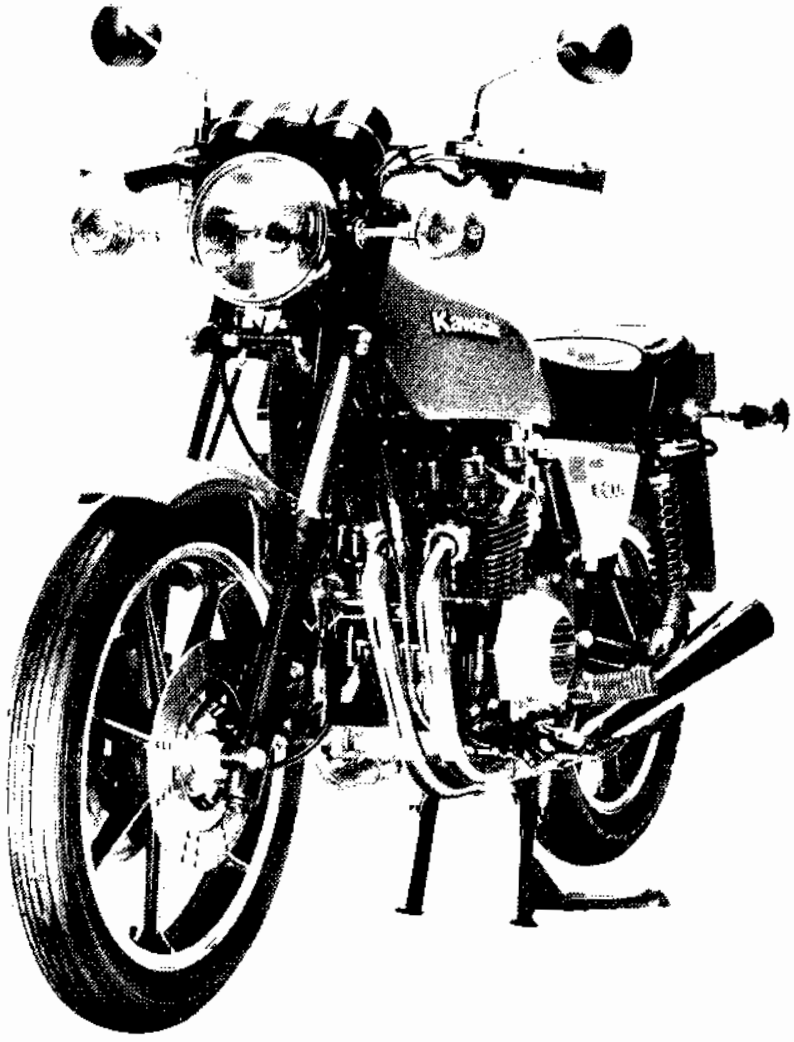
Kawasaki

KZ400
KZ500
KZ550



Motorcycle
Service Manual

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Revised 2: Feb. 17, 1981 Ⓨ

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Foreword

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

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

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

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

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

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

This manual is divided into the following chapters:

(1) Adjustment

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

(2) Disassembly

The chapter shows the best method for the removal, disassembly, assembly, and installation which are necessary for maintenance and repair. Do not disassemble parts further than explained in this manual. For spare parts, refer to the Parts Catalog. Since assembly and installation are usually the reverse of disassembly and removal, assembly and installation are not explained in detail in most cases. Instead, assembly notes and installation notes are provided to explain special points.

In cases where removal procedure is readily apparent, such as for the seat, side stand, etc., no information are given in this chapter.

(3) Maintenance and Theory of Operation

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

(4) Appendix

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

(5) Supplement

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

Since this Service Manual is based on the first production units of the KZ500-B1, there may be minor discrepancies between some vehicles and the illustrations and text in this manual. Major changes and additions pertaining to later year units will be explained in a supplement following the appendix or by a new edition.

QUICK REFERENCE GUIDE

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

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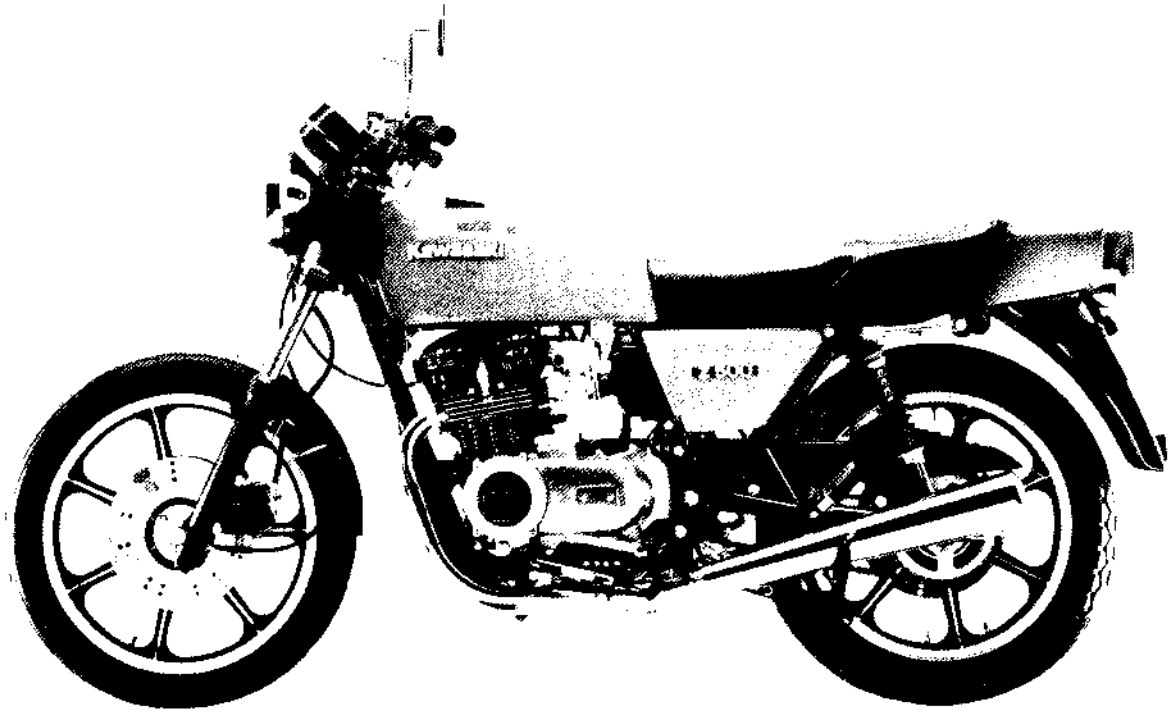
Appendix M

Supplement N

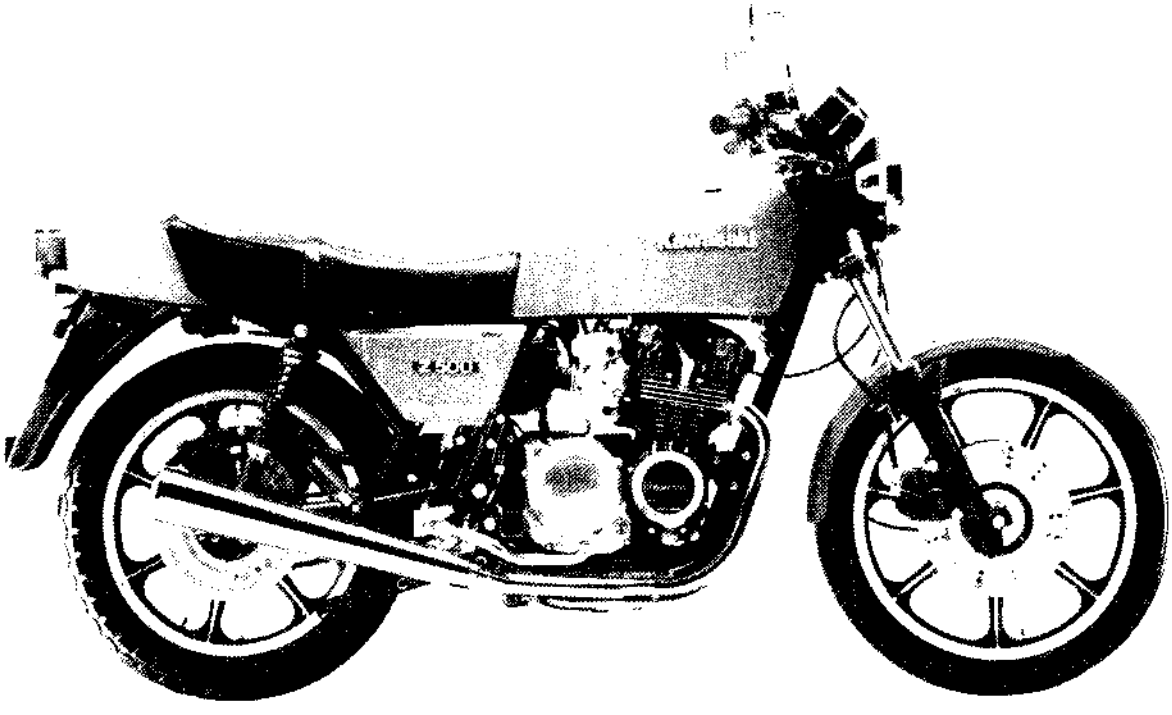
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Model Identification

KZ500-B1 Left Side View



KZ500-B1 Right Side View



A

Specifications

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SPECIFICATIONS

		KZ500-B1	
Dimensions			
Overall length		2,150 mm	Ⓒ 2,100 mm
Overall width		740 mm	Ⓒ 785 mm
Overall height		1,095 mm	Ⓒ 1,125 mm
Wheelbase		1,395 mm	
Road clearance		145 mm	
Dry weight		192 kg	Ⓒ 189 kg
Fuel tank capacity		15.0 ℓ	
Performance			
Climbing ability		30°	
Braking Distance		11.0 m @50 kph	
Minimum turning radius		2.4 m	
Engine			
Type		DOHC, 4-cylinder, 4-stroke, air-cooled	
Bore and stroke		55.0 x 52.4 mm	
Displacement		497 cc	
Compression ratio		9.5	
Maximum horsepower		52 HP @9,000 rpm	
Maximum torque		4.5 kg-m @7,500 rpm	
Valve timing			
Inlet	Open	20° BTDC	
	Close	48° ABDC	
	Duration	248°	
Exhaust	Open	48° BBDC	
	Close	20° ATDC	
	Duration	248°	
Carburetors		TK K22P-2A	
Lubrication system		Forced Lubrication (wet sump)	
Engine oil	Type	SE class SAE 10W40, 10W50, 20W40, or 20W50	
	Capacity	3.0 ℓ	
Starting system		Electric starter	
Ignition system		Battery and coil	
Cylinder numbering method		Left to right 1–2–3–4	
Firing order		1–2–4–3	
Ignition timing		From 10° BTDC @1,050 rpm to 35° BTDC @3,200 rpm	
Spark plugs		NGK D8EA or ND X24ES-U	
Transmission			
Type		6-speed, constant mesh, return shift	
Clutch		Wet multi disc	
Gear ratio:	1st	2.57 (36/14)	
	2nd	1.78 (32/18)	
	3rd	1.38 (29/21)	
	4th	1.13 (27/24)	
	5th	0.96 (25/26)	
	6th	0.85 (23/27)	

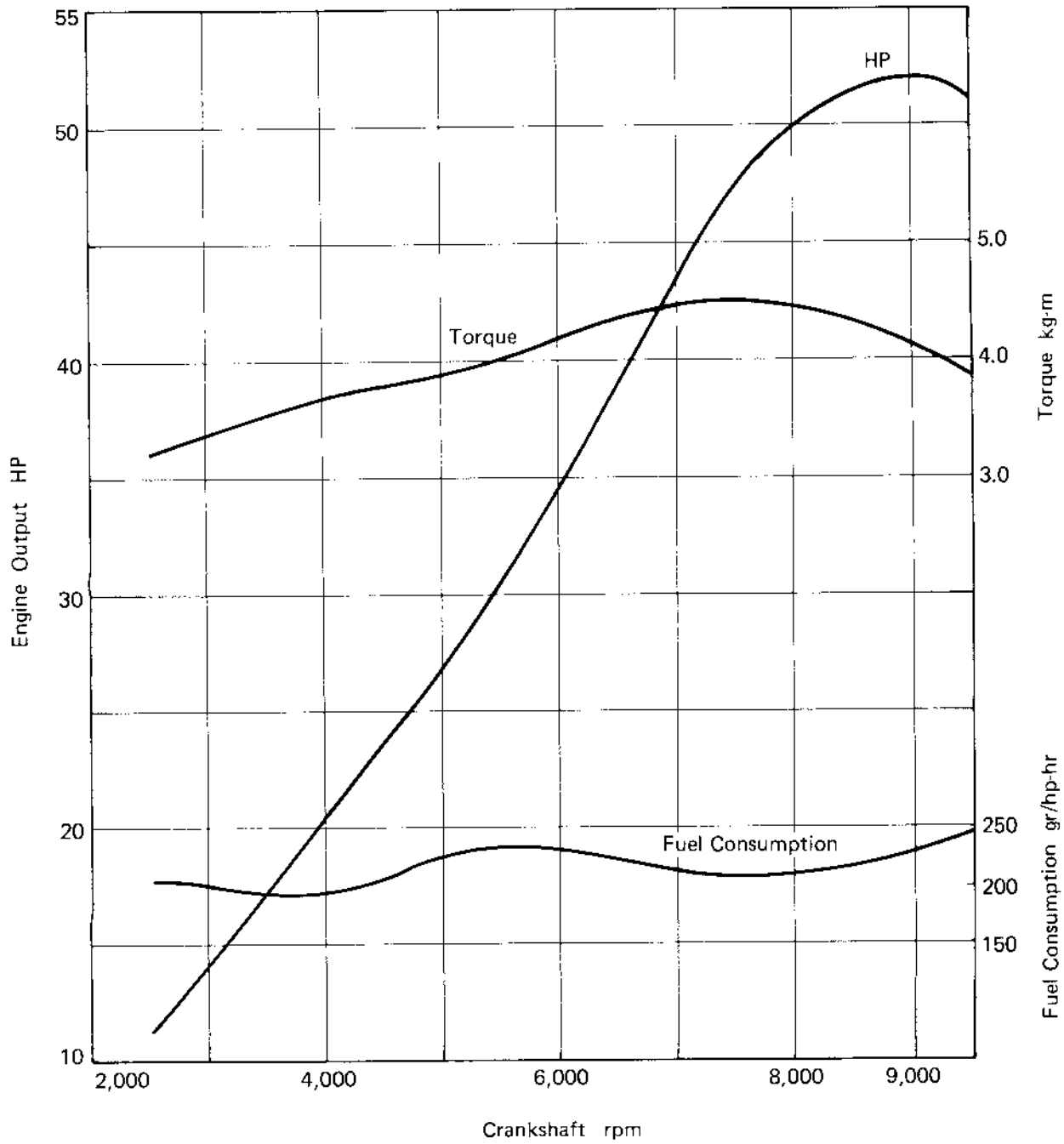
		KZ500-B1
Primary reduction ratio		2.94 (27/23 x 65/26)
Final reduction ratio		2.50 (40/16)
Overall drive ratio		6.25 (Top gear)
Electrical Equipment		
Alternator		Nippon Denso 037000-1400
Regulator/Rectifier		Mitsubishi TS10BR1K-L
Ignition coils		Toyo Denso ZC004-12V
Battery		Furukawa FB12A-A (12V 12AH)
Starter Motor		Mitsuba SM-227K
Headlight	Type	Semi-sealed
	Bulb	12V 45/40W Ⓐ Ⓞ 12V 50/40W
Tail/Brake light		12V 5/21W Ⓞ 12V 8/27W
City light		12V 4W Ⓐ Ⓞ 12V 3.4W
Turn signal lights		12V 21W Ⓐ Ⓞ 12V 23W
Meter lights		12V 3.4W
Indicator lights		12V 3.4W
Horn		12V 2.5A
Frame		
Type		Tubular, double cradle
Steering angle		37° to either side
Castor		26°
Trail		98 mm
Tire size	Front	3.25H-19 4PR
	Rear	3.75H-18 4PR
Suspension	Front	Telescopic fork
	Rear	Swing arm
Suspension stroke	Front	180 mm
	Rear	100 mm
Front fork oil	Type	SAE 5W20
	Capacity (each fork)	220 cc
	Oil level	505 mm (From top of inner tube with spring removed)
Brakes		
Type	Front	Dual disc brakes Ⓞ Single disc brake
	Rear	Disc brake
Effective disc diameter	Front	232 mm Ⓞ 250 mm
	Rear	237 mm

Ⓔ : European model Ⓐ : Australian model Ⓞ : Other than European and Australian model

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

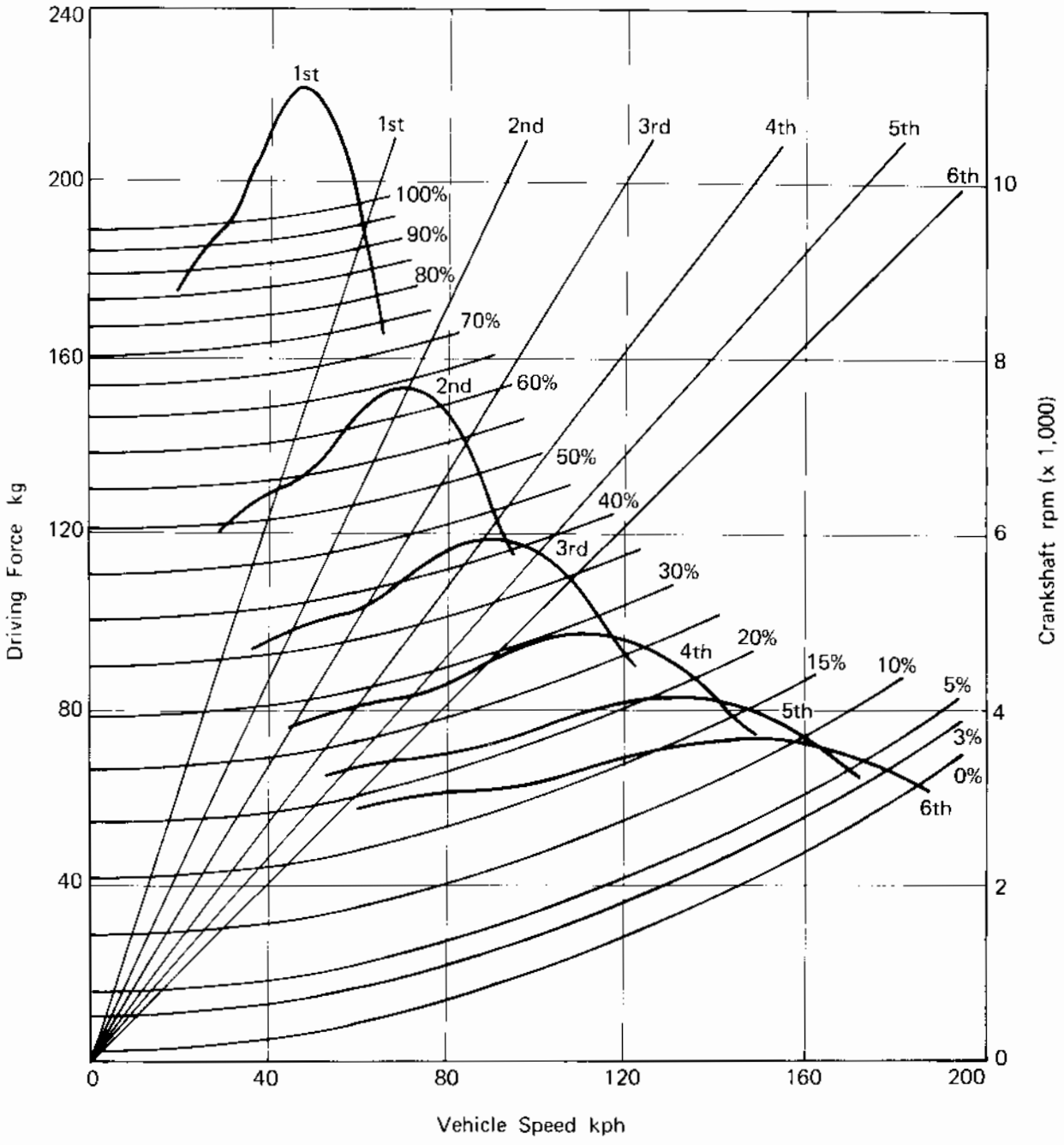
ENGINE PERFORMANCE CURVES

KZ500-B1



RUNNING PERFORMANCE CURVES

KZ500-B1



PERIODIC MAINTENANCE CHART

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

FREQUENCY / OPERATION	Whichever comes first — Every	ODOMETER READING * 800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	30,000 km	See Page
Battery electrolyte level — check †	month	•	•	•	•	•	•	•	214
Brake adjustment — check †		•	•	•	•	•	•	•	29
Brake wear — check †			•	•	•	•	•	•	200
Brake fluid level — check †	month	•	•	•	•	•	•	•	204
Brake fluid — change	year			•		•		•	205
Clutch — adjust		•	•	•	•	•	•	•	22
Carburetors — adjust		•	•	•	•	•	•	•	19
Throttle cables — adjust		•	•	•	•	•	•	•	18
Steering play — check †		•	•	•	•	•	•	•	30
Drive chain wear — check †			•	•	•	•	•	•	197
Front fork — inspect/clean		•	•	•	•	•	•	•	209
Rear shock absorbers — inspect		•	•	•	•	•	•	•	211
Nuts, Bolts, Fasteners — check and torque		•		•		•		•	39~42
Spark plugs — clean and gap †		•	•	•	•	•	•	•	12
Points, timing — check †		•	•	•	•	•	•	•	12
Valve clearance — check †		•	•	•	•	•	•	•	15
Air cleaner element — clean			•		•		•		154
Air cleaner element — replace	5 cleanings		•		•		•		154
Fuel system — clean		•	•	•	•	•	•	•	24
Tire tread wear — check †			•	•	•	•	•	•	194
Engine oil — change	year	•	•	•	•	•	•	•	24
Oil filter — replace		•		•		•		•	24
General lubrication — perform			•	•	•	•	•	•	33
Front fork oil — change				•		•		•	209
Timing advancer — lubricate				•		•		•	224
Swing arm — lubricate				•		•		•	33
Wheel bearings — grease	2 years					•			195
Steering stem bearings — grease	2 years					•			207
Drive chain — lubricate	Every 300 km								197
Drive chain — adjust	Every 800 km								28

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

Adjustment—Engine

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SPARK PLUGS

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

- Remove the spark plugs using a spark plug wrench.
- Clean the spark plug preferably in a sand-blasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool. If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard plug or its equivalent.
- Measure the gap with a wire-type thickness gauge. If the gap is incorrect, carefully bend the outer electrode, with a suitable tool to obtain the correct gap.

Spark Plug Gap (B1)

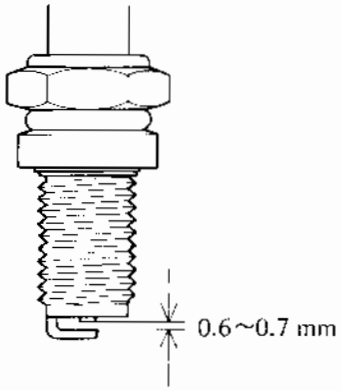


Table B1 Spark Plug

Type	NGK D8EA, ND X24ES-U
Gap	0.6~0.7 mm
Tightening Torque	1.4 kg-m (10.0 ft-lbs)

- Tighten the spark plugs in the cylinder head to 1.4 kg-m (10.0 ft-lbs).

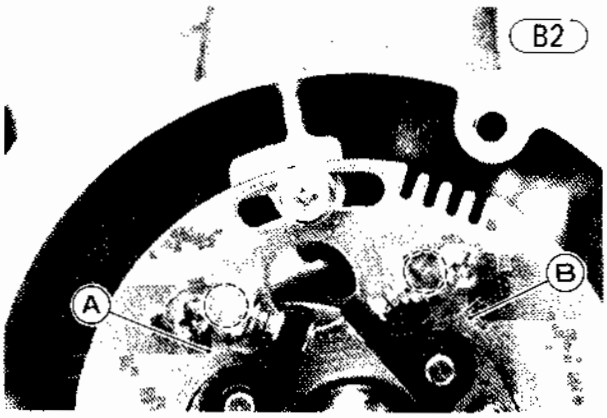
IGNITION TIMING

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

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

There are two sets of contact breaker points, the left set marked "L" fires spark plugs 1 and 4 simultaneously, and the right set marked "R" fires plugs 2 and 3 180° later. The gap for each set of points must be adjusted separately.

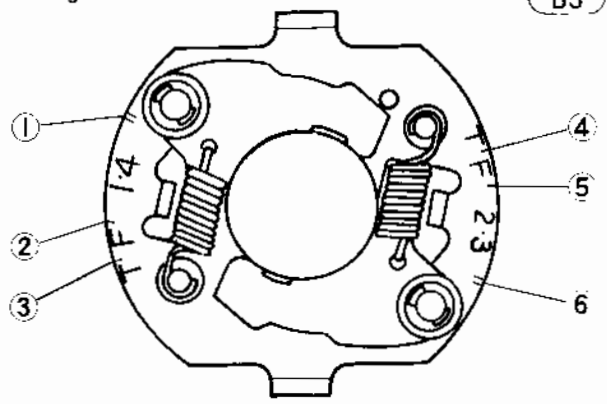
NOTE: Spark plugs and cylinders are numbered consecutively, starting from the left.



A. "L" contact breaker **B. "R" contact breaker**

There are two sets of timing marks on the timing advancer, which can be viewed through the inspection window by turning the crankshaft. One set is marked "1 4" and the other one is marked "2 3". The "F" mark of each set is for checking the timing before advancing, and the "advanced timing marks" (a pair of lines) are for checking the timing it has advanced.

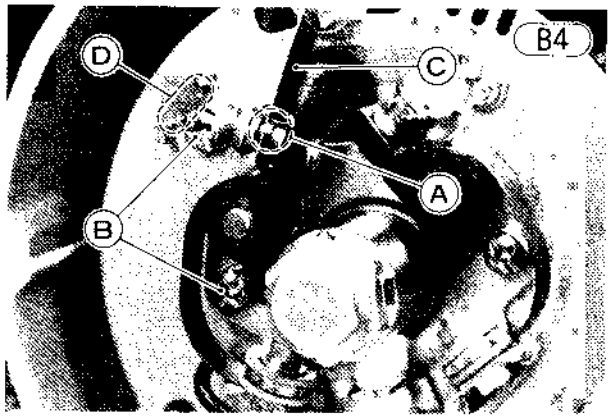
Timing Advancer (B3)



1. #1, 4 Cylinder Advanced Timing Marks
2. #1, 4 Cylinder Timing Mark
3. #1, 4 Cylinder TDC Mark
4. #2, 3 Cylinder TDC Mark
5. #2, 3 Cylinder Timing Mark
6. #2, 3 Cylinder Advanced Timing Marks

Point Gap Adjustment (using a thickness gauge):

- Remove the contact breaker cover and gasket.
- Clean the points with a piece of clean paper or cloth, using an oil-free solvent. A business card soaked in trichloroethylene can be used to remove traces of oil. To repair light damage, use emery cloth or an oilstone. If the points are badly worn down or damaged, or if the spring is weak, replace the contact breaker.
- Lubricate the point cam felt sparingly with suitable point cam lubricant. Do not overlubricate. Replace the felt if it is worn.
- Using a 17 mm wrench on the crankshaft, turn the engine clockwise until the contact breaker points are at their widest opening.
- Measure the size of the point gap with a thickness gauge. The proper gap is 0.3 ~ 0.4 mm.



A. Contact Breaker Points **C. Thickness Gauge**
B. Base Screws **D. Pry Points**

- If the gap is incorrect, loosen the contact breaker base screws (2) just enough to allow the base to move. Open the points using a slot screwdriver on the contact breaker base pry point, and insert a blade thickness of 0.35 mm between the points. Tighten the contact breaker base screws (2), and remove the blade. Again turn the crankshaft, and recheck the point gap.
- Repeat the steps above for the other set of points.
- Perform the timing test.

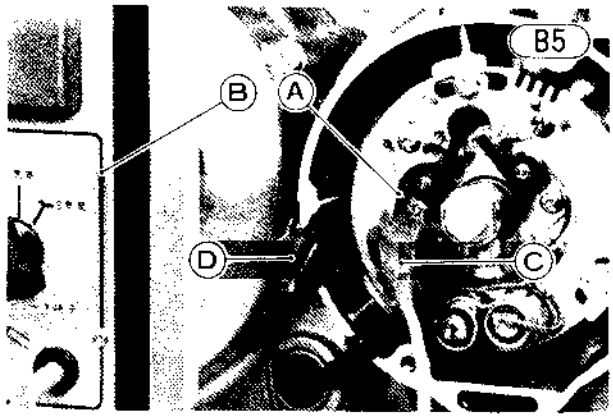
Point Gap Adjustment (using a dwell angle tester):

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

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

WARNING **Make sure that no tools, clothes, or meter leads touch the spinning crankshaft. Touching the crankshaft of a running engine could inflict an injury.**

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



A. Contact Breaker Spring **C. Tester (+) Lead**
B. Dwell Angle Tester **D. Tester (–) Lead**

- If the dwell angle tester is calibrated in degrees, turn the selector knob to the lowest cam lobe setting.
- Start the engine, and let it idle (below 1,400 rpm)
- Note the reading on the tester. The dwell angle specification is shown in Table B2. If the tester setting is for more than one cam lobe, the reading on the tester must be multiplied by the cam lobe number to obtain the true dwell angle.

Table B2 Dwell Angle

Selector Knob Setting	Dwell Angle Tester Reading
1 Cylinder	185.0~200.0° (51.0~56.0%)
2 Cylinders	92.5~100.0° (25.5~28.0%)
3 Cylinders	61.5~67.0° (17.0~19.0%)
4 Cylinders	46.0~50.0° (12.5~14.0%)

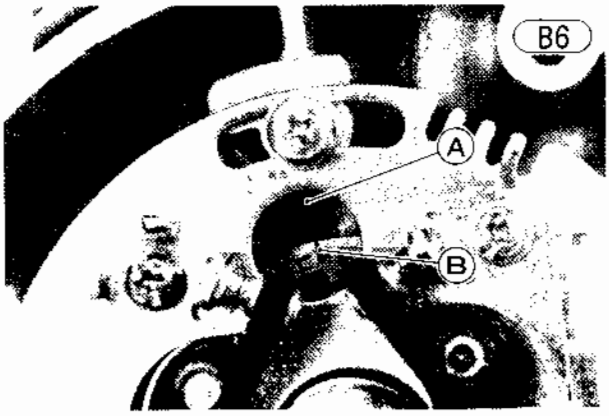
- If the dwell angle is not the same as the specification, loosen the contact breaker base screws (2) just enough so that a slot screwdriver at the contact breaker pry point will be able to change the gap (Fig. B4). Adjust the gap until the dwell angle specification is obtained. Tighten the screws (2).
- Repeat the steps above for the other set of points.
- Stop the engine, and disconnect the tester.
- Perform the timing test.

Timing Test (Static):

Check and adjust the static ignition timing using each "F" mark, first for #1 and #4 cylinders and then #2 and #3 cylinders.

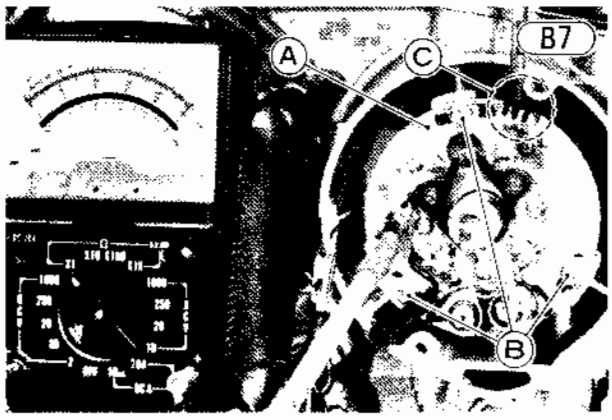
- Turn the ignition switch and engine stop switch off.
- Check the point gap, and adjust if necessary.

•Turn the crankshaft so that the "1 4" F mark on the timing advancer is aligned with the timing mark as shown.



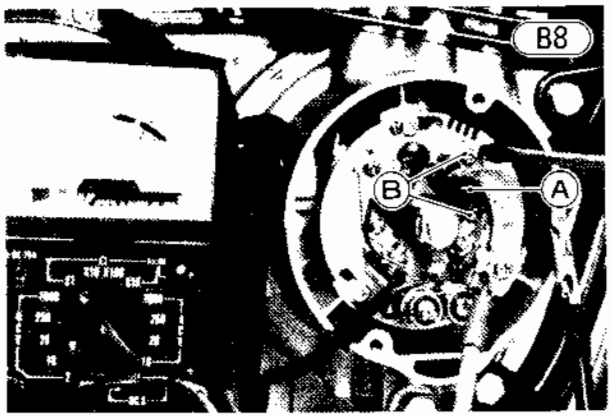
A. Timing Mark **B. "1 4" F Mark**

•Set an ohmmeter to the x 1 Ω range and connect it across the left set of points, one lead to the wire coming from the points (or to the spring leaf), and the other ohmmeter lead to chassis ground (engine, frame, contact breaker mounting, etc.). Make sure that both leads are securely connected.
•The circuit tester needle should flicker when the "F" mark and timing mark are aligned, indicating that the points have just opened. When using an audible timing tester, there should be a change in tone of the tester at this point.
•If the timing is not correct, loosen the mounting screws (3), and use a slot screwdriver on the pry points to adjust the mounting plate. Tighten the mounting screws securely and check the timing.



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

•Move the tester leads to the right set of points to check the ignition timing for #2 and #3 cylinders.
•Turn the crankshaft clockwise a half turn so that the "2 3" F mark on the timing advancer is aligned with the timing mark.
•If the circuit tester needle does not flicker when the "F" mark and timing mark are aligned, loosen base screws (2) on the right contact breaker and adjust the point gap to within its specification (0.3~0.4 mm) until the correct ignition timing is obtained.



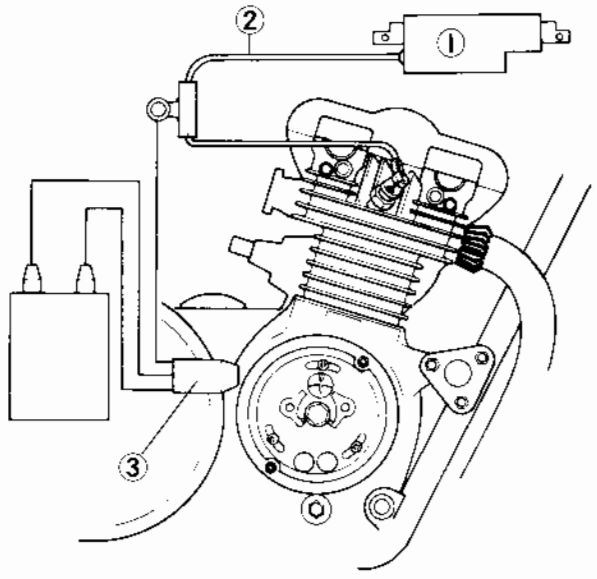
A. Right Contact Breaker **B. Base Screws**

•If the correct ignition timing for #2 and #3 cylinders cannot be obtained by adjusting the right contact breaker point gap, adjust the right contact breaker point gap to 0.35 mm, and adjust the ignition timing for #2 and #3 cylinders by shifting the mounting plate position.
•Recheck the left contact breaker point gap and the ignition timing for #1 and #4 cylinders. Readjust if necessary.
•If these adjustments resulted in failure, the contact breakers have worn out, and both must be replaced with new ones.
•Disconnect the tester leads and install the contact breaker cover and gasket.

Timing Test (Dynamic):

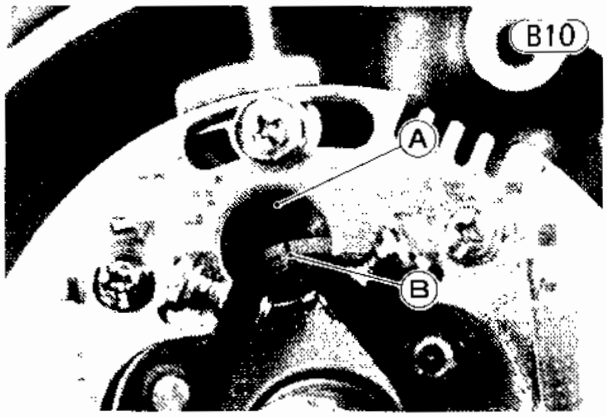
•Check the point gap, and adjust if necessary.
•Connect the strobe light lead to #1 or #4 spark plug lead in order to check the ignition timing for #1 and #4 cylinders under operating conditions. One example of the wiring is shown below.

Dynamic Ignition Timing Test B9



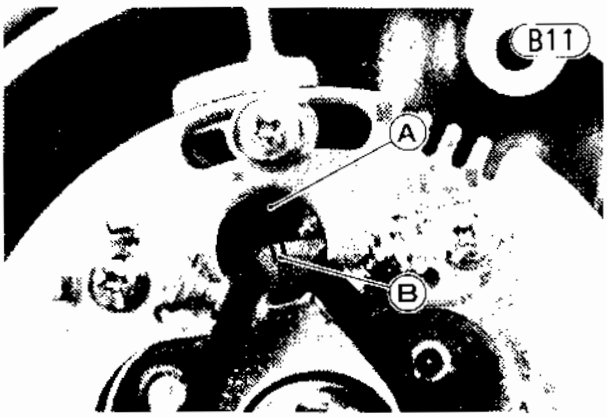
1. Ignition Coil
2. Spark Plug Lead
3. Strobe Light

•Turn on the ignition switch and engine stop switch. Start the engine and warm it up thoroughly. Then, direct the strobe light at the timing mark.
•At idle, the "1 4" F mark must be aligned with the timing mark for correct low rpm ignition timing. If the timing is not correct, adjust it by moving the mounting plate.



A. Timing Mark B. "1 4" F Mark

•At 3,400 rpm or higher, the advanced timing marks (a pair of lines) must be aligned with the timing mark for correct high rpm ignition timing. If the timing is not correct, examine the timing advancer mechanism for binding.



A. Timing Mark B. Advanced Timing Marks

Table B3 Timing Advancing

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

•Next, move the strobe light lead to #2 or #3 spark plug lead, and check the ignition timing for #2 and #3 cylinders using the "2 3" F mark. Adjust the contact breaker point gap on the right, if necessary.
•Disconnect the strobe light.
•Install the contact breaker cover and gasket.

VALVE CLEARANCE

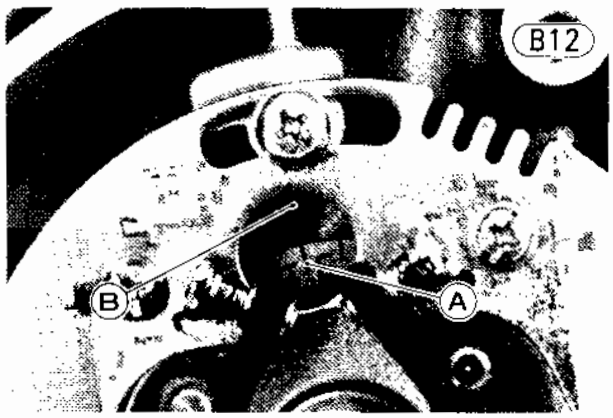
Valve and valve seat wear decreases valve clearance, upsetting valve timing. If valve clearance is left unadjusted, the wear will eventually cause the valves to remain partly open, which lowers performance, burns the valves and valve seats, and may cause serious engine damage.

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

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

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

To check the valve clearance:
•Remove the fuel tank (Pg. 47).
•Remove the ignition coils (Pg. 57).
•Remove the cylinder head cover bolts (24), and remove the cylinder head cover.
•Remove the contact breaker cover.
•Using a 17 mm wrench on the crankshaft, turn the crankshaft so that the "1 4" T mark on the timing advancer is aligned with the timing mark.



A. "1 4" T Mark B. Timing Mark

•For two inlet valves (#1 and #3, or #2 and #4) at a time, measure the clearance between the cam and the valve lifter.

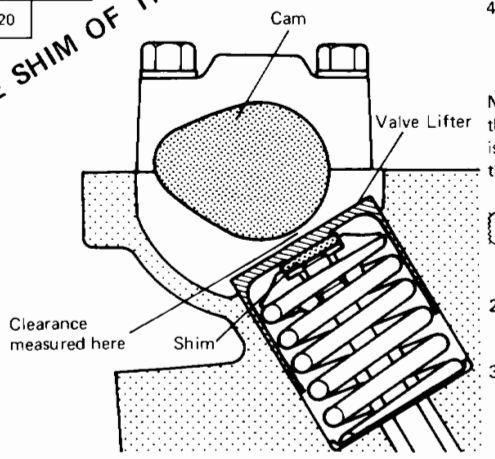
Table B4 Valve Clearance

Inlet	0.10 ~ 0.20 mm
Exhaust	0.15 ~ 0.25 mm

Table B5 Inlet Valve Clearance Adjustment Chart

	PRESENT SHIM																								
PART NUMBER (92025-)	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114
THICKNESS (mm)	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20

VALVE CLEARANCE (mm)	INSTALL THE SHIM OF THIS THICKNESS (mm)																								
0.00 ~ 0.02				2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.03 ~ 0.07			2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.08 ~ 0.09		2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15
0.10 ~ 0.20	SPECIFIED CLEARANCE / NO CHANGE REQUIRED																								
0.21 ~ 0.22	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	
0.23 ~ 0.27	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20		
0.28 ~ 0.32	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20			
0.33 ~ 0.37	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20				
0.38 ~ 0.42	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20					
0.43 ~ 0.47	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20						
0.48 ~ 0.52	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20							
0.53 ~ 0.57	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20								
0.58 ~ 0.62	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20									
0.63 ~ 0.67	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20										
0.68 ~ 0.72	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20											
0.73 ~ 0.77	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20												
0.78 ~ 0.82	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20													
0.83 ~ 0.87	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20														
0.88 ~ 0.92	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20															
0.93 ~ 0.97	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
0.98 ~ 1.02	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
1.03 ~ 1.07	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
1.08 ~ 1.12	2.95	3.00	3.05	3.10	3.15	3.20																			
1.13 ~ 1.17	3.00	3.05	3.10	3.15	3.20																				
1.18 ~ 1.22	3.05	3.10	3.15	3.20																					
1.23 ~ 1.27	3.10	3.15	3.20																						
1.28 ~ 1.32	3.15	3.20																							
1.33 ~ 1.37	3.20																								



1. Align the timing advancer "T" mark with the crankcase timing mark, and measure the clearance (when cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. The shim specified where the lines intersect is the one that will give you the proper clearance.

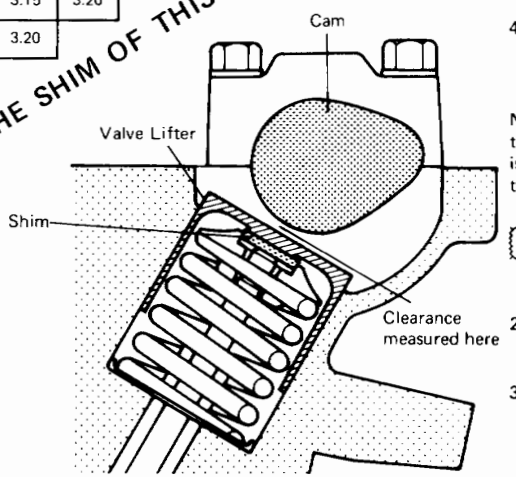
NOTE: If there is no clearance between the shim and the cam, select a shim which is several sizes smaller and then measure the clearance.

CAUTION
1. Do not put shim stock under the shim. This may cause the shim to pop out at high rpm causing extensive engine damage.
2. Do not grind the shim. This may cause it to fracture, causing extensive engine damage.
3. Check the valve clearance with the proper method in the text. Checking the clearance at any other cam position may result in improper valve clearance.

Table B6 Exhaust Valve Clearance Adjustment Chart

	PRESENT SHIM																								
PART NUMBER (92025-)	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114
THICKNESS (mm)	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20

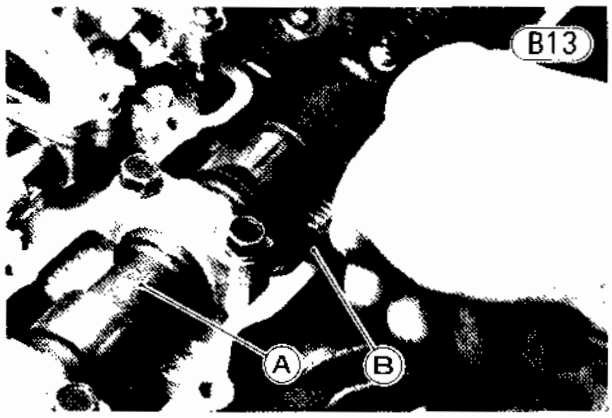
VALVE CLEARANCE (mm)	INSTALL THE SHIM OF THIS THICKNESS (mm)																								
0.00 ~ 0.02					2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00
0.03 ~ 0.07				2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.08 ~ 0.12			2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.13 ~ 0.14		2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15
0.15 ~ 0.25	SPECIFIED CLEARANCE / NO CHANGE REQUIRED																								
0.26 ~ 0.27	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	
0.28 ~ 0.32	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20		
0.33 ~ 0.37	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20			
0.38 ~ 0.42	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20				
0.43 ~ 0.47	2.25	2.30	2.35	2.40	2.45	2.50	2.551	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20					
0.48 ~ 0.52	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20						
0.53 ~ 0.57	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20							
0.58 ~ 0.62	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20								
0.63 ~ 0.67	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20									
0.68 ~ 0.72	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20										
0.73 ~ 0.77	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20											
0.78 ~ 0.82	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20												
0.83 ~ 0.87	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20													
0.88 ~ 0.92	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20														
0.93 ~ 0.97	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20															
0.98 ~ 1.02	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
1.03 ~ 1.07	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
1.08 ~ 1.12	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
1.13 ~ 1.17	2.95	3.00	3.05	3.10	3.15	3.20																			
1.18 ~ 1.22	3.00	3.05	3.10	3.15	3.20																				
1.23 ~ 1.27	3.05	3.10	3.15	3.20																					
1.28 ~ 1.32	3.10	3.15	3.20																						
1.33 ~ 1.37	3.15	3.20																							
1.38 ~ 1.45	3.20																								



1. Align the timing advancer "T" mark with the crankcase timing mark, and measure the clearance (when cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. The shim specified where the lines intersect is the one that will give you the proper clearance.

NOTE: If there is no clearance between the shim and the cam, select a shim which is several sizes smaller and then measure the clearance.

CAUTION
1. Do not put shim stock under the shim. This may cause the shim to pop out at high rpm causing extensive engine damage.
2. Do not grind the shim. This may cause it to fracture, causing extensive engine damage.
3. Check the valve clearance with the proper method in the text. Checking the clearance at any other cam position may result in improper valve clearance.



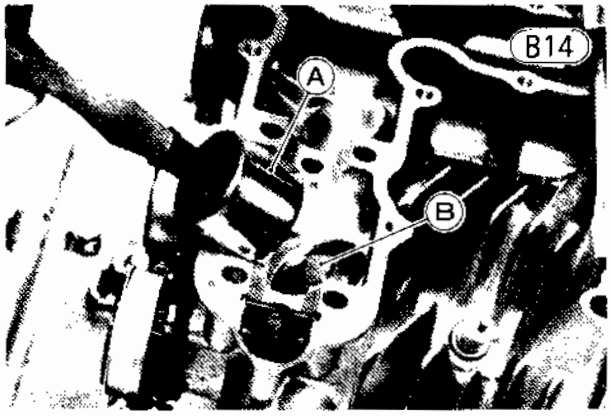
A. Inlet Camshaft B. Thickness Gauge

- Turn the crankshaft a half turn until the "2 3" T mark is aligned with the timing mark, and measure the clearance of two exhaust valves (#1 and #3, or #2 and #4).
- Turning the crankshaft another a half turn and then another a half turn to measure the valve clearance.
- If the valve clearance is incorrect, continue the following procedures to replace the present shim with a new shim, which will give the proper clearance.
- Before installing the cylinder head cover, remove the camshaft chain tensioner cap and push rod stop. Install them after the cover installation referring the camshaft installation section (Pg. 60).

NOTE: If there is no clearance between the valve lifter and cam, select a shim which is several sizes smaller and then remeasure the clearance once it is installed.

To adjust the valve clearance:

- Remove the camshaft (Pg. 57).
- Being careful not to damage the valve lifter, pull off the valve lifter with a suitable tool.



A. Valve Lifter B. Shim

- Check the present shim thickness (shim size) which is printed on the shim surface, and referring to the Valve Adjustment Charts (Pgs. 16, 17), select a new shim which brings valve clearance within the specified limits. Shims are available in sizes from 2.0 ~ 3.2 mm, in increments of 0.05 mm.
- Insert the new shim on the valve spring retainer.

CAUTION

1. Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.

2. Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

NOTE: If the smallest shim does not sufficiently increase clearance, the valve seat is probably worn. In this case, repair the valve seat (Pg. 168), and check the valve stem installed height (Pg. 170).

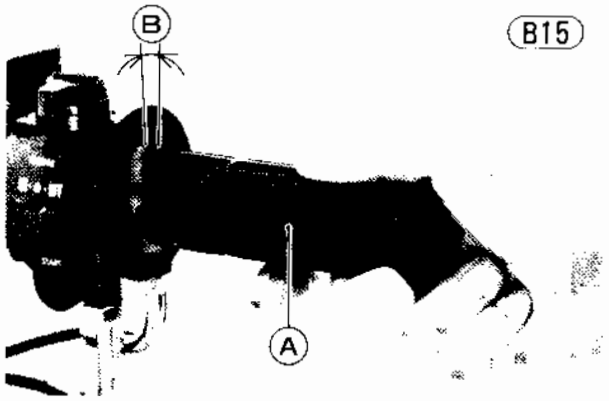
- Install the camshaft (Pg. 58), remeasure the valve clearance that was adjusted, and readjust if necessary.

THROTTLE CABLES

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

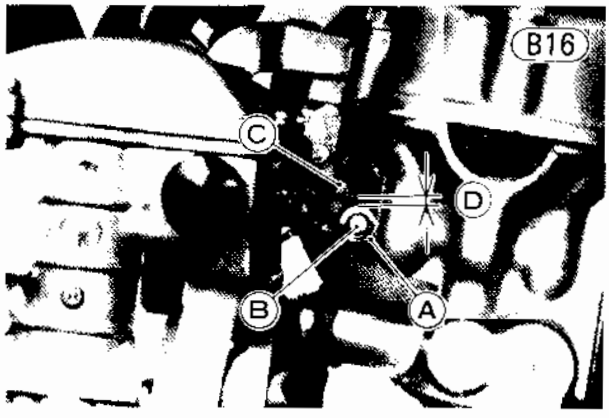
To check the throttle cable adjustment:

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



A. Throttle Grip B. 2~3 mm play

- Push the throttle grip completely closed. At this time there should be 2~3 mm clearance between the cable catch and pulley.

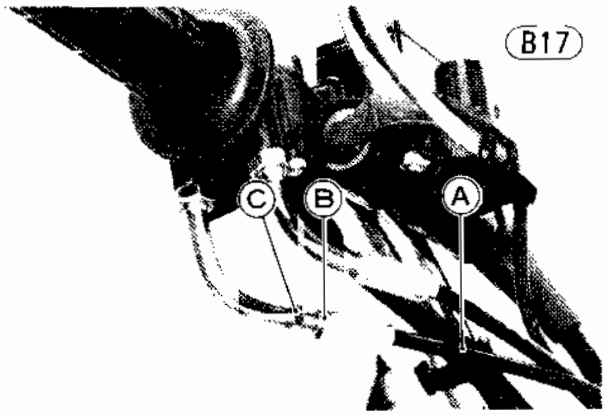


A. Cable Catch C. Pulley
B. Decelerator Cable Tip D. 2~3 mm

To adjust the throttle cables:

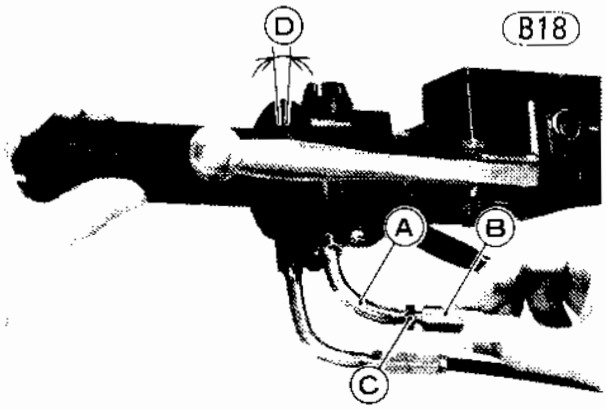
If any one of the above checks shows to be maladjusted, adjust the throttle cable as follows:

- Loosen the locknuts, and screw both throttle cable adjusting nuts in completely at the upper end of the throttle cables so as to give the throttle grip plenty of play.
- Turn out the decelerator cable adjusting nut until there is 2 ~ 3 mm clearance between the cable catch and pulley when the throttle grip is completely closed. Tighten the locknut.



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

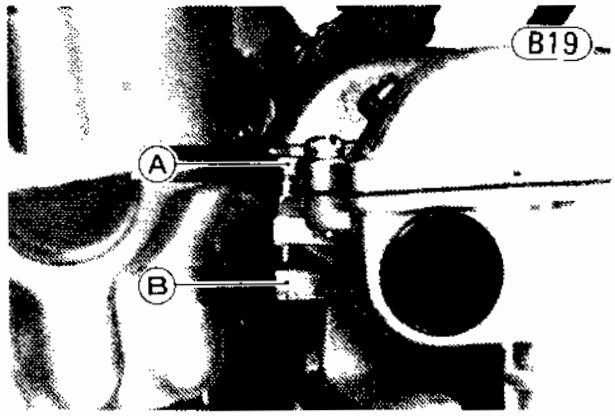
- Turn the accelerator cable adjusting nut until 2 ~ 3 mm of throttle grip play is obtained. Tighten the locknut.



A. Accelerator Cable Elbow **C. Locknut**
B. Adjusting Nut **D. 2~3 mm Play**

NOTES: 1. If the throttle cables cannot be adjusted by using the cable adjusting nuts at the upper end of the throttle cables, use the cable adjuster at the lower end of the throttle cables. Do not forget to securely tighten the adjuster mounting nuts.

2. If grip play is adjusted too large, the throttle valves may not open fully at full throttle. To check this, check to see that the pulley stop screw fits against the flange on the bracket when the throttle grip is fully opened.



A. Stop Screw **B. Flange**

CARBURETORS

For internal carburetor maintenance and replacement of parts, see the maintenance section (Pg. 156) of this manual. The following procedure covers the idling adjustment, which should be inspect during periodic maintenance or whenever the idling setting has been disturbed. This procedure also includes the necessary steps for obtaining proper carburetor synchronization.

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

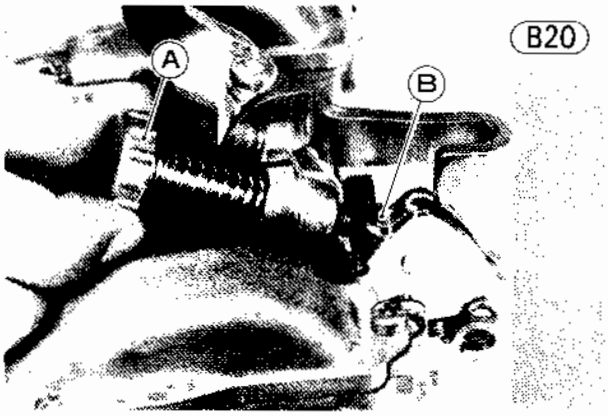
The following procedure consists of three parts: initial synhcronization--mechanical (sometimes necessary), idling adjustment, and carburetor synchronization.

Initial Synchronization—Mechanical

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

- Remove the carburetors from the engine (Pg. 49).
- Synchronize the throttle valves using the following procedure.

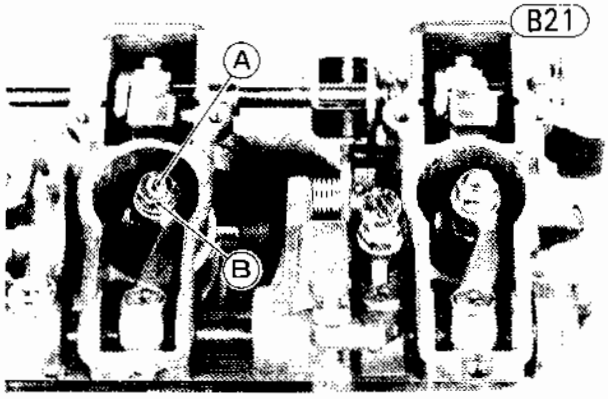
●Back out the idle adjusting screw a couple of turns. Turn the adjusting screw until there is no clearance between the screw and pulley, and then continue for another ¼ turn from that point.



B20

A. Idle Adjusting Screw B. Pulley

●Remove the top covers (4), and loosen the throttle adjusting screw locknut.



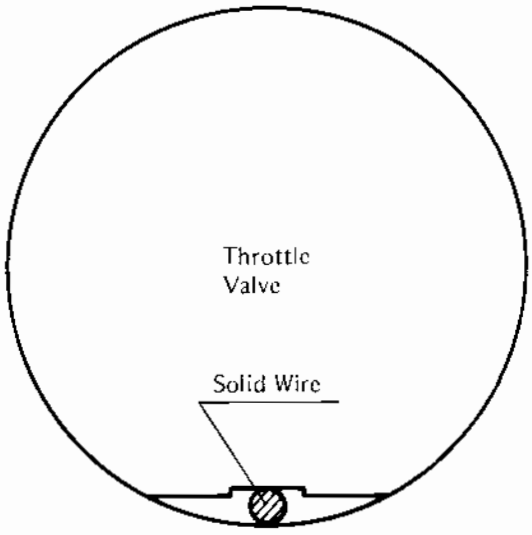
B21

A. Throttle Adjusting Screw B. Locknut

●Turn the adjusting screw to make a slight clearance between the throttle valve and the bottom of the carburetor bore. Turn each adjusting screw until the four clearances are the same. This is a very fine adjustment, so make it carefully.

NOTE: An easy method of performing this adjustment is to carefully insert a piece of 0.5 ~ 1.0 mm solid wire in the space between the bottom of the carburetor bore and the throttle valve, lifting the valve and slowly letting it seat on the wire. Then, with the carburetor throat facing downward, slowly turn the adjusting screw out until the wires fall out. Repeat the procedure above for each carburetor.

Throttle Valve Clearance B22

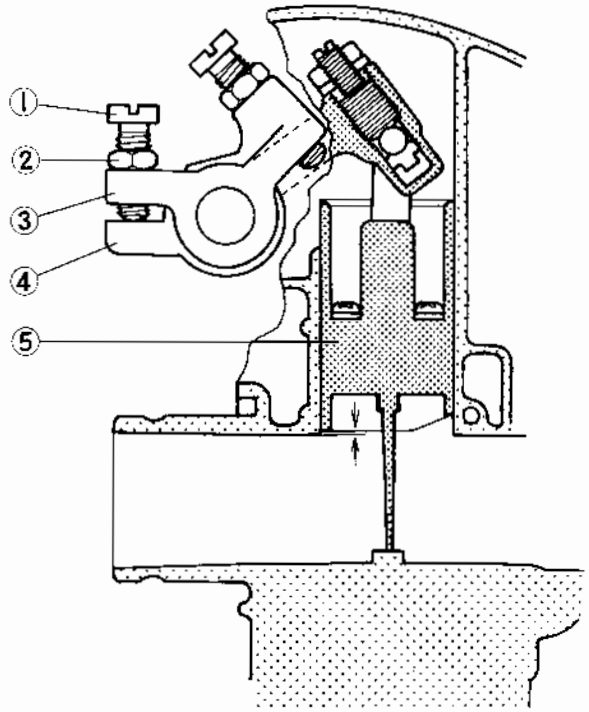


Bottom of Carburetor Bore

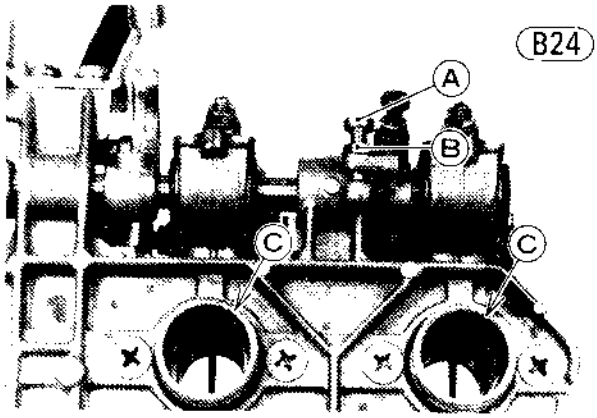
●Tighten the locknuts without changing the position of the screws. Install the top covers.

●Open the throttle so that the bottom edge of the lowest of the four carburetor throttle valves is even with the top of the carburetor bore. Loosen the locknut and turn the pulley stop screw so the throttle valve is stopped at that point, and then tighten the locknut.

Throttle Valve Position at Fully Throttle B23



1. Pulley Stop Screw
2. Locknut
3. Fast Idle Arm
4. Flange
5. Throttle Valve

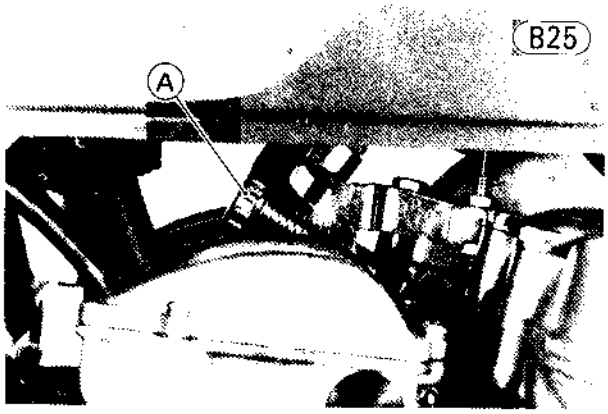


A. Pulley Stop Screw
B. Locknut
C. Carburetor Bore

•Install the carburetors (Pg. 50), and adjust the play in the throttle cables (Pg. 18).

Idling Adjustment:

(1)Idle speed adjustment
•Start the engine, and warm it up thoroughly.
•Adjust idle speed to 1,000 ~ 1,100 rpm by turning the idle adjusting screw.



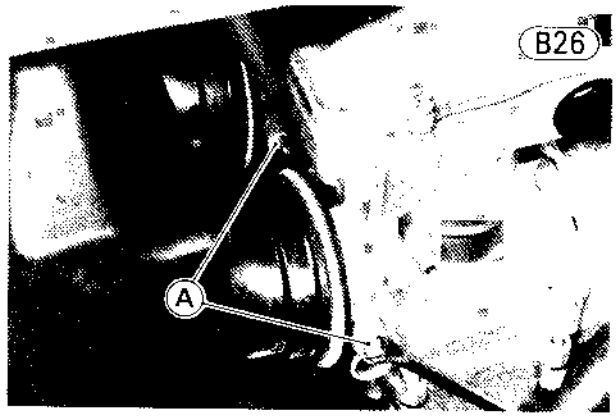
A. Idle Adjusting Screw

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

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

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

(2)Idle mixture adjustment
•For all carburetors, turn in the pilot air screw of each carburetor until it seats lightly, and then back it out $1\frac{1}{8}$ turns.



A. Pilot Air Screws

•Perform the idle speed adjustment.

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

Engine Oil
Spark Plugs
Ignition Timing
Throttle Cables
Cylinder Compression
Air Cleaner Element
Air Cleaner Duct and Carburetor Holder Leakage
Camshaft Chain
Valve Clearance

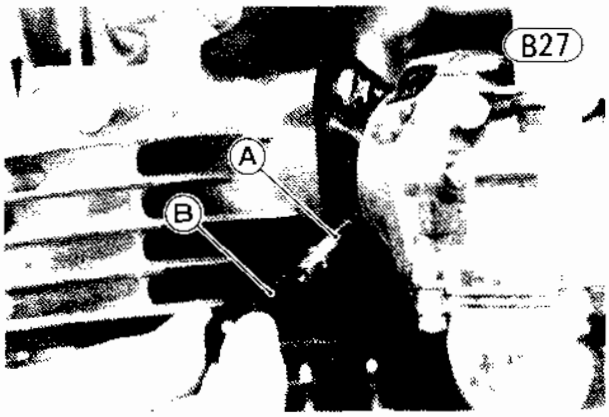
Fine Synchronization—Vacuum:

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

NOTE: During carburetor synchronization, the fuel tank will be removed. In most cases, it will be necessary to temporarily replace the standard fuel lines with lines long enough to reach the fuel tank while it is located on your workbench.

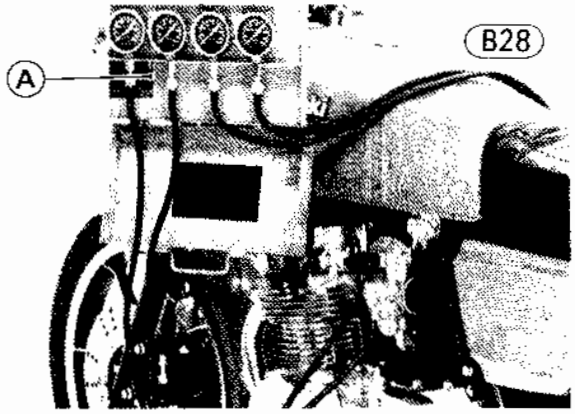
WARNING **Use extreme caution when working with gasoline, open fuel lines, etc. to avoid a fire or explosion.**

•Start the engine, and warm it up thoroughly.
•Perform idling adjustment.
•Remove the rubber caps from the vacuum gauge attachments on the carburetor holder.



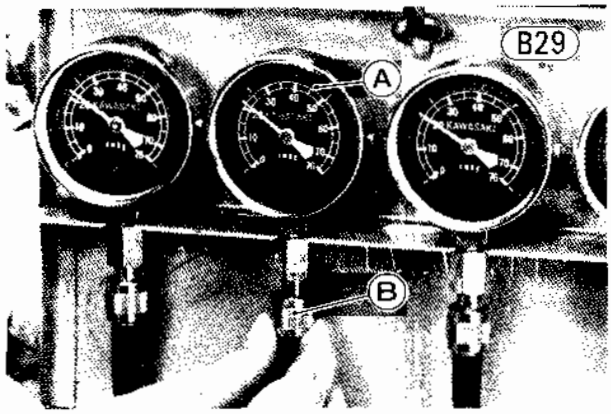
A. Vacuum Gauge Attachment B. Rubber Cap

•Attach the vacuum gauges (special tool) fitting the gauge hoses to the vacuum gauge attachments.



A. Vacuum Gauge Set (57001-127)

•With the engine running at idle speed, close the vacuum gauge damper valves until gauge needle flutter is less than 3 cm Hg. Normal vacuum gauge reading is 19 ~ 24 cm Hg, and the difference between any two cylinders should be less than 2 cm Hg.



A. Vacuum Gauge B. Damper Valve

•If the difference in vacuum readings between any two cylinders is greater than 2 cm Hg, synchronize the carburetors according to the following procedure.

To synchronize the carburetors

•Remove the fuel tank (Pg. 47), and supply fuel for carburetors by some means during adjustment.
•Remove the carburetor top covers (4) and loosen the locknuts (Fig. B21).
•With the engine running at idle speed, readjust the individual throttle adjusting screws to set all the carburetors to within 2 cm Hg of each other. Backing the screw out decreases vacuum and turning it in increases it. If any gauge reads less than 14 cm Hg after synchronizing the carburetors; check the points listed in the end of the idling adjustment (Pg. 21) and check and clean carburetor starter system.

CAUTION **Take care that no dirt or other foreign matter enters the tops of the carburetors during this operation, or else the throttle valves may stick.**

•Perform idling adjustment again.
•Open the throttle grip and let it snap shut a few times. Make sure the vacuum readings stay within the specified vacuum reading. If they do not, repeat the last two steps.
•After the carburetors are properly sunchronized, tighten the locknuts without changing the positions of the screws. Install the top covers.
•Detach the vacuum gauge and install the rubber caps on the vacuum gauge attachments.
•Install the fuel tank (Pg. 47).
•Adjust idle speed to 1,000 ~ 1,100 rpm with the idle adjusting screw.

CLUTCH

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

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

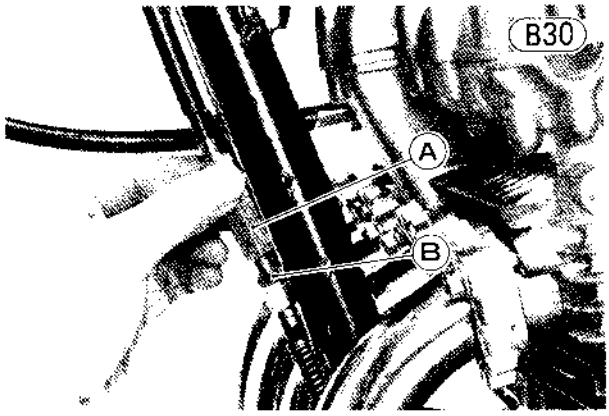
NOTE: Even though the proper amount of play exists at the clutch lever, clutch lever play alone cannot be used to determine whether or not the clutch requires adjustment.

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

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

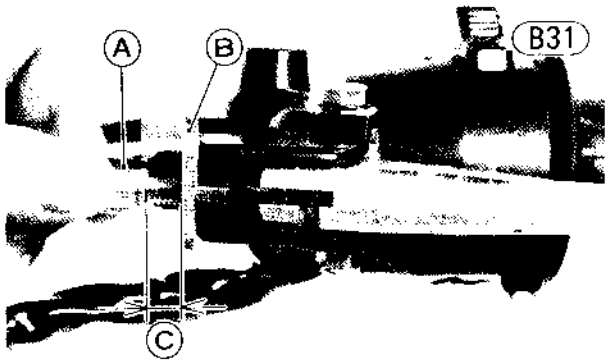
To adjust the clutch:

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



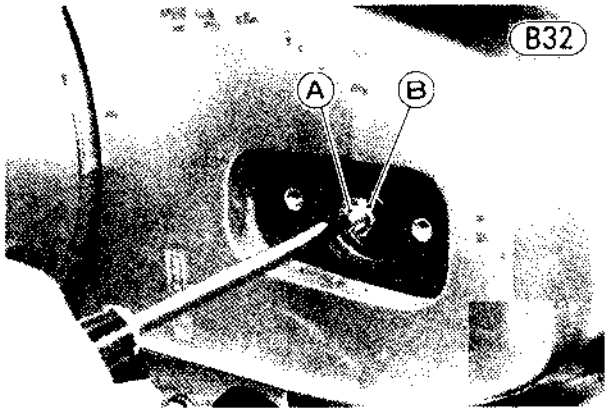
A. Adjusting Nut **B. Locknut**

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



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

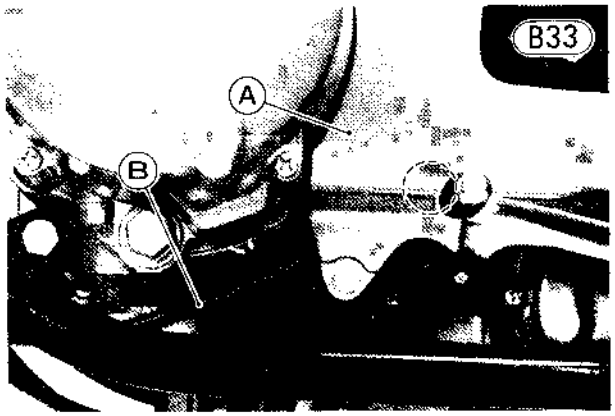
- Remove the clutch adjusting cover.
- Loosen the locknut, and back out the clutch adjusting screw a couple of turns.



A. Adjusting Screw **B. Locknut**

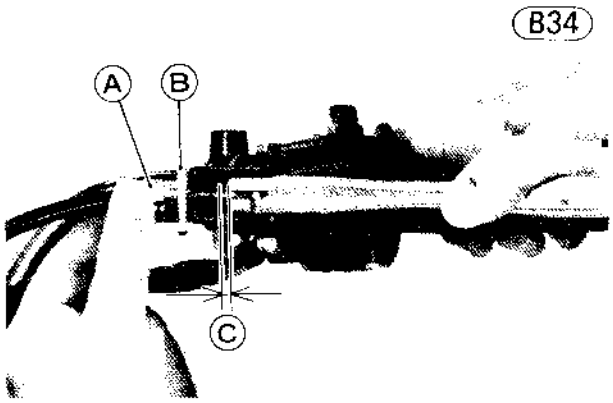
- Turn the adjusting screw in until it becomes hard to turn. This is the point where the clutch is just starting to release.
- Back out the adjusting screw ½ turn from that point, and tighten the locknut without changing the adjusting screw position.
- Take up all the cable play with the adjusting nut at the center of the cable, and then tighten the locknut.
- Make sure the lower end of the clutch outer cable is properly fitted into the cable bracket hole in the engine sprocket cover.

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



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

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



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

- Install the clutch adjusting cover and gasket.
- Start the engine and check that the clutch has no slippage and that it releases properly.

ENGINE OIL

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

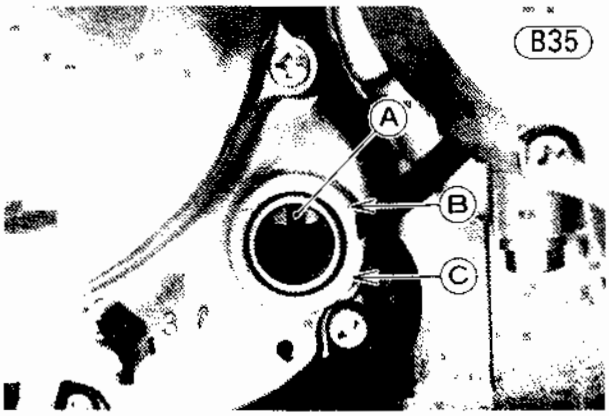
WARNING **Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure and accident and injury.**

Oil Level Inspection

- If the oil has just been changed, start the engine and run it for several minutes at idle. This fills the oil filter with oil. Then wait several minutes until the oil settles.

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

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



A. Engine Oil Level Gauge
B. Upper Level Line
C. Lower Level Line

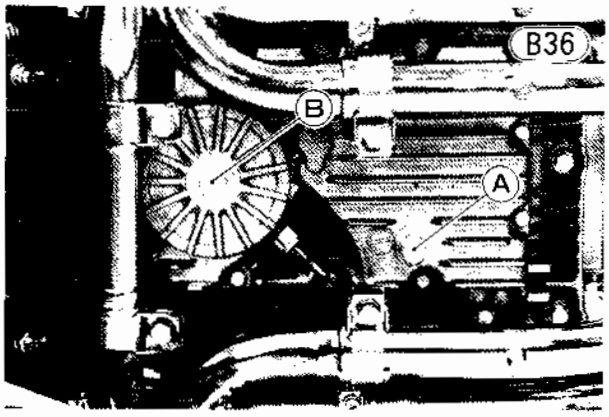
- If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- If the amount of oil is insufficient, add oil through the oil filler opening. Use the same type and brand of oil that already is in the engine.

CAUTION **If the engine oil level gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the red oil pressure warning light in the switch panel will light. If this light stays on when the engine speed is above 1,300 rpm, stop the engine immediately and find the cause.**

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

Oil and Oil Filter Change

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



A. Engine Drain Plug
B. Oil Filter Mounting Bolt

- If the oil filter is to be changed, remove the filter mounting bolt and drop out the oil filter.
- Replace the oil filter with a new one. Check that it is properly assembled.

NOTE: Check for O ring damage. If necessary, replace them with new ones.

- Install the oil filter, tightening its bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
- After the oil has completely drained out, install the engine drain plug. Proper torque for the drain plug is 3.8 kg-m (27 ft-lbs).
- Fill the engine up to the upper level with a quality motor oil specified in the table.

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

Table B7 Engine Oil

Grade	Viscosity	Filling Engine Oil Capacity	
SE class	SAE 10W40 10W50 20W40 20W50	When filter is not changed	When filter is changed
		2.6 liters	3.0 liters

FUEL SYSTEM

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

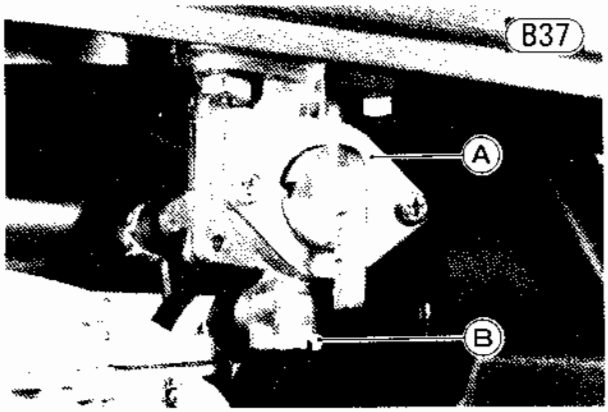
WARNING

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

2. Never clean out the fuel system when the engine is still warm.

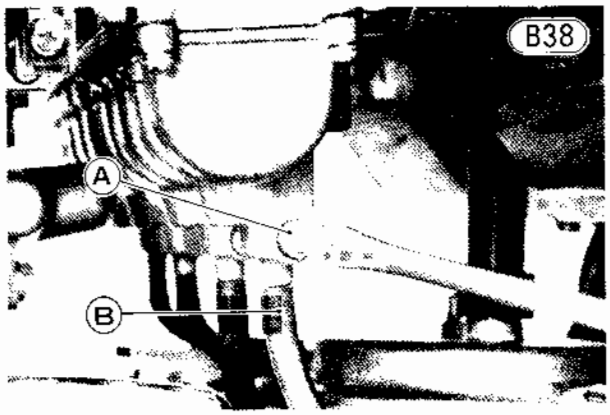
3. Wipe any fuel off the engine before starting it.

- Turn the fuel tap lever to the "ON" or "RES" position.
- Remove the drain plug at the bottom of the fuel tap.



A. Fuel Tap **B. Drain Plug**

- Holding a container under the fuel tap, turn the tap lever to the "PRI" position to drain the tank until only gasoline comes out. Then turn the lever to the "ON" or "RES" position. Install the gasket and the drain plug on the tap.
- If water has accumulated in the fuel tank, water may also have accumulated in the float bowl.
- Loosen the drain screws, and drain the fuel in the float bowls through the overflow tubes. Tighten the drain screws.



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

Adjustment–Chassis

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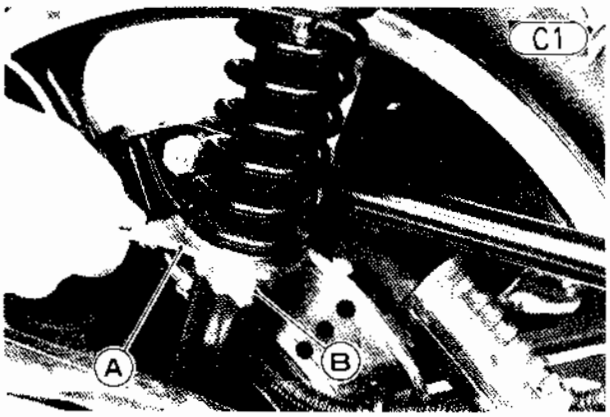
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REAR SHOCK ABSORBERS

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

To adjust the rear shock absorbers:

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



A. Hook Spanner **B. Adjusting Sleeve**

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

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

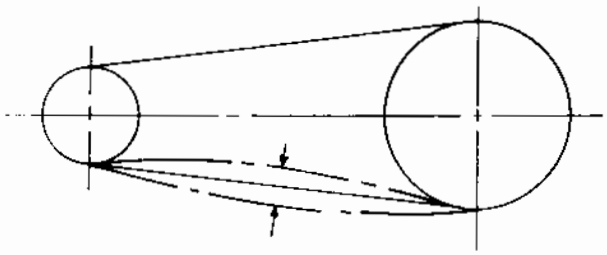
DRIVE CHAIN

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

- To determine whether or not the chain requires adjustment, first set the motorcycle up on its center stand. Rotate the rear wheel to find the position where the chain is tightest, and measure the vertical movement midway between the sprockets. If it is less than 20 mm or more than 35 mm, adjust the chain so that the vertical movement will be about 20 ~ 30 mm.

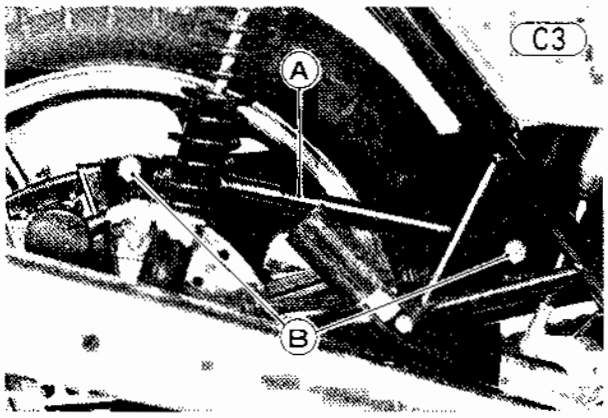
WARNING **A chain worn past the service limit (Pg. 196) must be replaced. Such wear cannot be adequately compensated for by adjustment.**

Drive Chain Slack C2



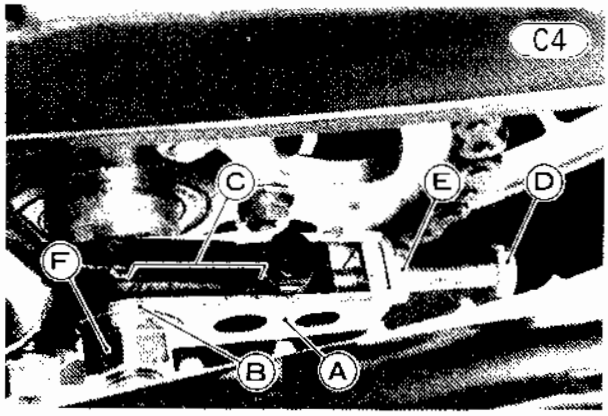
To adjust the drive chain:

- Loosen the nuts (2) of the torque link.



A. Torque Link **B. Nuts**

- Loosen the left and right chain adjuster locknut.



A. Chain Adjuster
B. Notch
C. Swing Arm Marks
D. Adjusting Bolt
E. Locknut
F. Axle Nut

- Remove the cotter pin, and loosen the rear axle nut.
- If the chain is too tight, back out the left and right chain adjusting bolts evenly, and kick the wheel forward until the chain is too loose.

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

- Turn the left and right chain adjusting bolts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel aligned, the notch on the left chain adjuster should align with the same swing arm mark that the right chain adjuster notch aligns with.

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

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

- Tighten both chain adjuster locknuts (Make sure the axle stays aligned).
- Tighten the axle nut to 8.0 kg-m (58 ft-lbs) of torque.
- Rotate the wheel, measure the vertical movement again at the tightest position, and readjust if necessary.
- Tighten the torque link nuts to 3.0 kg-m (22 ft-lbs) of torque.
- Insert a new cotter pin through the axle and spread its end.

BRAKES

Front Brake

Disc and disc pad wear is automatically compensated for and has no effect on brake lever action. So there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (Pg. 205).

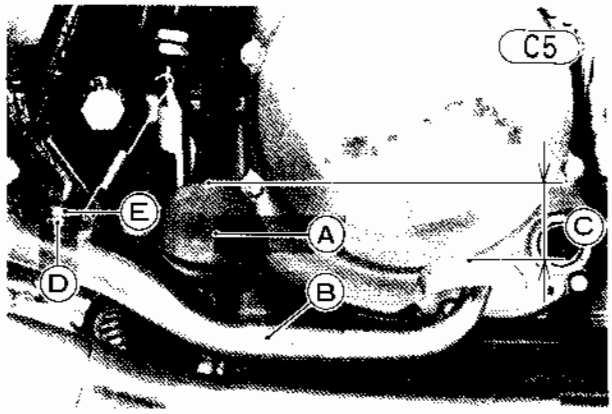
Rear Brake

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

NOTE: Check the brake fluid level in accordance with the Periodic Maintenance Chart (Pg. 10). Before adjusting the brake, be sure that all air is bled from the brake line (Pg. 205).

Brake Pedal Position

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

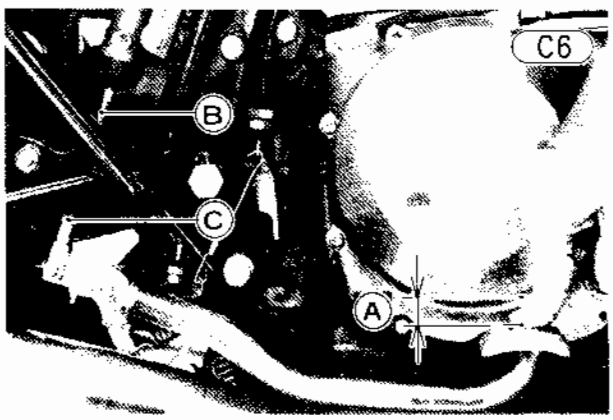


A. Footpeg
B. Brake Pedal
C. 0 ~ 30 mm
D. Adjusting Bolt
E. Locknut

- If it is too high; first loosen the brake push rod locknut, slide down the push rod dust cover, and shorten the push rod to give the brake pedal plenty of play (Fig. C6). Then adjust the brake pedal position.
- If it is too low; loosen the locknut, turn the brake pedal adjusting bolt to obtain the correct pedal position, and then tighten the locknut.
- Check brake pedal travel, and tighten the brake push rod locknuts.

Rear Brake Pedal Play

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



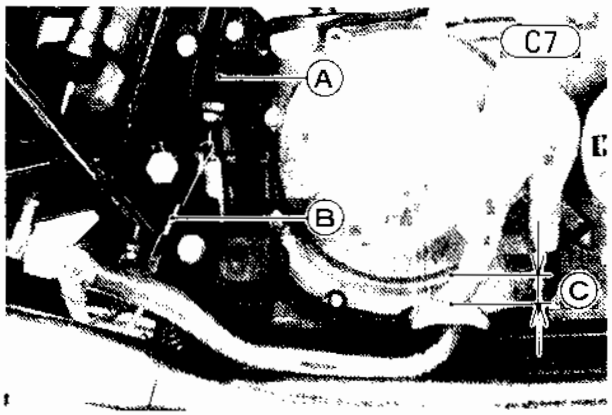
A. 8 ~ 10 mm Free Play
B. Push Rod
C. Locknut

- To adjust play, loosen the push rod locknut and turn the push rod. Tighten the locknut.
- Check the rear brake light switch (Pg. 30).
- Check for brake drag.
- Check braking effectiveness.

BRAKE LIGHT SWITCH

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

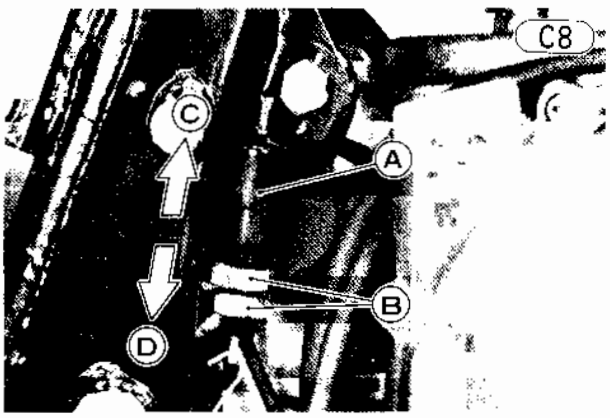
- Check the operation of the swing by turning on the ignition switch and depressing the brake pedal. The brake light should go on after 15 mm of pedal travel.



A. Rear Brake Light Switch
B. Spring
C. 15 mm

- If it does not, adjust the switch so that the brake light will go on after the proper amount of brake pedal travel. Raising the switch will make the light go on after less travel; lowering it will require more travel. Adjustment is made by altering the position of the mounting nuts on the brake switch body.

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



A. Brake Light Switch
B. Mounting Nuts
C. Lights sooner
D. Lights later

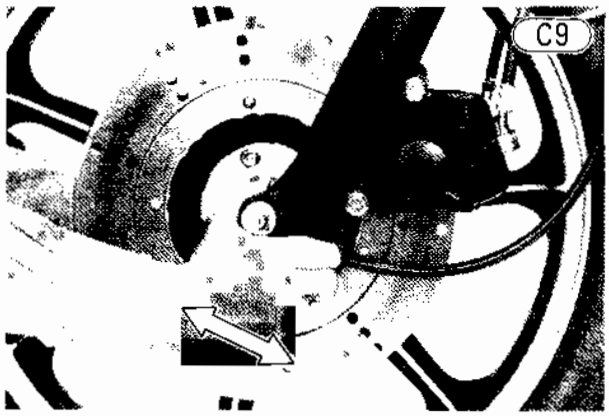
STEERING

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

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

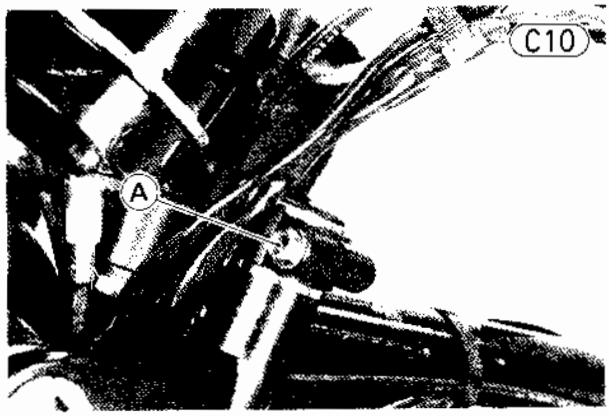
To check the steering adjustment:

- Place a stand or block under the engine so that the front wheel is raised off the ground.
- Push the handlebar lightly to either side; if it continues moving under its own momentum, the steering is not too tight.
- Squatting in front of the motorcycle, grasp the lower ends of the front fork at the axle, and push and pull the fork end back and forth; if play is felt, the steering is too loose.



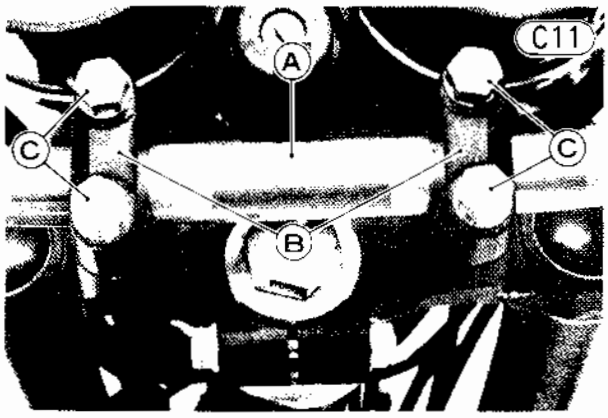
To adjust the steering:

- Put the motorcycle up on its center stand, and jack or prop up the engine so that the front wheel will be off the ground.
- Remove the fuel tank (Pg. 47) to avoid damaging the painted surface.
- Loosen the front fork upper clamp bolts (2) to free the fork tubes from the steering stem during adjustment.



A. Front Fork Upper Clamp Bolt

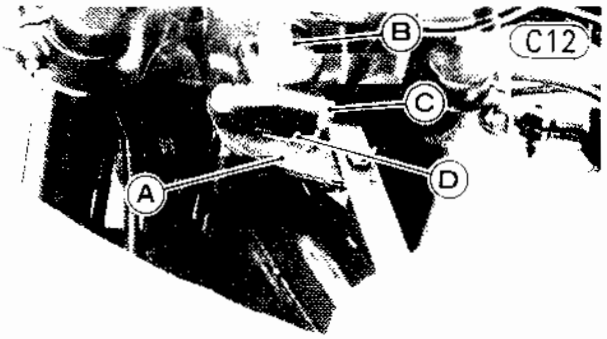
•Remove the handlebar clamp bolts and lockwashers (4 ea), and take off the clamps.



A. Handlebar B. Clamps C. Clamp Bolts

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

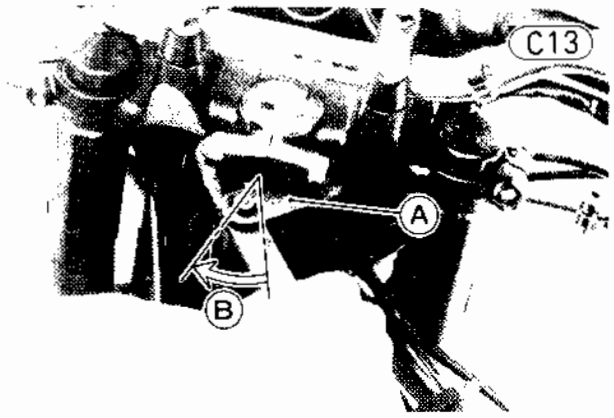
NOTE: Do not back out the steering stem locknut more than a couple of turns. If the locknut is backed off too far, the bearing balls in the steering stem may fall out of place. This will necessitate steering stem removal and installation.



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

•Tighten the stem locknut to 3.0 kg-m (22 ft-lbs) of torque.

NOTE: 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.



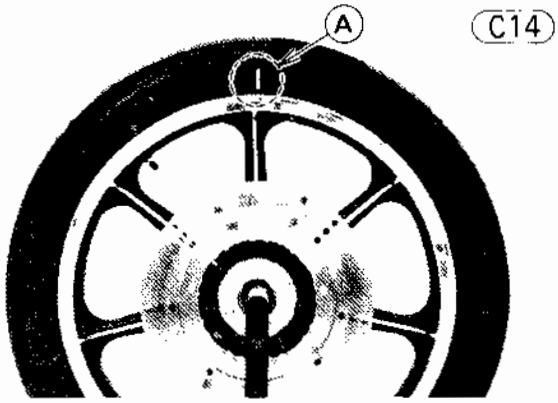
A. Stem Nut Wrench (57001-1100)
B. Another 1/16 Turn

•Tighten the steering stem head bolt to 4.5 kg-m (33 ft-lbs) of torque.
•Tighten the steering stem head rear clamp bolt to 1.8 kg-m (13.0 ft-lbs) of torque.
•Tighten the front fork upper 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 (Pg. 206).
•Install the handlebar referring to the handlebar installation section.
•Remount the fuel tank (Pg. 47).

WHEEL BALANCE

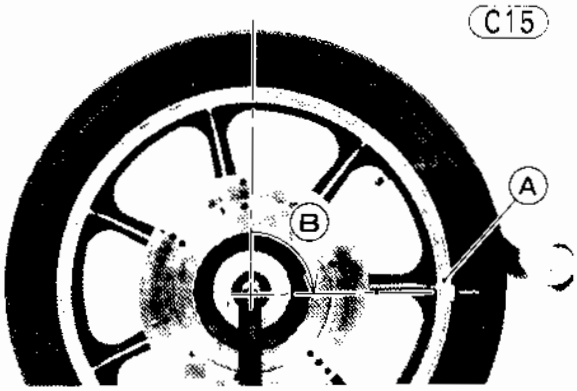
To improve stability and decrease vibration at high speed, the front and rear wheels must be kept balanced.

Check and balance the wheels when required, or when a tire is replaced with a new one:
•Remove the wheel (Pg. 115 or 123).
•Check that the wheel is not damaged.
•Suspend the wheel so that it can be spun freely.
•Spin the wheel lightly, and mark the wheel at the top when the wheel stops.



A. Mark

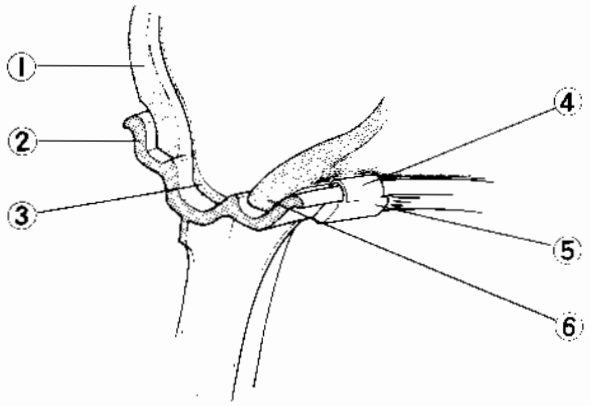
- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.
- However, if the wheel always stops in one position, provisionally attach a balance weight on the rim at the marking using an adhesive tape.
- Rotate the wheel ¼ turn, and see whether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



A. Balance Weight B. ¼ Turn

- If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated ¼ turn.
- Rotate the wheel another ¼ turn and then another ¼ turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- To install the balance weights on the rim, first reduce the tire pressure, pry the tire bead from the rim, and then insert the blade part of the balance weight between the rim and the tire bead until the stepped portion of the weight is hooked over the edge of the rim.

Balance Weight Installation C16



1. Tire
2. Rim
3. Tube
4. Blade
5. Weight
6. Tire Bead

- Inflate the tire to standard pressure (Pg. 194).
- Remount the wheel on the motorcycle (Pg. 115 or 124).

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

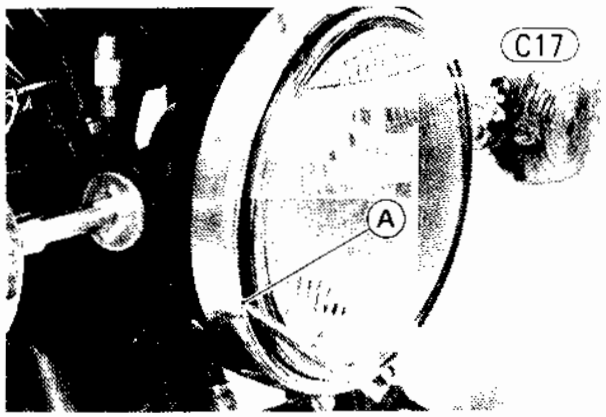
HEADLIGHT

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

NOTE: The headlight on UK model cannot be adjusted horizontally.

Horizontal Adjustment (not on UK model):

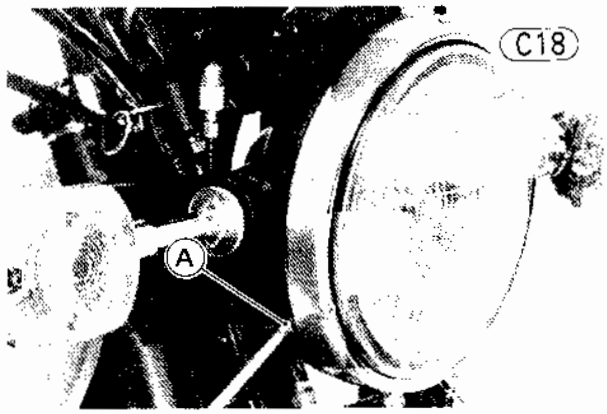
- Turn the small screw on the headlight rim in or out until the beam points straight ahead. Turning the adjusting screw clockwise makes the headlight beam point to the left.



A. Adjusting Screw

Vertical Adjustment:

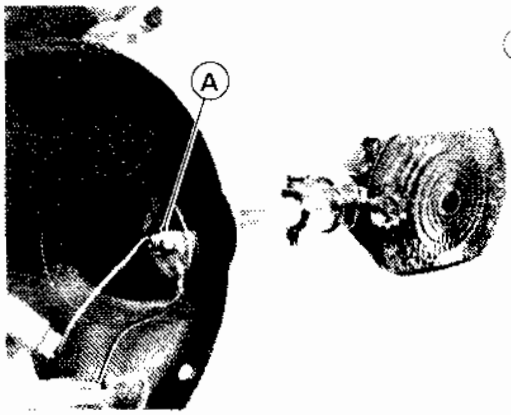
- Remove the two screws from the lower side of the headlight housing, and drop out the headlight unit.



A. Screw

•Loosen the turn signal mounting nuts.

C19



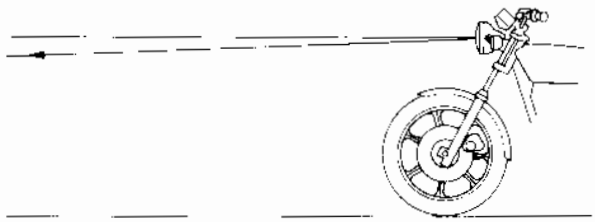
A. Turn Signal Mounting Nut

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

NOTE: On high beam, the brightest point should be slightly below horizontal. Adjust the headlight to the proper angle according to local regulation that applies to its operation. Adjust with normal operational weight loaded on the motorcycle.

Vertical Adjustment

C20



•Remount the headlight unit.

GENERAL LUBRICATION

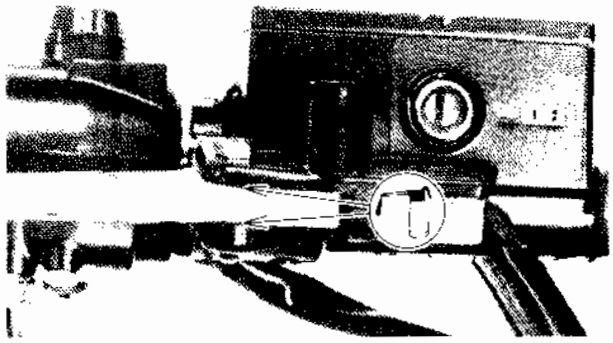
Lubrication of exposed parts subject to rust with either motor oil or regular grease should be carried out periodically and whenever the vehicle has been operated under wet or rainy conditions.

Avoid spraying water with any great force near the meter assembly, and under the fuel tank and the seat to prevent damage to electrical components. Exprosed parts that are subject to rust can be treated with a protective polish or a water-displacing oil (brand-name examples: WD-40, LPS).

WARNING **Never wax or lubricate brake discs. Loss of braking and an accident could result. Clean discs with an oilless solvent such as tricholoethylene or acetone. Observe solvent manufacture's warnings.**

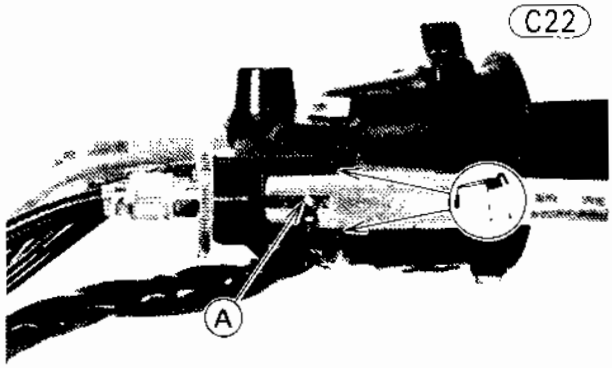
Brake Lever

C21



Clutch Lever

C22



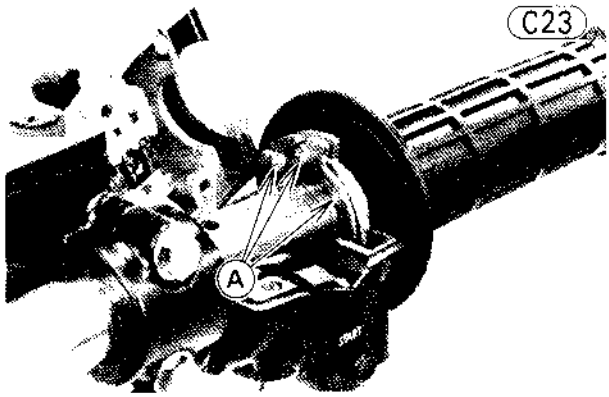
A. Grease.

Throttle Grip

Apply grease to the handlebar where the throttle grip turns.

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

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

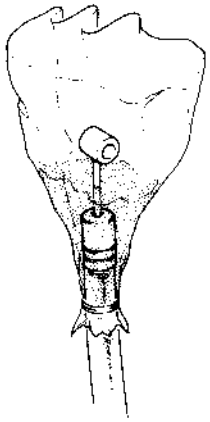


A. Grease

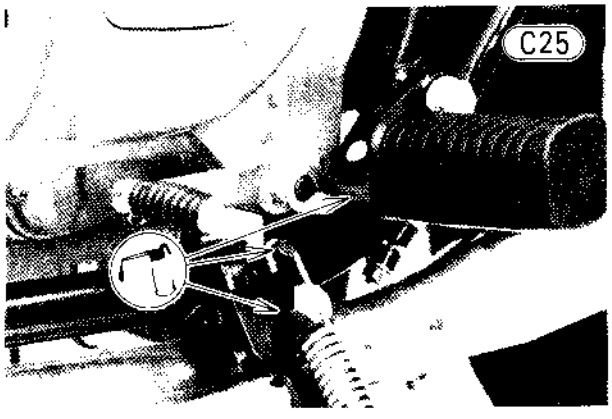
Clutch and Throttle Cables

Lubricate the clutch cable and throttle cables, as shown in the figure. Use a lubricant designed for cable lubrication. Refer to Pg. 134 for cable removal.

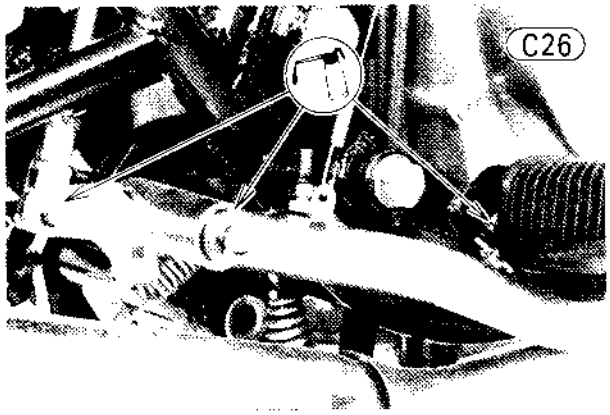
Cable Lubrication C24



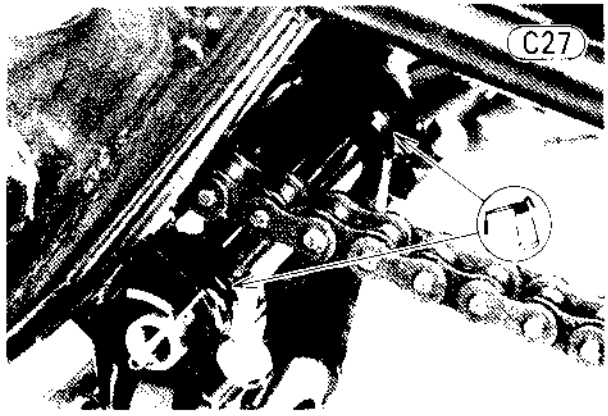
Left Footpeg, Side Stand



Right Footpeg, Brake Pedal, Brake Push Rod Joint

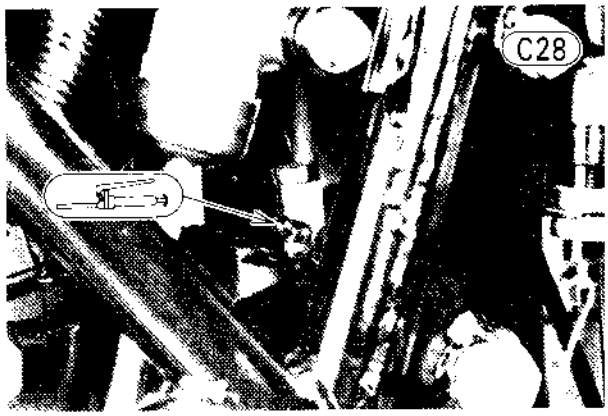


Center Stand



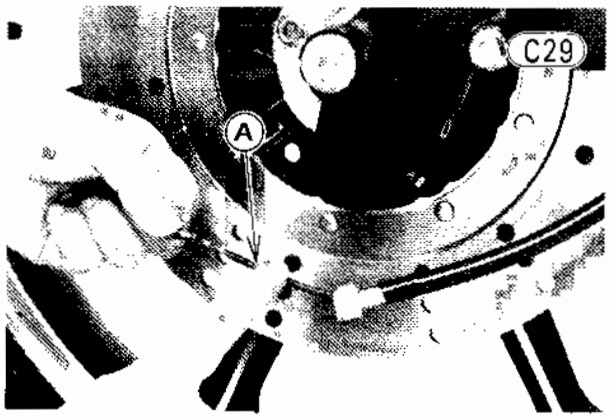
Swing Arm Pivot

Force grease into the nipple until it comes out at both sides of the swing arm, and wipe off any excess.



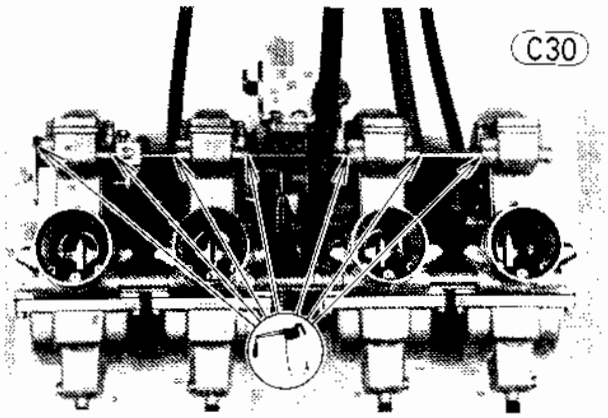
Speedometer and Tachometer Cables

Apply grease sparingly to these inner cables.



A. Grease.

Carburetor Choke Link Mechanism



Others

Lubricate the drive chain, wheel bearings, and steering stem bearing as explained in Maintenance Section. **NOTE:** A few drops of oil are effective to keep bolts and nuts from rusting and sticking. This makes easy removal at your next work. Badly rusted nuts, bolt, etc. should be replaced with new ones.

Disassembly–Introduction

Table of Contents

INTRODUCTION TO DISASSEMBLY 38
TORQUE AND LOCKING AGENT 39

D

INTRODUCTION TO DISASSEMBLY

Detail has not been spared in this section in order that the motorcycle can not only be taken apart but also put back together properly as well. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed 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) Lubrication
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. Old 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-permanent Locking Agent
Follow manufacturer'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 Leads
All the electrical leads are either single-color or two-color and, with only a few exceptions, must be connected to leads of the same color. On any of the two-color leads there is a greater amount of one color and a lesser amount of a second color, so a two-color lead 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.

TORQUE AND LOCKING AGENT

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. If insufficiently tightened, a bolt or nut may become damaged or fall off, possible resulting in damage to the motorcycle and injury to the rider. A bolt or nut which is overtightened may become damaged, strip an internal thread, or break and then fall out. 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.

Parts marked with a cross (†) must be retorqued according to the Periodic Maintenance Chart (Pg. 10). One at a time, loosen each bolt or nut ½ turn, 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 threads or washer.

ENGINE

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Remark	See Pg.
Alternator rotor bolt φ10 P1.25	1	7.0	51	–	76
Alternator stator Allen bolts φ6 P1.0	3	1.0	87 in-lbs	•	76
Breather cover bolt φ8 P1.25	1	0.60	52 in-lbs	–	69
Camshaft cap bolts φ6 P1.0	16	1.2	104 in-lbs	–	59

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Remark	See Pg.
Camshaft chain guide (rear) Allen bolts φ6 P1.0	2	–	–	•	67
Camshaft chain tensioner cap φ18 P1.5	1	2.5	18.0	–	60
Camshaft sprocket bolts φ6 P1.0	4	1.5	11.0	•	61
Carburetor holder screws φ6 P1.0	8	–	–	•	–
Clutch hub nut φ20 P1.5	1	13.5	98	–	80
Clutch release mounting screws φ6 P1.0	2	–	–	•	70
Clutch spring bolts φ6 P1.0	5	0.90	78 in-lbs	–	80
Connecting rod big end cap nuts φ7 P0.75	8	2.4	17.5	–	111
Crankcase bolts					
(upper) φ6 P1.0	13	1.0	87 in-lbs	–	102
(lower) φ6 P1.0	7	1.0	87 in-lbs	–	100
(lower) φ8 P1.25	10	2.5	18.0	–	100
Cylinder nuts φ6 P1.0	3	1.2	104 in-lbs	–	66
†Cylinder head					
bolts φ6 P1.0	5	1.2	104 in-lbs	–	62
nuts φ8 P1.25	12	2.3	16.5	–	62
Cylinder head cover bolts φ6 P1.0	24	1.0	87 in-lbs	–	60
Drive chain guard bolts φ6 P1.0	3	–	–	•	73
Engine drain plug φ12 P1.5	1	3.8	27	–	24
†Engine mounting bolts φ10 P1.25	6	4.0	29	–	95
†Engine mounting bracket bolts φ8 P1.25	6	2.4	17.5	–	95
Engine sprocket holding plate bolts φ6 P1.0	2	1.0	87 in-lbs	–	71
†Muffler					
exhaust pipe holder nuts φ6 P1.0	8	–	–	–	56
exhaust pipe clamp bolts φ8 P1.25	2	–	–	–	56
connecting pipe clamp bolts φ8 P1.25	2	–	–	–	56
rear mounting bracket bolts φ8 P1.25	4	–	–	–	–
rear mounting bolts (footpeg) φ10 P1.25	2	–	–	–	56
Neutral switch φ20 P1.5	1	1.5	11.0	–	73
Oil filter mounting bolt φ20 P1.5	1	2.0	14.5	–	24
Oil pan bolts φ6 P1.0	13	1.0	87 in-lbs	–	82

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Remark	See Pg.
Oil pressure switch PT1/8	1	1.5	11.0	–	81
Oil pressure relief valve φ12 P1.25	1	1.5	11.0	•	82
Return spring pin (bolt) φ8 P1.5	1	2.5	18.0	•	72
Secondary shaft nut φ18 P1.5	1	6.0	43	–	86
Shift drum pin plate screw φ6 P1.0	1	–	–	•	106
÷Shift pedal bolt φ6 P1.0	1	–	–	–	–
Spark plugs φ12 P1.25	4	1.4	10.0	–	12
Starter motor clutch Allen bolts φ8 P1.25	3	3.5	25	•	87
Studs					
(cylinder head) φ6 P1.0	8	–	–	•	–
(crankcase) φ6 P1.0	3	–	–	•	–
(crankcase) φ8 P1.25	12	–	–	•	–
Timing advancer mounting bolt φ8 P1.25	1	2.5	18.0	–	78

CHASSIS

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Remark	See Pg.
†Clutch lever holder bolt φ6 P1.0	1	–	–	–	–
Disc brake parts	See Table of Disc Brake Parts or Table G1 on Pg. 118.				
†Footpeg mounting bolts					
(front) φ12 P1.25	2	–	–	–	–
(rear) φ10 P1.25	2	–	–	–	–
†Front axle clamp bolt φ8 P1.25	1	2.0	14.5	–	115
†Front axle nut φ14 P1.5	1	8.0	58	–	115
÷Front fender mounting bolts φ8 P1.25	4	–	–	–	–
Front fork bottom Allen bolts φ8 P1.25	2	1.8	13.0	•, ★	148
÷Front fork clamp bolts					
(upper) φ8 P1.25	2	1.8	13.0	–	31
(lower) φ8 P1.25	4	1.8	13.0	–	146
Front fork drain bolts φ6 P1.0	2	0.80	69 in-lbs	★	150
†Handlebar clamp bolts φ8 P1.25	4	1.8	13.0	–	143
†Rear axle nut φ16 P1.5	1	8.0	58	–	29

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Remark	See Pg.
†Rear shock absorber mounting					
nuts ϕ10 P1.25	2	3.0	22	–	150
bolts ϕ10 P1.25	2	3.0	22	–	150
Rear sprocket nuts ϕ10 P1.25	4	4.0	29	–	126
†Side stand pivot nut ϕ10 P1.25	1	–	–	–	–
†Steering stem head bolt ϕ16 P1.5	1	4.5	33	–	31
†Steering stem head clamp bolt ϕ8 P1.25	1	1.8	13.0	–	31
Steering stem locknut ϕ30 P1.0	1	3.0	22	–	31
†Swing arm pivot shaft nut ϕ14 P1.5	1	8.0	58	–	152
†Torque link nuts ϕ10 P1.25	2	3.0	22	–	29,152

BRAKE

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Remark	See Pg.
Bleed valves ϕ7 P1.0	3	0.80	69 in-lbs	–	118,128
Brake hose banjo bolts ϕ10 P1.25	7	3.0	22	–	119,123,129 131,132
Brake lever pivot					
bolt ϕ6 P1.0	1	0.30	26 in-lbs	–	123
locknut ϕ6 P1.0	1	0.60	52 in-lbs	–	123
†Brake pedal cap nut ϕ8 P1.25	1	2.0	14.5	–	–
Disc mounting bolts ϕ8 P1.25	12	2.3	16.5	–	117,127
Front caliper holder shaft nuts ϕ10 P1.25	4	2.6	19.0	–	119
†Front caliper mounting bolts ϕ10 P1.25	4	3.0	22	–	115
†Front master cylinder clamp bolts ϕ6 P1.0	2	0.90	78 in-lbs	–	121
Rear caliper Allen bolts ϕ10 P1.25	2	3.0	22	–	129
†Rear caliper mounting bolt (torque link) ϕ10 P1.25	1	3.0	22	–	29
†Rear master cylinder mounting bolts ϕ8 P1.25	2	–	–	–	–
Pad mounting screws ϕ6 P1.0	2	0.30	26 in-lbs	•	119

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. 39~42 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. 39~42. All of the values are for use with dry solvent-cleaned threads.

Coarse threads

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

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

Disassembly—Engine Installed

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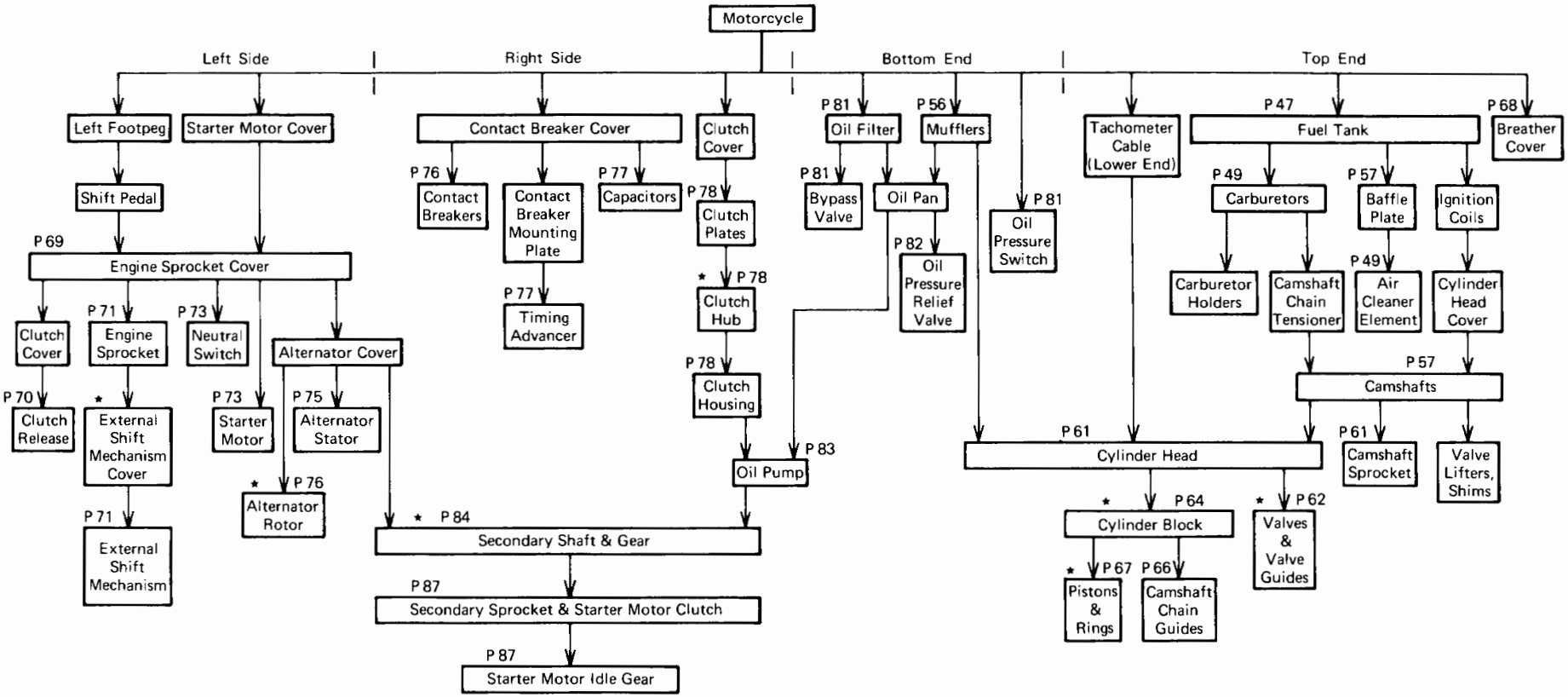
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SECONDARY SHAFT, STARTER MOTOR CLUTCH 84
STARTER MOTOR IDLE GEAR 87

E

FLOW CHART
Disassembly – Engine Installed

The following chart is intended to be aids to proper removal. Select the component you wish to remove and follow the arrows to that point on the chart.

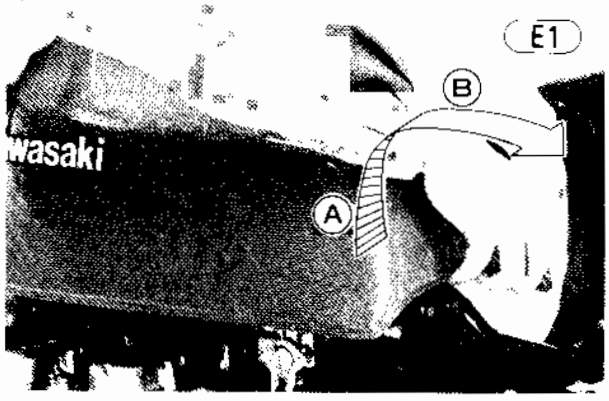


NOTES: 1. Before performing any disassembly operations, remove the ground (–) lead from the battery to prevent the possibility of accidentally turning the engine over.
2. Action with a mark (★) requires special tool(s) for removal, installation, disassembly, or assembly.

FUEL TANK

Removal:

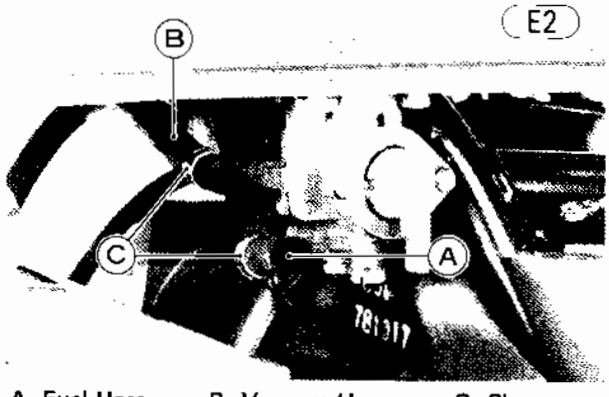
- Unlock the seat and swing it open.
- Turn the fuel tap to the "ON" or "RES" position, slide the hose clamps down, and pull the fuel hose and vacuum hose off the tap.
- Lift the rear end of the fuel tank up about 30 mm and then pull the fuel tank off toward the rear.



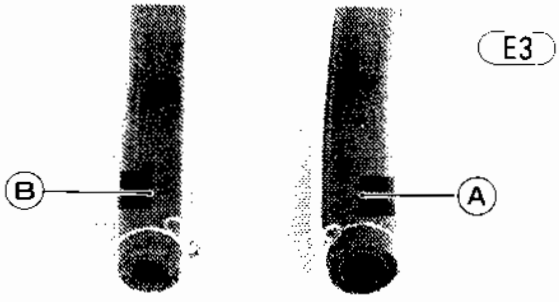
A. Lift up about 30 mm.
B. Pull off toward the rear.

Installation:

- Mount the fuel tank. Fit the fuel hose and vacuum hose back onto the fuel tap, and slide the hose clamps back into place. The vacuum hose has a small diameter than the fuel hose.

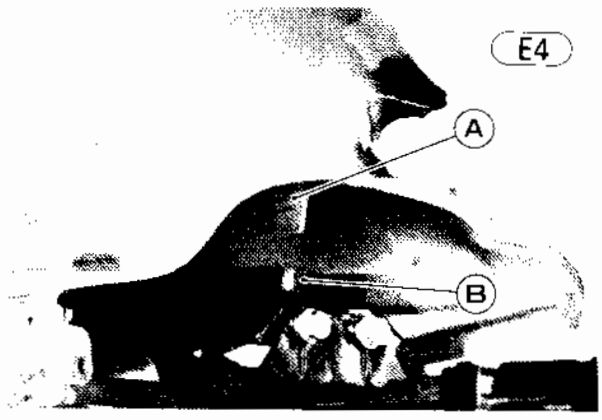


A. Fuel Hose **B. Vacuum Hose** **C. Clamps**



A. Fuel Hose **B. Vacuum Hose**

- Install the fuel tank completely. Be sure the retaining projection is seated in the retaining rubber hole.



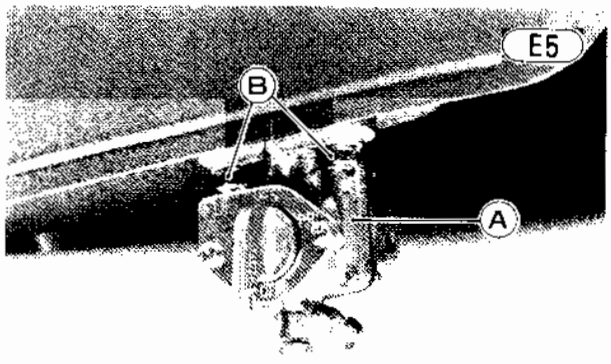
A. Retaining Projection **B. Retaining Rubber**

- Push the seat back down.

FUEL TAP

Removal:

- Remove the fuel tank.
- Holding a container under the fuel tap, turn the tap to the "PRI" position to drain the tank.
- Remove the bolts and gaskets, and pull the fuel tap off the fuel tank. Be careful not to damage the filter.



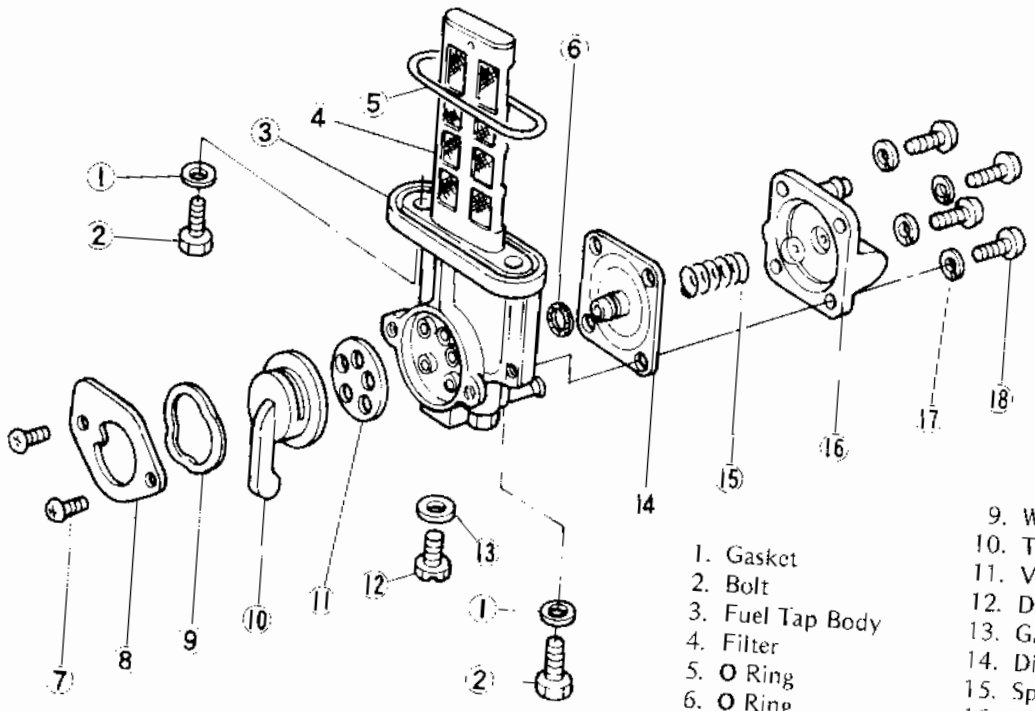
A. Fuel Tap **B. Fuel Tap Bolts**

Installation Notes:

1. Check the O ring, and replace it with a new one if it is damaged or deteriorated.
2. After installing the fuel tap on the tank, make sure that the fuel stops when the engine stops.
3. The vacuum hose is the small diameter hose; the fuel hose is larger (Fig. E3).

Fuel Tap

E6

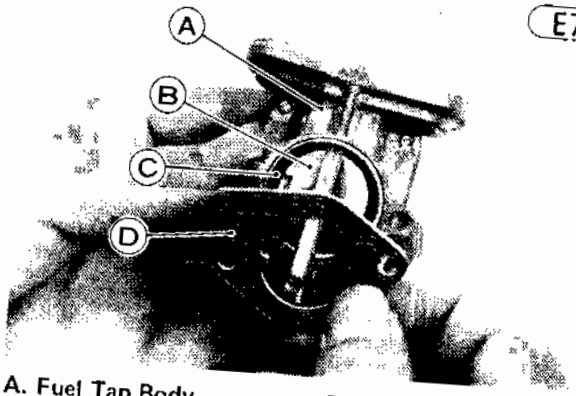


1. Gasket
2. Bolt
3. Fuel Tap Body
4. Filter
5. O Ring
6. O Ring
7. Screw
8. Holding Plate
9. Wave Washer
10. Tap Lever
11. Valve Gasket
12. Drain Plug
13. Gasket
14. Diaphragm
15. Spring
16. Diaphragm Cover
17. Lockwasher
18. Screw

Disassembly:

- Remove the screws (2), and remove the tap lever, wave washer, and holding plate.

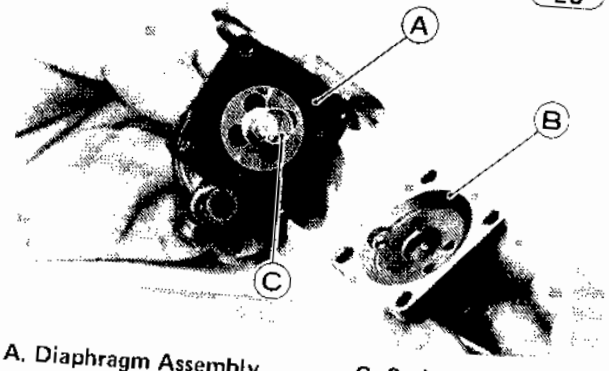
E7



A. Fuel Tap Body
B. Tap Lever
C. Wave Washer
D. Holding Plate

- Take out the valve gasket.
- Remove the screws and lockwashers (4 ea), and remove the diaphragm cover and spring.

E8

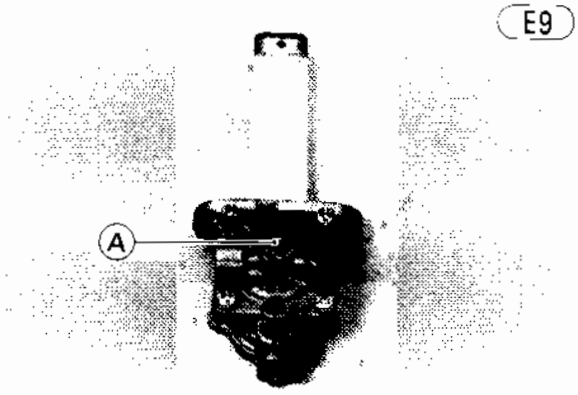


A. Diaphragm Assembly
B. Diaphragm Cover
C. Spring

- Remove the diaphragm assembly from the fuel tap.

Assembly Notes:

1. Check and clean all the parts (Pg. 155). Replace damaged parts with new ones.
2. Install the diaphragm cover in the direction shown in Fig. E9, making sure that the spring is compressed at the center of the diaphragm between the diaphragm and the cover.

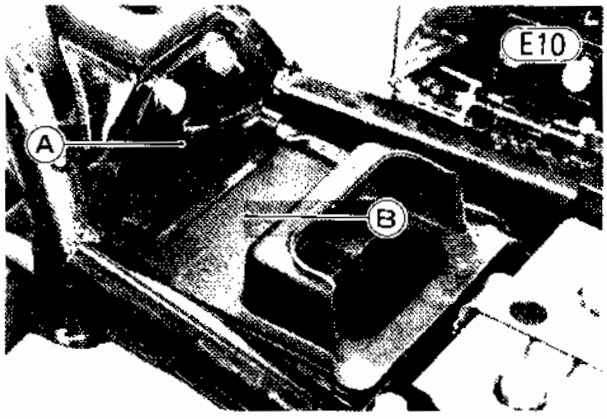


A. Diaphragm Cover

AIR CLEANER ELEMENT

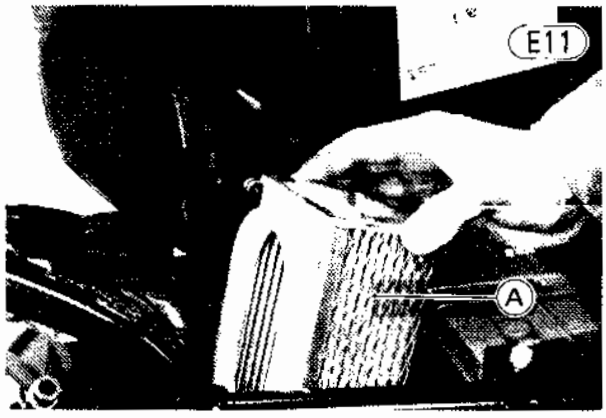
Removal:

- Unlock the seat, and swing it open.
- Remove the fuel tank (Pg. 47).
- Remove the bolts (2) and baffle plate.



A. Baffle Plate B. Air Cleaner Cap

- Remove the air cleaner cap screws (2) and flat washers (2), and remove the cap.
- Pull out the element.

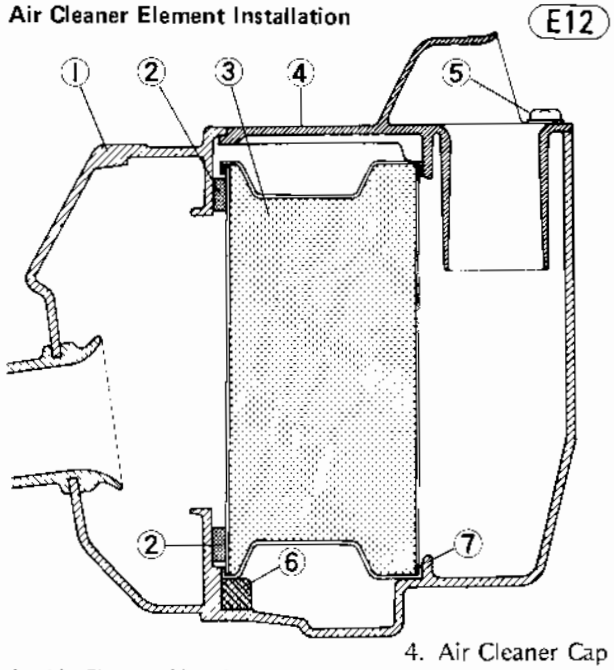


A. Air Cleaner Element

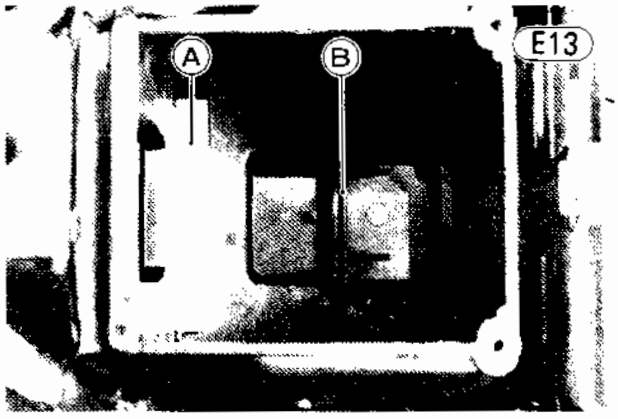
Installation Notes:

1. Install the air cleaner element as shown in Fig. E12.
2. When installing the air cleaner cap, fit the front edge of the cap into the housing properly (Fig. E12).

Air Cleaner Element Installation



1. Air Cleaner Housing
2. Sponge
3. Air Cleaner Element
4. Air Cleaner Cap
5. Cap Screw
6. Holder
7. Stop



A. Holder B. Stop

CARBURETORS

This section is divided as follows:

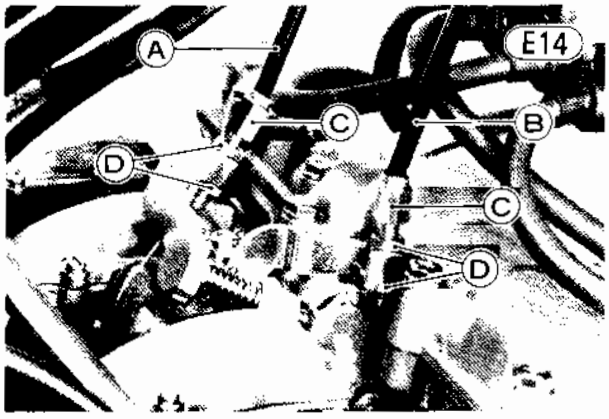
- Carburetor Removal and Installation
- Carburetors Separation and Assembly Notes
- Choke Mechanism Adjustment
- Fast Idle Mechanism Adjustment
- Throttle Valve, Jet Needle Removal and Assembly Notes
- Choke Valve Removal and Assembly Notes
- Carburetor Body Disassembly and Assembly Notes

Removal:

- Remove the fuel tank (Pg. 47).
- Screw in fully the locknuts and adjusting nuts at the upper end of the throttle cables so as to give the cables plenty of play.

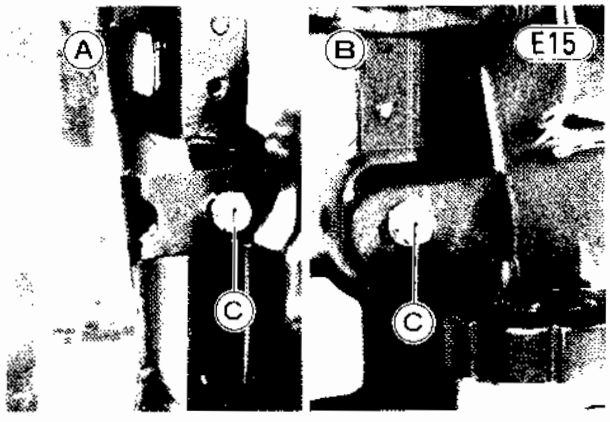
CAUTION **Removing the throttle cables from the carburetors without enough cable play, may cause throttle cable damage.**

•Loosen the throttle cable adjuster mounting nuts (2) fully, remove the decelerator throttle cable adjuster from its bracket, and slip the tip of its inner cable out of the pulley. Then do the same with the accelerator throttle cable.



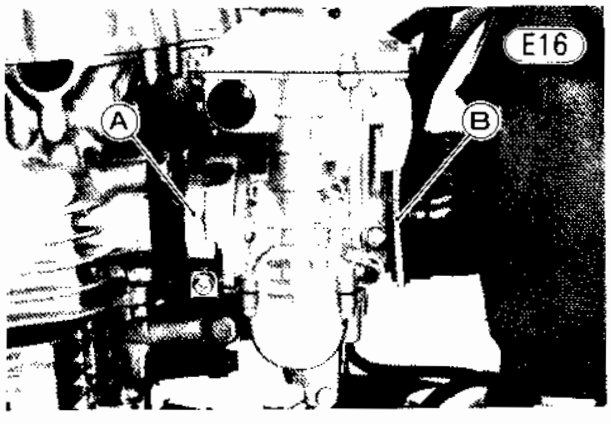
A. Accelerator Cable
B. Decelerator Cable
C. Cable Adjuster
D. Mounting Nuts

•Remove the right and left side covers.
•Loosen the air cleaner housing mounting bracket bolt on each side.



A. Left Side
B. Right Side
C. Bracket Bolt

•Loosen the carburetor holder clamp for each carburetor.

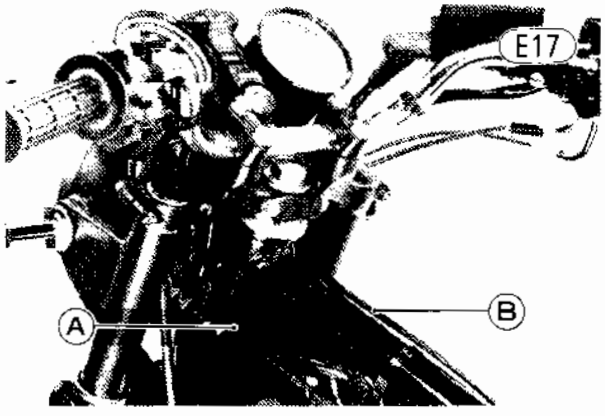


A. Holder Clamp
B. Spring Band

•Slip the spring band that connects each air cleaner duct to its carburetor out of place.
•Slip the carburetors out of place.

Installation:

NOTE: If the carburetors were disassembled, perform Initial Synchronization–Mechanical (Pg. 19).
•Slip the carburetors back into place reversing the removal procedure.
•Check that the ducts and holders are all properly fitted on the carburetors; tighten the clamps and fit the spring bands into their grooves.
•Tighten the air cleaner housing mounting bracket bolt on each side.
•Route the carburetor overflow tubes (4) to the right rear of the engine.
•Route the carburetor air vent tubes (2) between the air cleaner housing and the frame pipe.
•Run the accelerator throttle cable between the frame head pipe and left fork leg. Fit the tip of the accelerator throttle cable into the catch in the left pulley, and install its adjuster into the cable bracket.
•Run the decelerator throttle cable between the frame top tube and the right side cradle. Fit the tip of the decelerator throttle cable into the catch in the right pulley, and install its adjuster into the cable bracket. Turn the throttle grip at the same time, if necessary.
NOTE: Be sure that both throttle cables run without kinks or sharp bends, and that they do not twist around each other.

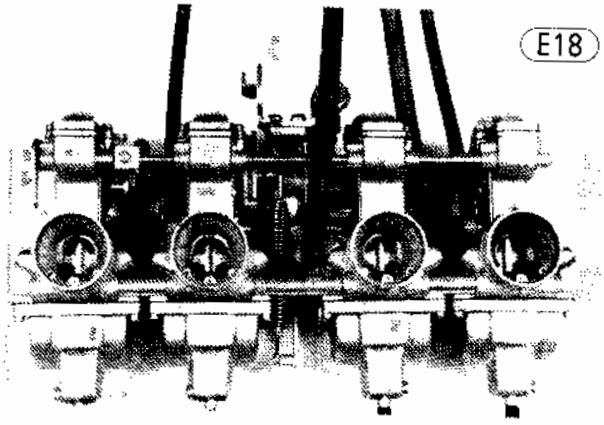


A. Accelerator Throttle Cable
B. Decelerator Throttle Cable

•Center each adjuster in place in the bracket, and tighten the locknut.
•Run the air vent tubes between the baffle plate and the frame pipes, and to the upper of the air cleaner housing.
•Run the overflow tubes through the clamp at the rear right side of the engine, and between the engine and the swing arm.
•Install the side covers.
•Install the fuel tank (Pg. 47).
•Adjust the throttle cables (Pg. 18).
•Adjust the carburetors (Pg. 19).

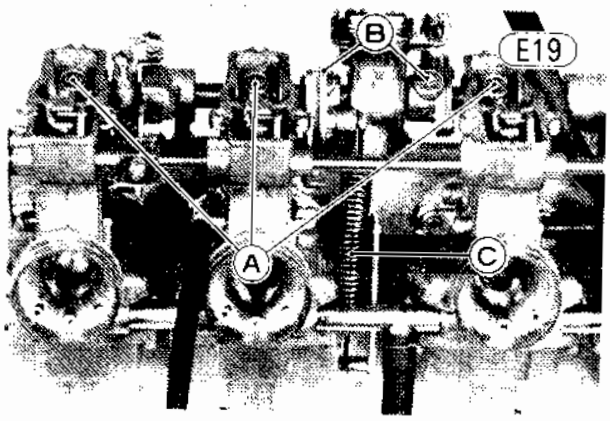
Separation of Carburetors:

NOTES: 1. The four carburetors look the same, but they are slightly different from each other. Note the following prior to removal:
- ○Position of the air screw and drain plug.
- ○Presence of the fuel hose 3-way joint, air vent hose and connecting pipe.



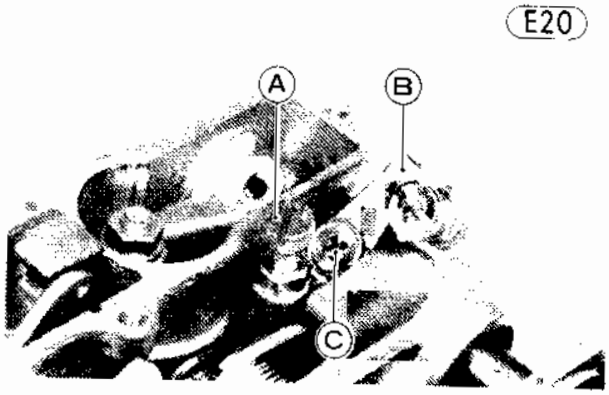
2. All carburetor parts except the linkage mechanism and fast idle mechanism can be removed without separating the carburetors from the mounting plate.

- ●Remove the idle adjusting screw 28, flat washer 29, and spring 30.
- ●Remove the rubber caps 44 from both sides of the carburetor assembly.
- ●Remove the screws 54 and lockwashers 55 (3 ea), and remove the top covers 56 (4) and gaskets 57 (4).
- ●Remove the throttle return spring 33.



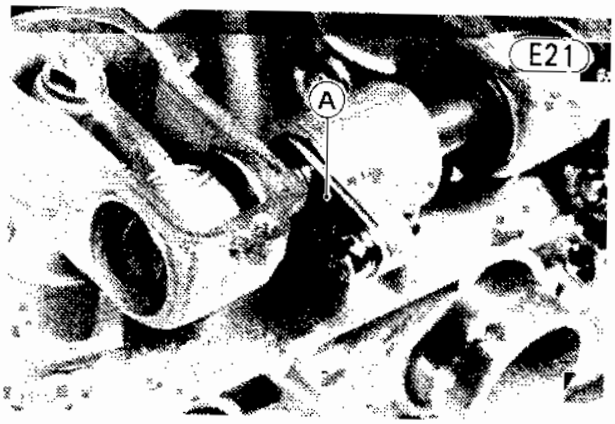
A. Throttle Arm Mounting Screws
B. Pulley Mounting Screws
C. Return Spring

- ●Remove the throttle arm mounting screws 27 (4).
- ●Remove the pulley mounting screws 8, 11 (2).
- ●Loosen the locknut 16 and remove the fast idle adjusting screw 15. Then remove the fast idle arm mounting screw 13.



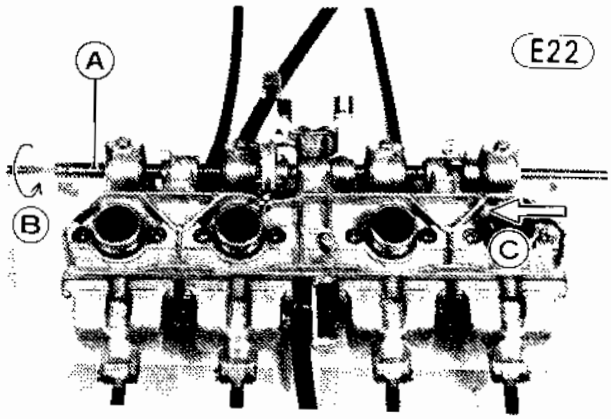
A. Fast Idle Adjusting Screw
B. Fast Idle Arm
C. Arm Mounting Screw

- ●Remove the screw 1 and lockwasher 2, and remove the throttle shaft set plate 3.



A. Set Plate

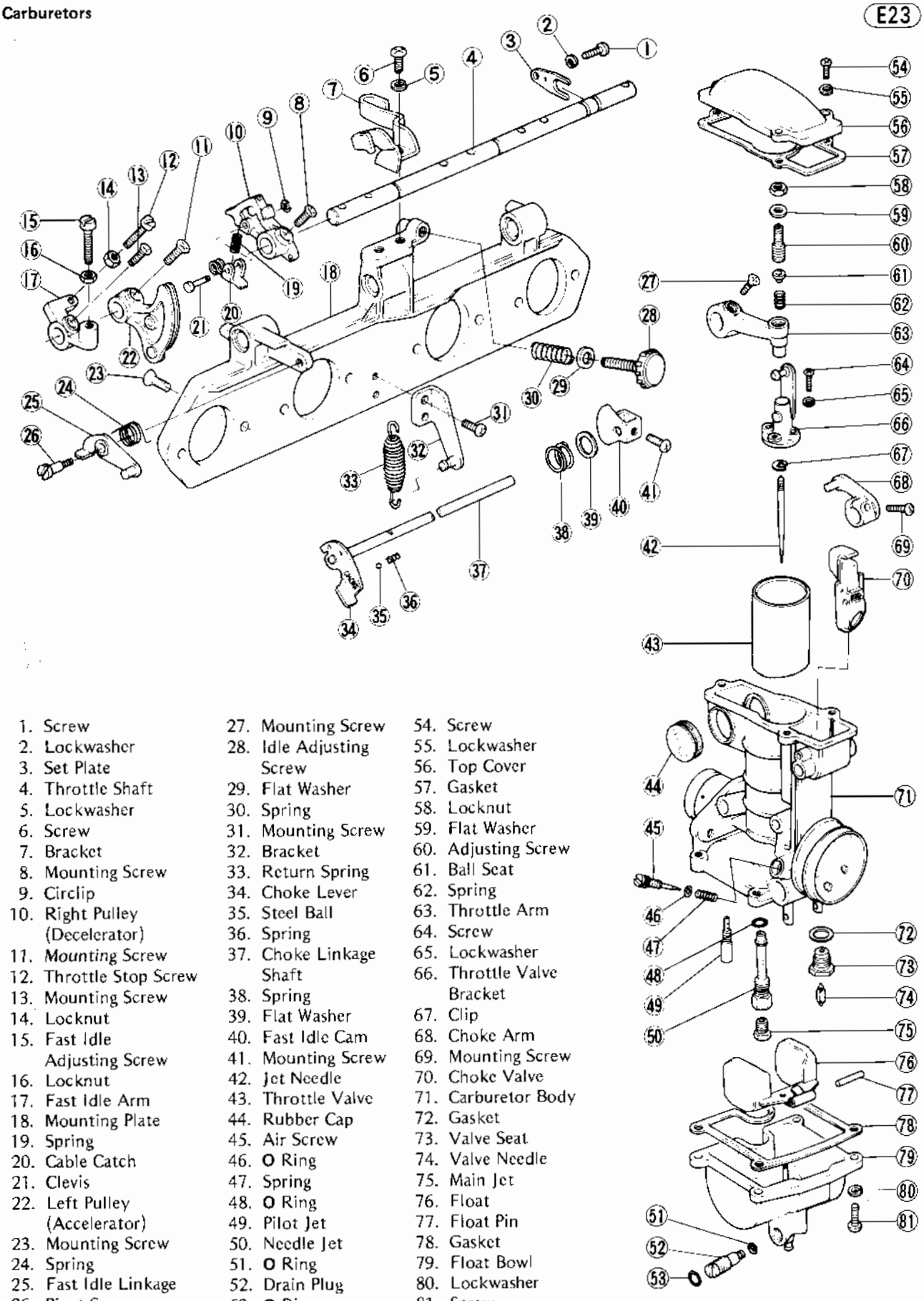
- ●Push the throttle shaft 4 out to the right by turning the shaft. The carburetor left pulley 22, right pulley 10, and fast idle arm 17 come off with the shaft.



A. Throttle Shaft **B. Turn.** **C. Push.**

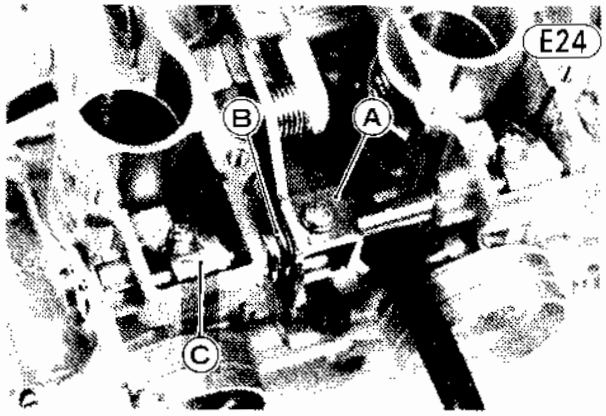
Carburetors

E23



1. Screw
2. Lockwasher
3. Set Plate
4. Throttle Shaft
5. Lockwasher
6. Screw
7. Bracket
8. Mounting Screw
9. Circlip
10. Right Pulley (Decelerator)
11. Mounting Screw
12. Throttle Stop Screw
13. Mounting Screw
14. Locknut
15. Fast Idle Adjusting Screw
16. Locknut
17. Fast Idle Arm
18. Mounting Plate
19. Spring
20. Cable Catch
21. Clevis
22. Left Pulley (Accelerator)
23. Mounting Screw
24. Spring
25. Fast Idle Linkage
26. Pivot Screw
27. Mounting Screw
28. Idle Adjusting Screw
29. Flat Washer
30. Spring
31. Mounting Screw
32. Bracket
33. Return Spring
34. Choke Lever
35. Steel Ball
36. Spring
37. Choke Linkage Shaft
38. Spring
39. Flat Washer
40. Fast Idle Cam
41. Mounting Screw
42. Jet Needle
43. Throttle Valve
44. Rubber Cap
45. Air Screw
46. O Ring
47. Spring
48. O Ring
49. Pilot Jet
50. Needle Jet
51. O Ring
52. Drain Plug
53. O Ring
54. Screw
55. Lockwasher
56. Top Cover
57. Gasket
58. Locknut
59. Flat Washer
60. Adjusting Screw
61. Ball Seat
62. Spring
63. Throttle Arm
64. Screw
65. Lockwasher
66. Throttle Valve Bracket
67. Clip
68. Choke Arm
69. Mounting Screw
70. Choke Valve
71. Carburetor Body
72. Gasket
73. Valve Seat
74. Valve Needle
75. Main Jet
76. Float
77. Float Pin
78. Gasket
79. Float Bowl
80. Lockwasher
81. Screw

- Remove the throttle valve assemblies (4).
- Remove the fast idle cam mounting screw 41 .

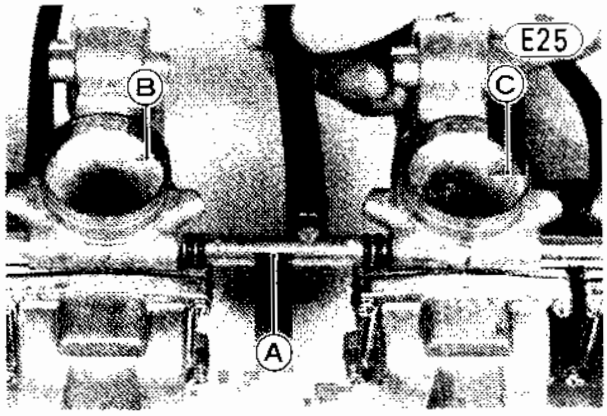


A. Fast Idle Cam B. Spring C. Choke Arm

- Remove the choke arm mounting screws 69 (4).
- Pull off the choke shaft 37 . The steel ball 35 , spring 36 , fast idle cam 40 , flat washer 39 , and spring 38 come off with the shaft.
- Remove the choke valves 70 and choke arms 68 (4 ea).
- Remove the mounting screws 23 (8) and remove the carburetors from the mounting plate 18 .

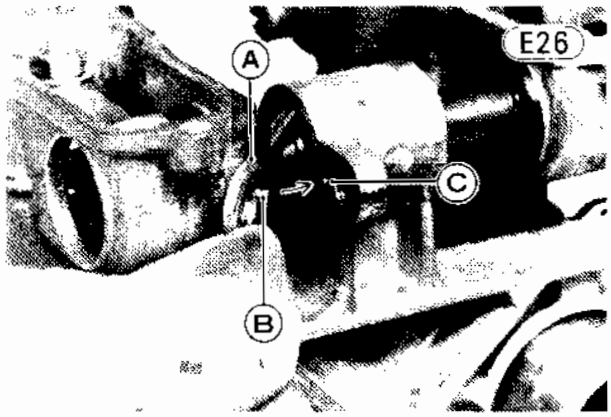
Assembly Notes:

1. Install the fuel hose 3-way joint as shown.



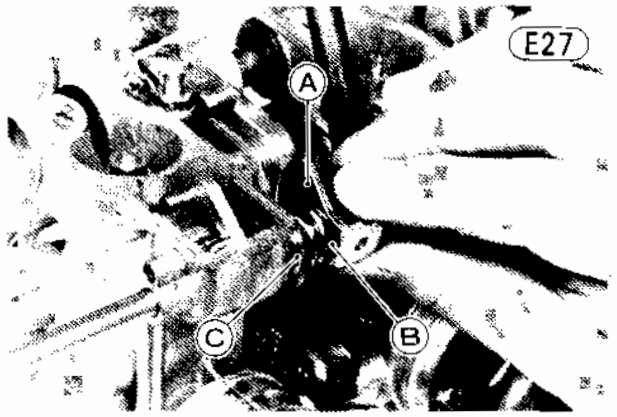
A. 3-way Joint C. #3 Carburetor
B. #2 Carburetor

2. Apply a non-permanent locking agent to the mounting screw threads.
3. Apply a thin coat of grease on the throttle shaft before inserting the shaft through the carburetors.
4. Install the throttle shaft so that the notched shaft end is on the right side of the carburetors.
5. Install the throttle shaft set plate so that the projection on the plate is fitted in the bracket hole.



A. Set Plate B. Projection C. Hole

6. Install the fast idle cam as shown. The flat washer must be installed between the cam and the spring.



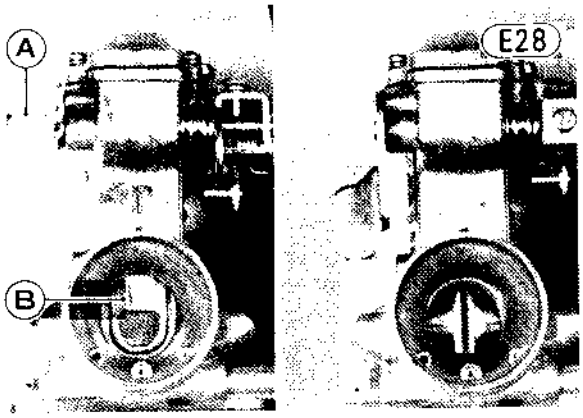
A. Fast Idle Cam B. Flat Washer C. Spring

7. Perform Initial Synchronization–Mechanical (Pg. 19), Choke Mechanism Adjustment (Pg. 53), and Fast Idle Mechanism Adjustment (Pg. 54) before installing the top covers.
8. Replace the top cover gasket with a new one, if it is damaged.

Choke Mechanism Adjustment:

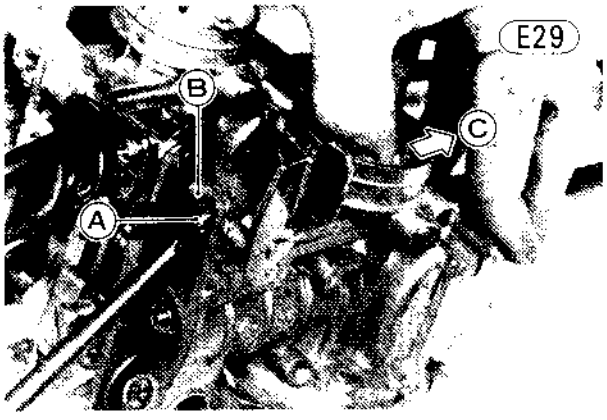
- Check to see that each choke valve opens and closes smoothly without no binding when operating the choke lever.

•Check to see that each choke valve closes the carburetor bore completely when the choke lever is pulled up, and that each choke valve opens fully when the choke lever is pushed down.



A. Choke Lever B. Choke Valve

•If the above check shows improper adjustment, remove the top covers (4).
•Loosen the choke arm mounting screws (69), and adjust each choke valve position as the above check.



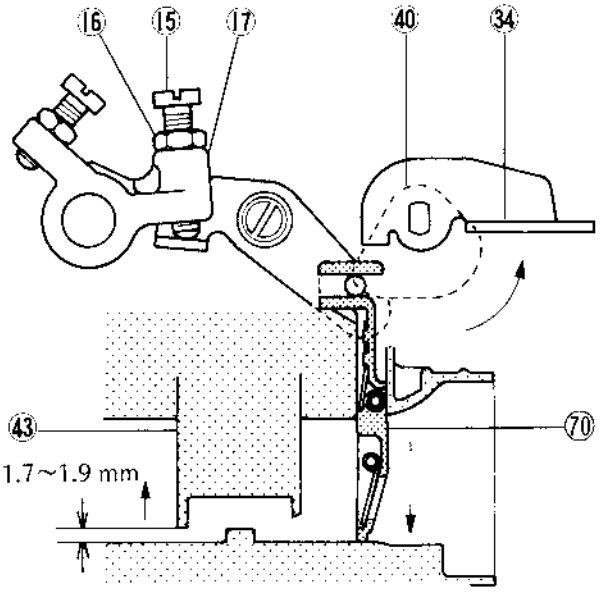
A. Mounting Screw C. Push down the choke valve.
B. Choke Arm

•Tighten all mounting screws, and re-check the valve operation.
•Install the top covers and gaskets.
NOTE: Replace the gasket with a new one, if it is damaged.

Fast Idle Mechanism Adjustment:

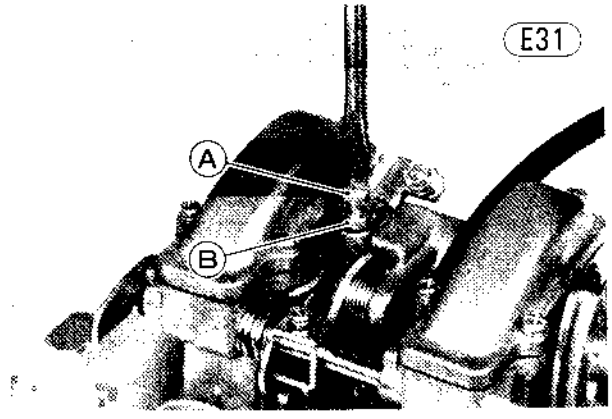
•Perform the Initial Synchronization–Mechanical (Pg. 19).
•Pull up the choke lever fully, and check that there is 1.7 ~ 1.9 mm clearance between the throttle valve and the bottom of the carburetor bore.

Fast Idle Mechanism



15. Fast Idle Adjusting Screw
16. Locknut
17. Fast Idle Arm
34. Choke Lever
40. Fast Idle Cam
43. Throttle Valve
70. Choke Valve

•If the clearance is not 1.7 ~ 1.9 mm, loosen the locknut (16) and turn the fast idle adjusting screw (15) to adjust.



A. Fast Idle Adjusting Screw B. Locknut

NOTE: This adjustment can be performed by using a piece of 1.7 ~ 1.9 mm solid wire as same method as Initial Synchronization Mechanical (Pg. 19).
•Tighten the locknut without changing the adjusting screw position.

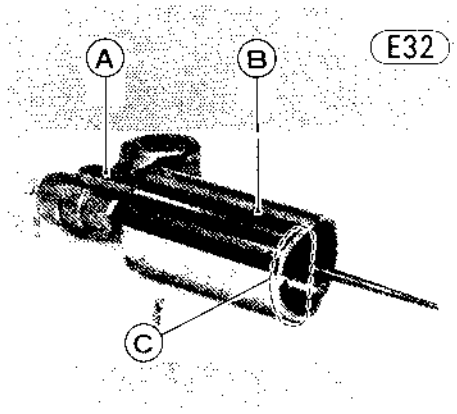
Throttle Valve, Jet Needle Removal:

NOTE: The throttle valve and jet needle can be removed without separating the carburetor from the mounting plate.

- Remove the idle adjusting screw (28), flat washer (29), and spring (30).
- Remove the screws (54) and lockwashers (55), and remove the top covers (56) and gaskets (57) (4 ea).
- Remove the throttle return spring (33).
- Remove the throttle arm mounting screws (27) (4).
- Remove the pulley mounting screws (8), (11).
- Loosen the locknut (16) and remove the fast idle adjusting screw (15). Then remove the fast idle arm mounting screw (13) (Fig. E20).
- Remove the screw (1) and lockwasher (2), and remove the throttle shaft set plate (3) (Fig. E21).
- Remove the rubber caps (44) from both sides of the carburetor assembly.
- Push the throttle shaft (4) out by turning the shaft. The carburetor left pulley (12), right pulley (10), and fast idle arm (17) come off with the shaft (Fig. E22).
- Lift up the linkage, and pull out the throttle valve (43) and jet needle (42).
- Remove the screws (64) and lockwashers (65) (2 ea), and take the throttle valve bracket (66) and jet needle (42) out of the throttle valve.

Assembly Notes:

1. Assemble the throttle valve and linkage as shown.



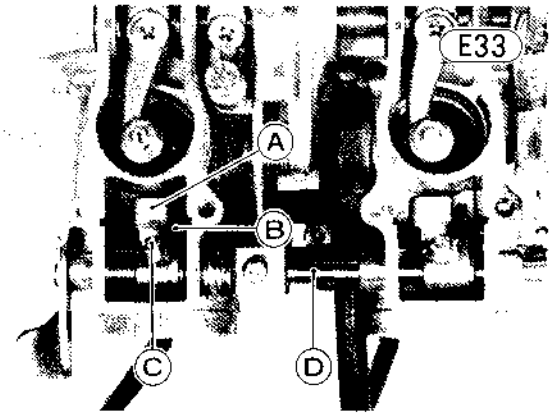
A. Linkage **B. Throttle Valve** **C. Cutaway**

2. Apply a thin coat of grease on the throttle shaft before inserting the shaft through carburetors.
3. Install the throttle shift so that the notched shaft end is on the right side of the carburetors.
4. Install the throttle shaft set plate so that the projection on the plate is fitted in the bracket hole (Fig. E26).
5. Perform Initial Synchronization–Mechanical (Pg. 19) and Fast Idle Mechanism Adjustment (Pg. 54) before installing the top covers.
6. Replace the top cover gaskets with new ones, if they are damaged.

Choke Valve Removal:

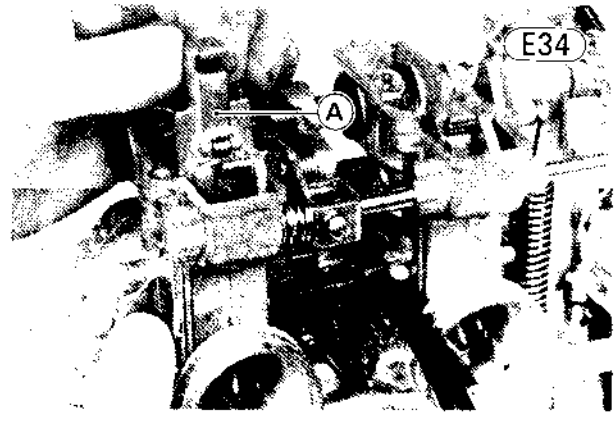
NOTE: The choke valve can be removed without separating the carburetor from the mounting plate.

- Remove the screws (54) and lockwashers (55), and remove the top covers (56) and gaskets (57) (4 ea).
- Remove the choke arm mounting screws (69).



A. Choke Valve **C. Mounting Screw**
B. Choke Arm **D. Choke Linkage Shaft**

- Pull the choke valve (70) off the carburetor.



A. Choke Valve

Assembly Note:

- Perform the Choke Mechanim Adjustment (Pg. 53) before installing the top covers.

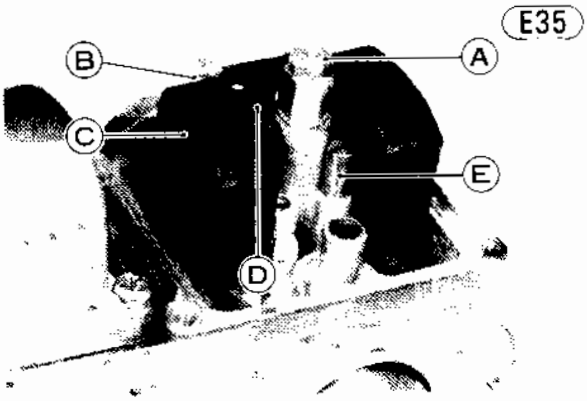
Carburetor Body Disassembly (per carburetor):

NOTE: Following procedure explains removal of the carburetor parts listed below, and these parts can be removed without separating the carburetors from the mounting plate.

Main Jet	Valve Needle
Needle Jet	Valve Seat
Pilot Jet	Pilot Air Screw
Float	

- Turn in the pilot air screw (45) and count the number of turns until it seats fully but not tightly, and then unscrew it and remove it with the O ring (46).
- Remove the spring (47).

- Remove the screws (81) and lockwashers (80) (4 ea), and take off the float bowl (79) and gasket (78).
- To remove the float valve seat (73), first push out the float pin (77), remove the float (76), and pull out the float valve needle (74).

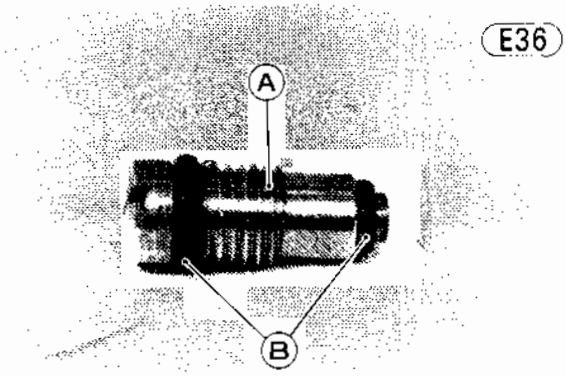


A. Main Jet
B. Float Pin
C. Float
D. Valve Needle
E. Pilot Jet

- Remove the float valve seat (73) and gasket (72).
- Remove the main jet (75) and needle jet (50) with its O ring (48).
- Remove the pilot jet (49).

Assembly Notes:

1. Replace any O rings and gaskets if damaged or deteriorated.
2. Install the plug (52) securely if it was removed.

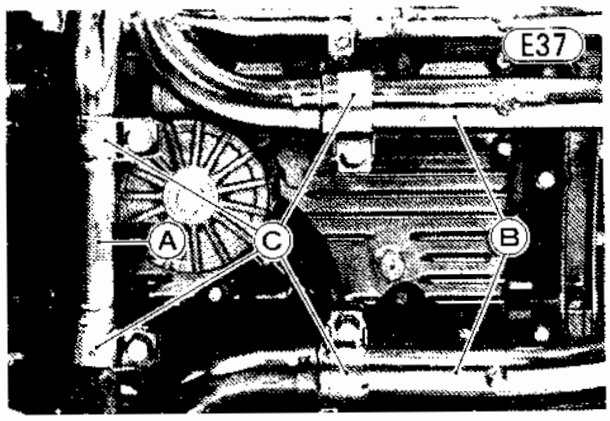


A. Drain Plug
B. "O" Rings

MUFFLERS

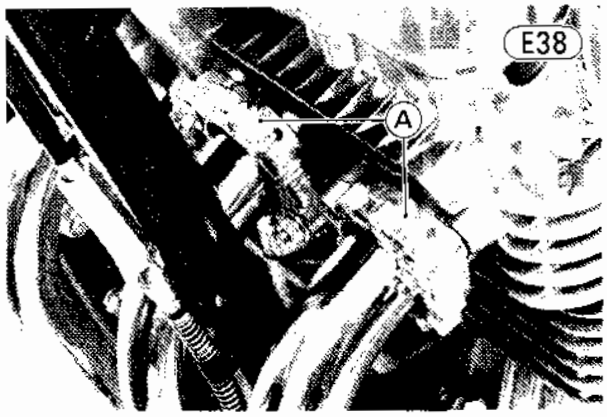
Removal (each muffler):

- Loosen both clamps securing the muffler connecting pipe to the mufflers, and loosen the clamp securing the exhaust pipe to the muffler.



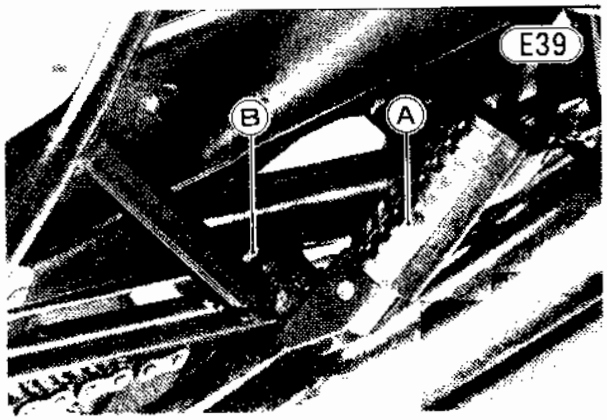
A. Connecting Pipe
B. Exhaust Pipes
C. Clamps

- Remove the inner exhaust pipe holder nuts (2), and slide the holder off its cylinder head studs.



A. Exhaust Pipe Holders

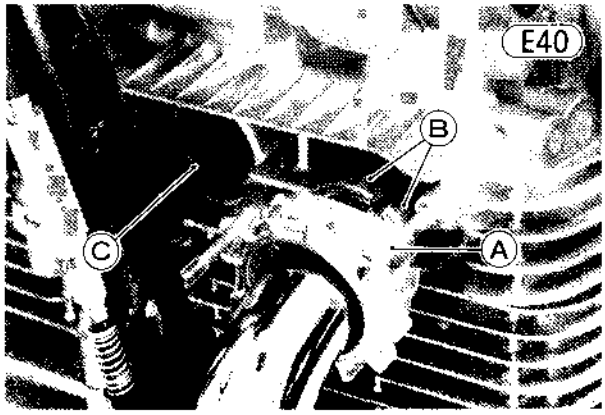
- Remove the split keeper, and pull the inner exhaust pipe off the muffler.
- Remove the outer exhaust pipe holder nuts (2), and slide the holder off its cylinder head studs.
- Remove the split keeper.
- Remove the rear footpeg mounting bolt to complete muffler removal. Also, remove the exhaust pipe holders and gaskets.



