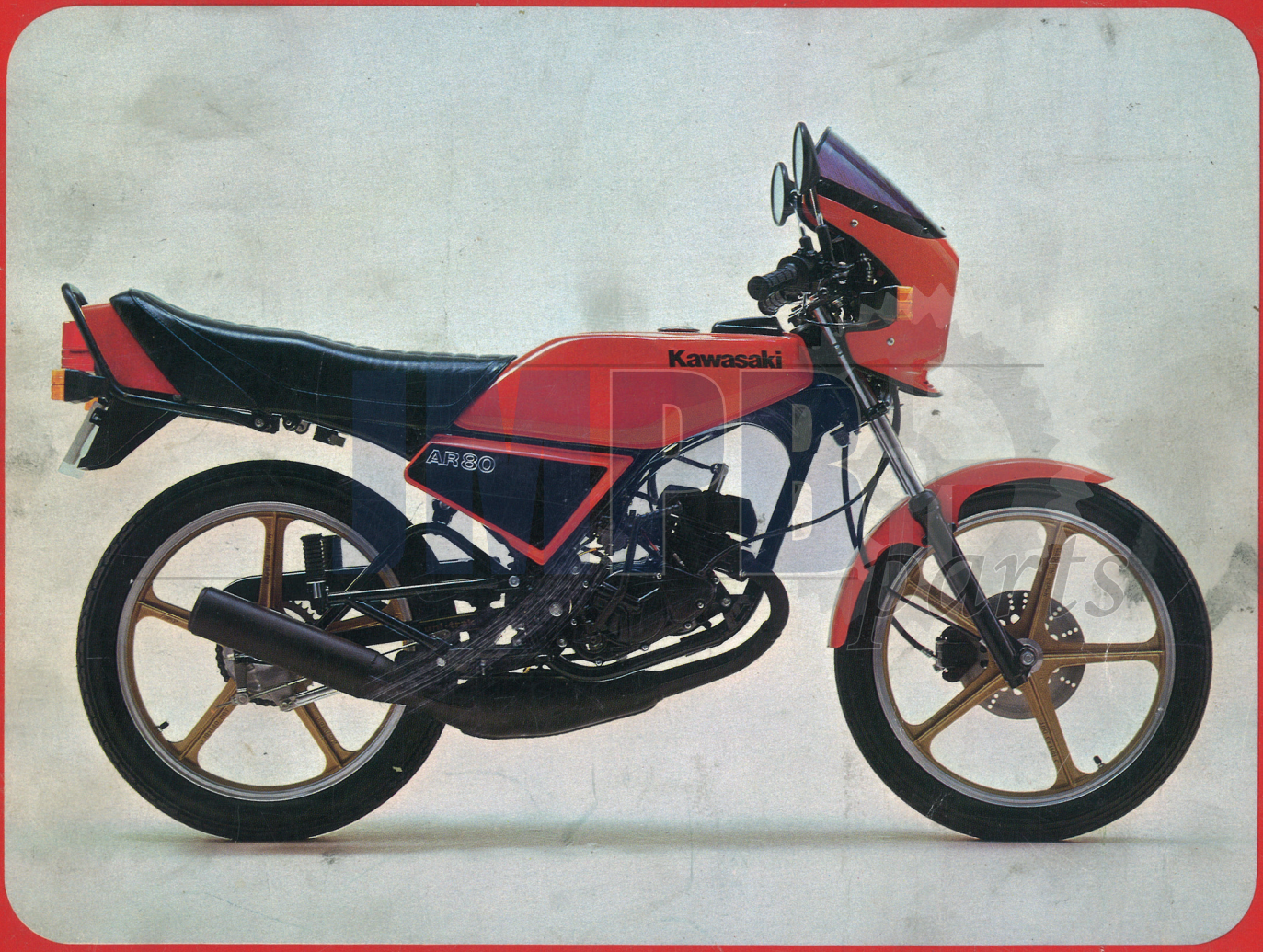
Kawasaki

AR50
AR80



Motorcycle
Service Manual

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AR50
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Second Edition ①: Feb. 1, 1982 Ⓚ

SAFETY AWARENESS

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"

This note symbol indicates points of particular interest for more efficient and convenient operation.

List of Abbreviations

A	ampere, amperes	kg-m	kilogram meters
ABDC	after bottom dead center	km	kilometer
AC	alternating current	kPa	kilo-Pascals
ATDC	after top dead center	kph	kilometers per hour
BBDC	before bottom dead center	ℓ	liter, litre
BDC	bottom dead center	m	meter, meters
BTDC	before top dead center	mm	milimeters
cc	cubic centimeters	psi	pounds per square inch
DC	direct current	r/min	revolutions per minute
F	farad, farads	rpm	revolutions per minute
ft-lbs	foot-pounds	sec	second, seconds
hp	horsepower	TDC	top dead center
in-lbs	inch-pounds	V	volt, volts
kg	kilogram, kilograms	Ω	ohm, ohms
kg/cm^2	kilograms per square centimeter		

Read OWNER'S MANUAL before operating

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.

This manual consists of the following major chapters:

1. "General Information" contains general information which will be useful when servicing the motorcycle.
2. "Scheduled Maintenance" gives the procedures for all maintenance which must be done periodically.
3. "Non-Scheduled Maintenance" describes the procedures for inspection, adjustment, and repair which may become necessary unexpectedly or irregularly.
4. "Disassembly" gives teardown sequences required to service most major components. Unless specific instructions are given for assembly and installation, they are performed by reversing the removal/disassembly sequences.
5. "Appendix" in the back of this manual contains miscellaneous information, including an additional considerations for racing, troubleshooting guide, and unit coversion table.

NOTE: Explanation on major changes and additions, that are unique to later year units since the publication of the Service Manual, will be added in the end of the text.

For the duration of your warranty period, especially, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your Motorcycle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

EMISSION CONTROL INFORMATION

DESCRIPITION OF EMISSION CONTROL SYSTEM

To protect the environment in which we all live, Kawasaki has incorporated into your motorcycle an emission control system in compliance with the applicable regulations of the United States Environmental Protection Agency.

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of your motorcycle. The fuel system and cylinder of your 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.
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.

General Information

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Table of Contents

BEFORE SERVICING

Before starting to service a motorcycle, careful reading of the applicable section is recommended to eliminate unnesessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detail account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(2) Dirt

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine, carburetor or other parts will work as an abrasive and shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal fillings.

(3) Tightening Sequence

Where there is a tightening sequence indication in this Service Manual: the bolts, nuts, or screws must be tightened in the order and method indicated. When installing a part with several bolts, nuts, or screws; they should all be started in their holes and tightened to a snug fit. Then tighten them evenly, according to the tightening sequence, to the specified torque. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws; loosen all of them about a quater of turn and then remove them.

(4) Torque

The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(5) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(6) Lubricant

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended.

(7) Battery Ground

Before performing any disassembly operations on the motorcycle, remove the ground (−) lead from the battery to prevent the possibility of accidentally turning the engine over while partially disassembled.

(8) Engine Rotation

When turning the crankshaft by hand, always turn it in the direction of normal rotation; which is clockwise, viewed from the right side of the engine. This will ensure proper adjustments.

(9) Lublication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Oil grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

(10) Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(11) Oil Seal, Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little oil, preferably high temperature grease on the lips to reduce rubber to metal friction.

(12) Gasket, O-Ring

When in doubt as to the condition of a gasket or O-Ring, replace it with a new one. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(13) Liquid Gasket, Non-permanaent Locking Agent

Follow manufacture's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(14) Ball Bearing, Oil Seal, Grease Seal Installation

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of the seal until the face of the seal is even with the end of the hole.

(15) Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

(16) High Flash-Point Solvent

A high flash-point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

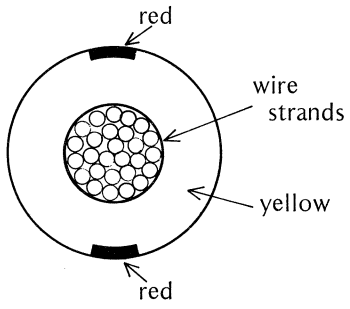
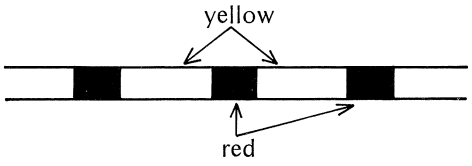
(17) Molybdenum Disulfide (MoS_2) Grease

This manual makes reference to molybdenum disulfide grease in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(18) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

Table1-1 Two-color wire Identification

Wire (cross-section)	Name of Wire Color	Picture in Wiring Diagram
	yellow/red	

MODEL IDENTIFICATIONS

AR50-A1

AR80-A1

SPECIFICATIONS

Items		AR50-A1	AR80-A1
Dimensions:			
Overall length		1,855 mm	*
Overall width		630 mm	*
Overall height		1,145 mm	*
wheelbase		1,195 mm	1,205 mm, Ⓕ 1,200 mm
Road clearance		175 mm	*
Seat height		790 mm	*
Dry weight		75 kg	*
Fuel tank capacity		9.6 liters	*
Performance:			
Climbing ability		20°	*
Braking distance		3m from 20 kph	6m from 35 kph
Minimum turning radius		2.1 m	*
Engine:			
Type		2-stroke, 1-cylinder, piston reed valve	*
Cooling system		Air cooled	*
Bore and stroke		39.0 x 41.6 mm	49.0 x 41.6 mm
Displacement		49 cc	78 cc
Compression ratio		7.0	7.8
Port timing:			
Scavenging	Open	50° BBDC	54° BBDC, Ⓤ 56° BBDC
	Close	50° ABDC	54° ABDC, Ⓤ 56° ABDC
Exhaust	Open	68° BBDC	74° BBDC, Ⓤ 86° BBDC
	Close	68° ABDC	74° ABDC, Ⓤ 86° ABDC
Carburetion system		Mikuni carburetor, VM14 SC	Mikuni carburetor, VM16 SC Ⓤ Mikuni carburetor, VM18 SC
Lubrication system		Superlube (oil injection)	*
Engine oil:			
Type		2-stroke oil for air-cooled engine	*
Capacity		1.2 liters	*
Starting system		Primary kick	*
Ignition system		Electronic CDI	*
Ignition timing		14° BTDC @3,000 rpm	20° BTDC @3,000 rpm, Ⓤ 17° BTDC @3,000 rpm
Spark plug		NGK B6ES	NGK BP7ES, Ⓤ NGK BP8ES
Drive Train:			
Primary reduction system:			
Type		Gear	*
Reduction ratio		3.619 (76/21)	*
Clutch type		Wet multi disc	*
Transmission:			
Type		5-speed, constant mesh, return shift	6-speed, constant mesh, return shift

Items		AR50-A1	AR80-A1
Gear ratios	1st	3.307 (43/13), *	*
	2nd	2.111 (38/18), *	*
	3rd	1.714 (36/21), Ⓤ 1.545 (34/22)	1.545 (34/22)
	4th	1.478 (34/23), Ⓤ 1.240 (31/25)	1.240 (31/25)
	5th	1.333 (32/24), Ⓤ 1.074 (29/27)	1.074 (29/27)
	6th	—— , —	0.965 (28/29)
Transmission oil:			
Grade		SE Class	*
Viscosity		SAE 10W30 or SAE 10W40	*
Capacity		0.6 litter	*
Final drive system:			
Type		Chain drive	*
Reduction ratio		3.769 (49/13)	2.733 (41/15), Ⓤ Ⓕ 2.866 (43/15)
Overall drive ratio		18.188 @Top gear, Ⓤ 14.651 @Top gear	9.550 @Top gear, Ⓤ Ⓕ 10.016 @Top gear
Frame:			
Type		Tubular, semi-double cradle	*
Caster (rake angle)		27.5°	27.25°
Trail		85 mm	83 mm
Front Tire:			
Type		Tube type	*
Size		2.50-18 4PR	*
Rear Tire:			
Type		Tube type	*
Size		2.75-18 6PR, Ⓤ 2.75-18 4PR	2.75-18 6PR, Ⓤ Ⓕ 2.75-18 4PR
Front suspension:			
Type		Telescopic fork	*
Wheel travel		130 mm	*
Rear suspension:			
Type		Swing arm (uni-trak)	*
Wheel travel		120 mm	*
Brake type:			
Front		Single disc brake	*
Rear		Internal expansion, leading-trailing	*
Electrical Equipment:			
Battery		6V 6AH	*
Headlight		6V15W, Ⓤ 6V 25/25W	6V 25/25W
Trail/brake light		6V 5/21W	*

"This engine licensed under one or more of Eyvind Boyesen's patent Nos. : 3,905,340. 3,905,341. Re. 30,425. 4,062,331. 4,161,163. 4,202,298. and 4,202,299."

Ⓕ: French model Ⓤ : UK model * : Identical to left side.

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

SERVICE DATA

The following tables list the service data which show criteria for servicing major parts. Although reliable measurements can only be obtained by using the proper instruments and following the procedures explained in this text, detail has not been explained in this section. See each section for a detailed account.

Items (Engine)	Standard	Service Limit	See Table
Carburetor:			
Idle Speed	1,200 – 1,300 rpm	– – –	2-4
Service Fuel Level:			
AR50-80	3.5 ± 1 mm	– – –	3-3
AR80 for UK model	1.5 ± 1 mm	– – –	3-3
Float Height:			
AR50-80	23.8 ± 1 mm	– – –	3-4
AR80 for UK model	22.2 ± 1 mm	– – –	3-4
Throttle Grip:			
Throttle Grip Play	2 – 3 mm	– – –	Page 2-5
Cylinder Head, Cylinder:			
Cylinder Compression:			
AR50	7.5 – 11.7 kg/cm² (107 – 167 psi)	– – –	3-5
AR80	8.8 – 13.5 kg/cm² (125 – 192 psi)	– – –	3-5
Cylinder Head Warp	– – –	0.1 mm	3-6
Combustion Chamber Volume:			
AR50	3.7 – 4.1 cc	– – –	3-7
AR80	6.8 – 7.4 cc	– – –	3-7
Cylinder Inside Diameter: AR50	39.000 – 39.015 mm	39.10 mm	3-8
AR50 AR80	Ⓤ 49.000 – 49.015 mm	49.10 mm	3-8
AR80	ⓌⒻ 49.010 – 49.025 mm	49.10 mm	3-8
Piston:			
Piston Diameter: AR50	38.970 – 38.985 mm	38.83 mm	3-9
AR80	48.965 – 48.980 mm	48.82 mm	3-9
Piston/Cylinder Clearance: AR50	0.030 – 0.040,	– – –	3-10
	ⓊⓌ 0.025 – 0.035 mm	– – –	3-10
AR80	Ⓤ 0.030 – 0.040 mm	– – –	3-10
	ⓌⒻ 0.040 – 0.050 mm	– – –	3-10
Piston Ring End Gap	0.10 – 0.30 mm	0.6 mm	3-11
Piston Pin Diameter	11.995 – 12.000 mm	11.96 mm	3-12
Piston Pin Hole Diameter	12.000 – 12.006 mm	12.07 mm	3-12
Crankshaft, Connecting Rod:			
Connecting Rod:			
Small End Diameter	16.003 – 16.014 mm	16.05 mm	3-12
Bend/100 mm	Under 0.05 mm	0.2 mm	3-13
Twist/100 mm	Under 0.15 mm	0.2 mm	3-14
Big End Radial Clearance	0.009 – 0.025 mm	0.07 mm	3-15
Big End Side Clearance	0.30 – 0.40 mm	0.60 mm	3-16
Crankshaft Runout	Under 0.04 mm	0.10 mm	3-17

Items (Engine)	Standard	Service Limit	See Table
Clutch:			
Clutch Lever Play	2 – 3 mm	– – –	Page 2-6
Clutch Spring Tension/14 mm	9.7 – 10.9 kg	8.7 kg	3-18
Friction Plate Thickness	3.12 – 3.28 mm	3.0 mm	3-19
Clutch Plate Warp	– – –	0.3 mm	3-20
Friction Plate/Clutch Housing Clearance	0.30 – 0.65 mm	0.9 mm	3-21
Clutch Housing Gear/Primary Gear Backlash	Under 0.102 mm	0.14 mm	3-22
Clutch Housing Inside Diameter	22.000 – 22.021 mm	22.03 mm	3-23
Clutch Sleeve Diameter	21.965 – 21.980 mm	21.94 mm	3-23
Transmission:			
Shift Pawl Spring Free Length	21.5 mm	22.6 mm	3-24
Gear Set Lever Spring Free Length	25.6 mm	26.9 mm	3-24
Shift Fork Thickness	4.9 – 5.0 mm	4.7 mm	3-25
Gear Shift Fork Groove Width	5.05 – 5.15 mm	5.25 mm	3-26
Shift Fork Guide Pin Diameter	4.9 – 5.0 mm	4.85 mm	3-27
Shift Drum Groove Width	5.05 – 5.20 mm	5.25 mm	3-28
Gear/Shaft, Gear/Bush Clearance:			
O1 gear	0.022 – 0.058 mm	0.16 mm	3-29
O2, O3, O4, D5, D6 gear	0.032 – 0.068 mm	0.17 mm	3-29
Kickstarter:			
Kick Gear Inside Diameter	16.016 – 16.034 mm	16.08 mm	3-30
Kick Shaft Diameter	15.939 – 15.984 mm	15.92 mm	3-31
Idle Gear Inside Diameter:			
on Drive Shaft	22.020 – 22.041 mm	22.08 mm	3-32
on Output Shaft	12.016 – 12.034 mm	12.08 mm	3-33
Output Shaft Diameter:			
at Idle Gear	11.976 – 11.994 mm	11.93 mm	3-34
Reed Valve:			
Reed Warp	– – –	0.2 mm	3-35
Oil Pump:			
Oil Pump Output (2,000 rpm):			
AR50	0.8 – 1.0 cc	– – –	3-36
AR80	2.3 – 2.8 cc	– – –	3-36

Items (Chassis)	Standard	Service Limit	See Table
Wheels:			
Tire Tread Depth	NITTO DUNLOP		
Front	4 mm , 4.4 mm	1 mm	2-11
Rear	6 mm , 5.4 mm	2 mm	2-11
Rim Runout:			
Axial	— — —	0.5 mm	4-2
Radial	— — —	0.8 mm	4-2
Axial Runout/100 mm	Usable Range: 0.2 mm	0.7 mm	4-3
Sprockets:			
Engine Sprocket Diameter:			
13T	44.70 — 44.90 mm	44.0 mm	4-4
15T	52.78 — 52.98 mm	52.1 mm	4-4
Rear Sprocket Diameter:			
41T	158.06 — 158.56 mm	157.7 mm	4-4
43T	166.15 — 166.65 mm	165.8 mm	4-4
49T	190.40 — 190.90 mm	190.1 mm	4-4
Rear Sprocket Warp	Under 0.5 mm	0.6 mm	4-5
Drive Chain:			
Drive Chain Slack	30 — 35 mm	less than 30 mm or more than 40 mm	2-5
20 link Length	254.0 — 254.5 mm	259 mm	2-7
Disc Brake:			
Pad Lining Thickness	3.7 mm	1 mm	2-8
Disc Runout	Under 0.2 mm	0.3 mm	4-8
Disc Thickness	3.8 — 4.1 mm	3.5 mm	4-9
Drum Brake:			
Brake Pedal Play	20 — 30 mm	— — —	Page 2-10
Cam Lever Angle	80 — 90°	— — —	Page 2-10
Drum Inside Diameter	110.000 — 110.087 mm	110.75 mm	4-10
Lining Thickness	2.9 — 3.5 mm	1.6 mm	4-11
Brake Spring Free Length	30.8 — 31.2 mm	32.6 mm	4-12
Brake Camshaft Diameter	11.957 — 11.984 mm	11.88 mm	4-13
Camshaft Hole Diameter	12.000 — 12.027 mm	12.15 mm	4-14

Items (Chassis)	Standard	Service Limit	See Table
Front Fork:			
Fork Oil:			
Oil Type	SAE5W20	— — —	2-10
Oil Capacity	83 — 91 cc	— — —	2-10
Oil Level	429 — 433 mm	— — —	2-10
Fork Spring Length	358 mm	351 mm	4-15
Swing Arm, Uni-trak			
Sleeve Diameter:			
Swing Arm	16.982 — 17.000 mm	16.95 mm	4-17
Uni-trak	16.982 — 17.000 mm	16.95 mm	4-18
Bushing Inside Diameter:			
Swing Arm	17.050 — 17.100 mm	17.25 mm	4-17
Rocker Arm	17.022 — 17.097 mm	17.25 mm	4-18
Tie-rod	17.022 — 17.247 mm	17.35 mm	4-18
Pivot Shaft Runout/100 mm	Under 0.2 mm	0.7 mm	4-19

Items (Electrical)	Standard	Service Limit	See Table
Lighting/Charging System:			
AC Lighting Voltage/4,000 rpm	about 6.5 V	— — —	5-2
DC Charing Voltage/4,000 rpm	about 8.0 — 8.5V (Headlight off)	— — —	5-3
DC Charging Amperage/4,000 rpm	about 0.8 — 1.0 A (Headlight off)	— — —	5-4
Lighting Coil Resistance	0.25 — 0.37 Ω, Ⓦ 0.36 — 0.54 Ω	— — —	5-5
Charging Coil Resistance	0.28 — 0.42 Ω, Ⓦ 0.48 — 0.72 Ω	— — —	5-5
Ignition System:			
Ignition Coil Resistance:			
Primary Winding	0.34 — 0.52 Ω	— — —	5-9
Secondary Winding	3.2 — 4.8 kΩ	— — —	5-9
Exciter Coil Resistance	98 — 146 Ω	— — —	5-10
Pickup Coil Resistance	14 — 22 Ω	— — —	5-10

Ⓦ : AR50 for West German model

TORQUE AND LOCKING AGENT

The following table lists the tightening torque for the major bolts and nuts, and the parts requiring use of a non-permanent locking agent or liquid gasket. To retorque fasteners, first loosen each bolt or nut ½ turn, one at a time, and then tighten it to the specified torque. Follow the sequence if specified. For engine fasteners, retorque them when the engine is cold (at room temperature).

NOTE: Marks used in "Remark"

★ : Apply a non-permanent locking agent to the threads

● : Apply a liquid gasket to the washer

Engine Parts	Threads		Quantity	Torque		Remark	See Page
	Dia. (mm)	Pitch (mm)		kg-m	ft-lbs		
Clutch hub bolt	8	1.25	1	2.5	18.0	—	6-13
Clutch spring bolts	5	0.8	6	0.25	22 in-lbs	—	6-13
Cylinder head nuts	8	1.25	4	2.2	16.0	—	6-7
Engine drain plug	10	1.5	1	2.0	14.5	—	2-3
Engine mounting bolts	8	1.25	3	1.9	13.5	—	6-17
Kick guide mounting screws	6	1.0	2	—	—	★	6-16
Magneto flywheel nut	10	1.25	1	3.0	22	—	6-9
Neutral switch	10	1.25	1	1.2	104 in-lbs	—	6-9
Return spring pin	8	1.25	1	—	—	★	6-14
Spark plug	14	1.25	1	2.8	20	—	2-4

Chassis Parts	Threads		Quantity	Torque		Remark	See Page
	Dia. (mm)	Pitch (mm)		kg-m	ft-lbs		
Front axle nut	12	1.25	1	6.5	47	—	7-5
Front fork bottom Allen bolts	10	1.0	2	1.8	13.0	★, ●	7-10
Front fork lower clamp bolts	8	1.25	2	1.8	13.0	—	2-15
Front fork top bolts	22	1.0	2	3.0	22	—	7-10
Rear axle nut	12	1.25	1	6.5	47	—	2-8
Rear shock absorber nuts	10	1.25	2	3.3	24	—	7-17
Rear sprocket bolts	8	1.25	4	2.1	15.0	—	7-15
Steering stem head bolt	10	1.25	1	2.0	14.5	—	2-15
Steering stem locknut	25	1.0	1	2.0	14.5	—	2-15
Swing arm pivot shaft nut	10	1.25	1	4.0	29	—	7-17
Uni-trak rocker arm/tie rod nuts	10	1.25	4	3.3	24	—	7-17

Brake Parts	Threads		Quantity	Torque		Remark	See Page
	Dia. (mm)	Pitch (mm)		kg-m	ft-lbs		
Brake disc mounting bolts	8	1.25	5	2.1	15	—	7-6
Brake hose banjo (fitting) bolts	10	1.25	2	3.0	22	—	7-6
Brake lever pivot locknut	6	1.0	1	0.60	52 in-lbs	—	7-9
Brake pedal pivot nut	12	1.25	1	3.3	24	—	2-21
Caliper mounting bolts	8	1.25	2	2.3	16.5	—	7-6
Master cylinder clamp bolts	6	1.0	2	0.90	78 in-lbs	—	7-8
Torque link nuts							
Front	10	1.25	1	3.3	24	—	7-17
Rear	10	1.25	1	3.0	22	—	2-8

The table below, relating tightening torque to thread diameter and pitch, lists the basic torque for the bolts and nuts used on Kawasaki Motorcycles. However, the actual torque that is necessary may vary amount bolts and nuts with the same thread diameter and pitch. The bolts and nuts listed on Pg. 1-11 – 1-12 vary to a greater or lesser extent from what is given in this table. Refer to this table for only the bolts and nuts not included in the table on Pg. 1-11 – 1-12. All of the values are for use with dry solvent-cleaned threads.

Coarse threads

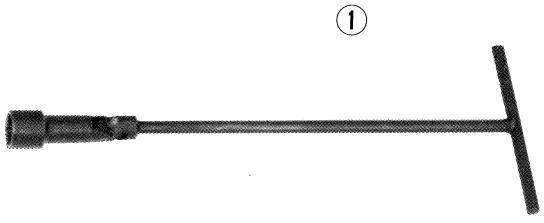
Threads		Torque	
dia. (mm)	pitch (mm)	kg-m	ft-lbs
5	0.80	0.35 – 0.50	30 – 43 in-lbs
6	1.00	0.60 – 0.90	52 – 78 in-lbs
8	1.25	1.6 – 2.2	11.5 – 16.0
10	1.50	3.1 – 4.2	22 – 30
12	1.75	5.4 – 7.5	39 – 54
14	2.00	8.3 – 11.5	60 – 83
16	2.00	13.0 – 18.0	94 – 130
18	2.50	18.0 – 25	130 – 181
20	2.50	26 – 35	188 – 253

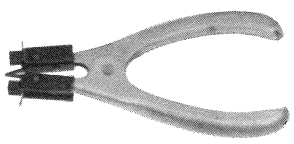
Fine threads

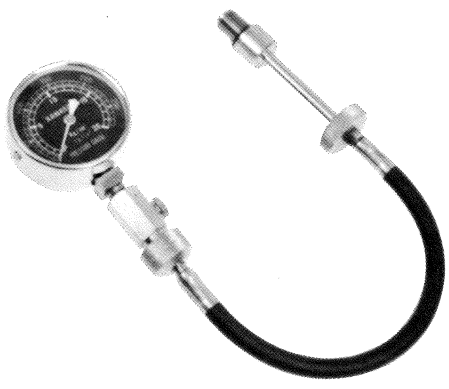
Threads		Torque	
dia. (mm)	pitch (mm)	kg-m	ft-lbs
5	0.50	0.35 – 0.50	30 – 43 in-lbs
6	0.75	0.60 – 0.80	52 – 69 in-lbs
8	1.00	1.4 – 1.9	10.0 – 13.5
10	1.25	2.6 – 3.5	19.0 – 25
12	1.50	4.5 – 6.2	33 – 45
14	1.50	7.4 – 10.2	54 – 74
16	1.50	11.5 – 16.0	83 – 116
18	1.50	17.0 – 23	123 – 166
20	1.50	23 – 33	166 – 239

SPECIAL TOOLS

Ref. No.	Part No.	Description	Quantity
1	57001-110	Spark Plug Wrench	1
2	57001-115	Piston Ring Pliers	
3	57001-221,1159	Compression Gauge Assy	1 set
4	57001-137	Stem Bearing Driver	1
5	57001-156	Crankcase Splitting Tool Adapter (included in 57001-1098)	(2)
6	57001-158	Bearing Puller	1 set
7	57001-183	Front Fork Cylinder Holder Handle	1
8	57001-194	Front Fork Oil Seal Driver	1
9	57001-252	Magneto Flywheel Puller	1
10	57001-263	Oil Seal Guide	1
11	57001-264	Oil Seal Guide	1
12	57001-306	Magneto Flywheel Holder	1
13	57001-317	Bearing Puller Adapter	1
14	57001-402	TDC Finder	1 set
15	57001-980	Electrotester	1
16	57001-983	Hand Tester	1
17	57001-1011	Front Fork Cylinder Holder Adapter	1
18	57001-1015	Gear Holder	1
19	57001-1017	Fuel Level Gauge	1
20	57001-1063	Rim Protectors	1 set
21	57001-1073	Tire Irons	1 set
22	57001-1098	Crankcase Splitting Tool	1 set
23	57001-1100	Stem Nut Wrench	1
24	57001-1129	Bearing Driver Set	1 set
25	57001-1158	Gear puller	1
26	57001-1303	Electrotester Adapter	1







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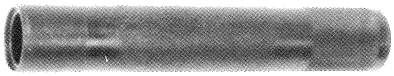

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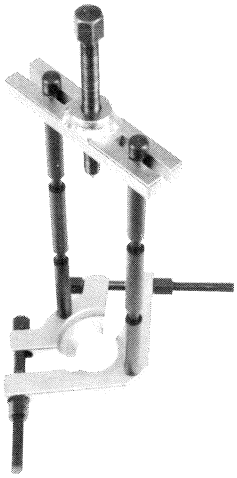

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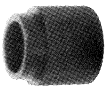

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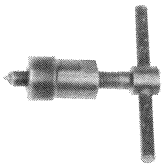

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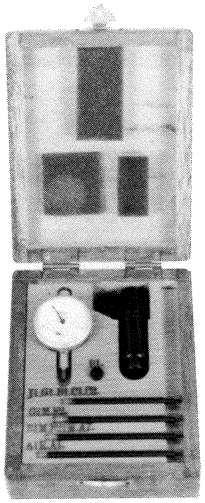

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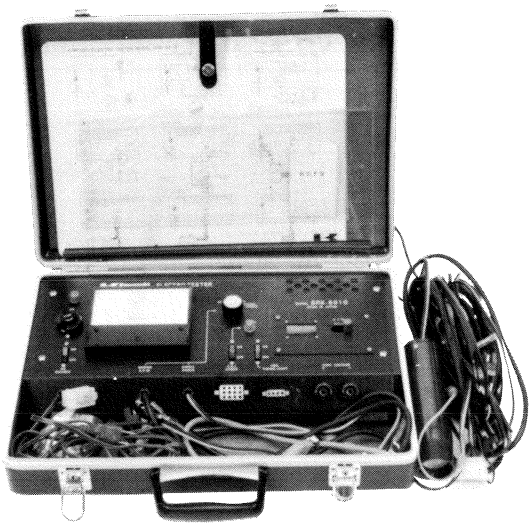

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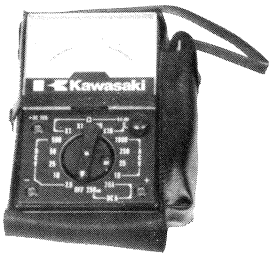

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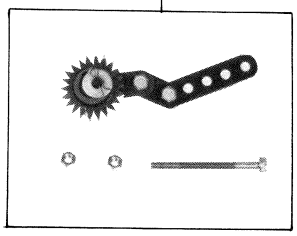

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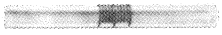

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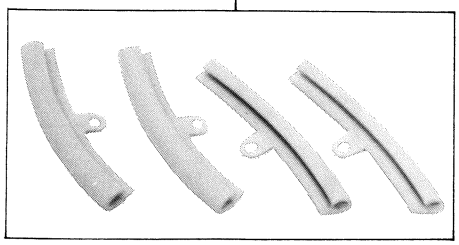

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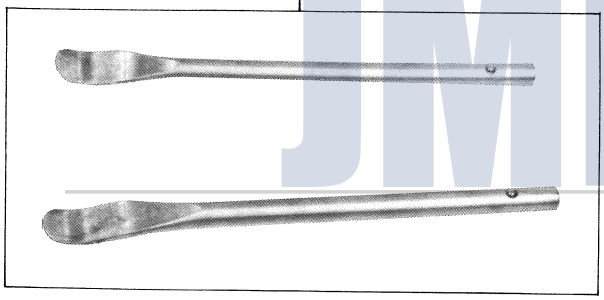

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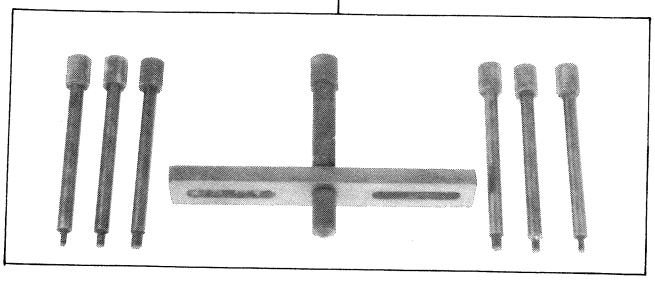

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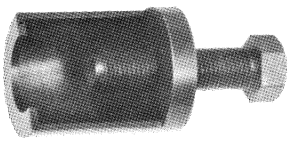

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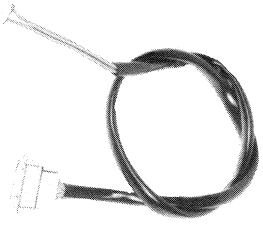
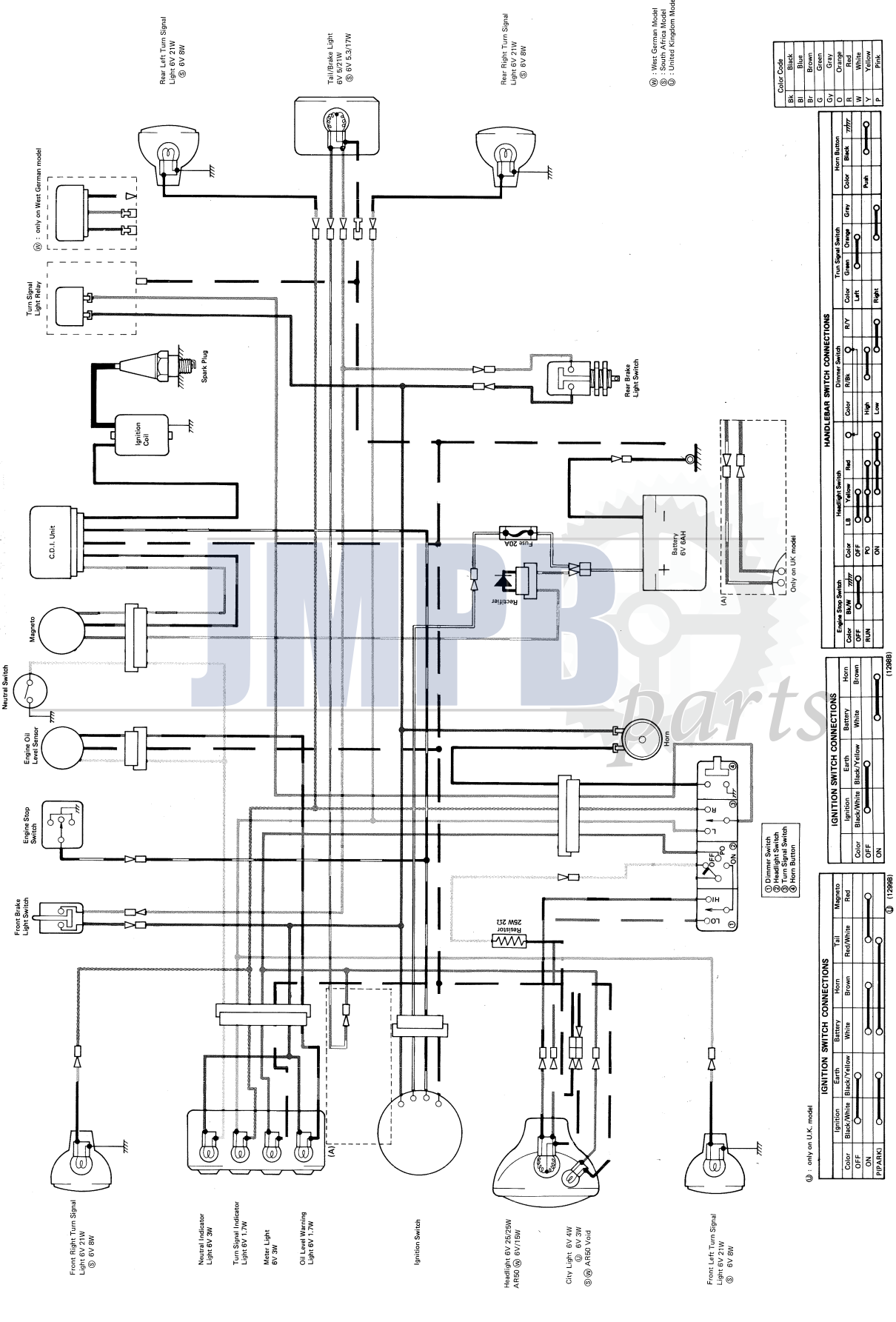


WIRING DIAGRAM

AR50, 80-A1 Wiring Diagram:



Color Code

Bk	Black
Bl	Blue
Br	Brown
G	Green
Gy	Gray
O	Orange
R	Red
W	White
Y	Yellow
P	Pink

HANDLEBAR SWITCH CONNECTIONS

Engine Stop Switch		Headlight Switch				Dimmer Switch			Turn Signal Switch				Horn Button	
Color	Bk/W	Color	LB	Yellow	Red	Color	R/Bk	R/Y	Color	Left	Color	Orange	Color	Black
OFF		OFF									Green			
RUN		PO				High							Push	
		ON				Low			Right					

IGNITION SWITCH CONNECTIONS

	Ignition	Earth	Battery	Horn
Color	Black/White	Black/Yellow	White	Brown
OFF				
PO				
ON				

(12988)

IGNITION SWITCH CONNECTIONS

	Ignition	Earth	Battery	Horn	Tail	Magneto
Color	Black/White	Black/Yellow	White	Brown	Red/White	Red
OFF						
ON						
P(PARK)						

Ⓤ : only on U.K. model

Ⓤ (12998)

① Dimmer Switch
② Headlight Switch
③ Turn Signal Switch
④ Horn Button

Scheduled Maintenance

Table of Contents

2

PERIODIC MAINTENANCE CHART (81, 82 model)

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

OPERATION \ FREQUENCY	Whichever comes first → Every	*ODOMETER READING 800 km	4,000 km	8,000 km	12,000 km	16,000 km	20,000 km	24,000 km	See Page
Idle speed—check †		•	•	•	•	•	•	•	2-6, 9-5
Throttle grip play—check †		•	•	•	•	•	•	•	2-4
Oil pump and carburetor synchronization—check †		•	•	•	•	•	•	•	2-5, 9-4
Spark plug—clean and gap †		•	•	•	•	•	•	•	2-3, 9-4
Air cleaner element—clean			•		•		•		2-4
Air cleaner element—replace	5 cleanings			•		•		•	2-4
Fuel system—clean				•		•		•	2-18
Cylinder head nuts—check †		•		•		•		•	6-7
Battery electrolyte level—check †	month	•	•	•	•	•	•	•	2-17
Brake play—check †		•	•	•	•	•	•	•	2-9
Brake light switch—check †		•	•	•	•	•	•	•	2-13
Brake lining wear—check †			•	•	•	•	•	•	2-10,2-11
Brake fluid level—check †	month	•	•	•	•	•	•	•	2-11
Brake fluid—change	year			•		•		•	2-11
Clutch—adjust		•	•	•	•	•	•	•	2-6
Steering play—check †		•	•	•	•	•	•	•	2-14
Drive chain wear—check †			•	•	•	•	•	•	2-7
Front fork oil seal—clean			•	•	•	•	•	•	2-15
Nuts, bolts, fasteners—check †		•		•		•		•	1-11,2-21
Tire wear—check †			•	•	•	•	•	•	2-16
Transmission oil change	year	•	•	•	•	•	•	•	2-3
General lubrication—perform			•	•	•	•	•	•	2-18
Front fork oil—change				•		•		•	2-16
Swing arm and uni-trak—lubricate				•		•		•	2-17
Brake camshaft—lubricate	2 years					•			2-13
Wheel bearing lubricate	2 years					•			2-16
Speedometer gear—lubricate	2 years					•			2-16
Steering stem bearing—lubricate	2 years								2-15
Master cylinder cup and dust seal—replace	2 years								2-13
Caliper piston seal and dust seal—replace	2 years								2-13
Brake hose—replace	4 years								2-13
Fuel hose—replace	4 years								2-18
Drive chain—lubricate	Every 300 km								2-9
Drive chain slack—check †	Every 800 km								2-7

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

TRANSMISSION OIL

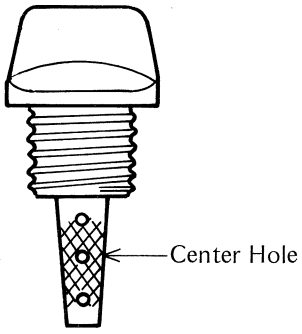
In order for the transmission and clutch to function properly, always maintain the transmission oil at the proper level and change the oil in accordance with the Periodic Maintenance Chart.

WARNING **1. Motorcycle operation with insufficient, deteriorated, or contaminated transmission oil will cause accelerated wear and may result in transmission seizure, accident, and injury.**

Oil Level Inspection

- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- If the oil has been poured in since the motorcycle was last used, kick the engine over 3 or 4 times with the ignition switch left in the OFF position. This ensures that the oil will "settle".
- Situate the motorcycle so that it is perpendicular to the ground.
- Remove the oil filler opening plug dipstick, and wipe off any oil on the end.
- Insert the dipstick back through the oil filler opening and screw it in all the way. Then unscrew it and pull it out to read it. The oil level should be at the center dipstick hole.

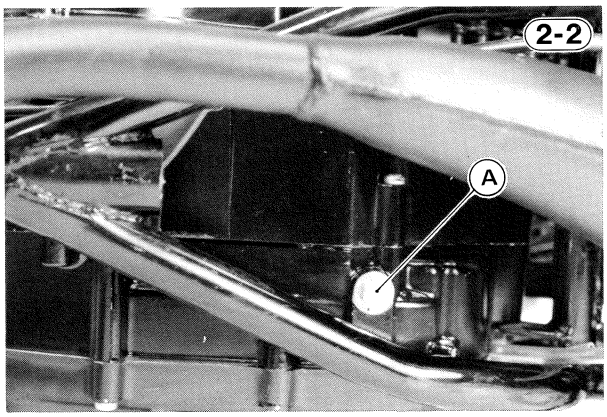
Dipstick (2-1)



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

Oil Change

- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.
- Place an oil pan beneath the engine.
- Remove the engine drain plug.



A. Engine Drain Plug

- With the motorcycle perpendicular to the ground, let the oil completely drain.
- After the oil has completely drained, install the drain plug with its gasket. Proper torque for it is shown in the table.

NOTE: 1. Replace the damaged gasket with a new one.

- Fill the engine up to the upper level with a motor oil specified in the table.
- Check the oil level.

Table 2-1 Tightening Torque

Engine Drain Plug	2.0 kg-m (14.5 ft-lbs)

Table 2-2 Transmission Oil

Grade	SE class
Viscosity	SAE 10W30 or 10W40
Capacity	0.6 litter

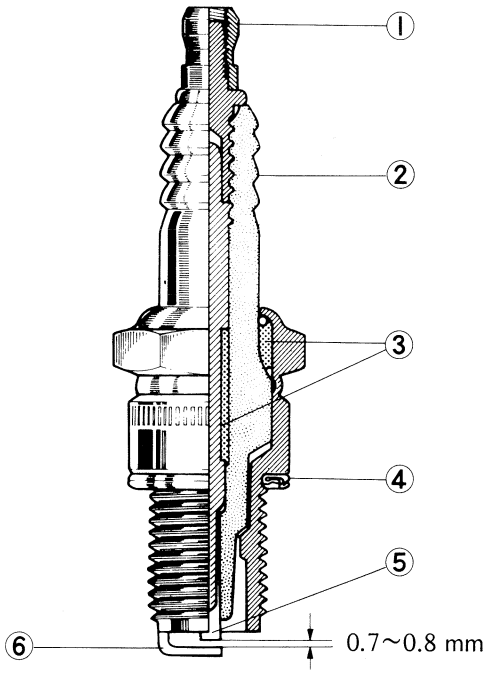
SPARK PLUG

The standard spark plug is shown in the table. The spark plug should be taken out periodically in accordance with the Periodic Maintenance Chart for cleaning, inspection, and resetting of the plug gap.

Maintenance

If the plug is oily or has carbon built up on it, have it cleaned, 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. Measure the gap with a wire-type thickness gauge, and adjust the gap if incorrect by bending the outer electrode. 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.

Spark Plug (2-3)



1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center Electrode
6. Side Electrode

Table 2-3 Spark Plug

	AR50	AR80
Standard Plug	NGK B6ES	NGK BP7ES Ⓤ NGK BP8ES
Plug Gap	0.7 – 0.8 mm	
Tightening Torque	2.8 kg-m (20 ft-lbs)	

Ⓤ: UK model

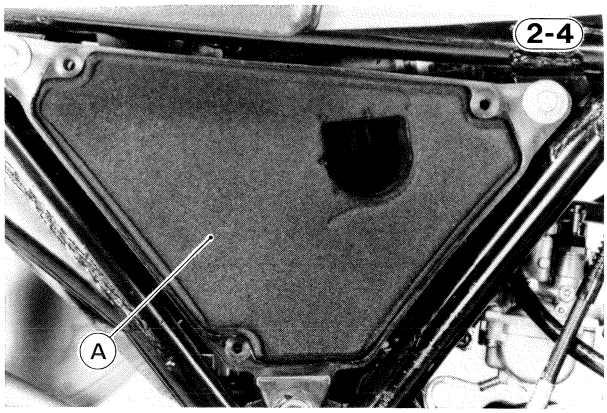
AIR CLEANER

A clogged air cleaner restricts the engine's air intake, increasing fuel consumption, reducing engine power, and causing spark plug fouling.

The air cleaner element must be cleaned and replaced in accordance with the Periodic Maintenance Chart. In dusty areas, the element should be cleaned more frequently than the recommended interval. After riding through rain or on muddy roads, the element should be cleaned immediately. The element should be replaced if it is damaged.

Element Cleaning

●Clean the element in a bath of a high flash-point solvent, and squeeze it dry.



A. Element

●After cleaning, saturate the element with SE class SAE 30 oil, squeeze out the excess, then wrap it in a clean rag and squeeze it dry as possible. Be careful not to tear the element.

CAUTION

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

2. Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.

3. A break in the element material will allow dirt and dust to pass through into the carburetor and eventually damage the engine. If any part of the element is damaged, the element must be replaced.

Replacement

●Replace the air cleaner element with a new one in accordance with the Periodic Maintenance Chart.

THROTTLE CONTROL CABLE

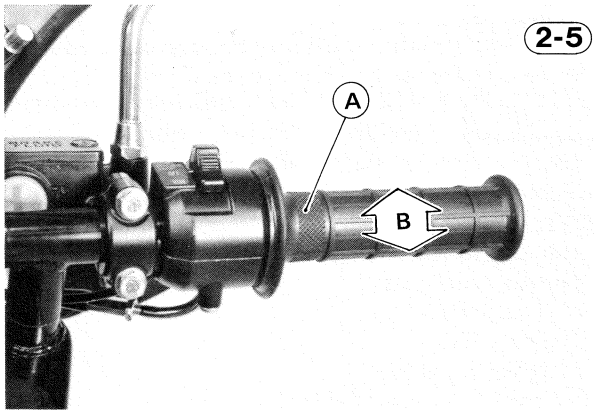
The throttle control cable is actually an assembly of three cables: the throttle cable, the carburetor cable, and the oil pump cable. The throttle cable runs from the throttle grip to the cable assembly junction where it connects to both the carburetor cable which leads to the carburetor, and the oil pump cable which leads to the oil pump.

Cable stretch will cause delayed engine response and upset the oil pump synchronization, necessitating periodic adjustment. To compensate for cable stretch, adjust the throttle cable and the oil pump cable in accordance with the Periodic Maintenance Chart.

Throttle Cable:

Inspection

- Check to see that the outer cable ends of the throttle and carburetor cables are fully seated in each cable adjuster or adjusting nut.
- Check the throttle cable play. When lightly turning the throttle grip, the grip should have 2 – 3 mm of play. If the throttle cable has improper play, adjust it.

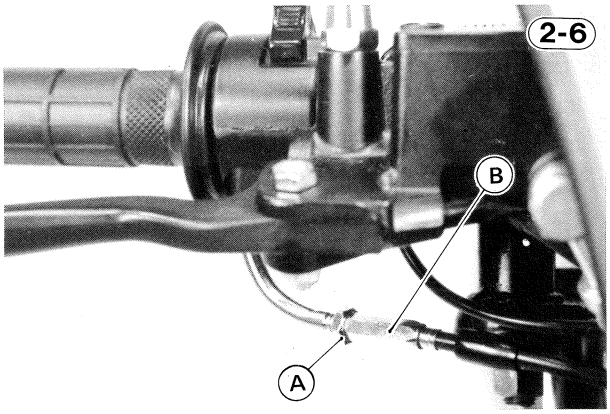


A. Throttle Grip **B. 2 – 3 mm Play**

Adjustment

- 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.

NOTE: 1. If the throttle grip play cannot be adjusted with the adjusting nut at the grip, use the carburetor cable adjuster at the carburetor. After completion of the adjustment, tighten the locknut.



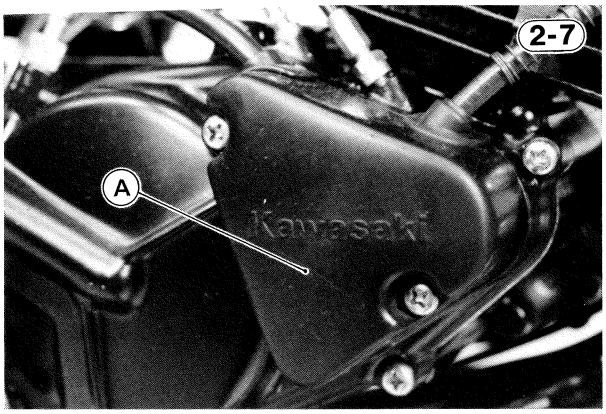
A. Locknut **B. Adjusting Nut**

- Check the oil pump cable.

Oil Pump Cable:

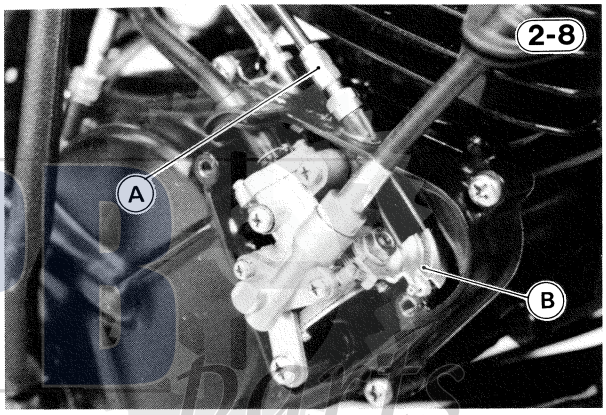
Inspection

- Warm up the engine, and check the engine idling. (See the Carburetor section.)
- Check the throttle cable.
- Remove the screws and oil pump cover.



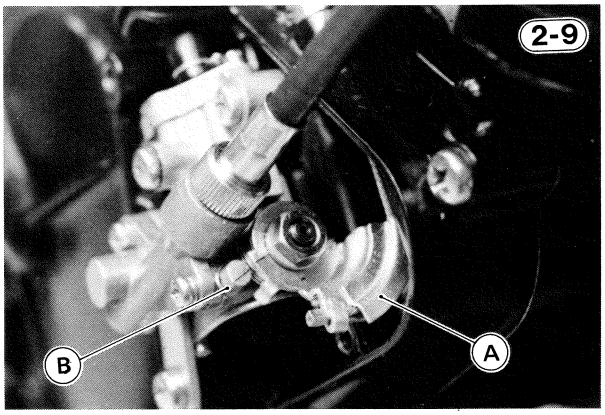
A. Oil Pump Cover

- Check to see that the outer cable end of the oil pump cable is fully seated in the cable adjuster. Make sure the tang on the oil pump lever is bent to hold the oil pump inner cable securely.



A. Cable Adjuster **B. Oil Pump Lever**

- Check the synchronization between the carburetor and the oil pump while idling the engine. Listening to exhaust noise, gradually open the throttle grip, and stop turning the grip at the point where the engine speed just begins to increase from the idle speed.
- Without changing the position of the throttle grip, check whether or not the mark on the oil pump lever lines up with the mark on the lever stop.



A. Oil Pump Lever **B. Lever Stop**

If the oil pump does not synchronize with the carburetor, adjust it.

Adjustment

- Start the engine.
- Loosen the locknut at the oil pump cable adjuster, and turn the adjuster so that the marks on the pump lever and the lever stop line up when the idle speed is at the point of increasing.
- Tighten the locknut.
- Check that the throttle grip has the proper amount of play.
- Install the oil pump cover.

CARBURETOR

The following procedure covers the idling adjustment, which should be inspected during periodic maintenance or whenever the idling setting has been disturbed.

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.

Idle Speed:

Inspection

- Thoroughly warm up the engine.
- Check that the idle speed is within the specified range.

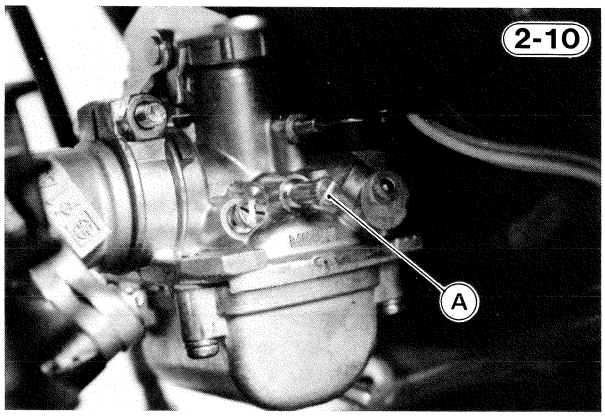
Table 2-4 Idle Speed

1,200 – 1,300 rpm

★If the idle speed is out of the specified range, adjust it as follows.

Adjustment

- Turn the idle adjusting screw to adjust the idle speed.



A. Idle Adjusting Screw

NOTE: 1. If the idle speed cannot be lowered by turning the idle adjusting screw, there may be no play in the carburetor cable. Loosen the locknut on the carburetor cap, and turn the cable adjuster into the cap as necessary. Tighten the locknut. In this case, be sure to adjust the throttle control cable later.

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

NOTE: 1. With the engine idling, turn the handlebar to either side. If handlebar movement changes idle speed, the throttle control cable may be improperly adjusted or incorrectly routed, or it may be damaged.

WARNING

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

- Adjust the throttle control cable (Pg. 2-4).

NOTE: 1. If proper idle speed cannot be obtained by this adjustment alone, first check the following and correct as necessary.

Transmission Oil
Spark Plug
Ignition Timing
Throttle Control Cable
Cylinder Compression
Air Cleaner Element
Air Cleaner Duct and Carburetor Holder Leakage
Reed Valve

CLUTCH

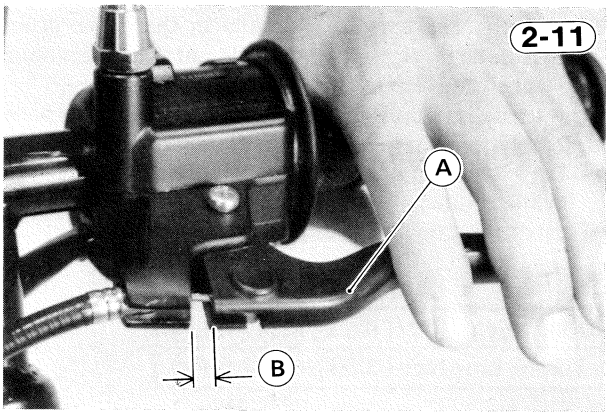
Due to the friction plate wear and the clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

WARNING

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

Inspection

●Check that the clutch lever has 2 – 3 mm of play as shown in the figure.

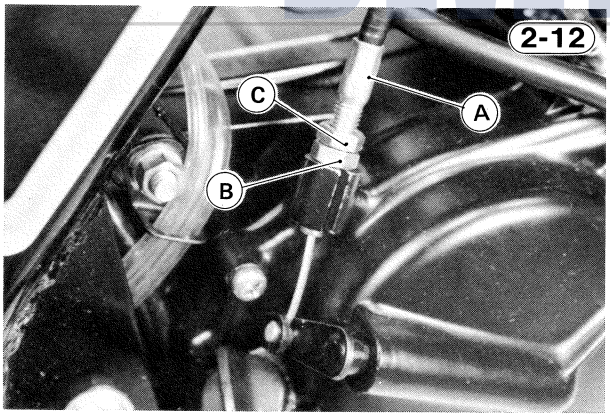


A. Clutch Lever **B. 2 – 3 mm**

★If the check reveals improper adjustment, adjust the clutch.

Adjustment

●Loosen the locknut, and turn the adjusting nut at the lower end of the clutch cable so that the clutch lever has 2 – 3 mm of play.



A. Clutch Cable **B. Adjusting Nut**
C. Locknut

●Tighten the locknut.

WARNING

1. Be sure each end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement, resulting in a hazardous riding condition.

●After the adjustment is made, start the engine and check that the clutch does not slip and that it releases properly.

DRIVE CHAIN

The drive chain must be checked, adjusted, and lubricated in accordance with the Periodic Maintenance Chart for safety and to prevent excessive wear. Lubrication is also necessary after riding through rain or on wet roads, or any time that the chain appears dry. If the chain becomes badly worn or maladjusted – either too loose or too tight – the chain could jump off the sprockets or break.

WARNING

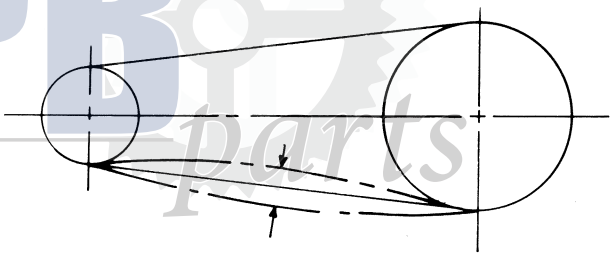
1. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.

Slack Inspection

●Set the motorcycle up on its side stand.

●Rotate the rear wheel to find the position where the chain is tightest, and measure the vertical movement midway between the sprockets.

Chain Slack **2-13**



★If the drive chain is too tight or too loose, adjust it so that the chain slack will be within the standard value.

Table 2-5 Drive Chain Slack

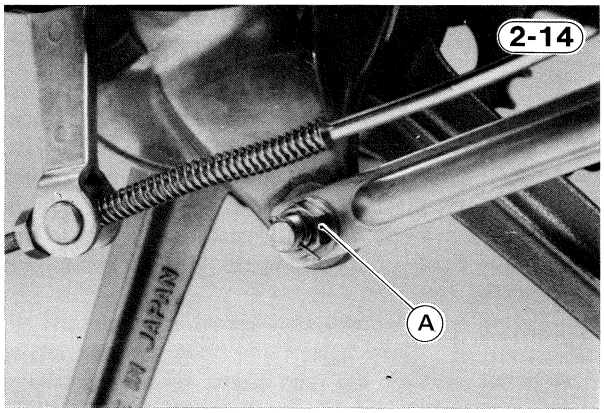
Standard	30 – 35 mm
Too tight or too loose	less than 30 mm more than 40 mm

Slack Adjustment

●Loosen the rear torque link nut (Fig. 2-14).

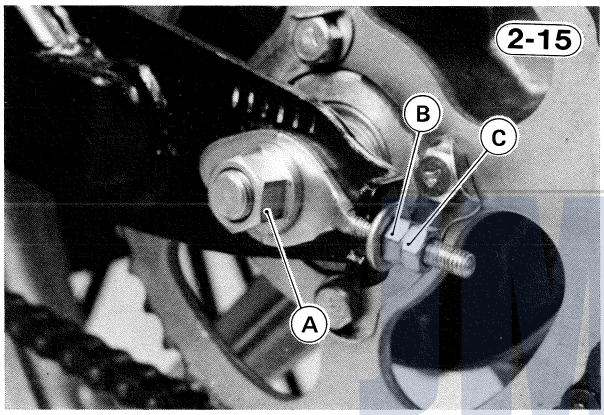
CAUTION

1. Do not forget to loosen the torque link nut.



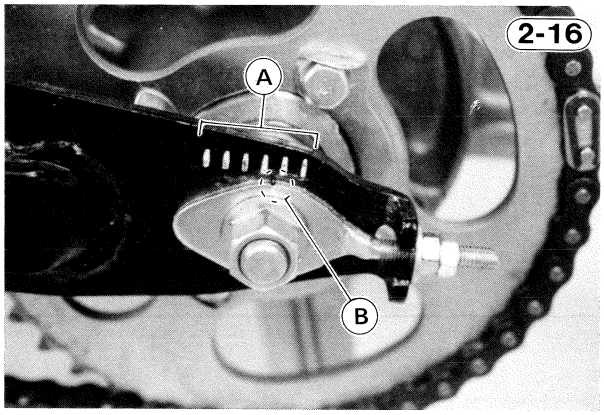
A. Torque Link Nut

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



A. Axle Nut **B. Adjusting Nut** **C. Locknut**

- If the chain is too tight, back out the left and right chain adjusting nuts evenly, and kick the wheel forward until the chain is too loose.
- Turn both chain adjusting nuts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly 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. Alignment Marks **B. Notch**

NOTE: 1. Wheel alignment can also be checked using the straightedge or string method.

