Kawasaki KZ440

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
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 KZ440

Motorcycle Service Manual

Third Edition ②: Sep. 9, 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 divied 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 and theory of Operation

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

(4) Appendix

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

(5) Supplement

The maintenance and repair procedures, that 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 unit of the 1980 KZ440-A1, B1, C1, D1, 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

KZ440-A1 Left Side View

KZ440-A1 Right Side View

KZ440-B1 Left Side View

KZ440-B1 Right Side View

KZ440-C1 Left Side View

KZ440-C1 Right Side View

KZ440-D1 Left Side View

KZ440-D1 Right Side View

A

Specifications

Table of Contents

SPECIFICATIONS

	KZ440-A1	KZ440-D1
Dimensions		
Overall length	2,080 mm, Ⓔ 2,120 mm	2,080 mm
Overall width	810 mm	*
Overall height	1,180 mm	*
Wheelbase	1,390 mm	*
Road clearance	140 mm	*
Dry weight	169 kg, Ⓔ 170 kg, Ⓖ 171 kg	169 kg
Fuel tank capacity	12 ℓ	*
Performance		
Climbing ability	30°	24°
Braking distance	13.5 m from 50 kph	*
Minimum turning radius	2.4 m	*
Engine		
Type	SOHC, 2 cylinder, 4-stroke, air-cooled	*
Bore and stroke	67.5 x 62.0 mm	*
Displacement	443 cc	*
Compression ratio	9.2	*
Maximum horsepower	40 HP @8,500 rpm, Ⓖ 27 HP @7,000 rpm	40 HP @8,500 rpm
Maximum torque	3.6 kg-m @7,000 rpm, Ⓖ 3.3 kg-m @3,000 rpm	3.6 kg-m @7,000 rpm
Valve timing		
Inlet Open	27° BTDC	*
Close	73° ABDC	*
Duration	280°	*
Exhaust Open	70° BBDC	*
Close	30° ATDC	*
Duration	280°	*
Carburetors	Keihin CV36 x 2, Ⓖ Keihin CV32 x 2	Keihin CV36 x 2
Lubrication system	Forced lubrication (wet sump)	*
Engine oil	SE class SAE 10W40, 10W50, 20W40, or 20W50	*
Engine oil capacity	2.9 ℓ	*
Starting system	Electric starter	*
Ignition system	Battery and coil	*
Ignition timing	From 10° BTDC @1,200 rpm to 35° BTDC @3,200 rpm	*
Spark plugs	NGK B7ES or ND W22ES-U	*
Transmission		
Type	6-speed, constant mesh, return shift	*
Clutch	Wet, multi disc	*
Gear ratio: 1st	2.54 (33/13)	*
2nd	1.75 (28/16)	*
3rd	1.32 (25/19)	*
4th	1.10 (23/21)	*
5th	0.96 (22/23)	*
6th	0.88 (21/24)	*
Primary reduction ratio	2.43 (56/23)	*

		KZ440-A1	KZ440-D1
Final reduction ratio		3.00 (45/15)	2.73 (60/22)
Overall drive ratio		6.39 (Top gear)	5.81 (Top gear)
Electrical Equipment			
Alternator Rated Output		15 amp. @10,000 rpm, 14V	*
Regulator/Rectifier		Shindengen SH222-12B	*
Ignition coil		Nippon Denso 029700-3881	*
Battery		Furukawa FB12A-A (12V 12AH)	*
Starter		Mitsuba SM-8203	*
Headlight type		Sealed beam, Ⓔ Semi-sealed	Sealed beam
Headlight		12V 50/35W, Ⓔ 12V 35/35W, Ⓕ 12V 36/36W	12V 50/35W
Tail/Brake light		12V 8/27W, Ⓔ 12V 5/21W	12V 8/27W
Speedometer light		12V 3.4W	*
Tachometer light		12V 3.4W	*
Neutral indicator light		12V 3.4W	*
High beam indicator light		12V 3.4W	*
Turn signal/Running position lights		—	—
Turn signal lights		12V 23W, Ⓔ 12V 21W	12V 23W
Turn signal indicator light		12V 3.4W	*
Oil pressure indicator light		12V 3.4W	*
Brake light failure indicator light		12V 3.4W	*
Horn		12V 2.5A	*
City light		Ⓔ 12V 3.4W	—
Frame			
Type		Tubular, double cradle	*
Steering angle		40° to either side	*
Castor		27.5°	*
Trail		112 mm	*
Tire size	Front	3.25S-19 4PR	*
	Rear	130/90-16 67S	*
Suspension	Front	Telescopic fork	*
	Rear	Swing arm	*
Wheel travel	Front	150 mm	*
	Rear	115 mm	*
Front fork oil capacity (each fork)		150 cc	*
Front fork oil type		SAE 5W20	*
Brakes			
Type	Front	Disc brake	*
	Rear	Internal expansion, leading-trailing	*
Effective disc diameter	Front	230 mm	*
Brake drum inside diameter and width	Rear	160 x 30 mm	*

* : Identical to KZ440-A1 Ⓔ : European model Ⓖ : West German model Ⓕ : French model
Specifications subject to change without notice, and may not apply to every country.

SPECIFICATIONS

	KZ440-B1	KZ440-C1
Dimensions		
Overall length	2,045 mm	2,045 mm, Ⓔ2,070 mm
Overall width	810 mm	810 mm, Ⓔ775 mm
Overall height	1,130 mm	1,130 mm, Ⓔ1,070 mm
Wheelbase	1,365 mm	*
Road clearance	160 mm	135 mm
Dry weight	159 kg	166 kg
Fuel tank capacity	14 ℓ	*
Performance		
Climbing ability	30°	*
Braking distance	13.5 m from 50 kph	*
Minimum turning radius	2.3 m	*
Engine		
Type	SOHC, 2 cylinder, 4-stroke, air-cooled	*
Bore and stroke	67.5 x 62.0 mm	*
Displacement	443 cc	*
Compression ratio	9.2	*
Maximum horsepower	40 HP @8,500 rpm	41 HP @8,500 rpm, Ⓖ 26.7 HP @7,000 rpm
Maximum torque	3.6 kg-m @7,000 rpm	3.6 kg-m @7,000 rpm, Ⓖ3.3 kg-m @3,000 rpm
Valve timing		
Inlet Open	27° BTDC	*
Close	73° ABDC	*
Duration	280°	*
Exhaust Open	70° BBDC	*
Close	30° ATDC	*
Duration	280°	*
Carburetors	Keihin CV36 x 2	Keihin CV36 x 2, Ⓖ Keihin CV32 x 2
Lubrication system	Forced lubrication (wet sump)	*
Engine oil	SE class SAE 10W40, 10W50, 20W40, or 20W50	*
Engine oil capacity	2.9 ℓ	*
Starting system	Electric starter	*
Ignition system	Battery and coil	*
Ignition timing	From 10° BTDC @1,200 rpm to 35° BTDC @3,200 rpm	*
Spark plugs	NGK B7ES or ND W22ES-U	*
Transmission		
Type	6-speed, constant mesh, return shift	*
Clutch	Wet, multi disc	*
Gear ratio: 1st	2.54 (33/13)	*
2nd	1.75 (28/16)	*
3rd	1.32 (25/19)	*
4th	1.10 (23/21)	*
5th	0.96 (22/23)	*
6th	0.88 (21/24)	*
Primary reduction ratio	2.43 (56/23)	*

