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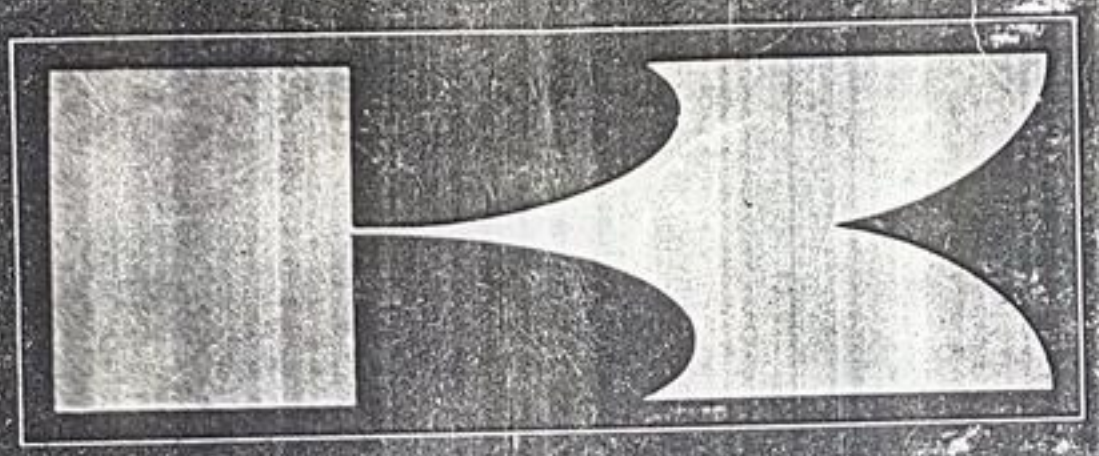


Kawasaki

all model short manual

Unit Conversion Table

cc	x	.0610	=	cu in
cc	x	.02816	=	oz (imp)
cc	x	.03381	=	oz (US)
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 (US)
gal (US)	x	3.7853	=	liters
gal (US)	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/cm²	x	14.22	=	lbs/in²
km	x	.6214	=	mile
lb	x	.4536	=	kg
lb/in²	x	.0703	=	kg/cm²
litre	x	28.16	=	oz (imp)
litre	x	33.81	=	oz (US)
litre	x	.8799	=	qt (imp)
litre	x	1.0567	=	qt (US)
metre	x	3.281	=	ft
mile	x	1.6093	=	km
mm	x	.03937	=	in
oz (imp)	x	35.51	=	cc
oz (US)	x	29.57	=	cc
oz (weight)	x	28.35	=	grams
qt (imp)	x	1.1365	=	litre
qt (imp)	x	1.201	=	qt (US)
qt (US)	x	.9463	=	litre
qt (US)	x	.8326	=	qt (imp)
kg/cm²	x	98.07	=	kPa
lbs/in²	x	6.896	=	kPa
kPa	x	.1450	=	lbs/in²

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

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

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/cm²	kilograms per square centimeter
kg-m	kilogram meters
km	kilometer
kph	kilometers per hour
lb, lbs	pound, pounds
lbs/in²	pounds per square inch
ltr	liter, litre
m	meter, meters
mi	mile, miles
mm	milimeters
mph	miles per hour
oz	ounce, ounces
psi	pounds per square inch
qt	quart, quarts
rpm	revolutions per minute
sec	second, seconds
SS	standing start
TDC	top dead center
"	inch, inches
r/min	revolutions per minute
ℓ	liter, litre
kPa	kilo-Pascals

Foreword

This short manual is useful for all models and is designed primarily for use by motorcycle mechanics in a properly equipped shop, although it contains enough detail and basic information to make it useful to the motorcycle user who desires to carry out his own basic maintenance and repair work. Since a certain basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily; the adjustments, maintenance, and repair should be carried out only by qualified mechanics whenever the owner has insufficient experience, or has doubts as to his ability to do the work, so that the motorcycle can be operated safely.

In order to perform the work efficiently and to avoid costly mistakes, the mechanic should read the text, thoroughly familiarizing himself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment is specified, makeshift tools or equipment should not be used. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation of the motorcycle.

Whenever you see the symbols shown below, heed their instructions! Always follow safe operating and maintenance practices.

WARNING **This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.**

CAUTION **This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to, or destruction of equipment.**

"NOTE" indicates points of particular interest for more efficient and convenient operation.

This manual is divided into the following chapters:

(1) Adjustment

The adjustment chapter gives the procedure for all adjustments which may become necessary periodically and which do not involve major disassembly.

(2) Maintenance and Theory of Operation

The procedures for inspection and repair are described in detail in this chapter. An explanation on the structure and functioning of each of the major parts and assemblies, especially on one of new devices, is given to enable the mechanic to better understand what he is doing.

Since the Service Manual is based on the first production units of the KH110, there may be minor discrepancies between some vehicles and the illustrations and text in this manual. Explanation on major changes and additions pertaining to later year units will be explained in a supplement following the appendix or by a new edition, as required.

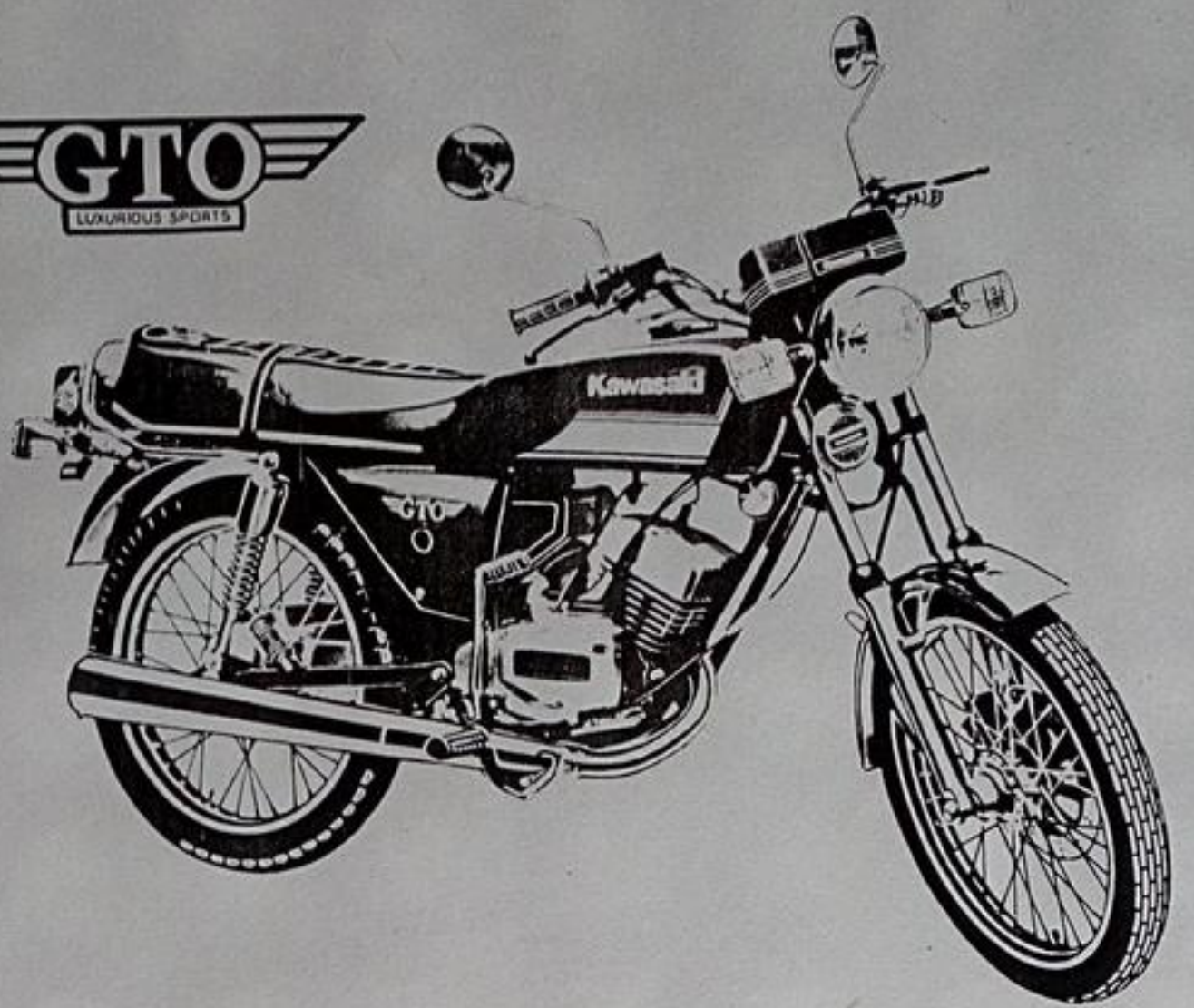
QUICK REFERENCE GUIDE

To use, bend the manual back and match the desired section below against the black spot showing at the edge of these pages. ➡

Adjustment	Engine	A
	Chassis	B
Maintenance & Theory	Engine	C
	Chassis	D
	Electrical	E
Troubleshooting		F
Periodic Maintenance Chart		G

GTO

LUXURIOUS SPORTS



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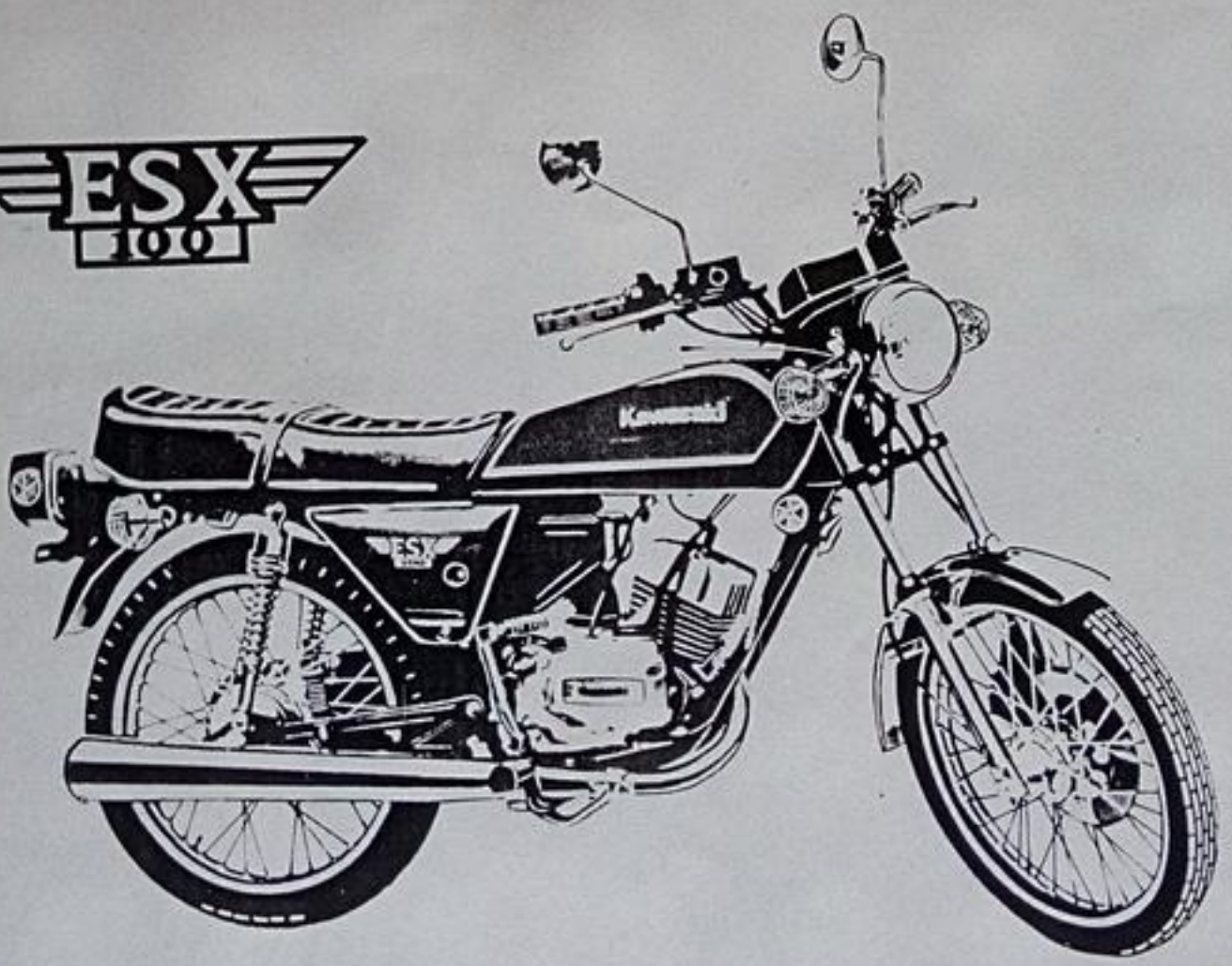

Adjustment – Engine

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FUEL SYSTEM 19

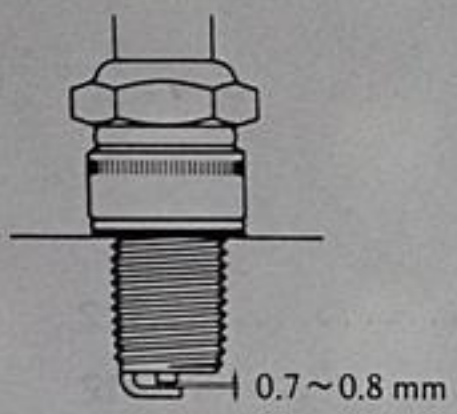
A

SPARK PLUG

Neglecting the spark plug eventually leads to difficult starting and poor performance. During normal operation, the electrodes gradually burn away and carbon builds up along the insulator. In accordance with the Periodic Maintenance Chart (Pg. 10), the plug should be removed for inspection, cleaning, and to reset the gap. If the center electrode is fairly worn down, install a new spark plug with the proper gap.

- Remove the spark plug using a spark plug wrench.
- Clean off the electrodes, and measure the gap with a wire-type thickness gauge. If the gap is incorrect, carefully bend the outer electrode with a suitable tool to obtain the correct gap.

Spark Plug



B1

Table B1 Spark Plug

Spark Plug	NGK B7ES, B8ES
Gap	0.7~0.8 mm
Tightening Torque	2.8 kg-m (20 ft-lbs)

- Tighten the spark plug in the cylinder head to 2.8 kg-m (20 ft-lbs) of torque.

IGNITION TIMING

Incorrect ignition timing can cause poor performance, knocking, overheating, and serious engine damage. Periodic adjustment is necessary to compensate for parts wear, and the ignition timing must be checked whenever ignition related parts have been disassembled or replaced.

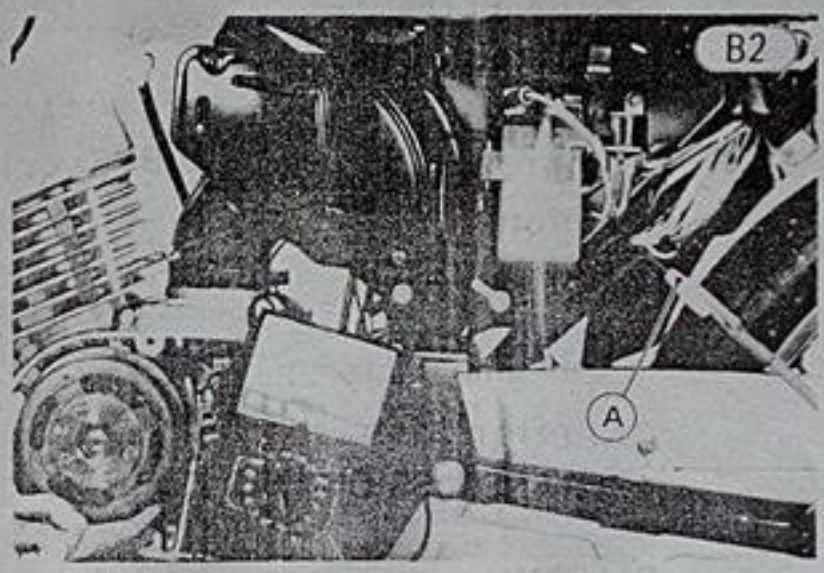
Correct ignition timing is achieved by working through the inspection window of the magneto flywheel to adjust the position of the contact breaker base so that the points are just beginning to open when the timing mark on the outer circumference of the flywheel aligns with the timing mark on the crankcase (Fig. B3), or when the piston is positioned 1.96 mm BTDC (before top dead center) measured with a dial gauge. When the timing mark is aligned with the timing projection, the piston is positioned 1.96 ± 0.19 mm BTDC. Within this range the ignition is set for good performance. However, superior performance is generally achieved by having ignition take place as close as possible to 1.96 mm BTDC. When precise ignition timing is desired, a dial gauge is used instead of the timing mark to set the position of the piston. Once the timing has been adjusted, it may be checked for accuracy with a strobe light. There is no adjustment for maximum point gap.

Inspection (static):

- Remove the spark plug.

WARNING **Never neglect to remove the spark plug, or the engine may turn suddenly on compression and injure you when the magneto flywheel is rotated to check ignition timing.**

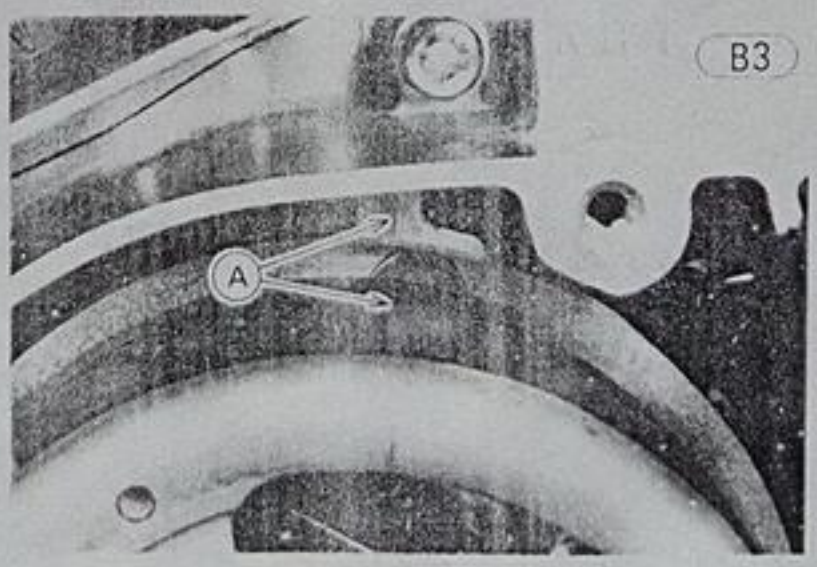
- Remove the left engine cover and shift pedal.
- Inspect the contact breaker points. If they are pitted or dirty, repair and clean them (Pg. 126).
- Remove the left side cover.
- Disconnect the black lead.
- Connect an ohmmeter set to the x 1 Ω range across the contact breaker points by securing one lead to chassis ground (such as the crankcase) and the other lead to the black lead. Be sure that the ohmmeter leads are connected firmly to make good electrical contact.



B2

A. Black Lead

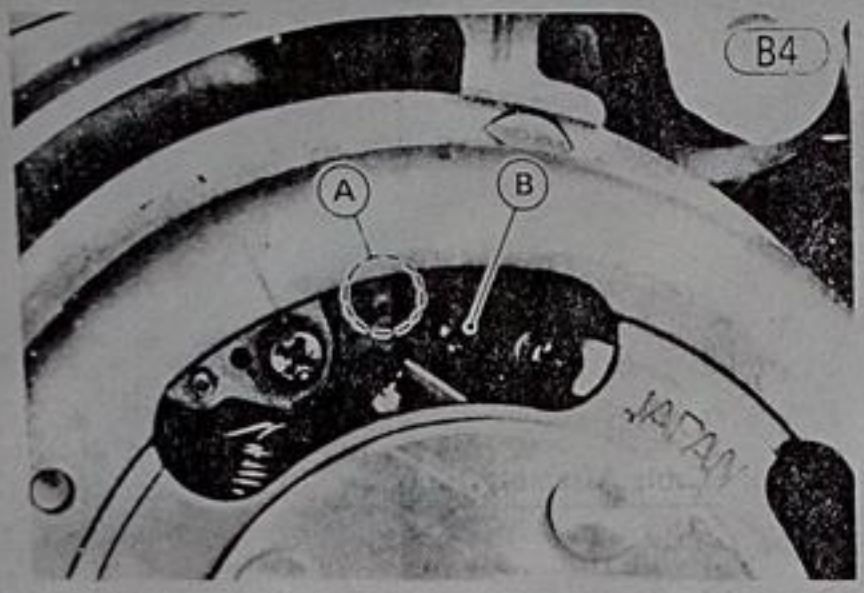
- Turning the magneto flywheel counterclockwise, check to see if the line on the flywheel outer circumference aligns with the timing mark on the left crankcase when the ohmmeter needle jumps. (Note that total needle travel as the points open is only about 3Ω). If not, adjust the ignition timing as follows.



B3

A. Timing Marks

- Position the magneto flywheel so that the line aligns with the timing mark on the crankcase.
- Loosen the contact breaker base screw just enough to allow the base to move.



A. Pry Point B. Base Screw

- Use a screwdriver on the pry points to adjust the position of the contact breaker base until the contact breaker points are just at the point of opening. The ohmmeter needle starts to rise when the points just begin to open. Clockwise rotation of the screwdriver advances the timing and counterclockwise retards it.
- Once the base seems properly positioned, tighten the base screw, rotate the flywheel a little clockwise, and then slowly rotate it counterclockwise. When the needle starts to rise, the timing mark and timing projection should be aligned. If they are not, readjust and recheck until the correct contact breaker base position is reached.
- Disconnect the ohmmeter, and reconnect the black lead.
- Install the left side cover.
- Install the left engine cover and shift pedal.
- Tighten the spark plug to 2.8 kg-m (20 ft-lbs) of torque, and connect the spark plug lead.
- Check the idle speed (Pg. 17).

Inspection (dynamic):

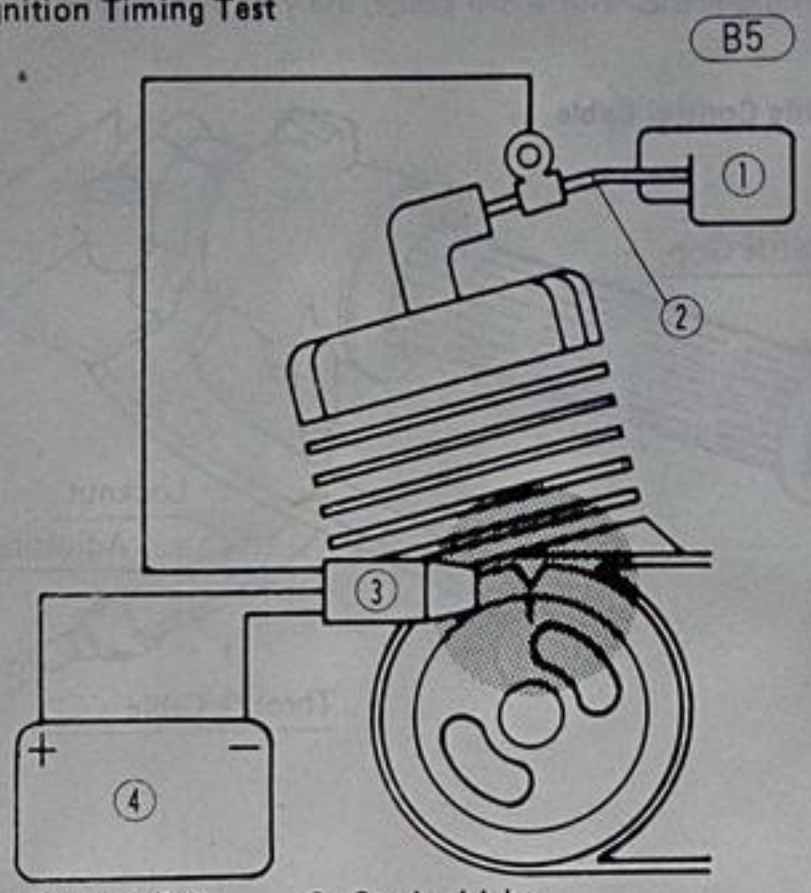
To check to see whether or not the ignition timing is correctly set, a strobe light may be used.

- Remove the left engine cover and shift pedal.
- Connect the strobe light in the manner prescribed by the manufacturer. One example is shown in Fig. B5.
- With the engine idling, direct the light at the timing marks. If both timing marks are aligned when the light flashes, the ignition timing is correctly set (Fig. B3).

WARNING **Make sure that no tools, clothes, or leads ever touch the spinning flywheel. Touching the flywheel of a running engine could cause an injury.**

- Install the left engine cover and shift pedal.

Ignition Timing Test

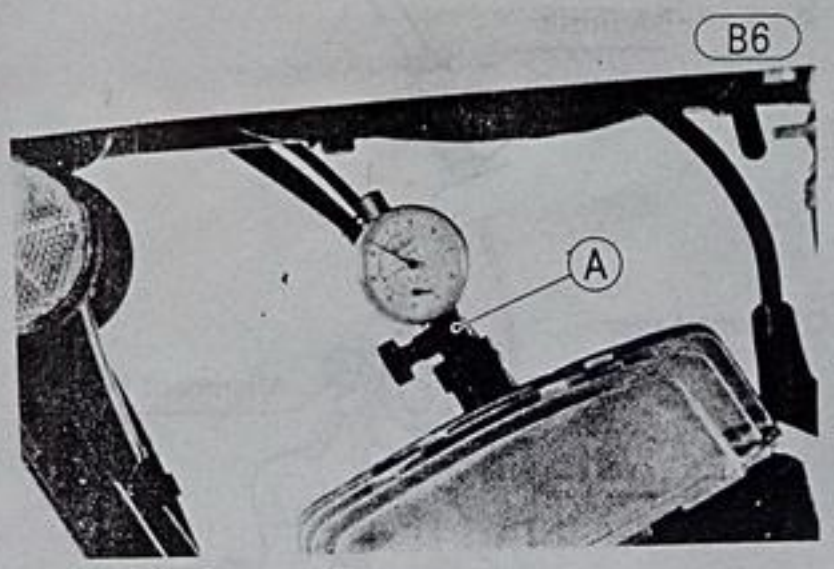


1. Ignition Coil
2. Spark Plug Lead
3. Strobe Light
4. Battery

Verification of Timing Marks:

The accuracy of the timing marks may be checked with a dial gauge and TDC finder "A" (special tool).

- Rmove the left engine cover and shift pedal.
- Remove the spark plug.
- Rotate the magneto flywheel until the position of the piston is close to the top.
- Using TDC finder "A" (special tool), mount the dial gauge on the cylinder, rotate the flywheel to set the piston at exact TDC (top dead center), and set the dial to zero.



A. TDC Finder "A" (57001-402)

- Rotate the flywheel clockwise until the dial gauge reads about 2.5 mm and then counterclockwise until the dial gauge reads 1.96 mm.
- The timing mark on the flywheel should align with the timing mark on the crankcase at this point. If it does not, once the piston has been set at 1.96 mm BTDC (before top dead center) make a new timing mark on the flywheel just under the crankcase timing mark.
- Install the left engine cover and shift pedal.

•Tighten the spark plug to 2.8 kg-m (20 ft-lbs) of torque, and connect the spark plug lead.

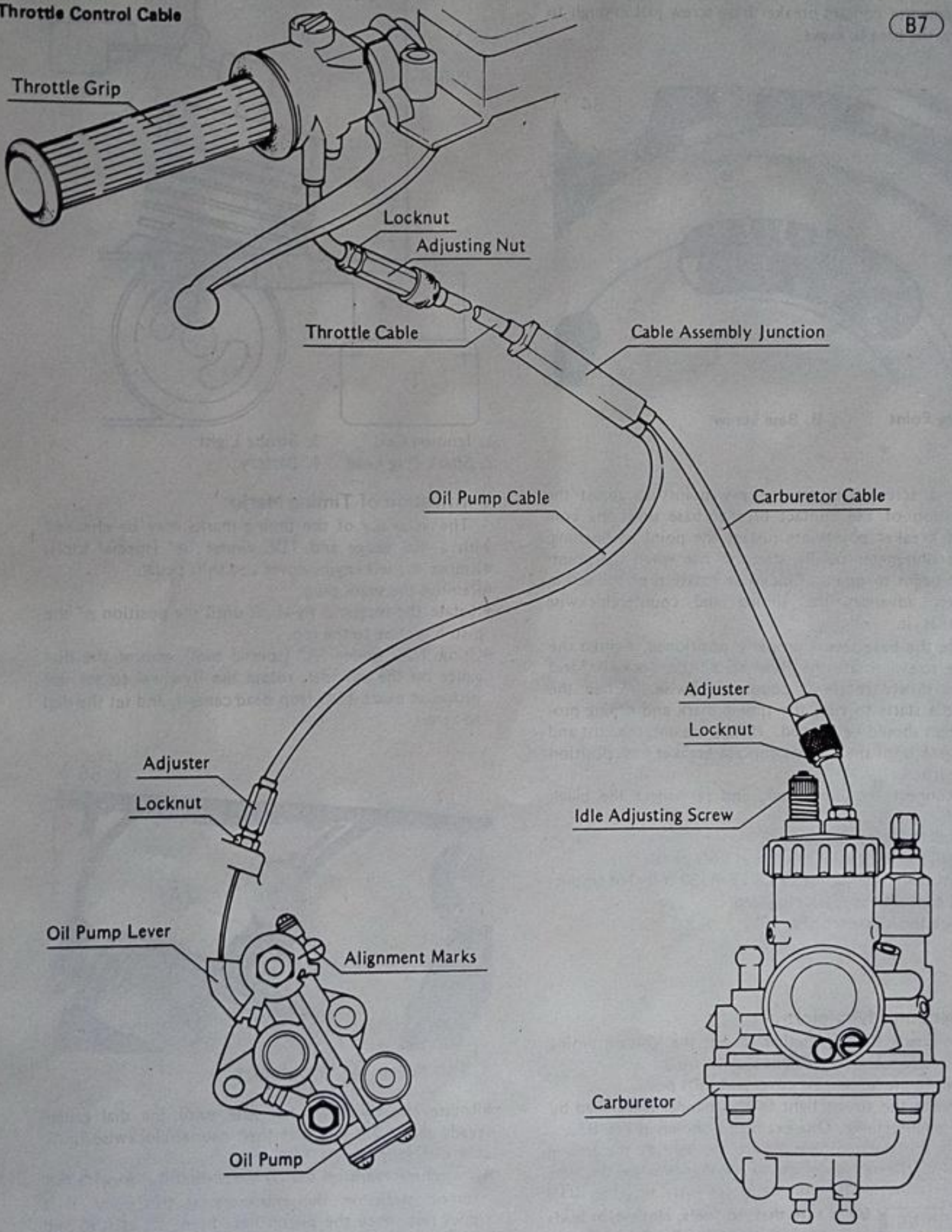
NOTE: When inspecting ignition timing after verifying the timing marks with a dial gauge, use your new timing mark.

THROTTLE CONTROL CABLE

The throttle control cable is actually an assembly of three cables: the throttle cable, the carburetor cable, and the oil pump cable. The throttle cable runs from the throttle grip to the cable assembly

Throttle Control Cable

B7



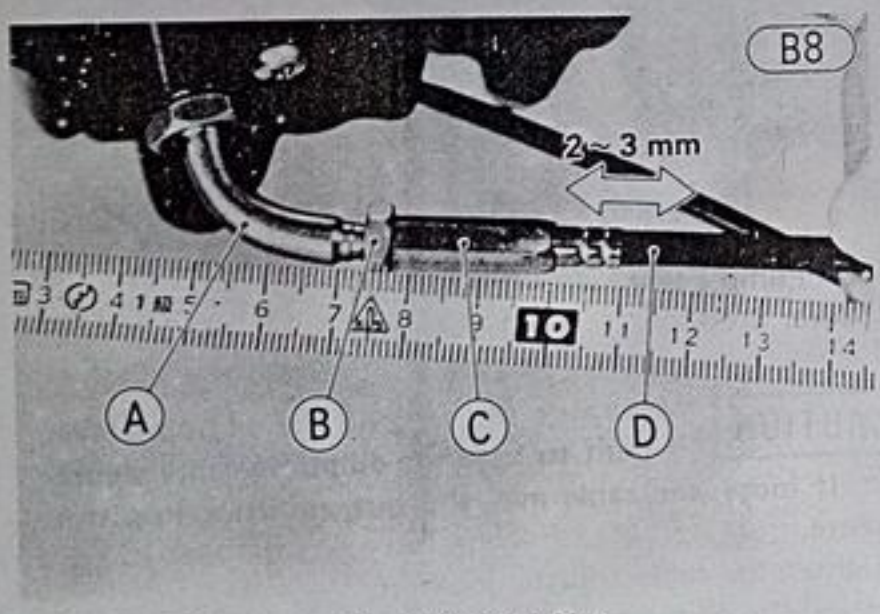
junction where it connects to both the carburetor cable which leads to the carburetor, and the oil pump cable which leads to the oil pump.

Since the throttle grip controls both the carburetor and the oil pump simultaneously, it is important that each cable be adjusted to its designed base position so that the oil and fuel/air mixture reach the engine in the correct proportion at all throttle openings. Cable stretch creates excess play at the throttle grip and alters the base positions of the cables at the carburetor and the oil pump, necessitating periodic adjustment.

Throttle Cable

The throttle cable, connecting to the carburetor cable and the oil pump cable, controls both the carburetor throttle valve and the oil pump lever. If there is too much play in the cable, neither the carburetor nor the oil pump will respond immediately when the grip is turned. Most of this excess play must be adjusted out. However, a small amount has to be left so that the steering movement will have no effect on the throttle valve or oil pump lever.

- To determine the amount of cable play, first slide back the dust cover, and place a ruler alongside the upper end of the throttle cable. Then pull out and push in the outer cable; the amount of cable travel is the amount of cable play. The proper amount of play is 2 ~ 3 mm. If there is too much or too little play, adjust the cable.
- Loosen the locknut at the throttle cable elbow.



A. Cable Elbow
B. Locknut
C. Adjusting Nut
D. Throttle Cable

- Turn the adjusting nut until the proper amount of throttle grip play is obtained.
- Tighten the locknut, and slide the dust cover back over the adjusting nut.
- Check the oil pump cable adjustment (Pg. 16).
- Turn the handlebar from side to side while idling the engine. If idle speed varies, the throttle control cable assembly may be poorly routed or it may be damaged.

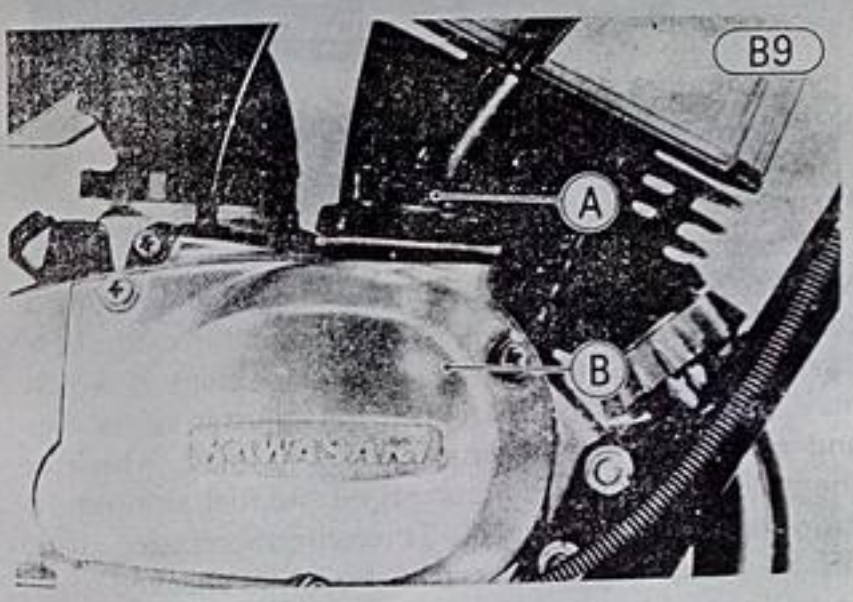
WARNING **Operation with improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.**

Carburetor Cable

The carburetor cable forms one of the two lower branches of the throttle control cable assembly. It is adjusted so that, should the throttle valve be closed fully (not at idle but all the way down), all the play in the carburetor cable would be taken up.

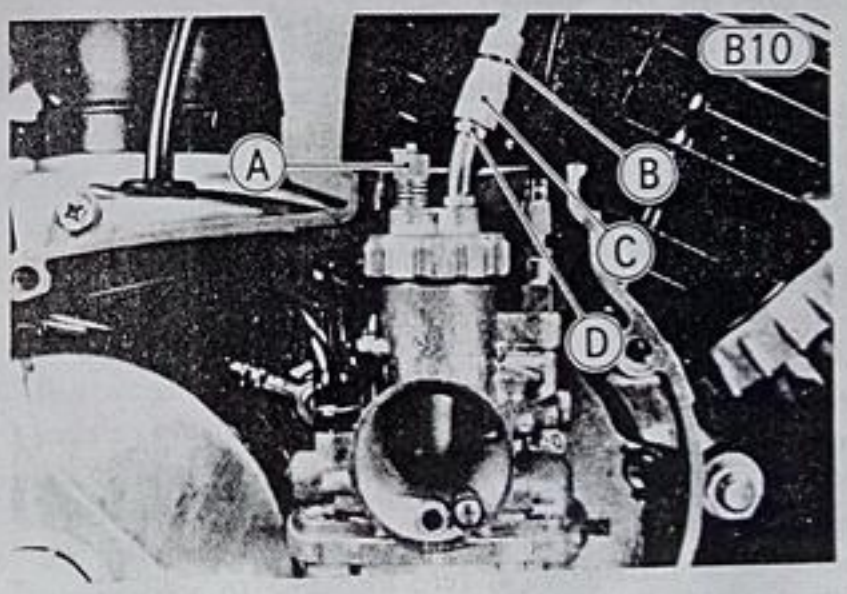
The play that develops as the cable stretches will cause a delayed engine response, and should faulty adjustment cause the cable to pull the throttle valve out of its rest position, proper idling cannot be achieved. If the carburetor cable is out of adjustment, the oil and fuel/air mixture ratio will be incorrect, resulting in over or underlubrication. Adjust the carburetor cable in accordance with the Periodic Maintenance Chart (Pg. 10) to compensate for cable stretch and whenever the throttle does not respond properly.

- Check to see that the throttle cable has the proper amount of play.
- Slide the carburetor rubber cap out of place, and remove the carburetor cover.



A. Carburetor Rubber Cap
B. Carburetor Cover

- Turn in the idle adjusting screw until the throttle valve reaches its lowest position.

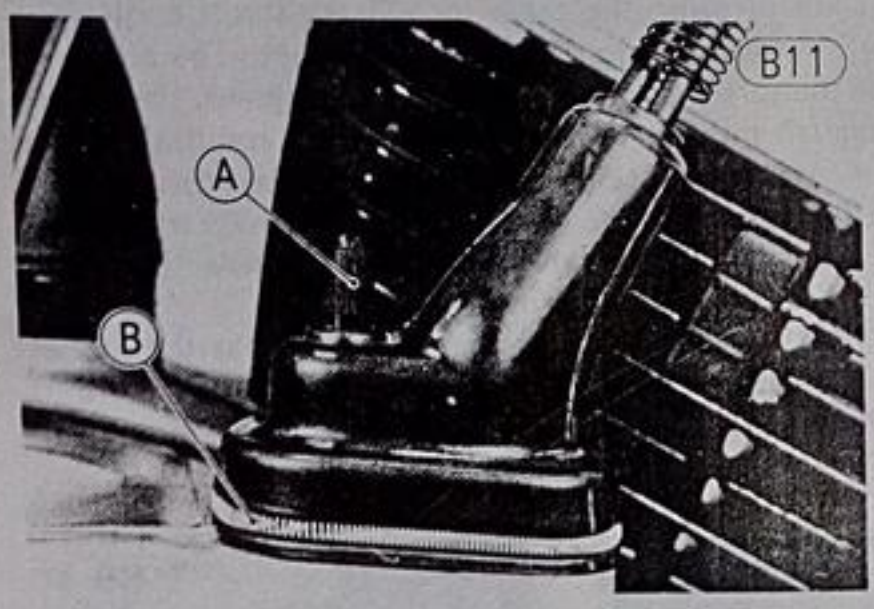


A. Idle Adjusting Screw
B. Safety Clip
C. Adjuster
D. Locknut

- Remove the safety clip from the adjuster at the lower end of the carburetor cable.
- Loosen the locknut at the lower end of the carburetor cable, and with the adjuster, eliminate the play between the cable and the throttle valve so that the slightest tug on the outer cable will affect the throttle valve. Be careful not to turn the adjuster so far that the throttle valve rises out of the zero position.
- Tighten the locknut.

•Reinstall the safety clip in the adjuster.
•Turn the idle adjusting screw out 3 or 4 turns.
•Install the carburetor cover and gasket.
•Slide back the carburetor rubber cap. Be sure that the spring band fits into its groove in the rubber cap.

NOTE: Be sure that the rubber extender fits properly on the idle adjusting screw.



A. Rubber Externder **B. Spring Band**

•Start the engine and warm it up for 5 minutes, and then adjust the idle speed (Pg. 17).

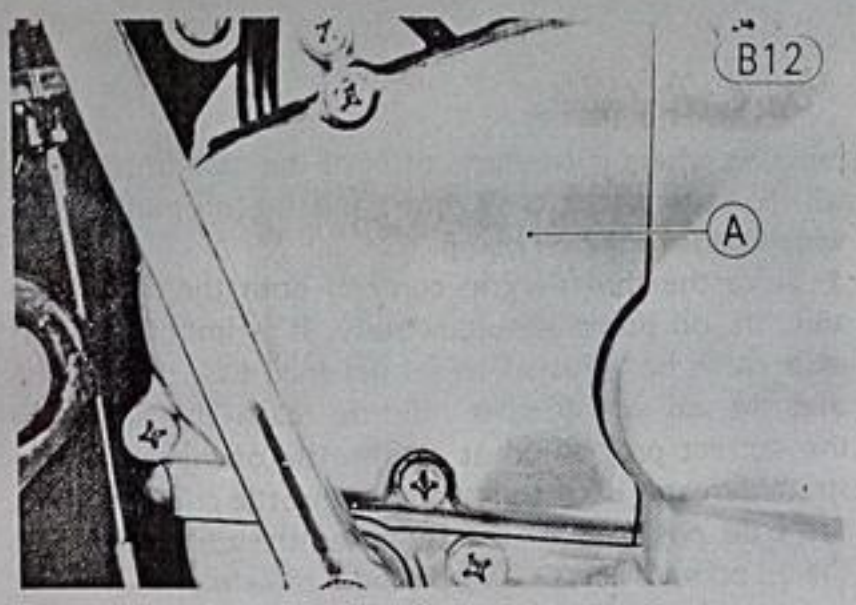
NOTE: After this adjustment has been completed, a certain amount of play will exist between the carburetor inner cable and the throttle valve, the extent of which may be detected by taking out the adjuster safety clip and pulling on the outer cable. This play, which is the proper amount for a correct oil and fuel/air mixture ratio, must not be altered. To ensure the proper ratio, the oil pump alignment marks should be checked after carburetor cable adjustment.

Oil Pump Cable

The oil pump cable forms one of the two lower branches of the throttle control cable assembly and connects to the oil pump lever. This cable must be kept adjusted so that the oil pump output which is dependent on throttle movement is minimal at zero throttle and increases from a predetermined throttle opening. This adjustment is correct when the mark on the oil pump lever lines up with the mark on the oil pump lever stop at zero throttle (Fig. B13).

