Kawasaki Shop Manual

Z Series

KAWASAKI HEAVY INDUSTRIES, LTD.
Motorcycle Division

Decimal Equivalents

INCH					MM INCH
1/64				.015625	
	1/32			.03125	1mm= .03937 inch
3/64				.046875	
		1/16		.0625	
5/64				.078125	2mm= .07874 inch
	3/32			.09375	
7/64				.109375	3mm= .11811 inch
			1/8	.125	
9/64				.140625	
	5/32			.15625	4mm= .15748 inch
11/64				.171875	
		3/16		.1875	5mm= .19685 inch
13/64				.203125	
	7/32			.21875	
15/64				.234375	6mm= .23622 inch
			1/4	.25	
17/64				.265625	7mm= .27559 inch
	9/32			.28125	
19/64				.296875	
		5/16		.3125	8mm= .31496 inch
21/64				.328125	
	11/32			.34375	9mm= .35433 inch
23/64				.359375	
			3/8	.375	
25/64				.390625	10mm= .39370 inch
	13/32			.40625	
27/64				.421875	11mm= .43307 inch
		7/16		.4375	
29/64				.453125	
	15/32			.46875	12mm= .47244 inch
31/64				.484375	
			1/2	.5	13mm= .51181 inch

INCH					MM INCH
33/64				.515625	
	17/32			.53125	
35/64				.546875	14mm= .55118 inch
		9/16		.5625	
37/64				.578125	15mm= .59055 inch
	19/32			.59375	
39/64				.609375	
			5/8	.625	16mm= .62992 inch
41/64				.640625	
	21/32			.65625	17mm= .66929 inch
43/64				.671875	
		11/16		.6875	
45/64				.703125	18mm= .70866 inch
	23/32			.71875	
47/64				.734375	19mm= .74803 inch
			3/4	.75	
49/64				.765625	
	25/32			.78125	20mm= .78740 inch
51/64				.796875	
		13/16		.8125	21mm= .82677 inch
53/64				.828125	
	27/32			.84375	
55/64				.859375	22mm= .86614 inch
			7/8	.875	
57/64				.890625	23mm= .90551 inch
	29/32			.90625	
59/64				.921875	
		15/16		.9375	24mm= .94488 inch
61/64				.953125	
	31/32			.96875	25mm= .98425 inch
63/64				.984375	
			1	1.	

Unit Conversion Table

cc	x	.0610	=	cu. in.
cc	x	.02816	=	oz. (imp.)
cc	x	.03381	=	oz. (U.S.)
cu. in.	x	16.39	=	cc
ft-lbs	x	12	=	in. lbs.
ft-lbs	x	.1383	=	kg-M
gal. (imp.)	x	4.546	=	litres
gal. (imp.)	x	1.201	=	gal. (U.S.)
gal. (U.S.)	x	3.7853	=	litres
gal. (U.S.)	x	.8326	=	gal. (imp.)
grams	x	.03527	=	oz.
in.	x	25.40	=	mm
in. lbs.	x	.0833	=	ft-lbs.
in. lbs.	x	.0115	=	kg-M
kg	x	2.2046	=	lbs.
kg	x	35.274	=	oz.
kg-M	x	7.233	=	ft-lbs
kg-M	x	86.796	=	in-lbs
kg/cm^2	x	14.22	=	lbs/sq. in.
km	x	.6214	=	mile
lb.	x	.4536	=	kg
lb/sq. in.	x	.0703	=	kg/cm^2
litre	x	28.16	=	oz. (imp.)
litre	x	33.81	=	oz. (U.S.)
litre	x	.8799	=	qt. (imp.)
litre	x	1.0567	=	qt. (U.S.)
metre	x	3.281	=	ft.
mile	x	1.6093	=	km
mm	x	.03937	=	in.
oz.(imp.)	x	35.51	=	cc
oz. (U.S.)	x	29.57	=	cc
oz. (weight)	x	28.35	=	grams
qt. (imp.)	x	1.1365	=	litre
qt. (imp.)	x	1.201	=	qt. (U.S.)
qt. (U.S.)	x	.9463	=	litre
qt. (U.S.)	x	.8326	=	qt. (imp.)

$°C \rightarrow °F: \quad \frac{9(°C + 40)}{5} - 40 = °F$

$°F \rightarrow °C: \quad \frac{5(°F + 40)}{9} - 40 = °C$

List of Abbreviations

ABDC..... after bottom dead center
ATDC..... after top dead center
BBDC..... before bottom dead center
BDC ..... bottom dead center
BTDC ..... before top dead center
cc ..... cubic centimeters
cu. in..... cubic inches
ft. ..... foot, feet
ft-lbs ..... foot-pounds
gal. ..... gallon, gallons
hp..... horsepower
in. ..... inch, inches
in-lb..... inch-pounds
kg..... kilogram, kilograms
kg/cm^2 ..... kilograms per square centimeter
kg-M..... kilogram meters
km..... kilometer
kph..... kilometers per hour
lb., lbs. ..... pound, pounds
lbs/sq.in. ..... pounds per square inch
ltr..... liter
M ..... meter, meters
mi. ..... mile, miles
mm..... millimeters
mph..... miles per hour
oz ..... ounce, ounces
psi ..... pounds per square inch
qt. ..... quart, quarts
r.p.m. ..... revolutions per minute
sec. ..... second, seconds
SS ..... standing start
TDC ..... top dead center
" ..... inch, inches

Kawasaki
Shop Manual
Z Series

KAWASAKI HEAVY INDUSTRIES, LTD.
Motorcycle Division

 Printed in Japan 11/72 Meiko First Issue: November 1, 1972

FOREWORD

This manual is designed primarily for use in the shop, although it contains enough basic information to make it useful to the motorcycle owner who wishes to do his own maintenance. It should be noted, however, that where special tools or equipment are necessary to perform maintenance correctly and safely, only the repair procedure using that equipment is explained.

In order to perform work most efficiently and avoid costly mistakes, it is recommended that the mechanic read the applicable text and thoroughly familiarize himself with the maintenance procedures before starting work.

For maximum utility, this manual is divided into the following four main sections:

(1) Adjustment

The adjustment section shows the adjustment procedure for all adjustments which may become necessary periodically, and that do not involve major disassembly.

(2) Disassembly

This section shows the best method for removal and installation of parts and assemblied, and covers disassembly of some assemblies such as the carburetor, starter, etc. Adjustments such as valve timing, which are a part of the assembly procedure, are also included in this section.

Since installation is usually the reverse of removal, installation of parts is not explained in detail in most cases. "Installation notes", however, are added wherever they may prove necessary or helpful.

In cases where the removal procedure is readily apparent, such as for the seat, kick stand, etc., no information is given in this section.

(3) Maintenance and Theory of Operation

Wear measurements and maintenance procedures are described in detail in this section, and enough theory of operation is given to enable the mechanic to understand the work.

(4) Appendix

The appendix contains all the miscellaneous information which is not found in other sections, and includes a list of special tools, torque tables, periodic maintenance, wiring diagrams, etc.

The information contained in this Shop Manual is intended to be as accurate as possible on the date of printing. When corrections become necessary, the changes will be passed on via correction sheets or Service News.

TABLE OF CONTENTS

U.S. Model

European Model

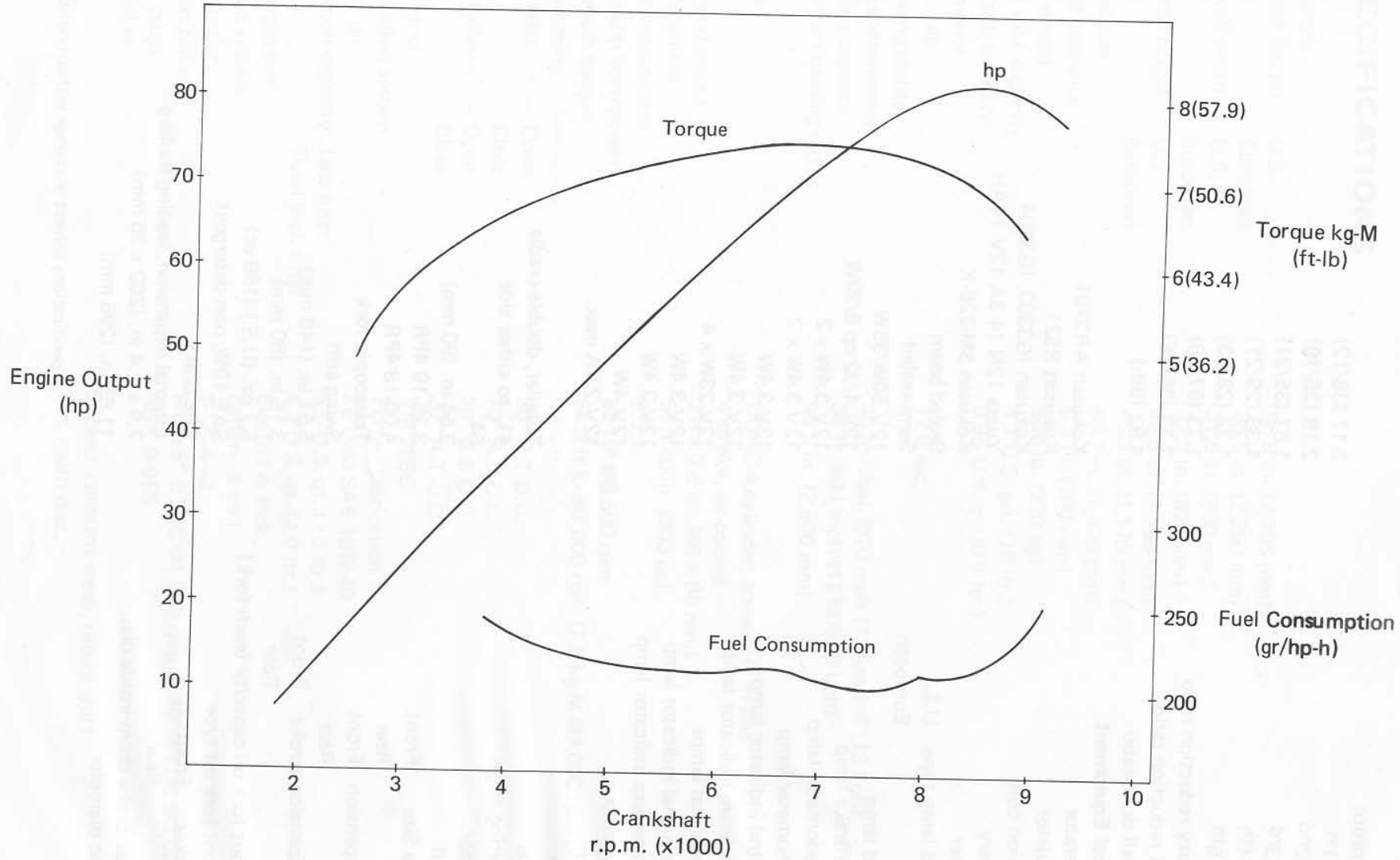
SPECIFICATIONS

Dimensions		
Overall length	U.S.	86.8 in. (2,205 mm)
	European	88.5 in. (2,250 mm)
Overall width	U.S.	31.5 in. (800 mm)
	European	32.3 in. (820 mm)
Overall height	U.S.	45.3 in. (1,150 mm)
	European	46.3 in. (1,175 mm)
Wheelbase		58.7 in. (1,490 mm)
Road clearance		6.3 in. (160 mm)
Dry weight		506 lb. (230 kg)
Fuel tank capacity		4.7 U.S. gal. (18 ltr.)
Oil tank capacity		0.95 U.S. qt. (0.9 ltr.)
Performance		
SS¼ mile		12.0 sec.
Climbing ability		30°
Fuel consumption		40 mil./gal. @70 mph (17 km/ℓ @113 kph)
Braking distance		36 ft. @31 mph (11 M @50 kph)
Minimum turning radius		98.5 in. (2,500 mm)
Engine		
Type		DOHC 4 cylinder, transverse in-line 4 stroke, air-cooled
Bore and stroke		2.6 x 2.6 in. (66 x 66 mm)
Displacement		55.1 cu.in. (903 cc)
Compression ratio		8.5:1
Maximum horsepower		82 HP @8,500 rpm
Maximum torque		54.3 ft-lb @7,000 rpm (7.5 kg-M @7,000 rpm)
Valve timing:	Clearance	0,05 ~ 0,1
Inlet	– Open	30° B.T.D.C.
	Close	70° A.B.D.C.
Exhaust	– Open	70° B.B.D.C.
	Close	30° A.T.D.C.
Carburetor		VM 28SC
Lubrication system		Forced lubrication
Engine oil		SE class SAE 10W-40
Engine oil capacity:	Less filter	3.5 U.S. qt. (3.3 ltr.)
	Total incl. filter	4.2 U.S. qt. (4.0 ltr.)
Starting sytem		Electric & kick
Ignition system		Battery & coil
Firing order		1–2–4–3
Ignition timing		From 5° BTDC @1 500 rpm to 40° BTDC @3,000 rpm
Spark plugs		NGK B-8ES
Transmission		
Type		5-speed, constant-mesh, return-shift
Clutch		Wet, multi-disc.

