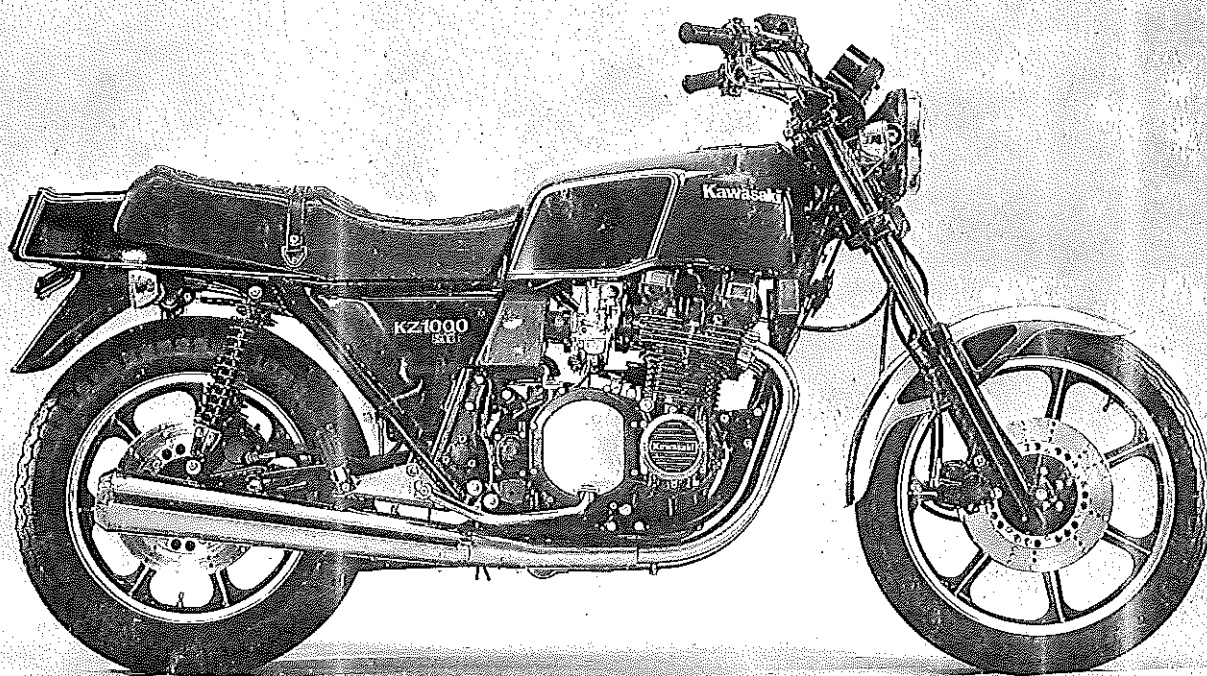


Kawasaki

**KZ1000
ST**



**Motorcycle
Service Manual**

Decimal Equivalents

INCH					MM INCH	INCH					MM INCH
$\frac{1}{64}$.015625	1 mm= .03937 inch	$\frac{33}{64}$.515625	14 mm= .55118 inch
	$\frac{1}{32}$.3125			$\frac{17}{32}$.53125	
$\frac{3}{64}$.046875		$\frac{35}{64}$.546875	
		$\frac{1}{16}$.0625				$\frac{9}{16}$.5625	
$\frac{5}{64}$.078125	2 mm= .07874 inch	$\frac{37}{64}$.578125	15 mm= .59055 inch
	$\frac{3}{32}$.09375			$\frac{19}{32}$.59375	
$\frac{7}{64}$.109375		$\frac{39}{64}$.609375	
		$\frac{1}{8}$.125				$\frac{5}{8}$.625	
$\frac{9}{64}$.140625	3 mm= .11811 inch	$\frac{41}{64}$.640625	16 mm= .62992 inch
	$\frac{5}{32}$.15625			$\frac{21}{32}$.65625	
$\frac{11}{64}$.171875		$\frac{43}{64}$.671875	
		$\frac{3}{16}$.1875				$\frac{11}{16}$.6875	
$\frac{13}{64}$.203125	4 mm= .15748 inch	$\frac{45}{64}$.703125	17 mm= .66929 inch
	$\frac{7}{32}$.21875			$\frac{23}{32}$.71875	
$\frac{15}{64}$.234375		$\frac{47}{64}$.734375	
		$\frac{1}{4}$.25				$\frac{3}{4}$.75	
$\frac{17}{64}$.265625	5 mm= .19685 inch	$\frac{49}{64}$.765625	18 mm= .70866 inch
	$\frac{9}{32}$.28125			$\frac{25}{32}$.78125	
$\frac{19}{64}$.296875		$\frac{51}{64}$.796875	
		$\frac{5}{16}$.3125				$\frac{13}{16}$.8125	
$\frac{21}{64}$.328125	6 mm= .23622 inch	$\frac{53}{64}$.828125	19 mm= .74803 inch
	$\frac{11}{32}$.34375			$\frac{27}{32}$.84375	
$\frac{23}{64}$.359375		$\frac{55}{64}$.859375	
		$\frac{3}{8}$.375				$\frac{7}{8}$.875	
$\frac{25}{64}$.390625	7 mm= .27559 inch	$\frac{57}{64}$.890625	20 mm= .78740 inch
	$\frac{13}{32}$.40625			$\frac{29}{32}$.90625	
$\frac{27}{64}$.421875		$\frac{59}{64}$.921875	
		$\frac{7}{16}$.4375				$\frac{15}{16}$.9375	
$\frac{29}{64}$.453125	8 mm= .31496 inch	$\frac{61}{64}$.953125	21 mm= .82677 inch
	$\frac{15}{32}$.46875			$\frac{31}{32}$.96875	
$\frac{31}{64}$.484375		$\frac{63}{64}$.984375	
		$\frac{1}{2}$.5					1	1.	
					9 mm= .35433 inch						22 mm= .86614 inch
					10 mm= .39370 inch						23 mm= .90551 inch
					11 mm= .43307 inch						24 mm= .94488 inch
					12 mm= .47244 inch						25 mm= .98425 inch
					13 mm= .51181 inch						

Unit Conversion Table

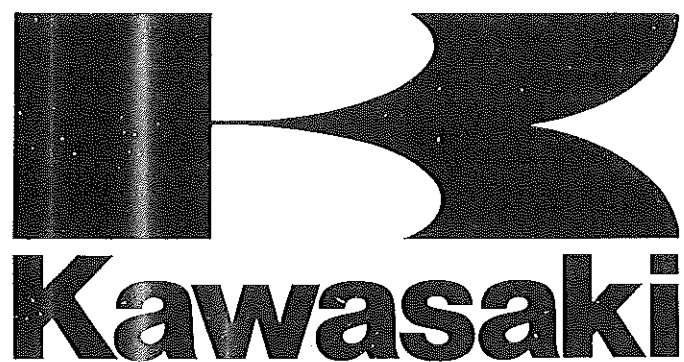
cc	x	.0610	=	cu in
cc	x	.02816	=	oz (imp)
cc	x	.03381	=	oz (US)
cu in	x	16.39	=	cc
ft-lbs	x	12	=	in lbs
ft-lbs	x	.1383	=	kg-m
gal (imp)	x	4.546	=	litres
gal (imp)	x	1.201	=	gal (US)
gal (US)	x	3.7853	=	liters
gal (US)	x	.8326	=	gal (Imp)
grams	x	.03527	=	oz
in	x	25.40	=	mm
in lbs	x	.0833	=	ft-lbs
in 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/cm ²	x	14.22	=	lbs/in ²
km	x	.6214	=	mile
lb	x	.4536	=	kg
lb/in ²	x	.0703	=	kg/cm ²
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/cm ²	x	98.07	=	kPa
lbs/in ²	x	6.896	=	kPa
kPa	x	.1450	=	lbs/in ²

$$^{\circ}\text{C} \rightarrow ^{\circ}\text{F}: \frac{9(^{\circ}\text{C} + 40)}{5} - 40 = ^{\circ}\text{F}$$

$$^{\circ}\text{F} \rightarrow ^{\circ}\text{C}: \frac{5(^{\circ}\text{F} + 40)}{9} - 40 = ^{\circ}\text{C}$$

List of Abbreviations

ABDC	after bottom dead center
ATDC	after top dead center
BBDC	before bottom dead center
BDC	bottom dead center
BTDC	before top dead center
cc	cubic centimeters
cu in	cubic inches
ft	foot, feet
ft-lbs	foot-pounds
gal	gallon, gallons
hp	horsepower
in	inch, inches
in-lb	inch-pounds
kg	kilogram, kilograms
kg/cm ²	kilograms per square centimeter
kg-m	kilogram meters
km	kilometer
kph	kilometers per hour
lb, lbs	pound, pounds
lbs/in ²	pounds per square inch
ltr	liter, litre
m	meter, meters
mi	mile, miles
mm	millimeters
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




**KZ1000
ST**



Motorcycle Service Manual

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. 

Specifications

A

Adjustment

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B

Chassis

C

Disassembly

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DEngine
(Installed)**E**Engine
(Removed)**F**

Chassis

GMaintenance
&
Theory

Engine

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Electrical

K

Troubleshooting

L

Appendix

M

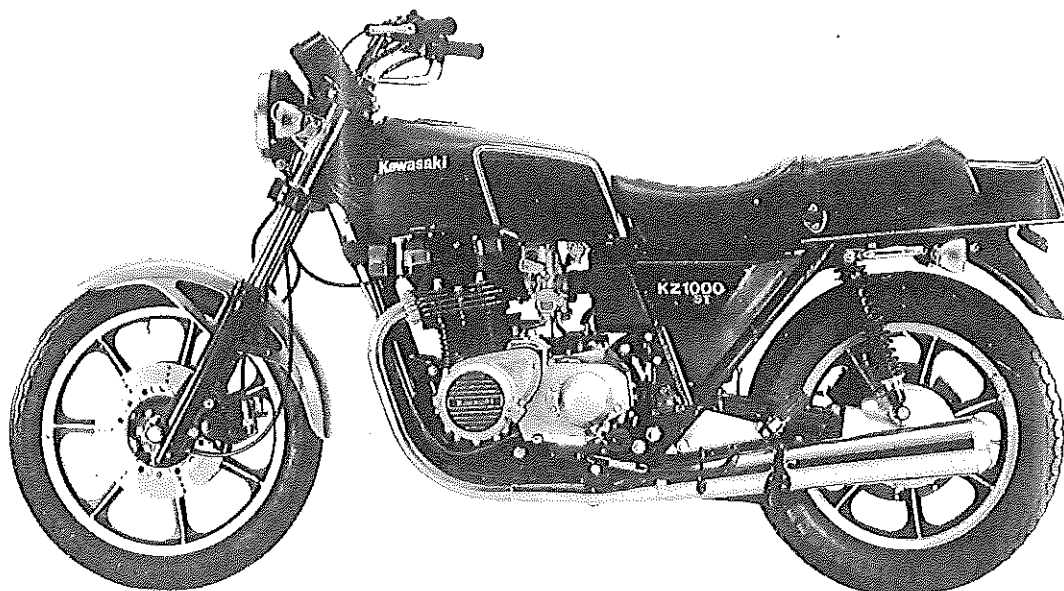
Index

N

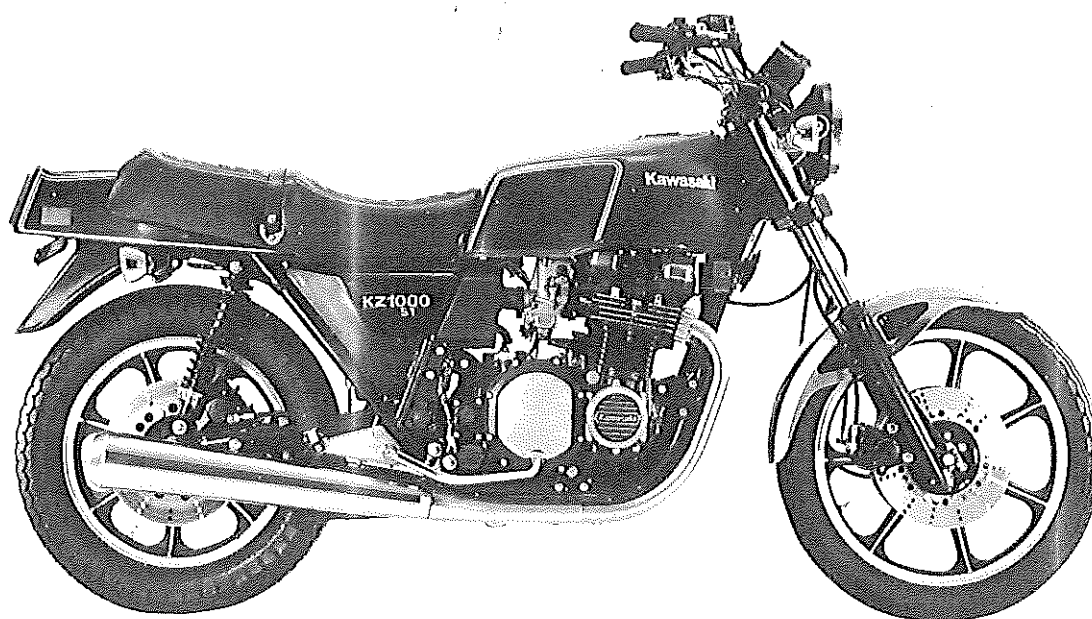
4 MODEL IDENTIFICATION

Model Identification

KZ1000-E1 Left Side View



KZ1000-E1 Right Side View



Specifications



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RUNNING PERFORMANCE CURVES.....	9
PERIODIC MAINTENANCE CHART	10

6 SPECIFICATIONS

SPECIFICATIONS

KZ1000-E1

Dimensions

Overall length	2,205 mm	⊙ 2,250 mm
Overall width	850 mm	⊙ 810 mm
Overall height	1,160 mm	⊙ 1,130 mm
Wheelbase	1,535 mm	
Road clearance	155 mm	⊙ 145 mm
Dry weight	255 kg	⊙ 257 kg
Fuel tank capacity	18.2 ℓ	