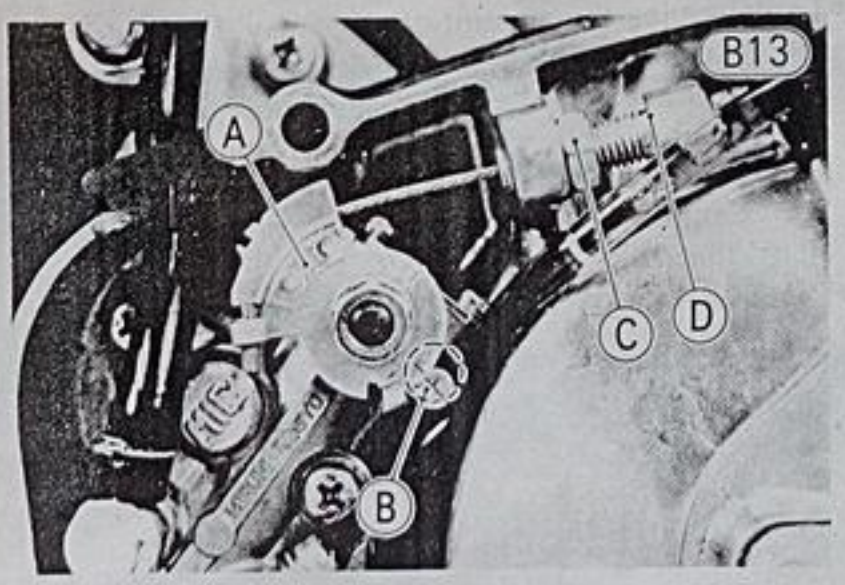
If adjustment is neglected or not carries out properly whenever necessary, the oil supply to the engine will become too low or too high, resulting in piston seizure from underlubrication or poor performance and spark plug trouble from overlubrication. The oil pump cable must be adjusted whenever the oil pump marks are found to be misaligned at zero throttle. In accordance with the Periodic Maintenance Chart (Pg. 10) and whenever white exhaust smoke is observed or oil insufficiency is suspected, check the oil pump alignment marks and adjust the oil pump cable if necessary.

•Check the idle speed (Pg. 17).
•Check that the throttle cable has the proper amount of play (Pg. 15).
•Remove the oil pump cover.



A. Oil Pump Cover

•Check to see that the mark on the oil pump lever aligns with the mark on the lever stop. If the marks are not properly aligned, loosen the cable adjuster locknut, and turn the adjuster until the marks on the oil pump lever and lever stop line up. After turning the adjuster, make sure the cable is firmly seated in the adjuster and not being held away by tension on the outer cable.



A. Oil Pump Lever **C. Locknut**
B. Lever Stop **D. Adjuster**

CAUTION **Make sure the tang on the oil pump lever is bent to hold the oil pump cable securely. If loose, the cable may slip out, resulting in piston seizure.**

•Tighten the cable adjuster locknut.
•Install the oil pump cover.

CARBURETOR

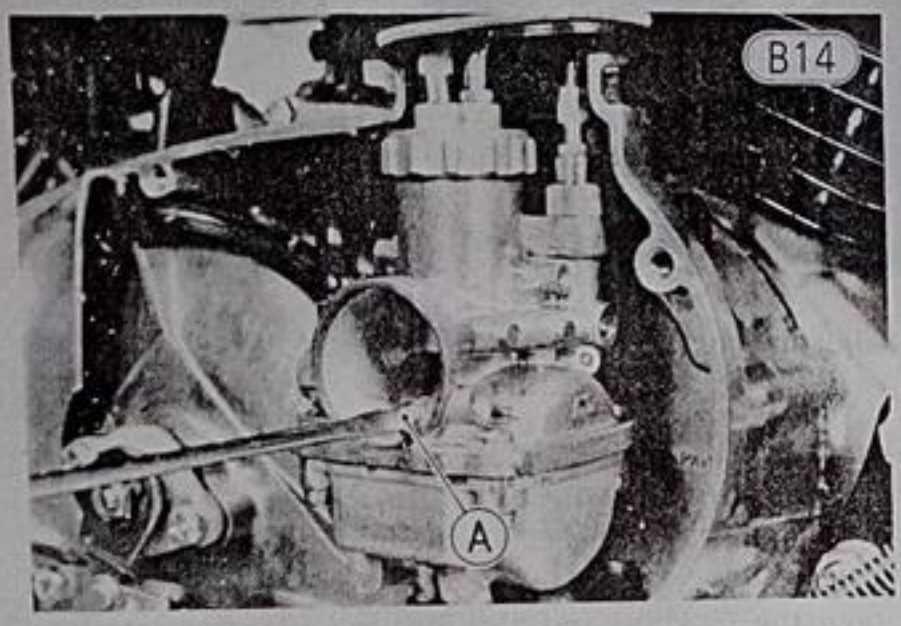
Although some internal carburetor parts can be adjusted by replacement, repositioning etc., these adjustments are covered in the Maintenance Section of this manual. The following procedure covers the idle adjustment, which is the adjustment required during periodic maintenance and whenever the idle setting has been disturbed.

When the idle speed is too low, the engine may stall, and when the idle speed is too high, the fuel consumption becomes excessive, and the resulting lack of engine braking may make the motorcycle difficult to control.

For a proper fuel/air mixture at idle and low speed, it is important to set the air screw properly when adjusting the idle speed.

NOTE: The ignition timing must be correct for proper idle adjustment (Pg. 12).

- Slide the carburetor rubber cap out of place, and remove the carburetor cover (Fig. B9).
- Screw in the air screw until it seats lightly, and then back it out 1 ¾ turns. This sets the low speed mixture.

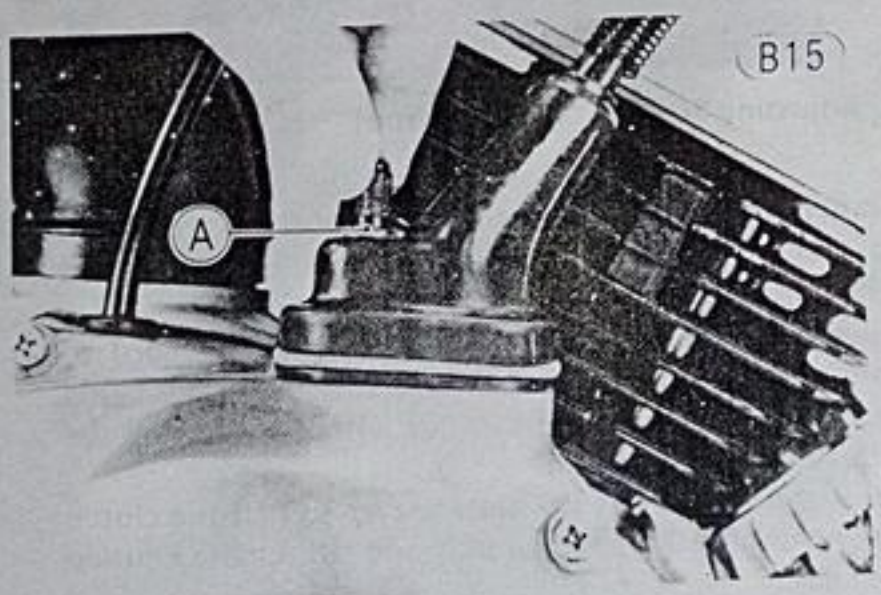


A. Air Screw

- Install the carburetor cover and gasket.
- Slide back the carburetor rubber cap. Be sure that the spring band fits into its groove in the rubber cap.

NOTE: Be sure that the rubber extender fits properly on the idle adjusting screw (Fig. B11).

- Warm up the engine for about 5 minutes.
- Adjust the idle speed with the idle adjusting screw to the lowest stable speed obtainable, which will normally be 1,300~1,400 rpm. Turning the idle adjusting screw clockwise lowers engine speed, while turning it counterclockwise raises it.



A. Idle Adjusting Screw

- Open and close the throttle a few times to make sure that the idle speed does not change. Readjust if necessary.

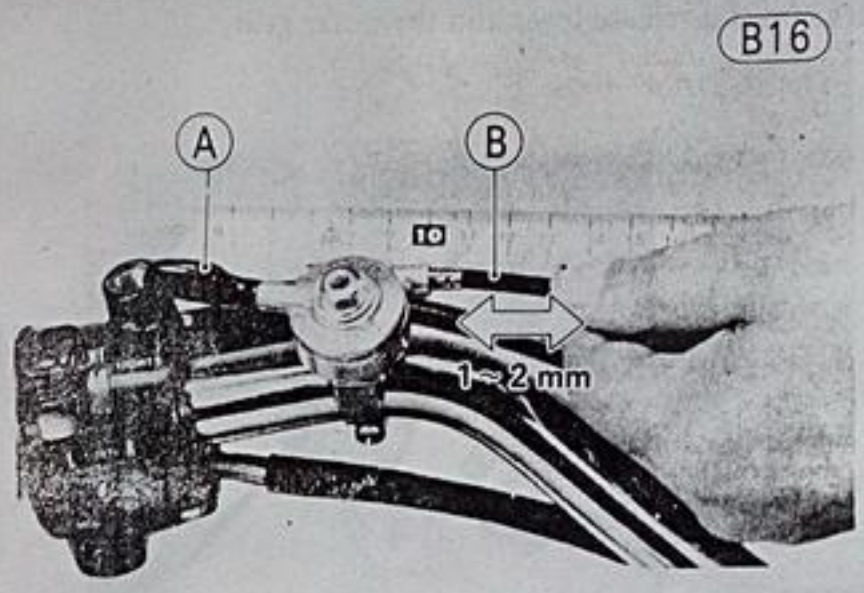
NOTE: With the engine idling, turn the handlebar to each side. If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted.

WARNING **Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.**

CHOKE CABLE

If the choke cable (more appropriately called a starter cable) is left too lose, the starter plunger may not open far enough when the choke lever is used. If the cable does not have enough play, the starter plugner may not close fully when the choke lever is returned, and the engine will always be running on too rich a mixture.

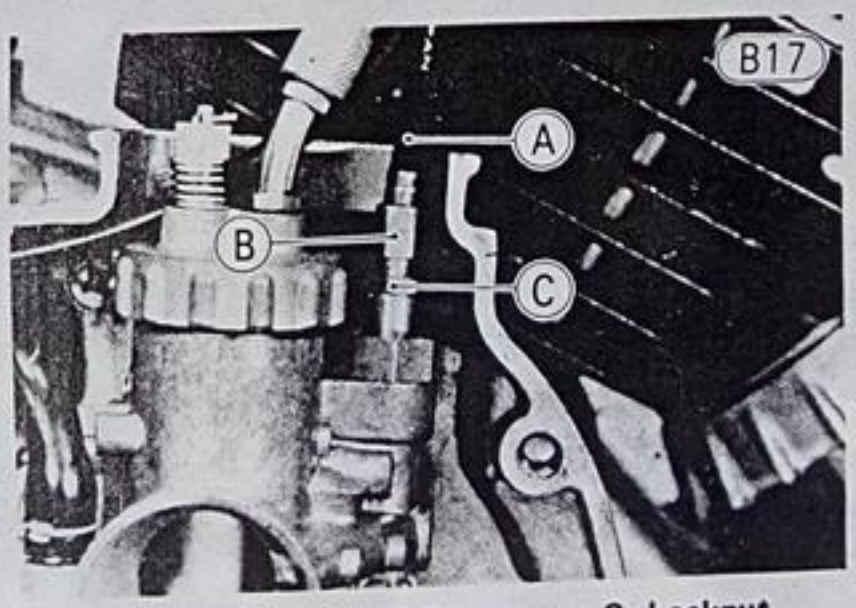
- To check the choke cable play, turn the choke lever all the way to the left. Then pull out and push in the cable. The travel of the outer cable is the choke cable play, and it should be 1~2 mm.



A. Choke Lever **B. Choke Cable**

If there is too much or too little play, adjust the cable as follows:

- Slide the carburetor rubber cap out of place, and remove the carburetor cover (Fig. B9).
- Loosen the choke cable adjuster locknut, and turn the adjuster until the cable has the proper amount of play. Tighten the locknut.



A. Choke Cable **B. Adjuster** **C. Locknut**

- Install the carburetor cover and gasket.
- Slide back the carburetor rubber cap. Be sure that the spring band fits into its groove in the rubber cap.

NOTE: Be sure that the rubber extender fits properly on the idle adjusting screw (Fig. B11).

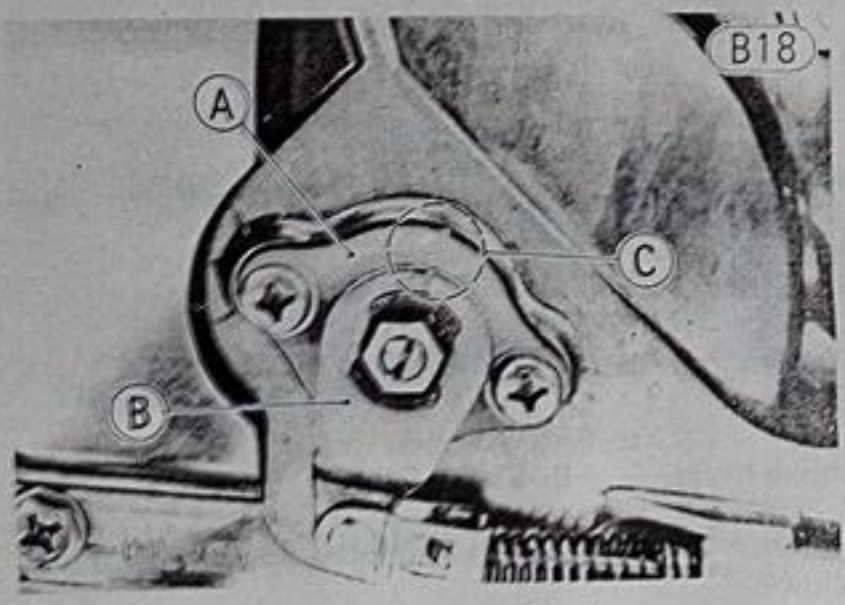
CLUTCH

Clutch cable stretch and push rod wear cause 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.

Clutch plate wear causes the play between the push rod and the adjusting screw to gradually diminish until the push rod touches the adjusting screw. When this play is lost, the clutch will not engage fully, causing it to slip.

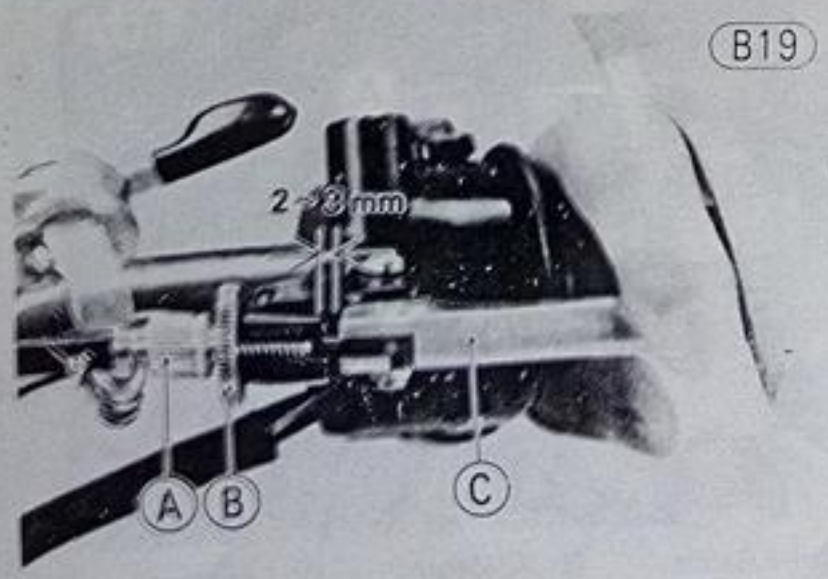
- Slide the carburetor rubber cap out of place, and remove the carburetor cover (Fig. B9).
- To determine whether or not the clutch requires adjustment, first check that the mark on the clutch release lever is aligned with the mark on the outer gear.

NOTE: The most effective stroke for disengagement is obtained by adjusting the lever position with the marks on the release lever and the outer gear.



A. Outer Gear
B. Clutch Release Lever
C. Marks

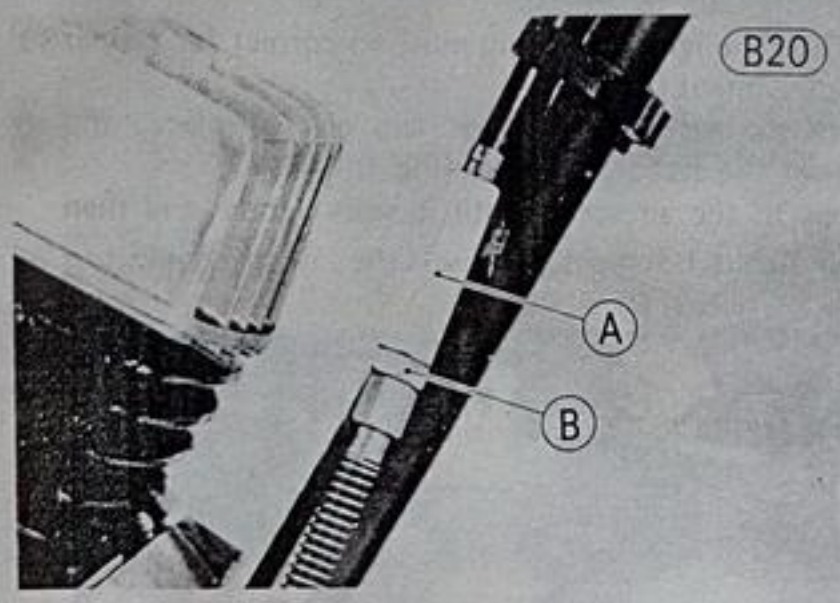
- Next check that the clutch lever has 2~3 mm of play as shown in the figure.



A. Adjuster
B. Knurled Locknut
C. Clutch Lever

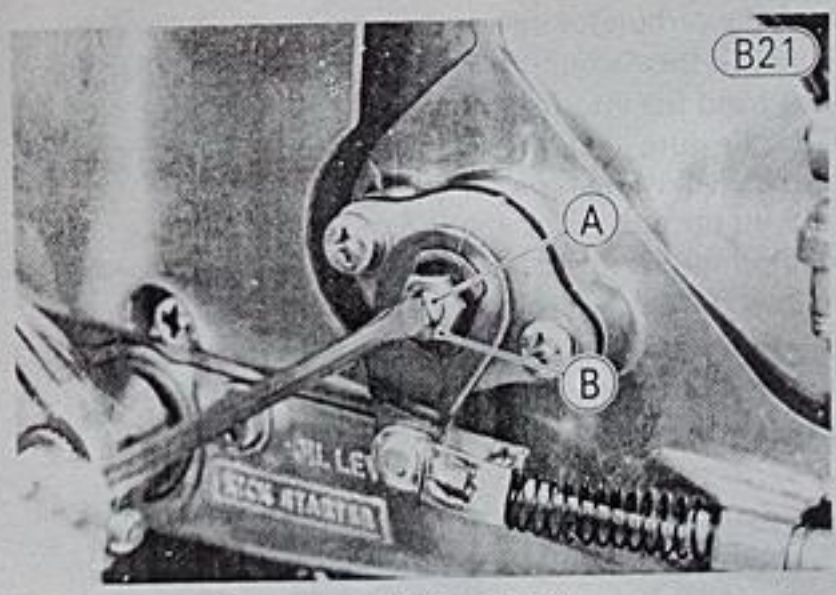
If any one of the above checks reveals improper adjustment, adjust the clutch as follows:

- Screw in fully the locknut and adjusting nut at the center of the clutch cable to give the cable plenty of play.



A. Adjusting Nut
B. Locknut

- Loosen the knurled locknut at the clutch lever just enough so that the adjuster will turn freely, and then turn the adjuster to make a 5~6 mm gap between the adjuster and locknut.
- Loosen the locknut, and back out the adjusting screw 3 or 4 turns until the screw turns without drag.



A. Adjusting Screw
B. Locknut

- Turn the adjusting nut at the center of the clutch cable so that the mark on the clutch release lever is aligned with the mark on the outer gear (Fig. B18).
- Turn the adjusting screw in until it becomes hard to turn. This is the point where the clutch is just starting to release. Tighten the locknut without changing the adjusting screw position.
- Turn the adjuster at the clutch lever so that the clutch lever will have 2~3 mm of play and tighten the knurled locknut.
- Install the carburetor cover and gasket.
- Slide back the carburetor rubber cap. Be sure that the spring band fits into its groove in the rubber cap.

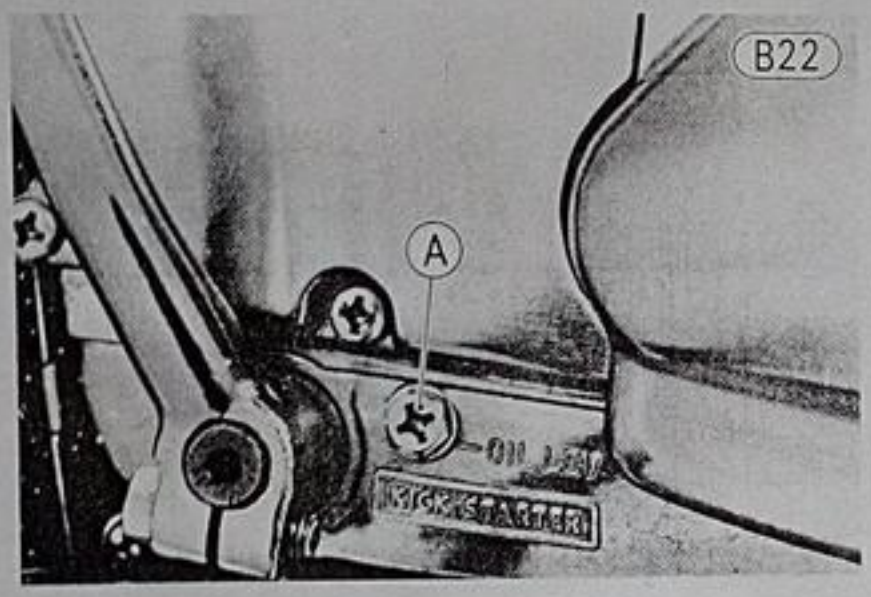
NOTE: Be sure that the rubber extender fits properly on the idle adjusting screw (Fig. B11).

TRANSMISSION OIL

To help ensure that the transmission and clutch function properly, maintain the transmission oil at the proper level, and change the oil in accordance with the Periodic Maintenance Chart (Pg. 10). Motorcycle operation with insufficient, deteriorated, or contaminated transmission oil will cause accelerated wear and may result in transmission seizure.

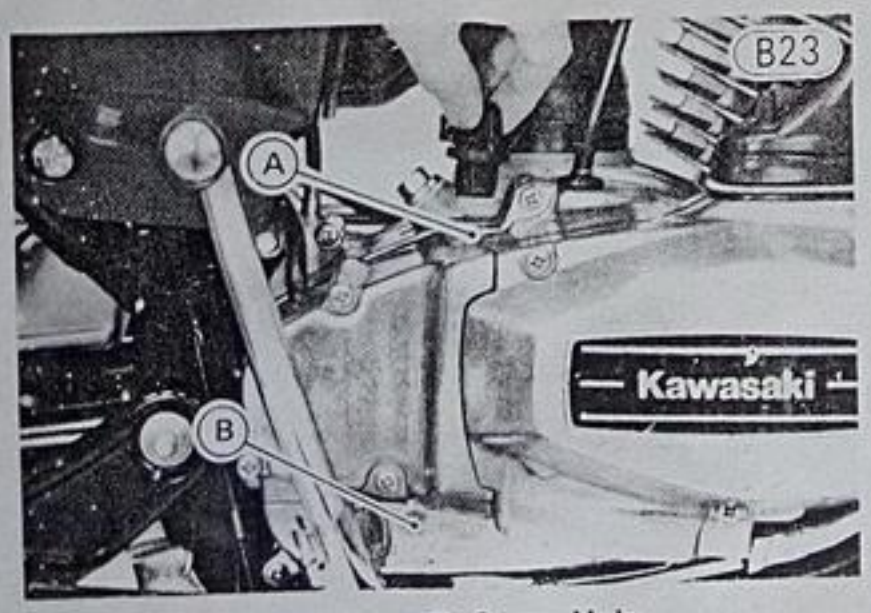
Oil Level

- Situate the motorcycle so that it is fully perpendicular to the ground (on its center stand).
- If the motorcycle has just been used, wait 2 to 3 minutes for all the oil to drain down.
- If the oil has been poured in since the motorcycle was last used, kick the motorcycle over 3 or 4 times with the ignition switch left in the off position. This ensures that the oil will "settle".
- Remove the oil level inspection screw and gasket from the lower part of the right engine cover.



A. Oil Level Inspection Screw

- The quantity of oil is correct when the oil is level with the inspection hole.
- If there is too much oil, remove the excess oil using a syringe or some other suitabel device.
- If no oil comes out, add oil slowly through the oil filler opening until the level is up to the screw hole. Fill using the same type and make of oil that already is in the transmission.

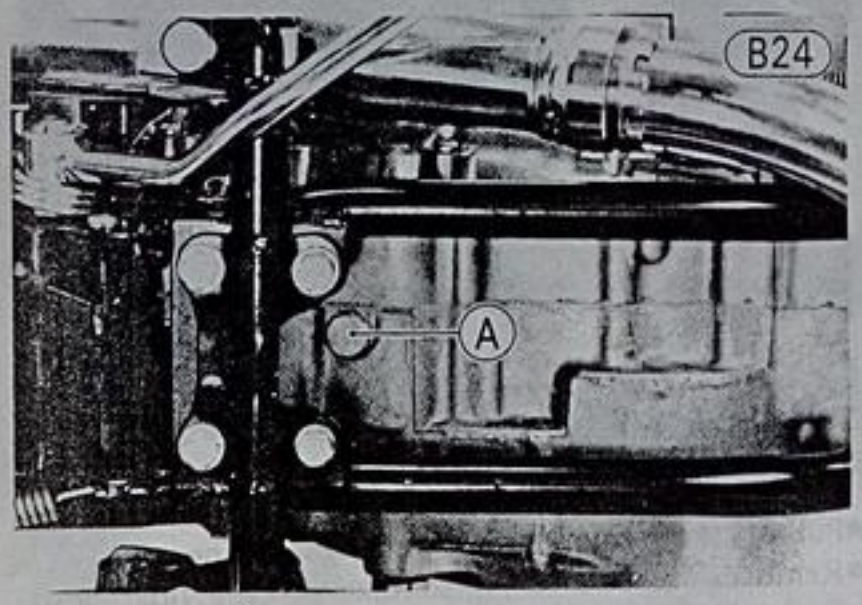


A. Oil Filler Opening B. Screw Hole

- Install the oil level inspection screw and gasket.
- Install the oil filler opening plug.

Oil Change

- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily.
- Stop the engine.
- With the motorcycle fully perpendicular to the ground, place an oil pan beneath the engine, and remove the engine drain plug so that all the transmission oil drains out.



A. Engine Drain Plug

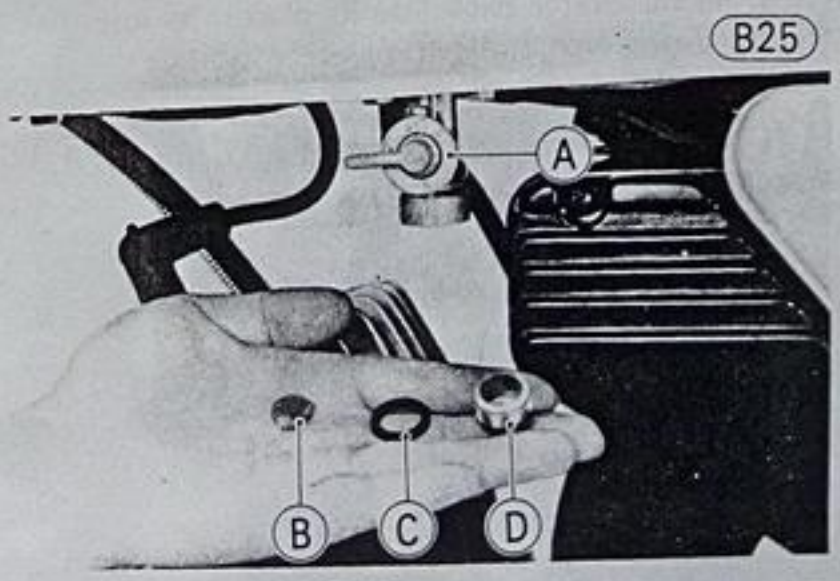
- After the oil has completely drained out, install the engine drain plug and a new aluminum washer. Proper torque for the engine drain plug is 2.0 kg-m (14.5 ft-
- Pour 0.6 ℓ of good quality SAE 10W30 or 10W40 motor oil into the filler opening.
- Install the oil filler opening plug.

FUEL SYSTEM

Water or dirt anywhere in the fuel system can cause starting difficulty, poor running, and lack of power.

Clean out the fuel system as follows:

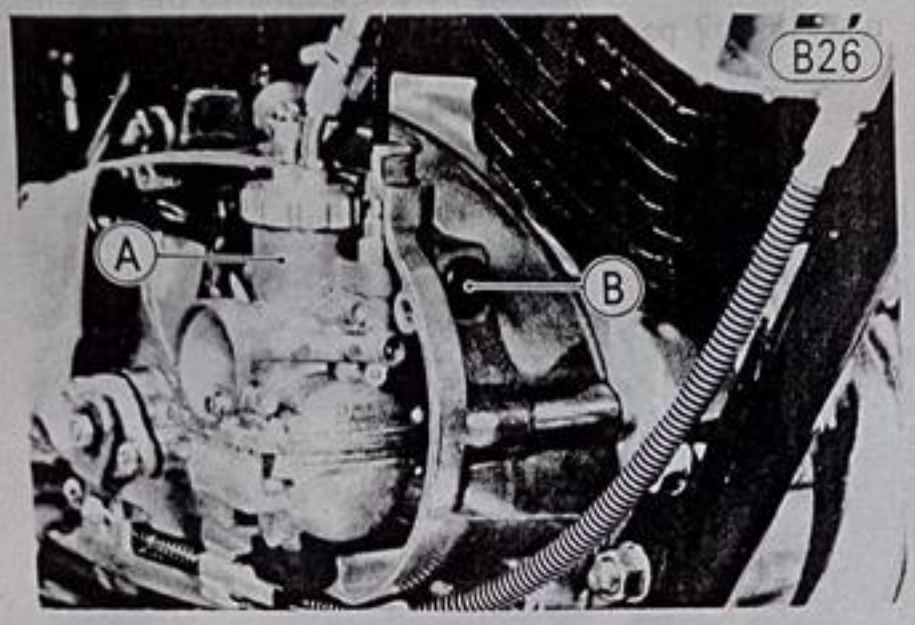
- Turn the fuel tap to the "OFF" position. Unscrew the sediment cup at the bottom of the tap, and clean out the water or dirt from it. Clean any dirt out of the fuel tap filter.



A. Fuel Tap
B. Filter
C. Gasket
D. Sediment Cup

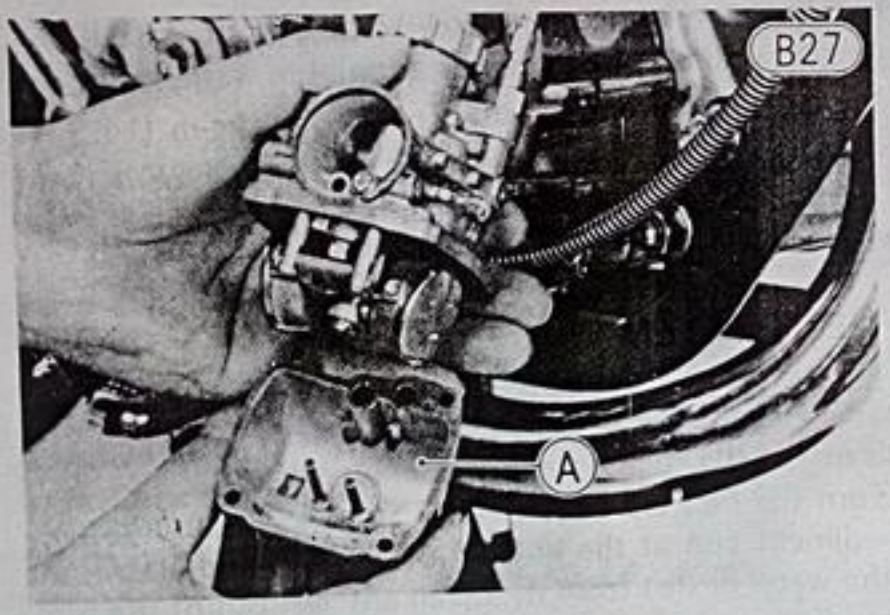
- If there was water inside the sediment cup, there may also be some in the fuel tank. Holding a container under the fuel tap, turn the tap to the reserve position to drain the tank until only gasoline comes out, and then close the tap.

- Install the gasket and the sediment cup. Make sure that the gasket is in the tap and that the filter is not damaged during installation.
- Slide the rubber cap out of place, and remove the carburetor cover and gasket (Fig. B9).
- Remove the rubber plug from the front of the right engine cover, and loosen the carburetor mounting bolt.



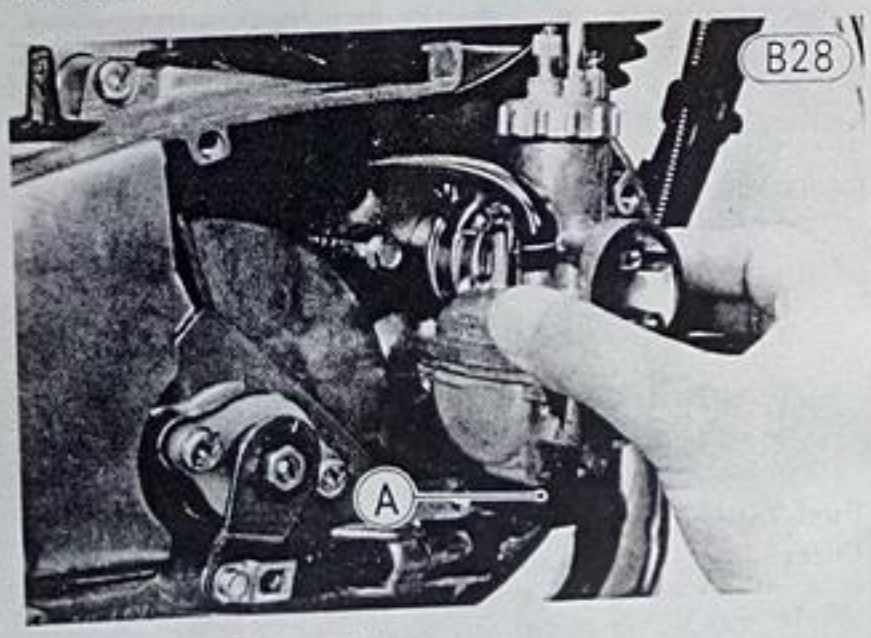
A. Carburetor B. Rubber Plug

- Pull off the carburetor from the right engine cover.
- Remove the screws (4) to take off the float bowl. Drain the fuel, and clean out any sediment.



A. Float Bowl

- Press the carburetor back into its place. Be sure that the overflow grommet fits into place.



A. Overflow Grommet

- Tighten the carburetor mounting bolt, and install the rubber plug in the front of the right engine cover.
- Install the carburetor cover and gasket.
- Slide back the carburetor rubber cap. Be sure that the spring band fits into its groove in the rubber cap.

NOTE: Be sure that the rubber extender fits properly on the idle adjusting screw (Fig. B11).

Adjustment – Chassis

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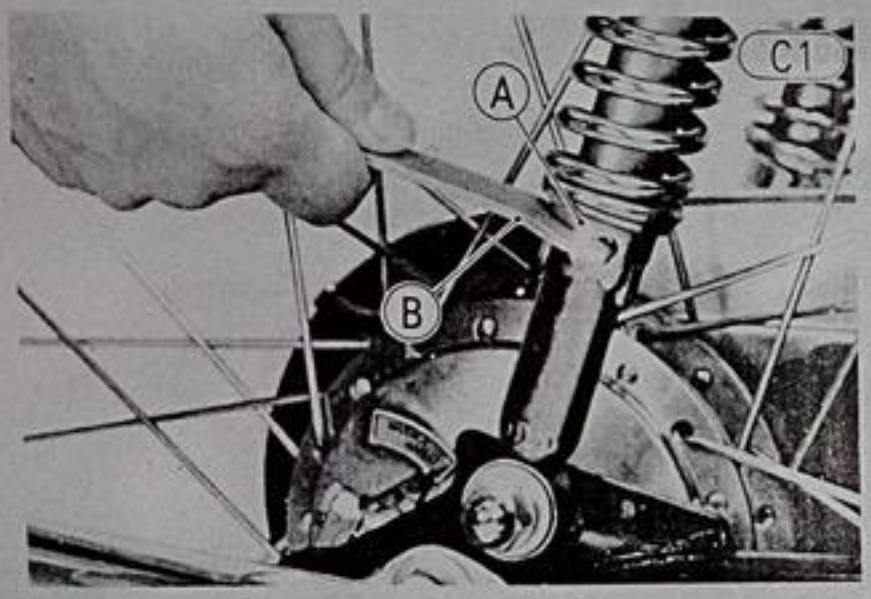
REAR SHOCK ABSORBERS

The rear shock absorbers can be adjusted to one of five positions to suit riding conditions. They can be left soft for average riding but should be adjusted harder for high speed riding, or riding with a passenger. Shock absorbers adjusted either too soft or too hard adversely affect riding comfort and stability.

To adjust the rear shock absorbers:

- Turn the adjusting sleeve on each shock absorber to the desired position with a hook spanner. The higher the adjusting sleeve is positioned, the stronger the spring tension, and the harder the ride.



A. Adjusting Sleeve B. Hook Spanner

- Check to see that both adjusting sleeves are turned to the same relative position.

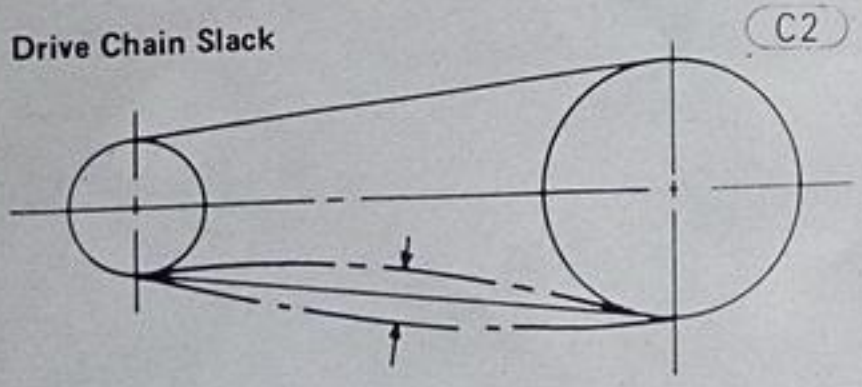
WARNING **If the shock absorber sleeves are not adjusted to the same position, an unsafe riding condition may result.**

DRIVE CHAIN

Chain and sprocket wear causes the chain to loosen, which results in power loss, accelerated chain and sprocket wear, and increased noise. A chain that has been adjusted too loose may be thrown off the sprockets. A chain that has been adjusted too tight will wear excessively and possibly break.

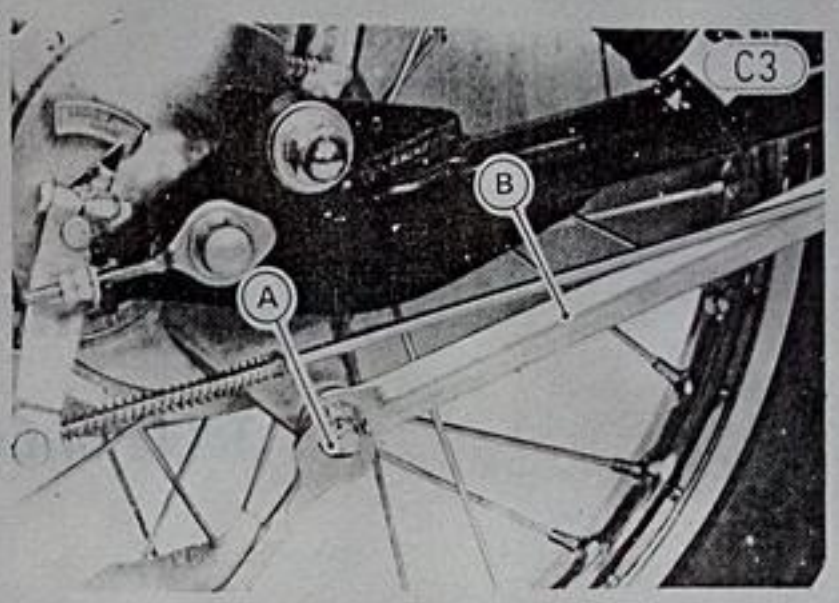
- To determine whether or not the chain requires adjustment, first set the motorcycle up on its center stand.
- Remove the rubber cap from the lower chain cover. Rotate the rear wheel to find the position where the chain is tightest, and measure the vertical movement. If it is less than 15 mm or more than 25 mm, adjust the chain so that the vertical movement will be about 15~20 mm.

Drive Chain Slack



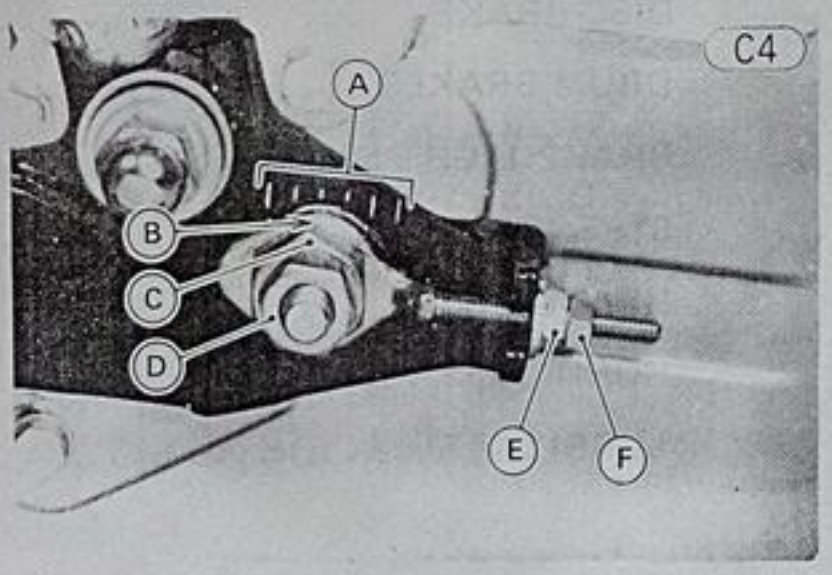
WARNING **A chain worn past the service limit (Pg. 125) must be replaced. Such wear cannot be adequately compensated for by adjustment.**

- Loosen the nut at the rear end of the torque link. It is not necessary to remove the safety clip.



A. Nut B. Torque Link

- Loosen the left and right chain adjuster locknuts.
- Loosen the axle nut and sleeve nut.



A. Marks B. Notch C. Sleeve Nut
D. Axle Nut E. Adjusting Nut F. Locknut

- If the chain is too tight, loosen the left and right chain adjusting nuts evenly, and kick the wheel forward until the chain is too loose.
- Turn the left and right chain adjusting nuts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel aligned, the notch on the left chain adjuster should align with the same swing arm mark with which the right chain adjuster notch aligns.

NOTE: Wheel alignment can also be checked using the straightedge or string method.

WARNING **Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition.**

- Tighten both chain adjuster locknuts (Make sure the axle stays aligned).

○In case of the drum brake type, center the brake panel assembly in the brake drum. This is done by tightening the axle lightly, spinning the wheel, and depressing the brake pedal forcefully. The partially tightened axle allows the brake panel assembly to center itself within the brake drum.

NOTE: This procedure can prevent a soft, or "spongy feeling" brake.

- Tighten the axle nut to 3.1 kg-m (22 ft-lbs) of torque.
- Rotate the wheel, measure the amount of slack at the tightest position and readjust if necessary.
- Install the rubber cap into the lower chain cover.
- Tighten the torque link rear nut to 3.1 kg-m (22 ft-lbs) of torque.
- Check the rear brake and rear brake light switch adjustment.

