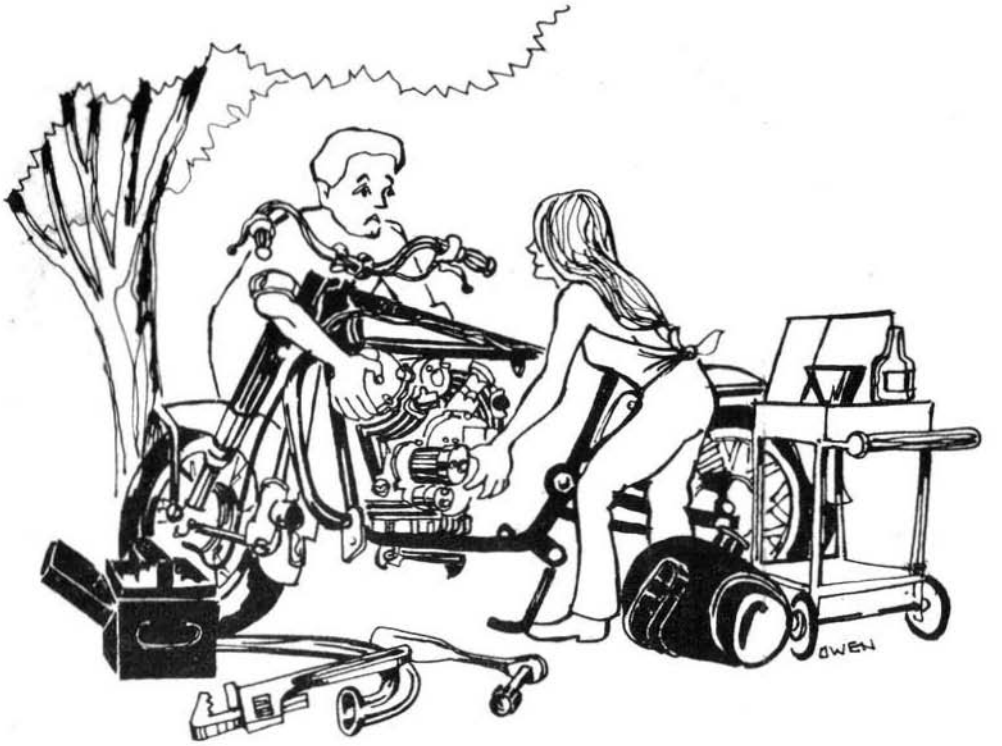
TUNE-UP GUIDE FOR THE SHADE TREE MECHANIC



Or Did You Check The Gas Dear!

Moto Guzzi

Tune-up Guide for the SHADE TREE MECHANIC

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Dedicated to MGNOC and the traditions of Informed and Safe motorcycling.

Special thanks to Charles Williams for his mechanical suggestions and help.

FOREWARD

1. Please read this manual through completely BEFORE begining work on your bike. Helpful hints necessary to good work are contained throughout the manual.

2. Certain methods of completing a task work for some people and do not work for others. For this reason, several methods of doing somthing are listed in some places. Pick the one that works the best for you.

3. In this manual, right is defined as the right hand side from astride the bike facing forward. Left is the left hand side from astride the bike while facing forward.

4. This manual is very detailed, and with a little care and patience, anyone should be able to tune his bike--even if he or she (for the lady members) has never attempted to tune before, or even looked to see if there was an engine under his seat. The more times you tune your bike, the better job you will do. If you are unsure of yourself, tune your bike, then have your favorite mechanic check it over for you. (Don't tell him you tried to tune it, simply beam with satisfaction when he tells you the bike is in great shape). You will be surprised at how well you actually do.

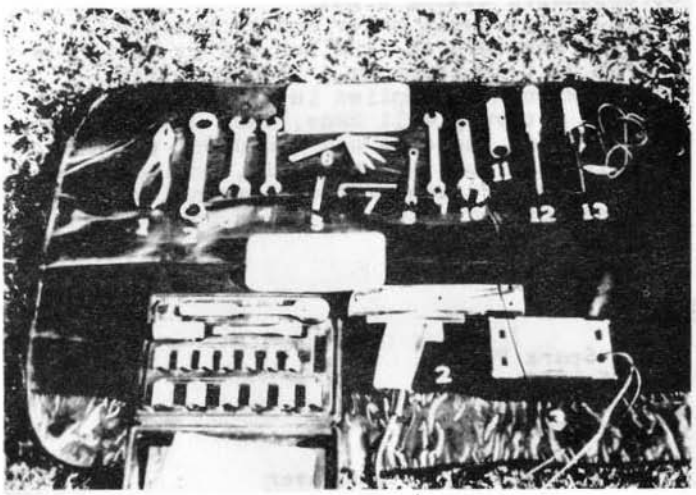
5. Any suggestions to help improve this manual will be welcomed in the true biker tradition.

6. Read the manual, assemble your tools, tune your bike and say good-by to impersonal, onerpriced and sometimes incompetent mechanics. (I apologize to the few excellent service departments for the last statement). Now you can give your bike the loving care it deserves.

GOOD LUCK AND WELCOME TO THE JOYS, FRUSTRATIONS AND PRIDE OF THE "SHADE-TREE MECHANIC'S CLUB" ! ! ! ! !

CONTENTS

TOOLS



REQUIRED TOOLS

1. 1 pair of pliers
2. 1 22mm and 27mm box end wrench as supplied in basic tool kit.
3. 19mm and 17mm open end wrench as supplied in tool kit.
4. 14mm and 13mm open end wrench as supplied in tool kit.
5. Valve tappet adjusting tool as supplied in tool kit.
6. 1 set of metric feeler gages.
7. 5mm allen wrench
8. 8mm wrench
9. 10mm and 9mm open end wrench as supplied in basic tool kit.
10. Cresent (adjustable end) wrench
11. Spark Plug wrench as supplied in tool kit.
12. Screwdriver
13. Continuity light
14. Ignition point file (not shown)

OPTIONAL TOOLS

1. Good set of metric sockets
2. Stroboscopic timing light
3. Small engine dwell meter and tachometer
   These are hard to find but one is available from J. C. Whitney Co., Chicago, Ill.
4. As the wrenches supplied in the Moto Guzzi tool kit are not very well made, they have a tendancy to spread at the ends and round off the heads of bolts and nuts. If possible, replace these wrenches with a good set of compination open end and box end wrenches. Use a box end wrench whenever possible.

PARTS

1. 2 ea. Spark Plugs
   a. NGK B8ES
   b. Bosch W225 T2
   c. Champion N-3G

2. 1 set of points and condenser

3. 3 quarts of 10W-40 Detergent Motor Oil. Use only oils with SD service rating or equivilant.

MISCELLANEOUS

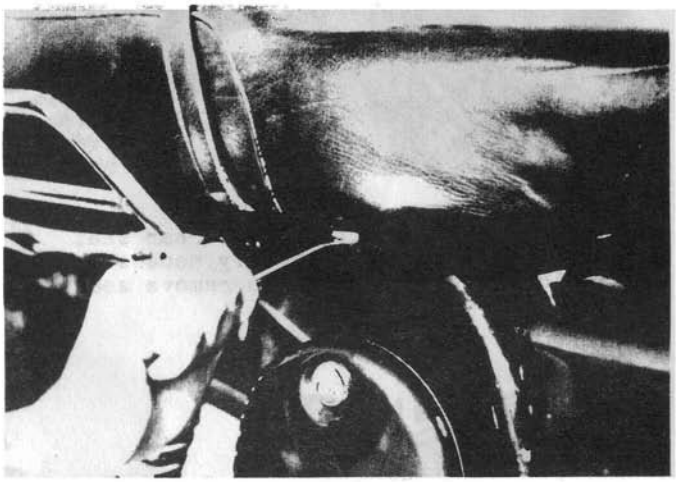
1. Rag to wipe up grease and oil and clean tools.
2. Box for nuts and bolts
3. Ground cloth
4. Guide for the Shade Tree Mechanic

PRELIMINARY STEPS

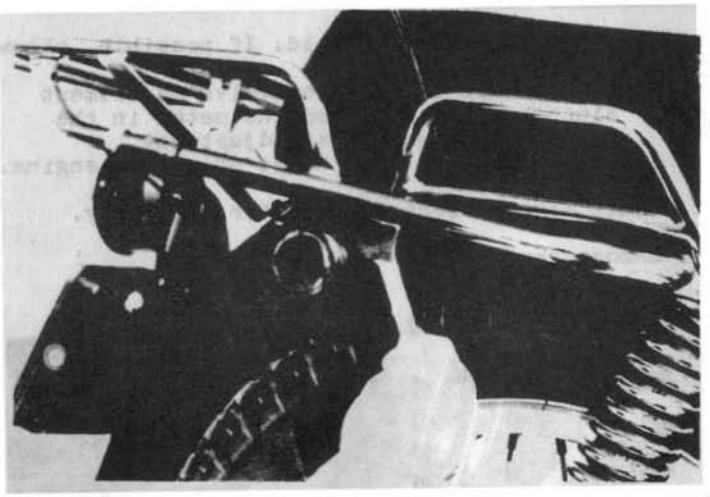
1. Bike engine should be cold. If possible, allow bike to sit overnight.
   a. Engine must be cold for valve adjustment since heat will expand the metal in the valves and cause loose adjustment.
   b. You won't burn your hands on a cold engine.

2. Place bike on center stand for stability.

3. Remove seat.



a. Using a 13mm wrench, remove front seat mounting bolts. (one on each side of seat)

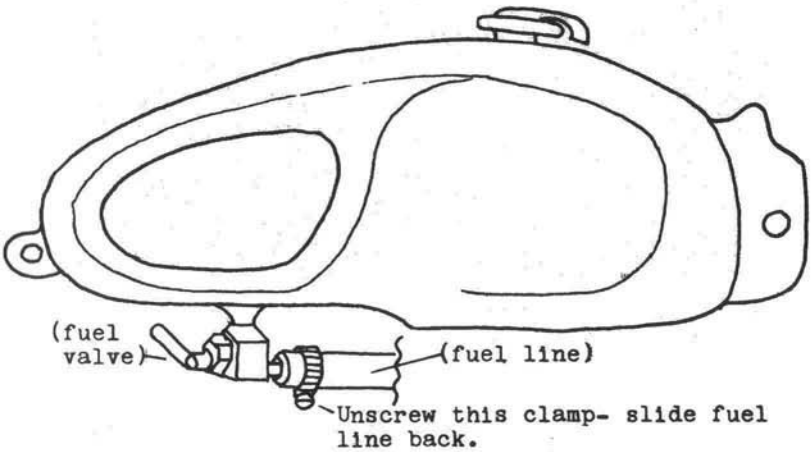


b. Using a 17mm wrench, remove rear seat mounting bolts. (It is only necessary to loosen these enough to remove seat)

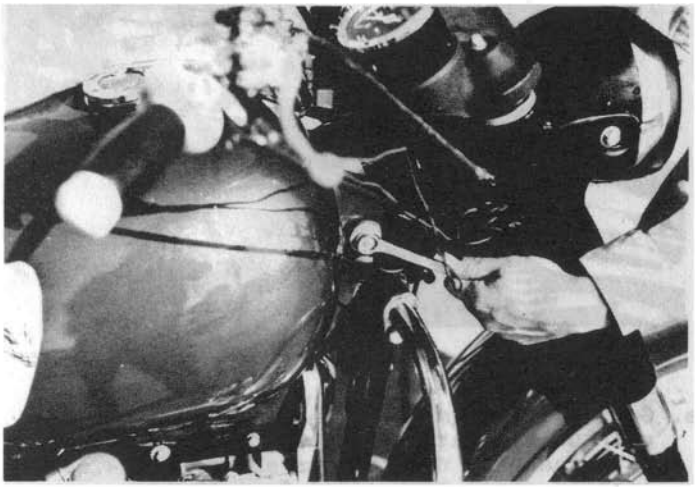
c. Lift off seat.

4. Remove both side covers.

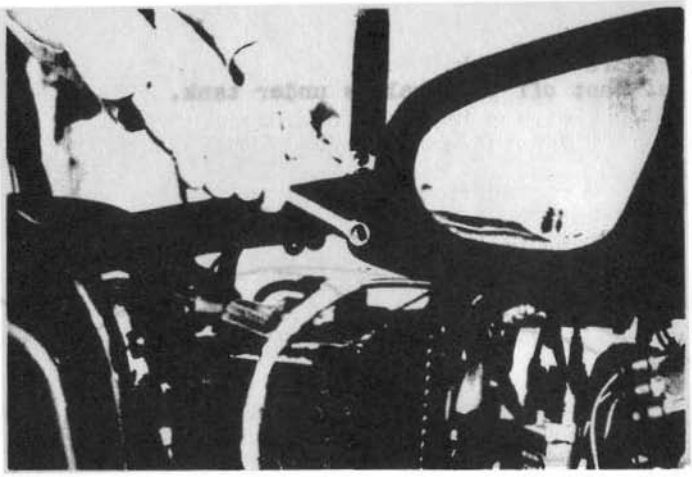
5. Remove Gas Tank.
   a. Shut off fuel valves under tank.



   b. Unscrew hose clamp on fuel line and slide fuel line away from fuel valve. Be careful not to tear or break fuel line.



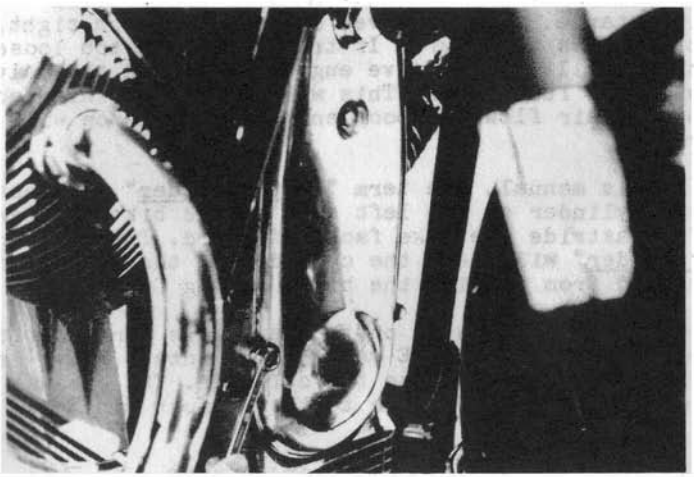
   c. Using 13 mm wrench (14mm on some bikes), remove front gas tank mounting bolt.



d. Using a 13mm wrench, remove rear gas tank mounting bolt.

e. Gently slide gas tank back and lift up rear of tank at same time. Lift off tank, being careful not to tear electrical wires located under tank loose from their connections.

6. Remove timing case cover on front of engine.



Using a 10mm wrench, remove three 10mm bolts on timing cover. Slide cover down and out. Remove timing case cover.

7. Lay tools and equiptment out for easy access. a box may be useful to store nuts and bolts to prevent loss. As a general rule, try to keep all nuts, bolts, and screws with the parts they go with.

8. Tune up should be performed in order because adjustment of some things will affect the adjustment of other things, and for convenience.

VALVE TAPPET ADJUSTMENT

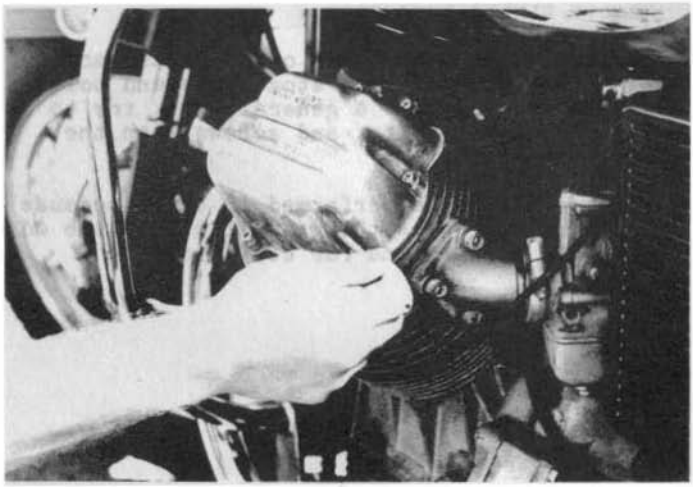
Proper valve tappet adjustment is of critical importance. If the valves are adjusted too tight, the valves will burn. If the valves are too loose, there will be excessive engine noise and the valve will not fully open. This will cause partial blockage of the air flow and poor engine performance will result.