Performance

Climbing ability	30°
Braking distance	11.0 m @50 kph
Minimum turning radius	2.7 m

Engine

Type	DOHC 4 cylinder, 4 stroke, air-cooled
Bore and stroke	70.0 x 66.0 mm
Displacement	1,015 cc
Compression ratio	8.7
Maximum horsepower	93 HP @8,000 rpm
Maximum torque	9.1 kg-m @6,500 rpm
Valve timing	
Inlet	Open 30° BTDC
	Close 70° ABDC
	Duration 280°
Exhaust	Open 70° BBDC
	Close 30° ATDC
	Duration 280°
Carburetors	Mikuni VM28SS x 4
Lubrication system	Forced lubrication (wet sump)
Engine oil	SE class SAE 10W40, 10W50, 20W40, or 20W50
Engine oil capacity	3.7 ℓ
Starting system	Electric and kick
Ignition system	Battery and coil
Cylinder numbering method	Left to right, 1-2-3-4
Firing order	1-2-4-3
Ignition timing	From 10° BTDC @1,000 rpm to 40° BTDC @3,400 rpm (⊙ : 2,350 rpm)
Spark plugs	NGK B8ES or ND W24ES-U

Transmission

Type	5-speed, constant mesh return shift
Clutch	Wet multi disc
Gear ratio:	
1st	3.17 (38/12)
2nd	2.19 (35/16)
3rd	1.67 (35/21)
4th	1.38 (29/21)
5th	1.22 (28/23)

KZ1000-E1

Primary reduction ratio	1.73 (97/56)
Final reduction ratio	2.29 (15/22 x 37/11)
Overall drive ratio	4.84 (Top gear)

Electrical Equipment

Alternator	Kokusan GP9105
Regulator/Rectifier	Shindengen SH230-12C
Ignition coils	Toyo Denso ZC005-TR12V
Battery	Furukawa 12N16-3B (12V 16AH)
Starter	Mitsuba SM-226-K
Headlight type	Sealed beam ⑤ Semi-sealed
Headlight	12V 60/50W ⑤ 12V 45/40W ④ 12V 50/40W
Tail/Brake light	12V 8/27W ⑤ ④ 12V 5/21W
Meter lights	12V 3.4W
Indicator lights	12V 3.4W
Turn signal/running position lights	12V 23/8W
Turn signal lights	12V 23W ⑤ 12V 21W
Horn	12V 2.5A
City light	12V 4W

Frame

Type	Tubular, double cradle
Steering angle	38° to either side
Castor	63°
Trail	98 mm
Tire size	Front 3.50V-19 4PR
	Rear 4.50V-17 4PR
Suspension	Front Telescopic fork
	Rear Swing arm
Suspension stroke	Front 200 mm
	Rear 100 mm
Front fork oil	Type SAE 10W
	Capacity (each fork) 0.34 ℓ ⑤ 0.35 ℓ
Final gear case oil	Type API GL-5 Hypoid gear oil
	SAE 90 (above 5°C)
	SAE 80 (below 5°C)
	Capacity 0.25 ℓ

Brakes

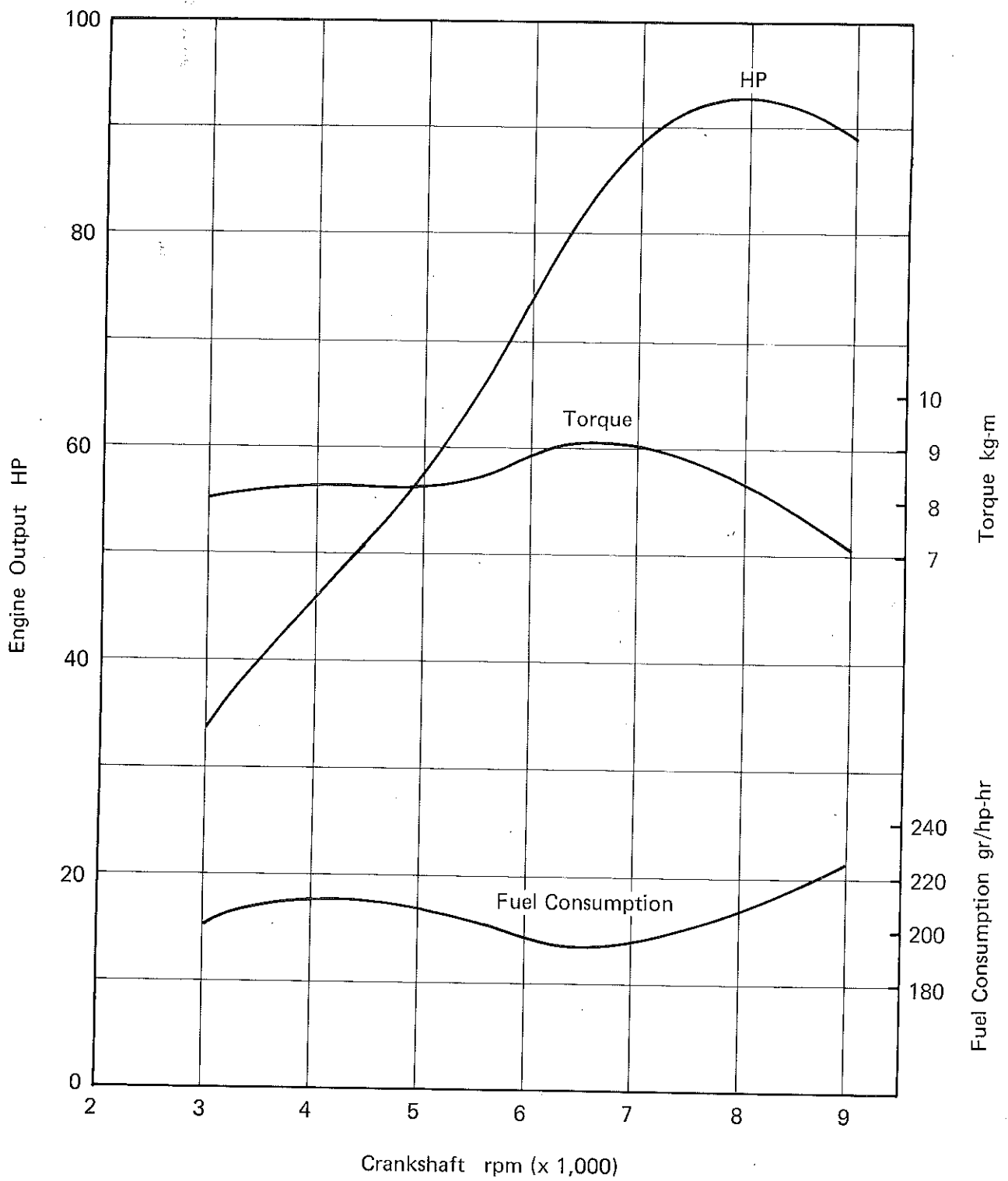
Type	Front and Rear	Disc brake
Effective disc diameter	Front	240 mm
	Rear	250 mm

④ : Other than US model ⑤ : European model ④ : Australian model
 Specifications subject to change without notice, and may not apply to every country.

