CHAPTER ONE

GENERAL INFORMATION

This detailed, comprehensive manual covers the U.S and the U.K. models of the Yamaha XV535 Virago V-twins from 1987-on. **Table 1** lists engine and chassis numbers for models covered in this manual and **Table 2** lists the general specifications.

Table 1 and **Table 2** are found at the end of the chapter.

NOTE

This chapter covers all procedures unique to the XV535 Virago V-twins. If a specific procedure is not included in this chapter, refer to Chapter One at the front of this manual for service procedures.

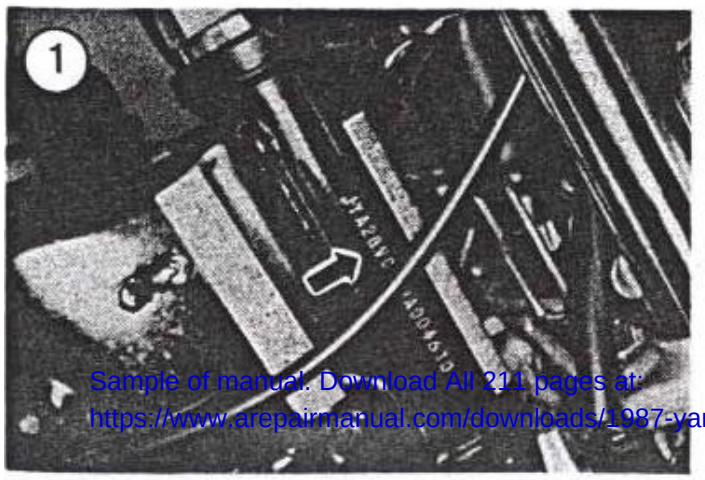
PARTS REPLACEMENT

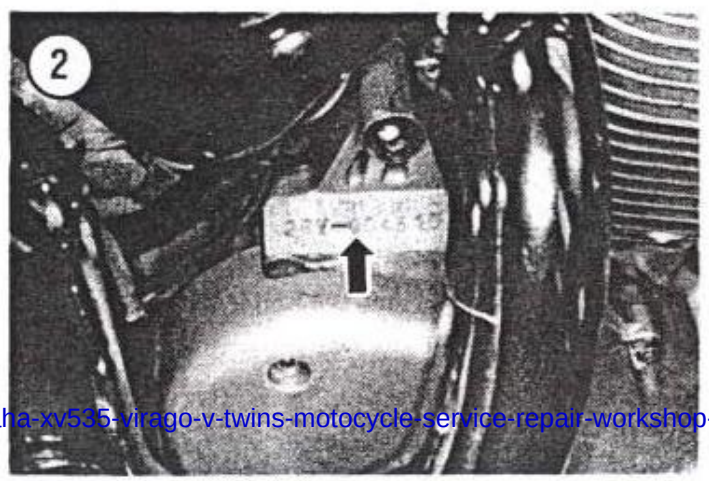
Yamaha makes frequent changes during a model year, some minor, some relatively major. When you order parts from the dealer or other parts distributor, always order by frame and engine numbers. The frame serial number and vehicle identification number (VIN) is stamped on the right-hand side of the steering stem (**Figure 1**). The engine number is stamped on a raised pad on the right-hand side of the crankcase (**Figure 2**) by the rear cylinder. The carburetor number is on the left-hand side of the No. 1 carburetor body just below the top cover.

Write the numbers down and carry them with you. Compare new parts to old before purchasing them. If they are not alike, have the parts manager explain the difference to you. **Table 1** lists engine and frame serial numbers for the models covered in this manual.

NOTE

If your Yamaha was purchased second-hand and you are not sure of its model





year, use the bike's engine serial number and vehicle identification number (VIN) and the information listed in ***Table 1****. Read your bike's engine serial number. Then compare the number with the engine and serial numbers listed in* ***Table 1****. If your bike's serial number is listed in* ***Table 1****, cross-reference the number with the adjacent model number and year.*

Table 1 ENGINE SERIAL NUMBERS

Model Number and Year	Engine Serial No. Start to End
U.S. Models	
1987	
XV535T	2GV-000101 to *
XV535TC	2JU-000101 to *
1988	
XV535U	2GV-038101 to *
XV535UC	3BG-000101 to *
1989	
XV535W	2UJ-020101 to *
XV535WC	3BG-002101 to *
1990 **	
XV535A	3JC-007101 to *
XV535AC	3JC-002101 to *
1993	
XV535E	3JC-014101 to *
XV535EC	3JC-020101 to *
U.K. Models	
Model Number and Year	**Engine Serial No. Start to End**
1988	2YL-003101 to *
1989	2YL-005101 to *
1990	2YL-0022101 to *
1991	2YL-031101 to *
1992	2YL-*
1993	2YL-*

* Not specified.
** The XV535 was not available in the U.S. in 1991 and 1992.

Table 2 GENERAL SPECIFICATIONS

Engine type	Air-cooled, 4-stroke, SOHC, V-twin
Bore and stroke	2.992 × 2.323 in. (76 × 59 mm)
Displacement	32.64 cu. in. (535 cc)
Compression ratio	9:1
Ignition	Transistor control ignition (TCI)
Carburetion	2 Mikuni carburetors
Air filter	Dry type element
Fuel type	Gasoline: regular unleaded
Fuel tank capacity	
1987-1989 U.S. models and 1988 U.K. models	
Total	2.3 U.S. gal. (8.6 L, 1.9 Imp. gal.)
Reserve	0.5 U.S. gal. (2.0 L, 0.4 Imp. gal.)
1990-on U.S. models and 1989-on U.K. models	
Total	3.6 U.S. gal. (13.5 L, 3.0 Imp. gal.)
Reserve	0.7 U.S. gal. (2.5 L, 0.5 Imp. gal.)
Clutch	Wet, multi-plate
Transmission	5 speeds, constant mesh

(continued)

Table 2 GENERAL SPECIFICATIONS (continued)

Transmission ratios	
1st	2.714
2nd	1.900
3rd	1.458
4th	1.166
5th	0.966
Final reduction ratio	3.071
Starting system	Electric starter only
Battery	12 volt/12 amp hour
Charging system	AC alternator
Chassis dimensions	
Overall length	87.0 in. (2,210 mm)
Overall width	32.1 in. (815 mm)
Overall height	43.3 in. (1,100 mm)
Seat height	27.6 in. (700 mm)
Wheelbase	59.5 in. (1,511 mm)
Ground clearance	5.7 in. (145 mm)
Basic weight	
U.S. models	
1987-1989	
49-state	408 lb. (185 kg)
California	410 lb. (186 kg)
1990-on	
49-state	430 lb. (195 kg)
California	432 lb. (196 kg)
U.K. models	415 lb. (188 kg)
Steering head angle	31°
Trail	4.8 in. (122 mm)
Front suspension	
Telescopic fork	
Travel	5.9 in. (150 mm)
Rear suspension	Dual shock
Travel	3.3 in. (85 mm)
Front tire	3.00S-19 4PR
Rear tire	
1987-1989	140/90-15 70S
1990-on	140/90-15M/C 70S

Místo pro vaše poznámky :

CHAPTER TWO

TROUBLESHOOTING

Diagnosing mechanical problems is relatively simple if you use orderly procedures and keep a few basic principles in mind. The first step in any troubleshooting procedure is to define the symptoms as closely as possible and then localize the problem. Subsequent steps involve testing and analyzing those areas which could cause the symptoms. A haphazard approach may eventually solve the problem, but it can be very costly in terms of wasted time and unnecessary parts replacement.

NOTE

This chapter covers all procedures unique to the XV535 Virago V-twins. If a specific procedure is not included in this chapter, refer to Chapter Two at the front of this manual for service procedures.

EMERGENCY TROUBLESHOOTING

When the vehicle is difficult to start, or won't start at all, it does not help to wear down the battery and overheat the starter. Check for obvious problems even before getting out your tools. Go down the following list step-by-step. Do each one. If the vehicle still will not start, refer to the appropriate troubleshooting procedures which follow in this chapter.

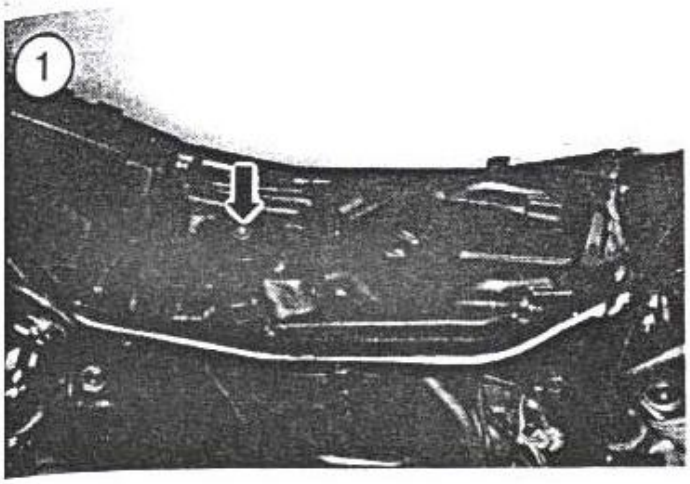
1. Is there fuel in the tank? On models without a sub-fuel tank, raise the seat and open the main fuel tank filler cap (**Figure 1**). On models with a sub-fuel tank, open the sub-fuel tank filler cap (**Figure 2**) and rock the bike from side to side. Listen for fuel sloshing around.

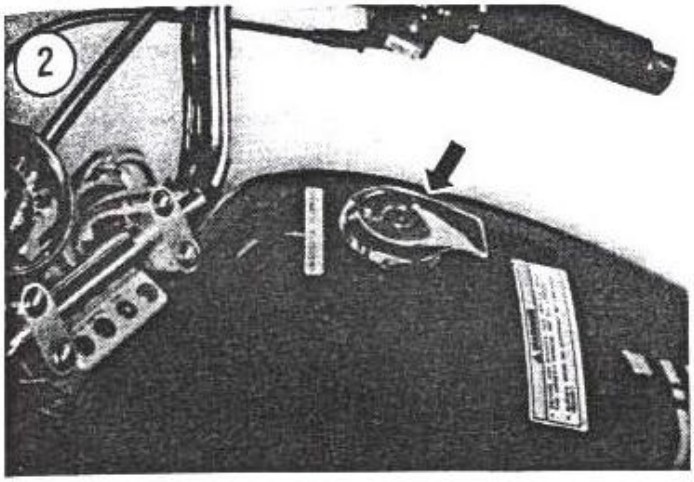
WARNING

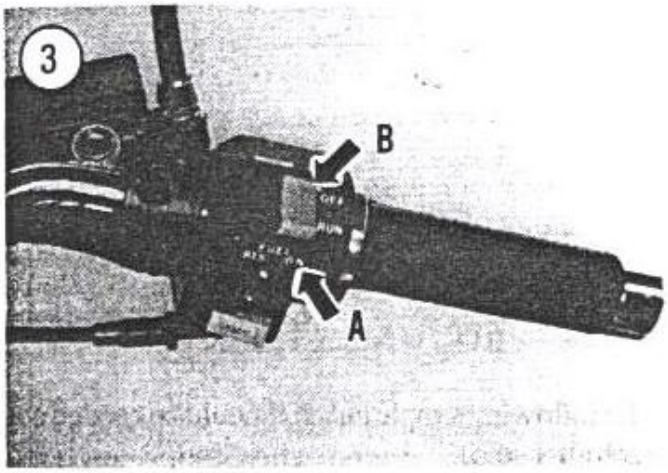
Do not use an open flame to check in the tank. A serious explosion is certain to result.

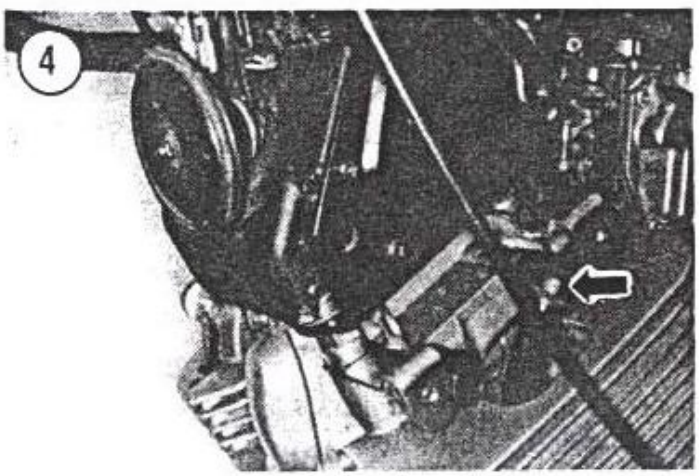
2. On models so equipped, is the fuel shutoff valve in the ON position?

3. Make sure the fuel reserve switch (A, **Figure 3**) is in the RES position. If there is any doubt about the









fuel pump operation, refer to Chapter Seven in this section of the manual.

4. Make sure the engine kill switch (B, **Figure 3**) is not stuck in the OFF position or that the wire is not broken and shorting out.

5. Are the spark plug wires (**Figure 4**) on tight? Remove the engine covers and push both on and slightly rotate them to clean the electrical connection between the plugs and the connectors.

6. Is the choke lever (**Figure 5**) in the correct position? Push the lever down for a cold engine and up for a warm engine.

ENGINE STARTING

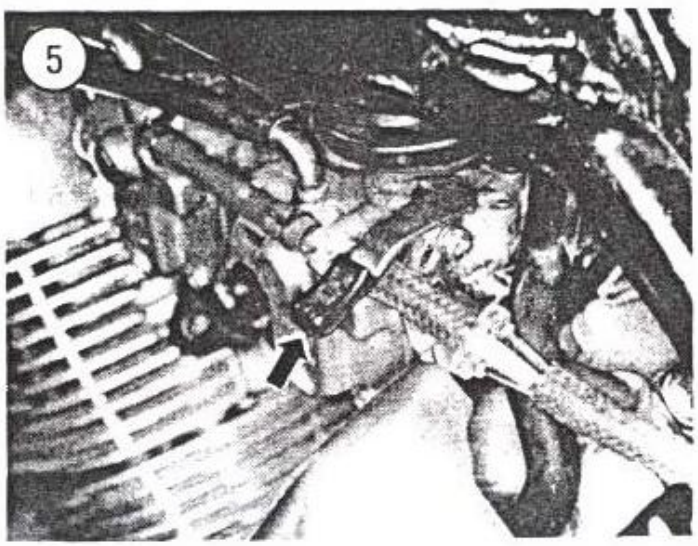
Follow the *Engine Starting* procedure in Chapter Two in front of this manual noting that the XV535 is equipped with an Ignitor Unit and not a CDI unit.

ENGINE PERFORMANCE

Follow the *Engine Performance* procedure in Chapter Two in front of this manual noting that the XV535 is equipped with a fuel filter.

IGNITION SYSTEM

All XV535 models are equipped with the Transistor Control Ignition system. This system consists of both a pickup unit and an ignitor unit and uses no breaker points or other moving parts. It is non-adjustable, and if any problems arise that you believe to be related to the ignition system, refer to Chapter Seven for ignition system troubleshooting procedures.



CHAPTER THREE

PERIODIC LUBRICATION, MAINTENANCE AND TUNE-UP

Your bike can be cared for by two methods: preventive and corrective maintenance. Because a motorcycle is subjected to tremendous heat, stress and vibration—even in normal use—preventive maintenance prevents costly and unexpected corrective maintenance. When neglected, any bike becomes unreliable and actually dangerous to ride. When properly maintained, the Yamaha XV535 is one of the most reliable bikes available and will give many miles and years of dependable and safe riding. By maintaining a routine service schedule as described in this chapter, costly mechanical problems and unexpected breakdowns can be prevented.

The procedures presented in this chapter can be easily performed by anyone with average mechanical skills. **Table 1** presents a factory recommended maintenance schedule. **Tables 1-5** are at the end of the chapter.

NOTE

This chapter covers all procedures unique to the XV535 Virago V-twins. If a specific procedure is not included in this chapter, refer to Chapter Three at the front of this manual for service procedures.

ROUTINE CHECKS

The following simple checks should be carried out at each fuel stop.

Engine Oil Level

Refer to *Engine Oil Level Check* under *Periodic Lubrication* in this chapter.

Tire Pressure

Tire pressure must be checked with the tires cold. Correct tire pressure depends a lot on the load you are carrying. See **Table 2**.