DISC BRAKE

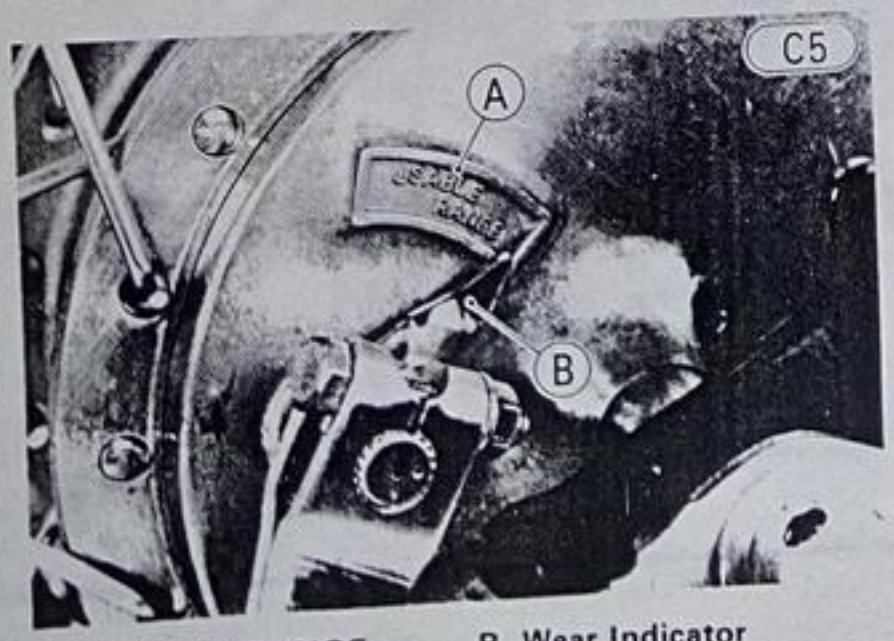
Disc and disc pad wear is automatically compensated for and has no effect on the brake lever action. So there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (Pg. 117)

DRUM BRAKES

Brake lining and drum wear, and front brake cable stretch cause the brakes to go out of adjustment, increasing lever and pedal play and decreasing braking effectiveness. Brake adjustment to compensate for this actually consists of correcting the cam lever angle, and adjusting the front brake lever and rear brake pedal travel.

If brake drag is detected during brake adjustment, disassemble the brake (Pg. 80 or 84) and inspect for wear or damage (Pg. 120). Also, if the brake lever or pedal does not return to its rest position quickly upon release, inspect the brake for wear or damage. If the brake has a soft, or "spongy feeling", make sure the brake panel is properly centered.

On the outside of each the front and rear brake panels there is a brake lining wear indicator. Whenever the indicator has gone past USABLE RANGE, the brake shoes must be immediately replaced and the other brake parts examined. Adjustment alone cannot compensate for the wear of a brake worn past USABLE RANGE.

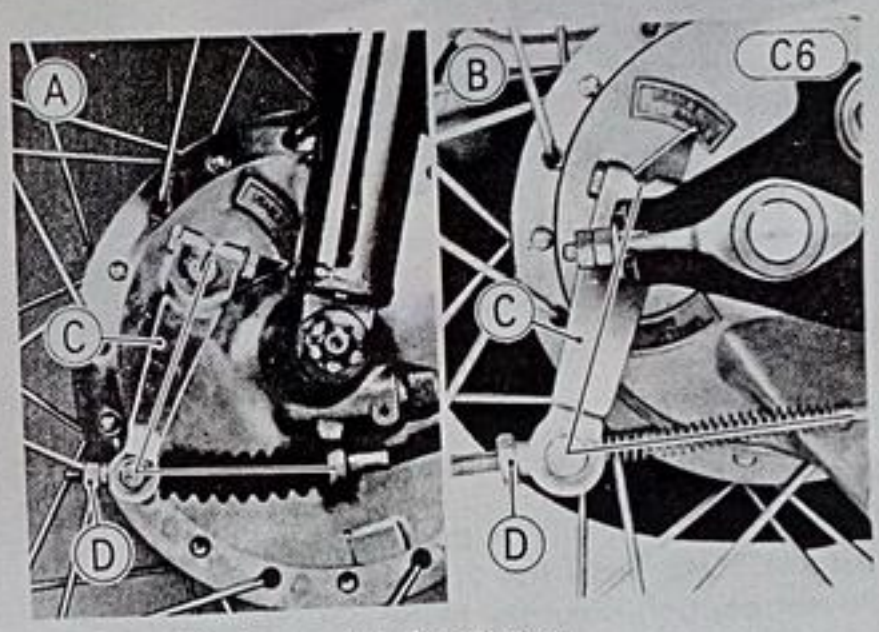


A. USABLE RANGE B. Wear Indicator

Front and Rear Brake Cam Lever Angle

- When the brake is fully applied, the brake cam lever should come to an 80 ~ 90° angle with the threaded portion of the brake cable or brake rod. If it does not, remove the adjusting nut, and free the cable or rod from the cam lever. Remount the cam lever at a new position on the cam shaft for the proper angle.

WARNING **Since a cam lever angle greater than 90° reduces braking effectiveness, this adjustment should not be neglected. When remounting the cam lever, be sure that the position of the indicator on the serrated shaft is not altered. See Pgs. 84, 91 for detailed information on the position of the wear indicator when the cam lever is not on the shaft. A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper lever or pedal operation, taking particular note of the brake lining wear indicator position. If you feel that the brakes may not work properly, disassemble and inspect all internal brake parts. Worn parts could cause the brake to lock or fail.**



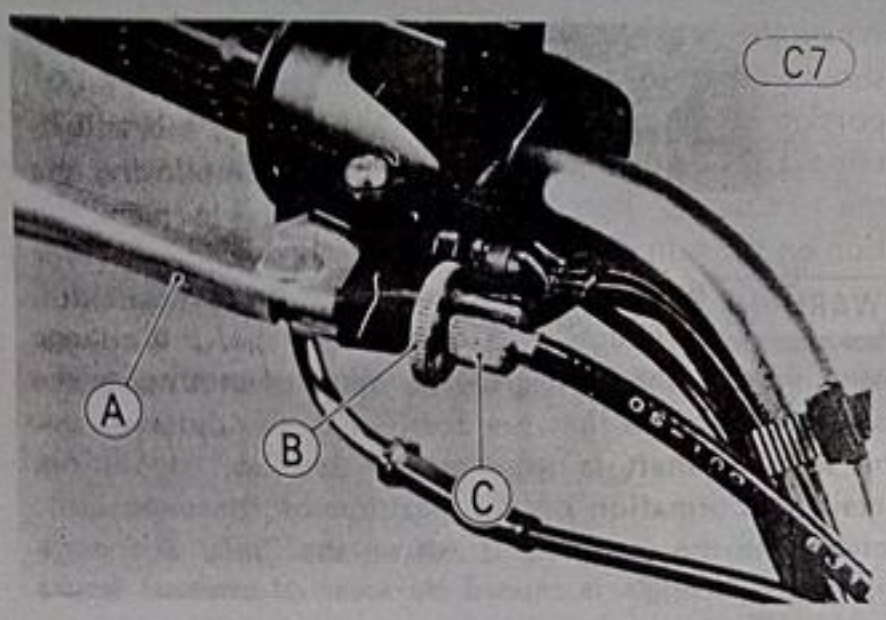
A. Front Brake B. Rear Brake C. Cam Lever D. Adjusting Nut

- Fit the cable joint to the cam lever, and insert the threaded portion of the brake cable or rod.
- Install the adjusting nut.
- Rotate the wheel to check for brake drag.
- Operate the brake lever or pedal a few times to see that it returns to its rest position immediately upon release.
- Adjust the front brake lever, rear brake pedal travel and reat brake light switch.

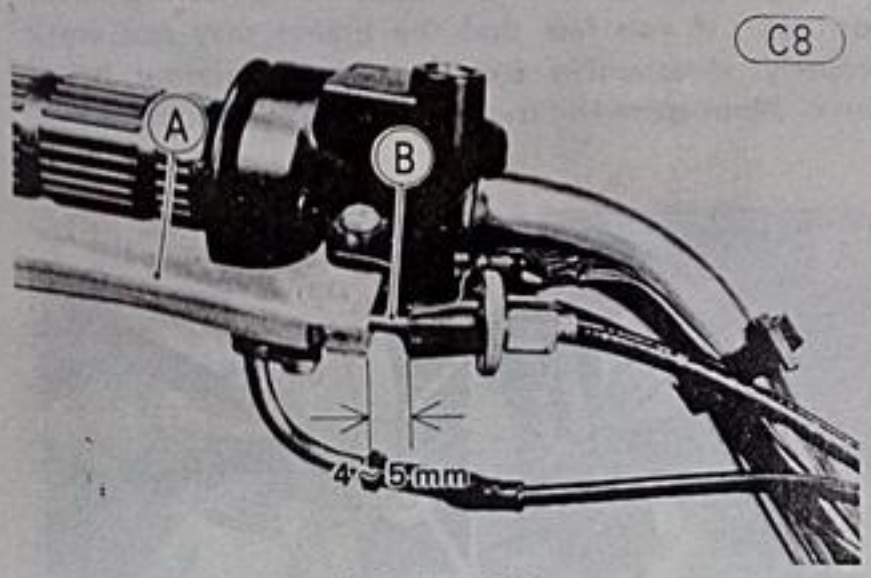
Front Brake Lever

- Loosen the knurled locknut at the front brake lever, turn the adjuster fully in, and tighten the locknut.
- Turn the adjusting nut on the lower end of the front brake cable so that the brake lever will have 4 ~ 5 mm of play as shown in the figure.

•Check for brake drag.
•Operate the lever a few times to see that it returns to its rest position immediately upon release.
•For minor corrections, use the adjuster at the front brake lever.



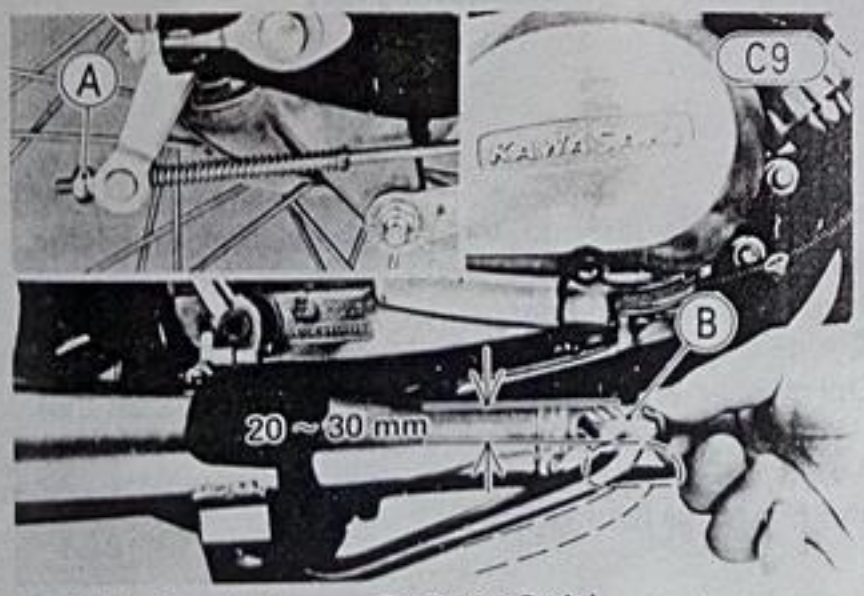
A. Front Brake Lever
B. Knurled Locknut
C. Adjuster



A. Brake Lever
B. Brake Cable

Rear Brake Pedal

•Turn the adjusting nut on the end of the brake rod so that the brake pedal has 20 ~ 30 mm of travel from the rest position when the brake pedal is pushed down lightly by hand.



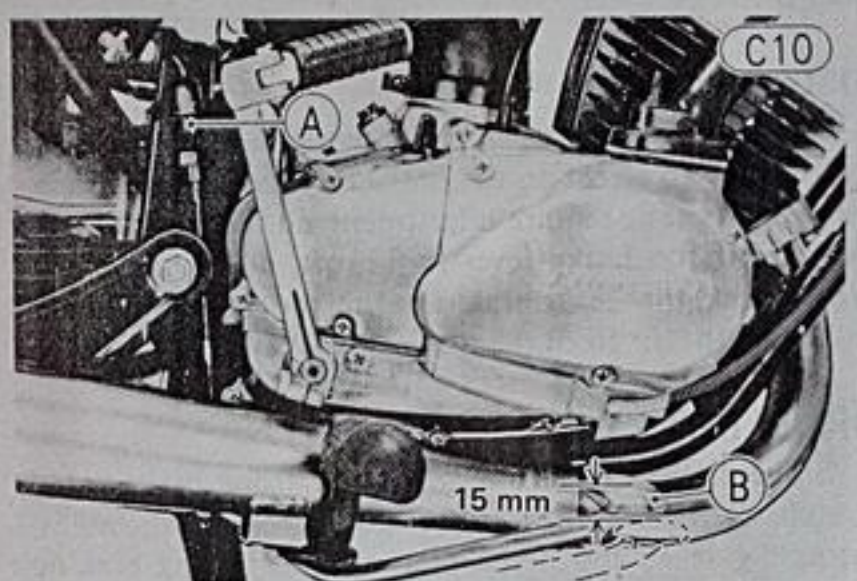
A. Adjusting Nut
B. Brake Pedal

•Rotate the rear wheel to check for brake drag.
•Operate the pedal a few times to see that it returns to its rest position immediately upon release.

•Check the rear brake light switch operation.

BRAKE LIGHT SWITCHES

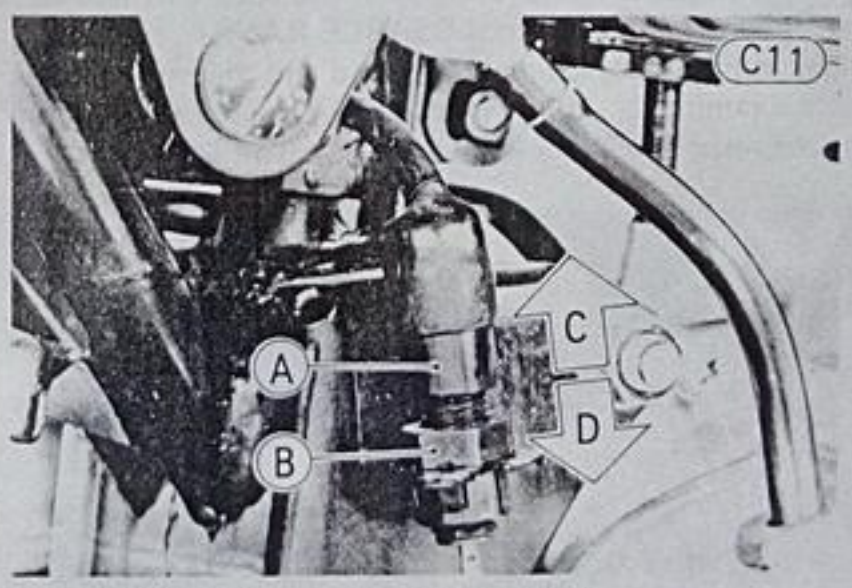
The front brake light switch, mounted on the front brake lever holder, is operated by simple electrical contact and should not need adjustment. However, the rear brake light switch, activated by a spring attached to the brake pedal, requires periodic adjustment to compensate for any change in spring tension or brake adjustment.
•Check the operation of the switch by turning on the ignition switch and depressing the brake pedal. The brake light should go on after 15 mm of pedal travel.



A. Rear Brake Light Switch
B. Brake Pedal

•Adjust the switch so that the brake light will go on after the proper amount of brake pedal travel. Raising the switch will make the light go on after less travel; lowering it will require more travel. Adjustment is made by altering the position of the adjusting nut on the brake switch body.

CAUTION **To avoid damaging the electrical connections inside the switch, do not turn the switch body during adjustment.**



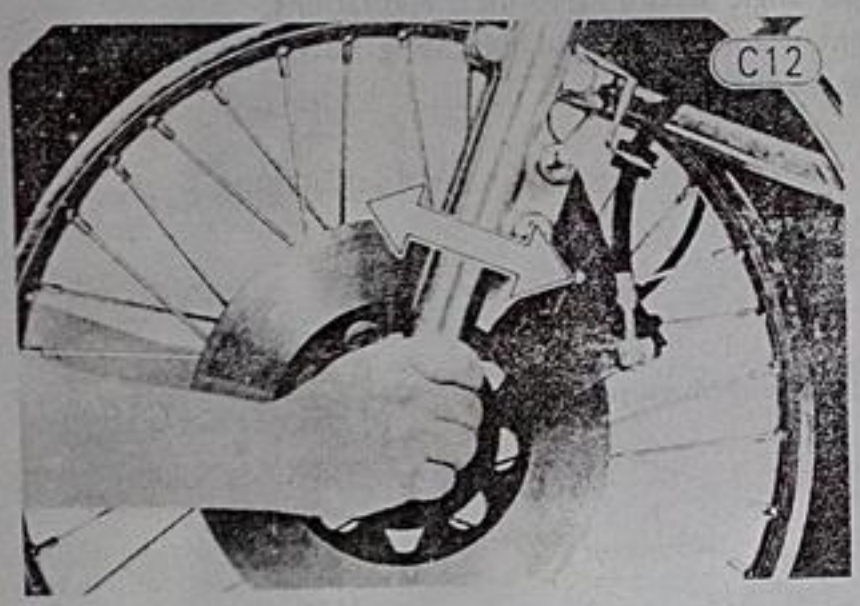
A. Switch Body
B. Adjusting Nut
C. Lights sooner.
D. Lights later.

STEERING

For safety, the steering should always be kept adjusted so that the handlebar will turn freely but has no play.

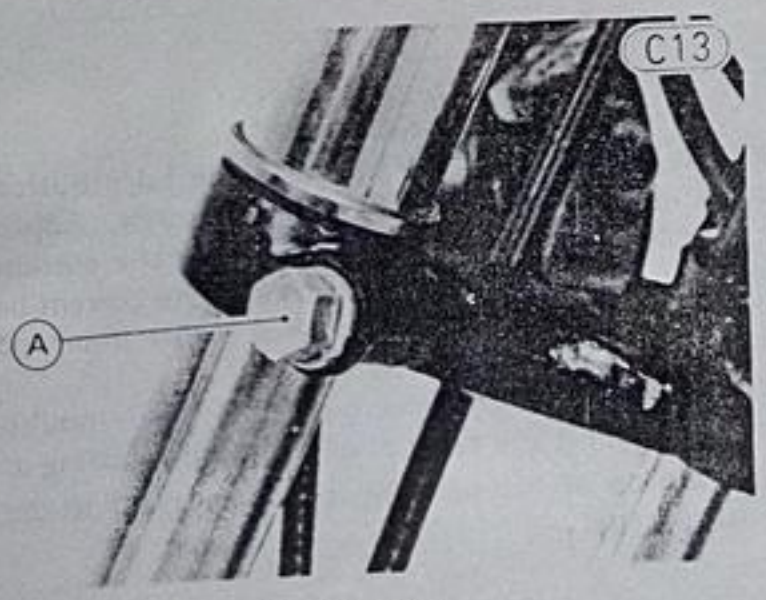
If the steering is too tight; it will be difficult to turn the handlebar quickly, the motorcycle may pull to one side, and the steering stem bearings may become damaged. If the steering is too loose; the handlebar will vibrate and the motorcycle will be unstable and difficult to steer in a straight line.

- 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 handlebar lightly to either side; if it continues moving under its 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 push and pull the fork end back and forth; if play is felt, the steering is too loose.



To adjust the steering:

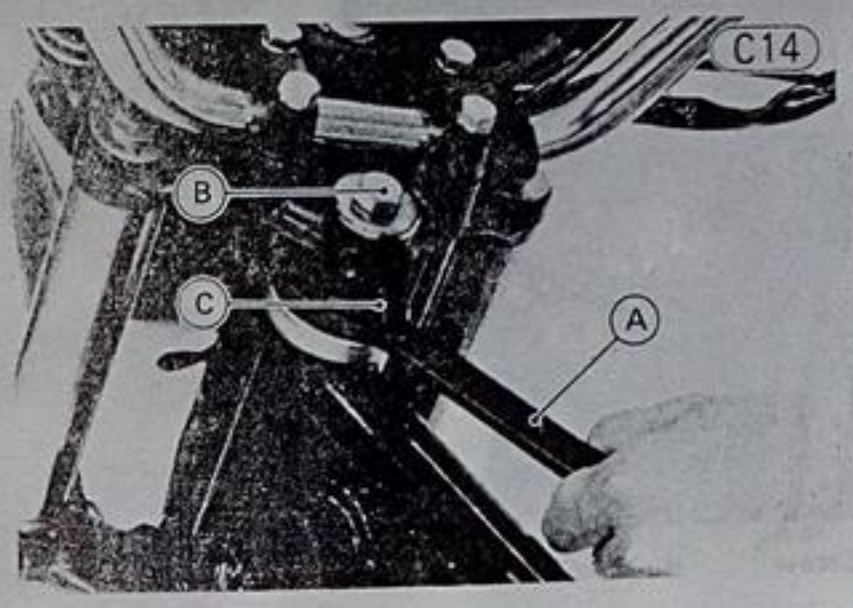
- Put the motorcycle up on its center stand, and jack or prop up the engine so that the front wheel is off the ground.
- Remove the fuel tank to avoid damaging the painted surface.
- Loosen the front fork lower clamp bolts (2) to free the fork tubes from the steering stem during adjustment.



A. Front Fork Lower Clamp Bolts

- Loosen the steering stem head bolt, and back out the steering stem locknut using the stem nut wrench (special tool) 1 or 2 turns until it turns without drag.

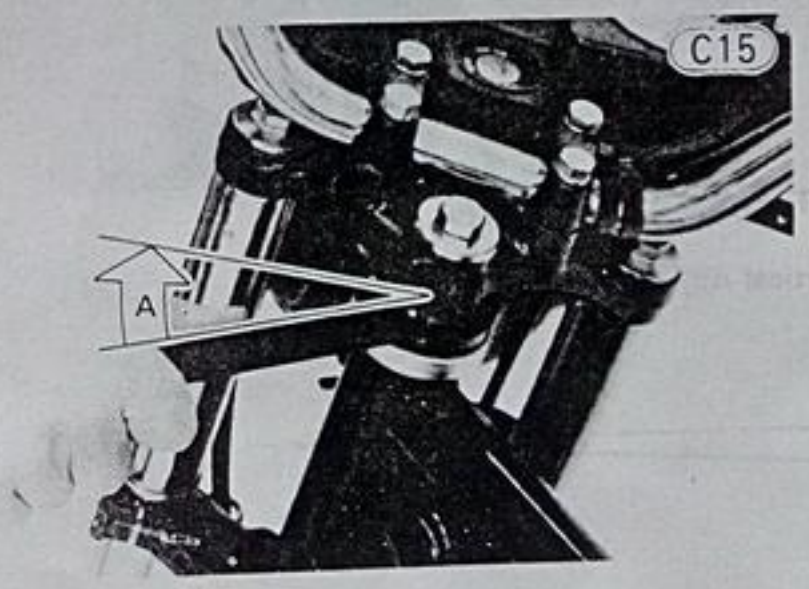
NOTE: Do not back off the steering stem locknut more than a couple of turns. If the stem locknut is loosened too much, it may upset the steering stem bearing ball arrangement, and the steering stem may need to be removal and installed to correct the situation.



A. Stem Nut Wrench (57001-1100)
B. Stem Head Bolt
C. Stem Locknut

- Tighten the stem locknut to 2.0 kg-m (14.5 ft-lbs) of torque.

NOTE: If a suitable torque wrench is not available, torque the steering stem locknut by the following procedure. Tighten the steering stem locknut lightly, turning it until it just becomes hard to turn, and then continue for another 1/16 turn (about 20° travel) from that point as shown in Fig. C15.



A. Another 1/16 Turn

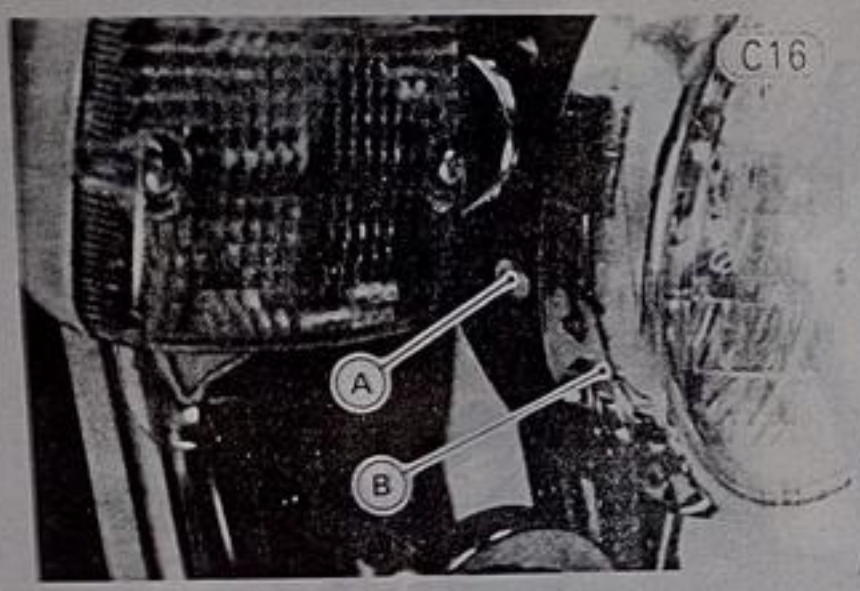
- Tighten the steering stem head bolt to 2.8 kg-m (20 ft-lbs) of torque.
- Tighten the lower clamp bolts (2) with 2.0 kg-m (14.5 ft-lbs) of torque.
- Check the steering again. If the steering is too tight or too loose in spite of correct adjustment, inspect the steering stem parts according to the maintenance section (Pg. 121).

•Remount the fuel tank.

HEADLIGHT

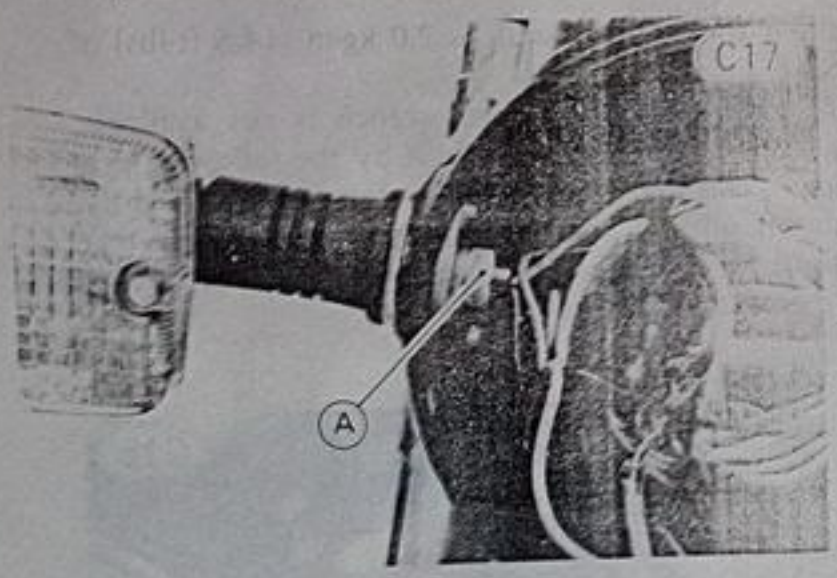
The headlight beam is adjustable vertically. If adjusted too low, neither the low nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam won't illuminate the road close ahead, and the low beam will dazzle oncoming drivers.

•Remove the screw from the right side of the headlight housing, and drop out the headlight unit.



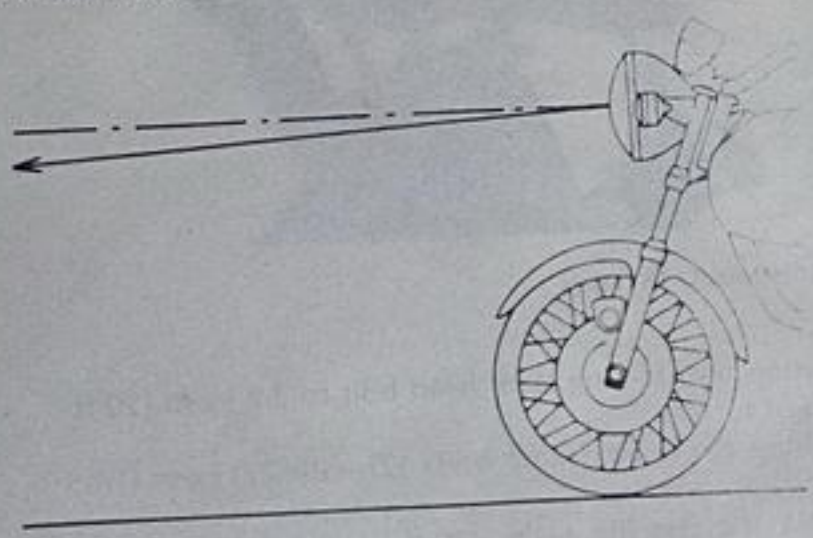
A. Screw **B. Headlight Unit**

•Loosen the turn signal mounting nuts, and adjust the headlight vertically.



A. Turn Signal Mounting Nut

Vertical Adjustment (C18)



•Tighten the turn signal mounting nuts, and remount the headlight unit.

HORN

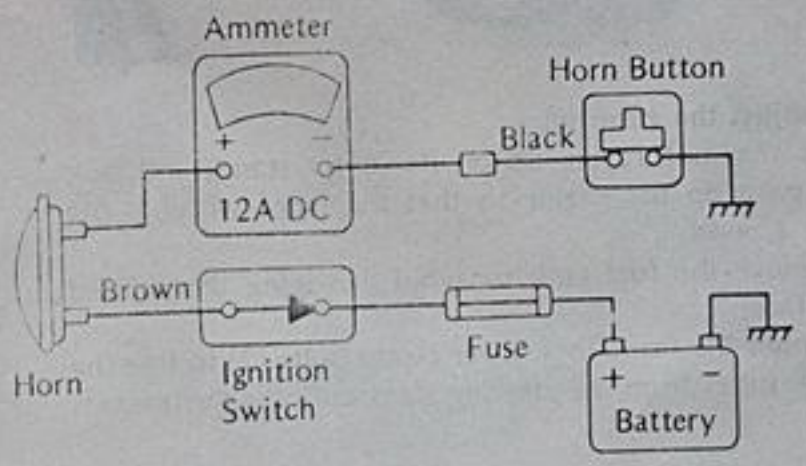
The horn contacts wear down after long use and may need to be adjusted from time to time. Turning in the adjusting screw compensates for contact wear. If satisfactory horn performance cannot be obtained by this adjustment when the rest of the electrical system is functioning properly, the horn must be replaced. It cannot be disassembled.

CAUTION **Do not turn the adjusting screw in too far, since doing so will increase horn current with the possibility of burning out the horn coil.**

•Disconnect the black horn lead from the horn terminal, and connect an ammeter in series to the horn circuit. The + ammeter lead goes to the horn terminal and the – ammeter lead goes to the black lead as shown in Fig. C19.

NOTE: On high beam, the brightest point should be slightly below horizontal. Adjust the headlight to the proper angle according to local regulations.

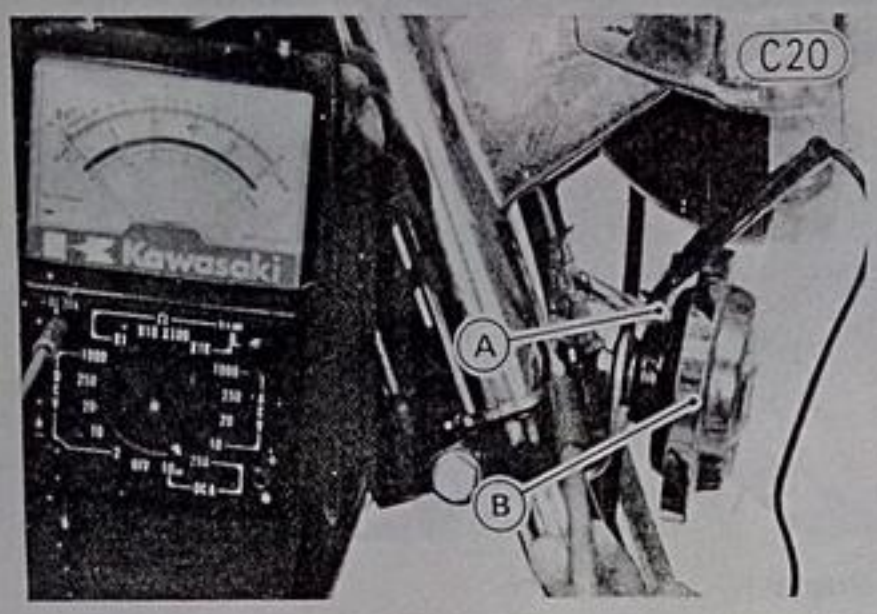
Horn Current Measurement (C19)



•Turn on the ignition key, and keep the horn button pressed while turning the horn adjusting screw. Adjust for a healthy horn sound while keeping the current under 3.0 amperes. In no event should the current be allowed to exceed 3.0 ampers since at higher amperage the horn life is seriously shortened.

NOTE: The horn will not sound properly if it is mounted incorrectly or if any cable or other part is touching it.

•Apply a drop of non-permanent locking agent to the adjusting scerw.

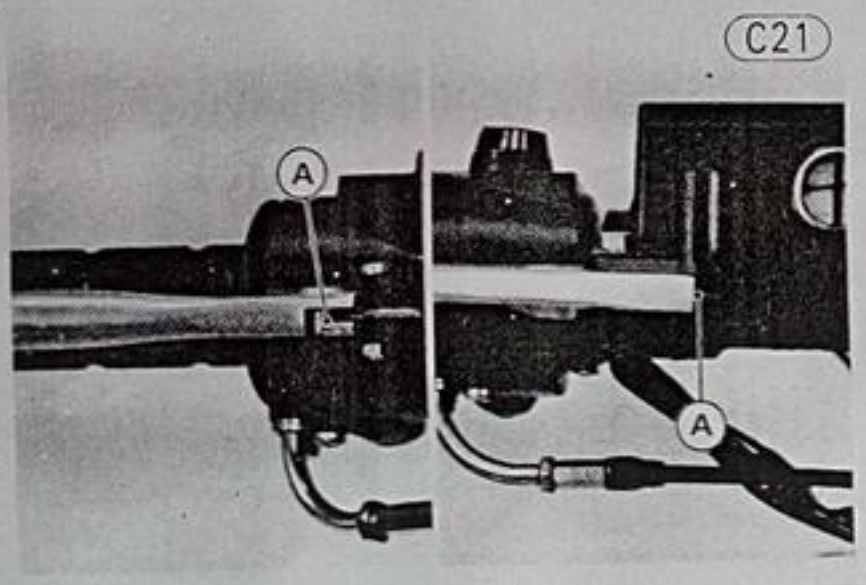


A. Adjusting Screw B. Horn

LUBRICATION

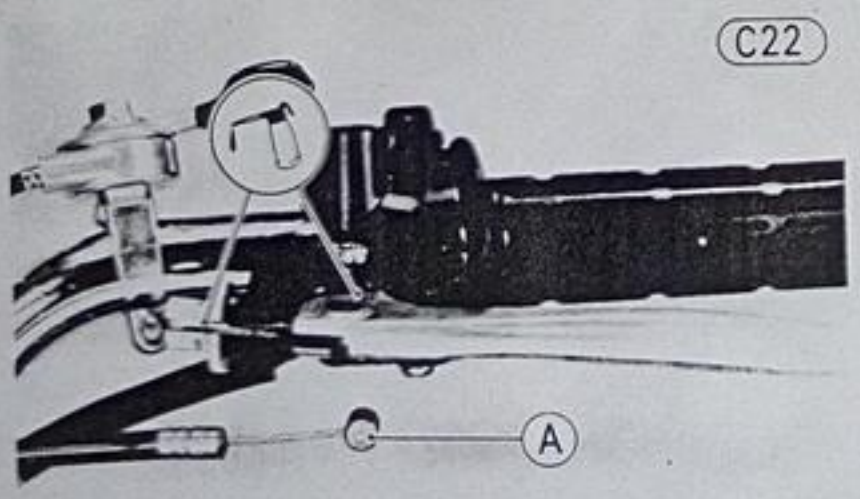
Lubricate exposed parts which are subject to rust, with either motor oil or regular grease whenever the vehicle has been operated under wet or rainy conditions, and especially after using a high-pressure spray washer. Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.

Brake Lever



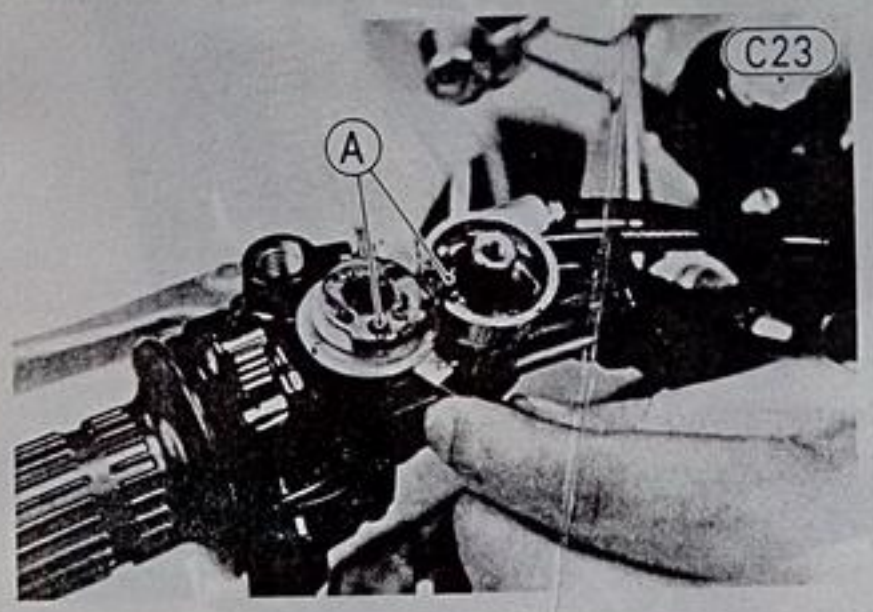
A. Grease

Clutch Lever



A. Grease

Choke Lever

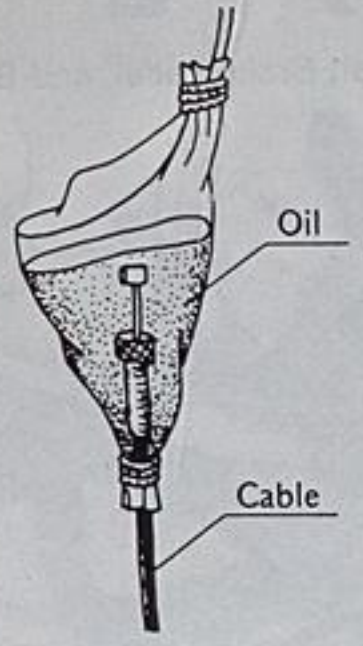


A. Grease

Clutch, Throttle, Brake, and Choke Cables

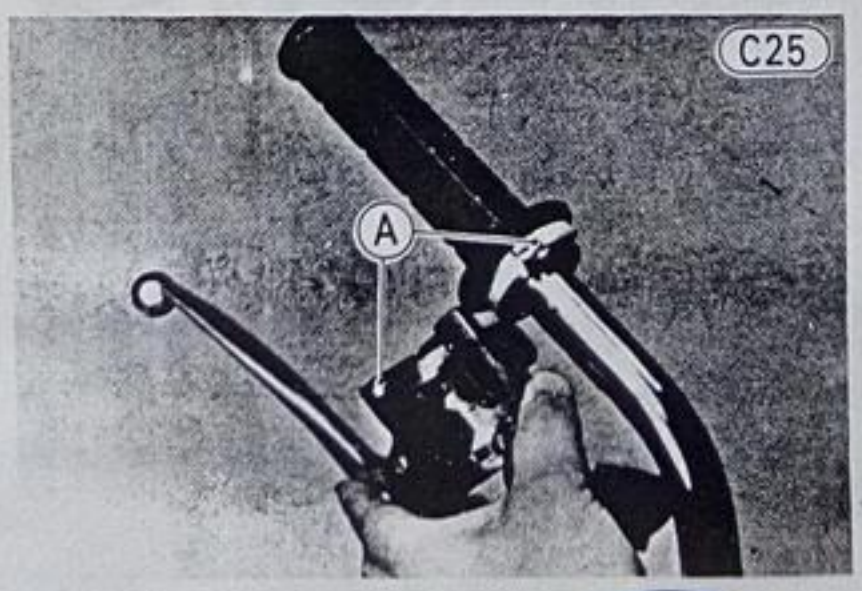
Lubricate the clutch cable, throttle cable, brake cable, and choke cable as shown in Fig. C24.

Cable Lubrication C24



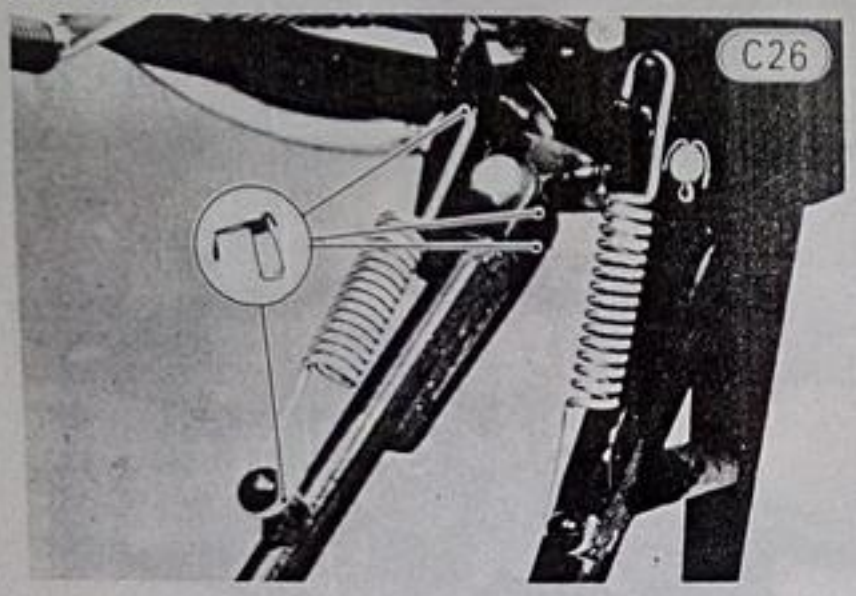
Throttle Grip

Apply a light coat of grease to the exposed portion of the throttle inner cable and the catch in the throttle grip.

