cable with the cable adjuster on the front brake panel so that when the brake is fully applied there is 55~65 mm (2~2½ in.) of space left between the throttle grip and the end of the brake lever.



(2) 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.

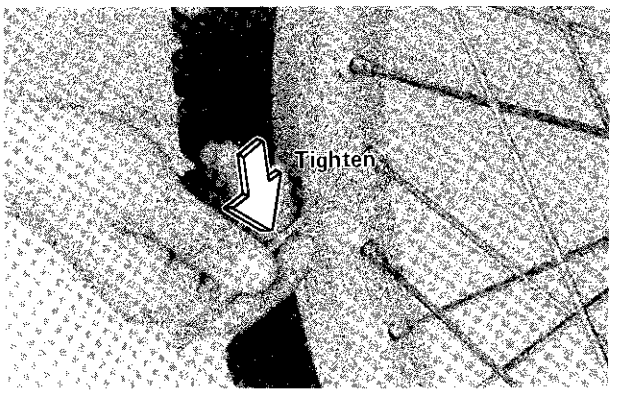
NOTE: Since the brakes must always function for top braking performance, replace the shoes whenever the linings have worn down to ½ their original thickness.



4. Spokes & 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.).

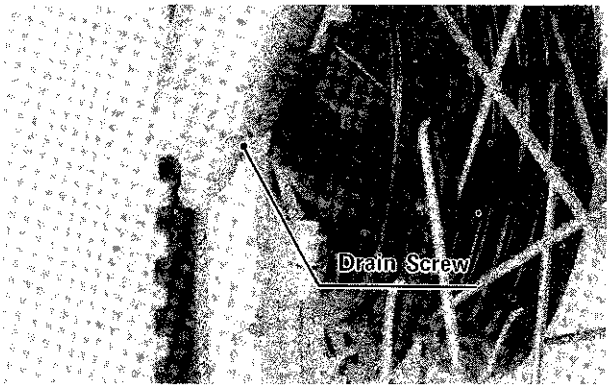


5. Front Fork

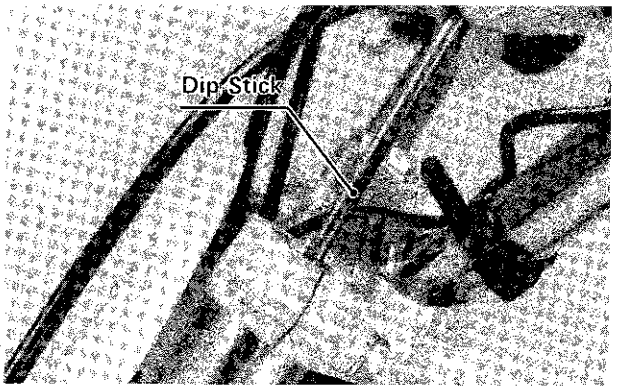
The condition of the front fork is very important for steering stability, and front fork performance is dependent on front fork oil viscosity, quantity, and quality. Deteriorated oil may foam when violent fork action causes the oil to heat, resulting in unsatisfactory fork performance. When the motorcycle 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 190 cc (6.4 U.S. fl.oz.) of SAE 10W 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 495 mm (19.45 in.) below the top of the tube.



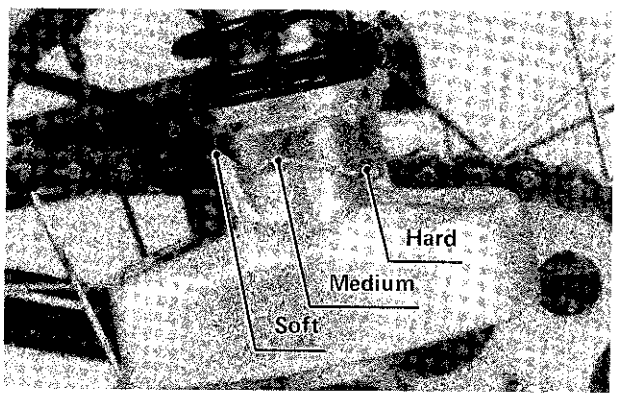
- If the quantity of oil is insufficient, add oil a little at a time until the proper oil level is reached.
- Tighten each shock absorber top bolt.

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.

6. Rear Shock Absorbers

An oil reservoir at the base of each shock absorber promotes cooling to help prevent a loss of shock absorber performance due to excessive oil temperature.

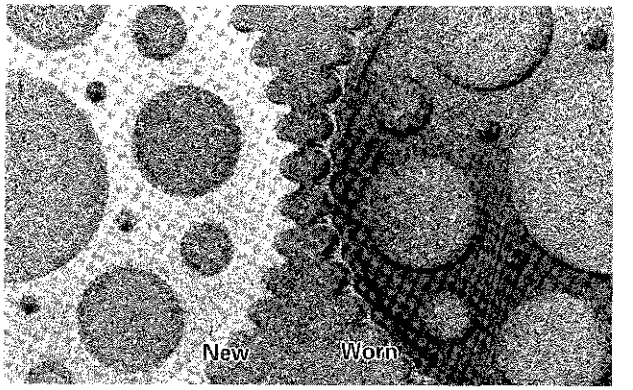
The rear shock absorbers may be adjusted to any of 3 positions to suit rider preference and course conditions.



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

7. 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.



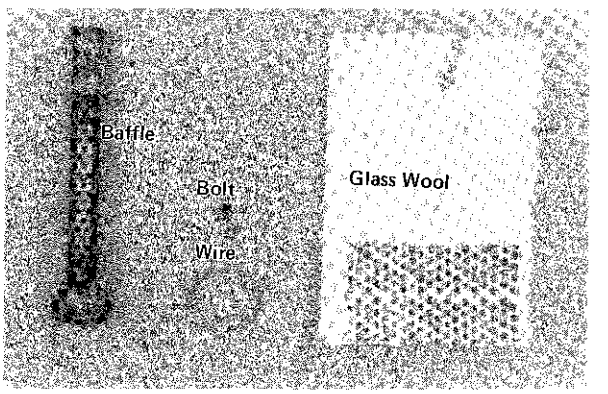
NOTE: Inspect the sprockets for wear, warp, and cracks.

8. 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 chanber 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 bounce, 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 220 cc (7.44 U.S. fl.oz.), and the standard oil is SAE 10W.
- Add only 190 cc (6.4 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	Final Reduction Ratio
13	46	3.54
STD 13	48	3.69
13	50	3.84
14	46	3.28
14	48	3.43
14	50	3.57

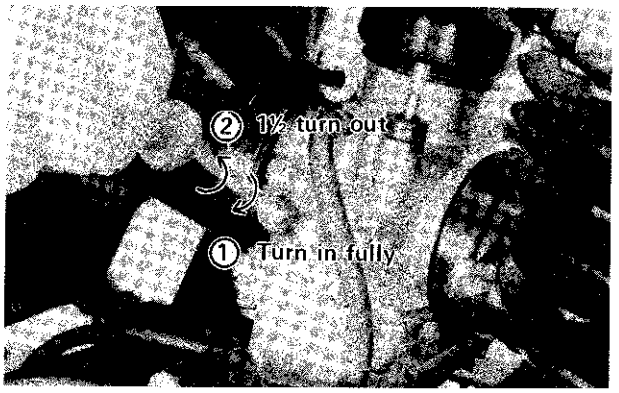
4. Carburetor

●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.

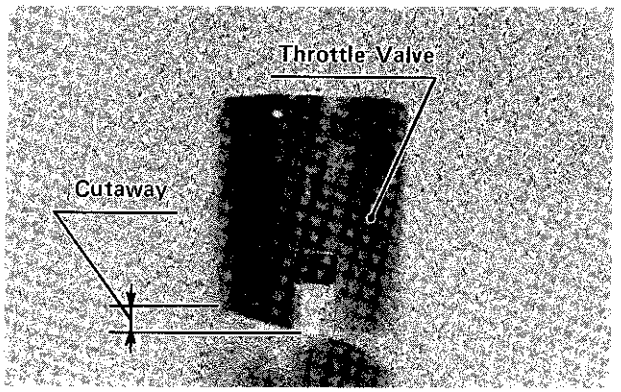
To achieve the standard air screw setting, turn in the air screw lightly until it stops, and then back it out 1½ turns.



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

(2) 1/8~1/2 throttle

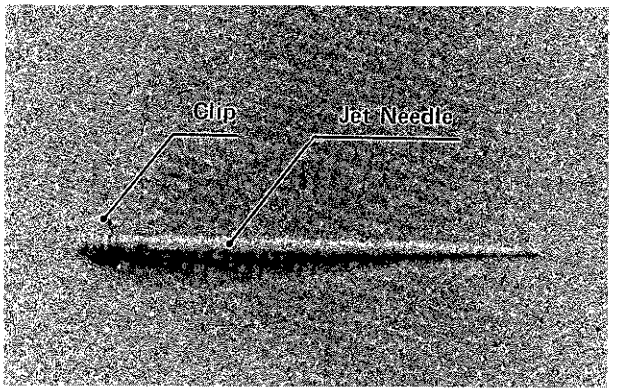
Alteration of the fuel mixture within this range is effected largely by the amount of throttle valve cutaway. The greater the amount of the cutaway, the leaner the mixture in this throttle range.



(3) 1/4~3/4 throttle

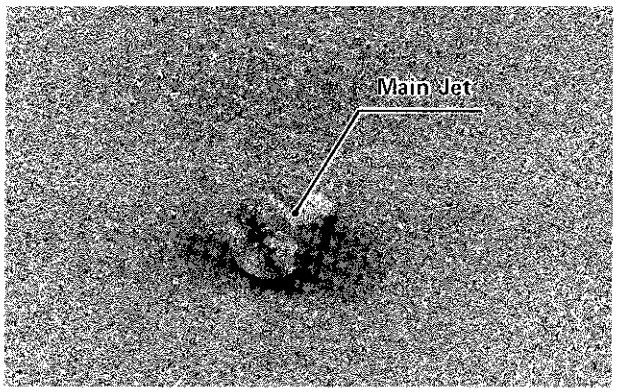
Alteration of the mixture in this range is effected by the position of the jet needle in the needle jet.

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.



(4) 3/4~1 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 Settings

Main Jet	142.5R
Air Jet	0.5
Jet Needle	6DH 2-4
Needle Jet	P-O
Cutaway	2.5
Pilot Jet	40
Air screw (turn out)	1½
Fuel level	38 ± 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.