8 SPECIFICATIONS

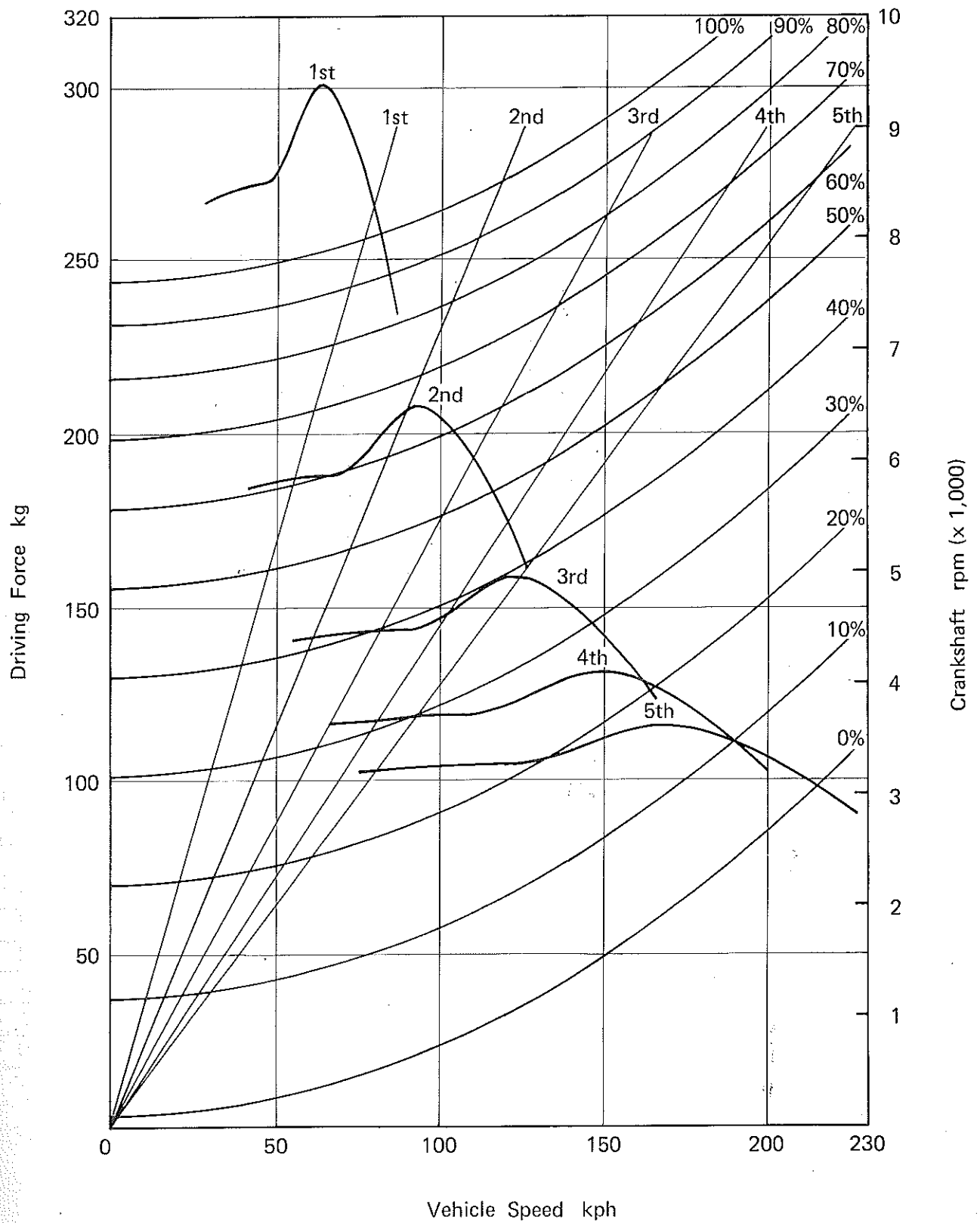
ENGINE PERFORMANCE CURVES

KZ1000-E1



RUNNING PERFORMANCE CURVES

KZ1000-E1



10 SPECIFICATIONS

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	ODOMETER READING* km						
		800 ± 100	5,000 ± 250	10,000 ± 250	15,000 ± 250	20,000 ± 250	25,000 ± 250	30,000 ± 250
	Whichever comes first ↓ Every							See Page
Battery electrolyte level — check †	month	•	•	•	•	•	•	218
Brake adjustment — check †		•	•	•	•	•	•	24
Brake wear — check †			•	•	•	•	•	208~210
Brake fluid level — check †	month	•	•	•	•	•	•	24,208
Brake fluid — change	year		•		•		•	206
Clutch — adjust		•	•	•	•	•	•	18
Carburetors — adjust		•	•	•	•	•	•	16
Throttle cables — adjust		•	•	•	•	•	•	15
Steering play — check †		•	•	•	•	•	•	25
Front fork — inspect/clean		•	•	•	•	•	•	213
Rear shock absorbers — inspect		•	•	•	•	•	•	214
Nuts, Bolts, Fasteners — check and torque		•		•		•		33~37
Spark plugs — clean and gap †		•	•	•	•	•	•	12
Valve clearance — check †		•	•	•	•	•	•	12
Air suction valve — check †			•	•	•	•	•	172
Air cleaner element — clean			•	•		•		154
Air cleaner element — replace	5 cleanings		•		•		•	154
Fuel system — clean		•	•	•	•	•	•	20
Tire tread wear — check †			•	•	•	•	•	197
Engine oil — change	year	•	•	•	•	•	•	20
Oil filter — replace		•		•		•		20,191
General lubrication — perform			•	•	•	•	•	29
Front fork oil — change			•		•		•	214
Timing advancer — lubricate				•		•		229
Swing arm — lubricate				•			•	215
Speedometer gear housing — grease	2 years				•			201
Final bevel gear case oil level — check †				•	•		•	28
Final bevel gear case oil — change		•					•	29
Propeller shaft sliding joints — lubricate				•			•	201

* For higher odometer readings, repeat at the frequency interval established here.

† Replace, add or adjust if necessary.

Adjustment—Engine

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12 ADJUSTMENT—ENGINE

SPARK PLUGS

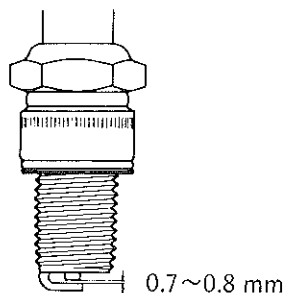
Neglecting the spark plug eventually leads to difficult starting and poor performance. If the spark plug is used for a long period, the electrodes gradually burn away and carbon builds up along the inside part. In accordance with the Periodic Maintenance Chart (Pg. 10), the plug should be removed for inspection, cleaning and to reset the gap.

- Remove the spark plugs using a spark plug wrench.
- Clean the spark plug, preferably in a sand-blasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool. If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard plug or its equivalent.
- 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.

Table B1 Spark Plug

Plug	NGK B8ES, ND W24ES-U
Gap	0.7~0.8 mm
Tightening Torque	2.8 kg-m (20 ft-lbs)

Spark Plug Gap



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

NOTE: Refer to the electrical maintenance section, Pg. 227, for detailed spark plug information.

VALVE CLEARANCE

Valve and valve seat wear decreases valve clearance, upsetting valve timing. If valve clearance is left unadjusted, the wear will eventually cause the valves to remain partly open, which lowers performance, burns the valves and valve seats, and may cause even more serious engine damage.

The valve clearance for each valve should be checked and, if incorrect, adjusted in accordance with the Periodic Maintenance Chart (Pg. 10) or any time that clearance may have been affected by disassembly.

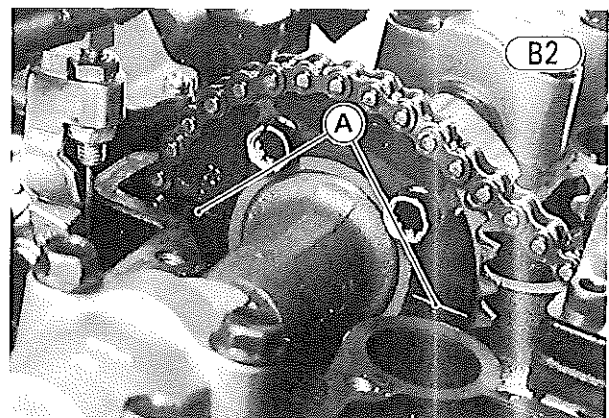
When carrying out adjustment, be careful to adjust the clearance within the specified range. Adjusting to

a larger value will disturb valve timing and cause engine noise.

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

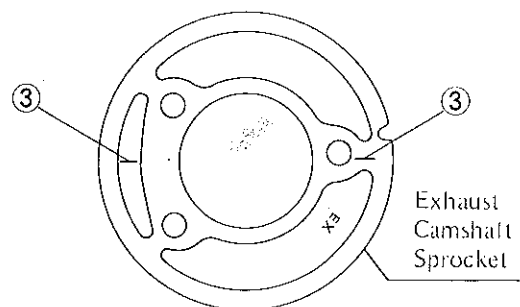
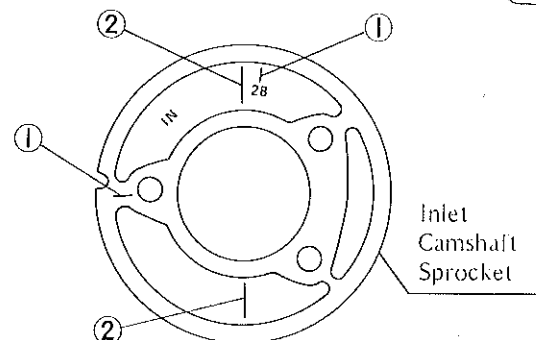
To check and adjust the valve clearance:

- Remove the fuel tank (Pg. 41).
- Remove the ignition coils (Pg. 48).
- Remove the cylinder head cover (Pg. 49).
- Check the tightening torque of the camshaft cap bolts [1.7 kg-m (12.0 ft-lbs)].
- Remove the pick-up coil cover.
- Using a 17 mm wrench, turn the crankshaft until the line marks for the valve clearance measurement on the appropriate camshaft sprocket line up with the surface of the cylinder head.



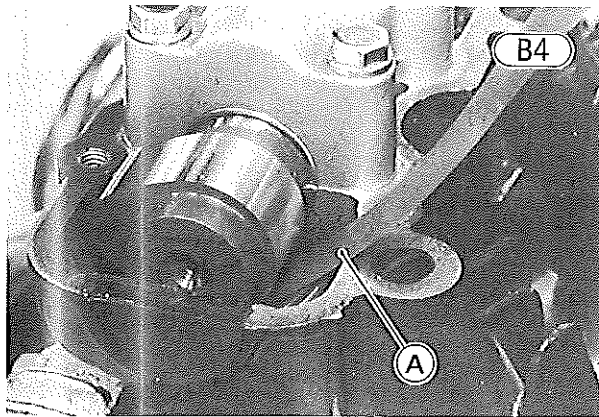
A. Marks

Marks on the Camshaft Sprocket



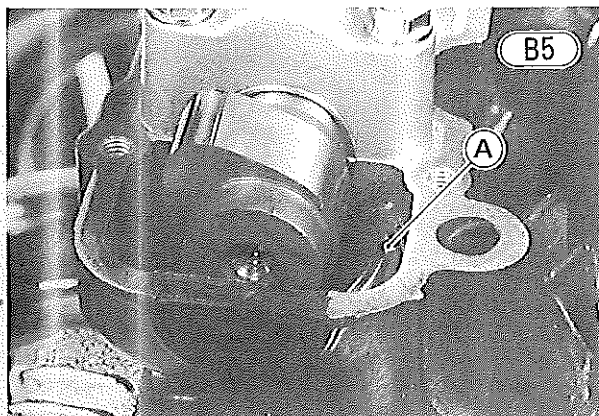
1. Mark for camshaft chain installation
2. Mark for inlet valve clearance measurement
3. Mark for both camshaft chain installation and exhaust valve clearance measurement

- For two valves (1 and 2, or 3 and 4) at a time, measure the clearance between the cam and the shim. The correct clearance is 0.05~0.15 mm for both inlet and exhaust valves.



A. Thickness Gauge

- Turn the crankshaft another one turn until the marks on the sprocket line up again, and measure the other two valve clearances.
 - Measure the valve clearance for the other camshaft using the same procedure.
 - If the valve clearance is incorrect, continue the following procedures to replace the present shim with a new shim, which will give the proper clearance.
- NOTE:** If there is no clearance between the shim and cam, select a shim which is several sizes smaller, and then remeasure the gap once it is installed.
- Use the valve lifter holder (special tool), according to the following instructions, to hold the valve lifter down; and then remove the shim.
 - Turn the crankshaft so that the cam points away from the lifter. Position the notch in the lifter so it points toward the opposite camshaft. This will allow the shim to be lifted and grasped later.

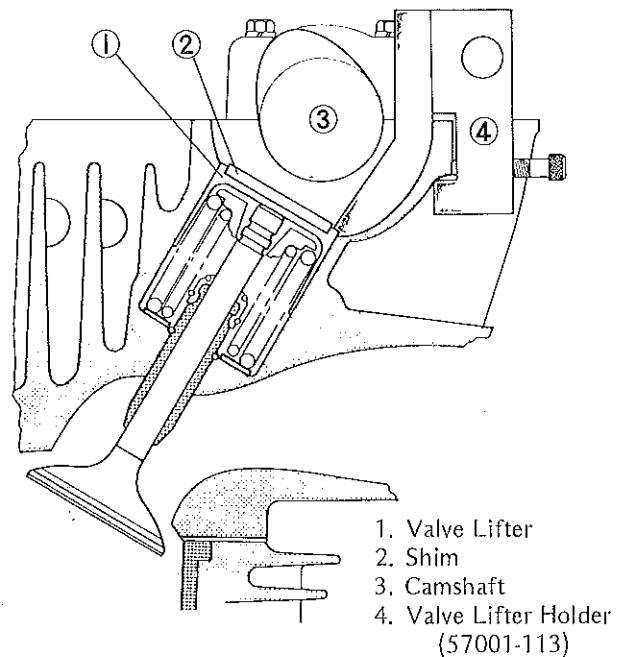


A. Notch

- Turn the crankshaft so that the cam is pushing the lifter down, and fit the tool in place.

Valve Lifter Holder

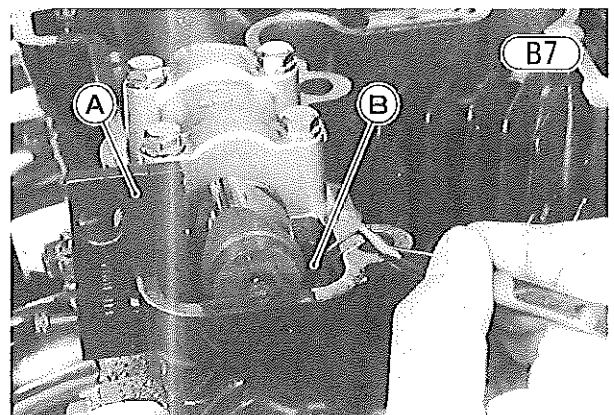
B6



- Turn the crankshaft in the proper direction so that the cam points away from the lifter, and remove the shim.

CAUTION When the valve lifter holder is fitted to a valve assembly, and the crankshaft is turned to rotate the camshaft, it **MUST** be turned so the cam lobe turns away from the tool. If it is turned toward the tool, serious engine damage can result.

- NOTES:** 1. The camshaft rotates in the same direction as the crankshaft.
2. If the camshafts are unbolted instead of using a special tool to remove the shims, see information on valve timing (Pg. 53) and camshaft installation (Pg. 51) before tightening the shafts in place.



A. Valve Lifter Holder (57001-113)

B. Shim

- Check the present shim thickness (shim size) which is printed on the shim surface; and referring to the Valve Adjustment Chart (Pg. 14), select a new shim which brings valve clearance within the specified limits. Shims are available in sizes from 2.00 to 3.20 mm, in increments of 0.05 mm.

- Insert the new shim on the valve lifter with the numbered side facing downwards so the number won't be polished off by the action of the cam.

- CAUTION**
1. Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
 2. Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

NOTE: If the smallest shim does not sufficiently increase clearance, the valve seat is probably worn. In this case, (a) repair the valve seat (Pg. 168), (b) grind down the stem lightly (Pg. 167), (c) then recheck the clearance.