Battery

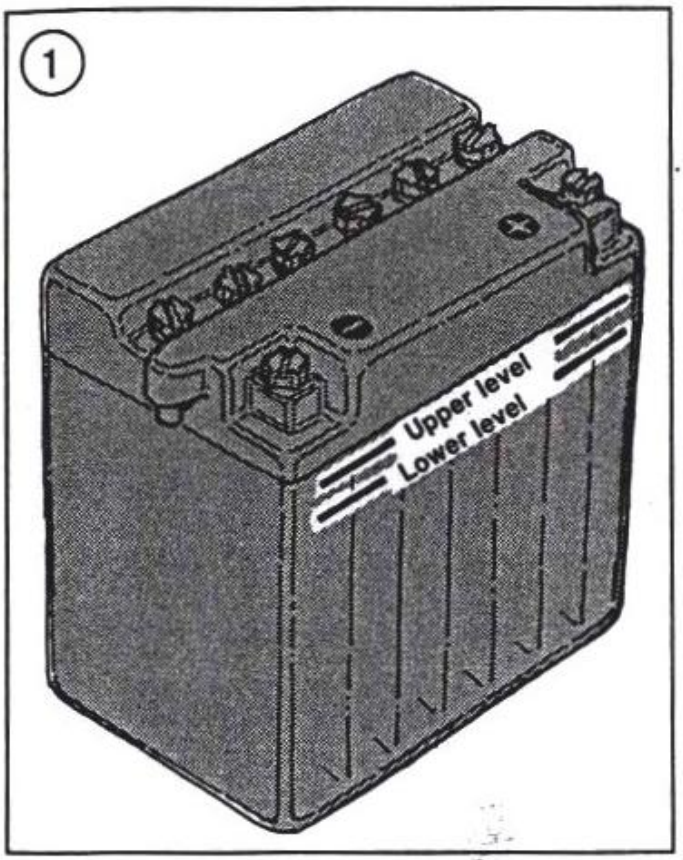
Remove the frame right-hand side cover and check the battery electrolyte level. The level must be between the upper and lower level marks on the case (**Figure 1**).

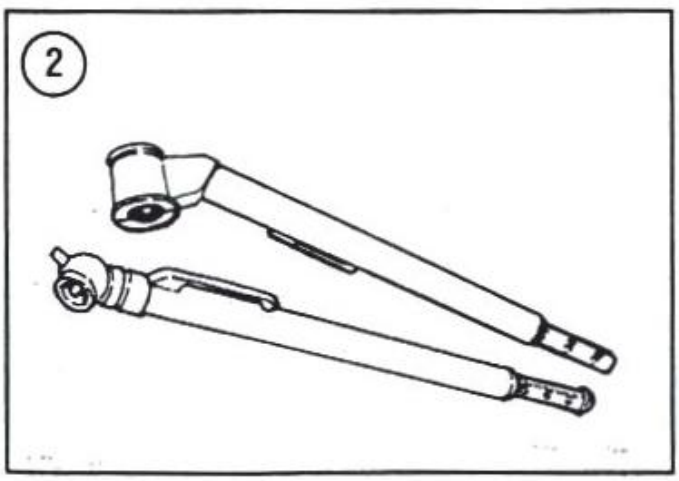
For complete details see *Battery Removal/Installation and Electrolyte Level Check* in this chapter.

MAINTENANCE INTERVALS

The services and intervals shown in **Table 1** are recommended by the factory. Strict adherence to these recommendations will insure long life from your Yamaha. If the bike is run in an area of high humidity, the lubrication services must be done more frequently to prevent possible rust damage.

For convenient maintenance of your motorcycle, most of the services shown in **Table 1** are described in this chapter. Those procedures which require more than minor disassembly or adjustment are covered elsewhere in the appropriate chapter. The *Contents* and *Index* can help you locate a particular service procedure.





TIRES AND WHEELS

Tire Pressure

Tire pressure should be checked and adjusted to accommodate rider and luggage weight. A simple, accurate gauge (**Figure 2**) can be purchased for a few dollars and should be carried in your motorcycle tool kit. The appropriate tire pressures are shown in **Table 2**.

NOTE

After checking and adjusting the air pressure, make sure to reinstall the air valve cap. The cap prevents small pebbles and/or dirt from collecting in the valve stem that could allow air leakage or result in incorrect tire pressure readings.

BATTERY

CAUTION

If it becomes necessary to remove the battery breather tube from the frame when performing any of the following procedures, make sure to route the tube correctly during installation to prevent acid from spilling on parts.

Removal/Installation and Electrolyte Level Check

The battery is the heart of the electrical system. It should be checked and serviced as indicated (**Table 1**). The majority of electrical system troubles can be attributed to neglect of this vital component.

In order to correctly service the electrolyte level it is necessary to remove the battery from the frame.

The electrolyte level should be maintained between the two marks on the battery case. If the electrolyte level is low, it's a good idea to completely remove the battery so that it can be thoroughly cleaned, serviced, and checked.

1. Remove the seat(s).
2. On 1990-on U.S. models and 1989-on U.K. models, perform the following:
   a. Unhook both fuel lines (A, **Figure 3**) from the clamps on top of the battery cover.
   b. Remove the battery cover (B, **Figure 3**).
3. Unhook the battery strap (A, **Figure 4**).
4. Disconnect the battery vent tube (B, **Figure 4**).
5. Pull the battery part way up out of the battery box to gain access to the battery cable attachment screws.
6. Disconnect the negative (–) battery cable (A, **Figure 5**) from the battery.
7. Disconnect the positive (+) battery cable (B, **Figure 5**).

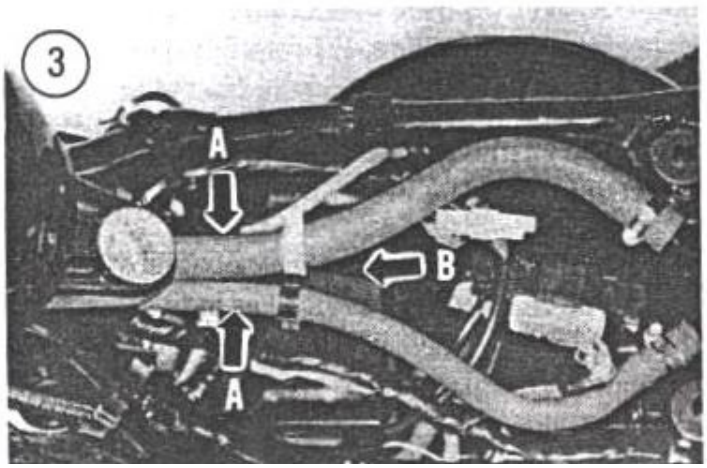
WARNING

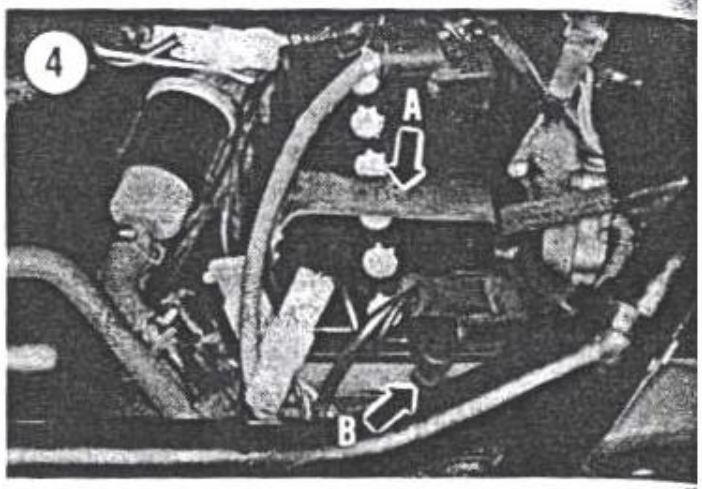
Protect your eyes, skin and clothing. If electrolyte gets into your eyes, flush your eyes thoroughly with clean water and get prompt medical attention.

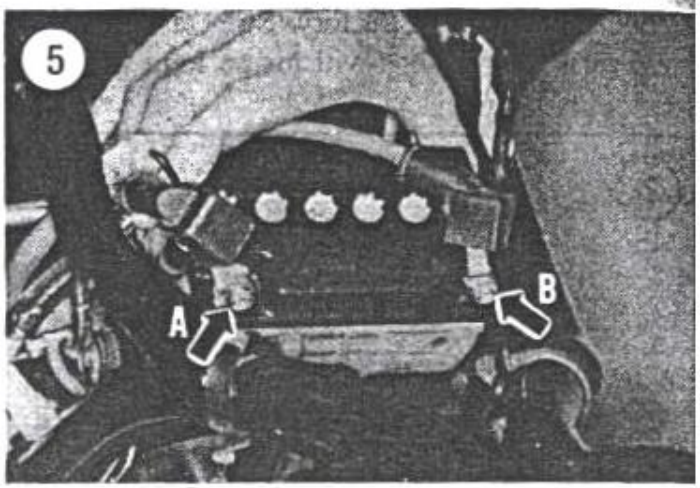
CAUTION

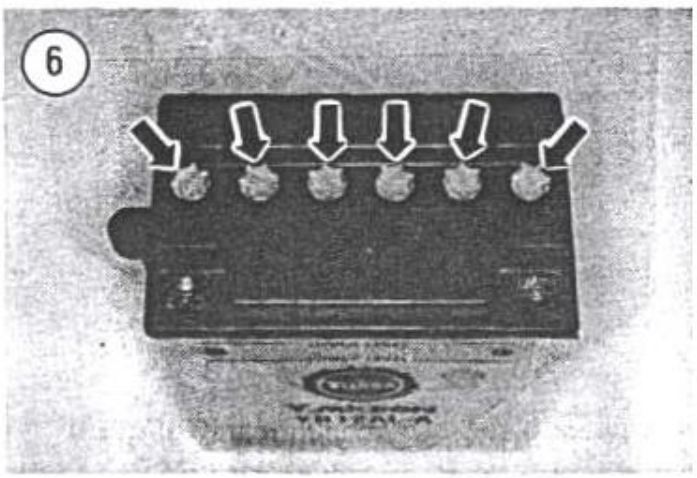
Be careful not to spill battery electrolyte on painted or polished surfaces. The liquid is highly corrosive and will damage the finish. If it is spilled, wash it off immediately with soapy water and thoroughly rinse with clean water.

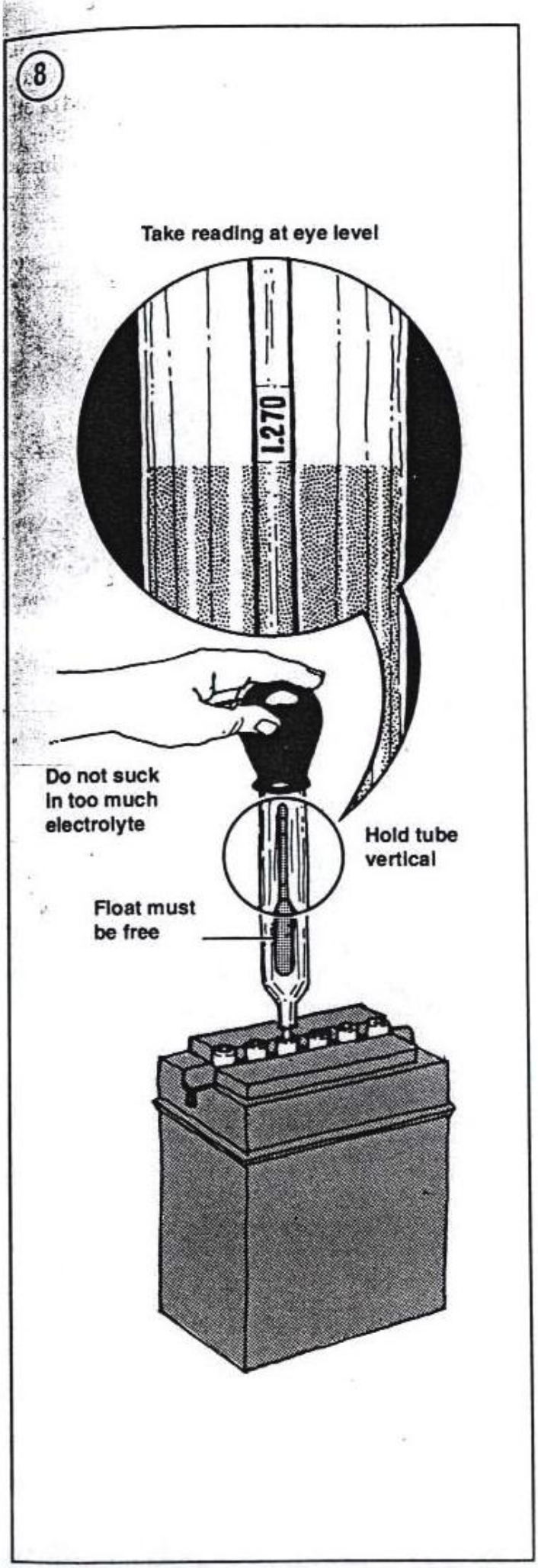
8. Lift the battery out of the battery box and remove it.
9. Rinse the battery off with clean water and wipe dry.











10. Remove the caps (**Figure 6**) from the battery cells and add distilled water. Never add electrolyte (acid) to correct the level. Fill only to the upper battery level mark (**Figure 7**).

11. After the level has been corrected and the battery allowed to stand for a few minutes, check the specific gravity of the electrolyte in each cell with a hydrometer (**Figure 8**). Follow the manufacturer's instructions for reading the instrument. See *Battery Testing* in Chapter Three in the front section of this manual.

CAUTION

If distilled water has been added to a battery in freezing or near freezing weather, add it to the battery, dress warmly and then ride the bike for a ***minimum of 30 minutes****. This will help mix the water thoroughly into the electrolyte in the battery. Distilled water is lighter than electrolyte and will float on top of the electrolyte if it is not mixed in properly. If the water stays on the top, it may freeze and fracture the battery case, ruining the battery.*

12. After the battery has been refilled, recharged or replaced, install it by reversing these removal steps while noting the following:

a. Position the battery in the case with the negative (–) terminal on the right-hand side of the bike.
b. Coat the battery terminals with a thin layer of dielectric grease to retard corrosion and decomposition of the terminals.
c. Attach the positive (+) cable first then the negative (–) cable.

CAUTION

Make sure to reconnect the battery breather tube (B, ***Figure 4****) to the battery. If the tube was removed with the battery, make sure to route it in its correct position through the frame.*

NEW BATTERY INSTALLATION

When replacing the old battery with a new one, be sure to charge it completely (specific gravity, 1.260-1.280) before installing it in the bike. Failure to do so, or using the battery with a low electrolyte level will permanently damage the battery. When pur-

chasing a new battery, the correct battery capacity for models covered in this manual is 12 volts/12 amp hours.

NOTE

Recycle your old battery. *When you replace the old battery, be sure to turn in the old battery at that time. The lead plates and the plastic case can be recycled. Most motorcycle dealers will accept your old battery in trade when you purchase a new one, but if they will not, many automotive supply stores certainly will.* ***Never*** *place an old battery in your household trash since it is illegal, in most states, to place any acid or lead (heavy metal) contents in landfills. There is also the danger of the battery being crushed in the trash truck and spraying acid on the truck operator.*

PERIODIC LUBRICATION

Engine Oil Level Check

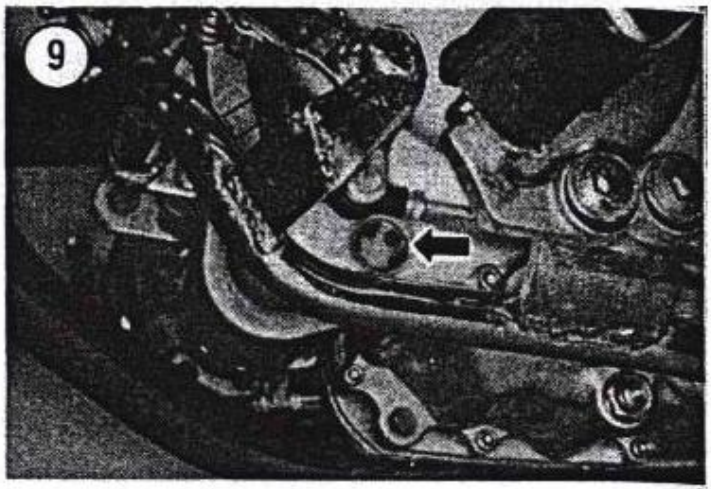
Engine oil level is checked through the inspection window located at the bottom of the crankcase cover on the right-hand side (**Figure 9**).