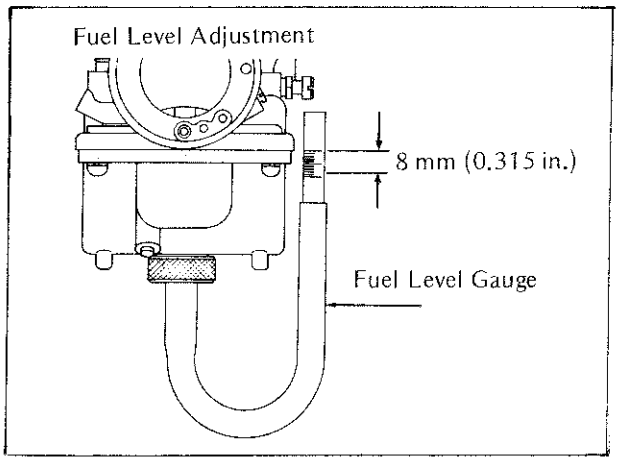
(7) Selecting the correct main jet

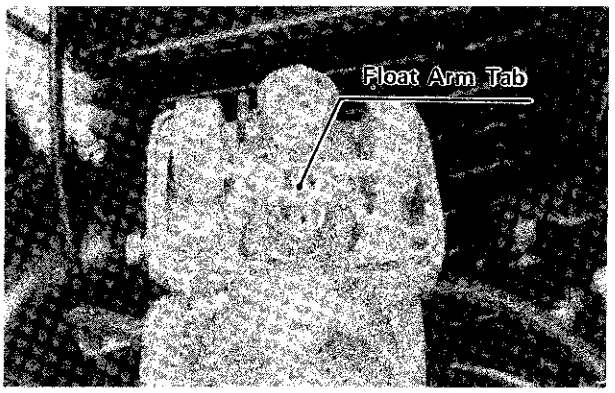
Choose a main jet that fulfills the following conditions:

- Highest rpm.
- Smooth transition 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 8 mm (0.31 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

Ordinarily for motocross the throttle stop screw is turned out so that the engine stops at zero throttle whenever the vehicle is not in motion. Be sure to tighten the lock nut to secure the screw in place.

5. Handlebar

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

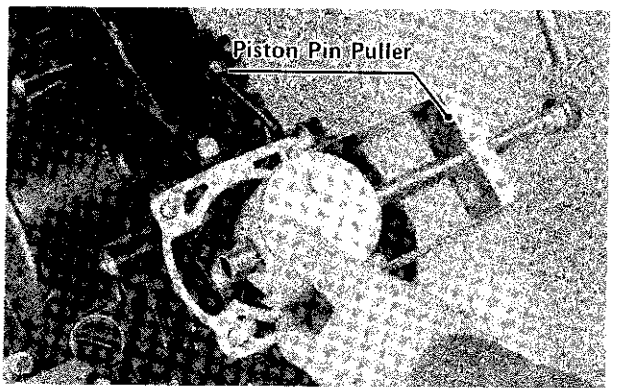
ENGINE REMOVAL

- Drain the transmission oil.
- Close the fuel tap, and pull off the fuel hose.
- Pull off the spark plug lead from the spark plug.
- Loosen the lock nuts at both ends of the clutch cable, and screw in the adjusters.
- Remove the clutch release lever mounting bolt, and then remove the clutch release lever together with the cable.
- Remove the shift pedal.
- Remove the engine sprocket cover.
- Remove the drive chain.
- Loosen sufficiently the clamps on the air cleaner and intake manifold, and remove the carburetor.
- Remove the strap that holds the magneto wiring harness to the frame, and disconnect the harness at the coupling.
- Remove the expansion chamber springs (5).
- Remove the expansion chamber mounting bolt and then the expansion chamber.
- Remove the engine mounting bolts (4).
- Lifting up first on the rear of the engine, remove the engine from the left side of the frame.

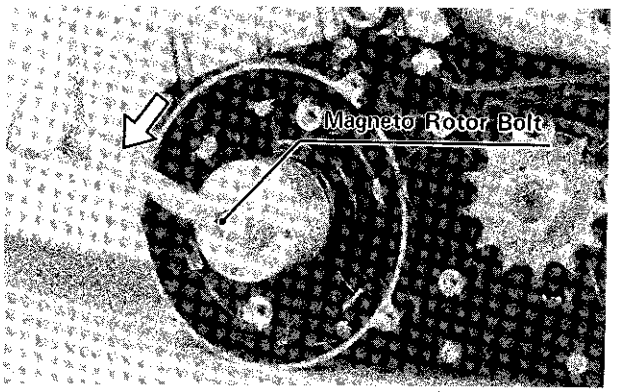
NOTE: Engine installation is the reverse of engine removal.

ENGINE DISASSEMBLY

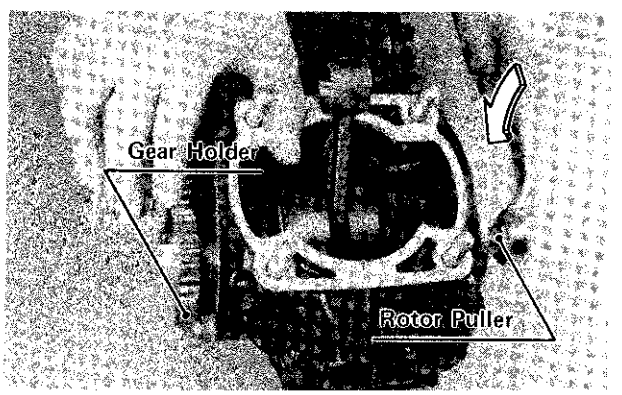
- Remove the kick pedal.
- Remove the spark plug.
- Remove the cylinder head and cylinder head gasket.
- Remove the cylinder and cylinder base gasket.
- Remove the piston rings.
- Remove one of the piston pin snap rings.
- Remove the piston pin with the piston pin puller.



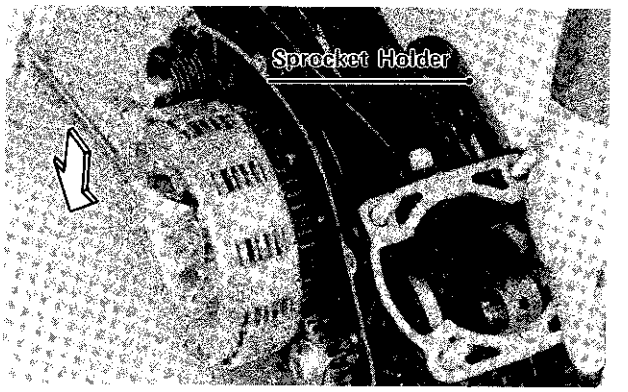
- Remove the con-rod small end bearing.
- Remove the magneto cover and gasket.
- Remove the wiring harness clamp screw.
- Remove the magneto base.
- Remove the right engine cover.
- Fix the primary gear in place using the gear holder and remove the magneto rotor bolt.



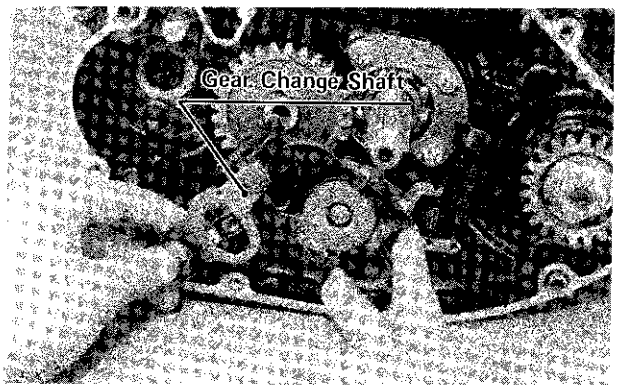
- Remove the rotor with the rotor puller. Leave the gear holder in place.



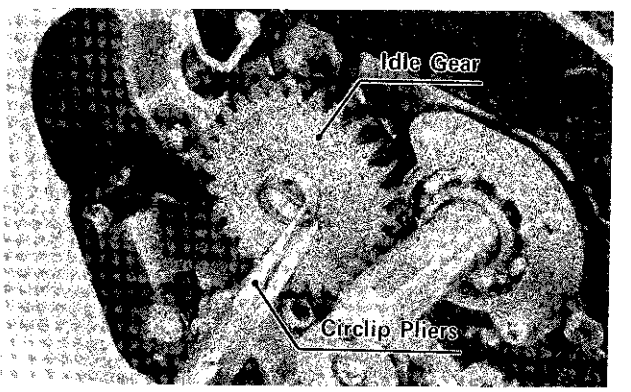
- Remove the clutch pusher.
- Remove the clutch spring bolts.
- Remove the clutch springs and the clutch spring holder.
- Fit the shift pedal back on the gear change shaft, put the transmission into 1st gear, and take the shift pedal back off.
- Keeping the engine sprocket from rotating by use of the sprocket holder, remove the clutch housing bolt, and take off the clutch housing, clutch bushing, kick-starter pinion, and thrust washer.



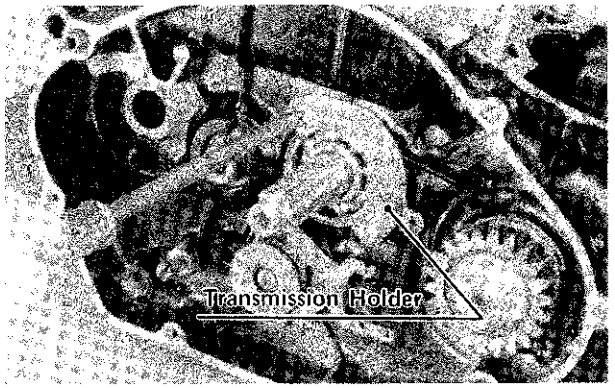
- Pull out the kickstarter spring, kick spring guide, and kick shaft.
- Pull out the gear change shaft.



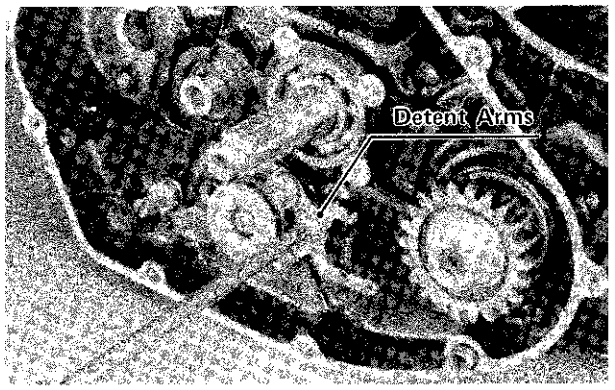
- Remove the circlip, idle gear, and thrust washer.



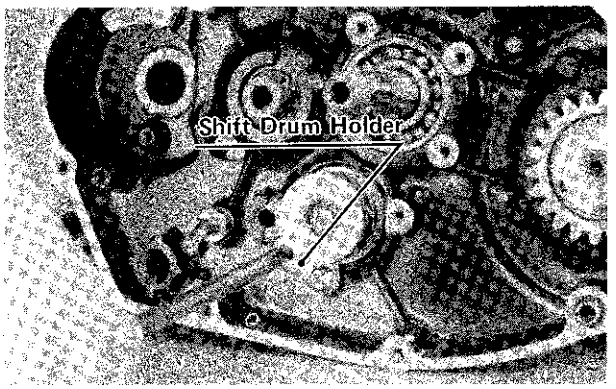
●Remove the transmission holder.



