

CHAPTER 2. ADJUSTMENTS

2-1. VALVE ADJUSTMENT	18
A. Valve Adjustment	18
B. Setting Ignition Timing	18
2-2. CAM CHAIN ADJUSTMENT	21
A. Chain Tensioner	21
B. Timing the Camshaft	22
C. Checking Valve Timing with a Degree Wheel	23
2-3. CLUTCH ADJUSTMENT	24
2-4. CARBURETOR	25
A. Idle-speed Adjustment	25
B. Fuel Level Adjustment	25
2-5. SHIFT ADJUSTMENT	26
2-6. REAR BRAKE AND STOP SWITCH ADJUSTMENT	26
A. Rear Stoplight Switch Adjustment	27
2-7. SERVICE CHECKS/ADJUSTMENTS.....	27
A. Cylinder Compression Check	27
B. Changing or Adding Engine/Transmission Oil	28



CHAPTER 2. ADJUSTMENTS

2-1. Valve Adjustment

A. Valve Adjustment

Improper valve clearance causes poor engine performance and possible engine damage. If there is too little clearance, the valve is held partially open. This permits blowby past the valve and a drop in compression. If there is too much clearance there will be excessive engine noise and the valve will not open fully which will create partial blockage of airflow at the port.

1. Remove all four tappet covers and the alternator cover.
2. Next, align the "T" mark on the stator with the timing mark on the rotor. This places the pistons at top dead center. One of the cylinders is now at the top of its compression stroke. The cylinder that is on the compression stroke has both valves shut. This can be noted by observing which cylinder has clearance at both valve adjustors.
3. Use a feeler gauge to determine the existing clearance. The exhaust valve clearance should measure 0.004 in. (0.10 mm.); the intake clearance should measure 0.002 in. (0.05 mm.). (engine cold)
4. Loosen the lock nut and use the valve adjusting tool found in the Special Tool kit. Turn the adjustor in or out to obtain the correct clearance. Hold the adjustor solid to prevent it from moving and thoroughly tighten the lock nut. Recheck the clearance after tightening.
5. Rotate the crankshaft one complete revolution and once again line up the rotor and stator marks. The valve train of the other cylinder is now in position for adjustment.

Caution:

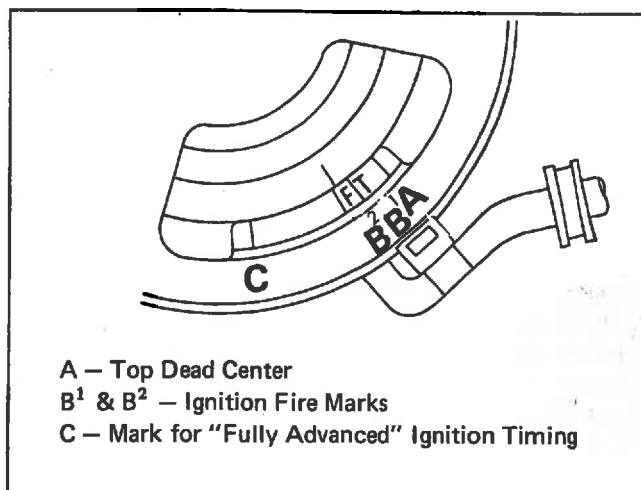
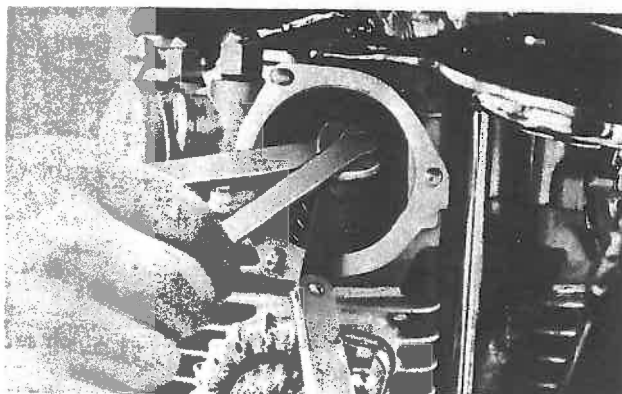
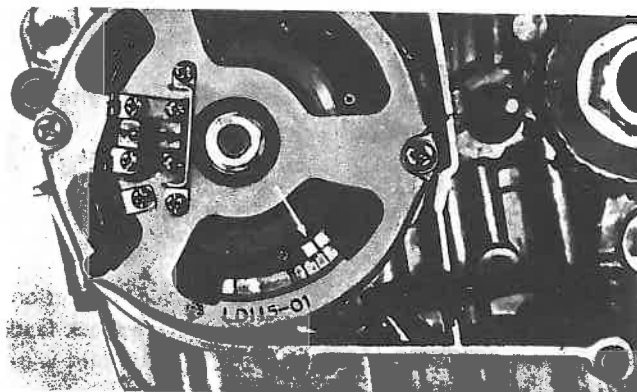
ADJUST VALVE CLEARANCE ONLY WHEN THE ENGINE IS COLD.

B. Setting Ignition Timing

Caution:

In order to obtain accurate ignition timing, in relation to piston position, the cam chain must first be adjusted.