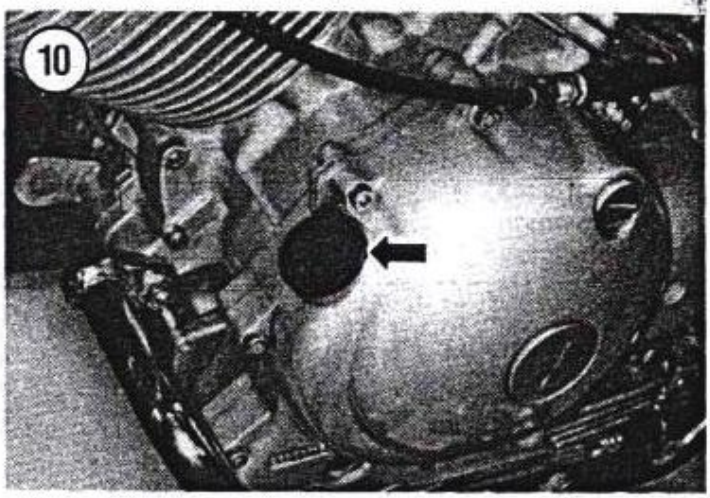
1. Place the bike on level ground on the sidestand. Start the engine and let it reach normal operating temperature.
2. Stop the engine and allow the oil to settle.
3. Hold the bike level in the upright position.
4. The oil level should be between the maximum and minimum window marks (**Figure 9**). If necessary, remove the oil fill cap (**Figure 10**) and add the recommended oil listed in **Table 3** to raise the oil to the proper level. Do not overfill.

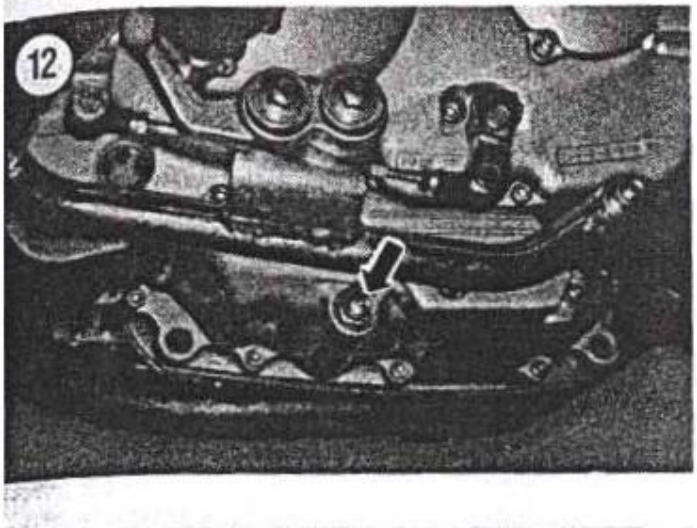
Engine Oil and Filter Change

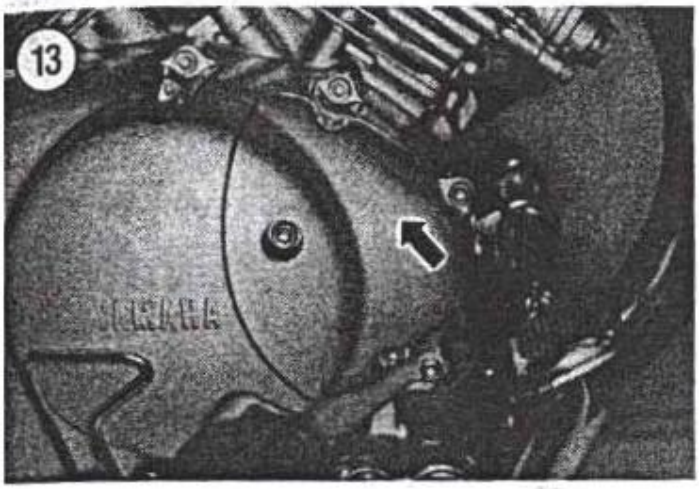
The factory-recommended oil and filter change interval is specified in **Table 1**. This assumes that the motorcycle is operated in moderate climates. The time interval is more important than the mileage interval because combustion acids, formed by gasoline and water vapor, will contaminate the oil even if the motorcycle is not run for several months. If a motorcycle is operated under dusty conditions, the oil will get dirty more quickly and should be changed more frequently than recommended.

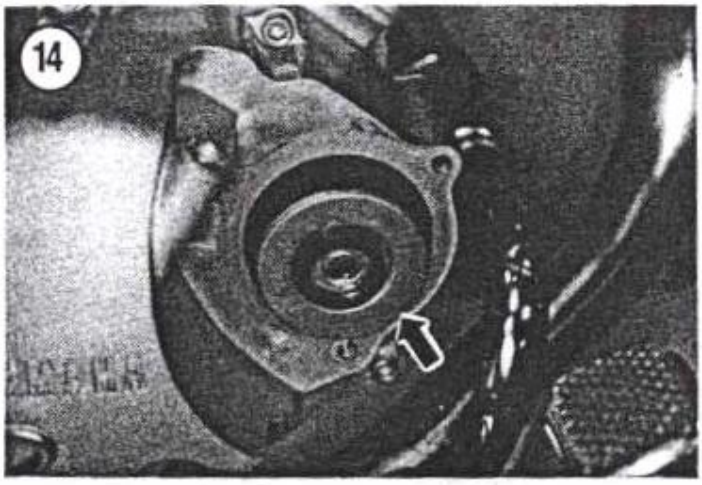
Use only a detergent oil with an API rating of SE or SF. The quality rating is on the label of the bottle (**Figure 11**). Try always to use the same brand of oil. Use of oil additives is not recommended. Refer to **Table 3** for correct weight of oil to use under different temperatures.

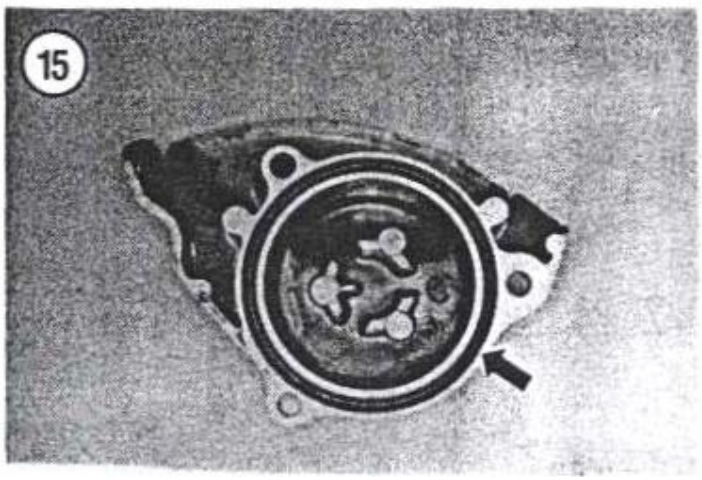












To change the engine oil and filter you will need the following:

a. Drain pan.
b. Funnel.
c. Wrench or socket to remove drain plug.
d. 3 quarts of oil.
e. Oil filter element.

NOTE

If you are going to recycle the oil, do not add any other type of chemical (fork oil, brake fluid, etc.) to the oil as the oil recycler will probably not accept the oil.

There are a number of ways to discard the used oil safely. The easiest way is to pour it from the drain pan into a gallon plastic bleach, juice or milk container for recycling or disposal. Do not discard oil in your household trash or pour it onto the ground.

1. Place the motorcycle on the sidestand.
2. Start the engine and run it until it is at normal operating temperature, then turn it off.
3. Place a drip pan under the crankcase and remove the drain plug (**Figure 12**).
4. Remove the oil filler cap (**Figure 10**); this will speed up the flow of oil.
5. Allow the oil to drain for at least 15-20 minutes.

NOTE

Before removing the oil filter cover, thoroughly clean off all dirt and oil around it.

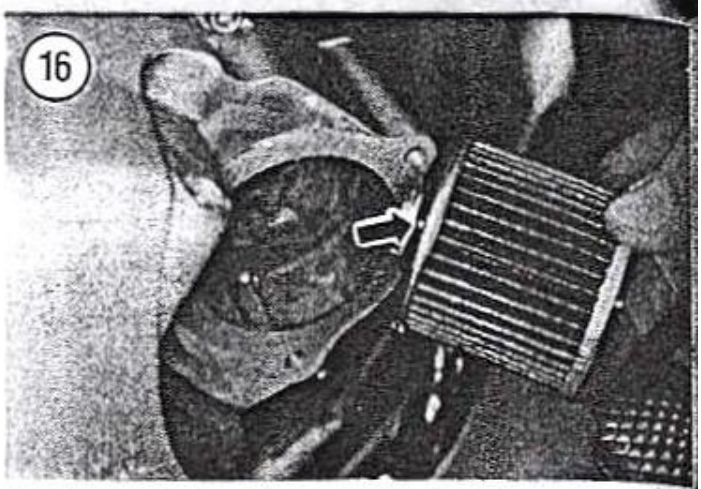
6. Remove the bolts securing the filter cover (**Figure 13**) to the crankcase.
7. Remove the cover and the filter (**Figure 14**). Discard the oil filter and clean out the cover and filter housing with cleaning solvent. Dry parts thoroughly.
8. Inspect the O-ring in the end of the cover (**Figure 15**) and replace if necessary.

NOTE

Prior to installing the cover, clean off the mating surface of the crankcase—do not allow any dirt to enter the oil system.

9. Position the new oil filter with the shoulder end (**Figure 16**) going in first and install the filter.
10. Reinstall the filter cover to the crankcase and tighten the bolts to 7.2 ft.-lb. (10 N•m).
11. Install the drain plug and gasket and tighten to 31 ft.-lb. (43 N•m).

12. Fill the crankcase with the correct weight (**Table 3**) and quantity of oil (**Table 4**).
13. Screw the oil filler cap on securely.
14. Start the engine and allow it to idle. Check for leaks.
15. Turn the engine off and allow the oil to settle. Check for correct oil level (**Figure 9**); adjust if necessary.

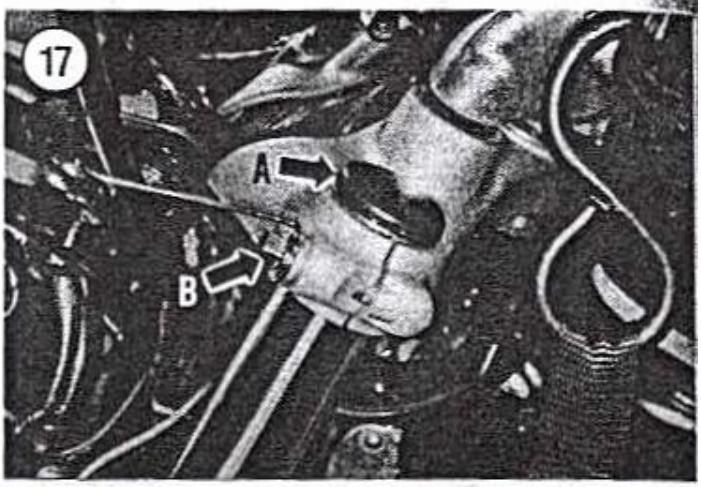


Front Fork Oil Change

1. Place the bike on the sidestand.

CAUTION

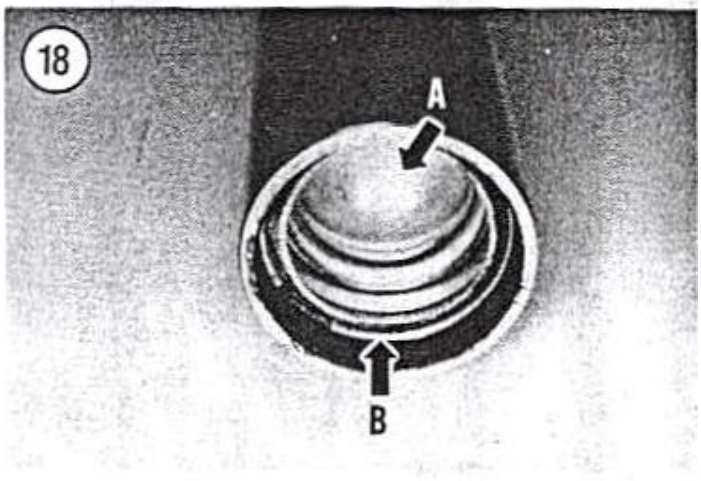
If the bike has been subjected to frequent rain or moisture or if the bike has been in storage for any period of time, moisture may have passed by the trim cap causing rust. Any rust must be removed prior to removing any upper fork parts during this procedure. If any rust particles drop down into the fork assembly the fork must be removed, disassembled and thoroughly cleaned prior to refilling with fresh fork oil. After removing the trim cap, if rust is present, scrape it clean, blow the rust residue out with compressed air and apply WD-40, or equivalent, then remove the stopper ring and spring seat.



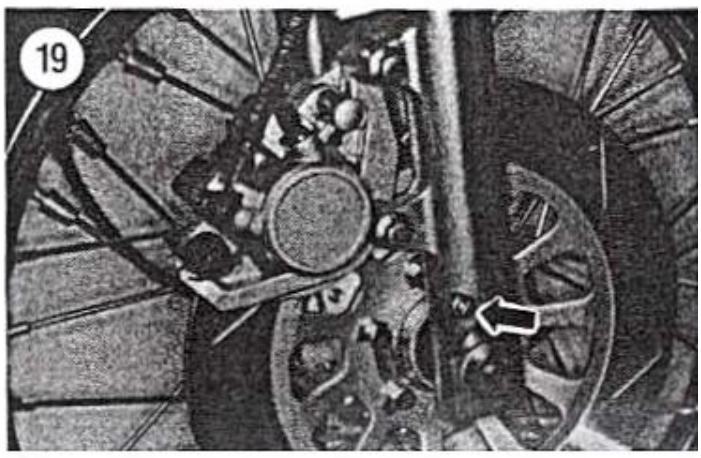
2. Remove the fork trim cap (A, **Figure 17**).
3. Loosen the top fork tube pinch bolt (B, **Figure 17**).

NOTE

***Figure 18** is shown with the fork assembly removed for clarity. It is not necessary to remove the fork assembly for this procedure.*



4. The spring seat and spring are held in position by a stopper ring. To remove the stopper ring, have an assistant depress the spring seat (A, **Figure 18**) using a suitable size drift.
5. Remove the stopper ring (B, **Figure 18**) from its groove in the fork with a small screwdriver. Discard the stopper ring as a new one must be installed.
6. When the stopper ring is removed, release tension from the spring seat and remove it.
7. Place a drip pan under the fork and remove the drain screw and washer (**Figure 19**). Allow the oil to drain for at least 5 minutes.



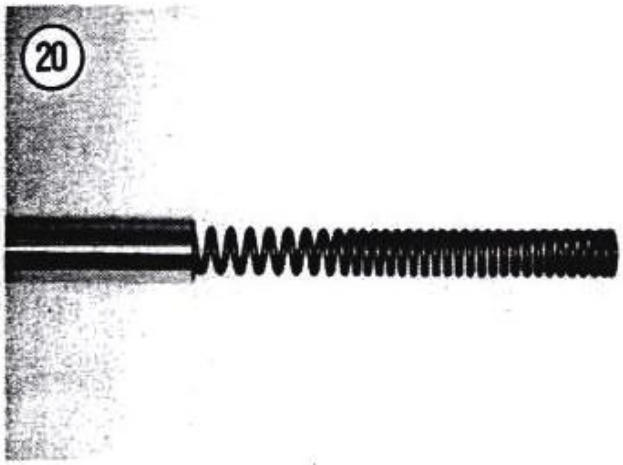
WARNING

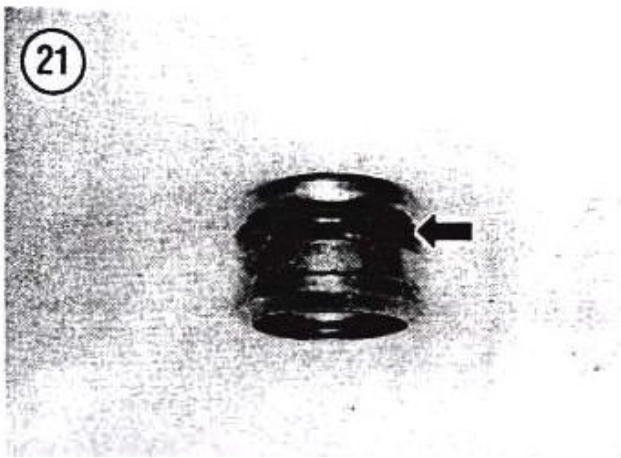
Do not allow the fork oil to come in contact with any of the brake components.

8. Place a shop cloth around the top of the fork tube, the handlebar and the upper fork bridge to catch remaining fork oil while the fork spring is removed. Withdraw the fork spring from the fork tube.
9. With both of the bike's wheels on the ground, have an assistant steady the bike. Then push the front end down and allow it to return. Perform this procedure until all the oil is expelled from the fork tube.
10. Install the drain screw and washer (**Figure 19**) and tighten securely.
11. Fill the fork tube with the correct amount (**Table 4**) and weight (**Table 3**) of fork oil.

NOTE

In order to measure the correct amount of fluid, use a baby bottle. These bottles have measurements in fluid ounces (oz.) and cubic centimeters (cc) imprinted on the side.





