Kawasaki

MULE 2510
MULE 2520

Utility Vehicle
Service Manual

Quick Reference Guide

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

Kawasaki

MULE 2510
MULE 2520

MULE 2510: KAF620A

MULE 2520: KAF620B

Utility Vehicle Service Manual

Third Edition (1): Nov. 30, 1999 (K)

PLEASE DO NOT TAMPER WITH NOISE CONTROL SYSTEM
(US Model only)

To minimize the noise emissions from this product, Kawasaki has equipped it with effective intake and exhaust silencing systems. They are designed to give optimum performance while maintaining a low noise level. Please do not remove these systems, or alter them in any which results in an increase in noise level.

LIST OF ABBREVIATIONS

A	ampere(s)	lb	pound(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	rpm	revolution(s) per minute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot, feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

Read OWNER'S MANUAL before operating.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

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

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

To get the longest life out of your vehicle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki vehicle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki vehicles are introduced by the Special Tool Catalog or Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use this Manual

In preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Spark Plug section.

Whenever you see these WARNING and CAUTION symbols, 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.

This manual contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

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

● Indicates a procedural step or work to be done.

○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

Table of Contents

Before Servicing

Before starting to service a vehicle, careful reading of the applicable section is recommended to eliminate unnecessary work. 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) Dirt

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

(2) Battery Ground

Remove the ground (−) lead from the battery before performing any disassembly operations on the vehicle. This prevents:

(a) the possibility of accidentally turning the engine over while partially disassembled.

(b) sparks at electrical connections which will occur when they are disconnected.

(c) damage to electrical parts.

(3) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of turn and then remove them.

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.

(4) Torque

When torque values are given in this Service Manual, use them. 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) 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.

(7) 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.

(8) Gasket, O-Ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(9) 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).

(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) Ball Bearing

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.

(12) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

(13) Seal Guide

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.

(14) 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.

(15) Cotter Pin

Replace any cotter pins that were removed with new ones, as removal deforms and breaks them.

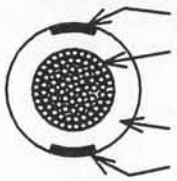
(16) Lubrication

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.

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. This manual makes reference to molybdenum disulfide grease (MoS_2) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(17) Electrical Wires

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

Wire (cross-section)	Name of Wire Color
	Yellow/Red

(18) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(19) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration	Seizure	

(20) Specifications

Specification terms are defined as follows.

"Standards" show dimensions or performances which brand-new parts or systems have.

"Service Limits" indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

KAF620-A1:

KAF620-B1:

General Specifications

Item			KAF620-A1, A2/B1, B2
Dimensions:			
Overall length			2 845 mm
Overall width			1 460 mm
Overall height			(A)1 920 mm, (B)1 900 mm
Wheelbase			1 870 mm
Tread	Front		1 160 mm
	Rear		1 180 mm
Ground clearance			170 mm
Seat height			(A)870 mm, (B)850 mm
Dry weight			(A)537 kg, (B)501 kg
Curb weight:	Front		(A)243 kg, (B)222 kg
	Rear		(A)318 kg, (B)303 kg
Fuel tank capacity			20 L
Cargo bed (L x W x H)			1 175 x 1 310 x 250 mm
Performance:			
Minimum turning radius			3.4 m
Engine:			
Type			4-stroke, OHV, V2-cylinder
Cooling system			Liquid-cooled
Bore and stroke			76.0 x 68.0 mm
Displacement			617 mL
Compression ratio			10.3
Carburetion system			Carburetor, Mikuni BV26-18
Starting system			Electric starter
Ignition system			Battery and transistor
Ignition timing			20° BTDC (constant)
Spark plug			NGK BMR2A
Cylinder numbering method			Front to rear, 1 - 2
Firing order			1 - 2
Valve timing:			
Inlet:	Open:	#1	68° BTDC
		#2	64° BTDC
	Close:	#1	76° ABDC
		#2	80° ABDC
	Duration		324°
Exhaust:	Open		94° BBDC
	Close		48° ATDC
	Duration		322°
Lubrication system			Forced lubrication (wet sump)
Engine oil:			
	Grade		SE, SF or SG class
	Viscosity		SAE10W-40, 10W-50, 20W-40, or 20W-50
	Capacity		1.8 L

Item	KAF620-A1, A2/B1, B2
Drive Train:	
Primary reduction system:	
Type	Belt drive torque converter
Reduction ratio	3.5 ~ 0.98
Transmission gear ratio:	
Forward	(A)1.821 (51/28): High (A)3.750 (51/28 x 25/20 x 28/17): Low (B)1.821 (51/28)
Reverse	(A)2.050 (41/20): High (A)4.220 (41/20 x 25/20 x 28/17): Low (B)2.050 (41/20)
Final drive system:	
Type	(A)2-Speed, Automatic, Reverse Gear drive (4WD/2WD) (B)1-Speed, Automatic, Reverse Gear drive (2WD)
Reduction ratio	5.4 (81/15)
Overall drive ratio:	
Foward	(A)9.639: High, (A)19.845: Low, (B)9.639
Reverse	(A)10.848: High, (A)22.335: Low, (B)10.848
Transmission oil:	
Type	API "GL-5" Hypoid gear oil SAE90: above 5°C (41°F) SAE80: below 5°C (41°F)
Capacity	(A)2.5 L, (B)2.2 L
Front final gear case oil (KAF620A):	
Type	API "GL-5" Hypoid gear oil for LSD SAE140 or SAE85W-140
Capacity	0.4 L
Frame:	
Type	Steel tube, Ladder
Caster (rake angle)	7.5°
Camber	0.8°
Trail	35 mm
Tire: Front and rear	(A)22 x 11.00-10, Tubeless (B)20 x 10.00-10, Tubeless
Steering type	Rack and pinion
Suspension:	
Front Type	MacPherson strut
Weel travel	100 mm
Rear Type	De Dion axle
Weel travel	70 mm
Brake type: Front and rear	Drum (Hydraulic)
Parking brake type	Drum (Mechanical internal expansion)
Electrical Equipment:	
Battery	12 V 19 Ah
Headlight:	
Type	Sealed beam
Bulb	12 V 35 W x 2
Tail/brake light	12 V 5/21 W
Alternator:	
Type	Single-phase AC
Rated output	14.7 A @4000 r/min (rpm), 14V
Load Capacity:	
Maximum vehicle load (including occupants and cargo)	603 kg
Maximum cargo bed load	364 kg

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

Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the vehicle in good running condition. **The first service is vitally important and must not be neglected.**

FREQUENCY / OPERATION	Whichever comes first → / ↓ Every	First Service	Regular Service	
		After 50 h, or 1 000 km of use	Every 250 h, or 5 000 km of use	Every 500 h, or 10 000 km of use
ENGINE				
Converter belt--check*			●	
Converter driven pulley shoe--check*				●
Spark plug--clean and gap			●	
Air cleaner element--clean*		●	●	
Valve clearance--check		●		●
Engine oil--change*	1 year	●		●
Oil filter--replace*		●		●
Throttle pedal play--check		●		●
Idle speed--adjust		●	●	
Fuel system cleanliness--check*				●
Spark arrester--clean			●	
Radiator--clean*		●	●	
Radiator hoses and connections--check*	1 year	●		●
Coolant--change	2 years			
Fuel hose--replace	4 years			

● = Clean, adjust, lubricate, torque, or replace parts as necessary
* = Service more frequently when operated in mud, dust, or other harsh riding conditions.

FREQUENCY / OPERATION	Whichever comes first → / Every ↓	First Service	Regular Service	
		After 50 h, or 1 000 km of use	Every 250 h, or 5 000 km of use	Every 500 h, or 10 000 km of use
CHASSIS				
Steering--check		●	●	
Steering joint dust boots--check		●	●	
Brake pedal play--check*		●	●	
Parking brake lever--check		●	●	
Brake hose and pipe--check		●	●	
Brake fluid level--check		●	●	
Brake wear--check*			●	
Tire wear--check*		●	●	
Battery--check			●	
Brake light switch--check		●	●	
Seat belt--check			●	
General lubrication--perform*			●	
Bolts, nuts, and fasteners tightness--check		●	●	
Wheel nuts tightness--check		●	●	
Front final gear case oil (KAF620A) and transmission oil--change*	1 year	●		●
Brake fluid--change	2 years			
Brake master cylinder cup and dust seal--replace	2 years			
Brake wheel cylinder assembly--replace	2 years			
Brake hose--replace	4 years			

● = Clean, adjust, lubricate, torque, or replace parts as necessary
* = Service more frequently when operated in mud, dust, or other harsh riding conditions.

Torgue and Locking Agent

The following tables list the tightening torque for the major fasteners, and the parts requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the "Remarks" column mean:

L : Apply a non-permanent locking agent to the threads.
O : Apply an oil to the threads, seated surface, or washer.
S : Tighten the fasteners following the specified sequence.
SS : Apply a silicone sealant to the threads.

Fastener	Torque			Rematks
	N-m	kg-m	ft-lb	
Fuel System:				
Carburetor mounting bolts	15	1.5	11.0	
Carburetor throtte valve mounting screws	-	-	-	L
Carburetor choke valve mounting screws	-	-	-	L
Carburetor float bowl mounting bolt	7.8	0.80	69 in-lb	
Carburetor holder mounting bolts	-	-	-	L
Governor arm clamp nut	7.4	0.75	65 in-lb	
Cooling System:				
Radiator fan switch	25	2.5	18.0	
Coolant temperature switch	-	-	-	SS
Water pump cover bolts (M6)	8.8	0.90	78 in-lb	
Water pump cover bolts (M8)	22	2.2	16	
Engine Top End:				
Cylinder head bolts	22	2.2	16.0	S
Valve adjusting screw locknuts	9.8	1.0	87 in-lb	
Muffer mounting bolts	-	-	-	L
Converter System:				
Converter cover bolts	1.5	0.15	13 in-lb	
Drive pulley bolt	93	9.5	69	
Driven pulley bolt	93	9.5	69	L
Drive pulley cover bolts	13	1.3	113 in-lb	
Ramp weight shaft stop bolts	13	1.3	113 in-lb	
Ramp weight roller shaft stop bolts	13	1.3	113 in-lb	
Driven pulley coupling bolts	13	1.3	113 in-lb	
Engine Lubrication System:				
Engine oil drain plug: 14 mm dia.	22	2.2	16.0	
16 mm dia.	25	2.5	18.0	
Oil pressure switch	-	-	-	SS
Engine Bottom End:				
Crankcase cover bolts	22	2.2	16.0	
Connecting rod big end cap bolts	21	2.1	15.0	
Transmission:				
Transmission case mounting nuts	44	4.5	33	
Transmission oil drain plug	15	1.5	11.0	
Transmission case bolts	8.8	0.90	78 in-lb	
Neutral switch	15	1.5	11.0	
Transmission shift arm positioning bolt	37	3.8	27	
Differential shift shaft stop bolt	7.8	0.80	69 in-lb	

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
2WD/4WD shift shaft stop bolt (KAF620A)	7.8	0.80	69 in-lb	
Differential gear housing bolts	29	3.0	22	L
Hi/low gear case bolts (KAF620A)	20	2.0	14.5	
Drive bevel gear shaft bearing holder (KAF620A)	120	12.0	87	O
Wheels/Tires:				
Wheel nuts	98	10.0	72	
Final Drive:				
Front final gear case (KAF620A):				
Mounting nuts	44	4.5	33	
Bracket bolts	44	4.5	33	L
Oil filler cap	29	3.0	22	
Oil drain plug	20	2.0	14.5	
Drive shaft cap bolts	8.8	0.90	78 in-lb	
Ring gear cover bolts: 10 mm dia.	47	4.8	35	
8 mm dia.	25	2.5	18.0	
Ring gear bolts	49	5.0	36	
Differential case torx bolts	32	3.3	24	L
Pinion gear slotted nut	120	12.0	87	O
Pinion gear bearing housing nuts	25	2.5	18.0	
Bevel gear assembly mounting bolts (KAF620A)	22	2.2	16.0	
Drive bevel gear mounting nut (KAF620A)	120	12.0	87	O
Driven bevel gear retaining nut (KAF620A)	110	11.0	80	L
Driven bevel gear shaft assembly bearing holder (KAF620A)	120	12.0	87	L
Driven bevel gear shaft assembly housing locknut (KAF620A)	120	12.0	87	L
Driven bevel gear shaft assembly holder nuts (KAF620A)	25	2.5	18.0	
Brakes:				
Master cylinder reservoir clamp bolt	5.9	0.60	52 in-lb	
Master cylinder piston stop bolt	8.8	0.90	78 in-lb	
Master cylinder push rod locknut	18	1.8	13.0	
Brake hose banjo bolts	25	2.5	18.0	
Brake pipe nipples	18	1.8	13.0	
Axle nuts	195	20.0	145	
Brake panel mounting bolts	44	4.5	33	
Wheel cylinder mounting bolts and nuts	7.8	0.80	69 in-lb	
Bleed valves	5.9	0.60	52 in-lb	

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Suspension:				
Strut (Front shock absorber):				
Upper mounting nuts	44	4.5	33	
Lower clamp nuts	98	10.0	72	
Front suspension arm pivot bolts	98	10.0	72	
Front suspension arm joint nuts	78	8.0	58	
Rear shock absorber mounting nuts	44	4.5	33	
Leaf spring mounting nuts: Front	98	10.0	72	
Rear	59	6.0	43	
Damper bracket mounting nuts	44	4.5	33	
Steering:				
Steering wheel mounting nut	52	5.3	38	
Intermediate shaft clamp bolts	20	2.0	14.5	
Steering gear assembly bracket bolts	52	5.3	38	
Steering gear tie-rod end locknuts	49	5.0	36	
Steering gear tie-rod end nuts	34	3.5	25	
Steering gear rack guide spring cap locknut	39	4.0	29	
Frame:				
Seat belt mounting bolts	34	3.5	25	
Front bar mounting bolts:				
Lower	145	15.0	110	
Upper	44	4.5	33	
Rear bar mounting bolts and nuts	44	4.5	33	
Rear end sub-frame mounting nuts	44	4.5	33	
Electrical System:				
Spark plugs	17	1.7	12.0	
Alternator rotor nut	120	12.0	87	
Alternator stator mounting screws	–	–	–	L
Starter motor lead terminal nut	8.8	0.90	78 in-lb	

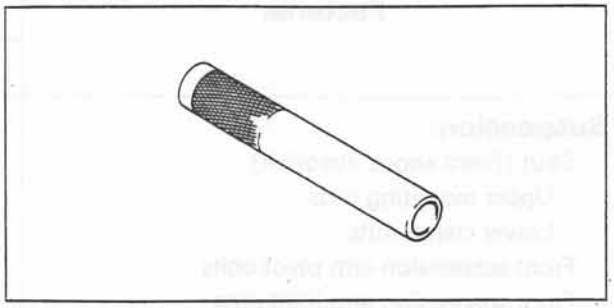
The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

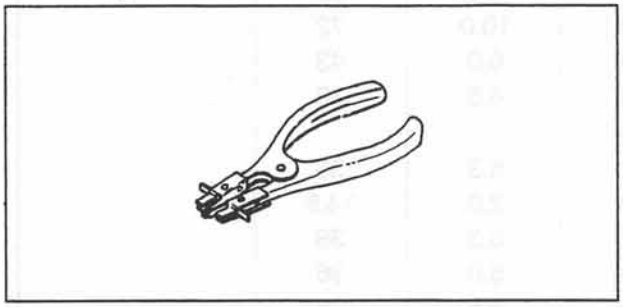
Threads dia. (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in-lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in-lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25.0
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Special Tools, Sealant

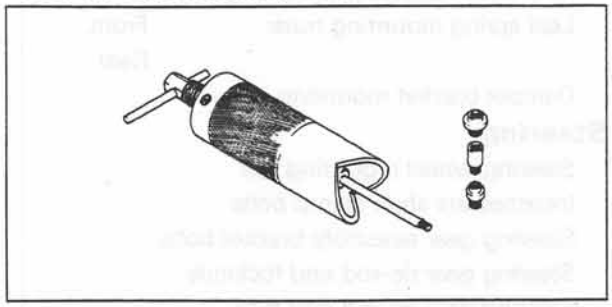
Bearing Driver: 57001-382



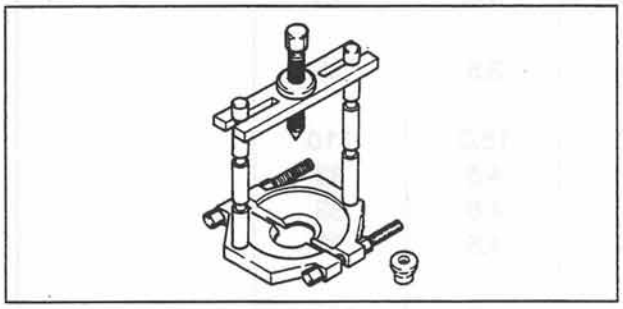
Piston Ring Pliers: 57001-115



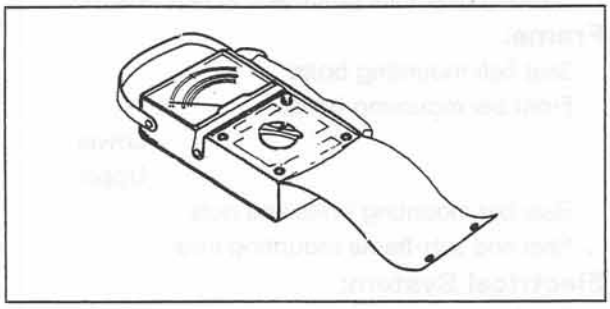
Piston Pin Puller Assembly: 57001-910



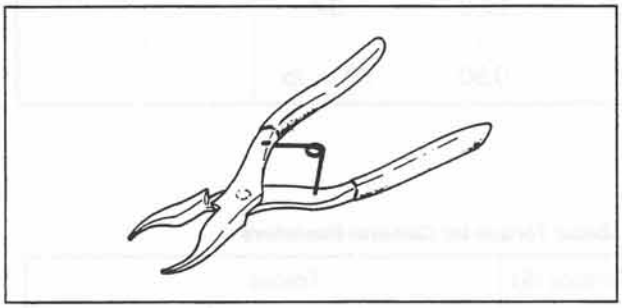
Bearing Puller: 57001-135



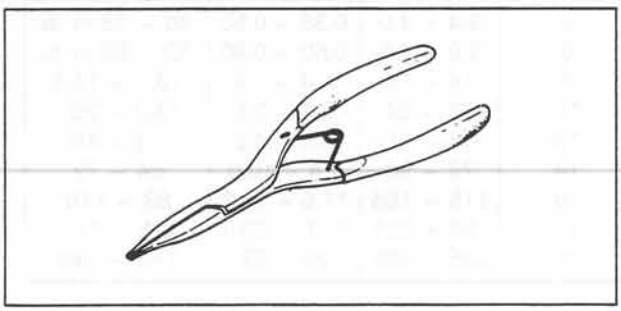
Hand Tester: 57001-1394



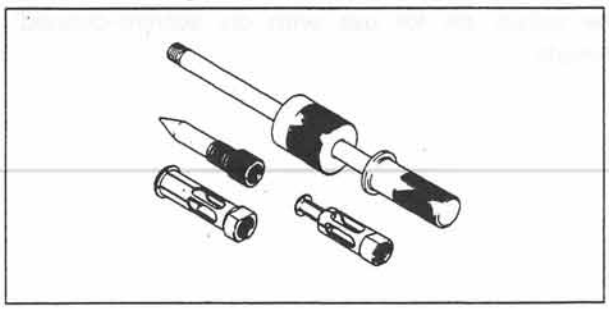
Inside Circlip Pliers: 57001-143



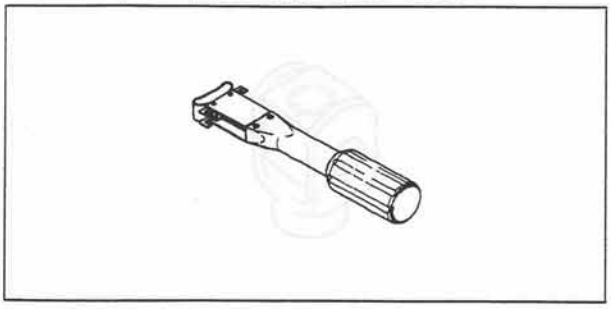
Outside Circlip Pliers: 57001-144



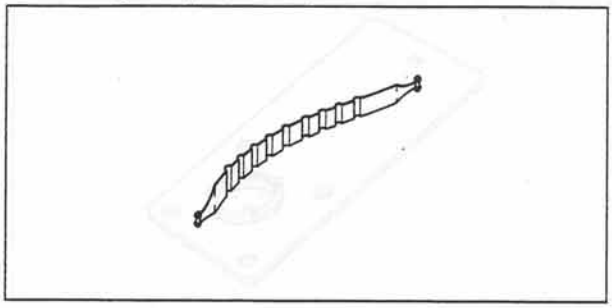
Oil Seal & Bearing Remover: 57001-1058



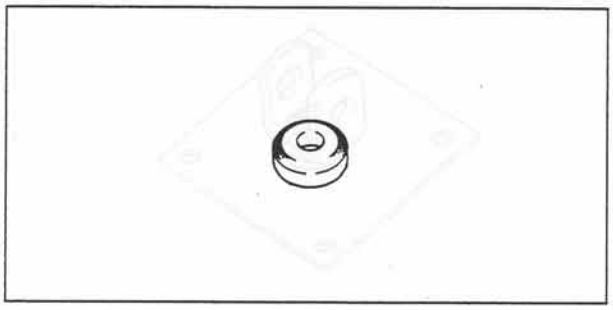
Piston Ring Compressor Grip: 57001-1095



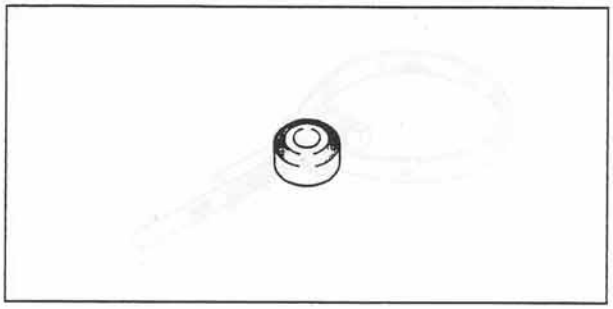
Piston Ring Compressor Belt, Φ67 ~ Φ79: 57001-1097



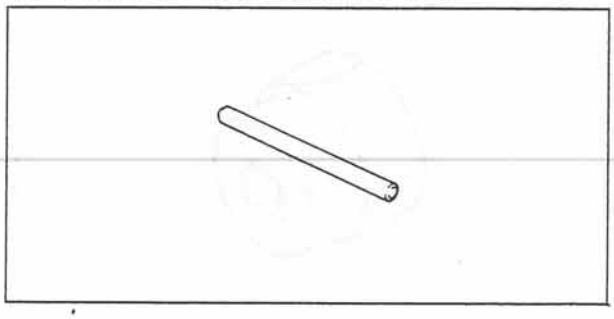
Valve Seat Cutter, 45° – Φ35: 57001-1116



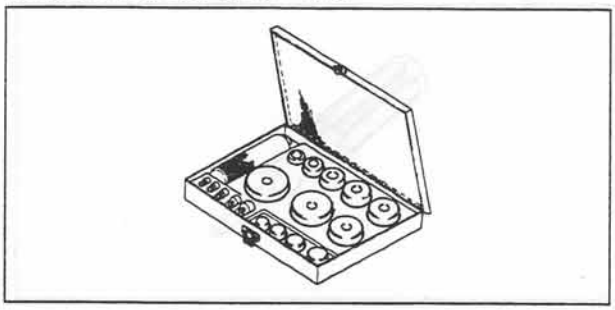
Valve Seat Cutter, 32° – Φ30: 57001-1120



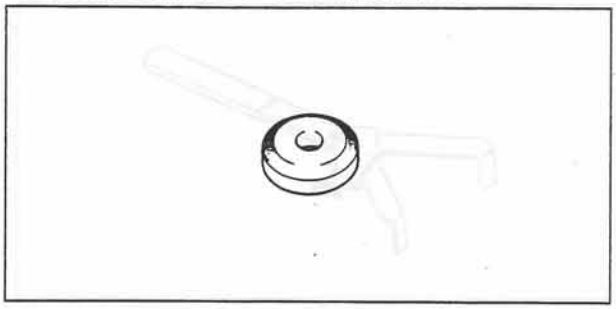
Valve Seat Cutter Holder Bar: 57001-1128



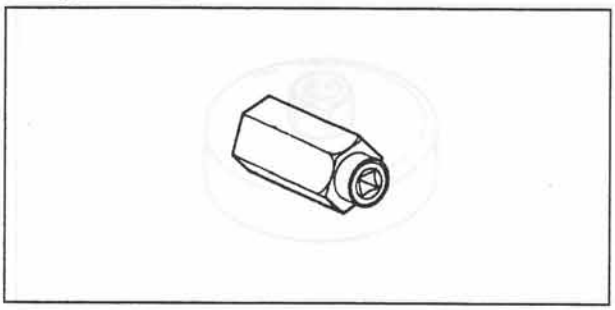
Bearing Driver Set: 57001-1129



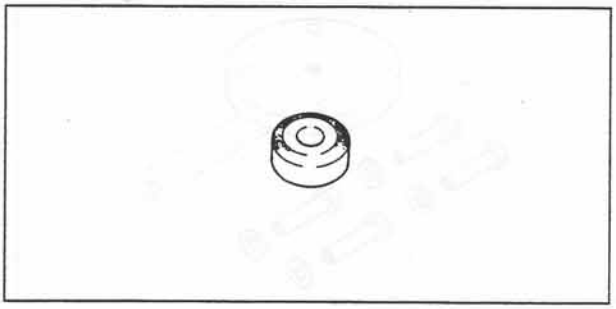
Valve Seat Cutter, 45° – Φ30: 57001-1187



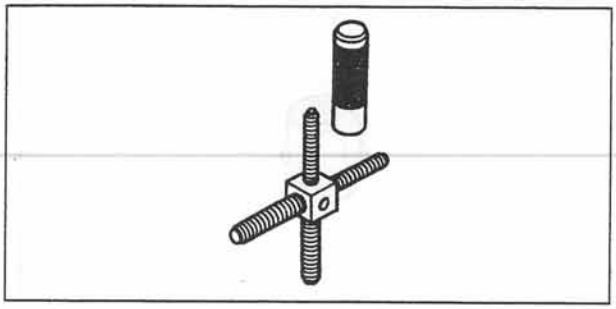
Hexagon Wrench, Hex 32: 57001-1194



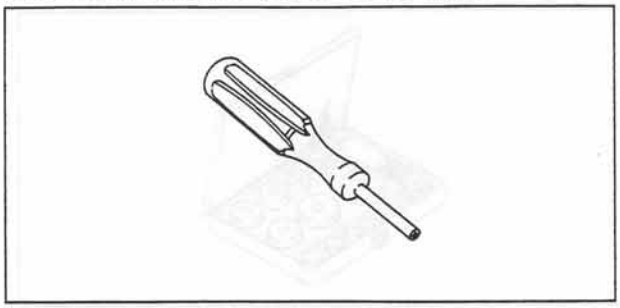
Valve Seat Cutter, 32° – Φ33: 57001-1199



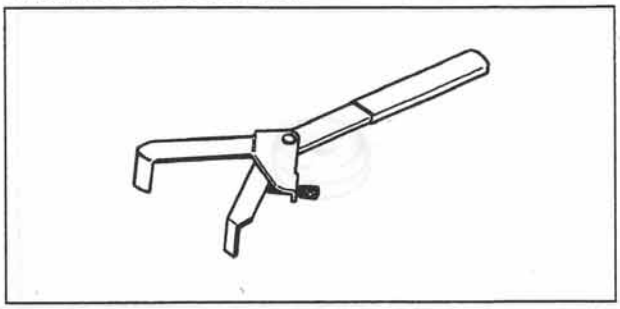
Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216



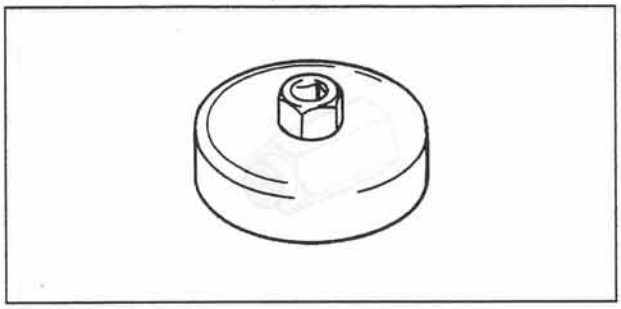
Valve Adjusting Screw Holder: 57001-1217



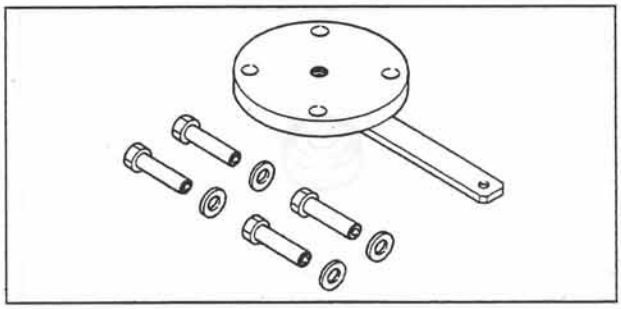
Clutch Holder: 57001-1243



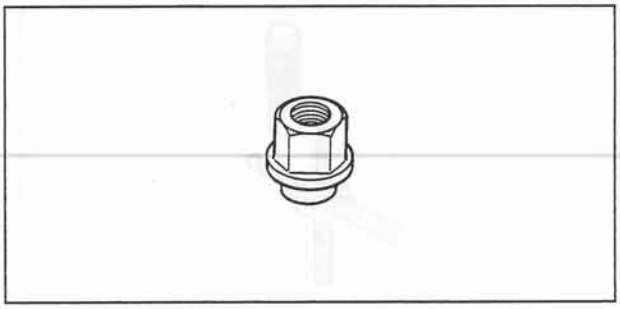
Oil Filter Wrench: 57001-1249



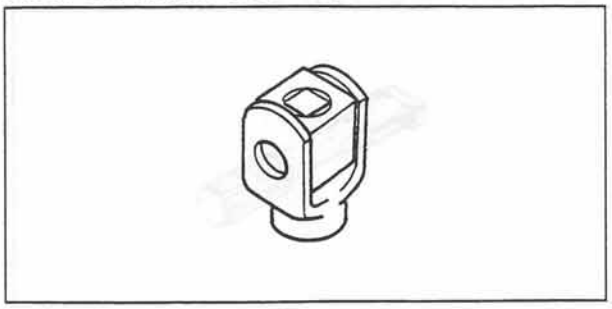
Brake Drum Remover: 57001-1260



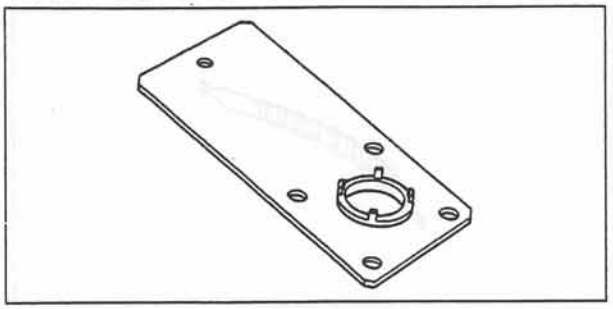
Brake Drum Pusher: 57001-1261



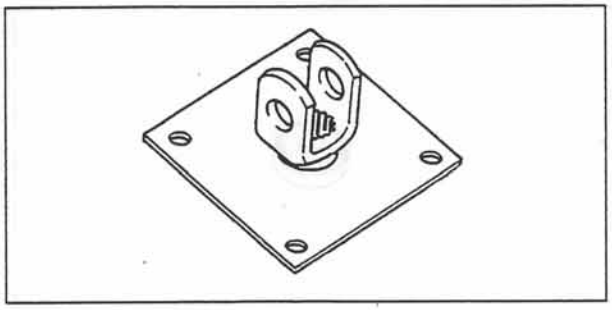
Pinion Gear Holder: 57001-1281



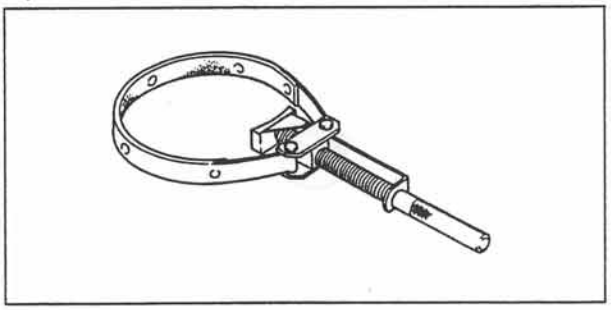
Socket Wrench: 57001-1283



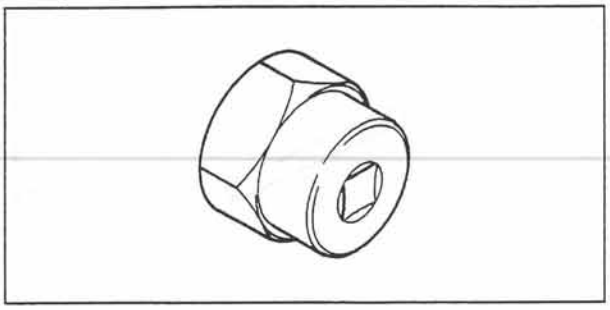
Pinion Gear Holder: 57001-1285



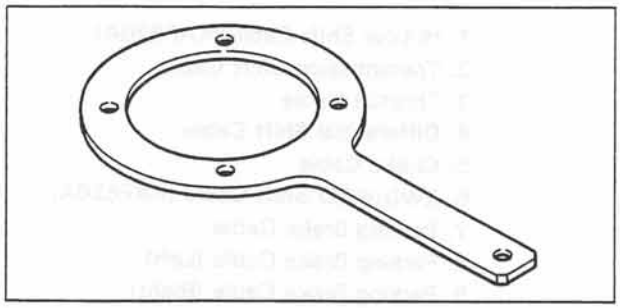
Flywheel Holder: 57001-1313



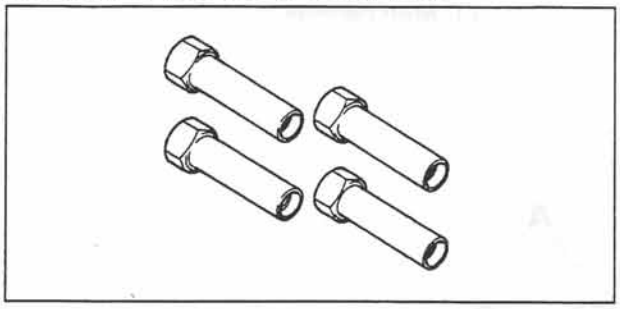
Hexagon Wrench, Hex 40: 57001-1324



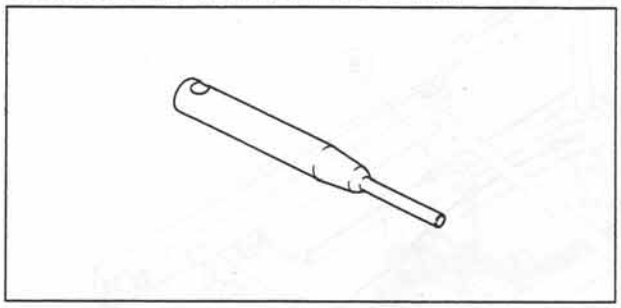
Brake Drum Holder: 57001-1325



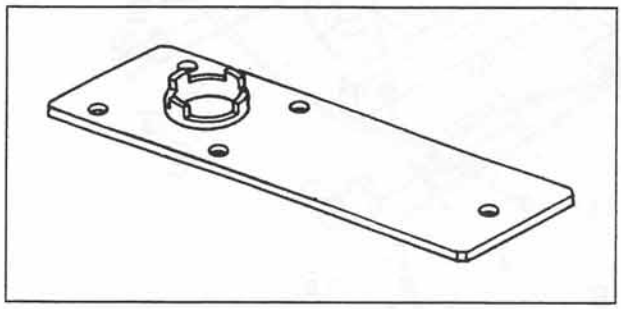
Brake Drum Remover Nuts: 57001-1326



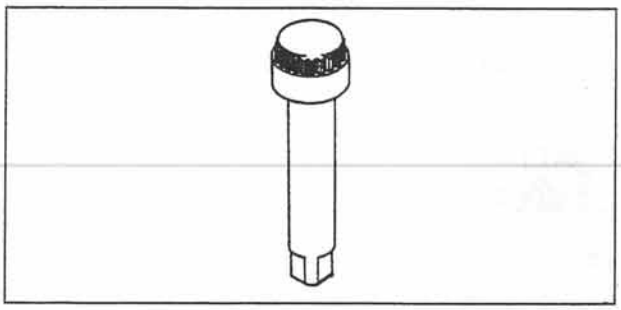
Valve Seat Cutter Holder, Φ6: 57001-1360



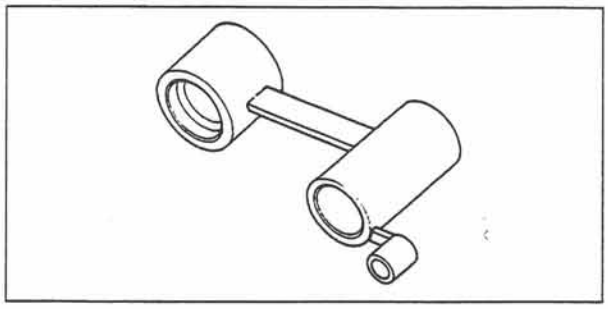
Socket Wrench: 57001-1363



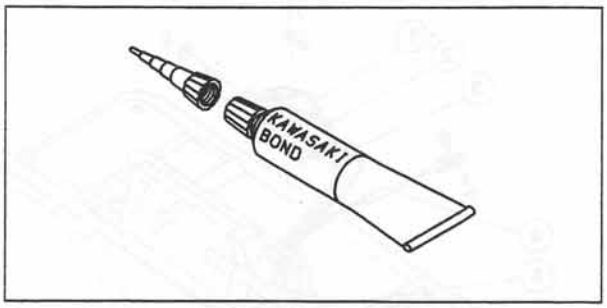
Transmission Gear Holder: 57001-1364



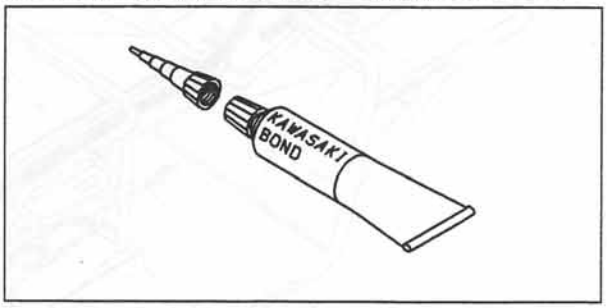
Assembly Jig: 57001-1365



Kawasaki Bond (Silicone Sealant): 56019-120



Kawasaki Bond (Liquid Gasket – Silver): 92104-002



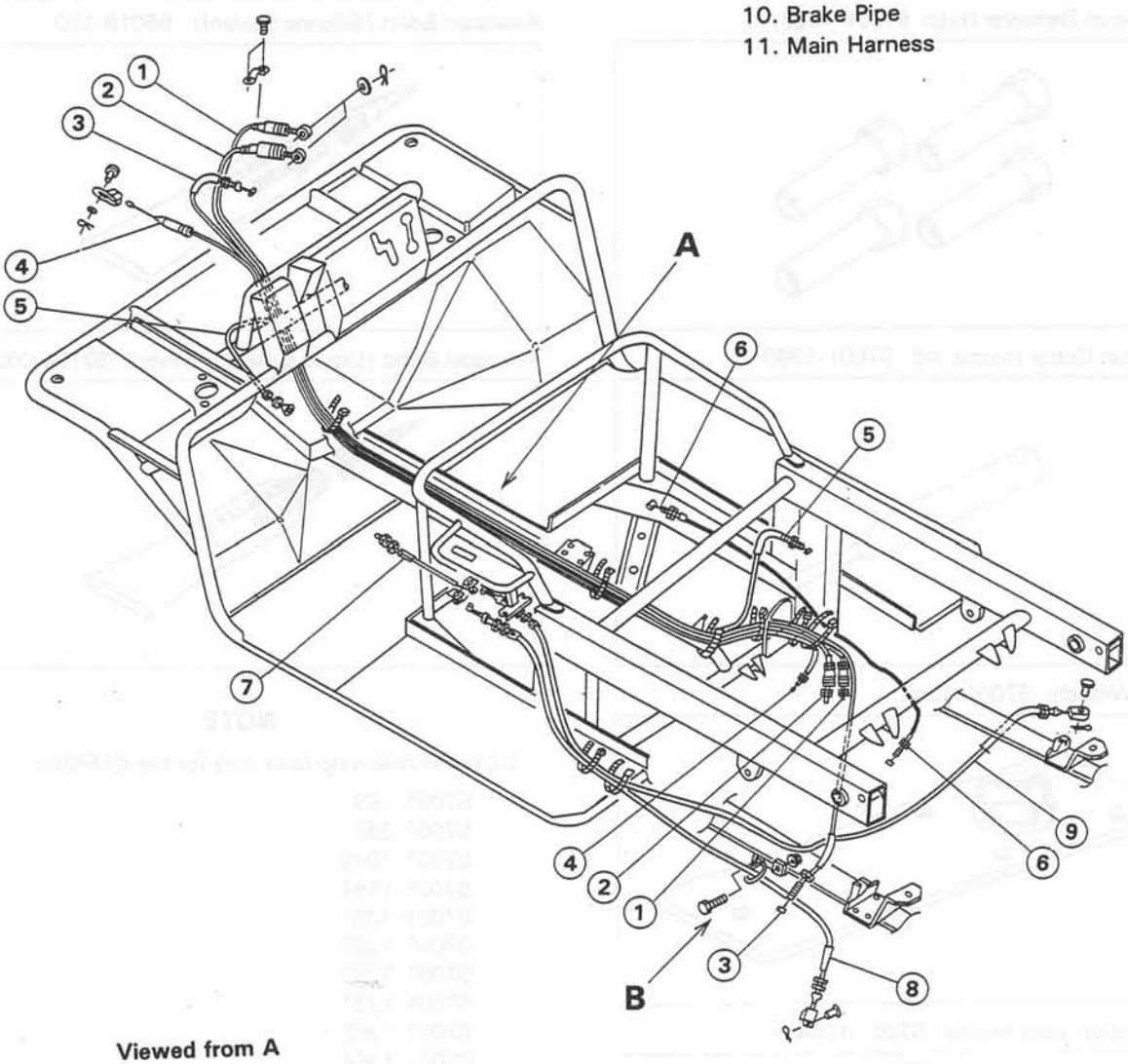
NOTE

○ *Use the following tools only for the KAF620A.*

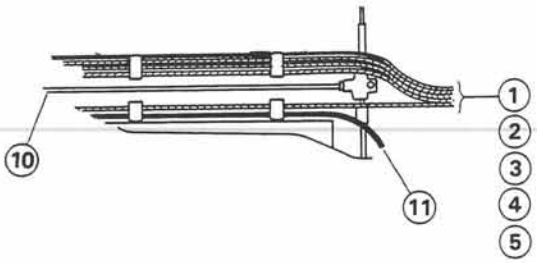
57001-135
57001-382
57001-1049
57001-1194
57001-1281
57001-1283
57001-1285
57001-1324
57001-1363
57001-1364

Cable, Wire, Hose, and Pipe Routing

1. Hi/Low Shift Cable (KAF620A)
2. Transmission Shift Cable
3. Throttle Cable
4. Differential Shift Cable
5. Choke Cable
6. 2WD/4WD Shift Cable (KAF620A)
7. Parking Brake Cable
8. Parking Brake Cable (Left)
9. Parking Brake Cable (Right)
10. Brake Pipe
11. Main Harness