		KZ440-B1	KZ440-C1
Final reduction ratio		3.00 (45/15)	*
Overall drive ratio		6.39 (Top gear)	*
Electrical Equipment			
Alternator Rated Output		15 amp. @10,000 rpm, 14V	*
Regulator/Rectifier		Shindengen SH222-12B	*
Ignition coil		Nippon Denso 029700-3881	*
Battery		Furukawa FB12A-A (12V 12AH)	*
Starter		Mitsuba SM-8203	*
Headlight type		Sealed beam	Semi-sealed
Headlight		12V 50/35W	12V 50/40W, Ⓔ 12V 35/35W
Tail/Brake light		12V 8/27W	12V 8/27W, Ⓔ 12V 5/21W
Speedometer light		12V 3.4W	*
Tachometer light		12V 3.4W	*
Neutral indicator light		12V 3.4W	*
High beam indicator light		12V 3.4W	*
Turn signal/Running position lights		12V 23/8W	—
Turn signal lights		—	12V 23W, Ⓔ 12V 21W
Turn signal indicator light		12V 3.4W	*
Oil pressure indicator light		12V 3.4W	*
Brake light failure indicator light		12V 3.4W	*
Horn		12V 2.5A	*
City light		—	12V 3.4W, Ⓔ 12V 4W
Frame			
Type		Tubular, double cradle	*
Steering angle		41° 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	95 mm	*
Front fork oil capacity (each fork)		150 cc	*
Front fork oil type		SAE 5W20	*
Brakes			
Type	Front	Internal expansion, two-leading	Disc brake
	Rear	Internal expansion, leading-trailing	*
Effective disc diameter		—	230 mm
Brake drum inside diameter and width	Front	180 x 30 mm	—
	Rear	160 x 30 mm	*

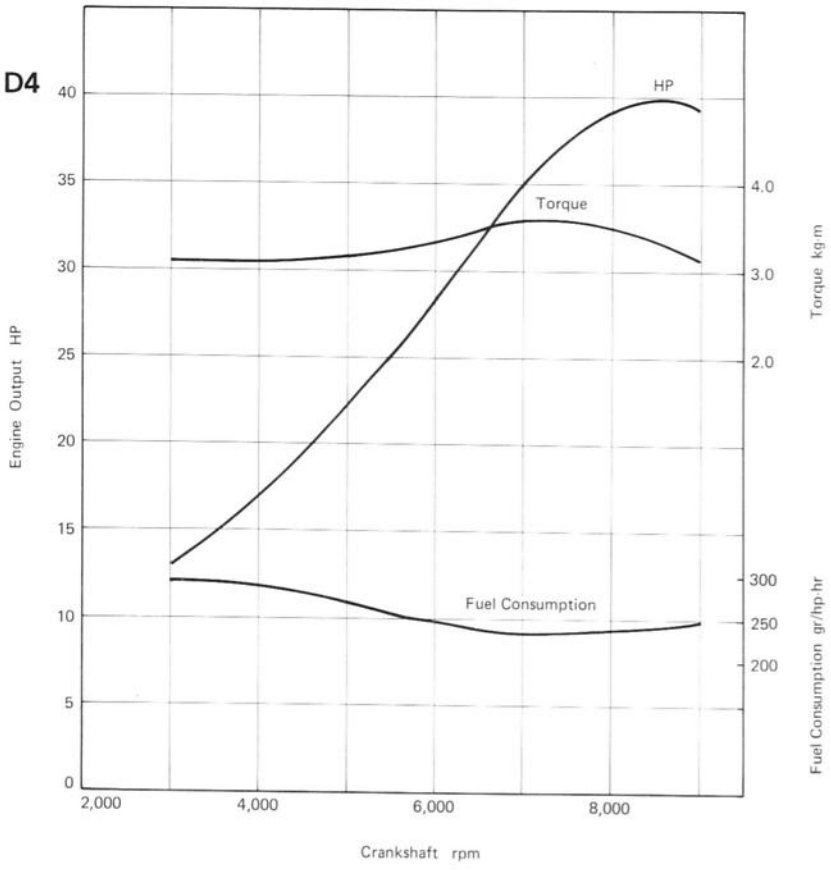
* : Identical to KZ440-B1 Ⓔ : European model Ⓖ : West German model