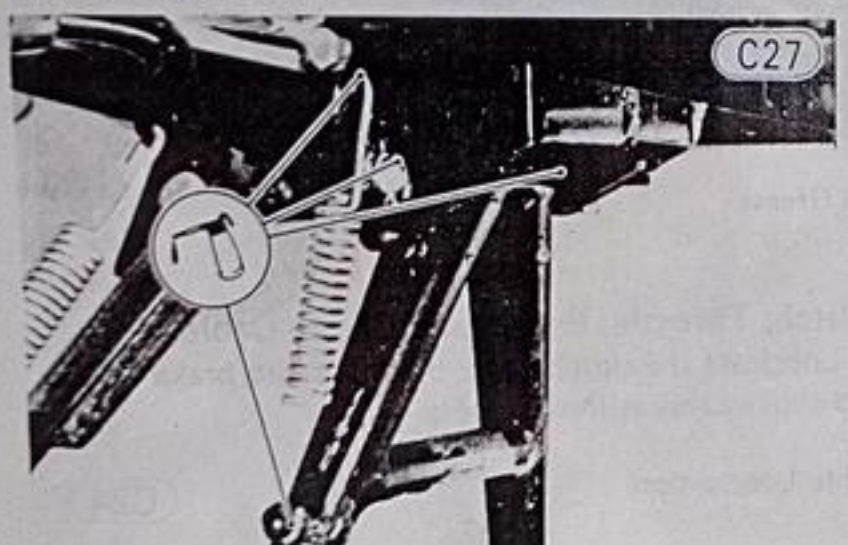


A. Grease

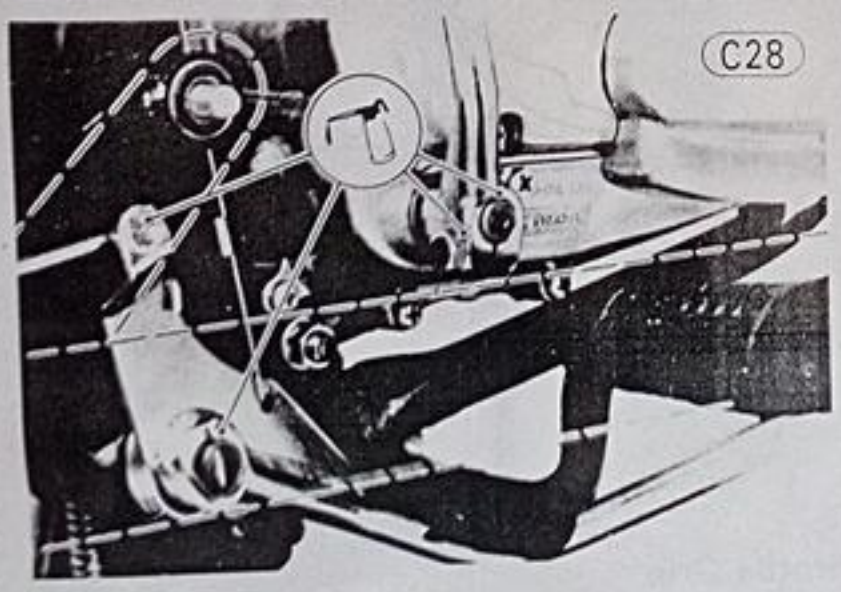
Side Stand



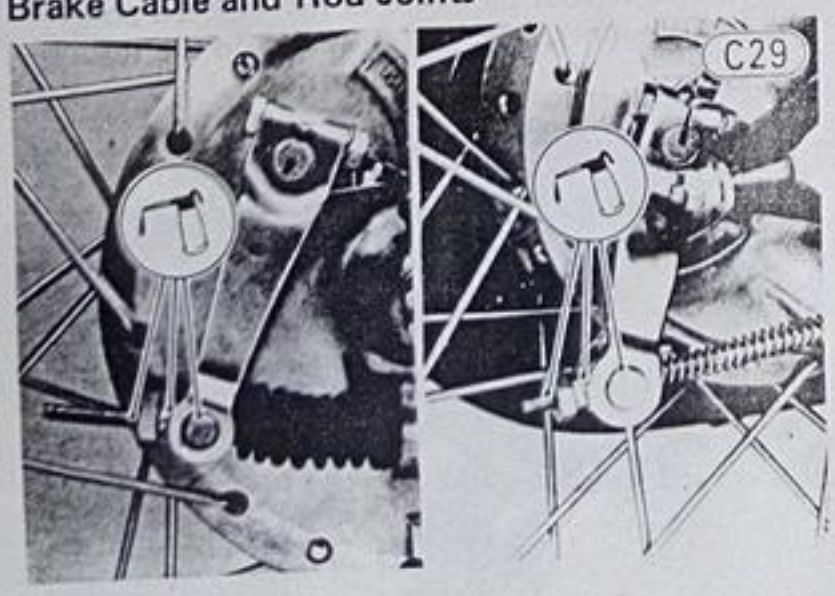
Center Stand



Kickstarter Pedal, Brake Pedal, and Brake Rod

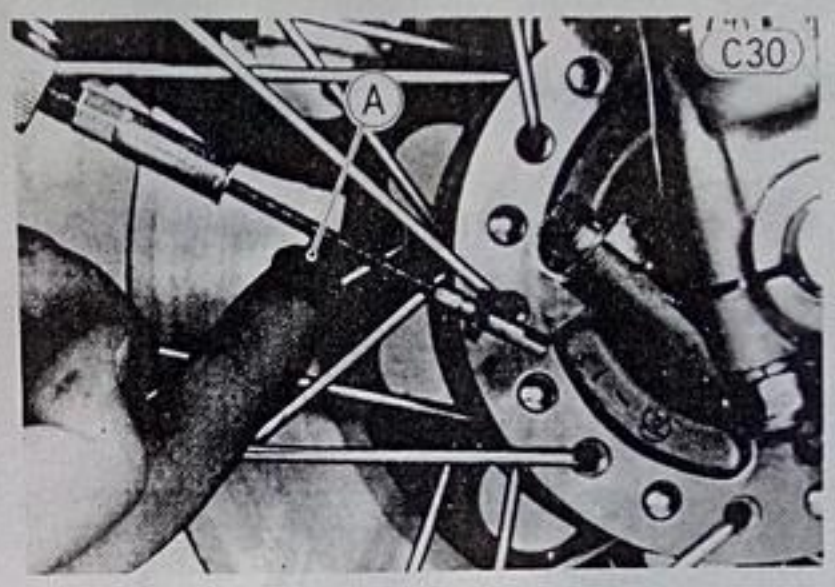


Brake Cable and Rod Joints



Speedometer and Tachometer Cables

Apply grease sparingly to the inner cables.



A. Grease

Others

Lubricate the drive chain, wheel bearings, speedometer gear housing, swing arm, and steering stem bearings as explained in the Maintenance Section.

NOTE: A few drops of oil are effective to keep bolts and nuts from rusting and sticking. This makes removal easier. Badly rusted nuts, bolts, etc. should be replaced with new ones.

Maintenance – Engine

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KICKSTARTER 107
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ENGINE LUBRICATION 109

C

AIR CLEANER

Cleaning and replacement

The air cleaner element must be cleaned periodically (Pg. 10). In extremely dry, dusty areas, the element will need to be cleaned more often. After riding through rain or on muddy roads, the element should be cleaned immediately.

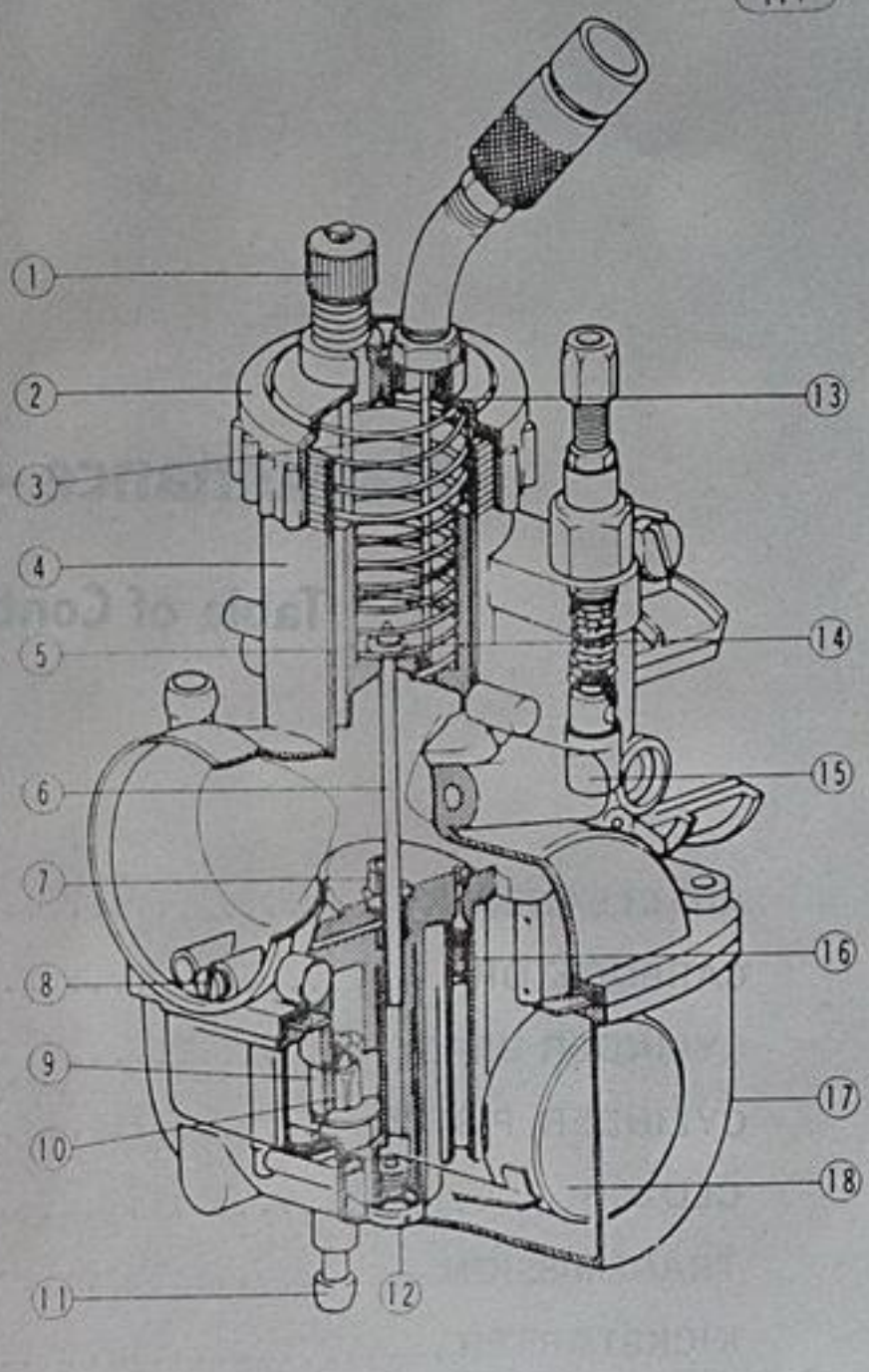
Remove the air cleaner element. Clean it in a bath of a high flash-point solvent, and then dry it from the inside using compressed air. Since this is a dry-type element, do not use kerosene or any fluid which would leave the element oily.

WARNING **Clean the element in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the element.**

If the sponge gasket on the side of the element come loose, stick them back on with an adhesive. If the sponge or the element is damaged or holed, replace the element.

Since repeated cleaning opens the pores of the element, replace it with a new one in accordance with the Periodic Maintenance Chart (Pg. 10). Also, if there is a break in the element material or any other damage to the element, replace the element with a new one.

Carburetor Construction (H1)



1. Idle Adjusting Screw
2. Cap
3. Spring
4. Carburetor Body
5. Throttle Valve
6. Jet Needle
7. Needle Jet
8. Air Screw
9. Valve Seat
10. Valve Needle
11. Overflow Pipe
12. Main Jet
13. Carburetor Cable
14. Clip
15. Starter Plunger
16. Pilot Jet
17. Float Bowl
18. Float

CARBURETOR

Since the carburetor regulates and mixes fuel and air going to the engine, there are two general types of carburetor trouble: too rich a mixture (too much fuel); or too lean a mixture (too little fuel). Such trouble can be caused by dirt, wear, maladjustment, or improper fuel level in the float chamber. A dirty or damaged air cleaner can also alter the fuel-to-air ratio.

Table H1 Mixture Trouble Symptoms

Mixture too rich	Mixture too lean
Engine is sluggish	Engine overheats
Smoky exhaust	Runs better with choke lever pulled in
Runs worse when warm	Spark plug burned white
Spark plug fouled black	Running is unstable
Runs better without air cleaner	Loss of power

CAUTION

1. **Remove the fuel hose and over flow grommet from the carburetor before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of them.**
2. **The starter plunger has a rubber seat that cannot be removed. DO NOT use a strong carburetor cleaning solution which could attack it; instead, use a mild cleaning solution safe for the rubber.**
3. **Do not use wire for cleaning as this could damage the jets.**

Starter System

Cleaning (See caution)

Remove the float bowl. Blow the starter pipe, starter air passage, mixture passage, and starter jet clean with compressed air.

Remove the starter plunger, and clean it with a high flash point solvent.

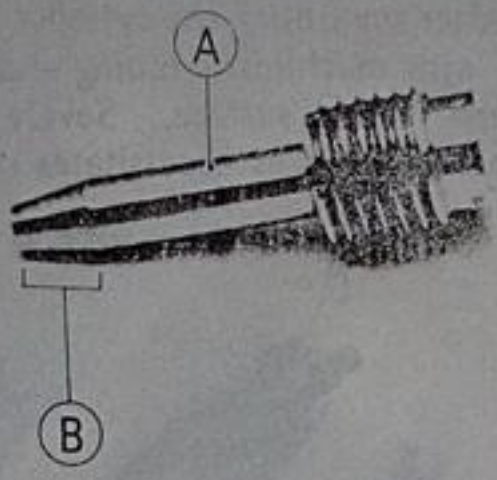
Pilot System

Cleaning and replacement (See caution)

Wash the pilot jet with a high flash-point solvent, and blow it clean with compressed air. Also, use compressed air to clean the pilot outlet passage and air passage.

Remove the air screw, and check that the tapered portion is not worn or otherwise deformed. If it is, replace the air screw.

H2



A. Air Screw **B. Tapered Portion**

Main System

Cleaning and adjustment (See caution Pg. 96)

Disassemble the carburetor and wash the main jet, needle jet, jet needle, air jet, and air passage with a high flash-point solvent, blowing them clean with compressed air. If necessary, use a bath of automotive-type carburetor cleaner.

A worn needle jet or jet needle should be replaced, although a certain amount of adjustment can be made by lowering the position of the needle. There are five grooves at the top of the needle. Changing the position of the clip to a groove closer to the top lowers the needle, which makes the mixture leaner at a given position of the throttle valve.

NOTE: The last digit of the jet needle number ("3" of 4EL15-3) is not stamped on the needle, but is the number of the standard groove in which the clip is set. The groove numbers are counted from the top of the needle, 1 being the topmost groove, and 5 being the lowest groove.

Float System

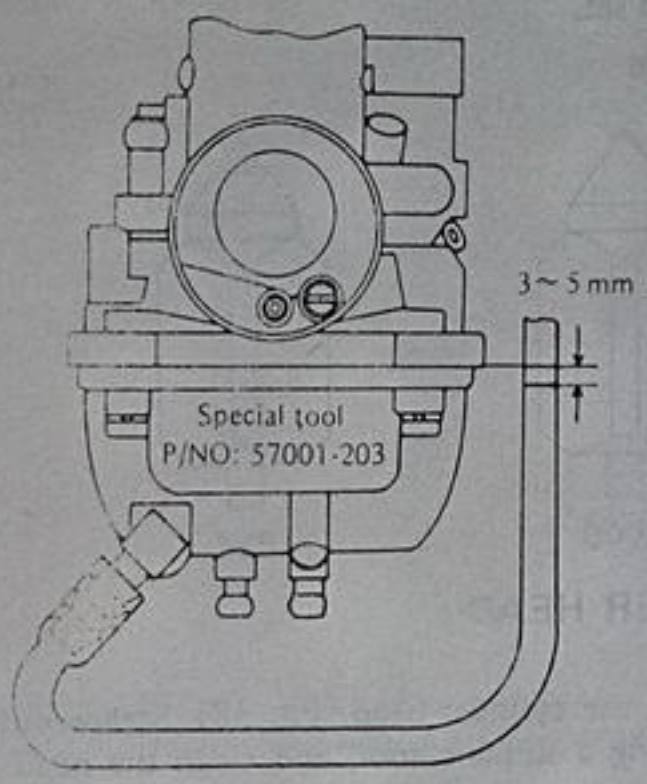
Service fuel level/measurement and adjustment

Secure the motorcycle in a true vertical position. Turn the fuel tap off and remove the carburetor cover and carburetor. Remove the float bowl and install in its place the fuel level gauge (special tool), and then install the carburetor. Hold the plastic tube against the side of the carburetor so that the "0" line is even with the bottom edge of the carburetor body. Turn on the fuel tap. Read the service fuel level in the plastic tube.

NOTE: Measure the service fuel level at the center of the carburetor

Fuel Level Measurement and Adjustment

H3



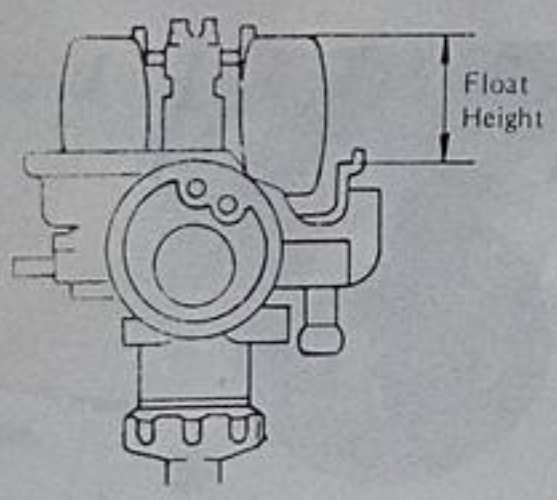


Table H2

Service Fuel Level	:	3 – 5 mm
Float Height	:	25.1 mm

If the fuel level is incorrect, remove the carburetor, and then remove the float bowl and float. Bend the tang on the float a very slight amount to change the fuel level. Bending it up closes the valve sooner and lowers the fuel level; bending it down raises the level. The float height for the proper service fuel level is shown in the table. The carburetor is helded upside down, and float bowl gasket is removed.

After adjustment, measure the service fuel level again, and readjust if necessary.

Remove the fuel level gauge (special tool) and install the float bowl in its place, and then install the carburetor.

Cleaning and replacement (See caution Pg. 96)

If dirt gets between the needle and seat, the float valve will not close and fuel will overflow. Overflow can also result if needle and seat become worn. If the needle sticks closed, no fuel will flow into the carburetor.

Table H3 Carburetor Specifications

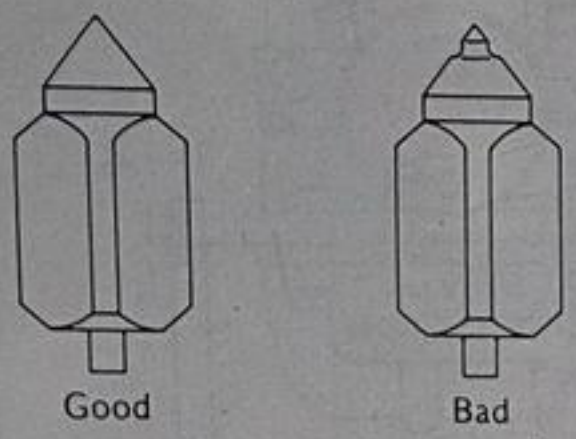
Type	Main Jet	Needle Jet	Jet Needle	Pilot Jet	Throttle Valve Cutaway	Air Screw	Design Fuel Level	Service Fuel Level
Mikuni VM22SC	92.5R	0.5	4EL15-3	20	2.0	1¼ turns out	28 ± 1 mm	4 ± 1 mm

Remove the carburetor, and take off the float bowl and float. Wash the bowl and float parts in a high flash-point solvent. Use carburetor cleaner if necessary on the float bowl and metal parts. Blow out the fuel overflow pipe with compressed air.

Examine the float, and replace if damaged. If the needle is worn as shown in the figure, replace the needle and seat as a set.

Valve Needle

H4



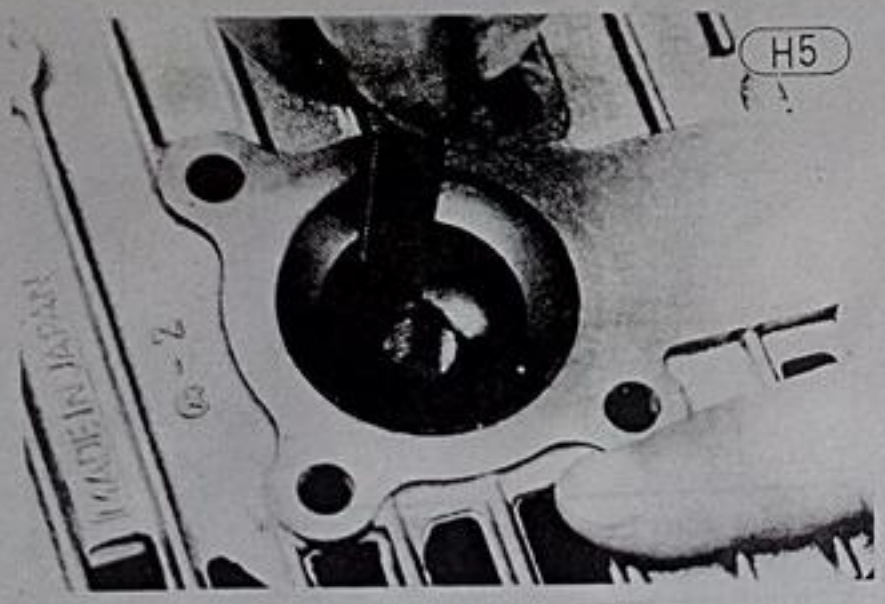
Good Bad

CYLINDER HEAD

Cleaning

Remove the cylinder head (Pg. 38). Scrape out any carbon, using a suitable tool, and clean the head with a high flash-point solvent.

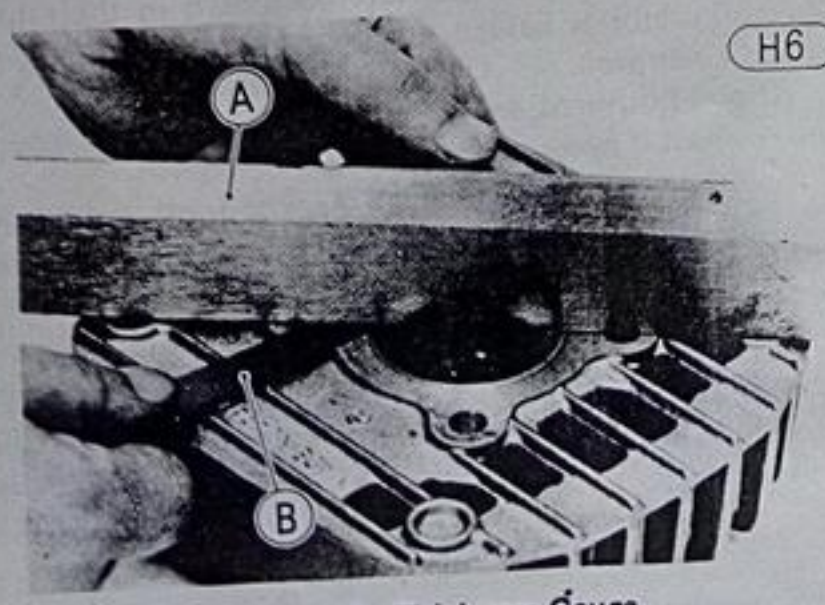
H5



Inspection

Lay a straightedge across the mating surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head. Light damage of the lower surface is repairable.

H6



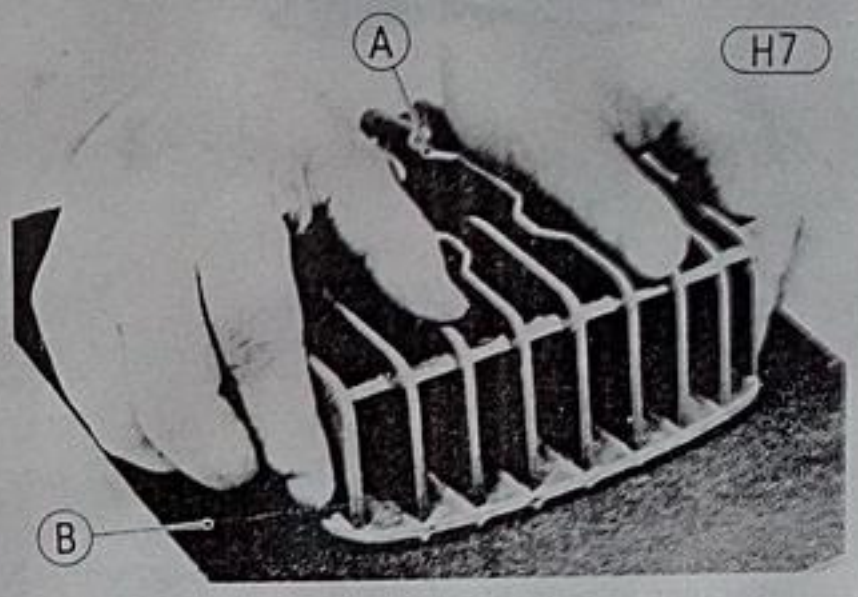
A. Straightedge **B. Thickness Gauge**

Table H4 Cylinder Head Warp

Service limit
under 0.05 mm

If warp exceeds the service limit, replace the cylinder head. Repair light damage by rubbing the mating surface on emery cloth (first #200, then #400) secured to a surface plate. After smoothing the cylinder head mating surface, coat it with machinist's bluing and rub it over the cylinder head mating surface. Severe damage to either of the mating surfaces necessitates replacement.

H7



A. Cylinder Head **B. Emery Cloth**

NOTE: Use only the proper gasket for the cylinder head. The use of a gasket of incorrect thickness will change the compression.

Combustion chamber volume measurement

The combustion chamber volume should be measured anytime that compression measurement results in compression pressures well below or above the standard.

NOTES:

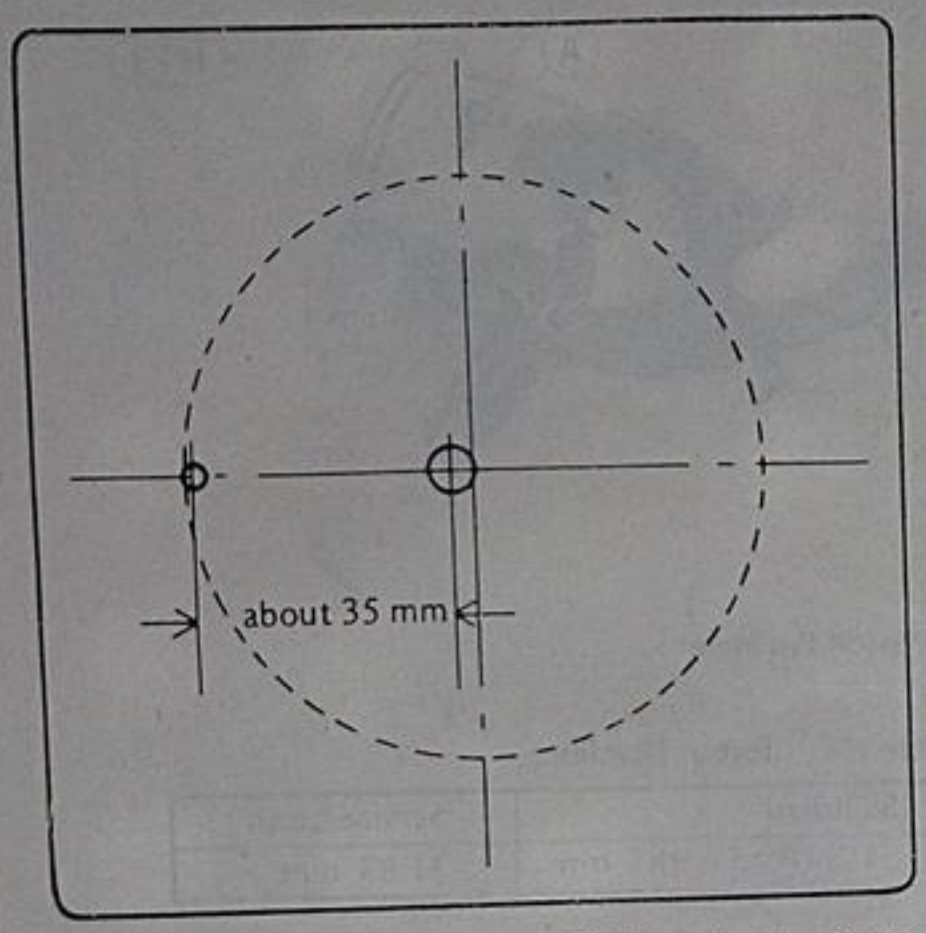
1. One more person will be needed to help expel air bubbles out of the cylinder head combustion chamber.
2. Prepare a piece of transparent plastic plate which has a flat surface and has two holes about 35 mm apart in its center portion. One is a large hole (about 6 mm in diameter), the other is small hole (about 3 mm in diameter). This plate must be oil resistant, about 120 mm square, and at least 3 mm thick (See Fig. H8).
3. Obtain a burette or syringe which is calibrated at one-cc or smaller graduations. Fill it with thin oil.

Prior to the combustion chamber volume measurement, clean off any carbon on the combustion chamber, and remove any dirt on the cylinder head mating surface. The standard spark plug should be installed in the chamber to be measured.

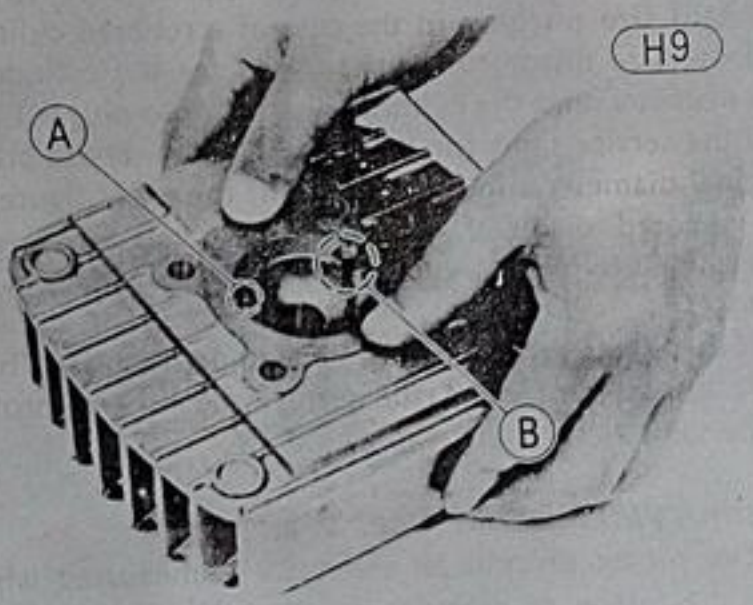
- Apply a thin coat of grease to the cylinder head mating surface and place the plastic plate over the cylinder head combustion chamber, fitting its small hole within the circumference of the combustion chamber.
- Place the cylinder head on a level surface. Through the large hole, fill the combustion chamber with light oil until the chamber is completely filled but not overflowing. Tilt the cylinder head slightly so that air

bubbles come out through the small hole. The oil should just rise to the bottom edge of the holes in the plate.

Measuring Plastic Plate (H8)

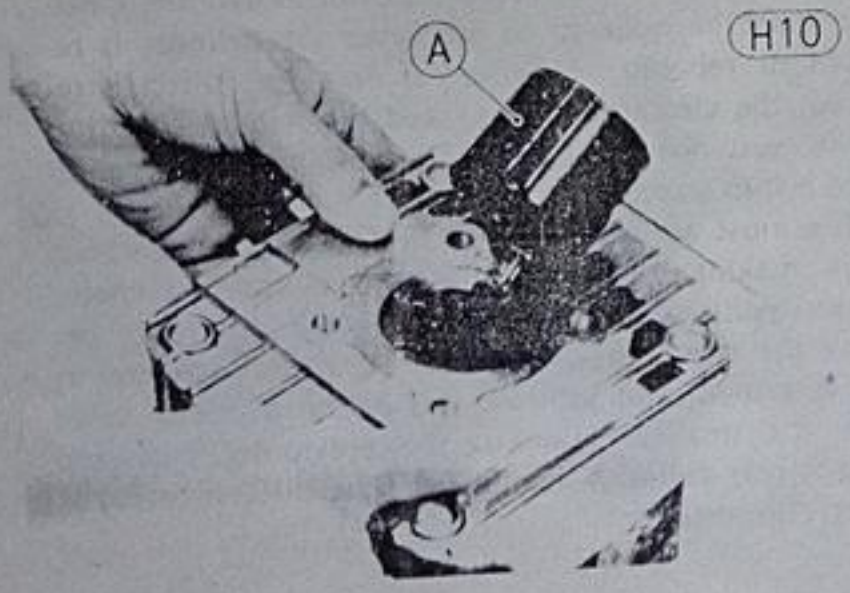


The amount of oil used to fill the chamber is the combustion chamber volume.



(H9)

A. Small Hole B. Large Hole



(H10)

A. Oil

Table H5 Combustion Chamber Volume

Standard
11.2 ~ 11.8 cc

If the combustion chamber volume is too small, it is possible that the cylinder head was modified for higher compression. Make sure that all carbon deposits have been cleaned out of the chamber, also make sure that the spark plug is the standard type and that it is correctly tightened.

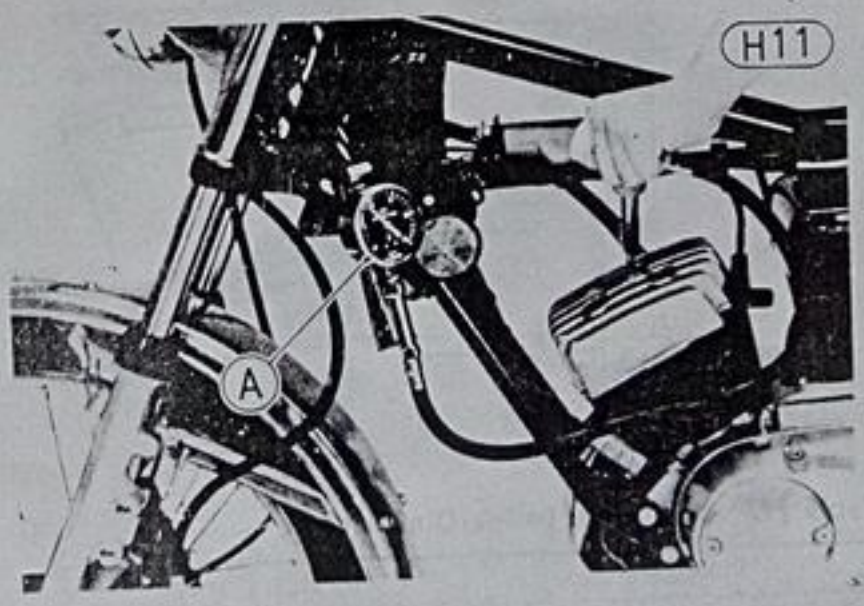
CYLINDER, PISTON

Compression measurement

A compression test is very useful as an aid in determining the condition of the engine. Low compression may be due to cylinder wear; worn piston ring grooves; worn, broken, or sticking piston rings; cylinder head leaks; damaged crankshaft oil seals; or damage to the engine, such as piston seizure. Excessive compression may be due to carbon build-up on the piston head and cylinder head.

Before measuring compression, check that the cylinder head is tightened down to 2.2 kg-m (16.0 ft-lbs) of torque, and then thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running. While the engine is running, check that there is no gas leakage from around the spark plug or the cylinder head gasket.

Stop the engine, remove the spark plug, and fit the compression gauge securely into the spark plug hole so that there will be no leakage. With the throttle fully open so that air can flow freely to the engine, turn the engine over sharply with the kickstarter several times until the compression gauge stops rising. The compression is the highest reading obtainable.



(H11)

A. Compression Gauge

Table H6 Cylinder Compression

Standard	Usable Range
9.5 ~ 11.5 kg/cm² (135 ~ 163.5 psi)	7.4 ~ 11.5 kg/cm² (105 ~ 163.5 psi)

Cylinder, piston decarbonization

Carbon readily accumulates around the cylinder exhaust port, which reduces exhaust efficiency. To remove the carbon, take off the cylinder (Pg. 38). and scrape out the carbon from the exhaust port carefully. At this time, the muffler should also be inspected, and cleaned out if necessary.

Built-up carbon on the piston head reduces the cooling capability of the piston and raises compression, leading to overheating which could possibly even melt the top of the piston. To decarbonize the piston head, remove the piston (Pg. 39), scrape off the carbon, and then lightly polish the piston with fine emery cloth.

Carbon, accumulated in the piston ring grooves, can cause the rings to stick. Remove the rings (Pg. 39), and clean out any carbon deposits using an end of a broken piston ring or some other suitable tool.

CAUTION

1. When removing carbon, take ample care not to scratch the cylinder wall, the side of the piston, or the piston ring grooves.

2. Never clean the piston head with the engine assembled. If the carbon is scraped from the piston head with the cylinder left in place, carbon particles will unavoidably drop between the piston and cylinder onto the rings and eventually find their way into the crank chamber. Carbon particles, which are very abrasive, drastically shorten the life of the rings, piston, cylinder, crankshaft bearings, and oil seals.

Cylinder, piston wear

Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-rear measurement at each of the 3 locations (total of 6 measurements) shown in Fig. H12. If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored to oversize and then honed. However, if the amount of boring necessary would make the inside diameter greater than 50.5 mm, the cylinder must be replaced.

Cylinder Diameter Measurement (H12)

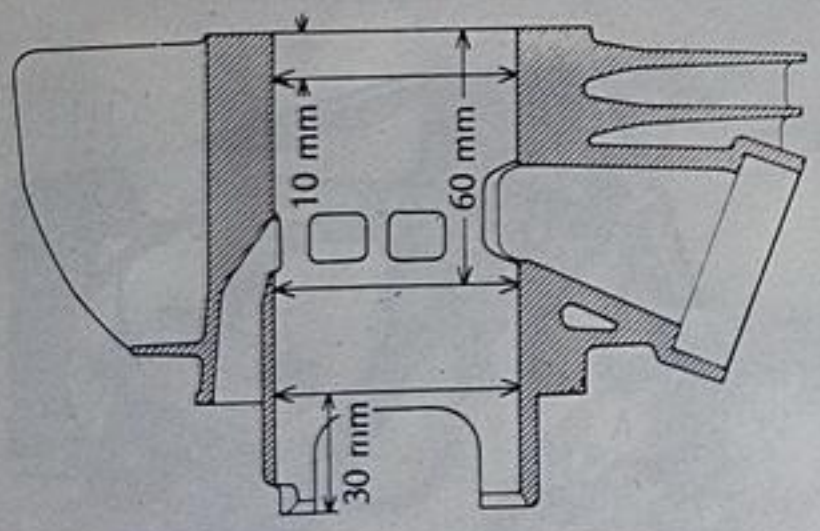
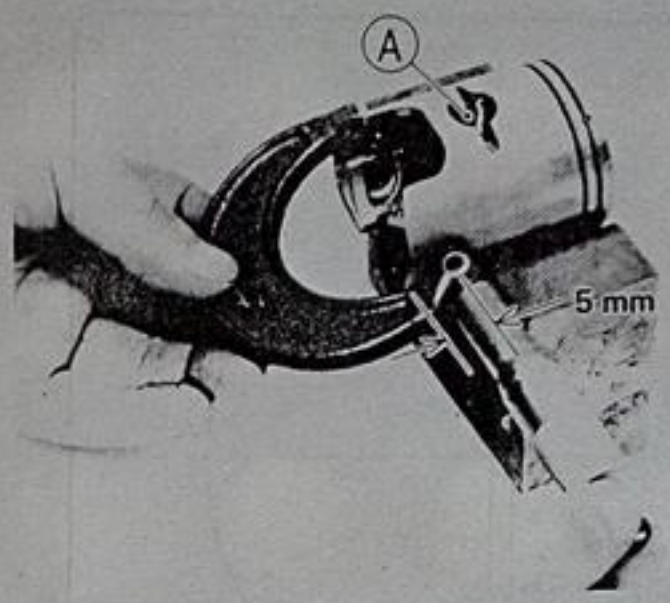


Table H7 Cylinder Inside Diameter

Standard	Service Limit
52.000 ~ 52.015 mm and less than 0.01 mm difference between any time measurements	52.1 mm, or more than 0.05 mm difference between any two measurements

Measure the outside diameter of each piston 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin. If the measurement is under the service limit, replace the piston.

NOTE: Abnormal wear such as a marked diagonal pattern across the piston skirt may mean a bent connecting rod or crankshaft.



(H13)

A. Piston Pin Hole

Table H8 Piston Diameter

Standard	Service Limit
51.970~51.985 mm	51.83 mm

Table H7 applies only to a cylinder that has not been bored to oversize, and Table H8 appiies only to the standard size piston. In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm and the service limit for the piston is the oversize piston original diameter minus 0.15 mm. If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

NOTE: Whenever the piston or cylinder block has been replaced with a new one, the motorcycle must be broken in the same as with a new machine.

Piston/cylinder clearance

The piston to cylinder clearance is measured whenever the piston or cylinder is replaced with a new one, or whenever the cylinder is rebored and an oversize piston installed. The standard piston to cylinder clearance must be adhered to whenever the cylinder is replaced or rebored. However, if only the piston is replaced, the clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid piston seizure.

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter as just described, and subtract this piston diameter value from the smallest value of the previously measured front-to-rear cylinder diameters. The difference is the piston clearance.

Table H9 Piston/Cylinder Clearance

Standard
0.025 ~ 0.035 mm

Boring, honing

When boring and honing a cylinder, note the following:

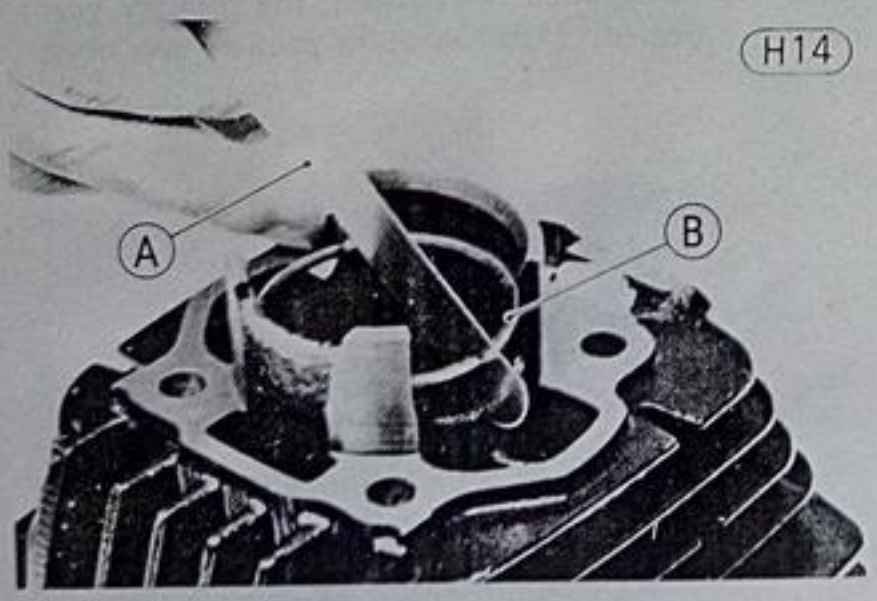
1. Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, in accordance with the standard clearance given in Table H9 determine the diameter of the rebore.
2. Cylinder inside diameter must not vary more than 0.01 mm at any point.
3. Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.
4. There are two sizes of oversize pistons available: 0.5 mm and 1.0 mm. Oversize pistons require oversize rings.

Piston/cylinder seizure

Remove the cylinder and piston to check the damage. If there is only slight damage, the piston may be smoothed with #400 emery cloth, and any aluminum deposits removed from the cylinder with either #400 emery cloth or light honing. However, in most cases the cylinder will have to be bored to oversize and honed, and an oversize piston installed.

Piston ring end gap

Place the piston ring being checked inside the cylinder using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low. Measure the gap between the ends of the ring with a thickness gauge. If the gap is wider than the service limit, the ring is overworn and must be replaced.



A. Thickness Gauge B. Piston Ring

Table H10 Piston Ring End Gap

Standard	Service Limit
0.15~0.35 mm	0.65 mm

Piston, piston pin, connecting rod wear

Measure the diameter of the piston pin with a micrometer, and measure the inside diameter of both piston pin holes in the piston. If the piston pin diameter is less than the service limit at any point, replace the piston pin. If either piston pin hole diameter exceeds the service limit, replace the piston.

Measure the inside diameter of the connecting rod small end. If the diameter exceeds the service limit, replace the connecting rod.

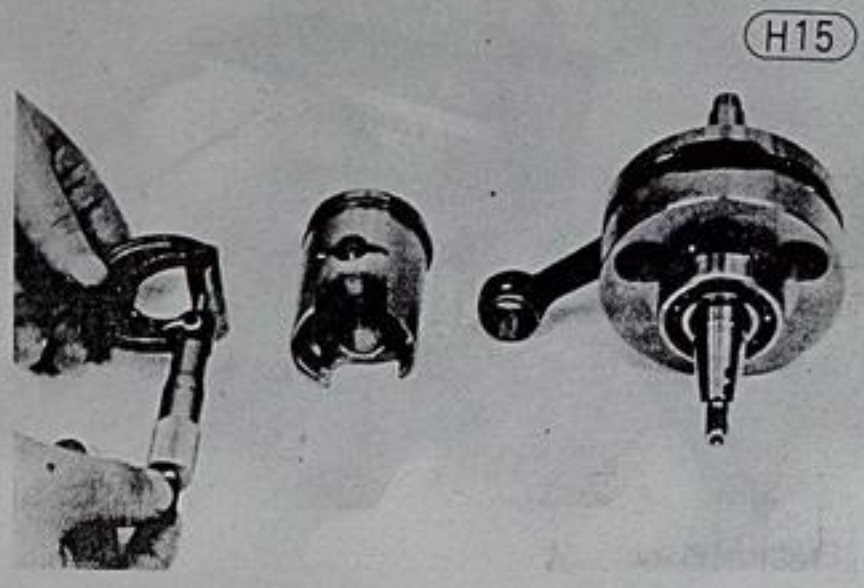


Table H11 Piston Pin, Pin Hole, Small End Diameter

	Standard	Service Limit
Pin	13.995~14.000 mm	13.96 mm
Pin Hole	14.001 ~ 14.007 mm	14.07 mm
Small End	18.003~18.014 mm	18.05 mm

NOTE: When a new piston or pin is used, check that piston to pin clearance is 0.001~0.012 mm

Small end needle bearing wear

The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearing for abrasions, color change, or other damage. If there is any doubt as to its condition, replace the needle bearing.