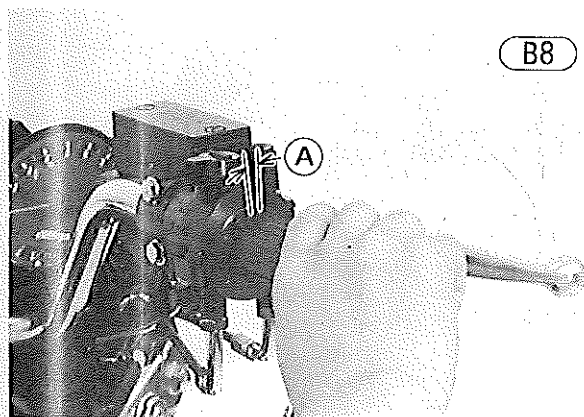
- Turn the crankshaft so that the cam is again pushing down the lifter, and remove the special tool.
- Make sure that the valve clearance is correct. If it is not, readjust.
- Install the cylinder head cover (Pg. 49).
- Install the ignition coils (Pg. 48).
- Install the pick-up coil cover and gasket.
- Install the fuel tank (Pg. 41).

THROTTLE CABLES

There are two throttle cables: an accelerator cable for opening the throttle valves, and a decelerator cable for closing them. If the cables are too loose due either to cable stretch or maladjustment, the excessive play in the throttle grip will cause a delay in throttle response, which will be especially noticeable at low rpm. Also, the throttle valves may not open fully at full throttle. On the other hand, if the cables are too tight, the throttle will be hard to control, and the idle speed will be erratic.

To check the throttle cable adjustment:

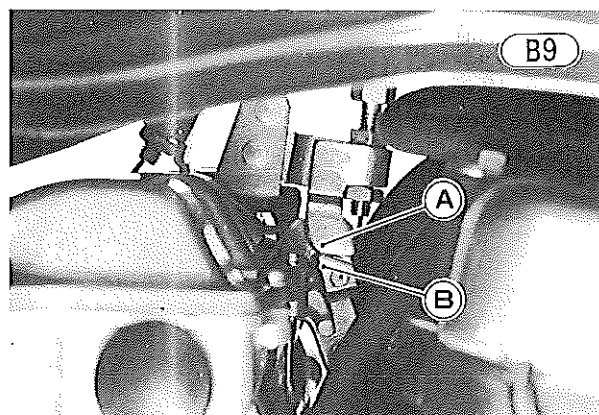
- Check that there is 2~3 mm throttle grip play.



A. 2~3 mm

- Push the throttle grip completely closed. At this time there should be no clearance between the cable bracket and the stop.

NOTE: This assures that the stress of throttle grip return will be taken by the pulley, protecting the carburetor linkage mechanism

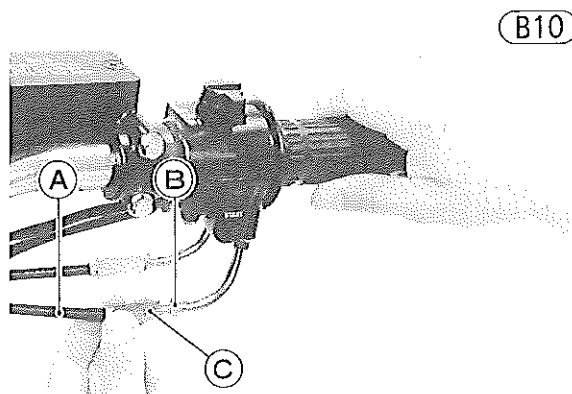


A. Cable Bracket

B. Pulley Stop

If any one of the above checks shows improper adjustment, adjust the throttle cables as follows:

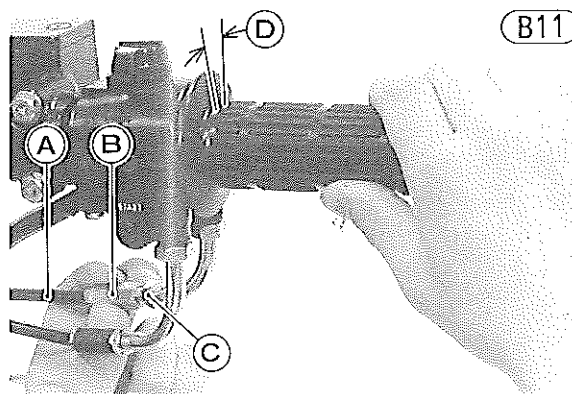
- Loosen the locknuts, and turn both throttle cable adjusting nuts in fully at the upper end of the throttle cables so as to give the throttle grip plenty of play.
- Turn out the decelerator cable adjusting nut until there is no clearance between the cable bracket and the stop when the throttle grip is completely closed. Tighten the locknut.



A. Decelerator Cable
B. Locknut

C. Adjusting Nut

- Turn the accelerator cable adjusting nut until 2~3 mm of throttle grip play is obtained. Tighten the locknut.



A. Accelerator Cable
B. Adjusting Nut

C. Locknut
D. 2~3 mm

16 ADJUSTMENT—ENGINE

NOTE: If the throttle cables cannot be adjusted by using the cable adjusting nuts at the upper end of the throttle cables, use the cable adjusters at the lower ends of the throttle cables. Do not forget to securely tighten the adjuster mounting nuts.

CARBURETORS

For internal carburetor maintenance and adjustment of parts, see the maintenance section (Pg. 155) of this manual. The following procedure covers the idling adjustment, which should be inspected during periodic maintenance or whenever the idle setting has been disturbed. This procedure also includes the necessary steps for obtaining proper carburetor synchronization.

When the idle speed is too low, the engine may stall; 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. Poor carburetor synchronization will cause unstable idling, sluggish throttle response, and reduced engine power and performance.

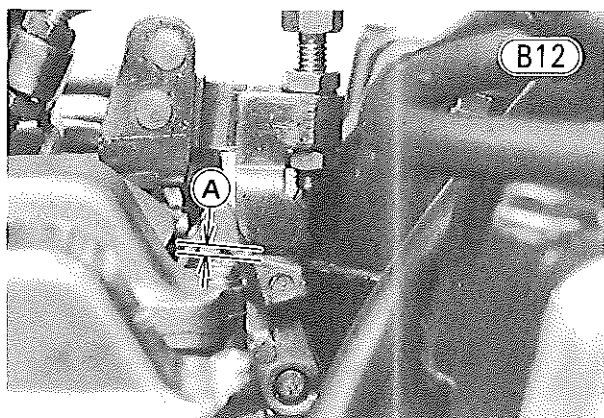
The carburetors on US model have an accelerator pump to richen the fuel/air mixture during acceleration. Though the accelerator pump does not require periodic maintenance, inspect it if symptoms of accelerator pump trouble appear (Pgs. 161 ~ 162).

The following procedure consists of three parts: initial synchronization—mechanical (sometimes necessary), idling adjustment, and fine synchronization—vacuum.

Initial Synchronization—Mechanical:

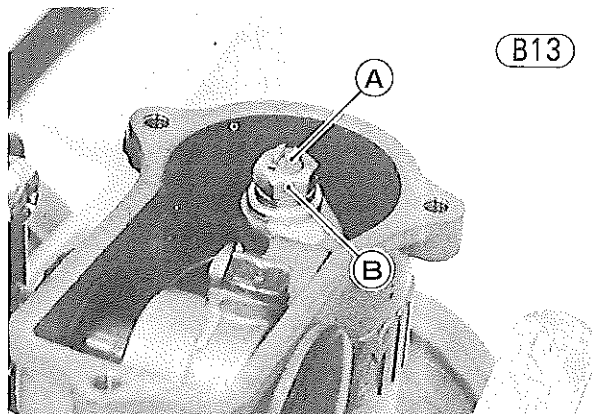
If the engine idle is especially rough, it may be necessary to synchronize the throttle valves before making the idling adjustment.

- Turn the idle adjusting screw so that there is 1.6 ~ 2.0 mm clearance between the throttle cable bracket and the stop on the pulley.



A. 1.6 ~ 2.0 mm

- Push the throttle grip completely closed. At this time there should be no clearance between the cable bracket and the stop. When the throttle grip is released, there should be 1.6 ~ 2.0 mm clearance between the cable bracket and the stop. Replace the cable bracket if it does not work as above.
- Remove the carburetors from the engine (Pg. 44).
- Synchronize the throttle valves using the following procedure.
- Remove the top covers (4) and loosen the locknuts (4).



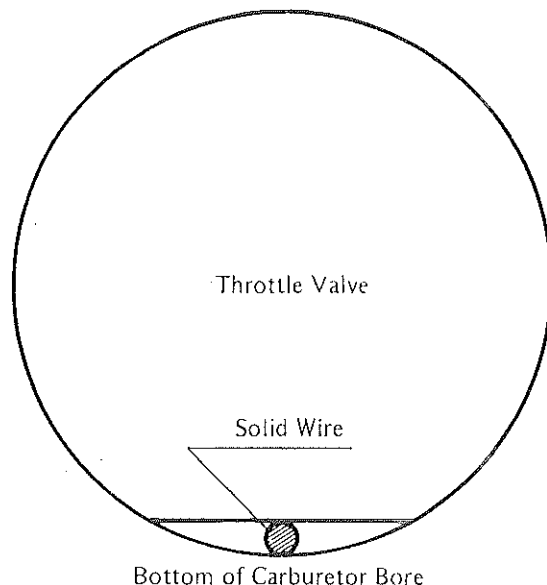
A. Adjusting Screw

B. Locknut

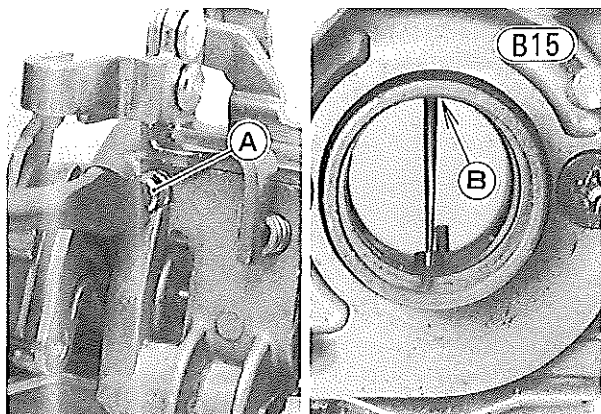
- Turn the adjusting screw so that there is 0.7 mm clearance between the throttle valve and the bottom of the carburetor bore. This is a very fine adjustment, so make it carefully for each of the four carburetors.

NOTE: An easy method of performing this adjustment is to carefully insert a piece of 0.7 mm solid wire in the space between the bottom of the carburetor bore and the throttle valve, lifting the valve and slowly letting it seat on the wire. Then, with the carburetor throat facing downward, slowly turn the adjusting screw out until the wire just falls out. Repeat the procedure above for each carburetor. This will insure a correct and uniform setting for each valve.

Throttle Valve Clearance



- Tighten the locknuts without changing the position of the screws. Install the top covers.
- Open the throttle so that the bottom edge of the lowest of the four carburetor throttle valves is even with the top of the carburetor bore. Turn the pulley stop screw so the pulley is stopped at that point.



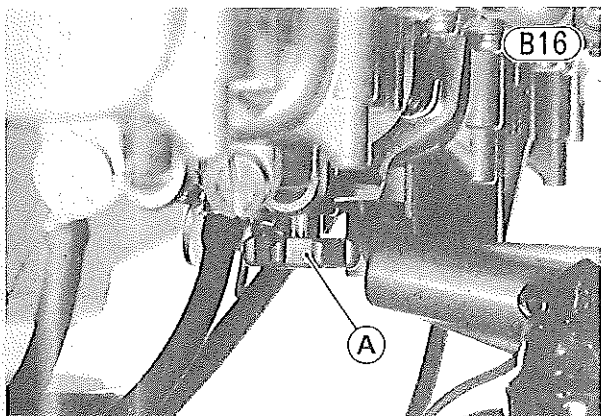
A. Pulley Stop Screw

B. Throttle Valve

- Install the carburetor (Pg. 44), and adjust the play in the throttle cable (Pg. 15).

Idling Adjustment:

- 1) Idle speed adjustment
 - Start the engine, and warm it up for 5 minutes.
 - Adjust the idle speed to 950 ~ 1,050 rpm by turning the idle adjusting screw.