A. Rear Footpeg
B. Nut

Installation (each muffler):

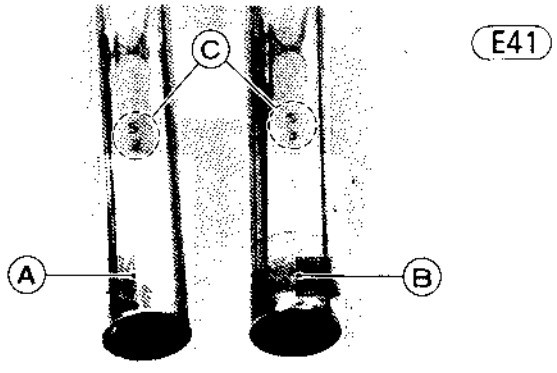
- Fit the connecting pipe and gasket to the muffler.
- Fit a gasket into the outer exhaust port, and place an exhaust pipe holder on the stud bolts.
- Fit the end of the exhaust pipe into the exhaust port, and attach the muffler to the frame with the rear footpeg mounting bolt finger tight.
- Fit the split keeper back into place, holding it in place with the exhaust pipe holder, tighten the holder nuts evenly to avoid an exhaust leak, and then tighten the rear footpeg mounting bolt.



A. Exhaust Pipe Holder
B. Split Keeper
C. Gasket

- Fit a gasket into the inner exhaust port and place an exhaust pipe holder on the stud bolts.
- Fit the inner exhaust pipe into the exhaust port and into the muffler.

NOTE: There is an identification mark on the inner exhaust pipes. Do not mix up those exhaust pipes.



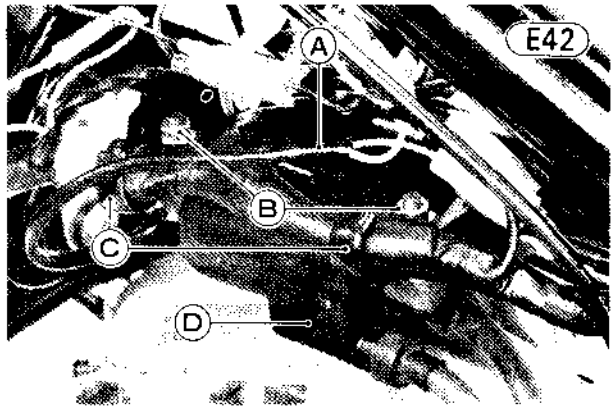
A. #2 Cylinder Exhaust Pipe
B. #3 Cylinder Exhaust Pipe
C. Marks

- Fit the split keeper back into place, tighten the exhaust pipe holder nuts evenly, and then tighten the clamp bolt.
- Tighten the clamp bolts of the muffler connecting pipe.

IGNITION COILS

Removal (each ignition coil):

- Remove the fuel tank (Pg. 47).
- Pull the spark plug lead from each spark plug.
- Disconnect the black or green lead, and yellow/red lead of the ignition coil.



A. Ignition Coil Leads
B. Nuts
C. Clamps
D. Ignition Coil

- Remove the nuts (2) to take off the ignition coil.

Installation (each ignition coil):

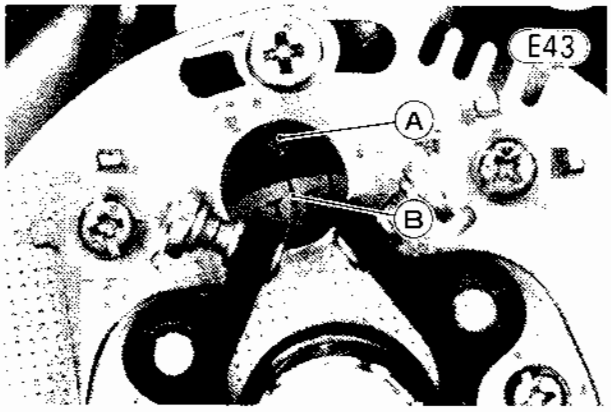
NOTE: Install the ignition coil (#1, 4) under the right bracket and the ignition coil (#2, 3) under the left bracket.

- Install the ignition coil with locknuts (2) so that the spark plug leads point to the rear. #2, 3 ignition coil locknuts have lead clamps.
- Connect the spark plug lead to each spark plug.
- Connect the ignition coil leads (green or black, yellow/red).

CAMSHAFTS

Removal:

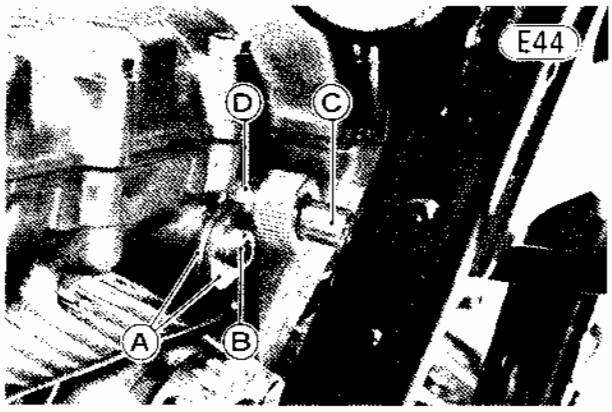
- Remove the fuel tank (Pg. 47).
- Remove the ignition coils (Pg. 57).
- Remove the carburetors (Pg. 49).
- Remove the contact breaker cover and gasket.
- Using a 17 mm wrench on the crankshaft, set the 1, 4 pistons at TDC by aligning the timing advancer "T" mark on the 1, 4 side (the line adjoining the "T") with the timing mark.



A. Timing Mark B. "T" Mark

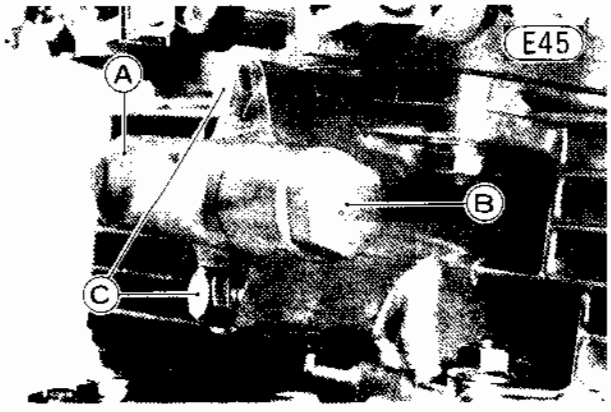
- Remove the Allen bolt, and remove the tachometer pinion holder stops. Pull the tachometer pinion holder and pinion with the tachometer cable off the cylinder head.

CAUTION **Attempting to install the camshafts with the tachometer pinion left in the cylinder head may cause tachometer gear damage.**



A. Holder Stops C. Tachometer Cable
B. Allen Bolt D. Pinion Holder

- Remove the cylinder head cover bolts (24), and slip the cover off the cylinder head.
- Remove the cylinder head cover gasket.
- Remove the chain tensioner cap and gasket, and remove the tensioner bolts (2) and tensioner.



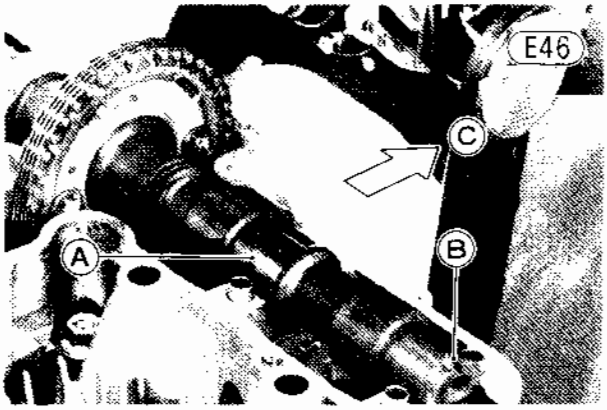
A. Chain Tensioner C. Bolts
B. Tensioner Cap

- Remove the camshaft cap bolts (16), and take off the camshaft caps (8).
- Remove the camshafts. Use a screwdriver or wire to keep the chain from falling down into the cylinder block.

CAUTION **Always pull the camshaft chain taut while turning the crankshaft with the camshaft chain loose. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.**

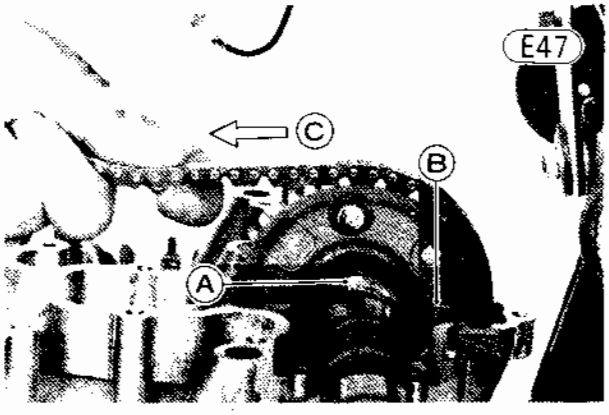
Installation:

- Check that the tachometer pinion is removed from the cylinder head, and all camshaft cap knock pins (16) are fitted.
- Check crankshaft position to see that the 1, 4 pistons are still at TDC, and readjust if necessary. Remember to pull the camshaft chain taut before rotating the crankshaft.
- Apply clean engine oil to all cam parts.
- Feed the exhaust camshaft (tachometer gear is affixed) through the chain and remove the screwdriver. The notched camshaft end must be on the right side of the engine.



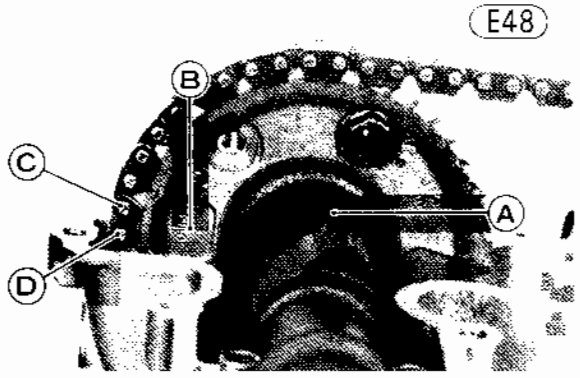
A. Exhaust Camshaft B. Notch C. Front

- Turn the exhaust camshaft so that the line adjoining the EX mark on the sprocket is pointing to the front aligned with the cylinder head surface.
- Pull the chain taut and fit it onto the exhaust camshaft sprocket.



A. Exhaust Camshaft B. Line C. Pull

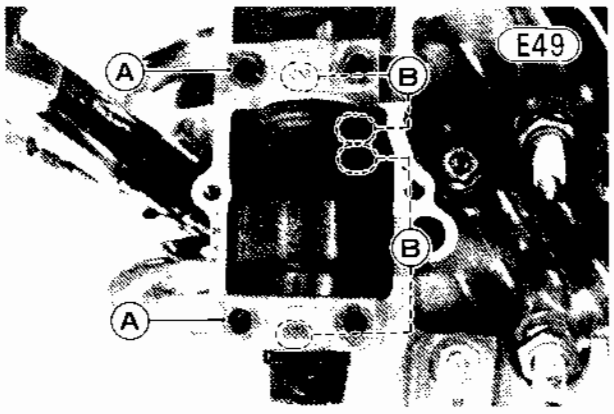
•Feed the inlet camshaft through the chain, and align the line adjoining the Z/5 IN mark on the sprocket with the cylinder head surface and pointing to the rear. Find the pin on the link pointed at by the exhaust camshaft sprocket line adjoining the EX mark, starting with this pin as first (1), count to the 43th pin. Check to see that the inlet camshaft sprocket line adjoining the Z/5 IN mark points between that 43th and 44th pins. If not, the camshafts are installed incorrectly.



A. Inlet Camshaft
B. Line
C. 43rd Pin
D. 44th Pin

•Check that the camshaft chain seats in the groove of the front and rear chain guides.

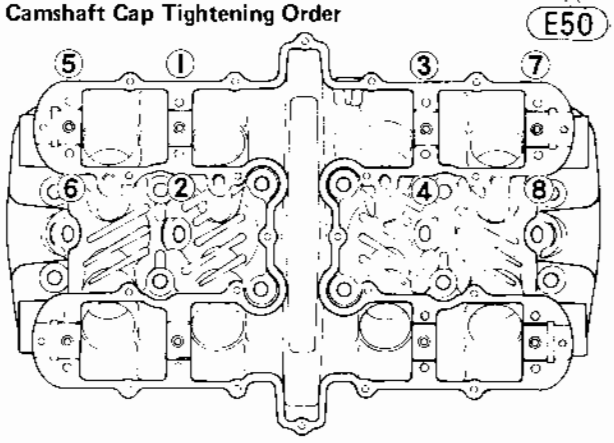
•The camshaft caps are machined together with the cylinder head, so match the number on the camshaft caps with the number on the cylinder head. The arrow on the cap points forward (toward the exhaust).



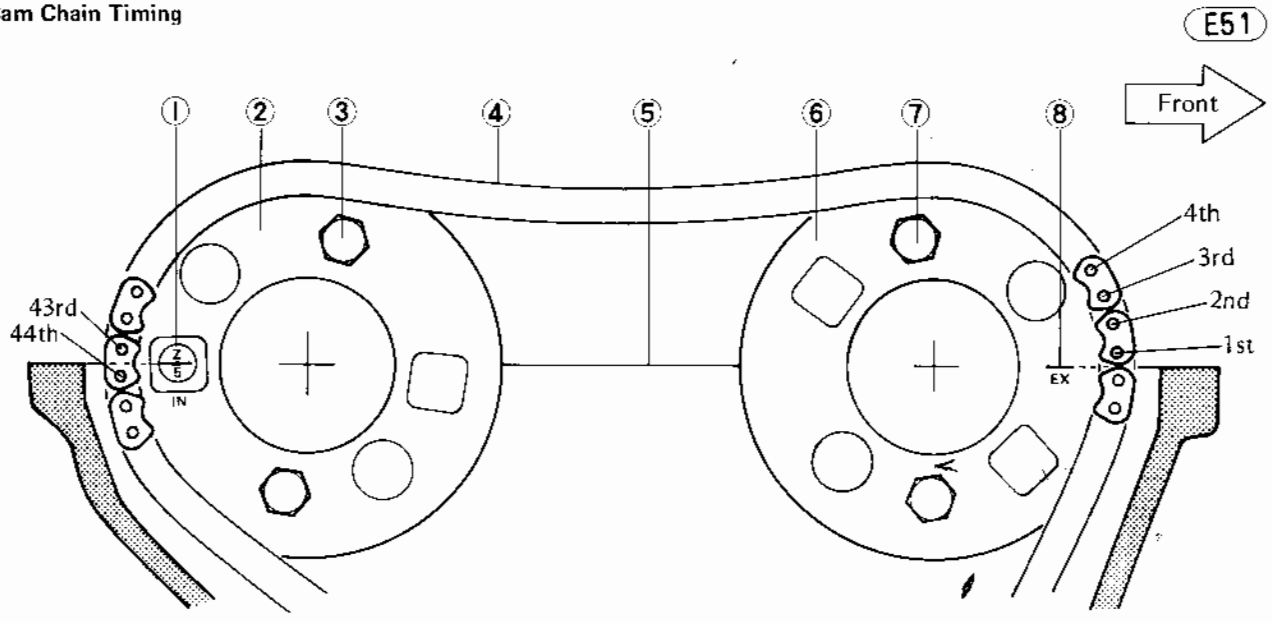
A. Camshaft Cap
B. Match the number.

•Partially tighten the left inside camshaft cap bolts first, to seat the camshaft in place. Fully tighten all the bolts to 1.2 kg-m (104 in-lbs) of torque, following the tightening sequence shown in the figure.

Camshaft Cap Tightening Order



Cam Chain Timing



1. "IN, Z/5" Mark
2. Inlet Camshaft Sprocket
3. Sprocket Mounting Bolt
4. Camshaft Chain
5. Cylinder Head Upper Surface
6. Exhaust Camshaft
7. Sprocket Mounting Bolt
8. "EX" Mark

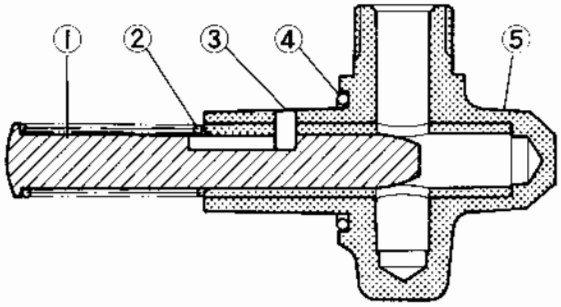
- Remove the O ring and clean the other tensioner parts using a high flash-point solvent, and then apply a molybdenum disulfide engine assembly grease to the sliding surfaces of them.

CAUTION **The dirt or grime on the sliding surfaces of the tensioner parts could cause the tensioner malfunction.**

- Install the push rod spring on the push rod and insert the push rod into the tensioner body. Compressing the spring, align the groove in the side of the rod with the hole in the side of the tensioner body. Put the pin in the hole.

CAUTION **Installation of the tensioner without the pin can cause the push rod to fall into the cylinder.**

Push Rod Installation (E52)

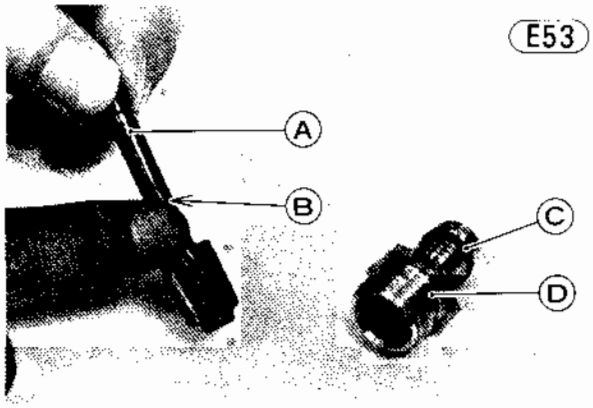


1. Push Rod
2. Spring
3. Pin
4. O Ring
5. Tensioner Body

- Install the tensioner body with its O ring, and tighten the bolts (2) evenly. The tensioner cap must be on the right side of the engine.
- Before rotating the crankshaft, check that, with the crankshaft positioned so #1 and #4 pistons are at TDC, the timing marks on the exhaust and inlet camshaft sprockets are aligned with the cylinder head surface.

CAUTION **Rotation of the crankshaft with improper camshaft timing could cause the valves to contact each other or the piston, and bend.**

- Turn the crankshaft over clockwise until pistons #1 and #4 are at TDC, and re-check the camshaft timing. If the three timing mark pairs are aligned (Fig. E51), the cam timing is correct.

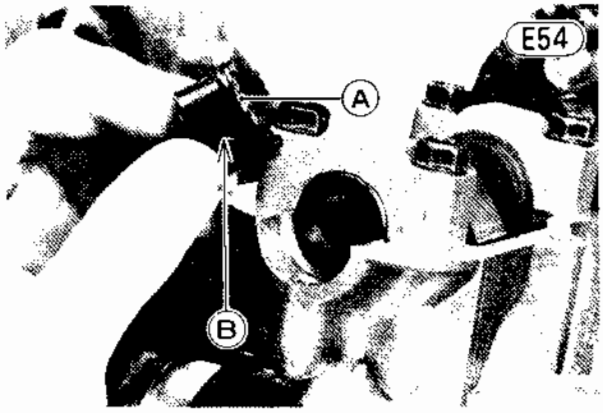


A. Pinion Shaft **C. "O" Ring**
B. Grease **D. Pinion Holder**

CAUTION
1. **If any resistance is felt when turning over the crankshaft, stop immediately, and check the camshaft chain timing. Valves may be bent, if the timing was not properly set.**
2. **Do not try to turn the crankshaft and camshafts with a wrench on the camshaft sprocket. Use a 17 mm wrench on the end of the crankshaft.**

NOTE: If a new camshaft, cylinder head, valve or valve lifter wear installed, check valve clearance at this time (Pg. 15), and adjust if necessary.

- Apply a small amount of molybdenum disulfide engine assembly grease to the tachometer pinion shaft, insert the pinion and pinion holder into the cylinder head (Fig. E53).
- Install the pinion holder stops, and tighten the holder stop Allen bolt.
- Apply a liquid gasket to the circumference of each cylinder head rubber plug, and fit them in place.

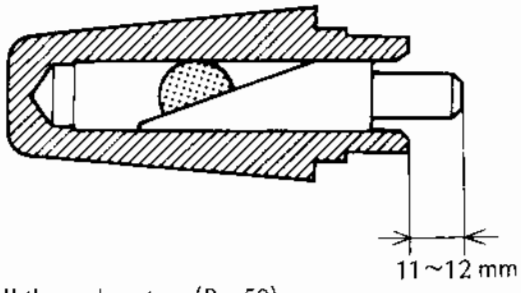


A. Rubber Plug **B. Apply a liquid gasket.**

- Install the cylinder head cover with a new cylinder head cover gasket. The arrow on the cover must point toward the front. Tighten the cover bolts (24) to 1.0 kg-m (87 in-lbs) of torque.
- Install the chain tensioner push rod stop so that the tapered surfaces of the push rod and stop face each other. When the push rod stop has been properly installed, the push rod stop end stickes out 11~12 mm.

NOTE: If the push rod stop stickes out over the correct amount, it shows the camshaft chain slack has not yet been taken up fully. In this case, turn the crankshaft over slowly in the normal direction pushing in the stop end lightly.

Push Rod Stop Installation (E55)



- Install the carburetors (Pg. 50).
- Install the ignition coils (Pg. 57).
- Install the fuel tank (Pg. 47).
- Install the contact breaker cover and gasket.

CAMSHAFT SPROCKETS

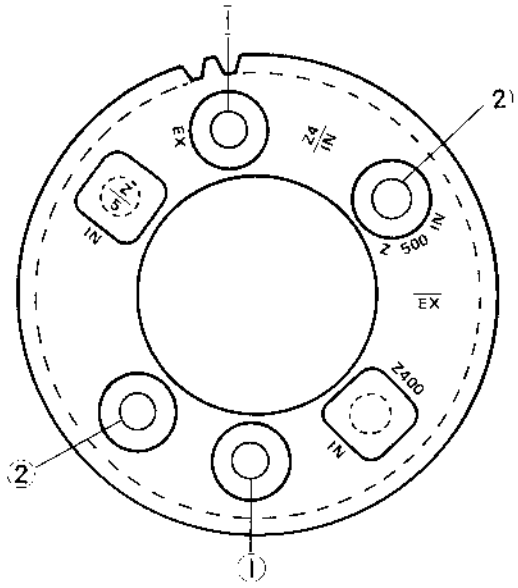
Removal (on each camshaft):

- Remove the camshaft (Pg. 57).
- Remove the camshaft sprocket bolts (2), and slide the sprocket off the camshaft.

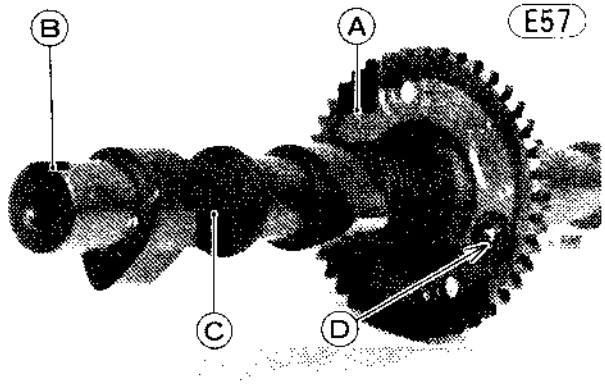
Installation:

- Set the sprocket on the camshaft, aligning the bolt holes. Use the two of four sprocket bolt holes for installation as shown. The marked side of the camshaft sprocket must face the notch on the shaft end.

Camshaft Sprocket Installation E56



1. Bolt Hole for Exhaust Camshaft
2. Bolt Hole for Inlet Camshaft



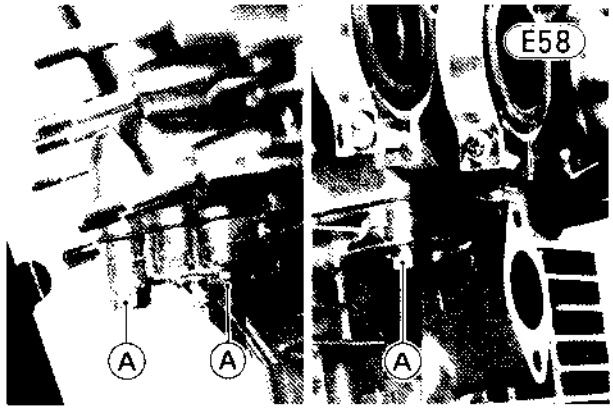
A. Sprocket B. Notch C. Camshaft
D. Apply a non-permanent locking agent.

- Apply a non-permanent locking agent to the sprocket bolts (2) and install the bolts, tightening them to 1.5 kg-m (11.0 ft-lbs) of torque.
- Install the camshafts (Pg. 58).

CYLINDER HEAD

Removal:

- Remove the mufflers (Pg. 56).
- Remove the carburetors (Pg. 49).
- Remove the camshafts (Pg. 57).
- Remove the cylinder head bolts (5) from the bottom of the cylinder head, and nuts (12) from the upper cylinder head.



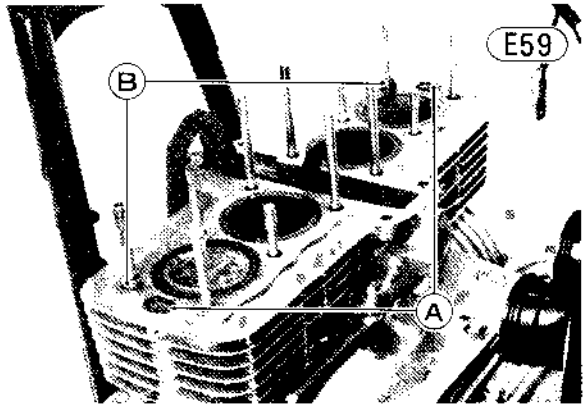
A. Cylinder Head Bolt

- Pull off the cylinder head, and remove the cylinder head gasket and O rings.

Installation:

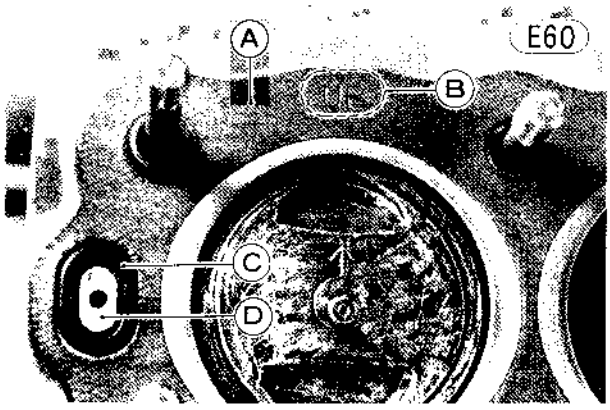
NOTE: The camshaft caps are machined together with the cylinder head, so, if a new cylinder head is installed, use the caps that are supplied with the new head.

- Using compressed air, blow out any particles which may obstruct the oil passages.
- Check that the orifices (2) are in place.
- Install new O rings.
- Be sure that the knock pins (2) are in place.



A. "O" Rings B. Knock Pins

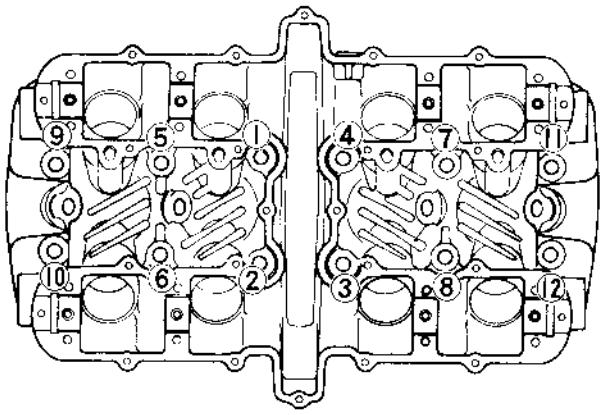
- Install the gasket, so that the up mark on the gasket faces out.



A. Gasket
B. "UP" Mark
C. "O" Ring
D. Orifice

- Install the cylinder head.
- Tighten the cylinder head nuts (12) first to about 1.5 kg-m (11.0 ft-lbs) and finally to 2.3 kg-m (16.5 ft-lbs) of torque, following the tightening sequence shown in Fig. E61. Each nut has a flat washer.

Cylinder Head Nut Tightening Order E61



- Tighten the cylinder head bolts (5) to 1.2 kg-m (104 in-lbs) of torque.
- Lift up the camshaft chain, and use a screwdriver to keep the chain from falling down into the cylinder block.
- Install the camshafts (Pg. 58).

NOTE: If a new camshaft, cylinder head, valve, or valve lifter was installed, check valve clearance (Pg. 15), and adjust if necessary.

- Install the carburetors (Pg. 50).
- Install the mufflers (Pg. 57).
- Adjust the throttle cable play (Pg. 18).
- Check the idling and adjust the carburetors if necessary (Pg. 21).
- Throughly warm up the engine, wait until the engine grows cold, and retighten the cylinder head nuts (12) to 2.3 kg-m (16.5 ft-lbs) of torque (Fig. E61).

WARNING **To avoid serious burn, never touch the engine or exhaust pipes while they are hot.**

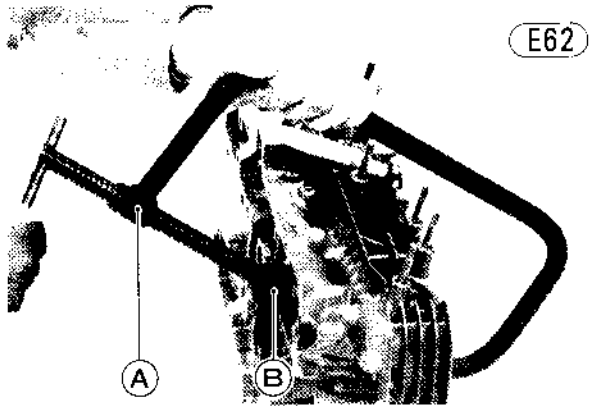
VALVES, VALVE GUIDES

Removal (each valve and valve guide):

- Remove the cylinder head (Pg. 61).
- Pull out the valve lifters (8) and shims (8) with a suitable tool, marking them as to location.

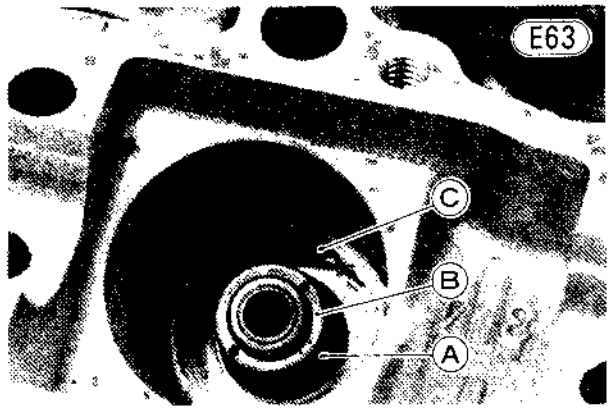
NOTE: If more than one valve is to be removed, mark them as to location so they can be reinstalled in the proper place.

- Using the valve spring compressor assembly and adapter (special tools) to press down the valve spring retainer (4), remove the split keeper (3).



A. Valve Spring Compressor Assembly (57001-241)
B. Adapter (57001-1078)

- Remove the tool, and then remove the spring retainer, outer spring (6), and inner spring (5).
- Push out the valve (12) or (13).
- Remove the oil seal (7) and spring band (8).

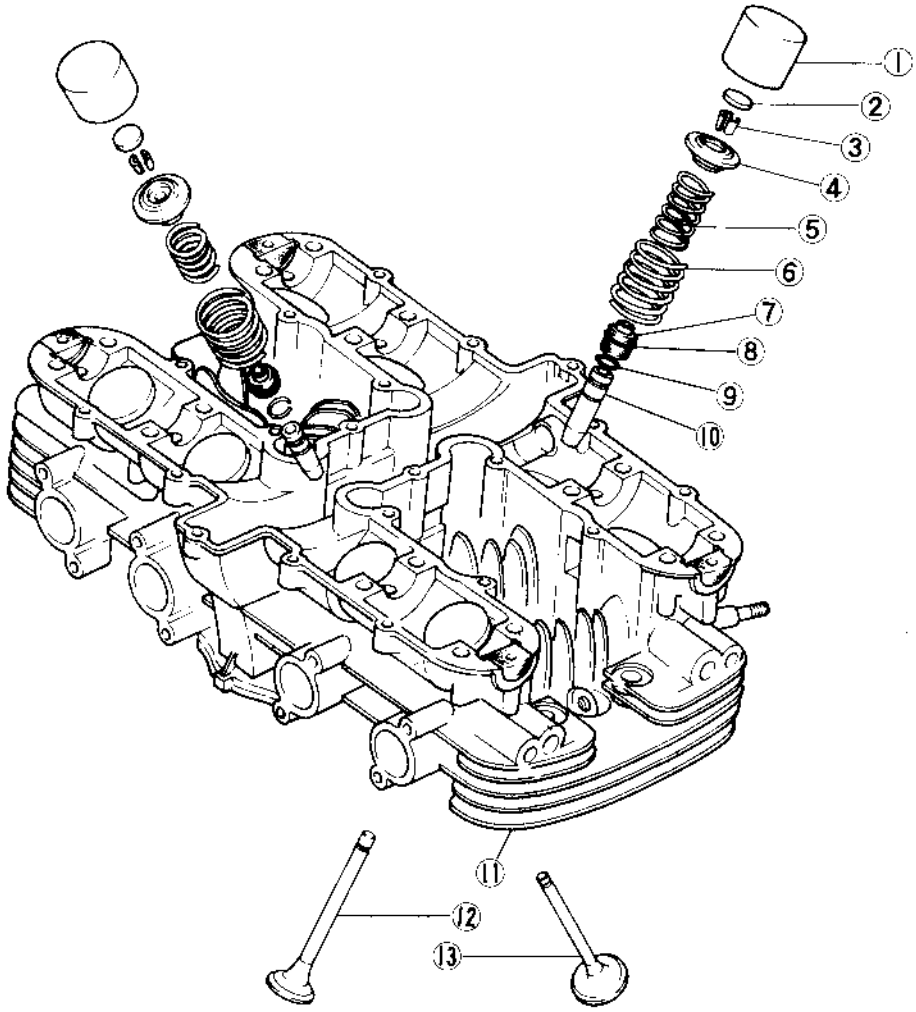


A. Spring Band
B. Oil Seal
C. Spring Seat

- Remove the spring seat.
- Heat the area around the guide (10) to about 120~150°C (248~302°F), and hammer lightly on the valve guide arbor (special tool) to remove the guide from the top of the head.

Valve and Valve Guide

E64



1. Valve Lifter
2. Shim
3. Split Keeper
4. Spring Retainer
5. Inner Spring
6. Outer Spring
7. Oil Seal
8. Spring Band
9. Circlip
10. Valve Guide
11. Cylinder Head
12. Exhaust Valve
13. Inlet Valve

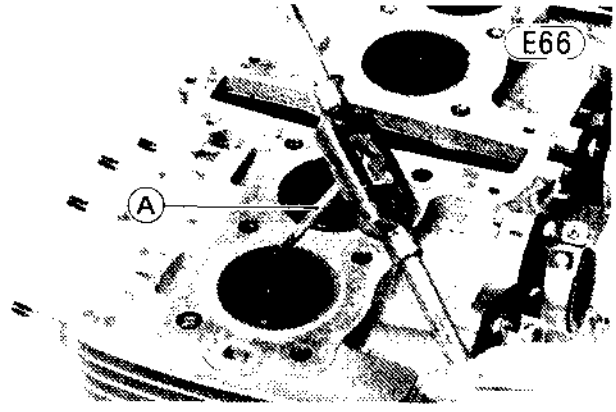


A. Valve Guide Arbor (57001-1021)

Installation (each valve and valve guide):

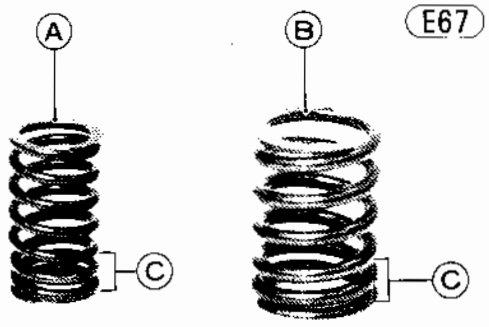
NOTE: If a new valve or valve guide are installed, check the valve/valve guide clearance (Pg. 167).

- Apply oil to the valve guide, and snap the circlip ⑨ into the groove on the valve guide.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F), and drive the valve guide in from the top of the head using the valve guide arbor (special tool). The circlip stops the guide from going in too far.
- Ream the valve guide with the valve guide reamer (special tool) even if the old guide is re-used.



A. Valve Guide Reamer (57001-1079)

- Lap the valve to check that it is seating properly. If it is uneven, refer to the Maintenance Section (Pg. 168).
- Push a new oil seal into place.
- Apply a thin coat of a molybdenum disulfide engine assembly grease to the valve stem, insert the valve, and install the outer and inner springs with the concentrated portion of each spring down as shown.



A. Inner Spring
B. Outer Spring
C. Concentrated Portion

- Install the spring retainer, press it down with the valve spring compressor assembly, and put on the split keeper.
- After making sure that the split keeper, spring retainer, and valve stem are all properly fitted, remove the valve spring compressor assembly.
- Mount the shims and valve lifters in their original locations.
- Install the cylinder head (Pg. 61).
- Check valve clearance (Pg. 15), and adjust if necessary.

CYLINDER BLOCK

Removal:

- Remove the cylinder head, gasket, and O rings (Pg. 61).
- Remove the cylinder block nuts (3).
- With a large screwdriver, pry at the gap in each side of the cylinder base to free the cylinder block from the crankcase, and lift off the cylinder.

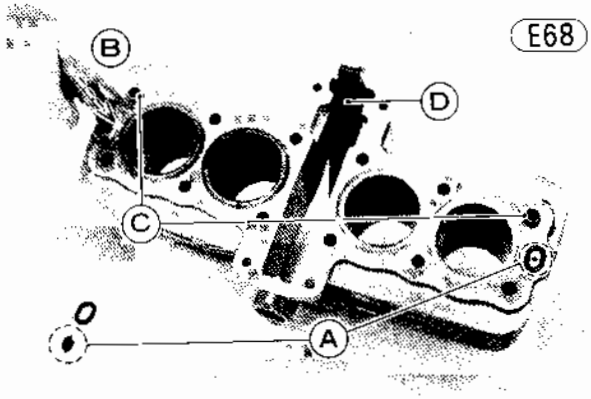
CAUTION **Do not hammer on the screwdriver while it is in the pry point as engine damage could result (Fig. E69).**

- Wrap a clean cloth around the base of each piston so that no parts or dirt will fall into the crankcase.

Installation:

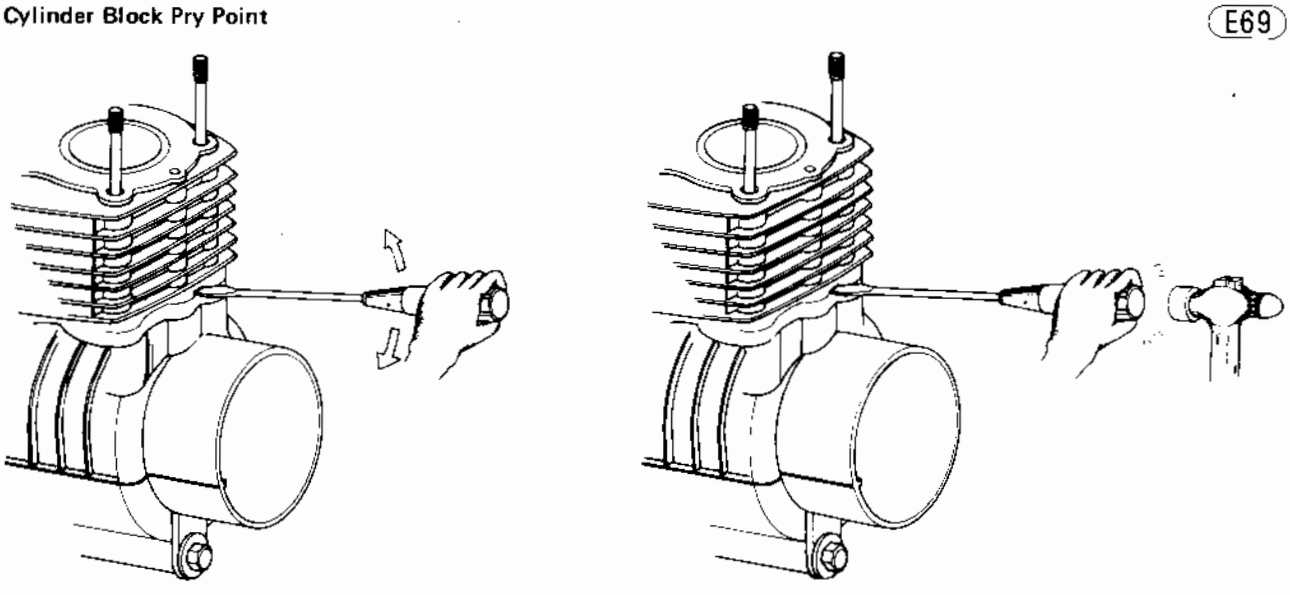
NOTE: If the cylinder block is replaced with a new one, piston to cylinder clearance must be checked against the specified value (Pg. 173).

- With compressed air, blow out the oil passages and O ring guides to remove dirt or particles which may obstruct oil flow.



A. "O" Ring Guides
B. Compressed Air
C. Knock Pins
D. Front Chain Guide

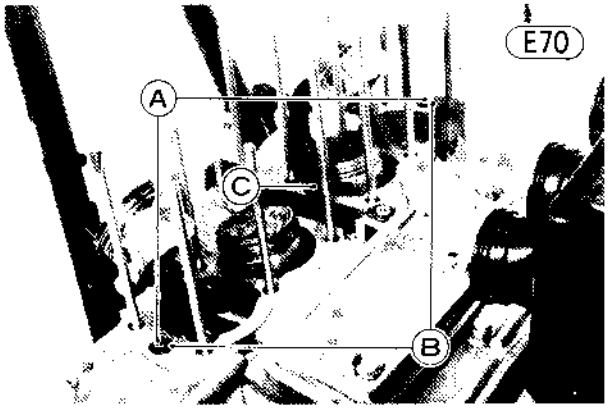
Cylinder Block Pry Point



Good

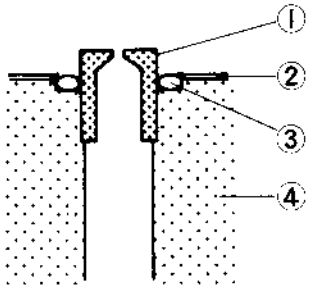
Bad

•Remove the cloth from under each piston.
•Check to see that the oil passage orifices (2) are in place, and that the small hole in each orifice faces up. Install the new orifice O rings (2).



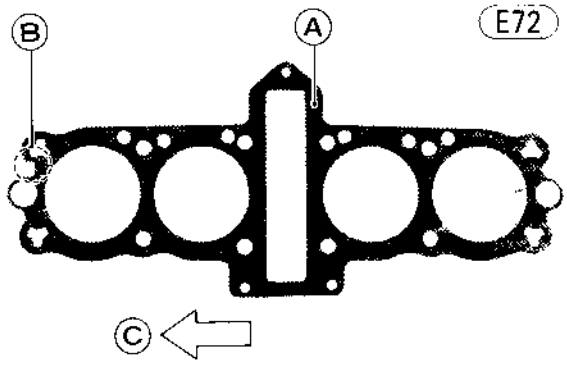
A. Orifices
B. "O" Rings
C. Rear Chain Guide

Orifice Installation E71



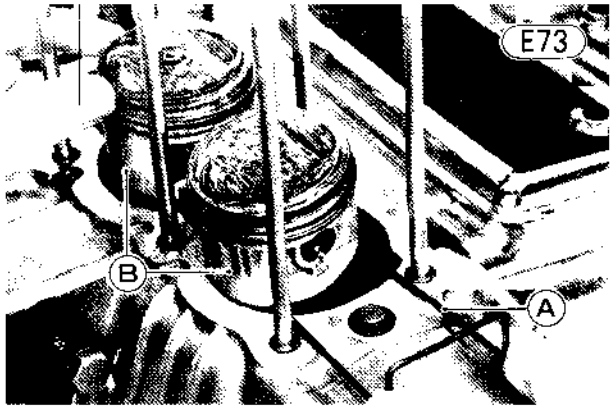
1. Orifice
2. Gasket
3. O Ring
4. Cylinder Block

•Check that the front and rear chain guides are in place.
•Install a new cylinder base gasket so that the notch of the gasket comes to the left side.



A. Gasket
B. Notch
C. Left

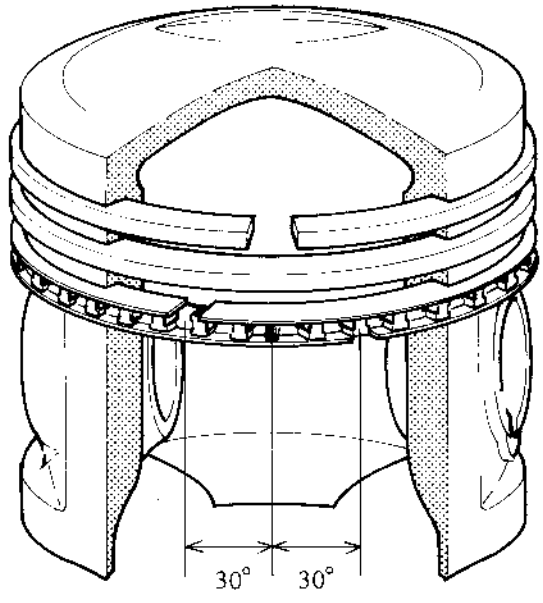
•Pull the chain taut to avoid kinking the chain, and using a 17 mm wrench on the crankshaft, turn the crankshaft so that all the pistons are at about the same height.
•Slip the piston bases (special tool) under the pistons to hold them level.



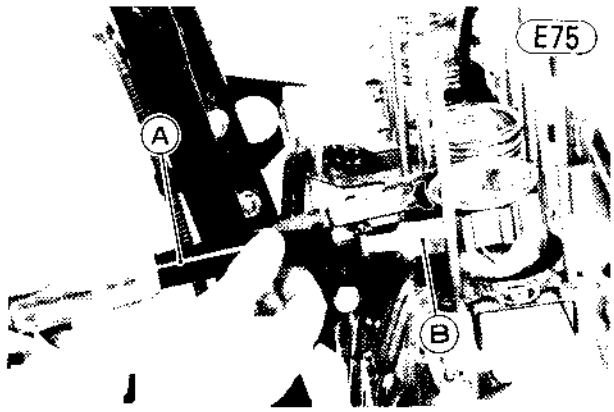
A. Piston Base (57001-149)
B. Pistons

•Position each piston ring so that the opening in the top and oil ring of each piston is facing forwards, and the second ring opening faces the rear. The openings of the oil ring steel rails must be slipped to both directions about 30° from the opening of the expander. (This last step is unnecessary if the motorcycle is provided with a one-piece oil ring.)

Piston Ring Openings (Front Side View) E74



•Apply engine oil to the piston rings and the inside cylinder surfaces.
•Compress the piston rings using a piston ring compressor grip and adapter (special tools) on each piston.



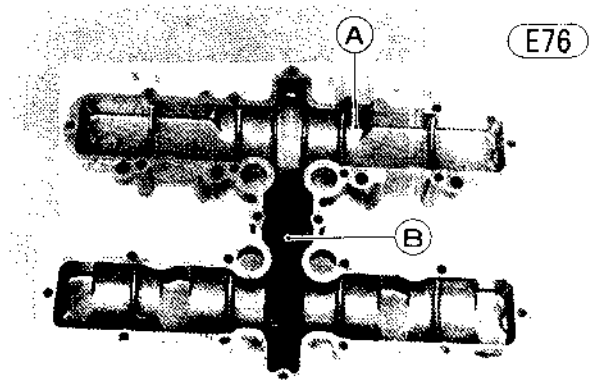
A. Piston Ring Compressor Grip (57001-1095)
B. Piston Ring Compressor Adapter (57001-1096)

- Check to see that the front chain guide is properly fitted in the cylinder.
- Fit the cylinder block on the crankcase studs, inserting the rear chain guide into the cylinder block, and rest the bottom of the cylinders on the piston ring compressors.
- Pull the camshaft chain up through the cylinders and insert a screwdriver through it to prevent the chain from falling into the crankcase.
- Work the bottom of each cylinder past the rings, and set the cylinder block in place while removing the special tools. If the cylinder block does not seat on the crankcase, lift it up slightly, pull out the camshaft chain, and press the cylinder block down.
- Tighten the cylinder nuts (3) to 1.2 kg-m (104 in-lbs) of torque.
- Install the cylinder head (Pg. 61).

CAMSHAFT CHAIN GUIDES (Upper, Front, Rear)

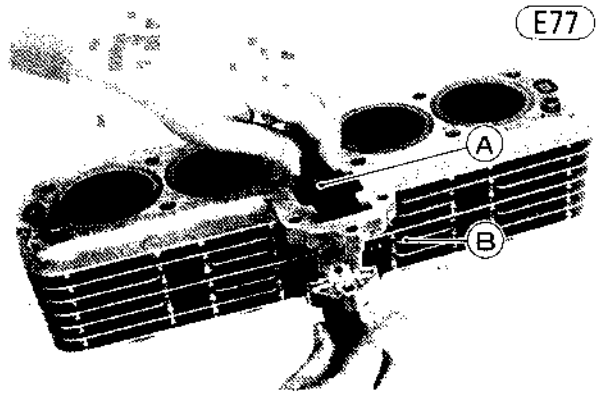
Removal:

- Remove the cylinder block (Pg. 64).
- Remove the upper camshaft chain guide from the cylinder head cover.



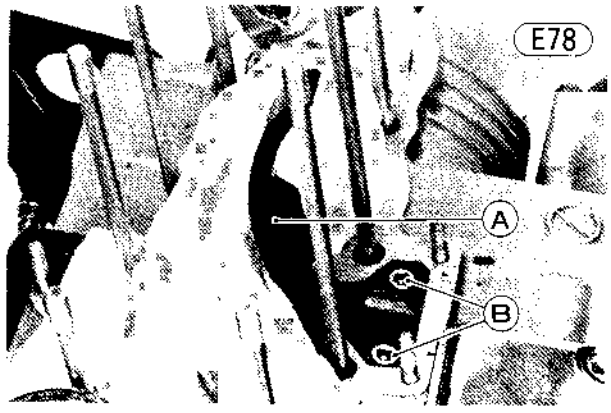
A. Cylinder Head Cover **B. Upper Chain Guide**

- Pushing the front camshaft chain guide up, remove the guide from the cylinder block.



A. Front Chain Guide **B. Cylinder Block**

- Remove the rear camshaft chain guide Allen bolts (2), and take the guide off the crankcase.

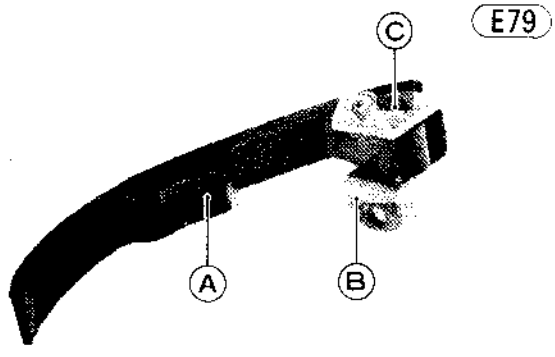


A. Rear Chain Guide **B. Allen Bolts**

- Pull the pivot pin to separate the guide from the bracket.

Installation Notes:

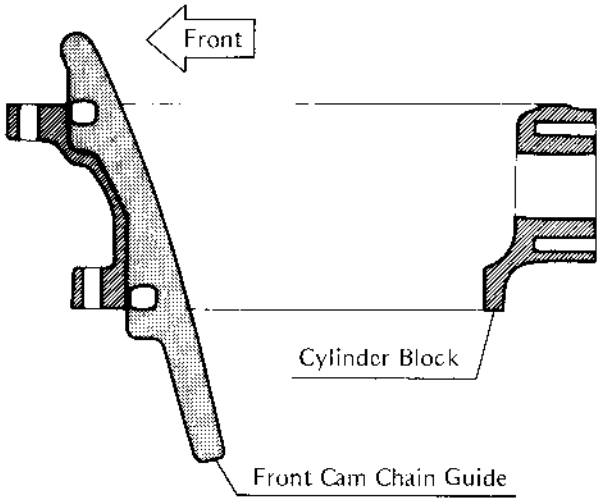
1. Install the rear chain guide to the bracket with the pin as shown.



A. Rear Chain Guide **B. Bracket** **C. Pin**

2. Apply a non-permanent locking agent to the rear chain guide Allen bolts (2), and tighten them.
3. Install the front chain guide in the cylinder block as shown.

Front Camshaft Chain Guide Installation E80



PISTONS, PISTON RINGS

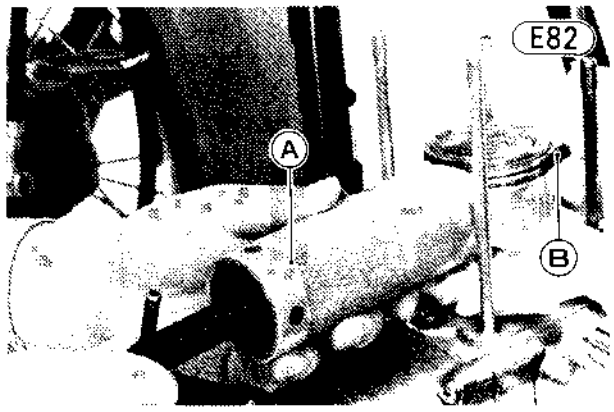
Removal:

- Remove the cylinder block (Pg. 64).
- Wrap a clean cloth around the base of each piston so that no parts and dirt will fall into the crankcase.
- Remove the piston pin snap rings from the outside of each piston.



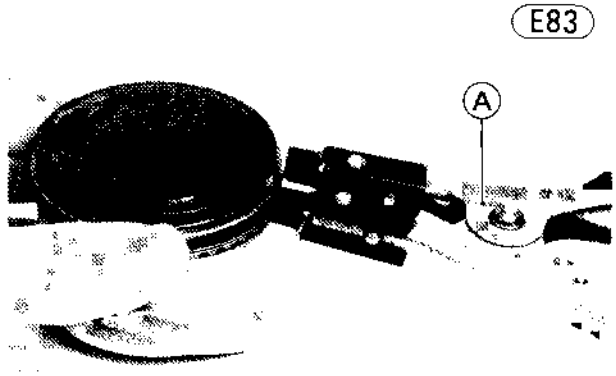
A. Piston B. Snap Ring

- Remove each piston by pushing its piston pin out the side that the snap ring was removed. Use the piston pin puller and adapter "A" (special tools) if necessary.

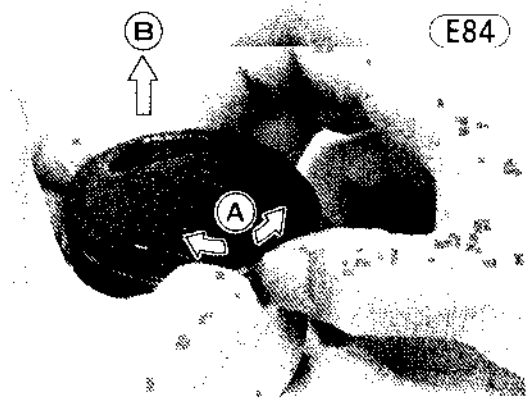


A. Piston Pin Puller (57001-910)
B. Adapter "A" (57001-912)

- Remove the top and second rings with the piston ring pliers (special tool). To remove a ring by hand, spread the ring opening with both thumbs, and then push up on the opposite side.



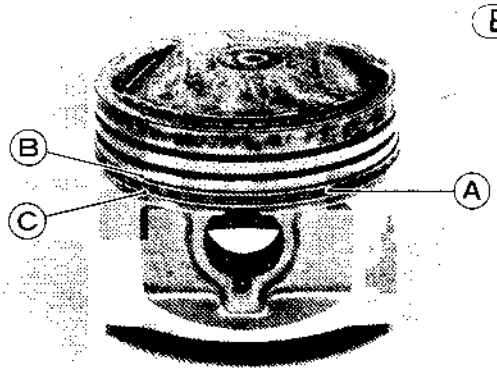
A. Piston Ring Pliers (57001-115)



A. Spread. B. Push up.

- Remove the upper and lower oil ring steel rails, and then remove the oil ring expander.

E85



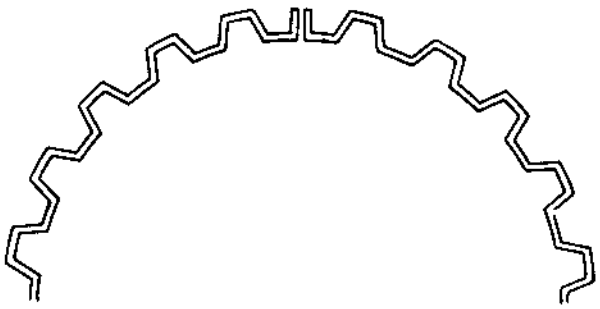
A. Oil Ring Expander
B. Upper Steel Rail
C. Lower Steel Rail

Installation:

- To install the oil ring, first install the expander so that the expander ends butt together, and then install the upper and lower steel rails. The two steel rails are identical. There is no "up" or "down" to the rails; they can be installed either way.

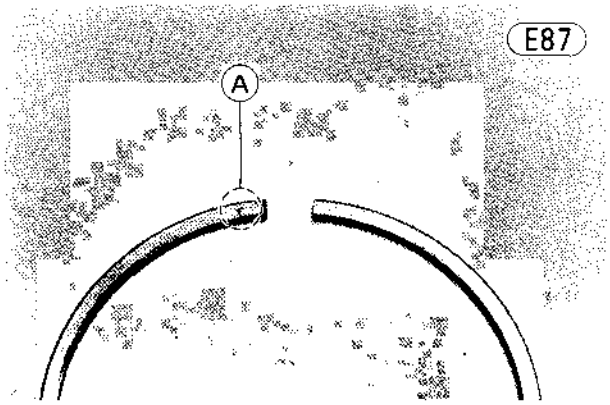
Oil Ring Expander Installation

E86



- Install the top and second rings so that the correct side (marked "T") faces up. The cross section of the second ring is larger than the top ring cross section.

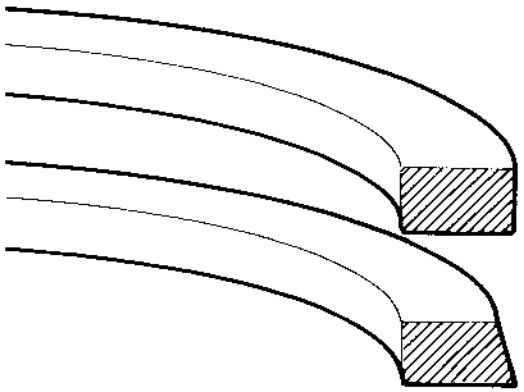
E87



A. "T" Mark

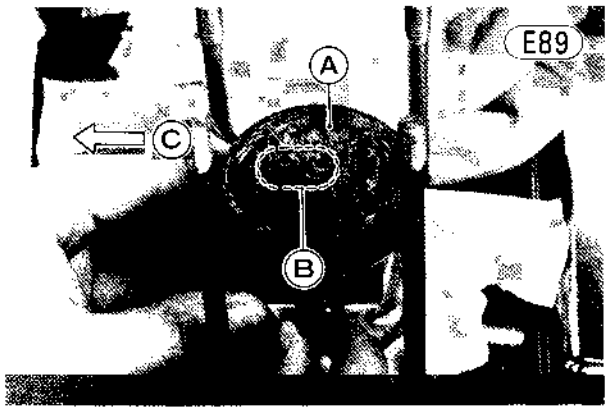
Top Ring, Second Ring

E88



- Turn the rings so that the opening in the top ring and oil ring of each piston faces forward and the opening in the second ring faces the rear. The openings of the oil ring steel rails must be slipped to both directions about 30° from the opening of the expander (Fig. E74).
- Apply a little engine oil to the piston pins, and install the pistons and piston pins. The arrow on the top of each piston must point towards the front.

E89



A. Piston
B. Arrow Mark
C. Front

- Fit a new piston pin snap ring into the side of each piston, taking care to compress it only enough to install it and no more. Check that the other snap ring is in place.

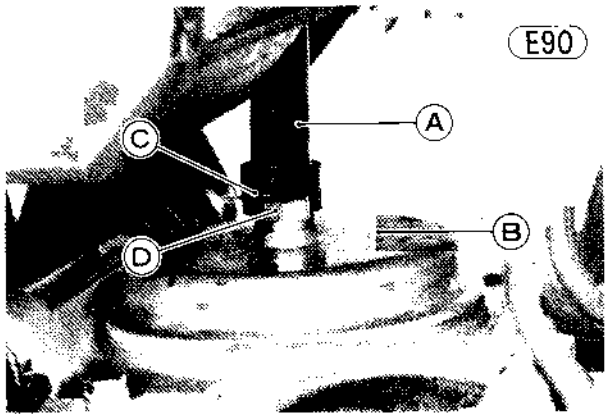
CAUTION **Do not reuse snap rings, as removal weakens and deforms the snap ring. It could fall out and score the cylinder wall.**

- Install the cylinder block (Pg. 64).

BREATHER COVER

Removal:

- Slide the clip out of place, and remove the breather hose from the breather cover.

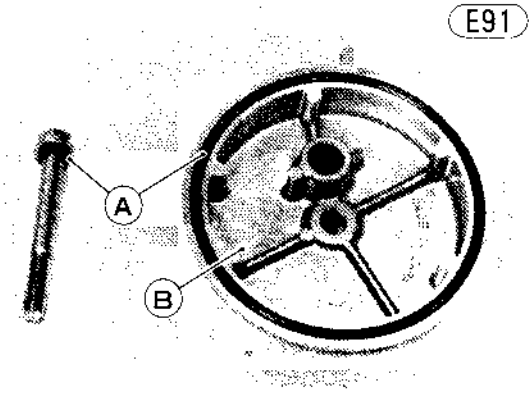


A. Breather Hose
B. Breather Cover
C. Clamp
D. Bolt

•Remove the breather cover bolt and cover.

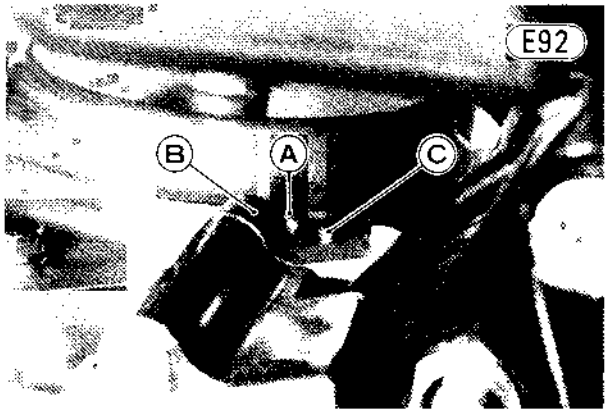
Installation Notes:

1. Replace the breather cover O ring and cover bolt O ring with new ones if deteriorated or damaged.



A. "O" Rings
B. Breather Cover

2. The projection of the breather cover must be installed between the positioning pin and mount on the crankcase.



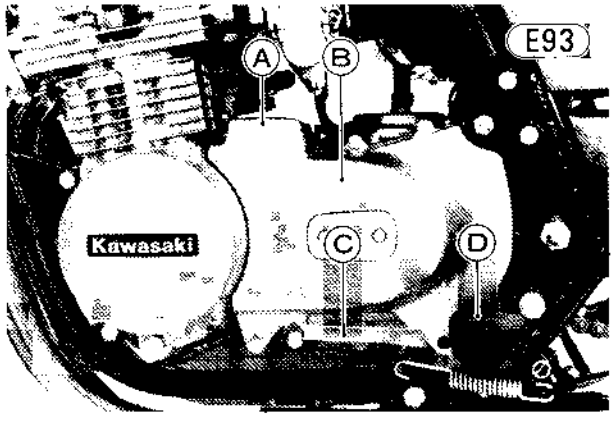
A. Breather Cover Projection
B. Mount
C. Pin

3. Tightening torque for the breather cover bolt is 0.60 kg-m (52 in-lbs).

ENGINE SPROCKET COVER

Removal:

•Remove the left footpeg bolt and left footpeg.

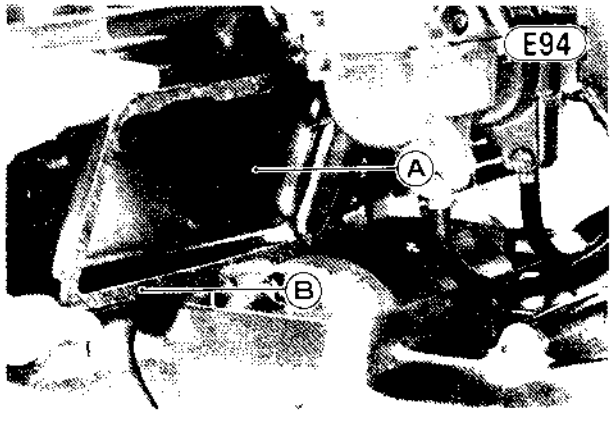


A. Starter Motor Cover
B. Engine Sprocket Cover
C. Shift Pedal
D. Left Footpeg

•Take out the shift pedal bolt, and remove the shift pedal.
•Remove the starter motor cover bolts (2) and cover.
•Remove the engine sprocket cover bolts (4), and pull the cover free from the crankcase.

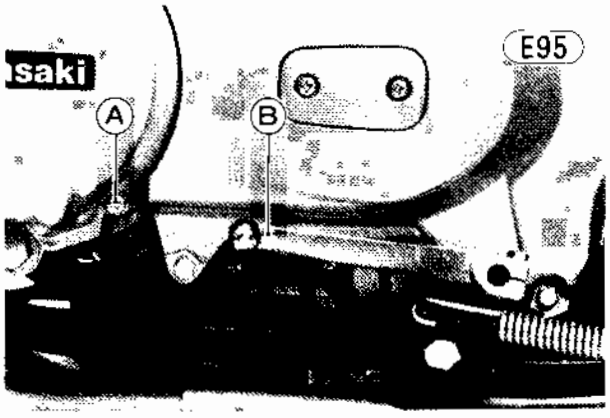
Installation:

•Check that the knock pins (2) are in place, install the engine sprocket cover.
•Check that the starter motor cover gasket is in place, and install the cover with the bolts (2) and flat washers (2).



A. Starter Motor Cover
B. Gasket

•Mount the shift pedal so that its end matches the level of the alternator cover lower right bolt.



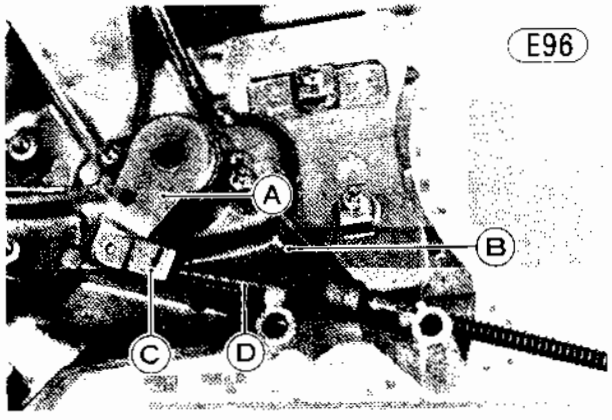
A. Lower Right Bolt **B. Shift Pedal**

•Mount the left footpeg with its bolt and lockwasher.
•Adjust the clutch (Pg. 22).

CLUTCH RELEASE

Removal:

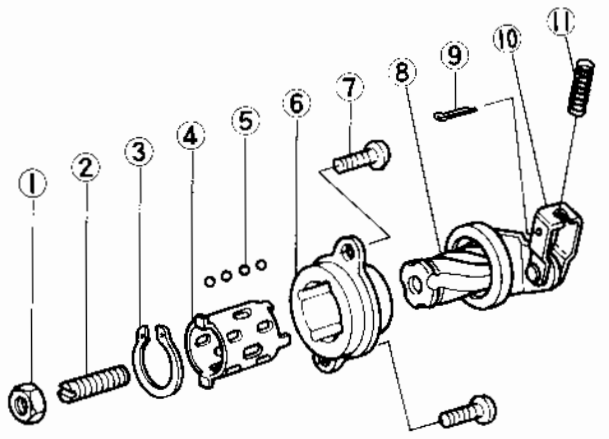
•Remove the engine sprocket cover (Pg. 69).
•Remove the cotter pin from the clutch release lever, and free the clutch inner cable tip from the lever and engine sprocket cover.



A. Clutch Release Lever **C. Cotter Pin**
B. Engine Sprocket Cover **D. Spring**

•Remove the clutch release assembly mounting screws (2), and remove the release assembly.
•Take out the circlip, and separate the outer release gear and the inner release gear.

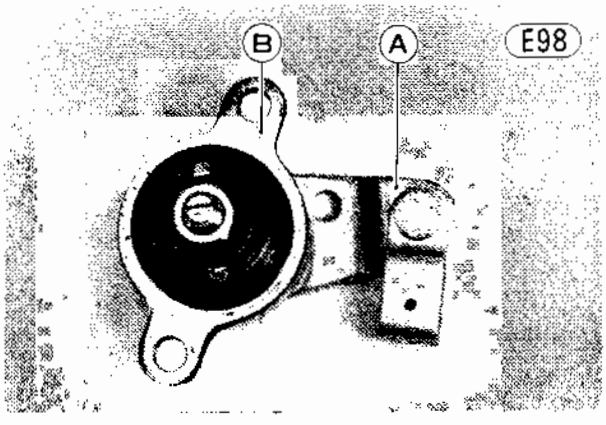
Clutch Release



1. Locknut
2. Adjusting Screw
3. Circlip
4. Ball Retainer
5. Steel Ball
6. Outer Release Gear
7. Screw
8. Inner Release Gear
9. Cotter Pin
10. Release Lever
11. Spring

Installation:

•Wash and clean the release balls (11) and inner release gear with a high flash-point solvent. Dry and then lubricate them with grease.
•Fit the inner gear back into the outer release gear. When the two gears are fully meshed, the clutch release lever and the outer release gear must be positioned as shown in Fig. E98. The machined side of the outer release gear must face upward.



A. Release Lever **B. Outer Release Gear**

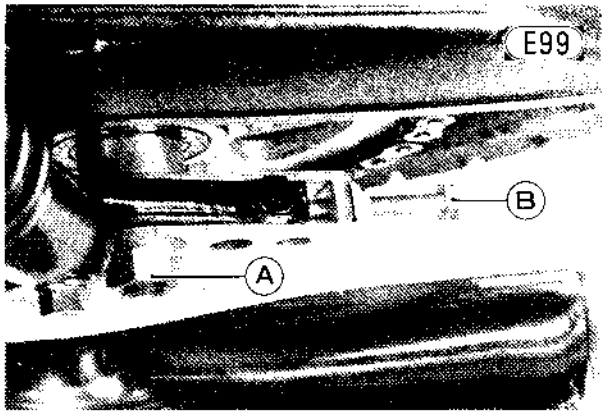
•Install the circlip on the inner release gear.
•Fit the clutch release lever assembly back into the engine sprocket cover, apply a non-permanent locking agent to the screws, and tighten the screws. The clutch release lever must be positioned as shown in Fig. E96, when the gears are fully meshed.
•Run the clutch cable into the engine sprocket cover and spring, and fit the tip of the inner cable into the clutch release lever.
•Using a new cotter pin, secure the cable tip to the release lever.

- Install the engine sprocket cover (Pg. 69).
- Adjust the clutch (Pg. 22).

ENGINE SPROCKET

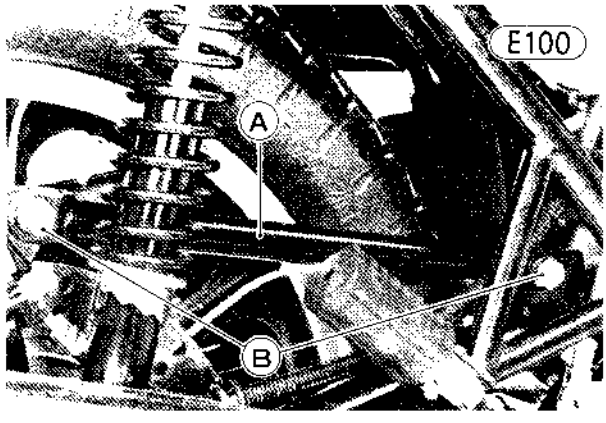
Removal:

- Stand the motorcycle up on its center stand.
- Check that the transmission is in neutral.
- Remove the engine sprocket cover (Pg. 69).
- Remove the cotter pin, and loosen the rear axle nut.



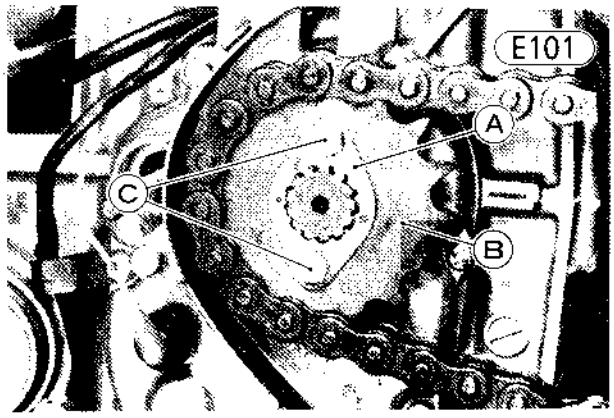
A. Axle Nut B. Chain Adjusting Bolt

- Loosen the nuts at the torque link.



A. Torque Link B. Nuts

- Loosen the left and right chain adjusting bolt locknuts, and then back out the chain adjusting bolts. Kick the wheel forward to give the chain plenty of play.
- Remove the engine sprocket holding plate bolts (2), and remove the plate and engine sprocket.



A. Engine Sprocket Holding Plate C. Bolts
B. Engine Sprocket

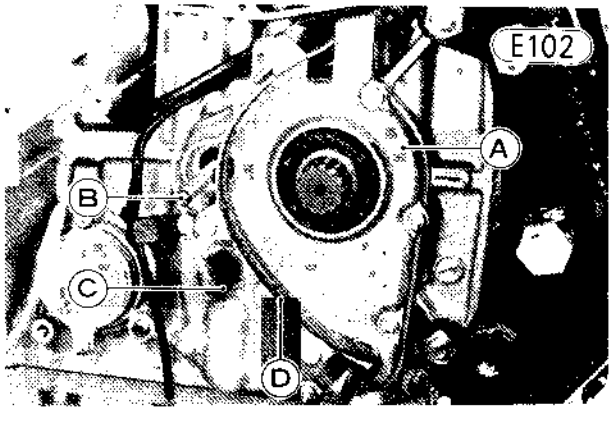
Installation:

- Mount the engine sprocket while meshed with the drive chain.
- Install the engine sprocket holding plate, and then tighten the holding plate bolts (2) to 1.0 kg-m (87 in-lbs) of torque.
- Install the engine sprocket cover (Pg. 69).
- Adjust the drive chain (Pg. 28).

EXTERNAL SHIFT MECHANISM

Removal:

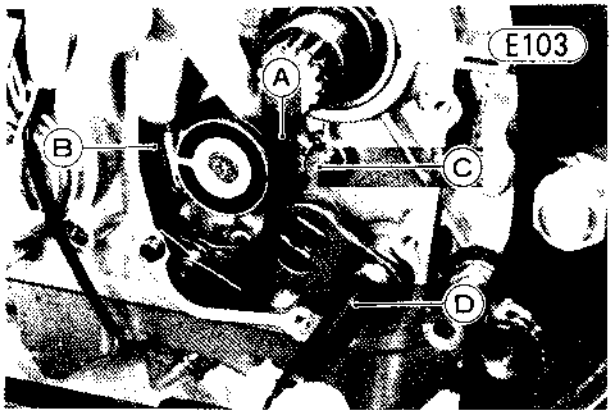
- Remove the engine sprocket cover (Pg. 69).
- Remove the engine sprocket (Pg. 71).
- Disconnect the neutral switch lead and pull out the clutch push rod.



A. External Shift Mechanism Cover
B. Clutch Push Rod
C. Neutral Switch
D. Chain Guard

- Remove the chain guard.
- Remove the external shift mechanism cover screws (7), and pull off the external shift mechanism cover and gasket.
- Move the shift arm and overshift limiter out of their positions on the end of the shift drum, and pull out the external shift mechanism.

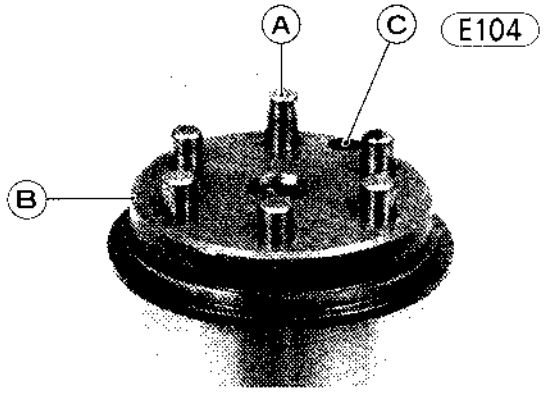
NOTE: Do not pull the shift rod more than 50 mm out of the crankcase, or the shift forks inside the crankcase will fall to the bottom of the oil pan, requiring removal of the crankcase to install them.



A. Overshift Limiter
B. Shift Arm
C. Shift Rod
D. Shift Mechanism

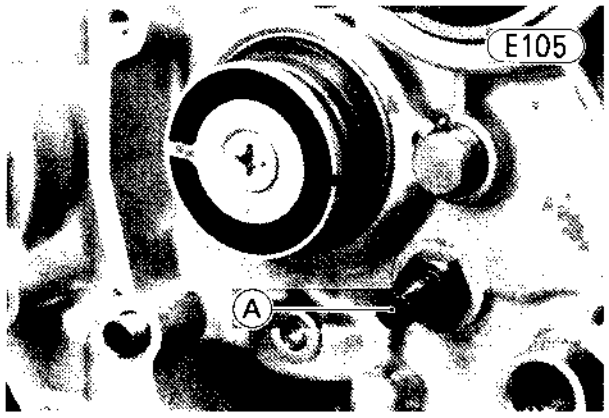
Installation:

- If the shift drum pins were removed, make sure the one long pin is assembled in the position shown. If this pin is assembled in the wrong position, the neutral indicator light will not light when the gears are in neutral.



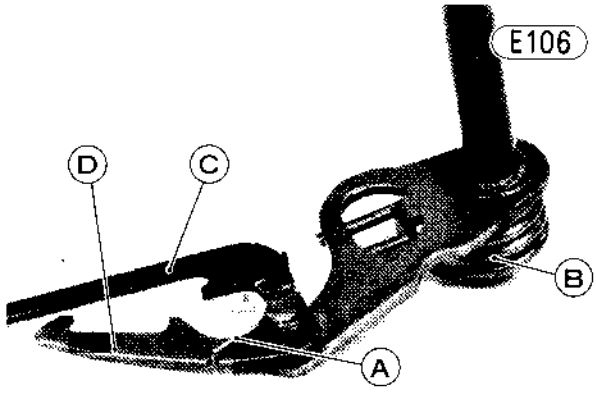
A. Long Pin
B. Shift Drum
C. Hole

- Check that the external shift mechanism return spring bolt is not loose. If it is loose, remove it, apply a non-permanent locking agent to the threads, and tighten it to 2.5 kg-m (18.0 ft-lbs) of torque.



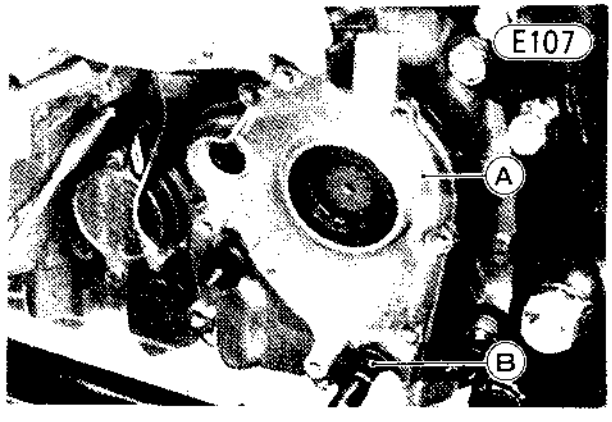
A. Return Spring Bolt

- Check that the return spring and pawl spring are properly fitted on the mechanism, install the external shift mechanism, and place the shift arm and overshift limiter on the shift drum pins.



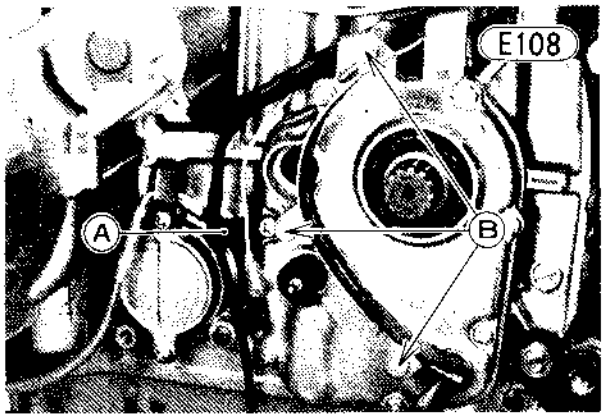
A. Pawl Spring
B. Return Spring
C. Overshift Limiter
D. Shift Arm

- Check that the two knock pins (2) are in place.
- Apply a high temperature grease to the lips of the clutch push rod oil seal and the output shaft collar oil seal.
- Insert the shift shaft oil seal guide (special tool) in the external shift mechanism cover oil seal, install the cover and gasket, and then tighten the screws (7). The left upper screw has a lead clamp.



A. External Shift Mechanism Cover
B. Shift Shaft Oil Seal Guide (57001-264)

•Apply a non-permanent locking agent to the bolts (3), and install the chain guard.



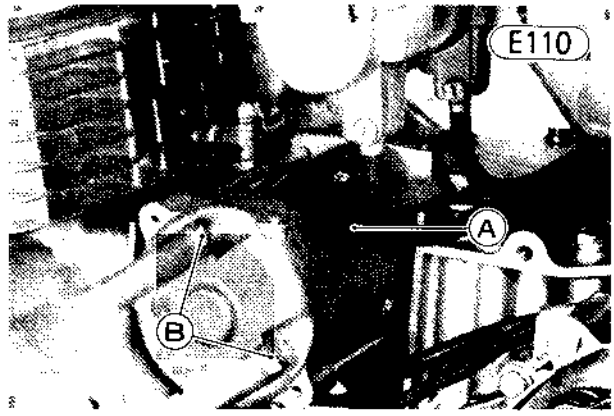
A. Lead Clamp
B. Apply a non-permanent locking agent.

•Fit the lead back on the switch.
•Install the engine sprocket cover (Pg. 69).

STARTER MOTOR

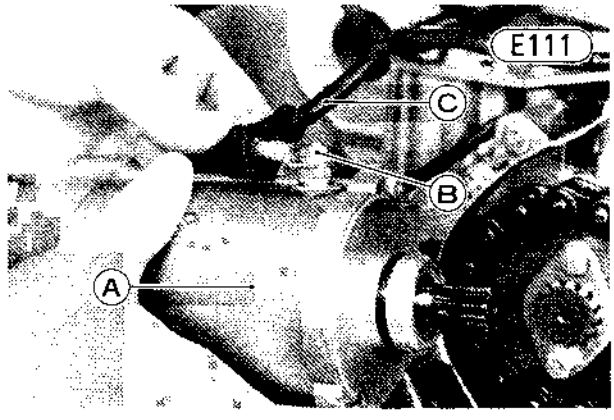
Removal:

•Remove the engine sprocket cover (Pg. 69).
•Remove the starter motor retaining bolts (2).



A. Starter Motor B. Retaining Bolts

•Pull off the starter motor.
•Remove the starter motor terminal nut and lockwasher, and take the lead off the starter motor.



A. Starter Motor C. Lead
B. Terminal Nut

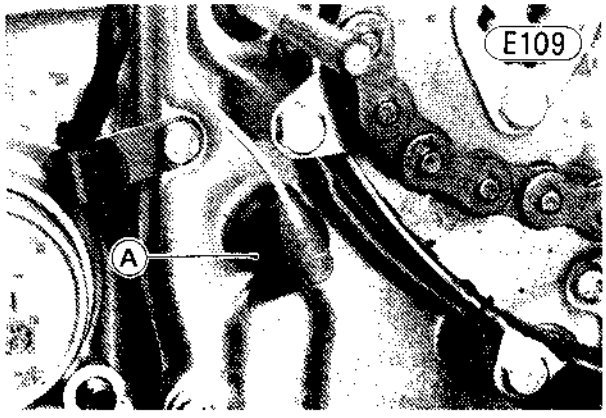
Installation:

•Replace the O ring with a new one, if it is deteriorated or damaged, and apply a little oil to it.
•Reconnect the motor lead onto the terminal with its nut and lockwasher, and tighten the nut.
•Clean the starter motor lugs and crankcase where the starter motor is grounded.

NEUTRAL SWITCH

Removal:

•Remove the engine sprocket cover (Pg. 69).
•Pull the neutral switch lead off the switch.

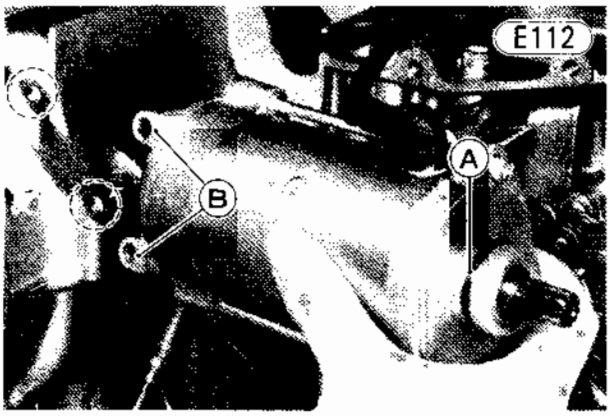


A. Neutral Switch

•Unscrew the neutral switch and gasket.

Installation:

•Install the neutral switch and gasket tightening it to 1.5 kg-m (11.0 ft-lbs) of torque.
•Fit the lead back on the switch.
•Install the engine sprocket cover (Pg. 69).
•Install the neutral switch lead onto the switch.
•Apply molybdenum disulfide engine assembly grease to the clutch push rod, and install the rod.
•Install the engine sprocket (Pg. 71).
•Install the engine sprocket cover (Pg. 69).
•Adjust the drive chain (Pg. 28).



A. "O" Ring B. Starter Motor Lugs

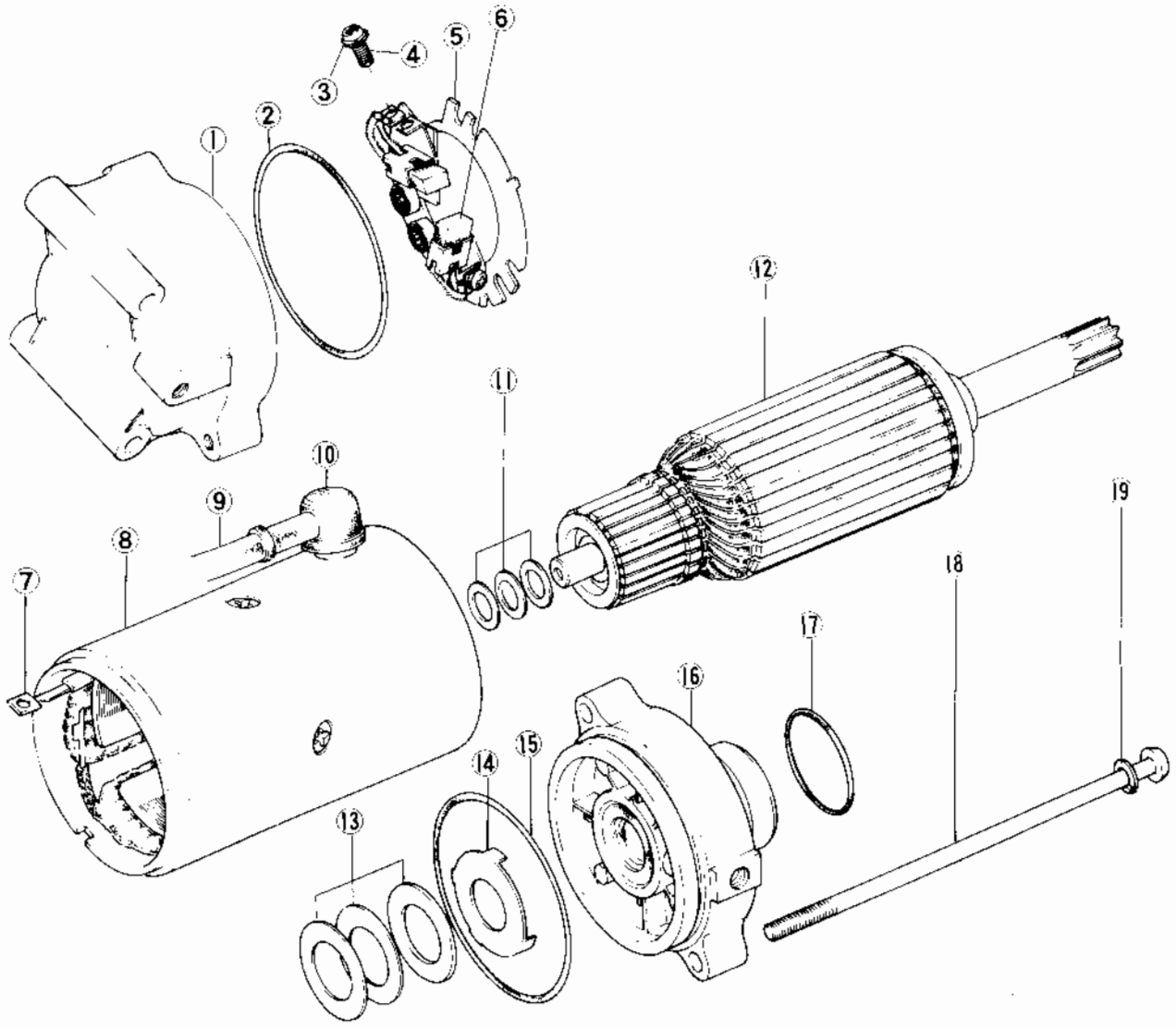
- Place the starter motor back into position fitting the shaft through the idle gear.
- Tighten the starter motor retaining bolts (2).
- Install the engine sprocket cover (Pg. 69).

Disassembly:

- Remove the screws 18 (2) and lockwashers 19 (2), and remove the end covers ①, 16.
- Remove the shims 13, toothed washer 14, and armature 12 from the shaft side.
- Remove the screw which connects the brush lead to the field coil lead 7, and remove the brush plate 5. The screw has a lockwasher ③. There is an O ring ② at the brush side of the housing.

NOTE: The yoke assembly 8 is not meant to be disassembled.

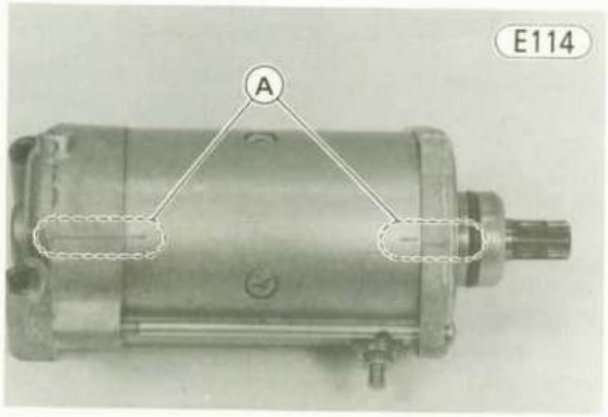
Starter Motor



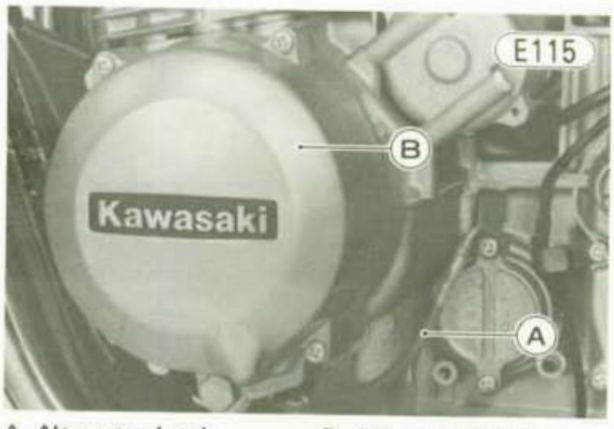
1. End Cover
2. O Ring
3. Lockwasher
4. Screw
5. Brush Plate
6. Brush
7. Field Coil Lead
8. Yoke Assembly
9. Starter Motor Lead
10. Terminal Cover
11. Shims
12. Armature
13. Shims
14. Toothed Washer
15. O Ring
16. End Cover
17. O Ring
18. Screw
19. Lockwasher

Assembly Notes:

1. Replace any O rings that are deteriorated or damaged with new ones.
2. Install the grease seal stop so that the stop teeth fit on the grease seal mount.
3. Align the line on each end cover with its line on the housing.

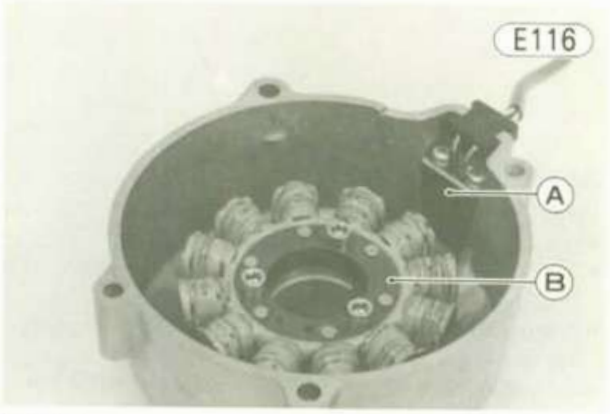


A. Align the lines.



A. Alternator Leads B. Alternator Cover

- Remove the alternator cover screws (4), and pull off the alternator cover and gasket.
- Remove the wiring clamp screws (2) and wiring clamp.



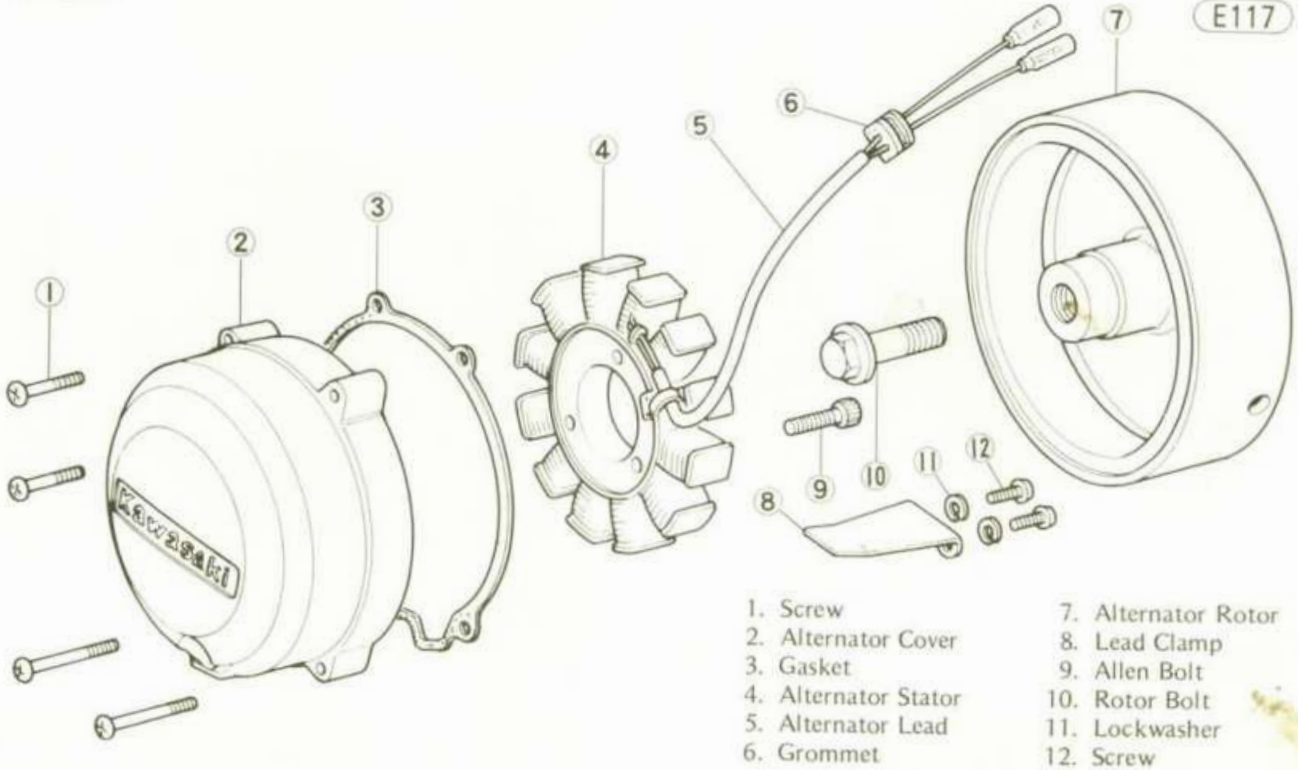
A. Wiring Clamp B. Alternator Stator

ALTERNATOR STATOR

Removal:

- Remove the engine sprocket cover (Pg. 69).
- Disconnect the alternator wiring yellow leads.

Alternator



1. Screw
2. Alternator Cover
3. Gasket
4. Alternator Stator
5. Alternator Lead
6. Grommet
7. Alternator Rotor
8. Lead Clamp
9. Allen Bolt
10. Rotor Bolt
11. Lockwasher
12. Screw

•Remove the alternator stator Allen bolts (3), and pull out the alternator stator.

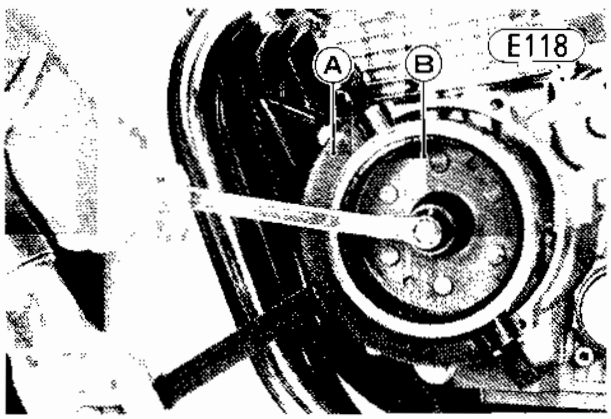
Installation:

•Install the grommet, and fit the stator into place. Use a non-permanent locking agent on each Allen bolt, and tighten the bolts to 1.0 kg-m (87 in-lbs) of torque.
•Install the wiring clamp with its screws (2) and lockwashers (2).
•Check that the knock pins (2) are in place, install the alternator cover and a new gasket, and tighten its screws (4).
•Connect the alternator wiring yellow leads.
•Install the engine sprocket cover (Pg. 69).

ALTERNATOR ROTOR

Removal:

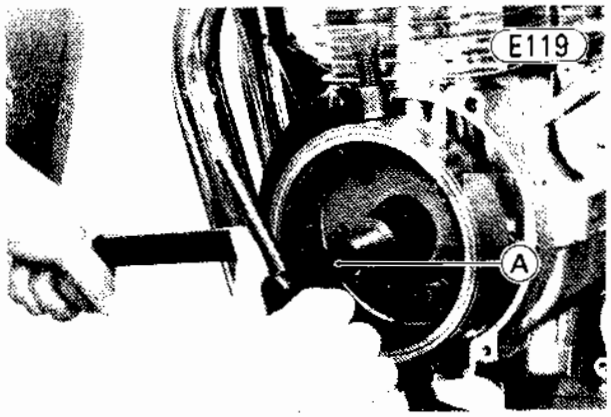
•Remove the engine sprocket cover (Pg. 69).
•Disconnect the alternator wiring yellow leads (Fig. E115).
•Remove the alternator cover screws (4), and pull off the alternator cover and gasket.
•Hold the alternator rotor steady with the rotor holder (special tool), and remove the rotor bolt.



A. Rotor Holder (57001-308) **B. Rotor**

•Using the special tool to hold the rotor steady, remove the rotor with the rotor puller (special tool).

CAUTION **If the rotor is difficult to remove and a hammer is used, turn the bar with hand tapping the head of the puller shaft with a hammer. Do not attempt to strike the bar or the alternator rotor itself. Striking the bar or the rotor can cause the bending or the magnets to lose their magnetism.**



A. Rotor Puller (57001-254 or 57001-1099)

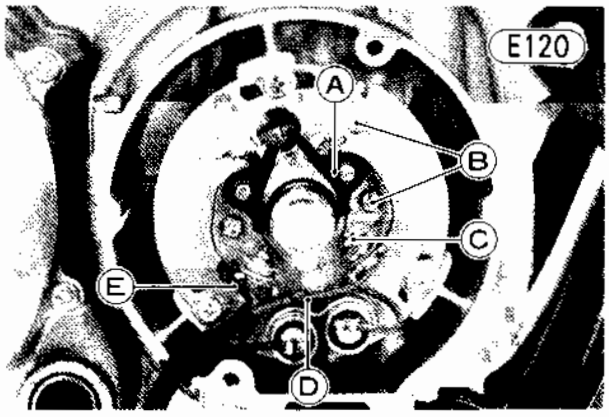
Installation:

•Using a high flash-point solvent, clean off any oil or dirt that may be on the crankshaft taper or rotor hub, and place the rotor back on the crankshaft.
•Tighten the rotor bolt to 7.0 kg-m (51.0 ft-lbs) of torque while holding the alternator rotor steady with the rotor holder (special tool).
•Check that the knock pins (2) are in place, install the alternator cover using a new gasket, and tighten its screws (4).
•Connect the alternator wiring yellow leads.
•Install the engine sprocket cover (Pg. 69).

CONTACT BREAKERS

Removal (each contact breaker):

•Remove the contact breaker cover and gasket.
•Loosen the contact breaker terminal nut, and remove the two leads.



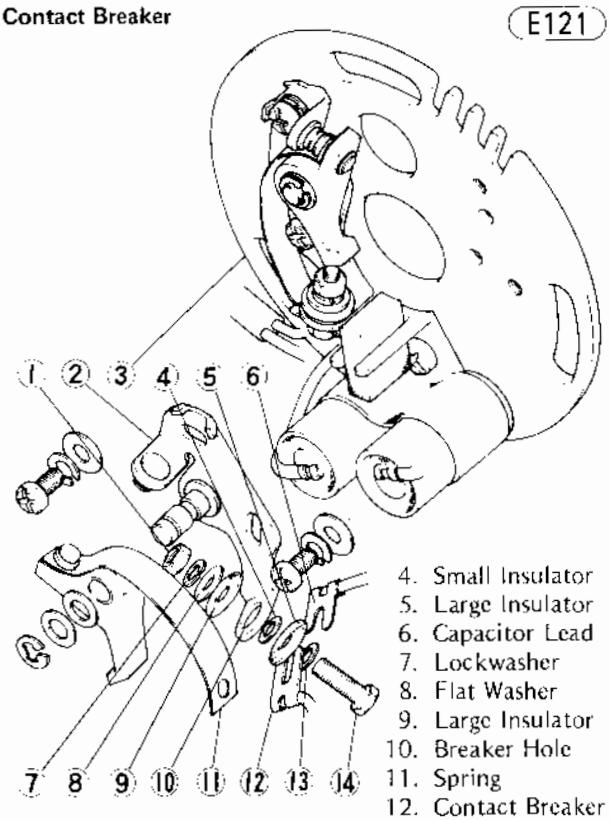
A. Contact Breaker
B. Contact Breaker Base Screws
C. Terminal Nut
D. Green Lead
E. Black Lead

•Remove the contact breaker base screws (2). Each screw has a flat washer and lockwasher.

Installation Notes:

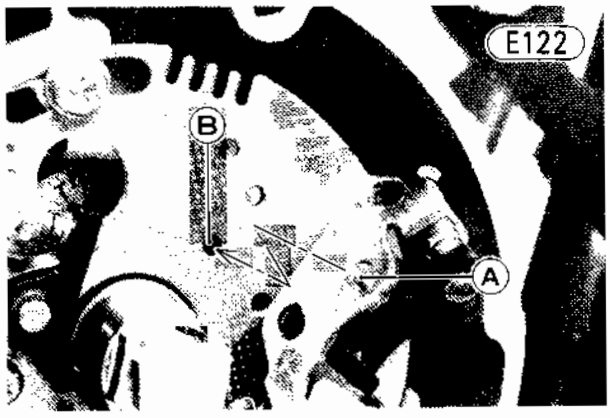
1. The sequence of installation on the contact breaker bolt is: bolt 14, flat washer 13, capacitor lead 6, contact breaker lead 12, spring 11, large insulator 5, small insulator 4 (in contact breaker hole), large insulator 9, flat washer 8, lockwasher 7, and nut 1. The green contact breaker lead must be connected to the right contact breaker (#2 and #3), and black lead to the left one (#1 and #4).

Contact Breaker



1. Nut
2. Breaker Base
3. Mounting Plate
4. Small Insulator
5. Large Insulator
6. Capacitor Lead
7. Lockwasher
8. Flat Washer
9. Large Insulator
10. Breaker Hole
11. Spring
12. Contact Breaker Lead
13. Flat Washer
14. Bolt

2. Fit the contact breaker base projection into the hole in the mounting plate.



A. Projection **B. Hole**

3. After installation, adjust the ignition timing (Pg. 12).

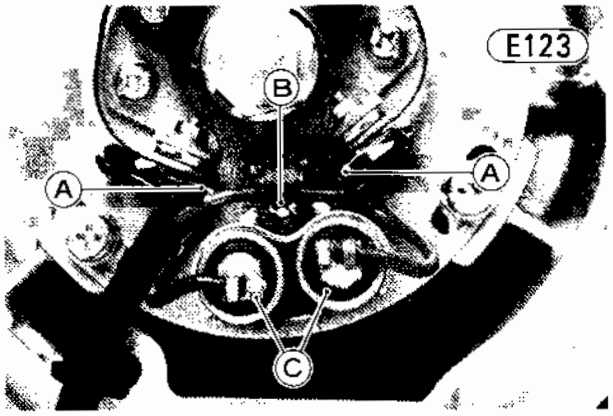
CAPACITORS

Removal:

- Remove the contact breaker cover and gasket.
- Loosen each contact breaker nut, and remove the capacitor lead to complete capacitor removal.
- Remove the capacitor screw. The screw has a flat and lockwasher.

Installation Note:

- The sequence of installation on the contact breaker bolt is: bolt, flat washer, capacitor lead, contact breaker lead, spring, large insulator, small insulator (in contact breaker hole), large insulator, flat washer, lockwasher, and nut (Fig. E121).

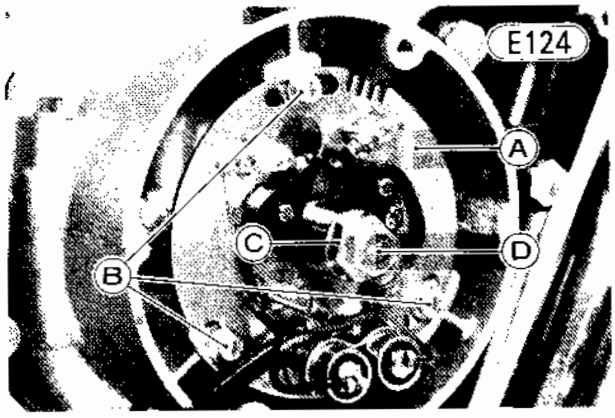


A. Capacitor Lead **C. Capacitors**
B. Capacitor Screw

TIMING ADVANCER

Removal:

- Remove the contact breaker cover and gasket.
- Take out the contact breaker mounting plate screws, lockwashers, and flat washers (3 ea), and remove the plate.

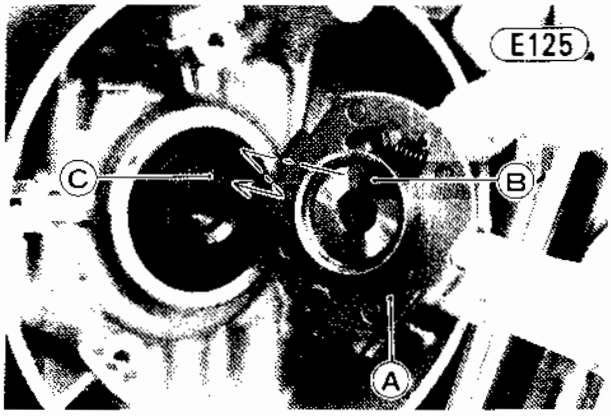


A. Contact Breaker Mounting Plate
B. Plate Screws
C. Crankshaft Rotation Nut
D. Advancer Mounting Bolt

•With a 17 mm wrench on the crankshaft rotation nut to keep the shaft from turning, remove the advancer mounting bolt, and take off the rotation nut and the timing advancer.

Installation:

•Fit the timing advancer onto the crankshaft, matching its notch with the pin in the end of the crankshaft, and install the crankshaft rotation nut and advancer mounting bolt. The notches in the nut fit the projections on the timing advancer. Tighten the bolt to 2.5 kg-m (18.0 ft-lbs) of torque.

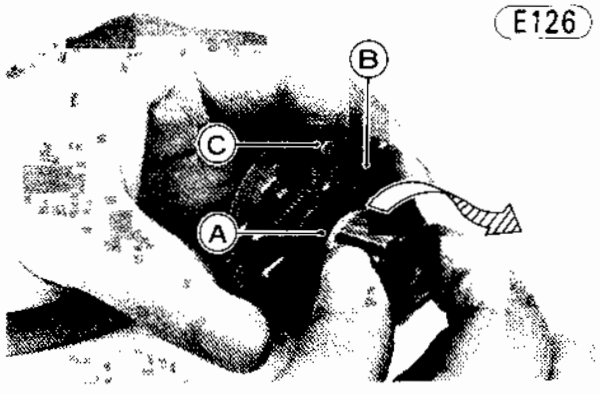


A. Timing Advancer B. Notch C. Pin

•Mount the contact breaker mounting plate, and tighten its screws (3) loosely. Each screw has a lockwasher and flat washer.
•Adjust the ignition timing (Pg. 12).

Disassembly:

•Pull off the cam by turning it clockwise.

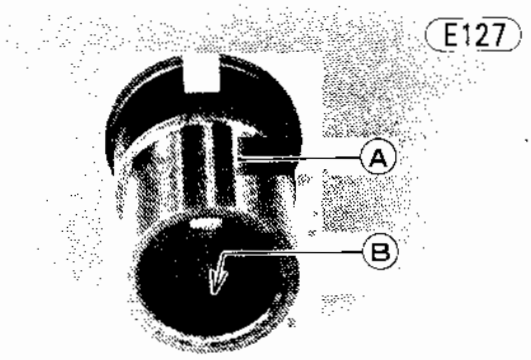


A. Cam B. Weight C. "C" Ring

•Remove the C rings (2), washers (4), and weights (2).
•Remove the thrust washer from each weight shaft.

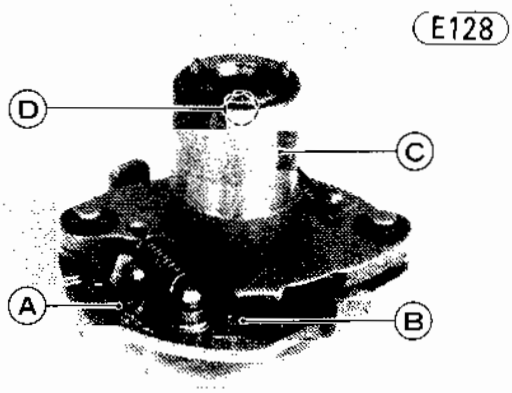
Assembly Notes:

1. Wipe the advancer clean, and fill the groove in the advancer cam with grease.



A. Advancer Cam B. Grease

2. When installing the cam, align the mark on the cam with the small hole in the advancer body.



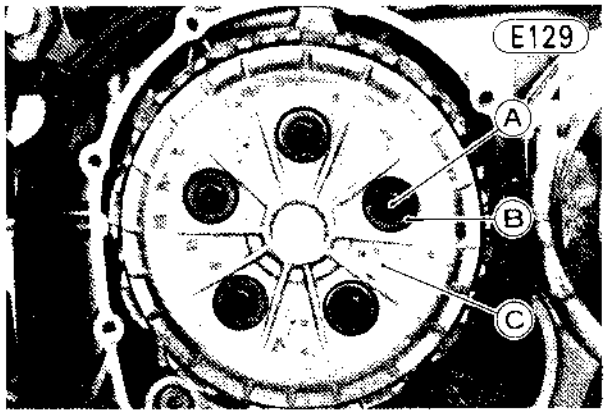
A. Advancer Body C. Cam
B. Small Hole D. Mark

CLUTCH

Removal:

•With the motorcycle on its center stand, place an oil pan beneath the engine, and remove the engine drain plug and washer to drain out the oil.
•After the oil has drained, tighten the drain plug to 3.8 kg-m (27 ft-lbs) of torque.
•Remove the screws (9), and pull off the clutch cover and gasket.

•Remove the clutch spring bolts 15 (5), washers 16 (5), and springs 14 (5).

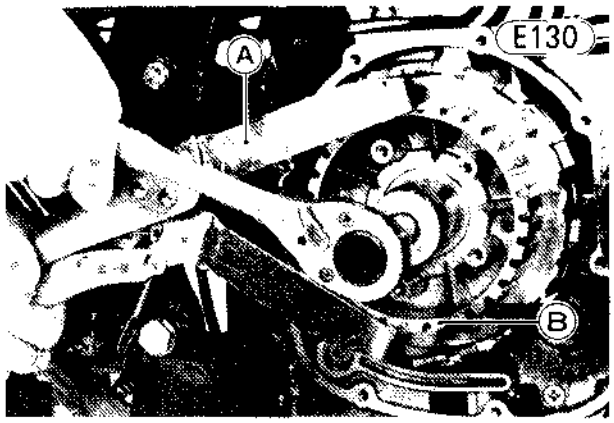


A. Clutch Spring Bolt
B. Washer
C. Spring Plate

•Pull off the spring plate 13, pull out the spring plate pusher 12, and tilt the motorcycle so that the steel ball 11 will fall out.

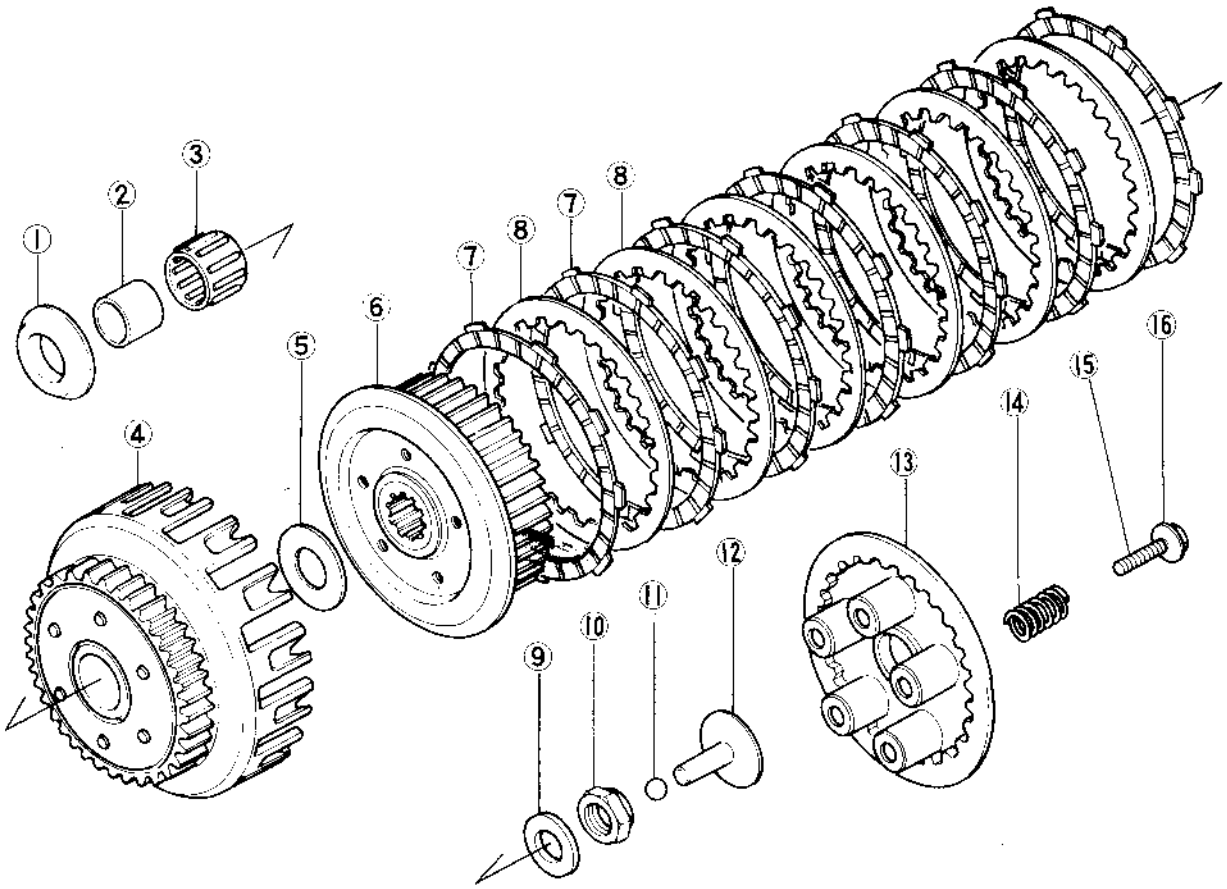
•Remove the friction plates 7 (7) and steel plates 8 (6).

•Hold the clutch hub from turning using a clutch holder (special tool), and remove the clutch hub locknut 10 and lockwasher 9.



A. Clutch Holder (57001-305)
B. Clutch Hub

Clutch

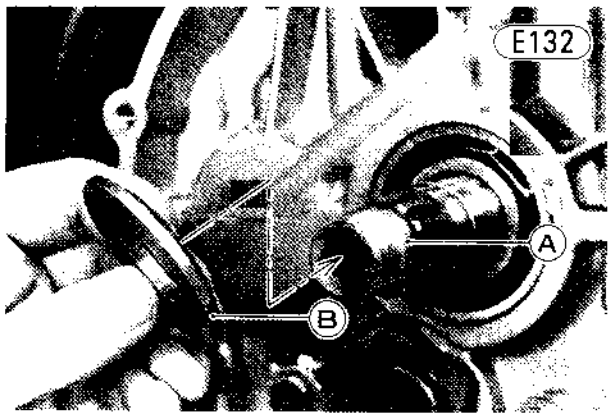


1. Spacer
2. Sleeve
3. Needle Bearing
4. Clutch Housing
5. Thrust Washer
6. Clutch Hub
7. Friction Plate
8. Steel Plate
9. Lockwasher
10. Locknut
11. Steel Ball
12. Spring Plate Pusher
13. Spring Plate
14. Clutch Spring
15. Bolt
16. Washer

•Pull off the clutch hub, clutch housing, needle bearing, drive shaft sleeve, and spacer. There is a thrust washer between the clutch hub and clutch housing.

Installation:

•Put the clutch housing spacer on the drive shaft. The spacer must be installed with its flat side facing toward the end of the shaft.

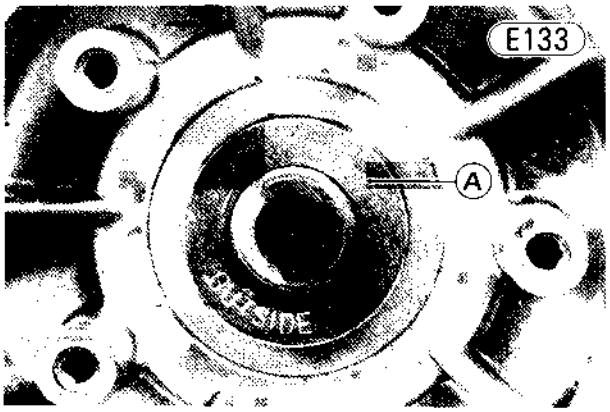


A. Drive Shaft B. Clutch Housing Spacer

•Install the drive shaft sleeve, needle bearing, and clutch housing.

•Put on the thrust washer, clutch hub, and lockwasher. Replace the clutch hub locknut with a new one, screw on the locknut and tighten it to 13.5 kg-m (98 ft-lbs) of torque, while holding the hub stationary with the clutch holder (special tool).

WARNING **The lockwasher between the clutch hub and the clutch hub locknut must be installed with the marked side, "OUT SIDE", facing out. If this washer is installed backwards, the hub locknut might loosen during operation. This causes clutch disengagement resulting in loss of motorcycle control.**

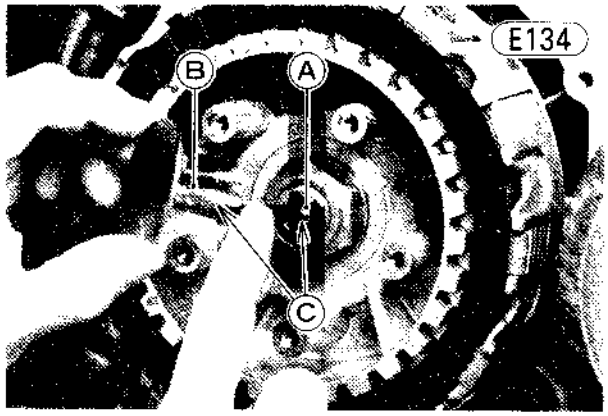


A. Lockwasher

•Install the friction plates (7) and steel plates (6), starting with a friction plate and alternating them.

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

•Insert the clutch steel ball, and spring plate pusher, applying a thin coat of a molybdenum disulfide engine assembly grease to their surfaces.

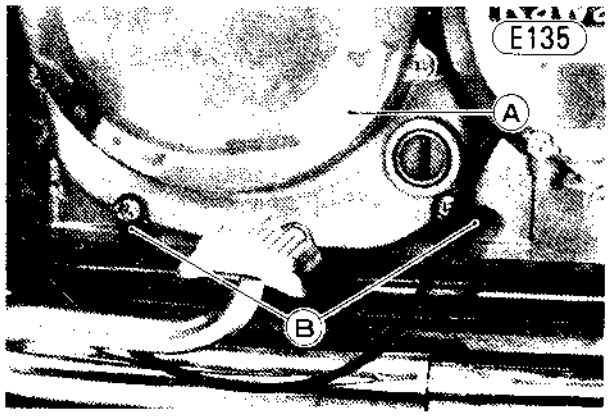


A. Steel Ball C. Grease.
B. Spring Plate Pusher

•Install the spring plate, springs, washers, and spring bolts (5 ea). Cross tighten the bolts evenly to 0.90 kg-m (78 in-lbs) of torque.

NOTE: The spring plate can be installed on the clutch hub in any position, so there is no mark on either the spring plate or the clutch hub.

•Fit a new clutch cover gasket, and install the clutch cover. Tighten the screws (9) firmly. Be sure to include the contact breaker lead clamps (2) with their clutch cover screws.



A. Clutch Cover B. Clamps

•Fit the contact breaker wiring with the wiring clamps under the clutch cover.

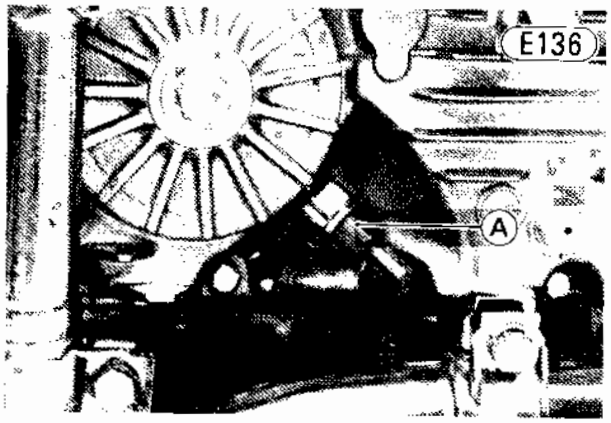
•Fill the engine with oil, check the oil level (Pg. 24), and add more if necessary.

•Adjust the clutch (Pg. 22).

OIL PRESSURE SWITCH

Removal:

•Remove the bolt and lockwasher, and free the lead from the oil pressure switch.



A. Oil Pressure Switch

•Remove the oil pressure switch.

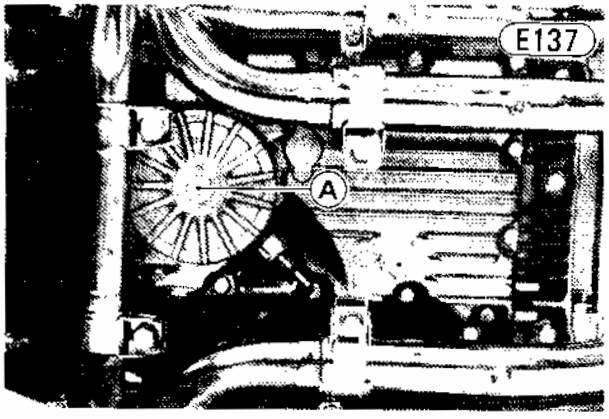
Installation Note:

•Tighten the oil pressure switch to 1.5 kg-m (11.0 ft-lbs) of torque.

OIL FILTER, BYPASS VALVE

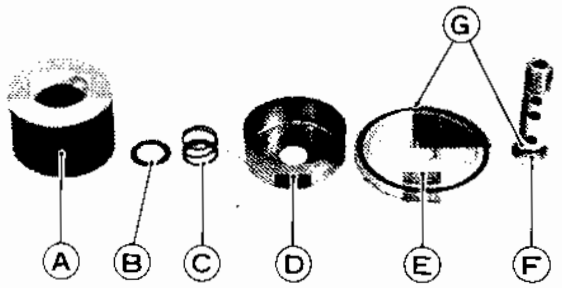
Removal:

•With the motorcycle up on its center stand, place an oil pan beneath the engine, and remove the oil filter mounting bolt and oil filter.



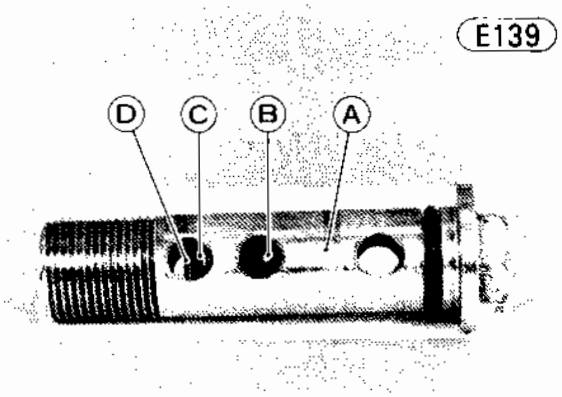
A. Oil Filter Mounting Bolt

•Holding the element steady, turn the mounting bolt to work the element free.
•Remove the flat washer, spring, and element fence, and pull the filter cover off the bolt.



A. Element
B. Flat Washer
C. Spring
D. Element Fence
E. Filter Cover
F. Mounting Bolt
G. "O" Rings

•To remove the bypass valve steel ball, drive the pin and drop out the spring and steel ball from mounting bolt.

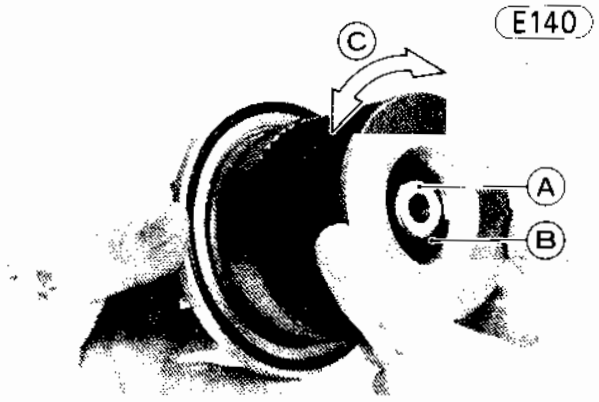


A. Mounting Bolt
B. Steel Ball
C. Spring
D. Pin

Installation:

CAUTION **Using damaged or deteriorated O rings instead of replacing them with new ones will cause oil leaks and eventually result in little or no oil left in the engine. This will cause serious engine damage. The oil in the oil filter housing is pressurized by the engine oil pump, so these O rings must be inspected with special care. Look for discoloration (indicating the rubber has deteriorated), hardening (the sides which face the mating surfaces are flattened), scoring, or other damage.**

•Fit the steel ball and spring into the mounting bolt, and drive in the pin while pressing the spring.
•Apply a little engine oil to the O ring on the filter mounting bolt, fit the filter cover and element fence on the bolt, and install the spring and flat washer.
•Apply a little engine oil to the oil filter grommets on the both sides of the element, and holding the filter steady, turn the filter mounting bolt to work the element into place. Be careful that the element grommets do not slip out of place.



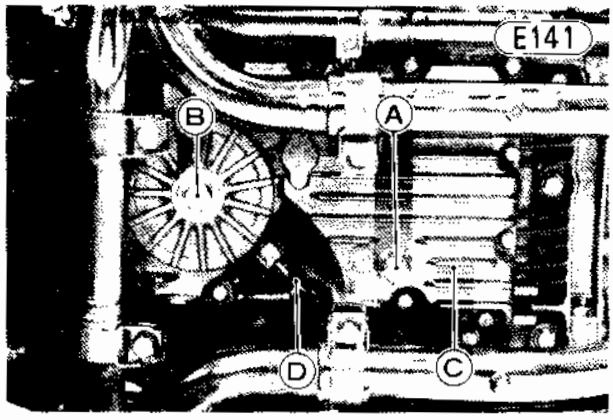
A. Mounting Bolt B. Grommet C. Turn.

- Install the oil filter, and tighten its mounting bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
- Check the oil level (Pg. 24), and add more if necessary.

OIL PRESSURE RELIEF VALVE

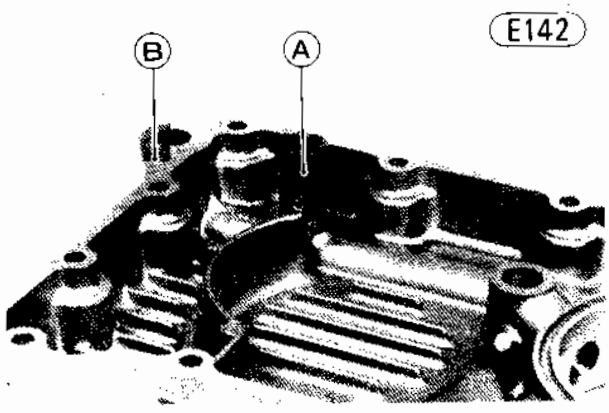
Removal:

- With the motorcycle on its center stand, place an oil pan beneath the engine, and remove the engine oil drain plug and oil filter mounting bolt to drain out the oil.



A. Engine Drain Plug
B. Oil Filter Mounting Bolt
C. Oil Pan
D. Oil Pressure Switch Lead

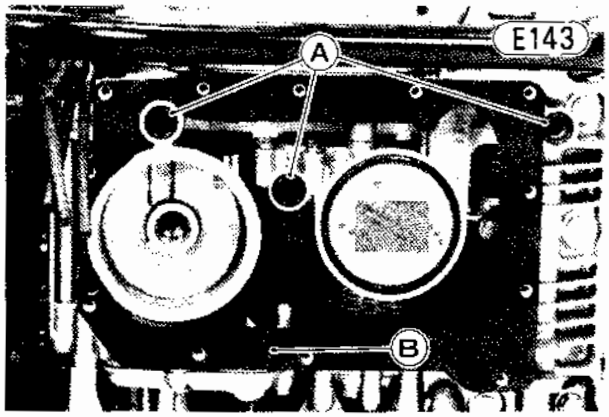
- After the oil has drained out, install the drain plug.
- Remove the mufflers (Pg. 56).
- Remove the bolt and lockwasher, and free the lead from the oil pressure switch.
- Remove the oil pan bolts (13), and remove the oil pan, gasket, and oil passage O rings (3).
- Unscrew the oil pressure relief valve from the oil pan.



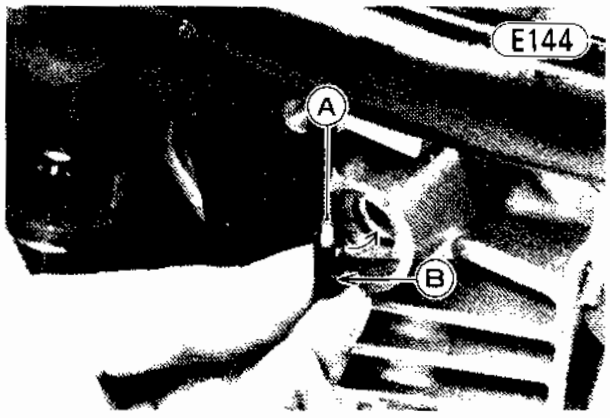
A. Oil Pressure Relief Valve B. Oil Pan

Installation Notes:

1. Use a non-permanent locking agent on the valve thread, and tighten the valve to 1.5 kg-m (11.0 ft-lbs) of torque.
2. Replace the oil passage O rings (3) and oil pan gasket with new ones. The flat side of the O ring must face to the crankcase.



A. Oil Passage "O" Rings B. Oil Pan Gasket



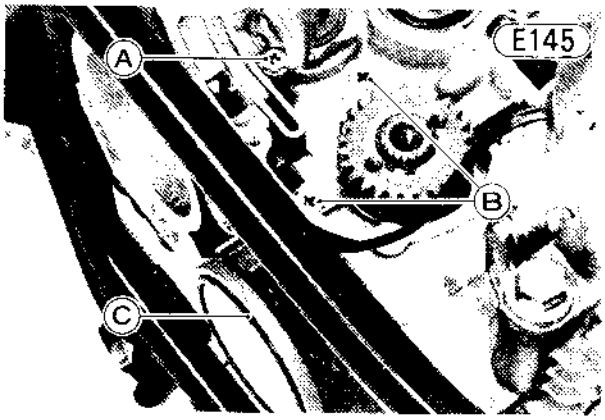
A. "O" Ring B. Flat Side

3. Tighten the oil pan bolts (13) to 1.0 kg-m (87 in-lbs) of torque, and the engine drain plug to 3.8 kg-m (27 ft-lbs) of torque.
4. If the oil pressure switch was removed, tighten it to 1.5 kg-m (11.0 ft-lbs) of torque.

ENGINE OIL PUMP

Removal:

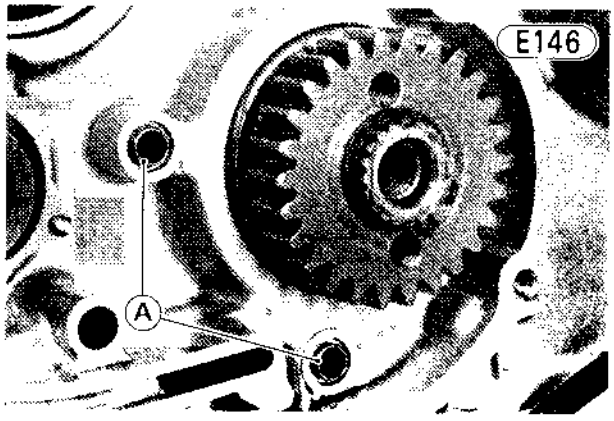
- With the motorcycle on its center stand, place an oil pan beneath the engine, and remove the engine oil drain plug and oil filter to drain out the oil.
- After the oil has drained out, install the drain plug and tighten it to 3.8 kg-m (27 ft-lbs) of torque.
- Remove the mufflers (Pg. 56).
- Remove the clutch (Pg. 78).
- Remove the oil pan bolts (13), and remove the oil pan gasket, and oil passage O rings (3).
- Remove the mounting bolt and screws (2), and pull off the oil pump. There are two knock pins on the crankcase.



A. Mounting Bolt
B. Mounting Screws
C. Oil Pump

Installation Notes:

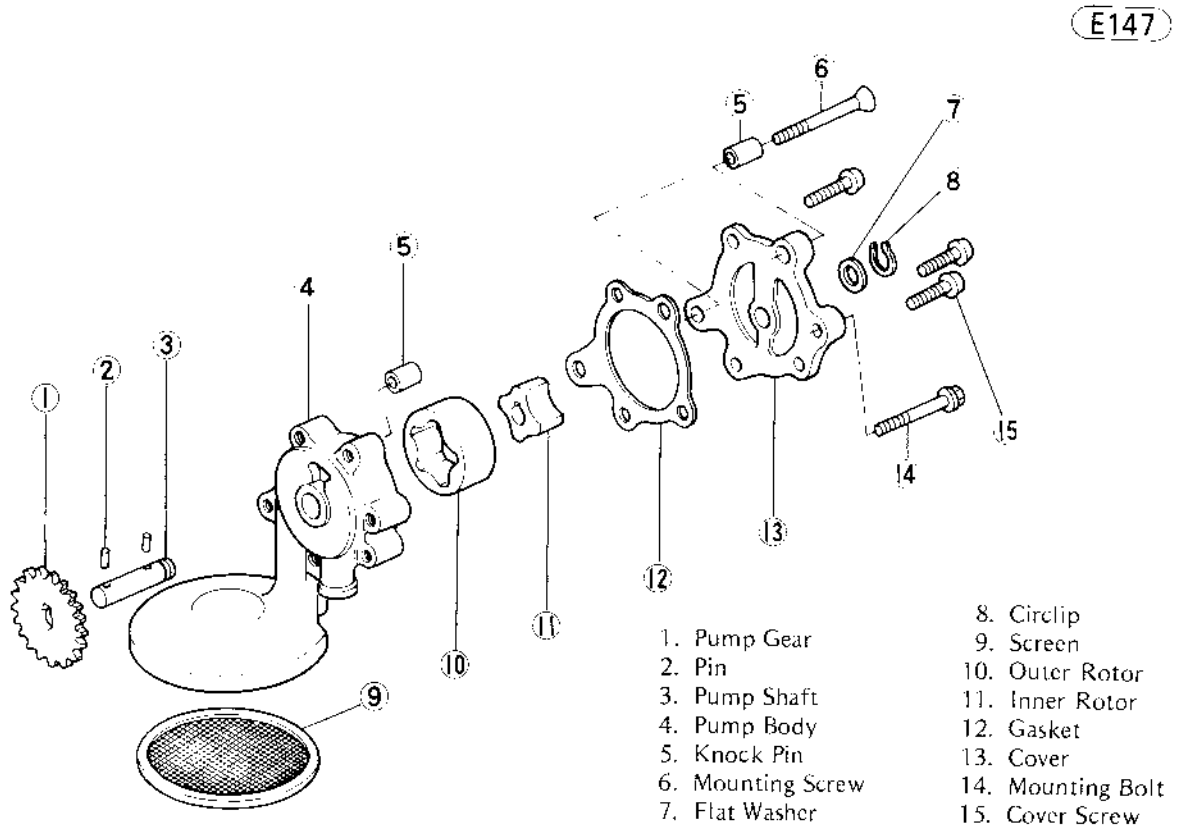
1. Fill the oil pump with engine oil for initial lubrication.
2. Check to see that the knock pins (2) are in place.



A. Knock Pins

3. Be sure the oil pump gear and pump drive gear at the secondary shaft mesh properly.
4. Install the bearing stop with the mounting screws (2).
5. Stake each oil pump screw head with a punch to prevent loosening.
6. Replace the oil passage O rings and oil pan gasket with new ones (Figs. E143 and E144).

Oil Pump



1. Pump Gear
2. Pin
3. Pump Shaft
4. Pump Body
5. Knock Pin
6. Mounting Screw
7. Flat Washer
8. Circlip
9. Screen
10. Outer Rotor
11. Inner Rotor
12. Gasket
13. Cover
14. Mounting Bolt
15. Cover Screw

7. Tighten the oil pan bolts (13) to 1.0 kg-m (87 in-lbs) of torque.
8. Install the oil filter (Pg. 81).
9. Install the clutch (Pg. 80).

Disassembly:

- Remove the circlip (8) and washer (7) on the pump shaft end.
- Remove the oil pump cover screws (5) (3), and take off the oil pump cover (4) and gasket (2).
- Take out the rotors (6), (1).
- Take out the pin (2), and pull off the oil pump gear (1) and shaft (3).
- Slide off the pump gear, and take out the pin (2) from the shaft.

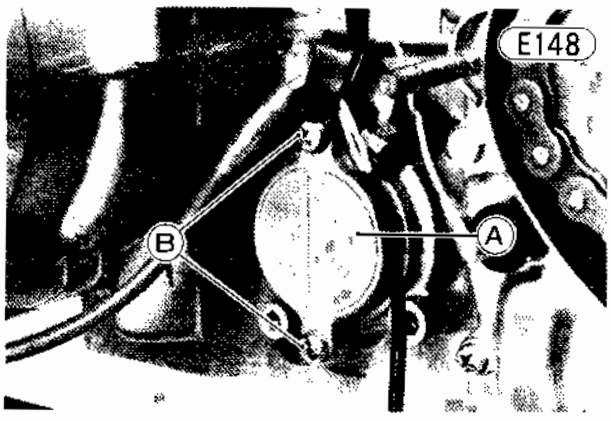
Assembly Notes:

1. Replace the gasket with a new one.
2. After completing the oil pump assembly, check that the rotor shaft and rotor turn smoothly.

SECONDARY SHAFT, STARTER MOTOR CLUTCH

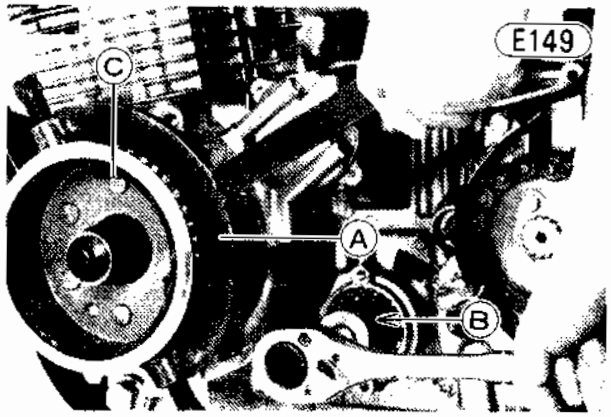
Removal:

- Remove the mufflers (Pg. 56).
- Remove the engine sprocket cover (Pg. 69).
- Remove the clutch (Pg. 78).
- Remove the oil pump (Pg. 83).
- Remove the screws (2), and pull off the secondary shaft bearing cap.



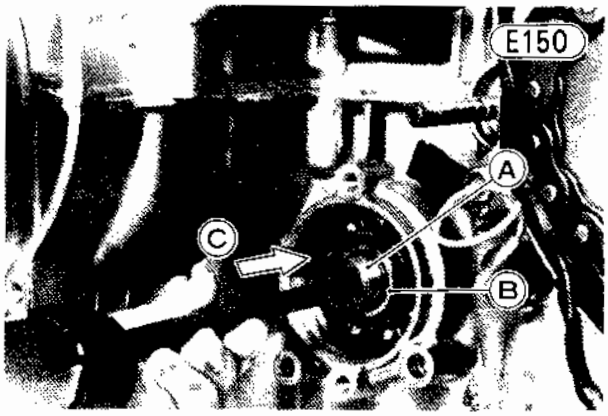
A. Secondary Shaft Bearing Cap B. Screws

- Remove the alternator cover.
- Using a rotor holder (special tool) to hold the alternator rotor, remove the secondary shaft nut.



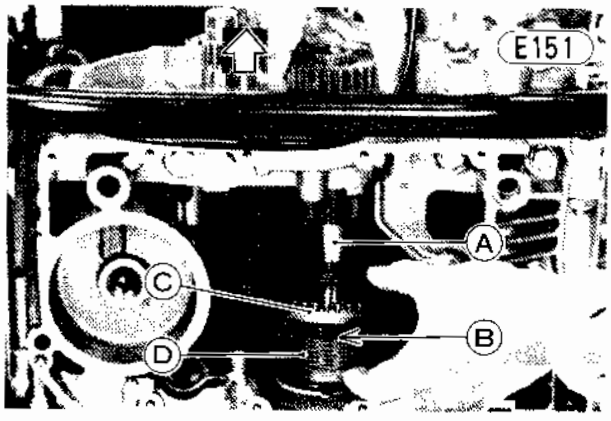
A. Rotor Holder (57001-308) C. Alternator Rotor
B. Secondary Shaft Nut

- Tap the secondary shaft from the left side of the crankcase until the right bearing comes out of place. There is a collar in the left bearing.



A. Secondary Shaft B. Collar C. Tap

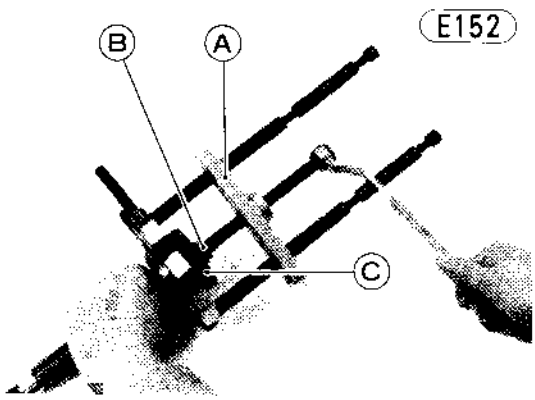
- Holding the secondary sprocket and starter motor clutch assembly, pull out the secondary shaft.



A. Secondary Shaft
B. Secondary Sprocket
C. Starter Motor Clutch Assembly
D. Primary Chain

- Slip the secondary sprocket and starter motor clutch assembly from the primary chain, and take them out.

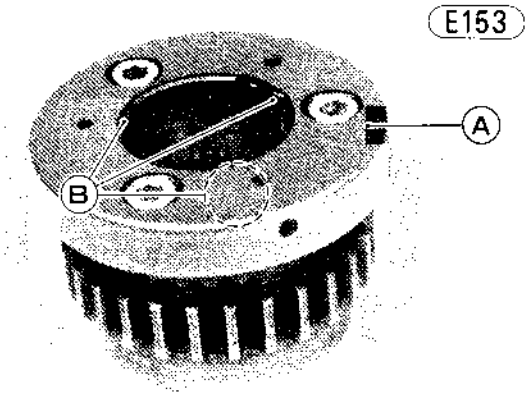
•Remove the secondary shaft gear circlip. Using the bearing puller and adapter (special tools), pull the secondary shaft gear off the shaft.



A. Bearing Puller (57001-135)
B. Adapter (57001-317)
C. Secondary Shaft Gear

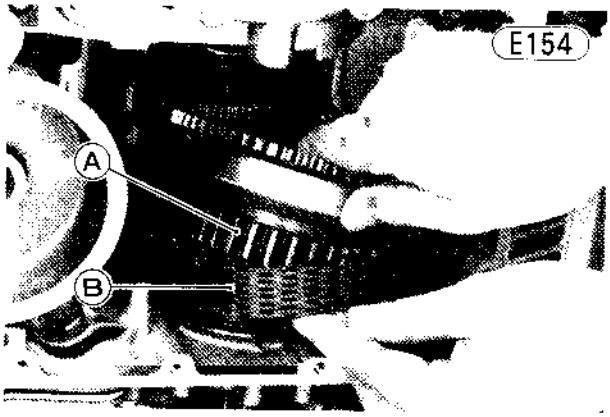
Installation:

•Check that the starter clutch rollers (3) are in place.



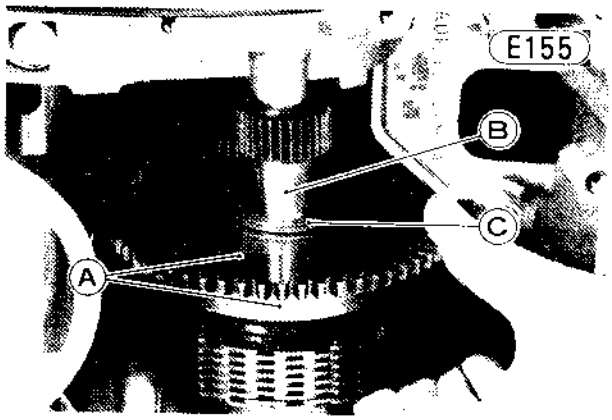
A. Starter Clutch B. Rollers

•Put the thrust washer, starter motor clutch, and needle bearing into the secondary sprocket and starter motor clutch assembly.
•Fit the primary chain on the secondary sprocket.



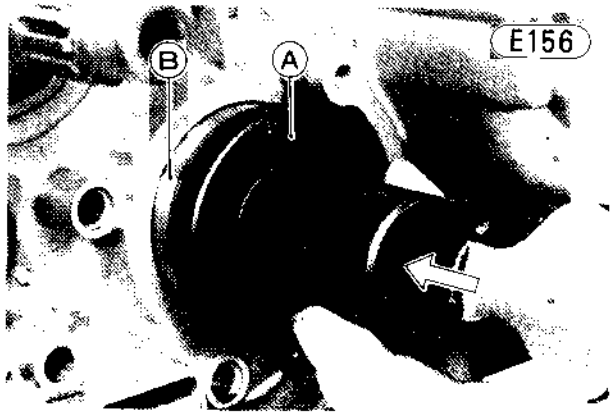
A. Secondary Sprocket B. Primary Chain

•Put the thrust washer on the secondary shaft, and put the secondary shaft into the secondary sprocket and starter motor clutch assembly, fitting their splines.



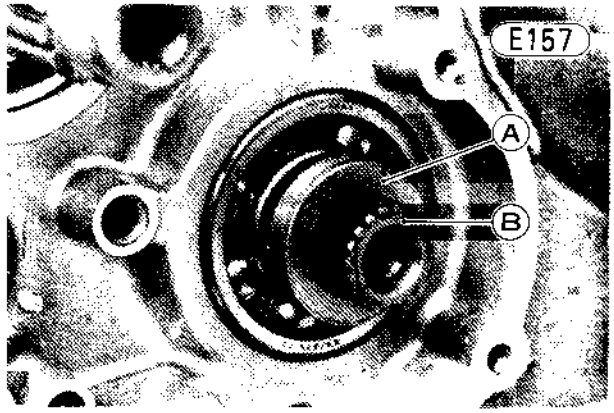
A. Starter Clutch Assembly C. Thrust Washer
B. Secondary Shaft

•Install the left bearing collar.
•Using the bearing driver (special tool), tap the secondary shaft bearing into the crankcase with the secondary shaft until the bearing stops at the bottom of the crankcase bearing hole.



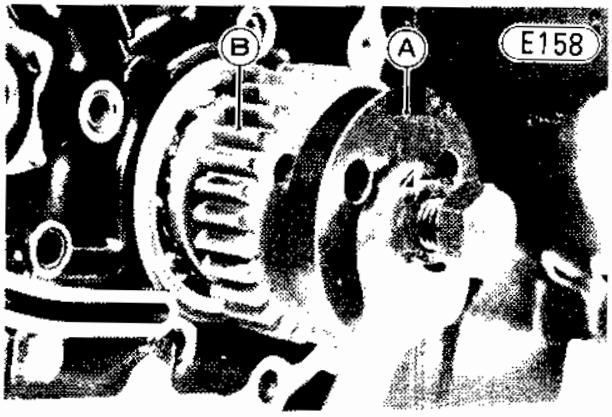
A. Bearing Driver (57001-297)
B. Secondary Shaft Bearing

•Put the collar on the secondary shaft.



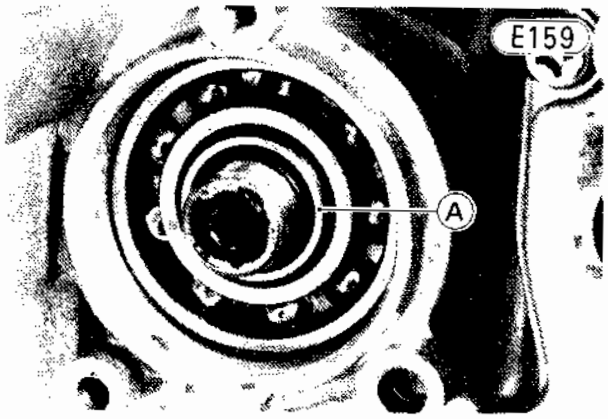
A. Collar B. Secondary Shaft

- Apply a little oil on the secondary shaft and between the secondary shaft gear and gear pusher (special tool). Using the rotor holder (special tool) to keep the crankshaft and secondary shaft from turning, push the secondary shaft gear on the shaft by rotating the gear pusher (special tool).



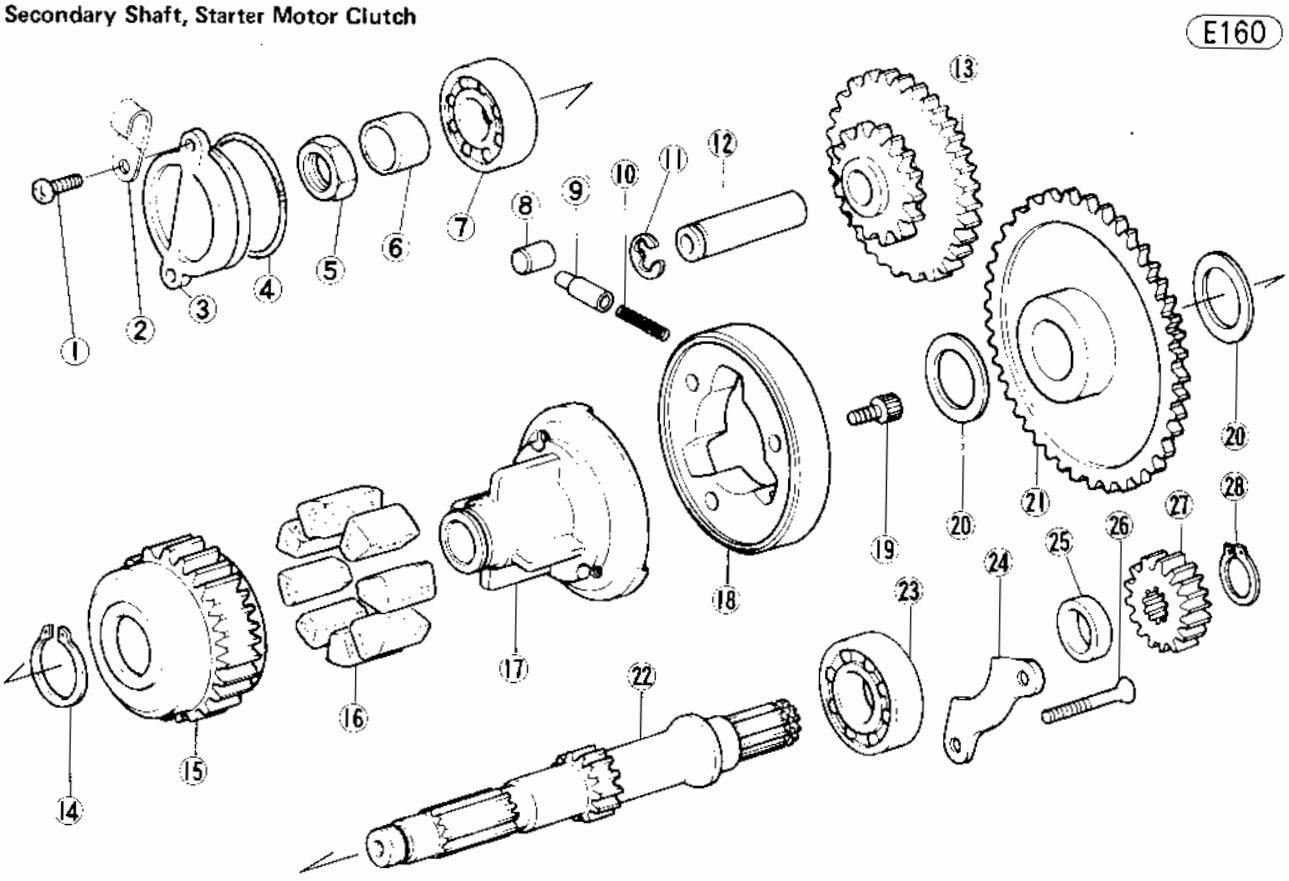
A. Gear Pusher (57001-319)
B. Secondary Shaft Gear

- Install the circlip on the secondary shaft.
- Install the oil pump, oil pan, and oil filter according to the oil pump installation (Pg. 84).
- Check that the left bearing collar is in place, and tighten the secondary shaft nut to 6.0 kg-m (43 ft-lbs) of torque by holding the alternator rotor with the rotor holder (special tool).



A. Collar

Secondary Shaft, Starter Motor Clutch

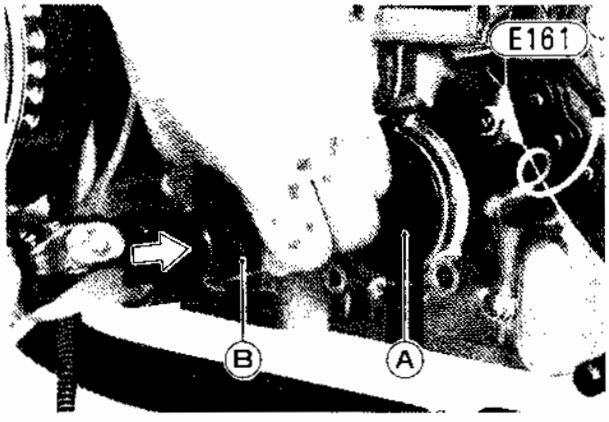


1. Screw
2. Lead Clamp
3. Bearing Cap
4. O Ring
5. Nut
6. Collar
7. Ball Bearing
8. Roller
9. Spring Cap
10. Spring
11. Circlip
12. Idle Gear Shaft
13. Starter Motor Idle Gear
14. Circlip
15. Secondary Sprocket
16. Rubber Damper
17. Inner Coupling
18. Starter Motor Clutch
19. Allen Bolt
20. Thrust Washer
21. Starter Clutch Gear
22. Secondary Shaft
23. Ball Bearing
24. Bearing Stop
25. Collar
26. Screw
27. Secondary Shaft Gear
28. Circlip

- Install the secondary shaft bearing cap, and tighten its screws (2). The upper screw has a wiring clamp.
- Install the alternator cover.
- Install the clutch (Pg. 80).
- Install the engine sprocket cover (Pg. 69).
- Install the mufflers (Pg. 57).
- Fill the engine with oil and check the oil level (Pg. 24).

Disassembly:

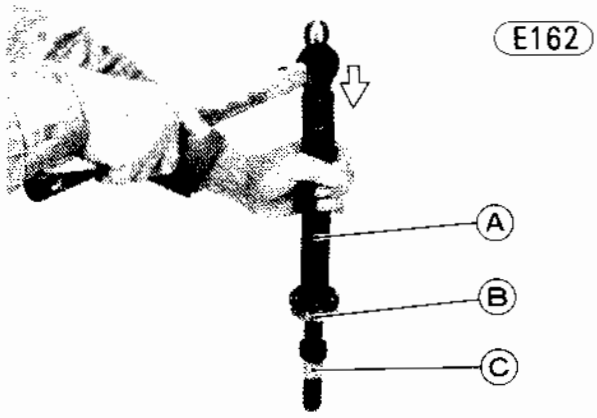
- Pull off the starter clutch gear 21 and flat washer 20.
- Remove the rollers 8, springs 10, and spring caps 9 (3 ea) from the starter motor clutch.
- Remove the circlip 14, and pull off the secondary sprocket 15. There are rubber dampers 16 (8).
- Holding the secondary shaft coupling steady, remove the Allen bolts 19 (3) to separate the coupling and starter motor clutch.
- Remove the right ball bearing 23 using the same special tool (P/N: 57001-135) used for the secondary gear removal.
- Using the bearing driver and bearing driver holder (special tools), tap the left ball bearing 7 off the crankcase.



A. Bearing Driver (57001-289)
B. Bearing Driver Holder (57001-139)

Assembly Notes:

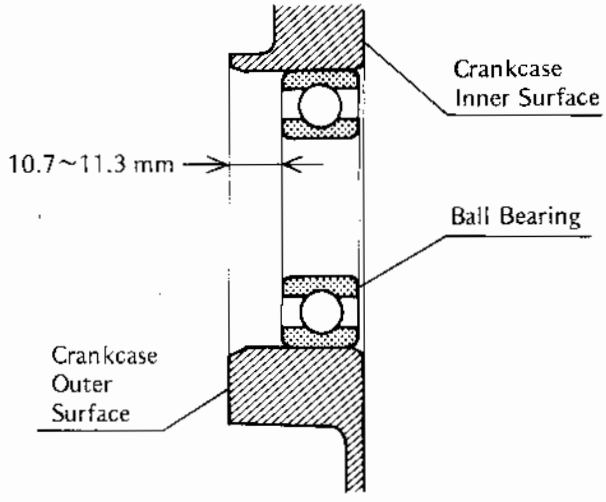
1. Check the rubber dampers (8), and replace them with new ones if damaged.
2. Apply a little oil on the rubber dampers (8) to assemble the secondary sprocket and coupling.
3. Apply a non-permanent locking agent to the starter clutch Allen bolts (3), and tighten the bolts to 3.5 kg-m (25 ft-lbs) of torque.
4. Install the right ball bearing using the transmission circlip driver (special tool).



A. Driver (57001-382)
B. Ball Bearing
C. Secondary Shaft

5. Install the left ball bearing using the same special tools (P/N: 57001-289, 57001-139) until it is 10.7 ~ 11.3 mm deeper than the crankcase surface.

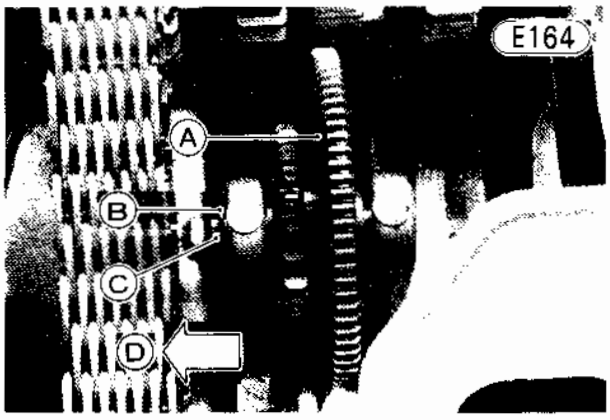
Ball Bearing Installation



STARTER MOTOR IDLE GEAR

Removal:

- Remove the secondary shaft and starter motor clutch (Pg. 84).
- Remove the circlip, pull off the shaft, and remove the idle gear.



A. Idle Gear
B. Circlip
C. Shaft
D. Left Side

Installation Note:

- The idle gear must be installed so that the smaller gear side points to the left.

Disassembly–Engine Removed

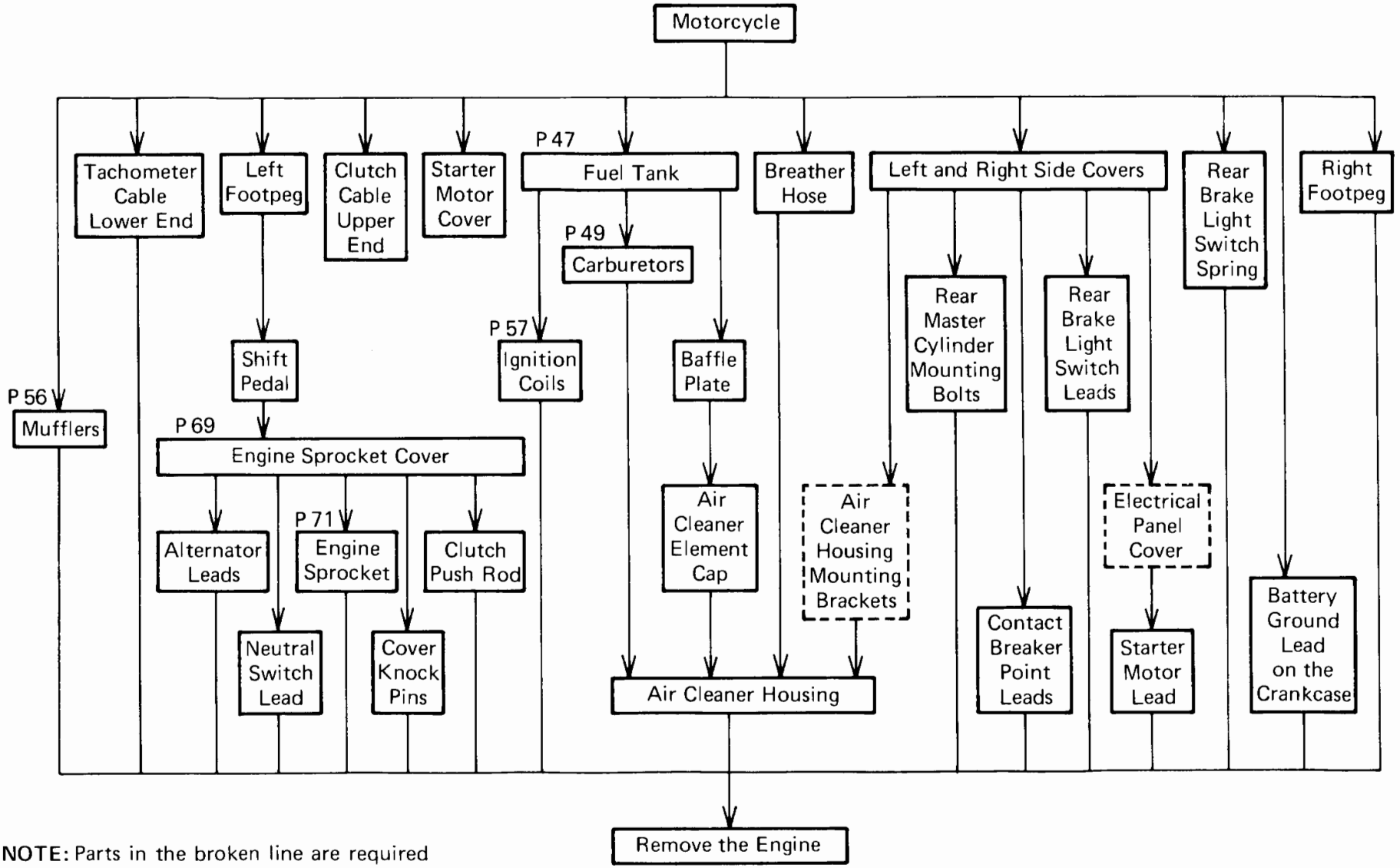
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FLOW CHARTS 90
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F

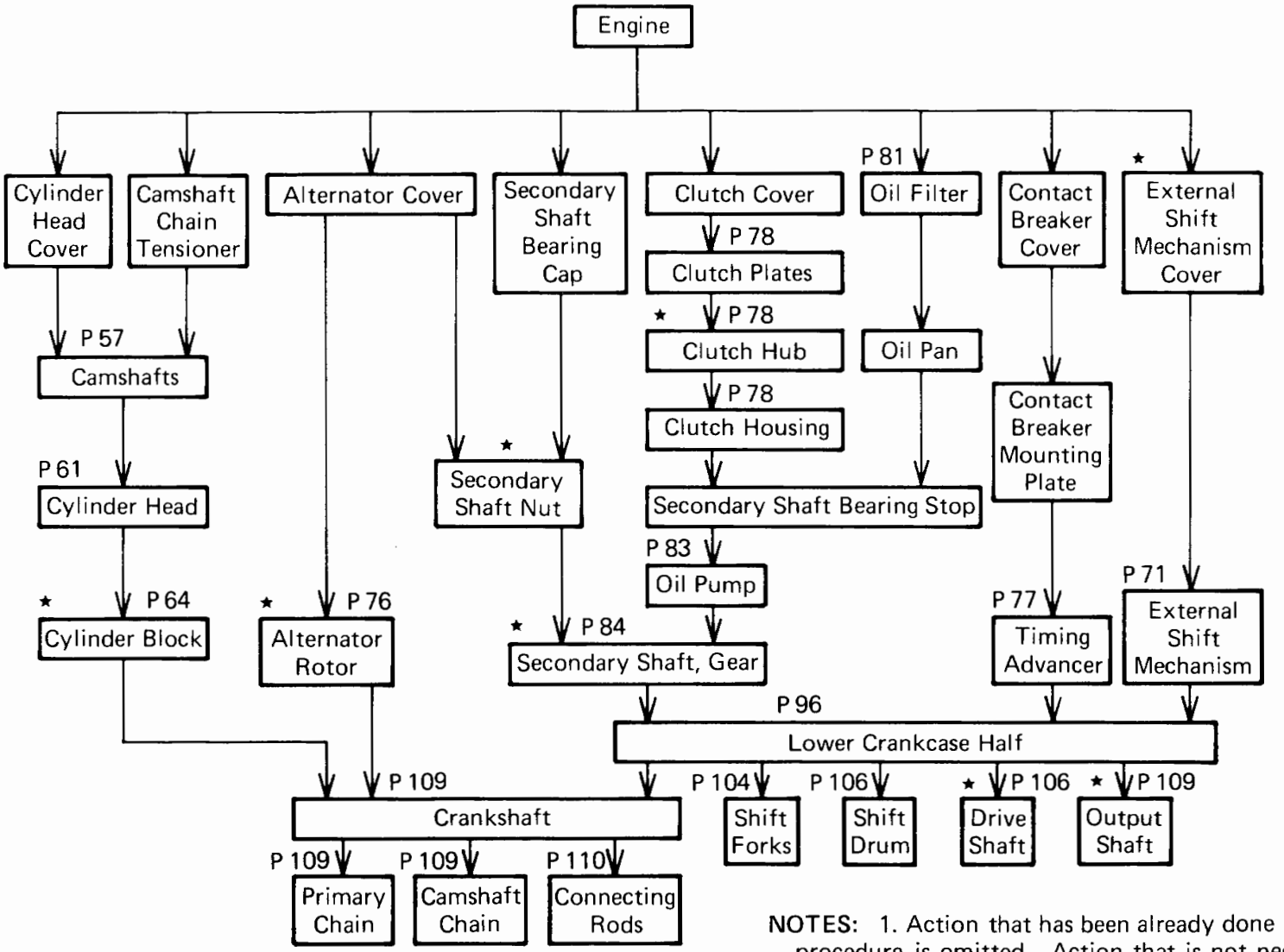
FLOW CHART
Engine Removal

The following charts are intended to be aids to proper removal. Select the component you wish to remove and follow the arrows to that point on the chart.



NOTE: Parts in the broken line are required to loosen its mounting bolts or screws, but not necessary its complete removal.

FLOW CHART
Disassembly – Engine Removed

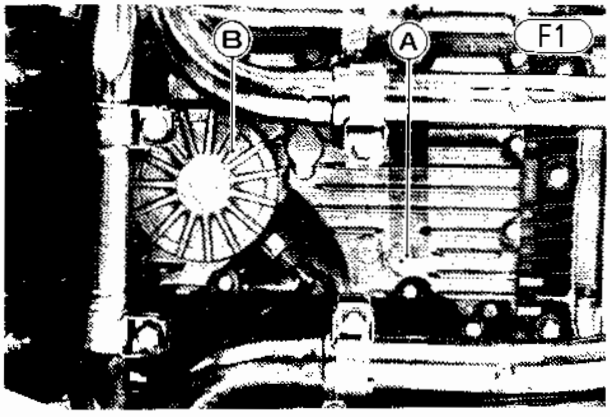


NOTES: 1. Action that has been already done in the engine removal procedure is omitted. Action that is not necessarily required for engine disassembly off the motorcycle is also omitted.
2. Action with a mark (★) requires special tool(s) for removal, installation, disassembly, or assembly.

ENGINE REMOVAL

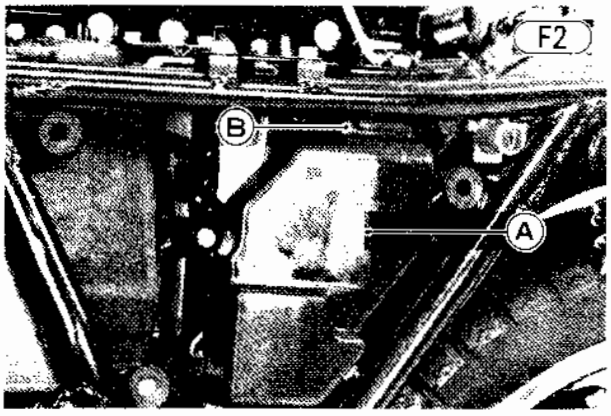
Removal:

•With the motorcycle up on its center stand, place an oil pan beneath the engine, and remove the engine drain plug and oil filter to drain out the oil.



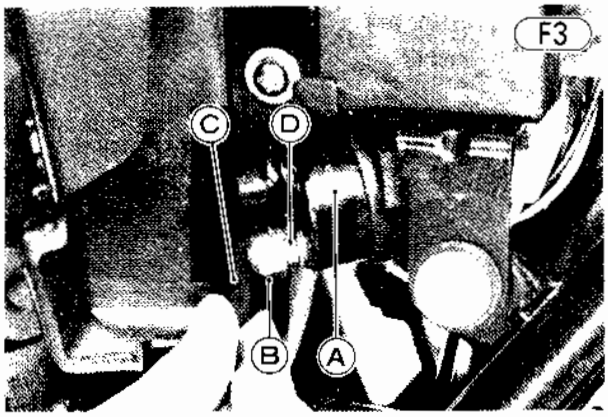
A. Engine Drain Plug B. Oil Filter

•After draining the oil, replace the drain plug with its aluminum gasket, tighten the plug to 3.8 kg-m (27 ft-lbs) of torque, and install the oil filter tightening its bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
•Remove the fuel tank (Pg. 47).
•Take off the right and left side covers.
•Remove the ignition coils (Pg. 57).
•Remove the screw and flat washer, and open the electrical panel cover.



