Kawasaki

# Z250
# KZ305

Jim Schmidt


# Motorcycle
# Service Manual

## Decimal Equivalents

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

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

## Unit Conversion Table

| | | | | |
|---|---|---|---|---|
| cc | x | .0610 | = | cu in |
| cc | x | .02816 | = | oz (imp) |
| cc | x | .03381 | = | oz (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 | = | $lbs/in^2$ |

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

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

## 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 |
| $kg/cm^2$ | 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 | 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 |

Kawasaki

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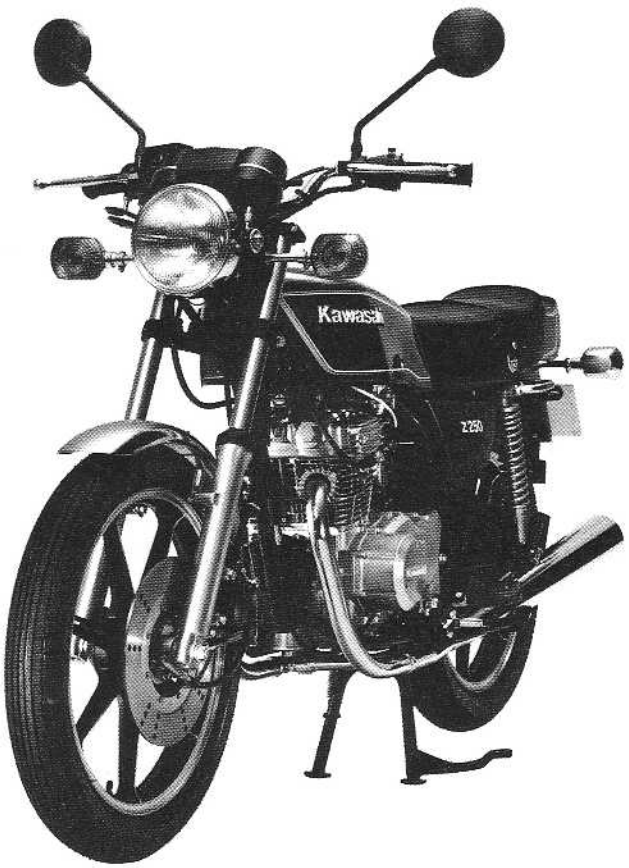



# Motorcycle
# Service Manual



Fourth Edition ① : Sep. 30, 1981 Ⓜ

# EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated two emission control systems in compliance with the applicable regulations of the United States Environmental Protection Agency.

1. Crankcase Emission Control System

   This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into the combustion chamber, where they are burned along with the fuel and air supplied by the carburetors.

2. Exhaust Emission Control System

   This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions".

"Sec. 203(a) The following acts and the causing thereof are prohibited...

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

Note: The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows:

1. Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.

EMISSION CONTROL INFORMATION (CONT.)

2. Tampering could include:
   a. Maladjustment of vehicle components such that the emission standards are exceeded.
   b. Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.
   c. Addition of components or accessories that result in the vehicle exceeding the standards.
   d. Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.

**WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10,000 PER VIOLATION.**

# Foreword

This manual 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) Disassembly

This chapter shows the best method for the removal, disassembly, assembly, and installation which are necessary for maintenance and repair. Do not disassemble the component parts further than explained here. Since assembly and installation are usually the reverse of disassembly and removal, assembly and installation are not explained in detail in some cases. Instead, assembly notes and installation notes are provided to explain special points.

In cases the removal procedures are apparent without explanation such as for the seat or side stand, no information is given.

(3) Maintenance

The procedures for inspection and repair are described in detail in this chapter.

(4) Appendix

The appendix in the back of this manual contains miscellaneous information, including a special tool list and a wiring diagram.

(5) Supplement

The maintenance and repair procedures, that are unique to later year units since the first publication of the Service Manual, are explained in this chapter per one year unit.

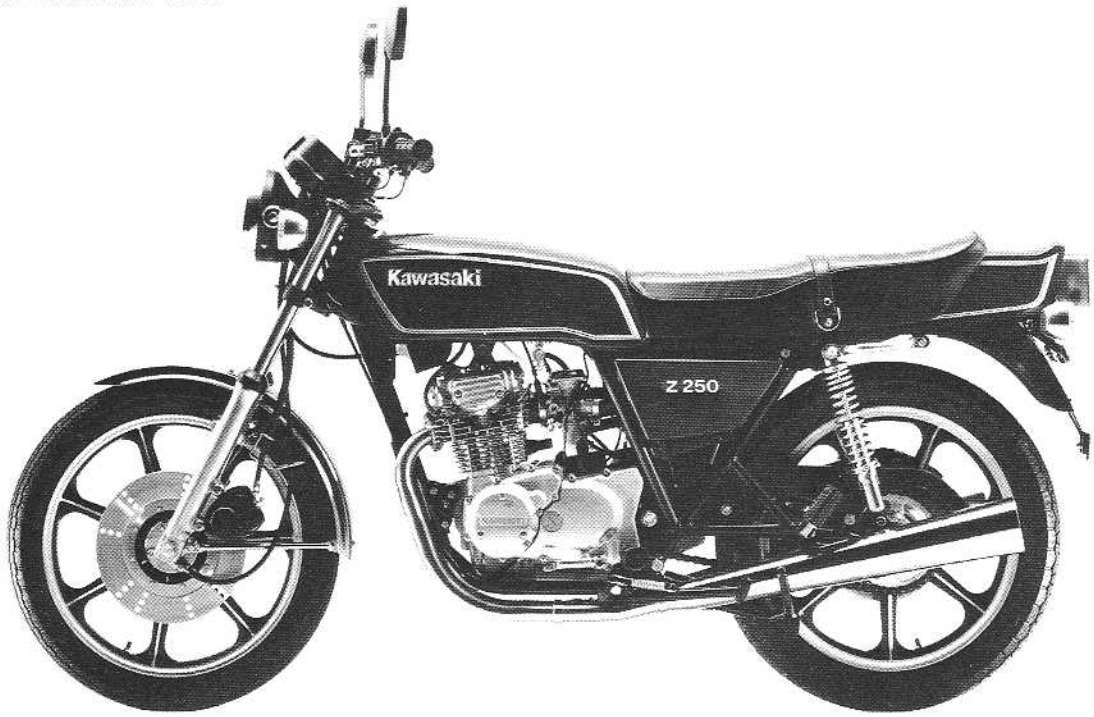
Since the Service Manual is based on the first production units of the 1979 Z250-A1, there may be minor discrepancies between some vehicles and the illustrations and text in this manual. Explanations on major changes and additions pertaining to later year units will be added in the end of the supplement by a new edition, as required.

## QUICK REFERENCE GUIDE

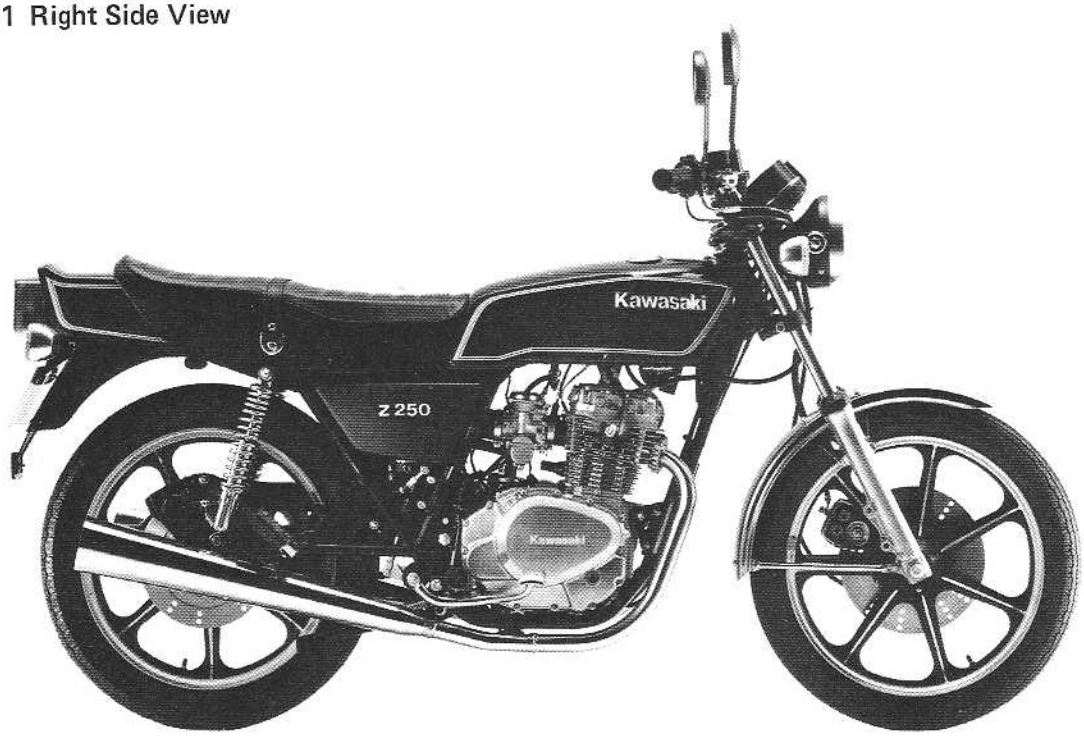
To use, bend the manual back and match the desired section below against the black spot showing at the edge of these pages. ➡

# Model Identification

Z250-A1 Left Side View




Z250-A1 Right Side View



A

# Specifications

## Table of Contents

## SPECIFICATIONS

| | | Z250-A1, A2 |
|---|---|---|
| **Dimensions** | | |
| Overall length | | 2,020 mm, (UK) 2,015 mm, (E) (A) 2,060 mm |
| Overall width | | 760 mm, (E) 740 mm |
| Overall height | | 1,085 mm, (E) 1,070 mm |
| Wheelbase | | 1,340 mm |
| Road clearance | | 145 mm, (E) 140 mm |
| Dry weight | | 153 kg |
| Fuel tank capacity | | 13.6 ℓ |
| **Performance** | | |
| Climbing ability | | 25° |
| Braking Distance | | 12.5 m from 50 kph |
| Minimum turning radius | | 2.2 m |
| **Engine** | | |
| Type | | SOHC 2 cylinder, 4 stroke, air cooled |
| Bore and stroke | | 55.0 x 52.4 mm |
| Displacement | | 248 cc |
| Compression ratio | | 9.5 |
| Maximum horsepower | | 27 HP @10,000 rpm |
| Maximum torque | | 2.1 kg-m (15 ft-lbs) @8,500 rpm |
| Valve timing | | |
| Inlet | Open | 21° BTDC |
| | Close | 59° ABDC |
| | Duration | 260° |
| Exhaust | Open | 61° BBDC |
| | Close | 19° ATDC |
| | Duration | 260° |
| Carburetors | | Keihin CV32 x 2 |
| Lubrication system | | Forced lubrication (wet sump) |
| Engine oil | | SE class SAE 10W40, 10W50, 20W40 or 20W50 |
| Engine oil capacity | | 1.8 ℓ<br>1.5 ℓ (without filter change) |
| Starting system | | Electric starter |
| Ignition system | | Battery and coil |
| Ignition timing | | From 10° BTDC @1,250 rpm to 40° BTDC @3,000 rpm |
| Spark plugs | | NGK D8EA or ND X24ES-U<br>(E) NGK DR8ES or ND X24ESR-U |
| **Transmission** | | |
| Type | | 6-speed, constant mesh, return shift |
| Clutch | | Wet, multi disc |
| Gear ratio: 1st | | 2.60 (39/15) |
| 2nd | | 1.79 (34/19) |
| 3rd | | 1.41 (31/22) |
| 4th | | 1.16 (29/25) |
| 5th | | 1.00 (27/27) |
| 6th | | 0.89 (25/28) |

| | |
|---|---|
| Primary reduction ratio | 3.74 (71/19) |
| Final reduction ratio | 2.33 (35/15) |
| Overall drive ratio | 7.79 (@Top gear) |