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

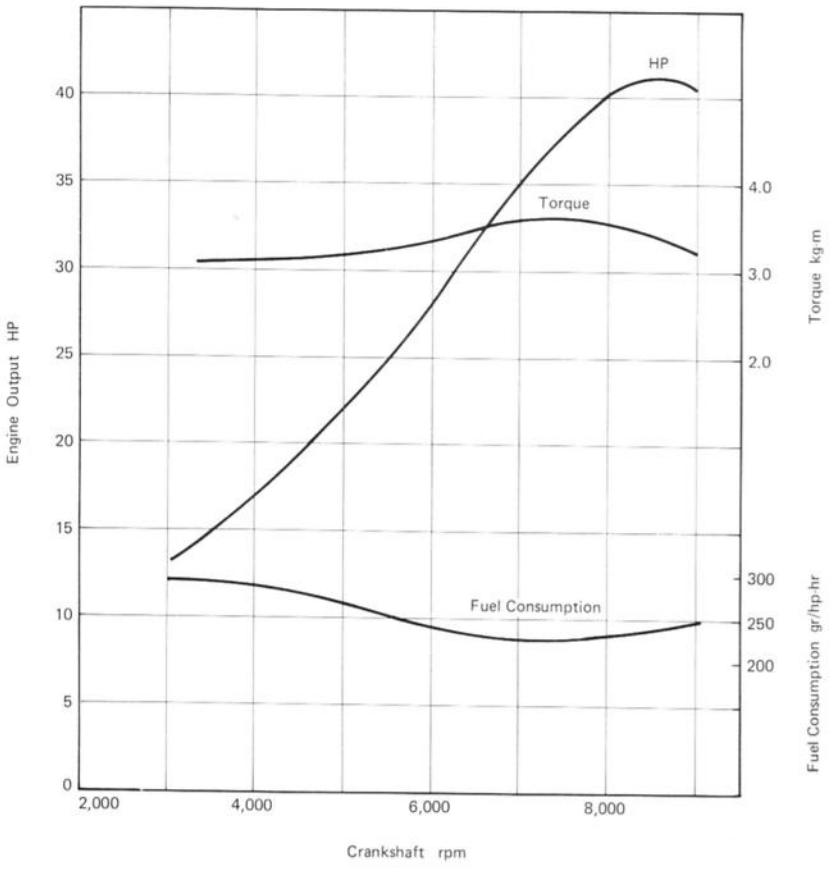
14 SPECIFICATIONS

ENGINE PERFORMANCE CURVES

KZ440-A1, A2, A3
KZ440-B1, B2
KZ440-D1, D2, D3, D4

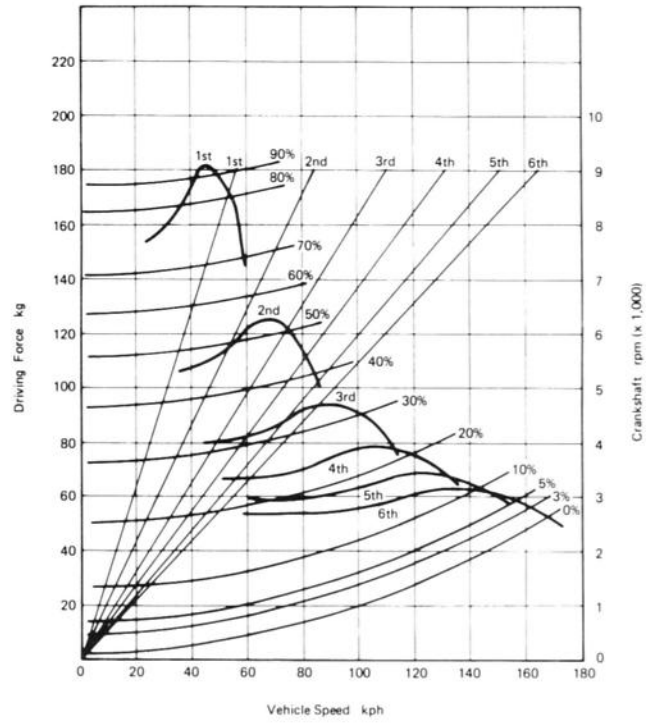


KZ440-C1, C2

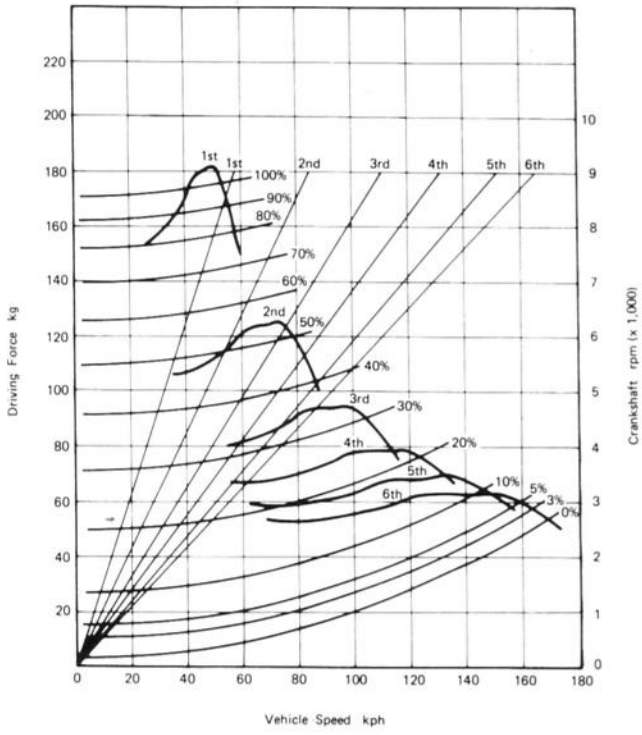


RUNNING PERFORMANCE CURVES

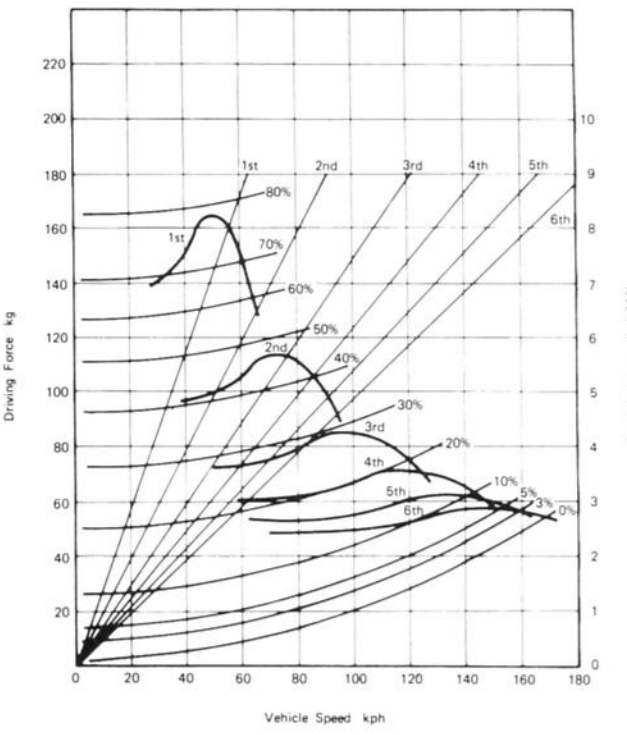
KZ440-A1, A2, A3, B1, B2



KZ440-C1, C2



KZ440-D1, D2, D3, D4



PERIODIC MAINTENANCE CHART (KZ440-A1, B1, C1, D1)

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

OPERATION \ FREQUENCY	Whichever comes first ➡ / Every ⬇	ODOMETER READING* 800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	30,000 km	See Page
Battery electrolyte level — check †	month	•	•	•	•	•	•	•	214
Brake adjustment — check †		•	•	•	•	•	•	•	32
Brake wear — check †			•	•	•	•	•	•	201,202
Brake fluid level — check † (If applicable)	month	•	•	•	•	•	•	•	198
Brake fluid — change (If applicable)	year			•		•		•	198
Clutch — adjust		•	•	•	•	•	•	•	25
Carburetors — adjust		•	•	•	•	•	•	•	22
Throttle cable(s) — adjust		•	•	•	•	•	•	•	21
Steering play — check †		•	•	•	•	•	•	•	35
Spoke tightness and rim runout — check † (If applicable)		•	•	•	•	•	•	•	192
Drive chain wear — check † (If applicable)			•	•	•	•	•	•	195
Front fork — inspect/clean			•	•	•	•	•	•	207
Rear shock absorbers — inspect		•	•	•	•	•	•	•	208
Nuts, Bolts, Fasteners — check and torque		•		•		•		•	43~46
Spark plugs — clean and gap †		•	•	•	•	•	•	•	18
Points, timing — check †		•	•	•	•	•	•	•	18
Valve clearance — check †		•	•	•	•	•	•	•	20,159
Air cleaner element — clean			•		•		•		146
Air cleaner element — replace	5 cleanings			•		•		•	147
Fuel system — clean		•	•	•	•	•	•	•	27
Tire tread wear — check †			•	•	•	•	•	•	191
Engine oil — change	year	•	•	•	•	•	•	•	26
Oil filter — replace		•		•		•		•	27,185
General lubrication — perform			•	•	•	•	•	•	38~40
Front fork oil — change				•		•		•	207
Timing advancer — lubricate				•		•		•	223
Swing arm — lubricate				•		•		•	210
Wheel bearings — grease	2 years					•			193
Speedometer gear housing — grease	2 years					•			194
Brake camshaft — grease	2 years					•			203
Steering stem bearings — grease	2 years					•			204
Drive belt tension — check † (If applicable)		•	•	•	•	•	•	•	31
Drive belt — check † (If applicable)		•	•	•	•	•	•	•	31,197
Drive chain — lubricate (If applicable)	Every 300 km								195
Drive chain — adjust	Every 800 km								30

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

†Replace, add or adjust if necessary.

Adjustment–Engine

Table of Contents

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. 16), 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 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 side electrode with a suitable tool, to obtain the correct gap.

Spark Plug Gap B1

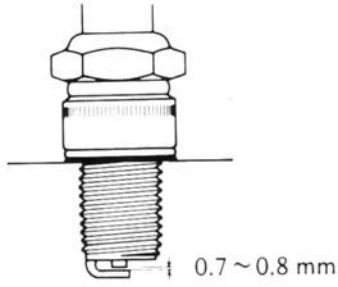


Table B1 Spark Plug

Plug	NGK B7ES, NDW22ES-U
Gap	0.7 ~ 0.8 mm
Tightening Torque	2.8 kg-m (20 ft-lbs)

- Tighten the spark plugs in the cylinder head to the specified torque.

NOTE: Refer to electrical maintenance section, Pg. 223, 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.

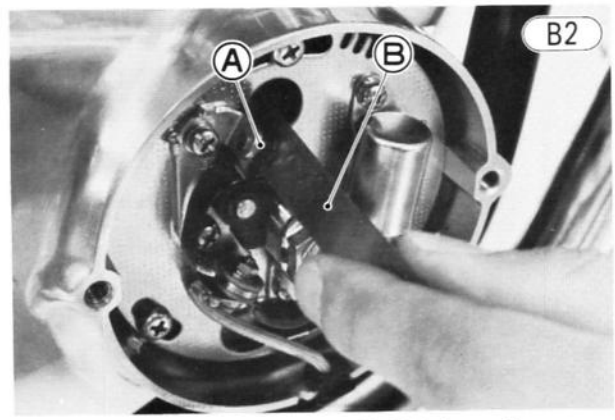
Correct ignition timing is achieved by first obtaining the correct contact breaker point gap (this can also be achieved by adjusting the dwell angle to the specified amount) and then changing the position of the contact breaker mounting plate. Often the first step returns the timing very close to the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

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.

Point Gap/Dwell Angle Adjustment

To check the point gap:

- Remove the screws (2), and remove the contact breaker cover.
- Clean the points with 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.
- Check to see that the ignition switch is turned off.
- Using a 17 mm wrench on the crankshaft, turn the engine counterclockwise until the contact breaker points are at their widest opening.
- Determine the size of the point gap with a thickness gauge, or measure the dwell angle using a dwell angle tester.