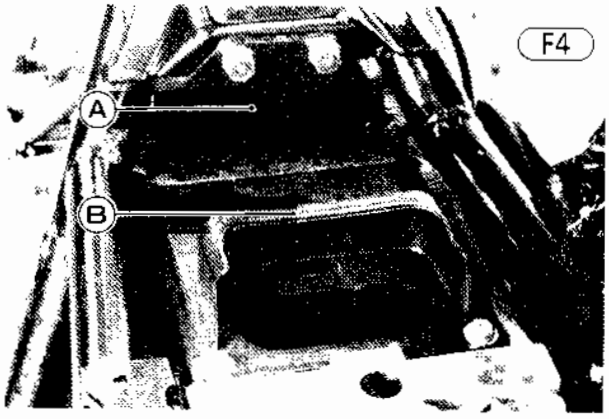
A. Electrical Panel Cover B. Screw

•Slide the rubber cap out of place, remove the nut and lockwasher, and free the starter motor lead from the starter relay terminal.



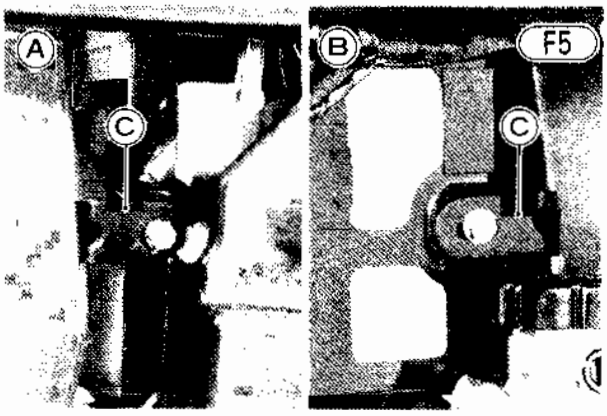
A. Starter Relay C. Rubber Cap
B. Starter Motor Lead D. Relay Terminal

•Remove the bolts (2) and baffle plate.



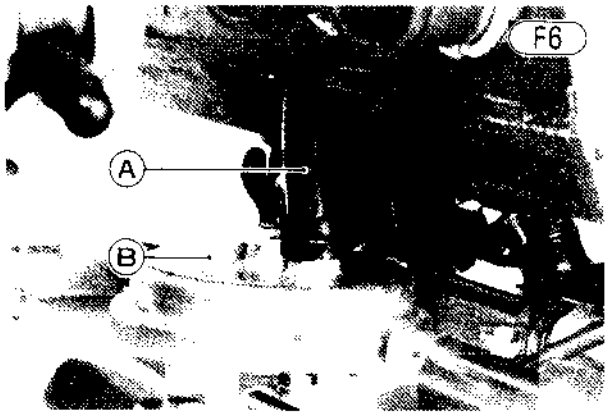
A. Baffle Plate B. Air Cleaner Element Cap

the air cleaner element cap.
•Remove the air cleaner housing mounting bracket bolts, lockwashers, and flat washers from both sides of the battery housing. Remove the mounting brackets.



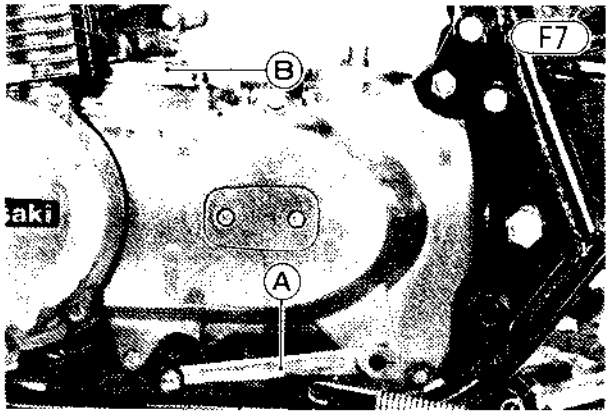
A. Left Side C. Mounting Bracket
B. Right Side

•Remove the carburetors (Pg. 49).
•Slide the clip out of place, and remove the breather hose from the breather cover.



A. Breather Hose B. Breather Cover

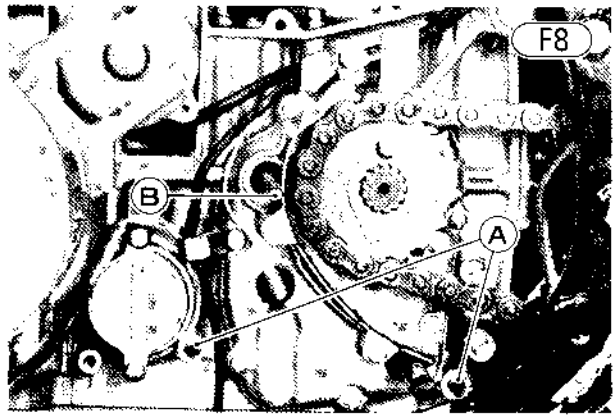
•Remove the air cleaner housing.
•Remove the left footpeg bolt and lockwasher, and remove the footpeg.
•Check to see that the transmission is in neutral, then take out the shift pedal bolt, and remove the shift pedal.



A. Shift Pedal B. Starter Motor Cover

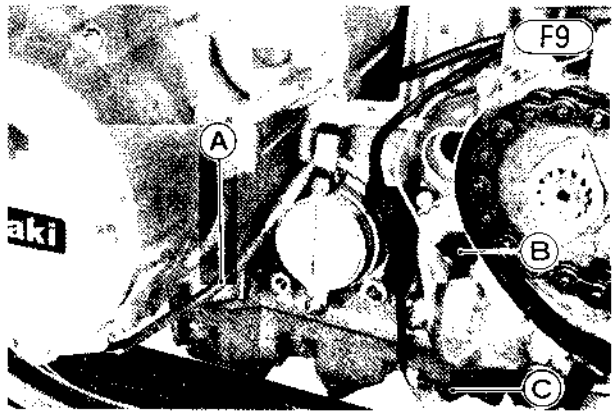
•Remove the bolts (2) and flat washers (2), and remove the starter motor cover.
•Remove the clutch cable clamp from the frame.
•Remove the engine sprocket cover bolts (4), and pull the cover free from the crankcase.
•Loosen the knurled locknut on the clutch lever holder, and screw in the adjuster.
•Line up the slots in the clutch lever, locknut, and adjuster and then free the cable from the lever.
•Free the clutch cable and engine sprocket cover from the frame.
•Pull out the engine sprocket cover knock pins (2), if they are still in the engine.

NOTE: This prevents the knock pin from catching the engine mounting bracket when the engine is lifted up.



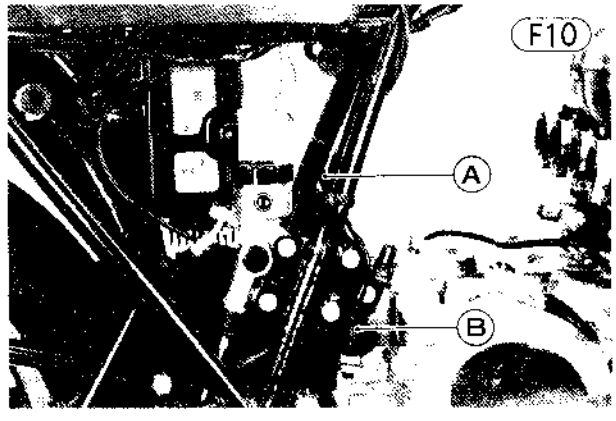
A. Knock Pins B. Clutch Push Rod

•Take the clutch push rod off the crankcase.
•Disconnect the neutral switch lead from the switch and the oil pressure switch lead from the switch, and disconnect the alternator yellow leads. Free the lead from the engine.



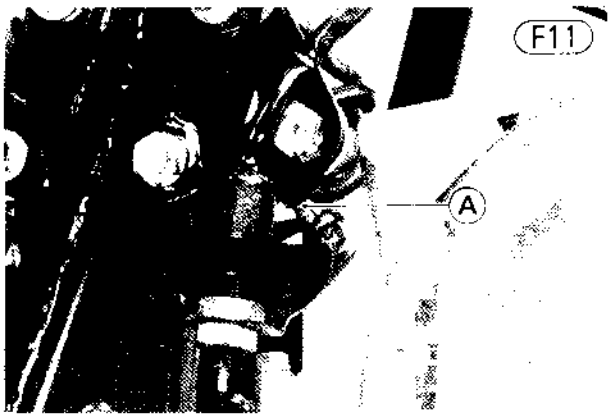
A. Alternator Yellow Leads C. Oil Pressure Switch
B. Neutral Switch

•Remove the mufflers (Pg. 56).
•Remove the rear brake light switch spring.
•Disconnect the rear brake light switch leads (blue and brown).



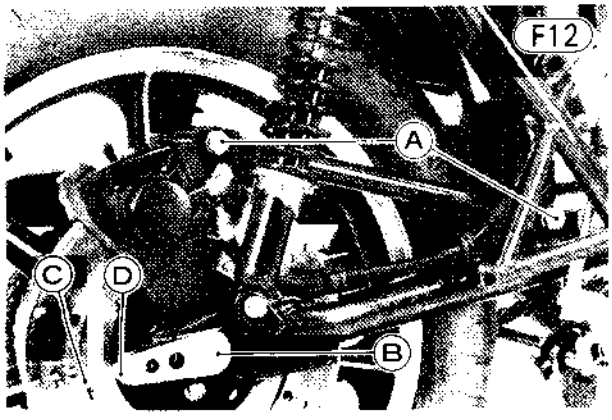
A. Rear Brake Light Switch Leads
B. Rear Brake Light Switch

•Remove the bolt and lockwasher, and remove the battery negative ground lead from the engine.



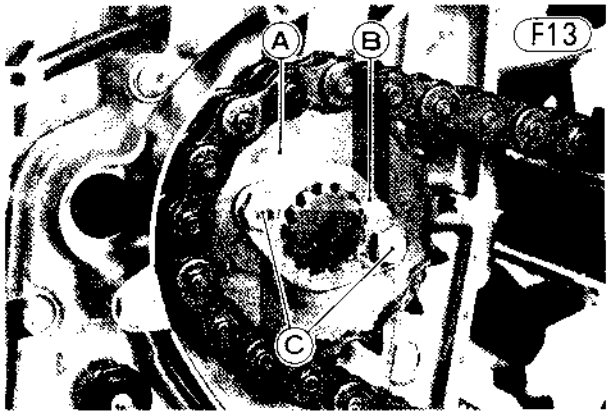
A. Battery Negative Ground Lead

•Free the contact breaker point leads (black and green) from the frame.
•Remove the rear master cylinder mounting bolts (2).
•Loosen the brake pedal adjusting bolt locknut, and back out the adjusting bolt until the pedal is held down out of the way.
•Remove the bolt and lockwasher, and remove the right footpeg.
•Unscrew the tachometer cable from the cylinder head and pull off the cable from the cylinder head.
•Loosen the torque link nuts, rear axle nut, and chain adjusting bolt locknuts, and then turn out the chain adjusting bolts in order to give the chain plenty of play. Kick the wheel forward until the chain is slack. This will facilitate removal of the engine sprocket.



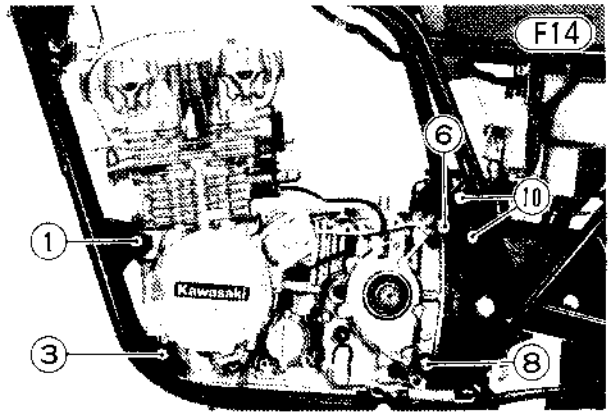
A. Torque Link Nuts
B. Rear Axle
C. Adjusting Bolt
D. Locknut

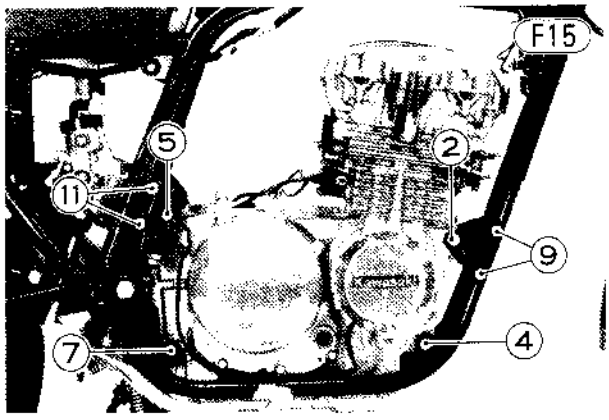
•Remove the engine sprocket holding plate bolts (2), and remove the holding plate and engine sprocket.



A. Engine Sprocket
B. Holding Plate
C. Plate Bolts

•Remove the left and right reflectors. Each of them has a rubber damper.
•Jack or lever the engine up slightly to take the weight off the mounting bolts.
•Remove the engine mounting bolt nuts ⑥, ⑧.





1. Front Upper Left Mounting Bolt
2. Front Upper Right Mounting Bolt
3. Front Lower Left Mounting Bolt
4. Front Lower Right Mounting Bolt
5. Rear Upper Mounting Bolt
6. Rear Upper Mounting Bolt Nut
7. Rear Lower Mounting Bolt
8. Rear Lower Mounting Bolt Nut
9. Front Upper Right Bracket Bolts
10. Rear Upper Left Bracket Bolts
11. Rear Upper Right Bracket Bolts

- Remove the engine mounting bolts ①, ②, ③, ④.
- Remove the front upper mounting bracket bolts ⑨, nuts, and lockwashers, and remove the bracket.
- Remove the rear upper mounting bracket bolts ⑩ and lockwashers, and remove the bracket with the rear brake light switch.
- Pull out the engine mounting bolts ⑤, ⑦. Be careful not to damage the threads upon removal. The rear upper mounting bolt has two spacers.
- Make sure that the following cables and leads are free, and properly positioned on the engine and frame so that they will not get damaged during engine removal: starter lead, clutch cable, tachometer cable, contact breaker point leads, battery negative ground lead, alternator wiring, neutral and oil pressure switch leads, and throttle cables.
- Lift the engine straight up keeping it level, then move it to the right slightly so the rear and front of the engine slips over the lower right rear and the lower right front engine mounts.
- Lift up the right side so that the oil pan at the bottom of the engine clears the frame, and pull the engine out to the right side.

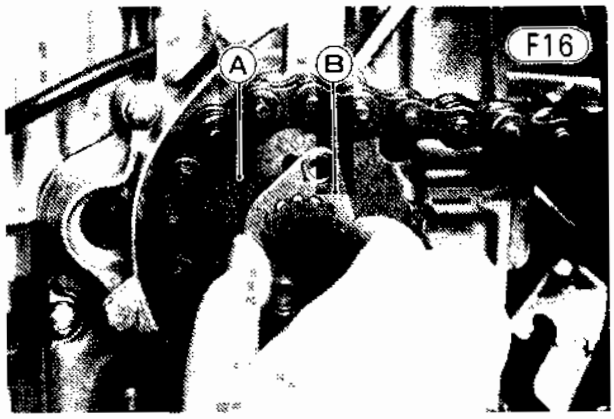
Installation:

- Place the engine into the frame the reverse of how it was removed.
- Install the rear upper and the front upper mounting brackets, and tighten four bracket bolts ⑨, ⑪ loosely. The rear two bolts and front two nuts have lockwashers.
- Lifting the engine as necessary so that the mounting bolt threads do not get damaged, insert the six engine mounting bolts and tighten them loosely. The rear upper mounting bolt ⑤ has two spacers.

Table F1 Engine Mounting Bolt Length and Torque

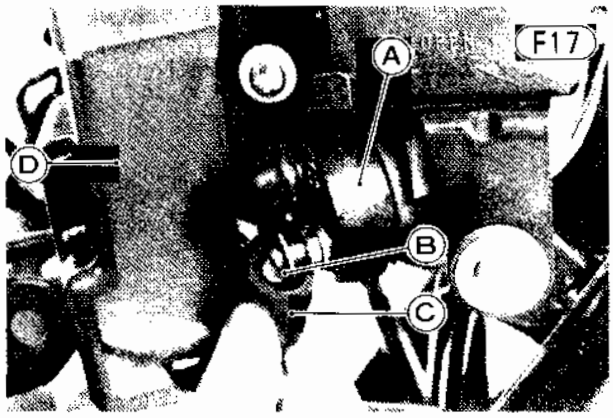
Bolt		Length	Torque
Front Upper Mounting Bolts	Left ①	72 mm	4.0 kg-m (29 ft-lbs)
	Right ②	62 mm	
Front Lower Mounting Bolts	Left ③	84 mm	
	Right ④		
Rear Upper Mounting Bolt ⑤		255 mm	
Rear Lower Mounting Bolt ⑦		179 mm	
Front Upper Right Bracket Bolts ⑨	Upper	63 mm	2.4 kg-m (17.5 ft-lbs)
	Lower	59 mm	
Rear Upper Bracket Bolts	Left ⑩	40 mm	
	Right ⑪		

- Tighten four bracket bolts and six engine mounting bolts to specified torque as shown in Table.
- Fit the drive chain back on the engine sprocket, and install the engine sprocket with the drive chain.
- Install the engine sprocket holding plate, and tighten the holding plate bolts (2) to 1.0 kg-m (87 in-lbs) of torque.



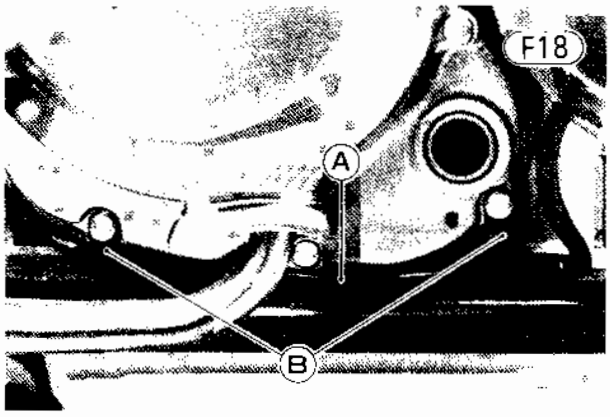
A. Engine Sprocket **B. Holding Plate**

- Install the push rod, applying a thin coat of a molybdenum disulfide engine assembly grease to its surface.
- Connect the alternator leads.
- Connect the neutral switch light green lead to the switch terminal and the oil pressure blue/red lead to the switch terminal.
- Fit the starter lead to the starter relay terminal. After tightening the nut, slide the rubber cap back onto the relay terminal.



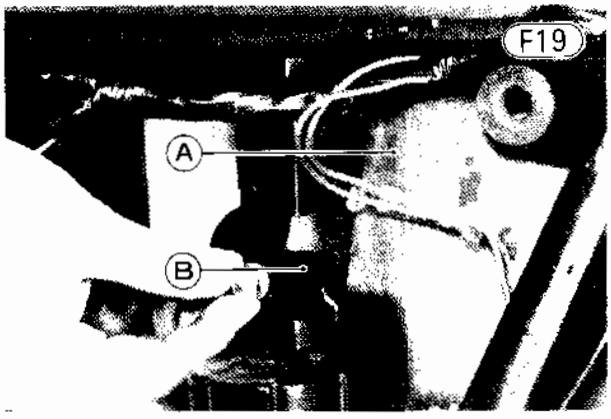
A. Starter Relay **C. Rubber Cap**
B. Starter Motor Lead **D. Electrical Panel Cover**

- Tighten the electrical panel cover screw and flat washer.
- Run the clutch cable between the left down tube and the lower part of the engine, and run the upper end of the cable between the left front fork and head pipe.
- Fit the tip of the cable back into the clutch lever.
- Fasten the clutch cable to the frame down tube with the clamp.
- Fit the engine sprocket cover knock pins (2).
- Install the engine sprocket cover, starter motor cover, shift pedal, and left footpeg (Pg. 69).
- Install the right footpeg with its bolt and lockwasher.
- Turn in the rear brake pedal adjusting bolt to install the rear brake master cylinder.
- Tighten the master cylinder mounting bolts.
- Check the harness of the contact breaker point leads is clamped.



A. Contact Breaker Leads B. Clamps

- Connect the rear brake light switch leads (blue and brown).
- Install the battery negative ground lead on the engine right side tightening its bolt. The bolt has a lockwasher.
- Adjust the drive chain (Pg. 28).
- Install the air cleaner housing, and put the mounting brackets into both sides of the housing. Install the bracket bolts, lockwashers, and flat washers with finger tight. The bracket bolts are tightened after carburetor installation.



A. Air Cleaner Housing B. Mounting Bracket

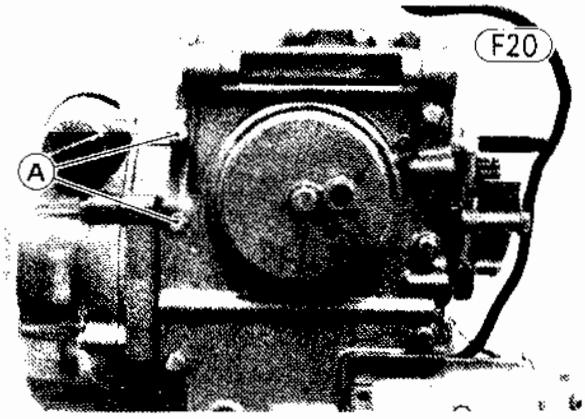
- Check that the air cleaner element is fitted in the correct position as shown in Fig. E12.
- Install the air cleaner element cap, and tighten the screws and flat washers.
- Install the baffle plate with its bolts. Each bolt has a lockwasher and flat washer.
- Fit the breather hose onto the breather cover, slide back the clip.
- Put on the carburetor holder clamp (4).
- Install the carburetors (Pg. 50).
- Fix the air cleaner housing to battery housing with the left and right side bracket bolts.
- Install the ignition coils (Pg. 57), and connect the contact breaker point leads (green and brake).
- Install the tachometer cable lower end onto the cylinder head.
- Install the mufflers (Pg. 57).
- Install the fuel tank (47).
- Push the seat back down.
- Fit the right and left side covers.
- Install the left and right reflectors. Each of them has a rubber damper.
- Install the rear brake light switch spring.
- Adjust the rear brake pedal (Pg. 29).
- Adjust the rear brake light switch (Pg. 30).
- Fill the engine with oil, check the level (Pg. 24), and add more if necessary.
- Adjust the clutch (Pg. 22).
- Adjust the throttle cables (Pg. 18).
- Adjust the ignition timing (Pg. 12).

CRANKCASE SPLIT

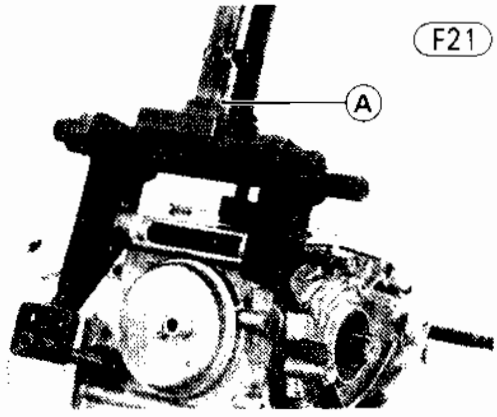
Disassembly:

- Remove the engine (Pg. 92).
- Set the engine on a clean surface or, preferably, into a disassembly apparatus with some means of holding the engine steady while parts are being removed.

NOTE: If the engine is to be set onto the engine stand (special tool), two of the upper crankcase half bolts (13) shown in Fig. F20 must be removed before positioning the engine.

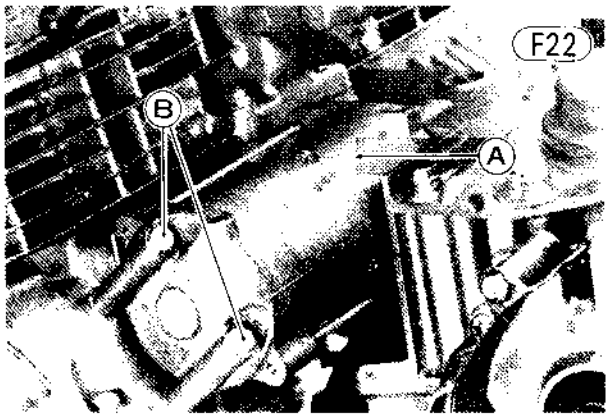


A. Remove the bolts.



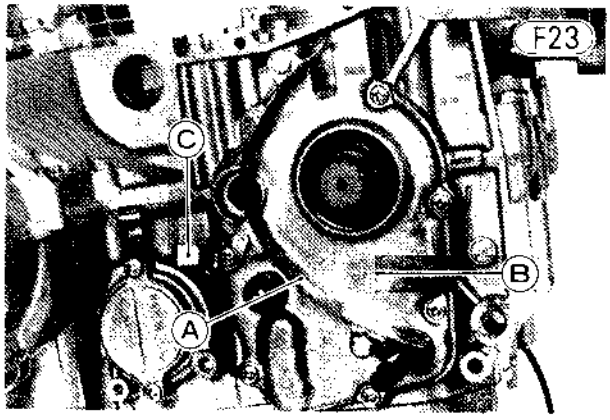
A. Engine Stand (57001-900)

- Remove the starter motor retaining bolts (2), and pull off the starter motor.



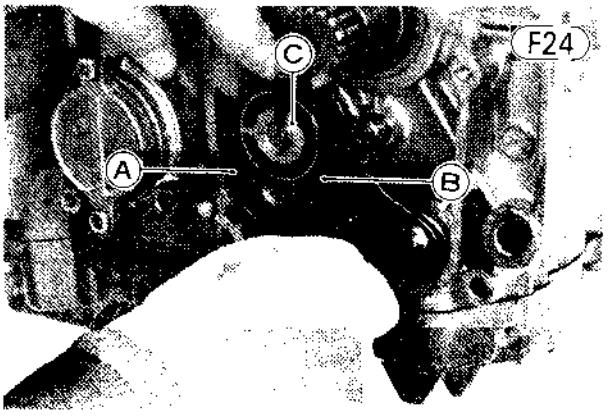
A. Starter Motor B. Retaining Bolts

•Remove the bolts (3) and drive chain guard.



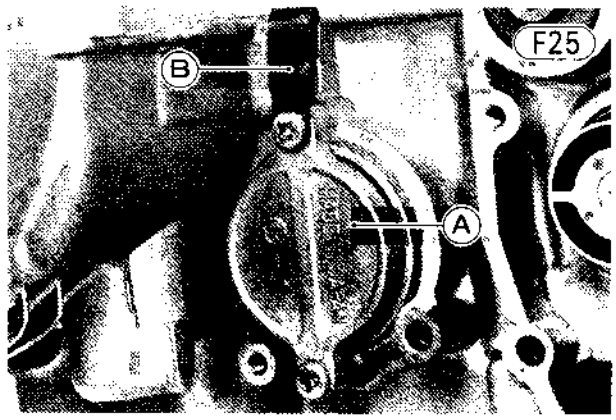
A. Drive Chain Guard C. Clamp
B. External Shift Mechanism Cover

•Remove the external shift mechanism cover screws (7), and pull off the external shift mechanism cover and gasket. There are two knock pins. One of the cover screws has a cable clamp.
•Move the shift arm and overshift limiter out of their positions on the end of the shift drum, and pull out the external shift mechanism.



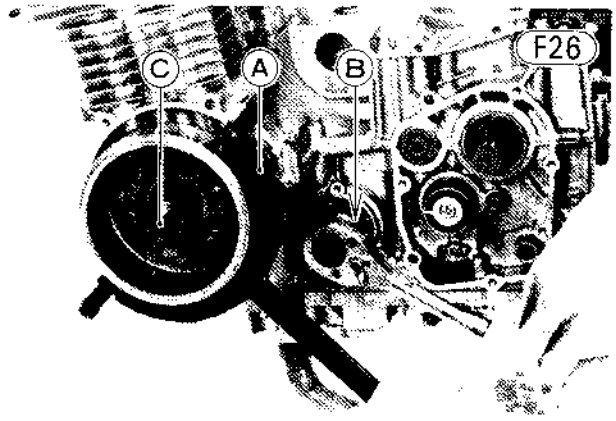
A. Shift Arm C. Shift Drum
B. Overshift Limiter

•Remove the screws (2), and pull off the secondary shift bearing cap. The upper screw has a wiring clamp.



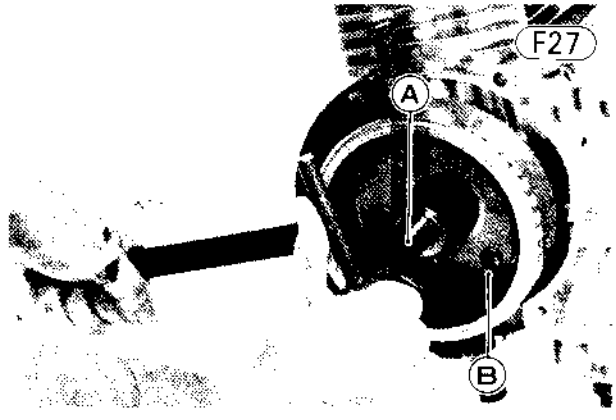
A. Bearing Cap B. Wiring Clamp

•Remove the alternator cover screws (4), and pull off the alternator cover and gasket. There are two knock pins.
•Holding the alternator rotor steady with the rotor holder (special tool), and remove the secondary shaft nut.



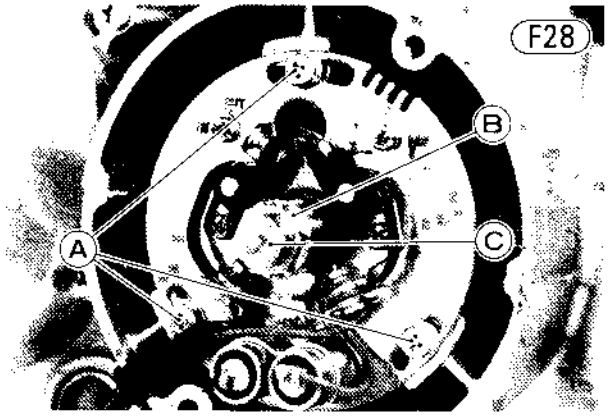
A. Rotor Holder (57001-308) C. Rotor Bolt
B. Secondary Shaft Nut

•Remove the alternator rotor according to the following two steps only if the crankshaft is to be removed.
○Hold the alternator rotor steady with the rotor holder (special tool), and remove the rotor bolt.
○Using the special tool to hold the rotor steady, remove the rotor with the rotor puller (special tool).



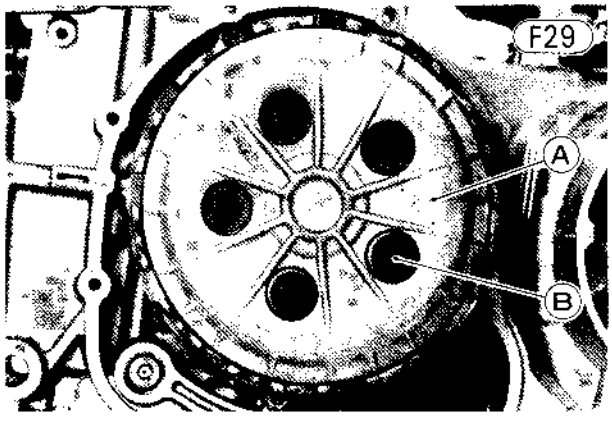
A. Rotor Puller (57001-254 or 57001-1099)
B. Alternator Rotor

- Remove the contact breaker cover and gasket.
- Free the contact breaker point leads from the clamps under the clutch cover.
- Take out the contact breaker plate screws, lockwashers, and flat washers (3 ea).



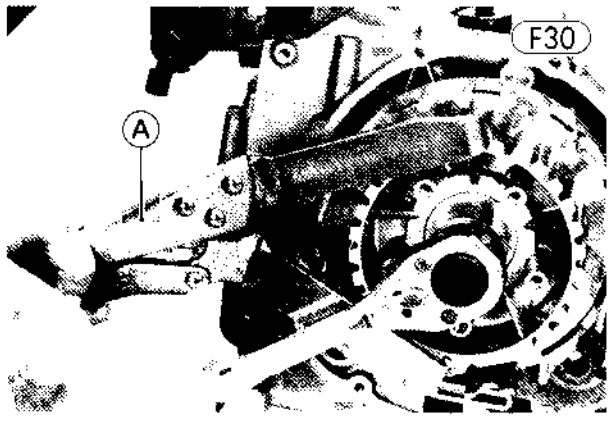
A. Contact Breaker Plate Screws
B. Crankshaft Rotation Nut
C. Timing Advancer Mounting Bolt

- With a 17 mm wrench on the crankshaft rotation nut to keep the shaft from turning, remove the advancer mounting bolt, and take off the timing advancer.
- Remove the screws (9), and pull off the clutch cover and gasket.
- Remove the clutch spring bolts (5), washers (5), and springs (5).



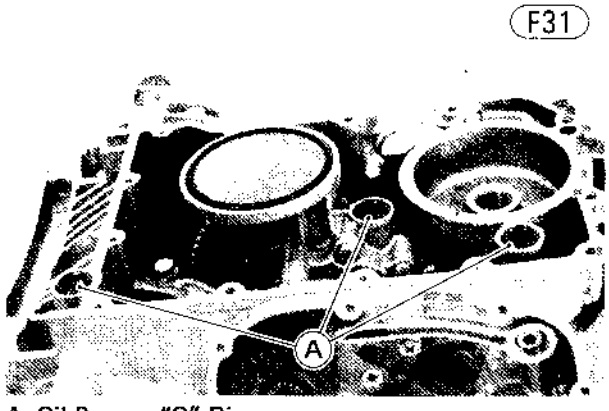
A. Spring Plate **B. Spring Bolt**

- Pull off the spring plate and spring plate pusher.
- Push in the push rod to remove the steel ball, and pull out the push rod.
- Remove the friction plates (7) and steel plates (6).
- Hold the clutch hub from turning using a clutch holder (special tool), and remove the clutch hub nut and lockwasher.



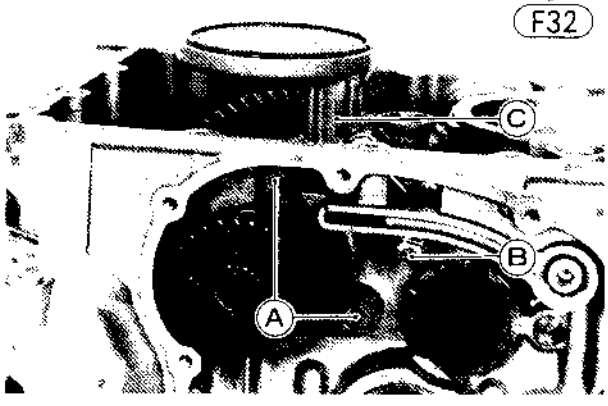
A. Clutch Holder (57001-305)

- Pull off the clutch hub, clutch housing, needle bearing, collar, and large flat washer. There is a thrust washer between the clutch hub and clutch housing.
- Remove the upper crankcase half bolts (13, or 11 if two were removed just after engine removal).
- Turn the engine upside down.
- Remove the oil filter mounting bolt, oil filter, and large O ring.
- Remove the oil pan bolts (13), and remove the oil pan, gasket, large O ring, and oil passage O rings (3).



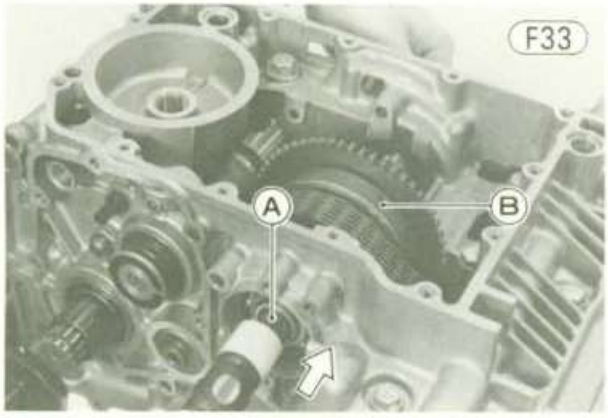
A. Oil Passage "O" Rings

- Remove the secondary shaft bearing stop screws (2), and remove the stop.



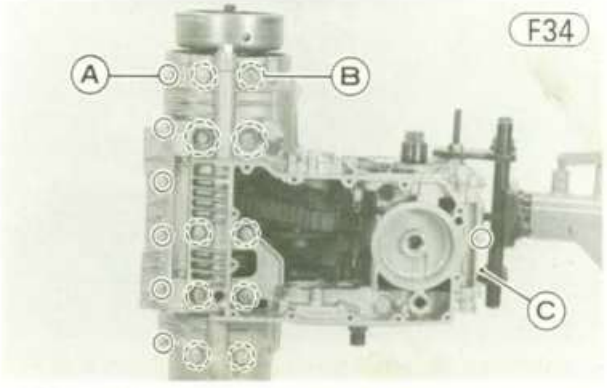
A. Bearing Stop Screws **C. Oil Pump**
B. Oil Pump Bolt

•Remove the engine oil pump bolt, and take off the engine oil pump. There are two knock pins.
•Tap the secondary shaft from the left side of the crankcase until the right bearing comes out of place.

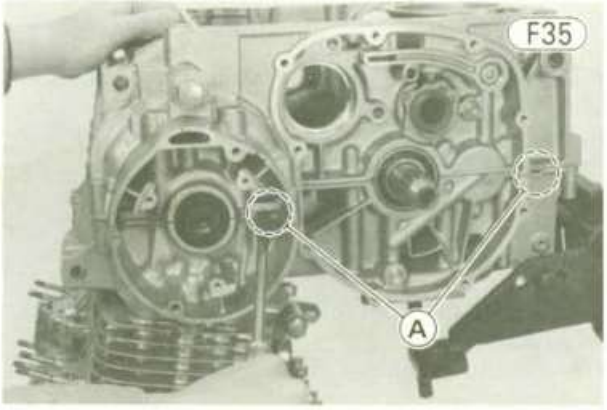


A. Secondary Shaft
B. Starter Motor Clutch Assembly

•Holding the secondary sprocket and starter motor clutch assembly, pull out the secondary shaft.
•Slip the secondary sprocket and starter motor clutch assembly from the primary chain, and take them out.
•Remove the 6 mm lower crankcase half bolts (7) and 8 mm bolts (10), pry the four points shown in Fig. F35 to split the two crankcase halves apart, and lift off the lower crankcase half. The one of the 6 mm bolts has the clamp for the battery vent hose.



A. 6 mm Bolt B. 8 mm Bolt C. Clamp



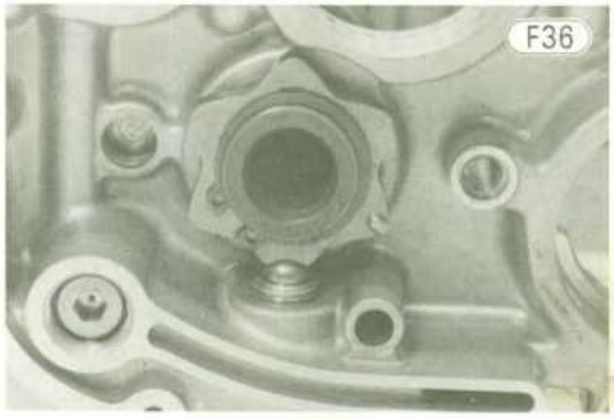
A. Pry Points

•Take out the drive shaft and output shaft assemblies.

Assembly:

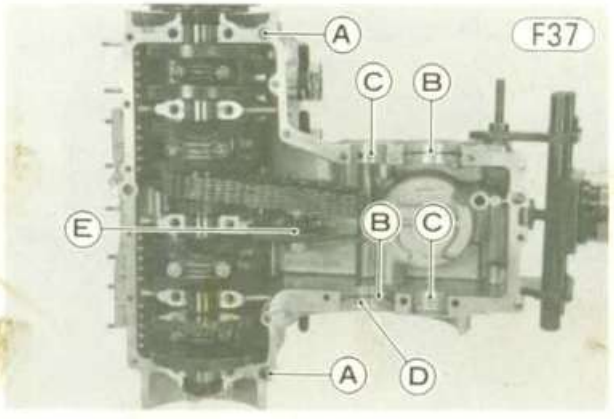
NOTES: 1. The upper crankcase half and the lower crankcase half are machined at the factory in the assembled state, so the crankcase halves must be replaced together as a set.
2. Replace the 8 mm lower crankcase half bolts (10) with new ones if they have already been removed 5 times.
3. If a new crankshaft, crankcase halves, and/or main bearing inserts are used, select the proper bearing inserts in accordance with the combination of crankshaft and crankcase marks (See Pg. 110).

•Set the shift drum in neutral position as shown.



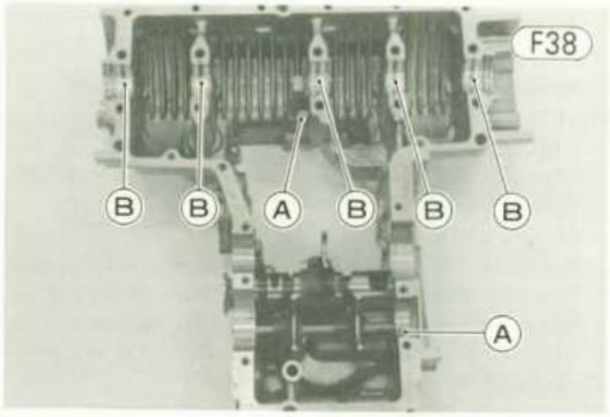
•Check to see that the following parts are in place on both the upper crankcase half and the lower crankcase half, and blow the oil passage nozzles clean with compressed air.

Upper crankcase half:
Knock pins (2); drive shaft and output shaft set rings (2), and set pins (2); oil passage plug (rubber ball); and starter motor idle gear.



A. Knock Pin
B. Set Ring
C. Set Pin
D. Oil Passage Plug
E. Idle Gear

Lower crankcase half:
Oil passage nozzles (2); and crankshaft main bearing inserts (5).



A. Oil Passage Nozzle B. Bearing Insert

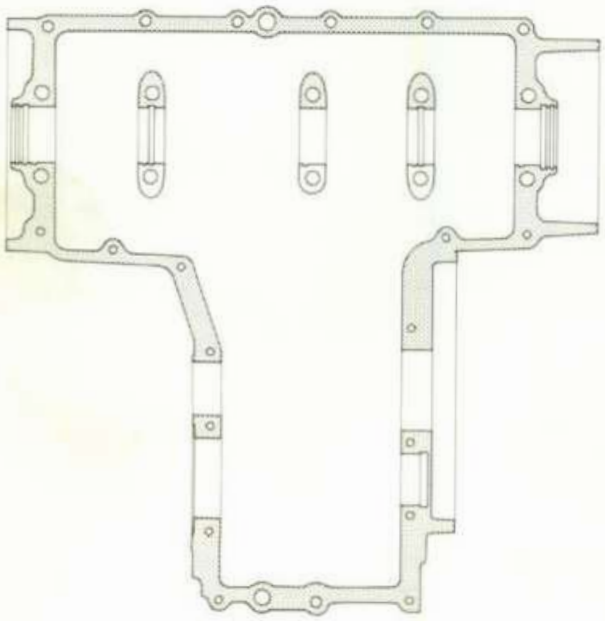
- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Fit the output and drive shaft assemblies on the upper crankcase half. When installing the output and drive shafts, the crankcase set pins must go into the holes in the respective needle bearing outer races, and the set rings must fit into the grooves in each ball bearing.

CAUTION **Make sure the crankcase set pins are properly aligned to avoid damage to the crankcases upon installation.**

- Apply a little engine oil to the transmission gears, ball bearings, shift drum, and crankshaft main bearing inserts.
- Apply liquid gasket to the mating surface of the lower crankcase half in the areas shown in Fig. F39.

CAUTION **If liquid gasket adheres to any areas not indicated, the engine oil passages may be obstructed, causing engine seizure.**

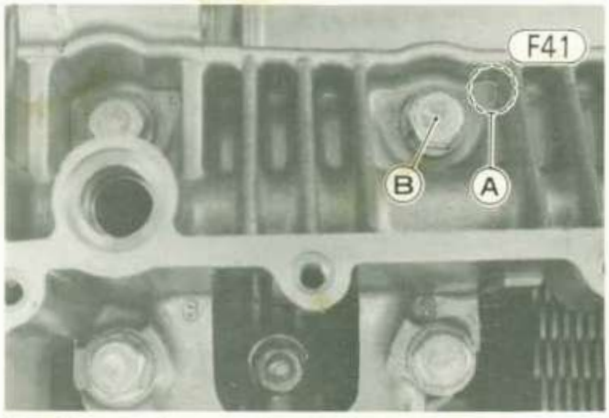
Liquid Gasket Applied Area (Crankcase) F39



- Fit the lower crankcase half on the upper crankcase half. Each shift fork must fit in its gear groove.

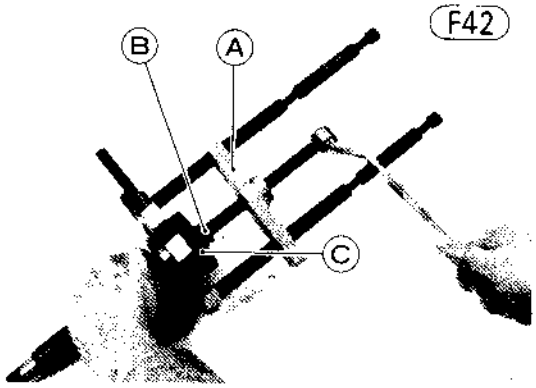


- Install and lightly tighten the lower crankcase half 8 mm bolts (10) and 6 mm bolts (7).
- Following the tightening sequence numbers on the lower crankcase half, tightening the 8 mm bolts (10) first to about 1.5 kg-m (11.0 ft-lbs) and finally to 2.5 kg-m (18.0 ft-lbs) of torque.



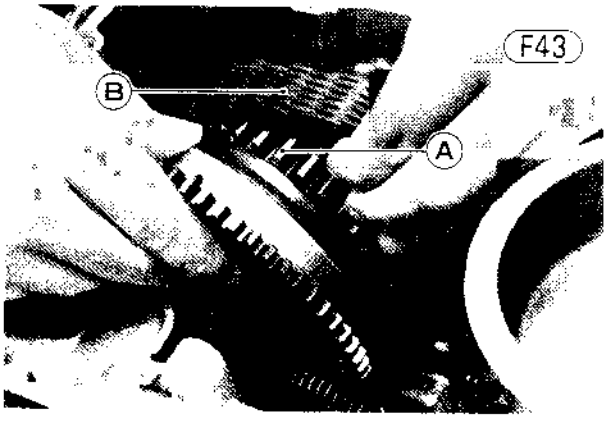
A. Tightening Sequence Number B. 8 mm Bolt

- Tighten the 6 mm bolts (7) to 1.0 kg-m (87 in-lbs) of torque.
- Check to see that the drive shaft and output shaft turn freely.
- Install the alternator rotor according to the following two steps only if the rotor was removed.
  - Using a high flash-point solvent clean off an any oil or dirt that may be on the crankshaft taper or rotor hub, and install the alternator rotor.
  - Tighten the bolt to 7.0 kg-m (51 ft-lbs) of torque while holding the alternator rotor steady with the rotor holder (special tool).
- Remove the secondary shaft gear circlip. Using the bearing puller and adapter (special tools), pull the secondary shaft gear and collar off the shaft.



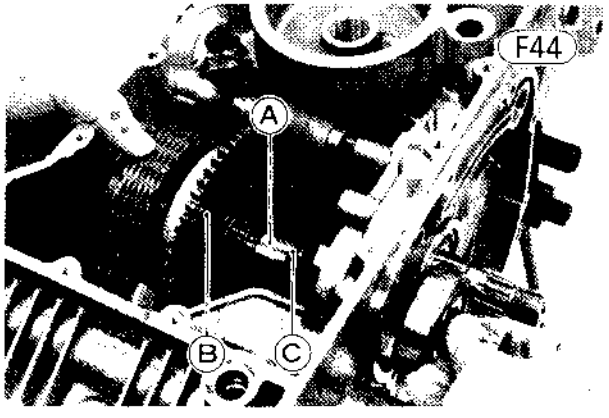
A. Bearing Puller (57001-135)
B. Bearing Puller Adapter (57001-317)
C. Secondary Shaft Gear

•Put the thrust washer and starter motor clutch into the secondary sprocket and starter motor clutch assembly.
•Fit the primary chain on the secondary sprocket.



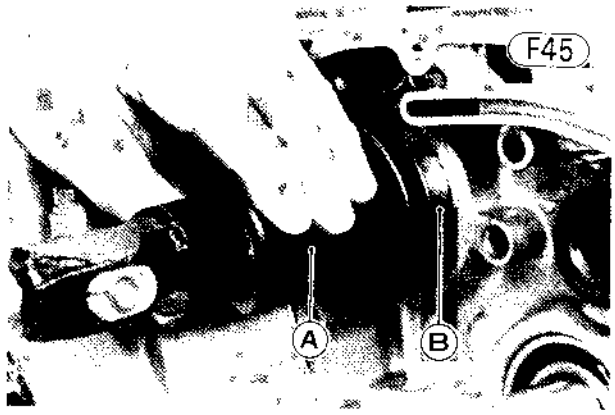
A. Secondary Sprocket B. Primary Chain

•Put the bearing collar into the left secondary shaft bearing.
•Put the thrust washer on the secondary shaft, and put the secondary shaft into the secondary sprocket and starter motor clutch assembly, fitting their splines.



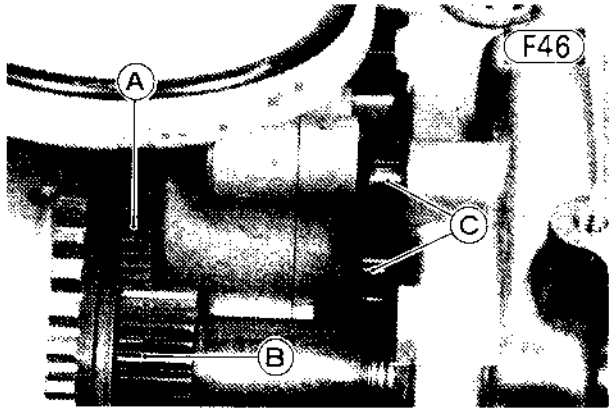
A. Secondary Shaft
B. Starter Motor Clutch Assembly
C. Thrust Washer

•Using the bearing driver (special tool), tap the secondary shaft bearing into the crankcase with the secondary shaft until the bearing stops at the bottom of the crankcase bearing hole. Check that the bearing collar is properly fitted in the left bearing.



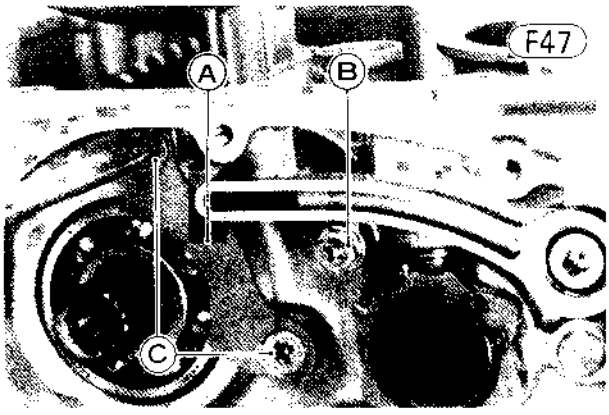
A. Bearing Driver (57001-297)
B. Right Secondary Shaft Bearing

•Check to see that the oil pump knock pins (2) are in place. Install the oil pump, making sure the oil pump gear and pump drive gear at the secondary shaft mesh properly. Tighten the oil pump bolt.



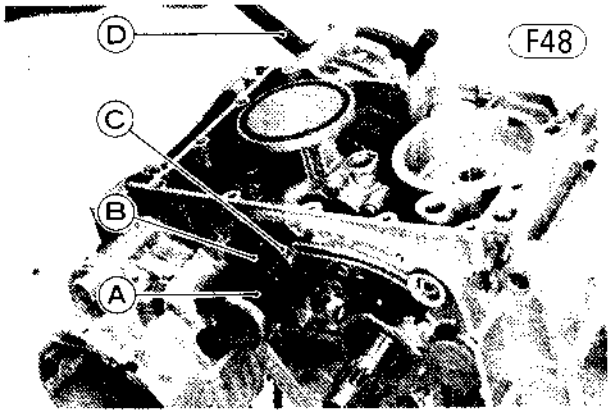
A. Oil Pump Gear C. Knock Pins
B. Drive Gear

•Install the secondary shaft bearing stop with the screws (2), stake each screw head with a punch to prevent loosening.



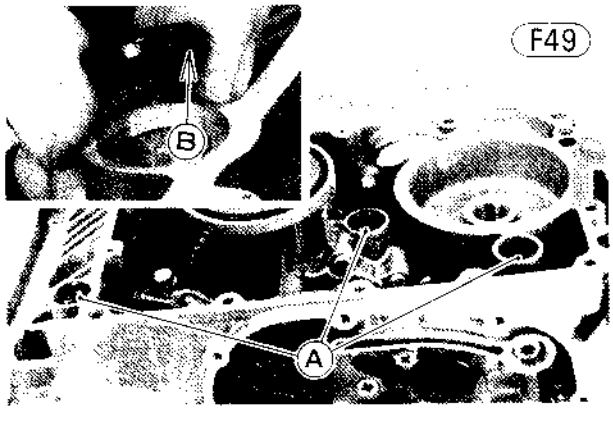
A. Bearing Stop
B. Oil Pump Bolt
C. Stop Screws

- Put the collar on the secondary shaft.
- Apply a little oil on the secondary shaft and between the secondary shaft gear and gear pusher (special tool). Using the holder (special tool) to keep the crankshaft and secondary shaft from turning, push the secondary shaft gear on the shaft by rotating the gear pusher (special tool).



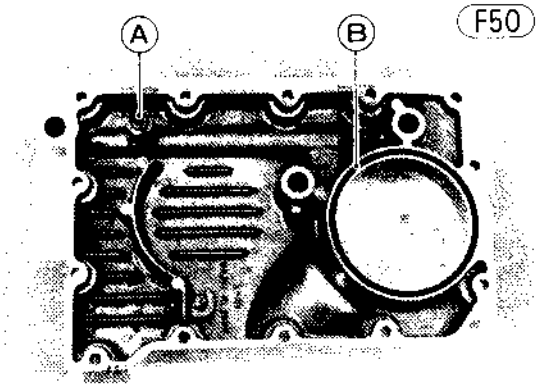
A. Gear Pusher (57001-319)
B. Secondary Shaft Gear
C. Collar
D. Holder (57001-308)

- Install the circlip on the secondary shaft.
- Fit the oil passage O rings (3) on the lower crankcase. Replace the O rings with new ones, if deteriorated or damaged. The flat side of the O ring must face down.



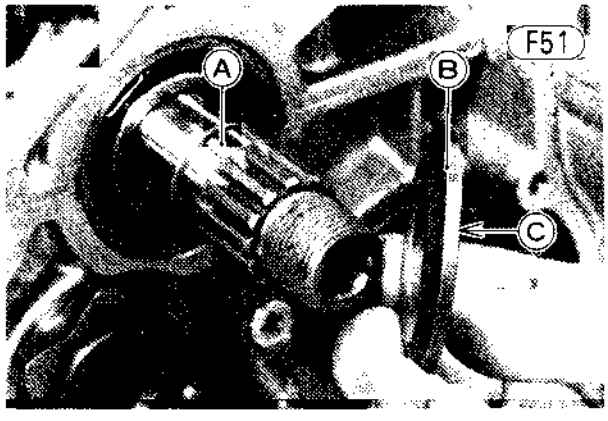
A. Oil Passage "O" Rings
B. Flat Side

- Check that the large O ring and oil pressure relief valve are in place, and install a new oil pan gasket, and the oil pan with its mounting bolts (13). Tighten the bolts to 1.0 kg-m (87 in-lbs) of torque.



A. Oil Pressure Relief Valve
B. Large O Ring

- Check that the large O ring is in place, and install the oil filter, tightening its bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
- Turn the engine right side up.
- Install the upper crankcase bolts [13, or 11 if the engine is set on the engine stand (special tool)], and tighten them to 1.0 kg-m (87 in-lbs) of torque.
- Put the clutch housing spacer on the drive shaft. The spacer must be installed with its flat side facing toward the end of the shaft.

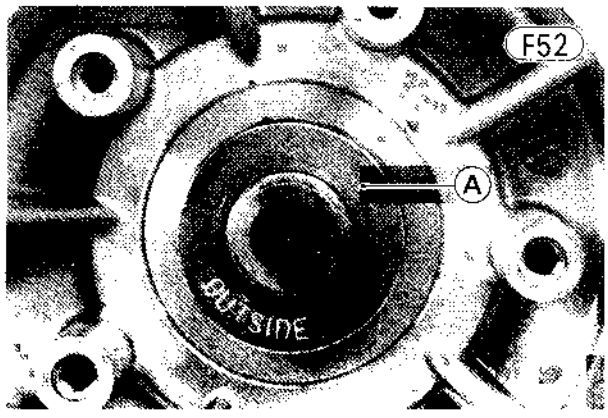


A. Drive Shaft
B. Clutch Housing Spacer
C. Flat Side

- Install the drive shaft sleeve, needle bearing, and clutch housing.
- Put on the thrust washer, clutch hub, and lockwasher. Replace the clutch hub nut with a new one, screw on the nut and tighten it to 13.5 kg-m (98 ft-lbs) of torque, while holding the hub stationary with the clutch holder (special tool).

WARNING **The washer between the clutch hub and the clutch hub nut must be installed with**

the marked side, "OUT SIDE", facing out (Fig. F52). If this washer is installed backwards, the hub nut might loosen during operation. This causes clutch disengagement, resulting in loss of motorcycle control.

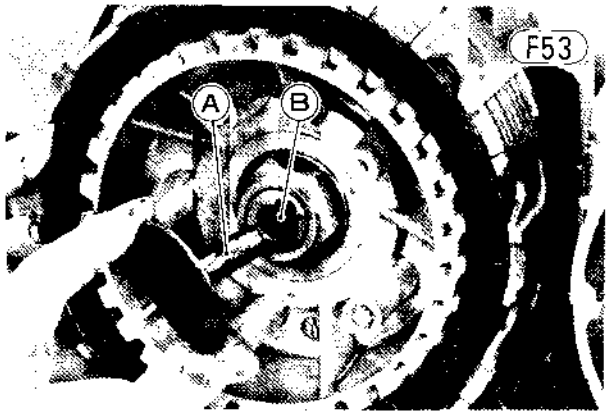


A. Lockwasher

•Install the friction plates (7) and steel plates (6), starting with a friction plate and alternating them.

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

•Insert the clutch steel ball, and spring plate pusher, applying a thin coat of molybdenum disulfide engine assembly grease to their surfaces.

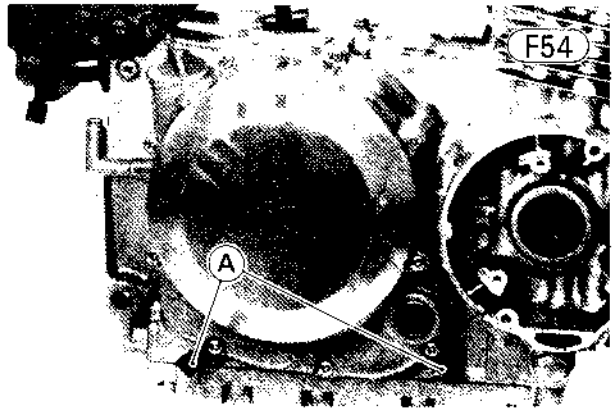


A. Spring Plate Pusher B. Steel Ball

•Install the spring plate, springs, spring washers, and spring bolts (5 ea). Cross tighten the bolts evenly to 0.90 kg-m (78 in-lbs) of torque.

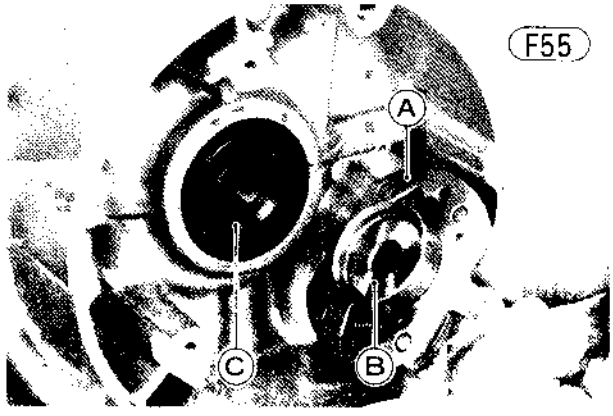
NOTE: The spring plate can be installed on the clutch hub in any position, so there is no mark on either the spring plate or the clutch hub.

•Fit the clutch cover onto the crankcase. Tighten the screws (9) firmly. Be sure to include the contact breaker lead clamps (2) with their clutch cover screws.



A. Clamps

•Fit the timing advancer onto the crankshaft, matching its notch with the pin in the end of the crankshaft, and install the crankshaft rotation nut and the advancer mounting bolt. The notches in the nut fit the projections on the timing advancer. Tighten the bolt to 2.5 kg-m (18.0 ft-lbs) of torque.



A. Timing Advancer B. Notch C. Pin

•Mount the contact breaker plate, and tighten its screws (3) loosely. Each screw has a lockwasher and flat washer.

NOTE: Contact breaker plate screws will be tightened securely during ignition timing adjustment.

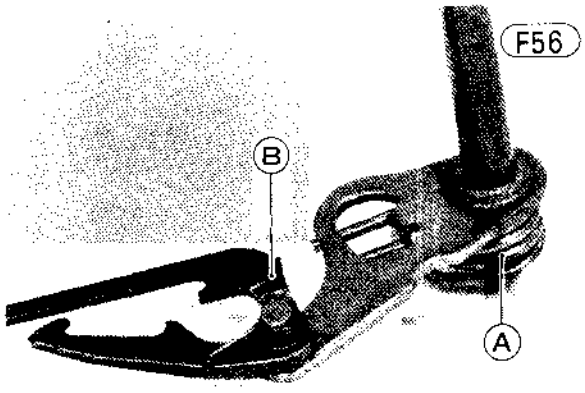
•Fit the wiring grommet, and install the gasket and contact breaker cover with the screws (2).

•Clamp the contact breaker wiring with the wiring clamps under the clutch cover.

•Check that the external shift mechanism return spring pin is not loose. If it is loose, remove it, apply a non-permanent locking agent to the threads, and re-install it (Fig. E105 on Pg. 72).

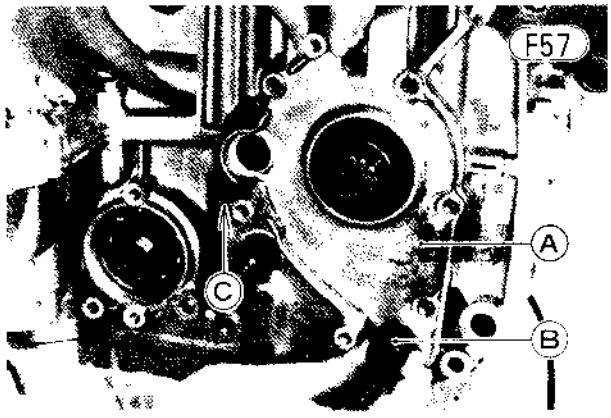
•Check that the return spring and pawl spring are

properly fitted in place, mount the external shift mechanism, and place its arms on the shift drum pins.



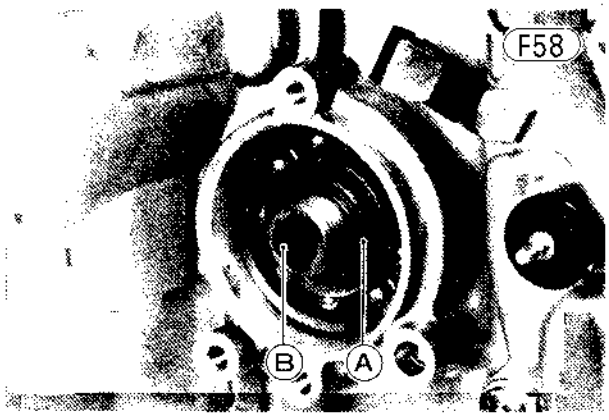
A. Return Spring B. Pawl Spring

- Apply a high temperature grease to the lips of the clutch push rod oil seal and the output shaft collar oil seal.
- Check that the external shift mechanism cover knock pins (2) are in place.
- Insert the shift shaft oil seal guide (special tool) in the external shift mechanism cover oil seal, install the cover and gasket, and then tighten the screws (7). There is a lead clamp.



A. External Shift Mechanism Cover
B. Shift Shaft Oil Seal Guide (57001-264)
C. Attach the lead clamp here with a screw.

- Apply a non-permanent locking agent to the bolts (3), and install the drive chain guard.
- Clean the starter motor lugs and crankcase where the starter motor is grounded.
- Apply a little oil to the O ring and install the starter motor. Tighten the starter motor retaining bolts (2).
- Check that the secondary shaft collar is in place.



A. Collar B. Secondary Shaft

- Tighten the secondary shaft nut to 6.0 kg-m (43 ft-lbs) of torque while holding the alternator rotor steady with the rotor holder (special tool).
- Install the secondary shaft bearing cap, and tighten its screws (2). The upper screw has a wiring clamp.
- Check that the knock pins (2) are in place, install the gasket and alternator cover, and tighten the screws (4).

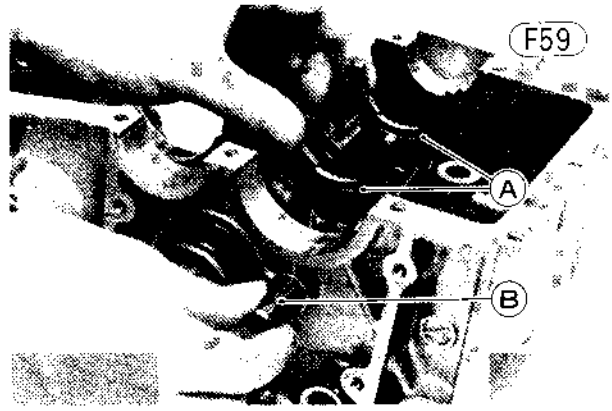
NOTE: Before installing the engine, tighten the remaining upper crankcase bolts if not already tightened. Tightening torque of the bolt is 1.0 kg-m (87 in-lbs).

- Install the engine (Pg. 95).
- Fill the engine with oil, check the oil level (Pg. 22), and add more if necessary.
- Carry out the adjustment procedures listed at the end of the engine installation section (Pg. 96).

TRANSMISSION

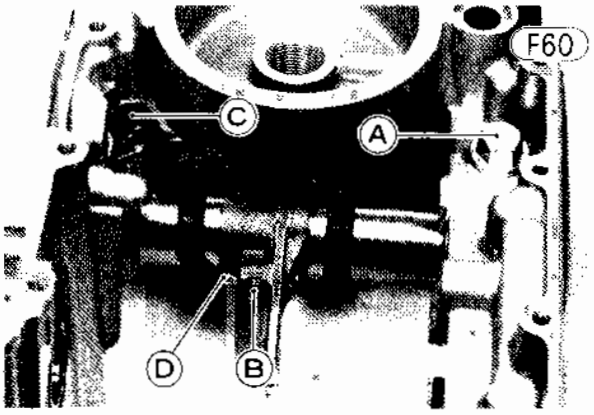
Removal:

- Remove the engine (Pg. 92).
- Split the crankcases (Pg. 96).
- Pull out the shift rod, and remove the two shift forks in the lower crankcase half.



A. Shift Forks B. Shift Rod

•Remove the shift drum positioning bolt, spring, and pin.

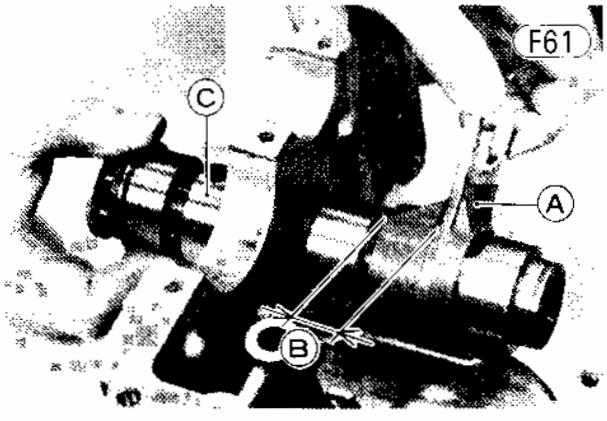


A. Positioning Bolt
B. Shift Fork Guide Pin
C. Guide Bolt
D. Cotter Pin

•Straighten the side of the lockwasher that is bent over the side of the shift drum guide bolt, and remove the bolt and lockwasher.
•Remove the cotter pin, and pull out the 5th/6th shift fork guide pin.
•Remove the operating place circlip and operating plate.
•Pull out the shift drum slightly, and remove the 5th/6th shift fork. Pull the shift drum free from the crankcase.

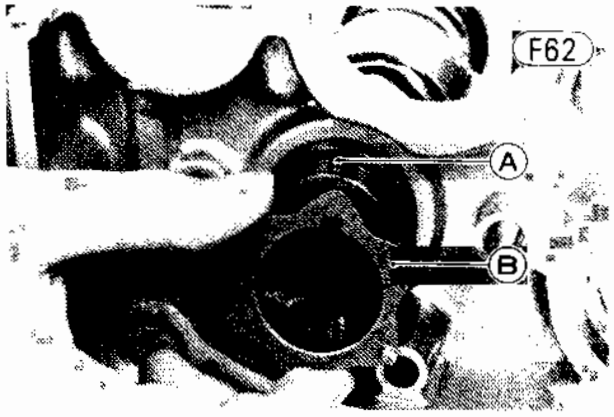
Installation:

•Insert the shift drum into the crankcase part way, install the 5th/6th shift fork with the long end facing the neutral switch, i.e., the long end goes onto the drum first.



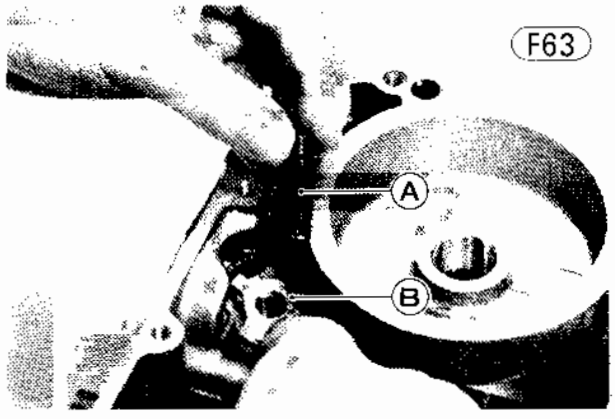
A. 5th/6th Shift Fork
B. Long End
C. Shift Drum

•Push the shift drum in the rest of the way.
•Check to see that the operating plate pin is in place, fit the operating plate onto the end of the shift drum, and install the circlip.



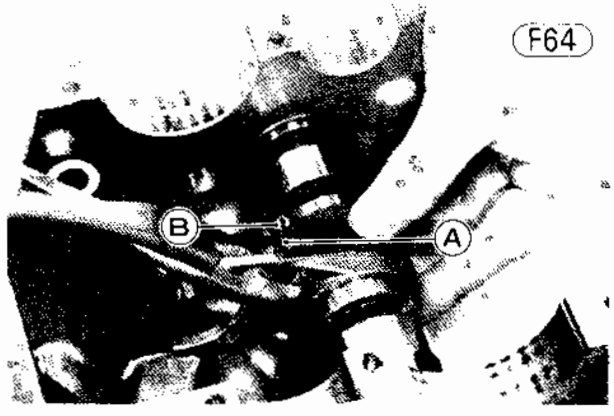
A. Operating Plate Pin
B. Operating Plate

•Tighten the shift drum guide bolt checking the guide bolt is properly fitted in the shift drum groove, and bend the side of the lockwasher over the side of the bolt. The lockwasher must seat in the crankcase.



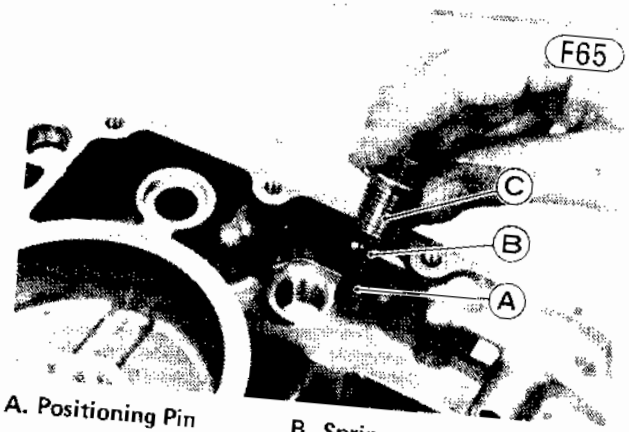
A. Shift Drum Guide Bolt
B. Lockwasher

•Put the shift fork guide pin into the 5th/6th shift fork. The guide pin rides in the middle groove of the three guide pin grooves.
•Insert a new cotter pin through the 5th/6th shift fork and guide pin from the long end side of the shift fork, and spread the cotter pin long end inward.



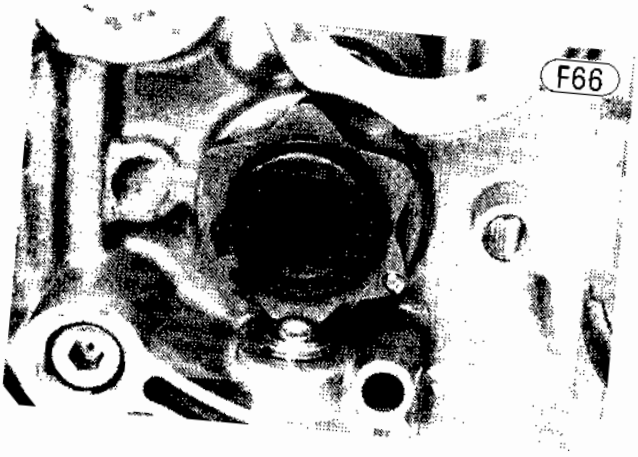
A. Shift Fork Guide Pin
B. Cotter Pin

•Install the shift drum positioning pin, spring, and bolt.

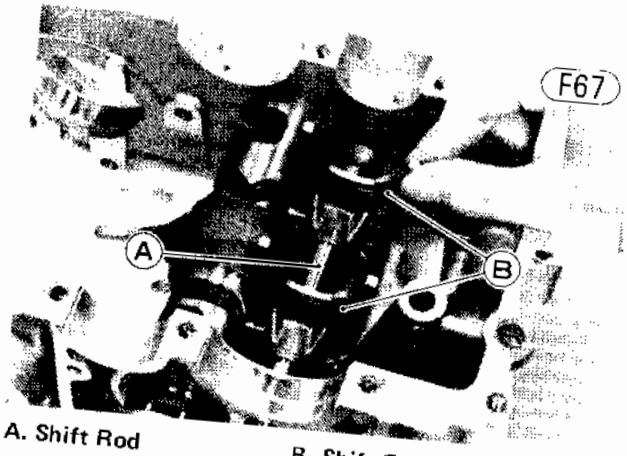


A. Positioning Pin B. Spring C. Bolt

•Set the shift drum in neutral position as shown.



•Apply a little engine oil to the shift rod and shift fork fingers. Insert the shift rod, running it through the shift forks, fitting each shift fork guide pin into the shift drum groove. The shift forks are identical.



A. Shift Rod B. Shift Forks

Shift Drum

Disassembly:

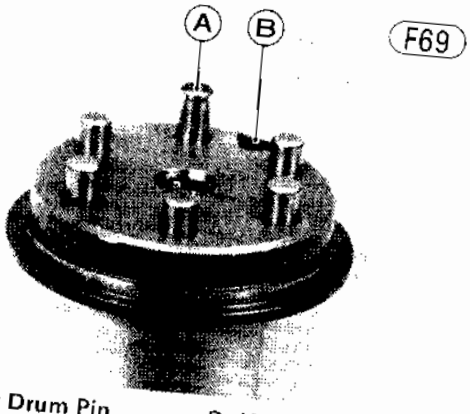
•Drop out the operating plate pin 29.
•Remove the screw 22 and shift drum pin plate 23.
•Pull out the pins 24 (6).
•To remove the shift drum needle bearing 25, tap out the needle bearing using the shift drum bearing driver (special tool).



A. Needle Bearing B. Bearing Driver (57001-287)

Assembly Notes:

1. The long shift drum pin must be in the position shown in Fig. F69. If the pin is assembled in the wrong position, the neutral indicator light will not light when the gears are in neutral.



A. Long Shift Drum Pin B. Hole

2. Apply a non-permanent locking agent to the pin plate screw, and tighten it.
3. Install the shift drum needle bearing using a suitable driver. Press it so that the end of the bearing is even with the left end of the hole.

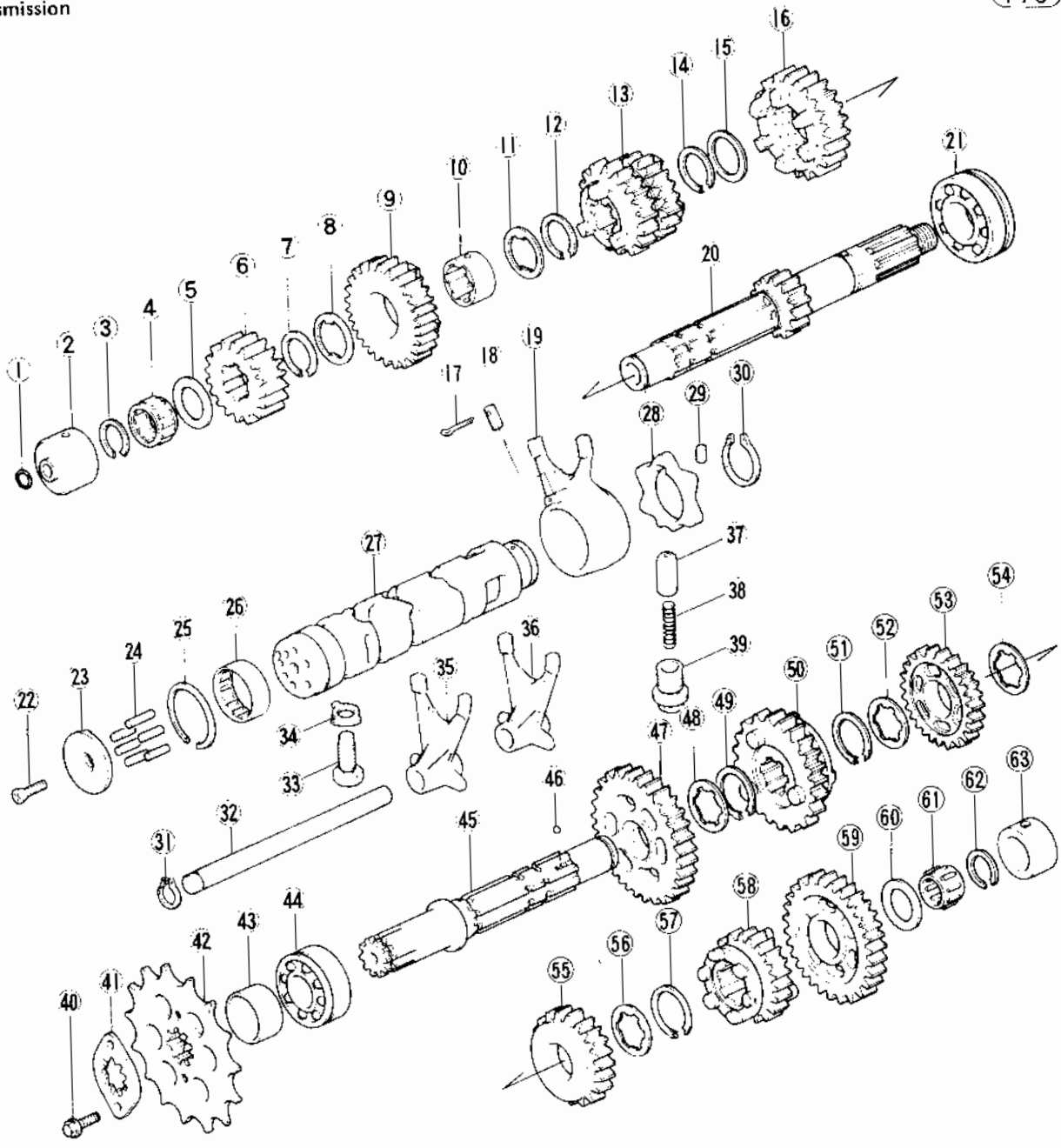
Drive Shaft

Disassembly:

•Remove the needle bearing outer race 2.
•Remove the circlip 3, and pull off the needle bearing 4, wahser 5, and 2nd gear 6.

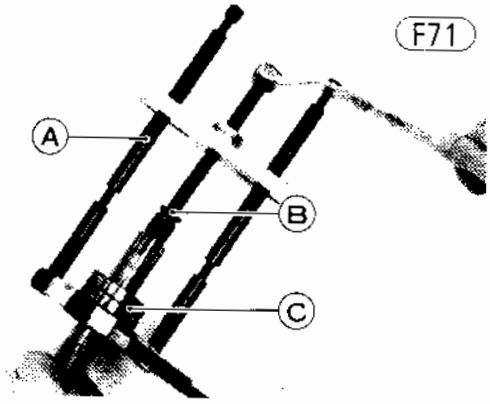
(F70)

Transmission



1. O Ring
2. Bearing Outer Race
3. Circlip
4. Needle Bearing
5. Thrust Washer
6. 2nd Gear (D)
7. Circlip
8. Splined Washer
9. 6th Gear (D)
10. Bushing
11. Splined Washer
12. Circlip
13. 3rd/4th Gear (D)
14. Circlip
15. Thrust Washer
16. 5th Gear (D)
17. Cotter Pin
18. Shift Fork Guide Pin
19. Shift Fork (5th/6th)
20. Drive Shaft
21. Ball Bearing
22. Screw
23. Pin Plate
24. Shift Drum Pin
25. Circlip
26. Needle Bearing
27. Shift Drum
28. Operating Plate
29. Pin
30. Circlip
31. Circlip
32. Shift Rod
33. Guide Bolt
34. Lockwasher
35. Shift Fork (2nd/4th)
36. Shift Fork (1st/3rd)
37. Positioning Pin
38. Spring
39. Positioning Bolt
40. Bolt
41. Holding Plate
42. Engine Sprocket
43. Collar
44. Ball Bearing
45. Output Shaft
46. Ball
47. 2nd Gear (O)
48. Splined Washer
49. Circlip
50. 6th Gear (O)
51. Circlip
52. Splined Washer
53. 4th Gear (O)
54. Splined Washer
55. 3rd Gear (O)
56. Splined Washer
57. Circlip
58. 5th Gear (O)
59. 1st Gear (O)
60. Thrust Washer
61. Needle Bearing
62. Circlip
63. Bearing Outer Race

- Remove the circlip 7, and pull off the splined washer 8, 6th gear 9, bushing 10, and splined washer 11.
- Remove the circlip 12, and pull off the 3rd/4th gear 13.
- Remove the circlip 14, and pull off the washer 15 and 5th gear 16.
- Remove the ball bearing 21 using the bearing puller and adapter (special tools).

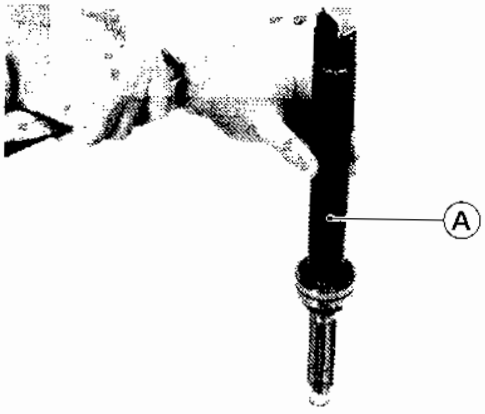


F71

A. Bearing Puller (57001-135)
B. Adapter (57001-317)
C. Ball Bearing

Assembly Notes:

1. Install the drive shaft ball bearing using the transmission circlip driver (special tool).

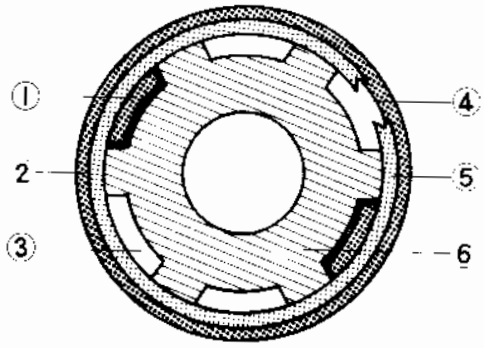


F72

A. Driver (57001-382)

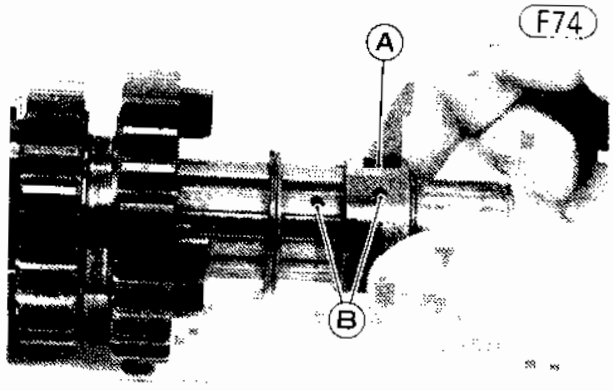
2. To install a circlip without damage, fit the circlip onto the shaft expanding it onto enough to install it, and use a suitable gear to push the circlip into place.
3. Replace any circlips that were removed with new ones. Install the circlip so that the opening coincides with one of the splined grooves in the output shaft (Fig. F73).
4. Install the splined washer so that its teeth do not coincide with the circlip opening (Fig. F73).

Circlip and Splined Washer Installation F73



1. Teeth of Splined Washer
2. Splined Washer
3. Groove of Shaft
4. Opening of Circlip
5. Circlip
6. Shaft

5. When assembling the 6th gear bushing to the drive shaft, align the oil holes with the holes in the shaft.

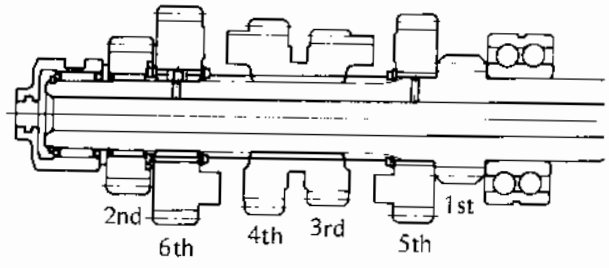


F74

A. 6th Gear Bushing **B. Oil Holes**

6. The drive shaft gears can be recognized by size, the gear with smallest diameter being 1st gear, and the largest one being 6th gear. Be sure that all parts are put back in the correct sequence, facing the proper direction, and all circlips and washers are properly in place.

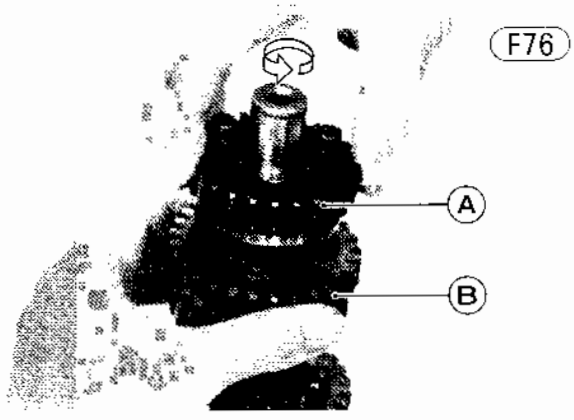
Drive Shaft Gears F75



7. Proper sequence starting with 1st gear (part of drive shaft) is: 1st gear, 5th gear (face the flat side of the gear to the right), washer, circlip, 3rd/4th gear (face 3rd gear side to the right), circlip, splined washer, bushing (face the chamfered side to the right), 6th gear (face the dogs to the right), splined washer, circlip, 2nd gear (face the recessed side to the right), washer, needle bearing, circlip, and needle bearing outer race.

Output Shaft
Disassembly:

- Pull off the needle bearing outer race (63).
- Remove the circlip (62), and pull off the needle bearing (61), washer (60), and 1st gear (59).
- 5th gear (58) has three steel balls (46) (3) assembled into it for neutral positioning. To remove this gear with the balls, quickly spin the shaft in a vertical position while holding 3rd gear (55), and pull off 5th gear upwards.



F76

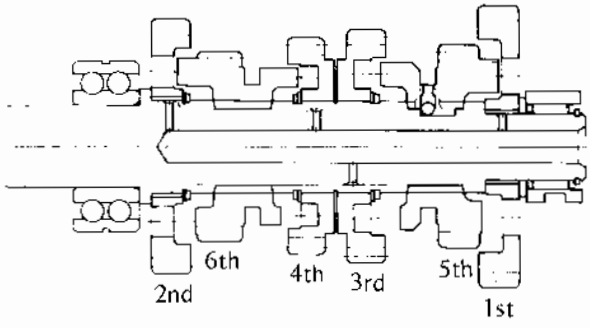
A. 5th Gear B. 3rd Gear

- Remove the circlip (57), and pull off the splined washer (56), 3rd gear (55), washer (54), 4th gear (53), and splined washer (52).
- Remove the circlip (51), and pull off the 6th gear (50).
- Remove the circlip (49), and pull off the washer (48), and 2nd gear (47).
- Using the bearing puller (special tool), remove the output shaft ball bearing (44) and collar (43).

Assembly Notes:

1. Install the output shaft ball bearing and collar using the driver (special tool).
2. To install a circlip without damage, fit the circlip onto the shaft expanding it only enough to install it, and use a suitable gear to push the circlip into place.
3. 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 driver shaft (Fig. F73).
4. Install the splined washer so that its teeth do not coincide with the circlip opening (Fig. F73).
5. Do not use grease on the three balls during assembly; these balls must be able to move freely.
6. The output shaft gear sizes are opposite from those of the drive shaft gears, the largest being 1st gear and the smallest being top gear. Be sure that all parts are put back in the correct sequence, and facing the proper direction, and that all circlips and washers are properly in place.

Output Shaft Gears F77



7. Proper sequence starting with 2nd gear is: 2nd gear (face the flat side of the gear to the left), washer, circlip, 6th gear (face the fork groove side to the right), circlip, splined washer, bushing (face the chamfered side to the left), 3rd gear (face the side with the dog recesses to the right), splined washer, circlip, 5th gear (face the fork groove side to the left) and steel balls (3), 1st gear (face the flat side of the gear to the right), washer, needle bearing, circlip, and needle bearing outer race.

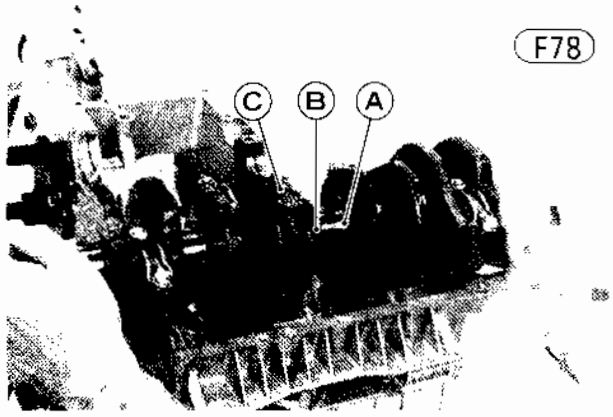
CRANKSHAFT (including connecting rods), CAMSHAFT CHAIN, AND PRIMARY CHAIN

Removal:

- Remove the engine (Pg. 92).
- Set the engine on a clean surface or, preferably, into a disassembly apparatus with some means of holding the engine steady while parts are being removed.

NOTE: If the engine is to be set onto the engine stand (special tool), two of the upper crankcase half bolts (13) shown in Fig. F20 must be removed before positioning the engine.

- Remove the camshafts as explained in camshaft removal (Pg. 57).
- Remove the cylinder head (Pg. 61).
- Remove the cylinder block (Pg. 64).
- Remove the pistons (Pg. 67).
- Split the crankcase (Pg. 96).
- Lift off the crankshaft with the camshaft chain and primary chain.



A. Crankshaft
B. Camshaft Chain
C. Primary Chain

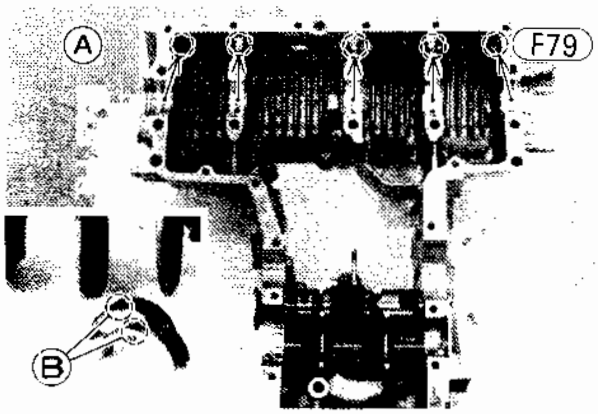
- Pull the oil seals off both ends of the crankshaft.
- Remove the camshaft chain from the crankshaft.
- Remove the primary chain.

Installation Notes:

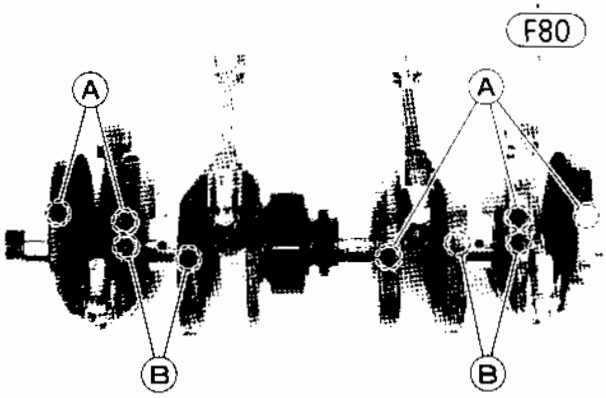
1. If a new crankshaft and/or connecting rod is used, select the proper bearing insert in accordance with the combination of connecting rod and the crankshaft marks (See Pg. 111).
2. If a new crankshaft, crankcase halves, and/or main bearing inserts are used, select the proper bearing insert in accordance with the combination of crankcase and the crankshaft marks. If the crankcase only is replaced with a new one, first measure the diameter of the crankshaft journal, mark its flywheel in accordance with the diameter (Pg. 177), and then select the right bearing inserts in accordance with Table F2.

Table F2 Main Bearing Insert Selection

Crankshaft Marking \ Crankcase Marking	○	No mark
1	Brown P/N 13034-1016	Black P/N 13034-1017
No mark	Black P/N 13034-1017	Green P/N 13034-1018

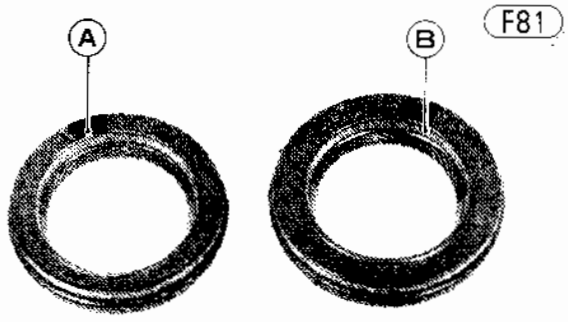


A. Markings for Crankcase ("○" or No mark)
B. Painted Marks (Brown, Black, or Green)

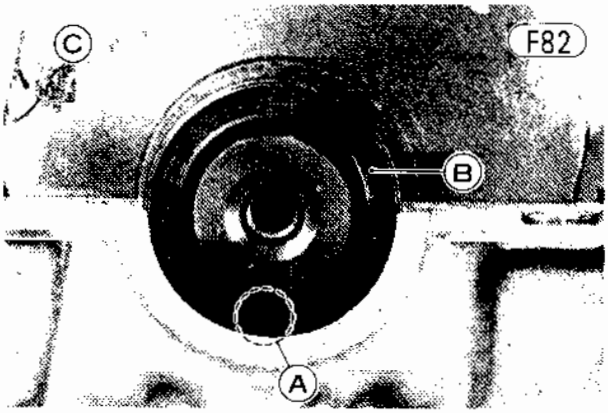


A. Markings for Crankshaft Journal ("1" or No mark)
B. Markings for Connecting Rod Journal

3. Apply engine oil to the main bearing inserts.
4. Apply a high temperature grease to the lip of the oil seals, and fit the oil seals onto both sides of the crankshaft with the arrow mark on the oil seal facing out. The arrow mark should shown the same direction of the crankshaft rotation (clockwise, watching from the contact breaker side).



A. Oil Seal for Left End
B. Oil Seal for Right End



A. Arrow Mark
B. Oil Seal
C. Contact Breaker Side (Right End)

CONNECTING RODS

Removal (each side):

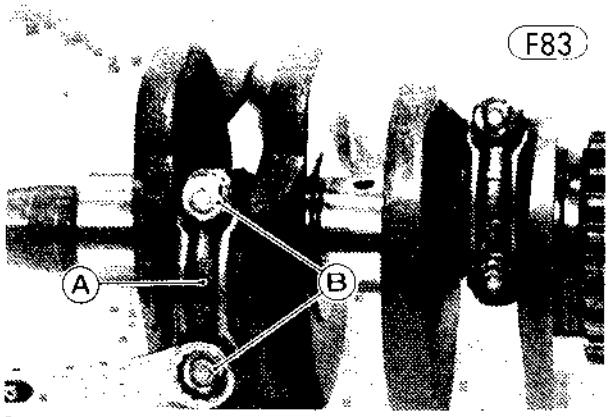
- Remove the crankshaft (Pg. 109).

●Remove the nuts (2) and pull off the connecting rod big end cap.

CAUTION **To prevent damage to the crankshaft journals, do not allow the big end cap bolts to bump against them.**

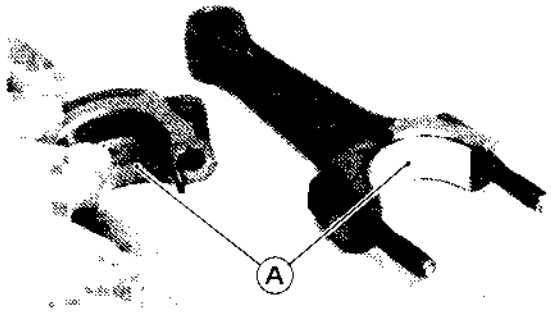
●Remove the connecting rod bearing insert halves from the connecting rod big end and the big end cap.

F83



A. Big End Cap B. Nuts

F84

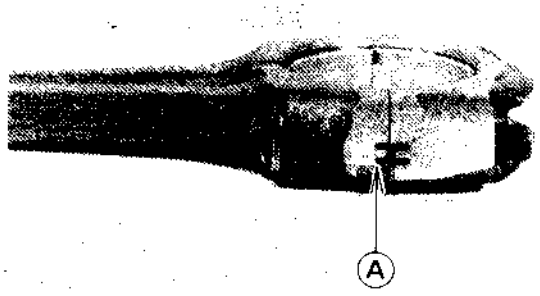


A. Bearing Inserts

Installation Notes:

1. Apply engine oil to the rod bearing inserts.
2. A pair of connecting rods (#1 and #2, or #3 and #4) should have the same weight mark in each pair. This weight mark, indicated using a capital letter, is stamped on the connecting rod big end.

F85



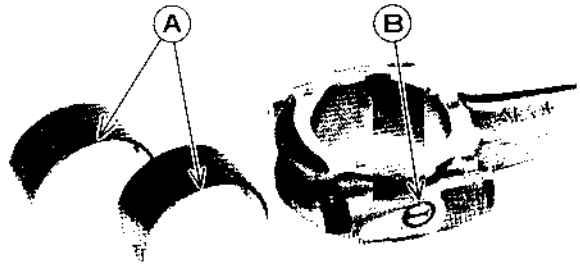
A. Weight Mark

3. The connecting rod big end cap is machined with the connecting rod as a set, so fit them together so that the weight marks align (Fig. F85). The big end cap must be replaced together with the connecting rod as a set.
4. If a new crankshaft and/or connecting rod is used, select the right rod bearing insert in accordance with the combination of the connecting rod and the crankshaft marks (Fig. F86). If the connecting rod only is replaced with a new one, first measure the diameter of the crankpin, mark its flywheel in accordance with the diameter (Pg. 176), and then select the right bearing insert in accordance with Table F3.

Table F3 Connecting Rod Bearing Insert Selection

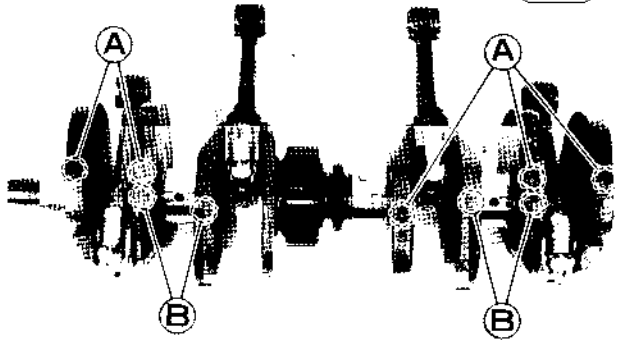
Crank-shaft Marking \ Con-Rod Marking	○	No mark
○	Black P/N: 13034-1005	Brown P/N: 13034-1006
No mark	Green P/N: 13034-1004	Black P/N: 13034-1005

F86



A. Painted Marks (Brown, Black, or Green)
B. Marking for Connecting Rod ("○" or No mark)

F87



A. Markings for Crankshaft Journal
B. Markings for Connecting Rod Journal ("○" or No mark)

5. Hand tighten both nuts first, and then tighten each nut to 2.4 kg-m (17.5 ft-lbs) of torque.

Disassembly—Chassis

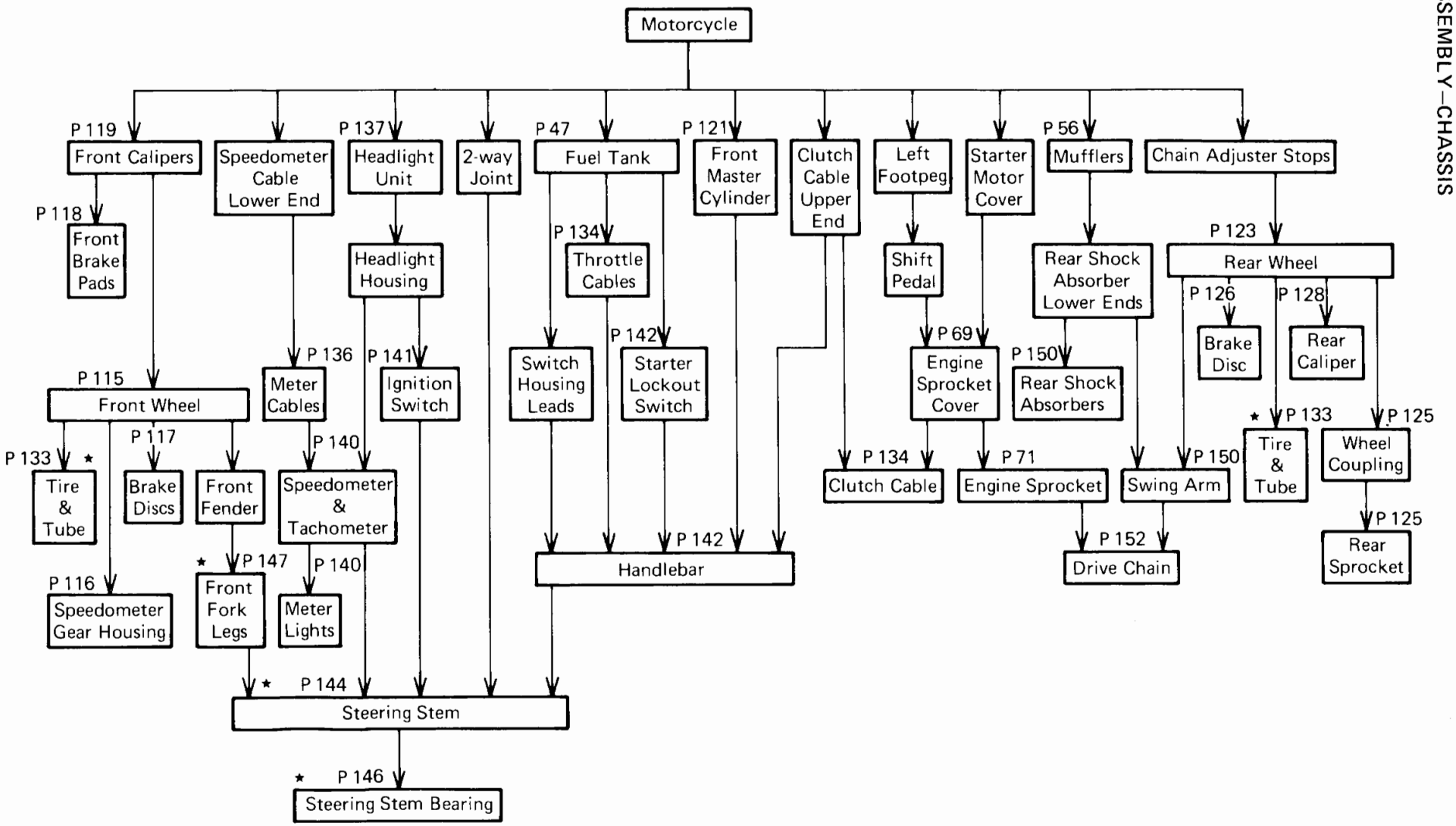
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G

FLOW CHART
Disassembly – Chassis

The following chart is intended to be aids to proper removal. Select the component you wish to remove and follow the arrows to that point on the chart.

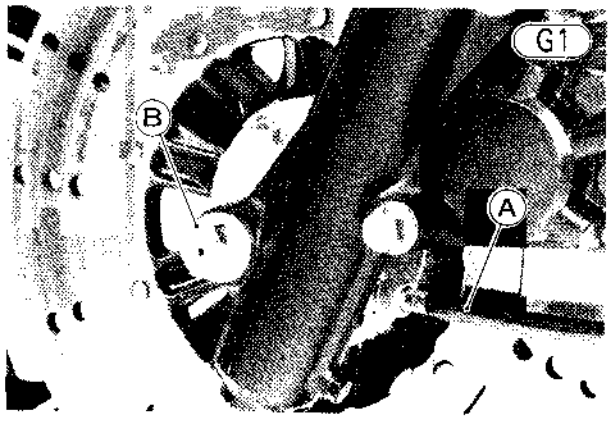


NOTE: Action with a mark (★) requires special tool(s) for removal, installation, disassembly, or assembly.

FRONT WHEEL

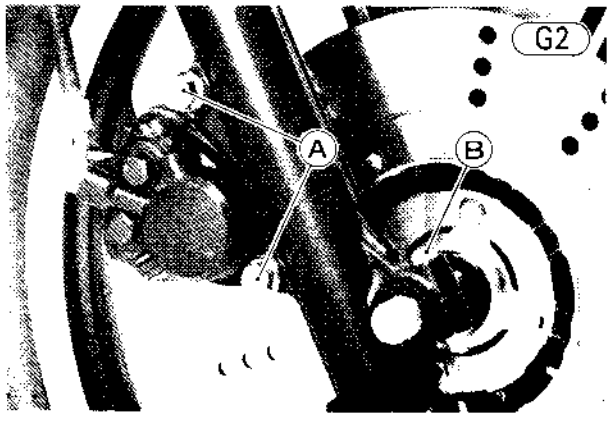
Wheel Removal:

•Disconnect the lower end of the speedometer cable with pliers.



A. Speedometer Cable B. Axle Nut

•Unbolt one of the brake calipers, and move it free of the fork leg. Avoid straining the brake lines and fittings.



A. Caliper Mounting Bolts B. Axle Clamp Bolt

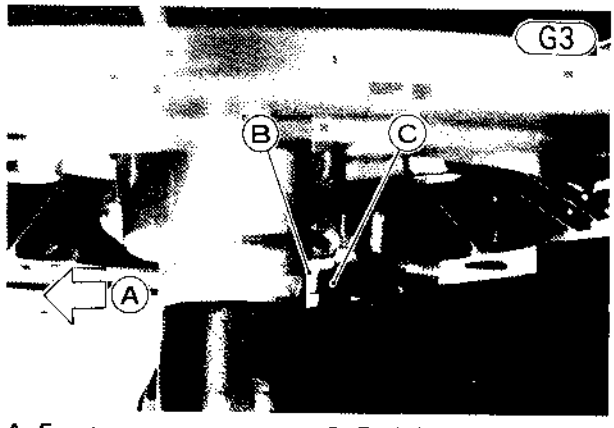
•Remove the axle nut, and loosen the axle clamp bolt nut.
•Use a jack under the engine or other suitable means to lift the front of the motorcycle.
•Holding the wheel to facilitate axle removal, pull out the axle, and then remove the wheel from the motorcycle.

CAUTION **Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place the blocks under the wheel so that the discs do not touch the ground.**

•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.

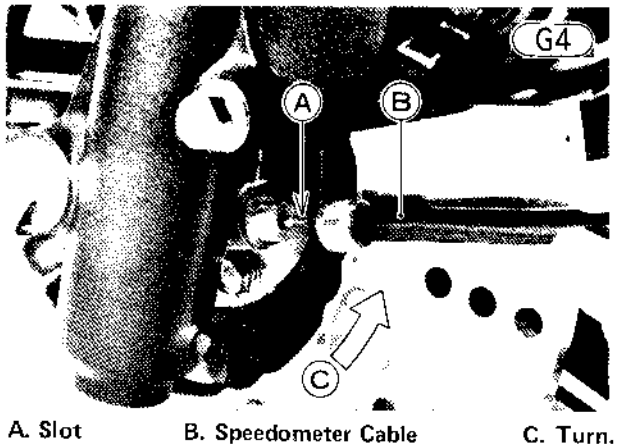
Wheel Installation:

•Remove the wedge from between the disc brake pads.
•Check that the speedometer gear housing is properly fitted on the front hub (See the speedometer gear housing assembly notes on Pg. 117), and check that the collar is on the right side of the hub.
•Hold the front wheel in its place between the front fork tubes, and insert the axle from the right.
•Install the front axle nut finger tight.
•Turn the speedometer gear housing so that it points to the rear, and fit the housing stop to the fork leg stop.



A. Front C. Fork Leg Stop
B. Gear Housing Stop

•Holding the axle with a metal bar so that it does not turn, tighten the axle nut to 8.0 kg-m (58 ft-lbs) of torque.
•Tighten the axle clamp bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
•Install the brake caliper, and tighten the caliper mounting bolts (2) to 3.0 kg-m (22 ft-lbs) of torque.
•Run the speedometer cable through the cable guide at the front fender.
•Insert the speedometer inner cable into the 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.



A. Slot B. Speedometer Cable C. Turn.

•Check the front brake.

WARNING **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**

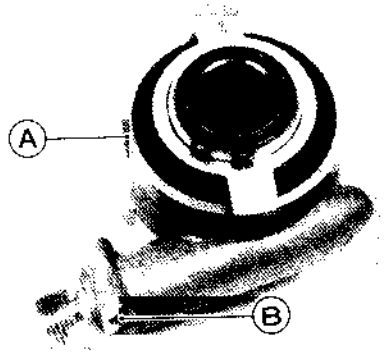
disc. The brakes will not function on the first application of the lever if this is not done.

Speedometer Gear Housing Disassembly:

- Pull the speedometer gear housing 20 and collar 5 off the front wheel 3.
- If the speedometer cable bushing 25 or speedometer pinion 24 needs to be removed, first drill the housing through the pin 22 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 23.

NOTE: It is recommended that the assembly be replaced rather than attempting to repair the components.

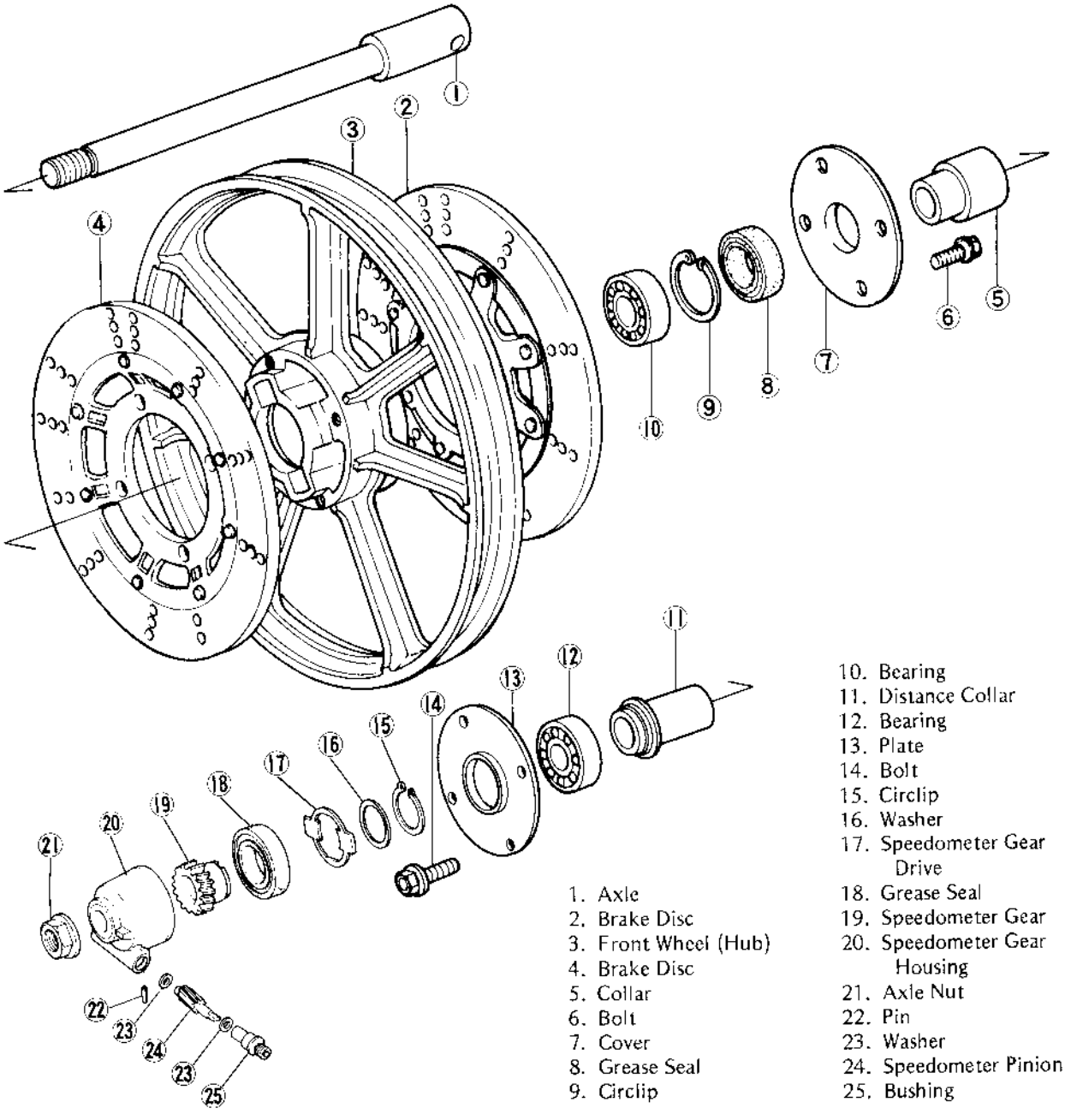
G5



A. Speedometer Gear Housing **B. Pin**

Front Wheel

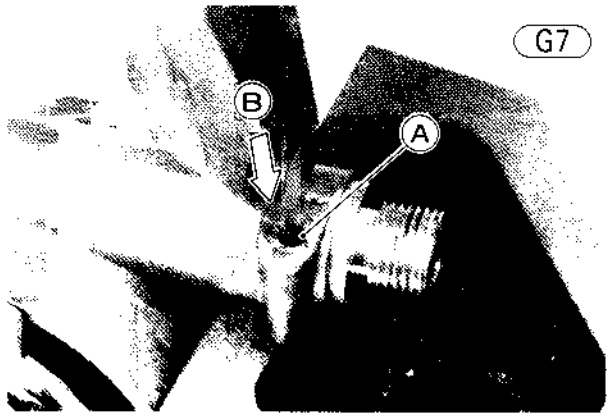
G6



1. Axle
2. Brake Disc
3. Front Wheel (Hub)
4. Brake Disc
5. Collar
6. Bolt
7. Cover
8. Grease Seal
9. Circlip
10. Bearing
11. Distance Collar
12. Bearing
13. Plate
14. Bolt
15. Circlip
16. Washer
17. Speedometer Gear Drive
18. Grease Seal
19. Speedometer Gear
20. Speedometer Gear Housing
21. Axle Nut
22. Pin
23. Washer
24. Speedometer Pinion
25. Bushing

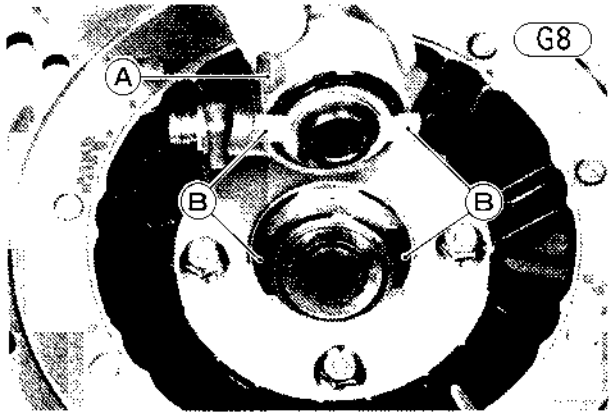
Speedometer Gear Housing Assembly Notes:

1. After inserting a new pin, stake the housing hole to secure the pin in place.



A. Pin **B. Stake.**

2. Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

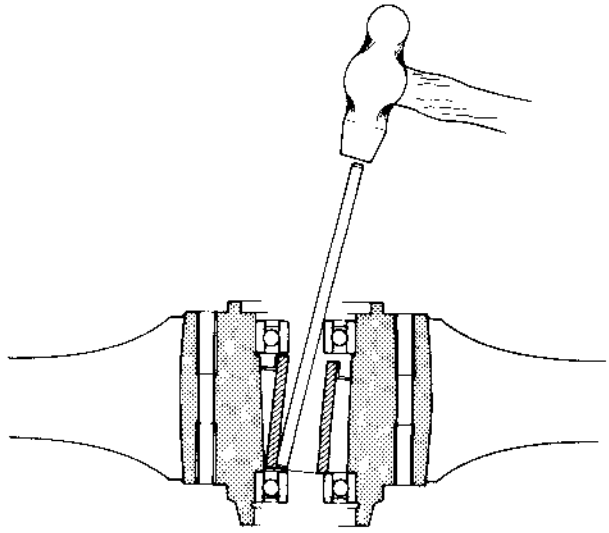


A. Speedometer Gear Housing
B. Fit in the gear drive notches.

Bearing, Brake Disc Removal:

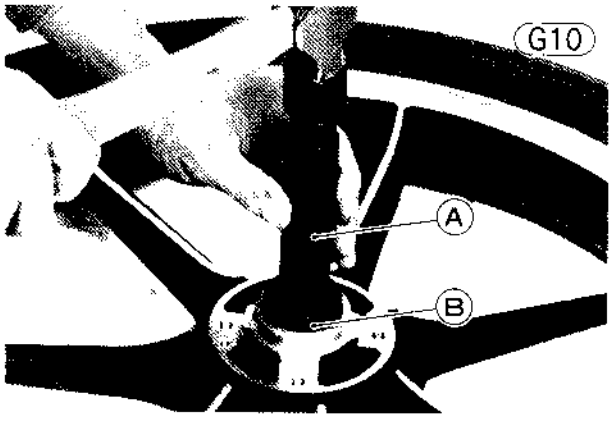
- Pull the speedometer gear housing 20 and collar 5 off the wheel.
- Remove the disc bolts 6, 14 (8), and take off the discs 2, 4. The left disc has the holding plate 13, and right has the cover 7.
- Using a hook, pull out the grease seal 18, and remove the circlip 9.
- Insert a metal rod into the hub from the left side, and remove the bearing 10 on the right side by tapping evenly around the bearing inner race (Fig. G9).
- Insert the metal rod into the hub from the right side, and remove the other bearing 12 by tapping evenly around the bearing inner race. The distance collar 11 will come out with the bearing.

Wheel Bearing Removal G9



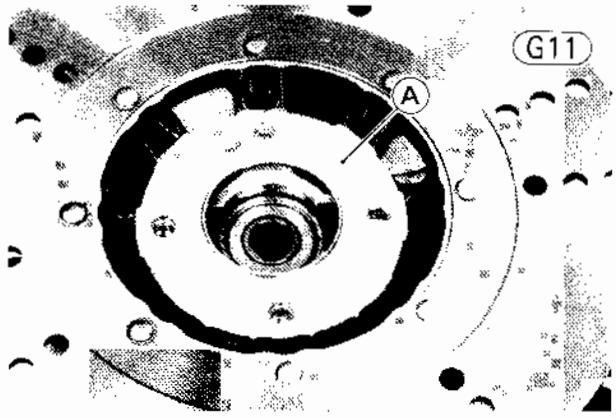
Bearing, Brake Disc Installation:

- Inspect the bearings and replace if necessary. Lubricate them.
- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Install the right side ball bearing using the bearing driver and the bearing driver holder (special tools) so that the bearing shields face out. Press the bearing until it stops at the bottom of the hole.



A. Bearing Driver Holder (57001-139)
B. Bearing Driver (57001-288)

- Put the distance collar into the hub.
- Install the left side ball bearing using the same special tools so that the bearing shields face out, and install the circlip to the outside of the right side ball bearing.
- Install a new grease seal using a suitable driver. Press the seal so that the face of the seal is level with the surface of the front hub.
- Mount the discs on the wheel, and install the holding plate on the left disc so that the plain side facing in, and the cover on the right disc. Tighten the disc mounting bolts to 2.3 kg-m (16.5 ft-lbs) of torque.



A. Holding Plate

- After installing the disc, check the disc runout (Pg. 203).
- Install the speedometer gear housing so that it fits in the speedometer gear drive notches (Fig. G8).
- Install the collar on the right side of the hub.
- Completely clean off any grease that has gotton on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.

FRONT DISC BRAKE

Removal, installation, disassembly, and assembly of the front disc brake is divided as follows:

Pad Removal and Installation
Caliper Removal and Installation Notes
Caliper Disassembly and Assembly
Master Cylinder Removal and Installation Notes
Master Cylinder Disassembly and Assembly Notes
Brake Hose Replacement

NOTE: Disc removal and disc installation are covered in Front Wheel Section (Pg. 117).

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

CAUTION

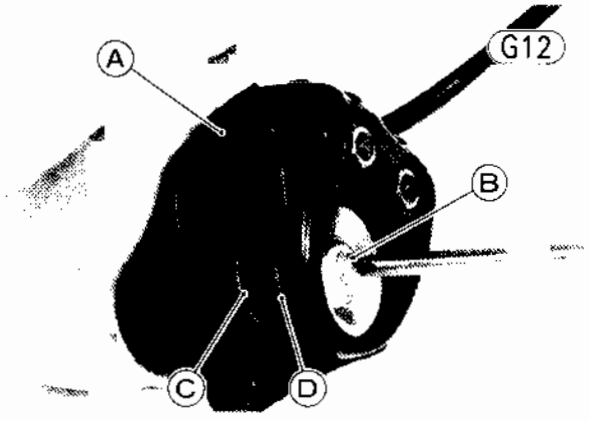
1. **Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any 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. 205).**
5. **When installing or assembling the disc brake, tighten the disc brake fittings to the values given in Table G1. Improper torque may cause the brake to malfunction.**

Table G1 Disc Brake Torque (for front and rear)

Part	kg-m	ft-lbs
Bleed valves	0.80	69 in-lbs
Brake hose banjo bolts	3.0	22
Brake lever pivot bolt	0.30	26 in-lbs
Brake lever pivot bolt locknut	0.60	52 in-lbs
Brake pedal cap nut	2.0	14.5
Disc mounting bolts	2.3	16.5
Front caliper holder shaft nuts	2.6	19.0
Front caliper mounting bolts	3.0	22
Front master cylinder clamp bolts	0.90	78 in-lbs
Rear caliper Allen bolts	3.0	22
Rear caliper mounting bolts	3.0	22
Pad mounting screws	0.30	26 in-lbs

Pad Removal (each side):

- Remove the caliper mounting bolts.
- Lift the caliper off the disc, take out the mounting screw for pad B, and remove the pad. A lockwasher and metal plate also come off.

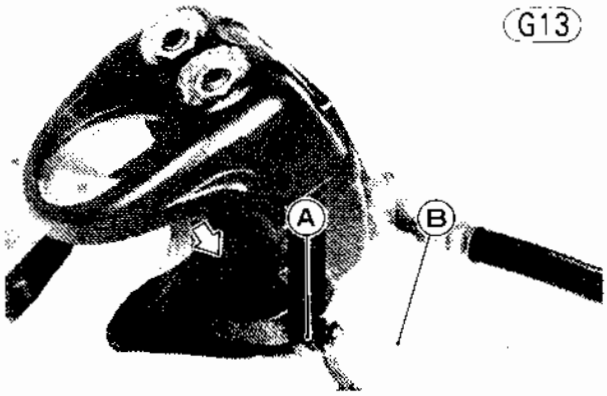


A. Caliper
B. Mounting Screw
C. Pad A
D. Pad B

- After pad B is removed, slide the caliper holder to the piston side, and remove pad A.

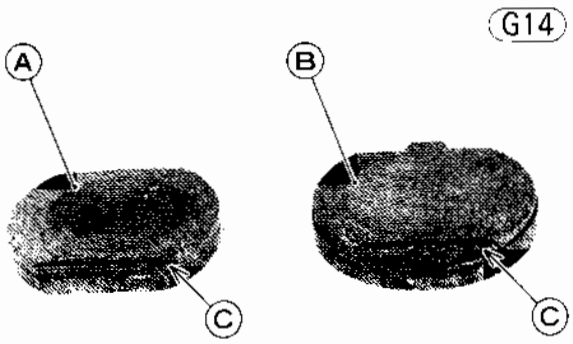
Pad Installation:

- Remove the bleed valve cap on the caliper, attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.
- Open (loosen) the valve slightly, push the piston in by hand as far as it will go, and then close (tighten) the valve. Wipe up any spilled fluid, and recap the bleed valve. The bleed valve must be tightened to 0.80 kg-m (69 in-lbs) of torque.



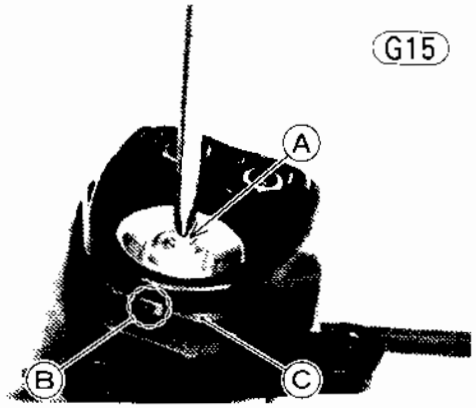
A. Bleed Valve B. Hose

•Fit the pad A so that the stepped portion points upward.



A. Pad A B. Pad B C. Stepped Portion

•Fit pad B, aligning the tongue on the pad with the groove in the caliper. Install the metal plate, lockwasher and mounting screw; using a non-permanent locking agent on the screw.



A. Apply a non-permanent locking agent.
B. Tongue and Groove C. Pad B

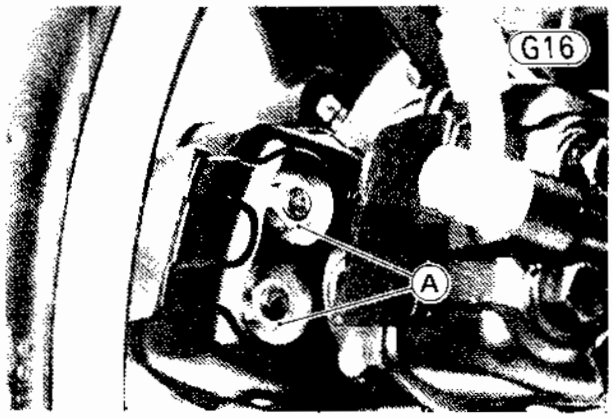
•Install the caliper, tightening the caliper mounting bolts to 3.0 kg-m (22 ft-lbs) of torque.

•Since some brake fluid was lost when the bleed valve was opened, check the fluid level in the master cylinder and bleed the air from the brake system (Pg. 205).
•Push the bleed valve cap onto the valve.
•Check the front brake.

WARNING **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.**

Caliper Removal (each caliper):

•If the caliper is to be disassembled, loosen the caliper holder shaft nuts (2).



A. Holder Shaft Nuts

NOTE: If the caliper is to be disassembled after caliper removal and compressed air is not available, remove the piston using the following two steps before disconnecting the brake hose fitting from the caliper.
  ○Remove the pad (Pg. 118).
  ○Pump the piston out with the brake lever.
•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.
•Remove the mounting bolts (2), each with a flat washer and lockwasher, and take off the caliper.

Caliper Installation Notes:

1. Tighten the mounting bolts to 3.0 kg-m (22 ft-lbs) of torque.
2. Tighten the caliper holder shaft nuts to 2.6 kg-m (19.0 ft-lbs) of torque.
3. 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.
4. Check the fluid level in the master cylinder, and bleed the brake line (Pg. 205).

WARNING **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.**

Caliper Disassembly:

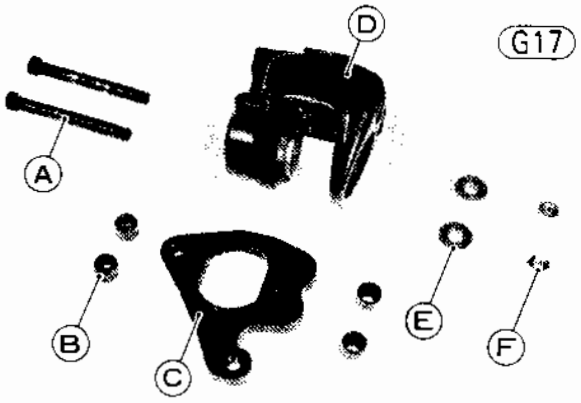
- Take out the mounting screw (16) for pad B (13), and remove the pad A (17). A lockwasher (15) and metal plate (14) also come off.
- Remove the caliper holder shaft nuts (6) (2), and pull out the caliper holder shafts (3) (2) and the spacers (5) (2) taking care not to damage the dust covers (12) (4). Remove the holder (10).

CAUTION **To avoid damage to the dust covers and O rings, unscrew each shaft in turn a little at a time.**

- Remove the dust seal (9) around the piston (8).
- 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 **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.**

NOTE: If compressed air is not available, reconnect the brake line and pump the piston out with the brake lever.

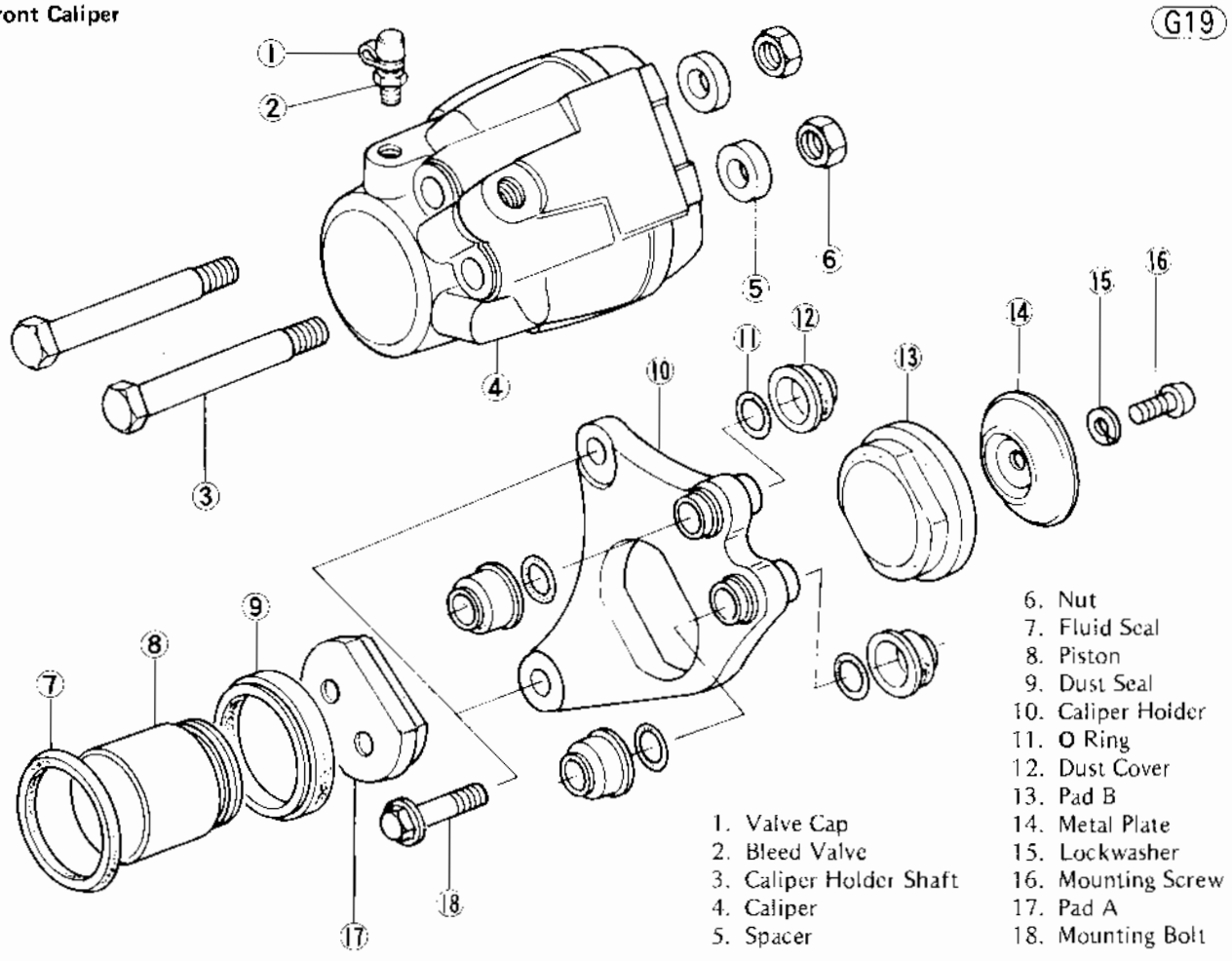


A. Holder Shaft
B. Dust Cover
C. Holder
D. Caliper
E. Spacer
F. Nut



A. Compressed Air
B. Heavy Cloth

Front Caliper



1. Valve Cap
2. Bleed Valve
3. Caliper Holder Shaft
4. Caliper
5. Spacer
6. Nut
7. Fluid Seal
8. Piston
9. Dust Seal
10. Caliper Holder
11. O Ring
12. Dust Cover
13. Pad B
14. Metal Plate
15. Lockwasher
16. Mounting Screw
17. Pad A
18. Mounting Bolt

•Taking care not to damage the cylinder surface, remove the fluid seal 7 with a hook.

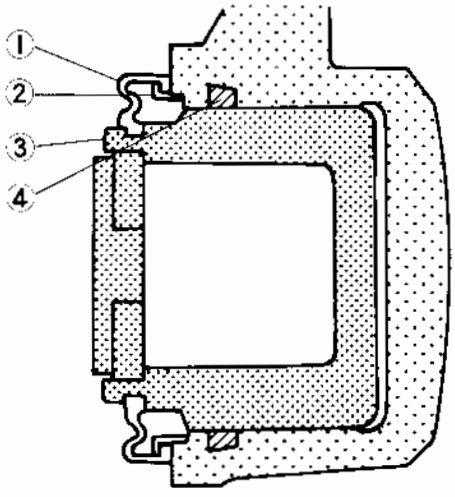
Caliper Assembly:

•Clean the caliper parts with brake fluid or alcohol (See CAUTION Pg. 118).
•Fit a new fluid seal in place inside the cylinder.

NOTE: It is recommended that the fluid seal, which is removed, be replaced with a new one.

•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.
•Install the dust seal around the dust seal stop. Check that the dust seal is properly fitted into the groove in the piston and on the dust seal stop.

Caliper Dust Seal, Fluid Seal (G20)



1. Dust Seal
2. Seal Stop
3. Piston
4. Fluid Seal

•Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes. (PBC is a special high temperature, water-resistant grease).

NOTE: Replace the dust covers and O rings if they were damaged.

•With the caliper holder properly positioned, insert the caliper holder shafts while carefully turning the shafts to prevent damage to the dust covers.
•Install the spacers and nuts, and tighten the nuts loosely.

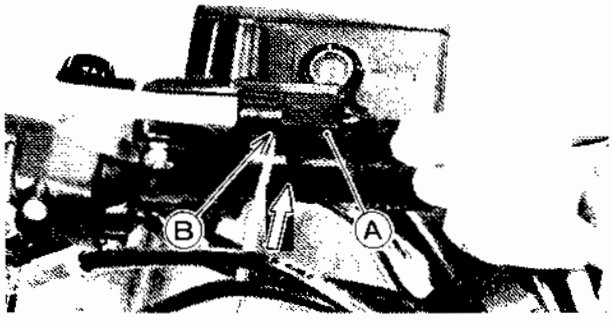
NOTE: Do not forget to tighten the nuts after installing the caliper on the motorcycle (Pg. 119).

•Install pad A in the caliper holder (Fig. G14).
•Fit pad B, aligning the tongue on the pad with the groove in the caliper. Install the metal plate, lockwasher, and mounting screw using a non-permanent locking agent on the screw (Fig. G15).

Master Cylinder Removal:

•Take off the right rear view mirror.
•Using a thin-bladed screwdriver or some other suitable tool, press in the front brake switch tab which catches in the hole in the underside of the master cylinder, and then remove the switch.

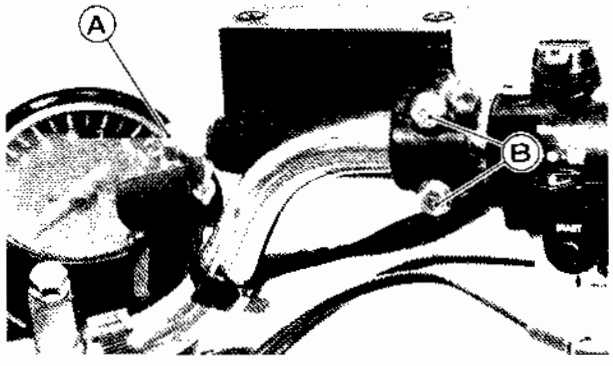
(G21)



A. Front Brake Switch **B. Switch Tab**

•Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder. There is a flat washer on each side of the hose fitting.

(G22)



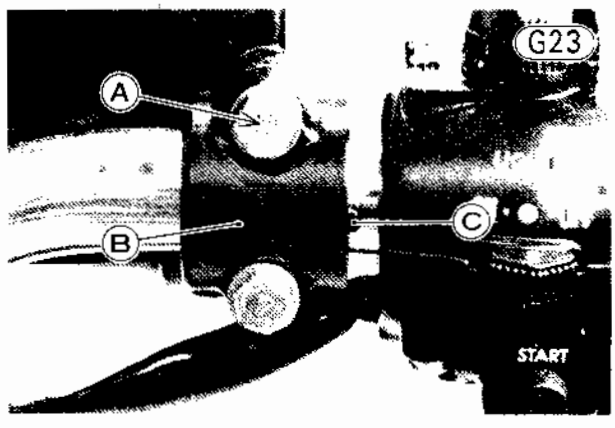
A. Banjo Bolt **B. Clamp Bolts**

•Remove the clamp bolts (2), and take off the master cylinder. There is a flat washer for each master cylinder clamp bolt. Immediately wipe up any brake fluid that spills.

Master Cylinder Installation Notes:

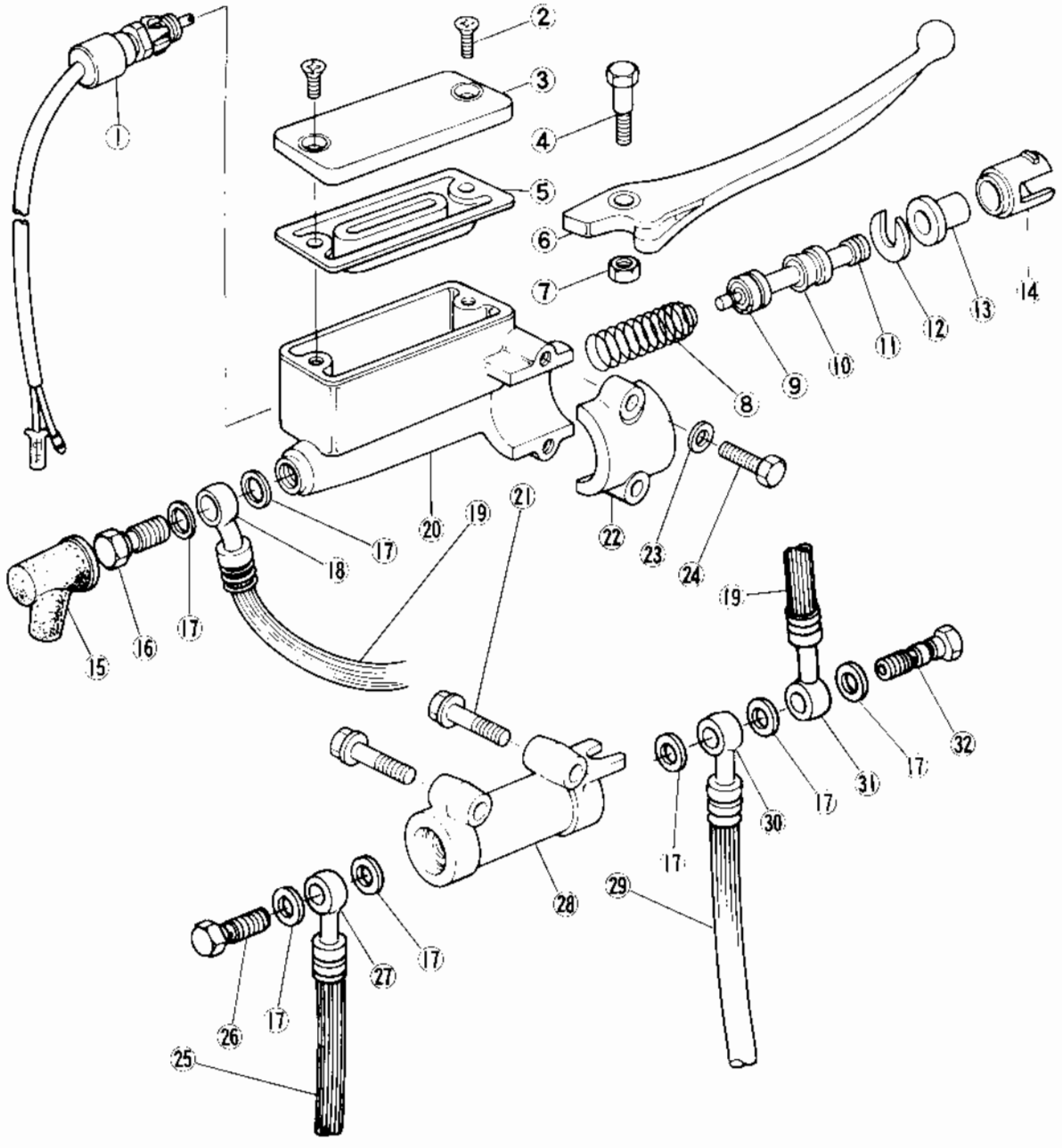
1. The master cylinder clamp is installed with the small projection towards the throttle grip. Tighten the upper clamp bolt first, and then the lower clamp bolt both to 0.90 kg-m (78 in-lbs) of torque.

(G23)



A. Tighten the upper clamp bolt first.
B. Clamp **C. Projection**

Front Master Cylinder G24

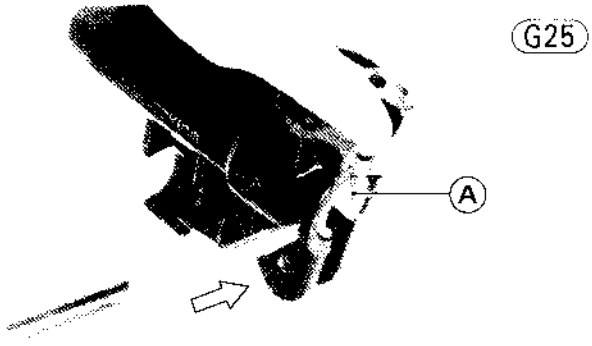


1. Front Brake Light Switch
2. Screw
3. Master Cylinder Cap
4. Brake Lever Pivot Bolt
5. Diaphragm
6. Brake Lever
7. Locknut
8. Spring
9. Primary Cup
10. Secondary Cup
11. Piston
12. Piston Stop
13. Dust Seal
14. Liner
15. Dust Cover
16. Banjo (Fitting) Bolt
17. Flat Washer
18. Hose Fitting
19. Upper Brake Hose
20. Master Cylinder Body
21. Mounting Bolt
22. Master Cylinder Clamp
23. Flat Washer
24. Clamp Bolt
25. Lower Left Brake Hose
26. Banjo (Fitting) Bolt
27. Hose Fitting
28. 2-way Joint
29. Lower Right Brake Hose
30. Hose Fitting
31. Hose Fitting
32. Banjo (Fitting) Bolt

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. 205).

Master Cylinder Disassembly:

- Remove the screws 2 (2), take off the master cylinder cap 3 and diaphragm 5, and empty out the brake fluid.
- Remove the locknut 7 and pivot bolt 4, and remove the brake lever 6.
- Using a thin-bladed screwdriver or some other suitable tool, press in the liner tabs which catch in the holes in the master cylinder, and then remove the liner (4).

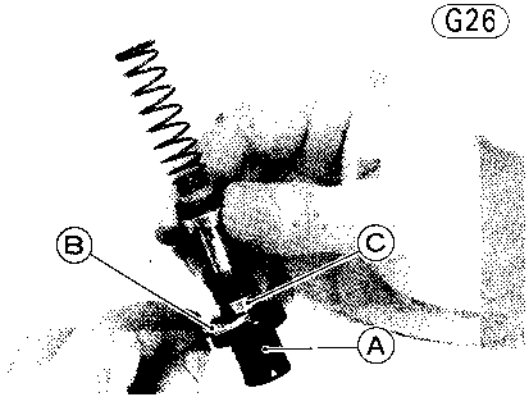


A. Liner

- Pull out the dust seal (13), piston stop (12), and piston and spring unit (11). Do not remove the primary cup (9) and secondary cup (10) from the piston since removal will damage the cups.

Master Cylinder Assembly Notes:

1. Before assembly, clean all parts including the master cylinder with brake fluid or alcohol (See CAUTION — Pg. 118). Apply brake fluid to the parts removed and to the inner wall of the cylinder.
2. Be sure that the piston stop (12) is between the piston and dust seal (13).



A. Dust Seal B. Piston Stop C. Piston

3. Tighten the brake lever pivot bolt to 0.30 kg-m (26 in-lbs) of torque, and tighten the locknut to 0.60 kg-m (52 in-lbs) of torque.

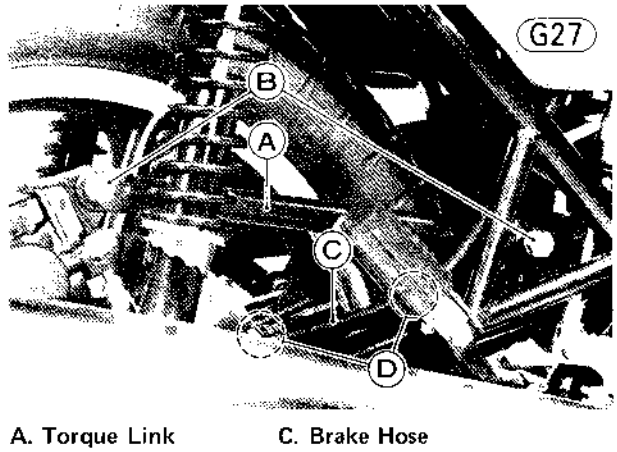
Brake Hose Replacement:

- Pump the brake fluid out of the line as explained in the Maintenance Section — Changing the brake fluid (Pg. 205).
- Remove the banjo bolts at the 2-way joint and at the caliper or master cylinder (depending on the hose), and remove the brake hose. There is a flat washer on each side of the hose fitting.
- Connect the new brake hose to the 2-way joint and the caliper or master cylinder, putting a new flat washer on each side of the brake hose fittings.
- Be sure that the metal pipe is properly fitted into the U-shaped notch in the 2-way joint and tighten the banjo bolts to the specified torque.
- Fill the reservoir with fresh brake fluid, and bleed the brake line (Pg. 205).

REAR WHEEL

Wheel Removal:

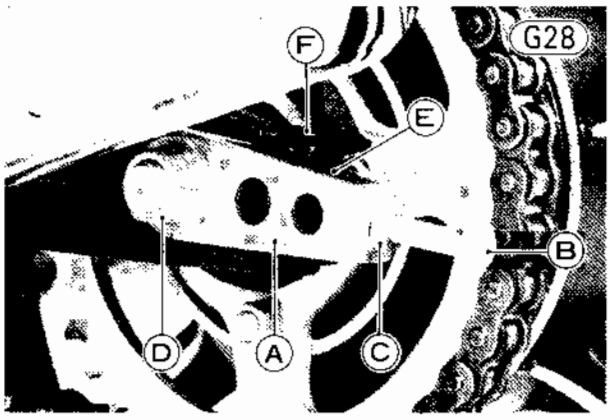
- Put the motorcycle up on its center stand.
- Loosen the self-locking nuts at the torque link.



A. Torque Link C. Brake Hose
B. Nuts D. Guides

- Free the brake hose from its guides.

•Loosen the left and right chain adjuster locknuts, and fully loosen both chain adjuster bolts.

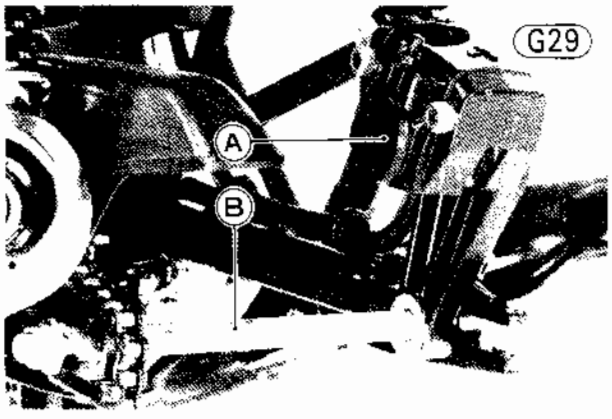


A. Chain Adjuster
B. Adjusting Bolt
C. Locknut
D. Axle Nut
E. Chain Adjuster Stop
F. Stop Bolt

•Remove the cotter pin, loosen the axle nut, and then push the wheel forward so that the chain can be easily removed from the rear sprocket.
•Remove the bolts and lockwashers (2 ea) and take out the chain adjuster stops.
•Remove the drive chain from the rear sprocket, and hang it to the left side of the swing arm.
•Pull the rear wheel together with the rear caliper toward the rear.
•Remove the axle nut and left chain adjuster. Then pull off the axle with the right chain adjuster.
•Remove the rear wheel.

CAUTION **Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

•Run the axle through the swing arm and the caliper to prevent the caliper from dangling.

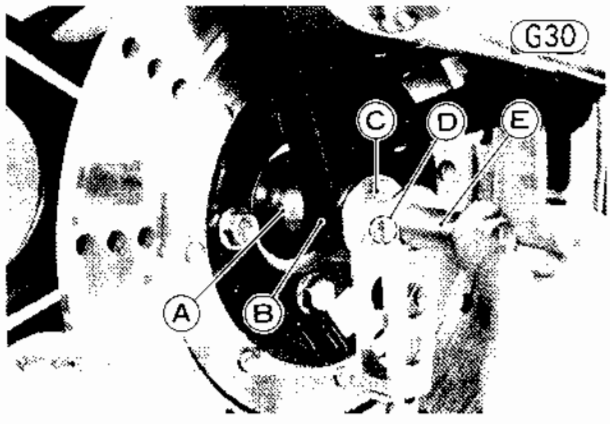


A. Rear Caliper
B. Axle

•Insert a wood wedge (7~8 mm thick) between the disc brake pads. This prevents them from being moved out of their proper position, should the brake pedal be pushed accidentally.

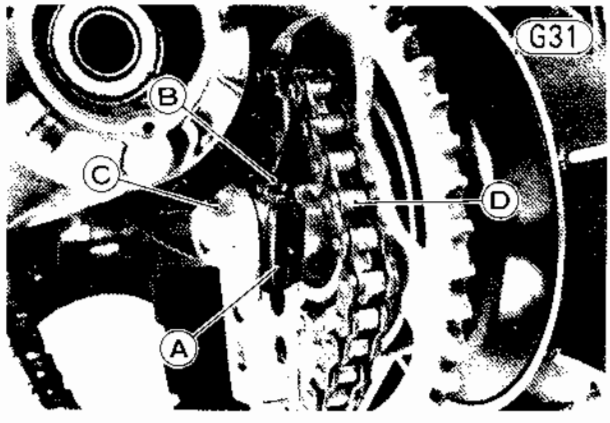
Wheel Installation:

•Wipe out old grease and apply a little grease to the O ring on the rear hub (Fig. G40).
•Remove the wedge from between the brake pads, and pull the rear axle off the caliper holder and the swing arm.
•Slip back the rear wheel. Be sure the coupling sleeve is in place.
•Put the caliper on the disc so that the disc is between the pads, and run the axle through the right chain adjuster (facing the alignment mark side to the right), caliper, collar, rear hub, coupling sleeve, coupling, coupling collar, and left chain adjuster (facing the alignment mark to the left). Then screw on the axle nut.



A. Collar
B. Caliper
C. Chain Adjuster
D. Alignment Mark
E. Rear Axle

•Put the rear wheel into the swing arm end, and install the chain adjuster stops (2). Tighten the bolts (2) with lockwashers (2).

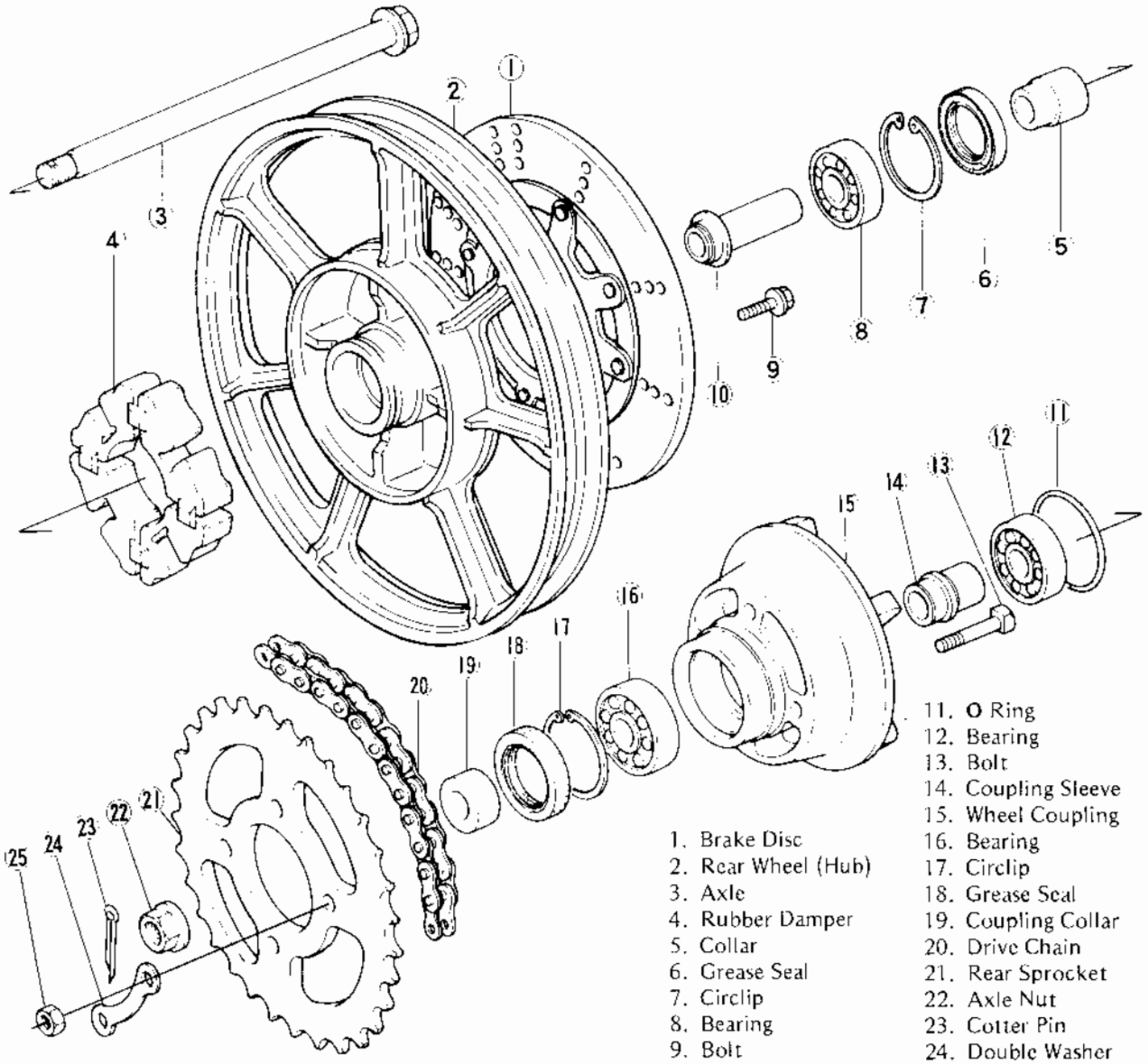


A. Chain Adjuster Stop
B. Stop Bolt
C. Axle Nut
D. Drive Chain

•Fit the drive chain onto the rear sprocket.
•Adjust the drive chain (Pg. 28).
•If the caliper was removed, check the fluid level in the master cylinder, and bleed the brake line (Pg. 205).
•Check the rear brake.

Rear Wheel

G32



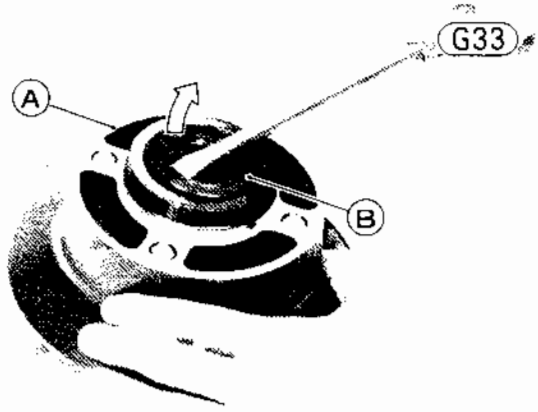
1. Brake Disc
2. Rear Wheel (Hub)
3. Axle
4. Rubber Damper
5. Collar
6. Grease Seal
7. Circlip
8. Bearing
9. Bolt
10. Distance Collar
11. O Ring
12. Bearing
13. Bolt
14. Coupling Sleeve
15. Wheel Coupling
16. Bearing
17. Circlip
18. Grease Seal
19. Coupling Collar
20. Drive Chain
21. Rear Sprocket
22. Axle Nut
23. Cotter Pin
24. Double Washer
25. Nut

WARNING **Do not attempt to drive the motorcycle until a full brake pedal is obtained by pumping the brake pedal until the pads are against the disc. The brake will not function on the first application of the pedal if this is not done.**

Wheel Coupling, Rear Sprocket Removal:

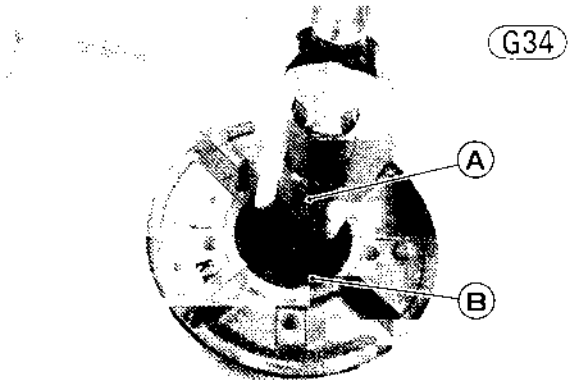
- Install the rubber damper and wheel coupling temporarily on the rear hub to aid in rear sprocket removal.
- Straighten the bent portions of the double washers 24 (2).
- Remove the rear sprocket nuts 25 (4) and the double washers (2) to separate the rear sprocket 21 and wheel coupling 15.
- Remove the rear sprocket and remove the coupling from the rear wheel.
- Pull out the coupling collar 19 from the left, and the coupling sleeve 14 from the right.
- Using a hook, pull out the grease seal 18 and remove the circlip 17.

G33



A. Wheel Coupling B. Grease Seal

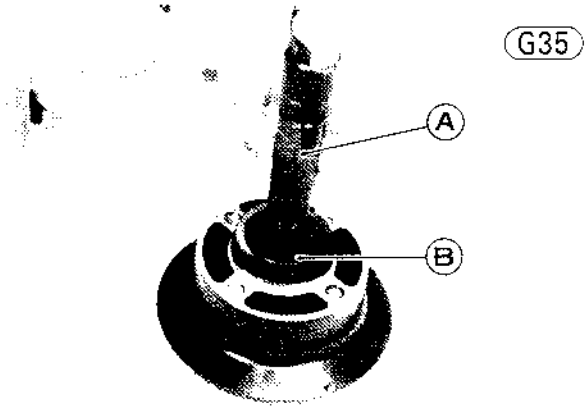
•Using the bearing driver and driver holder (special tools) or some other suitable tool, remove the bearing ⑮ by tapping from the wheel side.



A. Bearing Driver Holder (57001-139)
B. Bearing Driver (57001-288)

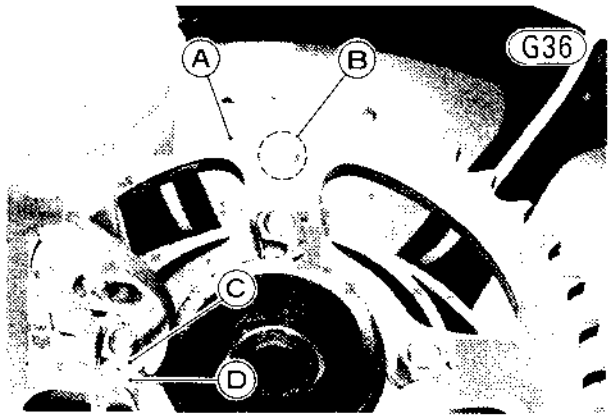
Wheel Coupling, Rear Sprocket Installation Notes:

1. Inspect the bearing, and replace if necessary (Pg. 195). Lubricate it, and then install it using the wheel bearing driver and the bearing driver holder (special tools).



A. Bearing Driver Holder (57001-139)
B. Bearing Driver (57001-289)

2. Replace the grease seal with a new one using the suitable driver. Press the seal in until the face of the seal is level with the end of the grease seal hole. Apply a little grease to the grease seal lip.
3. Install the rear sprocket with the numbered side facing out. After tightening the sprocket nuts to 4.0 kg-m (29 ft-lbs) of torque, bend the tab portions of the double washers over the nuts.

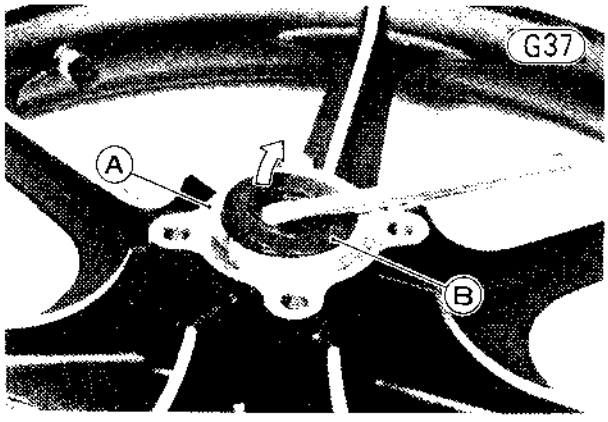


A. Rear Sprocket
B. Tooth Number
C. Sprocket Nut
D. Double Washer

Bearing, Brake Disc Removal:

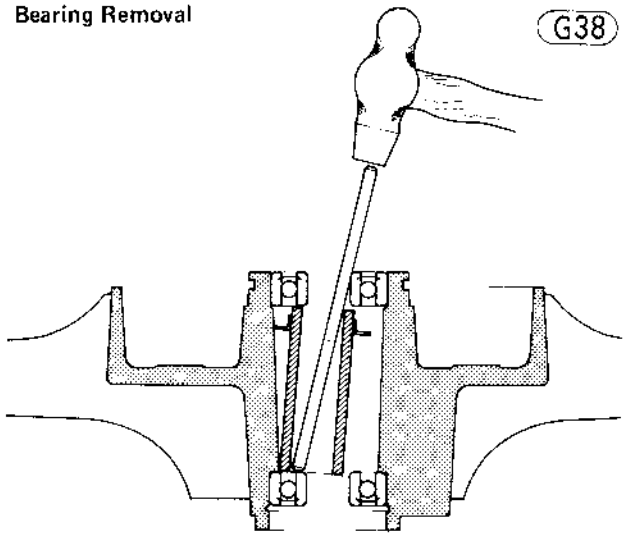
CAUTION **Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

•Remove the wheel coupling.
•Pull out the collar ⑤ from the disc side.
•Remove the disc mounting bolts ⑨ (4), and take off the disc ①.
•Remove the grease seal ⑥ using a hook, and remove the circlip ⑦.



A. Rear Hub
B. Grease Seal

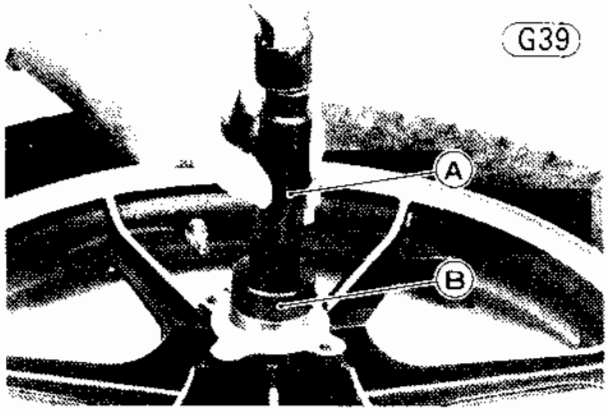
Bearing Removal



- Insert a metal rod into the hub from the coupling side, and remove the right side bearing (8) by tapping evenly around the bearing inner race.
- Remove the remaining bearing (12) by tapping evenly around the bearing inner race. The distance collar (10) come out with the bearing.

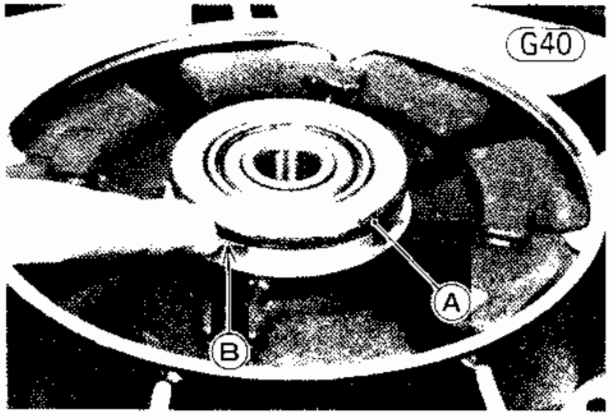
Bearing, Brake Disc Installation Notes:

1. Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
2. Inspect the bearings and replace them if necessary (Pg. 195). Lubricate them and install them using the bearing driver and the bearing driver holder (special tools) so that the bearing shields face out.



A. Bearing Driver Holder (57001-139)
B. Bearing Driver (57001-290)

3. Inspect the grease seal and replace if necessary (Pg. 195). Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
4. Inspect the O ring (11) on the rear hub, replace it with a new one if it has deteriorated, and apply a little grease to the O ring.



A. "O" Ring **B. Grease.**

5. Tighten the disc mounting bolts (4) to 2.3 kg-m (16.5 ft-lbs) of torque.
6. After installing the disc, check the disc runout (Pg. 203).

REAR DISC BRAKE

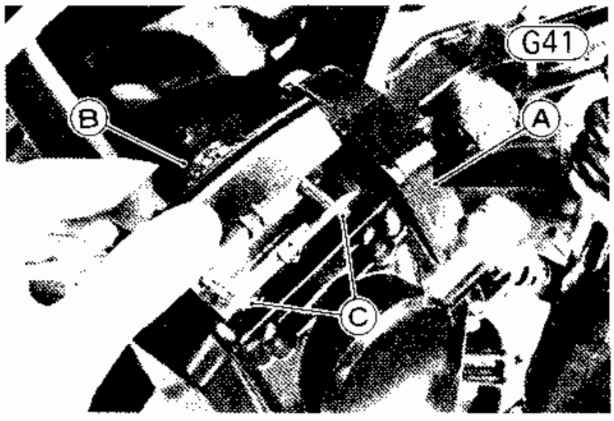
Removal, installation, disassembly, and assembly of the rear disc brake is divided as follows:

Pad Removal and Installation
Caliper Removal and Installation Notes
Caliper Disassembly and Assembly
Master Cylinder Removal and Installation Notes
Master Cylinder Disassembly and Assembly
Brake Hose Replacement

NOTE: Refer to the CAUTION (Pg. 118) for general disc brake information.

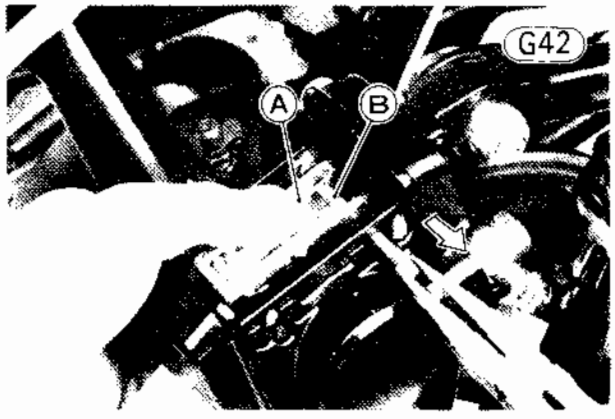
Pad Removal:

- Remove the pad cover on the caliper.



A. Caliper **B. Pad Cover** **C. Clips**

- Remove the clips (2) from the pins (2).
- Holding a thumb on the anti-rattle springs to keep it from flying off, pull the pins off the caliper.

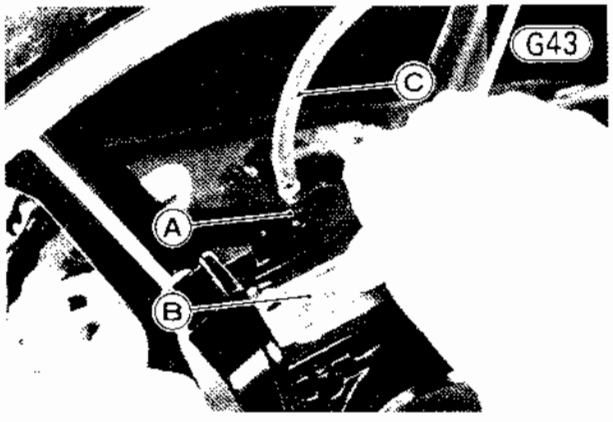


A. Anti-rattle Spring **B. Pin**

- Remove the pads (2) from the caliper.

Pad Installation:

- Remove the bleed valve cap, attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.
- Open (loosen) the valve slightly, push both pistons in by hands as far as they will go using a worn pad, and then close (tighten) the valve. Wipe up any spilled fluid, and recap the bleed valve. The bleed valve must be tightened to 0.80 kg-m (69 in-lbs) of torque.

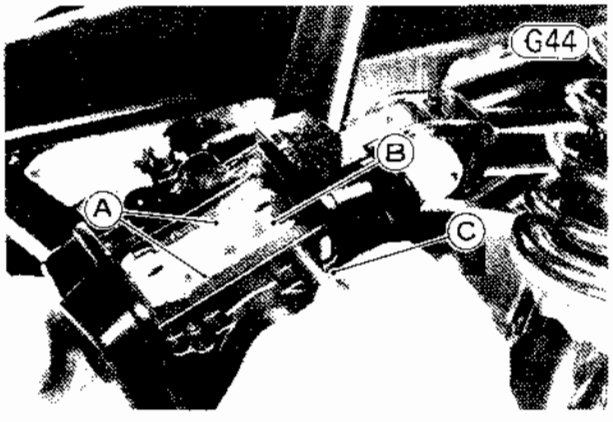


A. Bleed Valve B. Worn Pad C. Hose

CAUTION **Do not lever the pistons with a screwdriver against the disc. This can damage or warp the disc.**

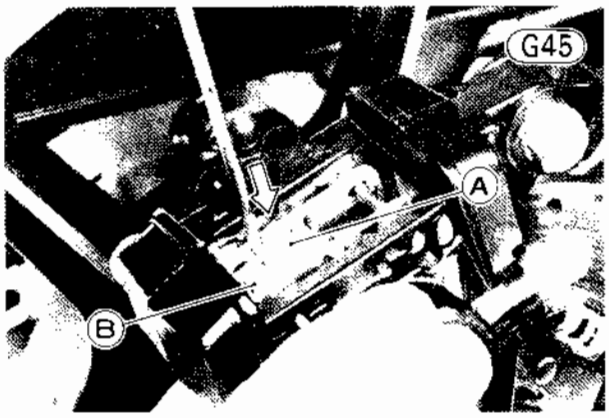
- Insert one of the pins through the outer wall of the caliper, the pads, and into the inner wall of the caliper.