**Electrical Equipment**

| | |
|---|---|
| Alternator Rated Output | 13.5 amp. @8,000 rpm, 14V |
| Regulator/Rectifier | Shindengen SH221-12 |
| Ignition coil | Toyo denso ZC003-12V |
| Battery | Yuasa YB10L-A2 (12V 10AH) |
| Starter | Mitsuba SM-725-I |
| Headlight type | Semi-sealed |
| Headlight | 12V 50/40W, (E) 12V 35/35W, (F) 12V 36/36W |
| Tail/Brake light | 12V 8/27W, (E) (A) 12V 5/21W |
| City light | 12V 3W, (E) 12V 4W |
| Turn signal lights | 12V 23W, (E) 12V 21W |
| Meter lights | 12V 3.4W |
| Indicator lights | 12V 3.4W |
| Horn | 12V 2A |

**Frame**

| | | |
|---|---|---|
| Type | | Tubular, single cradle |
| Steering angle | | 40° to either side |
| Castor | | 27° |
| Trail | | 100 mm |
| Tire size | Front | 3.00S-18 4PR |
| | Rear | 3.50S-18 4PR |
| Suspension | Front | Telescopic fork |
| | Rear | Swing arm |
| Wheel travel | Front | 150 mm |
| | Rear | 98 mm |
| Front fork oil capacity (each fork) | | 150 cc |
| Front fork oil type | | SAE 5W20 |

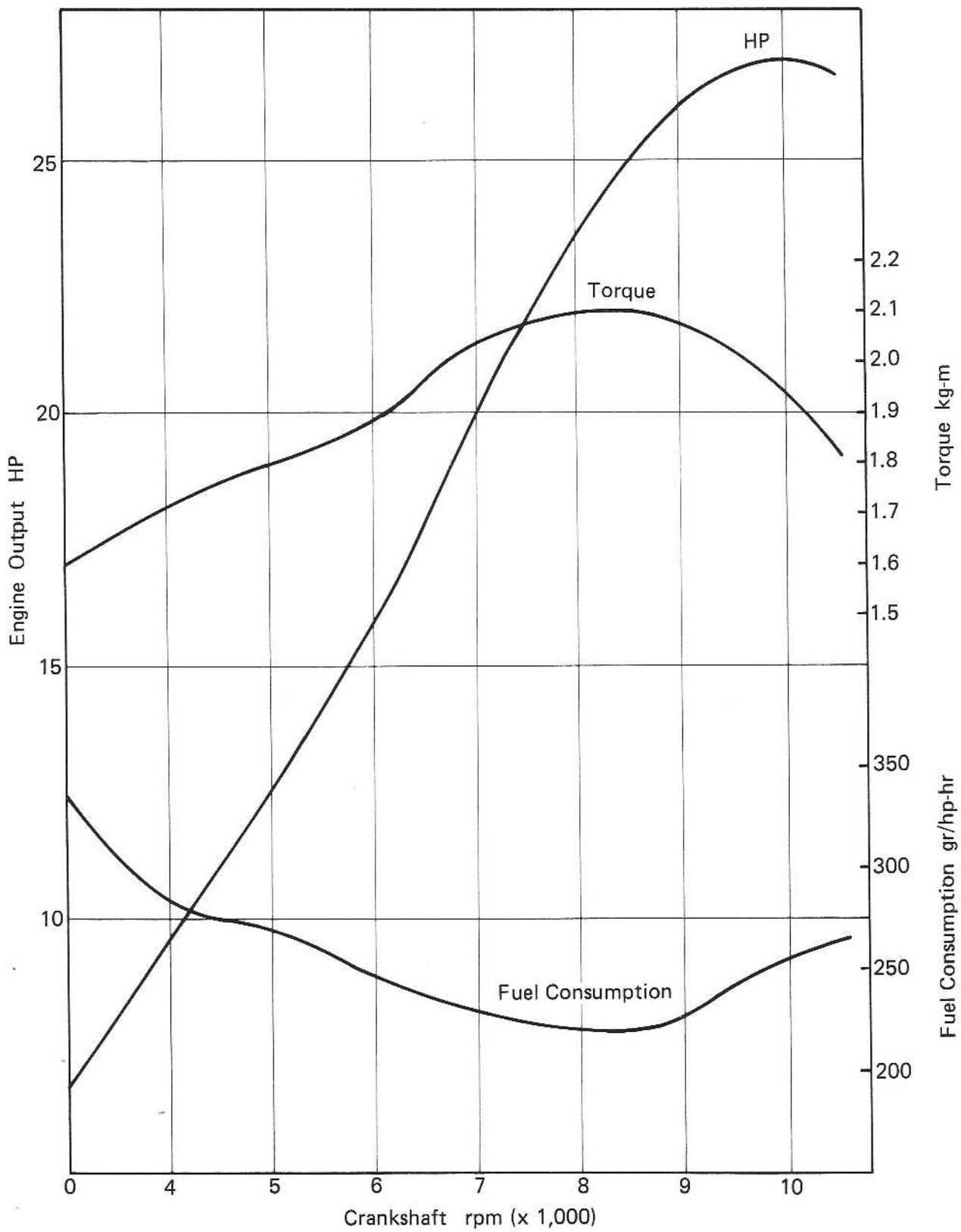
**Brakes**

| | | |
|---|---|---|
| Type | Front and Rear | Disc brake |
| Effective disc diameter | Front | 230 mm |
| | Rear | 218 mm |

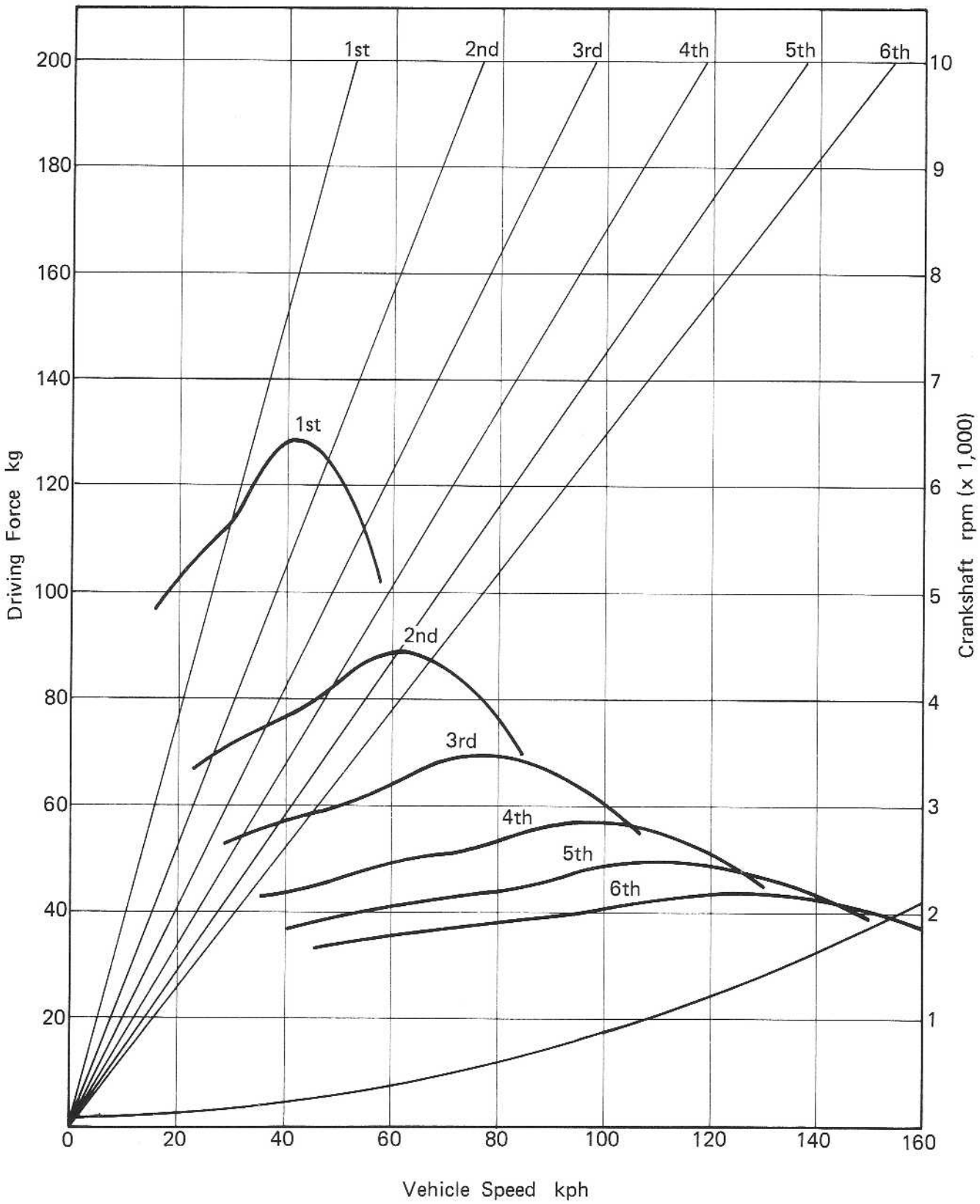
(E) : European model, (EI) : European model except Italian model, (F) : French model,
(UK): U.K. model, (A) : Australian model

Specifications subject to change without notice, and may not apply to every country.