1. Ignition timing is checked observing the position of the timing marks on the rotor in relation to the timing marks on the stator.
2. The rotor has one timing mark. The stator has four timing marks. The first mark is identified by the letter "T". This means the piston is at "Top Dead Center". The next two marks, identified by the letter "F" stamped between them, are the point of proper ignition timing when fully retarded (engine stopped or idling). When setting ignition timing, set it so both cylinders fire between the marks (both ignition advance weights completely closed).

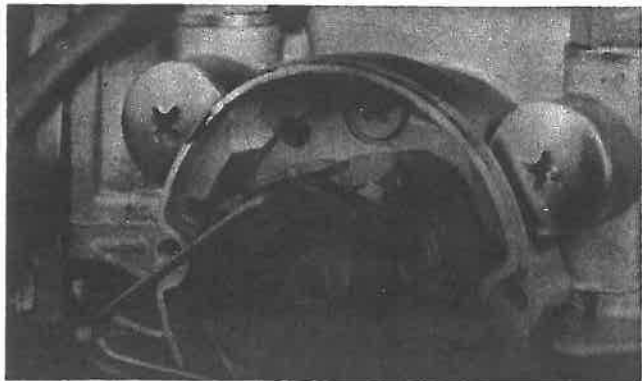


- The fourth timing mark indicates 38° before TDC, the fully advanced ignition position.

Note:

Each point gap should be checked first, and adjusted, if necessary. Then proceed with the timing adjustment.

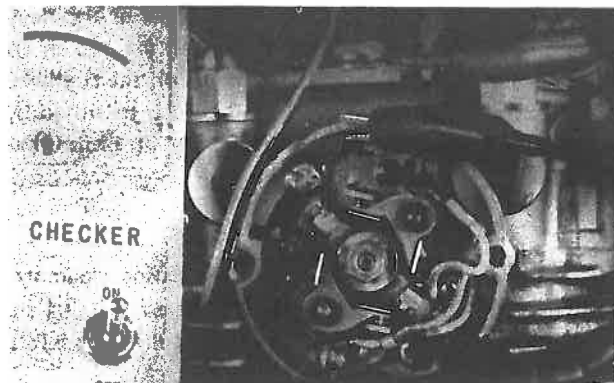
- Remove the alternator inspection plate, ignition points cover, and ignition advance unit cover.
- Securely anchor the ignition advance weights into the "fully retarded" position (weights held inward).



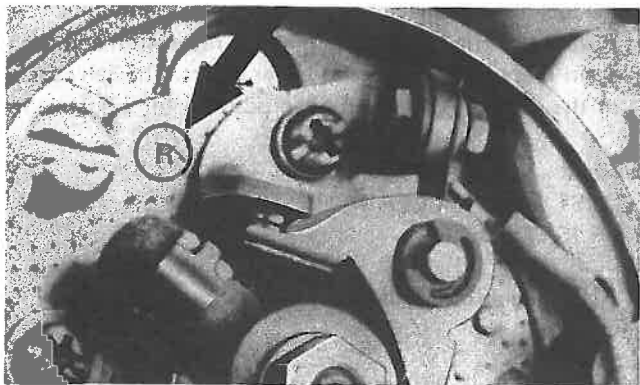
- Check the point checker for full scale deflection (Infinity to Zero resistance), then hook the black lead to a good ground; the red lead to the grey point wire (right cylinder).

Caution:

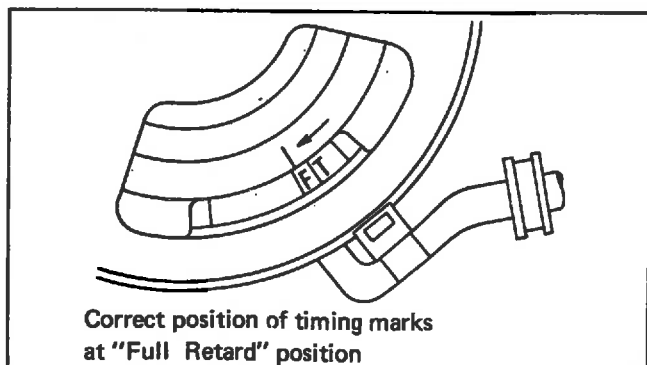
Ignition timing for each cylinder is set separately. However, it is absolutely necessary that the right cylinder points are timed before the left cylinder points. The right cylinder points are mounted directly to the ignition point base plate. The left cylinder points, however, mount on a separate plate that is in turn mounted to the large ignition base plate. If the left cylinder points are timed first, they will shift out of position when the base plate is pivoted to time the right cylinder points.



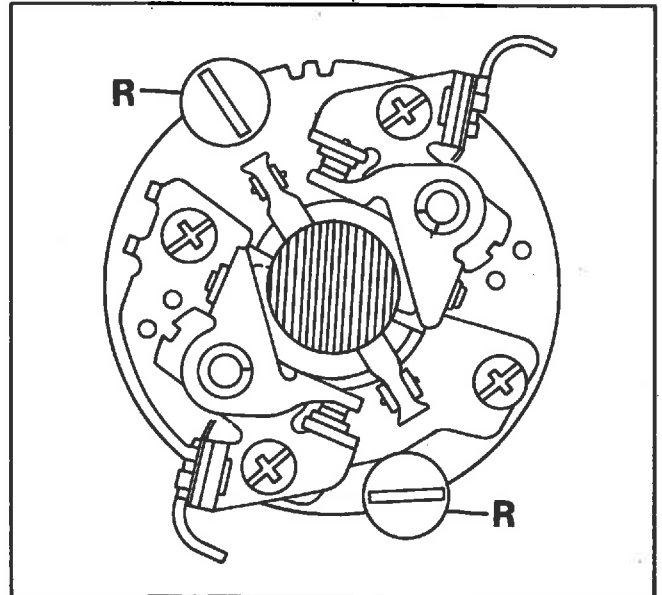
- The letter "L" (for left cylinder) is stamped next to one set of points, the letter "R" (for right cylinder) is stamped next to the other set. This indicates which set of point fires which cylinder.