WARNING **1. Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition.**

- Tighten both chain adjuster locknuts.
- Center the brake panel assembly in the brake drum. This is done by tightening the axle nut lightly, spinning the wheel, and depress the brake pedal forcefully. The partially tightened axle nut allows the brake panel assembly to center itself within the brake drum.

NOTE: 1. This procedure can prevent a soft, or "spongy feeling" brake.

- Tighten the axle nut to the specified torque.

Table 2-6 Tightening Torque

Axle Nut	6.5 kg-m (47 ft-lbs)
Torque Link Nut	3.0 kg-m (22 ft-lbs)

- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Tighten the rear torque link nut to the specified torque.

WARNING **1. If the axle and torque link nuts are not securely tightened and the cotter pin and safety clip are not installed, an unsafe riding condition may result.**

- Check the rear brake. (See the Brakes section.)

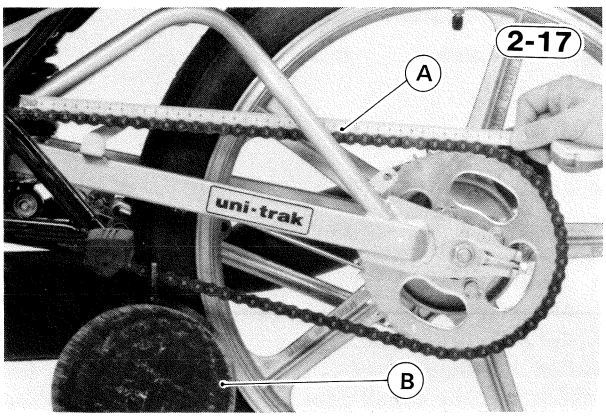
Wear Inspection

- Stretch the chain taut either by using the chain adjuster, or by hanging a 10 kg weight on the chain.
- Measure the length of 20 links on a straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the drive chain may wear unevenly, take measurements at several places.
- ★If any measurement exceeds the service limit, replace the chain. Also, replace the engine and rear sprockets when the drive chain is replaced.

WARNING **1. For safety, use only the standard chain.**

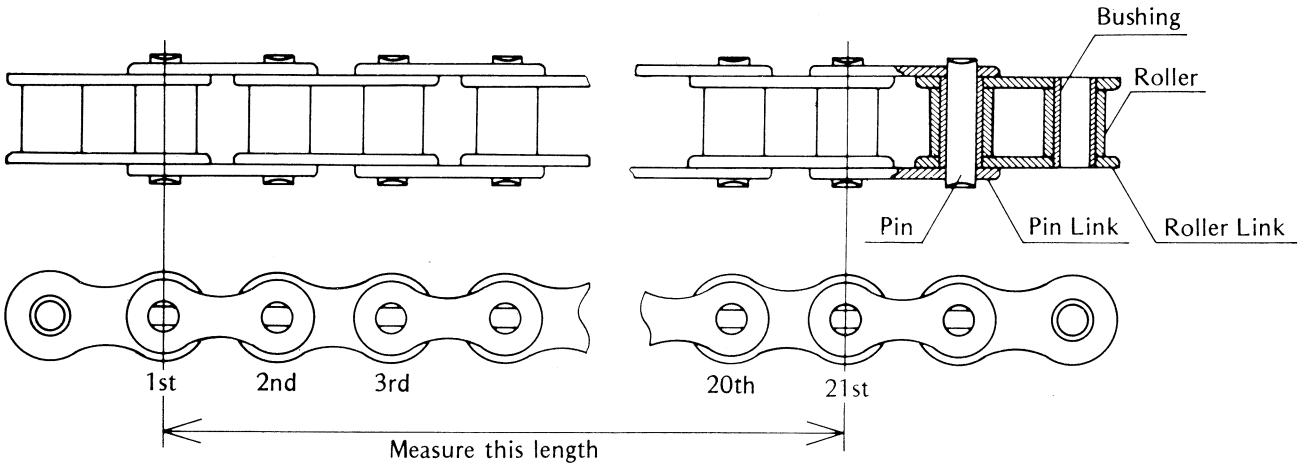
Table 2-7 Drive Chain 20-link Length

Standard	Service Limit
254.0 – 254.5 mm	259 mm



A. Measure **B. Weight**

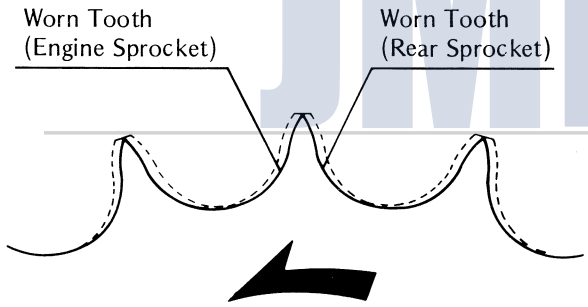
Drive Chain (2-18)



- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loosen pins and links.
- Also, inspect the sprockets for unevenly or excessively worn teeth, and damaged teeth.

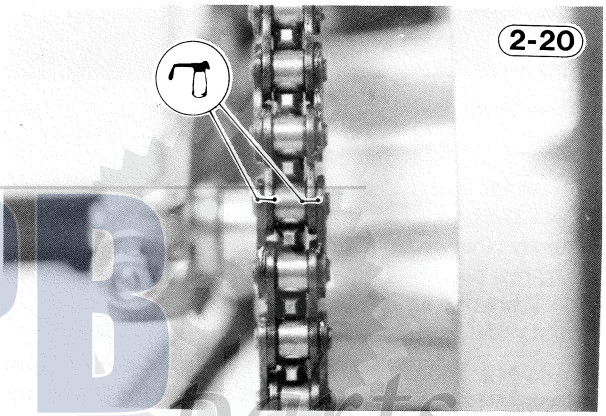
NOTE: 1. Sprocket wear is exaggerated for illustration.

Sprocket Wear (2-19)



Direction of rotation

★If there is any irregularity, replace the drive chain and both sprockets.



★If the chain is especially dirty, it should be washed in Diesel oil or kerosene, and afterward soaked in a heavy oil. Shake the chain while it is in the oil so that oil will penetrate to the inside of each roller.

Lubrication

The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication. If a special lubricant is not avaiable, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.

- Apply the oil to the sides of the rollers and between the side plates of the links so that oil will penetrate to the rollers and bushings where most wear takes place. Wipe off any excess oil.

BRAKES

Brake Play:

Front Brake:

Disc and disc pad wear is automatically compensated for and has no effect on the brake lever action. So there are no parts that require periodic adjustment on the front brake.

WARNING

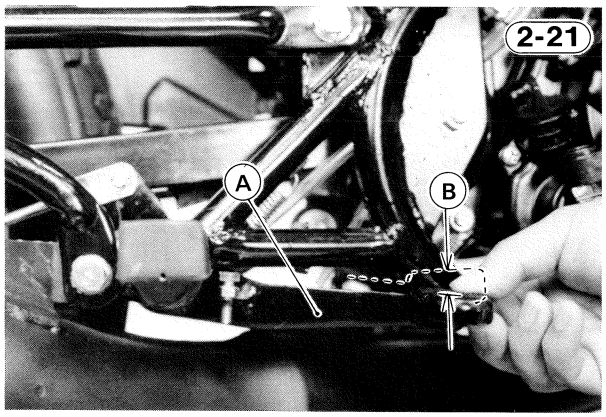
1. If the brake lever has a soft or "spongy feeling" when it is applied, there might be air in the brake lines or the brake may be defective. Since it is dangerous to operate the motorcycle under such conditions, bleed the air from the brake line immediately.

Rear Brake:

In accordance with the Periodic Maintenance Chart, inspect the brake pedal play.

Pedal Play Inspection

●The brake pedal should have 20 – 30 mm of play when the pedal is pushed down lightly by hand.



A. Rear Brake Pedal B. 20 – 30 mm

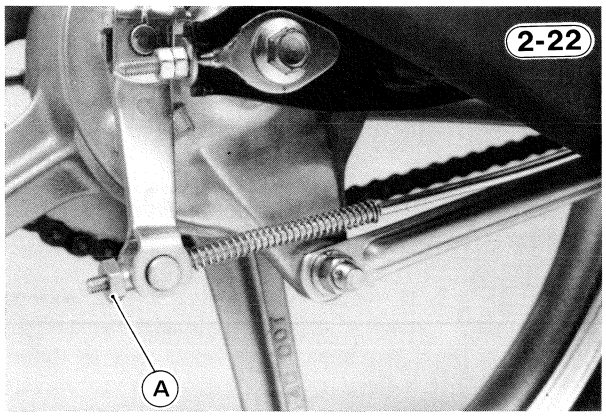
●Rotate the wheel to check for brake drag.
●Check the brake cam lever angle.
●Operate the pedal a few times to see that it returns to its rest position immediately upon release.
●Check braking effectiveness.
●If the pedal has improper play, adjust it.

WARNING

1. If brake drag is detected during brake adjustment, disassemble the brake, and inspect for wear or damage. Also, if the brake pedal does not return to its rest position quickly upon release, inspect the brake for wear or damage. If the brake has a soft, or "spongy feeling", make sure the brake panel is properly centered (See the Drive Chain Adjustment section).

Pedal Play Adjustment

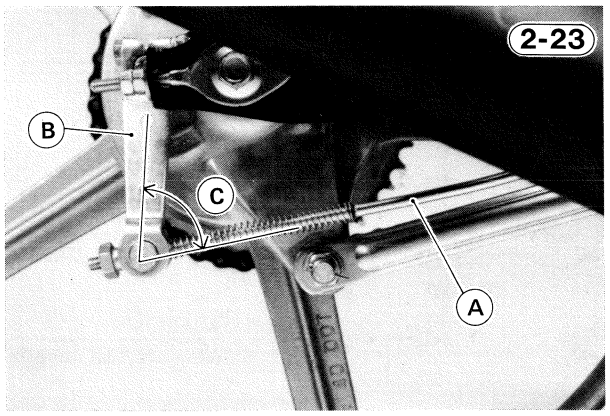
●Turn the adjusting nut at the brake cam lever so that the pedal has 20 – 30 mm of play



A. Adjusting Nut

Cam Lever Angle Inspection

●The brake cam lever should come to an 80 – 90° angle with the brake rod when the brake is fully applied.



A. Brake Rod B. Cam Lever C. 80 – 90°

★If it does not, adjust the brake cam lever angle.

Cam Lever Angle Adjustment

●Remove the bolt and take off the cam lever.
●Mount the cam lever at a new position, so that the cam lever comes to an 80 – 90° angle with the brake rod when the brake is fully applied.

WARNING

1. Since a cam lever angle greater than 90° reduces braking effectiveness, this adjustment should not be neglected. When remounting the cam, be sure that the position of the indicator on the serrated shaft is not altered. A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper pedal operation, taking particular note of the brake lining wear indicator position. In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts could cause the brake to lock or fail.

Brake Wear:

In accordance with the Periodic Maintenance Chart, inspect the brakes for wear.

Front Disc Brake:

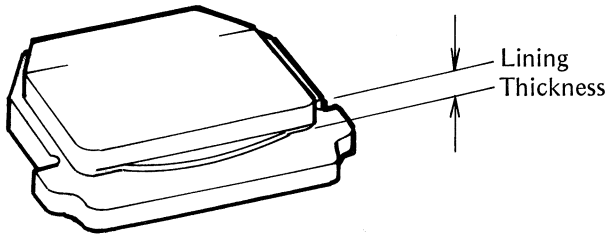
Inspection

●Check the lining thickness of the pads in each caliper.
★If the lining thickness of either pads is less than the service limit, replace both pads in the caliper as a set.

Table 2-8 Pad Lining Thickness

Standard	Service Limit
3.7 mm	1 mm

Brake Pad (2-24)

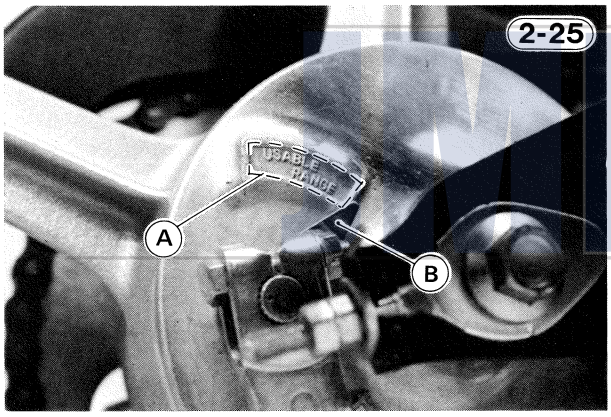


Drum Brake:

Inspection

●Check the brake lining wear indicator points within the USABLE RANGE when the brake is fully applied.

★If does not, the brake shoes must be immediately replaced and the other brake parts examined.



A. USABLE RANGE
B. Brake Lining Wear Indicator

Brake Fluid:

Brake Fluid Level:

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the brake fluid reservoir.

Inspection

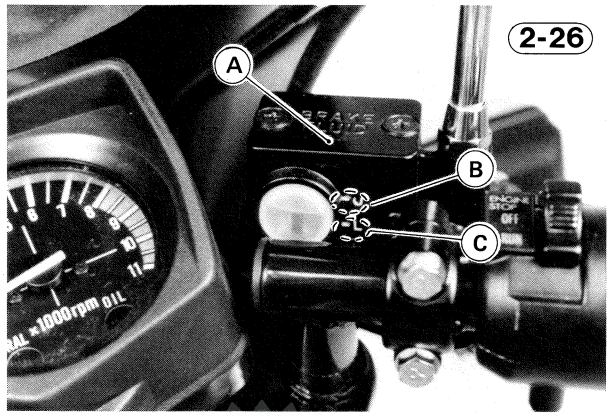
●Check the brake fluid level in the reservoir.

NOTE: 1. Hold the reservoir horizontal when checking brake fluid level.

★The fluid level should be between the upper and lower level lines. If the fluid level is lower than the lower level line, fill the reservoir to the upper level line with the same type and brand of fluid that already is in the reservoir.

NOTE: 1. See the next paragraph for brake fluid requirement.

WARNING **1. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**



A. Front Brake Fluid Reservoir
B. Upper Level Line
C. Lower Level Line

Brake Fluid Change:

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water.

Brake Fluid Requirement:

Recommended fluids are given in the table below. If none of the recommended brake fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.3.

Table 2-9 Recommended Disc Brake Fluid

Type	Brand
D.O.T.3	Atlas Extra Heavy Duty Shell Super Heavy Duty Texaco Super Heavy Duty Wagner Lockheed Heavy Duty Castrol Girling-Green Castrol GT (LMA) Castrol Disc Brake Fluid

Changing Brake Fluid

●Remove the reservoir cap, and remove the rubber cap on the bleed valve.

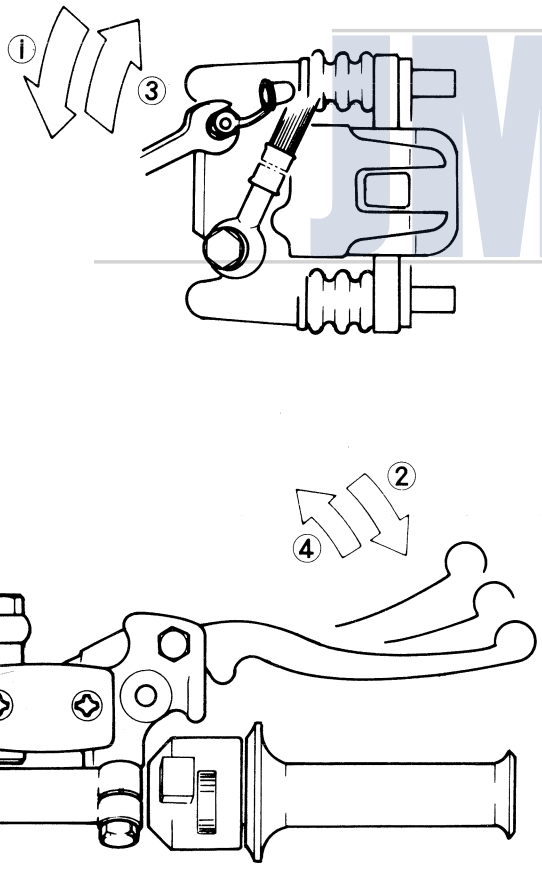
●Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.

●Open the bleed valve (counterclockwise to open), and pump the brake lever until all the fluid is drained from the line.

WARNING **When working with the disc brake, observe the precautions listed below.**

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and discs, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually reach and break down the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE.**

Brake Fluid Change (2-27)



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

- Close the bleed valve.
- If a dual disc brake is used, repeat the above 4 steps one more time for the other side.
- Fill the reservoir with fresh brake fluid.
- Open the bleed valve, apply the brake by the brake lever close the valve with the brake held applied, and then quickly release the lever or pedal. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

NOTE: 1. Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.

- Bleed the air from the lines.

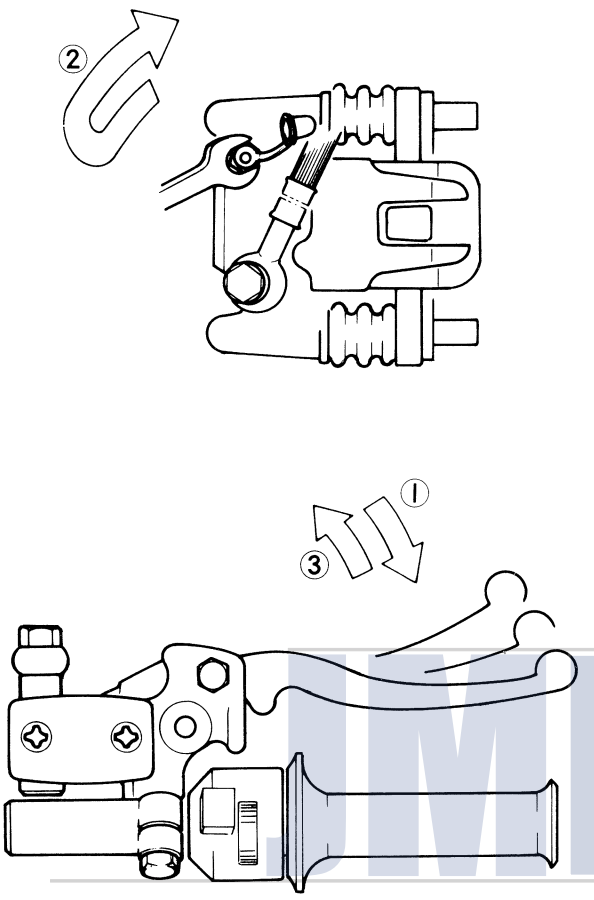
Air Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir.
- With the reservoir cap off, slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.
- Install the reservoir cap, and connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container. Pump the brake lever a few times until it becomes hard and then, holding the lever squeezed or the pedal pushed down, quickly open (turn counterclockwise) and close the bleed valve. Then release the lever. Repeat this operation until no more air can be seen coming out into the plastic hose.

Air Bleeding (2-28)



1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

NOTE: 1. The fluid level must be checked several times during the bleeding operation and replenished as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.

- When air bleeding is finished, install the rubber cap on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir (handlebar turned so that the reservoir is level).
- Apply the brake forcefully for a few seconds, and check for fluid leakage around the fittings.

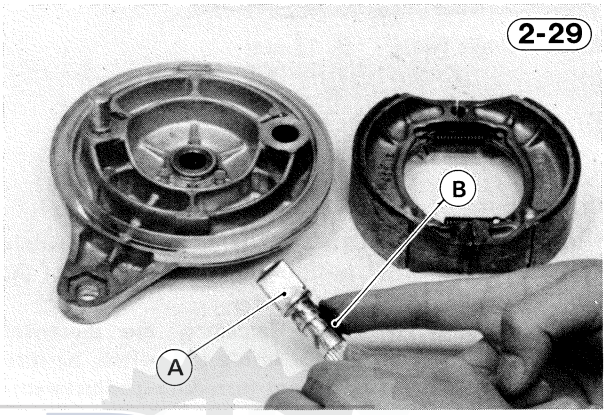
Brake Camshaft:

In accordance with the Periodic Maintenance Chart, the brake camshaft should be lubricated.

Lubrication

- Disassemble the drum brake.
- Using a high flash-point solvent, clean the old grease off the brake camshaft and other pivot points.
- ★Replace the drum brake parts if they show wear or damage.
- Apply grease to the brake pivot points (brake shoe anchor pin, spring ends, and cam surface of the camshaft) and fill the camshaft groove with grease. Do not get any grease on the brake shoe linings, and wipe off any excess grease so that it will not get on the linings or drum after brake assembly.

(2-29)



A. Brake Camshaft **B. Grease**

- Assemble the drum brake.

Rubber Disc Brake Parts:

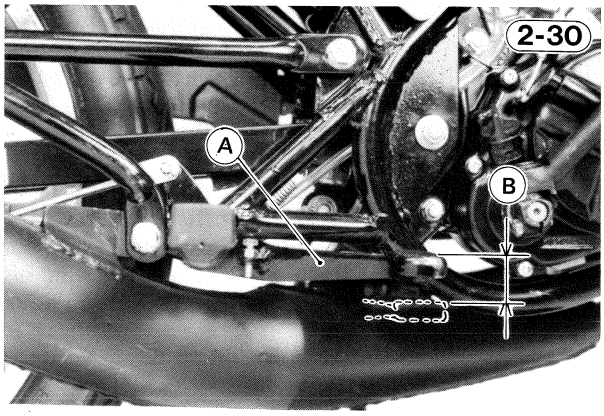
In accordance with the Periodic Maintenance Chart, replace the brake hoses, caliper and master cylinder rubber parts. The removal and installation, disassembly and assembly sequences which need a special care is explained in the "Disassembly" chapter.

BRAKE LIGHT SWITCHES

When either the front or rear brake is applied, the brake light goes on. The front brake light switch requires no adjustment, but the rear brake light switch should be adjusted in accordance with the Periodic Maintenance Chart.

Inspection

- Turn on the ignition switch.
- The brake light should go on when the front brake is applied.
- ★If it does not, inspect the front brake light circuit.
- Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on after about 15 mm of pedal travel (Fig. 2-30).



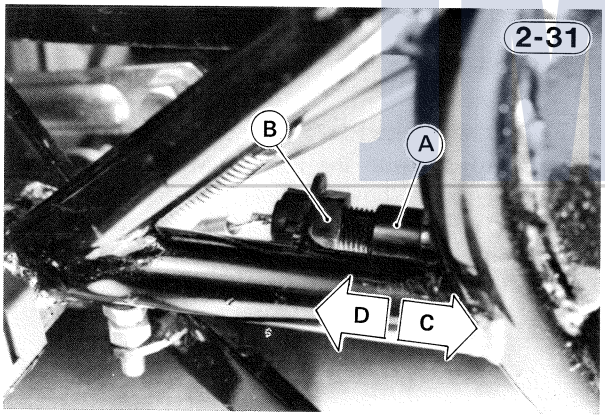
A. Rear Brake Pedal B. 15 mm

★If it does not, adjust the rear brake light switch.

Adjustment

●Adjust the rear brake light switch by moving the switch. To change the switch position, alter the position of the adjusting nut.

CAUTION **1. To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.**



A. Rear Brake Light Switch
B. Adjusting Nut
C. Light sooner
D. Light later

STEERING

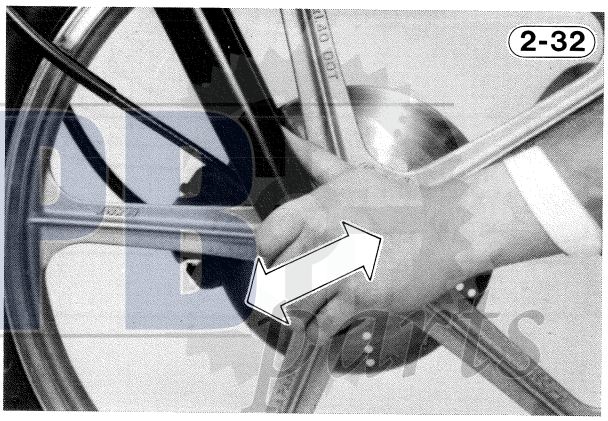
For safety, the steering should always be kept adjusted so that the handlebar will turn freely but have no play.

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

Inspection

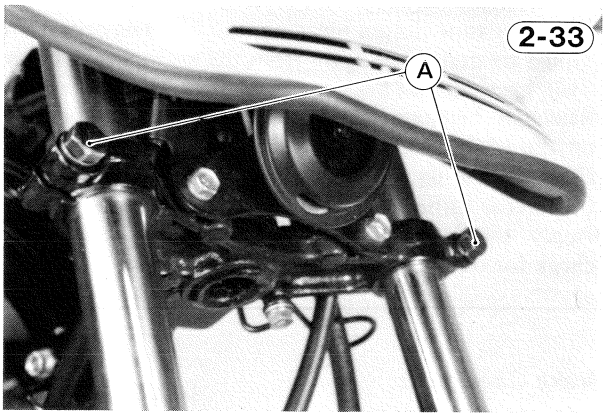
The steering should be checked in accordance with the Periodic Maintenance Chart.

●Raise the front wheel off the ground.
●Push the handlebar lightly to either side.
★If it continues moving under its own momentum, the steering is not too tight.
★If the handlebar jerks or catches when turned, the steering is too tight, necessitating adjustment.
●Squatting in front of the motorcycle, grasp the lower ends of the front fork at the axle, and push and pull the front fork end back and forth.
★If play is felt, the steering is too loose, necessitating adjustment.



Adjustment

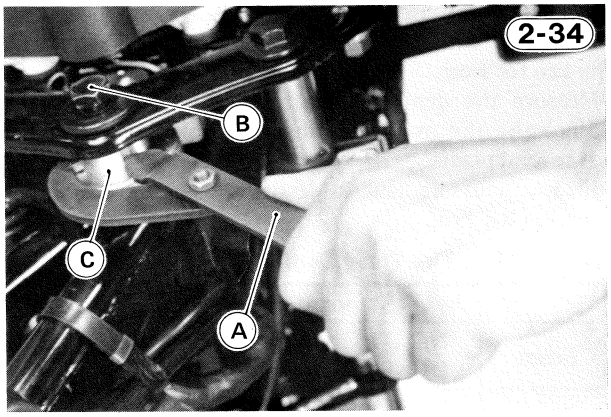
●Raise the front wheel off the ground.
●Remove the fuel tank to avoid damaging the painted surface.
●Loosen the front fork lower clamp bolts (2) to free the fork tubes from the steering stem during adjustment.



A. Front Fork Lower Clamp Bolts

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

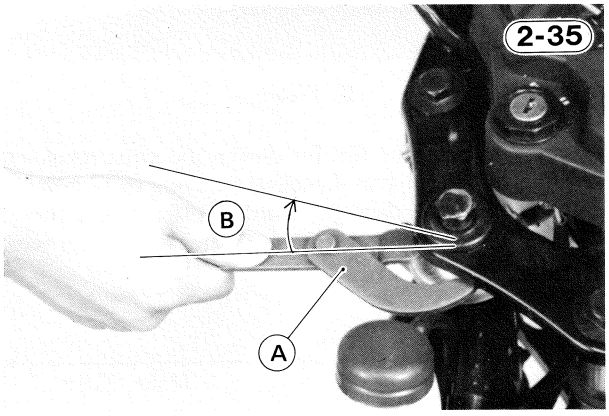
NOTE: 1. Do not back out the steering stem locknut more than a couple of turns. If the locknut is backed off too far, the bearing balls in the steering stem may fall out of place. This will necessitate steering stem removal and installation.



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

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

NOTE: 1. If a suitable torque wrench is not available, tighten the steering stem locknut lightly (until it just becomes hard to turn), and then continue for another 1/16 turn (about 20° travel) from that point.

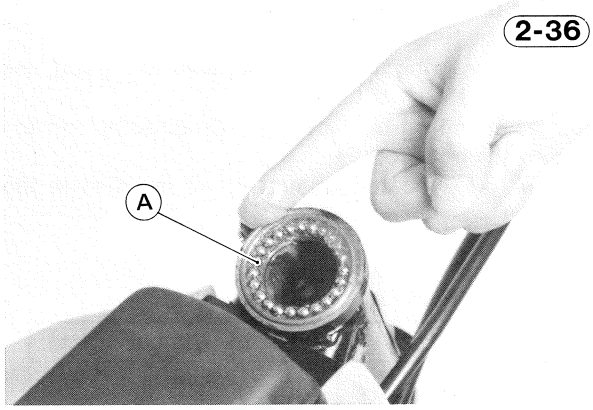


A. Stem Nut Wrench: 57001-1100
B. Another 1/16 Turn

●Tighten the steering stem head bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
●Tighten the front fork lower clamp bolts (2) to 1.8 kg-m (13.0 ft-lbs) of torque.
●Check the steering again. If the steering is too tight or too loose in spite of correct adjustment, inspect the steering stem parts according to the maintenance section.
●Remount the fuel tank.

Lubrication

In accordance with the Periodic Maintenance Chart, the steering stem bearing should be lubricated.
●Disassemble the steering stem.
●Wipe the old grease off the races and balls, washing them in a high flash-point solvent if necessary.
★Replace the bearing parts if they show wear or damage.
●Apply grease liberally to the upper and lower races, and stick the bearing balls in place with grease.



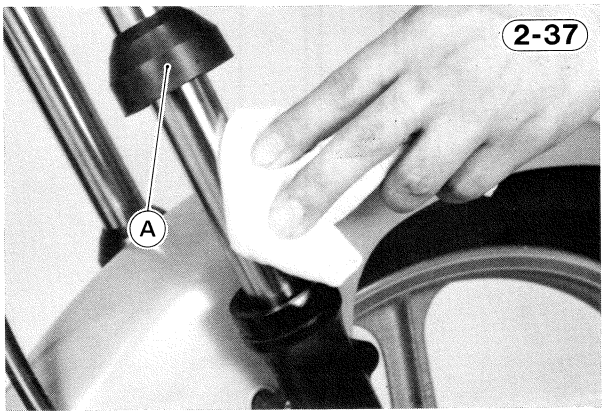
A. Bearing Balls

●Assemble the steering stem.

FRONT FORK

Cleaning

Dirt or sand that has worked its way past a dust seal will eventually damage the oil seal, causing oil leakage. In accordance with the Periodic Maintenance Chart, clean out the dirt or sand that has accumulated in the dust seals.
●Slide up the dust seals and clean out any dirt or sand. Be careful not to damage either the oil seal or the inner tube surface.



A. Dust Seal

Oil Change

Either too much or too little oil in the fork legs will adversely affect shock damping. Too much oil or too heavy an oil makes the action too stiff; too little oil or too light an oil makes the action soft, decreases damping potential, and may cause noise during fork movement.

Contaminated or deteriorated oil will also affect shock damping and, in addition, will accelerate internal wear. The fork oil should be changed periodically or sooner if the oil appears dirty.

- Remove the front fork.
- Remove the top bolt from the front fork.
- Remove the spring stop, distance collar, spring seat, and spring from the inner tube.
- Pump out the oil by repeatedly compressing and extending the front fork.
- Pour in the type and amount of oil specified in the table.

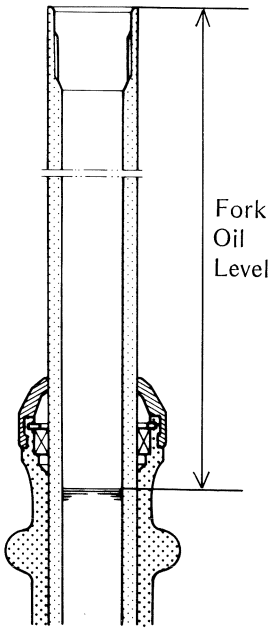
Table 2-10 Fork Oil

Type	Capacity	Oil Level (without spring)
SAE5W20	87 ± 4 cc	431 ± 2 mm from the top of the inner tube.

- Pump the fork by several times to expel the air from the upper and lower chambers.
- Insert a rod down into the tube, and measure the distance from the top of the inner tube to the oil level.

★If the oil is below the correct level, add enough oil to bring it up to the proper level, taking care not to overfill.

Fork Oil Level (2-38)



- Assemble and install the front fork.

WHEELS

Tires:

Tire Wear, Damage

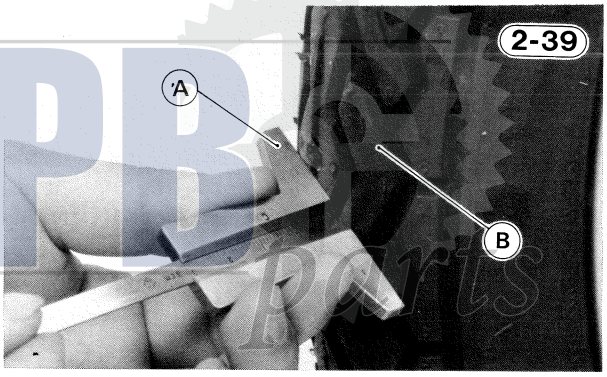
As the tire tread wears down, the tire becomes more susceptible the puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald. In accordance with the Periodic Maintenance Chart, check the tire for wear.

- Measure the depth of the tread with a depth gauge. Since the tire may wear unevenly, take measurements at several places.

★If any measurement is less than the service limit, replace the tire.

Table 2-11 Tire Tread Depth

	Standard	Service Limit
Front	NITTO; 4.0 mm DUNLOP; 4.4 mm	1 mm
Rear	NITTO; 6.0 mm DUNLOP; 5.4 mm	2 mm



A. Depth Gauge **B. Tread**

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

Table 2-12 Standard Tire

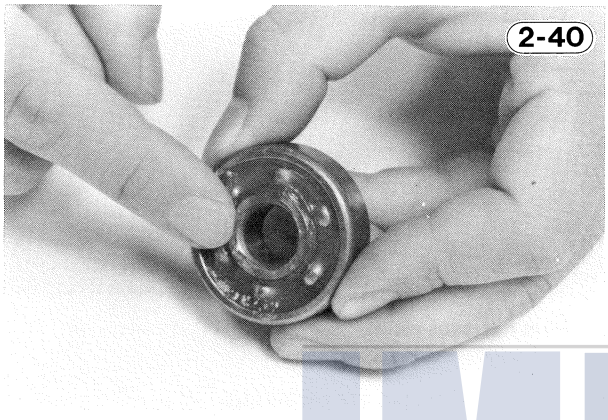
	Size	Make, Type
Front	2.50-18 4PR	NITTO NT-77S or DUNLOP F12A
Rear	2.75-18 6PR Ⓤ 2.75-18 4PR	NITTO NT-189 or DUNLOP K698

Wheel Bearings and Speedometer Gear:

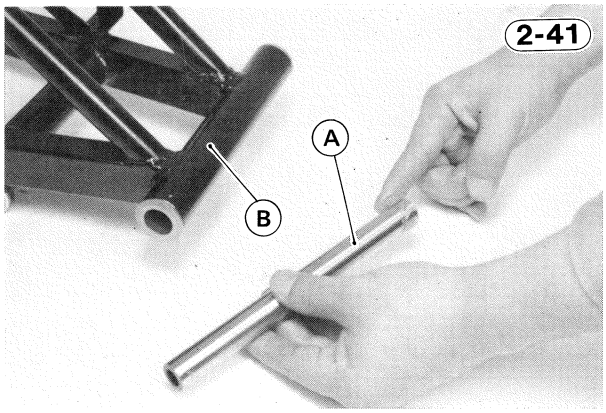
Lubrication

Since worn wheel bearings will cause play in the wheel, vibration, and instability, they should be cleaned, inspected, and greased in accordance with the Peirodic Maintenance Chart. Also, the speedometer gear housing should be cleaned and greased in periodically.

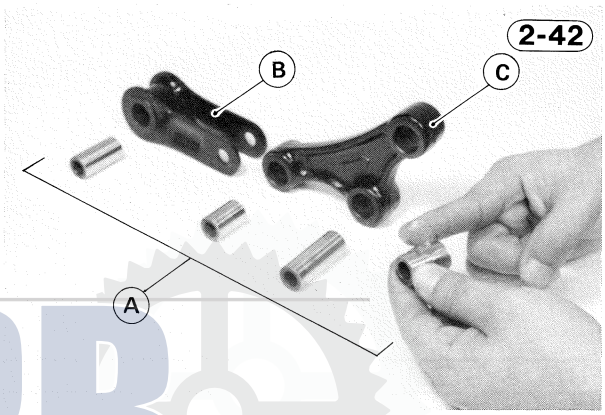
- Remove the front wheel and the rear wheel, and remove the front and rear wheel bearings.
- Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it.
- Spin it by hand to check its condition.
- ★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- If the same bearing is to be used again, re-wash it with a high flash-point solvent, and dry it.
- Pack it with good quality bearing grease before installation. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the hub before bearing installation.



- Clean and grease the speedometer gear housing.
- Replace the grease seals, which are removed for bearing removal, with new ones. The seals are generally damaged upon removal.



A. Sleeve **B. Swing Arm**



A. Sleeves **C. Rocker Arm**
B. Tie Rod

- Install the swing arm and uni-trak.

SWING ARM, UNI-TRAK

In order for the swing arm and uni-trak to function safely and wear slowly, they should be lubricated in accordance with the Periodic Maintenance Chart.

Lubrication

- Remove the swing arm and uni-trak, and pull out the sleeves.
- Using a high flash-point solvent, wash the sleeves clean of grease, and dry them.
- Inspect the sleeves, for abrassious, color change, or other damage.
- ★If there is any doubt as to the condition of any sleeve, replace the sleeves with new ones.
- Apply grease to the outer circumferance of the sleeves.

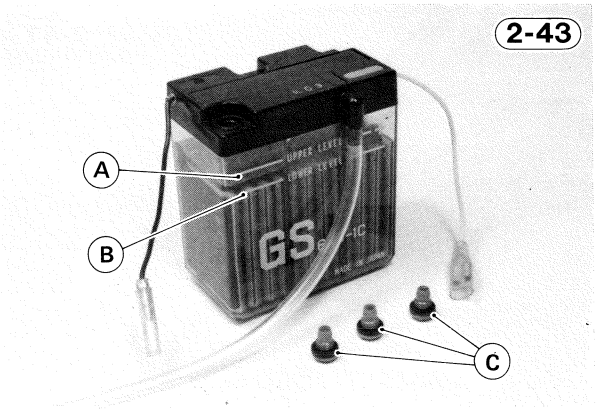
BATTERY

Battery Electrolyte Level Inspection

The battery electrolyte level must be kept between the upper and lower level lines. Check the electrolyte level in each cell in accordance with the Periodic Maintenance Chart.

- Remove the left side cover.
- Check that the electrolyte level in each cell is between the upper and lower level lines.
- ★If the electrolyte level is low in any cell, fill with distilled water as follows.
- Remove the battery from the motorcycle.
- Remove the battery filler caps and fill with distilled water until the electrolyte level in each cell reaches the upper level line (Fig. 2-43).

CAUTION **1. Add only distilled water is not a substitute for distilled water and will shorten the life of the battery.**



A. Upper Level **B. Lower Level** **C. Filler Caps**

●Install the battery.

FUEL SYSTEM

Accumulation of moisture or sediment in the fuel system will restrict the flow of fuel and cause carburetor malfunction. The system should be checked in accordance with the Periodic Maintenance Chart.

WARNING

1. Inspect the fuel system in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area.
2. Never inspect the fuel system when the engine is still warm.
3. Wipe any fuel off the engine before starting it.

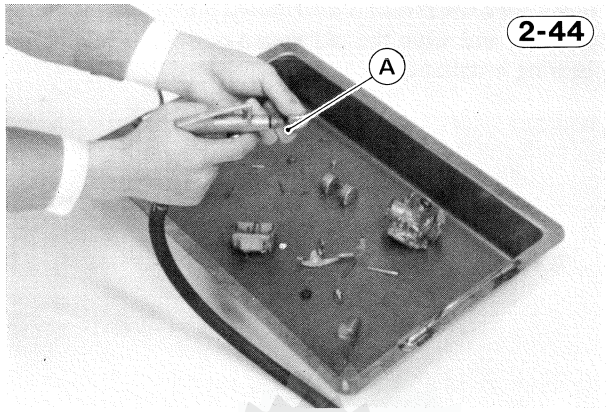
Inspection and Cleaning

●Remove the carburetor from the motorcycle.
●Remove the float bowl.
★If any water or dirt appeared, clean the fuel system as follows.
●Remove the fuel tank, and remove the fuel tap from the tank.
●Flash out the fuel tank with a high flash-point solvent.
●Wash the fuel filter on the fuel tap, clean off dirt with a high flash-point solvent.
●Disassemble the carburetor to clean the fuel and air passages.

CAUTION

1. Remove the float before cleaning the carburetor with compressed air, or it will be damaged.
2. Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts.
3. The carburetor body has plastic parts that cannot be removed. DO NOT use a strong carburetor cleaning solution which could attack these parts; instead, use a mild cleaning solution safe for plastic parts.
4. Do not use wire for cleaning as this could damage the jets.

●Wash the disassembled parts, and air and fuel passages with a high flash-point solvent then blow them clean with compressed air. If necessary, use a bath of automotive type carburetor cleaner.



A. Blow Passages clean.

●Assemble and install the carburetor.
●Install the fuel tap on the fuel tank, and install the fuel tank.

Fuel Hose:

Replacement

In accordance with the Periodic Maintenance Chart, replace the fuel hose with a new one.
●Replace the fuel hose which connect the fuel tap with the carburetor. Also replace the hose clamps with new ones.
●Check for fuel leakage.

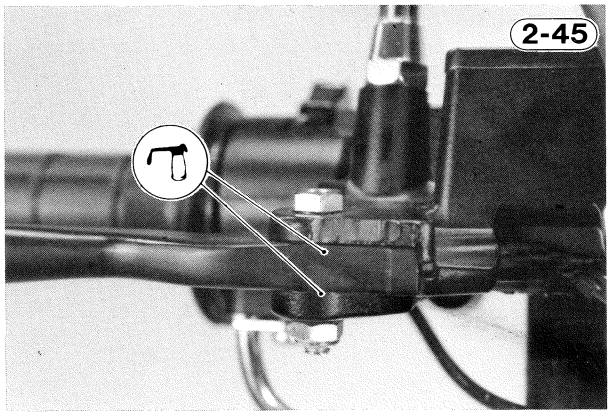
GENERAL LUBRICATION

Lubricate the points shown here, with either motor oil or regular grease, in accordance with the Periodic Maintenance Chart or whenever the vehicle has been operated under wet or rainy conditions, and especially after using a highpressure spray washer.

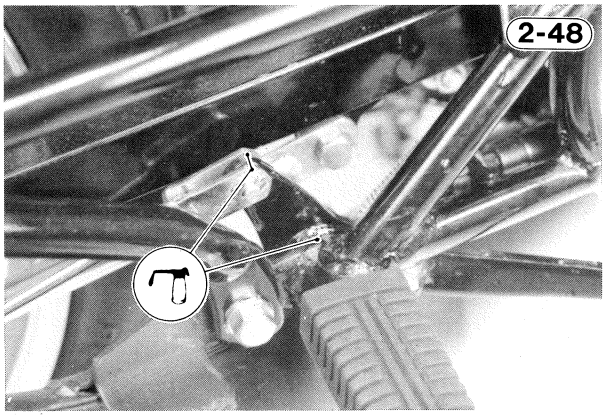
Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.

NOTE: 1. A few drops of oil are effective to keep bolts and nuts from rusting and sticking. This makes removal easier. Badly rusted nuts, bolts, etc., should be replaced with new ones.

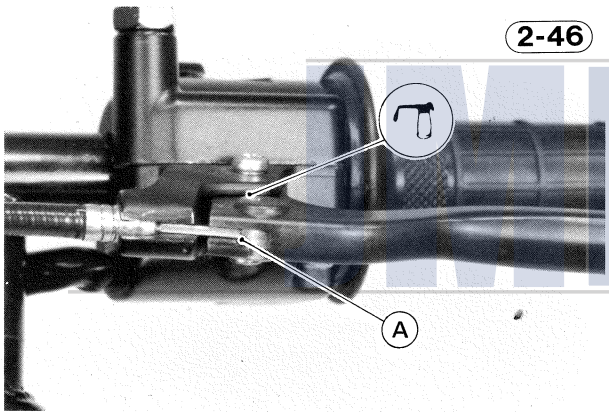
Brake Lever:



Brake Pedal, Brake Rod Joint:

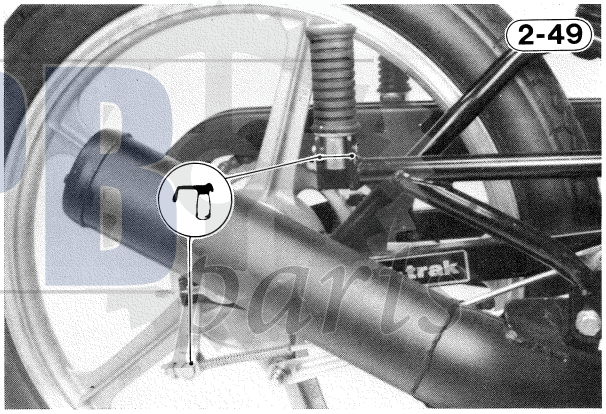


Clutch Lever:

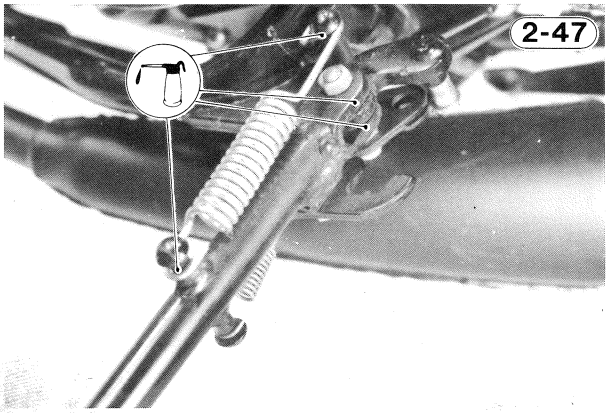


A. Grease.

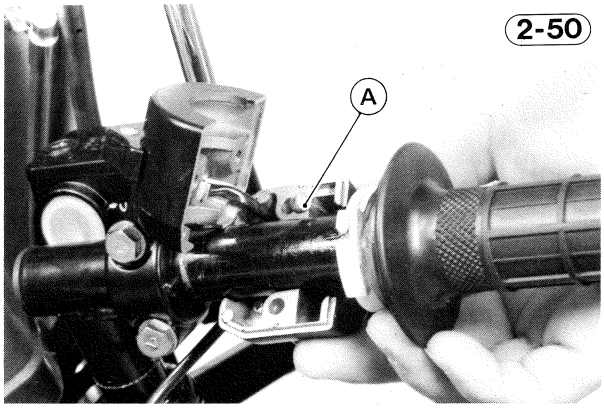
Brake Rod Joint, Rear Footpeg:



Side Stand:



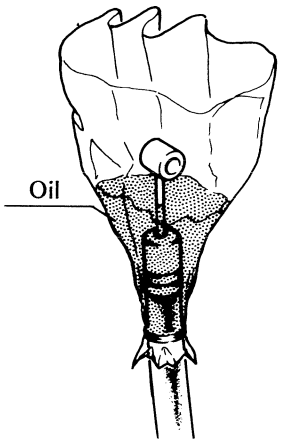
Throttle Grip:



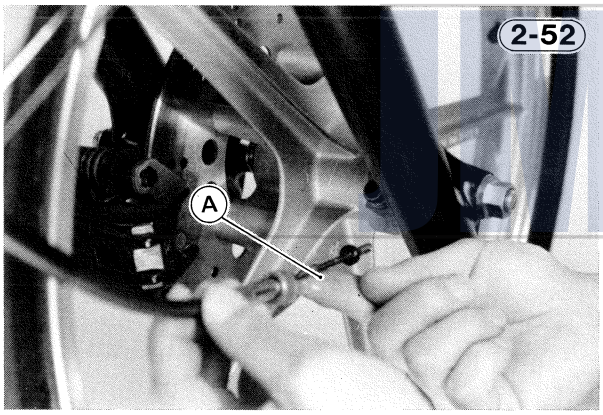
A. Grease.

Clutch and Throttle Cable:

Cable Lubrication (2-51)

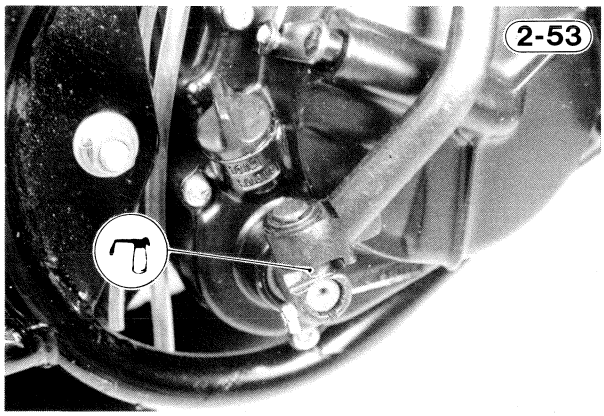


Speedometer and Tachometer Cables:



A. Grease Sparingly.

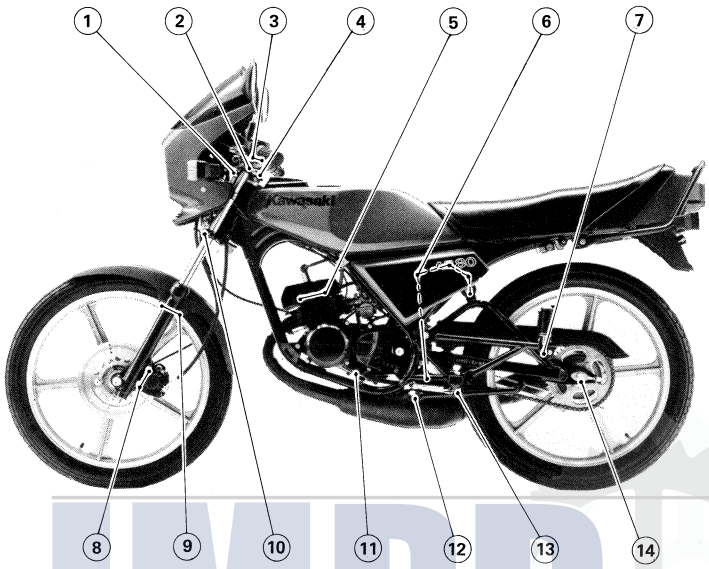
Kick Pedal:

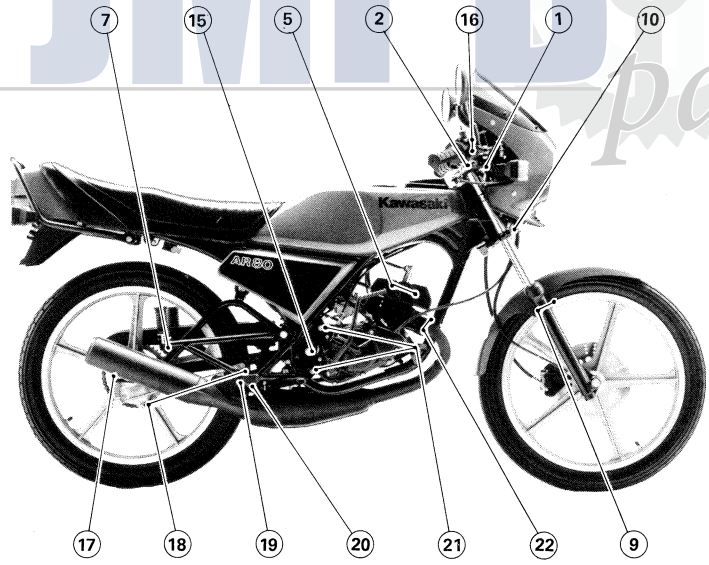


BOLT AND NUT TIGHTENING

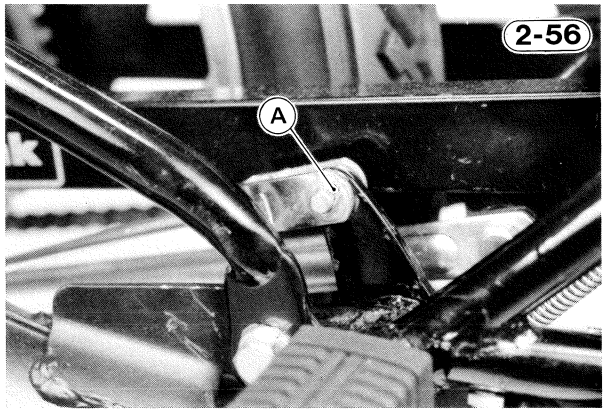
In accordance with the Periodic Maintenance Chart, it is very important to check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE: 1. For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).
2. When retorquing the fasteners, first loosen each bolt or nut ½ turn, one at a time then tighten it to the specified torque. (See Pgs. 1-11, 12)



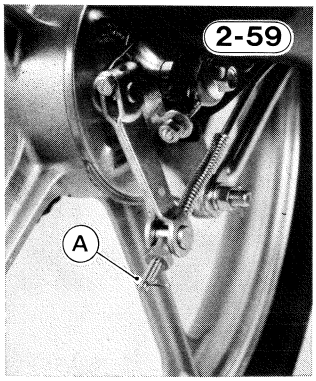


1. Handlebar Clamp Nuts
2. Front Fork Top Bolts
3. Left Switch Housing Clamp Screws
4. Stem Head Bolt
5. Cylinder Head Nuts
6. Rear Shock Absorber and Uni-trak Nuts
7. Rear Footpeg Mounting Nuts
8. Caliper Mounting Bolts
9. Front Fender Bolts
10. Front Fork Clamp Bolts
11. Shift Pedal Bolt
12. Side Stand Bolt
13. Footpeg Mounting Nut
14. Rear Axle Nut
15. Pivot Shaft Nut
16. Master Cylinder Clamp Bolt
17. Brake Cam Lever Bolt
18. Torque Link Nuts
19. Muffler Mounting Bolt
20. Brake Pedal Pivot Nut
21. Engine Mounting Nuts
22. Exhaust Pipe Holder Nuts

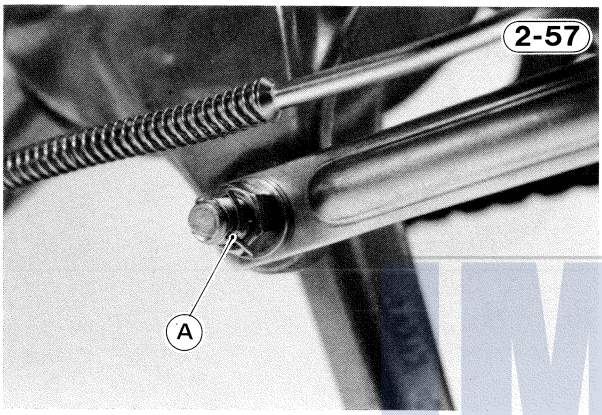


A. Cotter Pin (Brake Rod Joint)

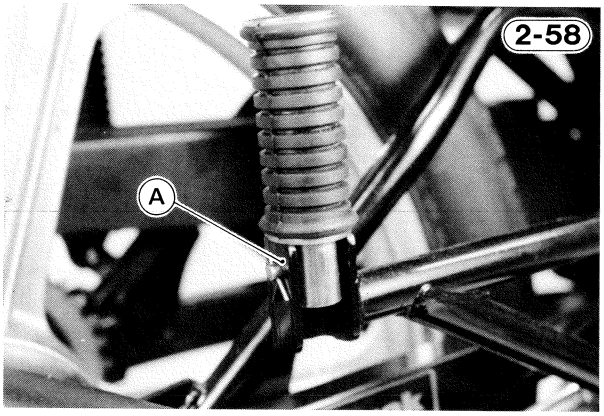
Some of the model have cotter pin (brake rod) as shown in the figure on the right.



A. Cutter Pin (Brake Rod)



A. Cotter Pin (Torque Link Nut)



A. Cotter Pin (Rear Footpeg)

Non-scheduled Maintenance – Engine

Table of Contents

FUEL TANK, FUEL TAP, FUEL TANK CAP

WARNING **1. Inspect the fuel tank, fuel tap, and tank cap in a well-ventilated area, and take ample care that there are no sparks and flame anywhere near the working area.**

Inspection

If fuel leaks from the tank cap or from around the fuel tap –

●Remove the tank cap, or remove and disassemble the fuel tap, inspect the O-rings and/or cap gasket.

★If there is any damage, replace it with a new one.

If the air vent in the tank cap is obstructed –

●Use compressed air to clear an obstructed vent.

If there is any doubt about the condition of the fuel tap –

●Remove and disassemble the fuel tap, and inspect the parts.

★If there is any damage, replace the part with a new one. Make sure the O-ring and its seat are clean and undamaged.

CARBURETOR

Carburetor trouble can be caused by dirt, wear, maladjustment, or improper fuel level in the float chamber.

Table 3-1 Mixture Trouble Symptoms

Poor running
Overheating
Exhaust smokes excessively
Frequent backfiring in the exhaust system during engine braking

The following explanation covers the inspection of the carburetor.

WARNING **1. Inspect the carburetor in a well-ventilated area, and take ample care that there are no sparks and flame anywhere near the working area.**

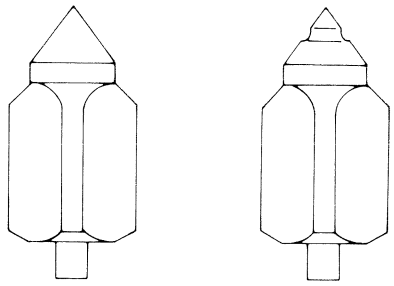
Wear Inspection

●Remove and disassemble the carburetor.

★Examine the float, and replace if damaged.

★If the needle is worn as shown in the diagram, replace the valve needle and valve seat as a set.

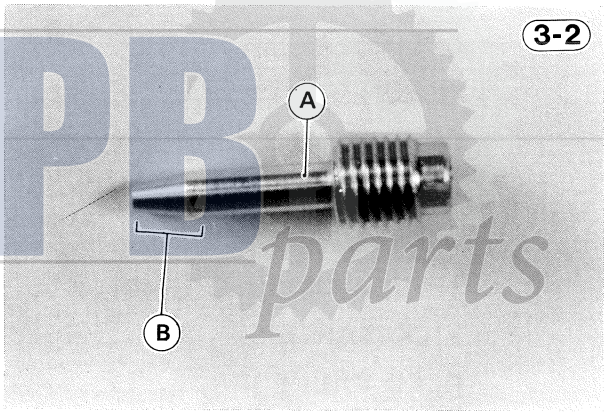
Float Valve Wear (3-1)



Good Bad

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

★If it is, replace the air screw.



(3-2)

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

●Check the jet needle and needle jet.

★If they are worn, replace them.

Service Fuel Level Measurement

If the motorcycle exhibits symptoms of improper fuel mixture, measure the service fuel level.

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

Table 3-2 Carburetor Specifications

	Type	Main Jet	Jet Needle	Needle Jet	Throttle Valve Cutaway	Pilot Jet	Air Screw (turns out)	Service Fuel Level
AR50	VM14SC	110	3I7-3	D-9	2.0	15	1	3.5 ± 1 mm
AR80	VM16SC Ⓤ VM18SC	122.5	3I7-3 Ⓤ 4M4-3	D-8 Ⓤ O-6	2.0	17.5	1¾	3.5 ± 1 mm Ⓤ 1.5 ± 1 mm

Ⓤ : UK model

NOTE: 1. A new float bowl and the fuel level gauge (special tool) are required to measure the service fuel level.
2. Cut off the overflow pipe of a new float bowl, install the fuel level gauge (special tool), and use this assembly as a gauge unit.

- Remove the carburetor from the motorcycle.
- Remove the float bowl, and install the gauge unit.
- Keeping the calibrated plastic pipe of the gauge higher than the float bowl, supply fuel for the carburetor by some means (such as a tube from a small fuel container). Wait until the fuel level in the tube settles.
- Keeping the calibrated plastic tube vertical, slowly lower the calibrated plastic tube until the "0" line is even with the bottom edge of the carburetor body.

NOTE: 1. Do not lower the "0" line below the bottom edge of the carburetor body. If the calibrated plastic tube is moved upward, the fuel level measurement must be repeated from the beginning.

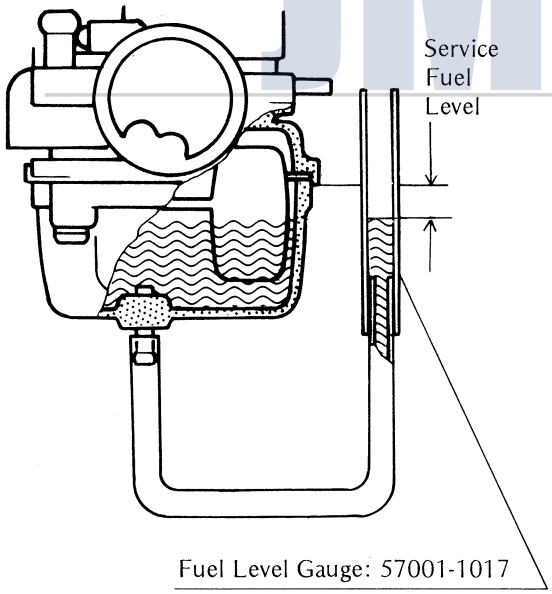
- Read the service fuel level in the plastic pipe.