## ENGINE PERFORMANCE CURVES (Z250-A1 ~ A4)



## RUNNING PERFORMANCE CURVES (Z250-A1 ~ A4, B1 ~ B3)



## PERIODIC MAINTENANCE CHART (Z250-A1, A2)

| OPERATION \ FREQUENCY | Whichever comes first ➡ / Every ⬇ | ODOMETER READING * km | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 800 | 5,000 | 10,000 | 15,000 | 20,000 | 25,000 | 30,000 | See Page |
| Battery electrolyte level — check † | month | • | • | • | • | • | • | • | 156 |
| Brake adjustment — check † | | • | • | • | • | • | • | • | 25 |
| Brake wear — check † | | | • | • | • | • | • | • | 145~150 |
| Brake fluid level — check † | month | • | • | • | • | • | • | • | 145 |
| Brake fluid — change | year | | | • | | • | | • | 145 |
| Clutch — adjust | | • | • | • | • | • | • | • | 20 |
| Carburetors — adjust | | • | • | • | • | • | • | • | 18 |
| Throttle cables — adjust | | • | • | • | • | • | • | • | 17 |
| Steering play — check † | | • | • | • | • | • | • | • | 26 |
| Drive chain wear — check † | | | • | • | • | • | • | • | 144 |
| Front fork — inspect/clean | | • | • | • | • | • | • | • | 151 |
| Rear shock absorbers — inspect | | • | • | • | • | • | • | • | 24 |
| Nuts, Bolts, Fasteners — check and torque | | • | | • | | • | | • | 34 |
| Spark plugs — clean and gap † | | • | • | • | • | • | • | • | 12 |
| Camshaft chain — adjust | | • | • | • | • | • | • | • | 16 |
| Points, timing — check † | | • | • | • | • | • | • | • | 12 |
| Valve clearance — check † | | • | • | • | • | • | • | • | 16 |
| Air cleaner element — clean | | | • | | • | | • | | 115 |
| Air cleaner element— replace | 5 cleanings | | | • | | • | | • | 115 |
| Fuel system— clean | | • | • | • | • | • | • | • | 22 |
| Tire tread wear — check † | | | • | • | • | • | • | • | 140 |
| Engine oil — change | year | • | • | • | • | • | • | • | 22 |
| Oil filter — change | | • | | • | | • | | • | 22 |
| General lubrication — perform | | | • | • | • | • | • | • | 29 |
| Front fork oil — change | | | | • | | • | | • | 152 |
| Timing advancer — lubricate | | | | • | | • | | • | 162 |
| Swing arm — lubricate | | | | • | | • | | • | 30 |
| Wheel bearings — grease | 2 years | | | | | • | | | 143 |
| Speedometer gear housing — grease | 2 years | | | | | • | | | 89 |
| Steering stem bearings — grease | 2 years | | | | | • | | | 150 |
| Drive chain — lubricate | Every 300 km | | | | | | | | 144 |
| Drive chain — adjust | Every 800 km | | | | | | | | 24 |

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

# Adjustment–Engine

## Table of Contents

B

## SPARK PLUGS

Neglecting the spark plugs 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 plugs should be removed for inspection, cleaning, and to reset the gaps.

- Remove the spark plugs using a spark plug wrench.
- Clean the spark plugs, preferably in a sand-blasting device, and then clean off any abrasive particles. The plug may also be cleaned using a hgh 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 spark plug gaps with a thickness gauge. If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

**Spark Plug Gap**

B1

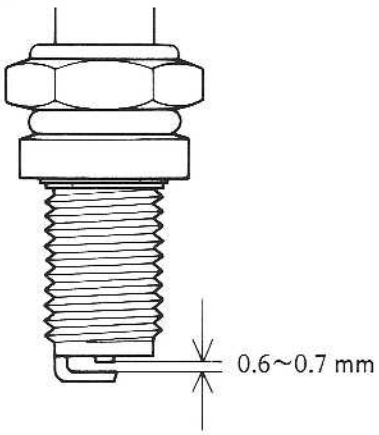



**Table B1 Spark Plugs**

| | |
|---|---|
| Type | NGK D8EA or ND X24ES-U<br>(EI) NGK DR8ES or ND X24ESR-U |
| Gap | 0.6~0.7 mm |
| Tightening Torque | 2.0 kg-m (14.5 ft-lbs) |

(EI) : European model except Italian model

- Screw the spark plugs into the cylinder head and tighten them to the specified torque. Connect the spark plug leads.

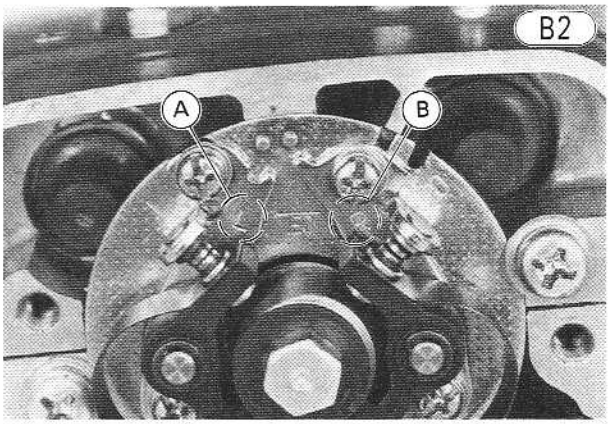
**NOTE:** Refer to the electrical maintenance section, Pg. 163, for detailed spark plug information.

## IGNITION TIMING

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

Correct ignition timing is achieved by first obtaining the correct contact breaker point gap (this can also be achieved by adjusting the dwell angle to the specified amount) and then changing the position of the contact breaker mounting plate. Setting the points often returns the timing very close to the correct setting. Once the timing has been adjusted, it may be checked for accuracy by the use of a strobe light.

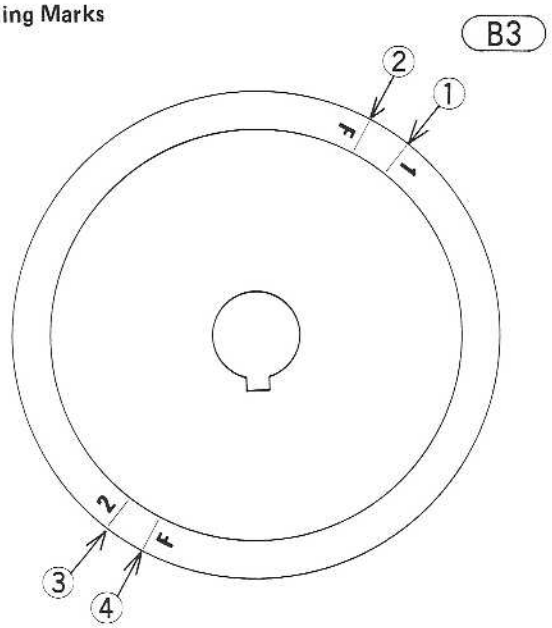
There are two sets of contact breaker points: the left set marked "L" fires the spark plug on the left, and the right set marked "R" fires the spark plug on the right 180° later. The gap for each set of points must be adjusted separately.




**A. L Mark** **B. R Mark**

There are two sets of timing marks on the rotor. One set marked "1" or "L" is for timing the left cylinder, and the other set marked "2" or "R" is for timing the right cylinder. The "F" mark of each set is for checking the timing before advancing, and the "advanced timing marks" (a pair of lines) are for checking the timing after it has advanced.

**Timing Marks**

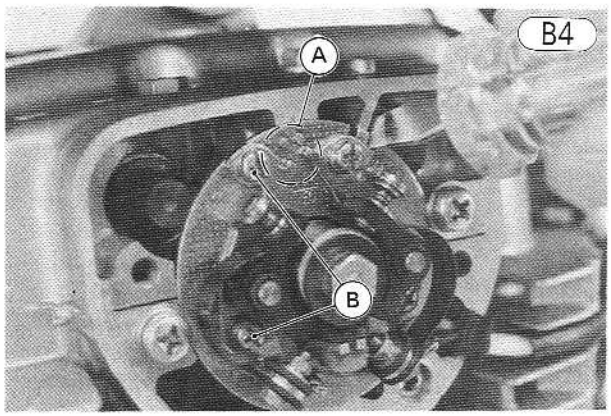



1. Left Cylinder TDC Mark
2. Left Cylinder "F" Mark
3. Right Cylinder TDC Mark
4. Right Cylinder "F" mark

### Point Gap Adjustment

- Remove the contact breaker cover and gasket.
- Remove the alternator cover.

- Clean the points with a piece of clean paper or cloth using an oil-free solvent. A business card soaked in trichloroethylene can be used to remove traces of oil. To repair light damage, use emery cloth or an oilstone. If the points are badly worn down or damaged, or if the spring is weak, replace the contact breaker.
- Lubricate the point cam felt sparingly with suitable point cam lubricant. Do not overlubricate. Replace the felt if it is worn.
- Using a 14 mm wrench on the crankshaft, turn the engine counterclockwise until the contact breaker points are at their widest opening.
- Measure the contact breaker point gap with a thickness gauge. The proper gap is 0.3~0.4 mm.
- If the gap is incorrect, loosen the contact breaker base screws (2) just enough to allow the base to move. Use a slot screwdriver on the pry points until the correct point gap is obtained. Tighten the screws.




**A. Pry Points** **B. Base Screws**

- Turn the crankshaft until the other point gap is opened, and adjust it if necessary.
- Adjust the ignition timing.

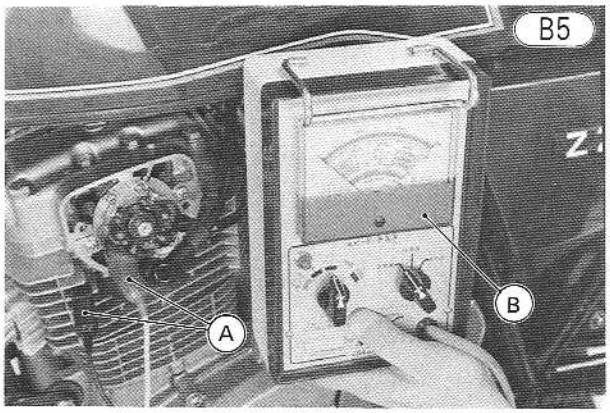
## Dwell Angle Adjustment

The most precise means to set the point gap is to use a dwell angle tester instead of a thickness gauge. If a dwell angle tester is available, adjust the dwell angle (point gap) in the following manner.

**NOTE:** The dwell angle is the angular range for which the contact breaker points are closed. This allows the current to flow in the ignition coil primary winding.

**WARNING** **To prevent an injury when measuring the dwell angle, make sure that no tools, clothes, or tester leads touch the spinning camshaft.**

- Remove the contact breaker cover and gasket.
- Clean the points with a piece of clean paper or cloth using an oil-free solvent. A business card soaked in trichloroethylene can be used to remove traces of oil. To repair light damage, use emery cloth or an oilstone. If the points are badly worn down or damaged, or if the spring is weak, replace the contact breaker.
- Lubricate the point cam oil felt sparingly with suitable point cam lubricant. Do not overlubricate. Replace the oil felt if it is worn.
- Connect the dwell angle tester (–) lead to chassis ground and the (+) lead to the contact breaker spring.




