YAMAHA

IT250J/IT465J

OWNER'S MANUAL
TUNING AND SERVICE

LIT-11626-03-12

4V5-28199-12

IMPORTANT NOTICE

THIS MACHINE IS DESIGNED STRICTLY FOR COMPETITION USE ONLY. IT IS ILLEGAL TO OPERATE THIS VEHICLE ON STREET. OFF ROAD USE ON PUBLIC LAND MAY BE ILLEGAL. PLEASE CHECK YOUR LOCAL RIDING AREA REGURATIONS. SUSPENSION ON THIS MACHINE CAN BE ADJUSTED TO ACCOMODATE DIFFERING RIDER WEIGHTS AND TECHNIQUE.

1. **GASOLINE IS HIGHLY FLAMMABLE:**
   * **Always turn off the engine when refueling.**
   * **Take care not to spill on the engine or exhaust pipe/muffler, when refueling.**
   * **If any gasoline spills on the engine or exhaust pipe/muffler, wipe it off immediately.**
   * **Never refuel while smoking or in the vicinity of an open flame.**
2. **If you should swallow some gasoline or inhale a lot of gasoline vapor, or allow some gasoline to get in your eye(s), see your doctor immediately. If any gasoline spills on your skin or clothing, immediately wash it with soap and water, and change your clothes.**
3. **When parking the machine, note the followings:**
   * **The engine and exhaust pipe / muffler are heated up. Park the machine in a place where pedestrians or children are not likely to touch the machine.**
   * **Do not park the machine on a slope or soft ground; the machine can easily overturn.**
4. **When transporting the machine in another vehicle, be sure it is kept upright and that the fuel petcock is turned to the "OFF" position. If it should lean over, gasoline may leak out of the carburetor or fuel tank.**
5. **Never start your engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and can cause loss of consciousness and death within a short time. Always operate your machine in an area with adequate ventilation.**
6. **Always wear a helmet, groves, boots, MX's trousers and jacket.**

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1st. edition, August 1981

P/N LIT-11626-03-12

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1 GENERAL INFORMATION

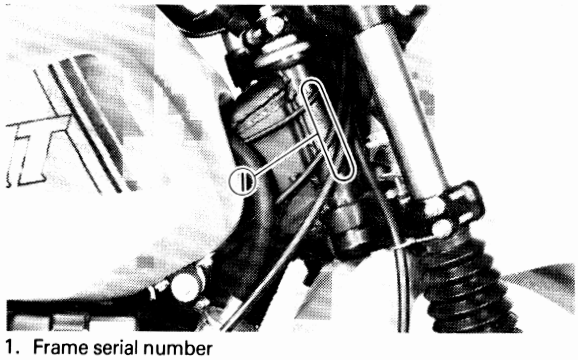
MACHINE IDENTIFICATION

There are two significant reasons for knowing the serial number of your machine:

1. When ordering parts, you can give the number to your Yamaha dealer for positive identification of the model you own;
2. If your bike is stolen, the authorities will need the number to search for and identify your machine.

Frame serial number

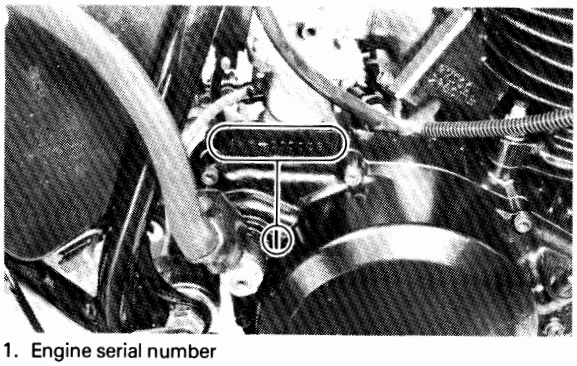
The frame serial number is stamped on the right of the steering head pipe.



1. Frame serial number

Engine serial number

The engine serial number is stamped into the elevated part of the right rear section of the engine.



1. Engine serial number

CONTROL FUNCTIONS

WARNING:

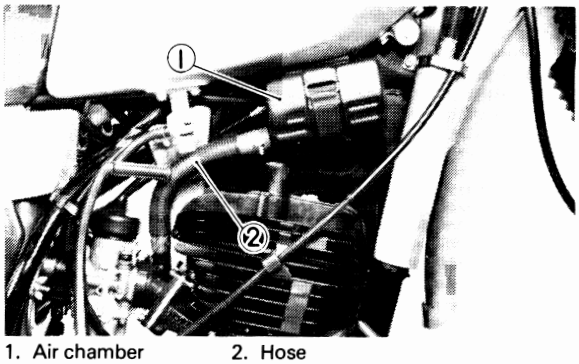
Before riding this machine, become thoroughly familiar with all the operating controls and their functions. If there are any controls which you do not understand, consult your Yamaha dealer.

NOTICE:

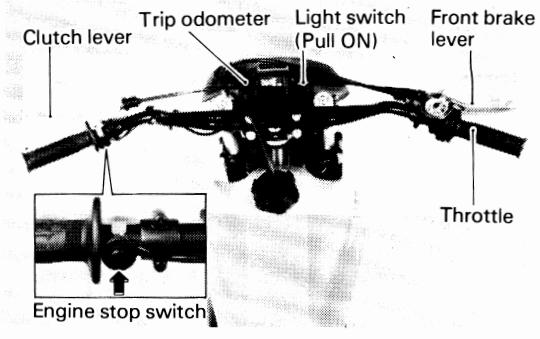
This machine is designed strictly for competition use only. It is not equipped with highway approved lighting. Off-road use on public land may be illegal.

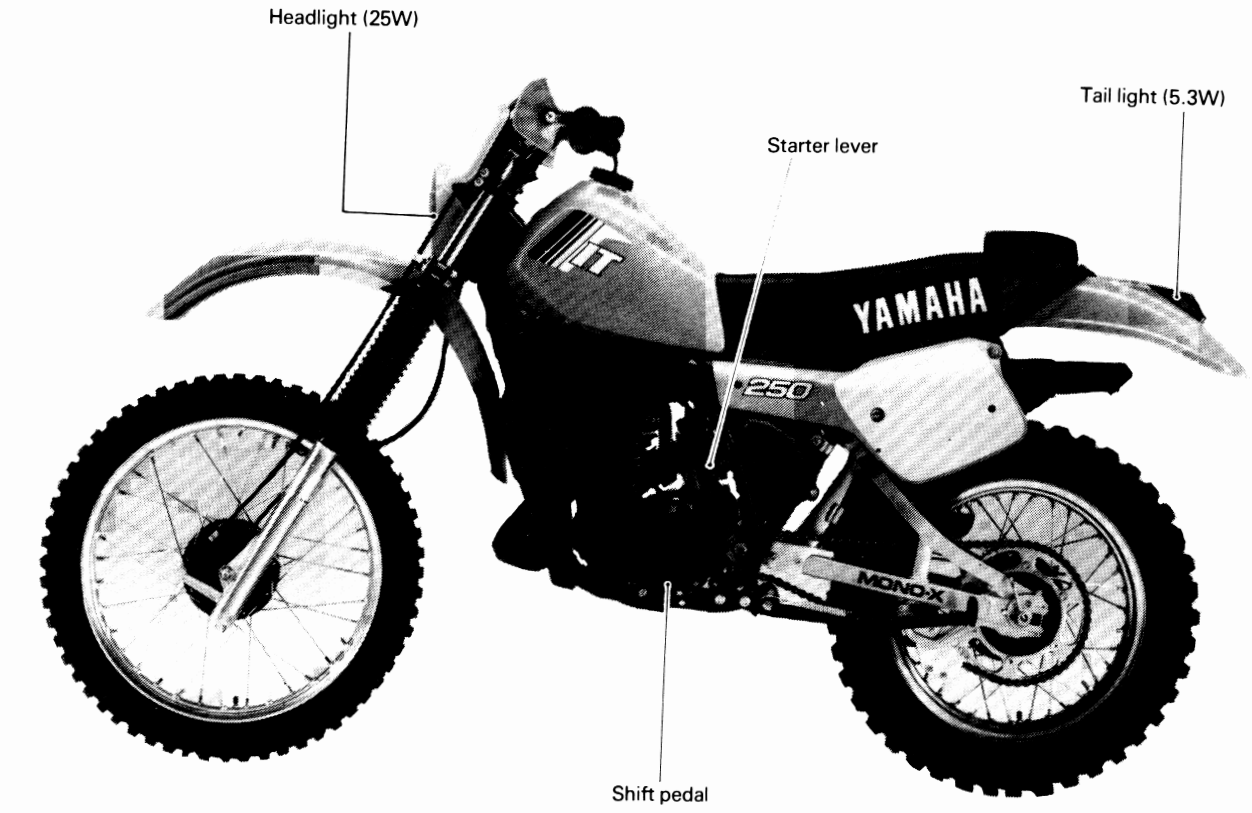
Note on handling of the Yamaha Energy Induction System

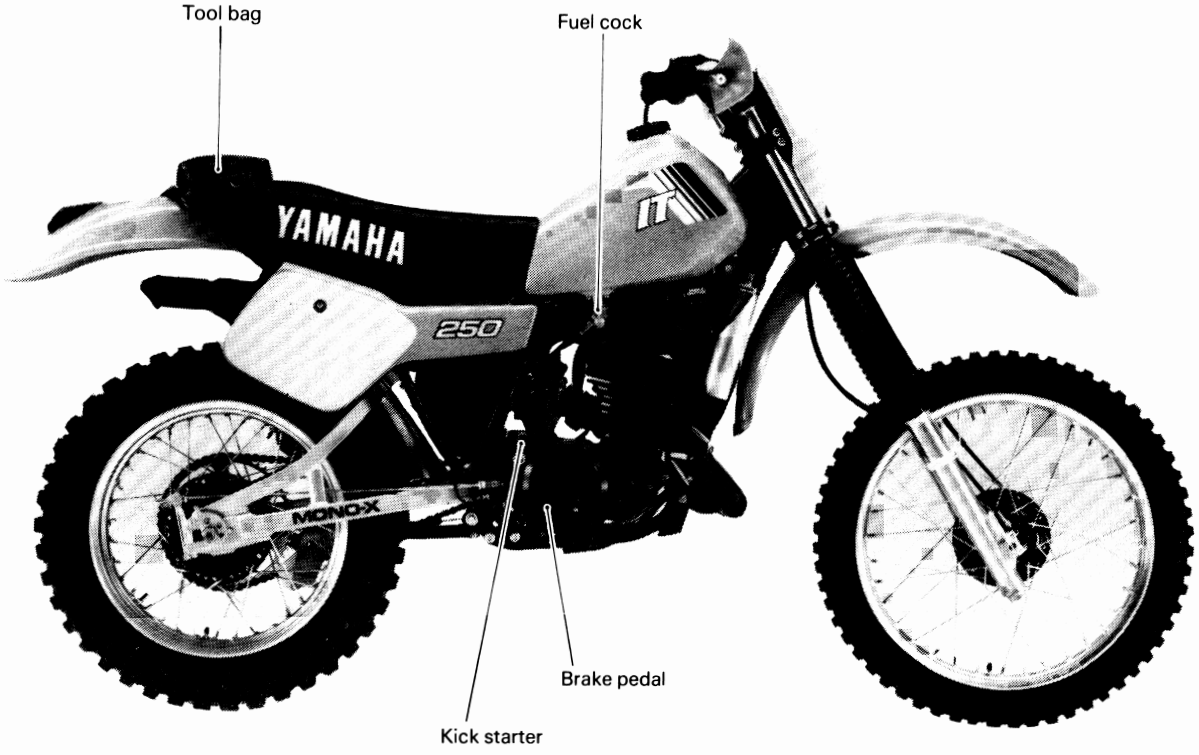
Handle the air chamber and hose with special care. Improper installation or damaged parts will result in poor performance. Replace any cracked or damage parts *immediately*. No modification of this system in any form is not allowed.



1. Air chamber 2. Hose




Headlight (25W)
Tail light (5.3W)
Starter lever
YAMAHA
250
MONO-X
Shift pedal


Tool bag
Fuel cock
YAMAHA
250
MONO-X
Brake pedal
Kick starter

FUEL AND OIL

Fuel

Use premium fuel with an octane rating of at least 90. Mix oil with the gas at the ratio specified below. Always use fresh, name-brand gasoline, and mix the oil and gas the day of the race. Do not use premix that is more than a few hours old.

Fuel tank capacity: 13 lit (3.4 US. gal)

Engine mixing oil

Oil must be mixed with the gasoline to lubricate the piston, cylinder, crankshaft bearings, and connecting rod bearings.

Recommended oil: Yamalube "R"
(Yamalube Racing 2-cycle oil)
Mixing ratio: 24 : 1

If for any reason you should use another type, select from the following list.

Mixing ratio: 20 : 1
* Castrol R30
* Castrol R545

CAUTION:

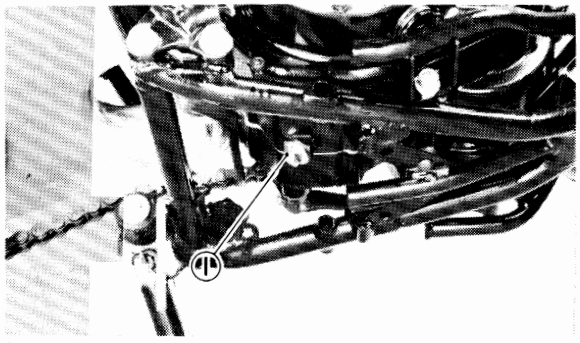
Never mix two types of oil in the same batch; clotting of the oil could result. If you wish to change oil types, be sure to drain the fuel tank and the carburetor float bowl of old premix prior to filling with the new type.

Transmission oil

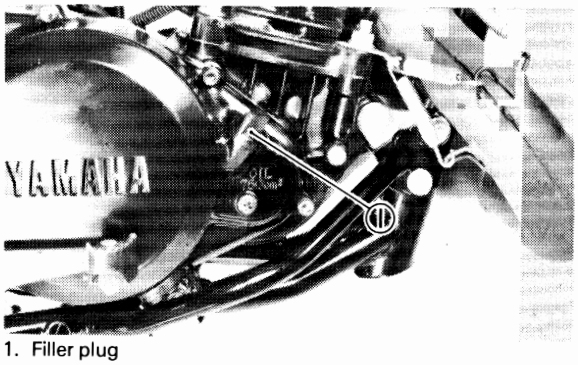
To assure proper lubrication of the transmission, clutch, and primary gears, the transmission oil should be changed after every fifth race. Remove the drain plug and allow the oil to drain for several minutes into a drain pan. Reinstall and tighten the drain plug. Remove the filler plug, refill the transmission, and replace the filler plug.

Recommended oil:
Yamalube 4-cycle oil or SAE 10W/30 "SE" motor oil

Transmission oil capacity:
Periodic oil change:
750 cc (0.80 US qt)
Overhaul: 800 cc (0.85 US qt)



1. Drain plug



1. Filler plug

PREOPERATION CHECKS

The following items should be checked before each use of the machine. These checks can be accomplished thoroughly in a very short time; the added safety they can assure is well worth the effort.

Item	Procedure	Page
Brakes	Check operation/adjustment	2-11
Clutch	Check operation/adjustment	2-10
Fuel tank	Fill with proper fuel/oil mix	1-3
Transmission oil	Check oil level/Change oil as required	1-3
Drive chain	Check alignment/adjustment/lubrication	2-12
Spark plug	Check color and condition/Replace as required	2-6
Throttle	Check for proper cable operation	2-8
Air filter	Foam type—must be clean and damp with oil always	2-9
Wheels & Tires	Check pressure/runout/spoke tightness/axle nuts	2-14
Fittings/Fasteners	Check all/tighten as necessary	—

STARTING AND OPERATION

CAUTION:

Before starting the machine, perform the checks in the preoperation check list.

WARNING:

Never start or run the engine in a closed area. The exhaust fumes are poisonous; they can cause loss of consciousness and death in a very short time. Always operate the machine in a well-ventilated area.

Starting a cold engine

Shift the transmission into neutral. Turn on the fuel petcock and raise the starter knob on the carburetor. With the throttle completely closed, kickstart the engine with a smooth, firm stroke. Using the starter knob as required, run the engine at idle or slightly higher until it warms up; this usually takes about one or two minutes. The engine is warmed up when it responds normally to the throttle with the starter knob pushed completely down.

[redacted]

Do not warm up the engine for extended periods.

Starting a warm engine

Do not raise the starter knob. Open the throttle slightly and kickstart the engine with a smooth, firm stroke.

[redacted]

Observe the following break-in procedures during initial operation to ensure optimum performance and avoid engine damage.

Break-in procedures

1. Before starting the engine, fill the fuel tank with a break-in oil-fuel mixture of 12 : 1 to 14 : 1.
2. Perform the preoperation checks on the machine.
3. Start and warm up the engine. Check the idle speed, and check the operation of the controls and the engine stop switch.
4. Operate the machine in the lower gears at moderate throttle openings for five to eight minutes. Stop and check the spark plug condition; it will show a rich condition during break-in.
5. Allow the engine to cool. Restart the engine and operate the machine as in the step above for five minutes. Then, very briefly shift to the higher gears and check full-throttle response. Stop and check the spark plug.
6. After again allowing the engine to cool, restart and run the machine for five more minutes.
   Full throttle and the higher gears may be used, but sustained full-throttle operation should be avoided. Check the spark plug condition.
7. Allow the engine to cool, remove the top end, and inspect the piston and cylinder; instructions for this are on page 4-7. Remove any high spots on the piston with 600-grit, wet sandpaper. Clean all components and carefully reassemble the top end.
8. Drain the break-in oil-fuel mixture from the fuel tank and refill with the specified mix. Check the entire machine for loose screws, bolts, and nuts.
9. Restart the engine and check the operation of the machine throughout its entire operating range. Stop and check the spark plug condition. Restart the machine and operate it for about 10 to 15 more minutes. The machine will now be ready to race.

CAUTION:

1. **After the break-in period is completed, check the entire machine for loose fittings and fasteners. Tighten all such fasteners as required.**
2. **When any of the following parts have been replaced, they must be broken in.**
   About one hour of break-in operation is necessary.
   PISTON, RINGS, GEARS
   These parts require about 30 minutes of break-in operation at half-throttle or less. Observe the condition of the engine carefully during operation.

CLEANING AND STORAGE

Cleaning

Frequent cleaning of your machine will enhance its appearance, maintain good overall performance, and extend the life of many components.

1. Before washing the machine, block off the end of the exhaust pipe to prevent water from entering. A plastic bag secured with a rubber band may be used for this purpose.
2. If the engine is excessively greasy, apply some degreaser to it with a paint brush. Do not apply degreaser to the chain, sprockets, or wheel axles.
3. Rinse the dirt and degreaser off with a garden hose; use only enough pressure to do the job.

CAUTION:

Excessive hose pressure can force water into wheel bearings, front fork seals, brake drums, and transmission seals. Avoid using high-pressure hoses such as those found in coin-operated car washes.

4. After the majority of the dirt has been hosed off, wash all surfaces with warm water and a mild detergent. Use an old toothbrush to clean hard-to-reach places.
5. Rinse the machine off immediately with clean water, and dry all surfaces with a soft towel or cloth.
6. Immediately after washing, remove excess water from the chain with a paper towel and lubricate the chain to prevent rust.
7. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
8. Automotive wax may be applied to all painted or chromed surfaces. Avoid combination cleaner-waxes, as they may contain abrasives.
9. After completing the above, start the engine and allow it to idle for several minutes.

Storage

If your machine is to be stored for 60 days or more, some preventive measures must be taken to avoid deterioration. After cleaning the machine thoroughly, prepare it for storage as follows:

1. Drain the fuel tank, fuel lines, and the carburetor float bowl.
2. Remove the spark plug, pour a tablespoon of SAE 10W/30 motor oil in the spark plug hole, and reinstall the plug. With the engine stop switch pushed in, kick the engine over several times to coat the cylinder walls with oil.
3. Remove the drive chain, clean it thoroughly with solvent, and lubricate it. Reinstall the chain or store it in a plastic bag tied to the frame.
4. Lubricate all control cables.
5. Block the frame up to raise the wheels off the ground.
6. Tie a plastic bag over the exhaust pipe outlet to prevent moisture from entering.
7. If the machine is to be stored in a humid or salt-air environment, coat all exposed metal surfaces with a film of light oil. Do not apply oil to rubber parts or the seat cover.

NOTE:

Make any necessary repairs before the machine is stored.

2 REGULAR MAINTENANCE AND ADJUSTMENT

2 REGULAR MAINTENANCE AND ADJUSTMENT

MAINTENANCE INTERVALS CHART

The following schedule is intended as a general guide to maintenance and lubrication. Bear in mind that such factors as weather, terrain, geographical location, and individual usage will alter the required maintenance and lubrication intervals. If you are in doubt as to what intervals to follow in maintaining and lubricating your machine, consult your Yamaha dealer.

	After Every Ride	Every 500 km	Every 1,500 km	After Every Event	As Required	Recommended Lubricant type
WASH MACHINE	(This item is also essential to proper performance)				×	
PISTON						
Inspect		×		×		
Clean		×		×		
Replace					×	
PISTON RING						
Inspect		×		×		
Replace			×		×	
CYLINDER HEAD						
Inspect		×		×		
Clean/Retighten		×		×		
CYLINDER						
Inspect		×		×		
Head torque		×		×		
Replace					×	
CLUTCH						
Adjust					×	
Replace (Plates)					×	
TRANSMISSION						
Oil change		×		×		No. 1
Inspect gears/			×			
Shift mech.					×	
Replace bearings					×	
CRANKSHAFT						
Main bearing check			×			
Big end check			×	×		
Small end check		×		×		
Piston pin check		×				
CARBURETOR						
Clean, inspect, & adjust		×		×		
YEIS						
Inspect	×					
EXHAUST SYSTEM						
Inspect & tighten		×		×		
Clean and decarbonize					×	
FRAME						
Clean & inspect		×		×		
SWING ARM						
Check lubricate			×		×	No. 5
CONTROLS & CABLES						
Check & adjust	×			×		
Lubricate		×		×		No. 2

	After Every Ride	Every 500 km	Every 1,500 km	After Every Event	As Required	Recommended Lubricant type
BRAKES Check & adjust Replace linings		×		×	×	
WHEELS & TIRES Check runout Check spokes Check bearings	× 	× ×		× × ×		
STEERING HEAD Check Clean, lube & repair		×	×	× × (every two events)		No. 6
CDI Check connectors		×		×		
AIR FILTER Clean & oil Replace	×			×	×	No. 3
SPARK PLUG Check condition	×					
DRIVE CHAIN Clean & lubricate Check tension Replace	× ×			×	×	No. 7
FUEL TANK Clean & flush Clean petcock filter		 ×	×	× ×		
REAR SHOCK Clean & inspect				×		
FRONT FORKS Clean & change oil Replace seals		×		×	×	No. 4
CLUTCH & BRAKE SHAFT Lubricate		×		×		No. 5

RECOMMENDED LUBRICANT

No. 1 Use Yamaha 4-cycle oil or SAE 10W/30 "SE" motor oil.

No. 2 Use Yamaha Chain and Cable Lube or SAE 10W/30 "SE" motor oil.

No. 3 Air filters-foam element air filters must be damp with oil at all times to function properly. Clean and lube every meet and every ride. Do not over-oil. Use foam-air-filter oil.

No. 4 Use Yamaha Fork Oil 10wt.

No. 5 Use lithium base grease.

No. 6 Medium-weight wheel bearing-grease of quality manufacturer — preferably waterproof.

No. 7 Use SAE 30 ~ 50 motor oil.

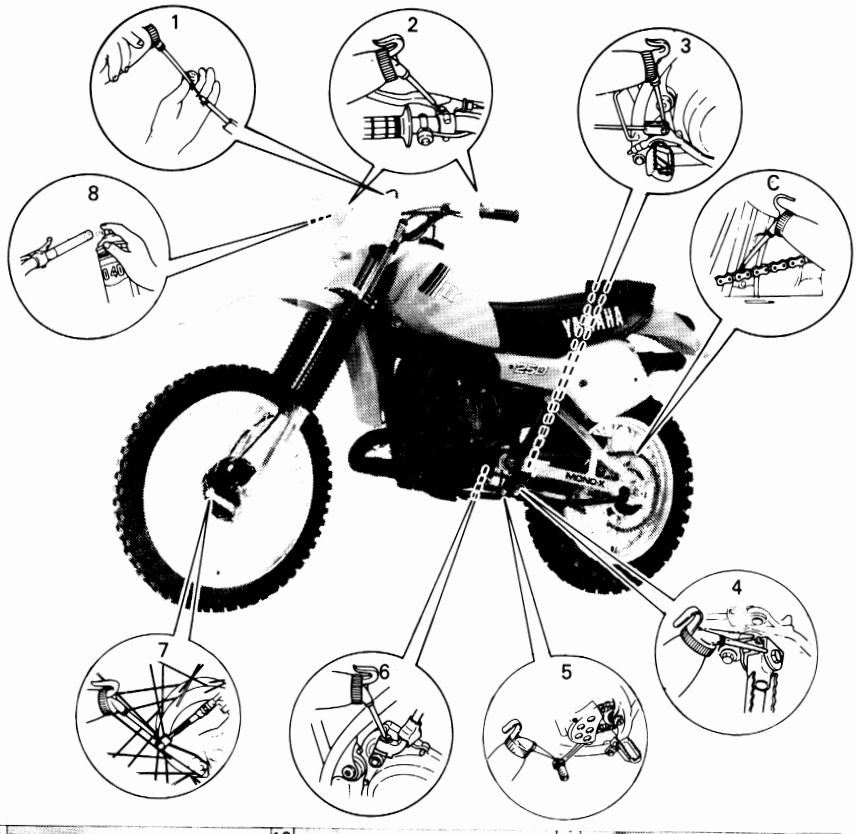
LUBRICATION

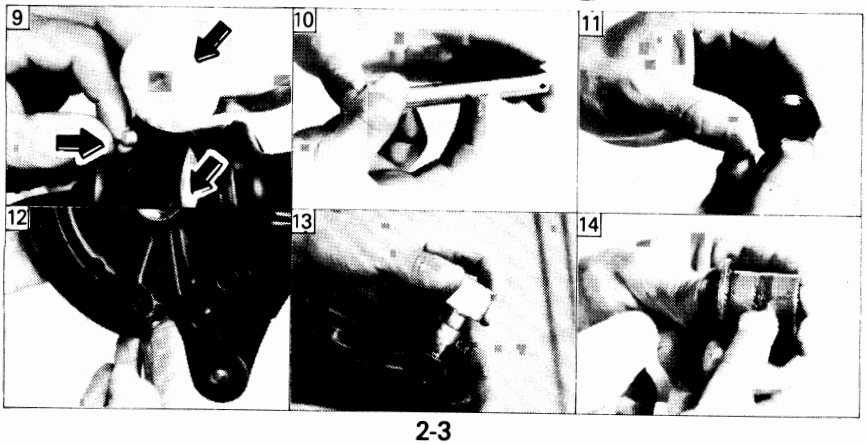
To ensure smooth operation of all components, lubricate your machine as follows after every race.

A. Use Yamaha chain and cable lube on these areas:
   1. All control cables
   2. Brake and clutch lever pivots
   3. Brake rod pivot
   4. Footpeg pivots
   5. Shift lever pivot
   6. Kickstart lever pivot
   7. Brake arm pivot
   8. Throttle-to-handlebar contact area

B. Lubricate the following areas with lithium base grease:
   9. Throttle bevel gear
   10. Rear shock absorber pivot
   11. Razmo bushing
   12. Brake shoe pivot
   13. Brake shoe cam
   14. Brake backing plate bushing

C. Lubricate the drive chain with SAE 30 ~ 50 motor oil.

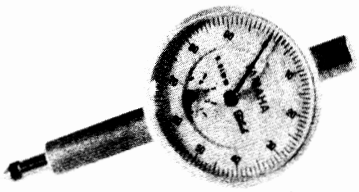




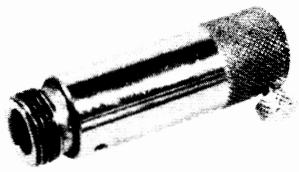
SPECIAL TOOLS

The following special tools are required to perform maintenance, adjustments, and repairs on your machine. These tools can be obtained through your Yamaha dealer.

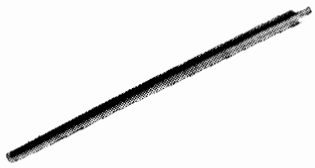
1 Dial gauge (90890-03097-00)



2 Dial gauge stand (90890-01195-00)

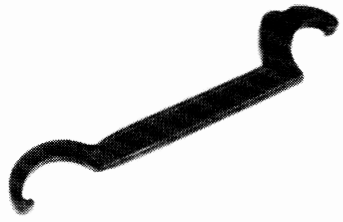


3 Dial gauge extension (90890-03098-00)



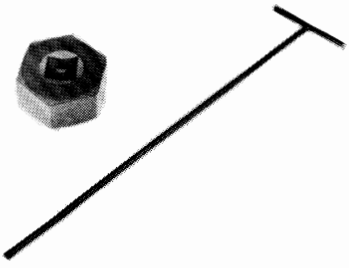
Tools 1, 2, and 3 are used to set the ignition timing.

4 Steering nut wrench (90890-01268-00)



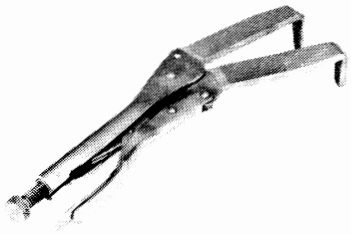
Use this wrench to put the proper tension on the steering head bearings.

5 Fork cylinder holder and adapter (90890-01326-00; 90890-01327-00)



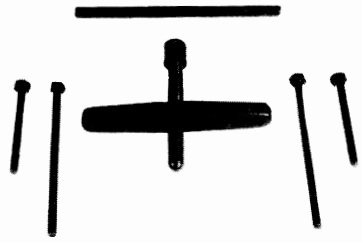
Use these tools to remove and install the fork cylinder.

6 Clutch holding tool (TLM-90910-42-00)



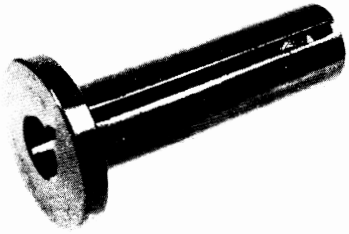
Use this tool to hold the clutch boss while removing or tightening the clutch boss nut.

7 Crankcase separating tool (90890-01135-00)

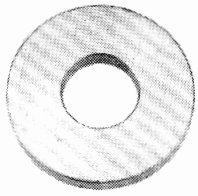


This tool is used to split the crankcases as well as remove the crankshaft from either case.

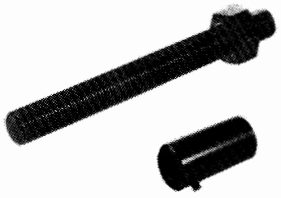
8 Crankshaft installing tool (90890-01274-00)



9 Spacer (90890-01016-00)



10 Crankshaft installing bolt and adapter (90890-01275-00; 90890-01278-00)

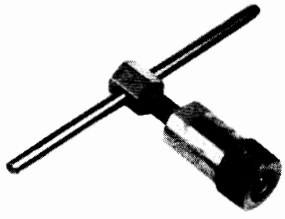


Tools 8, 9, and 10 are used to install the crankshaft.

11 Flywheel holding tool (90890-01235-00)

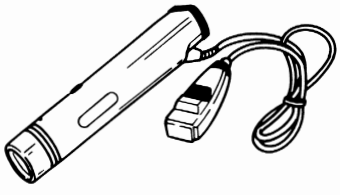
Use this tool to hold the flywheel magneto while removing or tightening the magneto boss nut.

12 Flywheel puller (90890-01189-00)



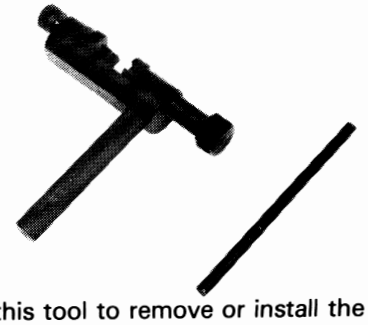
This tool is used to remove the flywheel magneto.

13 Timing light (90890-03109-00)



Use this tool to check the ignition timing.

14 Drive chain cutter (90890-01286-00)

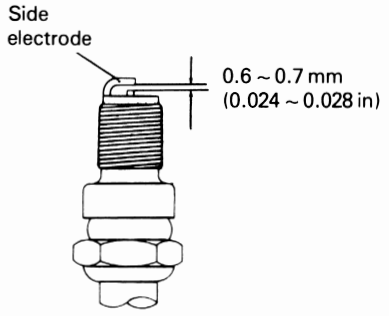


Use this tool to remove or install the drive chain.

Spark plug

Standard spark plug:
IT250J . . . . . N-2G (CHAMPION)
IT465J . . . . . N-3 (CHAMPION)

Spark plug gap:
0.6 ~ 0.7 mm (0.024 ~ 0.028 in)



1. Whenever a new spark plug is installed, the gap must be checked and adjusted properly. Use a wire feeler gauge to check the gap, and adjust the gap by bending the side electrode gently.
2. Be sure to clean the gasket surface and threads before installing the spark plug. Torque the plug to specification.