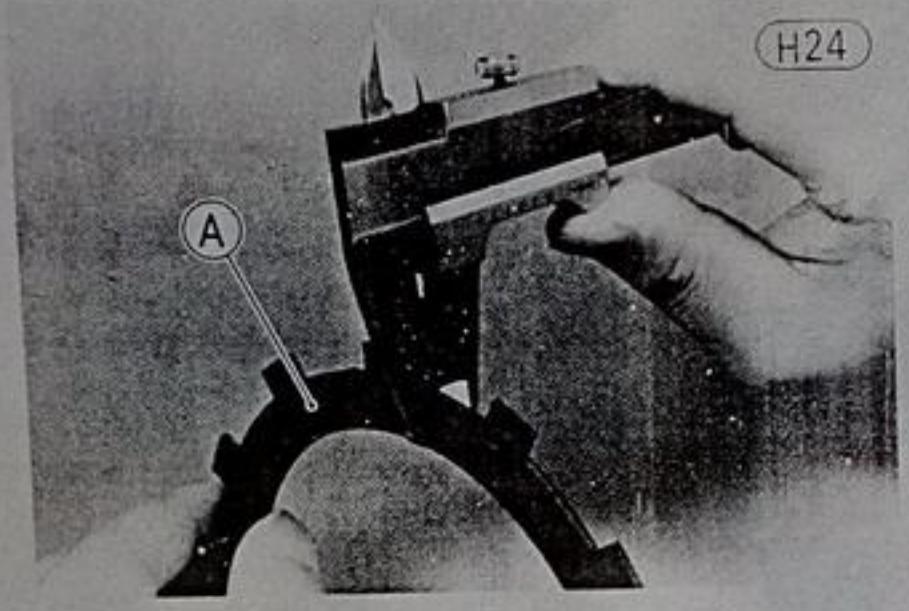
Table H17 Clutch Spring Tension

Length	Standard	Service Limit
14 mm	13.5 ~ 14.5 kg	12.6 kg

Friction plate wear, damage

Visually inspect the friction plates to see whether or not they show any signs of seizure, overheating, or uneven wear. Measure the thickness of the plates with vernier calipers.

If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.



A. Friction Plate

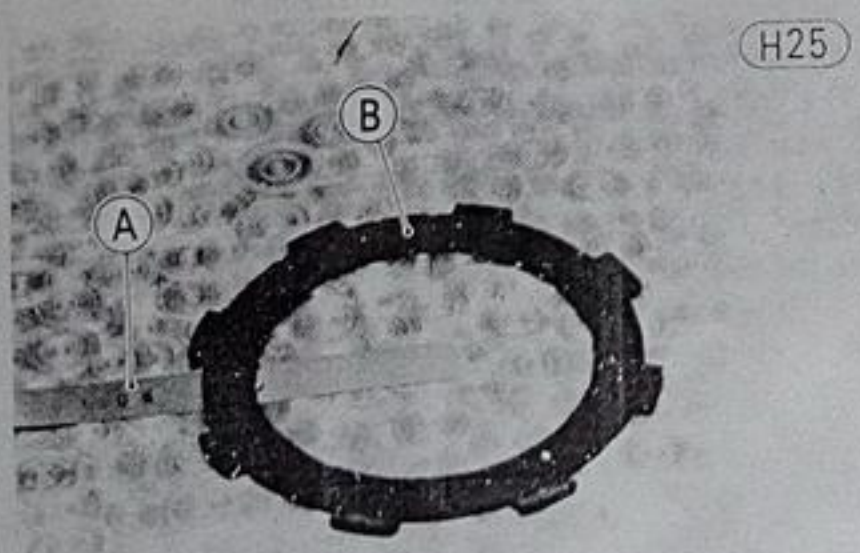
Table H18 Friction Plate Thickness

Standard	Service Limit
3.1 ~ 3.3 mm	2.8 mm

Clutch plate warp

Place each clutch plate on a surface plate, and measure the gap between each clutch plate and the surface plate. This gap is the amount of clutch plate warp.

Replace any plates warped over the service limit.



A. Thickness Gauge **B. Clutch Plate**

Table H19 Clutch Plate Warp

Standard	Service Limit
under 0.3 mm	0.45 mm

Friction plate/clutch housing clearance

Measure the clearance between the tangs on the friction plates and the fingers of the clutch housing. If this clearance is excessive, the clutch will be noisy.

If the clearance exceeds the service limit, replace the friction plates. Also, inspect the fingers of the housing where the tangs of the friction plates hit them. If they are badly worn or if there are grooves cut where the tangs hit, replace the clutch housing.

Friction Plate/Clutch Housing Clearance H26

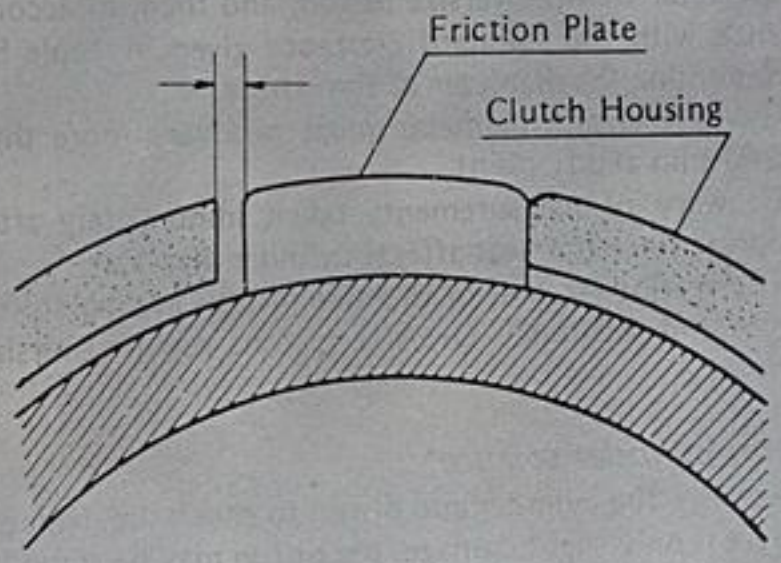
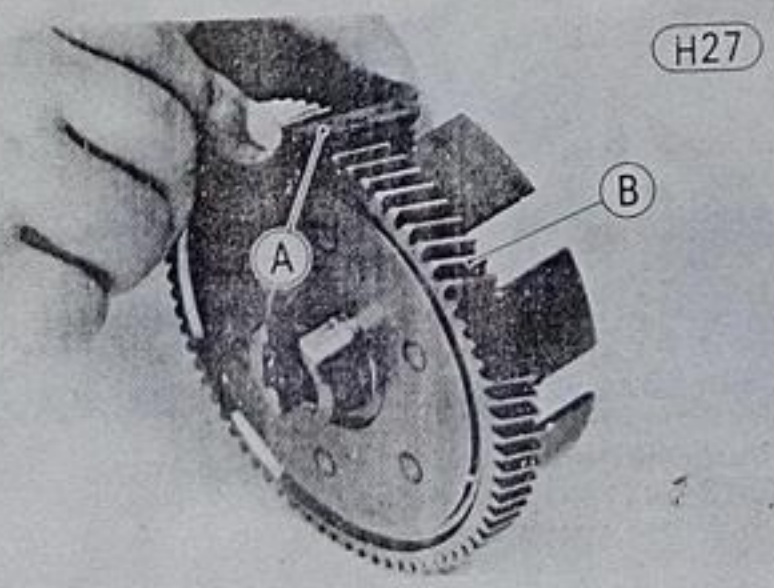


Table H20 Friction Plate/Clutch Housing Clearance

Standard	Service Limit
0.15~0.40 mm	0.6 mm

Clutch housing gear damage

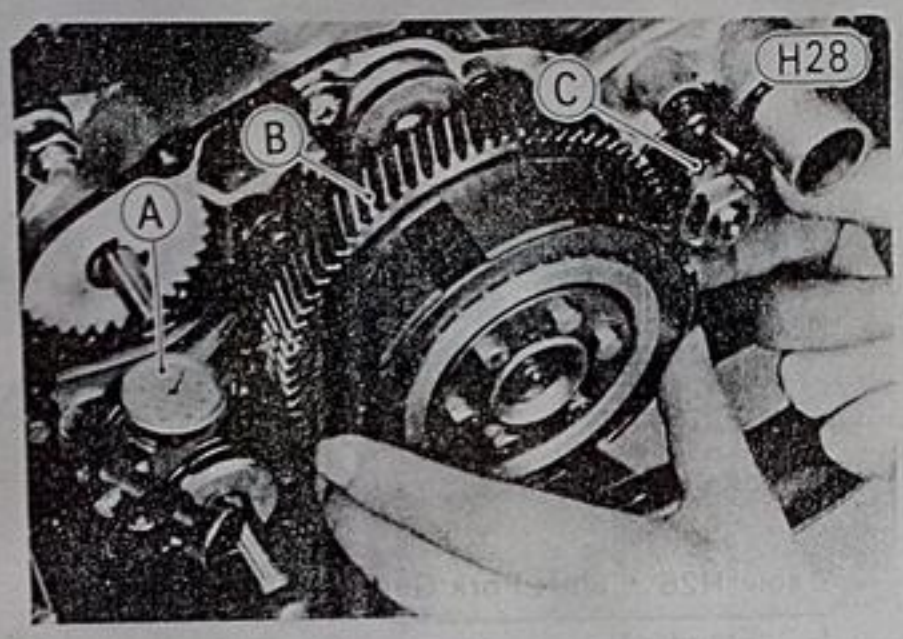
Inspect the teeth on the clutch housing gear. Any light damage can be corrected with an oilstone, but the clutch housing must be replaced if the teeth are badly damaged. Damaged teeth on the clutch housing gear indicate that the primary gear, by which it is driven, may also be damaged. At the same time that the clutch housing gear is repaired or replaced, the primary gear should be inspected. If damaged, the primary gear must be replaced.



A. Oilstone **B. Clutch Housing Gear**

Clutch housing/primary gear backlash

Measure the backlash between the clutch housing gear and primary gear with a dial gauge. Set the dial gauge against a tooth on the clutch housing gear, and rotate the clutch housing gear back and forth while keeping the primary gear stationary. The difference between the highest and lowest dial reading is the amount of backlash. If the amount of backlash exceeds the service limit, replace both the clutch housing and the primary gear.



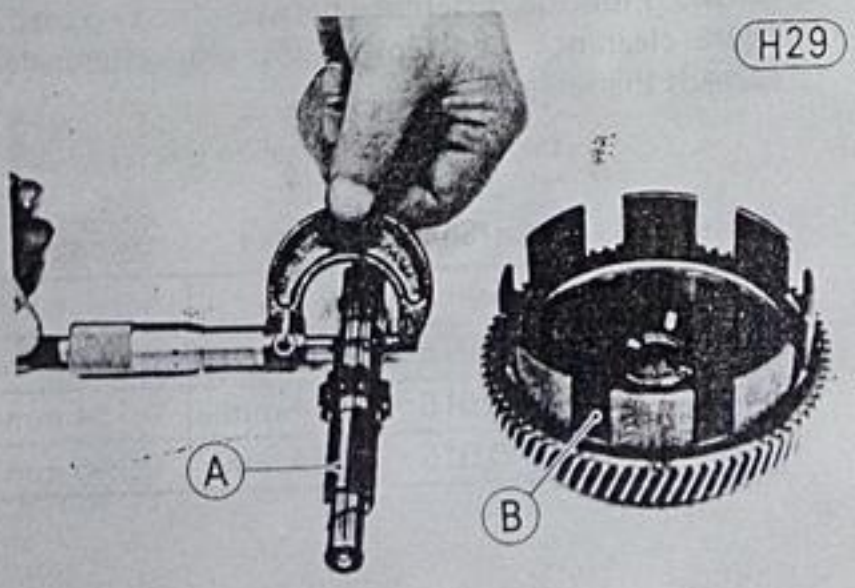
A. Dial Gauge
B. Clutch Housing Gear
C. Primary Gear

Table H21 Clutch Housing/Primary Gear Backlash

Standard	Service Limit
under 0.095 mm	0.15 mm

Clutch housing/drive shaft idle gear clearance

Measure the diameter of the drive shaft with a micrometer, and measure the inside diameter of the drive shaft idle gear. Find the difference between the two readings to determine the clearance. Replace the idle gear if the clerance exceeds the service limit.



A. Drive Shaft
B. Clutch Housing

Table H22 Clutch Housing/Drive Shaft Idle Gear Clearance

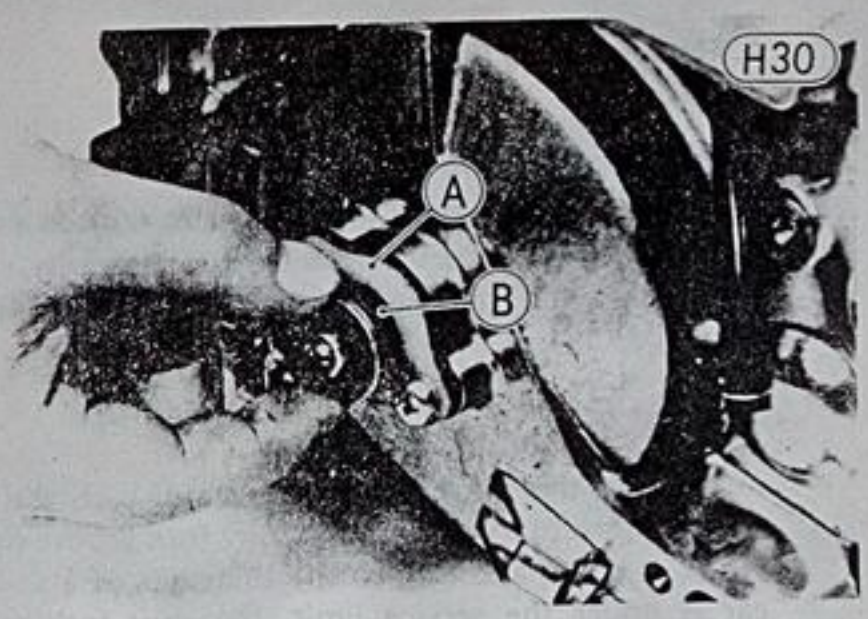
Standard	Service Limit
0.022~0.058 mm	0.158 mm

Clutch hub damage

Inspect where the teeth on the steel plates wear against the splines of the clutch hub. If there are notches worn into the splines, replace the clutch hub.

Clutch release gear wear

Fit the inner and outer clutch release worm gears together, and push them back and forth in the direction of the shaft without turning them. If there is excessive play, replace the outer worm gear.



A. Outer Worm Gear
B. Inner Worm Gear

Lubrication

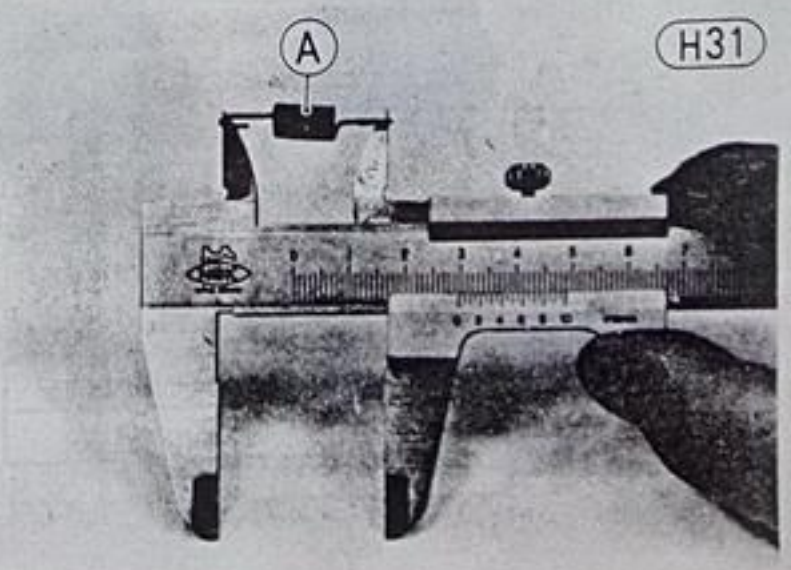
Lubricate the clutch release worm gears with grease.

TRANSMISSION

External shift mechanism inspection

Inspect the shift pawl spring, shift pawls, and return spring. Replace any broken or otherwise damaged parts.

Measure the free length of the shift pawl spring. If it exceeds the service limit, replace it with a new one.

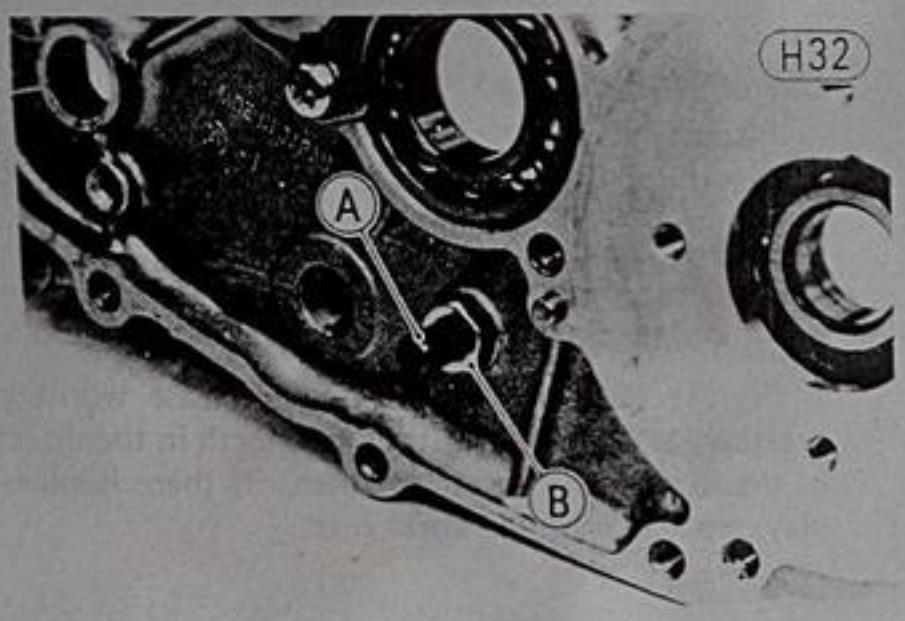


A. Shift Pawl Spring

Table H23 Shift Pawl Spring Free Length

Standard	Service Limit
29.4 mm	31.0 mm

Check to see if the return spring pin is loose or not. If it is loose, remove it and apply a locking agent to the threads. Then screw it back in tightening its locknut.



A. Return Spring Pin B. Locknut

Shift fork bending

Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting or allow the transmission when under power to jump out of gear.

Shift fork/gear groove wear

Measure the thickness of the ears of each shift fork, and measure the width of the shift fork groove on gears D2 & D3, O4, and O5. If the thickness of a shift fork ear is under the service limit, the shift fork must be replaced. If a gear shift fork groove is worn over the service limit, the gear must be replaced.

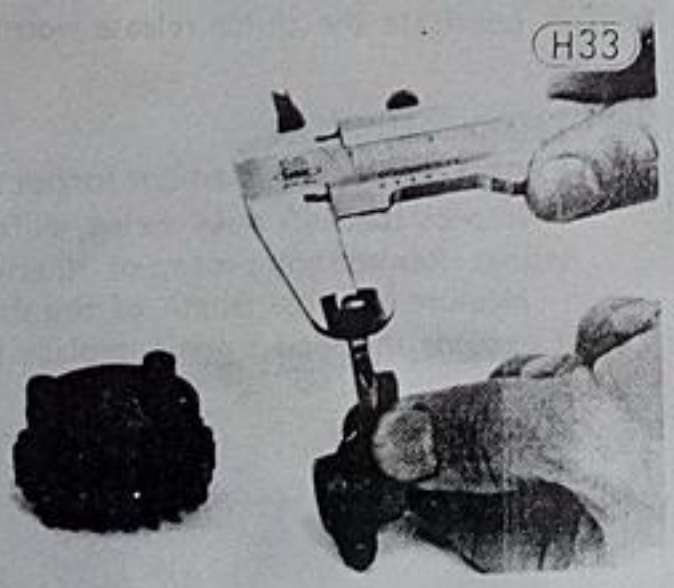


Table H24 Shift Fork Thickness

Standard	Service Limit
4.9~5.0 mm	4.8 mm

Table H25 Gear Shift Fork Groove Width

Standard	Service Limit
5.05~5.15 mm	5.25 mm

Shift fork guide pin/shift drum groove wear

Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove. Replace the guide pin which has worn past the service limit. If a shift drum groove is worn past the service limit, replace the shift drum.

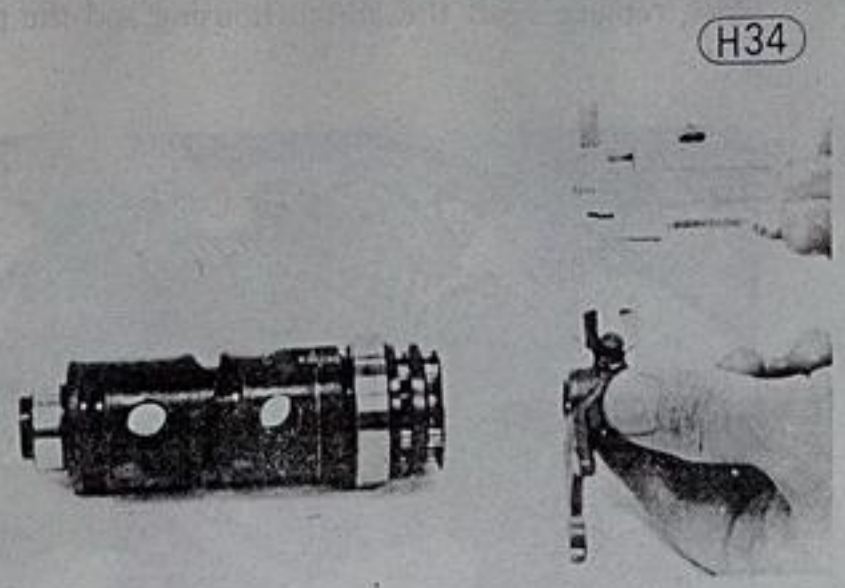


Table H26 Shift Fork Guide Pin Diameter

Standard	Service Limit
5.9~6.0 mm	5.85 mm

Table H27 Shift Drum Groove Width

Standard	Service Limit
6.05~6.20 mm	6.25 mm

Gear dog, gear dog hole, gear dog recess damage

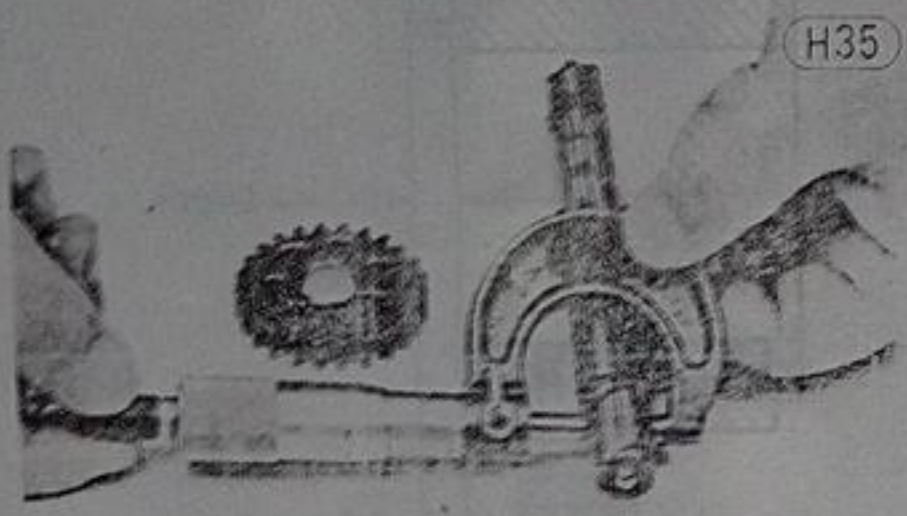
Visually inspect the gear dogs, gear dog holes, and gear dog recesses. Replace any gears that have damaged or unevenly or excessively worn dogs, dog holes, or dog recesses.

Gear/shaft clearance

Measure the diameter of each shaft with a micrometer, and measure the inside diameter of each gear listed below. Find the difference between the two readings to figure clearance, and replace any gear where clearance exceeds the service limit.

Table H28 Gear/Shaft Clearance

	Standard	Service Limit
D4, O2, O3	0.016~0.052 mm	0.152 mm
D5	0.016~0.054 mm	0.154 mm
O1	0.016~0.045 mm	0.145 mm


H35

KICKSTARTER

Kick gear, shaft wear

Measure the inside diameter of the kick gear, and replace the gear if the diameter is over the service limit. Visually inspect the ratchet portion of the kick gear. If there is any kind of damage, replace the kick gear.

Measure the kick shaft diameter at the kick gear, and replace it if it is under the service limit.

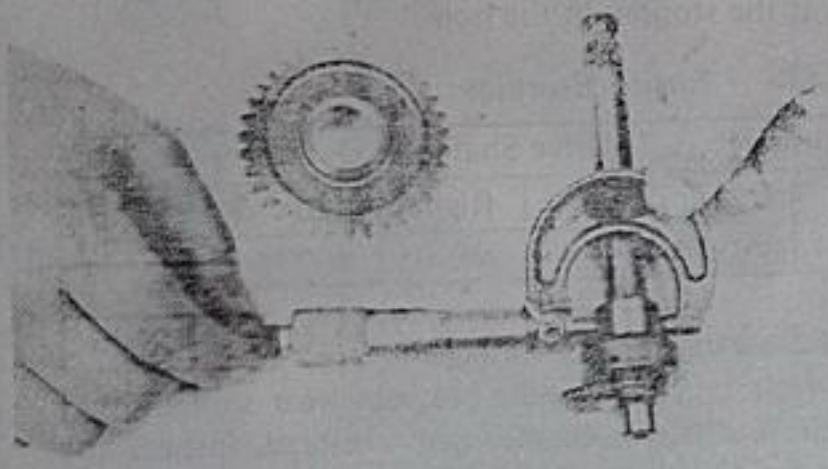

H36

Table H29 Kick Gear Inside Diameter

Standard	Service Limit
20.000~20.021 mm	20.07 mm

Table H30 Kick Shaft Diameter at Kick Gear

Standard	Service Limit
19.959~19.980 mm	19.92 mm

Drive shaft idle gear/shaft clearance

Measure the inside diameter of the drive shaft idle gear with a cylinder gauge, and measure the diameter of the drive shaft with a micrometer. Find the difference between the two readings to figure the clearance. Replace the gear if the clearance exceeds the service limit.

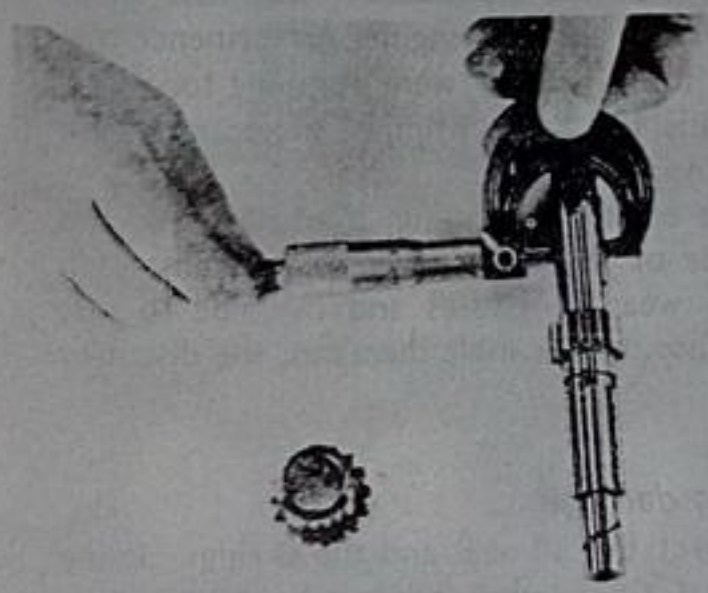

H37

Table H31 Drive Shaft Idle Gear/Shaft Clearance

Standard	Service Limit
0.028~0.058 mm	0.158 mm

Output shaft idle gear/shaft clearance

Measure the inside diameter of the output shaft idle gear with a cylinder gauge, and measure the diameter of the output shaft with a micrometer. Find the difference between the two readings to figure the clearance. Replace the gear if the clearance exceeds the service limit.

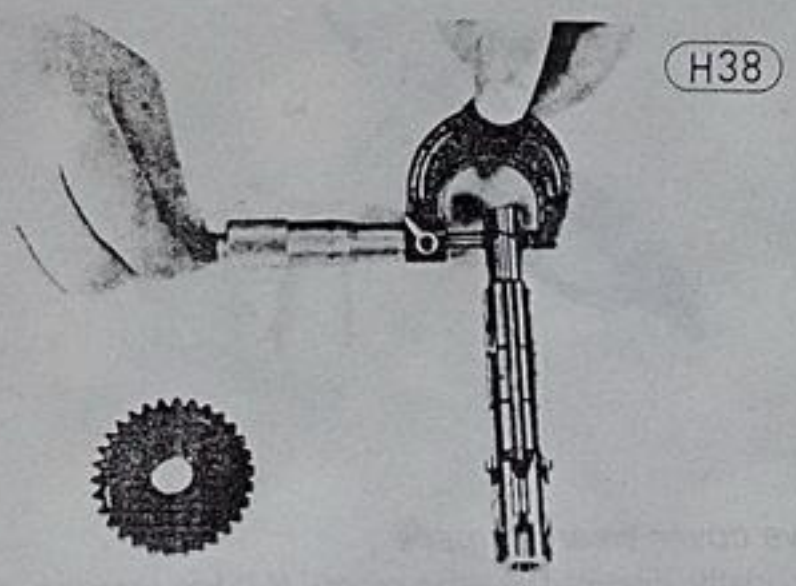

H38

Table H32 Output Shaft Idle Gear/Shaft Clearance

Standard	Service Limit
0.032~0.061 mm	0.161 mm

Ratchet, spring damage

Visually inspect the ratchet, ratchet on the kick gear, and ratchet pin spring. Replace any part that is damaged.

ROTARY VALVE

An oil seal and 2 O rings in the valve seal off the [illegible] from the area inside the right engine

cover. A damaged oil seal or O ring thereby results not only in fuel/air mixture leaks, but also in transmission oil being drawn into the combustion chamber. This excess oil adversely affects engine performence the same as though the oil pump were pumping too much oil. Also, as this leakage continues, the transmission may seize from insufficient oil.

Whenever the engine is running, the rotary disc and the inner surface of the valve cover wear against each other. As this wear progresses and the side to side motion of the disc on the shaft increases, the disc may possibly warp.

Oil seal, O ring damage

Visually inspect the oil seal and the O rings. If the lip of the oil seal is deformed, hardened, discolored, or otherwise damaged, replace the oil seal. An O ring should be replaced if damaged.

Rotary disc warp, wear

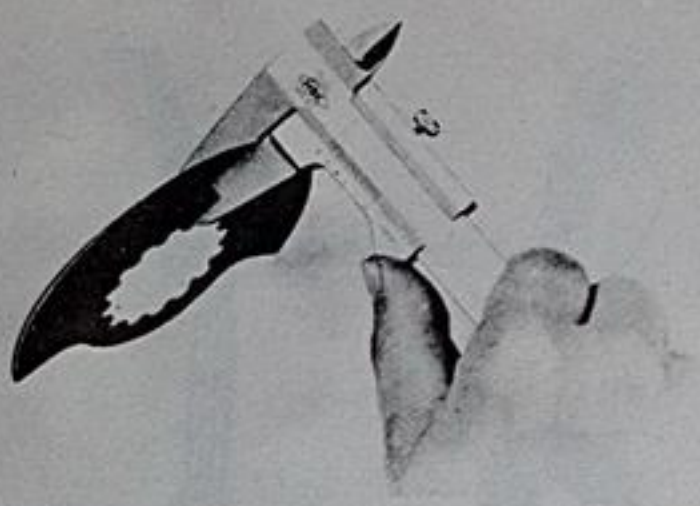
Visually inspect the rotary disc. If the rotary disc has become warped, replace it.

Measure the thickness of the rotary disc. Replace it if it has worn past the service limit.

Table H33 Rotary Disc Thickness

Standard	Service Limit
0.67 ~ 0.73 mm	0.52 mm

H39



Valve cover wear, damage

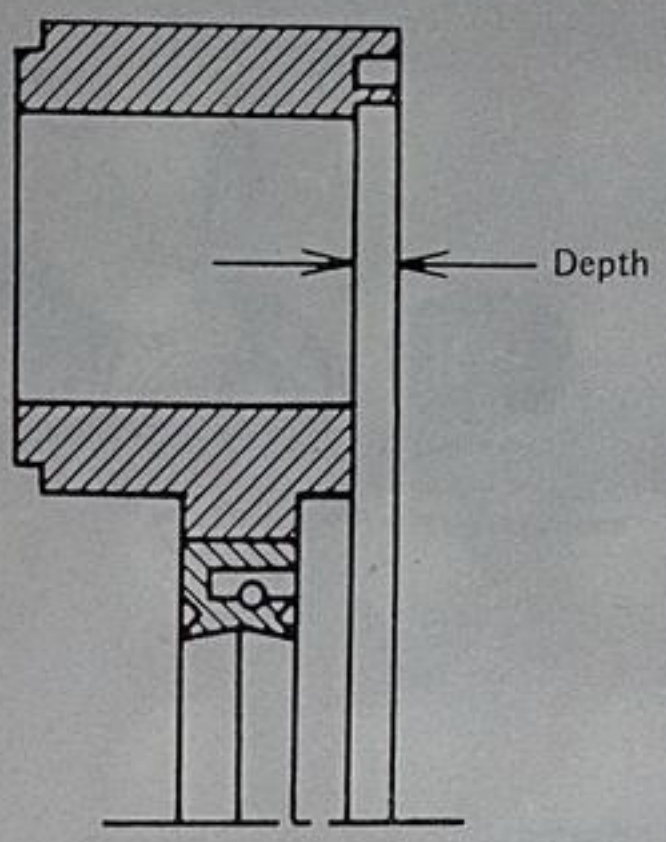
Visually inspect the valve cover. If it has abrasions or scratches, it should be replaced.

Measure the depth of the inner surface of the valve cover. Replace the valve cover if the inner surface is worn past the service limit.

Table H34 Rotary Valve Cover Inner Surface Depth

Standard	Service Limit
1.1 ~ 1.2 mm	1.5 mm

Valve Cover (H40)



ENGINE BEARINGS, OIL SEALS

Ball bearing wear, damage

Since the ball bearings are made to extremely close tolerances, the clearance cannot normally be measured. Therefore, the condition of the bearings must be judged by feel. Wash each bearing with a high flash-point solvent, dry it (**do not spin it which it is dry**), and oil it. Spin it by hand to check its condition. If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced. Before reinstalling the bearing, replace its oil seal with a new one. Press in the bearing until it stops at the stopper in the hole.

Table H35 Engine Bearings

Crankshaft		Drive Shaft		Output Shaft	
Left	Right	Left	Right	Left	Right
#6204	#6204	—	#6005	#6004	—

Needle bearing wear, damage

The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the bearings for abrasions, color change, or other damage. If there is any doubt as to the condition of either bearing, replace it.

Oil seal damage

Inspect the oil seals, and replace any if the lips are misshapen, discolored (indicating the rubber has deteriorated), hardened, or otherwise damaged. Since an oil seal is nearly always damaged on removal, and removed oil seals must be replaced. When pressing in an oil seal which is marked, press in with the mark facing out. Press the oil seal so that the face of the seal is level with the surface of its hole.

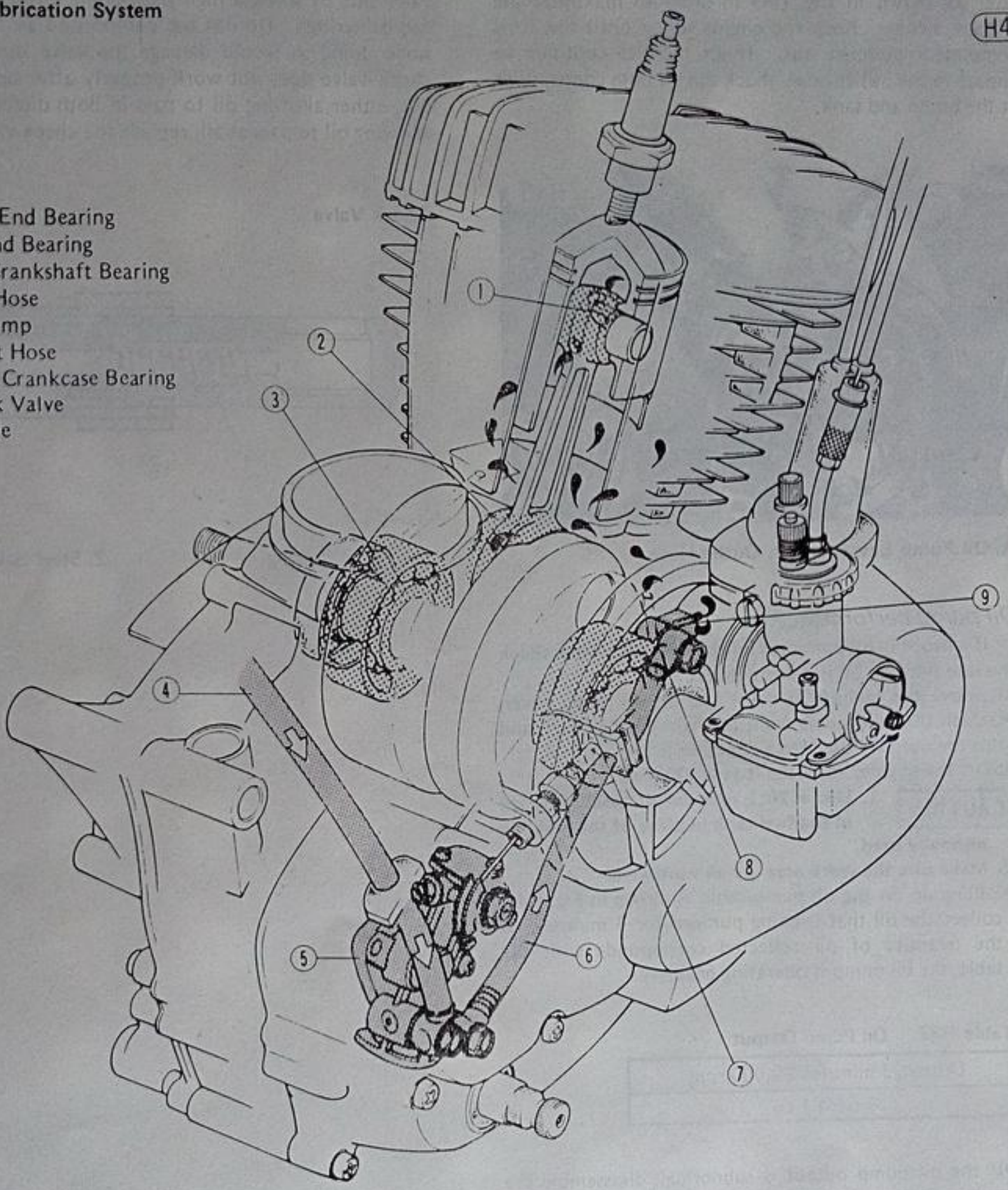
Table H36 Oil Seals

Left Crankcase Half			Right Crankcase Half		Rotary Valve Cover	Engine Sprocket Cover
Crankshaft	Output Shaft	Shift Shaft	Kick Shaft	Tachometer Pinion	Crankshaft	Shift Shaft
DM20407	SC25376	SB12205	DM14257	MY101505	DM25407	GM12185

Engine Lubrication System

H41

1. Small End Bearing
2. Big End Bearing
3. Left Crankshaft Bearing
4. Inlet Hose
5. Oil Pump
6. Outlet Hose
7. Right Crankcase Bearing
8. Check Valve
9. Nozzle



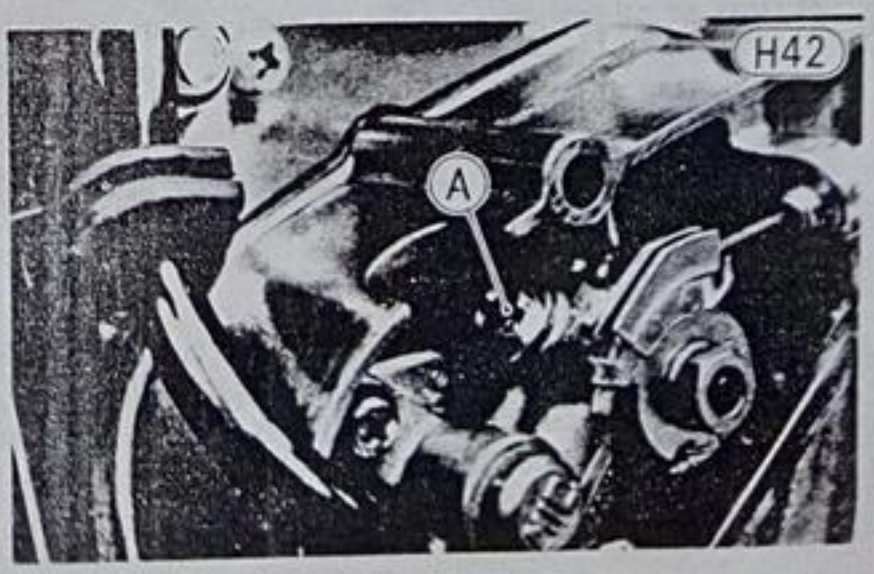
ENGINE LUBRICATION

Bleeding the oil pump

When either of the oil pump hoses has been removed, air may become trapped inside, which will obstruct oil flow. Check that there is plenty of engine oil in the oil tank.

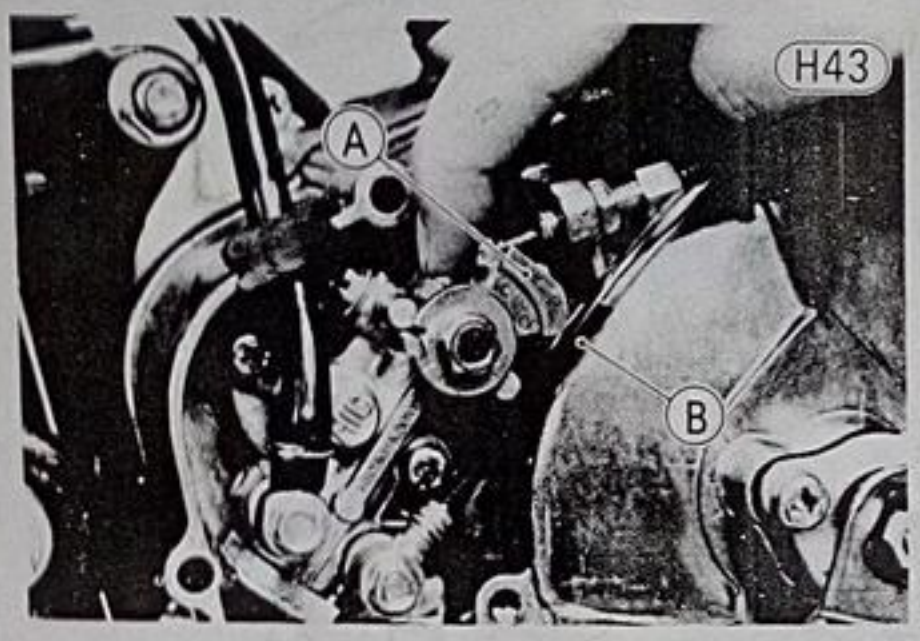
Bleed the air from the inlet hose and oil pump body by backing out the bleed valve on the oil pump body a couple of turns (Fig. H42). Leave it until the oil flows out of the bleed valve, and tighten the valve securely. Check that the banjo bolts are tight, and wipe off the spilled oil.

CAUTION **To avoid possible engine damage, make sure the oil flows steadily without any air bubbles.**



A. Bleed Valve

Bleed the air from the outlet hose by idling the engine (below 2,000 rpm) while pulling up on the oil pump lever as shown in Fig. H43 in order to maximize the plunger stroke. Keep the engine idling until the air is completely pumped out. If air bubbles continue to appear in the outlet hose, check the oil hose connections at the pump and tank.