**A. Tester Leads** **B. Dwell Angle Tester**

- If the dwell angle tester is calibrated in degrees, turn the selector knob to the lowest cam lobe setting.
- Start the engine and let it idle.
- Note the reading on the tester. The dwell angle specification is 97 ~ 112° for a tester calibrated in degrees and 27 ~ 31% for one calibrated in percentage. If the tester setting is for two cylinders, the reading must be doubled to obtain the true dwell angle.

**Table B2 Dwell Angle**

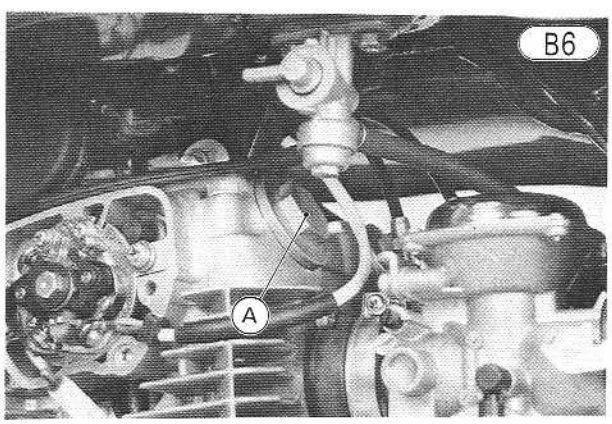
| Selector Knob Setting | Dwell Angle |
|---|---|
| 1 Cylinder | 97° ~ 112° |
| 2 Cylinders | 48.5° ~ 56° |

- If the dwell angle is incorrect, loosen the contact breaker base screws (2) just enough to allow the base to move. Use a slot screwdriver on the pry points until the correct dwell angle is obtained. Tighten the screws.
- Check the dwell angle for the other contact breaker, and adjust it if necessary.
- Stop the engine and disconnect the tester leads.
- Adjust the ignition timing.

## Static Ignition Timing

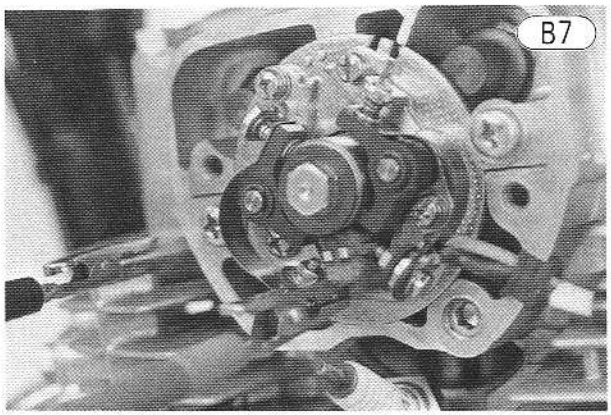
Check and adjust the static ignition timing for both cylinders using each "F" mark, first for the left cylinder and then the right cylinder.

- Turn off the ignition switch and engine stop switch.
- Remove the inlet valve adjusting cap on the left cylinder.

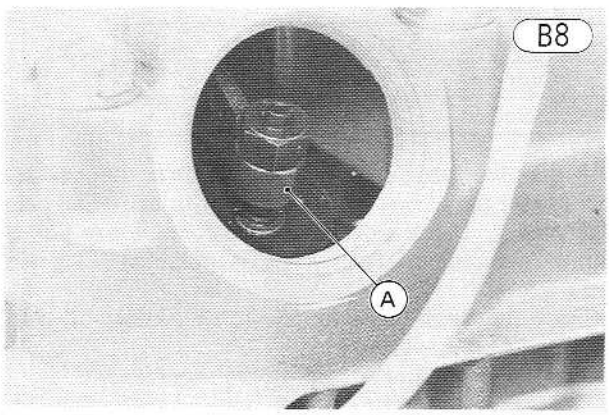



**A. Inlet Valve Adjusting Cap**

•Connect a timing tester or circuit tester across the left-hand set of contact breaker points by securing one lead to the contact breaker spring or lead, and the other lead to the chassis ground.

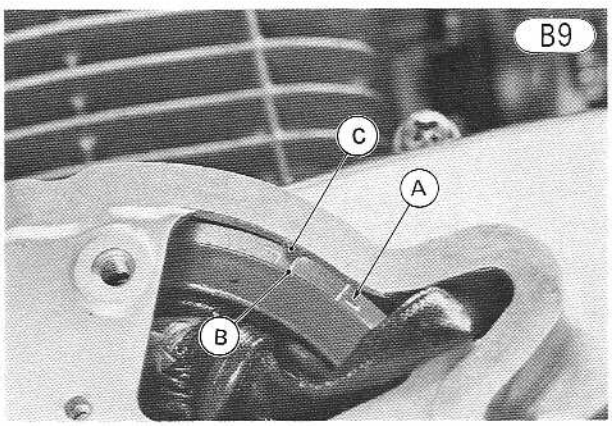



•Using a 14 mm wrench, turn the crankshaft counterclockwise until the inlet valve rocker arm on the left cylinder goes downward (valve opening) and returns upward (valve closing).



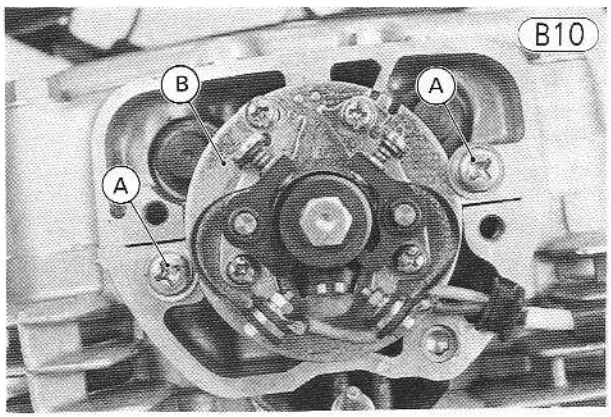

**A. Rocker Arm**

•Continue turning the crankshaft counterclockwise another half turn so that the "F" mark near the number "1" or "L" on the rotor is aligned with the timing mark on the left engine cover.



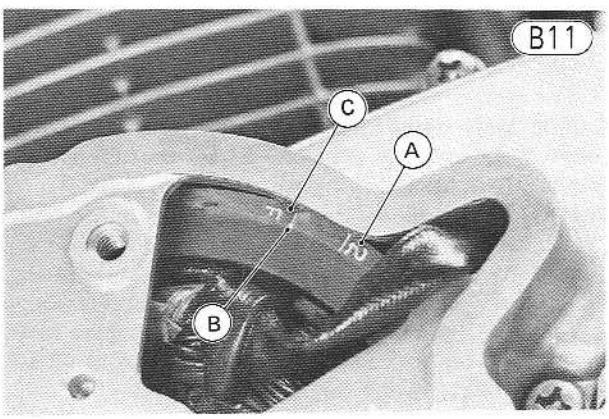

**A. Number "1" or "L"** **C. Timing Mark**
**B. "F" Mark**

•The circuit tester needle should flicker when the "F" mark and timing mark are aligned, indicating that the points have just opened. When using an audible timing tester, there should be a change in tone of the tester at this point.
•If the timing is not correct, loosen the mounting screws (2), and use a slot screwdriver on the pry points to adjust the mounting plate. Tighten the screws securely and recheck the timing.



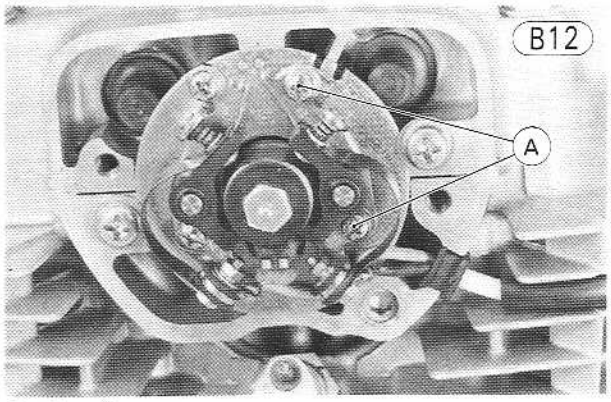

**A. Mounting Screws (2)** **B. Mounting Plate**

•Move the tester leads to the right-hand set of points to check the ignition timing for the right cylinder.
•Turn the crankshaft counterclockwise a half turn so that the "F" mark near the number "2" or "R" on the rotor is aligned with the timing mark on the left engine cover.




**A. Number "2" or "R"** **C. Timing Mark**
**B. "F" Mark**

•If the circuit tester needle does not flicker when the "F" mark and timing mark are aligned, loosen the base screws (2) on the right contact breaker and adjust the point gap to within its specification (0.3~0.4 mm) until the correct ignition timing is obtained.



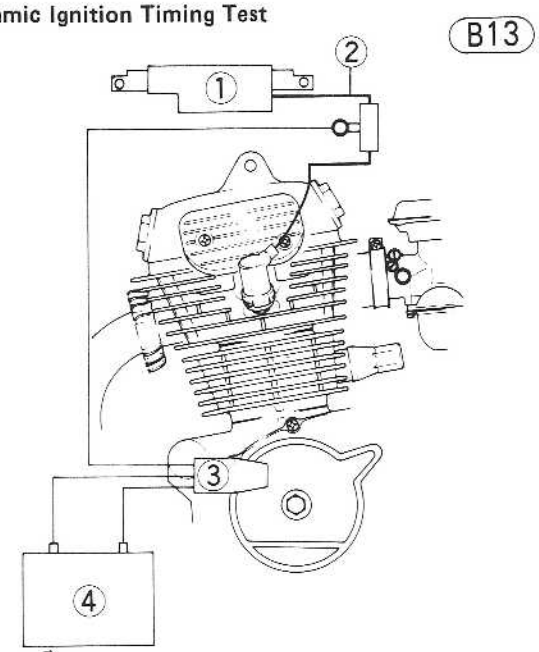

**A. Base Screws**

- If the correct ignition timing for the right cylinder cannot be obtained by adjusting the right contact breaker point gap, adjust the right contact breaker point gap to 0.35 mm, and adjust the ignition timing for the right cylinder by shifting the mounting plate position.
- Recheck the left contact breaker point gap and the ignition timing for the left cylinder. Readjust if necessary.
- If these adjustments resulted in failure, the contact breakers have worn out, and both must be replaced with new ones.
- Disconnect the tester leads and install the contact breaker cover.