NOTE

***Figure 20** is shown with the fork assembly removed for clarity. It is not necessary to remove the fork assembly for this procedure.*

12. Position the fork spring with the narrow pitch coils toward the top and install the fork spring (**Figure 20**).
13. Inspect the O-ring seal (**Figure 21**) on the spring seat; replace if necessary.

CAUTION

Always install a new stopper ring during assembly. This is necessary in order to hold the spring seat securely in place.

14. Install the spring seat. Have an assistant compress the spring seat and install a *new* stopper ring. Make sure the stopper ring seats fully in the groove in the fork tube before releasing the spring seat.
15. Install the trim cap.
16. Repeat Steps 2-15 for the opposite side.
17. Road test the bike and check for oil leaks.

PERIODIC MAINTENANCE

Front Disc Brake

The hydraulic brake fluid in the disc brake master cylinder should be checked every month. The disc brake pads should be checked at the intervals specified in **Table 1**. Replacement is described in Chapter Ten.

Disc Brake Fluid Level

The brake fluid on these models is visually monitored by observing the fluid level in the reservoir (**Figure 22**). The level is corrected by adding fresh brake fluid.

1. The fluid level in the reservoir should be maintained above the lower level line (**Figure 22**). If necessary, correct the level by adding fresh brake fluid. Remove the cover screws and cover (**Figure 23**) and lift the diaphragm out of the housing.

WARNING

Use brake fluid from a sealed container and clearly marked DOT 3 only (specified for disc brakes). Others may vaporize and cause brake failure. Do not

intermix different brands or types of brake fluid as they may not be compatible. Do not intermix a silicone based (DOT 5) brake fluid as it can cause brake component damage leading to brake system failure.

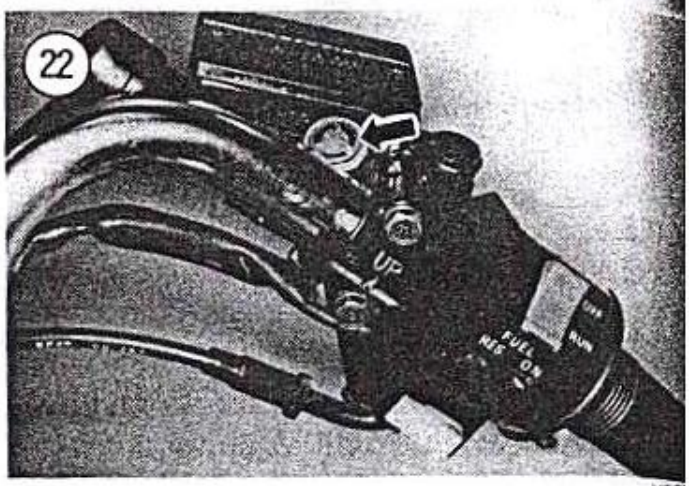
CAUTION

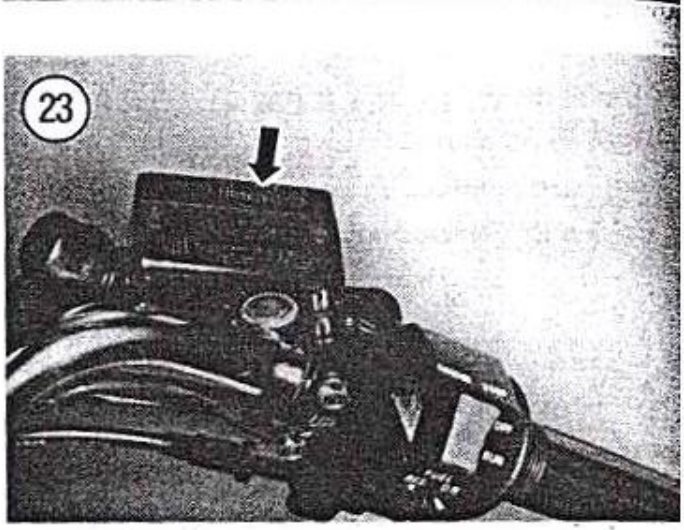
Be careful not to spill brake fluid on painted or plated surfaces as it will destroy the surface. Wash immediately with soapy water and thoroughly rinse it off.

2. Reinstall all parts and tighten the cover screws securely.

NOTE

If the brake fluid was so low as to allow air in the hydraulic system, the brakes will have to be bled. Refer to Chapter Ten in the front section of this manual.



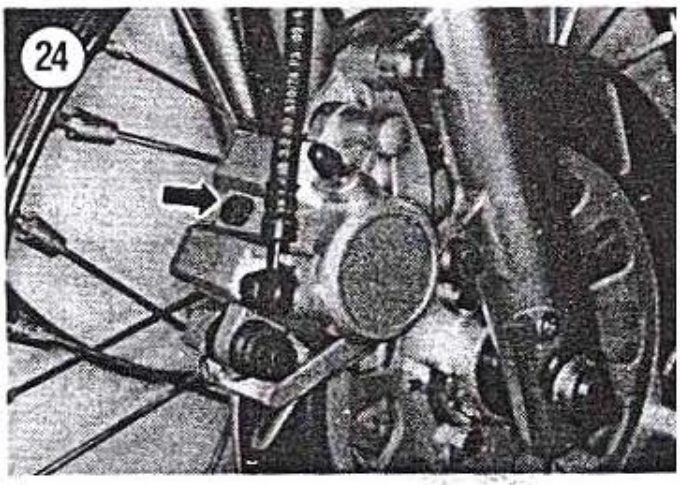


Disc Brake Pad Wear

Inspect the brake pads for excessive or uneven wear, scoring, and oil or grease on the friction surface.

If any of these conditions exist, replace the pads as described under *Brake Pad Replacement* in Chapter Ten, in this section of this manual.

To inspect, remove the plug (**Figure 24**) on top of the caliper and observe the thickness on each pad. If the pads are worn to a thickness of 0.03 in. (0.8 mm) or less, they must be replaced.



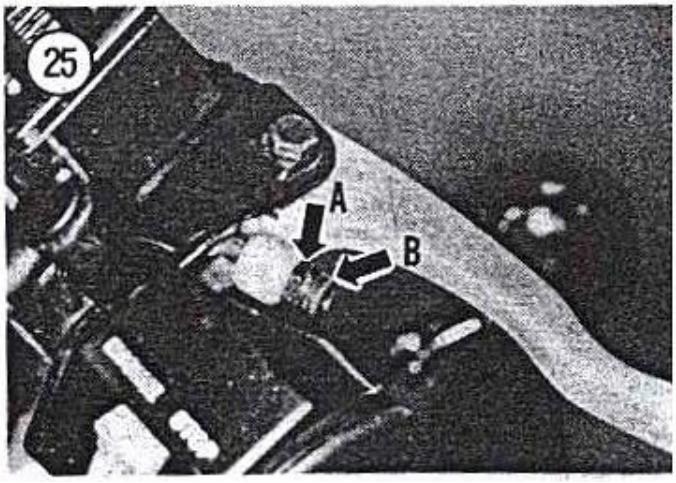
Front Brake Lever Adjustment

An adjuster is provided to maintain the front brake lever free play.

1. Loosen the adjuster locknut (A, **Figure 25**) and turn the adjuster (B, **Figure 25**) to obtain a free play measurement of 0.08-0.20 in. (2-5 mm). Tighten the locknut securely.

NOTE

Free play is the distance the lever travels from the at-rest position to the applied position when the master cylinder is depressed by the lever adjuster.



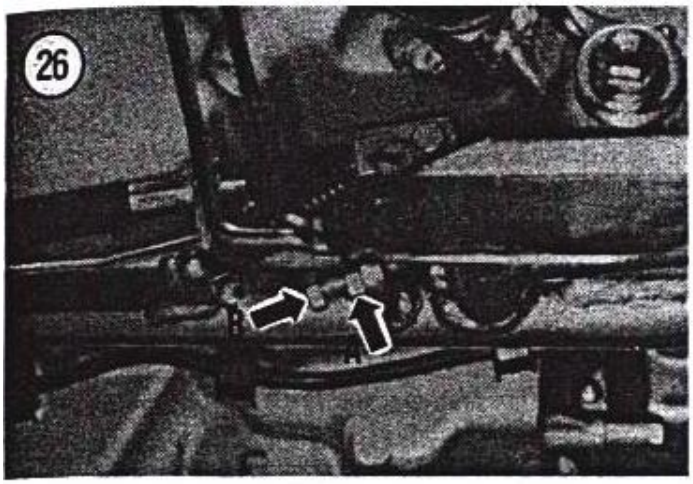
2. Rotate the front wheel and check for brake drag. Also operate the brake lever several times to make

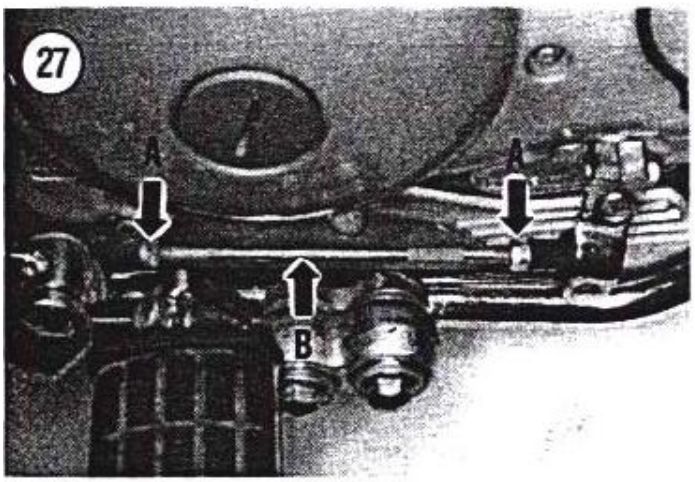
sure it returns to the at-rest position immediately after release.

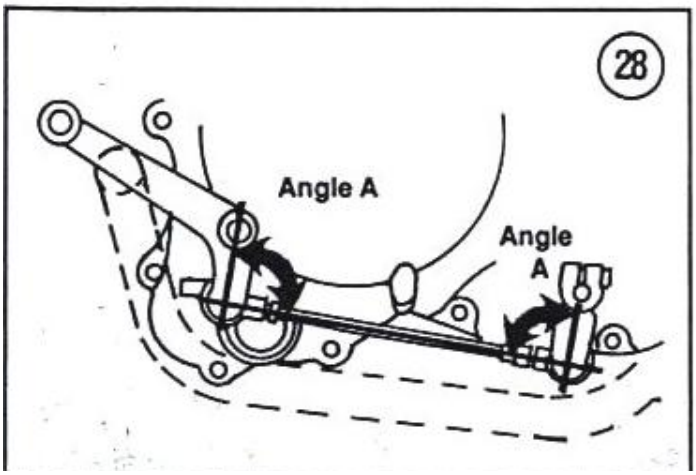
Rear Brake Pedal Height Adjustment

The rear brake pedal height should be adjusted at the intervals specified in **Table 1** or anytime the brake shoes are replaced.

1. Place the motorcycle on the sidestand.
2. Check to be sure the brake pedal is in the at-rest position.







3. The correct height position above the top of the foot peg is 3/4-1 1/4 in. (20-30 mm). To adjust, proceed to Step 4.
4. Loosen the locknut (A, **Figure 26**) and turn the adjusting bolt (B, **Figure 26**) to achieve the correct height. Tighten the locknut securely and adjust the free play, described in Chapter Three in the front section of the manual, and brake light, described in Chapter Seven in this section of the manual.

Gearshift Pedal Adjustment

NOTE

The adjuster rod front locknut has left-hand threads.

1. Loosen the front and rear locknuts (A, **Figure 27**) on the adjuster rod.
2. Turn the adjuster rod (B, **Figure 27**) in either direction until the top of the gearshift pedal is 2.0-2.4 in. (50-60 mm) above the top surface of the footpeg.
3. After the correct height is achieved, check the angle of the change pedal arms. They must be at a 90° angle to the adjuster rod as shown in **Figure 28**. Readjust if necessary to achieve this alignment.
4. Tighten both locknuts securely.

Clutch Adjustment

The clutch cable free play should be adjusted to obtain a free play of 3/32-1/8 in. (2-3 mm) at the intervals specified in **Table 1**.

NOTE

If you are unable to achieve the correct amount of free play adjustment using this adjustment procedure, there is an additional adjustment procedure within the clutch mechanism. Refer to Chapter Five in this section of this manual.

1. At the hand lever, slide back the clutch lever shield (**Figure 29**).
2. Loosen the locknut (A, **Figure 30**) and rotate the adjuster (B, **Figure 30**) for free play adjustment (**Figure 31**).

NOTE

If sufficient free play cannot be obtained at the hand lever, additional adjustment can be made at the lower adjuster on the crankcase.

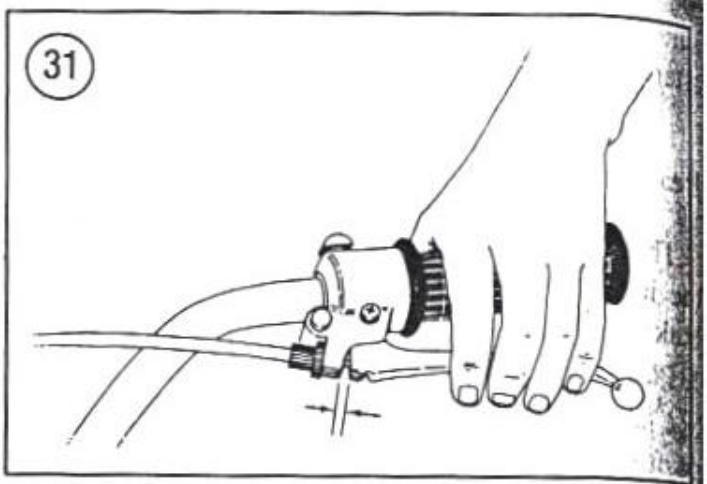
3. Completely loosen the clutch cable at the handlebar.
4. At the clutch cable lower adjuster, loosen the locknuts (A, **Figure 32**) and rotate the adjuster (B, **Figure 32**) until the correct amount of free play is achieved. For fine adjustment, repeat Step 2 if necessary.

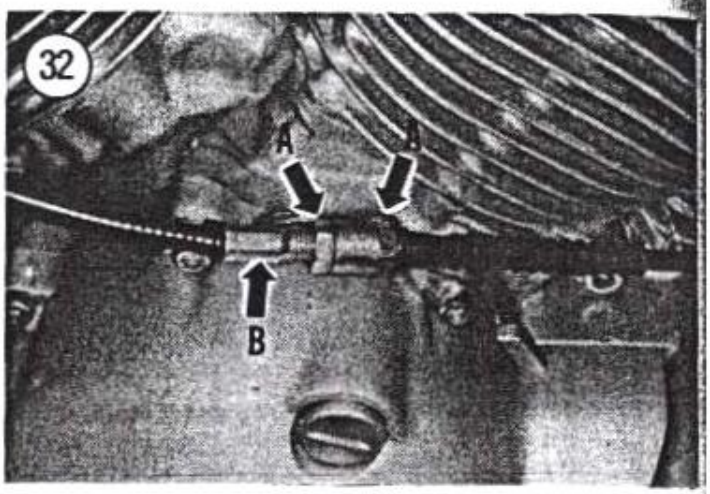
Throttle Operation/Adjustment

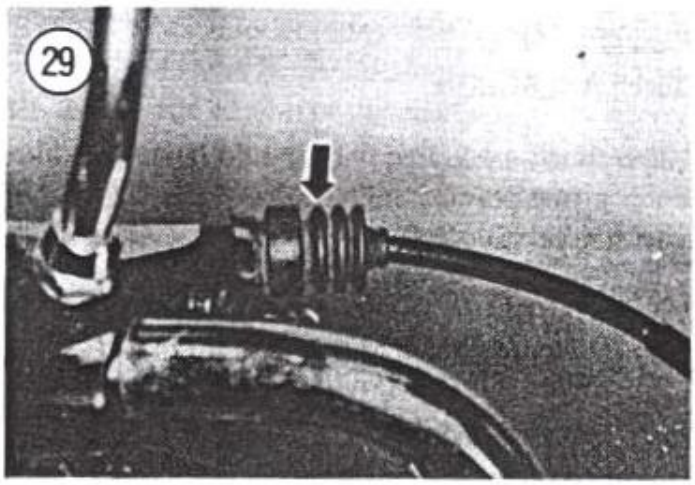
The throttle grip should have 1/8 to 1/4 in. (3-5 mm) of rotational play (**Figure 33**). Make sure there is free play in the cable so the carburetors will be able to close completely when the throttle is let off. If adjustment is necessary, loosen the cable locknut (A, **Figure 34**) and turn the adjuster (B, **Figure 34**) in or out to achieve the proper play. Tighten the locknut securely.