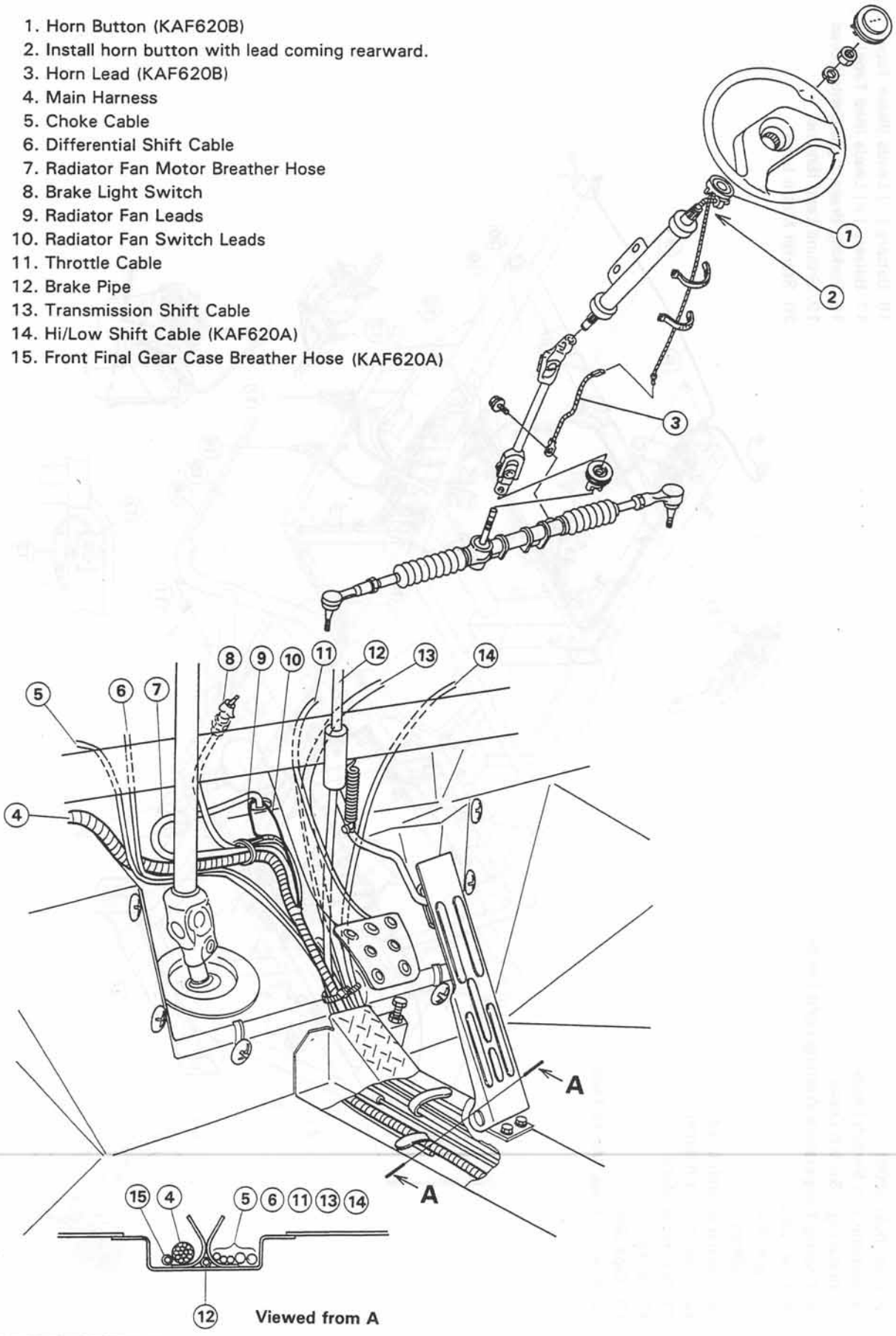


Viewed from A

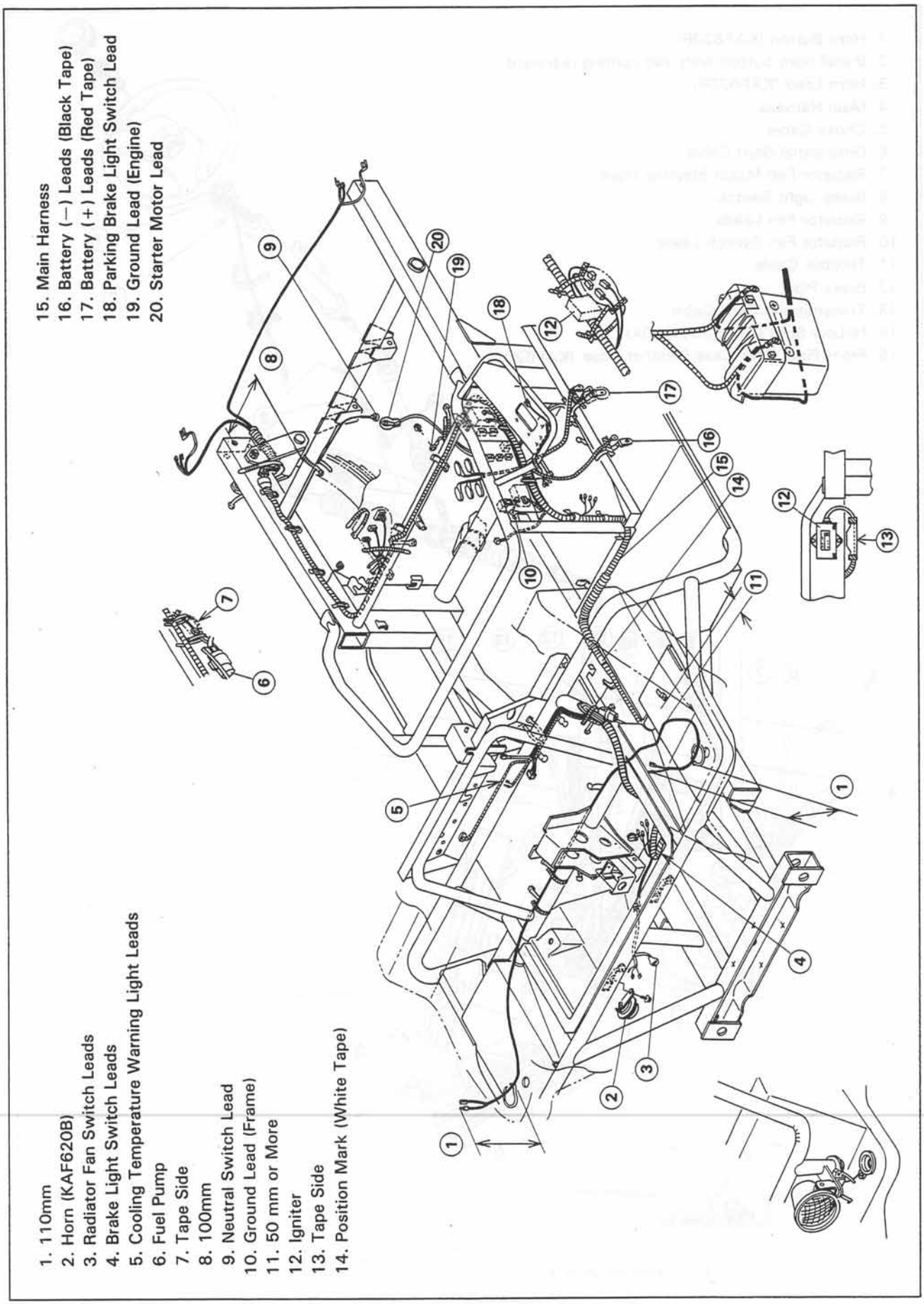


Viewed from B

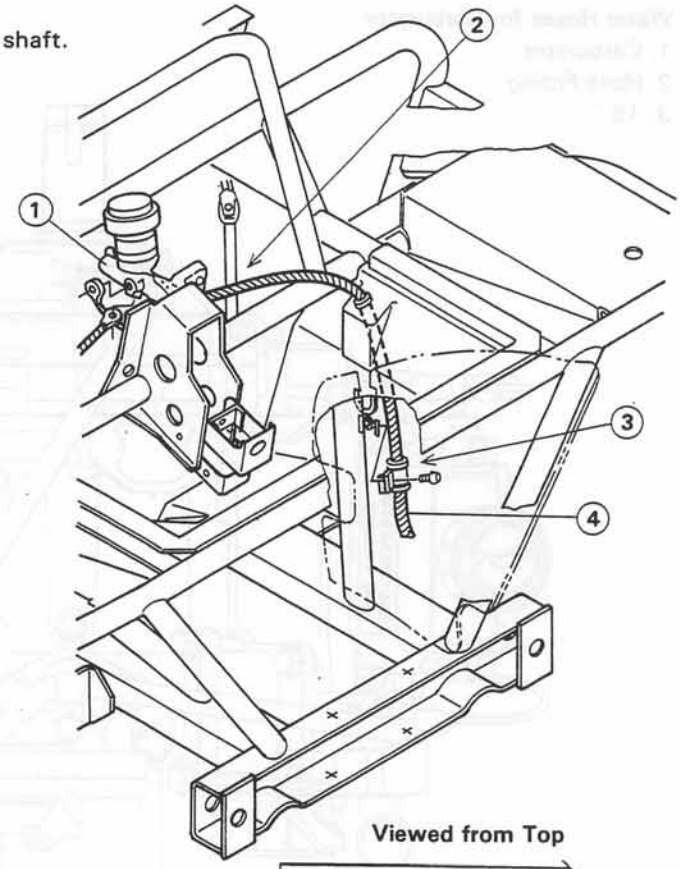
1. Horn Button (KAF620B)
2. Install horn button with lead coming rearward.
3. Horn Lead (KAF620B)
4. Main Harness
5. Choke Cable
6. Differential Shift Cable
7. Radiator Fan Motor Breather Hose
8. Brake Light Switch
9. Radiator Fan Leads
10. Radiator Fan Switch Leads
11. Throttle Cable
12. Brake Pipe
13. Transmission Shift Cable
14. Hi/Low Shift Cable (KAF620A)
15. Front Final Gear Case Breather Hose (KAF620A)

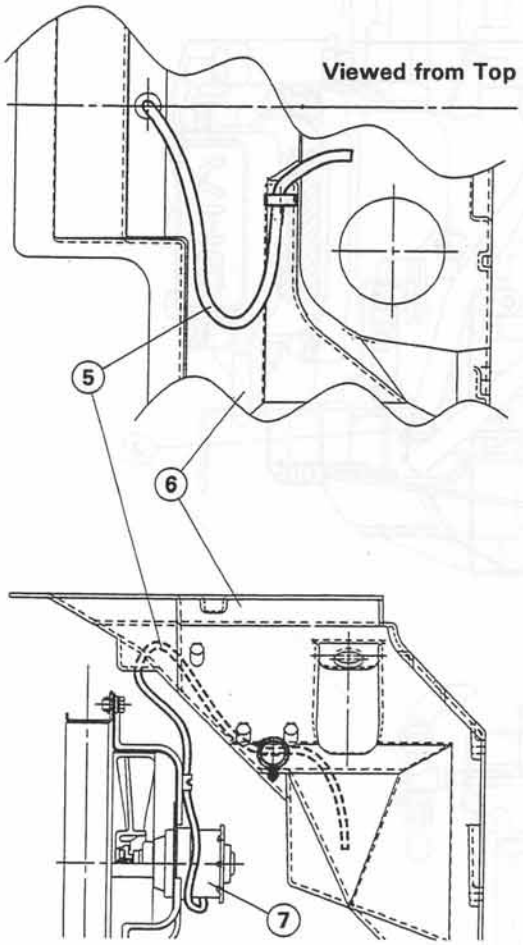


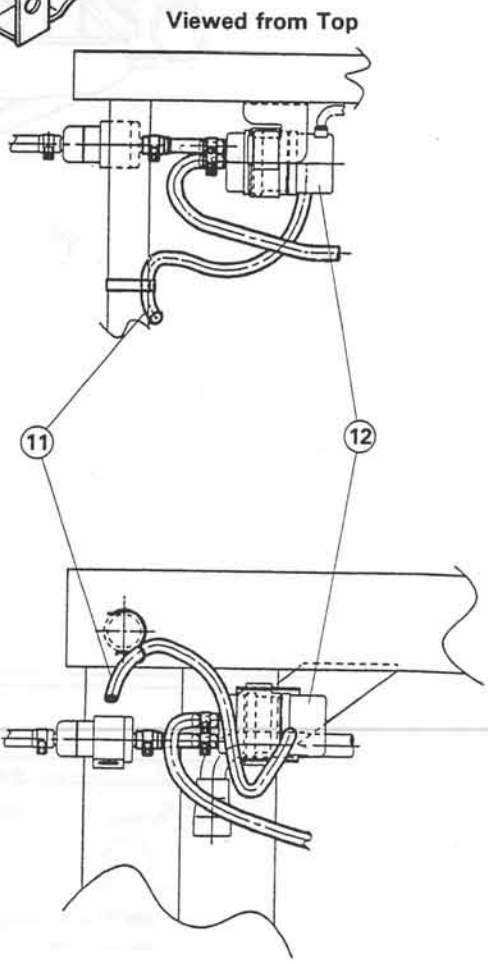
Viewed from A

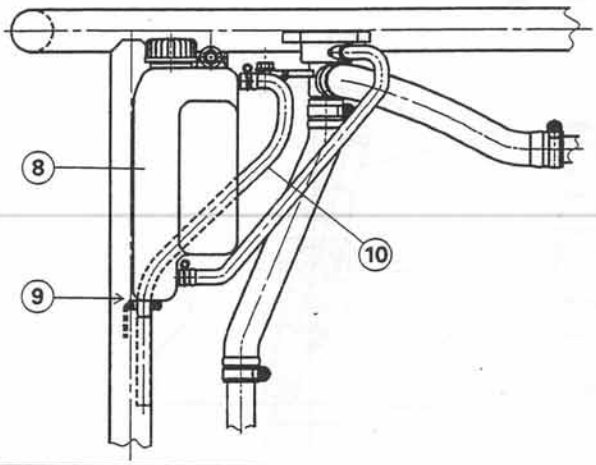

1. 110mm
2. Horn (KAF620B)
3. Radiator Fan Switch Leads
4. Brake Light Switch Leads
5. Cooling Temperature Warning Light Leads
6. Fuel Pump
7. Tape Side
8. 100mm
9. Neutral Switch Lead
10. Ground Lead (Frame)
11. 50 mm or More
12. Igniter
13. Tape Side
14. Position Mark (White Tape)
15. Main Harness
16. Battery (−) Leads (Black Tape)
17. Battery (+) Leads (Red Tape)
18. Parking Brake Light Switch Lead
19. Ground Lead (Engine)
20. Starter Motor Lead

1. Brake Master Cylinder
2. Keep hose away from steering intermediate shaft.
3. Install clamp in this direction.
4. Brake Hose (Left)
5. Rediator Fan Motor Breather Hose
6. Front Fender Lower
7. Radiator Fan Motor
8. Reservoir Tank
9. Run overflow hose through bracket hole.
10. Reservoir Tank Overflow Hose
11. Fuel Pump Breather Hose
12. Fuel Pump



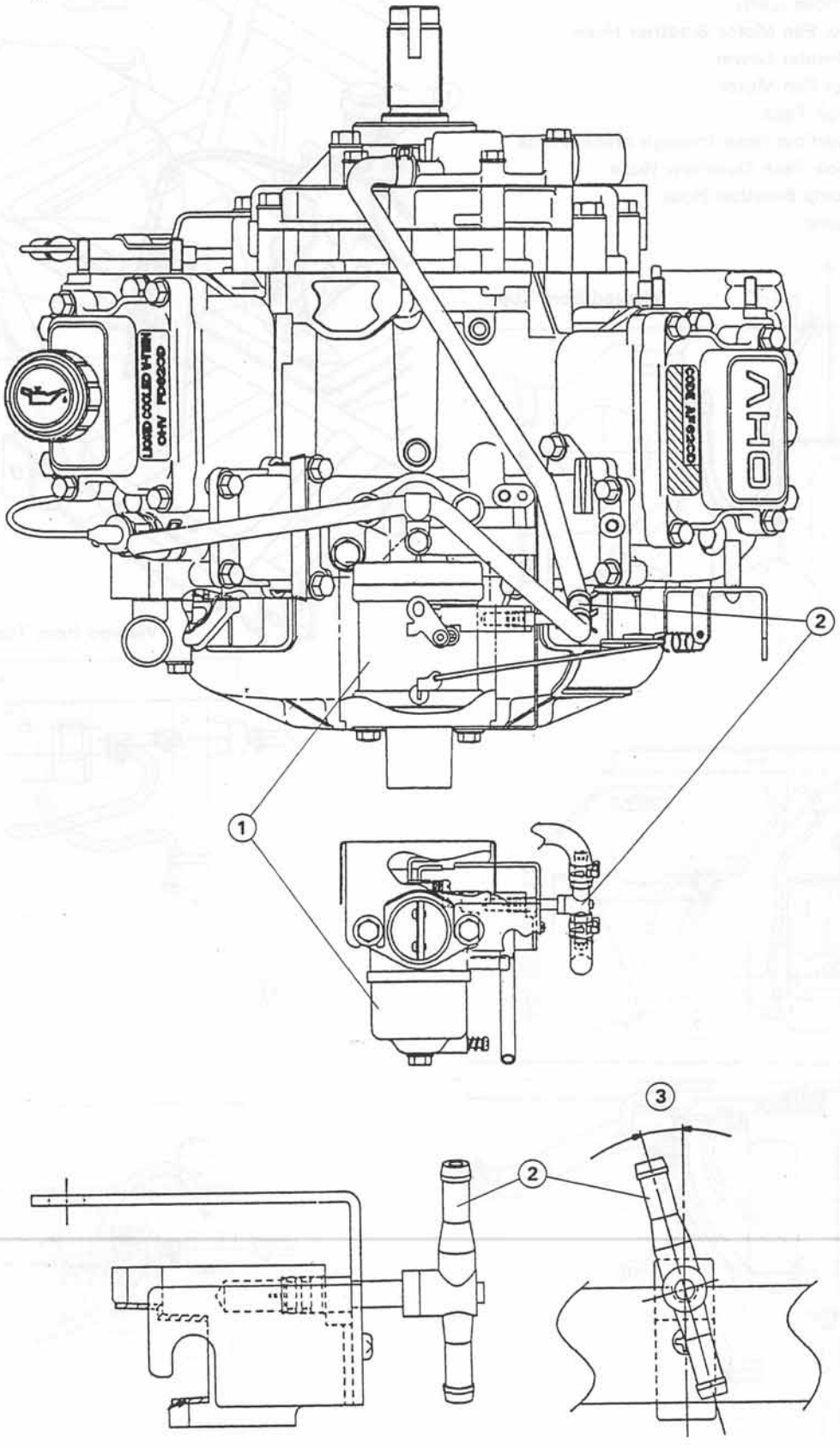






Water Hoses for Carburetor

1. Carburetor
2. Hose Fitting
3. 15 °



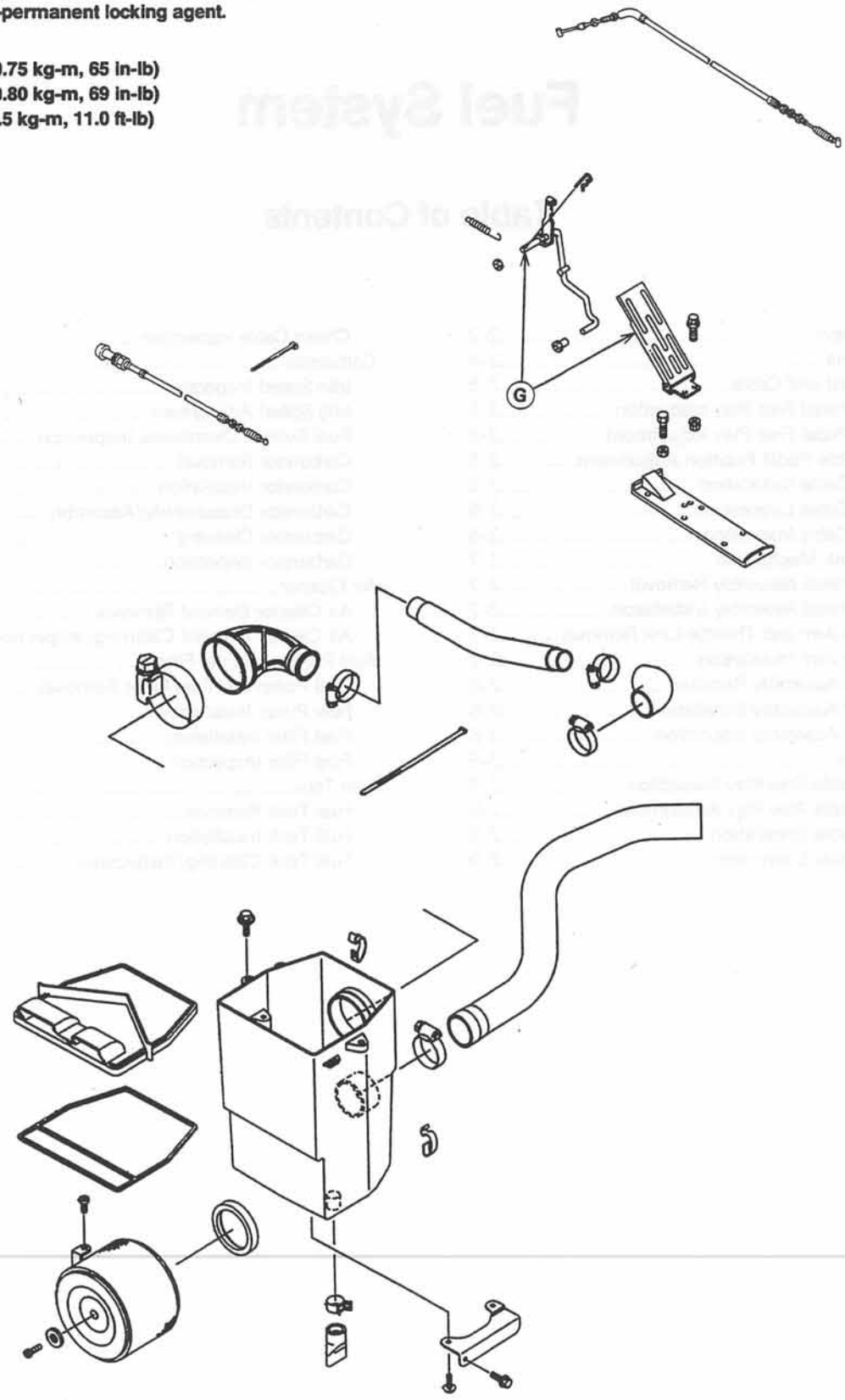
Fuel System

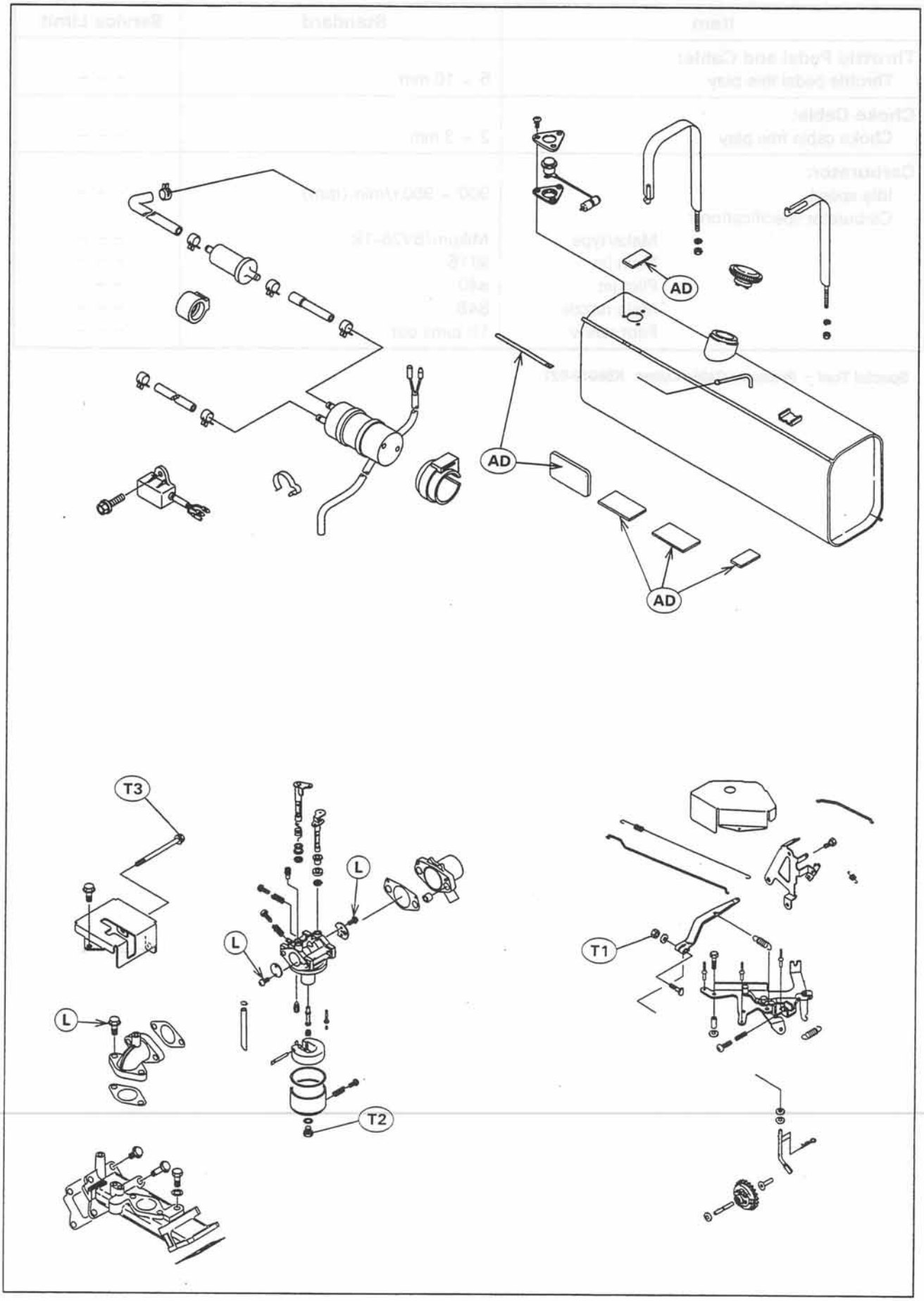
Table of Contents

Exploded View

AD : Apply adhesive agent.
G : Apply grease.
L : Apply non-permanent locking agent.

T1 : 7.4 N-m (0.75 kg-m, 65 in-lb)
T2 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T3 : 15 N-m (1.5 kg-m, 11.0 ft-lb)




AD
AD
AD
T3
L
L
L
T2
T1

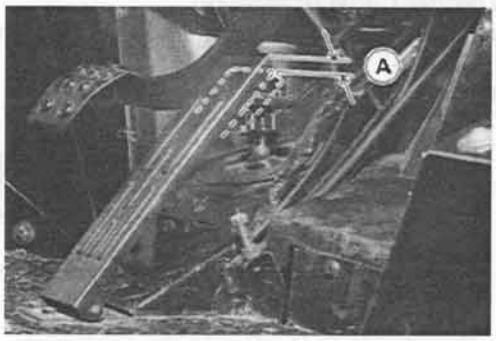
Specifications

Item		Standard	Service Limit
Throttle Pedal and Cable:			
Throttle pedal free play		5 ~ 10 mm	– – –
Choke Cable:			
Choke cable free play		2 ~ 3 mm	– – –
Carburetor:			
Idle speed		900 ~ 950 r/min (rpm)	– – –
Carburetor specifications:			
	Make/type	Mikuni/BV26-18	– – –
	Main jet	#115	– – –
	Pilot jet	#40	– – –
	Main nozzle	84B	– – –
	Pilot screw	1½ turns out	– – –

Special Tool – Pressure Cable Luber: K56019-021

Throttle Pedal and Cable

Throttle Pedal Free Play Inspection

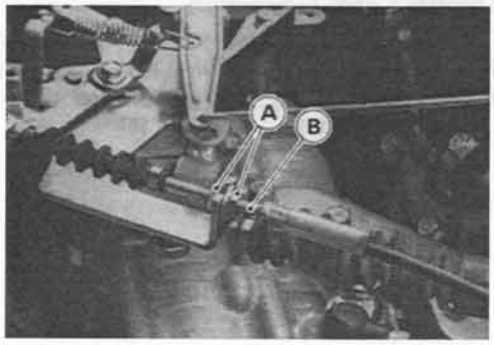


- Check the throttle pedal free play [A].

★If the free play is incorrect, adjust the throttle cable.

Throttle Pedal Free Play
Standard: 5 ~ 10 mm

Throttle Pedal Free Play Adjustment



- Remove:
  Cargo Bed (tilt up)
- Loosen the adjuster mounting nuts [A] at the cable lower end.
- Slide the adjuster [B] until the proper amount of throttle pedal free play is obtained.
- Tighten the mounting nuts securely.
- Start the engine.
- With the transmission in neutral, operate the throttle pedal a few times to make sure that the idle speed does not change.

★If the idle speed does change, the throttle cable may be improperly adjusted, incorrectly routed, or it may be damaged.

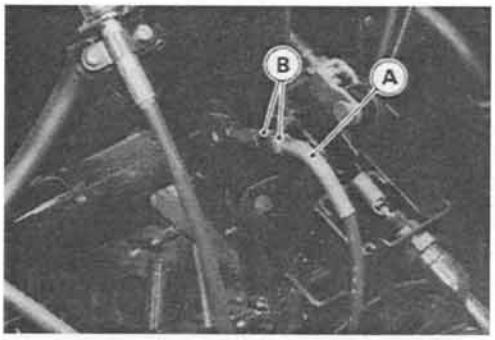
- Correct any of these conditions before operation.

⚠WARNING

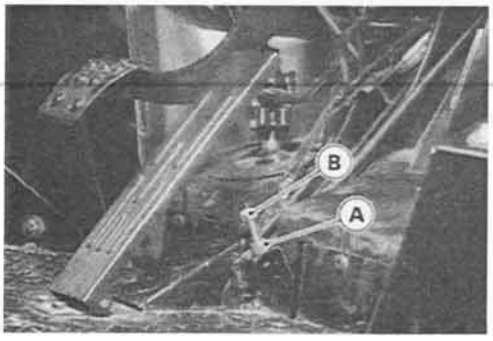
Operation with improperly adjusted, incorrectly routed, or a damaged cable could result in an unsafe operating condition.

NOTE

○*If the throttle pedal free play cannot be adjusted by using the adjuster at the cable lower end, use the adjuster [A] at the cable upper end. Do not forget to securely tighten the adjuster mounting nuts [B].*



Full Throttle Pedal Position Adjustment



- Loosen the locknut [A].
- Screw in the throttle pedal stop bolt [B].
- Depress the throttle pedal until the throttle lever on the carburetor is in the fully opened position, and keep its position.
- Turn the throttle pedal stop bolt until the bolt head lightly touches the bottom of the throttle pedal.
- Tighten the locknut securely.

Throttle Cable Installation

- Route the throttle cable correctly (see the General Information chapter).
- Adjust:
  Throttle Pedal Free Play Adjustment

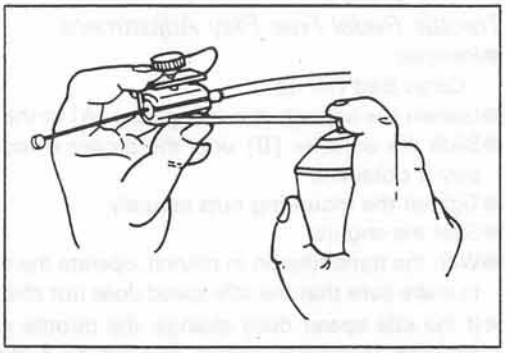
⚠WARNING

Operation with incorrectly routed or improperly adjusted cable could result in an unsafe operating condition.

Throttle Cable Lubrication

Whenever the throttle cable is removed, lubricate the cable as follows.

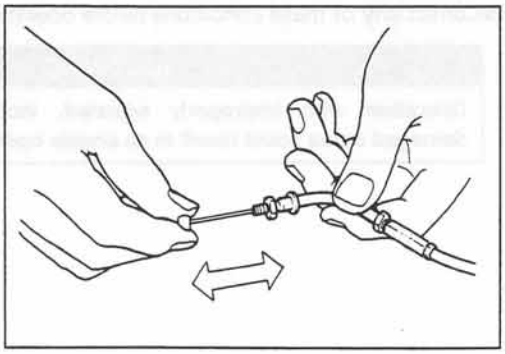
- Apply a thin coating of grease to the cable upper and lower ends.
- Lubricate the cable with a penetrating rust inhibitor through the pressure cable luber.



Throttle Cable Inspection

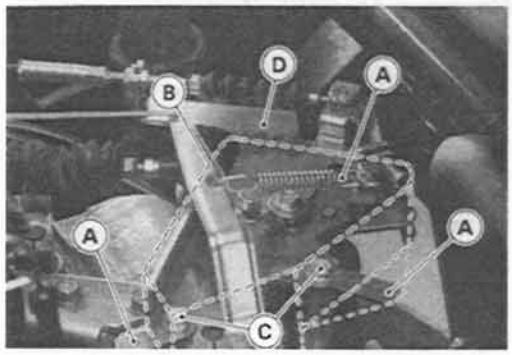
- With the throttle cable disconnected at both ends, the cable should move freely within the cable housing.

★If the cable does not move freely after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.



Governor Link Mechanism

Control Panel Assembly Removal

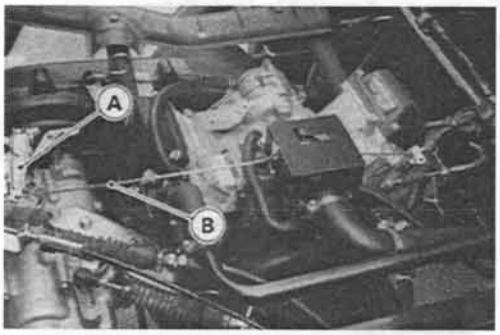


- ●Remove:
  Cargo Bed
- ●Drill out the pop rivets [A] holding the control panel assembly shroud [B] with a drill bit of the 5 mm diameter.
- ○Drill only until the rivet head comes off. Do not drill through the hole.
- ●Remove:
  Control Panel Assembly Mounting Bolts [C] and Collars
  Control Panel Assembly [D]

Control Panel Assembly Installation

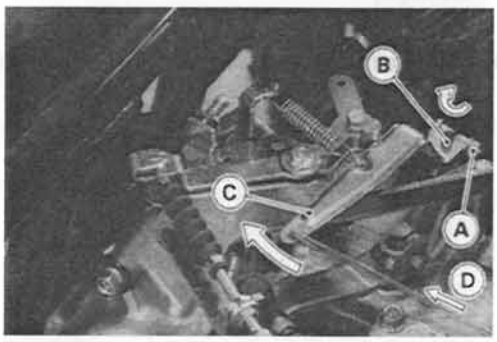
- ●Turning the control panel assembly counterclockwise, tighten the assembly mounting bolts.
- ●Install the control panel assembly shroud and pop rivet the shroud to the control panel assembly.
- ●Adjust:
  Throttle Pedal Free Play Adjustment
  Idle Speed Adjustment

Governor Arm and Throttle Link Removal

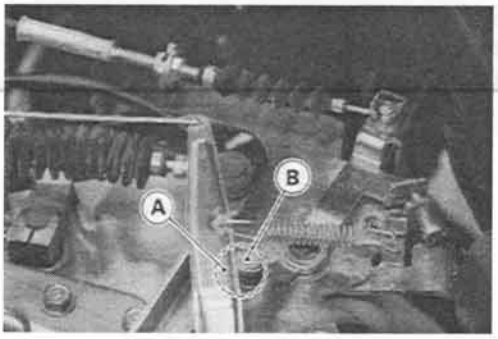


- ●Remove:
  Cargo Bed
  Control Panel Assembly Shroud
  Governor Arm [A]
  Throttle Link [B]

Governor Arm Installation



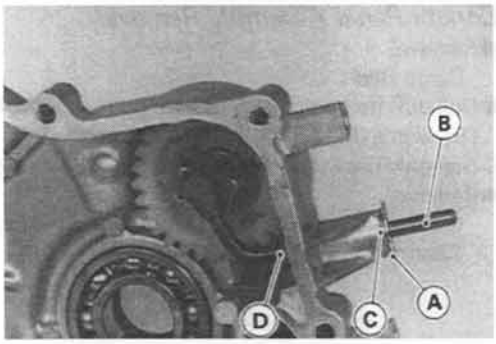
- ●Adjust the governor arm on the shaft.
- ○Loosen the nut [A].
- ○Turn the governor shaft [B] clockwise as far as possible and hold it there.
- ○Turn the governor arm [C] clockwise as far as possible (to make it fully open the throttle valve [D]), hold it there, and tighten the nut.



- ●Check that the governor arm [A] and the accel lever pin [B] fit together or there is a slight clearance between the governor arm and the accel lever pin, when the throttle lever is fully opened.

Governor Assembly Removal

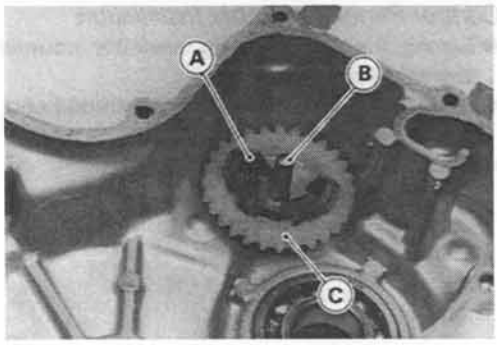
● Remove:
Transmission Case (split)
Governor Arm
Governor Shaft Snap Pin [A]
Governor Shaft [B]
Washer (thin) [C]
Washer (thick) [D]



● Remove the governor assembly [A] with the sleeve [B] by prying the gear [C] with two suitable levers.

CAUTION

Do not remove the governor assembly unless it is necessary. Once it has been removed, it must be replaced.



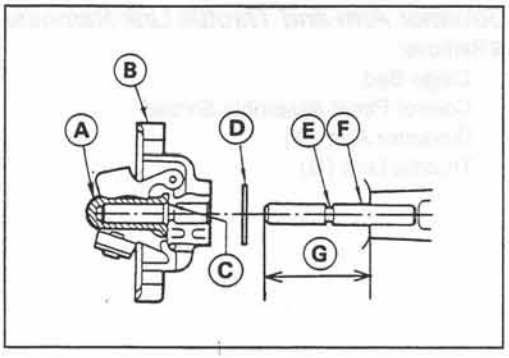
● Remove the washer.

Governor Assembly Installation

● Fit the sleeve into the governor assembly, and install them as a set.

NOTE

○ *The sleeve and the governor assembly cannot be installed separately.*
○ *Push the set onto the shaft until the step fits into the groove securely.*



Sleeve [A]
Governor Assembly [B]
Step [C]
Washer [D]
Groove [E]
Shaft [F]
32 mm [G]

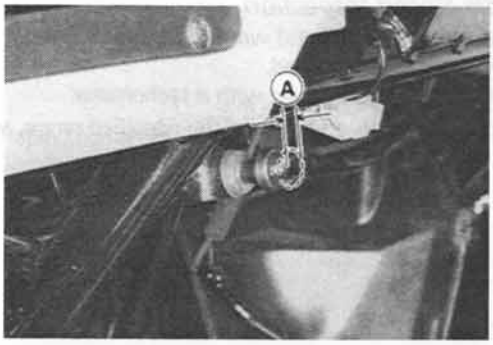
● Check that the gear turns freely and the weights move smoothly.

Governor Assembly Inspection

● Visually check the governor assembly for wear and damage.
★ If any part is worn or damaged, replace the assembly.

Choke Cable

Choke Cable Free Play Inspection



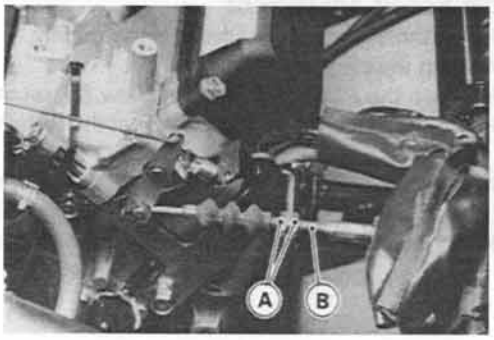
- Push in the choke knob all the way.
- Check the choke cable free play [A].

○ Determine the amount of free play at the choke knob. Pull the choke knob until the starter lever on the carburetor begins to turn; the amount of choke knob travel is the amount of free play.

★If the free play is not correct, adjust the choke cable.

Choke Cable Free Play
Standard: 2 ~ 3 mm

Choke Cable Free Play Adjustment



- Remove:
  Cargo Bed (tilt up)
- Loosen the mounting nuts [A] and slide the adjuster [B] until the cable has the proper amount of free play.
- Tighten the mounting nuts securely.

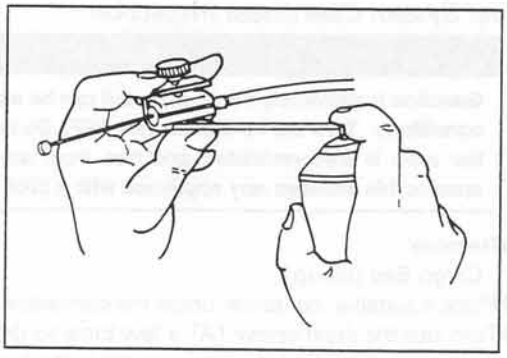
Choke Cable Installation

- Route the choke cable correctly (see the General Information chapter).
- Adjust:
  Choke Cable Free Play Adjustment

⚠WARNING

Operation with incorrectly routed or improperly adjusted cable could result in an unsafe operating condition.

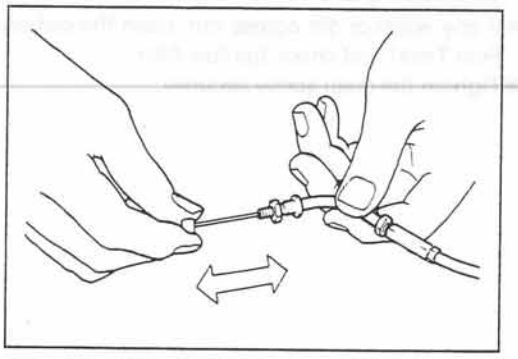
Choke Cable Lubrication



Whenever the choke cable is removed, lubricate the cable as follows.

- Lubricate the cable with a penetrating rust inhibitor through the pressure cable luber.

Choke Cable Inspection



- With the choke cable disconnected at both ends, the cable should move freely within the cable housing.

★If the cable does not move freely after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.

Carburetor

Idle Speed Inspection

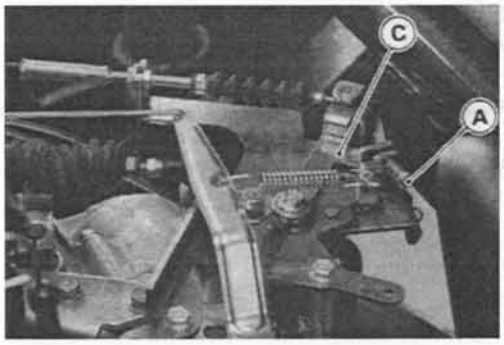
- Start the engine and warm it up thoroughly.
- Tilt up the cargo bed.
- Check the idle speed with a tachometer.

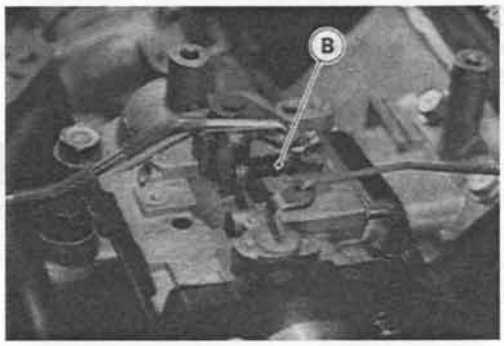
★If the idle speed is out of the specified range, adjust it.

Idle Speed
Standard: 900 ~ 950 r/min (rpm)

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Tilt up the cargo bed.
- Loosen the accel lever stopper screw [A] on the control panel.
- Turn the idle adjusting screw [B] at the carburetor until the idle speed is correct.
- Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.
- After the adjustment, screw in the accel lever stopper screw [A] until the screw lightly touches the accel lever [C].

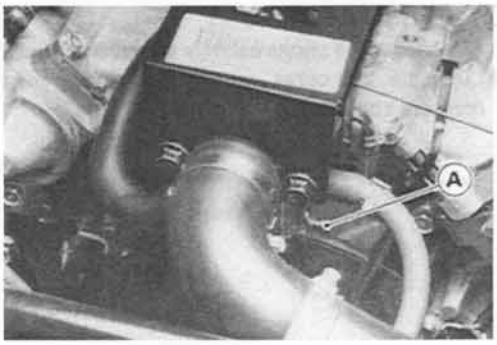




Fuel System Cleanliness Inspection

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.



- Remove:
  Cargo Bed (tilt up)
- Place a suitable container under the carburetor.
- Turn out the drain screw [A] a few turns to drain some fuel from the carburetor, and check for water or dirt in the fuel.

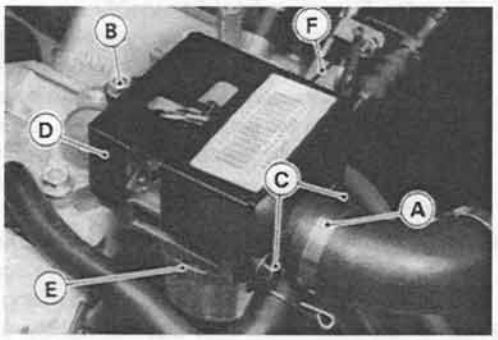
★If any water or dirt comes out, clean the carburetor and fuel tank (see Fuel Tank) and check the fuel filter.

- Tighten the drain screw securely.

Carburetor Removal

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.



- Remove:
  - Cargo Bed (tilt up)
  - Fuel Hose (disconnect)
  - Air Intake Duct Clamp [A] (loosen)
  - Carburetor Cover Bolt [B]
  - Carburetor Mounting Bolts [C]
  - Carburetor Cover [D]
  - Carburetor [E]
  - Choke Link [F]
- After removing the carburetor, stuff pieces of lint-free, clean cloth into the carburetor holder and the air cleaner duct to keep dirt out of the engine and air cleaner.

CAUTION

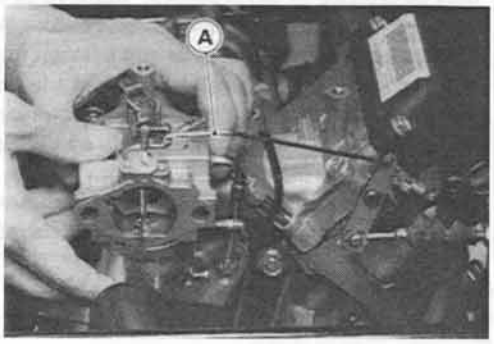
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

Carburetor Installation

- Torque:

Torque – Carburetor Mounting Bolts: 15 N-m (1.5 kg-m, 11.0 ft-lb)

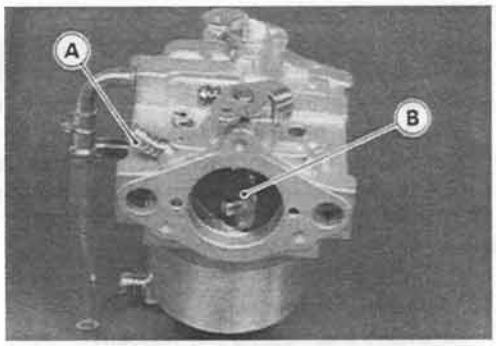
- Install the choke link [A] as shown.
- Adjust:
  - Throttle Pedal Free Play Adjustment
  - Choke Cable Free Play Adjustment
  - Idle Speed Adjustment

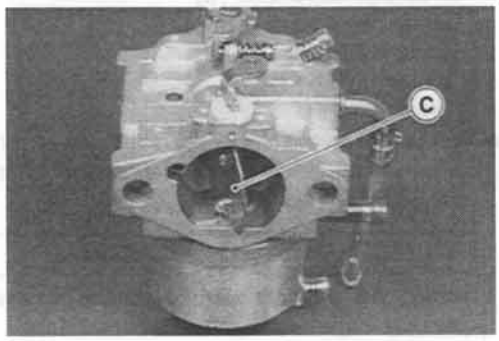


Carburetor Disassembly/Assembly

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.





- Turn in the pilot screw [A] and count the number of turns until it seats fully but not tightly, and then remove the screw. This is to set the screw to its original position when assembling.
- Turn in the pilot screw fully but not tightly, and then back it out the same number of turns counted during disassembly.
- Remove the screws and take off the throttle valve [B] and/or choke valve [C]. The throttle valve shaft has the return spring.
- Apply non-permanent locking agent:
  Throttle Valve Mounting Screws
  Choke Valve Mounting Screws
- Torque:

Torque – Float Bowl Mounting Bolt : 7.8 N-m (0.80 kg-m, 69 in-lb)

Carburetor Cleaning

⚠WARNING

Clean the carburetor in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetor.

CAUTION

Do not use compressed air on an assembled carburetor, the float may be crushed by the pressure. Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts. The carburetor body has plastic parts that cannot be removed. Do not use a strong carburetor cleaning solution which could attack these parts; instead, use a mild high flash point cleaning solution safe for plastic parts.
Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

- Disassemble the carburetor.
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetor.

Carburetor Inspection

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Turn the throttle and choke shafts to check that the throttle and choke butterfly valves move smoothly.

★If the valves do not more smoothly, replace the damaged parts. damaged parts.

- Check that the gaskets on the float bowl mounting bolt and the carburetor body are in good condition.

★If any gaskets are not in good condition, replace them.

- Check the float for cracks.

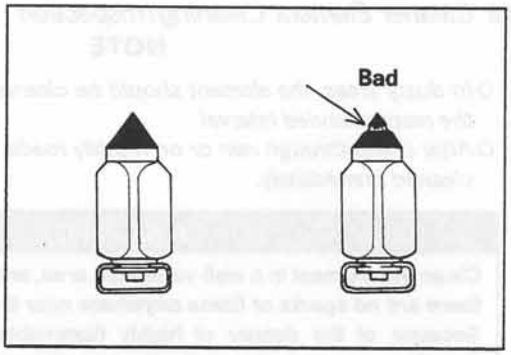
★If there are any cracks, replace the float.

NOTE

○*Float height can not be adjusted.*

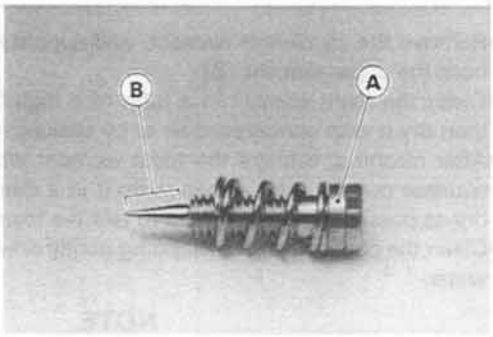
- Check the tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.

★If the tip is damaged, replace the needle.