Spark plug torque: 2.5 m-kg (18 ft-lb)

3. After running, the porcelain insulator around the center electrode should be a medium-to-light tan color. If it is too light or dark, check the carburetion, ignition timing, and oil-fuel mixture. If the light or dark color persists, a spark plug with a different heat range may be required. Bear in mind, though, that a darker-than-normal color is not unusual during break-in.

NOTE:

If a torque wrench is not available when you are installing a spark plug, a good estimate of the correct torque is 1/2 to 1/4 turns past finger tight. Have the spark plug torqued to the correct value as soon as possible with a torque wrench.

IGNITION TIMING

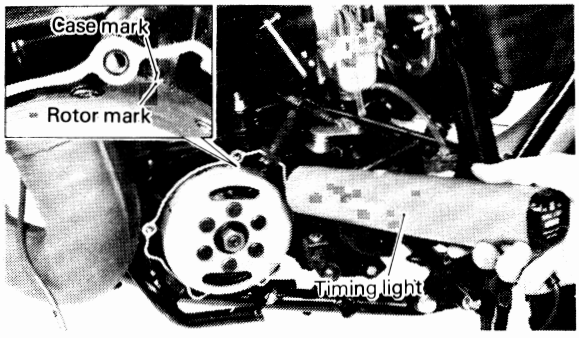
Checking

Ignition timing is checked with a timing light by observing the position of the case mark and rotor mark.

1. Remove the crankcase cover (L).
   When removing, press the shift pedal down.
2. Connect the timing light to the spark plug lead wire.
3. Start the engine and keep it running at the specified speed. Use a tachometer for checking.

Specified speed:
IT250J: 5,000 r/min
IT465J: 2,000 r/min

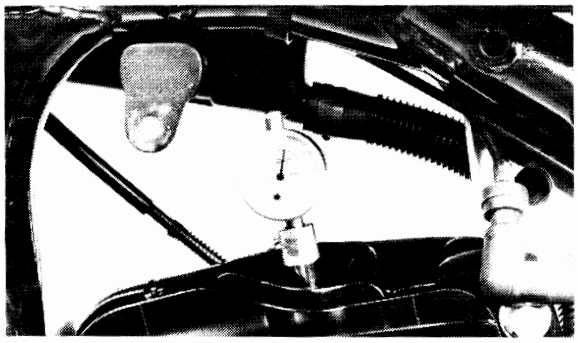
4. While keeping the engine running at a specified speed, check that the rotor mark is aligned with the case mark.
   If they are not aligned, adjust the ignition timing.



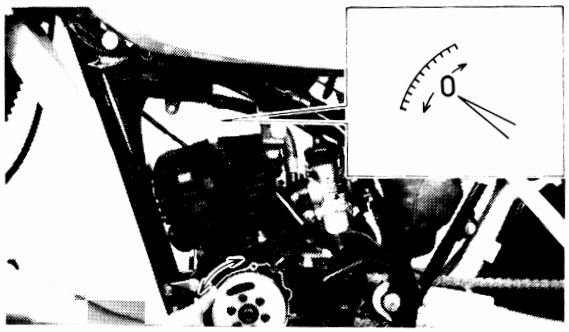
Adjustment

The ignition timing must be set precisely to ensure that the ignition spark occurs at the proper time to provide optimum engine power.

1. Remove the spark plug, expansion chamber, and the left-hand crankcase cover.
2. Screw the dial gauge stand into the spark plug hole.
3. Install the extension on the dial gauge, and slide the dial gauge assembly into the dial gauge stand.

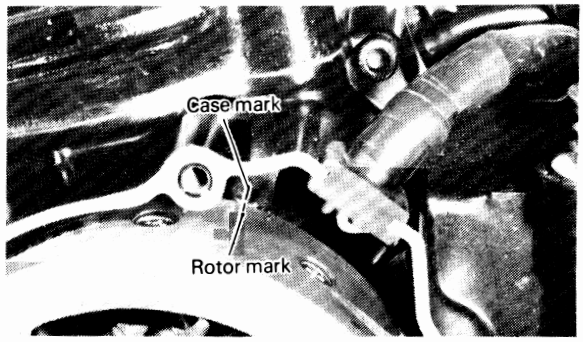


4. Rotate the magneto rotor until the piston reaches top dead center (TDC). When this happens, the needle on the dial gauge will stop and reverse directions even though the rotor is being turned in the same direction. Zero the dial gauge at TDC.

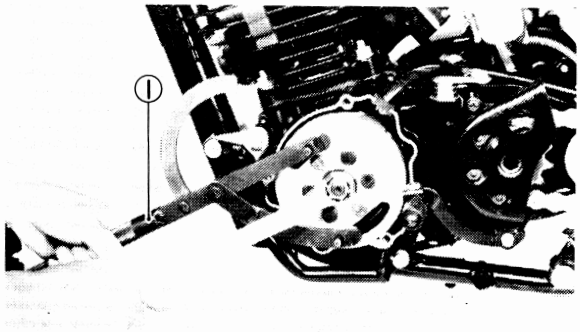


5. From TDC, rotate the rotor clockwise until the dial gauge indicates that the piston is at a specified distance from TDC. At this point, the scribed marks on the rotor and the crankcase should be aligned.

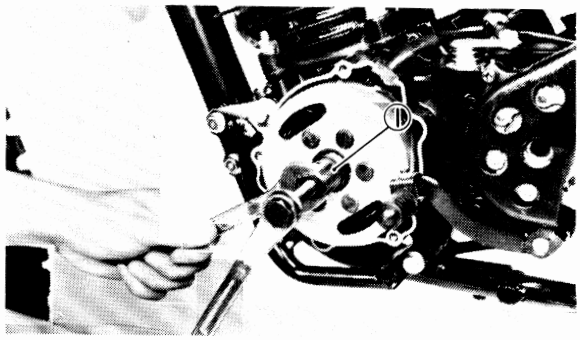
Ignition timing: B.T.D.C.	
IT250J	1.65 ± 0.1 mm (0.065 ± 0.04 in)
IT465J	2.07 ± 0.1 mm (0.081 ± 0.04 in)



6. If the marks are not aligned, punch a new mark on the crankcase in line with the rotor mark.
7. Remove the flywheel magneto using the magneto holder and flywheel puller.

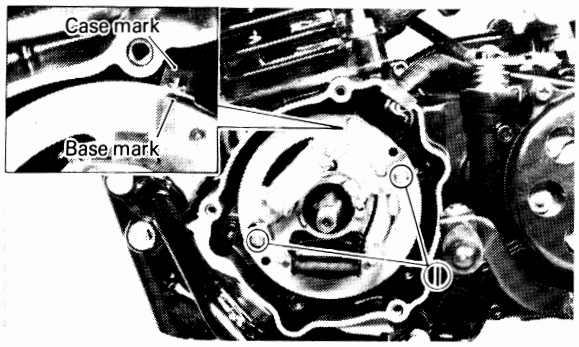


1. Flywheel holding tool (90890-01235)



1. Flywheel puller (90890-01189)

7. Loosen the base set screws and turn the base right or left until the base mark aligns the new mark. And tighten the base set screws.



1. Set screw

8. Reinstall the flywheel and tighten the nut.

Tightening torque: 8 m-kg (56 ft-lb)

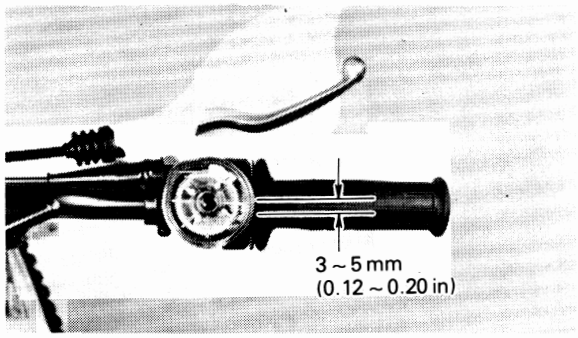
9. Remove the dial gauge assembly and stand, and reinstall the spark plug. Torque the plug to specification.

Spark plug torque: 2.5 m-kg (18 ft-lb)

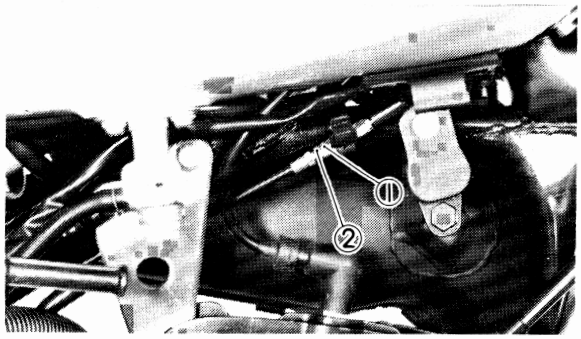
10. Reinstall the left-hand crankcase cover and the expansion chamber.

Throttle cable

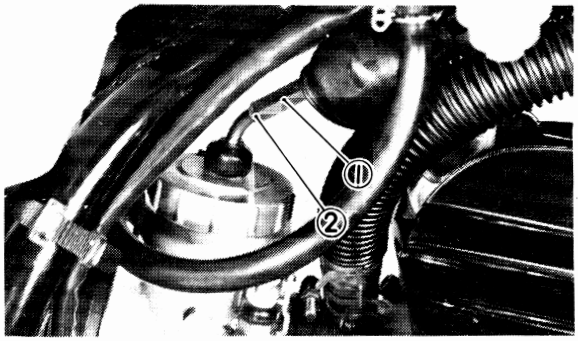
1. Check the free play in the throttle twist grip; the play should be 3 ~ 5 mm (0.12 ~ 0.20 in) at the edge of the inner flange of the grip.



2. To adjust the free play, loosen the lock nut on the cable adjuster and turn the adjuster in or out to achieve the proper free play. Retighten the lock nut.



1. Adjuster 2. Lock nut

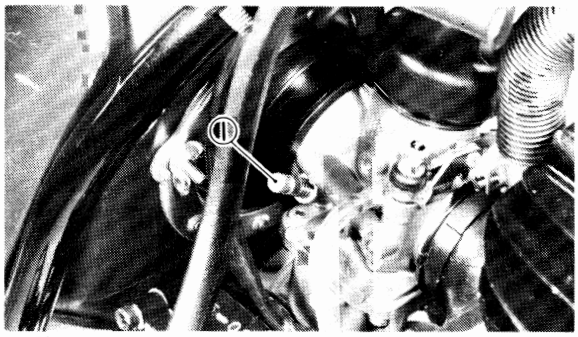


1. Adjuster 2. Lock nut

3. After adjustment, start the engine and check throttle operation. Turn the handlebars from lock to lock and note if the engine speeds up; if it does, the cable adjustment is too tight and must be readjusted.

Idle speed

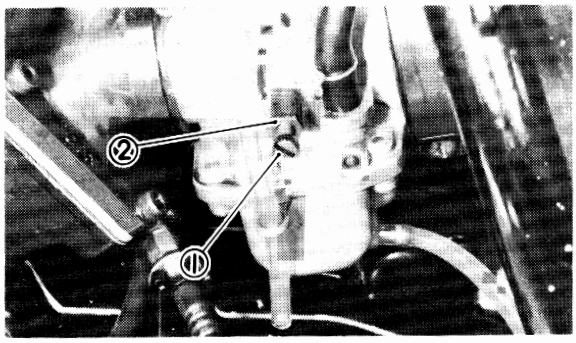
1. Screw in the pilot air screw until it is lightly seated.
2. Back out by the specified number of turns. Start the engine and let it warm up.



1. Pilot air screw

Pilot air screw setting:
IT250J . . . . . 1 and 1/2
IT465J . . . . . 1 and 3/8

3. Loosen the lock nut on the throttle stop screw and turn the screw until the idle is at the desired rpm.



1. Throttle stop screw 2. Lock nut

4. Turn the pilot air screw in or out in 1/8-turn increments to achieve the highest rpm with just the pilot screw.
5. Once again, turn the throttle stop screw to attain the desired idle rpm, and tighten the lock nut.

The throttle response off idle should be crisp and clean, without any hesitation. If the engine is completely warmed up and hesitates off idle, turn the pilot air screw in or out in 1/8-turn increments until the problem is eliminated.

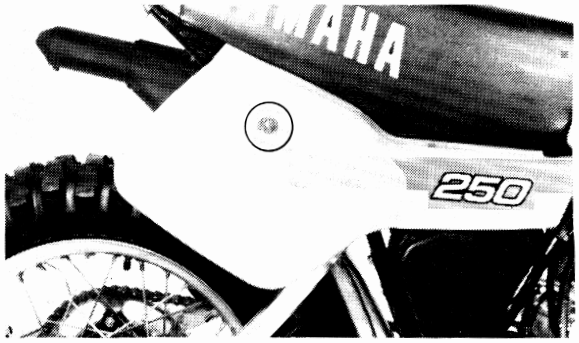
Air filter

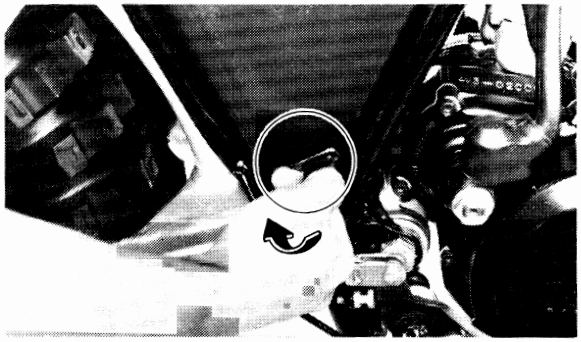
Proper air filter maintenance is the biggest key to preventing premature engine wear and damage. All elements of the air filter system should be maintained after every moto; engine life will be prolonged and power output will remain consistent.

CAUTION:

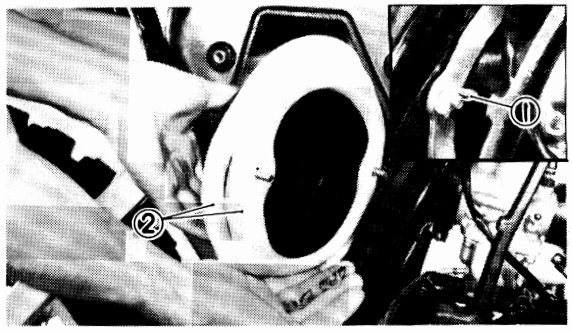
Never run the engine without the air filter elements in place; this would allow dirt and dust to enter the engine and cause rapid wear and possible engine damage. In addition, carburetor jetting would be significantly affected, with subsequent poor performance and possible overheating.

1. Remove the right-hand side cover from the machine.



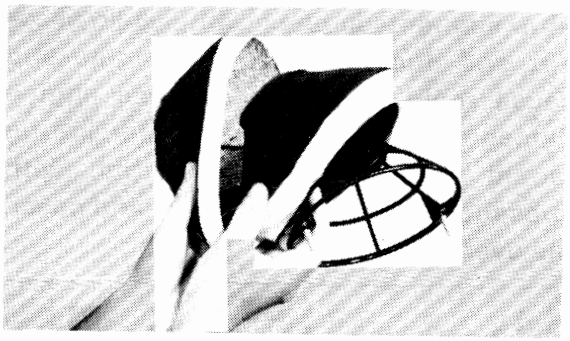


2. Remove the two wing nuts from the front of the air filter box, and remove the air filter element assembly from the box.

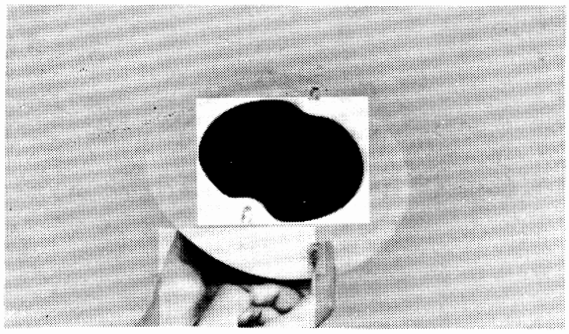


1. Wing nut 2. Double-layer elements

3. Separate the two elements from the filter "cage".



4. Wash both elements gently but thoroughly in solvent, squeeze the solvent out of the elements, and allow the elements to dry.
5. Pour a small quantity of foam-air-filter oil on the elements and work it thoroughly into the foam. Squeeze out the excess oil.
6. Reinstall the elements on the filter cage, and coat the sealing edge of the element assembly with light grease to provide an airtight seal.



7. After checking the air inlet hose for any obstructions, carefully reinstall the element assembly in the air filter box. Reinstall the wing nuts and tighten them.

CAUTION:

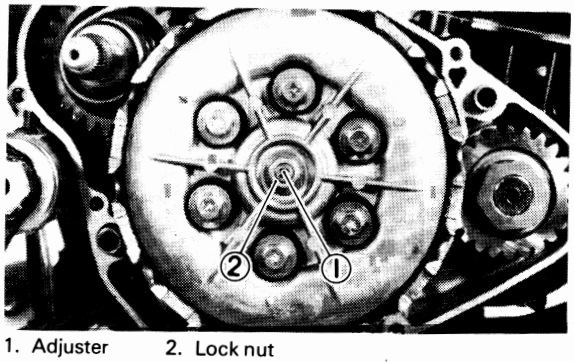
Do not overtighten the wing nuts to avoid distorting the filter element cage.

8. Reinstall the right-hand side cover.
9. Inspect the air filter joint and intake manifold rubber for tears and cracks. Replace them if any damage is found.

Clutch

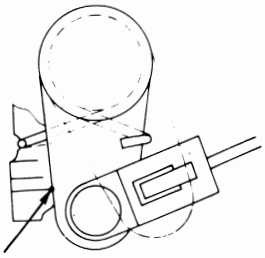
To avoid clutch slipping or dragging, the clutch mechanism and cable must be adjusted correctly.

1. Remove the two bolts which hold the brake pedal and footpeg assembly to the frame; allow the assembly to hang down by the brake rod.
2. Remove the kickstart lever and engine guard.
3. Drain the transmission oil.
4. Remove the right-hand crankcase cover.
5. Loosen the clutch mechanism adjuster lock nut, and loosen the adjusting screw.



1. Adjuster 2. Lock nut

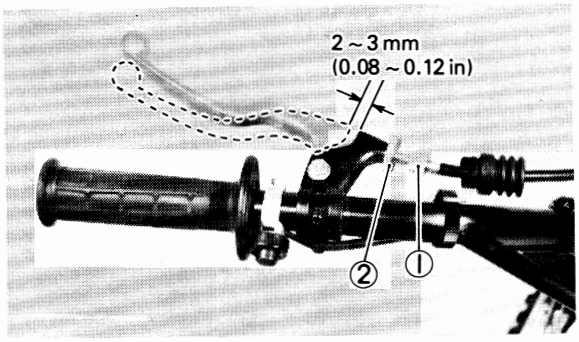
6. At the handle lever, loosen the cable adjuster lock nut and adjust the cable length to align the match mark on the left-hand crankcase with the edge of the push lever.



Align the edge of push lever to the match mark on the case.

7. Turn the clutch mechanism adjusting screw in until resistance is felt, and tighten the adjuster lock nut.

8. Adjust the cable adjuster at the handle lever to provide 2 ~ 3 mm (0.08 ~ 0.12 in) of free play at the clutch lever pivot; tighten the lock nut.

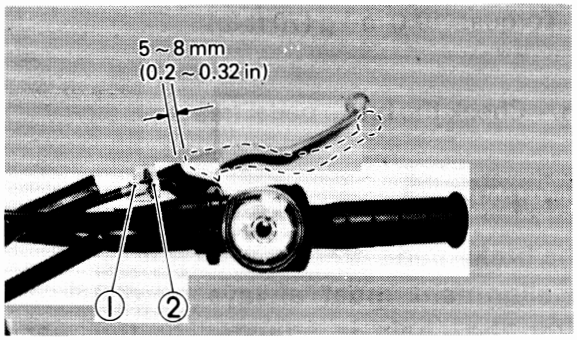


1. Adjuster 2. Lock nut

9. Reinstall the crankcase cover, kickstart lever, and the brake pedal and footpeg assembly. Refill the transmission with oil.

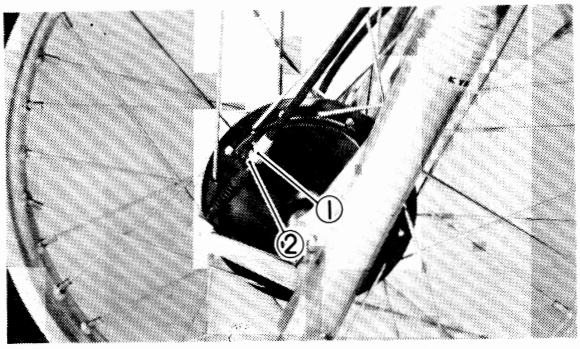
Front brake

The front brake can be adjusted to suit rider preference within a 5 ~ 8 mm (0.2 ~ 0.32 in) free play at the brake lever pivot.



1. Adjuster 2. Lock nut

1. Make sure the cable adjuster at the handle lever is screwed all the way in.
2. Loosen the lock nut on the cable adjuster at the brake backing plate, and turn the adjuster in or out to achieve 8 mm of free play at the brake lever pivot. Tighten the lock nut.



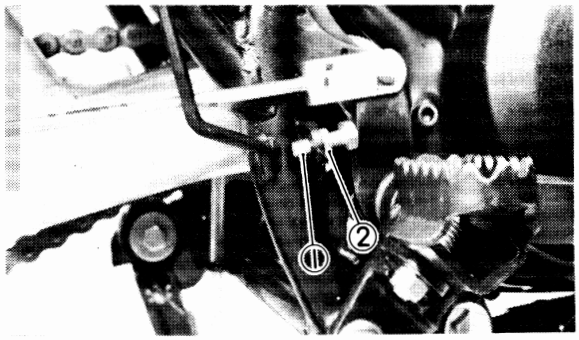
1. Adjuster 2. Lock nut

3. At the handle lever, turn the adjuster out to achieve the desired free play within the specified range. Tighten the lock nut.

Rear brake

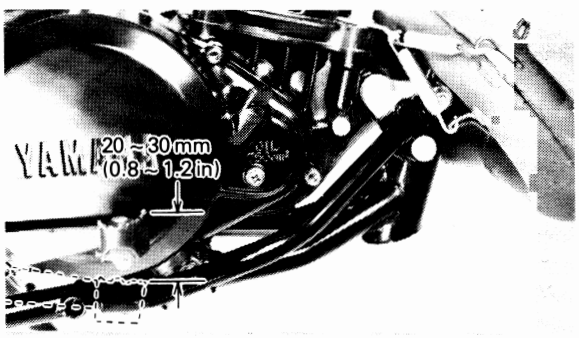
In adjusting the rear brake, the pedal height should first be set and then the free play should be adjusted.

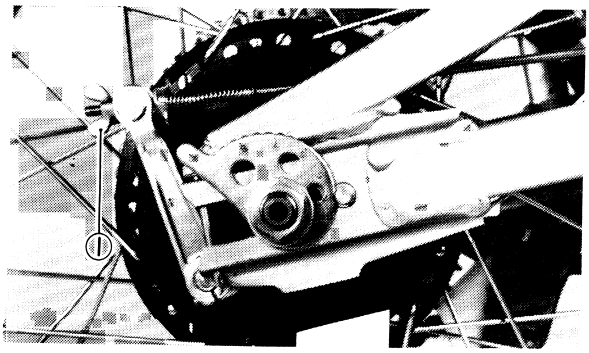
1. Loosen the lock nut on the brake pedal height adjuster, and turn the adjuster to achieve the desired pedal height according to rider preference. Tighten the lock nut.



1. Adjuster 2. Lock nut

2. Turn the adjusting nut on the end of the brake rod in or out to achieve the desired free play within 20 ~ 30 mm (0.8 ~ 1.2 in).





1. Adjusting nut

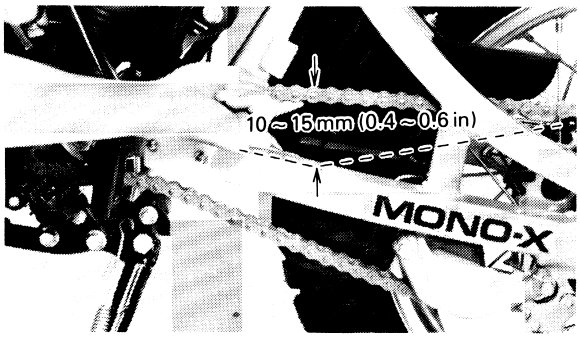
DRIVE CHAIN
(Removal begins on page 5-3)

This machine has a drive chain with O-rings between the chain plates.

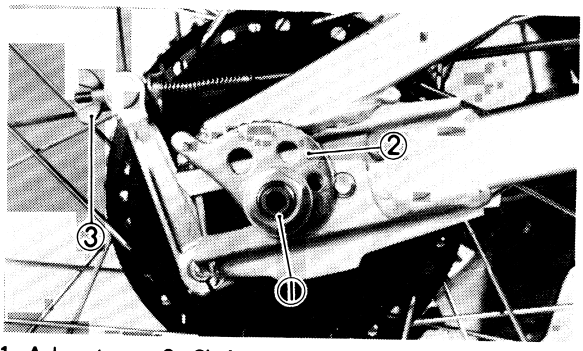
Cleaning
To wash the grease-sealed chain, be sure to use kerosene. Never use a high pressure washes, steam cleaning, a volatile solvent such as gasoline, or wire brush. It will damage O-rings and thus the chain will also be damaged or wear faster.

Lubrication
After washing, dry up the chain and lube it with "SAE 30 ~ 50 motor oil". Avoid using any other lubricants because it contains a solvent.

Free play adjustment
1. With the machine standing vertically and rider on it, check the free play at the position shown below; the normal vertical free play is 10 ~ 15 mm (0.39 ~ 0.59 in). If the free play exceeds 15 mm (0.59 in), the chain must be adjusted.



2. Loosen the rear wheel axle nut.
3. Turn chain puller both left and right, until axle is situated in same cam slot position.



1. Axle nut 2. Chain puller 3. Adjusting nut

NOTE:

Before adjusting, rotate rear wheel through several revolutions and check tension several times to find the tightest point. Adjust chain tension with rear wheel in this "tight chain" position.

4. Tighten the rear axle nut.

Torque: 10.0 m-kg (70 ft-lb)

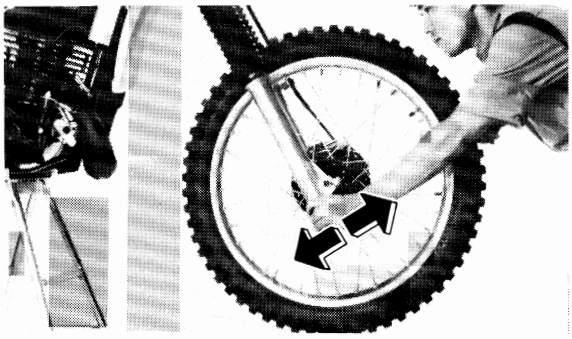
5. Check the brake pedal free play.

WARNING:

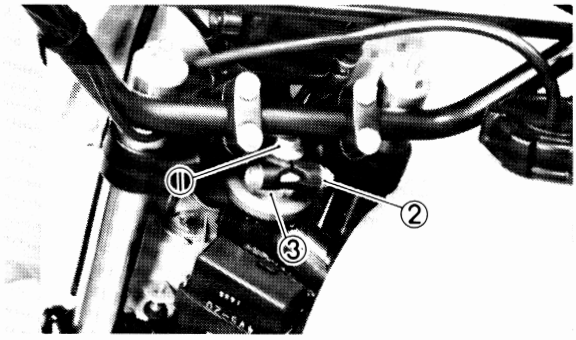
The brake pedal free play and the rear axle alignment must always be checked after the chain is adjusted or the rear wheel is removed.

Steering head

1. Block the front wheel off the ground, grab the bottom of the fork legs, and gently push and pull the legs to check for free play in the steering head. If there is any noticeable play in the steering head, the bearings must be adjusted. In addition, check to see that the forks swing from lock to lock without any binding or catching. If any such binding is noticed, the bearings should be cleaned, inspected, and readjusted after thorough greasing.

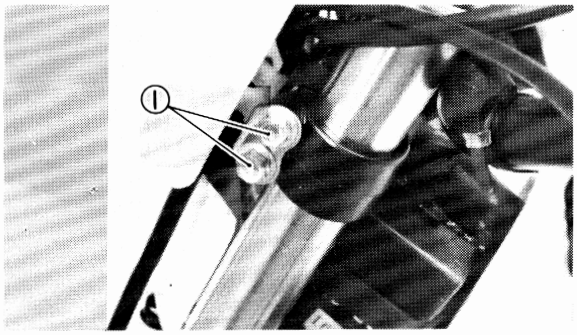


2. To adjust the bearings, first loosen the steering fitting bolt and stem pinch bolt.



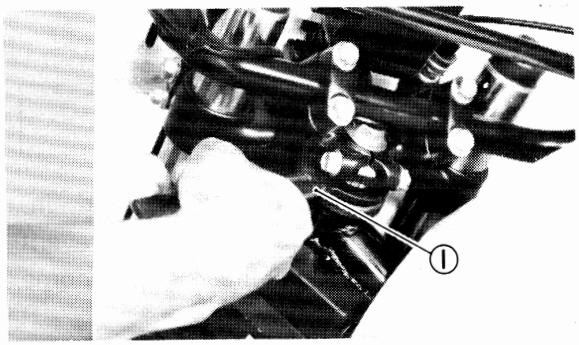
1. Steering fitting bolt 2. Pinch bolt 3. Ring nut

3. Loosen the fork pinch bolts in the handle crown, and slide the handle crown up.



1. Fork pinch bolt

4. Tighten the ring nut beneath the handle crown with the steering nut wrench until the free play is eliminated and there is no binding.



1. Steering nut wrench

5. Torque the steering fitting bolt to specification.

Fitting bolt torque: 9.5 m-kg (68 ft-lb)

6. Tighten the steering pinch bolt and fork pinch bolts to specification.

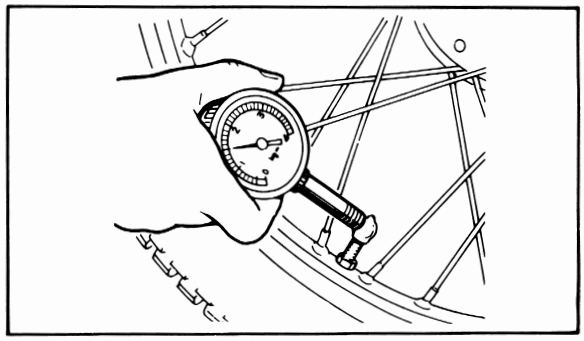
Pinch bolt torque: 2.3 m-kg (17 ft-lb)

Tire air pressure

Tire pressure affects traction, handling, and the life of the tire. Adjust the tire pressure to suit track conditions and rider preference, but do not stray too far from the recommended pressure.

Recommended pressure:

Front	1.0 kg/cm² (14 psi)
Rear	1.0 kg/cm² (14 psi)



Tuning guidance

Adjust the tire pressures to suit track conditions.

1. When the trail is wet in the rain, muddy, sandy or slippery, reduce the tire pressure to increase the tire tread.

0.8 ~ 1.0 kg/cm² (11 ~ 14 psi)

2. When the trail is pebbly or hand, increases the tire pressures to prevent punctures, though tires will become easy to skid.

1.0 ~ 1.2 kg/cm² (14 ~ 17 psi)

CAUTION:

When the tire pressure is low, a loose rim locks may allow the tire to slip on the rim. Check for loose rim locks.
Make sure the valve stem is square in the rim hole. If not square, adjust its position properly.

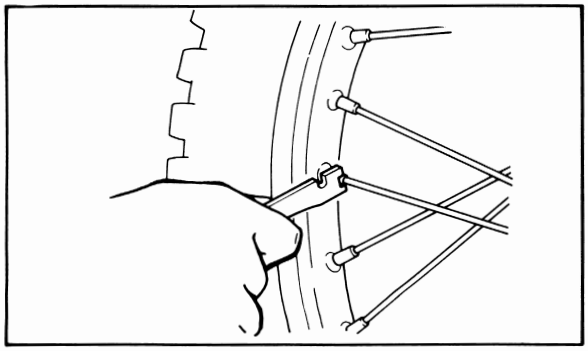
Spokes

The spokes should be checked after every race.

Bent → Replace spokes.
Loosen → Tighten spokes.

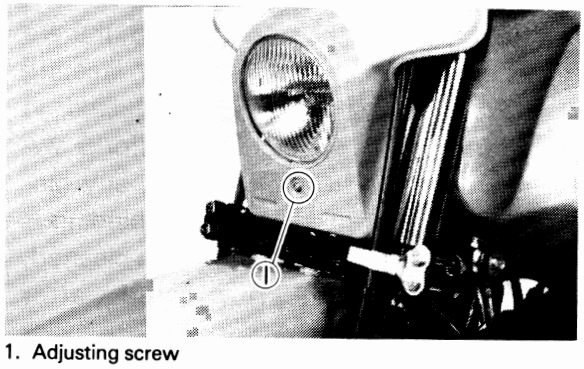
CAUTION:

Avoid overtightening the spokes, as the hub may be distorted and braking power diminished.