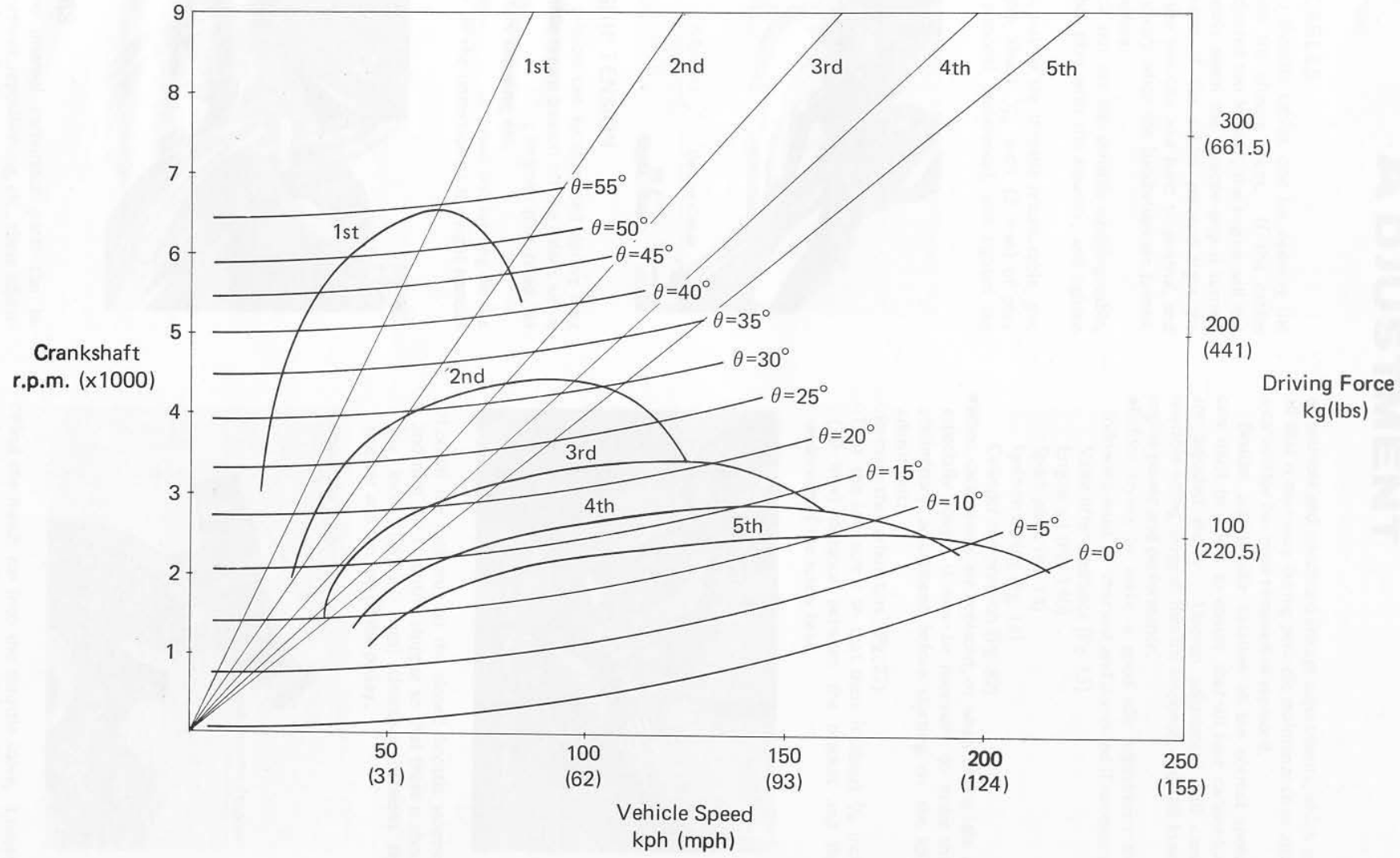
Gear ratio:	
1st	3.17 (38/12)
2nd	2.19 (35/16)
3rd	1.67 (35/21)
4th	1.38 (29/21)
5th	1.22 (28/23)
Primary reduction ratio	1.73 (97/56)
Final reduction ratio	2.33 (35/15)
Overall drive ratio	4.92 (5th)
Electrical Equipment	
Generator	Kokusan AR3701
Regulator	Kokusan RS21
Ignition coil	Kokusan IG3303, IG3304
Battery	Yuasa 12N 14-3A 12V 14AH
Starter	Kokusan SM-226-K
Head lamp type U.S.	Sealed beam
European	Semi-sealed
Head lamp	12V 50W/35W
Tail/Brake lamp	12V 4/32 cp 8/23W
Speedometer lamp	12V 3.4W x 2
Tachometer lamp	12V 3.4W x 2
Neutral indicator lamp	12V 3.4W
High beam indicator lamp	12V 3.4W
Turn signal lamps	12V 23W x 4
Turn signal indicator lamp	12V 3.4W
Oil pressure indicator lamp	12V 3.4W
City lamp	12V 4W
Horn	12V 2.5A max.
Frame	
Type	Tubular, double-cradle
Steering angle	41° to either side
Castor	64°
Trail	3.54 in. (90 mm)
Tire Size Front	3.25-19 4PR
Rear	4.00-18 4PR
Suspension Front	Telescopic fork
Rear	Swing arm
Suspension stroke Front	5.51 in. (140 mm)
Rear	3.15 in. (80 mm)
Front fork oil capacity (each fork)	5.7 oz. (U.S.) (169 cc)
Front fork oil type	SAE 10W, non-detergent
Brakes: Front	Disc brake
Rear	Internal expansion, leading-trailing
Rear brake drum inside dia.	7.9 x 1.4 in. (200 x 35 mm)
Disc diameter	11.65 in. (296 mm)

Specifications subject to change without notice.

ENGINE PERFORMANCE CURVES



RUNNING PERFORMANCE CURVES



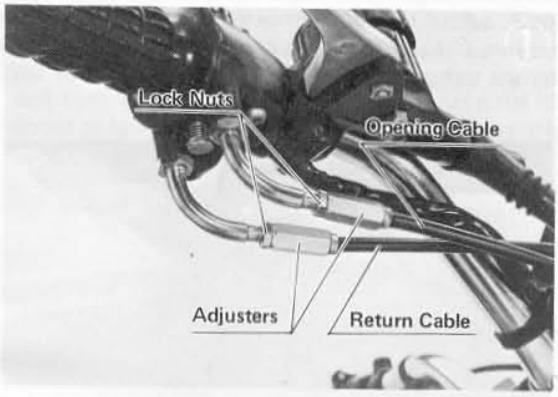
ADJUSTMENT

THROTTLE CABLES

There are two throttle cables, one for opening the throttles and one for closing them. If the cables stretch or are adjusted too loosely, the engine will not respond immediately when the throttle grip is turned. On the other hand, if the cables are too tight the throttle will be too sensitive and hard to control, and engine speed may vary when the handlebars are turned.

Adjustment Procedure:

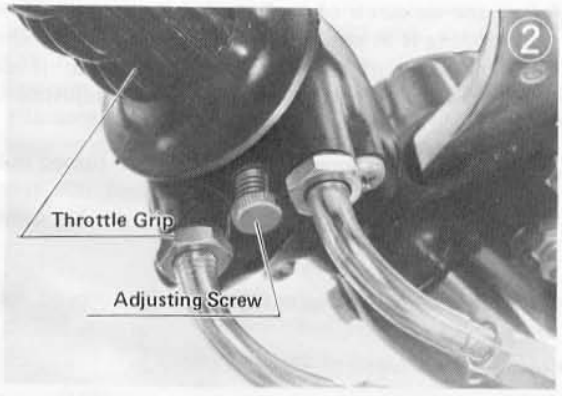
- Loosen the lock nut on the throttle opening cable, take up all cable play with the adjuster, and tighten the lock nut.
- Loosen the lock nut on the throttle return cable, give the throttle grip about $^{1}/_{16}$ inch (2 mm) of play (according to personal preference), and tighten the lock nut.



THROTTLE GRIP TENSION

Throttle grip tension can be increased during long rides to take throttle return tension off the rider's wrist. It is also convenient for holding engine r.p.m. steady to check timing, battery charging, etc.

- Throttle grip tension is increased by turning in the adjusting screw on the underside of the right handlebar assembly.

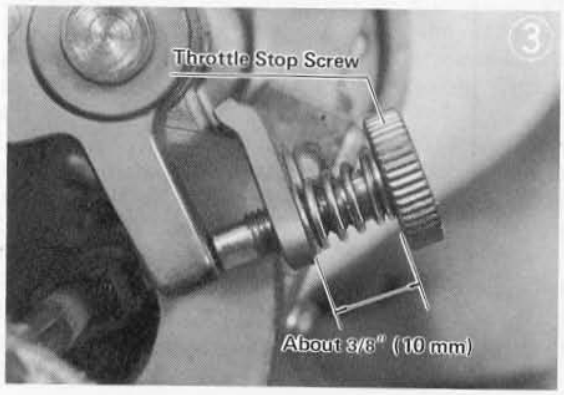


CARBURETORS

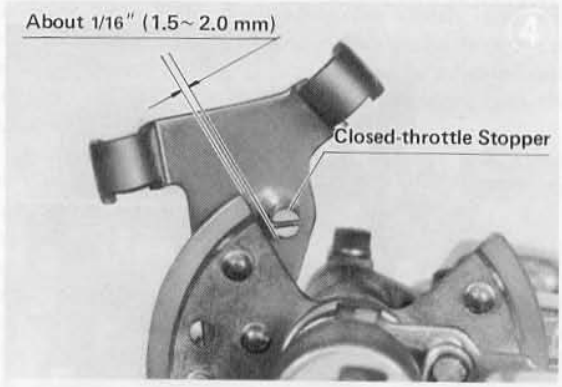
Although some internal carburetor parts can be adjusted by replacement, repositioning, etc., these adjustments are covered in the Maintenance section of this manual. The following procedure covers only the idle adjustment and associated linkage adjustments, which are all that is necessary during periodic maintenance or after a carburetor has been removed or replaced.

Besides setting idle rotation at the correct speed, care must be taken to ensure that all four carburetors are adjusted evenly. Uneven adjustment will cause unstable idling, sluggish throttle response, and will lower engine power and performance.

- Before trying to make a good idle adjustment the following must be checked and corrected if necessary.
  - Valve lifter clearance (Pg. 15)
  - Engine oil (Pg. 140)
  - Spark plugs (Pg. 14)
  - Ignition timing (Pg. 14)
  - Cylinder compression (Pg. 82)
- When carburetors are replaced, or when engine idle is especially rough, it may be necessary to make this preliminary adjustment before starting on the idle adjustment:
  - Remove the carburetors. (Pg. 27)
  - Turn the idle screw so that there is about $^{3}/_{8}$ inch (10 mm) distance between the bracket and the underside of the screw head.

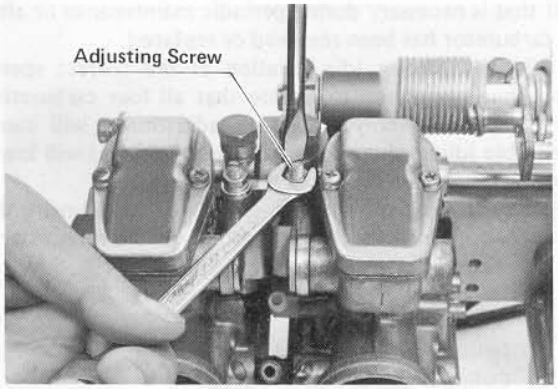


  - Loosen the lock nut on the closed-throttle stopper, and turn the eccentric stopper so that there is about $^{1}/_{16}$ inch (1.5~2.0 mm) clearance between the stopper and the top of the pulley.