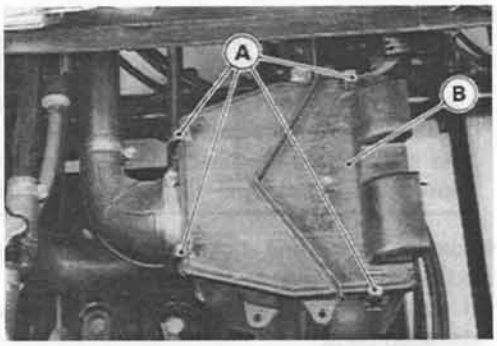
- Check the tapered portion of the pilot screw [A] for wear or damage.

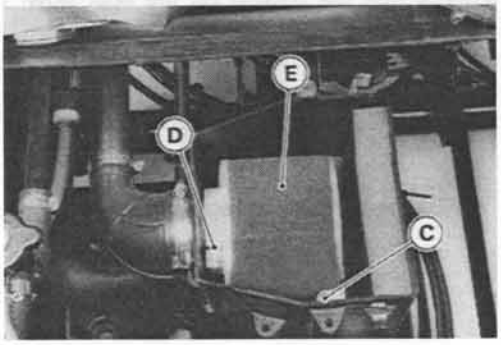
★If the pilot screw is worn or damaged on the tapered portion [B] it will prevent the engine from idling smoothly. Replace it.



Air Cleaner

Air Cleaner Element Removal





- Remove:
  - Seat (tilt up)
  - Fasteners [A] (unhook)
  - Air Cleaner Housing Cap [B]
  - Element Mounting Screw [C]
  - Element Clamp Screw [D]
  - Element [E]
- After removing the element, stuff pieces of lint-free, clean cloth into the air cleaner duct to keep dirt out of the carburetor and engine.

⚠WARNING

If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident.

CAUTION

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

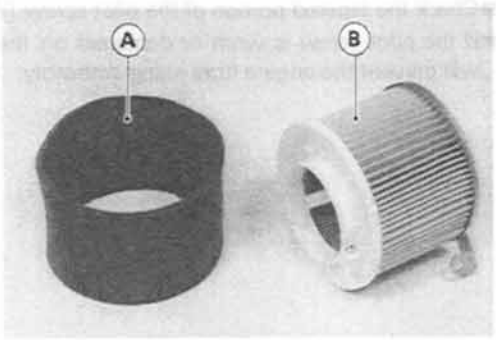
Air Cleaner Element Cleaning/Inspection

NOTE

- *In dusty areas, the element should be cleaned more frequently than the recommended interval.*
- *After riding through rain or on muddy roads, the element should be cleaned immediately.*

⚠WARNING

Clean the element in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.



- Remove the air cleaner element, and separate the foam element [A] from the paper element [B].
- Clean the foam element in a bath of a high flash-point solvent, and then dry it with compressed air or by shaking it.
- After cleaning, saturate the foam element with SE class SAE30 oil, squeeze out the excess, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the foam element.
- Clean the paper element by tapping gently or washing in detergent and water.

NOTE

- *After washing, dry thoroughly.*

CAUTION

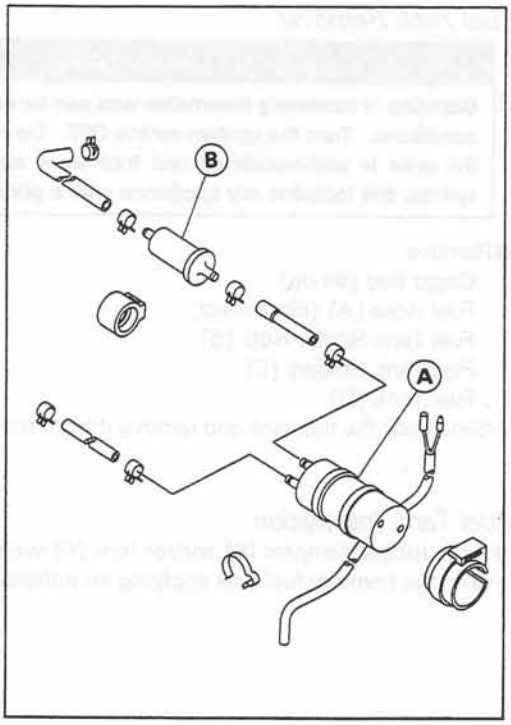
Do not use compressed air to clean the paper element.
Do not oil the paper element.

Fuel Pump and Fuel Filter

Fuel Pump and Fuel Filter Removal

⚠WARNING

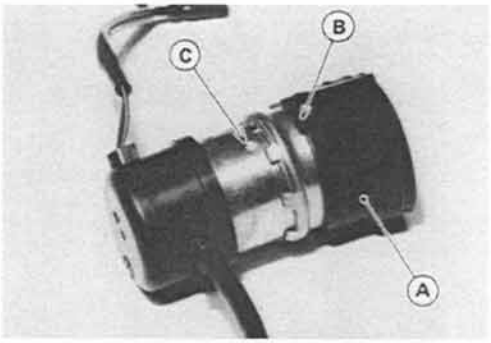
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.



- Remove:
  Cargo Bed (tilt up)
  Fuel Hoses (disconnect)
  Fuel Pump [A]
  Fuel Filter [B]

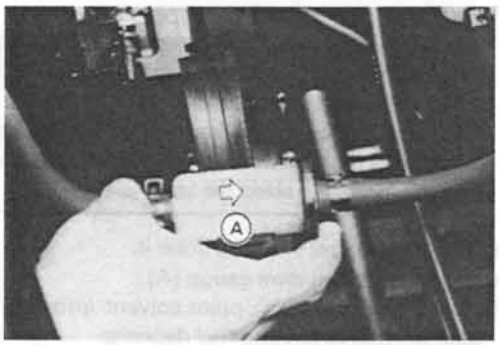
Fuel Pump Installation

- Install the rubber damper [A] to the pump so that the projection [B] on the damper aligns with the paint mark [C] on the pump.
- Connect the fuel hose from the filter to the fitting marked INLET, and the hose to the carburetor to the another fitting.



Fuel Filter Installation

- Install the fuel filter so that the arrow [A] on it shows the fuel flow from the fuel tank to the fuel pump.



Fuel Filter Inspection

- Visually inspect the fuel filter.

★If the filter is clear with no signs of dirt or other contamination, it is OK and need not be replaced.

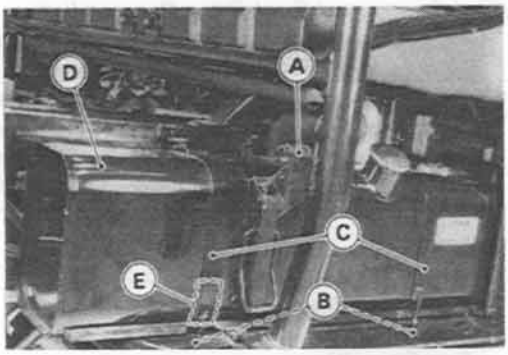
★If the filter is dark or looks dirty, replace it. Also, check the rest of the fuel system for contamination.

Fuel Tank

Fuel Tank Removal

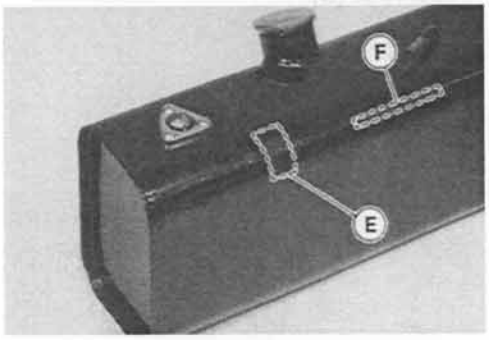
⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.



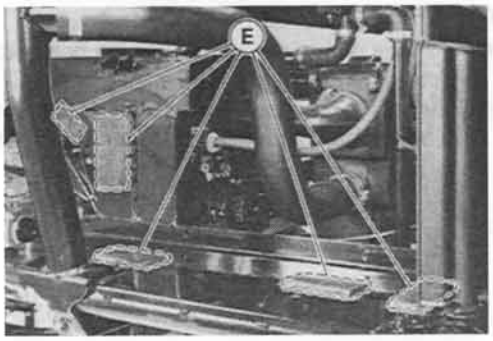
● Remove:
Cargo Bed (tilt up)
Fuel Hose [A] (disconnect)
Fuel Tank Holder Nuts [B]
Fuel Tank Holders [C]
Fuel Tank [D]

○ Slide back the fuel tank and remove it from the vehicle.



Fuel Tank Installation

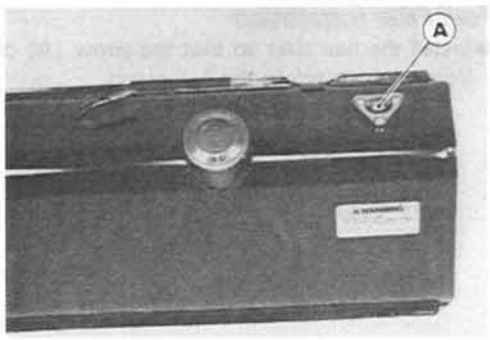
● If the rubber dampers [E] and/or trim [F] were removed, install them onto the frame or fuel tank applying an adhesive agent.



Fuel Tank Cleaning/Inspection

⚠WARNING

Clean the tank 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 tank.



● Remove the fuel tank and drain it.
● Remove the fuel level gauge [A].
● Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
● Pour the solvent out of the tank.
● Dry the tank with compressed air.
● Visually inspect the gaskets on the fuel level gauge and fuel tank cap for any damage.

★ Replace the gaskets if they are damaged.

Cooling System

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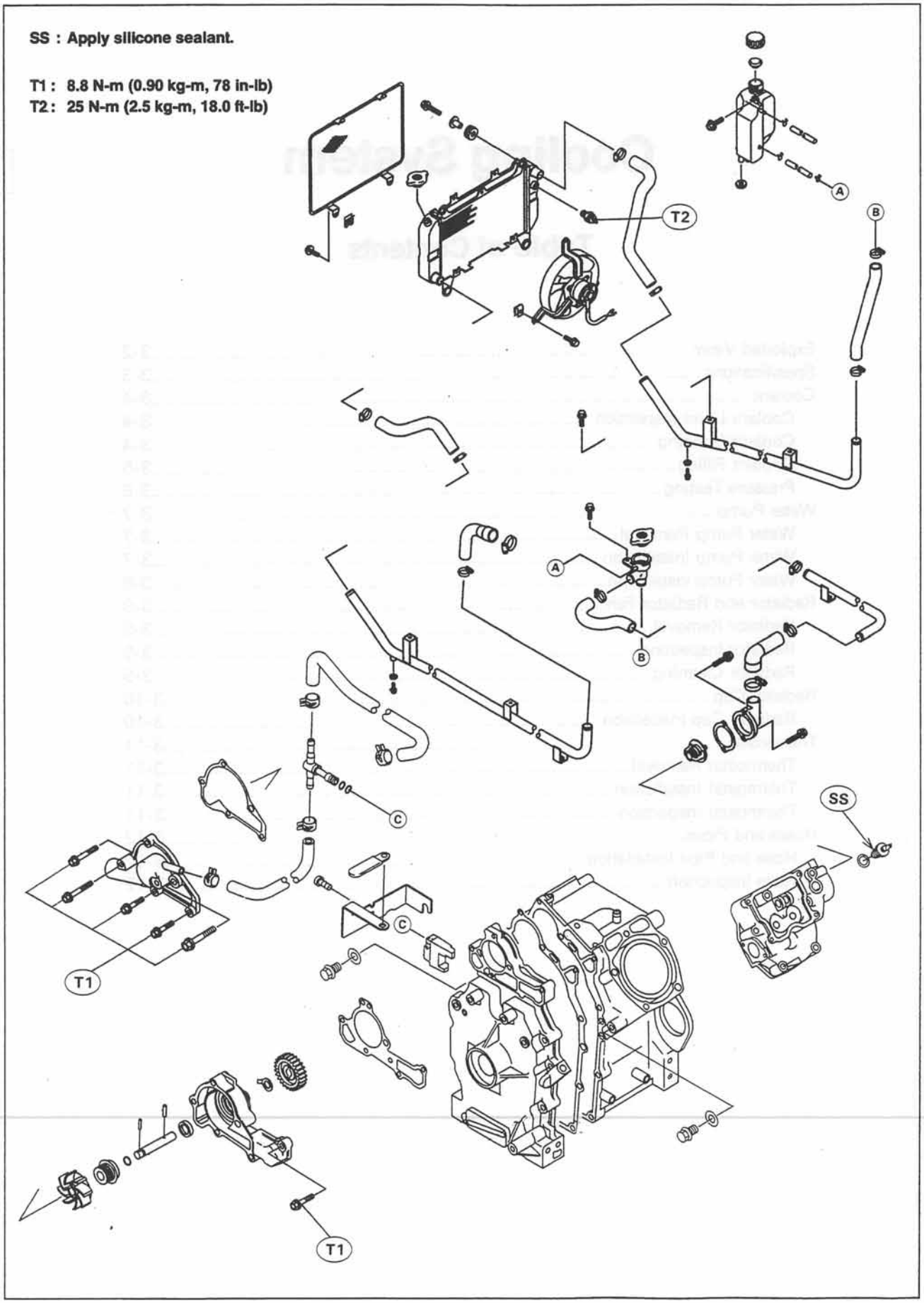
Exploded View



Specifications

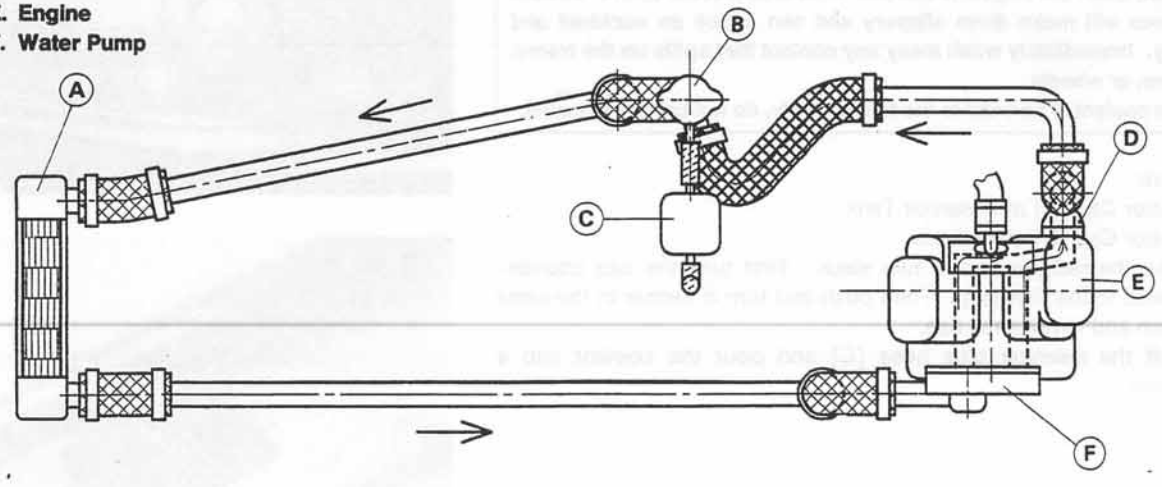
Item	Standard	Service Limit
Coolant:		
Type	Permanent type of antifreeze (Soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)	- - -
Color	Green	- - -
Mixed ratio	Soft water 50%, coolant 50%	- - -
Freezing point	−35°C (−31°F)	- - -
Total amount	2.7 L	- - -
Radiator Cap:		
Relief pressure	93 ~ 123 kPa (0.95 ~ 1.25 kg/cm², 14 ~ 18 psi)	- - -
Thermostat:		
Valve opening temperature	80.5 ~ 83.5 °C (177 ~ 182 °F)	- - -
Valve full opening lift	8 mm or more @90°C (194°F)	- - -
Water Pump:		
Water pump shaft diameter	9.975 mm ~ 9.990 mm	9.94 mm
Water pump shaft bearing inside diameter	10.020 ~ 10.038 mm	10.09 mm

Special Tool – Bearing Driver Set: 57001-1129

Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

Coolant Flow Chart

A. Radiator
B. Radiator Cap
C. Reservoir Tank
D. Thermostat
E. Engine
F. Water Pump



Coolant

Coolant Level Inspection

NOTE

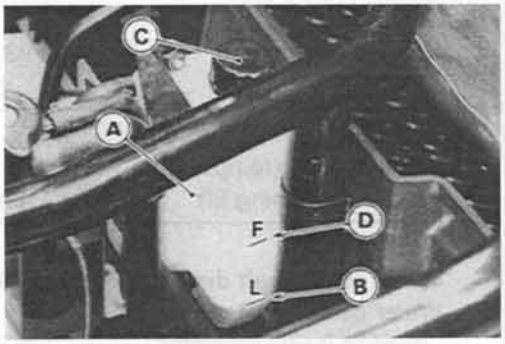
○ *Check the level when the engine is cold (room of ambient temperature).*

CAUTION

Do not check the level through the coolant filler by removing the radiator cap. If the cap is removed, the coolant will flow out from the reservoir tank.

● Check the coolant level in the reservoir tank [A] with the vehicle held perpendicularly.

★ If the coolant level is lower than the L (Low) [B] mark, remove the reservoir tank cap [C], then add coolant to the F (Full) [D] mark.



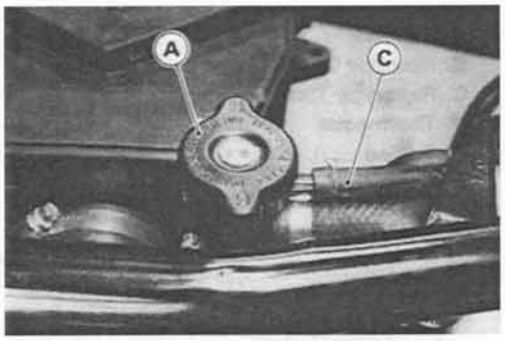
CAUTION

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties.
The diluted coolant can attack the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
If coolant must be added often, or the reservoir tank has run completely dry; there is probably leakage in the cooling system. Check the system for leaks.

Coolant Draining

⚠WARNING

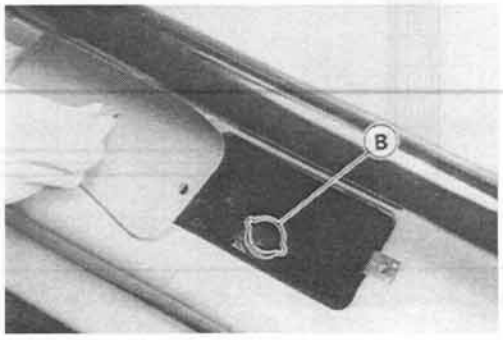
To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down. Coolant on tires will make them slippery and can cause an accident and injury. Immediately wash away any coolant that spills on the frame, engine, or wheels.
Since coolant is harmful to the human body, do not use for drinking.



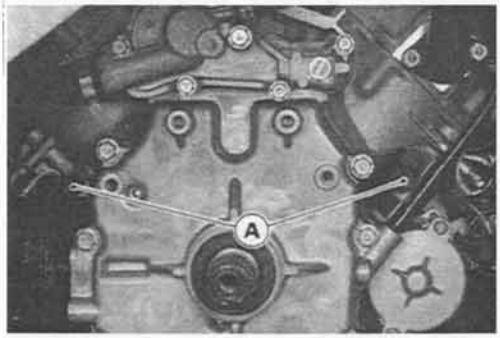
● Remove:
Radiator Cap [A] at Reservoir Tank
Radiator Cap [B] at Radiator

○ Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

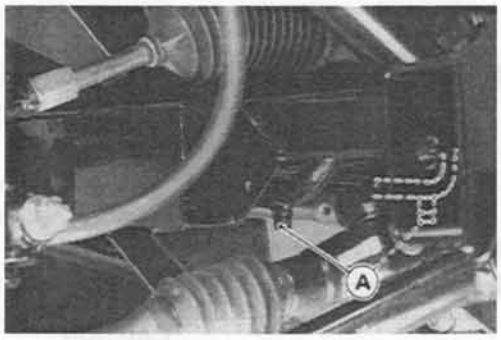
● Pull off the reservoir tank hose [C] and pour the coolant into a container.



● Remove:
Torque Converter
Coolant Drain Plugs [A] at Cylinders
○ Place a container under the drain plugs.



● Remove:
Front Final Gear Case Skid Plate (KAF620A)
Coolant Drain Plugs [A] at Water Pipes
○ Place a container under the drain plugs.



Coolant Filling

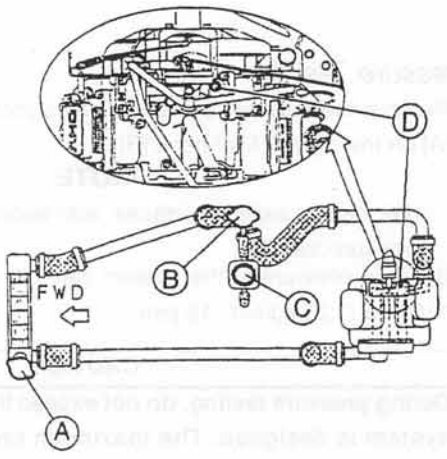
● Tighten the drain plugs.
● Remove:
Radiator Cap 1 [A] (on the radiator)
Radiator Cap 2 [B] (near the reservoir tank)
Reservoir Tank Cap [C]
Air Bleeder Bolt [D]
● Pour the coolant slowly into the radiator cap 2 fitting.

NOTE

○ *Pour in the coolant slowly so that the air in the engine and radiator can escape.*

CAUTION

Soft or distilled water must be used with antifreeze (see Specifications in this chapter) in the cooling system
If hard water is used in the system, it causes scale accumulation in the water passages, considerably reducing the efficiency of the cooling system.



Top View

Water and Coolant Mixture Ratio (Recommended)

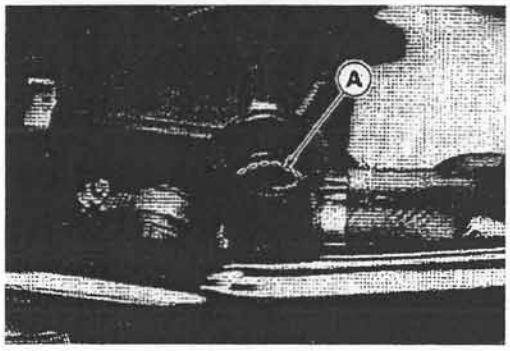
Soft Water	:	**50 %**
Coolant	:	**50 %**
Freezing Point	:	**-35°C (-31°F)**
Total Amount	:	**2.7 L**

NOTE

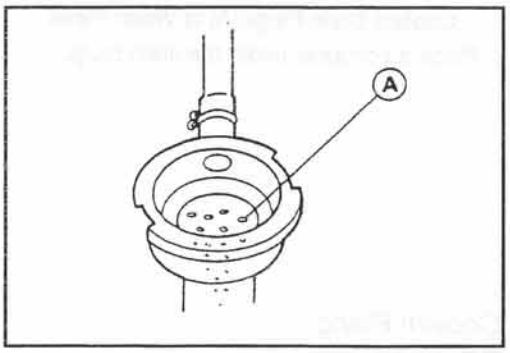
○ *Choose a suitable mixture ratio by referring to the coolant manufacture's directions.*

● When the coolant begins to flow out the air bleeder bolt hole, tighten the air bleeder bolt.
● When the coolant begins to flow out the radiator cap 1 fitting, install the radiator cap 1.

● Fill the cooling system up to the filler neck [A] in the radiator cap 2 fitting with coolant.



● Bleed the air from the cooling system as follows.
○ Start the engine and run it until no more air bubbles [A] can be seen in the coolant (less than five minutes).
○ Tap the radiator hoses to force any air bubbles caught inside.
○ Stop the engine and add coolant up to the filler neck.
● Install the radiator cap 2.
● Fill the reservoir tank up to the F (Full) mark with coolant.



CAUTION
Do not add more coolant above the FULL mark.

● Install the reservoir tank cap.

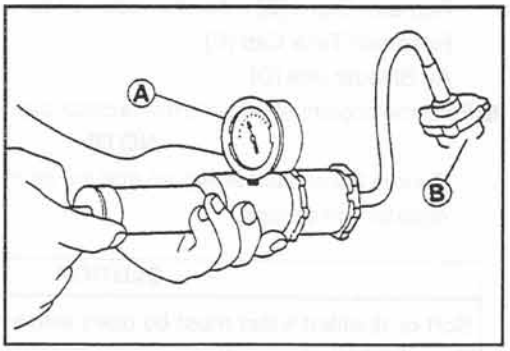
Pressure Testing

● Remove the radiator cap, and install a cooling system pressure tester [A] on the coolant filler neck [B]

NOTE

○ *Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.*

● Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kg/cm², 18 psi).



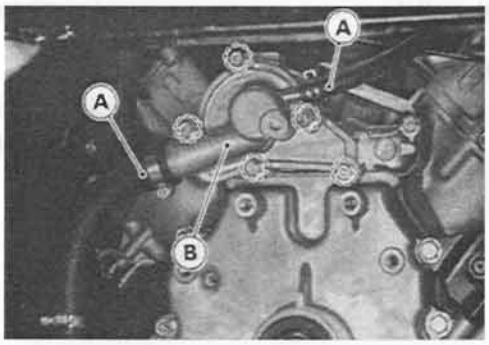
CAUTION
During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kg/cm², 18 psi).

● Watch the gauge for at least 6 seconds.
★ If the pressure holds steady, the system is all right.
★ If the pressure drops soon, check for leaks.

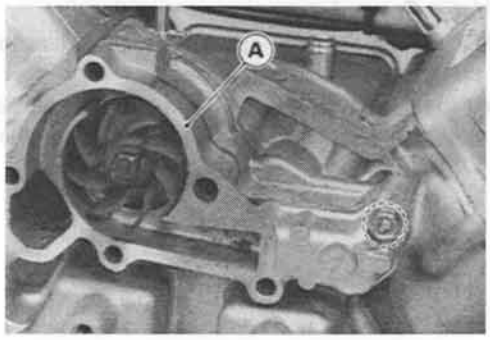
Water Pump

Water Pump Removal

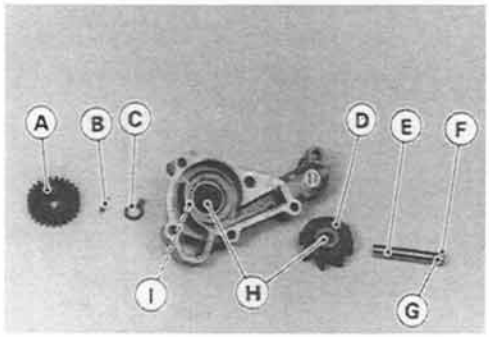
- Remove:
  Torque Converter
  Coolant (drain)
  Water Hoses [A]
  Water Pump Cover [B]



- Remove:
  Water Pump Housing [A]

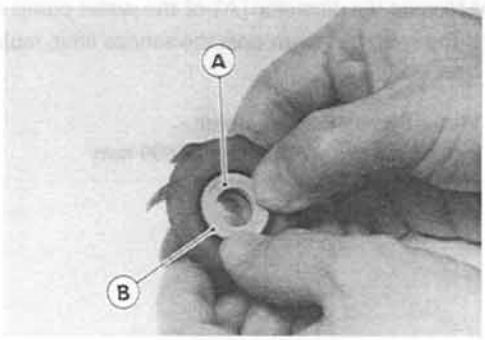


- Remove:
  Water Pump Drive Gear [A]
  Pin [B]
  Washer [C]
  Water Pump Impeller [D]
  Shaft [E], Pin [F], and O-ring [G]
  Mechanical Seal [H]
  Oil Seal [I]

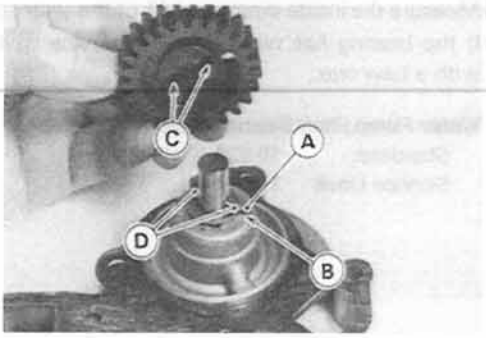


Water Pump Installation

- Clean the sliding surface of a new mechanical seal with a high-flash point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal and sealing seat [A], and press the rubber seal [B] and sealing seat into the impeller by hand until the seat bottoms out.

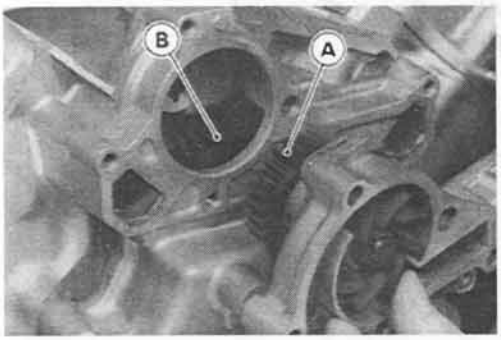


- Fit the washer tab [A] to the notch [B] of the housing.
- Fit the drive gear notches [C] to the pin [D].



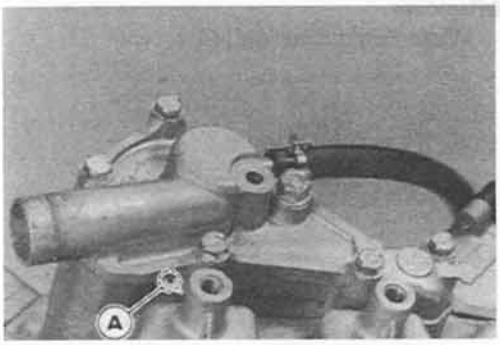
● Install the water pump housing turning the impeller so that the drive gear [A] engages with the camshaft gear [B].
● Torque:

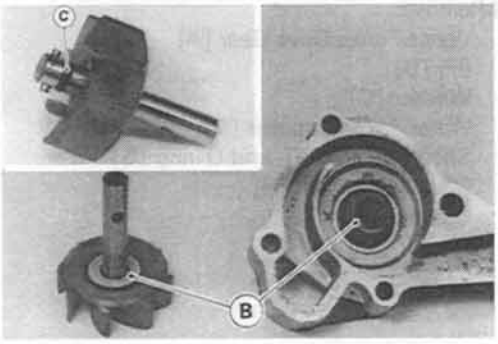
Torque - Water Pump Cover Bolts (M6): 8.8 N-m (0.90 kg-m, 78 in-lb)
- Water Pump Cover Bolts (M8): 22 N-m (2.2 kg-m, 16 ft-lb)



Water Pump inspection

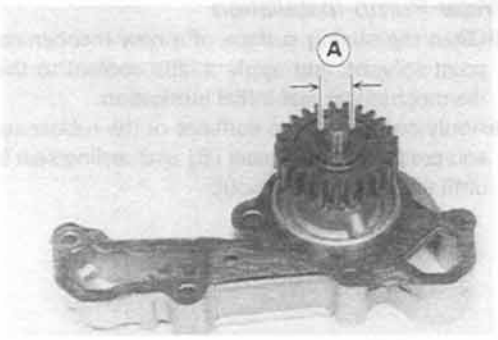
● Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leakage.
★ If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passages. Replace the mechanical seal [B] or O-ring [C].





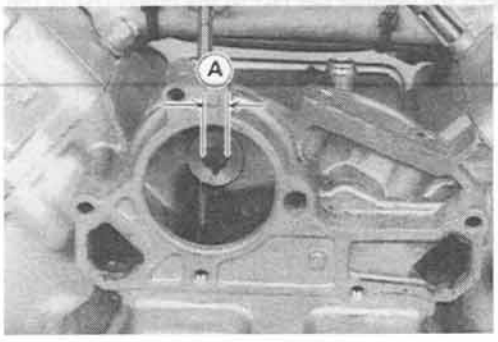
● Measure the diameter [A] of the water pump shaft.
★ If the shaft has worn past the service limit, replace the shaft with a new one.

Water Pump Shaft Diameter
Standard: 9.975 ~ 9.990 mm
Service Limit: 9.94 mm



● Measure the inside diameter [A] of the water pump shaft bearing.
★ If the bearing has worn past the service limit, replace the crankcase with a new one.

Water Pump Shaft Bearing Inside Diameter
Standard: 10.020 ~ 10.038 mm
Service Limit: 10.09 mm

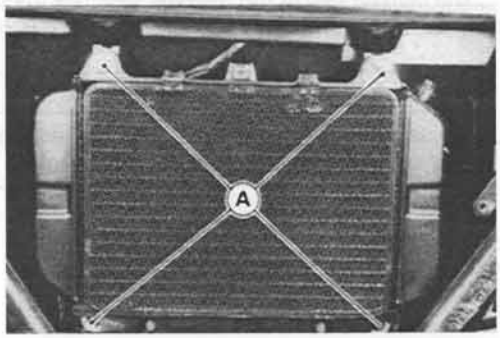


Radiator and Radiator Fan

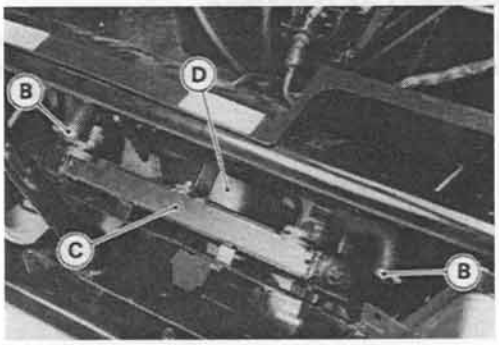
Radiator Removal

⚠WARNING

The radiator fan is connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE RADIATOR FAN CONNECTOR IS DISCONNECTED. TOUCHING THE FAN BEFORE THE CONNECTOR IS DISCONNECTED COULD CAUSE INJURY FROM THE FAN BLADES.



● Remove:
Coolant (drain)
Front Fender Upper
Radiator Mounting Bolts [A]
Water Hose Clamps (loosen) [B]
Radiator [C] and Radiator Fan [D]

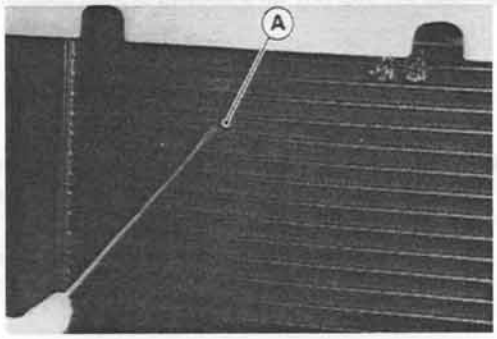


CAUTION

Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.

Radiator Inspection

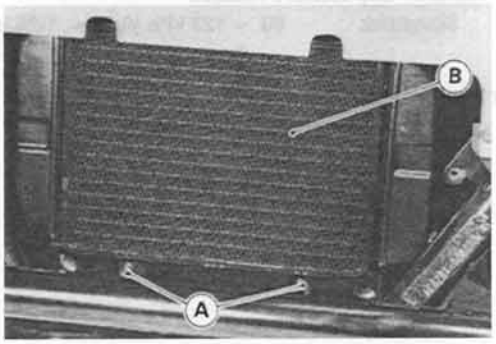
● Check the radiator core.
★ If there are obstructions to air flow, remove them.
★ If the corrugated fins [A] are deformed, carefully straighten them.
★ If the air passages of the radiator core are blocked more than 20 % by unremovable obstructions or irreparable deformed fins, replace the radiator with a new one.



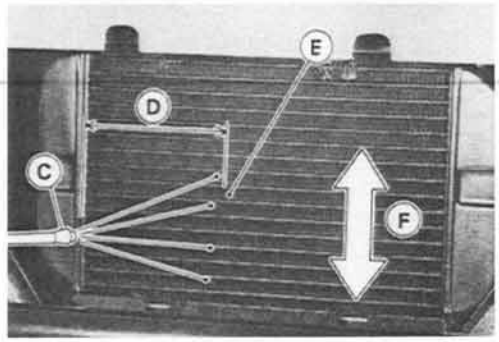
Radiator Cleaning

CAUTION

Clean the radiator screen and the radiator in accordance with the Periodic Maintenance Chart. In dusty areas, they should be cleaned more frequently than the recommended interval. After riding through muddy terrains, the radiator screen and the radiator should be cleaned immediately.



● Remove:
Front Fender Front Cover
Radiator Screen Mounting Bolts [A]
Radiator Screen [B]
● Clean the radiator screen in a bath of tap water, and then dry it with compressed air or by shaking it.



CAUTION

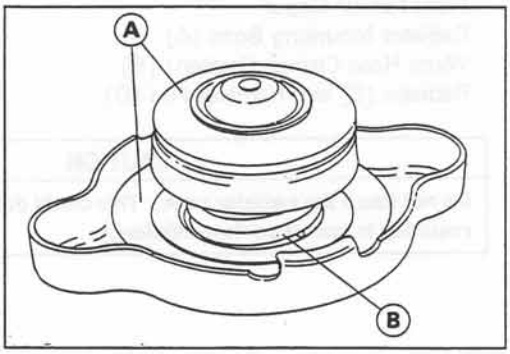
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.
Keep the steam gun [C] away more than 0.5 m [D] from the radiator core [E].
Hold the steam gun perpendicular to the core surface.
Run the steam gun following the core fin direction [F].

Radiator Cap

The radiator cap at the reservoir tank has the pressure relief valve, and must be inspected. The cap at the radiator has no valve.

CAUTION
Do not change the positions of the radiator cap at the reservoir tank and the cap at the radiator.

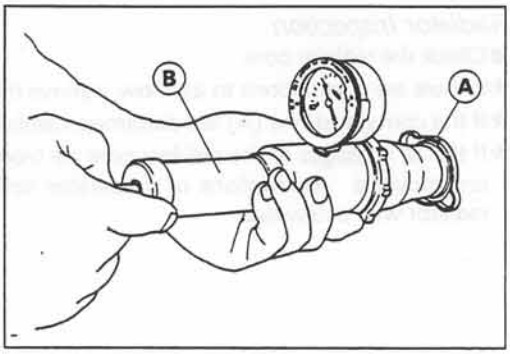
Radiator Cap Inspection



●Check the radiator cap valve seals [A] and valve spring [B].

★If any one of them shows visible damage, replace the cap.

●Install the cap [A] on a cooling system pressure tester [B].



NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.*

●Watching the pressure gauge, slowly pump the pressure tester to build up the pressure. The gauge pointer must remain within the relief pressure range in the table below at least 6 seconds. Continue to pump the tester until the relief valve opens, indicated by the gauge pointer flicks downward. The relief valve must open within the specified range.

Radiator Cap Relief Pressure

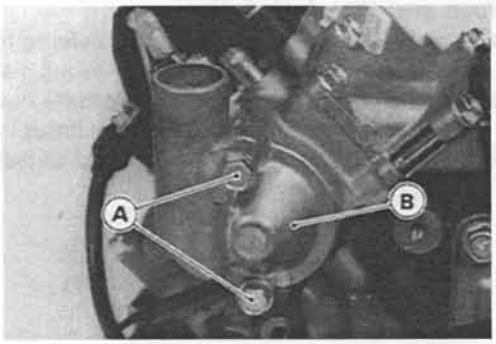
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kg/cm^2, 14 ~ 18 psi) for 6 seconds.

★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

Thermostat

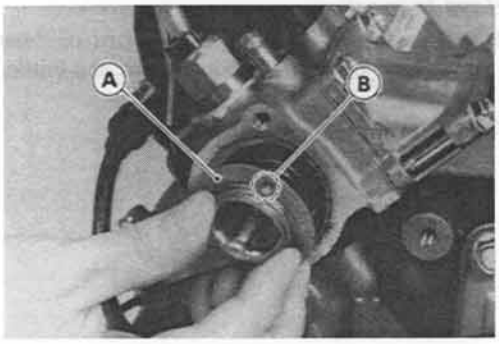
Thermostat Removal

● Remove:
Coolant (drain)
Thermostat Housing Cap Bolts [A]
Thermostat Housing Cap [B]



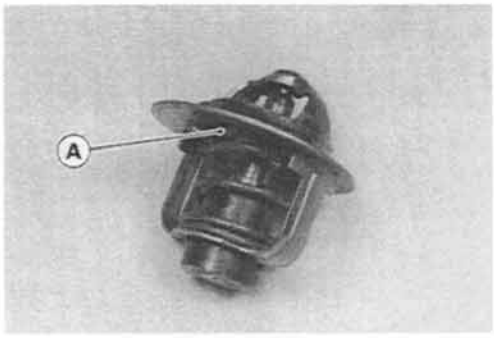
Thermostat Installation

● Install the thermostat [A] so that the jiggle valve [B] is on top.
● Adjust:
Coolant



Thermostat Inspection

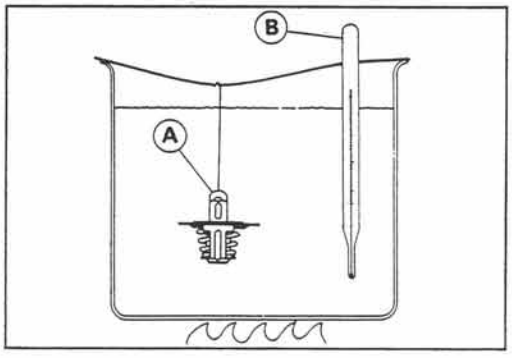
● Remove the thermostat, and inspect the thermostat valve [A] at room temperature.
★ If the valve is open, replace the valve with a new one.



● To check valve opening temperature, suspend the thermostat in a container of water and raise the temperature of the water.
★ If the measurement is out of the specified range, replace the thermostat.

Thermostat Valve Opening Temperature
Standard: 80.5 ~ 83.5 °C (177 ~ 182 °F)

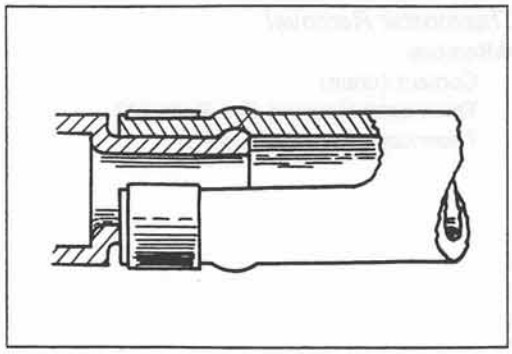
○ The thermostat [A] must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water. It must not touch the container, either.



Hoses and Pipes

Hose and Pipe Installation

- ●Install the hoses and pipes being careful to follow bending direction or diameter. Avoid sharp bending, kinking, flattening, or twisting.
- ●Install the clamps as near as possible to the hose end to clear the raised rib or the fitting. This will prevent the hoses from working loose.
- ○The clamp screws should be positioned correctly to prevent the clamps from contacting anything.



Hose Inspection

- ●Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.
- ●Replace any damaged hoses.

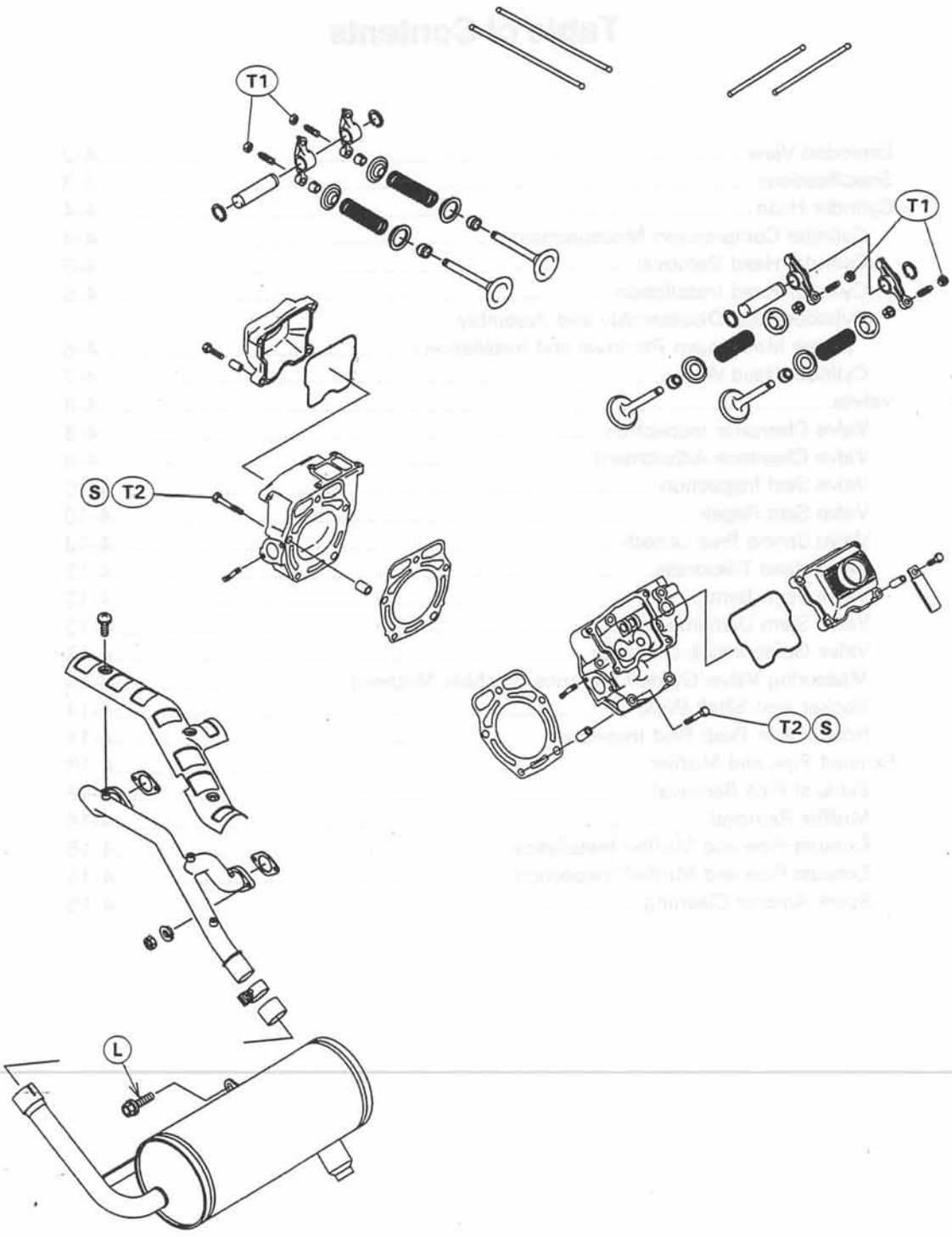
Engine Top End

Table of Contents

Exploded View

L : Apply non-permanent locking agent.
S : Follow specified tightening sequence.

T1 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T2 : 22 N-m (2.2 kg-m, 16.0 ft-lb)



Specifications

Item		Standard	Service Limit
Cylinder Heads:			
Cylinder compression		(Usable Range) 1 000 ~ 1 520 kPa (10.2 ~ 15.5 kg/cm², 145 ~ 220 psi) @490 r/min (rpm)	– – –
Cylinder head warp		– – –	0.03 mm
Valves:			
Valve clearance (when cold)		0.25 mm	– – –
Valve head thickness		0.85 mm	0.4 mm
Valve stem bend		Less than 0.01 mm TIR	0.05 mm TIR
Valve stem diameter:	Inlet	5.960 ~ 5.975 mm	5.95 mm
	Exhaust	5.950 ~ 5.965 mm	5.94 mm
Valve guide inside diameter		6.000 ~ 6.015 mm	6.08 mm
Valve spring free length		32.55 mm	31.6 mm
Valve seating surface:			
Width		0.5 ~ 1.1 mm	– – –
Outside diameter:	Inlet	29.5 mm	– – –
	Exhaust	25.5 mm	– – –
Valve seat cutting angle		45°	– – –
Valve/guide clearance (wobble method):			
	Inlet	0.06 ~ 0.12 mm	0.23 mm
	Exhaust	0.08 ~ 0.14 mm	0.25 mm
Rocker arm inside diameter		12.006 ~ 12.024 mm	12.05 mm
Rocker shaft diameter		11.989 ~ 12.000 mm	11.95 mm
Rocker arm push rod runout		Less than 0.5 mm TIR	0.8 mm TIR

Special Tool – Outside Circlip Pliers: 57001-144
Valve Seat Cutter, 45° – Φ35: 57001-1116
Valve Seat Cutter, 32° – Φ30: 57001-1120
Valve Seat Cutter Holder Bar: 57001-1128
Valve Seat Cutter, 45° – Φ30: 57001-1187
Valve Seat Cutter, 32° – Φ33: 57001-1199
Valve Adjusting Screw Holder: 57001-1217
Valve Seat Cutter Holder, Φ6: 57001-1360

Cylinder Head

Cylinder Compression Measurement

- Tilt up the cargo bed.
- Thoroughly warm up the engine so that the engine oil between the piston and the cylinder wall will help seal compression as it does during normal running.
- Stop the engine, remove the spark plugs, and attach a compression gauge firmly into the one spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; this is the highest compression reading obtainable.