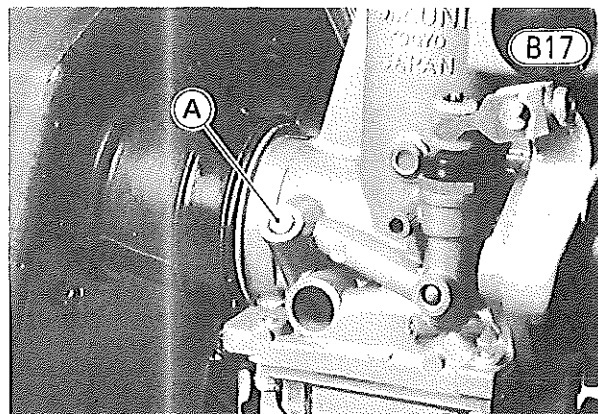
A. Idle Adjusting Screw

- 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 either side. If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed, or they may be damaged.

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

- 2) Idle mixture adjustment (US model only)
 - Check all carburetors for stripping of the yellow mark painted on the air screw. If the paint falls off, first turn the screw in until it seats lightly, and back it out $1\frac{1}{8}$ turns.



A. Air Screw

- Perform the idle speed adjustment.

NOTE: If proper idle speed cannot be obtained by this adjustment, first check the following and correct as necessary.

- Engine Oil (Pg. 19)
- Spark Plugs (Pg. 12)
- Throttle Cables (Pg. 15)
- Cylinder Compression (Pg. 174)
- Air Cleaner Element (Pg. 154)
- Valve Clearance (Pg. 12)
- Ignition Timing (Pg. 227)
- Air Injection System (Pg. 172)
- Air Cleaner Duct and Carburetor Holder Leakage

Fine Synchronization—Vacuum:

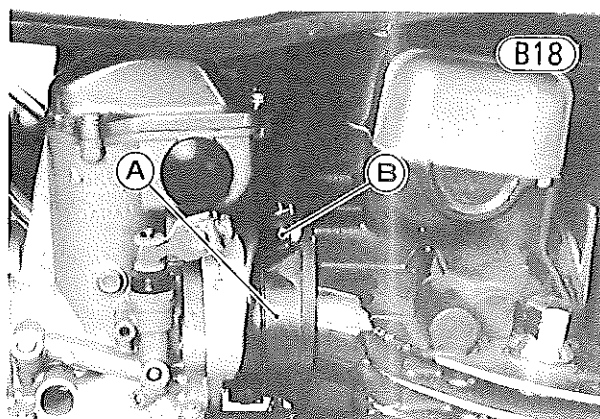
Fine adjustment of carburetor synchronization, necessary for smooth engine operation, requires the use of vacuum gauges. Differences between the left two cylinders and right two cylinders might be found from exhaust noise and exhaust pressure; but to accurately synchronize each carburetor, the use of vacuum gauges is essential.

- NOTES:** 1. During carburetor synchronization, the fuel tank will be removed. In most cases, it will be necessary to temporarily replace the standard fuel lines with lines long enough to reach the fuel tank while it is located on your workbench.
2. If fuel is supplied to the carburetors from another optional tank, the vacuum hose for the automatic fuel tap will be open and extra air drawn into the carburetor bore through the vacuum hose. This results in improper carburetor synchronization. To prevent this, plug the open end of the vacuum hose during carburetor synchronization so that no extra air can be drawn into the carburetor.

WARNING Use extreme caution when working with gasoline, open fuel lines, etc. to avoid a fire or explosion.

- Start the engine, and warm it up for 5 minutes.
- Adjust the idle.
- Remove the rubber caps from the vacuum gauge attachments on the carburetor holder, and attach the vacuum gauges (special tools).
- For US model, slide up the hose clamps, and pull the vacuum hoses off the #1 and #4 vacuum gauge attachments to connect the vacuum gauge to the #1 and #4 carburetor holders.

18 ADJUSTMENT—ENGINE

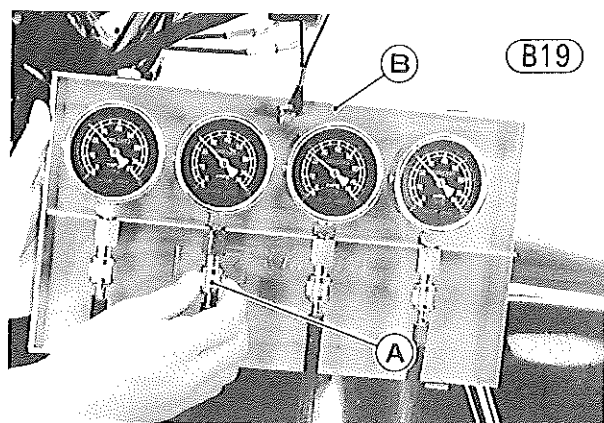


A. Carburetor Holder B. Attachment

- Completely close the vacuum gauge damper valves, and then start the engine.
- With the engine idling, slowly open the vacuum gauge damper valves until gauge needle flutter is less than 3 cmHg, and note the gauge readings.

Table B3 Engine Vacuum

Engine Vacuum	20 ~ 28 cmHg
Difference between any two cylinders	less than 2 cmHg



A. Damper Valve B. Vacuum Gauge Set (57001-127)

- If there is a difference of more than the specified value between any two gauges, stop the engine, and synchronize the carburetors according to the following procedure.
- Remove the fuel tank (Pg. 41), and supply fuel for the carburetors by some means during adjustment.
- Remove the carburetor top covers (4), and loosen the locknuts (Fig. B13).
- With the engine idling, readjust the individual throttle adjusting screws to set all the carburetors to within 2 cmHg of each other. Backing the screw out decreases vacuum and turning it in increases it. If any gauge reads less than 15 cmHg after synchronizing the carburetors, recheck the points listed in the end of the idling adjustment; check and clean the carburetor start-er system if necessary.

CAUTION

Take care that no dirt or other foreign matter enters the tops of the carburetor

during this operation, or else the throttle valves may stick.

- Adjust the idle again.
- Open the throttle grip and let it snap shut a few times. Make sure the vacuum readings stay within the specifications. If they do not, repeat the last two steps.
- After the carburetors are properly synchronized, tighten the locknuts without changing the positions of the screws. Install the top covers.
- Install the fuel tank (Pg. 41).
- Detach the vacuum gauge, and install the rubber caps or vacuum hoses on the vacuum gauge attachments.
- Adjust the idle speed to 950 ~ 1,050 rpm with the idle adjusting screw.

CLUTCH

Stretching of the clutch cable causes the clutch lever to develop excessive play. Too much play will prevent complete disengagement and may result in shifting difficulty and possible clutch and transmission damage. Most of the play must be adjusted out, but a small amount must remain so that the clutch release lever will function properly.

Clutch plate wear also causes the clutch to go out of adjustment. This 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 the clutch to slip.

NOTE: Even though the proper amount of play exists at the clutch lever, clutch lever play alone cannot be used to determine whether or not the clutch requires adjustment.

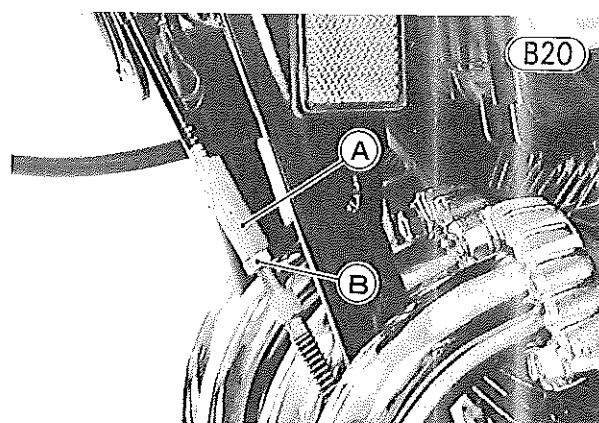
The adjustment procedure which follows compensates for both cable stretch and plate wear.

To adjust the clutch:

WARNING

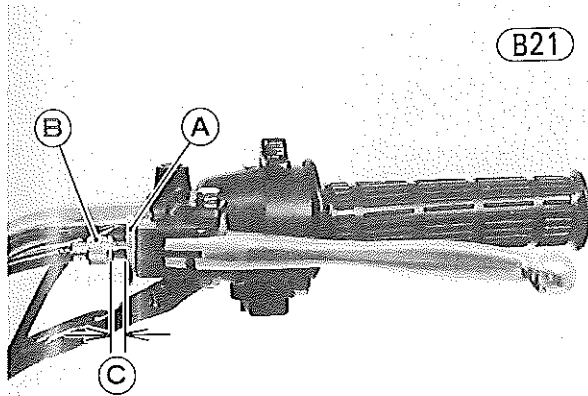
To avoid a serious burn, never touch the engine or exhaust pipe during clutch adjustment.

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



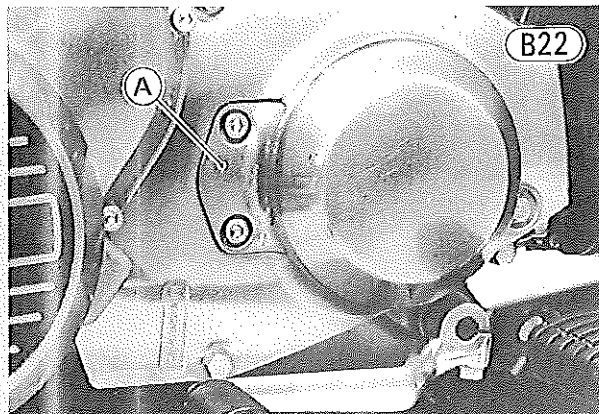
A. Adjusting Nut B. Locknut

- 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 knurled locknut.



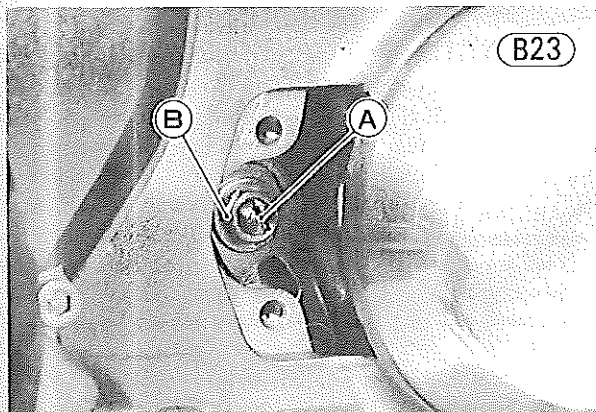
A. Knurled Locknut
B. Adjuster
C. 5~6 mm

- Remove the Allen bolts (2), and take off the clutch adjusting cover.



A. Clutch Adjusting Cover

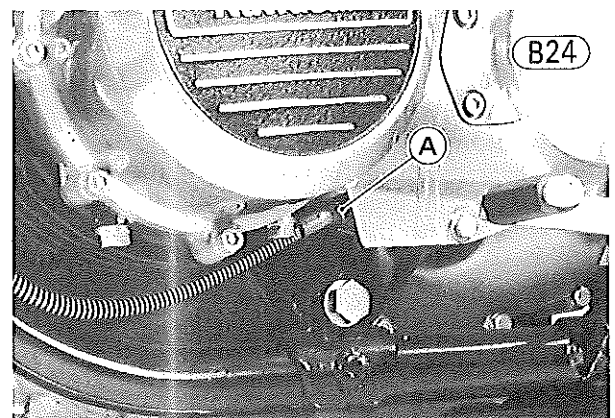
- Loosen the locknut, and back out the clutch adjusting screw 3 or 4 turns keeping the locknut from turning with the screw. Be sure to fit the clutch release lever onto the release shaft properly.



A. Adjusting Screw
B. Locknut

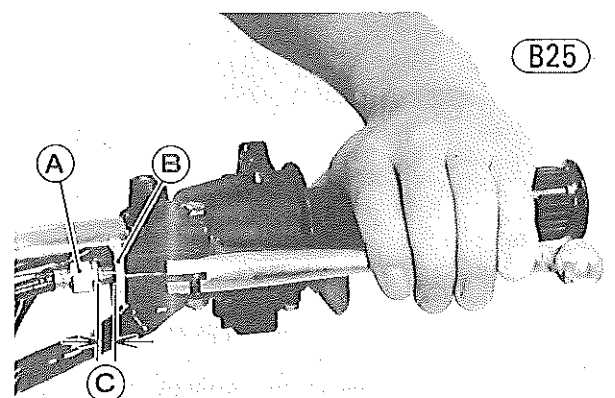
- Turn the adjusting screw in until it becomes hard to turn. This is the point where the clutch is just starting to release.
- Back out the adjusting screw ½ turn from that point, and tighten the locknut.
- Take up all the cable play with the adjusting nut at the center of the cable, and then tighten the locknut.
- Make sure the lower end of the clutch outer cable is properly fitted into the hole in the front bevel gear case mount.

WARNING If the cable is not fully seated in the hole in the front bevel gear case mount, it could slip into place later and the clutch would not disengage.