A. Contact Breaker Points **B. Thickness Gauge**

Table B2 Contact Breaker

	Standard
Point Gap	0.3 ~ 0.4 mm
Dwell Angle	185 ~ 200° (51 ~ 56%)

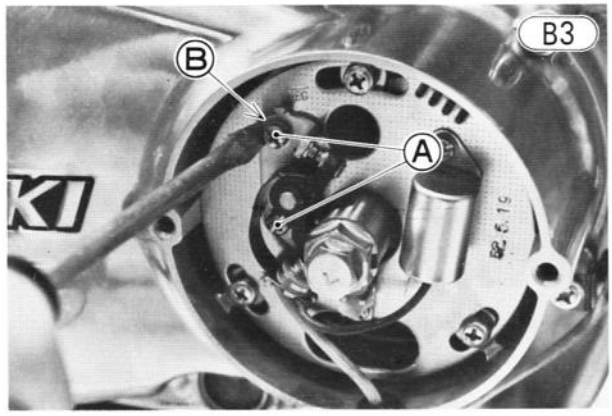
NOTE: The point gap is set more precisely using a dwell angle tester instead of a thickness gauge. Connect a dwell angle tester in the manner prescribed by the manufacturer in order to check the dwell angle.

WARNING **When measuring the dwell angle, make sure that no tools, clothes, or meter leads touch the spinning crankshaft. Touching the crankshaft of a running engine could cause an injury.**

To adjust the point gap:

- If the gap or dwell angle is not the same as the specification, loosen the contact breaker base screws (2) just enough so that a slot screwdriver can be used at the

contact breaker pry point to change the gap or dwell angle. Adjust the contact breaker until the correct point gap or dwell angle specification is obtained.



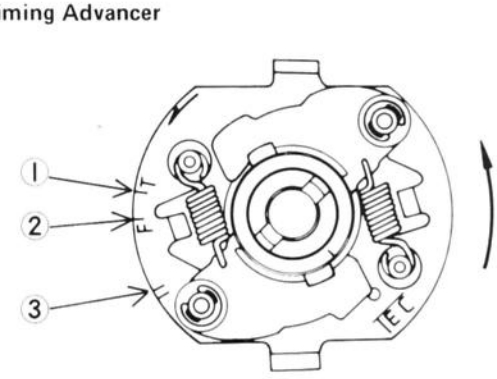
A. Base Screws B. Pry Point

- Tighten the screws (2).
- Perform the timing test.

Timing Test

To inspect the ignition timing there are two marks on the automatic timing advancer. One ("F" mark) is for checking the timing before advancing, and the other (a pair of lines) for checking the timing after it has advanced.

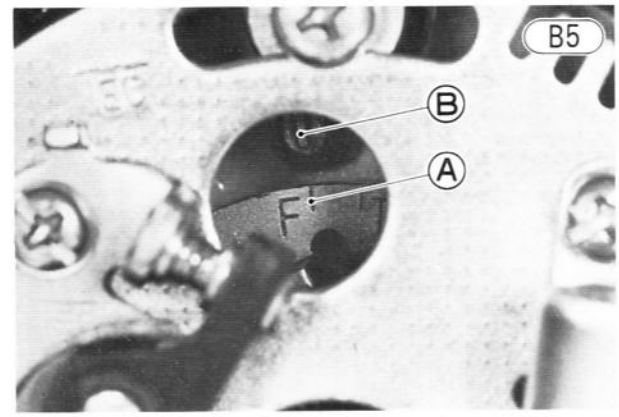
Timing Advancer



1. "T" Mark 2. "F" Mark 3. Advanced Mark

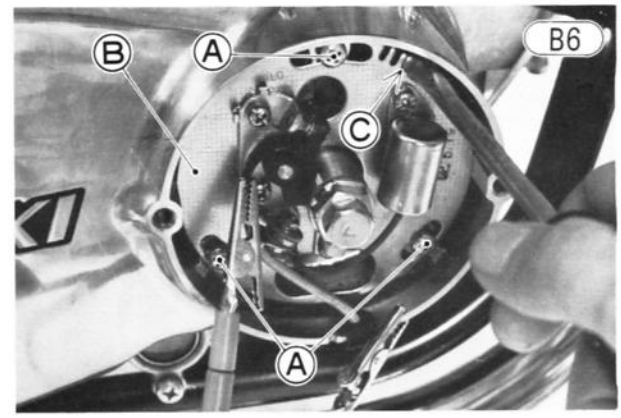
To check and adjust the timing (static):

- Check the point gap, and adjust if necessary.
- With the ignition switch turned off, turn the engine stop switch to one of the "OFF" positions to make the ohmmeter flicker easier to read.
- Set an ohmmeter to the x 1 Ω range and connect it across the points, one lead to the wire coming from the points (or to the spring leaf), and the other ohmmeter lead to chassis ground (engine, frame, contact breaker mounting etc.). Make sure that both leads are securely connected.
- Turning the cranksahft counterclockwise, check to see if the "F" mark is aligned with the timing mark when the needle jumps.



A. "F" Mark B. Timing Mark

- If the timing is incorrect, turn and stop the crankshaft so that the "F" mark (the line adjoining the "F") on the timing advancer is aligned with the timing mark.
- Loosen the contact breaker mounting plate screws (3), and turn the mounting plate (using a screwdriver in the pry points) so that the contacts are just at the point of opening. This point can be found by watching the ohmmeter needle, which will flicker just when the points begin to open or close.



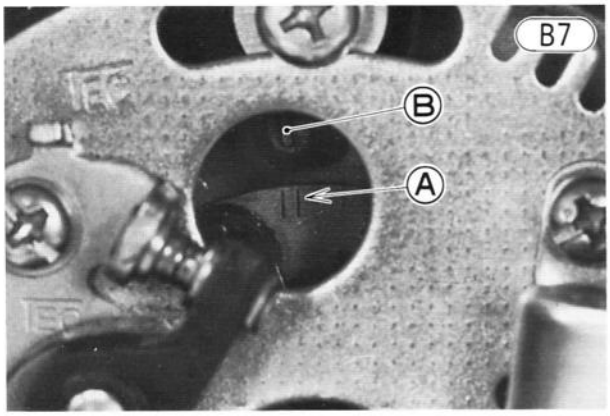
A. Mounting Plate Screws C. Pry Points
B. Mounting Plate

- Tighten the mounting plate screws (3).
- Check the point gap again, and adjust if it was disturbed.
- Disconnect the ohmmeter leads.
- Install the contact breaker cover and its gasket.

To check the timing (dynamic):

- Check the point gap, and adjust if necessary.
- Connect a strobe light in the manner prescribed by the manufacturer in order to check the ignition timing under operating conditions.
- Start the engine, and direct the light at the timing mark through the inspection window. At low engine speed the timing mark and the "F" mark on the timing advancer must be aligned for correct low rpm ignition timing (Fig. B5). At high engine speed (above

3,400 rpm) the timing mark and the pair of lines on the timing advancer must be aligned for correct high rpm ignition timing as shown in Fig. B7. If both low and high rpm ignition timing are incorrect, adjust the timing as just explained. If either low or high rpm ignition timing is correct but the other is not, examine the timing advancer mechanism (Pg. 223).



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

Table B3 Timing Advancing

	Engine Speed
Advance Begins	1,400 ~ 1,600 rpm
Full Advance	3,000 ~ 3,400 rpm

- Check the point gap again, and adjust if it was disturbed.
- Install the contact breaker cover and its gasket.

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 serious engine damage.