Table 3-3 Service Fuel Level†

Standard	
3.5 ± 1 mm	AR80 for UK model: 1.5 ± 1 mm

†distance below from the bottom edge of the carburetor body to the fuel level

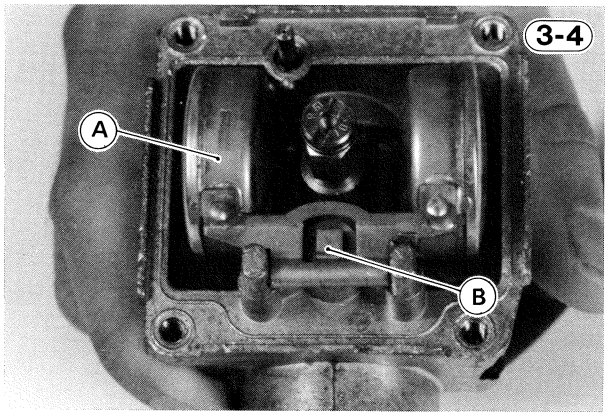
Service Fuel Level (3-3)



★If the fuel level is incorrect, adjust the fuel level.

Service Fuel Level Adjustment

- Remove the gauge unit, and remove the float.
- Bend the tang on the float a very slight amount to change the fuel level.



A. Float **B. Tang**

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

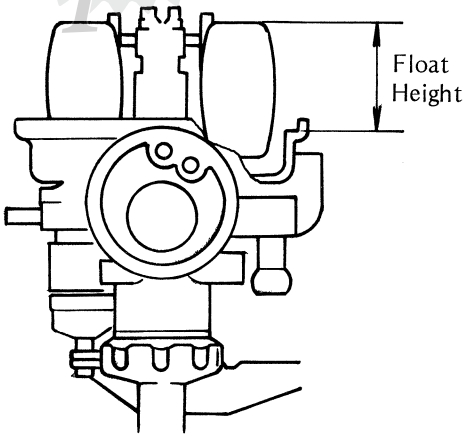
NOTE: 1. Bending the tang on the float makes the altering the float height. Raising the float height closes the valve sooner and lowers the fuel level; lowering the float height raises the level.
2. The float height for the proper service fuel level is shown in the table. The carburetor is helded upside down, and float bowl gasket is removed.

Table 3-4 Float Height†

Standard	
23.8 ± 1 mm	AR80 for UK model: 22.2 ± 1 mm

†distance above from the bottom surface of the caburetor body to the top of the float

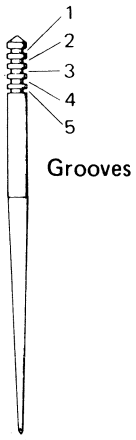
Float Height Measurement (3-5)



3. The last number of the jet needle number ("3" of 4M4-3 for example) is not stamped on the needle, but is the number of the groove in which the clip must be installed. The groove numbers are counted from the topmost groove, 5 being the lowest groove.

CAUTION **1. If the clip is put in any but the specified groove, exhaust emission will be increased, and the engine may suffer serious damage which could result in a crash.**

Jet Needle (3-6)



CYLINDER HEAD, CYLINDER, PISTON

Compression Measurement

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

- Before measuring compression, check that the cylinder head is tightened down with the specified torque (Pg. 1-11), and then thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running. While the engine is running, check that there is no gas leakage from around the cylinder head gasket and from the spark plug.
- **Stop the engine, remove the spark plug, and screw the** compression gauge (special tool) firmly into the spark plug hole.
- Using the kickstarter, turn the engine over sharply with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

Table 3-5 Cylinder Compression †

Usable Range	AR50	7.5 – 11.7 kg/cm² (107 – 167 psi)
	AR80	8.8 – 13.5 kg/cm² (125 – 192 psi)

† Engine hot, throttle fully opened, kicking the engine 5 times.

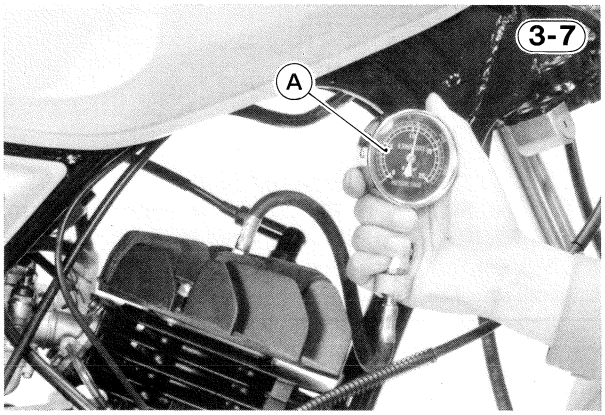
★If cylinder compression is higher than the usable range, check the following:
1. Carbon build-up on the piston head and cylinder head – Clean off any carbon on the piston head and cylinder head.
2. Cylinder head gasket, cylinder base gasket – Use only the proper gaskets for the cylinder head and base. The use of gaskets of the incorrect thickness will change the compression.
3. Cylinder head volume. (Pg. 3-6).

★If cylinder compression is lower than the usable range, check the following:
1. Gas leakage around the cylinder head – Replace the damaged gasket and check the cylinder head for warp.
2. Gas leakage from the crank chamber – Check the crankshaft oil seal and reed valve, and check the joint between the crankcase halves.
3. Piston/cylinder clearance, piston seizure.
4. Piston ring, piston ring groove wear.

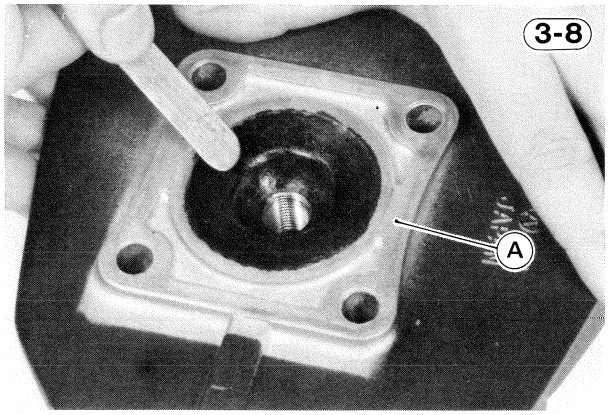
Cylinder Head:

Cleaning

- Remove the cylinder head.
- Scrape out any carbon, and wash the head with a high flash-point solvent.



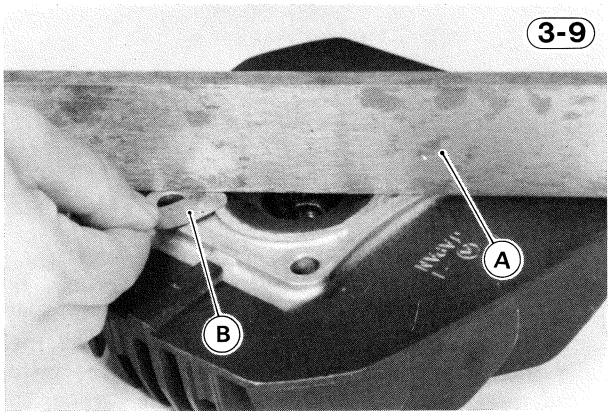
A. Compression Gauge: 57001-221, 57001-1159



A. Cylinder Head

Cylinder Head Warp Inspection

●Lay a straightedge across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head.



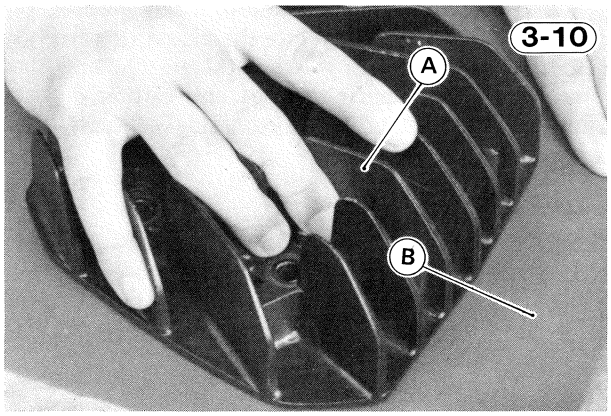
A. Straightedge **B. Thickness Gauge**

Table 3-6 Cylinder Head Warp

Service Limit	0.1 mm

★If warp exceeds the service limit, replace the cylinder head. Repair light damage by rubbing the mating surface on emery cloth (first #200, then #400) secured to a surface plate. After smoothing the cylinder head mating surface. The spark plug in Table 3-7 should be installed in the chamber.
damage to either of the mating surfaces necessitates replacement.

NOTE: 1. Use only the proper gasket for the cylinder head. The use of a gasket of incorrect thickness will change the compression.



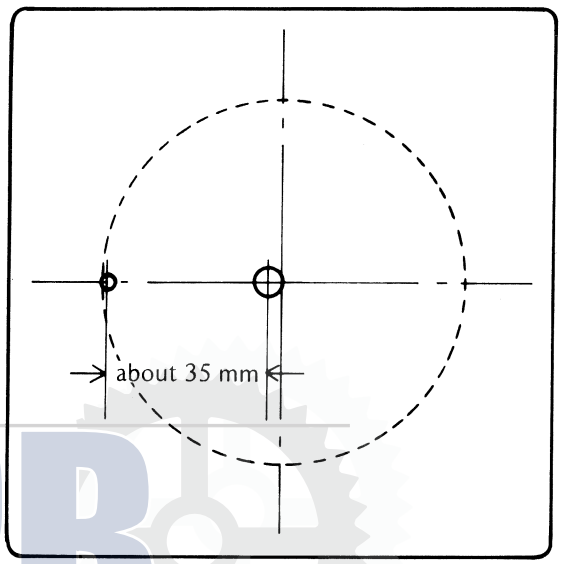
A. Cylinder Head **B. Emery Cloth**

Combustion Chamber Volume Measurement

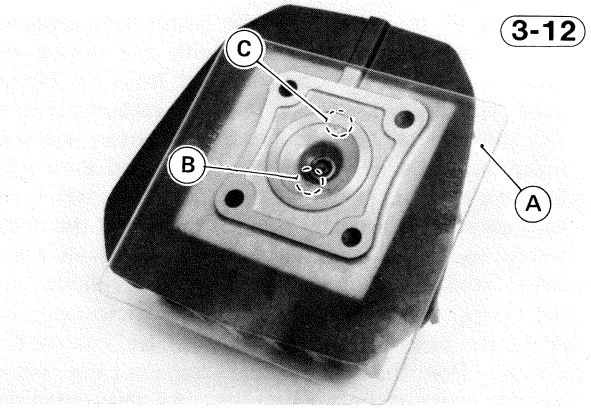
The combustion chamber volume should be measured any time that compression measurement results in compression pressures well below or above the standard.

NOTE: 1. Another person will be needed to help expel air bubbles out of the combustion chamber.
2. Prepare a piece of transparent plastic plate which has a flat surface and two holes about 35 mm apart in its center portion. One hole should be about 6 mm in diameter, the other about 3 mm in diameter. The plate must be oil resistant, about 120 mm square, and at least 3 mm thick.

Plastic Plate



3. Obtain a burette or syringe which is calibrated at one-cc or smaller graduations. Fill it with thin oil.
●Prior to the combustion chamber volume measurement, clean off any carbon on the combustion chamber, and remove any gasket flakes on the cylinder head mating surface. The spark plug in Table 3-7 should be installed in the chamber.
●Apply a thin coat of grease to the cylinder head mating surface and place the plastic plate over the cylinder head combustion chamber, fitting its small hole near the edge of the combustion chamber.



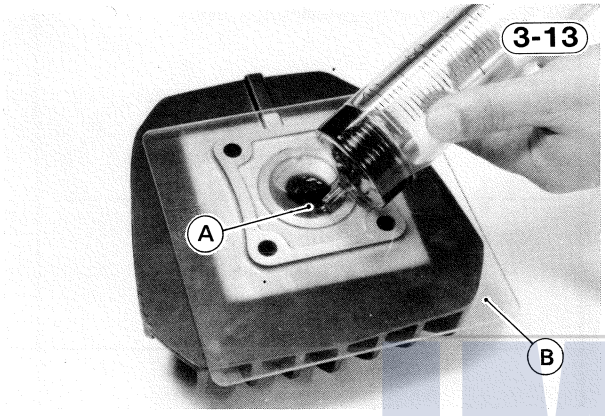
A. Plastic Plate **C. Small Hole**
B. Large Hole

●Place the cylinder head on a level surface.
●Through the large hole, fill the combustion chamber with light oil such as 2-stroke oil or missing oil until the chamber is completely filled but not overly. Tilt the cylinder head slightly so that air bubbles come out through the small hole. The oil should just rise to the bottom edge of the holes in the plate.

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

Table 3-7 Combustion Chamber Volume

Model	Standard	Spark Plug
AR50	3.7 – 4.1 cc	NGK B8ES or BR8ES
AR80	6.8 – 7.4 cc	NGK BP8ES or BPR8ES



A. Oil **B. Measuring Plastic Plate**

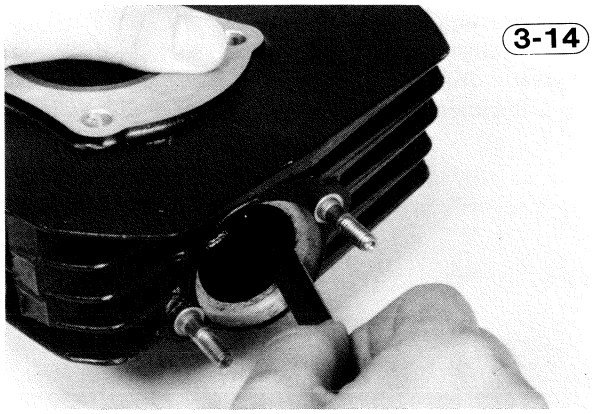
★If the combustion chamber volume is too small, it is possible that the cylinder head was modified for higher compression. Make sure that all carbon deposits have been cleaned out of the chamber.
★If the combustion chamber volume is too large, make sure that the spark plug is correctly tightened.

Cylinder, Piston, Piston Rings:

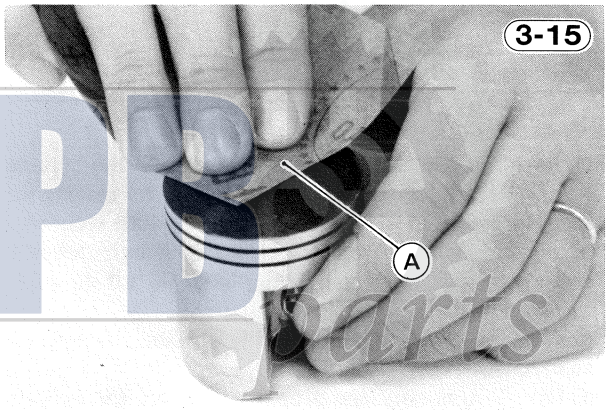
Cylinder, Piston Cleaning

CAUTION **1. When removing carbon, take ample care not to scratch the cylinder wall, the side of the piston, or the piston ring grooves.**
2. Never clean the piston head with the engine assembled. If the carbon is scraped from the piston head with the cylinder left in place, carbon particles will unavoidably drop between the piston and cylinder onto the rings and eventually find their way into the crank chamber. Carbon particles, which are very abrasive, drastically shorten the life of the rings, piston, cylinder, crankshaft bearings, and oil seals.

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

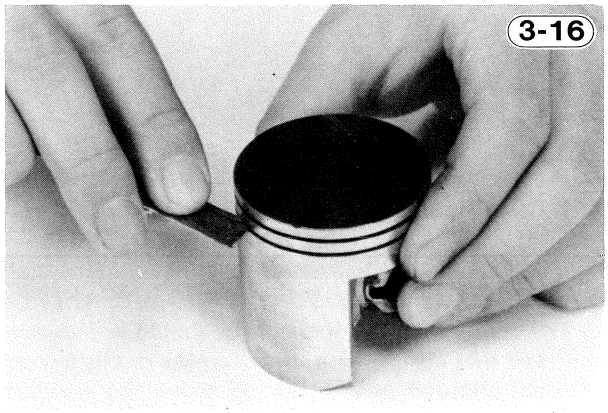


●Built-up carbon on the piston head reduces the cooling capability of the piston and raises compression, leading to overheating which could possibly even melt the top of the piston. To decarbonize the piston head, remove the piston, scrape off the carbon, and then lightly polish the piston with fine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



A. Emery Cloth

Carbon, accumulated in the piston ring grooves, can cause the rings to stick. Note the piston ring free gap before removing the rings from the piston, and then remove the rings, and clean out any carbon deposits using an end of a broken piston ring or some other suitable tool.



Cylinder, Piston Wear Inspection

●Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.

★If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored oversize and then honed.

★However, if the amount of boring necessary would make the inside diameter greater than the repair limit, the cylinder block must be replaced.

Table 3-8 Cylinder Inside Diameter

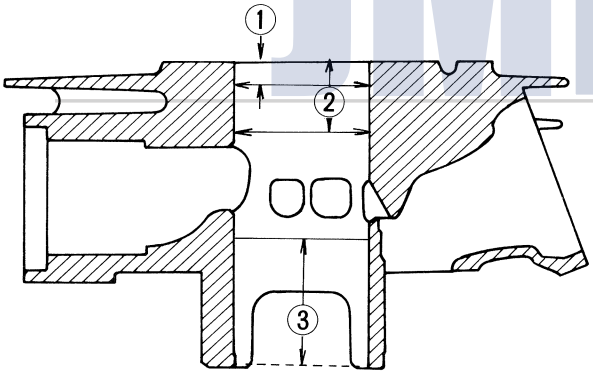
	Standard	Service Limit	Repair Limit
AR50	39.000 – 39.015 mm†	39.10 mm††	40.015 mm
AR80 Ⓤ	49.000 – 49.015 mm†	49.10 mm††	50.015 mm
AR80 ⓌⒻ	49.010 – 49.025 mm†	49.10 mm††	50.025 mm

Ⓤ : UK model Ⓦ : West German Ⓕ : France

† less than 0.01 mm difference between any two measurements

†† less than 0.05 mm difference between any two measurements

Cylinder Inside Diameter Measurement **3-17**



1. 10 mm
2. 25 mm
3. 40 mm

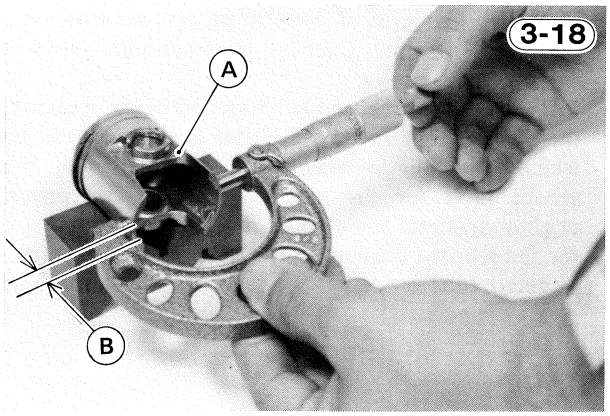
●Measure the outside diameter of the piston 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under the service limit, replace the piston.

Table 3-9 Piston Diameter†

	Standard	Service Limit
AR50	38.970 – 38.985 mm	38.83 mm
AR80	48.965 – 48.980 mm	48.82 mm

† This table applies only to the standard size piston.



A. Piston **B. 5 mm**

NOTE: 1. Abnormal wear such as a marked diagonal pattern across the piston skirt may mean a bent connecting rod or crankshaft.

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

Piston/Cylinder Clearance

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

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter as just described, and measure the cylinder diameter at the very bottom of the cylinder.

Table 3-10 Piston/Cylinder Clearance

Model		Standard
AR50	UK, German	0.025 – 0.035 mm
	Ohter than UK, German	0.030 – 0.040 mm
AR80	UK	0.030 – 0.040 mm
	France German	0.040 – 0.050 mm

Boring, Honing

When boring and honing a cylinder, note the following:

1. Before boring a cylinder, first measure the exact diameter of the oversize piston, and then in accordance with the standard clearance given in the table, determine the diameter of the rebore.
2. Never separate the liners from the cylinder when boring and honing the liners; because the top surface of cylinder and liners is machined at the factory as an assembly to get the proper surface.
3. Cylinder inside diameter must not vary more than 0.01 mm at any point.
4. Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

5. There are two sizes of oversize pistons available: 0.5 mm and 1.0 mm. Oversize piston require oversize rings.
6. In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter to which the cylinder was bored plus 0.1 mm, the service limit for the piston is the oversize piston original diameter minus 0.15 mm. If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

Piston/Cylinder Seizure

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

Piston Ring, Piston Ring Groove Wear Inspection

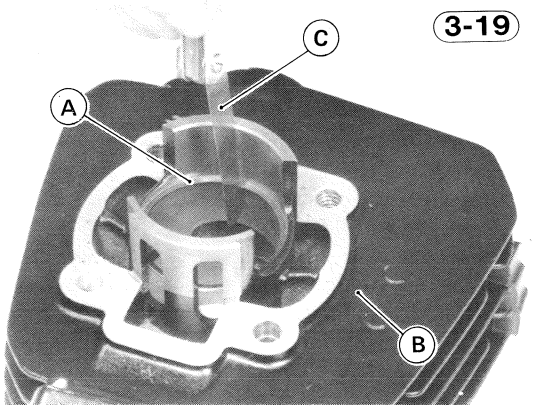
●Visually inspect the piston rings and the piston ring grooves.
★If the rings are worn unevenly or damaged, they must be replaced.
★If the piston ring grooves are worn unevenly or damaged, the piston must be replaced and fitted with new rings.

Piston Ring End Gap Inspection

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

Table 3-11 Piston Ring End Gap

Standard	Service Limit
0.10 – 0.30 mm	0.6 mm

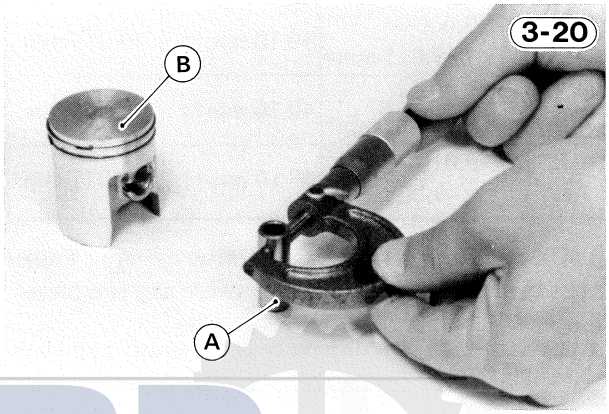


A. Piston Ring **C. Thickness Gauge**
B. Cylinder

NOTE: 1. The service limit is effective also for the bored cylinder, oversize piston, and piston rings.

Piston, Piston Pin, Connecting Rod Wear Inspection

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

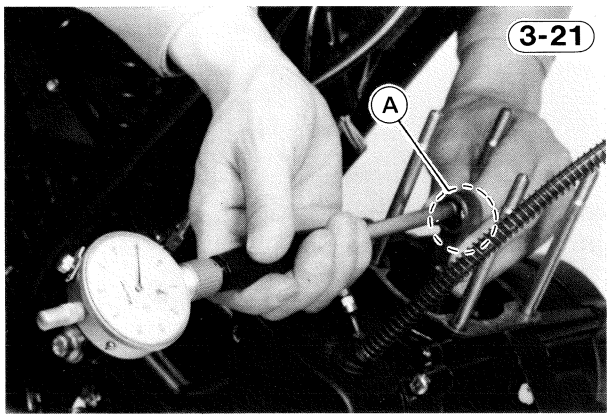


A. Piston Pin **B. Piston**

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

Table 3-12 Piston Pin, Pin Hole, Small End Diameter

	Standard	Service Limit
Piston Pin	11.995 – 12.000 mm	11.96 mm
Pin Hole	12.000 – 12.006 mm	12.07 mm
Small End	16.003 – 16.014 mm	16.05 mm



A. Connecting Rod Small End

NOTE: 1. When a new piston or pin is used, check that piston to pin clearance is less than 0.065 mm.

Small End Needle Bearing Wear

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

CRANKSHAFT, CONNECTING ROD

The following explanation concerns the most common crankshaft and connecting rod problems, giving the procedure for detecting damage and measuring wear and runout.

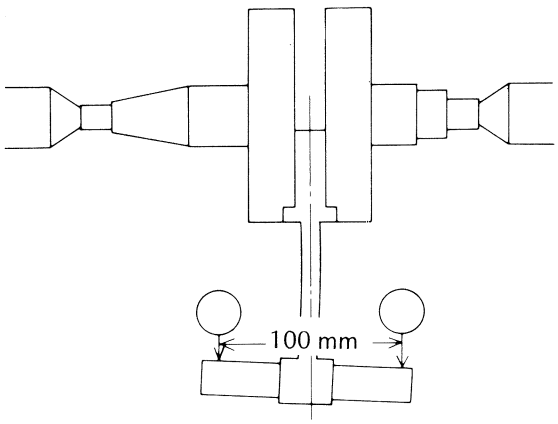
Connecting Rod Bend, Twist Inspection

- On a surface plate set the crankshaft in a flywheel alignment jig or on V blocks so that the connecting rod is perpendicular to the surface plate.
- Select an arbor of the same diameter as the small end and of optional length, and insert it through the small end of the connecting rod.
- Using a height gauge or dial gauge, measure the difference in the height of the rod above the surface plate over a 100 mm length to determine the amount of the connecting rod bend.

Table 3-13 Connecting Rod Bend/100 mm

Standard	Service Limit
under 0.05 mm	0.2 mm

Connecting Rod Bend (3-22)

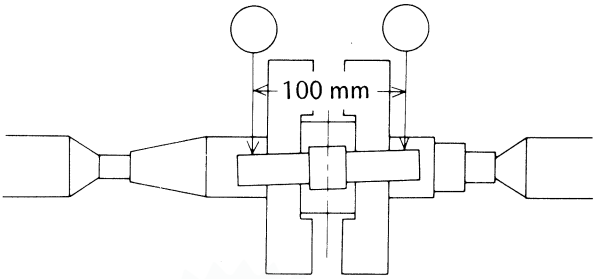


- Swing the connecting rod 90° to one side and support it parallel to the surface plate as shown in the figure.
- Measure the difference in the height of the small end arbor above the surface plate over a 100 mm length to determine the amount of the connecting rod twist.

Table 3-14 Connecting Rod Twist/100 mm

Standardd	Service Limit
Under 0.15 mm	0.2 mm

Connecting Rod Twist (3-23)



★If either of the above measurements exceeds the service limit, the connecting rod or the crankshaft assembly must be replaced.

Connecting Rod Big End Radial Clearance Inspection

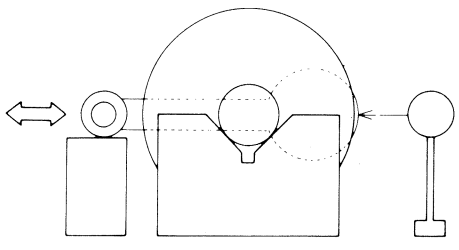
- Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge against the big end of the connecting rod.
- Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

★If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Table 3-15 Connecting Rod Big End Radial Clearance

Standard	Service Limit
0.009 – 0.025 mm	0.07 mm

Radial Clearance (3-24)



Connecting Rod Side Clearance Inspection

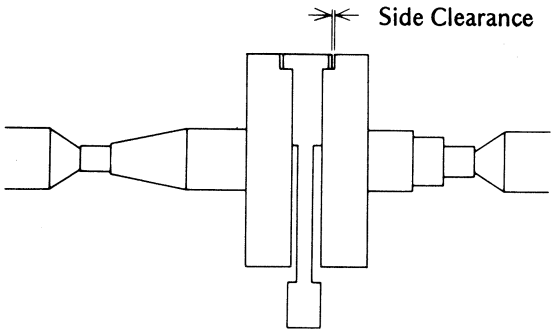
●Measure the side clearance of the connecting rod with a thickness gauge.

★If the clearance exceeds the service limit, replace the crankshaft.

Table 3-16 Connecting Rod Big End Side Clearance

Standard	Service Limit
0.30 – 0.40 mm	0.60 mm

Side Clearance (3-25)



Crankshaft Runout Inspection

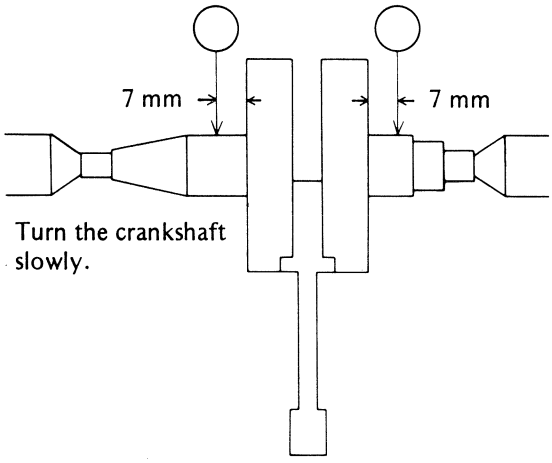
●Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge against the points indicated.

●Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.

Table 3-17 Cranksahft Runout

Standard	Service Limit
Under 0.04 mm	0.10 mm

Crankshaft Runout (3-26)



★If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit. As shown in Figs. 3-27, 3-28, there are three types of flywheel misalignment.

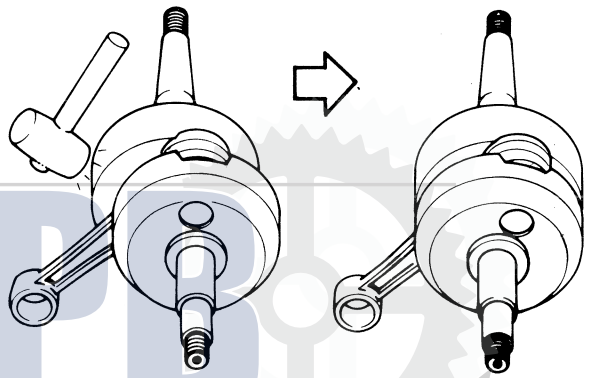
●In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.

●Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit. Vertical misalignment is corrected either by driving a wedge in between the flywheels or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment. In both cases of horizontal and vertical misalignment, correct the horizontal misalignment first.

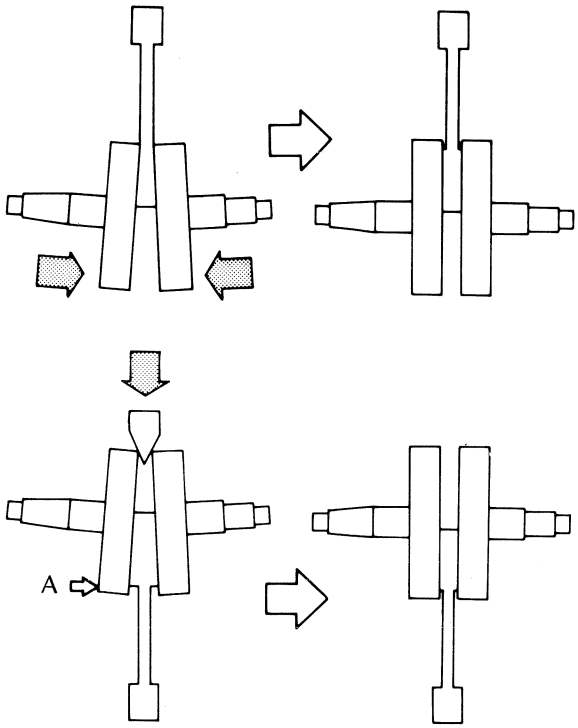
★If flywheel misalignment cannot be corrected by the above method, replace the crankpin or the crankshaft itself.

CAUTION **1. Don't hammer the flywheel at part "A".**

Horizontal Misalignment (3-27)



Vertical Misalignment (3-28)



Big End Seizure

In case of serious seizure with damaged flywheels, the crankshaft must be replaced. In case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

CLUTCH

Clutch Trouble

A clutch that does not properly disengage will cause shifting difficulty and possible transmission damage. On the other hand, a slipping clutch will reduce power transmission efficiency and may overheat and burn out. A clutch that does not properly disengage may be caused by:

1. Excessive clutch lever play.
2. Clutch plates that are warped or too rough.
3. Uneven clutch spring tension.
4. Deteriorated transmission oil.
5. Transmission oil viscosity too high.
6. Transmission oil level too high.
7. The clutch housing frozen on the drive shaft.
8. A defective clutch release mechanism.
9. An unevenly worn clutch hub or housing.
10. Missing parts.

A slipping clutch may be caused by:

1. No clutch lever play.
2. Worn friction plates.
3. Weak clutch springs.
4. Clutch cable not sliding smoothly.
5. A defective clutch release mechanism.
6. An unevenly worn clutch hub or housing.

Clutch noise may be caused by:

1. Too much backlash between the primary gear and the clutch gear.
2. Damaged gear teeth.
3. Too much clearance between the friction plate tangs and the clutch housing.
4. Weak or damaged damper rubber(s).
5. Metal chips jammed into the clutch housing gear teeth.

Spring Tension Inspection

- Remove the clutch springs, and set them, one at a time, on a spring tension testing device.
- Compress the spring, and read the tension at the test length.

★If the spring tension at the specified length is weaker than the service limit, replace the spring.

Table 3-18 Clutch Spring Tension

Test Length	Standard	Service Limit
14 mm	9.7 – 10.9 kg	8.7 kg

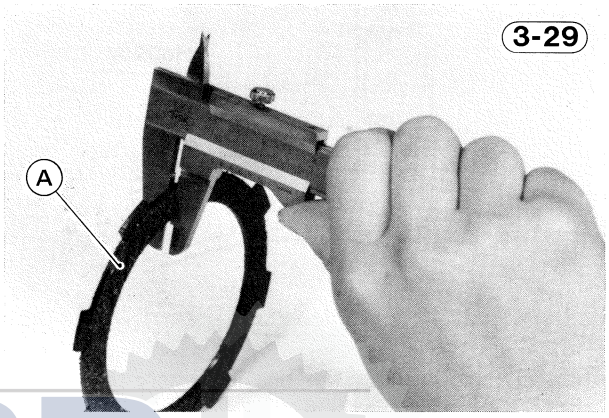
Friction Plate Wear, Damage Inspection

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

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

Table 3-19 Friction Plate Thickness

Standard	Service Limit
3.12 – 3.28 mm	3.0 mm



A. Friction Plate

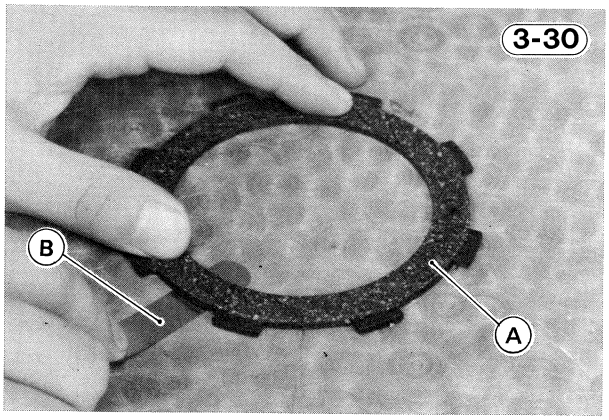
Clutch Plate Warp Inspection

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

★If any plates warped over the service limit, replace the clutch plate.

Table 3-20 Clutch Plate Warp

Service Limit	0.3 mm



A. Friction Plate **B. Thickness Gauge**

Friction Plate/Clutch Housing Clearance Inspection

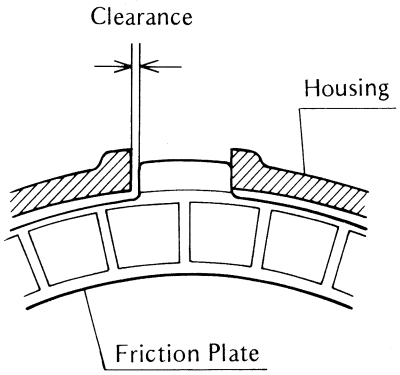
- Measure the clearance between the tangs on the friction plates and the fingers of the clutch housing. If this clearance is excessive, the clutch will be noisy.

★If the clearance exceeds the service limit, replace the friction plates. Also, replace the clutch housing if it is unevenly or badly worn where the friction plates wear against it.

Table 3-21 Friction Plate/Clutch Housing Clearance

Standard	Service Limit
0.30 – 0.65 mm	0.9 mm

Friction Plate/Clutch Housing Clearance (3-31)



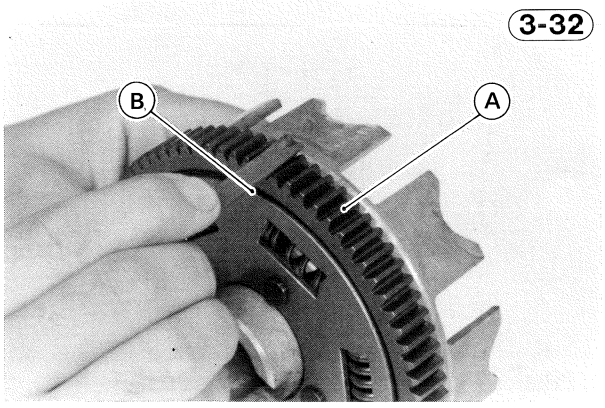
●Inspect the fingers of the housing where the tangs of the friction plates hit them.
★If they are badly worn or if there are grooves cut where the tangs hit, replace the clutch housing.

Clutch Housing Gear Damage Inspection

●Inspect the teeth on the clutch housing gear.
★If the teeth of the gear are light damaged, correct them with an oilstone, but the clutch housing must be replaced if the teeth are badly damaged.

NOTE: 1. Damaged teeth on the clutch housing gear indicate that the primary gear, by which it is driven, may also be damaged. Whenever the clutch housing gear is repaired or replaced, the primary gear should be inspected, and then replaced if necessary.

(3-32)



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

Clutch Housing Gear/Primary Gear Backlash Inspection

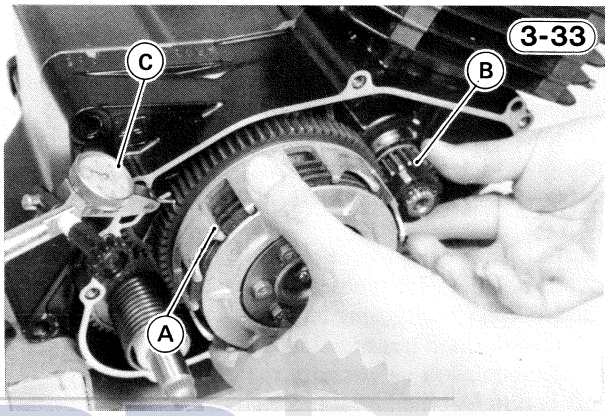
Measure the backlash between the clutch housing gear and primary gear.

●To measure the backlash, set a dial gauge against the teeth of one gear. Then move the gear back and forth while holding the other gear steady. The difference between the highest and the lowest gauge reading is the amount of backlash.
★If the amount of backlash exceeds the service limit, replace both the clutch housing and the primary gear.

Table 3-22 Clutch Housing Gear/Primary Gear Backlash

Standard	Service Limit
Under 0.110 mm	0.14 mm

(3-33)



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

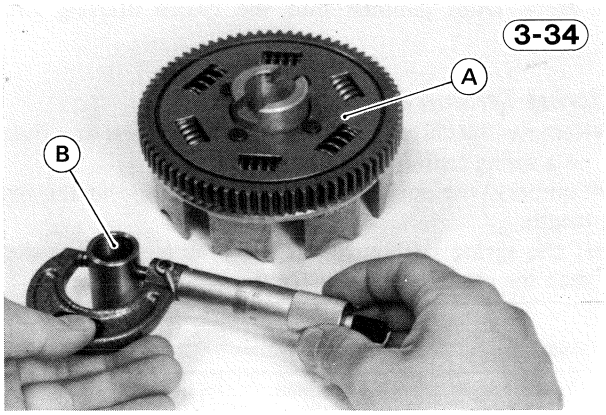
Clutch Housing/Drive Shaft Sleeve Wear Inspection

●Measure the diameter of the drive shaft sleeve with a micrometer.
★If the diameter is less than the service limit, replace the drive shaft sleeve.
●Measure the inside diameter of the clutch housing with a cylinder gauge.
★If the diameter exceeds the service limit, replace the clutch housing.

Table 3-23 Clutch Housing, Sleeve Diameter

	Standard	Service Limit
Housing	22.000 – 22.021 mm	22.03 mm
Sleeve	21.965 – 21.980 mm	21.94 mm

(3-34)



A. Clutch Housing **B. Drive Shaft Sleeve**

Clutch Hub Damage Inspection

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

Clutch Release Rack and Pinion Wear

●Visually inspect the clutch release rack and pinion for damage or excessive wear.
★If there is any damage or excessive wear, replace the rack and shaft as a set.
●Fit the rack and shaft into the right engine cover, and turn the shaft back and forth while holding the rack steady to check rack and pinion movement.
★If there is excessive play, replace the rack and shaft as a set.

TRANSMISSION

Transmission Trouble

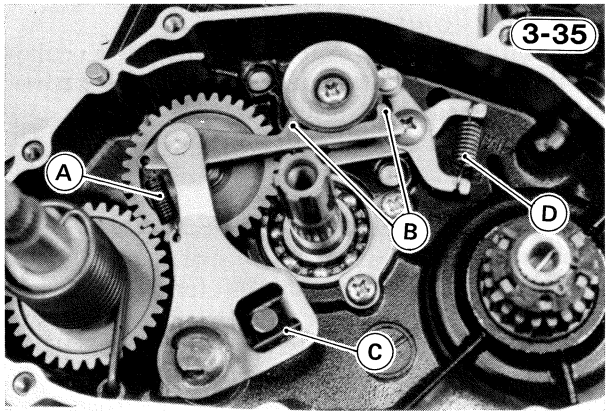
Transmission or external shift mechanism damage, causing the transmission to misshift, overshift, and/or jump out of gear, can cause further damage to the transmission and overrev damage to the engine itself. An improperly functioning transmission or external shift mechanism may be caused by the following:

1. Loose return spring pin
2. Broken or weakened return spring or set lever spring
3. Broken or weakened shift pawl spring
4. Damaged shift arm and/or set levers
5. Bent or worn shift fork(s)
6. Worn shift fork grooves on transmission gears
7. Worn shift fork guide pin(s)
8. Worn shift drum groove(s)
9. Worn or damaged gear dogs, gear dog holes, and/or gear dog recesses
10. Improperly functioning clutch or clutch release
11. Improper assembly or missing parts

Transmission noise results from worn or damaged shafts, bearings, gear hubs or teeth, etc.

External Shift Mechanism Inspection

●Inspect the shift pawl spring, shift pawls, and return spring.
★If they are broken or otherwise damaged, replace them.



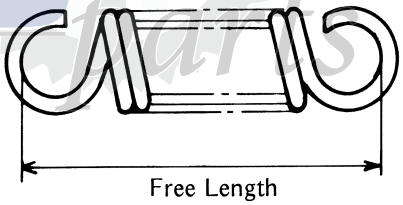
A. Pawl Spring
B. Shift Pawls
C. Return Spring
D. Gear Set Lever Spring

●Measure the free length of the shift pawl spring and gear set lever spring.
★If they are shorter than the service limit, replace them with new ones.

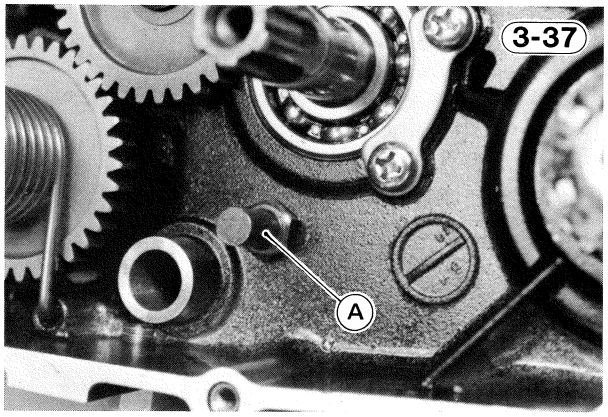
Table 3-24 Shift Pawl, Gear Set Lever Spring Free Length

	Standard	Service Limit
Shift Pawl	21.5 mm	22.6 mm
Gear Set Lever	25.6 mm	26.9 mm

Spring Free Length 3-36



●Check to see if the return spring pin is loose.
★If it is, remove it and apply a non-permanent locking agent to the threads, and then tighten it.



A. Return Spring Pin

Shift Fork Bending Inspection

A bent fork could cause difficulty in shifting or allow the transmission to jump out of gear when under power.

- ●Visually inspect the shift forks.
- ★If the shift fork is bent, replace it.

Shift Fork/Gear Groove Wear Inspection

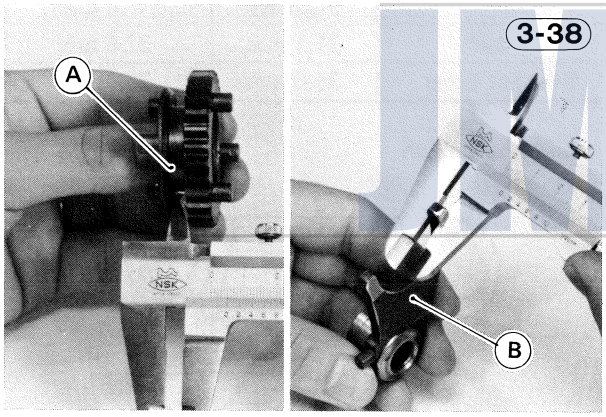
- ●Measure the thickness of the ears of each shift fork, and measure the width of the shift fork grooves on the gears.
- ★If the thickness of a shift fork ear is under the service limit, the shift fork must be replaced.
- ★If a gear shift fork groove is worn over the service limit, the gear must be replaced.

Table 3-25 Shift Fork Thickness

Standard	Service Limit
4.9 – 5.0 mm	4.7 mm

Table 3-26 Gear Shift Fork Groove Width

Standard	Service Limit
5.05 – 5.15 mm	5.25 mm



A. Gear Shift Fork Groove **B. Shift Fork**

Shift Fork Guide Pin/Shift Drum Groove Wear Inspection

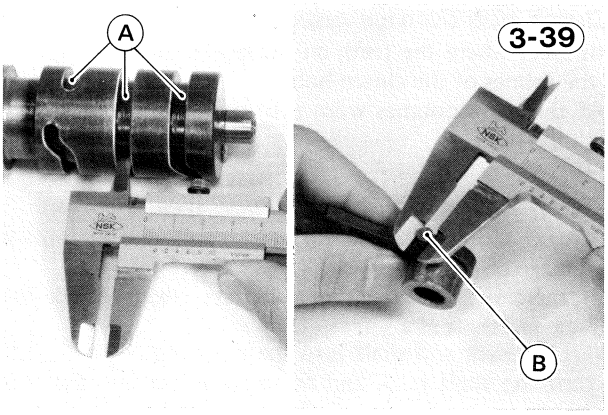
- ●Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove.
- ★If the shift fork guide pin has worn past the service limit, replace the shift fork.
- ★If a shift drum groove is worn past the service limit, replace the shift drum.

Table 3-27 Shift Fork Guide Pin Diameter

Standard	Service Limit
4.9 – 5.0 mm	4.85 mm

Table 3-28 Shift Drum Groove Width

Standard	Service Limit
5.05 – 5.20 mm	5.25 mm



A. Shift Drum Grooves **B. Shift Fork Guide Pin**

Gear Dog, Gear Dog Hole, Gear Dog Recess Damage Inspection

- ●Visually inspect the gear dogs, gear dog holes, and gear dog recesses.
- ★If the gears have damaged, or unevenly or excessively worn dogs, dog holes, or dog recesses, replace them.

Gear/Shaft Clearance Inspection

- ●Measure the diameter of each shaft and bush with a micrometer, and measure the inside diameter of each gear listed below.
- ★If the difference between the two readings to figure clearance exceeds the service limit, replace the gear.

Table 3-29 Gear/Shaft, Gear/Bush Clearance

	Standard	Service Limit
O1	0.022 – 0.058 mm	0.16 mm
O2, O3, O4, D5, D6	0.032 – 0.068 mm	0.17 mm

KICKSTARTER

Kick Gear, Shaft Wear

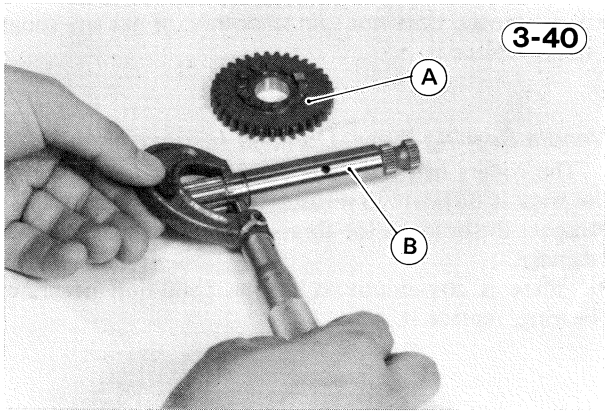
- ●Measure the inside diameter of the kick gear.
- ★Replace the gear if the diameter is over the service limit.
- ●Visually inspect the ratchet portion of the kick gear.
- ★If there is any kind of damage, replace the kick gear.
- ●Measure the kick shaft diameter at the kick gear.
- ★Replace it if it is under the service limit.

Table 3-30 Kick Gear Inside Diameter

Standard	Service Limit
16.016 – 16.034 mm	16.08 mm

Table 3-31 Kick Shaft Diameter

Standard	Service Limit
15.939 – 15.984 mm	15.92 mm



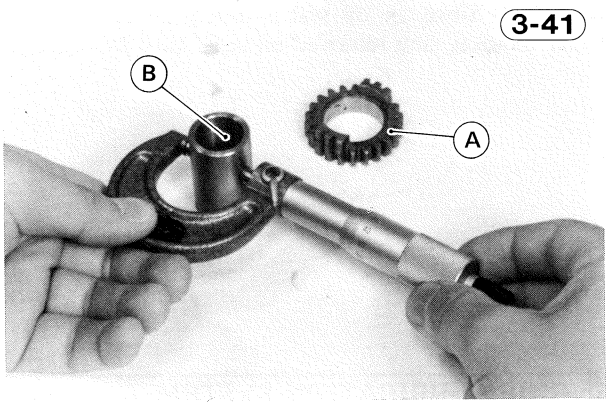
A. Kick Gear **B. Kick Shaft**

Drive Shaft Idle Gear/Sleeve Clearance

- Measure the inside diameter of the drive shaft idle gear with a cylinder gauge.
- ★If the inside diameter exceeds the service limit, replace the gear with a new one.
- Check the drive shaft sleeve (Table 3-23).

Table 3-32 Drive Shaft Idle Gear Inside Diameter

Standard	Service Limit
22.020 – 22.041 mm	22.08 mm



A. Drive Shaft Idle Gear **B. Sleeve**

Output Shaft Idle Gear/Shaft Clearance

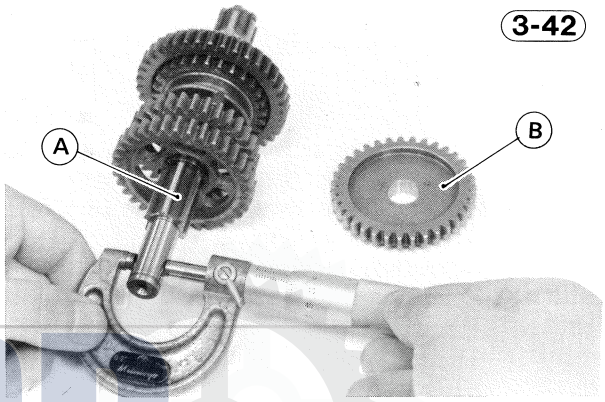
- Measure the inside diameter of the output shaft idle gear with a cylinder gauge.
- ★If the inside diameter exceeds the service limit, replace the gear with a new one.
- Measure the diameter of the output shaft with a micrometer.
- ★If the diameter exceeds the service limit, replace it with a new one.

Table 3-33 Output Shaft Idle Gear Inside Diameter

Standard	Service Limit
12.016 – 12.034 mm	12.08 mm

Table 3-34 Output Shaft Diameter (at Idle Gear)

Standard	Service Limit
11.976 – 11.994 mm	11.93 mm



A. Output Shaft **B. Idle Gear**

Ratchet, Spring Inspection

- Visually inspect the ratchet portion of the ratchet lever.
- ★If there is any kind of damage, replace the ratchet lever.
- Visually inspect the spring.
- ★If the spring is damaged, replace the spring.

REED VALVE

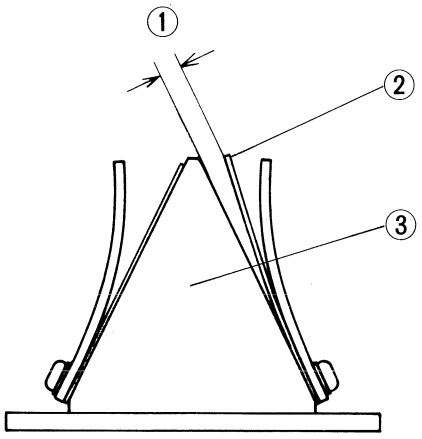
Reed Inspection

- Check reed warp by measuring the clearance between each reed and the valve holder (Fig. 3-43).
- ★If any one of the clearance measurements exceeds the service limit, replace the reed valve assembly with a new one.

Table 3-35 Reed Warp

Service Limit	0.2 mm

Reed Warp (exaggerated for illustration) (3-43)



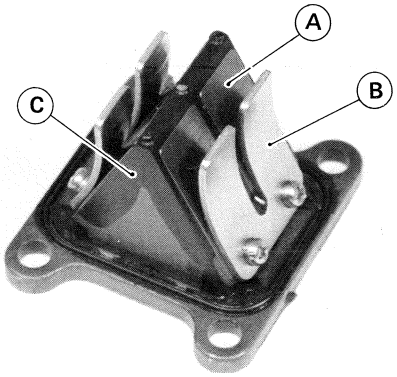
1. Clearance
2. Reed
3. Reed Valve Holder

●Visually inspect the reeds for cracks, folds, or other damage.
★If there is any doubt as to the condition of a reed, replace the reed valve assembly.
★If a reed becomes wavy, replace the reed valve assembly with a new one even if its warp is less than the service limit.

Valve Holder Inspection

●Check the reed contact areas of the valve holder for grooves, scratches, or other damage.
●Check that the rubber coating on the valve holder does not show any signs of separation from the holder.
★If there is any doubt as to the condition of the rubber coating, replace the reed valve assembly with a new one.

(3-44)



A. Reed **B. Stop** **C. Rubber Coating**

Valve Stop Inspection

●Check the valve stops for deformation, cracks, or other damage.
★If there is any doubt as to the condition of a stop, replace the reed valve assembly with a new one.

BALL BEARINGS, NEEDLE BEARINGS

Ball Bearing Wear, Damage Inspection

Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than by measurement.

●Clean each bearing in a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.
★If it is noisy, does not spin smoothly, or has any rough spots, replace it.

Needle Bearing Wear, Damage Inspection

The rollers in the needle bearings wear so little that the wear is difficult to measure.

●Inspect the bearings for abrasion, color change, or other damage.
★If there is any doubt as to the condition of either bearing, replace it.

OIL SEALS

Oil Seal Damage Inspection

●Inspect the oil seals.
★If the lips are misshapen, discolored (indicating the rubber has deteriorated), hardened, or otherwise damaged, replace it.

NOTE: 1. Since an oil seal is nearly always damaged on removal, any removed oil seals must be replaced.

ENGINE LUBRICATION SYSTEM

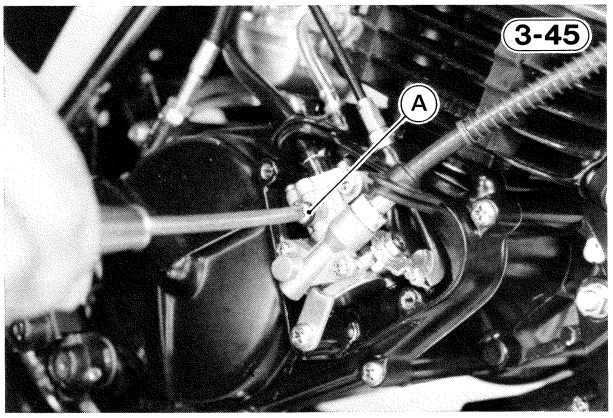
Bleeding the Oil Pump

When either of the oil pump hoses has been removed, air may become trapped inside, which will obstruct oil flow.

●First check that there is plenty of engine oil in the oil tank.
●Remove the oil pump cover.

●Bleed the air from the oil pump inlet hose and oil pump body by backing out the bleed valve on the oil pump body a couple of turns. Leave it until the oil flows out of the bleed valve, and tighten the valve securely.

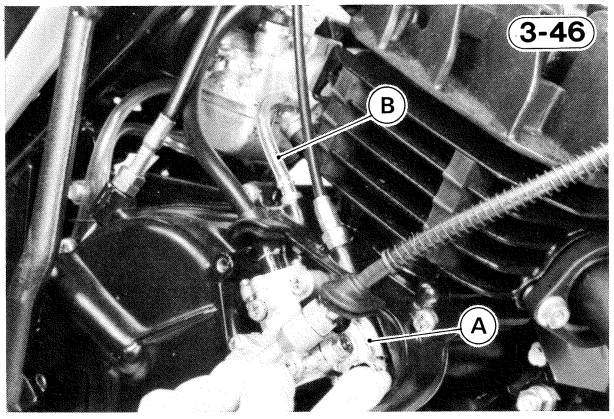
CAUTION
1. To avoid possible engine damage, make sure the oil flows steadily without any air bubbles.



A. Bleed Valve

●Bleed the air from the oil pipe by idling the engine (below 2,000 rpm) while pushing up on the oil pump lever as shown in the figure in order to maximize the plunger stroke. Keep the engine idling until the air is completely pumped out.

★If air bubbles continue to appear in the oil pipe, check the oil hose connections at the pump and tank.



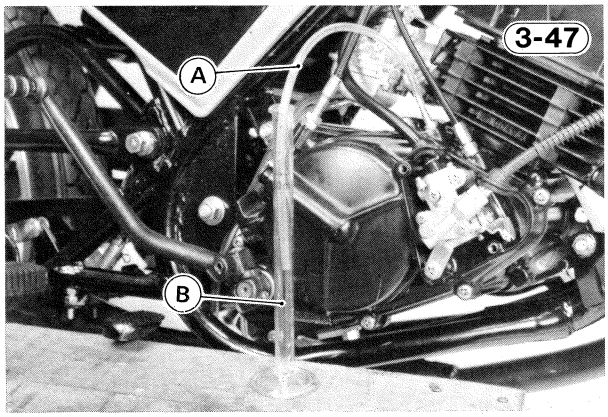
A. Oil Pump Lever **B. Oil Pipe**

Oil Pump Performance Test

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

●Remove the oil pump cover.

●Disconnect the oil tube from the right engine cover. Connect a suitable tube and lead it into a container.



A. Suitable Tube **B. Container**

●Start the engine, and keep it at 2,000 rpm.

CAUTION
1. Use a 20:1 mixture of gasoline to oil in the fuel tank in place of the gasoline normally used.
2. Make sure the work area is well ventilated.

●Pushing up on the oil pump lever as shown in Fig. 3-46, collect the oil that is being pumped for 3 minutes. If the quantity of oil collected corresponds with the table, the oil pump is operating properly.

Table 3-36 Oil Pump Output†

	AR50	AR80
Standard	0.8 – 1.0 cc	2.3 – 2.8 cc

† 3 minutes measurement at 2,000 rpm of engine speed, oil pump lever fully opened.

★If the oil pump output is subnormal, inspect the oil pump for damage.

Oil Pump Damage

Pump repair is limited to replacement of the O-rings and the shaft oil seal, since these are the only parts that may be expected to deteriorate. Other moving parts are well lubricated by the oil in the pump, and wear very little.

★If the O-rings or oil seals deteriorate or are damaged, the pump will lose compression, pump output will drop, and oil may leak from the pump.

★When pump trouble is suspected, inspect the O-rings and replace any defective ones.

★If the trouble is with parts other than the O-rings, replace the oil pump as an assembly. The pump is precision made with no allowance for replacement of individual parts.

Check Valve Inspection

The check valve opens when oil pressure is in the direction of the arrow, and allow oil flow in that one direction only. When the engine is stopped – and therefore the oil pump is also stopped – the check valve stops

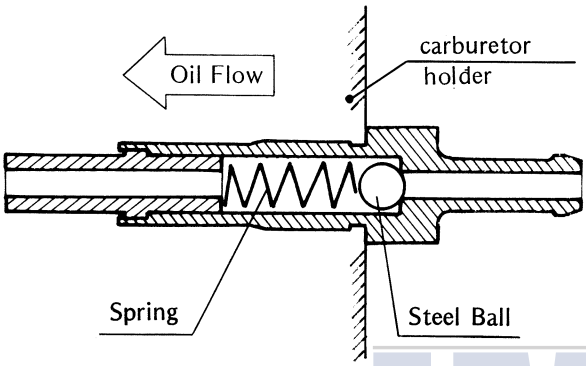
oil flow, and any oil that has passed a check valve is prevented from returning.

- If oil will not pass through the check valve, clean the valve out by using a high flash-point solvent in a squirt can or syringe.
- ★If the check valve does not work properly after being clean out, either allowing oil to pass in both directions or not allowing oil to pass at all, replace the check valve.