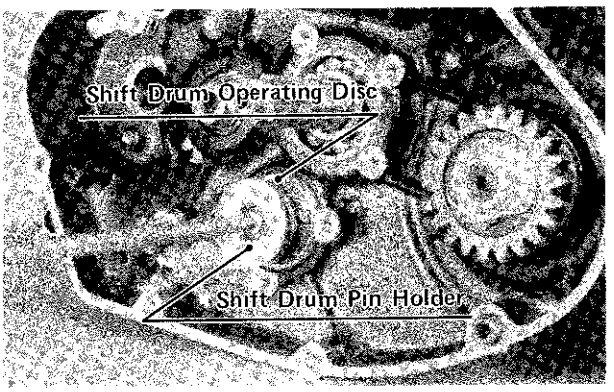
●Remove the detent arms.



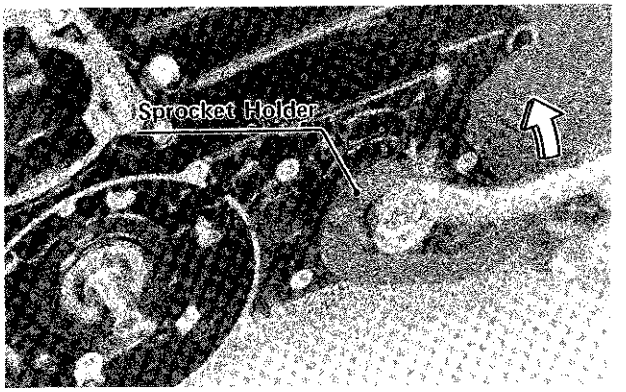
●Remove the shift drum holder.



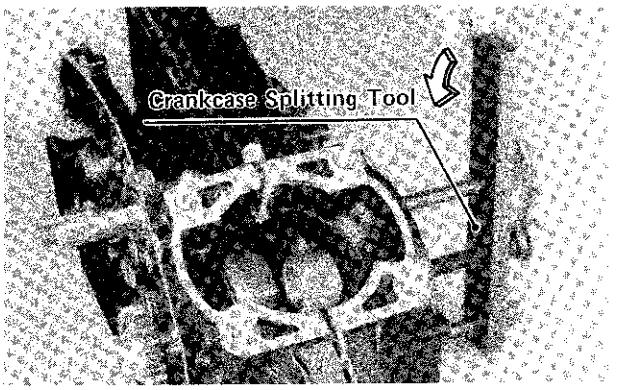
●Remove the shift drum pin holder and operating disc.



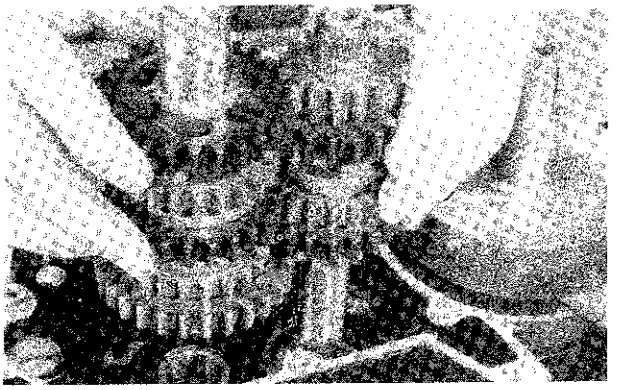
●Remove the engine sprocket with the sprocket holder.



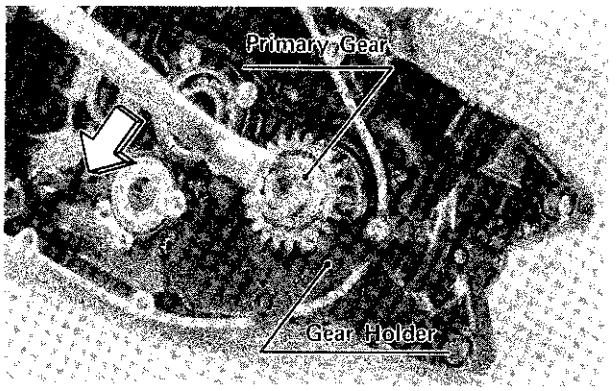
●Remove the engine sprocket collar and O ring.
●Remove all the crankcase screws.
●Split the crankcase with the crankcase splitting tool. After the front part starts to open up, strike the rear of the crankcase at an appropriate, sturdy spot with a plastic hammer if necessary so that the rear opens up as well. The transmission gears will be in the right crankcase half.



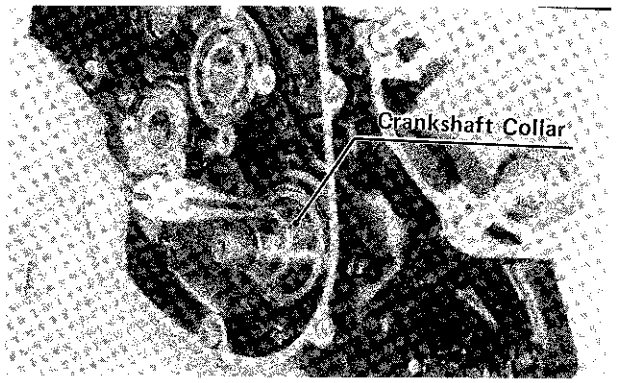
●Take out the shift rods and then the shift drum.
●Remove the shift forks, and then pull out the output and drive shaft assemblies. Arrange the transmission parts in an orderly manner, taking ample care that they do not get mixed up for reassembly.



●Remove the primary gear nut, washer, and then the gear holder.



●Pull off the primary gear, and remove the woodruff key.
●Remove the crankshaft collar and O ring.

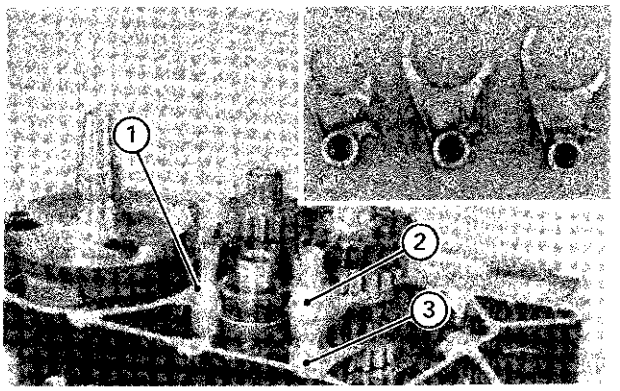


●Remove the crankshaft using a plastic or brass hammer.

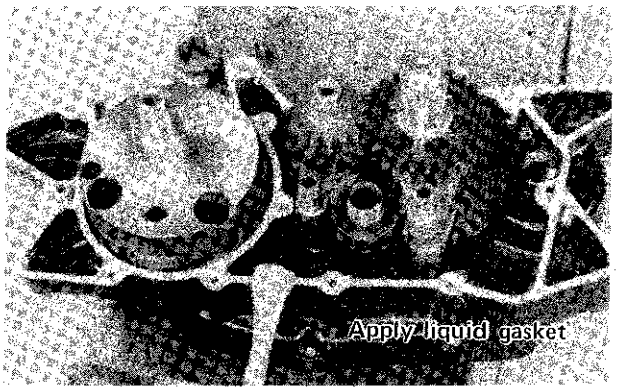
NOTE: The bearing on the left side of the crankshaft does not require removal unless it is worn or damaged. If worn or damaged, replace for a new one.

ENGINE ASSEMBLY

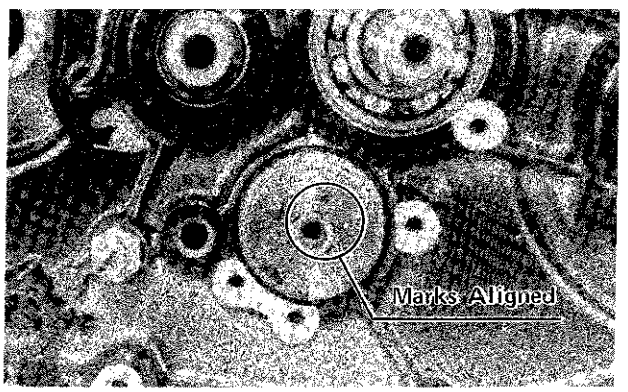
●Clean the mating surfaces of the crankcase halves.
●Replace the crankshaft into the right crankcase half using a press.
●Assemble the transmission gears, shift drum, and shift forks into the right crankcase half. After these parts are all in place, insert the shift rods into the shift forks.



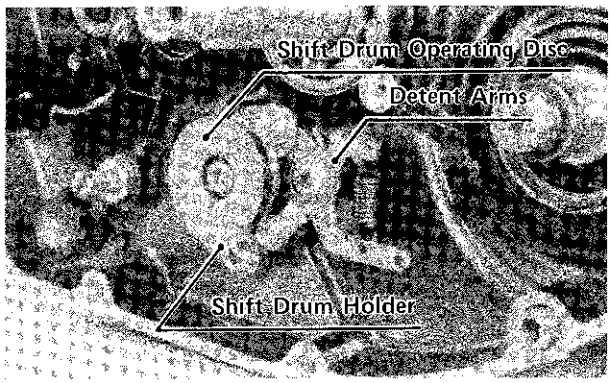
●Apply liquid gasket evenly to the right crankcase half mating surface.



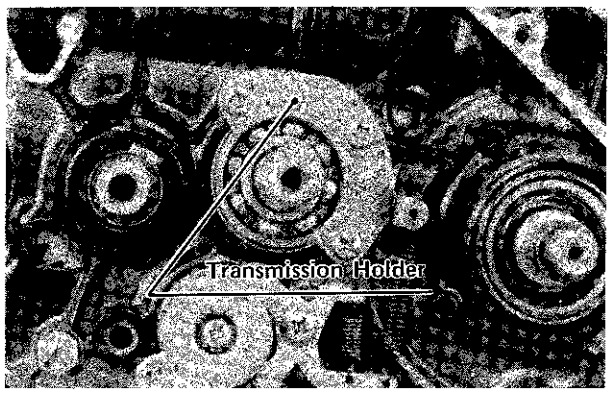
●Cover the right crankcase half with the left crankcase half, pressing them together with a press.
●Replace all crankcase screws, tightening them evenly.
●Wrap a clean cloth around the con-rod at the crankcase opening so that no parts or dirt will fall into the crankcase.
●Check to see that the crankshaft and the transmission gears turn easily.
●Replace the pins and the shift drum pin holder so that its mark lines up with the mark on the shift drum.



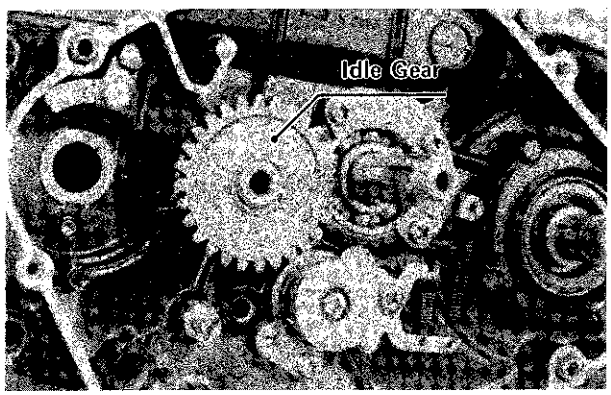
●Replace the shift drum holder.
●Mount the detent arms tightening their screw and fitting their spring back into place.