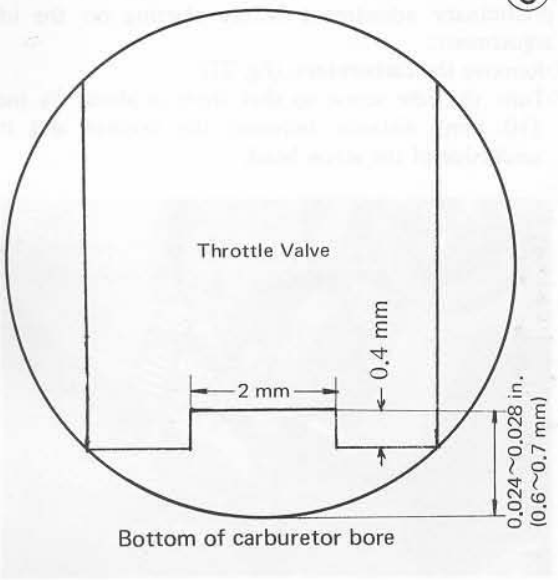


  - Find the notch cut into the throttle valve. Loosen the lock nut and turn the adjusting screw so that there is .024~.028 inch (.6~.7 mm) clearance

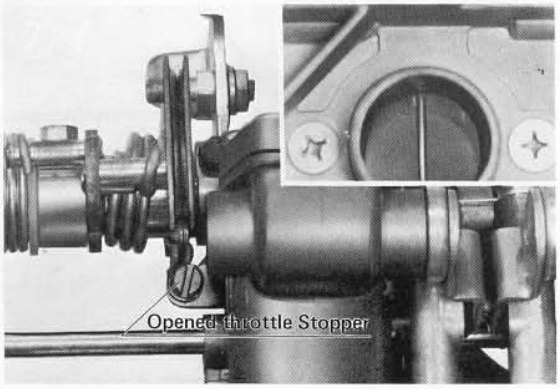
between the notch and the bottom of the carburetor throat. **This is a very fine adjustment, so make it carefully for each of the four carburetors.** Then tighten the lock nuts.



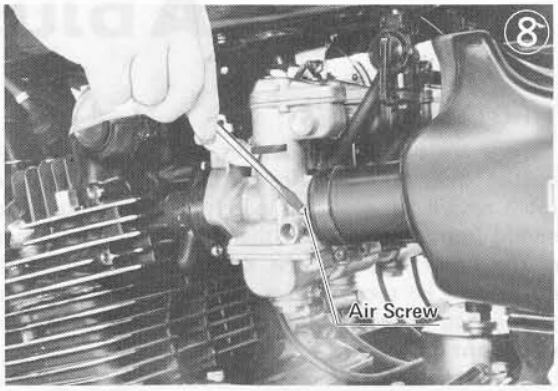
Throttle Valve Clearance ⑥



○Open the throttle (turn the pulley) so that the bottom edge of the lowest of the four carburetor throttle valves is even with the top of the carburetor throat. Turn the open-throttle stopper screw so the pulley is stopped at that point.

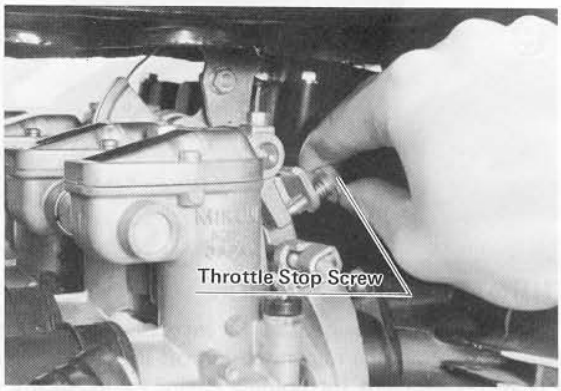


○Turn in the air screw of each carburetor fully – but not tightly – and then back it out 1½ turns.



○Mount the carburetors onto the engine, and adjust throttle grip (cable) play. (Pg. 11)

●Start the engine and warm it up for 5 minutes, and then adjust engine idle with the main idle adjust screw so that idle r.p.m. is about 800~1,000 r.p.m. by the tachometer.



●Adjust the air screw of each carburetor, one at a time, first turning it in one direction and then in the other until the point of highest idle is determined. If idle r.p.m. rises too much during air screw adjustment, lower it with the main idle adjust screw.

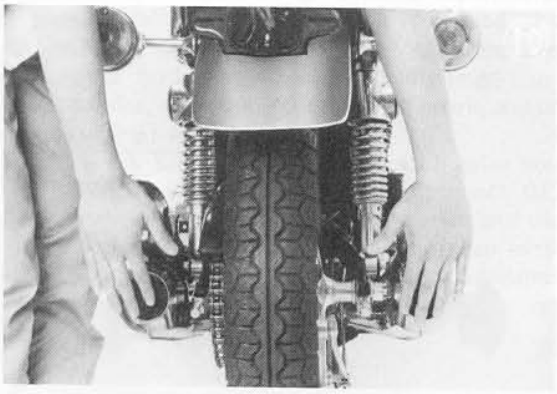
NOTE: If any carburetor air screw can be turned in to less than ½ turn from full in, without idle speed changing, there is probably trouble within that carburetor.

●From the point of highest idle speed, turn all four air screws in a small, equal amount.

●Re-adjust idle speed to 800~1,000 r.p.m.

●Use vacuum gauges as explained in the following steps to make fine adjustment of carburetor balance. If a vacuum gauge set is not available, perform only the following steps preceded by circles. If vacuum gauges are available, skip to the next step marked with a black dot.

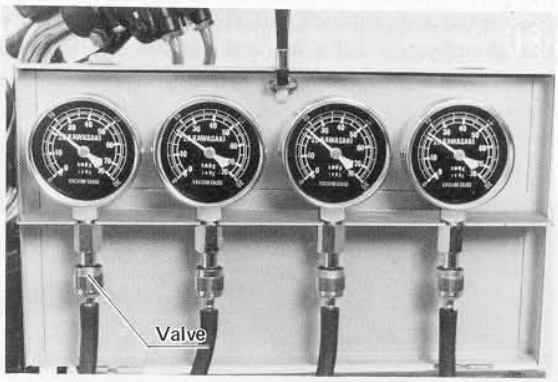
○Listen to the exhaust noise, and place your hands behind the mufflers to feel exhaust pressure.



○If there is a variation in noise or exhaust pressure among the cylinders, re-adjust the individual throttle stop screws to make combustion uniform. Use a special purpose tool to loosen the lock nut and turn the screw. Backing the screw out increases pressure and turning it in decreases it, but try to keep the idle speed as low as possible. Tighten the lock nut after adjustment.

○For any carburetors that were re-adjusted, re-adjust the air screw as explained in a previous step.
○Adjust idle speed to 800~1,000 with the main idle adjust screw.
●Remove the rubber caps from the vacuum gauge attachments on the cylinder head, and attach the vacuum gauges.

●With the engine running at idle speed, close down the vacuum gauge intake valve until the gauge needle flutters less than 2 cm Hg (.8 in. Hg).



●Normal vacuum gauge reading is 20~23 cm Hg (8~9 in. Hg). If any gauge reads less than 15 cm Hg (6 in. Hg), recheck the points listed in the first step of these carburetor adjustments, and check that the carburetor hose clamps and spark plugs are tight.
●If there is a variation in vacuum readings among the different cylinders, re-adjust the individual throttle stop screws to make combustion uniform. Using a special purpose tool to loosen the lock nut and turn the screw, set all the carburetors to within 2 cm Hg (.8 in. Hg) of each other. Backing the screw out decreases vacuum and turning it in increases it, but try to keep the idle speed as low as possible. Tighten the lock nuts after adjustment.
●Open the throttle grip and let it snap shut a few times. Make sure the vacuum readings stay the same after this is done, making further adjustment if necessary.
●Detach the vacuum gauge and replace the rubber caps on the vacuum fittings.
●For any carburetors re-adjusted, re-adjust the air screw as explained in a previous step.
●Adjust idle speed to 800~1,000 r.p.m. with the main idle adjusting screw.

CLUTCH

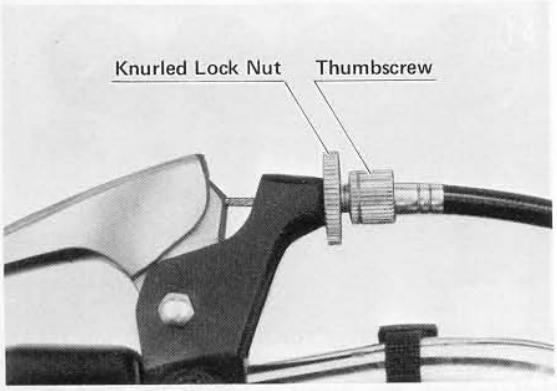
Stretching of the clutch cable causes the clutch lever to develop excessive play. Too much play will prevent the lever from fully disengaging the clutch, and will result in shifting difficulty and possible clutch or transmission damage. Most of the play must be adjusted out, but a small amount has to be left to ensure that the clutch will engage fully without slipping.

Besides cable stretch, clutch plate wear also causes the clutch to go out of adjustment, with a decrease in push rod play. Due to this wear, the push rod gradually moves closer to the clutch release lever (at the lower end of the clutch cable) until it touches the adjusting screw. When the rod is touching the screw and therefore has no play, the clutch will not engage fully and clutch slippage will occur. Note that the clutch push rod does not necessarily have play just because the clutch hand lever has play, and so hand lever play alone cannot be used to determine whether or not the clutch requires adjustment.

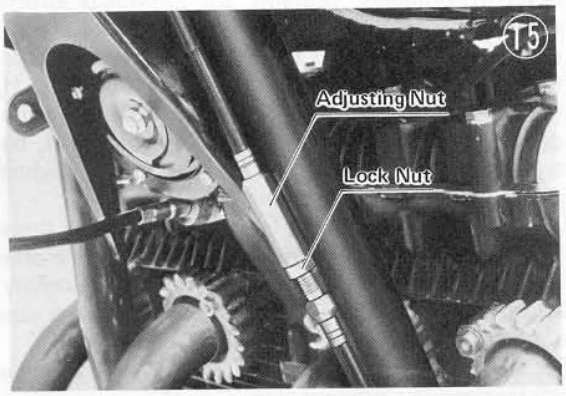
The adjustment procedure below includes adjustment both for cable stretch and plate wear.

Adjustment procedure:

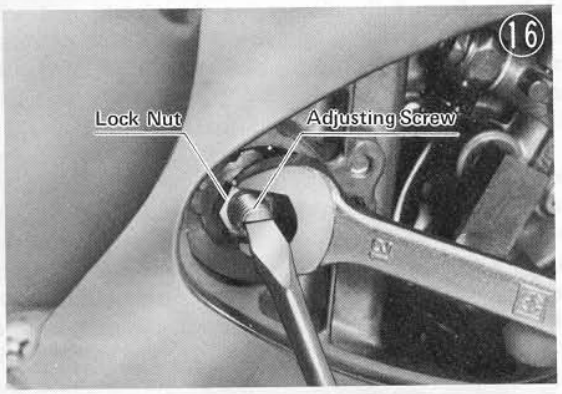
- Loosen the knurled lock nut at the clutch lever, screw the thumbscrew fully in, and tighten the lock nut.



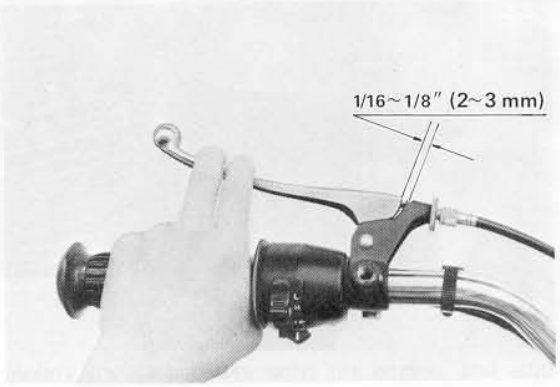
- Loosen the lock nut at the center of the clutch cable and screw in the adjusting nut to give the cable plenty of play.