Headlight adjustment

1. Adjust the headlight beam by tightening or loosening the adjust screw.



1. Adjusting screw

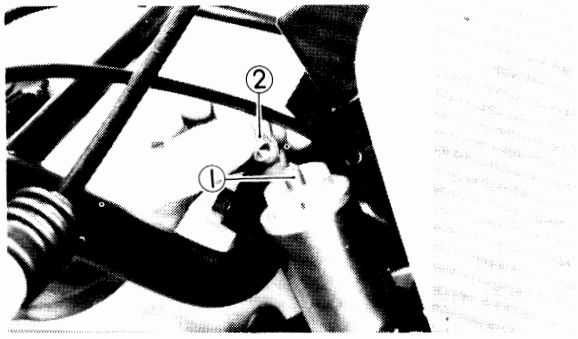
3 SUSPENSION TUNING

3 SUSPENSION TUNING

FRONT FORK

Fork oil replacement

1. Place a suitable stand under the engine to keep the front of machine raised off the floor.
2. Remove the valve cap.



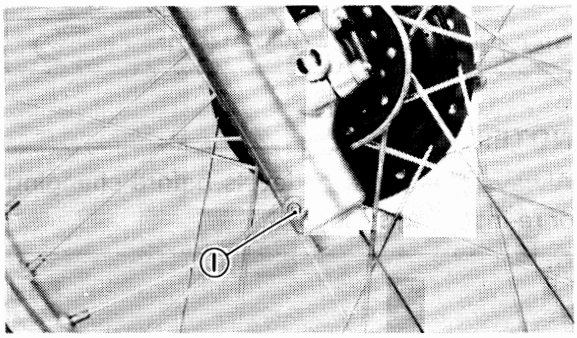
1. Valve 2. Valve cap

3. Using a slotted-head screwdriver, press the valve and keep it open for more than 5 seconds so that the air can be let out from the inner tube.

NOTE:

When the air has to be extracted from the tube extract little by little. If not, oil stout out together with the air, causing harm to you.

4. Remove the cap bolt assembly.
   And remove the spacer, spring seat and fork spring.
5. Place an open container beneath each drain hole and remove the drain screws.



1. Drain screw

6. After most of oil has drained, slowly raise and lower outer tubes to pump out remaining oil.
7. Install drain screws.

NOTE:

Check gasket, replace if damaged.

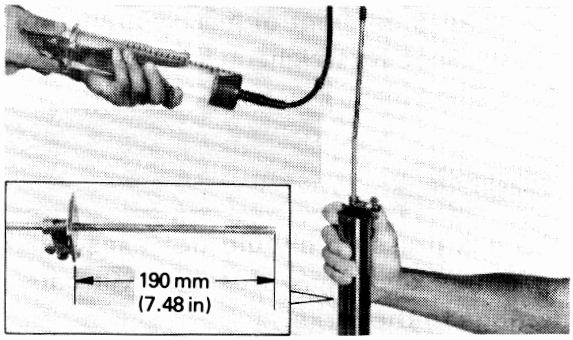
8. Measure correct amount of oil and pour into each leg.

Recommended oil: Yamaha fork oil 10 wt or SAE #10 motor oil Oil quantity: 423 cc (14.3 oz)

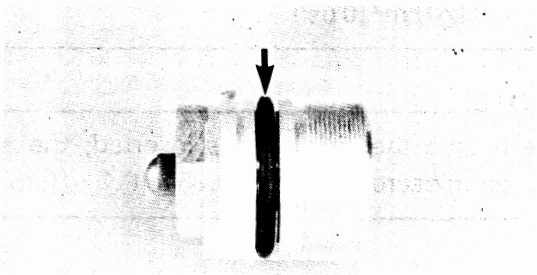
NOTE:

Select the weight oil that suits local conditions and your preference (lighter for less damping, heavier for more damping).

9. Measure the oil level from top of the fork tube with oil level tool. The fork tubes must be fully bottomed.

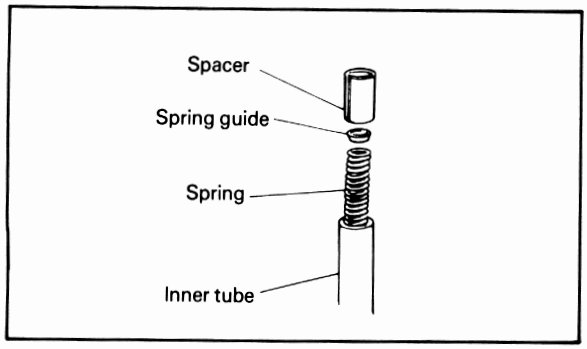


10. After filling, slowly pump the outer tubes up and down to distribute the oil.
11. Inspect the O-ring on cap bolt and replace if damaged.



12. Install spacer, spring seat, fork spring and cap bolt and torque to specification.

Tightening torque: 2.3 m-kg (17 ft-lb)



Air pressure adjustment

CAUTION:

For proper damping effects, the air pressure must be maintained at the following levels.

1. Place a suitable stand under the engine to keep the front of machine raised off the floor. No weight on front wheel.
2. Using a manual air pump, fill with air.

CAUTION:

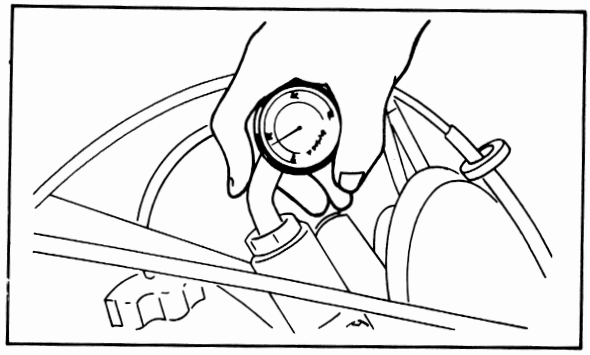
The gas pressure should not exceed 2.5 kg/cm². Excess gas pressure will cause damage to the forks.

3. Using the air check gauge, adjust the air pressure to specification.

Recommended air pressure: 0 kg/cm² (0 psi)

NOTE:

Each time the air gauge is inserted, the air pressure decreases about 0.05 to 0.1 kg/cm².



NOTE:

An optional air check gauge is available. Please ask your nearby Yamaha dealer. P/No. 2X4-2811A-00

4. The difference between both right and left tubes should be 0.1 kg/cm² (1.42 lb/in²) or less.

CAUTION:

Use only air or nitrogen for filling. Never use any other gas. An explosion may result.

Fork spring replacement

In addition to the standard type, two different type fork spring are sold. A proper spring should be selected according to the conditions of a racing course or the weight of the rider.

Type		Part No.	I.D. mark
Light duty	Spring	4V5-23141-11	
STD	Spring	4V5-23141-L1	
Heavy duty	Spring	4V5-23141-21	

NOTE:

Always check the oil levels before changing or re-installing springs.

Tuning guidance

Air Pressure:

* Increase air pressure →
  cause initial load to increase, and absorber becomes hard.
* Decrease air pressure →
  cause initial load to decrease, and absorber becomes soft.

Spring replacement:

* Replace to hard type →
  initial load is slightly affected, and absorber becomes hard.
* Replace to soft type →
  initial load is slightly affected, and absorber becomes soft.

Oil viscosity:

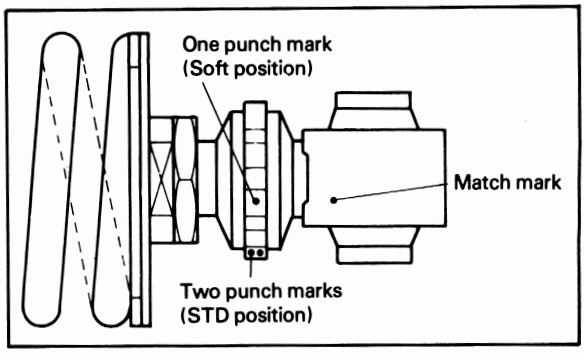
* From #10 to #15 →
  damping is increased, and the fork moves slowly.
* From #10 to # 5 →
  damping is decreased, and the fork moves quickly.

REAR SHOCK ABSORBER (MONO-CROSS SUSPENSION "DE CARBON" SYSTEM)

Break-in:

For the first 300 km (200 mi) of operation, this suspension unit should be broken in. To afford better riding comfort, the monocross unit is set on a two steps softer side (one punch mark). After the break-in period, return the monocross unit to the standard position (two punch marks). If the standard position does not suit your preferance or road condition, make a readjustment or other necessary adjustments.

***The monocross unit is originally set so as to suit the standard rider.**



This machine's suspension is adjustable to best suit the rider's preferance or road conditions.

Damping adjustment

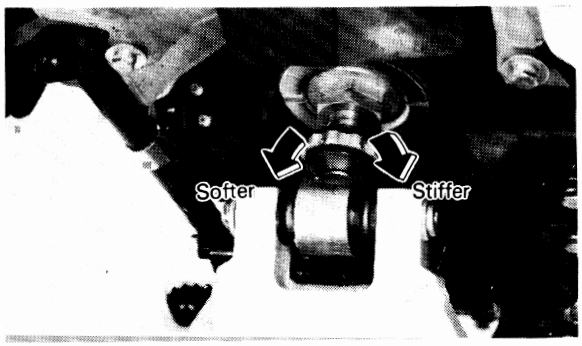
This adjustment can be done in 24 steps without removing the rear shock absorber.

* To make the damping stiffer, turn the damping adjuster clockwise.
* To make the damping softer, turn the adjuster counterclockwise.

Adjust the damping in increments of 2 clicks. And test the performance by riding after adjustment.

STANDARD DAMPING SETTING:
12 Clicks Out

* To set the damping, turn the damping adjuster clockwise until it bottoms; then back it out to the standard setting.



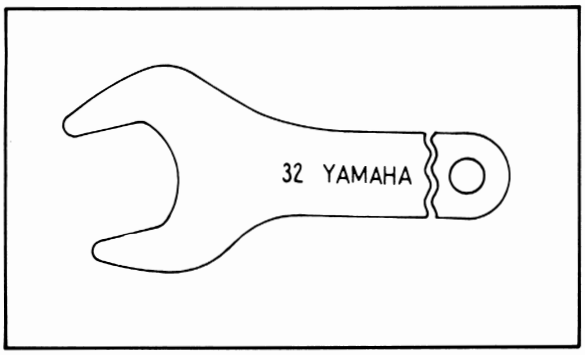
NOTE:

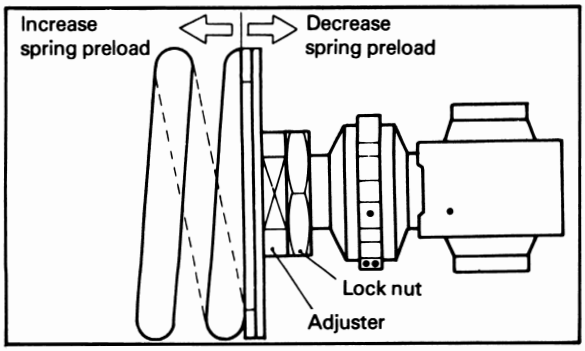
Turn the adjuster until it clicks.
Stop turning the adjuster when it suddenly becomes heavy or light. Do not give any father turns.

Spring preload adjustment

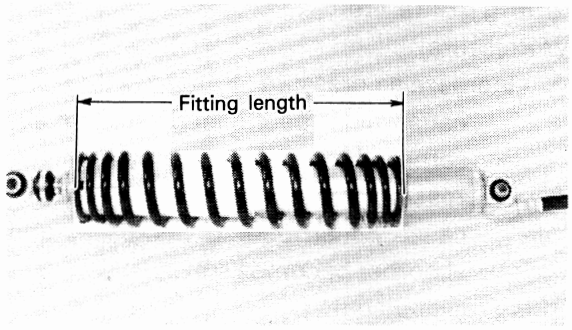
The preload is adjusted by changing the set length of the spring: a shorter set length increases the preload, a longer set length decreases the preload.

1. To adjust the preload, remove the shock absorber and loosen the lock nut.
2. Adjust the spring set length by turning the spring adjuster with the special wrench. To increase the preload, turn the spring adjuster clockwise. To decrease the preload, turn the spring adjuster counterclockwise. Never attempt to turn the adjuster beyond the maximum or minimum setting.





Standard Length (installed): 347 mm (13.66 in)
Minimum Length (installed): 332 mm (13.07 in)
Maximum Length (installed): 347 mm (13.66 in)



NOTE:

Whenever adjusting the preload, adjust the spring set length in 3 mm (0.1 in) increments. Always tighten the lock nut against the spring adjuster and torque the lock nut to specification.

Tightening torque: 5.5 m-kg (40 ft-lb)

* Shortening the set length: increases the preload; the shock becomes stiffer and rebounds more quickly.
* Lengthening the set length: decreases the preload; the shock becomes softer and rebounds more slowly.

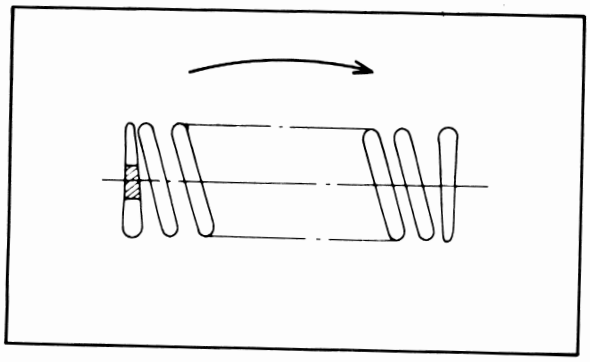
Spring replacement

In addition to the standard type, hard and soft types of springs are available. If the standard type is improper for your purpose, select a proper one according to the rider's weight or road conditions.

1. Using the hard type: the spring rate is higher; the spring is stiffer and rebounds more quickly.
2. Using the soft type: the spring rate is lower; the spring is softer and rebounds more slowly.

Type	Part No.	I.D. color
Light duty	4V5-22212-10	Yellow/Purple
Standard	4V5-22212-00	Yellow/Red
Heavy duty	4V5-22212-20	Yellow/White

Identification color is shown on right end of a spring.



Gas pressure adjustment

The nitrogen gas pressure is adjustable. For this adjustment, take the unit to your Authorized Yamaha dealer.

TUNING GUIDANCE

The effect of suspension setting is determined by the combination of the spring and damping. In other words, the key point of suspension setting is to make the spring and damping well-balanced.

When setting the suspension, the rider's riding technique, machine speed and track conditions must be taken into consideration, but normally it will be set so as to best suit the rider's preference. If the suspension is not set to his preference, he will be sure to find it unsatisfactory during a race. In this case, it may probably be said that the spring and damping are unbalanced.

1. Possible causes of unsatisfactory suspension setting.
   - Spring is too stiff.
   - Spring is too soft.
   - Damping is too stiff.
   - Damping is too soft.

2. The following chart shows combinations of the abovementioned four factors resulting in unsatisfactory suspension setting.

Cause	Symptom of improper suspension setting	Remedy
Spring is too softer.	1. Suspension bottoms when landing. 2. Rear end bouces up when starting up after striking the bottom of a slope. 3. Rear end of machine lowers with less available suspension stroke.	• Increase spring preload. • Replace with hard spring.
Spring is too stiffer.	1. Rear end bounces up when striking a bump. 2. Suspension does not contract properly. 3. Machine lands with rear wheel touching ground first.	• Decrease spring preload. • Replace with soft spring.
Damping force is stiffer.	1. Suspension bottoms at high speeds over rough ground. 2. Machine assumes a squatting posture.	• Decrease damping force.
Damping force is softer.	1. Suspension stretches quickly when rear wheel is off ground, and it bounces up when landing. 2. Suspension is felt unstable.	• Increase damping force.

3. General suspension setting

* Setting depending on the cource condition
  - Furrowed ground with larger pitch
    — Increase damping force
  - Furrowed ground with smaller pitch
    — Decrease damping force
  - Ground is hard
    — Replace to soft spring
  - Ground is soft
    — Replace to hard spring
* Setting depending the rider
  - Beginners
    — Increase damping force and use soft spring
  - Experienced rider
    — Decrease damping force and use hard spring

If it is difficult to set the suspension satisfactorily, try again by changing the spring or adjusting the damping force.

KEEP THE STANDARD SETTING IN MIND.
THE SETTING THE SUSPENSION PROPERLY IS NOT SO EASY EVEN FOR EXPERIENCED RIDERS. REMEMBER IT REQUIRES RICH EXPERIENCE.

COMPATIBILITY CHART

WARNING:

READ AND UNDERSTAND ALL INSTRUCTIONS DEALING WITH SUSPENSION COMPONENTS. FAILURE TO FOLLOW INSTRUCTIONS AND GUIDELINES MAY RESULT IN DAMAGE TO MACHINE AND/OR INJURY TO A MECHANIC OR USER.

FRONT FORKS

Problem	Step 1	Step 2	Step 3
Bottoming	Increase air pressure	Use harder spring	—
Too soft	Increase air pressure	Increase oil viscosity (10 wt to 15 wt)	Use harder spring (4V5-23141-21)
Too hard	(Decrease air pressure)	Decrease oil viscosity (10 wt to 5 wt)	Use softer spring (4V5-23141-11)
GUIDELINES AND LIMITS			
(1)	Oil: STANDARD: 10 wt fork oil		ALTERNATE: 5 wt, 15 wt
(2)	AIR PRESSURE:	MINIMUM: 0 kg/cm² (0 psi) MAXIMUM: 1.2 kg/cm² (17.0 psi) INCREASES: step of 0.1 kg/cm² (1.5 psi)	

REAR SHOCK ABSORBER

Problem	Step 1	Step 2	Step 3
Bottoming	Shorten the spring set length	Increase damping force	Use harder spring (4V5-22212-20)
Too soft	Increase damping force	Shorten the spring set length	Use hard spring (4V5-22212-20)
Too hard	Decrease damping force	Extent the spring set length	Use softer spring (4V5-22212-10)
GUIDE LINES AND LIMITS			
1. SET LENGTH	MINIMUM: 332 mm (13.07 in) MAXIMUM: 347 mm (13.66 in) INCREASE: steps of 3 mm (0.1 in)		
2. DAMPING FORCE	Adjust by 1 or 2 clicks. Do not jamp over many clicks at a time; it may give the rider a misleading suspension feeling.		

Tuning Notes:

1. It is advisable to use the standard setting. If it does not suit your preference, then make an adjustment according to the table above and the following instructions.
2. **Start adjustments using sequence 1. After each test ride, proceed to the next sequence, if necessary.**

- Set length should be adjusted in 3 mm (0.1 in) increments.
- Damping should be adjusted in increments of 2 clicks.

4 ENGINE MAINTENANCE AND REPAIR

4 ENGINE MAINTENANCE AND REPAIR

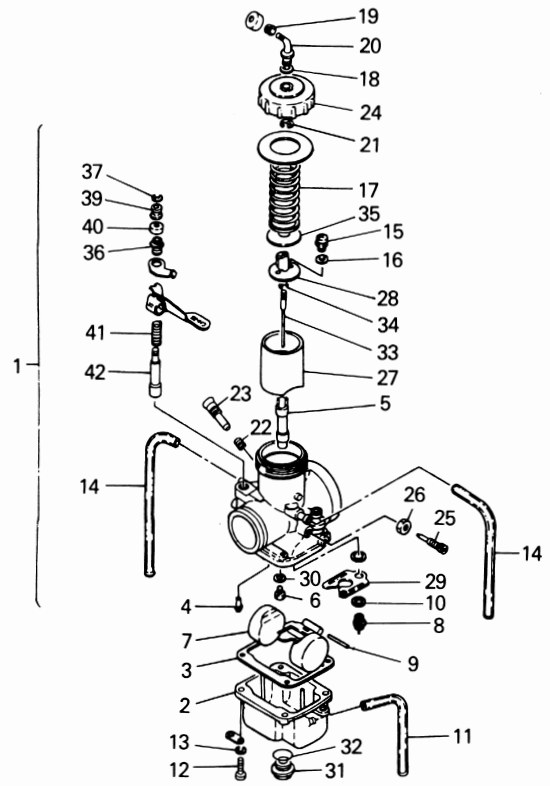
PREPARATION FOR SERVICE

Prior to beginning any work on the engine, take note of the following bits of advice; they will greatly facilitate your engine maintenance and repair:

- Clean your machine as described in the General Information section entitled, "Cleaning and Storage";
- Group the parts of each component on individual trays, and arrange the parts in the order of their removal;
- When replacing parts, always use the genuine Yamaha article to maintain optimum performance, durability, and safety;
- All gaskets and seals should be replaced during engine work, and all gasket surfaces should be clean;
- During assembly, always apply oil or grease to bearing surfaces to protect them upon initial start-up;
- Replace all circlips which are distorted from use or disassembly;
- Always replace cotter pins and piston pin clips after one use;
- Always clean and oil the threads of nuts, bolts, and screws during assembly, and torque them to the proper specifications whenever possible.

DISASSEMBLY, INSPECTION AND ASSEMBLY

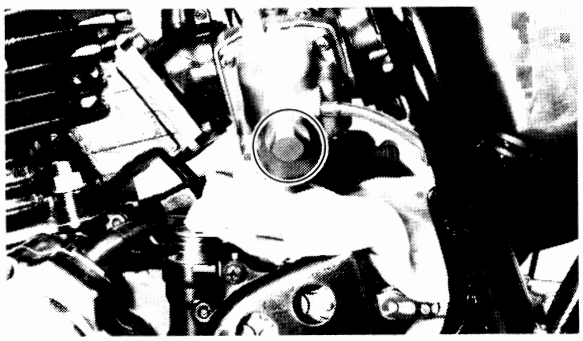
CARBURETOR

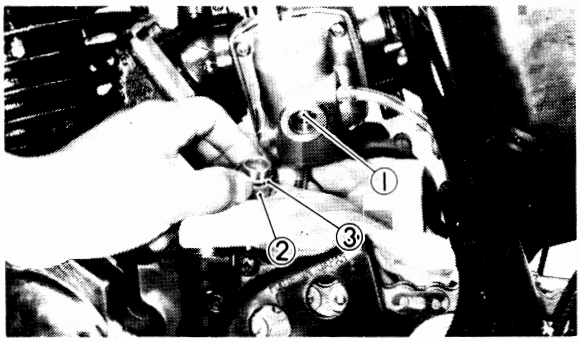


1. Carburetor assy
2. Float chamber body
3. Float chamber gasket
4. Pilot jet
5. Main nozzle
6. Main jet
7. Float
8. Needle valve assy
9. Float pin
10. Needle valve washer
11. Pipe
12. Pan head screw
13. Spring washer
14. Pipe
15. Pan head with washer screw
16. Washer
17. Throttle valve spring
18. O-ring
19. Cable adjusting nut
20. Cable guide
21. Clip
22. Air adjusting spring
23. Air adjusting screw
24. Mixing chamber top
25. Throttle screw
26. Cable adjusting nut
27. Throttle valve
28. Connector
29. Plate
30. Main jet washer
31. Screw plug
32. O-ring
33. Needle
34. Clip
35. Spring seat
36. Plunger cap
37. Plunger clip
38. Cotter pin
39. Holder
40. Plunger cap cover
41. Plunger spring
42. Starter plunger

NOTE:

It is not necessary to remove the carburetor to replace the main jet: Loosen the hose clamps on the manifold and air cleaner joint, rotate the carb, and remove the main jet cover bolt from the float bowl. The main jet can thereby be removed and replaced.





1. Main jet 2. Cover bolt 3. O-ring

Standard Main Jet Size:

IT250J	#400
IT465J	#380

WARNING:

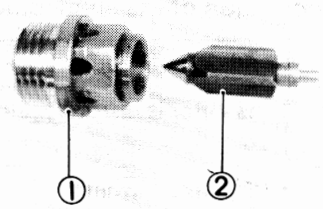
When the main jet cover bolt is removed, the fuel in the float bowl will drain. Do not remove the bolt when the engine is hot. Place a rag under the carb when removing the bolt to catch the fuel. Remove the bolt in a well-ventilated area, away from any open flame. Always clean and dry the machine after completing main jet changes.

IMPORTANT:

The carburetor has been set for operation at or near sea level; in most instances, it will not require changes. Some conditions, however, do demand carb setting changes to maintain performance. If this is the case, make the changes in small increments and check the results with a spark plug check. Improper settings can lead to poor performance or possible engine damage. If you are in doubt as to what setting changes to make, consult your Yamaha dealer.

Inspection

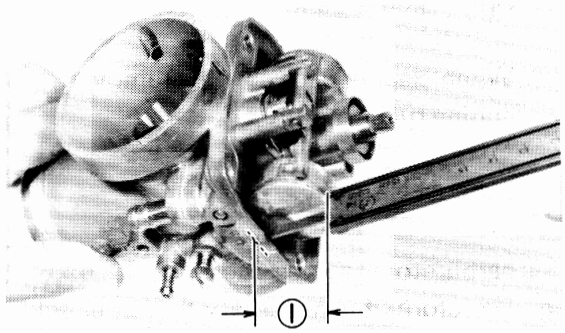
1. Examine carburetor body and fuel passages. If contaminated, wash carburetor in petroleumbased solvent. Do not use caustic carburetor cleaning solutions. Blow out all passages and jet with compressed air.
2. Examine condition of floats. If floats are damaged, they should be replaced.
3. Inspect inlet float valve and seat for wear or contamination. Replace these components as a set.



1. Valve seat 2. Float valve

4. Hold the carburetor in an upside down position.
   Incline the carburetor at 60° ~ 70° (so that the end of the float valve does not hang down of float weight), and measure the distance from the mating surface of the float chamber (gasket removed) to the top of the float using a gauge.

Float height:
IT250J . . 24.0 ± 1 mm (0.94 ± 0.04 in)
IT465J . . 27 ± 1 mm (1.1 ± 0.04 in)

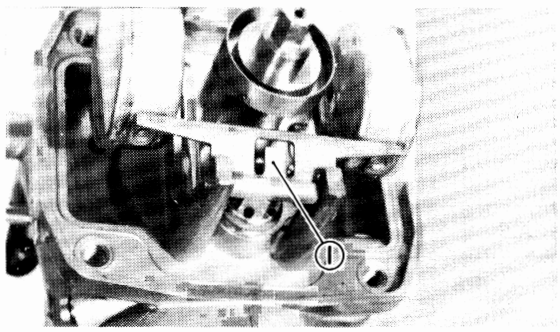


1. Float height

CAUTION:

Check the float valve and valve seat for wear before adjustment.

Make the adjustment by bending the tang on the float arm.



1. Tang

TUNING GUIDANCE

When the carburetor is not set properly for the engine, poor engine performance will result from the following two causes; too rich or too lean mixture.

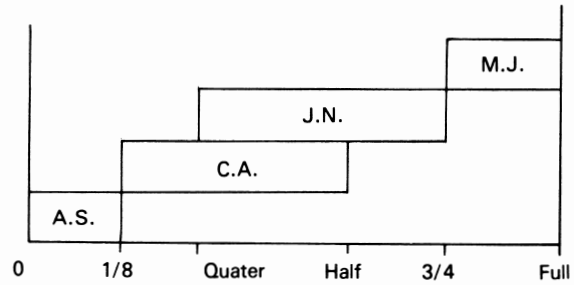
Mixture is too rich.	Mixture is too lean.
* Exhaust makes dull sound in an on-and-off way.	* Engine overheats.
* When starter is applied, engine runs more roughly.	* When starter is applied, engine runs smoothly.
* When engine is warmed up, it runs roughly.	* Poor acceleration will result.
* Spark plug is dark.	* Spark plug is too light.
* When cleaner case cover is removed, engine runs smoothly.	* Engine runs roughly and lacks power.
* Exhaust is smoky.	

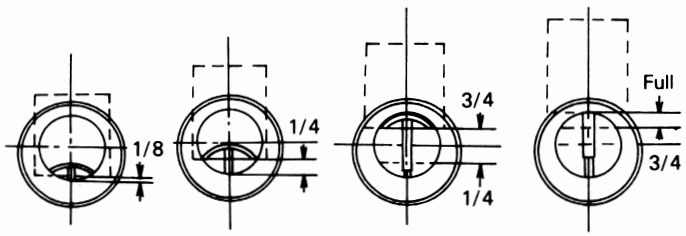
This carburetor is so designed that the parts to be adjusted differ depending on the throttle opening. Therefore, it is necessary to first check whether mixture is too rich or too lean, and then to find out what is the throttle opening.

• Machine speed

* Low speed	Air screw, Cutaway
* Medium speed	Jet needle-clip position
* High speed	Main jet

• Throttle opening





It is a wise practice to adjust the air screw, jet needle - clip position or main jet to eliminate the causes of trouble.

If the air-fuel mixture is too lean, the engine tends to overheat and seize up, and on the contrary, if too rich, the spark plug easily gets wet, thus causing misfires. The proper strength of the mixture varies depending on atmospheric conditions (pressure, humidity, and temperature). Taking these condition into consideration, adjust the carburetor settings properly.

TEST RUNS

Warm up the engine with the carburetor of the standard settings, and run two or three laps of the course while examining the operating condition of the spark plug.

Condition of spark plug	
Correct	Insulator is dry and light tan color.
Too hot	Insulator is whitish.
Too cold	Insulator is wet and sooty.

If spark plug is whitish, the fuel-air mixture is lean.

* Replace the main jet with a one step large type.

If spark plug is wet, the fuel-air mixture is rich.

* Replace the main jet with a one step smaller type.

MAIN JET (M.J.)

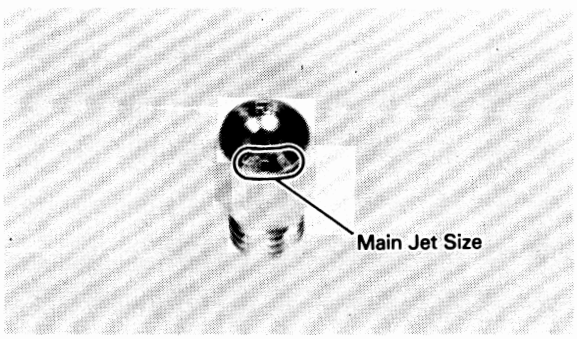
Standard setting	
IT250	#400
IT465	#390

The larger the size No., the richer the mixture, and smaller the No., the leaner the mixture.

*** It is advisable to carry extra main jets which are up to 3 steps (1 step = 10) above and below the standard size.**

*** The main jet determines the mixture in the range of throttle opening from 3/4 to full-open.**

To RICH ↑	# 420 (137-14143-84)	
	# 410	-82
	# 400	-80
STD	# 390	-78
↓ To LEAN	# 380	-76
	# 370	-74
	# 360	-72



JET NEEDLE ADJUSTMENT

Jet needle should be changed only when the machine shows poor medium speed performance. If the mixture is too rich or too lean, acceleration will be slow.

- When rich at medium speeds:

The engine runs roughly with slow throttle response.

Raise the jet needle clip position one step to make the mixture lean.

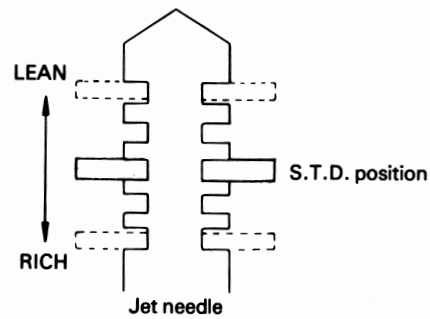
- When lean at medium speed:

The engine runs roughly.

Lower the clip position one step to enrich the mixture.

The jet needle is provided with five grooves. When the clip position is moved up one or two steps, the mixture becomes leaner. When the clip position is moved down one or two steps, the mixture becomes richer.

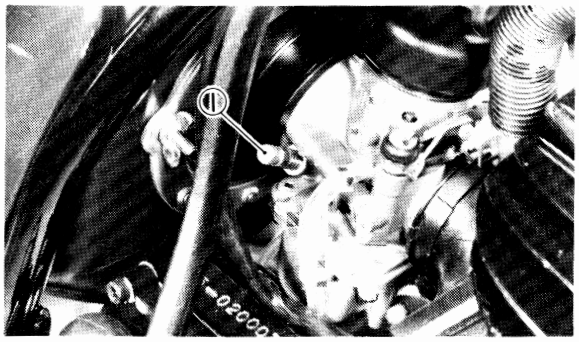
Standard setting:	
IT250	6F34-3
IT465	6F39-4



AIR SCREW (A.S.)

Standard setting:	
IT250	1 and 1/2
IT465	1 and 3/8

Turning in the air screw decreases the air flow and makes the mixture richer, and turning out makes the mixture leaner with an increase in the air flow.

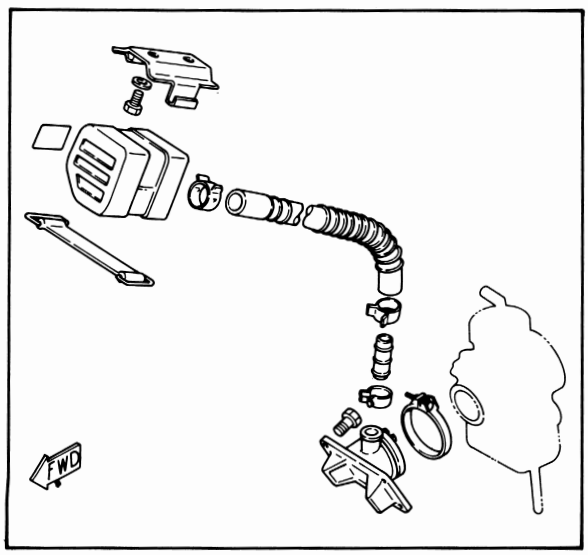

1. Air screw

YAMAHA ENERGY INDUCTION SYSTEM (Y.E.I.S.)