NOTE: Hold the pin by the end with the hole to insert it.



A. Pads B. Pin C. Hole

- Install the anti-rattle springs. Be sure that the end of each spring goes under the installed pin, and that the top of each spring rides on the pad.
- Insert the other pin through caliper and pads pressing down the free end of each spring so that the pin can pass over it.



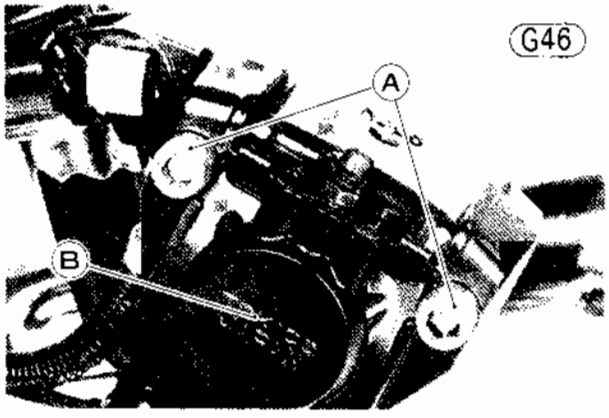
A. Spring B. Pin

- Insert the clips through the pins on the right side of the right pad.
- Install the pad cover.
- Since some brake fluid was lost when the bleed valve was opened, check the fluid level in the master cylinder and bleed the air from the brake system (Pg. 205).
- Push the bleed valve cap onto the valve.

WARNING **Do not attempt to drive the motorcycle until a full brake pedal is obtained by pumping the brake pedal until the pads are against the disc. The brakes will not function on the first application of the pedal if this is not done.**

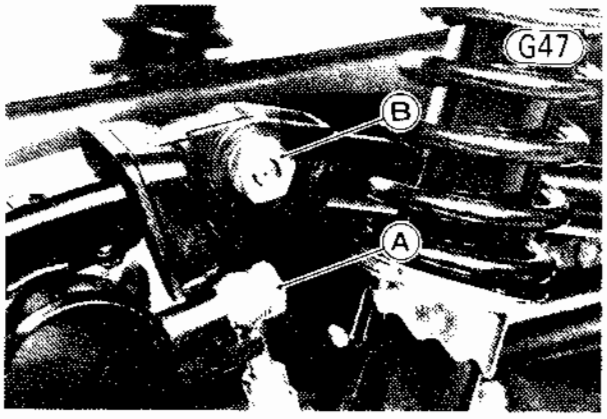
Caliper Removal:

- Remove the rear wheel (Pg. 123).
- If the caliper is to be disassembled, loosen the caliper Allen bolts (2).



A. Allen Bolts B. Rear Caliper

- Remove the banjo bolt at the caliper, and temporarily secure the end of the brake hose to some place higher than the rear brake reservoir to prevent fluid loss. There is a flat washer on each side of the hose fitting.



A. Banjo Bolt B. Torque Link Nut

- Remove the torque link nut and bolt at the rear end of cycle.

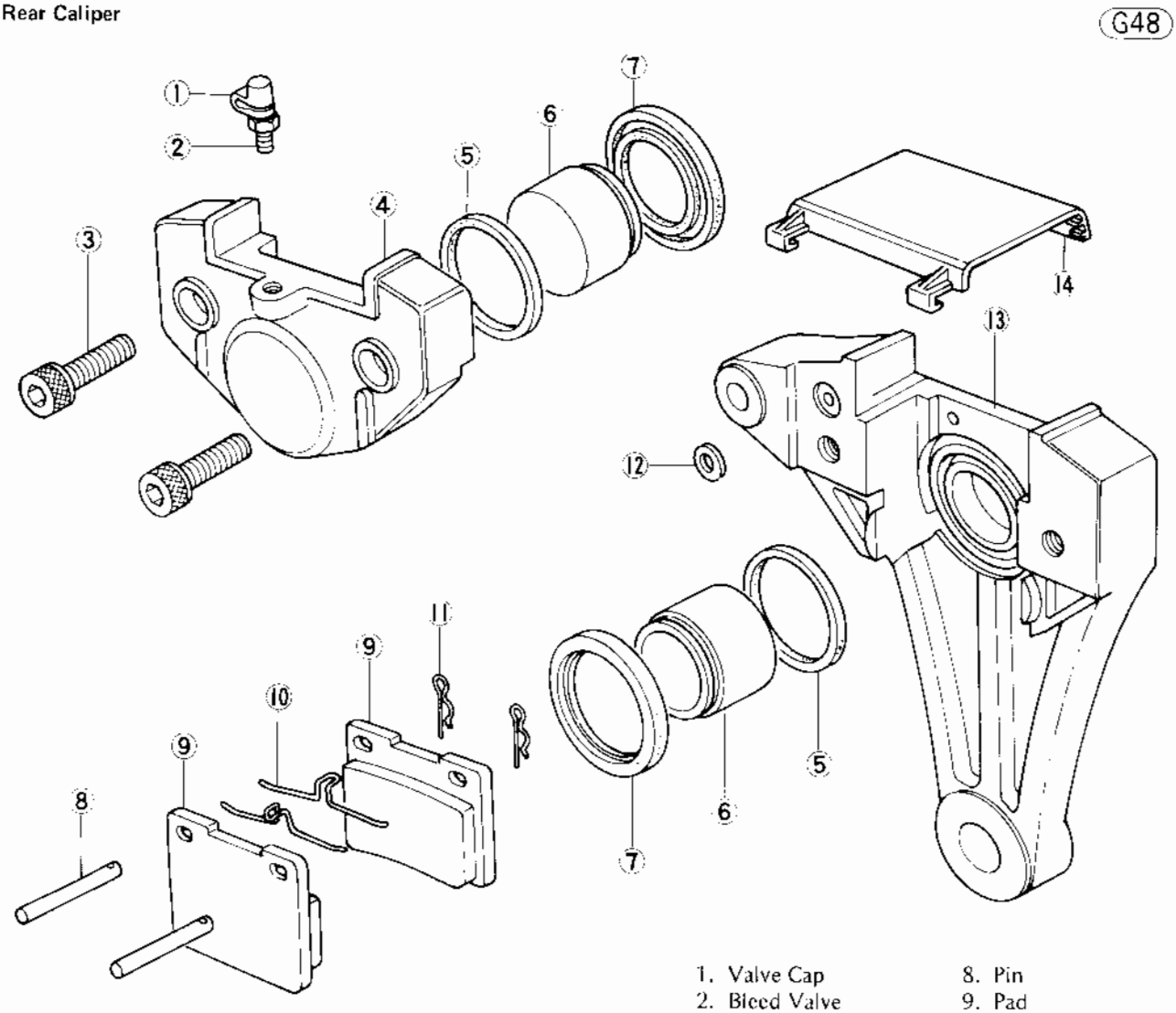
Caliper Installation Notes:

1. Put a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to 3.0 kg-m (22 ft-lbs) of torque.
2. Tighten the caliper Allen bolts 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. 205).
4. Adjust the drive chain (Pg. 28).

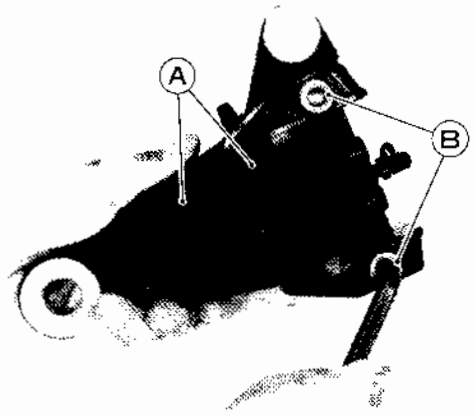
Caliper Disassembly:

- Remove the rear caliper.
- Remove the pads as explained in the pad removal section (Pg. 127).
- Remove the Allen bolts 3, (2) and separate the left caliper half 4.

Rear Caliper

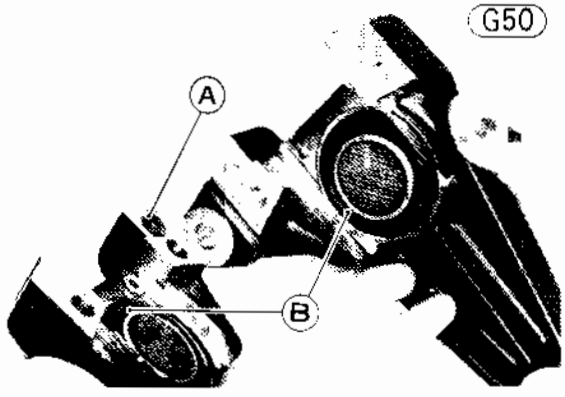


1. Valve Cap
2. Bleed Valve
3. Allen Bolt
4. Caliper Half
5. Fluid Seal
6. Piston
7. Dust Seal
8. Pin
9. Pad
10. Anti-rattle Spring
11. Clip
12. O Ring
13. Caliper Half
14. Pad Cover



A. Caliper Halves B. Allen Bolts

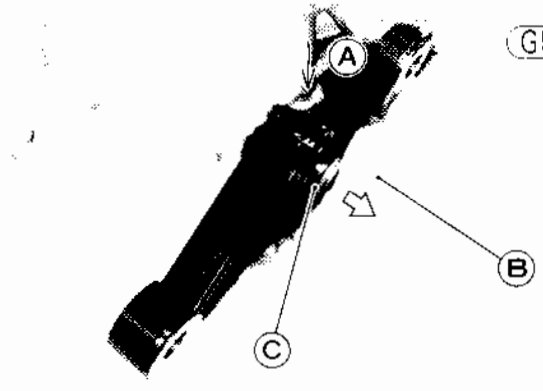
•Remove the O ring 12 (2) and the dust seals 7 around the pistons.



A. "O" Ring B. Dust Seals

•Wrap each caliper half with a clean, heavy cloth, and remove each piston 6 by lightly applying compressed air to the brake fluid passage.

WARNING **To avoid serious injury, never place your fingers or palm on the piston. If you apply compressed air into the caliper, the piston may crush your hand or fingers.**



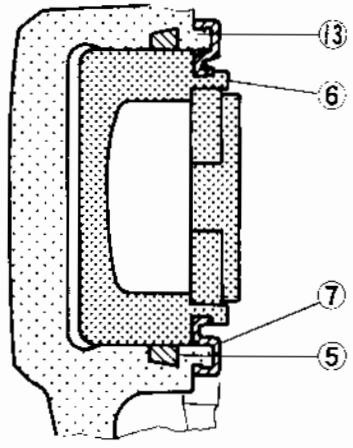
A. Compressed Air C. Piston
B. Clean Cloth

•Taking care not to damage the cylinder surfaces, remove the fluid seals 5 with a hook.

Caliper Assembly:

•Clean the caliper parts with brake fluid or alcohol (See CAUTION – Pg. 118).
•Fit a new fluid seal in place inside each cylinder.
NOTE: It is recommended that the rubber parts, which are removed, be replaced with new ones.
•Apply brake fluid to the outside of each piston and fluid seal, and then push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt are scratched.
•Install a new dust seal around each piston. Check that the dust seals are properly fitted into the grooves in the piston and the caliper halves.

Caliper Fluid Seal, Dust Seal G52

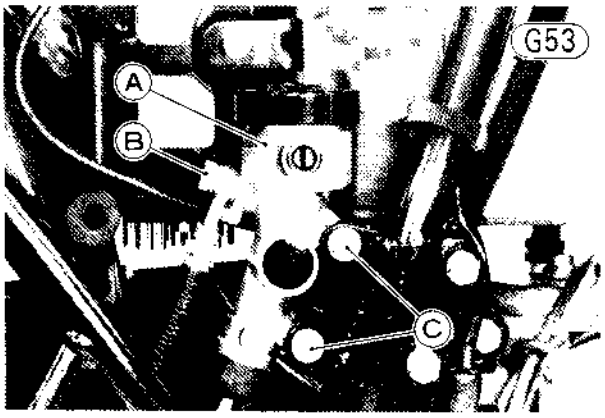


5. Fluid Seal 7. Dust Seal
6. Piston 13. Caliper (or 4)

•Fit a new O ring onto the right caliper half, and install the left caliper half with the Allen bolts.
•Tighten the Allen bolts to 3.0 kg-m (22 ft-lbs) of torque.
•Install the pads as explained in the pad installation section (Pg. 128).
•Install the rear wheel (Pg. 124).
•Adjust the drive chain (Pg. 28).
•Check the fluid level in the master cylinder, and bleed the brake line (Pg. 205).

Master Cylinder Removal:

•Pull off the right side cover.
•Remove the banjo bolt to disconnect the brake hose from the master cylinder. There is a flat washer on each side of the hose fitting. Immediately wipe up any brake fluid that spills.



A. Master Cylinder
B. Banjo Bolt
C. Mounting Bolts

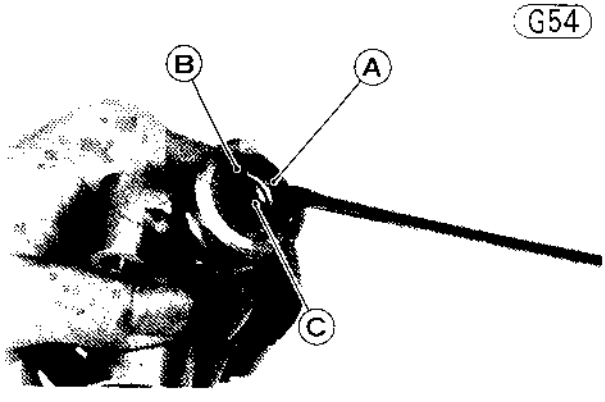
•Remove the master cylinder mounting bolts (2), and free the rear master cylinder from the motorcycle.

Master Cylinder Installation Notes:

1. Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to 3.0 kg-m (22 ft-lbs) of torque. Be sure that the metal pipe comes to the right side of the stop on the master cylinder (Fig. G58).
2. Bleed the brake line after master cylinder installation (Pg. 205).
3. Adjust the rear brake (Pg. 29).

Master Cylinder Disassembly:

•Remove the push rod dust cover [9].
•Take off the master cylinder cap [1] and diaphragm [3], and empty the brake fluid into a suitable container.
•Remove the retainer [18] with a thin screwdriver, and pull out the piston stop [17] and piston [15]. Do not remove the secondary cup [16] from the piston since removal will damage the cup.

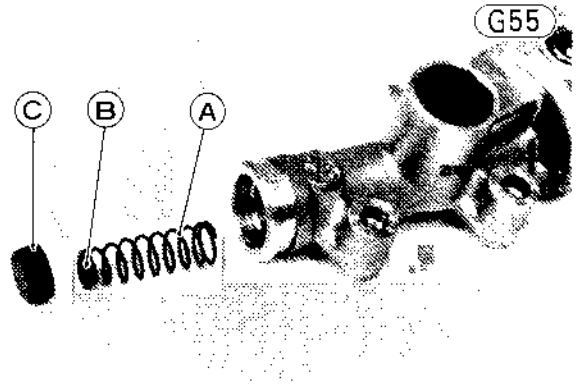


A. Retainer
B. Piston Stop
C. Piston

•Remove the return spring [13] and primary cup [14] by lightly applying compressed air into the outlet hole.

Master Cylinder Assembly:

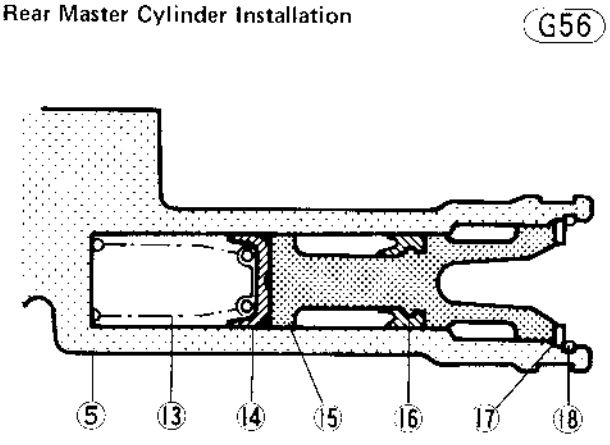
•Before assembly, clean all parts including the master cylinder with brake fluid or alcohol (See CAUTION - Pg. 118), and apply brake fluid to the removed parts and the inner wall of the cylinder. Take care not to scratch the piston or the inner wall of the cylinder.
•Put the return spring into the cylinder. The spring seat side must face out.



A. Spring
B. Spring Seal
C. Primary Cup

•Install the primary cup. Be sure that the primary cup is not installed backward or turned sideways after insertion.

Rear Master Cylinder Installation

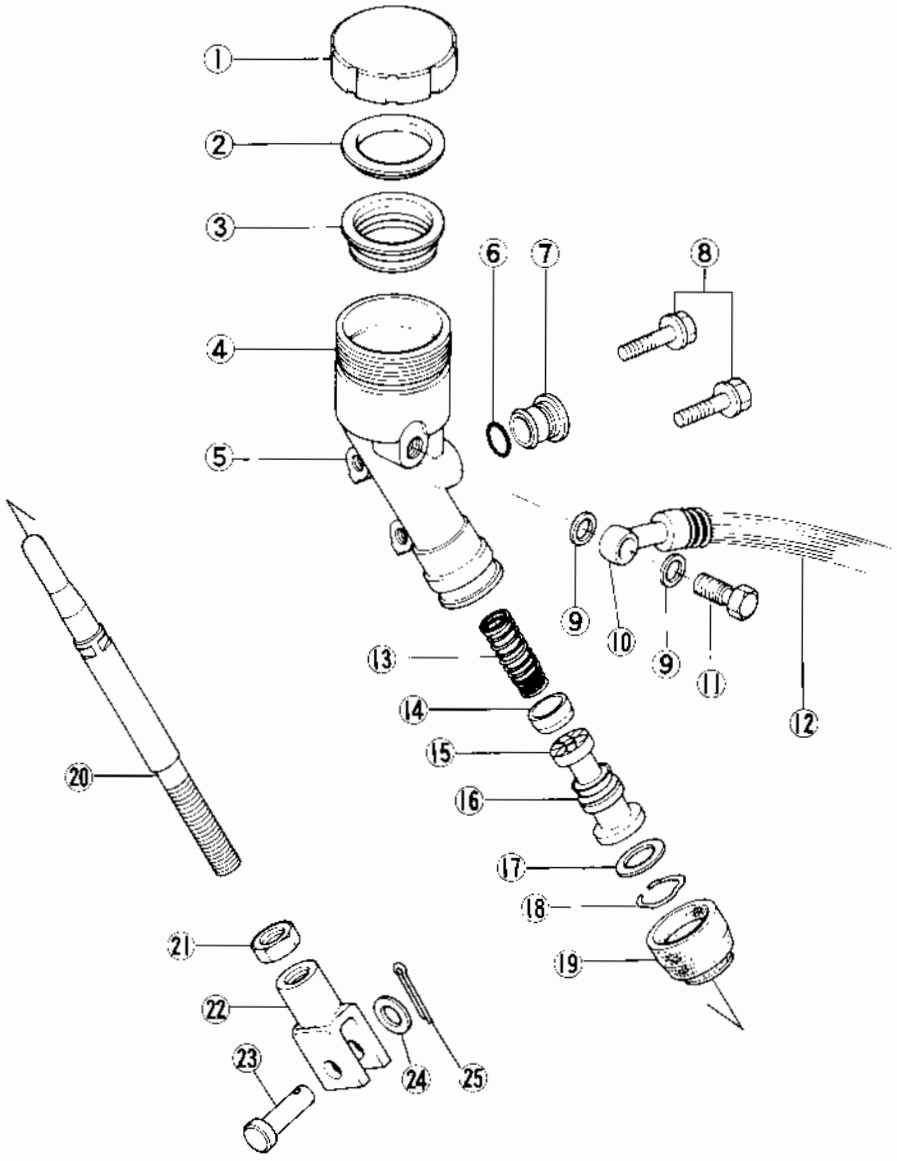


5. Master Cylinder Body
13. Spring
14. Primary Cup
15. Piston
16. Secondary Cup
17. Piston Stop
18. Retainer

•Install the piston and stop, and with a suitable rod, install the retainer to hold the piston in as far as it will go.

Rear Master Cylinder

G57

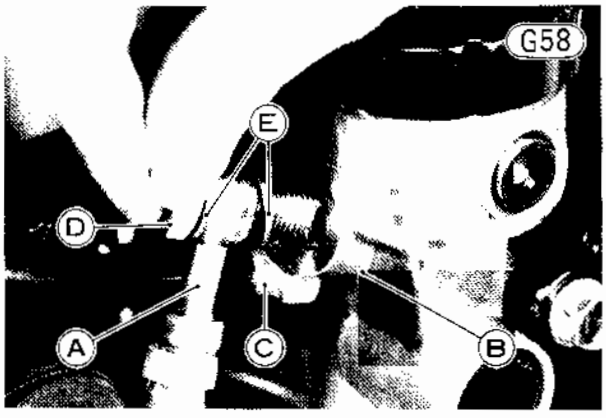


1. Cap
2. Ring Plate
3. Diaphragm
4. Reservoir
5. Master Cylinder Body
6. Gasket
7. Plug
8. Mounting Bolts
9. Flat Washer
10. Hose Fitting
11. Banjo Bolt
12. Brake Hose
13. Return Spring
14. Primary Cup
15. Piston
16. Secondary Cup
17. Piston Stop
18. Retainer
19. Dust Cover
20. Push Rod
21. Locknut
22. Joint
23. Clevis
24. Flat Washer
25. Cotter Pin

- Fit the diaphragm and the master cylinder cap.
- Fit the push rod dust cover.

Brake Hose Replacement:

- Pump the brake fluid out of the line as explained in the Maintenance Section – *Changing the brake fluid*, Pg. 205.
- Remove the banjo bolts at the caliper and the master cylinder, and pull the brake hose out of the guides (2) on the swing arm and the frame.
- Secure the new brake hose in its guides with the rubber grommets, and install the brake hose fittings on the caliper and master cylinder. Use a new flat washer for each side of the fittings.
- Be sure that the metal pipe is to the right of the stop on the master cylinder, and tighten the banjo bolts to 3.0 kg-m (22 ft-lbs) of torque.



A. Metal Pipe
B. Master Cylinder
C. Stop
D. Banjo Bolt
E. New Flat Washers

- Fill the reservoir with fresh brake fluid, and bleed the brake line (Pg. 205).

TIRES, TUBES

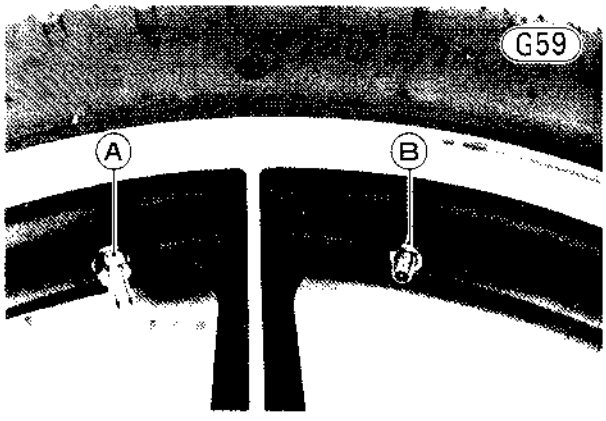
Removal:

- Remove the wheel from the motorcycle (Pg. 115 or 123).

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

- Remove the disc(s).
- Mark the valve stem position on the tire with chalk so that the tire will be reinstalled in the same position to maintain wheel balance.
- Take out the valve core to let out the air.
- Remove the valve stem nut, and fully loosen the two bead protector nuts.

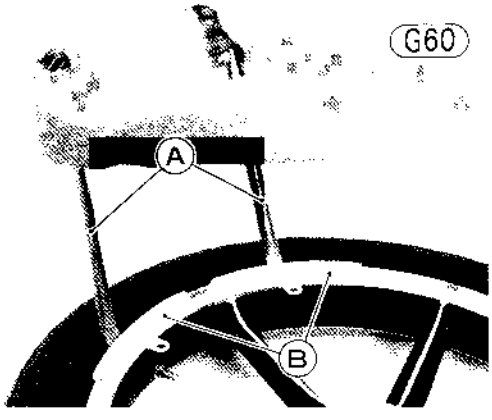
NOTE: Front tire has not tire bead protectors.



A. Bead Protector Nut **B. Valve Stem Nut**

- Use a rubber mallet to break the tire beads away from both sides of the rim.
- Install the rim protectors (special tool) on the rim flange near the valve stem, and lubricate the tire beads, rim flanges, rim protectors, and tire irons with a soap and water solution or liquid soap.
- 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. Take care not to insert the tire irons so deeply that the tube gets damaged.

NOTE: 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.



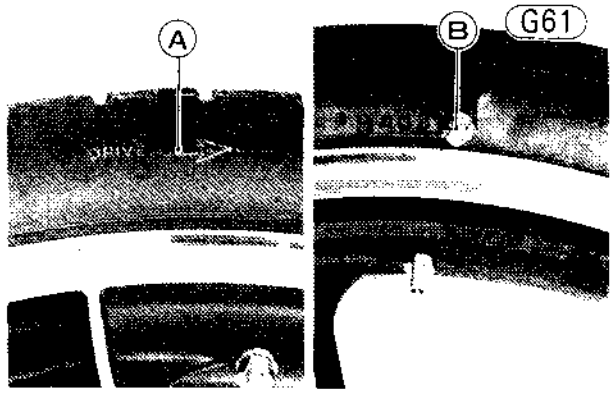
A. Tire Irons **B. Rim Protectors (57001-1063)**

- Remove the tube when one side of the tire is pried off.
- Pry the tire off one of the bead protectors and then pry the other side of the tire off the rim.

Installation:

- 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. 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.
- 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.
- If the tire was completely removed, pry one side back onto the rim and fit the bead protectors into the tire. Be sure that the tire does not go on backwards; the rear tire has an arrow molded into the sidewall to show the direction of tire rotation. Align the chalk mark on the tire with the valve stem.

NOTE: If a new tire is installed, the yellow paint mark on the tire should be aligned with the valve stem for best balancing results.



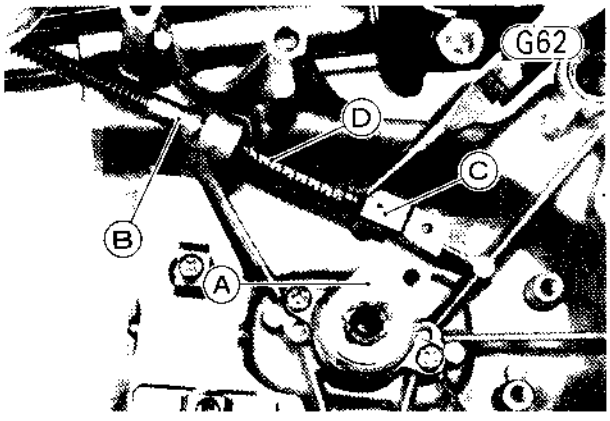
A. Arrow Mark **B. Yellow Paint Mark**

- Pry the other side of the tire onto the rim, starting at the side opposite the valve. Take care not to insert the tire irons so deeply that the tube gets damaged.
- Check that the tube is not pinched between the tire and rim, and then inflate to the specified pressure (Pg. 194).
- Tighten the bead protector nuts and valve stem nut, and put on the valve cap.
- Install the disc(s), and tighten the disc mounting bolts to 2.3 kg-m (16.5 ft-lbs) of torque.
- Balance the wheel (Pg. 31).
- Mount the wheel on the motorcycle (Pg. 115 or 124).
- Adjust the drive chain (Pg. 28), if the rear wheel was removed.

CLUTCH CABLE

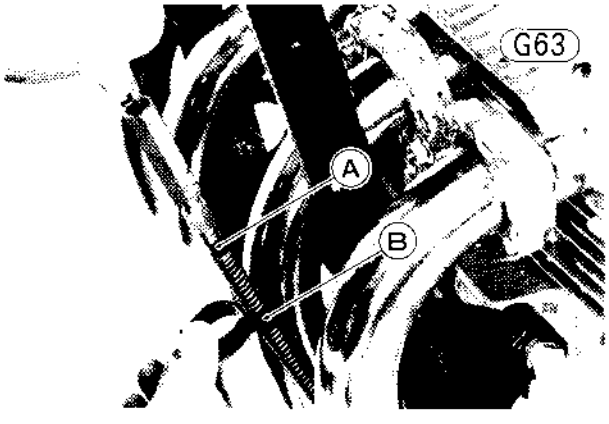
Removal:

- Remove the engine sprocket cover (Pg. 69).
- Remove the cotter pin, and disconnect the tip of the clutch cable from the clutch release lever.



A. Clutch Release Lever
B. Clutch Cable
C. Cotter Pin
D. Spring

- Loosen the locknut on the clutch lever, and screw in the adjuster.
- Line up the slots in the clutch lever, locknut, and adjuster and free the cable from the lever.
- Pull the cable free from the motorcycle with the clamp.



A. Clutch Cable
B. Clamp

Installation:

NOTE: Before installing the clutch cable, lubricate it.

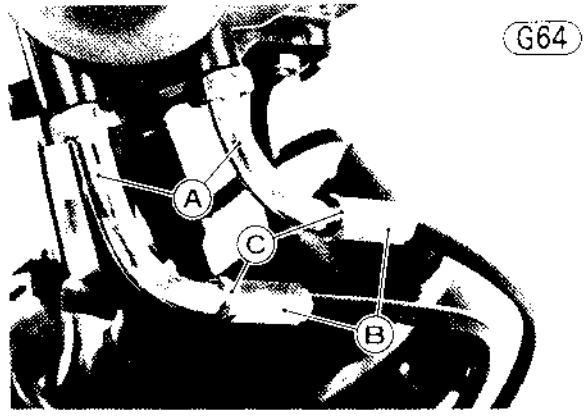
- Run the upper end of the cable between the left fork leg and the head pipe to the clutch lever.
- Fit the tip of the cable back into the clutch lever.
- Run the lower end of the clutch cable between the left down tube and the lower part of the engine into the engine sprocket cover and spring. Fit the tip of the inner cable into the clutch release lever.
- Using a new cotter pin, secure the cable tip to the release lever.
- Install the engine sprocket cover (Pg. 69).
- Fasten the clutch cable to the frame down tube with the clamp.
- Adjust the clutch (Pg. 22).

THROTTLE CABLES

Removal:

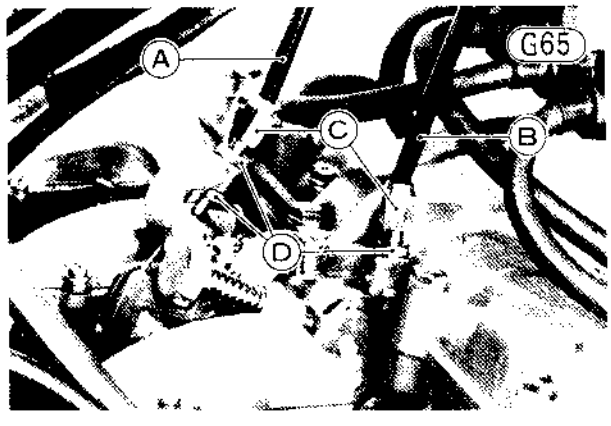
- Remove the fuel tank (Pg. 47).
- Screw in fully the locknuts and adjusting nuts at the upper end of the throttle cables so as to give the cables plenty of play.

CAUTION **Removing the throttle cables from the carburetors without enough cable play, may cause throttle cable damage.**



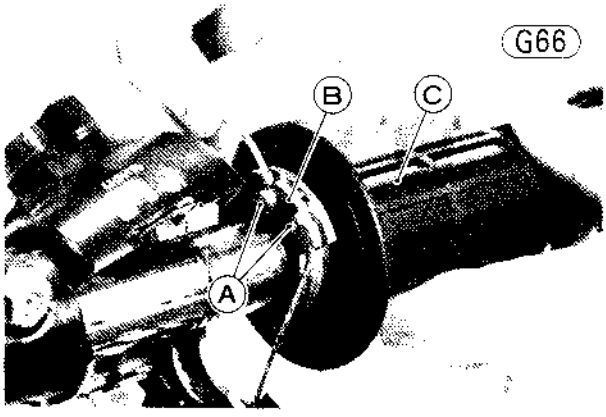
A. Cable Elbows
B. Adjusting Nuts
C. Locknuts

- Loosen the throttle cable adjuster mounting nuts (2 ea) fully, remove the accelerator throttle cable adjuster from its bracket, and slip the tip of its inner cable out of the pulley. Then do the same with the decelerator throttle cable.



A. Accelerator Throttle Cable
B. Decelerator Throttle Cable
C. Cable Adjusters
D. Adjuster Mounting Nuts

•Loosen both cable elbow nuts, and pull out the cables through the right cable guide on the stem head.
•Remove the right switch housing screws (2), and open the housing.
•Slip both throttle cable tips from their catches in the throttle grip.



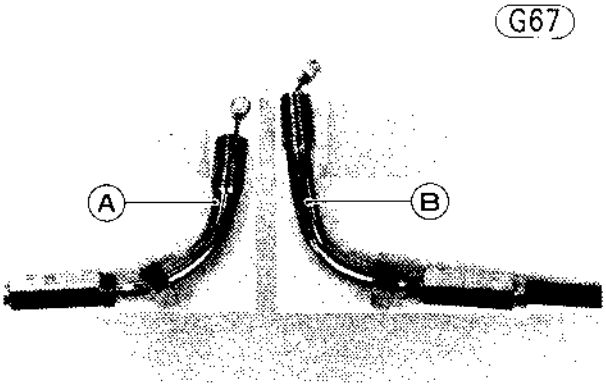
A. Throttle Cable Tips
B. Catches
C. Throttle Grip

•Unscrew the decelerator throttle cable elbow (the elbow next to the starter button), and pull the cable out of the right switch housing. Then do the same with the accelerator throttle cable elbow to free the throttle cables from the motorcycle.

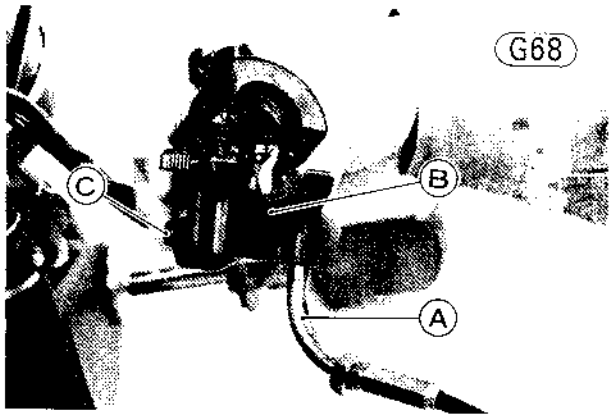
Installation:

NOTE: Before installing the throttle cables, lubricate them.

•Screw the accelerator throttle cable elbow (shorter than the decelerator throttle cable elbow) into the side of the right switch opposite the starter button. Screw it in almost all the way, and then lightly tighten the elbow nut.



A. Accelerator Cable Elbow
B. Decelerator Cable Elbow

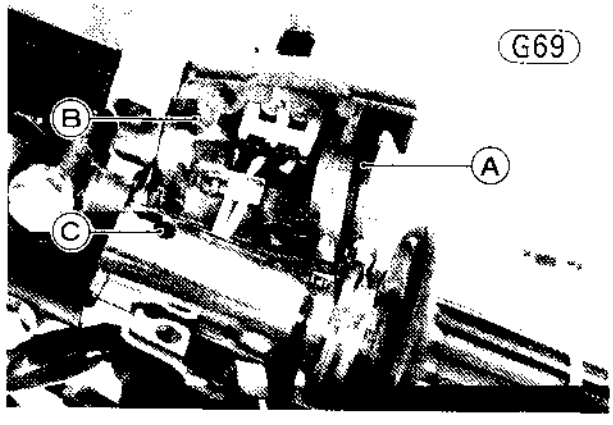


A. Accelerator Cable Elbow
B. Right Switch Housing
C. Starter Button

•Screw in the decelerator cable elbow almost all the way, and then lightly tighten the elbow nut.
•Run the accelerator throttle cable through the right cable guide on the stem head, between the left fork leg and the head pipe to the carburetors.
•Run the decelerator throttle cable through the right cable guide on the stem head, between the right fork leg and the head pipe to the carburetors.

NOTE: The cables should be naturally routed, neither one twisted about the other.

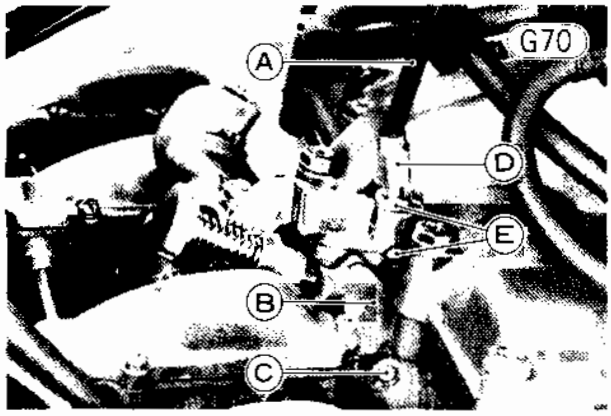
•Turn the throttle grip so that the cable catches are facing up, fit the accelerator throttle cable tip in the front catch and the other cable tip in the rear catch.
•Put together the switch housing, and tighten its screws. The upper half of the housing has a small projection which fits into a hole in the handlebar. The front switch housing screw is longer than the rear screw.



A. Switch Housing
B. Small Projection
C. Hole

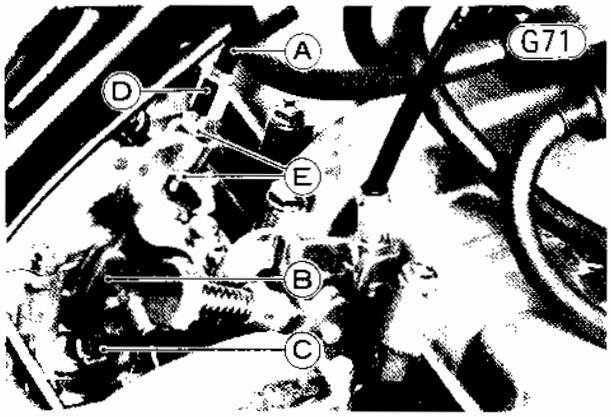
•Turn each elbow in the direction of its cable, and tighten its nut to secure the elbow in the proper position.

•Fit the tip of the decelerator throttle cable into the catch in the right pulley, and install its adjuster into the cable bracket.



A. Decelerator Throttle Cable
B. Right Pulley
C. Cable Tip
D. Adjuster
E. Mounting Nuts

•Fit the tip of the accelerator throttle cable into the catch in the left pulley, and install its adjuster into the cable bracket.



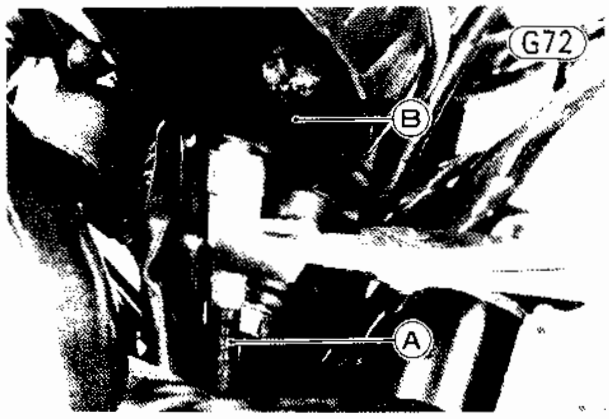
A. Accelerator Throttle Cable
B. Left Pulley
C. Cable Tip
D. Adjuster
E. Mounting Nuts

•Center each adjuster in its place in the bracket, and tighten the mounting nuts.
•Adjust the throttle cables (Pg. 18).
•Install the fuel tank (Pg. 47).

SPEEDOMETER CABLE

Removal:

•Disconnect the upper and lower ends of the speedometer cable with pliers.

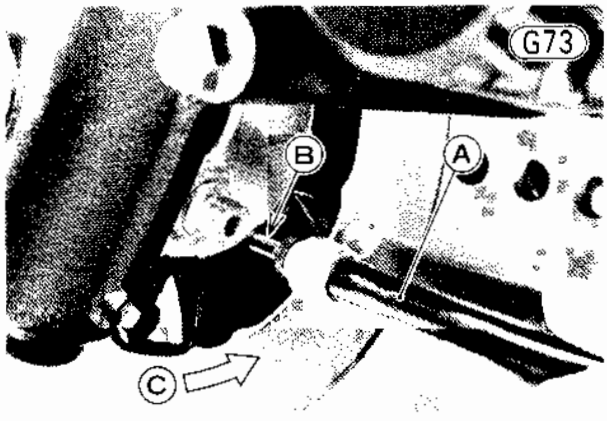


A. Speedometer Cable
B. Speedometer

•Pull the cable free.

Installation:

•Run the speedometer cable through its guide at the front fender left side, and secure the upper end of the cable to the speedometer with pliers.
•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 in the tongue of the speedometer pinion. Tighten the cable nut with pliers.



A. Speedometer Cable
B. Slot
C. Turn.

TACHOMETER CABLE

Removal:

•Disconnect the upper and lower ends of the tachometer cable with pliers.
•Free the cable from the motorcycle.

Installation:

•Fit the inner cable into the tachometer, and tighten the cable nut with pliers.
•Fit the bottom end of the cable into its place in the cylinder head. Turn it if necessary so that it fits all the way into place, and tighten its nut with pliers.

There is a gasket between the outer cable and the tachometer pinion holder.

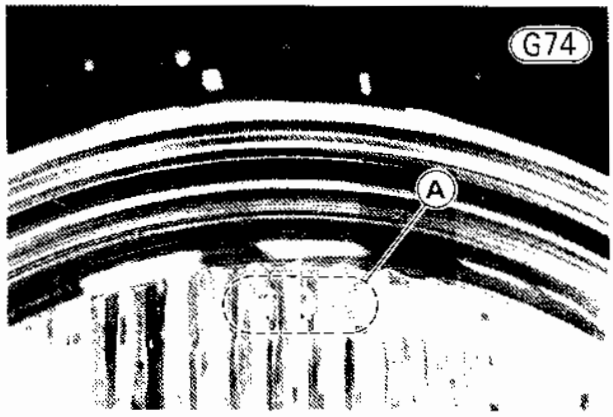
HEADLIGHT UNIT

Removal:

- Take out the retaining screws 6 (2), and swing the unit 10 from the housing 30.
- Disconnect the headlight socket 11 from the rear of the unit. For semi-sealed beam units, the bulb can now be removed.
- Remove the pivot screws 7, nuts 9, and rubber dampers 8 (2 ea), and the beam horizontal adjusting screw 2. A nut 5, spring seat 4, and spring 3 come off with the adjusting screw.
- Separate the outer rim 1 from the inner rim.
- Remove the screws (2), and separate the sealed beam unit from the inner rim and mounting rim.

Installation Notes:

1. Place the sealed beam unit into the mounting rim, fitting the raised portion into its holders on the mounting rim. This ensures that the part of the sealed beam unit marked "TOP" will be on top after the headlight unit is mounted in the headlight housing.



A. "TOP" Mark

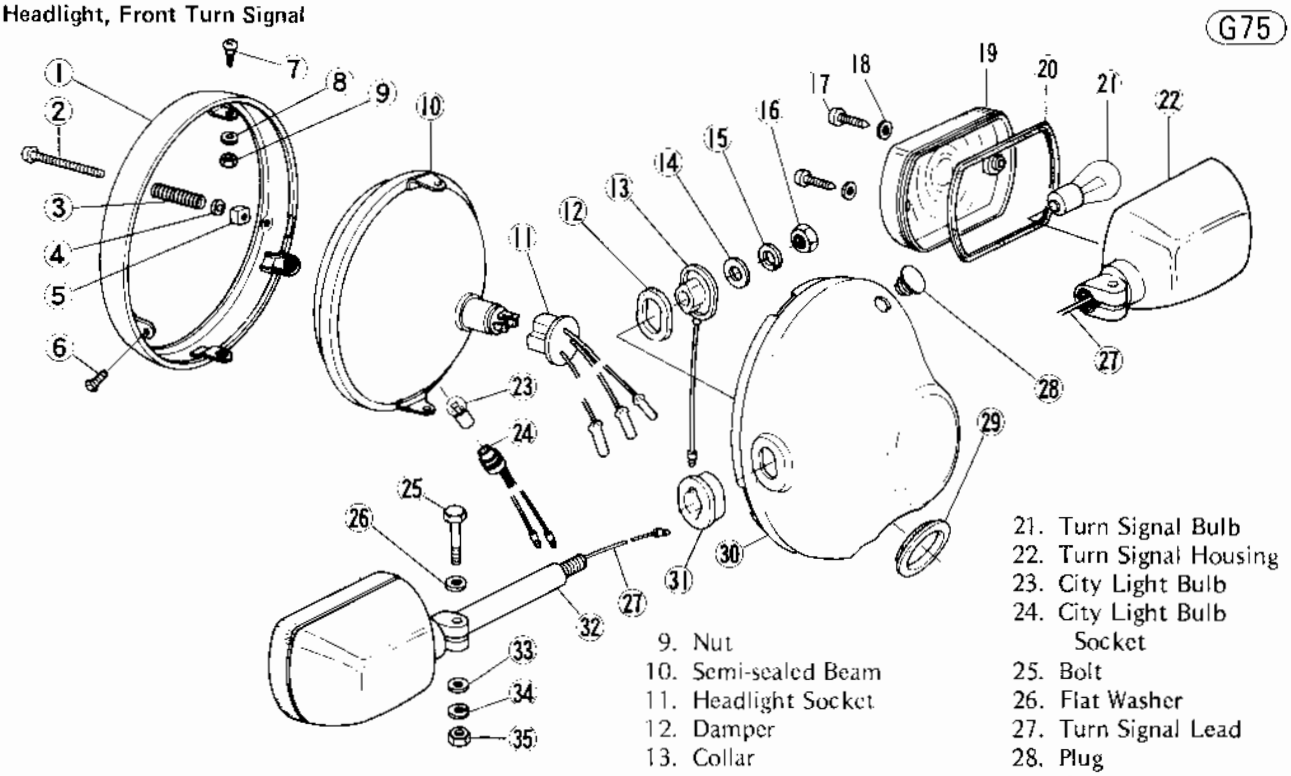
2. The spring seat on the adjusting screw goes between the spring and the bracket.
3. Carry out horizontal beam adjustment after installation (Pg. 32).

INDICATOR LIGHTS (Left and Right Turn, High Beam, Neutral)

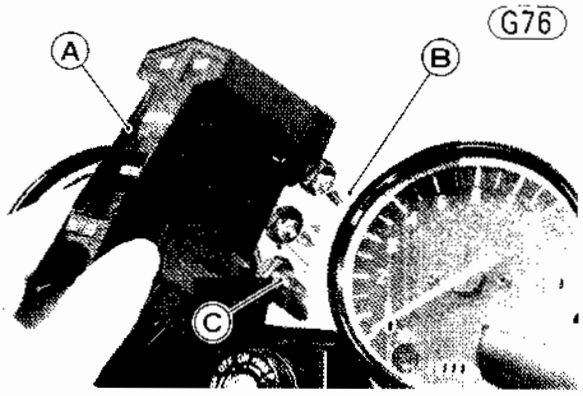
Removal:

- Remove the mounting screws (2) and take off the upper cover.

Headlight, Front Turn Signal

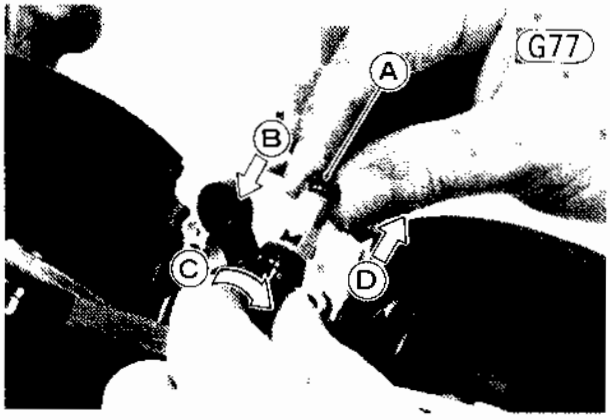


1. Rim
2. Adjusting Screw
3. Spring
4. Spring Seat
5. Nut
6. Retaining Screw
7. Pivot Screw
8. Rubber Damper
9. Nut
10. Semi-sealed Beam
11. Headlight Socket
12. Damper
13. Collar
14. Flat Washer
15. Lockwasher
16. Nut
17. Screw
18. Gasket
19. Lens
20. Rubber Gasket
21. Turn Signal Bulb
22. Turn Signal Housing
23. City Light Bulb
24. City Light Bulb Socket
25. Bolt
26. Flat Washer
27. Turn Signal Lead
28. Plug
29. Grommet
30. Headlight Housing
31. Damper
32. Stay
33. Flat Washer
34. Lockwasher
35. Nut



A. Upper Cover B. Bulb Holder C. Bulb

•Pull the indicator light bulb out the bulb holder.
•To remove the indicator light bulb, first press the bulb inwards, then holding the bulb in this position, twist it to the left and pull it out.



A. Bulb C. Twist.
B. Press. D. Pull out.

Installation Note:

•Use the bulbs shown in Table G2 for indicator light replacement. Also, refer to the table for light location by lead color. Example: The right turn signal socket takes the bulb with Black/Yellow and gray leads.

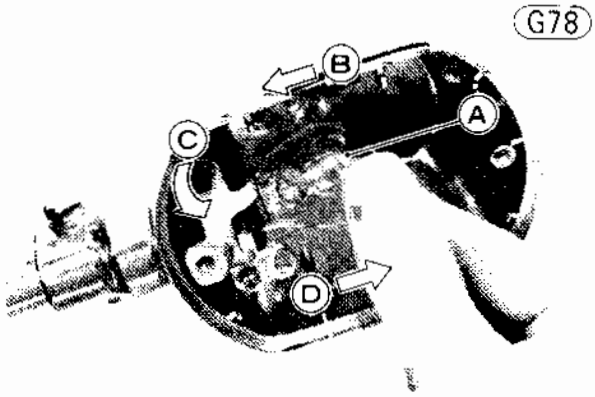
Table G2 Indicator Lights

Bulb Wattage	Indicator Lights	Lead Color
12V 3.4W	Neutral	Brown, Light Green
	High Beam	Red/Black, Black/Yellow
	Left Turn Signal	Green, Black/Yellow
	Right Turn Signal	Gray, Black/Yellow

TURN SIGNAL LIGHTS

Bulb Replacement:

•Remove the lens mounting screws, and take off the lens.
•Press the bulb inwards, and holding the bulb in this position, twist it to the left and pull it out.



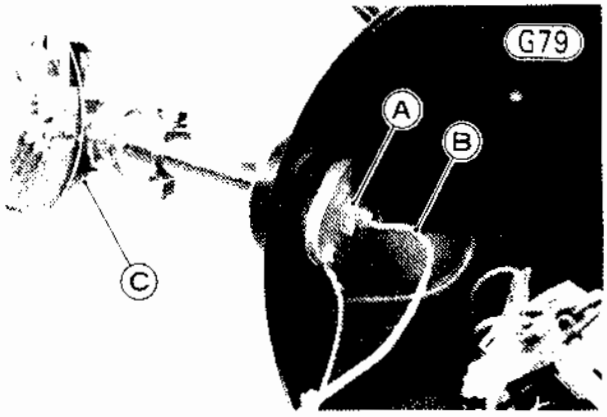
A. Bulb C. Twist.
B. Press. D. Pull out.

•Install a new 12 volt bulb of the correct wattage (see the wiring diagram).
•Fit the rubber gasket in place, if removed, and install the lens. Be careful not to overtighten the mounting screws. Each screw has a plastic washer.

TURN SIGNAL ASSEMBLYS

Removal (front, either side):

•Take out the retaining screws (2), pull the bottom of the headlight unit out of its housing, and swing the unit out from the housing.
•Disconnect the headlight socket, and pull out the city light leads from the rear of the unit.
•Disconnect the turn signal lead in the headlight housing.
•Remove the mounting nut, and pull the front turn signal from the front fork cover stay.



A. Mounting Nut C. Turn Signal
B. Turn Signal Lead

Installation Notes (front, either side):

1. If the front turn signal dampers have been removed, install them as shown in Fig. G75.
2. Connect the turn signal leads referring to Table G3.

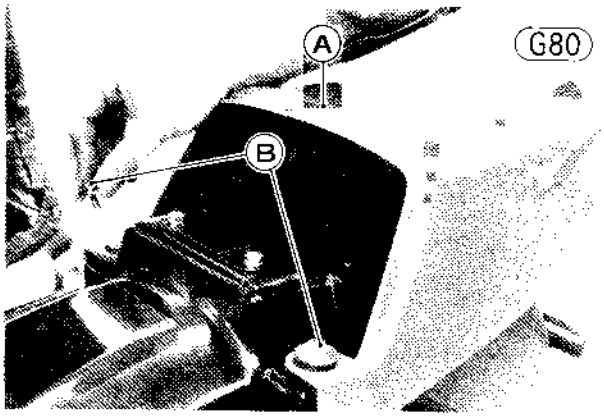
Table G3 Turn Signal Lead Color

	Turn Signal Lead	Main Wiring Harness Lead
Right	Green or Gray	↔ Gray
	Black/Yellow	↔ Black/Yellow
Left	Green or Gray	↔ Green
	Black/Yellow	↔ Black/Yellow

3. Adjust the headlight vertically.

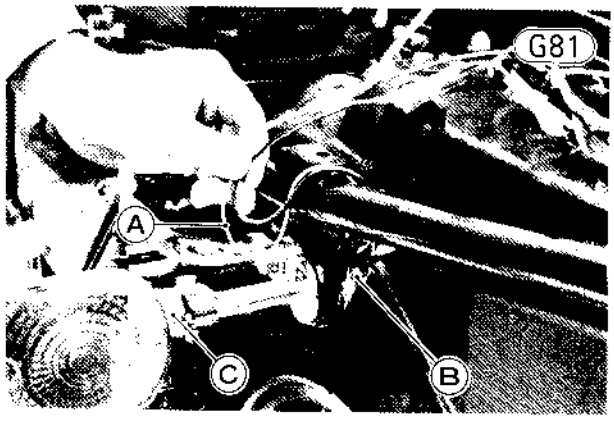
Removal (rear, either side):

- Unlock the seat and swing it open.
- Remove the rear fender cover bolts (2), lockwashers (2), and flat washers (2), and remove the fender cover.



A. Rear Fender Cover B. Bolts

- Disconnect the turn signal lead.



A. Turn Signal Lead C. Turn Signal
B. Mounting Nut

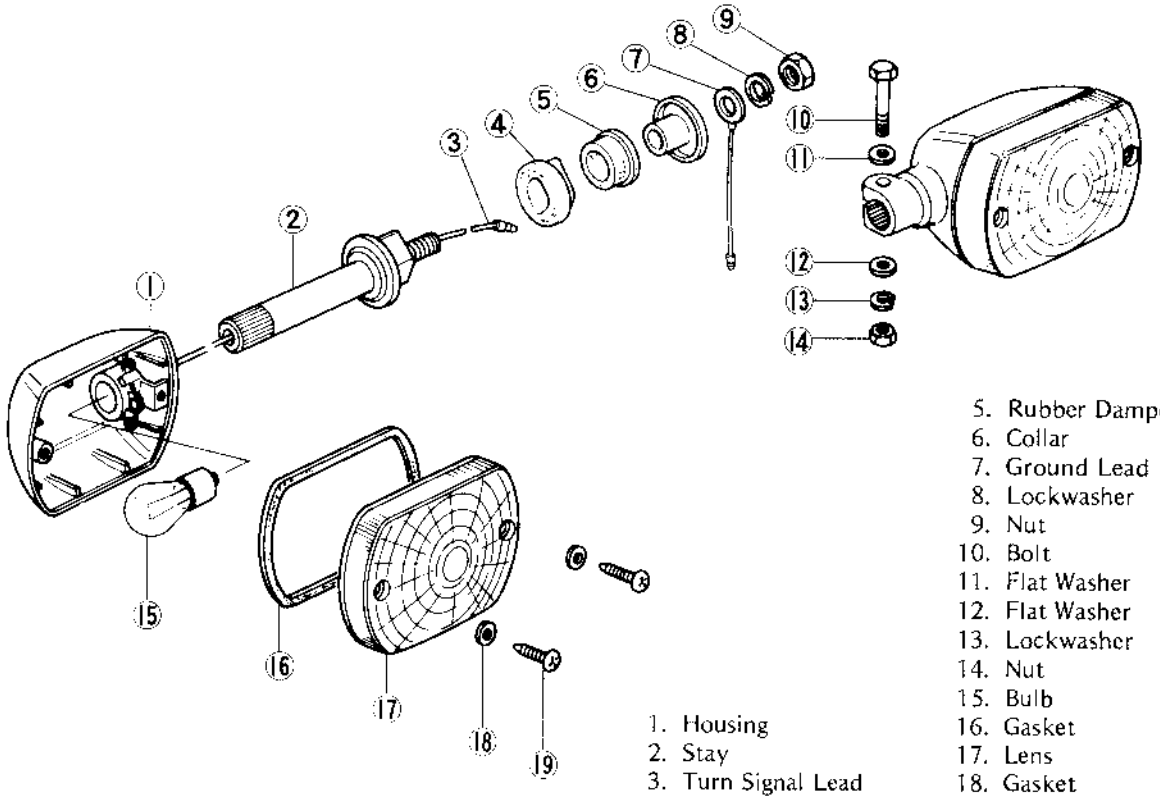
- Remove the mounting nut and lockwasher, and pull the rear turn signal from the frame.

Installation Notes (rear, either side):

1. If the rear turn signal dampers have been removed, install them as illustrated in Fig. G82.
2. Connect the turn signal leads according to Table G3.

Rear Turn Signal

G82

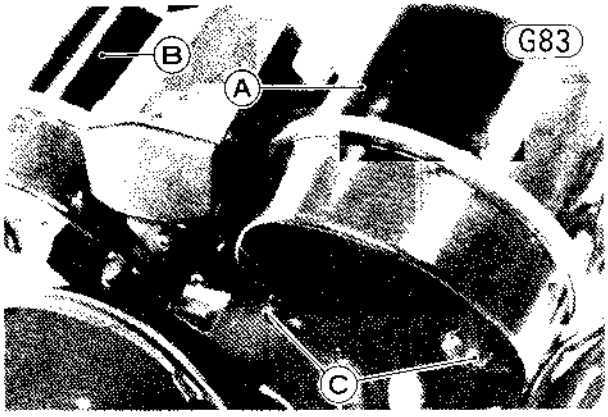


1. Housing
2. Stay
3. Turn Signal Lead
4. Rubber Damper
5. Rubber Damper
6. Collar
7. Ground Lead
8. Lockwasher
9. Nut
10. Bolt
11. Flat Washer
12. Flat Washer
13. Lockwasher
14. Nut
15. Bulb
16. Gasket
17. Lens
18. Gasket
19. Screw

SPEEDOMETER, TACHOMETER, METER LIGHTS, INDICATOR LIGHTS (Oil, Stop Lamp)

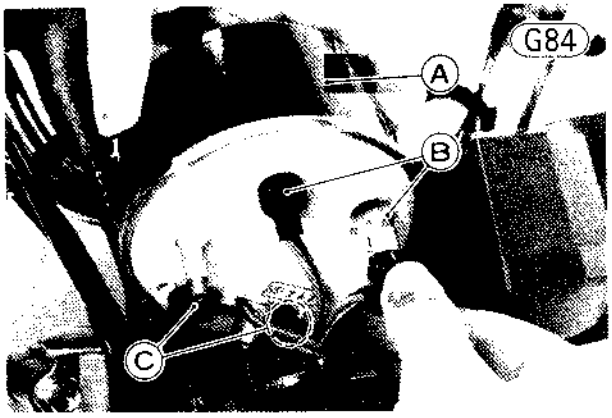
Removal:

- Disconnect the upper end of the speedometer cable and tachometer cable with pliers.
- Remove the cap nuts from the bottom of the meter.



A. Speedometer
B. Tachometer
C. Cap Nuts

- Pull up the speedometer and tachometer, pull the meter lights and indicator lights, and remove the meters.



A. Tachometer
B. Meter Lights
C. Indicator Lights

- To remove the meter light bulb or indicator light bulb, first press the bulb inward, then holding the bulb in this position, twist it to the left and pull it out (Fig. G77).

CAUTION **Place the meter so that the correct side of the meter is up. If a meter is left upside down or sideways for any length of time it will malfunction.**

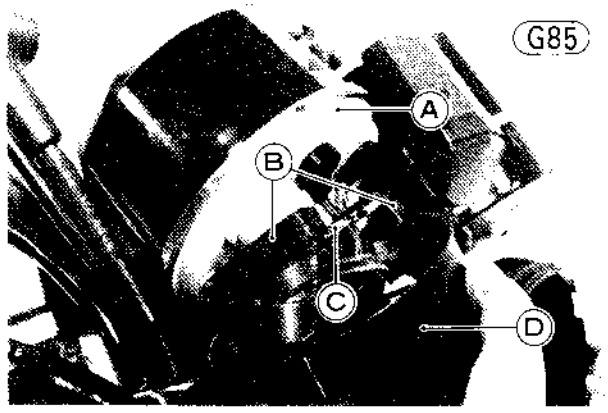
Installation Notes:

1. Use 12V 3.4W bulb for meter light replacement.
2. Refer to the table for light location by lead color.

Table G4 Meter and Indicator Lights

Bulb Wattage	Lights	Lead Color
12V 3.4W	Speedometer	Brown/White, Black/Yellow
	Tachometer	Blue, Black/Yellow
	Oil	Blue/Red, Brown
	Stop Lamp	Green/White, Brown

3. There are two rubber dampers between the meter and meter bracket.

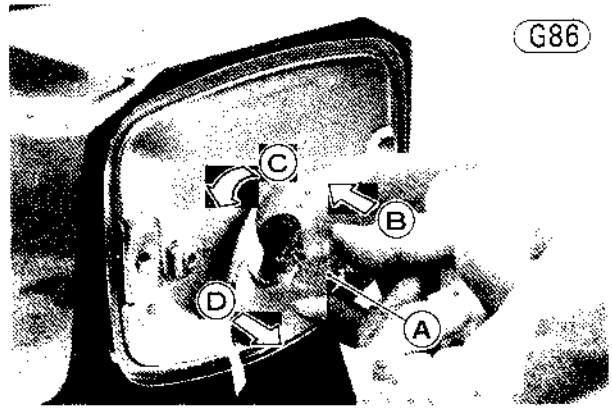


A. Meter
B. Rubber Dampers
C. Meter Bracket
D. Cover

TAIL/BRAKE LIGHT

Bulb Replacement:

- Remove the lens mounting screws, and take off the lens.
- Press the bulb inwards, and holding the bulb in this position, twist it to the left and pull it out.



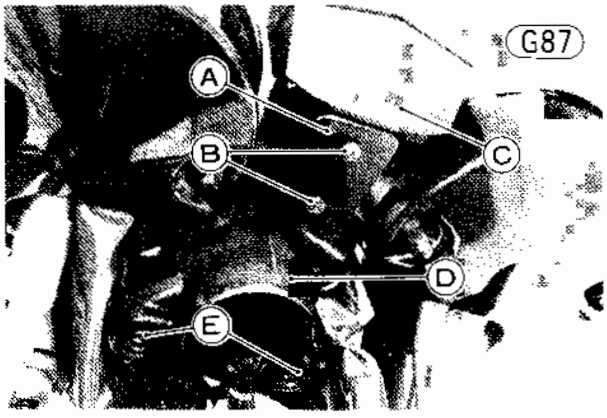
A. Tail/Brake Light Bulb
B. Press.
C. Twist.
D. Pull out.

- Replace a burned-out bulb with a new 12 volt bulb of the correct wattage (see the wiring diagram).
- Fit the rubber gasket in place, if removed, and install the lens. Be careful not to overtighten the mounting screws.

IGNITION SWITCH

Removal:

- Open the headlight housing, and free the headlight unit from the motorcycle (Pg. 137).
- Disconnect the ignition switch wiring harness socket from the plug (6-pin) it connects to in the headlight housing and push the socket out of the housing.
- Remove the front turn signal mounting nuts (2), and remove the left and right turn signal assemblies.
- Take out the screws from the bottom of the indicator light panel, and remove the lower cover and rubber dampers.



A. Lower Cover
B. Screws
C. Indicator Panel
D. Ignition Switch
E. Allen Bolts

- Remove the rubber damper and indicator panel.
- Remove the Allen bolts (2), and pull out ignition switch.

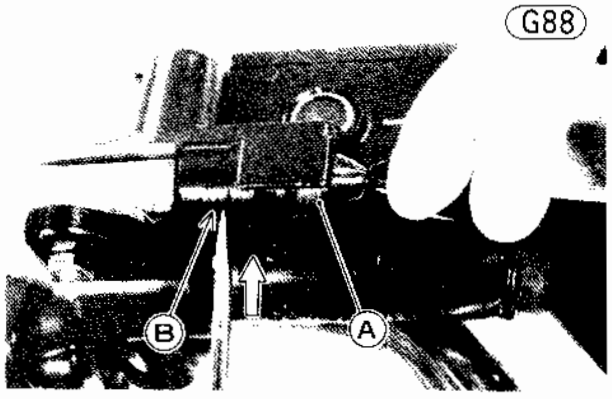
Installation:

- Fit the ignition switch in place, and tighten the Allen bolts and lockwashers.
- Install the indicator light panel with its rubber damper so that the damper projection fits into the bracket hole.
- Install the rubber dampers and lower cover, and tighten the screws (2).
- Connect the ignition switch wiring harness socket to its plug in the headlight housing.
- Install the left and right turn signal assemblies (Pg. 138).
- Install the headlight unit (Pg. 137).
- Adjust the headlight (Pg. 32).

FRONT BRAKE LIGHT SWITCH

Removal:

- Remove the headlight unit (Pg. 137).
- Disconnect the front brake light switch brown and blue leads in the headlight housing, and pull the leads out of the housing.
- Using a thin-bladed screwdriver or some other suitable tool, press in the front brake light switch tab which catches in the hole in the underside of the master cylinder, and then remove the switch.

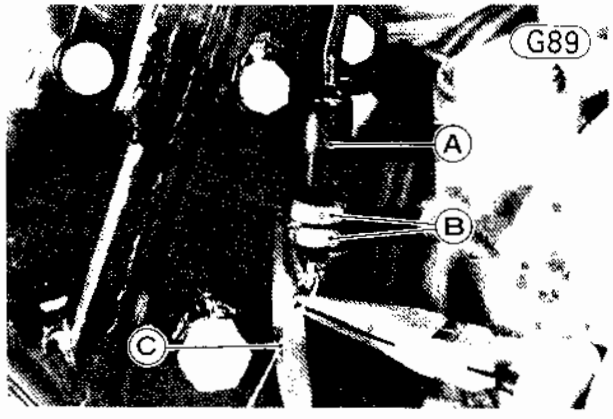


A. Front Brake Light Switch
B. Tab

REAR BRAKE LIGHT SWITCH

Removal:

- Remove the rear brake light switch spring from the switch.



A. Rear Brake Light Switch
B. Mounting Nuts
C. Spring

- Remove the right side cover, and disconnect the blue and brown leads from the rear brake light switch.
- Loosen the lower mounting nut fully, and remove the rear brake light switch.

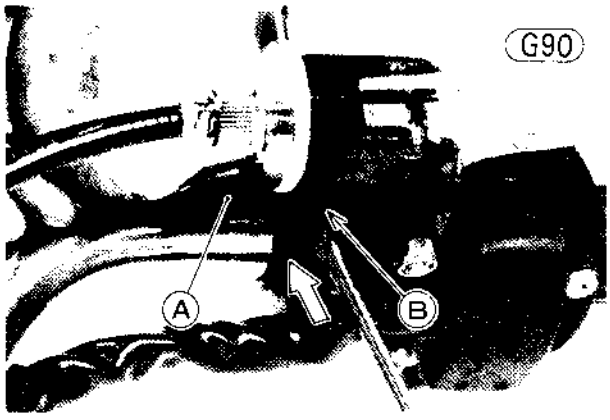
Installation Note:

- Adjust the switch after installation (Pg. 30).

STARTER LOCKOUT SWITCH

Removal:

- Open the headlight housing, and free the headlight unit from the motorcycle (Pg. 137).
- Disconnect the starter lockout switch lead connections in the headlight housing, and pull these leads out of the housing.
- Using a thin-bladed screwdriver or some other suitable tool, press in the starter lockout switch tab which catches in the hole in the clutch holder, and then remove the switch.

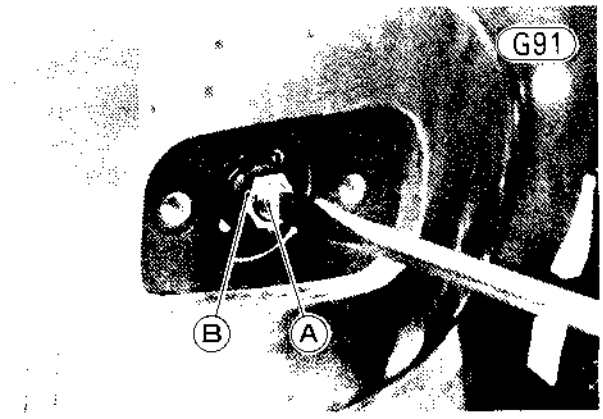


A. Starter Lockout Switch B. Tab

HANDLEBAR

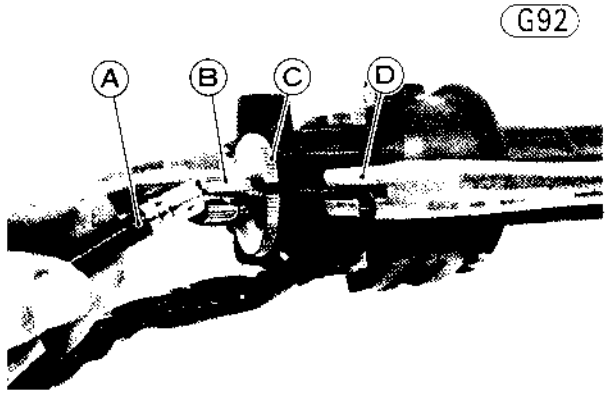
Removal:

- Take off the rear view mirrors.
- Remove the fuel tank (Pg. 47) or cover it with a thick cloth to avoid damaging the painted surface.
- Loosen the locknut, and turn in fully the adjuster at the center of the clutch cable to give the cable plenty of play.
- Remove the clutch adjusting cover.
- Loosen the locknut, and turn in the clutch adjusting screw a couple of turns to give the clutch cable plenty of play.



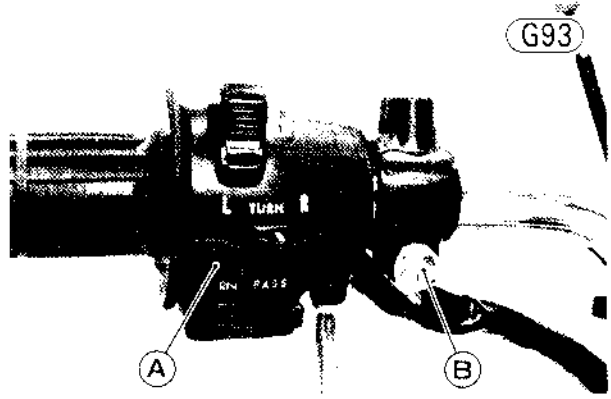
A. Adjusting Screw B. Locknut

- Loosen the knurled locknut on the clutch lever, and turn in the adjuster and line up the slots in the clutch lever, locknut, and adjuster. Free the inner cable from the lever.



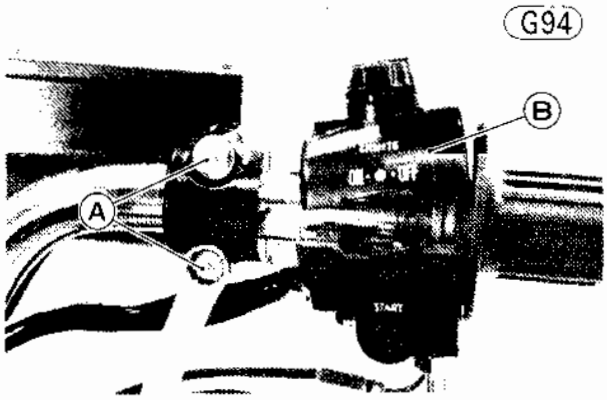
A. Clutch Cable C. Knurled Locknut
B. Adjuster D. Clutch Lever

- Remove the straps which hold the left switch wiring harness and right switch wiring harness to the handlebar.
- Take out the left switch housing screws (2), and remove the housing from the handlebar. If necessary, loosen the clutch lever holder bolt, and slide the clutch lever to the right.



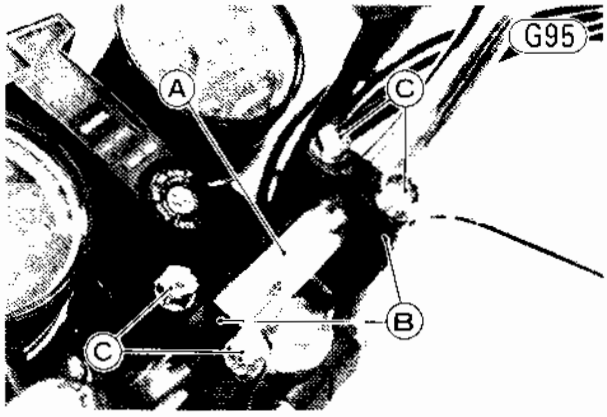
A. Left Switch Housing B. Clutch Lever Holder Bolt

- Remove the right switch housing screws (2), and open up the housing.
- Loosen the master cylinder clamp bolts (2).



A. Master Cylinder Clamp Bolts
B. Right Switch Housing

- Take the starter lockout switch off the clutch holder.
- Remove the handlebar clamp bolts and lockwashers (4 ea), remove the clamps (2), and slide the handlebar from the throttle grip, right switch housing, and master cylinder or front brake lever holder.

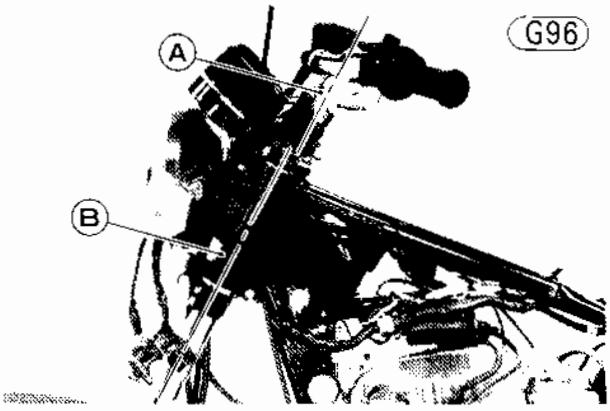


A. Handlebar
B. Handlebar Clamps
C. Clamp Bolts

- To remove the clutch lever, loosen the clutch lever holder bolt, cut off the left handlegrip, which is bonded to the handlebar, and slide off the clutch lever.

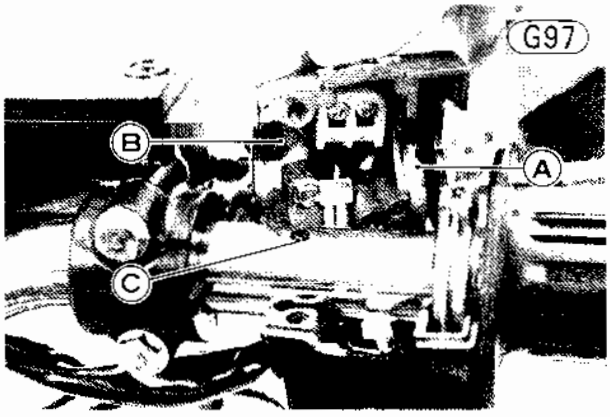
Installation:

- If the clutch lever and left handlegrip were removed; slide the clutch lever back on, hand tighten its bolt, and bond a new left handlegrip to the handlebar.
- Slide the right side of the handlebar through the master cylinder or front brake lever holder, and the right switch housing, and into the throttle grip assembly.
- Mount the handlebar, and install the handlebar clamps, lockwashers, and clamp bolts so that the angle of the handlebar matches the angle of the front fork as shown, and tighten the clamp bolts evenly to 1.8 kg-m (13.0 ft-lbs) of torque.



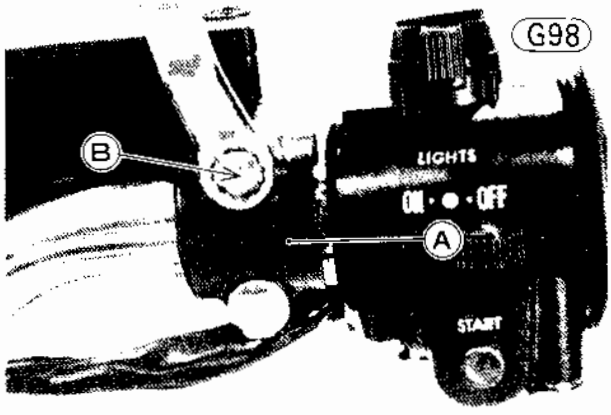
A. Handlebar
B. Front Fork

- Install the left switch housing, and tighten its screws (2).
- Put together the right switch housing, and tighten its screws. The upper half of the housing has a small projection which fits into a small hole in the handlebar. The front switch housing screw is longer than the rear screw.



A. Right Switch Housing
B. Projection
C. Hole

- With the brake lever mounted at the proper angle, tighten first the upper and then the lower master cylinder clamp bolt to 0.90 kg-m (78 in-lbs) of torque.



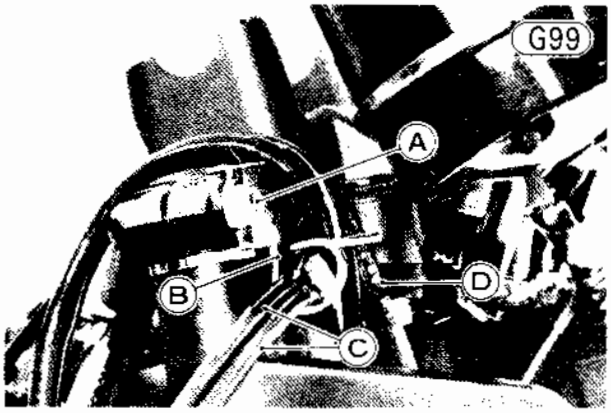
A. Master Cylinder Clamp
B. Tighten first.

- With the clutch lever mounted at the proper angle, tighten the clutch lever holder bolt.
- Install the starter lockout switch onto the clutch holder.
- Strap the left switch housing wiring harness, the right switch housing wiring harness, and the front brake light switch leads back onto the handlebar.
- Fit the tip of the clutch cable back into the clutch lever.
- Install the fuel tank (Pg. 47).
- Check the front brake (Pg. 29).
- Check the throttle cables (Pg. 18).
- Adjust the clutch (Pg. 22).
- Install the rear view mirrors.
- Adjust the rear view mirrors.

STEERING STEM

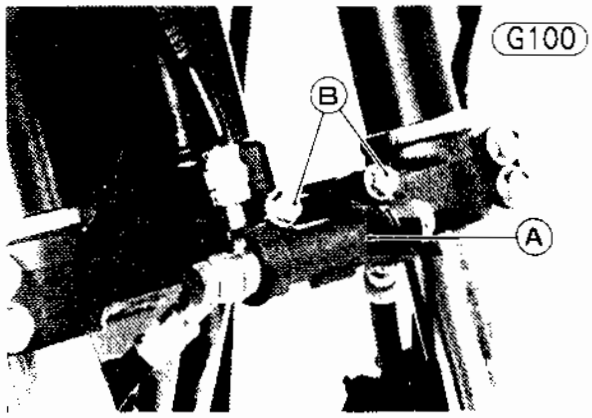
Removal:

- Remove the fuel tank (Pg. 47).
- Remove the speedometer cable (Pg. 136).
- Remove the front wheel (Pg. 115).
- Remove the headlight unit (Pg. 137).
- Disconnect all the leads and plugs in the headlight housing.
- Remove the left and right turn signal assemblies (Pg. 138), and take off the headlight housing.
- Remove the handlebar (Pg. 142).
- Remove the right front fork upper clamp bolt and cable guide, and loosen the left front fork upper clamp bolt.



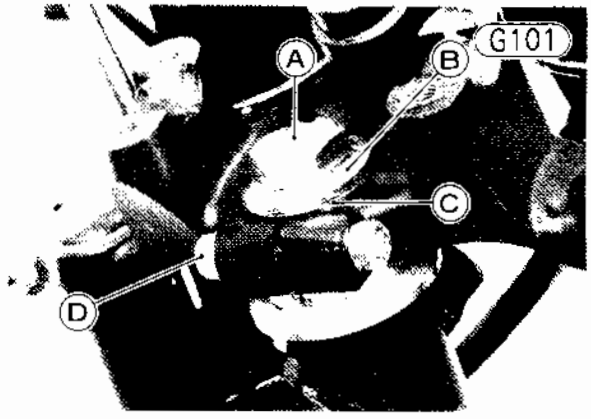
A. Upper Clamp Bolt
B. Cable Guide
C. Throttle Cables
D. Brake Hose

- Disconnect the tachometer cable at the tachometer with pliers.
- Remove the mounting bolts (2) and the 2-way joint.



A. 2-way Joint
B. Mounting Bolts

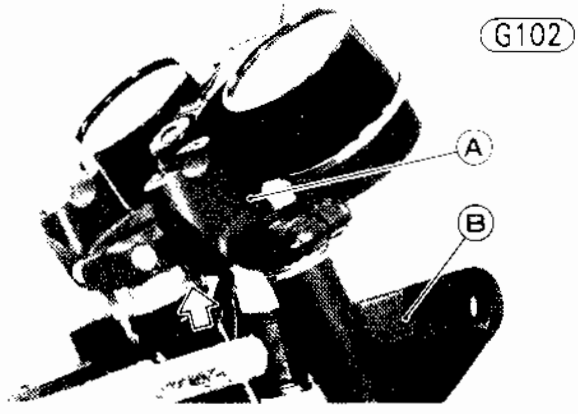
- Remove the caliper mounting bolts (2), and remove the calipers together with the master cylinder, upper brake hose, 2-way joint, and lower brake hoses.
- Loosen the stem head clamp bolt, and then remove the stem head bolt, flat washer, and lockwasher.



A. Stem Head Bolt
B. Flat Washer
C. Lockwasher
D. Clamp Bolt

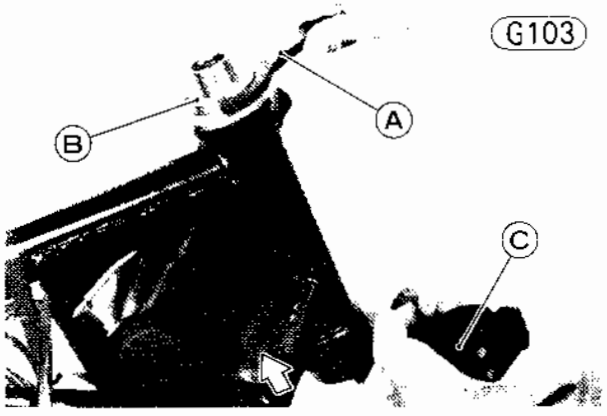
- Tap lightly on the bottom of the stem head with a mallet, and then remove the steering stem head together with the meters and ignition switch.

CAUTION **Place the stem head so that the correct side of the meters are up. If a meter is left upside down or sideways for any length of time, it will malfunction.**



A. Stem Head
B. Fork Cover

- Remove the fork covers. Each fork cover has a ring cap at the top, and a stem base cover, damper ring, and rubber damper at the bottom.
- Remove the front fender bolts and lockwashers (4 ea), and take off the fender.
- Loosen the lower clamp bolts, and pull out each fork leg with a twisting motion.
- 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 20 steel balls in the lower outer race.

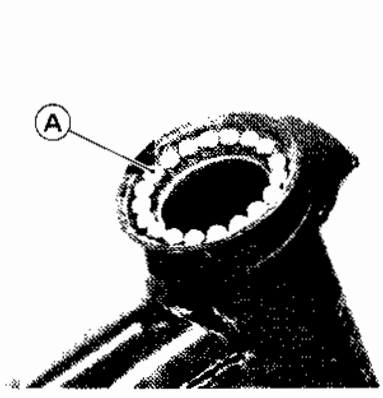


A. Stem Nut Wrench (57001-1100)
B. Stem Locknut
C. Stem Base

- Remove the steering stem cap, the upper inner race, and the upper steel balls (19).

Installation:

- 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 (19) and lower steel balls (20). All upper and lower steel balls are one size.

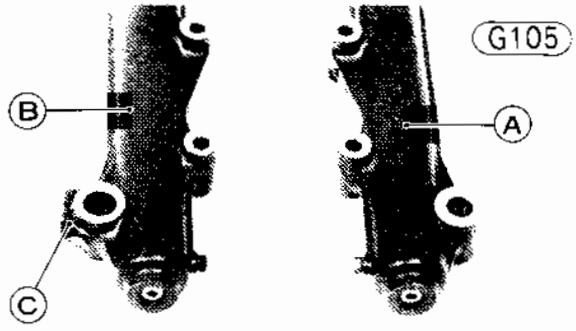


A. Steel Balls

- Put on the upper inner race and steering stem cap. Insert the steering stem into the head pipe, and tighten the steering stem locknut to 3.0 kg-m (22 ft-lbs) of torque.

- Run the inner tube of each front fork leg up through its clamp in the stem base. Temporarily tighten the lower clamp bolts on each side to hold each fork leg in place with its inner tube protruding about 200 mm above the steering stem base.

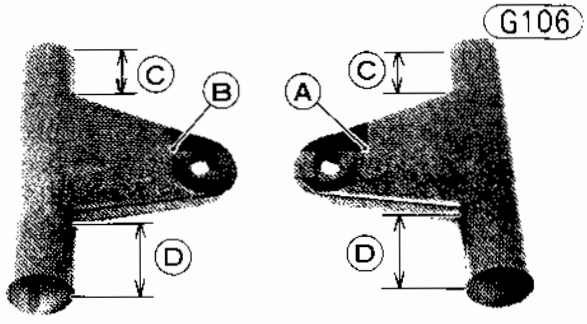
NOTE: Right fork leg has a clamp.



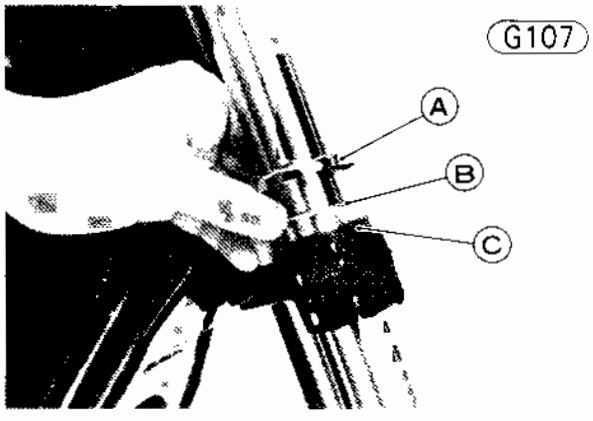
A. Left Fork Leg
B. Right Fork Leg
C. Clamp

- Install the rubber damper, damper ring, base cover, and fork cover, ring cap, on each tube in this order.

NOTE: The fork covers can be identified as shown.

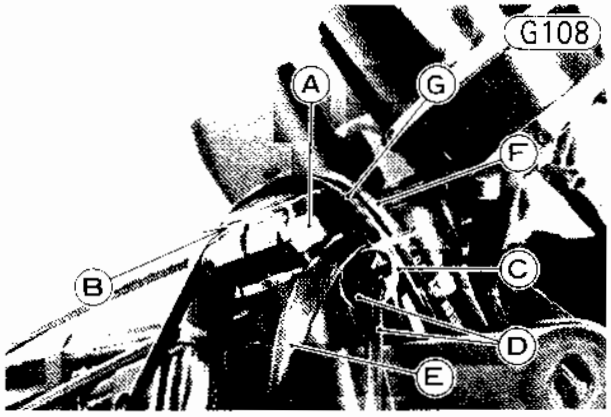


A. Left Fork Cover
B. Right Fork Cover
C. Short End
D. Long End



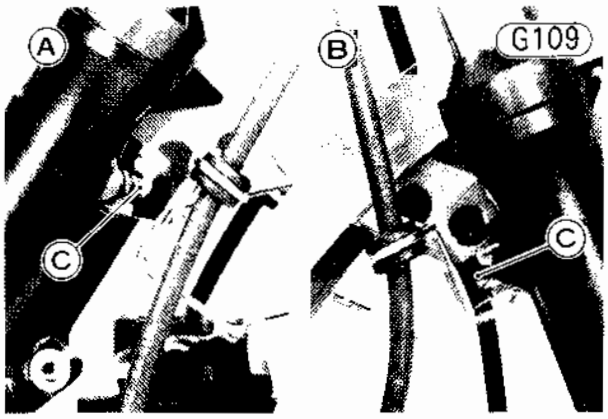
A. Base Cover
B. Damper Ring
C. Rubber Damper

- Install the stem head assembly and the stem head lockwasher and flat washer (flat side facing down). Screw in the stem head bolt loosely. Be sure the wiring harnesses and all cables go between the stem head and the front fork legs.
- Install one of the calipers on the fork leg. Tighten the caliper mounting bolts (2) to 3.0 kg-m (22 ft-lbs) of torque.
- Install the 2-way joint with its mounting bolts. Tighten the bolts to 0.90 kg-m (78 in-lbs) of torque.
- For each fork leg, loosen the lower clamp, and align the upper end of the front fork inner tube with the upper surface of the stem head. Tighten the upper clamp bolt to 1.8 kg-m (13.0 ft-lbs) of torque. The right upper clamp bolt has a cable guide. Run the throttle cables, right switch housing wirings, brake hose, brake light switch leads as shown.



A. Right Upper Clamp Bolt
B. Inner Tube Upper End
C. Cable Guide
D. Throttle Cables
E. Right Switch Housing Wirings
F. Brake Hose
G. Brake Light Switch Leads

- Tighten the stem head bolt to 4.5 kg-m (33 ft-lbs) of torque and the rear clamp bolt to 1.8 kg-m (13.0 ft-lbs) of torque.
- Tighten the front fork lower clamp bolts to 1.8 kg-m (13.0 ft-lbs) of torque.
- Fit the tachometer inner cable into the tachometer, and tighten the cable nut with pliers.
- Run the plugs, sockets, and wiring into the headlight housing, and mount the headlight housing.
- Install the left and right front turn signal assemblies (Pg. 138).
- Connect the plugs, sockets, and leads in the headlight housing. Connect the same color leads to the same color leads.
- Install the headlight unit (Pg. 137).
- Install the front fender and hose guides, and tighten the bolts (4). Each bolt has a lockwasher.



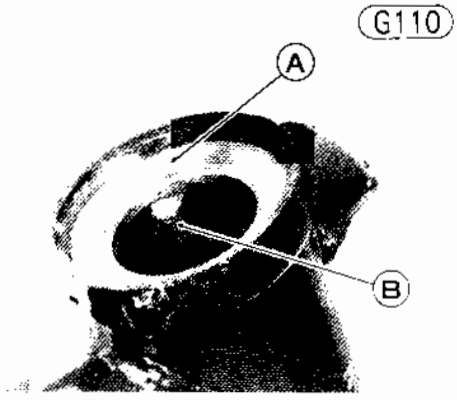
A. Left Side **B. Right Side** **C. Hose Guide**

- Secure the lower brake hoses in their guides. Be sure the rubber grommets are in place.
- Install the front wheel (Pg. 115).
- Install the speedometer cable (Pg. 136).
- Check the steering and adjust it, if necessary (Pg. 30).
- Install the fuel tank (Pg. 47).
- Check the front brake and bleed the system, if necessary (Pg. 205).
- Adjust the clutch (Pg. 22).
- Check the throttle cables and adjust, if necessary (Pg. 18).
- Adjust the rear view mirrors.

STEERING STEM BEARINGS

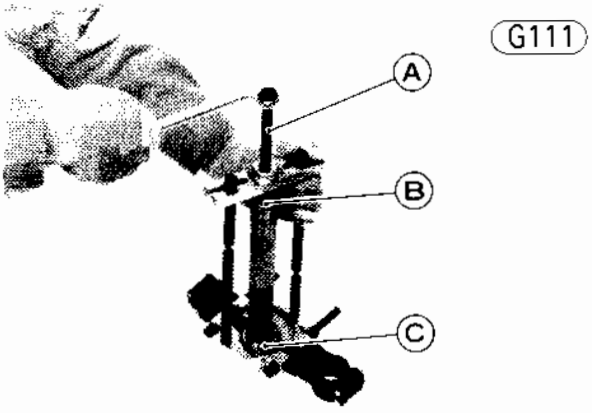
Removal:

- Remove the steering stem (Pg. 144).
- 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.



A. Outer Race **B. Bar**

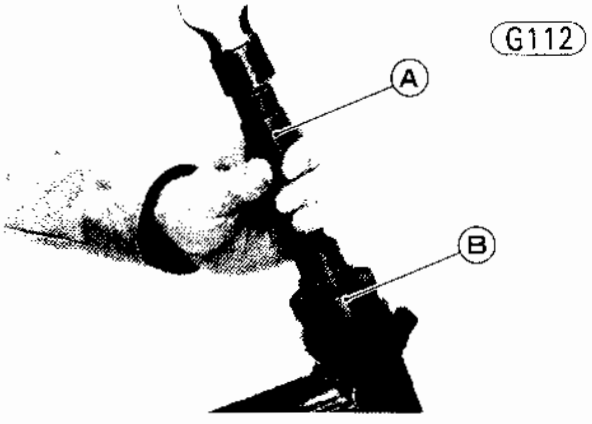
•Remove the grease seal under the lower inner race. Be careful not to damage the grease seal during removal.
•Remove the lower inner race, which is pressed onto the steering stem, with a stem bearing puller and adapter (special tools).



A. Bearing Puller (57001-135)
B. Adapter (57001-136)
C. Lower Inner Race

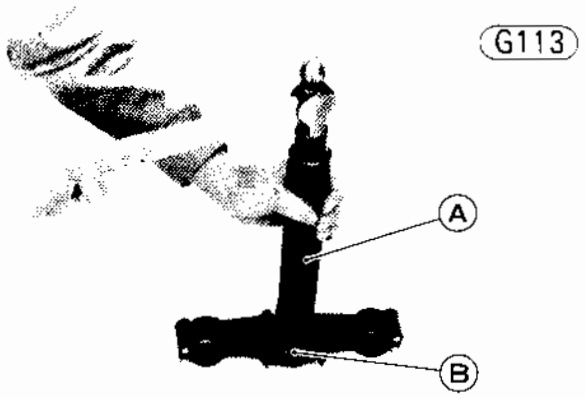
Installation:

•Apply oil to the outer races, and then drive them into the head pipe using the stem cup driver and the bearing driver holder (special tools). Be sure to press them until they stop at the stepped portion in the head pipe.



A. Bearing Driver Holder (57001-139)
B. Stem Cup Driver (57001-138)

•Install the grease onto the steering stem.
•Apply oil to the lower inner race, and then drive it onto the steering stem using the stem bearing driver and adapter (special tools). Be sure to press it until it stops at the stem base.



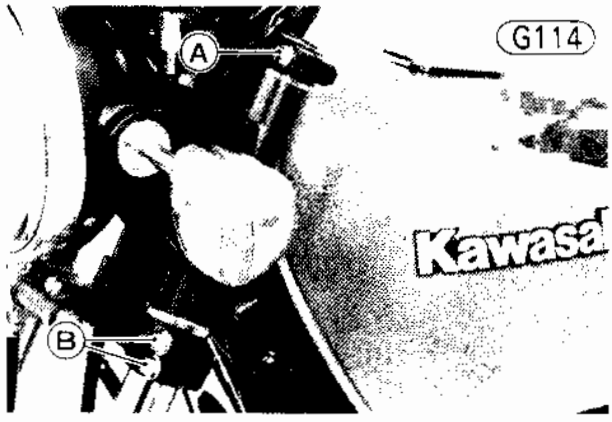
A. Stem Bearing Driver (57001-137) **B. Inner Race**

•Install the steering stem (Pg. 145).

FRONT FORK

Removal (each fork leg):

•Remove the mounting bolts, take off the only caliper on the fork leg to be removed, and rest the caliper on some kind of stand so that it does not dangle.
•Remove the front wheel (Pg. 115).
•Remove the bolts (4) that hold the front fender to the left fork leg, and remove the fender.
•Loosen the upper and lower front fork clamp bolts.



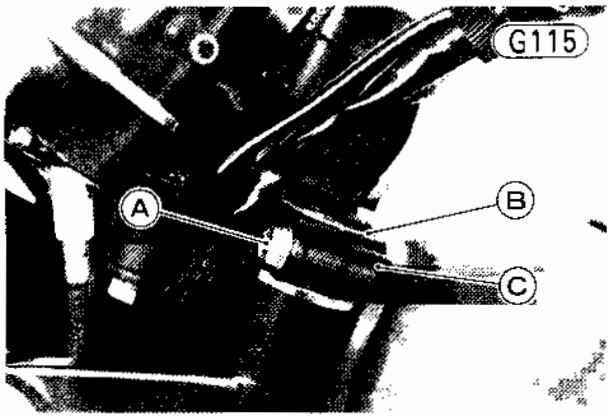
A. Upper Clamp Bolt **B. Lower Clamp Bolts**

•With a twisting motion, work the fork leg down and out.

Installation (each fork leg):

•Slide the fork leg up through the lower and upper clamps until the upper end of the front fork inner tube

is even with the upper surface of the stem head. Tighten the clamp bolts to 1.8 kg-m (13.0 ft-lbs) of torque.

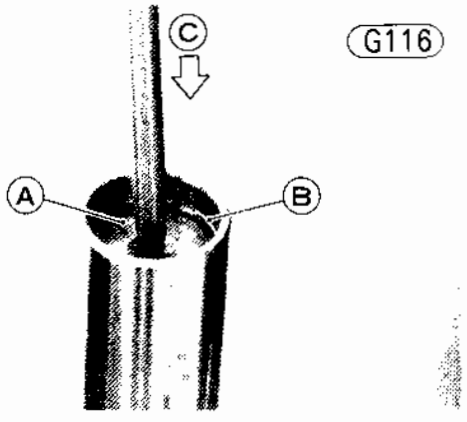


A. Upper Clamp Bolt
B. Inner Tube Upper End
C. Stem Head

- Install the front fender and hose guides between the front fork legs. Tighten the bolts (4) with lockwashers (Fig. G109).
- Install the caliper, tightening the caliper mounting bolts to 3.0 kg-m (22 ft-lbs) of torque.
- Secure the lower brake hose in its guide. Be sure the rubber grommet is in place.
- Install the front wheel (Pg. 115).

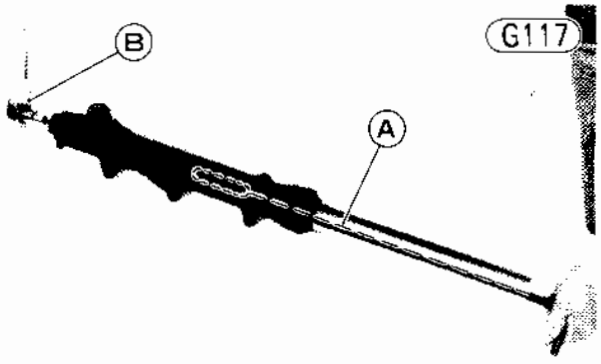
Disassembly:

- Remove the cap 14 from the inner tube.
- Press the top plug 16 to remove the top plug retaining ring 15, and then remove the top plug and spring 22.



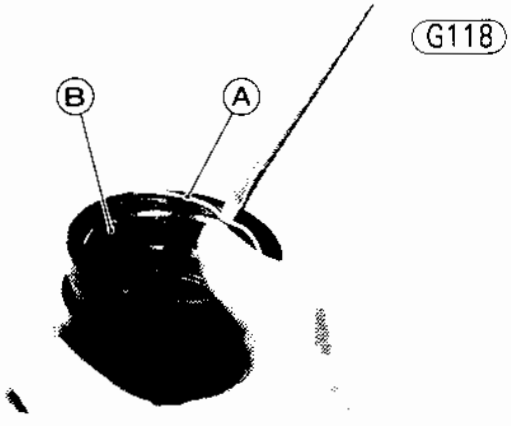
A. Top Plug
B. Retaining Ring
C. Press down.

- Pour the oil into a suitable container, pumping as necessary to empty out all the oil.
- Stop the cylinder 1 from turning by using the front fork cylinder holder handle and holder adapter (special tools). Unscrew the Allen bolt 11 and gasket 10 from the bottom of the outer tube 9 or 37, and then separate the inner tube from the outer tube by pulling it out.



A. Front Fork Cylinder Holder Handle and Adapter (57001-183, 57001-1011)
B. Allen Wrench

- Slide or push the cylinder 1 and its spring 3 out the top of the inner tube.
- Remove the dust seal 5 off the outer tube 9.
- Remove the cylinder base 4 out the top of outer tube.
- Remove the retainer 6 from the outer tube with a sharp hook, and pull out the oil seal 7. It may be necessary to heat the outer tube around the oil seal before pulling it out.



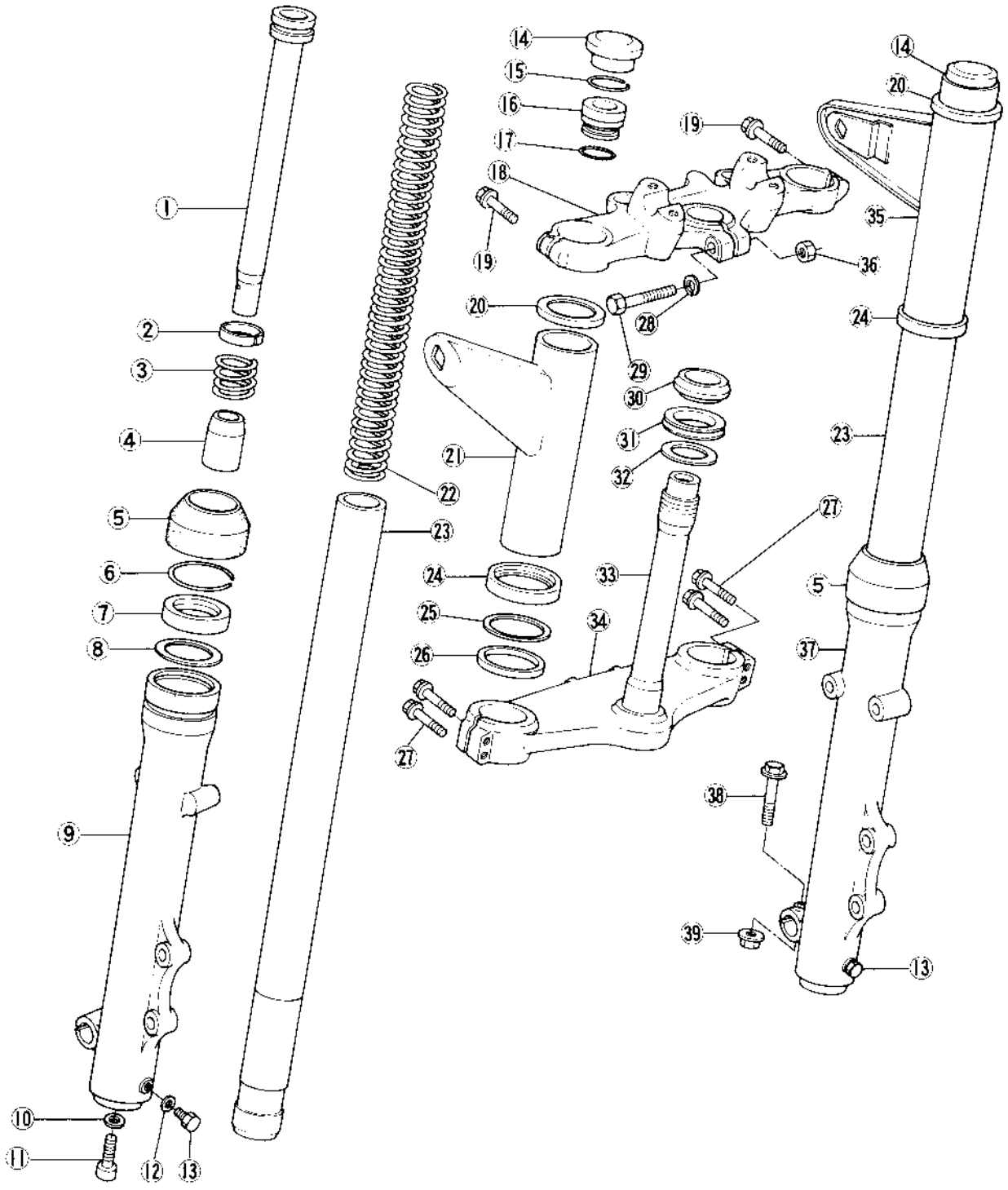
A. Retainer
B. Oil Seal

Assembly Notes:

1. Apply liquid gasket to both sides of the gasket 10, apply a non-permanent locking agent to the Allen bolt, and tighten it using the front fork cylinder holder handle and holder adapter (special tools) to stop the cylinder from turning. The torque for the Allen bolt is 1.8 kg-m (13.0 ft-lbs).

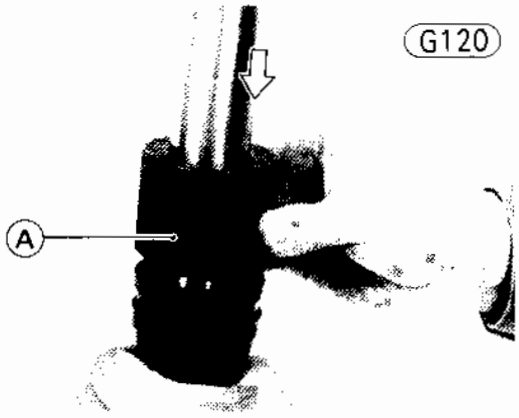
Front Fork

G119



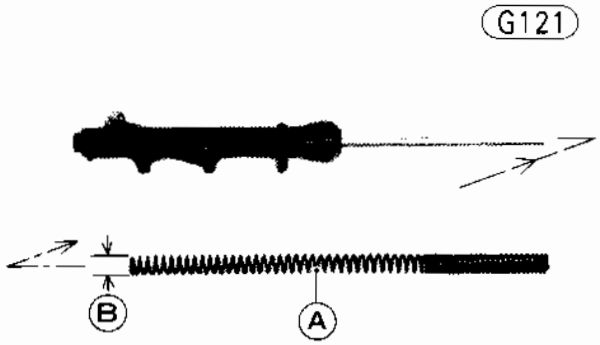
1. Piston and Cylinder Unit
2. Piston Ring
3. Spring
4. Piston Base
5. Dust Seal
6. Retainer
7. Oil Seal
8. Flat Washer
9. Left Outer Tube
10. Gasket
11. Allen Bolt
12. Gasket
13. Drain Bolt
14. Rubber Cap
15. Retainer
16. Top Plug
17. O Ring
18. Stem Head
19. Upper Clamp Bolt
20. Ring Cap
21. Left Fork Cover
22. Spring
23. Inner Tube
24. Base Cover
25. Damper Ring
26. Rubber Damper
27. Lower Clamp Bolt
28. Lockwasher
29. Clamp Bolt
30. Lower Inner Race
31. Grease Seal
32. Flat Washer
33. Steering Stem
34. Stem Base
35. Right Fork Cover
36. Nut
37. Right Outer Tube
38. Clamp Bolt
39. Nut

2. Replace the oil seal with a new one, apply oil to the outside, and install it with the front fork oil seal driver (special tool).



A. Front Fork Oil Seal Driver (57001-141)

3. Install the spring (2) with the smaller diameter end facing down.



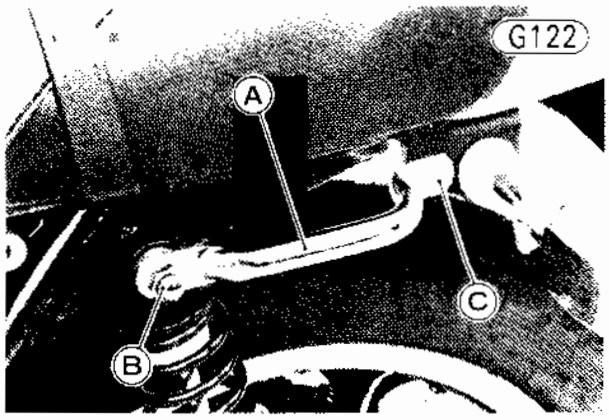
A. Spring **B. Smaller Diameter End**

4. Apply a non-permanent locking agent to the drain bolt, and tighten it to 0.80 kg-m (69 in-lbs) of torque, if it was removed.
5. Refill with 217.5 ~ 222.5 cc of fresh SAE 5W20 oil.

REAR SHOCK ABSORBERS

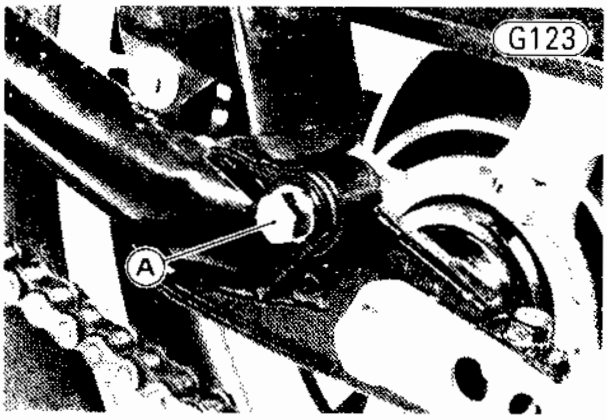
Removal (each side):

- Set the motorcycle up on its center stand.
- Remove the muffler (Pg. 56).
- To remove the left shock absorber, remove the grab rail mounting bolt, and lockwasher.



A. Grab Rail **C. Mounting Bolt**
B. Cap Nut

- Remove the cap nut, lockwasher, and flat washer(s). The right shock absorber cap nut has two flat washers. To remove the left shock absorber, also remove the grab rail and flat washer.
- Lift up on the rear wheel as necessary to avoid damaging the shock absorber bolt threads, and remove the shock absorber bolt and lockwasher.



A. Mounting Bolt

- Pull off the rear shock absorber.

Installation Note:

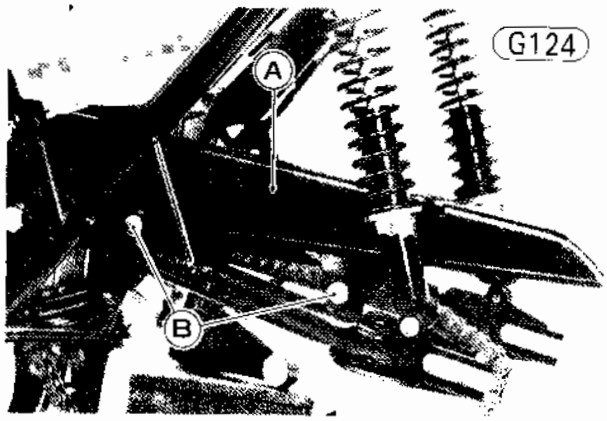
- Tighten the shock absorber bolt and nut to 3.0 kg-m (22 ft-lbs) of torque.

SWING ARM

Removal:

- Set the motorcycle up on its center stand.
- Remove the mufflers (Pg. 56).

- Remove the rear wheel (Pg. 123).
- Pull the rear brake hose out of the guides on the swing arm, remove the torque link rear bolt, and rest the rear caliper on some kind of stand.
- Remove the bolts, lockwashers, and flat washers (2 ea), and take off the chain cover.



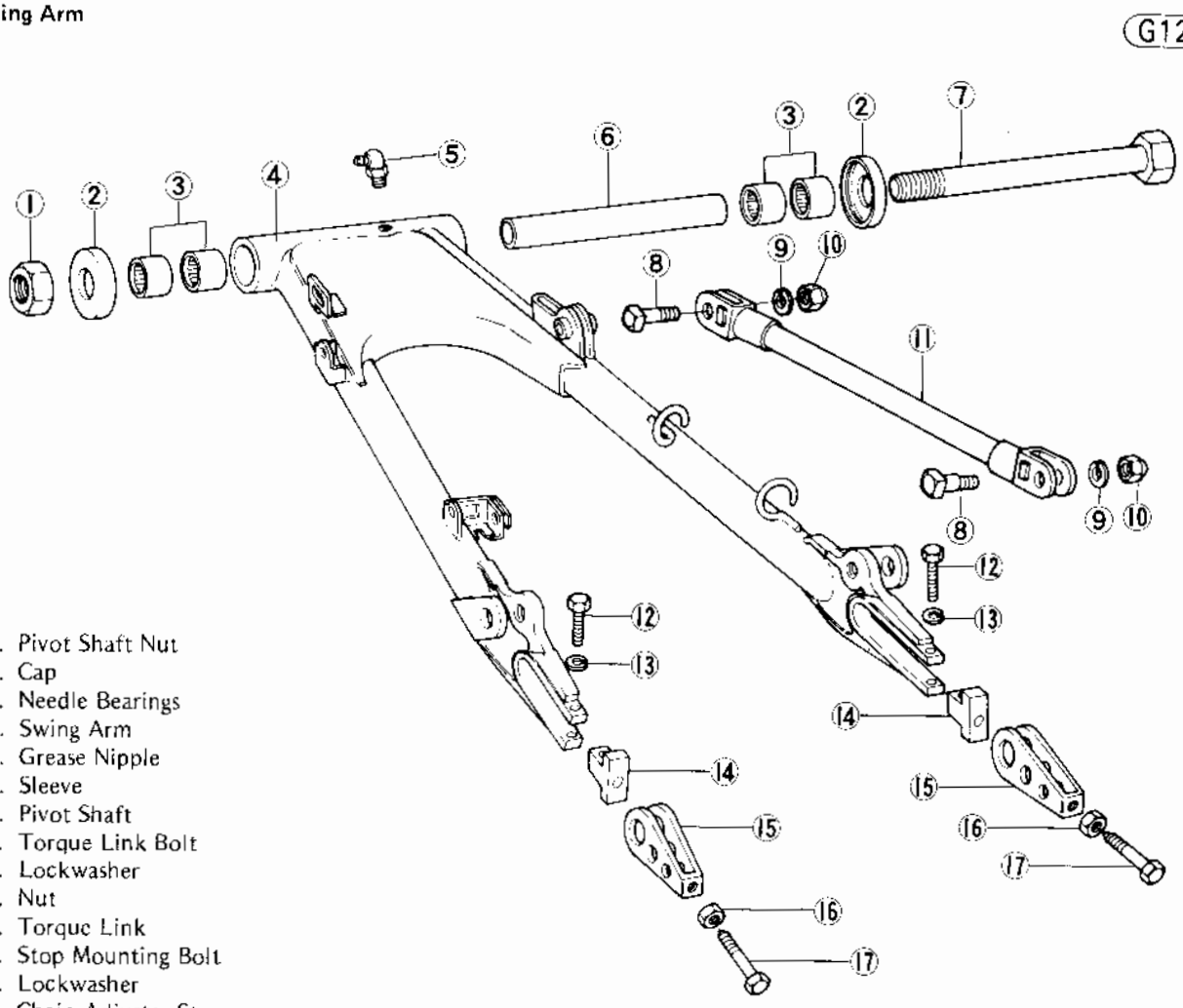
A. Chain Cover B. Bolts

- Remove the mounting bolt from each shock absorber bottom. A lockwasher comes off with the bolt.
- Move the swing arm up and down to check for abnormal friction.
- Remove the pivot shaft nut and pull out the pivot shaft.



A. Pivot Shaft Nut

Swing Arm



1. Pivot Shaft Nut
2. Cap
3. Needle Bearings
4. Swing Arm
5. Grease Nipple
6. Sleeve
7. Pivot Shaft
8. Torque Link Bolt
9. Lockwasher
10. Nut
11. Torque Link
12. Stop Mounting Bolt
13. Lockwasher
14. Chain Adjuster Stop
15. Chain Adjuster
16. Locknut
17. Adjusting Bolt

•Pull back the swing arm. A cap on each side of the pivot will also drop off.

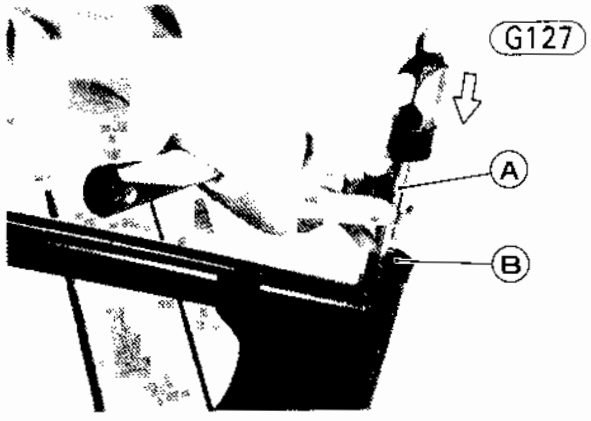
Installation:

•Install the cap on each end of the pivot of the swing arm, and put the left side of the swing arm through the drive chain loop.
•Position the pivot of the swing arm into its place in the frame, and slide in the pivot shaft from the right to left.
•Install the pivot shaft nut and tighten the nut to 8.0 kg-m (58 ft-lbs) of torque.
•Install the rear shock absorber bolts and lockwashers, tighten each bolt to 3.0 kg-m (22 ft-lbs) of torque.
•Install the rear wheel (Pg. 124).
•Install the mufflers (Pg. 57).
•Adjust the drive chain (Pg. 28).

Disassembly:

NOTE: As the swing arm needle bearings will be damaged upon removal, be sure to have new ones on hand prior to disassembly.

•Take out the torque link nut 10 and bolt, and then remove the torque link 11 from the swing arm 4.
•Pull out the swing arm sleeve 6.
•Insert a bar into one side, hammering on them lightly to knock out the needle bearings 3 on the opposite side.

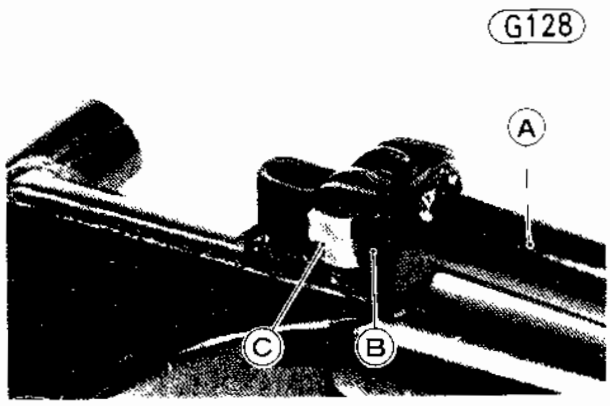


A. Bar **B. Needle Bearing**

•Use the bar again to knock out the other bearings.

Assembly Notes:

1. Inspect the swing arm sleeve (Pg. 212), and replace it with a new one if it has worn past the service limit or is damaged. Also, replace all needle bearings whenever the sleeve is replaced.
2. Replace the needle bearings with new ones if any one has been damaged or removed. Apply oil to the outside surface of the bearings before installing them with a press.
3. Install the torque link so that the welded side faces in. After installation tighten the torque link nut to 3.0 kg-m (22 ft-lbs) of torque.



A. Torque Link **C. Torque Link Bolt**
B. Welded Side

4. Adjust the drive chain (Pg. 28) after installing the swing arm.

DRIVE CHAIN

Removal:

WARNING **The chain must not be cut for installation, as this may result in subsequent chain failure and loss of control.**

•Remove the mufflers (Pg. 56).
•Remove the engine sprocket (Pg. 71).
•Remove the rear wheel (Pg. 123).
•Remove the swing arm (Pg. 150) and take off the chain.

Installation:

•Install the swing arm (Pg. 152).
•Install the rear wheel (Pg. 124).
•Install the engine sprocket (Pg. 71).
•Install the mufflers (Pg. 57).
•Adjust the drive chain (Pg. 28).

Maintenance–Engine

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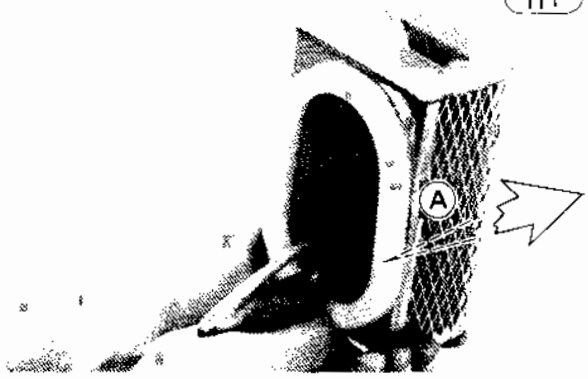
H

AIR CLEANER

A properly maintained air cleaner ensures that only clean, filtered air is supplied through the carburetor to the engine. If the air is supplied directly without filtering, dirt and dust from the air will clog carburetor passages causing the engine to run poorly. The dust that enters the engine will also act like grinding compound, wearing down the cylinders, pistons, and rings. If the air cleaner element is damaged, the result will be the same as if no element were used.

An air cleaner element clogged with dirt chokes the air supply to the engine, resulting in an overly rich fuel/air mixture and inefficient combustion. This in turn causes overheating from carbon build-up, and reduced engine power.

H1



A. Compressed Air

Cleaning and replacement

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

Remove the air cleaner element (Pg. 49). Clean it in a bath of a high flash-point solvent, and then dry it from the inside using compressed air. Since this is a dry-type element, do not use kerosene or any fluid which would leave the element oily.

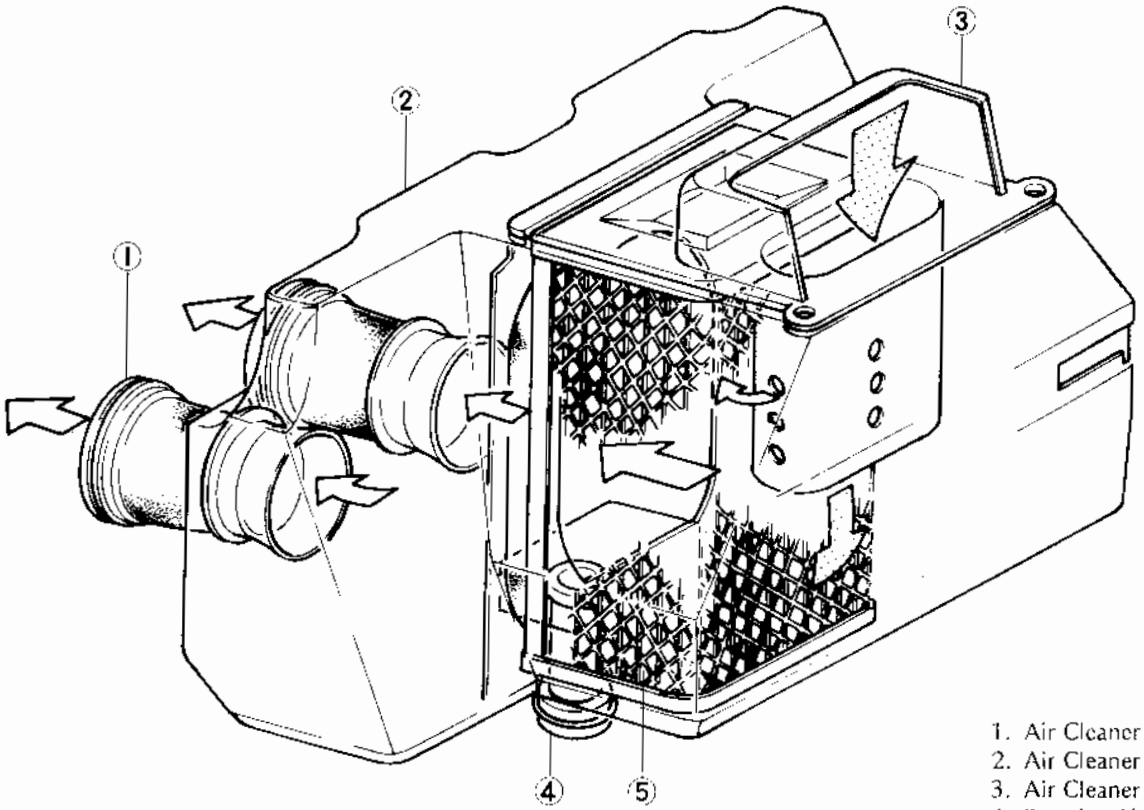
WARNING **Clean the element in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the element.**

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

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

Air Cleaner

H2



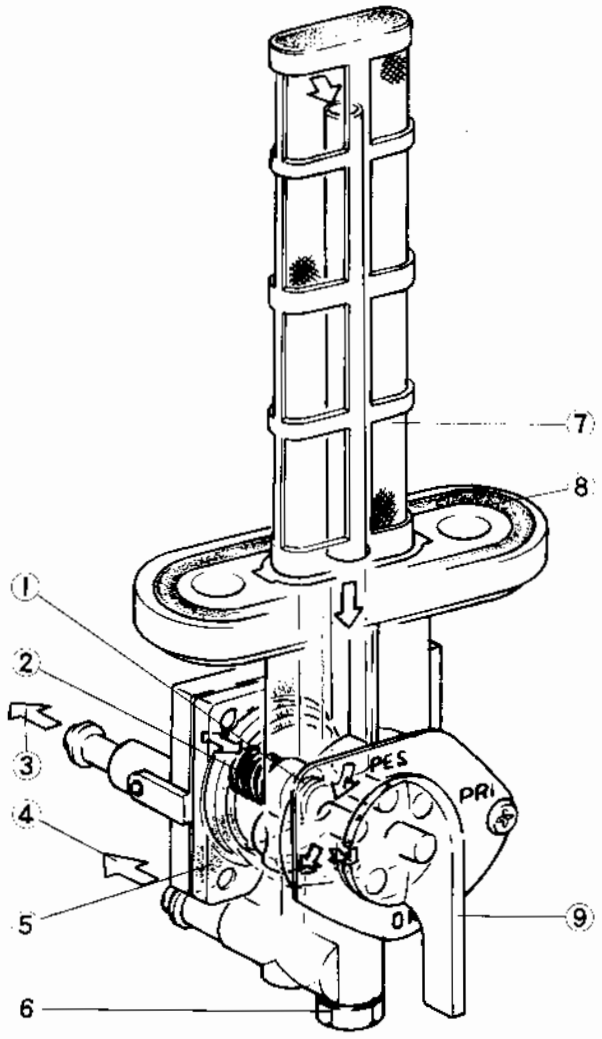
1. Air Cleaner Duct
2. Air Cleaner Housing
3. Air Cleaner Cap
4. Breather Hose
5. Air Cleaner Element

FUEL TANK, FUEL TAP

The fuel tank capacity is 15.0 liters, 1.5 liters of which forms the reserve supply. A cap is attached to the top of the tank, and a fuel tap to the bottom. An air vent is provided in the cap to prevent an air lock, which would hinder fuel flow to the carburetors.

Fuel tap construction is shown in Fig. H3. The fuel tap is an automatic type which shuts off the fuel supply when the engine is stopped in the **ON** or **RES** position. The fuel tap has three positions: **ON, RES** (reserve), and **PRI** (prime). With the tap in the "On" position, fuel flows through the tap by way of the main pipe until only the reserve supply is left in the tank; with the tap in the "Reserve" position, fuel flows through the tap from the bottom of the tank. The "Pri" position bypasses the automatic control and is useful for priming the engine after running out of gas, or for completely draining the tank. The fuel tap contains a filter to filter out dirt.

Fuel Tap (H3)



1. O Ring
2. Spring
3. Vacuum
4. Fuel
5. Diaphragm
6. Drain Plug
7. Filter
8. O Ring
9. Tap Lever

The automatic valve in the fuel tap operates as follows: When the engine is running, negative pressure (vacuum) is created at the carburetor due to engine intake. This engine intake vacuum is transmitted to the diaphragm vacuum chamber in the fuel tap through the vacuum hose and the check valve. The vacuum pulls the diaphragm 5 against its spring pressure, and the O ring 1 on the diaphragm assembly 5 is pulled out of its seat, permitting fuel to flow between the O ring and seat. When the engine stops and vacuum is lost, air enters the diaphragm vacuum chamber through the vacuum hose, bringing chamber pressure back up to atmospheric and allowing the diaphragm spring 2 to push the diaphragm back into place and hold the O ring against the seat.

The check valve in the diaphragm cover keeps the pressure in the diaphragm vacuum chamber negative in spite of the pulsation of the intake vacuum while the engine is running so that fuel flows smoothly.

Inspection and cleaning

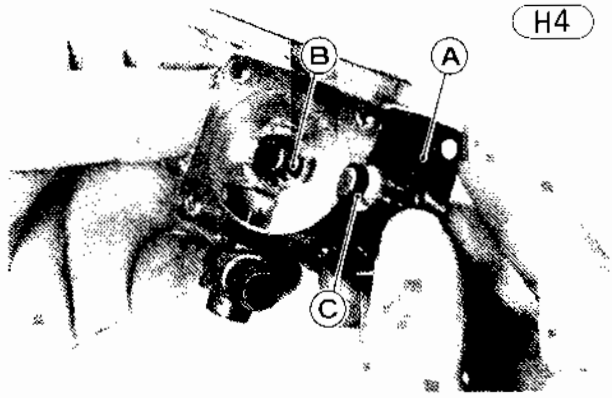
If fuel leaks from the tank cap or from around the fuel tap, the cap gasket or tap O ring may be damaged. Visually inspect these parts, and replace them if necessary.

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

Any water in the fuel tank and the carburetors can be drained through the drain plugs (Pg. 24). If water cannot be drained completely by loosening the drain plugs, remove the fuel tap (Pg. 47), and flush out the tank with a high flash-point solvent. For thorough cleaning of the carburetors, remove and disassemble the carburetors (Pg. 49).

If there is any doubt about the condition of the fuel tap, remove and disassemble the fuel tap (Pg. 47), and inspect the parts. Especially examine the diaphragm assembly. Make sure the O ring and its seat are clean and undamaged; if the O ring is prevented from seating properly or if it is damaged, fuel flow will not stop when the engine is stopped, and may overflow from the carburetors. Visually inspect the diaphragm. If there is any tear or other damage, the diaphragm assembly should be replaced.

(H4)



A. Diaphragm
B. "O" Ring Seat
C. "O" Ring

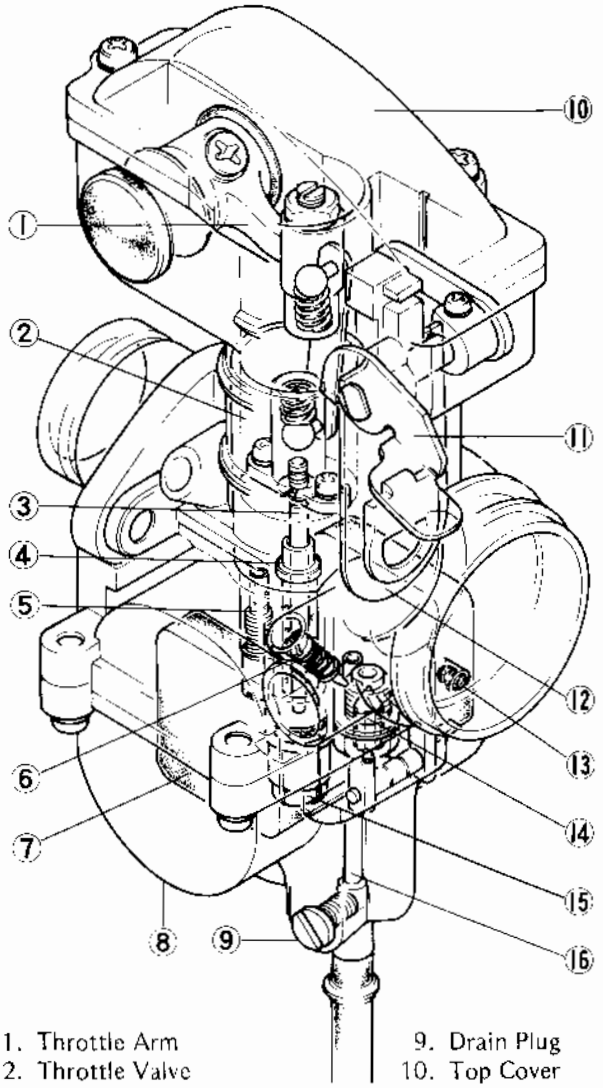
Clean the air and fuel passages by lightly applying compressed air to the passage openings.

CAUTION **Do not use wire for cleaning as this could damage the check valve, O ring seat, and diaphragm mating surfaces.**

CARBURETOR

The carburetors perform the function of mixing the fuel and air in the proportions necessary for good engine performance at varying speeds and loads. In order for them to function satisfactorily, they must be properly adjusted and maintained. The throttle cable adjustment, idling adjustment, and synchronizing adjustment are covered in the Adjustment Section. The discussion here concerns the fundamentals of carburetor operation, fuel level adjustment, and cleaning and replacement of carburetor parts.

Carburetor Constructions (H5)



1. Throttle Arm
2. Throttle Valve
3. Jet Needle
4. Needle Jet
5. Pilot Jet
6. Air Screw
7. Float
8. Float Bowl
9. Drain Plug
10. Top Cover
11. Choke Lever
12. Choke Valve
13. Main Air Jet
14. Float Valve
15. Main Jet
16. Overflow Pipe

A linkage mechanism opens each carburetor throttle valve the same amount in response to throttle grip movement so that the carburetors operate in unison. As the throttle grip is turned counterclockwise, the throttle accelerator cable turns the carburetor pulley. Through the linkage mechanism the pulley opens the throttle valves. As the throttle grip is turned clockwise or is released, the linkage mechanism return spring, together with the throttle decelerator cable, closes the throttle valves.

One of the basic principlies in carburetor operation is that the pressure exerted by a moving body of air is less than atmospheric pressure. As the engine draws air in through the carburetor bore, the air pressure in the carburetor bore is less than the air pressure in the float chamber, which is vented to the atmosphere. This difference in air pressure forces fuel up through the passages into the carburetor bore, where it is atomized by the high-speed air flowing into the engine.

Another important principle is the Venturi Principle, which states that when an air passage narrows, moving air flows faster, exerting even less pressure. For example, especially at lower speeds the amount of the cutaway on the throttle valve makes use of this principle in determining the speed, and thus the pressure, of the air passing below it.

The amount of fuel passing through a jet depends both on the size of the jet and on the speed of the air flow over the jet. The speed of this air flow is in turn determined both by the engine rpm and by the dimensions of the passage (varied with the throttle valve) just above the jet. The size of the jet openings, the various dimensions of the air passages, and the engine rpm are correlated through carburetor design so that, when properly adjusted, the carburetor meters (measures) the fuel and air in the correct proportions at different throttle openings.

The ratio of fuel to air at different throttle openings is set through carburetor design by a number of interrelating factors.

0 ~ 1/8 throttle	pilot screw
1/8 ~ 1/4 throttle	throttle valve cutaway, pilot screw
1/4 ~ 3/4 throttle	jet needle position
3/4 ~ 1 throttle	main jet size

The carburetor specifications (Table H4) have been chosen for best all around performance.

Carburetor trouble can be caused by dirt, wear, maladjustment, or improper fuel level in the float chamber. A dirty or damaged air cleaner can also alter the fuel-to-air ratio.

Table H1 Mixture Trouble Simptoms

Poor running
Overheating
Exhaust smokes excessively

The following explanation of the functioning and maintenance of the carburetors covers the four main systems for fuel regulation and supply.

Table H2 Carburetor Systems

System	Function
Starter System	Supplies the necessary rich mixture for starting a cold engine.
Pilot System	Supplies fuel at idling and low speeds.
Main System	Supplies fuel at medium and high speeds.
Float System	Maintains the fuel at a constant level in the float chamber.

CAUTION

1. **To prevent damage or deterioration of the rubber or plastic parts, remove as many rubber or plastic parts from the carburetor (Table H3) as possible before cleaning the carburetor with a cleaning solution.**
2. **Do not use wire for cleaning as this could damage the jets.**
3. **To prevent damage to the float, remove the float bowl and the float when blowing the carburetor clean with compressed air.**

Table H3 Carburetor Rubber Parts or Plastic Parts

Parts	Quantity	Removable
Breather Hose 3-way Joint	2	Yes
Float	4	Yes
Link Shaft End Rubber Cap	2	Yes
Link Shaft Dust Seal	6	Yes
Bleed Pipe O Ring	4	Yes
Drain Plug O Ring	8	Yes
Fuel Hose Joint Pipe O Ring	12	Yes
Pilot Screw O Ring	4	Yes
Breather Hose	2	Yes
Breather Hose Joint Hose	2	Yes
Fuel Hose	1	Yes
Overflow Tube	4	Yes
Vacuum Hose	1	Yes

Starter System

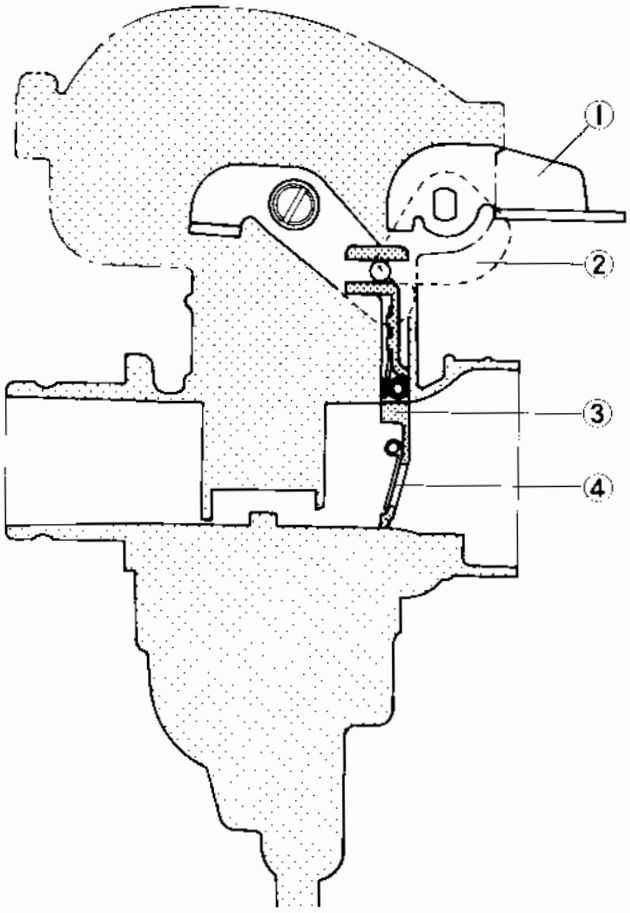
Fig. H5 shows the starter system, which includes the choke lever, choke valve 3 , relief valve 4 , idling cam, and idling link.

The starter system provides the exceptionally rich fuel/air ratio that is necessary to enable easy starting when the engine is cold. When starting the engine, the choke valves close down the carburetor bores by pulling up the choke lever. Since the choke valves close down the carburetor bores, a high intake vacuum (suction or low pressure) is developed at the engine side of the carburetor bores. The relief valves on the choke valves are opened by a high intake vacuum, and air is drawn into the carburetor bores. As the engine is cranked over, fuel is drawn in from the float chamber through the main jets and pilot jet. This fuel is then drawn into the carburetor, mixed with the air drawn in through the relief valve, and drawn into the engine.

The engine must be run at a faster than normal idle speed to prevent the engine from stalling until it reaches operating temperature. To accomplish this, the fast idling cam pushes the idling link when the choke lever is pulled up, and the throttle valve is held open an amount sufficient to prevent stalling.

In order for the starter system to work properly, the choke lever must be pushed up fully so that the choke valve will be kept closed and sufficient vacuum can be built up at the engine of the carburetor bore. Clogged

Starter System (H6)

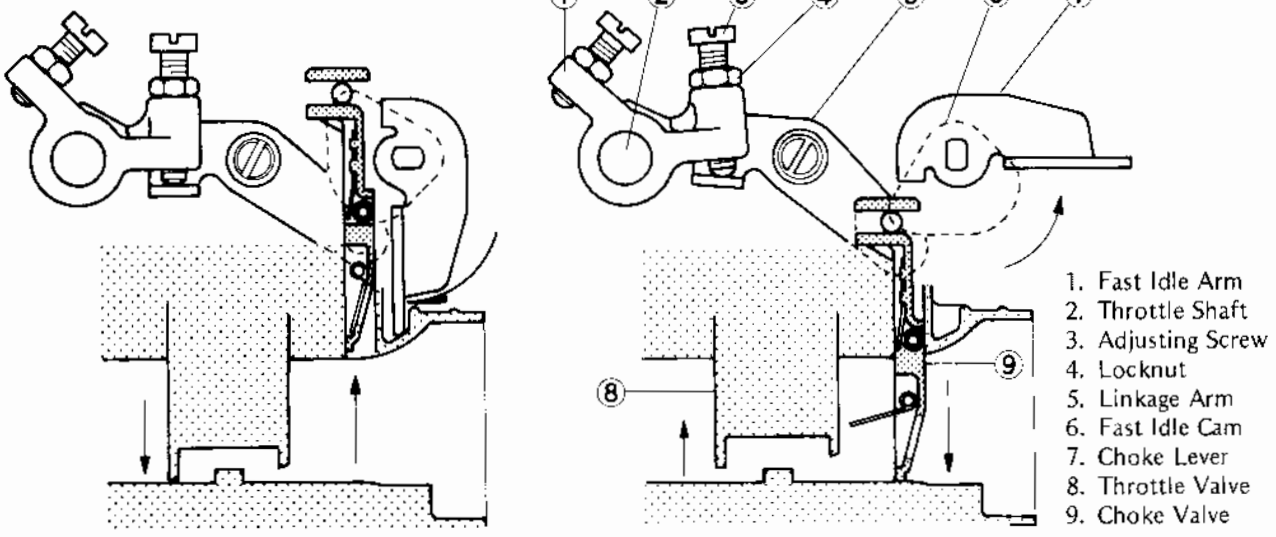


1. Choke Lever
2. Fast Idle Cam
3. Choke Valve
4. Relief Valve

Table H4 Carburetor Specifications

Type	Main Jet	Jet Needle	Pilot Jet	Pilot Screw	Throttle Valve Cutaway	Fuel Level	
						Design	Service
K22P-2A	#90	#4C91-2	#32	$1\frac{1}{8} \pm \frac{1}{4}$	2.5	29.5 ± 1 mm	3.5 ± 1 mm

Fast Idle Mechanism H7



1. Fast Idle Arm
2. Throttle Shaft
3. Adjusting Screw
4. Locknut
5. Linkage Arm
6. Fast Idle Cam
7. Choke Lever
8. Throttle Valve
9. Choke Valve

When choke lever is pushed down. When choke lever is pulled up.

pilot jet, main jets, pilot air jet, and main jet bleed pipe will cause insufficient atomization, thus impairing starter efficiency. Fuel mixture trouble results if choke linkage mechanism, pilot and main system is defective. A damaged relief valve will cause insufficient vacuum, thus impairing starter system efficiency. Fuel mixture trouble results if the choke valve does not open fully after the choke lever is returned.

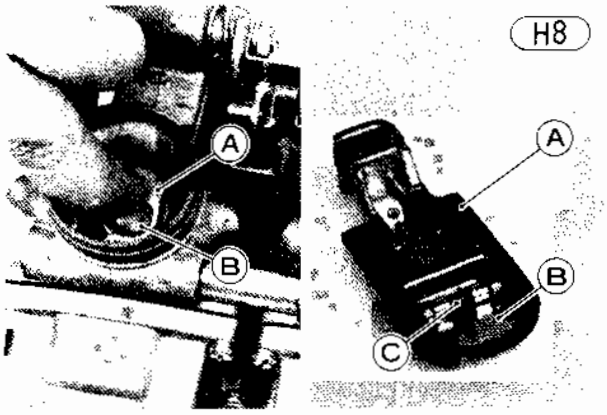
Cleaning and inspection (See cautions on Pg. 157)

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

Pull up and push down the choke lever to check that the choke valves move smoothly. The choke valves must close the carburetor bores completely when the lever is pulled up, and must open fully when the lever is pushed down. If necessary, adjust the choke linkage (Pg. 53). To check that the relief valve spring is working properly, push on the relief valve itself. The relief valve must move smoothly, and must close by spring tension.

If the choke valve or the relief valve does not work properly, replace the carburetor body.

H8

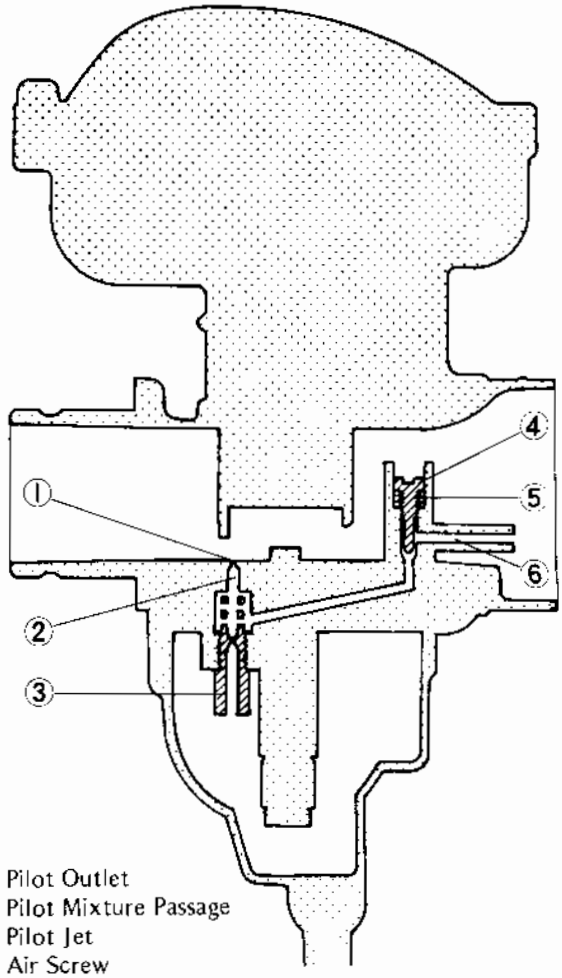


A. Choke Valve **B. Relief Valve** **C. Spring**

Pilot System

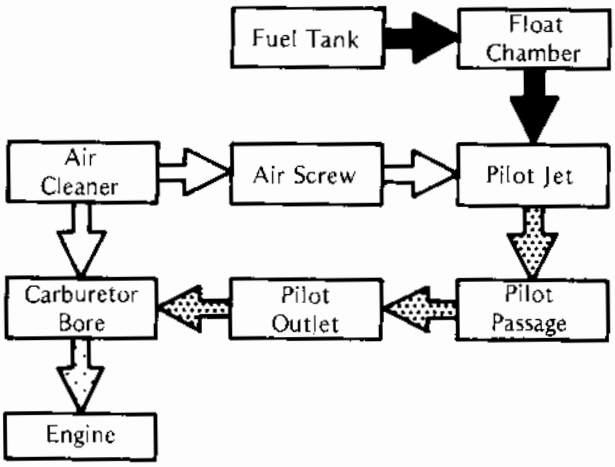
Fig. H9 shows the pilot system, which includes the pilot jet ③, pilot outlet ①, and pilot air screw ④.

Pilot System H9



1. Pilot Outlet
2. Pilot Mixture Passage
3. Pilot Jet
4. Air Screw
5. Spring
6. Pilot Air Passage

Pilot System Fuel and Air Supply (H10)



The pilot system determines the operation of the carburetor from 0 to ¼ throttle opening. At these small throttle openings, almost no fuel is drawn through the main system due to insufficient air flow. Instead, the fuel is drawn through the pilot jet as a result of the low pressure (suction) brough about by the demand for air by the engine and the limited but relatively fast flow of air past the pilot outlet.

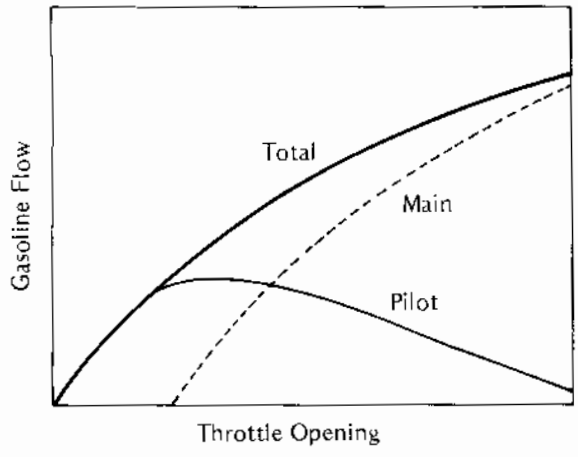
The supply of the fuel and air in the pilot system is shown in Fig. H10. Fuel is metered by the pilot jet. It mixes with air controlled by the pilot air screw, and flows through the pilot passage.

At the idling position the throttle valve restricts the carburetor bore air flow, preventing it from relieving the low pressure around the pilot outlet created by the engine's suction, while the venturi effect (i.e., the narrower the air passage, the faster the flow of air) at the engine side of the throttle valve further reduces the low pressure.

Once the throttle valve rises, it no longer concentrates the low pressure area around just the pilot outlet.

Fig. H11 shows throttle valve opening versus fuel flow for the main and pilot systems. If trouble occurs in the pilot system, not only are starting and low speed running affected, but the transition from pilot to main system is not smooth as the throttle is opened, causing a drop in acceleration efficiency. Pilot system trouble might be due to maladjustment; a dirty or loose pilot jet; or clogging of the pilot outlet passage, pilot jet passage, or pilot air passage.

Flow Characteristic (H11)



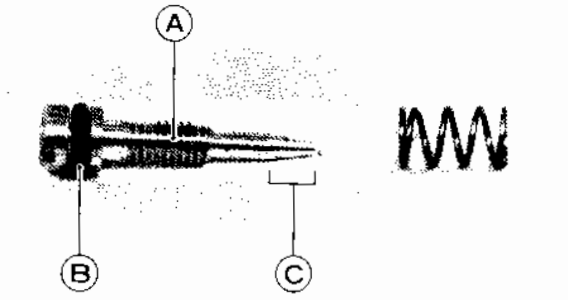
Cleaning and replacement

(See cautions on Pg. 157)

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

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

(H12)



A. Pilot Screw
B. "O" Ring
C. Tapered Portion

Main System

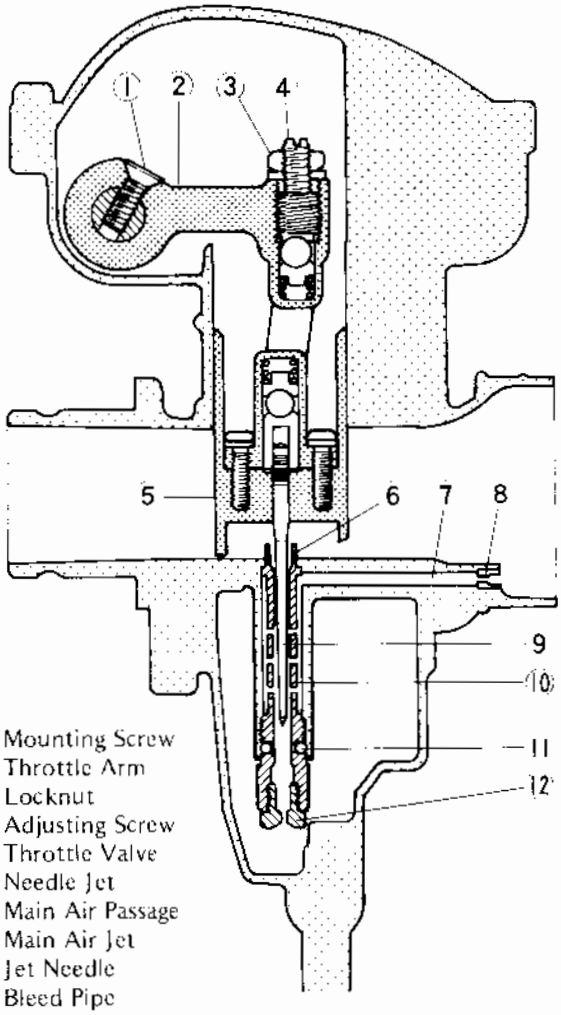
Fig. H13 shows the main system, which consists of the main jet 12 , bleed pipe 10 and needle jet 6 , jet needle 9 , throttle valve 5 , and air jet 8 .

From about ¼ throttle opening, the air flow past the needle jet outlet is sufficient to cause most of the engine's fuel supply to be drain through the main system. Fuel passes through the main jet and the bleed pipe, through the space in the needle jet around the jet needle, and into the carburetor bore, where it is atomized by the air flow to the engine.

The bleed pipe has holes to admit the air metered by the main air jet. This air mixes with the fuel in the needle jet to prepare the fuel for better atomization in the carburetor bore.

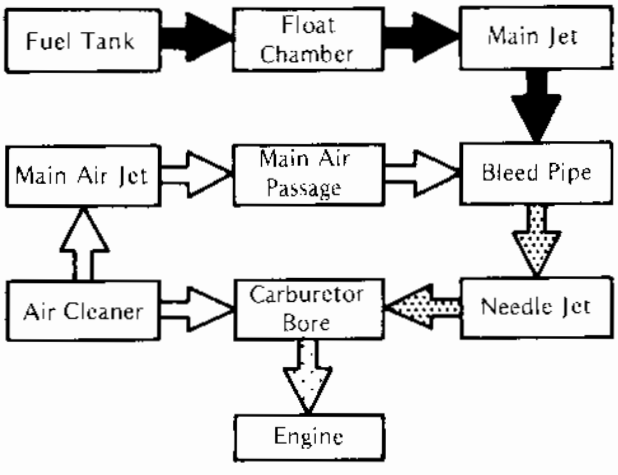
The lower part of the jet needle is tapered and extends down into the needle jet. It is fixed to the throttle valve, and thus rises up in the needle jet as the throttle valve rises. At ¼ throttle opening, the tapered portion of the needle starts coming up out of the jet, which increases needle-to-jet clearance and thereby increases the amount of fuel that can pass up through the jet.

Main System (H13)



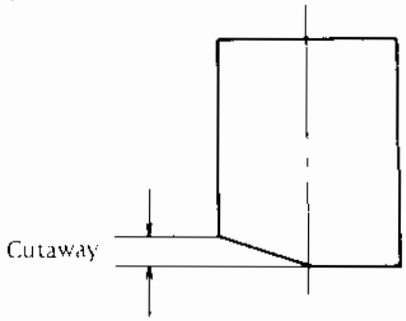
1. Mounting Screw
2. Throttle Arm
3. Locknut
4. Adjusting Screw
5. Throttle Valve
6. Needle Jet
7. Main Air Passage
8. Main Air Jet
9. Jet Needle
10. Bleed Pipe
11. O Ring
12. Main Jet

Main System Fuel and Air Supply (H14)



The amount of fuel drawn out of the needle jet is also influenced, particularly at lower speeds, by the amount of cutaway on the throttle valve. The amount of this cutaway, which is on the intake side of the throttle valve, helps define the size of the air passage directly above both the pilot outlet and needle jet outlet.

Cutaway (H15)



At near full throttle openings, the cross-sectional area of the needle to jet clearance becomes greater than the cross-sectional area of the main jet. At these openings, the fuel drawn up into the carburetor bore is limited by the size of the main jet rather than the needle to jet clearance.

Trouble in the main system is usually indicated by poor running, or lack of power at high speeds. A dirty or clogged main jet will cause the mixture to become too lean. An overly rich mixture could be caused by clogging of the air jet, its air passage, or the air holes in the bleed pipe; by needle jet or needle wear (increasing clearance); by a loose main jet; or by a loose bleed pipe.

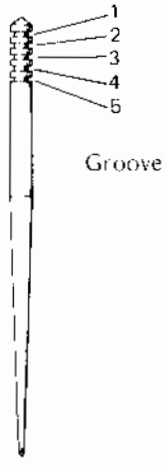
Cleaning (See caution on Pg. 157)

Disassemble the carburetor and wash the main jet, bleed pipe, needle jet, jet needle, air jet, and air passage with a high flash-point solvent, blowing them clean with compressed air. If necessary, use a bath of automotive type carburetor cleaner. A worn needle jet or jet needle should be replaced.

NOTE: The last number of the jet needle number ("2" of 4C91-2) 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 **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 (H16)



Float System

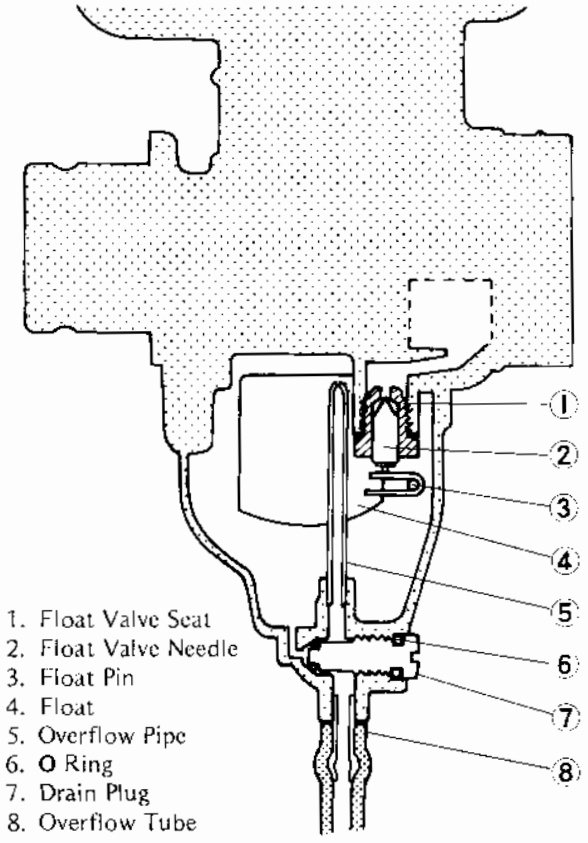
Fig. H17 shows the float system which consists of the float 4 , float valve needle 2 , float valve seat 1 , and overflow pipe 5 .

The float system serves to keep a relatively constant level of fuel in the carburetor float chamber at all times so that the fuel supply to the engine will be stable. If the fuel level in the float chamber is set too low, it will be more difficult for fuel to be drawn up into the carburetor bore, resulting in too lean a mixture. If the level is set too high, the fuel can be drawn up too easily, resulting in too rich a mixture.

The design fuel level is defined as the vertical distance from the center of the carburetor bore to the surface of the fuel in the float chamber. The fuel level is maintained at a constant value by the action of the float valve, which opens and closes according to the fuel level. As fuel flows through the float valve into the chamber, the fuel level rises. The float, rising with the fuel level, pushes up on the needle. When the fuel reaches a certain level, the needle is pushed completely into the valve seat, which closes the valve so that no more fuel may enter the chamber. As the fuel is drawn up out of the float chamber, the fuel level drops, lowering the float. The needle no longer blocks the float valve, and fuel once again flows through the float valve into the chamber.

NOTE: It is impractical to measure the actual design fuel level. Service fuel level is defined as the vertical distance from the bottom edge of the carburetor body to the surface of the fuel in the float chamber. Measuring the service fuel level is an indirect method of inspecting for correct design fuel level.

Float System (H17)



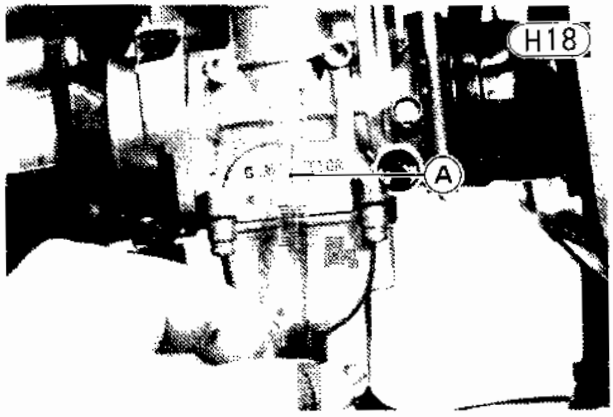
1. Float Valve Seat
2. Float Valve Needle
3. Float Pin
4. Float
5. Overflow Pipe
6. O Ring
7. Drain Plug
8. Overflow Tube

Service fuel level measurement and adjustment

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

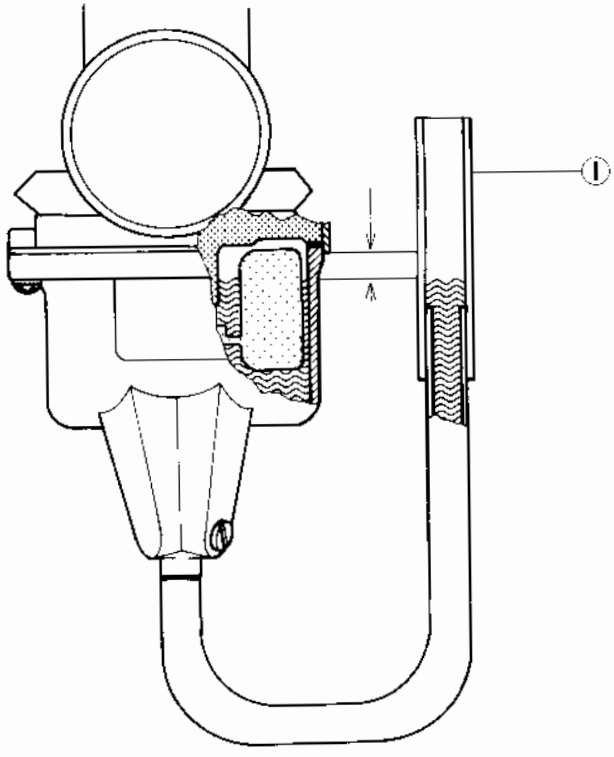
Secure the motorcycle in a true vertical position. Turn the fuel tap to the "ON" or "RES" position, and attach the fuel level gauge (special tool) to the open end of the overflow tube. Hold the gauge against the side of the carburetor so that the "0" line is even with the bottom edge of the carburetor body. Turn the fuel tap to the "PRI" position, and turn out the drain plug 1 ~ 2 turns. Wait until no air bubbles can be seen rising up through the fuel from the overflow tube, and read the service fuel level in the gauge.

NOTE: Measure the fuel level keeping the carburetor fully perpendicular to the ground.



A. Fuel Level Gauge (57001-1017)

Service Fuel Level Measurement (H19)



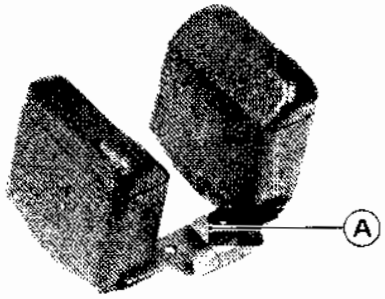
1. Fuel Level Gauge (57001-1017)

Table H5 Service Fuel Level

Standard
3.5 ± 1 mm from the edge of the carburetor body to the fuel level

If the fuel level is incorrect, remove the carburetor, and then remove the float bowl and float. Bend the tang on the float a very slight amount to change the fuel level. Bending it up closes the valve sooner and lowers the fuel level; bending it down raises the level.

(H20)



A. Tang

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

Cleaning and replacement

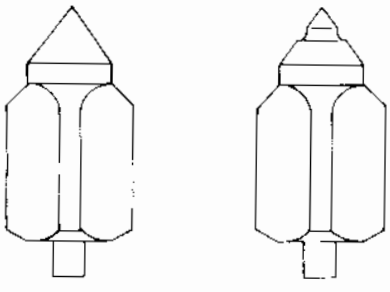
(See caution on Pg. 157)

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

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

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

Valve Needle (H21)



Good Bad

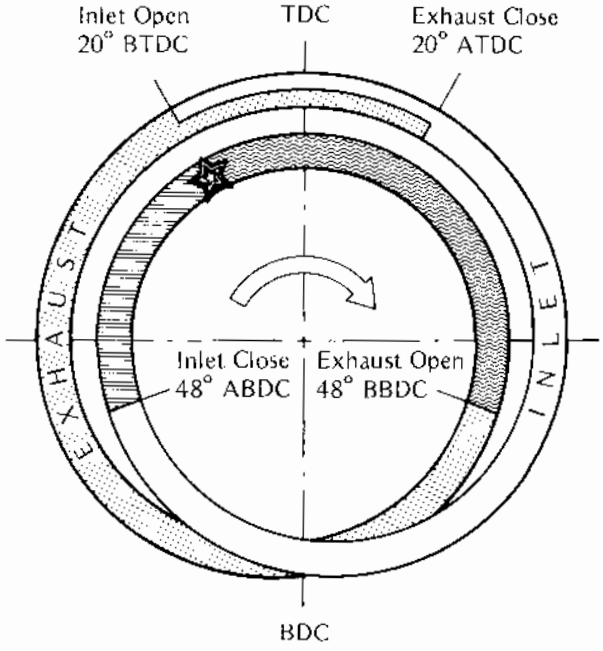
CAMSHAFT

Since this engine is a DOHC (Double Over Head Camshaft) type, there are two camshafts mounted in the top of the cylinder head. One is the inlet camshaft, and is manufactured with four cam lobes, one to open the inlet valve for each cylinder. The other is the exhaust camshaft, and has four cam lobes to open the exhaust valves. There is a sprocket at the center of the crankshaft and at the center of each camshaft. A chain placed over these sprockets enables the crankshaft to turn both camshafts so that the valves will be opened and closed at the proper times during each rotation of the engine.

Each sprocket has marks so that valve timing (the time that each valve is opened) can be reset correctly any time the camshafts are removed for inspection or repairs.

However, since the time, amount, and duration that each valve is opened (valve timing) changes with cam wear, journal wear, and camshaft runout (bend), the camshafts should be inspected periodically and whenever timing trouble is suspected. If the valves do not open at the right times or if they do not open the correct amount or for the proper duration, there will be a decrease in combustion efficiency, causing a loss of engine power and leading to serious engine trouble.

Valve Timing (H22)



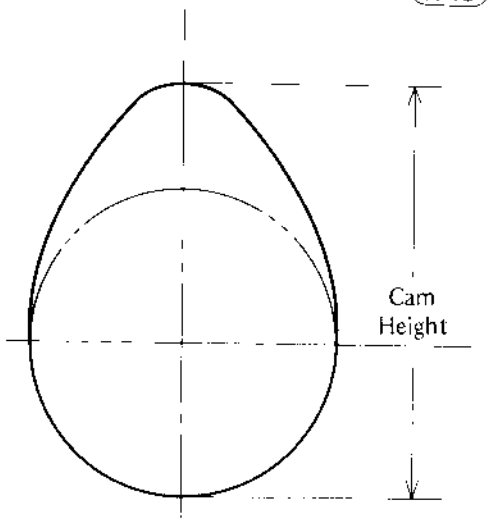
Cam wear

Remove the camshafts, and measure the height of each cam with a micrometer. If the cams are worn down past the service limit, replace the camshafts.

Table H6 Cam Height

Service Limit	35.45 mm

Cam Height Measurement



Journal, bearing wear

The journal wear is measured using plastigauge (press gauge), which is inserted into the clearance to be measured. The plastigauge indicates the clearance by the amount it is compressed and widened when the parts are assembled.

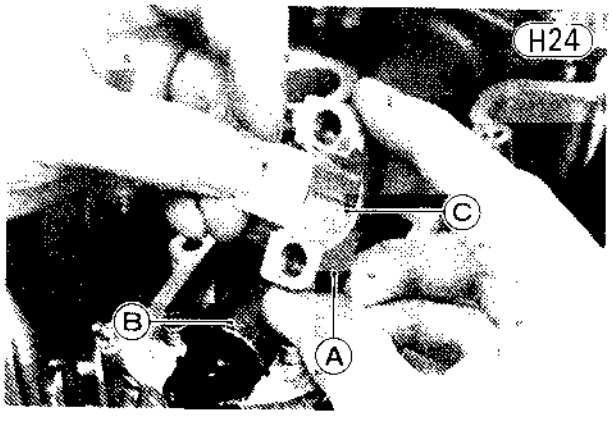
Remove the camshaft, and wipe each journal and camshaft cap surface clean of oil. Cut strips of plastigauge to journal width. Place a strip on each journal parallel to the camshaft and so that the plastigauge will be compressed between the journal and camshaft cap.

Now, fit the chain over the camshaft sprocket so the shaft won't turn, and install the camshaft, tightening the bolts in the correct sequence with the specified torque (Pg. 39).

CAUTION **While installing the camshaft, be sure to reset it correctly (Pg. 58). If it is installed incorrectly, valves may be bent.**

Next, remove the camshaft cap again, and measure the plastigauge width to determine the clearance between each journal and the camshaft cap.

If any clearance exceeds the limit, measure the diameter of the camshaft journal and the bearing inside diameter.

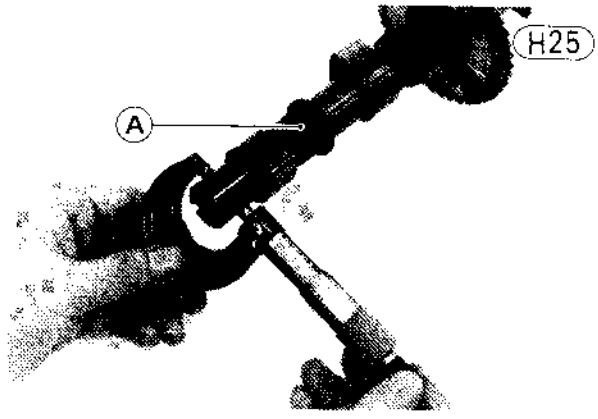


A. Camshaft Cap
B. Camshaft
C. Plastigauge

Table H7 Camshaft Journal/Camshaft Cap Clearance

Service Limit	0.13 mm

Measure the diameter of each camshaft journal with a micrometer. If the diameter of any journal is less than the service limit, replace the camshaft.

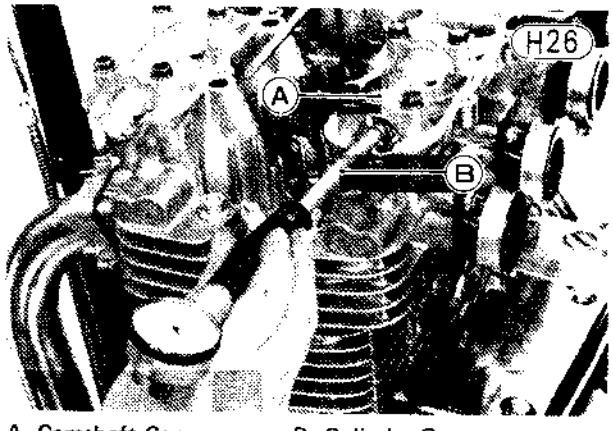


A. Camshaft

Table H8 Camshaft Journal Diameter

Service Limit	21.93 mm

Remove the camshafts, and tighten the camshaft caps with the specified torque (Pg. 39). Measure the vertical inside diameter of each bearing with a cylinder gauge. If it exceeds the service limit, replace the cylinder head and camshaft caps as a set since the camshaft caps are machined together with the cylinder head.



A. Camshaft Cap
B. Cylinder Gauge

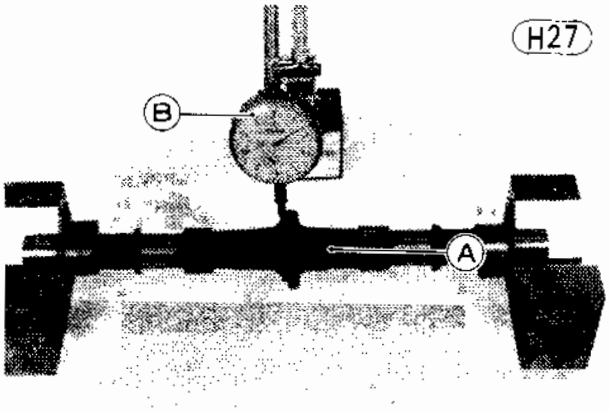
Table H9 Camshaft Bearing Inside Diameter

Service Limit	22.06 mm

Camshaft runout

Remove the camshaft and take the sprocket off the shaft.

Set the shaft on V blocks at the outside journals as shown in the figure. Measure runout with a dial gauge at the sprocket mounting location, and replace the shaft if the runout exceeds the service limit.



H27

A. Camshaft B. Dial Gauge

Table H10 Camshaft Runout

Service Limit	0.1 mm

CAMSHAFT CHAIN, GUIDE, TENSIONER

The camshaft chain, which is driven by the crankshaft sprocket, drives the two camshafts at one-half crankshaft speed. For maximum durability and minimum noise, an endless-type silent chain with no master link is used.

The automatic camshaft chain tensioner of cross-wedge type is utilized for this machine. Periodic adjustment of the tensioner is not needed since chain slack is removed automatically.

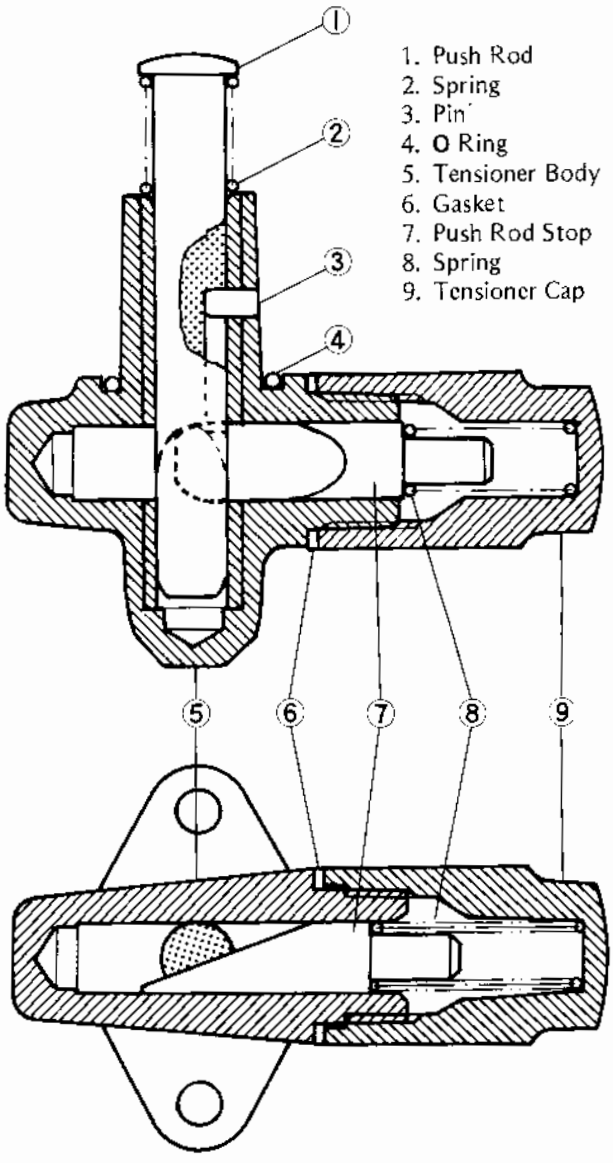
The cross-wedge type tensioner consists of push rod 1, push rod stop 7, springs 2, 8, tensioner cap 9, tensioner body 5, and pin 3. The push rod and push rod stop have a wedge-shaped portion, and are crossed wedgewise.