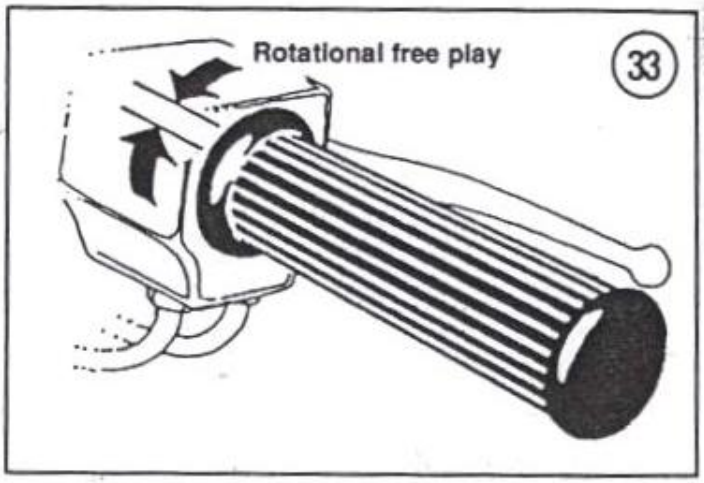
Check the throttle cable from grip to carburetors. Make sure it is not kinked or chafed. Replace it if necessary.

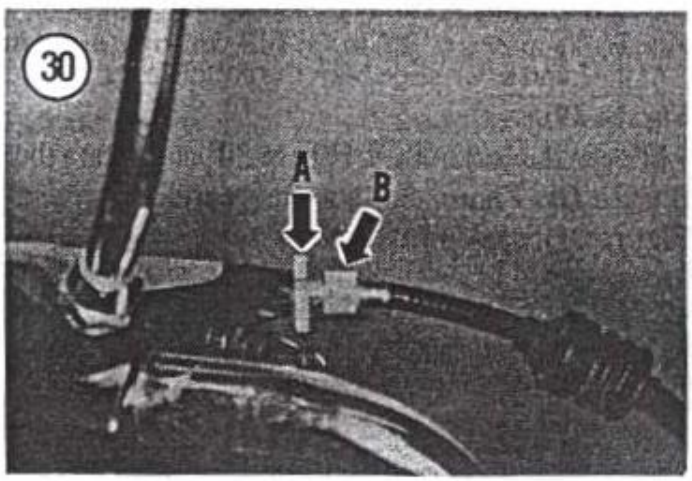
Make sure that the throttle grip rotates smoothly from fully closed to fully open. Check at center, full left and full right position of steering.

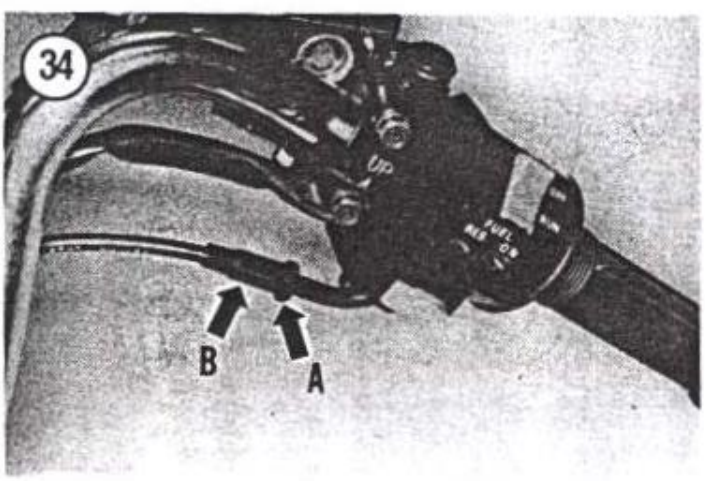


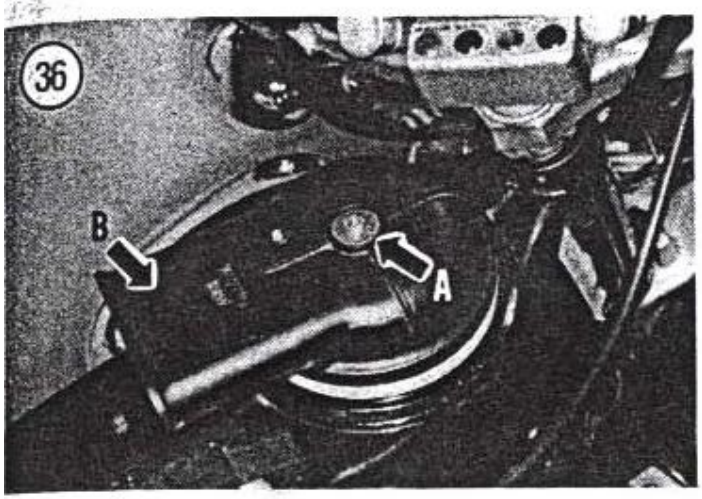


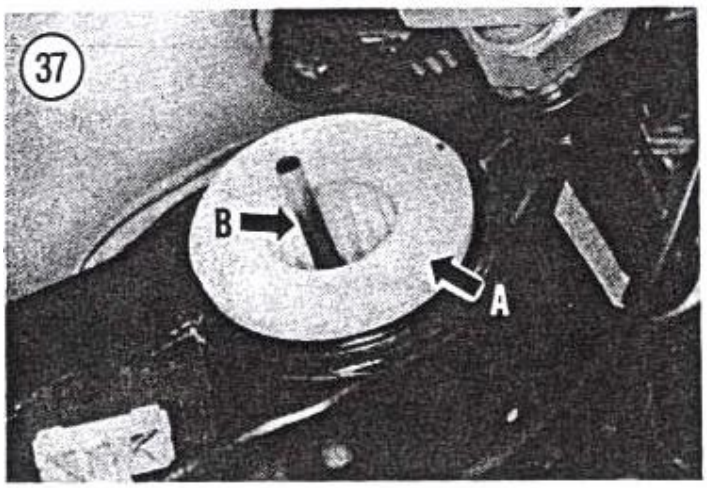












Air Cleaner Removal/Installation

A clogged air cleaner can decrease the efficiency and life of the engine. Never run the bike without the air cleaner installed; even minute particles of dust can cause severe internal engine wear.

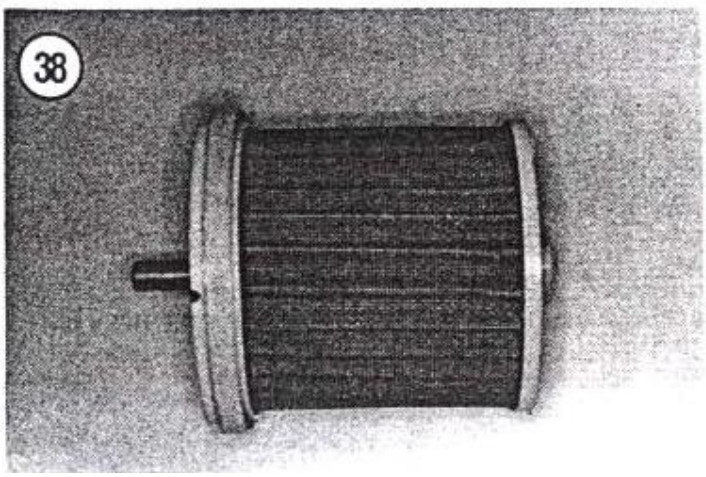
The service intervals specified in **Table 1** should be followed with general use. However, the air cleaner should be serviced more often if the bike is ridden in dusty areas.

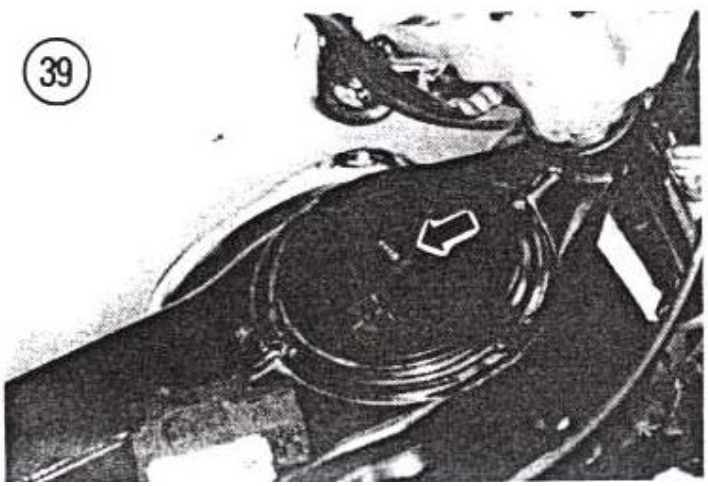
1. Place the bike on the sidestand.
2. Remove the seat(s).

3A. On 1987-1989 U.S. models and 1988 U.K. models, remove the rear bolt and front bolt on each side, securing the frame top cover and remove the cover (**Figure 35**).

3B. On 1990-on U.S. models and 1989-on U.K. models, remove the sub-fuel tank as described in Chapter Six in this section of the manual.

4. Unscrew the long bolt and remove the bolt and washer (A, **Figure 36**) securing the air cleaner cover.
5. Remove the air cleaner cover (B, **Figure 36**).
6. Remove the air cleaner element (A, **Figure 37**) and long metal tube.
7. Tap the element lightly to remove most of the dirt and dust; then apply compressed air to the *outside* surface of the element.
8. Inspect the element (**Figure 38**) and make sure it is in good condition. Replace if necessary.
9. Clean out the inside of the air box (**Figure 39**) with a shop rag and cleaning solvent. Remove any foreign matter that may have passed through a broken cleaner element.
10. When installing the air cleaner element make sure that the rubber O-ring gasket (**Figure 40**) seats against the air box properly. Also align the hole in the filter with the threaded hole in the lower mount-





ing bracket and install the long metal tube (B, **Figure 37**).
11. Install the cover and position it so the intake lip touches the projection on the frame (**Figure 41**).
12. Install the long bolt and washer and tighten the bolt securely.
13. Install the frame top cover, or sub-fuel tank and the seat(s).

Front Suspension Check

1. Apply the front brake and pump the fork up and down as vigorously as possible. Check for smooth operation and check for any oil leaks.
2. Make sure the upper (A, **Figure 42**) and lower (B, **Figure 42**) fork bridge bolts are tight.
3. Remove the trim caps and check the tightness of the 4 Allen bolts securing the handlebar upper holders (**Figure 43**) and handlebar.
4. Check that the front axle pinch bolt (A, **Figure 44**) and the front axle (B, **Figure 44**) are tight.

CAUTION

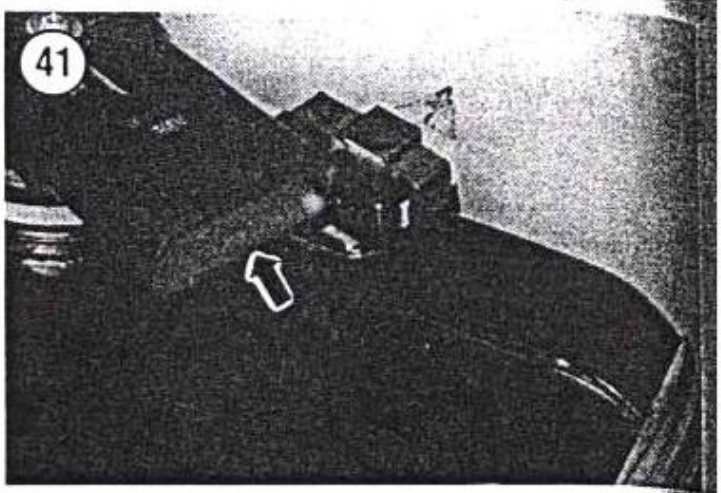
If any of the previously mentioned bolts and nuts are loose, refer to Chapter Eight, in this section of the manual, for correct procedures and torque specifications.

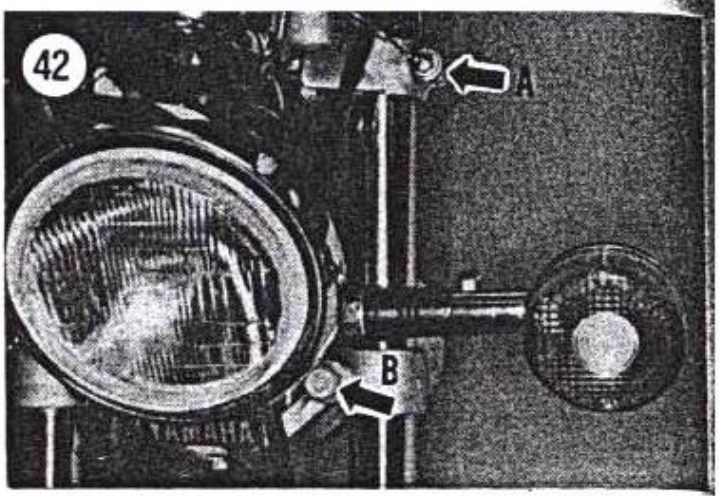
Rear Suspension Check

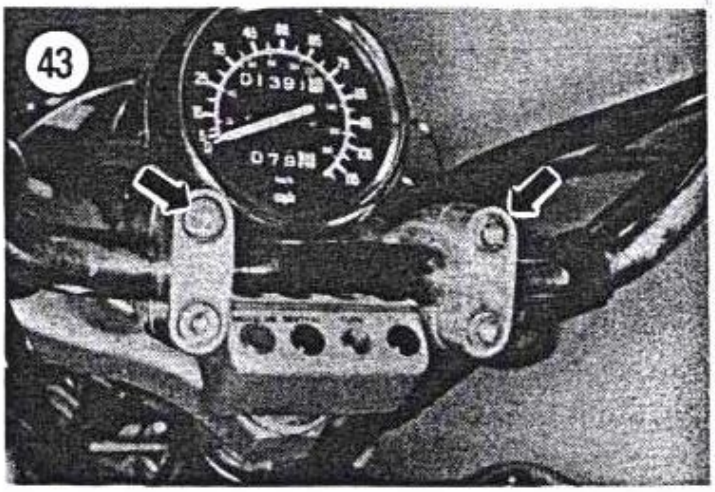
1. Place the bike on the sidestand.
2. Push hard on the rear wheel sideways to check for side play in the rear swing arm bushings or bearings.

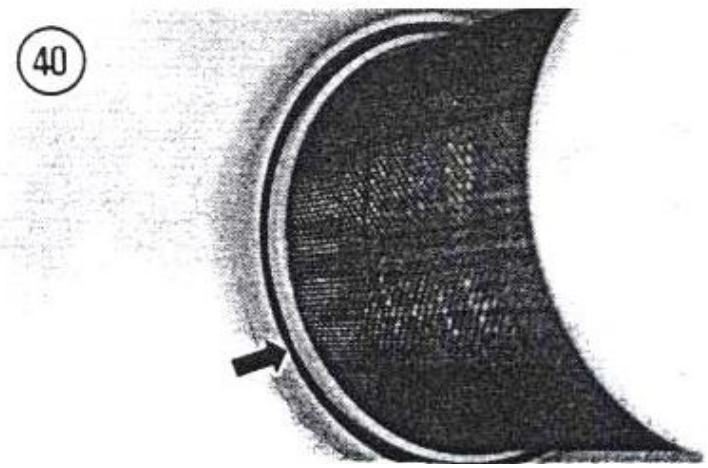
NOTE

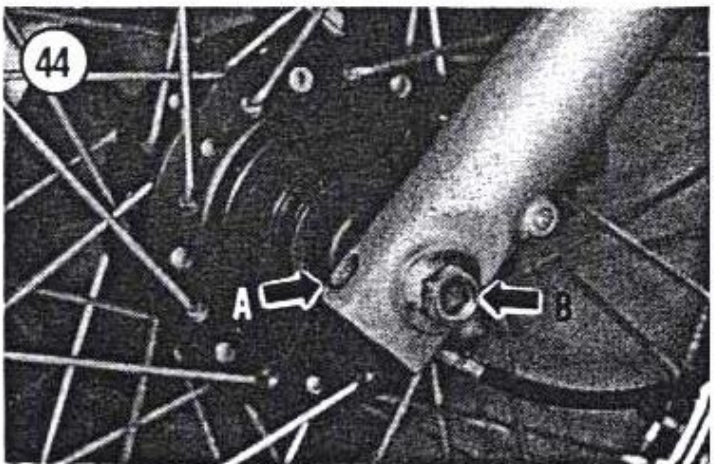
***Figure 45** and **Figure 46** are shown with the rear wheel removed for clarity.*