CAUTION

1. Do not use compressed air on the valve since doing so would damage the valve spring.

Check Valve (3-48)



Non-scheduled Maintenance – Chassis

Table of Contents

WHEELS

Payload and Tire Pressure:

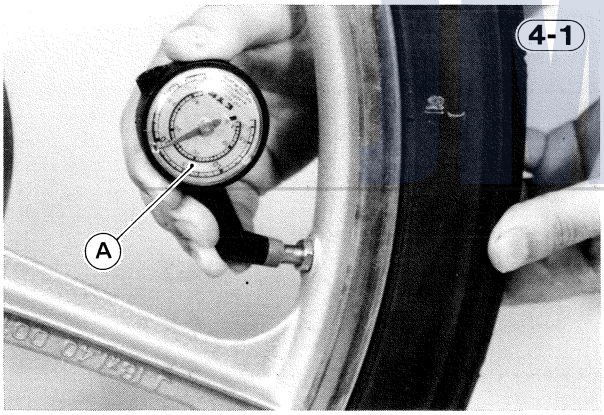
Failure to maintain proper inflation pressures or observe payload limits for your tires may adversely affect handling and performance of you motorcycle and can result in loss of control. The maximum recommended load in addition to vehicle weight is 190 kg, including rider, passenger, baggage, and accessories.

Tire Pressure Adjustment

●Check the tire pressure often, using an accurate gauge.

Table 4-1 Tire Air Pressure (when cold)

Front	1.75 kg/cm² (25 psi, 175 kPa)	
Rear	Up to 97.5 kg (215 lbs) load	2.0 kg/cm² (28 psi, 200 kPa)
	97.5 – 190 kg (215 – 419 lbs) load	2.8 kg/cm² (40 psi, 280 kPa)
	UK model	2.25 kg/cm² (32 psi, 225 kPa)



A. Pressure Gauge

★If the tire pressure is not correct, adjust it.

NOTE: 1. Measure the tire pressure when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).

2. Tire pressure is affected by changes in ambient temperature and altitude, and so the tire pressure should be checked and adjusted when your riding involves wide variations in temperature or altitude.

Cast Rims:

Rim Runout Measurement

If there is any doubt as to the condition of the wheel, or if the wheel has received a heavy impact, check the rim runout as follows:

●Remove the tire and suspend the wheel by the axle.

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

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

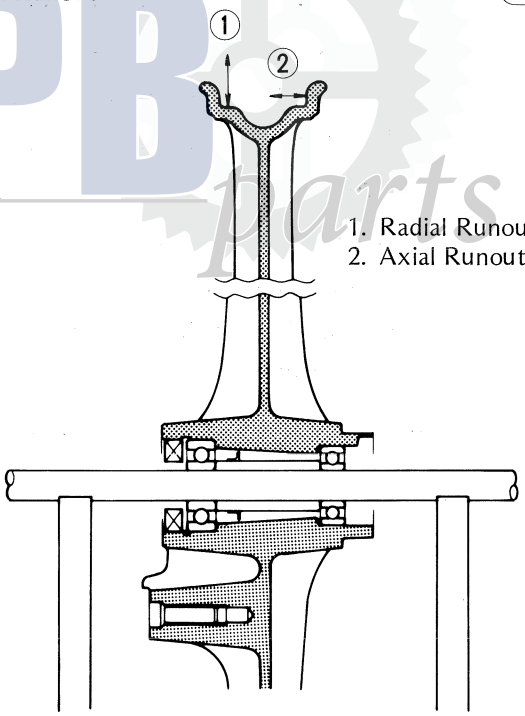
★If rim runout exceeds the service limit, check the wheel bearings first.

★If they are damaged, replace them. If the problem is not due to the bearings, the wheel must be replaced. Do not attempt to repair a damaged wheel.

Table 4-2 Rim Runout

	Axial	Radial
Service Limit	0.5 mm	0.8 mm

Rim Runout 4-2



1. Radial Runout
2. Axial Runout

Rim Damage Inspection

●Carefully inspect the wheel for small cracks, dents, bents, or warp.

★If there is any damage to the wheel, it must be replaced.

WARNING

1. Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.

Axles:

Axle Runout Measurement

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

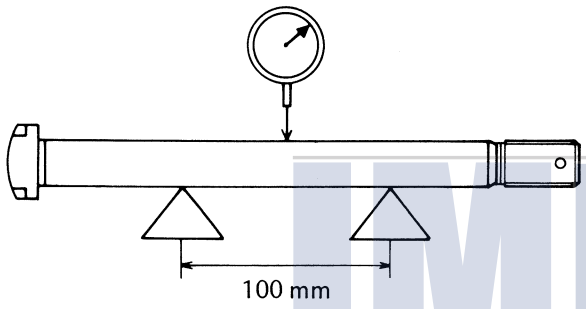
★If runout exceeds the usable range, straighten the axle or replace it.

★If the axle cannot be straightened to within tolerance, or if runout exceeds service limit, replace the axle.

Table 4-3 Axle Runout/100 mm

Usable Range	Service Limit
0.2 mm	0.7 mm

Axle Runout (4-3)



Grease Seals:

Inspection

- Inspect the grease seals.

★If the seal or internal ribbing is discolored (indicating the rubber has deteriorated), hardened, or other wise damaged, replace it.

NOTE: 1. Whenever the grease seal is removed, it should be replaced. The grease seal is generally damaged upon removal.

SPROCKETS

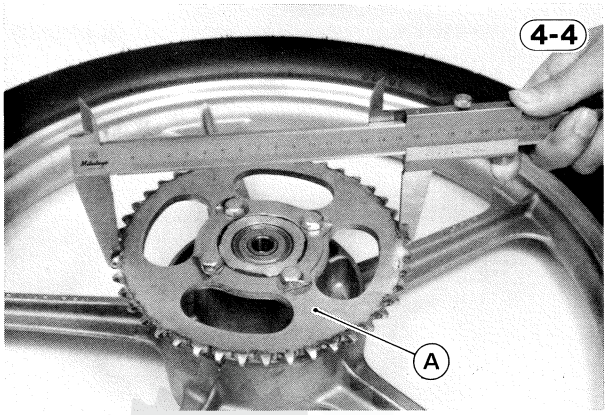
Sprocket Wear Inspection

- Measure the diameter of the sprocket at the base of the teeth.

★If the sprocket is worn down to less than the service limit, replace the sprocket.

Table 4-4 Engine, Rear Sproket Diameter

		Standard	Service Limit
Engine	13T	44.70 – 44.90 mm	44.0 mm
	14T	49.1 – 49.3 mm	48.4 mm
	15T	52.78 – 52.98 mm	52.1 mm
Rear	41T	158.06 – 158.56 mm	157.7 mm
	43T	166.15 – 166.65 mm	165.8 mm
	46T	178.38 – 178.88 mm	178.1 mm
	49T	190.40 – 190.90 mm	190.1 mm



A. Rear Sprocket

NOTE: 1. If a sprocket requires replacement, the chain is probably worn also. Upon replacing a sprocket, insepct the chain.

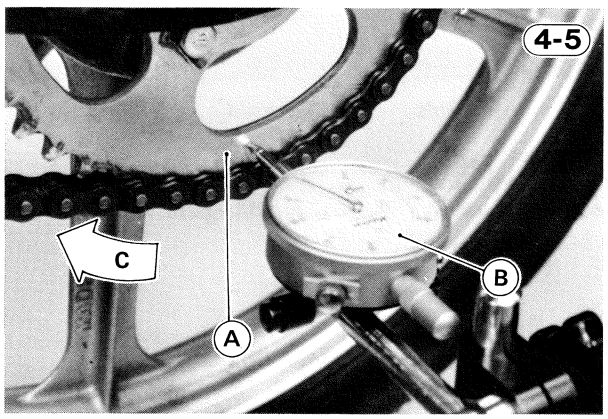
Rear Sprocket Warp Inspection

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

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

Table 4-5 Rear Sprocket Warp

Standard	Service Limit
Under 0.5 mm	0.6 mm



A. Rear Sprocket **B. Dial Gauge** **C. Turn**

BRAKES

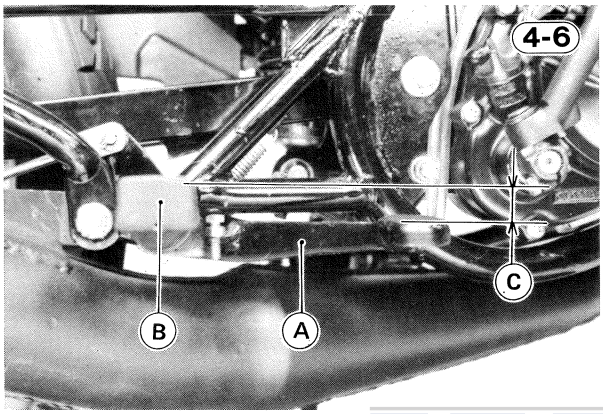
Brake Pedal Position:

Brake pedal position can be adjusted within the usable range to suit you.

Pedal Position Inspection

●When the brake pedal is in its rest position, it should be 0 – 30 mm lower than the top of the footpeg.

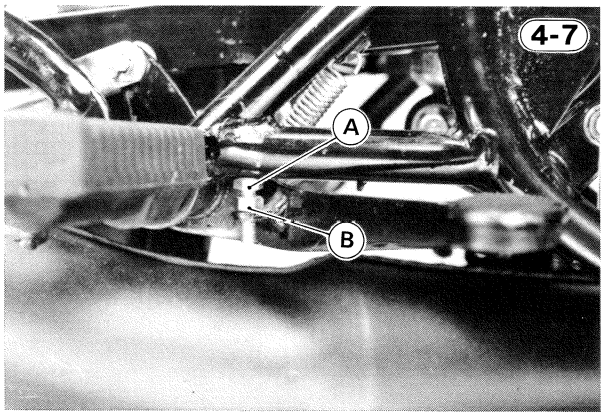
★If it is not, adjust the pedal position.



A. Brake Pedal **B. Footpeg**
C. 0 – 30 mm

Pedal Position Adjustment

●Loosen the locknut, and turn the adjusting bolt to adjust the pedal position.



A. Adjusting Bolt **B. Locknut**

●Tighten the locknut.

●Check the brake pedal play and operation of the rear brake light switch.

Disc Brake:

Master Cylinder Part Wear Inpsection

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

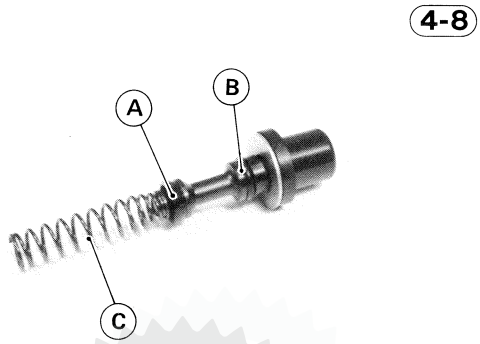
If the small relief port becomes plugged, especially with a swollen or damaged primary cup, the brake pads will drag on the disc.

●Inspect the inside of the master cylinder and piston, and measure the cylinder inside diameter and piston diameter.

★If there are scratches, rust, or pitting on the piston and the inside of the cylinder, replace them.

★If they are worn out of tolerance, replce them.

NOTE: 1. The cup and spring are part of the piston assembly. Replace the piston assembly if the cup or the spring requires replacement.



A. Primary Cup **B. O-Ring** **C. Spring**

●Inspect the primary cup and O-ring. When inserting the cup into the cylinder, see that it is slightly larger than the cylinder.

★If a cup is worn, damaged, softned (rotted), or swollen, replace it.

★If fluid leakage is noted at the brake lever, the cup should be replaced.

●Check that the spring is not damaged and the spring free length is not shorter than the service limit.

★If it is damaged and/or it is shorter than the service limit, replace it.

Table 4-6 Master Cylinder Parts

	Standard	Service Limit
Cylinder Dia.	11.000 – 11.063 mm	11.08 mm
Piston Dia.	10.823 – 10.850 mm	10.80 mm
Primary Cup Dia.	11.3 – 11.7 mm	11.2 mm
Spring Free Length	38.3 – 42.3 mm	36.4 mm

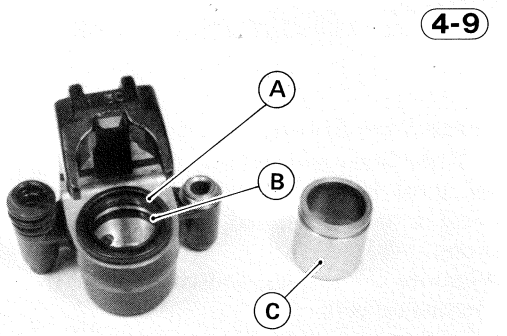
Caliper Part Inspection

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

●Replace the fluid seal under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in left and right pad wear; (d) the seal is stuck to the piston.

NOTE: 1. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

- Check the dust seal.
- ★If they are cracked, worn, swollen, or otherwise damaged, replace them.
- Check the cylinder and piston, and measure the cylinder inside diameter and piston outside diameter.
- ★If they are worn out of tolerance, badly scored, or rusty.



A. Dust Seal **B. Fluid Seal** **C. Piston**

Table 4-7 Caliper Parts

	Standard	Service Limit
Cylinder Dia.	30.23 – 30.28 mm	30.30 mm
Piston Dia.	30.167 – 30.200 mm	30.13 mm

Caliper holder shafts must slide smoothly in the caliper holder. If the shafts do not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid tmeperature.

- Check to see if the caliper holder shafts are nor badly worn or stepped, or rubber friction boot are not damaged.
- ★If the shafts or rubber friction boot are damaged, replace the shafts, rubber friction boot, and the caliper holder.

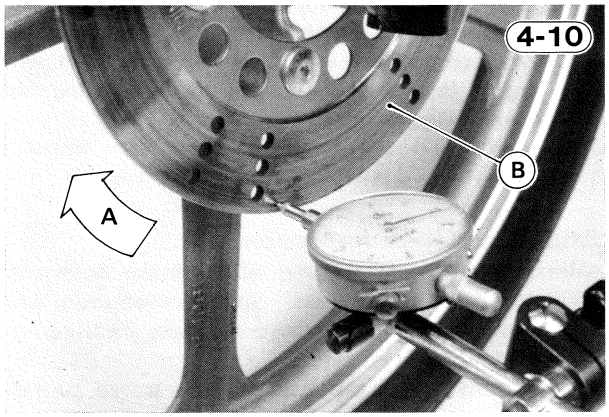
Disc Warp, Wear Inspection

Besides wearing down, the disc may warp. A warped disc will cause the brake pads to drag on the disc and will wear down both the pads and disc quickly. Dragging will also cause overheating and poor braking efficiency.

- Jack up the motorcycle so that the front wheel is off the ground, and turn the handlebar fully to one side.
- Set up a dial gauge against the brake disc and measure the brake disc runout.
- ★If runout exceeds the service limit, replace the disc.

Table 4-8 Disc Runout

Standard	Service Limit
Under 0.2 mm	0.3 mm

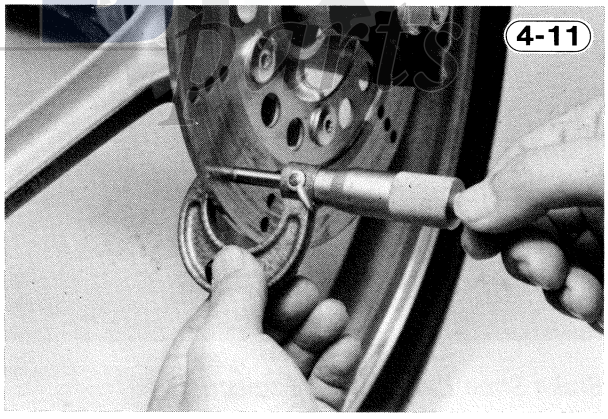


A. Turn **B. Brake Disc**

- Measure the thickness of the disc at the point where it has worn the most.
- ★If it has worn past the service limit, replace it.

Table 4-9 Disc Thickness

Standard	Service Limit
3.8 – 4.1 mm	3.5 mm



Disc Cleaning

Poor braking can also be caused by oil on the disc.

- Oil on the disc must be cleaned off with trichloroethylene or a high flash-point solvent. Do not use one which will leave an oily residue.

Brake Line Damage Inspection

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

- Bend and twist the rubber hose while examining it.
- ★If any crackes or bulges are noticed, replace it.

Drum Brake:

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

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

Brake Drum Wear Inspection

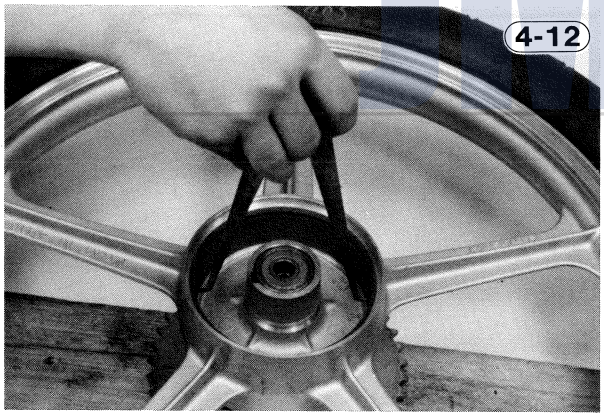
●Measure the inside diameter of the brake drum with calipers to determine wear. Since uneven drum wear will decrease braking effectiveness, take measurement at a minimum of two places.

★If the drum is worn unevenly or if it is scored, turn the drum down on a brake drum lathe or replace the hub with a new one. (Do not turn it down to the service limit, and do not turn it down if any diameter measurement exceeds the service limit).

★If any diameter measurement exceeds the service limit, replace the hub with a new one.

Table 4-10 Brake Drum Inside Diameter

Standard	Service Limit
110.000 – 110.087 mm	110.75 mm



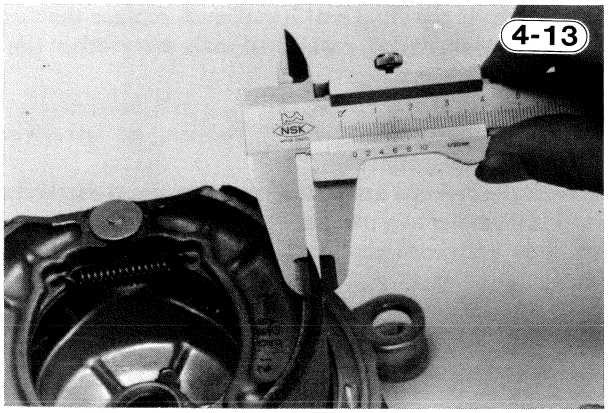
Brake Shoe Lining Wear Inspection

●Check the thickness of the brake linings.

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

Table 4-11 Brake Shoe Lining Thickness

Standard	Service Limit
2.9 ~ 3.5 mm	1.6 mm



Brake Shoe Spring Tension Inspection

If the brake springs have stretched, they will not pulll the shoes back away from the drum after the brake pedal or lever is released, and the shoes will drag on the drum.

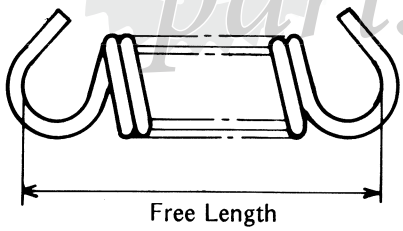
●Remove the springs, and check their free length with vernier calipers.

★If either is stretched beyond the service limit, replace both springs.

Table 4-12 Brake Spring Free Length

Standard	Service Limit
30.8 – 31.2 mm	32.6 mm

Spring Free Length 4-14



Camshaft, Shaft Hole Wear Inspection

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

●Measure the shaft diameter with a micrometer.

★If it is worn down to less than the service limit, replace the camshaft.

●Measure the inside diameter of the camshaft hole.

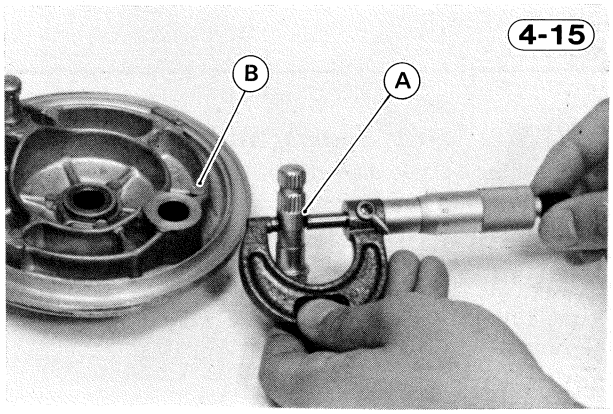
★If it is worn past the service limit, replace the brake panel.

Table 4-13 Brake Camshaft Diameter

Standard	Service Limit
11.957 – 11.984 mm	11.88 mm

Table 4-14 Camshaft Hole Diameter

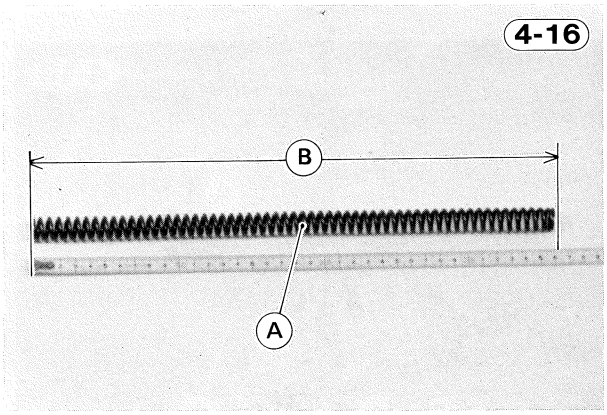
Standard	Service Limit
12.000 – 12.027 mm	12.15 mm



A. Camshaft B. Brake Panel

Table 4-15 Front Fork Spring Length

Standard	Service Limit
358 mm	351 mm



A. Fork Spring B. Free Length

STEERING STEM

Steering Stem Warp Inspection

●Examine the steering stem.

★If it is bent, replace it.

Bearing Wear, Damage Inspection

●Wipe the bearings clean of grease and dirt, and examine the races and balls.

★If the balls or races are worn, or if either race is dented, replace both races and all the balls for that bearing as a set.

Grease Seal Deterioration, Damage Inspection

●Check the grease seal.

★If it has any signs of deterioration or damage, replace it.

FRONT FORK

Spring Tension Inspection

●Since the spring becomes shorter as it weakens, check its free length to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced.

★If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Inner Tube Damage Inspection

●Visually inspect the inner tube, and repair any damage.

★If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced. Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

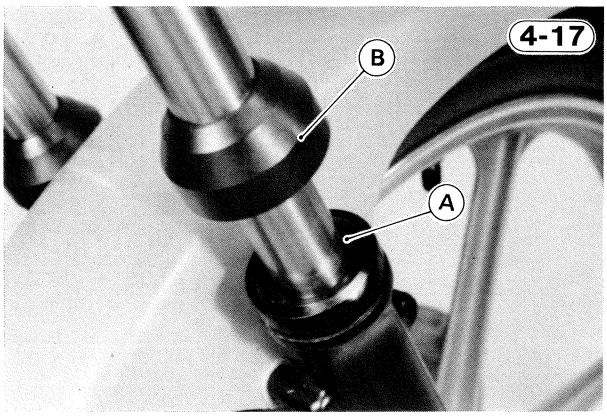
CAUTION **1. If the inner tube is bent or badly creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

Oil Seal, Dust Seal Inspection

●Check the oil seal and dust seal.

★If any signs of deterioration or damage, replace them.

NOTE: 1. Replace the oil seal with a new one whenever it has been removed.



A. Oil Seal B. Dust Seal

Non-scheduled Maintenance – Electrical

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BATTERY

With proper care, the battery can be expected to last several years, but it may be completely ruined long before that if it is mistreated. Following a few simple rules will greatly extend the life of the battery.

1. **When the level of the electrolyte in the battery is low, add only distilled water to each cell, until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.**
2. **Never add sulphuric acid solution to the battery. This will make the electrolyte solution too strong and will ruin the battery within a very short time.**
3. **Avoid quick-charging the battery. A quick-charge will damage the battery plates.**
4. **Never let a good battery stand for more than 30 days without giving it a supplemental charge, and never let a discharged battery stand without charging it. If a battery stands for any length of time, it slowly self-discharges. Once it is discharged, the plates sulphate (turn white), and the battery will no longer take a charge.**
5. **Keep the battery well charged during cold weather so that the electrolyte does not freeze and crack open the battery. The more discharged the battery becomes, the more easily it freezes.**
6. **Always keep the battery vent hose free of obstruction, and make sure it does not get pinched, crimped, or melted shut by contact with the hot muffler. If battery gases cannot escape through this hose, they will explode the battery.**
7. **DON'T INSTALL THE BATTERY BACKWARDS. The negative side is grounded.**

Electrolyte:

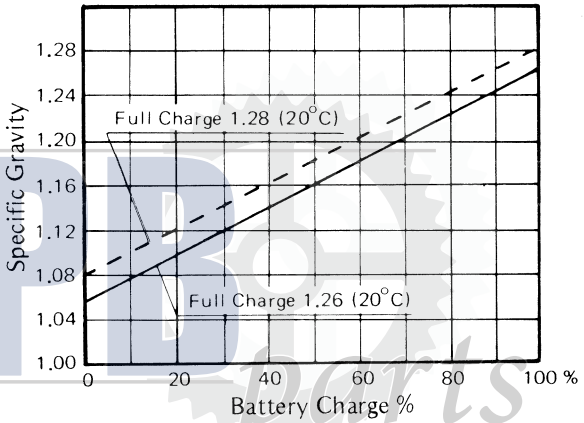
The electrolyte is dilute sulphuric acid. The standard specific gravity of the electrolyte used in warm climates in a fully charged battery is 1.260 at 20°C (68°F). (In particularly cold regions, a solution with a standard specific gravity of 1.280 is used.) The water in this solution changes to a gaseous mixture due to chemical action in the battery and escapes, which concentrates the acid in a charged battery. Consequently, when the level of the electrolyte becomes low, only distilled water should be added. If sulphuric acid is added, the solution will become too strong for proper chemical action and will damage the plates. Metal from the damaged plates collects in the bottom of the battery. This sediment will eventually cause an internal short circuit.

The specific gravity of the electrolyte is measured with a hydrometer and is the most accurate indication of the condition of the battery. When using the hydrometer, read the electrolyte level at the bottom of the meniscus (curved surface of the fluid). Fig. 5-1 shows the relationship between the specific gravity of the solution at 20°C (68°F) and the percentage of battery charge. Since specific gravity varies with temperature, and since the temperature of the solution being checked is likely to be other than 20°C (68°F); the formula given below should be used to compute the equivalent specific gravity for any temperature. When the temperature goes up, the specific gravity goes down, and vice versa.

○Celsius $S_{20} = S_t + [0.0007 (t - 20)]$
○Fahrenheit $S_{68} = S_t + [0.0004 (t - 68)]$
S_t = specific gravity at the present temperature S_{20} = specific gravity at 20°C S_{68} = specific gravity at 68°F t = present temperature of solution

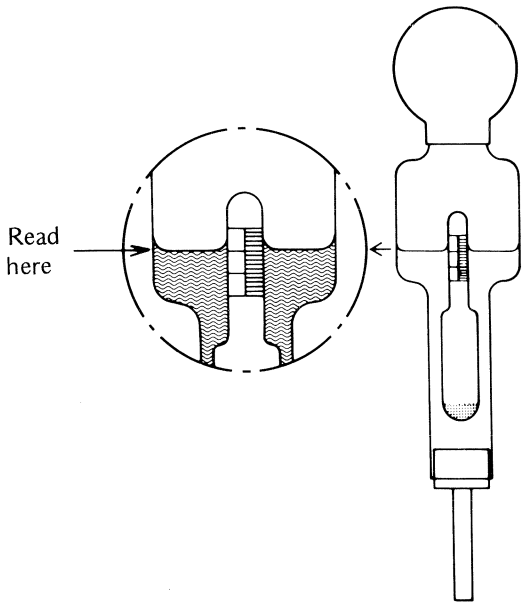
Generally speaking, a battery should be charged if a specific gravity reading shows it to be discharged to 50% or less of full charge.

Specific Gravity/Battery Charge Relationship **5-1**



NOTE: 1. When using the hydrometer, read the electrolyte level at the bottom of the meniscus (curved surface of the fluid).

Hydrometer **5-2**



Battery Charge:

Initial Charging

New batteries for Kawasaki motorcycles are dry charged and can be used directly after adding the electrolyte. However, the effect of the dry charge deteriorates somewhat during storage, especially if any air has entered the battery from imperfect sealing. Therefore, it is best to give the battery an initial charge before using it in order to ensure long battery life.

WARNING **1. Because the battery gives off an explosive gas mixture of hydrogen and oxygen, keep any sparks or open flame away from the battery during charging.**

- Pour a 1.260 (specific gravity at 20°C or 68°F) sulphuric acid solution into each cell of the battery up to the upper level line.
- Let the battery stand for 30 minutes, adding more acid if the level drops during this time.

NOTE: 1. If the temperature of the solution is over 30°C (85°F) cool the solution before pouring it into the battery.

2. After pouring the acid into the battery, start charging the battery within 12 hours.

- Leaving the caps off the cells, connect the battery to a charger, set the charging rate at 1/10 the battery capacity, and charge it for 10 hours. For example, if the battery is rated at 6AH, the charging rate would be 0.6 ampere. If a constant voltage charger is used, the voltage must be adjusted periodically to keep the current at a constant value.

CAUTION **1. If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to bring down the temperature, and increase the charging time proportionately.**

- After charging, check the electrolyte level in each cell. If the level has dropped, add distilled water to bring it back up to the upper level line.
- Check the results of charging by measuring the specific gravity of each cell and by measuring battery voltage. Battery voltage of a 6 volt battery directly after the completion of charging should be 7.5 to 8 volts.

Ordinary Charge

WARNING **1. Because the battery gives off an explosive gas mixture of hydrogen and oxygen, keep any sparks or open flame away from the battery during charging.**

- Clean off the battery using a solution of baking soda and water. Make especially sure that the terminals are clean.
- If the electrolyte level is low in any cell, fill to over the lower level line but not up to the upper level line since the level rises during charging. Figure the charging rate to be between 1/10 and 3/10 of battery capacity. For example, the maximum charging rate for a 6AH battery would be 3/10 x 6 which equals 1.8 amperes.

CAUTION **1. Charging the battery at a rate higher than specified above could ruin the battery. Charging at a higher rate causes excess heat, which can warp the plates and cause internal shorting. Higher than normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.**

- Measure the specific gravity of the electrolyte, and use the graph, Fig. 5-1, to determine the percentage of discharge. Multiply the capacity of the battery by the percentage of discharge to find the amount of discharge in ampere-hours. Use this figure in the formula below to compute charging time.

$$\text{Charging time (hours)} = \frac{\text{Amount of discharge (AH)}}{\text{Charging current (A)}} \times 1.2 \sim 1.5$$

- Remove the caps from all the cells, and begin charging the battery at the rate just calculated. If a constant voltage charger is used, the voltage will have to be adjusted periodically to maintain charging current at a constant value.

CAUTION **1. If the temperature of the electrolyte rises above 45° C (115°F) during charging, reduce the charging rate to bring down the temperature, and increase charging time proportionately.**

- After charging, check the electrolyte level in each cell.
- ★If the level has dropped, add distilled water to bring it back up to the upper level line.
- Check charging results by measuring the specific gravity of each cell and by measuring battery voltage. Battery voltage of a 6 volt battery directly after the completion of charging should be 7.5 to 8 volts and the specific gravity of the electrolyte should be more than 1.250.
- ★If the voltage is lower than this, the battery is not completely charged or can no longer take a full charge.
- ★If the specific gravity of any one cell is lower than 1.250, there may be damage in the cell.

Battery Test:

When the battery is suspected of being defective, check the battery as the following:

- Inspect the points noted in the Table 5-1.

Table 5-1 Battery Troubleshooting Guide

	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (−) gray	white (sulphated); + plates broken or corroded	Replace
Sediment	none, or small amount	sediment up to plates, causing short	Replace
Voltage	above 6 volts	below 6 volts	Test charge
Electrolyte Level	above plates	below top of plates	Fill and test charge
Specific Gravity	above 1.200 in all cells; no two cells more than 0.020 different	below 1.100, or difference of more than 0.020 between two cells	Test charge

●Charge the battery with the ordinary charge following the table.
★If the battery will take a charge so that the voltage and specific gravity come up to normal, it may be considered good except in the following case:
☆If the voltage suddenly jumps to over 7 volts just after the start of charging, the plates are probably sulphated. A good battery will rise to 6 volts immediately and then gradually go up to 6.3 – 6.5 volts in about 30 to 60 minutes after charging is started.
☆If one cell produces no gas bubbles, or has a very low specific gravity, it is probably shorted.
☆If there does not appear to be enough sediment to short the plates, but one cell has a low specific gravity after the battery is fully charged, the trouble may be instance only, sulphuric acid solution may be added to correct the specific gravity.
☆If a fully charged battery not in use loses its charge after 2 to 7 days, or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1% per day.

LIGHTING/CHARGING SYSTEM

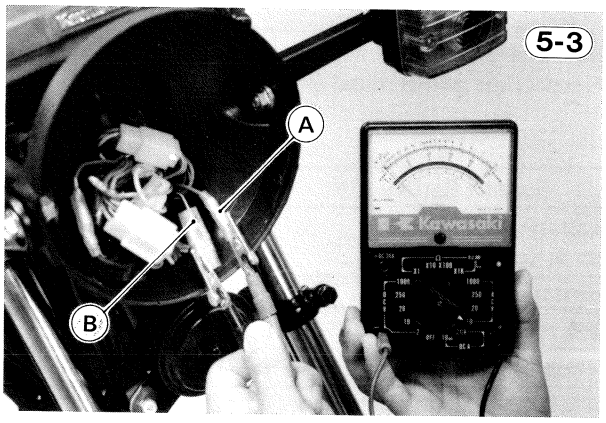
Lighting/Charging Coil:

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

AC Lighting Voltage Measurement

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

NOTE: 1. Perform test with headlight connected.



A. Red/Yellow Lead **B. Ground Lead**

●Switch on the headlight, tail light, neutral indicator light, tachometer light, and speedometer light by turning the headlight switch to the ON position and the dimmer switch to high beam.
●Start the engine, and see that these lights are all lit.
●Measure the lighting voltage at 4,000 rpm. The voltage should show the value in Table 5-2.

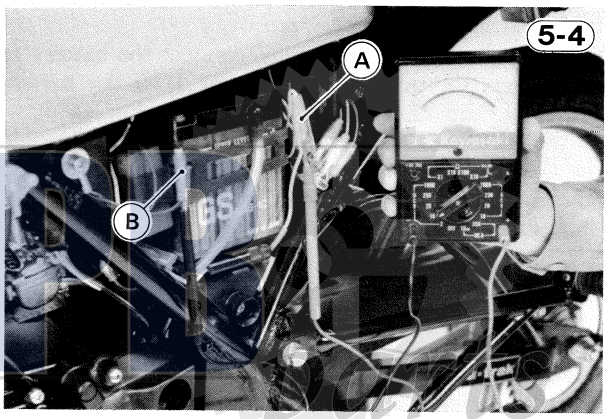
Table 5-2 AC Lighting Voltage

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

●Stop the engine.
●Disconnect the meter leads.

DC Charging Voltage Measurement

●To measure the DC voltage produced by the magneto, connect the voltmeter, set to 10VDC, across the battery – lead and the + lead to the battery + lead.



A. + Lead **B. – Lead**

●Start the engine, and run it at 4,000 rpm.
●Measure the voltage when the headlight is off with turning the headlight switch.

Table 5-3 DC Charging Voltage

Headlight	Meter	Reading @4,000 rpm
OFF	DC 10V	about 8.0 – 8.5V

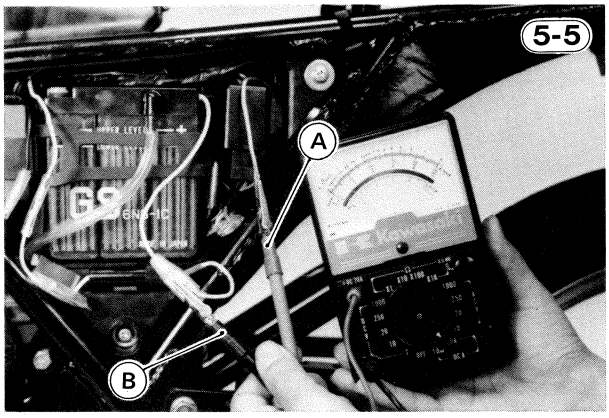
●Stop the engine.
●Disconnect the meter leads.

DC Charging Amperage Measurement

●Set the ammeter to the 20A DC range.
●Disconnect the rectifier white/red lead from the battery + lead.
●Connect the – meter lead to the battery + lead, and connect the + meter lead to the white/red lead on the rectifier side. This puts the meter on series with the rectifier and battery so that the battery charging amperage can be measured.
●Start the engine, and run it at 4,000 rpm.
●Measure the amperage when the headlight is off with turning the headlight switch.

Table 5-4 DC Charging Amperage

Headlight	Meter	Reading @4,000 rpm
OFF	DC 20A	about 0.8 – 1.0A



A. Meter + Lead **B. Meter – Lead**

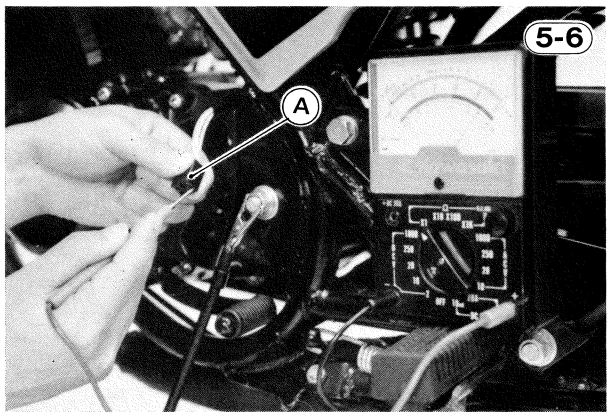
★If any one of the above checks shows a low reading, the lighting/charging system is not functioning satisfactorily. Since the components outside the magneto itself have been determined to be in proper order, the trouble must be either with the coils or with the magneto flywheel.

- Disconnect the magneto output lead connector.
- Use an ohmmeter as shown in Table 5-5 and Fig. 5-6. Less than the proper resistance means a coil short; higher than the proper resistance or no reading at all means a break in the coils. In case of a short or break, replace the lighting/charging coils as a set.

Table 5-5 Lighting/Charging Coil Resistance †

Coil	Connections	Reading	
		AR50-80	AR50 for West German
Charging	Pink Lead ↔ Ground	0.28 – 0.42 Ω	0.48 – 0.72 Ω
Lighting	Yellow Lead ↔ Ground	0.25 – 0.37 Ω	0.36 – 0.54 Ω

†Measure when the coil is cold (room or atomospheric temperature).



A. Magneto Output Lead Connector

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

Rectifier:

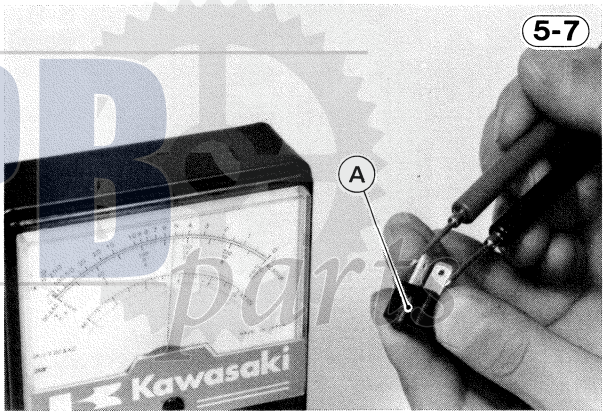
A defective rectifier can be readily detected with a resistance check.

NOTE: 1. If the motorcycle is operated with the battery left disconnected, the rectifier will become damaged due to excessive inverse voltage.

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

Inspection

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



A. Rectifier

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

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

Headlight Circuit:

If the headlight does not light, check to see if the bulb has burned out or the fuse has blown. A blown fuse should be replaced. If the bulb and fuse are good, check the dimmer switch and headlight switch. Table 5-6 shows the connections in the dimmer switch for both high and low beam.

Inspection

- Remove the headlight unit.
- Disconnect the leads and connector to the headlight switch and the dimmer switch.

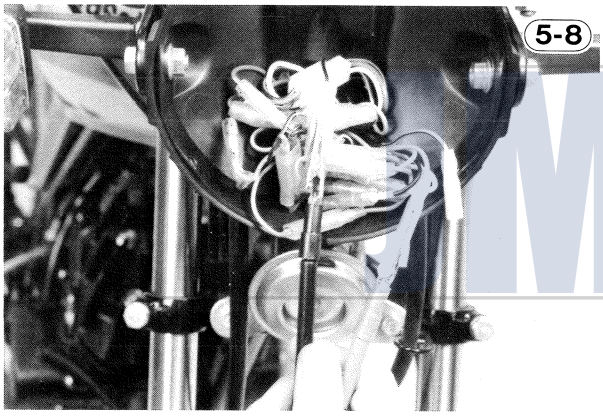
●Use an ohmmeter to see that only the connections shown in the the table have continuity (zero ohms).

Table 5-6 Dimmer Switch Connections

Color	Red/Black	to Headlight Switch	Red/Yellow
High	○———	———○	
Low		○———	———○

Table 5-7 Headlight Switch Connections

Color	Light Blue	Yellow	Red	to Dimmer Switch
OFF	○———	———○		
PO	○———	———○	———○	
ON		○———	———○	———○



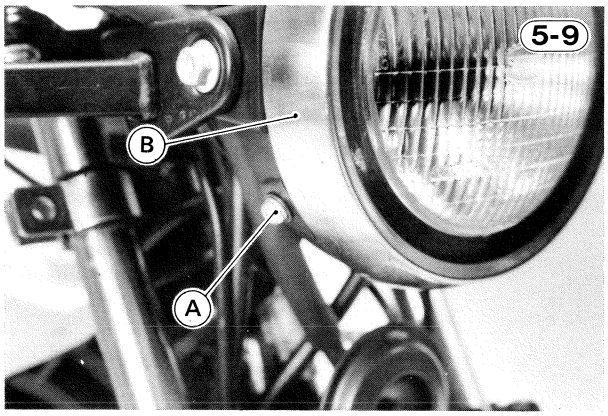
★If the switch has an open or a short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement.
★If any parts are not repairable, the switch must be replaced as a unit.
★If the procedure above does not remedy the problem, check the ignition switch, the wiring, and the magneto.

Headlight Beam:

Vertical Adjustment

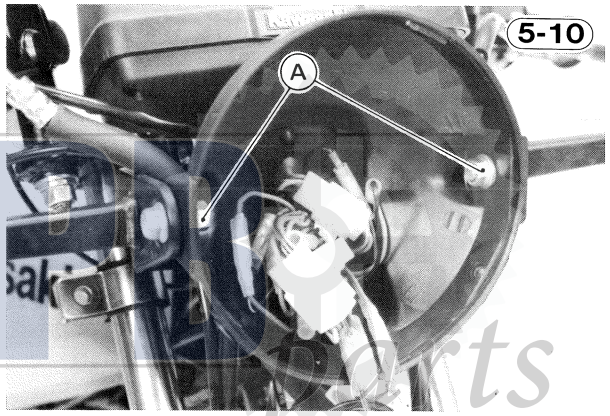
The headlight beam is adjustable vertically. If adjusted too low, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam will fail to illuminate the road close ahead, and the low beam will dazzle oncoming drivers.

●Remove the mounting screws, and drop out the headlight unit.



A. Mounting Screw **B. Headlight Unit**

●Loosen the headlight housing mounting nuts, and adjust the headlight vertically.

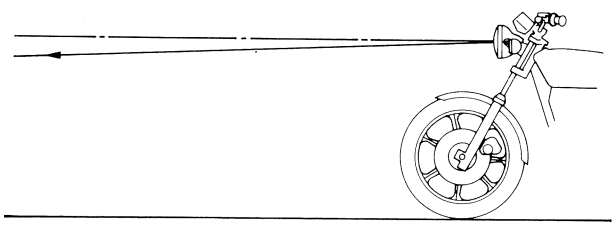


A. Mounting Nuts

●Tighten the headlight housing mounting nuts.
●Install the headlight unit, and tighten the mounting screws.

NOTE: 1. On high beam, the brightest point should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.

Vertical Adjustment 5-11

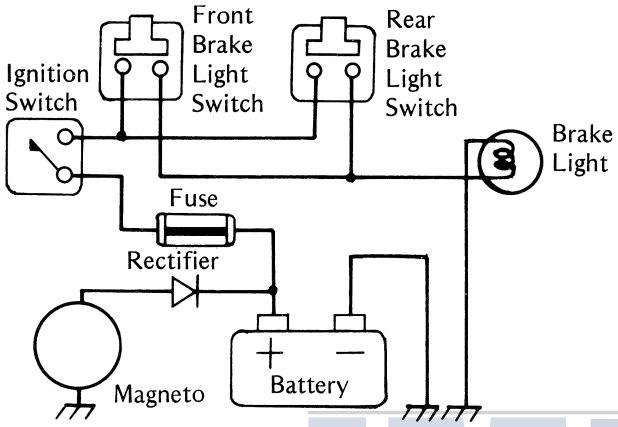


Tail/Brake Light Circuit:

NOTE: 1. The same bulb is used for both the brake and tail light.

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

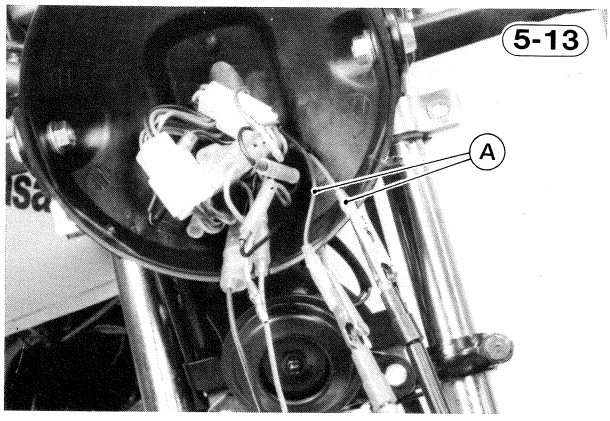
Brake Light Circuit (5-12)



Front Brake Light Switch Inspection

- To check the front brake light switch, first disconnect the brown and the blue switch leads in the headlight housing.
- Connect an ohmmeter to the switch leads, and pull the front brake lever. The ohmmeter should read zero ohms.

★If it does not, replace the switch. If the switch checks out okay but the brake light does not light, check the wiring.

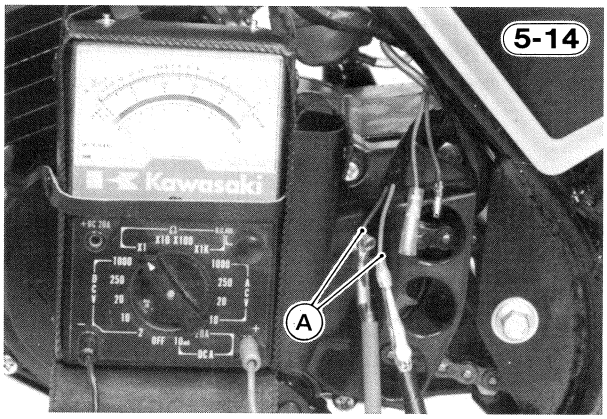


A. Front Brake Light Switch Leads

Rear Brake Light Switch Inspection

- Disconnect the rear brake light switch leads in the left side cover.
- Inspect the rear brake light switch in the same way that the front brake light switch was inspected.

★If there is no continuity whenever the rear brake pedal is depressed, replace the switch.

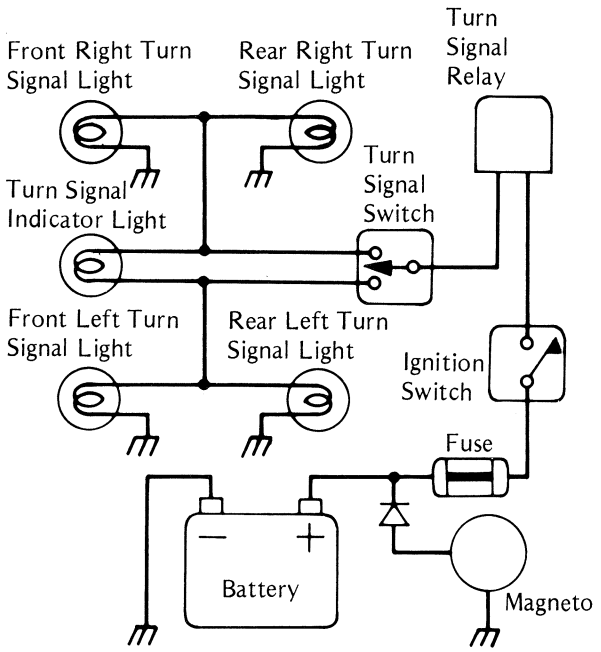


A. Rear Brake Light Switch Leads

Turn Signal Circuit:

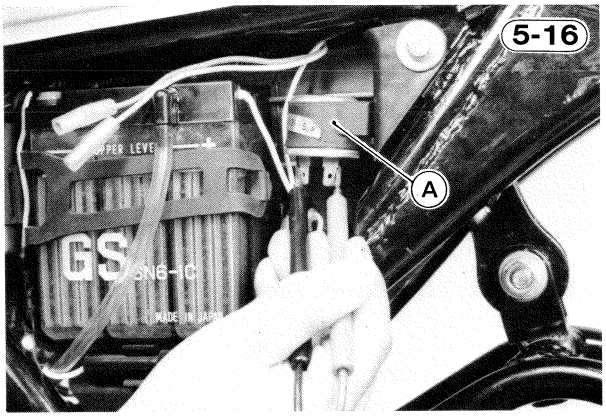
Since the turn signal relay is designed to operate correctly only when two turn signals (one front and one rear) and the turn signal indicator light are properly connected in the circuit, trouble may result from a burned out bulb, a bulb of incorrect wattage, loose wiring, as well as from a defect in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

Turn Signal Circuit (5-15)



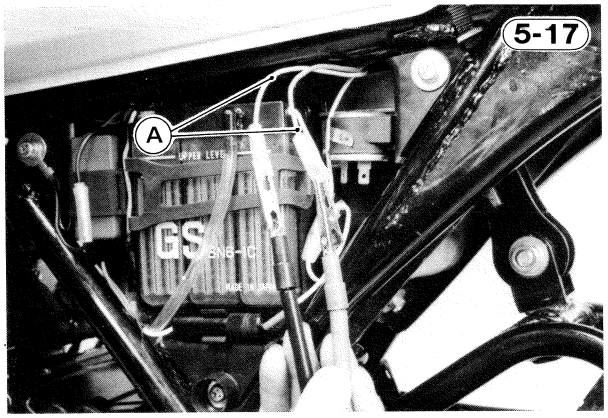
Inspection

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



A. Turn Signal Relay

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



A. Turn Signal Relay Leads

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

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

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

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

IGNITION SYSTEM

The ignition system of this vehicle consists of a spark plug, an ignition coil, a Capacitor Discharge Ignition (CDI) unit, an exciter coil, a pickup coil, and an engine stop switch.

Since the CDI system has no mechanical parts such as a cam or contact breakers, there are no parts to wear out and no periodic maintenance is required. So, unless there is circuit failure or the magneto stator plate is incorrectly installed during engine assembly, there is never any need to readjust the timing once it has been set correctly. However, if there is any doubt as to correct timing, inspect and adjust as follows.

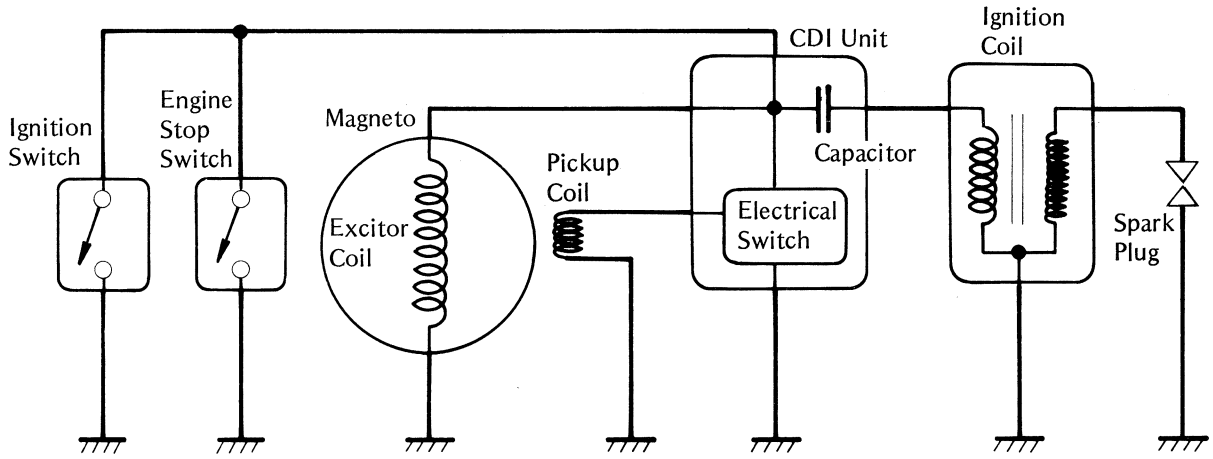
Ignition Timing:

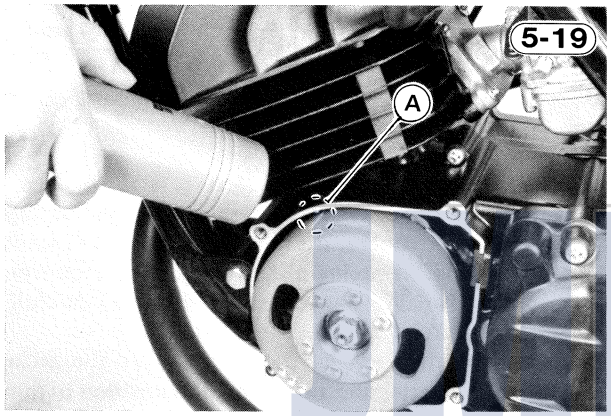
Ignition Timing Test

- ●Remove the magneto cover.
- ●Connect a strobe light in the manner prescribed by the manufacturer in order to check the ignition timing under operating conditions.

WARNING **1. Make sure that no tools, clothes, or leads ever touch the spinning flywheel. Touching the flywheel of a running engine could cause an injury.**

- ●Start the engine, run the engine at 3,000 rpm, and direct the light at the timing marks on the flywheel and crankcase. The marks should align at 3,000 rpm.





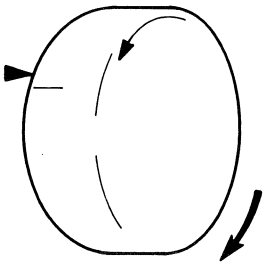
A. Timing Marks

- If they do not, stop the engine.
- Remove the magneto flywheel.
- Loosen the magneto stator plate screws (3), and turn the magneto stator to adjust the timing; clockwise rotation advances the timing and counterclockwise retards it.

Dynamic Ignition Timing 5-20

1. Plug Fires Late

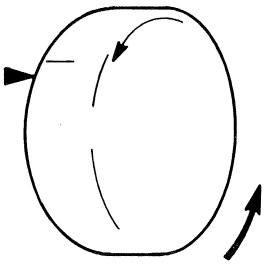
Retarded



To correct move stator clockwise.

2. Plug Fires Early

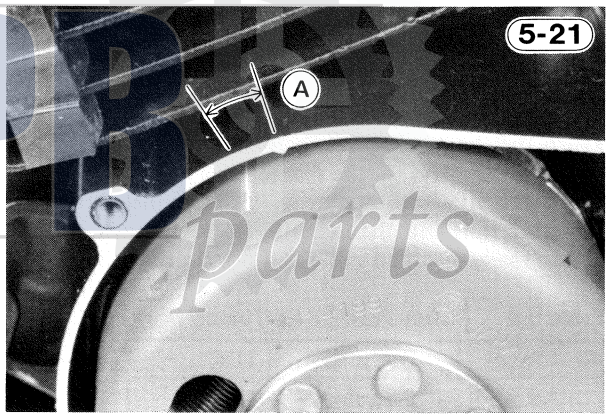
Advanced



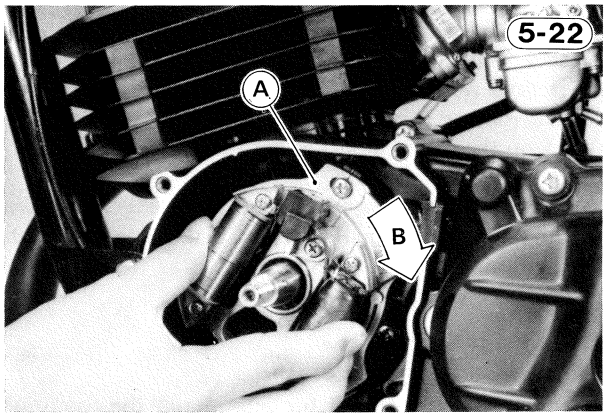
To correct move stator counterclockwise.

Example (when retarded):

If flywheel mark is retarded 5° for example as shown in Fig. 5-21, stator must be advanced by the same amount (5°) to set timing correctly as shown in Fig. 5-22. (Angles shown are exaggerated for emphases.)



A. Retarded 5°



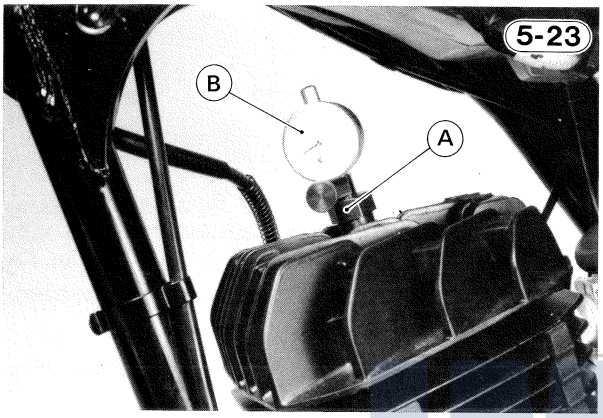
A. Stator **B. Turn the stator clockwise 5°.**

- After adjusting, tighten the stator plate screws securely, and reinstall the magneto flywheel.

●Recheck the timing with strobe light, and readjust if necessary.
●Install the magneto cover and gasket.

Verification of Timing Marks

The accuracy of the timing marks can be checked with a dial gauge and TDC finder (special tool).
●Remove the magneto cover, and turn the magneto flywheel until the position of the piston is close to the top.
●Pull off the spark plug cap, and unscrew the spark plug.
●Install the TDC finder "A" (special tool) in the plug hole, and mount the dial gauge on the TDC finder.



A. TDC Finder "A": 57001-402 **B. Dial Gauge**

●Turn the flywheel to set the piston at exact TDC (top dead center), and set the dial to zero.
●Turn the flywheel clockwise until the dial gauge read about 2 mm and then counterclockwise until the dial gauge reads specified value as shown in the table.

Table 5-8 Piston Position at Timing Mark

	Distance from TDC
AR50	0.75 mm
AR80	1.53 mm, Ⓤ 1.10 mm

Ⓤ : UK model

●The timing mark on the flywheel should align with the timing projection on the crankcase at this point.
★If it does not, set the piston at the specified position BTDC (before top dead center) and make a new timing mark on the flywheel just under the projection.
●Check the ignition timing.
NOTE: 1. When inspecting ignition timing after verifying the timing marks with a dial gauge, use your new timing mark.

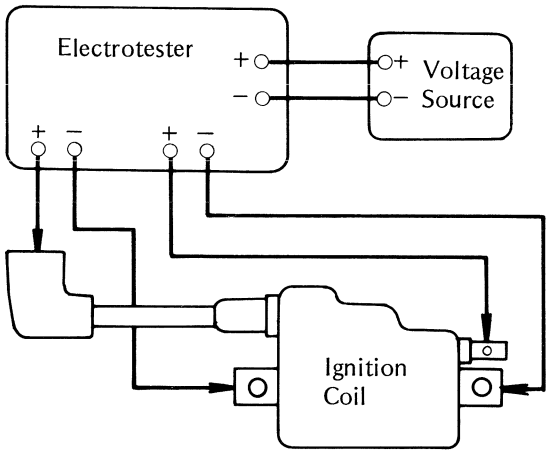
Ignition Coil:

Ignition Coil Inspection

The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with the Kawasaki Electrotester. Since a tester other than the Kawasaki Electrotester may produce a different arcing distance, the Kawasaki Electrotester is recommended for reliable results.

●Remove the ignition coil.
●Connect the ignition coil to the Kawasaki Electrotester as shown in the figure.

Ignition Coil Test 5-24

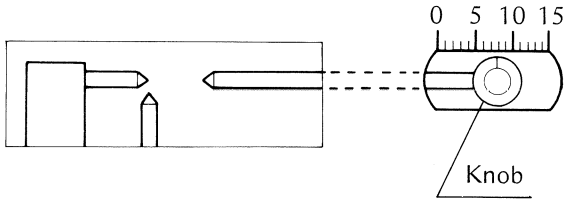


●Turn on the tester switches.

WARNING **1. To avoid extremely high voltage shocks, do not touch the coil or leads.**

●Generally slide the arcing distance adjusting knob from left to right (small distance to large distance) carefully checking the arcing.
●Stop moving the knob at the point where the arcing begins to fluctuate, and note the knob position in mm. The reading should be 6 mm.