Cylinder Compression
Usable Range: **1 000 ~ 1 520 kPa**
(10.2 ~ 15.5 kg/cm², 145 ~ 220 psi)
@490 r/min (rpm)

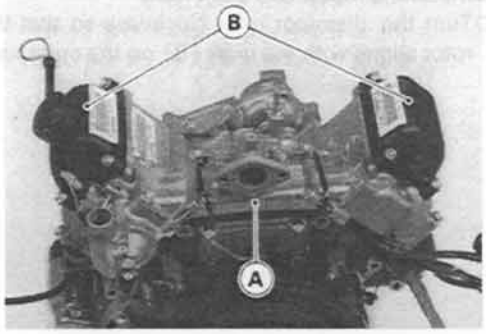
- Repeat the measurement to the other cylinder.

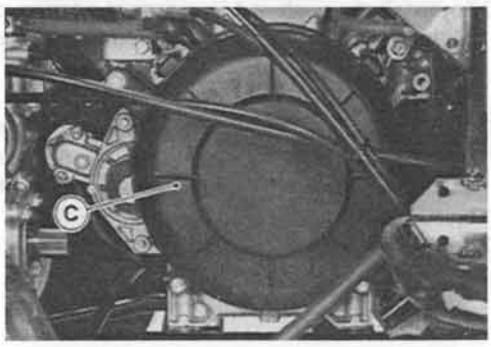
The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression higher than usable range	Carbon accumulation on piston and cylinder head, and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace with a gasket of the proper thickness.
Cylinder compression lower than usable range	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if possible.
	Incorrect valve, piston/cylinder clearance	Adjust.
	Piston seizure	Inspect cylinder and liner and replace/ repair as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace.

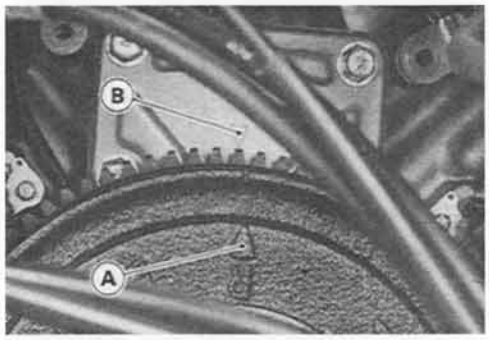
Cylinder Head Removal

●Remove:
Cargo Bed
Torque Converter
Coolant (drain)
Water Hoses
Carburetor
Carburetor Intake Manifold [A]
Muffler and Exhaust Pipe
Spark Plug Caps
Cylinder Head Covers [B]
Alternator Cover [C]

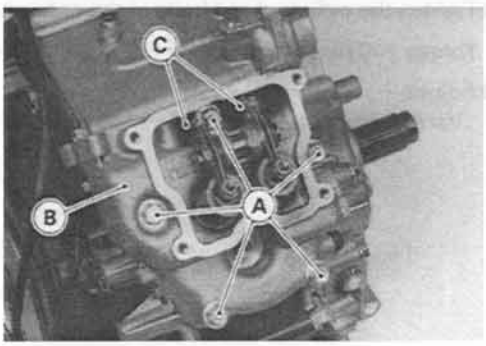




●Turn the alternator rotor clockwise so that the mark "R" [A] on the rotor aligns with the mark [B] on the crankcase breather cover. Check the rocker arms are free. If not, turn the rotor more one turn and free the rocker arms.

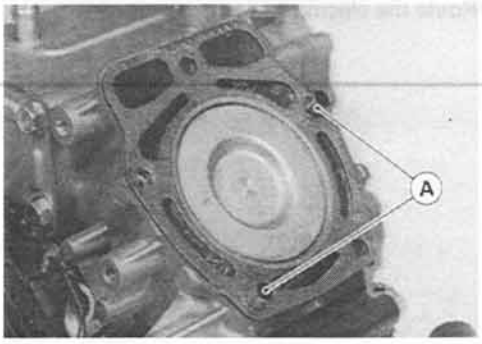


●Remove:
Cylinder Head Bolts [A]
Cylinder Head [B]
Cylinder Head Gasket
Rocker Arm Push Rods [C]



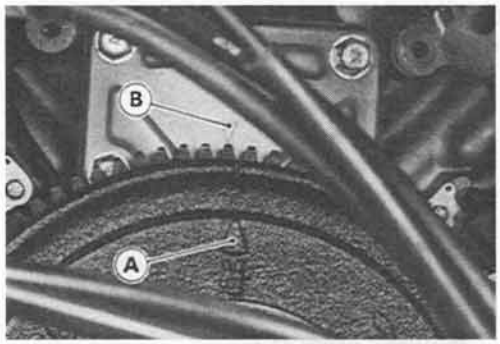
Cylinder Head Installation

●Clean the mating surface of the cylinder head and the cylinder.
●Replace the gasket with a new one.
●Check to see that the cylinder head knock pins [A] are in place on the cylinder.



● Install the rocker arm push rods.

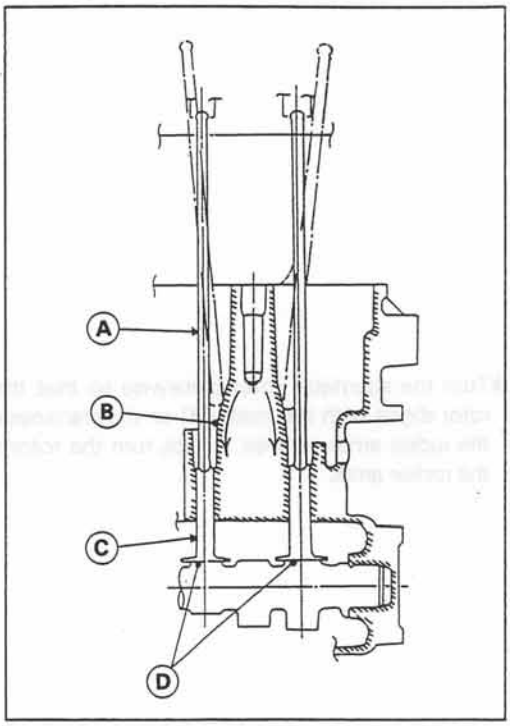
○ Turn the alternator rotor clockwise so that the mark "R" [A] on the rotor aligns with the mark [B] on the crankcase breather cover.



○ To install the push rod in a correct position on the tappet, insert the push rod [A] so that the end of the push rod is sliding down along inside wall [B] of the crankcase and position the push rod end on to the tappet [C].

○ Check both inlet and exhaust push rods on each cylinder are lowest position [D] on the cam lobes. If not, turn the alternator rotor clockwise more one turn and align both marks on the rotor and breather cover again.

○ Be sure the end of the push rods are correctly seated on the tappets.

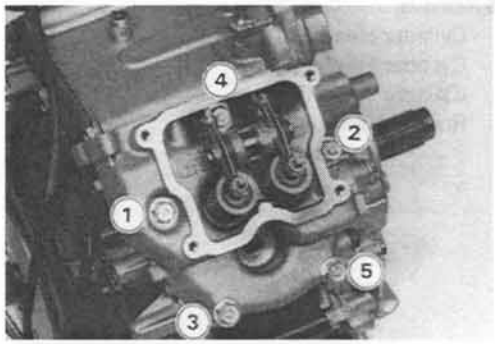


● Tighten the cylinder head bolts in the order shown.

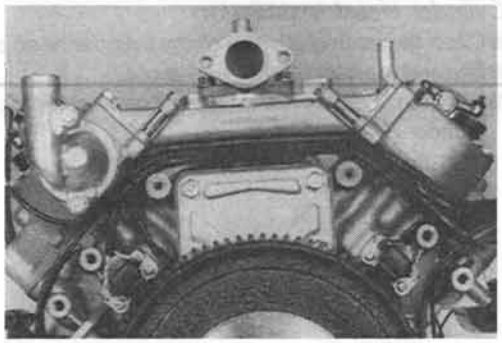
Torque – Cylinder Head Bolts : 22 N-m (2.2 kg-m, 16.5 ft-lb)

● Adjust:

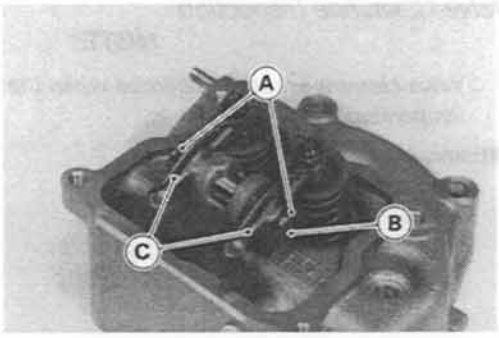
Valve Clearance Adjustment



● Route the electric wires.

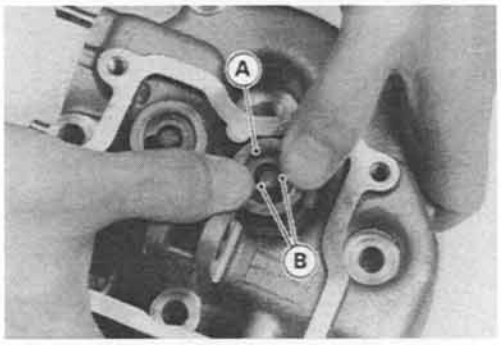


Cylinder Head Disassembly and Assembly (Valve Mechanism Removal and Installation)



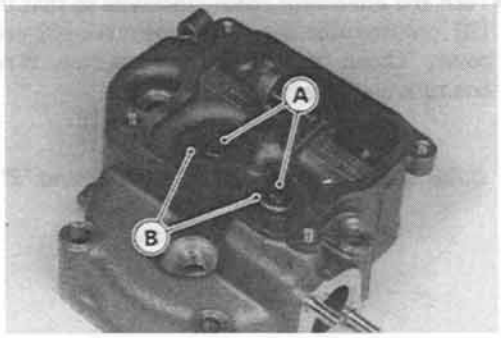
● Remove:
Circlips [A]
Rocker Shaft [B]
Rocker Arms [C]

Special Tool – Outside Circlip Pliers: 57001-144



● Remove:
Valve Spring Retainers [A]
Split Keepers [B]
Valve Springs
Valves

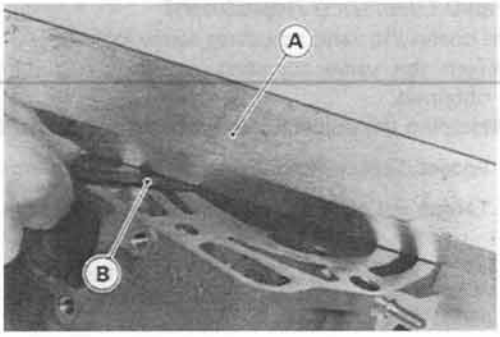
○ Press down the valve spring retainer holding the valve head, and remove the split keepers.



● Remove:
Oil Seals [A]
Spring Seats [B]

● Check to see that the valve moves smoothly up and down in the guide.
● Check to see that the valve seats properly in the valve seat. If it does not, repair the valve seat.
● Apply engine oil:
Valve Stems
Rocker Shaft

Cylinder Head Warp



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

★ If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.

Cylinder Head Warp
Service Limit: 0.03 mm

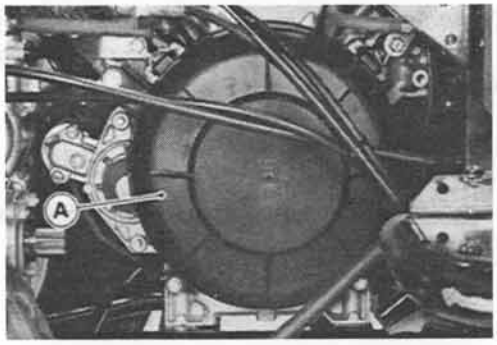
Valves

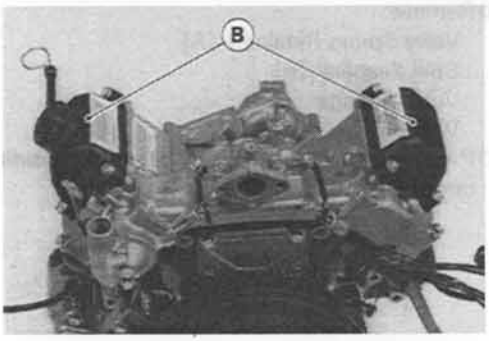
Valve Clearance Inspection

NOTE

○ *Valve clearance must be checked when the engine is cold (at room temperature).*

● Remove:
Alternator Cover [A]
Cylinder Head Covers [B]
Spark Plugs

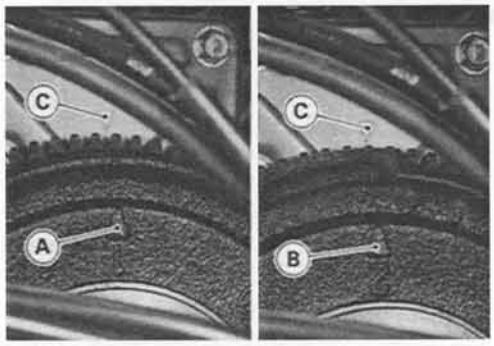




● Turn the alternator rotor clockwise so that the mark "1" [A] or **"2"** [B] on the rotor aligns with the mark [C] on the crankcase breather cover. Check both rocker arms are free. If not, turn the rotor more one turn and free both rocker arms.

NOTE

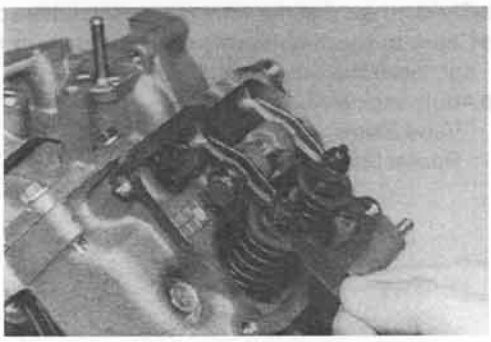
○ *The mark "1" is for the No.1 cylinder, and "2" is for the No.2 cylinder.*



● Using a thickness gauge, measure the valve clearance between the rocker arm and the valve stem.

★ If the valve clearance is incorrect, adjust it.

Valve Clearance (when cold)
Standard: 0.25 mm



Valve Clearance Adjustment

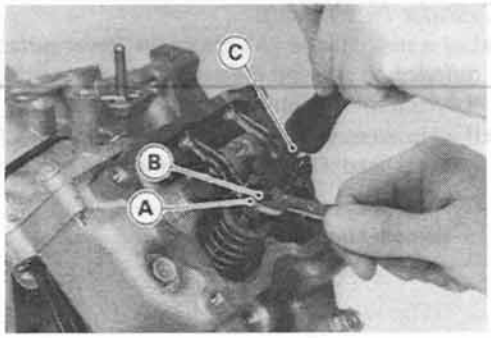
● Loosen the valve adjusting screw locknut [A].

● Turn the valve adjusting screw [B] until the correct clearance is obtained.

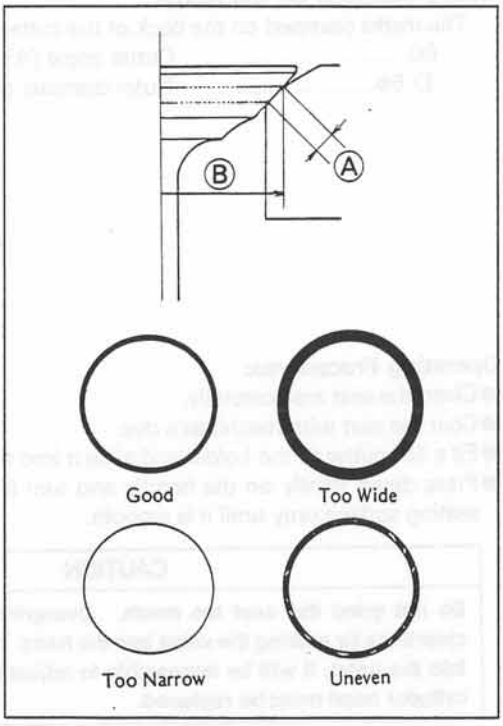
● Holding the adjusting screw with the holder [C], tighten the locknut.

Special Tool – Valve Adjusting Screw Holder: 57001-1217

Torque – Locknut : 9.8 N-m (1.0 kg-m, 87 in-lb)



Valve Seat Inspection



- Remove the valve.
- Coat the valve seat with machinist's dye.
- Push the valve into the guide.
- Rotate the valve against the seat with a lapping tool.
- Pull the valve out, and check the seating pattern on the valve head. It must be the correct width [A] and even all the way around.

NOTE

○*The valve stem and guide must be in good condition, or this check will not be valid.*

★If the valve seating pattern is not correct, repair the seat.

- Measure the outside diameter [B] of the seating pattern on the valve seat.

★If the outside diameter of the valve seating pattern is too large or too small, repair the seat.

Valve Seating Surface Outside Diameter
Inlet: 29.5 mm
Exhaust: 25.5 mm

Valve Seating Surface Width
Standard: 0.5 ~ 1.1 mm

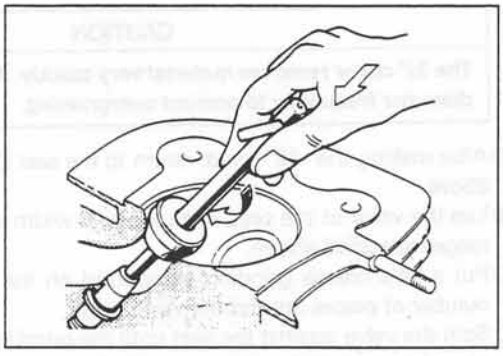
Valve Seat Repair

- Follow the manufacturer's instructions for use of valve seat cutters.

Special Tool – Valve Seat Cutter, 45° – Φ35: 57001-1116 [IN]
Valve Seat Cutter, 32° – Φ30: 57001-1120 [EX]
Valve Seat Cutter, 45° – Φ30: 57001-1187 [EX]
Valve Seat Cutter, 32° – Φ33: 57001-1199 [IN]
Valve Seat Cutter Holder, Φ6: 57001-1360
Valve Seat Cutter Holder Bar: 57001-1128

★If the manufacture's instructions are not available, use the following procedure.

Seat Cutter Operating Cares:



1. The valve seat cutter is designed only for valve seat repair. Therefore the cutter must not be used for other purposes.
2. Do not drop or hit the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

4. Setting the valve seat cutter holder in position, operate the cutter with one hand. Do not apply too much force to the diamond portion.

NOTE

○*Prior to grinding, apply oil to the cutter, and during the operation wash off any ground particles sticking to the cutter with washing oil.*

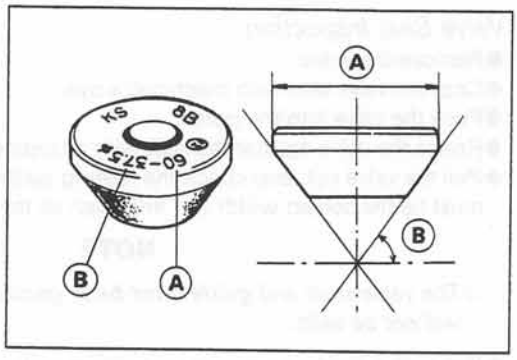
5. After use wash the cutter with washing oil and apply a thin layer of engine oil before storing.

Marks Stamped on the Cutter:

The marks stamped on the back of the cutter represent the following.

60 ..... Cutter angle [A]

37.5Φ ..... Outer diameter of cutter [B]



Operating Procedures:

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter to the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

CAUTION
Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

- Measure the outside diameter (O.D.) of the seating surface with a vernier caliper.

★If the O.D. of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

★If the O.D. of the seating surface is too large, make the 32° grind described below.

- Grind the seat at a 32° angle until the seat O.D. is within the specified range.

○To make the 32° grind, fit a 32° cutter to the holder, and slide it into the valve guide.

○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

CAUTION
The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

○After making the 32° grind, return to the seat O.D. measurement step above.

- Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.

○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

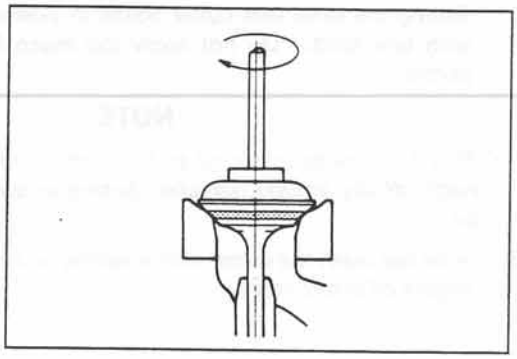
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

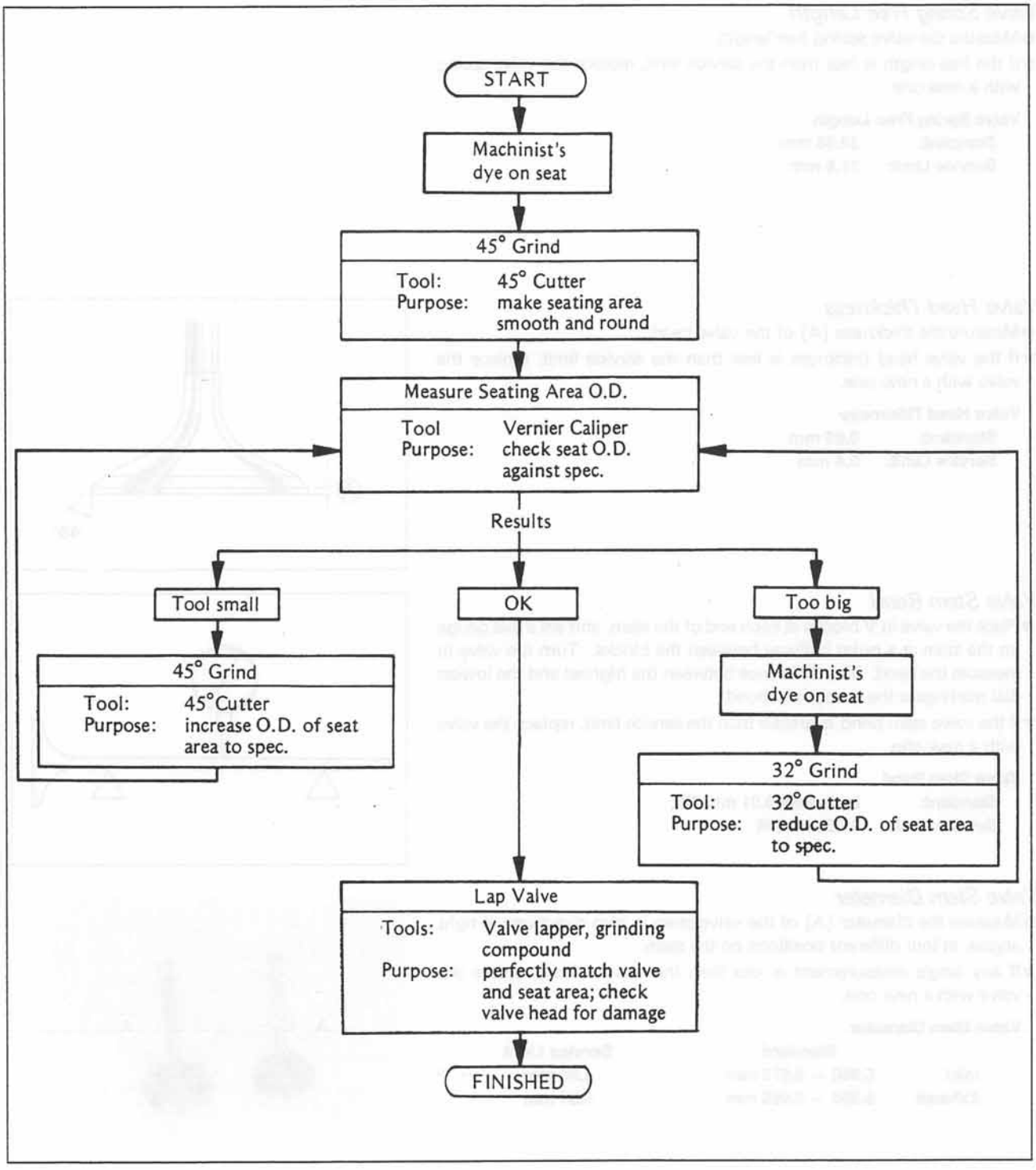
○Repeat the process with a fine grinding compound.

- The seating area should be marked about in the middle of the valve face.

★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearances (see Valve Clearance Adjustment).




START
Machinist's dye on seat
45° Grind
Tool: 45° Cutter
Purpose: make seating area smooth and round
Measure Seating Area O.D.
Tool Vernier Caliper
Purpose: check seat O.D. against spec.
Results
Tool small
OK
Too big
45° Grind
Tool: 45°Cutter
Purpose: increase O.D. of seat area to spec.
Machinist's dye on seat
32° Grind
Tool: 32°Cutter
Purpose: reduce O.D. of seat area to spec.
Lap Valve
Tools: Valve lapper, grinding compound
Purpose: perfectly match valve and seat area; check valve head for damage
FINISHED

Valve Spring Free Length

● Measure the valve spring free length.

★ If the free length is less than the service limit, replace the valve spring with a new one.

Valve Spring Free Length

Standard:	**32.55 mm**
Service Limit:	**31.6 mm**

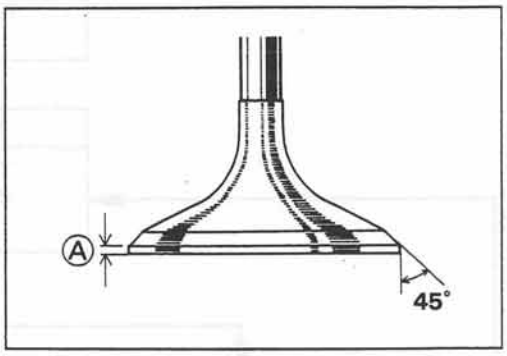
Valve Head Thickness

● Measure the thickness [A] of the valve head.

★ If the valve head thickness is less than the service limit, replace the valve with a new one.

Valve Head Thickness

Standard:	**0.85 mm**
Service Limit:	**0.4 mm**



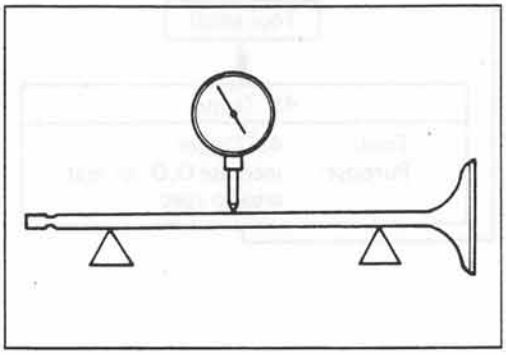
Valve Stem Bend

● Place the valve in V blocks at each end of the stem, and set a dial gauge on the stem at a point halfway between the blocks. Turn the valve to measure the bend. The difference between the highest and the lowest dial readings is the amount of bend.

★ If the valve stem bend is greater than the service limit, replace the valve with a new one.

Valve Stem Bend

Standard:	**Less than 0.01 mm TIR**
Service Limit:	**0.05 mm TIR**



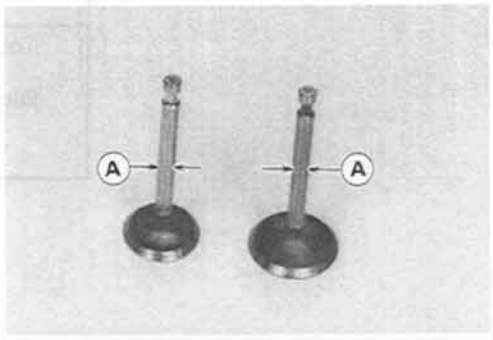
Valve Stem Diameter

● Measure the diameter [A] of the valve stem in two directions at right angles, at four different positions on the stem.

★ If any single measurement is less than the service limit, replace the valve with a new one.

Valve Stem Diameter

	Standard	Service Limit
Inlet	**5.960 ~ 5.975 mm**	**5.95 mm**
Exhaust	**5.950 ~ 5.965 mm**	**5.94 mm**



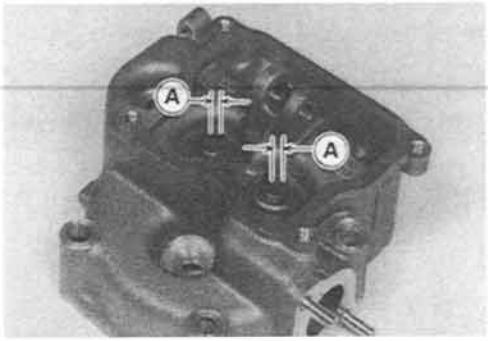
Valve Guide Inside Diameter

● Measure the inside diameter [A] of the valve guide.

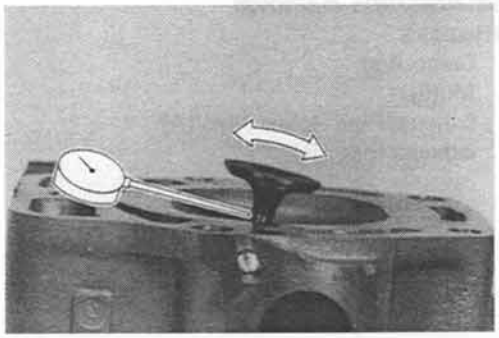
★ If the valve guide has worn past the service limit, replace the cylinder head.

Valve Guide Inside Diameter

Standard:	**6.000 ~ 6.015 mm**
Service Limit:	**6.08 mm**



Measuring Valve/Guide Clearance (Wobble Method)



If a small bore gauge is not available, inspect the valve guide wear by measuring the valve/guide clearance with the wobble method, as indicated below.

- Insert a new valve into the guide from the top of the head.
- Set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head upper surface.
- Move the stem back and forth to measure 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.

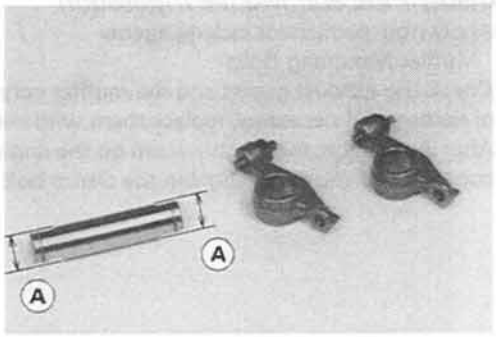
NOTE

○*The reading is not actual valve/guide clearance because the measuring point is above the guide.*

Valve/Guide Clearance (Wobble Method)

	Standard	Service Limit
Inlet	**0.06 ~ 0.12 mm**	**0.23 mm**
Exhaust	**0.08 ~ 0.14 mm**	**0.25 mm**

Rocker Arm/Shaft Wear

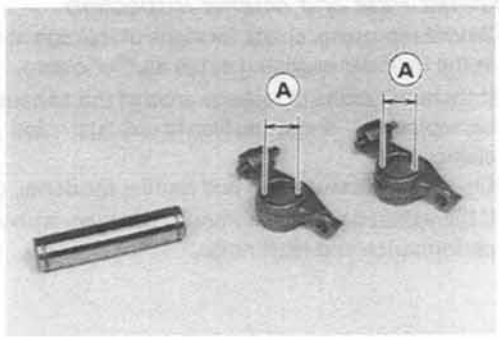


- Measure the diameter [A] of the rocker shaft.

★If the shaft has worn past the service limit, replace the rocker shaft with a new one.

Rocker Shaft Diameter

Standard: 11.989 ~ 12.000 mm
Service Limit: 11.95 mm



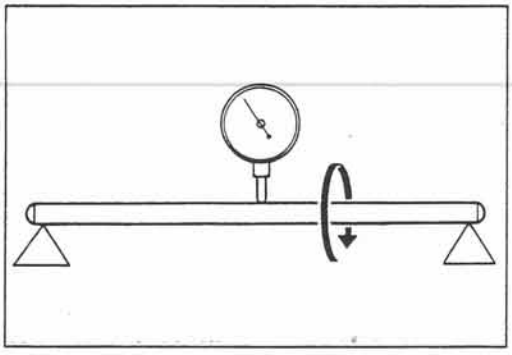
- Measure the inside diameter [A] of the rocker arm.

★If the bearing has worn past the service limit, replace the rocker arm with a new one.

Rocker Arm Inside Diameter

Standard: 12.006 ~ 12.024 mm
Service Limit: 12.05 mm

Rocker Arm Push Rod Inspection



- Place the rocker arm push rod in V blocks that are as far apart as possible, and set a dial gauge on the rod at a point halfway between the blocks. Turn the rod to measure the runout. The difference between the highest and the lowest dial readings is the amount of runout.

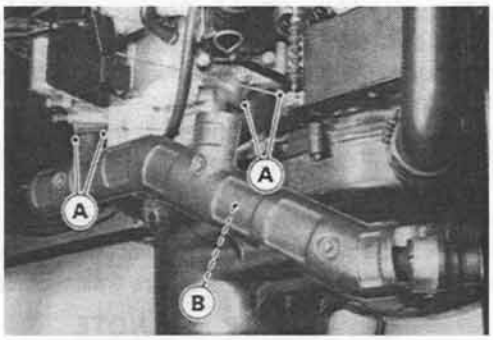
★If the runout exceeds the service limit, replace the rod.

Rocker Arm Push Rod Runout

Standard: Less than 0.5 mm TIR
Service Limit: 0.8 mm TIR

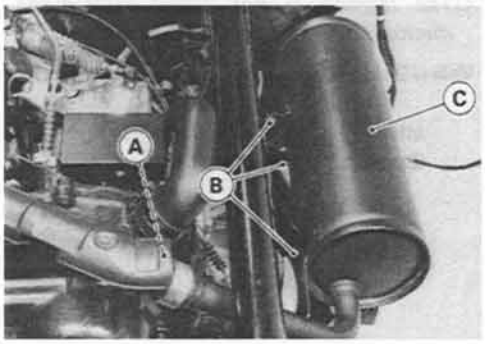
Exhaust Pipe and Muffler

Exhaust Pipe Removal



- Remove:
  - Cargo Bed
  - Muffler
  - Exhaust Pipe Holder Nuts [A]
  - Exhaust Pipe [B]

Muffler Removal



- Remove:
  - Cargo Bed
  - Clamp Bolt (loosen) [A]
  - Muffler Mounting Bolts [B]
  - Muffler [C]

Exhaust Pipe and Muffler Installation

- Apply non-permanent locking agent:
  - Muffler Mounting Bolts
- Check the exhaust gasket and the muffler connecting gasket for signs of damage. If necessary, replace them with new ones.
- After installation, thoroughly warm up the engine, wait until the engine cools down, and then retighten the clamp bolt and holder nuts.

Exhaust Pipe and Muffler Inspection

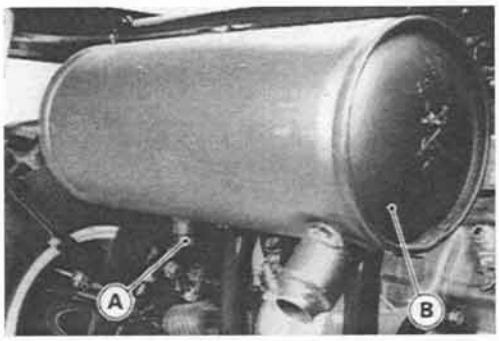
- Before removing, check for signs of leakage at the exhaust pipe gasket in the cylinder head and at the muffler clamp.

★If there are signs of leakage around the exhaust pipe gasket, it should be replaced. If the muffler-to-exhaust pipe joint leaks, tighten the clamp.

- Check the exhaust pipe and muffler for dents, cracks, rust and holes.

★If the exhaust pipe or muffler is damaged, it should be replaced for best performance and least noise.

Spark Arrester Cleaning



⚠WARNING

To avoid burns, wear gloves while cleaning the spark arrester. Since the engine must be run during this procedure, the muffler will become hot.

- Remove the drain plug [A] from the muffler [B].
- Apply the parking brake.
- In an open area away from combustible materials, start the engine with the gear shift lever in the N(neutral) position.
- Raise and lower engine speed while tapping on the muffler with a rubber mallet until the carbon particles are purged from the muffler.

⚠WARNING

Do not run the engine in a closed area. Exhaust gases contain carbon monoxide; a colorless, odorless, poisonous gas. Breathing exhaust gas can lead to carbon monoxide poisoning, asphyxiation, and death.

- Stop the engine.
- Install the drain plug.

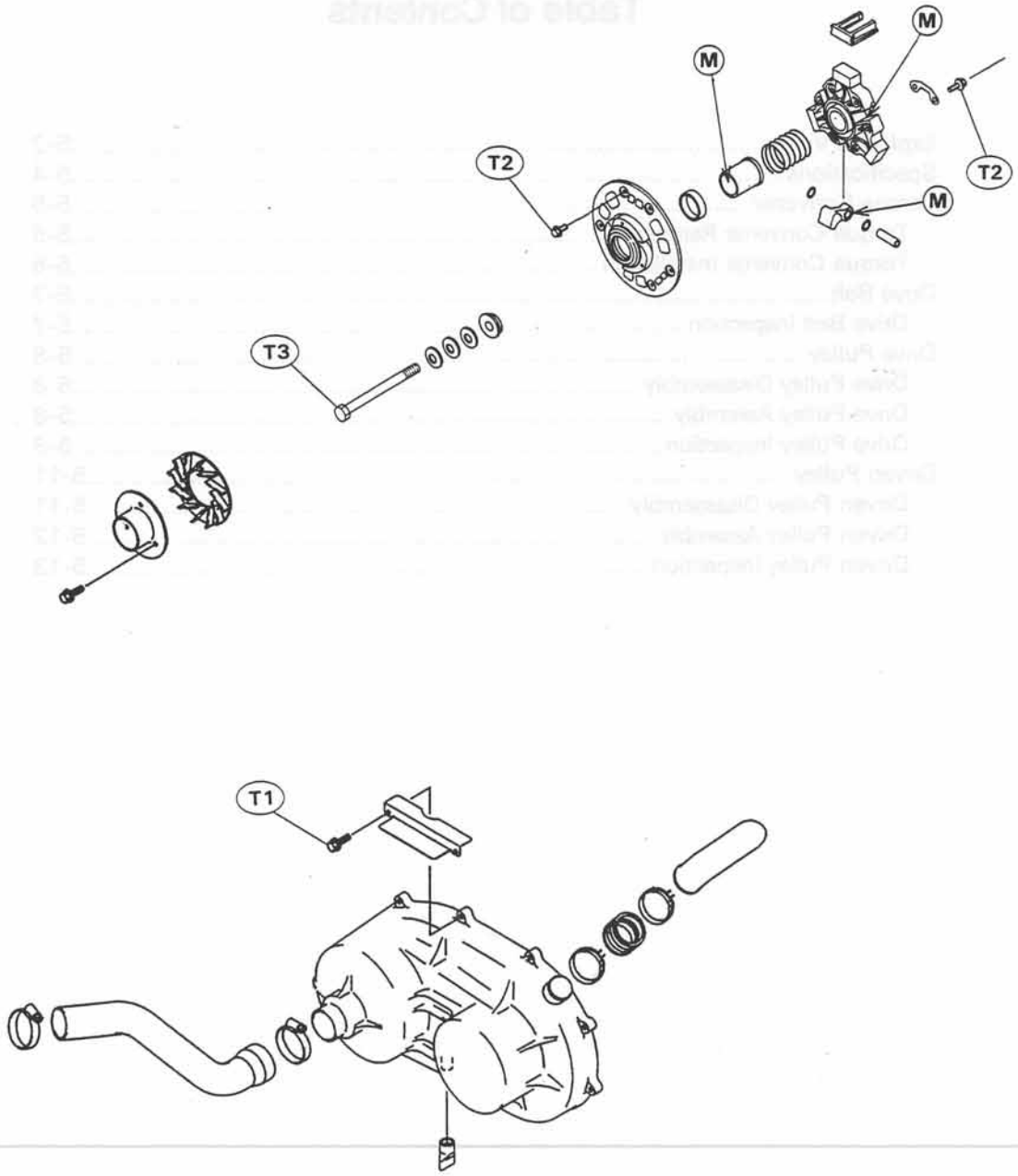
Converter System

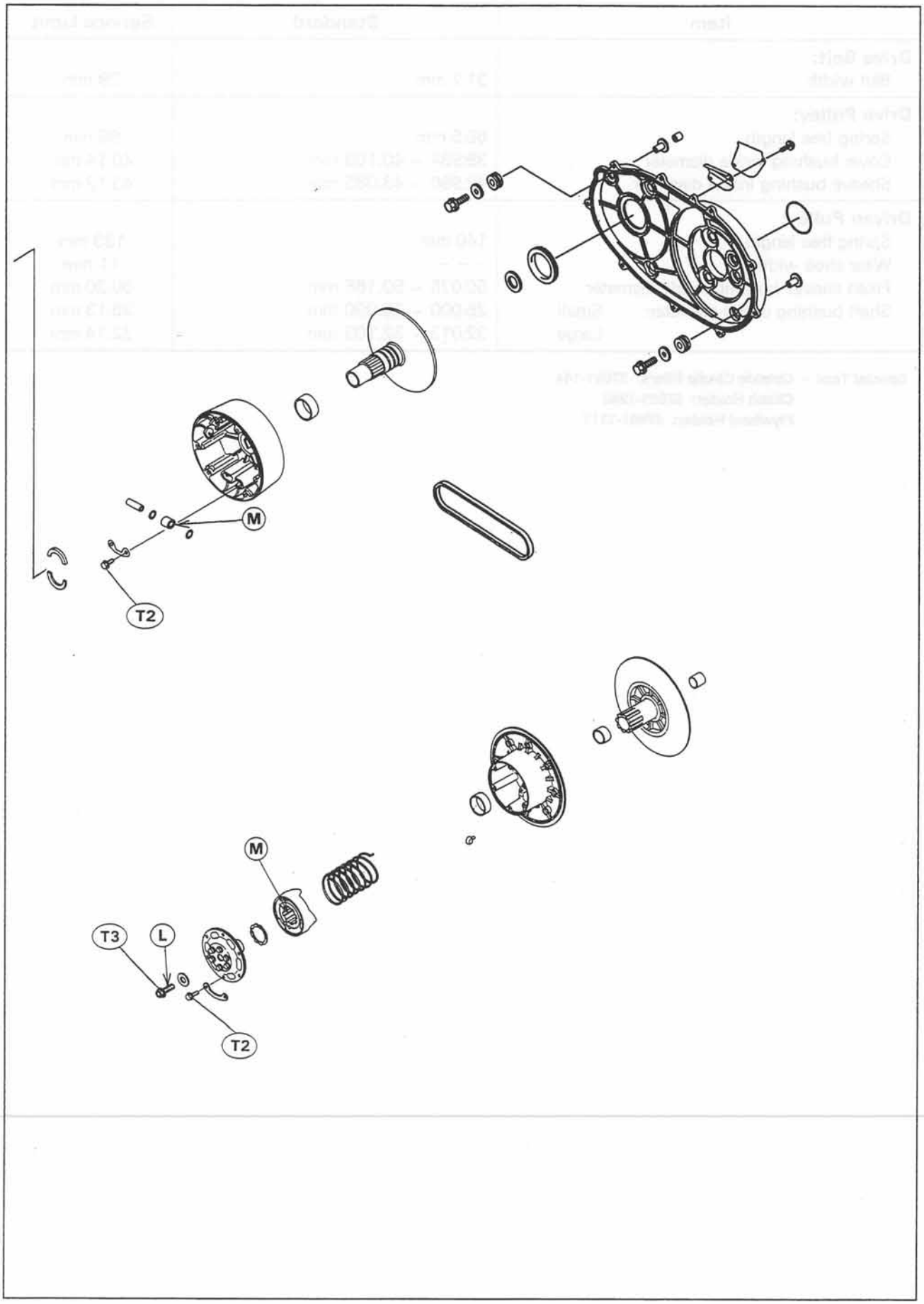
Table of Contents

Exploded View

L : Apply non-permanent locking agent.
M : Apply molybdenum disulfide grease.

T1 : 1.5 N-m (0.15 kg-m, 13 in-lb)
T2 : 13 N-m (1.3 kg-m, 113 in-lb)
T3 : 93 N-m (9.5 kg-m, 69 ft-lb)




M
T2
M
T3
L
T2

Specifications

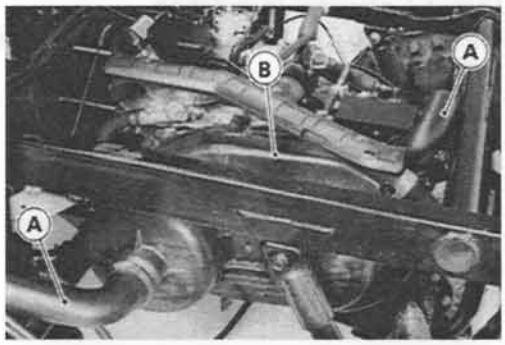
Item	Standard	Service Limit
Drive Belt:		
Belt width	31.2 mm	29 mm
Drive Pulley:		
Spring free length	69.5 mm	66 mm
Cover bushing inside diameter	39.984 ~ 40.108 mm	40.14 mm
Sheave bushing inside diameter	42.990 ~ 43.085 mm	43.12 mm
Driven Pulley:		
Spring free length	140 mm	133 mm
Wear shoe width	- - -	11 mm
Fixed sheave bushing inside diameter	50.075 ~ 50.165 mm	50.20 mm
Shaft bushing inside diameter: Small	25.000 ~ 25.090 mm	25.13 mm
Large	32.013 ~ 32.103 mm	32.14 mm

Special Tool – Outside Circlip Pliers: 57001-144
Clutch Holder: 57001-1243
Flywheel Holder: 57001-1313

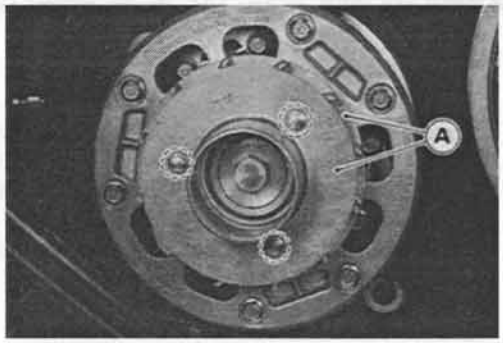
Torque Converter

Torque Converter Removal

● Remove:
Cargo Bed
Air Ducts [A]
Torque Converter Cover [B]



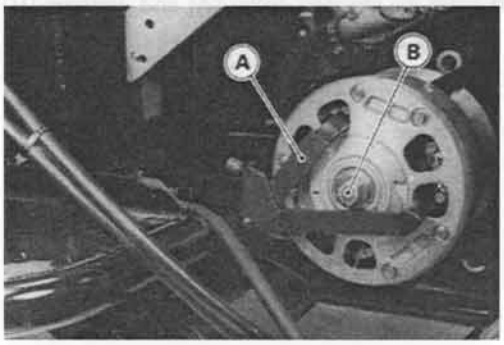
● Remove:
Cooling Fan and Cover [A]



● Using the clutch holder [A], remove the drive pulley bolt [B].