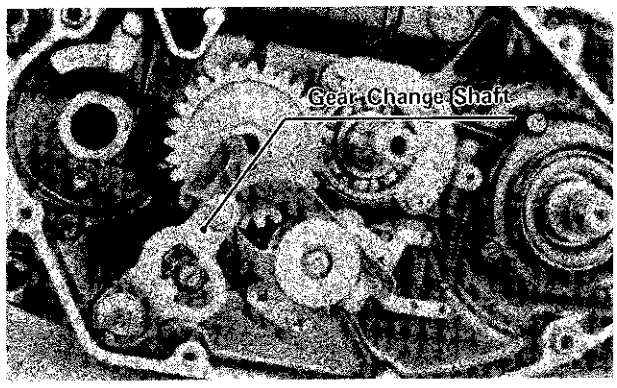
●Turn the shift drum with a phillips screwdriver to check that it moves properly.
●Mount the transmission holder, and fit the spring that runs between the transmission holder and the neutral detent arm.



●Put the idle gear onto the output shaft, and then replace its circlip.



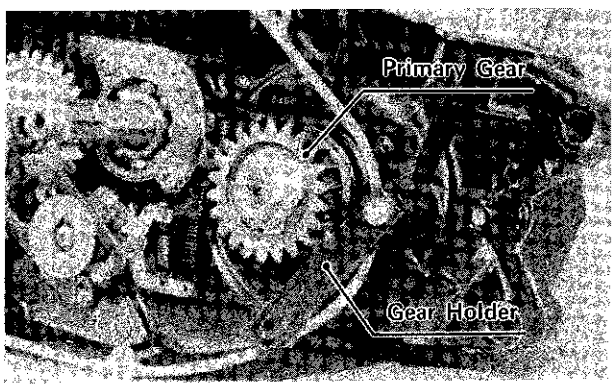
●Insert the gear change shaft.



●Replace the kick shaft, starter kick spring, and spring guide.

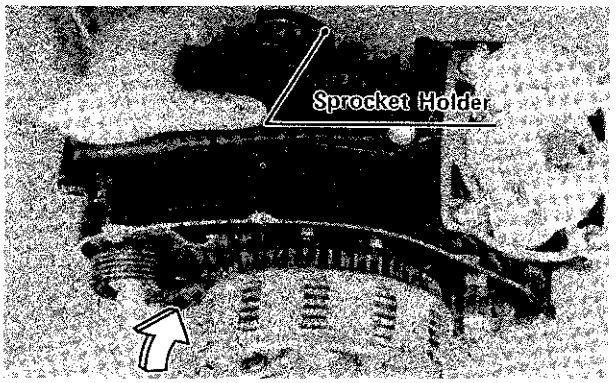


●Replace the collar and O ring onto the right side of the crankshaft, fit the woodruff key into the crankshaft, and replace the primary gear.
●Using the gear holder (special tool) to hold the primary gear steady, tighten the primary gear nut, and bend one part of the washer over the nut.

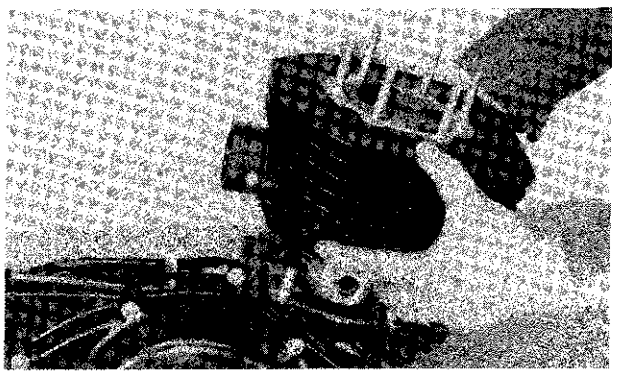


●Replace the collar and O ring onto the output shaft, and then replace the engine sprocket using the sprocket holder.

●Replace the washer, collar, and kick starter pinion onto the drive shaft, put the transmission into 1st gear, and hold the engine sprocket steady with the sprocket holder.



●Replace the clutch, fit the washer and lock washer in place, and then tighten the nut.
●Replace the clutch spring, and tighten the clutch spring bolts.
●Replace the clutch pusher.
●Fit the woodruff key into the left side of the crankshaft, and, while holding the primary gear steady with the gear holder, replace the rotor tightening its bolt.
●Remove the primary gear holder.
●Replace the magneto base so that the mark on the magneto base aligns with the mark on the crankcase.
●Replace the magneto cover and gasket. Check that the grommet is in its proper position, and replace the magneto wiring harness clamp.
●Replace the right engine cover.
●Replace the needle bearing into the con-rod small end.
●Replace the piston, piston pin, and snap ring.
●See that the pin in each piston groove is between the ends of its piston ring.
●Remove the cloth, and fit a new cylinder base gasket into place.
●Set the piston at BDC, and fit the base of the cylinder over the rings, pressing in on opposite sides of the rings as necessary. Be certain that the rings do not slip out of their proper position.



●Tighten the cylinder base nuts.
●Replace the cylinder head gasket and then the cylinder head.
●Tighten the cylinder head nuts.
●Replace the spark plug.
●Replace the kick pedal.

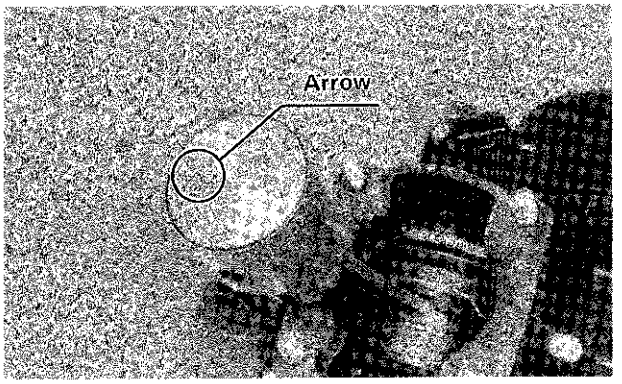
INSPECTION & INSTALLATION NOTES

1. Engine

(1) Piston, piston rings

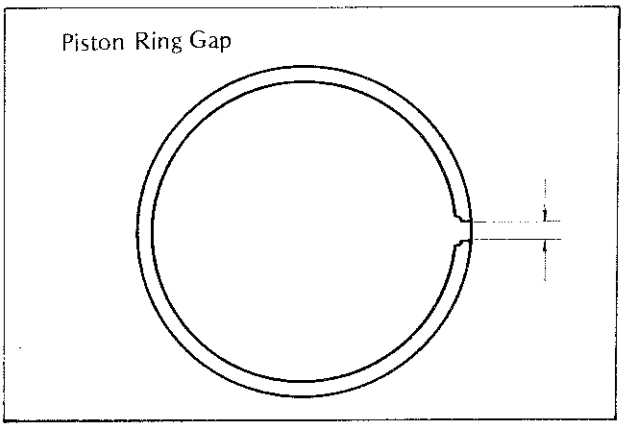
Piston installation note

●The arrow on the top of the piston must point towards the front.



Piston ring end gap

●Remove the piston ring to be checked, and fit it close to the bottom of the cylinder using the piston to locate the ring squarely in place. Measure the gap between the ends of the ring with a thickness gauge. If the gap is wider than the service limit, replace the ring for a new one.



Piston Ring End Gap

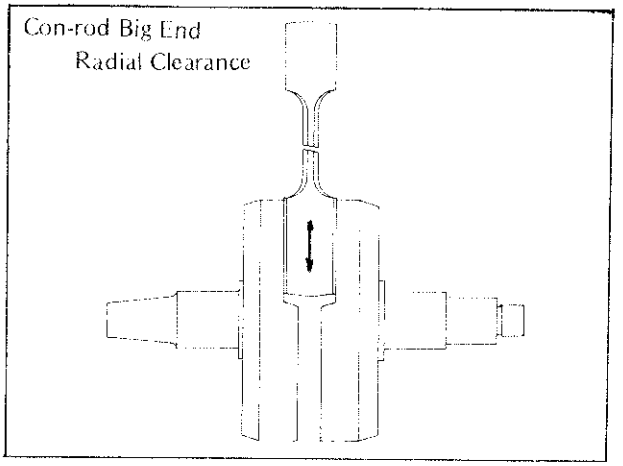
Standard	Service Limit
0.3~0.5 mm (0.012~0.020 in.)	0.6 mm (0.024 in.)

(2) Crankshaft

Con-rod big end radial clearance

●Set the crankshaft on V blocks, and place a dial gauge against the big end of the connecting rod. Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

●If the amount of radial clearance exceeds the service limit, replace the crankshaft for a new one.

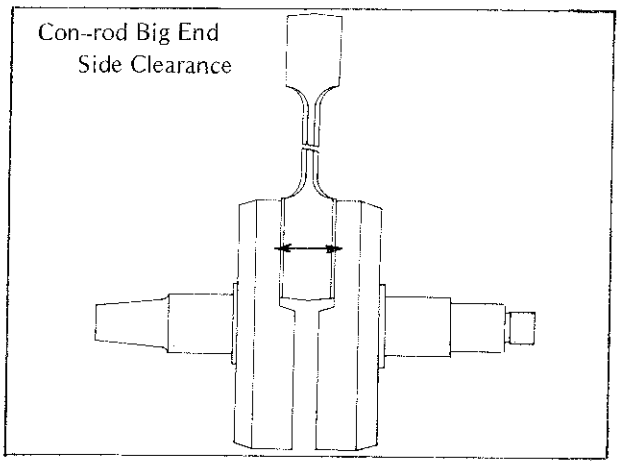


Con-rod Radial Clearance

Standard	Service Limit
0.037~0.050 mm (0.0015~0.0022 in.)	0.1 mm (0.004 in.)

Con-rod big end side clearance

●Remove the crankshaft, and measure the connecting rod big end side clearance with a thickness gauge. If the side clearance exceeds the service limit, replace the crankshaft for a new one.



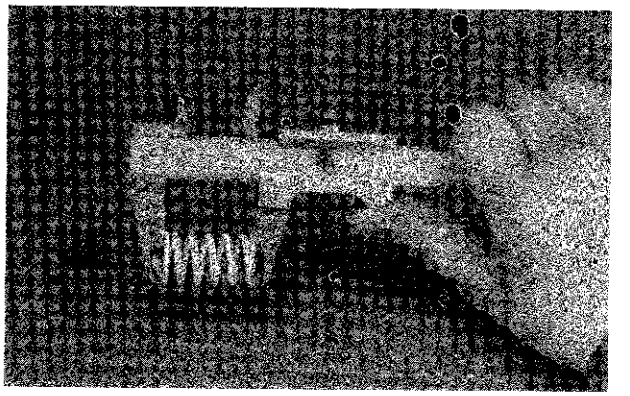
Con-rod Big End Side Clearance

Standard	Service Limit
0.40~0.45 mm (0.016~0.018 in.)	0.8 mm (0.031 in.)

(3) Clutch

Clutch spring tension

●Determine the condition of the clutch springs by measuring their free length with vernier calipers. If any spring is shorter than the service limit, replace all the springs as a matched set.