Arcing Distance Measurement 5-25



★If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.
●To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil.
★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.
NOTE: 1. If an Electrotester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

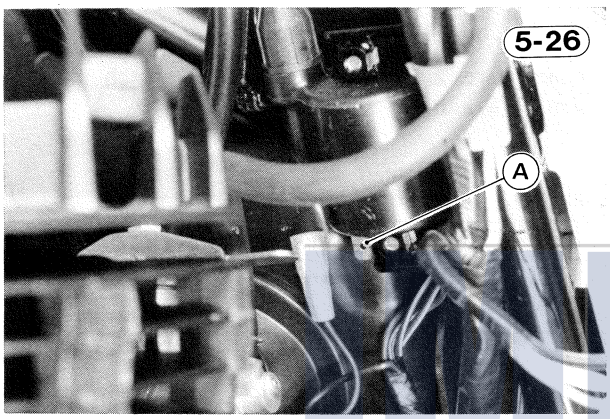
Ignition Coil Resistance Measurement

- Remove the fuel tank.
- Disconnect the green/white ignition coil lead, pull the spark plug cap off the spark plug, and test the windings as shown in Table 5-9. For measurement of secondary winding resistance, remove the spark plug cap from the spark plug lead.

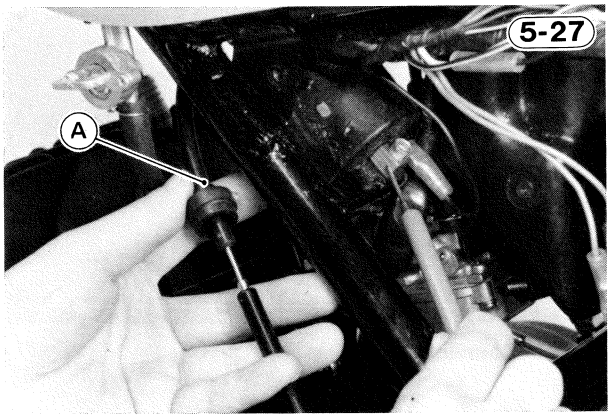
Table 5-9 Ignition Coil Resistance†

Wiring	Meter	Connections	Reading
Primary	x 1 Ω	Ground ↔ Terminal	0.34 – 0.52 Ω
Secondary	x 1 kΩ	Ground ↔ Spark Plug Lead	3.2 – 4.8 kΩ

†Measured when the coil is cold (room or atomospheric temperature).



A. Coil Terminal



A. Spark Plug Lead

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

★Also, replace the ignition coil if the spark plug lead shows visible damage.

Exciter, Pickup Coils:

Coil Inspection

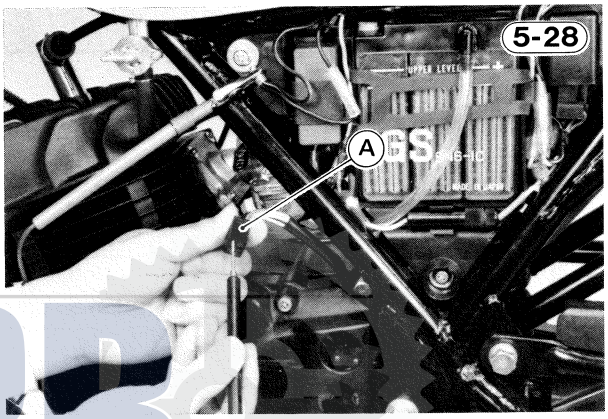
If the spark is weak or absent after the spark plug, ignition coil, and CDI unit are found to be all functioning properly, and if the wiring is all in good condition and properly connected, the cause may be a short or open in the exciter coil or signal coil, or a loss of magnetism in the flywheel magnets.

- Disconnect the magneto lead connector.
- Use an ohmmeter, and measure the resistance between the leads shown in Table 5-10.

Table 5-10 Exciter Coil, Pickup Coil Resistance †

Coil	Meter	Connections	Reading
Exciter	x 10 Ω	Black/Red Lead ↔ Ground	98 – 146 Ω
Pickup	x 10 Ω	Green/Red Lead ↔ Ground	14 – 22 Ω

†Measure when the coil is cold (room or atomospheric temperature).



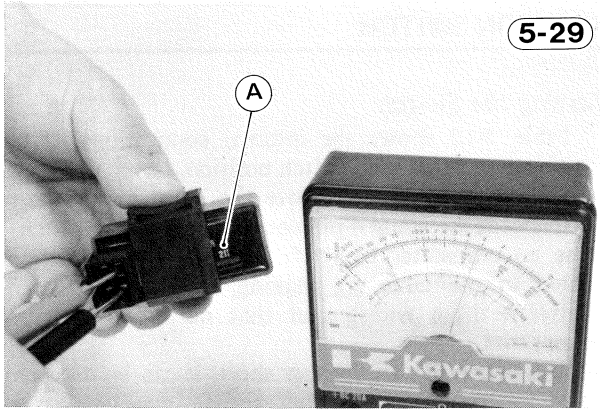
A. Magneto Lead Connector

CDI Unit:

CDI Unit Inspection

Set the Kawasaki hand tester (or a small portable type of multi meter) to the x 1 kΩ range, and connect the meter leads as shown in Table 5-11 (Fig. 5-30). If the readings correspond to the table, the CDI unit is good. "Zero" the meter before using it.

CAUTION **1. Use only a small portable type of multimeter for this test. If a megger or a meter with a large-capacity battery is used, the CDI unit will be damaged.**

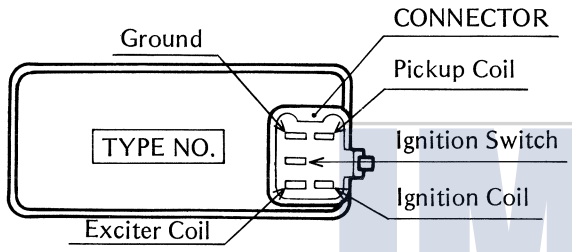


A. CDI Unit

Table 5-11 CDI Unit Test Using a Multimeter
TYPE No. CF411. . . .with black connector, for AR50 Ⓤ Ⓦ , AR80 Ⓦ Ⓕ etc.
(TYPE No. CF419). . .with green connector, for AR80 Ⓤ.

Tester Negative (−) Lead Connention	Terminal	Tester Positive (+) Lead Connection: Pickup Coil	Ignition Coil	Ground	Ignition Switch	Exciter Coil
	Pickup Coil		∞	15 – 50 kΩ (9 – 20 kΩ)	200 kΩ – ∞ (15 – 40 kΩ)	50 – 500 kΩ (15 – 40 kΩ)
	Igntion Coil	∞		∞	∞	∞
	Ground	5 – 20 kΩ (∞)	∞		2 – 6 kΩ (2 – 5 kΩ)	2 – 6 kΩ (2 – 5 kΩ)
	Igniiton Switch	∞	∞	∞		0 Ω (0 – 0.5 Ω)
	Exciter Coil	∞	∞	∞	0 Ω (0 – 0.5 Ω)	

CDI Unit Connector (5-30)



Engine Stop Switch:

Switch Inspection

- Disconnect the black/white lead from the engine stop switch in the headlight housing.
- Connect one ohmmeter lead to the black/white lead from the switch, and ground the other ohmmeter lead to the chassis.
- The switch should show continuity when the switch is in "OFF" position, and discontinuity when in "RUN" position.

IGNITION SWITCH

Testing the Switch

Table 5-12 shows the internal connections of the ignition switch for each switch position.

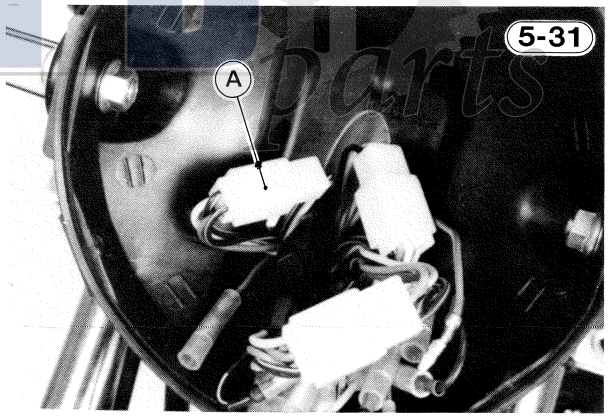
- To check the switch, remove the headlight unit, and disconnect the white 4-pin connector from the switch.
- Use an ohmmeter to verify that all the connections listed in the table are making contact (zero ohms between those wires), and that no other wires are connected.

★If the switch has an open or short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement.

★If any parts are not repairable, the switch must be replaced as a unit.

Table 5-12 Ignition Switch Connections

Color	Black/White	Black/Yellow	White	Brown
OFF	○	○		
ON			○	○



A. 4-pin Connector

Note: There may be difference in the connections on each model. See the wiring diagram for details.

ENGINE OIL LEVEL WARNING SYSTEM

This system warns the rider when there is only about 0.2 liters of engine oil remaining in the tank by lighting the low engine oil warning light. It consists of an engine oil level sensor inside the tank, warning light, battery, and neutral indicator circuit to check the bulb for burnout.

Engine Oil Level Warning Circuit (5-32)

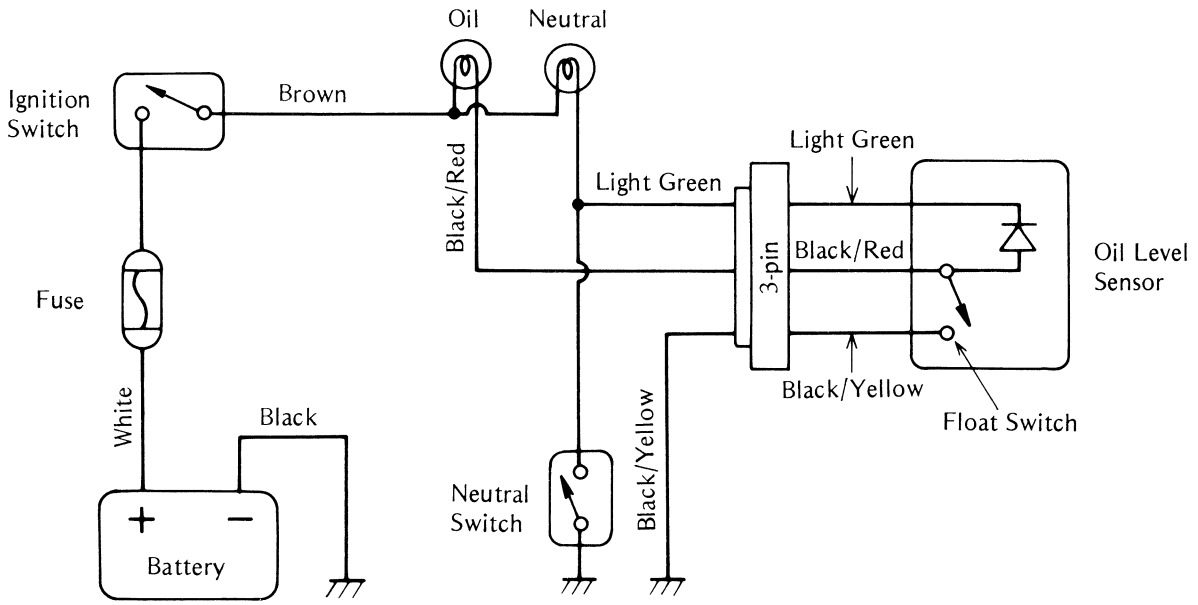


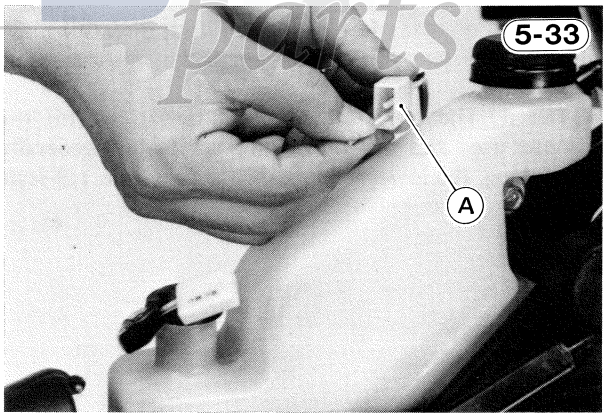
Table 5-13 Wiring Check

Meter Range	Connections	Ignition Switch	Reading
10V DC	Meter (+) → Black/Red Meter (−) → Ground	On	Battery voltage
x 10 Ω or x 1 Ω	One meter lead → Black/Yellow The other meter lead → Ground	Off	Continuity (close to zero ohms)

It works as follows: with the transmission in any but neutral position, the warning light stays on continuously until engine oil is added if the engine oil level is low. While the transmission is in neutral position, the warning light also goes on (even if sufficient engine oil is in the tank). This is to show if the bulb of the warning light has burned out.

If the warning system does not function properly, inspect the system as follows.

NOTE: 1. Before inspecting the warning system, make sure that the neutral indicator circuit works properly. By disconnecting the 3-pin connector of the engine oil level sensor under the fuel tank, the neutral indicator circuit becomes independent of the warning system, and easy to check. If the neutral circuit does not work properly, repair the circuit.



A. 3-pin Connector

Warning System Circuit Check

- Remove the fuel tank, and disconnect the 3-pin connector which connects the engine oil level sensor to the main wiring harness.
- Turn on the ignition switch, and short together the black/red and black/yellow leads on the main wiring harness side of the 3-pin connector. At this time the warning light should light.

★If it does not, the trouble is with one of the following: the warning light bulb, the black/red lead, or the black/yellow lead which is grounded to the chassis.

- Using a multimeter, measure the voltage and continuity at the 3-pin connector as shown in Table 5-13. If the meter reading shows an improper value, the wiring is damaged.

Sensor Check

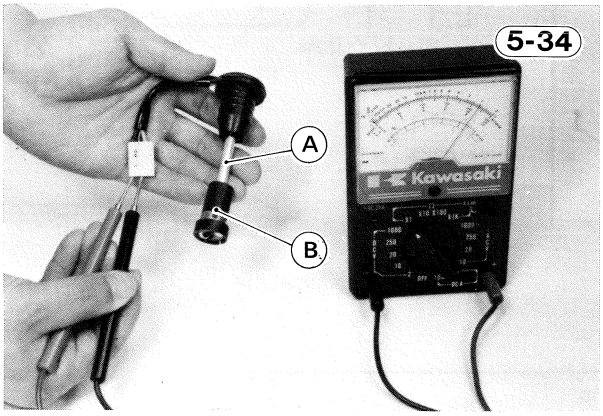
- Remove the engine oil level sensor from the oil tank, and stuff a piece of clean cloth into the opening to keep dirt from contaminating the engine oil in the tank.

- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly or if the sensor has visual damage, replace the sensor.

- Set an ohmmeter to the x 1 Ω range, and connect the ohmmeter leads to the black/red and black/yellow leads to check the switching operation of the float.
- The ohmmeter should show continuity when the float is at the bottom.

★If it does not, replace the sensor.



A. Oil Level Sensor **B. Float**

- Setting an ohmmeter to the x 10 Ω or x 100 Ω range, check the resistance between black/red lead and the light green lead. The resistance should be low in one direction and more than ten times as much in the other direction.

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

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

NEUTRAL SWITCH

Neutral Switch Inspection

If the neutral indicator light does not go on in the neutral position, or if it goes on in other positions —

- Check that the shift drum pin plate is installed in the correct position.

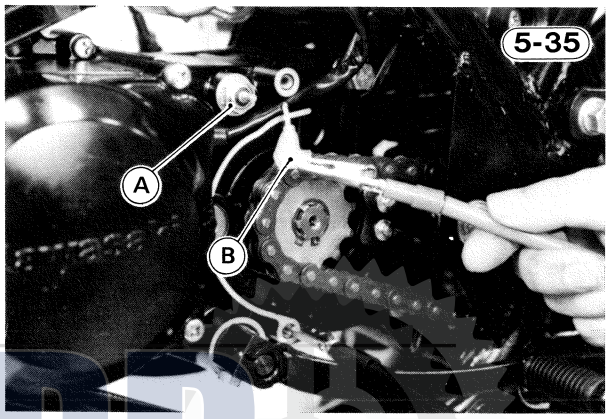
★If it is not, reinstall it in the correct position.

If the neutral indicator light does not go on in all positions, or if it goes on in all positions —

- Remove the engine sprocket cover, and disconnect the neutral switch lead.
- To check for the voltage, first turn the meter to 10V DC, connect the (+) meter lead to the switch lead, and connect the (—) meter lead to chassis ground.
- Turn the ignition switch on, and see if the meter reads battery voltage.

★If the meter does not indicate battery voltage, the trouble is either defective wiring or a burned-out indicator bulb.

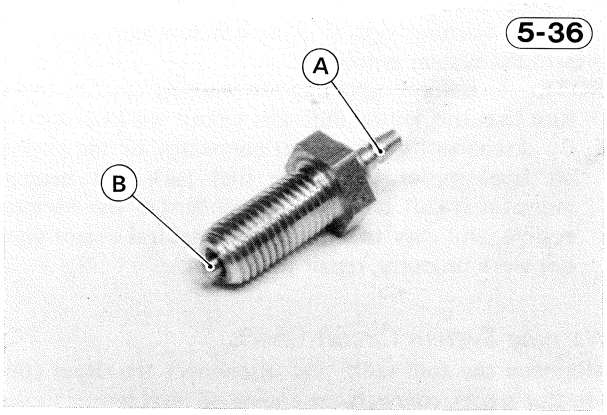
★If the voltmeter reads battery voltage, then the neutral switch may be defective.



A. Neutral Switch **B. Switch Lead**

- To check the neutral switch, first remove the switch, turn the meter to the x 1 Ω range, and measure the resistance between the switch terminal and the spring loaded pin.

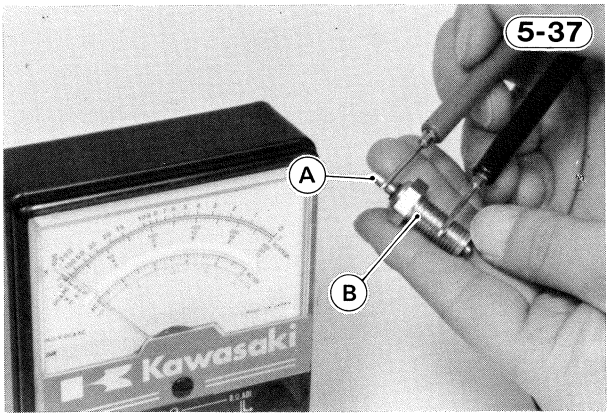
★If the resistance is not close to zero ohms, the switch is defective, and must be replaced.



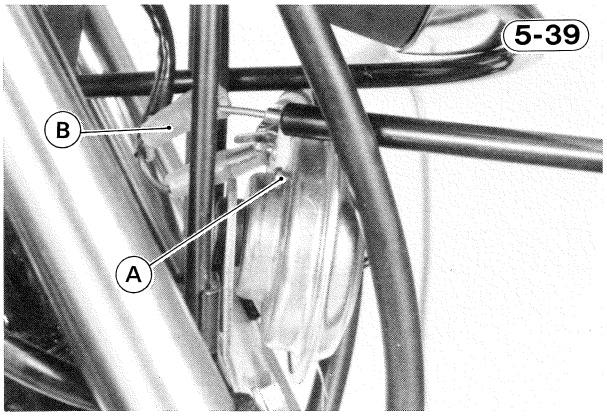
A. Switch Terminal **B. Spring Loaded Pin**

- If the resistance is close to zero ohms, measure the resistance between the switch terminal or spring loaded pin and the switch body.

★If there is any meter reading, the neutral switch is defective and must be replaced..



A. Switch Terminal B. Switch Body



A. Horn Adjusting Screw B. Black Lead

NOTE: 1. The horn will not sound properly if it is mounted incorrectly or if any cable or other part is touching it.

HORN

Horn Adjustment

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

WARNING

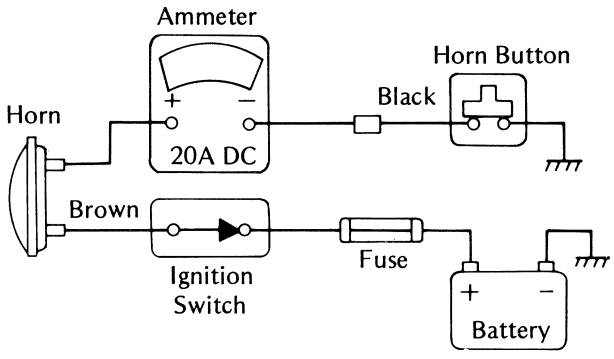
1. To avoid serious burn, never touch a hot engine or exhaust pipe during horn adjustment.

CAUTION

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

- Disconnect the horn black lead; and connect an ammeter in series to the horn circuit. The (+) ammeter lead goes to the horn terminal and the (–) ammeter lead to the black lead.

Horn Current Measurement 5-38

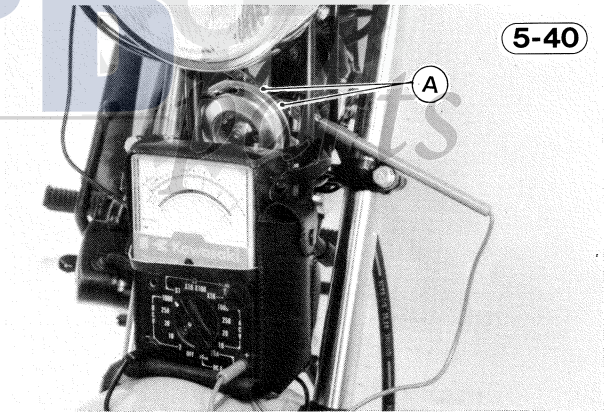


- Turn on the ignition switch, and keep the horn button pressed while turning the horn adjusting screw. Adjust for the best horn sound while keeping the current between 1.0 – 1.5 amperes.

Horn Trouble

- Check that battery voltage is normal.
- Check that the adjusting screw is turned in or out too far.
- Disconnect the leads to the horn, and connect to the horn terminals a multimeter set to the x 1 Ω range to check for continuity (close to zero ohms).

★If the reading is several ohms or if there is no reading at all, replace the horn.



A. Horn Terminals

- If the reading is very close to zero, set the multimeter to the 10V DC range, and connect the meter to the leads that were disconnected from the horn. The (+) meter lead goes to the brown lead, and the (–) meter lead goes to the black lead. With the ignition switch on, press the horn button. The meter should register battery voltage.

★If it does not, the fuse, ignition switch, horn button, or the wiring is at fault.

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

NOTE: 1. Do not loosen the armature mounting since doing so would alter the armature position such that the horn would probably have to be replaced.

Disassembly – Engine

Table of Contents

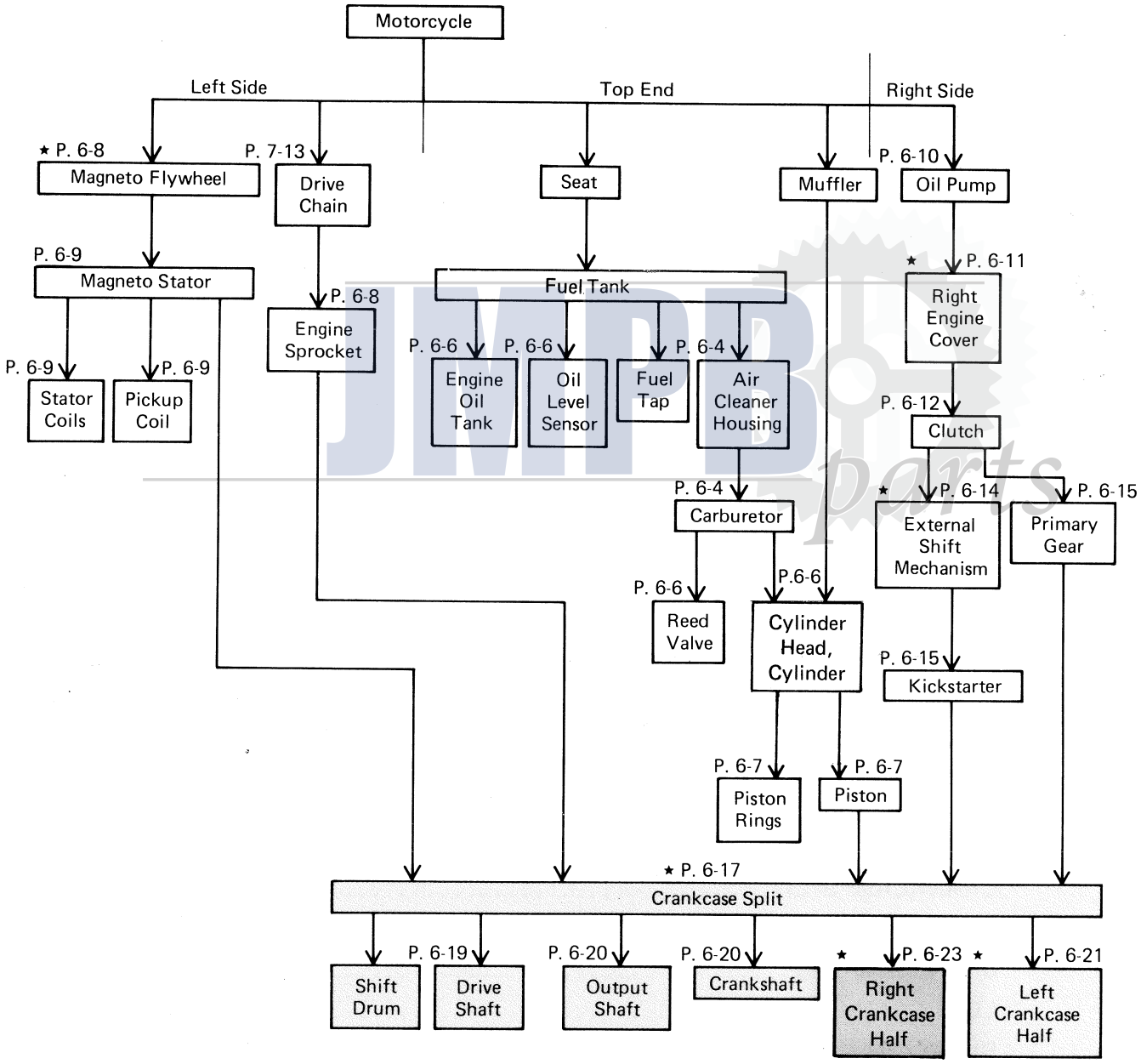
FLOW CHARTS

The following charts are designed to aid in determining proper removal sequence. Select the component you wish to remove and follow the arrows to that point on the chart.

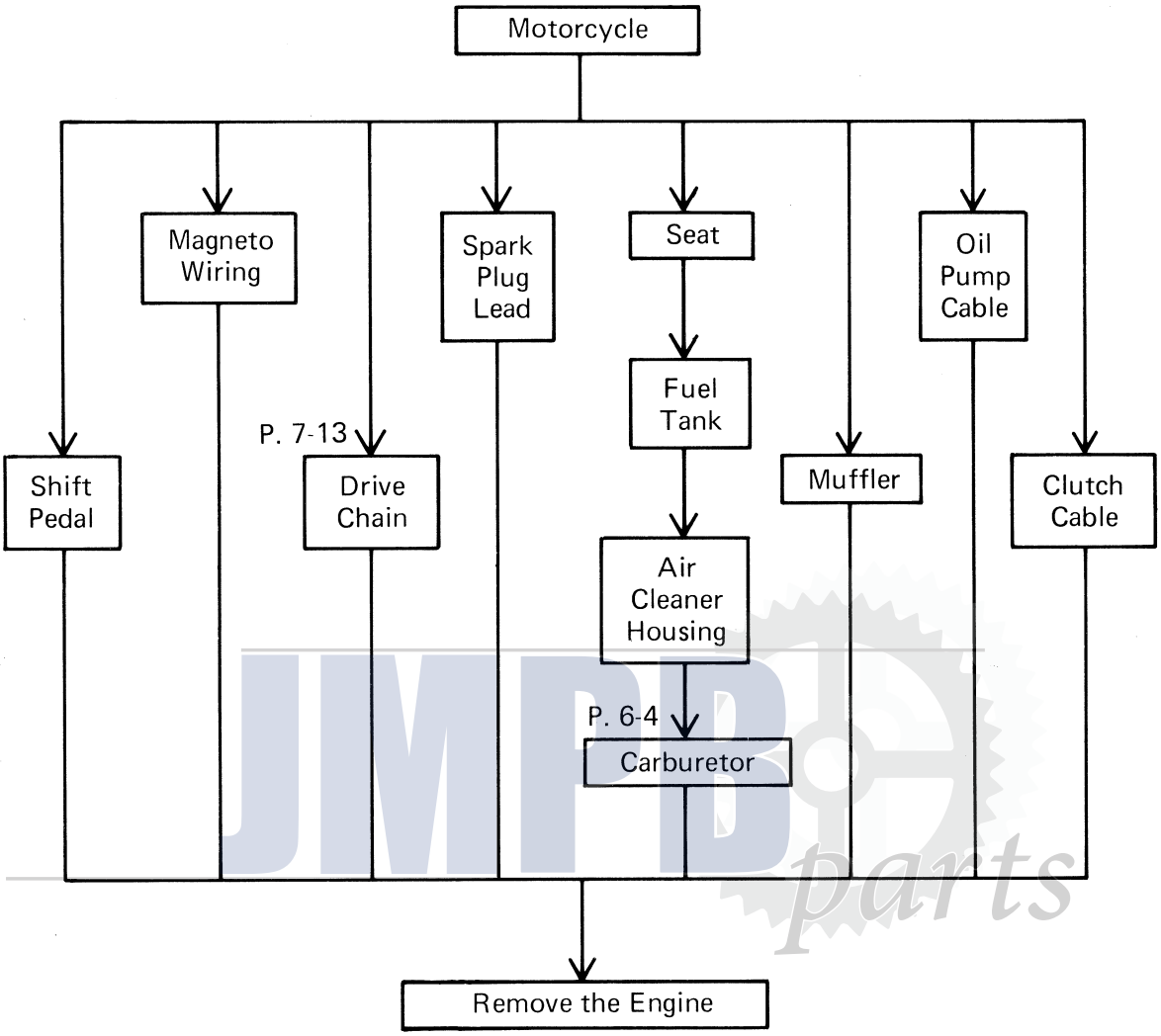
NOTE: 1. Action with a mark (★) requires special tool(s) for removal, installation, disassembly, and assembly.

2. Action for the shaded component requires engine removal from the motorcycle for removal and disassembly.

Disassembly – Engine



Engine Removal

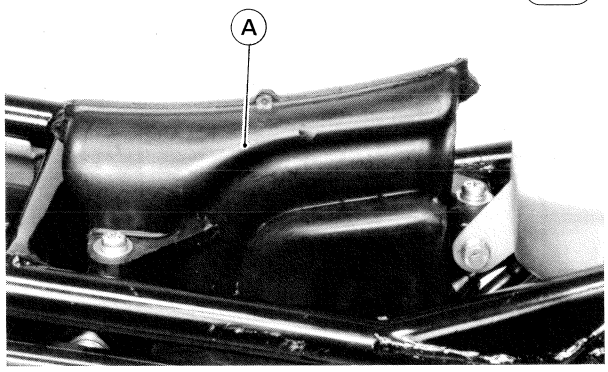


AIR CLEANER

Removal Note:

1. Remove the screws, lockwashers, and flat washers, and take off the air cleaner intake duct.

6-1



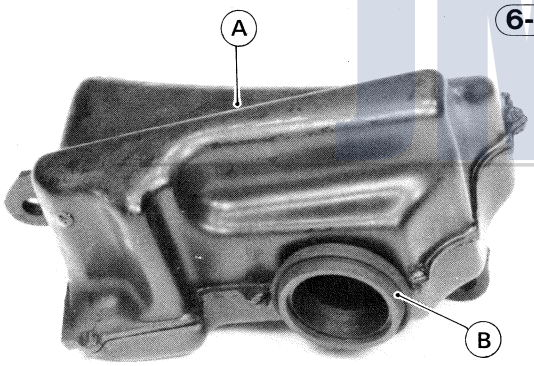
A. Air Cleaner Intake Duct

2. Remove the air cleaner housing mounting screws (3) with a lockwasher, and take the housing off the right side of frame.

Installation Note:

1. Fit the rubber grommet on the intake duct.

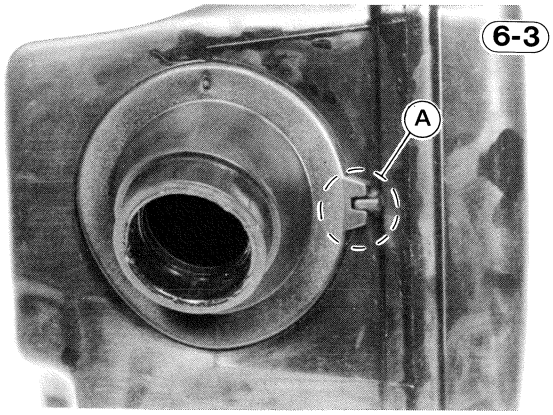
6-2



A. Intake Duct **B. Rubber Grommet**

2. When installing the air cleaner duct, fit the notch in the duct with the ridge on the air cleaner housing.

6-3



A. Notch and Ridge

CARBURETOR

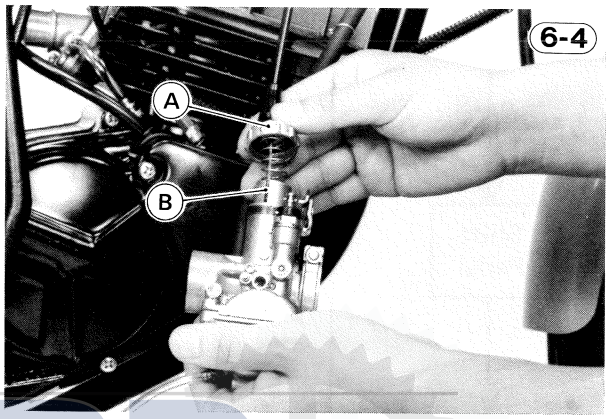
Removal Note:

1. Slip the carburetor out of place, unscrew the carburetor cap (32), and pull out the throttle valve assembly to remove the carburetor.

CAUTION

1. If the throttle valve is not removed from the cable, wrap a clean cloth around the throttle valve to avoid damage to it.
2. Stuff a piece of clean cloth into the carburetor holder to keep dirt out of the engine.

6-4

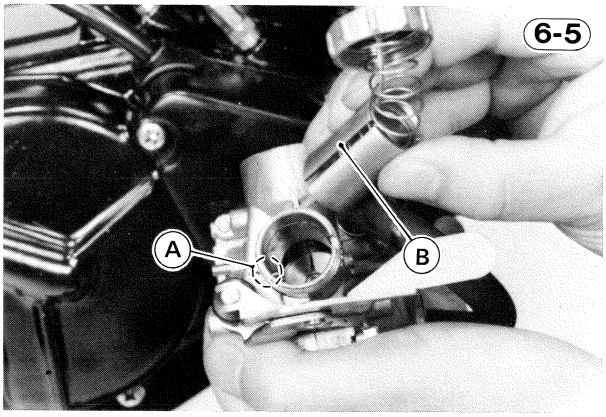


A. Carburetor Cap **B. Throttle Valve**

Installation Note:

1. Being careful not to bend or otherwise damage the jet needle, align the groove on the side of the throttle valve with the guide pin in the carburetor body. Check to see that the throttle valve goes all the way down into the carburetor body, and slides smoothly.

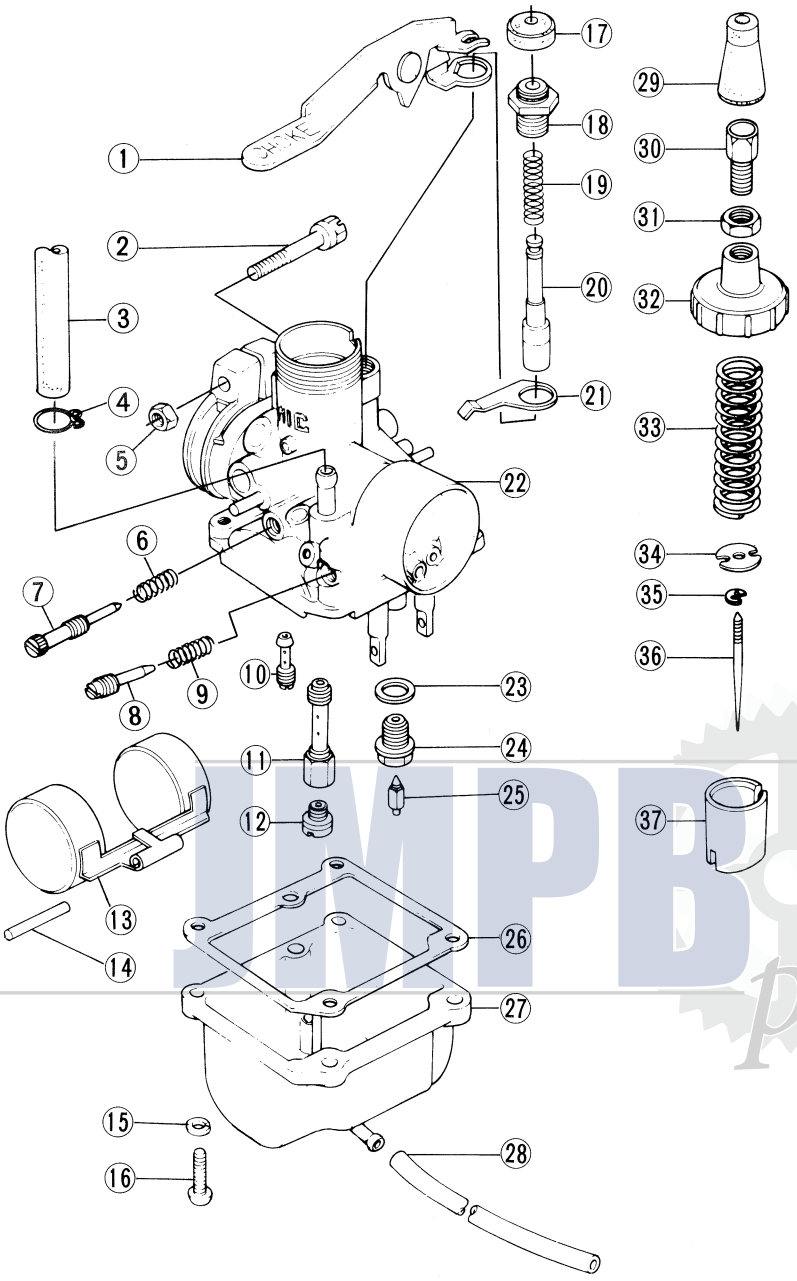
6-5



A. Guide Pin **B. Groove**

2. Adjust the carburetor.
3. Adjust the throttle control cable.

6-6

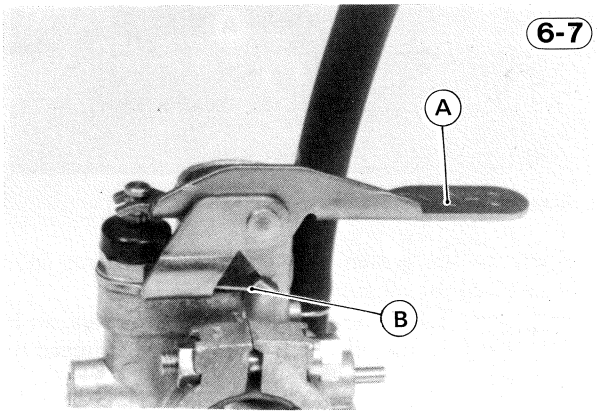


1. Choke Lever
2. Clamp Bolt
3. Fuel Hose
4. Clamp
5. Nut
6. Spring
7. Idle Adjusting Screw
8. Air Screw
9. Spring
10. Pilot Jet
11. Air Bleed Pipe
12. Main Jet
13. Float
14. Pin
15. Lockwasher
16. Screw
17. Dust Seal
18. Plunger Cap
19. Spring
20. Starter Plunger
21. Spring
22. Carburetor Body
23. Gasket
24. Valve Seat
25. Valve Needle
26. Gasket
27. Float Bowl
28. Overflow Tube
29. Dust Seal
30. Adjuster
31. Locknut
32. Carburetor Cap
33. Spring
34. Jet Needle Stop
35. Circlip
36. Jet Needle
37. Throttle Valve

Assembly Note:

1. Replace any O-ring and gasket that are damaged or deteriorated.
2. Install the choke lever ① and spring ㉑ as shown.

6-7

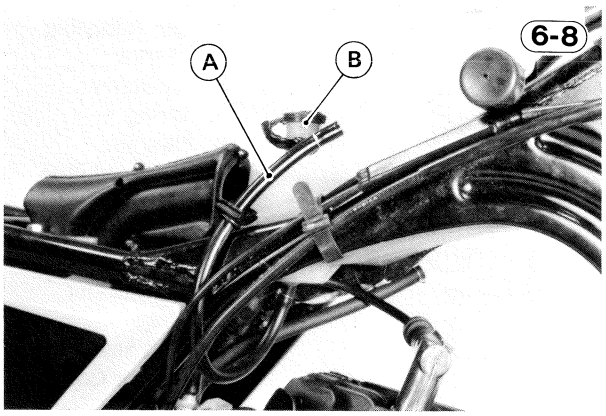


A. Choke Lever **B. Spring**

ENGINE OIL TANK, OIL LEVEL SENSOR

Removal Note:

1. Remove the oil pump cover, slide the clamp out of place and pull off the oil pump inlet hose. Screw one of the mounting screws into the inlet hose to keep the oil from flowing out, and keep the end of the hose upward.

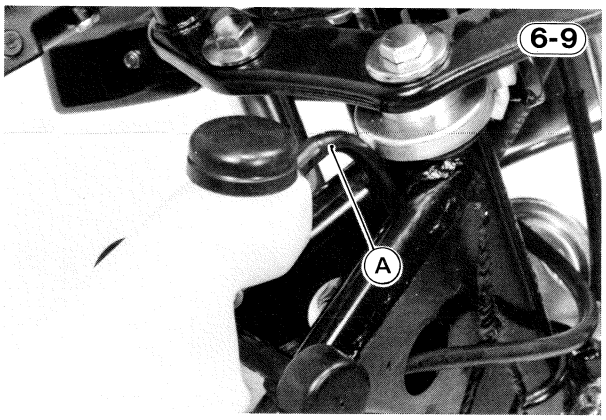


A. Oil Pump Inlet Hose B. Engine Oil Level Sensor

Installation Note:

1. Route the oil tank breather tube, being sure that the tube does not get pinched or twisted.

CAUTION **1. Always keep the oil tank breather tube free of obstruction, and make sure it does not get pinched, crimped, or bent sharply. If the breather tube is obstructed, engine oil flow to the oil pump will be hindered and serious engine damage will occur.**



A. Breather Tube

2. If any air has gotten trapped in the oil pump inlet hose, bleed the oil pump (Pg. 3-16).

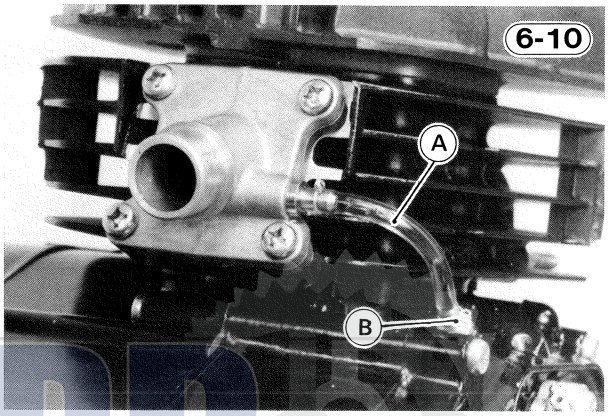
CAUTION **1. To avoid serious engine damage, air in the oil pump line must be removed by bleeding.**

3. When installing the oil pump cover, check that the hose grommet and cable grommet are in place.

CYLINDER HEAD, CYLINDER, REED VALVE

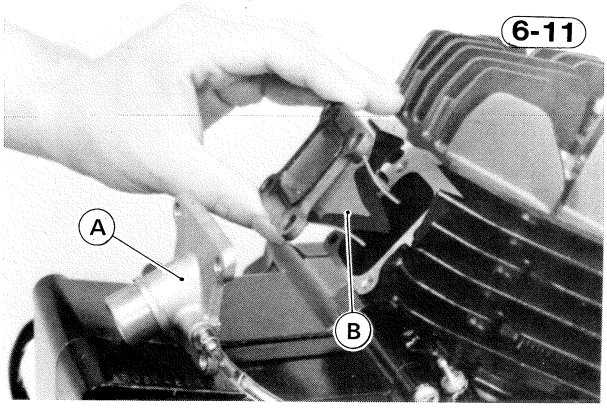
Removal Note:

1. Stuff a piece of clean cloth into the carburetor holder to keep dirt out of the engine.
2. Cover the carburetor with a clean cloth, and set it on the frame or workbench to avoid damaging the carburetor and cable.
3. Slide the hose clamp down, and pull the oil hose off the hose joint.



A. Oil Hose B. Hose Clamp

4. The reed valve for West German model cannot be removed from the cylinder.
5. Remove the carburetor holder mounting screws(4), and take off the carburetor holder and reed valve assembly.

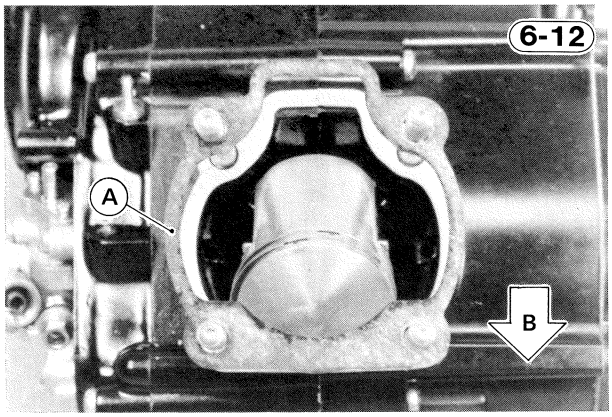


A. Carburetor Holder B. Reed Valve Assembly

6. Lift off the cylinder, and remove the cylinder base gasket. If necessary, tap lightly around the base of the cylinder with a plastic mallet, taking care not to damage the cooling fins. Before the cylinder is off the piston, cover the cylinder base hole with a clean cloth to prevent dirt or moisture from entering.

Installation Note:

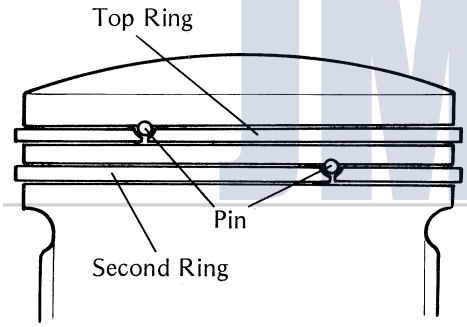
1. If the cylinder is replaced with a new one, piston-to-cylinder clearance must be checked against the special value (Pg. 3-7).
2. Install a new cylinder base gasket in proper position as shown.



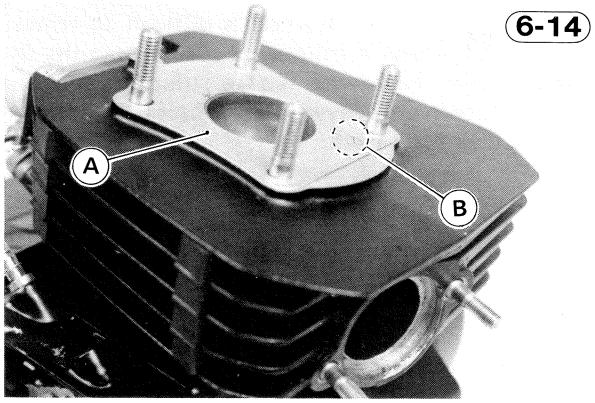
A. Cylinder Base Gasket **B. Front**

3. Check to see that the pin in each piston ring groove is between the ends of the piston ring.

Piston Ring Position 6-13



4. Apply a little two-stroke oil to the piston rings and the inside surface of the cylinder.
5. Fill the oil hose with a two-stroke engine oil before installation.
6. Install a new cylinder head gasket so that the "K" mark faces up as shown.

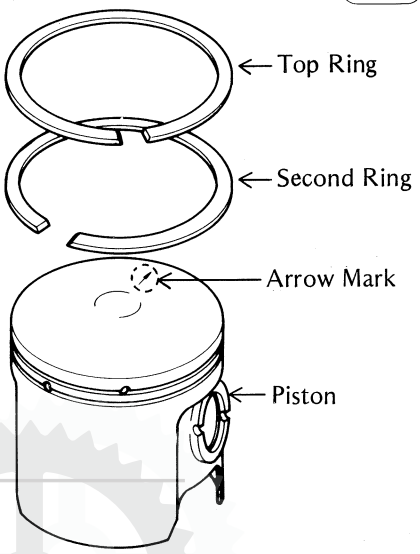


A. Cylinder Head Gasket **B. "K" Mark**

7. Tighten the cylinder head nuts (4) to 2.2 kg-m (16.0 ft-lbs) of torque.
8. Bleed the air from the engine oil line (Pg. 3-16).
9. Check the throttle control cable, and adjust if necessary.

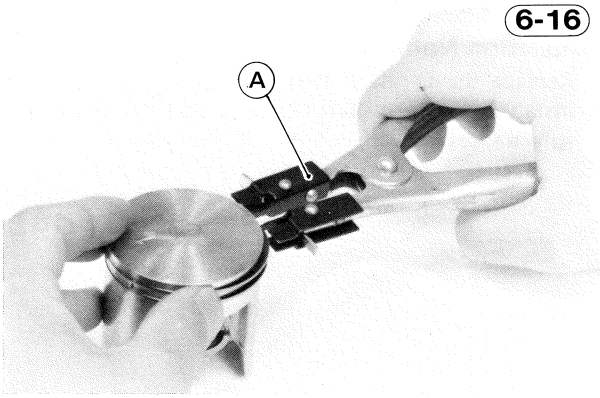
PISTON, PISTON RINGS

Piston, Piston Rings 6-15



Removal Note:

1. Wrap a clean cloth around the base of the piston to secure it in position for removal and so that no parts fall into the crankcase.
2. Remove both piston rings with the piston ring pliers (special tool). If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.



A. Piston Ring Pliers: 57001-115

Installation Note:

1. If the piston is replaced with a new one, check that piston to cylinder clearance has the special value (Pg. 3-7). Also, when a new piston or piston pin is installed, check that the piston to pin clearance has the specified value (Pg. 3-8).

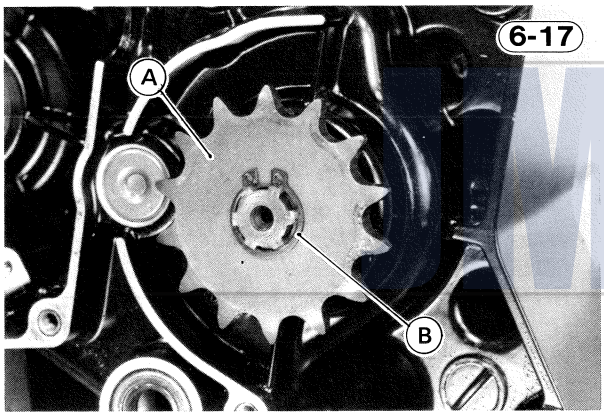
2. Install the piston rings so that the correct side (Fig. 6-13) faces up. The top ring and the second ring are identical. When installing the piston rings by hand, first fit one end of the piston ring against the pin in the ring groove, spread the ring opening with the other hand, and then slip the ring into the groove.
3. Fit a new piston pin snap ring into the side of the piston, taking care to compress it only enough to install it and no more. Check that the other snap ring is in place.

CAUTION **1. Do not reuse snap rings, as removal weakens and deforms the snap ring. It could fall out and score the cylinder wall.**

ENGINE SPROCKET

Removal Note:

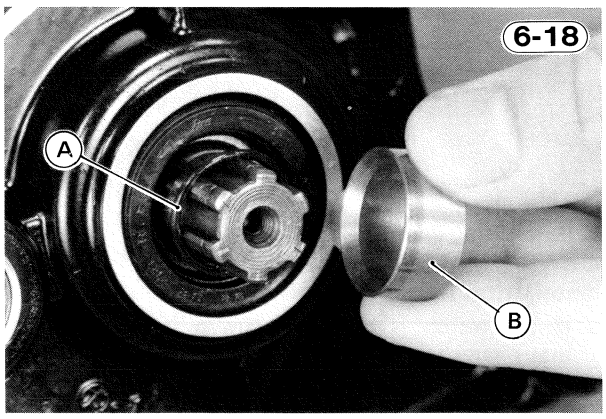
1. Remove the circlip and engine sprocket.



A. Engine Sprocket **B. Circlip**

Installation Note:

1. Replace the O-ring if it is deteriorated on damaged.
2. Install the output shaft coller so that the chamfered suface faces in.

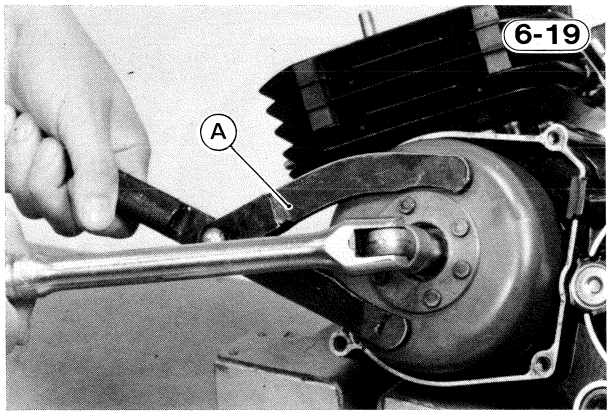


A. O-ring **B. Output Shaft Collar**

MAGNETO FLYWHEEL

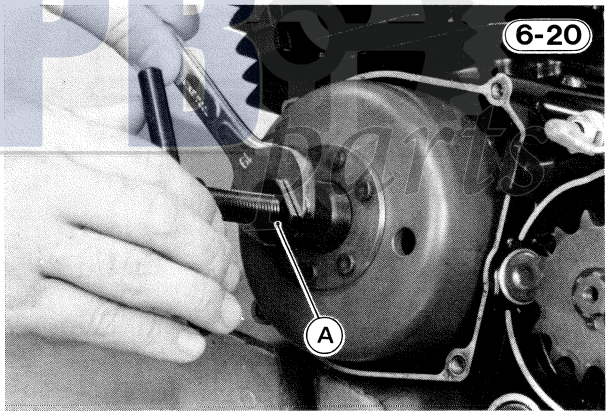
Removal Note:

1. Using a magneto flywheel holder (special tool) to hold the magneto flywheel stationary, remove the magneto flywheel nut.



A. Magneto Flywheel Holder: 57001-306

2. Remove the magneto flywheel with the magneto flywheel puller (special tool).

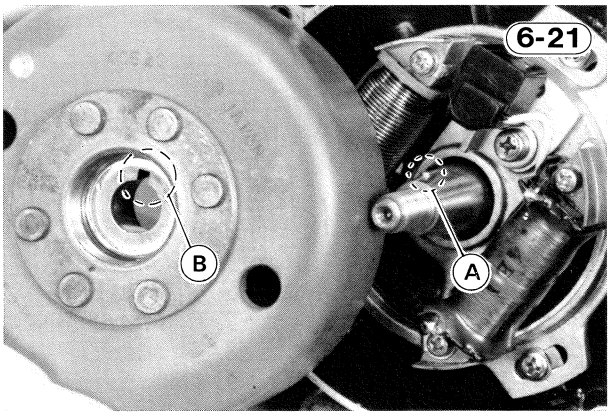


A. Magneto Flywheel Puller: 57001-252

CAUTION **1. If the flywheel is difficult to remove and a hammer is used to tap the flywheel puller, be careful not to strike the flywheel itself. Striking the flywheel can cause the magnets to lose their magnetism.**

Installation Note:

1. Clean off any oil or dirt that may be on the crankshaft taper or magneto flywheel hub.
2. See that the pin is fitted in place on the crankshaft properly, and then fit the flywheel in place so that the pin fits in the groove in the hub of the flywheel.



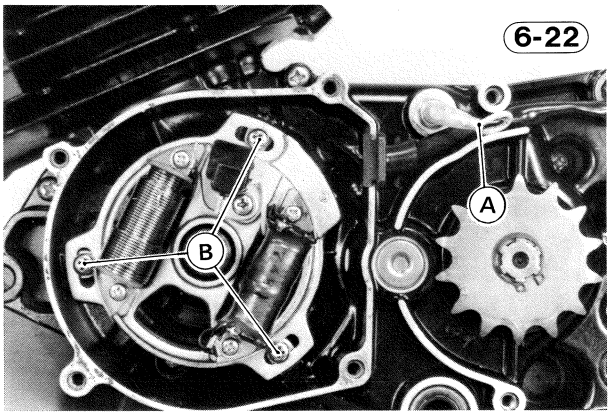
A. Pin B. Groove

3. Once the flywheel is all the way back in place, and tighten the magneto flywheel nut while holding the flywheel steady with the magneto flywheel holder (special tool). Tightening torque for the magneto flywheel nut is 3.0 kg-m (22 ft-lbs).

MAGNETO STATOR, PICKUP COIL, NEUTRAL SWITCH

Removal Note:

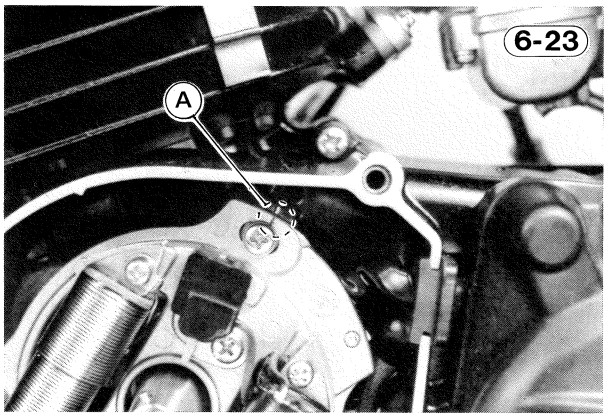
1. Disconnect the 6-pin connector from the magneto stator inside the left side cover.



A. Neutral Switch Lead
B. Magneto Stator Mounting Screws

Installation Note:

1. Install the stator so that its mark and the crankcase mark are aligned.

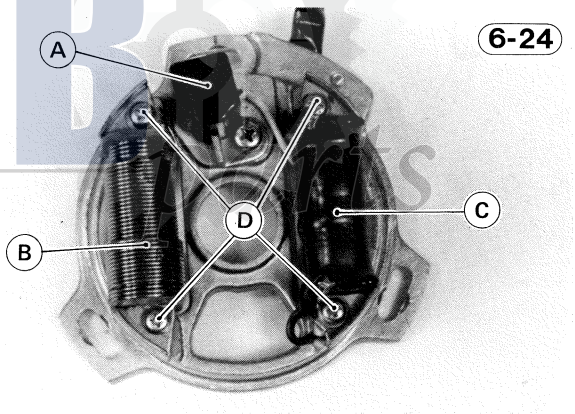


A. Timing Marks

2. Tighten the neutral switch to 1.2 kg-m (104 in-lbs) of torque.

Disassembly Note:

1. Remove the magneto coil mounting screws (4) and lockwashers (4).



A. Pickup Coil
B. Lighting/Cherging Coil
C. Exciter Coil
D. Coil Mounting Screws

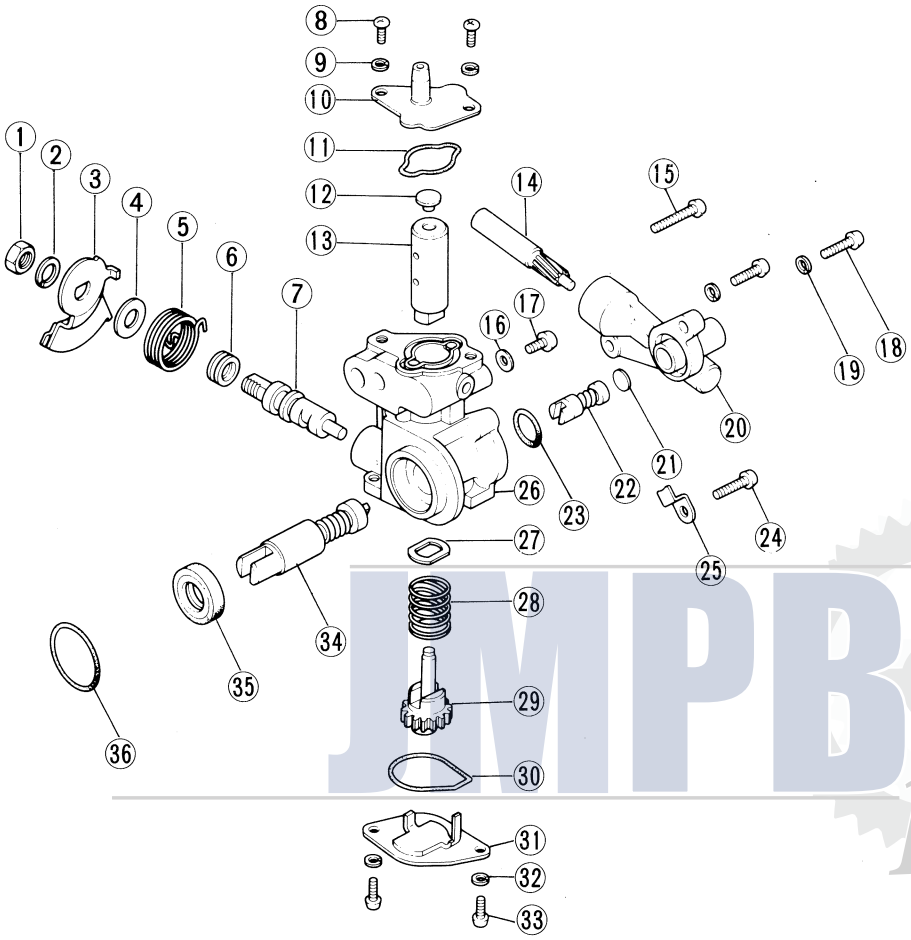
2. Remove the pickup coil mounting screw and lockwasher.
3. Cut off the insulator where the leads are to be disconnected.
4. Unsolder the leads to free the lighting/charging coil, excitor coil, and pickup coil from the magneto wiring.