When the slack appears on the chain, the push rod is pushed out to the chain by the springs 2, 8, and it cannot be pushed back in because of the wedge-shaped portion of the push rod locking on the wedge-shaped portion of the push rod stop.

The pin 3 is used to keep the push rod from falling into the crankcase.

When the chain can no longer be adjusted enough to stop it from making noise, remove the chain, guides, and tensioner for inspections.

Camshaft Chain Tensioner (Cross-wedge Type) H28



Camshaft chain wear

Hold the chain taut with a force of about 5 kg in some manner, and measure a 20-link length. Since the camshaft chain may wear unevenly, take measurements at several places. If any measurement exceeds the service limit, replace the chain.

Chain Length Measurement H29

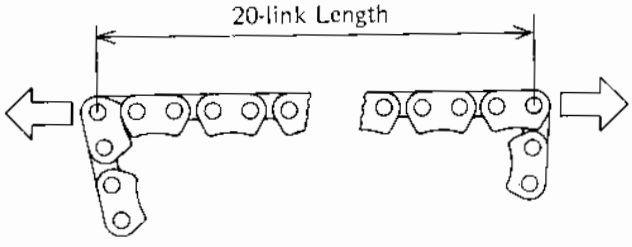


Table H11 Camshaft Chain Length

Service Limit	128.9 mm

Chain guide wear

Remove all the chain guides, and inspect them visually. Replace them if the rubber or any other portion shows damage.

Measure the depth of the grooves where the chain links run. Replace the guide if the wear exceeds the service limit.

Chain Guide Rubber Wear (H30)

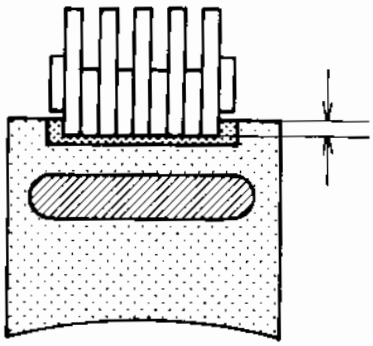


Table H12 Chain Guide Wear

Guide	Upper	Front	Rear
Service Limit	4.0 mm	5.0 mm	3.0 mm

Chain tensioner inspection

Remove the chain tensioner. Visually inspect the tensioner parts. If there is any damage or deut, replace the part with a new one.

CYLINDER HEAD, VALVE

The valves are mounted in the head, they are pushed open by the cams, and closed by the valve springs.

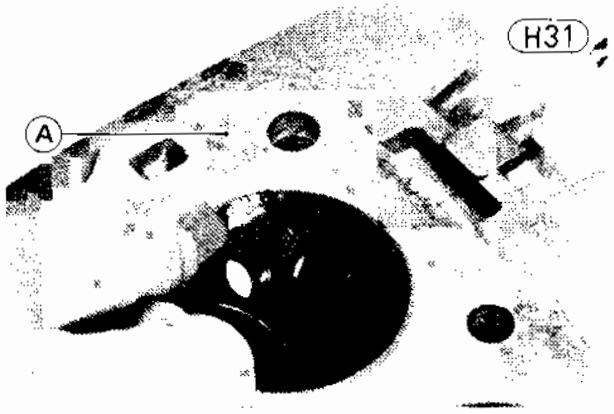
The valve guides and valve seats are pressed into the cylinder head. The valve seat prevents compression leakage by fitting snugly against the valve. It also prevents the valve from overheating by allowing efficient head transfer.

Cylinder Head

The cylinder head is made of aluminum alloy, used for its high heat conductivity, and is finned on the outside to aid dissipation of the heat generated in the combustion chambers. Carbon built up inside the combustion chambers interferes with heat dissipation and increases the compression ratio; which may result in preignition, detonation, and overheating. Trouble can also arise from improper head mounting or mounting torque, which may cause compression leakage.

Cleaning and inspection

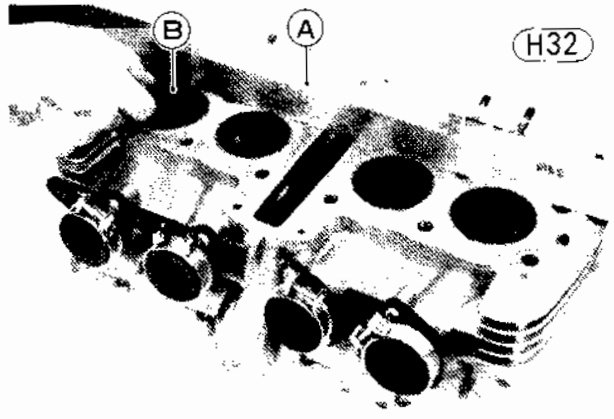
Remove the cylinder head (Pg. 61) and valves (Pg. 62). Scrape out any carbon, and wash the head with a high flash-point solvent.



A. Cylinder Head

Cylinder head warp

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. If warp exceeds the service limit, replace the cylinder head.



A. Straightedge **B. Thickness Gauge**

Table H13 Cylinder Head Warp

Service Limit	0.05 mm

Combustion chamber volume measurement

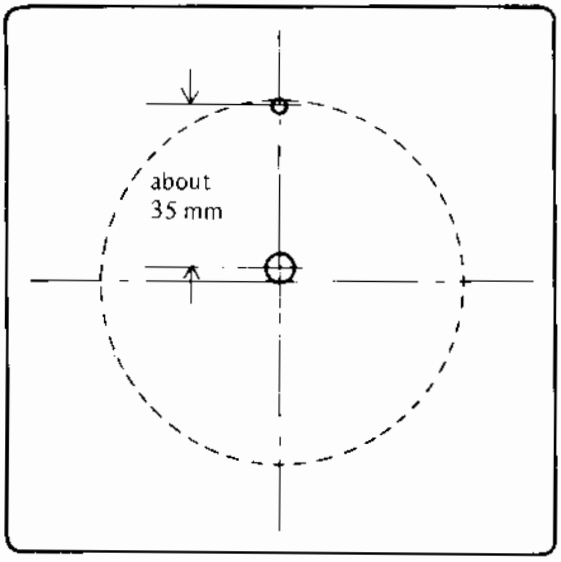
The combustion chamber volume should be measued any time that compression measurement results in compression pressures well below or above the standard.

NOTES:

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.

Measuring Plastic Plate (H33)

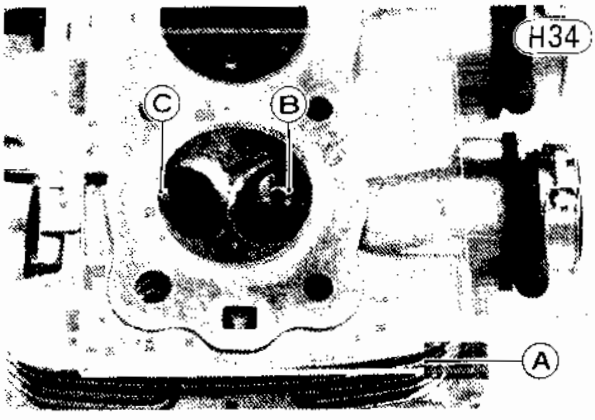


3. Obtain a burette or syringe which is calibrated at one-cc or smaller graduations. Fill it with thin oil.

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 standard spark plug should be installed in the chamber to be measured.

NOTE: The valves must seat well to prevent the oil from leaking out.

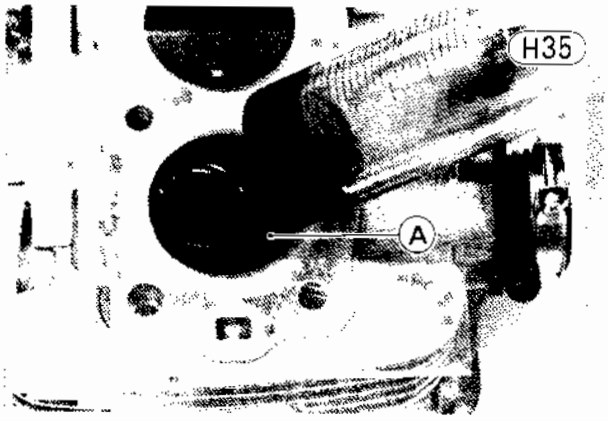
Apply a thin coat of grease to the cylinder head mating surface and place the plastic plate over the cylinder head combustion chamber, fitting its small hole near the edge of the combustion chamber.



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 mission 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.



A. Oil

Table H14 Combustion Chamber Volume

Standard	15.2 ~ 16.0 cc

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

If the combustion chamber volume is too large, it is possible that the valves and valve seats have been resurfaced so much that the volume is increased. Make sure that the spark plug is the standard type and that it is fully tightened.

Valve, Valve Guide, Valve Seat

Valve face deformation or wear, stem bending or wear, and valve guide wear can cause poor valve seating. Poor seating can also be caused by the valve seat itself, if there is heat damage or carbon build-up. The result of poor valve seating is compression leakage and a loss of engine power.

In addition, valve and valve seat wear causes deeper valve seating and a decrease in valve clearance. Insufficient clearance upsets valve timing and may eventually prevent the valve from seating fully. So that wear never progresses this far, adjust the valve clearance in accordance with the Periodic Maintenance Chart (Pg. 10).

Valve inspection

Visually inspect the valve face, and replace the valve if it shows deformation or uneven wear.

Measure the thickness of the valve head using vernier calipers, and replace the valve if the thickness is under the service limit.

If the seating surface of the valve is damaged or badly worn, repair the valve with a valve refacer. The angle of the seating surface is 45°.

If the end of the valve stem is damaged or badly worn, replace the valve with a new one.

CAUTION **Do not grind the valve stem end to repair it or to permit additional valve clearance. If the valve end is ground, the shim may contact the spring retainer and/or split keepers during operation, allowing the keeper to loosen. Consequently, the valve may drop into the engine, causing serious damage.**

Valve Shape (H36)

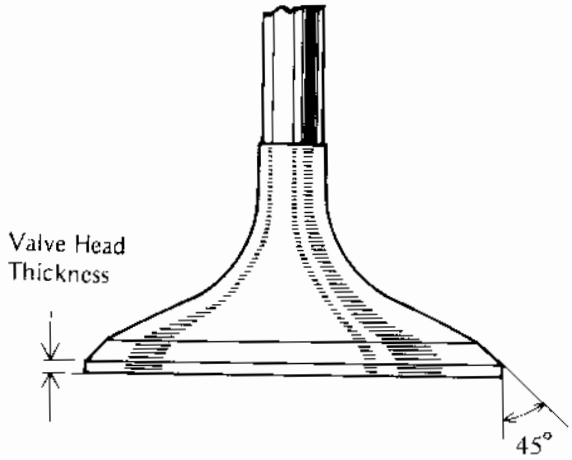


Table H15 Valve Head Thickness

Service Limit	0.5 mm

Position the valve in V blocks at each end of the straight portion of the stem, and set a dial gauge against the center of the stem. See the example shown in Fig. H37.

Turning the valve, read the variation in the dial gauge. Replace the valve if it is bent more than the service limit.

Valve Stem Bend (H37)

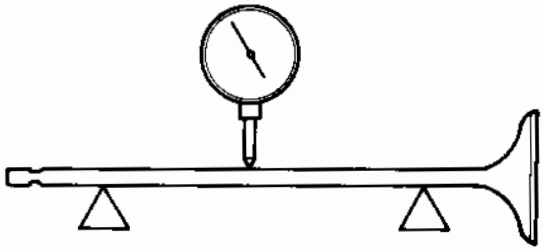


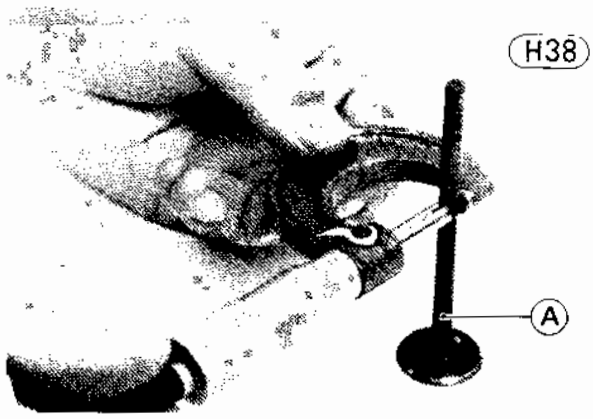
Table H16 Valve Stem Bend

Service Limit	0.05 mm

Measure the diameter of the valve stem with a micrometer. Since the stem wears unevenly, take measurements at four places up and down the stem, keeping the micrometer at right angles to the stem.

Replace the valve if the stem is worn to less than the service limit.

(H38)



A. Valve Stem

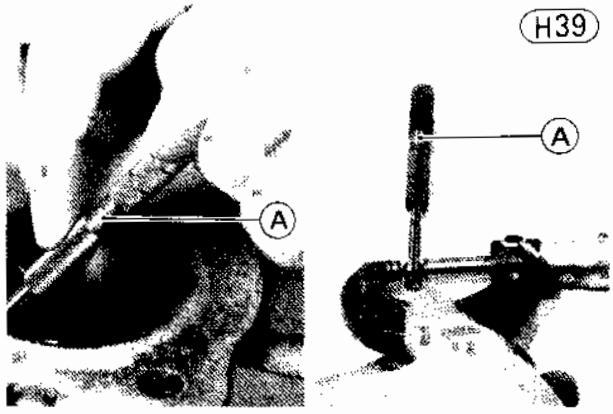
Table H17 Valve Stem Diameter

	Inlet	Exhaust
Service Limit	5.41 mm	5.39 mm

Valve guide inspection

Remove the valve, and measure the inside diameter of the valve guide using a small bore gauge and micrometer. Since the guide wears unevenly, measure the diameter at four places up and down the guide. If any measurement exceeds the service limit, replace the guide.

(H39)



A. Small Bore Gauge

Table H18 Valve Guide Inside Diameter

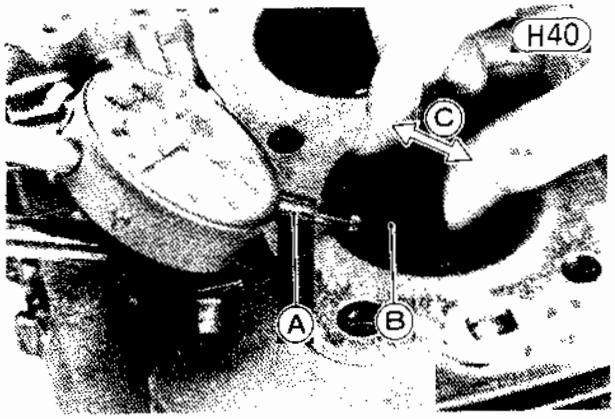
Service Limit	5.58 mm

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method, as indicated below.

Insert a new valve into the guide and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface. Move the stem back and force to measure valve/valve guide clearance. Repeat the measurement in a direction at a right angle to the first.

If the reading exceeds the service limit, replace the guide.

NOTE: The reading is not actual valve/valve guide clearance because the measuring point is above the guide.



A. Dial Gauge B. New Valve C. Move.

Table H19 Valve/Valve Guide Clearance (Wobble Method)

Service Limit	0.26 mm

Valve seat repair

The valve must seat in the valve seat evenly around the circumference over the specified area. If the seat is too wide, the seating pressure per unit of area is reduced, which may result in compression leakage and carbon accumulation on the seating surface. If the seating area is too narrow, heat transfer from the valve is reduced and the valve will overheat and warp. Uneven seating or seat damage will cause compression leakage.

Valve Seating Width (H41)

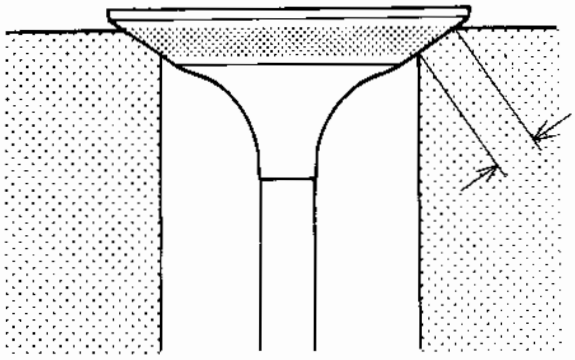


Table H20 Valve Seating Width

Standard	0.5 ~ 1.0 mm

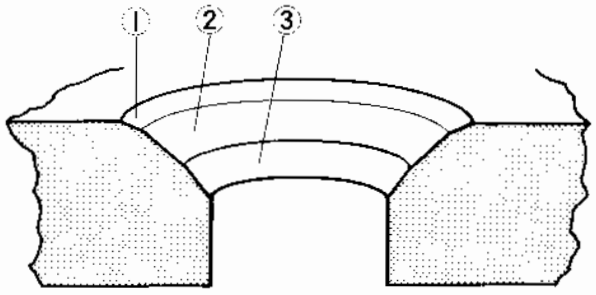
To determine whether or not the valve seat requires repair, first remove the valve, apply machinist's dye to the valve seat, and then use a lapper to tap the valve lightly into place. Remove the valve, and note where the dye adheres to the valve seating surface. The valve seating surface should be in the middle of the valve face (Fig. H41). The distribution of the dye on the seating surface gives an indication of seat condition (Fig. H43).

NOTE: The valve and valve guide must be in good condition before this check will give an accurate indication of valve seat condition.

A valve seat which requires repair is cut with a set of valve seat cutters. Four cutters are required for complete repair; one 30° (inlet valve seat only); one 45°; and two 60° cutters, one for the inlet and the other for the exhaust.

First, cut the seating surface of the valve seat with the 45° cutter. Cut only the amount necessary to make a good surface; overcutting will reduce the valve clearance, possibly making it no longer adjustable.

Cutting Angle of Valve Seat (H42)

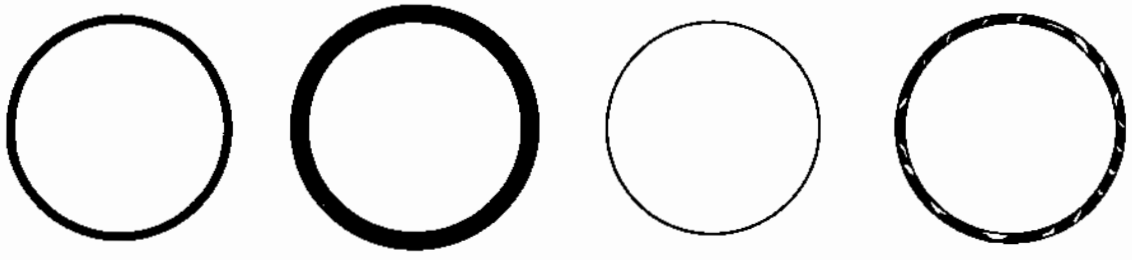


1. 30° 2. 45° 3. 60°

Next, use the 30° cutter (inlet valve seat only) to cut the surface inside the seating surface, and then use the 60° cutter to cut the outermost surface. Cut these two surfaces so that the seating surface will have the specified width.

After cutting, lap the valve to properly match the valve and valve seat surfaces. Start off with coarse lapping compound, and finish with fine compound.

Valve/Valve Seat Contact Area (H43)



GOOD TOO WIDE TOO NARROW UNEVEN

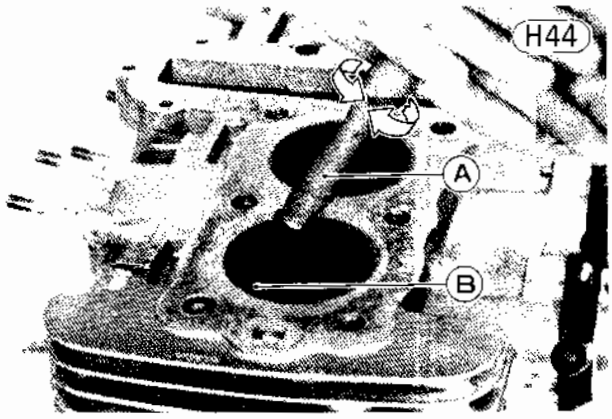
Table H21 Inlet Valve Stem Installed Height

Measurement	Probable Cause	Recommendation	
		Assembly with this shim:	After checking valve clearance, final shim may be in this range:
36.08 ~ 36.17 mm	Normal/acceptable	2.85 mm	2.85 ~ 3.20 mm
36.18 ~ 36.27 mm		2.75 mm	2.75 ~ 3.10 mm
36.28 ~ 36.37 mm		2.65 mm	2.65 ~ 3.00 mm
36.38 ~ 36.47 mm		2.55 mm	2.55 ~ 2.90 mm
36.48 ~ 36.57 mm		2.45 mm	2.45 ~ 2.80 mm
36.58 ~ 36.67 mm		2.35 mm	2.35 ~ 2.70 mm
36.68 ~ 36.77 mm		2.25 mm	2.25 ~ 2.60 mm
36.78 ~ 36.87 mm		2.15 mm	2.15 ~ 2.50 mm
36.88 ~ 36.97 mm		2.05 mm	2.05 ~ 2.40 mm
36.98 ~ 37.02 mm		2.00 mm	2.00 ~ 2.35 mm
More than 37.03 mm	Valve face and valve seat worn out.	1. Replace valve. Remeasure. 2. Replace cylinder head. Remeasure.	

Table H22 Exhaust Valve Stem Installed Height

Measurement	Probable Cause	Recommendation	
		Assembly with this shim:	After checking valve clearance, final shim may be in this range:
36.03 ~ 36.12 mm	Normal/acceptable	2.85 mm	2.85 ~ 3.20 mm
36.13 ~ 36.22 mm		2.75 mm	2.75 ~ 3.10 mm
36.23 ~ 36.32 mm		2.65 mm	2.65 ~ 3.00 mm
36.33 ~ 36.42 mm		2.55 mm	2.55 ~ 2.90 mm
36.43 ~ 36.52 mm		2.45 mm	2.45 ~ 2.80 mm
36.53 ~ 36.62 mm		2.35 mm	2.35 ~ 2.70 mm
36.63 ~ 36.72 mm		2.25 mm	2.25 ~ 2.60 mm
36.73 ~ 36.82 mm		2.15 mm	2.15 ~ 2.50 mm
36.83 ~ 36.92 mm		2.05 mm	2.05 ~ 2.40 mm
36.93 ~ 36.97 mm		2.00 mm	2.00 ~ 2.35 mm
More than 36.98 mm	Valve face and valve seat worn out.	1. Replace valve. Remeasure. 2. Replace cylinder head. Remeasure.	

Apply compound to the valve seat, and tap the valve lightly into place while rotating it with a lapper. Repeat this until a smooth, matched surface is obtained.

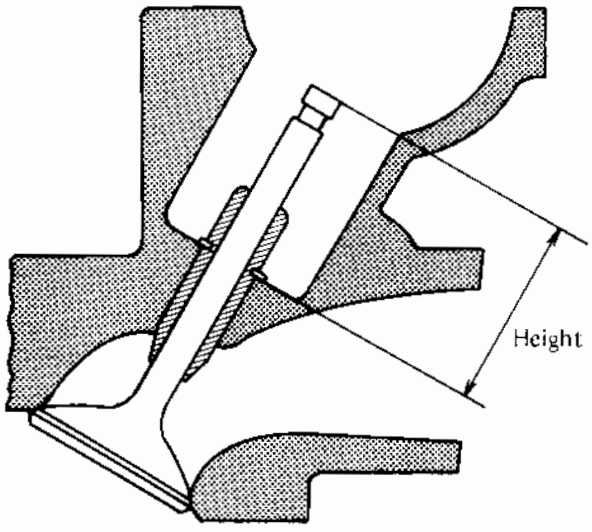


A. Lapper B. Valve

Valve stem height inspection

After grinding the valves or valve seats and before assembling the cylinder head, measure the installed valve height from the bottom of the cylinder head lifter hole to the end of the valve stem with a vernier caliper. Refer to Table H21 and Table H22 for the recommended repair.

Valve Installed Height (H45)



Be sure to mark each valve so it may be properly matched to its corresponding valve seat during assembly.

A selection of various thickness valve shims are available for adjusting the valve clearance. There is however, a limit to the amount of adjustment possible using the shims. Resurfacing of the valve face and valve seat inevitably drops the valve deeper into the valve seat, allowing the valve stem end to come closer to the camshaft. Consequently, a thinner shim must be used to compensate for the reduced valve clearance.

Over a period of long use and repeated resurfacing, the valve may drop so far into the valve seat. In this case, the installed height becomes so large that even the thinnest shim cannot give adequate clearance, and it should be necessary to replace the valve and remeasure the installed height. If this is not successful, it will be necessary to replace the cylinder head. Replacement valve seats are not available.

Valve Spring

When the valve is not being pushed open by the cam, the valve springs press the valve against the seat to prevent compression leakage. An inner spring is used with each outer spring to prevent spring surge, which may cause valve float at high rpm. If the springs weaken or break, compression leakage and valve noise will result, dropping engine power.

Spring tension

Remove the 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.

Valve Spring Tension Measurement (H46)

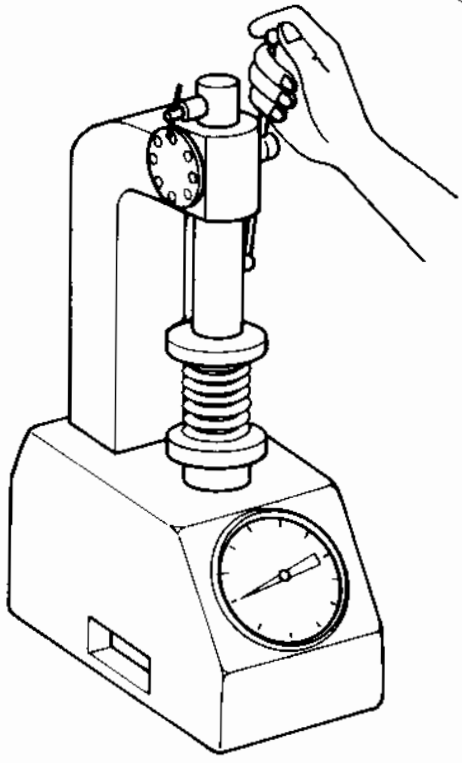


Table H23 Valve Spring Tension

Springs	Test Length	Service Limit
Inner	23.1 mm	16.2 kg
Outer	25.1 mm	31.3 kg

Spring Squareness

Measure the squareness of each spring by standing each end on a surface plate and setting a square against it. Replace any spring for which the distance between the top of the spring and the square is greater than the service limit.

Valve Spring Squareness (H47)

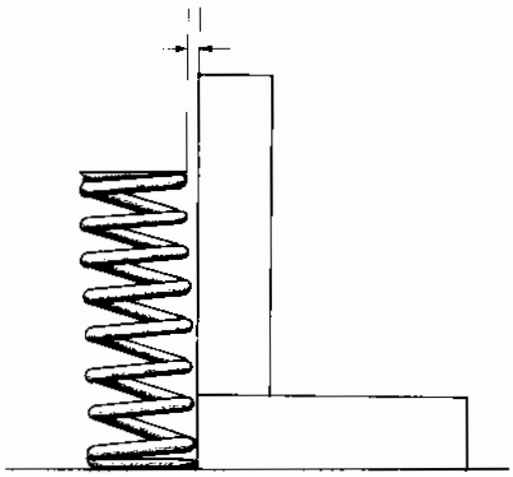


Table H24 Valve Spring Squareness

Service Limit	1.5 mm

Oil Seal

The oil seal around each valve stem prevents oil from leaking down into the combustion chamber. If an oil seal is damaged or deteriorated, oil consumption will increase, and carbon may build up in the combustion chambers. This may be indicated by white exhaust smoke.

If an oil seal appears damaged or deteriorated or if there is any doubt as to its condition, replace it with a new one.

CYLINDER BLOCK, PISTON

The cylinder block is subjected to extremely high temperatures. Since excessive heat can seriously distort the shape of a cylinder or cause piston seizure, the cylinder block is made of aluminum alloy for good heat conduction and the outside is finned to increase the heat-radiating surface for better cooling efficiency. To minimize distortion from heat and to maximize durability, a wear resistant iron sleeve is cold-pressed into each cylinder.

Each piston is made from an aluminum alloy, which expands and distorts slightly from heat during engine operation. So that the piston will become cylindrical after heat expansion, it is designed such that, when cold, it is tapered in towards the head and is elliptical rather than perfectly round. The piston diameter is made so that there is enough clearance between the piston and cylinder to allow for expansion.

Three rings are fitted into grooves near the top of each piston to prevent compression leakage into the crankcase and to stop oil from getting up into the combustion chambers. The top two rings are compression rings, and the bottom ring is an oil ring.

A full floating type piston pin is used to connect each piston to its connecting rod. The middle part of the piston pin passes through the small end of the connecting rod, and a snap ring is fitted at each end of the piston pin in a groove to prevent the pin from coming out of the piston. Since the pin is the full floating type, a small amount of clearance exists between the piston pin and the piston when the engine is at normal operating temperatures.

Proper inspection and maintenance of the cylinder block and the pistons include checking the compression; removing carbon from the piston heads, piston ring grooves, and cylinder head exhaust ports; and checking for wear and proper clearances during top end overhaul. A worn cylinder, worn piston, or worn or stuck piston rings may cause a loss of compression from gas blowby past the rings. Blowby may result in difficult starting, power loss, excessive fuel consumption, contaminated engine oil, and possibly engine destruction. Oil leakage into the combustion chambers causes carbon to build up on top of the pistons, which may result in preignition, overheating, and detonation. A worn piston pin causes piston rattle, which may cause accelerated piston and cylinder wear. It is evidenced by a knocking sound in the engine.

Engine problems may be caused not only by carbon deposits and wear or damage to the engine itself, but also by poor quality fuel or oil, improper oil, improper fuel/air mixture, improper oil supply, or incorrect ignition timing. Whenever knocking, pinging, piston rattle, or other abnormal engine noise is heard; the cause should be determined as soon as possible. Neglect of proper maintenance will result in wear, overheating, detonation, piston seizure, or engine destruction.

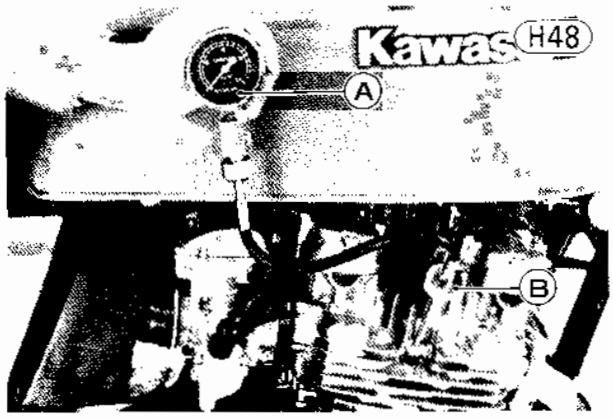
Compression measurement

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; poor valve seating; 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 heads and cylinder head. Difference in compression between the cylinders may cause poor running.

Before measuring compression, check that the cylinder head is tightened down with the specified torque (Pg. 40) and that the battery is fully charged (Pg. 215), and thoroughly warm up the engine so that engine oil between the pistons and cylinder walls 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 plugs.

Stop the engine, remove all spark plugs, and screw the compression gauge and hose (special tools) firmly into one spark plug hole. Using the starter motor, turn

the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable. Repeat the measurement for the other cylinder.



A. Compression Gauge (57001-221)
B. Hose (57001-1018)

Table H25 Cylinder Compression†

Usable Range	10.9~16.5 kg/cm² (155~235 psi), or less than 1 kg/cm² (14 psi) difference between any two cylinders

† Engine hot, spark plugs removed, throttle fully opened, cranking the engine with the starter motor.

If cylinder compression is higher than the standard value, 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. Valve stem oil seals and piston rings - rapid carbon accumulation in the combustion chambers may be caused by damaged valve stem oil seals and/or damaged piston oil rings. This may be indicated by white exhaust smoke.
4. Cylinder head volume (Pg. 165).

If cylinder compression is lower than the service limit, check the following:
1. Gas leakage around the cylinder head - replace the damaged gasket and check the cylinder head for warp (Pg. 165).
2. Condition of the valve seating (Pg. 168).
3. Valve clearance – if a valve requires an unusually thick shim to obtain proper clearance, the valve may be bent, and not seating completely.
4. Piston/cylinder clearance, piston seizure.
5. Piston ring, piston ring groove.

Cylinder, piston wear

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 Fig. H49. 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 56.0 mm, the cylinder block must be replaced.

Cylinder Inside Diameter Measurement H49

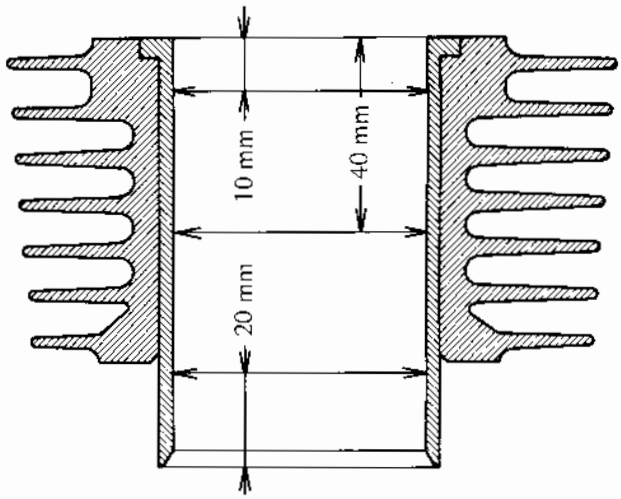
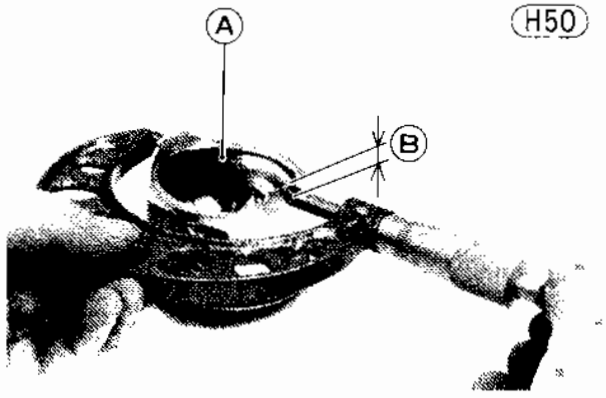


Table H26 Cylinder Inside Diameter

Service Limit
55.10 mm, or more than 0.05 mm difference between any two measurements

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

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



A. Piston B. 5 mm

Table H27 Piston Diameter

Service Limit	54.80 mm

Table H26 applies only to cylinder that has not been bored oversize, and Table H27 applies only to the standard size piston. In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter 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.

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

Piston/cylinder clearance

The piston-to-cylinder clearance is measured whenever a piston or the cylinder block 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 block 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 H28 Piston/Cylinder clearance

Standard	0.020 ~ 0.047 mm

Boring, honing

When boring and honing a cylinder, note the following:

1. Before boring a cylinder, first measure the exact diameter of the oversize piston, and then in accordance with the standard clearance given in Table H28, determine the diameter of the rebore.
2. To avoid cylinder distortion due to unbalanced metal temperatures, bore the cylinders in 2-4-1-3 or 3-1-4-2 order.
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 pistons require oversize rings.

Piston/cylinder seizure

Remove the cylinder block and pistons 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 cleaning

Built-up carbon on the piston head reduces the cooling capability of the piston and raises compression, leading to overheating which could possibly even melt the top of the piston. To decarbonize the piston head, remove the piston (Pg. 67), scrape off the carbon, and then lightly polish the piston with fine emery cloth.



H51

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

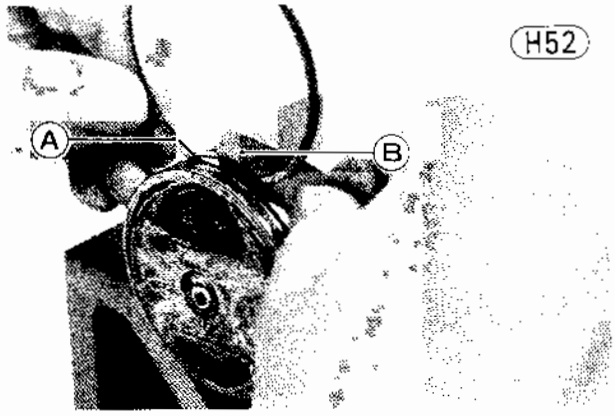
CAUTION

1. **When removing carbon, take care not to scratch the side of the piston, or the piston ring grooves.**
2. **Never clean the piston heads with the engine assembled. If the carbon is scraped from the piston heads with the cylinder left in place, carbon particles will unavoidably drop between the pistons and cylinder walls 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, pistons, cylinders, crankshaft bearings, and oil seals.**

Piston ring, piston ring groove wear

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. The two rails and the expander of the oil ring must be replaced as a set.

With the top and second rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance. If the clearance exceeds the service limit, measure the thickness of the piston rings and the width of the ring grooves. If the ring has worn down to less than the service limit, replace the ring; if the groove width exceeds the service limit, replace the piston.



A. Piston Ring B. Thickness Gauge

Table H29 Piston Ring/Groove Clearance

	Service Limit
Top and 2nd	0.15 mm

Table H30 Piston Ring Thickness

	Service Limit
Top and 2nd	1.10 mm

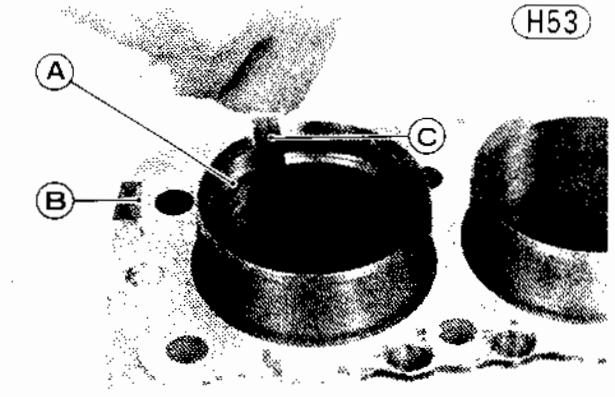
Table H31 Piston Ring Groove Width

	Service Limit
Top and 2nd	1.33 mm
Oil	2.60 mm

When new rings are being fitted into a used piston, check for uneven groove wear by inspecting the ring seating. The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.

Piston ring end gap (top, second)

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.



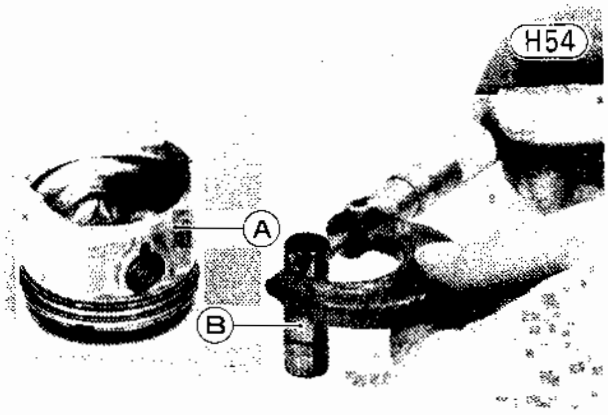
A. Piston Ring C. Thickness Gauge
B. Cylinder Block

Table H32 Ring End Gap

	Service Limit
Top and 2nd	0.7 mm

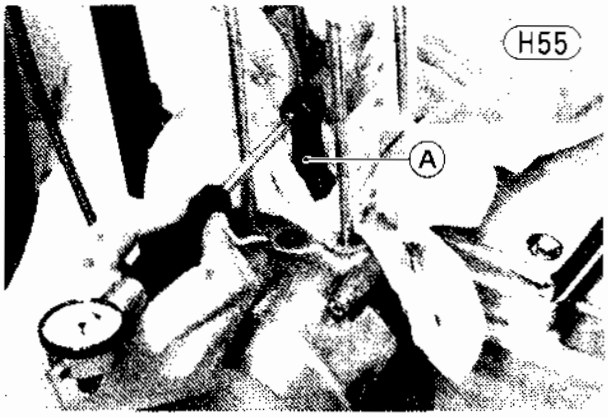
Piston, piston pin, connecting rod wear

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



A. Piston B. Piston Pin

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



A. Connecting Rod

Table H33 Piston Pin, Pin Hole, Small End Diameter

	Service Limit
Piston Pin	13.96 mm
Piston Pin Hole	14.07 mm
Small End	14.05 mm

NOTE: When a new piston or pin is used, also check that piston-to-pin clearance is 0.005 ~ 0.016 mm, and that pin to small end clearance is within 0.003 ~ 0.019 mm.

CRANKSHAFT, CONNECTING ROD

The crankshaft changes the reciprocating motion of the pistons into rotating motion, which is transmitted to the rear wheel when the clutch is engaged. The connecting rods connect the pistons to the crankshaft. Crankshaft or connecting rod trouble, such as worn crankshaft journals or a bent connecting rod, will multiply the stress caused by the intermittent force on the pistons. This results in not only rapid crankshaft bearing wear, but also noise, power loss, vibration, and shortened engine life. A defective crankshaft or connecting rod should always be detected at an early stage and then replaced immediately.

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

Remove the connecting rod big end bearing inserts and replace the connecting rod big end cap. Select an arbor of the same diameter as the connecting rod big end and of optional length, and insert it through the big end of the connecting rod. Select an arbor of the same diameter as the piston pin and of optional length, and insert it through the small end of the connecting rod.

On a surface plate, set the big-end arbor on V blocks so that the connecting rod is perpendicular to the surface plate. Using a height gauge or dial gauge, measure the difference in the height of the small-end arbor above the surface plate over a 100 mm length to determine the amount the connecting rod is bent. If the measurement exceeds the service limit, replace the connecting rod.

Connecting Rod Bend Measurement (H56)

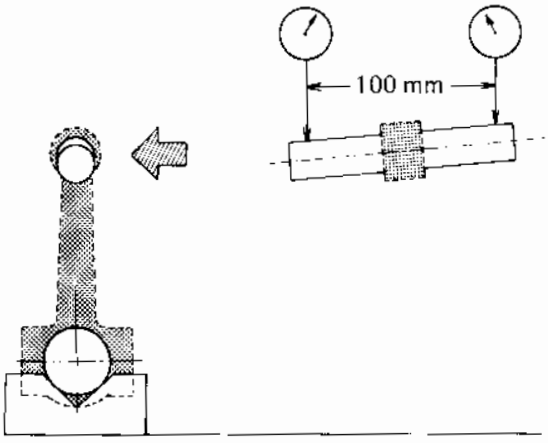


Table H34 Connecting Rod Bend/100 mm

Service Limit	0.2 mm

Swing the connecting rod 90° to one side and support it parallel to the surface plate as shown in Fig. H57. Measure the difference in the height of the small-end arbor above the surface plate over a 100 mm length to determine the amount the connecting rod is twisted.

If the measurement exceeds the service limit, replace the connecting rod.

Connecting Rod Twist Measurement (H57)

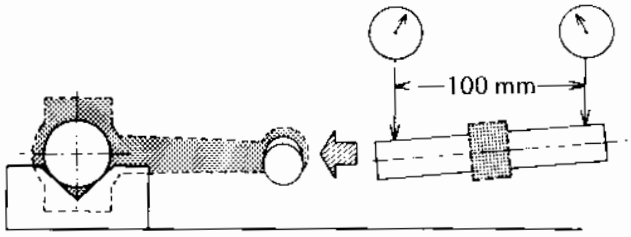


Table H35 Connecting Rod Twist/100 mm

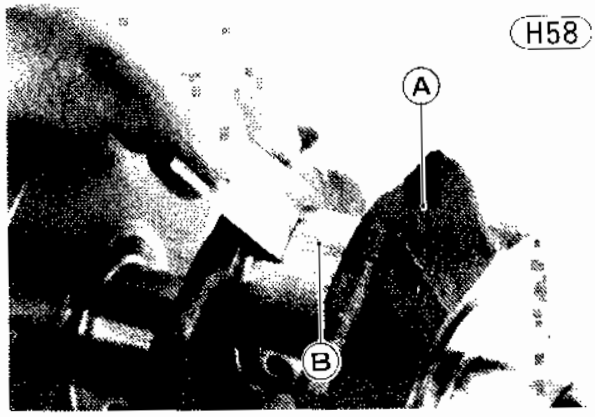
Service Limit	0.2 mm

Connecting rod bearing insert/journal wear

Bearing insert wear is measured using a plastigauge (press gauge), which is inserted into the clearance to be measured. The plastigauge indicates the clearance by the amount it is compressed and widened when the parts are assembled.

Remove the connecting rods. Cut strips of plastigauge to bearing insert width. Place a strip on the connecting rod bearing insert on each connecting rod parallel to the crankshaft so the plastigauge will be compressed between the bearing insert and the connecting rod journal. Install the connecting rods, tightening the nuts with the specified torque (Pg. 40).

Remove the connecting rods, and measure the plastigauge width to determine the bearing insert/journal wear.



A. Crankshaft **B. Plastigauge**

Table H36 Connecting Rod Bearing Insert/Journal Clearance

Service Limit	0.1 mm

If the clearance exceeds the service limit, replace the bearing inserts as follows:

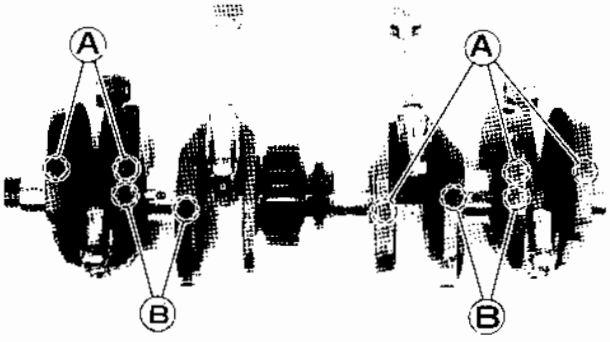
1. With a micrometer, measure the diameter of the crankshaft journals on which the connecting rods fit. Mark each flywheel in accordance with the journal diameter (Table H37).

If the measurements is less than the service limit, replace the crankshaft.

If the measurements is less than the standard value, but is not under the service limit; use bearing inserts painted green.

NOTE: Any mark already on the flywheel should not be referred to during servicing.

H59



A. Markings for Crankshaft Journal
B. Markings for Connecting Rod Journal ("○" or No mark)

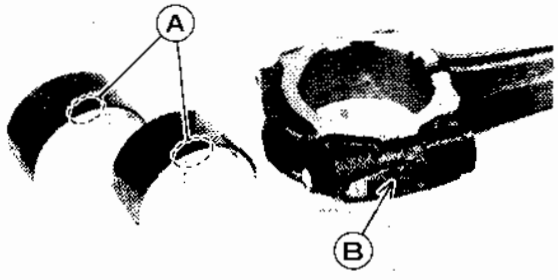
Table H37 Connecting Rod Journal Diameter

Marking	Standard	Service Limit
No mark	32.984~32.994 mm	32.97 mm
○	32.995~33.000 mm	

2. Put the connecting rod big end caps on the rods and tighten the nuts with the specified torque (Pg. 40). Measure the inside diameter, and mark each connecting rod big end in accordance with the inside diameter (Table H38).

NOTE: The mark already on the big end should almost coincide with the measurement.

H60



A. Painted Marks (Brown, Black, or Green)
B. Marking for Connecting Rod ("○" or No mark)

Table H38 Connecting Rod Big End Diameter

Marking	Standard
○	36.009~36.016 mm
No mark	36.000~36.008 mm

3. Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.

Table H39 Bearing Insert Selection

Con-Rod Marking / Crankshaft Marking	○	No mark
○	Black P/N: 13034-1005	Brown P/N: 13034-1006
No mark	Green P/N: 13034-1004	Black P/N: 13034-1005

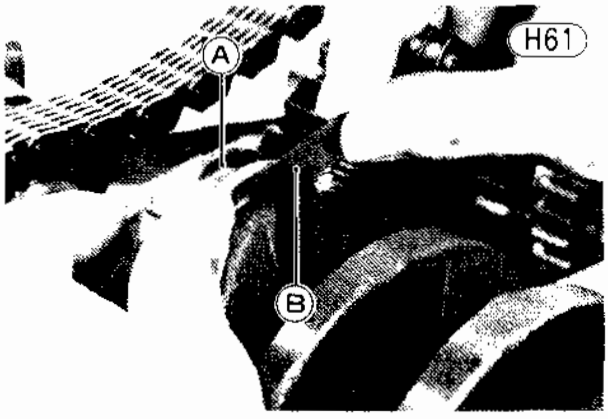
Table H40 Bearing Insert Thickness

Color	Thickness
Green	1.489~1.494 mm
Black	1.485~1.490 mm
Brown	1.480~1.485 mm

Connecting rod side clearance

Measure the side clearance of the connecting rod with a thickness gauge as shown. Replace the crankshaft and the connecting rod if the clearance exceeds the service limit.

H61



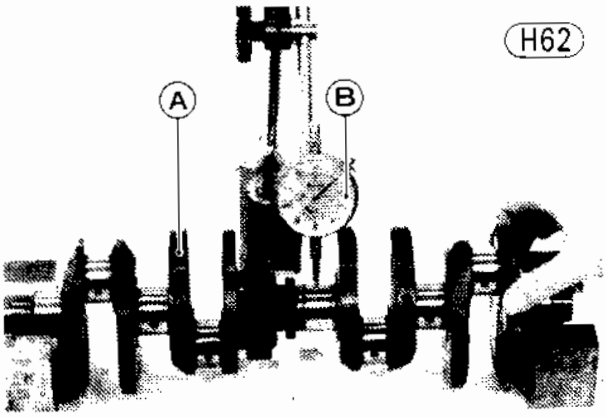
A. Connecting Rod **B. Thickness Gauge**

Table H41 Connecting Rod Big End Side Clearance

Service Limit	0.50 mm

Crankshaft runout

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.



A. Crankshaft B. Dial Gauge

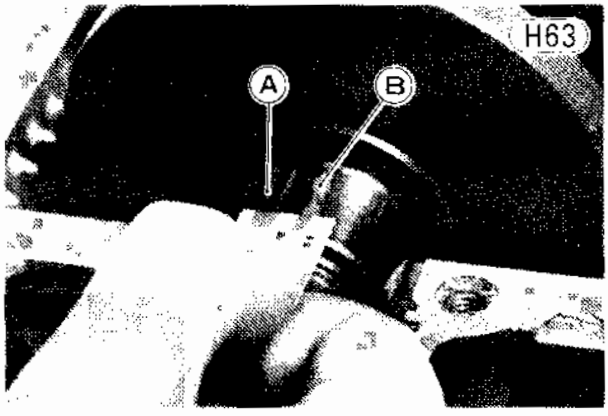
Table H42 Crankshaft Runout

Service Limit	0.05 mm

Crankshaft bearing insert/journal wear

Remove the crankshaft. Clean off the oil, and install the crankshaft. Cut strips of plastigauge to bearing insert width. Place a strip on each journal parallel to the crankshaft so the plastigauge will be compressed between the insert and the crankshaft journal. Install the lower crankcase half without turning the crankshaft, and tighten the bolts in the correct sequence with the specified amount of torque (Pg. 40).

Remove the lower crankcase half (making sure that the crankshaft does not turn at any time), and measure the plastigauge width to determine the bearing insert/journal wear.



A. Crankshaft B. Plastigauge

Table H43 Crankshaft Bearing Insert/Journal Clearance

Service Limit	0.10 mm

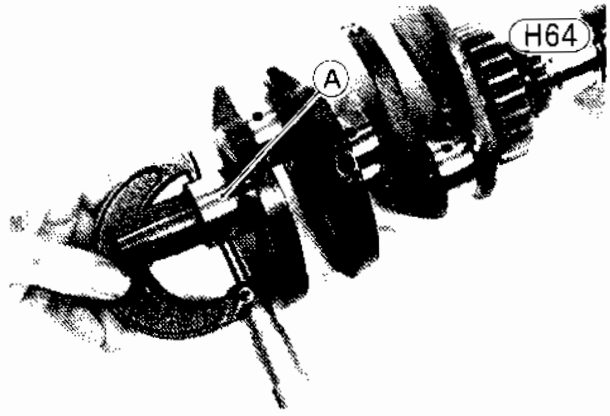
If any clearance exceeds the service limit, replace all bearing inserts (10) as follows:

1. Measure the diameter of the crankshaft journals which wear on these bearing inserts. Mark each flywheel in accordance with the journal diameter (Table H44).

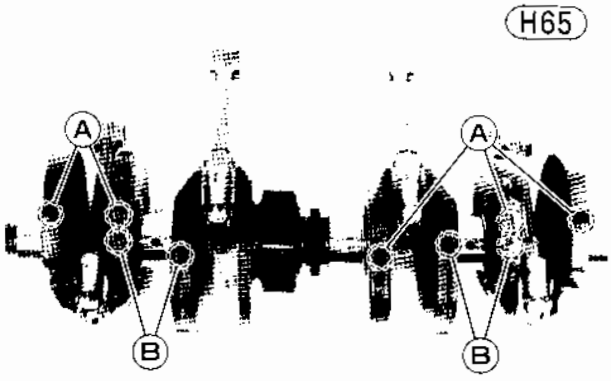
If the measurements is less than the service limit, replace the crankshaft.

If the measurements is less than the standard value, but is not under the service limit; use bearing inserts painted green.

NOTE: Any mark already on the flywheel should not be referred to during servicing.



A. Crankshaft Journal



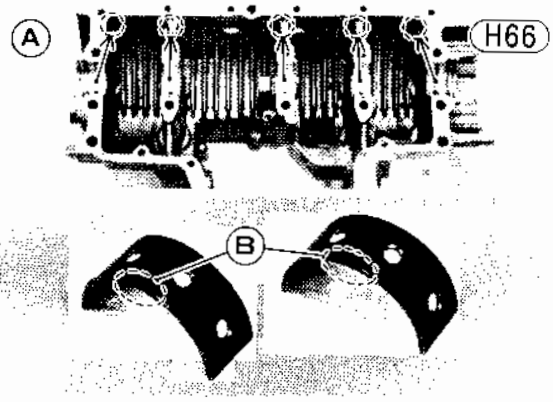
A. Markings for Crankshaft Journal ("1" or No mark)
B. Markings for Connecting Rod Journal

Table H44 Crankshaft Journal Diameter

Marking	Standard	Service Limit
No Mark	31.984~31.992 mm	31.96 mm
1	31.993~32.000 mm	

2. Put the lower crankcase half on the upper crankcase half without the bearing inserts, and tighten the bolts to the specified torque (Pg. 40). Measure the inside diameter, and mark the lower crankcase half in accordance with the inside diameter (Table H45).

NOTE: The mark already on the lower crankcase half should almost coincide with the measurement.



A. Markings for Crankcase ("○" or No mark)
B. Painted Marks (Brown, Black, or Green)

Table H45 Crankshaft Bearing Inside Diameter

Marking	Standard
○	36.000 ~ 36.008 mm
No mark	36.009 ~ 36.016 mm

3. Select the proper bearing inserts in accordance with the combination of the crankcase and the crankshaft marks (Table H46).

Table H46 Crankshaft Bearing Insert Selection

Crankcase Marking / Crank-Shaft Marking	○	No mark
1	Brown P/N: 13034-1016	Black P/N: 13034-1017
No mark	Black P/N: 13034-1017	Green P/N: 13034-1018

Table H47 Crankshaft Bearing Insert Thickness

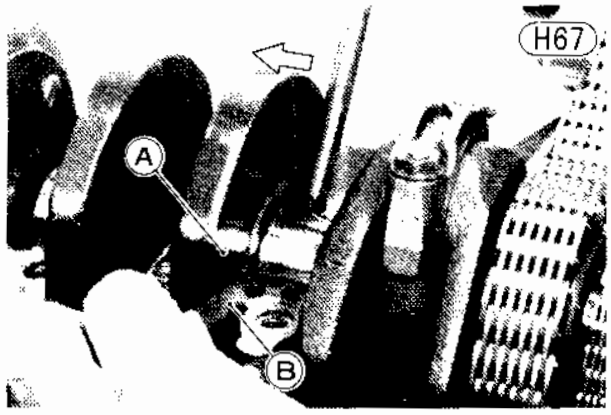
Color	Thickness
Brown	1.991 ~ 1.995 mm
Black	1.995 ~ 1.999 mm
Green	1.999 ~ 2.003 mm

Crankshaft side clearance

Measure the crankshaft side clearance with a thickness gauge as shown. Replace the crankcase halves as a set, if the clearance exceeds the service limit.

Table H48 Crankshaft Side Clearance

Service Limit	0.35 mm

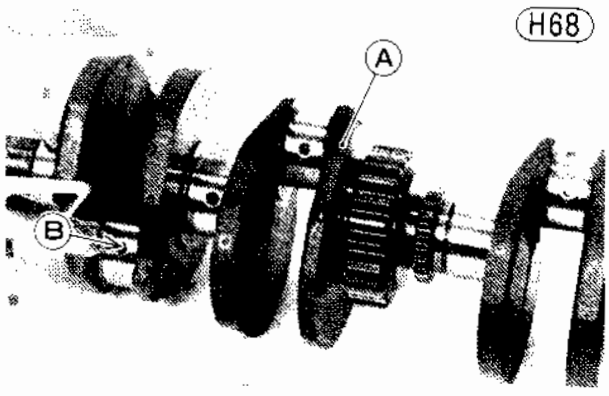


A. Crankshaft B. Thickness Gauge

NOTE: The upper crankcase half and the lower crankcase half are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

Oil passage cleaning

There are oil passages running between the crankshaft journals. Use compressed air to remove any foreign particles or residue that may have accummulated in these passages.



A. Crankshaft B. Compressed Air

SECONDARY SHAFT

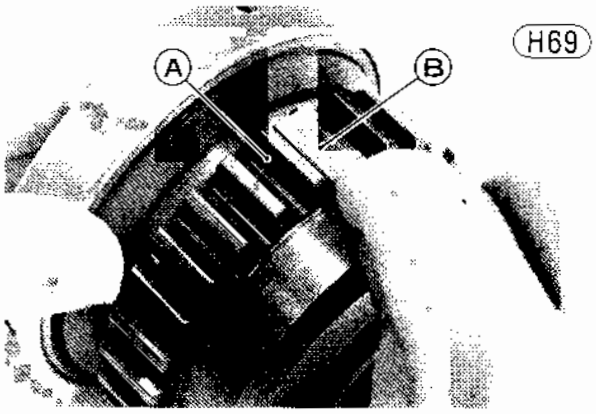
The secondary shaft has the secondary sprocket, coupling, starter motor clutch, and secondary shaft gear on it. The secondary sprocket is chain-driven by the crankshaft, and the secondary shaft gear transmits the power to the clutch housing gear. The secondary shaft coupling connects the secondary sprocket to the shaft. Rubber dampers in the coupling absorb the pulsations of the engine torque.

Check both of the end ball bearings of the secondary shaft, and replace if necessary (Pg. 192).

Secondary sprocket damage

Inspect the teeth on the secondary sprocket. Any light damage can be corrected with an oilstone, but the secondary sprocket must be replaced if the teeth are

badly damaged. Damaged teeth on the secondary sprocket indicate that the primary chain, by which it is driven, may also be damaged. At the same time that the secondary sprocket is repaired or replaced, the primary chain should be inspected, and then replaced if necessary.



A. Secondary Sprocket **B. Oilstone**

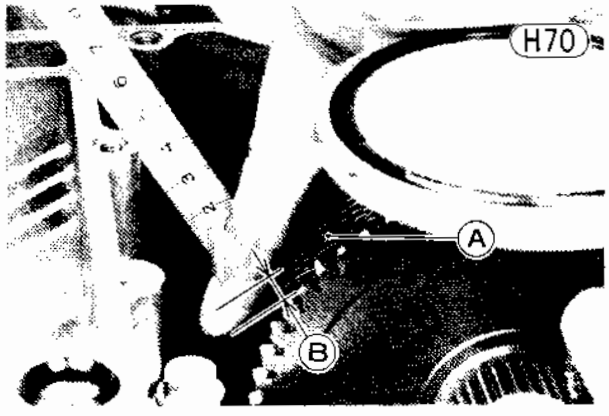
PRIMARY CHAIN

The power transmission from the crankshaft to the secondary shaft is chain-driven, utilizing a Hy-Vo (high velocity) chain. The Hy-Vo chain is a rocker-joint type with a pin and rocker construction. Some of the special features of the Hy-Vo chain are its capacity to transmit much power at high speed, its resistance to heat seizure due to a construction which employs rolling rather than sliding friction, quiet operation even at high rpm, and low power loss.

Wear

A primary chain which has worn so that it is 1.4% or more longer than when new is no longer safe for use and should be replaced. To inspect the chain wear by measuring the chain slack, remove the oil pan.

Measure the chain slack, and replace the chain if it has worn past the service limit. The replacement chain must be a Tsubakimoto Hy-Vo 3/8P-3/4W, 50 links chain.



A. Primary Chain **B. Chain Play**

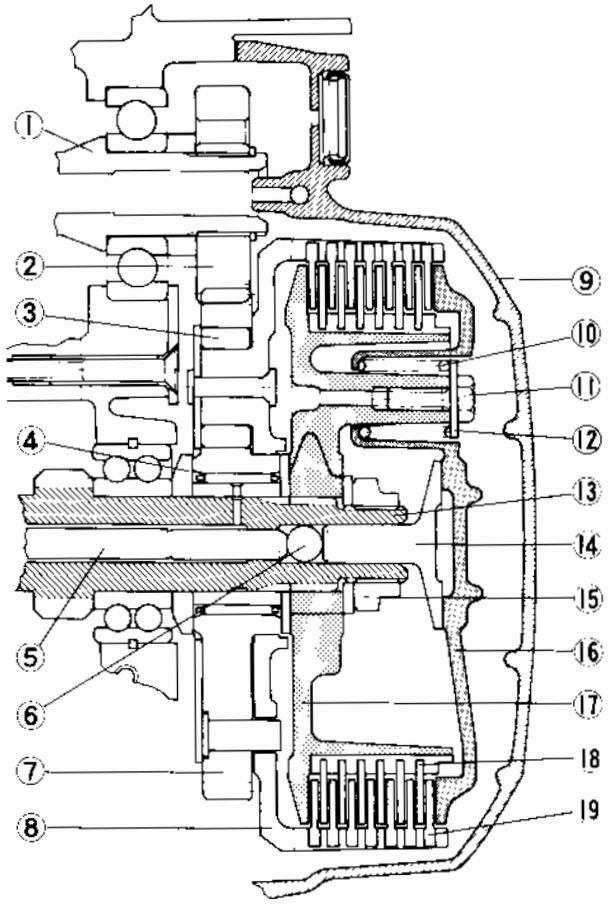
Table H49 Primary Chain Play

Service Limit	25 mm

CLUTCH

Fig. H71 shows the construction of the clutch, which is a wet, multi-plate type with 7 friction plates (19) and 6 steel plates (18). The friction plates are made of cork, used for its high coefficient of friction, bonded on a aluminum core, which provides durability and warp resistance. The clutch housing (8) has a reduction gear (7) on one side and contains rubber dampers (3) to absorb shock from the drive train.

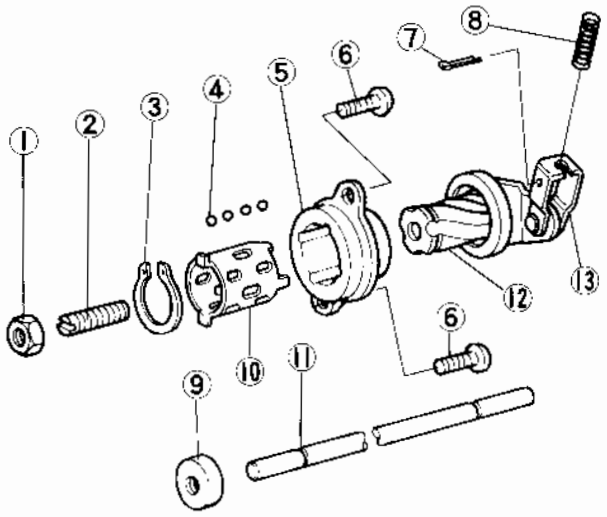
Clutch



1. Secondary Shaft
2. Secondary Shaft Gear
3. Rubber Damper
4. Spacer
5. Push Rod
6. Steel Ball
7. Clutch Housing Gear
8. Clutch Housing
9. Clutch Cover
10. Clutch Spring
11. Spring Bolt
12. Washer
13. Drive Shaft
14. Spring Plate Pusher
15. Clutch Hub Nut
16. Spring Plate
17. Clutch Hub
18. Steel Plate
19. Friction Plate

The clutch release mechanism is shown in Fig. H72. The clutch release outer release gear ⑤ and the inner release gear ⑫ are made of steel. Balls ④ are installed between the outer and inner release gears to reduce the friction between them. Assembled into the center of the inner release gear is the clutch adjusting screw ②, which pushes on the push rod ⑪ and steel ball inside the drive shaft to release the clutch.

Clutch Release (H72)



1. Locknut
2. Adjusting Screw
3. Circlip
4. Steel Ball
5. Output Release Gear
6. Mounting Screw
7. Cotter Pin
8. Spring
9. Oil Seal
10. Retainer
11. Push Rod
12. Inner Release Gear
13. Release Lever

The friction plates are keyed to the clutch housing by tangs on the outer circumference of each plate. Since the clutch housing is gear-driven from the secondary shaft, these plates are always turning any time the engine is running. The steel plates have a toothed inner circumference and mesh with the splines in the clutch hub. The hub is mounted on the drive shaft, so that the drive shaft and steel plates always turn together.

One end of each clutch spring pushes against its washer and bolt, which is threaded into the clutch hub. The other end pushes against the spring plate. When the clutch is left engaged, the springs force the spring plate, friction plates, steel plates, and clutch hub tightly together so that the friction plates will drive the steel plates and transmit power to the transmission drive shaft.

When the clutch lever is pulled to release (disengage) the clutch, the clutch cable turns the clutch release inner release gear in, towards the clutch. The clutch adjusting screw, assembled inside the clutch release inner release gear, then pushes the push rod, which (through the steel ball and spring plate pusher) pushes the spring plate. Since the spring plate moves the same distance that the inner release gear moves and the clutch hub remains stationary, the springs are compressed and pressure is taken off the clutch plates. Because the plates are no longer pressed together, power transmission from the crankshaft to the transmission drive shaft is interrupted. As the clutch lever is released, the clutch springs return the spring plate and once again force the spring plate, plate assembly, and clutch hub tightly together.

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 engine oil.
5. Engine oil viscosity too high.
6. Engine 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. The 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 secondary shaft gear and the clutch gear.
2. Damaged gear teeth.
3. Too much clearance between the friction plate tangs and the clutch housing.
4. Needle bearing worn or damaged.
5. Weak or damaged damper rubber(s).
6. Metal chips jammed into the clutch housing gear teeth.

Spring tension

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.

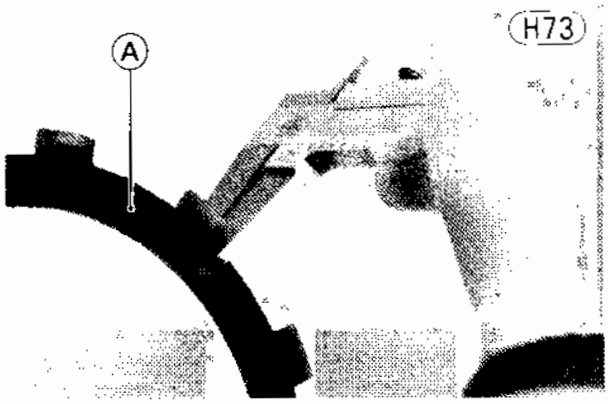
Table H50 Clutch Spring Tension

Test Length	Service Limit
23.5 mm	18.5 kg

Friction plate wear, damage

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

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



A. Friction Plate

Friction Plate Measurement H74

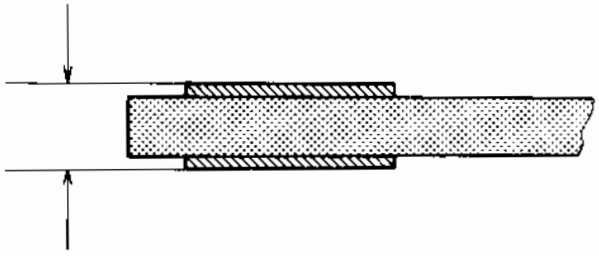


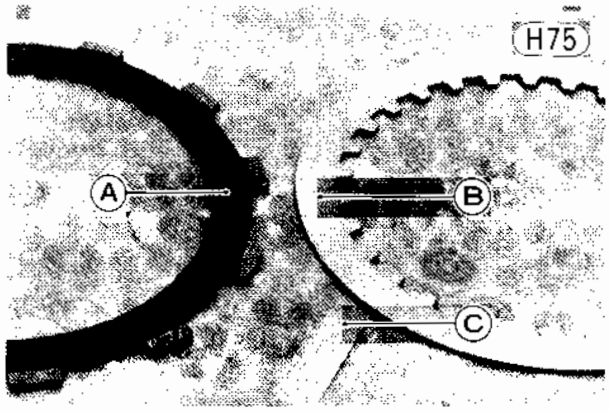
Table H51 Friction Plate Thickness

Service Limit	2.7 mm

Clutch plate warp

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

Replace any plates warped over the service limit.



A. Friction Plate
B. Steel Plate
C. Thickness Gauge

Table H52 Clutch Plate Warp

Service Limit	0.4 mm

Friction plate/clutch housing clearance

Measure the clearance between the tangs on the friction plates and the fingers of the clutch housing. If this clearance is excessive, the clutch will no 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.

Friction Plate/Clutch Housing Clearance H76

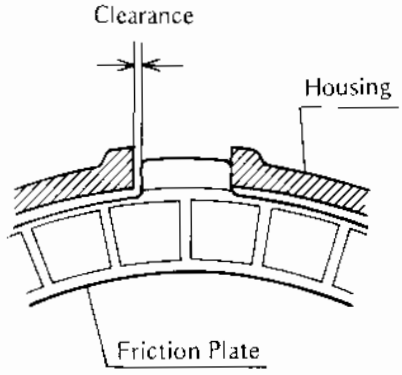


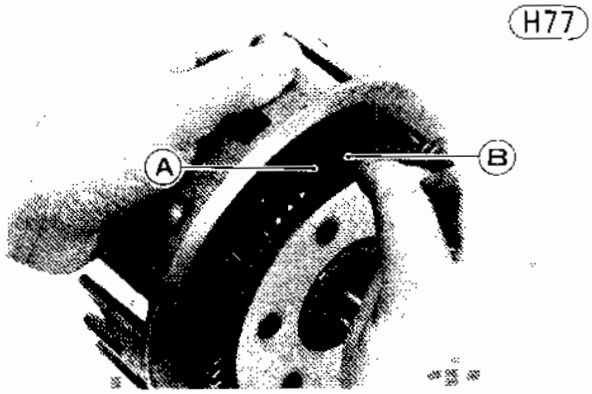
Table H53 Friction Plate/Clutch Housing Clearance

Service Limit	0.7 mm

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

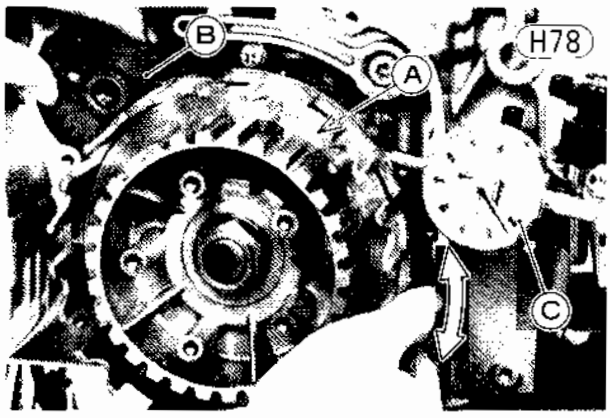
Inspect the teeth on the clutch housing gear. Any light damage can be corrected with an oilstone, but the clutch housing must be replaced if the teeth are badly damaged. Damaged teeth on the clutch housing gear indicate that the secondary shaft gear, by which it is driven, may also be damaged. Whenever the clutch housing gear is repaired or replaced, the secondary shaft gear should be inspected, and then replaced if necessary.



A. Clutch Housing Gear
B. Oilstone

Clutch housing gear/secondary shaft gear backlash

Measure the backlash between the clutch housing gear and secondary shaft 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. Replace both the clutch housing and the secondary shaft gear wherever the amount of backlash exceeds the service limit.



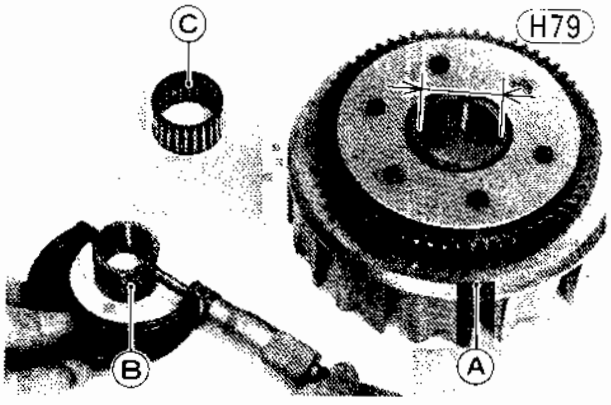
A. Clutch Housing Gear
B. Secondary Shaft Gear
C. Dial Gauge

Table H54 Clutch Housing Gear/Secondary Shaft Gear Backlash

Service Limit	0.13 mm

Clutch housing/drive shaft sleeve wear

Measure the diameter of the drive shaft sleeve with a micrometer. Replace the drive shaft sleeve if the diameter is less than the service limit. Measure the inside diameter of the clutch housing with a cylinder gauge. Replace the clutch housing if the diameter exceeds the service limit. Check the clutch housing needle bearing (Pg. 192). When replacing the clutch housing and/or drive shaft sleeve, replace the clutch housing needle bearing also.



A. Clutch Housing
B. Drive Shaft Sleeve
C. Needle Bearing

Table H55 Clutch Housing, Sleeve Diameter

	Clutch Housing	Sleeve
Service Limit	37.03 mm	31.96 mm

Clutch hub damage

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

Clutch release gear wear

With the clutch release assembled, push the inner release gear back and forth in the direction of the shaft without turning it. If there is excessive play, replace the clutch release assembly.

Lubrication

Lubricate the clutch release gear with grease.

TRANSMISSION

The transmission is a 6-speed, constant mesh, return shift type. Its cross section is shown in Fig. H80, and the external shift mechanism is shown in Fig. H81. For simplicity, the drive shaft gears in the following explanation are referred to as "D" (e.g., D1=drive shaft 1st gear) and the output shaft gear as "O".

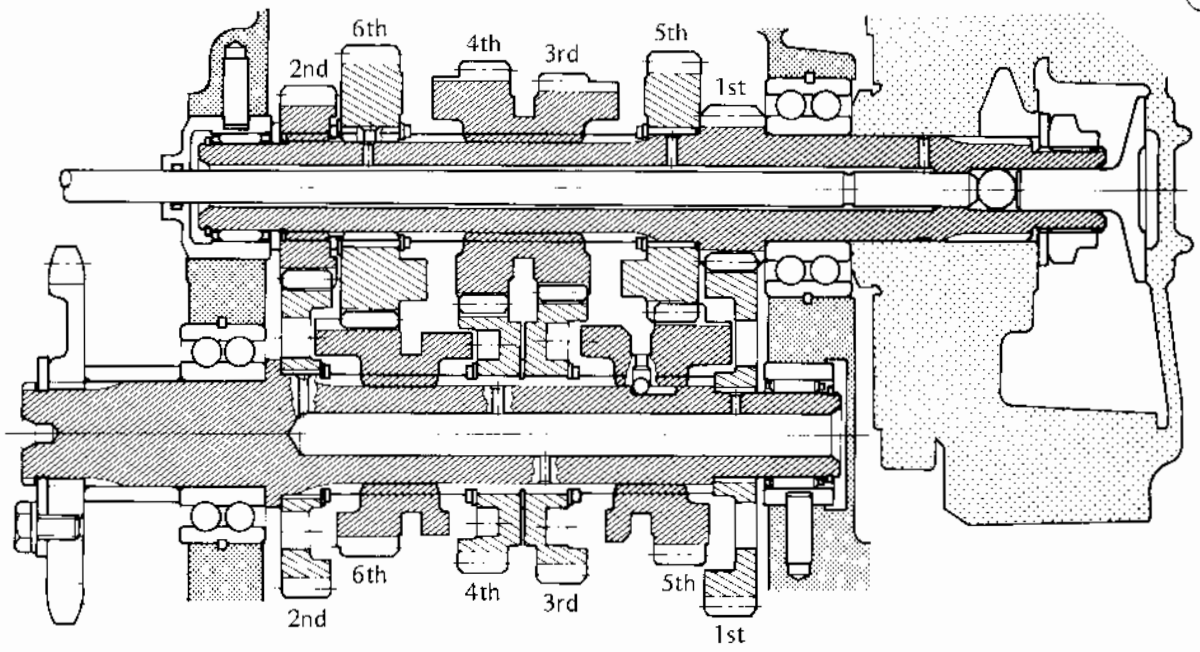
Gears D3/4, O5 and O6 are all splined to, and thus rotate with their shafts. During gear changes, these gears are moved sideways on their shafts by the three shift forks, one for each of them. Gears D5, D6, O1, O2, O3 and O4 rotate free of shaft rotation, but cannot move sideways. Gears D1 and D2 rotate with the shaft and are unable to move sideways.

Shift Mechanism

When the shift pedal 15 is raised or lowered, the shift shaft 21 turns, a pawl on the shift arm 7 catches on one of the shift drum pins 18, and the shift drum 10 turns. At the same time, the overshift limiter 9 on the shift lever 19 catches another pin as shown in Fig. H90. As the shift drum turns, the shift fork guide pins (3), each riding in a groove in the shift drum, change the position of one or another of the shift forks 11, 12, 13, in accordance with the winding of the grooves. The shift fork ears then determine the position of gears D3/4 1, O5 4, and O6 5. Refer to Fig. H82 through H88 for the gear position and drive path for neutral and each of the 6 gears. A pawl spring 16 is fitted on the external shift mechanism to keep the shift arm and

Transmission

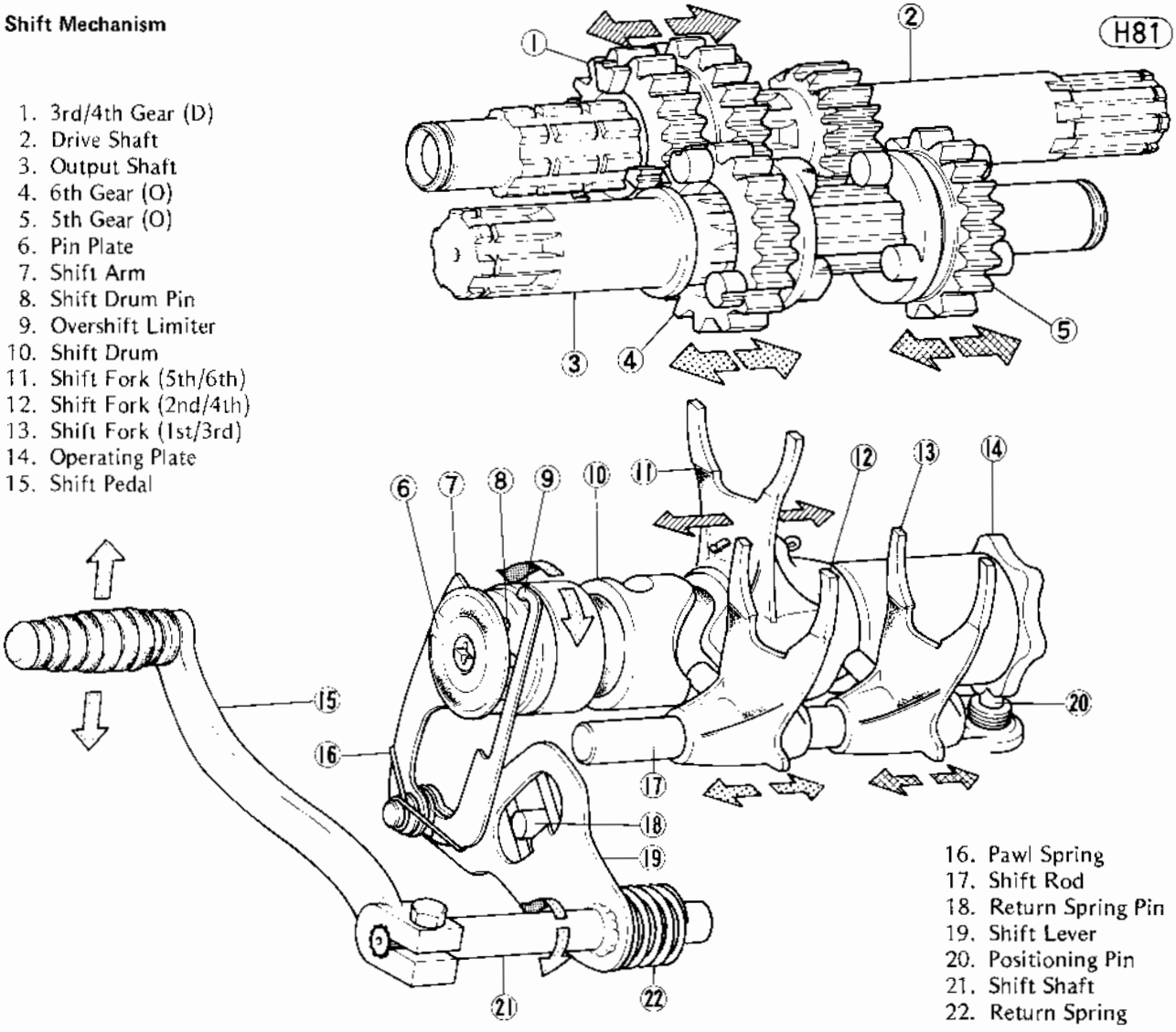
H80



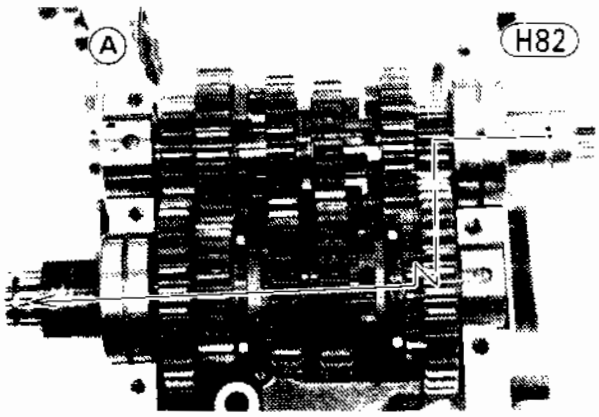
Shift Mechanism

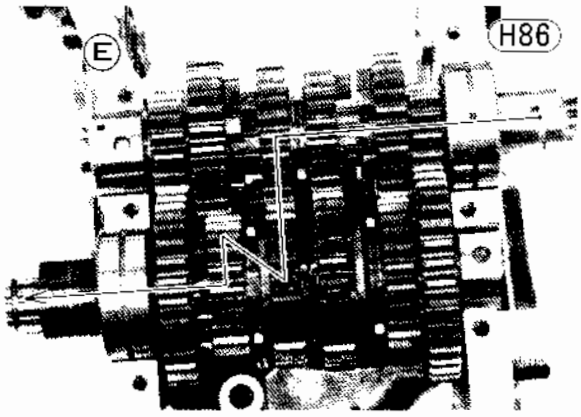
H81

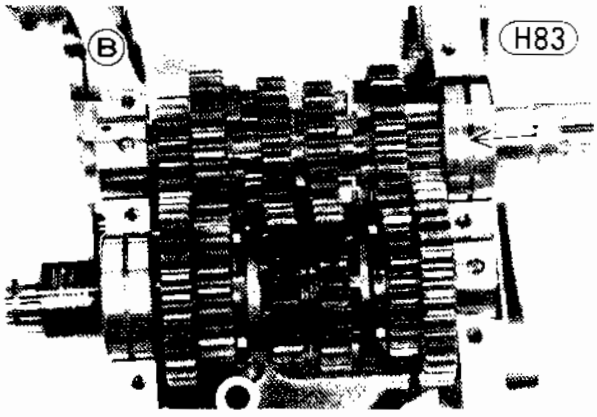
1. 3rd/4th Gear (D)
2. Drive Shift
3. Output Shaft
4. 6th Gear (O)
5. 5th Gear (O)
6. Pin Plate
7. Shift Arm
8. Shift Drum Pin
9. Overshift Limiter
10. Shift Drum
11. Shift Fork (5th/6th)
12. Shift Fork (2nd/4th)
13. Shift Fork (1st/3rd)
14. Operating Plate
15. Shift Pedal

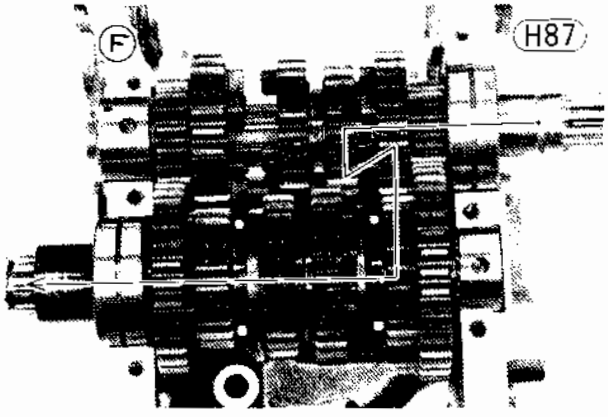


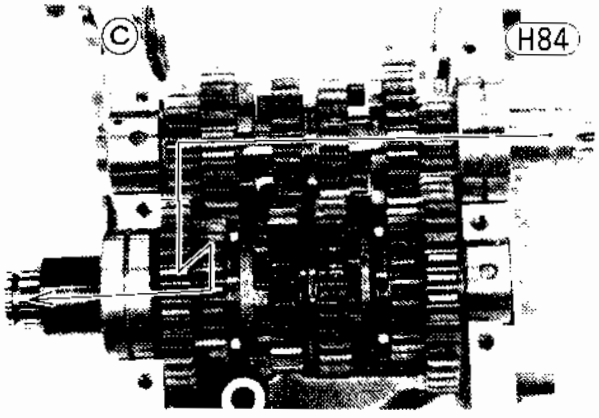
16. Pawl Spring
17. Shift Rod
18. Return Spring Pin
19. Shift Lever
20. Positioning Pin
21. Shift Shaft
22. Return Spring

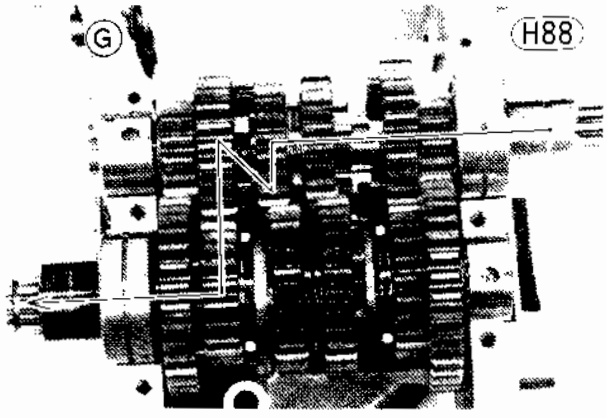


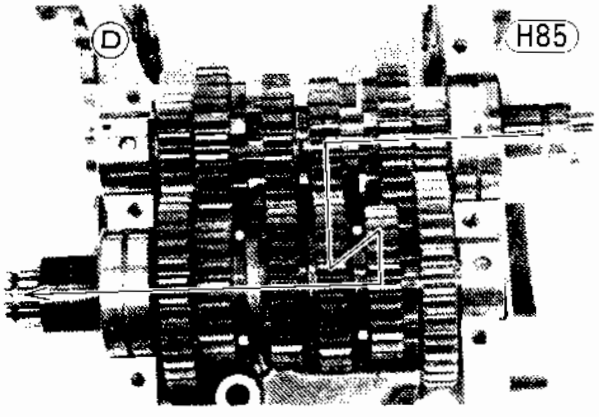












A. 1st
B. Neutral
C. 2nd
D. 3rd
E. 4th
F. 5th
G. 6th

overshift limiter pressed against the shift drum pins to ensure proper pawl and pin contact. When the shift pedal is released after shifting, the return spring 22 returns the shift lever and shift pedal to their original positions. So that the transmission will remain where it was shifted, the shift drum positioning pin spring pushes the shift drum positioning pin 20 into one of six notches on the shift drum operating plate 14. Six of these notches are equally spaced and correspond to the 6 gears. The other notch is halfway between the notches for 1st and 2nd gears, and corresponds to the half-stroke

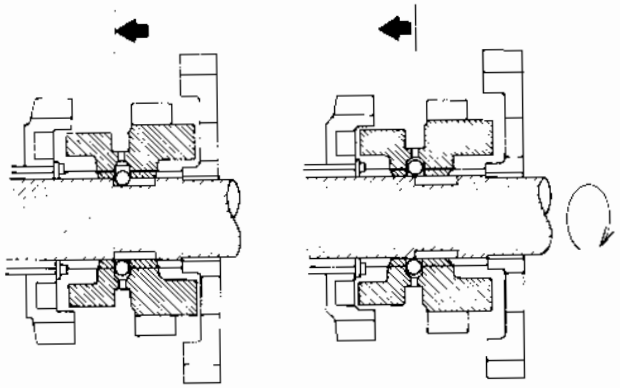
shift pedal movement from 1st or 2nd gear required to shift into neutral.

The return spring pin (8) on the side of the crankcase passes through a cutout on the shift mechanism lever. This pin engages between the two ends of the shift mechanism return spring. Normally, the return spring pin should not make contact with the cutout on the lever, because the overshift limiter is the primary control for shift lever movement.

Neutral Locator

Inside gear O5 three steel balls are located 120° apart, and serve to facilitate neutral location when shifting from first gear. When the motorcycle is stopped and the output shaft is not turning, one or two of these balls falls down into its respective groove in the output shaft. When the shift pedal is operated to shift from first toward second, gear O5 starts moving, but halfway toward its second gear position, the steel ball(s) hits the end of the groove(s) in the output shaft, stopping gear O5 from moving, stopping the shift drum from turning, and leaving the transmission gears in the neutral position.

Neutral Locator (H89)



Motorcycle stopped Motorcylce moving

Overshift Limiter

Each time that the shift pedal is operated, the overshift limiter interlocks with the shift drum pins to prevent overshifting. On a full upshift or downshift stroke, the limiter "hooks" catch the shift drum pins to keep the inertia of the heavy shift drum from allowing it to rotate beyond the intended gear position, particularly on a fast shift. At the same time, the overshift limiter arrests the shift lever's motion at the end of the stroke to aid in preventing overshifting.

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 shift drum positioning pin spring
3. Broken or weakened shift pawl spring
4. Damaged shift arm and/or overshift limiter
5. Loose shift drum guide bolt
6. Bent or worn shift fork(s)
7. Worn shift fork grooves on gears D3/4, O5, and/or O6
8. Worn shift fork guide pin(s)
9. Worn shift drum groove(s)
10. Binding of shift drum positioning pin in the positioning bolt
11. Worn or damaged gear dogs, gear dog holes, and/or gear dog recesses
12. Improperly functioning clutch or clutch release
13. Improper assembly or missing parts

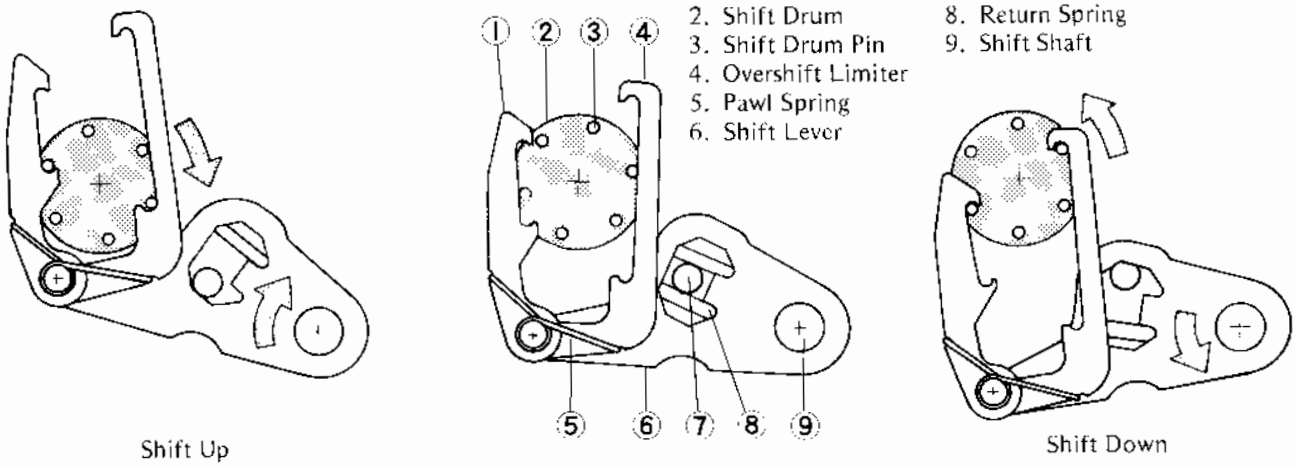
Transmission noise results from worn or damaged shafts, bearings, gear hubs or teeth, etc.

External shift mechanism inspection

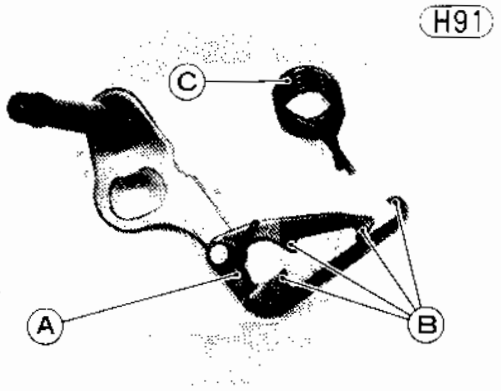
Inspect the shift pawl spring, shift pawls, and return spring. Replace any broken or other wise damaged parts.

Shift Arm and Overshift Limiter Operation (H90)

1. Shift Arm
2. Shift Drum
3. Shift Drum Pin
4. Overshift Limiter
5. Pawl Spring
6. Shift Lever
7. Return Spring Pin
8. Return Spring
9. Shift Shaft

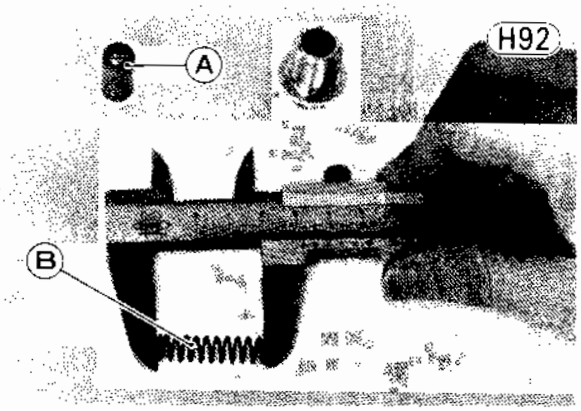


Shift Up Shift Down



A. Pawl Spring
B. Shift Pawls
C. Return Spring

Measure the free length of the shift drum positioning pin spring. If it is shorter than the service limit, replace it with a new one.

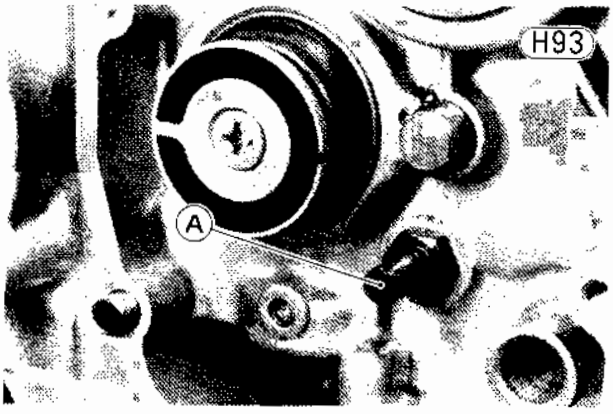


A. Positioning Pin
B. Pin Spring

Table H56 Positioning Pin Spring Length

Service Limit	30.7 mm

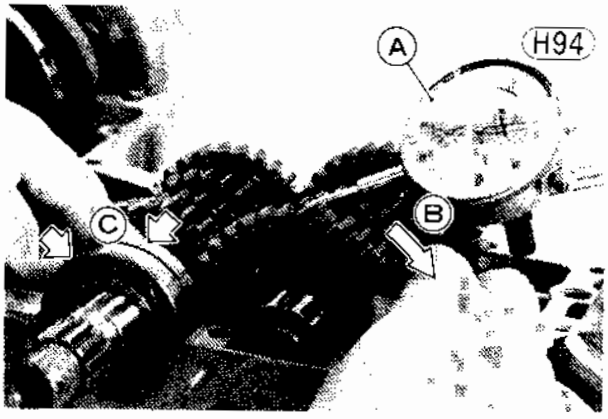
Check to see if the return spring pin is loose. If it is, remove it and apply a non-permanent locking agent to the threads, and then screw it back in.



A. Return Spring Pin

Gear backlash

Split the crankcase. Leaving the transmission in place, measure the backlash between gears O1 and D1, O2 and D2, O3 and D3, O4 and D4, O5 and D5, O6 and D6. To measure the backlash, set a dial gauge against the teeth on 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. Replace both gears if the amount of backlash exceeds the service limit.



A. Dial Gauge
B. Move
C. Hold

Table H57 Gear Backlash

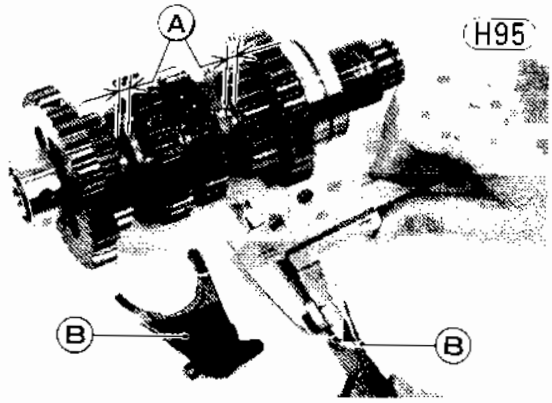
Service Limit	0.25 mm

Shift fork bending

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

Shift fork/gear groove wear

Measure the thickness of the ears of each shift fork, and measure the width of the shift fork grooves on gears D3/4, O5, and O6. 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.



A. Gear Shift Fork Grooves
B. Shift Fork

Table H58 Shift Fork Thickness

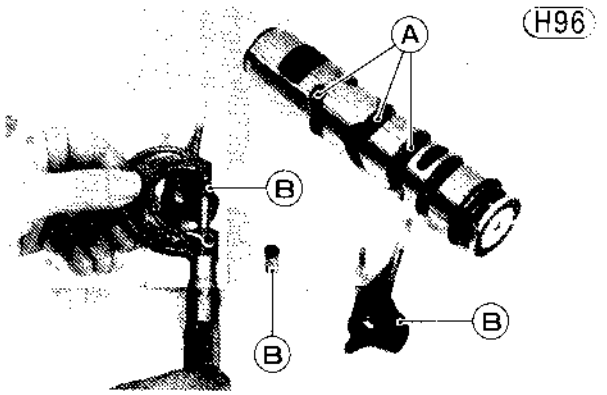
Service Limit	4.7 mm

Table H59 Gear Shift Fork Groove Width

Service Limit	5.25 mm

Shift fork guide pin/shift drum groove wear

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



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

Table H60 Shift Fork Guide Pin Diameter

	on Shift Rod	on Shift Drum
Service Limit	7.85 mm	7.93 mm

Table H61 Shift Drum Groove Width

Service Limit	8.25 mm

Gear dog, gear dog hole, gear dog recess damage

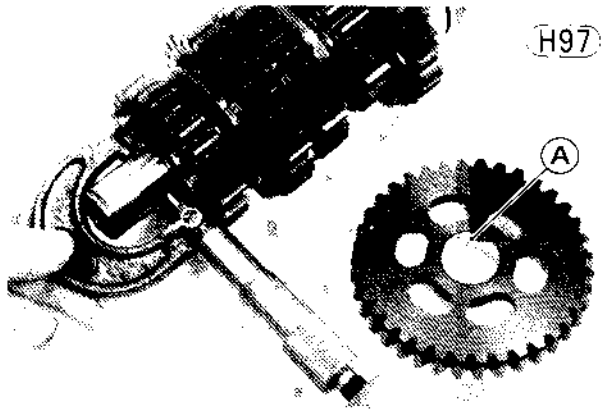
Visually inspect the gear dogs, gear dog holes, and gear dog recesses. Replace any gears that have damaged, or unevenly or excessively worn dogs, dog holes, or dog recesses.

Gear/shaft clearance

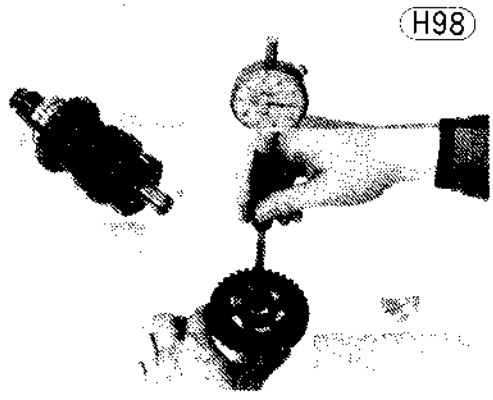
Measure the diameter of each shaft and bush with a micrometer, and measure the inside diameter of each gear listed below. Find the difference between the two readings to figure clearance, and replace any gear where clearance exceeds the service limit.

Table H62 Gear/Shaft, Gear/Bush Clearance

Service Limit	0.16 mm

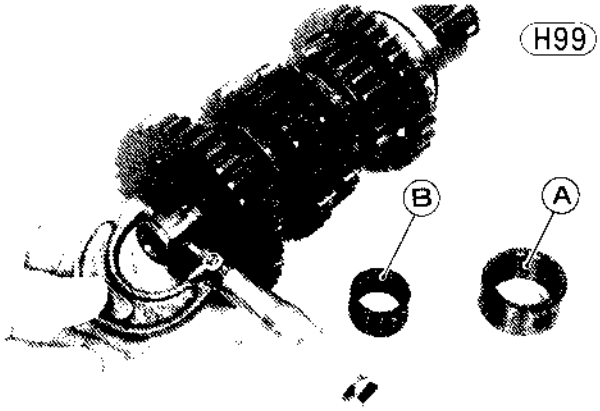


A. Bush



Shaft/needle bearing outer race wear

Measure the diameter of the drive and output shafts where it passes through the needle bearing. Replace the shaft if the diameter is less than the service limit. Measure the inside diameter of the needle bearing outer race with a cylinder gauge. Replace the outer race if the diameter exceeds the service limit. When replacing the shaft and/or outer race, replace the needle bearing also.



A. Needle Bearing Outer Race **B. Needle Bearing**

Table H63 Shaft, Needle Bearing Outer Race Diameter

	Shaft	Outer Race
Service Limit	19.96 mm	26.04 mm

Ball bearing, needle bearing wear, damage

Check the ball bearing and needle bearing (Pg. 192).

ENGINE LUBRICATION

The engine lubrication system includes the oil screen, engine oil pump, oil filter, oil pressure relief valve, oil bypass valve, and oil passages. An oil pressure switch is provided to warn in case of insufficient oil pressure. An oil breather keeps crankcase pressure variations to a minimum and reduces emmissions by recirculating blowby gases. The discussion here concerns how these parts work together, how the oil reaches the various parts of the engine, and how to check the oil pressure. Details on the oil pressure switch, relief valve, engine oil pump, oil filter, and oil breather are given in the sections (Pgs. 188~192) following engine lubrication.

Since the engine lubrication system is a wet sump type, there is always supply of oil in the crankcase at the bottom of the engine. The oil is drawn through the wire screen into the oil pump as the pump rotors turn. The pump is driven by a gear on the secondary shaft. The screen removes any metal particles and other foreign matter which could damage the oil pump. From the pump the oil passes through the oil filter element for filtration. If the element is badly clogged, slowing the flow of oil through it, oil bypasses the element through a bypass valve in the oil filter mounting bolt. After passing through the filter, the oil branches into two lubrication routes.

One of these routes is through the oil pan passage to the crankcase main oil passage. Through the main oil passage, the oil flows to the crankshaft main bearings, then to the connecting rod journals. The cylinder walls, pistons, and piston pins are lubricated by splash from the spinning crankshaft. The oil then drops and collects at the bottom of the crankcase to be used again. An oil passage at each side of the cylinder block takes oil up to the top of the cylinder head. After lubricating the camshaft journals, the oil flows out over the cams and down around the valve lifters to lubricate these areas. This oil return to the sump via the oil return holes at the base of the valve lifters, and via the cam chain opening in the center of the head and cylinder. A nozzle in the main oil passage squirts the oil to the primary chain.

The other route for filtered oil is to the transmission. The oil flows through the orifice and passage between the right side of the crankcase and clutch cover to the secondary shaft. Then, the oil lubricates the secondary shaft coupling and starter motor clutch gear. The oil flows through an orifice to the output shaft needle bearing and drive shaft needle bearing. Finally the oil drops down into the crankcase after lubricating the bearings and gears.

Oil Pressure Switch, Relief Valve

Both the oil pressure switch and the oil pressure relief valve are important for maintaining constant oil pressure. The oil pressure switch, mounted on the oil pan, checks on the oil pressure of the oil pump outlet and lights the oil pressure warning light if the pressure falls below a safe level. If the oil pressure is insufficient, the oil pump is worn or malfunctioning or there is an insufficient oil supply to the pump. On the other hand, if the oil pressure becomes excessive, such as when the engine is first started (especially in cold weather), the relief valve reduces the oil pressure. The relief valve opens whenever a pressure of 5.2 kg/cm^2 (74 psi) is exerted on the valve spring.

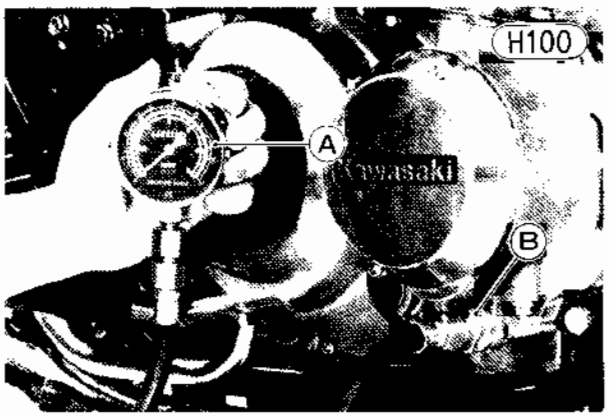
Oil pressure measurement

To inspect the relief valve operation, check the oil pressure with the engine cold (about room temperature).

NOTE: If the engine is warmed up already, begin by measuring the oil pressure at the normal operating temperature.

WARNING **If the oil passage plug is removed while the engine is warm, hot engine oil will drain through the oil passage; take care against burns.**

The engine must be stopped. With the motorcycle on its side stand, remove the oil passage plug from the right side of the crankcase, and connect the oil pressure gauge and adapter (special tools) in its place to measure oil pressure.



A. Oil Pressure Gauge (57001-164)
B. Adapter (57001-403)

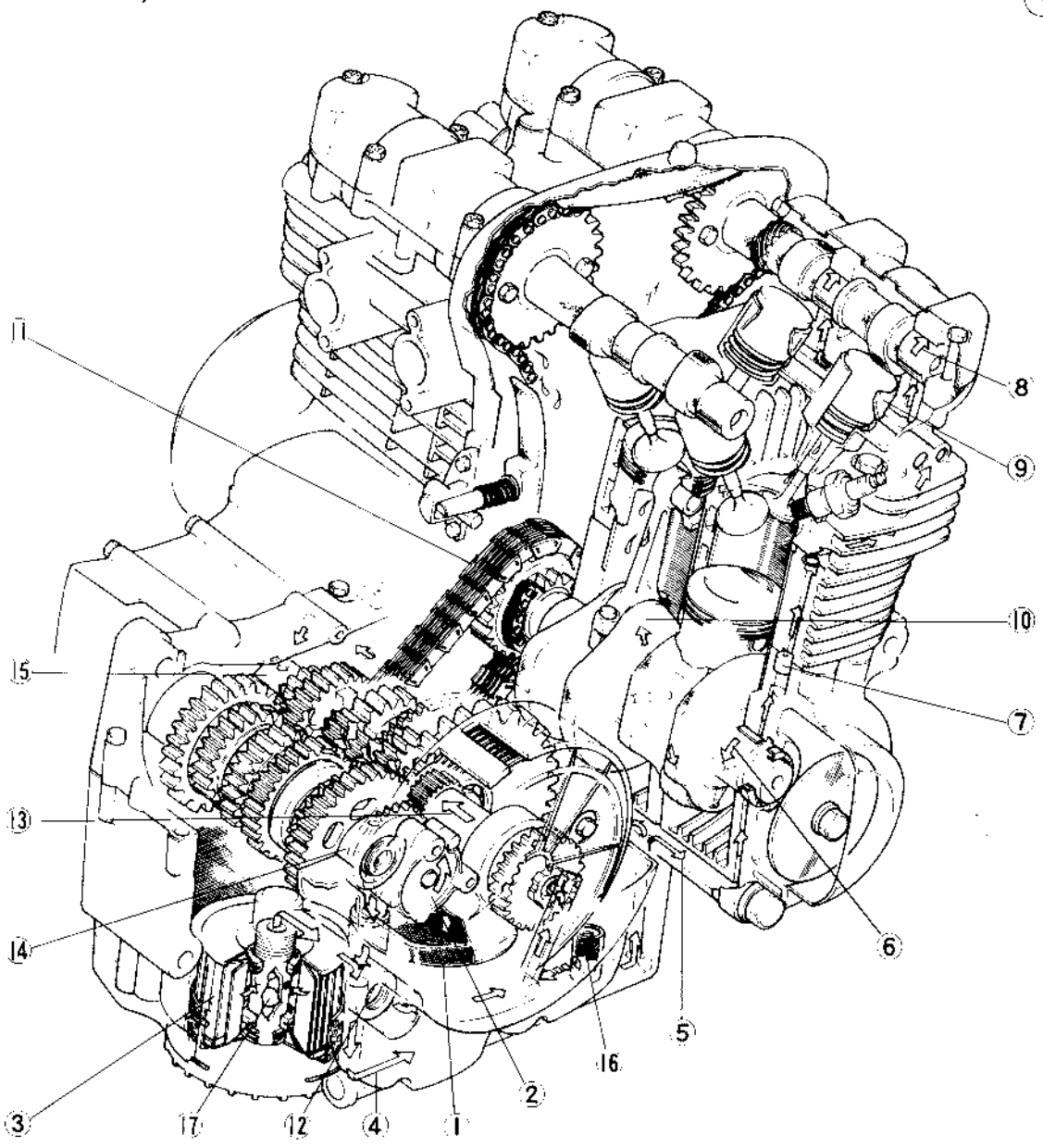
Start the engine, and note the oil pressure while running the engine at various speeds. A normal relief valve keeps the maximum oil pressure between the values in Table H64. If the oil pressure exceeds 6.0 kg/cm^2 (85 psi) by very much, the relief valve is stuck at its closed position. If the oil pressure is much lower than 4.4 kg/cm^2 (63 psi) at more than 5,000 rpm, the relief valve may be stuck open, or there may be other damage in the lubrication system.

Table H64 Relief Valve Opening Pressure

Standard
4.4 ~ 6.0 kg/cm^2 (63 ~ 85 psi)

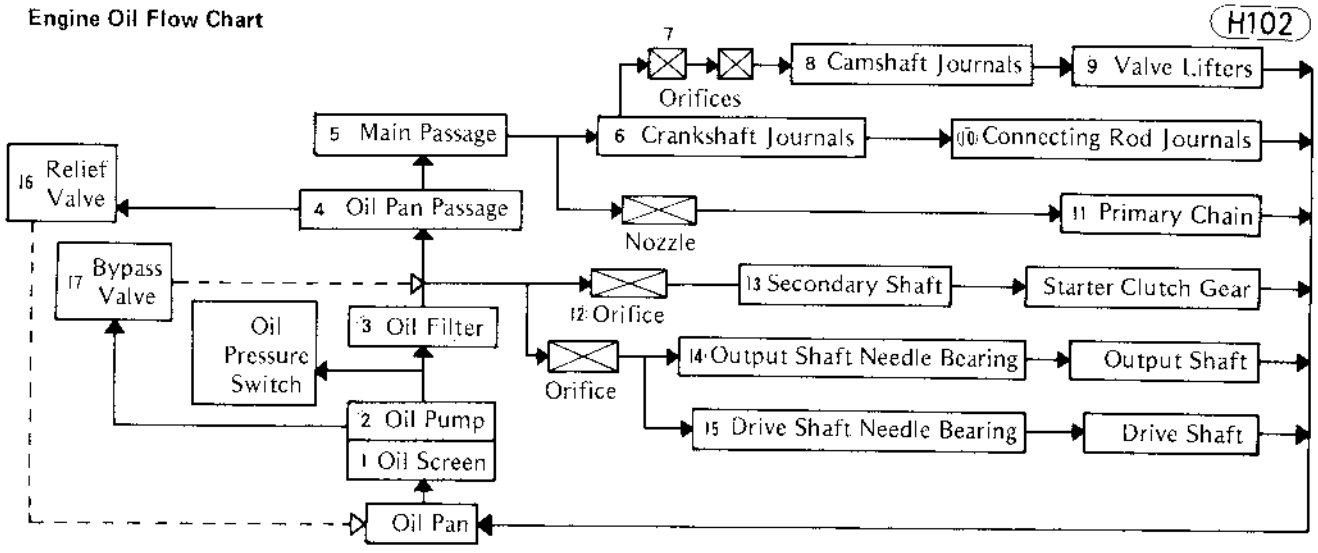
Engine Lubrication System

H101



Engine Oil Flow Chart

H102



Warm up the engine, and measure the oil pressure at the normal operating temperature.

Run the engine at the specified speed (Table H65), and read the oil pressure gauge.

Table H65 Oil Pressure

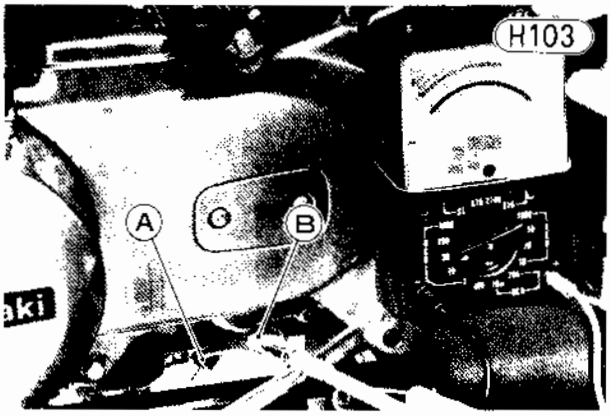
Oil Pressure @4,000 rpm, 90°C (194°F)
2.0~2.5 kg/cm² (28~36 psi)

If the oil pressure is significantly below the standard pressure, inspect the engine oil pump and relief valve. If the pump and relief valve are not at fault, inspect the rest of the lubrication system.

Oil pressure switch inspection

The switch should turn on the warning light whenever the ignition switch is on with the engine not running.

If the light does not go on, disconnect the switch lead. Connect the positive lead of a 20V DC range voltmeter to the switch lead and ground the voltmeter negative lead to the engine. Turn the ignition switch to the "ON" position, and read the voltmeter. If the voltmeter does not indicate battery voltage, the trouble is either defective wiring or a burned-out indicator bulb.



A. Oil Pressure Switch **B. Switch Lead**

If the voltmeter does indicate battery voltage, then the oil pressure switch may be defective. Use an ohmmeter to check for continuity between the switch terminal and the switch body. With the switch lead disconnected, any reading other than zero ohms indicates that the switch is at fault.

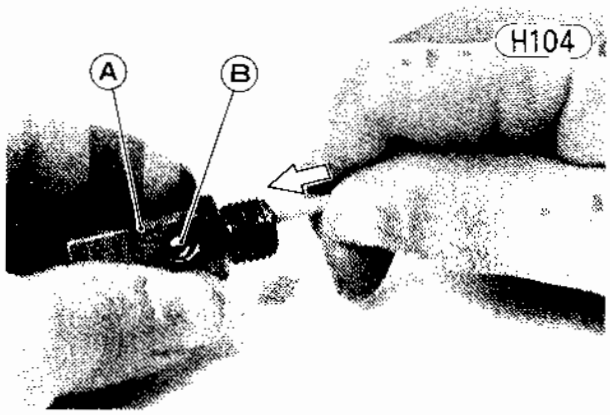
The switch should turn off the warning light whenever the engine is running faster than the idle speed. If the light stays on, stop the engine and measure the oil pressure (Pg. 188). If the oil pressure is more than the specified value with the engine running at the specified speed, the oil pressure indicator switch is defective, and must be replaced.

NOTE: When installing a new switch, tighten it to 1.5 kg-m (11.0 ft-lbs) of torque.

Relief valve inspection

Check to see if the steel ball inside the valve slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by valve spring pressure.

NOTE: Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.



A. Relief Valve **B. Steel Ball**

If any rough spots are found during the above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance for replacement of individual parts.

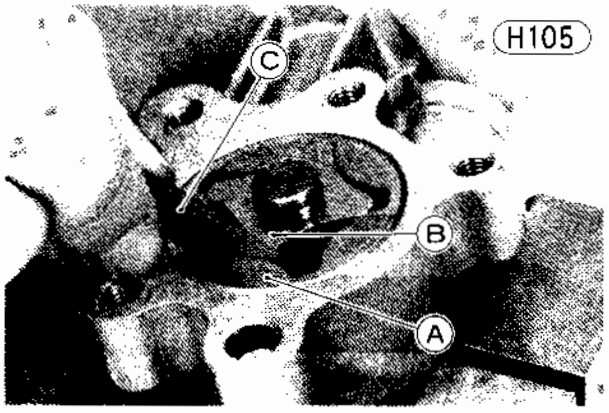
Engine Oil Pump

The oil pump, installed in the right side of the lower crankcase half, is a simple trochoid type with an outer and an inner rotor. The gear on the pump is driven in direct proportion to engine rpm by a gear attached to the secondary shaft.

If the oil pump becomes worn, it may no longer be able to supply oil to lubricate the engine adequately.

Outer rotor/inner rotor clearance

Measure the clearance between the outer rotor and inner rotor with a thickness gauge. If the clearance exceeds the service limit, replace the rotors.



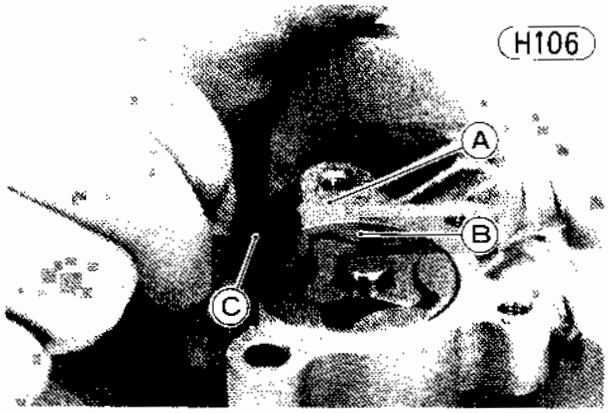
A. Outer Rotor **C. Thickness Gauge**
B. Inner Rotor

Table H66 Outer Rotor/Inner Rotor Clearance

Service Limit	0.30 mm

Outer rotor/pump body clearance

Measure the clearance between the outer rotor and the pump body with a thickness gauge. If the clearance exceeds the service limit, replace the oil pump assembly.



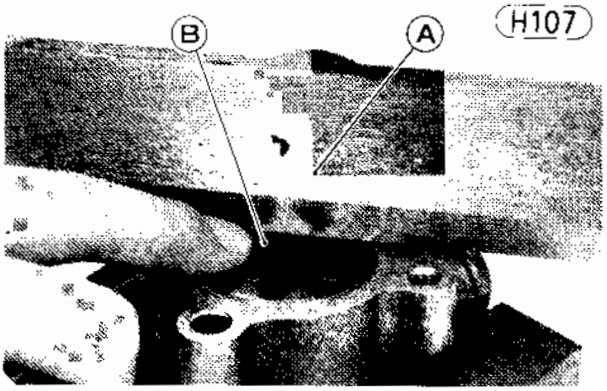
A. Pump Body
B. Outer Rotor
C. Thickness Gauge

Table H67 Outer Rotor/Pump Body Clearance

Service Limit	0.30 mm

Rotor side clearance

Lay a straightedge on the oil pump body, and measure the clearance between the straight edge and the rotors with a thickness gauge. If the clearance exceeds the service limit, replace the oil pump assembly.



A. Straightedge
B. Thickness Gauge

Table H68 Rotor Side Clearance

Service Limit	0.12 mm

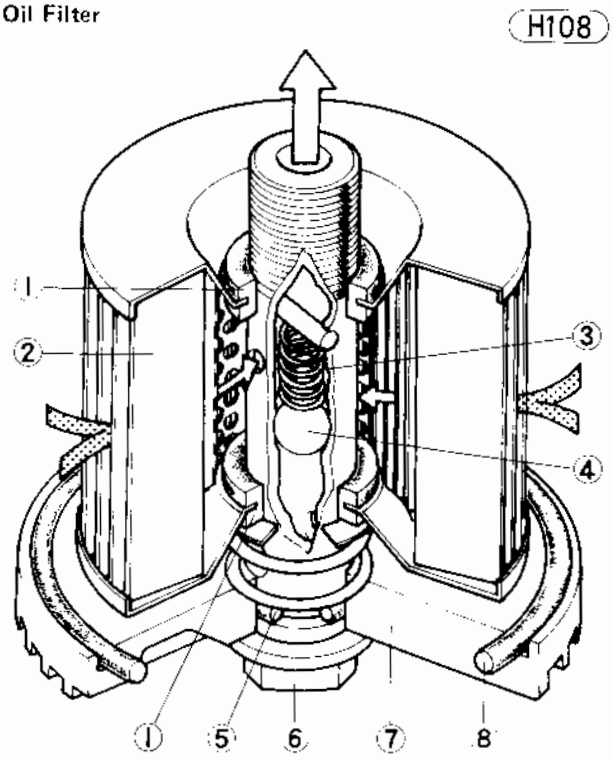
Oil Filter

The oil filter, located in the lower part of the crankcase, removes impurities from the oil.

As the filter element becomes dirty and clogged, its filtering efficiency is impaired. If it becomes so clogged that it seriously impedes oil flow, a pressure-activated bypass valve in the oil filter mounting bolt opens so that sufficient oil will still reach the parts of the engine needing lubrication. When the filter becomes clogged such that the oil pressure difference between the inlet and outlet for the filter reaches a certain pressure, the oil on the inlet side pushing on the valve spring opens the valve, allowing oil to flow to the main oil passage, bypassing the filter.

Never neglect the oil filter, or else metal particles or other foreign matter in the oil could reach the crankshaft and transmission, accelerating wear and shortening engine life.

Oil Filter



1. Grommet
2. Filter Element
3. Spring
4. Bypass Valve Steel Ball
5. O Ring
6. Mounting Bolt
7. Filter Cover
8. O Ring

Oil filter replacement

Replace the filter element in accordance with the Periodic Maintenance Chart (Pg. 10) since it becomes clogged with metal fillings from the engine and transmission especially during break-in. After break-in, replace the element at every other oil change. When the filter is removed for element replacement, wash the rest of the filter parts in a high flash-point solvent and check the condition of the O rings. If the O rings are worn or deteriorated, replace them to avoid oil leakage.

Oil Breather

The oil breather is located on the top of the crankcase. The front right side of the breather opens to the crankcase, while the upper part connects through the breather hose to the air cleaner. Its function is to minimize crankcase pressure variations caused by crankshaft and piston movement and to recycle blowby gas.

Gas blowby is combustion chamber gas which have escaped past the rings into the crankcase. A small amount is unavoidable, but gas blowby increases as cylinder wall and piston ring wear progresses. If not efficiently removed, blowby gas will seriously contaminate the engine oil.

Recycling blowby gas means more efficient combustion but the oil mist resulting from transmission gear movement must first be removed. The mixture of blowby gas and oil mist passes the breather, which separates most of the oil from the gas. The oil which is separated from the gas returns to the bottom of the crankcase. The gas is drawn through the breather hose into the air cleaner housing, and from there, through the carburetors into the engine.

If the breather hose or the parts inside the breather become clogged, pressure may build up in the crankcase and cause oil leaks.

NOTE: If the engine is overfilled with engine oil, mist from the excess oil will go through the oil breather to clog the air cleaner and cause carburetion trouble. This is not the fault of the oil breather.

BALL BEARING, NEEDLE BEARING

Ball bearing wear, damage

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

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

The crankshaft oil seal in the right engine cover forms a seal between the crank chamber and the contact breaker point cavity. If this seal is damaged, oil will leak into the contact breaker point cavity, and foul the contact breaker points. Any damaged, hardened, or otherwise defective oil seal will allow oil to leak.

Oil seal damage

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

MUFFLER

The mufflers reduce exhaust noise and conduct the exhaust gases back away from the rider while keeping power loss to a minimum. If much carbon is built up inside the muffler, exhaust efficienty is reduced, which lowers the engine power output.

If there is any exhaust leakage where the mufflers connect to the cylinder head, or if the gaskets appear damaged, replace the gaskets. If either muffler is badly damaged, dented, cracked or rusted, replace it with a new one.

Maintenance–Chassis

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J

WHEEL

The following sections, Pgs. 194 ~ 196, cover the tires, rims, spokes, axles, wheel bearings, and grease seals. For the brakes, see Pgs. 198 ~ 206.

Tire

The tires are designed to provide good traction and power transmission during acceleration and braking even on bad surfaces. To do this, they must be inflated to the correct pressure and not overloaded. The maximum recommended load, in addition to vehicle weight, is 165 kg

If the tires are inflated to too high a pressure, riding becomes rough, the center portion of the tread wears quickly, and the tires are easily damaged.

If inflation pressure is too low, the shoulder portions wear quickly, the cord suffers damage, fuel consumption is high and handling is poor. In addition, heat builds up at high speeds, and tire life is greatly shortened.

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

Table J1 Tire, Air Pressure (measured when cold)

	Load	Air Pressure	Size	Make, Type
Front	———	2.0 kg/cm² (28 psi)	3.25H-19 4PR	DUNLOP F7
Rear	Up to 97.5 kg	2.5 kg/cm² (36 psi)	3.75H-18 4PR	DUNLOP TT100
Rear	97.5 ~ 165 kg	2.8 kg/cm² (40 psi)	3.75H-18 4PR	DUNLOP TT100

Bead protectors are provided on the rear wheel to keep the tire from slipping on the rim and damaging the tube when extreme braking or driving forces are applied.

Tire wear, damage

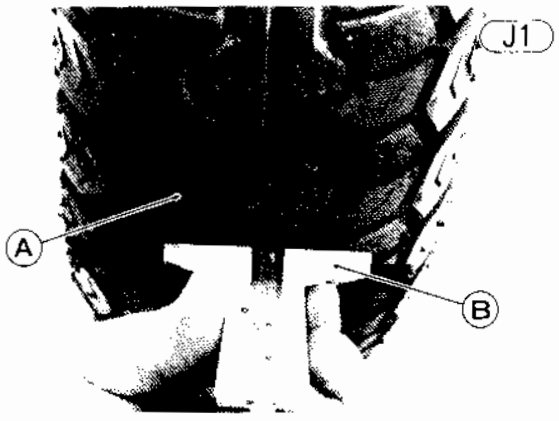
Tires must not be used if they are getting bald, or if they are cut or otherwise damaged. As the tire tread wears down, the tire becomes more susceptible to puncture and failure. 90% of tire failures occur during the last 10% of tire life.

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

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

Table J2 Tire Tread Depth

		Under 130 kph	Over 130 kph
Service Limit	Front	1 mm	1 mm
	Rear	2 mm	3 mm



A. Tire B. Depth Gauge

Rim

Cast wheels are installed on this motorcycle for driving safety. The hub, rim, and spokes are casted from light alloy in one united body. The case wheel does not need periodic maintenance such as a wire-spoke wheel.

Table J3 Rim Size†

	Front	Rear
Size	1.85 x 19	1.85 x 18

†The rim size shown in the table is the inner width of the rim flanges and bead seat diameter, both in inches.

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.

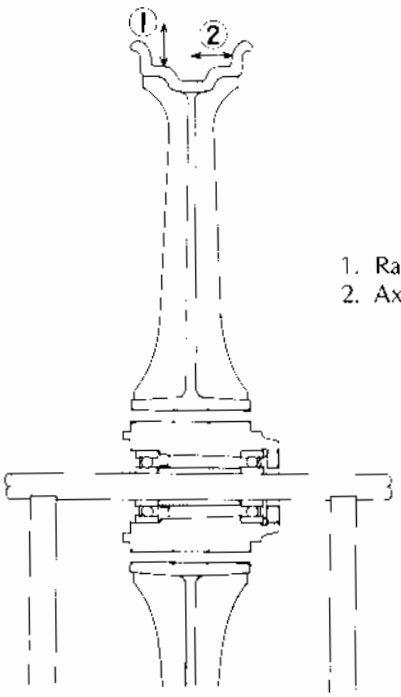
Set the dial gauge against the outer circumference of the rim, and rotate the wheel to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.

If rim runout exceeds the service limit, check the wheel bearings first. Replace them if they are damaged. If the problem is not due to the bearings, the wheel must be replaced. Do not attempt to repair a damaged wheel.

Table J4 Rim Runout

	Axial	Radial
Service Limit	0.5 mm	0.8 mm

Rim Runout (J2)



1. Radial Runout
2. Axial Runout

Rim damage

Carefully inspect the wheel for small cracks, dents, bents, or warp. If there is any damage to the wheel, it must be replaced.

WARNING **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.**

Axle

A bent axle causes vibration, poor handling, and instability.

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

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

Axle Runout (J3)

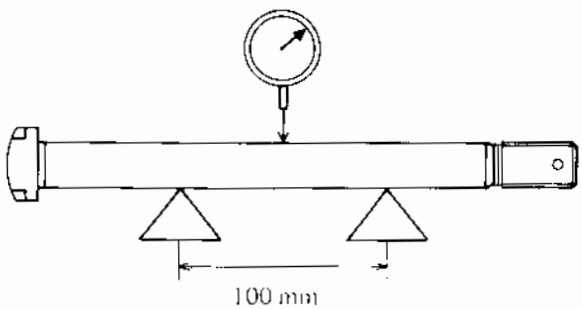


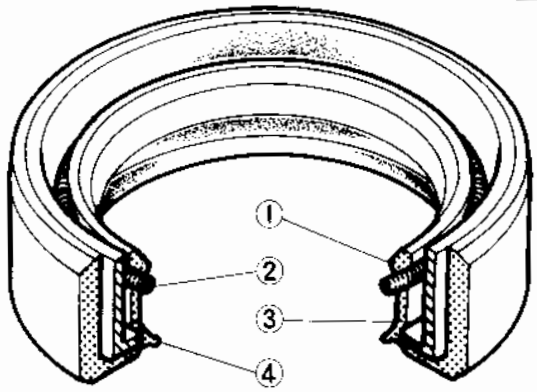
Table J5 Axle Runout/100 mm

Service Limit	Repair Limit
0.2 mm	0.7 mm

Grease Seal

A grease seal is fitted in the speedometer gear housing, in the right side of the front and rear hubs, and in the rear wheel coupling. Each grease seal is a rubber ring equipped with a steel band on its outer circumference. The grease seal inner lip is held against the axle collar by a wire spring band. Since the grease seal not only seals in the wheel bearing grease but also keeps dirt and moisture from entering the hub, the use of a damaged grease seal will cause the wheel bearing to wear quickly.

Grease Seal (J4)



1. Secondary Lip
2. Spring Band
3. Steel Band
4. Primary Lip

Inspection

If the grease seals are examined without removing the seals themselves, look for discoloration (indicating the rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seals are generally damaged upon removal.

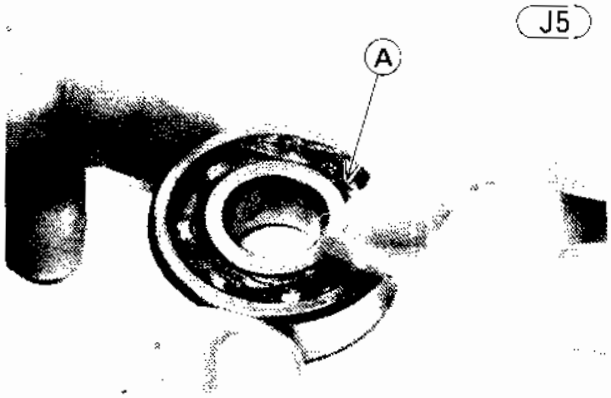
Wheel Bearing

A wheel bearing is fitted in both sides of each hub. Since worn wheel bearings will cause play in the wheel, vibration, and instability, they should be cleaned, inspected, and grease periodically.

Inspection and lubrication

Since the wheel bearings are made to extremely close tolerances, the clearance cannot normally be measured. Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition. If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

If the same bearing is to be used again, re-wash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the hub before bearing installation. Clean and grease the wheel bearings in accordance with the Periodic Maintenance Chart (Pg. 10).



A. Grease.

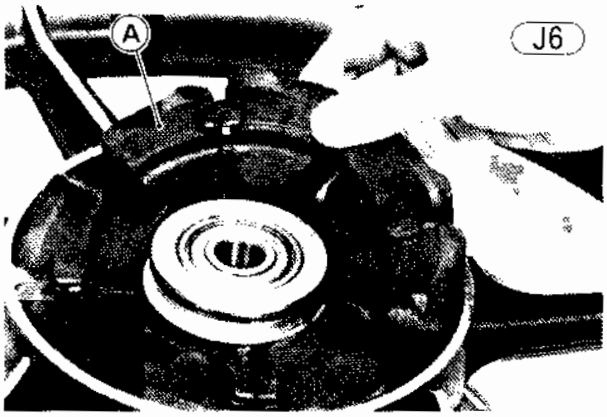
Rear Wheel Coupling

The rear wheel coupling connects the rear sprocket to the wheel. A rubber shock damper in the coupling absorbs some of the shock resulting from sudden changes in torque due to acceleration or braking.

Damper inspection

Remove the rear wheel coupling, and inspect the rubber damper.

Replace the damper if it appears damaged or deteriorated.



A. Rubber Damper

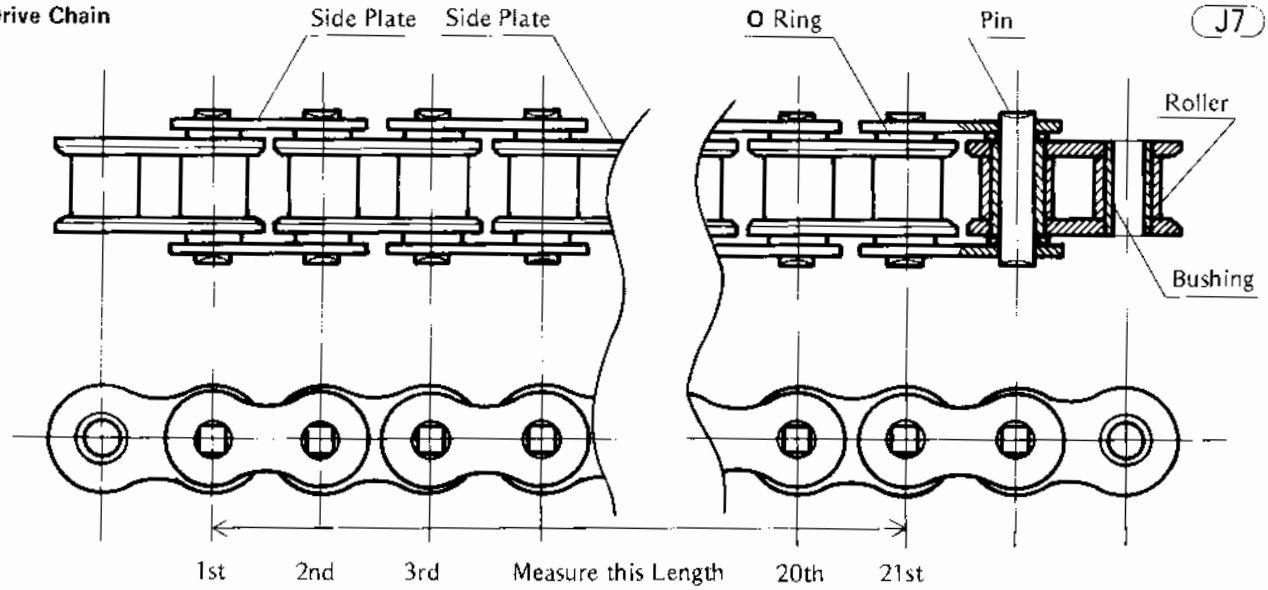
DRIVE CHAIN

The drive chain is an "endless" type in which the weakest link, the master link has been eliminated by constructing the chain in a closed loop. To preserve chain strength and reliability, never cut the chain to install it; follow the replacement procedure given in the "Disassembly" section of this manual. When chain replacement is necessary, use only the standard chain (Table J6) for replacement, since only this chain has been especially designed to withstand the extremely high torque developed by the engine.

Chain construction is shown in Fig. J7. Most chain wear occurs between the pin and bushing and between the bushing and roller, rather than on the outside of the roller. This wear causes the chain to lengthen and invites noise, excessive wear, breakage and disengagement from the sprocket if the chain is left unadjusted. If the chain is allowed to wear too much, the chain pitch (i.e., the distance from one roller to the next) becomes much greather than the sprocket pitch, causing the chain to slide up and down the sprocket teeth and wear even faster.

The wear between the pin and bushing is greatly

Drive Chain



reduced by providing O rings to seal in the lubricant between the pin and bushing. The wear between bushing and roller can be minimized by frequent and sufficient lubrication.

Table J6 Drive Chain

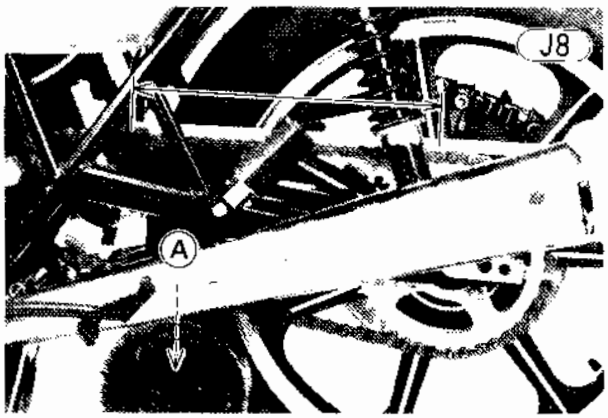
Make	Type	Link
Enuma	EK530SH-T_3O	100 link

Wear

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

Since it is impractical to measure the entire length of the chain, determine the degree of wear by measuring a 20-link length of the chain. Stretch the chain taut either by using the chain adjuster, or by hanging a 10 kg weight on the chain. Measure the length of 20 links on a straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the drive chain may wear unevenly, take measurements at several places. If any measurement exceeds the service limit, replace the chain.

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



A. 10 kg Weight

Table J7 Drive Chain 20-link Length

Service Limit	323 mm

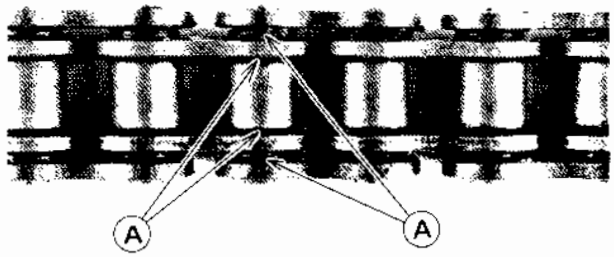
Lubrication

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

Anytime that the motorcycle has been washed, the chain should be adequately lubricated on the spot in order to avoid rust.

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

J9



A. Oil

Cleaning

Dirt will cling to the oil and act as an abrasive, accelerating chain wear. Whenever the chain becomes particularly dirty, it must be cleaned.

CAUTION **The O rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O rings and resultant loss of lubricant, observe the following rules.**

1. **Use only kerosene or diesel oil for cleaning an O ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swell of the O rings.**
2. **Immediately blow the chain dry with compressed air after cleaning.**
3. **Complete cleaning and drying the chain within 10 minutes.**
4. **Lubricate the chain after cleaning and drying.**

SPROCKET

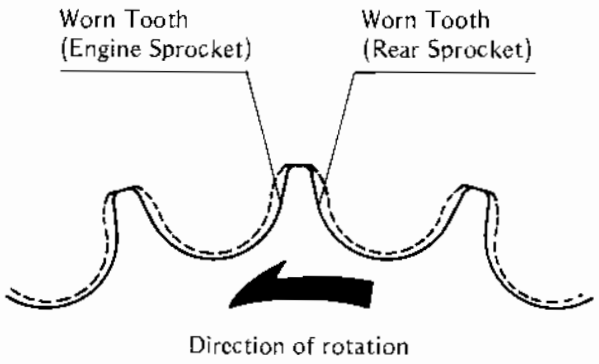
There are two sprockets for the drive chain. A forward sprocket, or engine sprocket, is mounted on the end of the output shaft and is used to drive the chain. A rear sprocket is connected to the rear wheel hub through the rear wheel coupling and is driven by the chain to turn the rear wheel.

Sprockets that have become excessively worn cause chain noise and greatly accelerate chain and sprocket wear. The sprockets should be checked for wear any time that the chain is replaced. A warped rear sprocket destroys chain alignment such that the chain may break or jump from the sprockets when traveling at high speed. The sprockets should be checked for wear and the rear sprocket for warp any time the chain is replaced.

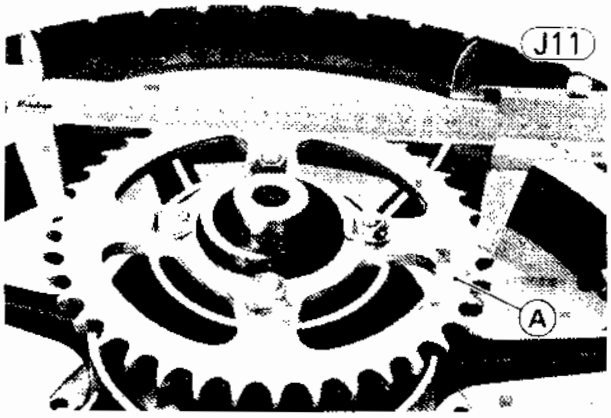
Sprocket wear

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

Sprocket Teeth (J10)



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.



A. Rear Sprocket

Table J8 Sprocket Diameter

	Engine	Rear
Service Limit	70.2 mm	191.3 mm

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

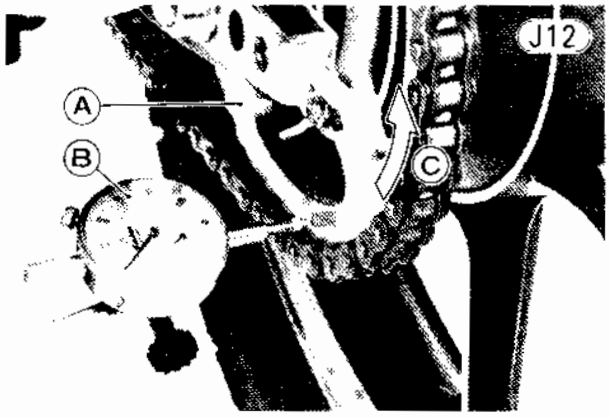
Rear sprocket warp

Elevate the rear wheel so that it will turn freely, and set a dial gauge against the rear sprocket near the teeth as shown in Fig. J12. Rotate the rear wheel. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

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

Table J9 Rear Sprocket Warp

Service Limit	0.6 mm



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

BRAKE

A hydraulic disc brake is used on each wheel for superior braking performance and high reliability. The major components of each disc brake are the brake lever (front) or the brake pedal (rear), master cylinder, brake line, caliper assembly, and disc. The brake lever is pulled or the brake pedal is pushed to move a piston in the master cylinder and pressurize the brake fluid. Fluid pressure is transmitted through the brake line to operate the caliper. The caliper grips the disc attached to the wheel, slowing wheel rotation. Front brake lever pushes the front brake light switch, and the rear brake pedal pulls the rear brake light switch. Each switch turns on the brake light.

Unlike a drum-type brake, the components of the disc brake which perform the actual braking action, i.e., the disc and pads, are open to direct contact with the air flow past the motorcycle. This provides for excellent dissipation of the heat from brake friction, and minimizes the possibility of brake fade common to drum brakes.

The automatic wear adjustment mechanism of the rear caliper is the same as that of the front caliper, and caliper operation is the same as for the front caliper except that the rear caliper is held stationary and has two pistons. So a separate explanation of the braking and release strokes of the rear caliper will be omitted.

Automatic Wear Adjustment

When fluid pressure develops in the cylinder, the piston is pushed exerting pressure against the brake pad, which in turn presses against the brake disc. The pressurized fluid is prevented from leaking by a fluid seal fitted into the cylinder wall. The seal is pressed against the piston and, instead of sliding when the piston moves, the seal is only distorted, allowing no fluid leakage at all (See Fig. J14). When the brake lever or pedal is released and fluid pressure lowers, the elasticity of the seal returns the piston to its original position.

After the brakes are used for a while and the pads wear slightly, the rubber seal will no longer be able to distort the additional amount that the piston travels. Instead, when piston travel forces the seal past its limit, the seal slips on the piston. The seal then returns the piston to a new rest position that is closer to the disc.

A small amount of fluid from the reservoir supplements the fluid in the brake line to compensate for the difference in piston position. Consequently, the length of the brake lever or pedal stroke remains unchanged, and the brake never needs adjustment.

The seal and the cup at the head of the master cylinder piston are made of special heat resistant rubber for best performance and to prevent deterioration. For this reason, only standard parts should be used.

Braking Stroke

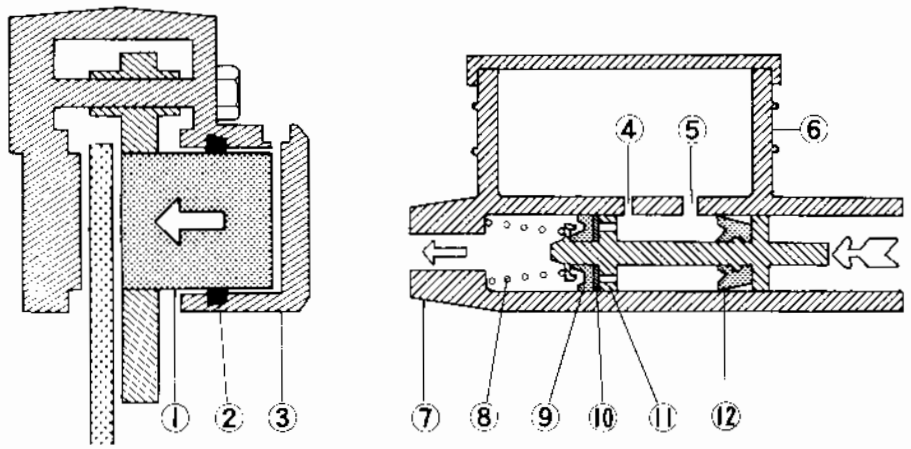
When the brake lever is pulled, the piston (11) in the master cylinder is pushed and moves forward against the force of the return spring (8). At this time, the primary cup (9) at the head of the piston closes the small relief port (4), which connects the pressure chamber and the reservoir (6). Until this port is fully closed, the brake fluid does not start being pressurized, in spite of the forward movement of the piston.

The pressure stroke starts as soon as the relief port is closed. The piston compresses the brake fluid, which is being used as the pressure medium, forcing it out into the brake line. The pressure is transmitted through the line to the cylinder portion of the caliper assembly, where it forces the piston (1) towards the disc. The piston presses pad A against the disc, but since the disc is immovable, further pressure cannot move the pad any farther. Instead, the entire caliper assembly moves in the opposite direction such that pad B is also forced against the disc. In this manner, the disc is gripped between the two pads, and the resulting friction slows wheel rotation.

Braking Release Stroke

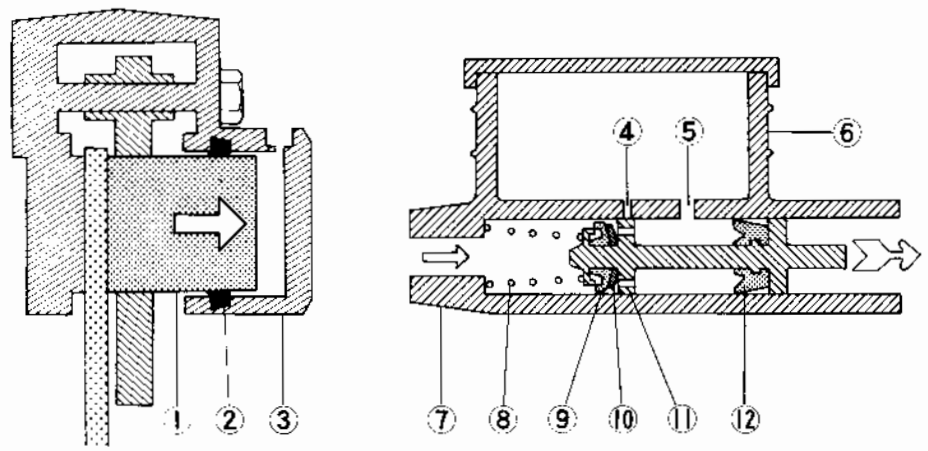
When the brake lever is released, the piston in the master cylinder is quickly returned toward its rest position by the spring (8), and brake fluid pressure drops in the line and in the caliper cylinder. The elasticity of

Braking Stroke (J13)



1. Piston
2. Fluid Seal
3. Caliper
4. Relief Port
5. Supply Port
6. Reservoir
7. Master Cylinder
8. Spring
9. Primary Cup
10. Non-return Valve
11. Piston
12. Secondary Cup

Braking Release Stroke (J14)



1. Piston
2. Fluid Seal
3. Caliper
4. Relief Port
5. Supply Port
6. Reservoir
7. Master Cylinder
8. Spring
9. Primary Cup
10. Non-return Valve
11. Piston
12. Secondary Cup

the fluid seal ② in the cylinder then returns the piston. This leaves no pressure against either pad A or B so that slight friction against the disc pushes them both slightly away from the disc.

As the master cylinder piston moves back further, the brake fluid in the line rushes to fill the low pressure area in front of the primary cup at the piston head. At this time, fluid from the reservoir flows through the large supply port ⑤ into the space between the primary and secondary cups, through the non-return valve ⑩, and passes around the edges of the primary cup to fill the vacuum. When the piston has returned to its rest position against the stop, the small relief port is uncovered. As the brake fluid returns from the line, excess fluid passes through the relief port into the reservoir until the brake line pressure returns to zero.

Master Cylinder

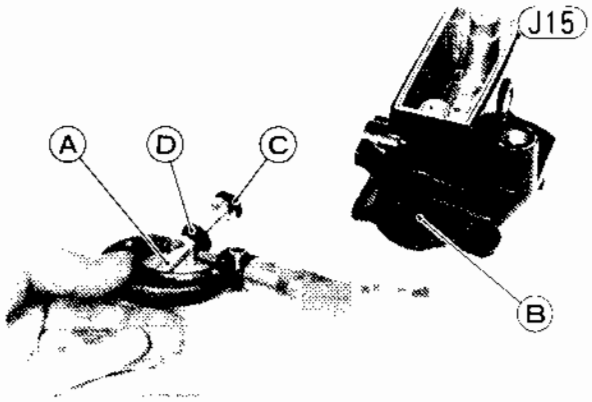
The master cylinder assembly includes the reservoir ⑤, piston ⑩, primary and secondary cups ⑧, ⑪, non-return valve ⑨, and spring ⑦. The reservoir has two holes at the bottom: a relatively large supply port ③ to supply fluid to the lines and a small relief port ② to admit excess fluid from the line. The primary and secondary cups stop the fluid from leaking back around the piston while the piston is moving forward to pressurize the line. The non-return valve is in the head of the piston; it stops backward fluid flow when the brake is applied. When the brake lever is released, the valve allows flow around the cup to fill the vacuum in front of the piston so that the piston can return easily.

Master cylinder part wear

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

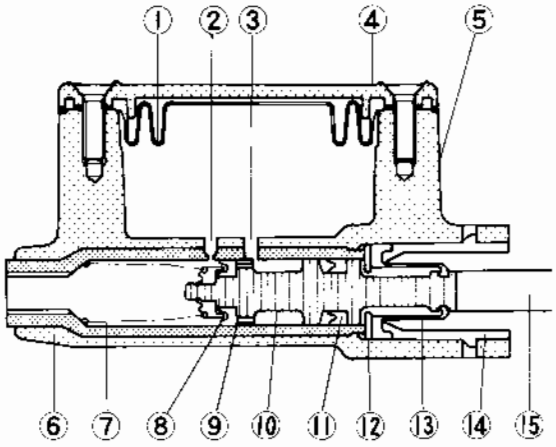
If the small relief port becomes plugged, especially with a swollen or damaged primary cup, the brake pads will drag on the disc.

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



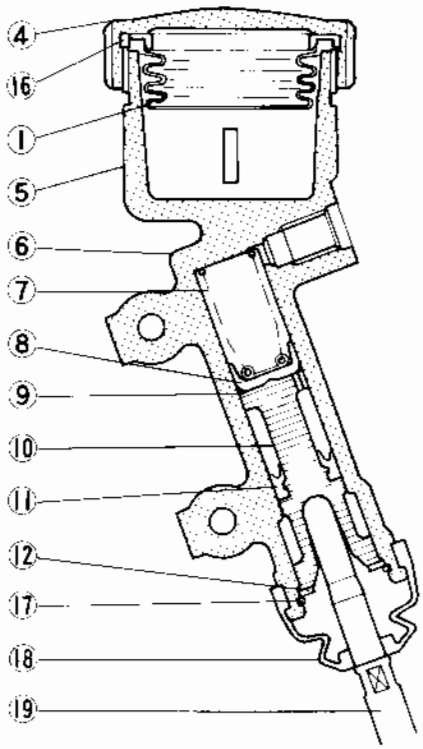
A. Piston
B. Cylinder
C. Primary Cup
D. Secondary Cup

Front and Rear Master Cylinders



1. Diaphragm
2. Relief Port
3. Supply Port
4. Cap
5. Reservoir
6. Master Cylinder Body
7. Spring
8. Primary Cup
9. Non-return Valve
10. Piston
11. Secondary Cup
12. Piston Stop
13. Dust Seal
14. Liner
15. Brake Lever
16. Plate
17. Retainer
18. Dust Cover
19. Push Rod

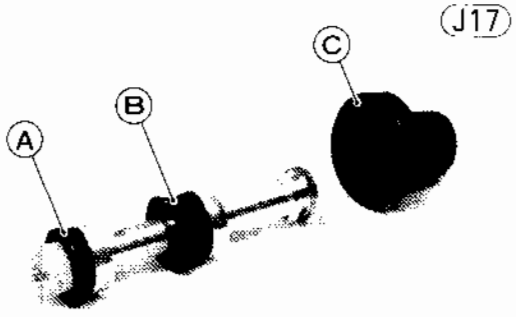
J16



NOTE: The cups and spring are part of the piston assembly. Replace the piston assembly if any one of the cups or the spring requires replacement.

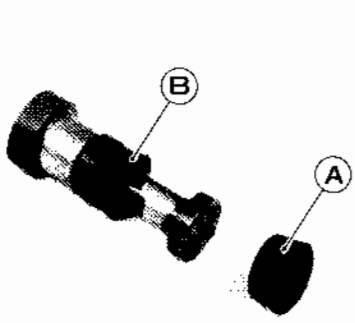
- Inspect the primary and secondary cups. If a cup is worn, damaged, softened (rotted), or swollen, replace it. If fluid leakage is noted at the brake lever, the cups should be replaced.

Front



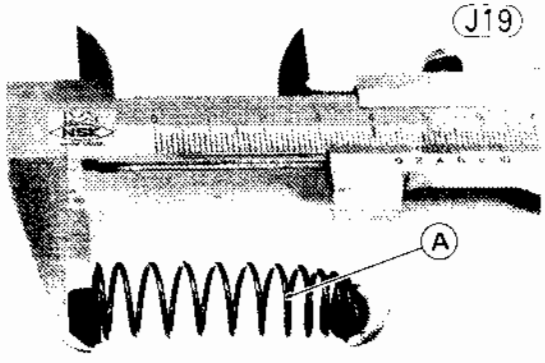
A. Primary Cup
B. Secondary Cup
C. Dust Cover

Rear



A. Primary Cup
B. Secondary Cup

- Replace the dust seal if damaged.
- Check that the spring is not damaged and the spring free length is not shorter than the service limit.



A. Spring

Table J10 Master Cylinder Parts

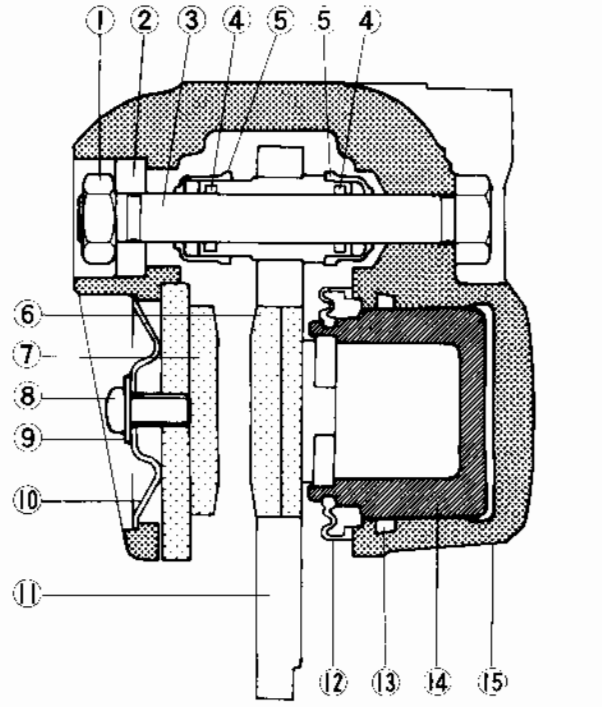
	Measurement	Service Limit
Front	Cylinder Inside Diameter	15.95 mm, Ⓢ 14.08 mm
	Piston Outside Diameter	15.80 mm, Ⓢ 13.90 mm
	Primary Cup Diameter	16.0 mm, Ⓢ 14.1 mm
	Secondary Cup Diameter	16.4 mm, Ⓢ 14.5 mm
	Spring Free Length	34.7 mm, Ⓢ 40.5 mm
Rear	Cylinder Inside Diameter	15.95 mm
	Piston Outside Diameter	15.80 mm
	Primary Cup Diameter	16.3 mm
	Secondary Cup Diameter	16.3 mm
	Spring Free Length	37.2 mm

Ⓢ : Single disc brake model

Caliper

The front wheel has a floating-type caliper. The front caliper assembly includes pad A (6), pad B (7), and the piston (4), which is inside the caliper cylinder. Through the caliper run two shafts (3), which also pass through the caliper holder (11) to mount the assembly to the fork leg. When the piston forces pad A against the disc, the shaft portion of the caliper assembly slides through the holder such that pad B is also forced against the disc, both brake pads being kept parallel to the disc.

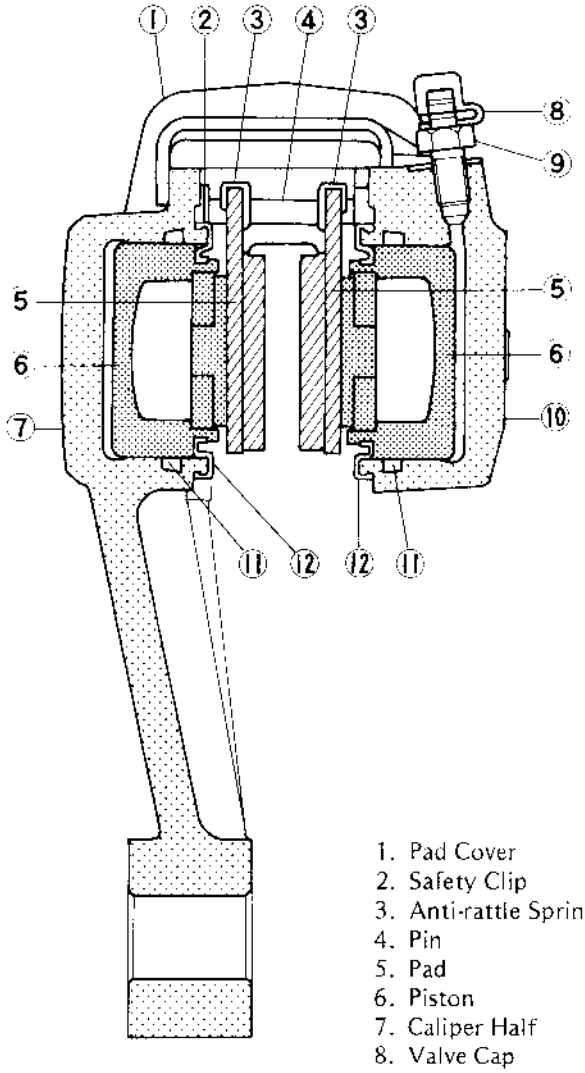
Front Caliper



1. Nut
2. Spacer
3. Holder Shaft
4. O Ring
5. Dust Cover
6. Pad A
7. Pad B
8. Mounting Screw
9. Lockwasher
10. Metal Plate
11. Caliper Holder
12. Dust Seal
13. Fluid Seal
14. Piston
15. Caliper

The rear wheel has a fixed caliper. The rear caliper assembly consists of two caliper halves 7 , 10 , bolted together, with each half containing a cylinder; a set of opposed pistons 6 ; and two pads 5 . The pad anti-rattle springs 3 hold the pads in position apart from the disc when the rear brake is not applied. When the brake is applied, the pressurized fluid is delivered to the piston areas on both sides of the caliper at the same time. Each piston goes forward until it is pressed against the disc, so no lateral movement of the disc and caliper is needed. There is a drilled internal fluid passage which is sealed by O ring where the two caliper halves join.

Rear Caliper (J21)

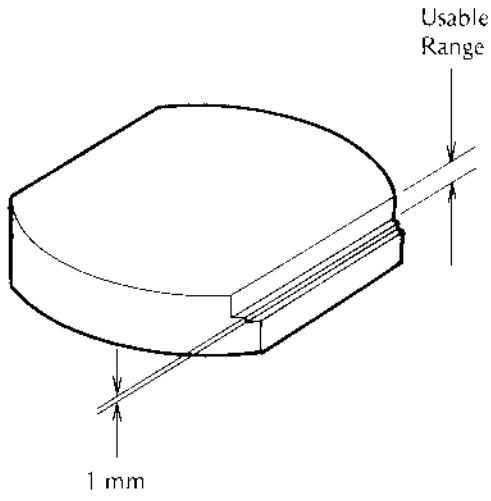


1. Pad Cover
2. Safety Clip
3. Anti-rattle Spring
4. Pin
5. Pad
6. Piston
7. Caliper Half
8. Valve Cap
9. Bleed Valve
10. Caliper Half
11. Fluid Seat
12. Dust Seal

Pad wear

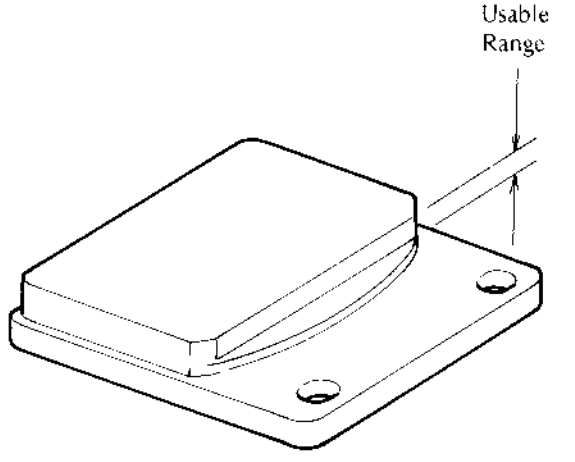
Inspect the pads for wear. For the front disc brakes, check the thickness of the pad linings, and replace both pads as a set if the thickness of either pad is less than 1 mm.

Front Brake Pad (J22)



For the rear disc brake, if either pad is worn down through the stepped portion, replace both pads as a set.

Rear Brake Pad (J23)

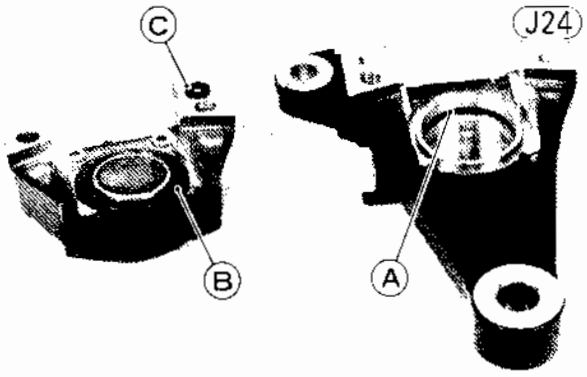


If any grease or oil spills on the pads, wash it off with trichloroethylene or a high flash-point solvent. Do not use one which will leave an oily residue. If the oil cannot be thoroughly clean off, replace the pads.

Fluid seal damage

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



A. Fluid Seal B. Dust Seal C. "O" Ring

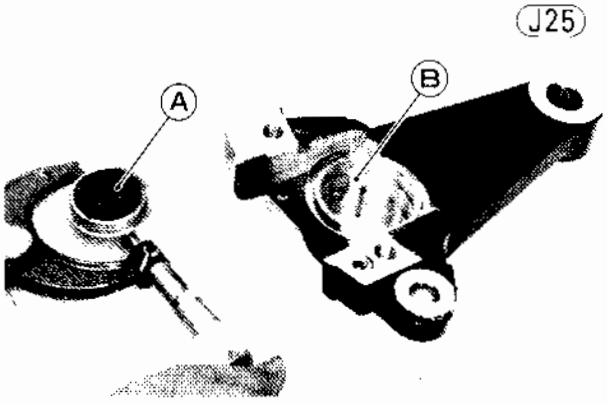
Dust seal, cover, O ring damage

Check the dust seals, covers, O ring, and replace any that are cracked, worn, swollen, or otherwise damaged.

Piston, cylinder wear

Measure the cylinder inside diameter and piston outside diameter.

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



A. Piston B. Cylinder

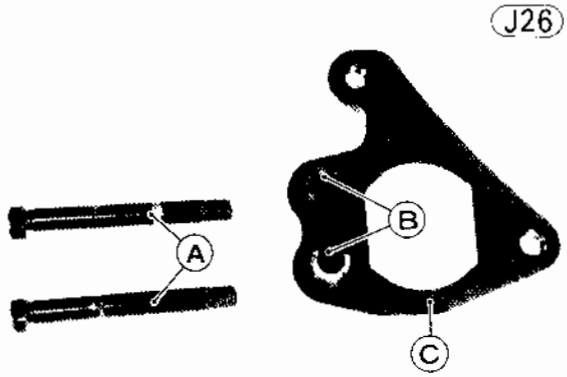
Table J11 Caliper Parts

	Measurement	Service Limit
Front	Cylinder Inside Diameter	38.25 mm, Ⓢ 42.92 mm
	Piston Outside Diameter	38.08 mm, Ⓢ 42.75 mm
Rear	Cylinder Inside Diameter	42.92 mm
	Piston Outside Diameter	42.75 mm

Ⓢ : Single disc brake model

Caliper holder shaft wear

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 temperature. Check to see if the caliper holder shafts are nor badly worn or stepped, or O rings are not damaged. If the shafts or O ring are damaged, replace the shafts, O rings, and the caliper holder.



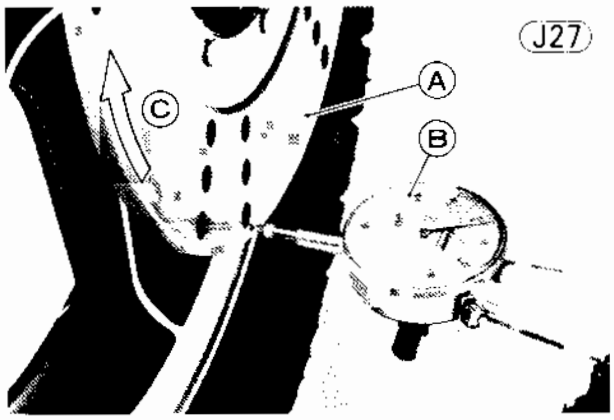
A. Caliper Holder Shafts B. "O" Rings C. Caliper Holder

Brake Disc

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.

Disc warp

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



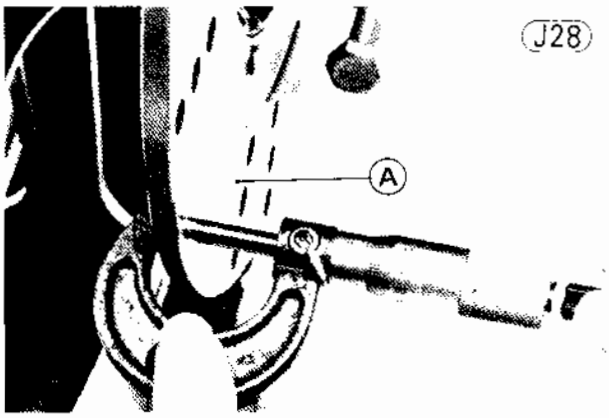
A. Disc B. Dial Gauge C. Turn.

Table J12 Disc Runout

Service Limit	0.3 mm

Disc wear

Measure the thickness of each disc at the point where it has worn the most. Replace the disc if it has worn past the service limit.



A. Disc

Table J13 Disc Thickness

	Front	Rear
Service Limit	4.5 mm, Ⓢ 6.0 mm	6.0 mm

Ⓢ : Single disc brake model

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 Fluid

The brake fluid is an extra heavy duty type with a high boiling point to withstand the heat produced by friction of the caliper pads on the disc. Since the boiling point and thus the performance of the fluid would be reduced by contamination with water vapor or dirt from the air, the reservoir is sealed with a rubber diaphragm under the cap. This cap seal also prevents fluid evaporation and spillage should the motorcycle fall over. The fluid is further protected by rubber seals in the caliper assembly and at the master cylinder brake line fitting.

When the brake is applied, heat is generated by the friction between the disc and the brake pads. While much of this heat is immediately dissipated, some of it is transmitted to the brake fluid and may raise fluid temperature to as high as 150°C (300°F) during brake operation. This temperature could boil the brake fluid and cause a vapor lock in the lines unless fluid with a high boiling point is used and has been kept from being contaminated with dirt, moisture, or a different type of fluid. Poor quality or contaminated fluid can also deteriorate from contact with the recommended brake fluids.

The graph of Fig. J29 shows how brake fluid contamination with moisture lowers the fluid boiling point. Although not shown in the graph, the boiling point also lowers as the fluid gets old, is contaminated with dirt, or if two different types of brake fluid are mixed.

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 a long time.
3. Do not mix two types of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. If may also cause the rubber brake parts to deteriorate. Recommended fluids are given in the table.

   NOTE: The type of fluid originally used in the disc brake is not available in most areas, but it should be necessary to add very little fluid before the first brake fluid change. After changing the fluid, use only the same type thereafter.

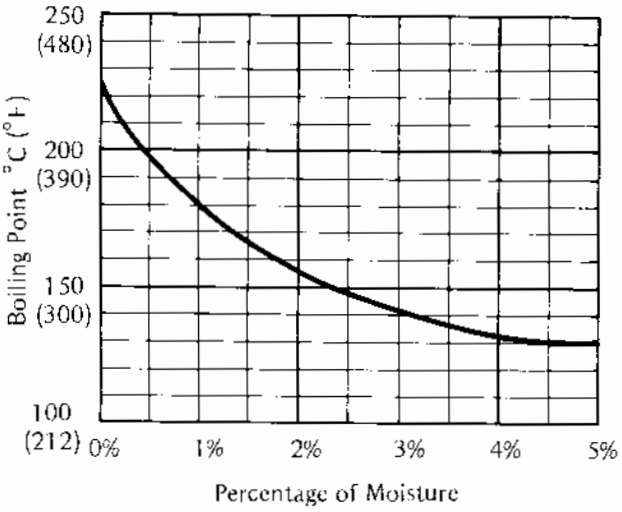
Table J14 Recommended Disc Brake Fluid

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

The correct fluid will come in a can labeled D.O.T.3. Do not use fluid that does not have this marking.

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.**
10. When installing or assembling the disc brake, tighten the disc brake fittings to the values given in Table G1. Improper torque may cause the brake to malfunction.

Brake Fluid Boiling Point (J29)



Changing the brake fluid

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

- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Remove the reservoir cap, and remove the rubber cap on the bleed valve.
- Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.
- If a dual disc brake is used, repeat the previous step one more time for the other side.
- Close the bleed valve(s), and fill the reservoir with fresh brake fluid.
- Open the bleed valve, apply the brake by the brake lever or pedal, 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. Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.
- Bleed the air from the lines.