## Dynamic Ignition Timing

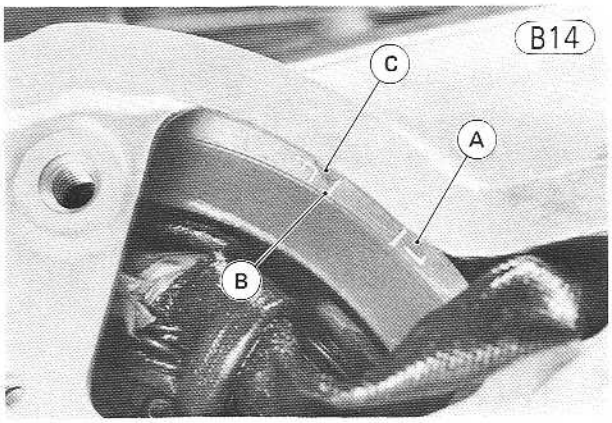
- Connect the strobe light lead to the left spark plug lead in order to check the ignition timing for the left cylinder under operating conditions. One example of the wiring is shown below.

**Dynamic Ignition Timing Test**



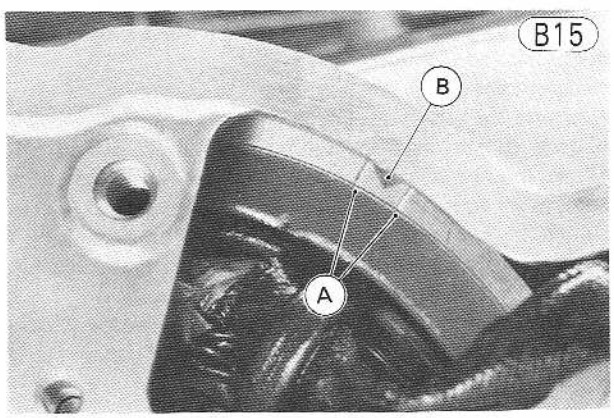

1. Ignition Coil
2. Spark Plug Lead
3. Strobe Light
4. Battery

- Prepare a cloth or rags as a small amount of oil may splash or spill out of the crankcase during engine operation without the alternator cover.
- Turn on the ignition switch and engine stop switch. Start the engine and warm it up thoroughly. Then, direct the strobe light at the timing mark.
- At idle, the "F" mark near the number "1" or "L" on the rotor must be aligned with the timing mark on the left engine cover for correct low rpm ignition timing. If the timing is not correct, adjust it by moving the mounting plate.




**A. Number "1" or "L"**
**B. "F" Mark**
**C. Timing Mark**

- At 3,200 rpm or higher, the advanced timing marks must be aligned with the timing mark for correct high rpm ignition timing. If the timing is not correct, examine the timing advancer mechanism for binding.



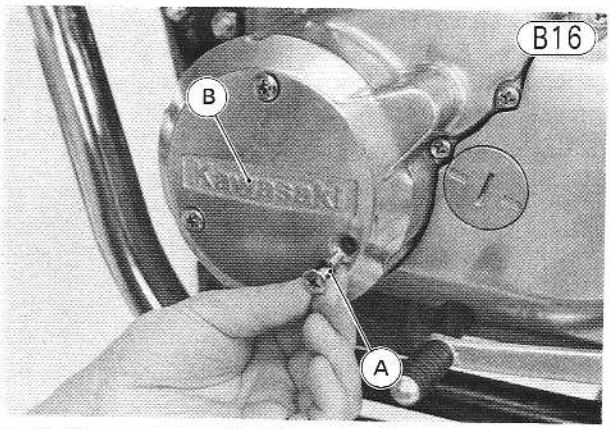

**A. Advanced Timing Marks**
**B. Timing Mark**

**Table B3 Timing Advancing**

| | Engine Speed (rpm) |
|---|---|
| Advance Begins | 1,300~1,660 |
| Full Advance | 2,800~3,200 |

- Next, move the strobe light lead to the right spark plug lead, and check the ignition timing for the right cylinder using the other "F" mark. Adjust the contact breaker point gap on the right, if necessary.
- Disconnect the strobe light lead, clean up any spilled oil, and install the alternator cover.

**CAUTION** **Before installing the screws, place the O rings under the screw heads to prevent O ring damage and resulting oil leakage.**




**A. O Ring** **B. Alternator Cover**

## CAMSHAFT CHAIN

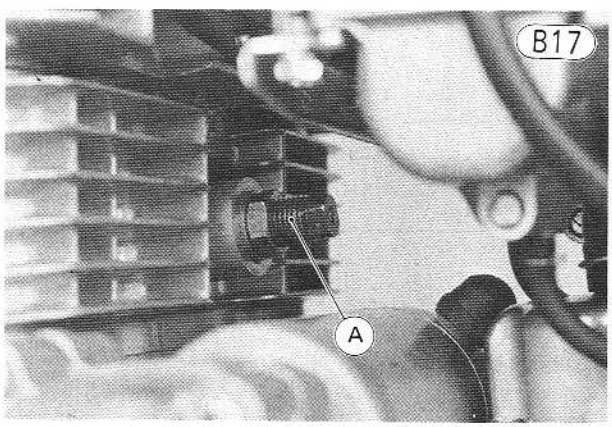
Camshaft chain and chain guide wear cause the chain to develop slack, which will cause noise and may result in engine damage. To keep the chain from making noise, periodic adjustment is necessary in accordance with the Periodic Maintenance Chart (Pg. 10).

However, if the adjustment fails to keep the chain from making noise, the camshaft chain or chain guides have probably worn past their service limits and will need to be replaced.

**WARNING** **To avoid a serious burn, never touch a hot engine or exhaust pipes during camshaft chain adjustment.**

- Remove the chain tensioner cap and **O** ring.
- Remove the alternator cover.
- Check to see that the ignition switch is turned off.
- Turn the crankshaft counterclockwise while watching the push rod (in the center of the push rod guide) move in and out. Continue turning the crankshaft counterclockwise until the push rod again reaches the innermost position, and then stop.

**NOTE:** Do not turn the crankshaft backwards (clockwise). Turning the crankshaft backwards may cause improper adjustment.

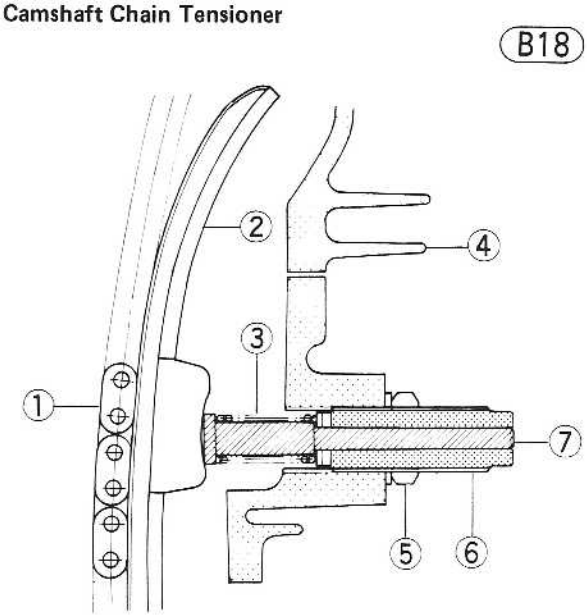



**A. Camshaft Chain Tensioner**

- Loosen the locknut, and turn in the push rod guide carefully until the ends of the push rod guide and push rod are flush.

**CAUTION** **Be sure that the ends are flush. Never overtighten the push rod guide after the ends are just flush, or the tensioner and chain may become damaged.**

**Camshaft Chain Tensioner**




1. Camshaft Chain
2. Chain Guide
3. Spring
4. Cylinder Block
5. Locknut
6. Push Rod Guide
7. Push Rod

- Tighten the locknut to 1.5 kg-m (11 ft-lbs) of torque.
- Install the chain tensioner cap with its **O** ring and tighten it to 1.5 kg-m (11.0 ft-lbs) of torque.
- Install the alternator cover.

**CAUTION** **Before installing the screws, place the O rings under the screw heads to prevent O ring damage and resulting oil leakage.**

## VALVE CLEARANCE

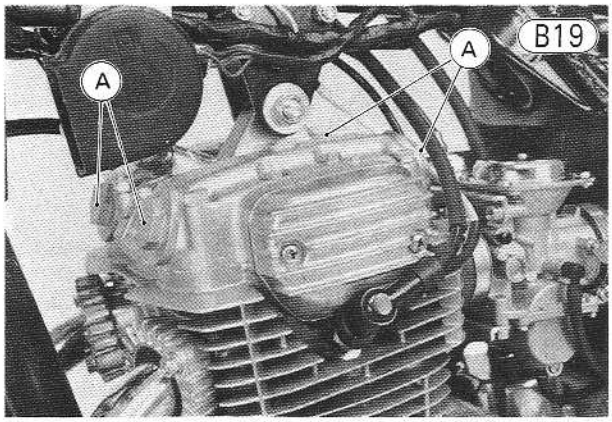
Valve and valve seat wear decreases the valve clearance, upsetting the valve timing. If the valve clearance is left unadjusted, the wear will eventually cause the valves to remain partly open; which lowers performance, burns the valves and valve seats, and may cause serious engine damage.

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

Be careful to adjust within the specified clearance. Adjusting to a larger value will disturb valve timing and cause engine noise.

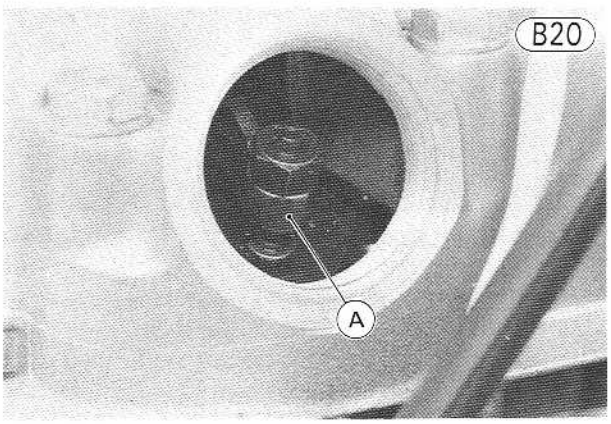
**NOTE:** The valve clearance must be checked when the engine is cold.

- Remove the fuel tank (Pg. 39).
- Remove the valve adjusting caps (4).



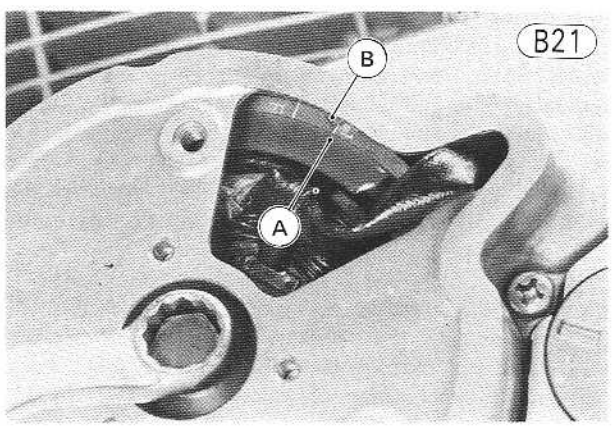

**A. Valve Adjusting Caps**

- Remove the screws (3), and remove the alternator cover.
- Using a 14 mm wrench, turn the crankshaft counterclockwise until the inlet valve rocker arm on the left cylinder goes downward (valve opening) and returns upward (valve closing).