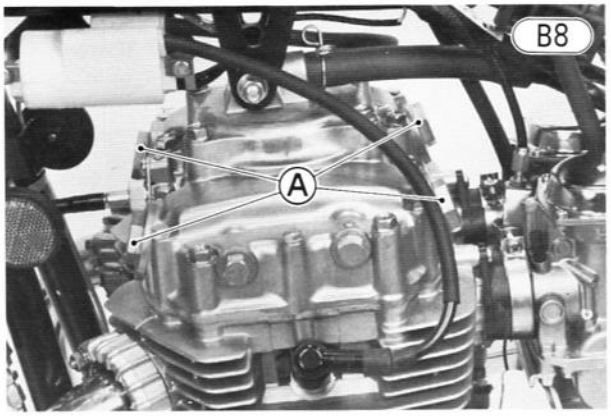
Valve clearance for each valve should be checked and adjusted if incorrect, in accordance with the Periodic Maintenance Chart (Pg. 16) and any time clearance may have been affected by disassembly.

When carrying out adjustment, be careful to adjust within the specified clearance. Adjusting to a larger value will both disturb valve timing and cause engine noise.

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

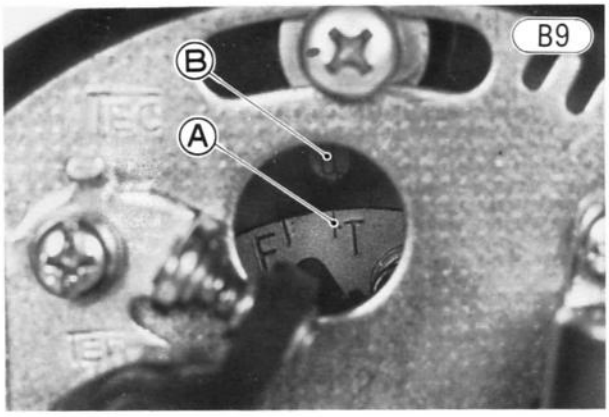
To check and adjust the valve clearance:

- Remove the fuel tank (Pg. 50).
- Remove the valve adjusting caps.



A. Valve Adjusting Caps

- Remove the screws (2), and remove the contact breaker cover.
- Using a 17 mm wrench, turn the crankshaft counterclockwise while watching the movement of the inlet valve (the valve to the rear) on the right side. When the valve has just finished opening and closing (moving downward and returning upward), turn the crankshaft in the same direction (counterclockwise) for about another ¼ turn until the "T" mark (the line adjoining the "T") on the timing advancer aligns with the timing mark.



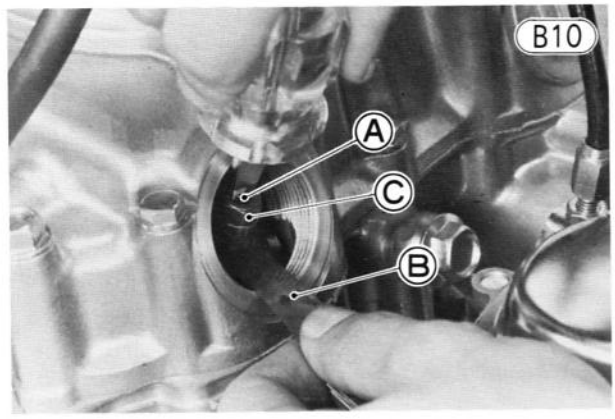
A. "T" Mark **B. Timing Mark**

- At this crankshaft position, the piston in the right cylinder is at the end of its compression stroke such that the inlet and exhaust valve for the right 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.

Table B4 Valve Adjustment (when cold)

Valve Clearance (for both inlet and exhaust)	0.17 ~ 0.22 mm
Locknut Tightening Torque	1.5 kg-m (11.0 ft-lbs)

●If a valve clearance is incorrect, loosen its adjusting screw locknut, and turn the adjusting screw until correct clearance is obtained.



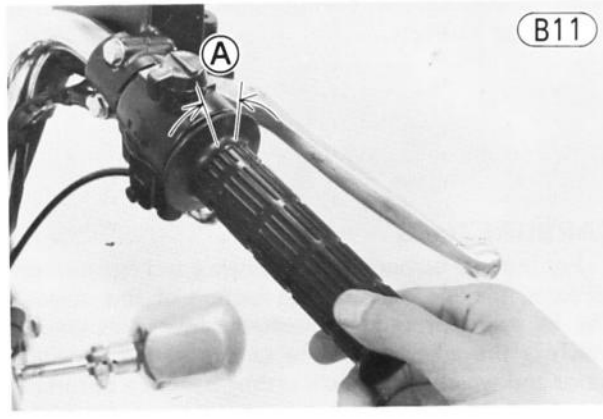
A. Adjusting Screw **C. Locknut**
B. Thickness Gauge (57001-1013)

●Tighten the locknut to the specified torque.
●After finishing with the right cylinder valves, turn the crankshaft counterclockwise one full turn so that the "T" mark again aligns with the timing mark. Check the left cylinder valves, and adjust if necessary.
●Install the valve adjusting caps together with O rings.
●Install the contact breaker cover and its gasket.
●Install the fuel tank (Pg 50).

THROTTLE CABLE (one throttle cable model)

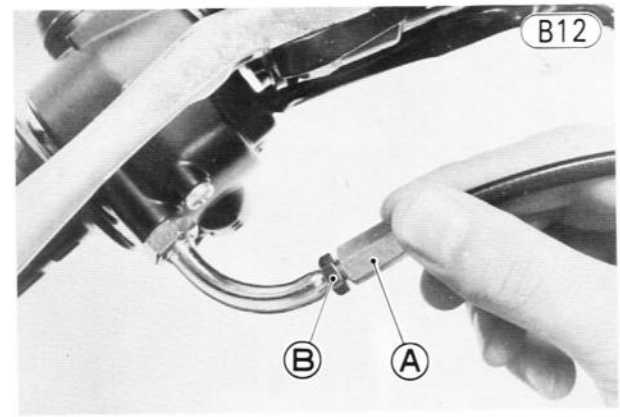
There is a throttle cable to open the butterfly valves in the carburetors. If the cable is too loose due either to cable stretch or maladjustment, the excessive play in the throttle grip will cause a delay in throttle response, which will be especially noticeable at low rpm. Also, the butterfly valves may not open fully at full throttle. On the other hand, if the cable is 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 when lightly turning the throttle grip back and forth.



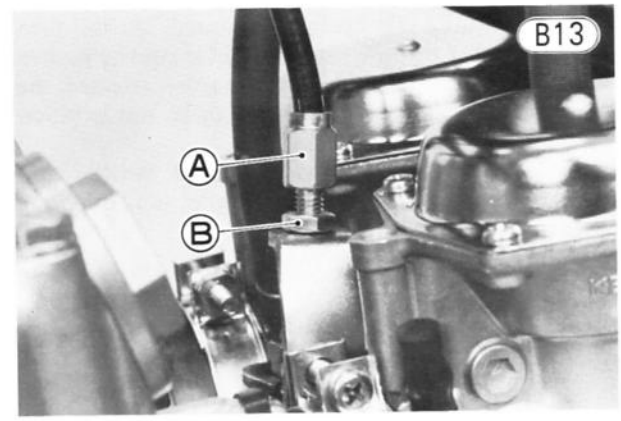
A. 2~3 mm

To adjust the throttle cable:
If the cable has improper play, adjust it as follows:
●Loosen the locknut at the throttle grip, and turn the adjusting nut until the proper amount of throttle grip play is obtained. Tighten the locknut.



A. Adjusting Nut **B. Locknut**

NOTE: If the throttle cable cannot be adjusted by using the cable adjusting nut at the upper end of the throttle cable, use the cable adjuster at the lower end of the throttle cable (at the carburetor). Do not forget to securely tighten the adjuster locknut.