In this manual, the term "left cylinder" will mean the cylinder on the left side of the bike as viewed from astride the bike facing forward. The term "right cylinder" will mean the cylinder on the right side as viewed from astride the bike, facing forward.

Refer to the drawing on the next page for location of EXHAUST and INTAKE valves. The intake valve leads from the carburetor to the cylinder. The exhaust valve leads from the cylinder to the exhaust pipe.

LEFT CYLINDER VALVE TAPPET ADJUSTMENT

1. Engine must be cold.



Using a 5mm allen wrench, remove 8 allen head screws around valve cover. Lift off the cover exposing valve rocker arms.

Fig. 1

VALVE ADJUSTMENT

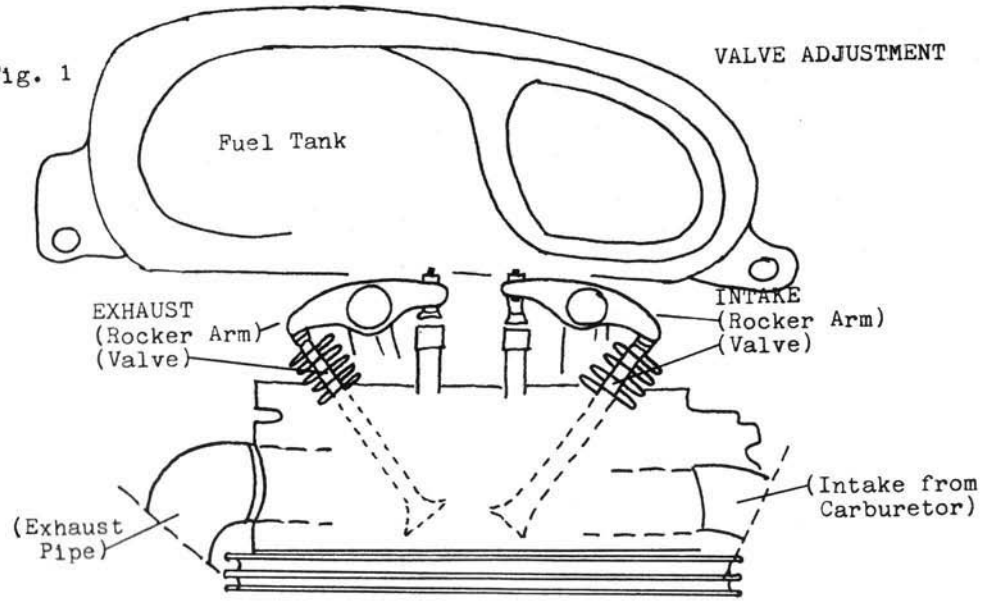
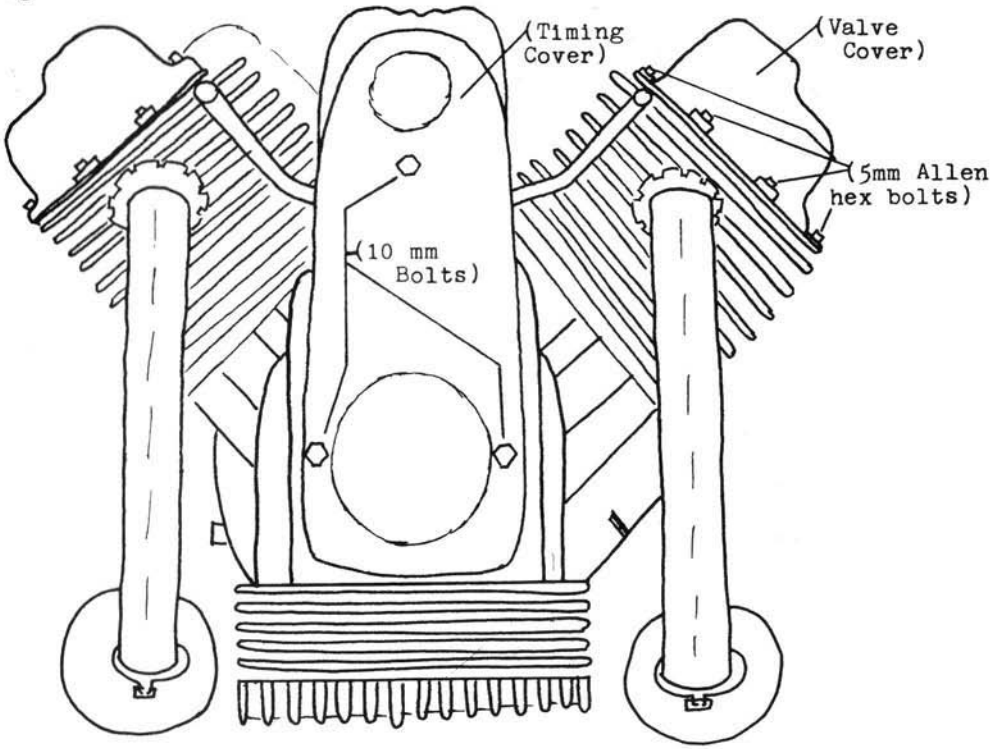


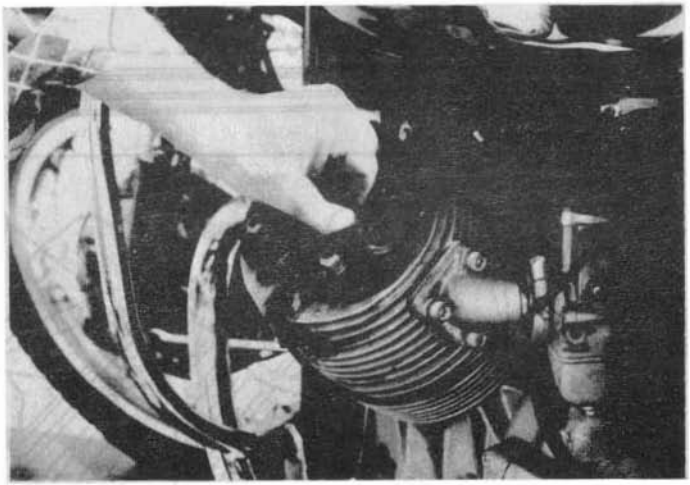
Fig. 2



2. Using a 27mm wrench, rotate the large nut in the center of the lower fan belt pulley in a clockwise direction. (Fig. 3 next page) This will rotate the crankshaft and raise the pistons.

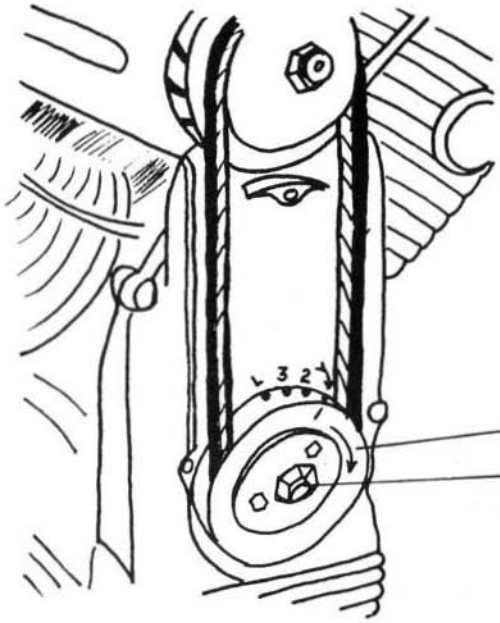
NOTE: As the fan belt pulley is rotated, four (4) marks will come into view. They are numbered in this manual from right to left in order of rotation 1-2-3-L. Mark "L" is top dead center for the left cylinder. Marks 1-2-3 are timing marks and are not used in tappet adjustment.

3. Align mark "L" up with the arrow on the crankcase. At this point, the left cylinder will be at Top Dead Center (TDC) of the stroke. Valves are adjusted when the cylinder is at TDC compression. (Fig. 3a)



To determine when cylinder is at TDC compression, grasp rocker arm between thumb and forefinger and move rocker arm up and down. When cylinder is at TDC compression, valves will be closed and the rocker arms loose. At TDC exhaust, valves will be open and the rocker arms tight. If both rocker arms are loose, valves may be adjusted. If the rocker arms are tight, rotate fan belt pulley 360 degrees.

Figure 3

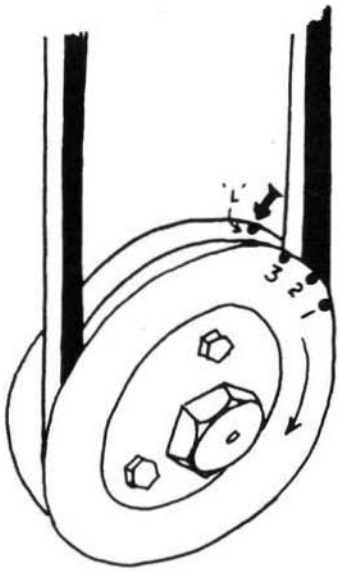


(Lower fan belt pulley)

(Turn this nut clockwise to turn crankshaft for valve and ignition timing)

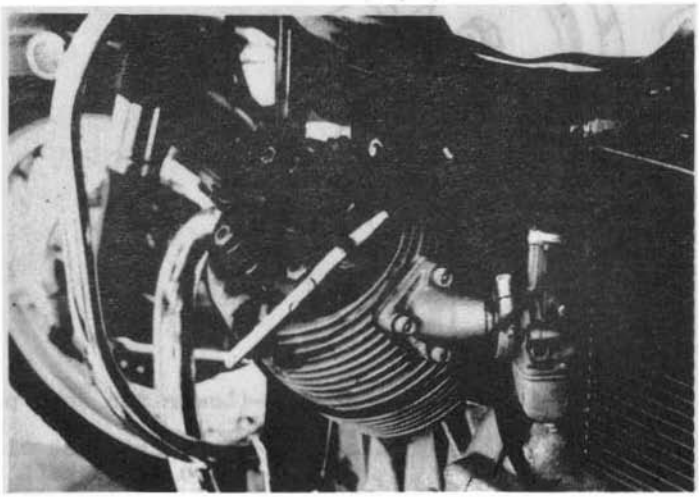
Arrow shows direction of rotation.

Figure 3a



Align last mark on left (mark "L") with arrow on crankcase to obtain TDC for LEFT cylinder.

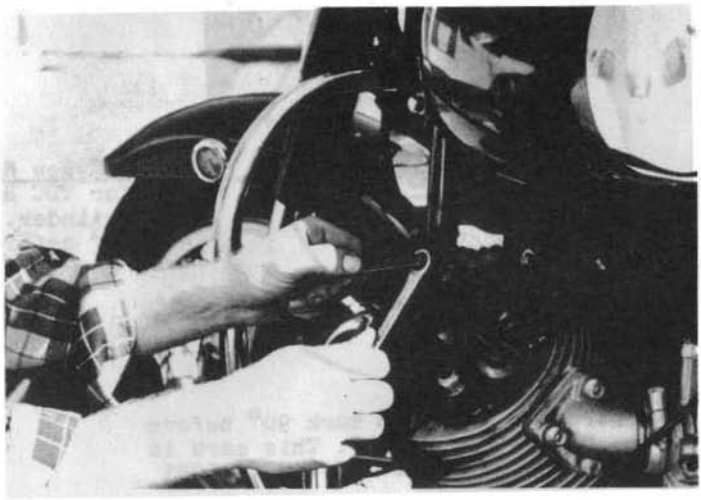
Intake valve must have 0.15mm clearance.
Exhaust valve must have 0.25mm clearance.



3. Insert proper feeler gauge between rocker arm and valve. If gauge will not fit between rocker arm and valve, valve is too tight. If a larger gauge will fit between rocker arm and valve, valve is too loose. In both cases, adjustment is necessary. Proceed as follows:

   a. Loosen adjusting bolt lock nut with 13mm wrench.
   b. Using tool provided in tool kit, or pliers, turn adjusting bolt clockwise to tighten valve and counterclockwise to loosen valve.

   Adjust valve as tight as possible and still be able to slide the feeler gauge in and out. If in doubt, here is a good rule to follow: Adjust valve so that correct feeler gauge will fit between valve and rocker arm, but next larger size will not fit. It is better to have a little valve noise than to burn your valves. After adjusting, pull the feeler gauge out and re-insert it. If the gauge will go in, gap is O.K.



When proper adjustment is made, proceed as follows:

a. Hold tappet adjusting bolt in place with adjusting tool.
b. Tighten lock nut with 13mm wrench.
c. Re-chech gap.

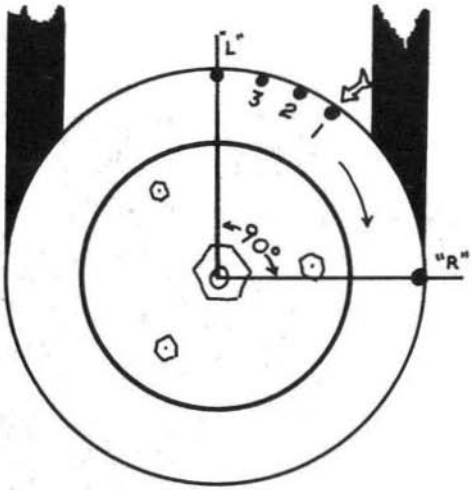
Repeat proceedure for other valve on LEFT CYLINDER.

RIGHT CYLINDER VALVE TAPPET ADJUSTMENT

The problem with right cylinder adjustment is in finding TDC for that cylinder. Mark "L" on the fan belt pulley is for the LEFT CYLINDER ONLY. There are several methods for obtaining TDC for the right cylinder.

1. Align mark "L" on fan belt pulley with arrow on crankcase. Place a degree wheel over pulley nut so that 0° is lined up with arrow. Rotate fan belt pulley 270° in a clockwise direction. Right cylinder is now at TDC. Check for compression or exhaust stroke.

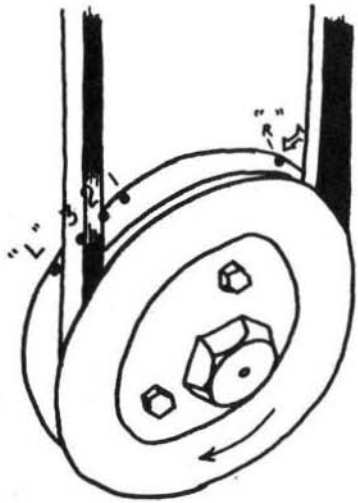
Drawing 4



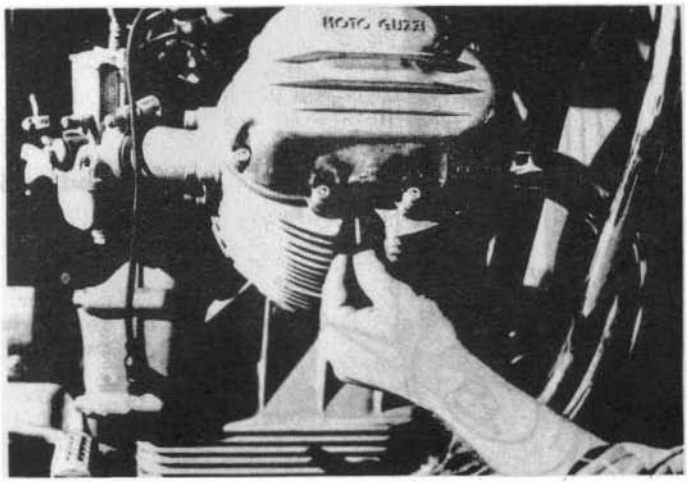
"R" New Mark for TDC RIGHT cylinder. Placed 90° before Mark "L"

2. With a protractor, place a mark 90° before and to the right of mark "L". This mark is called "R" and will be used for TDC RIGHT cylinder.

Drawing 4a



Line mark "R" up with arrow on crankcase. At this point, right cylinder will be at TDC. If you make this mark a permanent mark, you will always be able to find TDC right cylinder easily.