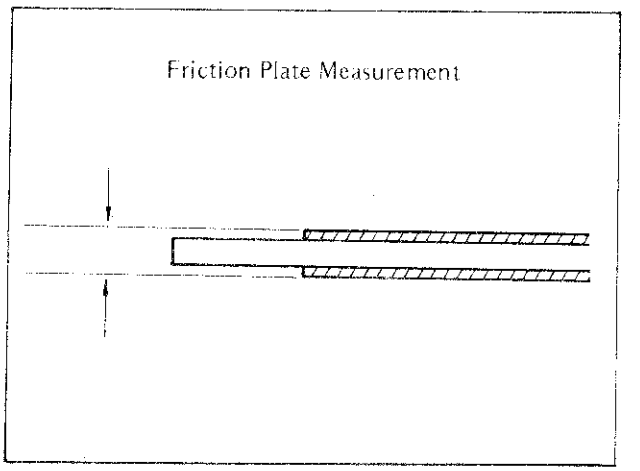
Clutch Spring Tension

Standard	Service Limit
33.0 mm (1.32 in.)	32.1 mm (1.26 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.

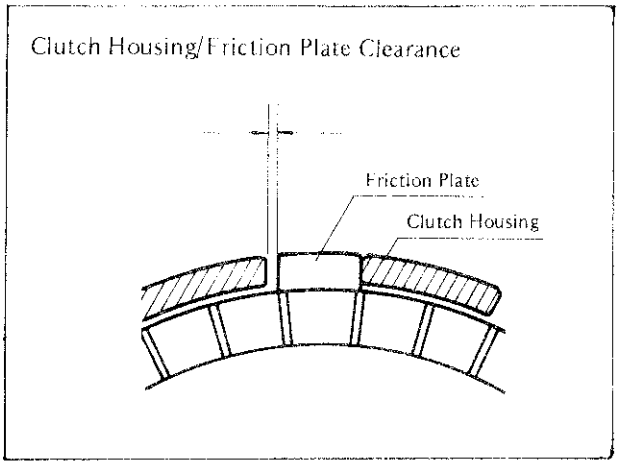


Friction Plate Wear, Damage

Standard	Service Limit
2.9~3.1 mm (0.114~0.122 in.)	2.5 mm (0.098 in.)

Clutch housing/friction plate clearance

●Measure the clearance between the tangs on the friction plates and the fingers of the clutch housing. If the clearance exceeds the service limit, replace the friction plates.

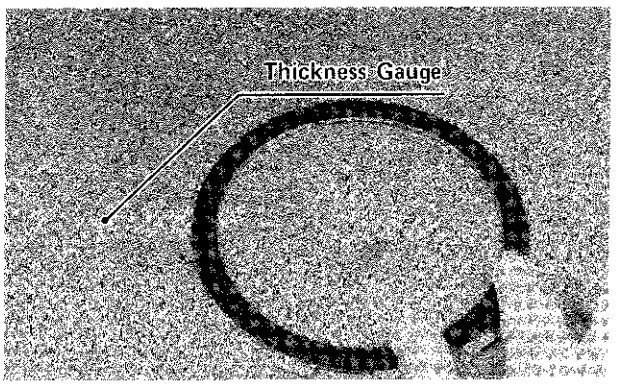


Clutch Housing/Friction Plate Clearance

Standard	Service Limit
0.09~0.30 mm (0.004~0.012 in.)	0.50 mm (0.020 in.)

Friction plate, steel plate warp

●Place each clutch plate on a surface plate, and measure the gap between each plate and the surface plate at several places with a thickness gauge. This gap is the amount of clutch plate warp. Repiace any plates warped over the service limit.



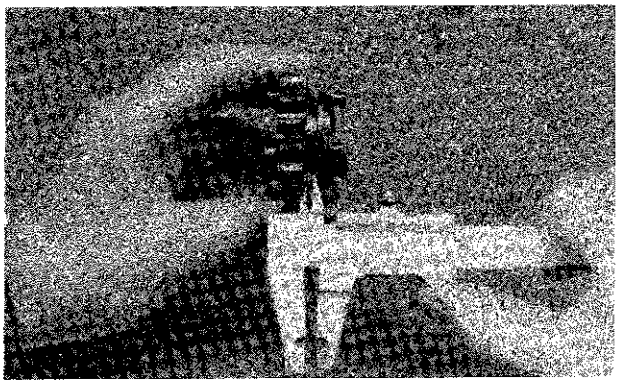
Friction Plate, Steel Plate Warp

	Standard	Service Limit
Friction Plate	0.1 mm (0.004 in.)	0.25 mm (0.01 in.)
Steel Plate	0.1 mm (0.004 in.)	0.25 mm (0.01 in.)

Shift fork, gear groove wear

●Measure the thickness of the ears on each shift fork, and measure the width of each gear shift fork groove with vernier calipers. If the thickness of a shift fork ear is under the service limit, replace the shift fork. If a gear shift fork groove is worn over the service limit, replace the gear.





Shift Fork, Gear Groove Wear

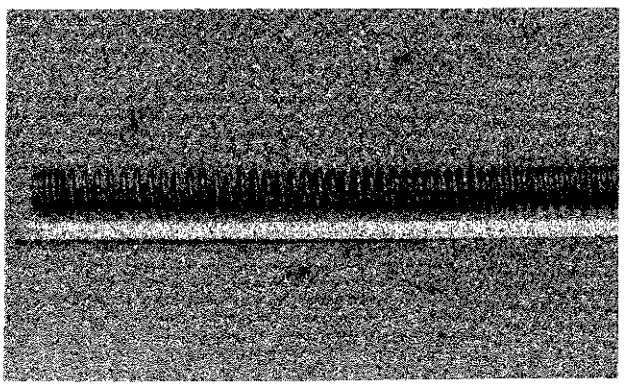
	Standard	Service Limit
Shift Fork Thickness	4.4~4.5 mm (0.173~0.177 in.)	4.30 mm (0.170 in.)
Shift Fork Groove	4.55~4.65 mm (0.179~0.183 in.)	4.75 mm (0.187 in.)

2. Frame

(1) Front fork

Front fork spring length

●Since the springs become shorter as they weaken, check their free length to determine their condition. If the spring of either shock absorber is found to be shorter than the service limit, replace both shock absorber springs for new ones.

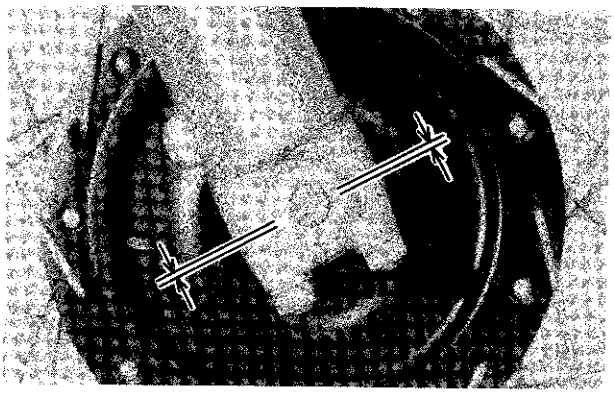


Front Fork Spring Length (Free)

Standard	Service Limit
481.5 mm (18.96 in.)	470 mm (18.50 in.)

(2) Front wheel installation note

●Each front fork clamp should be tightened so that the gap between the clamp and the shock absorber is the same on both the front and the rear of the clamp.



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) Firing 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 combustion chamber

(5) Other
- Ignition timing incorrect
- Brakes dragging
- Overheating
- Clutch slipping
- Throttle valve does not fully open
- Transmission oil quantity excessive
- Transmissio 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 doesn't disengage properly
- Clutch lever play excessive
- Clutch plates warped or damaged
- 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 groove worn
- Gear dog or dog recess worn
- Shift drum or shift fork pin worn
- Drive shaft, output shaft, or gear splines worn

Poor handling or stability

(1) Handlebar hard to turn
- Steering stem nut too 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 weak
- Suspension oil leak