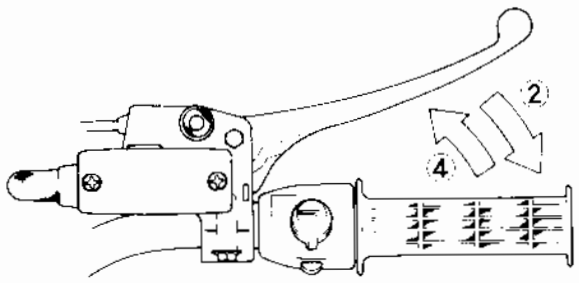
Bleeding the brake

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.

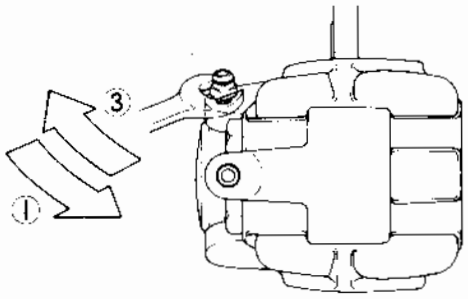
Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir. 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.

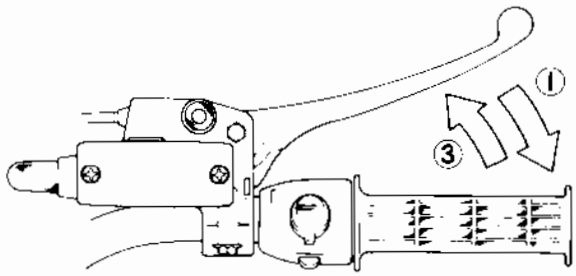
Filling up the Brake Line (J30)



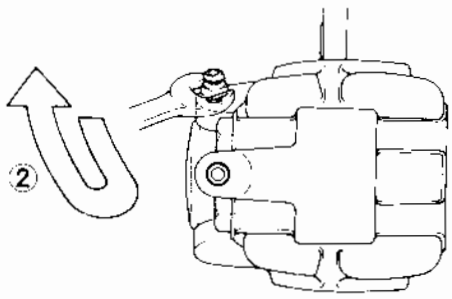
1. Open the bleed valve.
2. Apply the brake, keeping the brake applied.
3. Close the bleed valve.
4. Then quickly release the brake.



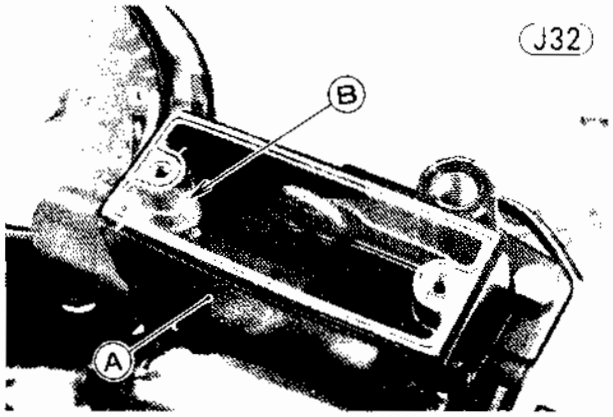
Bleeding the Brake Line (J31)



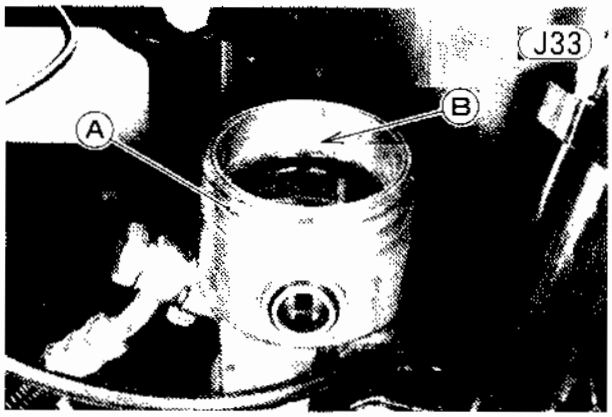
1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.



- With the reservoir cap off, slowly pump the brake lever or pedal 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 or pedal 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 or pedal. Repeat this operation until no more air can be seen coming out into the plastic hose. Check the fluid level in the reservoir every so often, replenishing it as necessary.
- If a dual disc brake is used, repeat the previous step one more time for the other side.
- When air bleeding is finished, install the rubber cap(s) 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).



A. Front Master Cylinder **B. Upper Level Line**



A. Rear Master Cylinder **B. Upper Level Line**

Brake line damage

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

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

STEERING STEM

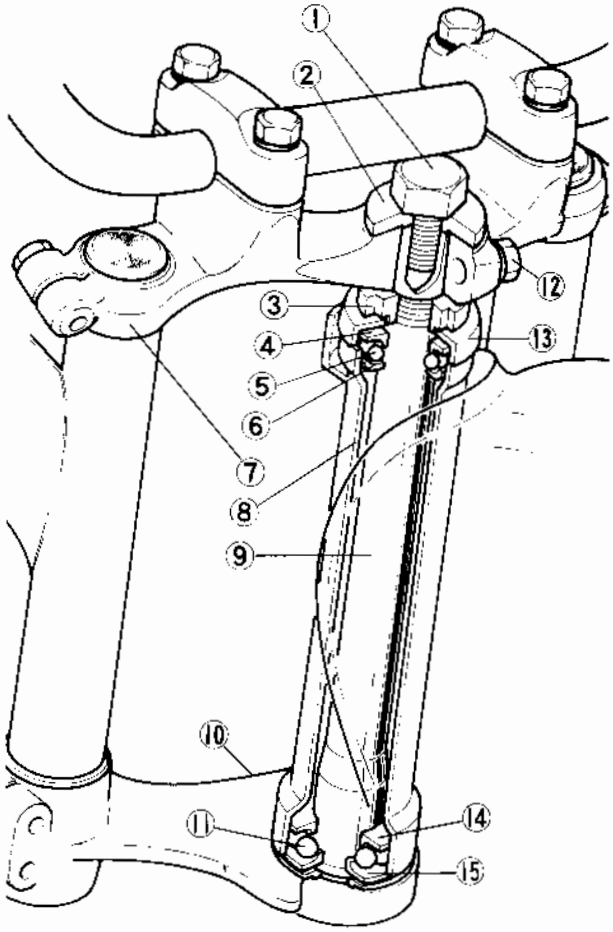
The steering stem supports the handlebar and front fork legs, and turns inside the frame head pipe. Ball bearings in the upper and lower ends of the head pipe enable the steering stem to turn smoothly and easily.

The steering stem itself does not wear, but it may become bent. If it becomes bent, the steering will be stiff, and the bearings may become damaged.

The steering stem will require periodic adjustment as it becomes loose due to bearing wear. Overtightening during adjustment, however, will make the steering stiff and cause accelerated bearing wear. Lack of proper lubrication will also bring about the same results.

From overtightening or from a heavy shock to the steering stem, the bearing race surfaces may become dented. Damaged bearing races will cause the handlebar to jerk or catch when turned.

Steering J34



1. Stem Head Bolt
2. Flat Washer
3. Stem Locknut
4. Upper Inner Race
5. Steel Ball
6. Upper Outer Race
7. Stem Head
8. Frame Head Pipe
9. Steering Stem
10. Stem Base
11. Steel Ball
12. Head Clamp Bolt
13. Stem Cap
14. Lower Outer Race
15. Lower Inner Race

Table J15 Bearing Ball Specifications

	Size	Quantity
Upper	¼"	19
Lower	¼"	20

Steering stem warp

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

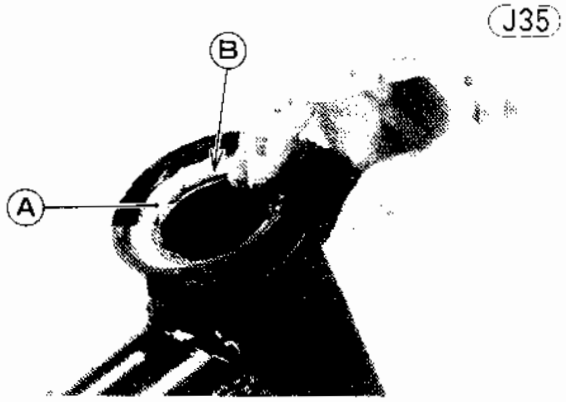
Bearing wear, damage

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.

Bearing lubrication

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

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



A. Bearing Race B. Grease.

Grease seal deterioration, damage

Inspect the grease seal for any signs of deterioration or damage, and replace it if necessary.

Replace the grease seal with a new one whenever it has been removed.

FRONT FORK

Front fork consists of the fork legs connected to the frame head pipe by the stem base and stem head bracket. It accomplishes shock absorption through spring action, air compression in the inner tube, and resistance to the flow of the oil forced into the cylinder by tube movement.

Each fork leg is telescopic tube including an inner tube (7), outer tube (8), cylinder and piston unit (6), collar (12), and cylinder base (14). The inner tube fits into the outer tube, altering its position in the outer tube as the tube arrangement absorbs shocks. The cylinder is fixed to the bottom of the outer tube and the piston (equipped with a piston ring (5)) is secured to the top of the cylinder. The collar (coupled with a non-return valve (17)), fixed in the lower end of the inner tube, forms the upper part of the lower chamber and together with the piston helps seal the upper chamber. The collar and cylinder base configuration function to form an oil lock at the end of the compression stroke to prevent the inner tube from striking the bottom. Small orifices in the upper part of the cylinder bring about an oil lock at the end of the extension stroke to prevent the inner tube from striking the top.

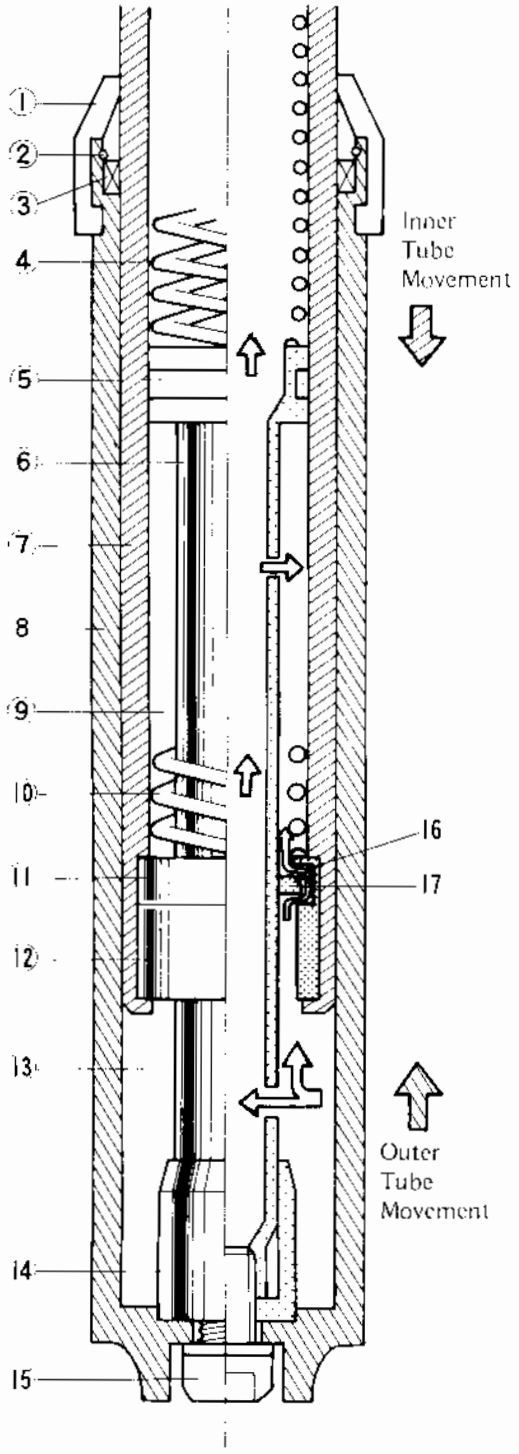
Compression Stroke

Whenever a load is placed on the front fork and whenever the front wheel receives a shock, the inner tube (7) moves down inside the outer tube (8), or the outer tube moves up, compressing both the spring (4) and the air in the inner tube. At the same time, low pressure (suction) is created in an enlarging chamber (upper chamber (9)) formed between the inner tube and the cylinder (6), and oil is drawn in from a diminishing chamber (lower chamber (13)) formed between the outer tube and the cylinder. As the lower chamber shrinks in size with oil passing freely through the non-return valve (17) into the upper chamber, oil also passes freely through the cylinder lower orifices into the cylinder as the inner tube approaches the cylinder base (14). Near the end of the compression stroke, the clearance between the tapered-out cylinder base and the collar (12) at the lower end of the inner tube approaches zero. The resulting resistance to the flow of oil through this small space slows the movement, finally forming an oil lock to finish the compression stroke.

Extension Stroke

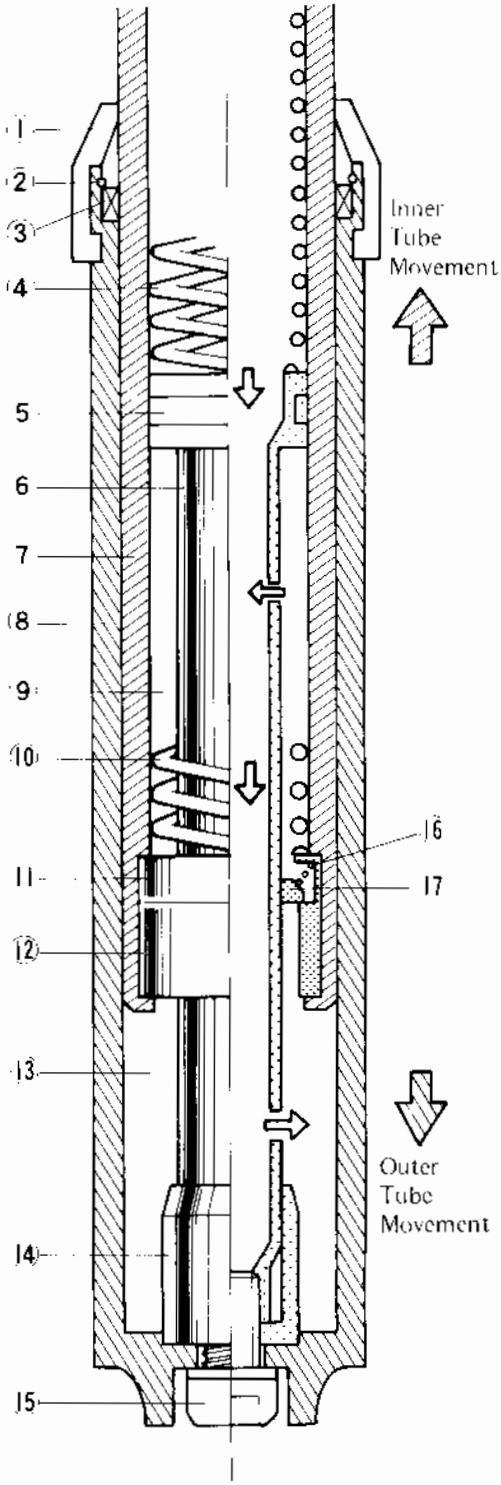
Following the compression stroke is the extension stroke, in which the compressed spring extends to push the inner tube back out of the outer tube. As the tubes move apart, the upper chamber grows smaller, forcing the oil through the way it came through the non-return valve. These small holes restrict the oil flow into the inner tube damping fork extension. Near the end of the extension stroke both the cylinder spring and the arrangement of the cylinder upper orifices provide further resistance to extension. As the collar rises, reducing orifices are eliminated and an oil lock forms, finishing the extension stroke.

Compression Stroke (J36)



1. Dust Seal
2. Retainer
3. Oil Seal
4. Spring
5. Piston Ring
6. Cylinder and Piston Unit
7. Inner Tube
8. Outer Tube
9. Upper Chamber
10. Spring
11. Spring Seat
12. Collar
13. Lower Chamber
14. Cylinder Base
15. Allen Bolt
16. Spring
17. Non-return Valve

Extension Stroke (J37)

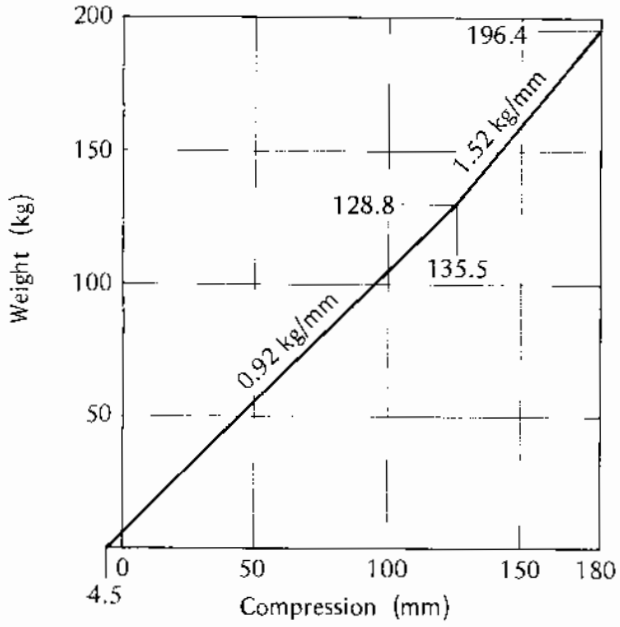


1. Dust Seal
2. Retainer
3. Oil Seal
4. Spring
5. Piston Ring
6. Cylinder and Piston Unit
7. Inner Tube
8. Outer Tube
9. Upper Chamber
10. Spring
11. Spring Seat
12. Collar
13. Lower Chamber
14. Cylinder Base
15. Allen Bolt
16. Spring
17. Non-return Valve

Spring

The front fork springs in the inner tube are made of special spring rods, heated and wound in the shape of a special coil, to suspend the vehicle.

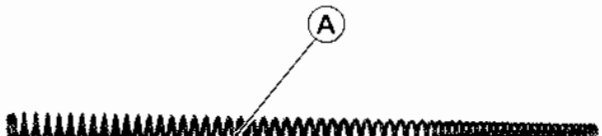
Front Fork Spring Force (J38)



Spring tension

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

(J39)



A. Fork Spring

Table J16 Fork Spring Free Length

Service Limit	543 mm

Inner Tube

A bent, dented, scored, or otherwise damaged inner tube will damage the oil seal, causing oil leakage. A badly bent inner tube may cause poor handling.

Inner tube damage

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 **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

Oil is prevented from leaking out by the oil seal 3, which is fitted at the upper end of the outer tube. A dust seal 1 on the outside of the tube keeps dirt and water from entering and damaging the oil seal and tube surface.

Inspection

Inspect the oil seal and dust seal for any signs of deterioration or damage, and replace them if necessary.

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

Fork Oil

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 (Pg. 10) or sooner if the oil appears dirty.

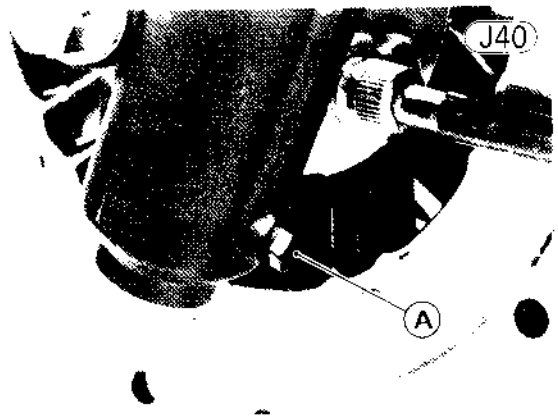
Fork oil change

To drain the old oil, remove the drain bolt from the lower end of the outer tube. With the front wheel on the ground and the front brake fully applied push down on the handlebar a few times to pump out the oil. Install the drain bolt and gasket applying a non-permanent locking agnet to its threads and tightening it to 0.80 kg-m (69 in-lbs) of torque, remove the top plug and spring from the inner tube, and pour in the type and amount of oil specified in Table J17. Check the oil level, and install the spring and top plug. If the oil is below and specified level, add oil and recheck the oil level.

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

Table J17 Fork Oil

Type	When changing oil	After disassembly and completely dry	Oil Level (without spring)
SAE 5W20	about 200 cc	217.5~222.5 cc	505 mm from the top of the inner tube

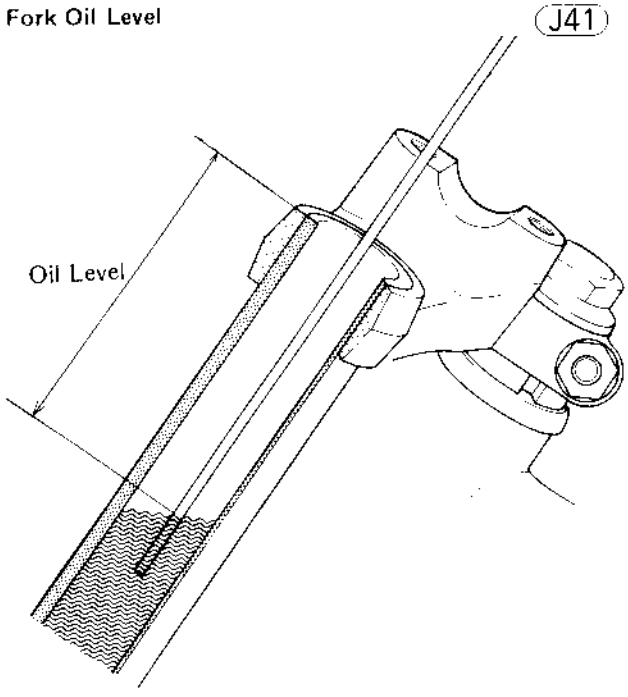


A. Drain Bolt

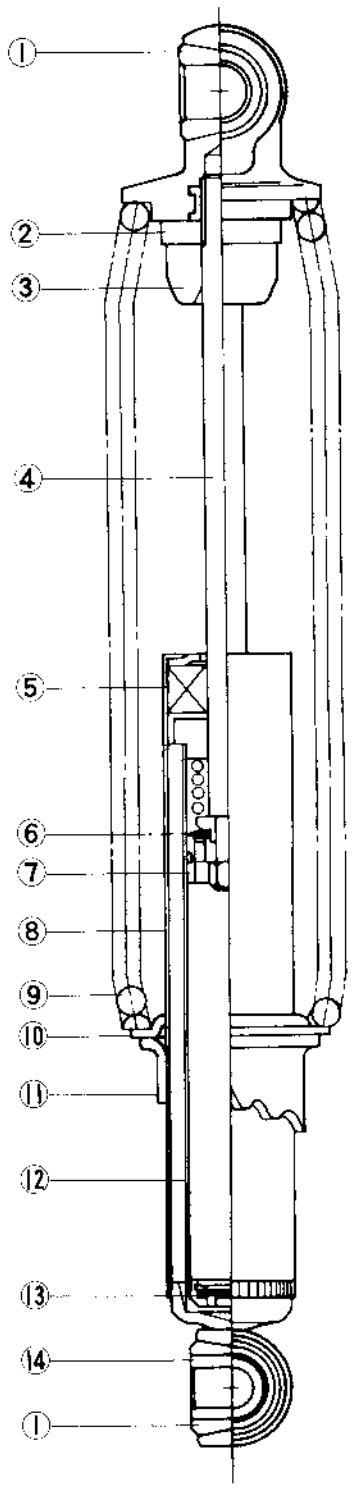
Oil level

To check the fork oil level, first place a jack or stand under the engine so that the front wheel is raised off the ground. Remove the top plug and fork spring from the inner tube. 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



Rear Shock Absorber

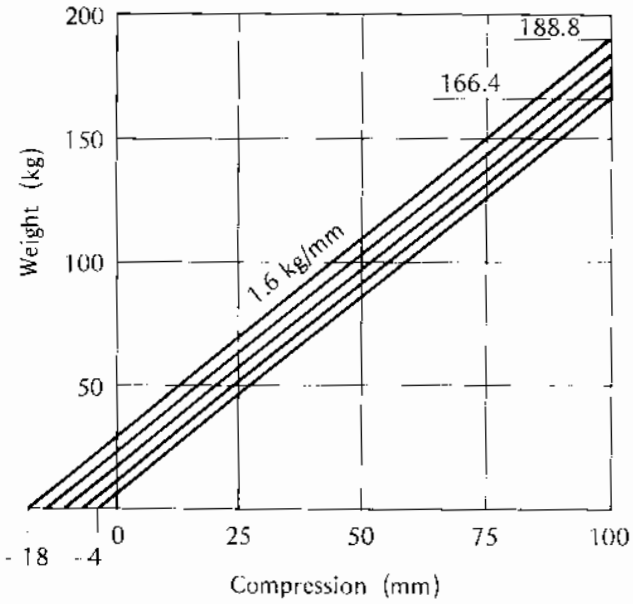


REAR SHOCK ABSORBER

The rear shock absorbers serve to damp shocks transmitted to the frame and rider from the rear wheel. For this purpose, they are connected between the frame and the rear end of the swing arm. Shock absorption is performed by the spring and by the resistance to the flow of oil inside each unit. Shock absorption is further aided by the use of rubber bushings in both the upper and lower shock absorber mountings.

1. Rubber Bushing
2. Locknut
3. Rubber Stop
4. Piston Rod
5. Oil Seal
6. Valve
7. Piston
8. Outer Shell
9. Spring
10. Spring Seat
11. Adjusting Sleeve
12. Cylinder
13. Valve
14. Collar

Shock Absorber Spring Force (J43)



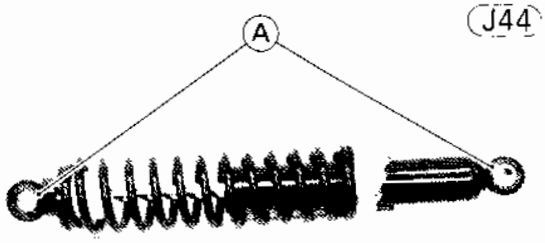
Since the rear shock absorbers are sealed units which cannot be disassembled, only external checks of operation are necessary. With the shocks removed, compress each one and see that the compression stroke is smooth and that there is damping in addition to spring resistance to compression. When the unit is released, the spring should not suddenly snap it to full length. It should extend smoothly with notable damping. When the shock absorber is operated, there should be no oil leakage. If either shock absorber does not perform all of these operations satisfactorily, or if one unit feels weaker than the other, replace both shock absorbers as a set. If only one unit is replaced and the two are not balanced, motorcycle instability at high speeds may result.

Shock absorber spring force for the 5 difference settings is shown in graph of Fig. J43.

Bushing inspection

Check the rubber bushings, and replace any that are worn, cracked, hardened, or otherwise damaged.

(J44)

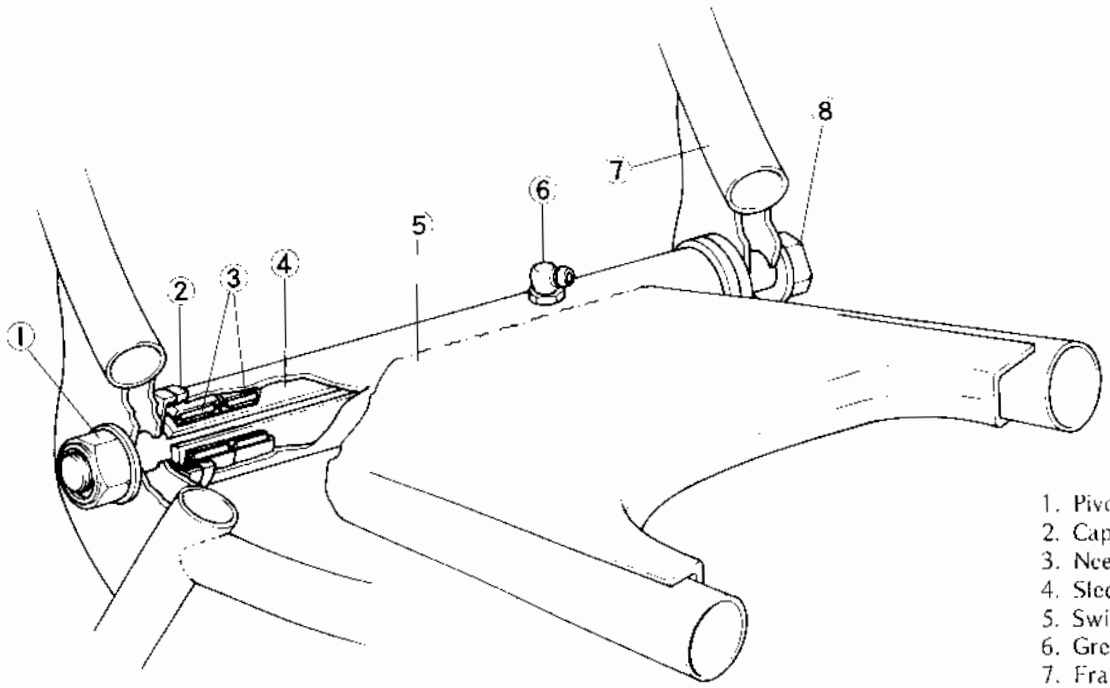


A. Rubber Bushings

SWING ARM

The swing arm is designed to work with the shock absorbers to dampen the shock to the frame from the rear wheel. The rear of the swing arm is connected to the frame by the rear shock absorbers, while the front

Swing Arm (J45)



1. Pivot Shaft Nut
2. Cap
3. Needle Bearings
4. Sleeve
5. Swing Arm
6. Grease Nipple
7. Frame
8. Pivot Shaft

end pivots on a shaft connected to the frame. When the rear wheel receives a shock, the swing arm, pivoting on its shaft, allows the wheel to move up and down in relation to the frame within the limits of the shock absorbers.

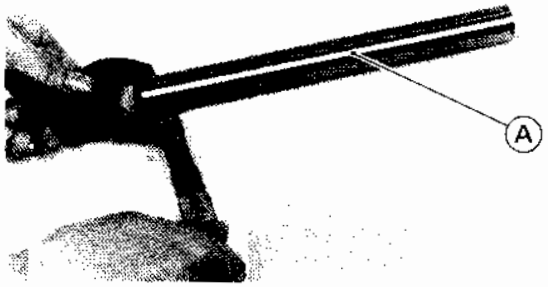
This motorcycle has needle bearings at the swing arm pivot. If bearing wear has progressed such that the swing arm has become loose, the motorcycle will be unstable. To minimize wear, the swing arm should be kept properly lubricated.

A bent pivot shaft or twisted swing arm will also cause instability by throwing the rear wheel out of alignment. A bent pivot shaft may also cause bearing seizure.

Swing arm bearing wear

Measure the outside diameter of the swing arm sleeve at both ends with a micrometer. Replace the swing arm sleeve if the diameter is less than the service limit or if it shows visible damage.

J46



A. Swing Arm Sleeve

Table J18 Swing Arm Sleeve

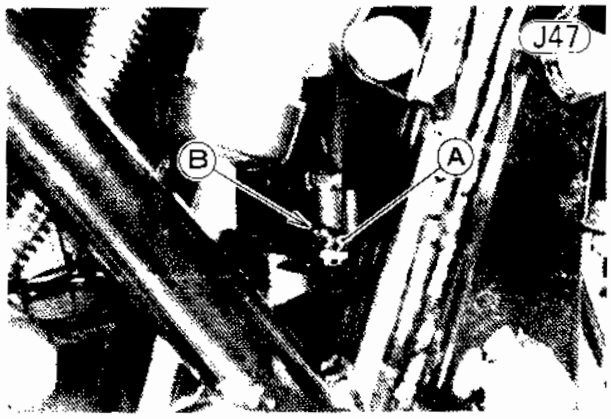
Service Limit	21.96 mm

The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearings for abrasions, color change, or other damage. If there is any doubt as to its the condition of either needle bearing, replace both needle bearings. Whenever the swing arm sleeve is replaced, also replace the needle bearings.

Swing arm lubrication

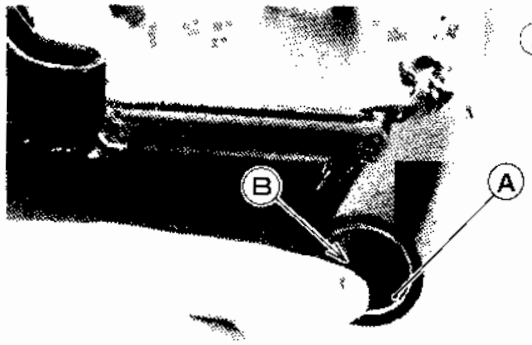
There is a grease nipple on the swing arm for lubrication. Grease the swing arm with regular cup grease as a part of general lubrication (Pg. 33) with the frequency given in the Periodic Maintenance Chart (Pg. 10). Force the grease into the nipple until it comes out at both sides of the swing arm, and wipe off any excess. If the grease does not come out, first check that the nipple is not clogged with dirt or old grease. If the nipple it clear but still will not take grease; remove the swing arm (Pg. 150), pull out the sleeve, clean out the old grease, and apply grease to the needle bearings.

J47



A. Grease Nipple **B. Grease.**

J48



A. Needle Bearing **B. Grease.**

Pivot shaft

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

Pivot Shaft Runout

J49

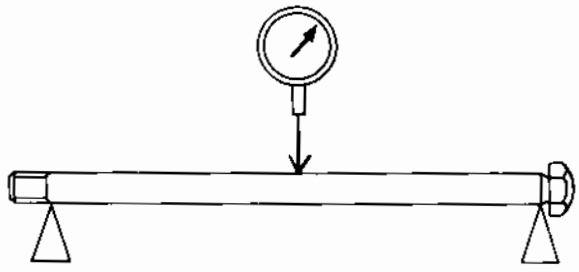


Table J19 Pivot Shaft Runout

Service Limit	Repair Limit
0.14 mm	0.7 mm

Maintenance–Electrical

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BATTERY

The battery supplies the current to the starter motor and serves as a back-up source of power to operate the electrical equipment whenever the engine is turning over too slowly for the alternator to supply sufficient power.

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.

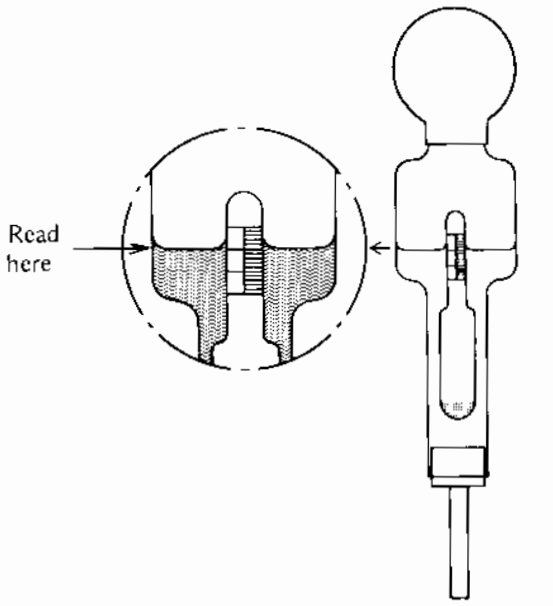
1. **When the level of the electrolyte in the battery is low, add only distilled water to each cell, until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.**
2. **Never add sulphuric 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 is 1.280 at 20°C (68°F). 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. K2 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.

Hydrometer (K1)



°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

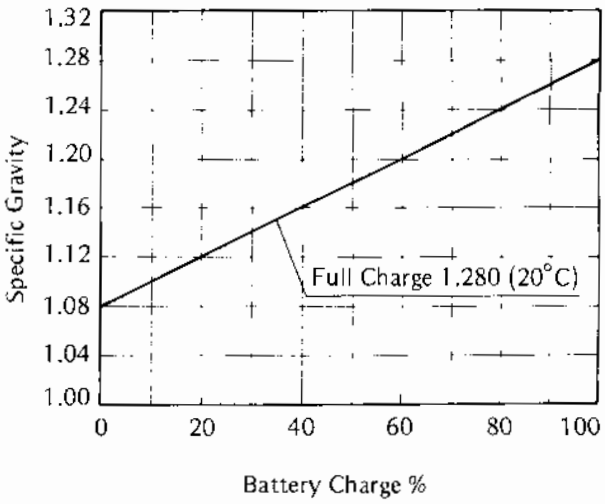
S_{20} = specific gravity at 20°C

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 (K2)



Initial charge

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 **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 1.280 (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.

NOTES: 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 12AH, the charging rate would be 1.2 ampere. If a constant voltage charger is used, the voltage must be adjusted periodically to keep the current at a constant value.

CAUTION **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 12 volt battery directly after the completion of charging should be 15 to 16 volts.

Ordinary charge

WARNING **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 12AH battery would be 12 x 3/10 which equals 3.6 amperes.

CAUTION **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 meterial. Deposits will accumulate, and can cause internal shorting.**

- Measure the specific gravity of the electrolyte, and use the graph, Fig. K2, 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 **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 12 volt battery directly after the completion of charging should be 15 to 16 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.

Test charging

When the battery is suspected of being defective, first inspect the points noted in the table below. The

Table K1 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 12 volts	below 12 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

battery can be restored by charging it with the ordinary charge. If it 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 13 volts just after the start of charging, the plates are probably sulphated. A good battery will rise to 12 volts immediately and then gradually go up to 12.5 ~ 13 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 just that there is insufficient acid in that cell. In this instance only, sulphuric acid solution may be added to correct the specific gravity.

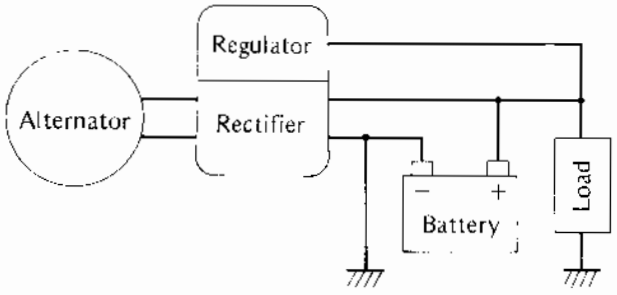
★ If a fully charged battery not in use loses its charge after 2 to 7 days, or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1% per day.

CHARGING SYSTEM

The charging system consists of an alternator and regulator/rectifier.

The alternator generates the current required by the electrical circuits. The generated current is a single phase alternating current (AC), which is changed to direct current (DC) and controlled by a solid-state regulator/rectifier to supply an even voltage to the circuit components.

Charging System (K3)



There are a number of important precautions that are musts when servicing the charging system. Cautions that are applied to the individual sections are mentioned in each section. Failure to observe these rules can result in serious system damage. Learn and observe all the rules below.

CAUTION **When handling the regulator/rectifier, observe the following to avoid damage to the regulator/rectifier.**

1. **Do not reverse the battery lead connections. This will burn out the zener diode.**
2. **For the regulator/rectifier to function properly, the battery must be charged to near capacity. If the battery is badly discharged, charge it before installing it in the motorcycle.**

When handling the alternator rotor:

3. **Do not allow the rotor to suffer sharp impacts such as striking it with a hammer or letting it fall on a hard surface. Such a shock to the rotor can cause the magnets to loss their magnetism.**

When there are any problem indications in the charging system, give the system a quick initial inspection or check before starting a series of time consuming tests, or worse yet, removing parts for repair or replacement. Such a check will often turn up the source of the trouble.

Make sure all connectors in the circuit are clean and tight. Examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation. Check the regulator/rectifier and alternator for evidence of physical damage.

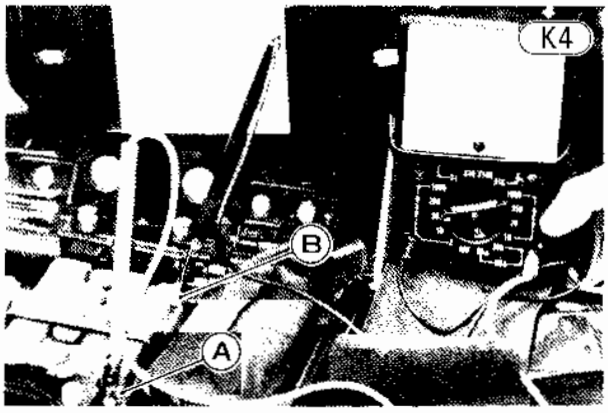
A worn out or badly sulphated battery will produce numerous problems that cannot be corrected until the battery is replaced. **ALWAYS CHECK BATTERY CONDITION BEFORE CONDEMNING OTHER PARTS OF THE SYSTEM. A FULLY CHARGED BATTERY IS A MUST FOR CONDUCTING ACCURATE SYSTEMS TESTS.**

Charging system malfunctions can be traced to either the battery, alternator, regulator/rectifier, or the wiring. Troubles may involve one unit or in some cases, all units. Never replace a defective unit without determining what **CAUSED** the failure. If the failure was brought on by some other unit or units, they too must be repaired or replaced, or the new replacement will soon fail.

Initial inspection

Before making this test, check the condition of the battery (Pg. 214). If the battery voltage is less than 12 volts, charge the battery. Before starting the charging voltage test warm up the engine to obtain actual alternator operating conditions.

- Unlock the seat and swing it open.
- Set the multimeter to the 20V DC range, and connect the meter (+) lead to the battery (+) terminal and the meter (–) lead to the battery ( ) terminal.



A. Battery (+) Terminal **B. Battery (–) Terminal**

•Start the engine, and run the engine at the rpm in Table K2. Note the voltage reading.

Table K2 Charging Voltage

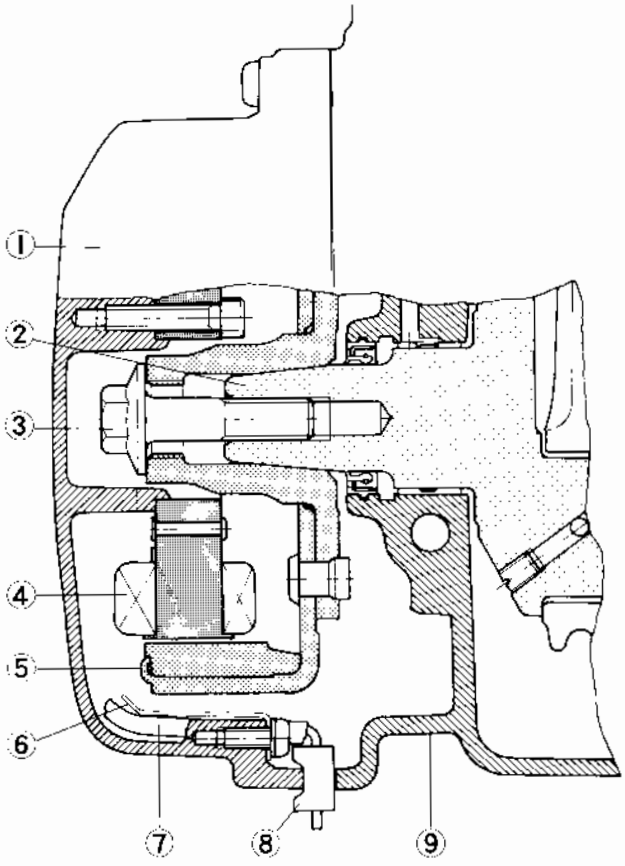
Meter	Connections	Reading @4,000 rpm
20V DC	Meter (+) ↔ Battery (+) Meter (–) ↔ Battery (–)	about 14.5 V

•If the reading is much higher than the values specified in the table, the regulator/rectifier is defective or its leads are loose or open. If the reading does not rise as the engine speed increases, check the alternator output and regulator/rectifier (Pg. 218) to determine which part is defective.

Alternator

The alternator is made of a rotor 5 and stator 4. The stator is mounted in the alternator cover 1, while the rotor is secured to the left end of the crankshaft 2 and rotates at engine rpm. Permanent magnets in the rotor supply the magnetic field for the stator so that no slip rings or brushes are necessary, making the alternator practically maintenance free. The rotor has 6 permanent magnets evenly spaced in its circumference to generate an alternating current with 6 cycles per rotor revolution.

Alternator Construction (K5)



1. Alternator Cover
2. Crankshaft
3. Rotor Bolt
4. Alternator Stator
5. Alternator Rotor
6. Wiring Clamp
7. Alternator Wiring
8. Grommet
9. Crankcase

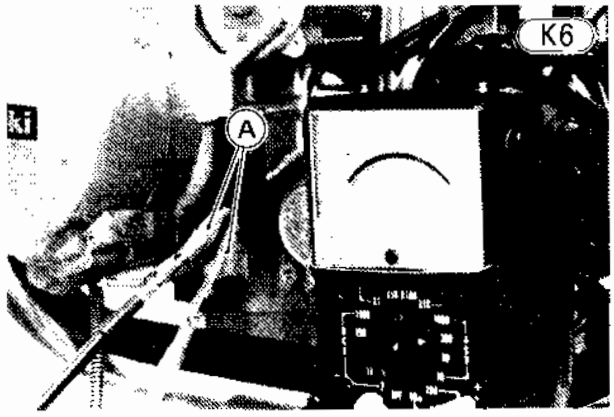
Alternator failure

If the battery, regulator/rectifier, leads, and connectors are all good, but there is still low voltage or insufficient charging current, the alternator may be defective. There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in the coil wire will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the rotor, leaving it near an electromagnetic field, or just by aging, will result in low output.

Alternator output test

Before starting alternator output test warm up the engine to obtain actual alternator operating condition.

•Remove the engine sprocket cover (Pg. 69), and disconnect the yellow leads from the alternator. Set the multimeter to the 250V AC scale, and connect one meter leads to each yellow lead from the alternator.



A. Alternator Leads

•Start the engine, run it at the rpm given in Table K3, and note the voltage reading. A much lower reading than that given in the table indicates that the alternator is defective.

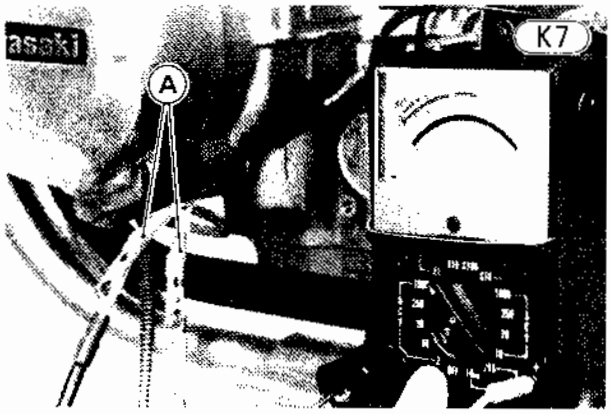
Table K3 Alternator Output

Meter	Reading @4,000 rpm
250 V AC	about 75 V

Stator coil resistance check

•Disconnect the meter leads from the alternator leads.

•Set the multimeter to the x 1 Ω range, and measure for continuity between the yellow leads. If there is more resistance than shown in Table K4, or not meter reading, the stator has an open and must be replaced.

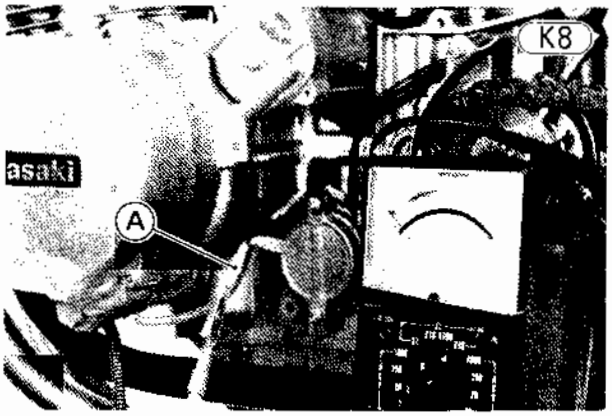


A. Alternator Leads

Table K4 Stator Coil Resistance (measured when cold)

Meter Range	Meter Reading
x 1 Ω	0.32~0.48 Ω

•Using the highest resistance range of the multimeter, measure the resistance between each of the yellow leads and chassis ground. Any meter reading less than infinity (∞) indicates a short, necessitating stator replacement.



A. Alternator Lead

If the stator windings have normal resistance, but the voltage check showed the alternator to be defective, then the rotor magnets have probably weakened, and the rotor must be replaced.

Regulator/Rectifier

The regulator and rectifier are solid-state type, and integrated into one unit. Since it contains no contacts or other moving parts, it does not wear out and never needs to be adjusted. It is therefore manufactured as a sealed unit, and must be replaced as a unit should it become defective. The rectifier in the unit rectifies (change to direct current, DC) the alternating current (AC) from the alternator. It contains four silicon diodes which are connected in a bridge circuit arrangement for efficient, full-wave rectification. The regulator in the unit keeps the battery (+) terminal voltage level to a maximum of the specified range. The control circuit in the diagram checks on the voltage level, and triggers the thyristors.

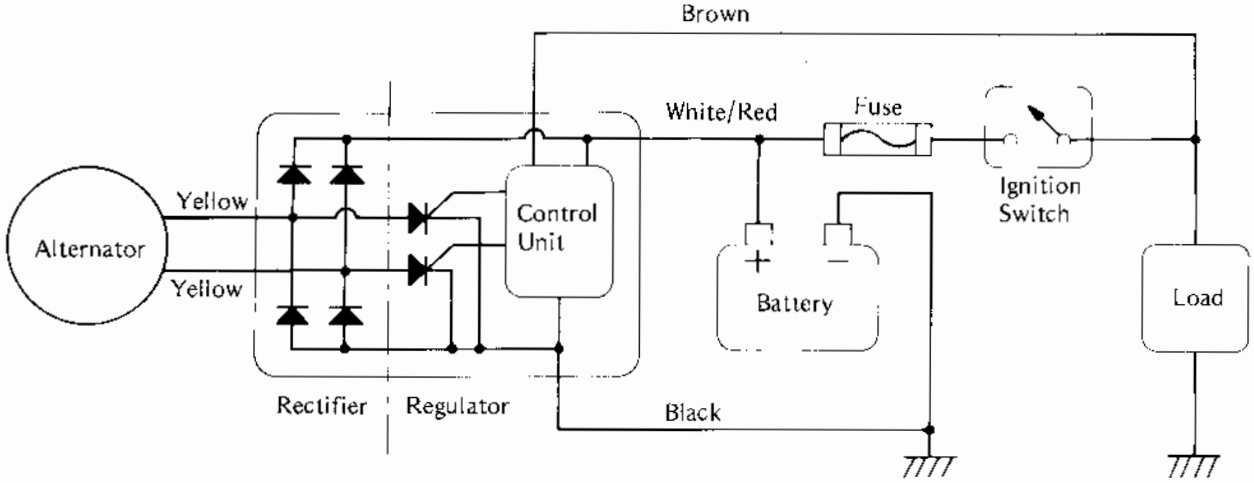
Though the actual regulator/rectifier circuit performs full-wave rectification, a simplified single-phase circuit of half-wave rectification is explained here to aid the technician in troubleshooting and in understanding test procedures. Fig. K13 shows the basic circuit of the regulator/rectifier. The main components of the regulator/rectifier circuit are a thyristor (Th), or Silicon Controlled Rectifier (SCR) as it is also called, and a diode. The diode, thyristor (Th), and zener diode (ZD) function as follows:

1. Diode

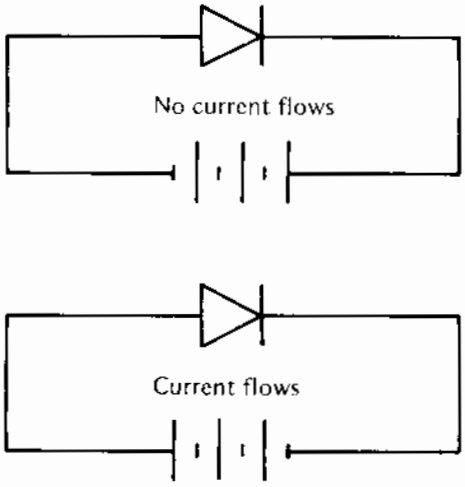
A current of electrons can flow only from the cathode to the anode of the diode. However, a defective diode will either conduct in both directions (a short) or not conduct at all (an open). If any of the diodes is shorted or open, the voltage from the regulator/rectifier will be below normal, and the battery may not be charged adequately.

Regulator/Rectifier

K9



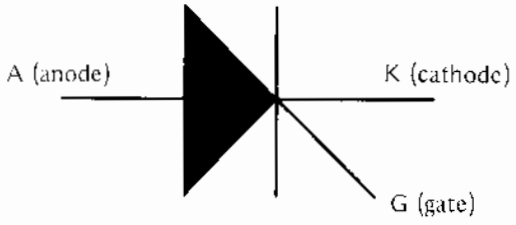
Diode Current Flow (K10)



2. Thyristor

The current of electrons will flow from the cathode to the anode but will not flow in the reverse direction. The thyristor differs from a diode in two respects: (a) even through a voltage of the correct polarity (negative to cathode) may be applied, the thyristor will not conduct until a signal is received at the gate input lead; (b) once started, it will not stop conducting (even if the gate lead signal voltage stops) until the anode to cathode voltage is removed or reversed.

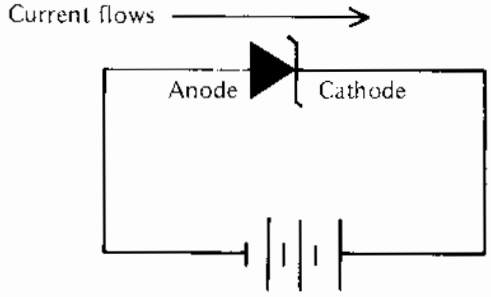
Thyristor (K11)



3. Zener diode

As in a normal diode, current will flow easily from the cathode to anode, and will not usually flow in the opposite direction. Unlike a normal diode, however, the zener diode will "break down", or conduct in the reverse direction, if enough voltage is applied in the reverse direction. When this voltage is lowered or removed, the diode will stop conducting and return to its normal state. The voltage at which the diode begins reverse conduction, is called the breakdown voltage, and is set at the desired level when the diode is manufactured. This property of the zener diode makes it very useful in voltage regulator circuits.

Zener Diode (K12)



More than break down voltage

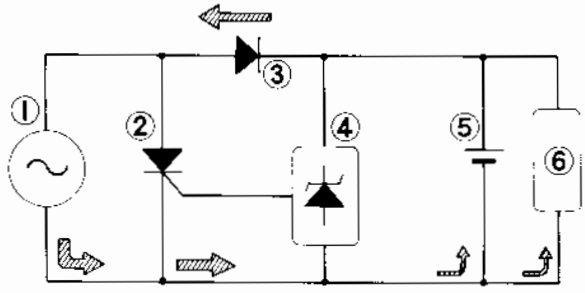
In the regulator/rectifier circuit, the diode is connected in series with the alternator to rectify the alternator output, and the thyristor is connected in parallel with the alternator. Detailed circuit operation is as follows:

When the battery voltage is lower than the specified value, the zener diode does not conduct and the control unit does not trigger the thyristor. At this time, the thyristor does not conduct, and all alternator output current flows through the battery and loads to supply adequate charging current.

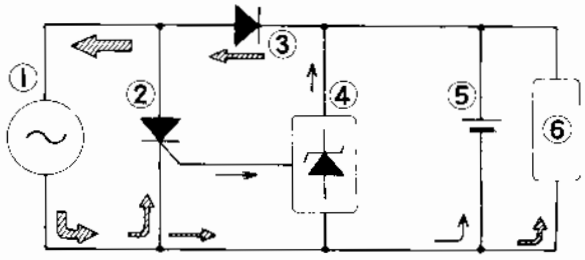
When the battery voltage is equal to or higher than the predetermined voltage, the zener diode conducts and the control unit signals the thyristor to start conducting. Then, instead of current going through the battery and overcharging it, it flows through the thyristor and then directly back to the alternator.

Basic Regulator/Rectifier Circuit (K13)

1. When battery voltage is low (Thyristor is off).



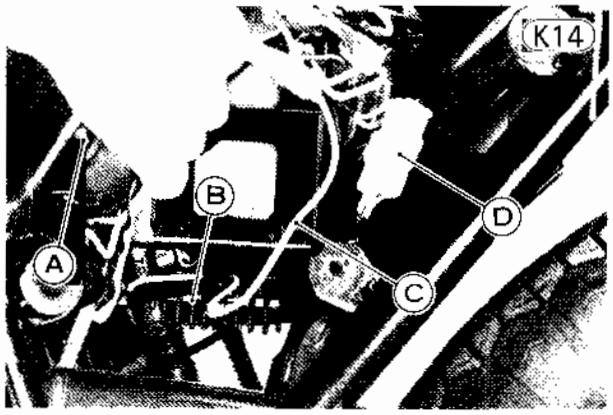
2. When battery voltage is high (Thyristor is on to provide bypass).



1. Alternator
2. Thyristor
3. Diode
4. Control Unit
5. Battery
6. Load

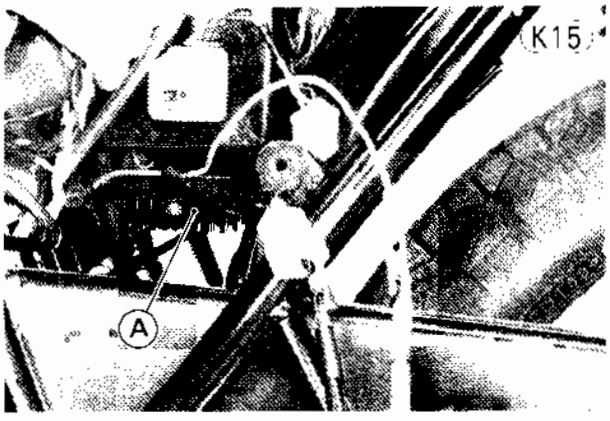
Rectifier inspection

•With the ignition switch turned off, remove the left side cover, open the electrical cover, and remove the electrical panel. Disconnect the regulator/rectifier white/red lead and white connector.



A. Electrical Panel
B. Regulator/Rectifier
C. White/Red Lead
D. White Connector

•Using the x 10 Ω or x 100 Ω range, check the resistance in both directions between the white/red lead and each yellow lead, and between the black lead and each yellow lead. There is a total of 8 measurements. The resistance should be low in one direction and more than ten times as much in the other direction. If any two leads are low or high in both directions, the rectifier is defective and must be replaced.



A. Regulator/Rectifier

NOTE: 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.

Regulator test

To test the regulator out of circuit, use three 12V batteries and a test light made from a 12V 3 ~ 6W bulb in a socket with leads.

•Remove the regulator/rectifier from the frame.

•Using auxiliary leads, connect one of the yellow leads to the battery (–) terminal, and connect the test light between the black lead and the battery (+) terminal. At this time the bulb should not be lit.

CAUTION **The test light works as an indicator and also as a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.**

•Connect the brown lead to the other battery (+) terminal and connect the black lead to the battery (–) terminal momentarily. At this time the bulb should not be lit.

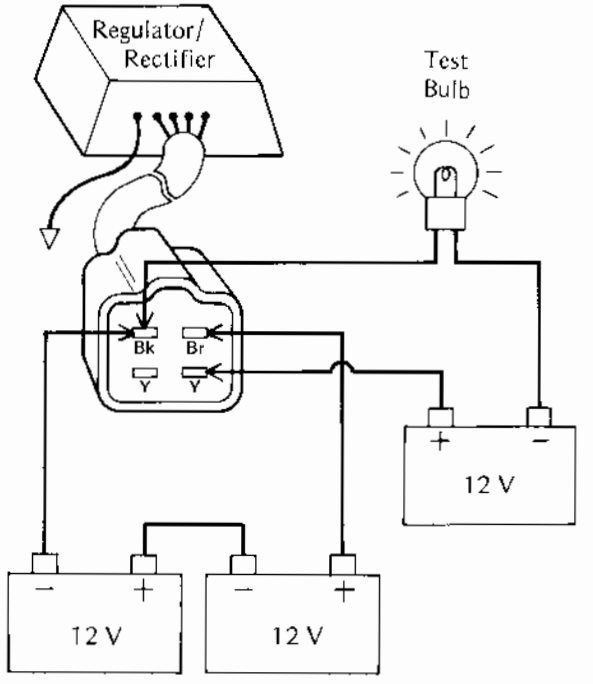
•To apply 24 V to the regulator/rectifier, connect two 12V batteries in series, and connect the brown lead to the battery (+) terminal and the black lead to the battery (–) terminal momentarily. The bulb should now light and stay on until the bulb circuit is opened.

CAUTION **Do not apply more than 24 volts. If more than 24 V is applied, the regulator/rectifier may be damaged. Do not apply 24 V more than a few seconds. If 24 V is applied for more than a few seconds, the regulator/rectifier may be damaged.**

•Replace the regulator/rectifier if the bulb does not light as described above.

NOTE: The above test is not foolproof. If the above checks show the regulator/rectifier is not damaged, but there is still trouble in the charging system, first carefully inspect the alternator, battery, wiring, and all connections. Replace the regulator/rectifier it all these other components turn out good.

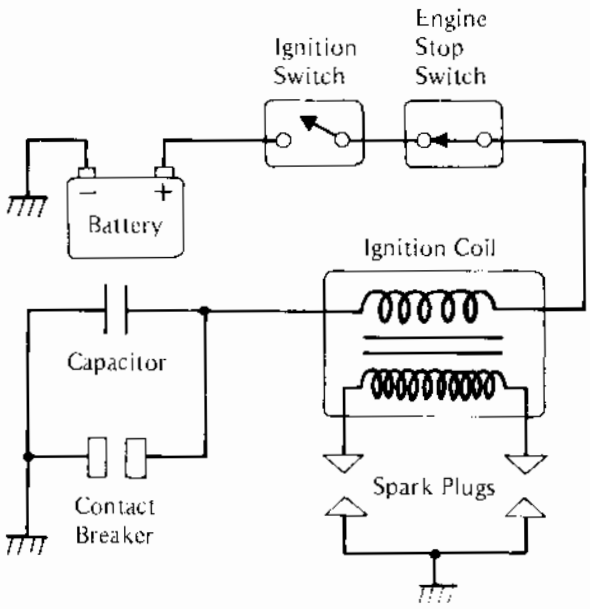
Regulator Test (K16)



IGNITION SYSTEM

The working electrical part of the ignition system consists of the battery, two sets of contact breaker points, two capacitors, two ignition coils, and four spark plugs. The timing advancer is attached to advance the ignition timing as engine rpm rises.

Ignition Circuit (K17)



A wiring diagram of one half of the ignition system is shown in Fig. K17. The other half is identical, and works as follows. The battery supplies the current for the primary circuit, which includes the contact breaker points, capacitor, and the primary winding of the ignition coil. When the points suddenly open with the ignition switch turned on, a surge of electrons is produced in the secondary circuit, which includes the ignition coil secondary winding and the two spark plugs. The two sets of points and two coils take the place of a distributor, which is left out to increase the reliability of the system. Each set of points fires two spark plugs every time the two pistons rise, that is, once every 360° of crankshaft rotation. Since the two sets of points (and the two sets of pistons) are 180° out of phase, plugs 2 and 3 fire 180° of crankshaft rotation after plugs 1 and 4 fire, and vice versa. For this system to function properly, all ignition parts must be in good order, the ignition timing correctly set, the ignition and engine stop switches not shorted, and all wiring in good condition (no shorts or breaks, and no loose or corroded connections).

Ordinarily in a 4-stroke engine, a spark jumps across the spark plug electrodes only every other time that the piston for that spark plug rises (once every 720° of crankshaft rotation). This is because between each compression stroke, in which a fuel/air mixture ready for combustion is in the cylinder, there is an exhaust stroke, in which the piston rises only to push out the burned gases. However, even if a spark does jump across the electrodes during the exhaust stroke, there is no effect since there is no compression and no fuel to burn. Therefore, to eliminate any need for a distributor (thus simplifying the system and making it more reliable), the system is constructed so that both spark plugs fire every time both pistons rise (once every 360° of crankshaft rotation) although one piston is on the compression stroke and the other on the exhaust stroke.

Because the two spark plugs are connected in series, the current through one spark plug also must go through the other. Consequently, if a spark will not jump across the electrodes of one spark plug (due to dirty electrodes, faulty plug lead, etc.), no spark will jump across the electrodes of the other plug as well.

Ignition Coil

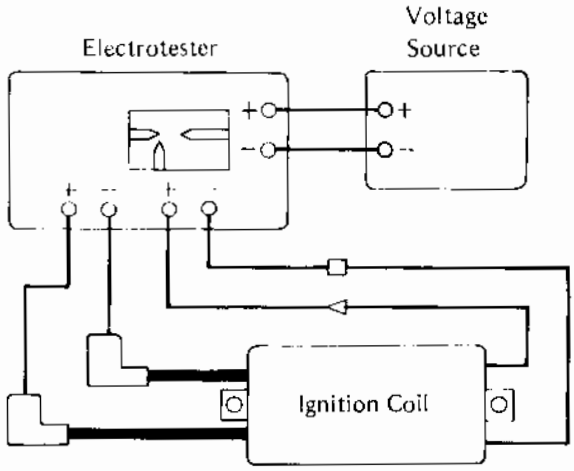
With the ignition switch on and the points closed, current flows in the primary circuit, including the ignition coil primary winding where the magnetic field (which accompanies electron flow) is concentrated (due to the winding). When the points open, this circuit is broken stopping the electron flow and collapsing the magnetic field. As this field collapses, magnetic flux cuts through the secondary winding inducing a current in the winding. The voltage of this current, depending on the number of turns in the secondary winding and the speed of the drop in the primary winding voltage, is much greater than the voltage in the primary winding. It is this high voltage that causes a spark to jump across the spark plug electrodes. A greater ratio of secondary winding turns over primary winding turns and a sharper drop of primary winding voltage increase the secondary winding voltage that is produced. For this reason, a certain ratio of turns in the ignition coil has been chosen and a certain voltage drop sharpness (determined by capacitor and breaker point performance) has been designed into the ignition system so that a spark of sufficient but not excessive strength will be produced.

Coil inspection

The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with the Kawasaki Electrotester (special tool: P/N 57001-980). 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 (K18)



•Turn on the tester switches.

WARNING **Do not touch the coil or leads to avoid extremely high voltage shocks.**

•Gradually slide the arcing distance adjusting knob from left to right (small distance to large distance) carefully watching 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 show the value in Table K5.

Table K5 Arcing Distance†

Standard	6 mm or more

† Measure with the Kawasaki Electrotester.

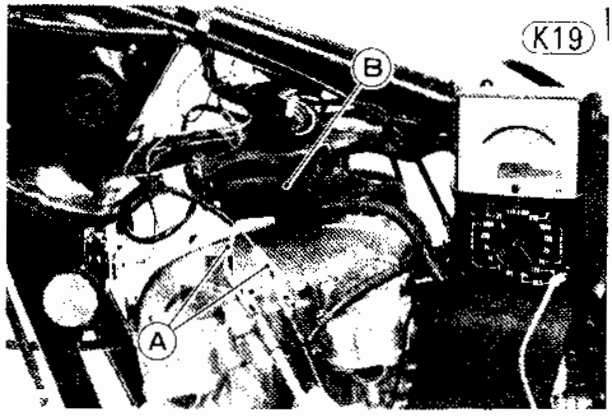
If the distance reading is less than the value shown in the table, the ignition coil or spark plug caps are defective. To determine which part is defective, measure the arcing distance again with the spark plug caps removed from the ignition coil. If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug caps.

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.

To measure the primary winding resistance:

•Remove the fuel tank (Pg. 47), and disconnect the ignition coil leads.

•Set the ohmmeter to the x 1 Ω range, and connect one ohmmeter lead to the yellow/red lead and the other to the green or black lead from the ignition coil.

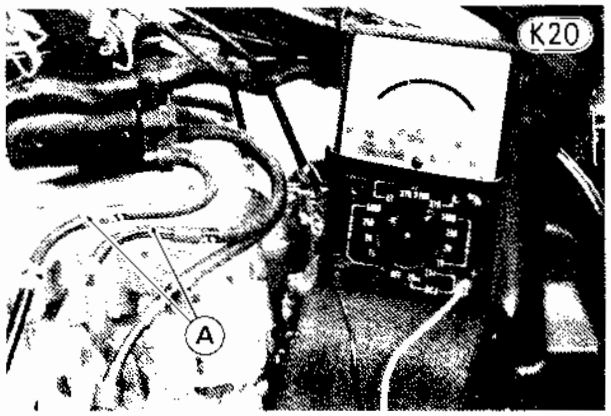


A. Ignition Coil Leads **B. Ignition Coil**

To measure the secondary winding resistance:

•Unscrew the spark plug caps from the spark plug leads.

•Set the ohmmeter to the x 1 kΩ range, and connect one ohmmeter lead to one of the spark plug leads and the other ohmmeter lead to the remaining spark plug lead.



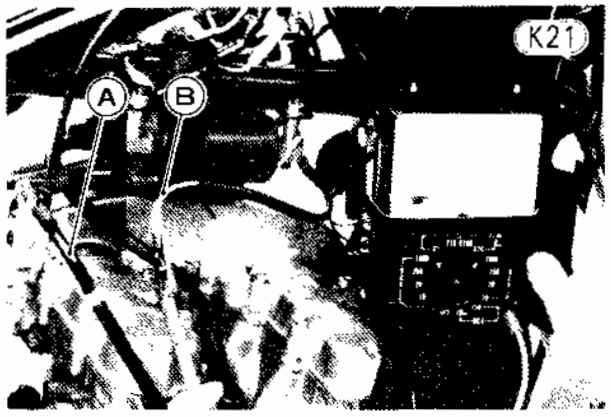
A. Spark Plug Leads

Table K6 Ignition Coil Resistance (measured when cold)

	Meter Range	Meter Reading
Primary Winding	x 1 Ω	3.2~4.8 Ω
Secondary Winding	x 1 kΩ	10.4~15.6 kΩ

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.

With the highest ohmmeter range, check for continuity between each ignition coil yellow/red lead, and one spark plug lead and the coil core (two tests on each coil). If there is any reading, the coil is shorted and must be replaced. Also, replace the ignition coil if either spark plug lead shows visible damage.



A. Spark Plug Lead **B. Yellow/Red Lead**

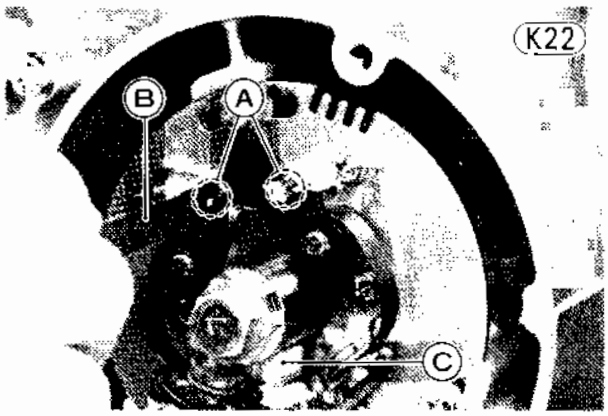
Contact Breaker

The contact breaker consists of one fixed and one movable contact point. The movable point is pivoted, and the heel on one end is held against the cam surface on the timing advancer by a single leaf spring. As the crankshaft rotates, the heel rides on the cam surface, and, as the crankshaft reaches the position where ignition takes place, the high spot on the cam surface pushes out on the heel, which opens the points. As the heel wears down, the point gap narrows, affecting ignition timing. Consequently, the ignition timing and point gap must be periodically adjusted to compensate for heel wear.

Contact breaker inspection

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

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



A. Points **B. Emery Cloth** **C. Felt**

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

Capacitor

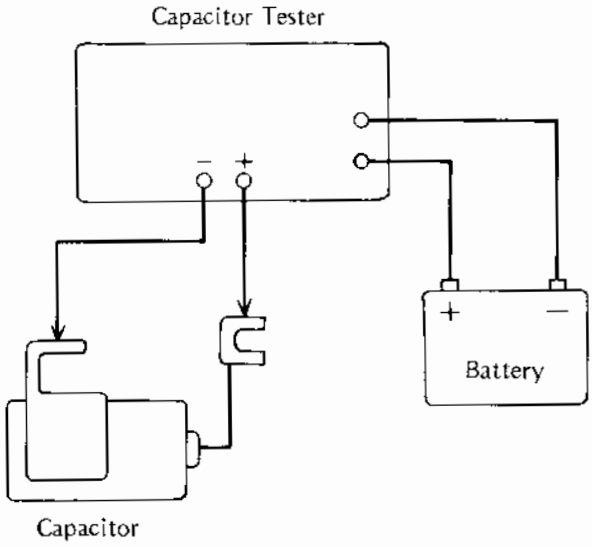
A capacitor is connected in parallel across each set of contact breaker points and serves to prevent current from arcing across the points as they open. Arcing across the points would reduce the sharpness of the voltage drop in the primary winding, thus weakening the spark plug spark, and also damaging the surface of the points. When the points are first opening, the capacitor absorbs a certain amount of current, giving the points time to open far enough apart to where current will not arc across. However, if the capacitor shorts, the current will simply flow through the capacitor whenever the points open. When the capacitor is otherwise defective, the current will not be prevented from arcing across the points at the time of ignition, resulting in poor spark plug performance and burned and pitted points.

Capacitor inspection

The capacitor can usually be considered to be defective if a long spark is seen arcing across the points as they open or if the points are burned or pitted for no apparent reason. Replace the capacitor any time it appears defective and whenever the contact breaker is replaced.

NOTE: For checking with a capacitor tester, capacitor specifications are: 0.24 ± 0.02μF, 1,000 WVDC.

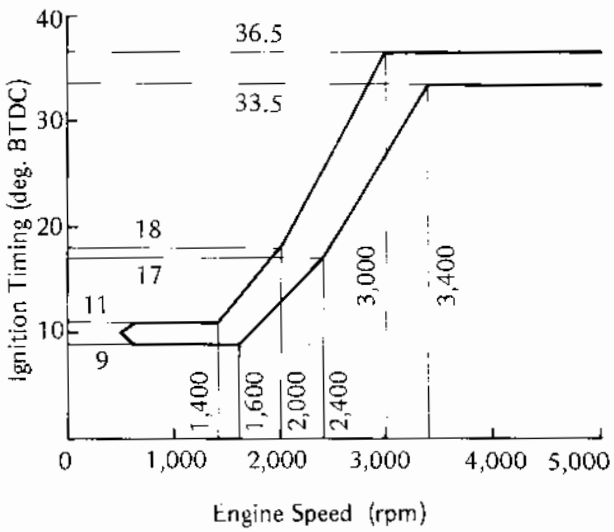
Capacitor Test (K23)



Timing Advancer

The timing advancer is a device that advances the ignition timing (makes the spark plugs fire sooner) as engine rpm rises. It consists of two weights and two springs connected to the timing cam that opens the contact breaker points. The more the engine speed rises, the further the weights are thrown out against spring tension, turning the cam in the direction of crankshaft rotation and causing the points to open sooner.

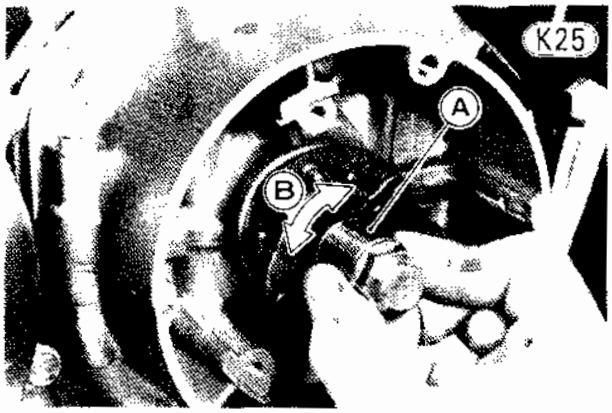
Ignition Timing/Engine Speed Relationship (K24)



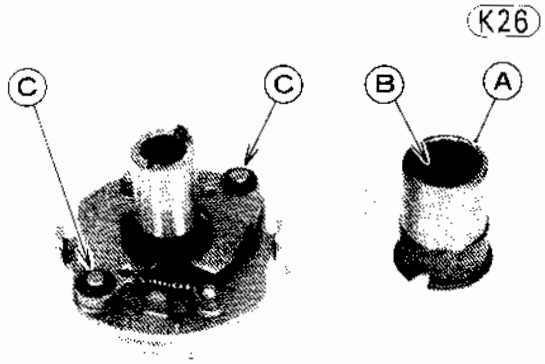
If the mechanism is damaged, has a weak or broken spring(s), or does not move smoothly, the ignition timing will not advance smoothly or it may stick in one position. This will result in incorrect timing at certain engine speeds, causing poor engine performance. Failure to advance at all will cause poor high speed performance, and excessive advance will cause knocking and poor low speed performance.

Inspection and lubrication

Check that the mechanism moves smoothly by hand and that no parts are visually worn or damaged. Periodically wipe the advancer clean, apply oil to it, and fill the groove in the advancer cam with grease.



A. Timing Advancer Cam B. Moves smoothly.



A. Advancer Cam C. Oil.
B. Grease.

Install the advancer (Pg. 78), adjust the timing (Pg. 12), and check it with a strobe light for both low and high speed operation (Pg. 14). If the timing differs from that which is shown in the graph (Fig. K24), replace the timing advancer with a new one.

Spark Plug

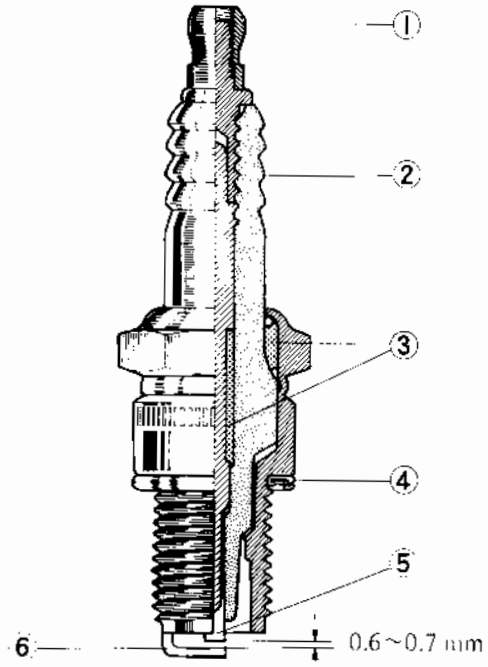
The spark plugs ignite the fuel/air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plugs must be used, and the spark plugs must be kept clean and adjusted.

Tests have shown the NGK D8EA or ND X24ES-U, set to a 0.6~0.7 mm gap to be the best plug for general use.

If a plug of the wrong heat range is used, the electrodes may not hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself - about 400~800°C (750~1,450°F).

CAUTION **The carbon on the electrodes 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 build-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. 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.**

Spark Plug K27



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

Table K7 Spark Plug Specifications

Required Plug Threads	Type
Diameter : 12.0 mm Pitch : 1.25 mm Reach : 19.0 mm	NGK D8EA ND X24ES-U

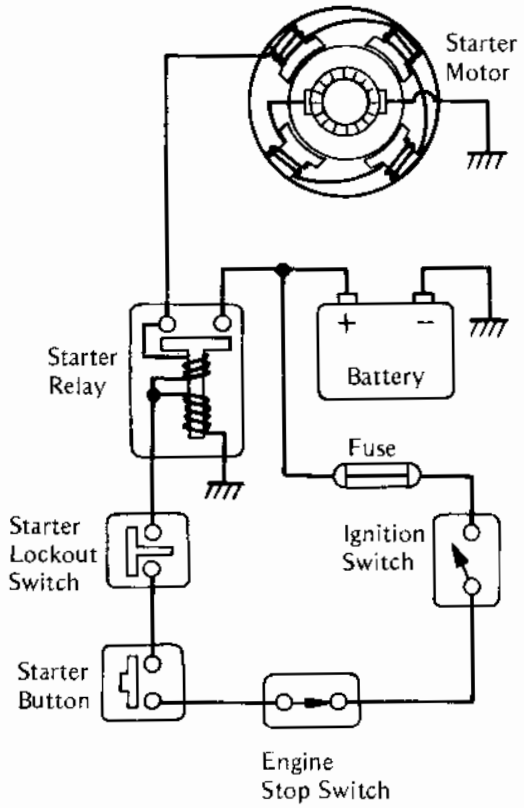
ELECTRIC STARTER SYSTEM

Starter Motor Circuit

The starter motor circuit includes the starter button (switch), starter lockout switch, starter relay, battery, and starter motor. The starter lockout switch mounted on the clutch lever holder is designed to prevent starter motor operation unless the clutch is disengaged. When the ignition switch is on, the clutch lever is pulled (the starter lockout switch is on), and the starter button is pushed, a small amount of current flows through the switches and the relay coil. This current magnetizes the relay core, which then pulls the armature to it, closing the relay contacts. The closed contacts complete a circuit for the starter motor, and the motor turns. The reason for using a relay instead of using the switch to turn on the starter motor directly is that the starter motor requires much current – enough that relatively thick wire is necessary to carry the current to the starter motor. Because it is not practical to put a heavy switch on the handlebar and have large wires running to it, the starter switch is made to carry just the light relay coil current, and heavy contacts inside the relay carry the starter motor current.

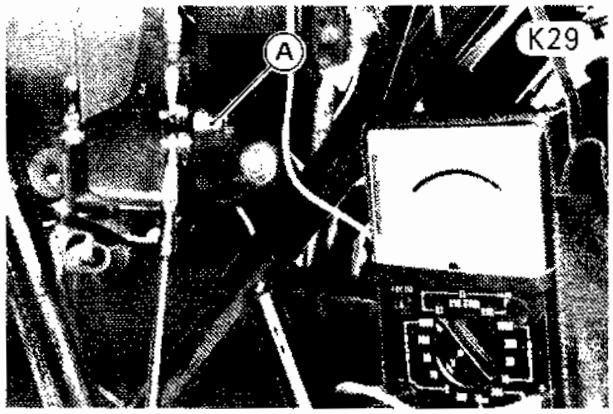
CAUTION **Because of the large amount of current, never keep the starter button pushed any time that the starter motor will not turn over, or the current may burn out the starter motor windings.**

Starter Motor Circuit (K28)



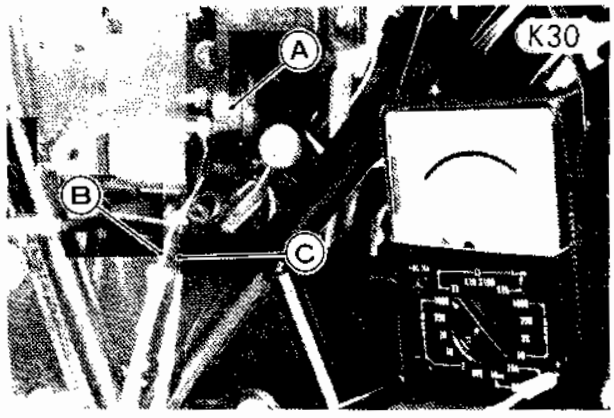
Starter relay test

Disconnect the starter motor lead from the starter relay in the electrical cover, and connect an ohmmeter set to the x 1 Ω range across the relay terminals. Pulling the clutch lever, push the starter button, and see if the meter reads zero ohms. If the relay makes a single clicking sound and the meter reads zero, the relay is good. If the relay clicks but the meter does not read zero, the relay is defective and must be replaced.



A. Starter Relay

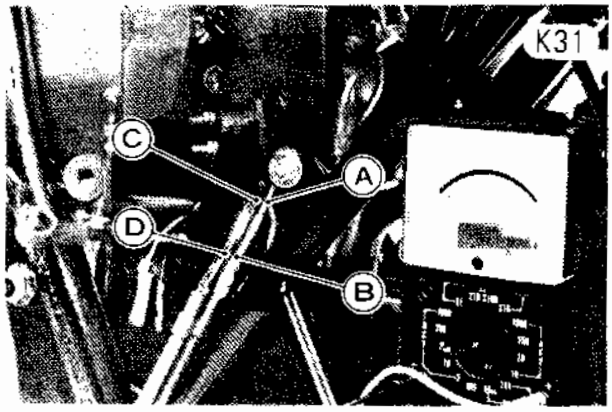
If the relay does not click at all, disconnect the other two leads (black and yellow/red), and measure the resistance across them. If the resistance is not close to zero ohms, the relay is defective.



A. Starter Relay
B. Yellow/Red Lead
C. Black Lead

However, if there is about zero ohms resistance, the relay may be good; check that there is actually voltage to the relay before deciding that the relay is defective. To check for the voltage, first turn the meter to 20V DC, connect the (–) meter lead to the yellow/red lead which was disconnected from the relay lead, and connect the (+) meter lead to the black lead. Pulling the clutch lever, push the starter button, and see if the meter reads battery voltage. If the meter does not, there is wiring, starter lockout switch, or starter switch trouble.

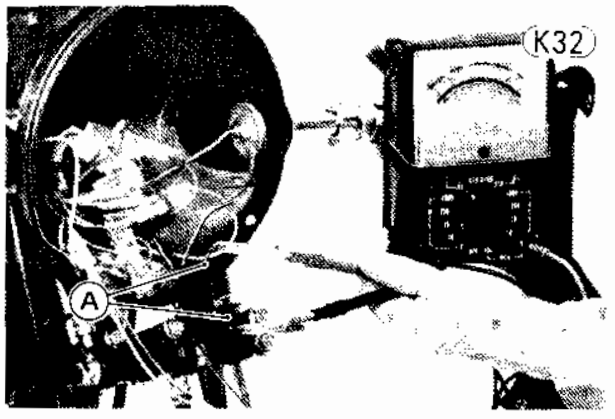
If the meter reads battery voltage but the relay does not click, the relay is defective.



A. Yellow/Red Lead
B. Meter (–) Lead
C. Black Lead
D. Meter (+) Lead

Starter lockout switch test

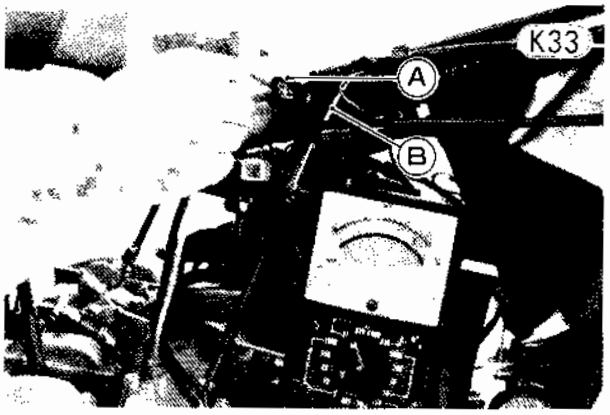
Remove the headlight unit (Pg. 137), and disconnect the two starter lockout switch black leads in the headlight housing. Connect an ohmmeter set to the x 1 Ω range across the two black leads. Pull the clutch lever, and see if the meter reads zero ohms. If the meter does not, the starter lockout switch is defective and must be replaced.



A. Switch Leads

Starter switch test

Remove the fuel tank (Pg. 47), and disconnect the 4-pin connector and black lead from the right switch housing. Connect an ohmmeter set to the x1Ω range across the yellow and the black leads. Push the starter button, and see if the meter reads zero ohms. If the meter does not, the starter switch is defective and the entire right switch housing assembly must be replaced.



A. 4-pin Connector
B. Yellow Lead

Starter Motor

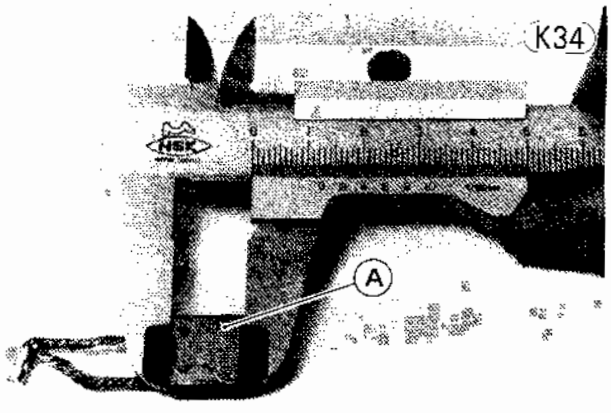
The starter motor is installed with an idle gear to transmit starter motor rotation to the crankshaft. A starter clutch (Pg. 228) disengages the starter motor once the engine starts.

Fig. K35 shows starter motor construction. The field coils 5 are wound around four cores, forming the yoke 8, and the armature windings 6 are connected to the commutator 12 and receive their current through the brushes 11. If the brushes are not making good contact, no starter motor current will flow since the field coils and armature windings are connected in series, and the motor will not turn over. A short or open in a coil or winding may also cause the motor to be inoperative. Particles from brush wear may be another cause of starter motor failure; these particles may get into the bearing at the rear of the motor, causing heat seizure.

Carbon brushes

Worn brushes or weak springs will cause poor brush contact.

Measure the length of the brushes, and replace both if either one is worn down to less than the service limit.

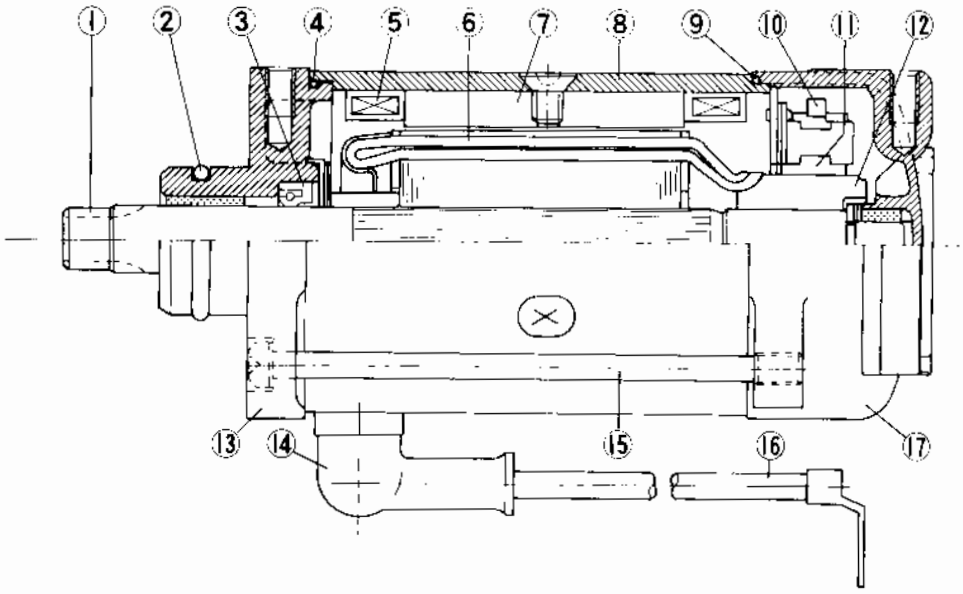


A. Carbon Brush

Table K8 Carbon Brush Length

Service Limit	6 mm

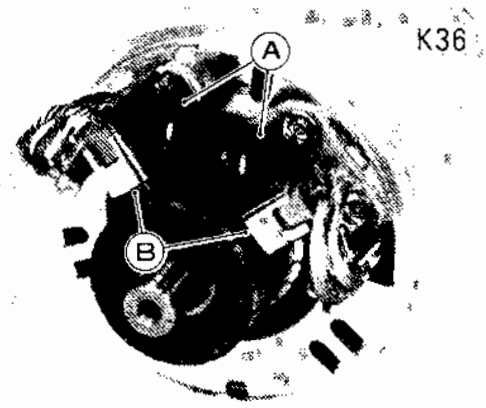
Starter Motor Construction



1. Shaft
2. O Ring
3. Grease Seal
4. O Ring
5. Field Coil
6. Armature Coil
7. Core
8. Yoke Assembly
9. O Ring
10. Spring
11. Brush
12. Commutator
13. End Cover
14. Terminal Cover
15. Screw
16. Lead
17. End Cover

Brush spring

Spring tension should be 560~680 grams but a spring can be considered serviceable if it will snap the brush firmly into place.

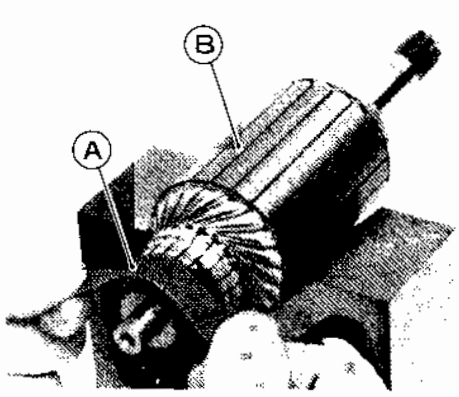


A. Springs **B. Brushes**

Commutator

A dirty or damaged commutator will result in poor brush contact and cause the brushes to wear down quickly. In addition, particles from brush wear accumulating between commutator segments may cause partial shorts.

Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves as illustrated. Determine as accurately as possible the depth of the grooves between commutator segments. Replace the armature with a new one if the groove depth is less than the service limit.



A. Emery Cloth **B. Armature**

Commutator Groove

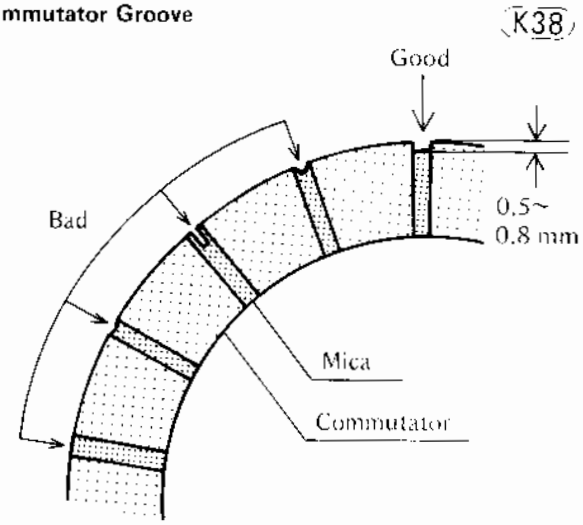
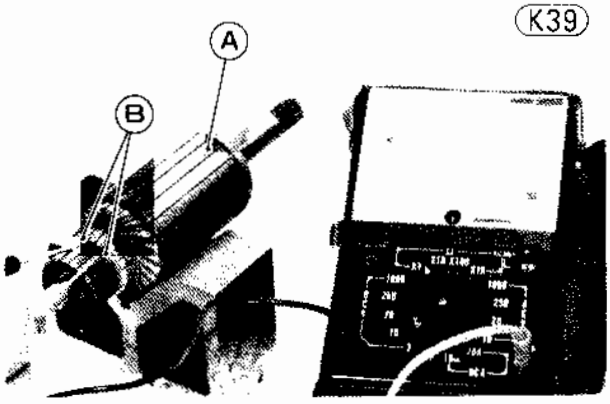


Table K9 Commutator Groove Depth

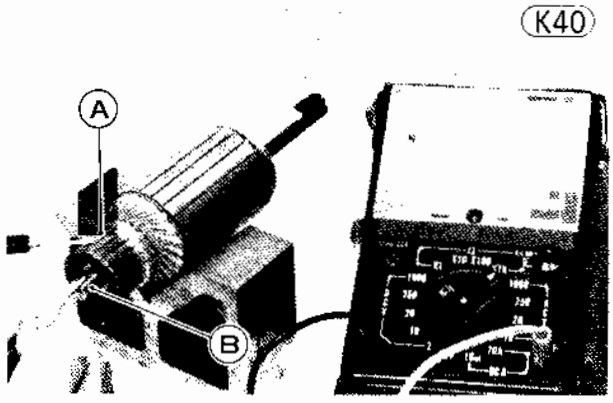
Service Limit	0.2 mm

Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments. If there is a high resistance or no reading between any two segments, a winding is open and the armature must be replaced.



A. Armature **B. Commutator Segments**

Using the highest ohmmeter range, measure the resistance between the commutator and the shaft. If there is any reading at all, the armature has a short and must be replaced.

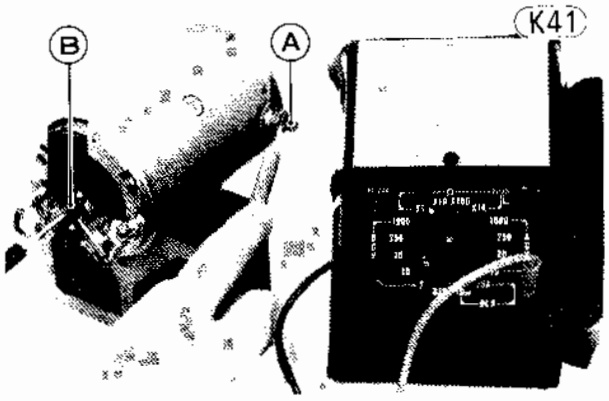


A. Commutator **B. Shaft**

Even if the foregoing checks shows the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the armature with a new one.

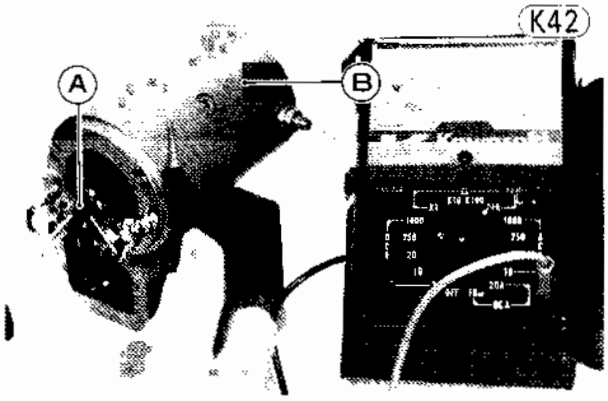
Field coils

Using the x 1 Ω ohmmeter range, measure the resistance between the (+) side carbon brush and the starter motor terminal. If there is not close to zero ohms, the field coils have an open and the yoke assembly must be replaced.



A. Terminal **B. (+) Side Carbon Brush**

Using the highest ohmmeter range, measure the resistance between the (+) side carbon brush and the yoke (housing). If there is any meter reading, the coils are shorted to ground and the yoke assembly must be replaced.

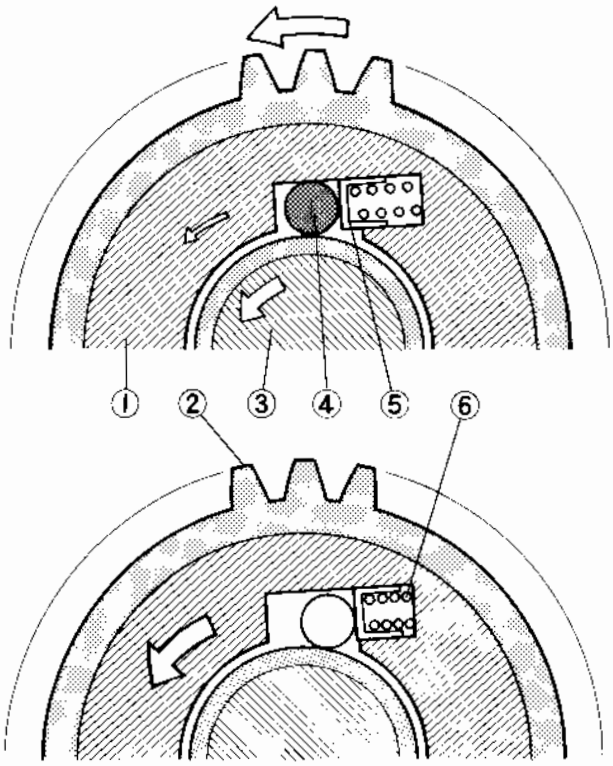


A. (+) Side Carbon Brush **B. Yoke**

Starter Motor Clutch

Fig. K43 shows starter motor clutch. The clutch body ① is connected to the crankshaft ③ through the secondary sprocket and the primary chain. When the starter clutch gear ② rotates in the direction of the arrow, each of the three rollers ④, pushed by its spring ⑤, is wedged into the narrower space between the clutch body and the starter clutch gear hub (the portion jutting out from the gear), thereby locking the clutch body and starter clutch gear together. With these two locked, starter motor rotation is transmitted to the crankshaft through the starter idle gear, starter clutch gear, rollers, clutch body, secondary sprocket, and primary chain.

Starter Motor Clutch Operation (K43)



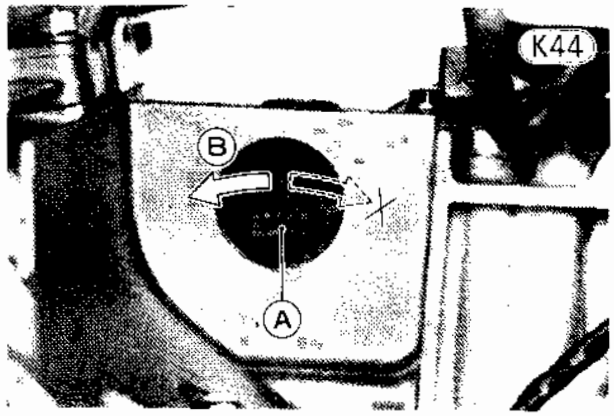
1. Clutch Body
2. Clutch Gear
3. Crankshaft
4. Roller
5. Spring Cap
6. Spring

When the engine starts, friction with the starter clutch gear (and at higher speeds, inertia) moves the rollers back against the tension of their springs so that they no longer serve as wedges locking the clutch body and starter clutch gear together. In this manner, the engine rotates freely without forcing the starter motor to turn with it.

If the rollers or the starter clutch gear hub becomes damaged or worn, the rollers may lock in place so that the starter motor will not disengage when the engine starts. On the other hand, roller or sprocket hub damage could prevent the clutch from engaging properly, causing the starter motor to run freely without transmitting rotation.

Clutch inspection

Remove the starter motor (Pg. 73), and turn the starter motor idle gear by hand. When viewed from the left side of the engine, the starter motor idle gear should turn counterclockwise freely, but should not turn clockwise. If the clutch does not operate as it should or if it makes noise, disassemble the starter clutch (Pg. 87), examine each part visually, and replace any worn or damage parts.



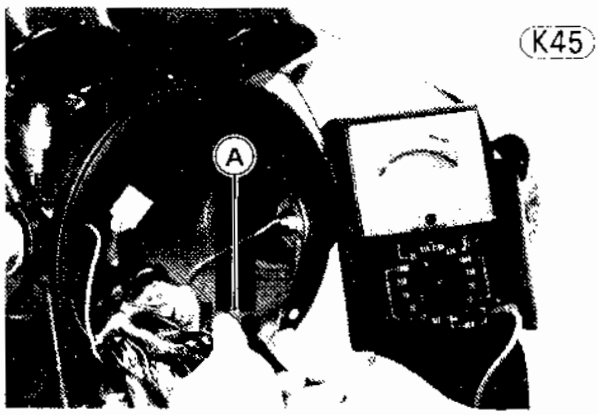
A. Starter Motor Idle Gear B. Turn freely.

IGNITION SWITCH

The ignition switch has four positions: off, on, lock, and park. In the off and lock position all circuits are turned off and the key can be removed from the switch. In the on position the motorcycle can be started and all electrical equipment can be used. The key cannot be removed from the switch when it is in the on position. In the park position the tail light is on, but all other circuits are cut off and the key can be removed from the switch. This provides added visibility when the motorcycle is parked.

Testing the switch

Table K10 shows the internal connections of the ignition switch for each switch position. To check the switch, remove the headlight unit (Pg. 137), and disconnect the 6-pin connector from the switch. Then 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 there are any opens or shorts in the switch, replace it with a new one.



A. 6-pin Connector

Table K10 Ignition Switch Connections

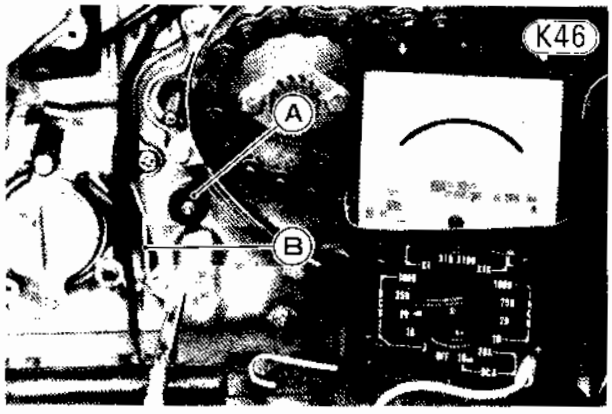
Lead	Ignition	Battery	Tail 3	Tail 1	Tail 2
Color	Yellow	White	Brown	Blue	Red
OFF					
ON	●	●	●	●	●
PARK		●	●		●

NEUTRAL SWITCH

A neutral indicator light is provided so that the rider can readily determine whether or not the transmission is in neutral. The neutral switch, installed in the external shift mechanism cover, consists of a spring loaded pin which contacts the outer surface of the shift drum pin plate when the transmission is in neutral. This completes the neutral indicator light circuit, which turns on the neutral indicator light.

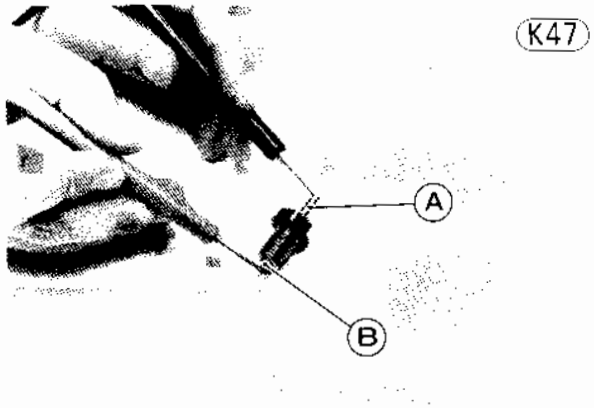
Switch inspection

- Turn on the ignition switch. Watching the indicator light, shift the transmission into neutral and then shift the transmission into other positions. If the neutral indicator light goes on in neutral position and the light does not go on in other positions, the neutral switch is good.
- If the neutral indicator light does not go on in the neutral position or if it does go on in other positions, remove the engine sprocket cover, (Pg. 69), and disconnect the neutral switch light green lead.
- To check for the voltage, first turn the meter to 20V 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.



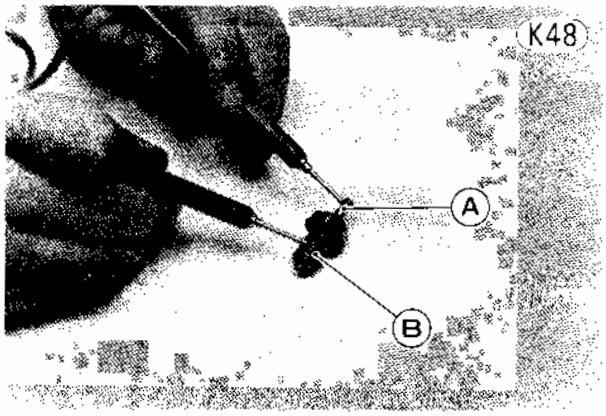
A. Neutral Switch **B. Switch Lead**

- To check the neutral switch, first remove the switch (Pg. 73), 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**

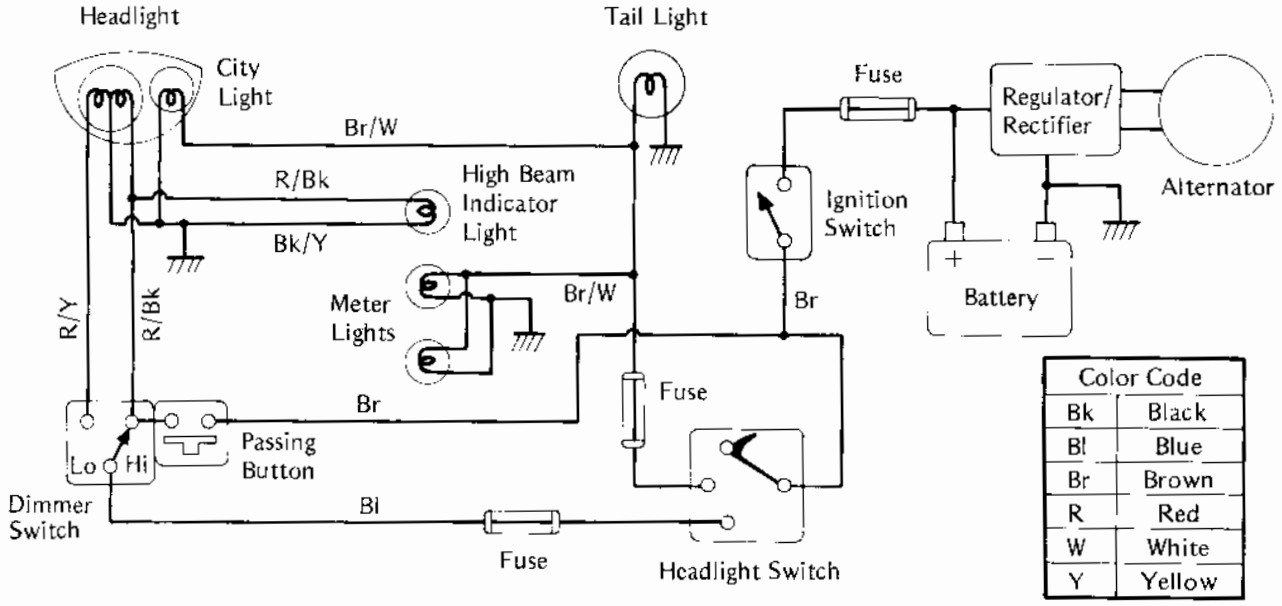
LIGHTING SYSTEM

Headlight Circuit

Fig. K49 is the wiring diagram of the headlight circuit.

With the ignition switch on, the center CL (○) position of the headlight switch turns on the small city light in the headlight housing, tail light and meter lights for driving in the city after dark. When the switch is turned to the on position, the headlight illuminates and the city light stays on. High and low beam can be selected only when the headlight switch is in the on position.

Headlight Circuit (K49)



There is also a passing and horn button. This button is spring loaded and when the button is pushed to pass, the high beam light (but not the tail light) comes on as a passing signal to the driver of the vehicle ahead. The passing button will light the high beam light regardless of the headlight switch position, and the button will spring back and turn the light off as soon as it is released.

Headlight trouble

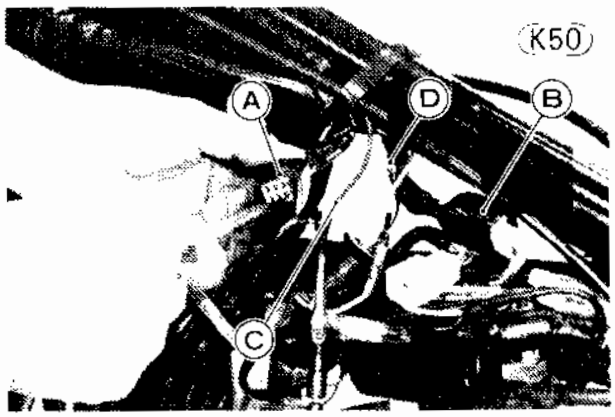
If the headlight does not light, check to see if the bulb has burned out or fuses have blown. A burned headlight and a blown fuse should be replaced. If the bulb and fuses are good, check the headlight switch and dimmer switch. Tables K11 and K12 show the connections in the dimmer switch for both high and low beam and the connections in the headlight switch. Remove the fuel tank, and disconnect the 6-pin connector and blue lead to the dimmer switch or the 4-pin connector and blue/white lead to the headlight switch. Use an ohmmeter to see that only the connections shown in the table have continuity (zero ohms). If the switch has an open or a short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement. If any parts are not repairable, the switch must be replaced as a unit. If the procedure above does not remedy the problem, check the ignition switch and the wiring.

Table K11 Dimmer Switch Connections

	Red/Black	Blue	Red/Yellow
Hi	●	●	
Lo		●	●

Table K12 Headlight Switch Connections

	Brown/White	Brown	Blue/White
OFF			
○	●	●	
ON	●	●	●



A. 6-pin Connector
B. 4-pin Connector
C. Blue Lead
D. Blue/White Lead

If the headlight lights but does not light brightly, the trouble may be that the headlight is of improper wattage or the alternator is not supplying sufficient current. However, the trouble may also be caused by a short or a component drawing too much current in other part of the electrical system.

Tail light trouble

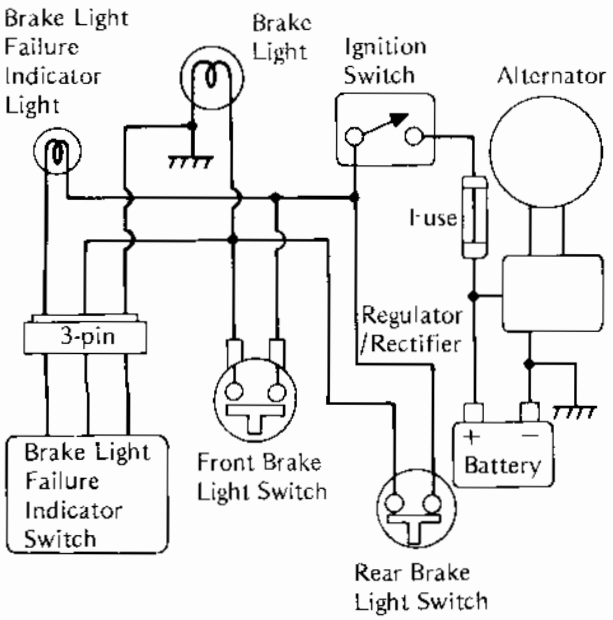
If the tail light does not go on when the circuit is closed, the filament is probably burned out. However,

if the bulb is good, check the fuses, wiring, ignition switch, headlight switch, and battery.

Brake Light Circuit

The brake light circuit is shown in Fig. K51. When the ignition switch is turned on, the brake light goes on whenever the circuit is closed by either the front or rear brake light switch. The same bulb is used for both the brake and tail lights as explained in the preceding section.

Brake Light Circuit (K51)



The front brake light switch, mounted on the front brake lever holder, is actuated when pressed by the front brake lever. The front brake light switch never requires adjustment, and so is not designed to be adjusted. It cannot be disassembled for repair and must be replaced when defective.

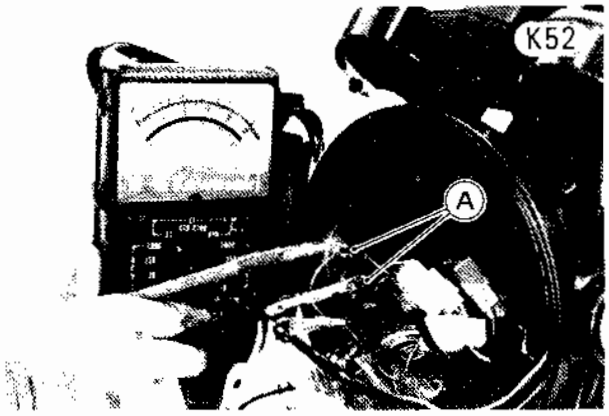
The rear brake light switch is a plunger type switch actuated by a spring attached to the rear brake pedal. It can be adjusted by changing its position higher or lower in the mounting bracket (Pg. 30).

The brake light failure indicator switch is in the brake light circuit as a warning device to indicate whether or not the brake light is functioning properly during vehicle operation. Brake light failure may be due to a burned out bulb or some other failure in the brake light circuit.

Brake light circuit inspection involves the front brake light switch, rear brake light switch, brake light, brake light failure indicator switch, brake light failure indicator light, and wiring.

Front brake light switch inspection

- Remove the headlight unit (Pg. 137).
- Disconnect the front brake light switch leads (brown and blue).
- Set an ohmmeter to the x 1 Ω range, connect the meter to the switch terminals, and determine whether or not there is continuity whenever the front brake lever is squeezed.

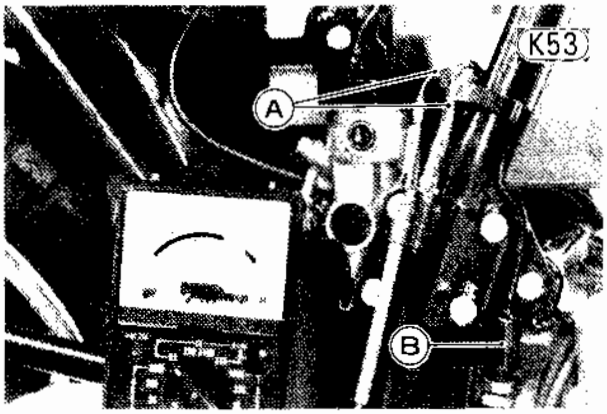


A. Front Brake Light Switch Leads

- If there is no continuity, replace the switch.

Rear brake light switch inspection

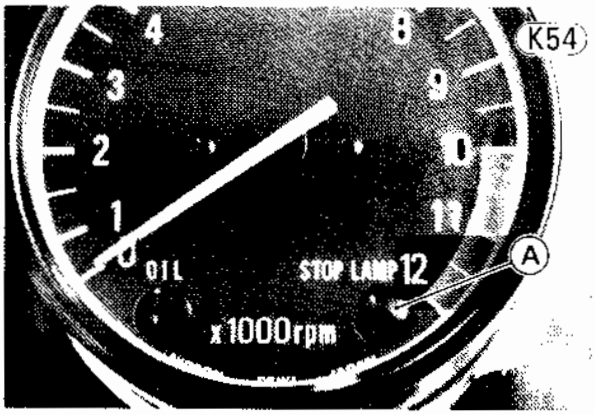
- Disconnect the rear brake light switch leads (blue and brown) in the right side cover.
- Inspect in the same way that the front brake light switch was inspected. If there is no continuity whenever the rear brake pedal is depressed, replace the switch.



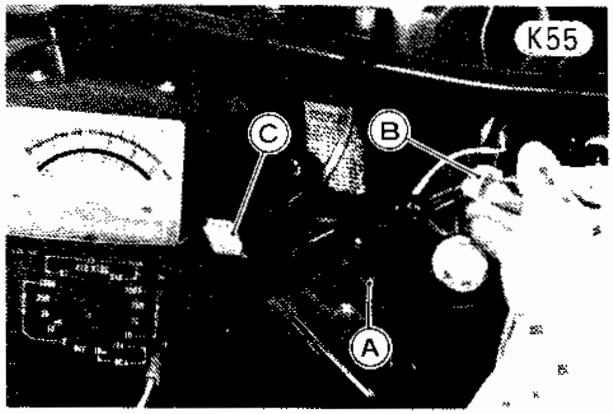
A. Rear Brake Light Switch Leads
B. Rear Brake Light Switch

Brake light failure indicator switch inspection

Turn on the ignition switch. Watching the indicator light (stop lamp), apply and then release either brake. Next, with the tail/brake light bulb removed, do the same above. If the indicator lights operates as shown in Table K13, the brake light failure indicator switch and brake light circuit are functioning properly.



A. Indicator Light



A. Brake Light Failure Indicator Switch
B. 3-pin Socket C. 3-pin Plug

Table K13 Brake Light Failure Indicator Switch Test

		Brake Lever or Pedal	
		Applied	Released
Tail/Brake Light Bulb	In place	Goes On	Goes Off
	Out of place	Goes On	Flashes

If the brake light failure indicator does not function properly, find out whether the brake light wiring is defective or the failure indicator switch is defective. The easiest way to test the failure indicator switch is to install and check the suspect switch on a motorcycle with a known good brake light circuit. When this method is impossible, check the circuit as follows (the battery must be charged).

(1) Brake light wiring inspection:

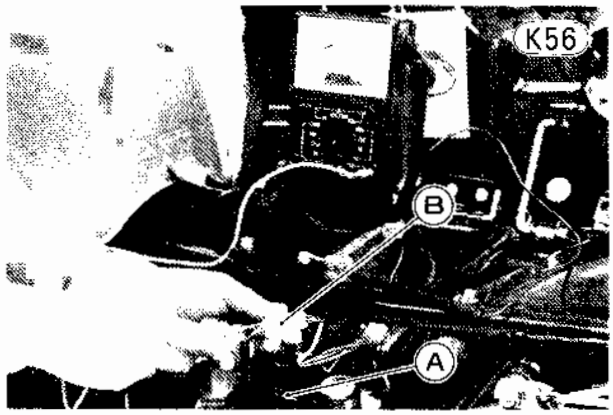
- Check brake light operation and replace any defective parts. The brake light must go on only when the brake is applied.
- Remove the left side cover, open the electrical cover, and disconnect the indicator switch 3-pin plug.
- Set an ohmmeter to the x 1 Ω range and voltmeter to the 20V DC range. Check the wiring as shown in Table K14.

CAUTION **To prevent a meter burning, turn off the ignition switch while using an ohmmeter.**

If the meter does not read according to this table, there may be an open or short. In case the voltage of the green/white lead shows 0 V, the indicator bulb may be burned out.

(2) Brake light failure indicator switch inspection:

- Make sure that the brake light operates properly, and that the brake light wiring is not damaged.
- Connect the indicator switch 3-pin connector.
- Measure the voltage at the 3-pin connector as shown in Table K15.



A. Brake Light Failure Indicator Switch
B. 3-pin Connector

Table K14 Brake Light Wiring Inspection

Meter Range	Connections	Brake	Reading
20V DC	Meter (+) Lead → Blue Lead Meter (–) Lead → Chassis Ground	Apply	Battery Voltage
		Release	0 V
	Meter (+) Lead → Green/White Lead Meter (–) Lead → Chassis Ground	—	Battery Voltage
x 1 Ω	Black/Yellow Lead ↔ Chassis Ground	—	0 Ω

Table K15 Indicator Switch Inspection

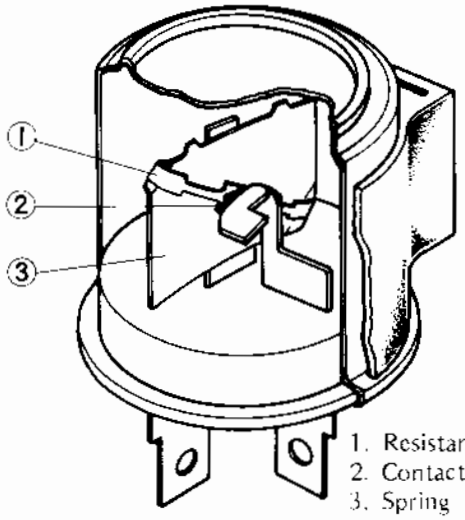
Meter Range	Connections	Brake	Reading
20V DC	Meter (+) Lead → Yellow Lead Meter (–) Lead → Chassis Ground	Apply	Battery Voltage
		Release	0 V
	Meter (+) Lead → Green/White Lead Meter (–) Lead → Chassis Ground	Apply	0 V
		Release	Battery Voltage

If any one of the meter readings shows an improper value, the brake light failure indicator switch is defective.

Turn Signal Circuit

A wiring diagram of the turn signal circuit is shown in Fig. K58. When the ignition switch is on and the turn signal switch is turned to R or L, a ground is provided for the circuit so current can flow. Current to the right or left turn signals flows through the closed contacts and the resistance wire inside the turn signal relay, and the turn signals go on. The resistance wire quickly heats up, expands, and allows a spring to pull the contacts open. When the contacts have opened, the circuits is broken, the turn signals go off, and the resistance wire cools and contracts, closing the contacts so that the cycle can begin again. The indicator light in the turn signal circuit flashes on and off with the turn signals to indicate that they are working properly.

Turn Signal Relay (K57)



1. Resistance Wire
2. Contacts
3. Spring

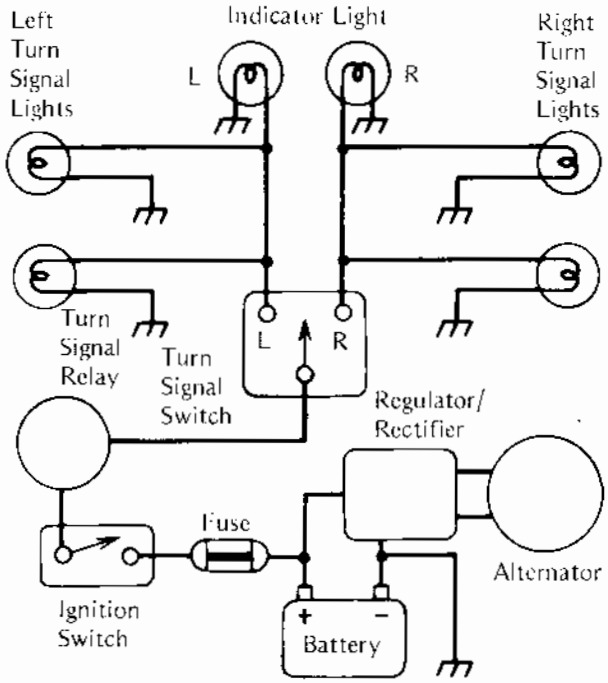
Since the turn signal relay is designed to operate correctly only when two turn signals (one front and one rear) and the turn signal indicator light are properly connected in the circuit, trouble may result from a burned out bulb, a bulb of incorrect wattage, loose wiring, as well as from a defect in 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 side.

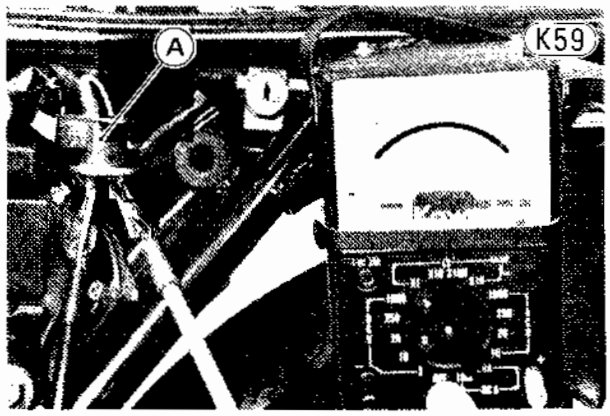
Turn signal trouble

(1)Neither right nor left turn signals come on at all:

- Check that battery voltage is normal.
- Remove the left side cover, and open the electrical cover.
- Unplug the brown lead and orange lead from the relay, and use an ohmmeter to check that there is continuity (close to zero ohms) between the relay terminals. If there is no ohmmeter reading, or if there is several ohms resistance, replace the relay with a new one.

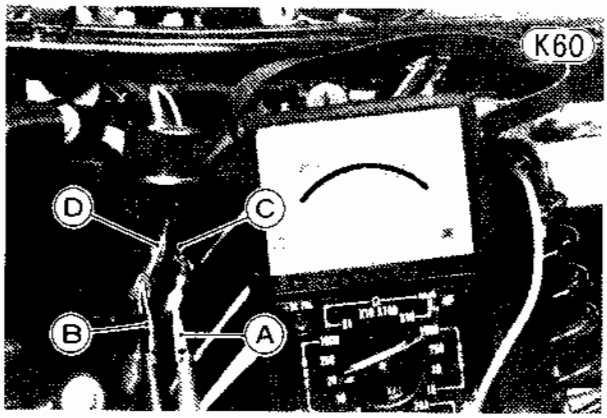
Turn Signal Circuit (K58)





A. Turn Signal Relay

- If the relay checks good, turn the meter to the 20V 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 resister 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 signals still will not work when the relay is reconnected, then recheck all wiring connections.



A. Meter (+) Lead
B. Meter (–) Lead
C. Brown Lead
D. Orange Lead

(2)Both right or both left turn signal 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.

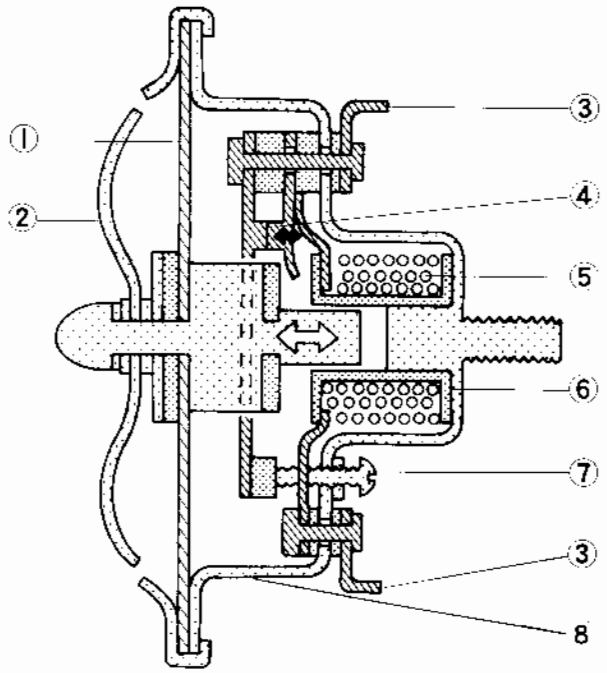
(4)Neither light on one side comes on:
- •Unless both lights for that side are burned out, the trouble is with the turn signal switch.

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

HORN

The horn construction is shown in Fig. K61. When the horn button is pressed with the ignition switch on, the horn is grounded to complete the horn circuit. Current then flows through the horn contacts and horn coil, magnetizing the iron core. The magnetized iron core pulls on the armature and diaphragm assembly, the movement of which pushes open the contacts, interrupting the current flow. Since the core now loses its magnetism, the armature and diaphragm assembly springs back to its original position, closing the contacts. This cycle repeats until the horn button is released. Since each cycle takes only a fraction of a second, the diaphragm moves fast enough to produce sound.

Horn Construction (K61)



1. Diaphragm
2. Ringer Disc
3. Horn Terminal
4. Contacts
5. Coil
6. Insulator
7. Adjusitng Screw
8. Housing

The contacts wear down after long use, requiring adjustment from time to time. If the horn itself is determined to be at fault and adjustment fails to correct the trouble, the contacts or some other component in the horn is defective. The horn cannot be disassembled and must be replaced if defective.

Horn adjustment

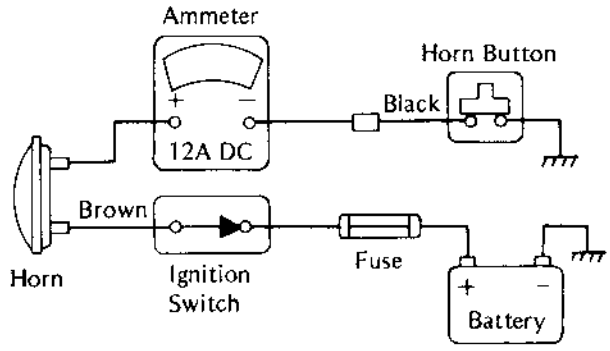
The horn contacts wear down after long use and may need to be adjusted from time to time. Turning in the adjusting screw compensates for contact wear. If satisfactory horn performance cannot be obtained by this adjustment when the rest of the electrical system is functioning properly, the horn must be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

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

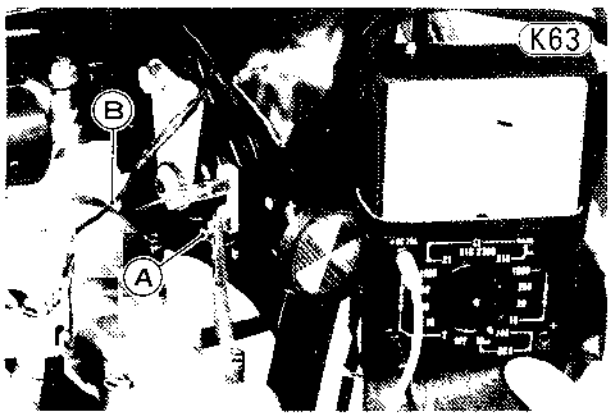
CAUTION **Do not turn the adjusting screw in too far, since doing so will increase horn current with the possibility of burning out the horn coil.**

•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 (K62)



•Fully loosen the adjusting screw locknut.
•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 2.0 ~ 3.0 amperes.

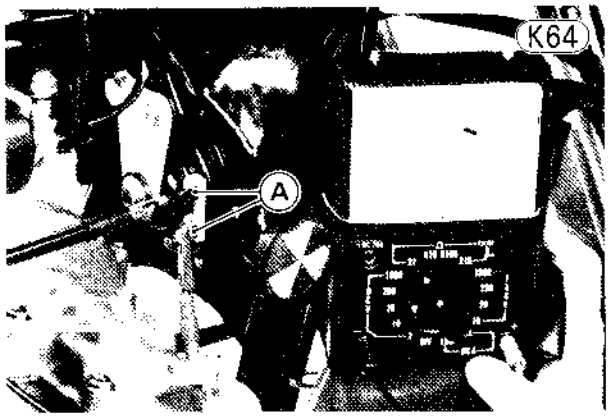


A. Horn Adjusting Screw **B. Black Lead**

•Tighten the adjusting screw locknut.
NOTE: The horn will not sound properly if it is mounted incorrectly or if any cable or other part is touching it.

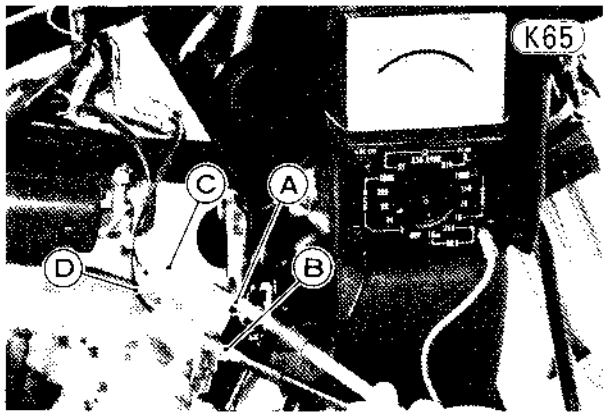
Horn trouble

•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 20V 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, or the wiring is at fault.



A. Meter (+) Lead **C. Brown Lead**
B. Meter (–) Lead **D. Black Lead**

•If the meter does show battery voltage, indicating that the horn trouble lies within the horn itself, and adjustment fails to correct the trouble, replace the horn.
NOTE: Do not loosen the armature mounting since doing so would alter the armature position such that the horn would probably have to be replaced.

SPEEDOMETER, TACHOMETER

The speedometer and tachometer are sealed units which cannot be disassembled. If either fails to work satisfactorily, it must be replaced as a complete unit.

The speedometer and tachometer lights and the indicator lights are independent and can be removed for replacement if necessary.

Troubleshooting—Guide

Engine Doesn't Start, Starting Difficulty

Starter motor not rotating
- Clutch lever not pulled
- Starter lockout switch trouble
- Starter motor trouble
- Battery voltage low
- Relay not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Engine stop switch off
- Fuse blown

Starter motor rotating but engine doesn't turn over
- Starter motor clutch defective

Engine won't turn over
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Secondary shaft bearing seizure
- Primary chain broken

No fuel flow
- No fuel in tank
- Sticking of the valve in the automatic fuel tap
- Fuel tap vacuum hose clogged
- Tank cap air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

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

No spark; spark weak
- Battery voltage low
- Ignition switch not on
- Engine stop switch turned off
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- Contact breaker points dirty or damaged
- Contact breaker point gap maladjusted
- Capacitor trouble
- Ignition coil trouble
- Ignition or engine stop switch shorted
- Wiring shorted or open

Compression low
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed

Spark weak
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Contact breaker points dirty or damaged
- Contact breaker point gap maladjusted
- Capacitor trouble
- Ignition coil trouble

Fuel/air mixture incorrect
- Air screw maladjusted
- Pilot jet, or air passage clogged
- Pilot jet bleed holes clogged
- Main jet clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed or missing
- Choke valve closed
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose

Compression low
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Other
- Ignition timing maladjusted
- Timing not advancing (spring broken or stretched)
- Carburetors not synchronizing
- Throttle valve doesn't slide smoothly
- Engine oil viscosity too high
- Brake dragging

Poor Running or No Power at High Speed

Firing incorrect
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Contact breaker points dirty or damaged

Contact breaker point gap maladjusted
Capacitor trouble
Ignition coil trouble
Ignition timing maladjusted and/or timing not advancing
Contact breaker spring weak

Fuel/air mixture incorrect
Choke valve closed
Main jet clogged or wrong size
Jet needle or needle jet worn
Air jet clogged
Fuel level too high or too low
Bleed holes of main jet bleed pipe or needle jet clogged
Air cleaner clogged, poorly sealed, or missing
Air cleaner duct poorly sealed
Water or foreign matter in fuel
Carburetor holder loose
Air cleaner duct loose
Fuel tank air vent obstructed
Fuel tap clogged
Fuel line clogged

Compression low
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/land clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn or carbon accumulation on the seating surface.)

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

Miscellaneous
Throttle valve won't fully open
Throttle valve don't slide smoothly
Ignition timing maladjusted
Timing not advancing
Brake dragging
Clutch slipping
Overheating
Engine oil level too high
Engine oil viscosity too high

Overheating

Firing incorrect
Spark plug dirty, damaged, or maladjusted
Spark plug incorrect
Ignition timing maladjusted

Fuel/air mixture incorrect
Main jet clogged or wrong size
Fuel level too low
Carburetor holder loose
Air cleaner poorly sealed, or missing
Air cleaner duct poorly sealed
Air cleaner clogged

Compression high
Carbon built up in combustion chamber

Engine load faulty
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Brake dragging

Lubrication inadequate
Engine oil level too low
Engine oil poor quality or incorrect

Clutch Operation Faulty

Clutch slipping
No clutch lever play
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch release maladjusted
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
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch release mechanism trouble
Loosen clutch hub nut

Gear Shifting Faulty

Doesn't go into gear; shift pedal doesn't return
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Shift drum positioning pin binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Shift pawl broken

Jumps out of gear
Shift fork worn
Gear groove worn
Gear dogs, dog holes, and/or dog recesses worn
Shift drum groove worn
Shift drum positioning pin spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts
Shift drum positioning pin spring weak or broken
Overshift limiter pawl broken
Shift mechanism arm spring broken

Abnormal Engine Noise

Knocking
Ignition timing maladjusted

Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating

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

Valve noise
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Valve lifter worn

Other noise
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken, or stuck
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose
Crankshaft bearing worn
Primary chain worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Loose alternator rotor

Abnormal Drive Train Noise

Clutch noise
Weak or damaged shock rubber damper
Clutch housing/friction plate clearance excessive

Transmission noise
Bearing worn
Transmission gear worn or chipped
Metal chip jammed in gear teeth
Engine oil insufficient or too thin

Drive chain noise
Drive chain adjusted improperly
Chain worn
Rear, engine sprocket 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 trouble

Disc brake noise
Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper defective
Cylinder damaged

Other noise
Bracket, nut, bolt, etc. not properly mounted or tightened

Exhaust Smokes Excessively

White smoke
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

Black smoke
Air cleaner clogged
Main jet too large or fallen off
Choke valve closed
Fuel level too high

Brown smoke
Main jet too small
Fuel level too low
Air cleaner duct loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory

Handlebar hard to turn
Steering stem locknut too tight
Bearing ball damaged
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 needle bearing worn
Rim warped, or not balanced
Front, rear axle runout excessive
Wheel bearing worn
Handlebar clamp loose
Steering stem head bolt and/or clamp bolt loose

Handlebar pulls to one side
Frame bent
Wheel misalignment
Swing arm bent or twisted
Steering stem bent
Front fork bent
Right/left fork legs oil level uneven
Right/left rear shock absorbers unbalanced

Shock absorption unsatisfactory
Too hard:
Front fork oil excessive
Front fork oil viscosity too high
Tire air pressure too high
Rear shock absorber maladjusted
Front fork bent
Too soft:
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

Brakes Don't Hold

Disc brake
Air in the brake line
Pad or disc worn
Brake fluid leak

Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup trouble
Master cylinder scratched inside

Oil Pressure Indicator Light Goes On

Engine oil pump defective
Engine oil pump screen clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearings worn
Crankshaft bearings worn
Oil pressure switch trouble
Wiring defective
Relief valve stuck open

Battery Discharged

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Battery leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Regulator/rectifier trouble
Ignition switch trouble
Alternator trouble
Wiring faulty

Battery Overcharged

Regulator/rectifier trouble
Battery trouble

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

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M

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 MOTORCYCLE 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.

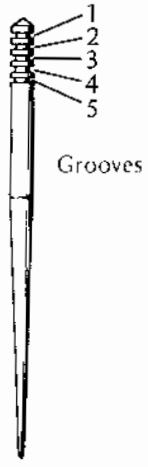
- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used 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 (M1)



NOTE: The last digit of the jet needle number ("2" of 4C91-2) is not stamped on the needle, but is the number of the standard groove in which the clip is set. The groove numbers are counted from the top of the needle, 1 being the topmost groove, and 5 being the lowest groove.

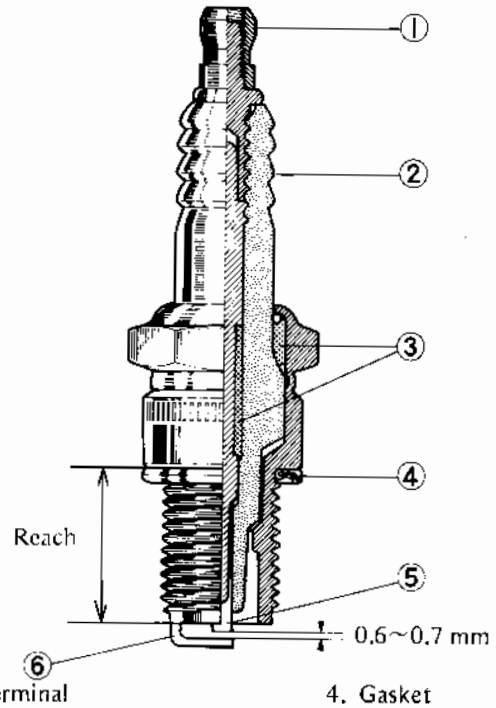
Spark Plug

The spark plugs ignite the fuel/air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plugs must be used, and the spark plugs must be kept clean and adjusted.

Tests have shown the NGK D8EA or ND X24ES-U, set to a 0.6~0.7 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.

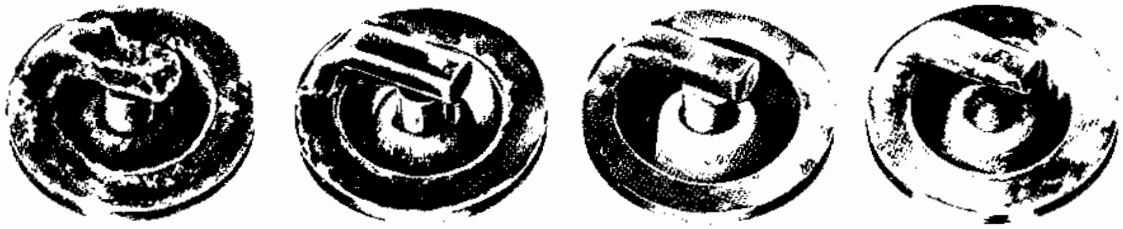
When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400~800°C (750~1,450°F) and can be judged by noting the condition and color of the 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 (M2)



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

Spark Plug Condition (M3)



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 plugs:

Remove each 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. For racing, install the colder plug.

CAUTION **If the spark plugs are replaced with a new one, make certain the replacement plugs have the same thread pitch and reach (length of threaded portion) as the standard plugs.**

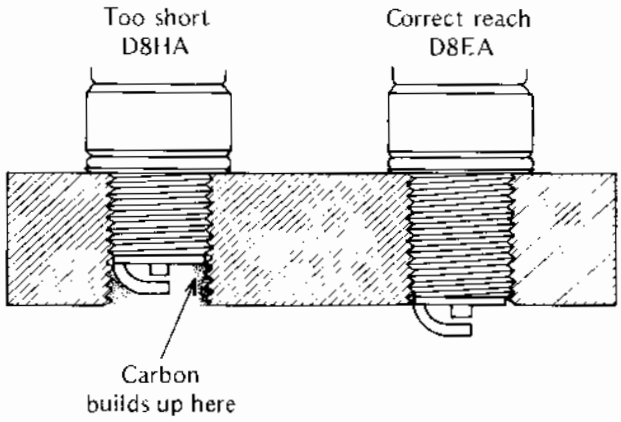
Table M1 Spark Plug Specifications

Required Plug Threads	Type
Diameter : 12.0 mm Pitch : 1.25 mm Reach : 19.0 mm	NGK D8EA ND X24ES-U

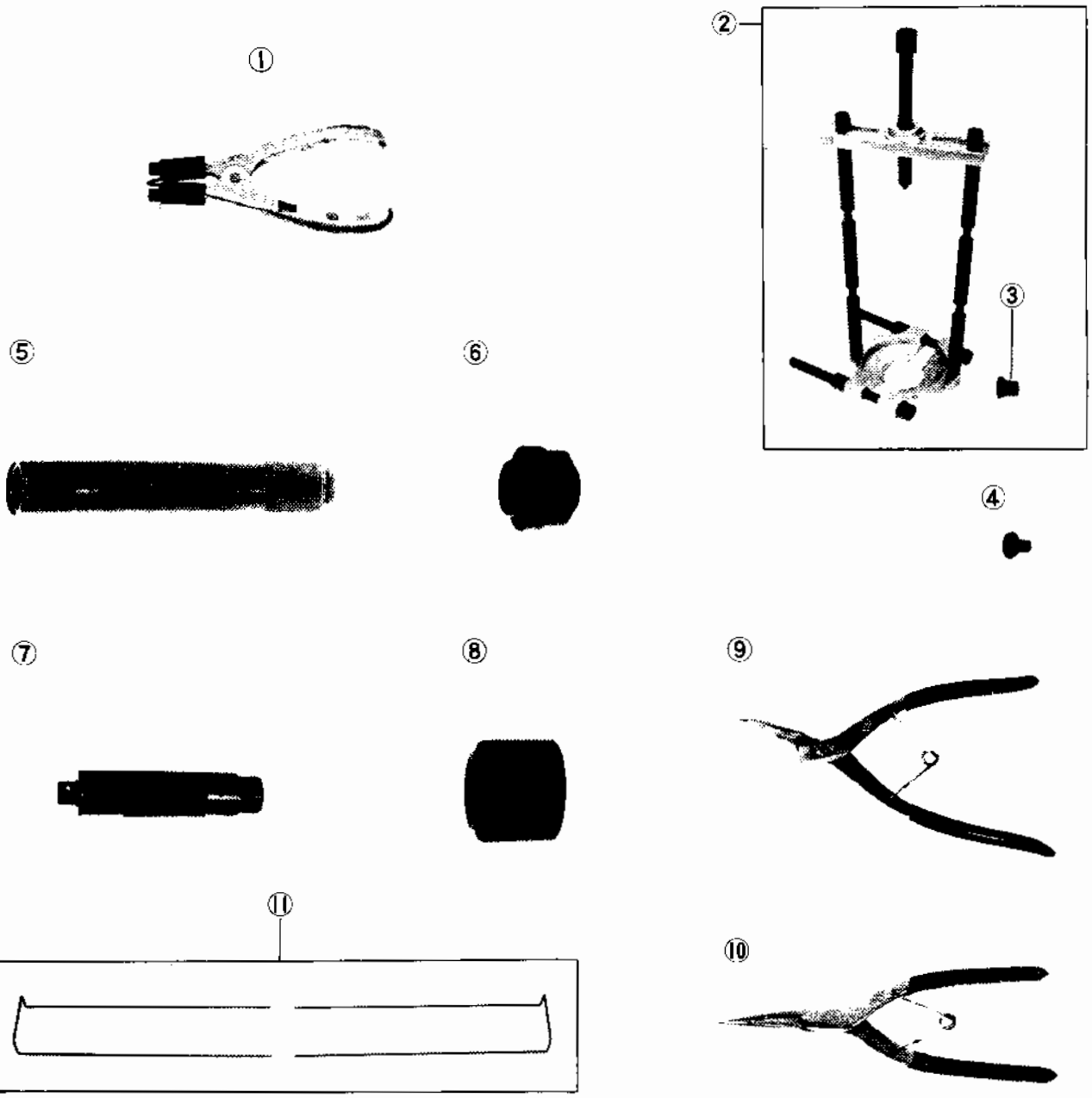
If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.

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.

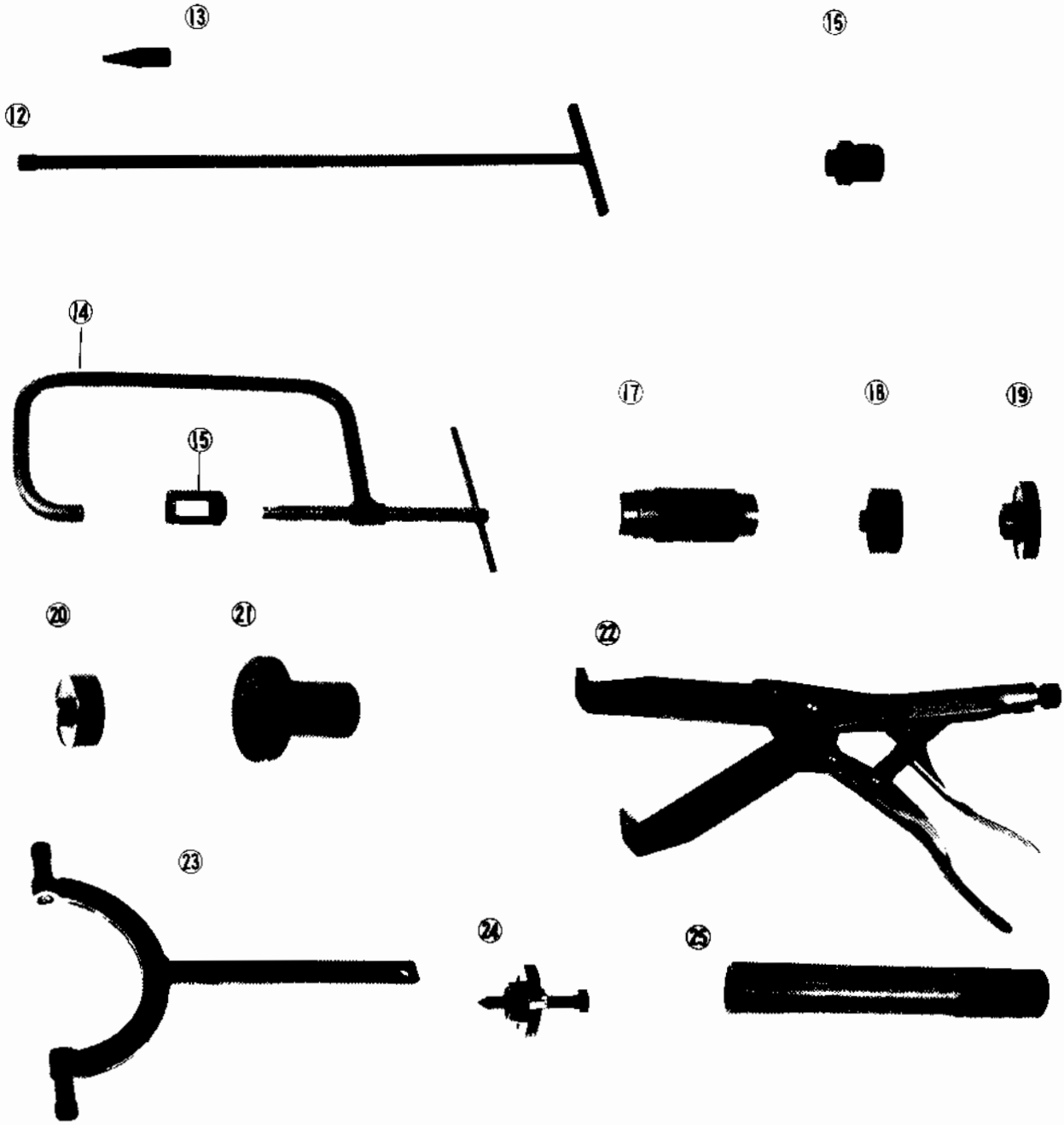
Spark Plug Reach (M4)



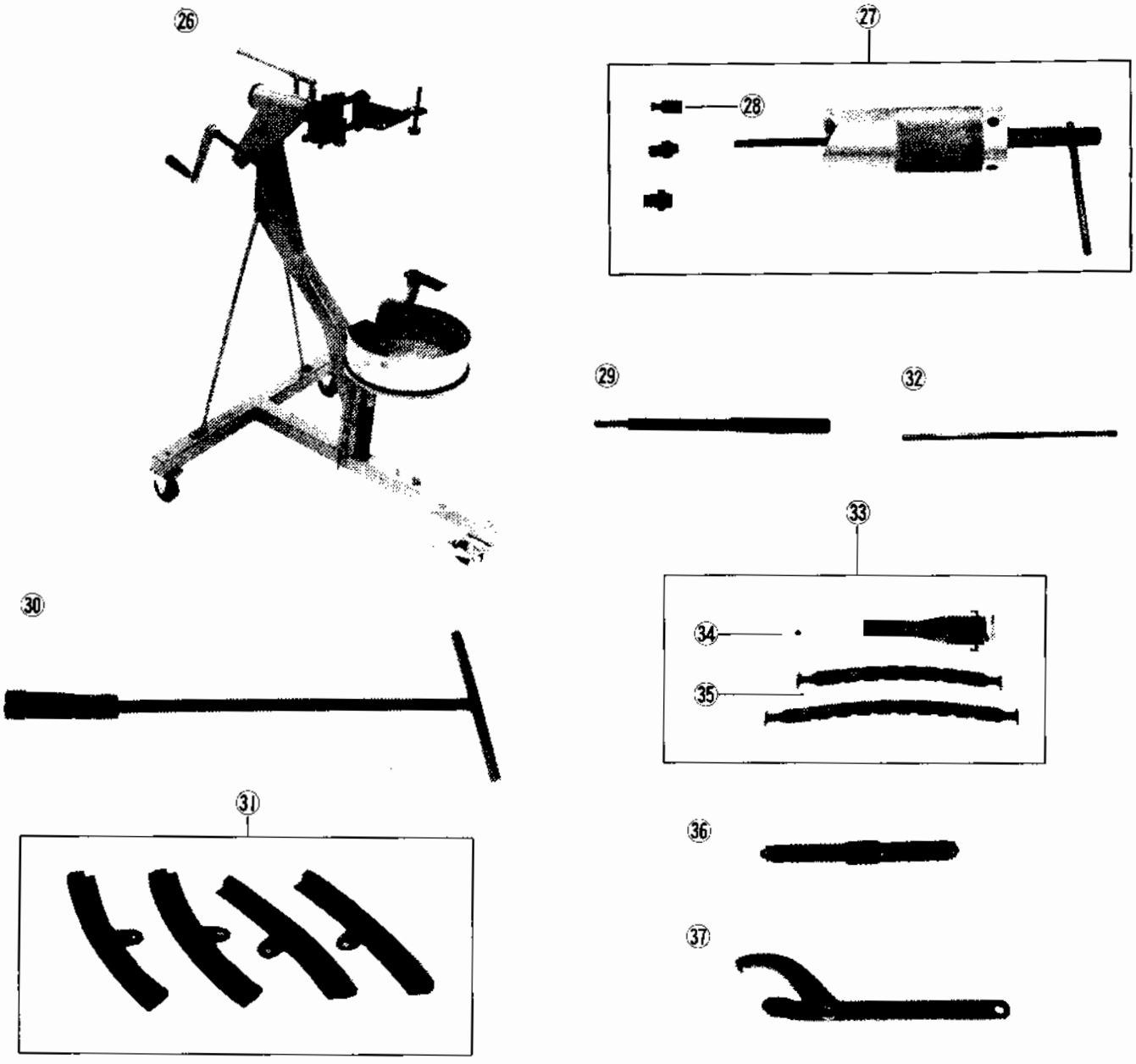
SPECIAL TOOLS



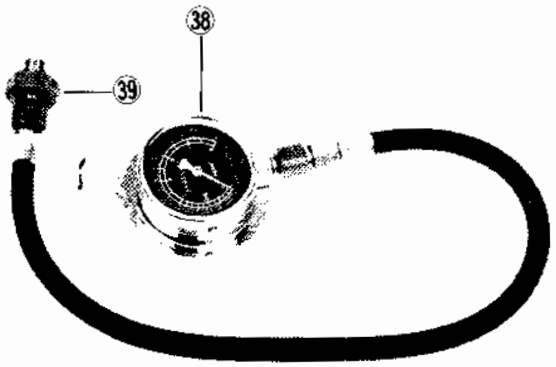
REF. NO.	PART NO.	DESCRIPTION	Q'TY
1	57001-115	PISTON RING PLIERS	1
2	57001-135 (or P/N 57001-158)	BEARING PULLER	1
3	57001-136	BEARING PULLER ADAPTER	(–)
4	57001-317	BEARING PULLER ADAPTER	1
5	57001-137	STEM BEARING DRIVER	1
6	57001-138	STEM CUP DRIVER	1
7	57001-139	BEARING DRIVER HOLDER	1
8	57001-141	FRONT FORK OIL SEAL DRIVER	1
9	57001-143	INSIDE CIRCLIP PLIERS	1
10	57001-144	OUTSIDE CIRCLIP PLIERS	1
11	57001-149	PISTON BASES	1 set

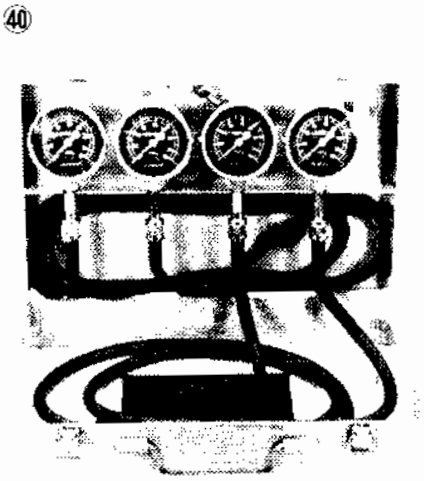


REF. NO.	PART NO.	DESCRIPTION	Q'TY
12	57001-183	FRONT FORK CYLINDER HOLDER HANDLE	1
13	57001-1011	FRONT FORK CYLINDER HOLDER ADAPTER	1
14	57001-241	VALVE SPRING COMPRESSOR ASS'Y	1
15	57001-1078	VALVE SPRING COMPRESSOR ADAPTER	1
16	57001-264	OIL SEAL GUIDE	1
17	57001-287	BEARING DRIVER	1
18	57001-288	BEARING DRIVER	1
19	57001-289	BEARING DRIVER	1
20	57001-290	BEARING DRIVER	1
21	57001-297	BEARING DRIVER	1
22	57001-305	CLUTCH HOLDER	1
23	57001-308	ROTOR HOLDER	1
24	57001-319	GEAR PULLER & PUSHER	1
25	57001-382	DRIVER	1



REF. NO.	PART NO.	DESCRIPTION	Q'TY
26	57001-900	ENGINE STAND	1
27	57001-910	PISTON PIN PULLER ASS'Y	1
28	57001-913	PISTON PIN PULLER ADAPTER "A"	(–)
29	57001-1021	VALVE GUIDE ARBOR	1
30	57001-1024	SPARK PLUG WRENCH	1
31	57001-1063	RIM PROTECTORS	1 set
32	57001-1079	VALVE GUIDE REAMER	1
33	57001-1094	PISTON RING COMPRESSOR ASS'Y	4
34	57001-1095	PISTON RING COMPRESSOR GRIP	(–)
35	57001-1096	PISTON RING COMPRESSOR ADAPTER	(–)
36	57001-1099	ROTOR PULLER	1
	(or P/N 57001-254)		
37	57001-1100	STEM NUT WRENCH	1

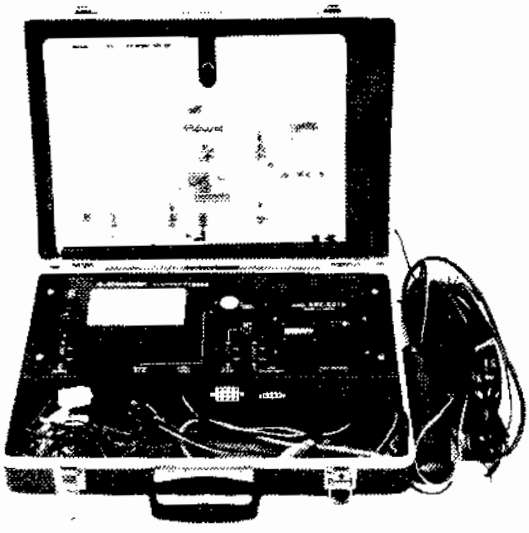








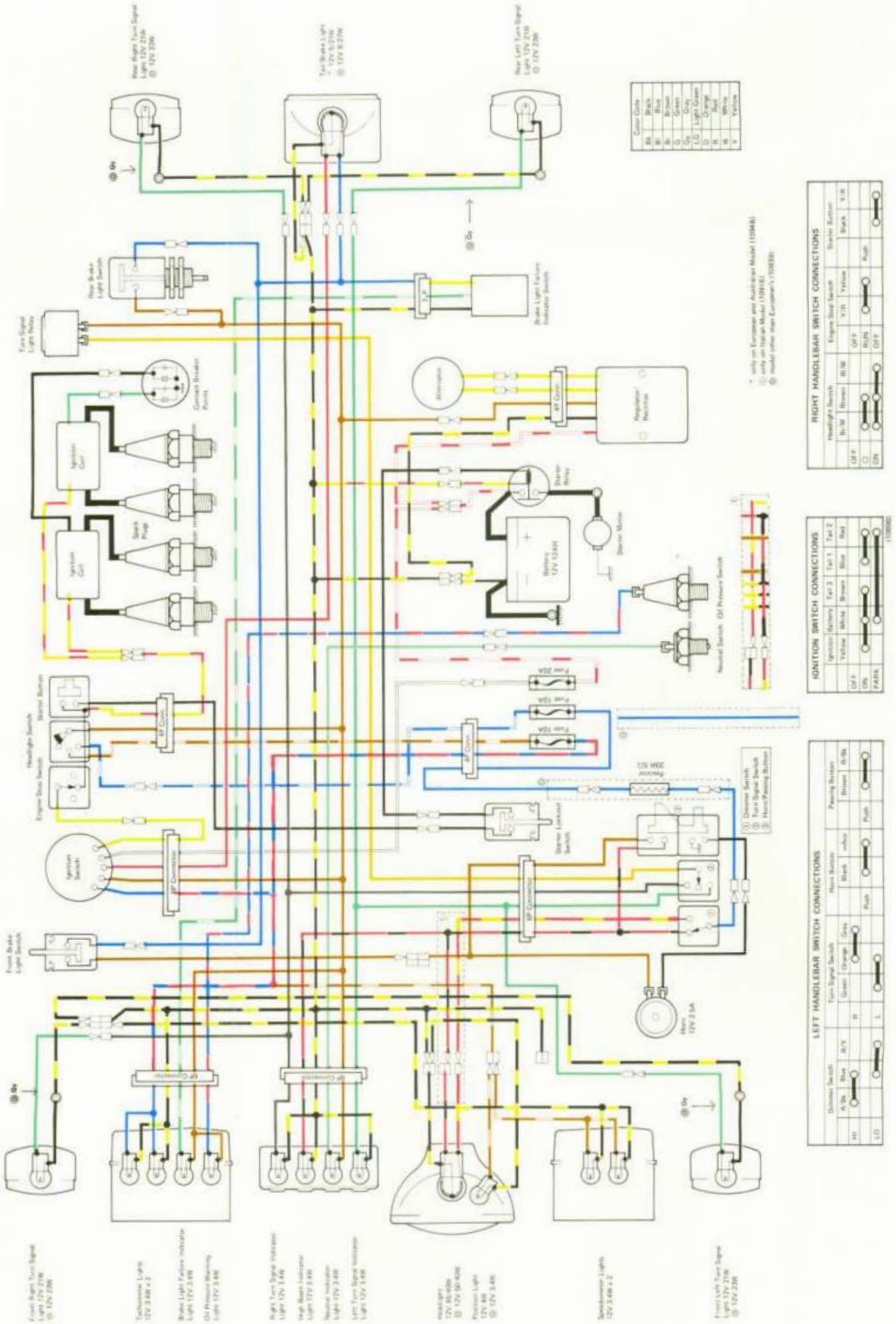






REF. NO.	PART NO.	DESCRIPTION	Q'TY
38	57001-125	OIL PRESSURE GAUGE ASS'Y	1
39	57001-403	OIL PRESSURE GAUGE ADAPTER	1
40	57001-127	VACUUM GAUGE SET	1
41	57001-221	COMPRESSION GAUGE	1
42	57001-1018	COMPRESSION GAUGE HOSE	1
43	57001-980	ELECTROTESTER	1
44	57001-983	HAND TESTER	1
45	57001-1017	FUEL LEVEL GAUGE	1

KZ500-B1 Wiring Diagram



Supplement

This Supplement is designed to be used in conjunction with the front part of this Service Manual (up to Pg. 248). 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.

This Supplement is divided into few sections. Each section is annually added to the preceding section, and explains procedures per one year unit that are unique to the latest year unit. Complete and proper servicing of later year units therefore requires mechanics to read (1) the section corresponding to the year unit they work at, (2) the previous section(s), and (3) the text in front of this Service Manual.

NOTE: The maintenance and repair procedures for the variation models (KZ400-J, KZ550-A, KZ550-B, KZ550-C, and KZ550-D) are included in this Supplement section. Unless otherwise noted, procedures for the variation models are the same as for the standard KZ500-B.