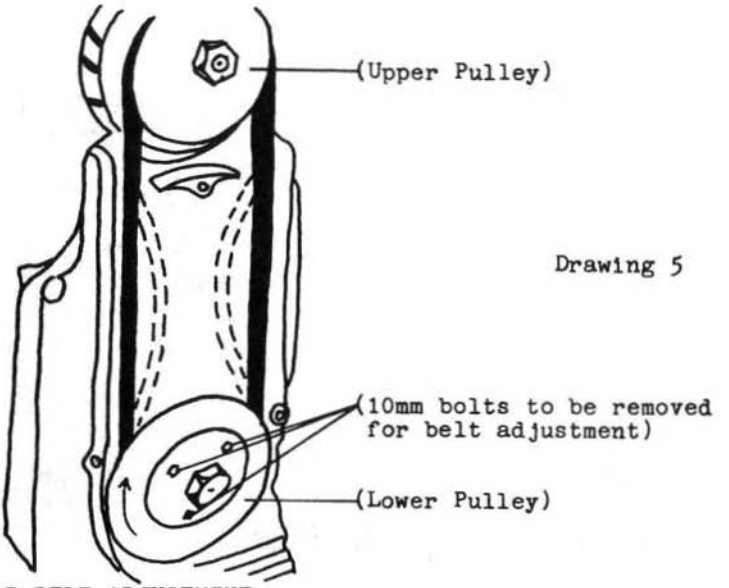


3. This method requires a great deal of care.

   a. Gently twist off right cylinder sparkplug lead and remove sparkplug.
   b. Insert a long screwdriver or allen wrench into sparkplug hole until the blade rests on piston head. CAUTION: Do not scratch or gouge piston head. Hold screwdriver lightly but do not let it fall into cylinder.
   c. Rotate lower fan belt pulley clockwise until screwdriver raises as high as it will go. At this point, right cylinder will be at TDC.

Once TDC for right cylinder has been determined, check to see if cylinder is on compression or exhaust stroke. When cylinder is on TDC compression, adjust valves as outlined in #3 for left cylinder adjustment.

After valves have been adjusted, replace rocker arm covers and tighten.

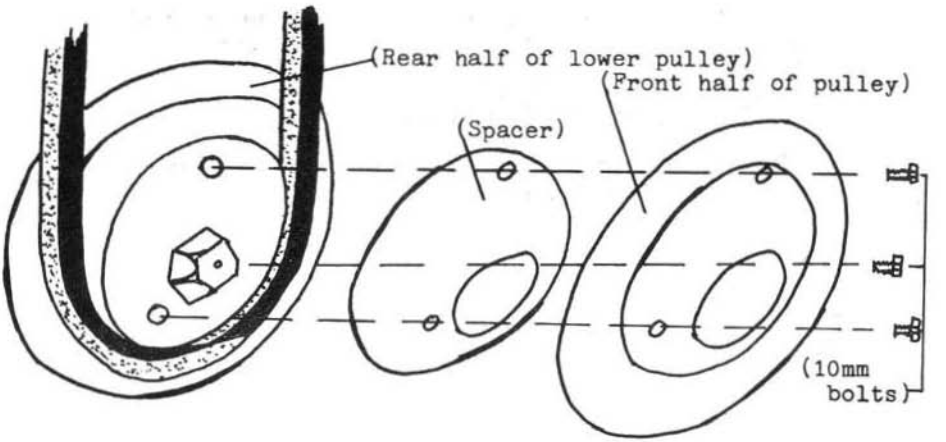


Drawing 5

GENERATOR BELT ADJUSTMENT

To check generator belt adjustment, grasp generator belt with thumb and forefinger at a point halfway between upper and lower pulleys. Squeeze generator belt together as shown by dotted lines above. Belt should have 1/2" to 3/4" of free play. If adjustment is necessary, proceed as follows:

a. Using a 10mm wrench, remove three (3) bolts in lower fan belt pulley. Slide front half of pulley off over crankshaft bolt.
b. Remove spacers, one at a time, to tighten belt. Add spacers, one at a time, to loosen belt.



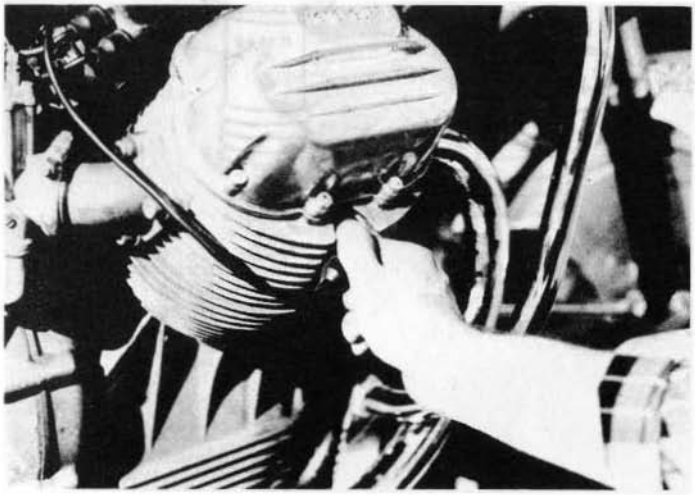
Extra spacers may be carried on the front and rear of the pulley-- if there is an odd number, the extra should be carried on the front.

c. Replace the pulley and tighten the three 10mm bolts.
d. Rotate the pulley several times then check for proper adjustment. (Belt will tighten after several rotations).

SPARK PLUG SERVICE AND REPLACEMENT

Refer to drawing #6 on next page for plug details.

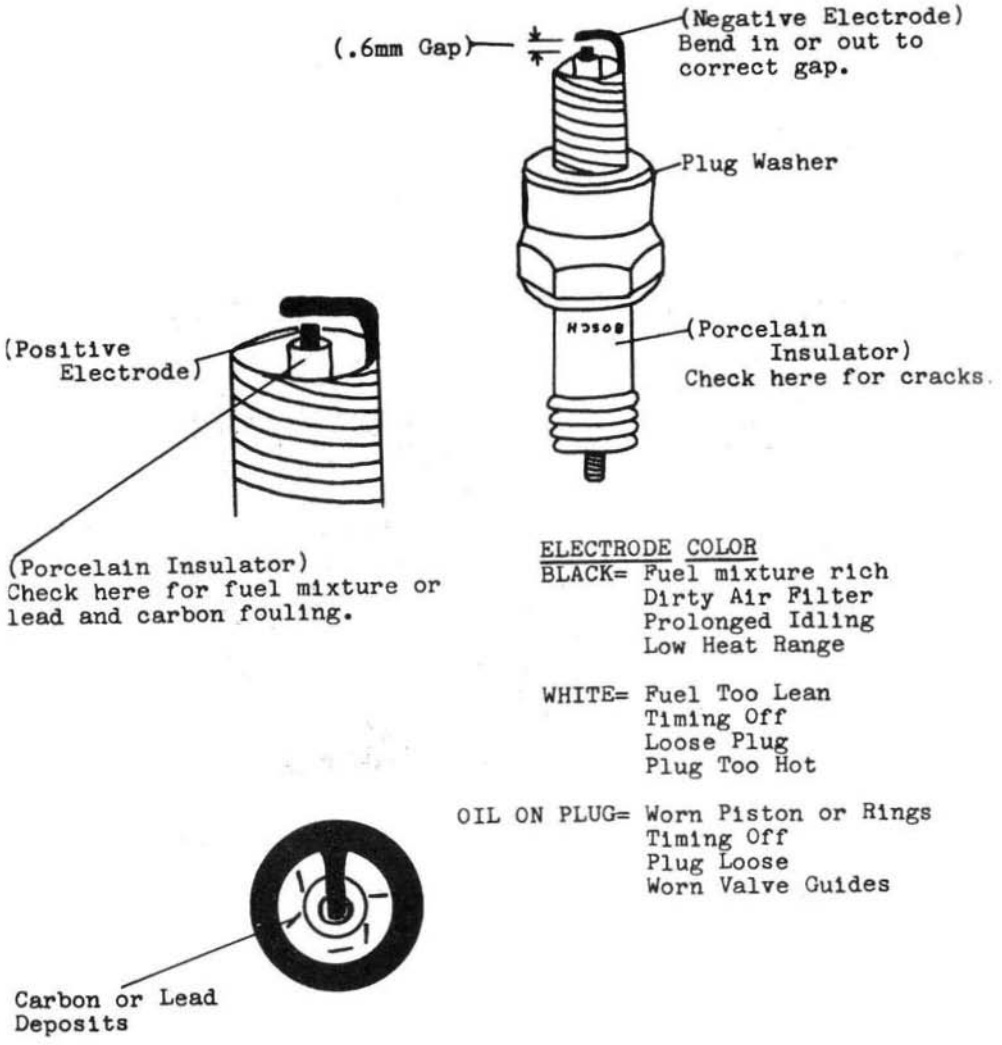
Before removing sparkplugs, be sure to blow all foreign material from around the plugs. If anything should fall into the cylinder, engine damage will result.



1. Remove sparkplug wires by pulling out and twisting gently. Do not jerk plug wires as damage may result causing replacement of plug wires

Drawing 6

SPARK PLUG

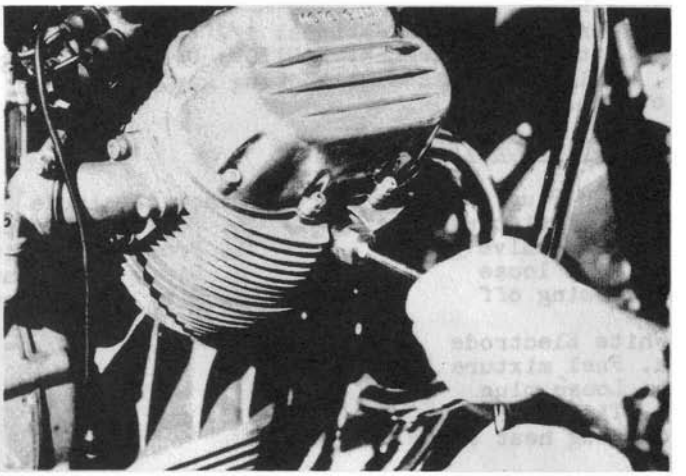


ELECTRODE COLOR

BLACK= Fuel mixture rich
Dirty Air Filter
Prolonged Idling
Low Heat Range

WHITE= Fuel Too Lean
Timing Off
Loose Plug
Plug Too Hot

OIL ON PLUG= Worn Piston or Rings
Timing Off
Plug Loose
Worn Valve Guides



2. Remove spark plug with a 13/16" plug socket. To remove plugs, turn counterclockwise.

3. Inspect plugs-
   a. Porcelain insulator should be a light chocolate color. If the insulator is black fuel mixture is too rich. Plug may be cleaned and used again. If the insulator is grey or white, fuel mixture is too lean. (Too much air and not enough gas). Plug may be cleaned and used again. In both cases carburetors must be adjusted.
   b. If insulator is cracked, discard plug and replace.
   c. If positive electrode is worn, replace plug.
   d. If there is oil on the plug, engine should be checked by a mechanic for cause.
   e. Hard carbon or lead deposits can be cleaned out with a sparkplug cleaner or wire brush.

4. Carefully bent negative electrode until a gap of o.6mm or .023" is reached between negative and positive electrodes. Measure gap by placing gage between positive and negative electrodes. A wire type gage is most accurate.

5. Replace sparkplugs
   a. Tighten as tight as possible with your FINGERS.
   b. Turn plugs an additional 1/2 to 3/4 turn with a plug wrench. CAUTION: Overtightening will cause a change in plug gap.
   c. Replace plug wires.

ELECTRODE COLOR INDICATIONS

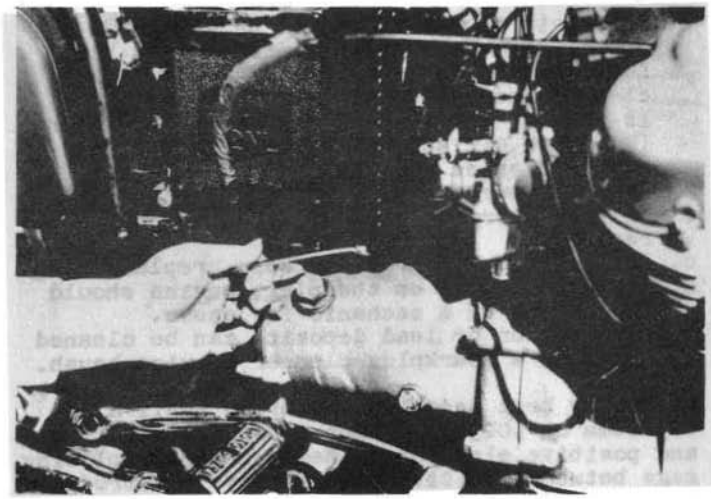
1. Oil On Plug
   a. Worn pistons or rings
   b. Worn valve guides
   c. Plug loose
   d. Timing off

2. Black Electrode
   a. Fuel mixture too rich
   b. Prolonged idling
   c. Dirty air cleaner
   d. Plug heat range too low

3. White Electrode
   a. Fuel mixture too lean
   b. Loose plug
   c. Timing off
   d. Plug heat range too hot

AIR CLEANER SERVICING

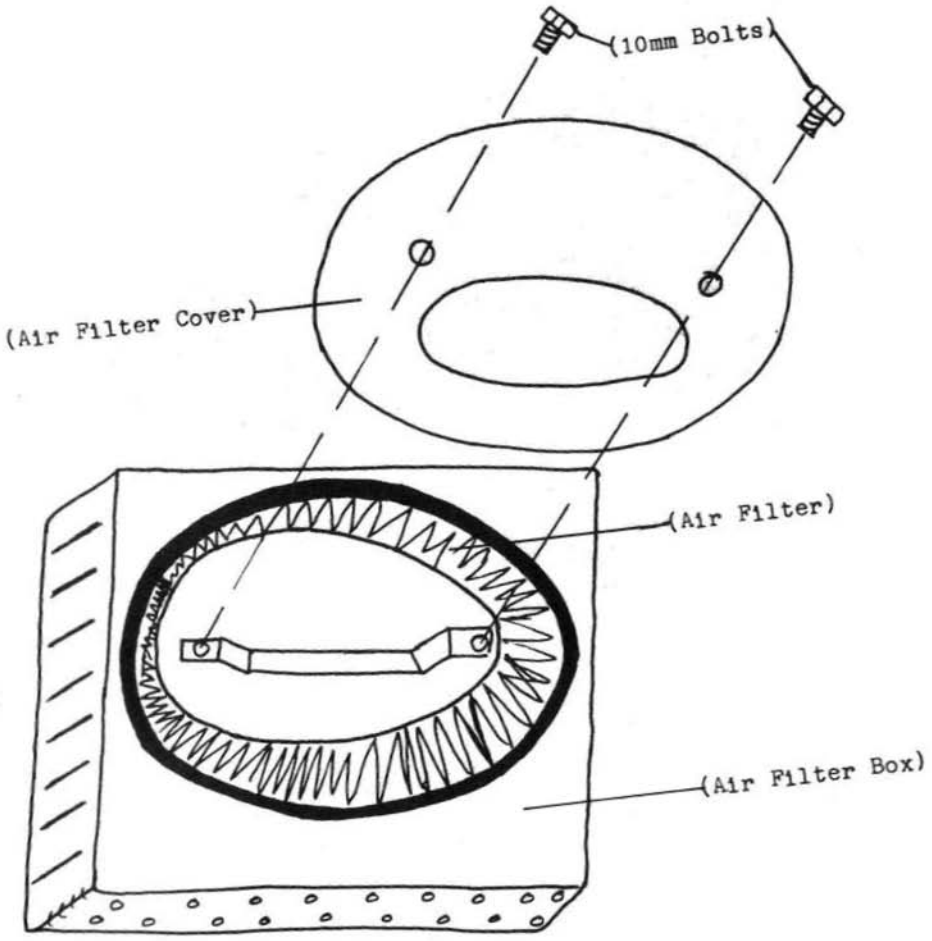
Refer to drawing #7 for the parts of the air cleaner. Air cleaner service is very important because the air cleaner keeps dust and dirt from being forced through the engine.