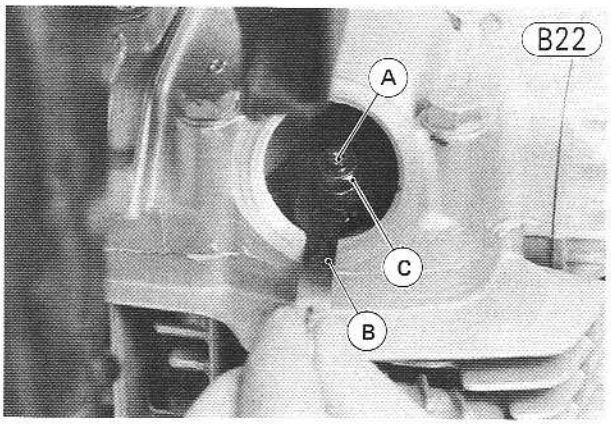

**A. Rocker Arm**

- Continue turning the crankshaft counterclockwise another half turn so that the TDC mark near the mark "1" or "L" on the rotor is aligned with the timing mark on the left engine cover.




**A. TDC Mark** **B. Timing Mark**

- At this crankshaft position, the piston in the left cylinder is at the end of its compression stroke and the inlet and exhaust valves for the left cylinder can be checked.
- Measure the clearance of each valve by inserting a thickness gauge (special tool) between the adjusting screw and the valve stem.




**A. Adjusting Screw** **C. Locknut**
**B. Thickness Gauge (57001-1081)**

**Table B4 Valve Adjustment (When cold)**

| | | |
|---|---|---|
| Valve Clearance | Inlet | 0.14~0.19 mm |
| | Exhaust | 0.21~0.26 mm |
| Locknut Tightening Torque | | 1.5 kg-m (11.0 ft-lbs) |

- If the valve clearance is incorrect, loosen its adjusting screw locknut, and turn the adjusting screw until the correct clearance is obtained.
- Tighten the locknut to the specified torque.
- Turn the crankshaft counterclockwise a half turn so that the TDC mark near the mark "2" or "R" on the rotor is aligned with the timing mark on the left engine cover. Check the valve clearances on the right cylinder, and adjust them if necessary.
- Install the valve adjusting caps.
- Install the alternator cover.

**CAUTION** **Before installing the screws, place the O rings under the screw heads to prevent O ring damage and resulting oil leakage.**

- Install the fuel tank (Pg. 39).

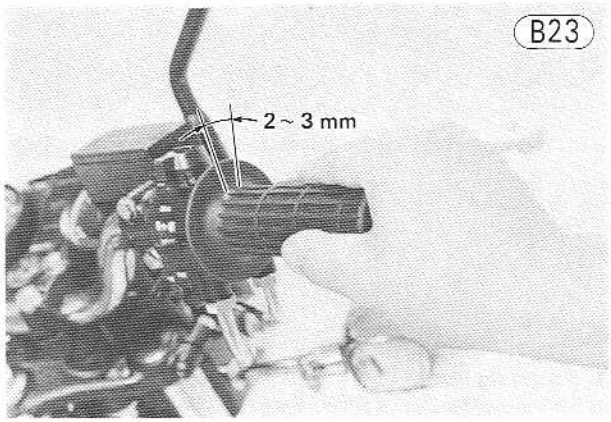
## THROTTLE CABLES

There are two throttle cables: an accelerator cable for opening the butterfly valves, and a decelerator cable for closing them. If the cables are too loose due to either 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 butterfly 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.

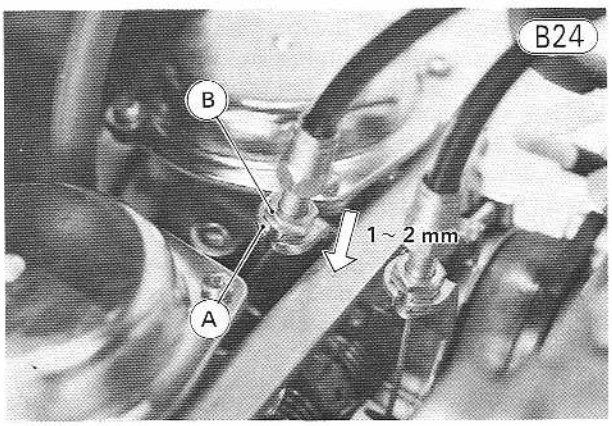
**To check the throttle cable adjustment:**

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




- Push the throttle grip completely closed. At this time the decelerator throttle cable bracket should be pushed down 1 ~ 2 mm. When the throttle grip is released, the cable bracket should be returned to its rest position by the spring tension.

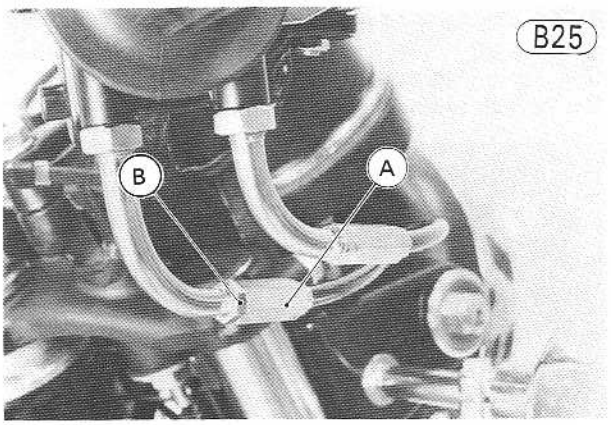
**NOTE:** This assures that the stress of throttle grip return will be taken by the throttle grip, protecting the carburetor linkage mechanism.




**A. Decelerator Throttle Cable Bracket** **B. Locknut**

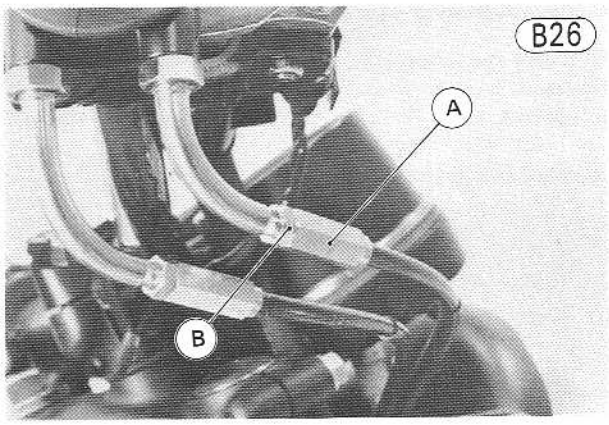
If any one of the above checks shows improper adjustment, adjust the throttle cables as follows:

- Loosen the locknuts, and screw 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 the cable bracket is pushed down 1 ~ 2 mm when the throttle grip is completely closed. Tighten the locknut.




**A. Decelerator Cable Adjusting Nut** **B. Locknut**

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




**A. Accelerator Cable Adjusting Nut** **B. Locknut**

**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 adjusting locknuts.

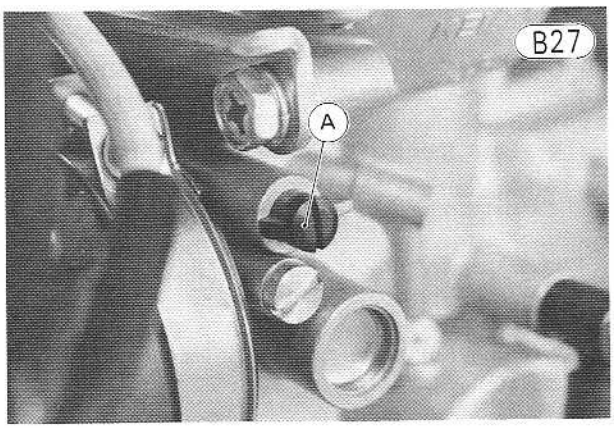
## CARBURETORS

Although some internal carburetor parts can be adjusted by replacement, repositioning, etc., these adjustments are covered in the maintenance section of this manual. The following procedure covers the idling adjustment, which is the adjustment necessary for periodic maintenance and 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, fuel consumption will be excessive, and the resulting lack of engine braking may make the motorcycle difficult to control. Poor carburetor synchronization causes unstable idling, sluggish throttle response, and reduced engine power and performance.

### Idling Adjustment:

- Start the engine and warm it up for five minutes.
- Turn the idle adjusting screw until the engine is at the lowest smooth rpm.
- Adjust the pilot screw of each carburetor, one at a time, to obtain highest idle speed. This pilot screw adjustment will be within ½ turn in or out from the specified setting.




**A. Pilot Screw**

- Turn the idle adjusting screw to set idle speed to 1,200 ~ 1,300 rpm.
- Make sure that engine rpm does not rise when the pilot screw positions are altered. If it does, repeat the last three steps.
- Open and close the throttle a few times to make sure that the idle speed does not change. Readjust if necessary.
- With the engine idling, turn the handlebar to eash side. If handlebar movement changes 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.**

**NOTE:** If idling adjustment has resulted in failure, check the following and correct if necessary.

Carburetor Function Checks (Pg. 42)
Engine Oil (Pg. 21)
Spark Plugs (Pg. 12)
Ignition Timing (Pg. 12)
Throttle Cables (Pg. 17)
Cylinder Compression (Pg. 127)
Air Cleaner Element (Pg. 115)
Camshaft Chain (Pg. 16)
Valve Clearance (Pg. 16)

### Carburetor Synchronization:

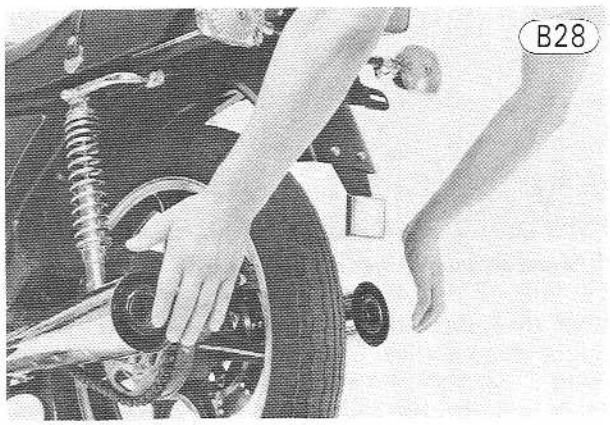
Adjustment of carburetor synchronization, necessary for smooth engine operation, can be obtained through the use of either of the following two procedures, depending on whether or not vacuum gauges are available.