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SUPPLEMENT FOR 1981 MODEL 309

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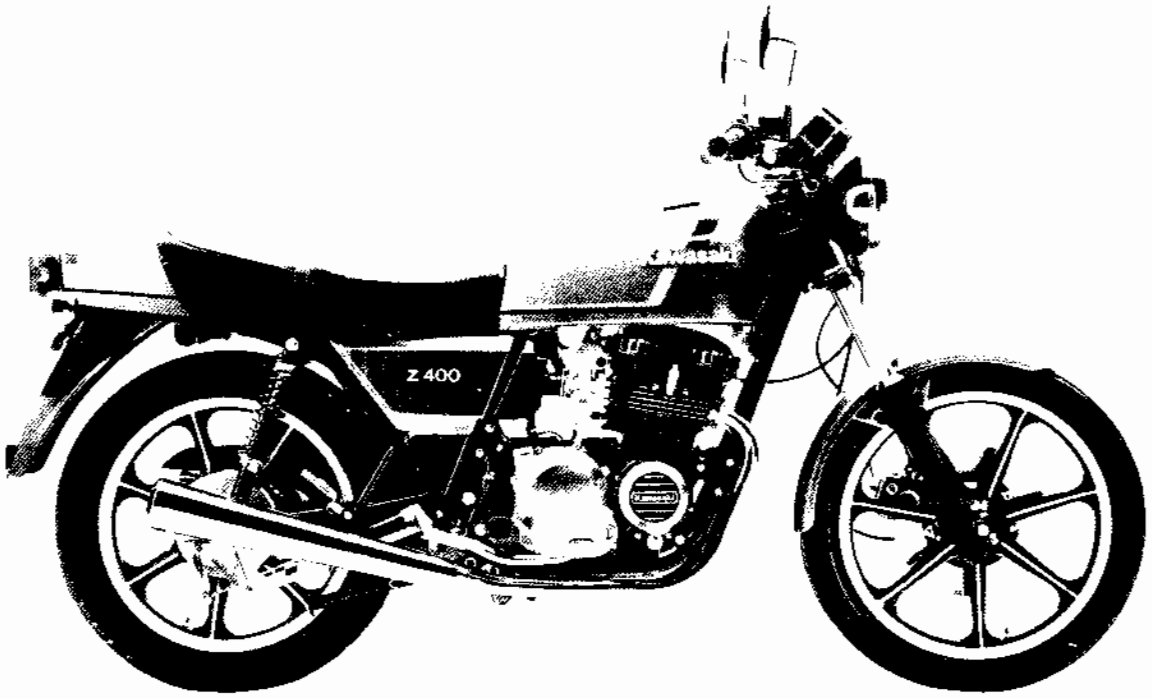
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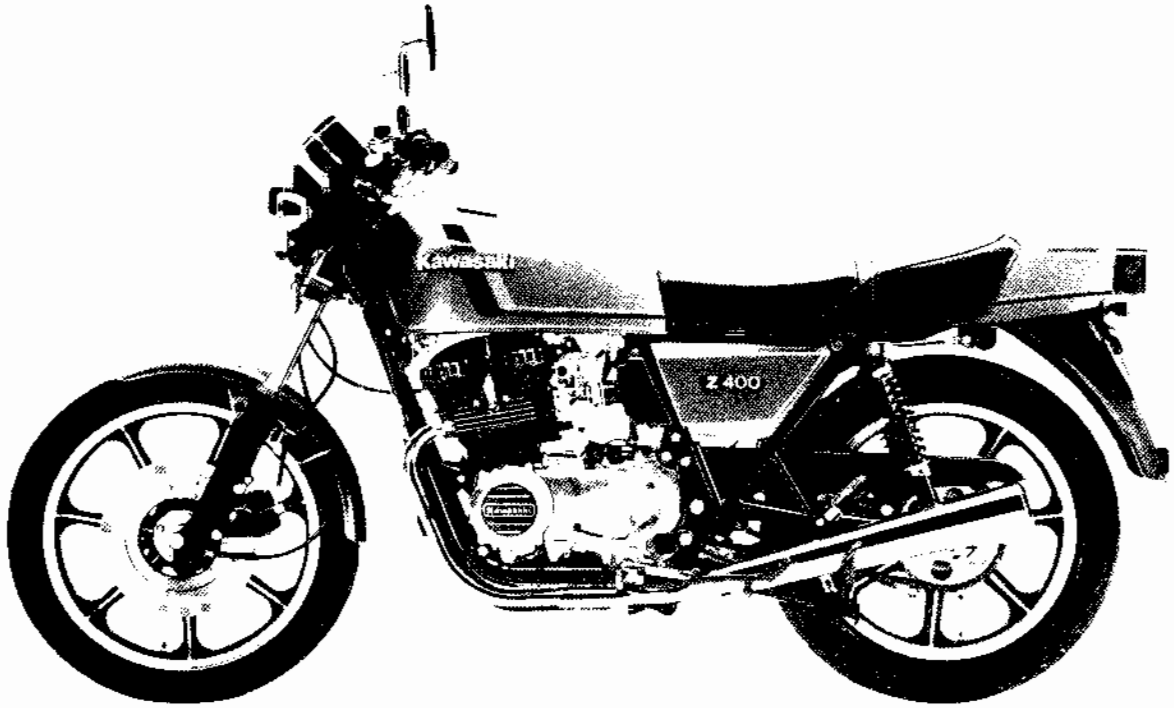
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Model Identification

KZ400-J1 (Right Side View)
Front disc and rear drum brake

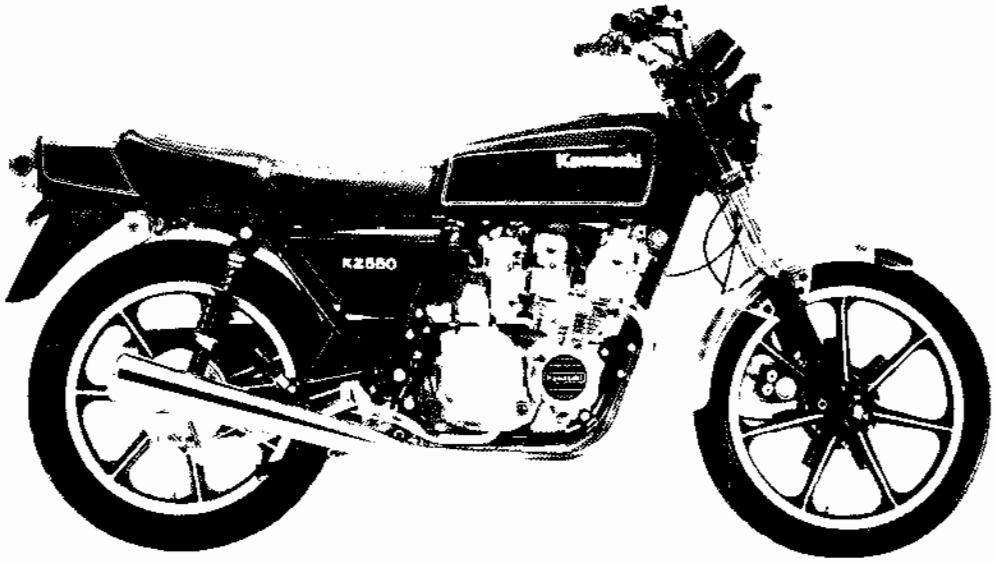


KZ400-J1 (Left Side View)



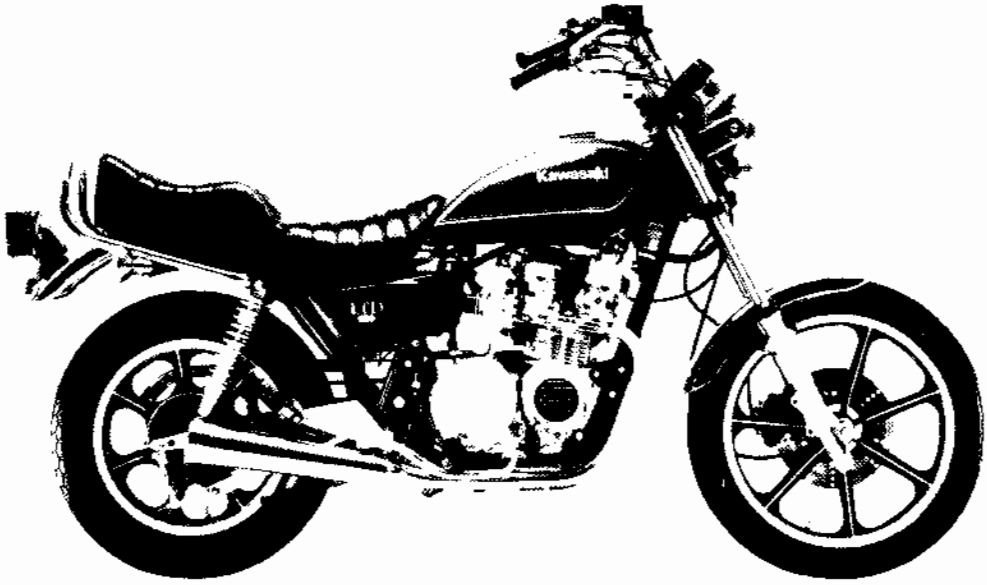
KZ550-A1

Front disc and rear drum brake



KZ550-C1

Front disc and rear drum brake
Pneumatic front fork and damping adjustable rear shock absorbers
Tubeless tires
Transistorized ignition system
Stepped seat and pullback handlebar



Specifications

SPECIFICATIONS (on KZ400)

		KZ400-J1
Dimensions		
Overall length		2,150 mm
Overall width		740 mm
Overall height		1,095 mm
Wheelbase		1,395 mm
Road clearance		145 mm
Dry weight		189 kg (UK)(WG) 194 kg
Fuel tank capacity		15.0 ℓ
Performance		
Climbing ability		30°
Braking distance		11.0 m from 50 kph
Minimum turning radius		2.4 m
Engine		
Type		DOHC, 4-cylinder, 4-stroke, air-cooled
Bore and stroke		52.0 x 47.0 mm
Displacement		399 cc
Compression ratio		9.5
Maximum horsepower		43 HP @9,500 rpm (WG) 27 HP @7,500 rpm
Maximum torque		3.5 kg-m @7,500 rpm (WG) 2.8 kg-m @6,500 rpm
Valve timing		
Inlet	Open	33° BTDC
	Close	41° ABDC
	Duration	254°
Exhaust	Open	51° BBDC
	Close	23° ATDC
	Duration	254°
Carburetors		TK K21P-2A (WG) TK K21P-2B
Lubrication system		Forced lubrication (wet sump)
Engine oil	Type	SE class SAE 10W40, 10W50, 20W40, or 20W50
	Capacity	3.0 ℓ
Starting system		Electric starter
Ignition system		Battery and coil (contact breaker)
Cylinder numbering method		Left to right, 1–2–3–4
Firing order		1–2–4–3
Ignition timing		15° BTDC @1,200 rpm ~ 35° BTDC @3,200 rpm
Spark plugs		NGK D8EA or ND X24ES-U
Transmission		
Type		6-speed, constant mesh, return shift
Clutch		Wet multi disc
Gear ratio	1st	2.57 (36/14)
	2nd	1.78 (32/18)
	3rd	1.38 (29/21)
	4th	1.13 (27/24)

		KZ400-J1
5th		0.96 (25/26)
6th		0.85 (23/27)
Primary reduction ratio		3.28 (27/23 x 67/24)
Final reduction ratio		2.50 (40/16)
Overall drive ratio		6.98 @Top gear
Electrical Equipment		
Maximum alternator output		210 W @10,000 rpm
Battery		Furukawa FB12A-A (12V 12AH)
Headlight	Type	Semi-sealed
	Bulb	12V 45/40W
Tail/Brake light		12V 5/21W
City light		12V 4W
Turn signal lights		12V 21W
Meter lights		12V 3.4W
Indicator lights		12V 3.4W
Horn		12V 2.5A
Frame		
Type		Tubular, double cradle
Steering angle		39° to either side
Castor		26°
Trail		98 mm
Tire	Front	3.25H-19 4PR
	Rear	3.75H-18 4PR
Suspension	Front	Telescopic fork
	Rear	Swing arm
Suspension stroke	Front	180 mm
	Rear	120 mm
Front fork oil	Type	SAE 5W20
	Capacity (per each fork)	220 cc
Brakes		
Type	Front	Single disc brake (UK)(WG) Dual disc brakes
	Rear	Drum brake
Effective disc diameter		250 mm (UK)(WG) 232 mm
Brake drum inside diameter and width		180 x 40 mm

(UK) : UK model (WG) : West German model

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

SPECIFICATIONS (on KZ550)

		KZ550-A1	KZ550-C1
Dimensions			
Overall length		2,100 mm, (E) 2,150 mm	2,160 mm, (E) 2,190 mm
Overall width		785 mm, (E) 740 mm	850 mm, (WG) 805 mm
Overall height		1,125 mm, (E) 1,095 mm	1,200 mm, (WG) 1,205 mm
Wheelbase		1,395 mm	1,420 mm
Road clearance		145 mm	*
Dry weight		189 kg, (E) 192 kg	192 kg, (E) 198 kg
Fuel tank capacity		15.0 ℓ	12.4 ℓ
Performance			
Climbing ability		30°	*
Braking distance		11.0 mm from 50 kph	*
Minimum turning radius		2.4 m	*
Engine			
Type		DOHC, 4-cylinder, 4-stroke, air-cooled	*
Bore and stroke		58.0 x 52.4 mm	*
Displacement		553 cc	*
Compression ratio		9.5	*
Maximum horsepower		54 HP @8,500 rpm (US) 53 HP @8,500 rpm	54 HP @8,500 rpm (US) 53 HP @8,500 rpm (WG) 50 HP @8,500 rpm
Maximum torque		4.9 kg-m @7,000 rpm (US) 4.8 kg-m @7,000 rpm	4.9 kg-m @7,000 rpm (US) 4.8 kg-m @7,000 rpm (WG) 4.7 kg-m @7,000 rpm
Valve timing			
Inlet	Open	20° BTDC	*
	Close	48° ABDC	*
	Duration	248°	*
Exhaust	Open	48° BBDC	*
	Close	20° ATDC	*
	Duration	248°	*
Carburetors		TK22P-2D (US) TK22P-2C	TK K22P-2D (US) TK K22P-2C (WG) TK K21P-2A
Lubrication system		Forced lubrication (wet sump)	*
Engine oil	Type	SE class SAE 10W40, 10W50, 20W40, or 20W50	*
	Capacity	3.0 ℓ	*
Starting system		Electric starter	*
Ignition system		Battery and coil (contact breaker)	Battery and coil (transistorized ignition)
Cylinder numbering method		Left to right, 1–2–3–4	*
Firing order		1–2–4–3	*
Ignition timing		10° BTDC @1,050 rpm ~ 35° BTDC @3,200 rpm	*
Spark plugs		NGK D8EA or ND X24ES-U	*
Transmission			
Type		6-speed, constant mesh, return shift	*
Clutch		Wet, multi disc	*

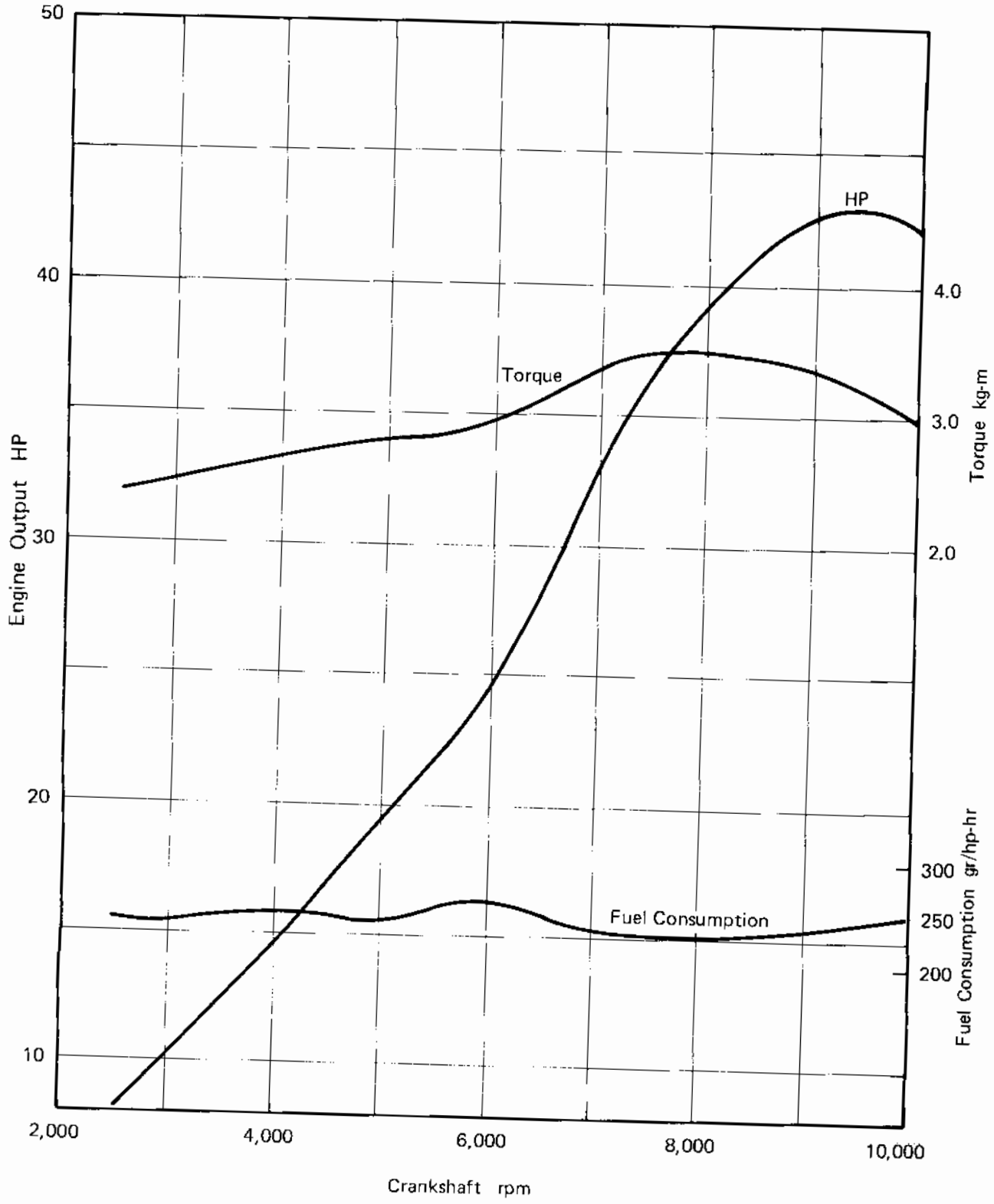
		KZ550-A1	KZ550-C1
Gear ratio:	1st	2.57 (36/14)	*
	2nd	1.78 (32/18)	*
	3rd	1.38 (29/21)	*
	4th	1.13 (27/24)	*
	5th	0.96 (25/26)	*
	6th	0.85 (23/27)	*
Primary reduction ratio		2.94 (27/23 x 65/26)	*
Final reduction ratio		2.50 (40/16)	2.38 (38/16)
Overall drive ratio		6.25 @top gear	5.94 @top gear
Electrical Equipment			
Maximum alternator output		210 W @10,000 rpm	*
Battery		Furukawa FB12A-A (12V 12AH)	*
Headlight	Type	Sealed beam, Ⓔ Semi-sealed	*
	Bulb	12V 50/35W, Ⓔ 12V 45/40W	*
Tail/Brake light		12V 8/27W, Ⓔ 12V 5/21W	*
City light		12V 4W	*
Turn signal lights		12V 23W, Ⓔ 12V 21W	*
Meter lights		12V 3.4W	*
Indicator lights		12V 3.4W	*
Horn		12V 2.5A	*
Frame			
Type		Tubular, double cradle	*
Steering angle		37° to either side	39° to either side
Castor		26°	27.5°
Trail		98 mm	110 mm
Tire	Front	3.25H-19 4PR	3.25S-19 4PR Tubeless
	Rear	3.75H-18 4PR	130/90-16 67S Tubeless
Suspension	Front	Telescopic fork	Telescopic fork (pneumatic)
	Rear	Swing arm	*
Wheel travel	Front	180 mm	*
	Rear	120 mm	*
Front fork oil	Type	SAE 5W20	*
Capacity (per each fork)		220 cc	290 cc
Brakes			
Type	Front	Single disc brake Ⓔ Dual disc brakes	*
	Rear	Drum brake	*
Effective disc diameter		250 mm, Ⓔ 232 mm	236 mm, Ⓔ 226 mm
Brake drum inside diameter and width		180 x 40 mm	*

Ⓔ: European model (US): US model (WG): West German model

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

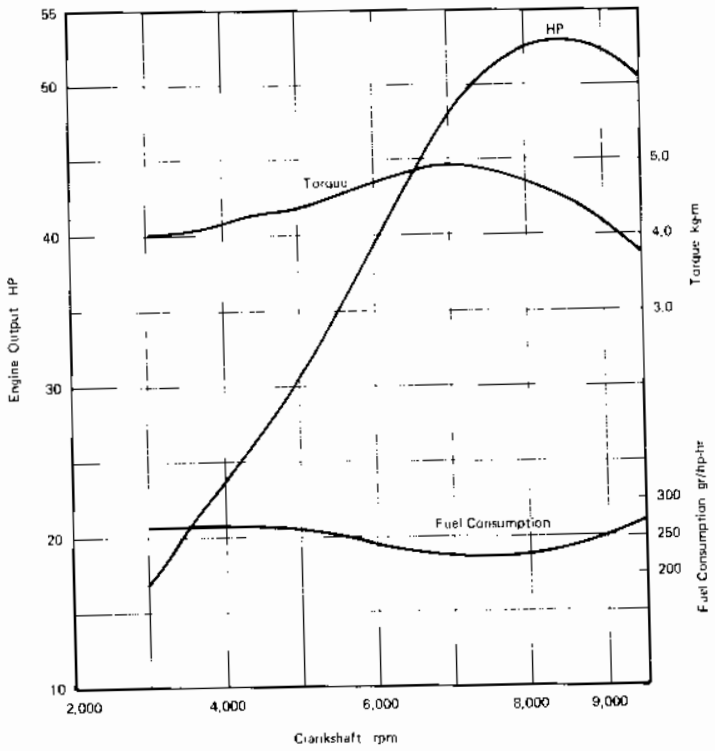
ENGINE PERFORMANCE CURVES (on KZ400)

KZ400-J1 (except West German model)

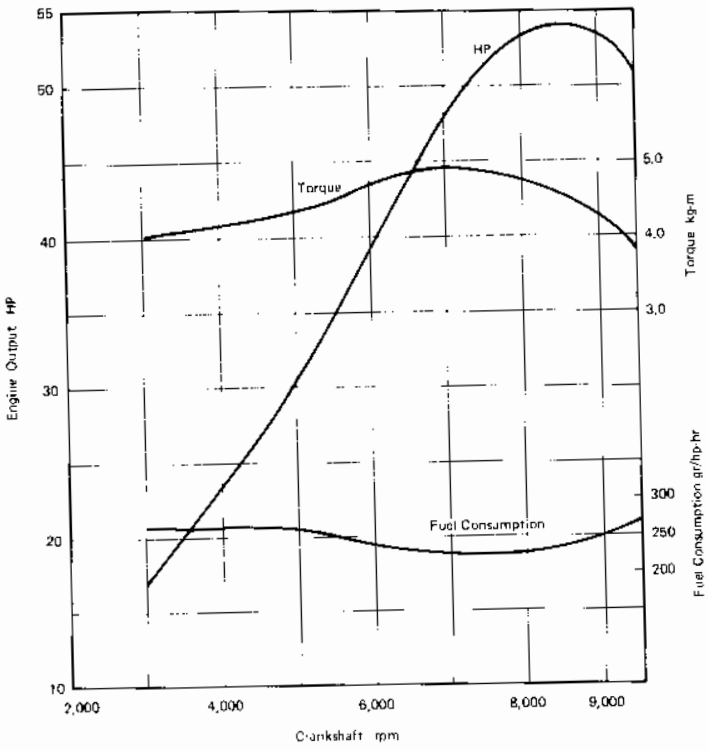


ENGINE PERFORMANCE CURVES (on KZ550)

KZ550-A1, C1 (US and Canadian models)

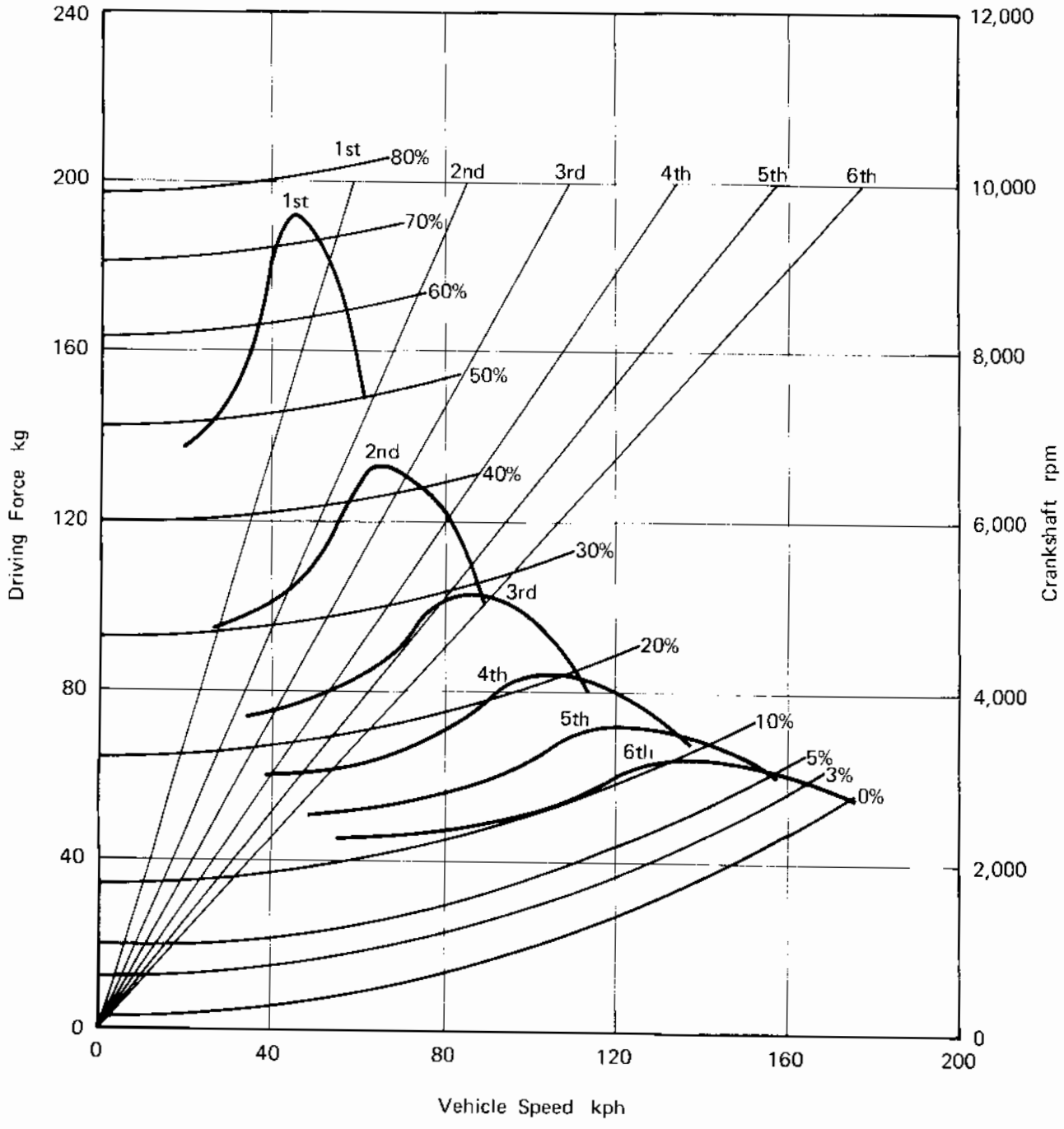


KZ550-A1, C1 (European model except West German model)



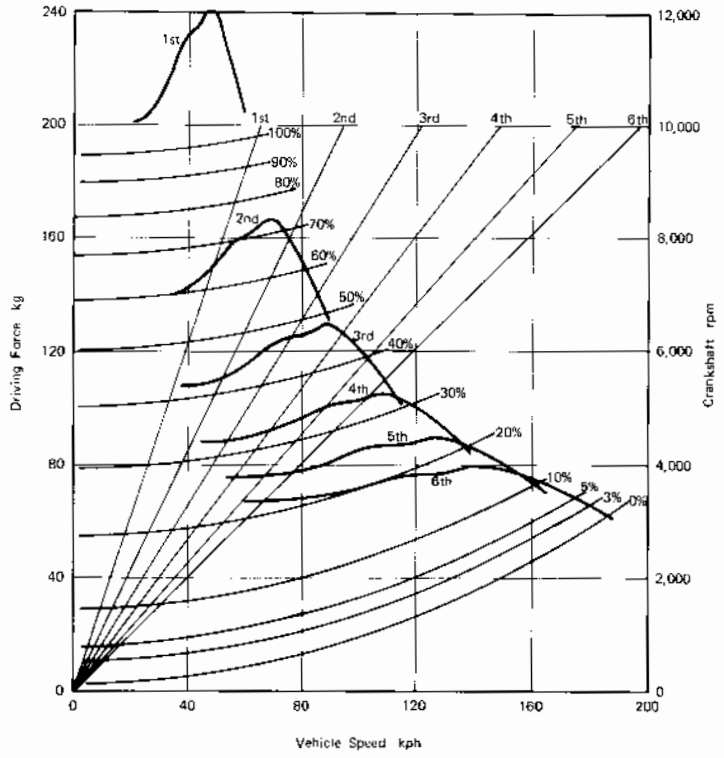
RUNNING PERFORMANCE CURVES (on KZ400)

KZ400-J1 (except West German model)

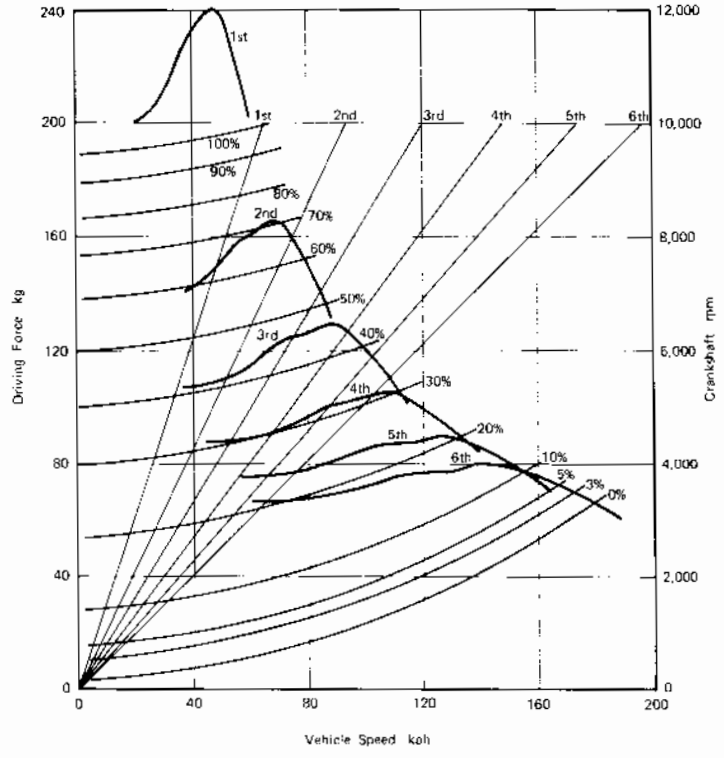


RUNNING PERFORMANCE CURVES (on KZ550)

KZ550-A1



KZ550-C1 (except West German model)



PERIODIC MAINTENANCE CHART

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

OPERATION \ FREQUENCY	Whichever comes first ➡ / Every ⬇	ODOMETER READING* 800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	30,000 km	See Page
Battery electrolyte level — check †	month	•	•	•	•	•	•	•	214
Brake adjustment — check †		•	•	•	•	•	•	•	29,266
Brake wear — check †			•	•	•	•	•	•	200,292
Brake fluid level — check †	month	•	•	•	•	•	•	•	204
Brake fluid — change	year			•		•		•	205
Clutch — adjust		•	•	•	•	•	•	•	22
Carburetors — adjust		•	•	•	•	•	•	•	19,263
Throttle cables — adjust		•	•	•	•	•	•	•	18
Steering play — check †		•	•	•	•	•	•	•	30
Drive chain wear — check †			•	•	•	•	•	•	197
Front fork — inspect/clean		•	•	•	•	•	•	•	209,294
Rear shock absorbers — inspect		•	•	•	•	•	•	•	211
Nuts, Bolts, Fasteners — check and torque		•		•		•		•	39~42,268
Spark plugs — clean and gap †		•	•	•	•	•	•	•	12
Points, timing — check † (If applicable)		•	•	•	•	•	•	•	12
Valve clearance — check †		•	•	•	•	•	•	•	15
Air suction valve — check † (If applicable)			•	•	•	•	•	•	287
Air cleaner element — clean			•		•		•		154
Air cleaner element — replace	5 cleanings		•		•		•		154
Fuel system — clean		•	•	•	•	•	•	•	24,263
Tire tread wear — check †			•	•	•	•	•	•	194
Engine oil — change	year	•	•	•	•	•	•	•	24
Oil filter — replace		•		•		•		•	24
General lubrication — perform			•	•	•	•	•	•	33,267
Front fork oil — change				•		•		•	209,294
Timing advancer — lubricate				•		•		•	224
Swing arm — lubricate				•		•		•	33
Wheel bearings — grease	2 years					•			195
Speedometer gear housing — grease (If applicable)	2 years					•			292
Brake camshaft — grease (If applicable)	2 years					•			294
Steering stem bearings — grease	2 years					•			207
Drive chain — lubricate	Every 300 km								197
Drive chain — adjust	Every 800 km								28

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

Adjustment

IGNITION TIMING (on KZ550-C)

KZ550-C has a magnetically controlled transistor ignition system which has no moving parts in the electrical circuit. Consequently, it is not necessary to check and adjust the ignition timing periodically. However, if there is any doubt as to correct ignition timing, inspect the ignition system as explained in the maintenance section (Pg. 297).

NOTE: Lubricate the timing advancer periodically just the same way as KZ500-B (Pg. 224).

CARBURETORS (on KZ400)

The procedures are the same as those for the 1979 KZ500-B with the following exception. See Pgs. 19 ~ 21.

- The idle speed for KZ400 is 1,150 ~ 1,250 rpm.

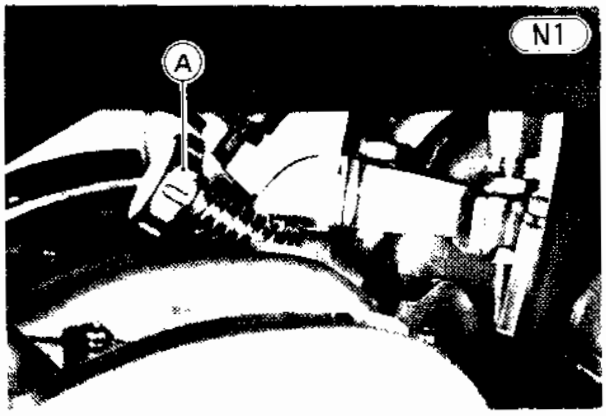
CARBURETORS (on US Model)

Since the air screws of the carburetors on US model are sealed with the bonding plugs, the carburetors do not require the idle mixture adjustment.

Adjust the idling as follows:

Idling Adjustment:

- Start the engine, and warm it up thoroughly.
- Adjust the idle speed to 1,000 ~ 1,100 rpm by turning the idle adjusting screw.



A. Idle Adjusting Screw

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

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

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

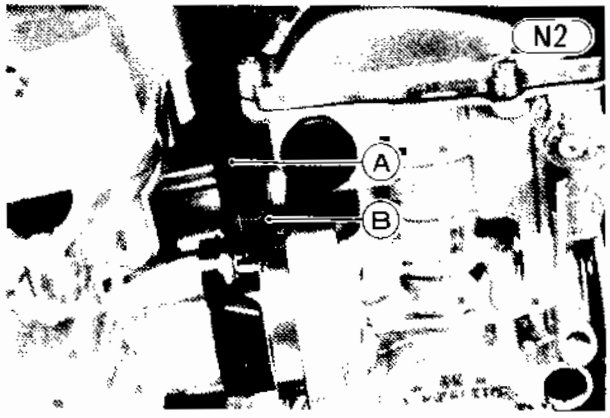
NOTE: If proper idle speed cannot be obtained by this adjustment, first check the following and correct as necessary.

Engine Oil (Pg. 19)
Spark Plugs (Pg. 12)
Throttle Cables (Pg. 15)
Cylinder Compression (Pg. 174)
Air Cleaner Element (Pg. 154)
Valve Clearance (Pg. 13)
Ignition Timing (Pg. 12)
Kawasaki Clean Air System (Pg. 286)
Air Cleaner Duct and Carburetor Holder Leakage

Fine Synchronization—Vacuum

Since the motorcycle for US has the air injection system, the vacuum gauge attachments are connected to the vacuum switch valve with the vacuum hoses. Refer to Pgs. 21 ~ 22, noting the follows:

1. For US model, slide up the hose clamps (2), and pull the vacuum hoses off the #1 and #4 vacuum gauge attachments to connect the vacuum gauge to the #1 and #4 carburetor holders.



A. Vacuum Hose **B. Clamp**

2. After the carburetors properly synchronized, connect the vacuum hoses (2) to the #1 and #4 carburetor holders, and slide back the hose clamps (2).

FUEL SYSTEM

The fuel tap has no drain plug. Refer to the follows when cleaning the fuel system:

WARNING

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

To clean the fuel system:

- Run the overflow tubes to a container.
- Turn the fuel tap lever to the "PRI" position.

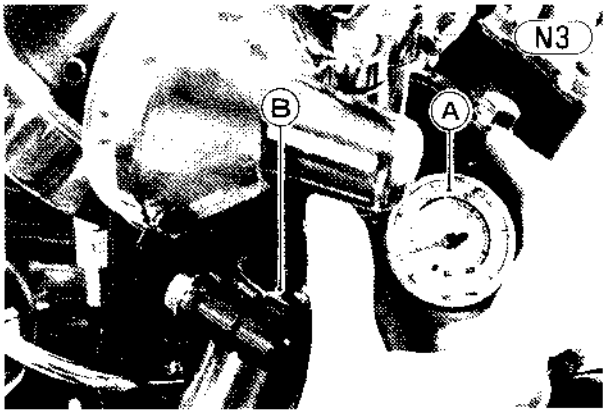
- Loosen the carburetor drain screws, and drain the fuel in the fuel and fuel tank through the overflow tubes. Tighten the drain screws.
- If any dirt comes out, clean the following parts in accordance to the procedure in the Maintenance Section.
  - Fuel Tank (Pg. 155)
  - Fuel Tap (Pg. 155)
  - Carburetors (Pg. 162)

FRONT FORK (on KZ550-C)

The front fork on KZ550-C can be adjusted to any air pressure within the usable range to suit various riding and load conditions. They can be adjusted to lower air pressure for cruising on smooth roads, but should be adjusted to higher pressure for high speed riding, or riding on bad roads. Before making any adjustments, however, read the procedures in this chapter.

To check the front fork air pressure:

- Put the motorcycle up on its center stand.
- Raise the front wheel off the ground by using a jack under the engine. All weight must be off the front wheel.
- Remove the rubber cover and air valve cap, and check the air pressure with the air pressure gauge (special tool).



A. Air Pressure Gauge (57001-1003) **B. Air Valve**

NOTES: 1. Check the air pressure when the fork legs are cold.
2. Do not use tire gauges for checking air pressure. They may not indicate the correct air pressure because of air leaks that occur when the gauge is applied to the valve.

To adjust the front fork air pressure:

- Inject air through the valve with a pump to adjust the pressure, but do not exceed 2.5 kg/cm^2 (36 psi).

NOTES: 1. A normal tire pump can be used.
2. Adjust the air pressure to suit various riding conditions referring to the Front and Rear Suspension Setting (Pg. 265).

Table N1 Air Pressure

Standard	Usable Range
0.6 kg/cm^2 (8.5 psi)	0.5 ~ 0.7 kg/cm^2 (7.1 ~ 10.0 psi)

CAUTION
1. Try to set the air pressure of the right and left fork legs as equally as possible. The difference in air pressure between the right and left fork legs must be within 0.1 kg/cm^2 (1.4 psi).
2. Inject air little by little so that air pressure does not rise rapidly. Air pressure exceeding 2.5 kg/cm^2 (36 psi) may damage the oil seals.

WARNING
1. Be sure to adjust the air pressure within the usable range. Front fork adjusted too low or too high adversely affect handling and stability and could lead to accident and injury.
2. Only air or nitrogen gas can be used. Never inject oxygen or any other kind of gas. Other gases could procedure an explosion.
3. Do not incinerate the front fork.

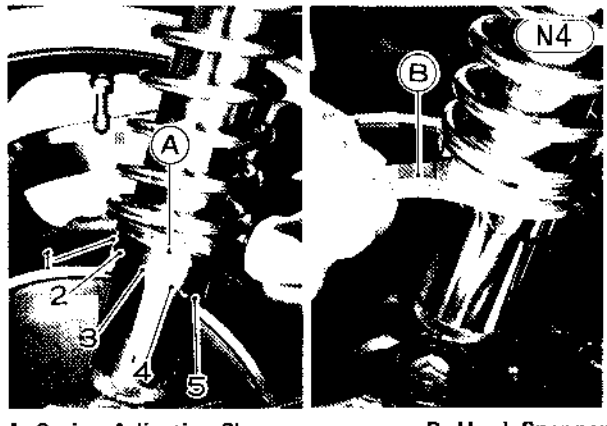
REAR SHOCK ABSORBERS (on KZ550-C)

The rear shock absorbers on KZ550-C can be adjusted by changing not only the spring force but also the damping force to suit various riding and loading conditions. The spring force and damping force can be left soft for average riding. But they should be adjusted harder for high speed riding, or riding with a passenger.

Before making any adjustments, read the following procedures:

Spring Adjustment

The spring adjusting sleeve on each rear shock absorber has 5 positions so that the spring can be adjusted for different road and loading conditions.



A. Spring Adjusting Sleeve **B. Hook Spanner**

If the spring action feels too soft or too stiff, adjust it in accordance with the following table:

Table N2 Spring Action

Position	1	2	3	4	5
Spring Action	Stronger →				

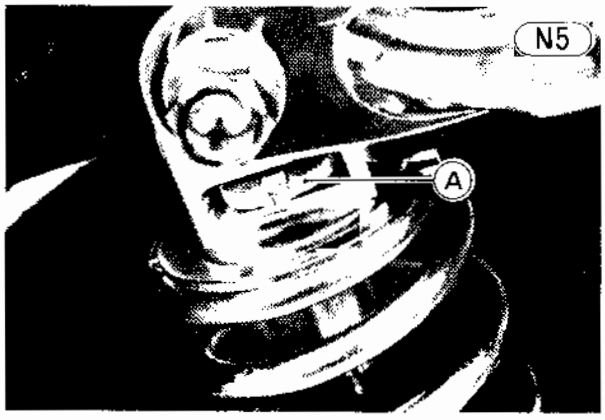
To adjust the spring force:
- Turn the adjusting sleeve on each shock absorber to the desired position with a hook spanner.
- Check to see that both adjusting sleeves are turned to the same relative position.

WARNING **If both spring adjusting sleeves are not adjusted equally, handling may be impaired and a hazardous condition may result.**

NOTE: Match the spring adjusting sleeve position with the damper adjuster position referring to the Front and Rear Suspension Setting.

Damper Adjustment

The damper adjuster on each rear shock absorber has 4 positions so that the damping force can be adjusted for different road and loading conditions. The numbers on the adjuster show the setting position of the damper.



A. Damper Adjuster

If the damper setting feels too soft or too stiff, adjust it in accordance with the following table:

Table N3 Damping Force

Position	1	2	3	4
Damping Force	Larger →			

To adjust the damping force:
- Turn the adjuster to the desired number until you feel a click.
- Check to see that both adjusters are turned to the same relative position.

WARNING **If both damper adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.**

NOTE: Match the damper adjuster position with the spring adjusting sleeve position referring to the Front and Rear Suspension Setting.

FRONT AND REAR SUSPENSION SETTING (on KZ550-C)

The table N4 shows an example of setting for the front and rear suspension. To obtain the stable handling or suitable riding condition, adjust the air pressure, spring force, or damping force for different road and loading conditions if necessary. For instance, setting **A** shown in the table is softest and designed for an average-built rider of 68 kg (150 lbs) with no accessories. Ordinarily, the heavier the total load becomes, the harder the suspension should be set.

DRIVE CHAIN (with Rear Drum Brake)

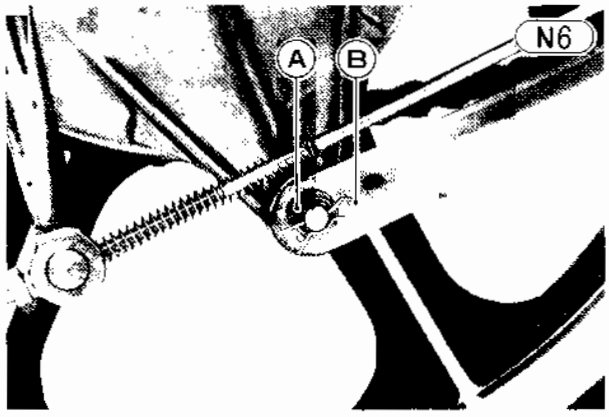
Refer to Pgs. 28 ~ 29, noting the followings:

1. Before adjusting the drive chain, remove the safety clip, and loosen the nut at the rear end of the torque link.

Table N4 Front and Rear Suspension Setting (Example)

Setting		Rear Shock Absorber		Front Fork
		Spring Force (Sleeve Position)	Damping Force (Adjuster Position)	Air Pressure kg/cm² (psi)
Soft ↕ Hard	A	1	1 or 2	0.5 (7.1) ~ 0.7 (10.0)
	B	2, 3, or 4	3 or 4	
	C	5	4	

CAUTION **If you don't loosen the torque link nut, it may lead to brake panel fracture when the chain adjusters are set.**



A. Torque Link Nut **B. Safety Clip**

2. Before tightening the rear axle nut, center the brake panel assembly in the brake drum. This is done by tightening the axle lightly, spinning the wheel, and depressing the brake pedal forcefully. The partially tightened axle allows the brake panel assembly to center itself within the brake drum.

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

BRAKES (on Rear Drum Brake)

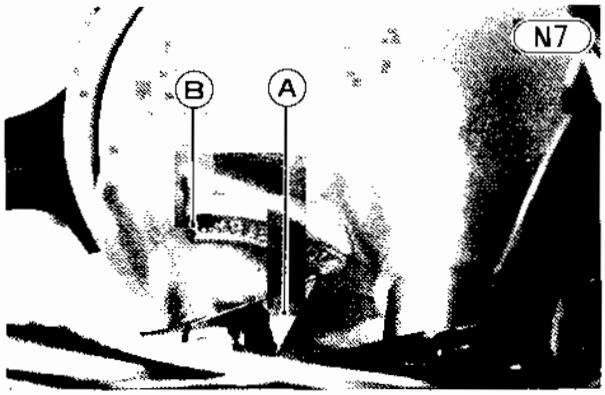
Adjust the rear drum brake as follows:

Rear Brake

Brake lining and drum wear causes the rear brake to go out of adjustment, increasing pedal play and decreasing brake effectiveness. Refer brake adjustment to compensate for this actually consists of three successive adjustments: brake pedal position, cam lever angle, and brake pedal travel.

If brake drag is detected during brake adjustment, disassemble the brake (Pg. 278), and inspect for wear or damage (Pg. 292). 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 second "NOTE" in drive chain adjustment procedure.

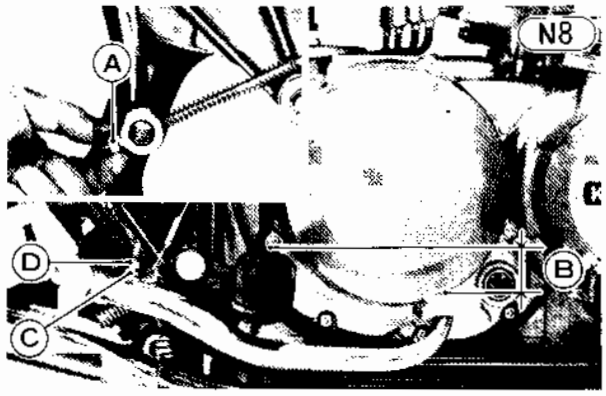
On the outside of the rear brake panel there is a brake lining wear indicator. Whenever the indicator has gone past USABLE RANGE, the brake shoes must be immediately replace and the other brake parts examined. Adjustment alone cannot compensate for the wear of a brake worn past USABLE RANGE.



A. Wear Indicator **B. USABLE RANGE**

Brake Pedal Position

- 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 too high, turn out the adjusting nut at the end of the brake rod to give the brake pedal plenty of play. If it is too low, go to the next step.

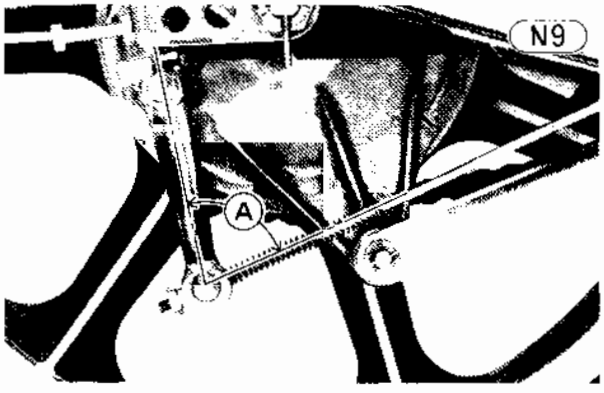


A. Adjusting Nut **C. Adjusting Bolt**
B. 0 ~ 30 mm **D. Locknut**

- Loosen the brake pedal adjusting bolt locknut, turn the adjusting bolt to obtain the correct pedal position, and tighten the locknut.
- Check the brake pedal travel.
- Check the rear brake light switch operation.

Cam Lever Angle

- When the brake is fully applied, the brake cam lever should come to an 80 ~ 90° angle with the brake rod.



A. 80 ~ 90°

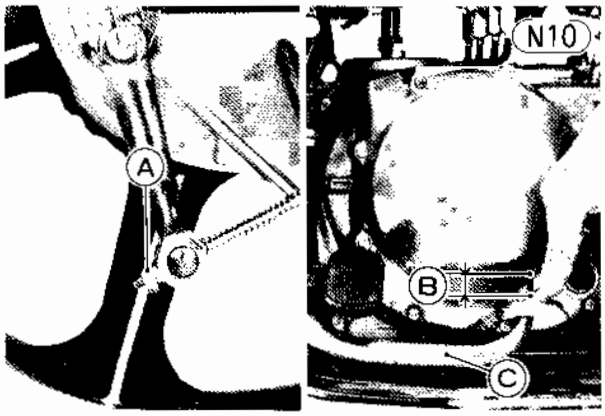
●If it does not, remove the cam lever, and then remount it at a new position on the shaft for the proper angle.

WARNING **Since a cam lever angle greater than 90° reduces braking effectiveness, this adjustment should not be neglected. When remounting the cam, be sure that the position of the indicator on the serrated shaft is not altered. See Pg. 279 for detailed information on the position of the wear indicator when the cam lever is not on the shaft. A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper 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.**

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

Brake Pedal Travel

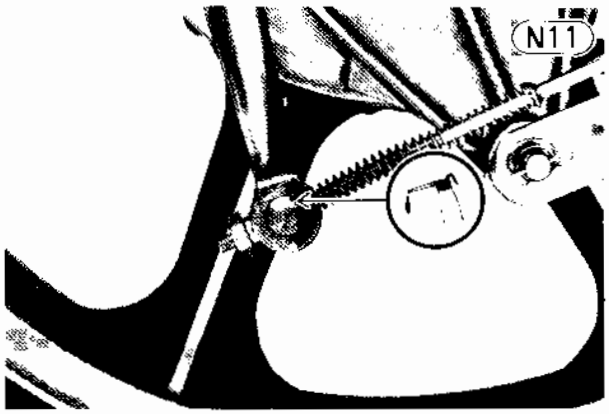
●Check to see that the brake pedal has 20 ~ 30 mm of travel from the rest position to the fully applied position when the brake pedal is pushed down lightly by hand.



A. Adjusting Nut
B. 20 ~ 30 mm
C. Brake Pedal

●If it does not, turn the adjusting nut on the end of the brake rod so that the brake pedal has the proper travel.
●Rotate the rear wheel to check for brake drag.
●Operate the pedal a few times to see that it returns to its rest position immediately upon release.
●Check the rear brake light switch operation.

Brake Rod Joint



GENERAL LUBRICATION
(with Rear Drum Brake)

Lubricate the following portion besides the portions shown on Pgs. 33 ~ 35.

Disassembly

TORQUE AND LOCKING AGENT

The table below shows the tightening torque for the parts which are added to the previous model. Tighten the other parts to the torque listed on Pgs. 39 ~ 43.

Part	Quantity	Metric (kg-m)	English (ft-lbs)	Locking Agent (•) Required	See Pg.
[Engine]					
Air suction valve cover bolts φ6 P1.0 (on US model)	(8)	1.0	87 in-lbs	–	270
Starter motor terminal nut φ6 P1.0 (on KZ550)	1	1.1	95 in-lbs	–	273
[Chassis]					
Front fork air valves φ8 P1.0 (on pneumatic front fork)	2	1.2	104 in-lbs	•	285
Tire air valve nuts φ8 P0.8 (on tubeless tire)	2	0.15	13 in-lbs	–	282
[Brake]					
Caliper holder shaft bolts φ8 P1.25 (on KZ550-C)	(4)	1.8	13.0	–	276

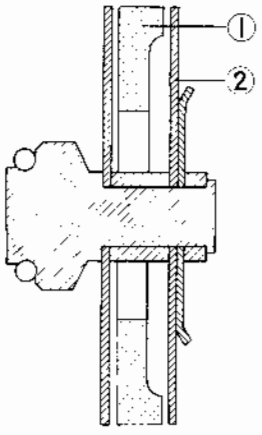
FUEL TAP

Disassembly and Assembly Notes:

Refer to Pgs. 48 ~ 49, noting the following:

1. The O ring is fitted on the fuel tap lever.
2. If the diaphragm assembly was disassembled, assemble the diaphragm and its plate as shown.

Diaphragm Installation (N12)



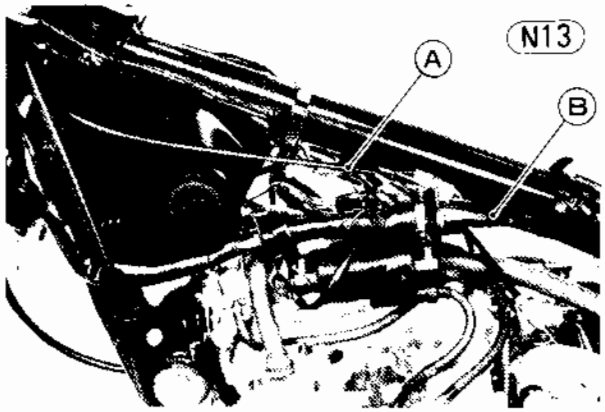
1. Plate 2. Diaphragm Assembly

CARBURETORS

Carburetor Removal and Installation:

Refer to Pgs. 49 ~ 50, noting the following:

•To install the accelerator throttle cable without sharp bends, run it between the frame top tube and the main harness.



A. Accelerator Cable **B. Main Harness**

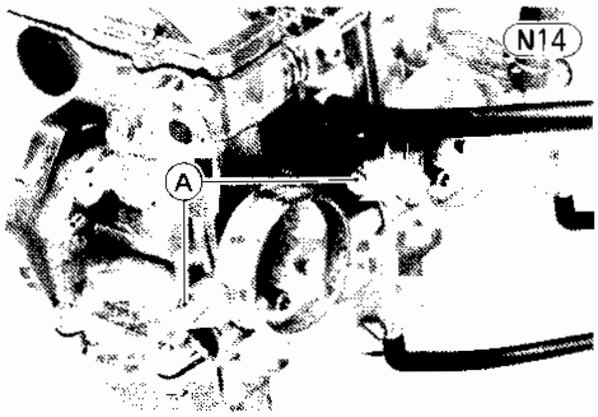
Carburetor Body Disassembly and Assembly (on US model):

Refer to Pgs. 55 ~ 56, noting the following:

The plug is added over each air screw. Refer to the follows when handling the air screw parts to clean the carburetor body.

To remove the air screw:

●Using an awl or some other suitable tools, punch and pry off the air screw plug.



A. Air Screw Plugs

●Turn in the air screw and count the number of turns until it seats fully but not tightly, and then remove it with its O ring and spring.

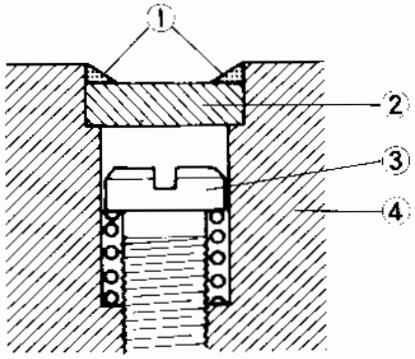
To install the air screw:

●Turn in the air screw fully but not tightly, and then back it out the same number of turns counted during disassembly.

●Replace the air screw plug with a new one, fit it into the air screw hole, and then apply a small amount of a bonding agent to the circumference of the plug to fix it.

CAUTION **Do not apply too much bonding agent onto the plug. This may fix up the air screw or close the air passage.**

Air Screw Plug Installation (N15)



1. Apply a bonding agent.
2. Pilot Screw Plug
3. Pilot Screw
4. Carburetor Body

MUFFLERS

Refer to Pgs. 56 ~ 57, noting the following:

There is also an identification mark on the inner exhaust pipe on KZ400 and KZ550. The marks for KZ400 and KZ550 are shown in the following table.

Table N5 Identification Marks

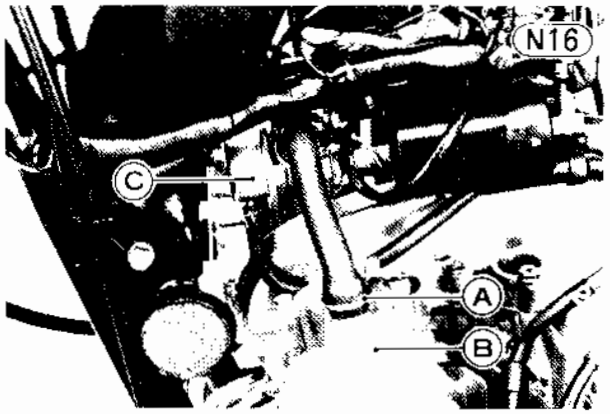
Model	Identification Mark	
	#2 exhaust pipe	#3 exhaust pipe
KZ400	4 2	4 3
KZ500 KZ550	5 2	5 3

VACUUM SWITCH VALVE (on US Model)

Removal:

●Remove the fuel tank (Pg. 47).

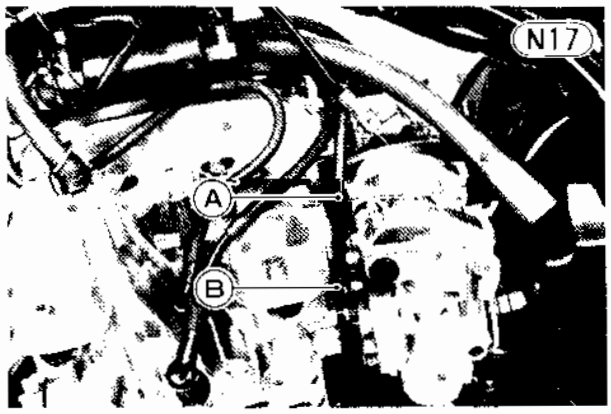
●Slide the clamp out of place, and pull the hose off each air suction valve cover.



A. Clamp
B. Air Suction Valve Cover
C. Vacuum Switch Valve

●Pull the hose off the air cleaner housing.

●Slide the clamp out of place, and pull the vacuum hose off #1 and #4 carburetor holders.

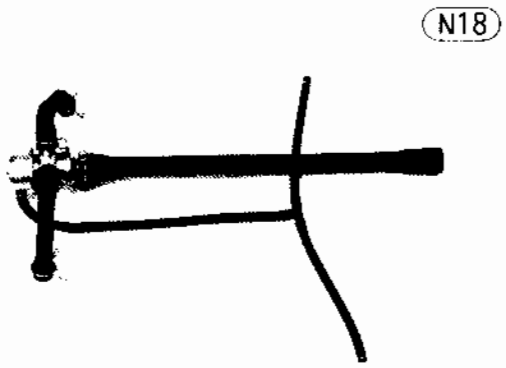


A. Vacuum Hose **B. Clamp**

•Pull the vacuum switch valve with the hoses attached free off the motorcycle.

Installation Note:

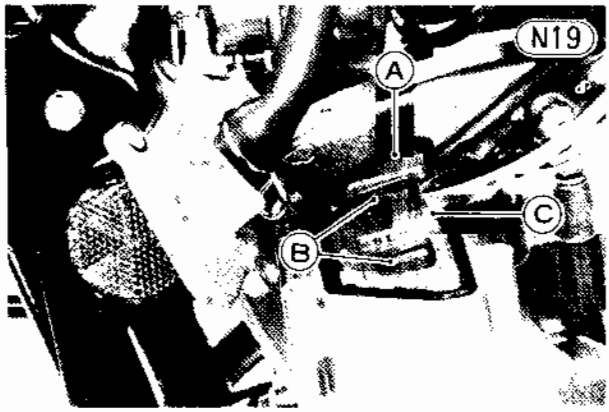
•Check that all hoses fit in place, and that all clamps are installed.



AIR SUCTION VALVE (on US Model)

Removal (either side):

•Remove the fuel tank (Pg. 47).
•Remove the air suction valve cover bolts, and lift the cover off the air suction valve assembly.
•Remove the valve assembly taking care not to damage the valve reeds and reed contact areas. If the valve assembly sticks in the cylinder head cover, pull it up by grasping the projection with pliers.



A. Valve Assembly
B. Valve Reeds
C. Projection

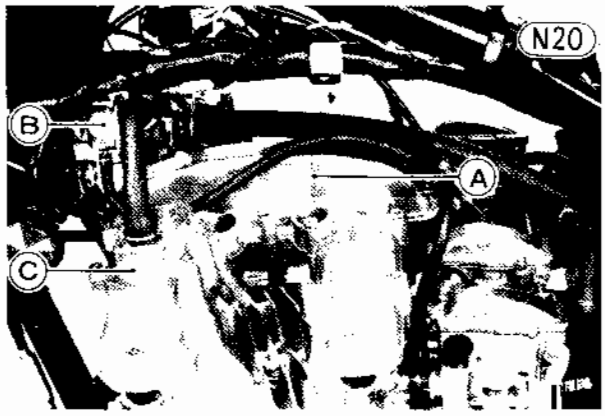
Installation Notes (either side):

1. Check the air suction valve assembly, and replace it with a new one if it is damaged (Pg. 287).
2. Tighten the cover bolts (4) to 1.0 kg-m (87 in-lbs) of torque with a flat washer installed under each bolt head.

CYLINDER HEAD COVER (on US Model)

Removal:

•Remove the fuel tank (Pg. 47).
•Remove the ignition coils (Pg. 57).
•Slide up the hose clamps (2), and pull the hoses (2) off the air suction valve covers.

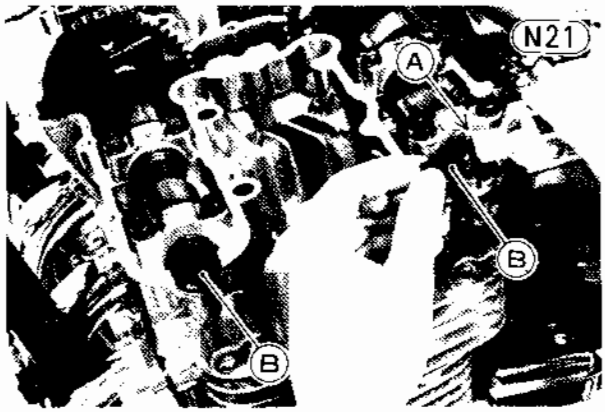


A. Cylinder Head Cover
B. Vacuum Switch Valve
C. Air Suction Valve Cover

•Swing the vacuum switch valve aside so that it does not hinder cylinder head cover removal.
•Remove the cylinder head cover bolts and air suction valve cover bolts (24), and remove the cylinder head cover.

Installation Notes:

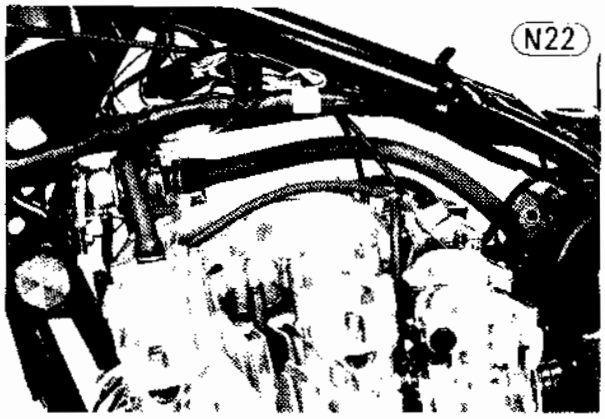
1. Replace the cylinder head cover gasket with a new one, applying a liquid gasket to the upper surface of each rubber plug before installation.



A. Apply a liquid gasket.
B. Rubber Plug

2. Tighten the cylinder head cover bolts and air suction valve cover bolts (24) to 1.0 kg-m (87 in-lbs) of torque.
3. Check to see that the vacuum switch valve is connected firmly to the air cleaner housing, air suction valves,

and the #1 and #4 carburetor holders. Each hose end should be secured by a hose clamp.



4. Thoroughly warm up the engine, allow it to cool completely, and then retighten all the cylinder head cover bolts and air suction valve cover bolts to the specified torque.

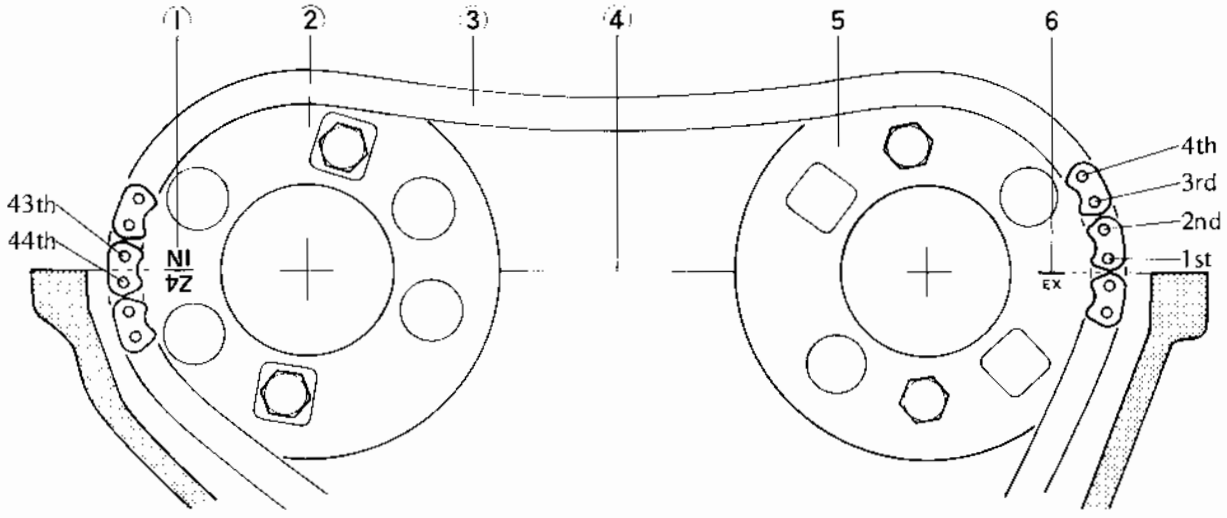
CAMSHAFTS (on KZ400)

Refer to Pgs. 57~60, noting the following:

- To timing the camshaft chain for KZ400, use the Z4/IN mark on the inlet camshaft sprocket.

NOTE: For KZ550, use the Z5/IN mark on the inlet sprocket. This is the same as KZ500.

Camshaft Chain Timing (on KZ400)



1. "Z4/IN" Mark
2. Inlet Camshaft Sprocket
3. Camshaft Chain
4. Cylinder Head Upper Surface
5. Exhaust Camshaft
6. "EX" Mark

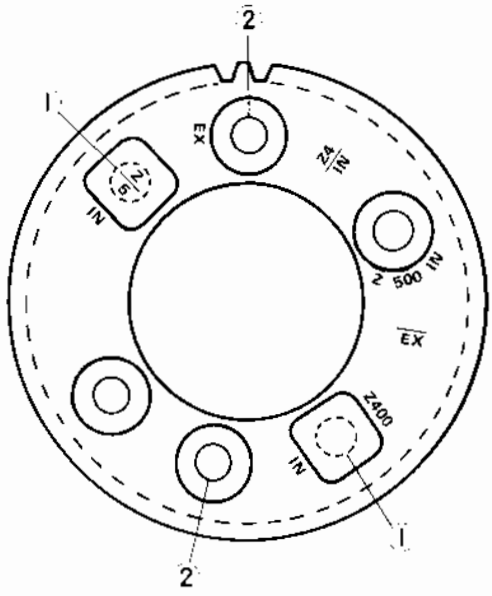
CAMSHAFT SPROCKETS (on KZ400)

Refer to Pg. 61, noting the following:

- For KZ400, set the sprocket on the camshaft, aligning the bolt holes. Use the two of the sprocket bolt holes for installation as shown. The inlet sprocket has six bolt holes, and the exhaust sprocket has four bolt holes.

NOTE: For KZ550, the camshaft sprockets are the same as the sprockets of KZ500.

Camshaft Sprocket Installation (KZ400)



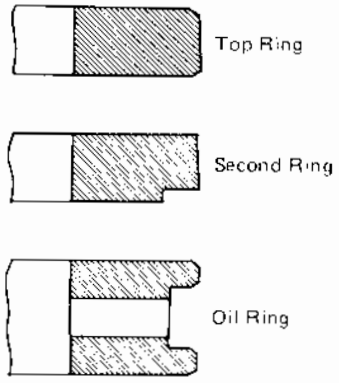
1. Bolt Hole for Inlet Camshaft
2. Bolt Hole for Exhaust Camshaft

PISTON RINGS (on KZ400)

The pistons on KZ400 use the one-piece type piston oil rings instead of the separate type piston oil rings. Refer to the follows when installing the oil rings:

- Install the oil ring so that the correct side (marked "T") faces up.
- Turn the rings so that the opening in the top ring and oil ring of each piston faces forward and the opening in the second ring faces the rear.

Piston Rings (KZ400) (N25)



CARBURETOR HOLDERS

Removal:

- Remove the fuel tank (Pg. 47).
- Remove the carburetors (Pg. 49).
- Pull the vacuum hoses off the attachments (on US model).
- Remove the screws (8), and remove the carburetor holders from the cylinder head.

Installation Notes:

1. For US model, install the #1 and #4 carburetor holders so that the vacuum hose attachments point upward and to the inside, and install the #2 and #3 carburetor holders so that the attachments point downward and to the outside.



A. #1 Carburetor Holder **B. #2 Carburetor Holder**

2. Apply a non-permanent locking agent to the mounting screw threads.
3. Fit the rubber caps onto the carburetor holder attachments. For US model, fit the rubber caps (2) onto the #2 and #3 carburetor holder attachments, and connect the vacuum hoses to the #1 and #4 carburetor holder attachments.

ENGINE SPROCKET (on KZ400)

The drive chain for KZ400 is not an "endless" type. Refer to the follows when removing and installing the engine sprocket:

Removal:

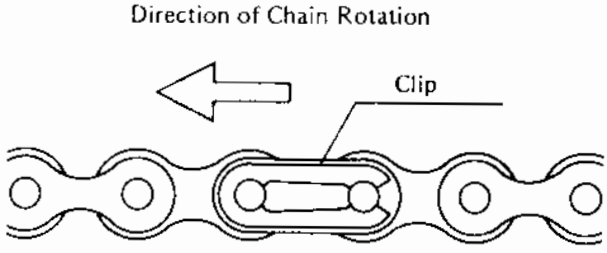
- Stand the motorcycle up on its center stand.
- Check that the transmission is in neutral.
- Remove the engine sprocket cover (Pg. 69).
- Remove the engine sprocket holding plate bolts (2), and remove the plate.
- Remove the clip from the chain master link using pliers, and remove the master link.
- Remove the engine sprocket, and free it from the drive chain.

Installation Notes:

1. Mount the engine sprocket while meshed with the drive chain, and install the drive chain master link and clip. The direction of the master link clip must be as shown.

WARNING **Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodges, the chain could come apart, and this could result in rear wheel lockup and loss of control.**

Master Link Clip Installation (N27)



2. Tighten the holding plate bolts (2) to 1.0 kg-m (87 in-lbs) of torque.

STARTER MOTOR (on KZ550)

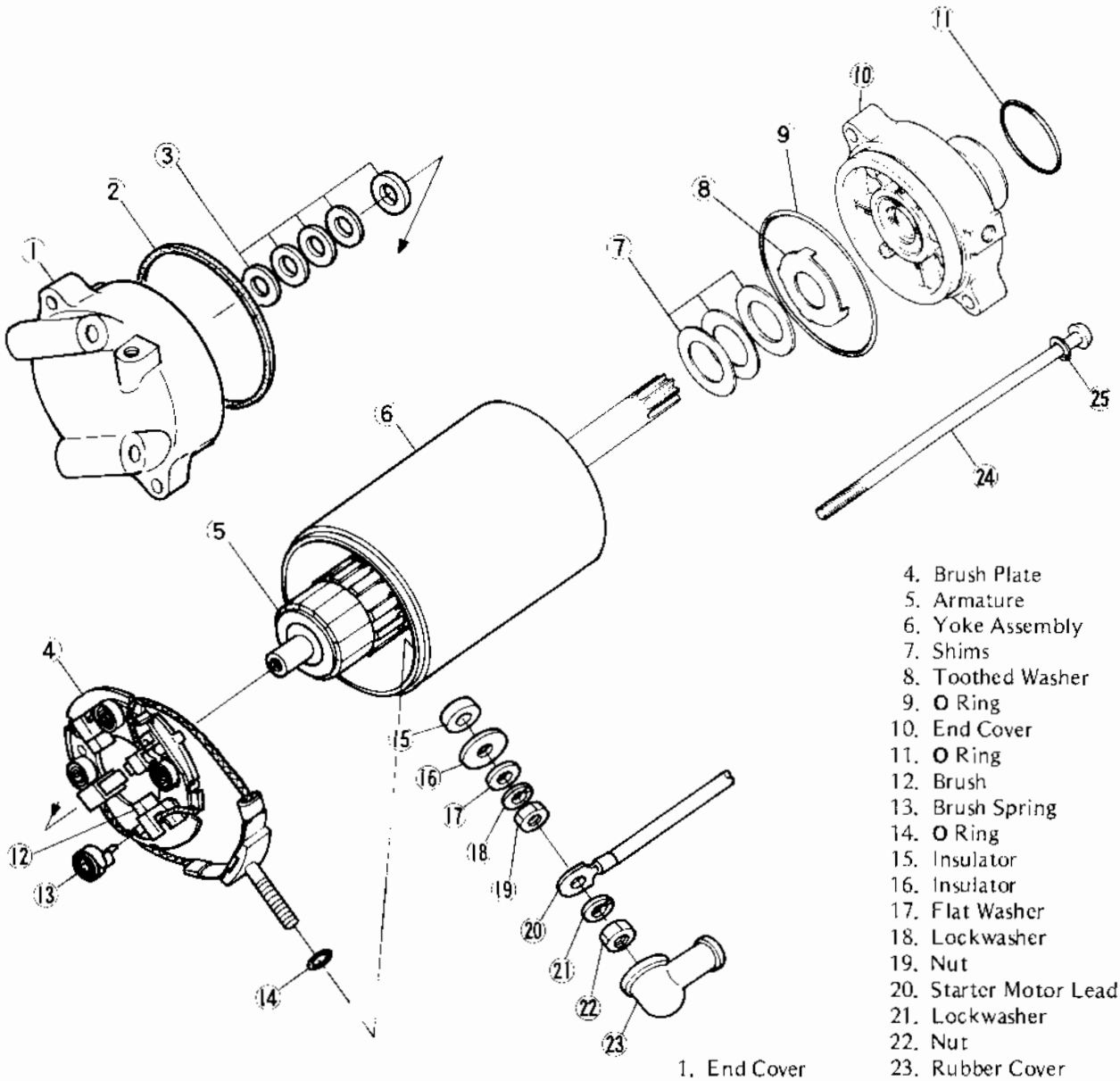
Disassembly and Assembly Notes:

Refer to Pgs. 74 ~ 75, noting the following:

1. The starter motor on KZ550 has the permanent magnets inside the yoke instead of the field coils.

Starter Motor (KZ550)

(N28)



1. End Cover
2. O Ring
3. Shims
4. Brush Plate
5. Armature
6. Yoke Assembly
7. Shims
8. Toothed Washer
9. O Ring
10. End Cover
11. O Ring
12. Brush
13. Brush Spring
14. O Ring
15. Insulator
16. Insulator
17. Flat Washer
18. Lockwasher
19. Nut
20. Starter Motor Lead
21. Lockwasher
22. Nut
23. Rubber Cover
24. Screw
25. Lockwasher

2. There is four carbon brushes on the motor for KZ550, and they are connected to the motor terminal the leads.
3. When installing the brush assembly to the yoke, tighten the terminal nut to 1.1 kg-m (95 in-lbs) of torque without the terminal bolt turning.

PICK-UP COIL ASSEMBLY (on KZ550-C)

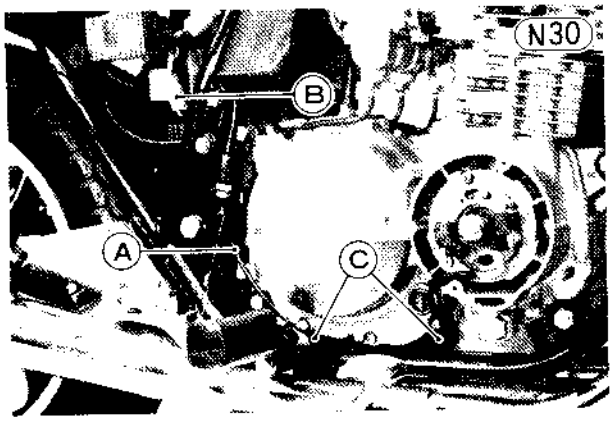
Removal:

- Remove the pick-up coil cover and gasket.



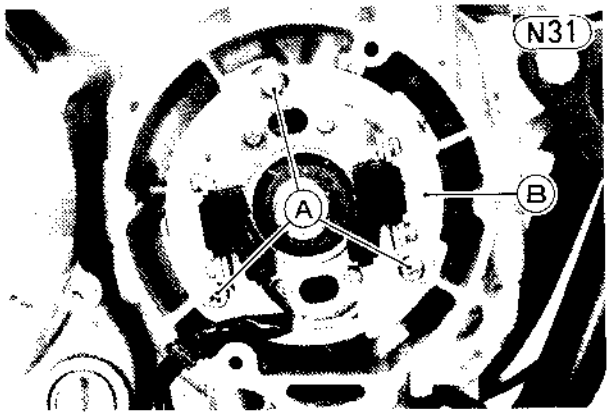
A. Pick-up Coil Cover

•Pull off the right side cover, disconnect the 4-pin connector that joins the pick-up coil leads to the IC igniter, and slide the leads free from the clamps (2) beneath the engine.



A. Pick-up Coil Lead
B. 4-pin Connector
C. Clamps

•Remove the pick-up coil assembly mounting screws (3), and remove the pick-up coil assembly. Each screw has a lockwasher and flat washer.



A. Mounting Screws
B. Pick-up Coil Assembly

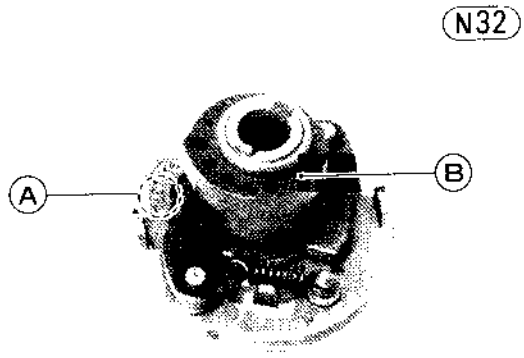
Installation Note:

•Fit the lead grommet into the notch in the right engine cover.

TIMING ADVANCER (on KZ550-C)

Refer to Pg. 77, noting the following:

•Install the timing rotor, aligning the projection on the rotor with the "TEC" mark on the advancer body.

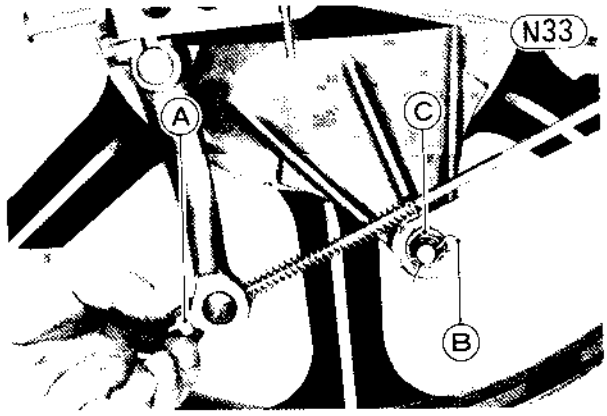


A. "TEC" Mark
B. Timing Rotor

ENGINE REMOVAL

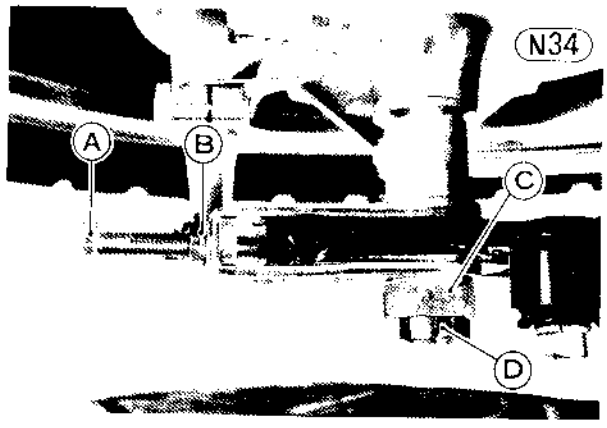
For US model, the model with the rear drum brake, or KZ400, refer to Pgs. 92 ~ 96, noting the following:

1. For US model, remove the vacuum switch valve (Pg. 269).
2. For the motorcycle with the rear drum brake, give the drive chain plenty of play, and hold down the rear brake pedal out of the way according to the following:
   •Back the rear brake adjusting nut off to the end of the brake rod to give the pedal play.



A. Adjusting Nut
B. Safety Clip
C. Rear Torque Link Nut

   •Loosen the brake pedal adjusting bolt locknut, and back out the adjusting bolt until the pedal is held down out of the way.
   •Remove the safety clip from the rear torque link nut, and remove the cotter pin from the rear axle nut.
   •Loosen the rear torque link nut, axle nut, and chain adjusting bolt locknuts, and then turn out the chain adjusting bolts in order to give the chain plenty of play. Kick the wheel forward until the chain is slack.



A. Chain Adjusting Bolt
B. Locknut
C. Axle Nut
D. Cotter Pin

3. For KZ400, remove the clip from the drive chain master link to free the drive chain from the engine sprocket.

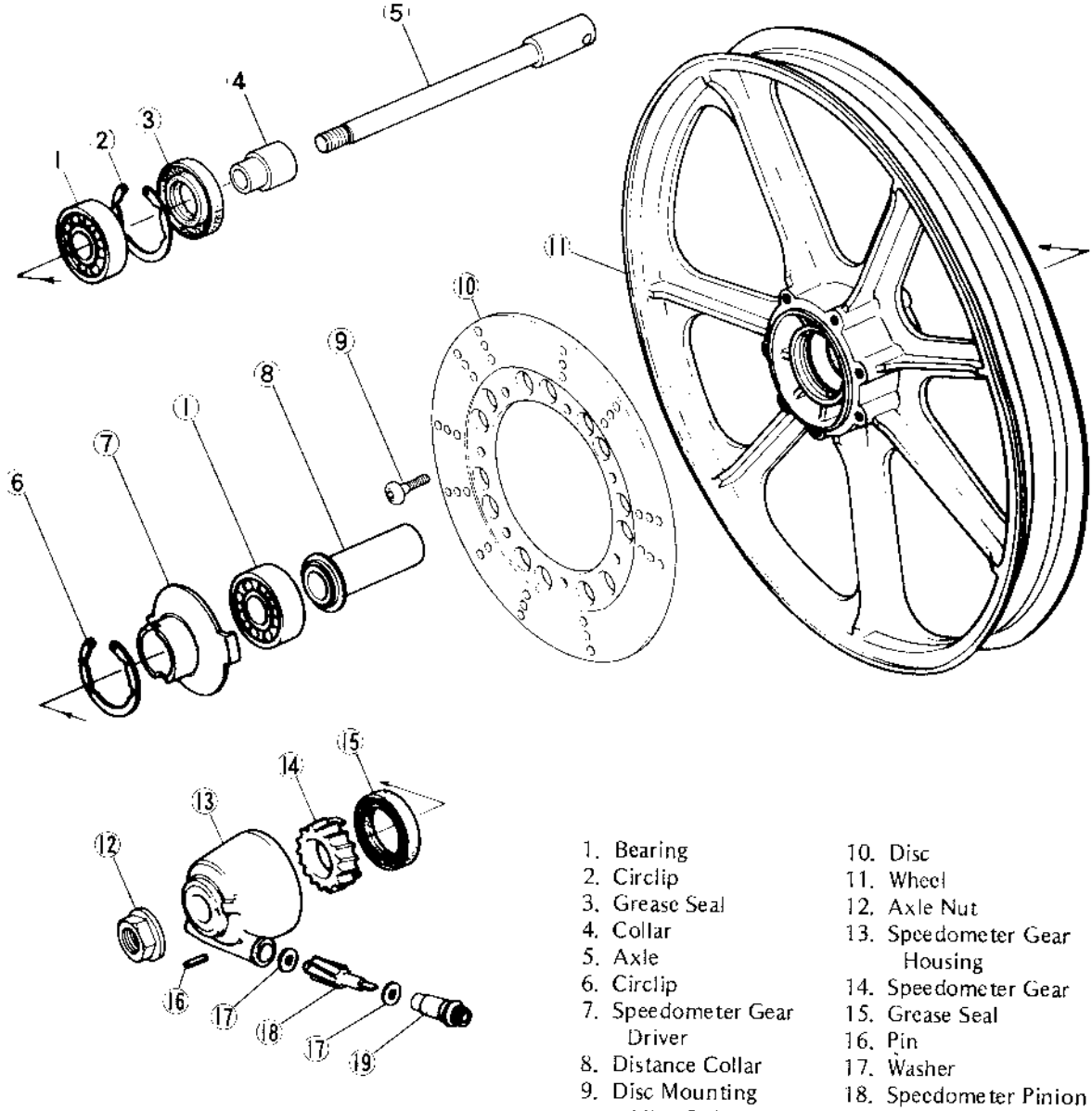
FRONT WHEEL (on KZ550-C)

Speedometer Gear Housing Disassembly and Assembly Notes:

Refer to Pgs. 116~117, adding the following:

1. To remove the speedometer gear 14 , pull out the grease seal 15 using a hook, and pull out the speedometer gear.
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.

Front Wheel (KZ550-C)

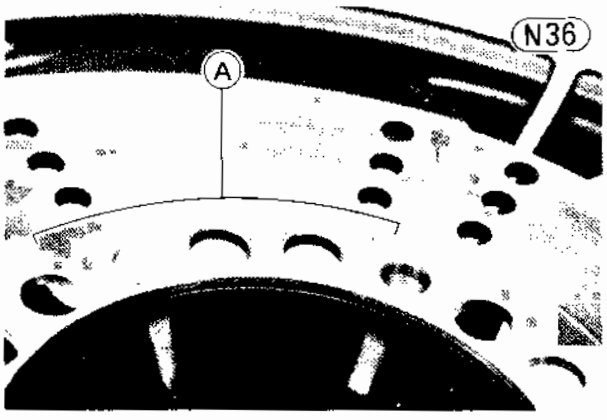


1. Bearing
2. Circlip
3. Grease Seal
4. Collar
5. Axle
6. Circlip
7. Speedometer Gear Driver
8. Distance Collar
9. Disc Mounting Allen Bolt
10. Disc
11. Wheel
12. Axle Nut
13. Speedometer Gear Housing
14. Speedometer Gear
15. Grease Seal
16. Pin
17. Washer
18. Speedometer Pinion
19. Bushing

Bearings, Brake Disc Removal and Installation:

Refer to Pgs. 117~118, noting the following:

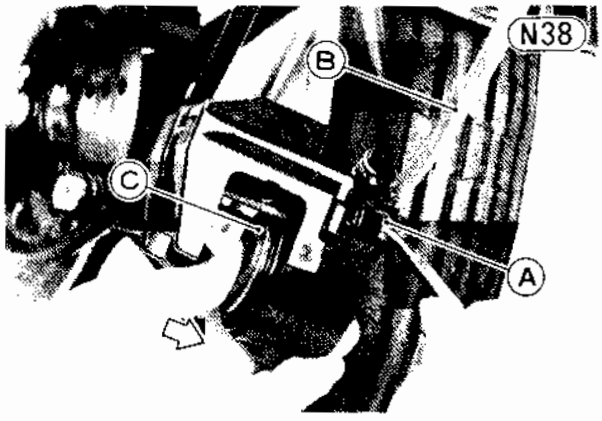
1. To remove the brake disc 10, remove the disc mounting Allen bolts 9 (7), and take off the disc.
2. To remove the left side ball bearing 1, remove the circlip 6 and speedometer gear driver 7, and remove the left side ball bearing.
3. Mount the brake disc on the wheel so that the marked side faces out, and tighten the disc mounting Allen bolts to 2.3 kg-m (16.5 ft-lbs) of torque.



A. Marking of the disc thickness service limit.

Pad Installation:

- Remove the bleed valve cap 2 on the caliper, attach a clear plastic hose to the bleed valve 3, and run the other end of the hose into a container.
- Open (loosen) the valve slightly, push the piston in by hand as far as it will go, and then close (tighten) the valve. Wipe up any spilled fluid, and recap the bleed valve. The bleed valve must be tightened to 0.80 kg-m (69 in-lbs) of torque.



A. Bleed Valve **B. Hose** **C. Piston**

- Check that the sliders 13 (2) are in place.
- Fit the pads against the disc.

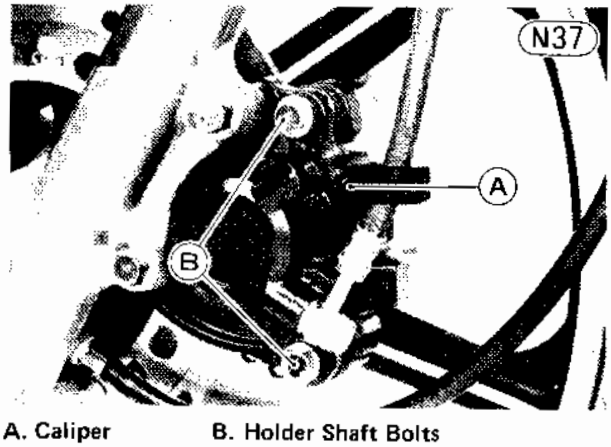
FRONT DISC BRAKE (on KZ550-C)

The caliper mounted on KZ550-C front disc brake is different from KZ500.

Refer to Pgs. 118~123, noting the following:

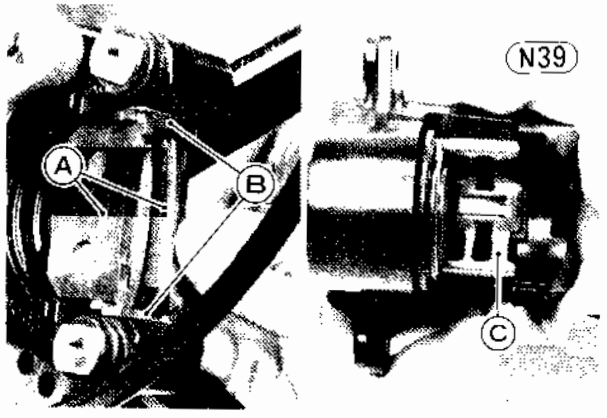
Pad Removal:

- Remove the caliper holder shaft bolts 1 (2).



A. Caliper **B. Holder Shaft Bolts**

- Lift the caliper 4 off the holder 12, and remove the pads 14 (2).

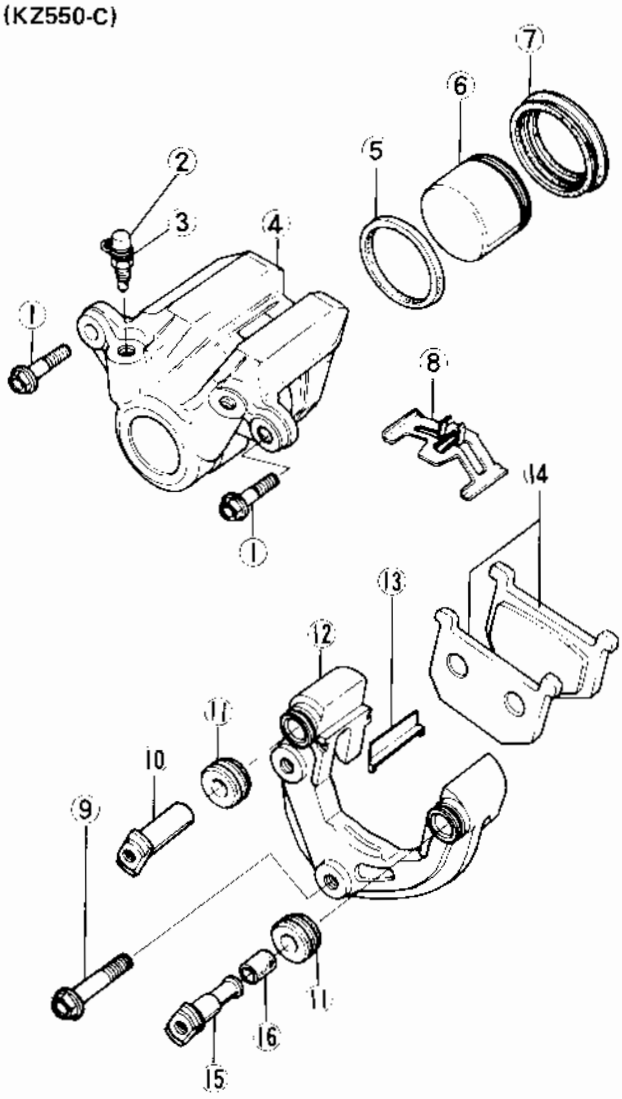


A. Pads **B. Sliders** **C. Anti-rattle Spring**

- Check that the anti-rattle spring 8 is in place. If it was removed, install it to the caliper as shown in Fig. N43.
- Install the caliper, and tighten the caliper holder shaft bolts to 1.8 kg-m (13.0 ft-lbs) of torque.
- Since some brake fluid was lost when the bleed valve was opened, check the fluid level in the master cylinder and bleed the air from the brake system (Pg. 205).
- Push the bleed valve cap onto the valve.
- Check the front brake.

Front Brake Caliper (KZ550-C)

(N40)



1. Caliper Holder Shaft Bolt
2. Bleed Valve Cap
3. Bleed Valve
4. Caliper
5. Fluid Seal
6. Piston
7. Dust Seal
8. Anti-rattle Spring
9. Caliper Mounting Bolt
10. Caliper Holder Shaft
11. Dust Cover
12. Caliper Holder
13. Slider
14. Pads
15. Caliper Holder Shaft
16. Friction Boot

WARNING **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.**

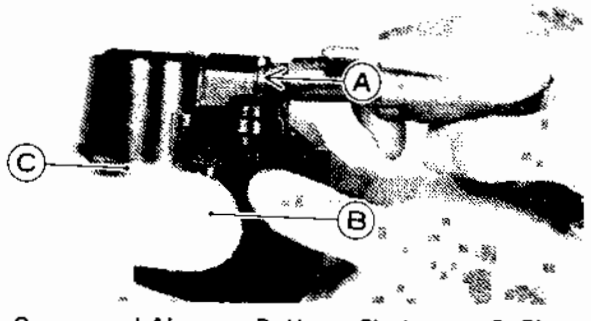
Caliper Disassembly:

- Remove the caliper holder shaft bolts 1 (2), and pull out the caliper holder 4 and the pads 14 (2).
- Remove the holder shafts 10 and 15 with the dust covers 11. There is the friction boot 16 on the shaft 15 that diameter is smaller than the other.
- Remove the anti-rattle spring 8.
- Remove the dust seal 7 around the piston 6.
- 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 **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 cruch your hand or fingers.**

NOTE: If compressed air is not available, reconnect the brake line and pump the piston out with the brake lever.

(N41)



A. Compressed Air **B. Heavy Cloth** **C. Piston**

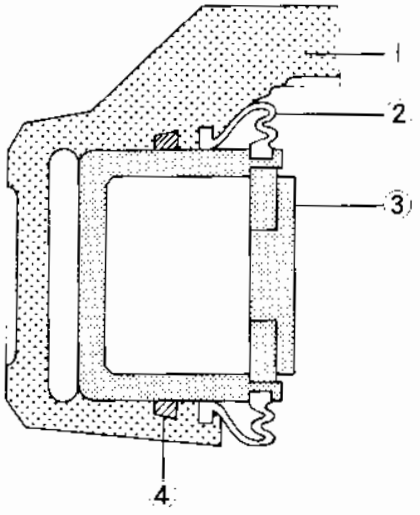
- Taking care not to damage the cylinder surface, remove the fluid seal 5 with a hook.

Caliper Assembly Notes:

1. Clean the caliper parts with brake fluid or alcohol (See CAUTION – Pg. 118).
2. It is recommended that the fluid seal, which is removed, be replaced with a new one.
3. Replace the dust covers and friction boot 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 on the caliper.

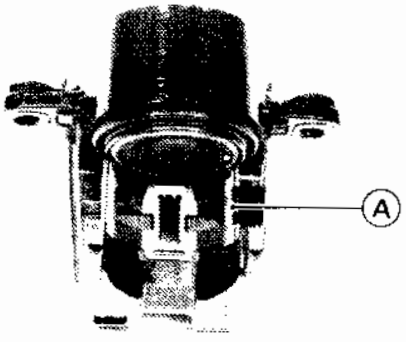
Caliper Dust Seal (N42)



1. Caliper
2. Dust Seal
3. Piston
4. Fluid Seal

6. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes. (PBC is a special high temperature, water-resistance grease).
7. Install the anti-rattle spring to the caliper as shown.

(N43)



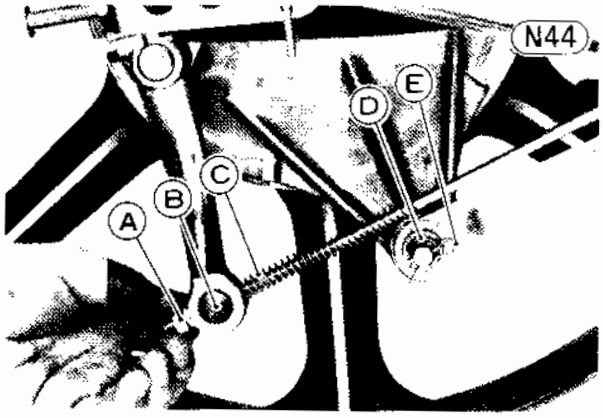
A. Anti-rattle Spring

8. Do not forget to tighten the holder shaft bolts after installing the caliper on the motorcycle (Pg. 276).

REAR WHEEL, REAR DRUM BRAKE

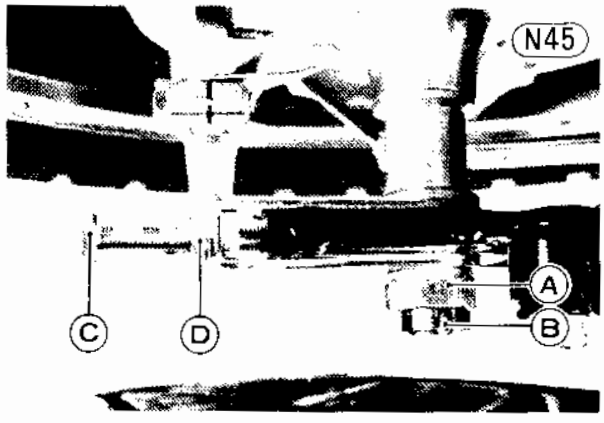
Removal:

- Put the motorcycle up on its center stand.
- Being careful not to bend or otherwise damage it, free the rear brake light switch spring from the tab on the brake pedal.
- Remove the adjusting nut from the end of the brake rod, and then free the rod from the cam lever by depressing the brake pedal. Remove the brake rod spring and joint.



A. Adjusting Nut
B. Brake Rod Joint
C. Brake Rod Spring
D. Rear Torque Link Nut
E. Safety Clip

- Take out the safety clip from the rear torque link bolt, remove the nut, lockwasher, and bolt.
- Take out the cotter pin, and loosen the axle nut.

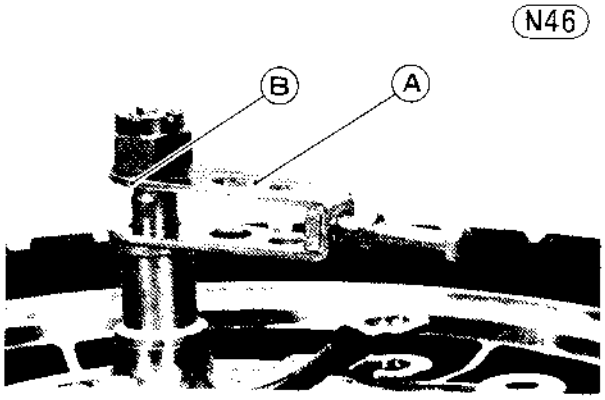


A. Axle Nut
B. Cotter Pin
C. Chain Adjusting Bolt
D. Locknut

- Remove the drive chain guard.
- Loosen the left and right chain adjusting bolt locknuts, back out the chain adjusting bolts, and kick the wheel forward until the chain is too loose.
- Remove the bolts, and take out the chain adjuster stops.
- Slip the chain off the sprocket, and then pull the wheel.
- Remove the axle nut, and pull off the axle.

Installation:

- Check to see that the coupling collar, coupling sleeve, rubber damper, and brake panel are in place.
- Slide the axle through the left chain adjuster, coupling collar, coupling, coupling sleeve, rear hub, brake panel, spacer, and right chain adjuster from the left to right. The chain adjusters should be installed with the notch mark side facing out.

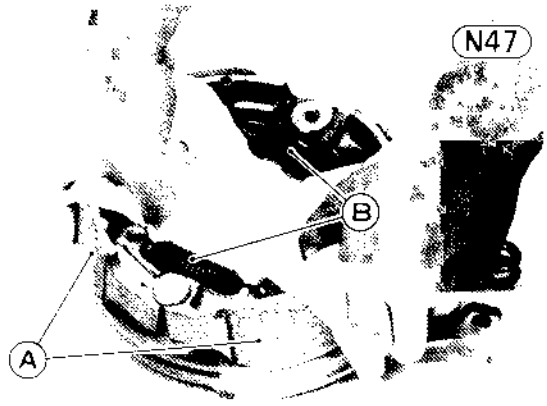


A. Chain Adjuster B. Notch

- Put the rear wheel into the swing arm end, and install the chain adjuster stops (2). Tighten the bolts (2) with lockwashers (2).
- Fit the drive chain onto the rear sprocket.
- Insert the axle nut, and tighten the nut loosely.
- Insert the torque link bolt into the brake panel, and install the torque link, lockwasher, and nut. Tighten the nut loosely.
- Install the chain guard.
- Adjust the drive chain (Pg. 265).
- Install the spring on the end of the brake rod, fit the rod through the joint, and screw on the adjusting nut.
- Carefully fit the rear brake light switch spring back into the tab on the brake pedal.
- Adjust the rear brake (Pg. 266), and check the rear brake light switch adjustment (Pg. 30).

Rear Drum Brake Disassembly:

- Remove the brake panel (21) from the wheel.
- Using a clean cloth around the linings to prevent grease or oil from getting on them, remove the brake shoes (19) by pulling up on the center of the linings.

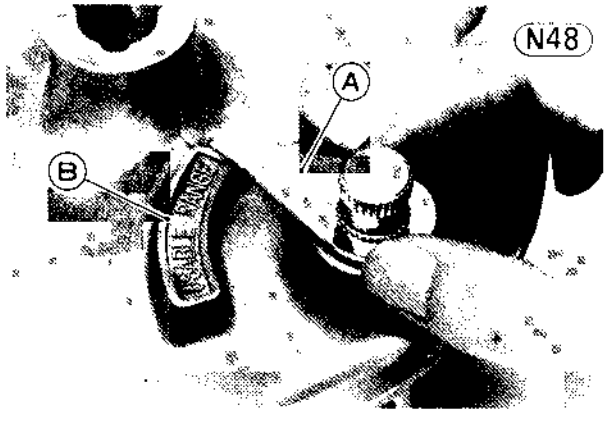


A. Brake Shoes B. Springs

- Remove the springs (20) (2) to separate the two brake shoes.
- Mark the position of the cam lever (24) so that it can be installed later in the same position.
- Unbolt and remove the cam lever, brake lining wear indicator (23), dust seal (22), and camshaft (25).

Rear Drum Brake Assembly:

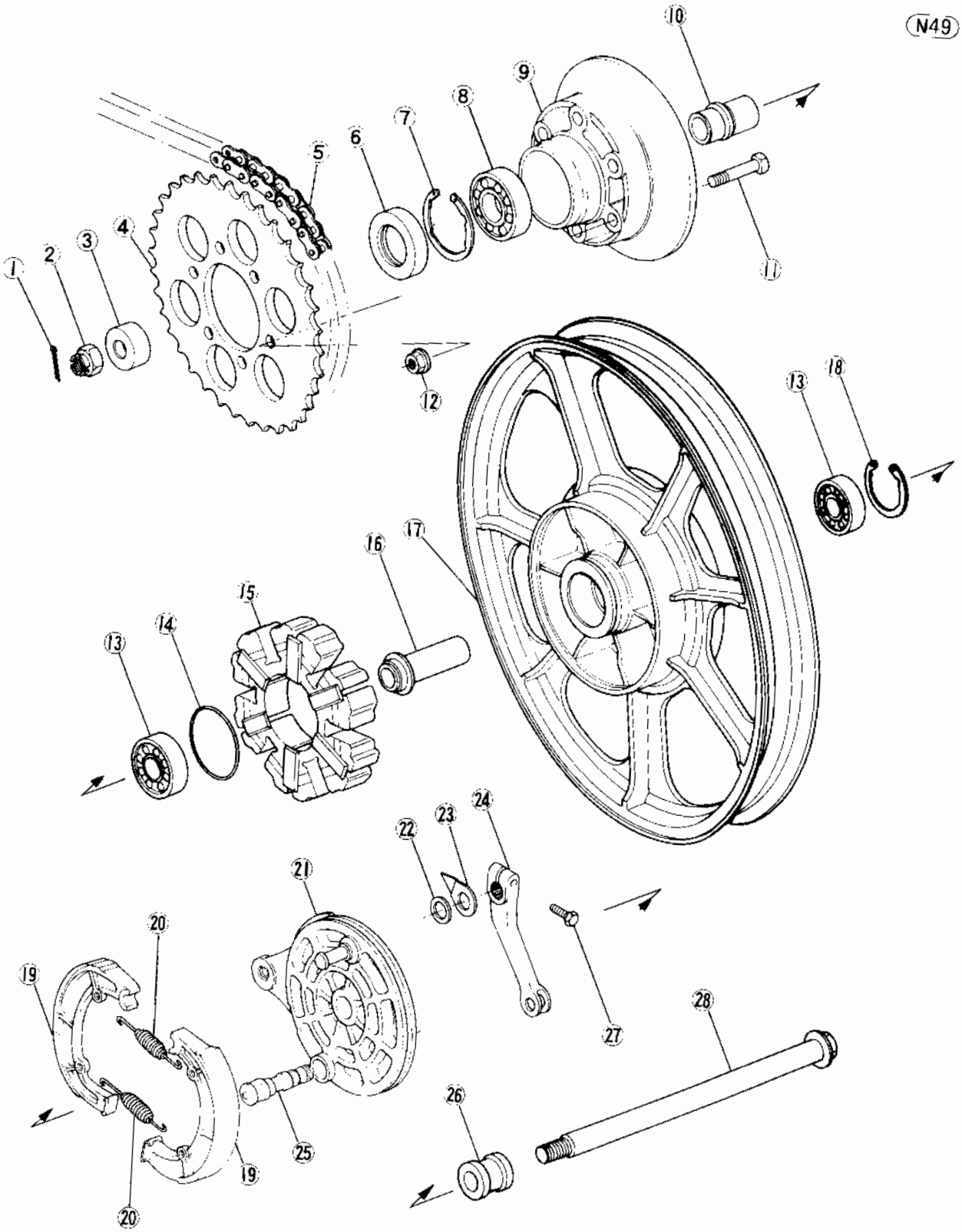
- Clean the old grease from the camshaft, and regrease using regular cup grease. Apply grease to the center of the shaft and on the cam surfaces. Do not over-grease.
- Put the camshaft back into the panel.
- Fit the springs onto the brake shoes, and wrapping a clean cloth around the linings to prevent grease or oil from getting on them, install the shoes onto the brake panel.
- Fit the dust seal and the indicator on the serration so that it points to the extreme right of the letters "USABLE RANGE".



A. Indicator B. USABLE RANGE

- Install the cam lever in its original position on the camshaft, and tighten its bolt.

Rear Wheel, Rear Drum Brake



1. Cotter Pin
2. Axle Nut
3. Collar
4. Sprocket
5. Drive Chain
6. Grease Seal
7. Circlip
8. Bearing
9. Rear Wheel Coupling
10. Coupling Sleeve
11. Bolt
12. Nut
13. Bearing
14. O Ring
15. Rubber Damper
16. Distance Collar
17. Wheel
18. Circlip
19. Brake Shoe
20. Spring
21. Brake Panel
22. Dust Seal
23. Wear Indicator
24. Cam Lever
25. Brake Cam
26. Collar
27. Bolt
28. Axle

Wheel Coupling Disassembly and Assembly:

Refer to Pg. 126, noting the following:

- Using the bearing driver and driver holder (special tools: P/N 57001-296, -139), install the wheel coupling ball bearing until it stops.

TUBELESS TIRES (on KZ550-C)

The tubeless tires are mounted on KZ550-C. Damage to the rim flanges and tire beads spoil the airtightness of tubeless tires and rims. When handling tubeless tires and rims, be careful not to damage the air-sealing surfaces. See the Maintenance Section for detailed information regarding tubeless tires (Pg. 288).

The following explanation covers tire removal and installation using bead breaker, rim protectors, and tire irons (special tools). If tires are to be removed and installed using a tire changer, operate it in the manner prescribed by the manufacturer.

NOTE: A tire changer suitable for tubeless and tube-type tires is available as a Kawasaki special tool.

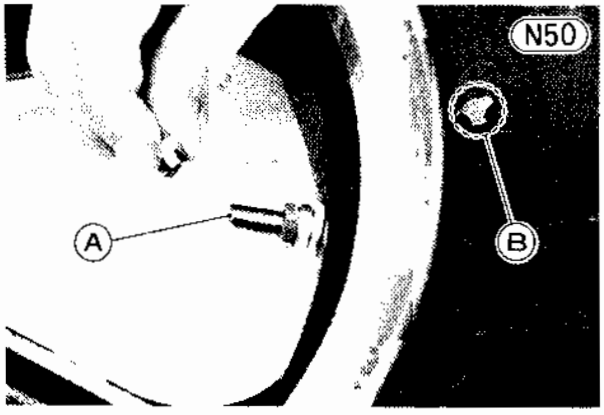
WARNING

1. To ensure safe handling and stability, use only wheels, valves, and tires recommended may result in an unsafe condition, leading to accident and injury.

2. Never install a tube on the rims on this motorcycle. They are designed for tubeless tires only.

Removal:

- Remove the wheel from the motorcycle (Pg. 115 or 123).
- Remove the speedometer gear housing and collar, and remove the disc(s) from the hub.
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire will be reinstalled in the same position.
- Take out the valve core to let out the air.

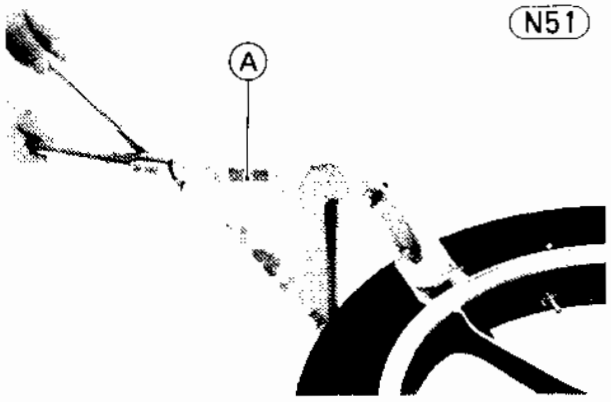


A. Valve Core **B. Chalk Mark**

- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

CAUTION **Never lubricate with mineral oil (engine oil) or gasoline because they will cause deterioration of the tire.**

- Break the beads away from both sides of the rim with the bead breaker (special tool).

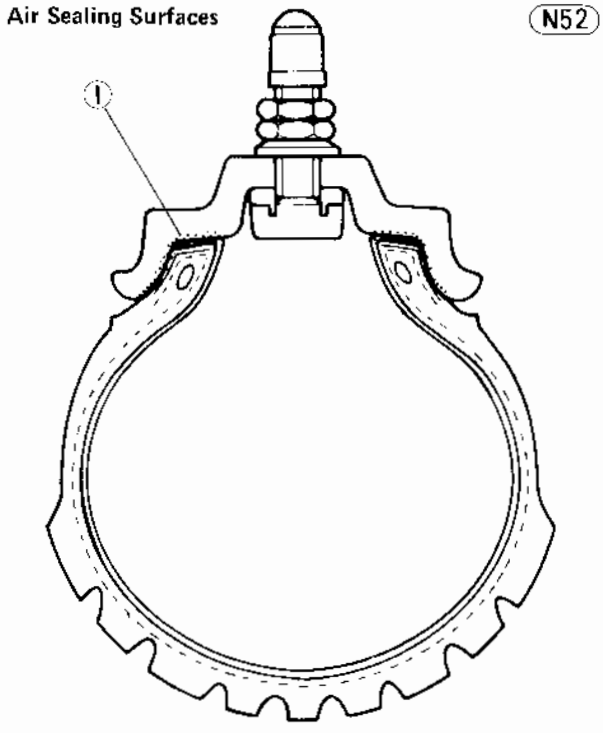


A. Bead Breaker (57001-1072)

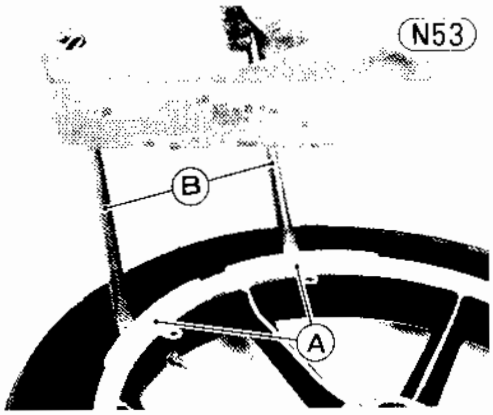
- Install the rim protectors (special tools) around the valve stem. Lubricate the tire irons and rim protectors with a soap and water solution, or rubber lubricant.
- Step on the side of the tire opposite the valve stem, and start prying the tire off the rim near the valve stem with tire irons (special tools).

NOTE: 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.

CAUTION **Be careful not to scratch the inner liner and air sealing surfaces of the rim and tire with the tire irons. A scratched inner liner or sealing surface may allow air to leak.**



1. Air Sealing Surfaces

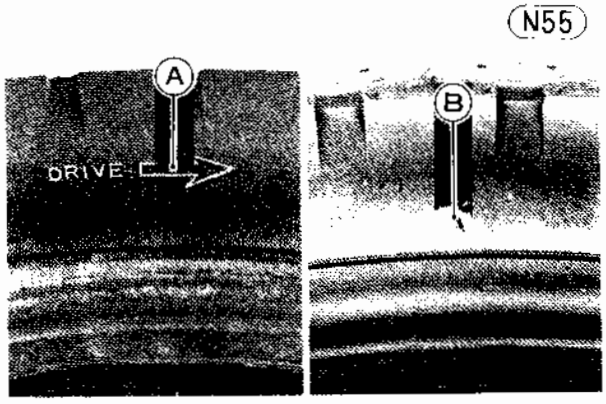


A. Rim Protectors (57001-1063)
B. Tire Irons (57001-1073)

- After removing the bead on one side, turn the wheel over and remove the other side.
- Remove the rim from the tire.
- Remove the rim protectors from the rim.

- Apply a soap and water solution, or rubber lubricant to the rim flanges, rim protectors, tire beads, and tire irons.
- Check the tire rotation mark on the rear tire and install it on the rim accordingly.

NOTE: The direction of the tire rotation is shown by an arrow on the tire sidewall.



A. Rotation Mark (Arrow)
B. Balance Mark (Yellow Paint)

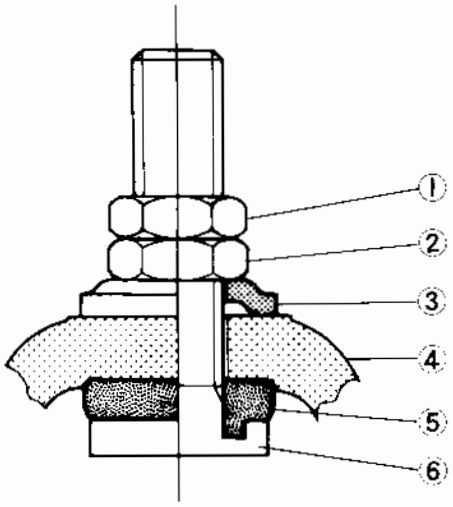
Installation:

- Inspect the rim and tire, and replace them if necessary.

NOTE: Refer to Pg. 289 for tire repair.

- Clean the sealing surfaces of the rim and tire, and smooth the sealing surface of the rim with a fine emery cloth if necessary.
- Replace the valve with a new one. Tighten the mounting nut and locknut to 0.15 kg-m (13 in-lbs) of torque.

Valve



1. Locknut
2. Nut
3. Washer
4. Cast Wheel
5. Grommet
6. Valve Stem

- Position the tire on the rim so that the valve is at the tire balance mark (the chalk mark made during removal, or the yellow paint mark on a new tire).
- Fit the rim protectors on the rim flange near the valve stem.
- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve.
- Use tire irons to install the remaining part of the tire bead which cannot be installed by hand. For easy tire installation, position the part of the bead which is already over the rim flange in the rim well.

NOTE: To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.

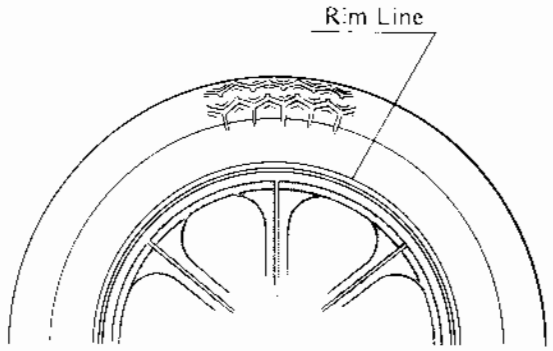
- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

WARNING **Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 4.0 kg/cm^2 (57 psi). Overinflation can explode the tire with possibility of injury and loss of life.**

- Check to see that the rim lines on both sides of the tire sidewalls are parallel with the rim flanges.

Rim Line

(N56)

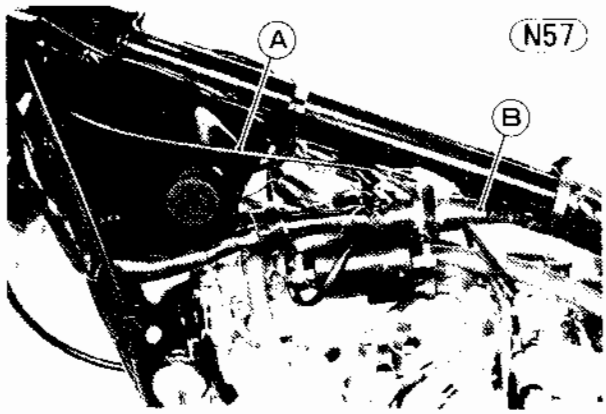


- If the rim lines and tire sidewall lines are not parallel, remove the valve core. Lubricate the rim flanges and tire beads. Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leaks. Inflate the tire slightly above standard inflation. Use a soap and water solution or submerge it, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (Pg. 289).
- Adjust the wheel balance (Pg. 31).
- Install the wheel (Pg. 115 or 124).

THROTTLE CABLES

Refer to Pgs. 134~136, noting the following:

- To install the accelerator cable without sharp bends, run it between the frame top tube and the main harness.

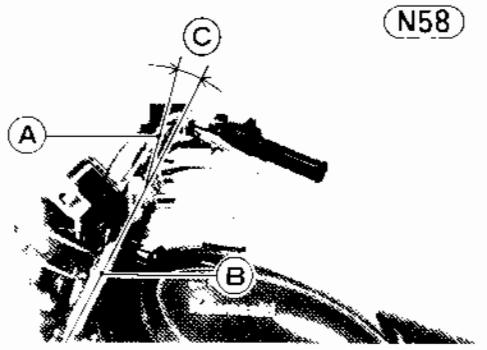


A. Accelerator Cable B. Main Harness

HANDLEBAR (on KZ550-C)

Refer to Pgs. 142~144, noting the following:

1. The front turn signal assemblies are mounted on the handlebar.
2. Mount the handlebar so that the handlebar come to an 10° angle with the front fork.



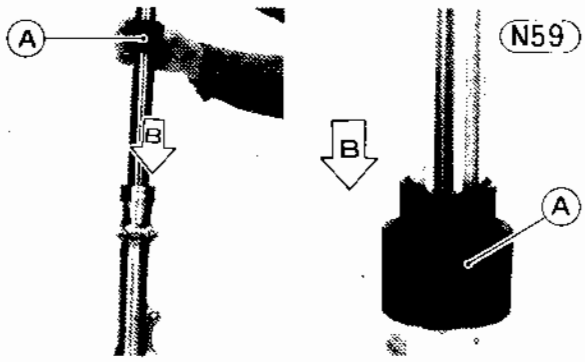
A. Handlebar B. Front Fork C. 10°

FRONT FORK (on KZ550-C)

The front fork on KZ550-C is an air adjustable front fork. Refer to Pgs. 147~150, noting the following:

Disassembly:

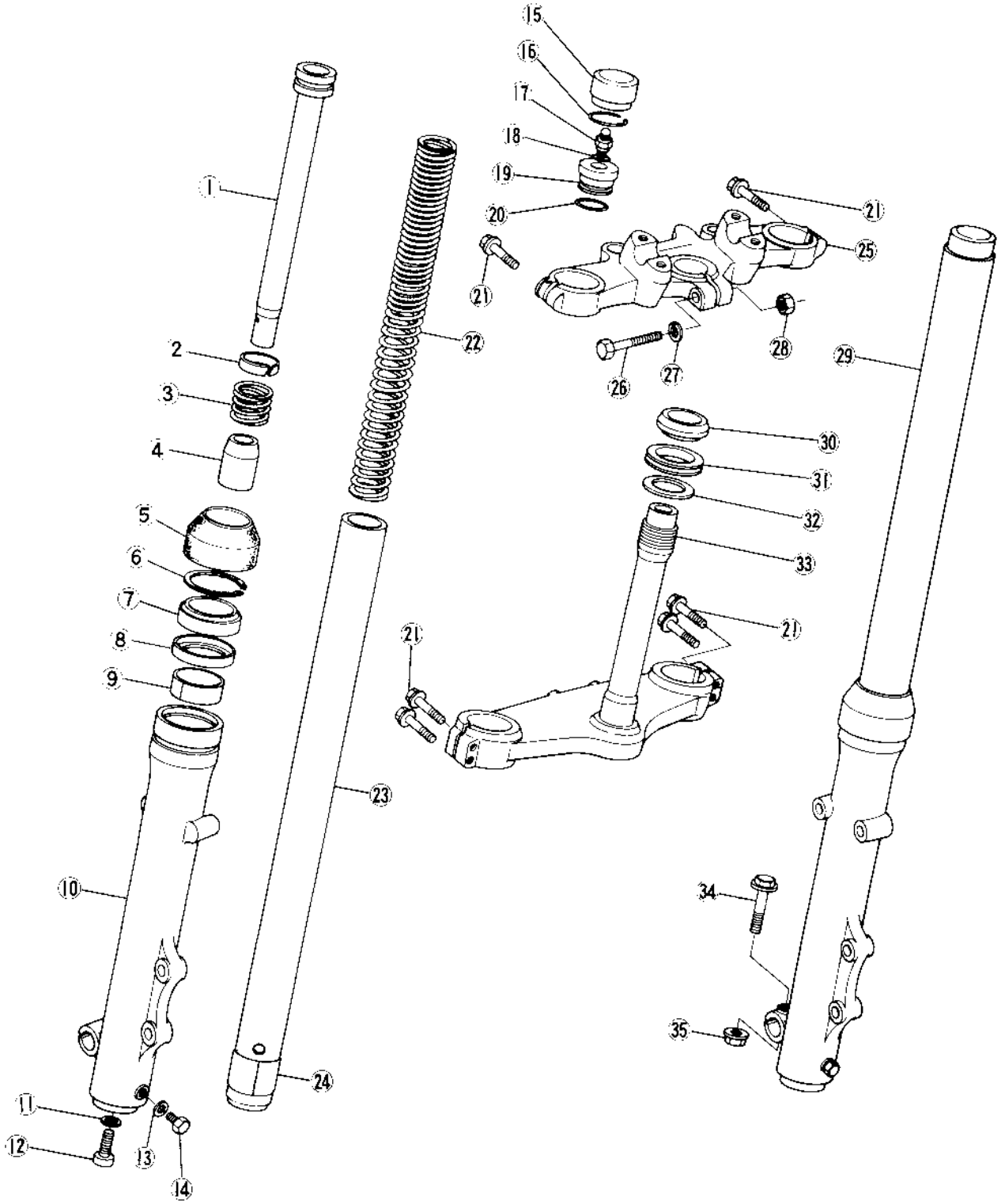
- Remove the rubber cap (15) from the top of the inner tube.
- Release the air through the air valve (17) before disassembling the fork leg.
- Remove the air valve (17) and its O ring (18) if necessary.
- Pressing the top plug (19) to remove the top plug retaining ring (16), remove the top plug and O ring (20).
- Remove the spring (22), and pour the oil into a suitable container, pumping as necessary to empty out all the oil.
- Remove the front fork bottom Allen bolt (12) and gasket (11) stopping the cylinder (1) from turning with the front fork cylinder holder handle and adapter (special tools: P/N 57001-183, -1011).
- Remove the dust seal (5) off the outer tube.
- Remove the circlip (6) off the outer tube.
- Slide the oil seal driver (special tool) onto the inner tube with the bigger diameter side of the driver first.
- To pull out the inner tube, hold the inner tube perpendicularly by hand and hit the outer tube with the oil seal driver. Don't hold the outer tube at this time, and take care not to drop the outer tube onto your foot.



A. Driver (57001-1091) B. Tap

- Remove the oil seal (7), oil seal seat (8), and guide bush (9) with the inner tube (23).
- Remove the cylinder (1) and spring (3) from the inner tube.
- Remove the cylinder base (4) from the outer tube.

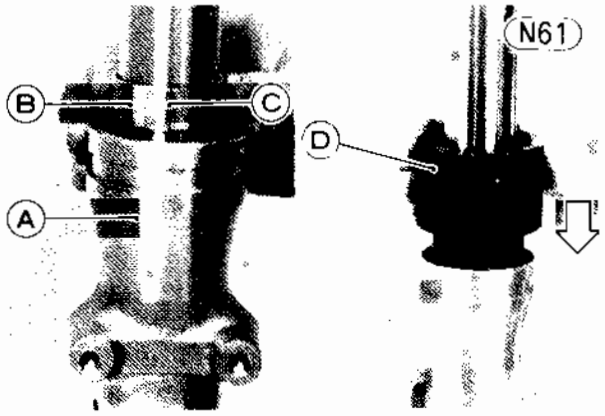
Front Fork (KZ550-C) (N60)



1. Piston and Cylinder Unit
2. Piston Ring
3. Spring
4. Piston Base
5. Dust Seal
6. Circlip
7. Oil Seal
8. Oil Seal Seat
9. Guide Bush
10. Left Outer Tube
11. Gasket
12. Allen Bolt
13. Gasket
14. Drain Bolt
15. Rubber Cap
16. Retaining Ring
17. Air Valve
18. O Ring
19. Top Plug
20. O Ring
21. Clamp Bolt
22. Spring
23. Left Inner Tube
24. Guide Bush
25. Stem Head
26. Clamp Bolt
27. Lockwasher
28. Nut
29. Right Fork Leg
30. Lower Inner Race
31. Grease Seal
32. Flat Washer
33. Steering Stem
34. Clamp Bolt
35. Nut

Assembly Notes:

1. Inspect the oil seal and guide brushes (Pg. 295), and replace them with new ones if necessary. Also check the O ring for damage. Replace them with a new one if damaged.
2. Being careful not to damage the guide bush at the lower end of the inner tube, insert the inner tube.
3. Apply liquid gasket to both sides of the gasket 11, apply a non-permanent locking agent to the Allen bolt, and tighten it using the front fork cylinder holder handle and adapter (special tools) to stop the cylinder from turning. The torque for the Allen bolt is 1.8 kg-m (13.0 ft-lbs).
4. Install the guide bush 9 with the oil seal seat 8 using the driver (special tool) until it stops. The slit of the bush must faced toward the left or right.



A. Outer Tube **C. Slit**
B. Guide Bush **D. Driver (57001-1091)**

5. Install the oil seal with the driver (special tool) used the guide bush installing. Do not strike the oil seal too strongly that the oil seal is deformed, which could cause oil leakage.
6. Apply a non-permanent locking agent to the threads of the air valve, and tighten the valve to 1.2 kg-m (104 in-lbs) of torque.
7. Inject air through the air valve (Pg. 264) after assembling the fork leg.

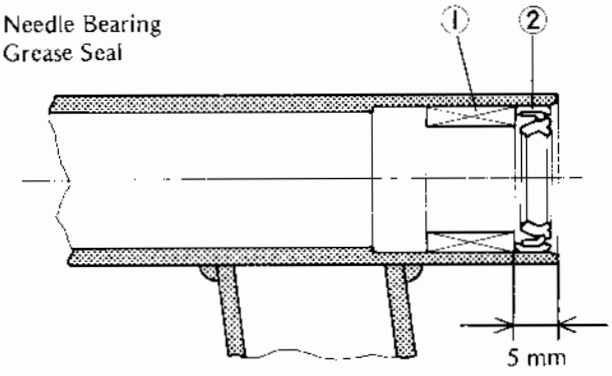
SWING ARM (on KZ550-C)

Refer to Pgs. 150 ~ 152, noting the following:

- Install the needle bearings and grease seals with a press as shown in the figure.

Needle Bearing and Grease Seal Installation (N62)

1. Needle Bearing
2. Grease Seal



DRIVE CHAIN (on KZ400)

Removal:

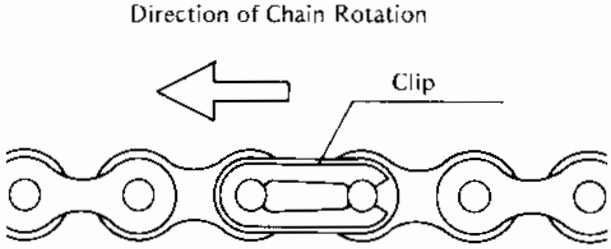
- Check to see that the transmission is in neutral.
- Remove the engine sprocket cover (Pg. 69).
- Remove the clip from the drive chain master link using pliers, and remove the master link.
- Free the drive chain from the sprockets, being careful that the chain does not get dirty from contact with the ground.

Installation Note:

- Install the master link clip with pliers. The direction of the master link clip must be as shown.

WARNING **Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodged, the chain could come apart, and this may result in rear wheel lock-up and loss of control.**

Drive Chain Master Link Clip Installation (N63)



Maintenance

CARBURETOR

Refer to Pgs. 156 ~ 162, noting the following:

1. Table N6 shows the carburetor specifications for KZ400-J and KZ550.
2. Jet needle on US model carburetor has only one groove in which the clip is set.

Table N6 Carburetor Specifications

Model	Type	Main Jet	Jet Needle	Pilot Jet	Pilot Screw	Throttle Valve Cutaway	Fuel Level (mm)	
							Design	Service
KZ400	K21P-2A Ⓦ K21P-2B	#90 Ⓦ #92	4C91-2	#32	1¼ ± ¼ Ⓦ 1½ ± ¼	2.5	29.5 ± 1	3.5 ± 1
KZ550 (US)	K22P-2C	#92	4D92	#32	———	2.5	29.5 ± 1	3.5 ± 1
KZ550 (other than US)	K22P-2D Ⓦ K21P-2A	#92 Ⓦ #90	4D93-2 Ⓦ 4C91-2	#32	1 3/8 ± ¼ Ⓦ 1¼ ± ¼	2.5	29.5 ± 1	3.5 ± 1

Ⓦ : West German model

KAWASAKI CLEAN AIR SYSTEM (on US Model)

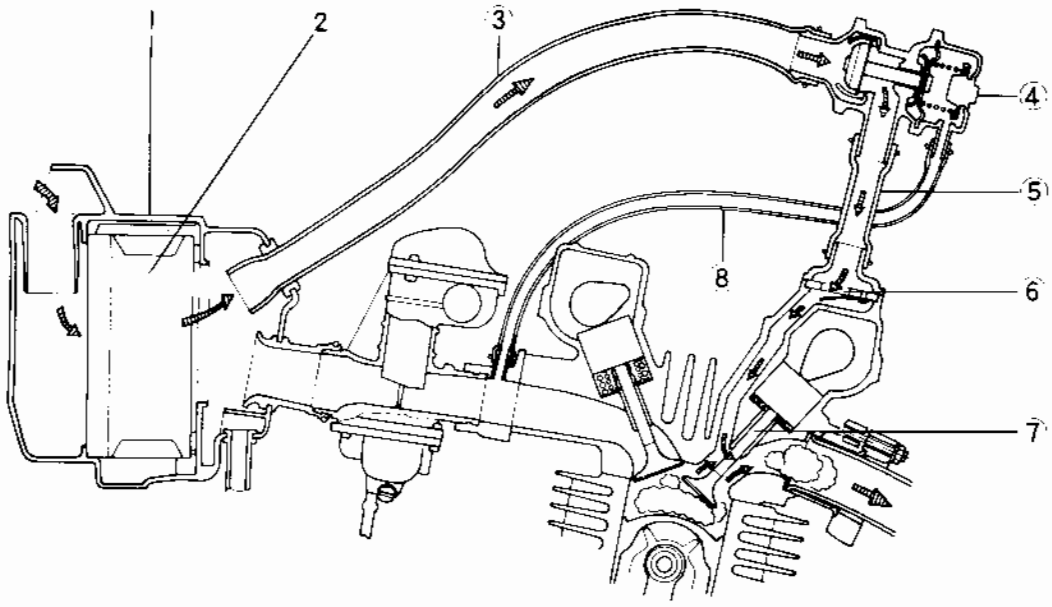
The motorcycle on US model adopts the air injection system for the clean air system.

The secondary air injection system helps the fuel/air mixture burn more completely. Following the power stroke, the exhaust valve opens. As the burned fuel charge passes the exhaust valve, it is still hot enough to burn if air is supplied. By introducing a stream of fresh air into the hot exhaust gases just as they pass the exhaust valve, the burning is both intensified and prolonged. This increased burning action tends to burn up a great deal of the normally unburned gases, as well as changing a significant portion of the positions carbon monoxide into harmless carbon dioxide.

The secondary air injection system consists of a vacuum switch valve, air suction valves, and air hoses. Without the use of an air pump, this system introduces fresh air into the exhaust system near the exhaust ports in response to pressure differentials generated by pulses in the exhaust.

Kawasaki Clean Air System (US model)

(N64)



1. Air Cleaner Housing
2. Air Cleaner Element
3. Air Hose
4. Vacuum Switch Valve
5. Air Hose
6. Air Suction Valve
7. Exhaust Valve
8. Vacuum Hose

Air Suction Valve

The air valve is essentially a check valve which allows fresh air to flow only from the air cleaner into the exhaust port. Any air that has passed the air suction valve is prevented from returning. Remove and inspect the air suction valves periodically (Pg. 262). Also, remove and inspect the air suction valves whenever the idle is unstable, engine power is greatly reduced, or there are abnormal engine noises.

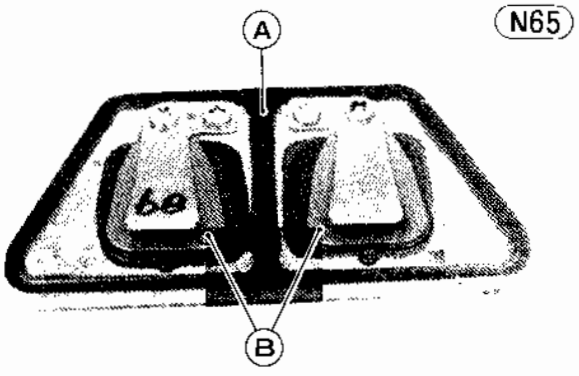
Inspection

Visually inspect the reeds for cracks, folds, warping heat damage, or other damage. If there is any doubt as to the condition of a reed, replace the air suction valve as an assembly.

Check the reed contact areas of the valve holder for grooves, scratches, any signs of separation from the holder, or heat damage. Check the sealing lip coating on the valve holder for the same signs. If there is any doubt as to the condition of the reed contact areas or the sealing lip, replace the air suction valve as an assembly.

If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly with a high flash-point solvent.

CAUTION **Do not scrape off the deposits as this could damage the rubber, necessitating air suction valve assembly replacement.**



A. Valve Holder **B. Reeds**

Vacuum Switch Valve

Although the vacuum switch valve usually permits secondary air flow, it shuts off the air flow when a high vacuum (low pressure) is developed at the engine side of the carburetor bores during engine braking. This is to prevent explosions in the exhaust ports which might be caused by extra unburned fuel in the exhaust during deceleration, if fresh air were injected into the exhaust ports. These explosions or "backfiring" in the exhaust system could damage the air suction valves.

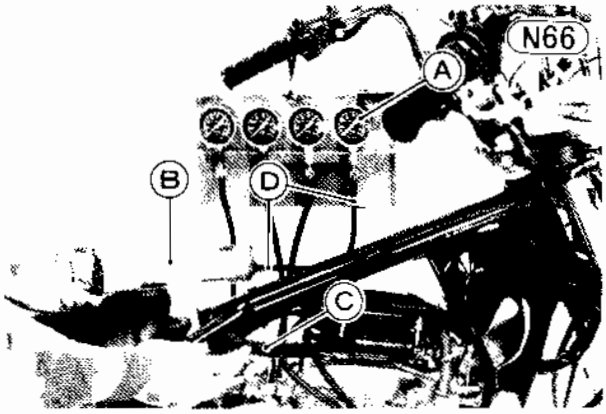
Regular inspection of the vacuum switch valve is not needed. If backfiring occurs frequently in the exhaust system during engine braking or if there are abnormal engine noises, check the vacuum switch valve as follows:

Inspection

Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, vacuum switch valve, #2 and #3 carburetor holders, and air suction covers. If they are not, correct them. Replace them if damaged.

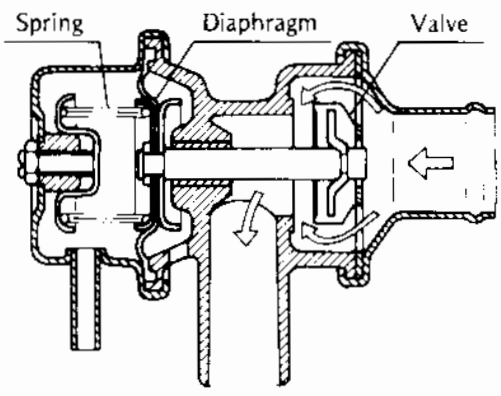
Using the vacuum gauge (special tool) and a syringe, inspect the vacuum switch operation as follows:

- Remove the fuel tank.
- Pull the air hose out of the air cleaner housing.
- Slide the hose clamps out of place, and pull the vacuum hoses (2) off the carburetor holders.
- Connect the vacuum gauge and a syringe to the vacuum hoses.

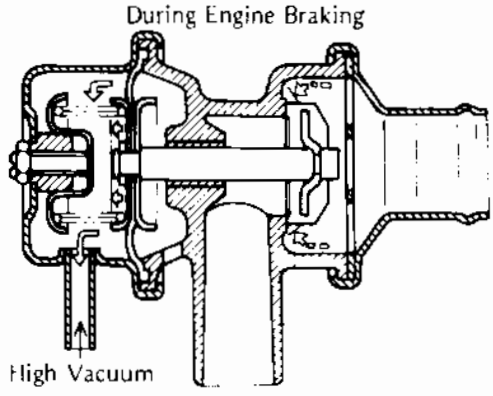


A. Vacuum Gauge (57001-127 or 226)
B. Syringe **C. Air Hose** **D. Vacuum Hoses**

Vacuum Switch Valve Operation



Secondary Air flows.



Secondary Air cannot flow.

•Gradually raise the vacuum (lower the pressure) applied to the vacuum switch valve, and check the valve operation. When the vacuum is low enough, the vacuum switch valve should permit air to flow. When the vacuum reaches a certain level between 40 and 46 cmHg, it should stop air flow. When the vacuum is high enough, the air cannot also flow through the valve. If the vacuum switch valve does not operate as this, replace it with a new one. Adjustment is not permitted.

NOTE: Whether the valve permits the air to flow or not is confirmed by blowing the air hose with breath.

CAUTION **Do not apply a vacuum more than 50 cmHg to the vacuum switch valve as this could damage the diaphragm in the valve.**

•Conversely, gradually lower the vacuum (raise the pressure) applied from the high vacuum, and check the valve operation. The valve will return to its original state just the reverse way as it came, but the transition should occur when the vacuum comes to a level between 40 and 46 cmHg. If the valve does not work as specified, replace the valve with a new one.

WHEEL (on KZ550-C)

Tubeless tires are installed on the wheels of KZ550-C. The main advantage of the tubeless tires is an added measure of driving safety. In the event of a puncture, tubeless tires would not blow out but instead tend to lose air gradually. Another advantage is cooler running characteristics.

The tire and rim form a leakproof unit by making airtight contacts at the tire chafers and the rim flanges instead of using an inner tube.

WARNING **The tires, rims, and air valves on this motorcycle is designed only for tubeless type wheels. The recommended standard tires, rims, and air valves must be used for replacement. For correct performance, do not install a tube in a tubeless tire.**

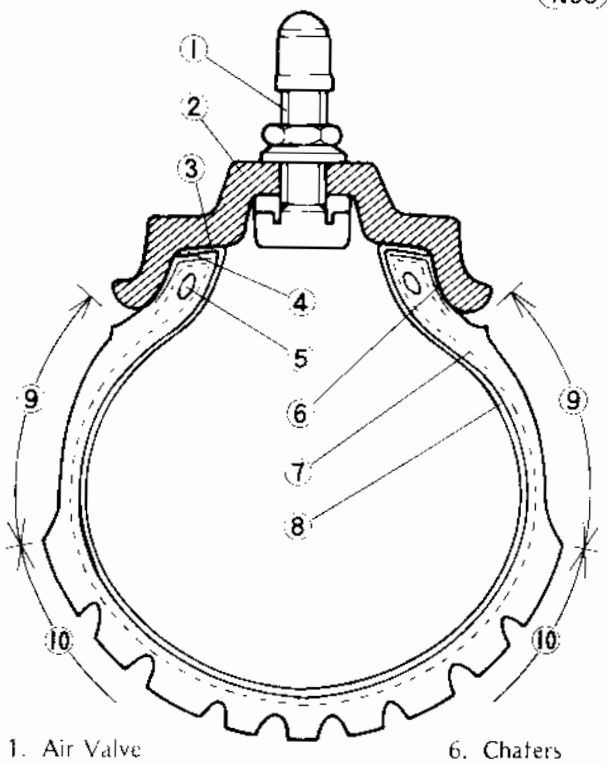
Tire

Structure of the tubeless tire is characterized by an inner liner and chafers.

The inner liner is a layer of thicker rubber which covers the inside wall of the tire. The inner liner is made from special quality of rubber which is hard to admit the air. Generally chafers reinforce tire beads which are likely damaged by friction with the rim. The chafers of tubeless tires have a characteristic of airtightness as well.

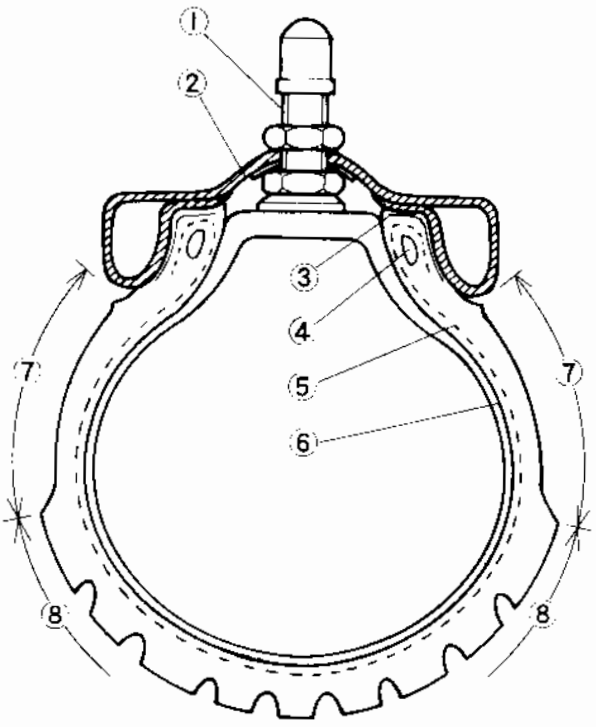
Since airtightness of tubeless tires is accomplished by closely seating the chafers in good condition on the rim, be careful not to damage the chafers when handling tubeless tires.

Tubeless Tire (N68)



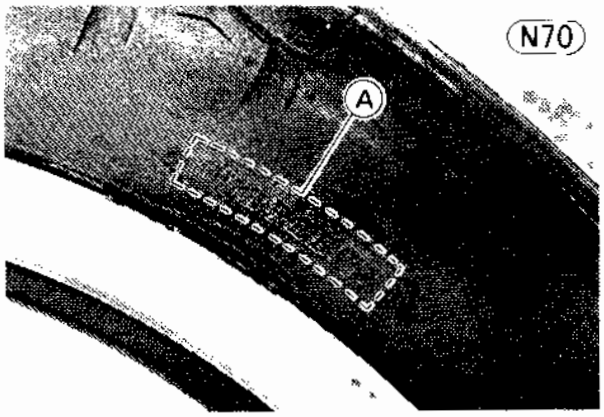
1. Air Valve
2. Rim
3. Rim Sealing Area
4. Bead Sealing Area
5. Bead Wires
6. Chafers
7. Plies
8. Inner Liner
9. Side Wall
10. Tread

Tube Tire (N69)



1. Air Valve
2. Rim
3. Chafers
4. Bead Wires
5. Plies
6. Tube
7. Side Wall
8. Tread

The indication of "TUBELESS" on the tire sidewall shows that the tire is designed for tubeless use.



A. "TUBELESS"

The tires are designed to provide good traction and power transmission during acceleration and braking, even on bad surfaces. To do this, they must be inflated to the correct pressure and not overloaded. The maximum recommended load, in addition to vehicle weight, is 155 kg.

If the tires are inflated to too high a pressure, the ride is rough, the center portion of the tread wears quickly, and the tires are easily damaged.

If inflation pressure is too low, the shoulder portions wear quickly, the cord suffers damage, fuel consumption is high and handling is poor. In addition, heat builds up at high speeds, and tire life is greatly shortened.

WARNING **To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure (Table N7). A certain variation from the standard pressure may be desired depending on road surface conditions (rain, snow, rough surface, etc.).**

Table N7 Tires, Air Pressure (measured when cold)

	Air Pressure		Size	Make, Type
Front	1.75 kg/cm² (25 psi)		3.25S-19 4PR	Dunlop Gold Seal F8 Nylon Tubeless
Rear	Up to 97.5 kg load	1.50 kg/cm² (21 psi)	130/90-16 67S	Dunlop Gold Seal K127 Nylon Tubeless
	97.5~155 kg load	2.00 kg/cm² (28 psi)		
	Ⓦ 156~194 kg load	2.25 kg/cm² (32 psi)		

Ⓦ : West German Model

Tire wear, damage

Refer to Pg. 194.

Tire repair

Currently two types of repair for tubeless tires have come into wide use. One type is called temporary (external) repairs which can be carried out without removing the tire from the rim, and another type is called permanent (internal) repairs which require tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs also have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended.

The tubeless tire repair methods described here describe the methods for COMBI UNITS made by TIP TIP (trade names). Repair methods may vary slightly TOP (trade names). Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

WARNING **A punctured tire cannot thoroughly recover the original performance by any repair method. When being repaired with COMBI UNITS made by TIP TOP, do not exceed 80 kph within 24 hours after repair, and 180 kph (113 mph) at any time after that.**

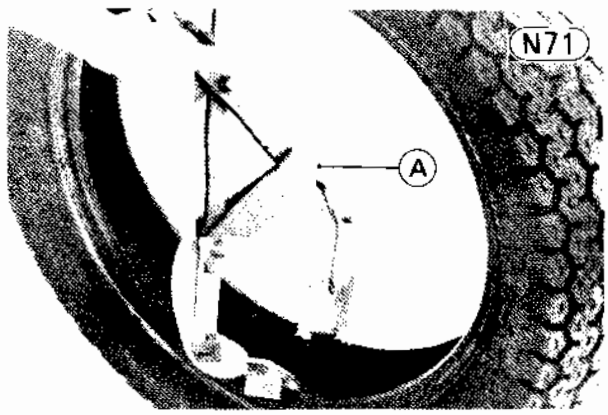
- Locate the mark the puncture and remove the injuring object.
- Remove the tire from rim (Pg. 281).
- Inspect the tire carefully. If any damage mentioned below is found, replace the tire with a new one:

1. Puncture or tear larger than 3 mm diameter.
2. Two punctures within 40 cm distance.
3. Three punctures or more in one tire.
4. Puncture or damage on sidewall.

- Inspect the rim. If there is any damage such as is mentioned on Pg. 291, replace the rim with a new one.
- Repair the tire puncture. COMBI UNITS made by TIP TOP are used here to describe the internal repair methods of tubeless tires.

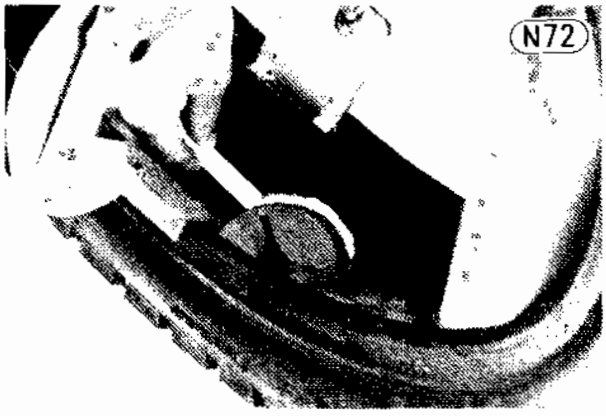
○Spread the tire slightly at the injury with the bead breaker (special tool). Choose a drill bit of slightly greater diameter than the injury.

NOTE: The diameter of a drill must be less than 3 mm at maximum.



A. Bead Breaker (57001-1072)

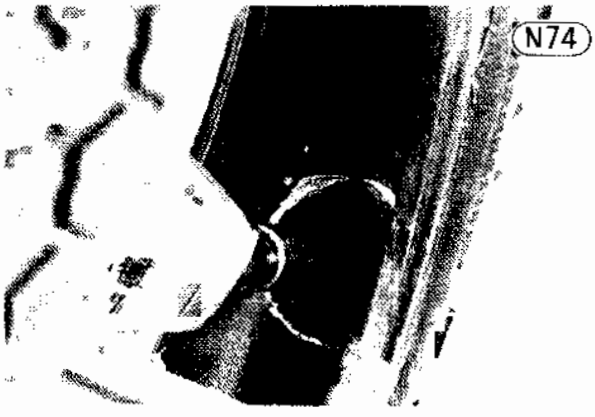
○Before buffing the tires, thoroughly clean the area around the puncture with a suitable solvent and scrape out all mold lubricants (i.e. silicon, graphite, etc.). Let dry before buffing.
○Center the COMBI UNIT on the puncture inside of the tire and draw an outline (do not use crayon).



○Buff the area slightly larger than the COMBI UNIT, remove the buffing dust.



○Center the drill in the break inside of the tire and screw into the puncture.
NOTE: Be careful not to expand the injury with the drill.



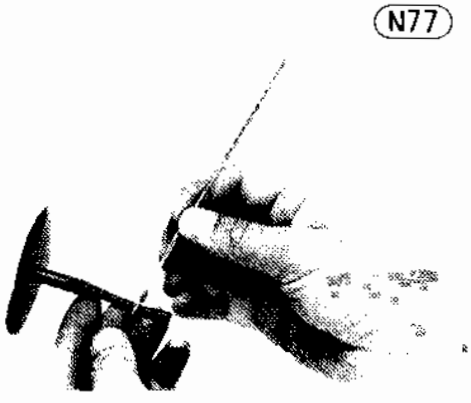
○Clean the buffed area thoroughly.
○Coat the puncture channel with a heavy layer of Rema Special Tire Cement. Using clean fingers or a brush, spread a thin, even coat of the same Cement to the buffed surface. Keep the repair area up to permit faster evaporation of solvent. Allow approximately 10 minutes for drying.



○Use the COMBI UNIT for motorcycle tires. Remove the protective sleeve from the stem of the COMBI UNIT. Break the metal foil across the center and peel the foil toward the edge. Coat the surface with a thin layer of Special Tire Cement. Do not touch the patch area.

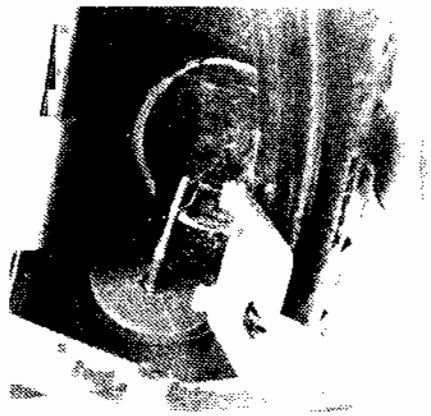


○Run the stem of the COMBI UNIT patch through the inserting wire.

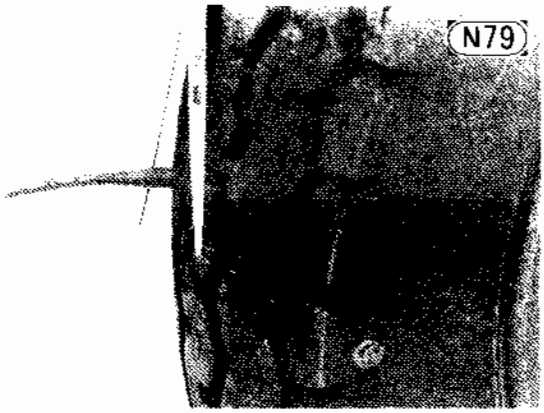


○Apply Special Tire Cement to the upper end of the stem (30 mm above the patch) so that the stem of COMBI UNIT patch slips smoothly.

○Pull the end of the stem through the puncture without turning until the base presses against inside of the tire.


N78

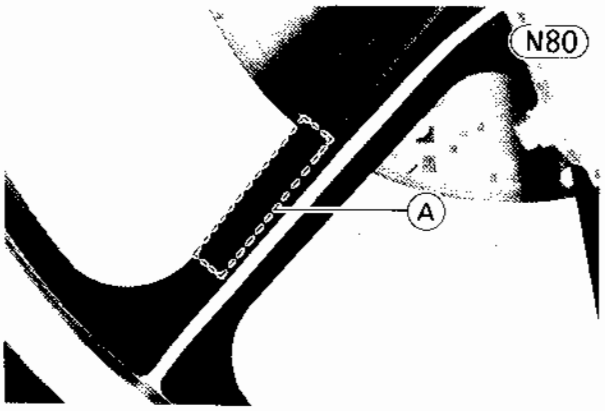
○Roll the stitcher cover the patch as hard as possible, keeping strokes close together and working from the center outwards.
○Cut off the protruding rubber tail flush with the tire surface.


N79

●Install the tire on the rim (Pg. 282).
●Balance the wheel (Pg. 31).

Rim

The indication "TUBELESS" on the rim shows that the rim is specially designed for tubeless tires.



N80

A. "TUBELESS"

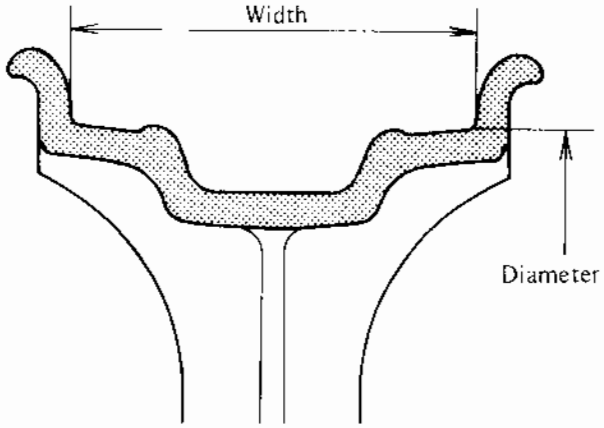
The rims for tubeless tires are specially designed in shape, size and finish to be airtight and to keep the tire from coming off the rim.

Table N8 Rim Size, Type*

	Size, Type
Front	19 x MT2.15 Tubeless
Rear	17 x MT3.00 Tubeless

*The rim size shown in the table is the inner width of the rim flanges and bead seat diameter, both in inches.

Rim Size



N81

Rim runout measurement

Refer to Pg. 194.

Rim damage

Carefully inspect the wheel for small cracks, dents, bents, or warp. If there is any damage to the wheel, it must be replaced.

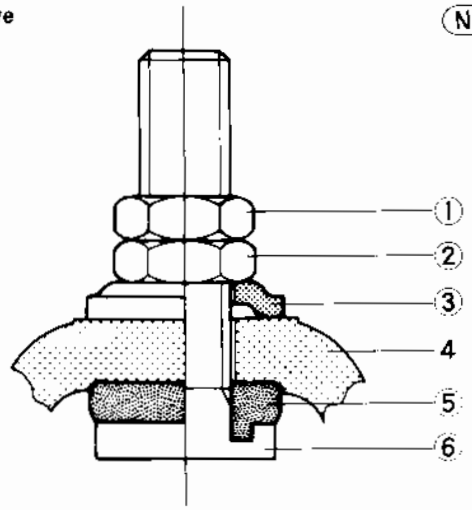
WARNING **Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.**

If the rim has a scratch deeper than 0.5 mm and/or across the rim sealing surface, replace the wheel.

Air Valve

For tubeless tires, the air valve is installed directly on the rim. The airtightness between the rim and the valve stem is ensured with a rubber grommet.

Air Valve (N82)



1. Locknut
2. Nut
3. Washer
4. Cast Wheel
5. Grommet
6. Valve Stem

Axle, Grease Seal, Wheel Bearing, and Rear Wheel Coupling

Refer to Pgs. 195~196.

Speedometer Gear Housing

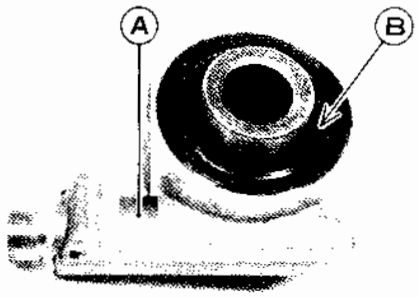
The speedometer gear housing is mounted on the left side of the front hub. The speedometer gear and pinion are in the housing, transmit the revolution of the front wheel to the speedometer through the speedometer cable.

The speedometer gear housing should be greased periodically.

Lubrication

Clean and grease to speedometer gear housing in accordance with the Periodic Maintenance Chart (Pg. 262).

(N83)



A. Speedometer Gear Housing **B. Grease**

DRIVE CHAIN

Refer to Pgs. 196~197, noting the following:

1. Table N9 shows the drive chain type.

Table N9 Drive Chain

Model	Make	Type	Links
KZ550 KZ500	Enuma	EK530SH-O	100 link
KZ400	Enuma	EK530D-G	100 link

2. The drive chain for KZ400 is not an "endless" type. It is provided with a master link to facilitate removal and replacement. To minimize any chance of the master link dislodging, the master link clip is fitted with the closed end of the "U" pointed in the direction of the chain rotation; follow the replacement procedure given in the Disassembly section (Pg. 285).
3. The drive chain for KZ400 has no O ring that seals in the lubricant between the pin and the bushing.

SPROCKET

The rear sprocket of KZ500-B has been changed for the diameter, and the rear sprocket of KZ550-C is different from the rear sprocket of KZ500-B. Refer to Pgs. 197~198, noting the following:

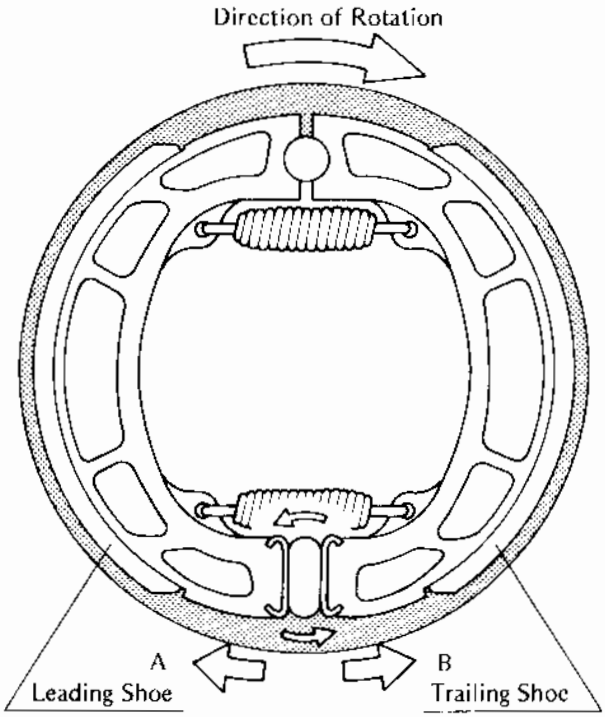
Table N10 Rear Sprocket Diameter

	KZ500-B (40T)	KZ550-C (38T)
Service Limit	191.9 mm	181.8 mm

DRUM BRAKE

The rear wheel of KZ550-A, KZ550-C, or KZ400-J is equipped with a leading-trailing type of drum brake. "Leading-trailing" means that one of the two brake shoes leads, expanding against the drum in the direction of drum rotation, and the other shoe trails, expanding in the direction opposite drum rotation.

Drum Brake (N84)



The force applied by the rider upon braking is transmitted to the interior of the brake by a camshaft. The force applied at the brake pedal is transmitted by a rod to the cam lever which then turns the camshaft. When the camshaft rotates, the large portion of the cam is forced between the two brake shoes. Since the shoes are only held together away from the drum by springs, the cam, overcoming spring tension, pushes the shoes outward against the drum. The leading shoe rotates in direction "A", and the trailing shoe in direction "B" as shown in the diagrams.

The friction between the linings and the drum, which decelerates the motorcycle, gradually wears down the brake shoe linings. On the outside of the brake panel is a brake lining wear indicator, which, as the brake is applied, moves in direct proportion to the distance that the brake shoe linings move to reach the brake drum. As the linings wear down, the lining surface has farther to travel before reaching the drum. The indicator accordingly travels farther until it finally points just to the left of the "U" in USABLE when the lining wear has reached the service limit.

Due to wear of the brake drum, shoe linings, and cam, periodic brake adjustment is required. However, if the brake parts become overworn, adjustment will not be sufficient to ensure safe brake operation. Not only can overworn parts crack (drum) and otherwise suffer damage as they lose their braking effectiveness, but, if the cam wears to the point where it turns nearly horizontal when the brake is fully applied, the brake may lock in the applied position, or brake pedal return may be very sluggish. All brake parts should be checked for wear in accordance with the Periodic Maintenance Chart (Pg. 262).

Brake drum wear

Measure the inside diameter of the brake drum with calipers to determine wear. Since uneven drum wear will decrease braking effectiveness, take 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 wheel 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 wheel with a new one.

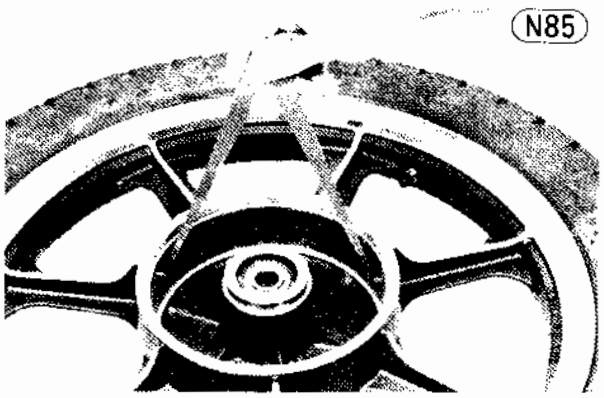


Table N11 Brake Drum Inside Diameter

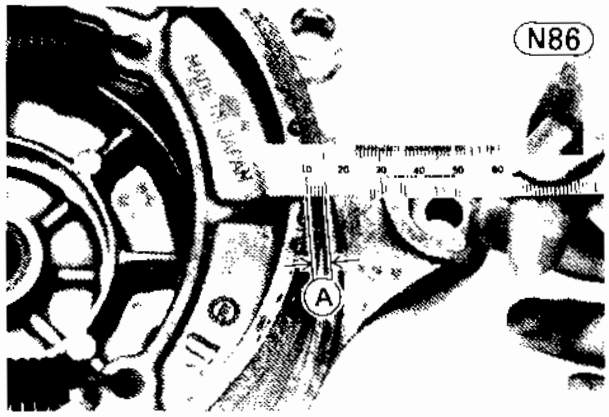
Service Limit	180.75 mm

Brake shoe lining wear

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

Table N12 Brake Lining Thickness

Service Limit	2.5 mm



A. Lining Thickness

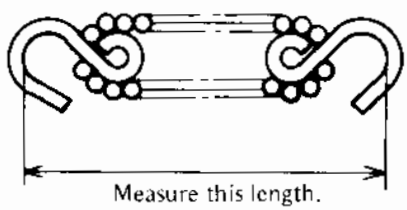
Brake shoe spring tension

If the brake springs have stretched, they will not pull 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 N13 Brake Shoe Spring Free Length

Service Limit	69.0 mm

Brake Shoe Spring Free Length (N87)



Measure this length.

Camshaft, shaft hole wear

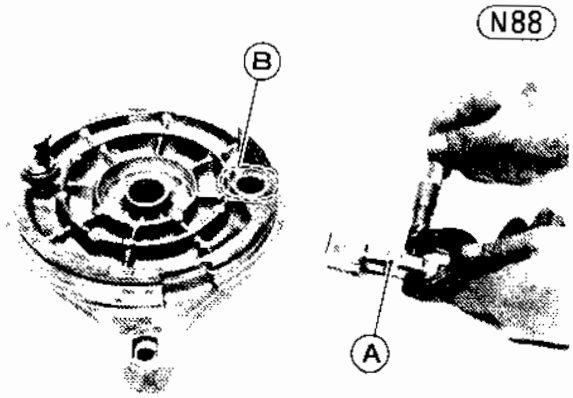
Excessive shaft to hole clearance will increase camshaft play and reduce braking efficiency.

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

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

Table N14 Brake Camshaft, Camshaft Hole Diameter

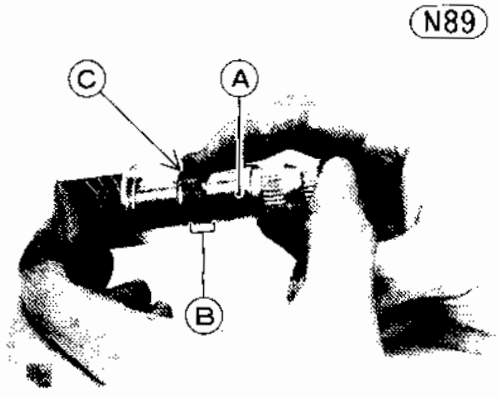
	Service Limit
Camshaft	16.83 mm
Camshaft Hole	17.22 mm



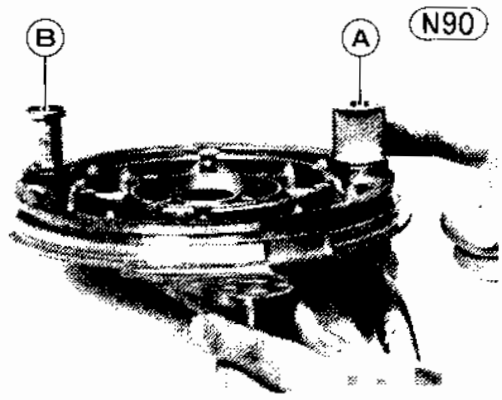
A. Camshaft **B. Camhsaft Hole**

Lubrication

Every time that the brake is disassembled, and in accordance with the Periodic Maintenance Chart (Pg. 262), wipe out the old grease, and re-grease the brake pivot points. Apply grease to the brake shoe anchor pin, spring ends, and cam surface of the camshaft, and fill the camshaft groove with grease. Do not get any grease on the brake shoe linings, and wipe off any excess grease so that it will not get on the linings or drum after brake assembly.



A. Camshaft **B. Groove** **C. Grease**



A. Camshaft **B. Pivot**

DISC BRAKE (on KZ550-C)

Master Cylinder

Refer to Pgs. 200 ~ 201, noting the following:

Table N15 Front Master Cylinder Parts for Single Disc

Measurement	Service Limit
Cylinder Inside Diameter	12.78 mm
Piston Outside Diameter	12.63 mm
Primary Cup Diameter	12.8 mm
Secondary Cup Diameter	13.1 mm
Spring Free Length	47.2 mm

FRONT FORK (on KZ550-C)

Refer to Pgs. 207 ~ 210, noting the following:

Pneumatic Front Fork

The front fork legs of KZ550-C contain compressed air to obtain adjustable suspension. This type of the front fork is especially effective when the fork is compressed. It also has the advantage that any air pressure can be choosen (within the usable range) to suit various riding conditions.

It accomplishes shock absorption through air compression in the inner tube, spring action, and the resistance to the flow of the oil forced into the cylinder by the movement.

WARNING **Do not remove the springs and rely on compressed air only. Correct springs must be used in this suspension system. Use without springs can lead to a condition causing accident and injury.**

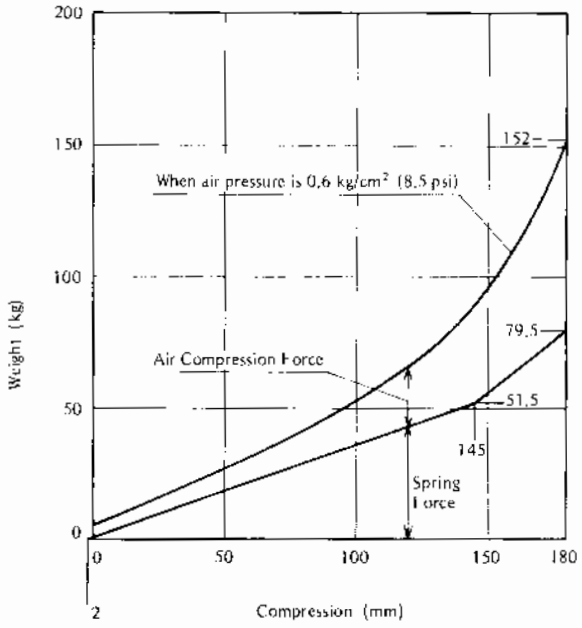
Oil Seal, Dust Seal

Refer to Pg. 209.

Fork Oil

Refer to Pgs. 209 ~ 210, noting the following:

Front Fork Load/Compression Stroke Replacement (per each fork leg) (N91)



Fork oil change

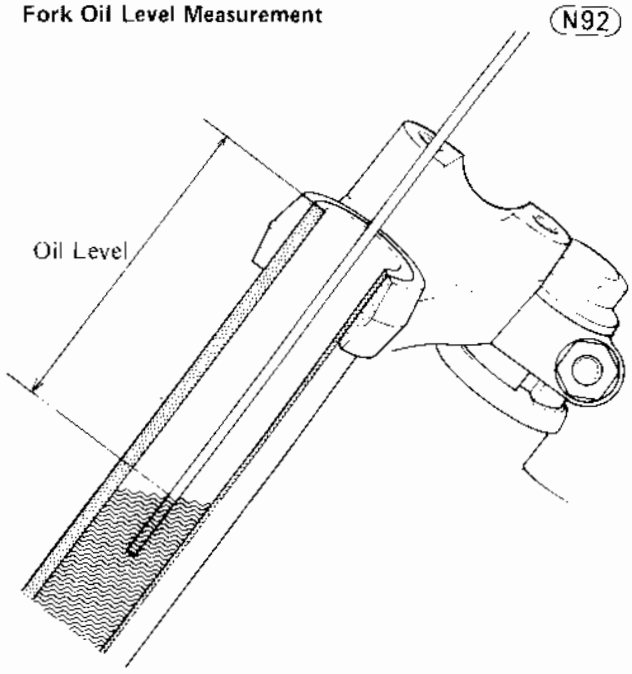
- Put a motorcycle up on its center stand.
- Release air through the air valve at the top end of the front fork.
- Remove the handlebar off the stem head.
- Remove the drain bolt from the lower end of the outer tube.
- Pump out the oil by repeatedly compressing and extending the front fork.
- Wash the drain bolt threads clean of oil, and blow them dry.
- Apply a liquid gasket to the thread of drain bolt, and tighten the bolt to 0.80 kg-m (69 in-lbs) of torque with gasket.
- Remove the top plug, and remove the spring from the inner tube, and pour in the type and amount of oil specified in Table N16.

Table N16 Fork Oil

Type	Filling fork oil capacity		Oil level (without spring)
	When changing oil	After disassembly and completely dry	
SAE 5W20	about 270 cc	about 290 cc	356 ± 4 mm from the top of the inner tube

- Pump the fork by several times to expel the air from the upper and lower chambers.
- Place a jack or stand under the engine so that the front wheel is raised off the ground.
- 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 Measurement (N92)



CAUTION **The operation of air front forks is especially dependent upon correct oil level. Higher level than specified may cause oil leakage and seal breakage. So be sure to maintain the specified level.**

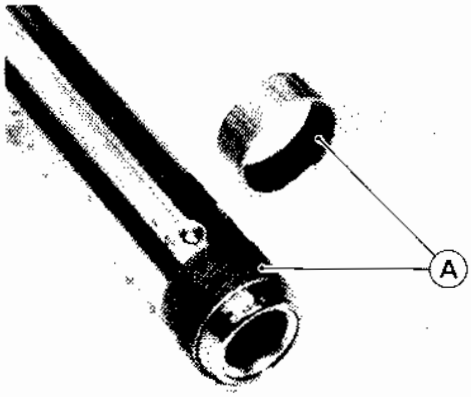
- Inspect the O ring on the top plug, and replace it with a new one if it is damaged.
- Install the spring and top plug, and fit the retainer.
- Change the oil of the other fork leg in the same manner.
- Install the handlebar (Pg. 283).
- Adjust the front fork air pressure (Pg. 264).

Inner Tube, Guide Bush

Guide bush damage

Visually inspect the guide bush, replace the guide bush or the inner tube assembly if it has badly damage.

(N93)



A. Guide Bushes

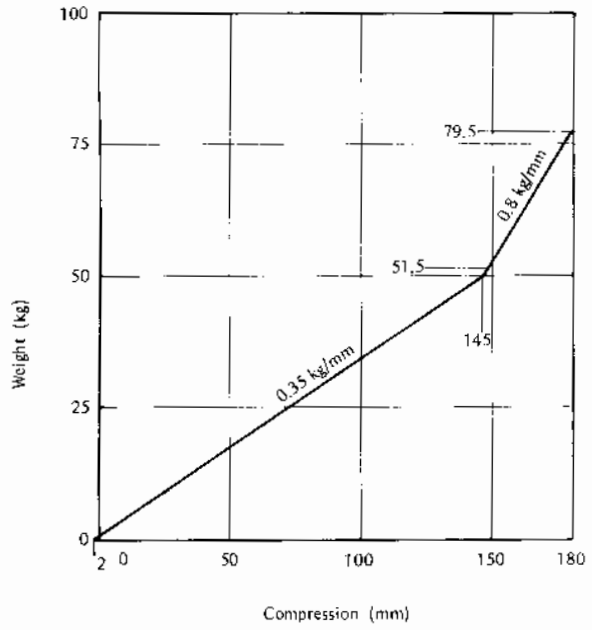
Spring

Refer to Pg. 209, noting the following:

Table N17 Fork Spring Free Length

Service Limit	605 mm

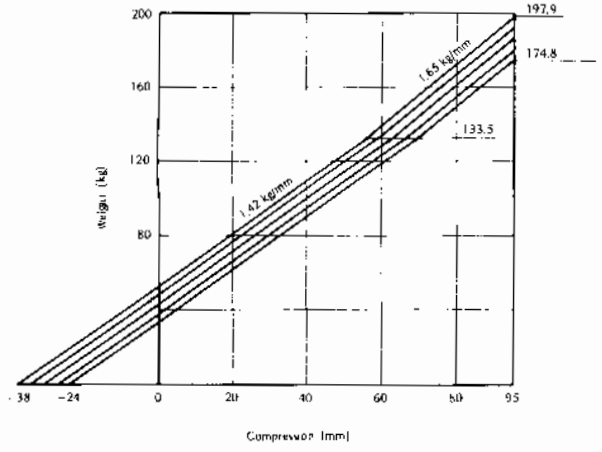
Front Fork Spring Force (per each fork leg) (N94)



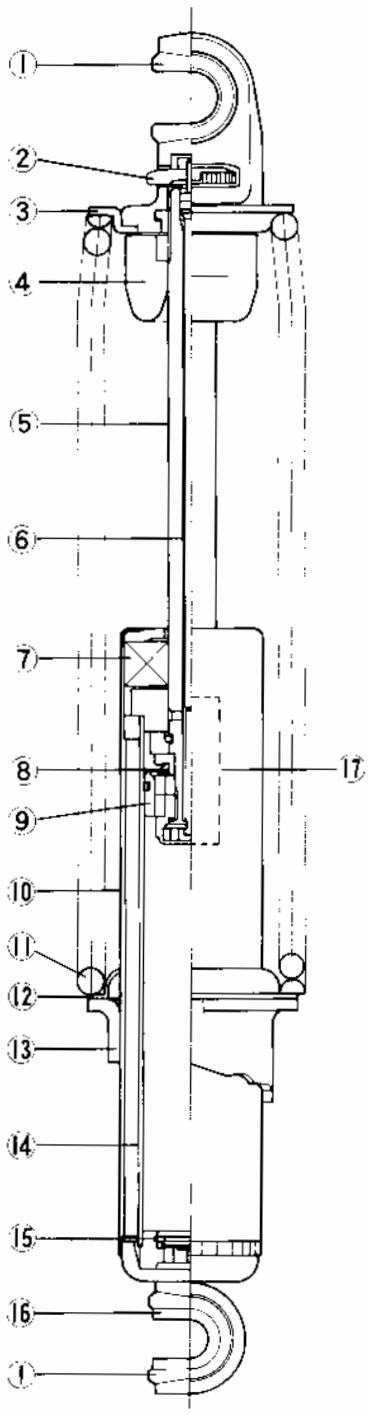
REAR SHOCK ABSORBER (on KZ550-C)

The rear shock absorbers on KZ550-C can be adjusted by the spring force and damping force. Shock absorber spring force can be adjusted to 5 settings, and damping force can be adjusted to 4 settings.

Shock Absorber Spring Force (per each shock absorber) (N95)



Rear Shock Absorber (KZ550-C) (N96)



1. Rubber Bushing
2. Damping Adjuster
3. Spring Seat
4. Rubber Stop
5. Piston Rod
6. Adjusting Rod
7. Oil Seal
8. Valve
9. Piston
10. Outer Shell
11. Spring
12. Spring Seat
13. Adjusting Sleeve
14. Inner Shell
15. Valve
16. Collar
17. Damping Adjusting Section

IGNITION SYSTEM (on KZ550-C)

The ignition system for this model is essentially a battery and coil ignition system where the battery supplies the current for the primary circuit in the ignition system. However, this ignition system is transistorized and controls the current for the primary circuit by use of a solid state electronic switching unit called a Darlington power transistor. The power transistors are triggered by pick-up coils and there are no mechanical breaker points, so the only periodic maintenance needed is automatic timing advancer lubrication (Pg. 262). Since contact breaker heel wear (with resultant retarded ignition timing) and breaker point pitting or burning are eliminated, periodic inspection and adjustment of the ignition timing are not required.

Ordinarily in a 4-stroke engine, a spark jumps across the spark plug electrodes only every other time that the piston for that spark plug rises (once every 720° of crankshaft rotation). This is because between each compression stroke, in which a fuel/air mixture ready for combustion is in the cylinder, there is an exhaust stroke, in which the piston rises only to push out the burned gases. However, even if a spark does jump across the electrodes during the exhaust stroke, there is no effect since there is no compression and no fuel to burn. Therefore, to eliminate any need for a distributor (thus simplifying the system and making it more reliable), the system is constructed so that both spark plugs fire every time both pistons rise (once every 360° of crankshaft rotation) although one piston is on the compression stroke and the other on the exhaust stroke.