- Remove the chain oil pump cover to get at the clutch adjusting screw.
- Loosen the lock nut and if the clutch adjusting screw does not turn loosely already, back it out until it does.
- Turn the clutch adjusting screw in to where it suddenly becomes hard to turn, back it out ½ turn from that point, and tighten the lock nut.



- Making sure that the ends of the clutch cable sleeve do not catch on the edge of the cable seat, now take up cable play with the adjuster at the cable center, until the clutch lever has $\frac{1}{16}\sim\frac{1}{8}$ inch (2~3 mm) play at the point indicated. Then tighten the lock nut.

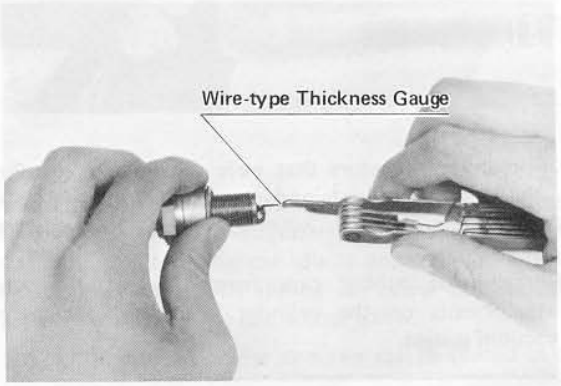


- If enough play could not be taken up with the adjuster in the center of the cable, make further adjustment with the thumbscrew at the clutch lever, and tighten the lock nut.
- Replace the chain oil pump cover.

SPARK PLUG GAP

Spark plug electrode wear will widen the gap and cause missing and difficulty in starting. Too narrow a gap as a result of maladjustment will also result in poor performance since the small gap will produce only a weak spark.

- Clean the electrodes off and measure the gap with a wire-type thickness gauge. It should be .028~.031 inch (.7~.8 mm); if it is not, bend the outer electrode with a spark plug gap adjusting tool.



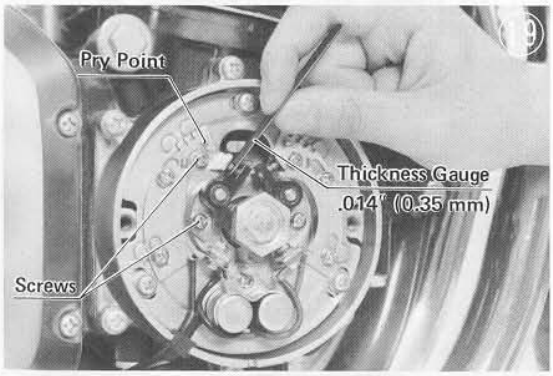
IGNITION TIMING

Incorrect ignition timing can cause poor performance, knocking, and overheating. Periodic adjustment will be necessary to compensate for wear of parts, and must also be checked any time ignition-related parts are disassembled or replaced.

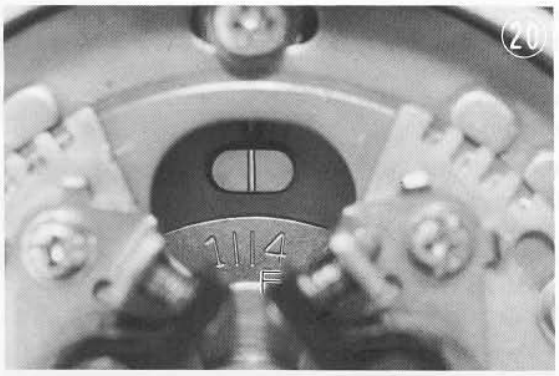
The Z1 has two sets of contact breaker points, the left set fires spark plugs 1 and 4 simultaneously, and the right set fires plugs 2 and 3 180° later. The gap for each set of points must be adjusted separately.

There are also two sets of double timing marks, which can be viewed through the inspection window by turning the crankshaft. One set is marked "1 4" and the other set is marked "2 3". After the gap is adjusted for both sets of points, timing must also be adjusted twice, once using the "1 4" **F** mark, and once using the "2 3" **F** mark.

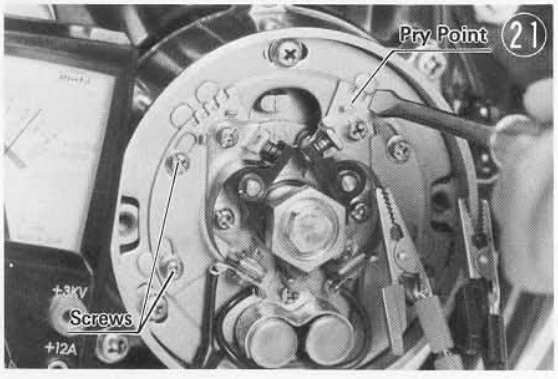
- Turn the crankshaft so that the contact breaker points are at their widest opening. If the gap is not .012~.016 inch (.3~.4 mm), loosen the screws and use a screwdriver in the pry points to set the gap to .014 inch (.35 mm). Tighten the screws after adjustment.



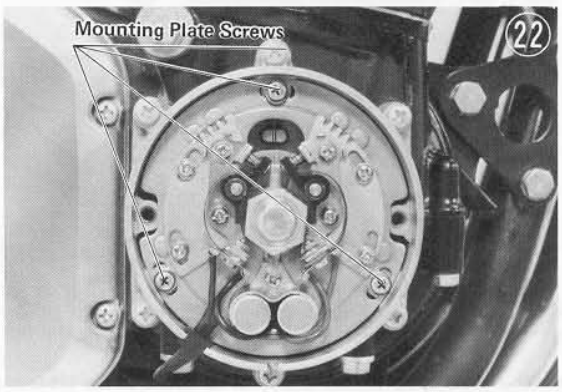
- Repeat the step above for the other set of points.
- Turn the crankshaft so that the **F** mark on the timing advancer is aligned with the timing mark seen above the advancer.



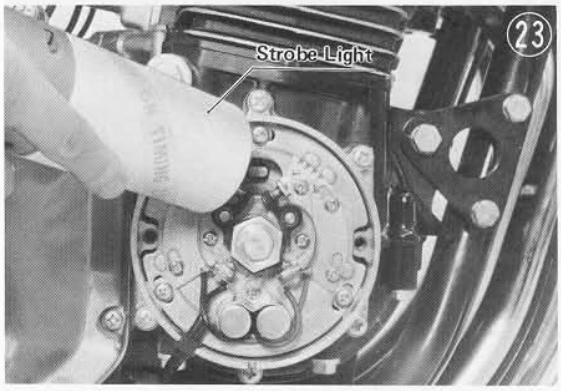
- Connect an ohmmeter across the appropriate set of points, one lead to the wire coming from the points (or to the spring leaf), and the other ohmmeter lead to chassis ground (engine, frame, contact breaker mounting, etc.). Make sure that both leads are positively connected.



- Loosening its mounting screws, turn the adjusting plate using a screwdriver in the pry points so that the contacts are just at the point of opening. This point can be found by watching the ohmmeter needle, which will flicker just when the points begin to open or close.
- If the adjusting plate will not travel far enough to allow correct timing adjustment, loosen the three mounting plate screws and turn the plate to provide more room for adjustment.



- Repeat the last four steps using the other **F** mark.
- Disconnect the ohmmeter, and verify correct timing adjustment using a strobe light. At idle speed the timing mark and the **F** mark should coincide. By about 2,900~3,100 r.p.m., the timing advancer changes timing enough so that above this speed, the timing mark and the pin on the timing advancer should be aligned.



VALVE LIFTER CLEARANCE

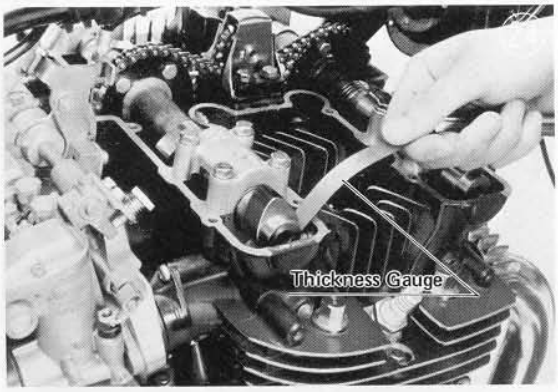
Wear of the valve and valve seat causes a decrease in valve lifter clearance. Besides upsetting valve timing, failure to adjust the clearance will eventually cause the valves to remain partly open, lowering performance and inviting engine damage.

Valve lifter clearances should be checked and adjusted as necessary at least every 4,000 miles (6,000 km), or any time repair or replacement of parts is done in the camshaft or valve areas. Do not adjust the clearance to a larger value than specified; too large a clearance will cause valve lifter noise and retard valve timing.

NOTE: Valve lifter clearance must be checked when the engine is **cold.**

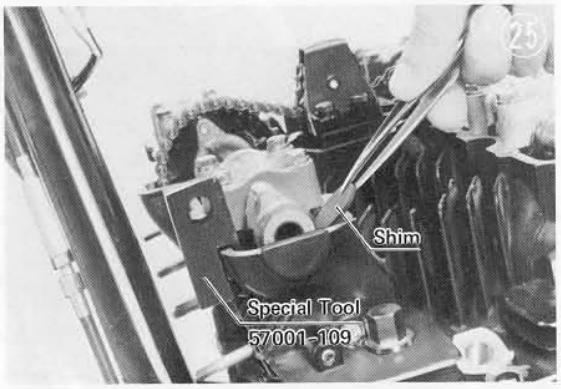
- Remove the fuel tank (Pg. 27).

●Remove the valve cover, and checking one valve at a time, turn the crankshaft so that the cam lobe (highest part of the cam) is pointing directly away from the valve lifter.
●Measure the clearance between the cam, and the shim in the top of the valve lifter. The correct clearance is .002~.004 inch (.05~.10 mm).



●If the clearance is too small or if there is no clearance at all, use a special purpose tool to push down the valve lifter, and then remove the shim.

To use the tool:
○Turn the crankshaft so that the cam is pushing the lifter down.
○Fit the tool in place.

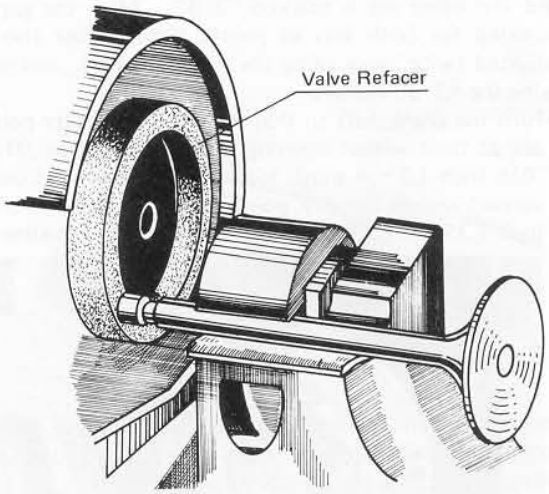


○Turn the crankshaft so that the cam points away from the lifter, and remove the shim. There is a notch in the lifter so that the shim can be grasped.

CAUTION: If the camshafts are unbolted instead of using a special tool to remove the shims, see information on valve timing and camshaft installation before tightening the shafts back into place.

●Insert a new shim to bring valve lifter clearance within the specified limits. Shims are available in sizes from 2.00 to 3.00 mm, in increments of .05 mm.
●When the valve seat is worn so much that not even the smallest shim will sufficiently increase clearance, remove the valve and grind down the stem slightly. Hold the valve in a V block to keep it at right angles to the side of the grinder.

Valve Stem Grinding (26)



CAMSHAFT CHAIN

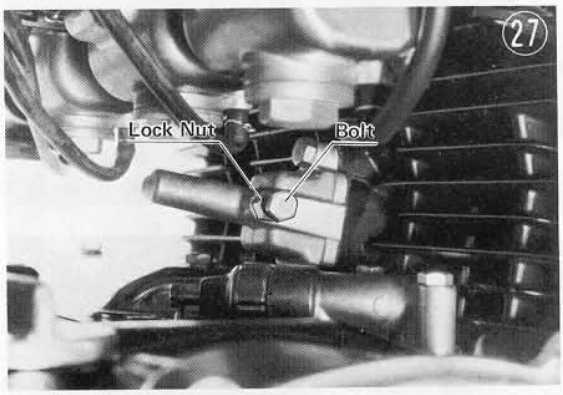
Chain and guide roller wear causes the chain to develop slack, and it should be re-tensioned periodically so that it does not come loose or break.