**NOTE:** During both of the procedures, 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.

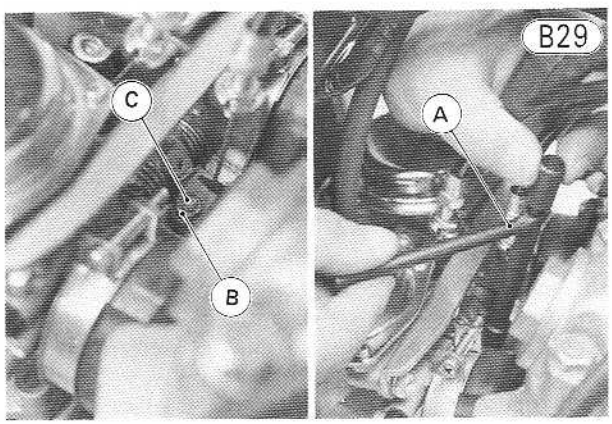
**WARNING** **Use extreme caution when working with gasoline, open fuel lines, etc. to avoid a fire or explosion.**

**Without Vacuum Gauges:**

- Start the engine, and warm it up for 5 minutes.
- Perform the idling adjustment.
- Listen to the exhaust noise, and place your hands at the rear of the mufflers to feel exhaust pressure.




- If there is a difference in noise or exhaust pressure between the cylinders, stop the engine, remove the fuel tank (Pg. 39), and supply fuel to the carburetors by some means. With the engine running, alter the balance adjusting screw position with the balance adjuster (special tool) to minimize the difference in noise or exhaust pressure.

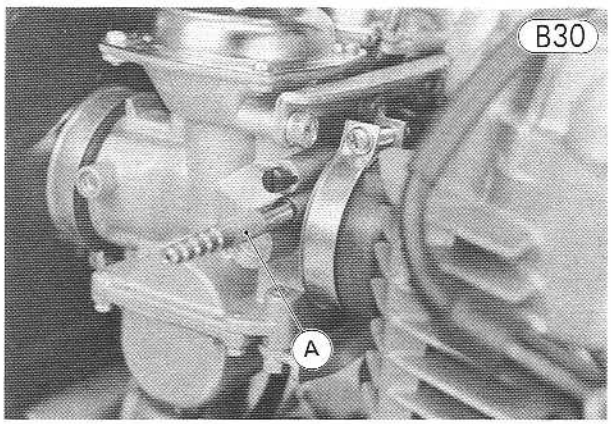



**A. Balance Adjuster (57001-351)**
**B. Locknut**
**C. Balance Adjusting Screw**

- Adjust the idle speed with the idle adjusting screw, if necessary.
- Recheck the exhaust noise and pressure, and if there is a difference between the cylinders, repeat the last 2 steps.
- When the balance adjusting screw is properly positioned, tighten the locknut, stop the engine, and install the fuel tank (Pg. 39).

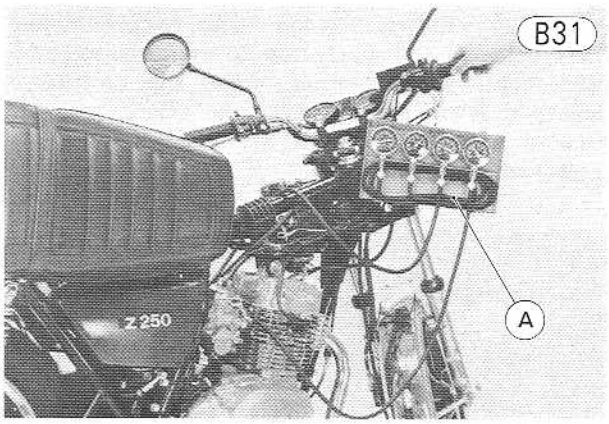
**With Vacuum Gauges:**

- Start the engine, and warm it up for 5 minutes.
- Perform the idling adjustment (Pg. 19).
- Remove the vacuum plug from each carburetor, and attach the vacuum gauges and adapters (special tools).




**A. Vacuum Gauge Adapter (57001-401)**

- With the engine running at idle speed, close the vacuum gauge damper valves until gauge needle flutter is less than 3 cm Hg. Normal vacuum gauge reading is 19 ~ 26 cm Hg, and the difference between the two cylinders should be less than 3 cm Hg.




**A. Vacuum Gauge Set (57001-127)**

- If there is a difference of more than 3 cm Hg between the two gauges, stop the engine, remove the fuel tank (Pg. 39), and supply fuel to the carburetors by some means.
- With the engine running, alter the balance adjusting screw position with the balance adjuster (special tool) to obtain a difference in readings of less than 3 cm Hg.
- Adjust the idle speed with the idle adjusting screw, if necessary.
- Recheck the difference in vacuum gauge readings, and if there is a difference of more than 3 cm Hg, repeat the last 2 steps.
- When the balance adjusting screw is properly positioned, tighten the balance adjusting screw locknut and stop the engine.
- Detach the vacuum gauges and adapter, and install the vacuum plugs.
- Install the fuel tank (Pg. 39).

## 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 taken up, 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.

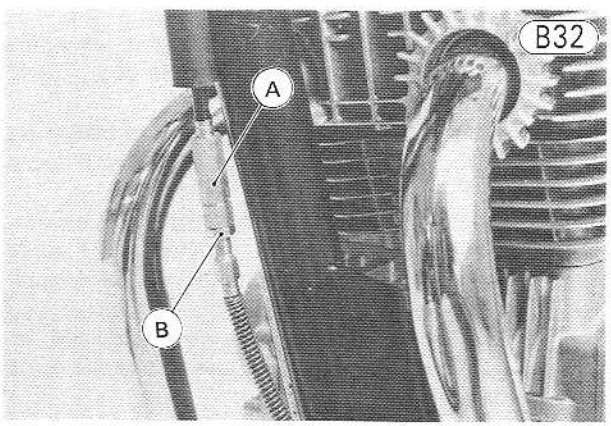
**NOTE:** Even though the proper amount of play exists at the clutch lever, clutch lever play alone cannot be used to determine whether or not the clutch requires adjustment.

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

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

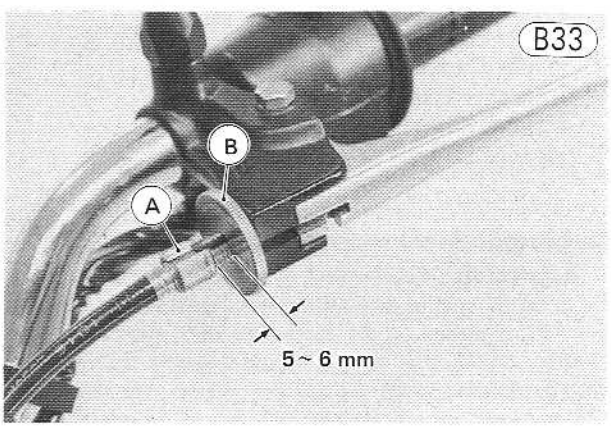
**To adjust the clutch:**

- Turn in fully the locknut and adjusting nut in the middle of the clutch cable. This assures plenty of cable play and proper clutch release angle.



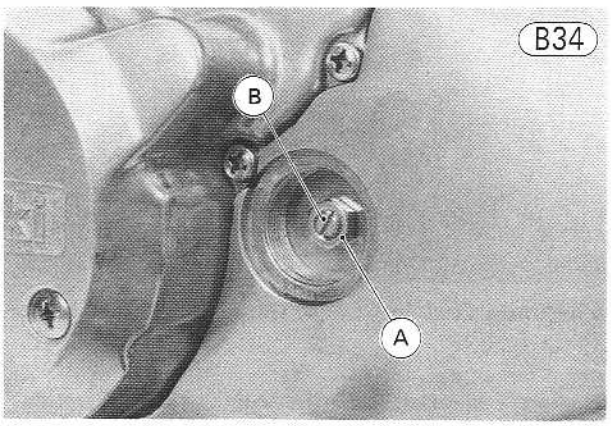

**A. Adjusting Nut** **B. Locknut**

- Loosen the knurled locknut at the clutch lever, and turn the adjuster so that there is a 5~6 mm gap between the adjuster and knurled locknut.




**A. Adjuster** **B. Knurled Locknut**

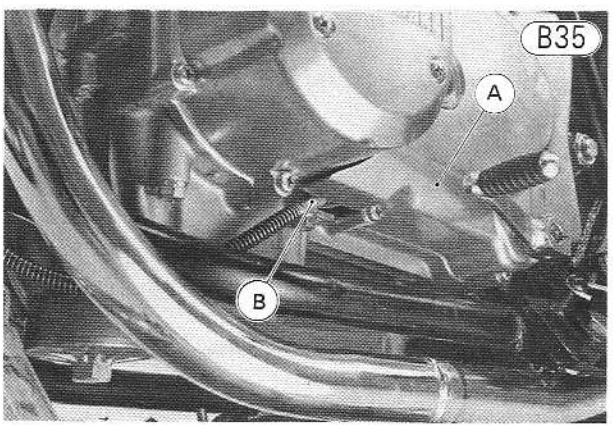
- Remove the clutch adjusting cover.
- Loosen the locknut, and turn in the adjusting screw a couple of turns.
- **Turn out** the adjusting screw until it seats lightly. This is the point where the clutch is just starting to release.
- **Turn in** the adjusting screw ¼ turn from that point, and tighten the locknut without changing the adjusting screw position.




**A. Locknut** **B. Adjusting Screw**

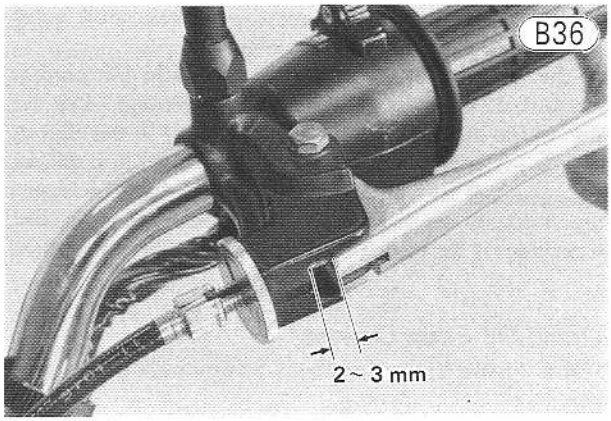
- Take up all the cable play with the adjusting nut in the middle of the cable, and tighten the locknut.
- Make sure the lower end of the clutch outer cable is properly fitted into the hole in the engine sprocket cover.