[redacted]

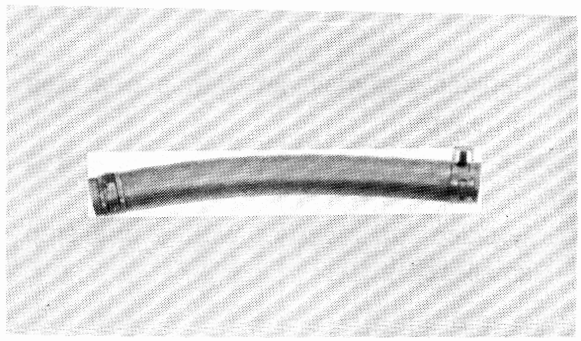
Never attempt to modify the Yamaha Energy Induction System.

The air chamber and hose should be handled with special care.
Any imperfect connection or installation of these parts or damaged parts will have an adverse effect on the performance of the system. Check parts, and be sure to replace any defective one.

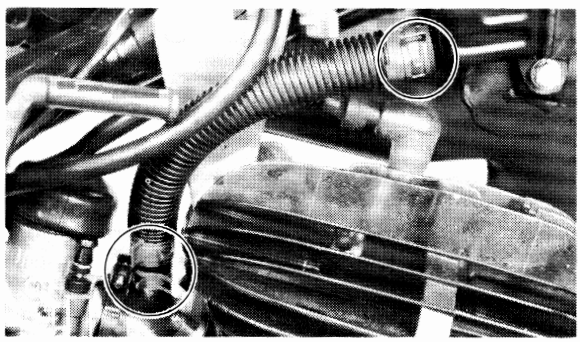


Inspection

1. Check the hose and air chamber for cracks or any other damage. If there is any cracks or damage, replace them.

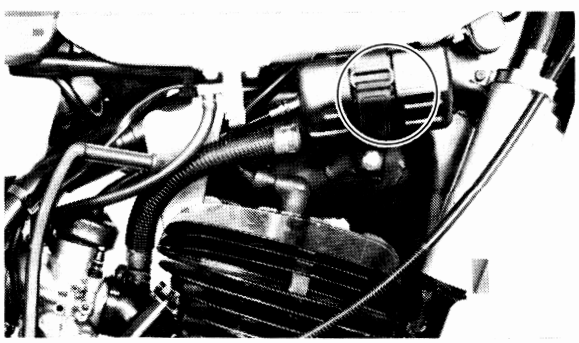


2. Check the tightness of hose clip, and retighten as required.

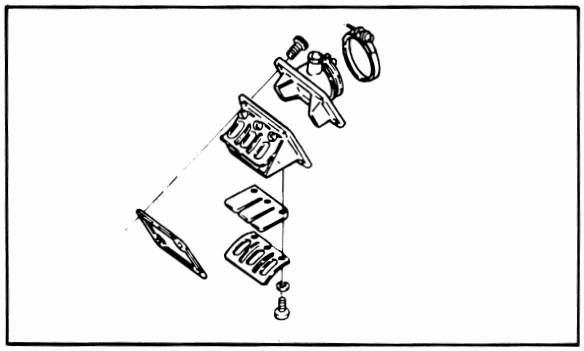


NOTE:

The fuel tank is provided with the Y.E.I.S. air chamber. When removing or mounting the fuel tank, first remove the band holding the air chamber.



REED VALVE

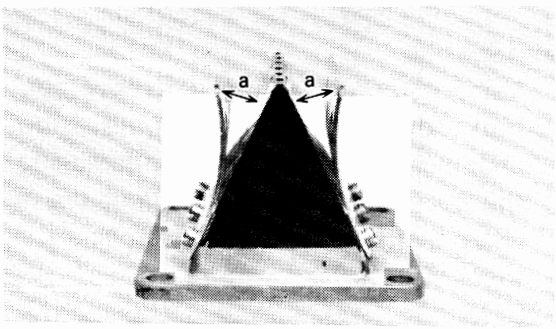


Inspection

1. Inspect rubber intake manifold for signs of weathering, checking or other deterioration.
2. Inspect reed petals for signs of fatigue and cracks. Reed petals should fit flush or nearly flush against neoprene seats. If in doubt as to sealing ability, apply suction to carburetor side of assembly. Leakage should be slight to moderate.
3. The valve stopper controls the movement of the valve. Check clearance "a".

Standard value "a":
12 mm (0.472 in)

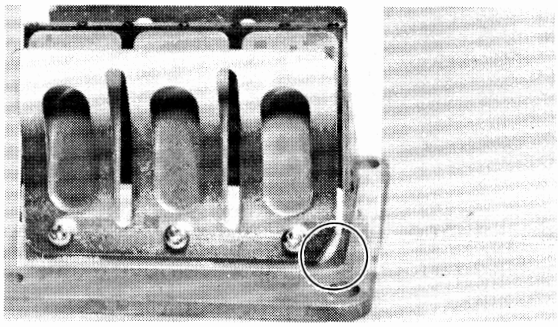
If it is 0.2 mm (0.008 in) more or less than specified, replace the valve stopper.



4. Check reed valve for bending. If beyond tolerance, replace reed valve.

Reed valve bending limit:
0.6 mm (0.024 in)

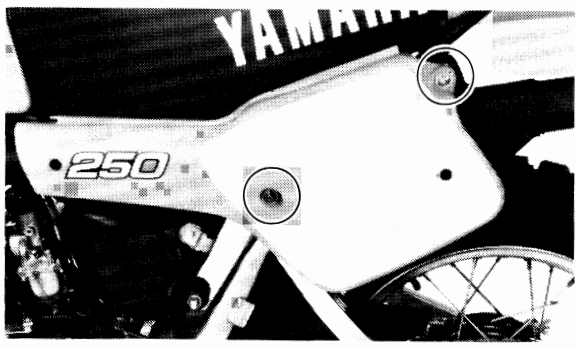
5. During reassembly, note the cut in the lower corner of the reed and stopper plate. Use as aid to direction of reed installation.

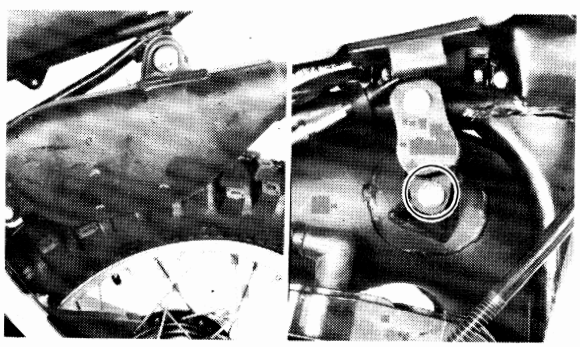


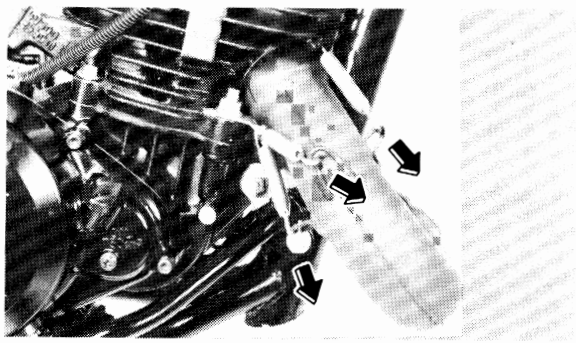
MUFFLER

Removal

1. Remove the two bolts and remove side cover.
2. Remove muffler and silencer mounting bolts and loosen the muffler joint screws.
3. Remove coil springs at muffler to cylinder joint and remove muffler.







Maintenance

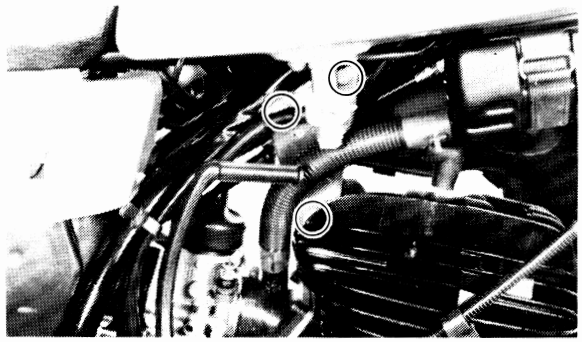
1. Using a rounded scraper, remove excess carbon deposits from manifold area of exhaust pipe.
2. Carbon deposits within the silencer may be removed by lightly tapping the outer shell with a hammer and then blowing out with compressed air. Heavy wire, such as a coat hanger, may be inserted to break loose deposits. Use care.
3. Check the exhaust pipe for cracks. If it has excessive cracks, replace it.

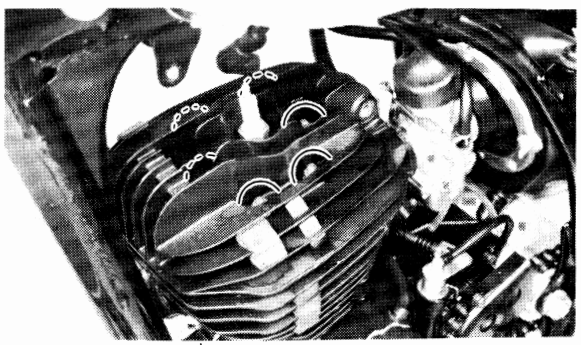
CYLINDER HEAD

Removal

1. Remove Y.E.I.S. air chamber and hose.
2. Remove spark plug lead wire. Loosen, but do not remove spark plug.
3. Remove the cylinder head holding bracket. And remove nuts securing cylinder head (6 nuts). Remove cylinder head and gasket.

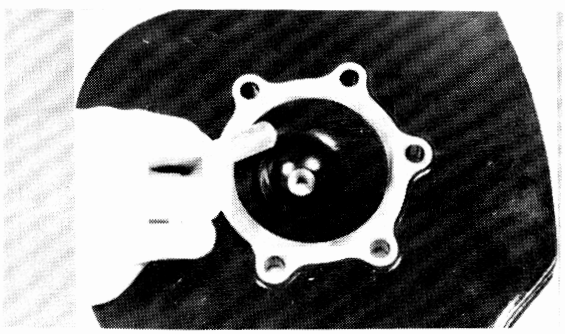
Upper	Bracket to frame Bracket to head	2.0 m-kg (14 ft-lb) 3.0 m-kg (22 ft-lb)
Cylinder head nut		2.5 m-kg (18 ft-lb)



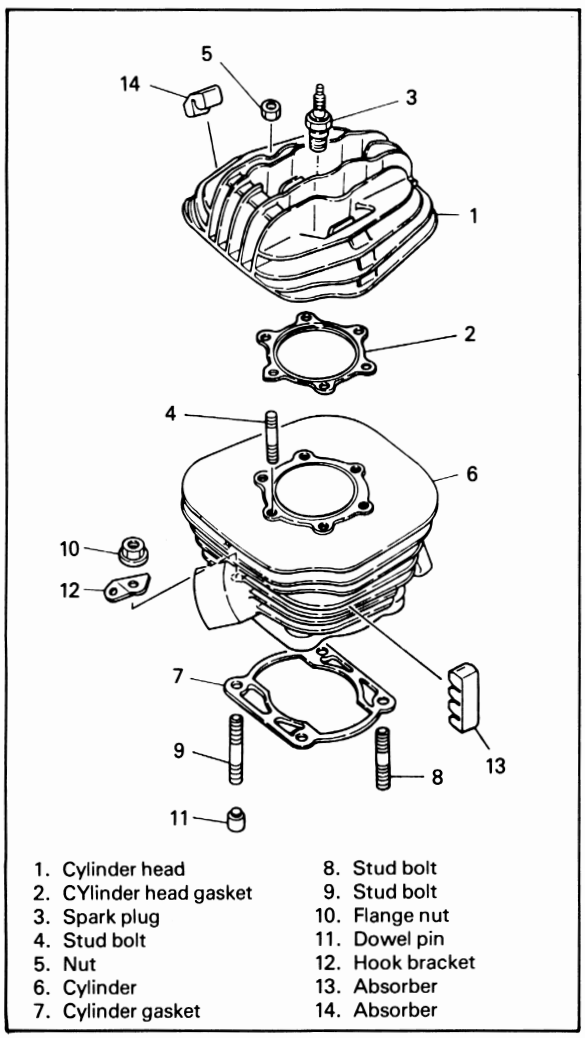


Maintenance

1. Using a rounded scraper, remove carbon deposits from combustion chamber. Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the metal surface.



2. Place the head on a surface plate. There should be no warpage. Correct by resurfacing. Place 400 ~ 600 grit wet emery sandpaper on surface plate and resurface head using a figure-eight sanding pattern. Rotate head several times to avoid removing too much material from one side.



1. Cylinder head
2. CYlinder head gasket
3. Spark plug
4. Stud bolt
5. Nut
6. Cylinder
7. Cylinder gasket
8. Stud bolt
9. Stud bolt
10. Flange nut
11. Dowel pin
12. Hook bracket
13. Absorber
14. Absorber

CYLINDER

Removal

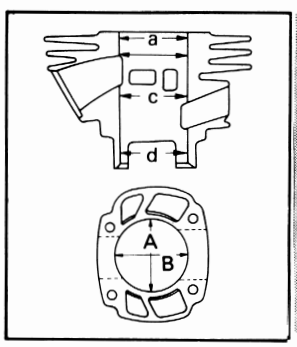
1. Remove cylinder holding nuts (4).
   With the piston at top dead center, rise the cylinder until the cylinder skirts clear crankcase. Stuff a clean shop rag into crankcase cavity, around rod, to prevent dirt and other foreign particles from entering. Remove cylinder and base gasket.

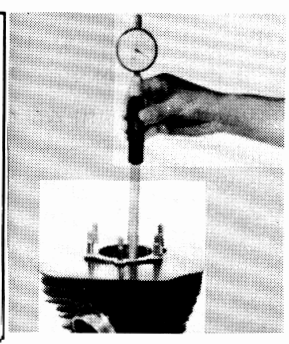
Cylinder holding nut: 6.0 m-kg (43 ft-lb)

Maintenance

1. Using a rounded scraper, remove carbon deposits from the exhaust port.

2. Check cylinder bore. Using a cylinder hone, remove any scoring. Hone lightly, using smooth stones. Hone no more than required to avoid excess piston clearance.
3. Using a cylinder gauge set to standard bore size, measure the cylinder. Measure front-to-rear and side-to-side at top, center and bottom just above exhaust port.





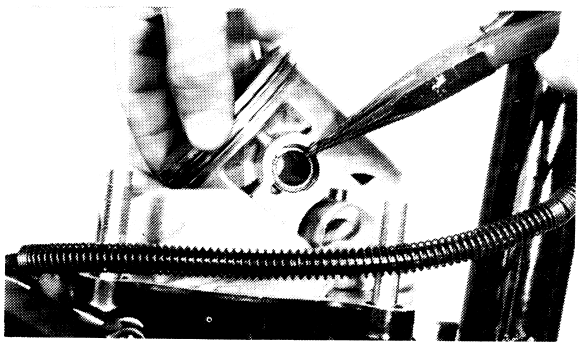
Compare minimum and maximum measurements. If over torelance and not correctable by honing, rebore to next oversize.

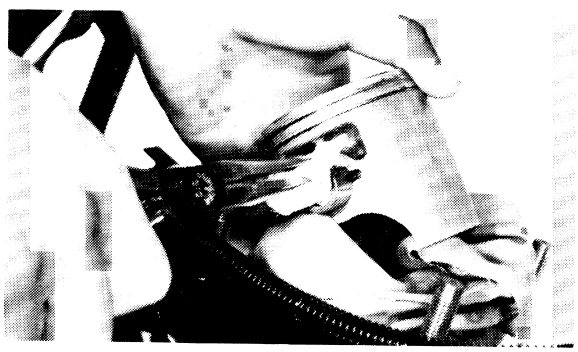
Max. allowable taper: 0.08 mm (0.0031 in) Max. allowable out-of-round: 0.05 mm (0.0020 in)

PISTON ASSEMBLY

Removal

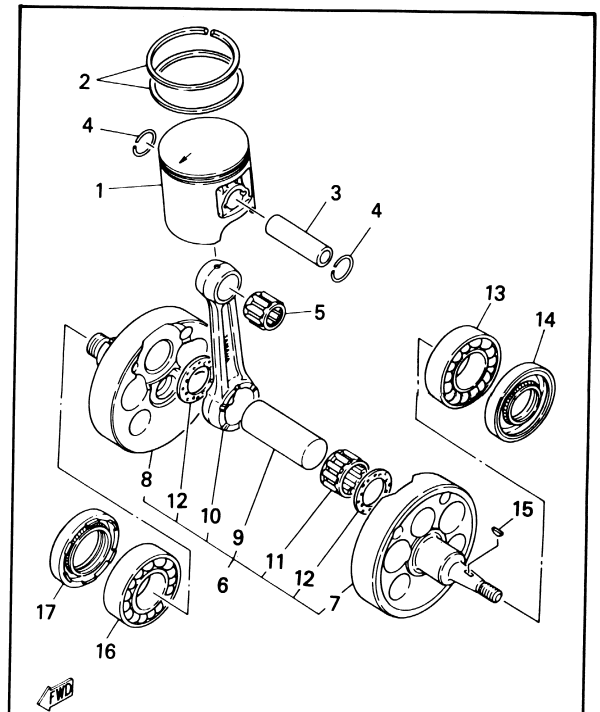
1. Remove the piston pin clip (1) from the piston. Push the piston pin out from opposite side. Remove the piston.





NOTE:

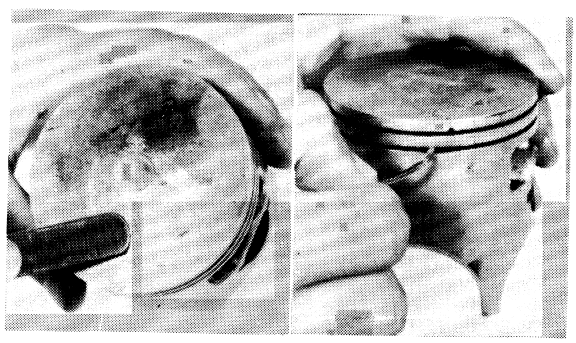
If the pin hangs up, use a piston pin puller. Do not hammer on pin as damage to rod, piston and bearing will result.



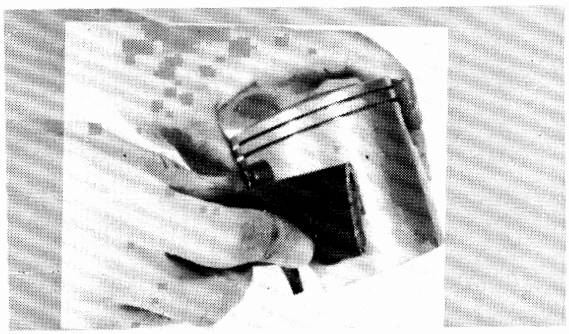
1. Piston
2. Piston ring
3. Piston pin
4. Circlip
5. Cylindrical bearing
6. Crankshaft assy
7. Crank
8. Crank
9. Crank pin
10. Connecting rod
11. Cylindrical bearing
12. Washer
13. Bearing
14. Oil seal
15. Woodroff key
16. Bearing
17. Oil seal

Maintenance

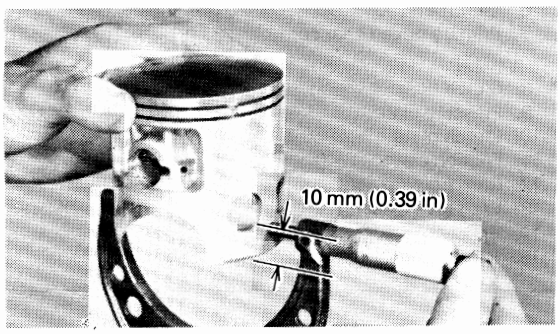
1. Using a rounded scraper, remove carbon deposite from piston crown and ring grooves.



2. Using 400 ~ 600 grit wet sandpaper, lightly sand score marks and lacquer deposits from sides of piston. Sand in crisscross pattern. Do not sand excessively.



3. Using an outside micrometer, measure piston diameter. The measuring point is at right-angles to the piston pin holes, 10 mm (0.39 in) from the bottom of the piston skirts. Compare piston diameter to cylinder bore measurements (bottom two measurements at right angles to piston pin line.)



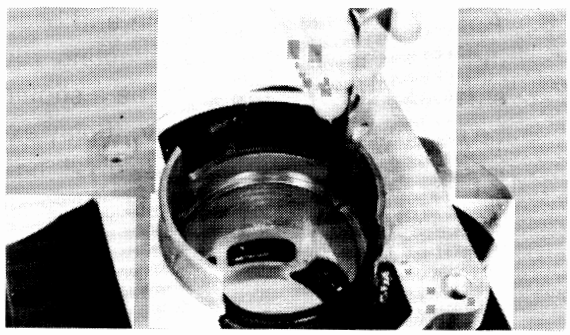
Piston clearance =
Minimum cylinder dia. −
Maximum piston dia.

If beyond tolerance replace piston or rebore cylinder as required.

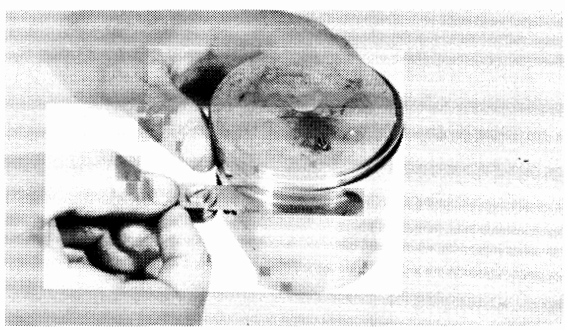
Normal piston clearance:	
IT250	0.045 ~ 0.050 mm (0.0018 ~ 0.0020 in)
IT465	0.070 ~ 0.075 mm (0.0028 ~ 0.0030 in)

4. Insert ring into cylinder. Push down approximately 20 mm (0.787 in) using piston crown to maintain right-angle to bore. Measure installed end gap. If beyond tolerance, replace.

Ring end gap (installed)
0.3 ~ 0.5 mm (0.012 ~ 0.020 in)



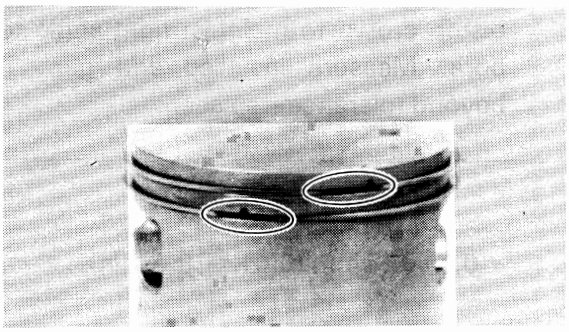
5. Holding cylinder towards light, check for full seating of ring around bore. If not fully seated, check cylinder. If cylinder is not out-of-round, replace piston ring.
6. Fit the piston rings in the grooves, and measure the side clearance. If it measures more than 0.1 mm, replace both piston and piston rings as an assembly.



7. During installation, make sure ring ends are properly fitted around ring locating pin in piston groove. Apply liberal coating of two-stroke oil to ring.

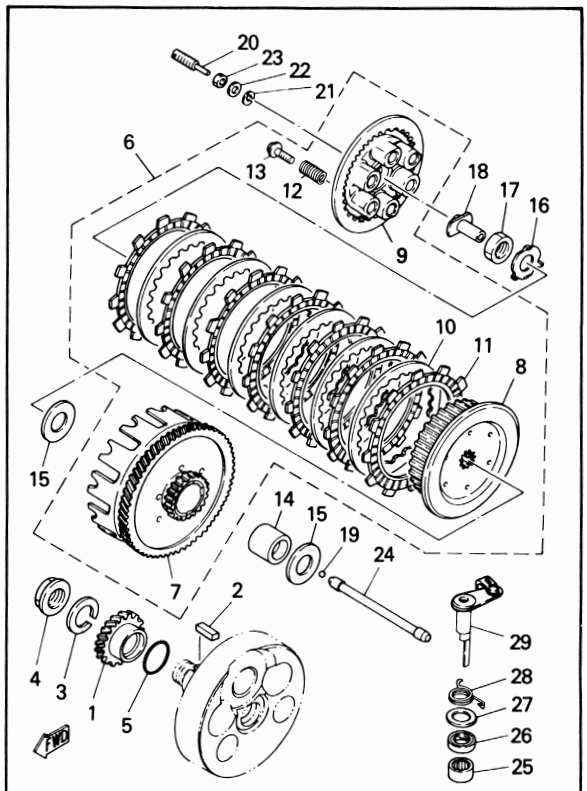
NOTE:

New ring requires break-in. Follow first portion of new machine break-in procedure.



8. Apply a light film of oil to pin and bearing surfaces. Install in connecting rod small end. Check for play. There should be no noticeable vertical play. If play exists, check connecting rod small end diameter for wear. Replace pin and bearing or all as required.

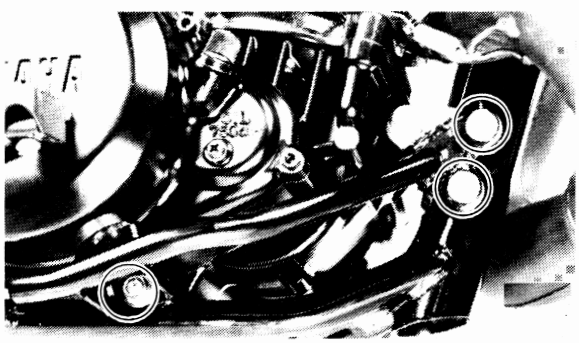
CLUTCH



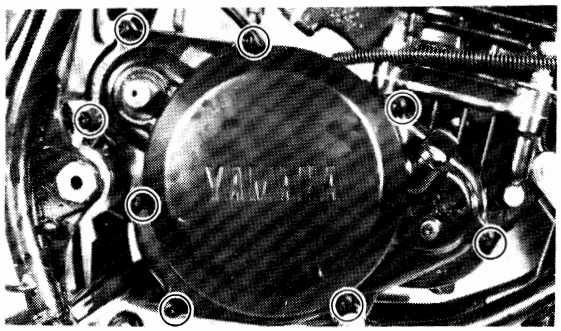
1. Primary drive (24T) gear
2. straight key
3. Spring washer
4. Nut
5. O-ring
6. Clutch assy
7. Primary driven gear comp. (63T)
8. Clutch boss
9. Pressure plate
10. Clutch plate
11. Friction plate
12. Compression spring
13. With washer screw
14. Spacer
15. Thrust plate
16. Lock washer
17. Nut
18. Push rod
19. Ball
20. Screw
21. Spring washer
22. Plate washer
23. Nut
24. Push rod
25. Cylindrical bearing
26. Oil seal
27. Plate washer
28. Torsion spring
29. Push lever assy
30. Hose

Removal

1. Drain the transmission oil.
2. Remove the right side engine guard.



3. Remove the rear brake adjuster and remove the footrest. Remove the kick starter, lever.

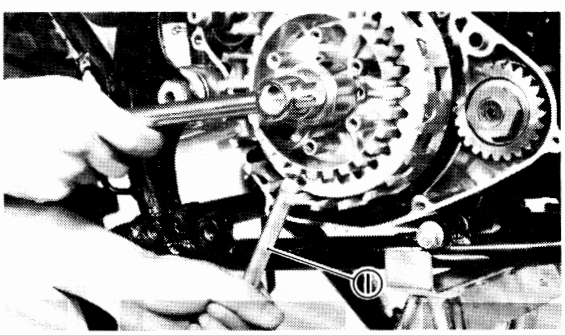


4. Remove the allen bolts holding the side cover in place and remove the cover. Note the position of the dowel pins.
5. Remove the phillips screws (6) holding the rressure plate. Remove the clutch springs, pressure plate and push rod. Remove the clutch plates and friction plates.

NOTE:

When removing phillips spring screws, loosen each screw in several stages working in a crisscross pattern to avoid any unnecessary warpage. Note the condition of each piece as it is removed and its location within the assembly.

6. Bend lock washer tab down. Using the clutch holding tool, remove the clutch securing nut and lock washer. Remove the clutch boss and driven gear (clutch housing).

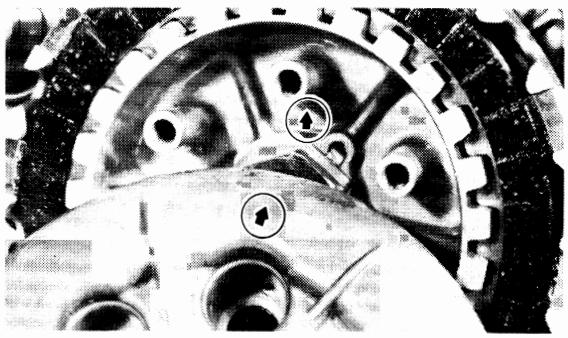


1. Clutch holding tool (90890-01024)

Clutch lock nut torque: 7.5 m-kg (54 ft-lb)

Primary drive gear nut torque: 7.5 m-kg (54 ft-lb)

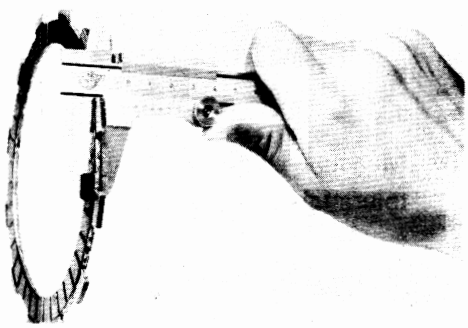
7. If the clutch housing spacer remains on the transmission main shaft, remove it. Remove the thrust plate and thrust plate spacers.
8. When installing the clutch pressure plate, align arrow mark on clutch boss and pressure plate mark.



Maintenance

1. Measure the friction plates at three or four points. If their minimum thickness exceeds tolerance, replace.

	New	Wear limit
Friction plate thickness	3.0 mm (0.12 in)	2.7 mm (0.106 in)

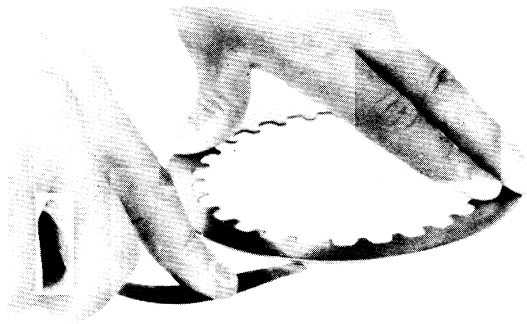


2. Check the plates for signs of warpage and heat damage, replace as required.

NOTE:

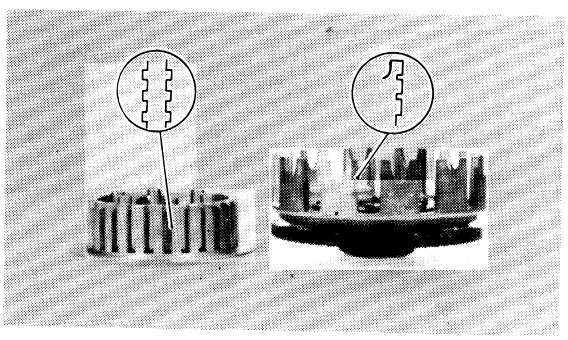
For optimum performance, if any plate requires replacement, it is advisable to replace the entire set.

3. Check each clutch plate for signs of heat damage and warpage. Place on surface plate (plate glass is acceptable) and use feeler gauge as illustrated. If warpage exceeds tolerance, replace.



Clutch plate warpage allowance:
0.05 mm (0.002 in) Maximum

4. Check dogs on driven gear (clutch housing). Look for cracks and signs of galling on edges. If moderate, deburr. If severe, replace.

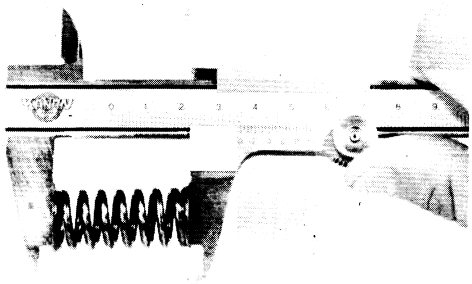


5. Measure each clutch spring. If beyond tolerance, replace.

		New	Min.
Clutch spring free length	IT250	36.4 mm (1.43 in)	35.4 mm (1.40 in)
	IT465	36.0 mm (1.42 in)	35.0 mm (1.38 in)

NOTE:

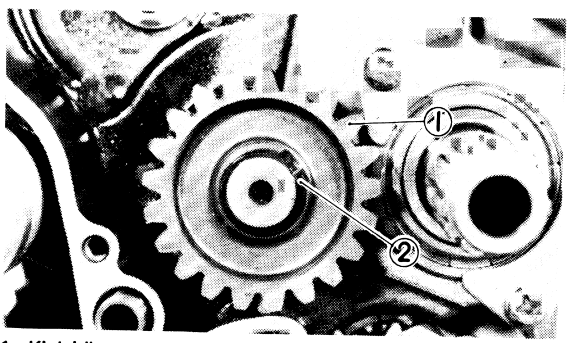
For optimum clutch operation it is advisable to replace the clutch springs as a set if one or more are faulty.