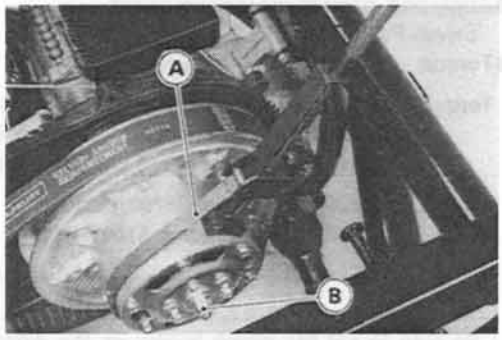
CAUTION
Be sure to set the clutch holder on the drive pulley cover. If the holder is set on the spider assembly, the assembly may be broken.

Special Tool – Clutch Holder: 57001-1243

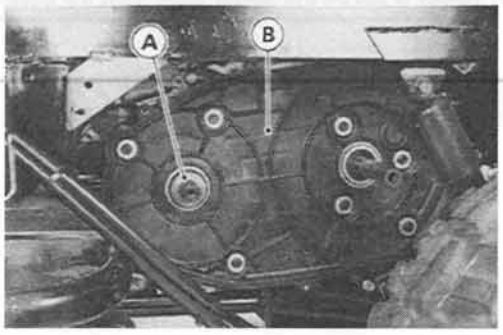


● Using the flywheel holder [A], remove the driven pulley bolt [B].

Special Tool – Flywheel Holder: 57001-1313

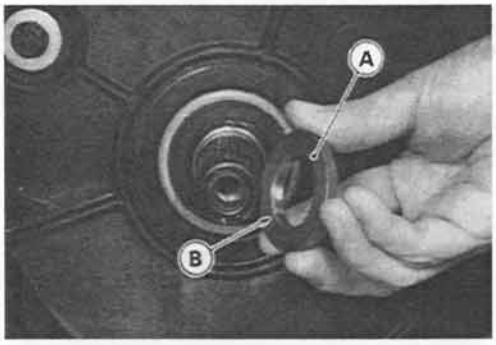


● Remove:
Drive Pulley, Driven Pulley, and Drive Belt
Spacer [A]
Converter Case [B]

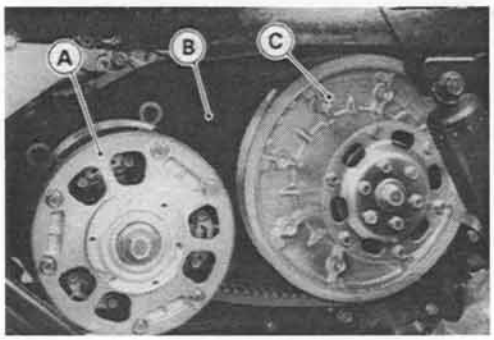


Torque Converter Installation

● Install the spacer [A] so as to face the chamfered side [B] to the crankcase.



● Install the drive pulley [A], driven pulley [B], and drive belt [C] together.

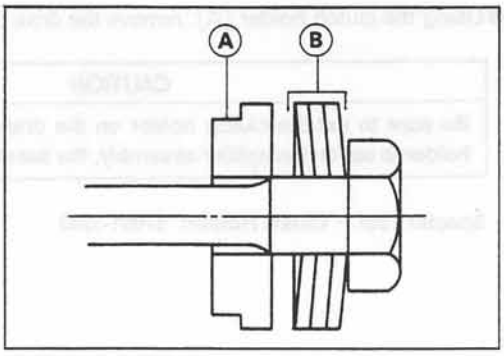


NOTE

○ *First engage the spline on the driven pulley with the spline on the drive shaft, next engage the spline on the drive pulley with the spline on the crankshaft, and push into them together at the same time.*

○ *When engaging the spline on the pulleys with the spline on the shafts, do not burr on the pulley's spline. If any burr occur, surely remove it with a file.*

● Install the stepped collar [A] and washers [B] as shown on the drive pulley bolt.



● Apply non-permanent locking agent:
Driven Pully Bolt

● Torque:

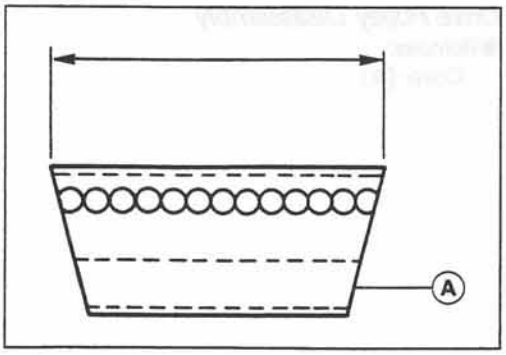
Torque – Drive Pulley Bolt: 93 N-m (9.5 kg-m, 69 ft-lb)
Driven Pulley Bolt: 93 N-m (9.5 kg-m, 69 ft-lb)
Converter Cover Bolts: 1.5 N-m (0.15 kg-m, 13 in-lb)

Special Tool – Clutch Holder: 57001-1243
Flywheel Holder: 57001-1313

CAUTION
Be sure to set the clutch holder on the drive pulley cover. If the holder is set on the spider assembly, the assembly may be broken.

Drive Belt

Drive Belt Inspection



● Measure the width of the belt [A].

★ If any measurements exceed the service limit, replace the belt.

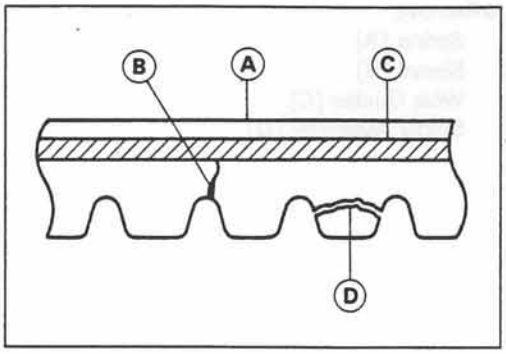
Belt Width

Standard:	**31.2 mm**
Service Limit:	**29 mm**

● Check the belt for wear, cracks or breaks.

★ If necessary, replace the belt with a new one.

Belt [A]
Crack [B]
Kevlar Cord [C]
Broken [D]



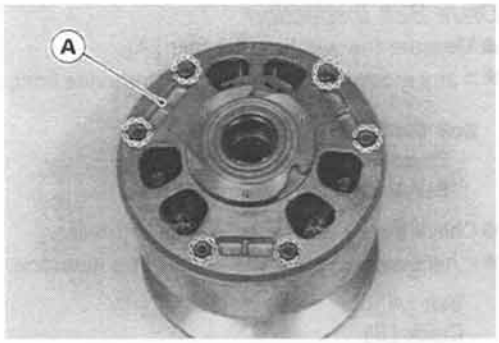
NOTE

○ *Whenever the belt is replaced, inspect the drive and the driven pulleys.*

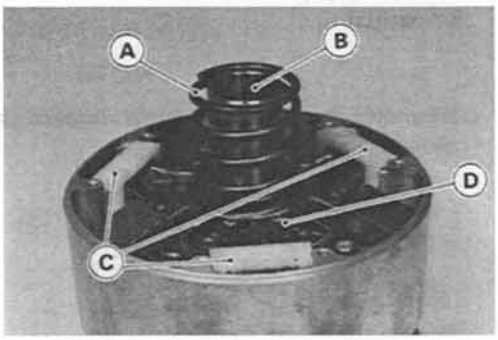
Drive Pulley

Drive Pulley Disassembly

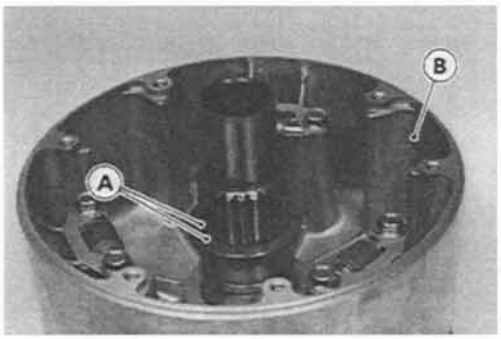
● Remove:
Cover [A]



● Remove:
Spring [A]
Sleeve [B]
Wear Guides [C]
Spider Assembly [D]

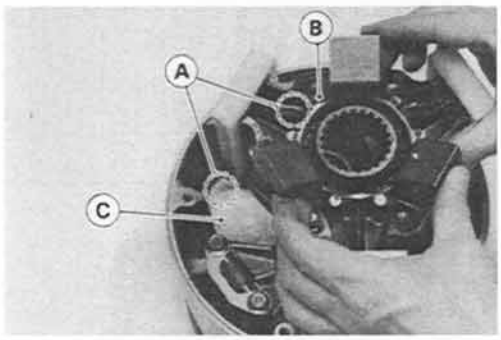


● Remove:
Split Ring [A]
Movable Sheave [B]
Fixed Sheave

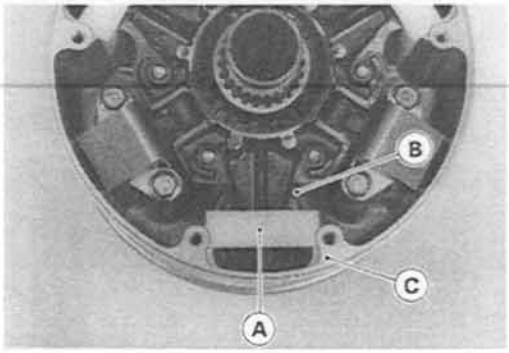


Drive Pulley Assembly

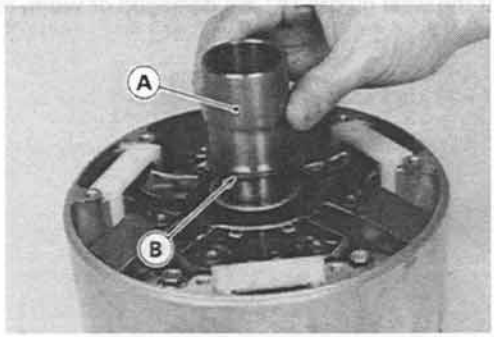
● Align the arrows [A] on the spider assembly [B] and the movable sheave [C].



● Fit the wear guides [A] into the correct position between the spider assembly [B] and the movable sheave [C].

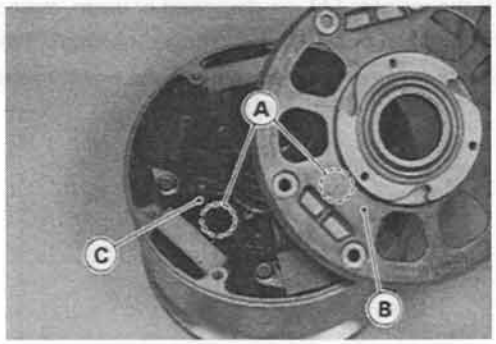


●Put the sleeve [A] on the shaft so that the flanged side [B] is down.



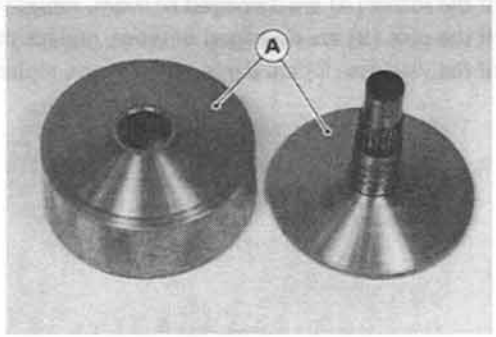
●Align the arrows [A] on the cover [B] and the spider assembly [C].
●Torque:

Torque – Drive Pulley Cover Bolts: 13 N-m (1.3 kg-m, 113 in-lb)



Drive Pulley Inspection

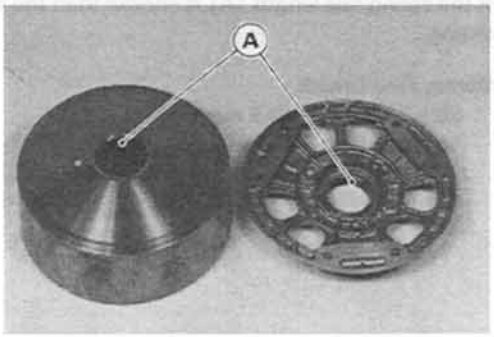
★If the sheave surfaces [A] appear damaged, replace the sheaves.



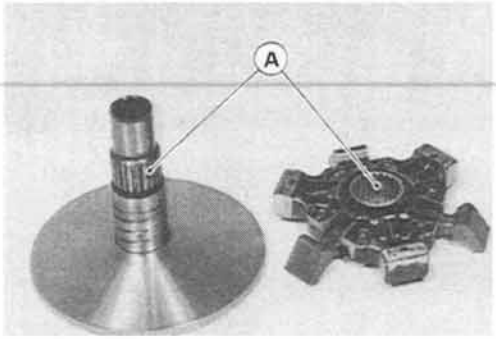
★If the guide bushings [A] are damaged or worn, replace them.

Cover Bushing Inside Diameter
Standard: 39.984 ~ 40.108 mm
Service Limit: 40.14 mm

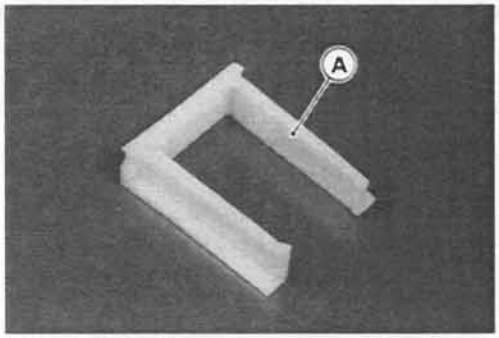
Sheave Bushing Inside Diameter
Standard: 42.990 ~ 43.085 mm
Service Limit: 43.12 mm



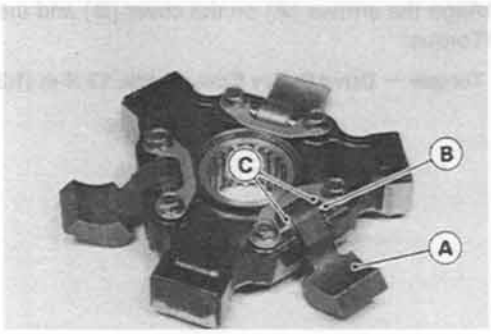
★If the splines [A] are badly worn, replace the fixed sheave.



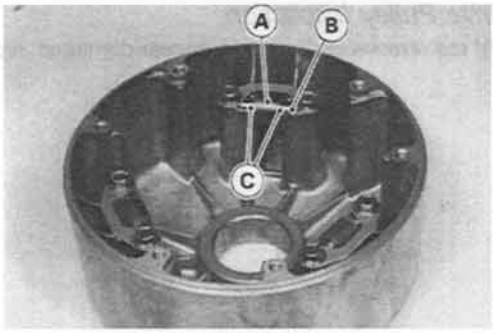
★If the wear guides [A] are damaged or worn, replace them.



★If the weights [A] are damaged or worn, replace them.
★If the pivot pins [B] are damaged or worn, replace them.
★If the washers [C] are damaged or worn, replace them.



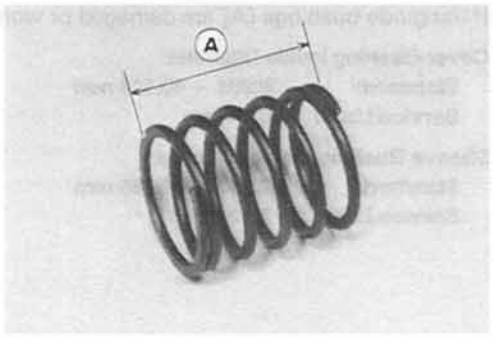
★If the rollers [A] are damaged or worn, replace them.
★If the pins [B] are damaged or worn, replace them.
★If the washers [C] are damaged or worn, replace them.



★If the spring free length [A] is shorter than the service limit, replace the spring.

Spring Free Length

Standard:	**69.5 mm**
Service Limit:	**66 mm**

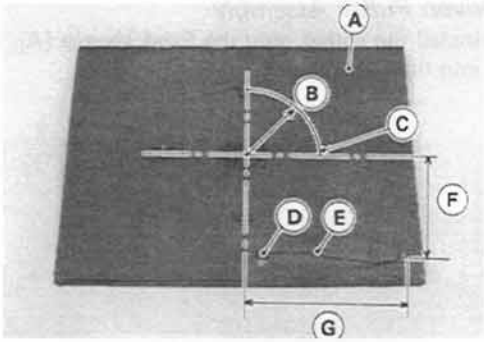


Driven Pulley

Driven Pulley Disassembly

● Make the driven pulley holder as shown if necessary.

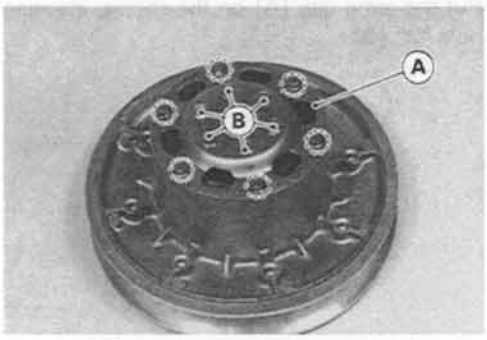
A. Wooden Board: 500 x 500 x 10 mm
B. Radius: 80 mm
C. Bolts: 6 mm dia., 30 mm length
D. Stopper Pin: 8 mm dia., 25 mm length
E. Wire: 140 mm length
F. 130 mm
G. 150 mm

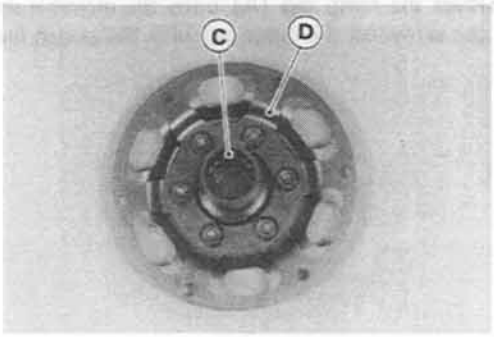


● Remove:
Coupling [A]

NOTE

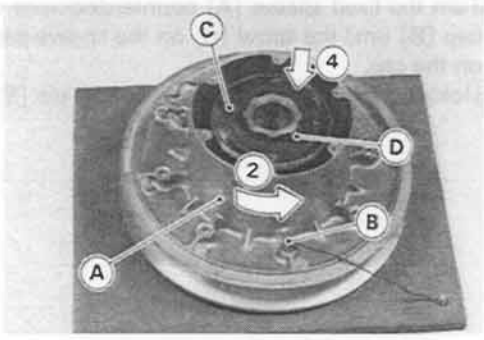
○ *Do not loosen the coupling inside bolts [B]. The shaft hub [C] and the coupler plate [D] are balanced at the factory.*





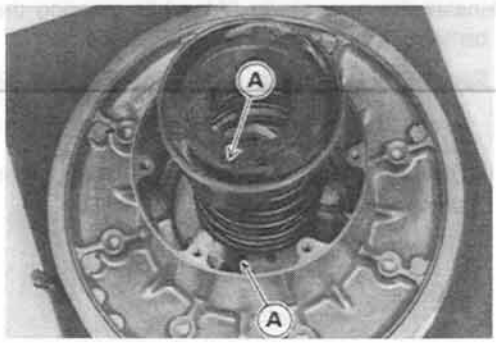
● Disassemble the driven pulley in accordance with the following procedures.
1. Set the driven pulley on the driven pulley holder.
2. Turn the fixed sheave [A] counterclockwise about 45°.
3. Hold the fixed sheave with the stopper pin [B].
4. Press the ramp cap [C].
5. Remove the circlip [D].
6. Release the fixed sheave slowly.
7. Remove the ramp cap and spring.

Special Tool – Outside Circlip Pliers: 57001-144



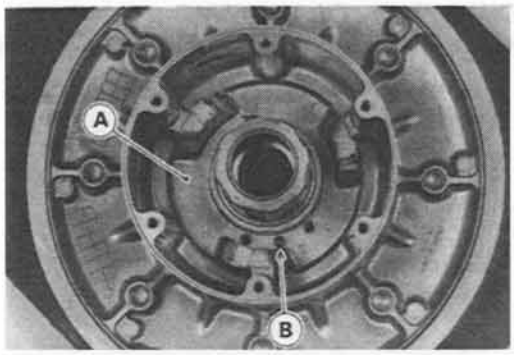
NOTE

○ *Mark and record the locations of the spring end fitting holes [A].*

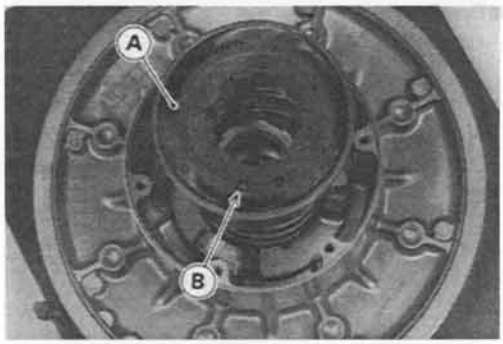


Driven Pulley Assembly

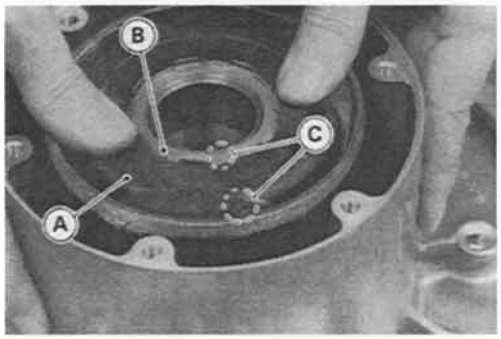
● Install the spring onto the fixed sheave [A], inserting the spring end into the hole "B" [B].



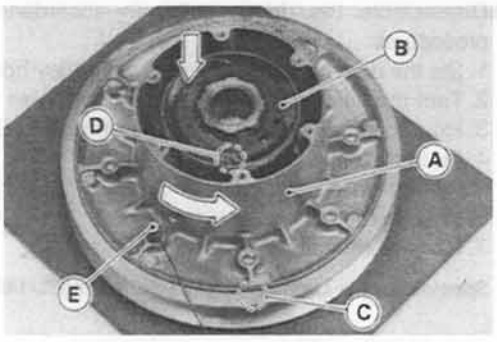
● Put the ramp cap [A] on the spring, inserting the spring end into the hole "2" [B].



● Press the ramp cap [A] onto the movable sheave shaft [B], aligning the arrow on the ramp cap with the punch mark on the shaft [C].



● Turn the fixed sheave [A] counterclockwise while pressing the ramp cap [B] until the arrow [C] on the sheave passes over the arrow [D] on the cap.
● Hold the fixed sheave with the stopper pin [E].

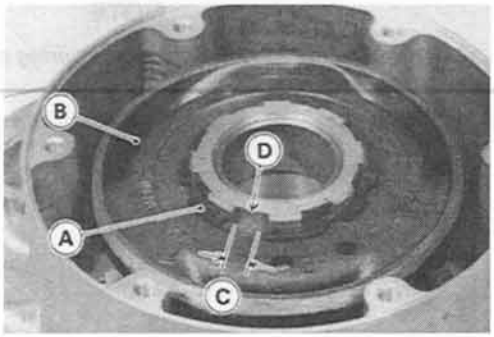


● Install the new circlip [A] while pressing the ramp cap [B] to the bottom.

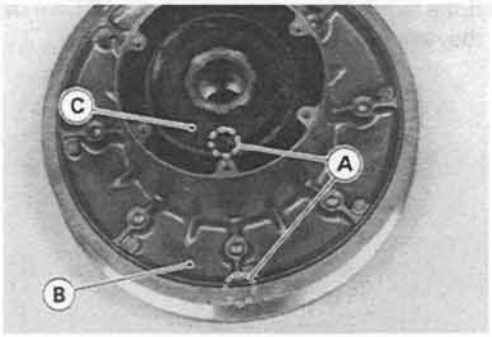
Special Tool – Outside Circlip Pliers: 57001-144

NOTE

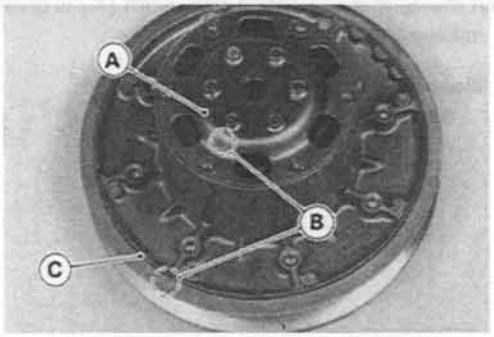
○ *Install the circlip so that the opening [C] is aligned with a spline groove [D].*



● Check for the alignment of the arrows [A] on the fixed sheave [B] and the ramp cap [C].



● Install the coupling [A] so that the arrow [B] on it is aligned with the arrow [B] on the fixed sheave [C].
● Torque:
Torque – Driven Pulley Coupling Bolts: 13 N-m (1.3 kg-m, 113 in-lb)



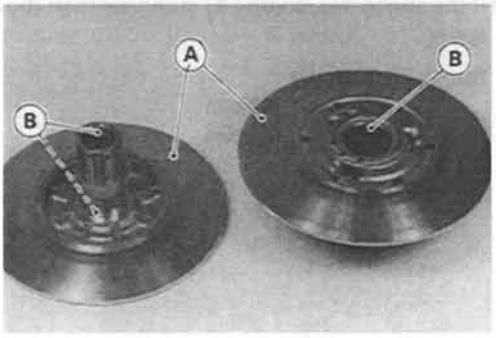
Driven Pulley Inspection

★If the sheave surfaces [A] appear damaged, replace the sheaves.
★If the guide bushings [B] are damaged or worn, replace them.

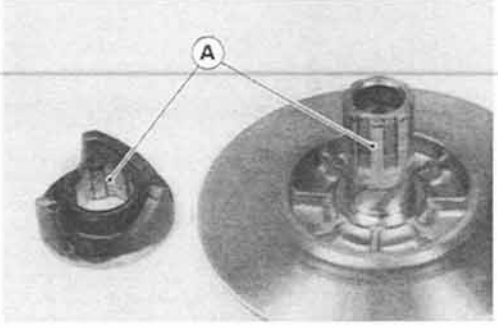
Fixed Sheave Bushing Inside Diameter
Standard: **50.075 ~ 50.165 mm**
Service Limit: **50.20 mm**

Shaft Bushing Inside Diameter (Small)
Standard: **25.000 ~ 25.090 mm**
Service Limit: **25.13 mm**

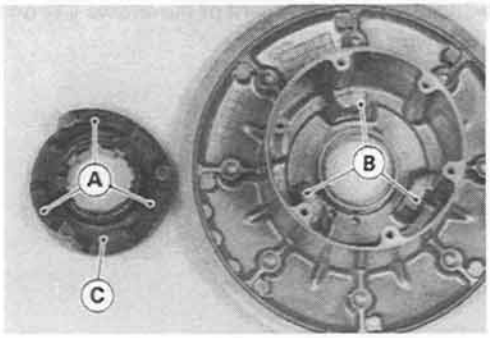
Shaft Bushing Inside Diameter (Large)
Standard: **32.013 ~ 32.103 mm**
Service Limit: **32.14 mm**



★If the splines [A] are damaged or worn, replace them.

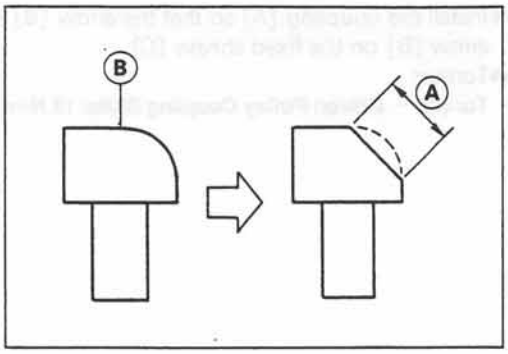


★If the ramps [A] or the wear shoes [B] are damaged or worn, replace the ramp cap [C] or the shoes.



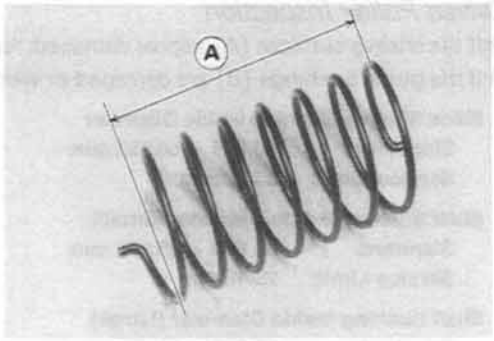
★If the wear shoe contact area width [A] is greater than the service limit, replace the shoe [B].

Wear Shoe Width
Service Limit: 11 mm



★If the spring free length [A] is shorter than the service limit, replace the spring.

Spring Free Length
Standard: 140 mm
Service Limit: 133 mm



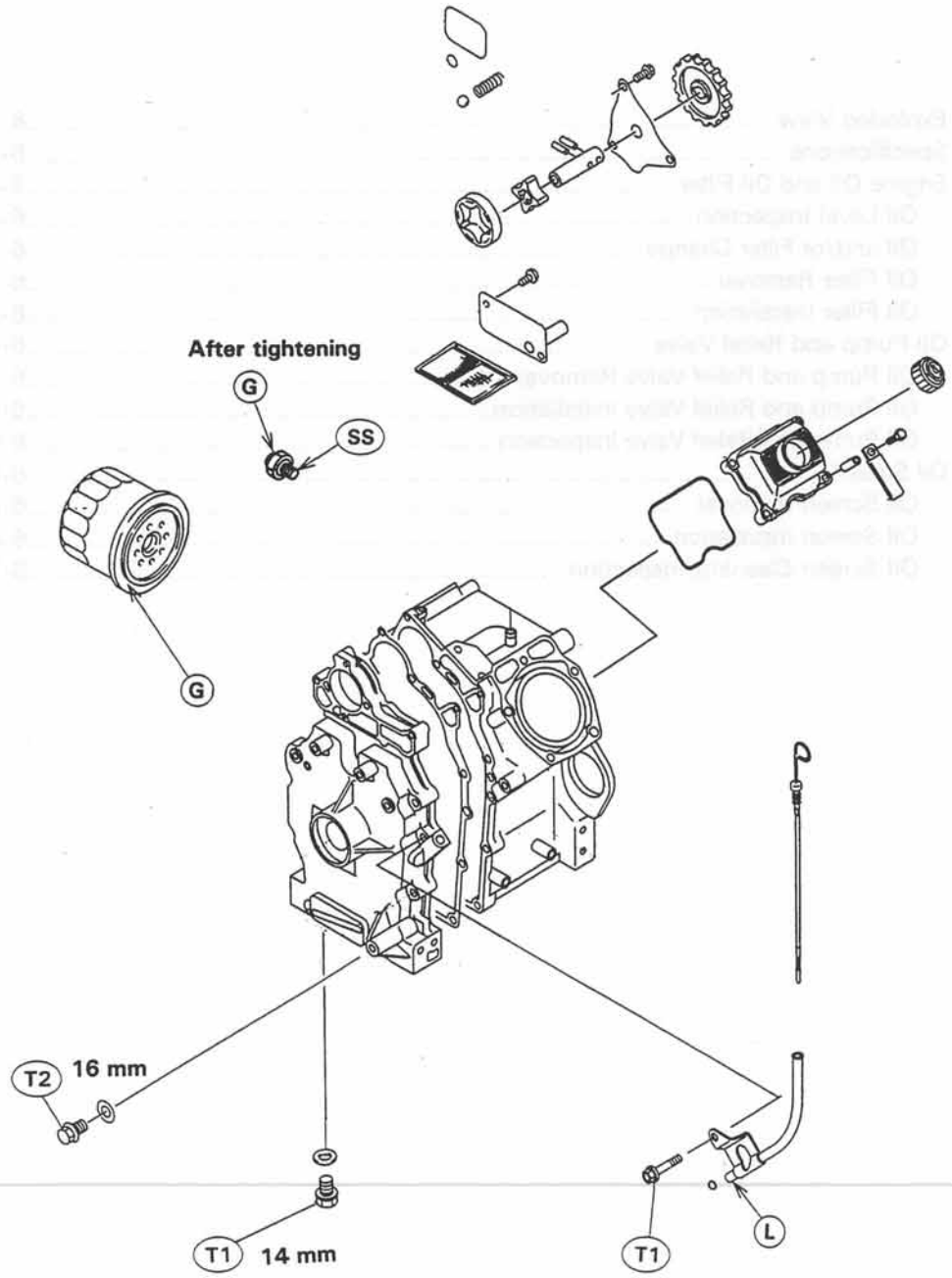
Engine Lubrication System

Table of Contents

Exploded View

G : Apply grease.
L : Apply non-permanent locking agent.
SS : Apply silicone sealant.

T1 : 22 N-m (2.2 kg-m, 16.0 ft-lb)
T2 : 25 N-m (2.5 kg-m, 18.0 ft-lb)



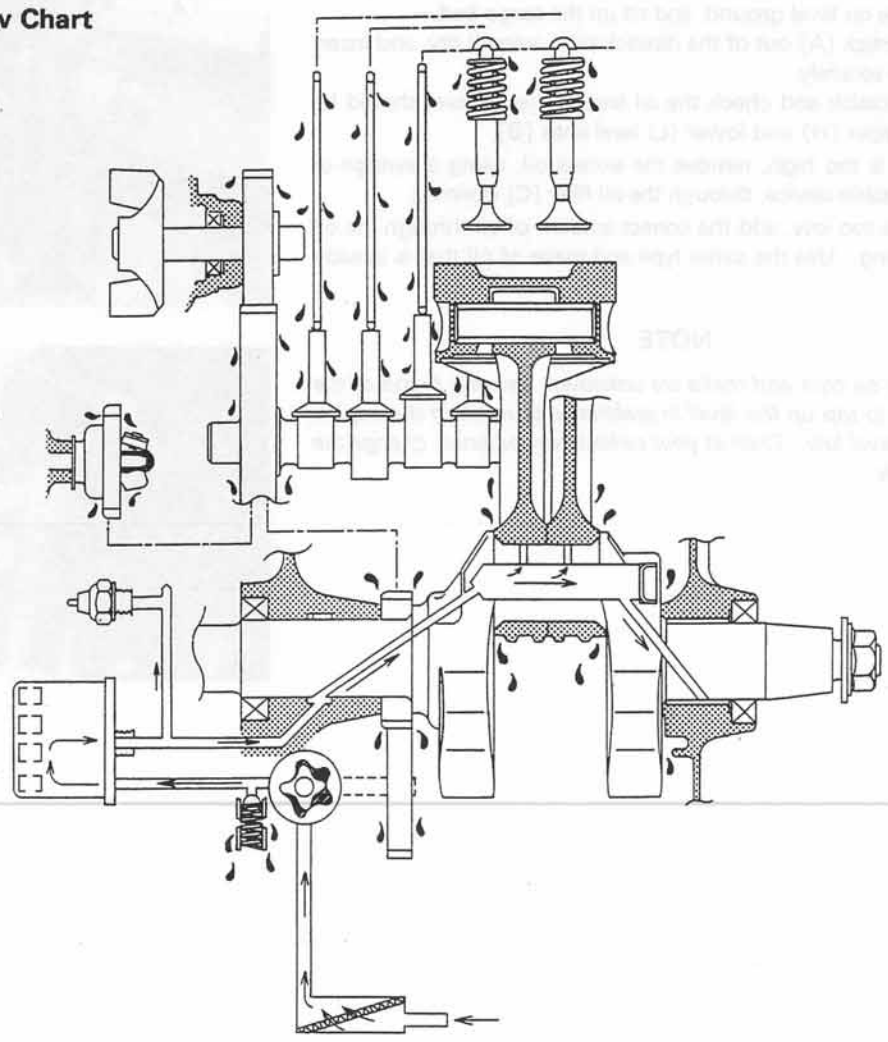
Specifications

Item		Standard	Service Limit
Engine Oil and Oil Filter:			
Engine oil:	Grade	SE, SF, or SG class	– – –
	Viscosity	SAE10W-40, 10W-50, 20W-40, or 20W-50	– – –
	Capacity	1.5 L (when filter is not removed)	– – –
		1.8 L (when filter is removed)	– – –
	Oil level	Between upper and lower level lines	– – –
Oil Pump and Relief Valve:			
Inner rotor/outer rotor clearance		Less than 0.14 mm	0.3 mm
Inner rotor shaft diameter		10.973 ~ 10.984 mm	10.93 mm
Inner rotor shaft bearing inside diameter		11.000 ~ 11.011 mm	11.07 mm
Outer rotor diameter		40.53 ~ 40.56 mm	40.47 mm
Outer rotor housing inside diameter		40.680 ~ 40.701 mm	40.80 mm
Outer rotor width		9.98 ~ 10.00 mm	9.83 mm
Rotor housing depth		10.030 ~ 10.080 mm	10.23 mm

Special Tool – Oil Filter Wrench: 57001-1249

Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

Engine Oil Flow Chart



Engine Oil and Oil Filter

⚠WARNING

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

Oil Level Inspection

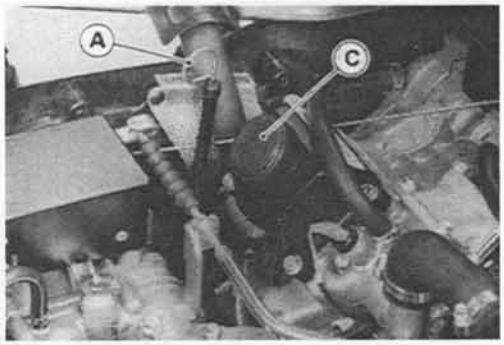
NOTE

○*If the vehicle has just been used, wait several minutes for all the oil to drain down.*

○*If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

CAUTION

Racing the engine before the oil reaches every part can cause engine seizure.



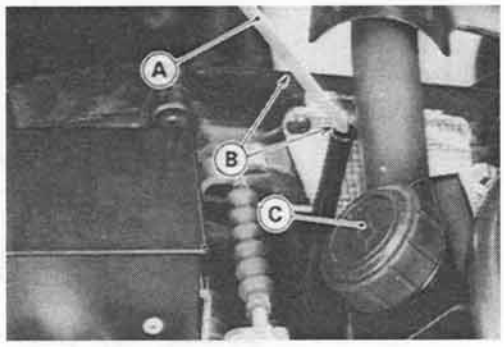
- Park the vehicle on level ground, and tilt up the cargo bed.
- Pull up the dipstick [A] out of the dipstick tube, wipe it dry, and insert it into the tube securely.
- Pull out the dipstick and check the oil level. The oil level should be between the upper (H) and lower (L) level lines [B].

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device, through the oil filler [C] opening.

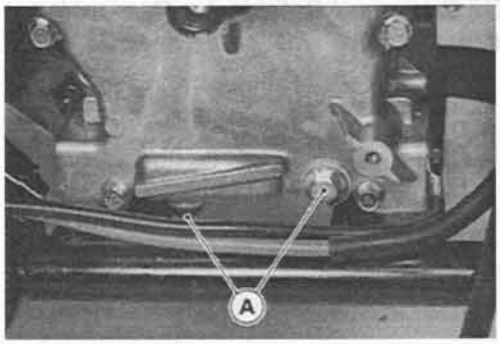
★If the oil level is too low, add the correct amount of oil through the oil filler [C] opening. Use the same type and make of oil that is already in the engine.

NOTE

○*If the engine oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*



Oil and/or Filter Change



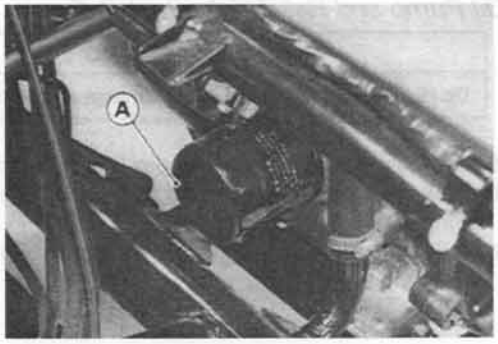
- ●Warm up the engine so that the oil will pick up any sediment and drain easily.
- ●Place an oil pan beneath the engine.
- ●Remove the engine oil drain plugs [A], and let the oil drain completely.
- ●If the oil filter is to be changed, replace it with a new one.
- ●Check the gaskets at the drain plugs for damage.
- ★Replace the gaskets with new ones if they are damaged.
- ●After the oil has completely drained out, install the drain plugs with the gaskets.

Torque – Engine Oil Drain Plug (14mm): 22 N-m (2.2 kg-m, 16.0 ft-lb)
(16mm): 25 N-m (2.5 kg-m, 18.0 ft-lb)

- ●Fill the engine with a good quality motor oil as specified in the table.
- ●Check the oil level.

Engine Oil	
Grade:	**SE, SF, or SG class**
Viscosity:	**SAE10W-40, 10W-50, 20W-40, or 20W-50**
Capacity:	**1.5 L (when filter is not removed)**
	1.8 L (when filter is removed)
Oil level:	**Between upper and lower level lines**

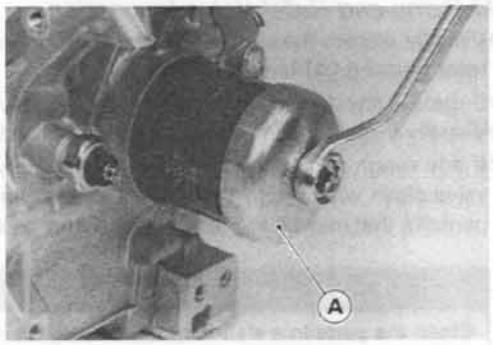
Oil Filter Removal



- ●Tilt up the cargo bed.
- ●Remove the oil filter [A].
- ○When unscrewing the oil filter, cover the filter bottom with a clean cloth so as not to spill the engine oil out of the filter. Any spilt oil should be wiped up completely.

- ○Use the oil filter wrench [A] if the oil filter is tight.

Special Tool – Oil Filter Wrench: 57001-1249



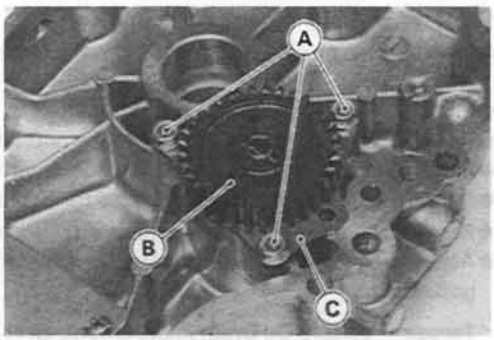
Oil Filter Installation

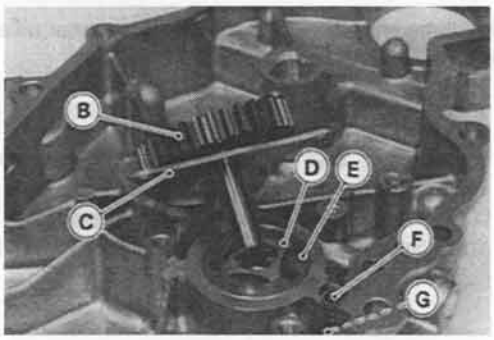
- ●Grease:
  Oil Filter Gasket
- ●Install the new filter.
- ○Screw the filter in until the gasket touches the engine, then turn it 3/4 turn.
- ●Add the engine oil (see Oil Level Inspection).
- ●Thoroughly warm up the engine, and check the oil leakage and the oil level.
- ★If necessary, add more engine oil.

Oil Pump and Relief Valve

Oil Pump and Relief Valve Removal

●Remove:
Engine
Crankcase Cover
Oil Pump Cover Bolts [A]
Oil Pump Gear [B] and Oil Pump Cover [C]
Oil Pump Inner Rotor [D]
Oil Pump Outer Rotor [E]
Relief Valve Spring [F]
Steel Ball [G]



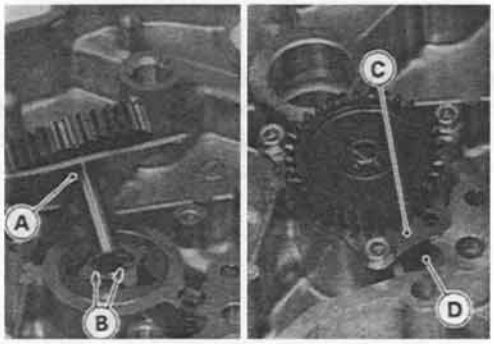


Oil Pump and Relief Valve Installation

CAUTION

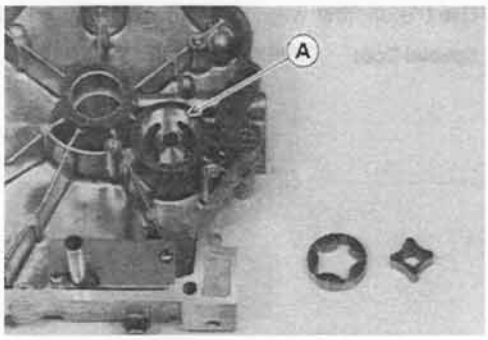
Do not allow any dust or other foreign matter to enter the oil pump.

●Install the pump shaft with its pin [A] in the inner rotor slot [B].
●Install the oil pump cover [C] so that the cover stops the relief valve spring [D].
●Fill the oil pump with engine oil for initial lubrication.



Oil Pump and Relief Valve Inspection

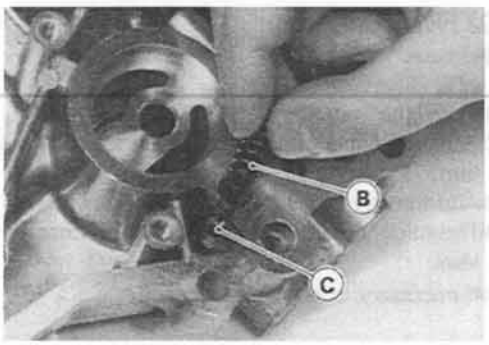
●Visually inspect the oil pump gear, shaft, inner rotor, outer rotor, and rotor housing [A] in the crankcase.
★If there is any damage or uneven wear, replace them.
●Visually inspect the relief valve spring [B], and steel ball [C].
★If any rough spots are found during the above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.



⚠WARNING

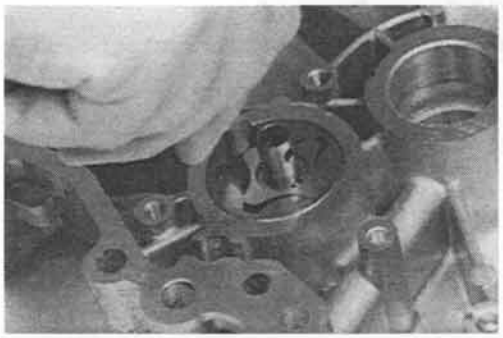
Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents.

★If cleaning does not solve the problem, replace the relief valve parts.



● Measure the clearance between the high point of the inner rotor and the high point of the outer rotor.

★ If the clearance exceeds the service limit, replace the inner and outer rotors as a set.

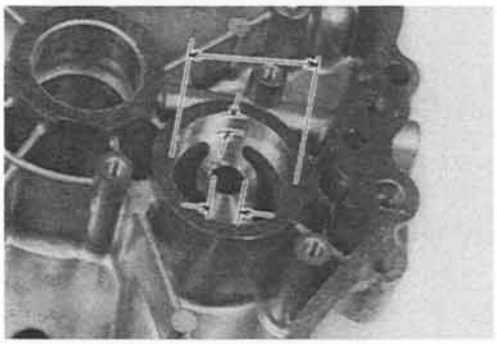


Inner Rotor/Outer Rotor Clearance

Standard:	**Less than 0.14 mm**
Service Limit:	**0.3 mm**

● Measure the following diameters and width of the oil pump parts.