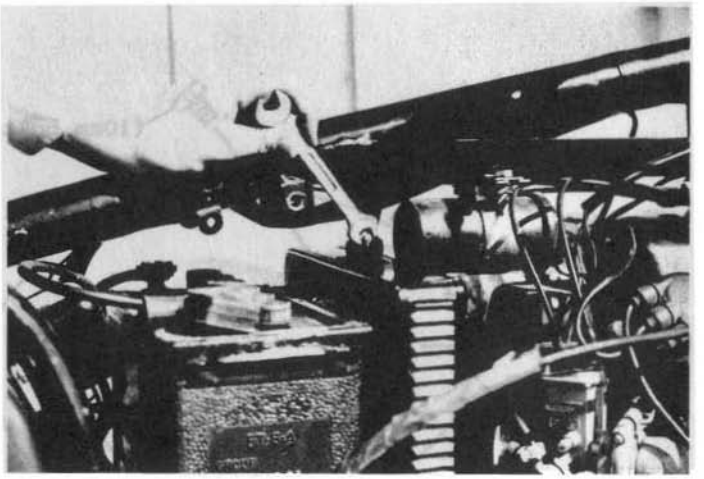


1. Remove lower 10mm bolts with a 10mm wrench. There is one bolt on each side of air filter box.

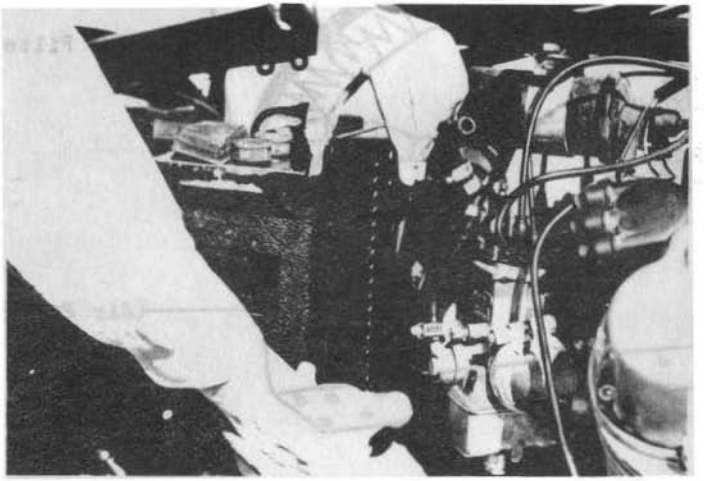
Drawing 7

AIR FILTER

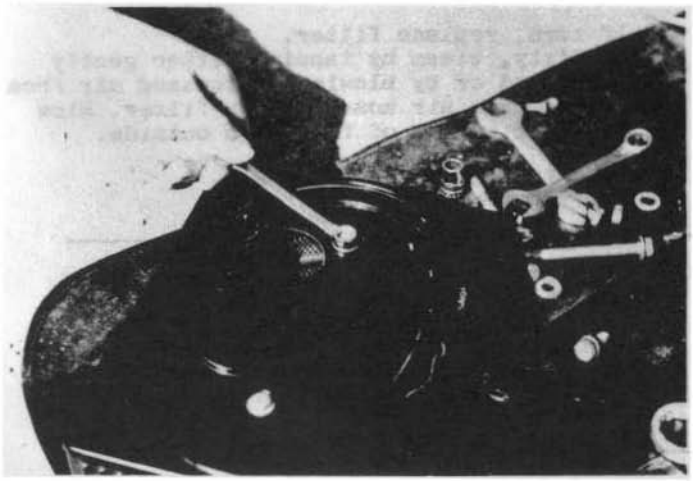




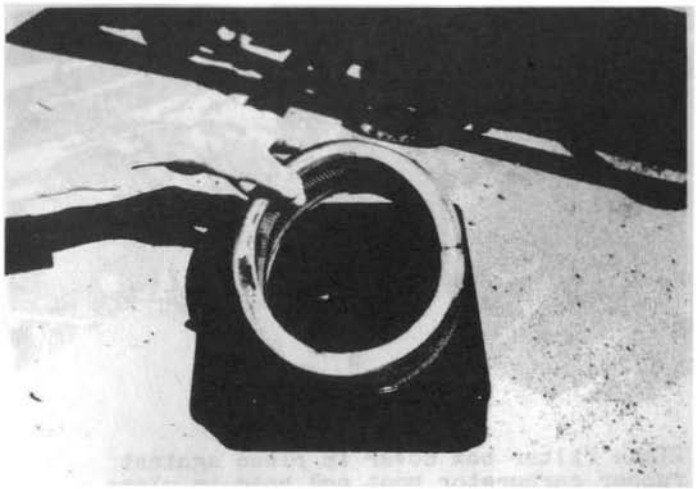
2. Remove top 10mm bolt with a 10mm wrench.



3. Slide filter box out of bike from the right hand side.



4. Remove two 10mm bolts on air filter cover.

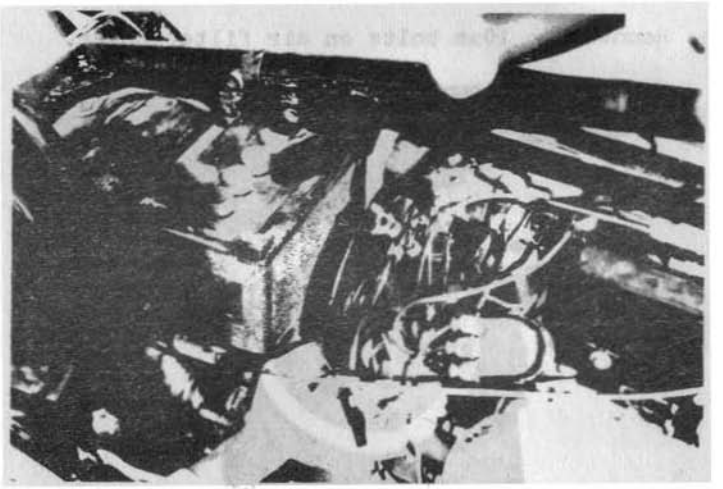


5. Lift air filter out of air filter box and inspect.

a. If torn, replace filter.
b. If dirty, clean by tapping filter gently on ground or by blowing compressed air from gas station air hose through filter. Blow air from inside of filter to outside.

6. Place filter back in filter box.

NOTE: This is an excellent time to syncronize carburetor cables--Before filter box is installed on bike--because you can see carburetor slides by removing rubber boot connecting carburetors to air filter box. This is covered in section on carburetors.



7. Place filter box cover in place against rubber carburetor boot and hold in place. Be sure raised lip on filter box is completely inside rubber boot or there will be air leaks.

8. Hold filter box cover in place and carefully slide filter box into place behind cover. Be careful not to dislodge cover from rubber boot.

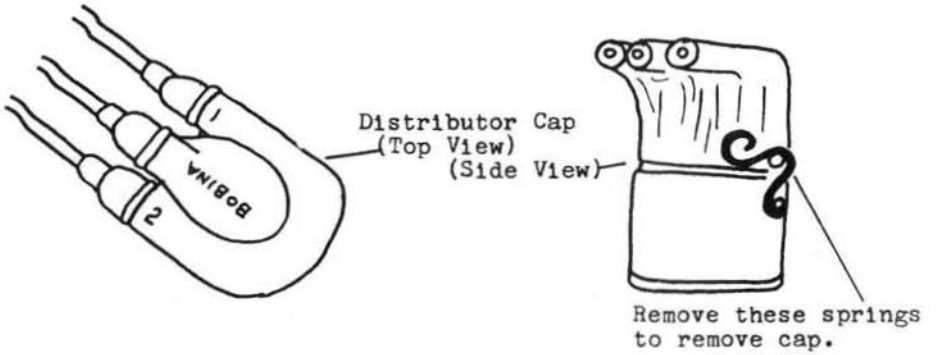
9. Carefully replace lower 10mm bolts. Check to be sure filter box cover and rubber boot are still properly adjusted and joined together.

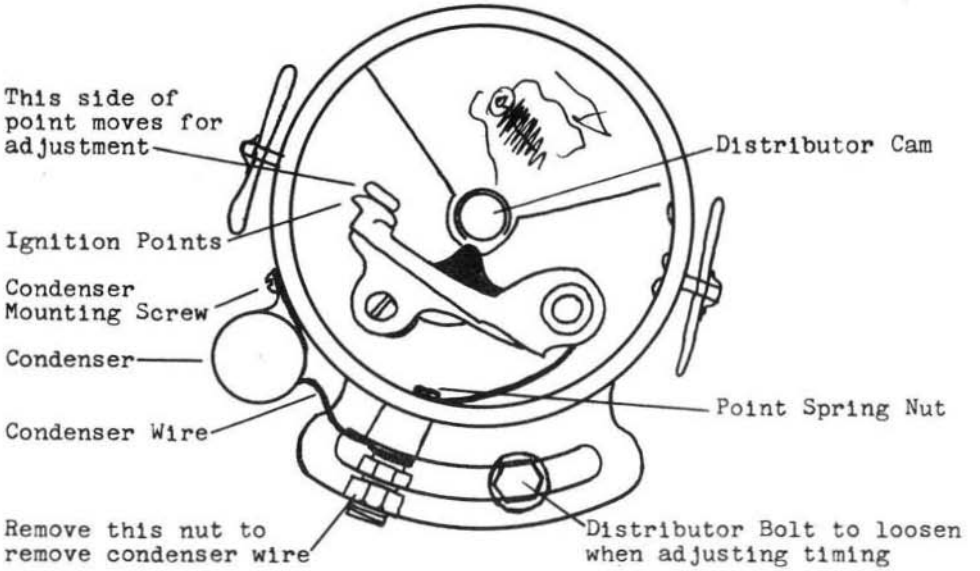
10. Replace two 10mm bolts holding filter box cover on filter box.

11. Replace top 10mm bolt. Check to be sure rubber boot still covers lip of filter cover. If rubber boot does not completely enclose raised lip on filter cover, adjust rubber boot.

DRAWING 8

TIMING





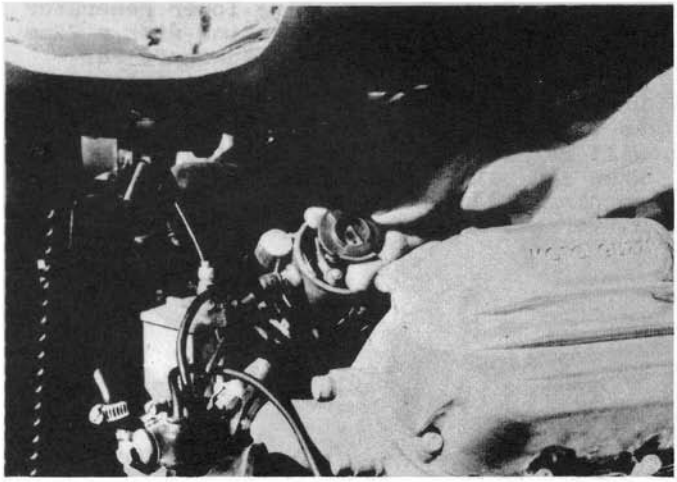
IGNITION POINT ADJUSTMENT

Drawing #8 (preceeding page) shows details distributor and ignition points.

ADJUSTMENT WITH FEELER GAGE

1. Distributor is located just behind the right hand cylinder.

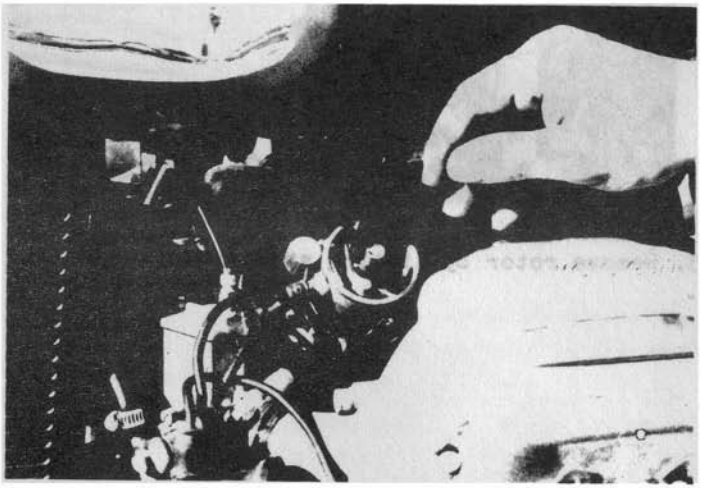
2. Remove distributor cap by loosening spring clip on each side of distributor cap. Push clips up and toward front of bike. Lift off distributor cap.



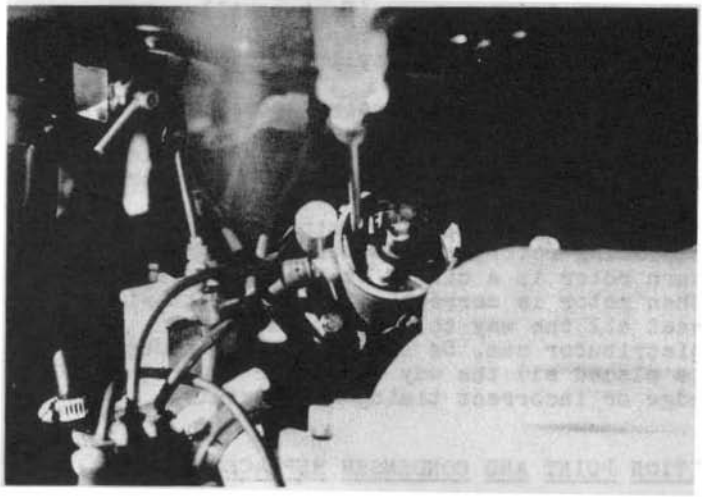
3. Remove rotor by lifting straight up.

4. Spread points by hand and visually check for a grey color or pitting on points.
   a. A grey color is normal and can be removed with a point file. The best method for filing points, is to insert file between points, close points firmly against the file, then file.
   b. Slight pitting can also be corrected with an ignition point file. Heavy pitting shows condenser breakdown and both points and condenser should be replaced.
   c. After filing, blow residue away from around points and clean points with an unwaxed business card.

5. Rotate cam shaft by turning lower generator pulley in a clockwise direction with a 27mm wrench. (Same as turning crankshaft for valve tappet adjustment). At the same time, watch the ignition points in the distributor. As the crankshaft turns, the distributor cam will rotate, opening and closing the points. When the points reach the point of widest opening, adjustment is made.
   a. Correct gap is .016"-.018" or .42mm-.48mm.



   b. Correct size gage should fit FIRMLY between the points without moving either point.



c. If adjustment is necessary, loosen point adjustment screw just enough to allow points to move. Move points in or out to obtain correct gap.
d. After correct gap is obtained, tighten point adjustion screw. Check to be sure point gap is still right.

6. Place a small dab of grease on distributor cam. This will retard wear of felt buffer pad on points and gap will last longer.

7. Replace distributor cap or leave off, depending on which timing method is to be used.

ADJUSTMENT BY DWELL METHOD

Dwell is defined as the number of degrees the distributor cam rotates while the points remain closed. Dwell method of adjusting points is more accurate than the gage method, but requires a Dwell meter. (If points are badly worn, dwell method cannot be used.) A dwell meter that will work on two-cylinder engines is hard to find. A combination dwell and tachometer for small engines is available from J. C. Whitney, Chicago, Ill.

1. Remove distributor cap and rotor.

2. Attach dwell meter according to instructions for your model.

3. Crank engine over with electric starter and watch dwell meter. (Engine will not start with distributor cap off.) Correct dwell is 75° on a two-cylinder scale.

4. If adjustment is necessary, loosen point adjusting screw and adjust points to correct dwell angle. After correct angle is obtained, tighten point adjusting screw.

5. Replace rotor and distributor cap. When replacing rotor, press down on rotor and turn rotor in a circle at the same time. When rotor is correctly installed, it will seat all the way to the bottom of the distributor cam. Be sure distributor cap is placed all the way down over tapered edge or incorrect timing will result.

IGNITION POINT AND CONDENSER REPLACEMENT

POINT REPLACEMENT

1. Remove distributor cap and rotor.

2. Make sure points are open. If not, rotate crankshaft until points are open to widest gap.

3. Remove point adjusting screw.

4. Remove point holding point spring. CAUTION: DO NOT LOOSE THESE SCREWS. THEY ARE VERY HARD TO REPLACE.

5. Lift out points.

6. Place new points in same position as old points were located.

7. Replace point adjusting screw.

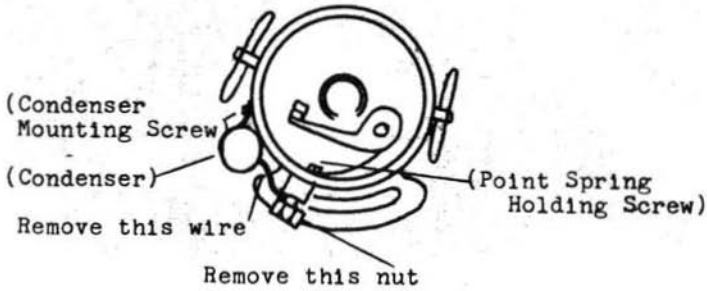
8. Replace spring holding screw.