**WARNING** **If the cable is not fully seated in the engine sprocket cover hole, it could slip into place later and the clutch would not disengage.**




**A. Engine Sprocket Cover** **B. Clutch Outer Cable**

- Turn the adjuster at the clutch lever until the clutch lever has 2~3 mm of play. Tighten the locknut.




- Install the clutch adjusting cover.

## ENGINE OIL

In order for the engine, transmission, and clutch to function properly, maintain the engine oil at the proper level, and change the oil in accordance with the Periodic Maintenance Chart (Pg. 10).

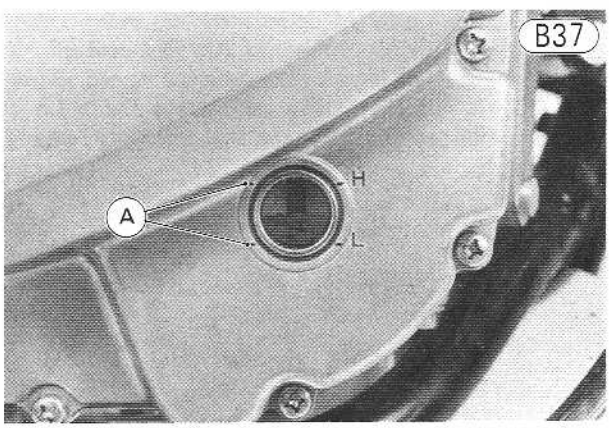
**WARNING** **Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, and accident and injury.**

### Oil Level

- 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 run it for several minutes at idle speed. This fills the oil filter with oil. Then wait several minutes until the oil settles.

**CAUTION** **Run the engine at idle speed for several minutes. 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. Level Lines**

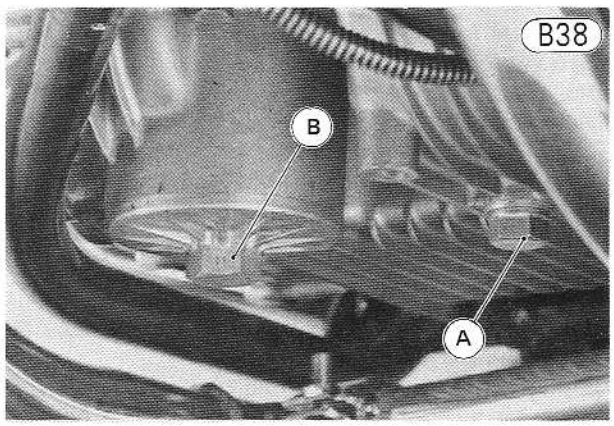
- If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- If the amount of oil is insufficient, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

**WARNING** **If the engine is run 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 for about 5 minutes and then stop it.
- Set the motorcycle up on its center stand, place an oil pan beneath the engine, and remove the engine oil drain plug.

**WARNING** **When the engine is hot, remove the drain plug carefully so as to not suffer a burn from the hot oil.**




**A. Drain Plug** **B. Oil Filter**

- If the oil filter is to be changed, remove the filter and replace the oil filter with a new one.

**NOTE:** Check for **O** ring damage. If necessary, replace it with a new one.

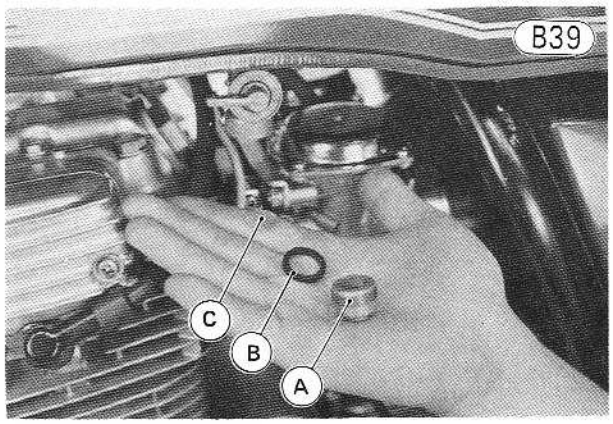
- After the oil has completely drained out, install the drain plug and gasket, using a new gasket if the old one is deteriorated or damaged. Proper torque for the drain plug is 3.0 kg-m (22 ft-lbs).
- Install the oil filter, tightening its bolt to 1.5 kg-m (11.0 ft-lbs) of torque.
- Fill the engine up to the upper level line with SE class SAE 10W40, 10W50, 20W40 or 20W50 motor oil. It will take about 1.8 ℓ when the filter is changed. When the filter is not changed, a refill takes about 1.5 ℓ.
- Check the oil level again after the engine is thoroughly warmed up.

## FUEL SYSTEM

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

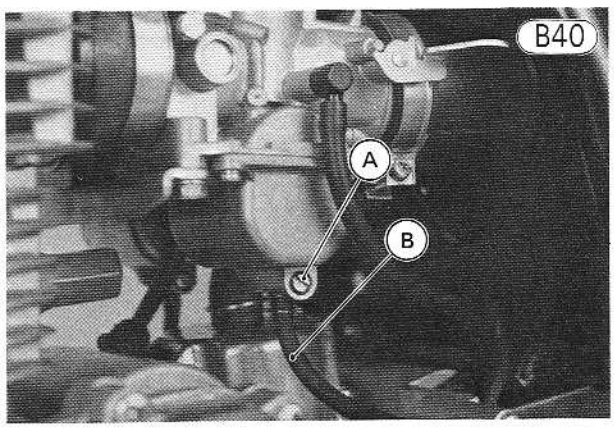
**Clean out the fuel system as follows:**

- Turn the fuel tap to the off position. Unscrew the sediment cup at the bottom of the tap, and clean out the water and firt. Clean any dirt out of the fuel tap filter.




**A. Sediment Cup** **B. Gasket** **C. Filter**

- If there was water inside the sediment cup, there may also be some in the fuel tank and carburetors. 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.
- Turn the fuel tap to the off position, loosen the drain screws, and drain the fuel in the float bowls through the over flow tubes.
- Tighten the drain screws.




**A. Drain Screw** **B. Overflow Tube**

**WARNING**

1. **Clean the fuel tap 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 tank or tap when the engine is still warm.**
3. **Wipe any fuel off the engine before starting it.**

# Adjustment–Chassis

## Table of Contents

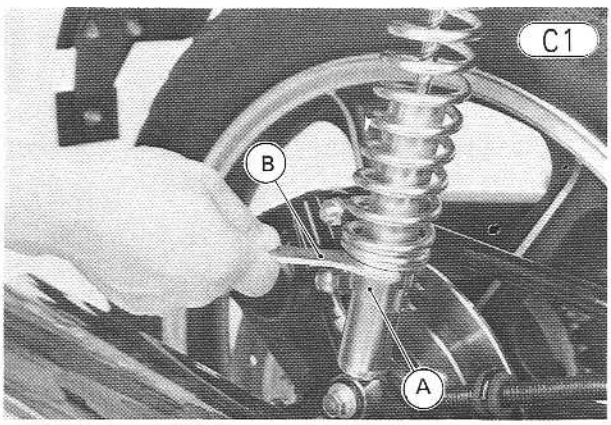
C

## 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 rough 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. Adjusting Sleeve** **B. Hook Spanner**

- Make sure that both adjusting sleeves are turned to the same relative position.

**WARNING** **If the rear shock absorbers are not adjusted equally, handling may be impaired.**

## DRIVE CHAIN

Chain and sprocket wear causes the chain to stretch, 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.

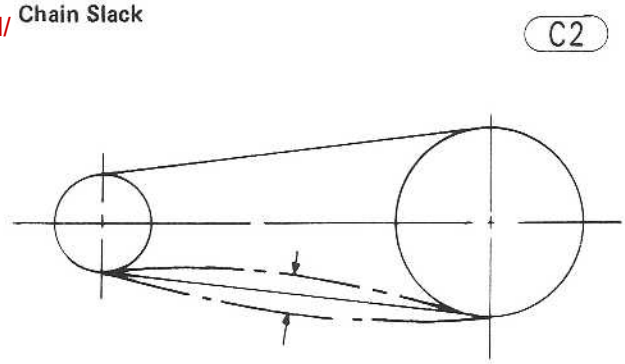
- To determine whether or not the chain requires adjustment, first set the motorcycle up on its center stand. Rotate the rear wheel to find the position where the chain is tightest, and measure the vertical movement midway between the sprockets. If it is less than 25 mm or more than 35 mm, adjust the chain so that the vertical movement will be about 25 ~ 30 mm.

**CAUTION**

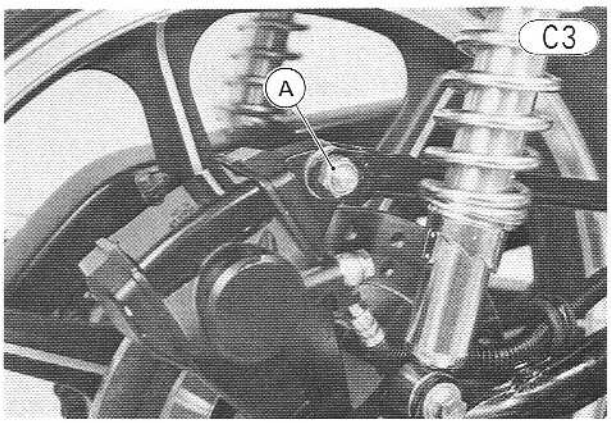
**1. A chain worn past the service limit (Pg. 144) must be replaced. Such wear cannot be adequately compensated for by adjustment.**

**2. Take care not to damage the brake hose. Damaging the brake line greatly reduces the brake line strength and causes brake fluid leakage, resulting in the loss of brake control.**

**Chain Slack**

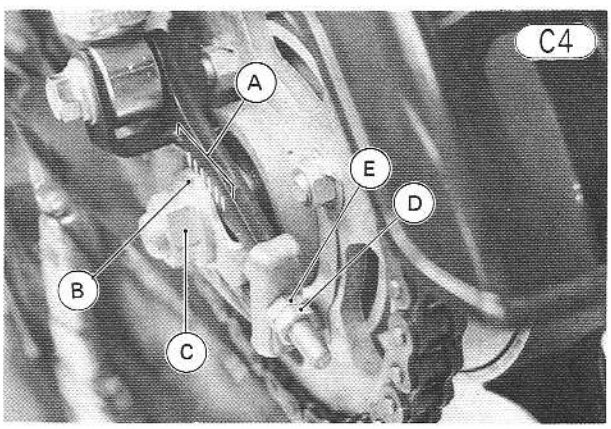



- Loosen the nut at the rear end of the torque link.




**A. Torque Link Nut**

- Loosen the left and right chain adjuster locknuts.
- Loosen the axle nut.
- If the chain is too tight, back out the left and right chain adjusting nuts, and kick the wheel forward until the chain is too loose.
- Turn in 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 that the right chain adjuster notch aligns with.




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