★ If the part(s) has worn past the service limit, replace the worn part(s).



Inner Rotor Shaft Diameter

Standard:	**10.973 ~ 10.984 mm**
Service Limit:	**10.93 mm**

Inner Rotor Shaft Bearing Inside Diameter

Standard:	**11.000 ~ 11.011 mm**
Service Limit:	**11.07 mm**

Outer Rotor Diameter

Standard:	**40.53 ~ 40.56 mm**
Service Limit:	**40.47 mm**

Outer Rotor Housing Inside Diameter

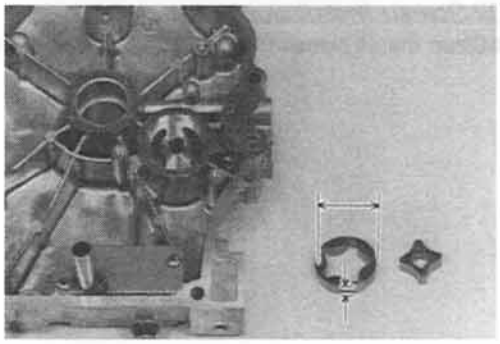
Standard:	**40.680 ~ 40.701 mm**
Service Limit:	**40.80 mm**

Outer Rotor Width

Standard:	**9.98 ~ 10.00 mm**
Service Limit:	**9.83 mm**

Rotor Housing Depth

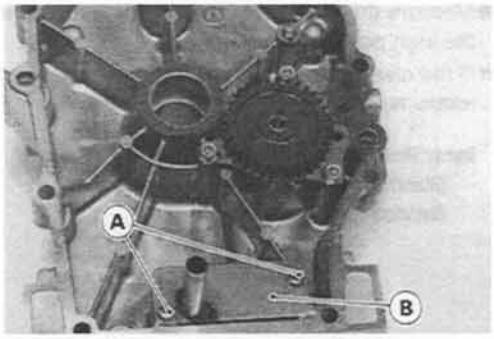
Standard:	**10.030 ~ 10.080 mm**
Service Limit:	**10.23 mm**

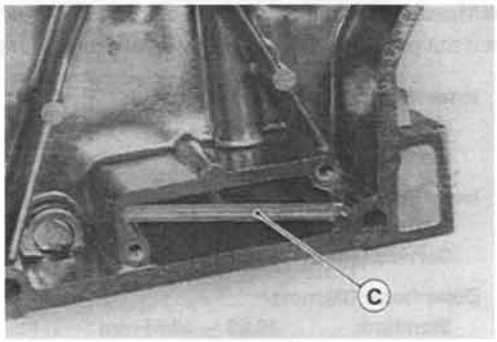


Oil Screen

Oil Screen Removal

●Remove:
Engine
Crankcase Cover
Oil Screen Cover Screws [A]
Oil Screen Cover [B]
Oil Screen [C]





Oil Screen Installation

●Clean the oil screen thoroughly whenever it is removed.

Oil Screen Cleaning/Inspection

●Clean the oil screen with high flash-point solvent and remove any particles stuck to it.

⚠WARNING

Clean the screen 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.

NOTE

○ *While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

●Check the screen carefully for any damage: holes and broken wire.
★If the screen is damaged, replace it.

Engine Removal / Installation

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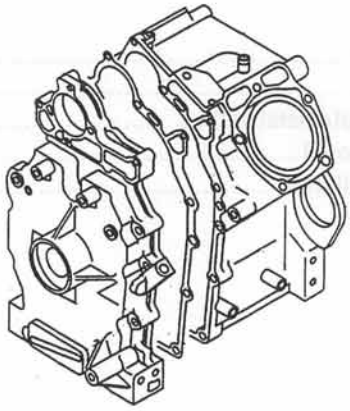
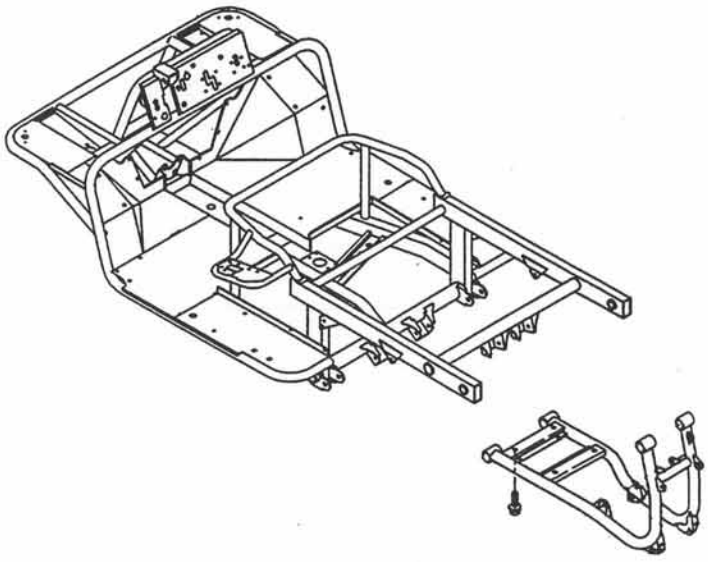
Exploded View





Specifications

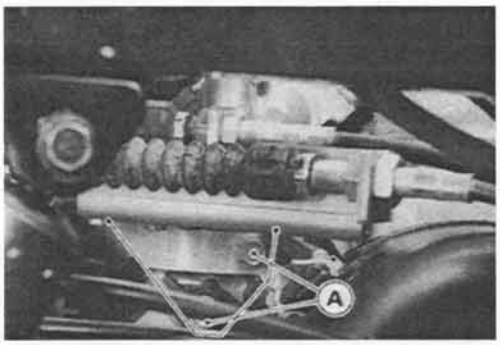
Special Tool – Assembly Jig: 57001-1365

Engine Removal/Installation

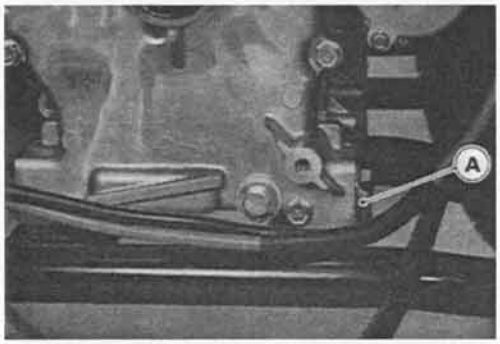
Engine Removal

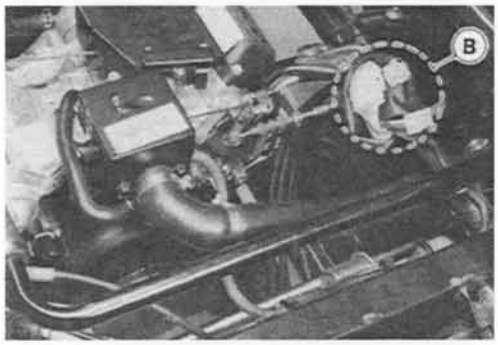
● Disconnect:
Battery + Terminal Leads

● Remove:
Engine Oil (drain)
Coolant (drain)
Cargo Bed
Exhaust Pipe and Muffler
Torque Converter
Water Hoses
Air Duct
Choke Cable Lower End
Fuel Hose
Cable Bracket Mounting Bolts (2) [A] and Collars

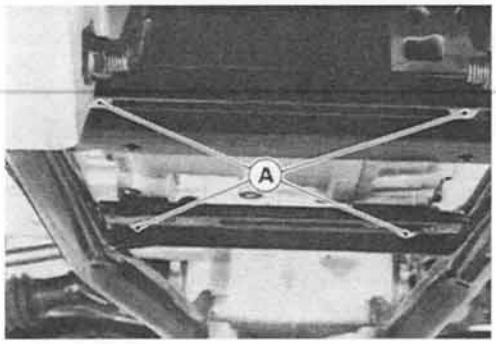


● Disconnect:
Battery Ground Lead [A]
Starter Motor Terminal Leads
Connectors [B] from the engine

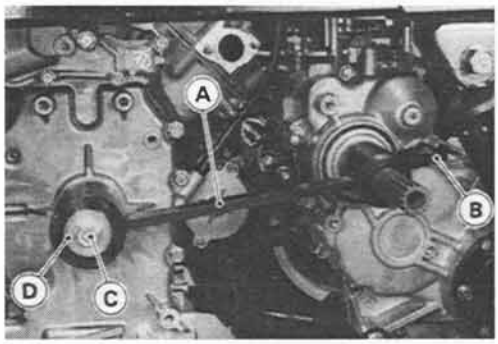




● Remove:
Engine Mounting Bolts [A]
Engine



Engine Installation



● Adjust the engine mounting position for alignment of the torque converter.

○ Mount the engine and install the engine mounting bolts loosely.

○ Install the assembly jig [A] onto the transmission drive shaft and crankshaft.

Special Tool – Assembly Jig: 57001-1365

○ First fit the assembly jig firmly to the transmission case with tightening the bolt [B], and then tighten the bolt [C] until the assembly jig is fitted to the engine completely.

NOTE

○ *Use the converter case bolt [B] to the transmission case and the driven pulley bolt [C] and the stepped collar [D] of the drive pulley.*

○ Tighten the engine mounting bolts securely.

○ Remove the assembly jig.

○ Tighten the cable bracket mounting bolts securely.

● Adjust:

Choke Cable Free Play Adjustment
Engine Oil
Coolant

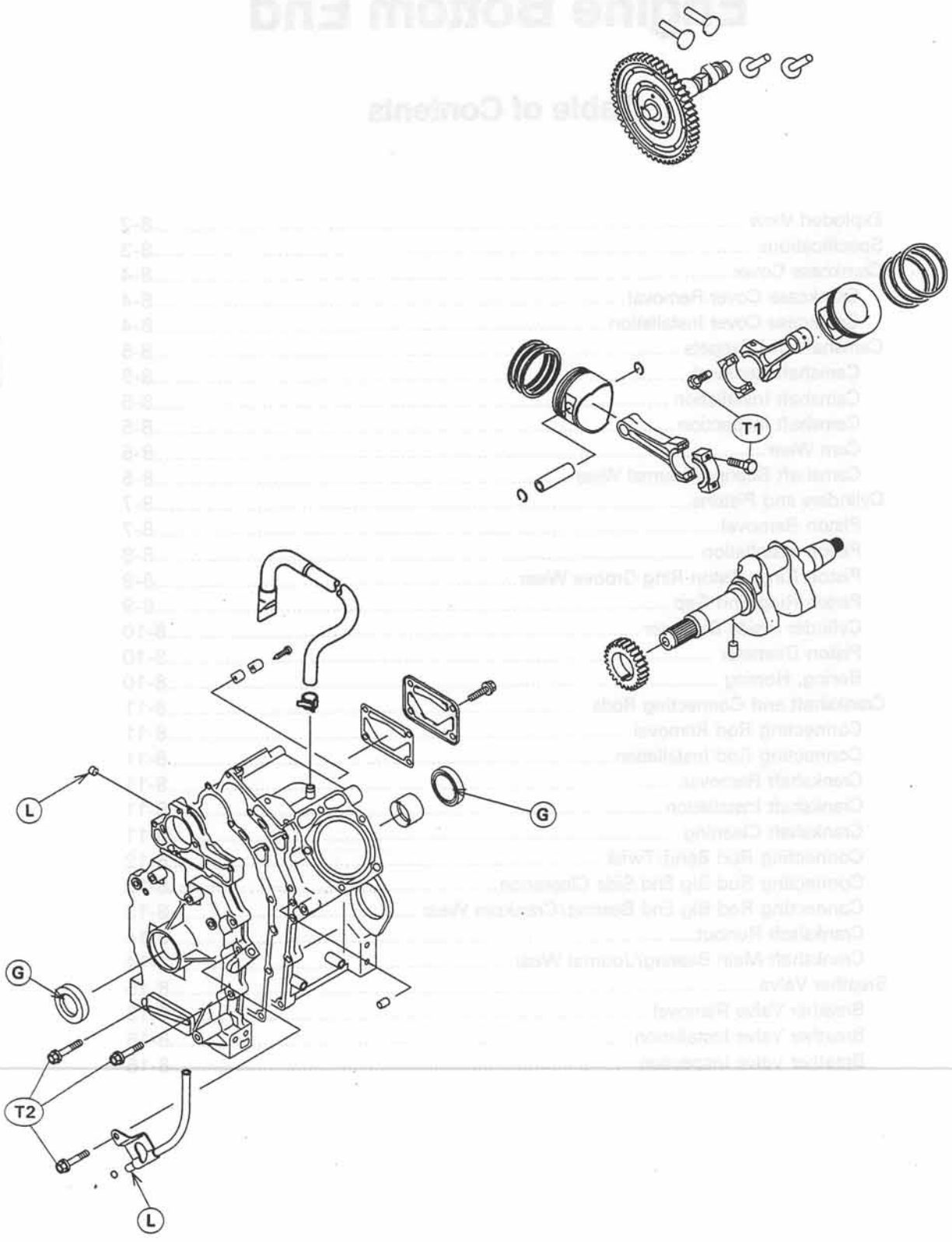
Engine Bottom End

Table of Contents

Exploded View

G : Apply grease.
L : Apply non-permanent locking agent.

T1 : 21 N-m (2.1 kg-m, 15.0 ft-lb)
T2 : 22 N-m (2.2 kg-m, 16.0 ft-lb)



Specifications

Item		Standard	Service Limit
Camshaft and Tappets:			
Cam height	Inlet	25.719 ~ 25.809 mm	25.62 mm
	Exhaust	25.962 ~ 26.052 mm	25.86 mm
Camshaft journal diameter		15.957 ~ 15.975 mm	15.93 mm
Camshaft bearing inside diameter		16.000 ~ 16.018 mm	16.08 mm
Cylinders and Pistons:			
Piston ring/groove clearance:	Top	0.04 ~ 0.08 mm	0.18 mm
	Second	0.03 ~ 0.07 mm	0.17 mm
Piston ring groove width:	Top	1.23 ~ 1.25 mm	1.33 mm
	Second	1.22 ~ 1.24 mm	1.32 mm
	Oil	3.01 ~ 3.03 mm	3.11 mm
Piston ring thickness:	Top, Second	1.17 ~ 1.19 mm	1.1 mm
Piston ring end gap:	Top, Second	0.2 ~ 0.4 mm	0.7 mm
Cylinder inside diameter		75.980 ~ 76.000 mm	76.10 mm
Piston diameter		75.935 ~ 75.950 mm	75.80 mm
Piston/cylinder clearance		0.030 ~ 0.065 mm	– – –
Oversize piston and rings		+0.50 mm	– – –
Crankshaft and Connecting Rods:			
Connecting rod bend		0.06/100 mm	0.2/100 mm
Connecting rod twist		0.06/100 mm	0.2/100 mm
Connecting rod big end side clearance		0.3 ~ 1.1 mm	1.3 mm
Connecting rod big end bearing/crankpin clearance		0.024 ~ 0.048 mm	0.08 mm
Crankpin diameter		33.967 ~ 33.980 mm	33.95 mm
Connecting rod big end bearing inside diameter		34.004 ~ 34.015 mm	34.05 mm
Crankshaft runout		Less than 0.02 mm TIR	0.05 mm TIR
Crankshaft main journal diameter		33.959 ~ 33.975 mm	33.94 mm
Crankshaft main bearing inside diameter:	on Crankcase (Bushing)	33.997 ~ 34.064 mm	34.12 mm
	on Crankcase cover	34.025 ~ 34.041 mm	34.10 mm

Special Tool – Piston Ring Pliers: 57001-115
Piston Pin Puller Assembly: 57001-910
Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt, Φ67 ~ Φ79: 57001-1097
Bearing Driver Set: 57001-1129

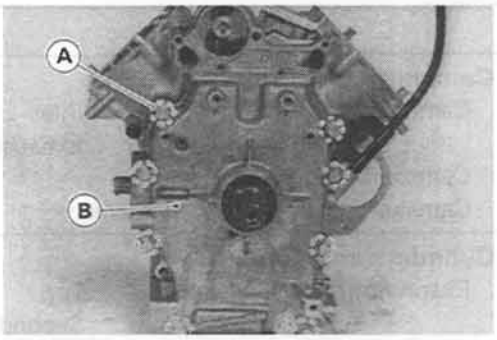
Crankcase Cover

Crankcase Cover Removal

- Remove:
  - Engine
  - Water Pump
  - Crankcase Cover Bolts [A]
  - Crankcase Cover [B]

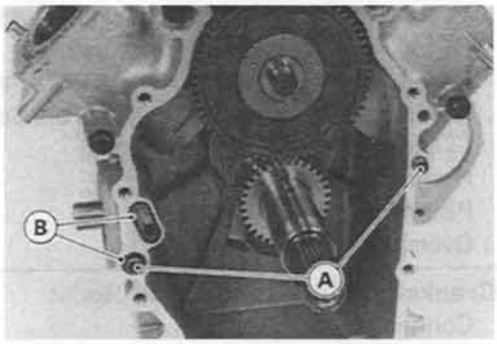
NOTE

○*If the crankcase cover sticks, tap lightly with a mallet on the alternator side near the knock pins.*



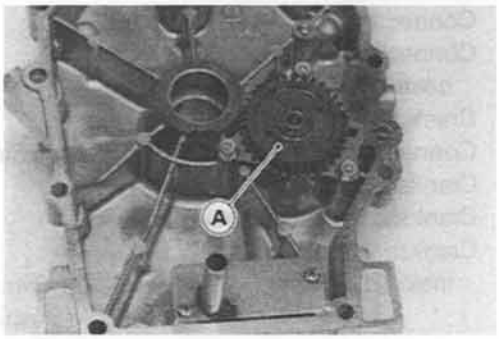
Crankcase Cover Installation

- Be sure to replace the oil seal removed with a new one. Press in the new oil seal using a press and suitable tools so that the seal surface is flush with the surface of the crankcase cover.
- Check to see that the crankcase knock pins [A] and O-rings [B] are in place on the crankcase. If any of them has been removed, replace it with a new one.

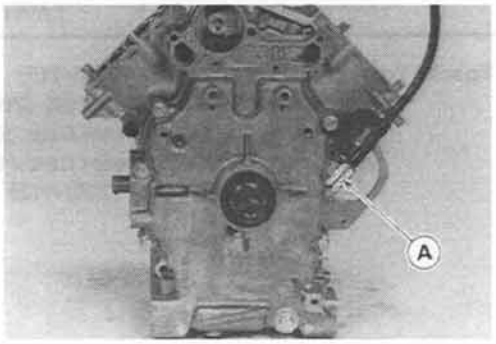


- Apply engine oil:
  - Crankshaft
  - Camshaft
- Grease:
  - Oil Seal Lips
- Install the crankcase cover so that the oil pump gear [A] is engaged with the crankshaft gear.
- Torque:

Torque – Crankcase Cover Bolts : 22 N-m (2.2 kg-m, 16.0 ft-lb)

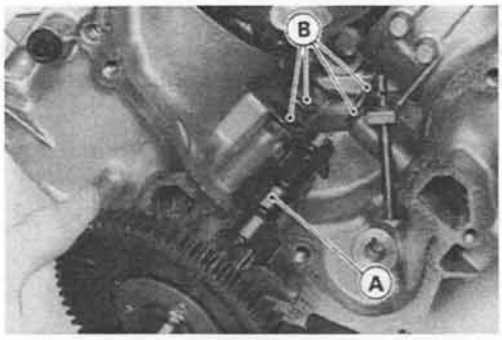


- Apply non-permanent locking agent:
  - Engine Oil Dipstick Tube Lower End [A]
- Check to see the crankshaft turns freely.



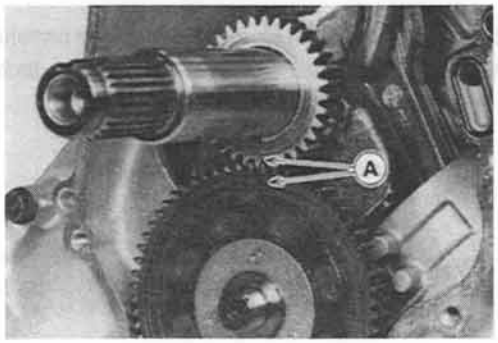
Camshaft and Tappets

Camshaft Removal



- ●Remove:
  - Engine
  - Cylinder Heads
  - Crankcase Cover
  - Camshaft [A]
  - Tappets [B]
- ○Turn the engine upside down to keep the tappets from catching the cam lobes.

Camshaft Installation



- ●Apply engine oil:
  - Tappets
  - Camshaft Journals
  - Cam Surfaces
- ●Align the timing marks [A] on the camshaft and crankshaft gears.

NOTE

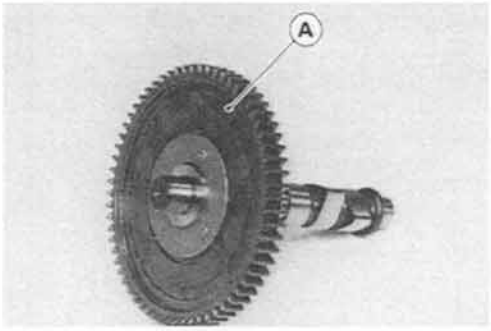
- ○*The camshaft and crankshaft gear are parts of the decided combination like below.*
- ○*When replacing the camshaft, note the combination parts.*

Model: KAF620 - A1~A4, B1~B4

Camshaft: 49118-2082 (Plastic gear)

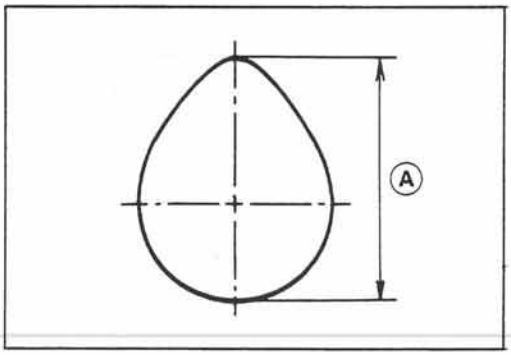
Crankshaft gear: 59051-2340

Camshaft Inspection



- ●Check the camshaft gear [A] for worn or broken teeth.
- ★If excessively worn or broken teeth are observed, replace the camshaft.

Cam Wear



- ●Measure the cam height [A] of each cam.
- ★If any cam has worn past the service limit, replace the camshaft.

Cam Height

	Standard	Service Limit
Inlet	**25.719 ~ 25.809 mm**	**25.62 mm**
Exhaust	**25.962 ~ 26.052 mm**	**25.86 mm**

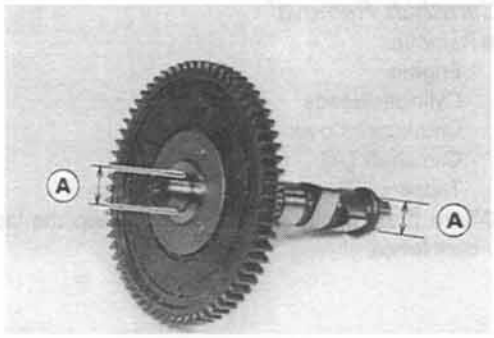
Camshaft Bearing/Journal Wear

● Measure the diameter [A] of the camshaft journals.

★ If any journal has worn past the service limit, replace the camshaft with a new one.

Camshaft Journal Diameter

Standard:	**15.957 ~ 15.975 mm**
Service Limit:	**15.93 mm**

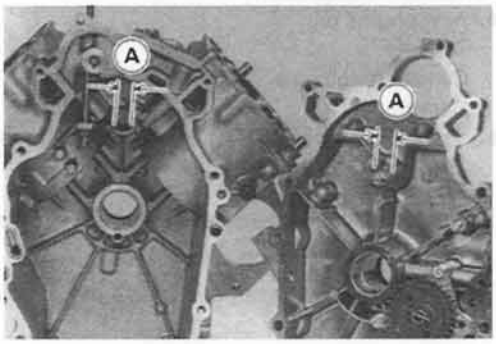


● Measure the inside diameter [A] of the camshaft bearings.

★ If any bearing has worn past the service limit, replace the crankcase and/or crankcase cover with a new one.

Camshaft Bearing Inside Diameter

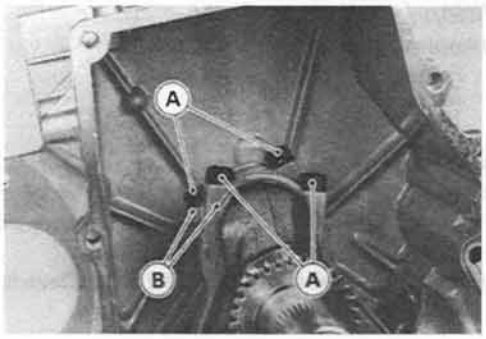
Standard:	**16.000 ~ 16.018 mm**
Service Limit:	**16.08 mm**



Cylinders and Pistons

Piston Removal

- Remove:
  - Engine
  - Cylinder Heads
  - Crankcase Cover
  - Camshaft
- Turn the crankshaft to expose the two connecting rod big end cap bolts.
- Remove:
  - Connecting Rod Big End Cap Bolts [A]
  - Connecting Rod Big End Caps [B]

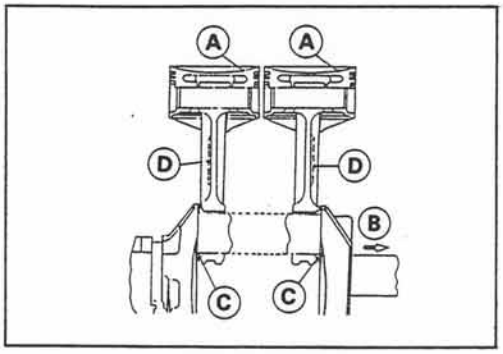


- Push the connecting rod ends into the cylinders, and pull the pistons and connecting rods out of the cylinders.

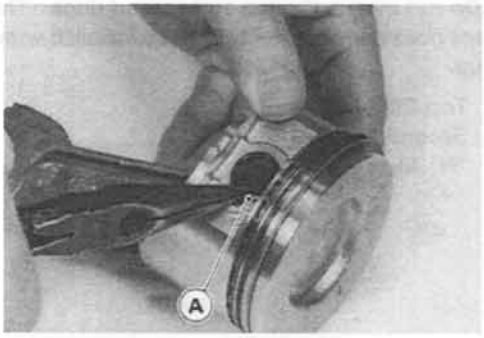
CAUTION

Note a location of the arrow on the top of the piston in relation to MADE IN JAPAN on the connecting rod. No.1 cylinder piston is opposite of No.2 piston. Keep parts together as a set.

A. Arrow
B. Alternator
C. Large Chamfer
D. Raised Letter (MADE IN JAPAN)

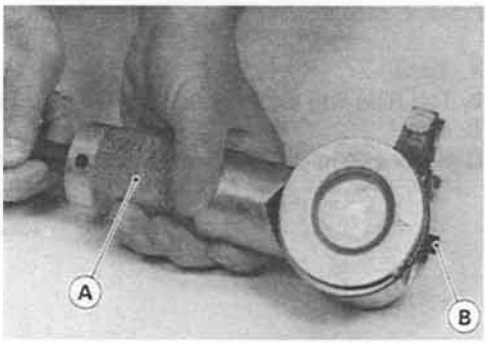


- Remove one of the piston pin snap rings [A] with needle nose pliers.



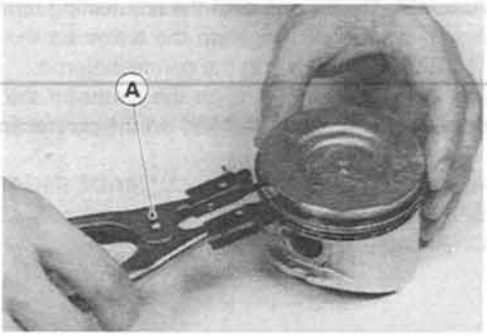
- Remove the piston by pushing the piston pin out the side from which the snap ring was removed. Use the piston pin puller assembly [A] and adapter "C" [B] if the pin is tight.

Special Tool – Piston Pin Puller Assembly: 57001-910



- Remove the top and second rings with piston ring pliers [A]. If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.

Special Tool – Piston Ring Pliers: 57001-115



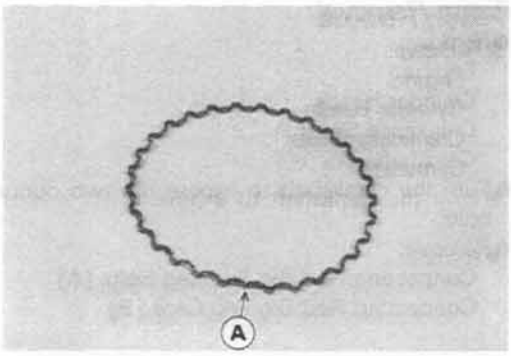
Piston Installation

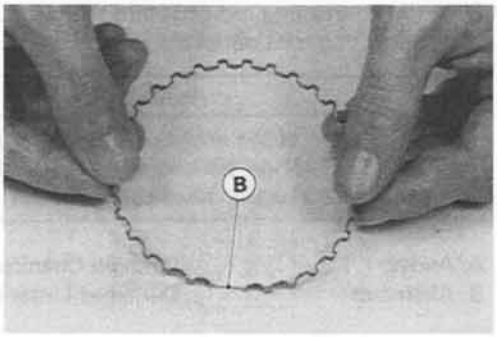
●Apply engine oil:
Piston Pin
Piston Skirt
Cylinder Bore

●Oil Ring Installation:

○First install the expander in the piston oil ring groove so that the expander ends [A] butt together. Be sure that the expander end rail [B] is inserted into the expander holes.

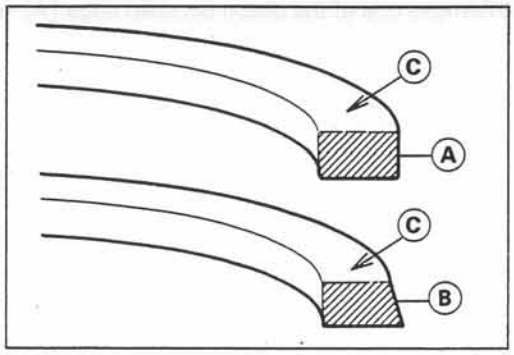
○Install the upper and lower steel rails. There is no UP or DOWN to the rails. They can be installed either way.





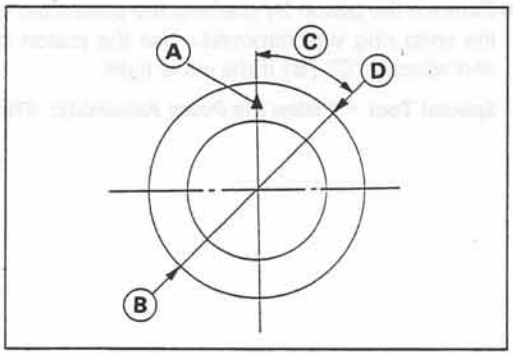
●Do not mix up the top and second rings. The top and second rings are not symmetrical and must be installed with the marked side facing up.

Top Ring [A]
Second Ring [B]
"N" Mark [C]



●Position each piston ring end gap as shown.

A. Arrow
B. Top Ring End Gap, Upper Side Rail End Gap
C. 45°
D. Second Ring End Gap, Lower Side Rail End Gap

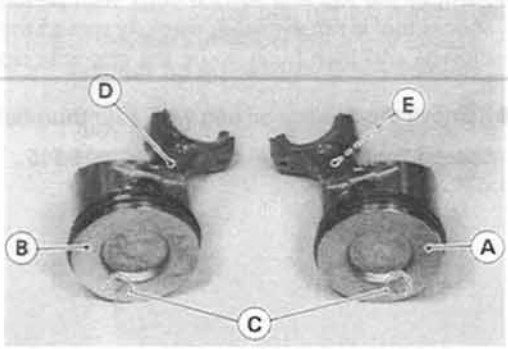


●Assemble the pistons onto the connecting rods as shown.

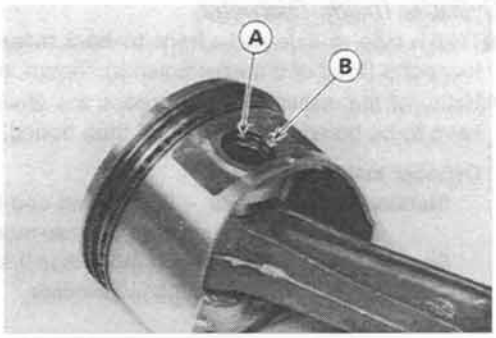
○No. 1 cylinder piston, align the arrow on the top of the piston with "MADE IN JAPAN" on the connecting rod.

○No. 2 cylinder piston, align the arrow on the top of the piston with opposite "MADE IN JAPAN" on the connecting rod.

A. No. 1 Cylinder Piston
B. No. 2 Cylinder Piston
C. Arrow
D. "MADE IN JAPAN"
E. Opposite "MADE IN JAPAN"



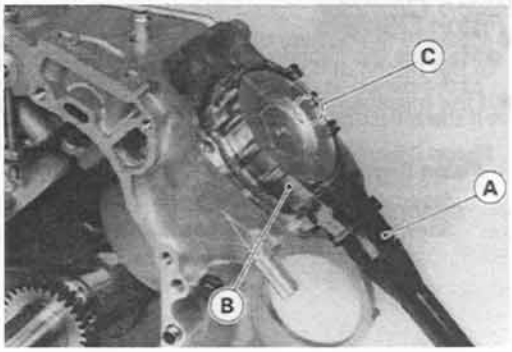
● Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the notch [B] in the edge of the piston pin hole.



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

● Using the piston ring compressor grip [A] and the belt [B], insert the piston and connecting rod into the cylinder.

Special Tool – Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt, Φ67 ~ Φ79: 57001-1097

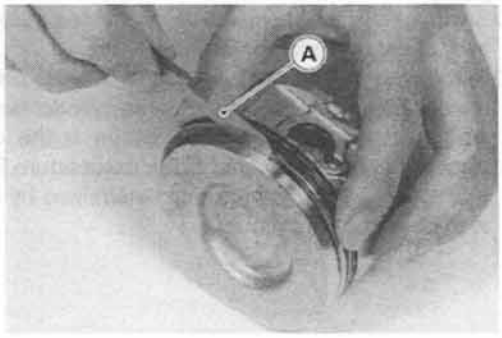


○ Insert the piston and connecting rod so that the arrow [C] on the top of the piston points toward the alternator side.
○ Lightly tap the top of the piston with a plastic mallet to insert the piston and connecting rod into the cylinder.
● Apply engine oil:
Crankpin
● Torque:

Torque – Connecting Rod Big End Cap Bolts: 21 N-m (2.1 kg-m, 15.0 ft-lb)

Piston Ring, Piston Ring Groove Wear

● 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.
● With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

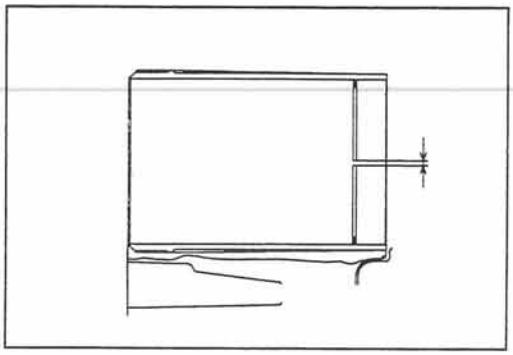


Piston Ring/Groove Clearance (Top, Second)

	Standard	Service Limit
Top	0.04 ~ 0.08 mm	0.18 mm
Second	0.03 ~ 0.07 mm	0.17 mm

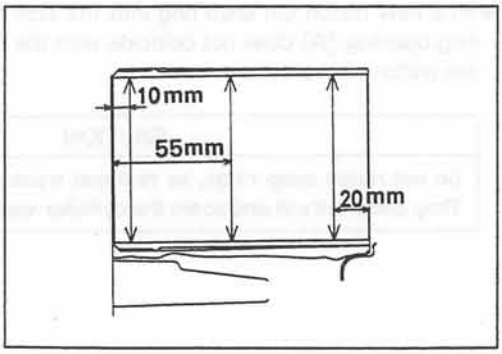
Piston Ring End Gap

● 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 were is low.
● Measure the gap between the ends of the ring with a thickness gauge.



Piston Ring End Gap (Top, Second)
Standard: 0.2 ~ 0.4 mm
Service Limit: 0.7 mm

Cylinder Inside Diameter



●Take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.

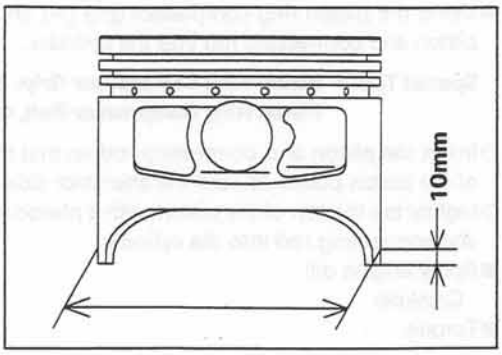
★If any of the measurements exceeds the service limit, the cylinder will have to be bored to oversize and then honed.

Cylinder Inside Diameter

Standard : **75.980 ~ 76.000 mm and less than 0.01 mm difference between any two measurements**

Service Limit : **76.10 mm or more than 0.05 mm difference between any two measurements**

Piston Diameter



●Measure the outside diameter of the piston 10 mm up from the bottom of the piston at right angles to the direction of the piston pin.

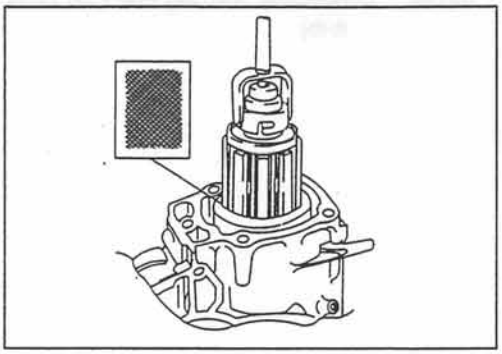
★If the measurement is under the service limit, replace the piston.

Piston Diameter

Standard: **75.935 ~ 75.950 mm**

Service Limit: **75.80 mm**

Boring, Honing



When boring and honing a cylinder, note the following.

○Oversize piston requires oversize rings.

Oversize Piston and Rings

0.50 mm **Oversize**

○Before boring a cylinder, first measure the exact diameter of the oversize piston, and the, according to the standard clearance in the Specifications, determine the rebore diameter. However, if the amount of boring necessary would increase the inside diameter by more than 0.50 mm, the crankcase must be replaced.

○Cylinder inside diameter must not vary more than 0.01 mm at any point.

○Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

○In the case of rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm and 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.

Crankshaft and Connecting Rods

Connecting Rod Removal

● Remove the connecting rods during the piston removal.

Connecting Rod Installation

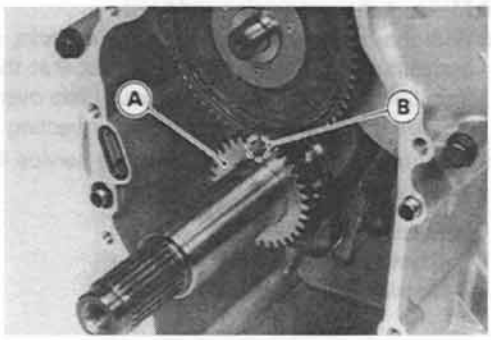
● Install the connecting rods during the piston installation

Crankshaft Removal

● Remove:
Engine
Cylinder Head
Alternator Rotor and Stator
Crankcase Cover
Camshaft
Pistons and Connecting Rods
Crankshaft

Crankshaft Installation

● Grease:
Oil Seal Lips
● Apply engine oil:
Crankshaft Journal
● Install the crankshaft gear [A] with the chamfered side faces in. The cam timing mark [B] faces out.



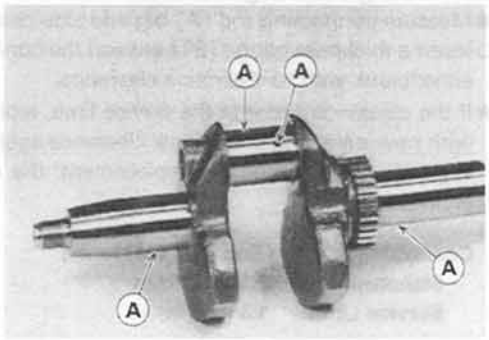
NOTE

○ *The Crankshaft gear and camshaft are parts of the decided combination.*

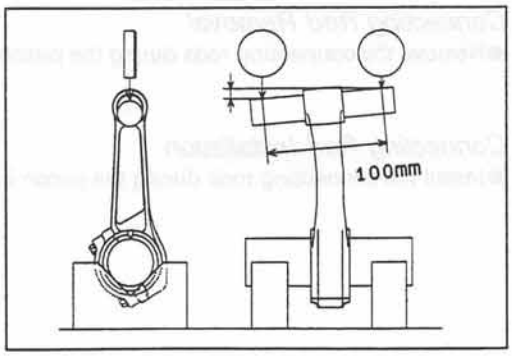
○ *When replacing the gear, refer to Camshaft Installation (P8-5) .*

Crankshaft Cleaning

● After removing, clean the crankshaft with a high flash-point solvent.
● Blow the crankshaft oil passages [A] with compressed air to remove any foreign particles or residue that may have accumulated.



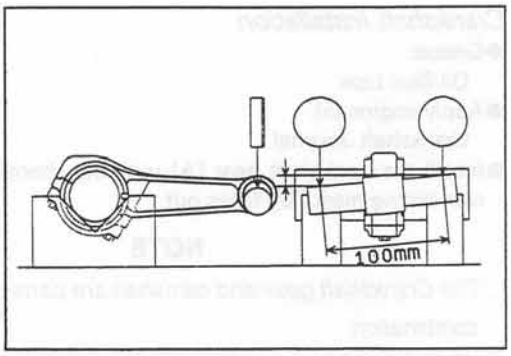
Connecting Rod Bend/Twist



- ●Measure the connecting rod bend.
- ○Select an arbor of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- ○Select an arbor of the same diameter as the piston pin and at least 100 mm long, and insert the arbor through the connecting rod small end.
- ○On a surface plate, set the big-end arbor on V blocks.
- ○With the connecting rod held vertically, use a height gauge to measure the difference in the height of the small end arbor above the surface plate over a 100 mm length to determine the amount of connecting rod bend.
- ★If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend

Standard:	**0.06/100 mm**
Service Limit:	**0.2/100 mm**

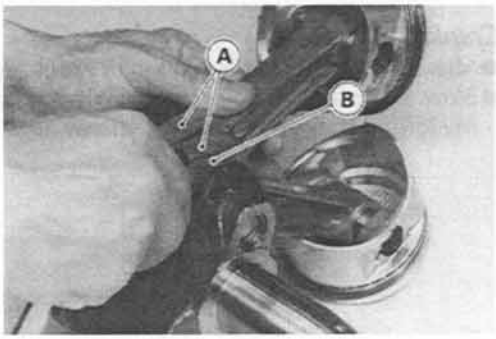


- ●Measure the connecting rod twist.
- ○With the big-end arbor still on the V blocks, hold the connecting rod horizontally and measure the amount that the small end arbor varies from being parallel with the surface plate over a 100 mm length of the arbor to determine the amount of connecting rod twist.
- ★If connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist

Standard:	**0.06/100 mm**
Service Limit:	**0.2/100 mm**

Connecting Rod Big End Side Clearance

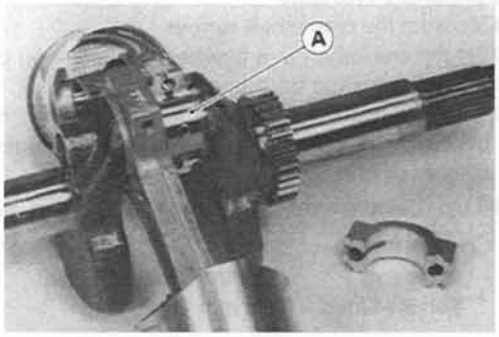


- ●Measure connecting rod [A] big end side clearance.
- ○Insert a thickness gauge [B] between the connecting rod big ends and either crank web to determine clearance.
- ★If the clearance exceeds the service limit, replace the connecting rods with new ones and then check clearance again. If the clearance is too large after connecting rod replacement, the crankshaft must also be replaced.

Connecting Rod Big End Side Clearance

Standard:	**0.3 ~ 1.1 mm**
Service Limit:	**1.3 mm**

Connecting Rod Big End Bearing/Crankpin Wear



Bearing/crankpin 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.

● Measure the bearing/crankpin clearance.

○ Remove the connecting rod big end cap and wipe the big end bearing and crankpin surface clean of oil.

○ Cut a strip of plastigauge to bearing width, and place the strip [A] on the crankpin for the connecting rod parallel to the crankshaft so that the plastigauge will be compressed between the crankpin and the bearing.

○ Install the connecting rod big end cap and tighten the big end cap bolts to the specified torque.

Torque – Connecting Rod Big End Cap Bolts : 21 N-m (2.1 kg-m, 15.0 ft-lb)

NOTE

○ *Do not turn the crankshaft during clearance measurement.*

○ Remove the connecting rod big end cap, and measure the plastigauge width to determine the bearing/crankpin clearance.

Connecting Rod Big End Bearing/Crankpin Clearance
Standard: 0.024 ~ 0.048 mm
Service Limit: 0.08 mm

NOTE

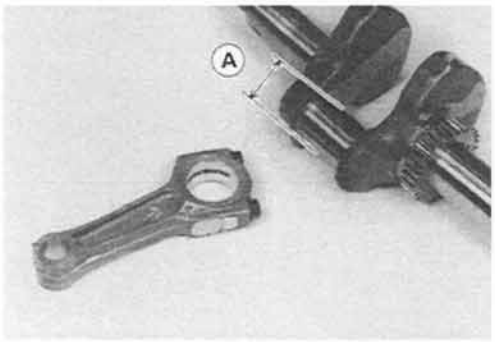
○ *The clearance less than 0.025 mm can not be measured by plastigauge.*

★ If the clearance is within the standard, no connecting rod replacement is required.

★ If the clearance is between the standard (maximum) and the service limit, replace the connecting rod.

● If the clearance exceeds the service limit, measure the diameter [A] of the crankpin.

★ If the crankpin has worn past the service limit, replace the crankshaft with a new one.

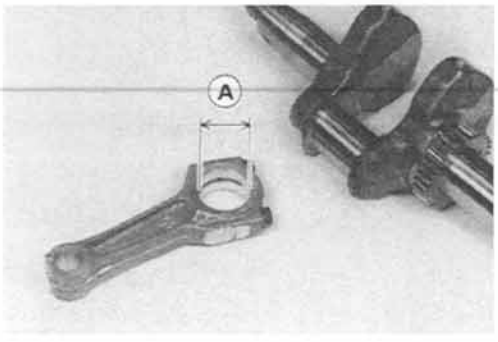


Crankpin Diameter
Standard: 33.967 ~ 33.980 mm
Service Limit: 33.95 mm

The connecting rod big end inside diameter can be measured as following.

● Install the connecting rod big end cap and tighten the big end cap bolts to the specified torque.

Torque – Connecting Rod Big End Cap Bolts: 21 N-m (2.1 kg-m, 15.0 ft-lb)

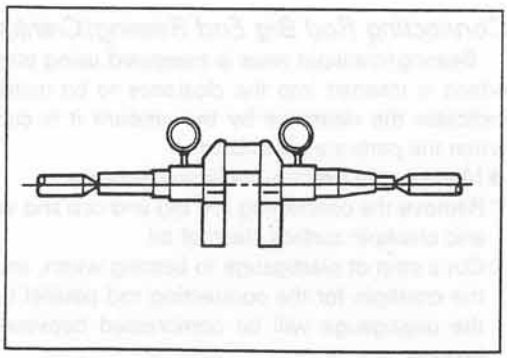


● Measure the inside diameter [A] of the connecting rod big end.