The cam chain should be adjusted at intervals of under 1,000 miles (1,500 km), at least often enough to keep it from making noise. The chain cannot be adjusted too often, and it cannot be maladjusted.

When the slack adjustment fails to stop the chain from making noise, the chain guide rollers are probably worn out and need to be replaced.

To adjust the cam chain:

●Loosen the lock nut and bolt. (With the bolt loose, a spring inside takes up slack automatically.)
●Turn the engine over a couple of times so that slack is taken up evenly on all parts of the chain.
●Tighten the bolt and then its lock nut.

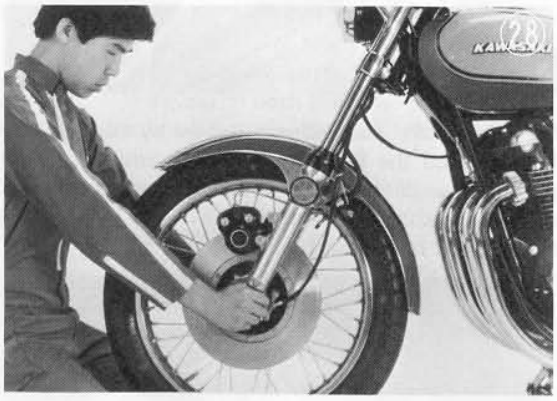


STEERING PLAY

For safety, the steering should always be kept adjusted so that the handlebars will turn freely, but do not have excessive play.

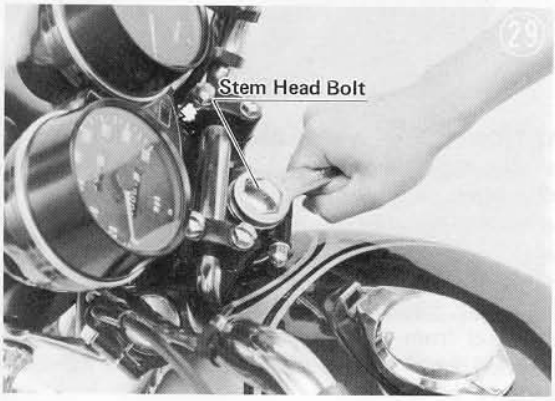
If the steering is too tight it will be hard to turn the handlebars quickly, the motorcycle may pull to one side, and the steering stem bearings may become damaged. If the steering is too loose the handlebars will vibrate, the motorcycle will be unstable, and it will be hard to steer in a straight line.

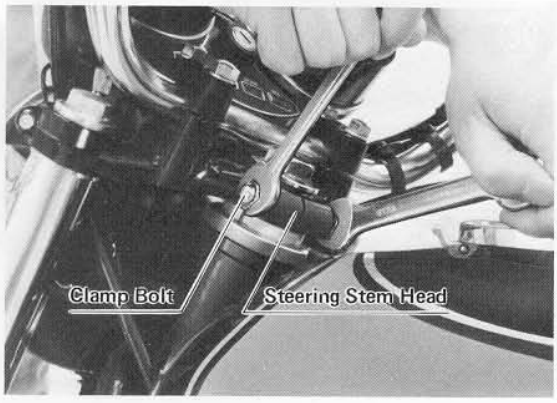
To check the steering adjustment, first place a stand or block under the engine so that the front wheel is raised off the ground. Push the handlebars lightly to either side; if they will continue moving under their own momentum, the steering is not too tight. Squatting in front of the motorcycle, grasp the lower ends of the front fork at the axle, and shake it back and forth; if no play is felt, the steering is not too loose.



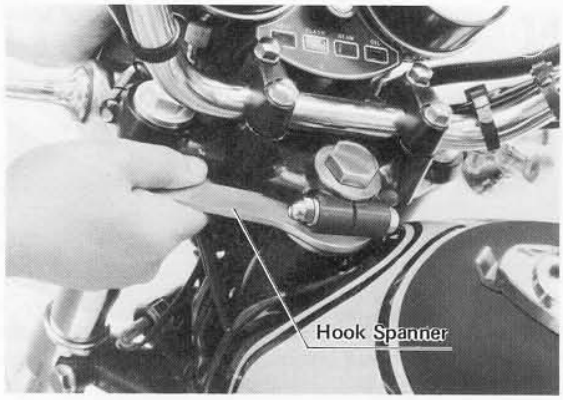
To adjust the steering:

- Loosen the steering stem head bolt and the one clamp bolt.



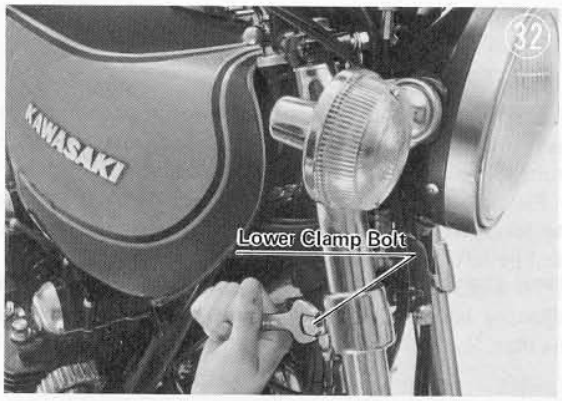


- Using a hook spanner, turn the steering stem lock nut down to tighten the steering, or up to loosen it.



- Tighten down the head bolt and clamp bolt.

- Loosen the two lower clamp bolts on the fork tubes to let the tubes reseat themselves, and tighten the bolts.



- Check that the three upper clamp bolts are tightened with 12~13 ft-lbs (1.6~1.8 kg-M) torque, and that the two lower bolts are tightened with 40~43 ft-lbs (5.4~6.0 kg-M) torque.

WHEEL BALANCE

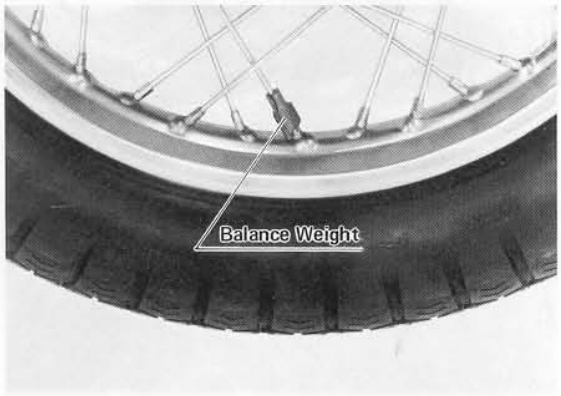
To improve stability and decrease vibration at high speed, the front and rear wheels must be kept balanced. Check and balance the wheels as follows:

- Make sure all spokes are tightened evenly.

- Raise the wheel off the ground and see that it will spin easily with no brake drag. In the case of the rear wheel, take the chain off the sprocket.

- Spin the wheel lightly several times and see if it stops of its own accord in various positions, indicating that it is correctly balanced.

●If one side of the wheel always stops at the bottom, attach a balance weight loosely to a spoke opposite that side.



●Repeat the previous two steps as many times as is necessary to correctly balance the wheel, and then clamp the weights on firmly using pliers.

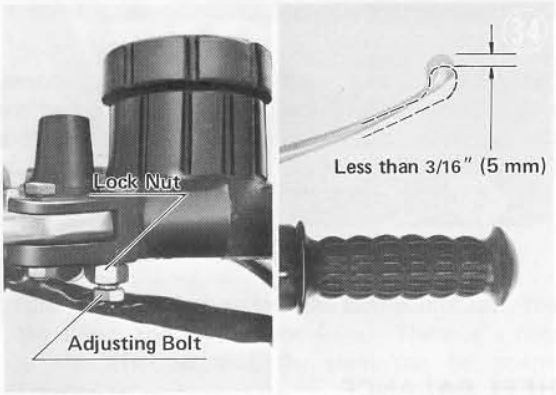
Balance weights are available from Kawasaki Dealers in 10, 20 and 30 gram ($\frac{1}{3}$, $\frac{2}{3}$ and 1 ounce) sizes. An imbalance of less than 10 grams will not usually affect running stability.

FRONT BRAKE LEVER

The front brake itself is adjusted automatically during use, and if it needs additional adjustment, parts are probably excessively worn or defective.

Play in the brake lever can be adjusted out to keep the lever from vibrating, but a small amount of play must be left in to ensure a full braking stroke.

To adjust lever play, loosen the lock nut, turn the adjusting bolt **a fraction of a turn** so that the lever has less than $\frac{3}{16}$ inch (5 mm) play, and tighten the lock nut.

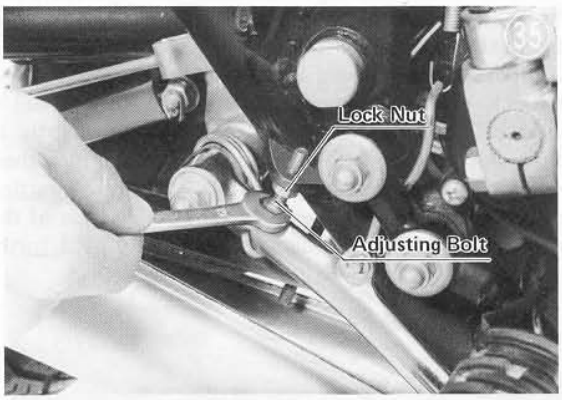


REAR BRAKE

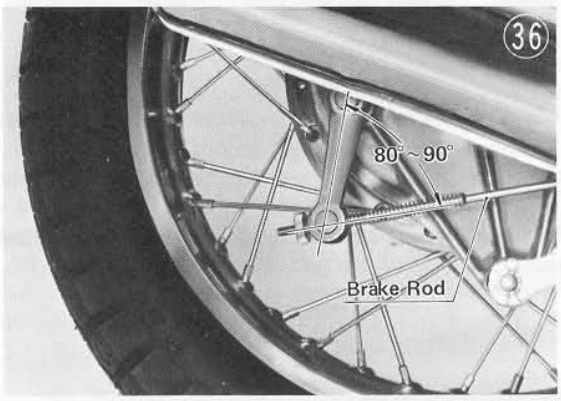
Brake lining and drum wear causes the rear brake to go out of adjustment, increasing pedal play and decreasing braking effectiveness. Rear brake adjustment to compensate for this actually consists of three separate adjustments: brake pedal position, cam lever angle, and brake pedal travel.

Adjustment procedure:

●Check that the top of the brake pedal in its rest position is slightly (about $\frac{1}{16}$" or 2 mm) lower than the right front foot rest. To adjust pedal position, loosen the lock nut, turn the adjusting bolt, and tighten the lock nut.

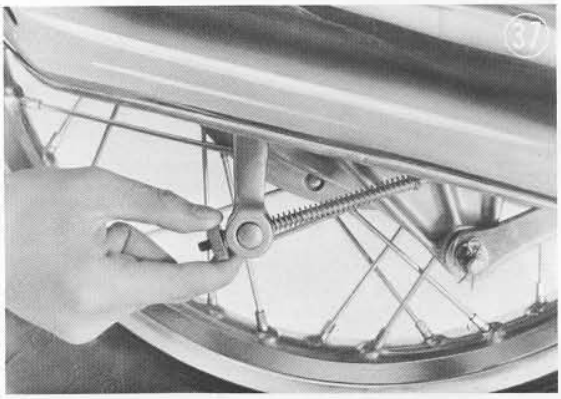


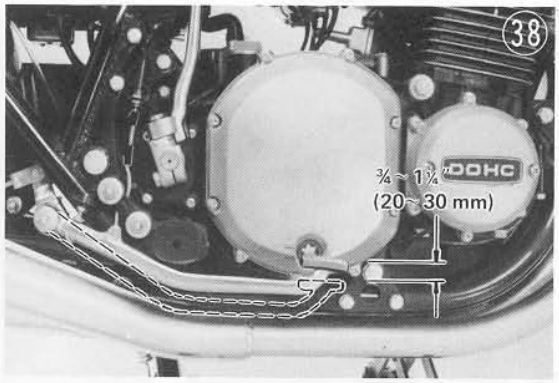
●Push the brake pedal down lightly by hand. When fully applied the brake cam lever should come to an 80°~90° angle with the brake rod; if it does not, remove the cam lever and mount it at a new position on the shaft to correct the angle.