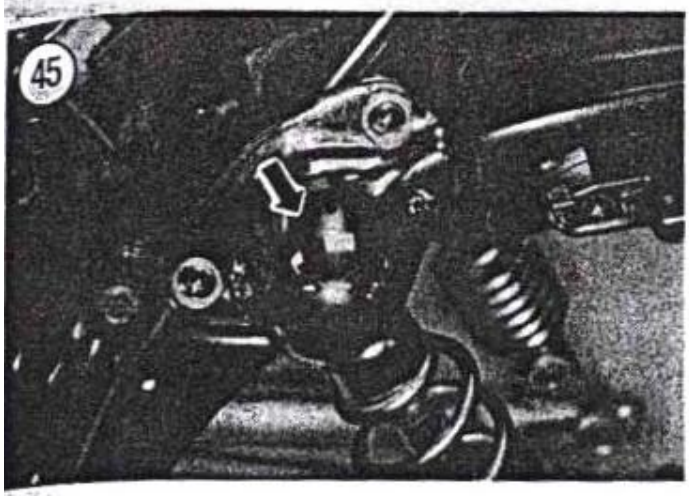


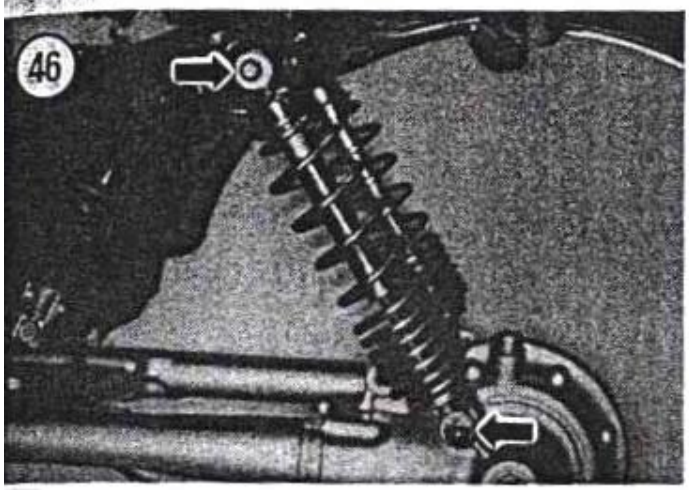


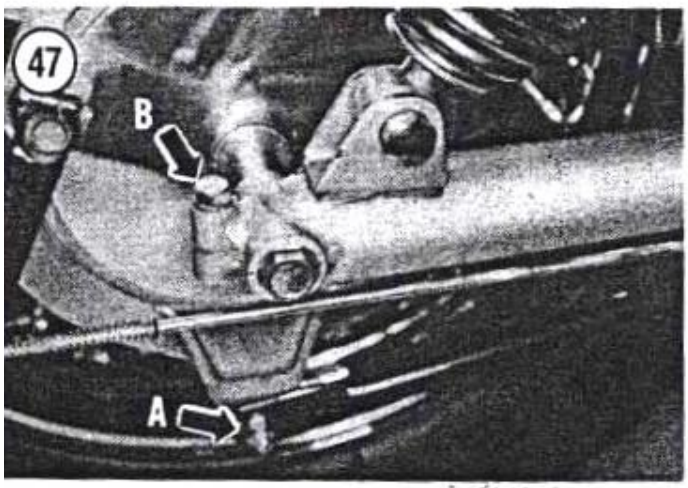












3. Remove the top cover (**Figure 45**) and check the tightness of the upper and lower shock absorber mounting nuts and bolts (**Figure 46**).
4. Check the tightness of the rear brake torque arm bolts (A, **Figure 47**).
5. Make sure the rear axle nut is tight and the cotter pin is still in place (**Figure 48**).
6. Make sure the rear axle pinch bolt (B, **Figure 47**) is tight.
7. Check the tightness of the swing arm pivot bolt (**Figure 49**) and that the tab on the lockwasher is up against one flat of the bolt head.

CAUTION

If any of the previously mentioned nuts or bolts are loose, refer to Chapter Nine, in this section of the manual, for correct procedures and torque specifications.

TUNE-UP

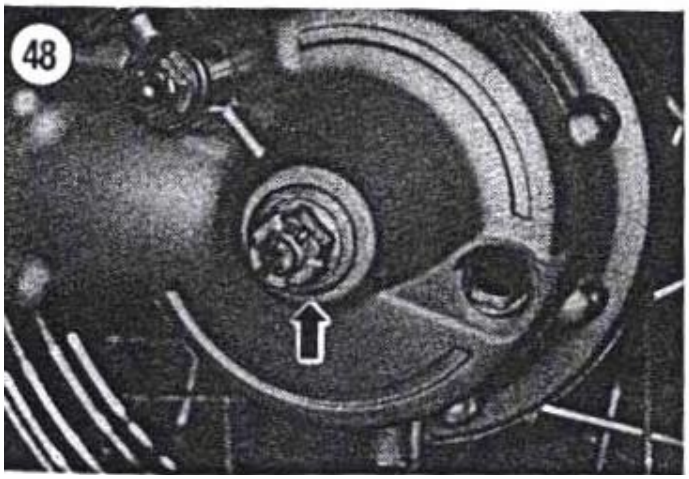
A complete tune-up restores performance and power that is lost due to normal wear and deterioration of engine parts. Because engine wear occurs over a combined period of time and mileage, the engine tune-up should be performed at the intervals specified in **Table 1**. More frequent tune-ups may be required if the bike is ridden primarily in stop-and-go traffic.

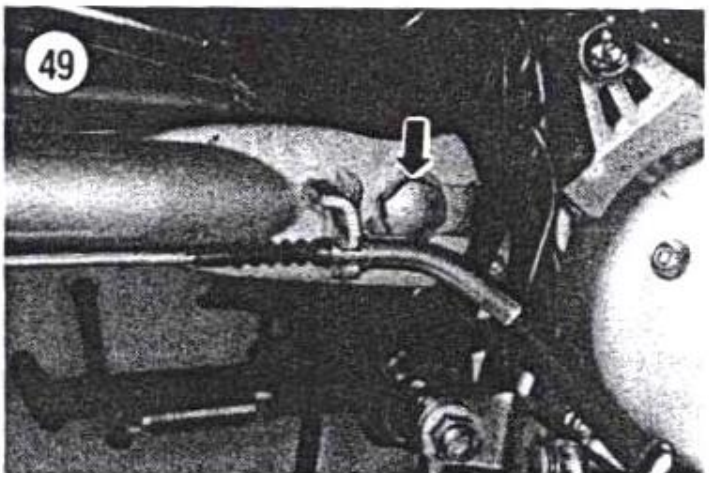
Table 5 summarizes tune-up specifications.

Before starting a tune-up procedure, make sure to first have all new parts on hand.

Because different systems in an engine interact, the procedures should be done in the following order:

a. Clean or replace the air cleaner element.
b. Adjust valve clearances.





c. Check engine compression.
d. Check or replace the spark plugs.
e. Check the ignition timing.
f. Synchronize carburetors and set idle speed.

Tools

To perform a tune-up on your Yamaha, you will need the following tools:

a. Spark plug wrench.
b. Socket wrench and assorted sockets.
c. Flat feeler gauge.
d. Compression gauge.
e. Spark plug wire feeler gauge and gapper tool.
f. Ignition timing light.
g. Carburetor synchronization tool—to measure manifold vacuum.

Air Cleaner Element

The air cleaner element should be cleaned or replaced prior to doing other tune-up procedures, as described in this chapter.

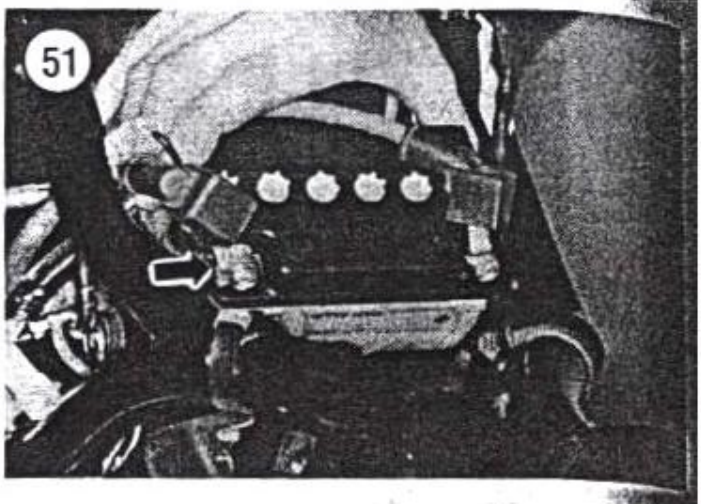
Valve Adjustment

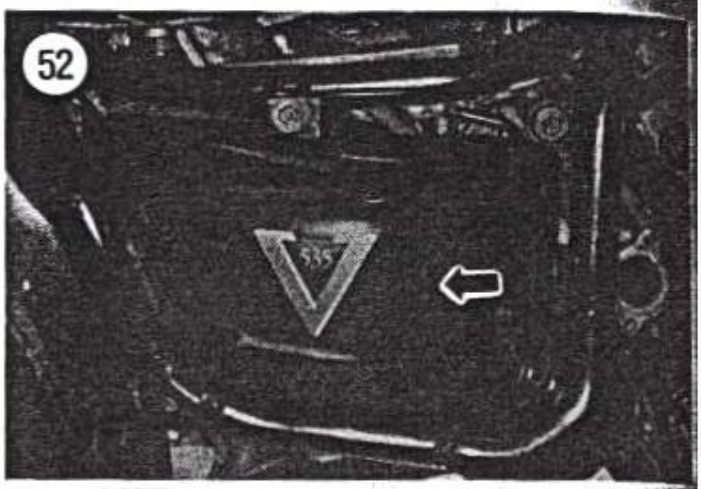
Valve clearance measurement must be made with the engine cool, at room temperature.

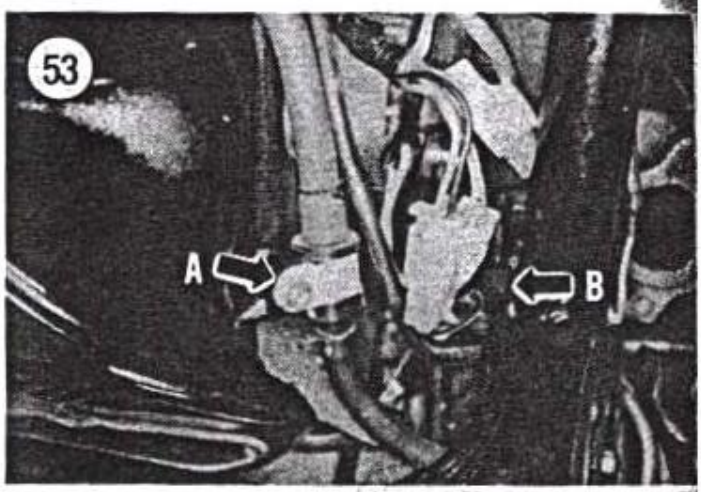
1. Remove the seat.

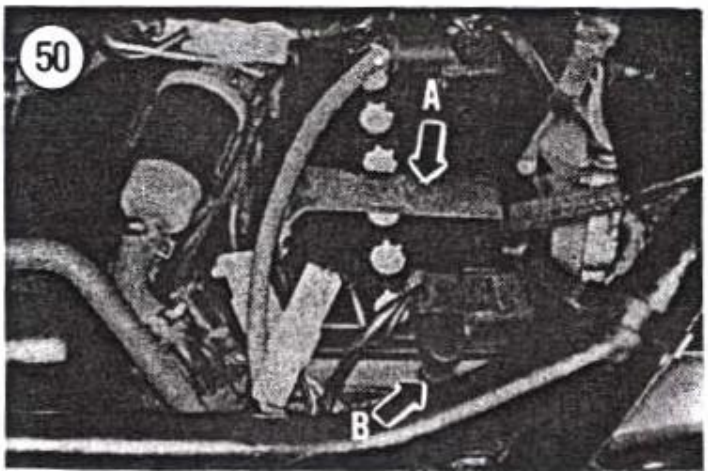
2A. On 1987-1989 U.S. models and 1988 U.K. models, remove the rear bolt and front bolt on each side securing the frame top cover and remove the cover (**Figure 35**).

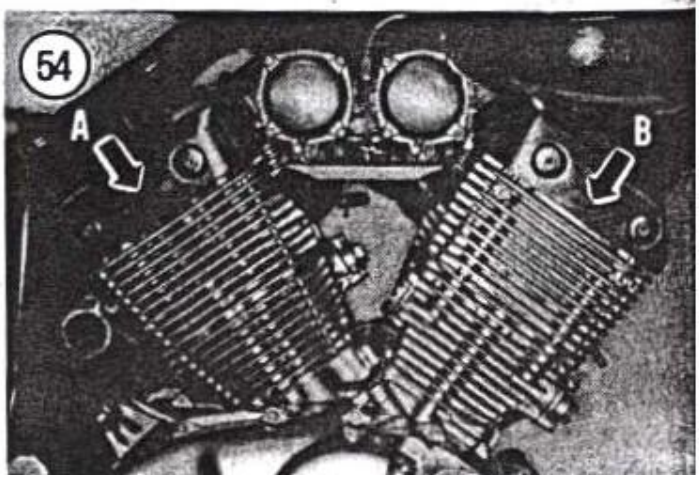
2B. On 1990-on U.S. models and 1989-on U.K. models, remove the sub-fuel tank as described in Chapter Six in this section of the manual.

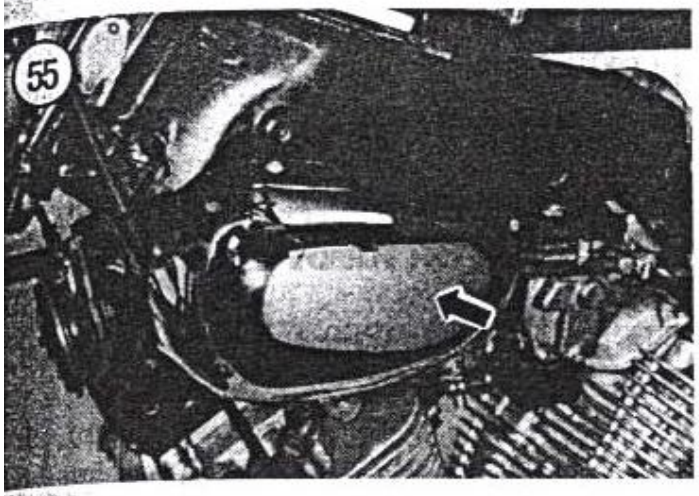


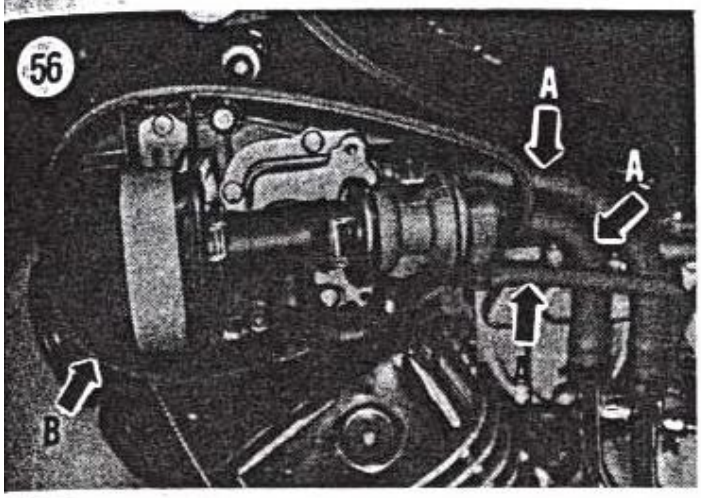


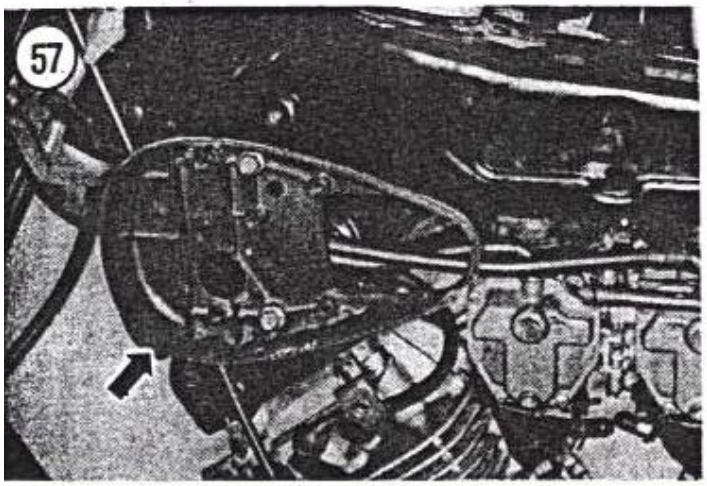


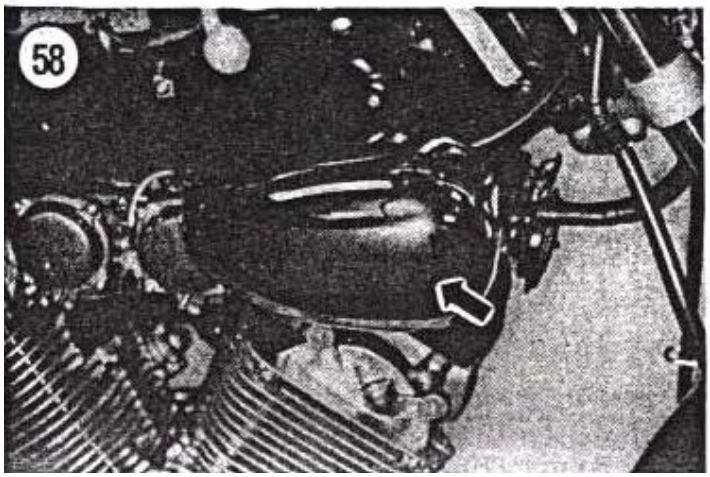












3. Unhook the battery strap (A, **Figure 50**).
4. Disconnect the battery vent tube (B, **Figure 50**).
5. Pull the battery part way up out of the battery box to gain access to the battery cable attachment points.
6. Disconnect the negative (–) battery cable (**Figure 51**) from the battery.
7. Remove the frame right-hand side cover (**Figure 52**).
8. Disconnect the fuel hose from the frame clamp (A, **Figure 53**) and move it out of the way.
9. Carefully pull the starter relay (B, **Figure 53**) from its frame mount and move it out of the way. Do not disconnect the cables from the relay.
10. Remove the battery as described in this chapter.
11. From the rear cylinder, remove the following:
    a. The cylinder head side cover (A, **Figure 54**) from each side.
    b. The spark plug (this makes it easier to turn over the engine by hand).
    c. The intake and exhaust valve adjuster covers.
12. Remove both frame side covers.
13. Remove bolts securing the left-hand side cover (**Figure 55**) and remove the cover.