- Rotate the crankshaft in the direction of running rotation (counterclockwise when viewed from the left side) until the right hand set of points just start to open, as indicated by the point checker.
- Check the rotor timing mark position. If the right-hand points are timed correctly, the rotor mark will line up exactly between the two "F" stamped timing marks on the stator. If these marks do not line up, a corrective adjustment must be made to the points.

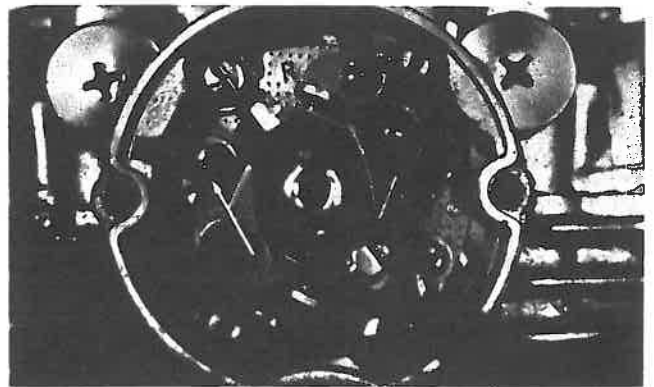


10. With the timing marks lined up correctly, loosen both base plate lock screws. Pivot the entire plate until the right cylinder points just start to open, (as indicated by the point checker).

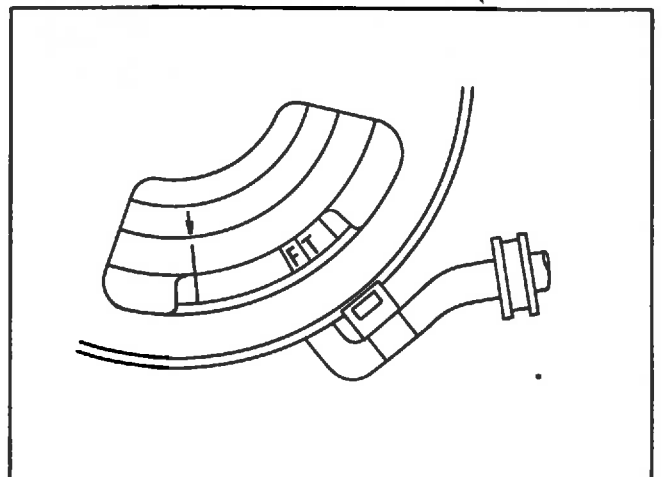


Base plate set screws

11. Tighten down both lock screws and check the timing again to make sure the base plate has not moved.
12. To set left cylinder timing, repeat steps 6 thru 10, except to switch the point checker probe from the grey wire to the orange wire. The left cylinder points are held in place on the base plate by two different lock screws. Loosen both lock screws as shown in the accompanying figure and make the necessary adjustments.

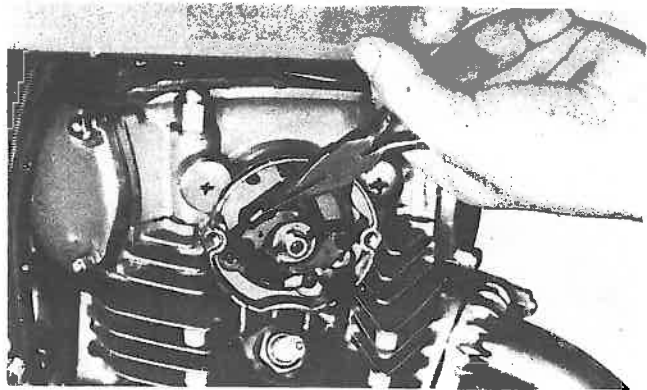


13. Ignition timing of both cylinders must be checked at the "fully advanced" position. Wedge both ignition advance weights fully open. With the point checker hooked up to the orange wire, rotate the crankshaft. The left-hand points must now open when the rotor mark lines up with the stator full advance mark. (A tolerance of 3 mm. is allowed in either direction of the stator mark.) Switch the point checker lead to the right-hand cylinder and re-check.