A. Adjuster **B. Locknut**

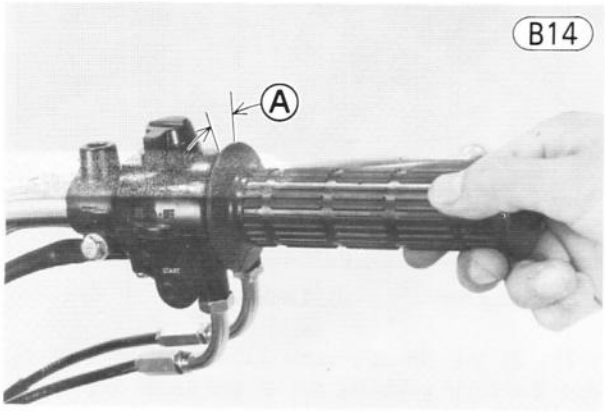
THROTTLE CABLES
(two throttle cables model)

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 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 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:

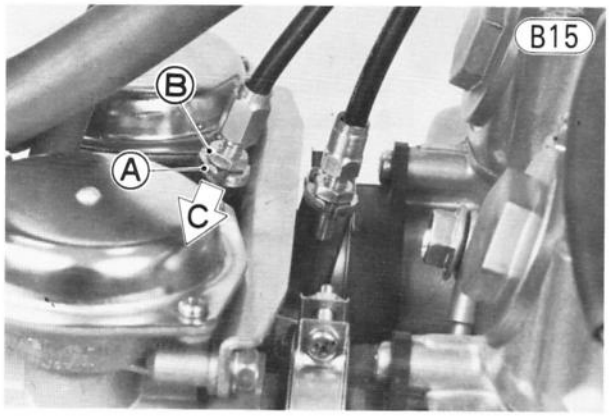
•Check that there is 2 ~ 3 mm throttle grip play (Fig. B14).



A. 2 ~ 3 mm

•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.



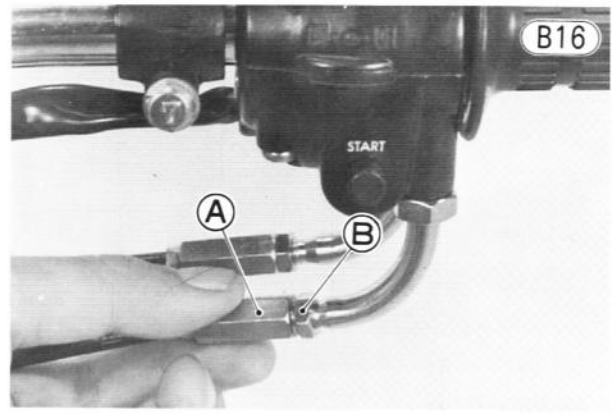
A. Decelerator Throttle Cable Bracket
B. Locknut **C. 1 ~ 2 mm**

To adjust the throttle cables:

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

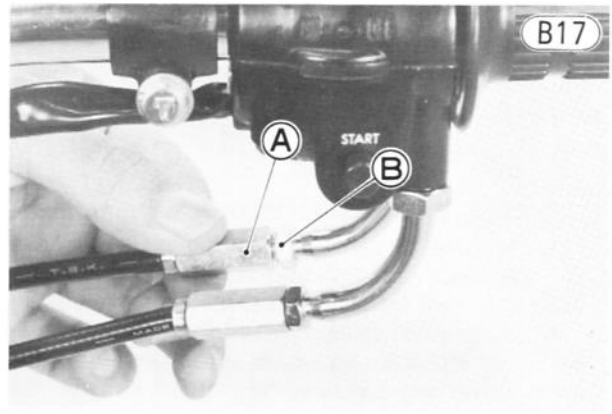
•Loosen the locknuts, and screw both throttle cable adjusting nuts in fully at the upper end of the throttle cables so as to give the throttle grip plenty of play.

•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 adjuster locknuts.

CARBURETORS

For internal carburetor maintenance and replacement of parts, see the maintenance section of this manual. The following procedure covers the idling adjustment, which is the adjustment necessary in periodic maintenance and whenever the idle setting has been disturbed. This procedure also includes the necessary steps for obtaining proper carburetor synchronization.

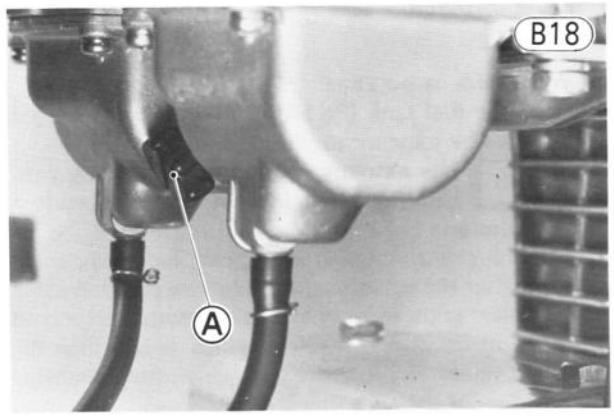
When the idle speed is too low, the engine may stall; when the idle speed is too high, the fuel comsumption becomes excessive, and the resulting lack of engine braking may make the motorcycle difficult to control. Poor carburetor synchronization will cause unstable idling, sluggish throttle response, and reduced engine power and performance.

The following procedure consists of two parts: idling adjustment and carburetor synchronization.

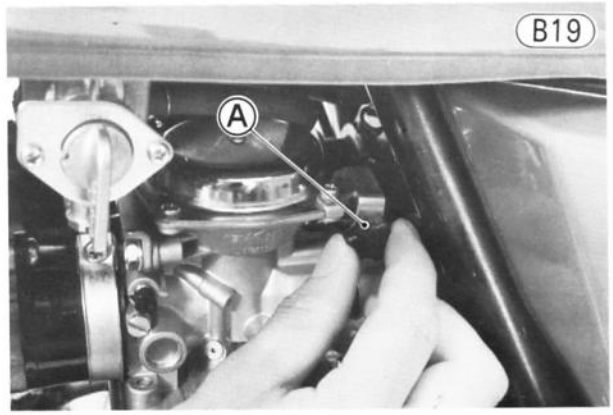
Idling Adjustment

1) Idle speed adjustment

- Start the engine, and warm it up thoroughly.
- Adjust the idle speed to 1,100 ~ 1,300 rpm by turning the idle adjusting screw.



A. Idle Adjusting Screw



A. Idle Adjusting Screw (West German Model)

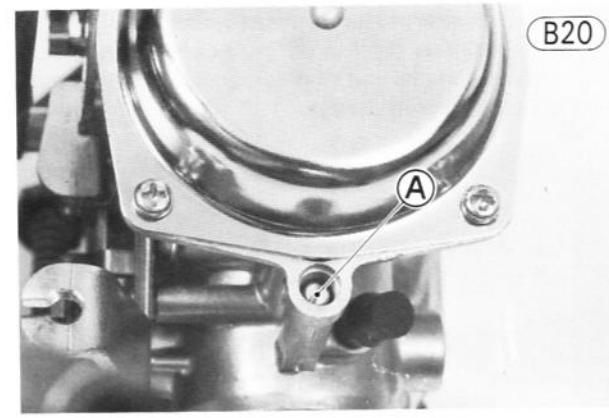
- Open and close the throttle a few times to make sure that the idle speed does not change. Readjust if necessary.

NOTE: With the engine idle, turn the handlebar to either side. If handlebar movement changes idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged.

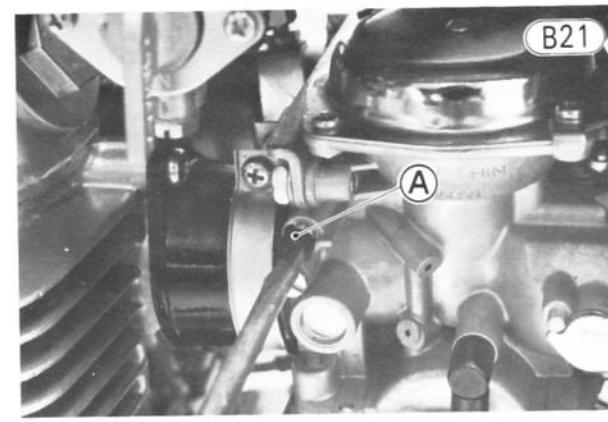
WARNING **Operation with improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.**

2) Idle mixture adjustment (not for US model)

- For all carburetor, turn in the pilot screw of each carburetor until it seats lightly, and then back it out 2¾ (West German Model: 2¼) turns.