A. Front Bevel Gear Case Mount

- Turn the adjuster at the clutch lever so that the clutch lever has 2~3 mm of play, and tighten the knurled locknut.



A. Adjuster
B. Knurled Locknut
C. 2~3 mm

- Install the clutch adjusting cover.

ENGINE OIL

In order for the engine, transmission, front bevel gear, and clutch to function properly, always maintain the

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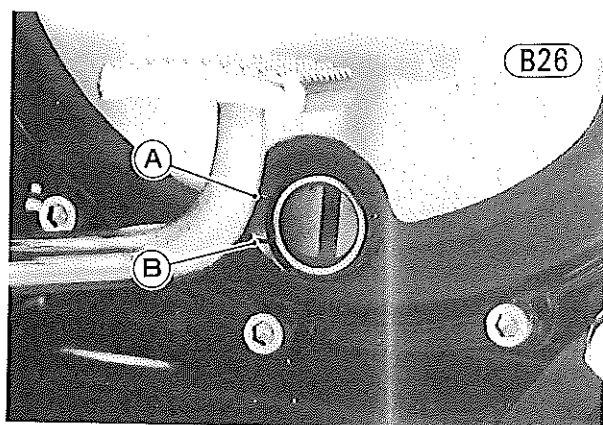
engine oil at the proper level and change the oil in accordance with the Periodic Maintenance Chart (Pg. 10). Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure.

Oil Level Inspection

- Situate the motorcycle so that it is perpendicular to the ground (on its center stand).
- If the oil has just been changed, start the engine and let it idle for several minutes. This fills the oil filter with oil. Then wait several minutes until the oil settles.

CAUTION Run the engine at idle speed at least until the oil pressure light turns off. Racing the engine before the oil reaches every part can cause engine seizure.

- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- Check the engine oil level through the oil level gauge in the lower right side of the engine. With the motorcycle held level or on the center stand, the oil level should come up between the lines next to the gauge.



A. Upper Level

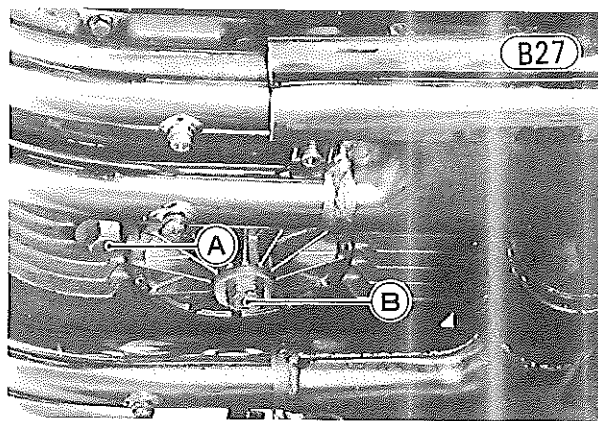
B. Lower Level

- If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- If the amount of oil is insufficient, add oil through the oil filler opening. Use the same type and brand of oil that is already in the engine.

WARNING If the engine runs without oil, it will be severely damaged. In addition, the engine may suddenly seize, locking the rear wheel and causing an accident if the clutch lever is not pulled in fast enough.

Oil and Oil Filter Change

- Warm up the engine thoroughly, and then stop the engine.
- Set the motorcycle up on its center stand, place an oil pan beneath the engine, and remove the engine drain plug.



A. Engine Drain Plug

B. Filter Mounting Bolt

- The engine drain plug is magnetic to catch steel filings. Be sure to clean it off before installing it.
 - If the oil filter is to be changed, remove the filter mounting bolt, and drop out the oil filter.
 - Replace the oil filter with a new one. Check that it is properly assembled (Pg. 84).
- NOTE:** Check for O ring damage. If necessary, replace it with a new one.
- Install the oil filter, tighten its bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
 - After the oil has completely drained out, install the engine drain plug. Proper torque for the drain plug is 3.0 kg-m (22 ft-lbs).
 - Fill the engine up to the upper level with SE class SAE 10W40, 10W50, 20W40, or 20W50 motor oil. It will take about 3.7 liters.

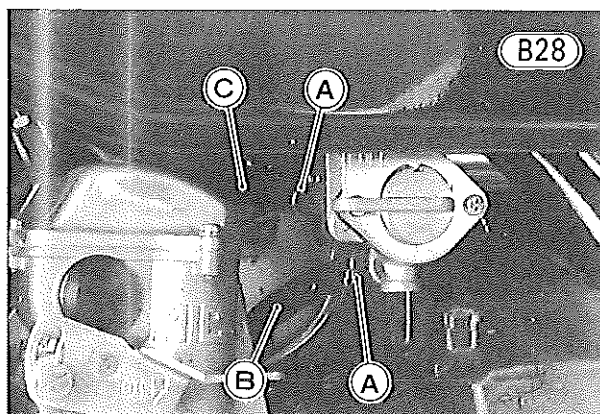
NOTE: After the engine has been run and then stopped for a few minutes, the oil level should come to between the upper and lower marks.

FUEL SYSTEM

Accumulation of water in the fuel tank will restrict the flow of fuel and cause the carburetor to malfunction. The fuel system should be cleaned out periodically in the following manner.

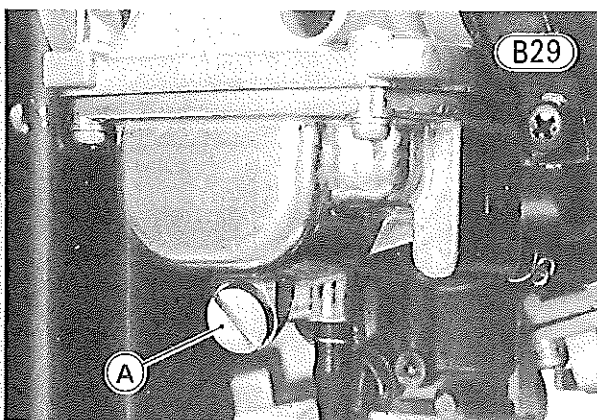
WARNING 1. Clean the fuel system in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area.

2. Never clean out the fuel system when the engine is still warm.
 3. Wipe any fuel off the engine before starting it.
- Slide the clamps down, pull the fuel hose and vacuum hose off the tap, and remove the fuel tank (Pg. 41).



A. Clamp B. Fuel Hose C. Vacuum Hose

- Holding a container under the fuel tap, turn the tap to the "PRI" position to drain the tank until only gasoline comes out, and then turn the tap to the "ON" position.
- Install the fuel tank (Pg. 41).
- If water has accumulated in the fuel tank, water may also have accumulated in the carburetor float bowl.
- Remove the drain plug from the bottom of each carburetor float bowl to drain the bowls.



A. Drain Plug

- Install the O rings and drain plugs on the float bowls.
- NOTE:** Check for O ring damage. If necessary, replace it with a new one.

Adjustment—Chassis

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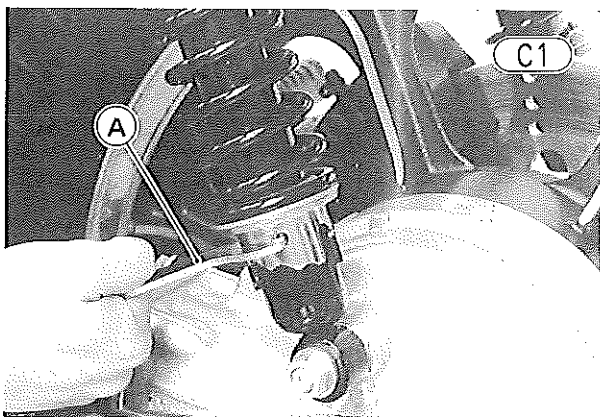
24 ADJUSTMENT—CHASSIS

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, riding on bad roads, 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. 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.

BRAKES

Front Brake:

Disc and disc pad wear is automatically compensated for and has no effect on the brake lever action. 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. 207).

Rear Brake:

Disc and disc pad wear is automatically compensated for and has no effect on brake pedal action. However, the brake pedal may occasionally require adjustment due to wear inside the pedal assembly itself, or in case of disassembly. Excessive play must be taken up to keep the braking action lag time to a minimum, but enough play must be left to ensure a full braking stroke.

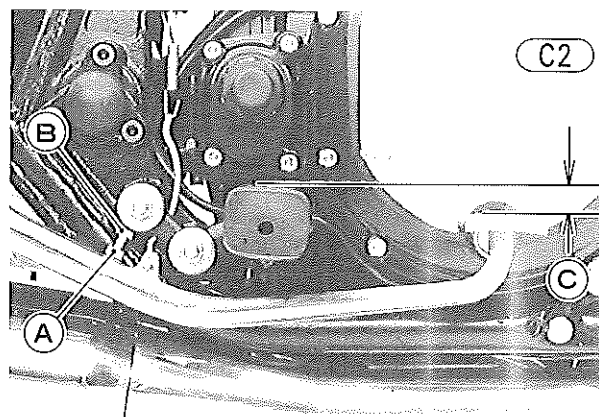
NOTE: Check the brake fluid level in accordance with the Periodic Maintenance Chart (Pg. 10). Before adjusting the brakes, be sure that air is bled from the brake lines (Pg. 207).

Brake Pedal Position:

- When the brake pedal is in its rest position, it should be 20 ~ 30 mm lower than the top of the footpeg.

- If it is too low; loosen the locknut, turn the brake pedal adjusting bolt to obtain the correct pedal position, and then tighten the locknut.

- If it is too high; loosen the locknut, slide down the push rod dust cover, and shorten the brake push rod to give the brake pedal plenty of play. Then adjust the brake pedal position.

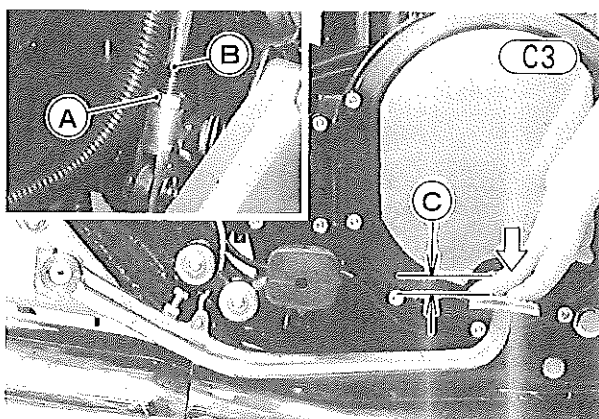


A. Adjusting Bolt B. Locknut C. 20 ~ 30 mm

- Check brake pedal travel, and tighten the brake push rod locknut.

Rear Brake Pedal Play:

- The brake pedal should have 8 ~ 10 mm of free play from the rest position before the push rod contacts the master cylinder piston.



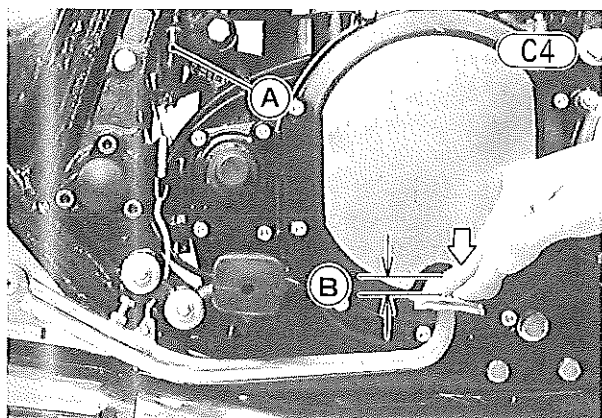
A. Locknut B. Rod C. 8 ~ 10 mm

- To adjust play, loosen the locknut and turn the push rod. Tighten the locknut.
- Check the rear brake light switch.
- Check for brake drag.
- Check braking effectiveness.

BRAKE LIGHT SWITCH

The front brake light switch, mounted on the front brake master cylinder, is operated by simple electrical contact and does not need adjustment. However, the rear brake light switch, activated by a wire spring attached to the brake pedal, requires periodic adjustment to compensate for any change in spring shape or tension, or in brake pedal shape.

- 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 or shortly before the brake pedal reaches the fully applied position.