14A. On models equipped with the air injection system, disconnect the hoses (A, **Figure 56**) from the air injection system and remove the left-hand bracket assembly (B, **Figure 56**) with the system components still attached to it.

14B. On all other models, remove the bracket (**Figure 57**).

15. Remove bolts securing the right-hand side cover (**Figure 58**) and electrical component bracket (**Figure 59**) and move the bracket assembly out of the way.
16. From the front cylinder, remove the following:
    a. The cylinder head side cover (B, **Figure 54**) from each side.
    b. The spark plug (this makes it easier to turn over the engine by hand).
    c. The intake and exhaust valve covers (**Figure 60**).
17. On the left-hand crankcase cover, remove the timing hole cover (A, **Figure 61**) and the crankshaft cover (B, **Figure 61**).
18. Rotate the engine by turning the crankshaft *clockwise*. Use a socket on the bolt (**Figure 62**) located on the left-hand end of the crankshaft. Continue to rotate the crankshaft until the "T" mark on the rotor for the *rear cylinder* (**Figure 63**) is aligned with the crankcase cover stationary pointer as

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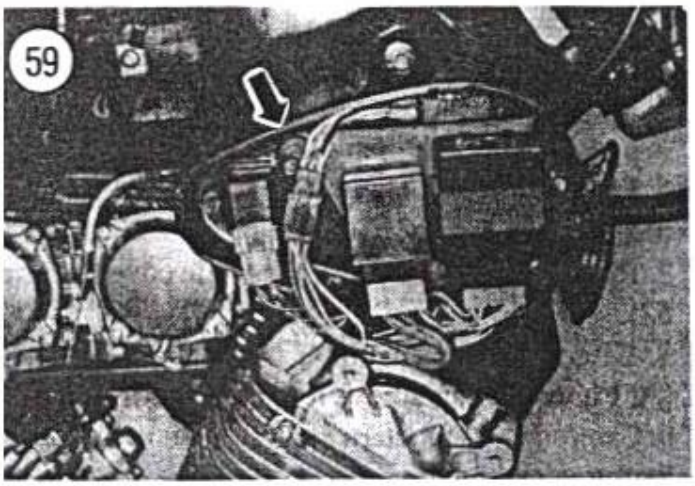

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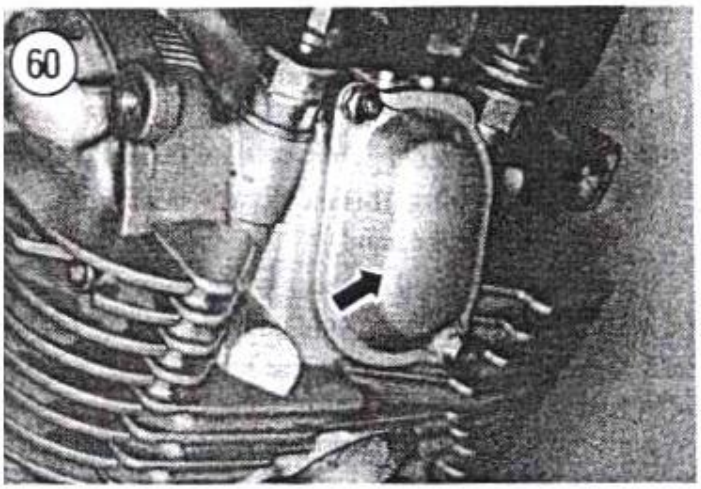

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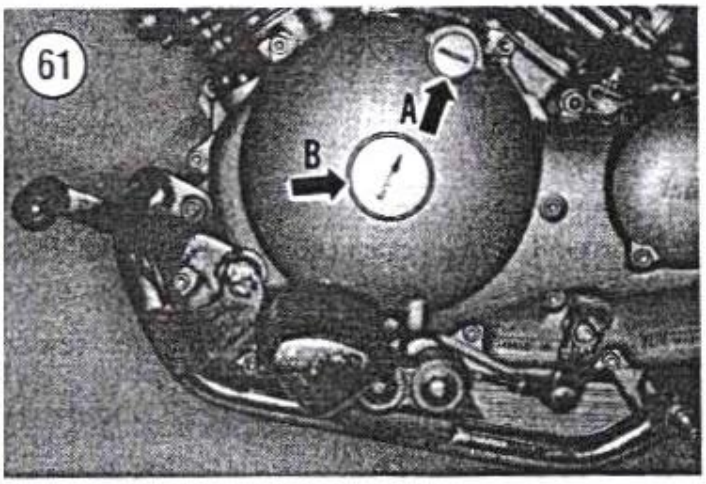

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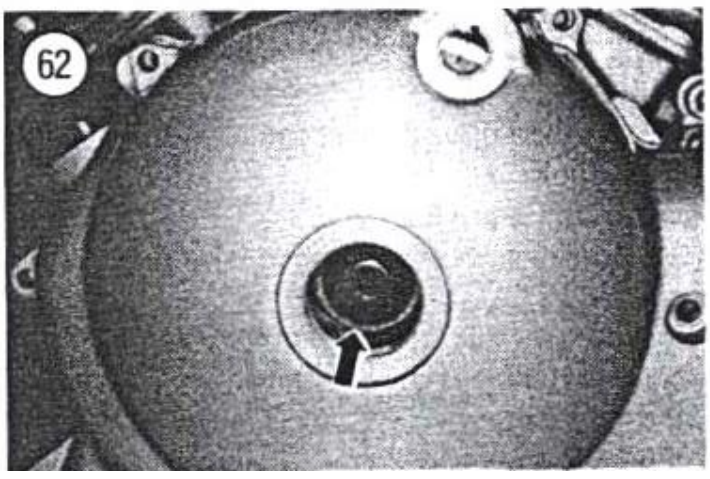

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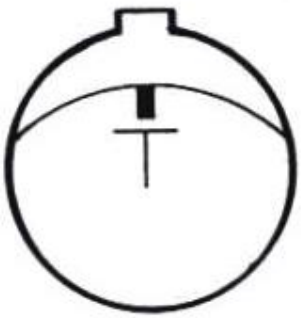
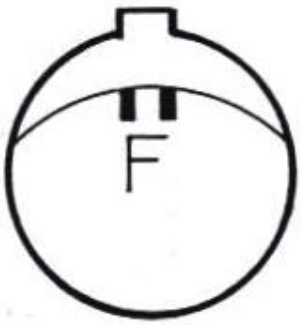
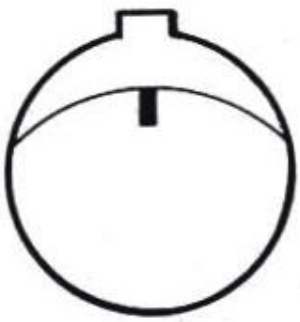
TDC FOR REAR CYLINDER



FIRING RANGE FOR REAR CYLINDER



TDC FOR FRONT CYLINDER



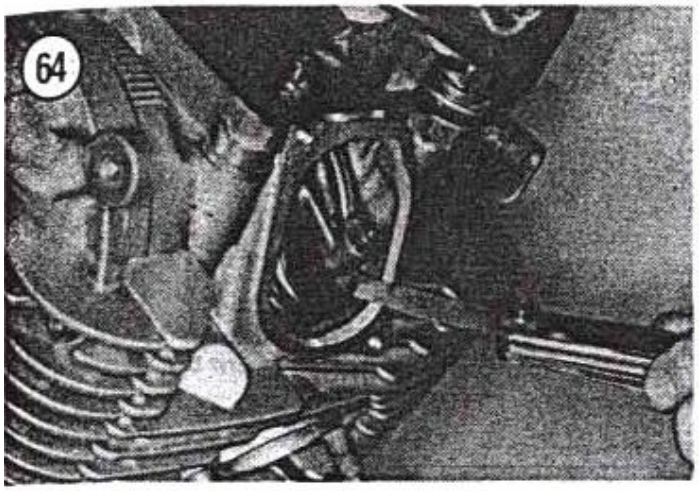
viewed through the timing window in the left-hand crankcase cover. The *rear cylinder* is now at top dead center (TDC) on the compression stroke.

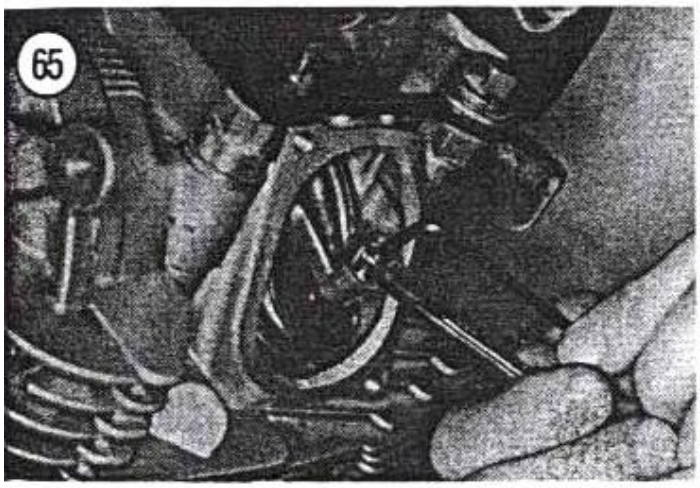
19. Check that there is free play in both the intake and exhaust valve for the *rear cylinder*. If not, rotate the crankshaft an additional 360° *clockwise*.

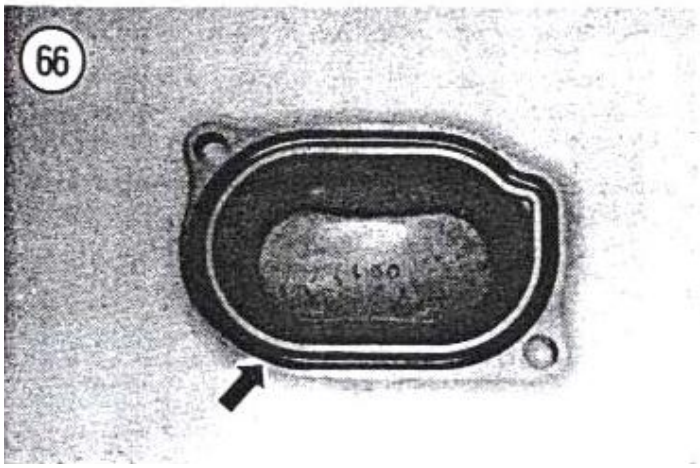
20. The correct clearance is as follows:

a. Exhaust valves: 0.005-0.007 in. (0.12-0.17 mm).

b. Intake valves: 0.003-0.005 in. (0.07-0.12 mm).







NOTE

The exhaust valves are located next to the exhaust pipes and the intake valves are located next to the carburetor assembly.

21. Insert a feeler gauge between exhaust valve rocker arm adjuster screw and valve stem (**Figure 64**). The clearance is correct when there is a slight drag on the feeler gauge when it is inserted and withdrawn. Repeat for the intake valve.

22. To correct the clearance, perform the following:

a. Loosen the valve adjuster locknut (**Figure 65**).

b. Turn the adjuster in or out to obtain the correct clearance.

c. When the correct clearance is obtained, tighten the locknut securely and recheck the clearance.

d. Repeat for the opposite valve.

23. Rotate the engine by turning the crankshaft *clockwise*. Use a socket on the nut located on the left-hand end of the crankshaft. Continue to rotate the crankshaft until the slit in the rotor for the *front cylinder* (**Figure 63**) is aligned with the crankcase cover stationary pointer as viewed through the timing window in the left-hand crankcase cover. The *front cylinder* is now at top dead center (TDC) on the compression stroke.

24. Repeat Steps 18-22 to adjust the front cylinder's intake and exhaust valves.

25. Install all items removed in the reverse order of removal. Make sure the O-ring seal (**Figure 66**) is in place in the valve adjuster cover. Replace if necessary.

Correct Spark Plug Heat Range

Spark plugs are available in various heat ranges that are hotter or colder than the spark plugs originally installed at the factory.

Select plugs in a heat range designed for the loads and temperature conditions under which the engine will operate. Using incorrect heat ranges, however, can cause piston seizure, scored cylinder walls or damaged piston crowns.

The standard heat range spark plugs are found in

Ignition Timing

Timing is set on all models and is not adjustable. The following procedure is used to check ignition timing only.

It is only necessary to check the timing on the rear cylinder. If it is found correct, the front cylinder will automatically be correct.

NOTE

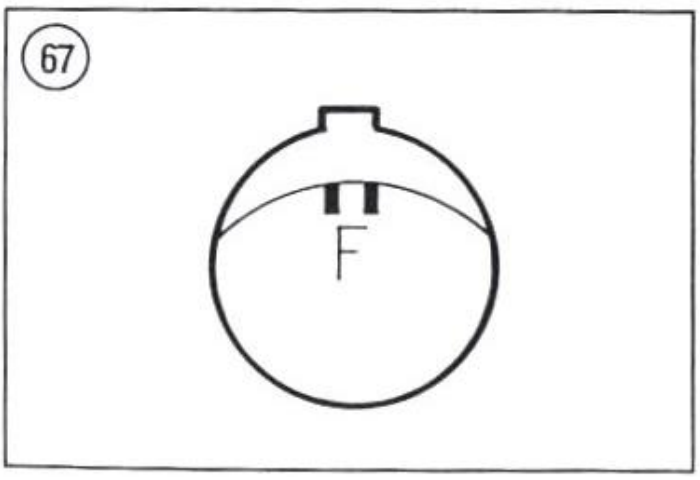
Before starting this procedure, check all electrical connections related to the ignition system. Make sure all connections are tight and free of corrosion and that all ground connections are tight.

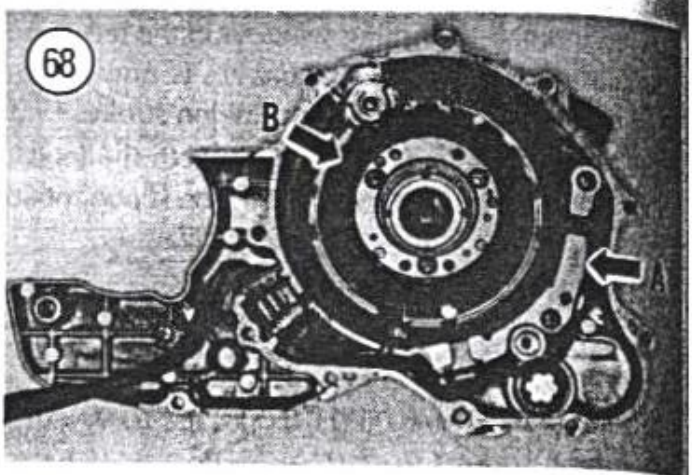
1. Place the bike on the sidestand.
2. Remove the timing cover (A, **Figure 61**) on the left-hand crankcase cover.
3. Connect a portable tachometer following the manufacturer's instructions.
4. Connect a timing light to the rear cylinder following the manufacturer's instructions.