A. Pilot Screw



A. Pilot Screw (West German Model)

- Adjust the idle speed.

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

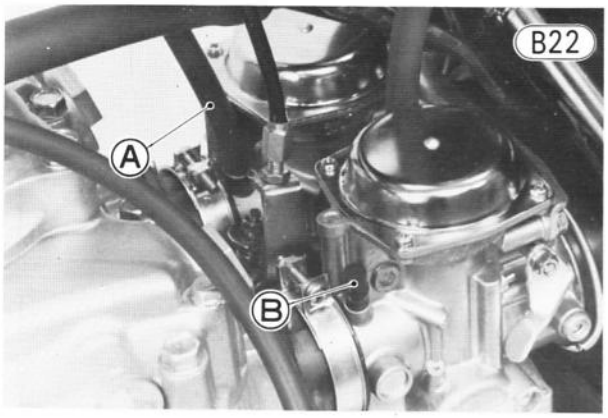
Engine Oil (Pg. 26)
Spark Plugs (Pg. 18)
Ignition Timing (Pg. 18)
Throttle Cable (Pg. 21)
Cylinder Compression (Pg. 164)
Air Cleaner Element (Pg. 146)
Air Cleaner Duct and Carburetor Holder Leakage
Valve Clearance (Pg. 20)

Carburetor Synchronization

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

To check carburetor synchronization:
- Start the engine, and warm it up thoroughly.
- Perform idling adjustment (Pg. 23).
- Stop the engine.
- Install the vacuum gauge as follows.

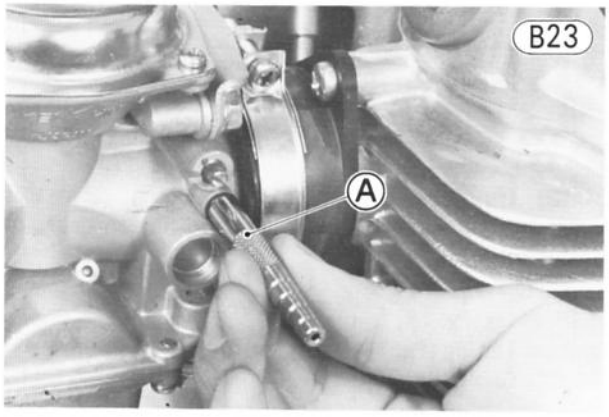
For the models except West German model:
- Remove the rubber cap from the left carburetor.
- Slide the hose clamp out of place, and pull the vacuum hose off the right carburetor.



A. Vacuum Hose B. Rubber Cap

- Fit the hose from vacuum gauge onto the fitting on each carburetor.

For the West German model:
- Remove the vacuum plugs from each carburetor, and attach the vacuum gauge and adapter (special tools).

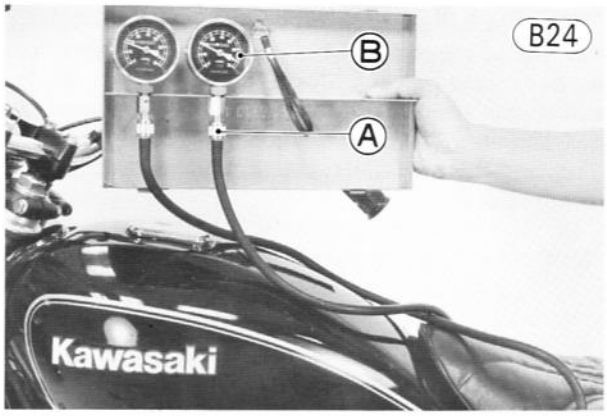


A. Vacuum Gauge Adapter (57001-401)

- Turn the fuel tap lever to the "PRI" position, and start the engine.
- With the engine running at idle speed, slowly turn the vacuum gauge damper valves until gauge needle flutter is less than 3 cmHg and note the gauge readings.

Table B5 Engine Vacuum

Difference between two cylinders	less than 3 cmHg

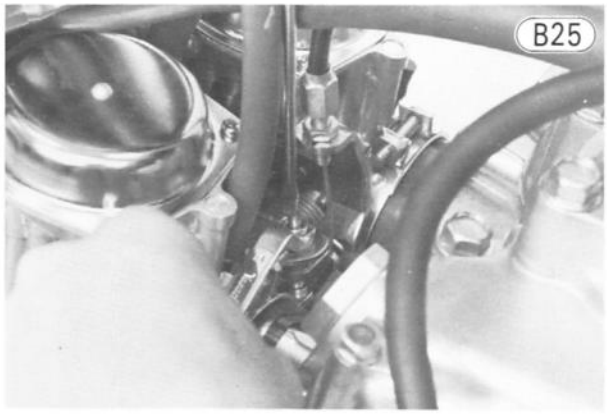


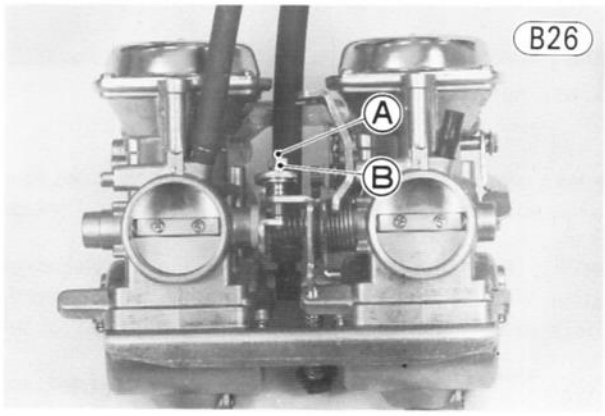
A. Damper Valve B. Vacuum Gauge (57001-226)

- If there is a difference of more than the specified value between the two gauges, stop the engine, and synchronize the carburetors according to the following procedure.

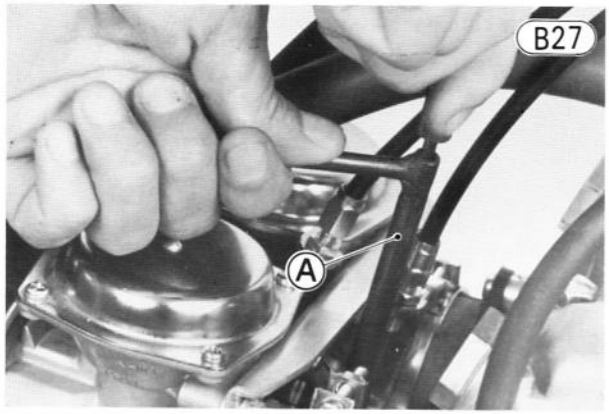
To synchronize carburetors:
- Remove the fuel tank (Pg. 50), and supply fuel for the carburetors by some means during adjustment.

WARNING **Use extreme caution when working with gasoline, open fuel lines, etc. to avoid a fire or explosion.**
- With the engine running at idle speed, loosen the locknut and alter the balance adjusting screw position using the balance adjuster (special tool) or suitable tools to obtain a difference in readings which is less than the specified value. Tighten the locknut without changing the position of the adjusting screw.