KICK STARTER

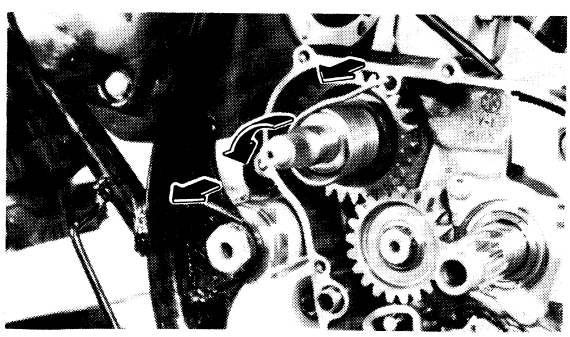
Removal

1. Remove the circlip and then remove kick idle gear and washers.



1. Kick idle gear 2. Circlip

2. Unhook the kick spring from its post in the crankcase. Allow it to relax. Then remove the kick axle assembly by rotating the shaft counterclockwise and then pulling out the entire assembly. Check the gear teeth for wear and breakage.

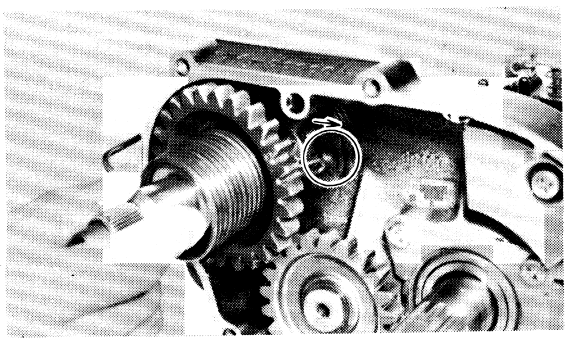


Inspection

1. The pressure of the kick clip is 1.0 kg (2.2 lb).
   If above pressure is too strong, spring wear and kick starter slipping will result. If it is too weak, the same slippage will occur particularly at low temperatures. Do not try to bend the clip.
2. Check the clip for damage and wear, and determine whether or not, it should be replaced.

Reassembly

1. While keeping the kick stopper upwards, engage the kick axle return spring with the slot on the end of the kick axle.
   And hook the spring to the spring hook. Check whether the kick starter acts correctly and whether it returns to its home position.



2. After installing the kick ass'y be sure to check wherethere it operates smoothly or not.

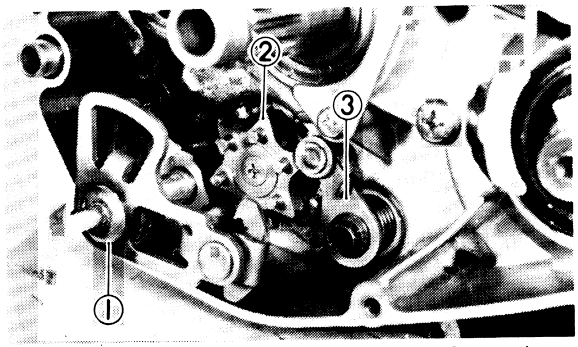
SHIFTER

NOTE:

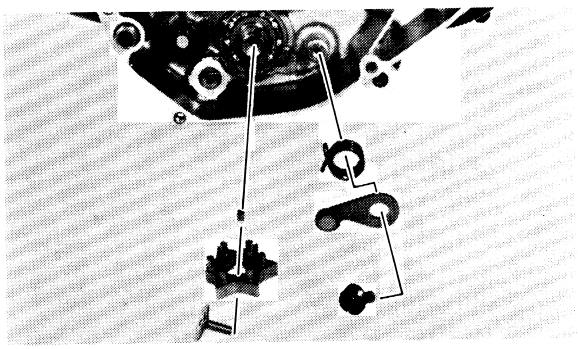
Shifter maintenance should be performed with clutch assembly removed.

Removal

1. Pull out the change lever assembly.
2. Shift into 2nd gear and unhook the stopper spring.
3. Remove the flange bolt, stopper lever and spring.
4. Remove the flat head screw and remove the shift cam, washer and straight key.



1. Change lever assembly 2. Segment 3. Stopper lever

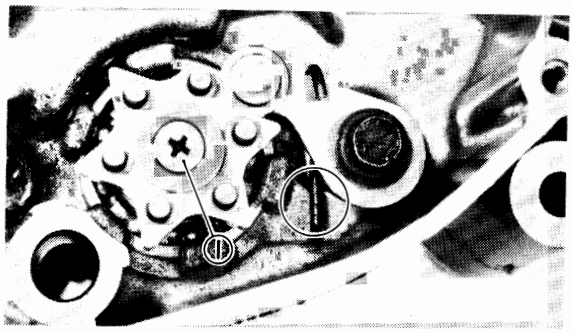


Inspection

1. Inspect shift return spring. A broken or worn spring will impair the return action of the shifting mechanism.
2. Inspect change shaft assembly for bending of shaft, worn or bent spline, and broken or worn shift arm spring. A bent shaft will cause hard shifting.

Installation

1. Apply a holding agent, such as "Loc-Tite", to threads of flat head screw.
2. Engage the shift return spring with its home position.

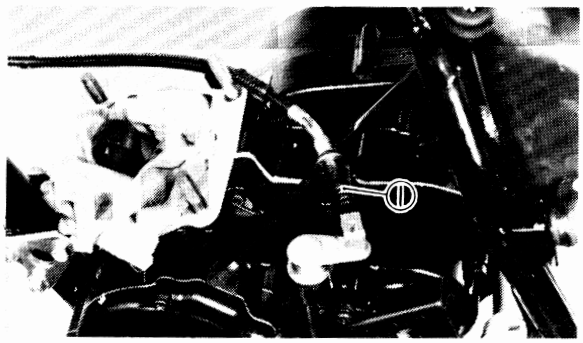


1. Apply a holding agent.

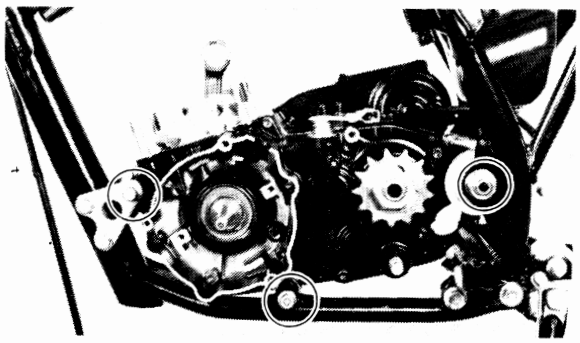
CRANKCASE

Engine removal

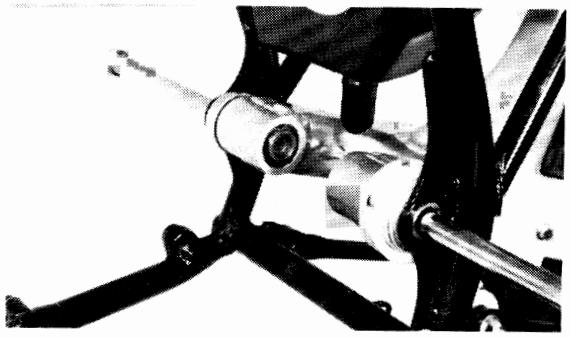
1. Remove the clutch cable.
2. Remove the right side engine guard.
3. Remove the magneto base, change pedal, and chain cover.
4. Remove the chain and two engine mounting bolts.



1. Clutch wire



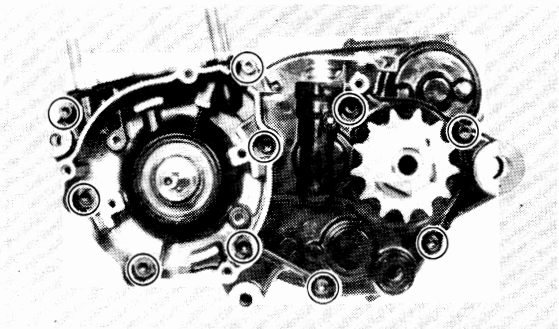
5. Remove the nut and pull out the pivot shaft about 2/3 of its length.



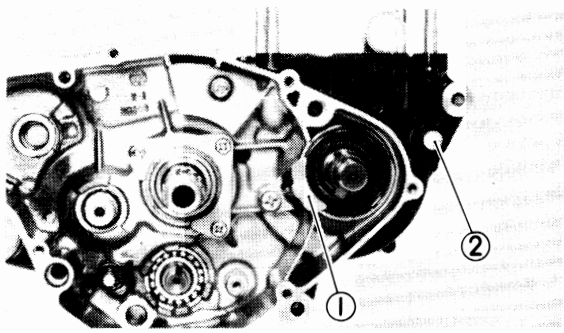
NOTE:

Do not pull it all the way out, or the swing arm will come off the frame.

6. Remove the engine from right side of frame.
7. Working in a crisscross pattern, loosen panhead screws 1/4 turn each. Remove them after all are loosened.



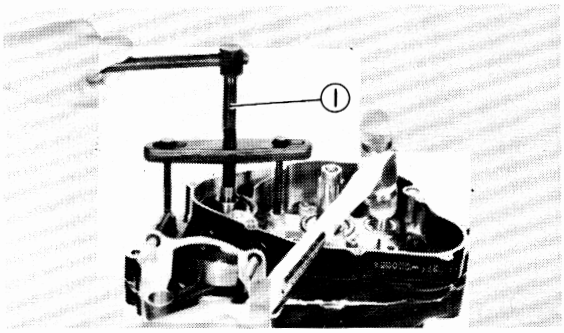
8. Remove the oil seal retainer and plug. Install crankcase separating tool as shown.



1. Retainer 2. Plug

NOTE:

Tighten the securing bolts on the crankcase separating tool, but make sure the tool body is parallel with the case. If necessary, one screw may be backed out slightly to level tool body.



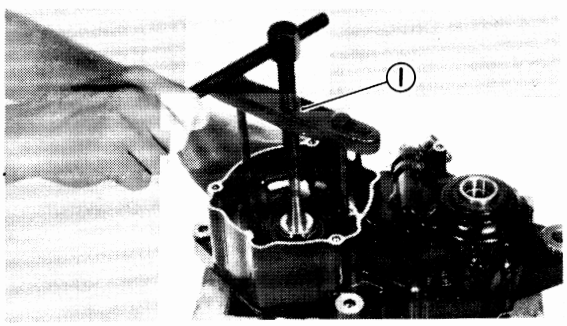
1. Crankcase separating tool

CAUTION:

Use a soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. Work slowly and carefully. Make sure the case halves separate evenly. If one end "hangs up", take pressure off the push screw, realign and start over. If the halves are reluctant to separate, check for a remaining case screw or fitting. Do not forece.

Crankshaft

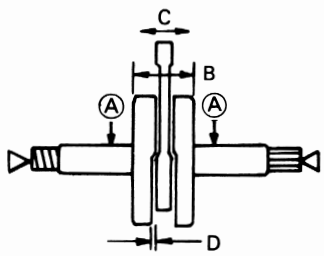
1. Remove crankshaft assembly with crankcase separating tool.



1. Crankcase separating tool

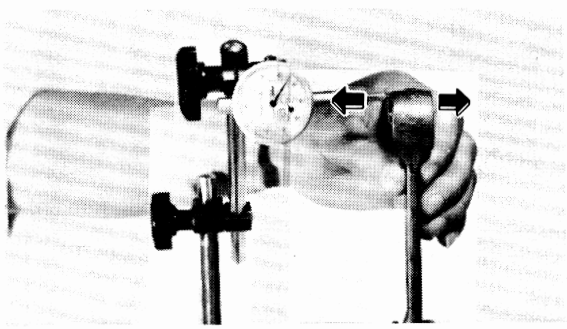
Inspection

1. The crankshaft requires the highest degree of accuracy in engineering and servicing.
2. The crankshaft is susceptible to wear and therefore the crank bearing must be inspected with special care.
3. Check crankshaft components.

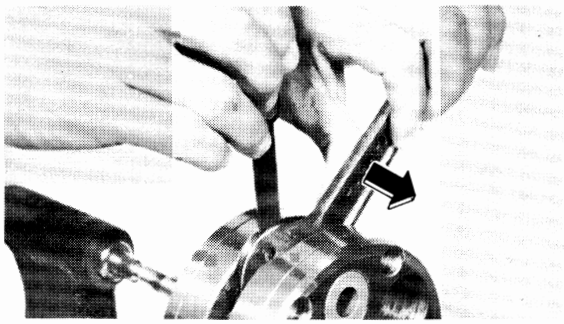


a. Mount the dial gauge at right angles to the connecting rod small end, holding the bottom of rod toward the dial indicator. Rock top of rod and measure axial play.

Connecting rod axial play (C):
0.4 ~ 2.0 mm (0.016 ~ 0.079 in)

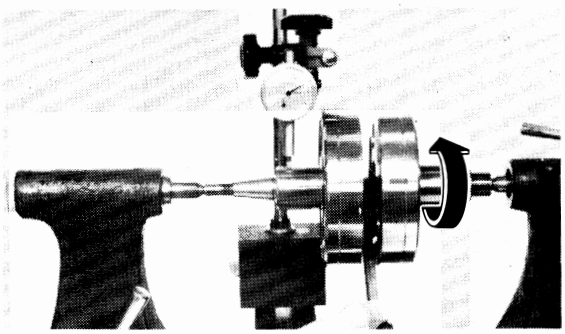


b. Remove the dial gauge and slide the connecting rod to one side. Insert a thickness gauge between the side of the connecting rod big end and the crank wheel. Measure clearance.



Connecting rod/crank side clearance (D):
0.25 ~ 0.75 mm (0.01 ~ 0.030 in)

c. If any of the above measurements exceed tolerance, crankshaft repair is required. Take the machine to your Authorized Yamaha Dealer.



Unit: mm (in)

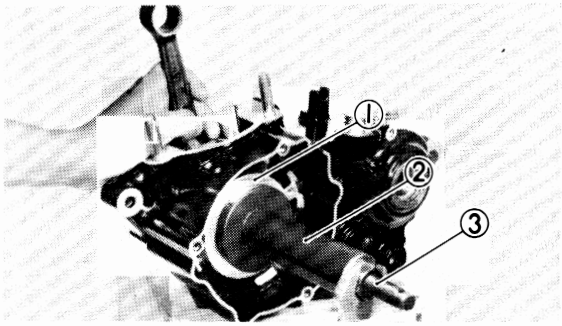
Deflection tolerance (A)		Flywheel width (B)
Left side	Right side	IT250: $62^{+0}_{-0.05}$ ($2.44^{+0}_{-0.02}$)
0.03 (0.0012)	0.03 (0.0012)	IT465: $66^{+0}_{-0.05}$ ($2.59^{+0}_{-0.02}$)

Crankshaft installation

1. Set the crankshaft into left case half and install crankshaft installing tool.

To protect the crankshaft against scratches or to facilitate the operation of installation: Pack the oil seal lips with grease. Apply engine oil to each bearing.

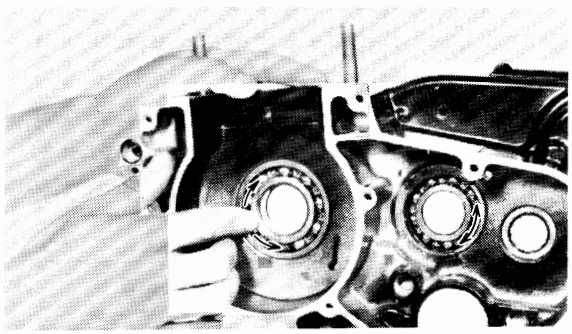
2. Hold the connecting rod at top dead center with one hand while turning the handle of the installing tool with the other. Operate tool until crankshaft bottoms against bearing.



1. Spacer
2. Crankshaft installer pot
3. Crankshaft installer bolt

Bearings and oil seals

1. After cleaning and lubricating the bearings, rotate inner race with a finger. If rough spots are noticed, replace the bearing.

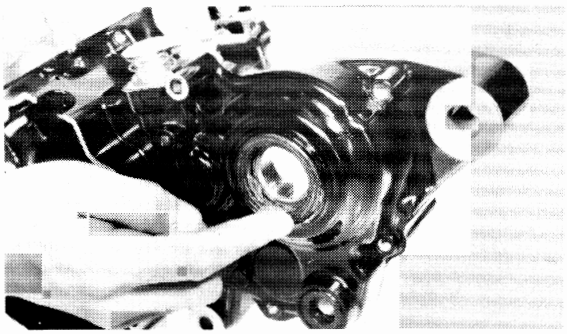


NOTE:

Bearing(s) are most easily removed or installed if the cases are first heated to approximately 90° ~ 120°C (194° ~ 248°F). Bring the case up to proper temperature slowly. Use an oven.

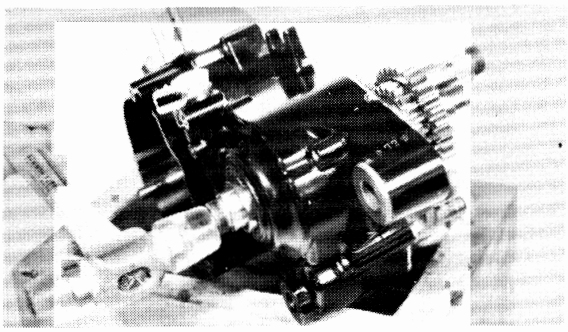
2. Check oil seal lips for damage or wear. Replace as required.
3. Always replace crankshaft oil seals whenever the crankshaft is removed.

4. Install bearing(s) and oil seal(s) with their manufacturer marks or numbers facing outward. Before installation, apply grease to oil seal lip(s) and bearing(s).



Transmission

1. Remove drive sprocket nut, lock washer, sprocket and collar.
2. Tap lightly on the transmission drive shaft with a soft hammer to remove.

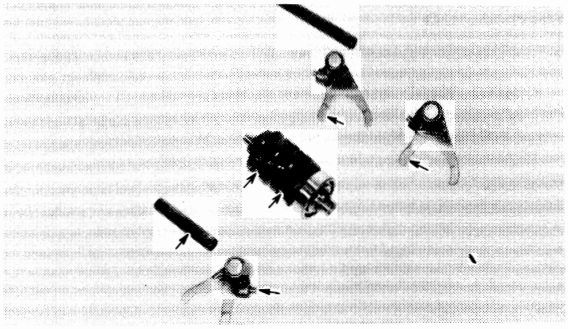


NOTE:

Remove assembly carefully. Note the position of each part. Pay particular attention to the location and direction of shift forks.

Inspection

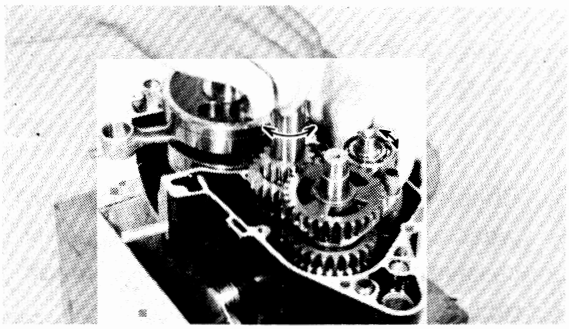
1. Inspect each shift fork for signs of galling on gear contact surfaces. Check for bending. Make sure each fork slides freely on its guide bar.
2. Roll the guide bars across a surface plate. If any bar is bent, replace.

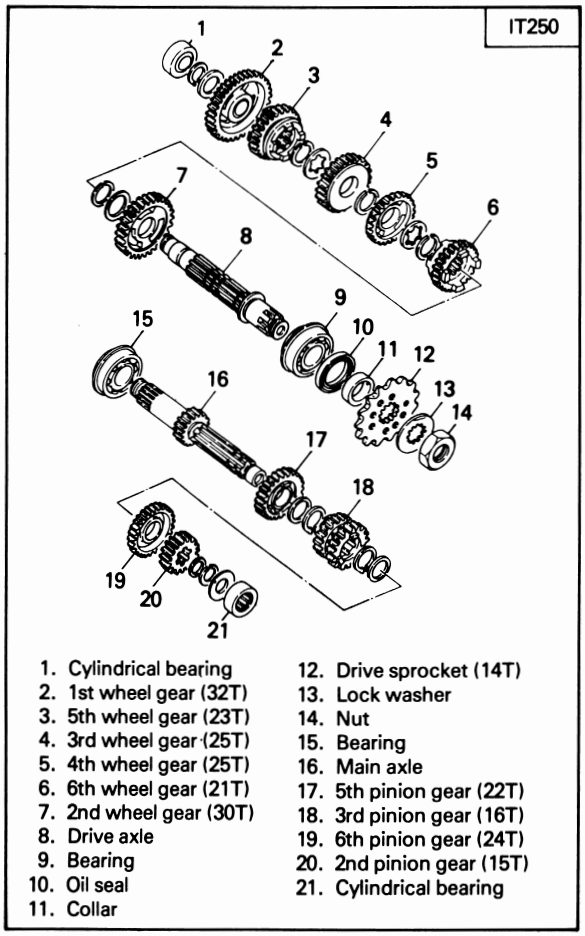


3. Check the shift cam grooves for signs of wear or damage. If any profile has excessive wear and/or any damage, replace cam.
4. Check the cam followers on each shift fork for wear. The follower should fit snugly into its seat in the shift fork, but should not be overly tight. Check the ends that ride in the grooves in the shift cam. If they are worn or damaged, replace.
5. Check shift cam dowel pins and side plate for looseness, damage, or wear. Repair as required, or replace.
6. Check the shift cam stopper plate, circlip, stopper for wear.
7. Check the transmission shafts using a centering device and dial gauge. If any shaft is bent, replace.
8. Carefully inspect each gear. Look for signs of obvious heat damage (blue discoloration). Check the gear teeth for signs of pitting, galling, or other extreme wear. Replace as required.
9. Check to see that each gear moves freely on its shaft.
10. Check to see that all washers and clips are properly installed and undamaged. Replace bent or loose clips and bent washers.
11. Check to see that each gear properly engages its counterpart on the shaft. Check the mating dogs for rounded edges, cracks, or missing portions. Replace as required.

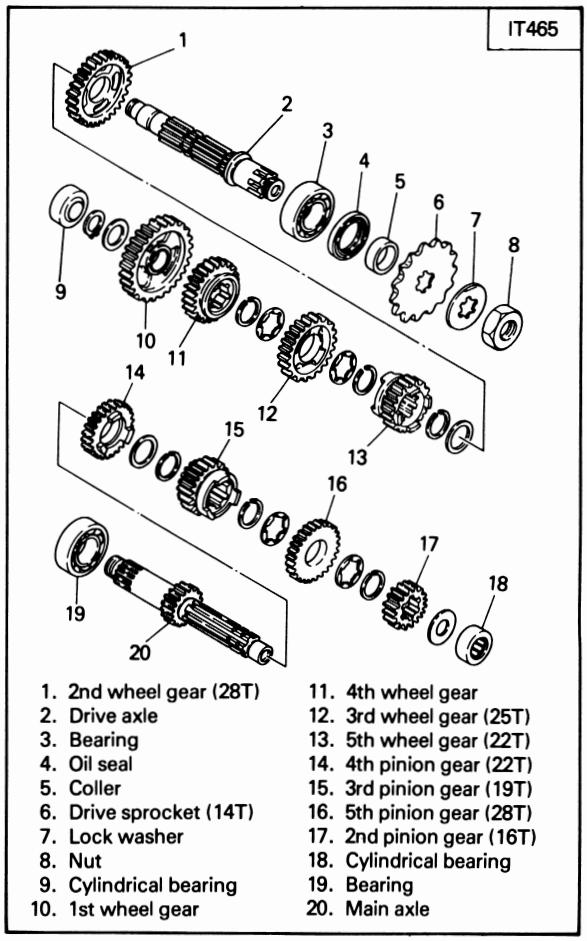
Installation

1. Check to see that all parts move freely and that all loose shims are in place. Make sure all shafts are fully seated.

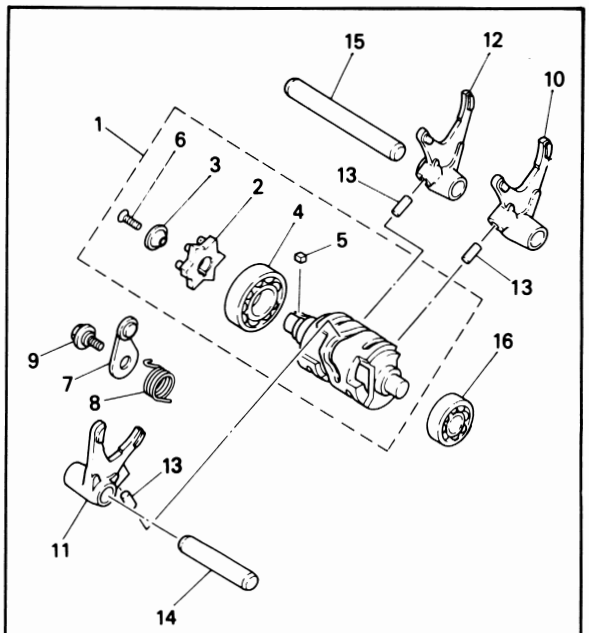




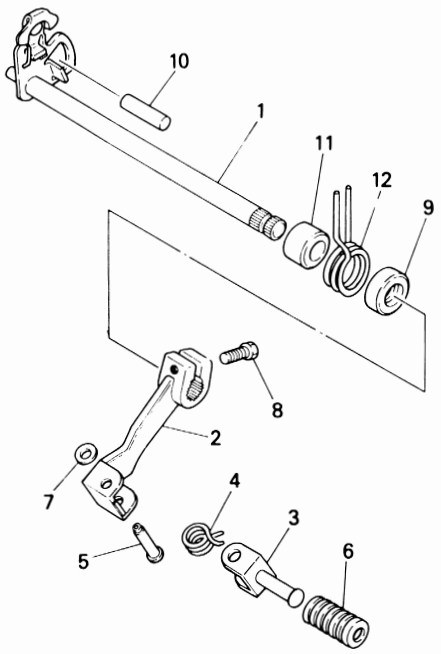
1. Cylindrical bearing
2. 1st wheel gear (32T)
3. 5th wheel gear (23T)
4. 3rd wheel gear (25T)
5. 4th wheel gear (25T)
6. 6th wheel gear (21T)
7. 2nd wheel gear (30T)
8. Drive axle
9. Bearing
10. Oil seal
11. Collar
12. Drive sprocket (14T)
13. Lock washer
14. Nut
15. Bearing
16. Main axle
17. 5th pinion gear (22T)
18. 3rd pinion gear (16T)
19. 6th pinion gear (24T)
20. 2nd pinion gear (15T)
21. Cylindrical bearing



1. 2nd wheel gear (28T)
2. Drive axle
3. Bearing
4. Oil seal
5. Coller
6. Drive sprocket (14T)
7. Lock washer
8. Nut
9. Cylindrical bearing
10. 1st wheel gear
11. 4th wheel gear
12. 3rd wheel gear (25T)
13. 5th wheel gear (22T)
14. 4th pinion gear (22T)
15. 3rd pinion gear (19T)
16. 5th pinion gear (28T)
17. 2nd pinion gear (16T)
18. Cylindrical bearing
19. Bearing
20. Main axle



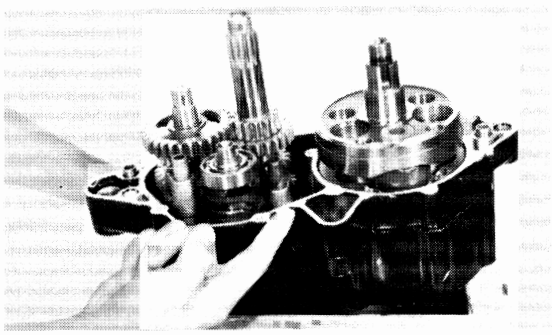
1. Shift cam assy
2. Segment
3. Side plate
4. Bearing
5. Straight key
6. Flat head screw
7. Stopper lever assy
8. Torsion spring
9. Stopper bolt
10. Shift fork
11. Shift fork
12. Shift fork
13. Dowel pin
14. Shift fork guide bar
15. Shift fork guide bar
16. Bearing (B6201)



1. Shift shaft assy
2. Shift pedal
3. Shift pedal
4. Torsion spring
5. Pin
6. Shift pedal cover
7. Plate washer
8. Bolt
9. Oil seal
10. Dowel pin
11. Spacer
12. Torsion spring

Reassembling

1. Apply YAMAHA BOND #4 to the mating surfaces of both case halves.



NOTE:

a. Do not tap on machined surface or end of crankshaft.
b. Before installing the crankshaft, check the crankshaft O-ring for damage.

2. After reassembly, apply a liberal coating of two-stroke oil to the crank pin and bearing and into each crankshaft bearing oil delivery hole.
3. Check crankshaft and transmission shafts for proper operation and freedom of movement.

Mounting

1. Install engine mounting bolts and nuts with proper tightening torque.

Bolt		Tightening Torque
Front	Bracket to frame	3.0 m-kg (22 ft-lb)
	Bracket to engine	3.0 m-kg (22 ft-lb)
Center, Lower		3.0 m-kg (22 ft-lb)

Pivot shaft nut:
8.0 m-kg (58 ft-lb)

2. Install drive sprocket.

Drive sprocket nut torque:
7.5 m-kg (54 ft-lb)

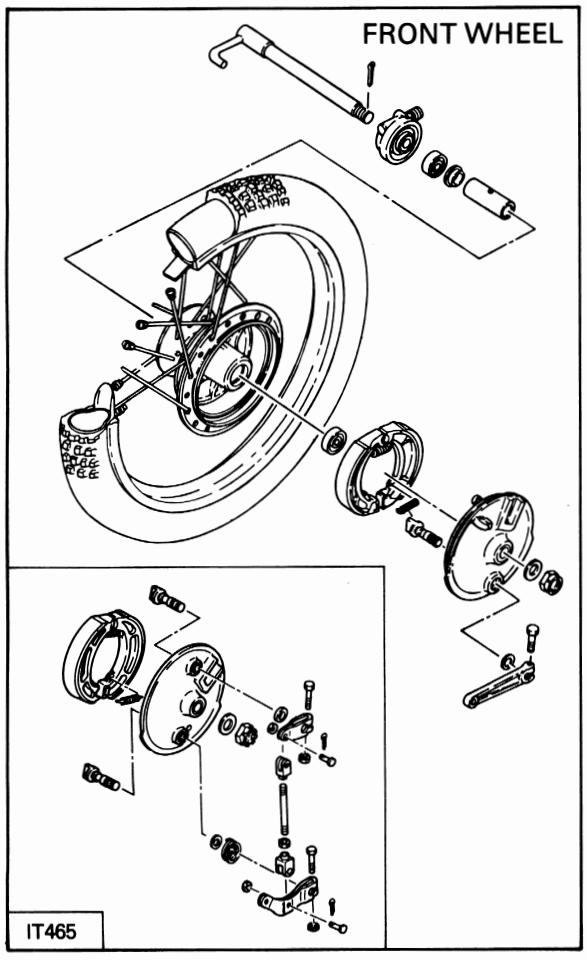
3. Install flywheel magneto.

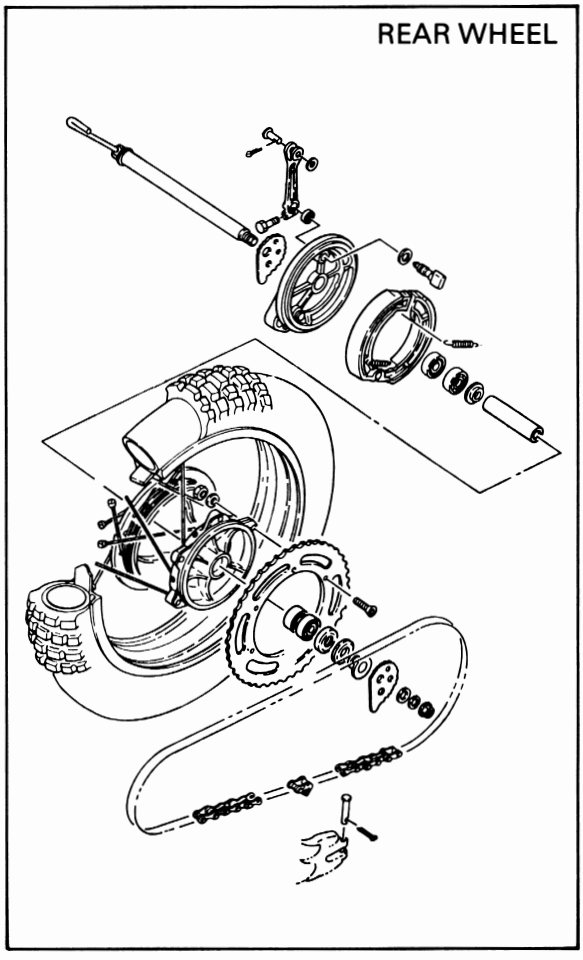
Rotor nut torque: 8.0 m-kg (58 ft-lb)

5 CHASSIS MAINTENANCE AND REPAIR

5 CHASSIS MAINTENANCE AND REPAIR

Whenever performing chassis work, always take extra care and double-check each step of each procedure. The wheels, brakes, suspension, steering, and frame must all be in top condition to provide optimum performance, reliability, and safety.





Front wheel removal

1. Elevate the front wheel by placing a suitable stand under the engine.
2. Remove brake cable: Loosen all cable adjuster screws and remove cable from handle lever holder. Then remove cable from cam lever at front brake shoe plate.
3. Loosen front axle pinch bolts.
4. Remove the front wheel axle.
5. Remove the front wheel assembly.