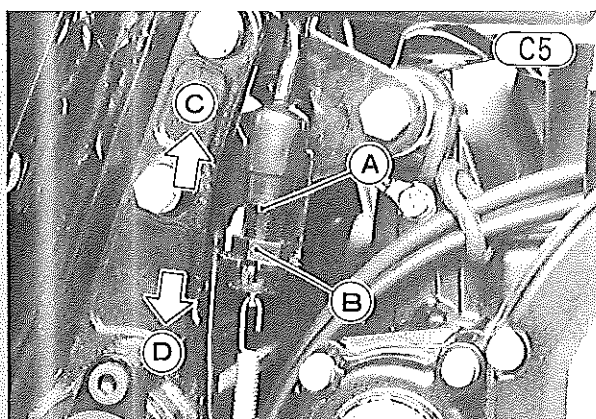


A. Rear Brake Light Switch

B. 15 mm

- If it does not, 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 light 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 NutC. Light Sooner
D. Light Later

STEERING

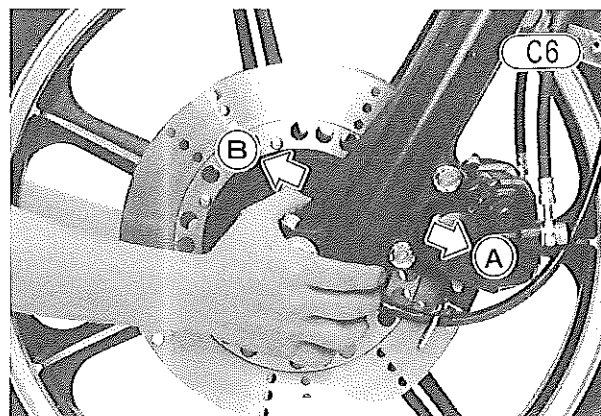
For safety, the steering should always be kept adjusted so that the handlebar will turn freely but have no play.

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:

- Raise the front wheel 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.

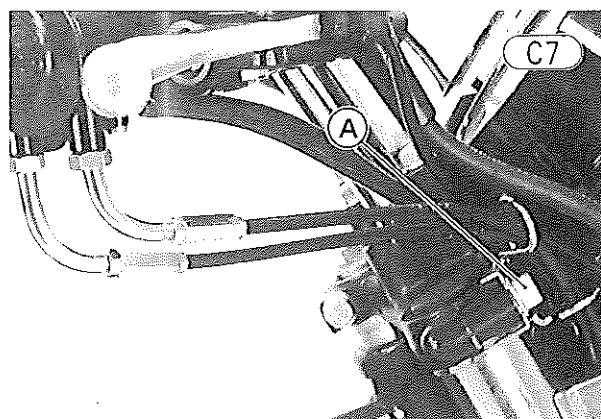


A. Push

B. Pull

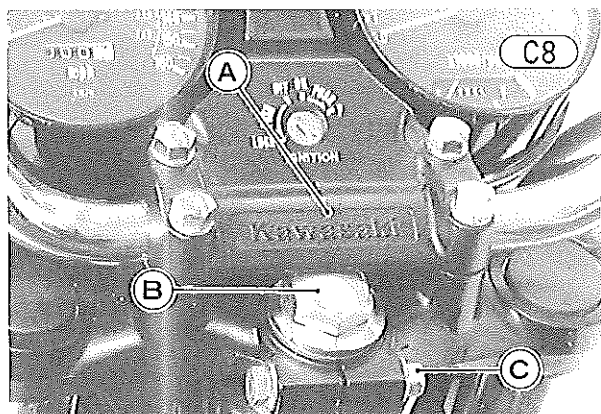
To adjust the steering:

- Remove the fuel tank (Pg. 41).
- Loosen the front fork upper clamp bolts (2) to free the fork tubes from the steering stem during adjustment.



A. Front Fork Upper Clamp Bolt

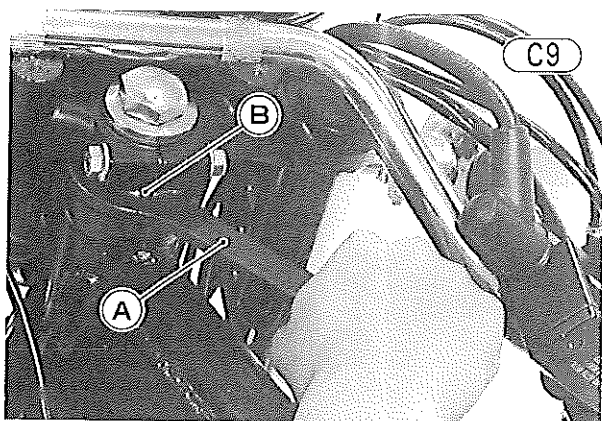
- Remove the handlebar clamp bolts and lockwashers (4 ea), and take off the clamp.

A. Handlebar Clamp
B. Stem Head Bolt

C. Head Clamp Bolt

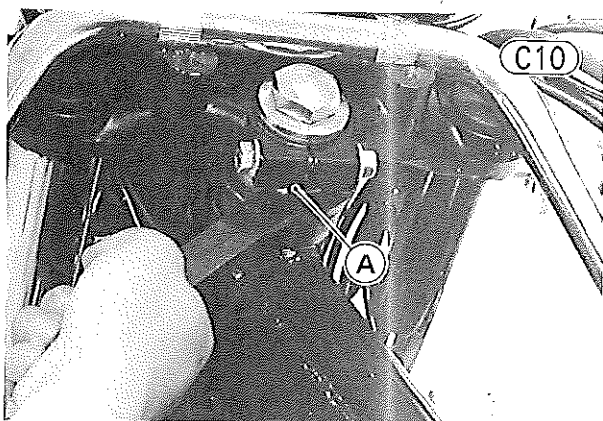
26 ADJUSTMENT—CHASSIS

- Loosen the steering stem head bolt and head clamp bolt, and loosen the steering stem locknuts with a hook spanner and stem nut wrench (special tool).
- Raise the front wheel off the ground.



A. Stem Nut Wrench (57001-134)
B. Lower Stem Locknut

- Using the stem nut wrench, tighten the lower stem locknut to 4.0 kg-m (29 ft-lbs) of torque. Check that there is no play and the steering stem turns smoothly without the rattle. If not, the steering stem bearing may be damaged.



A. Lower Stem Locknut

- Again back out the lower stem locknut a fraction of turn until it turns lightly.
- Turn the lower stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.
- Check that there is no play.
- Keeping the lower stem locknut at the position, clamp the upper stem locknut with finger tight.
- Tighten the steering stem head bolt to 4.0 kg-m (29 ft-lbs) of torque.
- Tighten the steering stem head rear clamp bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
- Tighten the front fork lower clamp bolts (4) to 2.0 kg-m (14.5 ft-lbs) of torque.
- Install the handlebar clamp, lockwashers, and clamp bolts so that the angle of the handlebar matches the angle of the front fork as shown in Fig. G110. Tighten the clamp bolts to 2.0 kg-m (14.5 ft-lbs) of torque.

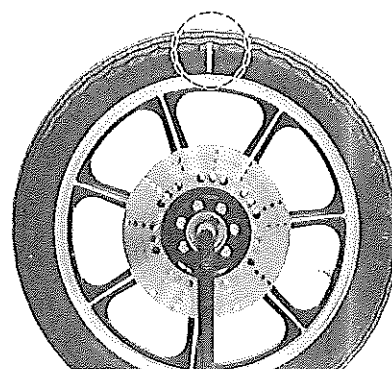
- Check the steering again. If the steering is too tight or too loose in spite of correct adjustment, inspect the steering stem parts according to the maintenance section (Pg. 210).
- Remount the fuel tank (Pg. 41).

WHEEL BALANCE

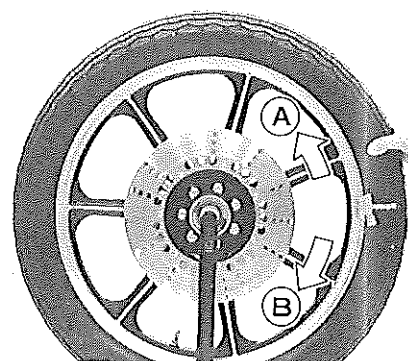
To improve stability and decrease vibration at high speed, the front and rear wheels must be kept balanced.

Check and balance the wheels when required, or when a tire is replaced with a new one:

- Remove the wheel (Pg. 109 or 117).
- Check that the wheel is not damaged.
- Suspend the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark the rim at the top when the wheel stops.



- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.
- However, if the wheel always stops in one position, provisionally attach a balance weight on the rim at the marking using an adhesive tape.
- Rotate the wheel ¼ turn, and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.



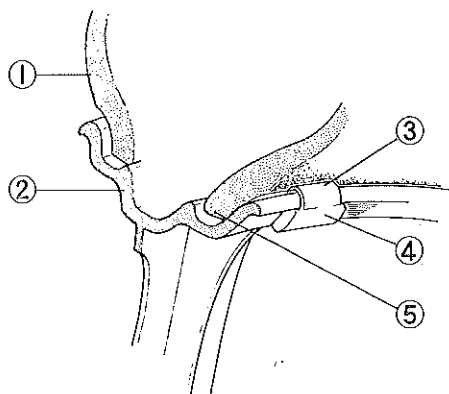
A. Use heavier weight.

B. Use lighter weight.

- If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated $\frac{1}{4}$ turn.
- Rotate the wheel another $\frac{1}{4}$ turn and then another $\frac{1}{4}$ turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- To install the balance weights on the rim, first reduce the tire pressure, pry the tire bead from the rim, and then insert the blade part of the balance weight between the rim and the tire bead until the stepped portion of the weight is hooked over the edge of the rim.

Balance Weight Installation

C13



- | | |
|----------|-------------------|
| 1. Tire | 4. Balance Weight |
| 2. Rim | 5. Tire Bead |
| 3. Blade | |

- Inflate the tire to standard pressure (Pg. 197).
- Remount the wheel on the motorcycle (Pg. 109 or 118).

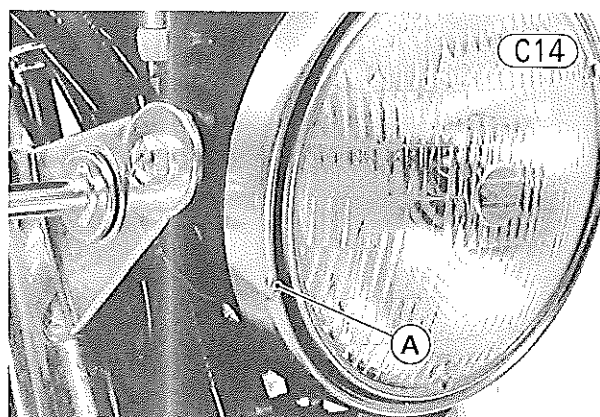
NOTE: Balance weights are available from Kawasaki Dealers in 10, 20, and 30 gram sizes. An imbalance of less than 10 grams will not usually affect running stability.

HEADLIGHT

The headlight beam is adjustable both horizontally and vertically. If not properly adjusted horizontally, the beam will point to one side rather than straight ahead. If adjusted too low vertically, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high vertically, high beam will fail to illuminate the road close ahead, and low beam will dazzle oncoming drivers.

Horizontal Adjustment:

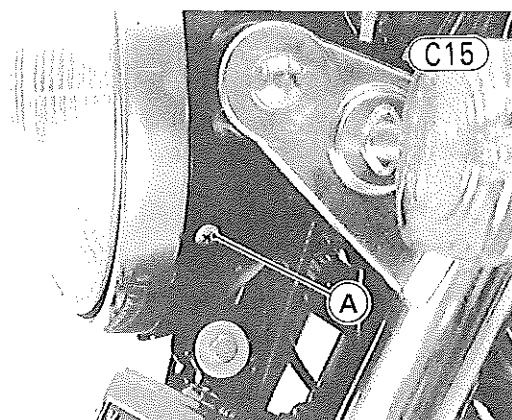
- Turn the adjusting screw on the headlight rim in or out until the beam points straight ahead. Turning the adjusting screw clockwise makes the headlight beam point to the left.



A. Adjusting Screw

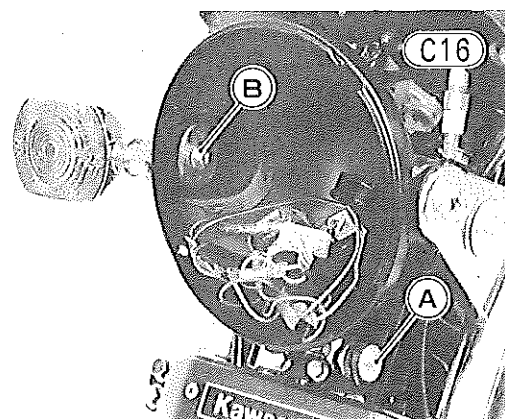
Vertical Adjustment:

- Remove the two screws from the lower side of the headlight housing, and drop out the headlight unit.