A. Oil Pump Lever **B. Outlet Hose**

Oil pump performance test

If a drops in oil pump performance is suspected, check the rate that the oil is being pumped.

- Remove the carburetor cover and the oil pump cover.
- Detach the banjo bolt from the right engine cover, and run the output hose into a container.
- Start the engine, and keep it at 2,000 rpm.

CAUTION

1. Use a 20:1 mixture of gasoline to oil in the fuel tank in place of the gasoline normally used.

2. Make sure the work area is well ventilated.

- Pulling up on the oil pump cable as shown in Fig. H43, collect the oil that is being pumped for 3 minutes. If the quantity of oil collected corresponds with the table, the oil pump is operating properly.

Table H37 Oil Pump Output

Output/3 minutes @2,000 rpm
3.6~4.1 cc

- If the oil pump output is subnormal, disassemble the pump, inspect the **O** rings and oil seal, and replace if defective. If the trouble is with parts other than the **O** rings or oil seal, replace the oil pump as an assembly. The pump is precision made with no allowance for replacement of individual parts.
- Install the banjo bolt.
- Install the oil pump cover and carburetor cover.

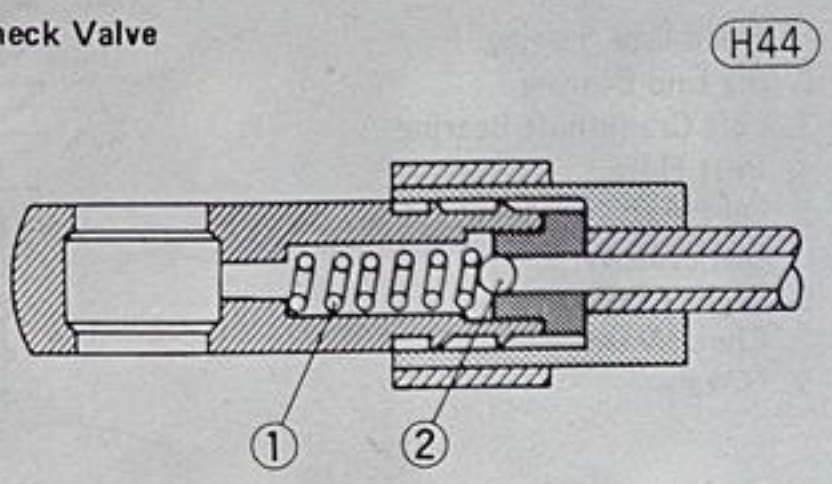
Oil pump damage

Disassemble the pump and inspect each part. If any part is damaged, replace the oil pump as an assembly. The pump is precision made with no allowance for replacement of individual parts.

Check valve

If oil will not pass through the check valve, clean the valve out by using a high flash-point solvent in a squirt can or syringe. Do not use compressed air on the valve since doing so would damage the valve spring. If the check valve does not work properly after being cleaned out, either allowing oil to pass in both directions or not allowing oil to pass at all, replace the check valve.

Check Valve



1. Spring 2. Steel Ball

Maintenance – Chassis

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FUEL TANK

Inspection and cleaning

If fuel leaks from the cap or from around the fuel tap, the cap gasket or tap O ring may be damaged. Visually inspect these parts, and replace them if necessary.

Examine the air vents in the cap to see if it is obstructed. Use compressed air to clear an obstructed vent.

Periodically inspect and clean the fuel tap filter and the sediment cup, using a high flash-point solvent and a fine brush (Pg. 19). If the filter is damaged, it must be replaced. If the sediment cup contains much water or dirt, the fuel tank and the carburetor may also need to be cleaned.

To clean out the fuel tank, disconnect the fuel hose, remove the fuel tap, and flush out the tank with a high flash-point solvent.

To drain the carburetor float bowl, remove the main jet holder at the bottom of the carburetor. For thorough cleaning, remove and disassemble the carburetor.

WHEELS

Tires

Tires, air pressure

The maximum recommended load in addition to vehicle weight is 110 kg.

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflating them to the standard pressure. Also, a certain variation from the standard pressure may be desired depending on road surface conditions (rain, ice, rough surface, etc).

Table J1 Tires, Air Pressure (measured when cold)

	Air Pressure		Size	Make, Type
Front	1.5 kg/cm² (21 psi)		2.50-18 4PR	Yokohama Y-954
Rear	Up to 97.5 kg	2.0 kg/cm² (28 psi)	2.75-18 4PR	Yokohama Y-955
	97.5~ 110 kg	2.25 kg/cm² (32 psi)		

Tire wear, damage

Tires must not be used if they are getting bald, or if they are cut or otherwise damaged. As the tire tread wears down, the tire becomes more susceptible to puncture and failure. 90% of tire failures occur during the last 10% of tire life.

Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage. Remove any imbedded stones or other foreign particles from the tread. Swelling or high spots indicate internal damage, requiring tire replacement unless the damage to the fabric is very minor.

Measure the depth of the tread with a depth gauge, and replace the tire if tread depth is less than the service limit.

Table J2 Tire Tread Depth

	Standard	Service Limit
Front	4.4 mm	1 mm
Rear	6.3 mm	2 mm

Rims, Spokes

Spoke breakage

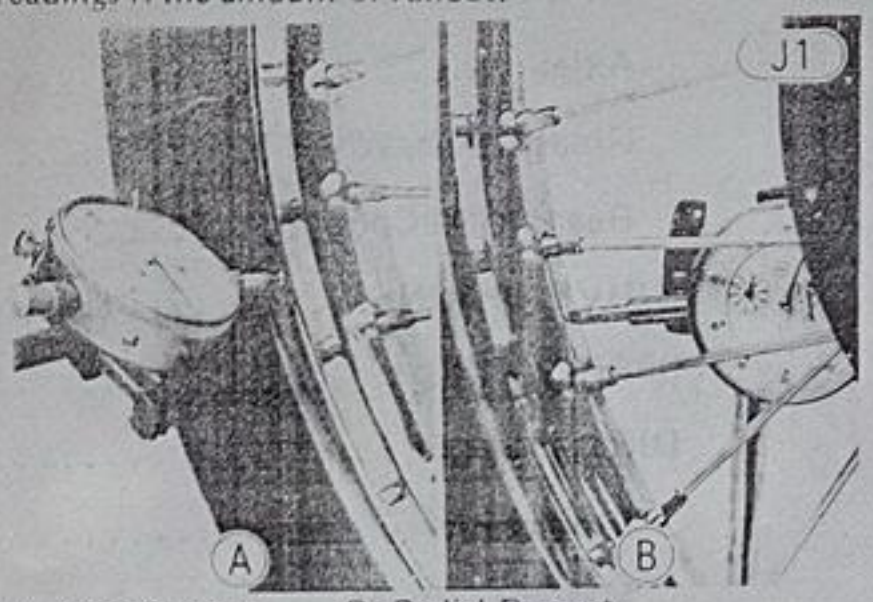
If any spoke breaks, it should be replaced immediately. A missing spoke places an additional load on the other spokes, which will eventually cause other spokes to break.

Periodically check that all the spokes are tightened evenly since they stretch a certain amount during use. Standard spoke tightening torque is 0.30 kg-m(26 in-lbs). Over-or under-tightening may cause breakage.

Rim runout

Set a dial gauge against the side of the rim, and rotate the wheel to measure axial runout. The difference between the highest and lowest dial readings is the amount of runout.

Set the dial gauge to the inner circumference of the rim, and rotate the wheel to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.



A. Axial Runout B. Radial Runout

Table J4 Rim Runout

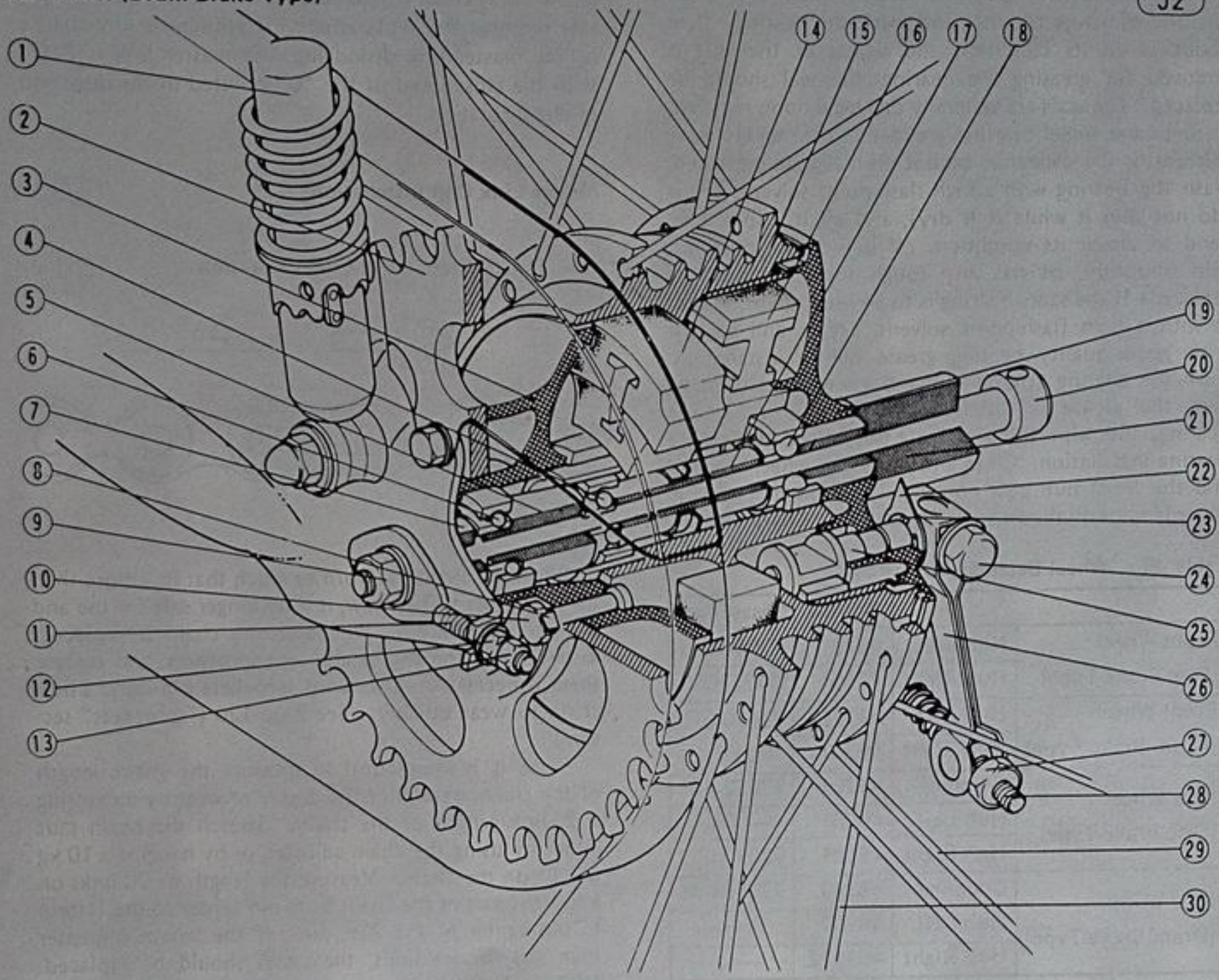
	Standard	Service Limit
Axial	under 0.5 mm	2 mm
Radial	under 0.8 mm	2 mm

A certain amount of rim warp (runout) can be corrected by recentering the rim. Loosen some spokes and tighten others to change the position of different parts of the rim. If the rim is badly bent, however, it should be replaced.

Table J3 Rim, Spoke Size

	Front (Disc Brake Type)		Front (Drum Brake Type)		Rear	
	Inner	Outer	Inner	Outer	Inner	Outer
Spoke	#10 x 184 x 98°	#10 x 184 x 86°	#10 x 164 x 101°	#10 x 164 x 82°	#10 x 171.5 x 100°	#10 x 171 x 86°
Rim	1.40 x 18		1.40 x 18W		1.60A x 18	

Rear Wheel (Drum Brake Type) J2



1. Shock Absorber
2. Rear Sprocket
3. Wheel Coupling
4. Ball Bearing
5. Coupling Sleeve
6. Ball Bearing
7. Coupling Collar
8. Double Washer
9. Axle Nut
10. Bolt
11. Chain Adjuster
12. Adjusting Nut
13. Locknut
14. Rubber Damper
15. Rear Hub
16. Brake Shoe
17. Distance Collar
18. Ball Bearing
19. Brake Panel
20. Rear Axle
21. Spacer
22. Wear Indicator
23. O Ring
24. Bolt
25. Camshaft
26. Cam Lever
27. Adjusting Nut
28. Brake Rod
29. Outer Spoke
30. Inner Spoke

Axles

Axle runout

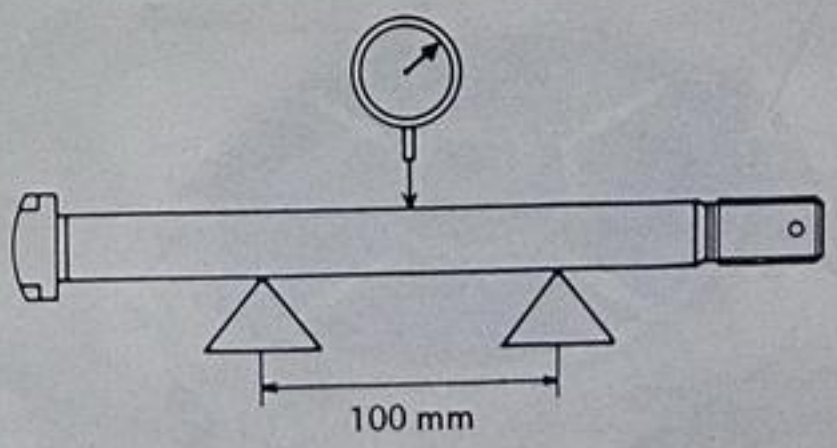
To measure axle runout, remove the axle, place it in V blocks that are 100 mm apart, and set a dial gauge to the axle at a point halfway between the blocks. Turn the axle to measure the runout. The amount of runout is the amount of dial variation.

If runout exceeds the service limit, straighten the axle or replace it. If the alxe cannot be straightened to within tolerance, or if runout exceeds 0.7 mm, replace the axle.

Table J5 Axle Runout/100 mm

	Standard	Service Limit
Front (Disc Type)	under 0.1 mm	0.2 mm
Front (Drum Type)	under 0.1 mm	0.2 mm
Rear	under 0.1 mm	0.2 mm

Axle Runout J3



Grease Seals, Wheel Bearings

Inspection and lubrication

If the grease seals are examined without removing the seals themselves, look for discoloration (indicating the

rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seals are generally damaged upon removal.

Since the wheel bearings are made to extremely close tolerances, the clearance cannot normally be measured. Wash the bearing with a high flash-point solvent, dry it (**do not spin it while it is dry**), and oil it. Spin it by hand to check its condition. If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced. If the same bearing is to be used again, re-wash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the hub before bearing installation. Clean and grease the wheel bearings and the front hub gear housing, (speedometer gear) in accordance with the Periodic Maintenance Chart (Pg. 10).

Table J6 Wheel Bearings, Grease Seals

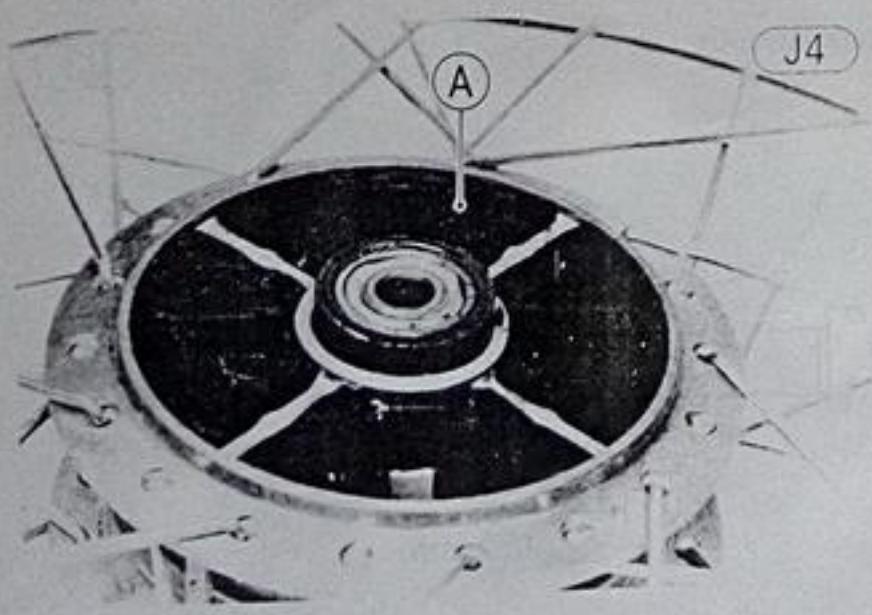
		Bearing	Grease Seal
Front Wheel (Disc Brake Type)	Hub Left	#6301	92050-059
	Hub Right	#6201	D425509
Front Wheel (Drum Brake Type)	Hub Left	#6301Z	92050-010
	Hub Right	#6301	92050-01
Rear Wheel (Disc Brake Type)	Coupling	#6203	92052-003
	Hub Left	#6201	———
	Hub Right	#6301	92050-059
Rear Wheel (Drum Brake Type)	Coupling	#6203	92052-003
	Hub Left	#6201	———
	Hub Right	#6301Z	———

Rear Wheel Coupling

Damper inspection

Remove the rear wheel coupling (Pg. 83), and inspect the rubber dampers.

Replace the dampers if they appear damaged or deteriorated.

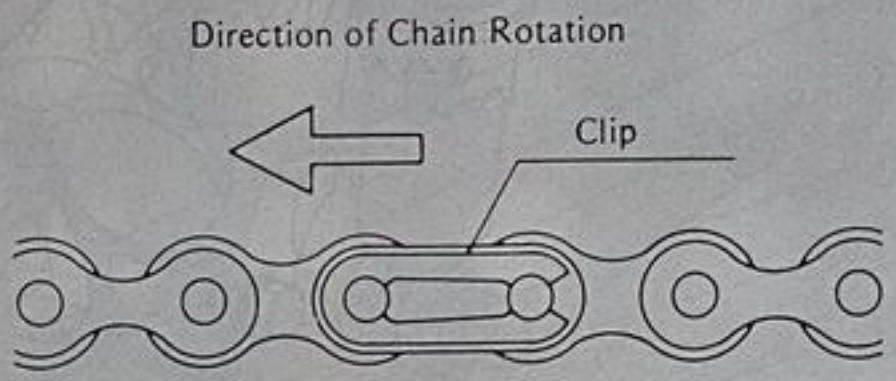


A. Rubber Damper

DRIVE CHAIN

The drive chain used to transmit the engine power to the rear wheel is the ENUMA EK428-G 110 link chain. This chain is provided with a master link to facilitate removal and replacement. To minimize any chance of the master link dislodging, the master link is fitted with the closed end of the "U" pointed in the direction of chain rotation.

Master Link Clip Installation J5

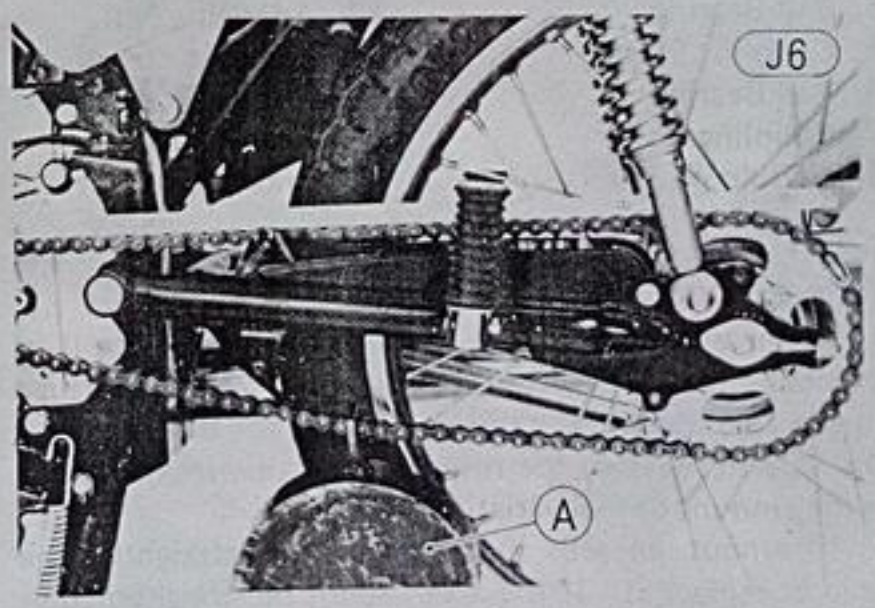


Wear

When the chain has worn so much that it is more than 2% longer than when new, it is no longer safe for use and should be replaced. Whenever the chain is replaced, inspect both the engine and rear sprockets, and replace them if necessary. Overworn sprockets will cause a new chain to wear quickly. See Page 126 ("sprockets" section).

Since it is impractical to measure the entire length of the chain, determine the degree of wear by measuring a 20-link length of the chain. Stretch the chain taut either by using the chain adjuster, or by hanging a 10 kg weight on the chain. Measure the length of 20 links on a straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. If the length is greater than the service limit, the chain should be replaced.

NOTE: The drive system was designed for use with the standard chain. For maximum strength and safety, the standard chain must be used for replacement.



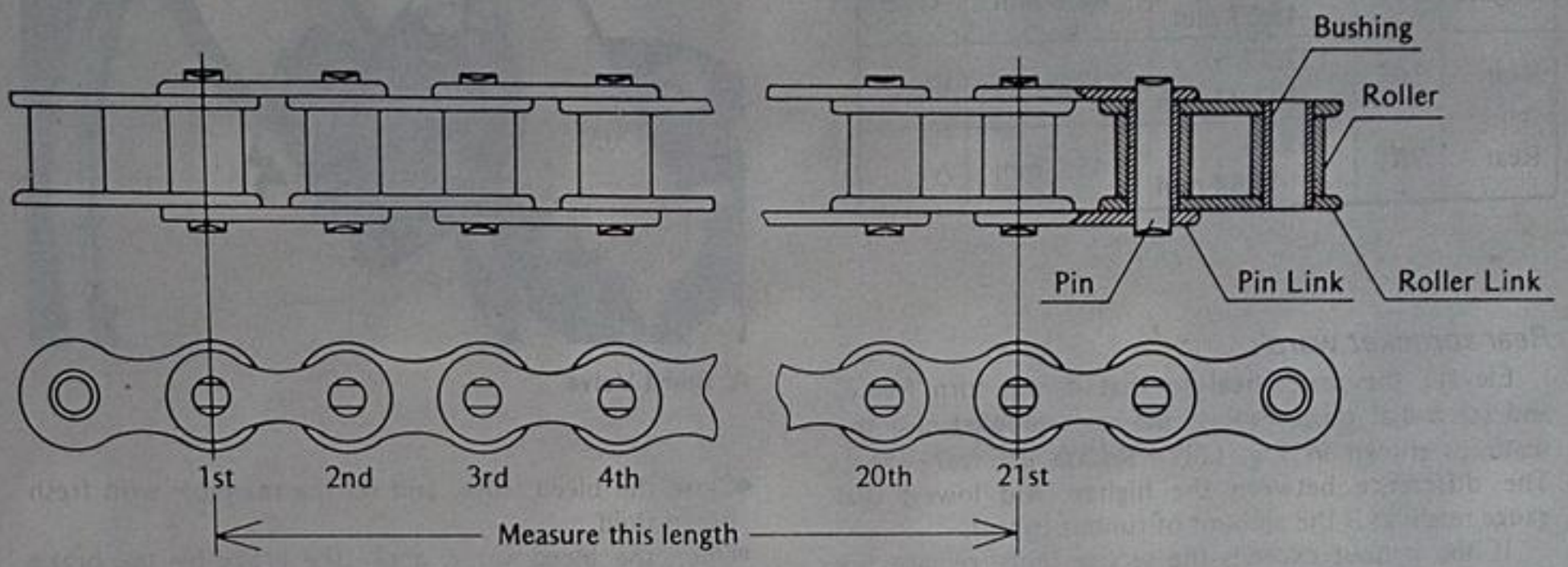
A. 10 kg Weight

Table J7 Drive Chain 20-link Length

Standard	Service Limit
254 mm	259 mm

Drive Chain

J7



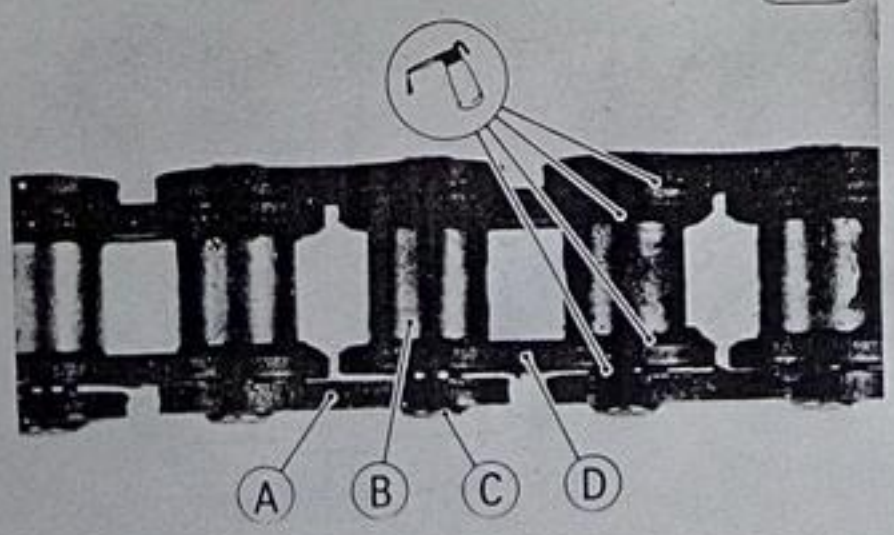
Lubrication

In order for the chain to function safely and wear slowly, it should be properly lubricated in accordance with the Periodic Maintenance Chart (Pg. 10). Lubrication is also necessary after riding through rain or on wet roads, or any time that the chain appears dry. Anytime that the motorcycle has been washed, the chain should be adequately lubricated on the spot in order to avoid rust.

The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication. If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication. Apply the oil to the sides of the rollers and between the side plates of the links so that oil will penetrate to the pins and bushings where most wear takes place. Wipe off any excess oil.

Dirt will cling to the oil and act as an abrasive, accelerating chain wear. Whenever the chain becomes particularly dirty, it must be cleaned in kerosene and then soaked in a heavy oil. Shake the chain while it is in the oil so that oil will penetrate to the inside of the rollers.

J8



A. Pin Link
B. Roller
C. Pin
D. Roller Link

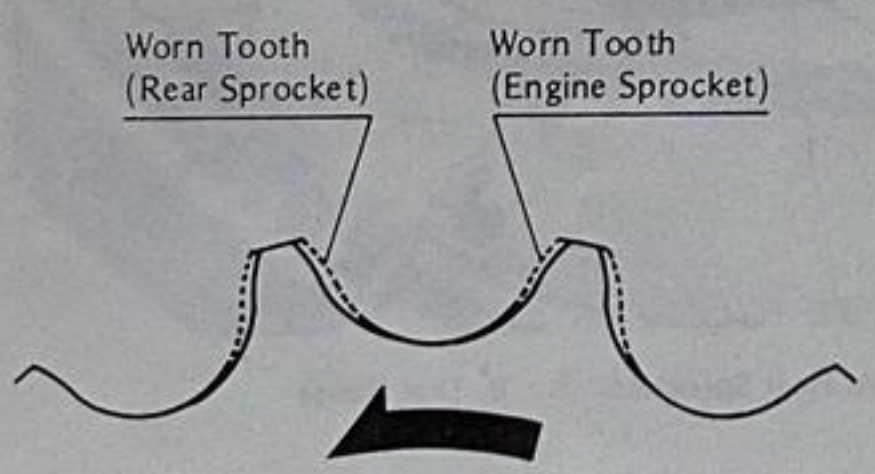
SPROCKETS

Sprocket wear

Visually inspect the sprocket teeth. If they are worn as illustrated, replace the sprocket.

Sprocket Teeth

J9

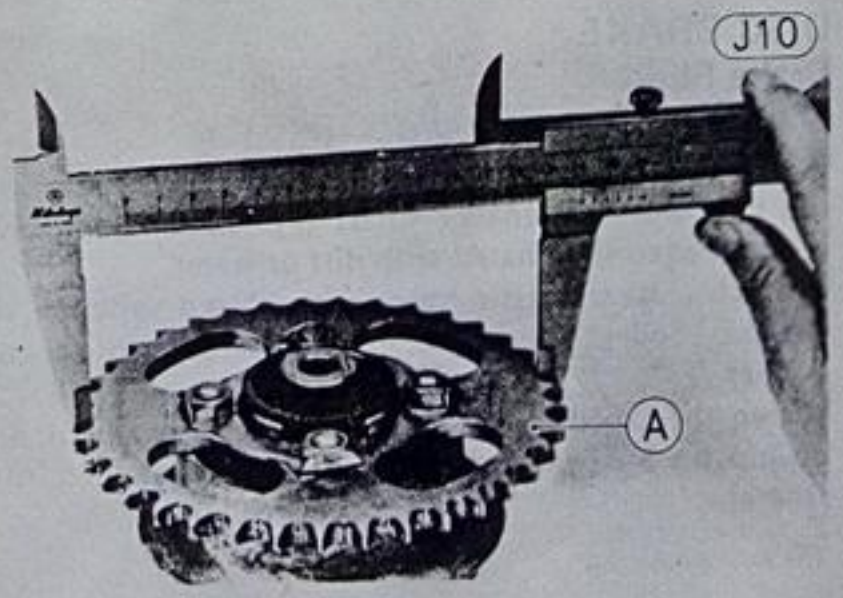


Direction of rotation

Measure the diameter of the sprocket at the base of the teeth. If the sprocket is worn down to less than the service limit, replace the sprocket.

NOTE: If a sprocket requires replacement, the chain is probably worn also. Upon replacing a sprocket, inspect the chain.

J10



A. Rear Sprocket

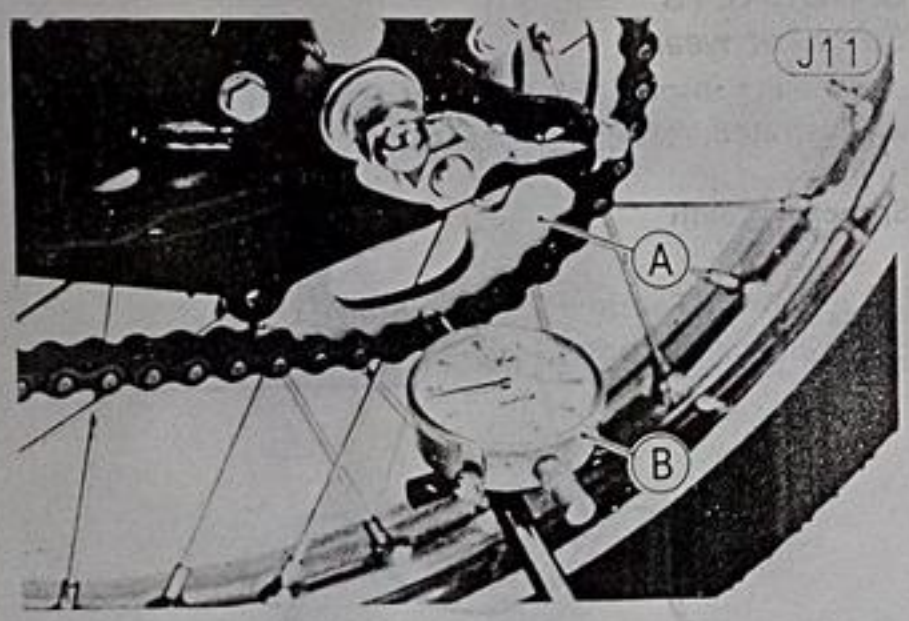
Table J8 Sprocket Diameter

		Standard	Service Limit	Model
Engine	14T	48.37 ~ 48.57 mm	48.0 mm	A1, B1
Rear	36T	137.27 ~ 137.77 mm	137.0 mm	B1
Rear	38T	145.34 ~ 145.84 mm	145.0 mm	A1

Rear sprocket warp

Elevate the rear wheel so that it will turn freely, and set a dial gauge against the rear sprocket near the teeth as shown in Fig. J11. Rotate the rear wheel. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

If the runout exceeds the service limit, replace the rear sprocket.



A. Rear Sprocket B. Dial Gauge

Table J9 Rear Sprocket Warp

Sprocket	Service Limit
under 0.3 mm	0.5 mm

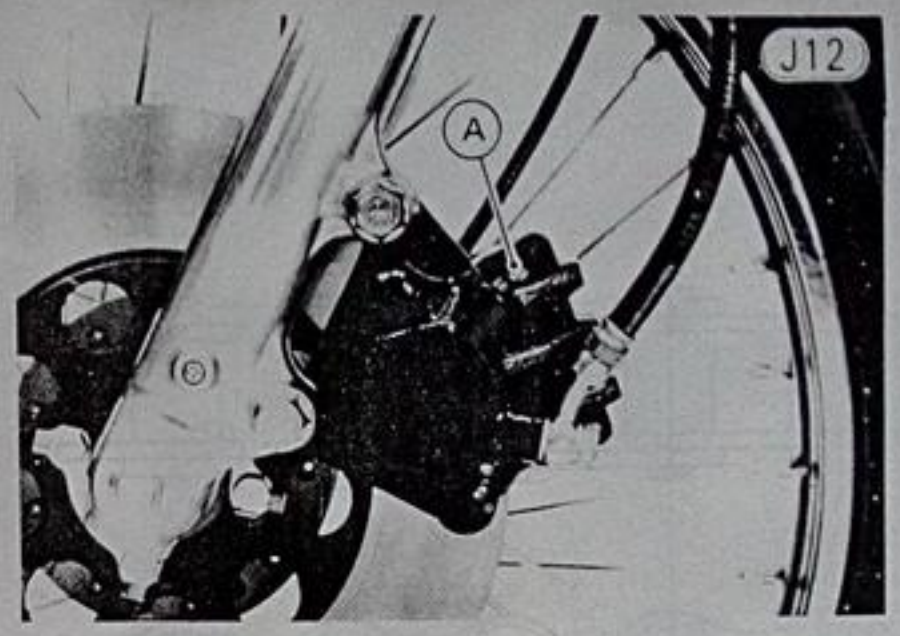
DISC BRAKE

Brake Fluid

Changing the brake fluid

The brake fluid should be changed in accordance with the Periodic Maintenance Chart (Pg. 10) and whenever it becomes contaminated with dirt or water.

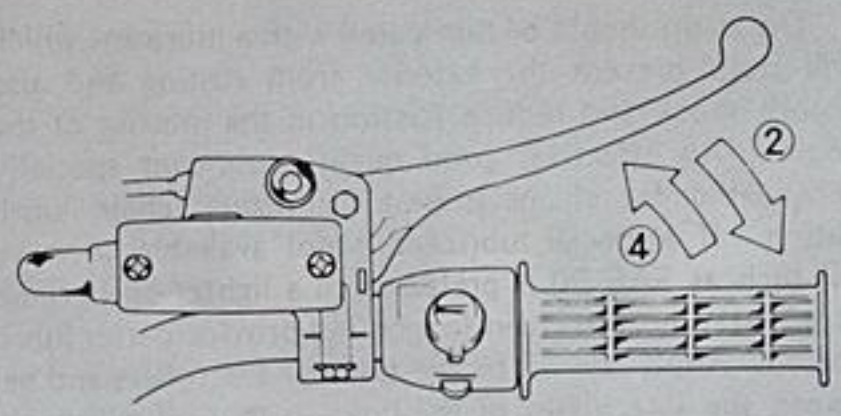
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Open the bleed valve (counterclockwise to open), and pump the brake lever until all the fluid is drained from the line.



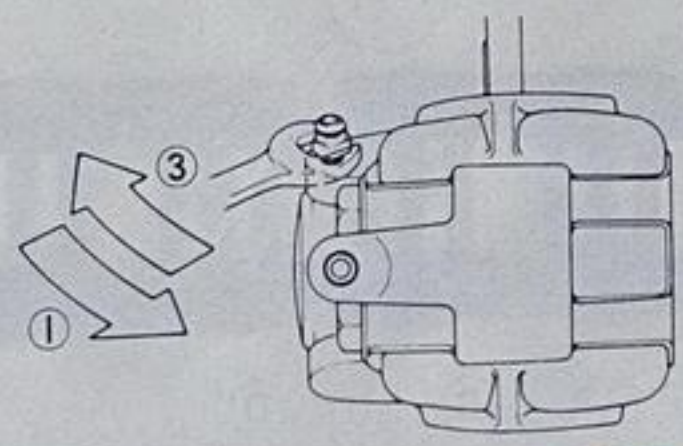
A. Bleed Valve

- Close the bleed valve, and fill the reservoir with fresh brake fluid.
- Open the bleed valve, apply the brake by the brake lever, close the valve with the brake held applied, and then quickly release the lever. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose. Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.
- Bleed the air from the lines (Pg. 117).

Filling Up the Brake Line J13



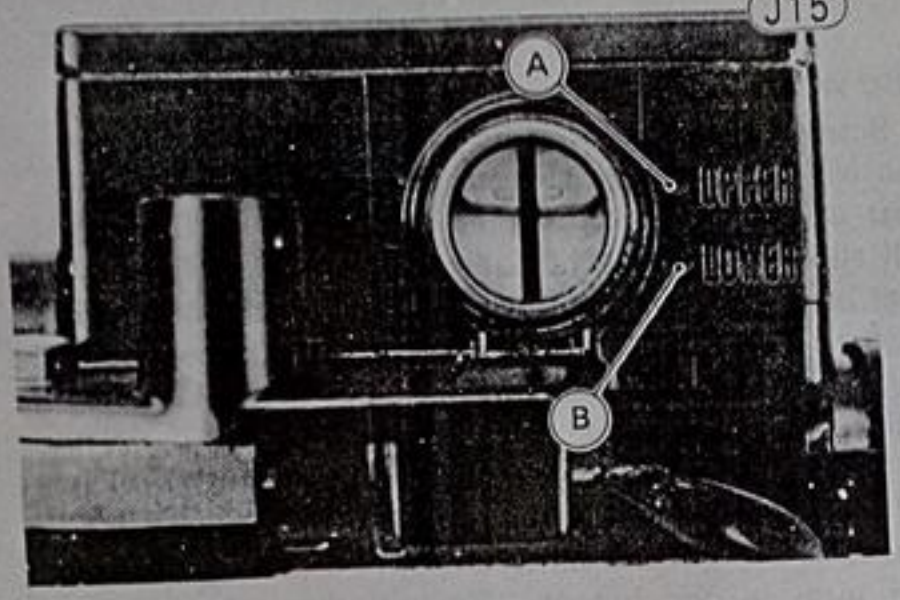
1. Open the bleed valve.
2. Apply the brake, keeping the brake applied.
3. Close the bleed valve.
4. Then quickly release the brake.



and close the bleed valve. Then release the lever. Repeat this operation until no more air can be seen coming out into the plastic hose. Check the fluid level in the reservoir every so often, replenishing it as necessary.

- When air bleeding is finished, install the rubber cap on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir (handlebar turned so that the reservoir is level).

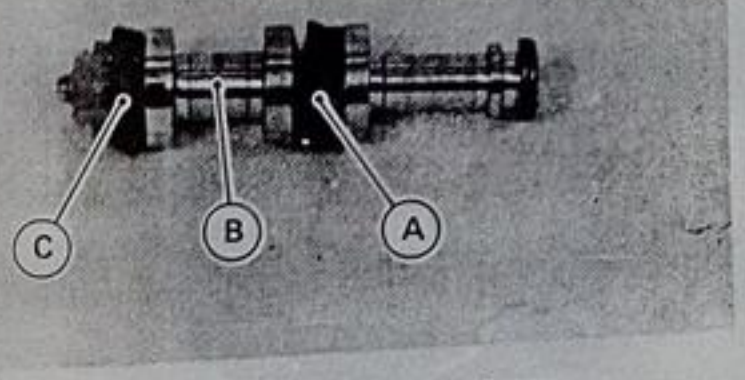
J15



A. Upper Level Line B. Lower Level Line

- Inspect the primary and secondary cups. If a cup is worn, damaged, softened (rotted), or swollen, replace piston assembly. If fluid leakage is noted at the brake lever, the piston assembly should be also replaced.

J16



A. Secondary Cup C. Primary Cup
B. Piston

- Check that the spring is not damaged. Replace the spring if damaged.
- Replace the dust seal if damaged.

Master Cylinder

Master cylinder parts wear

When master cylinder parts are worn or damaged, proper brake fluid pressure cannot be obtained in the line, and the brake will not hold.

If the small relief port becomes plugged, especially with a swollen or damaged primary cup, the brake pads will drag on the disc.

- Check that there are no scratches, rust or pitting on the inside of the master cylinder, and that it is not worn past the service limit.
- Check the piston for these same faults.

NOTE: In case of front master cylinder the cups and spring are part to the piston assembly. Replace the piston assembly if any one of the cups and spring requires replacement.

J17

A. Spring B. Dust Seal

Table J11 Master Cylinder Parts

	Front	
	Standard	Service Limit
Cylinder Inside Diameter	14.000 ~ 14.063 mm	14.08 mm
Piston Outside Diameter	13.957 ~ 13.984 mm	13.90 mm
Primary Cup Outside Diameter	14.2 ~ 14.6 mm	14.1 mm
Secondary Cup Outside Diameter	14.65 ~ 15.15 mm	14.5 mm

Caliper

Caliper parts wear

Inspect the pads for wear. If either pad is worn down through the bottom of the notch, replace both pads as a set. If any grease or oil spills on the pads, wash it off with trichloroethylene or a high flash-point solvent. Do not use one which will leave an oily residue. If the oil cannot be thoroughly cleaned off, replace the pads.

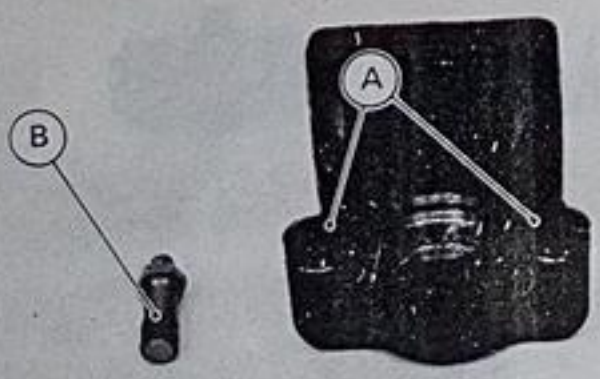
J18

A. Notch

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

Replace the fluid seal under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Check the dust covers and damper on the caliper shafts, and replace any that are cracked, worn, swollen or otherwise damaged. Also, replace all covers and damper every other time the pafs are changed.

J19



A. Dust Covers **B. Damper**

Measure the cylinder inside diameter and piston outside diameter.

Replace the cylinder and piston if they are worn out of tolerance, badly scored, or rusty.

Table J12 Caliper Parts

		Standard	Service Limit
Front	Cylinder Dia.	38.10~38.15 mm	38.4 mm
	Piston Dia.	37.97~38.02 mm	37.7 mm

Brake line damage

The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained.

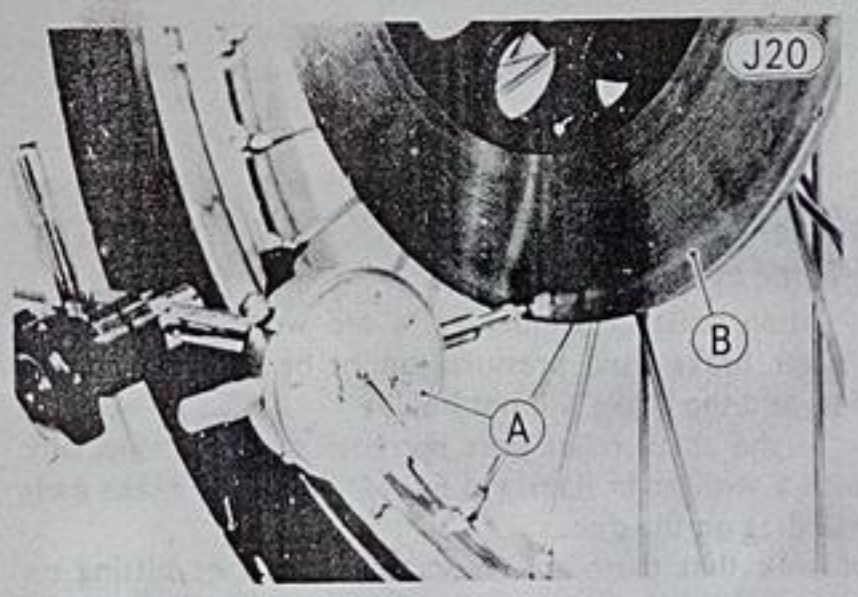
Bend and twist the rubber hose while examining it. Replace it if any cracks or bulges are noticed.