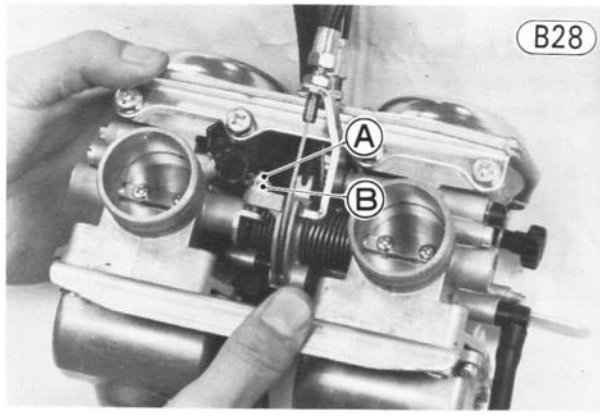




A. Balance Adjusting Screw B. Locknut



A. Balance Adjuster (57001-351)



A. Balance Adjusting Screw B. Locknut

- Perform idle adjustment again.
- Open the throttle grip and let it snap shut a few times. Make sure the vacuum readings stay within the specified vacuum reading. If they do not, repeat the last two steps.
- If any gauge reads a value less than 15 cmHg after synchronizing the carburetors; check the points listed in the end of the idling adjustment.
- Detach the vacuum gauge, and install the rubber cap and vacuum hose on the carburetors. Slide the hose clamp back into place.
- Install the fuel tank (Pg. 50).

CLUTCH

Clutch cable stretch 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 clutch release to gradually diminish until the push rod touches the clutch release. When this play is lost, the clutch will not engage fully, causing the clutch to slip.

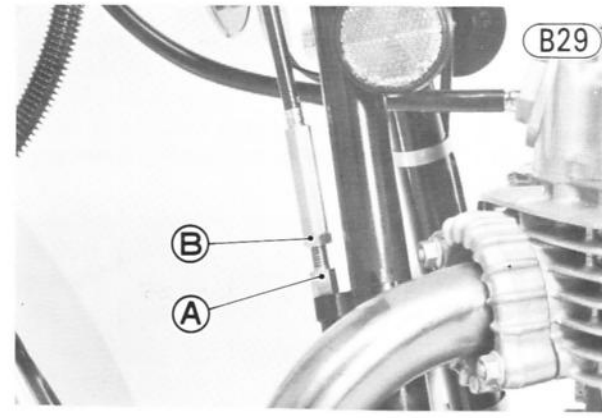
NOTE: Even though the proper amount of play exists at the clutch lever, clutch lever play alone cannot be used to determine whenever or not the clutch requires adjustment.

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

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

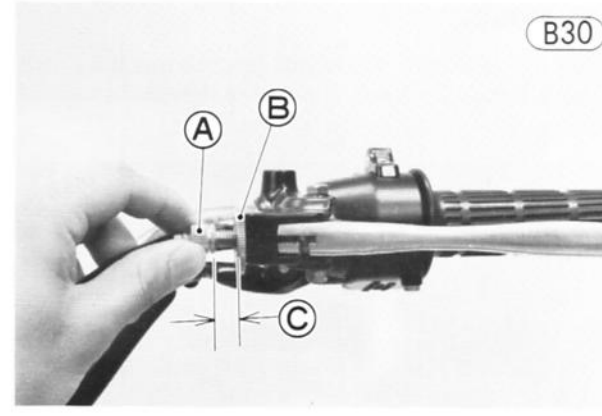
To adjust the clutch:

- Loosen the locknut, and turn in fully the adjuster at the center of the clutch cable to give the cable plenty of play (Fig. B29).



A. Adjuster B. Locknut

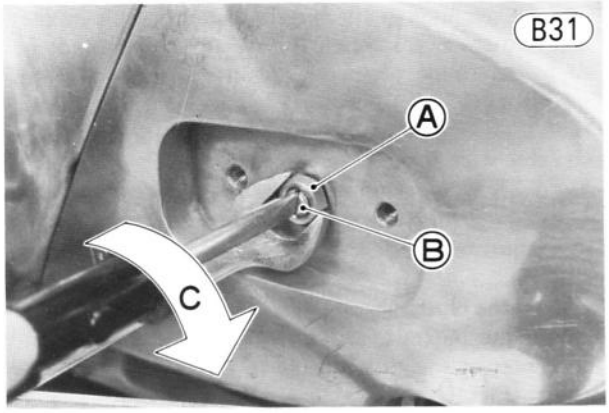
- Loosen the knurled locknut at the clutch lever just enough so that the adjuster will turn freely, and then turn the adjuster to make a 5 ~ 6 mm gap between the adjuster and knurled locknut.



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

- Remove the clutch release adjusting cover.
- Loosen the locknut, and turn in the adjusting screw until the screw turns without drag.

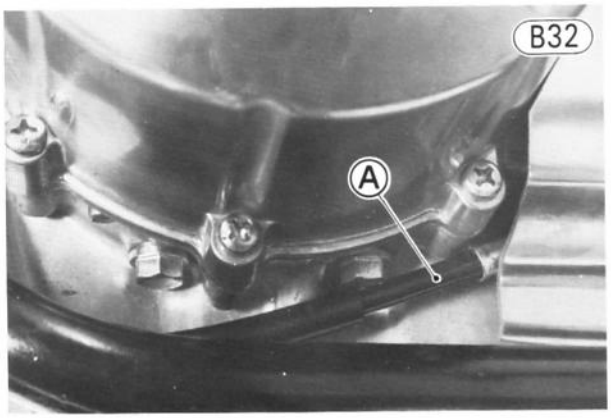
- Turn **out** the adjusting screw until it becomes hard to turn. This is the point where the clutch is just starting the release.
- Turn **in** the adjusting screw ¼ turn from that point, and tighten the locknut.



A. Locknut **B. Adjusting Screw** **C. 1/4 Turn**

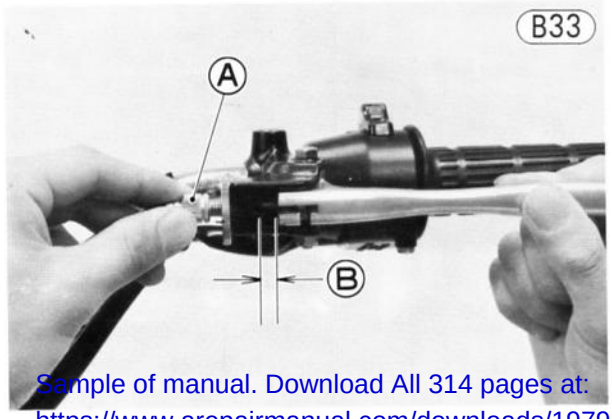
- Take up all the cable play with the adjuster at the center of the cable, and then tighten the locknut.

WARNING **Be sure the cable is fully seated in the engine sprocket cover hole, or it could slip into place later, creating enough cable play to prevent clutch disengagement.**



A. Clutch Cable

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



A. Adjuster **B. 2~3 mm**

- Install the clutch release adjusting cover.

ENGINE OIL

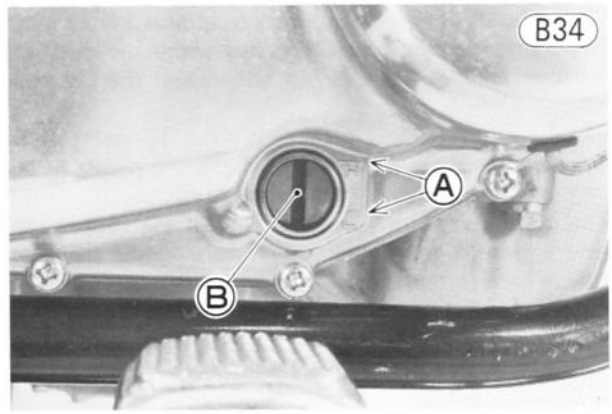
In order for the engine, transmission, and clutch to function properly; maintain the engine oil at the proper level, and change the oil in accordance with the Periodic Maintenance Chart (Pg. 16). Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure.

Oil Level Inspection

- Situate the motorcycle so that it is perpendicular to the ground.
- 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. Stop the engine, 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 **B. Oil Level Gauge**

- 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.

CAUTION **If the engine oil get extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the red oil pressure warning light in the switch panel will light. If this light stays on when the engine speed is above 1,500 rpm, stop the engine immediately and find the cause.**