Proper timing mark position at "full advance"

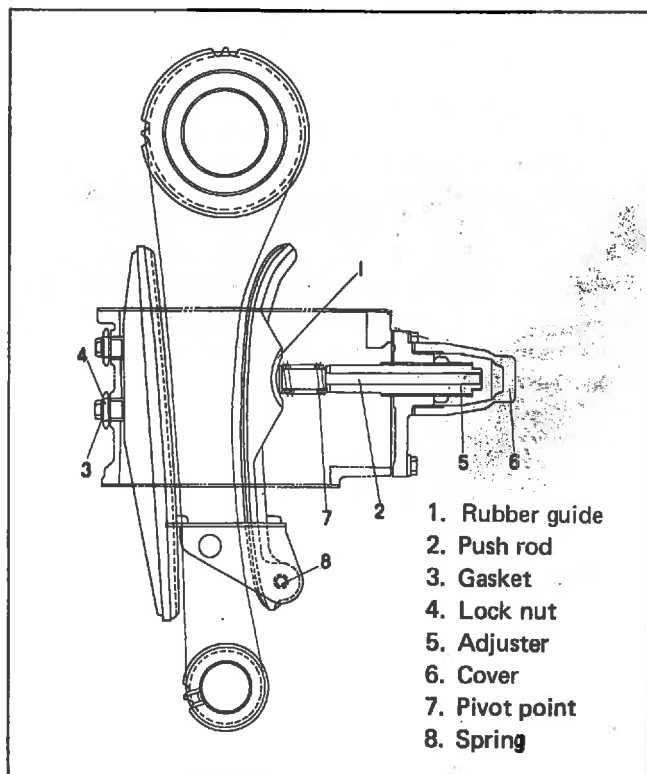
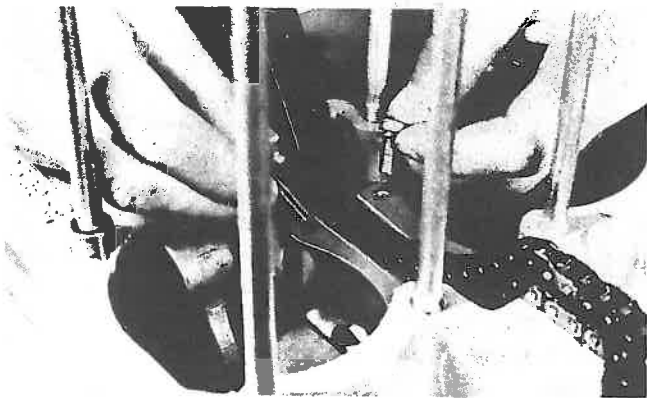
14. If both cylinders are timed correctly at "fully retarded" position, but the timing marks do not line up at the "fully advanced" position (within tolerances), make an adjustment at the ignition advance weight stoppers. Bend them in to slightly lessen the amount of ignition advance, bend them out to increase the amount of advance.
15. Finally, it is a good idea to re-check your results, especially in the case where the engine has not been running correctly.



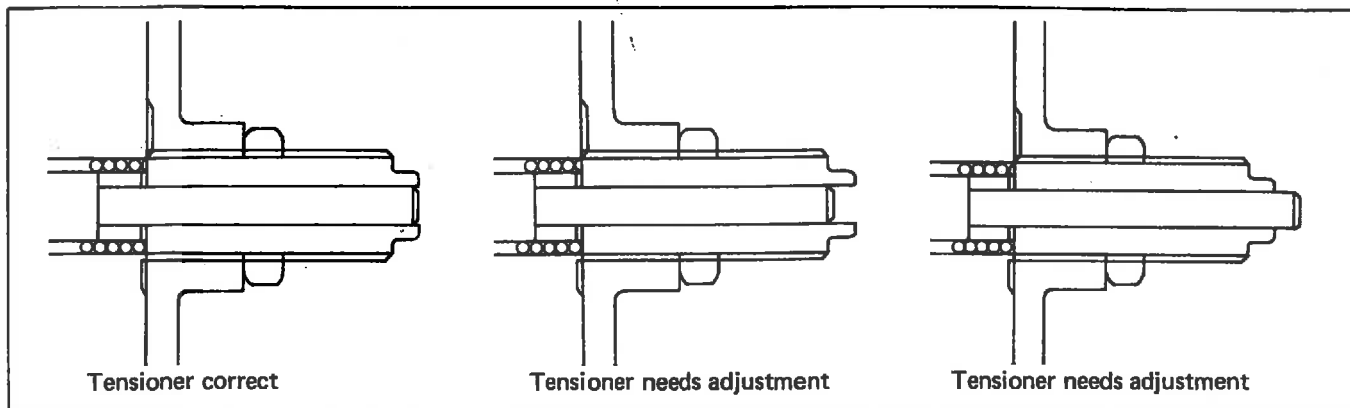
2-2. CAM CHAIN ADJUSTMENT

A. Chain Tensioner

1. The chain tensioner consists of a steel and rubber guide that is held against the cam chain by a spring and a locked in-place push rod. This slider takes up any free play in the chain. In addition, a rubber dampener solidly mounted to the tensioner arm, just below the tensioner base, helps to guide the cam chain. Because of gradual chain wear, an adjustment is required periodically.
2. Four 6 mm. bolts hold the tensioner housing in place. Remove these and pull the unit out of the cylinder.
3. Reverse this procedure to install the unit. During installation, install a new gasket coated on both sides with Yamaha Bond #4.
4. Rotate crankshaft in a counterclockwise direction (viewed from the left side of the engine) to place all slack in the area of the chain tensioner.
5. Remove the metal case protective cover.
6. Loosen the tensioner lock nut.
7. Use a 22 mm. wrench to turn the adjuster in until the push rod (inside adjuster) is flush with the end of the adjuster.