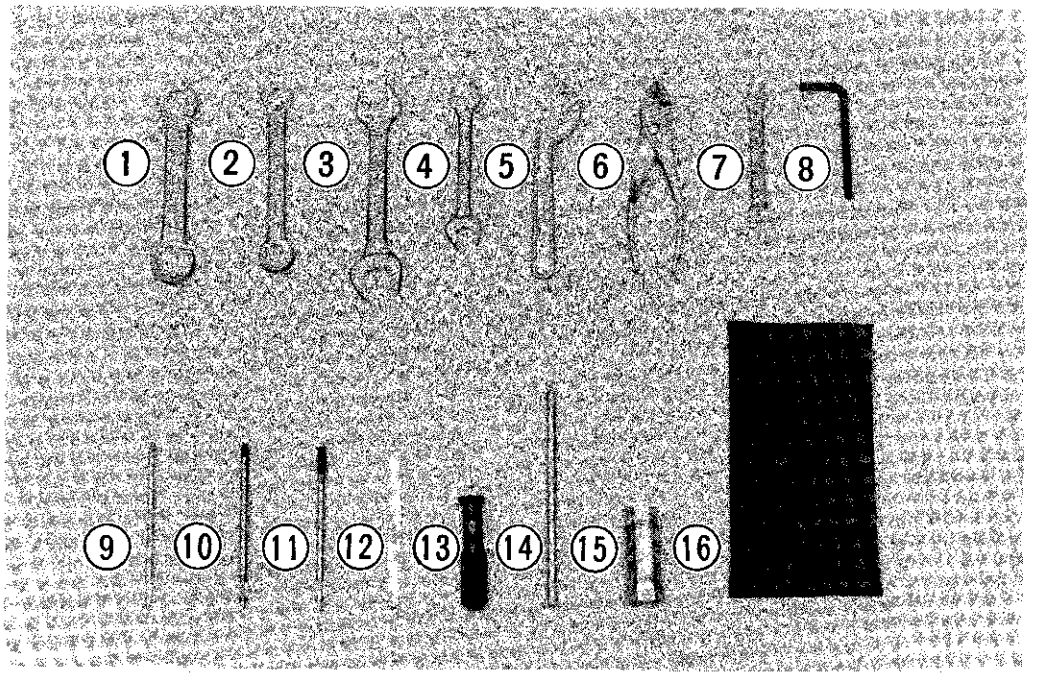
Brakes don't hold

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

2. Standard Values & Service Limits

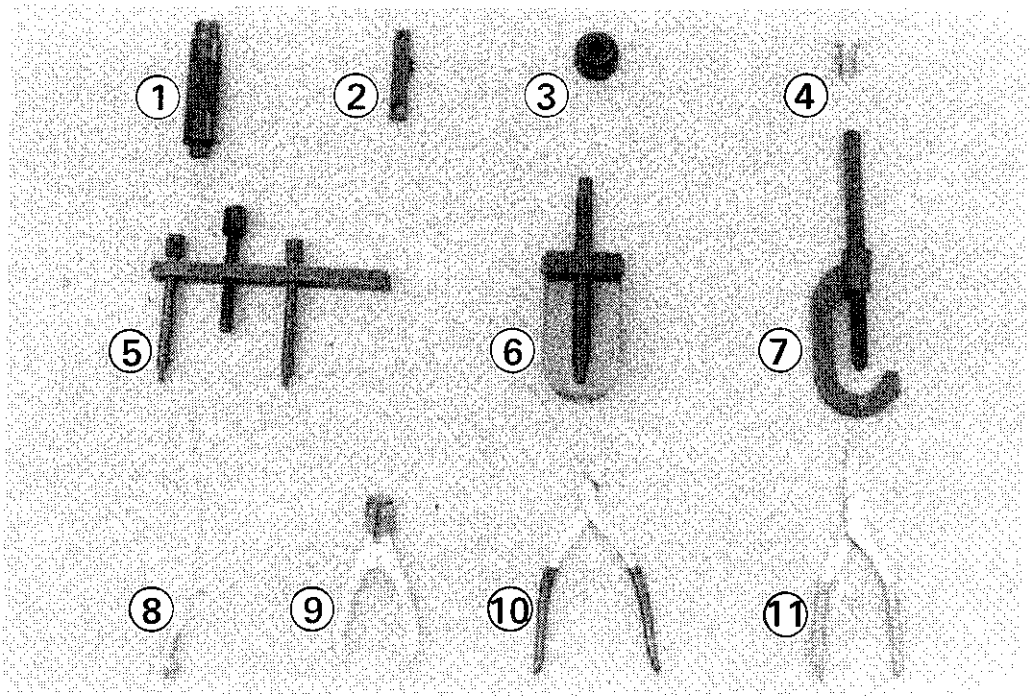
Measurement	Standard Value	Service Limit
1. Cylinder Inner Diameter	69.50~69.520 mm (2.736~2.730 in.)	69.55 mm (2.738 in.)
2. Piston Diameter	69.355~69.375 mm (2.730~2.731 in.)	69.25 mm (2.726 in.)
3. Piston Pin Hole Diameter	18.005~18.013 mm (0.7089~0.7092 in.)	18.1 mm (0.713 in.)
4. Piston Pin Diameter	17.994~18.000 mm (0.7084~0.7087 in.)	17.98 mm (0.708 in.)
5. Piston Ring End Gap	0.3~0.5 mm (0.012~0.020 in.)	0.6 mm (0.024 in.)
6. Con-rod Big End Radial Clearance	0.037~0.057 mm (0.0015~0.0022 in.)	0.1 mm (0.004 in.)
7. Con-rod Big End Side Clearance	0.40~0.45 mm (0.016~0.002 in.)	0.8 mm (0.031 in.)
8. Crankshaft Runout	0.03 mm - TIR (0.0012 in. - TIR)	0.10 mm (0.004 in.)
9. Clutch Spring Free Length	33.6 mm (1.32 in.)	32.1 mm (1.26 in.)
10. Friction Plate Thickness	2.9~3.1 mm (0.114~0.122 in.)	2.5 mm (0.098 in.)
11. Clutch Housing/Friction Plate Clearance	0.09~0.30 mm (0.004~0.012 in.)	0.50 mm (0.020 in.)
12. Friction Plate Warp	below 0.1 mm (below 0.004 in.)	0.25 mm (0.010 in.)
13. Steel Plate Warp	below 0.1 mm (below 0.004 in.)	0.25 mm (0.010 in.)
14. Shift Fork Ear Thickness	4.4~4.5 mm (0.173~0.177 in.)	4.30 mm (0.170 in.)
15. Shift Fork Rod Diameter	11.982~12.000 mm (0.4717~0.4724 in.)	11.95 mm (0.470 in.)
16. Shift Fork Hole Diameter	12.032~12.059 mm (0.474~0.475 in.)	12.1 mm (0.476 in.)
17. Gear Fork Groove Width	4.55~4.65 mm (0.179~0.183 in.)	4.75 mm (0.187 in.)

Measurement	Standard Value	Service Limit
18. Rim Runout	Rad. 0.8 mm (0.032 in.) Side 1.0 mm (0.039 in.)	Rad. 2 mm (0.079 in.) Side 3 mm (0.118 in.)
19. Axle Warp	0.1 mm - TIR/100 mm (0.004 - TIR/3.94 in.)	0.2 mm (0.008 in.)
20. Engine Sprocket Diameter (at tooth base)	55.67~55.69 mm (2.1917~2.1925 in.)	55 mm (2.165 in.)
21. Rear Sprocket Diameter (at tooth base)	232.56 mm (9.16 in.)	231 mm (9.09 in.)
22. Brake Drum Diameter (front)	130~130.1 mm (5.118~5.122 in.)	130.75 mm (5.15 in.)
23. Brake Drum Diameter (rear)	150~150.1 mm (5.906~5.909 in.)	150.75 mm (5.94 in.)
24. Brake Lining Thickness (front)	3.8~4.1 mm (0.150~0.161 in.)	2.00 mm (0.79 in.)
25. Brake Lining Thickness (rear)	5.2~5.7 mm (0.205~0.224 in.)	3.00 mm (0.12 in.)
26. Fork Spring Free Length	481.5 mm (18.96 in.)	470 mm (18.50 in.)
27. Pivot Shaft Warp	0.1 mm - TIR/100 mm (0.004 in.-TIR/3.94 in.)	0.2 mm (0.008 in.)



Tool Kit Tools

1. Box Wrench 22 x 24 mm
2. Box Wrench 14 x 17 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 8 mm
9. Phillips Bit #2
10. Phillips Bit #3
11. Slot Bit
12. Screwdriver Handle
13. Screwdriver Grip
14. Bar
15. Spark Plug Wrench 21 mm
16. Tool Bag



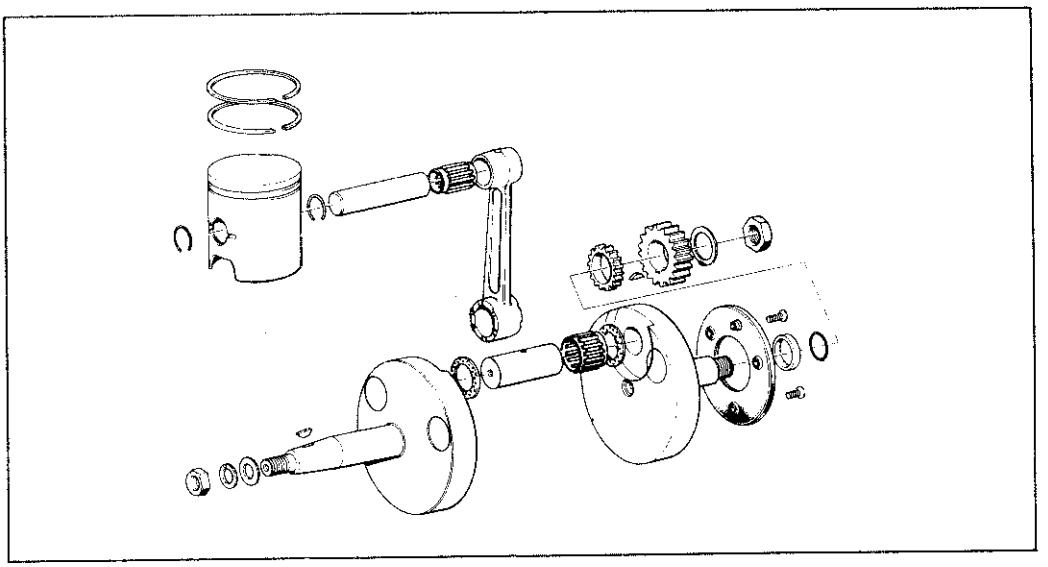
Special Tools

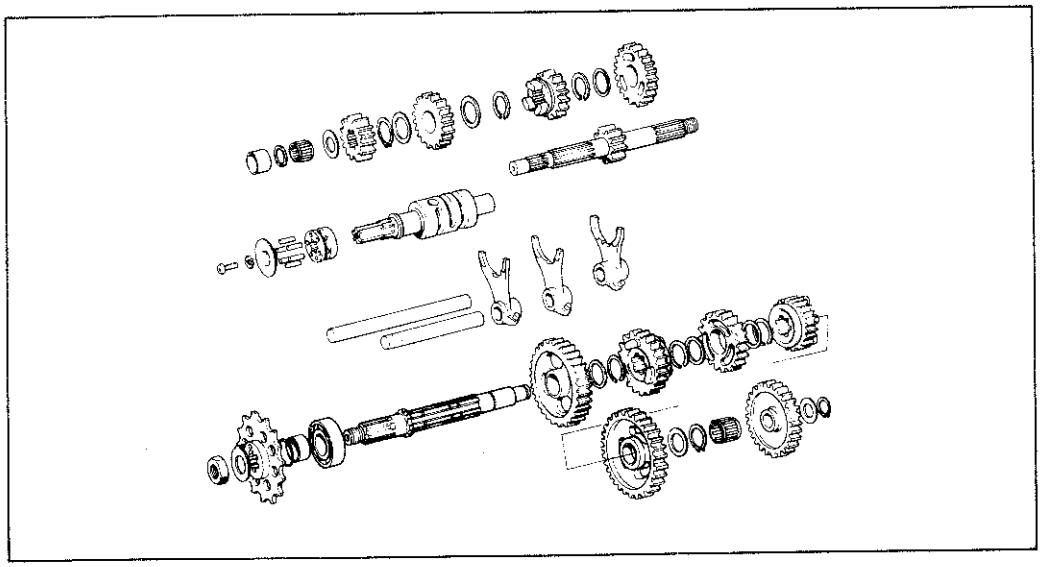
REF NO.	TOOL NO.	DESCRIPTION
1	57001-139	Bearing Driver Holder
2	57001-301	Gear Holder
3	57001-282	Bearing Driver
4	57001-251	Rotor Puller
5	57001-153	Crankcase Splitting Tool
6	57001-231	Piston Pin Puller
7	57001-040	Engine Sprocket Holder
8	57001-202	Fuel Level Gauge
9	57001-115	Piston Ring Pliers
10	57001-143	Circlip Pliers (close-in)
11	57001-144	Circlip Pliers (open-out)