Assembly Note:

1. Be careful not to mix up the leads for the coils when reconnecting them.
2. Apply a non-permanent locking agent to the threads of the coil mounting screws.
3. Run the magneto coil leads to keep them from touching the crankshaft or flywheel hub.

OIL PUMP

Oil Pump

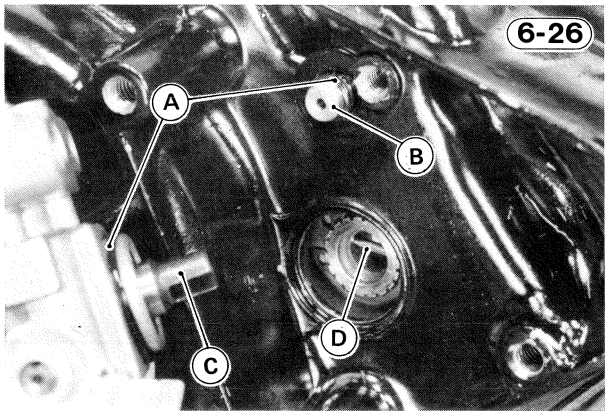


(6-25)

1. Nut
2. Lockwasher
3. Control Lever
4. Washer
5. Return Spring
6. V-Ring
7. Control Camshaft
8. Screw
9. Lockwasher
10. Follower Cap
11. O-Ring
12. Spacer
13. Plunger Follower
14. Pinion
15. Mounting Screw
16. Gasket
17. Bleed Valve
18. Screw
19. Lockwasher
20. Gear Housing
21. Washer
22. Gear
23. O-Ring
24. Mounting Screw
25. Plate
26. Oil Pump Body
27. Spring Seat
28. Spring
29. Plunger
30. O-Ring
31. Camshaft Cap
32. Lockwasher
33. Screw
34. Pump Shaft
35. Oil Seal
36. O-Ring

Removal Note:

1. Remove the screws ⑮, ㉔ (2) and holding plate ㉕ which hold the oil pump onto the right engine cover, and remove the oil pump. Turn the oil pump to free the oil pump from the tachometer cable.



(6-26)

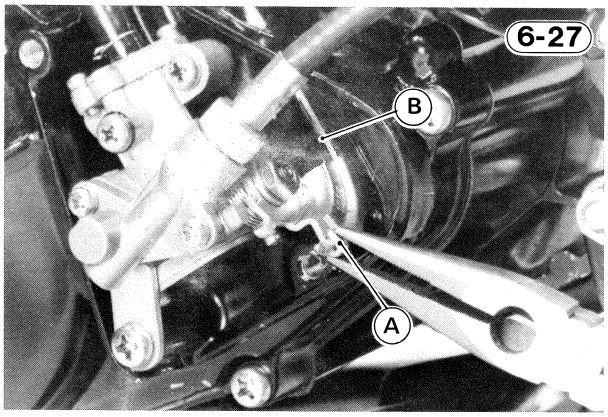
A. O-Rings
B. Oil Passage Pipe
C. Oil Pump Shaft
D. Pin

Installation Note:

1. See that the oil passage pipe and O-rings (2) are in place.

2. When mounting the oil pump, note the position of the pin in the crankshaft, and then turn the oil pump shaft so that it will fit onto the pin.
3. Attach the oil pump inner cable to the oil pump lever, and bend the tab back over the end of the cable.

CAUTION **1. Make sure the tab on the oil pump lever is bent to hold the cable nipple securely. If loose, the cable may slip out, resulting in piston seizure.**



A. Tab **B. Inner Cable**

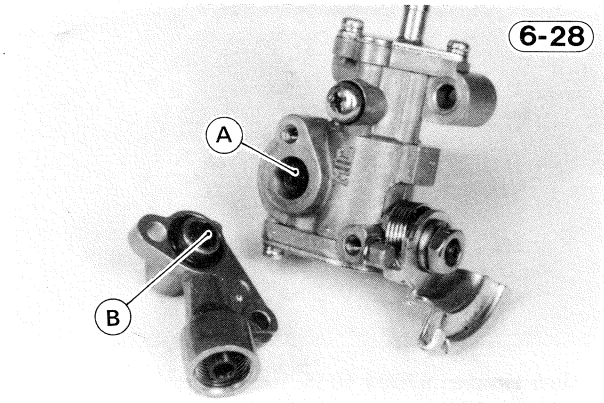
4. Bleed the oil pump (Pg. 3-16).
5. Adjust the oil pump cable (Pg. 2-5).

Disassembly Note:

1. The pump must not be disassembled during warranty, or the warranty will be voided.

Assembly Note:

1. When replacing the oil seal with a new one, apply oil to it.
2. Apply oil to the O-ring and V-ring, plunger follower, and plunger before assembly.
3. When installing the tachometer gear housing, note the notch on the tachometer cable drive shaft, and then turn the oil pump shaft so that it will fit into the notch.

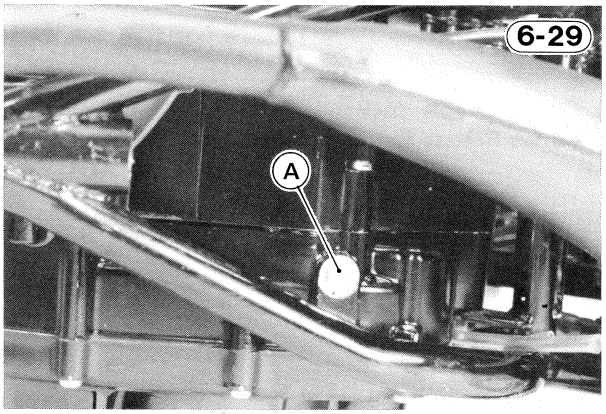


A. Pump Shaft **B. Cable Drive Shaft**

RIGHT ENGINE COVER

Removal Note:

1. With the motorcycle fully perpendicular to the ground, place an oil pan beneath the engine, and remove the engine drain plug so that all the transmission oil drains out. While draining the transmission oil, continue with the working.

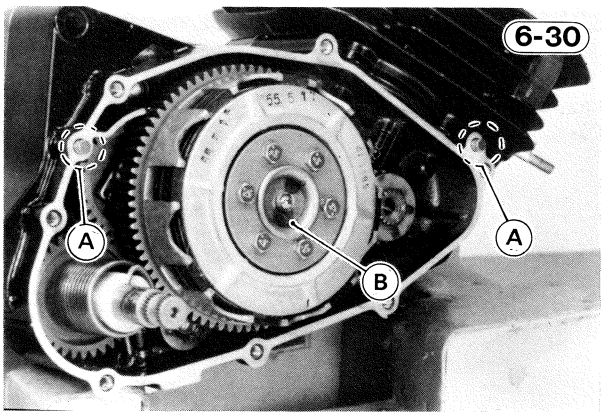


A. Engine Drain Plug

2. Mark the position of the kick pedal on the shaft so that it can be returned to the same position later.

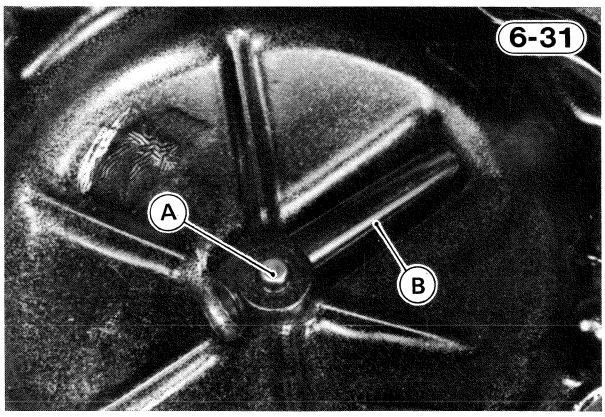
Installation Note:

1. Check that the knock pins (2), and clutch spring plate pusher are in place on the crankcase.

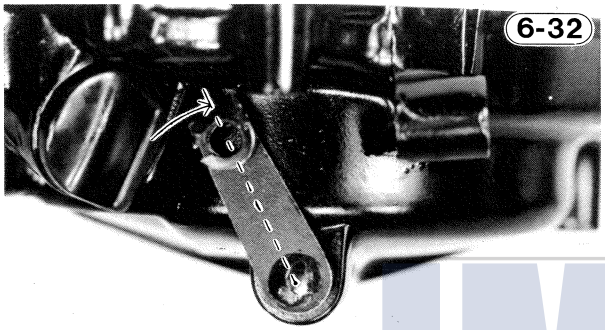


A. Knock Pin
B. Clutch Spring Plate Pusher

2. Use a new right engine cover gasket.
3. Check and see that the clutch release assembly is installed on the right engine cover with proper angle as shown in Fig. 6-32, when the clutch release lever is fully turned counterclockwise.

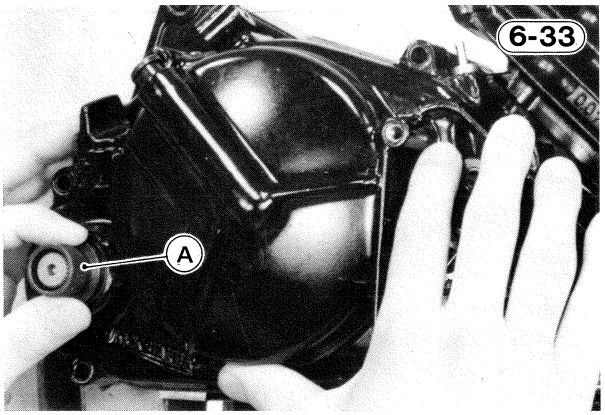


A. Clutch Release Ruck
B. Clutch Release Shaft and Pinion



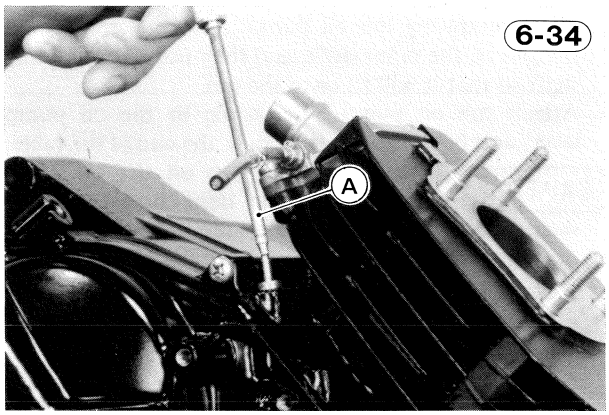
4. When installing the right engine cover, insert an oil seal guide (special tool) into the cover to prevent the kick shaft oil seal from being damaged.

CAUTION **1. Do not attempt to install the cover with the oil pump installed, or the pump may be broken.**



A. Oil Seal Guide: 57001-263

5. Fill the oil passage in the right engine cover with 2-stroke oil. This shortens air bleeding time.



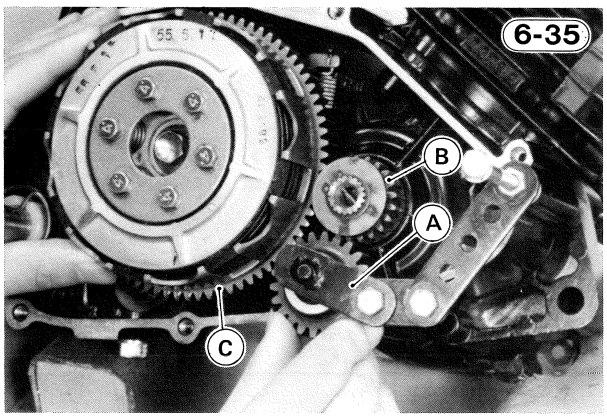
A. Apply a 2-stroke oil.

6. Tighten the drain plug with a new aluminum washer to 2.0 kg-m (14.5 ft-lbs) of torque.
7. Fill the transmission oil (Pg. 2-3).

CLUTCH

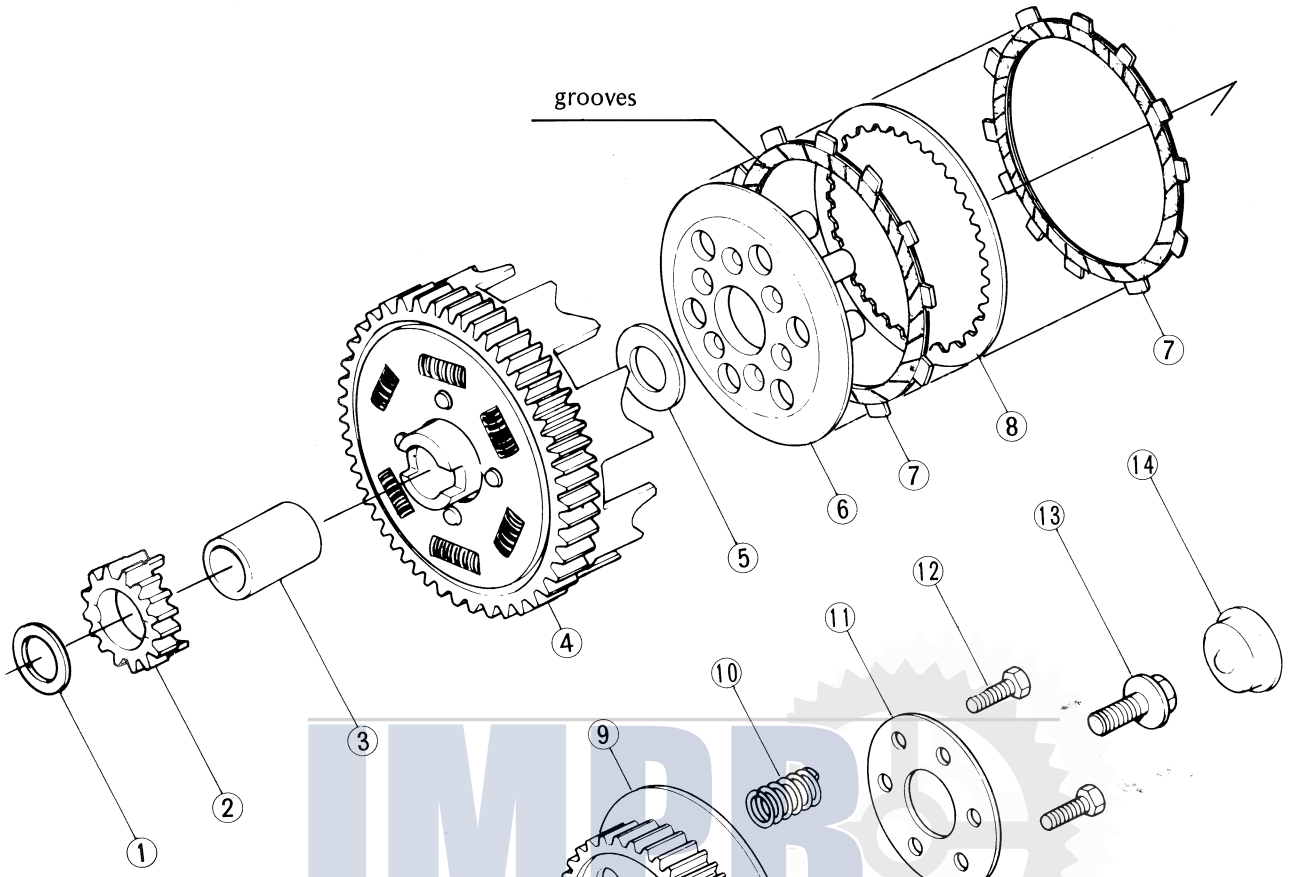
Removal Note:

1. Using the gear holder (special tool), hold the clutch housing gear to keep it from turning, and then remove the clutch hub bolt.



A. Gear Holder: 57001-1015
B. Primary Gear
C. Clutch Housing Gear

6-36



1. Washer
2. Idle Gear
3. Sleeve
4. Clutch Housing
5. Washer
6. Clutch Wheel
7. Friction Plate
8. Steel Plate
9. Clutch Hub
10. Spring
11. Plate
12. Bolt
13. Bolt
14. Pusher

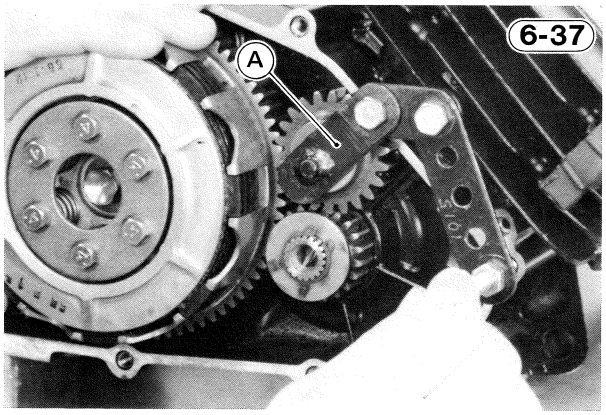
Installation Note:

1. The grooves on the friction plate surfaces are cut tangentially and radially; install the friction plates so that the grooves run toward the same direction as shown in fig. 6-36.
2. Install the clutch plates. The sequence is friction plate, steel plate, friction plate, etc. finishing with a friction plate.

CAUTION **1. If new dry steel plates and friction plates are installed, apply transmission oil to the surfaces of each plate to avoid clutch plate seizure.**

2. Tightening torque for the clutch spring bolts (6) is 0.25 kg-m (22 in-lbs).
3. Tightening torque for the clutch hub bolt is 2.5 kg-m (18.0 ft-lbs). Tighten the clutch hub bolt using the gear holder (special tool).
4. Adjust the clutch (Pg. 2-7).

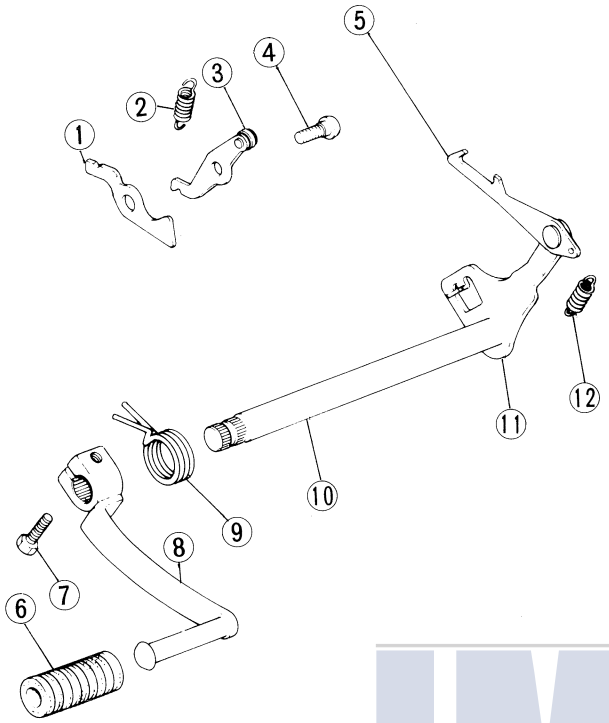
6-37



A. Gear Holder: 57001-1015

EXTERNAL SHIFT MECHANISM

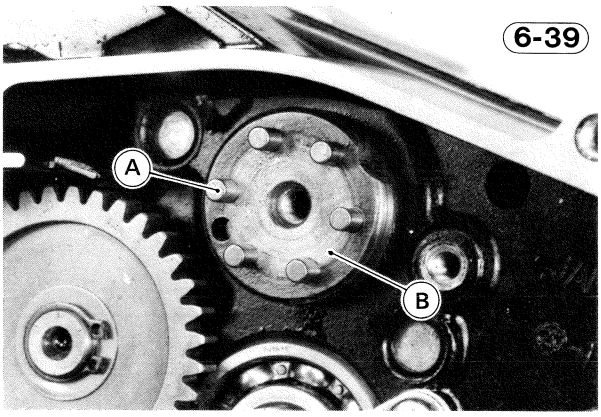
External Shift Mechanism 6-38



1. Gear Set Lever
2. Spring
3. Neutral Set Lever
4. Screw
5. Shift Arm
6. Rubber
7. Bolt
8. Shift Pedal
9. Return Spring
10. Shift Shaft
11. Shift Lever
12. Spring

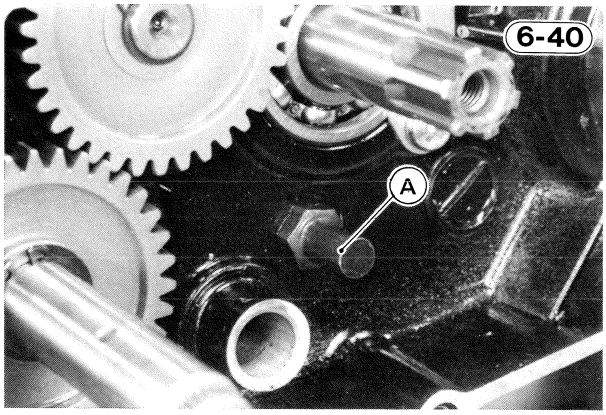
Installation Note:

1. Place the pins (6) on the shift drum as shown in the figure.



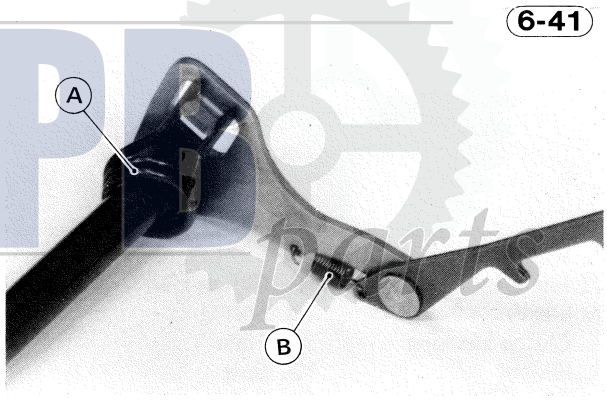
A. Pin B. Shift Drum

2. Check that the return spring pin is not loose. If it is loose, remove it, apply a non-permanent locking agent to the threads, and tighten it.



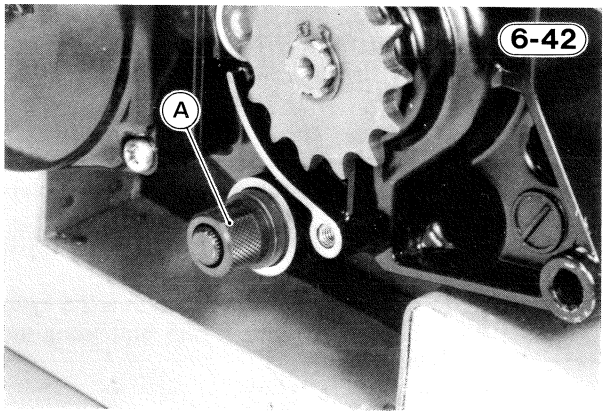
A. Return Spring Pin

3. Check that the return spring and pawl spring are properly fitted on the mechanism.



A. Return Spring B. Pawl Spring

4. For the installation of the shift shaft, use the oil seal guide (special tool) to keep the shift shaft oil seal from being damaged.



A. Oil Seal Guide: 57001-264

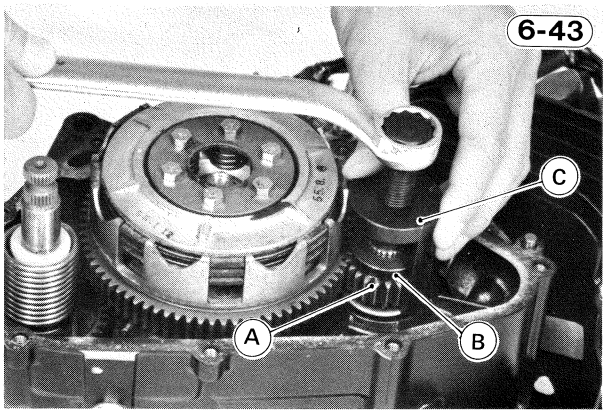
PRIMARY GEAR

Removal Note:

1. See the Figure 6-59 for removal and installation.
2. Remove the circlip on the right end of the crankshaft.
3. Using the gear puller (special tool), remove the primary gear, damper, collar, and thrust washer.

Installation Note:

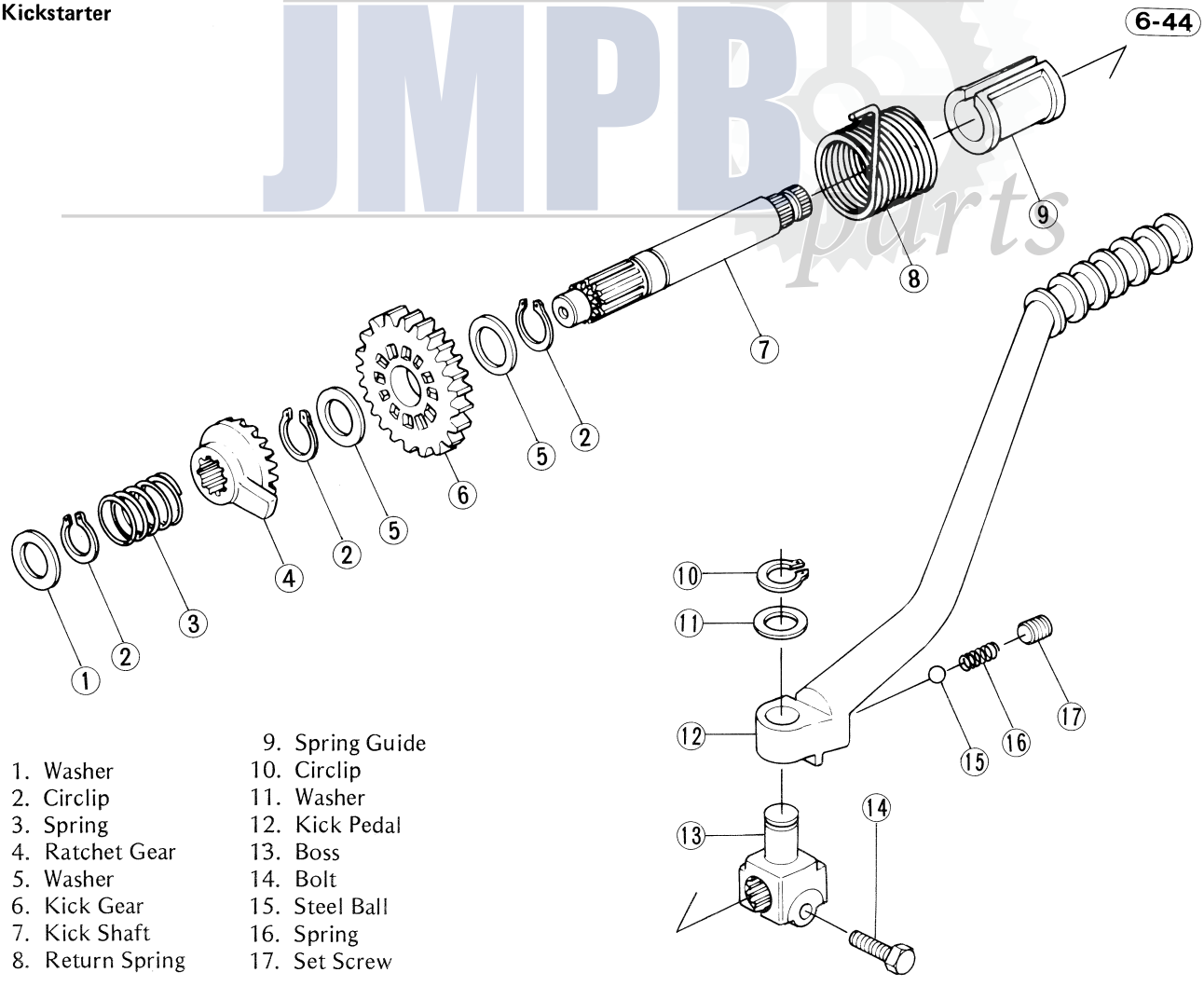
1. Install the damper by a suitable driver.



A. Primary Gear
B. Damper
C. Gear Puller: 57001-1158

KICKSTARTER

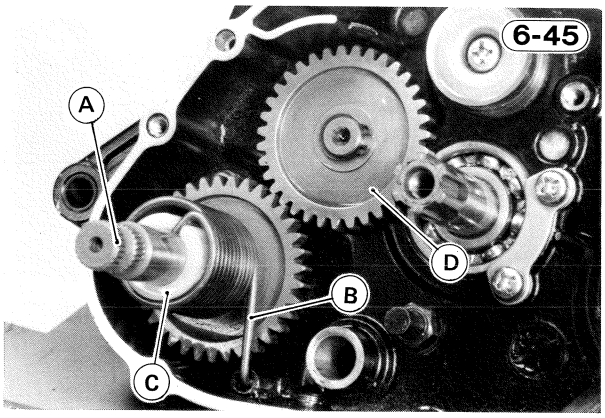
Kickstarter



1. Washer
2. Circlip
3. Spring
4. Ratchet Gear
5. Washer
6. Kick Gear
7. Kick Shaft
8. Return Spring
9. Spring Guide
10. Circlip
11. Washer
12. Kick Pedal
13. Boss
14. Bolt
15. Steel Ball
16. Spring
17. Set Screw

Removal Note:

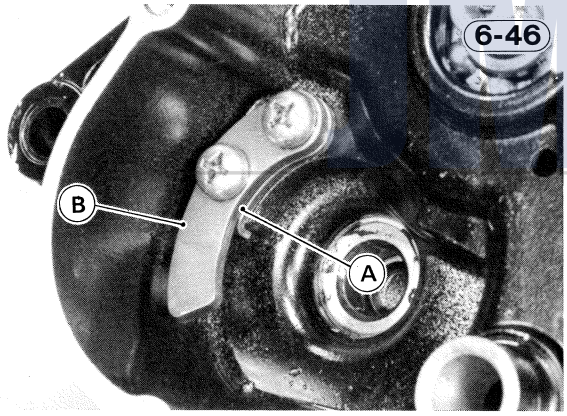
1. With needle nose pliers, remove the end of the kick spring from the crankcase hole.



A. Kickstarter Assembly
B. Kick Spring
C. Spring Guide
D. Output Shaft Idle Gear

Installation:

NOTE: 1. Apply a non-permanent locking agent to the threads of ratchet gear lever stop and guide mounting screws (2), and install them as shown.



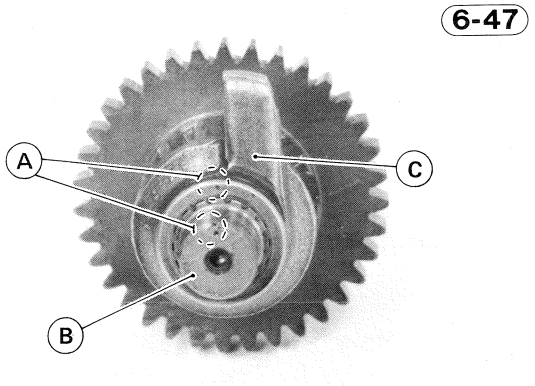
A. Lever Stop **B. Guide**

2. Put the thrust washer on the crankcase end of the kick shaft, and push the kickstarter assembly back into place.

Assembly Note:

1. Apply a little transmission oil to the inside of the kick gear and ratchet lever before installation.
2. When installing the ratchet gear, align the ratchet gear punch mark with the punch mark on the kick shaft.

CAUTION **1. Misalignment of the ratchet gear changes the kick spring preload. If the kick spring preload is too light, partial mesh of the kick lever and the ratchet gear could cause kick mechanism noise. If the kick spring preload is too heavy, the kick spring could weaken or break.**

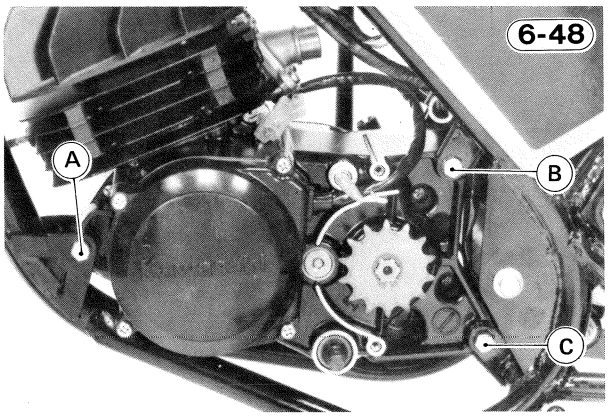


A. Align the marks. **C. Ratchet Gear**
B. Kick Shaft

ENGINE REMOVAL

Removal Note:

1. Remove the following parts:
   - Seat
   - Fuel Tank
   - Air Cleaner
   - Carburetor
   - Muffler
   - Drive Chain
   - Shift Pedal
2. Make sure that the following parts are free and properly positioned on the engine and frame so that they will not be damaged during engine removal:
   - Clutch Cable
   - Oil Pump Cable
   - Magneto Wiring
   - Spark Plug Lead
   - Oil Pump Inlet Hose
3. Jack or lever the engine up slightly to take the weight off the mounting bolts. Remove the engine mounting bolts and nuts (3 ea.).



A. Front Mounting Bolt **C. Rear Lower Mounting Bolt**
B. Rear Upper Mounting Bolt

Installation Note:

1. Tighten the engine mounting bolts (3) to 1.9 kg-m (13.5 ft-lbs) of torque.
2. Install the drain plug with a new aluminum gasket, and tighten the plug to 2.0 kg-m (14.5 ft-lbs) of torque. Fill the engine with oil to the proper level (Pg. 2-3).
3. When installing the tachometer gear housing, note the projection on the oil pump shaft, and then turn the tachometer cable drive shaft so that the notch on the drive shaft will fit into the pump shaft (Fig. 6-28).
4. Bleed the oil pump (Pg. 3-16).

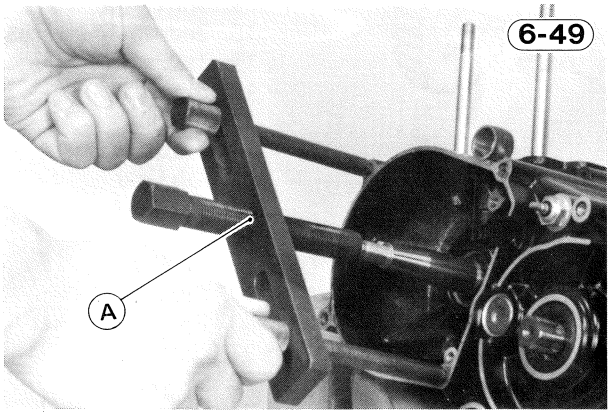
CAUTION **1. Make sure the tab on the oil pump lever is bent to hold the cable nipple securely. If loose, the cable may slip out, resulting in piston seizure (Fig. 3-8).**

5. Adjust the throttle control cable (Pg. 2-5).
6. Adjust the drive chain (Pg. 2-7).
7. Adjust the clutch cable (Pg. 2-7).
8. Adjust the carburetor (Pg. 2-6).

CRANKCASE SPLIT

Removal Note:

1. Remove the engine, and remove the following parts:
   - ○Cylinder head
   - ○Cylinder
   - ○Piston
   - ○Engine Sprocket
   - ○Magneto Flywheel
   - ○Magneto Stator
   - ○Oil Pump
   - ○Right Engine Cover
   - ○Clutch
   - ○External Shift Mechanism
   - ○Kickstarter
   - ○Primary Gear
2. Screw the crankcase splitting tool (special tool) into the left side of the crankcase. Be certain to screw the adapters in all the way.

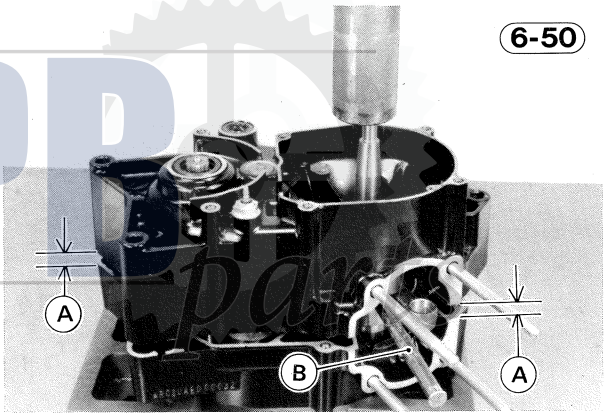


A. Crankcase Splitting Tool: 57001-1098

3. Tighten the bolt on the crankcase splitting tool (special tool) to split the crankcase. Constantly check the alignment of the two halves. The front and rear of the crankcase must be pulled apart evenly; if necessary gently tap the rear of the left crankcase half with a mallet.

Installation Note:

1. Apply a high temperature grease to the lips of the crankshaft left oil seal in the left crankcase half.
2. Clean the mating surfaces of the crankcase halves with a high flash-point solvent and wipe dry.
3. Apply liquid gasket to the mating surface of the left crankcase half.
4. Install the crankcase knock pins (2) if they were removed.
5. Fit the crankcase halves together using a press and a chisel or wedge inserted between the flywheels opposite the connecting rod big end. Constantly check the alignment of the two halves, and the position of the transmission shafts, and shift drum. The front and rear of crankcase must be pushed together evenly.



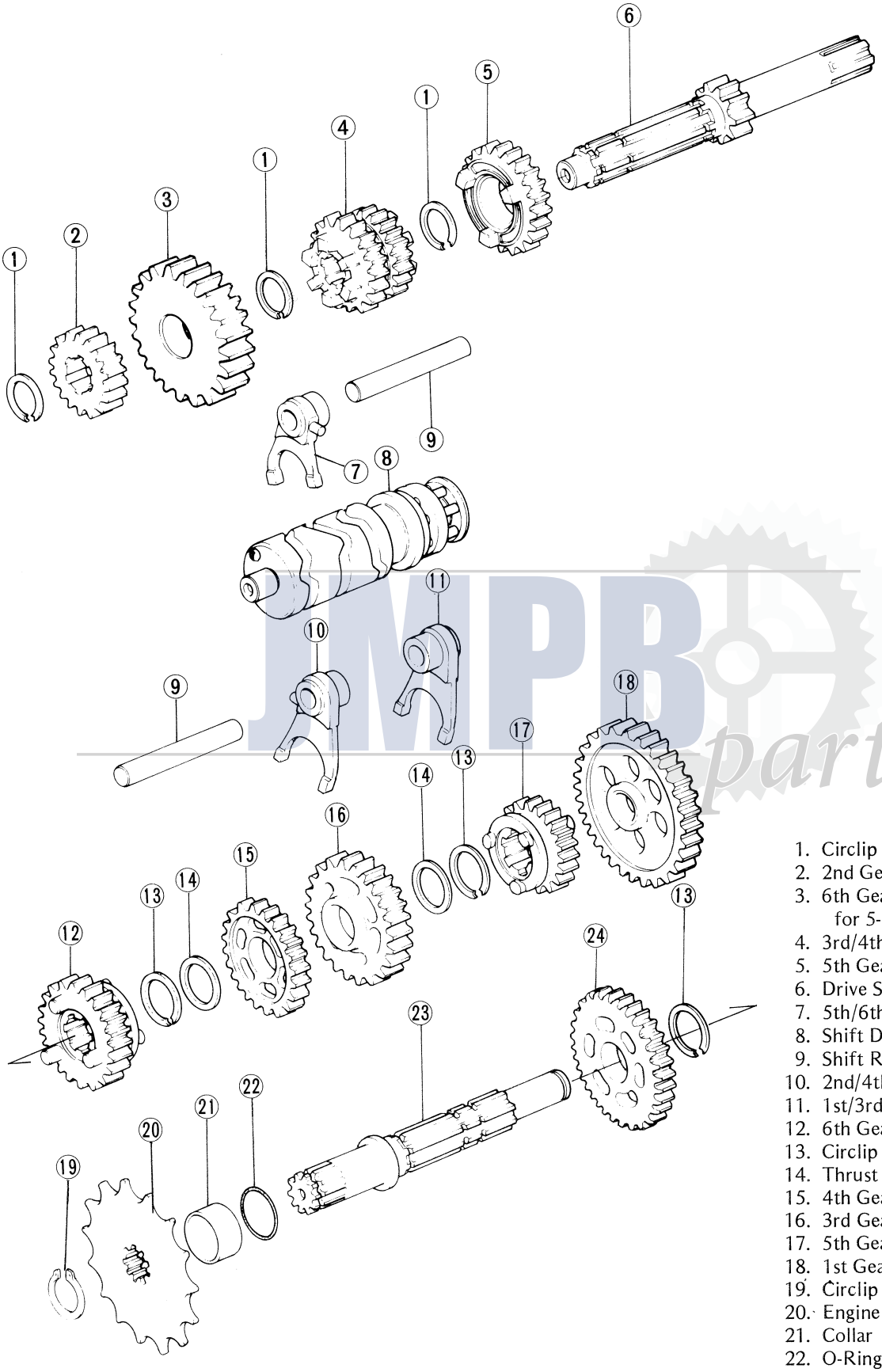
A. Even **B. Chisel**

6. Check to see that the crankshaft, drive shaft, and output shaft all turn freely (in the neutral position). If the crankshaft will not turn, probably the crankshaft is not centered; tap the appropriate end of the crankshaft with a mallet to reposition it.
7. Spinning the output shaft, shift the transmission through all the gears to make certain there is no binding and that all the gears shift properly.

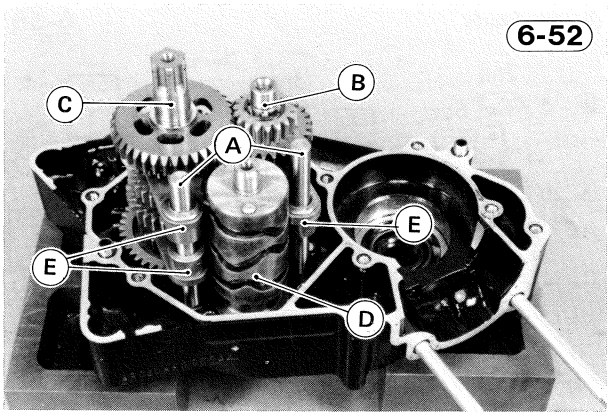
TRANSMISSION

Removal Note:

1. Pull out the shift rods ⑨ in the right crankcase half, and take out the drive shaft assembly, output shaft assembly, shift drum, and shift forks ⑦, ⑩, and ⑪ (Fig. 6-52).



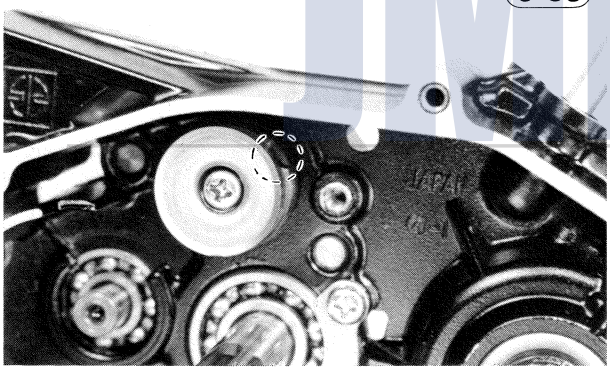
1. Circlip
2. 2nd Gear
3. 6th Gear (or Collar for 5-speed model)
4. 3rd/4th Gear
5. 5th Gear
6. Drive Shaft
7. 5th/6th Shift Fork
8. Shift Drum
9. Shift Rod
10. 2nd/4th Shift Fork
11. 1st/3rd Shift Fork
12. 6th Gear
13. Circlip
14. Thrust Washer
15. 4th Gear
16. 3rd Gear
17. 5th Gear
18. 1st Gear
19. Circlip
20. Engine Sprocket
21. Collar
22. O-Ring
23. Output Shaft
24. 2nd Gear



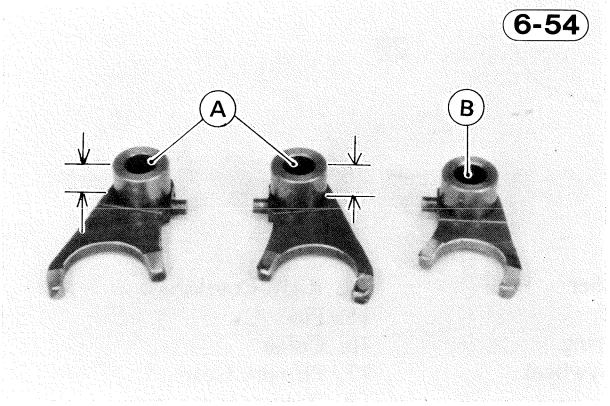
A. Shift Rods
B. Drive Shaft
C. Output Shaft
D. Shift Drum
E. Shift Forks

Installation Note:

1. Use a high flash-point solvent to clean the crankcase and all the transmission, shift drum, and crankshaft parts.
2. Apply transmission oil to the transmission gears and shift drum where they turn in the crankcase and on the drive and output shafts.
3. Install the drive shaft, output shaft, and shift drum in the right crankcase half, and set the shift drum in neutral position as shown.



4. Install the shift fork with short fingers on the front shift rod, and install the forks (2) with long fingers on the rear shift rod.

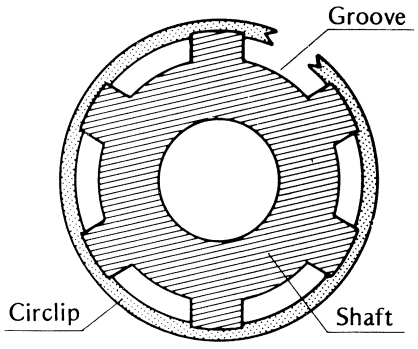


A. Shift Forks with Long Fingers
B. Shift Fork with Short Fingers

Drive Shaft Assembly Note:

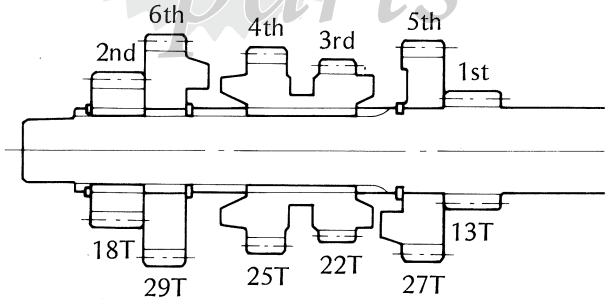
1. Replace any circlips that were removed with new ones. Install the circlip so that the opening coincides with one of the splined grooves in the drive shaft.

Circlip Installation 6-55

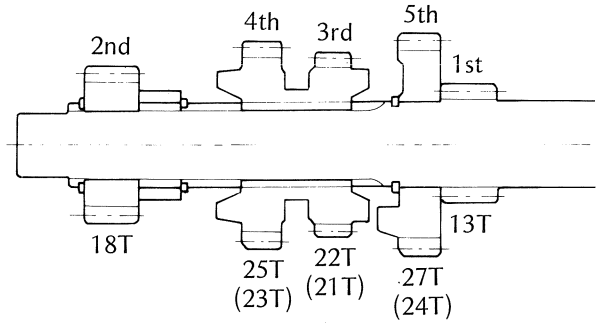


2. The drive shaft gears can be recognized by size, the gear with the smallest diameter is 1st gear and the largest one, 6th gear (or 5th gear).
3. Be sure that all parts are put back in the correct sequence, and facing the proper direction.

Drive Shaft (6-speed) 6-56



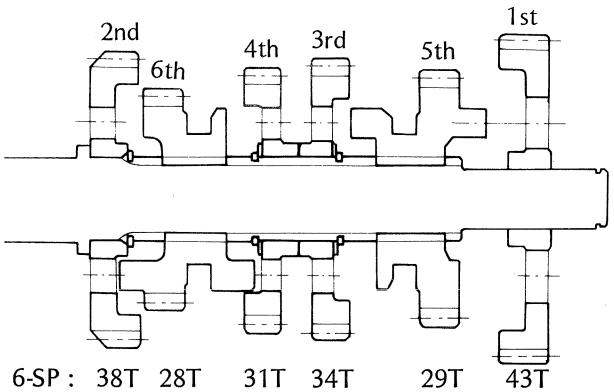
Drive Shaft (5-speed) 6-57



Output Shaft Assembly Note:

1. Replace any circlips that were removed with new ones. Install the circlip so that the opening coincides with one of the splined grooves in the output shaft (Fig. 6-55).
2. The output shaft gear sizes are opposite from those of the drive shaft gears; the largest is 1st gear and the smallest, 6th gear.
3. Be sure that all parts are put back in the correct sequence, and facing the proper direction.

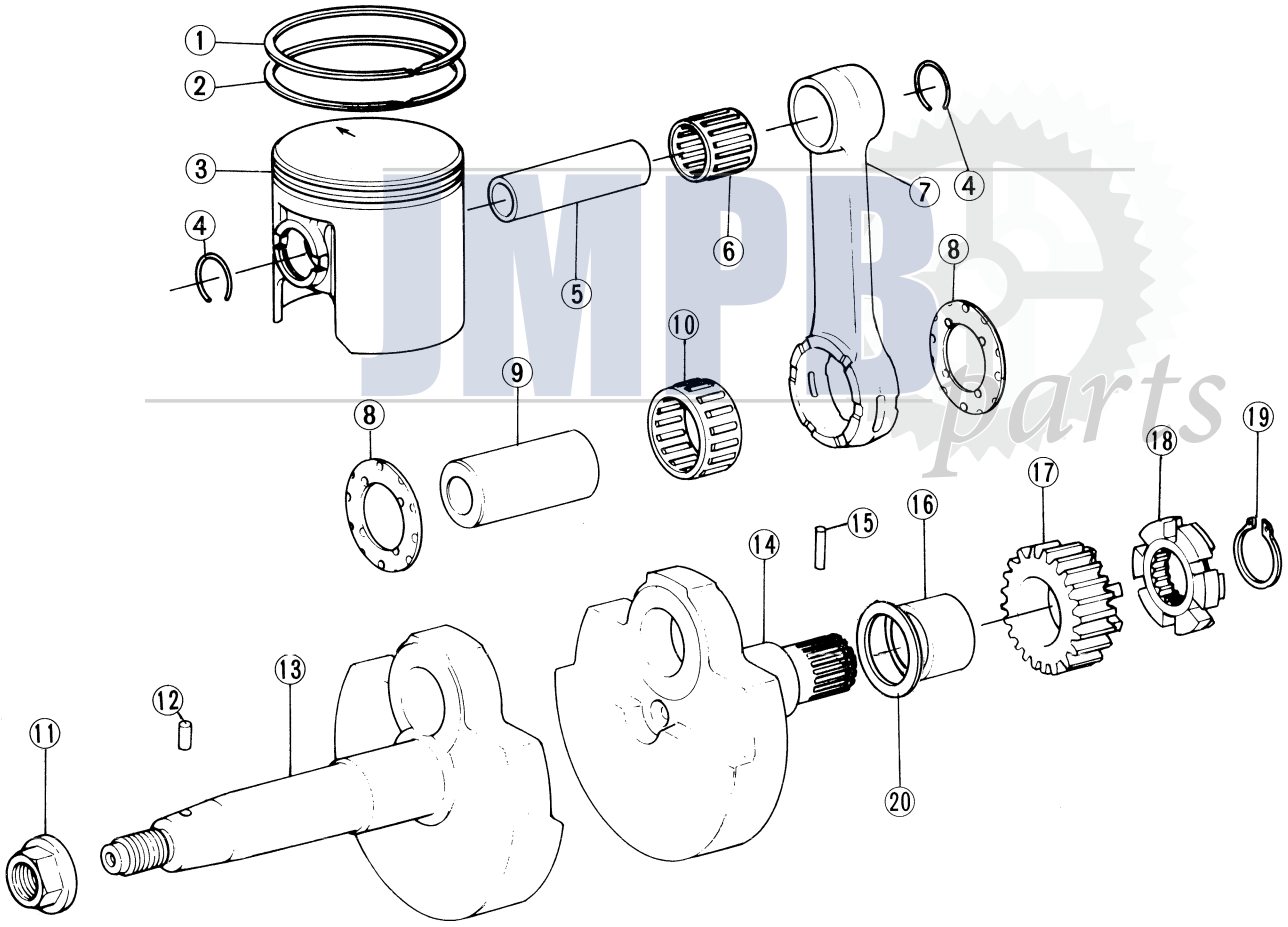
Output Shaft (6-58)



6-SP :	38T	28T	31T	34T	29T	43T
5-SP :	38T	–	31T (34T)	34T (36T)	29T (32T)	43T

CRANKSHAFT

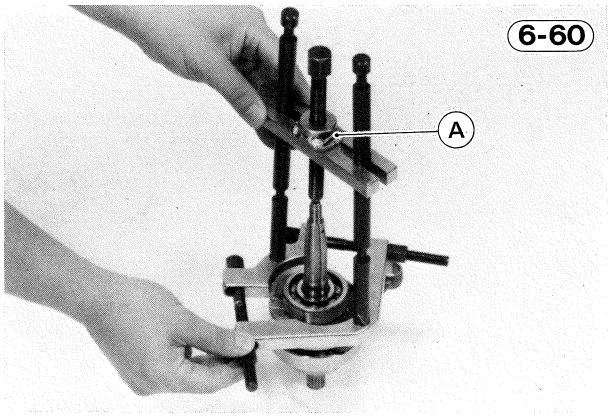
Crankshaft (6-59)



1. Top Ring
2. Second Ring
3. Piston
4. Snap Ring
5. Piston Pin
6. Needle Bearing
7. Connecting Rod
8. Thrust Washer
9. Crank Pin
10. Needle Bearing
11. Magneto Flywheel Nut
12. Pin
13. Left Crankshaft
14. Right Crankshaft
15. Pin
16. Collar
17. Primary Gear
18. Rubber Damper
19. Circlip
20. Washer

Removal Note:

1. Using a press, remove the crankshaft from the right crankcase half.
2. To remove the crankshaft ball bearing on the crankshaft, first fit the bearing puller (special tool) into place, and tighten the nuts evenly to create a space between the bearing and the crankshaft flywheel. Then remove the bearing by turning the bolt on the bearing puller.



A. Bearing Puller: 57001-158

Installation Note:

1. Install the left crankshaft bearing in the left crankcase half.
2. Install the crankshaft in the left crankcase half using a press with a chisel or wedge inserted between the flywheels opposite the connecting rod big end.

Disassembly Note:

1. If it should be necessary to disassemble the crankshaft, use a press to remove the crankpin ⑨. Removal of the crankpin separates the flywheels ⑬, ⑭, connecting rod ⑦, big end needle bearing ⑩, crankpin, and connecting rod thrust washers ⑧.

Assembly Note:

1. Since assembly of the crankshaft demand exacting tolerances, the disassembly and reassembly of the crankshaft can only be done by a shop having the necessary tools and equipment. The following information gives the tolerance that are necessary for a properly equipped shop to reassemble the crankshaft.
2. The flywheels and crankpin are cold-fitted to a tolerance of 0.053 ~ 0.068 mm.
3. Select a crankpin, needle bearing, and connecting rod such that the radial clearance will be 0.009 ~ 0.025 mm.
4. Press with a thickness gauge inserted between the connecting rod and one of the flywheels so that the side clearance will be 0.3 ~ 0.4 mm.
5. Supporting both ends of the crankshaft, check the crankshaft runout using a dial gauge. The flywheels must be aligned so that the runout is under 0.04 mm total indicated reading (Fig. 3-26).

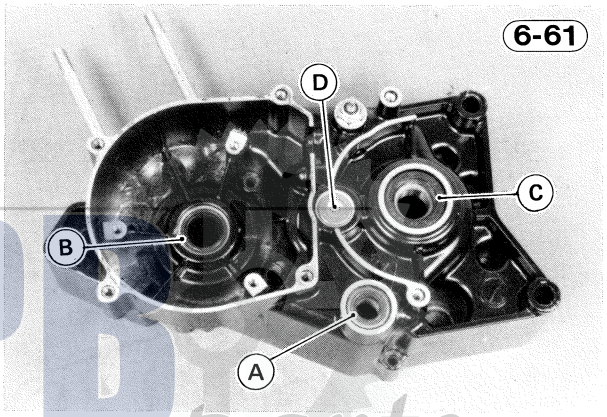
LEFT CRANKCASE HALF

Disassembly Note:

1. Crankcase bearing removal and installation require the use of a press, bearing driver, and/or bearing driver holder (special tools: P/N 57001-1129). In the absence of the above mentioned tools, satisfactory results may be obtained by quickly heating the case (in the area immediately surrounding the bearing) to approximately 93°C (200°F) max, and tapping the bearing in or out.

CAUTION **1. Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.**

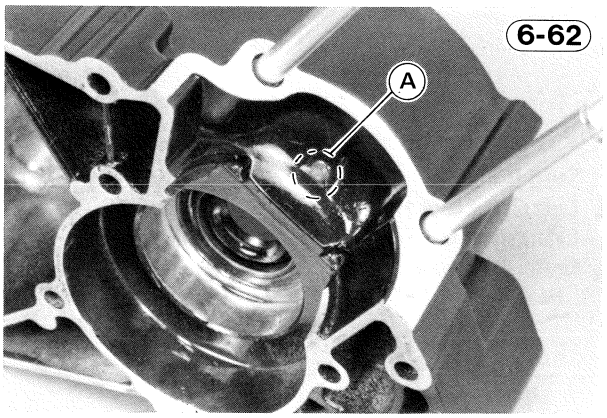
2. Using a hook, pull out the shift shaft oil seal, crankshaft oil seal, and output shaft oil seal.



A. Shift Shaft Oil Seal
B. Crankshaft Oil Seal
C. Output Shaft Oil Seal
D. Drive Shaft Needle Bearing

Assembly Note:

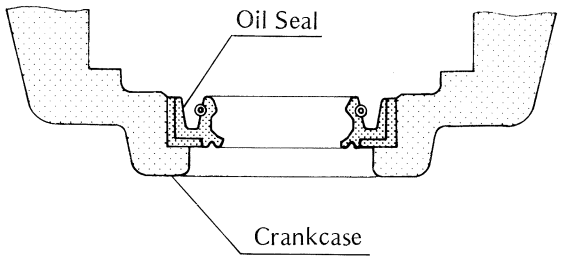
1. Inspect the bearings, and replace if necessary (Pg. 3-16).
2. With compressed air, blow out the oil passage for the left crankshaft bearing to remove dirt or particles which may block the passage.



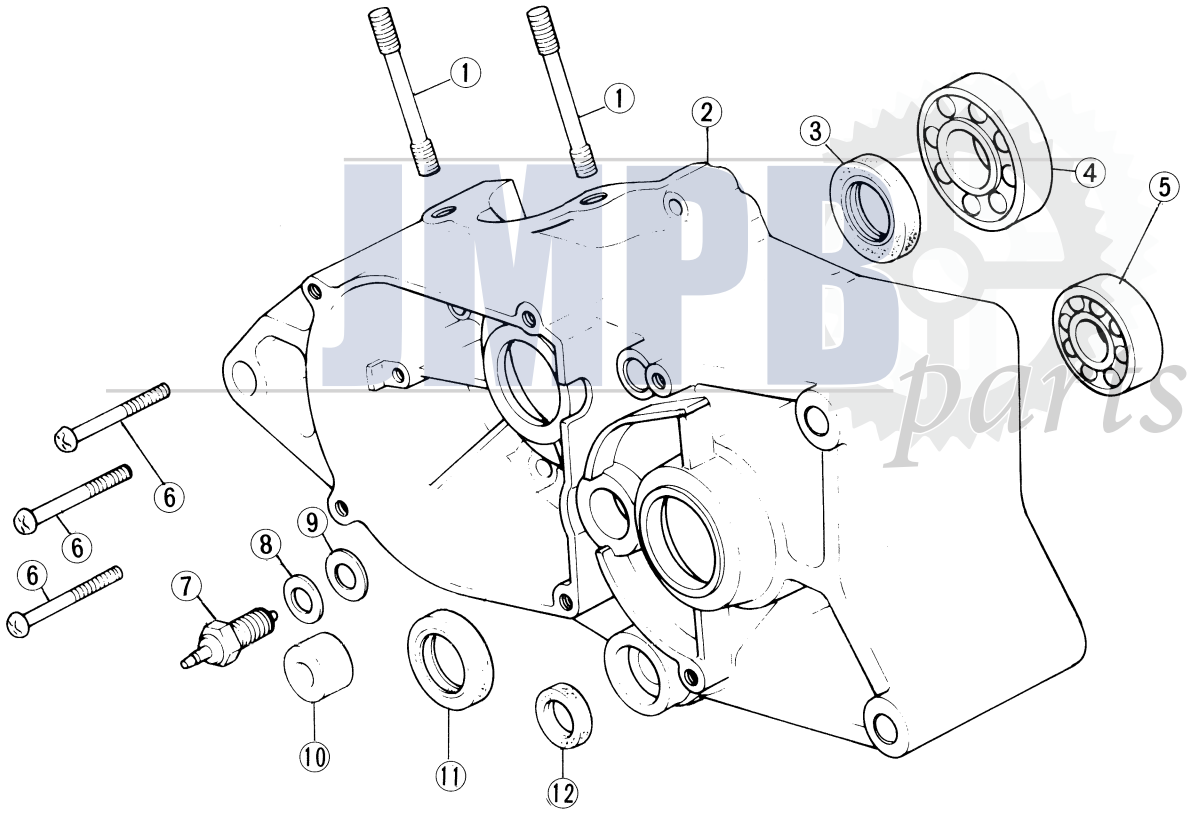
A. Oil Passage

3. Install a new crankshaft oil seal, using suitable tools as shown.
4. Install the output shaft ball bearing and crankshaft ball bearing using the bearing driver (special tools: P/N 57001-1129). Drive each bearing in until it stops at the bottom of the hole.
5. Install the drive shaft needle bearing from the left side of the crankcase using a suitable driver. Press it into place until the bearing end face is level with the surface of the left crankcase half.
6. Replace the oil seals with new ones. Using suitable tools, press the seals in so that the face of each seal is level with the surface of the left crankcase half.