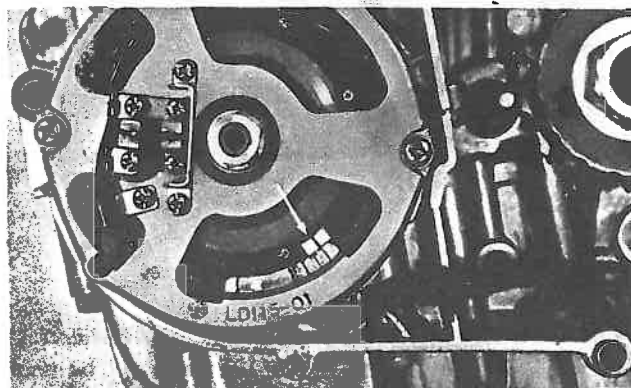
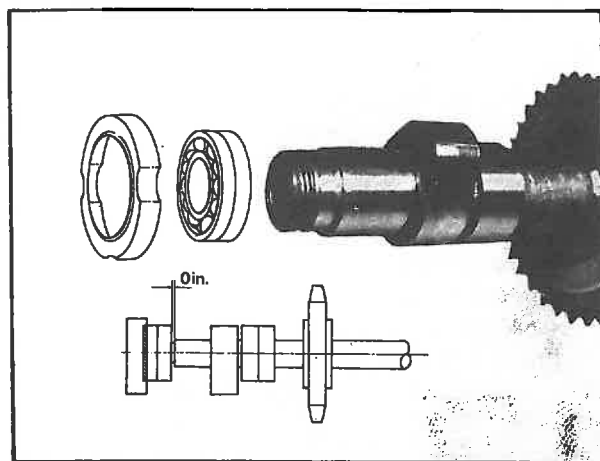


8. Tighten the lock nut and install the cover.
Check this adjustment every 2,000 miles.



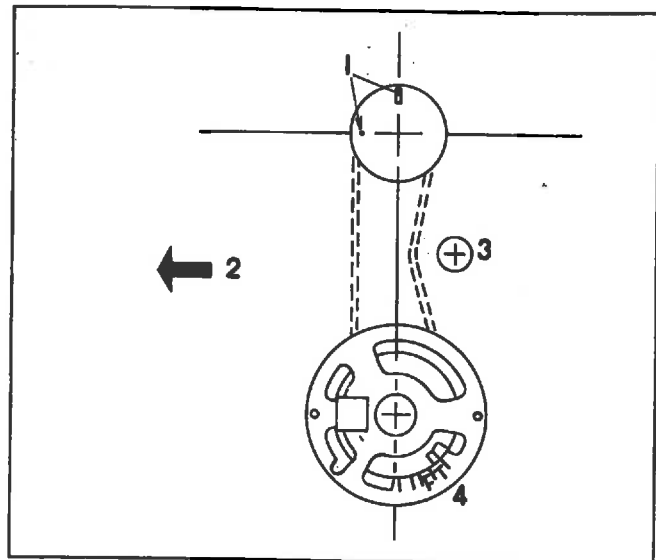
B. Timing the Camshaft

1. Slide all cam bearings in toward the center of the camshaft as far as possible. Place the camshaft into position with the camshaft threaded end on the right-hand side. Holding both cam bearings in toward the cam sprocket, move the cam back and forth until the cam chain driven sprocket is aligned with the crankshaft drive sprocket. This can be determined by observing the position of each cam bearing in its bearing boss. Both bearings must be positioned at equal distance in the cam bearing bosses.



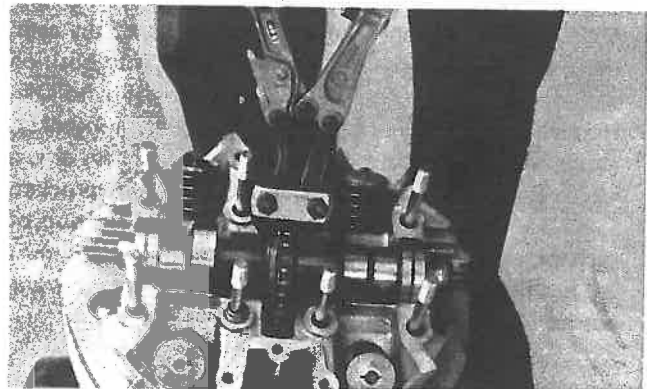
- Next, rotate the pistons to TDC, as verified by lining up the rotor timing mark with the "T" (top) mark on the stator.

If the stator has been removed, use the "dowel pin" process described in the Valve Timing section carefully equalizing the "dead point" of piston travel by turning the crankshaft forward and backward a few degrees at TDC. Make sure the piston is at the top of its compression stroke first. Otherwise, an opening valve may catch the dowel pin.



- | | |
|--------------------|----------------------|
| 1. Alignment marks | 3. Tensioner |
| 2. Front | 4. "T" mark lined up |

- There is a groove in the left side of the cam sprocket. Position this groove so that it lines up with the sprocket centers. This can be checked. The punch mark on the camshaft sprocket must be parallel with the head gasket surface. Lay a straight edge across the head surface and check the punch mark.
- Reconnect the cam chain. The chain tensioner has been loosened during disassembly. Therefore, the cam chain will have excessive slack. To avoid incorrect timing, the cam chain should be installed with no slack in the cam chain on the front portion (opposite side from the tensioner). Any slack on the back chain portion can be taken up with the tensioner.
- Join the chain together by installing and riveting a new chain link. Always use a new link each time the chain is reconnected. (Use a chain riveter, not a hammer and punch, to mushroom the rivet ends). The Parts Book lists the replacement link to use.