Disc wear, warp

Besides wearing down, the disc may warp. A warped disc will cause the brake pads to drag on the disc and wear down both the pads and disc quickly. Dragging will also cause overheating and poor braking efficiency. Poor braking can also be caused by oil on the disc. Oil on the disc must be cleaned off with trichloroethylene or a high flash-point solvent. Do not use one which will leave an oily residue.

Jack up the motorcycle so that the front wheel is off the ground, and turn the handlebar fully to one side. Set up a dial gauge against the front disc as illustrated and measure disc runout. Remove the jack, set the motorcycle up on its center stand, and then measure the rear disc runout. If runout exceeds the service limit, replace the disc.

J20



A. Dial Gauge **B. Brake Disc**

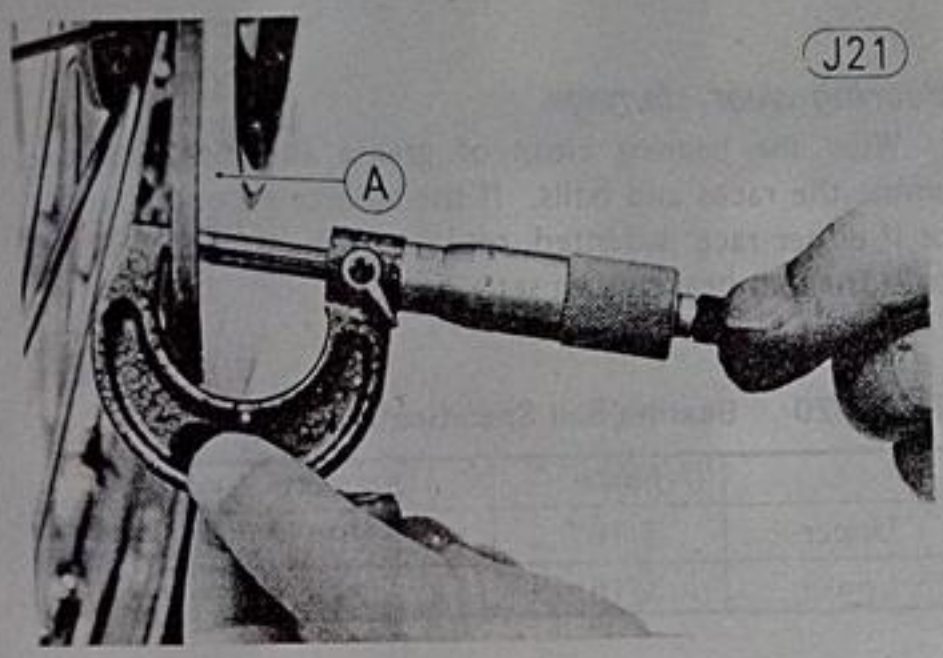
Table J13 Disc Runout

Standard	Service Limit
under 0.2 mm	0.3 mm

Measure the thickness of the disc at the point where it has worn the most. Replace the disc if it has worn past the service limit (Fig. J21).

Table J14 Disc Thickness

Standard	Service Limit
4.9~5.1 mm	4 mm



A. Brake Disc

DRUM BRAKE

WARNING Brake linings contain asbestos fiber. Inhalation of asbestos may cause serious scarring of the lungs and may promote other internal injury and illness, including cancer. Observe the following precautions when handling brake linings:

1. Never blow brake lining dust with compressed air.
2. If any components are to be cleaned, wash with detergent, then immediately discard the cleaning solution and wash your hands.
3. Do not grind any brake lining material unless a ventilation hood is available and properly used.

Brake drum wear

Measure the inside diameter of the brake drum with calipers to determine wear. Since uneven drum wear will decrease braking effectiveness, take measurements at a minimum of two places. If the drum is worn unevenly of if it is scored, turn the drum down on a brake drum lathe or replace the hub. (Do not run it down to the service limit, and do not turn it down if any diameter measurement exceeds the service limit). If any diameter measurement exceeds the service limit, replace the hub.

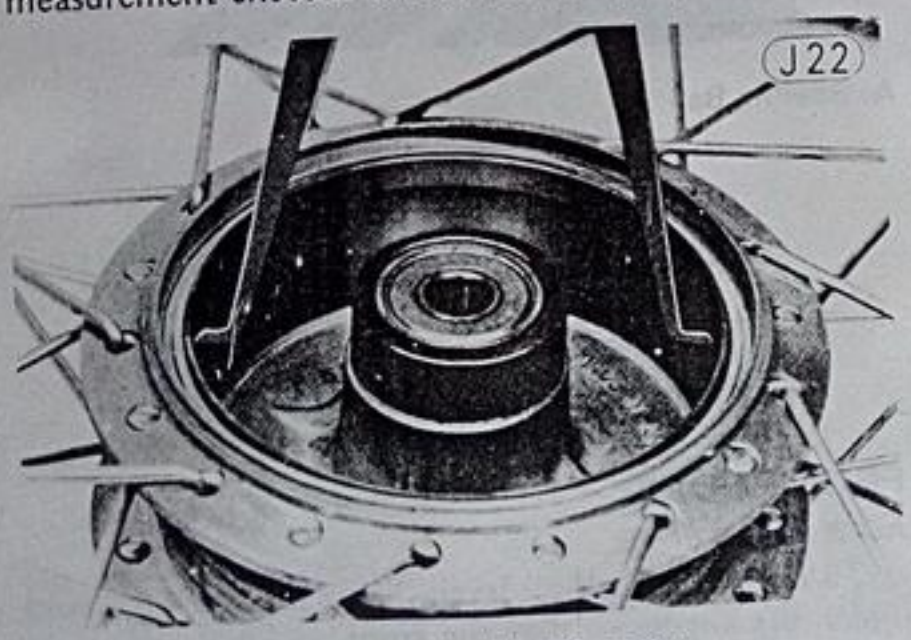


Table J15 Brake Drum Inside Diameter

	Standard	Service Limit
Front	130.00~130.16 mm	130.75 mm
Rear	110.000~110.087 mm	110.75 mm

Brake shoe lining wear

Check the thickness of the brake linings, and replace both shoes as a set if the thickness at any point is less than the service limit. If the thickness of the brake linings is sufficient, check the linings for uneven wear, and file or sand down any high spots. With a wire brush, remove any foreign particles imbedded in the lining surface. Wash off any oil or grease with a high flash-point solvent. Do not use one which will leave an oily residue. In case the linings are damaged or the surface cannot be restored by sanding and cleaning, the shoes must be replaced.

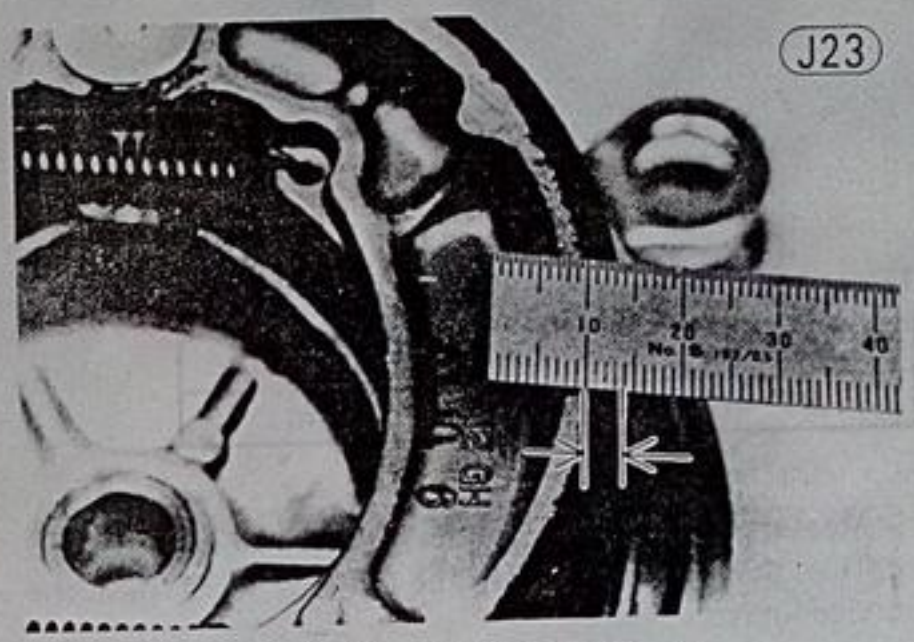


Table J16 Brake Shoe Lining Thickness

	Standard	Service Limit
Front	3.9~4.5 mm	2.5 mm
Rear	2.9~3.4 mm	1.7 mm

Brake shoe spring tension

If the brake springs become stretched, they will not pull the shoes back away from the drum after the brake lever or pedal is released, and the shoes will drag on the drum. Remove the springs, and check their free length with vernier calipers. If either is stretched beyond the service limit, replace both springs.

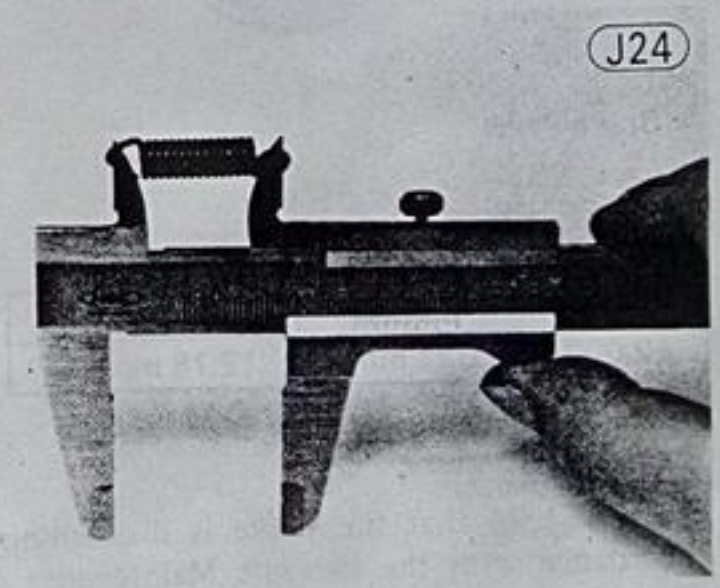


Table J17 Brake Spring Free Length

Standard	Service Limit
30.8~31.2 mm	34 mm

Camshaft, shaft hole wear

Excessive shaft to hole clearance will increase camshaft play and reduce braking efficiency.

Measure the shaft diameter with a micrometer, and replace it if it is worn down to less than the service limit.

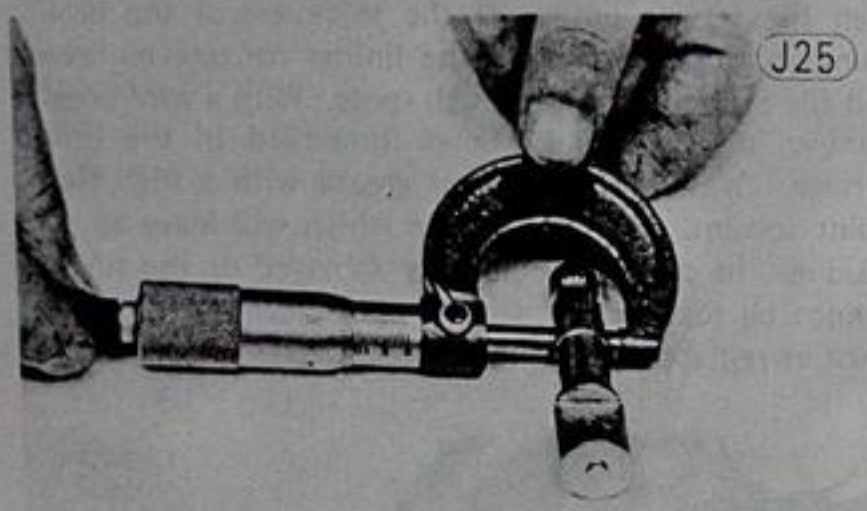
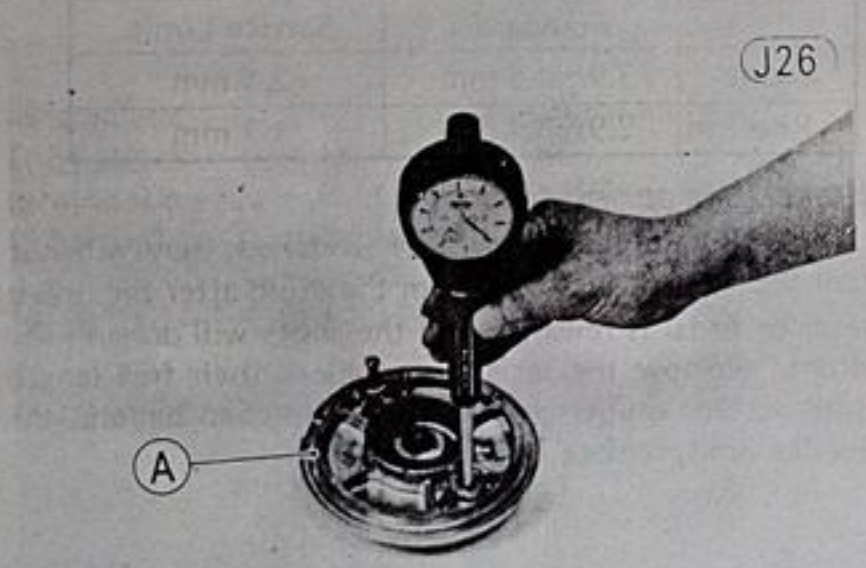


Table J18 Brake Camshaft Diameter

Standard	Service Limit
11.957~11.984 mm	11.83 mm

Measure the inside diameter of the camshaft hole, and replace the brake panel if the hole is worn past the service limit.



A. Brake Panel

Table J19 Camshaft Hole Diameter

Standard	Service Limit
12.000~12.027 mm	12.18 mm

Lubrication

Every time that the brake is disassembled, and in accordance with the Periodic Maintenance Chart (Pg. 10), wipe out the old grease, and re-grease the brake pivot points. Apply grease to the brake shoe anchor pin, spring ends, and cam surface of the camshaft, and fill the camshaft groove with grease. Do not get any grease on the brake shoe linings, and wipe off any excess grease so that it will not get on the linings or drum after brake assembly.

STEERING STEM

Steering stem warp

Examine the steering stem, and replace it if it is bent.

Bearing wear, damage

Wipe the bearing clean of grease and dirt, and examine the races and balls. If the balls or races are worn, or if either race is dented, replace both races and all the balls for that bearing as a set.

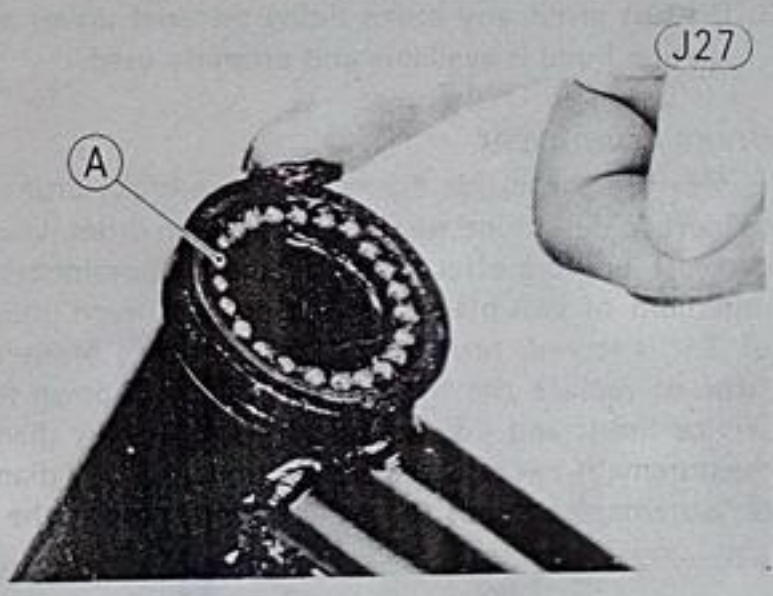
Table J20 Bearing Ball Specifications

	Size	Quantity
Upper	3/16"	23
Lower	3/16"	23

Bearing lubrication

In accordance with the Periodic Maintenance Chart (Pg. 10), and whenever the steering stem is disassembled, the steering stem bearings should be relubricated.

Wipe all the old grease off the races and balls, washing them in a high flash-point solvent if necessary. Replace the bearing parts if they show wear or damaged. Apply grease liberally to the upper and lower races, and stick the bearing balls in place with grease.



A. Bearing Ball

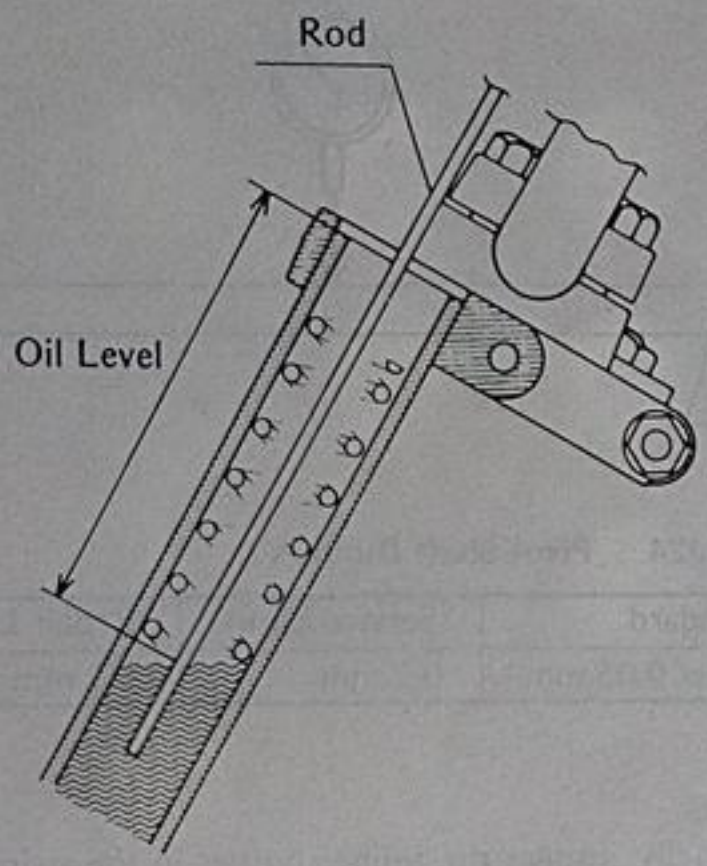
FRONT FORK

Fork oil level

To check the fork oil level, first place a jack or stand under the engine so that the front wheel is raised off the ground. Remove the top bolt from the inner tube. Insert a rod down into the tube, and measure the distance from the top of the stem head to the oil level. If the oil is below the correct level, add enough oil to bring it up to the proper level, taking care not to overfill.

Fork Oil Level

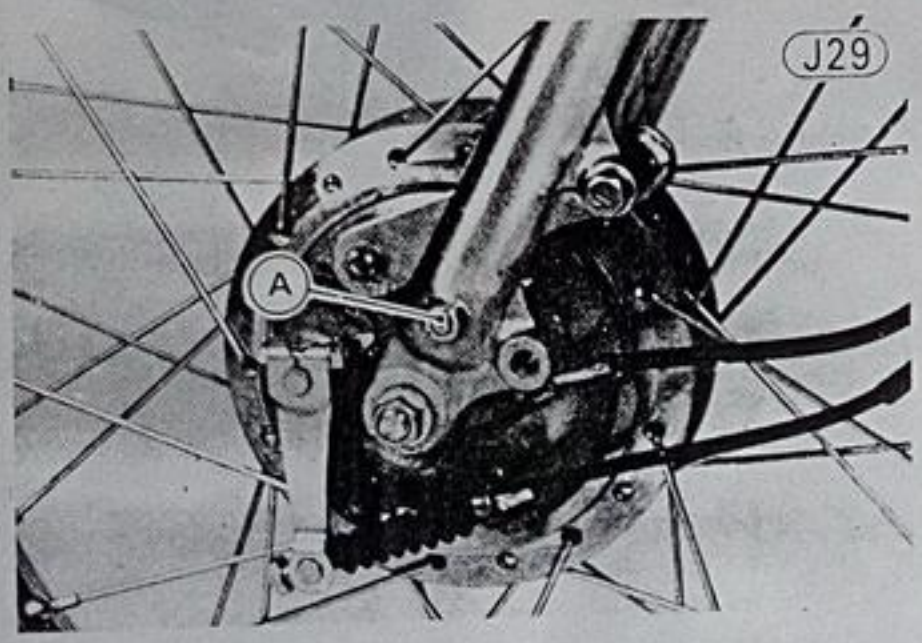
J28



Fork oil change

To drain out the old oil, remove the drain screw and gasket from the lower end of the outer tube. With the front wheel on the ground and the front brake fully applied push down on the handlebar a few times to pump out the oil. Install the drain screw and gasket, remove the top bolt from the inner tube, and pour in the type and amount of oil specified in Table J21. Then check the oil level. If the oil is below the specified level, add oil and re-check the oil level.

NOTE: After the front fork oil is changed, before checking the oil level, pump the front fork several times to expel air from the upper and lower chambers.



A. Drain Screw

Table J21 Fork Oil

Type	Filling fork oil capacity		Oil level (from upper surface of stem head)
	When charging oil	After disassembly and completely dry	
SAE 10W20	about 140 cc	145~153	318 mm

Spring tension

Since the spring becomes shorter as it weakens, check its free length to determine its condition. If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork leg balanced for motorcycle stability.

J30

Table J23 Fork Spring Free Length

Standard	Service Limit
464.5 mm	454.5 mm

Inner tube damage

Visually inspect the inner tube. If the inner tube is damaged, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced. Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

CAUTION **If the inner tube is bent or badly creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

SWING ARM

Pivot shaft

To measure the pivot shaft runout, set the pivot shaft on V blocks at the ends of the shaft, and set a dial gauge to the shaft halfway between the blocks. Turn the shaft to measure the runout. The amount of runout is the amount of dial variation. If the shaft runout exceeds the service limit, straighten it. If it cannot be straightened, or if the runout exceeds the repair limit, replace the shaft.

Pivot Shaft Runout (J31)

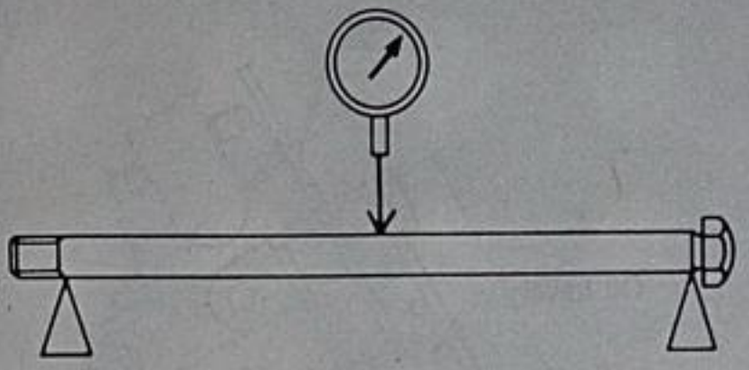


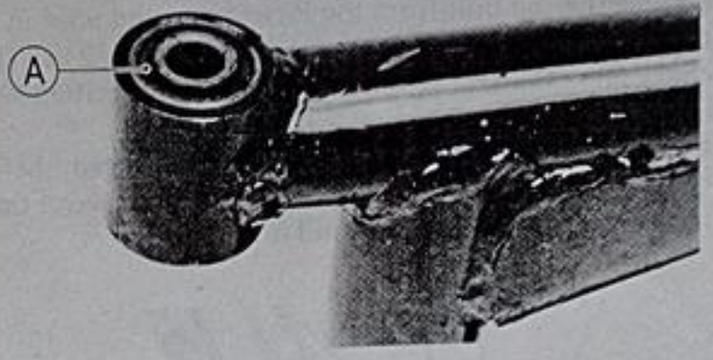
Table J24 Pivot Shaft Runout

Standard	Service Limit	Repair Limit
under 0.05 mm	0.2 mm	0.7 mm

Bushes

Visually inspect the rubber bushes in the swing arm. If they are deteriorated or damaged, they must be replaced.

(J32)



A. Rubber Bush

Maintenance – Electrical

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Rectifier 129
IGNITION SWITCH 129
LIGHTING SYSTEM 130
Headlight Circuit 130
Brake Light Circuit 130
Turn Signal Circuit 130
HORN CIRCUIT 131

E

IGNITION SYSTEM

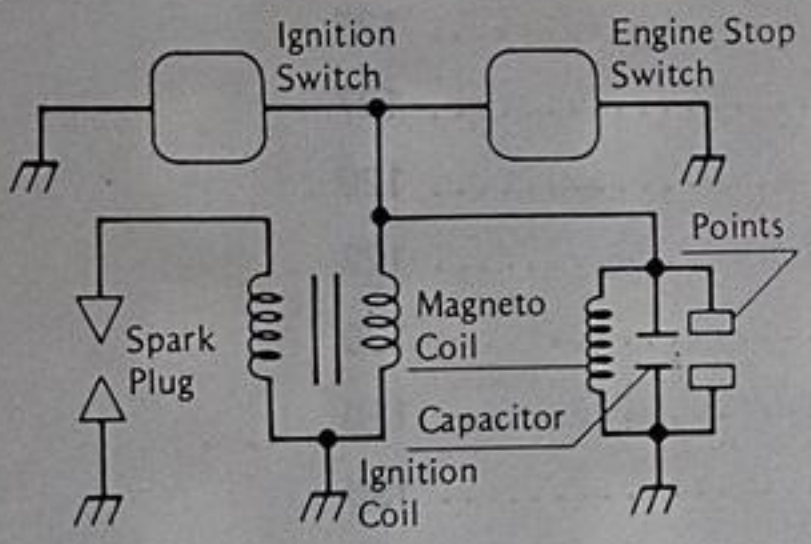
Contact breaker inspection

When the points become dirty, pitted, or burned, or if the spring weakens, the points will not make the contact necessary to produce a good spark, resulting in unstable idling, misfiring, or the engine not running at all. Inspect the contact breaker in accordance with the Periodic Maintenance Chart (Pg. 10), and repair or replace if necessary.

Clean the points with clean paper or cloth, or using an oil-free solvent. A business card soaked in trichloroethylene can be used to remove traces of oil. To repair light damage, use fine emery or an oilstone. If the points are badly worn down or damaged, or if the spring is weak, replace the contact breaker.

Whenever the contact breaker is inspected or replaced, apply a small amount of point cam grease to the felt to lubricate the cam. This will minimize wear of the contact breaker heel. Be careful not to apply so much grease that it can drop off or be thrown onto the points, which will cause the points to foul and burn.

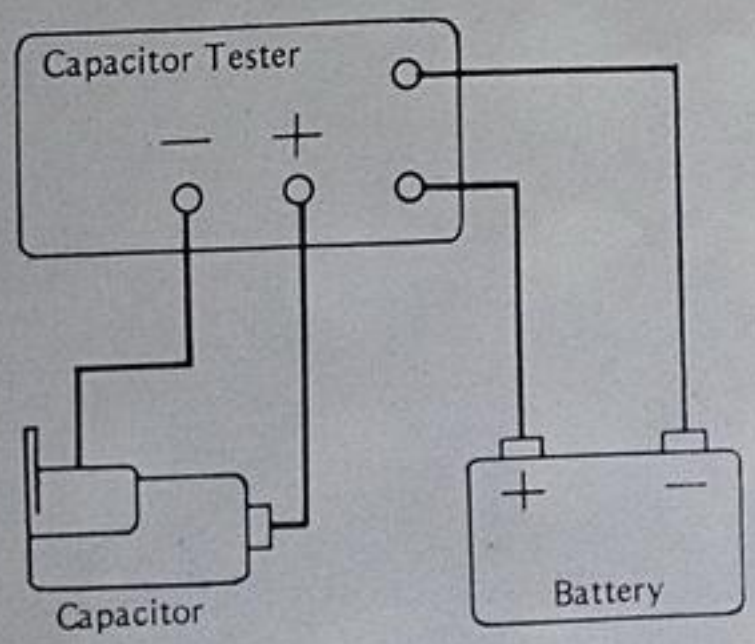
Ignition Circuit (K1)



Capacitor inspection

The capacitor can usually be considered to be defective if a long spark is seen arcing across the points as they open or if the points are burned or pitted for apparent reason. Replace the capacitor any time it appears defective and whenever the contact breaker is replaced.
NOTE: For checking with a capacitor tester, capacitor specifications are: 0.25 ± 0.03 μfd., 1,000 WVDC.

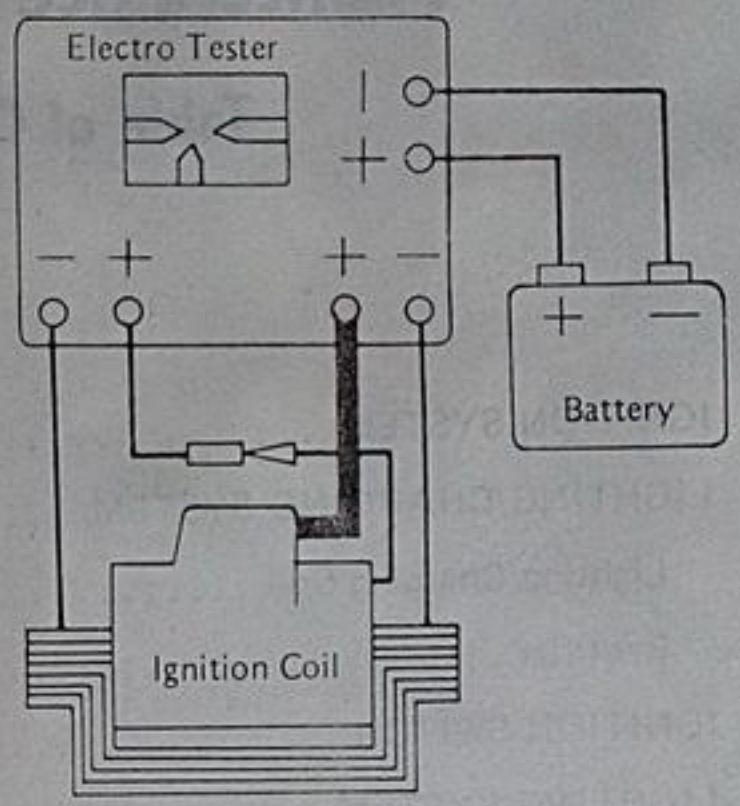
Capacitor Test (K2)



Ignition coil inspection

The most accurate test for determining the condition of the ignition coil is made with the Kawasaki electrotester. The ignition coil must be connected to the tester in accordance to the tester directions and should produce at least a 5 mm spark. Since an electrotester other than the Kawasaki electrotester may produce a different arcing distance, the Kawasaki electrotester is recommended for a reliable result.

Ignition Coil Test (K3)

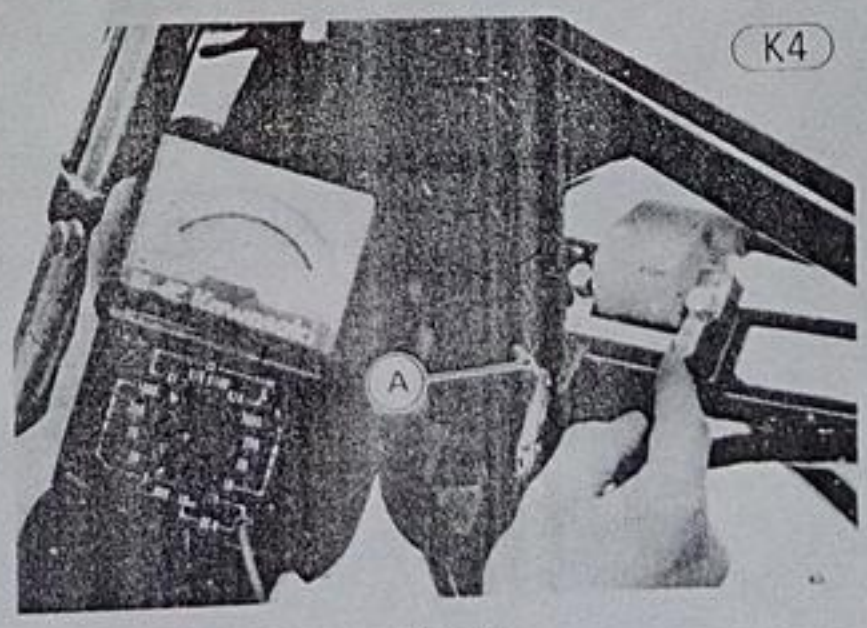


If an electrotester is not available, tne coil can be checked for a broken or a badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

To measure the ignition coil resistance, remove the fuel tank, remove the spark plug cap from the spark lead, and test the windings as shown in Table K1, Fig. K4, and Fig. K5.

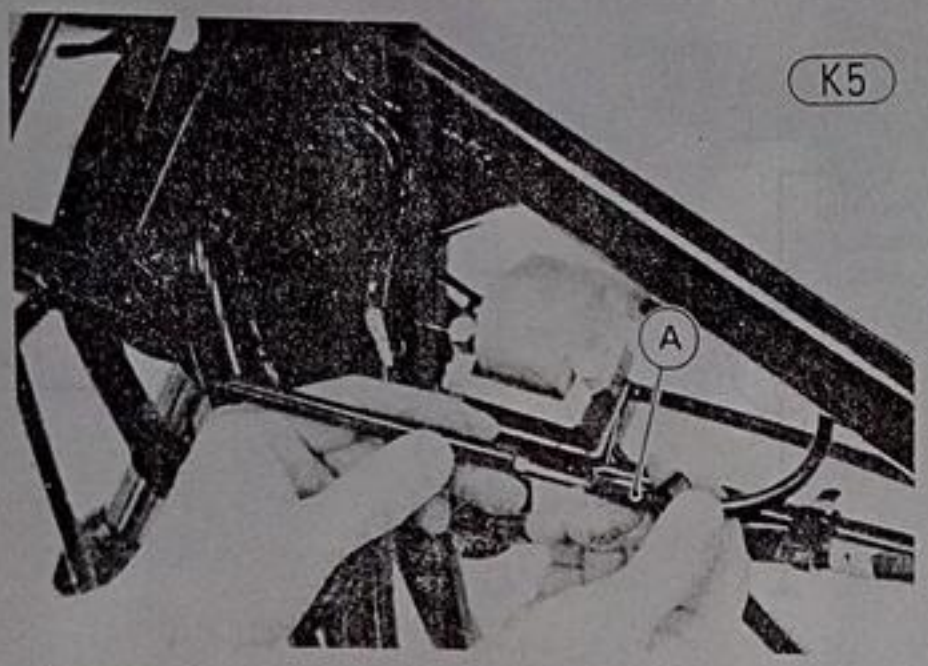
Table K1 Ignition Coil Resistance

	Meter	Reading
Primary Widing	x 1 Ω	0.4 – 1.2 Ω
Secondary Widing	x 1 kΩ	4 – 8 kΩ



K4

A. Primary Winding Lead (Black)



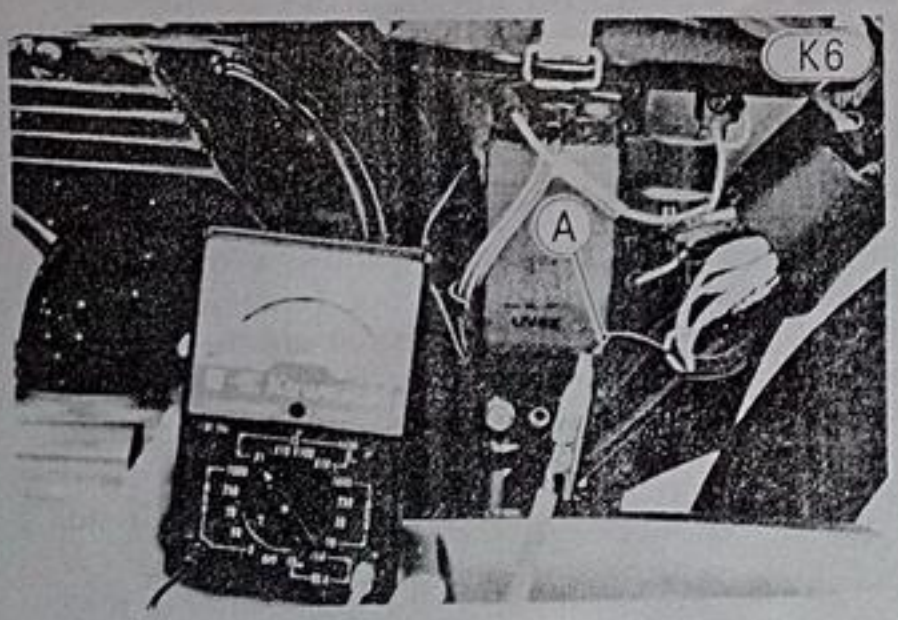
A. Spark Plug Lead

If the coil does not produce an adequate spark, or if either the primary or secondary winding does not have the correct resistance, replace the ignition coil.

Ignition magneto coil inspection

If the spark is weak or non-existent after the spark plug, ignition coil, points, and capacitor are found to be all functioning properly, the wiring all in good condition and properly connected, and the ignition timing correctly adjusted, the cause may be a short or open in the ignition magneto coil or a loss of magnetism in the flywheel magnets.

- Remove the left side cover, and disconnect the black lead connector.
- Rotate the magneto flywheel until the points open.
- Use an ohmmeter, and measure the resistance between the black lead and ground.



A. Black Lead

Table K2 Ignition Magneto Coil Resistance

Meter	Reading
x 1 Ω	1 – 3.5 Ω

If the resistance in this test is found to be less than the proper value, there is a short in the ignition magneto coil. Discontinuity indicates an open. In either case, replace the ignition magneto coil.

If, however, the coil checks out okay, the cause is probably a loss of magnetism in the flywheel, necessitating flywheel replacement.

LIGHTING/CHARGING SYSTEM

Lighting/Charging Coil

The condition of the coils is determined by measuring the voltage of the AC output and the voltage and amperage of the DC outputs. Before making this test, check the condition of the rectifier (Pg. 129). The battery must be charged if the voltage is less than 6 volts, and the rectifier replaced if defective. Also, check to see that all circuit loads (headlight, tail light etc.) are of the correct wattage.

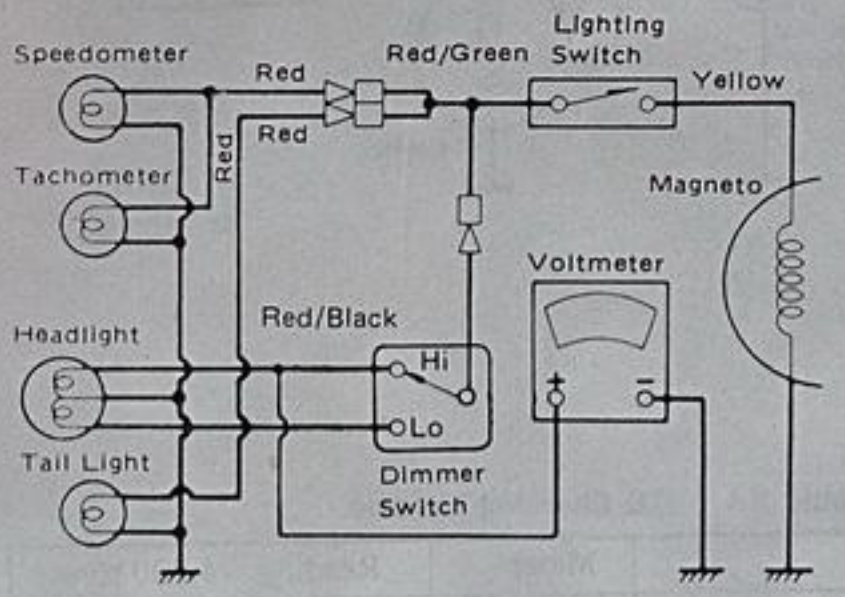
AC lighting voltage measurement

- Open the headlight housing, and connect a voltmeter, in parallel across the AC circuit load by connecting the + meter lead to red/black lead from the headlight and the – meter lead to ground.

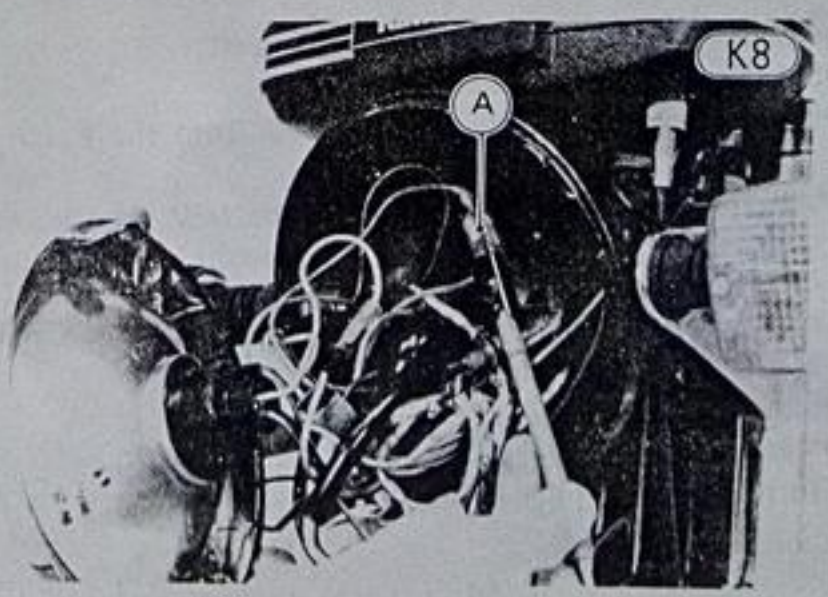
NOTE: Perform test with headlight connected.

- Switch on the headlight, tail light, tachometer light, and speedometer light by tunring the head light switch to the ON position and the dimmer switch to high beam.

AC Lighting Voltage Measurement K7



- Start the engine, set the engine at 4,000 rpm, and see that these lights are all lit.
- Measure the lighting voltage at 4,000 rpm. The voltage should show the value in Table K3.



A. Red/Black Lead

Table K3 AC Lighting Voltage

Meter	Reading @4,000 rpm
AC 10V	about 6.5V

- Stop the engine.
- Disconnect the meter leads.

DC charging voltage measurement

- To measure the DC voltage produced by the magneto, connect the voltmeter, set to 20V AC, across the battery – lead and the + lead to the battery + lead.
- Start the engine, and run it at 4,000 rpm.
- Measure the voltage at daytime and nighttime with turning the head light switch.