★ If the connecting rod big end bore has worn past the service limit, replace the connecting rod.

Connecting Rod Big End Inside Diameter
Standard: 34.004 ~ 34.015 mm
Service Limit: 34.05 mm

Crankshaft Runout

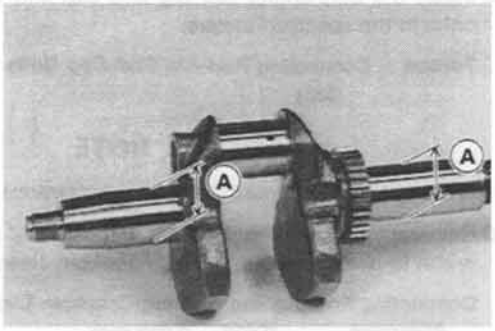


- ●Measure the crankshaft runout.
- ○Set the crankshaft in a flywheel alignment jig or on V blocks.
- ○Set a dial against both bearing journals.
- ○Turn the crankshaft slowly to measure the runout. The difference between the highest and lowest dial gauge readings (TIR) is the amount of runout.
- ★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Standard:	**Less than 0.02 mm TIR**
Service Limit:	**0.05 mm TIR**

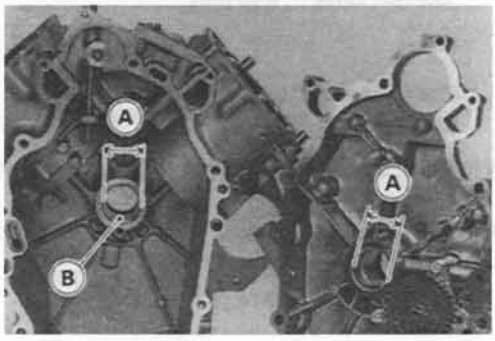
Crankshaft Main Bearing/Journal Wear



- ●Measure the diameter [A] of the crankshaft main journal.
- ★If the journal has worn past the service limit, replace the crankshaft with a new one.

Crankshaft Main Journal Diameter

Standard:	**33.959 ~ 33.975 mm**
Service Limit:	**33.94 mm**



- ●Measure the inside diameter [A] of the crankshaft main bearing.
- ★If the bearing has worn past the service limit, replace the crankcase bushing [B] and/or crankcase cover with a new one.

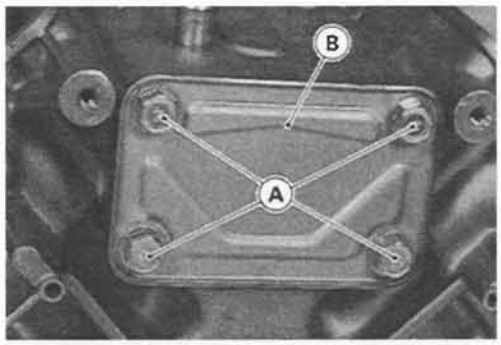
Crankshaft Main Bearing Inside Diameter

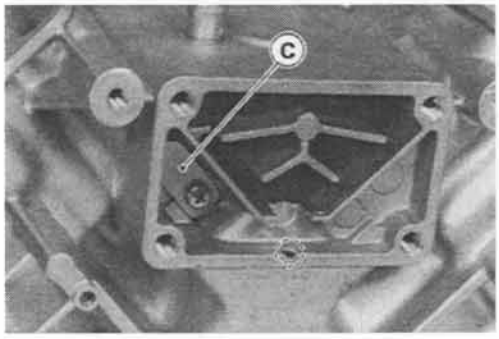
	Standard	Service Limit
Bushing	**33.997 ~ 34.064 mm**	**34.12 mm**
Cover	**34.025 ~ 34.041 mm**	**34.10 mm**

Breather Valve

Breather Valve Removal

●Remove:
Alternator and Stator
Breather Cover Bolts [A]
Breather Cover [B]
Breather Valve [C]

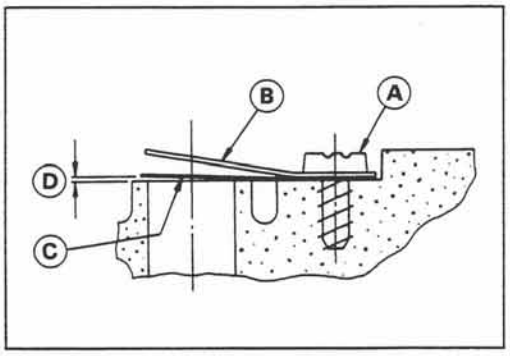




Breather Valve Installation

●Place the reed valve on the seat so that there is a slight gap between the valve and the seat.

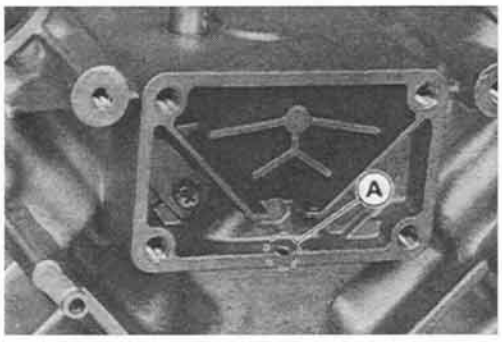
Mounting Screw [A]
Back Plate [B]
Reed Valve [C]
Gap [D]



●Be sure the drain back hole [A] does not accumulate with slugges before installing the breather valve.
●Align center of the valve seat with center of the reed valve and back plate, then tighten the mounting screw.

NOTE

○*The mounting screw is a self-tapping one. Be aware that misthreading or overtightening screw will strip the female threads and ruin the hole.*



Breather Valve Inspection

●Inspect the reed valve for breakage, hair cracks or distortion, replace it if necessary.
●Inspect the back plate for damage or rough contact surface, replace it if necessary.
●Inspect the valve seating surface. The surface should be free of nicks or burrs.

Transmission

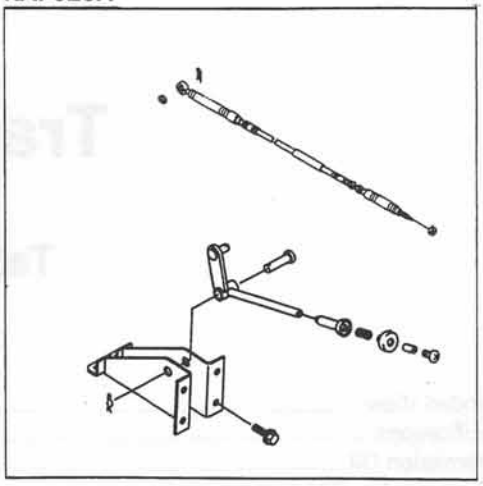
Table of Contents

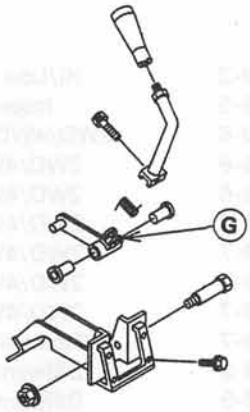
Exploded View

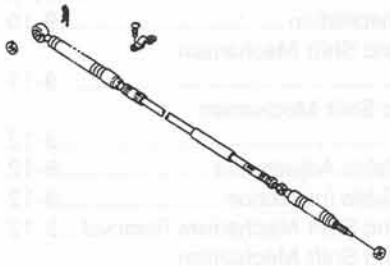
AD : Apply adhesive agent.
G : Apply grease.
L : Apply non-permanent locking agent.
LG : Apply liquid gasket.
O : Apply oil.

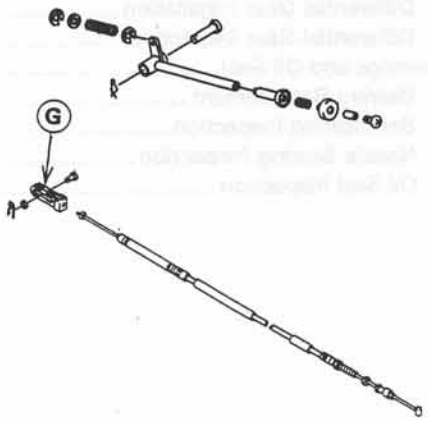
T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T2 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T3 : 15 N-m (1.5 kg-m, 11.0 ft-lb)
T4 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T5 : 29 N-m (3.0 kg-m, 22 ft-lb)
T6 : 37 N-m (3.8 kg-m, 27 ft-lb)
T7 : 44 N-m (4.5 kg-m, 33 ft-lb)
T8 : 120 N-m (12.0 kg-m, 87 ft-lb)

KAF620A

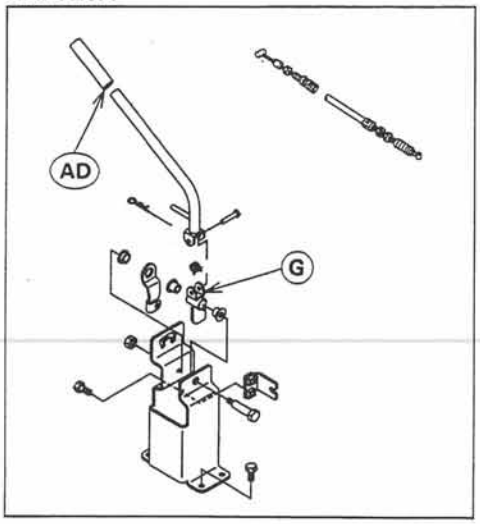


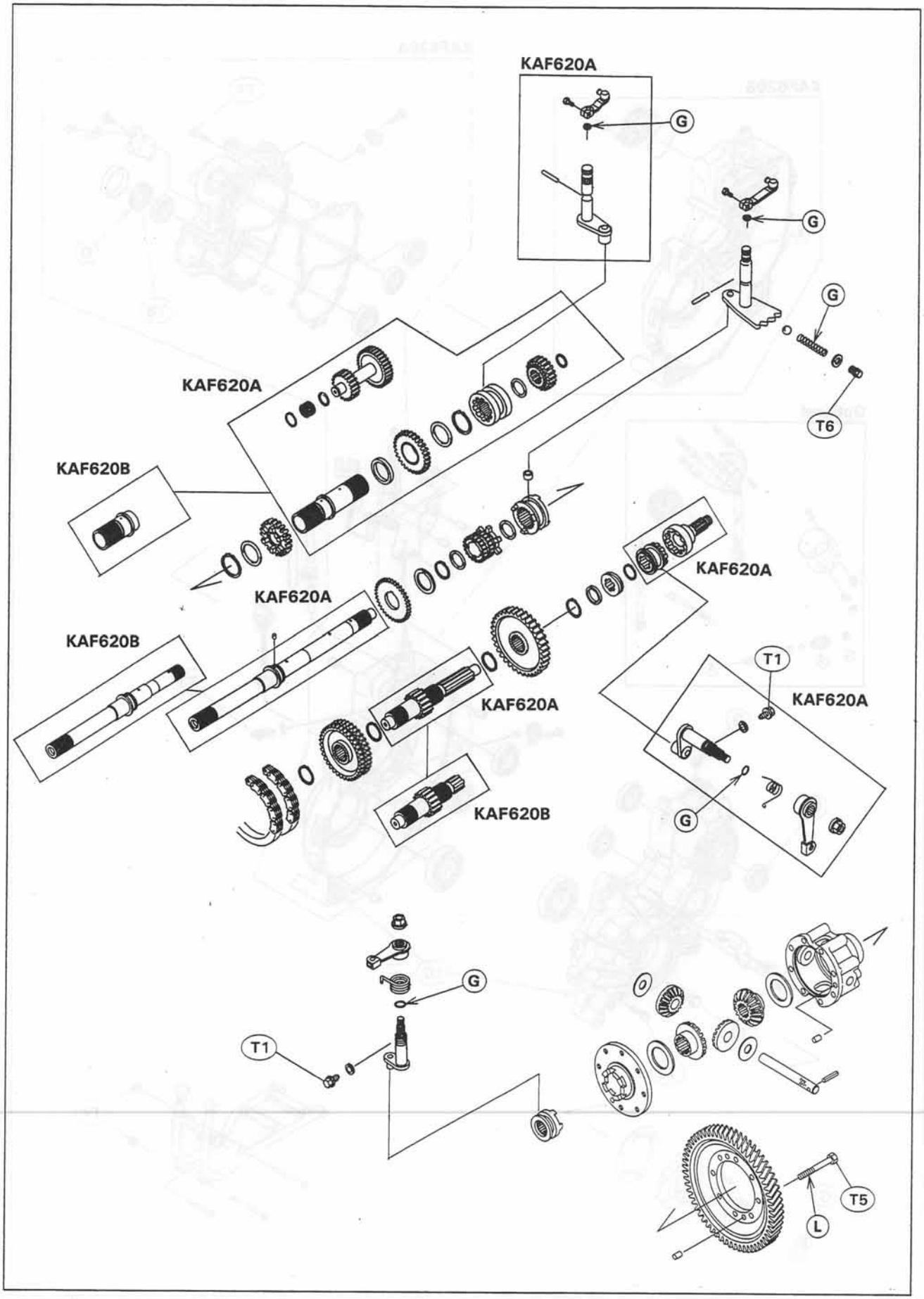


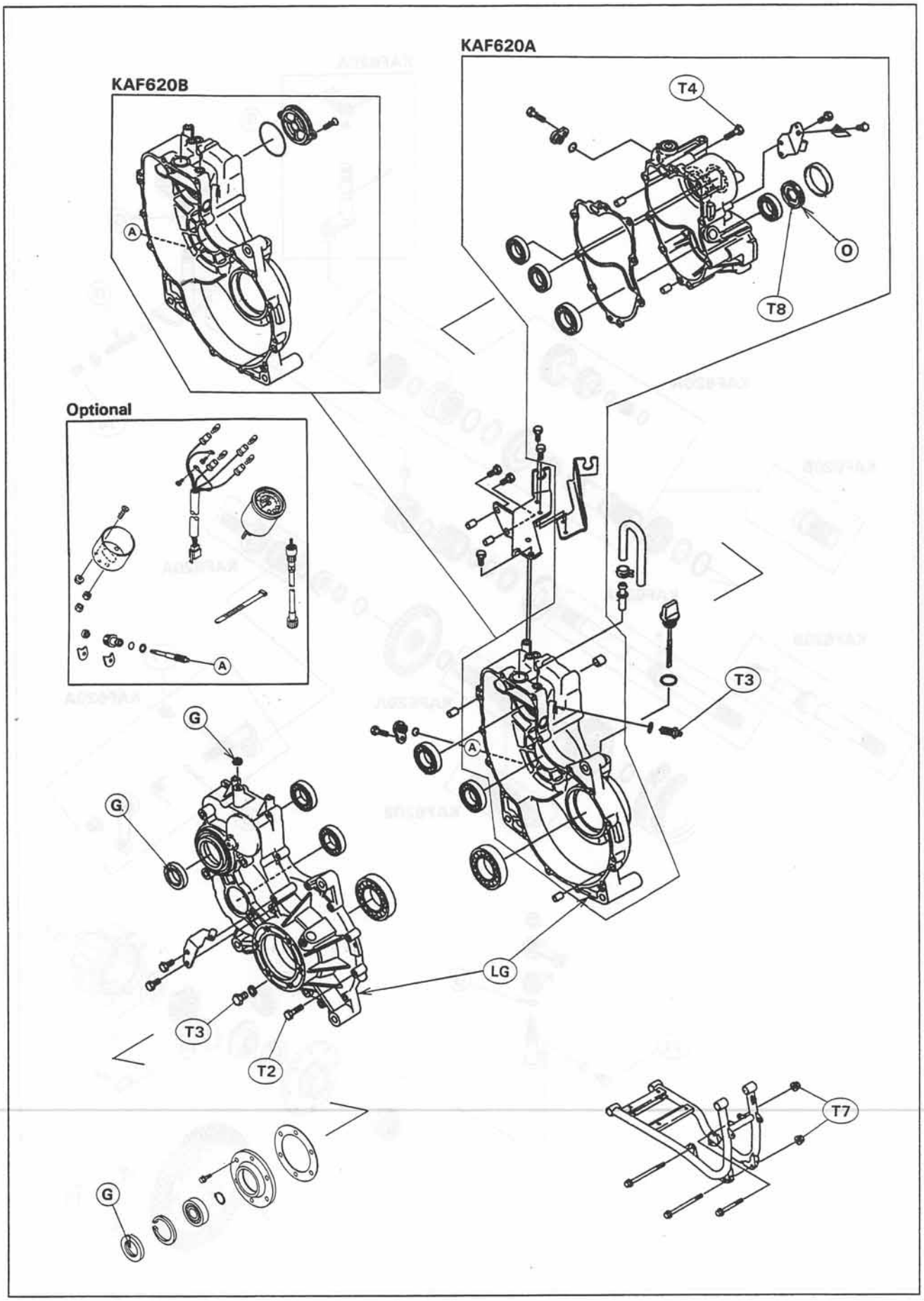




KAF620A




KAF620A
G
G
G
T6
KAF620A
KAF620B
KAF620A
KAF620A
KAF620B
KAF620A
T1
KAF620A
G
KAF620B
G
T1
T5
L


KAF620A
KAF620B
T4
O
T8
A
Optional
A
T3
G
G
A
LG
T3
T2
T7
G

Specifications

Item		Standard	Service Limit
Transmission Oil:			
Type		API "GL-5" Hypoid gear oil SAE90: above 5°C (41°F) SAE80: below 5°C (41°F)	– – –
Capacity:	KAF620A	2.5 L	– – –
	KAF620B	2.2 L	– – –
Oil level		Between upper and lower level lines	– – –
Transmission:			
Shift arm pin diameter		7.95 ~ 8.00 mm	7.8 mm
Shifter block inside diameter		8.05 ~ 8.10 mm	8.2 mm
Shifter block outside diameter		13.95 ~ 14.00 mm	13.8 mm
Shifter groove width		14.0 ~ 14.2 mm	14.3 mm
Drive chain 20-link length		158.76 ~ 159.18 mm	161.2 mm
Hi/Low Shift Mechanism (KAF620A):			
Shifter block outside diameter		13.95 ~ 14.00 mm	13.8 mm
Shifter groove width		14.05 ~ 14.15 mm	14.3 mm
2WD/4WD Shift Mechanism (KAF620A):			
Shifter block outside diameter		13.95 ~ 14.00 mm	13.8 mm
Shifter groove width		14.0 ~ 14.2 mm	14.3 mm
Differential Shift Mechanism:			
Shift arm pin diameter		8.4 ~ 8.6 mm	8.3 mm
Shifter groove width		9.0 ~ 9.1 mm	9.2 mm

Special Tool – Pressure Cable Luber: K56019-021
Outside Circlip Pliers: 57001-144
Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129
Hexagon Wrench, Hex 32: 57001-1194

Sealant – Kawasaki Bond (Liquid Gasket – Silver): 92104-002

NOTE

○ *Use the following tool only for the KAF620A.*

57001-1194

Transmission Oil

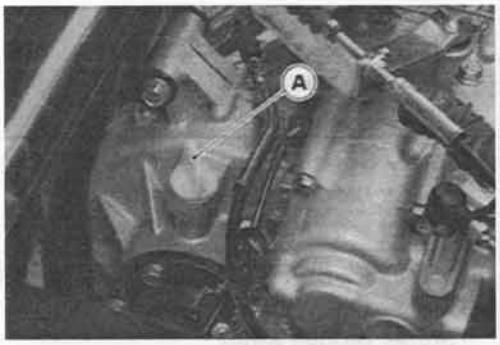
CAUTION

Vehicle operation with insufficient, deteriorated or contaminated transmission oil will cause accelerated wear and may result in transmission failure.

Transmission Oil Level Inspection

NOTE

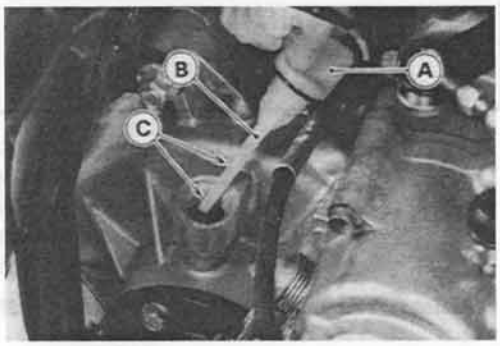
○ *If the vehicle has just been used wait several minutes for all the oil to settle down.*



- Park the vehicle on level ground, and tilt up the cargo bed.
- Unscrew the oil filler cap [A], wipe its dipstick [B] dry, and insert it into the filler opening but DO NOT SCREW IT IN.
- Pull out the dipstick and check the oil level. The oil level should be between the upper (H) and lower (L) level lines [C].

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device, through the oil filler opening.

★If the oil level is too low, add the necessary amount of oil through the oil filler opening. Use the same type and make of oil that is already in the transmission.



NOTE

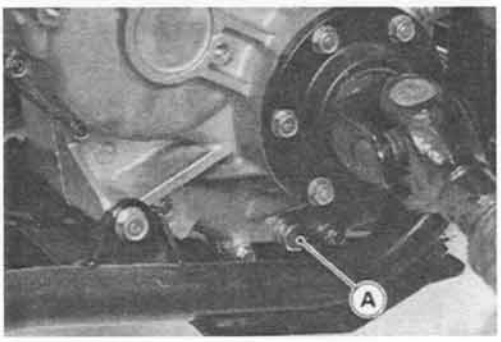
○ *If the transmission oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the transmission with the oil level low. Then, at your earliest convenience, change the oil completely.*

Transmission Oil Change

- Warm up the oil by running the vehicle so that the oil will pick up any sediment and drain easily. Then stop the vehicle.
- Place an oil pan beneath the transmission case.
- Remove the transmission oil drain plug [A], and let the oil drain completely.
- Check the gasket at the drain plug for damage.

★Replace the gasket with a new one if it is damaged.

- After the oil has completely drained out, install the drain plug with the gasket.



Torque – Transmission Oil Drain Plug : 15 N-m (1.5 kg-m, 11.0 ft-lb)

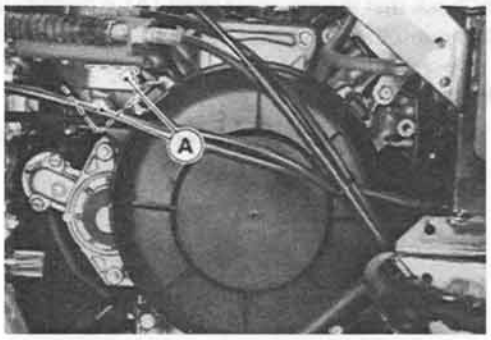
- Fill the transmission case with a good quality oil as specified in the table.
- Check the oil level.

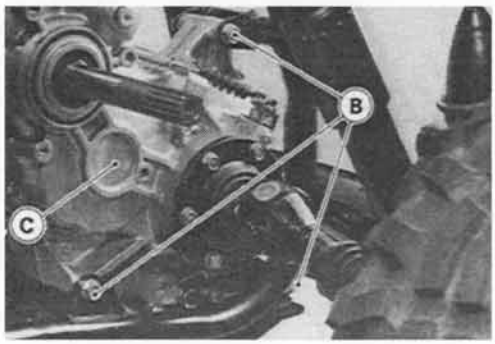
Transmission Oil

Type:	**API "GL-5" Hypoid gear oil**
	SAE 90 above 5°C (41°F)
	SAE 80 below 5°C (41°F)
Capacity:	**KAF620A 2.5 L**
	KAF620B 2.2 L
Oil level:	**Between upper and lower level lines**

Transmission Case

Transmission Case Removal





- Remove:
  - Transmission Oil (drain)
  - Cargo Bed
  - Propeller Shafts (KAF620A)
  - Torque Converter
  - Throttle Cable Lower End
  - Governor Arm
  - Control Panel Assembly
  - Neutral Switch Terminal Lead (disconnect)
  - Transmission Shift Cable Lower End
  - Differential Shift Cable Lower End
  - Hi/Low Shift Cable Lower End (KAF620A)
  - 2WD/4WD Shift Cable Lower End (KAF620A)
  - Cable Bracket Mounting Bolts [A] and Collars
  - Drive Shafts and Axles
  - Transmission Case Mounting Bolts and Nuts [B]
  - Transmission Case [C]

○ Remove the starter motor, engine mounting bolts, and/or rear end sub-frame upper mounting bolts for extra clearance.

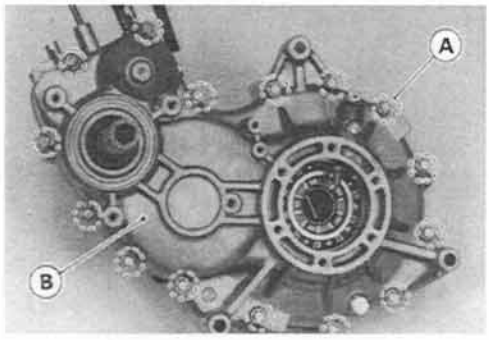
Transmission Case Installation

- Torque:

Torque – Transmission Case Mounting Bolts: 44 N-m (4.5 kg-m, 33 ft-lb)

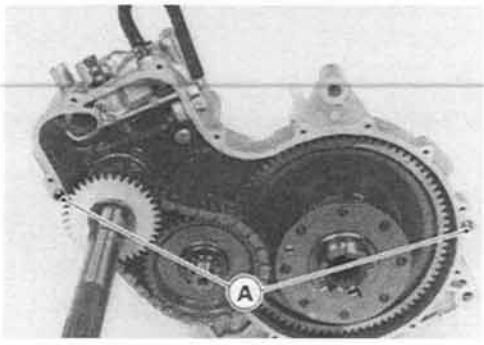
- Adjust:
  - Engine Mounting Position (see Engine Installation)
  - Transmission Oil
  - Transmission Shift Cable
  - Differential Shift Cable
  - Hi/Low Shift Cable
  - 2WD/4WD Shift Cable
  - Throttle Pedal Free Play

Transmission Case Splitting



- Remove:
  - Cable Bracket
  - Transmission Case Bolts [A]
  - Transmission Case (Left) [B]

Transmission Case Assembly



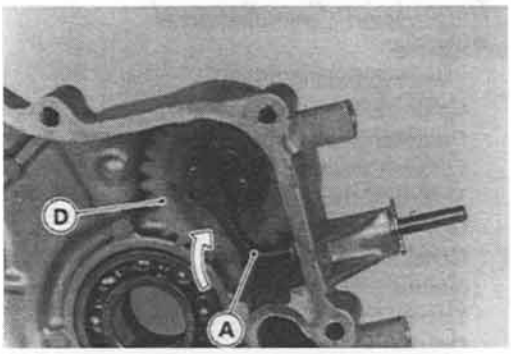
- Check to see that the transmission case knock pins [A] are in place. If any one of them has been removed, replace it with a new one.
- Apply liquid gasket:
  - Transmission Case Mating Surface

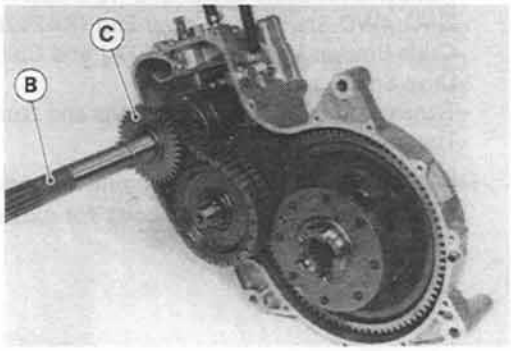
Sealant – Kawasaki Bond (Liquid Gasket – Silver): 92104-002

- Apply grease:
  - Oil Seal Lips

- Check that the governor shaft [A] is turned clockwise.
- Turning the drive shaft [B], engage the governor drive gear [C] with the governor gear [D].
- Torque:

Torque – Transmission Case Bolts: 8.8 N-m (0.90 kg-m, 78 in-lb)

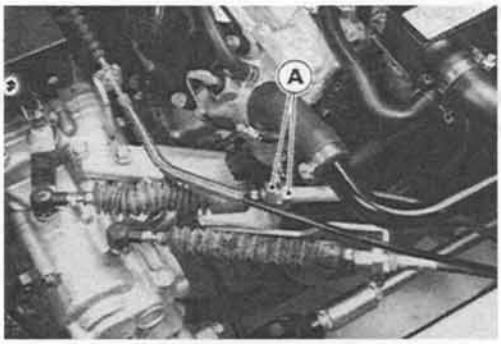




Transmission and Shift Mechanism

Transmission Shift Cable Adjustment

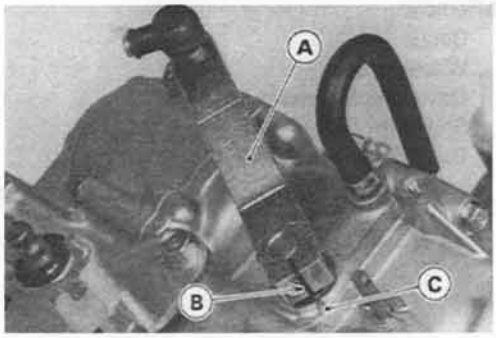
● Loosen the transmission shift cable adjuster nuts [A].



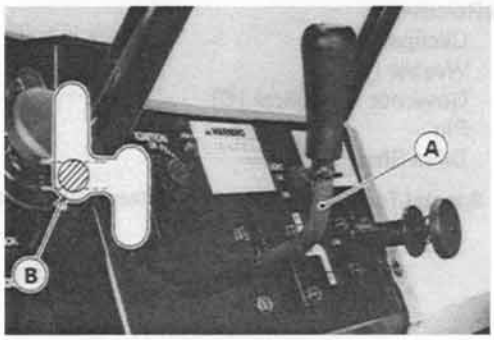
● Position the shift shaft lever [A] so that the opening [B] in the clamp is aligned with the mark [C] on the transmission case.

NOTE

○ *At this time, the transmission gears must be in neutral.*

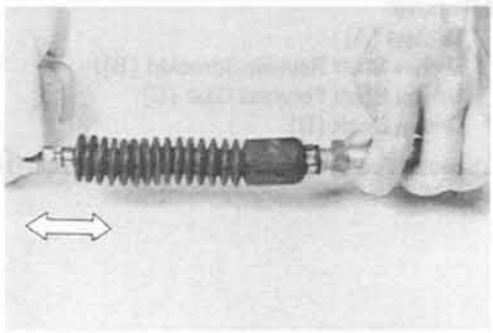


● Slide the adjuster until the transmission shift lever [A] is in the neutral position [B].
● Tighten the adjuster nuts securely.



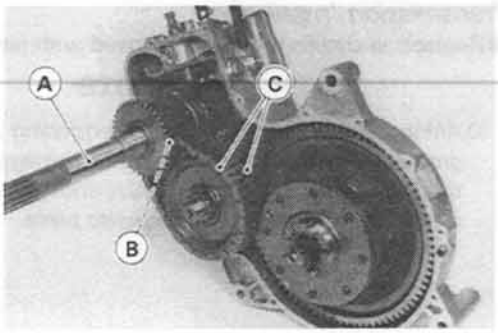
Transmission Shift Cable Inspection

● With the cable disconnected at both ends, the cable should move freely within the cable housing.
★ If the cable movement is not free, if the cable is frayed, or if the housing is kinked, replace the cable.

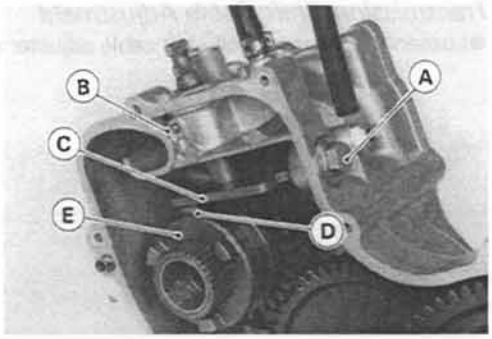


Transmission Removal

● Remove:
Transmission Case (split)
Hi/Low Shift Gears (KAF620A)
Drive Shaft [A]
Drive Shaft Reverse Sprocket [B]
Drive Chains [C]

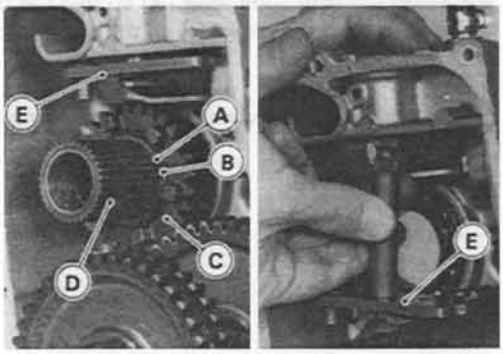


● Remove:
Shift Arm Positioning Bolt Assembly [A]
Retaining Pin [B]
● Lift the shift arm [C] and remove the shifter block [D].
● Remove:
Shifter [E]



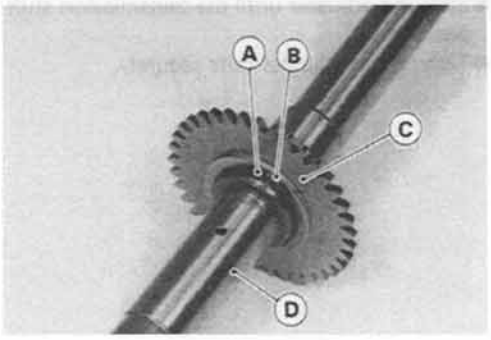
● Remove:
Circlip [A]
Washer [B]
Drive Shaft Forward Gear [C]
Shift Arm [D]
Drive Shaft (Outer) [E]

Special Tool – Outside Circlip Pliers: 57001-144



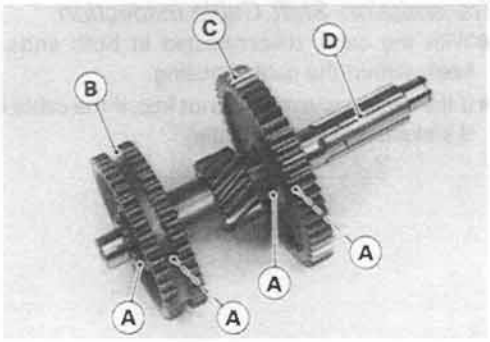
● Remove:
Circlips [A]
Washer [B]
Governor Drive Gear [C]
Pin
Drive Shaft [D]

Special Tool – Outside Circlip Pliers: 57001-144



● Remove:
Circlips [A]
Driven Shaft Reverse Sprocket [B]
Driven Shaft Forward Gear [C]
Driven Shaft [D]

Special Tool – Outside Circlip Pliers: 57001-144

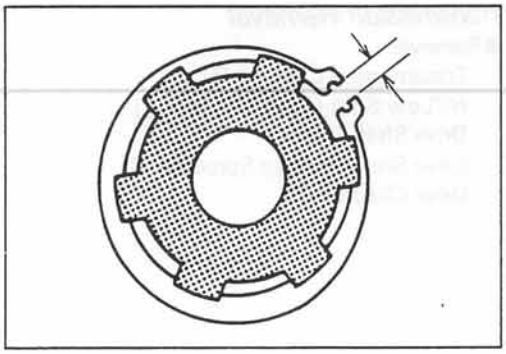


Transmission Installation

● Replace all circlips that were removed with new ones.

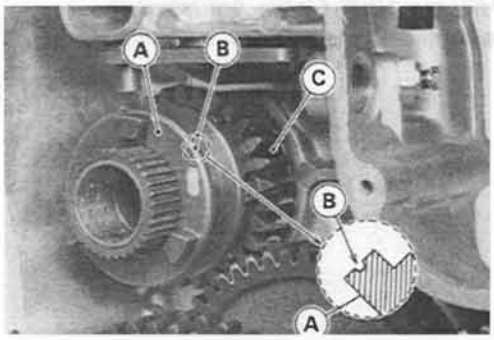
NOTE

○ *Always install circlips so that the opening is aligned with a spline groove. To install a circlip without damage, first fit the circlip onto the shaft and then expand it just enough to install. Hence, use a suitable gear to push the circlip into place.*

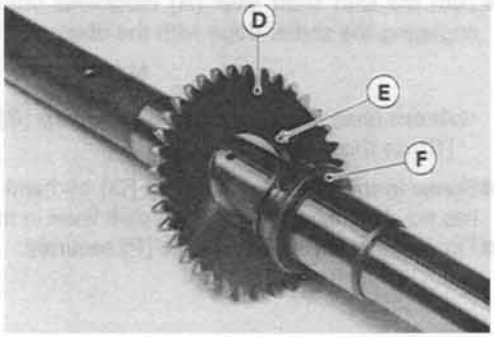


- Apply transmission oil:
  - Drive and Driven Shafts
  - Forward Gears
  - Reverse Sprockets
  - Drive Chains
- Apply grease:
  - Oil Seal Lips
  - Shift Arm Positioning Ball and Spring
- Torque:

Torque – Shift Arm Positioning Bolt : 37 N-m (3.8 kg-m, 27 ft-lb)

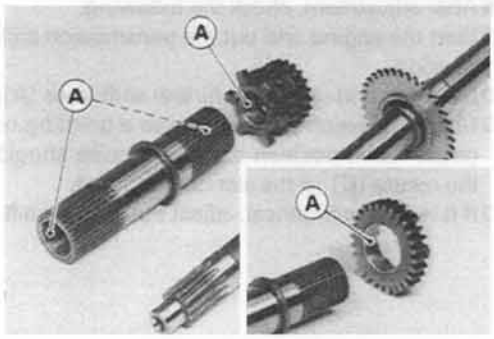


- Install the shifter [A] so that the grooved side [B] faces to the opposite side of the forward gear [C].
- Install the governor drive gear [D] so that the chamfered side [E] faces to the flange [F].
- Check that each gear, sprocket, and shifter spins or slides freely on its shaft without binding after assembly.



Transmission and Shift Mechanism Inspection

- Visually inspect the forward gears, reverse sprockets, gear and shaft bushings [A], drive chains, and shifter.
- Replace any of the above mentioned components should excessive wear be observed.



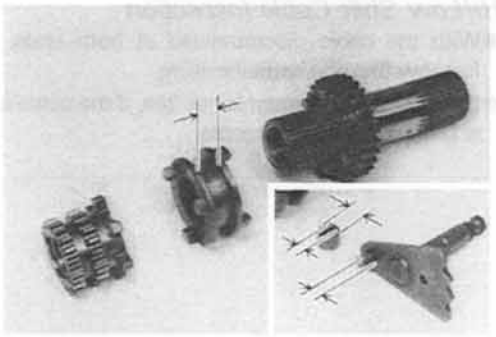
Shift Arm Pin Diameter
Standard: 7.95 ~ 8.00 mm
Service Limit: 7.8 mm

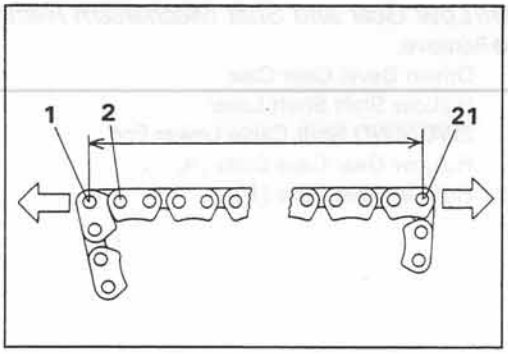
Shifter Block Inside Diameter
Standard: 8.05 ~ 8.10 mm
Service Limit: 8.2 mm

Shifter Block Outside Diameter
Standard: 13.95 ~ 14.00 mm
Service Limit: 13.8 mm

Shifter Groove Width
Standard: 14.0 ~ 14.2 mm
Service Limit: 14.3 mm

Drive Chain 20-Link Length
Standard: 158.76 ~ 159.18 mm
Service Limit: 161.2 mm

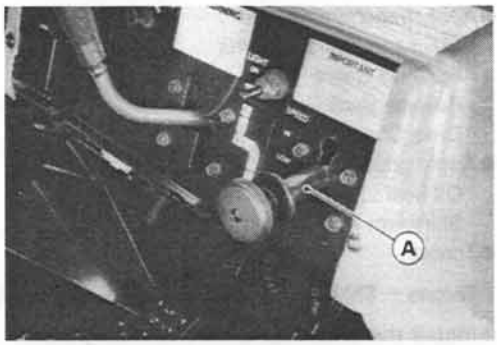




Hi/Low Gears and Shift Mechanism (KAF620A)

Hi/Low Shift Cable Adjustment

● Put the shift lever [A] in the low position.

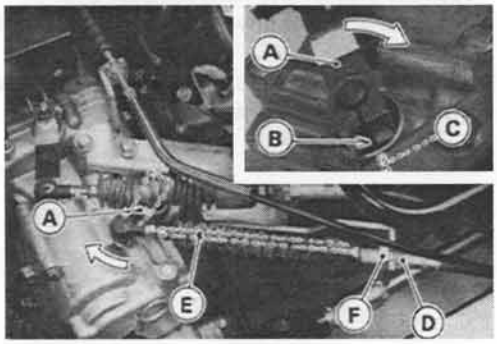


● Turn the shift shaft lever [A] clockwise until the lever is stopped by engaging the shifter dogs with the dogs on the low gear.

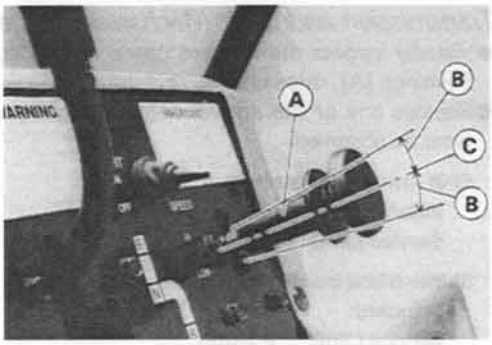
NOTE

○ *At this time, the shift shaft lever opening [B] is aligned with the mark [C] on the hi/low gear case.*

● Screw in the upper adjuster nut [D] by hand until the inner cable [E] has no slack while holding the shift lever in the LOW position.
● Tighten the lower adjuster nut [F] securely.

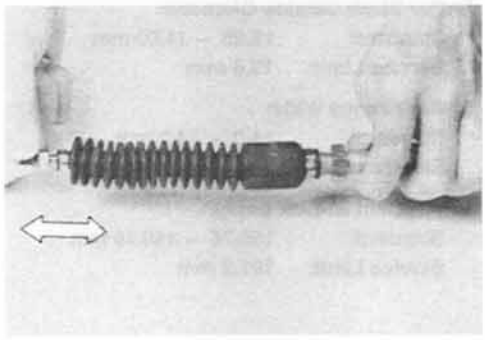


● After adjustment, check the following.
○ Start the engine and put the transmission shift liver in the F (Forward) position.
○ Move up and down the hi/low shift lever [A] slowly.
○ Check that each position makes a grinding noise of the high and low gears. Each position to make a noise should be symmetrical [B] for the center [C] of the slot on the board.
○ If it is not symmetrical, adjust the hi/low shift cable again.



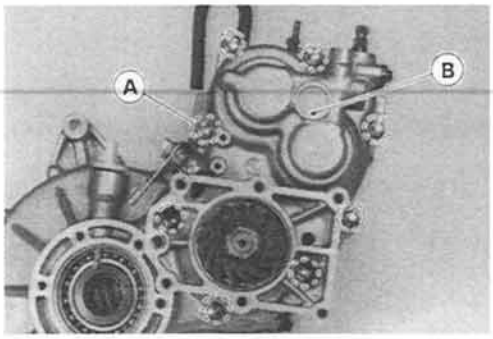
Hi/Low Shift Cable Inspection

● With the cable disconnected at both ends, the cable should move freely within the cable housing.
★ If the cable movement is not free, if the cable is frayed, or if the housing is kinked, replace the cable.

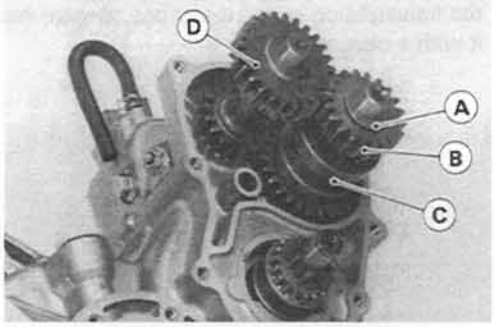


Hi/Low Gear and Shift Mechanism Removal

● Remove:
Driven Bevel Gear Case
Hi/Low Shift Shaft Lever
2WD/4WD Shift Cable Lower End
Hi/Low Gear Case Bolts [A]
Hi/Low Gear Case [B]

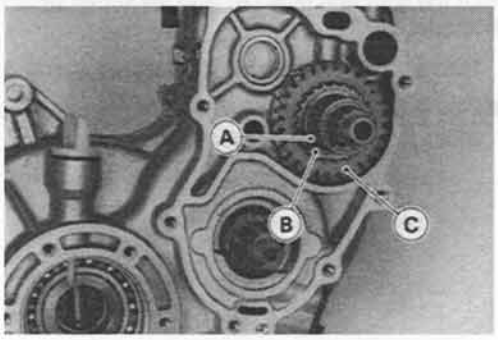


● Remove:
Washer [A]
High Gear [B]
Shifter [C]
Reduction Gear [D]

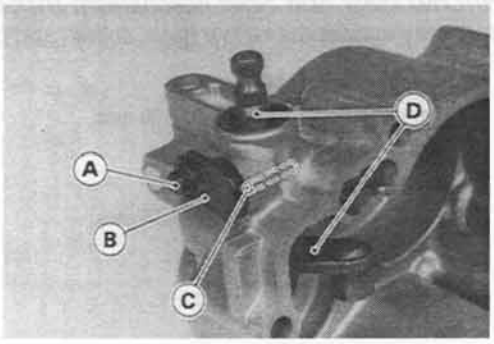


● Remove:
Circlip [A]
Washer [B]
Low Gear [C]
Collar

Special Tool – Outside Circlip Pliers: 57001-144



● Remove:
Bolt [A]
Holder [B]
Retaining Pin [C]
Shift Shaft and Arm [D]

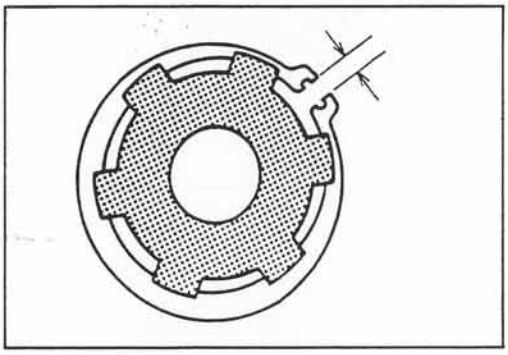


Hi/Low Gear and Shift Mechanism Installation

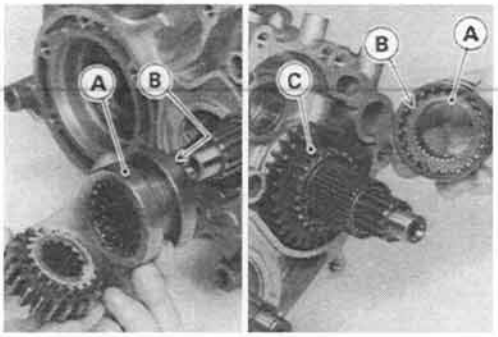
● Apply transmission oil:
Hi/Low Gears
Shifter
● Apply grease:
Oil Seal Lips
● Replace the circlip that was removed with a new one.

NOTE

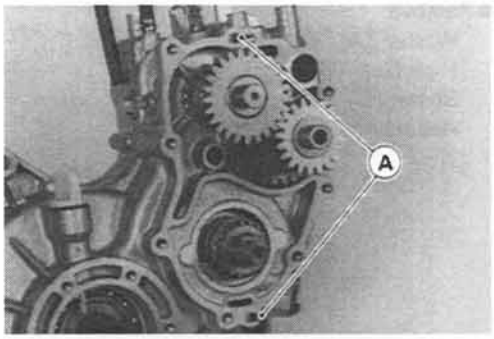
○ *Always install the circlip so that the opening is aligned with a spline groove. To install a circlip without damage, first fit the circlip onto the shaft and then expand it just enough to install. Hence, use a suitable gear to push the circlip into place.*



● Install the shifter [A] so that the large dogs [B] face to the low gear [C].