Important:

Make the proper chain tension adjustment.

C. Checking Valve Timing with a Degree Wheel

If the camshaft is not timed to open the valves in correct relation to crankshaft rotation, performance will be poor and engine misfire can occur.

- Important. Make sure the cam chain tensioner has been properly adjusted.
- Adjust all valves to correct clearances. (0.006" intake, 0.012" exhaust engine COLD.)
- Remove the left-hand case cover and stator. Mount the degree wheel (found in Special Tool Kit) to the rotor lock bolt.

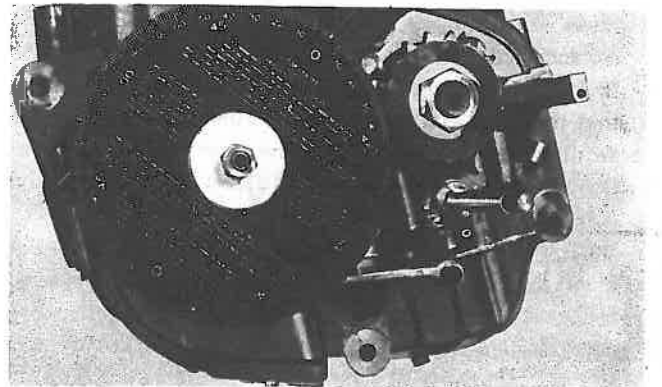
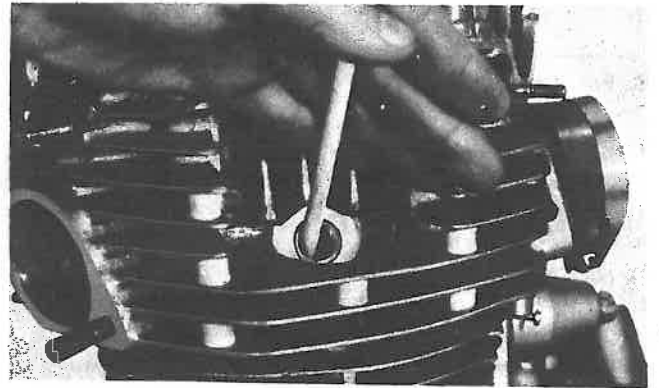
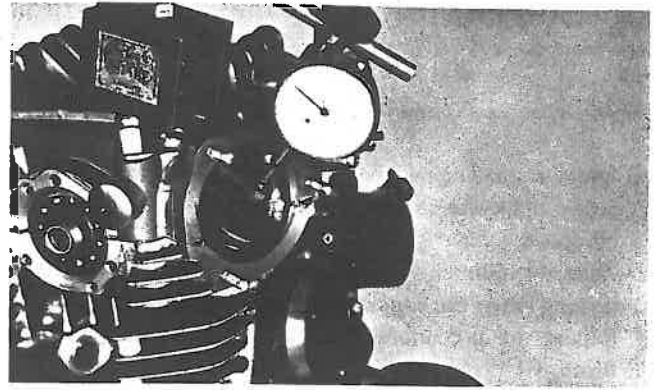
4. Remove a spark plug and place a wooden dowel pin in the hole. Rotate the engine in a counterclockwise direction (from left side) and find Top Dead Center on the compression stroke (valves are both closed) by watching the piston rise and fall as indicated by dowel pin position.

Mount a pointer at the degree wheel so that it points to "0" on the wheel with the engine at TDC.

5. Mount the dial indicator over an intake valve tappet adjuster.
6. Rotate the crankshaft in a counter-clockwise direction (from left side). Watch the mounted dial indicator. Note when all clearance is taken up and the valve just starts to open.
7. Check the pointer position (in degrees on the wheel). The dial indicator should show the valve open 47° before top dead center after all valve tappet clearance has been taken up. Remember, "0" on the degree wheel is at Top Dead Center. The intake valve must close 67° after bottom dead center; a total of 294° .
8. If the valve starts to open 37° or 57° before top dead center, the camshaft sprocket is one tooth off in its alignment with the crankshaft sprocket. The cam chain must be loosened and the camshaft rotated to its correct position.

Note:

Valve timing is off by approximately 10° for every tooth the camshaft sprocket is misaligned.



2-3. CLUTCH ADJUSTMENT

If the clutch lever lash is too small, the clutch tends to slip during engagement. If too large, it tends to drag. This causes fast wear to friction plates and results in poor gear shifting.

To adjust the clutch, proceed as follows:

1. Remove the adjusting screw cap, and loosen the adjusting screw lock nut.
2. Screw in the clutch cable adjusting screw (on the clutch lever holder) until tight, and screw in the clutch adjusting screw until it contacts the push rod. (If the clutch adjusting screw is further screwed in, the clutch springs will be contracted, and the clutch adjusting screw will also become tight.) Back out the clutch adjusting screw $1/4$ turn.
3. Tighten the clutch adjusting screw lock nut.
4. Finally, adjust the play of clutch lever holder by turning the clutch cable adjusting screw.

Amount of play: 0.8 - 1.1 in. (20 - 30 mm.)