9. Gap points.

CONDENSER REPLACEMENT

Condenser is metal container located on side of distributor.

1. Remove condenser wire from distributor.
   a. Remove nut.
   b. Remove condenser wire.



2. Remove condenser mounting screw.

3. Remove condenser.

4. Mount new condenser in reverse order of above instructions.

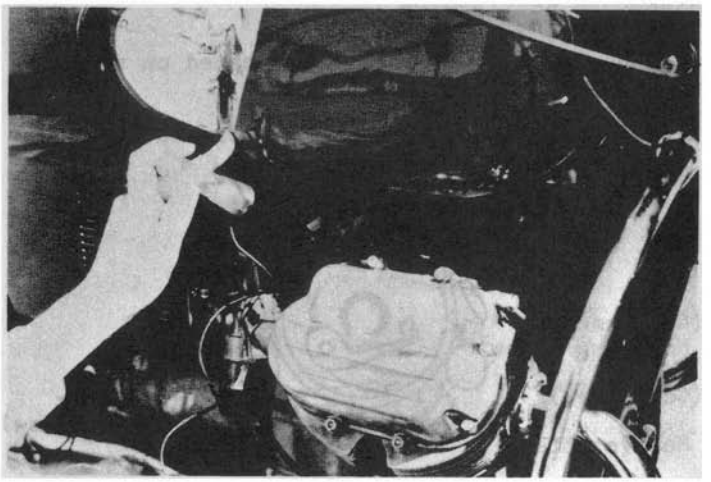
IGNITION TIMING (Refer to drawings 10, 11, 12 for timing information.)

STATIC TIMING

For this method a continuity light is necessary and can be purchased at any auto parts store.

1. Remove distributor cap.

2. Hook ground wire of continuity light to a good ground on the engine or unpainted part of the bike frame, or negative battery terminal. (Negative battery terminal does not have a rubber cover.)



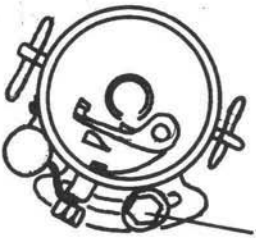
3. Touch continuity light to long arm of ignition points.

4. Turn on ignition key.

5. Slowly rotate 27mm nut on lower generator pulley in a clockwise direction and at same time watch continuity light.

6. At the instant the continuity light comes on, stop rotating generator pulley and check timing mark alignment. Mark #3 should line up with arrow on crankcase. If correct mark does not line up, adjustment is necessary.
   a. Loosen adjusting bolt on distributor with a 10mm wrench. Loosen bolt only enough to barely move distributor.

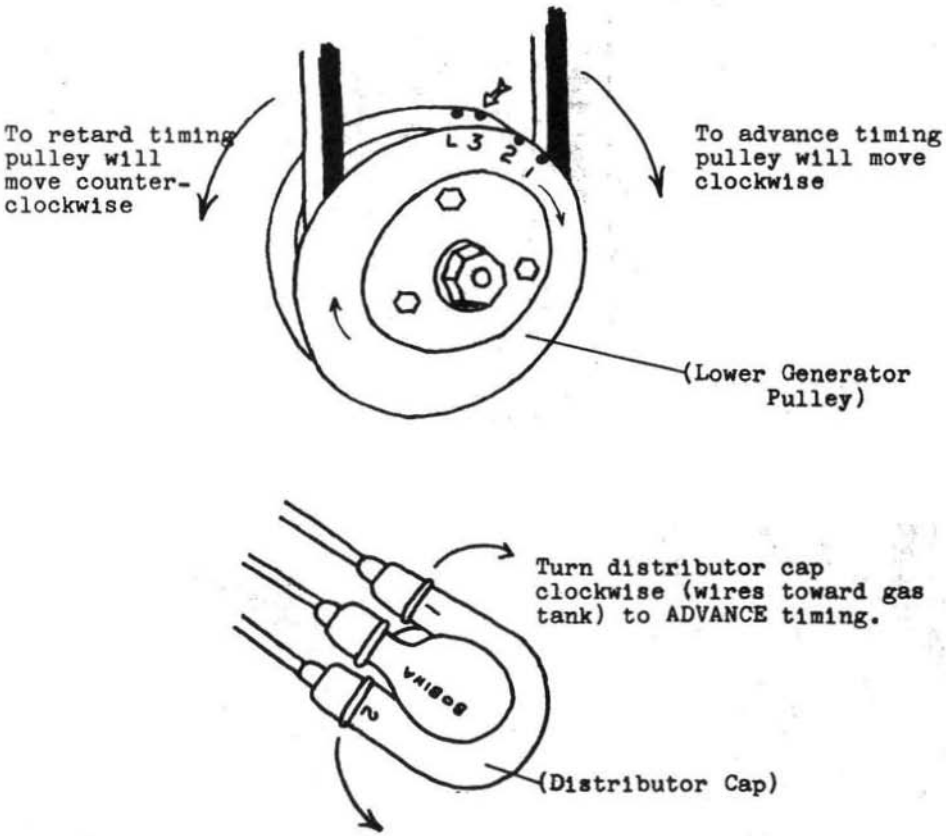
DRAWING 13



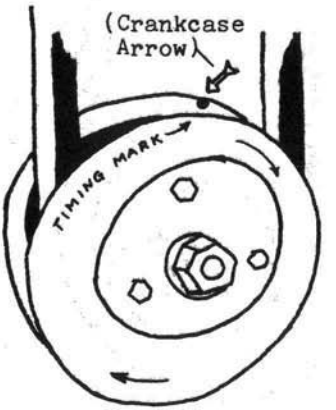
Loosen this nut to Rotate Distributor.

DRAWING 10

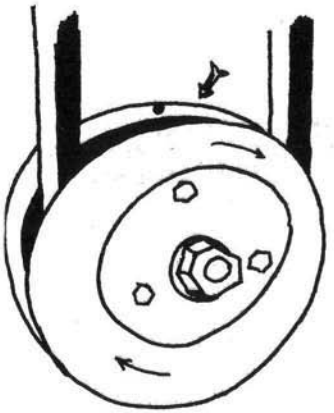
ALIGNMENT FOR STATIC TIMING



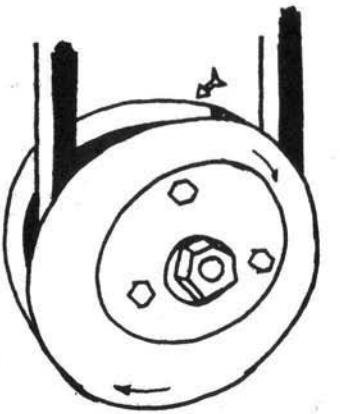
DRAWING 11



Timing Alignment Correct



TIMING RETARDED
Rotate distributor clockwise to ADVANCE timing



TIMING TOO ADVANCED
Rotate distributor counter-clockwise to RETARD timing

b. If continuity light comes on too soon, rotate distributor cap clockwise to ADVANCE timing.
c. If continuity light comes on too late, rotate distributor cap counter-clockwise to RETARD timing.
d. When correct mark alignment has been achieved, tighten distributor bolt. Re-check timing to be sure distributor did not move during tightening.
e. Disconnect continuity light, replace rotor, distributor cap, and timing case cover. (Remember the cover you removed 30 pages ago for tappet adjustment?)

7. Replace gas tank and connect both fuel lines to fuel valves. Be sure to tighten both hose clamps to prevent fuel leaks.

TIMING WITH TIMING LIGHT

This method is the best way to set timing because it allows you to set the timing under actual running conditions. Since most actual riding is done with the timing advance mechanism in full operation, full advance alignment is critical to maximum engine performance and long life. With static timing, you can not set timing at full advance and must assume the advance mechanism is working. This method requires a good STROBOSCOPIC TIMING LIGHT and an accurate tachometer.

This method is almost a two man job. One man, or woman, to twist the throttle, maintaining proper engine revolutions and to turn the distributor as required. The other person to operate the timing light and watch alignment of timing marks.

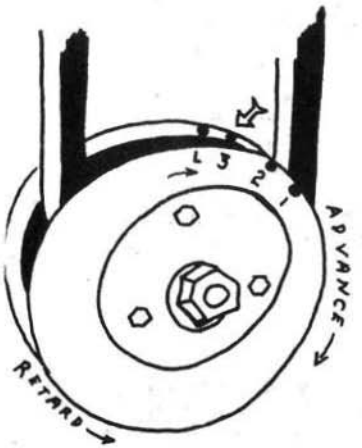
NOTE: It will be helpful to go over all timing marks with white paint or chalk for easy visibility.

1. Replace gas tank and hook up all fuel lines.

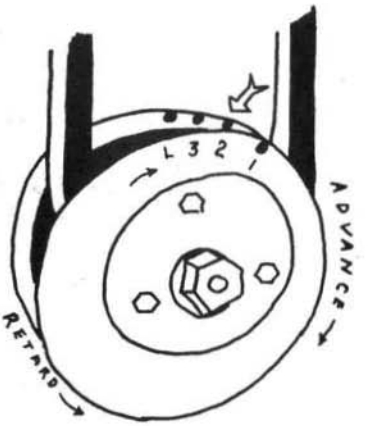
2. Attach engine tester according to instructions with your unit.

DRAWING 12

TIMING LIGHT METHOD

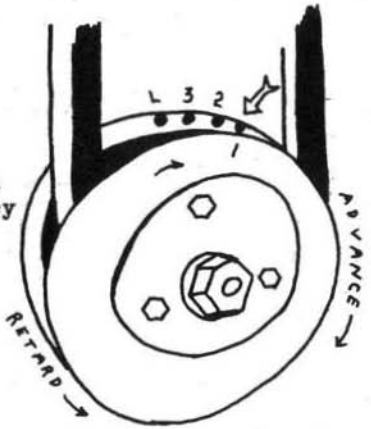


Alignment at 1200 RPM



Alignment at 2200 RPM

Retard Timing moves timing marks against direction that pulley rotates.



Advance Timing moves timing marks in same direction that pulley rotates.

Alignment at 3600 RPM

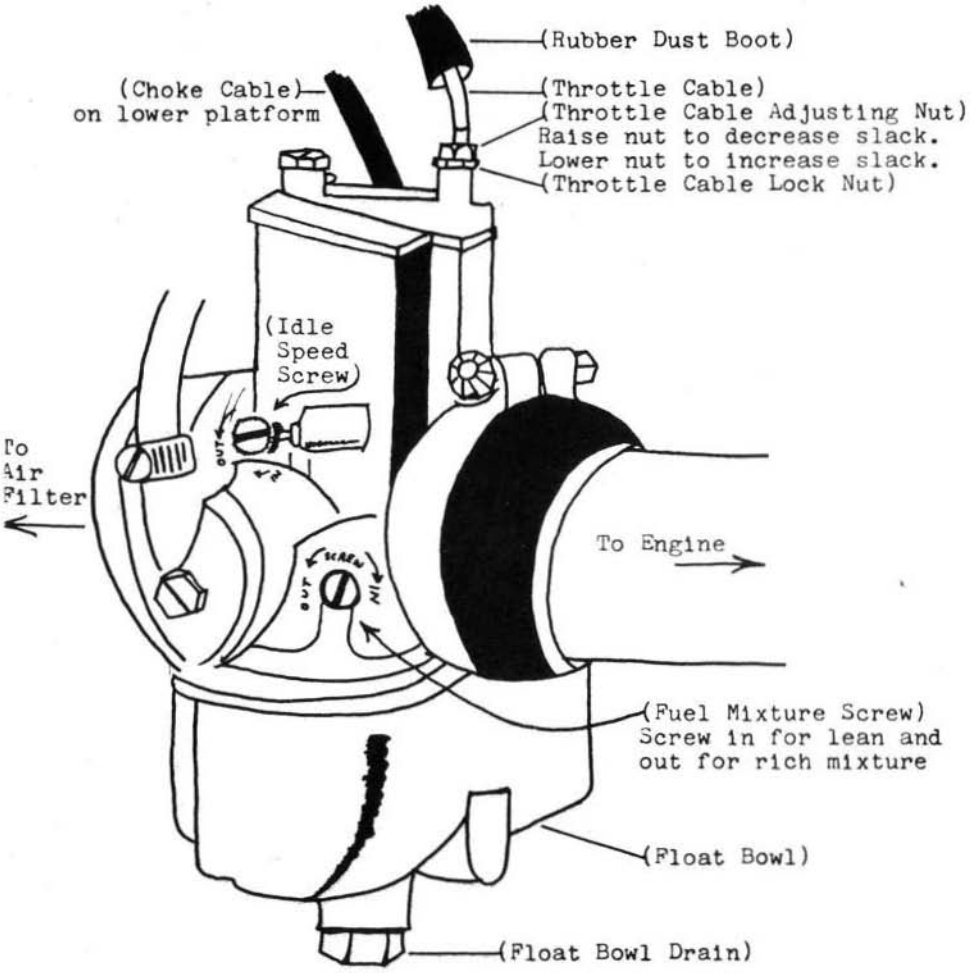
3. Attach timing light to bike. Generally, they are attached as follows:
   a. One lead to the left hand, or cylinder sparkplug.
   b. RED lead to positive terminal of battery. Positive terminal is located on right under rubber cover, negative is on left.
   c. BLACK lead to negative or ground terminal.

   CAUTION: BE CAREFUL THAT LEADS DO NOT COME INTO CONTACT WITH THE EXHAUST PIPES SINCE THE LEADS WILL MELT AND SHORT OUT VERY FAST.

4. Start engine and aim timing light at lower generator pulley. (Timing case cover should be removed.) Timing marks should line up with arrow on crankcase as follows:
   Mark #3 @ 1200 RPM
   Mark #2 @ 2200 RPM
   Mark #1 @ 3600 RPM

5. If adjustment is necessary, proceed as follows:
   a. Loosen distributor bolt with 10mm wrench.
   b. Set engine speed at 2200 RPM. (I find that best timing is accomplished by setting mark #2 first.
   c. If mark #2 aligns <u>before</u> it reaches the arrow on crankcase, rotate distributor clockwise to <u>advance</u> timing. Mark should line up exactly with crankcase arrow. If mark #2 lines up <u>after</u> it passes the arrow, rotate distributor counter-clockwise to <u>retard</u> timing.
   d. Check to see that marks #1 and #3 are in proper alignment. If they are not, timing advance mechanism must be replaced.
   e. After proper alignment is obtained, tighten distributor bolt and double check timing.
   f. Disconnect timing light and replace timing case cover. (Leave tachometer hooked up to aid in carburetor adjustment.)

CARBURETOR ADJUSTMENT



SYSTEM OF 1/4, 1/2, & FULL TURNS

Start 1/4 1/2 3/4 Full

CARBURETOR ADJUSTMENT

Before attempting carburetor adjustment, make sure engine is warmed up to operating temperature and the air lever (choke) is in the OFF position.

THROTTLE CABLE ADJUSTMENT

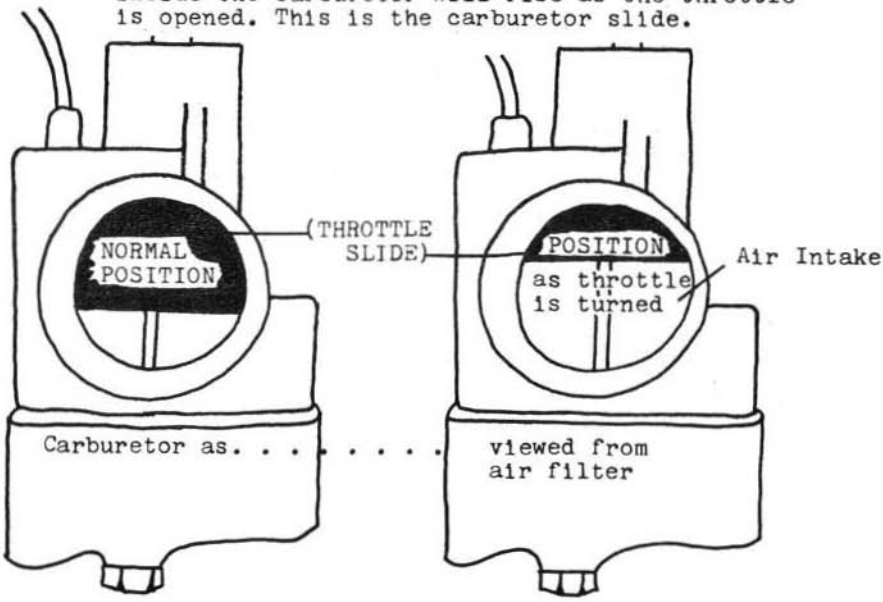
Adjustment of the throttle cable on each carburetor is extremely important. The throttle cable determines exactly when and how far each carburetor will open. If the carburetors do not open at the same time, and for the same distance, there will be irregular carburetion and increased engine vibration, not to mention loss of engine performance. Unfortunately, throttle cable adjustment is the most often neglected part of the tune-up-- even by some professional mechanics. There are several methods that may be used for cable adjustment.