A. Screw

- Loosen the mounting bolt underneath the headlight, and loosen the headlight housing mounting nuts.



A. Bolt

B. Nut

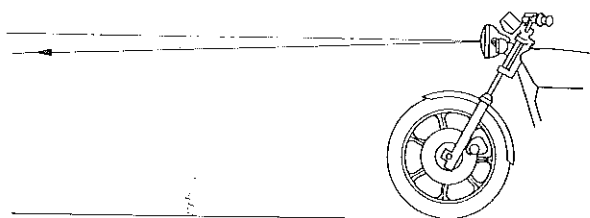
28 ADJUSTMENT—CHASSIS

- Move the headlight housing up or down so that the vertical aim is correct, and then tighten the bolt and nuts to hold it there.

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

Vertical Adjustment

(C17)

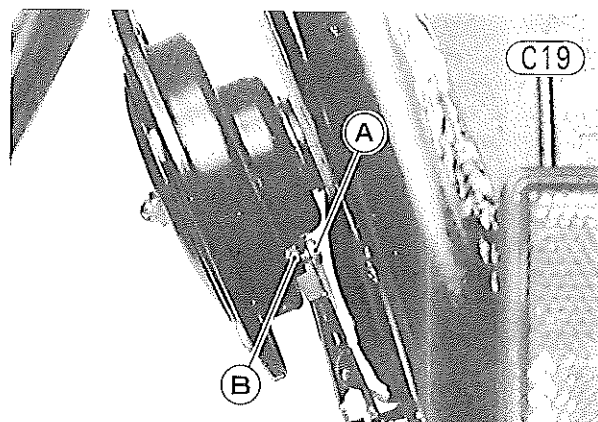


- Remount the headlight unit.

for the best horn sound while keeping the current between 2.0 ~ 3.0 amperes.

- Tighten the adjusting screw locknut.

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



A. Adjusting Screw

B. Locknut

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. If cannot be disassembled.

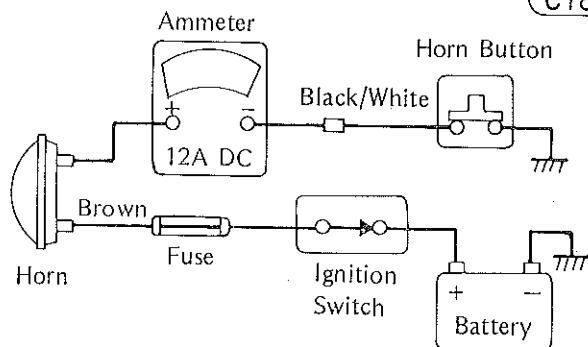
WARNING To avoid a serious burn, never touch the engine or exhaust pipes during horn adjustment.

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.

- Remove the fuel tank to gain access to the horn wires.
- Disconnect the black/white horn lead, and connect an ammeter in series to the horn circuit. The + ammeter lead goes to the horn terminal and the - ammeter lead to the black/white lead.

Horn Current Measurement

(C18)



- Fully loosen the adjusting screw locknut.
- Turn on the ignition key, and keep the horn button pressed while turning the horn adjusting screw. Adjust

FINAL BEVEL GEAR CASE OIL

In order for the pinion and ring gears to function properly, maintain the final gear case 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 oil will cause accelerated wear and may result in pinion and ring gear seizure.

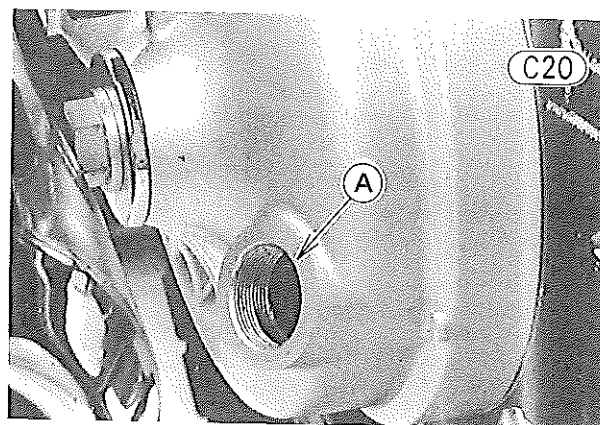
Oil Level Inspection

- Set the motorcycle up on its center stand.
- Remove the filler cap.

CAUTION Be careful not to allow any dirt or foreign materials to enter the gear case.

- Check the oil level, and if it is insufficient, add oil as necessary. The oil level should come to the bottom thread of the filler opening.

NOTE: Use the same type and make of oil that is already in the final gear case.



A. Filler Opening

Oil Change

NOTE: Final bevel gear case oil drains easily and picks up any sediment when the oil is warm after running.

- Set the motorcycle up on its center stand.
- Place an oil pan beneath the gear case.
- Remove the filler cap and drain plug.

WARNING When draining or filling the gear case, be careful that no oil gets on the tire or rim. Clean off any oil that inadvertently gets on them with a high flash-point solvent.



A. Drain Plug

- After the oil has completely drained out, install the drain plug and gasket. Replace the damaged gasket with a new one. Proper torque for the drain plug is 2.0 kg-m (14.5 ft-lbs).
- Fill the gear case up to the bottom thread of the filler opening with the oil specified below.

Table C1 Final Gear Case Oil

Oil Type	API "GL-5" Hypoid gear oil above 5°C (41°F) SAE 90 below 5°C (41°F) SAE 80	
Oil Capacity	When changing oil	about 230 cc
	After disassembly and completely dry	250 cc

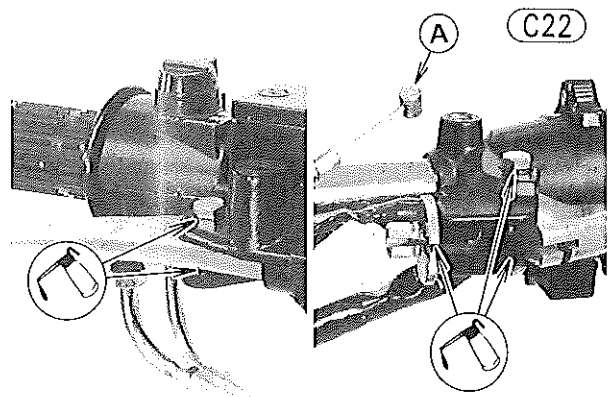
NOTE: "GL-5" indicates a quality and additive rating. "GL-6" rated hypoid gear oils can also be used.

- Install the filler cap.

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.

Clutch and Brake Levers



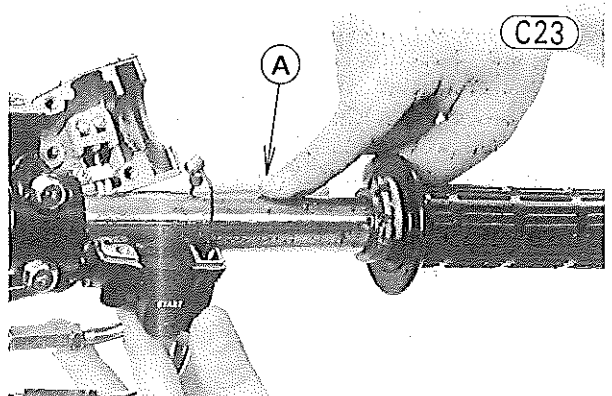
A. Grease

Throttle Grip

Apply grease to the handlebar where the throttle grip turns.

Apply a light coat of grease to the exposed portion of the throttle grip inner cables and their catches in the throttle grip.

Fit the throttle cables into the throttle grip. Refer to throttle cable installation (Pg. 135).

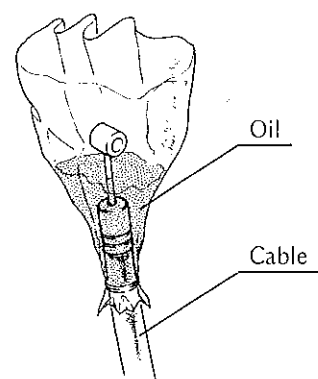


A. Grease

Clutch and Throttle Cables

Lubrication the clutch cable and throttle cables, as shown in the figure. Refer to Pg. 134 and 135 for cable removal.

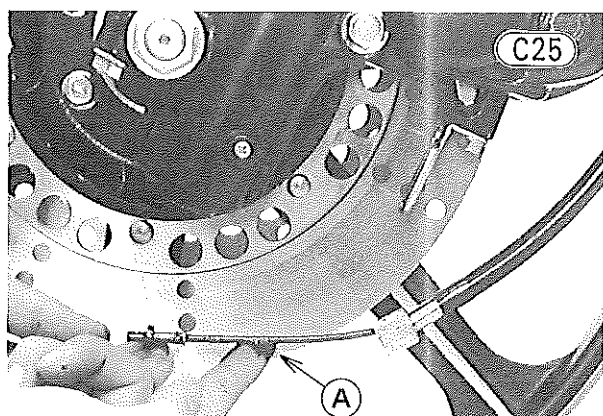
Cable Lubrication



30 ADJUSTMENT—CHASSIS

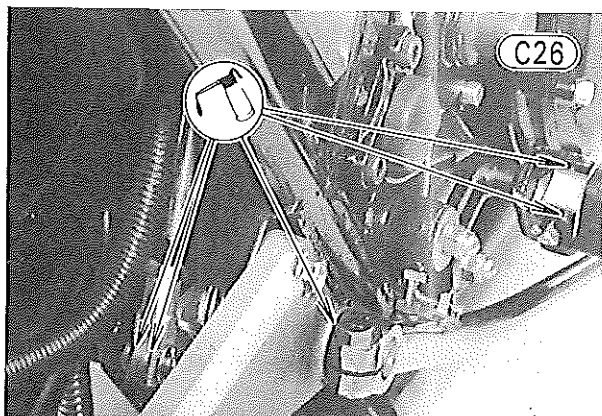
Speedometer and Tachometer Cables

Apply grease sparingly to the inner cables.

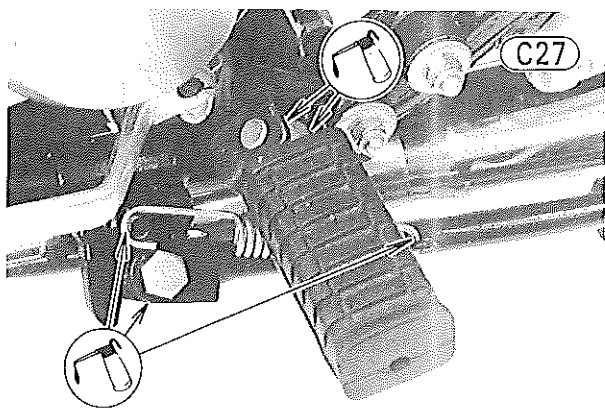


A. Grease.

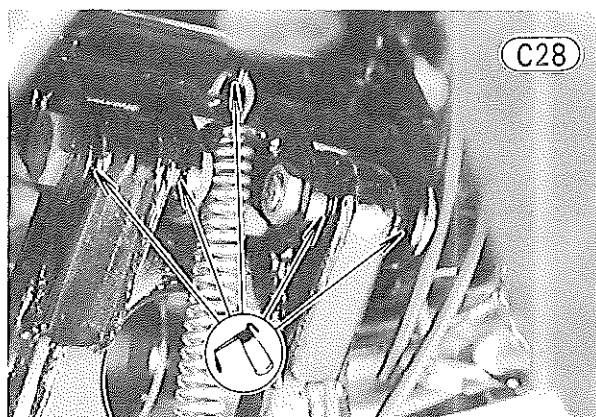
Brake Pedal, Brake Push Rod Joint, and Right Footpeg



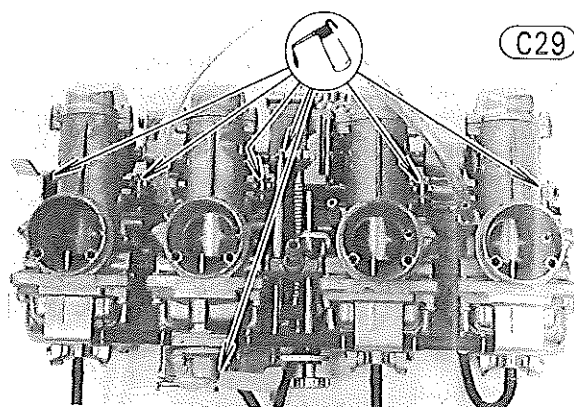
Left Footpeg and Side Stand



Center Stand



Carburetor Choke Link Mechanism and Accelerator Pump Linkage



Others

Lubricate the wheel bearings, speedometer gear housing, swing arm, propeller shaft sliding joints, 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.