CAUTION: Before remounting the cam lever, check brake lining, drum, and brake cam wear (see pg. 108, 109). Worn parts could cause the brake to lock or fail, and must be replaced before making further brake adjustment.

●Screw in the nut on the end of the brake rod so that the brake pedal has about ¾~1¼ inch (20~30 mm) of travel from the rest position to the fully applied position when the pedal is pushed down lightly by hand.





- Spin the rear wheel and check that the brake shoes are not dragging on the drum. If there is excessive drag (the wheel will not spin freely), disassemble and inspect the internal brake parts.
- Stand the motorcycle on both tires (use the side stand). Re-check the brake, making fine adjustment if necessary.
- Check the brake lamp switch adjustment.

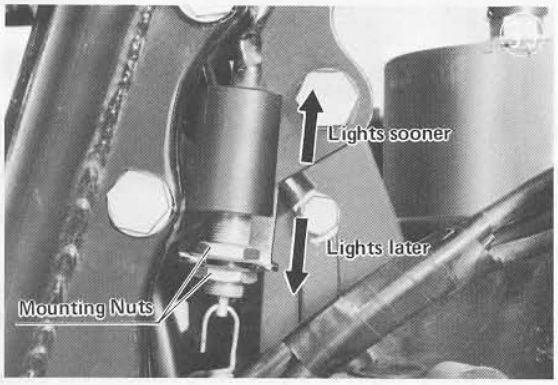
BRAKE LAMP SWITCH

A hydraulic pressure switch turns on the brake lamp when the front brake is applied, and so adjustment of this switch is neither necessary nor possible.

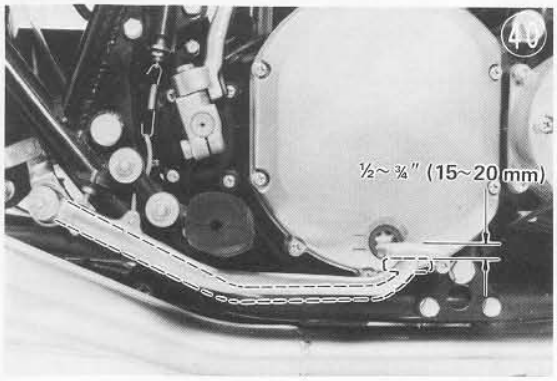
The rear brake switch, however, may require periodic adjustment as the activating spring stretches, or if the spring or brake pedal gets bent.

Adjustment procedure:

- Loosen the two switch mounting nuts.



- Move the switch up or down so that the brake lamp will light after ½~¾ inch (15~20 mm) of brake pedal movement.



- Tighten the two mounting nuts at that switch position.

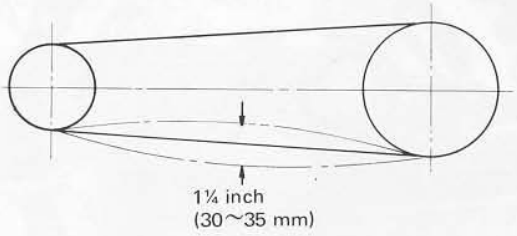
CAUTION: Do not turn the switch body during adjustment to avoid damage to the electrical wiring.

DRIVE CHAIN

Chain and sprocket wear causes the chain to become loose and results in a power loss, increased wear, noise, and the chain could slip off the sprockets and/or snap. Adjusting the chain too tightly will also cause excessive wear and possible chain breakage.

With the motorcycle resting on the center stand, the chain should have about 1¼ inch (30~35 mm) slack measured midway between the sprockets. Spin the rear wheel around to find the place where the chain is tightest (because it wears unevenly), and if there is less than 1 inch (25 mm) or more than 1½ inch (40 mm) of slack, the chain should be re-adjusted.

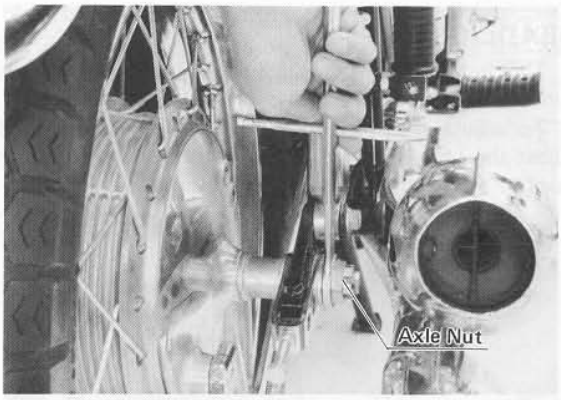
Chain Slack



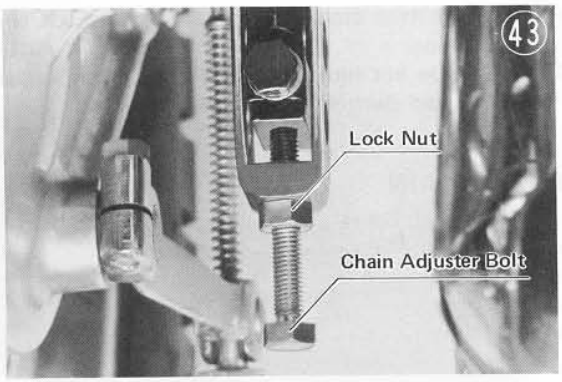
CAUTION: If the chain is worn past the service limit, replace it; don't try adjusting it. (See pg. 100)

Adjustment procedure:

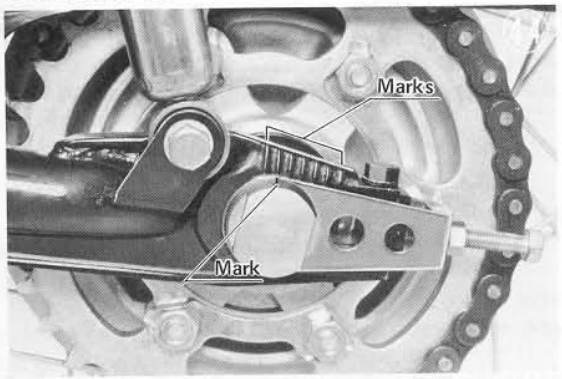
- Loosen the nut at the rear end of the torque link, and loose the right muffler mountings.
- Remove the cotter pin and loosen the axle nut.



- Loosen the lock nuts on the right and left chain adjusters. If the chain is too tight, first back out the chain adjuster bolts and kick the wheel forward until the chain is too loose.



●Now turn in the adjuster bolts, right and left sides evenly, until the chain has the correct amount of slack. To keep the chain and wheel aligned, the notch in the left chain adjuster must come to the same swing arm mark that the right hand chain adjuster notch comes to.

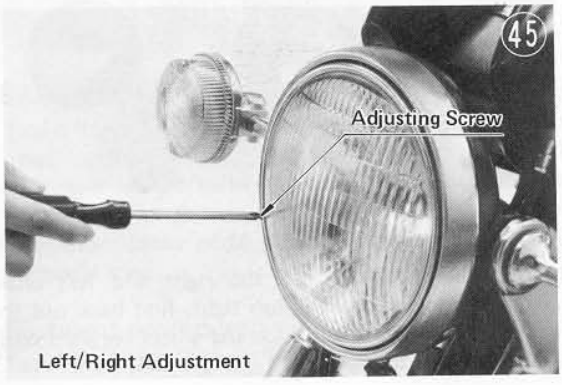


●Tighten both adjuster lock nuts and the axle nut, and spin the wheel and check adjustment, re-doing it if necessary.
●Tighten the axle nut with 95~115 ft-lbs (13~16 kg-M) torque, and insert a new cotter pin.
●Tighten the muffler mountings.
●Tighten the torque link nut with 22~25 ft-lbs (3~3.5 kg-M) torque.
●Check rear brake and brake lamp switch adjustments.

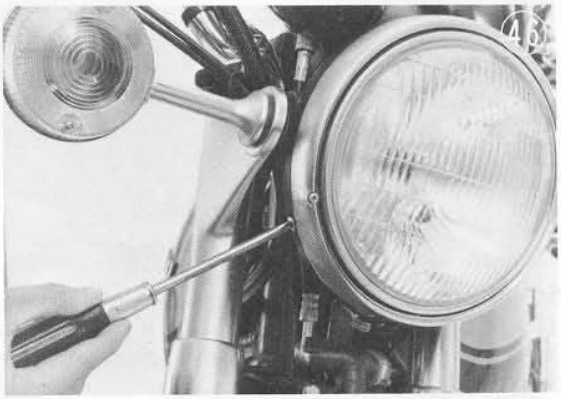
HEADLIGHT

The headlight beam is adjustable in both the horizontal and vertical directions.

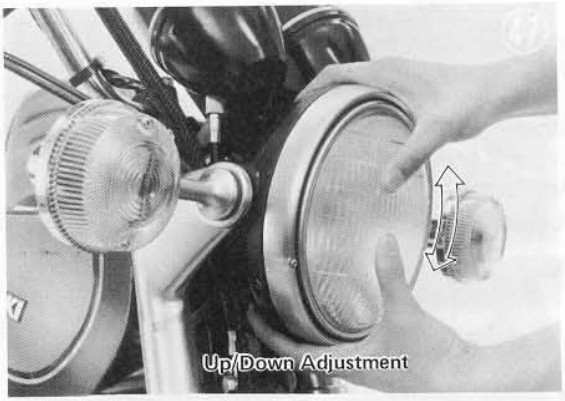
To adjust the horizontal aim of the beam, i.e. to adjust the beam right or left, turn the small screw in the front of the headlight rim.



Vertical beam adjustment is as follows:
●Remove the two screws from the lower side of the headlight housing, and drop out the headlight unit.



●Loosen the turn signal mounting nuts.
●Hold the headlight unit in place, loosen the mounting bolt underneath the headlight, move the headlight up and down to where the vertical aim is correct, and tighten the bolt to hold it there.

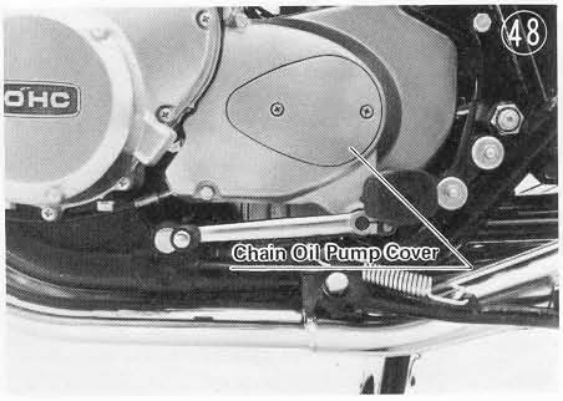


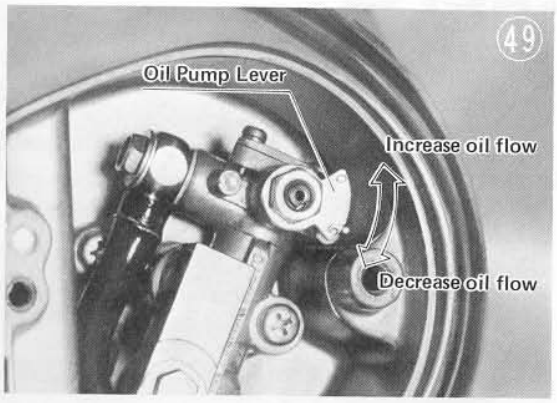
●Tighten the turn signal mountings and remount the headlight unit.

CHAIN OIL PUMP

Since the drive chain will wear very quickly if it is allowed to dry out, keep the oil pump adjusted so that the chain is wet but not dripping.

If the pump requires adjustment, remove the cover and turn the lever to a different notch. "O" supplies the least oil, and notch "5" is for maximum pump output.