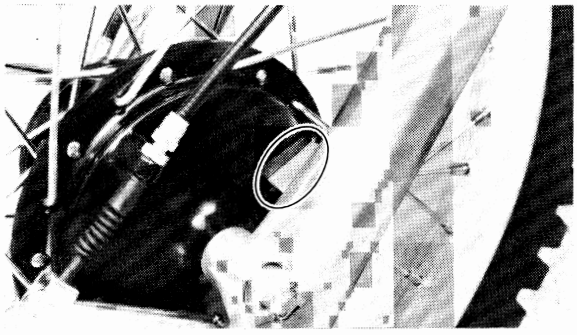
Rear wheel removal

1. Elevate the rear wheel by placing a suitable stand under the engine.
2. Remove the brake rod from the brake shoe plate. The brake rod can be removed by removing the adjuster.
3. Remove the rear wheel axle nut.
4. Pull out the rear wheel axle.
5. Remove the chain from the rear sprocket.
6. Remove the cotter pins (left and right) from clevis pins. Then remove the clevis pins.
7. Remove the rear wheel assembly.

Wheel installation

When installing wheels, reverse the removal procedure taking care of the following points.

1. Lightly smear grease on:
   * The shafts
   * The bearings and oil seal lips
   * The O-ring and dust cover interior for the rear brake shoe plate
2. Check for proper engagement of the boss on the outer tube with the locating slot on the brake shoe plate.



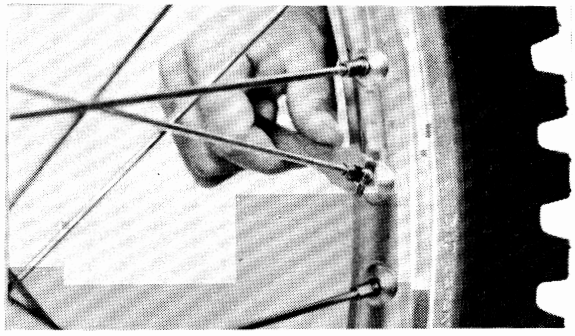
3. Always use a new cotter pins. Old pins should be discarded.
4. Make sure nuts are properly tightened.

Front wheel axle:	6.0 m-kg (43 ft-lb)
Axle holder nut:	1.0 m-kg (7.2 ft-lb)
Rear wheel axle:	10.0 m-kg (72 ft-lb)

5. Be sure to adjust the tension of the chain. (Refer to "Drive chain tension adjustment".)
6. Adjust the plays in the brake lever and pedal.

Rims and spokes

1. Block the wheels off the ground.
2. Spin the wheels and observe the amount of runout.
3. If the runout exceeds 2.0 mm (0.080 in), true the wheels.
4. Tap each spoke with a spoke wrench to determine if any spokes are loose; tighten all loose spokes and replace bent spokes.



5. If a rim is severely "dinged" or bent, replace the rim.

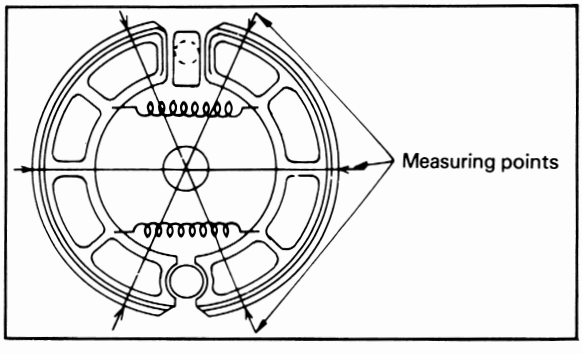
Bearings

1. To inspect the wheel bearings, try to move the wheel sideways in relation to the fork in the front or the frame in the rear. If any movement is felt, the bearings must be replaced.
2. Block the wheels off the ground and spin each wheel. If the wheels do not spin freely with the brakes disengaged, the bearings must be replaced. If bearings need replacement, take the wheels to your Yamaha dealer for this service.

Brake shoe inspection

Measure the outside diameter of the brake shoe set with slide calipers.
If they measure less than replacement limit, replace them. Smooth out any rough spots on shoe surface with sandpaper.

	FRONT	REAR
Brake shoe diameter	130 mm (5.12 in)	150 mm (5.9 in)
Replacement limit	126 mm (4.96 in)	146 mm (5.75 in)

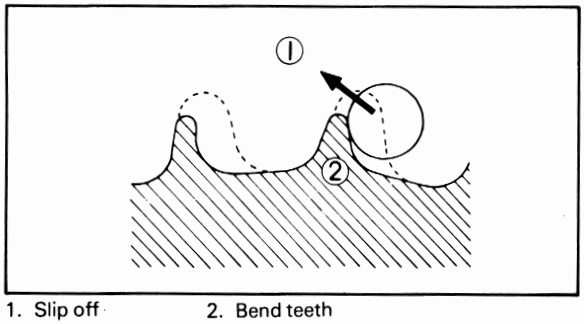


Brake drum

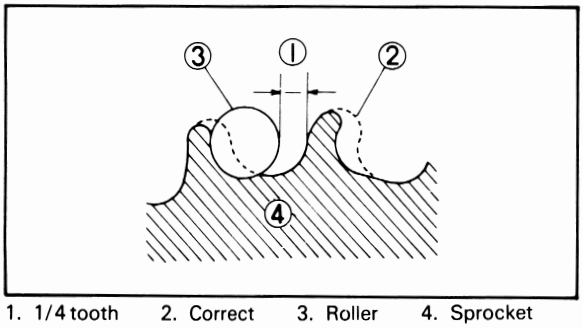
Inspect the brake drum; if there is any oil or dirt on the inner surface, wipe the drum clean with a rag dampened with lacquer thinner or solvent. If the drum is deeply grooved, the drum must be replaced.

Sprockets and chain (Adjustment begins on page 2-12)

1. Inspect the teeth on the rear sprocket; if they are worn as shown in the illustrations below, replace the sprockets and chain as a set.



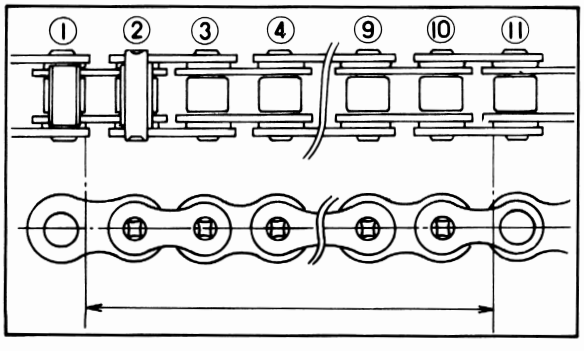
1. Slip off 2. Bend teeth



1. 1/4 tooth 2. Correct 3. Roller 4. Sprocket

2. Wear limit

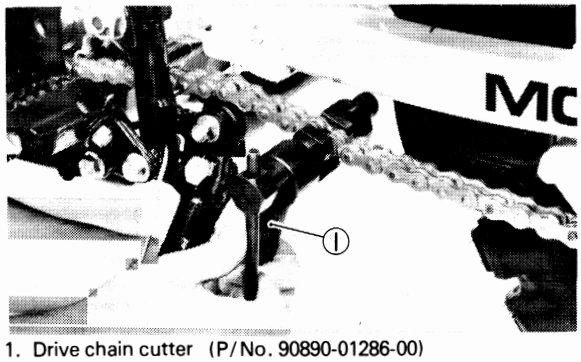
   The wear limit of the drive chain is determined by chain stretch. Measure chain stretch for 10-pitch distance with a vernier caliper as follows.



Wear limit: 150.1 mm (5.91 in)

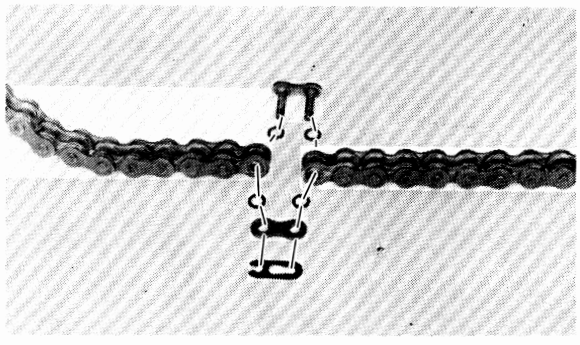
   If the stretch exceeds the wear limit, replace the chain with a new one.

3. To remove or install the chain, the drive chain cutter is required.



1. Drive chain cutter (P/No. 90890-01286-00)

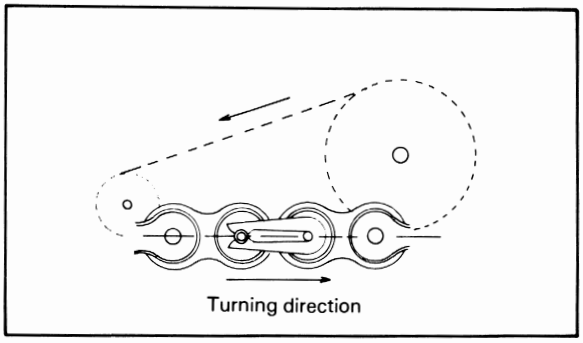
4. When installing, take care of the following instructions:
   a. Always use a new joint. Don't forget to install O-rings.



   b. Check that all link O-rings are installed. If any one of them is missing, replace the chain with a new one.
   c. During reassembly, the master link clip must be installed with the rounded end facing the direction of travel.

NOTE:

The chain should be cleaned and lubricated after every use of the machine.

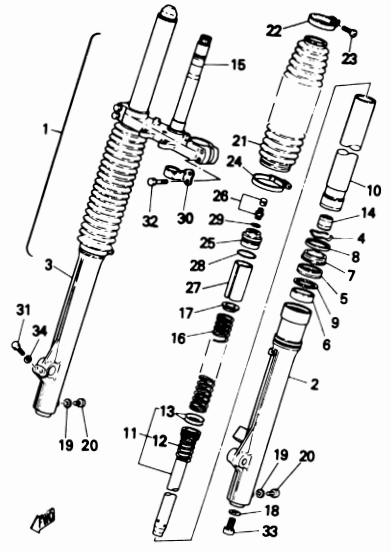


FRONT FORK
(Tuning begins on chapter 3)

To prevent an accidental explosion of air, the following instructions should be observed:

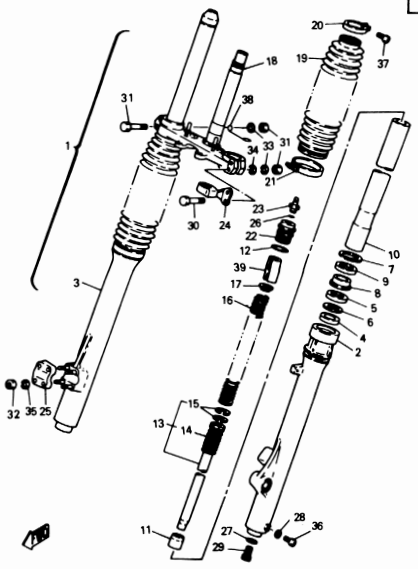
1. **Use only air or nitrogen for filling. Never use any other gas. An explosion may result.**
2. **Never throw the front fork into fire.**
3. **Before removing the front fork, be sure to extract the air from the air chamber completely.**

IT250



1. Front fork assy
2. Outer tube
3. Outer tube
4. Snap ring
5. Oil seal
6. Slide metal
7. Dust seal
8. Dust seal cover
9. Oil seal washer
10. Inner tube comp.
11. Front fork cylinder comp.
12. Sub spring
13. O-ring
14. Taper spidle
15. Under bracket comp.
16. Front fork spring.
17. Spring upper seat
18. Gasket
19. Drain plug gasket
20. Drain plug
21. Boot
22. Band
23. Boot band screw
24. Band
25. Cap bolt
26. Air valve comp.
27. Spacer
28. O-ring
29. O-ring
30. Cable guide
31. Axle holder bolt
32. Bolt
33. Hexagon socket head bolt
34. Spring washer

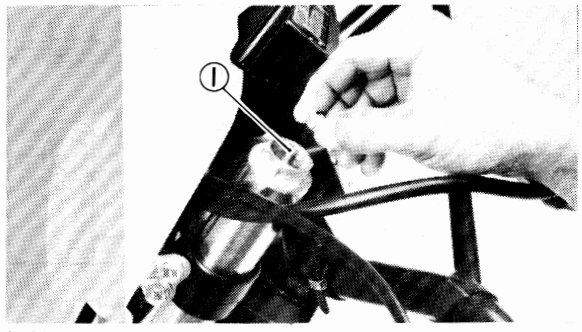
IT465



1. Front fork assy
2. Outer tube
3. Outer tube
4. Slide metal
5. Oil seal
6. Oil seal washer
7. Snap ring
8. Dust seal
9. Dust seal cover
10. Inner tube comp.
11. Taper spindle
12. Gasket
13. Front fork cylinder comp.
14. Rebound spring
15. Piston ring
16. Front fork spring
17. Spring upper seat
18. Under bracket comp.
19. Boot
20. Band
21. Band
22. Cap bolt
23. Air valve comp.
24. Cable guide
25. Axle holder
26. O-ring
27. Gasket
28. Drain plug gasket
29. Hexagon socket head bolt
30. Bolt
31. Nut
32. Nut
33. Spring washer
34. Plate washer
35. Spring washer
36. Drain plug
37. Boot band screw
38. Cable guide
39. Spacer

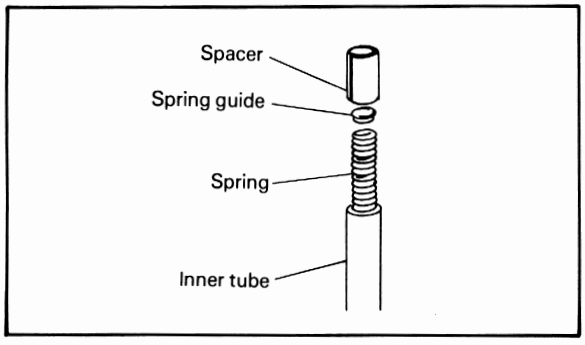
Disassembly and inspection

1. Place the machine on a suitable stand to keep it stable while the front wheel and forks are removed.
2. Remove the valve caps from the top of the fork legs, and depress the air valve to allow the air to escape from the fork legs.

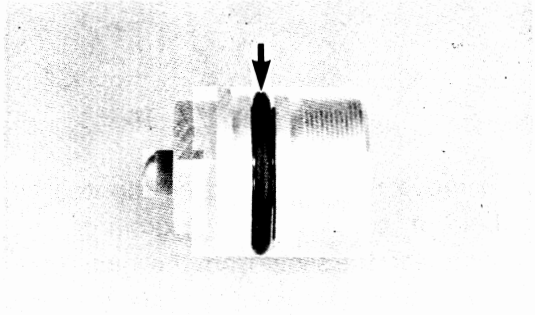


1. Valve

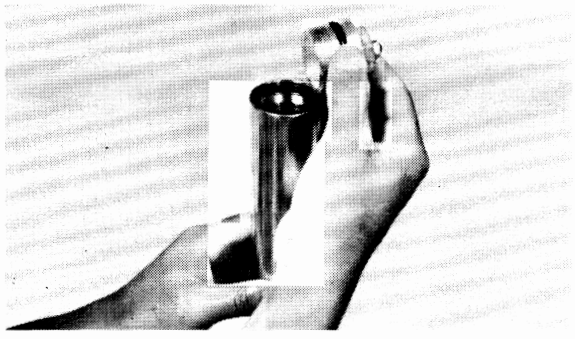
3. Loosen the cap bolts on each fork leg, but do not remove them yet.
4. Remove the front wheel.
5. Loosen the pinch bolts in the triple clamps, and slide the fork legs down and out of the clamps. Perform the following disassembly, and assembly procedures on one fork leg at a time.
6. Remove the cap bolt, spacer, spring guide, and spring from the fork tube.

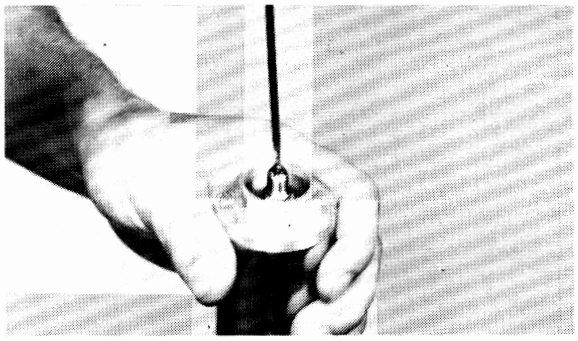


7. Inspect the O-ring on the cap bolt; if it is cut or otherwise damaged, replace the O-ring.

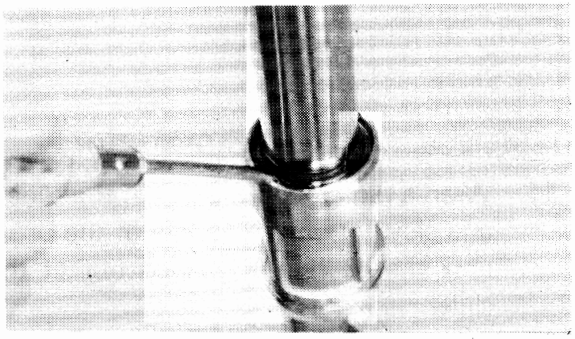


8. The oil seal in the fork leg must be removed hydraulically. Fill the fork completely with fork oil and reinstall the cap bolt. Depress the air valve until oil flows out.





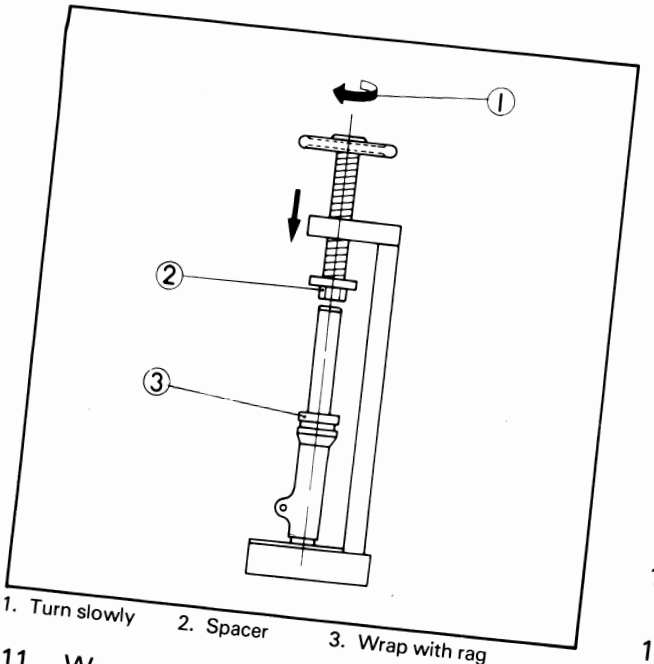
9. Remove the snap ring from the top of the slider.



10. Place a socket on top of the cap bolt, and place the fork leg in a hand press as illustrated. The socket will keep the press from contacting the air valve.

CAUTION:

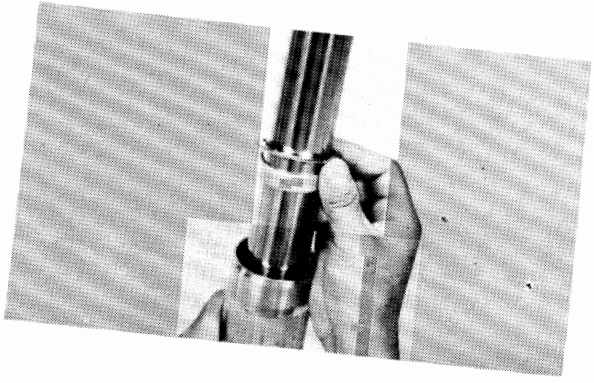
If the inner tube is abruptly contracted or air enters the inner tube, the oil may spurt out or the oil seal may spring out. Never touch the inner tube during disassembling operation. Also wrap the oil seal with a rag for safety.



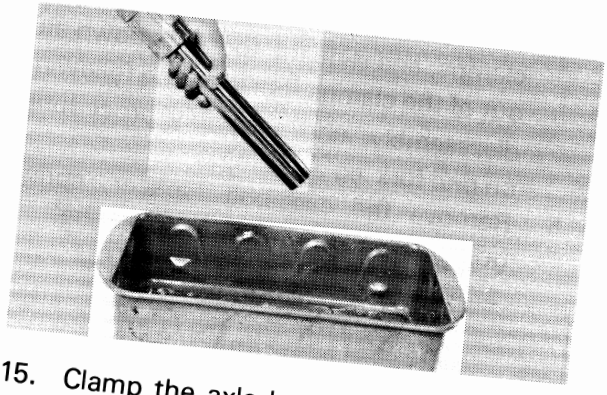
1. Turn slowly 2. Spacer 3. Wrap with rag

11. Wrap a rag around the top of the slider, and slowly turn the handle of the press until the oil seal is pushed out of the slider.
12. Remove the dust seal cover, dust seal, and oil seal. Discard the oil seal, as the seal must always be replaced whenever the fork is disassembled.

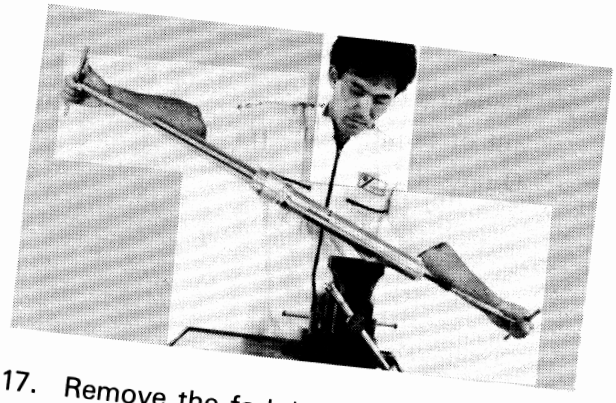
13. Remove the oil seal washer and slide metal, and inspect the slide metal; if it shows excessive wear, replace the slide metal.



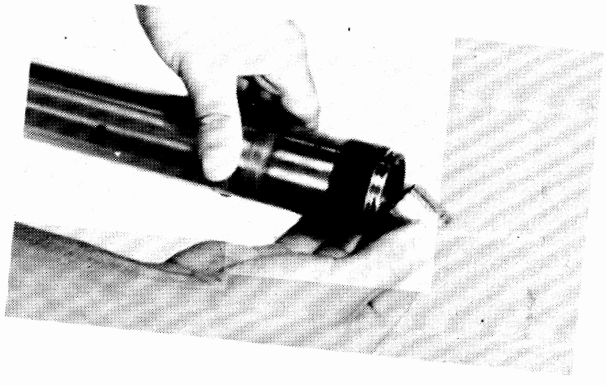
14. Remove the cap bolt and drain the oil into a drain pan; pump the fork to remove all the oil.

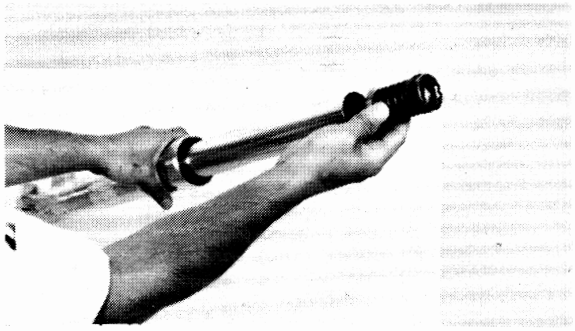


15. Clamp the axle lug in a vise, and push the inner tube all the way into the slider.
16. Use the damping-cylinder holding tool to remove the holding bolt from the bottom of the slider.



17. Remove the fork leg from the vise and hold it parallel to the ground while removing the slider from the inner tube.
18. Remove the tapered spindle from the end of the inner tube, and tilt the inner tube to allow the damping cylinder to slide out of the other end. Be sure to prevent the cylinder from dropping on the ground.



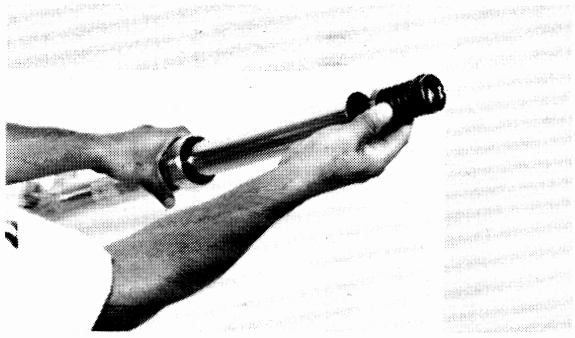


19. Inspect the O-rings on the damping cylinder, and replace them if they are damaged.
20. Inspect the bushing on the bottom end of the inner tube; if it is excessively worn, replace the inner tube.

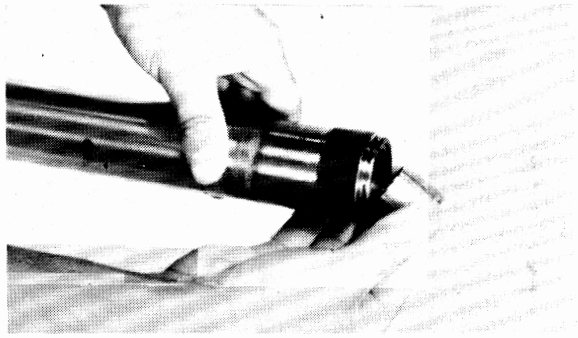
Reassembly

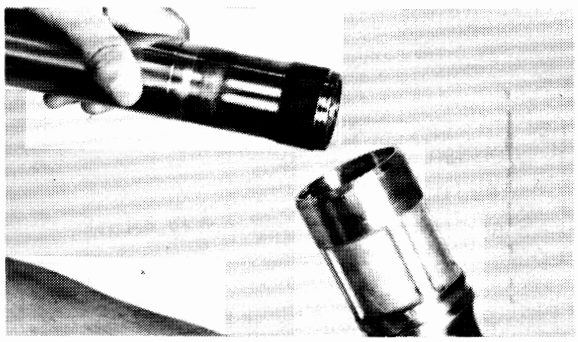
The assembly procedure is the reverse of the disassembly procedure.

1. Make sure all components are clean before assembly. Always install a new fork seal. Do not re-use a seal.
2. Hold the inner tube parallel to the ground, and insert the damping cylinder into the tube. Tilt the tube slightly to allow the cylinder to slide slowly down to the end of the tube. Do not hold the inner tube vertically while inserting the damping cylinder, as the cylinder and valve might be damaged.



3. While holding the inner tube parallel to the ground, install the tapered spindle on the damping cylinder and install the slider on the inner tube. Screw the holding bolt into the bottom of the slider, but do not tighten it at this time.





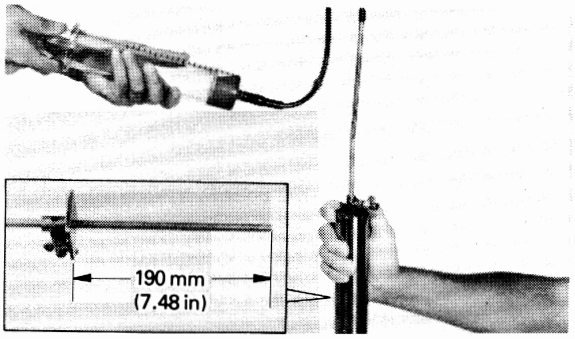
4. Clamp the axle lug of the fork leg into a vise so the fork leg is vertical.
5. Install the slide metal, oil seal washer, and oil seal. Carefully tap around the oil seal until it is at the proper depth in the slider.
6. Install the dust seal, dust seal cover, and snap ring.
7. Remove the holding bolt from the bottom of the slider, apply Loctite to the threads of the bolt, and reinstall the bolt.
8. Using the damping-cylinder holding tool, torque the holding bolt to specification.

Holding bolt torque:
4.0 m-kg (28 ft-lb)

9. Pour 415 cc (14.0 oz) of fork oil into the fork leg, and pump the inner tube up and down to remove all air from the valving mechanism.

Recommended oil:
Yamaha fork oil 10 wt or
SAE #10 motor oil

10. Use the fork oil level tool to attain the proper oil level with the tube pushed down.



Standard oil quantity:
423 cc (14.3 oz)
Standard oil level: 190 mm (7.48 in)

11. Pull the inner tube all the way up, and install the fork spring, spring guide, spacer, and cap bolt. Torque the cap bolt to specification.

Cap bolt torque:
2.3 m-kg (16.5 ft-lb)

12. Install the fork boot and boot bands.
13. Check the air pressure in the fork, and set it to specification.

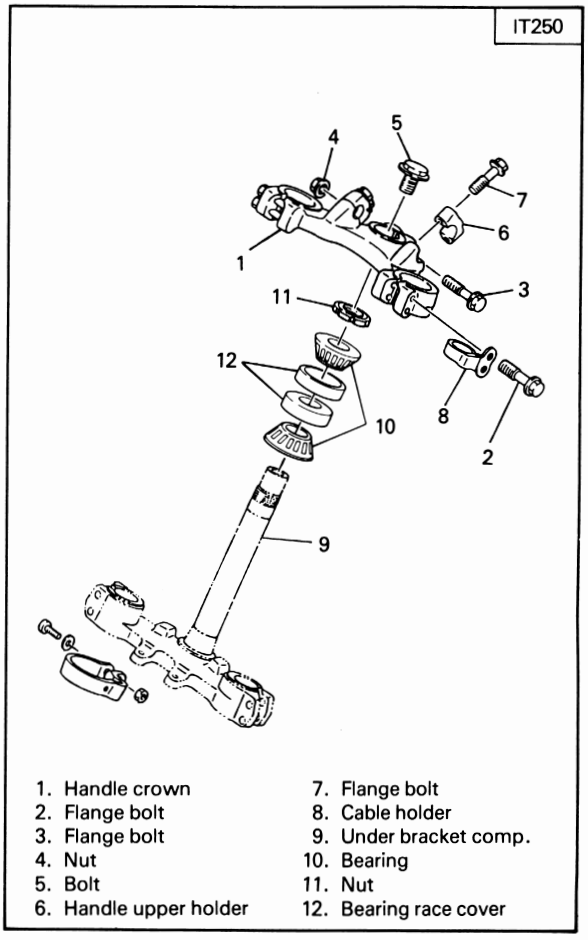
Standard fork air pressure:
0.0 kg/cm² (0.0 psi)

14. Install the fork legs in the triple clamps, and torque the pinch bolts to specification.

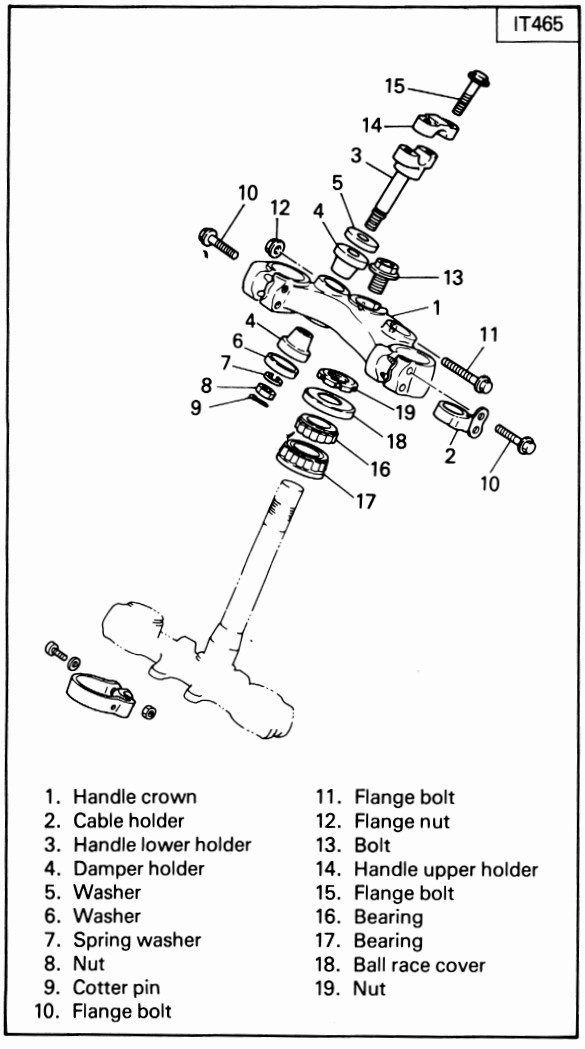
Pinch bolt torque:
2.3 m-kg (16.5 ft-lb)

15. Reinstall the front wheel, taking care to compress the forks several times before tightening the axle pinch bolts; this will center the fork legs properly on the axle.

STEERING HEAD



1. Handle crown
2. Flange bolt
3. Flange bolt
4. Nut
5. Bolt
6. Handle upper holder
7. Flange bolt
8. Cable holder
9. Under bracket comp.
10. Bearing
11. Nut
12. Bearing race cover



1. Handle crown
2. Cable holder
3. Handle lower holder
4. Damper holder
5. Washer
6. Washer
7. Spring washer
8. Nut
9. Cotter pin
10. Flange bolt
11. Flange bolt
12. Flange nut
13. Bolt
14. Handle upper holder
15. Flange bolt
16. Bearing
17. Bearing
18. Ball race cover
19. Nut

Inspection

1. Wash the bearings in solvent.
2. Inspect the bearings for pitting or other damage. Replace the bearings if pitted or damaged. Replace the races when bearings are replaced.
3. Clean and inspect the bearing races. If races are damaged, replaces the races and bearings.
4. Install the bearings in the races. Spin the bearings by hand. If the bearings hang up or are not smooth in their operation in the races, replace bearings and races.