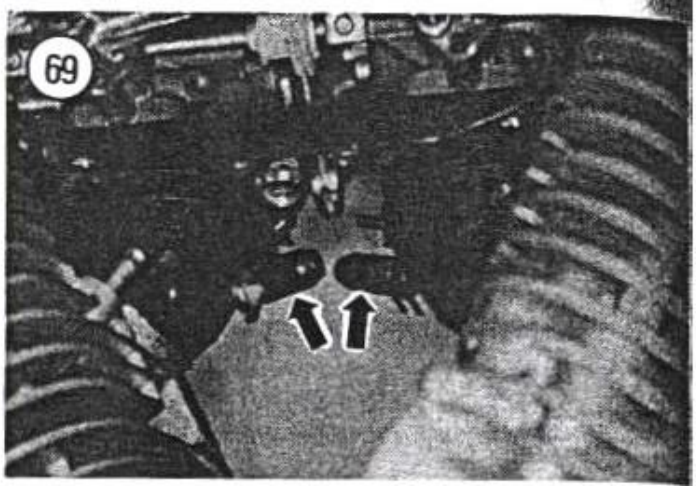
CAUTION

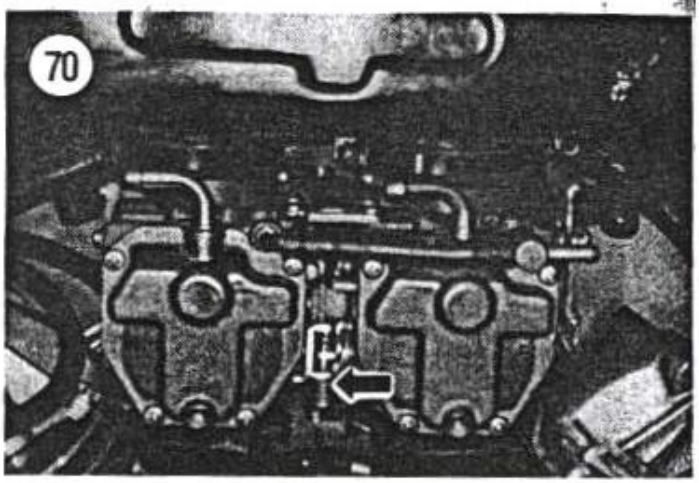
When attaching the timing light to the spark plug wire, do not puncture the wire or cap with the timing light probe. This would cause excessive wire resistance from the separation of the wire conductor and/or high-voltage leakage to ground due to damage of the plug wire insulation. In either case, engine miss-firing would result.

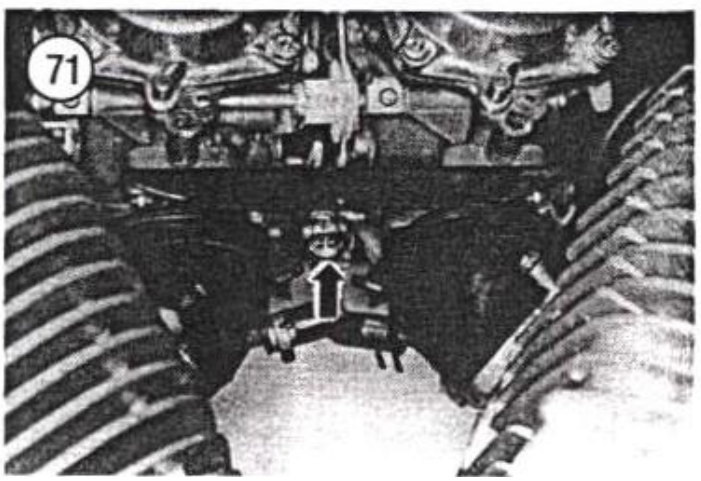
5. Start the engine and let it warm up to normal operating temperature. Bring the engine speed to 1,200 rpm and aim the timing light toward the timing marks on the timing plate.











6. The stationary pointer should align with the "F" mark on the timing plate (**Figure 67**). If not, remove the alternator cover as described in Chapter Seven, in this section of the manual, and check the pick-up (A, **Figure 68**) and stator (B, **Figure 68**) assembly screws for tightness. If these are tight, refer to Chapter Seven, in this section of the manual, for ignition system troubleshooting. Ignition timing cannot be adjusted on these models.

Carburetor Synchronization

A vacuum gauge (Chapter One) must be used to synchronize the carburetors.

NOTE

Prior to synchronizing the carburetors, the ignition timing must be checked and the valve clearance properly adjusted.

1. Place the bike on the sidestand.
2. Start the engine and let it reach normal operating temperature. Then turn it off.
3. Disconnect the small vacuum plug cap from each carburetor joint (**Figure 69**).
4. Connect the vacuum gauge to both carburetor vacuum port joints following the manufacturer's instructions.
5. Start the engine and allow it to idle at 1,140-1,250 rpm.
6. The carburetors are synchronized if they have the same gauge readings. If not, turn the synchronizing screw (**Figure 70**) and balance the rear carburetor to the front carburetor until the gauge readings are the same.
7. Rev the engine several times to make sure the readings remain the same.
8. Turn the engine off and disconnect the vacuum gauge from the carburetors.
9. Install the small vacuum plug cap onto each carburetor joint (**Figure 69**) and make sure it is secured in place.

Carburetor Idle Speed Adjustment

Before making this adjustment, the air cleaner must be clean, the carburetors must be synchronized and the engine must have adequate compression. Otherwise this procedure cannot be done properly.

1. Attach a portable tachometer following the manufacturer's instructions.
2. Start the engine and let it warm up to normal operating temperature.
3. Set the idle speed by turning the carburetor throttle stop screw (**Figure 71**) *in to increase* or *out to decrease* idle speed.
4. The correct idle speed is listed in **Table 5**.

Table 1 MAINTENANCE SCHEDULE*

Initial 600 miles (1,000 km) or 1 month	**Change engine oil and oil filter** **Inspect valve clearance, adjust if necessary** **Check front and rear brake lever and pedal free play; adjust if required** **Check front brake pads and rear brake shoe thickness; replace as required** **Adjust clutch lever free play** **Lubricate speedometer and control cables** **Change final gear oil** **Check sidestand switch operation**

(continued)

Table 1 MAINTENANCE SCHEDULE (continued)*

Every 4,400 miles (7,000 km) or 7 months	Inspect valve clearance; adjust if necessary Check, clean and regap spark plugs Change engine oil and oil filter Check crankcase breather hose for tightness and damage Inspect fuel lines for deterioration, chafed, cracked or swollen ends; replace if necessary Inspect the exhaust system for leaks; tighten bolts and nuts if necessary Synchronize the carburetors Check idle speed; adjust if necessary Check front brake pads and rear brake shoe thickness; replace as required Adjust clutch lever free play Check oil level in final drive unit Lubricate speedometer and control cables Clean and inspect air filter element with compressed air, replace if necessary Lubricate rear brake pedal, shift lever and sidestand Check front fork oil seal for leakage Check steering stem for looseness Check tire and wheel condition Check wheel bearings for smooth operation Check battery fluid level and specific gravity; add water if necessary Check brake fluid level in master cylinder; add fluid if necessary
Every 8,200 miles (13,000 km) or 13 months	Replace the spark plugs Check fluid level in final drive unit; add fluid if necessary
Every 15,800 miles (25,000 km) or 25 months	Lubricate steering stem bearings Lubricate swing arm bearings

* This Yamaha factory maintenance schedule should be considered as a guide to general maintenance and lubrication intervals. Harder than normal use (racing) and exposure to mud, water, sand, high humidity, etc. will naturally dictate more frequent attention to most maintenance items.

Table 2 TIRE INFLATION PRESSURE (COLD)

Load	psi (kg/cm^2)
Up to 198 lb. (90 kg)	
Front	28 (2.0)
Rear	32 (2.3)
198-max. lb. (90-max kg)*	
Front	28 (2.0)
Rear	36 (2.5)
High-speed riding	
Front	28 (2.0)
Rear	36 (2.5)

* Maximum load: 49-state 507 lb. (230 kg.), Calif. 505 lb. (229 kg.), U.K. 501 lb. (227 kg.)

Table 3 RECOMMENDED LUBRICANTS

Item	Oil Type
Engine oil	
40° F (5° C) and above	Yamalube 4 or SAE 20W/40
60° F (15° C) and below	Yamalube 4 or SAE 10W/30
Brake fluid	DOT 3
Battery refilling	Distilled water

(continued)

Table 3 RECOMMENDED LUBRICANTS (continued)

Item	Oil Type
Fork oil	SAE 10W
Control cables and pivot points	SAE 10W/30 motor oil
Final drive unit	Hypoid gear oil SAE 80 GL-4 or SAE 80W/90

Table 4 APPROXIMATE REFILL CAPACITIES

Item	Quantity
Engine oil	
With filter change	3.0 U.S. qt. (2.8 L, 2.5 Imp. qt.)
Without filter change	2.7 U.S. qt. (2.6 L, 2.3 Imp. qt.)
Engine rebuild	3.4 U.S. qt. (3.2 L, 2.8 Imp. qt.)
Front forks	7.71 U.S. oz. (228 cc, 8.03 Imp. oz.)
Final gear case	0.20 U.S. qt. (0.19 L, 0.17 Imp. qt.)

Table 5 TUNE UP SPECIFICATIONS

Ignition timing	Fixed
Valve clearance (cold)	
Intake	0.003-0.005 in. (0.07-0.12 mm)
Exhaust	0.005-0.007 in. (0.12-0.17 mm)
Spark plug	
Type	
U.S.	NGK BP7ES, ND W22EP-U
U.K.	NGK BPR7ES, ND W22EPR-U
Gap	0.028-0.031 in. (0.7-0.8 mm)
Idle speed	1,150-1,250 rpm
Compression pressure (cold at sea level)	
Standard	156 psi (11 kg/cm^2, 1,100 kPa)
Minimum	142 psi (10 kg/cm^2, 1,000 kPa)
Maximum	171 psi (12 kg/cm^2, 1,200 kPa)

Místo pro vaše poznámky :

CHAPTER FOUR

ENGINE

The engine is a V-twin air-cooled, 4-stroke design. The cylinders are offset (to improve rear cylinder cooling) and set at a 75° angle; the cylinders fire on alternate crankshaft rotations. Each cylinder is equipped with a single camshaft and 2 valves. The crankshaft is supported by 2 main bearings in a vertically split crankcase.

Both engine and transmission share a common case and the same wet sump oil supply. The clutch is a wet-type located inside the right crankcase cover. Refer to Chapter Five in this section of the manual for clutch and transmission service procedures.

This chapter provides complete procedures and information for removal, inspection, service and reassembly of the engine.

Table 1 provides complete specifications for the engine and **Table 2** lists all of the engine torque specifications. **Table 1** and **Table 2** are located at the end of this chapter.

Before beginning work, re-read Chapter One in the front section of this book. You will do a better job with this information fresh in your mind.

ENGINE PRINCIPLES

Figure 1 explains how the engine works. This will be helpful when troubleshooting or repairing the engine.

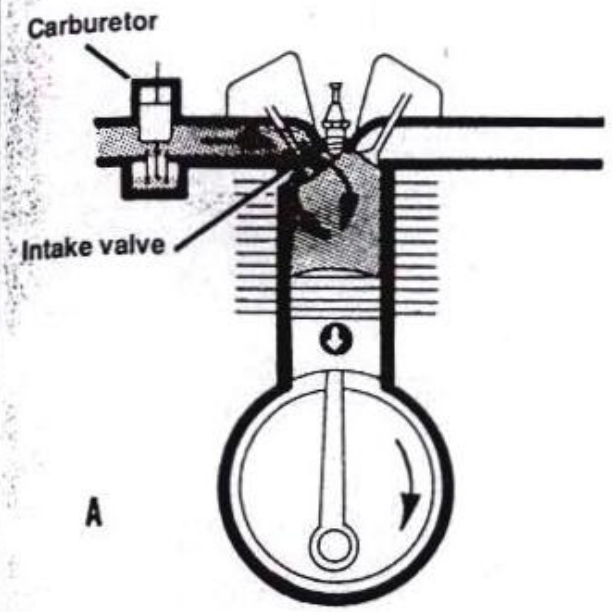
SERVICING ENGINE IN FRAME

The following components can be serviced while the engine is mounted in the frame (the bike's frame is a great holding fixture for breaking loose stubborn bolts and nuts):

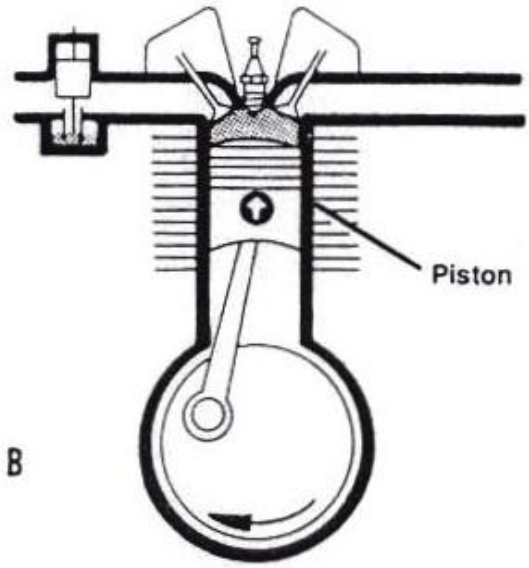
a. Gearshift mechanism.
b. Clutch.
c. Carburetors.
d. Starter motor and gears.

1

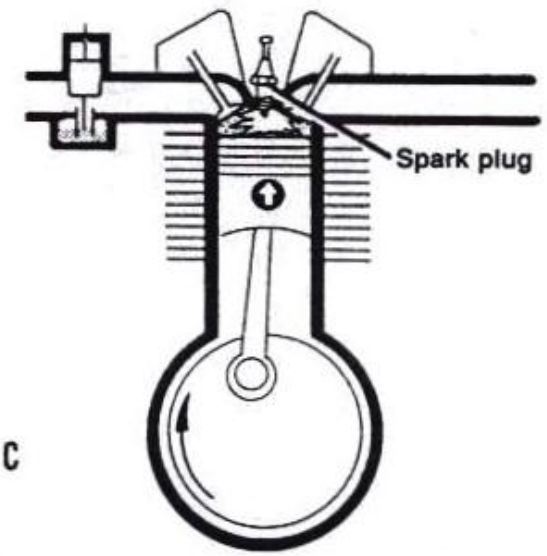
4-STROKE PRINCIPLES



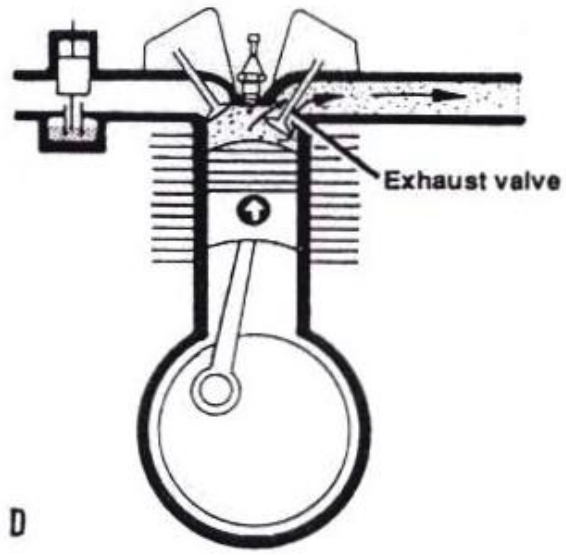
As the piston travels downward, the exhaust valve is closed and the intake valve opens, allowing the new air-fuel mixture from the carburetor to be drawn into the cylinder. When the piston reaches the bottom of its travel (BDC) the intake valve closes and remains closed for the next 1 1/2 revolutions of the crankshaft.



While the crankshaft continues to rotate, the piston moves upward, compressing the air-fuel mixture.



As the piston almost reaches the top of its travel, the spark plug fires, igniting the compressed air-fuel mixture. The piston continues to top dead center (TDC) and is pushed downward by the expanding gases.



When the piston almost reaches BDC, the exhaust valve opens and remains open until the piston is near TDC. The upward travel of the piston forces the exhaust gases out of the cylinder. After the piston has reached TDC, the exhaust valve closes and the cycle starts all over again.

e. Alternator and electrical systems.
f. Oil pump.

ENGINE

Removal/Installation

1. Drain the engine oil as described in Chapter Three in this section of the manual.
2. Remove the front cylinder head right-hand cover (**Figure 2**) and the rear cylinder head left-hand cover (**Figure 3**).
3. Remove the bolts securing the ignition coil cover (**Figure 4**) and remove the cover.
4. Disconnect the ignition primary coil wire electrical connectors (**Figure 5**). Each connector contains 2 wires: 1 red/white and 1 gray; and 1 red/white and 1 orange.
5. Remove the carburetor assembly as described in Chapter Six in this section of the manual.
6. Remove the exhaust system as described in Chapter Six in this section of the manual.
7. At the clutch hand lever, slide back the clutch lever shield (**Figure 6**).