2-4. CARBURETOR

A. Idle-speed adjustment

1. Reduce the engine speed by turning the throttle stop screw clockwise so that the engine runs at lowest possible speed.
2. Turn the pilot air screw to the right or left, and stop turning when the engine begins to run faster.
3. Repeat the procedures of 1. and 2. above two or three times.
4. Turn the throttle stop screw so that the engine runs at specified idling speed.

B. Fuel Level Adjustment

The fuel level is the distance from the center of main bore to the fuel surface. But in actual fuel level adjustment, it is the distance from the sealing surface of float chamber to the bottom of float.

To adjust the fuel level, proceed as follows:

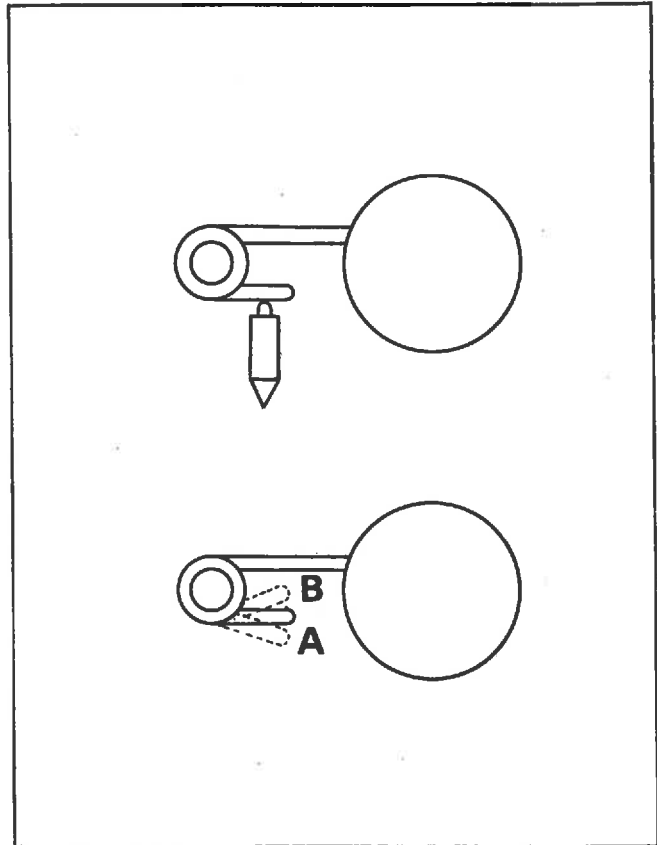
1. Remove the mixing chamber top, together with the slide.
2. Remove the float chamber, and clean the float valve of dust. If it is worn excessively, replace.

Remove the float chamber gasket, and invert the mixing chamber. Push up the float once with your finger, and lower it slowly. Using a vernier caliper, measure the distance from the sealing surface of mixing chamber to the bottom (top in this case) of the float the moment that the float arm lightly contacts the end of float valve. As illustrated below, bending the float arm in the direction of "A" lowers the fuel level; bending in the opposite direction "B" raises the fuel level.

Butterfly valve synchronization: Both butterfly valves must be adjusted to open and close simultaneously. Fully close the throttle grip so that both butterfly valve actuator mechanisms rest against their throttle stop screws. Slowly twist the throttle grip and note whether both butterfly valves start to open at the same time. If this does not occur simultaneously, use the cable adjuster to lengthen or shorten one cable until correct action is achieved. In addition, with the throttle fully closed, both throttle cables should have approximately 1 mm. free play before both butterfly valves start to lift simultaneously.

Note:

Idle speeds on both carburetors **MUST BE SET** before synchronizing butterfly operation.



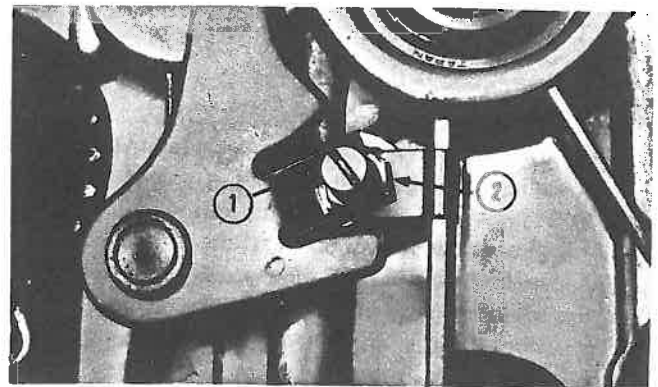
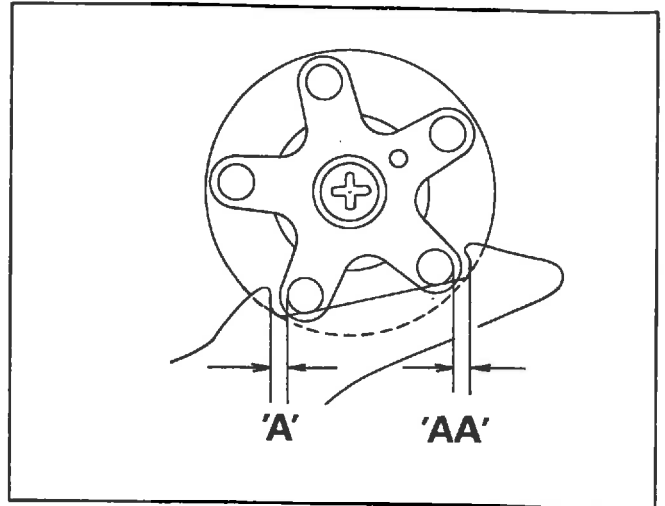
2-5. SHIFT ADJUSTMENT

1. If shifting adjustment is correct, distances "A" and "AA" will be equal (see this page). If these are not equal, loosen the screw lock nut ② and rotate the eccentric screw ① until "A" and "AA" become equal. Retighten the lock nut and bend up the tab.