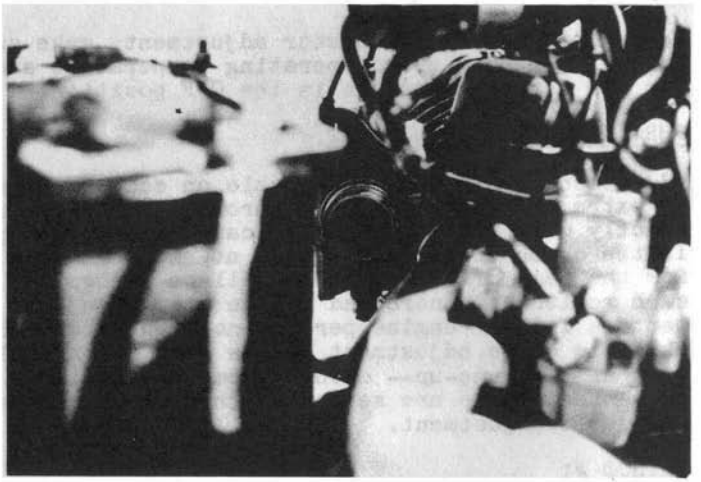
METHOD #1

This method is most easily used while servicing the air filter.

1. Remove air filter box and rubber boot connecting both carburetors to air filter.

2. Look into air intake (opening facing air filter) for the left carburetor. At the same time, twist the throttle twist grip. A large metal block inside the carburetor will rise as the throttle is opened. This is the carburetor slide.





3. Look into the left carburetor air intake and at the same time, insert your finger all the way into the carburetor on the RIGHT side until bottom edge of carburetor slide can be felt.

4. Twist throttle twist grip (on handlebar) and watch left carburetor throttle slide. You should see the left slide begin to rise at the same time you feel the right slide begin to rise. If both slides do not begin to rise at the same time, adjustment is necessary.
   a. Raise rubber dust boot.
   b. Loosen cable lock nut with 8mm wrench.
   c. Raise cable adjuster nut to make slide rise sooner.
   d. Lower cable adjuster nut to make slide rise later. (put more slack in cable)

   NOTE: After final adjustment, make sure that throttle twist grip has about 10^{o} free play out of total rotation.

METHOD #2

1. Raise rubber dust boot from top of carburetor exposing throttle cable end.

2. Loosen cable lock nut.

3. Start engine

4. Screw idle speed screw until cylinder stalls.

5. Turn cable adjusting nut counter-clockwise until a fast idle is obtained.

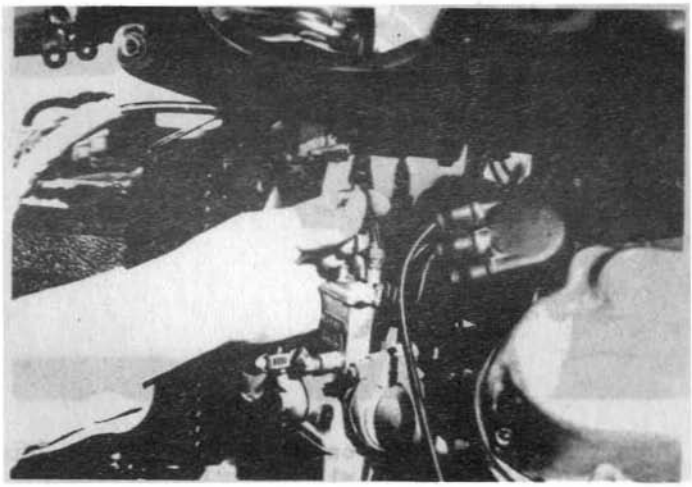
6. Disconnect LEFT cylinder sparkplug lead.

7. Turn cable adjusting nut clockwise (lower nut) until engine just stalls.

8. Repeat proceedure for other cylinder. At this point, both cables will be syncronized.

METHOD #3

1. Raise rubber dust cover from top of carburetor.



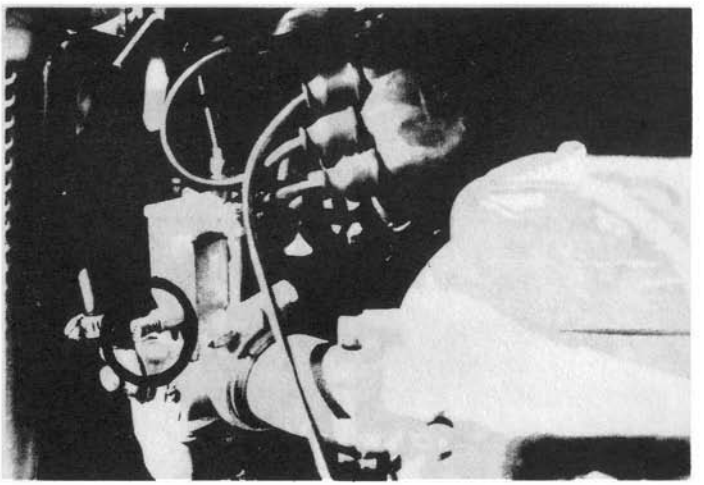
2. Grasp throttle cable and check amount of free pull. There should be about 1/16" of free pull. If there is more free pull or less free pull, adjustment is necessary.

3. If adjustment is necessary, loosen cable lock nut and raise cable adjusting nut to decrease slack and lower adjusting nut to put more slack in cable.

NOTE: After cables have been adjusted, check to make sure twist grip has about 10^{o} of free play out of total rotation. If not, adjust cables to give twist grip required free play. Be sure to tighten all lock nuts. Be sure to lower rubber dust boot and use care not to tear it.

IDLE SPEED ADJUSTMENT

1. Start engine. If not already warm, allow engine to warm up to operating temperature.



2. Turn idle speed screw on one carburetor in until cylinder will operate without other cylinder. (Turning screw in will increase engine speed.)

3. Disconnect sparkplug wire to other cylinder.

4. Turn idle speed screw out on operating cylinder until cylinder just stalls. Turn slowly- in order to stop turning at exact point that engine stalls.

5. Repeat same proceedure for opposit cylinder.

6. Turn both idle speed screws in 1½ turns. (This is an arbituary number. The idea is to be sure the bike will idle when started. Both screws must, however, be turned in EXACTLY the same number of turns.)

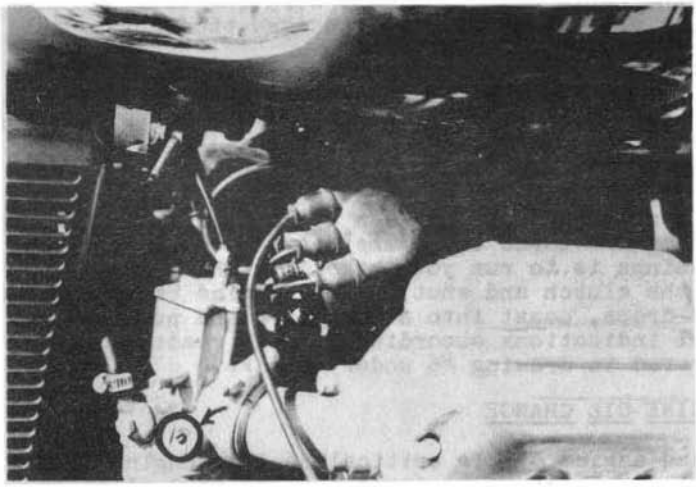
7. Start the engine.

8. Slowly turn both idle speed screws by the same number of ¼ turns until an idle speed of 1,000 to 1200 RPM is attained. If you do not have a tachometer, turn idle screws until generator light just goes out. Again, be sure both screws are turned EXACTLY THE SAME NUMBER OF TURNS or carburetor syncronization will be lost and you will have to start over again.

FUEL MIXTURE ADJUSTMENT

1. Start the engine.

2. Disconnect sparkplug wire to one cylinder.



3. Turn fuel mixture screw for operating cylinder all the way in until it gently seats or engine begins to stall. Turn fuel mixture screw out by ¼ turns until highest engine RPM is attained.
NOTE: Turn only until turning no longer affects engine RPM. Extra turn will only richen mixture and waste gas.

4. Repeat proceedure for other cylinder.

NOTE: If you have an accurate tach., watch tachometer for highest RPM. If not, you can find highest RPM by listening to engine, by placing palm of hand close to, but not against, end of exhaust pipe and feeling for fastest pulse of exhaust, or by holding a light card behind exhaust pipe and watching for fastest flutter of card. If your bike will not idle with one cylinder firing, the same proceedure can be followed with both cylinders running, but you will have to listen more carefully. If you have a tach graluated by units of 100 RPM, both cylinders running at same time will present no problem.

AIR CABLE (CHOKE) LUBRICATION

There are two cables entering each carburetor. One enters on top, the other further down. The cable entering the carburetor at the lowest level is the air lever (choke) cable. Raise the rubber dust boot and place a few drops of cable lubricant in the top of the cable adjusting nut. Work the lever a few times and lubricant will run down the cable and keep it from sticking.

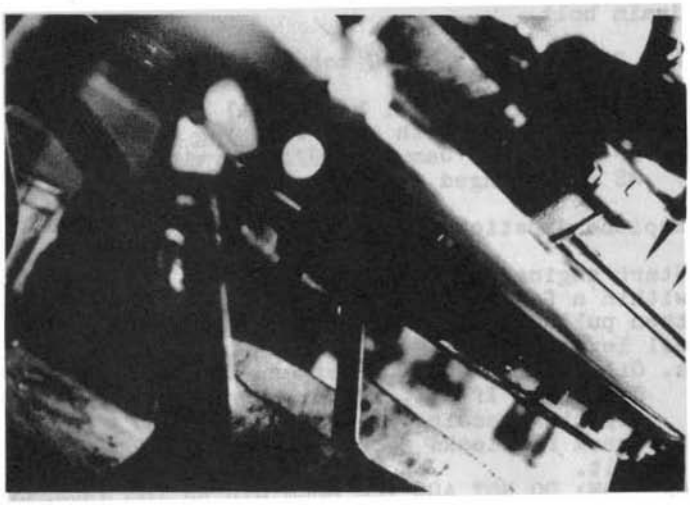
Carburetors are now adjusted. After running bike for a few miles, pull the sparkplugs and check them for fuel mixture adjustment. If they indicate fuel too rich or too lean, adjust fuel mixture screws until correct mixture is reached. A little bit of a turn on a mixture screw makes a big change, so adjust by 1/8 or 1/4 turns only. The best way to get plug readings is to run your bike at highway spped, pull in the clutch and shut off the engine before engine RPM drops, coast into a rest area and pull a plug. Fuel indications according to plug readings are covered in drawing #6 under SPARKPLUG SERVICE.

ENGINE OIL CHANGE

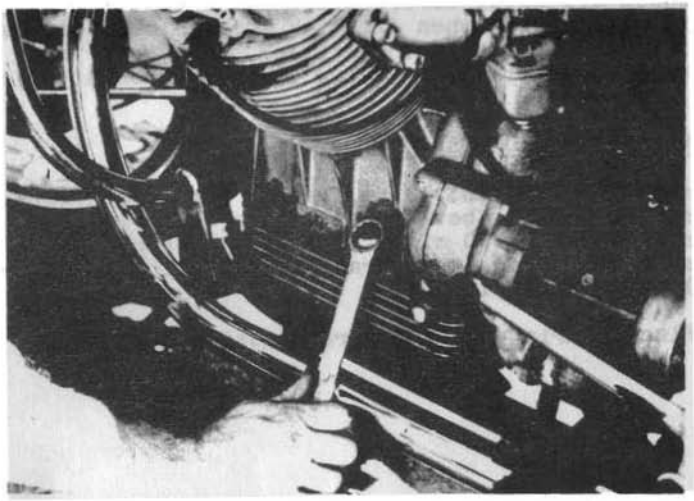
Clean engine oil is critical to long engine life. Engine oil should be changed every 1800 miles or sooner. When your bike is in storage, or use for occasional short runs with long periods of non-use between, engine oil must be clean or engine life will be hurt. Under occasional use conditions, change oil every 30 to 60 days. REMEMBER: THE CLEANER THE ENGINE OIL, THE MORE CHANCE OF SURVIVAL YOUR ENGINE HAS. Oil is cheap compared to repairing an engine.

1. Start engine and allow to warm up to operating temperature.

2. Place one gallon drip pan under oil bolt. (drain)



3. Remove oil drain bolt with 22mm BOX END wrench. This will allow engine oil to begin to drain.



4. Remove oil filler bolt and dipstick with 22mm box end wrench.

5. When oil has completely drained, replace oil drain bolt.

6. Add 3 quarts of 10W-40 motor oil through dipstick opening.
   a. A long funnel will be helpful here.
   b. Use only oil with an API rating of MS, DG or DM. As of January 1971, service rating MS was changed to SD.

7. Replace dipstick bolt.

8. Start engine and make sure oil light goes out within a few seconds. Run engine for 2 minutes then pull dipstick (oil filler bolt) and check oil level.
   a. Oil level should be between two marks on dipstick. If not, add oil until proper dipstick reading is reached.
   b. Check for leaks around drain bolt and filler bolt.

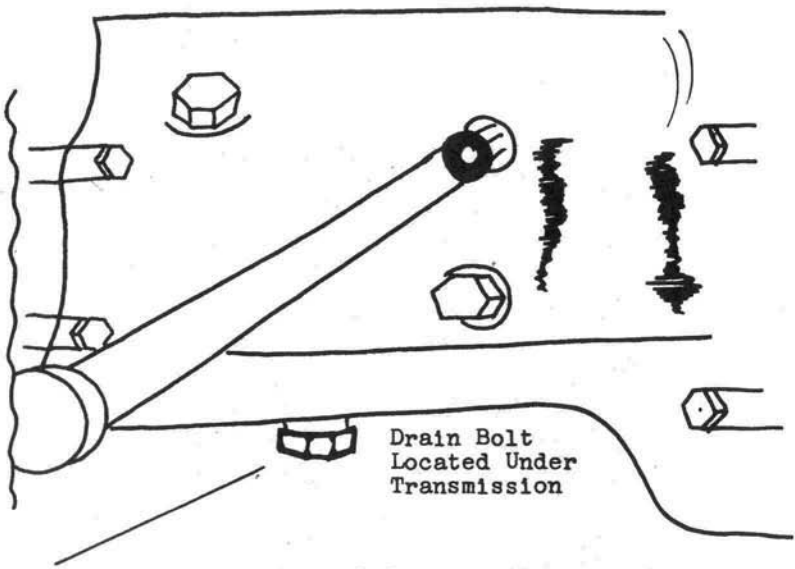
   CAUTION: DO NOT ADD TOO MUCH OIL AS THE INCREASED PRESSURE MAY DAMAGE ENGINE SEALS. OIL LEVEL SHOULD NEVER GO ABOVE THE UPPER MARK.

9. Check oil level before every ride. Be sure engine is not running when dipstick bolt is removed, as oil will be shot out of filler hole. Never ride bike if oil level is below lower mark on dipstick.

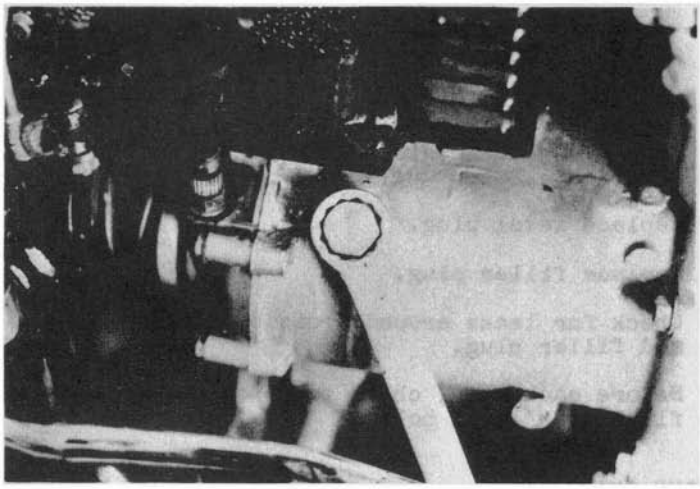
TRANSMISSION OIL CHANGE

Transmission oil should be checked for proper level every 1800 miles, better yet before each ride, and changed every 6,000 miles. The change should be made after a short ride when transmission oil is warm and will drain easily.