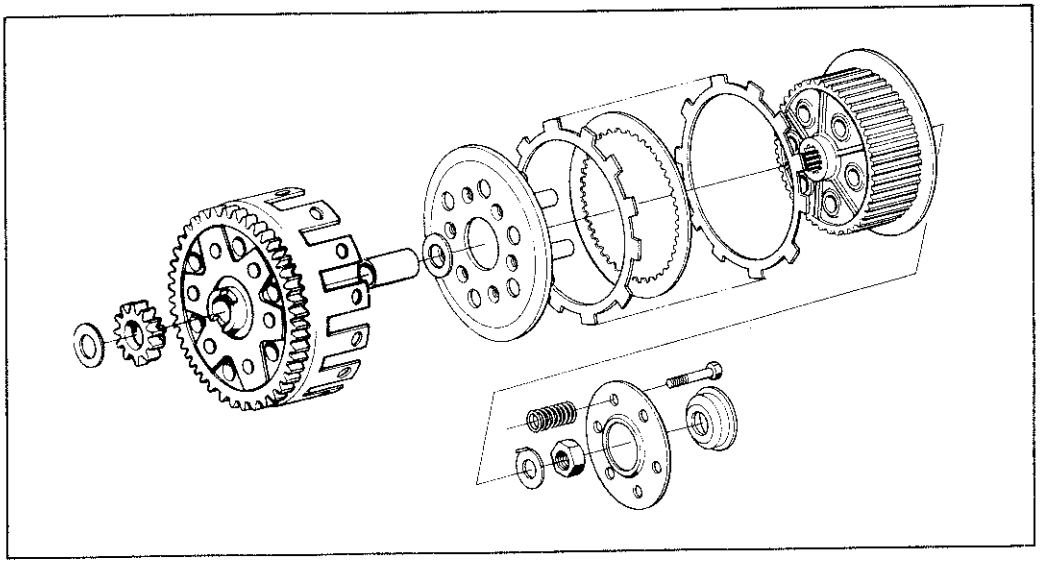
4. Replacement Parts

REF NO.	PART NO	DESCRIPTION
1	13001-070	Piston (standard)
2	13029-069	Piston (0.5 mm oversize)
3	13008-051	Piston Ring Set (standard)
4	13025-055	Piston Ring Set (0.5 mm oversize)
5	11005-121-21	Cylinder
6	11013-043	Air Cleaner Element
7	18002-112	Expansion Chamber
8	18033-080	Baffle Tube
9	92063-105	Main Jet (137.5)
10	92063-116	Main Jet (140.0)
11	92063-117	Main Jet (142.5)
12	92063-118	Main Jet (145.0)
13	92063-119	Main Jet (147.5)
14	13144-055	Engine Sprocket (13T)
15	13144-056	Engine Sprocket (14T)
16	42041-133	Rear Sprocket (48T)
17	42041-134	Rear Sprocket (46T)
18	42041-135	Rear Sprocket (50T)
19	92057-039	Drive Chain

5. Diagrams – Engine, Transmission, Clutch

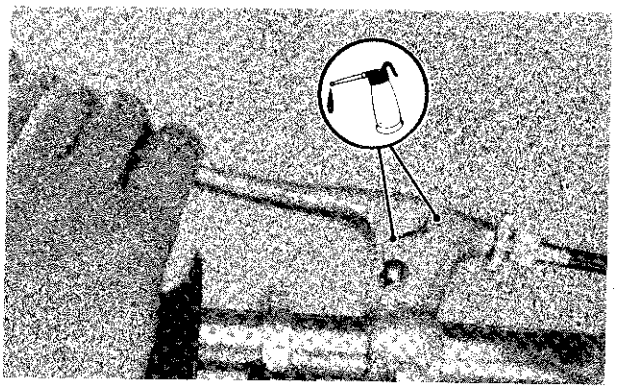


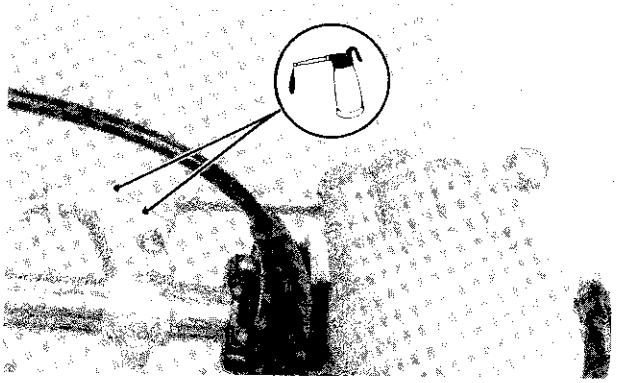


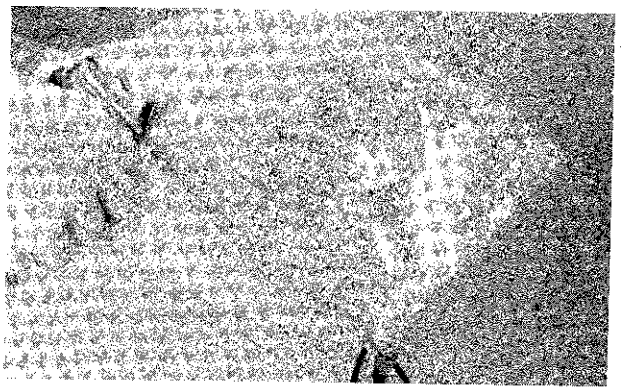


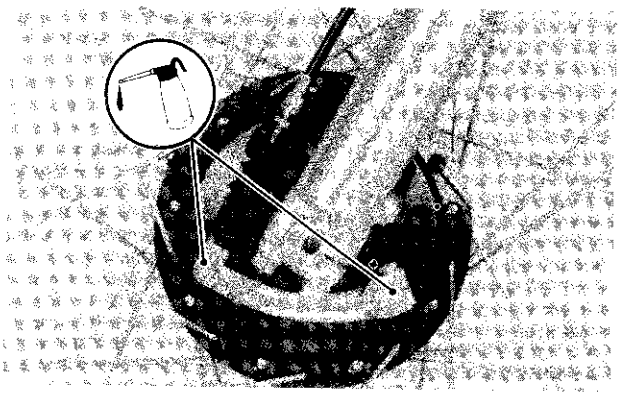
6. General Lubrication

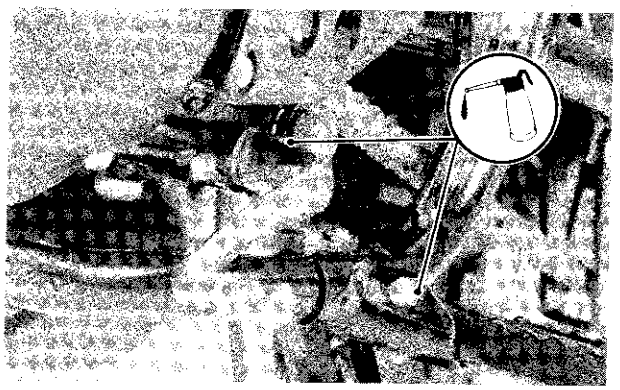
The general lubrication depicted in the following illustrations is important for long service life and for avoiding trouble during vehicle operation. Carry out this lubrication during vehicle inspection and everytime the vehicle is washed. Use SAE 30 oil.