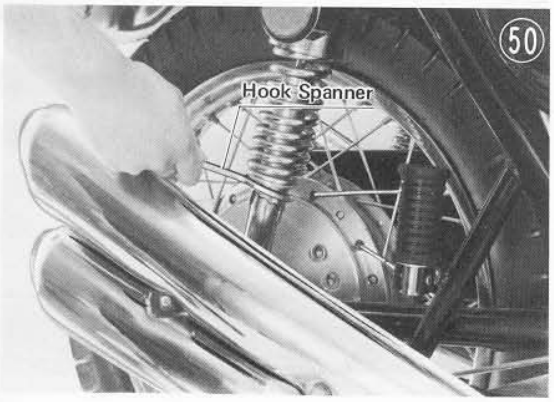


NOTE: Regardless of oil pump adjustment, the drive chain should still be hand oiled at least every 200 miles (300 km). Oil with SAE 90 weight oil between the end plates of the links, and at the sides of each roller. (See pg. 101.)

SHOCK ABSORBERS

The rear shock absorbers can be adjusted to one of 5 positions to suit riding conditions. They can be left soft for average riding, but should be adjusted slightly harder for high speed riding or for riding on bad roads.

Adjustment is made by turning the adjusting sleeve with a hook spanner. Be sure to turn both left and right shock absorbers to the same position in order to maintain stability.



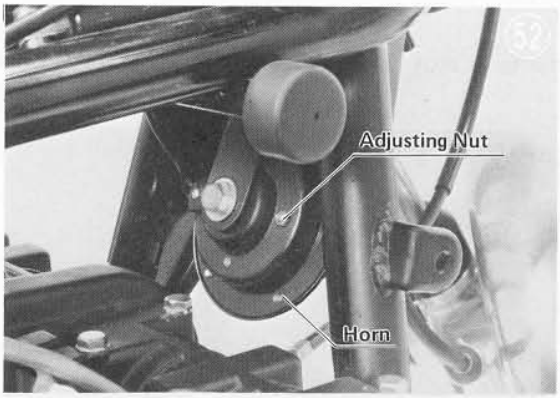
HORN

The horn may need to be re-adjusted as the contacts inside wear down over a long period. Turning the adjusting nut to the right compensates for contact wear.

CAUTION: Do not turn the adjusting nut too far in, as this will cause damage to the spring inside the horn, as well as increasing horn current and possibly burning out the horn coil.

Adjustment procedure:

- Remove the fuel tank to gain access to the horn wires.
- Disconnect the black horn wire, and connect an ammeter into the circuits, + ammeter lead to the black wire on the horn side, and - meter lead to the other black wire.
- Turn the ignition key on and keep the horn button pushed while turning the horn adjusting nut. Adjust for the best horn sound while keeping the horn current between 1.8 and 2.5 amperes

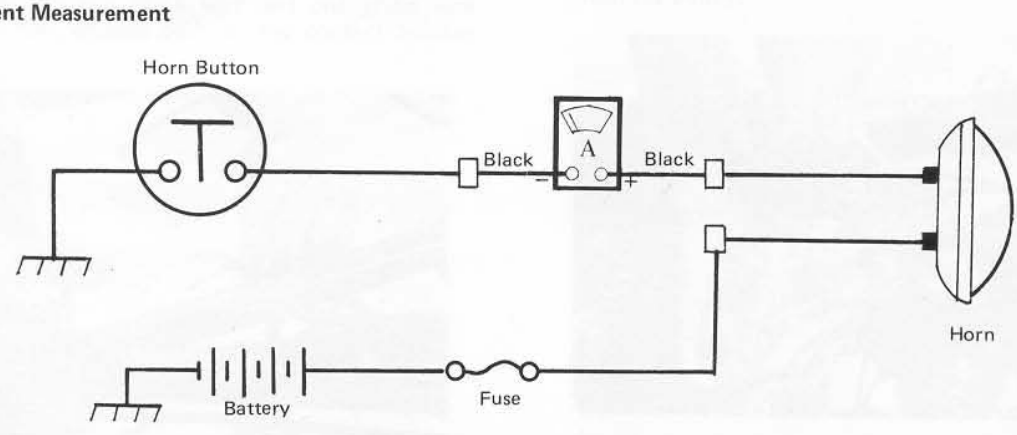


NOTE: The horn will not sound properly if it is mounted incorrectly or if any cables or other parts are touching it.

- If the horn cannot be adjusted properly, open it and clean and burnish the contacts first.

NOTE: Do not disassemble the horn during the warranty period, as this will invalidate horn warranty.

Horn Current Measurement

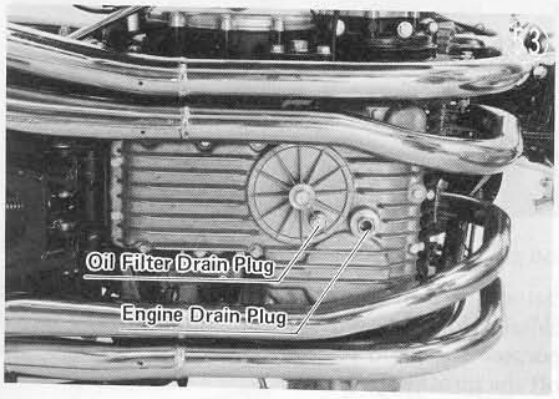


DISASSEMBLY

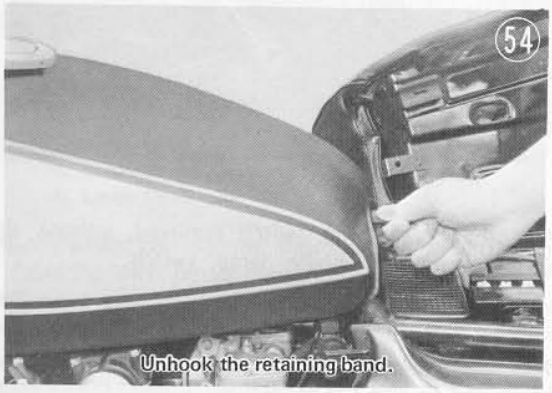
ENGINE

Removal:

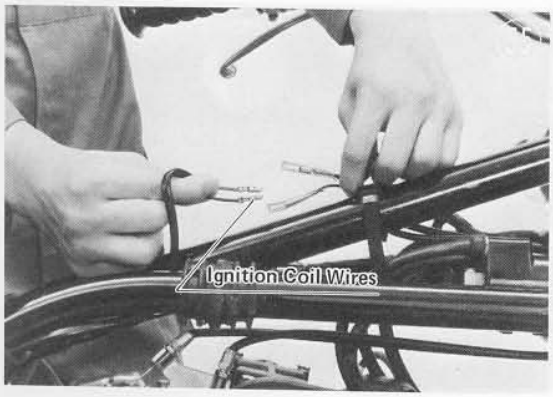
- Remove the engine and oil filter drain plugs and drain the engine oil.



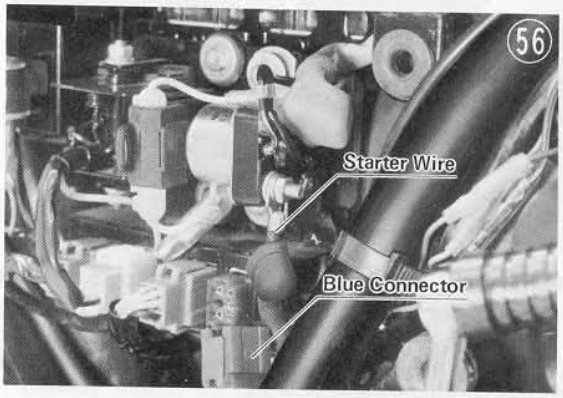
- Take off the motorcycle side covers. Turn the fuel tap to the **S** position, slide back the hose clamps and pull the two fuel hoses off the tap.
- Open the seat, unhooking it so that it will open completely and not scratch the fuel tank during tank removal.
- Unhook the rubber retaining band and pull the fuel tank off toward the rear.



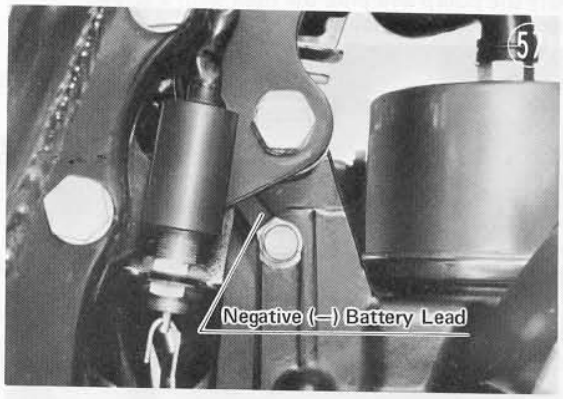
- Disconnect the one black wire and one green wire that join the ignition coils to the contact breaker points.



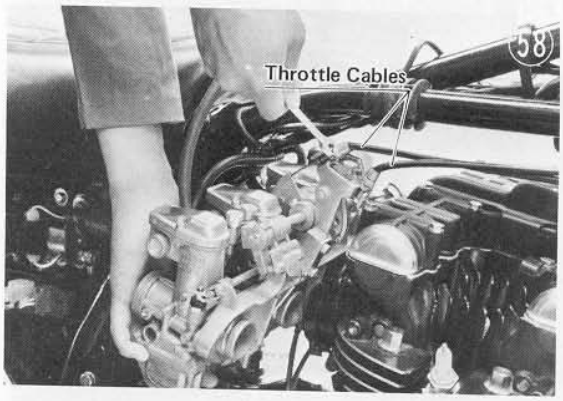
- Take the wires off all the spark plugs.
- Unscrew the tachometer cable and pull it from the cylinder head.
- Unplug the blue connector from the electrical panel.
- Take the starter wire off the starter relay terminal.



- Remove the right front foot rest.
- Unbolt the negative (−) battery lead from its ground on the engine.



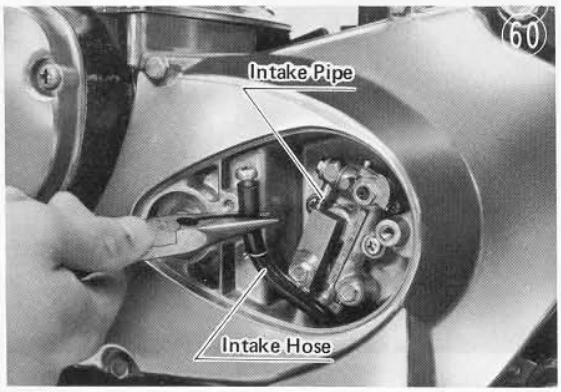
- Loosen all eight clamps and pull the carburetor assembly off to the rear.
- Loosen the nuts and unhook the two throttle cables from the pulley.



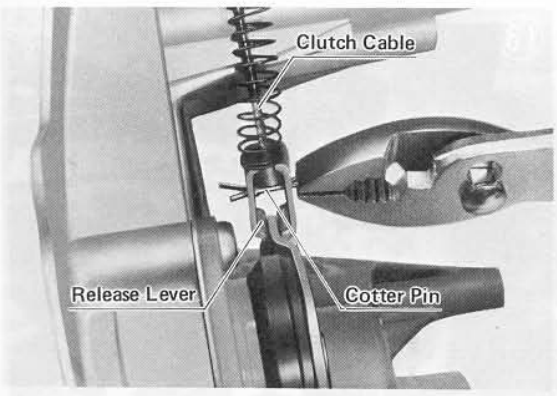
- Take the screen off the top of the air cleaner.

•Slide up the clamp to pull the hose off the oil breather, and remove the air cleaner assembly.

•Remove the nuts and pull each exhaust pipe collar off the cylinder head studs. Take out the rear mounting bolt and push the two mufflers on each side forward to remove them.
•Take off the left front foot rest.
•Remove the bolt completely and pull off the gear shift pedal.
•Take off the starter cover and gasket.
•Remove the chain oil pump cover, pull the inlet hose off the pump and plug the hose with a screw.

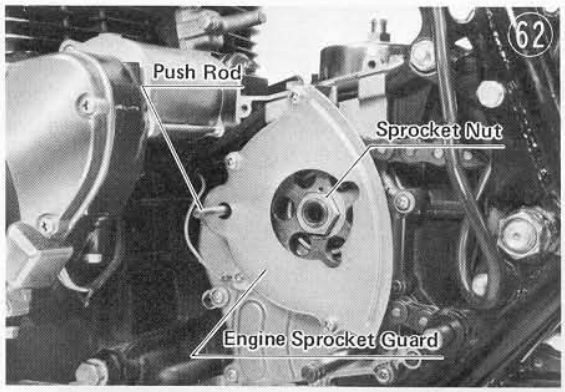


•Remove the chain cover, pull the cotter pin out of the clutch release lever, and unhook the clutch cable.