REAR SHOCK (Tuning begins on page 3-3 of chapter 3.)

WARNING:

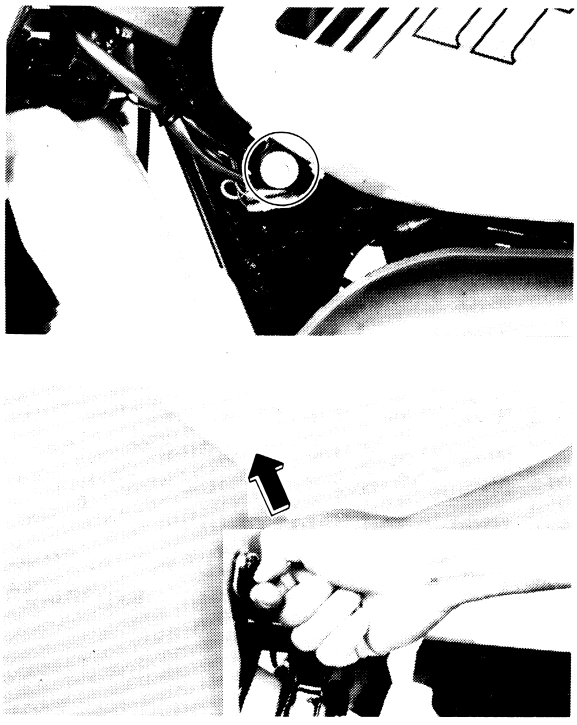
This shock absorber is provided with a separate type tank filled with high-pressure nitrogen gas. To prevent the danger of explosion, read and understand the following information before handling the shock absorber.

The manufacturer can not be held responsible for property damage or personal injury that may result from improper handling.

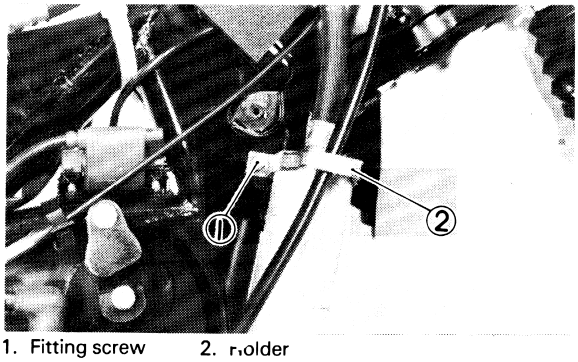
1. **Never tamper or attempt to disassemble the cylinder or the tank. Never tamper with the nut securing the hose to the cylinder assembly; otherwise, oil will spurt from the cylinder due to the high pressure in the nitrogen gas tank.**
2. **Never throw the shock absorber into an open flame or other high heat. The shock absorber may explode as a result of nitrogen gas expansion and/or damage to the hose.**
3. **Be careful not to damage any part of the gas tank. A damaged gas tank will impair the damping performance or cause a malfunction.**
4. **Use care not to damage any part of the hose. Any break in the hose may result in a spurt of oil under high-pressure.**
5. **Take care not to scratch the contact surface of the piston rod with the cylinder; or oil could leak out.**
6. **Never attempt to remove the plug at the bottom of the nitrogen gas tank. It is very dangerous to remove the plug.**
7. **When scrapping the shock absorber, follow the instructions on disposal.**

Removal and installation

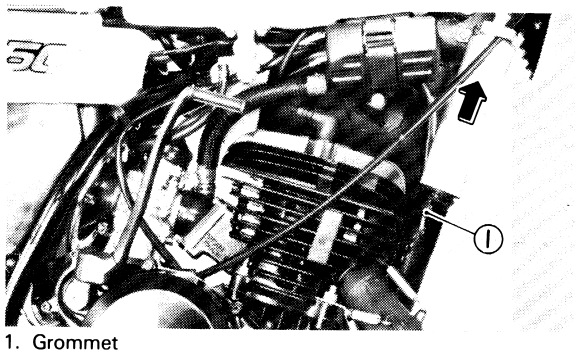
1. To remove the shock absorber, first place the machine on a suitable stand to keep the bike stable.
2. Remove the seat and fuel tank; be sure to remove the YEIS air chamber from beneath the fuel tank, and turn the petcock off before removing the fuel line.



3. Remove the clamp holding the top of the remote shock reservoir to the frame, and pull the reservoir out of the grommet.

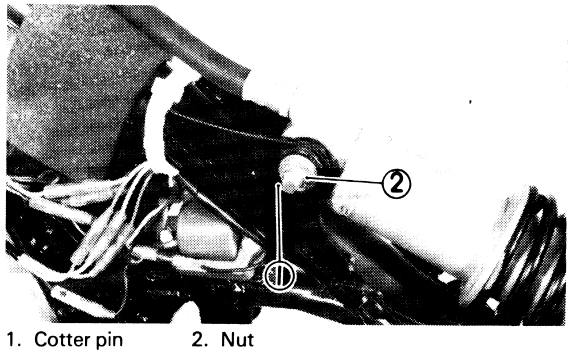


1. Fitting screw 2. Holder



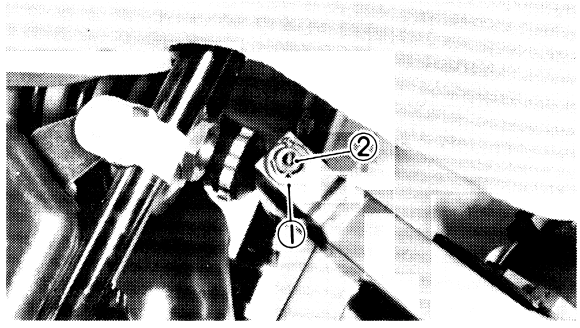
1. Grommet

4. Remove the cotter pin and nut holding the upper securing bolt to the frame, and remove the bolt.



1. Cotter pin 2. Nut

5. Remove the cotter pin and washer from the lower shock pivot pin, and remove the pin; take care not to lose the thrust washers.



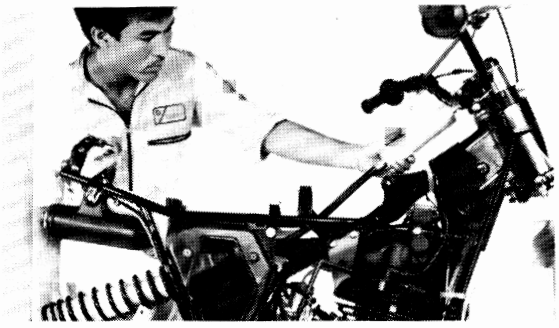
1. Cotter pin 2. Washer

6. Remove the shock absorber from the frame.

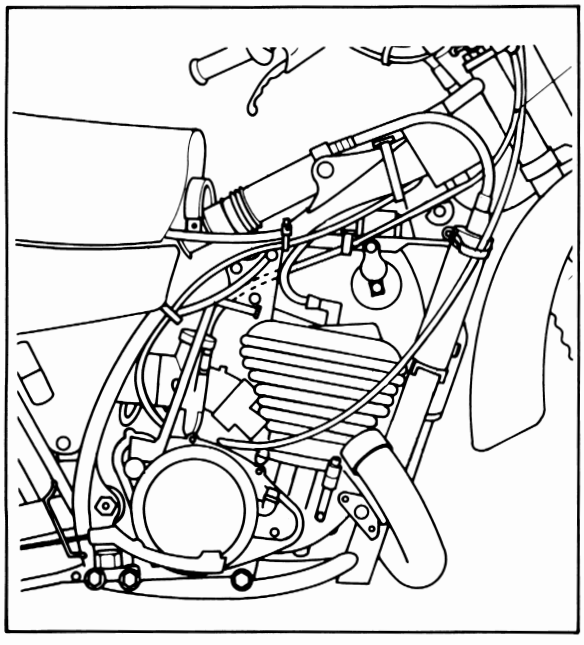
NOTE:

When removing the shock absorber, take the following precautions:

a. Take care not to damage the gas tank.
b. Do not damage the rubber hose.



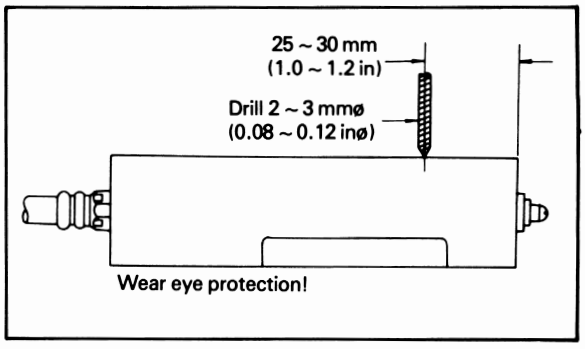
7. For assembly, reverse the procedure for disassembly while taking the following precautions:
   a. Be sure that the shock absorber is installed as illustrated.



   b. Installing the shock absorber, make sure the locating damper is securely in place.
   c. Always use a new cotter pin.
   d. Grease the PIN and thrust washer.
   e. Tighten the nut to specification.

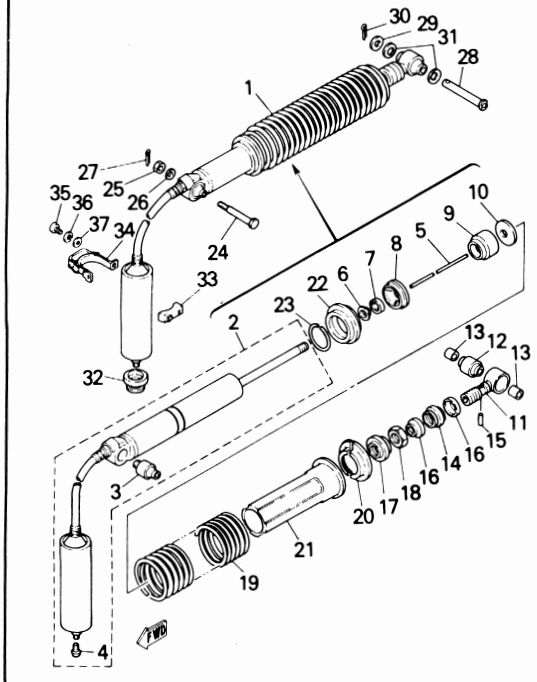
Upper bolt: 3.0 m-kg (22 ft-lb)

Notes on disposal (Yamaha dealers only)
Before disposing the shock absorber, be sure to extract the nitrogen gas. To do so, drill a 2 or 3 mm (0.08 ~ 0.12 in) hole through the tank at a position 25 ~ 30 mm (1.0 ~ 1.2 in) from the bottom end of the tank. At this time, wear eye protection to prevent eye damage from escaping gas and/or metal chips.



WARNING:

To dispose of a damaged or worn-out shock absorber, take the unit to your Yamaha dealer for this disposal procedure.

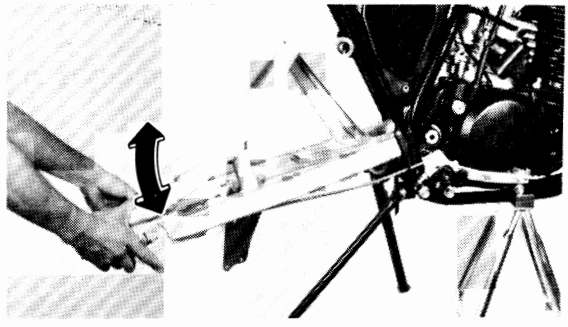


1. Rear shock absorber assy
2. Damper sub assy
3. Rear shock absorber bush
4. Pan head screw
5. Push rod
6. Dust seal
7. Seal ring housing
8. Case cap
9. Stop bumper
10. Bump stop support
11. Upper bracket sub assy
12. Shock absorber lower bush
13. Solid bush
14. Adjusting nut
15. Dowel pin
16. Cover
17. Spring upper seat
18. Nut
19. Spring
20. Spring guide
21. Spring guide
22. Spring lower seat
23. Circlip
24. Bolt
25. Nut
26. Plate washer
27. Cotter pin
28. Clevis pin
29. Plate washer
30. Cotter pin
31. Thrust cover
32. Grommet
33. Sub tank damper
34. Sub tank holder
35. Pan head screw
36. Spring washer
37. Washer
38. Wave washer

SWINGARM

Inspection

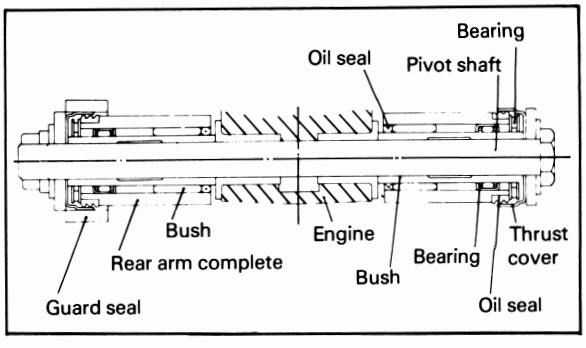
1. To check the swingarm bearings, remove the rear wheel and disconnect the shock from the swingarm.
2. Grasp the ends of the swingarm and try to move the arm sideways; if the free play exceeds tolerance, remove the swingarm and take it to your Yamaha dealer for bearing replacement.



Swingarm free play:
0 ~ 1 mm (0 ~ 0.04 in)

3. Closely inspect the swingarm for cracks or other damage, and repair or replace it as required.
4. When reinstalling the swingarm, be sure to grease the bearings, bushings, and oil seal lips.
5. Grease the pivot shaft, install it and its nut, and torque the nut to specification.

Pivot shaft nut torque:
8.0 m-kg (58.0 ft-lb)

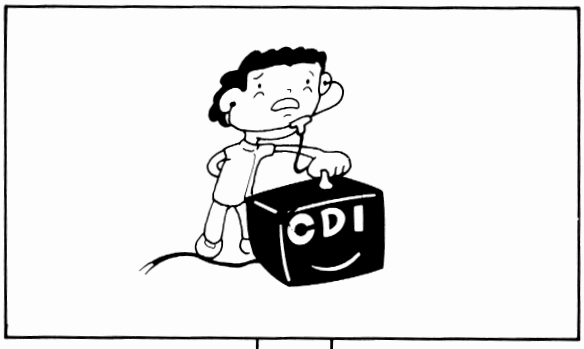


6 ELECTRICAL TROUBLESHOOTING

IGNITION SYSTEM

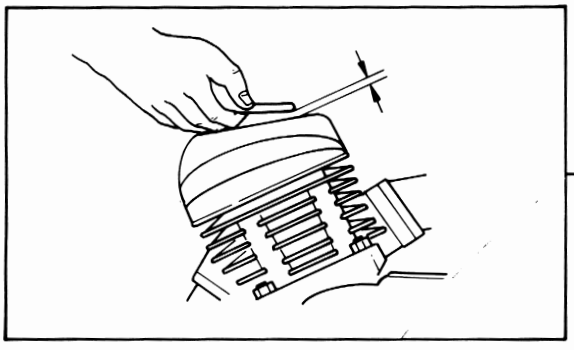
Troubleshooting

If the ignition spark is of poor quality or if there is no spark at all, use the following procedure, to locate and repair the problem.



1 Spark gap test

Remove the spark plug cap and check the spark.



Hold the high tension lead 5 mm (0.20 in) from the head, and kick engine through.

- Good spark
  1. Check plug cap.
  2. Check spark plug.
- No spark

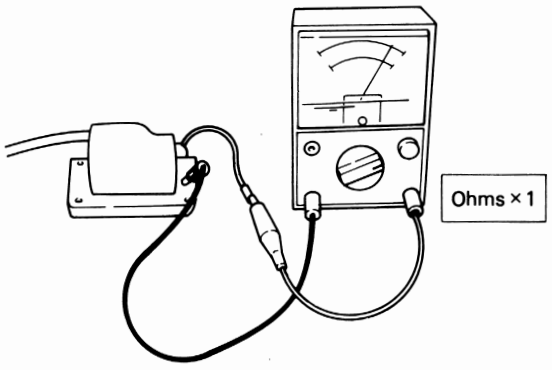
2 Connectors check-up

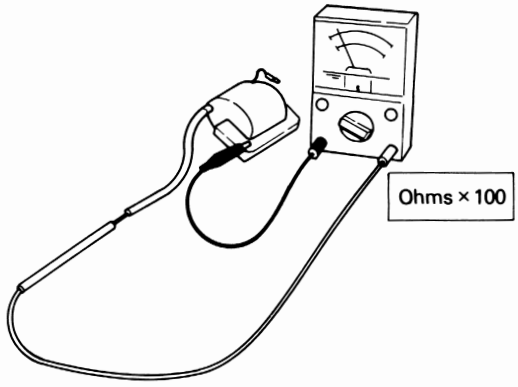
1. Check the connectors and couplers for loseness of joining ends.
2. Keep the connectors and couplers from dirt or rust.
3. Check the engine stop switch and ground lead.

- Poor connection
  - Clean
  - Correct
- OK

3 Ignition coil test

Use the pocket tester to check the resistance of primary and secondary windings of the ignition coil.





Primary coil resistance:
0.6 Ω ± 10%

Secondary coil resistance:
6.2 KΩ ± 20%

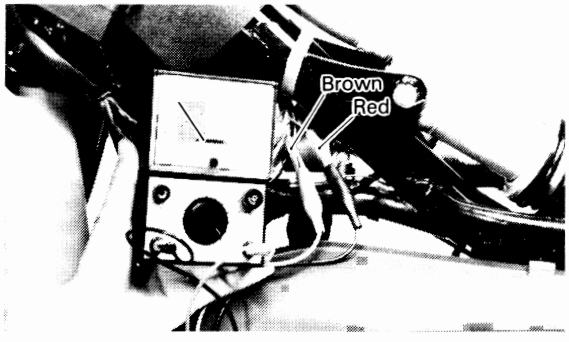
OK

If other than specified

Replace ignition coil

4 C.D.I. Magnet (Charge coil) test

Disconnect the red, and brown leads, and use the pocket tester to check the resistance of the magneto coil.



Red to Brown:
1,470 Ω ± 10%

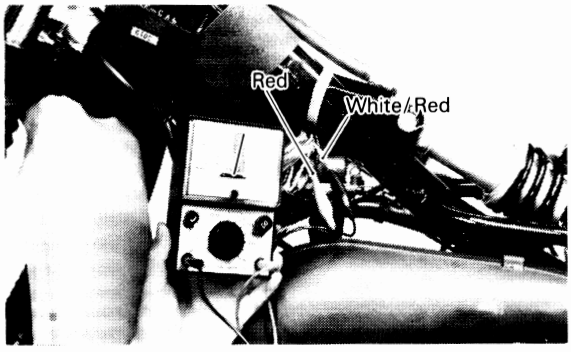
OK

If other than specified

Replace coil and check performance.

5	C.D.I. Magneto (Pulser coil) test

Disconnect the red, white/red leads, and use the pocket tester to check the resistance of the magneto coils.

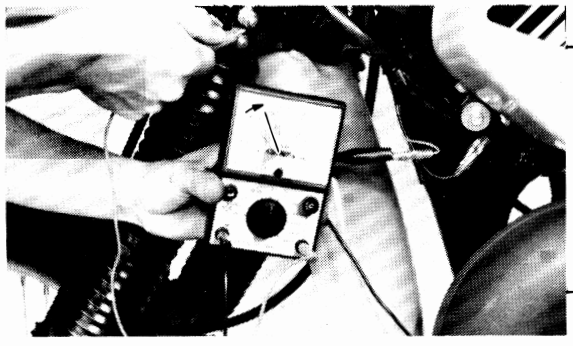


White/Red to Red: 470 Ω ± 10% → OK

If other than specified → Replace coil and check performance.

6	C.D.I. Unit test

Disconnect the orange lead, and connect the pocket lester leads as shown. Check output voltage.



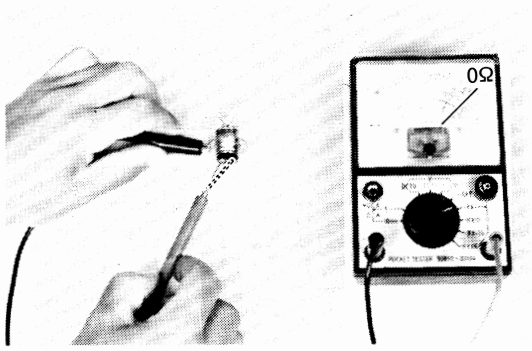
→ OK

If other specified → Replace unit

LIGHTING SYSTEM

1 CHECKING BULB

Check the condition of bulb.

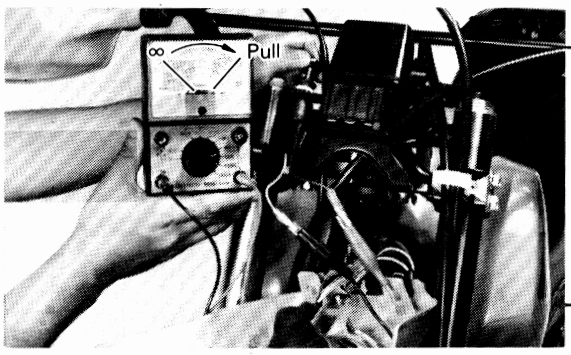


→ OK

→ If burn out or wrong wattage → Replace bulb

2 CHECKING SWITCHES

Check the operation of the switch.



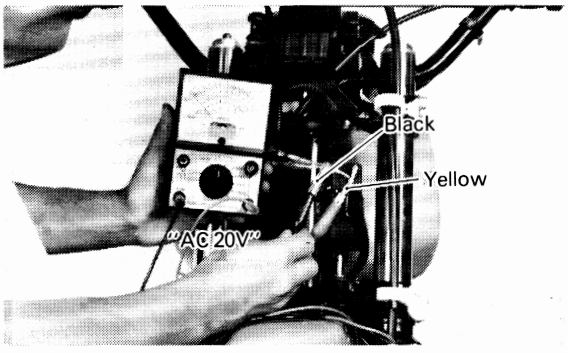
→ OK

→ Broken or no continuily → Replace switch assembly

Connect the pocket tester leads as shown, and check switches for continuity.

3	FLYWHEEL MAGNETO

Check the lighting coil resistance.

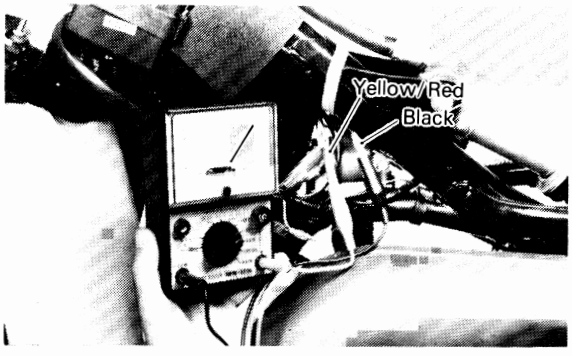


Lighting coil resistance:
0.48 Ω ± 10%
(Yellow/Red to Black)

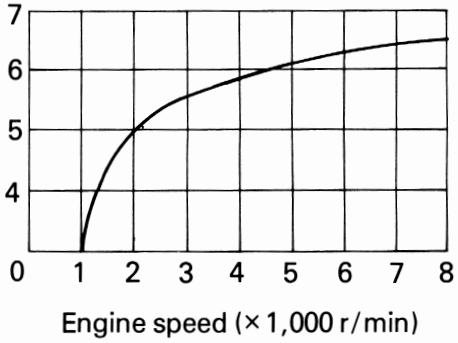
If other than specified → Replace lighting coil

OK

Check the out-put voltage.



Engine speed	Voltage
2,500 r/min	5.0V or more
8,000 r/min	7.0V to 8.0V

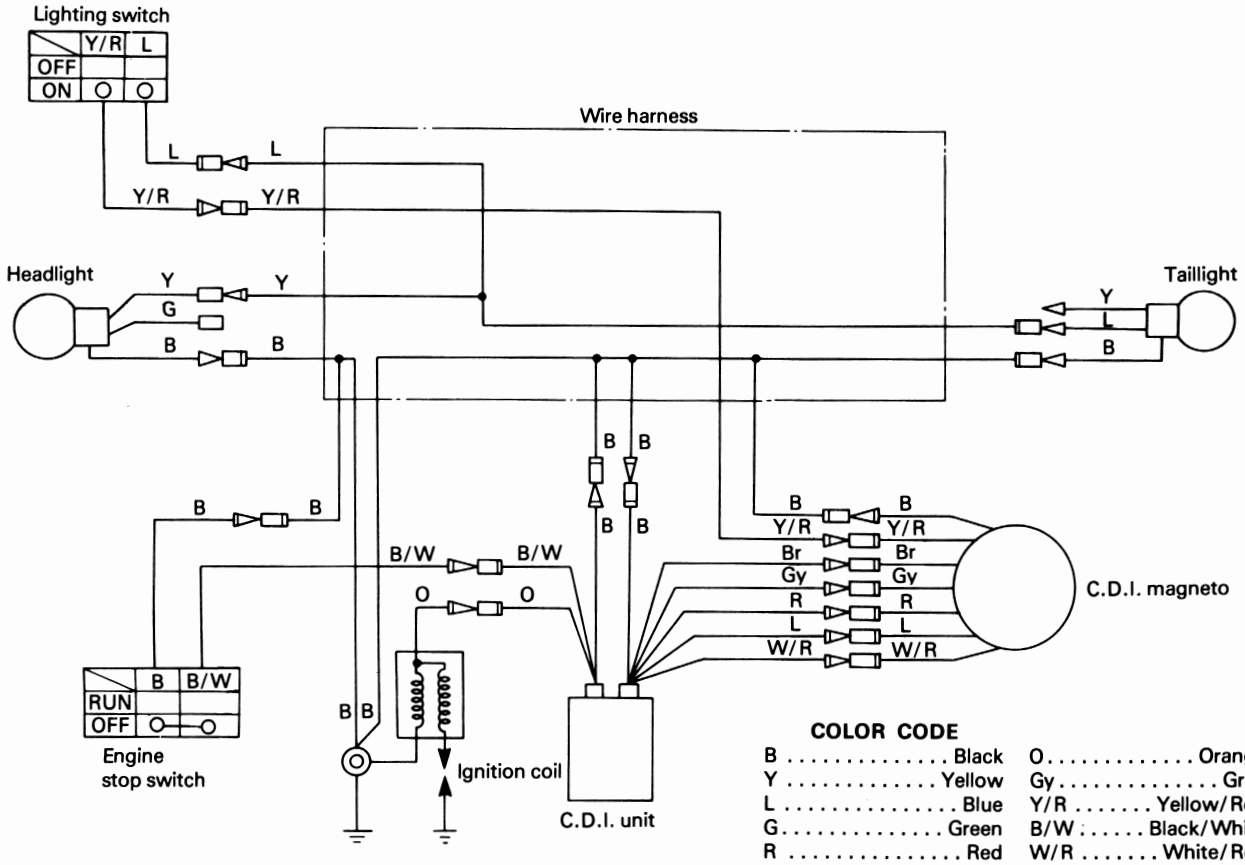


No voltage → Replace Lighting coil

OK

WIRING DIAGRAM

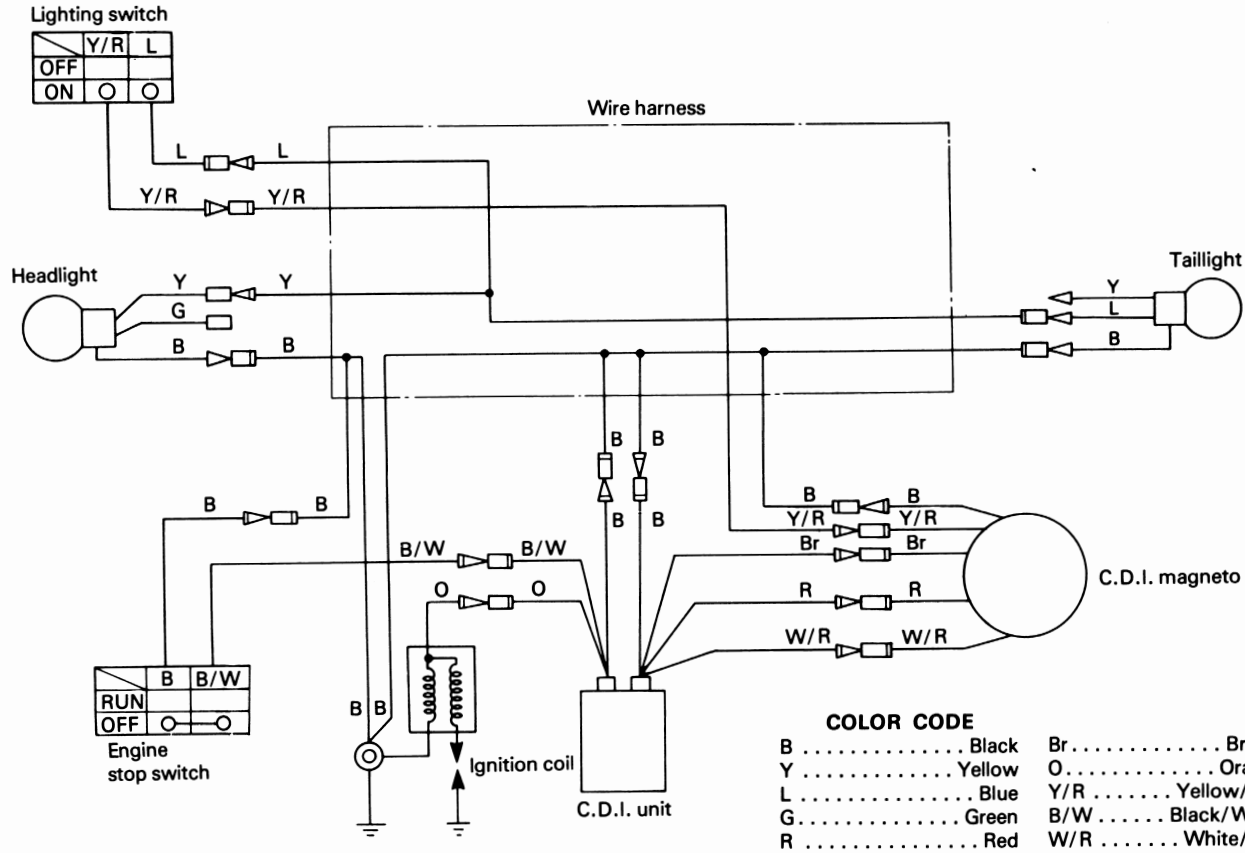
IT250J



COLOR CODE

B	Black	O	Orange
Y	Yellow	Gy	Gray
L	Blue	Y/R	Yellow/Red
G	Green	B/W	Black/White
R	Red	W/R	White/Red
Br	Brown		

IT465J



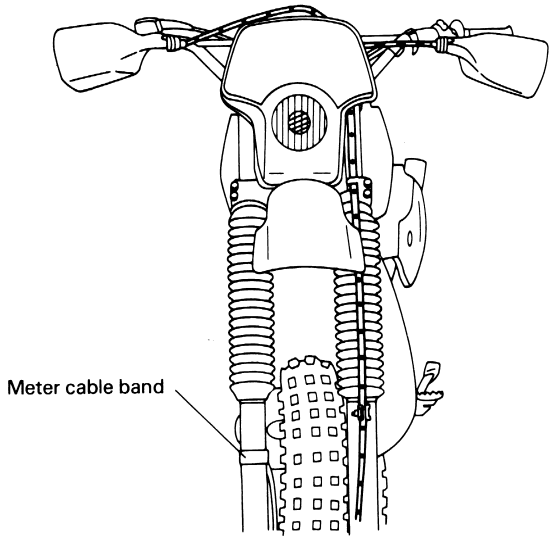
COLOR CODE

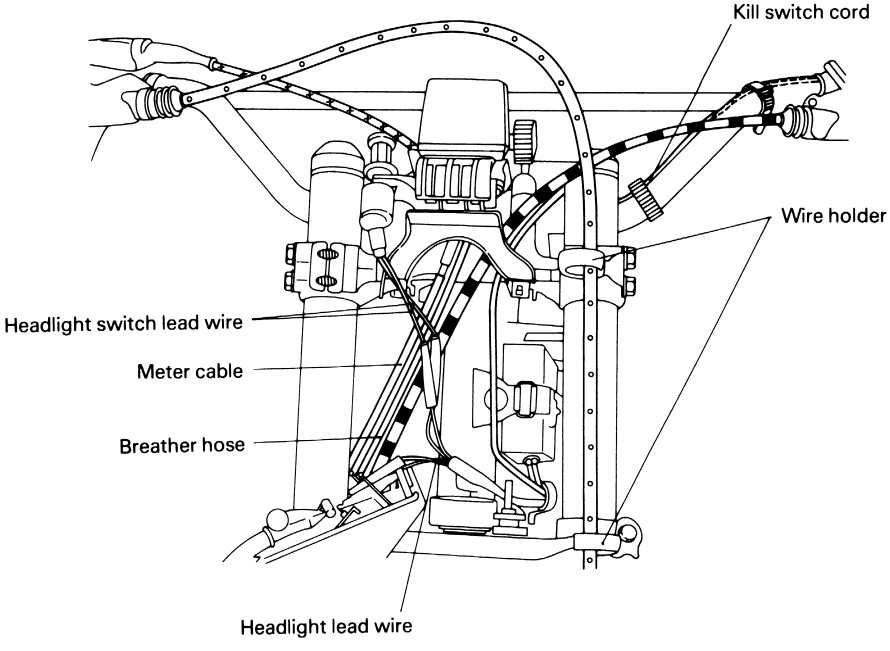
B	Black	Br	Brown
Y	Yellow	O	Orange
L	Blue	Y/R	Yellow/Red
G	Green	B/W	Black/White
R	Red	W/R	White/Red