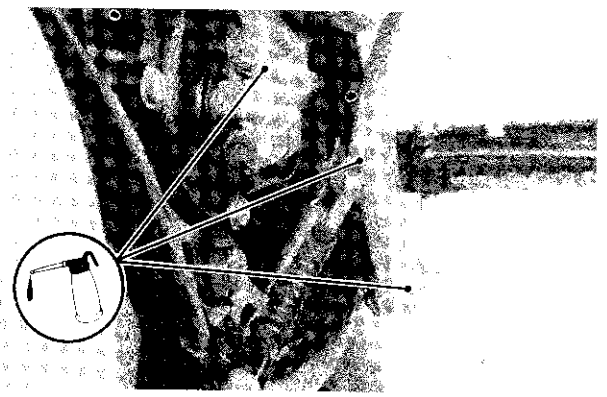


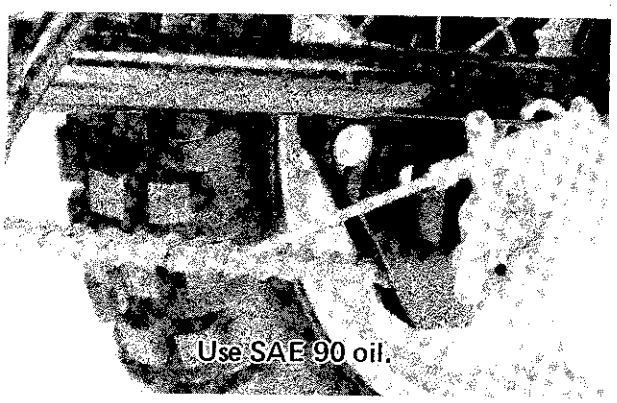


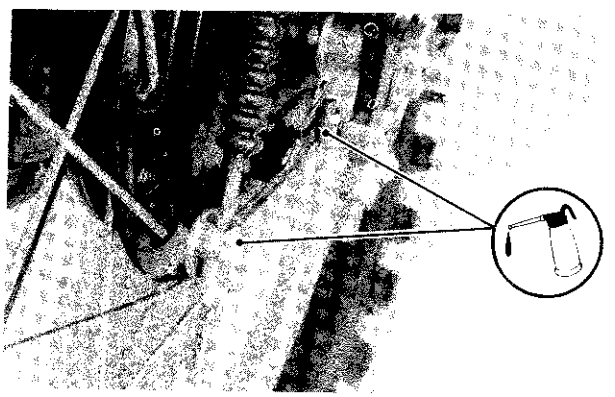




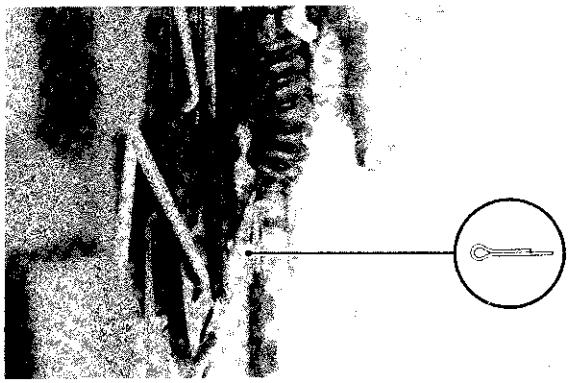


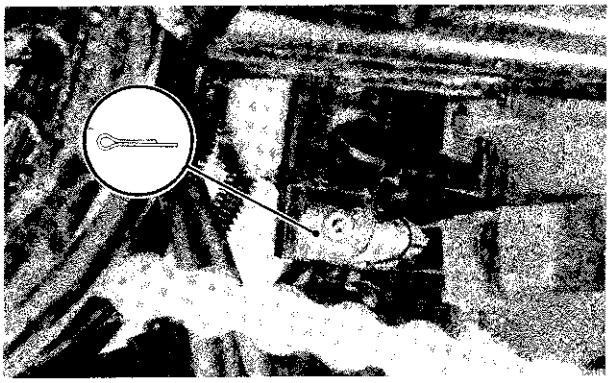


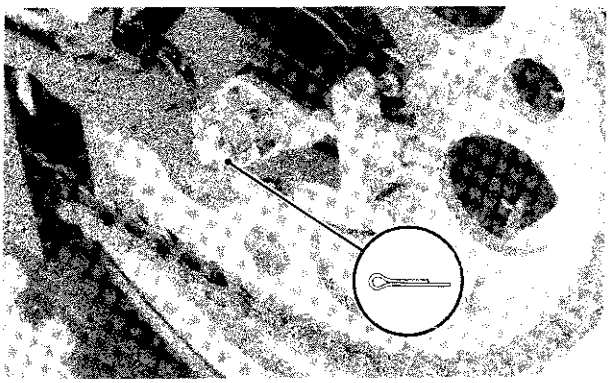


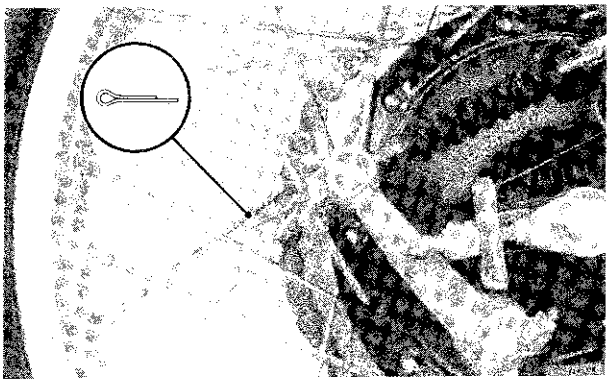


7. Cotter Pin Locations

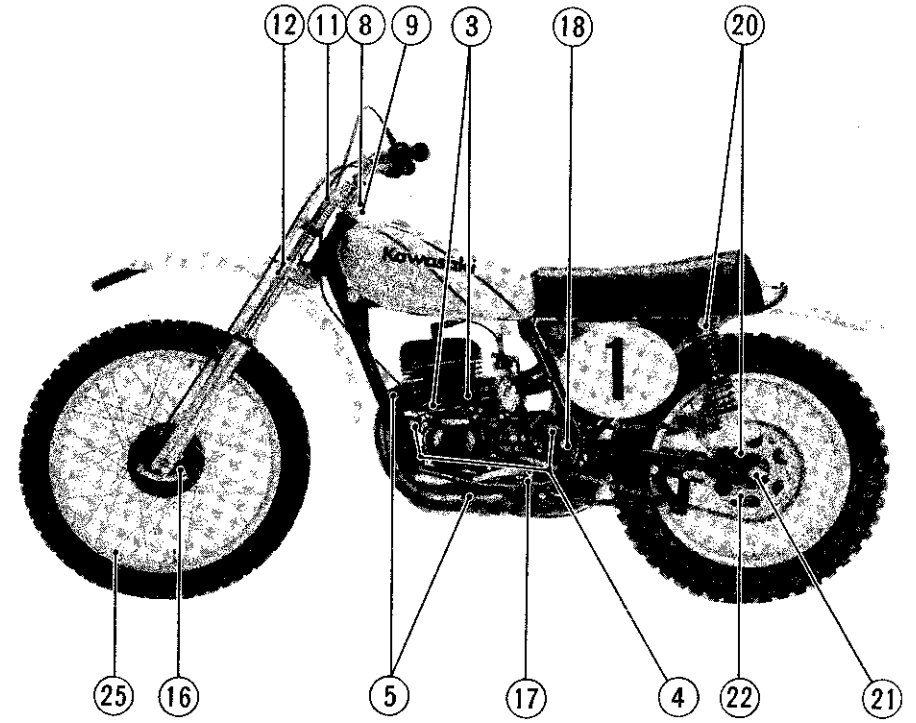


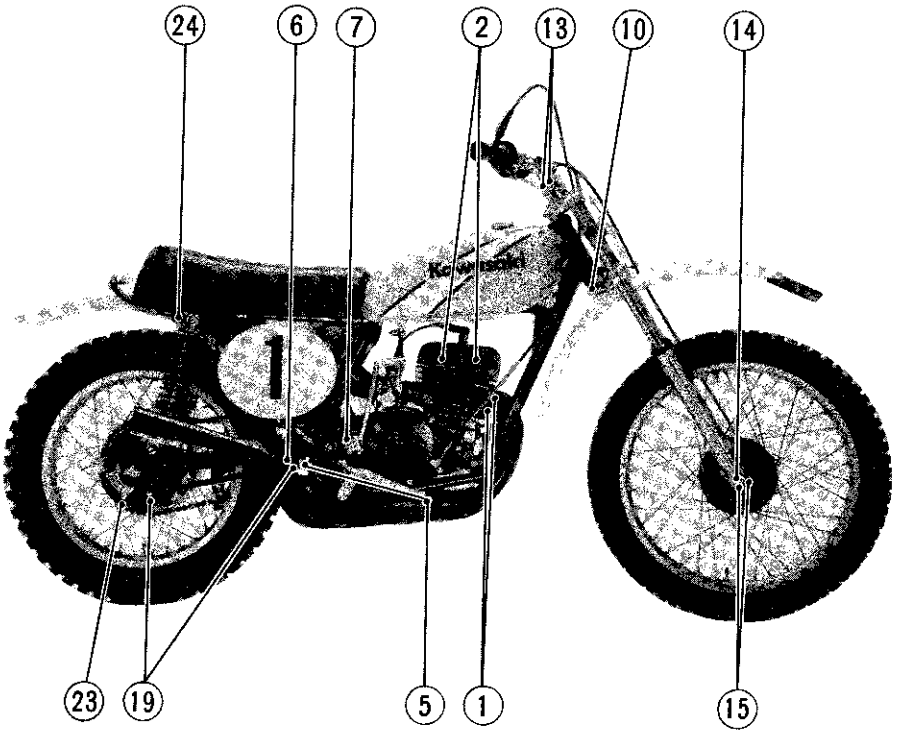






8. Bolt & Nut Tightening





	PART	TOOL SIZE (mm)	TORQUE
1.	Exhaust Screws (3)		
2.	Cylinder Head Nuts (6)	13	2.2 kg-m (16.0 ft-lbs)
3.	Cylinder Base Nuts (4)	14	3.5 kg-m (25 ft-lbs)
4.	Engine Mounting Nuts (4)	17	2.6~3.5 kg-m (19~25 ft-lbs)
5.	Muffler Springs (5)		
6.	Muffler Mounting Bolt	13	
7.	Kick Pedal Bolt	13	
8.	Steering Stem Head Bolt	13	3.1~3.8 kg-m (22~27 ft-lbs)
9.	Steering Stem Head Clamp Bolt	13	3.1~3.8 kg-m (22~27 ft-lbs)
10.	Steering Stem Base Nut	13	3.1~3.8 kg-m (22~27 ft-lbs)
11.	Front Fork Upper Clamp Bolts (2)	13	3.1~3.8 kg-m (22~27 ft-lbs)
12.	Front Fork Lower Clamp Bolts (4)	8	
13.	Handlebar Clamp Bolts (4)	13	0.7~0.8 kg-m (61~69 in-lbs)
14.	Front Axle Nut		
15.	Front Axle Clamp Nuts (4)	13	1.8~2.0 kg-m (13.0~14.5 ft-lbs)
16.	Front Brake Cam Lever Bolt	10	0.7~0.8 kg-m (61~69 in-lbs)
17.	Shift Pedal Bolt	10	
18.	Swing Arm Pivot Shaft Nut	19	7~8 kg-m (50~57 ft-lbs)
19.	Torque Link Nut	17	2.6~3.5 kg-m (19.0~25 ft-lbs)
20.	Rear Shock Absorber Nuts (2) (2)	10, 17	
21.	Rear Axle Nut	24	12~15 kg-m (87~108 ft-lbs)
22.	Rear Sprocket Nuts (6)	13	3.1~4.2 kg-m (22~30 ft-lbs)
23.	Rear Brake Cam Lever Bolt	10	0.7~0.8 kg-m (61~69 in-lbs)
24.	Seat Mounting Bolts (2)	13	
25.	Spokes		0.25~0.3 kg-m (22~26 in-lbs)

9. Torque Table

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

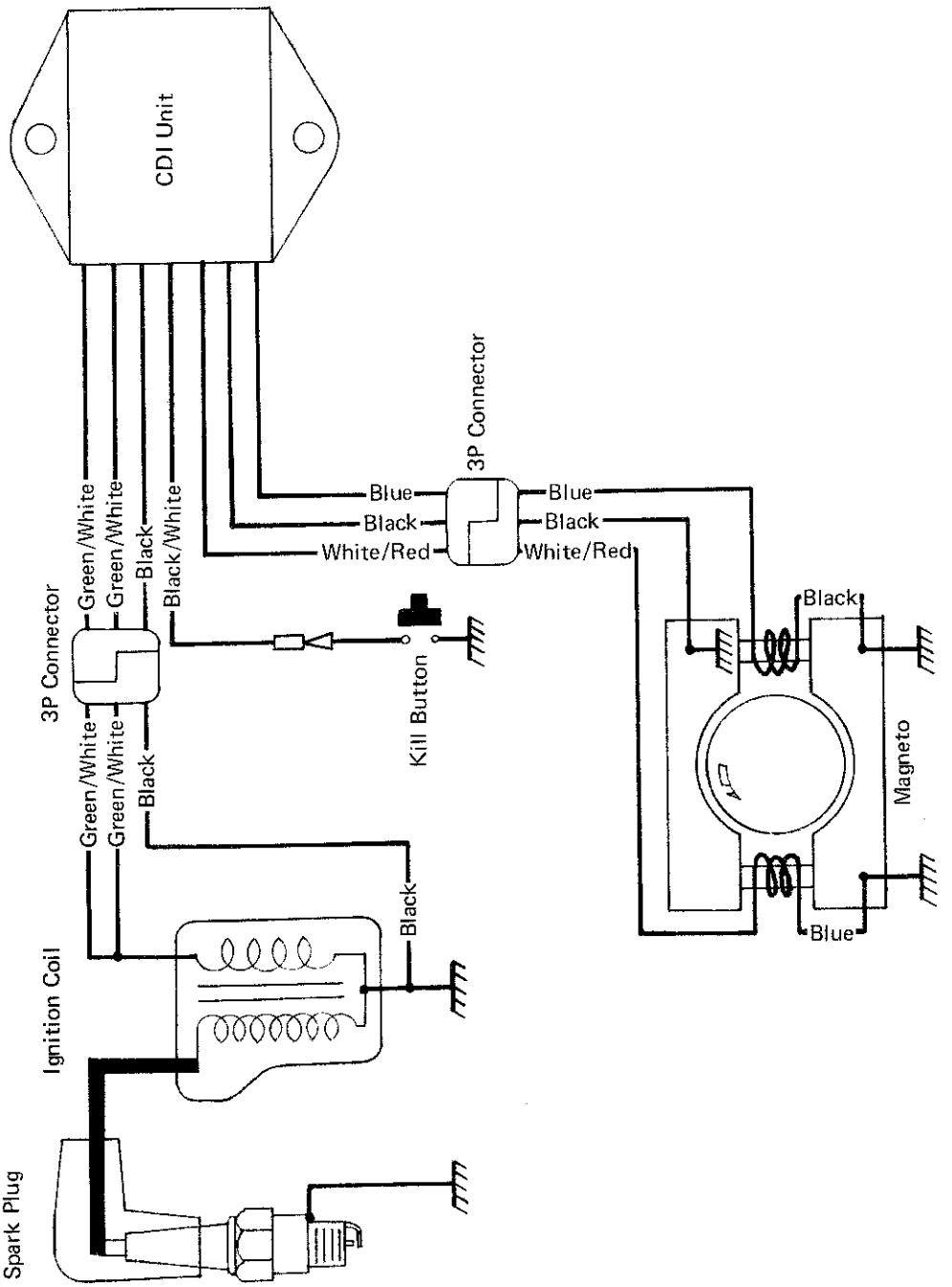
Coarse threads

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

10. Wiring Diagram



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