1. Place a drip pan under Transmission Drain Bolt.

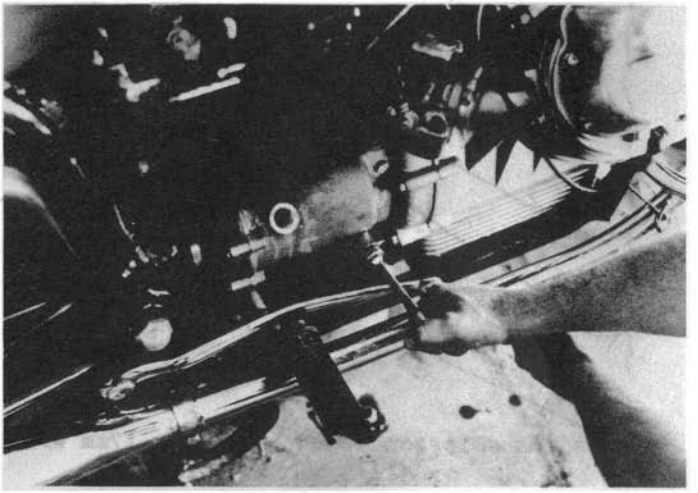


2. Remove transmission drain bolt with 17mm wrench.



3. Remove transmission filler bolt with 22mm wrench.

4. After oil has completly drained, replace drain bolt.



5. Remove transmission level plug.

6. Be sure bike is sitting level, then add 90 weight gear lube through filler plug hole. When gear lube begins to drain out of the level hole, stop adding gear lube.

7. Replace level plug.

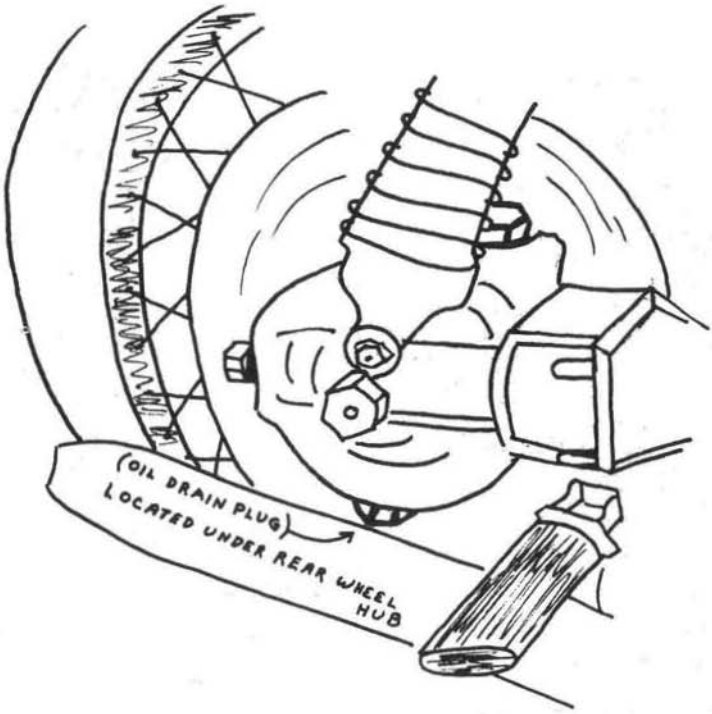
8. Replace filler plug.

9. Check for leaks around drain bolt, level plug, and filler plug.

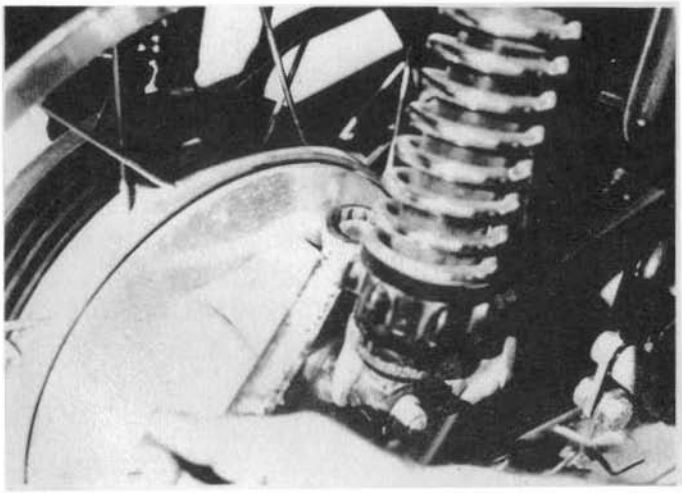
10. Before each ride, check to be sure gear lube is flush with level hole.

DRIVE SHAFT OIL

This oil should be checked before every ride and changed every 6,000 miles.

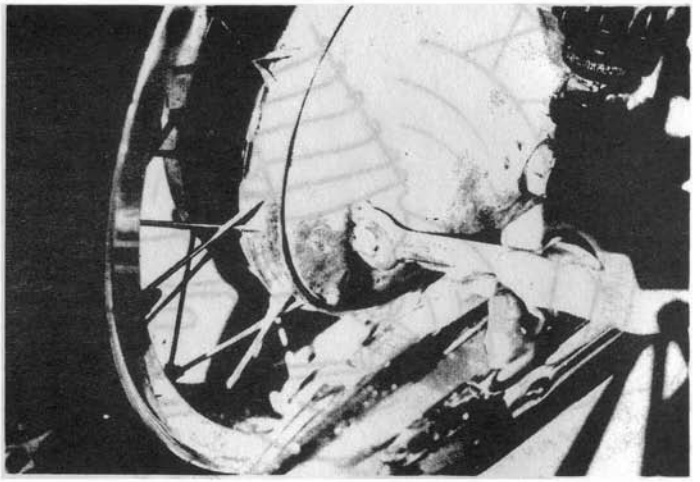


1. Remove drain plug with 17mm wrench.



2. Remove filler plug with 22mm wrench.

3. After oil has drained, replace drain bolt.



4. Remove level plug with 17mm wrench.

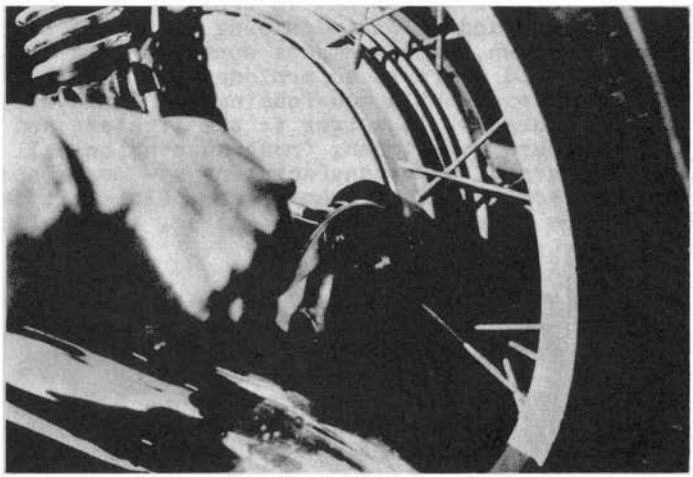
5. Add 90 wt gear lube until lube begins to run out through level hole.

6. Replace level plug.

7. Replace filler bolt.

8. Check fluid level before each ride. Fluid should be flush with level hole.

REAR BREAK ADJUSTMENT



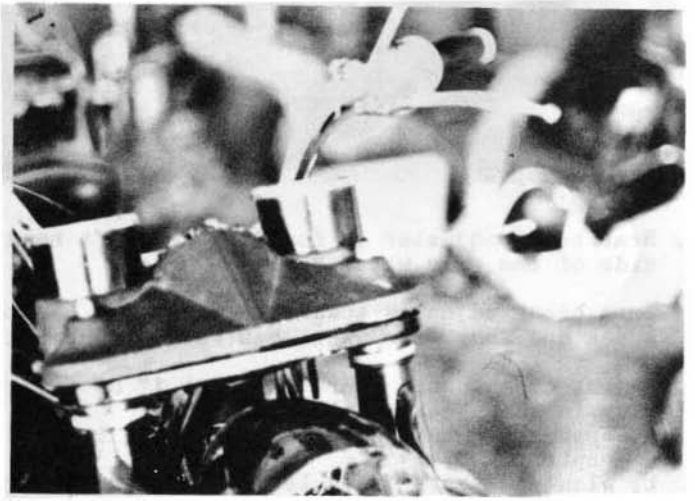
1. Rear break adjuster is found on the left hand side of the rear wheel hub.

2. Turn break adjuster toward wheel hub to tighten break and away from wheel hub to loosen break.

3. Adjust break until there is about 1" of free play in the break pedal or lever.
   a. Spin rear wheel by hand while bike is in neutral.
   b. Slowly depress break lever. When wheel begins to slow down, break drum is in contact with wheel hub. Free play is from the time you start to depress the break lever until the wheel begins to slow down.
   c. After completing adjustment, spin wheel again to be sure wheel has free spin.

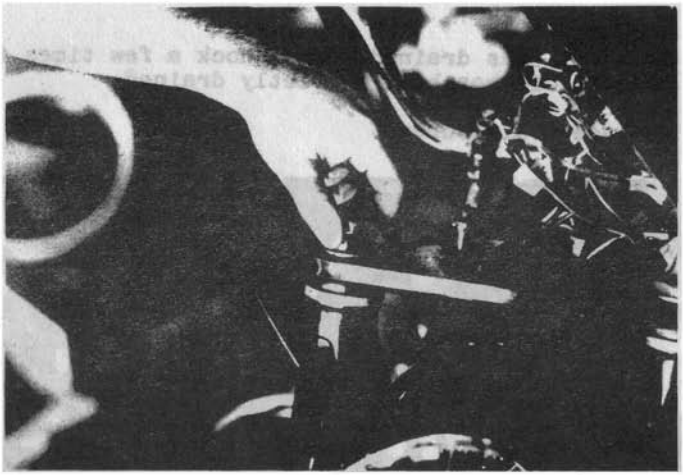
FRONT FORK OIL

Front fork oil should be changed every 6,000 miles. Fork oil must be maintained in fresh condition to insure good handling and maintain damping mechanisi life. As oil breaks down, handling gets worse. Only a non-foaming should be used in forks to prolong seal life. TORCO oil company pust out a non-foaming oil in several different weights. 10 weight is the lightest and as weight numbers get higher, front suspension will get stiffer. Several bike manufacturers now recommend the use of type F automatic transmission fluid. It dampens fork action very well, is non-foaming, and prolongs seal life.

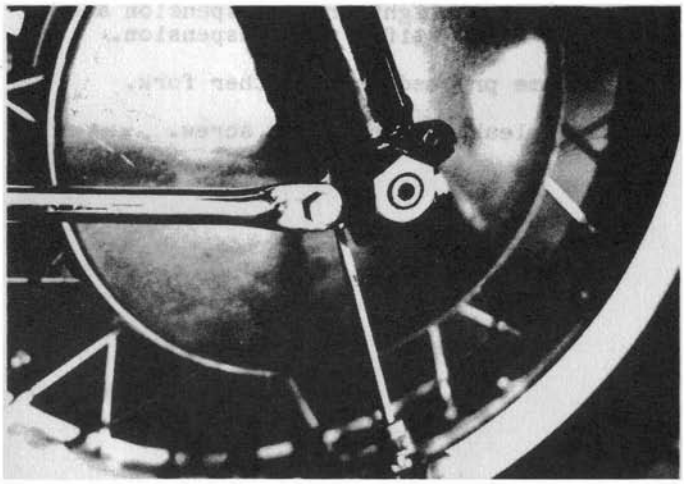


1. Remove 3 bolts on top of instrument panel with a 10mm wrench.

2. Lift up instrument panel.



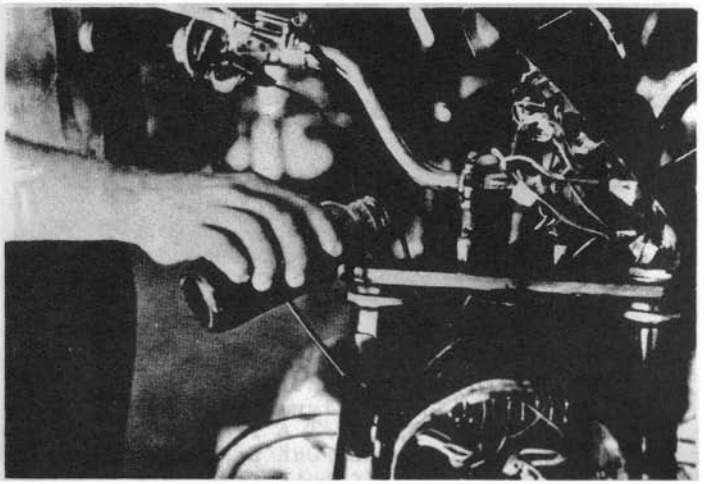
3. At this point, you will see two very large bolts under the instrument panel and over each fork. These are the fork filler plugs. REMOVE ONLY ONE OF THESE FILLER PLUGS AT A TIME. COMPLETLY DRAIN, FILL, AND RE-SEAL ONE FORK BEFORE DRAINING AND FILLING THE OTHER. If both forks are drained at the same time, front suspension will collapse. Remove one of these filler bolts.



4. At bottom of front fork is a small screw. Remove this screw and allow fork oil to drain.

5. After oil has drained, pump shock a few times to be sure oil has been completly drained.

6. Replace drain screw.



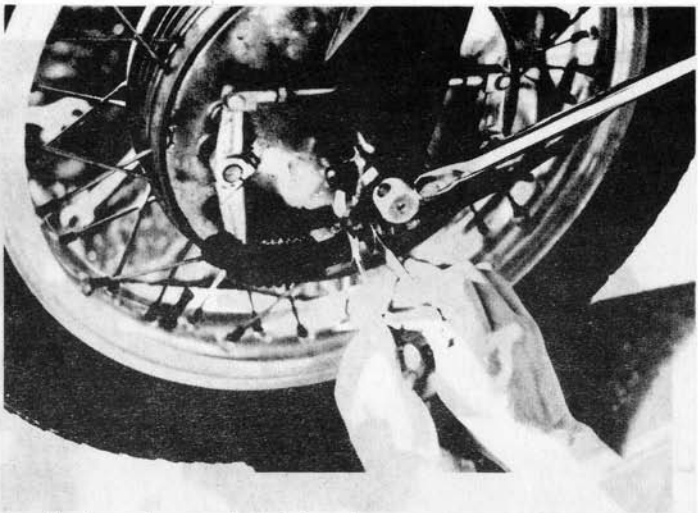
7. Fill shock with 5.4 oz of non-foaming oil or automatic transmission fluid, type F. Use a light oil for a light front suspension and a heavy oil for a stiff front suspension.

8. Follow same proceedure for other fork.

9. Check for leaks around drain screw.

FRONT BRAKE ADJUSTMENT

1. Front brake adjuster is located under a rubber dust cover on the left hand side of the front wheel hub. Slide this dust cover forward to expose front brake adjuster bolt.



2. Photo shows right hand wrench on adjuster lock nut and left hand wrench on brake adjuster.

3. Using 11mm wrench, loosen lock nut.

4. Using 11mm wrench, turn adjusting bolt toward bike to tighten brake and away from bike to loosen brake. (To tighten brake, rotate adjuster in a direction to make adjusting bolt move toward fromt of bike.) Adjust brake until there is 1" of free play at the brake lever.