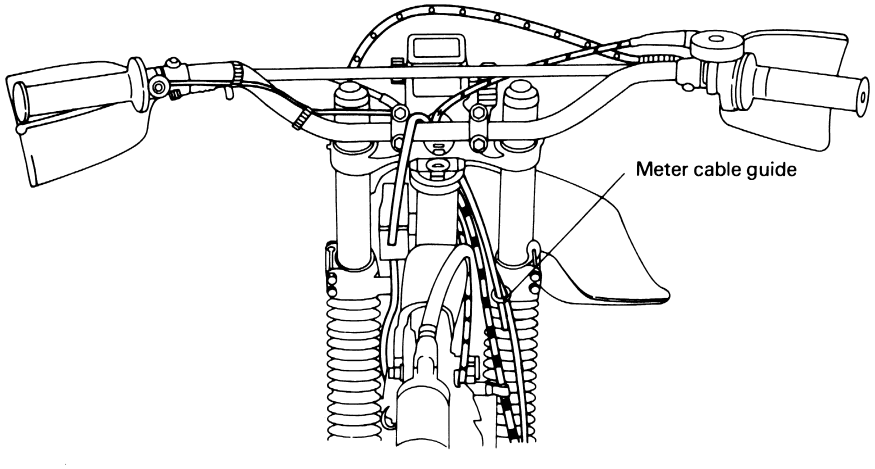
7 APPENDICES

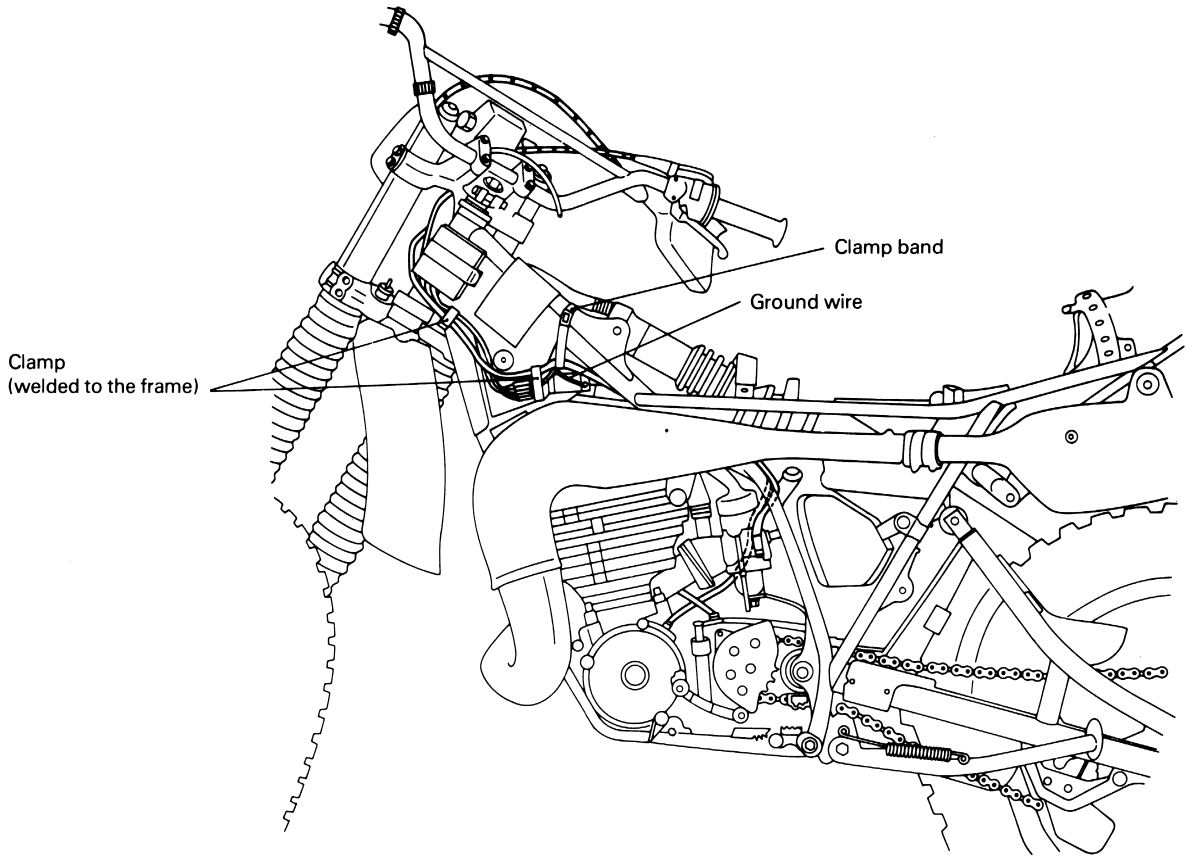
7 APPENDICES

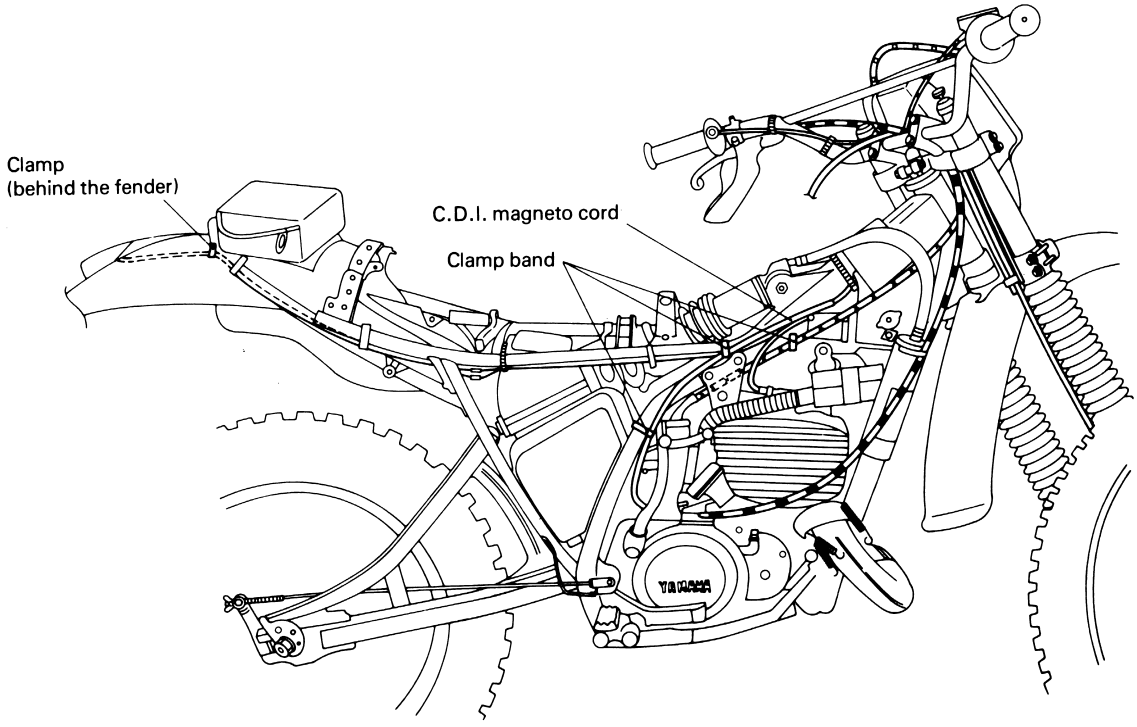
CABLE ROUTING DIAGRAM








Clamp band
Ground wire
Clamp
(welded to the frame)


Clamp
(behind the fender)
C.D.I. magneto cord
Clamp band

TROUBLE SHOOTING GUIDE

Engine *is hard* to start or does not start.

Ignition System	
Possible Cause	Remedy
1. Spark plug is wet.	• Clean or replace
2. Ignition coil is faulty.	• Replace
3. C.D.I. unit is faulty.	• Replace
4. C.D.I. magneto is faulty (Pulser coil, source coil)	• Replace
5. Ignition timing is incorrect.	• Adjust
6. Wire is broken, shorted or disconnected.	• Repair, replace or connect
7. Engine stop switch is shorted.	• Repair or replace
Compression System	
Possible Cause	Remedy
1. Piston rings are sticking or worn.	• Replace
2. Cylinder or piston is worn or scratched.	• Repair or replace
3. Compression leaks passing cylinder head gasket. (Head is distorted.)	• Replace (or repair)
4. Crankshaft side oil seal is faulty.	• Replace
5. Air leaks through crankcase sealing surfaces.	• Repair
Air/Fuel System	
Possible Cause	Remedy
1. Carburetor pilot jet is clogged.	• Clean
2. Fuel petcock or pipe is clogged.	• Clean
3. Float valve is faulty. (Float height is too high or too low.)	• Replace (remove gasoline from crankcase)
4. Reed valve is broken or deformed.	• Replace
5. Fuel tank filler cap or carburetor breather pipe is clogged.	• Clean
6. Air screw is improperly adjusted.	• Adjust
7. Fuel is deteriorated.	• Replace
8. Oil-gas mixing ratio is incorrect.	• Replace
9. Air leakes through carburetor joints.	• Retighten or replace gasket

Poor high speed performance

Ignition System	
Possible Cause	Remedy
1. Spark plug is dirty or plug gap is too narrow.	• Clean, repair or replace
2. C.D.I. unit is faulty.	• Replace
3. C.D.I. magneto is faulty.	• Replace
4. Ignition coil is faulty.	• Replace
5. Ignition timing is incorrect.	• Adjust
6. Loose wire connection.	• Repair
Compression System	
Possible Cause	Remedy
1. Piston rings are sticking or worn.	• Replace
2. Cylinder or piston is worn or scratched.	• Repair or replace
3. Compression leakage through crankcase sealing surfaces or crankshaft side oil seal.	• Repair or replace
4. Carbon deposits in combustion chamber (Piston, Cylinder head).	• Decarbonize
Air/Fuel System	
Possible Cause	Remedy
1. Clogged carburetor jets.	• Clean
2. Improperly adjusted main jet (High speed)	• Adjust
3. Improperly adjusted jet needle (Medium speed)	• Adjust
4. Incorrect fuel lever	• Adjust
5. Dirty or clogged air cleaner element	• Clean
6. Clogged fuel tank filler cap or carburetor breather pipe.	• Clean
7. Clogged fuel petcock or kinked fuel pipe.	• Clean or repair
8. Deteriorated fuel.	• Replace
9. Improper oil-gas mixing ratio	• Replace
10. Cracked or broken exhaust pipe (Leakage of exhaust gases).	• Replace

Overheat

Possible Cause	Remedy
1. Incorrect air-fuel mixture	• Adjust
2. Air leaks through carburetor joint.	• Repair or replace
3. Incorrect ignition timing	• Adjust
4. Carbon builds up in cylinder head or on piston head.	• Decarbonize
5. Improper spark plug heat range (too hot)	• Replace
6. Fuel is deteriorated or oil-gas mixing ratio is incorrect.	• Replace

Transmission and shifter

Trouble	Possible Cause	Remedy
Gears slip off	1. Gear dogs are worn.	• Replace
	2. Shift forks are bent. (burnt or worn)	• Replace
	3. Shift cam stopper spring is fatigued.	• Replace
Gear shifts skipping over the next.	1. Shift cam stopper spring is fatigued.	• Replace
	2. Shift forks are bent. (burnt or worn)	• Replace
Gear does not select	1. Shift cam is worn. (broken)	• Replace
	2. Change shaft is bent.	• Replace
	3. Shift arm spring is broken.	• Replace
	4. Gears are broken.	• Removal (Replace)
Shift pedal does not return.	1. Change return spring is broken.	• Replace
	2. Change shaft is bent.	• Replace

Clutch

Trouble	Possible Cause	Remedy
Clutch slips	1. Friction plate is worn.	• Replace
	2. Clutch plate is worn.	• Replace
	3. Clutch spring is fatigued.	• Replace
	4. Pressure plate is deformed.	• Replace
	5. Clutch plag is too small.	• Adjust
	6. Clutch adjustment is incorrect.	• Adjust
	7. Match marks of clutch boss and pressure plate does not aligned.	• Reassemble
Clutch drags	1. Clutch plate is worped.	• Replace
	2. Clutch lock nut is loosen.	• Replace
	3. Friction plate is broken.	• Replace
	4. Clutch play is too much.	• Adjust
	5. Oil viscosity is incorrect.	• Replace

Chassis

Steering head is loose	
Possible Cause	Remedy
1. Roller is worn. 2. Steering lock nut is loose.	• Replace • Retighten

Wheels have excessive run-out	
Possible Cause	Remedy
1. Bearing is worn. 2. Rim has dent. 3. Spokes are loose (or broken). 4. Axle nut is loose.	• Replace • Repair or replace • Retighten or replace • Retighten

Brakes		
Trouble	Possible Cause	Remedy
Faulty	1. Brake shoes are worn. 2. Brake is improperly adjusted. 3. Brake drum contains water. 4. Lining is greasy.	• Replace • Adjust • Clean • Degrease or replace
Not return smoothly	1. Wire is starved for oil. 2. Camshaft is starved for grease. 3. Return spring or brake shoe spring is broken. 4. Brake pedal axle is starved for grease.	• Grease or replace • Grease • Replace • Grease

Frame and Swing Arm	
Possible Cause	Remedy
1. Frame is cracked. 2. Rear arm is bend. 3. Rear arm is cracked. 4. Bushing is worn.	• Weld, reinforce or replace • Repair or replace • Replace • Replace

Headlight/Taillight

Trouble	Possible Cause	Remedy
Faulty	1. Burn out bulb. 2. Wire is broken, shorted or disconnected. 3. Lighting coil is faulty. 4. Lighting switch is faulty.	• Replace • Repair or replace • Replace • Replace

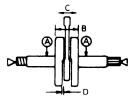
SPECIFICATIONS

A. General

Model	IT250J	IT465J
Model (I.B.M. No.)	4V5	4V6
Frame I.D. & Starting Number	4V5-020101	4V6-010101
Engine I.D. & Starting Number	4V5-020101	4V6-010101
Dimension:		
Overall length	2,205 mm (87.0 in)	←
Overall width	890 mm (35.0 in)	←
Overall height	1,225 mm (48.2 in)	←
Seat height	925 mm (36.4 in)	←
Wheelbase	1,450 mm (57.1 in)	1,475 mm (58.1 in)
Minimum ground clearance	295 mm (11.6 in)	←
Weight:		
Net weight	106 kg (234 lb)	120 kg (264 lb)

B. Engine

Model	IT250J	IT465J
Description:		
Engine type	Air Cooled 2-stroke Gasoline, torque induction	←
Engine model	4V5	4V6
Displacement	246 cc (15.0 cu. in)	465 cc (28.37 cu. in)
Bore × Stroke	70 × 64 mm (2.756 × 2.520 in)	85 × 82 mm (3.346 × 3.228 in)
Compression ratio	7.8 : 1	7.1 : 1
Starting system	Primary kick	←
Ignition system	Capacitor Discharge Ignition	←
Lubrication system	Mixed gasoline (Yamalube "R"; 24 : 1, Shell super M, Castrol R30, Castrol A545; 20 : 1)	←
Cylinder head:		
Cylinder head volume-with spark plug (N-2G)	21.0 cc (1.3 cu. in)	49.5 cc (3.0 cu. in)
Combustion chamber type	1/2 square + Squish	←
Head gasket material/thickness	Copper/1.0 mm (0.04 in)	Copper/1.2 mm (0.05 in)
Cylinder:		
Material	Cast iron sleeve with Aluminum alloy	←
Bore size	70 mm (2.756 in)	85 mm (3.346 in)
Wear limit	70.1 mm (2.759 in)	85.1 mm (3.350 in)
Taper limit	0.08 mm (0.003 in)	←
Out of round limit	0.05 mm (0.002 in)	←
Piston:		
Piston skirt clearance	0.045 ~ 0.050 mm (0.0018 ~ 0.0020 in)	0.070 ~ 0.075 mm (0.0028 ~ 0.0030 in)
Piston over size	70.25, 70.50, 70.75, 71.00 mm (2.766, 2.775, 2.785, 2.795 in)	85.25, 85.50, 85.75, 85.00 mm (3.356, 3.366, 3.376, 3.386 in)

Model	IT250J	IT465J
Piston rings:		
Piston ring design (Top/Second)	Keystone/Plain	←
Ring end gap, installed (Top/Second)	0.3 ~ 0.5 mm (0.012 ~ 0.019 in)	←
Ring groove side clearance (Top/Second)	0.03 ~ 0.05 mm/ 0.03 ~ 0.05 mm (0.0012 ~ 0.0020 in)/ (0.0012 ~ 0.0020 in)	0.02 ~ 0.06 mm/ 0.06 ~ 0.1 mm (0.0008 ~ 0.0024 in)/ (0.0024 ~ 0.0039 in)
Small end bearing:		
Type	Needle bearing (18 × 22 × 22)	Needle bearing (18 × 23 × 22)
Big end bearing:		
Type	Needle bearing (25 × 31 × 20)	←
Crankshaft:		
Crankshaft width (C)	62 $^{0}_{-0.05}$ mm (2.44 $^{0}_{-0.002}$ in)	66 $^{0}_{-0.05}$ mm (2.60 $^{0}_{-0.002}$ in)
Crankshaft deflection (A)	0.03 mm (0.0012 in)	←
Con-rod small end deflection (C)	0.4 ~ 2.0 mm (0.016 ~ 0.079 in)	←
Big end side clearance (D)	0.25 ~ 0.75 mm (0.010 ~ 0.030 in)	←
Crank bearing type (Left) 	6206C4 SPECIAL	83913-9TC4
(Right)	6206C4 SPECIAL	83913-9TC4
Oil seal type (Left)	SD 30 × 55 × 12	FWJ-30 × 55 × 10GS
(Right)	SW 40 × 55 × 12	FWJ-40 × 55 × 10GS
Clutch:		
Clutch type	Wet, multiple disc type	←
Clutch push mechanism	Inner push, Cam axle	←
Primary reduction ratio & method	63/24 (2.625), Helical gear	←
Friction plate thickness/limit	3.0 mm/2.7 mm (0.12 in/0.106 in)	←
Clutch plate thickness/warp limit	1.6 mm/0.05 mm (0.059 in/0.0020 in)	←
Clutch spring length/limit	36.4 mm/35.4 mm (1.43 in/1.39 in)	36.0 mm/35.0 mm (1.42 in/1.38 in)
Clutch housing thrust clearance	0.05 ~ 0.25 mm (0.002 ~ 0.0098 in)	←
Push rod bending limit	0.2 mm (0.008 in)	←
Transmission:		
Type	Constant mesh 6 speed, Return	Constant mesh 5 speed, Return
Gear ratio, 1st	32/12 (2.666)	←
2nd	30/15 (2.000)	28/16 (1.750)
3rd	25/16 (1.563)	25/19 (1.315)
4th	25/20 (1.250)	22/22 (1.000)
5th	23/22 (1.045)	22/28 (0.785)
6th	21/24 (0.875)	—
Transmission oil quantity & type	Total: 800 cc (0.84 US qt)	←
	Exchange: 750 cc (0.79 US qt)	←
	Yamalube 4-cycle oil or SAE 10W/30 "SE" motor oil	←
Bearing type: Main axle (Left)	Needle bearing (30 × 17 × 13)	Needle bearing (32 × 20 × 12)
(Right)	6205Z	←
(Left)	6205R	←
(Right)	Needle bearing (32 × 20 × 12)	←

Model	IT250J	IT465J
Drive axle oil seal type	SD 32 × 42 × 6	←
Secondary reduction method	Chain	←
ratio	50/13 (3.846)	44/14 (3.142)
Shifter change mechanism:		
Type	Guide bar type	←
Oil seal type	S 12 × 22 × 5	←
Shift fork finger thickness/limit	4.85 mm/4.45 mm (0.191 in/0.175 in)	←
Intake:		
Air cleaner, type	Oiled foam rubber	←
Oil grade	SAE 10W/30 motor oil	←
Reed valve, type	"V" type	←
Bending limit	0.6 mm (0.024 in)	←
Valve lift	12 ± 0.2 mm (0.47 ± 0.008 in)	←
Carburetor:		
Type & manufacturer	VM36SS, Mikuni	VM38SS, Mikuni
I.D. mark	4V500	4V610
Main jet (M.J.)	#400	#390
Jet needle-clip position (J.N.)	6F34-3	6F39-4
Needle jet (N.J.)	N-8	Q-2
Cutaway (C.A.)	2.0	2.0
Pilot jet (P.J.)	#50	#40
Air screw turns out (A.S.)	1 and 1/2	1 and 3/8
Float height	24.0 ± 1.0 mm (0.94 ± 0.04 in)	27 ± 1.0 mm (1.06 ± 0.04 in)

C. Chassis

Model	IT250J	IT465J
Frame:		
Frame design	Tubular steel double cradle	←
Steering system:		
Caster	29°0′	28°30′
Trail	126 mm (4.96 in)	122 mm (4.80 in)
Head pipe bearing type	Taper rollar bearing	←
Front suspension:		
Type	Telescopic fork	←
Damper type	Coil, air spring, oil damper	←
Fork travel	270 mm (10.6 in)	←
Front fork spring, Free length	615 mm (24.2 in)	←
spring rate	K_1 = 0.308 kg/mm (~ 120 mm),	←
	K_2 = 0.350 kg/mm (120 mm ~)	←
Fork oil quantity	423 cc (14.3 oz)	←
type	SAE #10 motor oil	←
Oil seal type	SD-38-50.5-10.5	←
Air pressure	0 kg/cm² (0 psi)	←

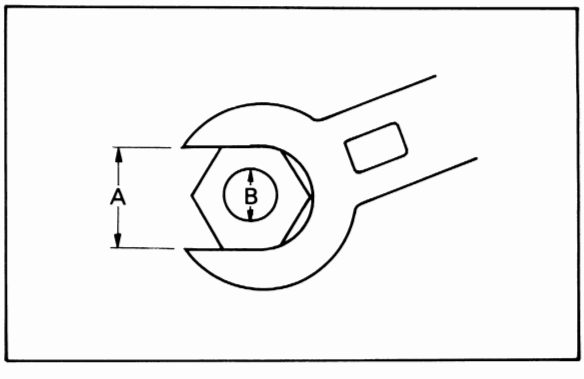
Model	IT250J	IT465J
Rear suspension:		
Type	Monocross suspension (De carbon system)	←
Damper type	Gas, coil spring + Oil damper	←
Gas pressure	15 kg/cm² (213 psi)	18 kg/cm² (256 psi)
Gas propriteil	Nitrogen gas	←
Rear shock absorber spring:		
Free length	352 mm (13.9 in)	←
Set length	347 mm (13.66 in)	←
Spring rate	K_1 = 2.4 kg/mm (134 lb/in)	K_1 = 2.9 kg/mm (162 lb/in)
	K_2 = 6.1 kg/mm (342 lb/in)	K_2 = 7.25 kg/mm (406 lb/in)
Rear shock absorber travel	142 + 3 mm (56 + 0.12 in) (with rubber bush)	←
Rear wheel travel	270 mm (10.6 in)	280 mm (11.0 in)
Swing arm length	515 mm (20.3 in)	540 mm (21.3 in)
deflection (rear end)	0 ~ 1.0 mm (0 ~ 0.039 in)	←
free play (pivot shaft)	0 ~ 0.2 mm (0 ~ 0.0079 in)	←
Pivot shaft-bearing type	Needle bearing + Thrust bearing	←
Fuel tank:		
Capacity	13 lit (3.4 US gal)	←
Wheels:		
Tire size (Front)	3.00-21-4PR	←
(Rear)	5.10-18-4PR	5.60-17-4PR
Patern	Nobby	←
Pressure (Normal) (Front)	1.0 kg/cm² (14 psi)	
(Rear)	1.0 kg/cm² (14 psi)	
Rim size (Front)	1.60-21	←
(Rear)	M.T. 2.50-18	M.T. 2.50-17
Run out (vert.)		
Front — limit	2 mm (0.08 in)	←
Rear — limit	2 mm (0.08 in)	←
Run out (horiz.)		
Front — limit	2 mm (0.08 in)	←
Rear — limit	2 mm (0.08 in)	←
Bearing type and size		
Front wheel (Left)	6202-RS	←
(Right)	6202	←
Rear wheel (Left)	6004 × 2	←
(Right)	6004, 6004-RS	←
Oil seal type and size		
Meter gear (Right)	SDD-40-52-6	←
Rear wheel (Left)	SD-28-47-7	←
Drive chain:		
Type	DID520VS	←
Number of links	107L + Joint	←
Chain pitch	15.875 mm (0.625 in)	←
Free play	10 ~ 15 mm (0.4 ~ 0.6 in)	←
Brakes:		
Type	Drum brake (leading trailing/leading trailing)	← (TWO leading/leading trailing)
Brake drum I.D.: (F/R)	130 mm (5.12 in)/ 150 mm (5.91 in)	← ←

Model	IT250J	IT465J
Brake shoe dia. × width		
Front	130 × 22 mm (5.12 in × 0.87 in)	←
Rear	150 × 25 mm (6.3 in × 0.98 in)	←
Lining length (Front/Rear)	124 mm (4.9 in)/	←
	145 mm (5.7 in)	←
Lining thickness/wear limit	4 mm/2 mm (0.16 in/0.08 in)	←
Shoe springs free length (F)/(R)	36.5 mm (1.44 in)/	←
	68 mm (2.67 in)	←

D. Electrical

Model	IT250J	IT465J
Ignition system:		
System	Capacitor Discharge Ignition	←
Manufacture	Mitsubishi	←
Model	F3T203	F3T202
Pulser coil resistance	9Ω ± 10% (W/R — B)	12.4Ω ± 10% (W/R — B)
Charge coil resistance		
Low speed:	360Ω ± 10% (Br — Gy)	420Ω ± 10% (Br — B)
High speed:	14Ω ± 10% (R — L)	13.6Ω ± 10% (R — B)
Lighting coil resistance:	0.48Ω ± 10% (Y/R — B)	←
Ignition timing (B.T.D.C.)	16.5° at 5,000 r/min	16° at 2,000 r/min
	(1.65 ± 0.1 mm (0.065 ± 0.04 in))	(2.07 ± 0.1 mm (0.081 ± 0.04 in))
Ignition coil:		
Manufacture	Mitsubishi	←
Model	F6T411	←
Spark gap	6 mm (0.28 in) or more	←
	300 r/min	
Primary winding resistance	1.0Ω ± 15%	←
Secondary winding resistance	5.9Ω ± 15%	←
Spark plug		
Manufacture and type	Champion N-2G	Champion N-3
Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in)	←
C.D.I. unit:		
Manufacture	Mitsubishi	←
Model	F8T04571	←
Headlight	6V 25W	←
Taillight	6V 5.3W	←

A (NUT)	B (BOLT)	TORQUE SPECIFICATION	
		m-kg	ft-lb
10 mm	6 mm	0.6	4.5
12 mm	8 mm	1.5	11.0
14 mm	10 mm	3.0	22.0
17 mm	12 mm	5.5	40.0
19 mm	14 mm	8.5	61.0
22 mm	16 mm	13.0	94.0



E. TIGHTENING TORQUE

Tightening torque		IT250J	IT465J
Cylinder head	M8	2.5 m-kg (18 ft-lb)	←
Spark plug	M14	2.5 m-kg (18 ft-lb)	←
Cylinder	M12	6.0 m-kg (43 ft-lb)	←
Primary drive gear	M18	7.5 m-kg (54 ft-lb)	←
Clutch boss	M20	7.5 m-kg (54 ft-lb)	←
Clutch spring	M6	0.8 m-kg (6 ft-lb)	←
Drive sprocket	M20	7.5 m-kg (54 ft-lb)	←
Kick crank	M12	5.0 m-kg (36 ft-lb)	←
Change pedal	M6	1.0 m-kg (7 ft-lb)	←
Reed valve	M3	0.1 m-kg (0.7 ft-lb)	←
Outer rotor	M12	8.0 m-kg (56 ft-lb)	←
Stater	M6	0.8 m-kg (6 ft-lb)	←
Chassis			
Engine mounting bolt;			
Front upper	M8	3.0 m-kg (22 ft-lb)	←
Front under	M8	3.0 m-kg (22 ft-lb)	←
Rear upper	M10	6.5 m-kg (46 ft-lb)	←
Engine mount stay;			
Front	M8	3.0 m-kg (22 ft-lb)	←
Upper	M8	1.5 m-kg (11 ft-lb)	←
Handle crown;			
Steering shaft	M22	9.5 m-kg (69 ft-lb)	←
Inner tube	M8	2.3 m-kg (17 ft-lb)	←
Handle holder	M8	2.3 m-kg (17 ft-lb)	←
Front fork;			
Cap bolt	M34	2.3 m-kg (17 ft-lb)	←
Under bracket	M8	2.3 m-kg (17 ft-lb)	←
Damper unit	M12	4.0 m-kg (29 ft-lb)	←
Front wheel axle	M14	6.0 m-kg (43 ft-lb)	←
Front wheel axle pinch	M6	1.0 m-kg (7 ft-lb)	←
Pivot shaft	M16	8.0 m-kg (58 ft-lb)	←
Rear wheel axle	M18	10.0 m-kg (70 ft-lb)	←
Sprocket wheel	M8	3.0 m-kg (22 ft-lb)	←
Rear shock absorber	M10	3.0 m-kg (22 ft-lb)	←
Tension bar	M8	2.3 m-kg (17 ft-lb)	←
Camshaft lever (brake)	M6	1.0 m-kg (7 ft-lb)	←
Steering bearing	M25	0.7 m-kg (6 ft-lb)	←
Foot rest	M12	10.0 m-kg (70 ft-lb)	←

CONVERSION TABLES

METRIC TO INCH SYSTEM			
	KOWN	MULTIPLIER	RESULT
TORQUE	m-kg	7.233	ft-lb
	m-kg	86.80	in-lb
	cm-kg	0.0723	ft-lb
	cm-kg	0.8680	in-lb
WT.	kg	2.205	lb
	g	0.03527	oz
FLOW/DISTANCE	km/ℓ	2.352	mpg
	km/hr	0.6214	mph
	km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
VOL./CAPACITY	cc (cm^3)	0.03382	oz (US liq)
	cc (cm^3)	0.06102	cu.in
	ℓ (liter)	2.1134	pt (US liq)
	ℓ (liter)	1.057	qt (US liq)
	ℓ (liter)	0.2642	gal (US liq)
MISC.	kg/mm	56.007	lb/in
	kg/cm^2	14.2234	psi (lb/in^2)
	Centigrade(°C)	9/5(°C) + 32	Fahrenheit(°F)

INCH TO METRIC SYSTEM			
	KOWN	MULTIPLIER	RESULT
TORQUE	ft-lb	0.13826	m-kg
	in-lb	0.01152	m-kg
	ft-lb	13.831	cm-kg
	in-lb	1.1521	cm-kg
WT.	lb	0.4535	kg
	oz	28.352	g
FLOW/DISTANCE	mpg	0.4252	km/ℓ
	mph	1.609	km/hr
	mi	1.609	km
	ft	0.3048	m
	yd	0.9141	m
	in	2.54	cm
	in	25.4	mm
VOL./CAPACITY	oz (US liq)	29.57	cc (cm^3)
	cu.in	16.387	cc (cm^3)
	pt (US liq)	0.4732	ℓ (liter)
	qt (US liq)	0.9461	ℓ (liter)
	gal (US liq)	3.785	ℓ (liter)
MISC.	lb/in	0.017855	kg/mm
	psi (lb/in^2)	0.07031	kg/cm^2
	Fahrenheit(°C)	5/9(°F−32)	Centigrade(°F)

WARRANTY INFORMATION

Please refer to your copy of the Yamaha Owner's Warranty Guide* for details of the warranty offered on your new Yamaha.

The Warranty Guide contains the warranty policy, an explanation of the warranty, and other important information. Becoming familiar with these policies will be to your advantage in making the best use of Yamaha's programs.

There are certain requirements which you must meet in order to qualify for warranty coverage. FIRST, your new Yamaha must be operated and maintained properly, as explained in this manual. If you have any questions about any procedure in this manual, please consult your dealer. ABUSE AND NEGLECTED MAINTENANCE MAY LEAD TO MECHANICAL FAILURES WHICH CANNOT BE COVERED UNDER WARRANTY.

SECOND, IF ANY PROBLEMS OCCUR WHICH YOU FEEL SHOULD BE COVERED UNDER WARRANTY NOTIFY YOUR DEALER IMMEDIATELY. Don't delay, as small problems left unrepaired can become large problems which may not be covered under warranty.

We recommend that the Warranty Guide be used as a folder in which you may keep your registration and other important documents related to your new Yamaha.

* The Yamaha Owner's Warranty Guide is to be supplied by your Yamaha dealer at the time of purchase. If you did not receive one, or have lost yours, you may obtain extra copies upon request from your Yamaha dealer or by writing to:

YAMAHA MOTOR CORPORATION, U.S.A.
P.O. Box 6555
6555 Katella Ave.
Cypress California 90630
Attn: Warranty Department

YAMAHA MOTOR CO.,LTD.
IWATA, JAPAN