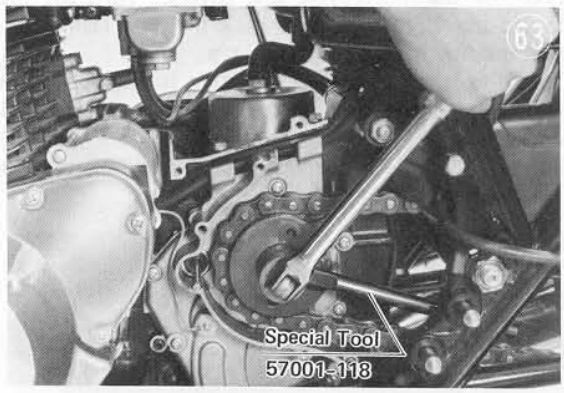


•Remove the engine sprocket guard.

•Take the clutch push rod out of the drive shaft.

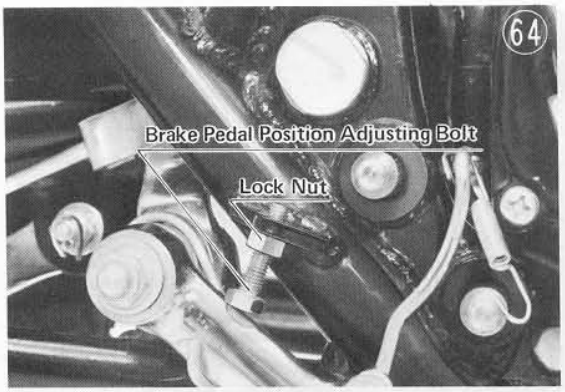


•Flatten the bent-up ear of the lock washer with a cold chisel. Hold the sprocket from turning using a special purpose tool, and remove the sprocket nut and take off the sprocket.

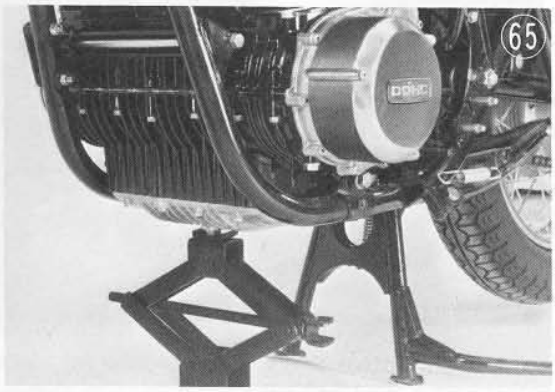


•With the brake lamp switch removed, unhook the spring from the brake lamp switch.

•Back the rear brake adjusting nut off to the end of the brake rod to give the pedal play. Loosen the lock nut and back out the brake pedal position adjusting bolt until the pedal is held down out of the way.

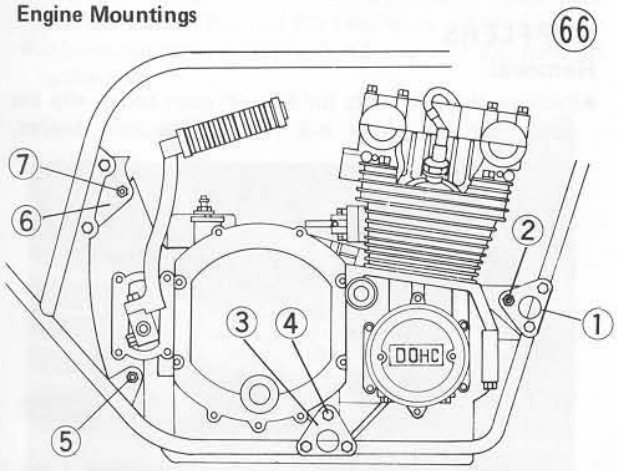


•Jack or lever the engine up to take the weight off the mounting bolts.



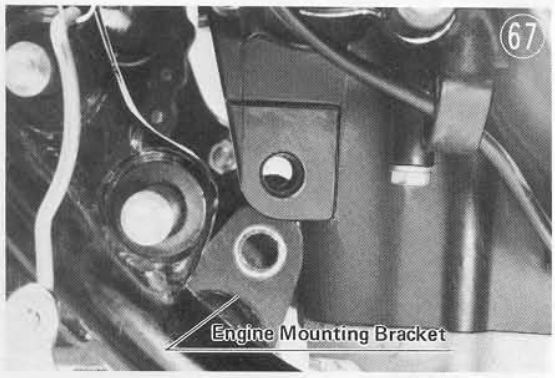
•Take the nuts off the three long engine mounting bolts.

Engine Mountings

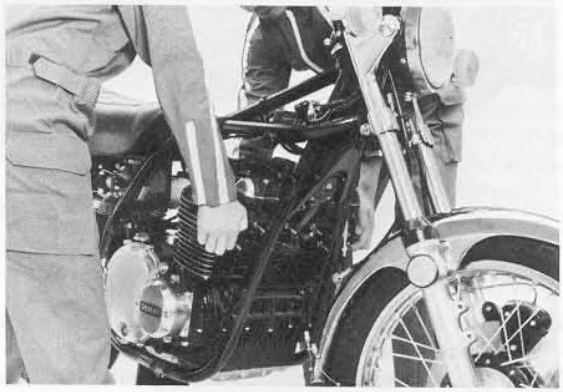


1. Front Bracket
2. Front Bolt
3. Lower Center Bracket
4. Lower Center Bolt
5. Rear Lower Bolt
6. Rear Upper Bracket
7. Rear Upper Bolt

•Completely remove the short engine mounting bolt from the lower center mounting on each side.
•Remove the right rear engine mounting bracket bolts.
•Remove the center and front right side mounting brackets.
•Remove the three long bolts.
•Level the engine and slowly lift it straight up about 1 inch (25 mm), then move it to the right slightly so the rear of the engine slips over the lower right rear mounting.

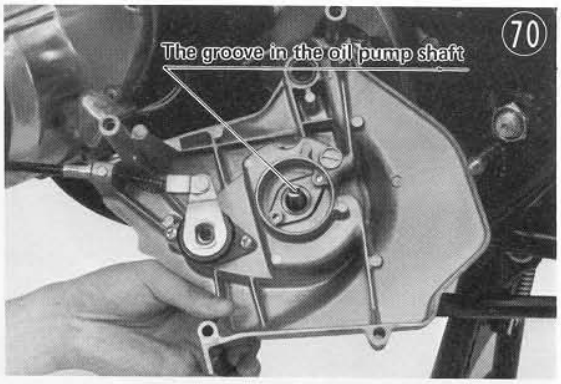


•Raise the front of the engine a little so that it will clear the frame, drop down the left side, and pull the engine out diagonally upward to the right.

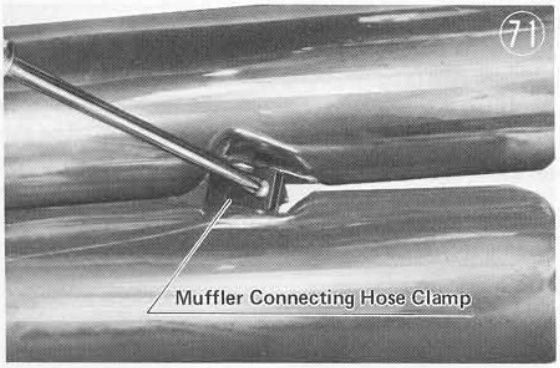


Installation Notes:

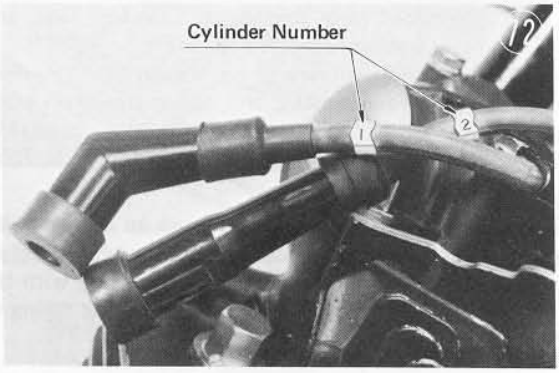
1. Loosely mount the three engine mounting brackets before the engine bolts are inserted. After engine bolt insertion, first tighten the bracket mounting bolts, and then the engine mounting bolts. The three long engine mounting bolts are inserted from the left side of the motorcycle. Two spacers go on the rear upper bolt; a long one on the left side of the engine, and a short one on the right side.
2. Tighten the bracket mounting bolts with 14.5~16.5 ft-lbs (2.0~2.3 kg-M) torque.
3. Engine mounting bolt torque is 47~50 ft-lbs (6.5~7.0 kg-M) for the three long (12 mm) bolts, and 26~29 ft-lbs (3.5~4.0 kg-M) for the two short (10 mm) bolts.
4. Slip the chain over the engine sprocket first, and then mount the sprocket on the shaft.
   If the sprocket will not go on, loosen the rear wheel as for chain adjustment, and adjust the chain afterwards. (See Drive Chain Adjustment, page 19.) Sprocket nut tightening torque is 87~108 ft-lbs (12~15 kg-M).
5. When replacing the chain cover, use an oil seal guide to protect the rubber seal. Turn the rear wheel so that the pin in the output shaft is aligned with the groove in the chain oil pump shaft before trying to push the cover fully on.



6. Be sure all the carburetor and air duct clamps are tight enough to stop any air leakage.
7. Put the mufflers on one at a time with the inside muffler of each side going on first. After installation tighten the muffler connecting hose clamp on each side so there is no exhaust leakage.



8. The numbers on the spark plug wires correspond to the cylinder numbers, counting from the left.

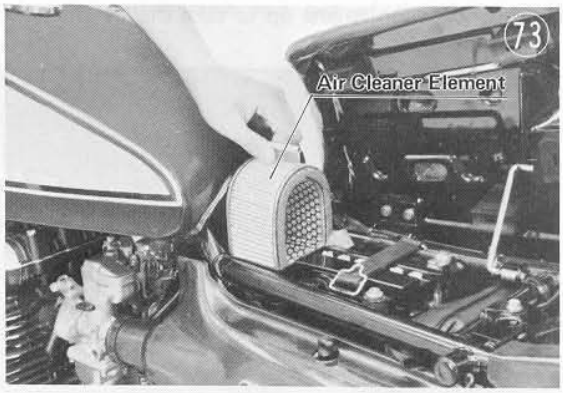


9. Fill the engine with a little over 4 quarts (about 4 litres) of SE or SD class SAE 10W-40, 10W-50 or 20W-50 weight motor oil. After the engine is run and then stopped for several minutes, the oil should come up above the low mark on the gauge.
10. After engine installation, adjust the rear brake (Pg. 18), and check the brake lamp (Pg. 19), chain (Pg. 19), clutch (Pg. 13), and throttle cable (Pg. 11) adjustments.

AIR CLEANER ELEMENT

Removal:

- Open the seat, take the screen off the air cleaner, and pull the element out.



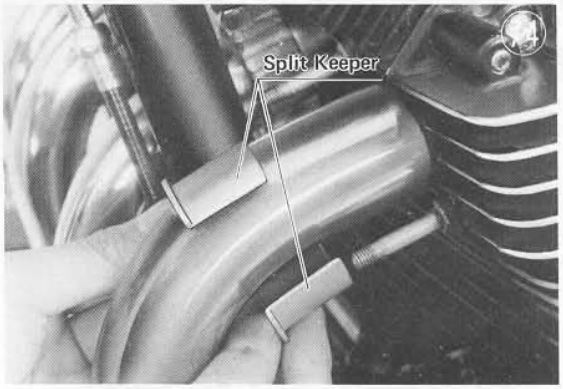
Installation Note:

- Take care not to push the sponge gaskets out of place during installation.

MUFFLERS

Removal:

- Remove the two nuts holding on each collar, slip the collar off the studs and remove the split keeper.



- Take out the mounting bolt at the rear, and push the two mufflers for either side forward, removing them as a pair.
- Take the two mufflers apart after loosening the connecting hose clamp.

Installation:

- Starting with the inside muffler of either side, put the gasket into the exhaust port of the cylinder head.
- Put the split keeper onto the exhaust pipe, holding it in place with the collar, and push the muffler into the cylinder head.