5. Tighten lock nut.

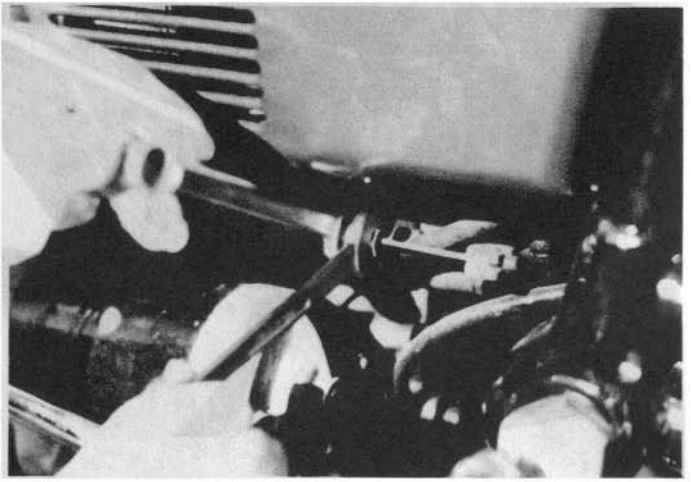
6. Replace rubber dust cover.

7. Re-check free play to be sure adjuster did not turn during tightening of lock nut.

CLUTCH ADJUSTMENT

1. Clutch adjusting bolt is located the left hand side cover and above the starter.

2. Clutch should be adjusted so that there is about 1/8" of free play at the clutch lever.



3. Photo shows right hand wrench on clutch adjusting bolt and left hand wrench on adjuster lock nut. To tighten clutch, turn adjusting bolt so that it moves toward the front af the bike. To loosen, move adjuster toward rear of bike.

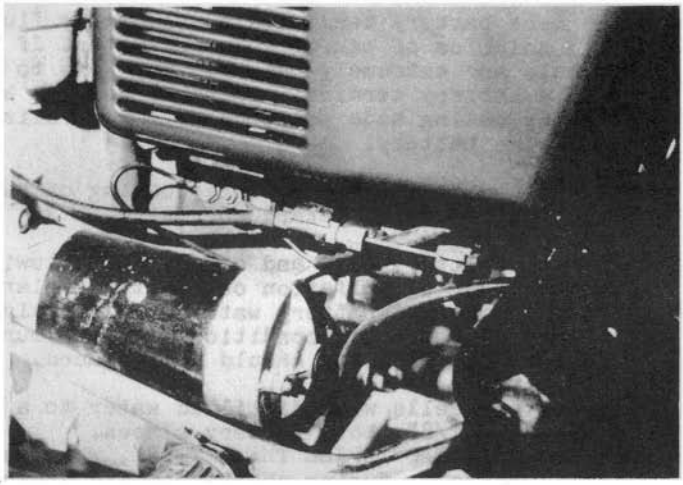
4. Loosen lock nut.

5. Turn adjusting bolt until there is proper amount of free slack in the clutch lever. (I personally prefer to adjust clutch so that clutch engages about 1½" from the handle bar. To do this, I simply pull the clutch lever all the way in, start the engine, let out on the clutch and watch the rear wheel. When the clutch lever gets about

1½" from the handle grip, the rear wheel should begin to move. (Be sure bike is on center stand when using this method.)

6. After adjusting clutch, either by adjusting free play in clutch lever, or by pulling the lever all the way in and watching to see where the rear wheel begins to spin, tighten lock nut.

7. Place bike in neutral and start the engine. With the bike in neutral, rev the engine. While giving the bike gas, watch the rear wheel. If the rear wheel spins, loosen the clutch adjuster. Next, place bike in gear, with clutch lever all the way in. Rev the engine. Rear wheel should not move. If the wheel moves, loosen the clutch.



BATTERY MAINTANENCE

Battery maintanence is more critical on the Guzzi that on most motorcycles, since the Guzzi does not have a kick starter. If another bike battery decides to die after a rest stop to enjoy the view on top of Wolf Creek Pass, the bike is simply kick started. If a Guzzi battery dies, you might as well go back and enjoy the view some more, or thumb a battery jump. CHECK YOUR BATTERY OFTEN! ! !

1. Remove seat.

2. Remove side covers.

3. With battery now exposed, check the battery case for any cracks. If any cracks are discovered, replace the battery.

4. Disconnect battery terminals and clean by flushing with a solution of baking soda and water. If the terminals are extremely bad, you may have to sand or use a battery terminal cleaner first. At any rate, the baking soda solution will neutralize any acid on the battery.

5. Coat the terminals with a light coating of vaseline or silicon grease to retard corrosion.

6. Remove the battery caps and check the following:
   a. White layer of sulfation on electrode plates.
   b. Cloudy color of battery water or electrolyte.
   If any of the above conditions exist, your battery is dying and should be replaced.

7. Fill battery cells with distilled water to a level approximetly 1/8" above battery plates.
   CAUTION: DO NOT OVERFILL THE BATTERY. When battery heats up during charging while engine is running, excess water (now in the form of battery acid) will be blown out through holes in battery caps. This will eventually cause damage to regulator and terminal relays behind the battery and anything else the acid contacts.

8. Replace battery caps.

9. Replace both battery terminals and tighten.
   a. Be sure Positive lead is connected to POS terminal and Negative lead is connected to NEG terminal or battery will be shorted out and possibly damage the bikes electrical system.
      It is easy to tell the terminals apart. The negative terminal is the ground and is bolted to the bikes frame. The positive terminal goes to the voltage regulator behind the battery.
   b. Loose leads can prevent the battery from putting a full charge through the bike's electrical system. You might think you have a dead battery when you only have loose connections at the terminals.
   c. When tightening terminals, do not bring the wrench into contact with battery terminal and metal frame at same time. Battery may be shorted out.

10. Replace side covers.

11. Replace seat.

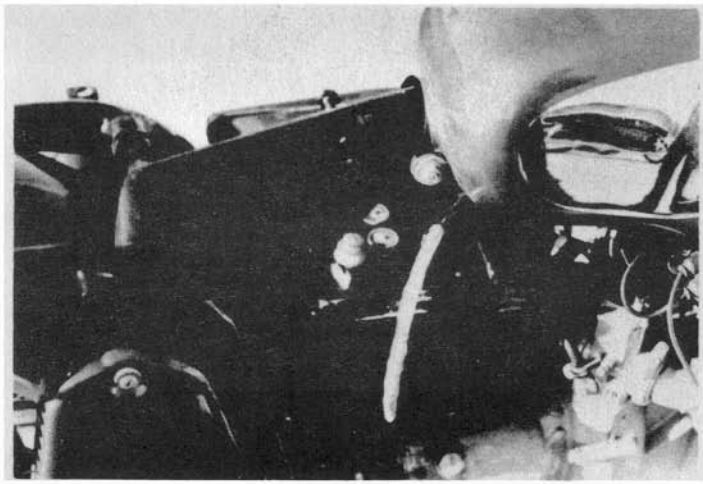


Photo shows positive terminal of battery and one battery cap removed.

FINISHING UP

1. Replace gas tank. Be careful not to break any electrical wires.

2. Replace side covers.

3. Replace seat.

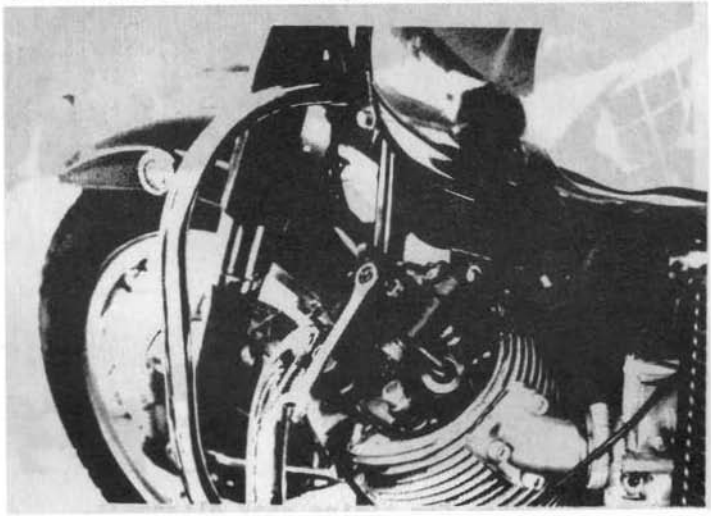
4. Clean and properly store tools and equiptment.

5. Clean up work area.

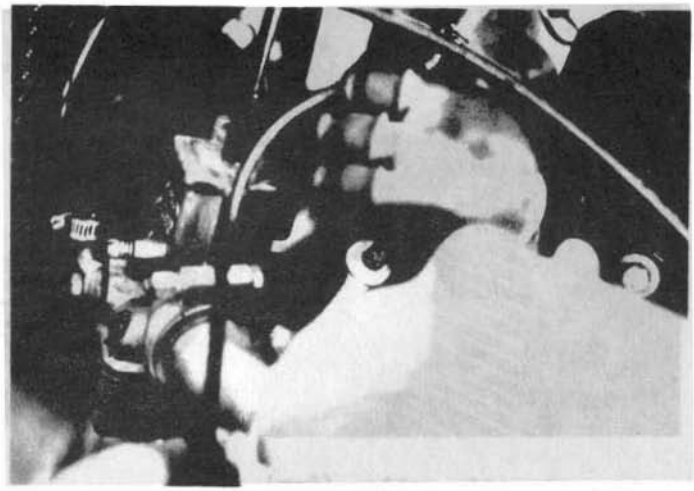
6. TAKE A RIDE

CONGRATULATIONS! YOU HAVE CORRECTLY TUNED YOUR BIKE AND YOU ARE READY FOR THE ROAD.

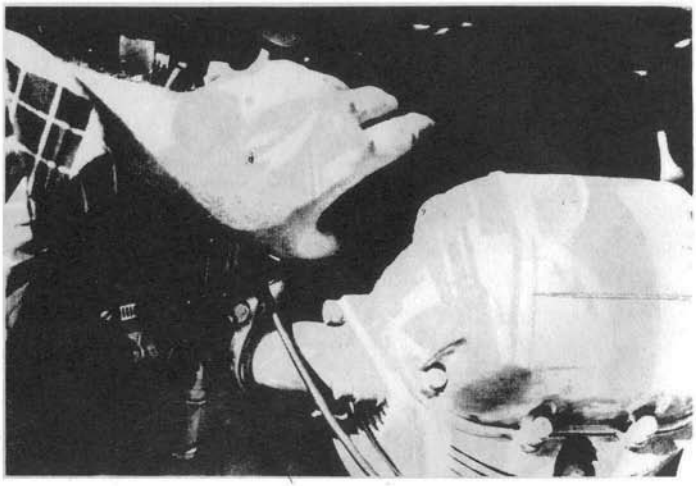
SUPPLIMENTAL PICTURE FOR MORE CLARIFICATION



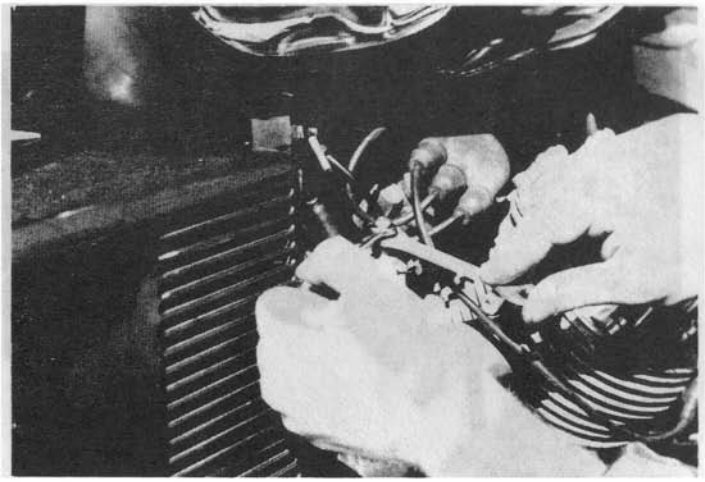
Loosen valve adjuster lock nut. (13mm)



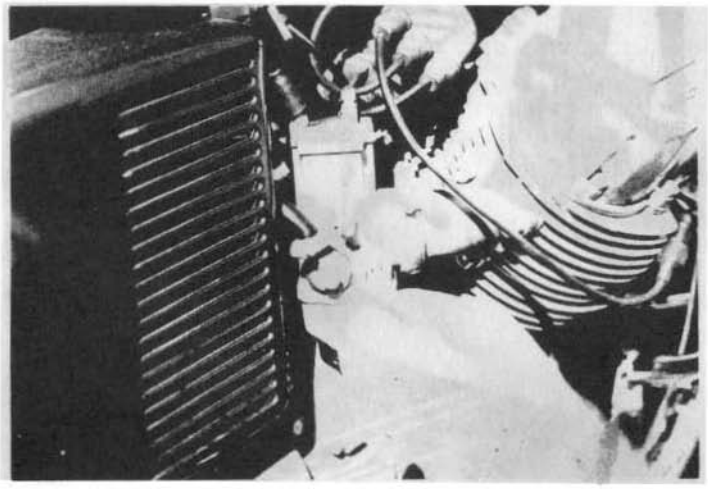
Loosen distributor adjusting bolt. (10mm)



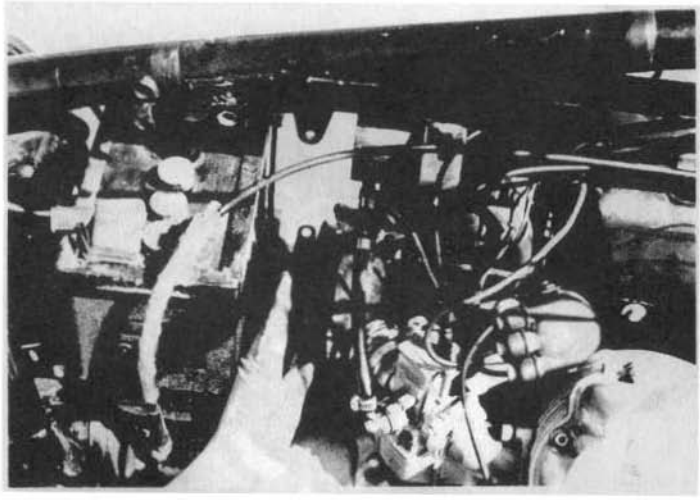
Rotate distributor for timing mark alignment.



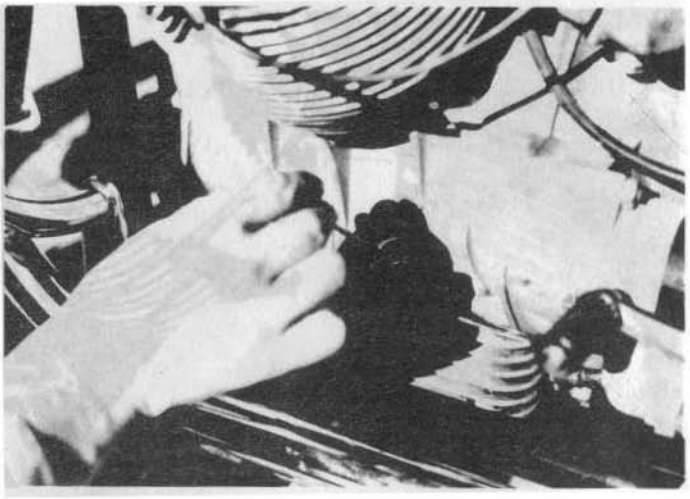
Adjusting throttle cable. (8mm)



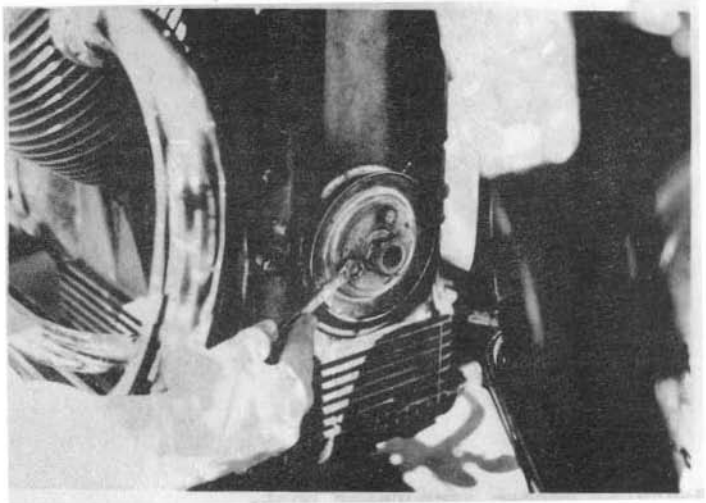
Adjusting fuel mixture screw.



Removing rubber carburetor boot.



Check engine oil. (22mm)



Remove lower fan belt pulley bolts for belt adjustment. (10mm)

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