DC Charging Voltage (K9)

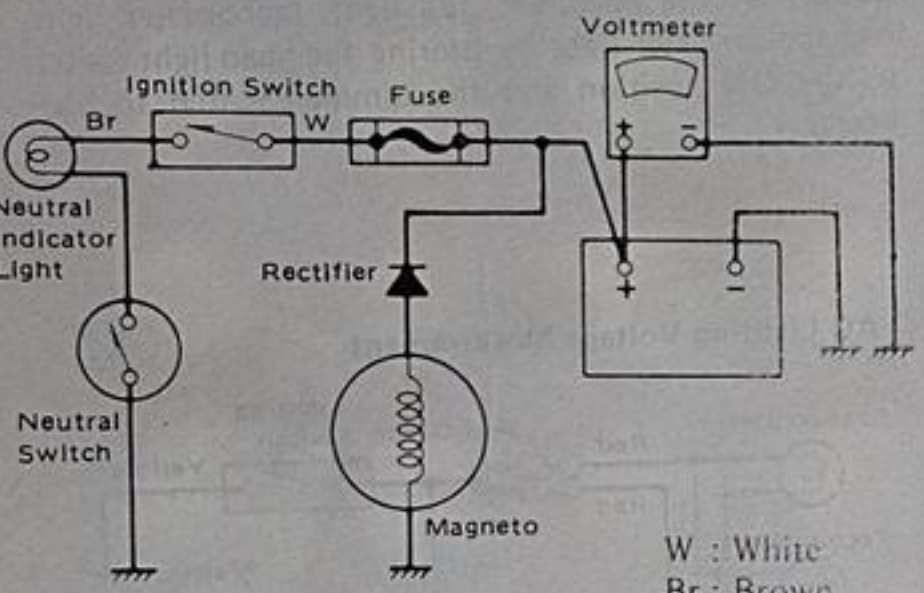


Table K4 DC Charging Voltage

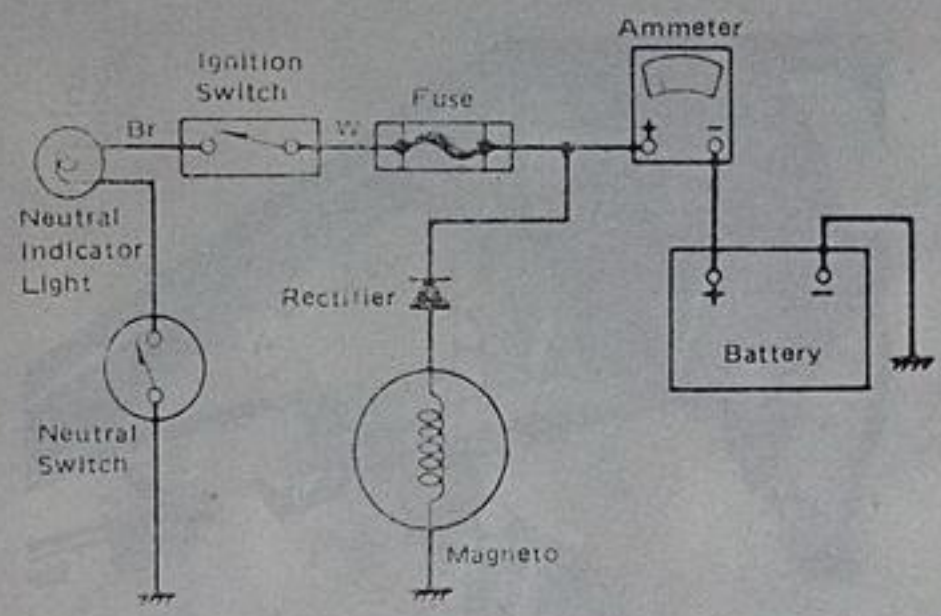
	Meter	Reading @4,000 rpm
Daytime	DC 20V	about 8.8 V
Nighttime		about 6.3~8.5V

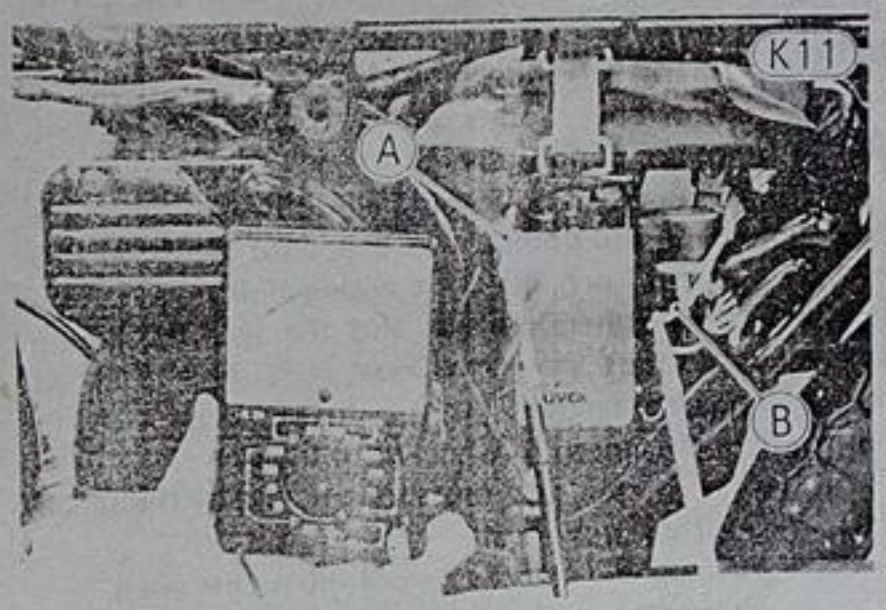
- Stop the engine.
- Disconnect the meter leads.

DC charging amperage measurement

- Set the ammeter to the 20A DC range.
- Disconnect the rectifier white lead from the battery + lead.
- Connect the – meter lead to the battery + lead, and connect the + meter lead to the white lead on the rectifier side. This puts the meter in series with the rectifier and battery so that the battery charging amperage can be measured.
- Start the engine, and run it at 4,000 rpm.
- Measure the amperage at daytime and nighttime with turning the head light switch.

DC Charging Amperage (K10)





A. Battery + Lead B. White Lead

Table K5 DC Charging Amperage

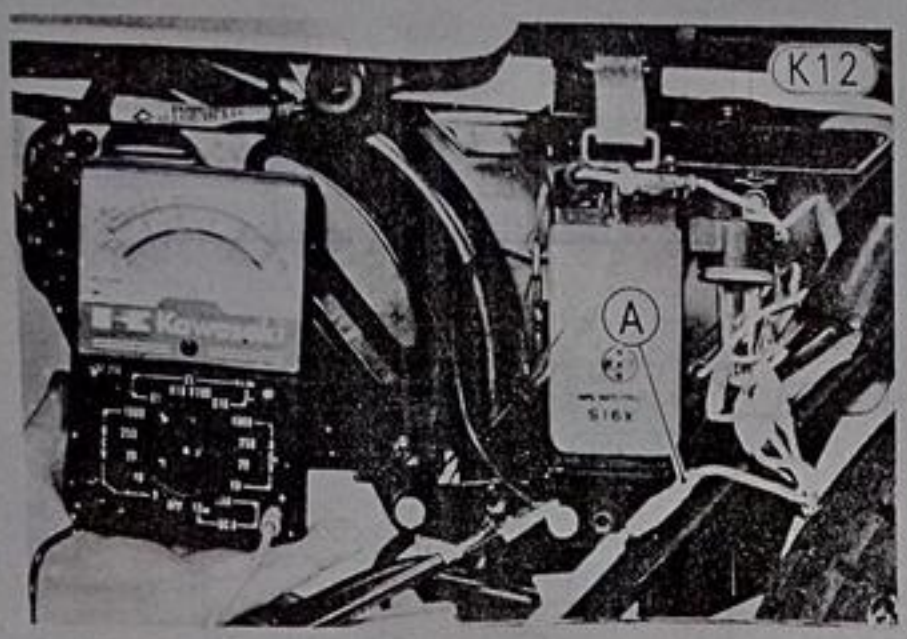
	Meter	Reading @4,000 rpm
Daytime	DC 20A	about 2.0A
Nighttime		about 0.5A

If any one of the above checks shows a low reading, the lighting/charging system is not functioning satisfactorily. Since the components outside the magneto itself have been determined to be in proper order, the trouble must be either with the coils or with the magneto flywheel.

- Disconnect the magneto output leads in the left side cover.
- Use an ohmmeter as shown in Table K6 and Fig. K12. Less than the proper resistance means a coil short; higher than the proper resistance or no reading at all means a break in the coils. In case of a short or break, replace the lighting/charging coils as a set.

Table K6 Lighting/Charging Coil Resistance

	Meter	Reading
Yellow Lead ↔ Ground	x 1 Ω	about 0.35Ω
Pink Lead ↔ Ground		about 0.4Ω
Light Blue Lead ↔ Ground		about 0.2Ω



A. Magneto Output Lead

If the coils have normal resistance, but the voltage and amperage checks show the lighting/charging system to be defective, then the permanent magnets in the flywheel have probably weakened, necessitating flywheel replacement.

Rectifier

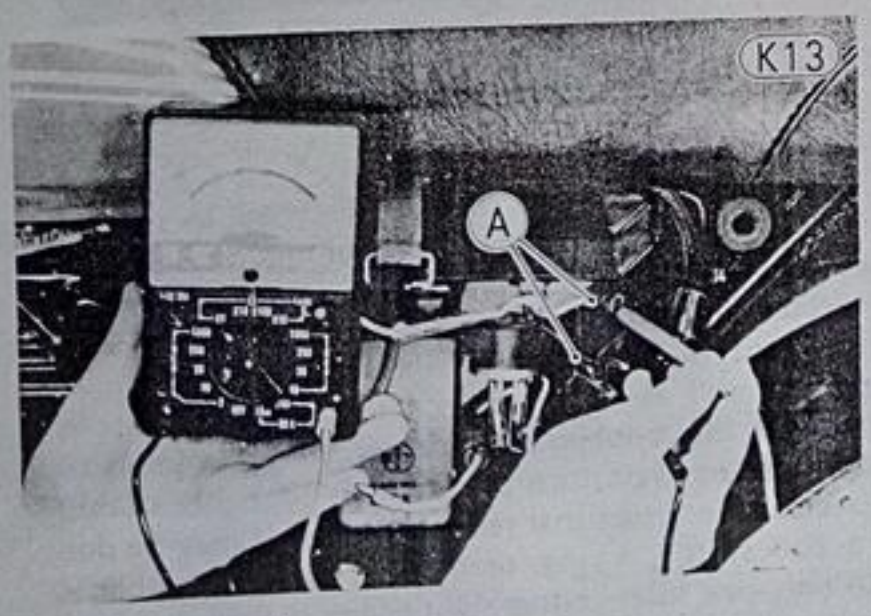
A defective rectifier can be readily detected with a resistance check.

NOTE: If the motorcycle is operated with the battery left disconnected, the rectifier will become damaged due to excessive inverse voltage.

The rectifier may become defective, however, and conduct in both directions (short) or not conduct at all (open circuit). In either case, the battery will discharge.

Inspection

With the engine off, disconnect the white and pink, rectifier leads from the rectifier. Use an ohmmeter, check the resistance between the white lead and pink lead. The resistance should be low in one direction and more than ten times as much in the other direction.



A. Rectifier Leads

NOTE: The actual meter reading varies with the meter used and with the individual rectifier, but generally speaking, the lower reading should be within 1/3 scale of zero ohms.

If the meter reads low or high in both directions, the rectifier is defective and must be replaced.

Table K7 Ignition Switch Connections

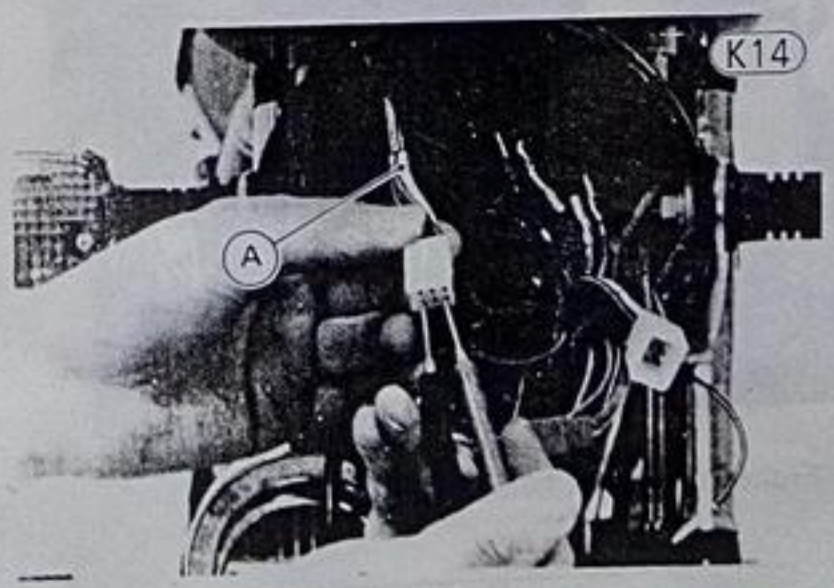
Lead	Ig.	Gnd.	Batt.	Horn
Color	Bk/W	Bk/Y	W	Br
OFF	○——	——○		
ON			○——	——○
Lock	○——	——○		

Color Code	
Bk	: Black
Bl	: Blue
Br	: Brown
LB	: Light Blue
R	: Red
W	: White
Y	: Yellow

IGNITION SWITCH

Testing the switch

Table K7 show the internal connections of the ignition switch for each switch position. To check the switch, disconnect the white 6-pin connector from the switch in the headlight housing, and use an ohmmeter to verify that there is no continuity between the leads that are not connected. If the switch has an open or short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement. If any parts are not repairable, the switch must be replaced as a unit.



A. Ignition Switch Leads

LIGHTING SYSTEM

Headlight Circuit

Headlight inspection

If the headlight does not light, check to see if the bulb has burned out or the fuse has blown. A blown fuse should be replaced. If the bulb and fuse are good, check the dimmer switch and head light switch. Table K9 shows the connections in the dimmer switch for both high and low beam. Disconnect the leads to the dimmer switch. Use an ohmmeter to see that only the connections shown in the table have continuity (zero ohms). If the switch has an open or a short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement. If any parts are not repairable, the switch must be replaced as a unit. If the procedure above does not remedy the problem, check the ignition switch, the wiring, and the magneto.

Table K9 Dimmer Switch Connections

Color	Red/Black	Red/Green	Red/Yellow
High Beam	●	●	
Low Beam		●	●

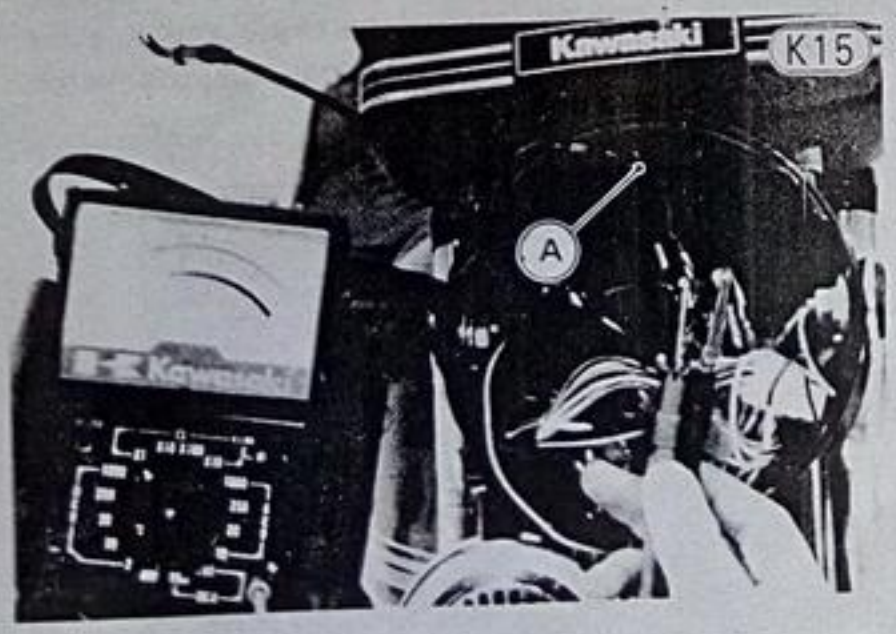
Tail light inspection

If the tail light does not go on when the circuit is closed, the filament is probably burned out. However, if the bulb is good, check the fuses, wiring, ignition switch, and battery.

Brake Light Circuit

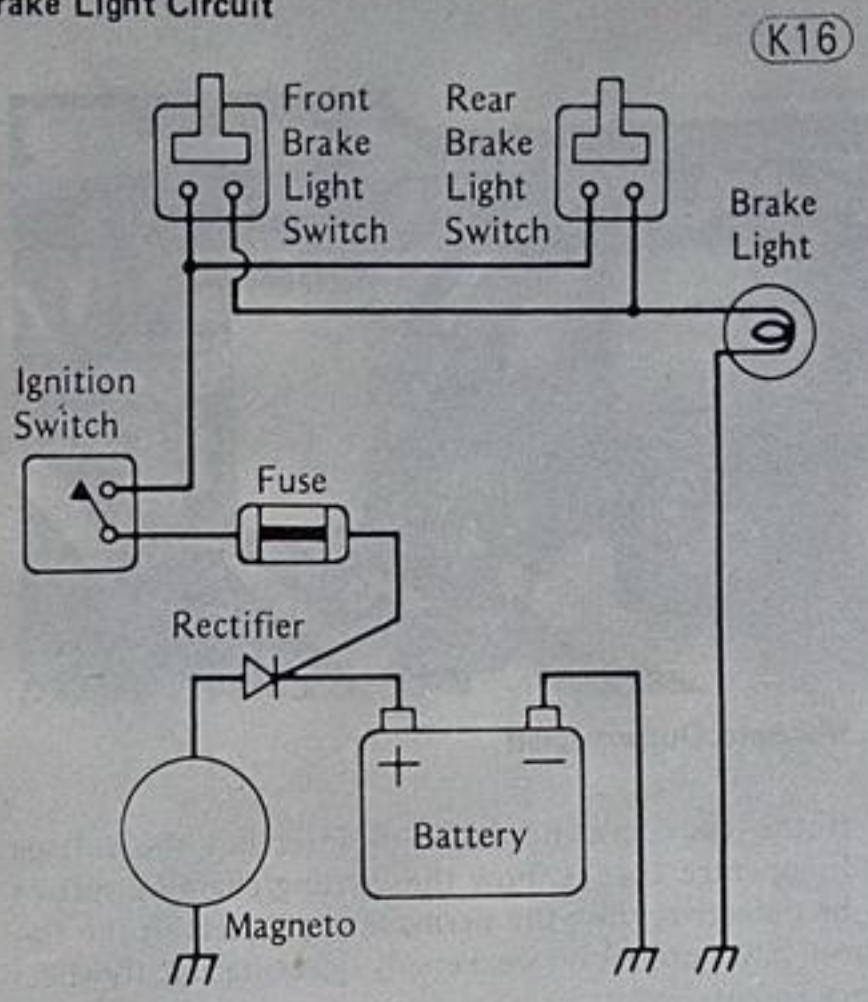
Front brake light switch inspection

To check the front brake light switch, first disconnect the brown and the blue/red switch leads in the headlight housing. Connect an ohmmeter to the switch leads, and pull the front brake lever. The ohmmeter should read zero ohms. If it does not, replace the switch. If the switch checks out okay but the brake light does not light, check the wiring.



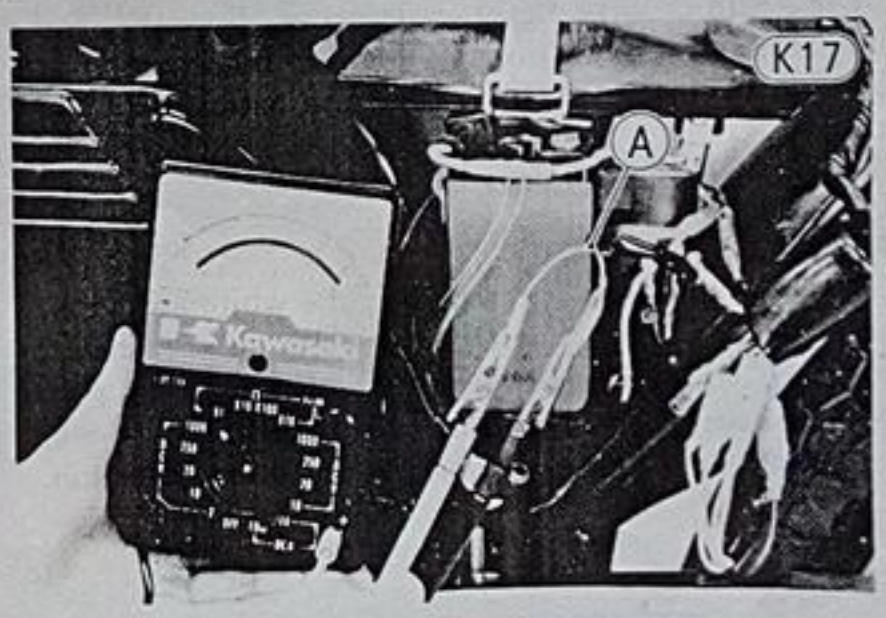
A. Front Brake Light Switch Leads

Brake Light Circuit



Rear brake light switch inspection

- Disconnect the rear brake light switch leads in the left side cover.
- Inspect the rear brake light switch in the same way that the front brake light switch was inspected. If there is no continuity whenever the rear brake pedal is depressed, replace the switch.

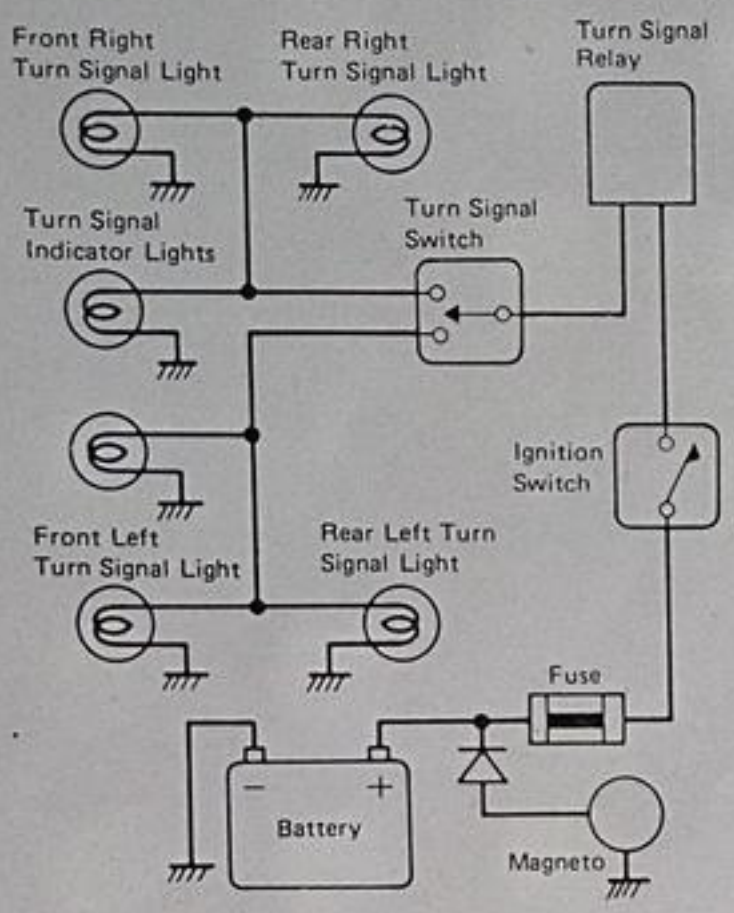


A. Rear Brake Light Switch Leads

Turn Signal Circuit

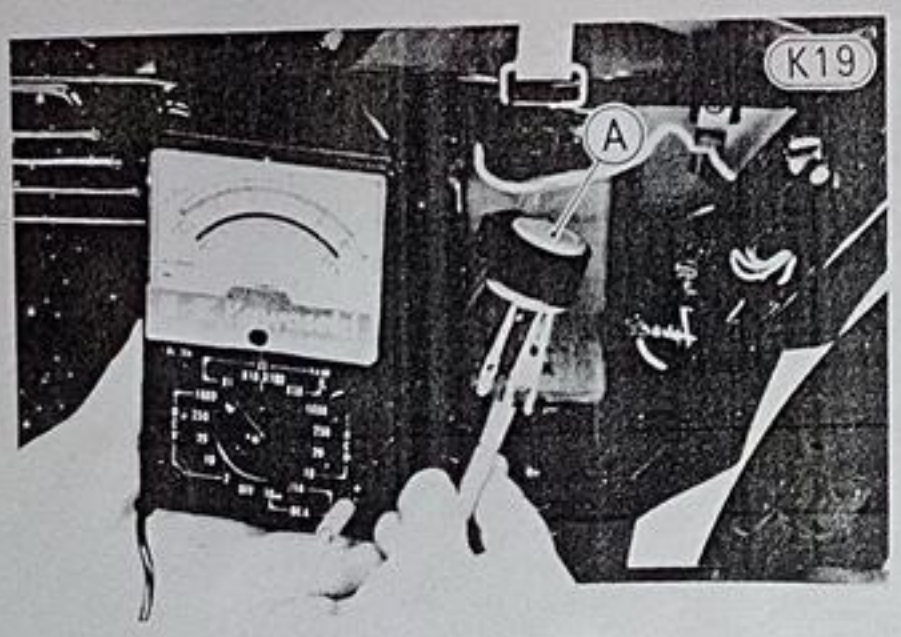
Since the turn signal relay is designed to operate correctly only when two turn signals (one front and one rear) and the turn signal indicator light are properly connected in the circuit, trouble may result from a burned out bulb, a bulb of incorrect wattage, loose wiring, as well as from a defect in the relay itself. In general, if the trouble with the circuit is common to both right and left turn signals, it is probably caused by a defective turn signal relay, although it may be due to a bad switch, wiring, or battery. If the trouble is with only one side – either right or left – then the relay is not at fault since the same relay is used for both sides.

Turn Signal Circuit



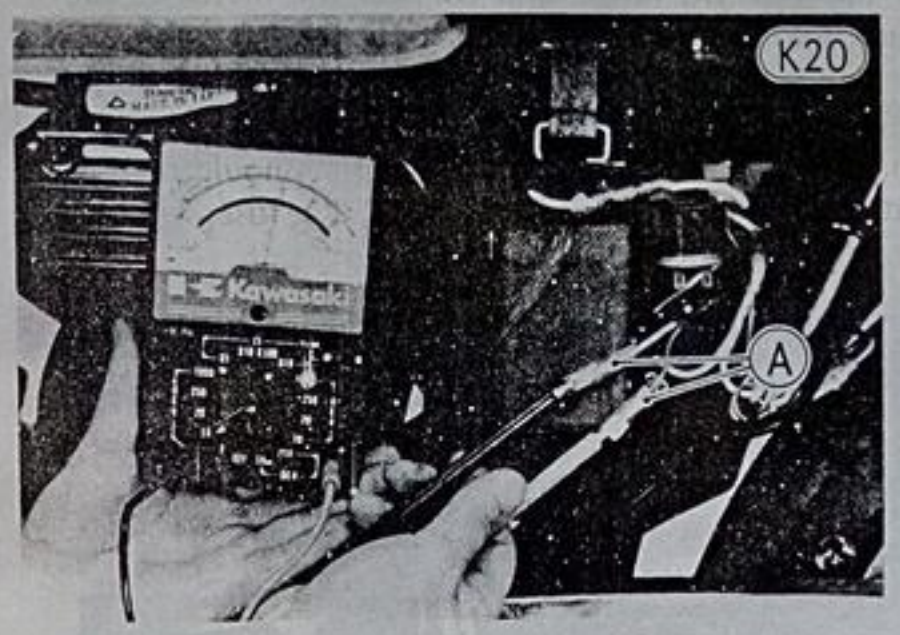
Turn signal inspection

(1)Neither right nor left turn signals come on at all:
- Check that battery voltage is normal.
- Remove the left side cover.
- Unplug the relay leads and use an ohmmeter to check that there is continuity (close to zero ohms) between the relay terminals. If there is not ohmmeter reading, or if there is several ohms resistance, replace the relay with a new one.



A. Turn Signal Relay

- Turn the meter to the 10V DC range, connect the + meter lead to the brown lead that was disconnected from the relay, and connect the – meter lead to the orange lead. With the ignition switch on, first switch the turn signal switch to the R and then to the L position. The meter should register battery voltage at either position. If it does not, the fuse, ignition switch, or wiring is at fault. If battery voltage is read on the meter but the turn signal still will not work when the relay is reconnected, then recheck all wiring connections.



A. Turn Signal Relay Leads

(2)Both right or both left turn signals come on and stay on or flash too slowly:
- Check that battery voltage is normal.
- Check that all wiring connections are good.
- Check that the turn signal bulbs and indicator bulbs are of the correct wattage.
- If all of the above check good, replace the relay.

(3)A single light on one side comes on and stays on:
- Either the light that does not come on is burned out or of the incorrect wattage, or the wiring is broken or improperly connected.

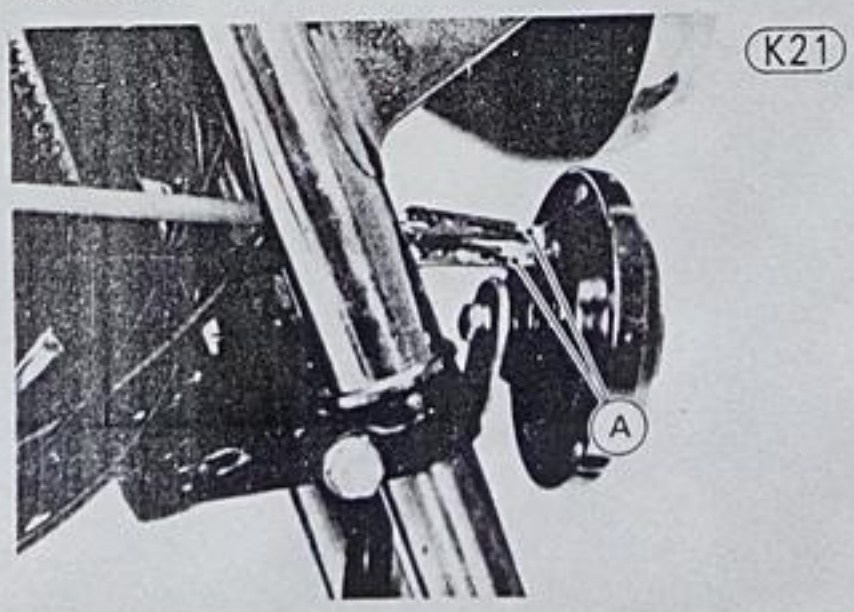
(4)Neither light on one side comes on:
- Unless both lights for that side are burned out, the trouble is with the turn signal switch.

(5)Flashing rate is too fast:
- If this occurs on both the right and left sides, check that the battery is not being overcharged. If the magneto and the battery voltage are normal, replace the turn signal relay.
- If this occurs on only one side, one or both of the turn signal bulbs are of too high a wattage.

HORN CIRCUIT

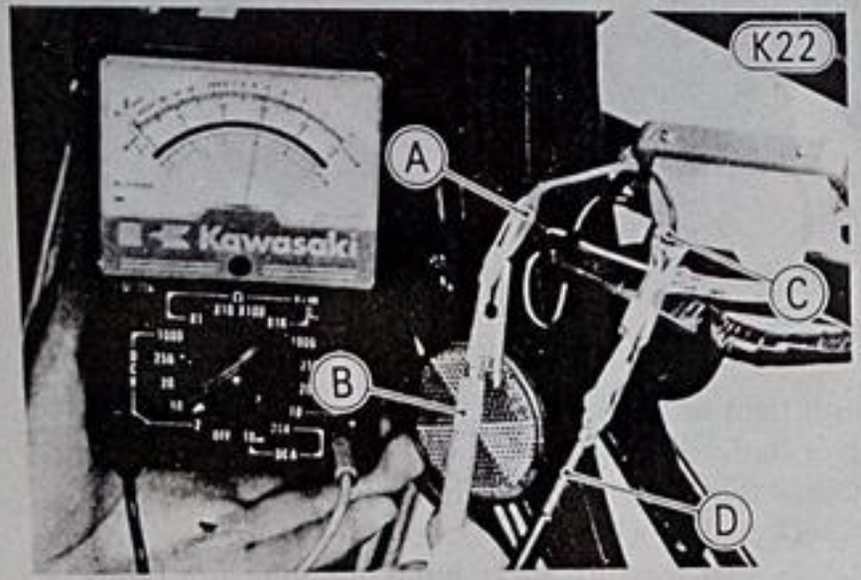
Horn inspection

- Check that battery voltage is normal.
- Disconnect the leads to the horn, and connect to the horn terminals a multimeter set to the x 1 Ω range to check for continuity (about 1 ohms). If the reading is several ohms or if there is no reading at all, replace the horn.



A. Horn Terminals

- If the reading is very close to zero, set the multimeter to the 10V DC range, and connect the meter to the leads that were disconnected from the horn. The + meter lead goes to the brown lead, and the – meter lead goes to the black lead. With the ignition switch on, press the horn button. The meter should register battery voltage. If it does not, the fuse, ignition switch, horn button, or the wiring is at fault.



A. Brown Lead
B. + Meter Lead
C. Black Lead
D. – Meter Lead

- If the meter does show battery voltage, indicating that the horn trouble lies within the horn itself, and adjustment fails to correct the trouble, replace the horn.

CAUTION **Do not loosen the armature mounting since doing so would alter the armature position such that the horn probably have to be replaced.**

Troubleshooting—Guide

Engine Doesn't Start; Starting Difficulty

Engine won't turn over
- Cylinder, piston seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Crankshaft main bearing seizure
- Transmission gear or bearing seizure
- Pawl not engaging with ratchet

No fuel flow
- No fuel in tank
- Fuel tap turned off
- Fuel tap clogged
- Tank cap air vents obstructed
- Fuel line clogged
- Float valve clogged

Engine flooded
- Float level too high
- Float valve worn or stuck open
- Starting technique faulty
- (When flooded, kick with the throttle fully open to allow more air to reach the engine.)

No spark; spark weak
- Ignition switch not on
- Engine stop switch turned off
- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or spark plug lead damaged
- Spark plug cap shorted or not in good contact
- Contact breaker points dirt or damaged
- Capacitor damaged
- Ignition coil damaged
- Ignition timing maladjusted
- Flywheel magneto damaged
- Ignition or engine stop switch shorted
- Wiring shorted or open

Fuel/air mixture incorrect
- Air screw and/or idling screw maladjusted
- Pilot jet or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter jet clogged

Compression low
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Spark plug loose
- Crankshaft oil seal deteriorated or damaged
- Rotary valve sleeve O ring deteriorated or damaged
- Rotary valve cover large O ring deteriorated or damaged

Poor Running at Low Speed

Spark weak
- Spark plug dirty, defective, or maladjusted
- Spark plug cap or spark plug lead damaged
- Spark plug cap shorted or not in good contact
- Spark plug heat range too high
- Contact breaker points dirty or damaged
- Capacitor damaged
- Ignition coil damaged
- Ignition timing maladjusted
- Flywheel magneto damaged

Fuel/air mixture incorrect
- Air screw maladjusted
- Pilot jet, or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel level too high or too low
- Tank cap air vents obstructed
- Fuel tap clogged
- Fuel line clogged
- Carburetor is attached loosely

Compression low
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Spark plug loose
- Crankshaft oil seal deteriorated or damaged
- Rotary valve sleeve O ring deteriorated or damaged
- Rotary valve cover large O ring deteriorated or damaged

Poor Running or No Power at High Speed

Firing incorrect
- Spark plug dirty, defective, or maladjusted
- Spark plug cap or spark plug lead damaged
- Spark plug cap shorted or not in good contact
- Incorrect spark plug heat range
- Contact breaker points dirty or damaged
- Contact breaker spring weak
- Capacitor damaged
- Ignition coil damaged
- Ignition timing maladjusted

Fuel/air mixture incorrect
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Jet needle clip in wrong position
- Fuel level too high or too low
- Air jet or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct poorly sealed
- Starter plunger stuck open
- Fuel to carburetor insufficient
- Carburetor is attached loosely
- Water or foreign matter in fuel
- Tank cap air vents obstructed

Compression low
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive

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Cylinder head gasket damaged
Cylinder head not sufficiently tighened down
Cylinder head warped
Spark plug loose
Crankshaft oil seal deteriorated or damaged
Rotary valve sleeve O ring deteriorated or damaged
Rotary valve cover large O ring deteriorated or damaged

Oil and fuel/air mixture incorrect
Throttle control cable maladjusted
Crankshaft oil seal deteriorated or damaged
Rotary valve sleeve O ring deteriorated or damaged
Rotary valve cover large O ring deteriorated or damaged
Oil passage pipe O ring damaged
Oil pump defective
Oil line or check valve clogged
Air in oil pump or oil line

Engine rpm will not rise properly
Starter plunger stuck open
Fuel level too high or too low
Main jet clogged
Throttle valve does not fully open
Throttle valve does not slide smoothly
Air cleaner clogged
Muffler clogged
Ignition timing maladjusted
Water or foreign matter in fuel
Cylinder exhaust port clogged
Brakes dragging
Clutch slipping
Overheating
Transmission oil level too high
Transmission oil viscosity too high
Crankshaft bearing worn or damaged

Knocking
Ignition timing maladjusted
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug heat range too low

Overheating

Firing incorrect
Spark plug dirty, damaged or maladjusted
Spark plug heat range too low
Ignition timing maladjusted

Fuel/air mixture incorrect
Main jet clogged
Fuel level too low
Air cleaner poorly sealed, or missing

Oil and fuel/air mixture incorrect
Throttle control cable maladjusted
Oil pump damaged
Oil line or check valve clogged
Air in oil pump or oil line

Compression high
Carbon built up in combustion chamber

Engine load faulty
Clutch slipping
Transmission oil level too high
Transmission oil viscosity too high
Brakes dragging

Fuel and Oil Consumption Excessive

Idling too fast
Idling screw maladjusted
Throttle control cable catching or poorly adjusted

Fuel/air mixture too rich
Air screw maladjusted
Main jet too large
Jet needle or needle jet worn
Starter plunger stuck open
Fuel level too high
Air cleaner clogged

Compression low
Cylinder, piston worn
Piston rings bad (worn, weak, broken, or sticking)
Piston ring/land clearance excessive
Cylinder head gasket damaged
Cylinder head not sufficiently tightened down
Cylinder head warped
Spark plug loose
Crankshaft oil seal deteriorated or damaged
Rotary valve sleeve O ring deteriorated or damaged
Rotary valve cover large O ring deteriorated or damaged

Exhaust obstructed
Muffler clogged
Cylinder exhaust port clogged

Engine load faulty
Clutch slipping
Brakes dragging

Clutch Operation Faulty

Clutch slipping
No clutch lever play
Friction plates worn or warped
Steel plates worn or warped
Clutch springs broken or weak
Clutch cable maladjusted
Clutch inner cable catching
Clutch release mechanism defective
Clutch hub or housing unevenly worn

Clutch not disengaging properly
Clutch lever play excessive
Clutch plates warped or too rough
Clutch spring tension uneven
Transmission oil deteriorated
Transmission oil viscosity too high
Transmission oil level too high
Clutch release mechanism damaged
Loose clutch hub nut

Gear Shifting Faulty

Doesn't go into gear; shift pedal doesn't return
Clutch not disengaging
Shift fork(s) bent or seized
Gear(s) stuck on the shaft
Shift return spring weak or broken
Shift lever broken
Shift return spring pin loose
External shift mechanism pawl broken

Pawl spring broken
Shift drum broken
Shift drum positioning pin binding

Jumps out of gear
Shift fork(s) worn
Gear groove(s) worn
Gear dogs, dog holes, and/or dog recesses worn
Shift drum groove(s) worn
Shift drum positioning pin spring weak or broken
Shift fork guide pin(s) worn
External shift mechanism arm pawl worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts
Shift return spring pin loose
Over shift limiter hooks broken
Pawl spring weak

Abnormal Engine Noise

Knocking
Ignition timing maladjusted
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Overheating
Spark plug heat range too low

Piston slap
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston holes worn

Other noise
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring(s) worn, broken, or stuck
Piston seizure damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder connection
Engine mounts loose
Crankshaft main bearings worn
Crankshaft runout excessive

Abnormal Drive Train Noise

Clutch noise
Clutch housing/friction plate clearance excessive
Clutch housing gear/primary gear backlash excessive
Clutch rubber dampers deteriorated
Metal chips jammed in clutch housing gear teeth

Transmission noise
Crankcase bearings worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Transmission oil insufficient or too thin
Pawl not properly disengaging from kick gear
Oil pump gear/pinion gear worn or chipped

Drive chain noise
Drive chain adjusted improperly
Chain worn
Rear and/or engine sprocket(s) worn
Chain lubrication insufficient

Abnormal Frame Noise

Front fork noise
Oil insufficient or too thin
Spring weak or broken

Rear shock absorber noise
Shock absorber damaged

Disc brake noise
Pad loose
Pad surface glazed
Disc warped

Drum brake noise
Brake linings overworn or worn unevenly
Drum worn unevenly or scored
Brake spring(s) weak or broken
Foreign matter in hub
Brake not properly adjusted

Other noise
Brackets, nuts, bolts, etc. not properly mounted or tightened

Exhaust smoke

Excessive white smoke
Throttle control cable maladjusted
Oil poor quality or incorrect
Crankshaft oil seal damaged
Rotary valve sleeve **O** ring deteriorated or damaged
Rotary valve cover large **O** ring deteriorated or damaged
Oil passage pipe **O** ring damaged

Brownish smoke
Air cleaner clogged
Main jet too large or fallen off
Starter plunger stuck open
Fuel level too high

Handling and/or Stability Unsatisfactory

Handlebar hard to turn
Steering stem locknut too tight
Bearing balls damaged
Race(s) dented or worn
Steering stem lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates
Tire(s) worn
Swing arm bush damaged
Rim(s) warped or not balanced
Front, rear axle runout excessive
Spokes loose
Wheel bearing(s) worn
Handlebar clamps loose
Steering stem head bolt loose

Handlebar pulls to one side
Frame bent
Wheel misalignment
Swing arm bent or twisted
Swing arm pivot shaft runout excessive
Steering stem bent
Front fork shock absorber(s) bent

Right/left front fork oil level uneven
Right/left rear shock absorbers unbalanced

Shock absorption unsatisfactory

Too hard:
Front fork oil excessive
Front fork oil viscosity too high
Tire air pressure too high
Rear suspension maladjusted
Front fork bent

Too soft:
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Front fork, rear shock absorber spring(s) weak
Rear shock absorber oil leaking

Brake Doesn't Hold

Disc brake

Pad or disc worn
Disc warped
Contaminated pads

Drum brake

Brake not properly adjusted
Linings overworn or worn unevenly
Drum worn unevenly or scored
Cam, camshaft, shaft hole worn
Oil, grease on lining and drum
Dirt, water between lining and drum
Overheated

Battery Discharged

Battery faulty (e.g., plates sulfated, shorted through sedimentation, electrolyte level too low)
Battery leads making poor contact
Rectifier or regulator/rectifier damaged
Ignition switch damaged
Load excessive (e.g., bulb of excessive wattage)
Flywheel magneto damaged

Battery Overcharged

Open in headlight circuit
Load inadequate (e.g., light burned out)
Regulator defective
Regulator/rectifier defective
Battery defective

NOTE: This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties. Electrical troubleshooting is not covered here due to its complexity. For electrical problems, refer to the appropriate heading in the Maintenance Section.

PERIODIC MAINTENANCE CHART

The maintenance and adjustments must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

Operation \ Frequency	Whichever comes first ➡ Every	**Odometer Reading km (mi) 800 (500)	4,000 (2,500)	8,000 (5,000)	12,000 (7,500)	16,000 (10,000)	20,000 (12,500)	24,000 (15,000)	See Page
Battery electrolyte level – check †	month	•	•	•	•	•	•	•	–
Transmission oil – change	year	•		•		•		•	19
Brake & Brake light switch – check †		•	•	•	•	•	•	•	23,130
Brake wear – check †			•	•	•	•	•	•	119
Brake fluid level – check †	month	•	•	•	•	•	•	•	118
Brake fluid – change	year			•		•		•	116
Clutch – adjust		•	•	•	•	•	•	•	18
Carburetor & Oil pump – adjust		•	•	•	•	•	•	•	16
Throttle grip – check †		•	•	•	•	•	•	•	14
Steering play – check †		•	•	•	•	•	•	•	25
Drive chain wear – check †			•	•	•	•	•	•	114
Front fork – clean			•	•	•	•	•	•	–
Spoke tightness and rim runout – check †		•	•	•	•	•	•	•	112
Ignition timing – check †		•	•	•	•	•	•	•	12
Nuts, bolts, fasteners – check †		•		•		•		•	31 ~ 33
Spark plug – clean and gap †		•	•	•	•	•	•	•	12
Air cleaner element – clean			•		•		•		96
Air cleaner element – replace	5 cleanings			•		•		•	96
Fuel system – clean				•		•		•	19
Tire tread wear – check †			•	•	•	•	•	•	112
General lubrication – perform			•	•	•	•	•	•	27
Front fork oil – change				•		•		•	122
Wheel bearing – lubricate	2 years					•			113
Speedometer gear – lubricate	2 years					•			–
Brake camshaft – lubricate	2 years					•			121
Steering stem bearing – lubricate	2 years					•			121
Master cylinder cup and dust seal – replace	2 years								74,118
Caliper piston seal and dust seal – replace	2 years								74,119
Brake hose – replace	4 years								80
Fuel hose – replace	4 years								–
Drive chain – lubricate	Every 300 km (200 mi)								115
Drive chain slack – check †	Every 800 km (500 mi)								22

** For higher odometer readings, repeat at the frequency interval here.
† Replace, add, adjust, or torque if necessary.

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