Note:

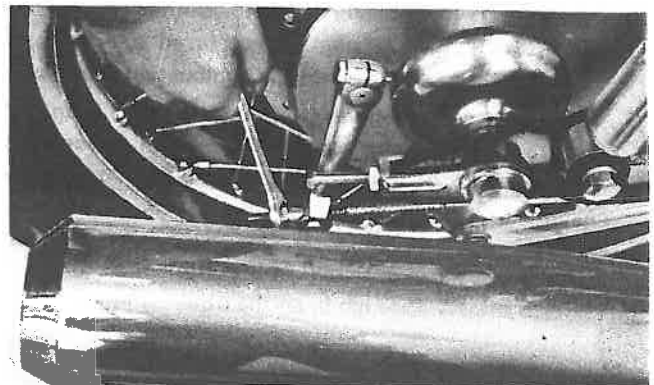
Make this adjustment in second, third, or fourth gear.

After adjustment, shift gears into a different position, and make sure that the above gaps are equal, then straighten the lock washer.



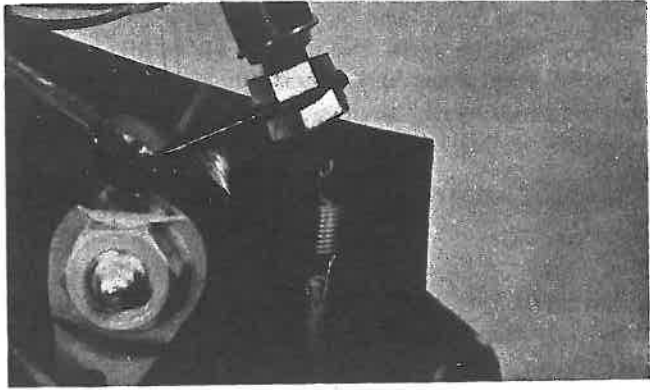
2-6. REAR BRAKE AND STOPSWITCH ADJUSTMENT

Rear brake adjustment should be checked any time the rear wheel is removed or the drive chain is adjusted.



A. Rear Stoplight Switch Adjustment

1. The rear brake stoplight switch mounts to the frame just behind the right-hand case cover. A thin rod connects the switch to the brake pedal.
2. To make an adjustment, loosen one lock nut and spin the other nut. To raise the switch, loosen the bottom nut. To lower the switch, loosen the top nut.
3. Check rear stoplight switch adjustment whenever the rear brake is adjusted or the rear wheel is moved.



2-7. SERVICE CHECKS/ADJUSTMENTS

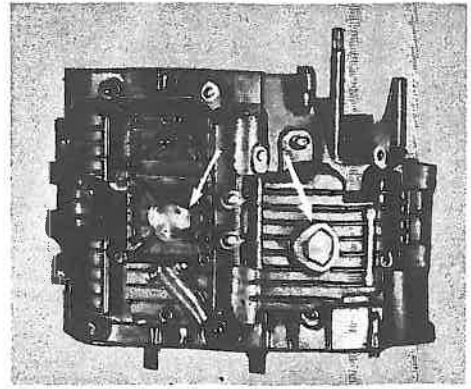
A. Cylinder Compression Check

1. Low cylinder compression means the combustion area is not sealing correctly. A leak exists at one of the following points: past one of the valves; out a defective gasket through a warped head; down past the rings.
2. Remove both spark plugs and screw the compression gauge adaptor tightly into either spark plug hole.
3. Twist the throttle grip FULLY OPEN and kick the engine over several times.
4. With 5 or 6 full kicks the gauge should register 10.5 kg/cm² (145 lbs/in²), but it could measure as low as 9.5 kg/cm² (130 lbs/in²) and still be considered adequate. If compression reads lower than 9.5 kg/cm² (130 lbs/in²), then a failure has occurred to one of the parts directly associated with the combustion chamber.
5. If cylinder compression reads more than 10.5 kg/cm² (145 lbs/in²), then carbon has built up on the combustion chamber or piston crown, reducing combustion chamber volume. This in turn creates a higher compression ratio. This situation must be corrected by decarbonizing or excessive heat will develop.
6. Perform steps 3. through 5. on the other cylinder.



B. Changing or Adding Engine/Transmission Oil

1. Engine and transmission oil is contained in a single reservoir in the bottom engine case.
2. Remove both oil drain plugs on the bottom of the engine. Immediately reinstall and tighten both plugs after the compartments have drained.



3. Remove the oil dip stick and add oil. If making a complete oil change, add 2-3/4 litres (5.8 pints). Actual capacity is 3 litres but 1/4 litres of oil cannot be immediately drained from all passages.
4. If oil is merely being added, use the dip stick to measure existing oil level. Then add sufficient oil to bring the oil up to its proper level, as indicated by the mark on the dip stick.
5. Finally, let the engine run for several minutes. Stop and let set for one minute, and recheck oil level. Check level with machine on mainstand and level.