Crankshaft Oil Seal 6-63



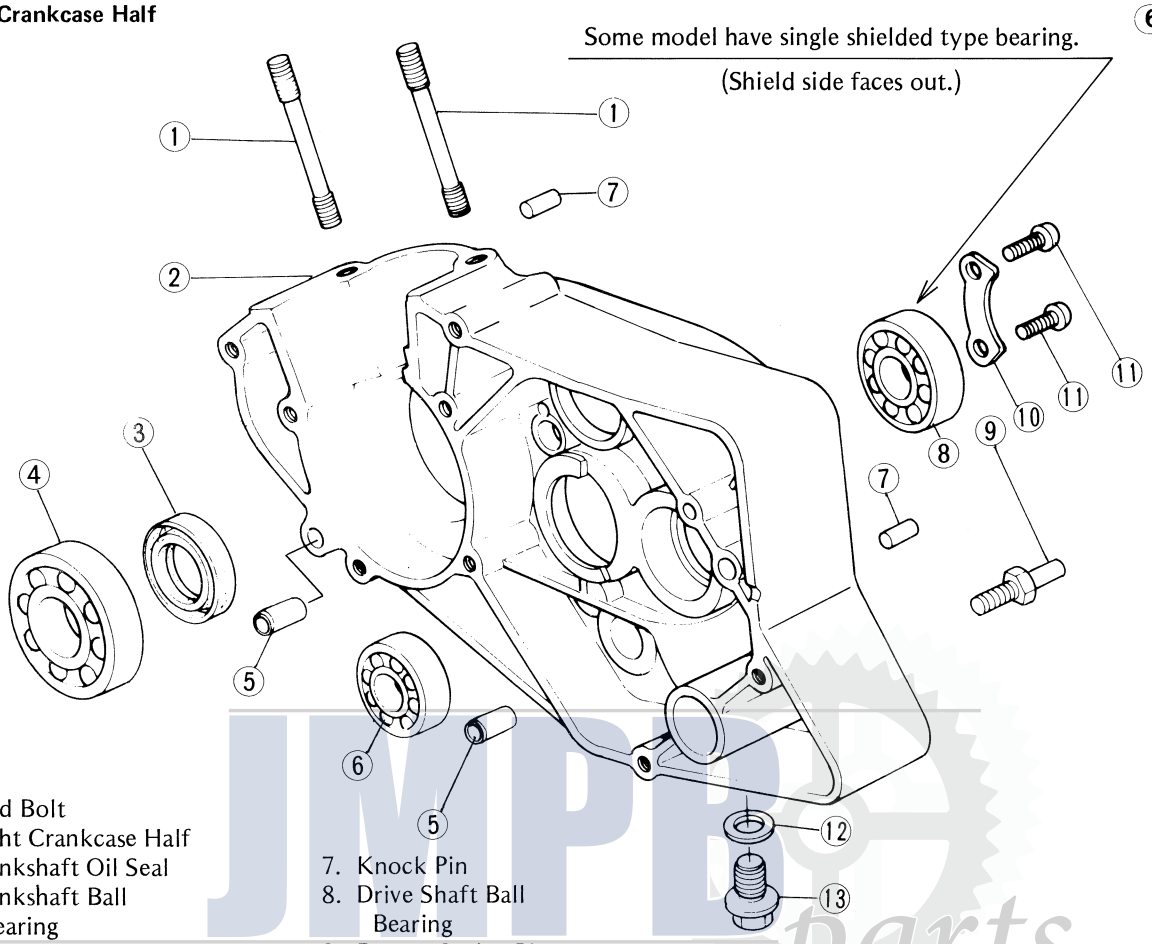
Left Crankcase Half 6-64



1. Stud Bolt
2. Left Crankcase Half
3. Crankshaft Oil Seal
4. Crankshaft Ball Bearing
5. Output Shaft Ball Bearing
6. Crankcase Screw
7. Neutral Switch
8. Flat Washer
9. (Spacer)
10. Drive Shaft Needle Bearing
11. Output Shaft Oil Seal
12. Shift Shaft Oil Seal

RIGHT CRANKCASE HALF

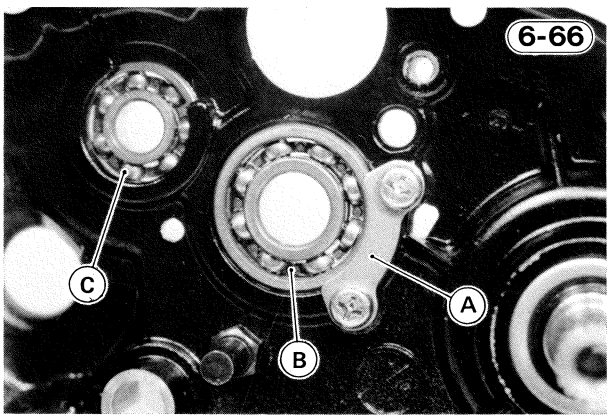
Right Crankcase Half



1. Stud Bolt
2. Right Crankcase Half
3. Crankshaft Oil Seal
4. Crankshaft Ball Bearing
5. Knock Pin
6. Output Shaft Ball Bearing
7. Knock Pin
8. Drive Shaft Ball Bearing
9. Return Spring Pin
10. Bearing Holder
11. Holder Screw

Disassembly Note:

1. See the Left Crankcase half Disassembly Note 1.
2. Remove the drive shaft ball bearing holder screws (2), and take off the holder.



A. Bearing Holder
B. Drive Shaft Ball Bearing
C. Output Shaft Ball Bearing

Assembly Note:

1. Inspect the bearings, and replace if necessary (Pg. 3-16).
2. With compressed air, blow out the oil passage for the right crankshaft bearing to remove dirt or particles which may block the passage.
3. Install the crankshaft ball bearing, drive shaft ball bearing, and output shaft ball bearing using the bearing driver and holder (special tools: P/N 57001-1129). Drive each bearing in until it stops at the bottom of the hole.
4. Install the ratchet lever stop and guide in the direction as shown in Fig. 6-46.
5. Apply a non-permanent locking agent to the thread of the return spring pin (Fig. 6-40).

Disassembly – Chassis

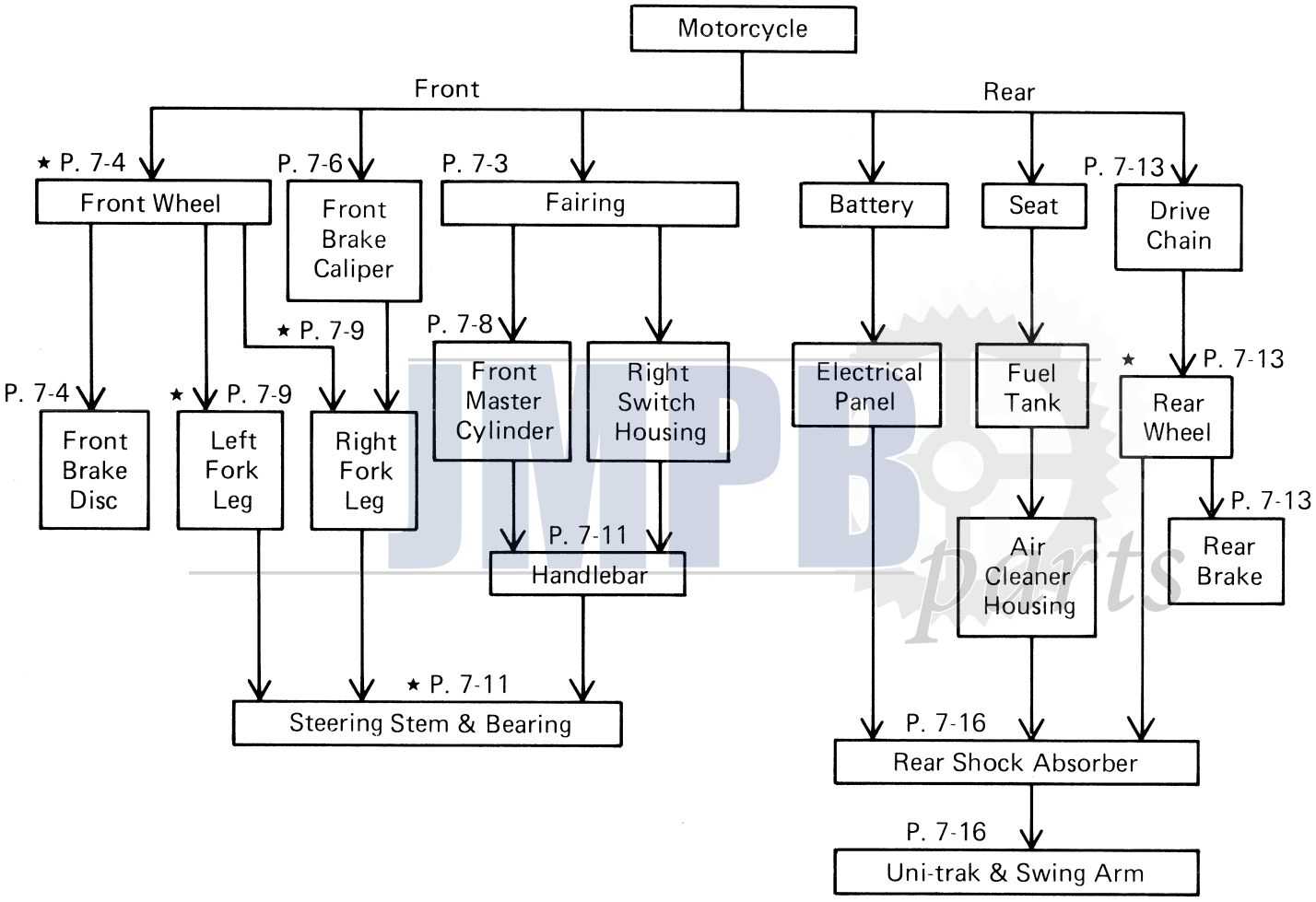
Table of Contents

FLOW CHART

The following chart is designed to aid in determining proper removal sequence. Select the component you wish to remove and follow the arrows to that point on the chart.

NOTE: 1. Action with a mark (★) requires special tool(s) for removal, installation, disassembly, and assembly.

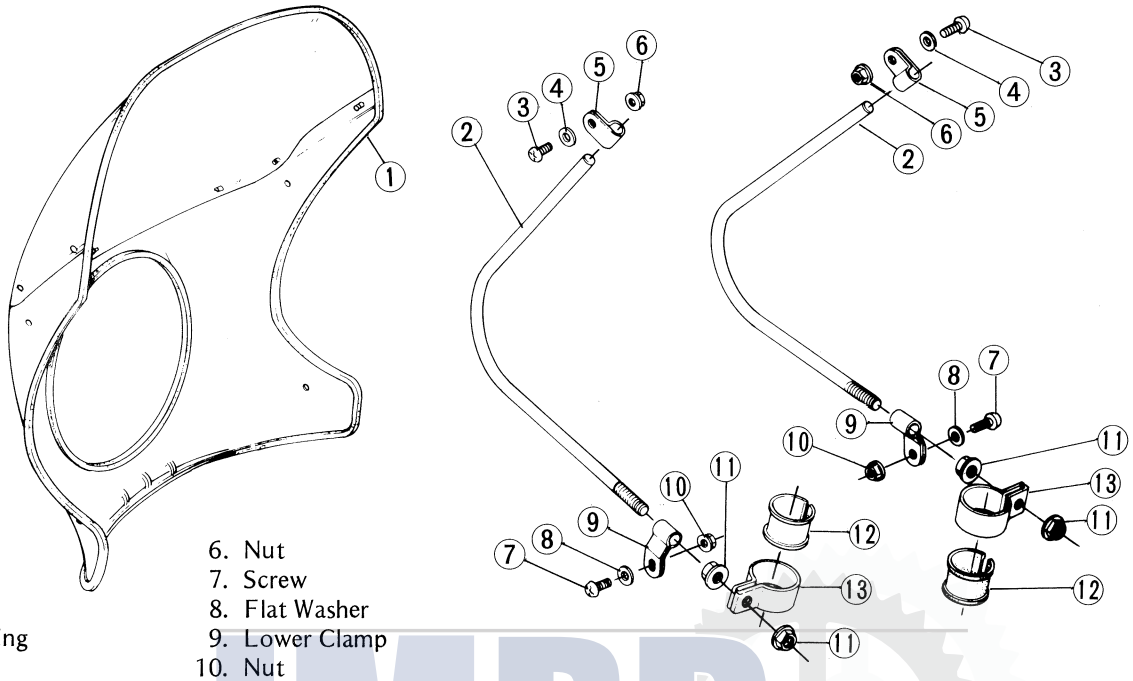
Disassembly — Chassis



FAIRING

Fairing

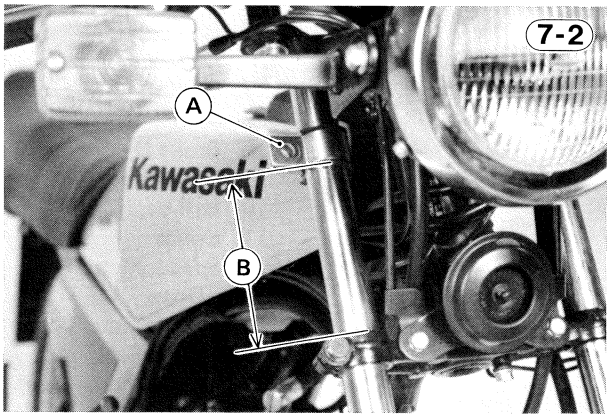
7-1



1. Fairing
2. Stay
3. Screw
4. Flat Washer
5. Upper Clamp
6. Nut
7. Screw
8. Flat Washer
9. Lower Clamp
10. Nut
11. Mounting Nut
12. Rubber Damper
13. Stay Holder

Installation Note:

1. Before installation, adjust the headlight beam (Pg. 5-6).
2. Check to see that the fairing is fully assembled and that all screws are loose, referring to the fairing assembly.
3. Set the stay holder ⑬ on each fork leg so that the distance shown in figure is 107 mm.

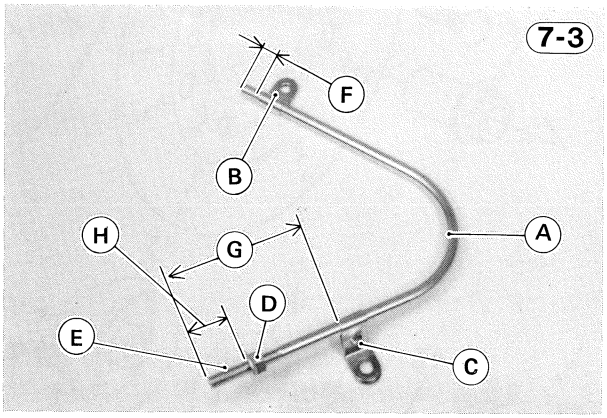


A. Stay Holder **B. 107 mm**

4. Tighten all screws and nuts so that the fairing fits the headlight rim. Check to see that the fairing touches no other parts.

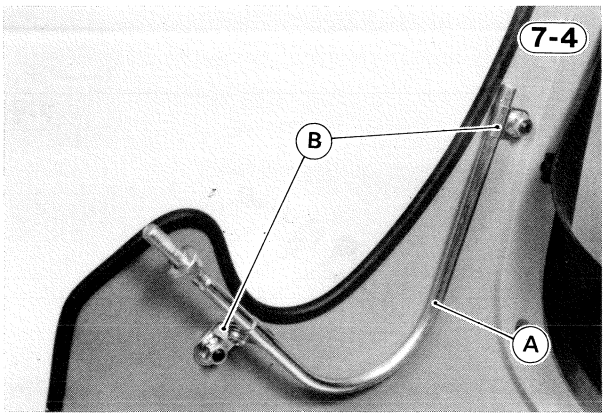
Assembly Note:

1. To assemble the left stay unit, set the upper clamp ⑤, lower clamp ⑨, and mounting nut ⑪ on the stay ② as shown. The two stays are identical.



A. Stay **E. Threaded Portion**
B. Upper Clamp **F. 10 mm**
C. Lower Clamp **G. 75 mm**
D. Mounting Nut **H. 21 mm**

2. Assemble the right stay unit. The left and right stay units are symmetric.
3. Install the left and right stay units to the fairing, and tighten the clamp screws ③, ⑦, and nuts ⑥, ⑩ loosely (Fig. 7-4).



A. Stay B. Clamps

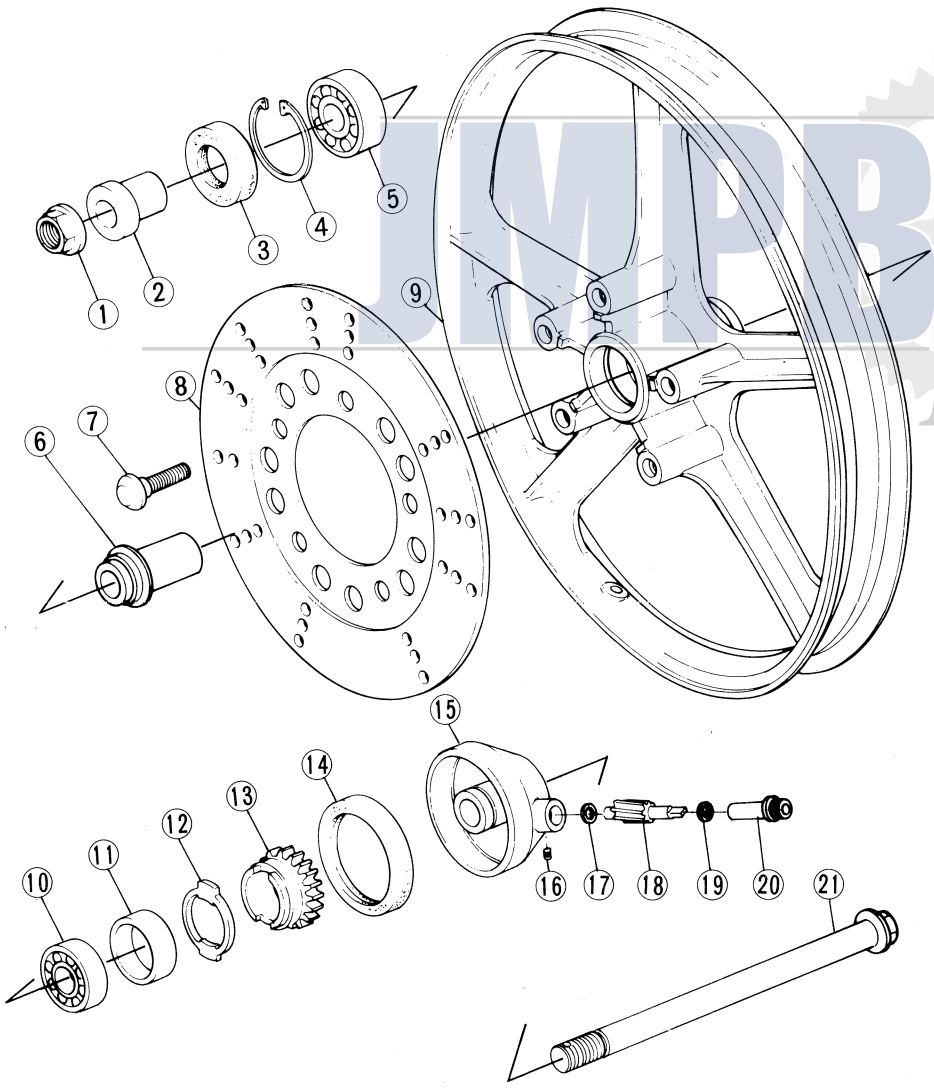
FRONT WHEEL, FRONT BRAKE DISC

Removal Note:

1. Use a jack under the engine or other suitable means to lift the front of the motorcycle. If necessary, remove the muffler.

CAUTION **1. Do not lay the wheel down on the disc. This can damage or warp the disc.**

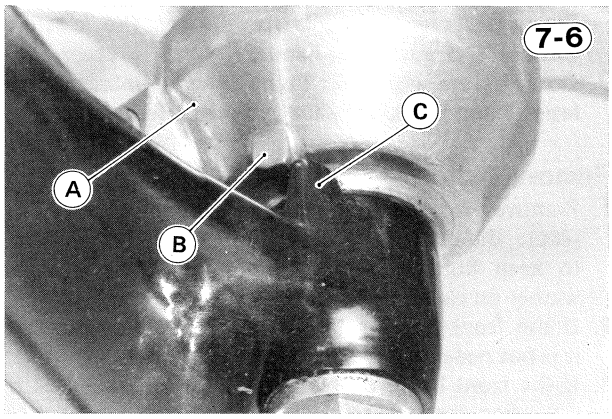
2. After wheel removal, insert a wood wedge (4 ~ 5 mm thick) between the disc brake pads. This prevents the pads from being moved out of their proper position, should the brake lever be squeezed accidentally.



1. Axle Nut
2. Collar
3. Grease Seal
4. Circlip
5. Ball Bearing
6. Distance Collar
7. Disc Mounting Allen Bolt
8. Brake Disc
9. Cast Wheel
10. Ball Bearing
11. Collar
12. Speedometer Gear Drive
13. Speedometer Gear
14. Grease Seal
15. Speedometer Gear Housing
16. Pin
17. Washer
18. Speedometer Pinion
19. Washer
20. Bushing
21. Front Axle

Installation Note:

1. Turn the speedometer gear housing so that the small projection of the housing fits on the tongue of the fork leg.



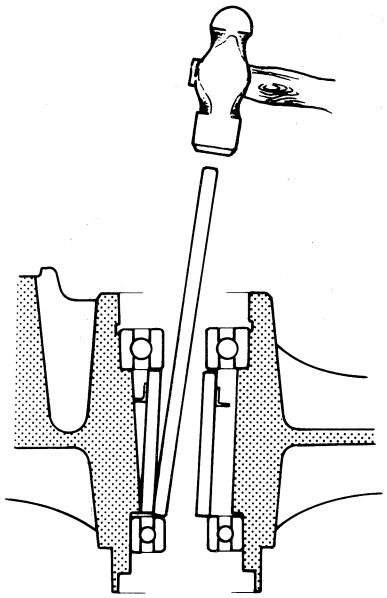
A. Speedometer Gear Housing
B. Small Projection
C. Tongue

2. Install the collar ② onto the disc side of the wheel.
3. Tighten the front axle nut to 6.5 kg-m (47 ft-lbs) of torque.
4. Insert the speedometer inner cable into the speedometer gear housing while turning the wheel so that the slot in the end of the cable will seat on the tongue of the speedometer pinion. Tighten the cable nut with pliers.

Disassembly Note:

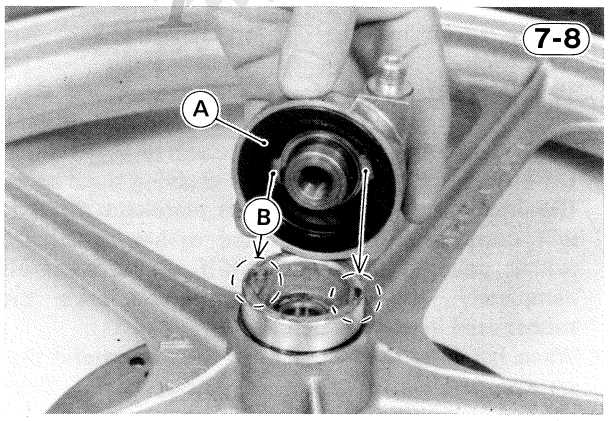
1. It is recommended that the speedometer pinion assembly be replaced rather than attempting to repair the components. If the speedometer cable bushing ⑳ or speedometer pinion ⑱ needs to be removed, first drill the housing through the pin ⑯ using a 1 mm drill bit. Drill the housing from the gear side using a 2 mm drill bit. Using a suitable tool, tap out the pin, and then pull out the speedometer cable bushing, pinion, and washers ⑰, ⑲.
2. See the CAUTION on Pg. 7-6 for handling the brake disc.
3. Insert a metal rod into the hub from the speedometer side, and remove the bearing (gear housing side) by tapping evenly around its inner race.

Bearing Removal (7-7)



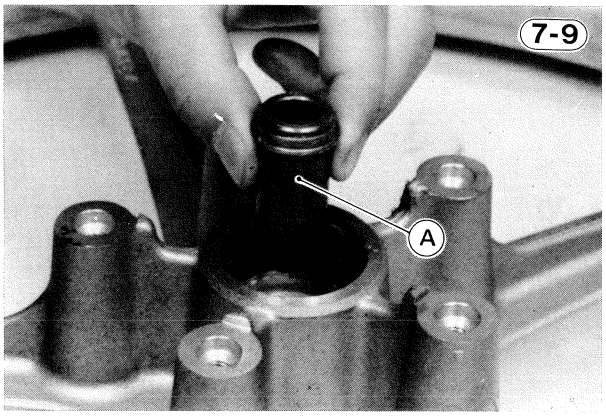
Assembly Note:

1. After inserting a new pin, stake the speedometer gear housing hole to secure the pin in place.
2. Replace the grease seal with a new one. Apply a little grease to the seal. Install it using a press or a suitable driver so that the face of the seal is level with the surface of the housing.
3. Regrease the speedometer gear.
4. Install the speedometer gear housing so that it fits in the speedometer gear drive notches.



A. Speedometer Gear Housing
B. Fit in the gear drive notches.

5. Inspect the bearings and replace them if necessary (Pg. 2-16).
6. Lubricate the ball bearings (Pg. 2-16).
7. Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
8. Install the distance collar in the direction as shown in Fig. 7-9.



A. Distance Collar

9. Install the ball bearings using the bearing driver and bearing driver holder (special tools: P/N 57001-1129) Press the bearing in until it stops at the bottom of the hole.
10. Install a new grease seal on the disc side using the bearing driver and bearing driver holder (special tools) Press the seal so that the face of the seal is level with the surface of the front hub.
11. Tighten the disc mounting bolts (5) to 2.1 kg-m (15.0 ft-lbs) of torque.

FRONT BRAKE CALIPER

Before working on the disc brake parts, please read the following:

CAUTION **1. Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

2. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Replace the pads with new ones if they cannot be cleaned satisfactorily.

3. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

4. If any of the brake line fittings or the bleed valve is opened at any time. AIR MUST BE BLED FROM THE BRAKE SYSTEM (Pg. 2-12).

5. When installing or assembling the disc brake, tighten the disc brake fittings to the values given in Table on Pg. 1-12. Improper torque may cause the brake to malfunction.

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

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

Removal Note:

1. Remove the banjo bolt at the caliper, and temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum. There is a flat washer on each side of the hose fitting.
2. If the front brake caliper is not to be disassembled, it is not necessary to remove the banjo bolt.
3. If the front brake caliper is to be disassembled without using compressed air, the banjo bolt must not be removed until the caliper piston removal.

Installation Note:

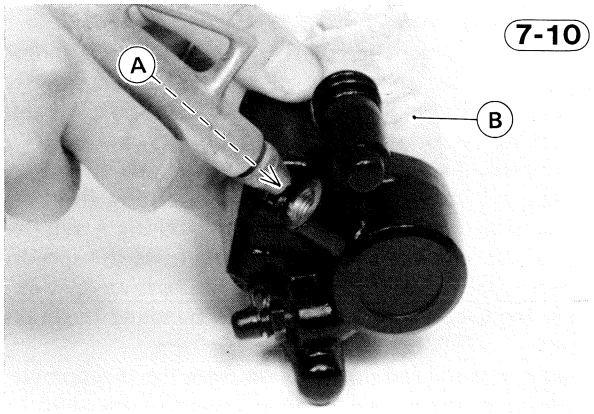
1. Tighten the front caliper mounting bolts to 2.3 kg-m (16.5 ft-lbs) of torque.
2. Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting. Tighten the banjo bolt to 3.0 kg-m (22 ft-lbs) of torque.
3. Check the fluid level in the master cylinder, and bleed the brake line (Pg. 2-12).

WARNING **1. Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.**

Disassembly Note:

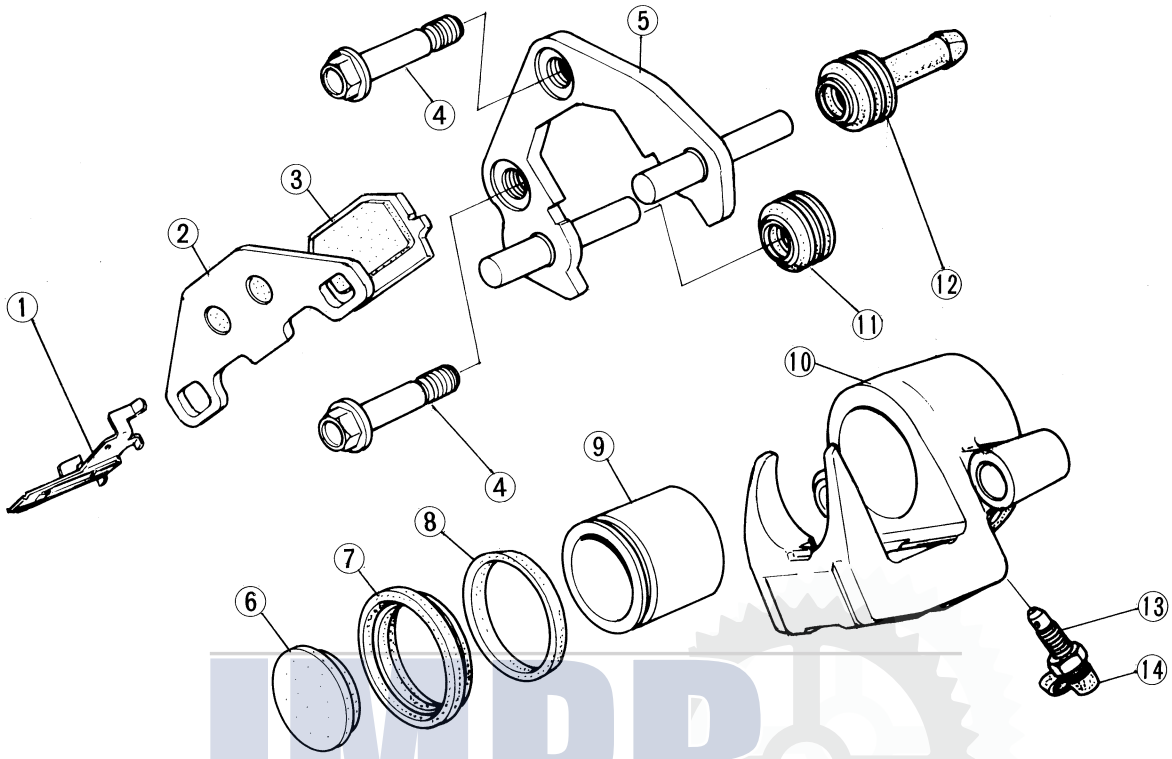
1. Cover the caliper opening with a clean, heavy cloth, and remove the piston by lightly applying compressed air to where the brake line fits into the caliper.

WARNING **1. To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.**



A. Compressed Air B. Heavy Cloth

Front Brake Caliper (7-11)



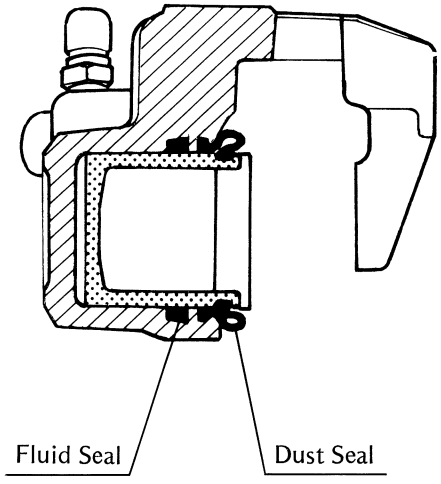
1. Anti-rattle Spring
2. Pad
3. Pad
4. Mounting Bolt
5. Caliper Holder
6. Piston Head
7. Dust Seal
8. Fluid Seal
9. Piston
10. Caliper
11. Dust Cover
12. Dust Cover
13. Bleed Valve
14. Rubber Cap

2. If compressed air is not available, reconnect the brake line and pump the piston out with the brake lever.

Assembly Note:

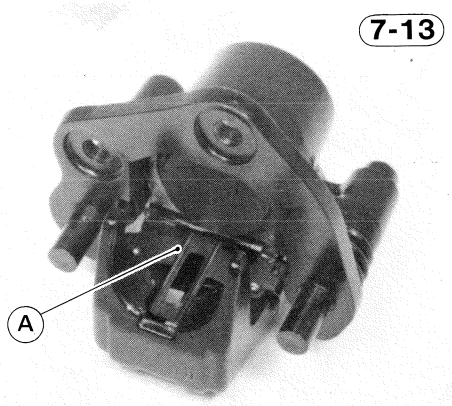
1. Clean the caliper parts with brake fluid or alcohol (See CAUTION – Pg. 7-6).
2. It is recommended that the fluid seal, which is removed, be replaced with a new one.
3. Replace the dust seal and covers if they were damaged.
4. Apply brake fluid to the outside of the piston and the fluid seal, and push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt get scratched.
5. Install the dust seal around the piston. Check that the dust seal is properly fitted into the grooves in the piston and caliper.

Caliper Dust Seal, Fluid Seal (7-12)



6. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes (PBC is a speacial high temperature, water-resistant grease).
7. Install the anti-rattle spring to the caliper as shown.

7-13



A. Anti-rattle Spring

FRONT MASTER CYLINDER

Removal Note:

1. See the Caution on Pg. 7-6 for handling the disc brake.
2. Disconnect the brake light switch leads from the master cylinder in the headlight housing.

Installation Note:

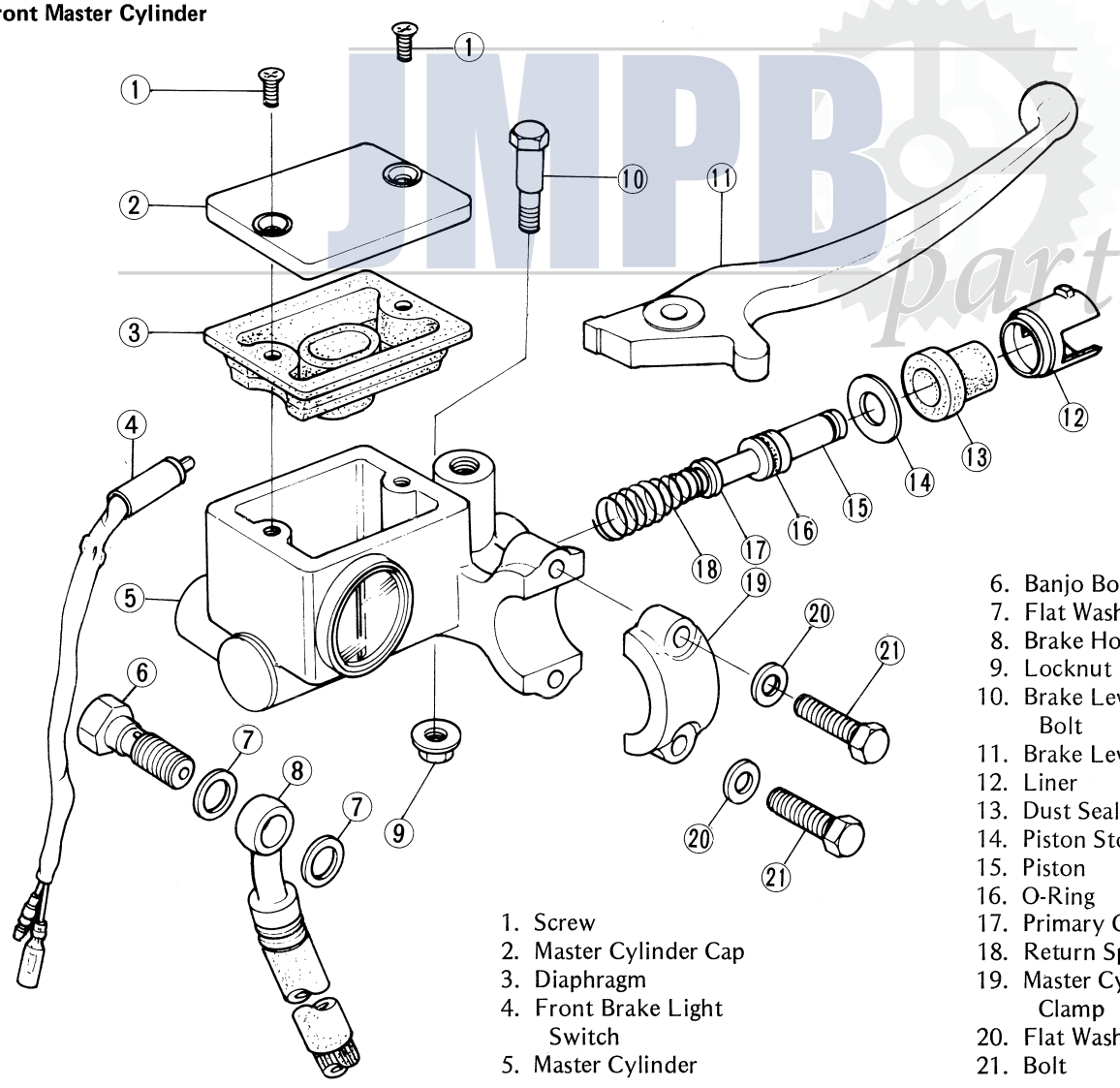
1. Install the master cylinder, and tighten the clamp bolts (2) to 0.90 kg-m (78 in-lbs) of torque.
2. Use a new flat washer on each side of the brake hose fitting. Tighten the banjo bolt to 3.0 kg-m (22 ft-lbs) of torque.
3. Bleed the brake line after master cylinder installation (Pg. 2-12).

Disassembly Note:

1. Using a thin-bladed screwdriver or some other suitable tool, press in the liner tabs which catch in the groove in the master cylinder, and then remove the liner

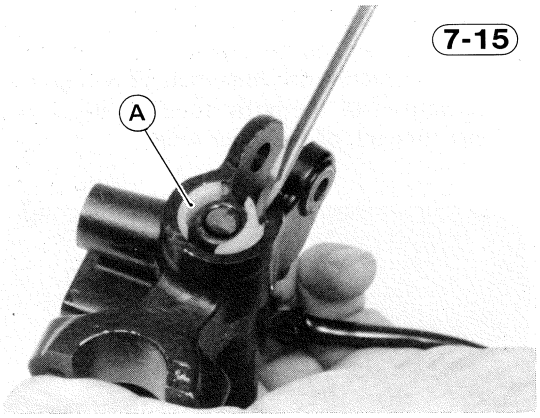
Front Master Cylinder

7-14



1. Screw
2. Master Cylinder Cap
3. Diaphragm
4. Front Brake Light Switch
5. Master Cylinder
6. Banjo Bolt
7. Flat Washer
8. Brake Hose Fitting
9. Locknut
10. Brake Lever Pivot Bolt
11. Brake Lever
12. Liner
13. Dust Seal
14. Piston Stop
15. Piston
16. O-Ring
17. Primary Cup
18. Return Spring
19. Master Cylinder Clamp
20. Flat Washer
21. Bolt

7-15

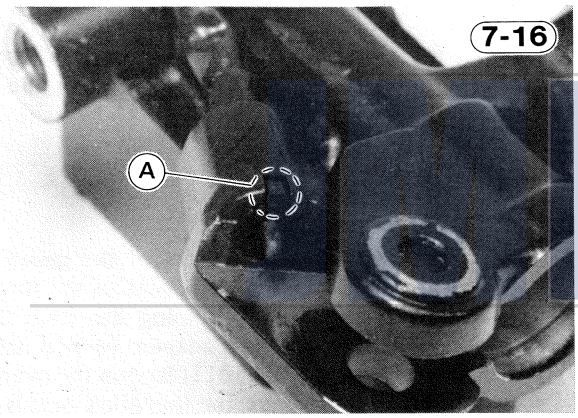


A. Liner

Assembly Note:

1. Before assembly, clean all parts including the master cylinder with brake fluid or alcohol (See CAUTION – Pg. 7-6). Apply brake fluid to the parts removed and to the inner wall of the cylinder.
2. Install the front brake light switch so that the small projection on the switch fits into the groove in the master cylinder body.

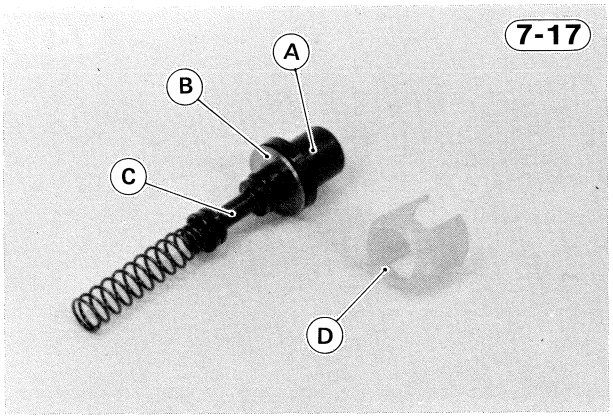
7-16



A. Projection and Groove

3. Be sure that the piston stop is between the piston and dust seal.

7-17

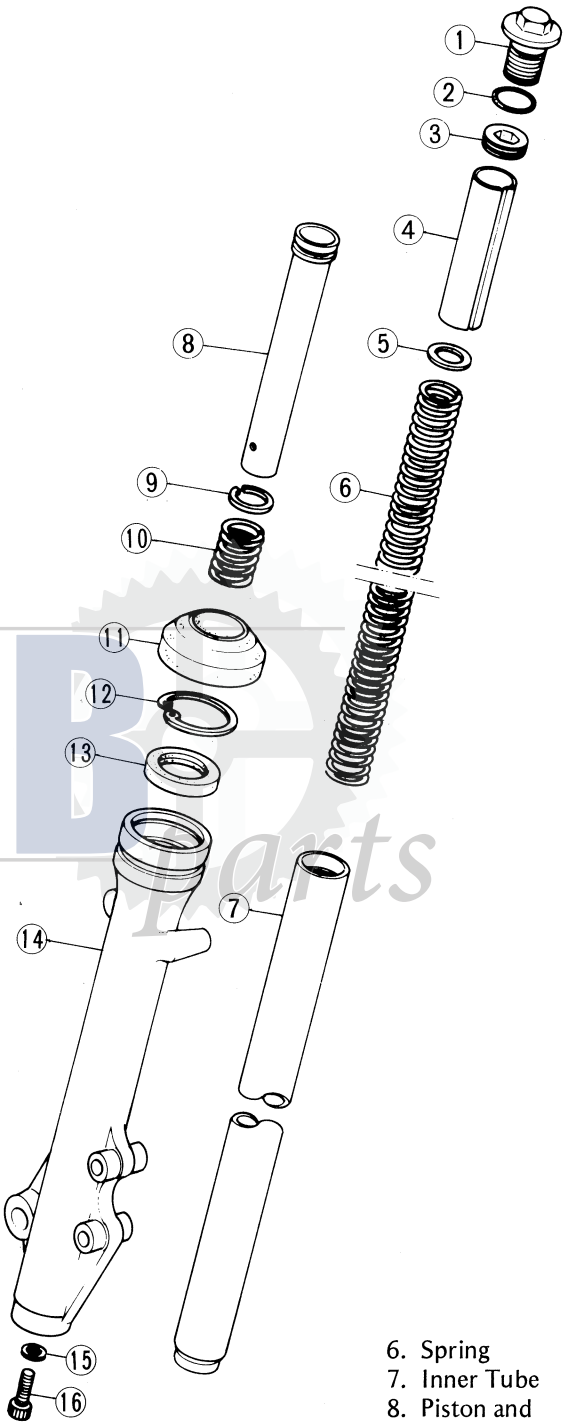


A. Dust Seal
B. Piston Stop
C. Piston
D. Liner

4. Tighten the brake lever pivot bolt and locknut to 0.6 kg-m (52 in-lbs) of torque.

FRONT FORK

Front Fork 7-18



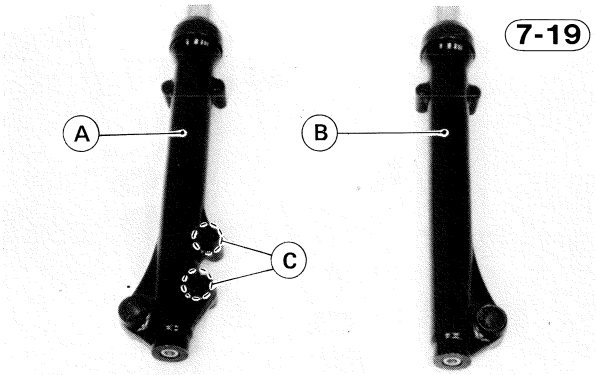
1. Top Bolt
2. O-Ring
3. Spring Stop
4. Collar
5. Spring Seat
6. Spring
7. Inner Tube
8. Piston and Cylinder Unit
9. Piston Ring
10. Spring
11. Dust Seal
12. Circlip
13. Oil Seal
14. Outer Tube
15. Gasket
16. Allen Bolt

Removal Note:

1. To remove the left fork leg, remove the front brake caliper.
2. After removal, finger tighten the top bolt ① to prevent the fork oil draining out.

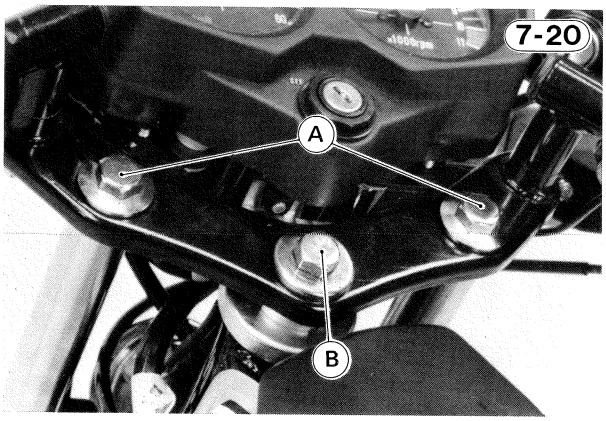
Installation Note:

1. Note that the left fork leg has the caliper mounting holes.



A. Left Fork Leg **C. Caliper Mounting Holes**
B. Right Fork Leg.

2. Slide the fork leg up through the lower clamp all the way, and tighten the top bolt to 3.0 kg-m (22 ft-lbs) of torque.

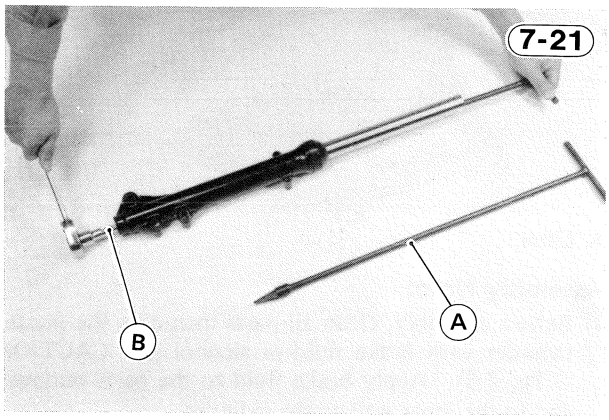


A. Top Bolts **B. Stem Head Bolt**

3. Tighten the front fork lower bolt to 1.8 kg-m (13.0 ft-lbs) of torque.
4. Tighten the stem head bolt to 2.0 kg-m (14.5 ft-lbs) of torque if it was loosened.

Disassembly Note:

1. Remove the stop ③ using a Allen wrench, and pull out the distance collar ④, spring seat ⑤, and spring ⑥.
2. Stop the cylinder ⑧ from turning by using the front fork cylinder holder handle and adapter (special tools). Unscrew the Allen bolt ⑯ and gasket ⑮ from the bottom of the outer tube ⑭ and then pull the inner tube out of the outer tube.

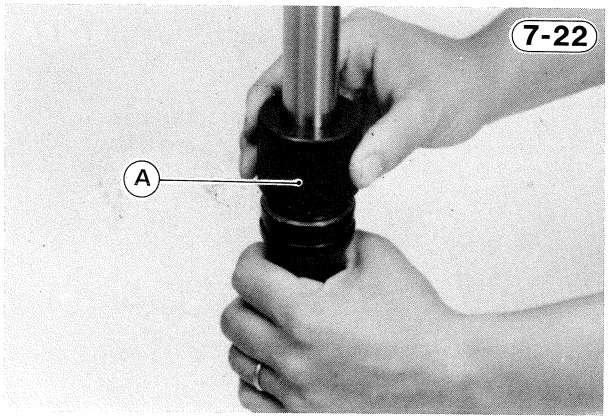


A. Front Fork Cylinder Holder Handle and Adapter: 57001-183, 57001-1011
B. Allen Wrench

3. Pull out the oil seal ⑬. It may be necessary to heat the outer tube around the oil seal before pulling it out.

Assembly Note:

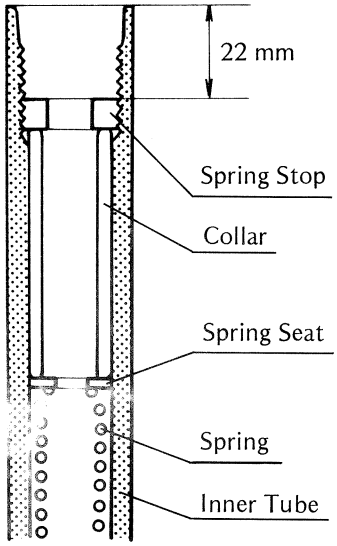
1. Apply liquid gasket to both sides of the gasket ⑮, apply a non-permanent locking agent to the threads of Allen bolt, and tighten it using the front fork cylinder holder handle and adapter (special tools: P/N 57001-183 and 57001-1011) to stop the cylinder from turning. The torque for the Allen bolt is 1.8 kg-m (13.0 ft-lbs).
2. Replace the oil seal with a new one, apply oil to the outside, and install it with the oil seal driver (special tool).



A. Oil Seal Driver: 57001-194

3. Turn the stop into the inner tube so that the distance from the top of the tube is 22 mm (Fig. 7-23).

Spring Stop (7-23)

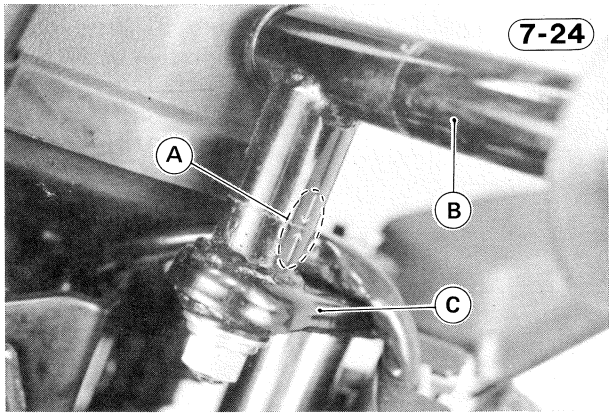


4. Refill with 83 – 91 cc of fresh SAE 5W20 oil.

HANDLEBAR

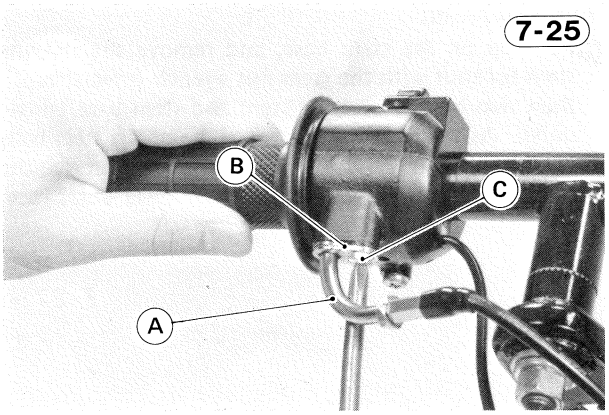
Installation Note:

1. Install the handlebar to the steering stem head so that the mark on the handlebar aligns with the mark on the stem head.



A. Marks **C. Stem Head**
B. Handlebar

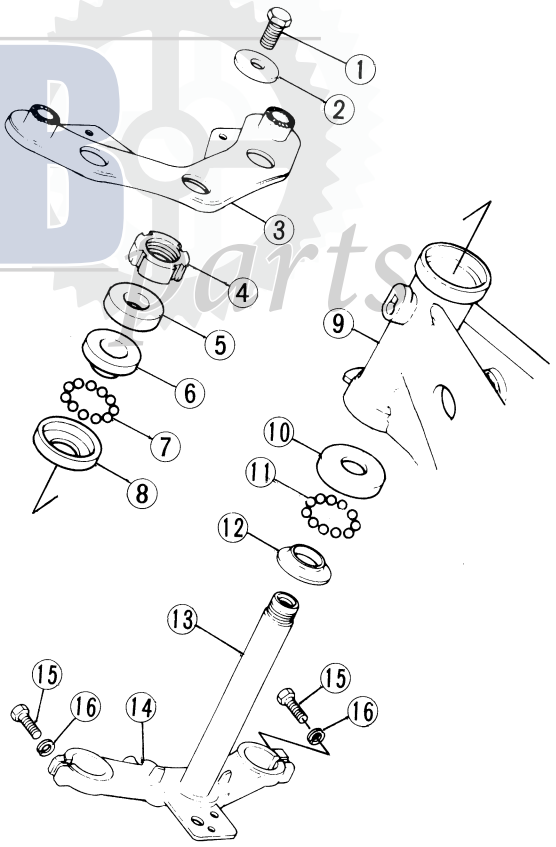
2. Install the throttle cable elbow holding plate with the right switch housing screw.



A. Cable Elbow **C. Screw**
B. Holding Plate

STEERING STEM, STEERING STEM BEARING

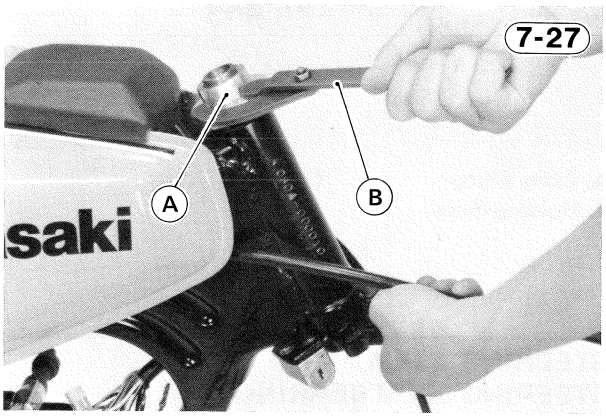
Steering Stem, Bearing (7-26)



1. Stem Head Bolt
2. Flat Washer
3. Stem Head
4. Stem Locknut
5. Stem Cap
6. Upper Inner Race
7. Bearing Ball
8. Upper Outer Race
9. Head Pipe
10. Lower Outer Race
11. Bearing Ball
12. Lower Inner Race
13. Steering Stem
14. Stem Base
15. Clamp Bolt
16. Lockwasher

Removal Note:

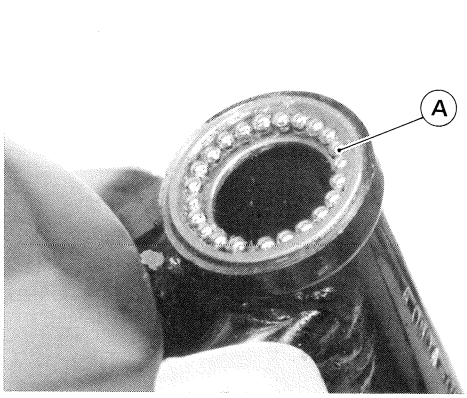
1. Push up on the stem base, and remove the steering stem locknut with the stem nut wrench (special tool); then remove the steering stem and stem base (single unit). As the stem is removed, some of the steel balls will drop out of the lower outer race. Remove the rest. There are 23 steel balls in the lower outer race.



A. Stem Locknut
B. Stem Nut Wrench: 57001-1100

Installation Note:

1. Apply grease to the upper and lower outer races in the head pipe so that the steel balls will stick in place during stem insertion. Install the upper steel balls (23) and lower steel balls (23).



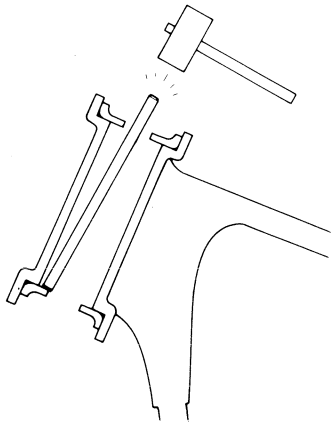
A. Steel Balls

2. Tighten the steering stem locknut to 2.0 kg-m (14.5 ft-lbs) of torque.
3. Tighten the stem head bolt to 2.0 kg-m (14.5 ft-lbs) of torque after front fork installation.

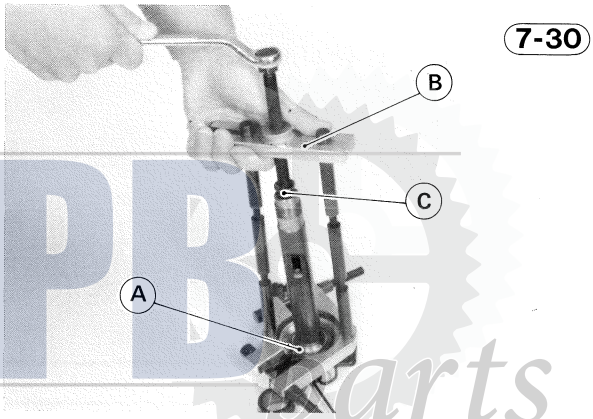
Disassembly Note:

1. To remove the outer races pressed into the head pipe, insert a bar into the head pipe, and hammer evenly around the circumference of the opposite race to drive it out.

Bearing Race Removal 7-29



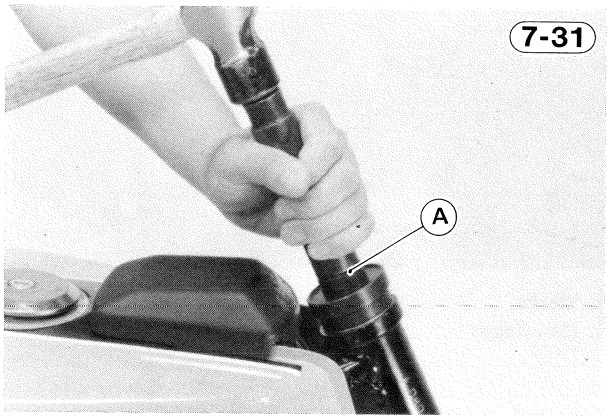
2. Remove the lower inner race, which is pressed onto the steering stem, with the bearing puller and adapter (special tools).



A. Lower Inner Race
B. Bearing Puller: 57001-158
C. Adapter: 57001-317

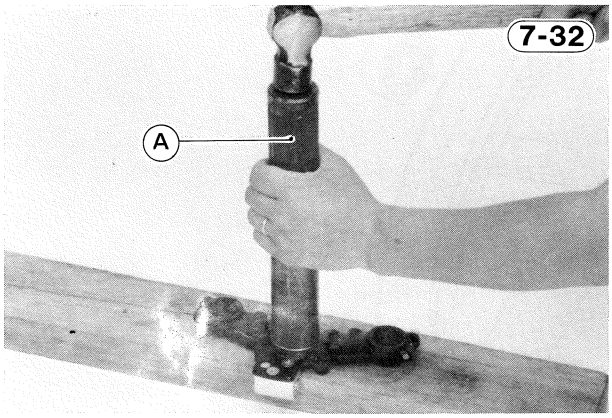
Assembly Note:

1. Apply oil to the outer races, and then drive them into the head pipe using a bearing driver and driver holder (special tools). Be sure to press them in until they stop at the stepped portion in the head pipe.



A. Bearing Driver and Holder : 57001-1129

● Apply oil to the lower inner race, and then drive it onto the steering stem using a stem bearing driver (special tool). Be sure to press it on until it stops at the stem base.



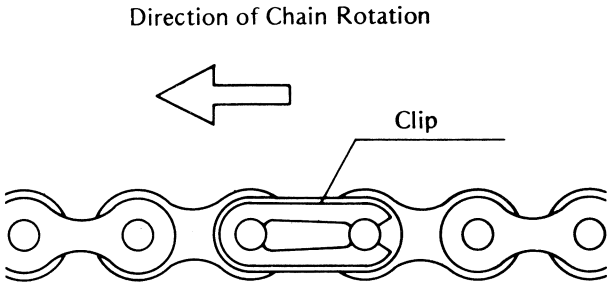
A. Stem Bearing Driver: 57001-137

Installation:

NOTE: 1. The direction of the master link clip must be as shown.