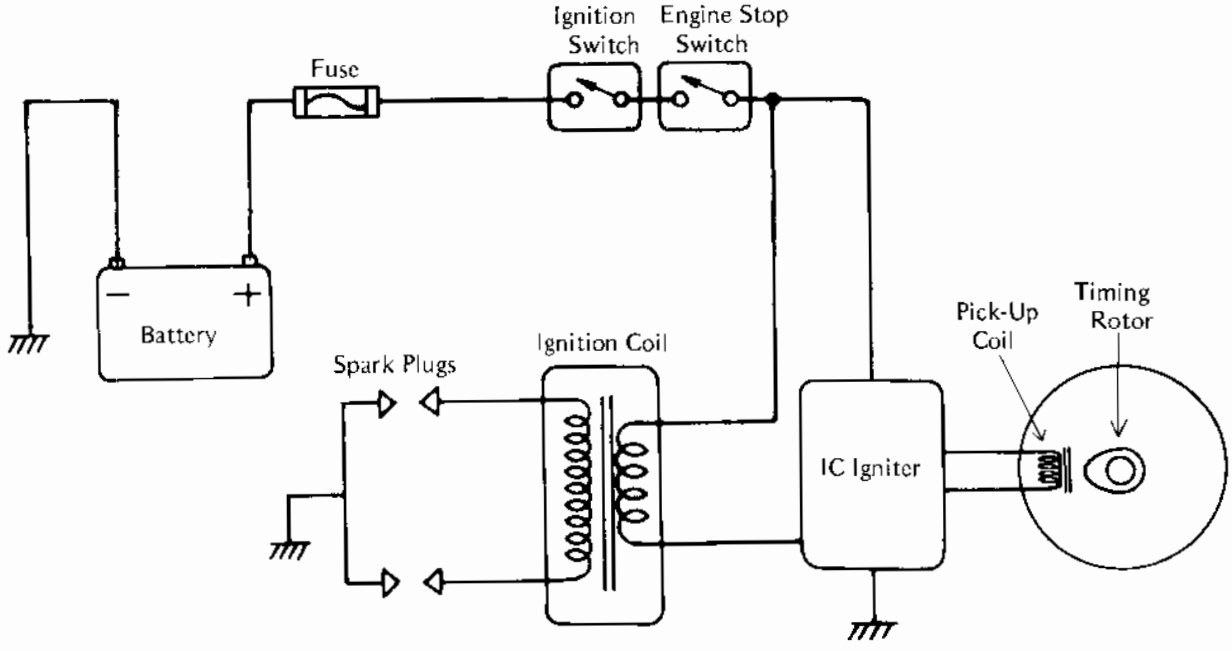
Because the two spark plugs are connected in series, the current through one spark plug also must go through the other. Consequently, if a spark will not jump across the electrodes of one spark plug (due to dirty electrodes, faulty plug lead, etc.), no spark will jump across the electrodes of the other plug as well.

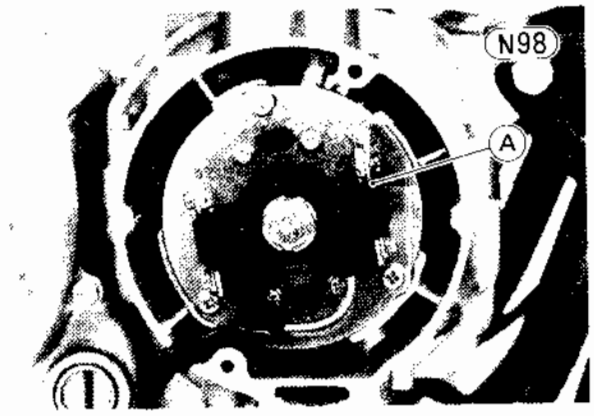
The working electrical part of the ignition system consists of a battery, two pick-up coils, an IC igniter, two ignition coils, and four spark plugs. To advance the ignition timing as engine rpm rises, an automatic centrifugal-type timing advancer is used. The ignition system comprises two parts; one part fires #1 and #4 cylinders, and the other part #2 and #3 cylinders. A schematic wiring diagram of one half the system is shown in Fig. N97. The other half is identical. Both work as follows.

Pick-up Coil

The pick-up coil assembly (a magnetic impulse generator) resembles the standard contact breaker assembly in most respects except that the two sets of breaker points have been eliminated. In their places is an iron timing rotor and two magnetic pick-up coils. Each pick-up coil assembly consists of a pair of permanent magnets and a pick-up coil on a mounting plate. The timing rotor which is attached to the timing advancer has one projection. As the projection on the timing rotor passes through the magnetic field created by the permanent magnets on the mounting plate, a magnetic field alternately builds up and collapses. Each time the projection passes a pick-up coil core an electric current is developed. Each voltage pulse is conducted to the IC igniter where it is amplified and switches the Darlington power transistor on and off to control the primary current.

Ignition Circuit (N97)



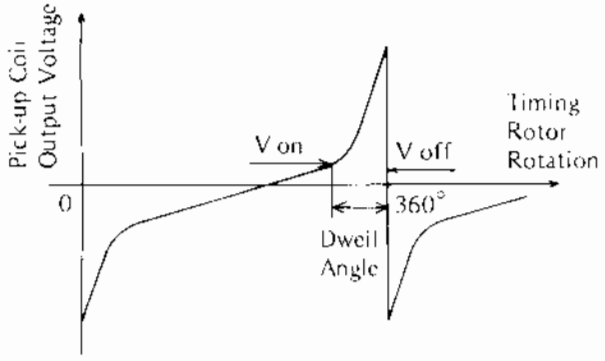


A. Pick-up Coil Assembly

IC Igniter

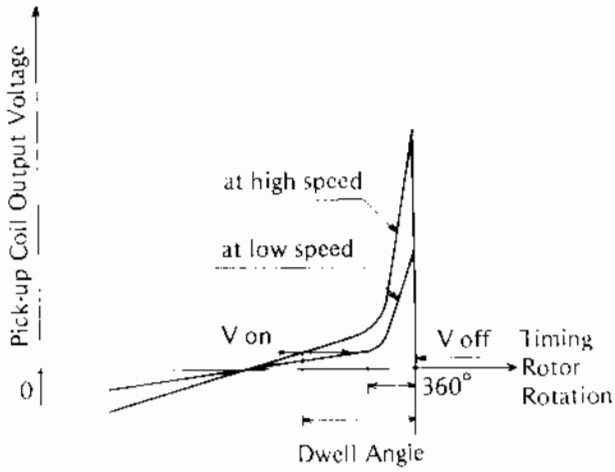
The IC igniter utilizes the voltage pulse sent from the pick-up coil as follows to obtain stable induced high tension voltage from low to high engine speeds. The output voltage of the pick-up coil alternates as shown in Fig. N99.

Ootput Voltage of Pick-up Coil (N99)

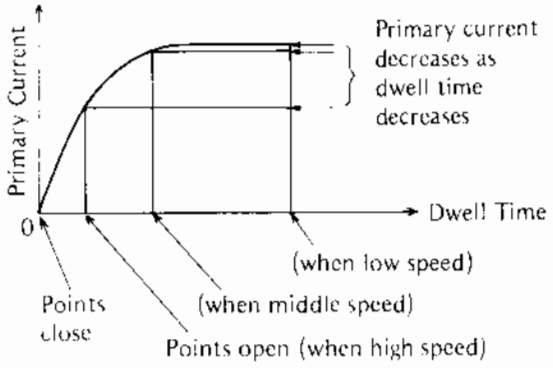


With rotation of the timing rotor the output voltage rises, and the power transistor conducts and permits primary current to flow when the pick-up coil output reaches the preset voltage (V on). When the output voltage drops to the other preset voltage (V off) after passing the voltage peak, the power transistor no longer conducts stopping the current flow in the ignition coil primary winding and inducing a high tension voltage that jumps across the spark plug electrodes. In the case of a standard breaker point ignition system the dwell time (the time during which current can flow in the primary circuit) decreases as the engine speed increases. This results in less current flow through the ignition coil primary winding and decreased induced voltage at high rpm. Conversely the dwell time in this transistorized ignition system is kept relatively constant by virtue of the pick-up coil output voltage. This is because the faster the engine runs, the higher the output voltage of the pick-up coil becomes and the sooner the V on voltage is reached. Therefore the dwell angle increases to keep the dwell time long enough at high engine rpm so that the induced high voltage does not decrease.

Pick-up Coil Output Voltage at Low and High Speed (N100)



Dwell Time and Primary Current (Breaker Point System) (N101)



Ignition Coil, Timing Advancer, Spark Plug

Refer to Pgs. 221 ~ 224.

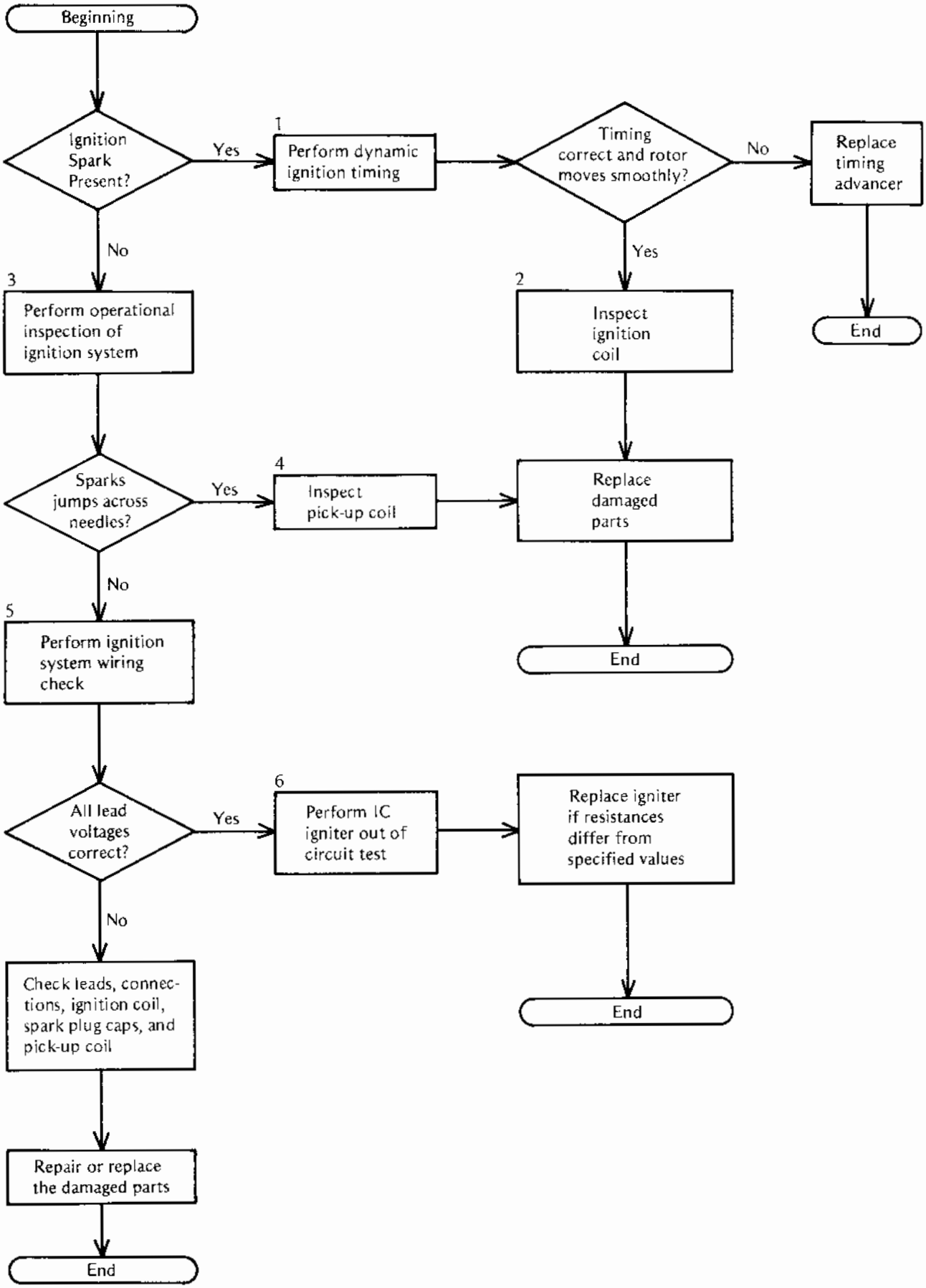
Ignition System Troubleshooting Guide

If trouble is suspected in the ignition system, check the system by the following procedure.

An example of troubleshooting is shown in Fig. N102. To use this chart, follow the arrows on the chart selecting a "yes" or "no" arrow at each diamond-shaped step until you reach the "end". Each test procedure is explained individually on the pages after the chart. This chart is for one half of the ignition circuit; use the same chart for the other half.

Ignition System Troubleshooting Guide

(N102)

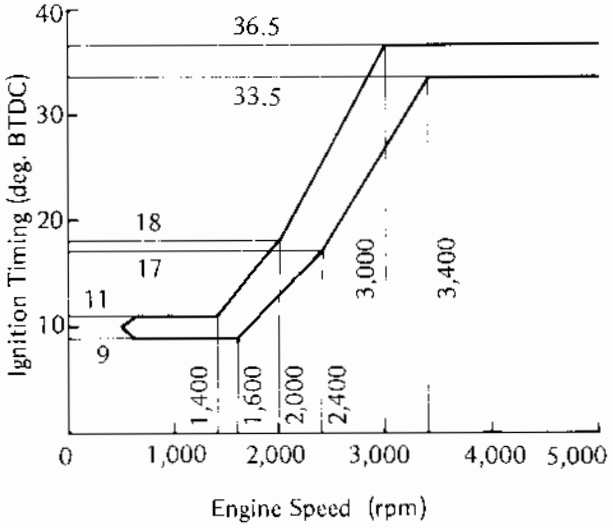


Description of Each Testing Procedure

1. Dynamic Ignition Timing Test

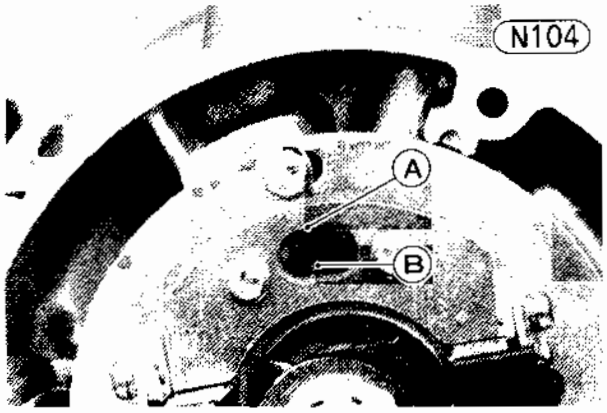
Check the ignition timing with a strobe light for both low and high speed operation. Timing advance begins at 1,400 ~ 1,600 rpm and reaches the maximum advance at 3,000 ~ 3,400 rpm. As a result, the timing must be checked at idle (below 1,400 rpm) and then at above 3,400 rpm when it is fully advanced.

Ignition Timing/Engine Speed Relationship (N103)



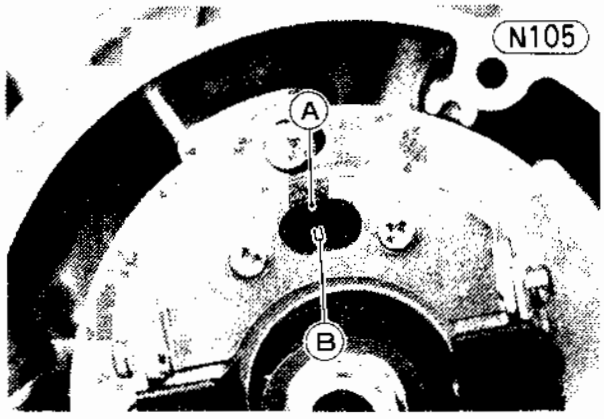
Check the timing as follows:

- Connect a strobe light to the #1 or #4 spark plug lead in the manner prescribed by the manufacturer in order to check the ignition timing under operating conditions.
- Turn on the ignition switch and engine stop switch. Start the engine, and direct the strobe light at the timing marks.
- Below 1,400 rpm, the "F" mark on the timing advancer must be aligned with the timing mark above the advancer for correct low rpm ignition timing.



A. Timing Mark **B. "F" Mark**

- Above 3,400 rpm, the advanced timing mark (the vertical lines to the right of the "4" mark) must be aligned with the timing mark above the advancer for correct high rpm ignition timing.



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

Table N18 Timing Advancing

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

- If the timing is not correct, check that the rotor on the timing advancer turns smoothly on the shaft by hand and that no parts are visually damaged.
- If the timing advancer binds on the shaft, lubricate it and re-check the ignition timing.
- A damaged timing advancer must be replaced with a new one. If advancer lubrication does not remedy the problem, replace the advancer with a new one.

2. Ignition Coil Inspection

Refer to Pgs. 221 ~ 222, noting the following:

Table N19 Ignition Coil Resistance (measured when cold)

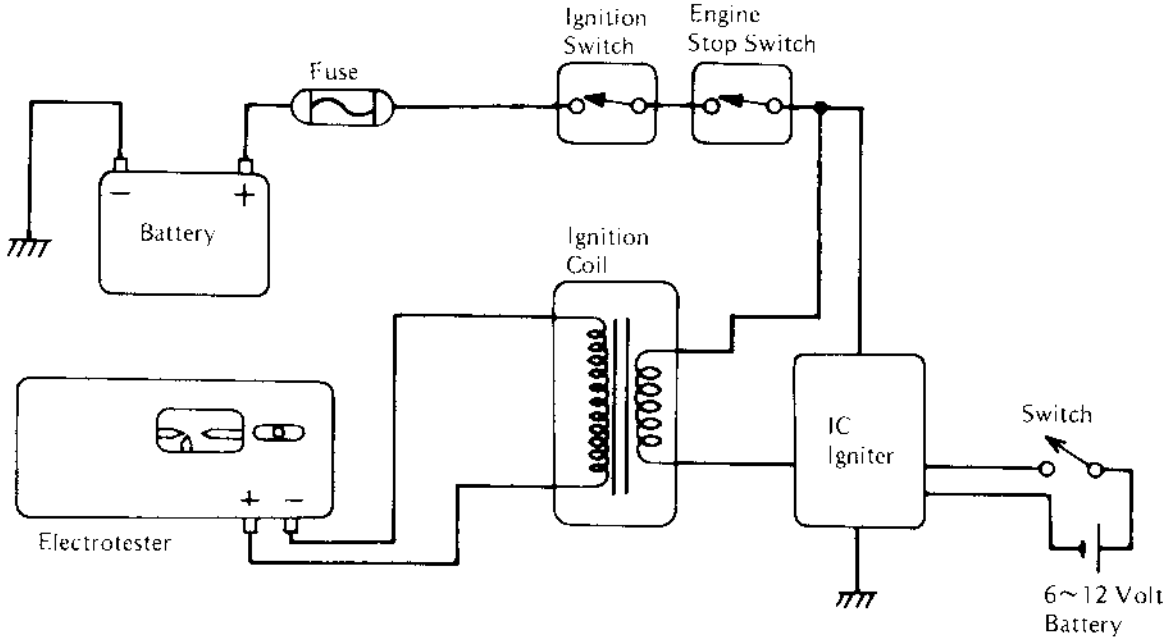
	Meter Range	Meter Reading
Primary Winding	x 1 Ω	1.2 ~ 1.9 Ω
Secondary Winding	x 1 kΩ	10.4 ~ 15.6 kΩ

3. Operational Inspection of the Ignition System

- Have a DC voltage source of 6 ~ 12 volts output such as a motorcycle battery.
- Pull off the right side cover, and disconnect the 4-pin connector which connects the IC igniter and the pick-up coils.
- Remove the fuel tank, and pull the spark plug caps off the spark plugs.

Operational Inspection of the Ignition System

N106



- Connect the spark plug leads to the Electrotester in the same way as for measuring the arcing distance. For this test, the Electrotester need not be supplied with electric power.
- Slide the adjusting knob to set the arcing distance to 5~8 mm.
- In the 4-pin connector from the IC igniter, connect the DC voltage source positive (+) lead to the black lead and the negative (−) lead to the blue lead for the #1 and #4 ignition coil (voltage source positive (+) lead to the yellow lead and the negative (−) lead to the red lead for the #2 and #3 ignition coil).
- Turn the ignition switch to the ON position, and switch the DC voltage source on and off.
- As the DC voltage source is switched, sparks should jump across the needles in the Electrotester.

4. Pick-up Coil Inspection

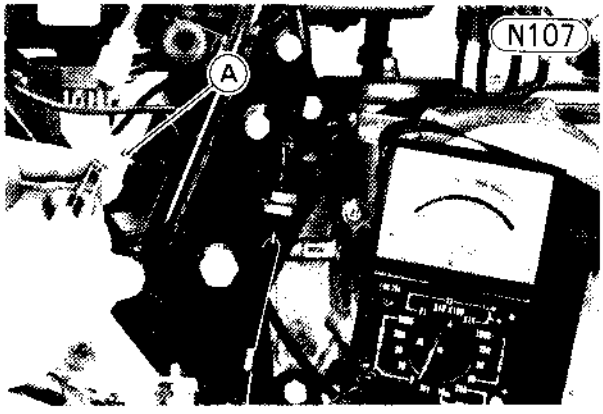
- Connect the multimeter to the pick-up coil leads to measure the coil resistance as shown in the table.

Table N20 Pick-up Coil Resistance

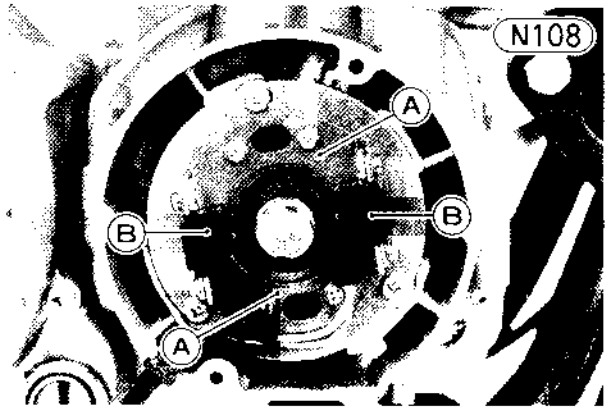
Meter Range	Connections	Reading
x 100 Ω	One meter lead → Black lead (Yellow†) The other lead → Blue lead (Red†)	360 ~ 540 Ω

† Leads for #2 and #3 pick-up coil

- If there is more resistance than shown in the table, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.
- Using the highest resistance range of the multimeter, measure the resistance between the pick-up coil leads and chassis ground. Any meter reading less than infinity (∞) indicates a short, necessitating replacement of the pick-up coil assembly.
- Visually inspect the pick-up coil assembly. If the permanent magnets and coils are damaged, replace the pick-up coil assembly.



A. Pick-up Coil Leads



A. Magnet B. Pick-up Coil

Table N21 Wiring Inspection

Meter Range	Connections*	Location	Reading
20V DC	Meter (+) → Yellow/Red, Black, or Green	At 4-pin connector for the ignition coils	Battery voltage
	Meter (+) → Black, Blue, Yellow, or Red	At 4-pin connector for the pick-up coils	0.5 ~ 1.0V

*Connect the meter (–) lead to ground.

Table N22 IC Igniter out of Circuit Test

Meter Range	Connections	Location	Reading ÷
x 1 kΩ	Meter (+) → Black/Yellow Meter ( ) → Black or Green	At 4-pin connector for the ignition coils	∞
x 100 Ω	Meter (+) → Black or Green Meter ( ) → Black/Yellow		200 ~ 500 Ω
	Meter (+) → Yellow/Red Meter ( ) → Black/Yellow		200 ~ 600 Ω
	Meter (+) → Black/Yellow Meter (–) → Yellow/Red		300 ~ 700 Ω
x 1 kΩ	Meter (+) → Blue (Red) Meter (–) → Black (Yellow)	At 4-pin connector for the pick-up coils	25 ~ 45 kΩ
	Meter (+) → Black (Yellow) Meter ( ) → Blue (Red)		20 ~ 40 kΩ

÷ Measured with the Kawasaki Hand Tester (P/N 57001-983).
A tester other than the Kawasaki Hand Tester may show slightly different readings.

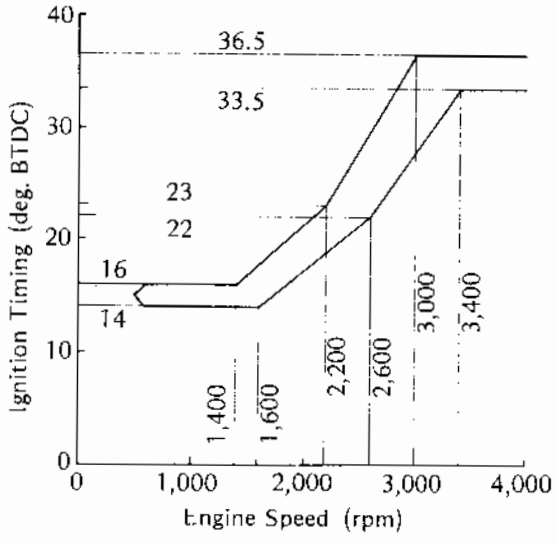
5. Ignition System Wiring Check

- Reconnect all leads and connectors which were disconnected.
- Connect the multimeter to the IC igniter leads as shown in the table, turn on the ignition switch, and note the meter readings. Measure the lead voltages with the engine stopped.

6. IC Igniter Out of Circuit Test

- Turn off the ignition switch, and disconnect all the IC igniter leads and connector.
- Connect the multimeter as shown in the table N22 to check the internal resistance of the igniter.

Ignition Timing/Engine Speed Relationship (N109)



IGNITION SYSTEM (on KZ400)

Timing Advancer

Refer to Pgs. 223 ~ 224, noting the following:

ELECTRIC STARTER SYSTEM (on KZ550)

Refer to Pgs. 225 ~ 229, noting the following:

Starter Motor

The starter motor on KZ550 has the permanent magnets in the yoke instead of the field coils. So this motor should be inspected the yoke assembly for damaging the permanent magnets or terminal insulator.

Yoke assembly inspection

Using the highest ohmmeter range, measure the resistance between the carbon brush and the yoke (housing). If there is any meter reading, the brush assembly is shorted to the ground, the terminal insulator must be replaced.

LIGHTING SYSTEM (on US, Canadian Model)

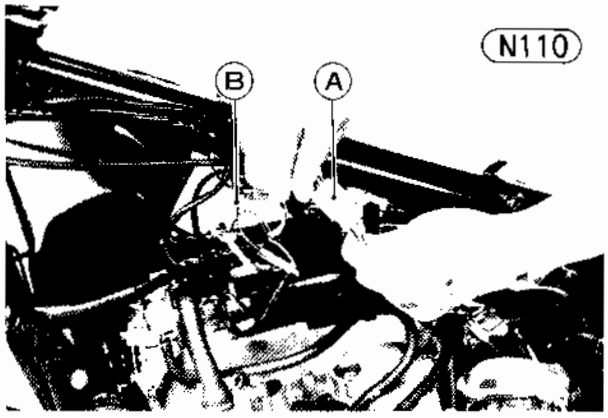
Headlight Circuit

Fig. N111 is US and Canadian models wiring diagram of the headlight circuit.

In the US and Canadian models, there is no headlight switch. When the ignition switch is turned to the on position the headlight circuit is completed, turning on the headlight, tail light, and meter lights. With the dimmer switch, high and low beam can be selected.

Headlight trouble

If the headlight does not light, check to see if the bulb has burned out or fuses have blown. If the bulb has burned out, the sealed beam unit must be replaced. A blown fuse should be replaced. If the bulb and fuses are good, check the dimmer switch and the ignition switch. Table N23 shows the connections in the dimmer switch for both high and low beam. Remove the fuel tank, and disconnect the 6-pin connector and blue lead to the dimmer switch. Use an ohmmeter to see that only the connections shown in the table have continuity (zero ohms). If the switch has an open or a short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement. If any parts are not repairable, the switch must be replaced as a unit. If the procedure above does not remedy the problem, check the ignition switch (Pg. 229) and the wiring.



A. 6-pin Connector **B. Blue Lead**

Table N23 Dimmer Switch Connection

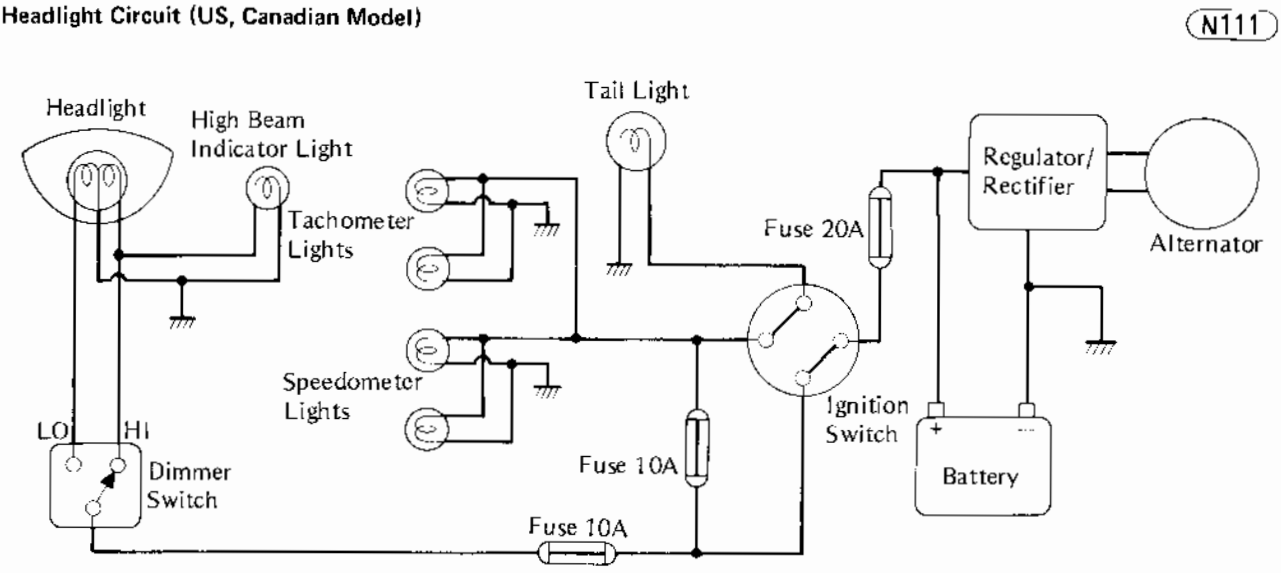
Color	Red/Black	Blue	Red/Yellow
Hi	●	●	
Lo		●	●

If the headlight lights but does not light brightly, the trouble may be that the headlight is of improper wattage or the alternator is not supplying sufficient current. However, the trouble may also be caused by a short or a component drawing too much current in some other part of the electrical system.

Tail light trouble

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

Headlight Circuit (US, Canadian Model)



SERVICE DATA FOR KZ400

The following tables show the service data applied only on KZ400-J. Refer to the maintenance or supplement section for the items not included here.

Table N24 Cylinder Inside Diameter

Service Limit
52.10 mm, or more than 0.05 mm difference between any two measurements

Table N25 Piston Diameter

Service Limit	51.80 mm

Table N26 Piston Oil Ring/Groove Clearance

Service Limit	0.15 mm

Table N27 Piston Oil Ring Thickness

Service Limit	2.40 mm

Table N28 Piston Oil Ring End Gap

Service Limit	0.7 mm

Table N29 Cylinder Compression†

Usable Range	9.7 ~ 14.9 kg/cm^2 (138 ~ 212 psi), or less than 1 kg/cm^2 (14 psi) difference between any two cylinders

†Engine hot, spark plugs removed, throttle fully opened, cranking the engine with the starter motor.

SERVICE DATA FOR KZ550

The following tables show the service data applied only on KZ550. Refer to the maintenance or supplement section for the items not included here.

Table N30 Cylinder Inside Diameter

Service Limit
58.10 mm, or more than 0.05 mm difference between any two measurements

Table N31 Piston Diameter

Service Limit	57.80 mm

Table N32 Clutch Housing Gear/Secondary Shaft Gear Backlash

Service Limit	0.14 mm

TROUBLESHOOTING GUIDE

Refer to Pgs. 237 ~ 240, noting the following:

1. If the air suction valves in the air injection system are damaged —
   Low engine output, unstable idling, or abnormal engine noise will result.
2. If the vacuum switch valve in the air injection system is damaged —
   Frequent backfiring in the exhaust system, or abnormal engine noise will result.
3. If trouble is suspected in the drum brake, refer to the following —

Brakes Don't Hold

Drum brake

Brake maladjusted
Brake linings or drum worn
Overheated
Water in brake drum
Brake cam, camshaft worn
Oil on brake linings

Abnormal Frame Noise

Drum brake noise

Brake linings overworn or worn unevenly
Drum worn unevenly or scored
Brake springs weak or broken
Foreign matter in hub
Brake not properly adjusted

4. If trouble is suspected in the transistorized ignition system, refer to the troubleshooting guide in the Maintenance Section.

Appendix

ADDITIONAL CONSIDERATIONS FOR RACING (on US Model)

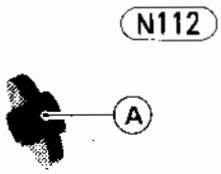
Carburetor

Jet needle on the carburetor of US model has only one groove in which the clip is set. So a richer mixture cannot be made by changing the position of the needle.

SPECIAL TOOLS

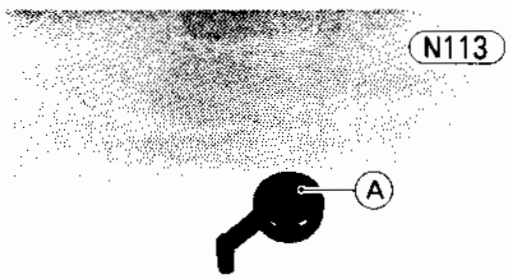
Refer to Pgs. 244 ~ 247, adding the following:

1. For the motorcycle with the rear drum brake, the bearing driver is necessary to install the ball bearing of the rear wheel coupling.



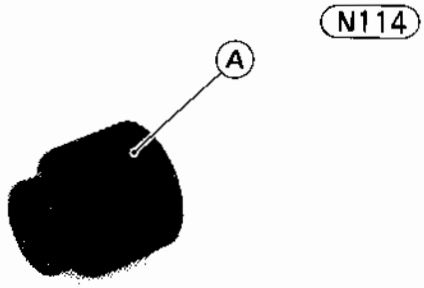
A. Bearing Driver (57001-296)

2. For KZ550-C, the air pressure gauge is necessary to check the front fork air pressure.



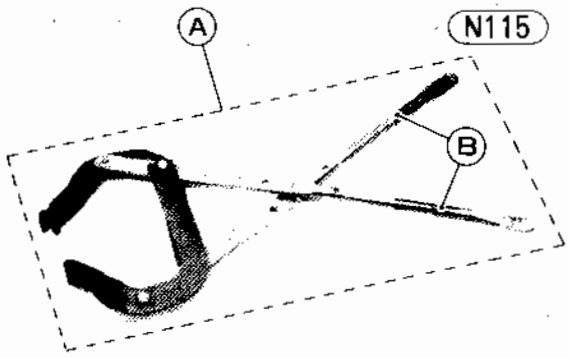
A. Air Pressure Gauge (52005-1003)

3. KZ550-C, the driver is necessary to remove and install the front fork oil seal.



A. Driver (57001-1091)

4. For KZ550-C, the bead breaker assy is necessary to remove the tubeless tire.



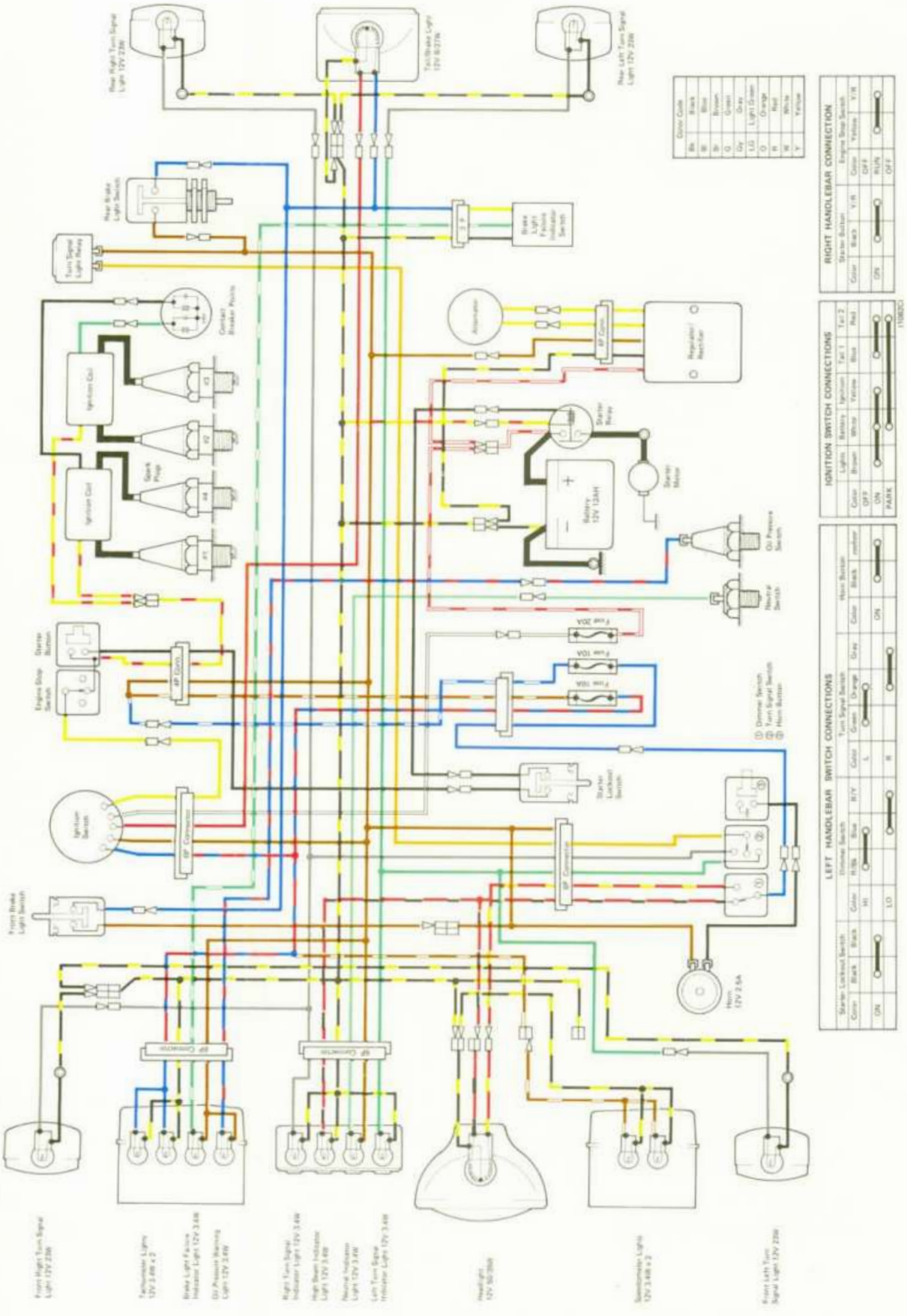
A. Bead Breaker Assy (57001-1072)
B. Tire Irons (57001-1073)

WIRING DIAGRAMS

Table N33 shows the locations of the wiring diagrams for the variation models.

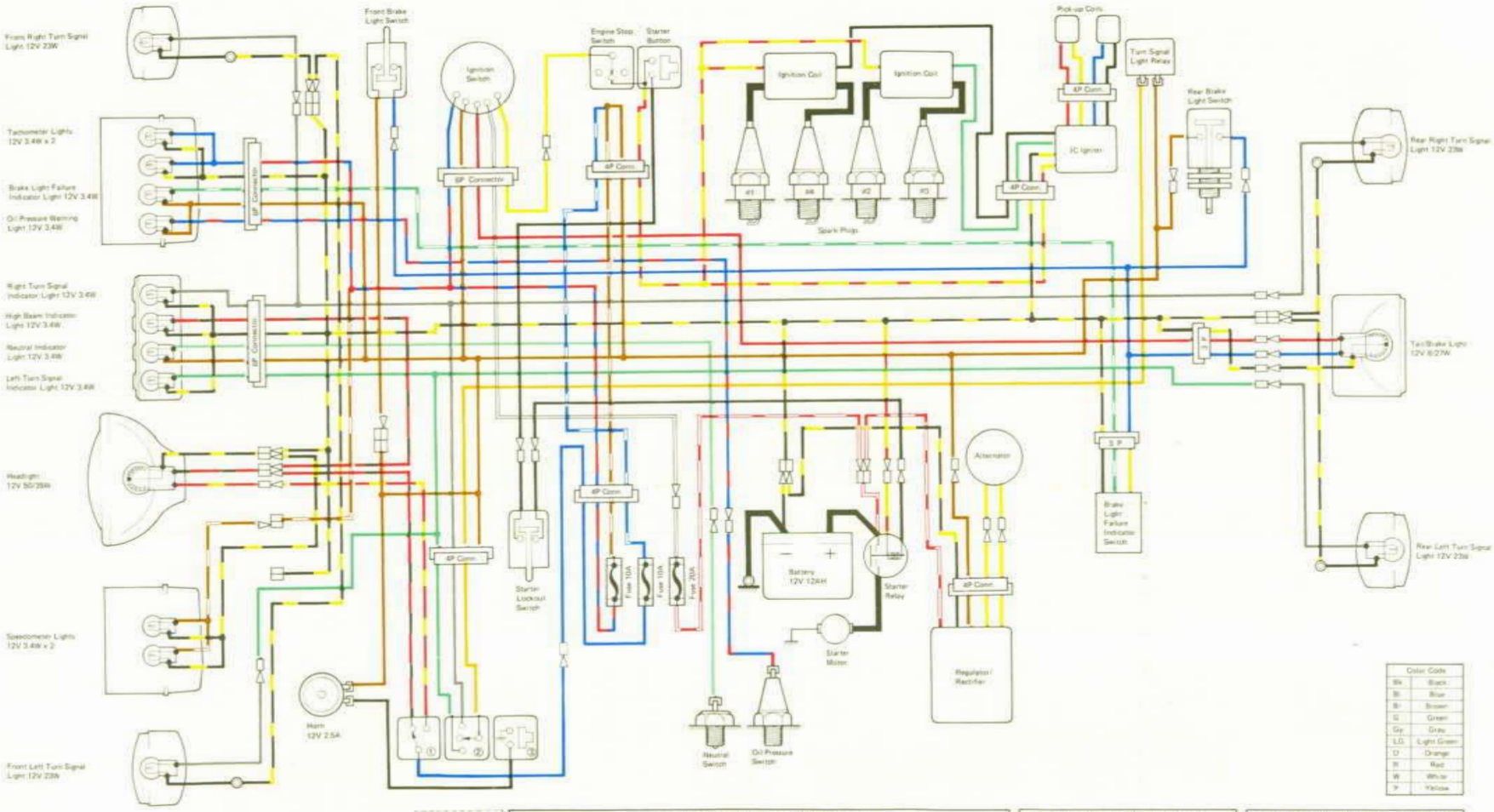
Table N33 Wiring Diagrams

Model	Remarks
KZ400-J1	Same as KZ500-B1 (Pg. 248)
KZ550-A1	
US, Canada	See Pg. 306.
Other than US, Canada	Same as KZ500-B1 (Pg. 248)
KZ550-C1	
US, Canada	See Pg. 307.
Other than US, Canada	See Pg. 308.



KZ550-A1 Wiring Diagram
(US and Canadian models)

KZ550-C1 Wiring Diagram
(US and Canadian models)



① Dimmer Switch
② Turn Signal Switch
③ Horn Button

LEFT HANDLEBAR SWITCH CONNECTIONS

Starter Lockout Switch			Dimmer Switch			Turn Signal Switch			Horn Button	
	Black	Black		R/Bk	Blue	R/Y	Green	Orange	Gray	Black
			HI			L				
ON									PUSH	
			LO			R				

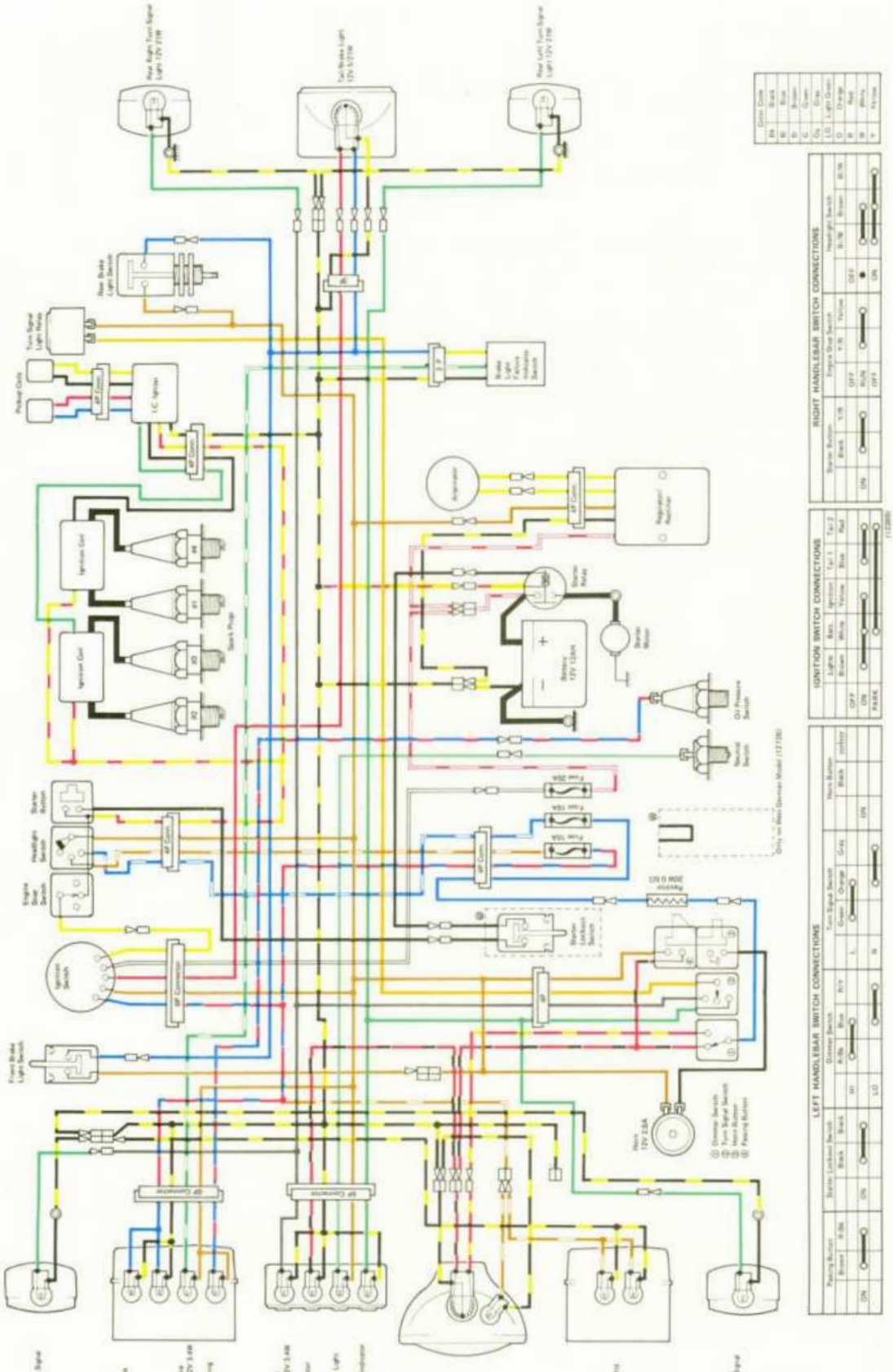
IGNITION SWITCH CONNECTIONS

	Lights	Battery	Ignition	TL 1	TL 2
	Brown	White	Yellow	Blue	Red
OFF					
ON					
P(PARK)					

(12378)

RIGHT HANDLEBAR SWITCH CONNECTIONS

Starter Button			Engine Stop Switch		
	Black	Y/R		Y/R	Yellow
			OFF		
PUSH			RUN		
			OFF		



KZ550-C1 Wiring Diagram
(European Model)

Supplement for 1981 Model

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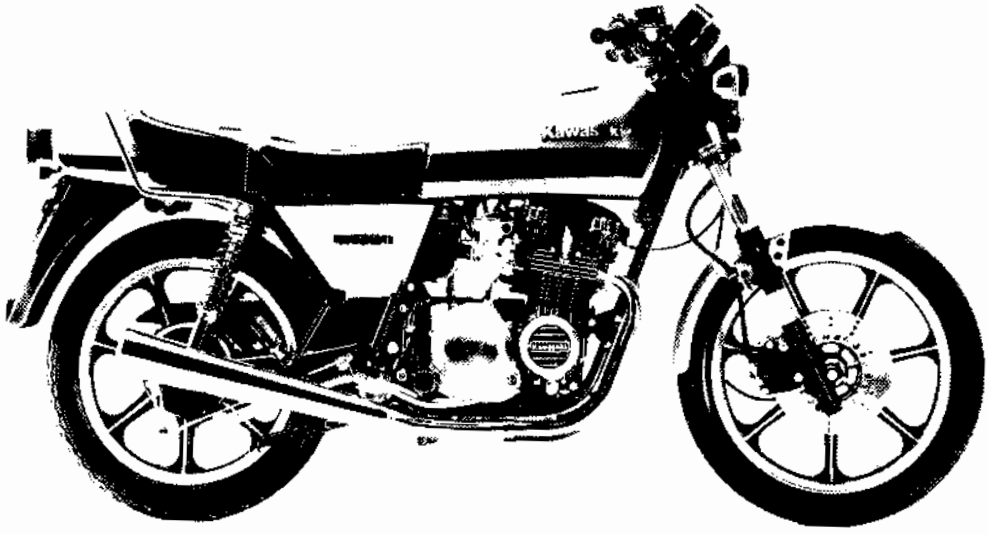
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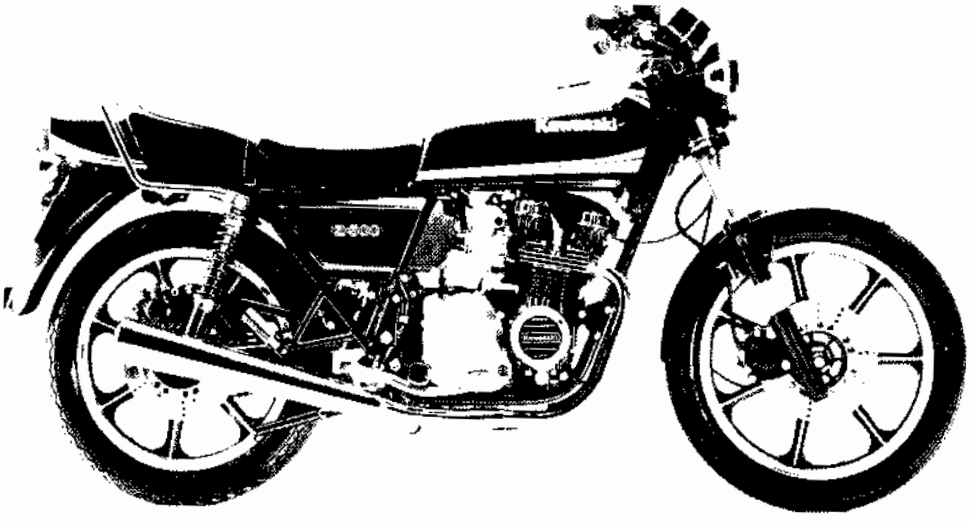
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Model Identification

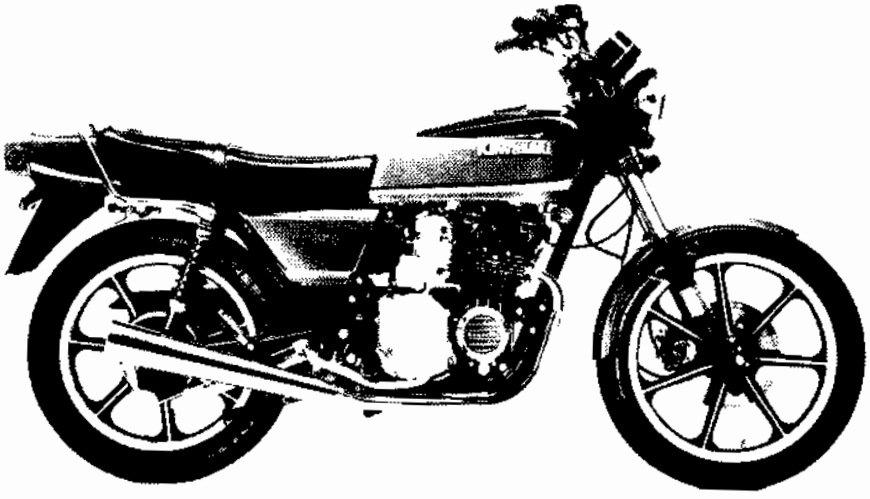
KZ400-J2



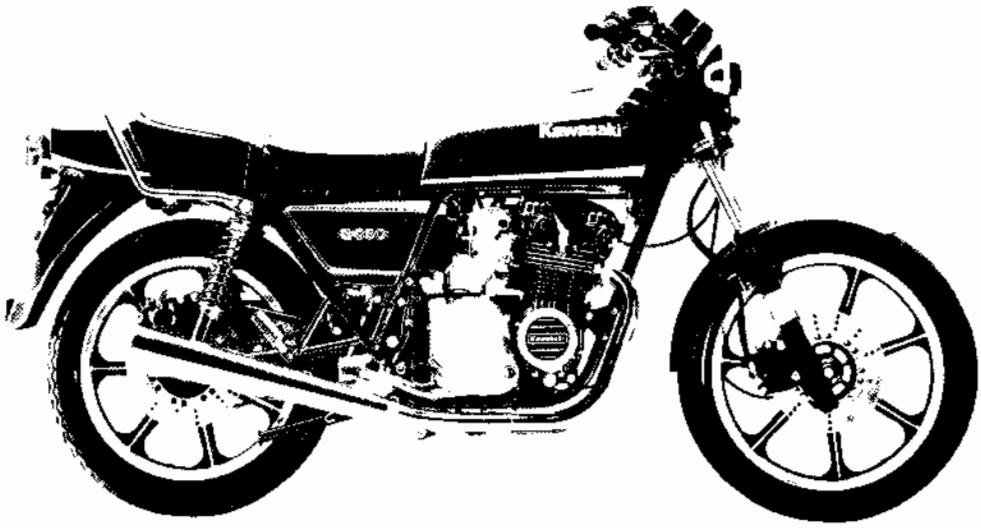
KZ500-B3



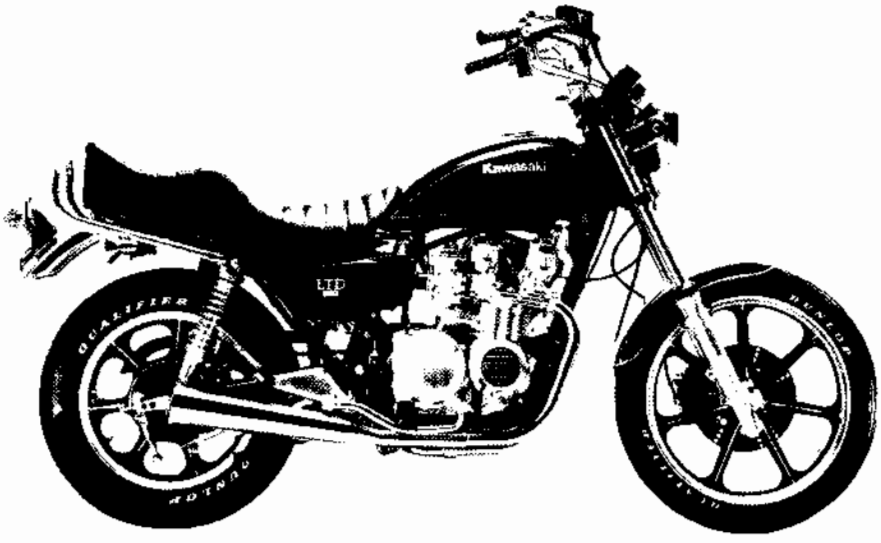
KZ550-A2



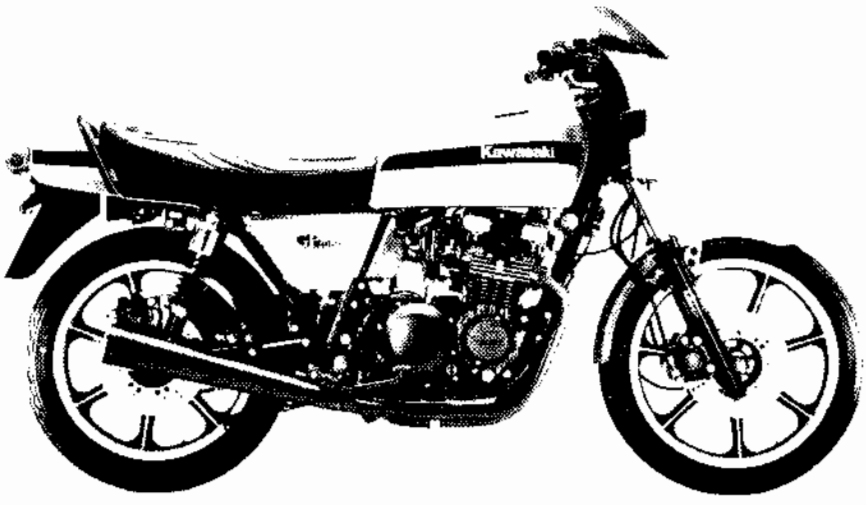
KZ550-B2



KZ550-C2



KZ550-D1



SPECIFICATIONS

Specifications

Items		KZ400-J2	KZ500-B3
Dimensions			
Overall length		2,100 mm, (E) 2,150 mm	*
Overall width		785 mm, (E) 740 mm	*
Overall height		1,125 mm, (E) 1,095 mm	*
Wheelbase		1,395 mm	*
Road clearance		145 mm	*
Dry weight		187 kg, (WG) (UK) 191 kg	193.5 kg
Feul tank capacity		15 liters	*
Performance			
Climbing ability		30°	*
Braking distance		12.5 m from 50 kph	*
Minimum turning radius		2.4 m	*
Engine			
Type		DOHC, 4-stroke, 4-cylinder, air-cooled	*
Bore and stroke		52.0 x 47.0 mm	55.0 x 52.4 mm
Displacement		399 cc	497 cc
Compression ratio		9.5	*
Maximum horsepower		43HP @9,500 rpm (WG) 27HP @7,500 rpm	52HP @9,000 rpm
Maximum torque		3.5 kg-m @7,500 rpm (WG) 2.8 kg-m @6,500 rpm	4.5 kg-m @7,500 rpm
Valve timing			
Inlet	Open	33° BTDC	20° BTDC
	Close	41° ABDC	48° ABDC
	Duration	254°	248°
Exhaust	Open	51° BBDC	48° BBDC
	Close	23° ATDC	20° ATDC
	Duration	254°	248°
Carburetors		TK K21P-2A, (WG) TK K21P-2B	TK K22P-2A
Lubrication system		Forced lubrication (wet sump)	*
Engine oil	Type	SE class SAE 10W40, 10W50, 20W40, or 20W50	*
	Capacity	3.0 liters	*
Starting system		Electric starter	*
Ignition system		Battery and coil (transistorized ignition)	*
Cylinder numbering method		Left to right, 1-2-3-4	*
Firing order		1-2-4-3	*
Ignition timing		From 15° BTDC @1,200 rpm to 35° BTDC @3,200 rpm	From 10° BTDC @1,050 rpm to 35° BTDC @3,200 rpm
Spark plugs		NGK D8EA or NDX24ES-U	*

* : Same as KZ400-J2
** : Same as KZ500-B3
*** : Same as KZ550-A2
(E) : European model
(UK) : U.K. model
(US) : U.S. model
(WG) : West German model

KZ550-A2	KZ550-B2	KZ550-C2	KZ550-D1
*	*	2,160 mm, (E) 2,190 mm	*
*	*	850 mm, (WG) 805 mm	740 mm
*	*	1,200 mm, (WG) 1,205 mm	1,185 mm
*	*	1,420 mm	1,400 mm
*	*	140 mm	*
188 kg, (UK) 191 kg	**	192 kg, (E) 198 kg	199.5 kg
*	*	12.4 liters	*
*	*	*	*
*	*	11m from 50 kph	*
*	*	*	*
*	*	*	*
58.0 x 52.4 mm	***	***	***
553 cc	***	***	***
*	*	*	10.0
54HP @8,500 rpm (US) 53HP @8,500 rpm (WG) 49.7HP @8,000 rpm	***	54HP @8,500 rpm (US) 53HP @8,500 rpm (WG) 50HP @8,500 rpm	58HP @9,000 rpm (US) 57HP @9,000 rpm
4.9 kg-m @7,000 rpm (US) 4.8 kg-m @7,000 rpm (WG) 4.8 kg-m @6,500 rpm	***	4.9 kg-m @7,000 rpm (US) 4.8 kg-m @7,000 rpm (WG) 4.7 kg-m @7,000 rpm	4.9 kg-m @8,000 rpm
**	**	**	31° BTDC
**	**	**	59° ABDC
**	**	**	270°
**	**	**	59° BBDC
**	**	**	31° ATDC
**	**	**	270°
TK K22P-2D, (US) TK K22P-2C, (WG) TK K21P-2A	***	***	TK K22P-2F (US) TK K22P-2E
*	*	*	Forced lubrication (wet sump with cooler)
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
**	**	**	**
*	*	*	*

SPECIFICATIONS (CONT.)

Items		KZ400-J2	KZ500-B3
Transmission			
Type		6-speed, constant mesh, return shift	*
Clutch		Wet multi disc	*
Gear ratio:	1st	2.571 (36/14)	*
	2nd	1.777 (32/18)	*
	3rd	1.380 (29/21)	*
	4th	1.125 (27/24)	*
	5th	0.961 (25/26)	*
	6th	0.851 (23/27)	*
Primary reduction ratio		3.277 (27/23 x 67/24)	2.935 (27/23 x 65/26)
Final reduction ratio		2.500 (40/16)	*
Overall drive ratio		6.979 @Top gear	6.249 @Top gear
Frame			
Type		Tubular, double cradle	*
Steering angle		39° to either side	37° to either side
Castor		26°	*
Trail		98 mm	*
Tire	Front	3.25S-19 4PR (tubeless)	3.25H-19 4PR (tubeless)
	Rear	3.75S-18 4PR (tubeless)	3.75H-18 4PR (tubeless)
Suspension	Front	Telescopic fork (pneumatic)	*
	Rear	Swing arm	*
Wheel travel	Front	180 mm	*
	Rear	120 mm	*
Front fork oil	Type	SAE 5W20	*
Capacity (per each fork)		245 cc	*
Brakes			
Type	Front	Single disc, (WG) (UK) Double disc	Double disc
	Rear	Drum brake	Single disc
Effective disc diameter			
	Front	236 mm, (WG) (UK) 226 mm	226 mm
	Rear	———	226 mm
Brake drum inside diameter and width		180 x 40 mm	———
Electrical Equipment			
Alternator	Type	Single-phase AC	Three-phase AC, (O) (WG) (I) (S) Single-phase AC
	Rated output	15 amp. @10,000 rpm, 14V	18.5 amp. @10,000 rpm, 14V (O) (WG) (I) (S) 15 amp. @ 10,000 rpm, 14V
Battery		12V 12AH	*
Headlight	Type	Semi-sealed (quartz-halogen), (O) Sealed beam	*
	Bulb	12V 60/55W, (O) 12V 50/40W	*

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

KZ550-A2	KZ550-B2	KZ550-C2	KZ550-D1
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
**	**	**	**
*	*	2.375 (38/16)	*****
**	**	5.937 @Top gear	*****
*	*	*	*
**	**	**	**
*	*	27.5°	*
*	*	110 mm	*
**	**	*	**
**	**	130/90-16 67S (tubeless)	**
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
		290 cc	244 cc
*	**	*	**
*	**	*	**
*	**	*	**
— — —	**	— — —	**
*	— — —	*	— — —
**	**	**	**
**	**	**	**
*	*	*	*
*	*	*	*
*	*	*	*

* : Same as KZ400-J2
** : Same as KZ500-B3
***** : Same as KZ550-C2

Ⓘ : Italian model
Ⓞ : Other than European, US, and Canadian model

Ⓢ : Swiss model
Ⓤ Ⓚ: U.K. model
Ⓦ Ⓖ: West German model

1981 MODEL MAIN CHANGED ITEMS

1. Transistor Controlled Breakerless Ignition

Motorcycle for 1981 model has a magnetically controlled transistor ignition system which is the same system as 1980 KZ550C had. Refer to the following items in 1980 Supplement.

[1980 Supplement]
- ○Ignition Timing (Pg. 263)
- ○Pickup Coil Assy (Pgs. 273 ~ 274)
- ○Timing Advancer (Pg. 274)
- ○Ignition System (Pgs. 297 ~ 302)

2. Starter Motor

The starter motor on the motorcycle for 1981 KZ400/500 is changed. New starter motor is the same motor as 1980 KZ550 had. Refer to the following items in 1980 Supplement.

[1980 Supplement]
- ○Torque and Locking Agent (Pg. 268)
- ○Starter Motor (Pgs. 272 ~ 273)
- ○Electric Starter System (Pgs. 302 ~ 303)

3. Suspensions

Motorcycle for 1981 model has a pneumatic front fork and 4-way adjustable damping shocks which are the same mechanism as 1980 KZ550C had. Refer to the following items in 1980 Supplement with 1981 Supplement.

[1980 Supplement]
- ○Front Fork (Pg. 264)
- ○Rear Shock Absorbers (Pgs. 264 ~ 265)
- ○Front and Rear Suspension Setting (Pg. 265)
- ○Torque and Locking Agent (Pg. 268)
- ○Front Fork (Pgs. 283 ~ 285)
- ○Front Fork (Pgs. 294 ~ 296)
- ○Special Tools (Pg. 305)

[1981 Supplement]
- ●Front Fork (Pg. 318)
- ●Rear Shock Absorber (Pg. 318)
- ●Front Fork (Pg. 329)
- ●Rear Shock Absorber (Pg. 329)

4. Tubeless Tires

Tubeless tires are mounted on the motorcycle for 1981 model. Refer to the following items of KZ550C in Supplement with 1981 Supplement.

[1980 Supplement]
- ○Torque and Locking Agent (Pg. 268)
- ○Tires (Pgs. 281 ~ 283)
- ○Wheel (Pgs. 288 ~ 292)
- ○Special Tools (Pg. 305)

[1981 Supplement]
- ●Wheel (Pg. 328)

5. Disc Brakes, Wheels, Swing Arm

Motorcycle for 1981 model has new type disc brakes, wheels, and swing arm. Refer to the following items in 1980 Supplement with 1981 Supplement.

[1980 Supplement]
- ○Torque and Locking Agent (Pg. 268)
- ○Front Wheel (Pgs. 275 ~ 276)
- ○Front Disc Brake (Pgs. 276 ~ 278)
- ○Swing Arm (Pg. 285)
- ○Wheel (Pgs. 288 ~ 292)

[1981 Supplement]
- ●Rear Disc Brake (Pg. 320)
- ●Disc Brake (Pg. 328)
- ●Swing Arm (Pg. 329)

PERIODIC MAINTENANCE CHART

The maintenance and adjustments for 1981 model must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

FREQUENCY / OPERATION	Whichever comes first ➡ Every	ODOMETER READING* km 800	5,000	10,000	15,000	20,000	25,000	30,000	See Page
Battery electrolyte level — check †	month	•	•	•	•	•	•	•	214
Brake — check †		•	•	•	•	•	•	•	29,266
Brake light switch — check †		•	•	•	•	•	•	•	30,318
Brake wear — check †			•	•	•	•	•	•	200,292, 328
Brake fluid level — check †	month	•	•	•	•	•	•	•	204
Brake fluid — change	year			•		•		•	205
Clutch — adjust		•	•	•	•	•	•	•	22,319
Carburetor operation — check †		•	•	•	•	•	•	•	19,263
Throttle grip — check †		•	•	•	•	•	•	•	18
Steering play — check †		•	•	•	•	•	•	•	30
Drive chain wear — check †			•	•	•	•	•	•	197
Front fork — clean			•	•	•	•	•	•	209,294
Nuts, bolts, fasteners — check †		•		•		•		•	39~42, 268
Spark plug — clean and gap †		•	•	•	•	•	•	•	12
Valve clearance — check †		•	•	•	•	•	•	•	15
Air suction valve — check † (If applicable)			•	•	•	•	•	•	287
Air cleaner element — clean			•		•		•		154
Air cleaner element — replace	5 cleanings			•		•		•	154
Fuel system — clean				•		•		•	24,263
Tire tread wear — check †			•	•	•	•	•	•	194
Engine oil — change	year	•	•	•	•	•	•	•	24
Oil filter — replace		•		•		•		•	24
General lubrication — perform			•	•	•	•	•	•	33,267
Front fork oil — change				•		•		•	209,294, 329
Timing advancer — lubricate				•		•		•	224
Swing arm — lubricate				•		•		•	329
Wheel bearing — lubricate	2 years					•			195
Speedometer gear — lubricate	2 years					•			292
Brake camshaft — lubricate (If applicable)	2 years					•			294
Steering stem bearing — lubricate	2 years					•			207
Master cylinder cup and dust seal — replace	2 years								201
Caliper piston seal and dust seal — replace	2 years								202
Brake hose — replace	4 years								206
Fuel hose — replace	4 years								—
Drive chain — lubricate	Every 300 km								197
Drive chain slack — check †	Every 800 km								28

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

† Replace, add, adjust or torque if necessary.

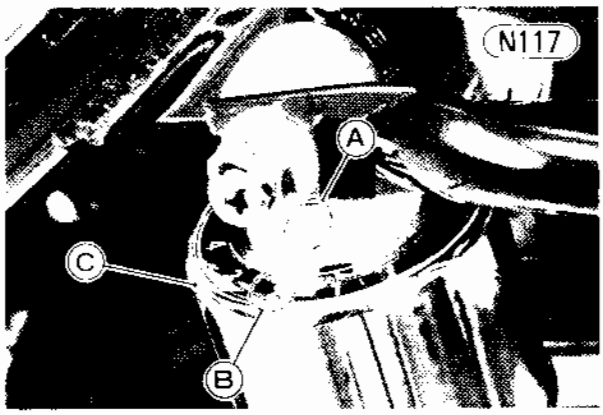
Adjustment

FRONT FORK

See the following table to adjust the fork air pressure.

Table N34 Front Fork Air Pressure

Model	Standard	Usable Range
KZ400J KZ500B KZ550A KZ550B KZ550D	0.7 kg/cm² (10.0 psi, 70 kPa)	0.6 ~ 0.8 kg/cm² (8.5 ~ 11.4 psi, 60 ~ 80 kPa)
KZ550C	0.6 kg/cm² (8.5 psi, 60 kPa)	0.5 ~ 0.7 kg/cm² (7.1 ~ 10.0 psi, 50 ~ 70 kPa)

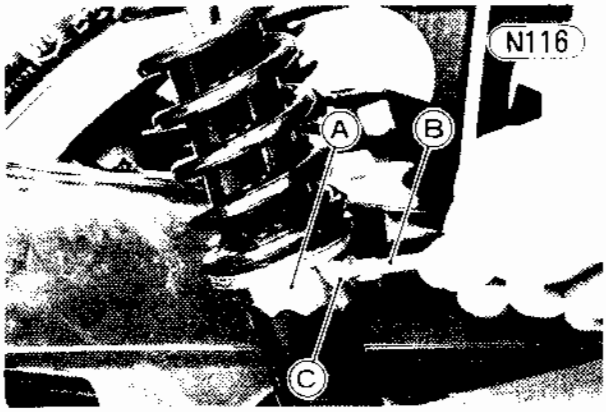


A. Arrow Mark
B. Position Number
C. Damper Adjuster

REAR SHOCK ABSORBERS

Refer to 1980 Supplement with the following exceptions.

1. There is a boss on each adjusting sleeve to adjust the spring tension. Using the screwdriver bit, adjust them.



A. Adjusting Sleeve
B. Screwdriver Bit
C. Boss

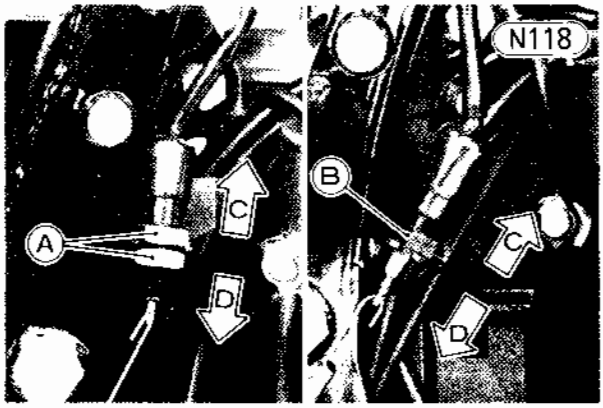
2. Damper adjuster on KZ550D is different from the other model's adjuster. To change the damping force, grasp the adjuster and turn it until the desired number is pointed by the arrow.

BRAKE LIGHT SWITCHES (on KZ550D)

Rear brake light switch on KZ550D is different from the other model's switch. But, the adjustment method of it is the same as the other model's switch.

KZ400J
KZ500B
KZ550A/B/C

KZ550D



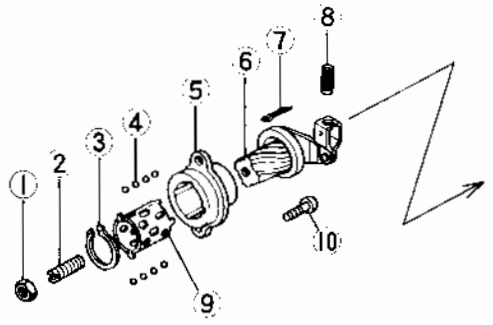
A. Mounting Nuts
B. Adjusting Nut
C. Lights sooner.
D. Lights later.

Disassembly

CLUTCH

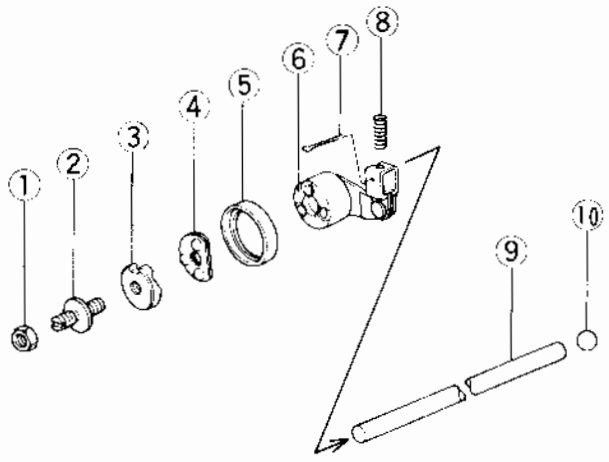
The clutch release is modified as shown in Fig. N120. Refer to the following exceptions.

Clutch Release ('79 ~ '80 model) (N119)



1. Locknut
2. Adjusting Screw
3. Circlip
4. Steel Ball x 11
5. Outer Worm Gear
6. Inner Worm Gear
7. Cotter Pin
8. Spring
9. Retainer
10. Screw x 2

Clutch Release ('81 model) (N120)



1. Locknut
2. Adjusting Screw
3. Ball Ramp Plate
4. Ball Assembly
5. Grease Seal
6. Release Lever
7. Cotter Pin
8. Spring
9. Push Rod
10. Steel Ball

1. Clutch Release ('81 model)

When the clutch release lever 6 turns, the lever rides on the steel balls 4 , and pushes the push rod 9 toward the clutch. The clutch adjusting screw 2 , assembled to the steel ball ramp plate 3 , is installed in the engine sprocket cover.

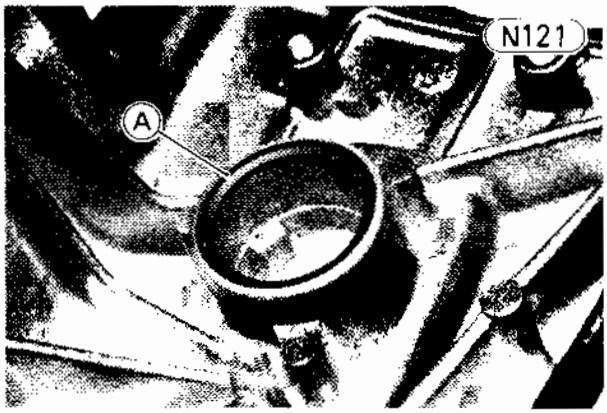
2. Removal and Installation Procedures

Removal:

- Remove the engine sprocket cover (Pg. 69).
- Remove the clutch release lever and steel ball assembly.
- Remove the clutch adjusting cover screws (2), and take off the cover.
- Remove the clutch adjusting screw locknut, adjusting screw, and ball ramp plate.

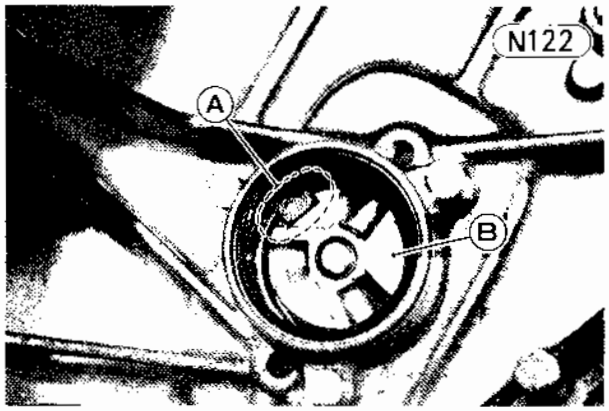
Installation:

- Wash and clean the clutch release lever, steel ball assembly, and ball ramp plate with a high flash-point solvent. Dry and lubricate them with grease.
- Check that the grease seal is in place.



A. Grease Seal

- Install the adjusting screw and ball ramp plate, aligning the ridge on the engine sprocket cover with the groove in the ball ramp plate.



A. Fit the ridge and the groove. **B. Ramp Plate**

- Install the adjusting screw locknut with finger tight.
- Install the steel ball assembly.
- Apply a grease to the grease seal, and install the clutch release lever.
- Install the engine sprocket cover (pg. 69).
- Check and adjust the clutch (Pg. 22).

REAR DISC BRAKE

The reservoir is separated from the rear master cylinder body, and connected to it with a brake hose.

Rear Master Cylinder, Reservoir Removal:

- Pull off the right side cover.
- Remove the rear brake reservoir mounting bolt, and take the reservoir off the frame.
- Remove the banjo bolt to disconnect the brake hose from the master cylinder. There is a flat washer on each side of the hose fitting. Immediately wipe up any brake fluid that spills.
- Remove the master cylinder mounting bolts, and free the rear master cylinder and reservoir from the motorcycle.

Rear Master Cylinder, Reservoir Installation Note:

1. Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to 3.0 kg-m (22 ft-lbs) of torque. Be sure that the metal pipe comes to the right side of the stop on the master cylinder.
2. Tighten the brake hose clamp screws firmly after installation.
3. Bleed the brake line after installation (Pg. 205).
4. Adjsut the rear brake (Pg. 29).

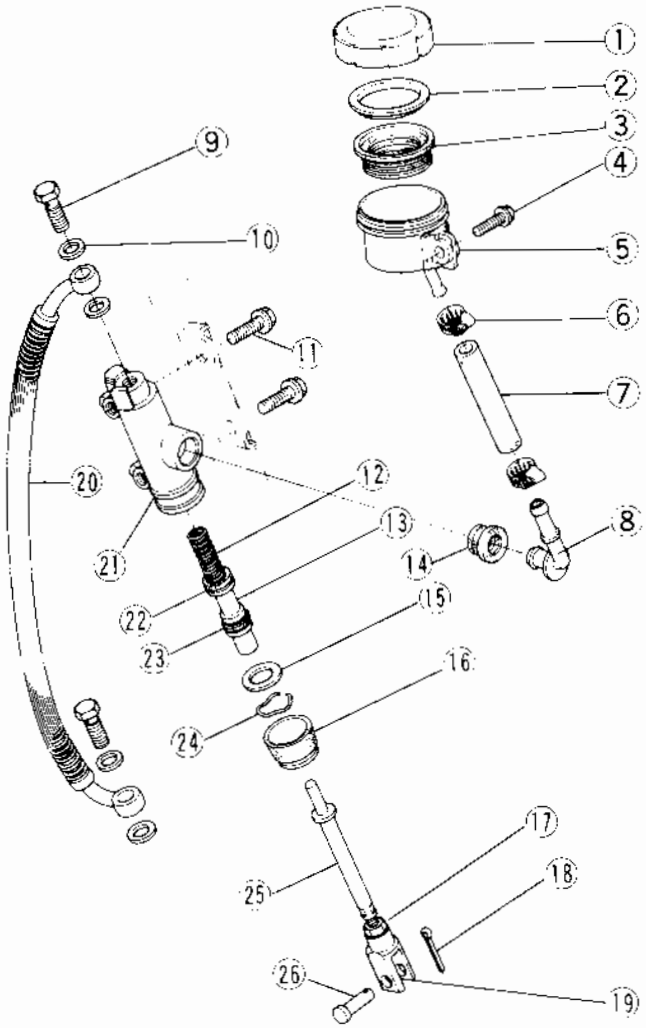
Rear Master Cylinder, Reservoir Disassembly:

- Loosen the clamp, disconnect the brake hose from the reservoir cup, and temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- Slide the push rod dust cover out of its place.
- Remove the ratainer with a thin screwdriver, and pull out the piston stop and piston assembly.

CAUTION **Do not remove the spring, primary cup, and secondary cup from the piston since removal will damage them.**

- Take off the reservoir cap and diaphragm, and empty the brake fluid into a suitable container.
- Loosen the clamp, and pull the brake hose off the reservoir. Immediately wipe up any brake fluid that spills.

Rear Master Cylinder and Reservoir (N123)



1. Cap
2. Ring Plate
3. Diaphragm
4. Bolt
5. Reservoir
6. Clamp x 2
7. Hose
8. Fitting
9. Banjo Bolt x 2
10. Washer x 4
11. Bolts x 2
12. Spring
13. Piston
14. Grommet
15. Stop
16. Dust Cover
17. Locknut
18. Cotter Pin
19. Clevis
20. Hose
21. Master Cylinder Body
22. Primary Cup
23. Secondary Cup
24. Retainer
25. Push Rod
26. Pin

Rear Master Cylinder, Reservoir Assembly Note:

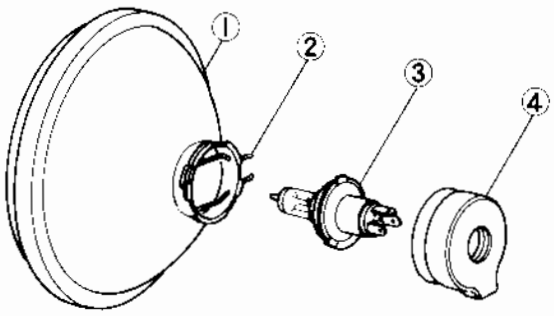
1. Before assembly, clean all parts including the master cylinder with brake fluid or alcohol, and apply brake fluid to the removed parts and the inner wall of the cylinder. Take care not to scratch the piston or the inner wall of the cylinder.

CAUTION **When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or even cause the bulb to explode.**

HEADLIGHT

There are the motorcycles which have the quartz-halogen headlight bulb.

Headlight Bulb (Quartz-halogen) (N124)

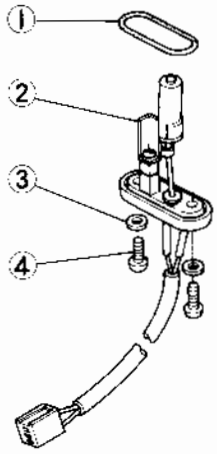


1. Refrector
2. Retaining Spring
3. Bulb
4. Dust Cover

FUEL LEVEL SENDER (on KZ550C)

The fuel level sender is attached on the bottom of the fuel tank.

Fuel Level Sender (on KZ550C) (N125)



1. O Ring
2. Fuel Level Sender
3. Flat Washer x 2
4. Screw x 2

TORQUE AND LOCKING AGENT (on KZ550D)

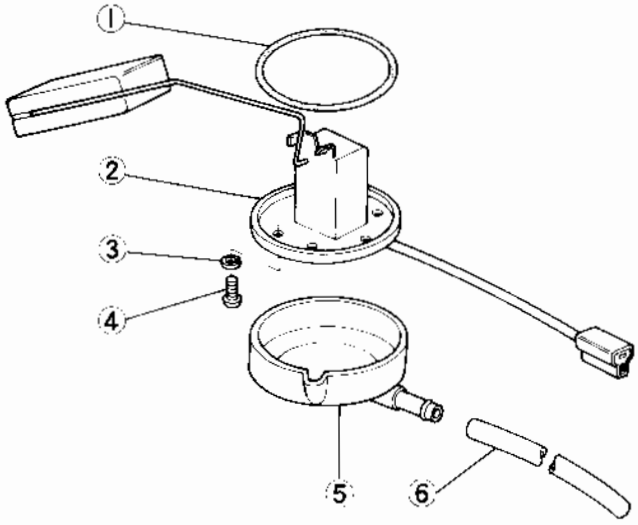
The table below shows the tightening torque for the parts which are attached to KZ550D. Tighten the other parts to torque listed on Pgs. 39 ~ 43, 268.

Part	Quantity	Torque		Locking Agent (•) Required	See Page
		kg-m	ft-lbs		
[Engine]					
Oil cooler mounting Allen bolts φ6 P1.0	4	1.0	87 in-lbs	—	324
Oil tube lower mounting bolts φ6 P1.0	4	1.0	87 in-lbs	—	324
Oil tube upper mounting nuts φ16 P1.5	2	2.3	16.5	—	324
Shift pedal pivot bolt φ14 P1.5	1	2.5	18.0	•	322
[Chassis]					
Turn signal assy mounting nuts φ10 P1.25	4	1.3	113 in-lbs	—	326

FUEL LEVEL SENDER (on KZ550D)

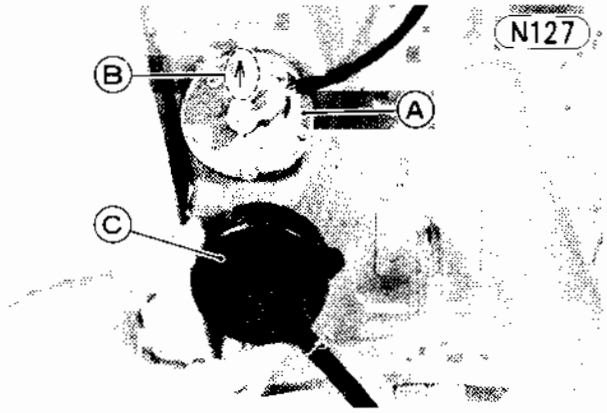
The fuel level sender is attached on the bottom of the fuel tank.

Fuel Level Sender (on KZ550D) (N126)



1. O Ring
2. Fuel Level Sender
3. Lockwasher x 5
4. Screw x 5
5. Cover
6. Hose

NOTE: 1. Install the fuel level sender to the fuel tank so that the arrow on the sender points forward.



A. Fuel Level Sender **C. Cover**
B. Arrow Mark

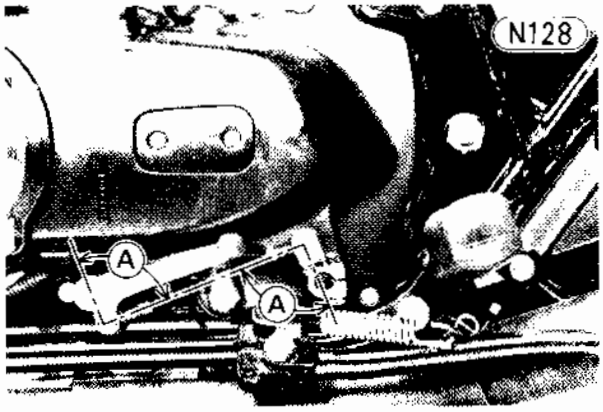
2. Fit the cover onto the bottom of the fuel level sender as shown in the figure.

SHIFT PEDAL LINKAGE (on KZ550D)

Refer to the following exceptions:

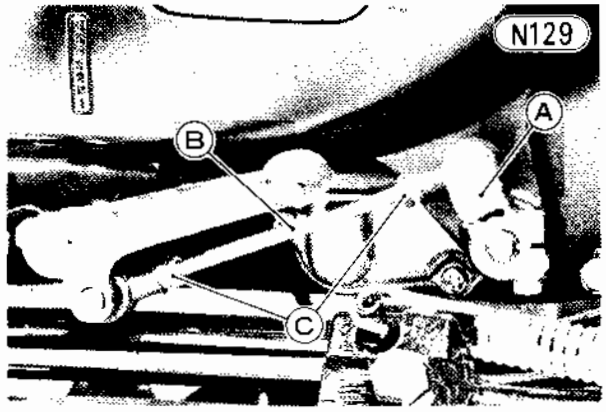
1. To make the shift pedal function most effectively, the shift pedal linkage should be in the proper position.
   - The shift pedal linkage angles are at 90°.
   - The lower side of the shift pedal end matches the upper level of the left footpeg.

   If the pedal is found improperly adjusted by either one of the above checks, adjust the shift pedal.



A. 90°

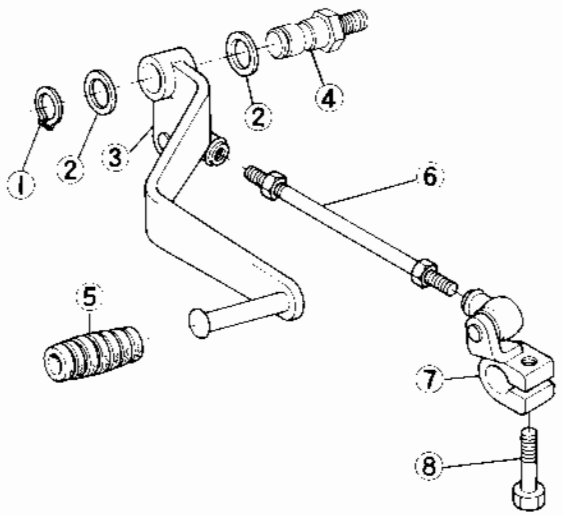
2. Adjust the shift pedal as the following procedures:
   - In case of the linkage angle at the shift lever is improper, first remove the lever, and then remount it at a new position on the shift shaft for the proper angle.
   - Tighten the lever bolt.
   - Loosen the locknuts of the shift linkage rod.
   - Turn the rod to make the proper pedal position, and tighten the locknuts.



A. Shift Lever **C. Locknuts**
B. Shift Linkage Rod

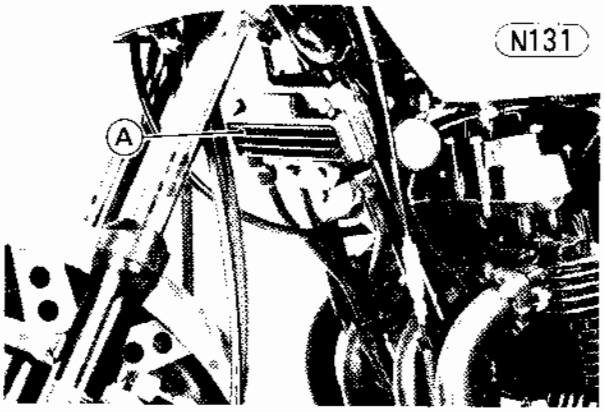
3. Apply a non-permanent locking agent to the threads of the pivot bolt 4 , and tighten it to 2.5 kg-m (18.0 ft-lbs) of torque.
4. Apply a grease to the pivot bolt before the shift pedal installation.

Shift Pedal Linkage (on KZ550D) (N130)



1. Circlip
2. Flat Washer x 2
3. Shift Pedal
4. Pivot Bolt
5. Pedal Rubber
6. Shift Linkage Rod
7. Shift Lever
8. Bolt

OIL COOLER (on KZ550D)



A. Oil Cooler (N131)

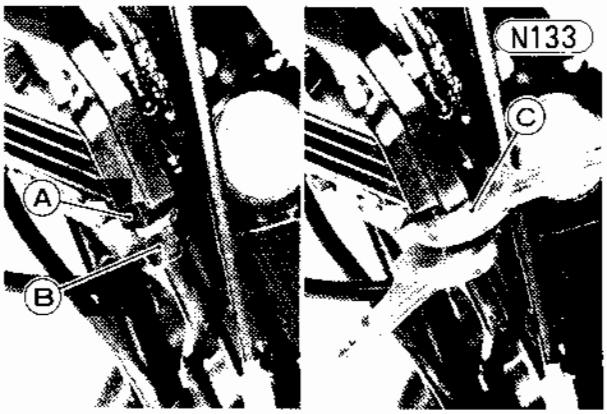
Removal:

- Set the motorcycle up on its center stand, place an oil pan beneath the engine.
- Remove the oil tube lower mounting bolts, and take the oil tube lower ends off the engine. There is the O ring at each lower end of the oil tube.



A. Mounting Bolts (N132)

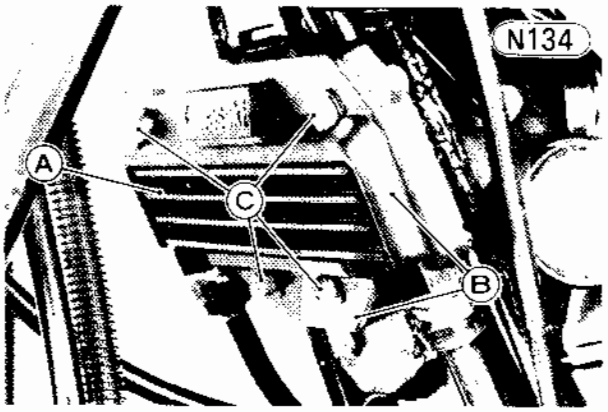
- Keep the oil tube fittings from turning, loosen the oil tube upper mounting nuts, and take off the oil tubes.



A. Oil Tube Fitting **C. Hold to keep from turning.**
B. Oil Tube Upper Mounting Nut (N133)

CAUTION **To prevent damage to the oil tube fittings, keep them with a wrench from turning during the oil tube upper mounting nuts loosening or tightening.**

- Remove the oil cooler mounting Allen bolts, and take off the oil cooler covers and oil cooler.



A. Oil Cooler **C. Mounting Allen Bolts**
B. Oil Cooler Covers (N134)

Installation Note:

1. Tightening order and tightening torque for each bolt and nut are shown in the Table N35.

Table N35 Oil Cooler Installation

Tightening Order	Part Name	Tightening Torque
1	Oil Cooler Mounting Allen Bolts (4)	Loosely with hand
2	Oil Tube Lower Mounting Bolts (4)	1.0 kg-m (87 in-lbs)
3	Oil Tube Upper Mounting Nuts (2)	Loosely with hand
4	Oil Cooler Mounting Allen Bolts (4)	1.0 kg-m (87 in-lbs)
5	Oil Tube Upper Mounting Nuts (2)	2.3 kg-m (16.5 ft-lbs)

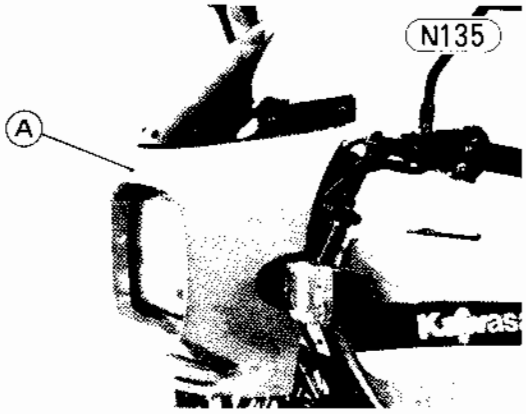
CAUTION **To prevent damage to the oil tube fittings, keep them with a wrench from turning during the oil tube upper mounting nuts tightening or loosening.**

2. Check the oil level and add more if necessary (Pg. 24).

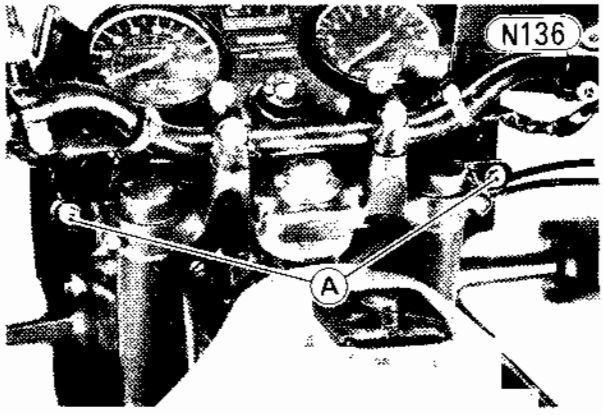
Removal:

- Remove the upper mounting cap nuts and lockwashers (2 ea).
- Remove the lower mounting bolts, lockwashers, and flat washers (2 ea).
- Remove the fairing.

FAIRING (on KZ550D)



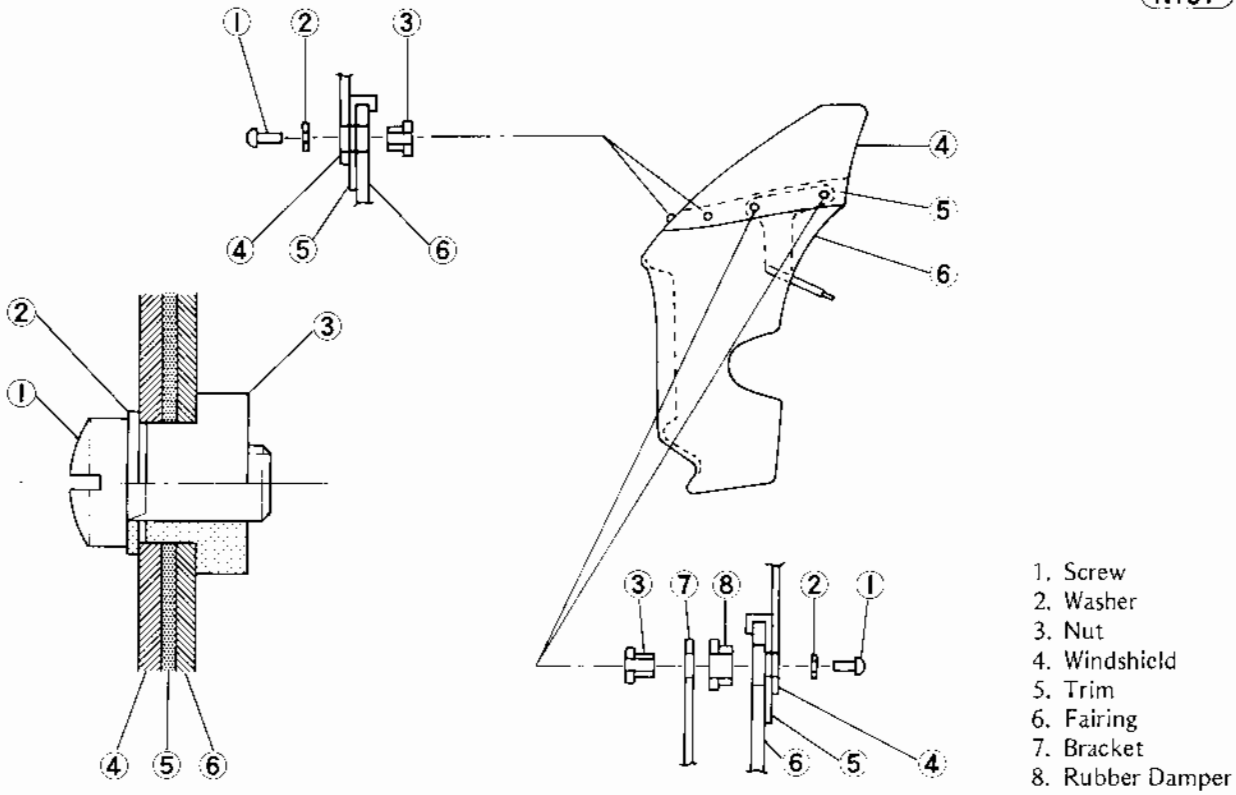
A. Fairing



A. Upper Mounting Cap Nuts

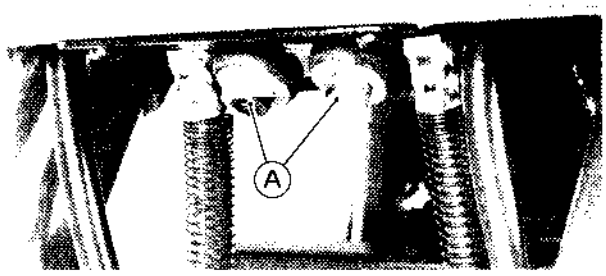
Windshield Installation

N137



1. Screw
2. Washer
3. Nut
4. Windshield
5. Trim
6. Fairing
7. Bracket
8. Rubber Damper

(N138)



A. Lower Mounting Bolts

Installation Note:

1. If the windshield is replaced with a new one, install it on the fairing as shown in Fig. N137.

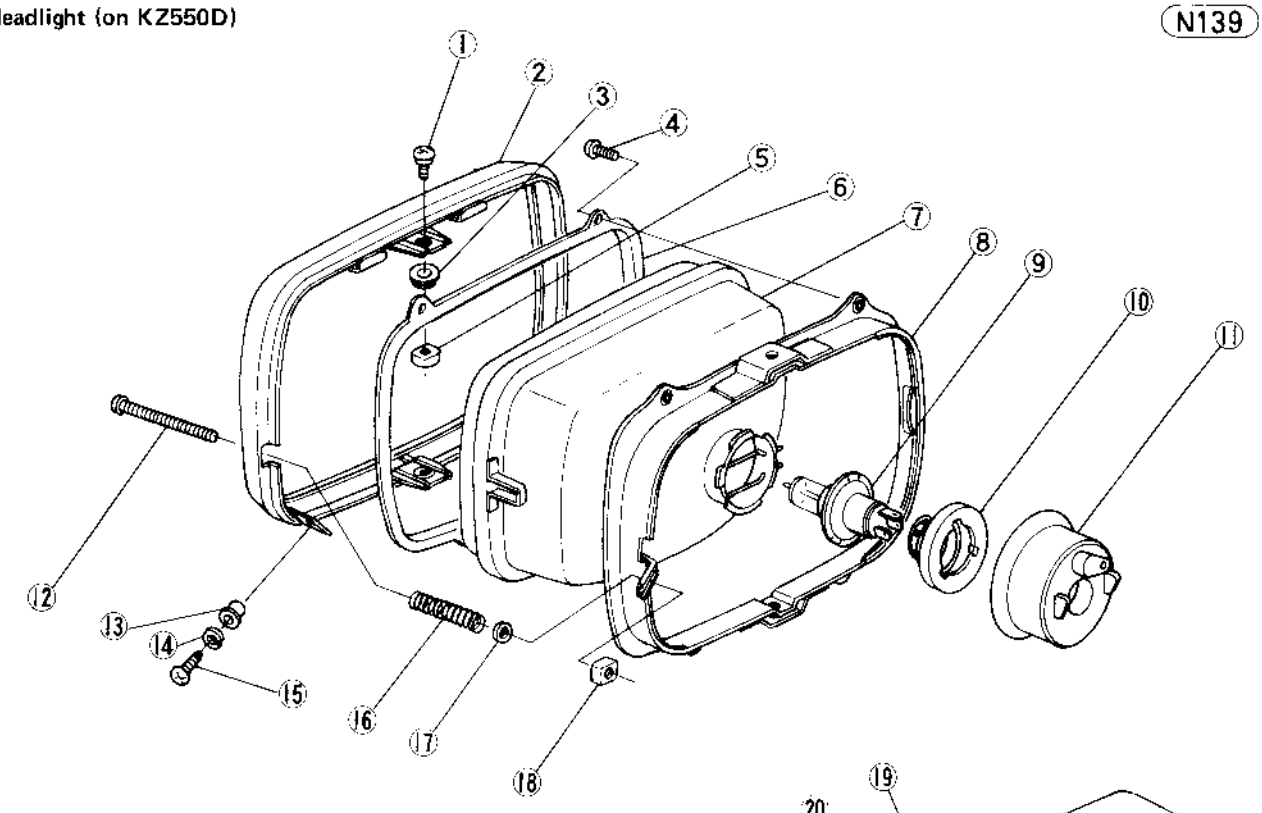
HEADLIGHT (on KZ550D)

Removal:

- Remove the fairing (Pg. 324).
- Take out the retaining screws.
- Swing the outer rim out from the housing, and disconnect the headlight socket from the rear of the unit.

Headlight (on KZ550D)

(N139)



1. Pivot Screw x 2
2. Outer Rim
3. Rubber Damper x 2
4. Screw x 4
5. Nut x 2
6. Inner Rim
7. Semi-sealed Beam Unit
8. Mounting Rim
9. Headlight Bulb
10. Bulb Stop
11. Rubber Boot
12. Adjusting Screw
13. Collar x 2
14. Lockwasher x 2
15. Screw x 2
16. Spring
17. Spring Seat
18. Nut
19. Headlight Housing
20. Nut x 2
21. Lockwasher x 2
22. Collar x 2
23. Rubber Damper x 2
24. Rubber Damper x 2
25. Flat Washer x 2
26. Bolt x 2
27. Bolt
28. Lockwasher
29. Flat Washer

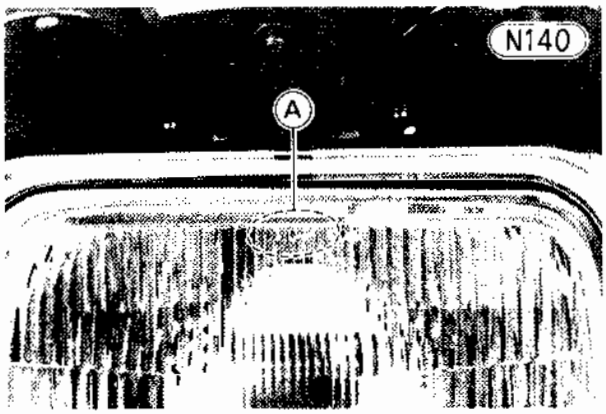
- Remove the rubber boot.
- Push the bulb stop and turn it counterclockwise so that the bulb stop can be removed, and then remove the bulb.

CAUTION **When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.**

- Remove the pivot screws, nuts, and rubber dampers, and the beam horizontal adjusting screw. The nut, spring seat, and spring will come off with the adjusting screw.
- Separate the outer rim from the inner rim.
- Remove the screws, and separate the semi-sealed beam unit from the inner rim and mounting rim.

Installation Note:

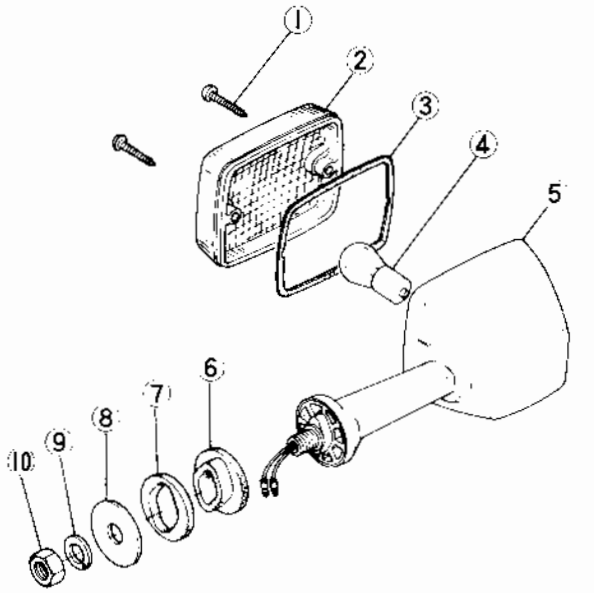
1. The top of the semi-sealed beam unit is marked "TOP".



A. TOP Mark

2. Adjust the headlight after installation (Pg. 32).

Turn Signal Assy (on KZ550D) (N141)



1. Screw x 2
2. Lens
3. Gasket
4. Bulb
5. Turn Signal Assy
6. Rubber Damper
7. Rubber Damper
8. Flat Washer
9. Lockwasher
10. Nut

TURN SIGNAL ASSY (on KZ550D)

Refer to Pgs. 138 ~ 139, noting the following:

- Tighten the turn signal mounting nuts to 1.3 kg-m (113 in-lbs) of torque.

CAUTION **Don't apply a torque more than 1.5 kg-m (11.0 ft-lbs) to the turn signal mounting nuts. Over-tightening may cause the damage of the turn signal assy.**

Maintenance

CYLINDER HEAD VALVE

Valve seat cutters (special tools) are newly available to repair the valve seat. See the following exceptions.

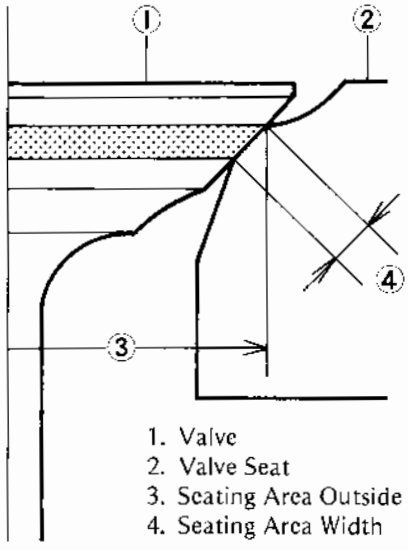
Valve seat inspection

The valve must seat in the valve seat evenly around the circumference over the specified area. If the seating area is too wide, the seating pressure per unit of area is reduced, which may result in compression leakage and carbon accumulation on the seating surface. If the seating area is too narrow, heat transfer from the valve is reduced and the valve will overheat and warp. Uneven seating, or seat damage will cause compression leakage.

- Remove the valve, and check to see if the valve and valve guide are in good condition before valve seat inspection.
- Apply machinist's dye to the valve seat, and then use a lapper to tap the valve lightly into place.
- Remove the valve, and note where the dye adheres to the valve seating surface. The distribution of the dye on the seating surface gives an indication of seat condition.

★If the distribution of the dye shows uneven seating or seat damage, or if the seating area is out of the specified range repair the valve seat.

Valve and Valve Seat (N142)



1. Valve
2. Valve Seat
3. Seating Area Outside Diameter
4. Seating Area Width

Table N36 Valve Seating Area

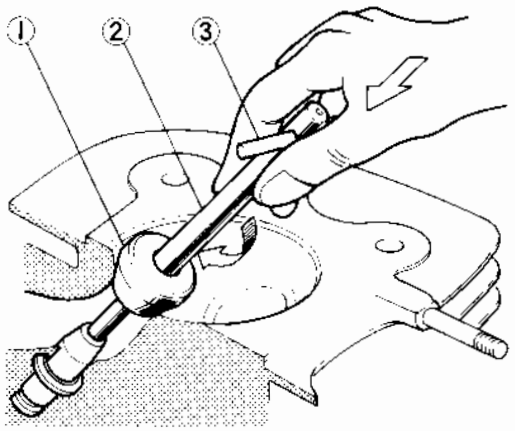
	Inlet	Exhaust
Outside Diameter	27 mm	23 mm
Width	0.5 ~ 1.0 mm	

Valve seat repair

- First, cut the seating surface of the valve seat with the 45° seat cutter, cutter holder, and bar (special tools). Cut only the amount necessary to make a good surface; overcutting will reduce the valve clearance, possibly making it no longer adjustable.

NOTE: When using the cutter, be sure to apply engine oil to the cutting part before grinding and also wipe off ground particles adhering to the cutter with washing oil.

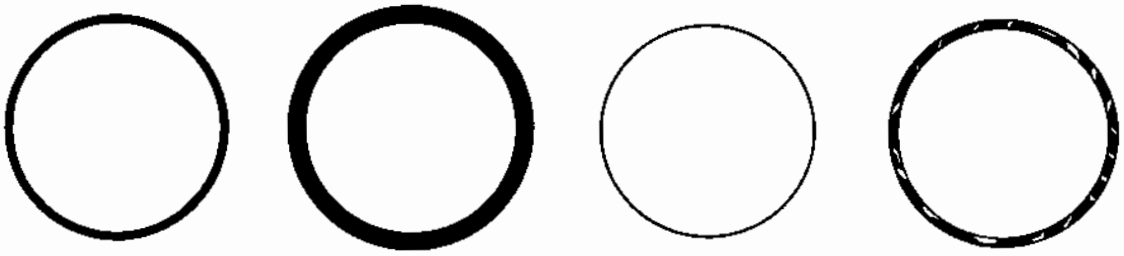
Valve Seat Cutter (N143)



1. Cutter
2. Cutter Holder 5.5 mm (57001-1125)
3. Bar (57001-1128)

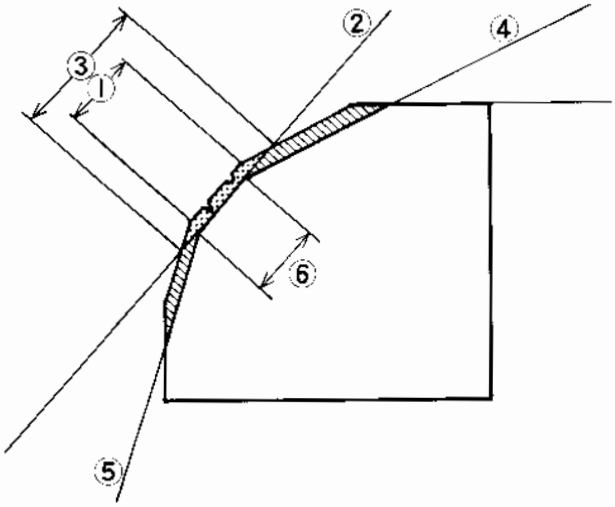
- Next, cut the outermost surface with the outside cutter (special tool) so that the valve seating surface will have the specified outside **diameter**.
- Then, cut the surface inside the seating surface with the inside cutter (special tool) so that the seating surface will have the specified **width**.

Valve Seat Contact (N144)



GOOD TOO WIDE TOO NARROW UNEVEN

Cutting Valve Seat (N145)

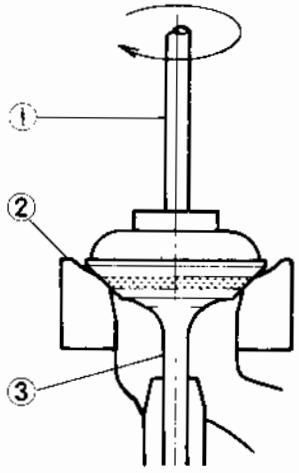


1. Original Seating Surface
2. Cut seating surface with following seat cutters to obtain new seating surface:
   Inlet: Seat Cutter stamped ③ (57001-1115)
   Exhaust: Seat Cutter stamped ② (57001-1114)
3. New Seating Surface
4. Cut this surface to adjust outside diameter of new seating surface with following outside cutter:
   Inlet: Outside Cutter stamped ⑧ (57001-1120)
   Exhaust: Seat Cutter stamped ⑦ (57001-1119)
5. Cut this surface to obtain correct width with following inside cutter:
   Inlet and Exhaust: Inside Cutter stamped ⑩ (57001-1123)
6. Corrective Seating Surface

After cutting, lap the valve to properly match the valve and valve seat surfaces. Start off with coarse lapping compound, and finish with fine compound.

- Apply compound to the valve seat, and tap the valve lightly into place while rotating it with a lapper. Repeat this until a smooth, matched surface is obtained.
- When lapping is completed, check the valve installed height and adjust if necessary (Pg. 170).

Lapping Valve Seat (N146)



1. Lapper
2. Valve Seat
3. Valve

WHEEL

For 1981 model except for KZ550C, refer to Pgs. 194~196, 288~292 noting the following table.

Table N37 Tire, Air Pressure (measured when cold)

	Air Pressure		Size	Make, Type
Front	2.0 kg/cm² (28 psi, 200 kPa)		3.25H-19 4PR Ⓙ 3.25S-19 4PR	DUNLOP, F8 MARK II, Tubeless
Rear	Up to 97.5 kg load	2.25 kg/cm² (32 psi, 225 kPa)	3.75H-18 4PR Ⓙ 3.75S-18 4PR	DUNLOP, K130, Tubeless Ⓤ DUNLOP, K127, Tubeless
	97.5~165 kg load	2.8 kg/cm² (40 psi, 280 kPa) Ⓙ 2.5 kg/cm² (36 psi, 250 kPa)		

Ⓙ : KZ400J Ⓤ : US model for KZ550A

For KZ550C, see Table N7 on Pg. 289 noting the following.

NOTE: Tires on KZ550C US and Canadian models are the white letter tires.

CAUTION **These tires have the white letters on the side walls. When handling the white letter tire, observe the following to avoid contamination of the white letters.**

1. **Keep the tire wrapped until required for assembly to the rim.**
2. **Avoid the white letters on one tire touching the black rubber (tread, bead, etc.) on another.**
3. **Use only soap and/or water to clean the white letters. Do not use gasoline or chemical solvents.**

DISC BRAKE

See the following tables for 1981 model's disc brakes.

Table N38 Master Cylinder Parts

Measurement	Service Limit (mm)		
	Front		Rear
	Single	Dual	
Cylinder Inside Diameter	12.78	15.95	14.08
Piston Outside Diameter	12.50	15.67	13.80
Primary Cup Diameter	12.8	16.0	14.0
Secondary Cup Diameter	13.1	16.4	14.6
Spring Free Length	47.2	34.8	32.4

Table N39 Caliper Parts

Measurement	Service Limit
Cylinder Inside Diameter	42.92 mm
Piston Outside Diameter	42.75 mm

FRONT FORK

For 1981 model except for KZ550C, refer to Pgs. 207 ~ 210, 294 ~ 296, noting the following. See Pgs. 294 ~ 296 for KZ550C.

Table N40 Fork Oil

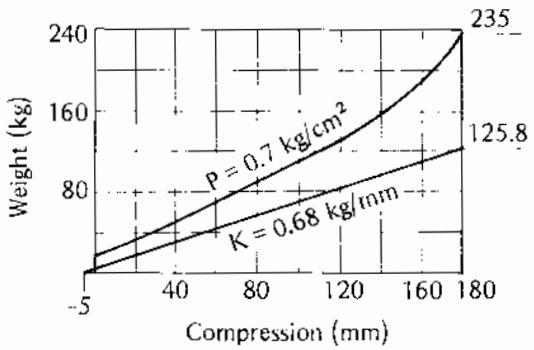
Type	Filling fork oil capacity		Oil level (without spring)
	When changing oil	After disassembly and completely dry	
SAE 5W 20	about 225 cc	245 ± 2.5 cc Ⓓ 244 ± 2.5 cc	520 ± 4 mm Ⓓ 517 ± 4 mm (from the top of the inner tube)

Ⓓ : KZ550D

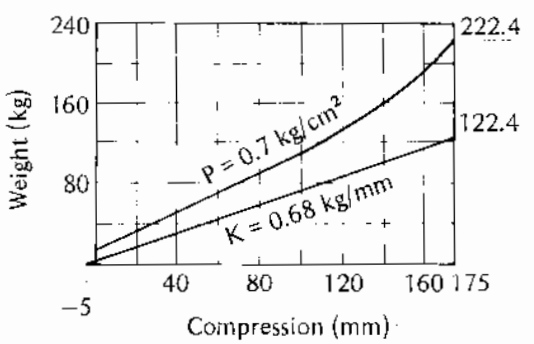
Table N41 Fork Spring Free Length

Service Limit	562 mm

Front Fork Load/Compression Stroke Relationship (on KZ400J/500B/550A,B) (N147)



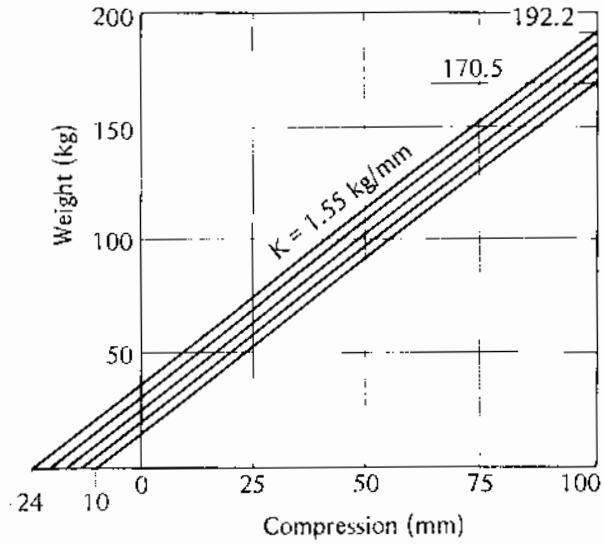
Front Fork Load/Compression Stroke Relationship (on KZ550D) (N148)



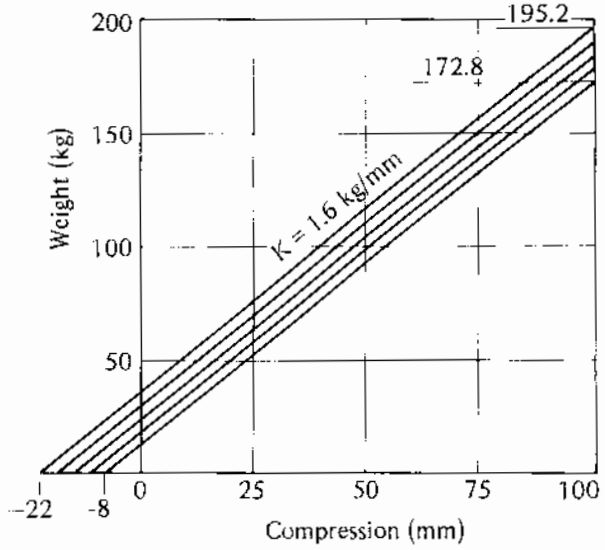
REAR SHOCK ABSORBER

For 1981 model except for KZ550C, refer to Pgs. 210 ~ 211, 296, noting the following. See Pg. 296 for KZ550C.

Shock Absorber Spring Force (KZ400J/500B/550A,B) (N149)



Shock Absorber Spring Force (KZ550D) (N150)



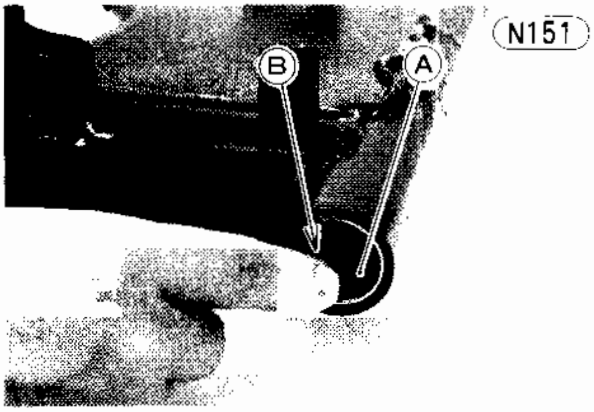
SWING ARM

Because the grease nipple is deleted from the swing arm, the swing arm should be removed for its lubricating. Refer to Pgs. 211 ~ 212 for other service information not specifically mentioned here.

Swing arm lubrication

In order for the swing arm to function safely and wear slowly, it should be properly lubricated in accordance with the Periodic Maintenance Chart (Pg. 317). Lubrication is also necessary after disassembly.

Remove the swing arm (Pg. 150), clean out the old grease, and apply grease to the needle bearings.



N151

A. Needle Bearing **B. Grease.**

RESERVE LIGHTING SYSTEM

The 1981 models for US and Canada contain a reserve lighting system in the headlight circuit. This system is a safety device that keeps the headlight on if one of the filaments burns out.

If either the high or low beam burns out, the reserve lighting system switches over to the remaining filament automatically, and lights the white headlight failure indicator light to show that the headlight bulb must be replaced. If the high beam filament burns out, the low beam is automatically turned on; if low beam burns out, the high beam is turned on but more dimly than normally.

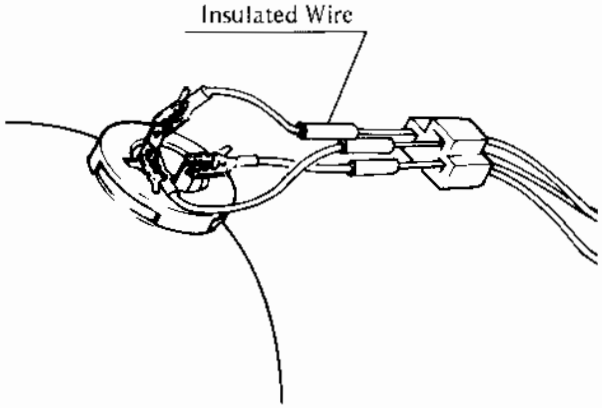
NOTE: Current is always flowing slightly in the headlight failure indicator light when the main switch and ignition switch are "ON" position. So you may notice the indicator light glimmers unless the headlight filaments burn out.

Reserve lighting system inspection

- Remove the headlight unit.
- Disconnect the headlight socket and connect the three terminals of headlight bulb with corresponding leads using three suitable insulated wires.

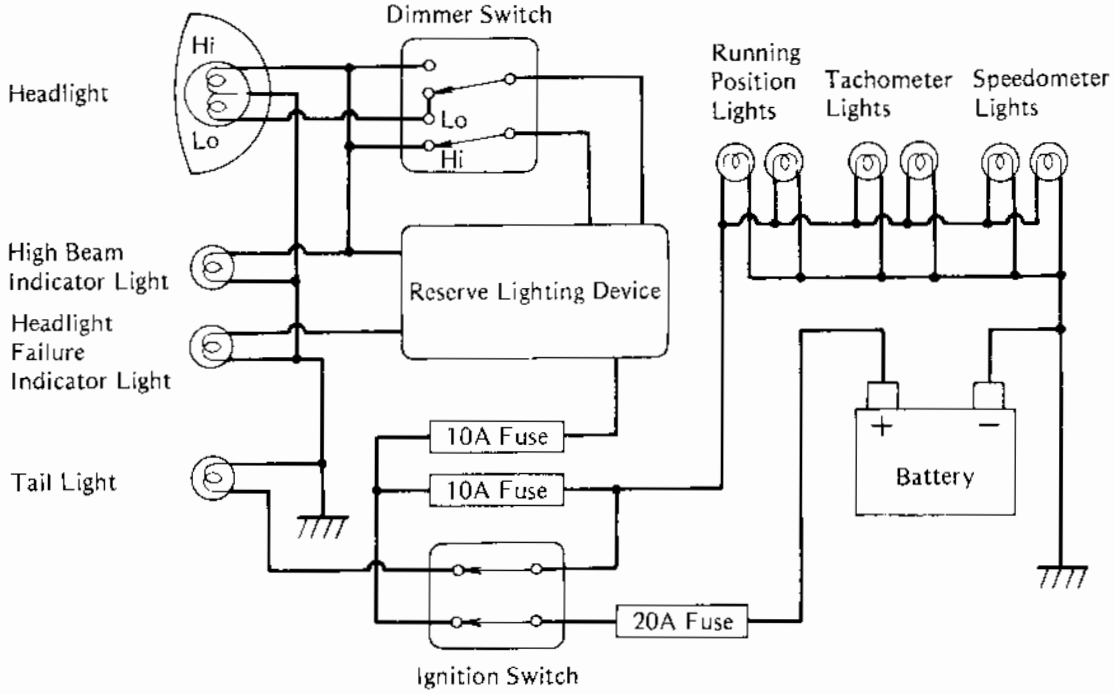
Check of Reserve Lighting System

N152



Headlight Circuit (on US and Canadian models)

N153



- Turn on the headlight and set the dimmer switch to the low beam position.
- Disconnect the wire which is connected to the red/yellow lead to simulate a bad low beam filament. At this time the high beam should go on more dimly than normal, and the white headlight failure indicator light should come on.
- Connect the red/yellow leads, and set the dimmer switch to the high beam position.
- Disconnect the wire which is connected to the red/black leads to simulate high beam failure. At this time the low beam should come on and the white indicator light should light.

Dimmer switch inspection

Table N42 shows the connections in the dimmer switch for both high and low beam.

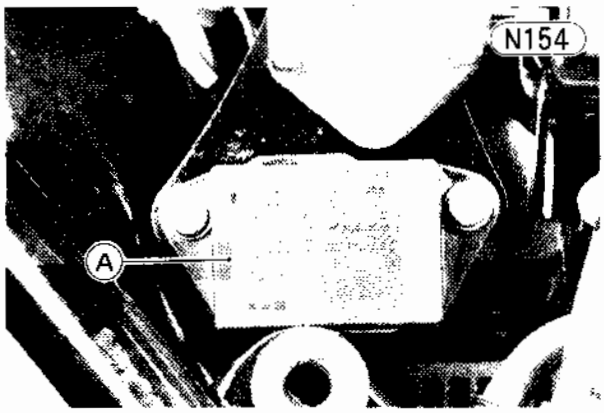
- Remove the fuel tank, and disconnect the leads to the left switch housing.
- Use an ohmmeter to see that only the connections shown in the table have continuity (zero ohms).
- ★If the switch has open or a short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement.
- ★If any parts are not repairable, the switch must be replaced as a unit.

Table N42 Dimmer Switch Connections (for Reserve Lighting model)

	Red/Black	Blue/Yellow	Red/Yellow	Blue
Hi	○	○	○	○
Lo	○		○	

Reserve lighting wiring inspection

- Unlock the seat, swing it open, and then pull out the 6-pin connector of the reserve lighting device.



A. Reserve Lighting Device

- Turn on the ignition switch to "ON" position.
- Check the voltage of each lead through the 6-pin connector by referring to the following procedure.

NOTE: Set a voltmeter to 25V DC range, and always ground the (−) probe of the voltmeter.

Trouble (a): When one filament is burned out, the other is not turned on.

○Examine the voltage of blue/orange lead by applying the (+) probe of voltmeter to the lead. When the meter reading is about 12 V, both filaments of the headlight are burned out or the black/yellow lead is broken. When the meter reading is less than about 12 V, advance to the next step.

○Examine the voltage of the blue lead. If the meter reading is about 12 V, the reserve lighting device is defective. When the reading is 0 V, the ignition switch or wiring harness is broken.

Trouble (b): Both filaments for upper beam and lower beam are turned on at the same time.

○Examine the voltage of the blue/orange lead. When the meter reading is about 12 V, the reserve lighting device is defective. When the reading is 0 V, the dimmer switch is defective.

Trouble (c): The high beam is not dimmed when the low beam burns out and the high one is turned on automatically.

○Examine the voltage of the red/black lead. If the meter reading is about 12 V, the reserve lighting device is defective. If the reading is 0 V, the wiring harness is broken.

Trouble (d): The failure indicator light is not turned on when the headlight filament burns out.

○Examine the voltage of the light green/red or green/blue lead. When the meter reading is about 12 V, the indicator light burns out or is not grounded. When the reading is 0 V, the reserve lighting device is defective.

AUTOMATIC TURN SIGNAL CANCELLING SYSTEM (on KZ550C)

The motorcycle on KZ550C contains a automatic turn signal cancelling system.

When the turn signal selector switch is in the **A** (Automatic) position, a solenoid turns off the turn signal after it has been on for 4 seconds, and from that time the motorcycle has traveled an additional 50 meters.

The cancelling system consists of the battery (power source), turn signal control unit, distance sensor, solenoid, and turn signal switch. When the turn signal switch is pushed to the left or right, the turn signals start flashing and the control unit starts counting off 4 seconds. At the end of this time, the control unit starts calculating distance traveled using pulses from the distance sensor in the speedometer. When the motorcycle has traveled 50 meters, the control unit operates the solenoid, which returns the turn signal switch to the off position.

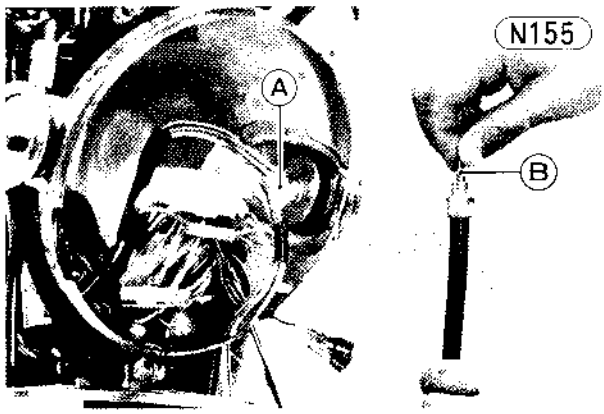
If the turn signal cancelling system does not function properly, first check all the wiring connections carefully,

and then inspect the distance sensor and turn signal switch/solenoid assembly. If all these are good, replace the turn signal control unit.

Distance sensor inspection

- Open the headlight housing, disconnect the 4-pin connector from the speedometer, and remove the speedometer cable lower end from the speedometer gear housing using pliers.
- Connect an ohmmeter across to the sensor leads (red and light green leads), and check continuity as follows.
- Turning the speedometer inner cable slowly, count how many times the sensor shows continuity. The ohmmeter should show continuity and then open four times per revolution.

★If it does not, replace the speedometer.



A. 4-pin Connector from the speedometer
B. Turn the speedometer inner cable.

Turn signal and selector switch inspection

First check that the turn signal switch and selector switch connections.

- Remove the fuel tank, and unplug the 6-pin connectors from the left switch housing.
- Check the turn signal switch and selector switch connections according to Table N43 and N44.

★If the switch has an open circuit 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.

Table N43 Selector Switch Connections

Lead Color		Brown	Yellow
Switch Position	M		
	A	○——○	

Table N44 Turn Signal Switch Connections

	Gray	Orange	Green	Red/ White	White/ Green	White/ Red	Blue/ White
R	○——○					○——○	
N				○——○			
L		○——○				○——○	

Next check that the solenoid operates properly when it receives a pulse from the control unit.

- Switch the turn signal switch to either side, connect a lead to the positive (+) side of the battery and touch its other end to the white/green lead momentarily. At

Turn Signal Cancelling System (on KZ550C)

N156

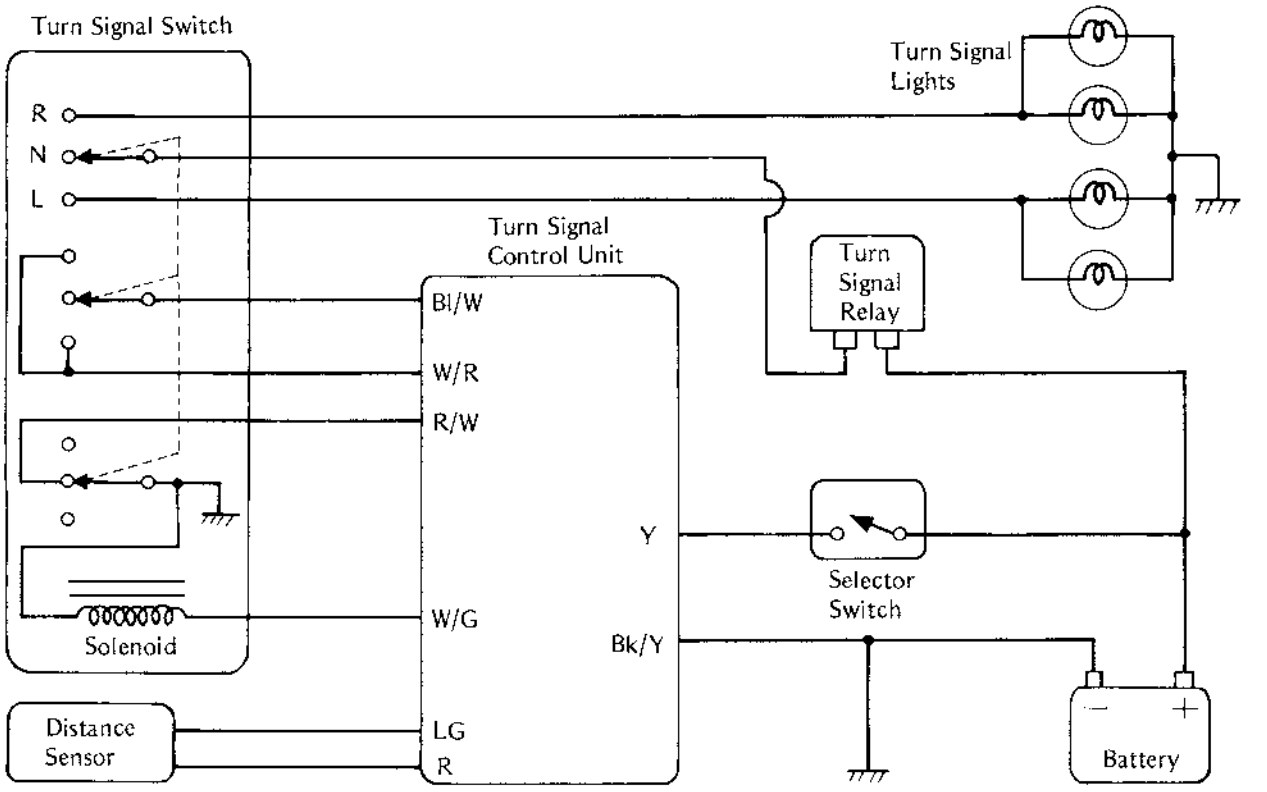


Table N45 Wiring Inspection

Meter Range	Connections*	Ignition Switch	Selector Switch Position	Turn Signal Switch Position	Reading
25V DC	Meter (+) → Yellow, Blue/White	ON	A	Any (R, L, Neu.)	Battery voltage
		OFF	M	Any	0 V
	Meter (+) → White/Red	ON	A	R or L	Battery voltage
		OFF	M	Neutral	0 V

*Connect the meter negative (-) lead to ground.

this time the solenoid should return the turn signal switch to the off position.

★If it does not do this for both right and left positions, replace the switch assembly.

CAUTION **Do not connect the battery lead to the white/green lead for more than a few seconds, as it could burn out the solenoid.**

Wiring inspection

- Connect all connectors.
- Pull off the right side cover.
- Measure the voltage at the 6-pin connector from the turn signal control unit as shown in Table N45.

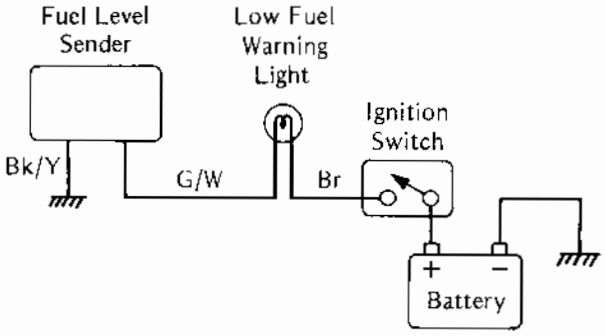
★If any one of the meter readings shows an improper values, check the wiring and connections of the turn signal switch, distance sensor, and turn signal control unit. Replace the turn signal control unit if all of them turn out good.

NOTE: The turn signal control unit is located in the right side cover.

LOW FUEL WARNING SYSTEM (on KZ550C)

This is a system that warns the rider when there is only about $^1/_5$ tank of fuel remaining. It consists of a fuel level sender inside the tank and a warning light. The same bulb is used for both the low fuel warning light and brake light failure indicator light.

Low Fuel Warning Circuit (on KZ550C) (N157)



When the ignition switch is turned on, the warning light does not come on if the fuel level is higher than the warning level. If the fuel level is low, the light comes on and stay on continuously until fuel is added.

Warning system trouble

Before starting to troubleshoot the fuel warning system, first check that the battery is good (Pg. 214) and make sure that all connectors in the system are clean and tight.

(1) Fuel level is low but the warning light does not come on.
- Check that the warning light comes on when the brake lever or pedal is applied.
- Disconnect the 2-pin connector to the fuel level sender, set the meter to the 25V DC or higher range, and connect the (+) meter lead to the green/white lead and the (−) lead to the black/yellow lead.
- Turn on the ignition switch and read the meter.

★If it does not read battery voltage, the wiring is at fault.

★If the meter does read battery voltage, the sensor is defective.

(2) Fuel level is not low but the warning light stays on continuously.
- Check that the brake light circuit is good.

★If it is good, the sender is bad.

(3) Warning light goes on and off irregularly.
- Check that the fuel is well above the low level.
- Check that the wiring is not shorting out against other parts.
- Check that the battery charging voltage is normal (Pg. 214).

★If all the above checks are good, check that the sender is not internally shorting intermittently.

CARBURETORS (on KZ550D)

Table N46 shows the carburetor specifications for KZ550D.

Table N46 Carburetor Specifications (on KZ550D)

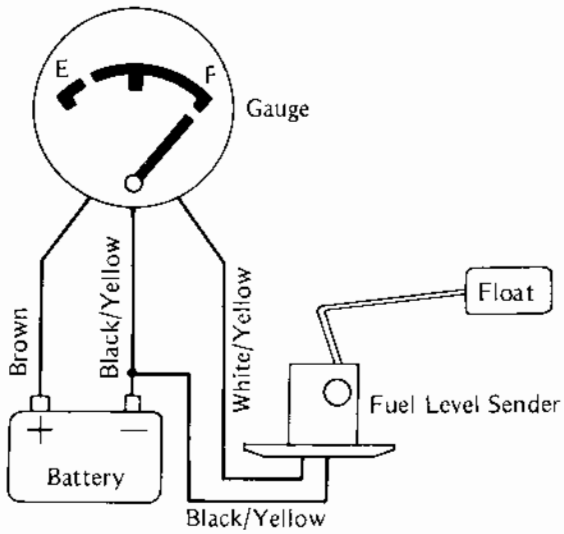
Type	Main Jet	Jet Needle	Pilot Jet	Pilot Screw	Throttle Valve Cutaway	Fuel Level (mm)	
						Design	Service
TK K22P-2F Ⓤ TK K22P-2E	#94	4D93-2 Ⓤ 4D92	#32	$1^3/_8 \pm {}^1/_4$ turn out Ⓤ (−)	2.5	29.5	3.5 ± 1

Ⓤ : US model

FUEL GAUGE (on KZ550D)

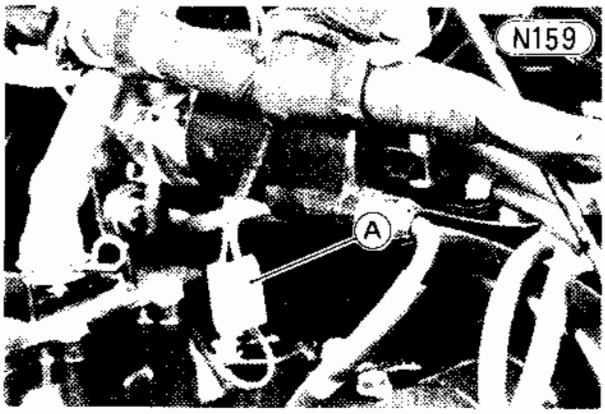
The fuel gauge is electrically operated through a sender in the fuel tank. A float in the tank rides up and down with the level of the fuel, changing the internal resistance of the sender and in this way changing the amount of current flowing through the meter.

Fuel Gauge Circuit (on KZ550D) (N158)



Gauge circuit check

- Disconnect the 2-pin connector to the sender underneath the fuel tank, and turn on the ignition switch. At this time the gauge should read E.
- Short together the black/yellow and white/yellow leads on the gauge side of the 2-pin connector. At this time the gauge should read F.

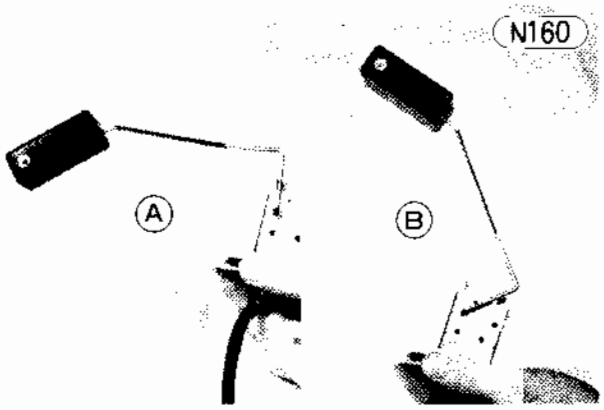


A. 2-pin Connector from main harness

★If the above E and F readings are correct, the fuel level sender is bad. If these reading are not obtained, the trouble is with the gauge or wiring.

Fuel level sender check

- Remove the fuel tank and remove the fuel level sender (Pg. 322).
- Check that the float moves up and down smoothly without binding or hitting the fuel tank. It should go down under its own weight. If the float does not move smoothly, replace the sender.



A. Lowest Position **B. Highest Position**

- Measure the resistance of the fuel level sender with an ohmmeter.

Table N47 Resistance of Fuel Level Sender

Tank	Resistance
Fuel (Highest position)	1 ~ 5 Ω
Empty (Lowest position)	103 ~ 117 Ω

★If the ohmmeter does not show the values in the table or the reading does not vary smoothly as the float level changes, replace the sender.
- Inspect the leads and connector.
★If they show any damage, replace the sender.

Gauge check

- Remove the fuel tank and disconnect the 9-pin connector from the gauge meter. Check the resistance of the meter using an ohmmeter as shown in Table N48. If the resistance in this test is found to be less than the proper value, there is a short in the meter. No reading (∞) indicates an open circuit. In either case, replace the gauge meter.

Table N48 Gauge Resistance

Connections	Reading
One meter lead → Terminal for brown lead	60 ~ 80 Ω
The other meter lead → Black/Yellow lead terminal	

Wiring check

- Connect a voltmeter to the 9-pin connector from the main harness as shown in the table, and turn on the ignition switch.

★If the voltmeter reading does not correspond to the table, the wiring is bad. Check the leads and connectors, and replace or repair any damaged wiring.

Table N49 Wiring Check

Meter Range	Connections	Reading
25V DC	Meter (+) → Brown Lead	Battery voltage
	Meter (–) → Black/Yellow Lead	

NOTE: With one exception the gauge is considered to be good even if the voltmeter needle fluctuates. The exception is when the trouble is over-indication on the gauge (or indicating near the "F" mark when empty).

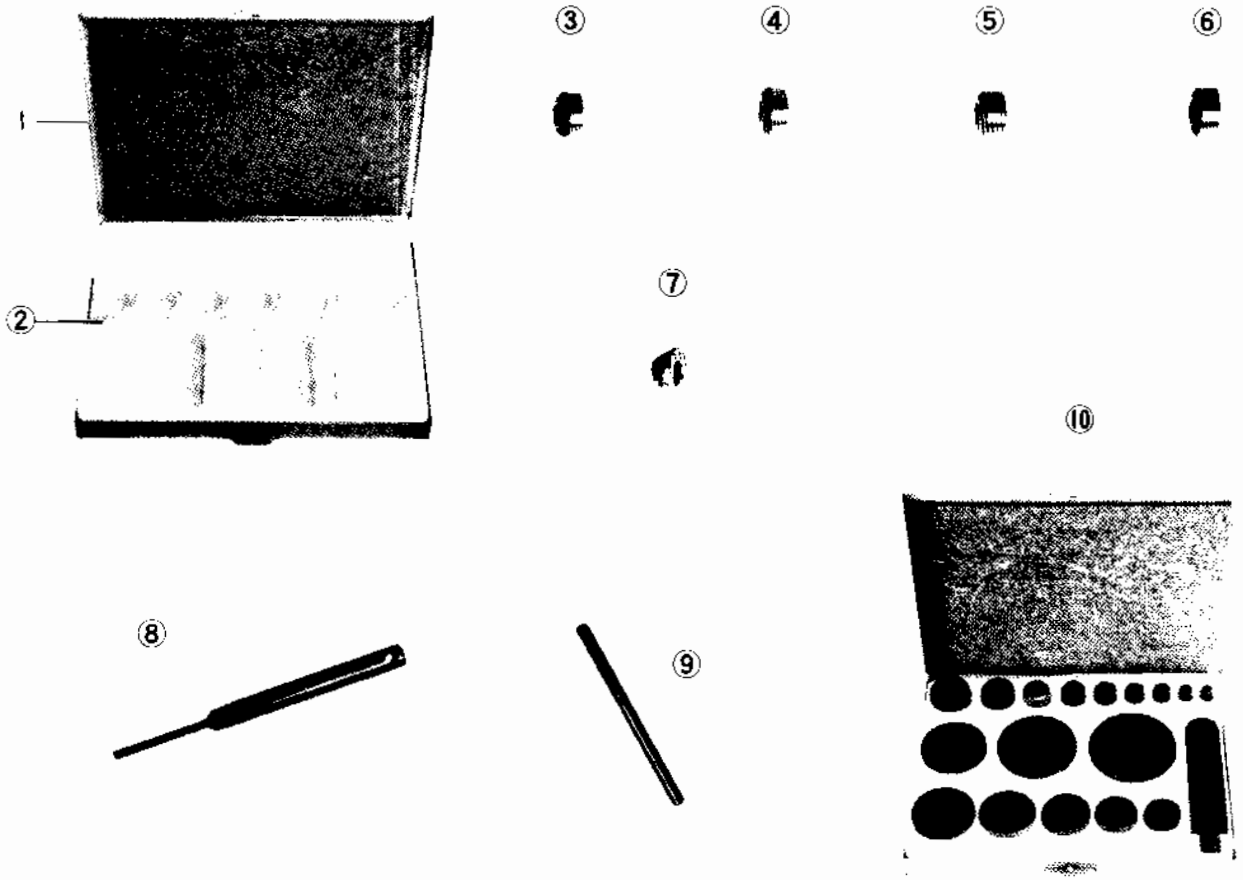
Appendix

SPECIAL TOOLS

The following special tools are newly available now.

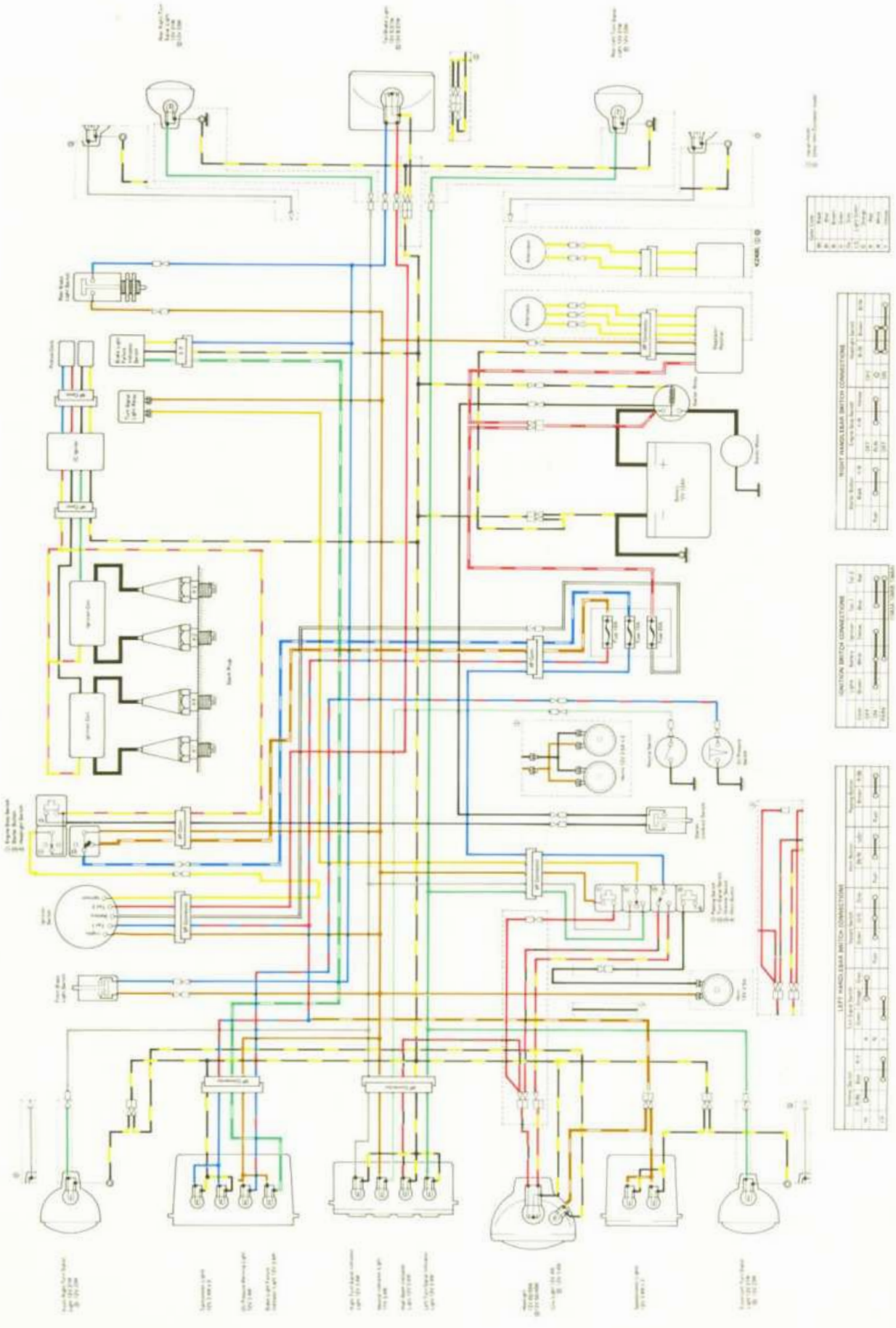
1. The valve seat cutters which can be used for all 4-stroke engines are manufactured by electrically nickelplating diamond particles on to the cutter body and can grind the valve seat in constant quality, which assures smooth finish of the seat surface.
2. There are selections of inner and outer drivers to choose in the bearing driver set (P/N: 57001-1129), which can be used to press in the bearings on the engine and chassis of all models. Also, this set can replace the older bearing drivers of the following part numbers.

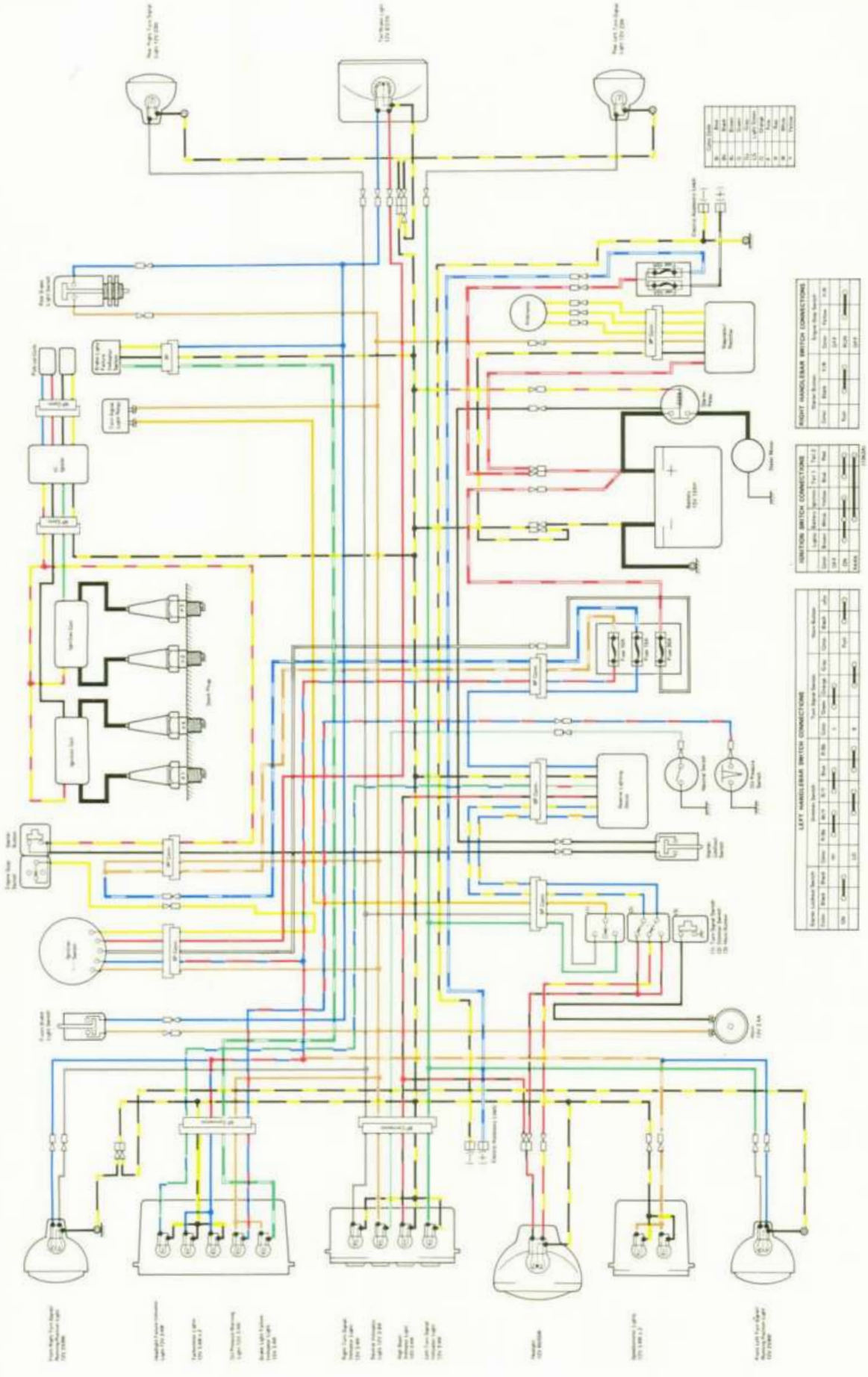
57001-138	57001-139	57001-140
57001-282	57001-283	57001-284
57001-286	57001-287	57001-288
57001-289	57001-290	57001-293
57001-296	57001-298	57001-1053



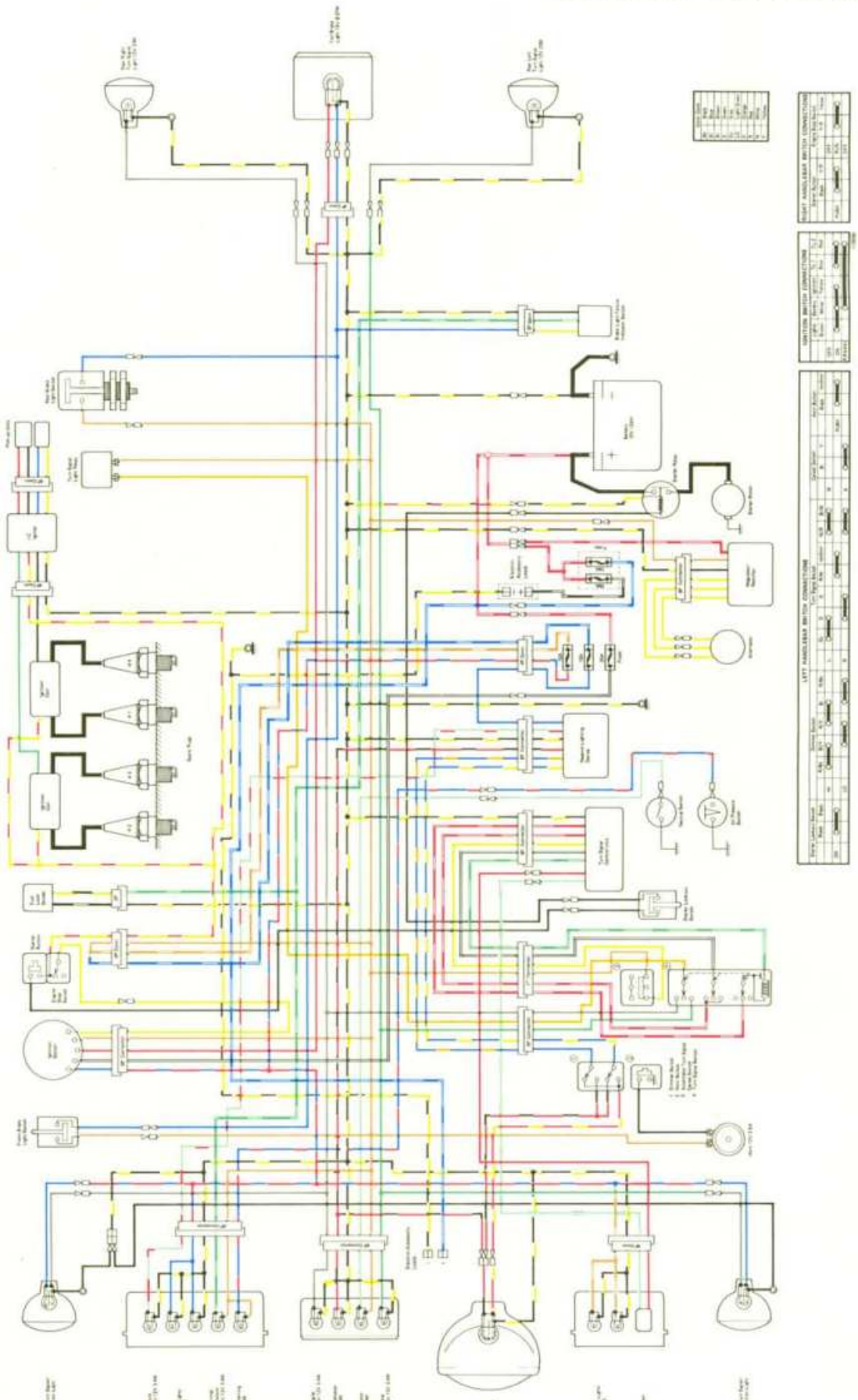
REF. NO.	PART NO.	DESCRIPTION	Q'TY
1	57001-1111	Valve Seat Cutter Case	1
2	57001-1112	Separate Case	1
3	57001-1114	Seat Cutter 45° – ϕ27.5 (EX)	1
4	57001-1115	Seat Cutter 45° – ϕ32.0 (IN)	1
5	57001-1119	Outside Cutter 32° – ϕ28.0 (EX)	1
6	57001-1120	Outside Cutter 32° – ϕ30.0 (IN)	1
7	57001-1123	Inside Cutter 60° – ϕ30.0 (EX and IN)	1
8	57001-1125	Cutter Holder 5.5 mm	1
9	57001-1128	Bar	1
10	57001-1129	Bearing Driver Set	1 set

KZ400-J2/KZ500-B3/KZ550-A2/KZ550-B2 Wiring Diagram



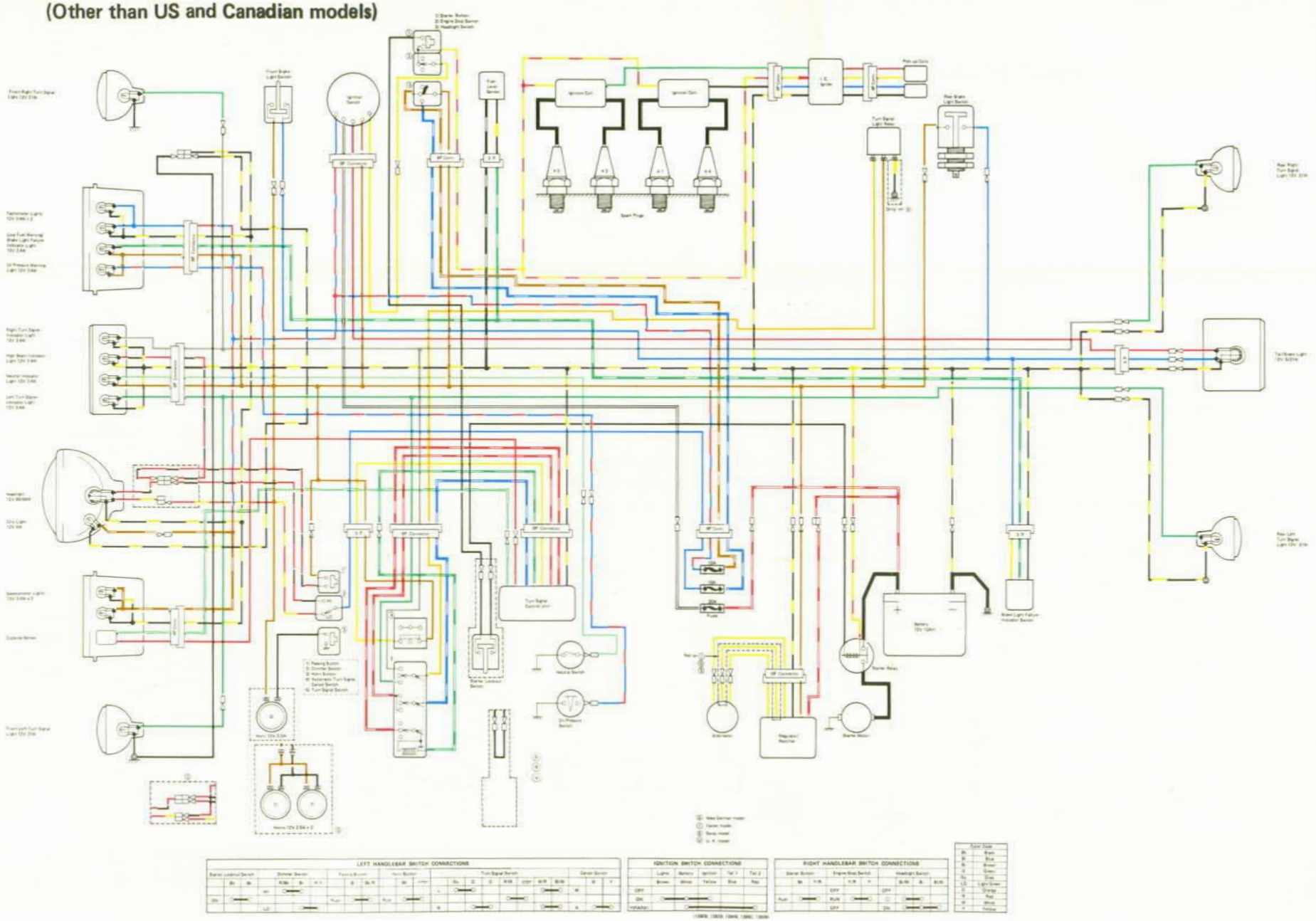


KZ650-A2 Wiring Diagram
(US and Canadian models)



KZ550-C2 Wiring Diagram
(US and Canadian models)

KZ550-C2 Wiring Diagram
(Other than US and Canadian models)

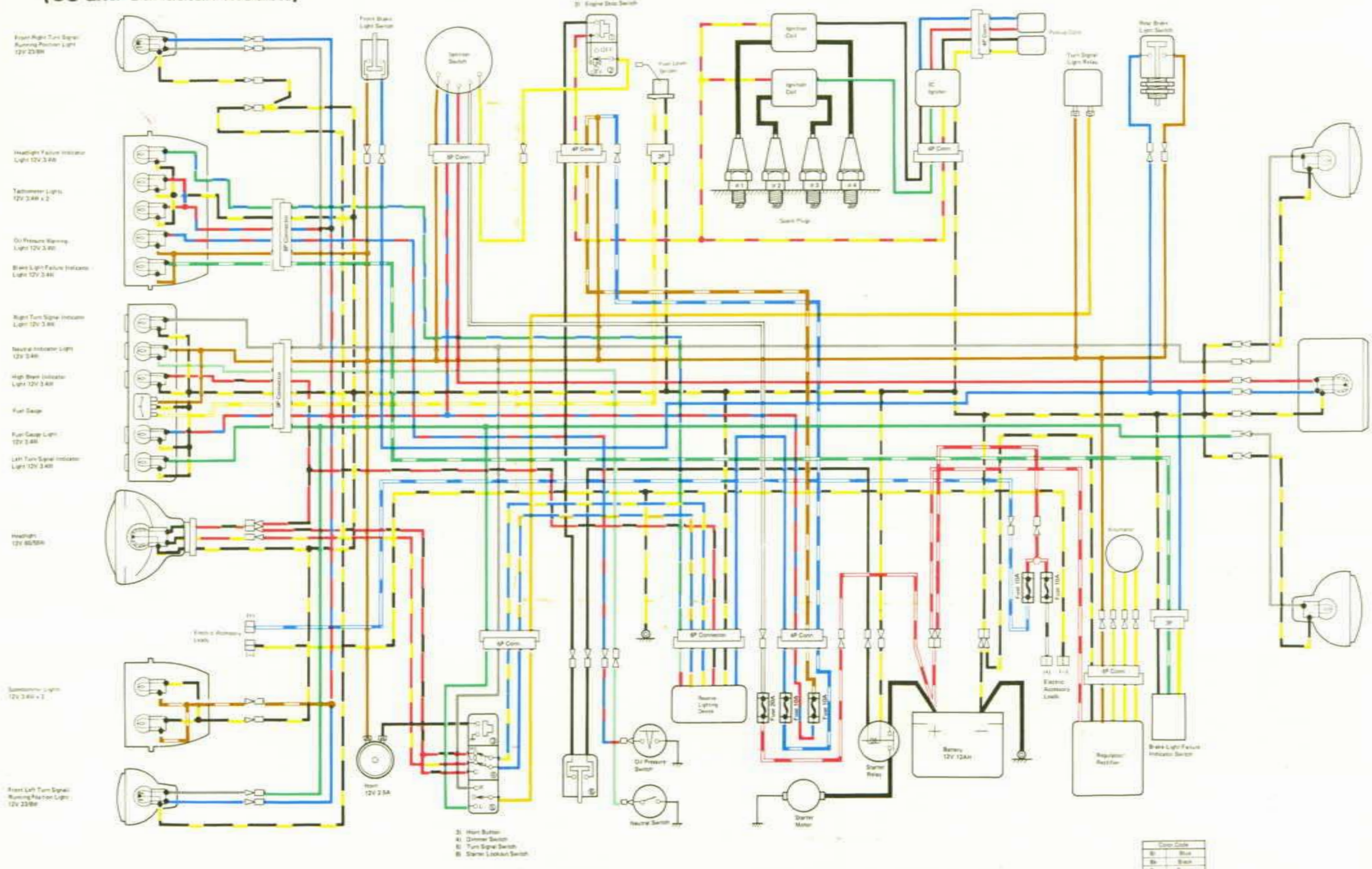


LEFT HANDLEBAR SWITCH CONNECTIONS

IGNITION SWITCH CONNECTIONS

RIGHT HANDLEBAR SWITCH CONNECTIONS

KZ550-D1 Wiring Diagram
(US and Canadian models)



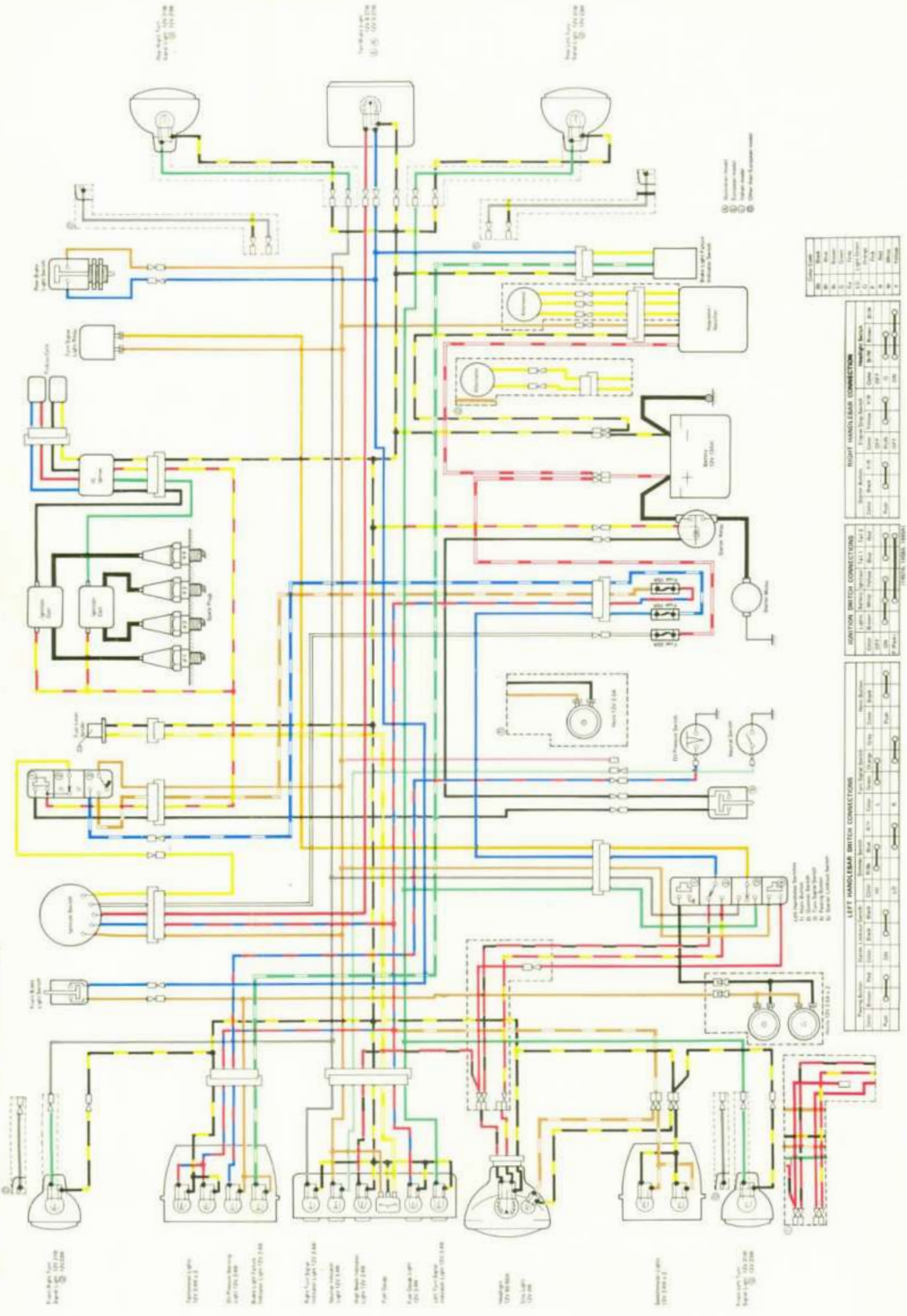
LEFT HANDLEBAR SWITCH CONNECTIONS															
Starter Lockout Switch			Dimmer Switch						Turn Signal Switch				Horn Button		
Color	Black	Black	Color	R/Bk	Bl/Y	R/Y	Blue	R/Bk	Color	Green	Orange	Gray	Color	Black	[illegible]
			HI	○	○	○	○		L	○	○				
Push	○	○											Push	○	○
			LO		○	○	○	○	R		○	○			

IGNITION SWITCH CONNECTIONS					
	Lights	Battery	Ignition	Tail 1	Tail 2
Color	Brown	White	Yellow	Blue	Red
OFF					
ON	○	○	○	○	○
P(Park)		○			○

(1456A)

RIGHT HANDLEBAR SWITCH CONNECTIONS					
Starter Button			Engine Stop Switch		
Color	Black	Y/R	Color	Yellow	Y/R
			OFF		
Push	○	○	RUN	○	○
			OFF		

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



KZ550-D1 Wiring Diagram
(Other than US and Canadian models)

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