WARNING **1. Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodge, the chain could come part, and this could result in rear wheel lockup and loss of control.**

Master Link Clip Installation (7-34)

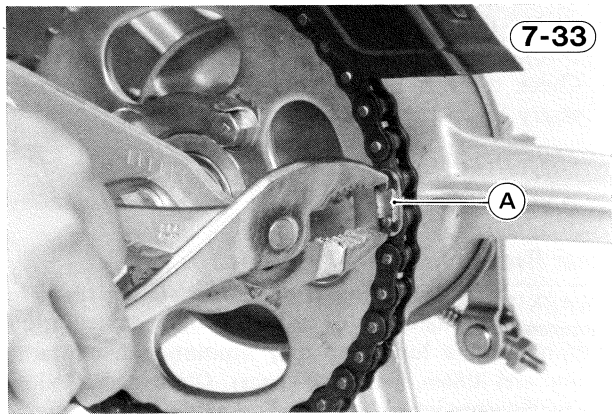


2. Adjust the drive chain (Pg. 2-7).

DRIVE CHAIN

Removal Note:

1. Remove the clip from the drive chain master link using pliers, and remove the master link.



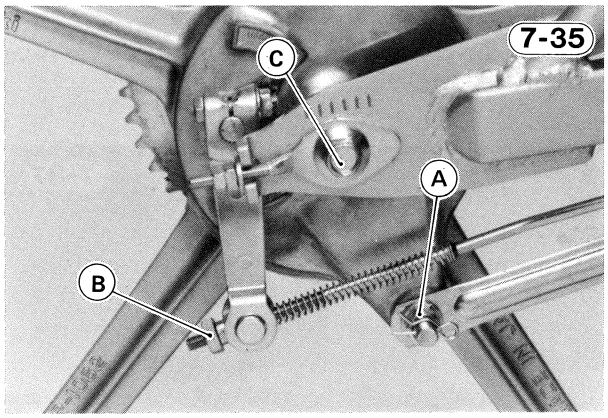
A. Master Link Clip

2. Free the drive chain from the sprockets, being careful that the chain does not get dirty from contact with the ground.

REAR WHEEL, REAR BRAKE

Removal Note:

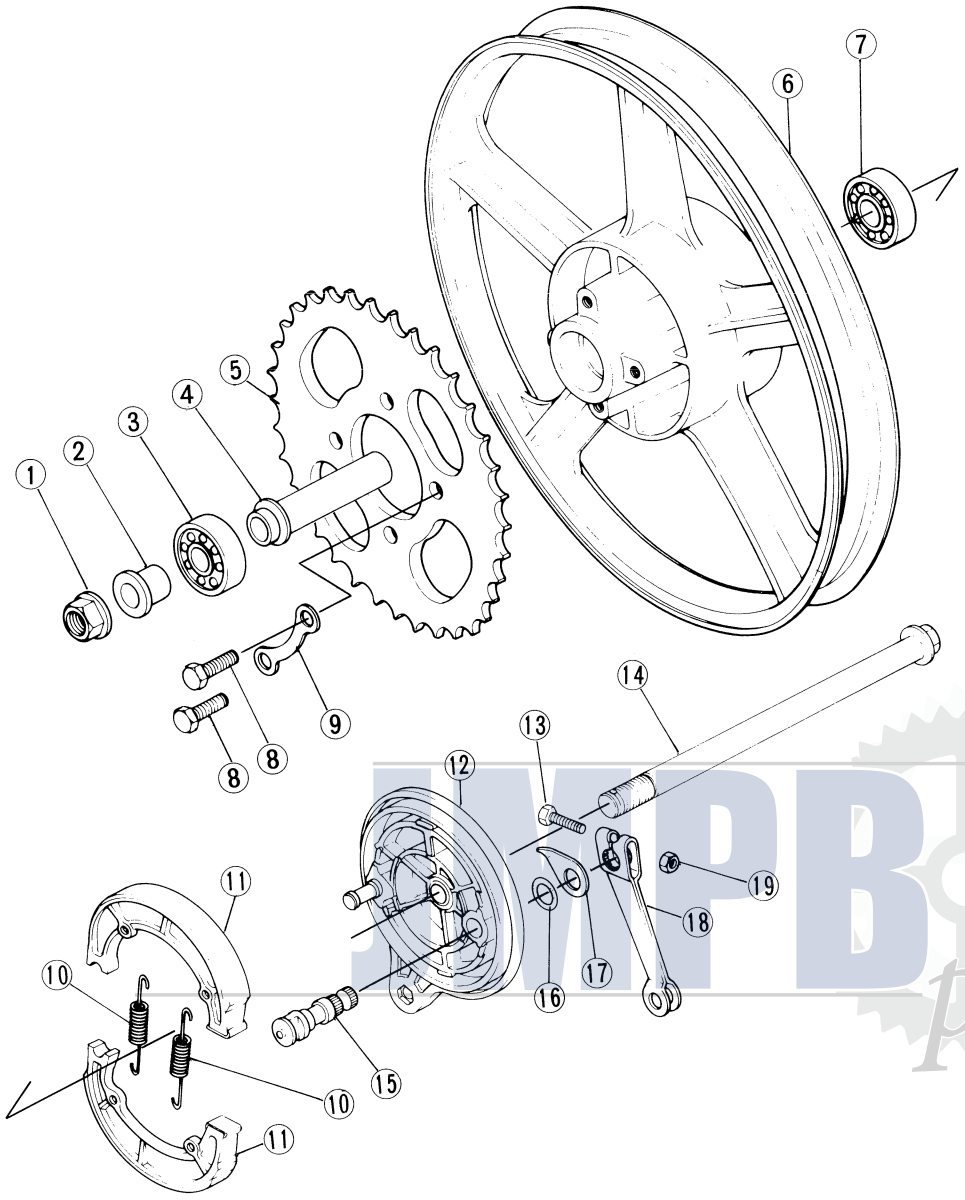
1. Remove the safety clip nut, and take off the bolt at the rear end of the torque link.



A. Torque Link Nut **C. Rear Axle**
B. Adjusting Nut

2. Remove the adjusting nut from the end of the brake rod, and free the rod from cam lever.

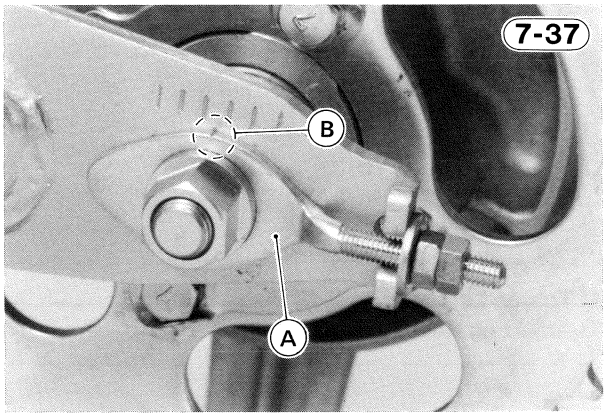
7-36



1. Axle Nut
2. Collar
3. Ball Bearing
4. Distance Collar
5. Rear Sprocket
6. Cast Wheel
7. Ball Bearing
8. Bolt
9. Double Washer
10. Spring
11. Brake Shoe
12. Brake Panel
13. Bolt
14. Rear Axle
15. Camshaft
16. Dust Seal
17. Wear Indicator
18. Cam Lever
19. Nut

Installation Note:

1. Install the chain adjuster on each side of the swing arm.
2. Adjust the drive chain (Pg. 2-7) and rear brake (Pg. 2-10).
3. Check the rear brake light switch and adjust if necessary (Pg. 2-13).



7-37

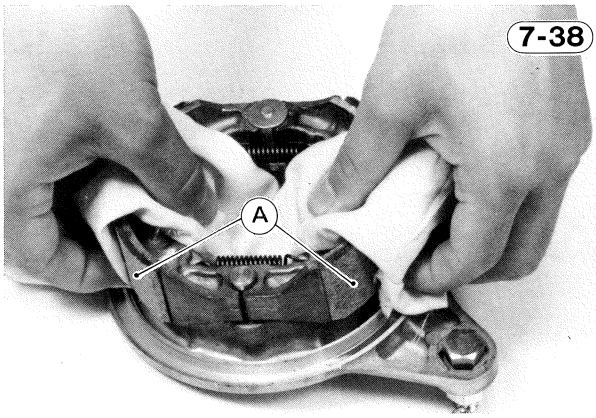
A. Chain Adjuster B. Notch Mark

Rear Brake Disassembly Note:

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

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

1. Using a clean cloth around the linings to prevent grease or oil from getting on them, remove the brake shoes ⑪ by pulling up on the center of the linings.

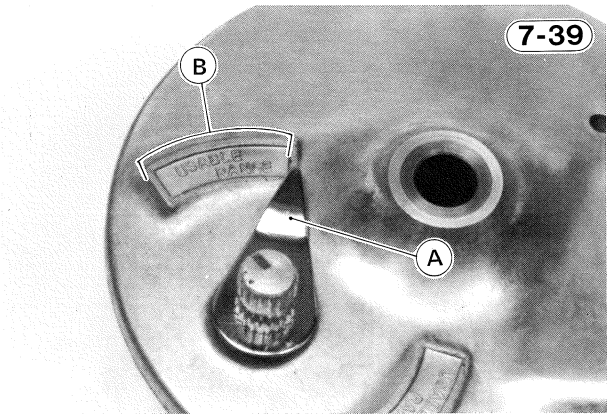


A. Brake Shoes

2. Mark the position of the cam lever ⑱ so that it can be installed later in the same position.

Rear Brake Assembly Note:

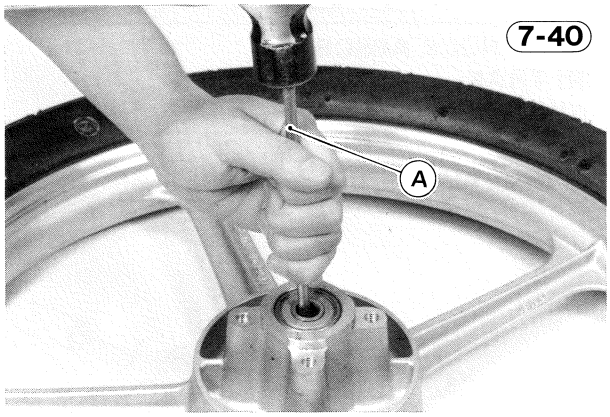
1. Clean the old grease from the camshaft, and regrease using regular cup grease. Apply grease to the center of the shaft and to the cam surfaces. Do not over-grease.
2. Fit the dust seal and the indicator on the serration so that it points to the extreme right of the USABLE RANGE.



A. Indicator **B. USABLE RANGE**

Rear Wheel, Rear Sprocket Disassembly Note:

1. Insert a metal rod into the hub from the rear sprocket side, and remove the right side bearing ⑦ by tapping evenly around the bearing inner race.



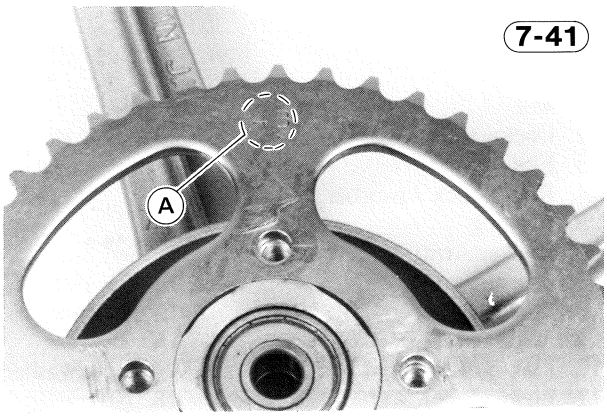
A. Metal Rod

2. Tap the distance collar ④ to remove the remaining bearing ③.

Rear Wheel, Rear Sprocket Assembly Note:

1. Inspect the bearings and replace them if necessary (Pg. 2-16).
2. Lubricate the ball bearing (Pg. 2-16).
3. Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
4. Install the ball bearings using the bearing driver and holder (special tools: P/N 57001-1129). Press in the left side (rear sprocket side) bearing until the face of the bearing is level with the end of the bearing hole, and then press in the left side bearing until it stops at the bottom of the hole.
5. Install the rear sprocket facing the tooth number marking outward, and tighten the bolts to 2.1 kg-m (15.0 ft-lbs) of torque. Bend the tap portions of the double washers over the bolts.

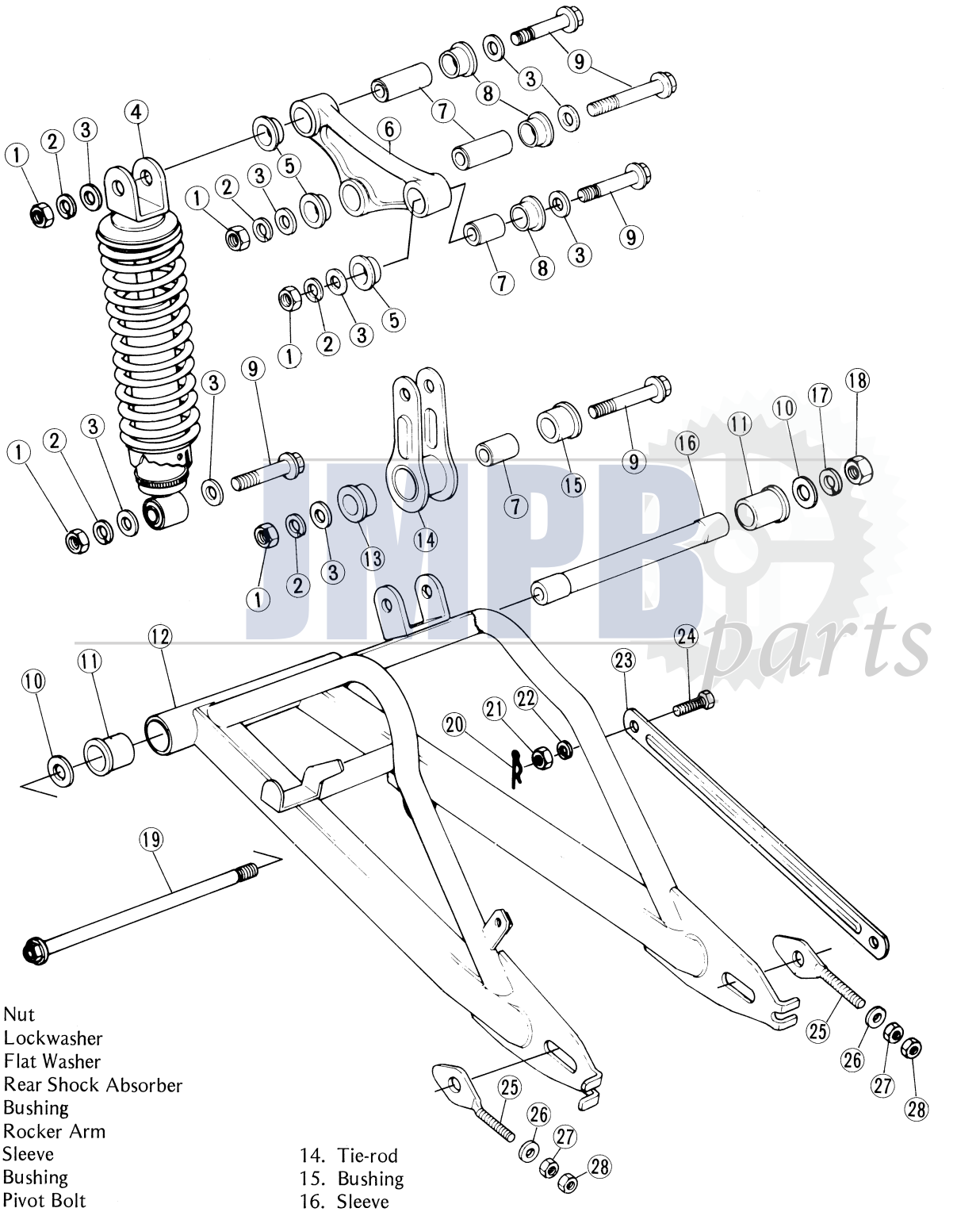
WARNING **1. By installing the sprocket this way, the chamfered hole side of the rear sprocket facing toward the coupling. If not, the sprocket will not seat on the coupling evenly, causing the drive chain to be thrown off by excessive sprocket runout during operation. This can result in rear wheel lockup and loss of control.**



A. Tooth Number Marking

REAR SHOCK ABSORBER, UNI-TRAK, SWING ARM

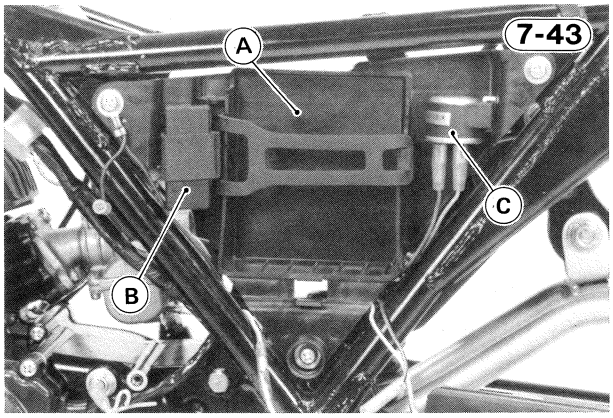
Rear Shock Absorber, Uni-trank, Swing Arm (7-42)



1. Nut
2. Lockwasher
3. Flat Washer
4. Rear Shock Absorber
5. Bushing
6. Rocker Arm
7. Sleeve
8. Bushing
9. Pivot Bolt
10. Flat Washer
11. Bushing
12. Swing Arm
13. Bushing
14. Tie-rod
15. Bushing
16. Sleeve
17. Lockwasher
18. Nut
19. Pivot Shaft
20. Safety Clip
21. Nut
22. Locknut
23. Torque Link
24. Bolt
25. Chain Adjuster
26. Flat Washer
27. Adjusting Nut
28. Locknut

Removal Note:

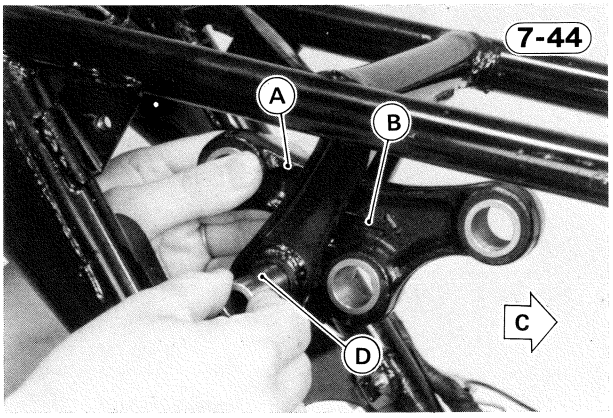
1. Remove the battery and air cleaner.
2. Remove the screws (3) and electrical pannel.



A. Electrical Pannel
B. CDI Unit
C. Turn Signal Relay

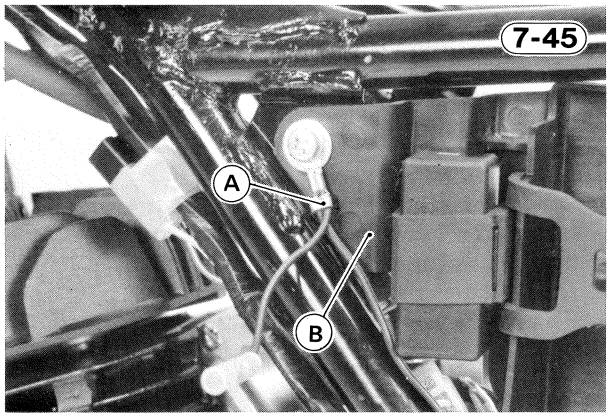
Installation Note:

1. Lubricate the sleeves (Pg. 2-17).
2. Install the rocker arm so that the arrow mark on the rocker arm points to the front.



A. Rocker Arm
B. Arrow Mark
C. Front
D. Sleeve

3. Tighten the rocker arm pivot shaft nut, tie-rod nuts, and rear shock absorber mounting nuts to 3.3 kg-m (24 ft-lbs) of torque.
4. Tighten the swing arm pivot shaft nut ⑱ to 4.0 kg-m (29 ft-lbs) of torque.
5. Install the ground lead with the left upper screw of the electircal panel.



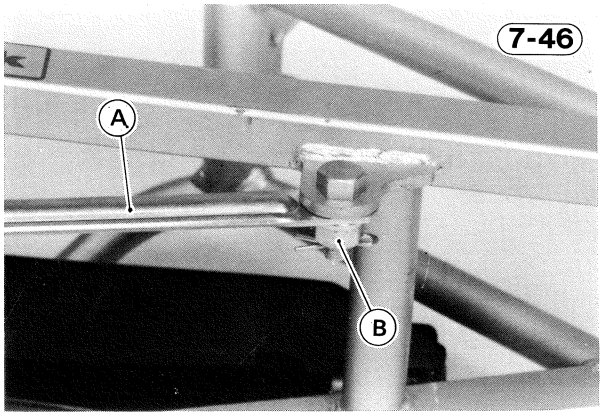
A. Ground Lead
B. Electrical Panel

Swing Arm Disassembly Note:

1. As swing arm bushing will be damaged upon removal, be sure to have new ones on hand prior to disassembly.
2. Insert a bar into one side, hammering on it lightly to knock out the bushing ⑪ on the opposite side. Use the bar again knock out the other bushing.

Swing Arm Assembly Note:

1. Replace the bushings with new ones if either one has worn past the service limit (Pg. 4-8) or has been removed. Apply oil to the bushings before installing them with a press.
2. Wipe the old grease off the swing arm sleeve, and inspect the swing arm sleeve (Pg. 4-8). Apply a molybdenum disulfide grease for frame assembly, especially in each sleeve groove.
3. Install the torque link as shown, and tighten the torque link out to 3.3 kg-m (24 ft-lbs) of torque.

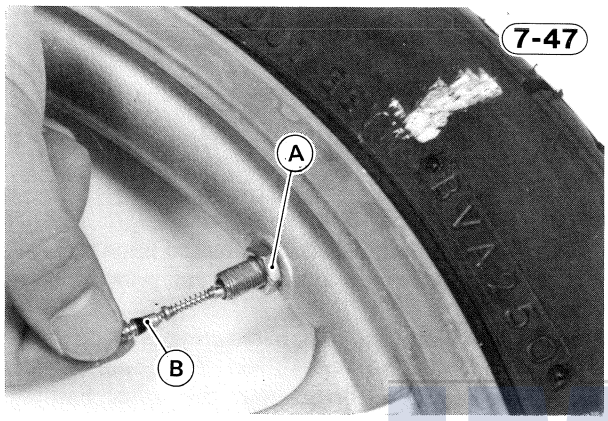


A. Torque Link
B. Torque Link Nut

TIRE, TUBE

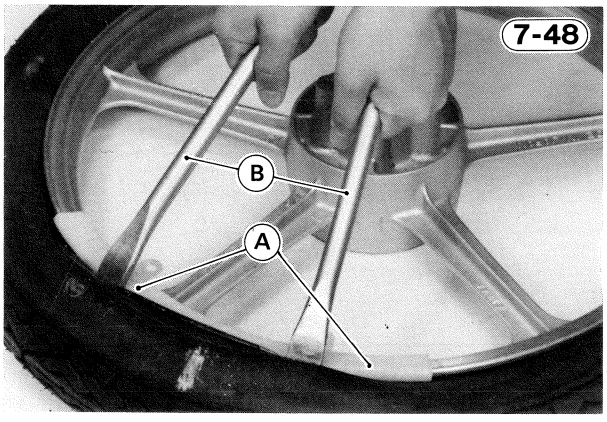
Removal Note:

1. Mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position to maintain wheel balance.
2. Take out the valve core to let out the air.
3. Remove the valve stem nut.



A. Valve Stem Nut **B. Valve Core**

4. Install the rim protectors (special tools) around the valve stem. Lubricate the tire irons and rim protectors with a soap and water solution, or rubber lubricant.
5. Step on the side of the tire opposite the valve stem, and start prying the tire off the rim near the valve stem with tire irons (special tools). For easier removal, always position the tire bead opposite the valve stem in the rim well, and pry the tire bead a little at a time. Take care not to insert the tire irons so deeply that the tube gets damaged.



A. Rim Protectors: 57001-1063
B. Tire Irons: 57001-1073

Installation Note:

1. Put just enough air in the tube to keep it from getting caught between the tire and rim. Too much air makes fitting difficult, and too little will make the tube more liable to be pinched by the irons.
2. Dust the tube and inside the tire with talcum powder, and insert the tube into the tire now, even if the tire was completely removed from the rim. Insert the valve stem into the rim, and screw the nut on loosely.
3. Lubricate the tire beads and rim flanges with a soap and water solution or liquid soap to help seat the tire beads in the rim while inflating the tire.
4. If a new tire is installed, the yellow paint mark on the tire should be aligned with the valve stem for best balancing results.
5. Check that the tube is not pinched between the tire and rim, and then inflate to the specified pressure (Pg. 4-2).

Appendix

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TROUBLESHOOTING GUIDE

Engine Doesn't Start; Starting Difficulty

Engine won't turn over
- Cylinder, piston seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or crankcase bearing seizure
- Kickstarter return spring broken
- Kick ratchet gear not engaging

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

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

No spark; spark weak
- Ignition switch not on
- Engine stop switch turned off
- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contact
- CDI unit damaged
- Pickup coil and/or exciter coil open or shorted
- Ignition coil damaged
- Flywheel magneto damaged
- Ignition or engine stop switch shorted
- Wiring shorted or open

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

Compression low
- Cylinder, psiton worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head or base gasket damaged
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Spark plug loose
- Crankshaft oil seal deteriorated or damaged
- Reed valve damaged

Poor Running at Low Speed

Spark weak
- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contact
- CDI unit damaged
- Pickup coil and/or exciter coil shorted or open
- Ignition coil damaged
- Flywheel magneto damaged

Fuel/air mixture incorrect
- Air screw and/or idle adjusting screw maladjusted
- Pilot jet or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter plunger stuck open
- Float level too high or too low
- Fuel tank air vent obstructed

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

Poor Running or No Power at High Speed

Firing incorrect
- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contact
- Pickup coil and/or exciter coil shorted or open
- CDI unit damaged
- Ignition coil damaged
- Ignition timing maladjusted

Fuel/air mixture incorrect
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Jet needle clip in wrong position
- Float level too high or too low
- Air jet or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel to carburetor insufficient
- Water or foreign matter in fuel
- Fuel tank air vent obstructed

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

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

Engine rpm will not rise properly
- Starter plunger stuck open
- Float level too high or too low

Main jet clogged
Throttle valve does not fully open
Air cleaner clogged
Muffler clogged
Water or foreign matter in fuel
Cylinder exhaust port clogged
Brake dragging
Clutch slipping
Overheating
Transmission oil level too high
Transmission oil viscosity too high
Crankshaft bearing worn or damaged

Knocking
Ignition timing maladjusted
Carbon built up in combustion chamber
Fuel poor quality or incorrect

Miscellaneous
Throttle valve won't fully open
Muffler clogged
Cylinder exhaust port clogged
Brake dragging
Clutch slipping
Overheating
Transmission oil level too high
Transmission oil viscosity too high
Crankshaft bearing worn or damaged

Overheating

Firing incorrect
Spark plug dirty, damaged, or maladjusted
Ignition timing maladjusted

Fuel/air mixture incorrect
Main jet clogged
Float level too low
Air cleaner clogged

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

Compression high
Carbon built up in combustion chamber

Engine load faulty
Clutch slipping
Transmission oil level too high
Brake dragging

Fuel and Oil Consumption Excessive

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

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

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

Exhaust obsturcted
Muffler clogged
Cylinder exhaust port clogged

Engine load faulty
Clutch slipping
Transmission oil level too high
Brake dragging

Clutch Operation Faulty

Clutch slipping
No clutch lever play
Friction plate worn or warped
Steel plate worn or warped
Clutch spring weak
Clutch cable maladjusted
Clutch inner cable catching
Clutch release mechanism trouble
Clutch hub or housing unevenly worn

Clutch not disengaging properly
Clutch lever play excessive
Clutch plate warped or too rough
Clutch spring tension uneven
Transmission oil deteriorated
Transmission oil viscosity too high
Clutch housing frozen on drive shaft
Clutch release mechanism trouble

Gear Shifting Faulty

Doesn't go into gear; shift pedal doesn't return
Clutch not disengaging
Shift fork bent or seized
Shift return spring weak or broken
Shift lever broken
Shift return spring pin loose
Shift pawl spring broken
Set levers binding on pivot screw
External shift mechanism arm pawl worn

Jumps out of gear
Shift fork worn
Gear groove worn
Gear dogs, holes, and/or recesses worn
Shift drum groove worn
Shift drum set lever spring weak or broken
Shift fork guide pin worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts
Shift drum set lever spring weak or broken

Abnormal Engine Noise

Knocking
Ignition timing maladjusted
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Overheating

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

Other noise
- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring worn, broken, or stuck
- Piston seizure or damaged
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder connection
- Crankshaft runout excessive
- Engine mount loose
- Crankshaft bearing worn

Abnormal Drive Train Noise

Clutch noise
- Clutch rubber damper deteriorated
- Clutch housing/friction plate clearance excessive
- Clutch housing gear/primary gear backlash excessive
- Metal chip jammed in clutch housing gear teeth

Transmission noise
- Crankcase bearing worn
- Transmission gear worn or chipped
- Metal chip jammed in gear teeth
- Transmission oil insufficient or too thin
- Kick ratchet gear not properly disengaging from kick gear
- Oil pump gear/output shaft idle gear worn or chipped

Drive chain noise
- Chain worn
- Rear and/or engine sprocket(s) worn
- Chain lubrication insufficient
- Rear wheel misaligned

Abnormal Frame Noise

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

Rear shock absorber noise
- Shock absorber damaged

Disc brake noise
- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper damaged
- Cylinder damaged

Drum Brake noise
- Brake lining overworn or worn unevenly
- Drum worn unevenly or scored
- Brake spring weak or broken
- Foreign matter in hub
- Brake not properly adjusted

Other noise
- Bracket, nut, bolt, etc. not properly mounted or tightened

Exhaust Smoke

Excessive white smoke
- Throttle control cable maladjusted
- Oil poor quality or incorrect
- Crankshaft oil seal damaged
- Oil passage pipe O-ring deteriorated or damaged

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

Handling and/or Stability Unsatisfactory

Handlebar hard to turn
- Steering stem locknut too tight
- Bearing ball damaged
- Bearing race dented or worn
- Steering stem lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebar shakes or excessively vibrates
- Tire worn
- Swing arm bushing damaged
- Rim warped
- Front, rear axle runout excessive
- Wheel bearing worn
- Handlebar clamp loose

Handlebar pulls to one side
- Frame bent
- Wheel misalignment
- Swing arm bent or twisted
- Swing arm pivot shaft runout excessive
- Steering stem bent
- Front fork leg bent
- Right/left front fork oil level uneven

Shock absorption unsatisfactory
- Too hard:
- Front fork oil excessive
- Front fork oil viscosity too high
- Tire air pressure too high
- Rear suspension maladjusted
- Too soft:
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Front fork, rear shock absorber spring(s) weak

Brake Doesn't Hold

Disc brake
- Air in the brake line
- Pad or disc worn
- Brake fluid leak
- Disc warped
- Contaminated pad
- Brake fluid deteriorated
- Primary cup or O-ring damaged
- Master cylinder scratched inside

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

Battery Discharged

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Battery lead making poor contact
Rectifier damaged
Ignition switch damaged
Load excessive (e.g., bulb of excessive wattage)
Flywheel magneto damaged

Battery Overcharged

Battery damaged

NOTE: 1. This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties. Electrical troubleshooting is not covered here due to its complexity. For electrical problems, refer to the appropriate heading in the Maintenance Section.

ADDITIONAL CONSIDERATIONS FOR RACING

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTROCYCLE AND ITS OPERATION.

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important points.

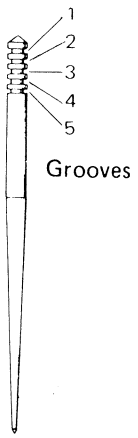
- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are use in competitive or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it **must** be in its original state in order to ensure safety and compliance with applicable emission regulations.

Carburetor:

Sometimes an alteration may be desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

A certain amount of adjustment can be made by changing the position of the needle. There are five grooves at the top of the needle. Changing the position of the clip to a groove closer to the bottom raises the needle, which makes the mixture richer at a given position of the throttle valve.

Jet Needle (8-1)



NOTE: 1. The groove numbers are counted from the top of the needle, 1 being the topmost groove, and 5 being the lowest groove.

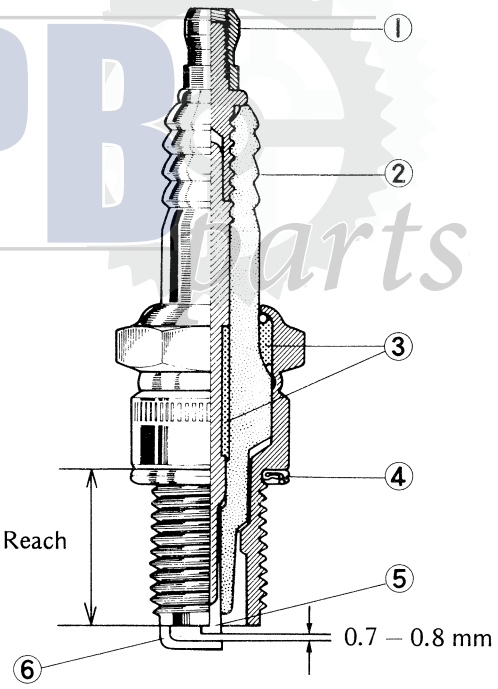
If the engine still exhibits symptoms of overly lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a larger one. A larger numbered jet gives a richer mixture.

Spark Plug:

The spark plug ignites the fuel/air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be used, and the spark plug must be kept clean and adjusted.

Tests have shown the standard plug, set to a 0.7 – 0.8 mm gap to be the best plug for general use. But since spark plug requirements change with ignition and carburetion adjustments and with riding conditions, this plug may have to be replaced with one of the next higher. Whether or not a spark plug of a different heat range should be used is generally determined by removing and inspecting the plug.

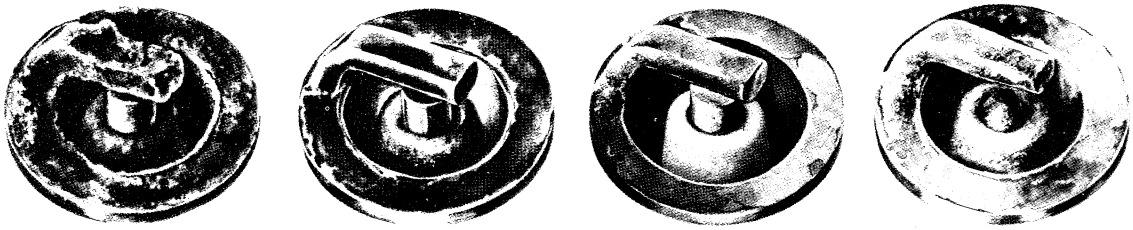
Spark Plug (8-2)



1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center Electrode
6. Side Electrode

When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 – 800°C (750 – 1,450°F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light brown color, the plug is operating at the right temperature.

Spark Plug Condition (8-3)



Carbon Fouling | Oil Fouling | Normal Operation | Overheating

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too high a heat range is used – that is, a "Cold" plug that cools itself too well – the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator. This carbon conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon built-up on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

To inspect the spark plug:

Remove the plug and inspect the ceramic insulator. Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling). The standard plug has been selected to match the normal usage of this motorcycle in combined street and highway riding. Unusual riding conditions may require a different spark plug heat range.

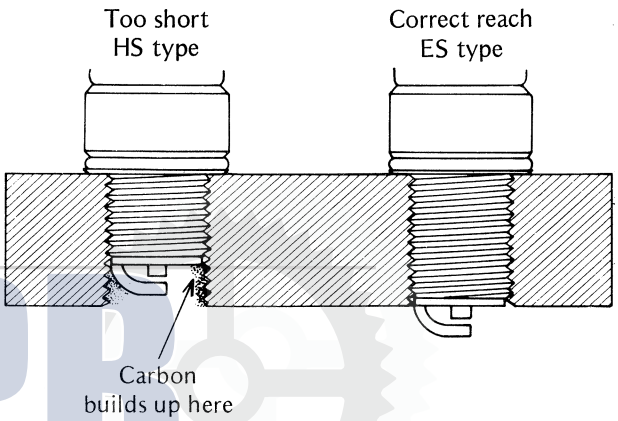
CAUTION **1. If the spark plug is replaced with a new one, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) as the standard plug.**

Table M1 Required Plug Threads

Diameter	Pitch	Reach
14 mm	1.25 mm	19.0 mm

If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.

Spark Plug Reach (8-4)



If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.

UNIT CONVERSION TABLE

Prefixes for Units

Prefix	Symbol	Power
mega	M	x 1,000,000
kilo	k	x 1,000
centi	c	x 0.01
milli	m	x 0.001
micro	μ	x 0.000001

Units of Length

km	x	0.6214	=	mile
m	x	3.281	=	ft
mm	x	0.03937	=	in
mile	x	1.609	=	km
ft	x	0.3048	=	m
in	x	25.4	=	mm

Units of Mass

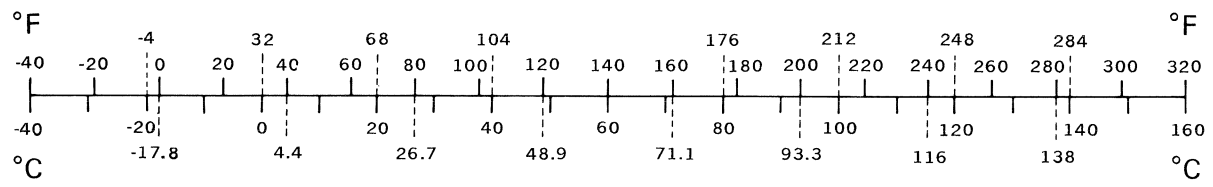
kg	x	2.205	=	lbs
g	x	0.03527	=	oz
lb	x	0.4536	=	kg
oz	x	28.35	=	g

Units of Torque

kg-m	x	7.233	=	ft-lbs
kg-m	x	86.80	=	in-lbs
ft-lbs	x	0.1383	=	kg-m
in-lbs	x	0.01152	=	kg-m

Units of Temperature

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



Units of Volume

liter	x	0.2642	=	gal (US)
liter	x	0.2200	=	gal (imp)
liter	x	1.057	=	qt (US)
liter	x	0.8799	=	qt (imp)
liter	x	2.113	=	pint (US)
liter	x	1.816	=	pint (imp)
cc	x	0.03381	=	oz (US)
cc	x	0.02816	=	oz (imp)
cc	x	0.06102	=	cu in
gal (US)	x	3.785	=	liter
gal (imp)	x	4.546	=	liter
qt (US)	x	0.9464	=	liter
qt (imp)	x	1.137	=	liter
pint (US)	x	0.4732	=	liter
pint (imp)	x	0.5506	=	liter
oz (US)	x	29.57	=	cc
oz (imp)	x	35.51	=	cc
cu in	x	16.39	=	cc

Units of Power

kW	x	1.341	=	hp
hp	x	0.7457	=	kW

Units of Pressure

kg/cm²	x	98.07	=	kPa
kg/cm²	x	14.22	=	psi
kPa	x	0.01020	=	kg/cm²
kPa	x	0.1450	=	psi
psi	x	0.07031	=	kg/cm²
psi	x	6.895	=	kPa

Supplement – 1982 Model

This supplement is designed to be used in conjunction with the front part of this Service Manual (up to Pg. 8-8). The maintenance and repair procedures described in this Supplement are only those that are unique to later year units since the first publication of this Service Manual. Complete and proper servicing of later year units therefore requires mechanics to read both this Supplement and the front part of this Service Manual.

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"NOTE"

High Altitude Performance Adjustment Information:

○*To improve the EMISSION CONTROL PERFORMANCE of vehicles operated above 4,000 feet, Kawasaki recommends the Environmental Protection Agency (EPA) approved modification. See Pg. 9-5 for detailed information.*

SPECIFICATIONS

Items	AR50-A1	AR80-A1, A1A
Dimensions:		
Overall length	1,855 mm	*
Overall width	630 mm	*
Overall height	1,145 mm	*
Wheelbase	1,195 mm	1,025 mm, (US) 1,200 mm
Road clearance	175 mm	*
Seat height	790 mm	*
Dry weight	75 kg	*
Fuel tank capacity	9.6 liters	*
Performance:		
Climbing ability	20°	*
Braking distance	3m from 20 kph	6m from 35 kph
Minimum turning radius	2.1 m	*
Engine:		
Type	2-stroke, 1-cylinder, piston reed valve	*
Cooling system	Air cooled	*
Bore and stroke	39.0 x 41.6 mm	49.0 x 41.6 mm
Displacement	49 cc	78 cc
Compression ratio	8.0, (W) (U) 7.0	7.8, (US) 7.7
Maximum horsepower	4.9 HP/9,000 rpm, (U) (W) 2.9 HP/4,500 rpm (SW) 7.5 HP/9,000 rpm	(W) 7.3HP/6,000 rpm, (U) 10HP/8,000 rpm, (US) 9HP/7,500 rpm
Maximum torque	0.42 kg-m/8,000 rpm (U) (W) 0.46 kg-m/4,000 rpm (SW) 0.65 kg-m/8,000 rpm	(W) 0.88 kg-m/6,000 rpm, (U) 0.89 kg-m/7,500 rpm, (US) 0.86 kg-m/7,000 rpm
Port timing:		
Scavenging Open	59° BBDC, (W) (U) 50°	55° BBDC, (U) 56°, (US) 55°
Close	59° ABDC, (W) (U) 50°	55° ABDC, (U) 56°, (US) 55°
Exhaust Open	88° BBDC, (W) (U) 68°	82° BBDC, (U) 86°, (US) 80.5°
Close	88° ABDC, (W) (U) 68°	82° ABDC, (U) 86°, (US) 80.5°
Carburetion system	Mikuni carburetor, VM16SC, (W) (U) Mikuni carburetor, VM14SC	Mikuni carburetor, VM18SC, (US) VM18SS
Luburication system	Superlube (oil injection)	*
Engine oil:		
Type	2-stroke oil for air-cooled engine	*
Capacity	1.2 liters	*
Starting system	Primary kick	*
Ignition system	Magneto CDI	*
Ignition timing	14° BTDC @3,000 rpm (US) (S) (SW) 20° BTDC @3,000rpm	17° BTDC @3,000 rpm, (US) 20° BTDC @3,000 rpm
Spark plug	NGK BR8ES, (U) (W) B6ES, (US) (S) (SW) B8ES	NGK BP7ES, (U) BP8ES, (W) BPR6ES
Drive Train:		
Primary reduction system:		
Type	Gear	*
Reduction ratio	3.619 (76/21)	*
Clutch type	Wet multi disc	*

Items		AR50-A1	AR80-A1, A1A
Transmission:		Ⓤ Ⓢ etc. 6-speed, constant mesh, return shift	
Type		Ⓤ Ⓦ 5-speed	6-speed, constant mesh, return shift
		ⓊⓈ Ⓢ etc. Ⓤ Ⓦ	
Gear ratios	1st	3.307 (43/13), * , *	*
	2nd	2.111 (38/18), * , *	*
	3rd	1.545 (34/22), * , 1.714 (36/21)	1.545 (34/22)
	4th	1.240 (31/25), * , 1.478 (34/23)	1.240 (31/25)
	5th	1.074 (29/27), * , 1.333 (32/24)	1.074 (29/27)
	6th	0.965 (28/29), — , —	0.965 (28/29)
Transmission oil:			
Grade		SE Class	*
Viscosity		SAE 10W30 or SAE 10W40	*
Capacity		0.6 litter	*
Final drive system:			
Type		Chain drive	*
Reduction ratio		3.538 (46/13), Ⓤ Ⓦ 3.769 (49/13)	2.866 (43/15), Ⓦ 3.153 (41/13)
Overall drive ratio		12.364, Ⓤ 14.651, Ⓦ 18.888 @Top Gear	10.016, Ⓦ 11.020 @Top Gear
Frame:			
Type		Tubular, semi-double cradle	*
Caster (rake angle)		27.5°	27.25°
Trail		85 mm	83 mm
Front Tire:			
Type		Tube type	*
Size		2.50-18 4PR	*
Rear Tire:			
Type		Tube type	*
Size		2.75-18 6PR, ⓊⓈⓈⓌ 2.75-18 4PR	2.75-18 6PR, Ⓤ 2.75-18 4PR
Front suspension:			
Type		Telescopic fork	*
Wheel travel		130 mm	*
Rear suspension:			
Type		Swing arm (uni-trak)	*
Wheel travel		120 mm	*
Brake type:			
Front		Single disc brake	*
Rear		Internal expansion, leading-trailing	*
Electrical Equipment:			
Battery		6V 6AH	*
Headlight		6V 15W, Ⓤ ⓈⓌ 6V 25/25W ⓊⓈ 6V 30/30W	6V 25/25W, ⓊⓈ 6V 30/30W
Trail/brake light		6V 5/21W, ⓊⓈ 6V 5.3/25W	6V 5/21W, ⓊⓈ 6V 5.3/25W

"This engine licensed under one or more of Eyvind Boyesen's Patent Nos.: 3,905, 340. 3.905, 341. Re. 30,425. 4,062,331. 4,161,163. 4,202,298 and 4,202,299."

Ⓤ : UK model
ⓊⓈ : US model
Ⓢ : South Africa model
Ⓦ : West German model
ⓈⓌ : Switzerland
* : Identical to left side.

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

Maintenance

SPARK PLUG

Refer to Pg. 2-3, noting the following.

Table 9-1 Spark Plug

	AR50	AR80
Standard Plug	NGK BR8ES Ⓤ Ⓦ NGK B6ES Ⓢ Ⓤⓢ Ⓢⓦ NGK B8ES	Ⓤⓢ etc. NGK BP7ES Ⓦ NGK BPR6ES Ⓤ NGK BP8ES
Plug Gap	0.7 – 0.8 m/m	
Tightening Torque	2.8 kg-m (20 ft-lbs)	

Ⓤ : UK model
Ⓦ : West German model
Ⓤⓢ : US model
Ⓢ : South Africa model
Ⓢⓦ : Switzerland model

OIL PUMP CARBURETOR SYNCHRONIZATION

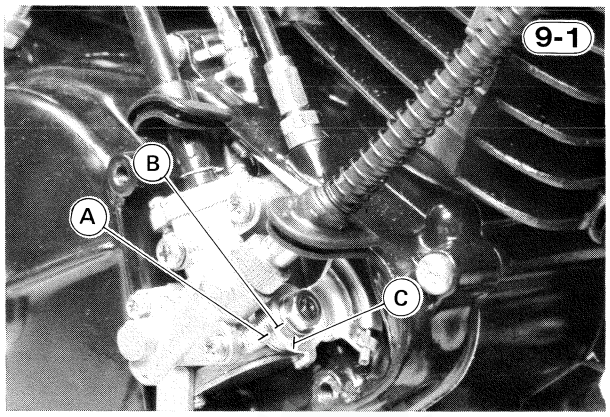
Refer to Pgs. 2-4, 2-6, noting that the sychronization is done with the engine stopped, and with the throttle opened fully.

Inspection (See Pg. 2-5)

- Check the throttle grip play.
- Remove the oil pump cover. (Fig. 2-7)
- Check to see that the outer cable end of the oil pump cable is fully seated in the cable adjuster. (Fig. 2-8)
- Make sure the tang on the oil pump lever is bent to hold the oil pump inner cable securely. (Fig. 2-8)
- Turn the throttle grip fully, and check to see if the synchronization mark on the pump lever is aligned with the mark on the lever stop.

○The pump lever has two marks on it.
One is the synchronization mark which is used to check the oil pump synchronizaiton, and the other is the idle mark which is not used during oil pump synchronization.

★The synchronization mark and the lever stop mark should be aligned.
If they do not line up, adjust the oil pump cable as follows.



A. Mark on Lever Stop
B. Synchronization Mark
C. Idle Mark

Adjustment

- Loosen the oil pump cable adjuster locknut, and turn the adjuster to synchronize the pump with the carburetor.
- Tighten the locknut, and check the pump synchronization. Re-adjust if necessary.
- Install the oil pump cover.

CARBURETOR

Refer to Pgs. 2-6, 3-2, 6-4, noting the following.

1. The carburetor specifications are shown in table 9-2.
2. Some of the model are modified service fuel level, and float height as shown in table 9-2, 9-3.

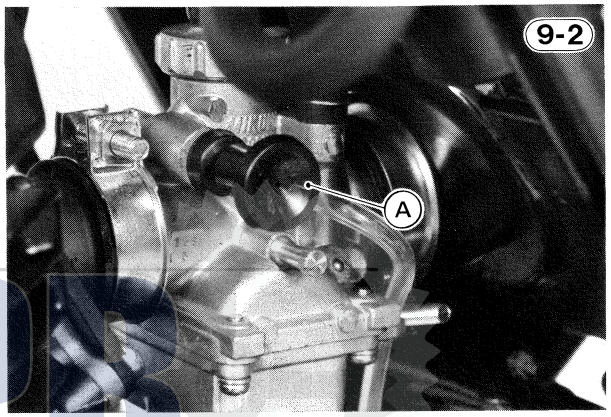
Table 9-2 Carburetor Specifications

Model		Type	Main Jet	Jet Needle	Needle Jet	Throttle Valve Cut away	Pilot Jet	Air Screw (turns out)	Service Fuel Level
AR50	(US) etc.	VM16SC	115	3i7-3	D-8	2.5	15	1¼	3.5 ± 1 mm
	(W)(U)	VM14SC	110		D-9	2.0		1.0	
AR80	(U)	VM18SC	122.5	4M4-3	O-6	2.0	17.5	1¾	1.5 ± 1 mm
	(W)	VM18SC	75	4M4-2	O-7	2.5		1½	
	(US)	VM18SS	62.5	4D44	O-5	1.5	25	–	5.0 ± 1 mm
			60 (high altitude)				20 (high altitude)		

Table 9-3 Float Height †

Model	Standard
AR80 (US)	19 ± 1 mm
AR80 (U)(W)	22.2 ± 1 mm
Other than the above model	23.8 ± 1 mm

† Distance above from the bottom surface of the carburetor body to the top of the float.



A. Choke Knob

Carburetor for AR80 US Model:

1. Idle speed;
   Refer to Pg. 2-6, noting the following.

Table 9-4 Idle Speed (AR80 for US)

1,200 – 1,400 rpm

High Altitude Performance Adjustment

High altitude adjustment requires replacement of the main and pilot jet. (See table 9-3)

NOTE: 1. When properly performed, these specified modifications only, are not considered to be emission system "tampering" and vehicle perfomance is generally unchanged as a result.

2. To improve the EMISSION CONTROL PERFOMANCE of vehicles operated above 4,000 feet, Kawasaki recommends the following Environmental Protection Agency (EPA) approved modification.
3. The air screw is deleted.
4. The jet needle has only one groove where the jet needle clip is fitted.
5. The choke knob is substituted for the choke lever.

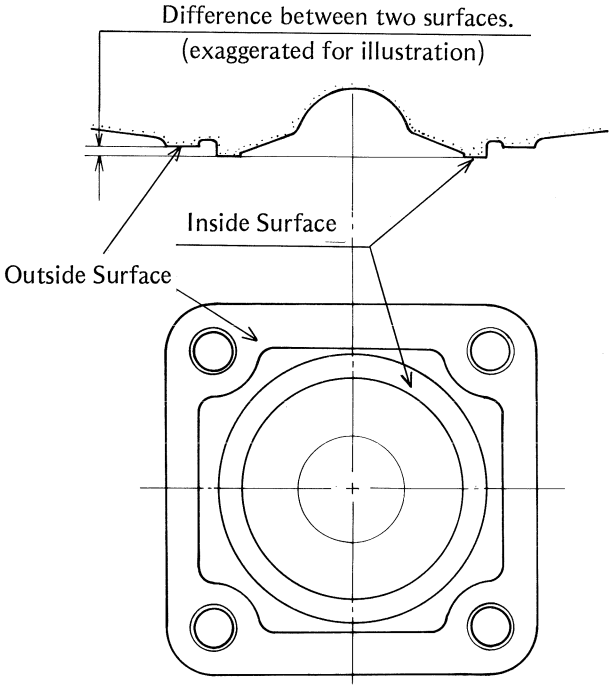
CYLINDER HEAD
CYLINDER
PISTON

Cylinder Head Warp Inspection

Refer to Pg. 3-5, noting the following table and figure.

Table 9-5 Cylinder Head Warp (AR80 US and German model)

	Inside Surface	Outside Surface	Difference
Service Limit	0.05 mm	0.1 mm	0.15 mm



Cylinder, Piston Wear Inspection

Refer to Pg. 3-7, noting the following.

Table 9-6 Piston/Cylinder Diameter

(Piston Diameter)

Models	Standard	Service Limit
AR50 (US) (S) etc.	38.965 – 38.980 mm	38.83 mm
AR50 (W) (U)	38.970 – 38.985 mm	38.83 mm

(Cylinder Inside Diameter)

Model	Standard	Service Limit	Repair Limit
AR80 (US)	49.005 – 49.020 mm†	49.10 mm††	50.020 mm
AR80 (W)	49.015 – 49.030 mm†	49.10 mm††	50.030 mm

† : Less than 0.01 mm difference between any two measurements

†† : Less than 0.05 mm difference between any two measurements

Table 9-7 Piston/Cylinder Clearance

Model	Standard
AR50 (US) (S) etc.	0.030 – 0.040 mm
AR80 (US)	0.035 – 0.045 mm
AR80 (W)	0.045 – 0.055 mm

Electro Fuse Cylinder (AR80 US model):

The ELECTRO FUSE cylinder is used, so refer to Pg. 3-7, noting the following.

Inspect the inside of the cylinder for scratches and abnormal wear. If the cylinder is damaged or badly worn, replace it with a new one.

Take a front-to-back measurement at the location shown in Fig. 3-8 to check cylinder wear. If the cylinder inside diameter measurement exceeds the service limit, the cylinder must be replaced with a new one since the ELECTRO FUSE cylinder cannot be bored or honed.

NOTE: 1. Whenever a piston or cylinder has been replaced with a new one, the motorcycle must be broken-in the same as with a new machine.

CLUTCH

Refer to Pg. 3-11, noting the following.

Table 9-8 Clutch Spring Tension

Test Length	Standard	Service Limit
14 m/m	8.2 – 10.1 kg	7.4 kg

This table is applicable for 81 model, too.

TRANSMISSION

Refer to Pg. 3-13, noting the following.

Table 9-9 Gear Set Lever Spring Free Length

Standard	Service Limit
22.6 mm	24 mm

This table is applicable for 81 model, too.

ENGINE LUBRICATION SYSTEM

Refer to Pg. 3-17, noting the following.

Table 9-10 Oil Pump Output †

	AR50 US model etc. (Other than UK, German)
Standard	1.4 – 1.7 cc

† : 3 minutes measurement at 2,000 rpm of engine speed, oil pump lever fully opened.

LIGHTING/CHARGING SYSTEM

Refer to Pgs. 5-4, 5-6, noting the following.

Headlight Circuit (AR50,80 US models):

There is no headlight switch, so the headlight circuit is completed when the ignition switch is turned on. High and low beam can be selected by the dimmer switch.

DC Charging Voltage, Amperage Measurement

●To turn off the headlight of US model disconnect the black/yellow lead from the headlight unit in the headlight housing.

Table 9-11 DC Charging Voltage

Model	Headlight	Meter	Reading @4,000 rpm
AR50, 80US	Off	DC 10V	about 8.5V

Table 9-12 DC Charging Amperage

Model	Headlight	Meter	Reading @4,000 rpm
AR50, 80US	Off	DC 20A	about 2.5 A

Table 9-13 Lighting/Charging Coil Resistance † (AR50, 80 US model)

Coil	Connections	Reading
Charging	Pink Lead ↔ Ground	0.26 – 0.38 Ω
Lighting	Yellow Lead ↔ Ground	0.16 – 0.24 Ω

† Measure when the coil is cold (room or atmospheric temperature).

IGNITION SYSTEM

Refer to Pgs. 5-10, 5-12, noting the following.

Table 9-14 Exciter Coil, Pickup Coil Resistance (AR50, 80 US model)

Coil	Meter	Connections	Reading*
Exciter	x 10 Ω	Black/Red Lead ↔ Ground	66 – 86 Ω
Pickup	x 10 Ω	Green/Red Lead ↔ Ground	16 – 22 Ω

*Measured when coils are cold (room or atmospheric temperature).

Table 9-15 Piston Position at Timing Mark

Model	Distance from TDC
AR50 Ⓦ Ⓤ	0.75 mm
AR50 other than Ⓦ Ⓤ AR80 (US)	1.53 mm
AR80 Ⓤ Ⓦ	1.10 mm

CDI Unit:

Refer to Pg. 5-11, 12, noting the following.

TYPE No. CF419 : for AR80 Ⓦ Ⓤ
*TYPE No. CF411 : for AR50, 80 (US)
TYPE No. CF411 : for AR50 Ⓦ Ⓤ etc.

*This type has identification No. 1021 on the body side.

Magneto Stator (for AR50,80 US model):

Refer to Pg. 6-9, noting the following.

1. The timing mark is deleted, but the stator is installed in the same way as before (Fig. 6-22).
2. Ignition timing adjustment is not required.

WHEELS (US model)

Refer to Pg. 4-2, noting the following.

Payload and Tire Pressure:

Failure to maintain proper inflation pressures or observe payload limits for your tires may adversely affect handling and performance of you motorcycle and can result in loss of control. The maximum recommended load in addition to vehicle weight is 180 kg, including rider, passenger, baggage, and accessories.

Tire Pressure Adjustment

●Check the tire pressure often, using an accurate gauge.

Table 9-16 Tire Air Pressure-when cold (for AR50, 80 US model)

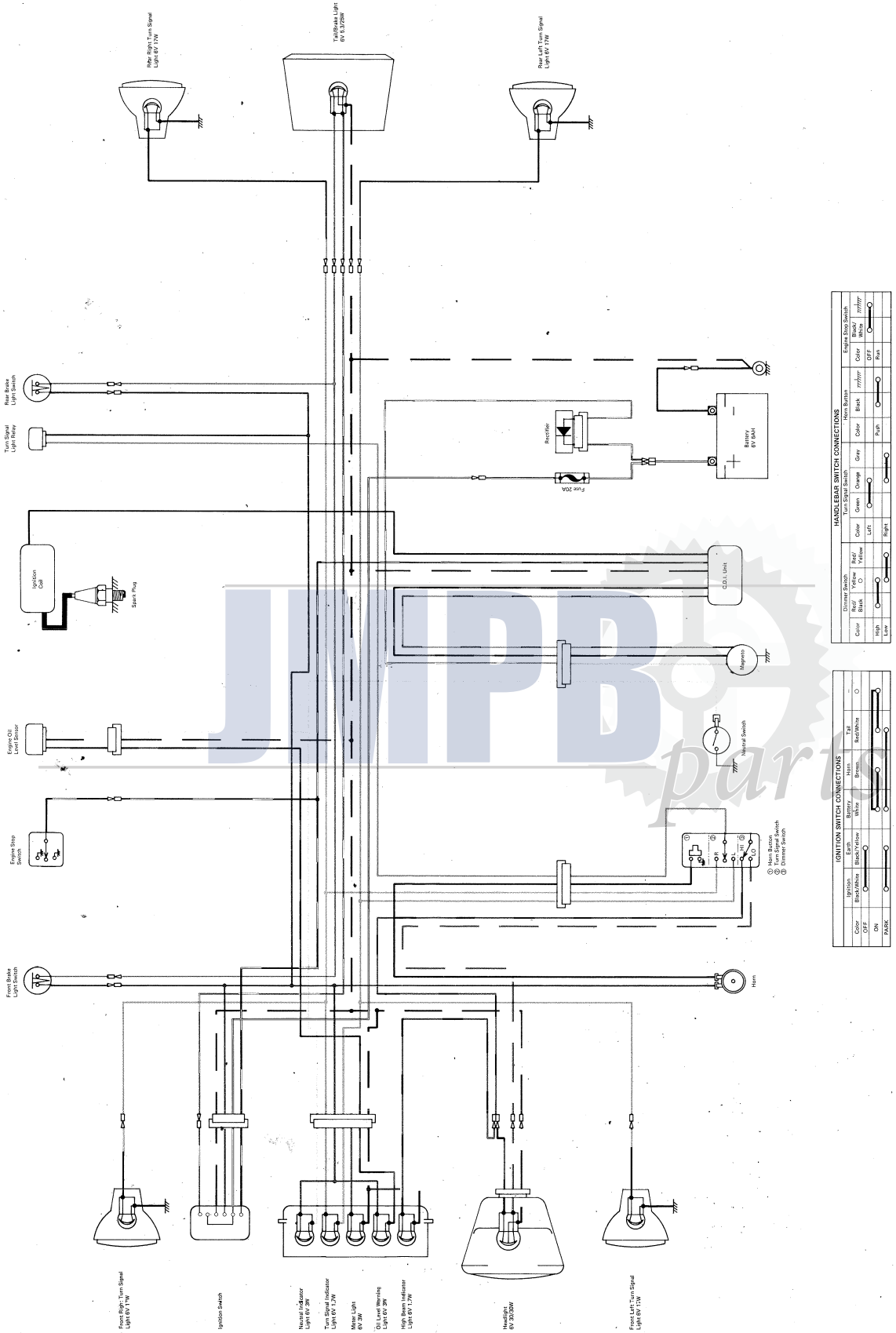
Rear	Up to 97.5 kg (215 lbs) load	2.0 kg/cm² (28 psi, 200 kPa)
	97.5 – 180 kg (215 – 397 lbs) load	2.8 kg/cm² (40 psi, 280 kPa)

Appendix

Wiring Diagram:

The wiring diagram for the US models is shown on Pg. 9-8. The other model is the same as it for the 1981 models, refer to Pg. 1-16.

AR50, 80-A1 Wiring Diagram (US model)



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MODEL APPLICATION

Model Year	Model	Beginning Frame No.
1981 – 1982	AR50-A1	AR050A-000001
1982	AR50-A1 (US)	JKAARYA1□CA******
1981 – 1982	AR80-A1	AR080A-000001
1982	AR80-A1A (West German)	AR080A-******

□ : This shows the digit which changes from one machine to another.
* : Serial No. continued from the 81 model.

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