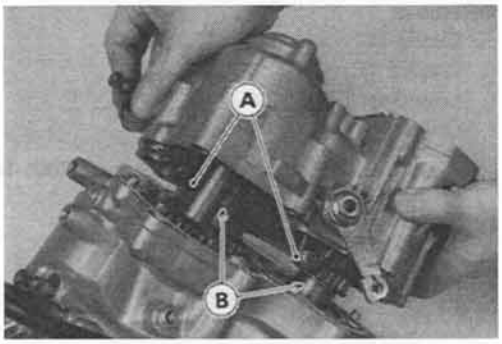
● Check to see that the hi/low gear case knock pins [A] are in place on the transmission case. If any one of them has been removed, replace it with a new one.



● Fit the shift arm pins [A] into the shifter grooves [B].
● torque:

Torque – Hi/Low Gear Case Bolts: 20 N-m (2.0 kg-m, 14.5 ft-lb)

● Check that each gear and shifter spins or slides freely on its shaft without binding after assembly.

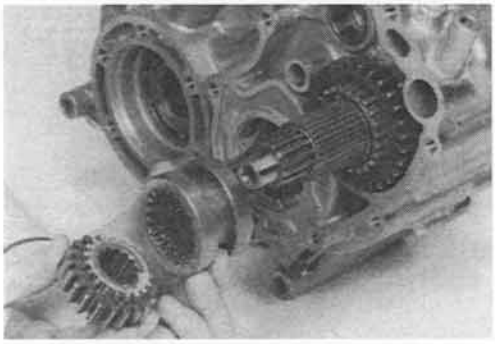


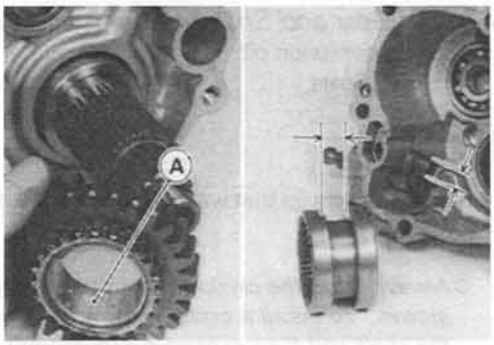
Hi/Low Gear and Shift Mechanism Inspection

● Visually inspect the hi/low gears, shifter, and gear bushing [A].

Shifter Block Outside Diameter
Standard: 13.95 ~ 14.00 mm
Service Limit: 13.8 mm

Shifter Groove Width
Standard: 14.05 ~ 14.15 mm
Service Limit: 14.3 mm

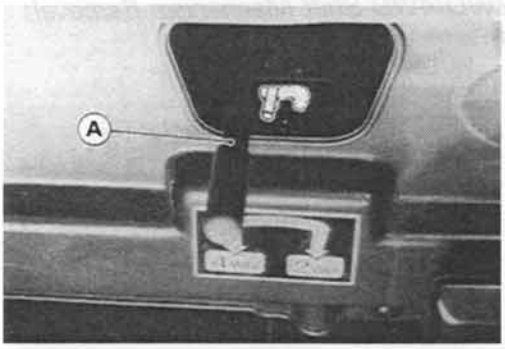




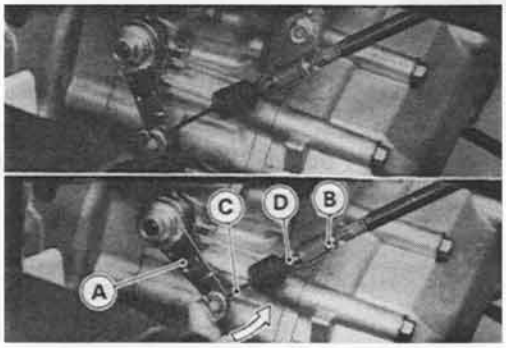
2WD/4WD Shift Mechanism (KAF620A)

2WD/4WD Shift Cable Adjustment

●Put the shift lever [A] in the 4WD position.

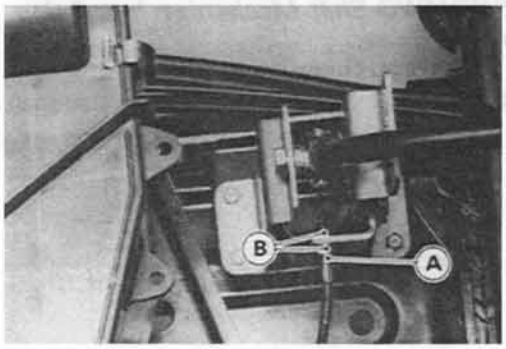


●Turn the shift shaft lever [A] counterclockwise until the lever is stopped by engaging the shifter dogs with the dogs on the drive bevel gear shaft.
●Screw in the upper adjuster nut [B] by hand until the inner cable [C] has no slack while holding the shift lever in the 4WD position.
●Tighten the lower adjuster nut [D] securely.



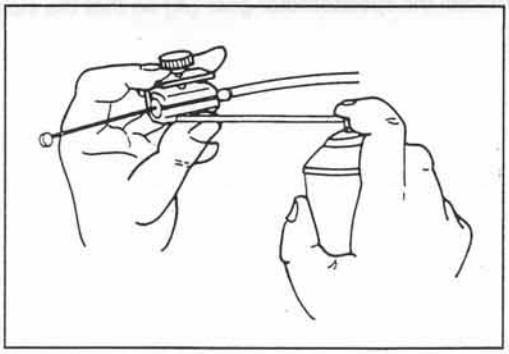
NOTE

○*If the 2WD/4WD shift cable cannot be adjusted by using the adjuster at the shift shaft lever, use the adjuster [A] at the shift lever. Do not forget to tighten the adjuster nuts [B].*



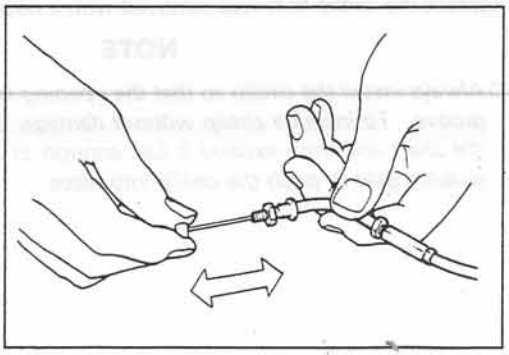
2WD/4WD Shift Cable Lubrication

Whenever the shift cable is removed, lubricate the cable as follows.
●Apply a thin coating of grease to the cable ends.
●Lubricate the cable with a penetrating rust inhibitor through the pressure cable luber.



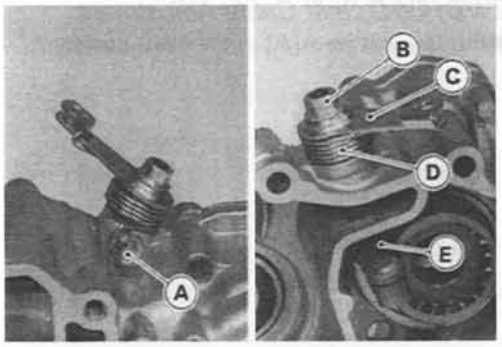
2WD/4WD Shift Cable Inspection

●With the cable disconnected at both ends, the cable should move freely within the cable housing.
★If the cable movement is not free, if the cable is frayed, or if the housing is kinked, replace the cable.



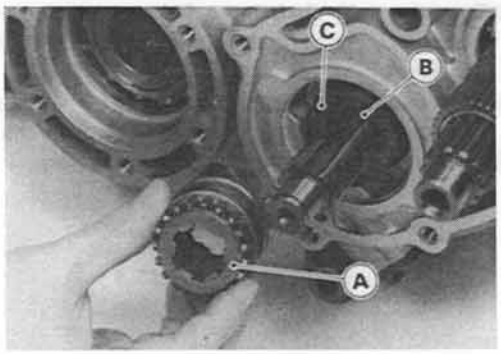
2WD/4WD Shift Mechanism Removal

● Remove:
Hi/Low Gear Case
Shift Shaft Stop Bolt [A]
Shift Shaft Lever Mounting Nut [B]
Shift Shaft Lever [C]
Spring [D]
Shift Shaft and Arm [E]



● Remove:
Shifter [A]
Circlip [B]
Speedometer Gear [C]
Collar

Special Tool – Outside Circlip Pliers: 57001-144

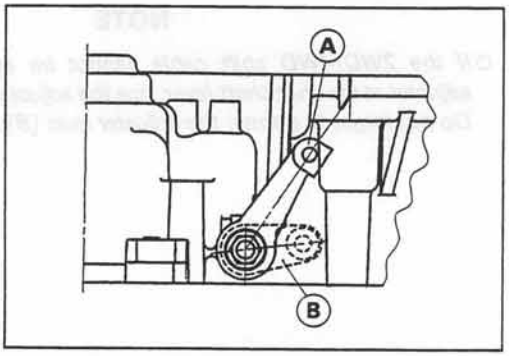


2WD/4WD Shift Mechanism Installation

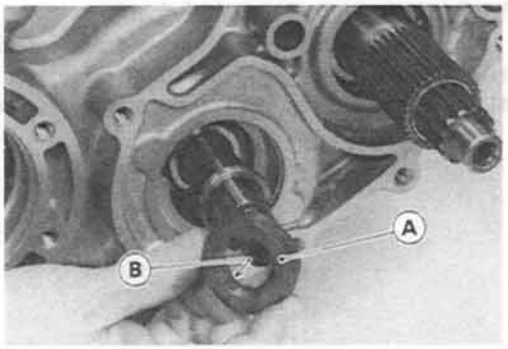
● Apply grease:
Shift Shaft O-ring

● Install the shift shaft lever [A] to the shift shaft arm [B] as shown.

Torque – Shift Shaft Stop Bolt : 7.8 N-m (0.80 kg-m, 69 in-lb)



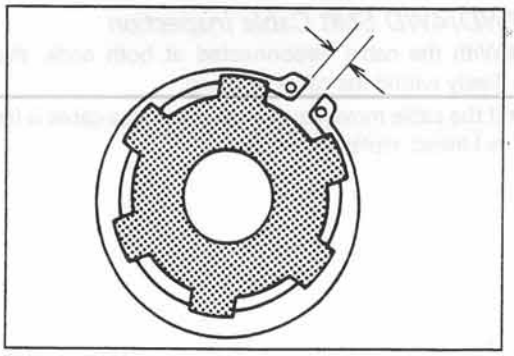
● Install the speedometer gear [A] so that the stepped side [B] faces in.



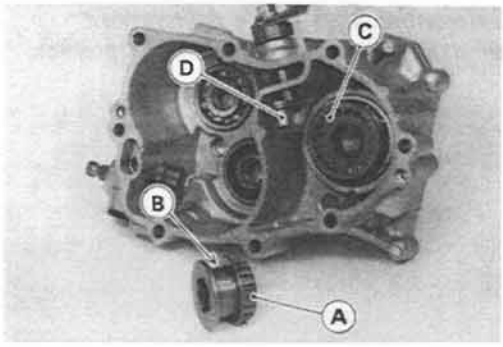
● Replace the circlip that was removed with a new one.

NOTE

○ *Always install the circlip so that the opening is aligned with a spline groove. To install a circlip without damage, first fit the circlip onto the shaft and then expand it just enough to install. Hence, use a suitable gear to push the circlip into place.*



2WD/4WD Shift Mechanism Inspection



● Visually inspect:
Dogs on Shifter [A]
Shifter Groove [B]
Dogs on Drive Bevel Gear Shaft [C]
Shifter Block [D]

★ If they are damaged or worn excessively, replace them.

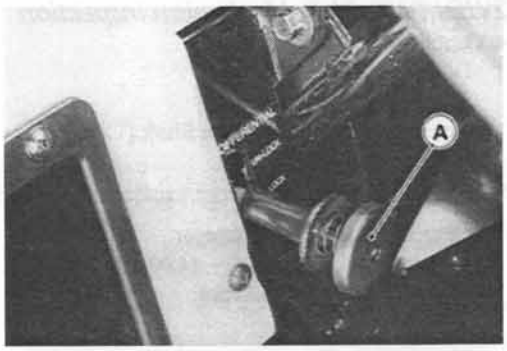
Shifter Block Outside Diameter
Standard: **13.95 ~ 14.00 mm**
Service Limit: **13.8 mm**

Shifter Groove Width
Standard: **14.0 ~ 14.2 mm**
Service Limit: **14.3 mm**

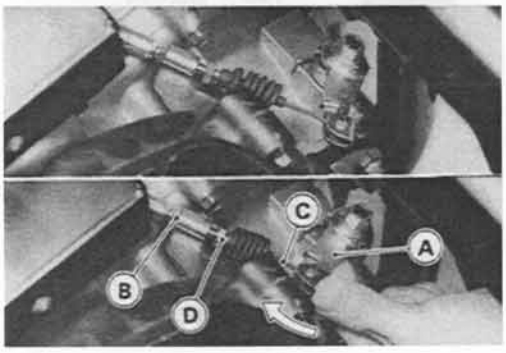
Differential Gears and Shift Mechanism

Differential Shift Cable Adjustment

● Put the shift lever [A] in the LOCK position.

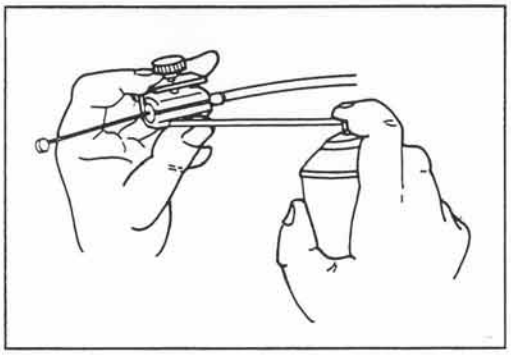


● Turn the shift shaft lever [A] clockwise until the lever is stopped by engaging the shifter dogs with the dogs on the differential gear.
● Screw in the upper adjuster nut [B] by hand until the inner cable [C] has no slack while holding the shift lever in the LOCK position.
● Tighten the lower adjuster nut [D] securely.



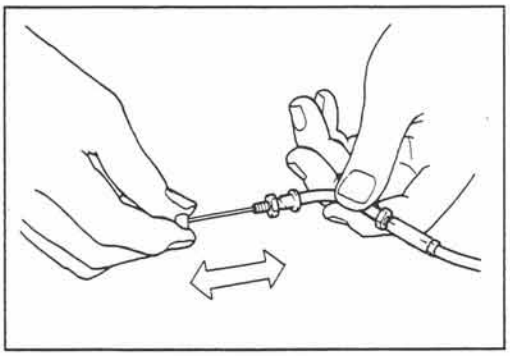
Differential Shift Cable Lubrication

Whenever the shift cable is removed, lubricate the cable as follows.
● Apply a thin coating of grease to the cable ends.
● Lubricate the cable with a penetrating rust inhibitor through the pressure cable luber.



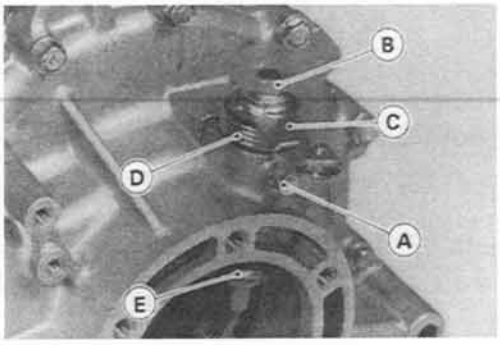
Differential Shift Cable Inspection

● With the cable disconnected at both ends, the cable should move freely within the cable housing.
★ If the cable movement is not free, if the cable is frayed, or if the housing is kinked, replace the cable.



Differential Shift Mechanism Removal

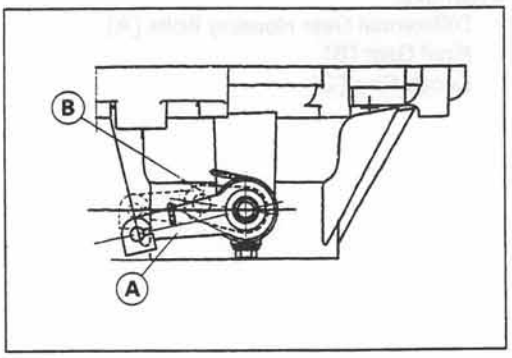
● Remove:
Drive Shafts and Axles
Shift Shaft Stop Bolt [A]
Shift Shaft Lever Mounting Nut [B]
Shift Shaft Lever [C]
Spring [D]
Shift Shaft and Arm [E]



Differential Shift Mechanism Installation

- Apply grease:
  Shift Shaft O-ring
- Install the shift shaft lever [A] to the shift arm [B] as shown.

Torque – Shift Shaft Stop Bolt : 7.8 N-m (0.80 kg-m, 69 in-lb)



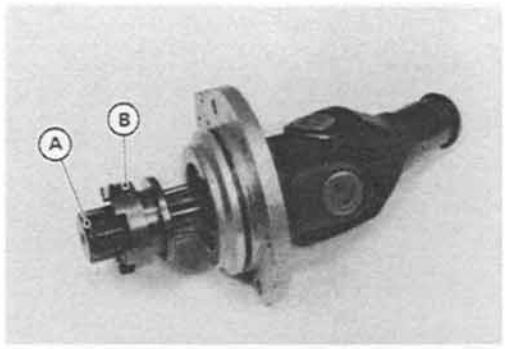
Differential Shift Mechanism Inspection

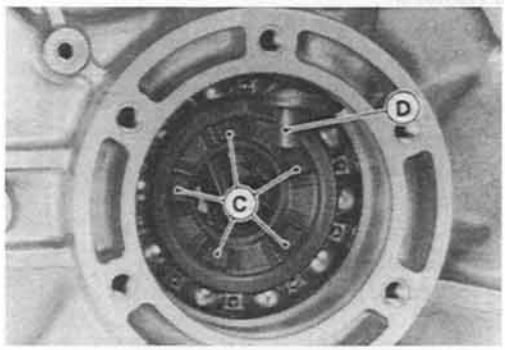
- Visually inspect:
  Splines on Drive Shaft [A]
  Splines on Shifter [B]
  Dogs on Shifter
  Shifter Groove
  Dogs on Differential Gear Housing [C]
  Shift Arm Pin [D]

★If they are damaged or worn excessively, replace them.

Shift Arm Pin Diameter
Standard: 8.4 ~ 8.6 mm
Service Limit: 8.3 mm

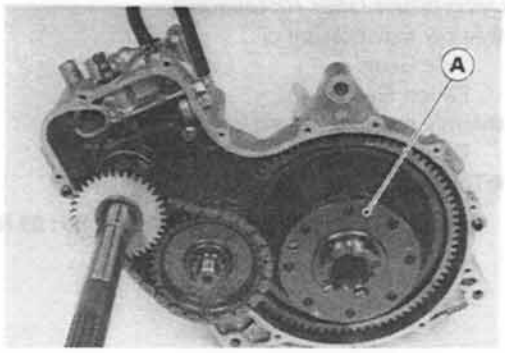
Shifter Groove Width
Standard: 9.0 ~ 9.1 mm
Service Limit: 9.2 mm



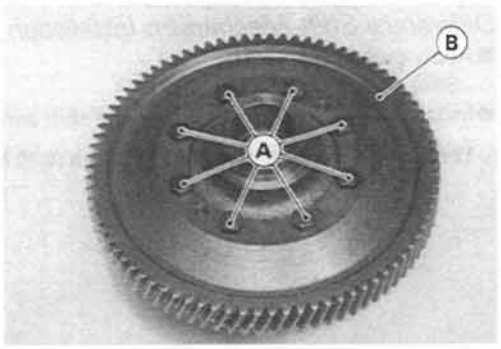


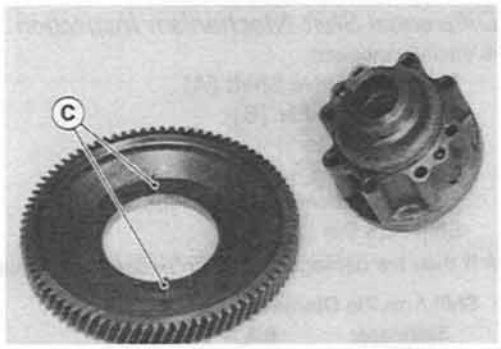
Differential Gear Removal

- Remove:
  Transmission Case (split)
  Differential Gear Assembly [A]

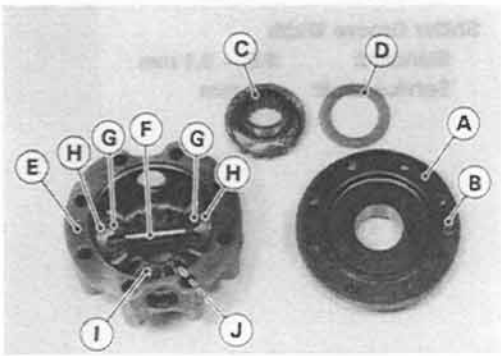


●Remove:
Differential Gear Housing Bolts [A]
Final Gear [B]
Knock Pins [C]





●Remove:
Housing Cover [A]
Knock Pin [B]
Side Gear [C]
Spacer [D]
Retaining Pin [E]
Pinion Gear Shaft [F]
Pinion Gears [G]
Spacers [H]
Side Gear [I]
Spacer [J]



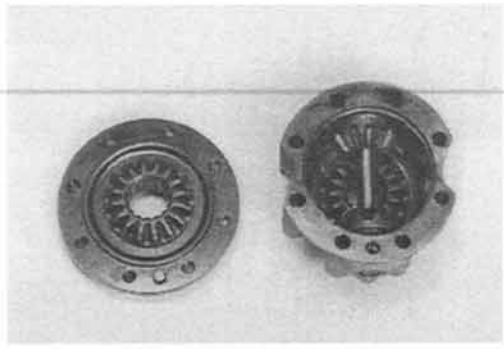
Differential Gear Installation

●Apply transmission oil:
Side Gears
Pinion Gears
●Apply non-permanent locking agent:
Differential Gear Housing Bolts
●Torque:

Torque – Differential Gear Housing Bolts : 29 N-m (3.0 kg-m, 22 ft-lb)

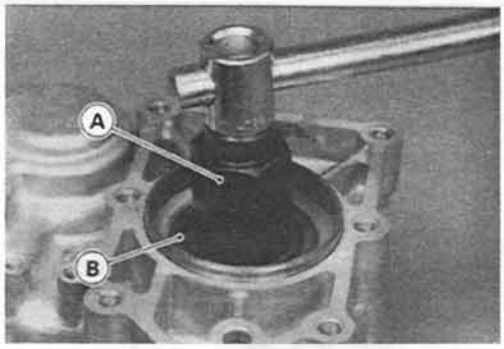
Differential Gear Inspection

●Visually inspect the differential gears.
★Replace the gears as a set if either gear is damaged.



Bearings and Oil Seal

Bearing Replacement



- Using a press, a puller, the oil seal & bearing remover, or the bearing driver set, remove the bearings.

Special Tool – Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129

- Using the hexagon wrench [A], remove the bearing holder [B] and remove the drive bevel gear shaft bearing.

Special Tool – Hexagon Wrench, Hex 32: 57001-1194

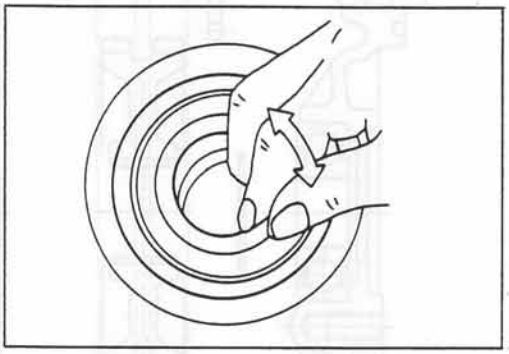
- Apply oil:
  Drive Bevel Gear Shaft Bearing Holder
- Torque:

Torque – Bearing Holder: 120 N-m (12.0 kg-m, 87 ft-lb)

- Using a press and the bearing driver set, install the new bearings and/or new oil seals.

Special Tool – Bearing Driver Set: 57001-1129

Ball Bearing Inspection



- Turn each bearing back and forth while checking for roughness or binding.

★If roughness or binding is found, replace the bearing.

- Examine the bearing seal for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Needle Bearing Inspection

- Check the needle bearing.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

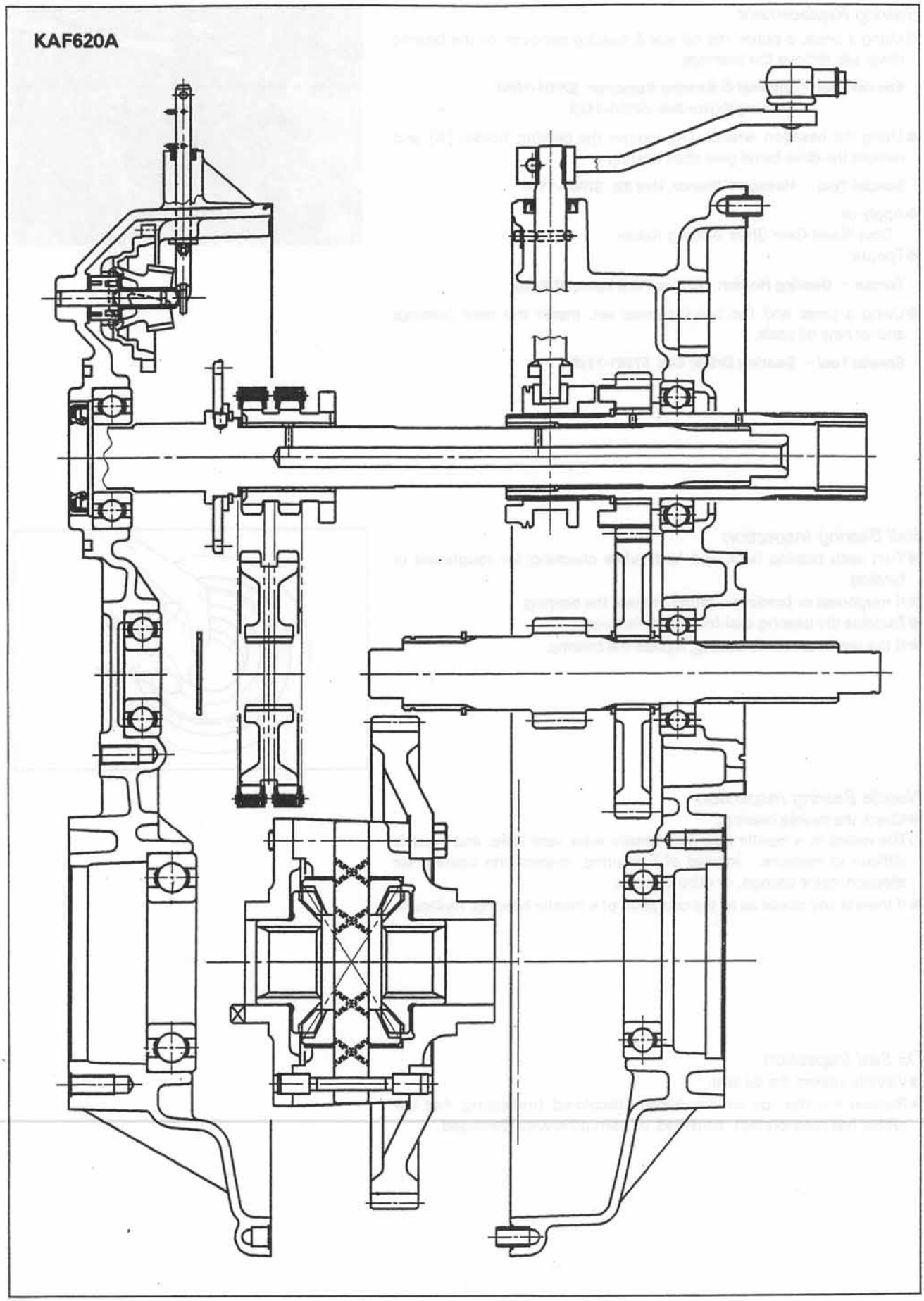
★If there is any doubt as to the condition of a needle bearing, replace it.

Oil Seal Inspection

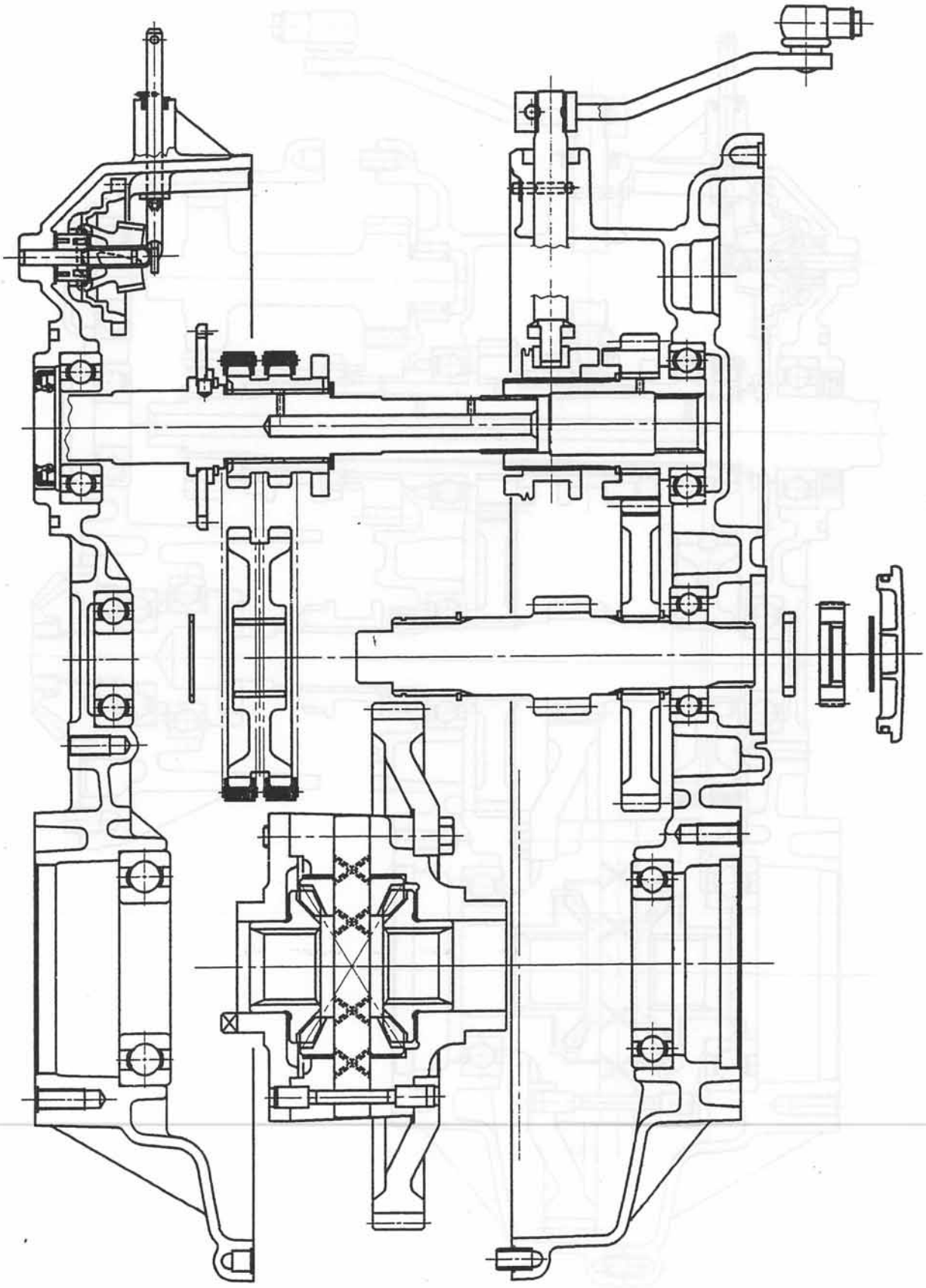
- Visually inspect the oil seal.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.

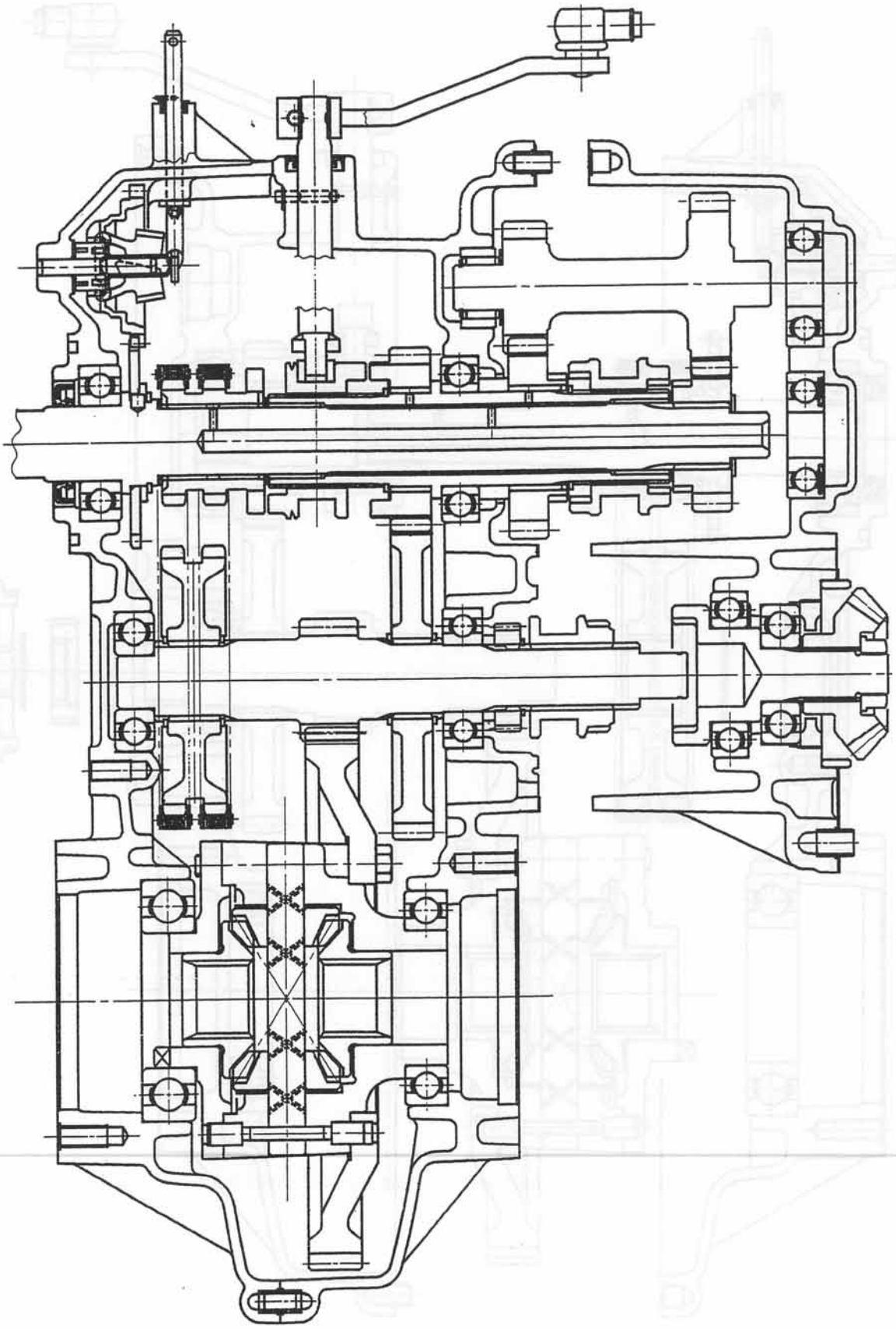
KAF620A



KAF620B



KAF620A



Wheels / Tires

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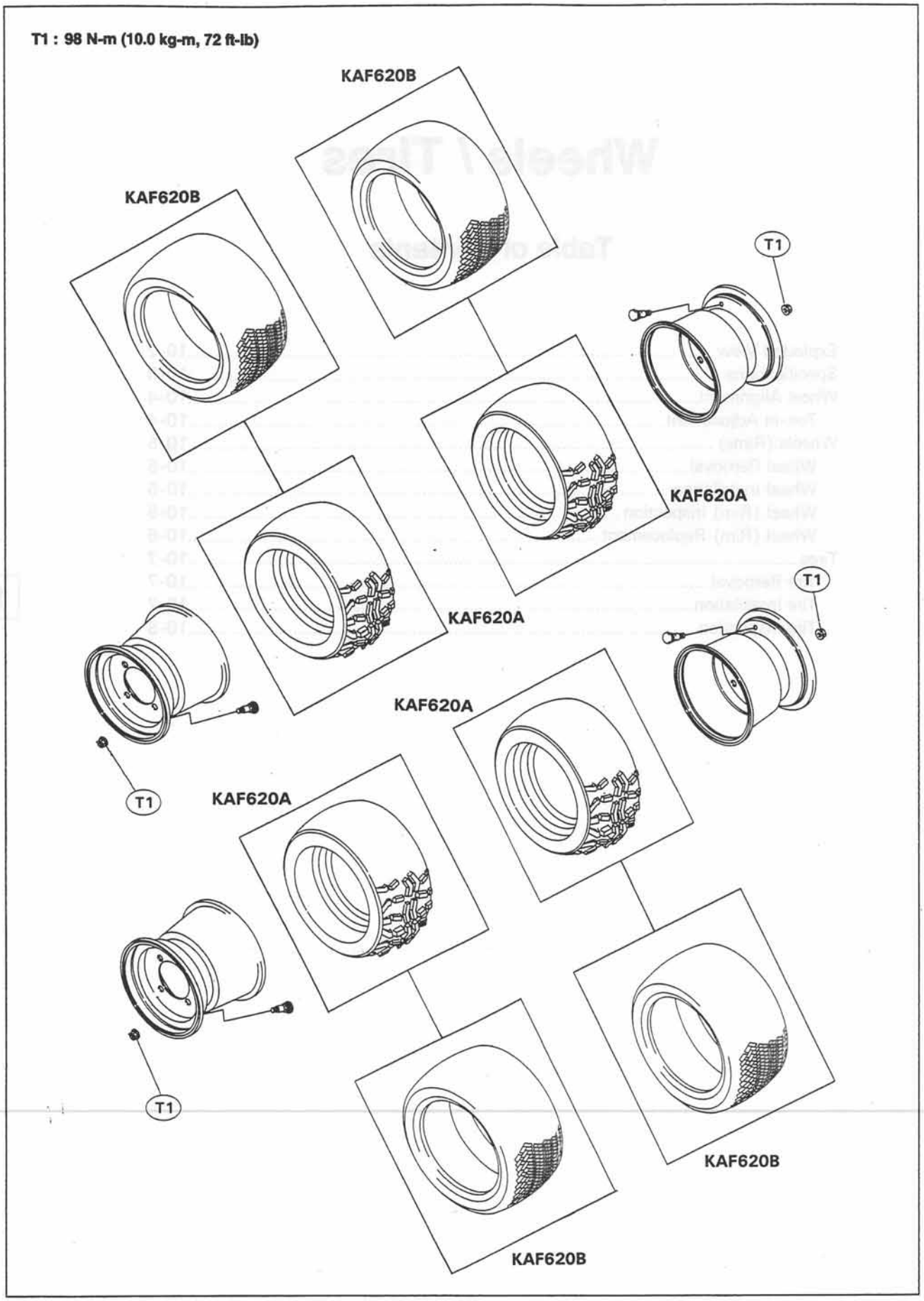
Exploded View



Specifications

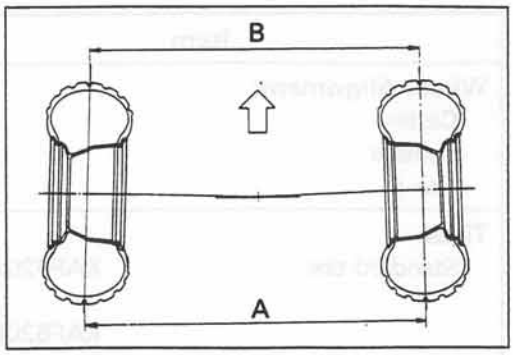
Item		Standard	Service Limit
Wheel Alignment:			
Caster		7.5° (non-adjustable)	– – –
Camber		0.8° (non-adjustable)	– – –
Toe-in		0 ~ 20 mm	– – –
Tires:			
Standard tire:	KAF620A	22 x11.00-10 Dunlop KT869A Tubeless	– – –
	KAF620B	20 x 10.00-10 Goodyear Power Rib Tubeless	
Tire air pressure (when cold):			
KAF620A:	Front	80 kPa (0.8 kg/cm², 12 psi)	– – –
	Rear	180 kPa (1.8 kg/cm², 26 psi)	– – –
KAF620B:	Front	80 kPa (0.8 kg/cm², 12 psi)	– – –
	Rear	140 kPa (1.4 kg/cm², 20 psi)	– – –
Maximum tire air pressure (to seat beads, when cold)		250 kPa (2.5 kg/cm², 36 psi)	– – –
Tire tread depth:	KAF620A	13.2 mm	3 mm
	KAF620B	8 mm	3 mm

Wheel Alignment

Toe-in is the amount that the front wheels are closer together in front than at the rear at the axle height. When there is toe-in, the distance **A** (Rear) is greater than **B** (Front) as shown. The purpose of toe-in is to prevent the front wheels from getting out of parallel at any time, and to prevent any slipping or scuffing action between the tires and the ground. If toe-in is incorrect, the front wheels will be dragged along the ground, scuffing and wearing the tread knobs.

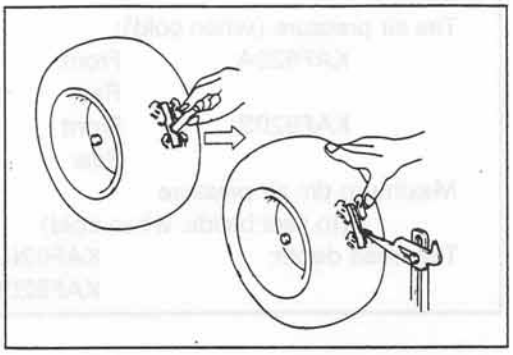
Caster and chamber are built-in and require no adjustment.

A (Rear) − B (Front) = Amount of Toe-in
(Distance A and B are measured at hub height)



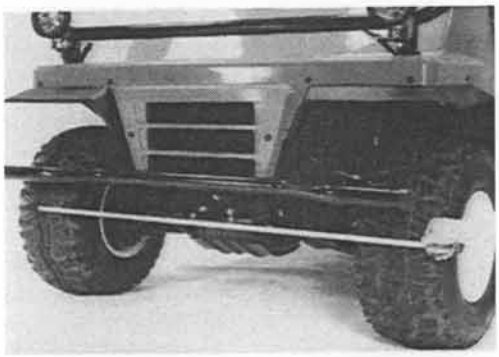
Toe-in Adjustment

- Lift the front wheels off the ground.
- Apply a heavy coat of chalk near the center of the front tires.
- Using a needle nose scriber, make a thin mark near the center of the chalk coating while turning the wheel.
- Set the wheels so that the marks on the tires are at the front side and at the level of the axle height.
- Ground the front wheels.
- Set the steering wheel straight ahead.
- At the level of the axle height, measure the distance between the scribed lines with a measure.
- Move the vehicle rearward until the marks on the front tires are at the rear side and at the same level as the axle.
- Measure the distance between the scribed lines.
- Subtract the measurement of the front from the measurement of the rear to get the toe-in.

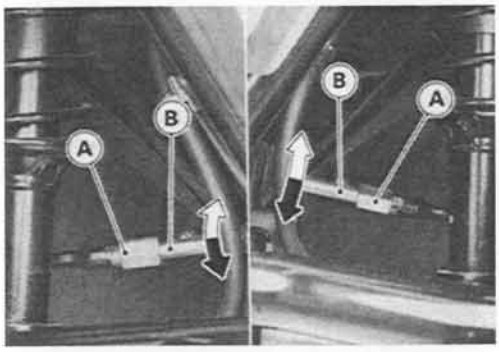


Toe-in of Front Wheels
Standard: 0 ~ 20 mm

★If the toe-in is not the specified value, perform the following procedure.

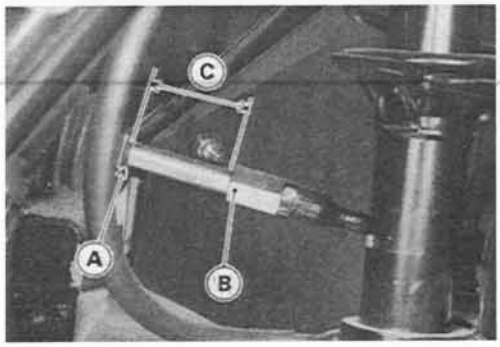


- Loosen the locknuts [A] on each tie-rod and turn the adjusting rods [B] the same number of turns and the same direction on both sides to achieve the specified toe-in.



NOTE

○ *The toe-in will be near the specified range, if the length of the tie-rod distance between the rod groove [A] and the locknut [B] is 51.5 mm [C] on both the left and right tie-rods.*



- Check the toe-in again.
- Torque:

Torque − Tie-rod End Locknuts : 49 N-m (5.0 kg-m, 36 ft-lb)

- Test ride the vehicle.

Wheels (Rims)

Wheel Removal

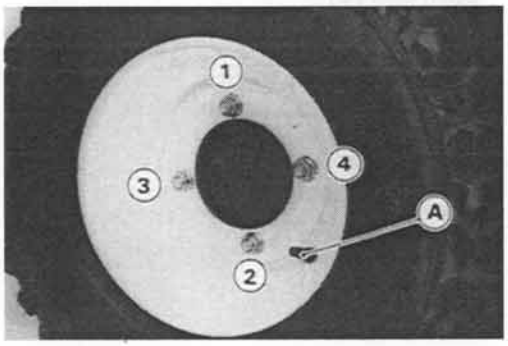
- ●Loosen the wheel nuts (Do not remove).
- ●Lift the wheel(s) off the ground.
- ●Remove:
  - Wheel Nuts
  - Wheel(s)

Wheel Installation

- ●Position the wheel so that the valve stem [A] is toward the outside of the vehicle.
- ●Torque:

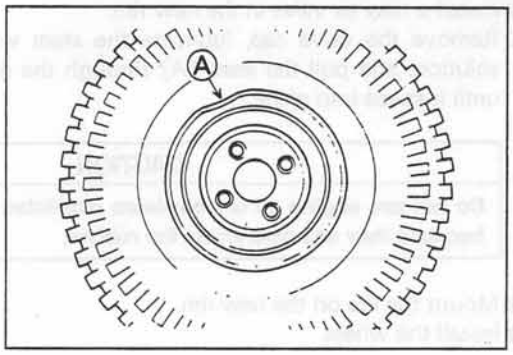
Torque – Wheel Nuts : 98 N-m (10.0 kg-m, 72 ft-lb)

- ○Tighten the wheel nuts in a criss-cross pattern.

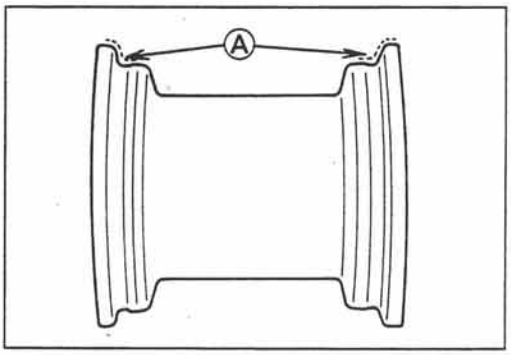


Wheel (Rim) Inspection

- ●Examine both sides of the rim for dents [A].
- ○If the rim is dented, replace it.



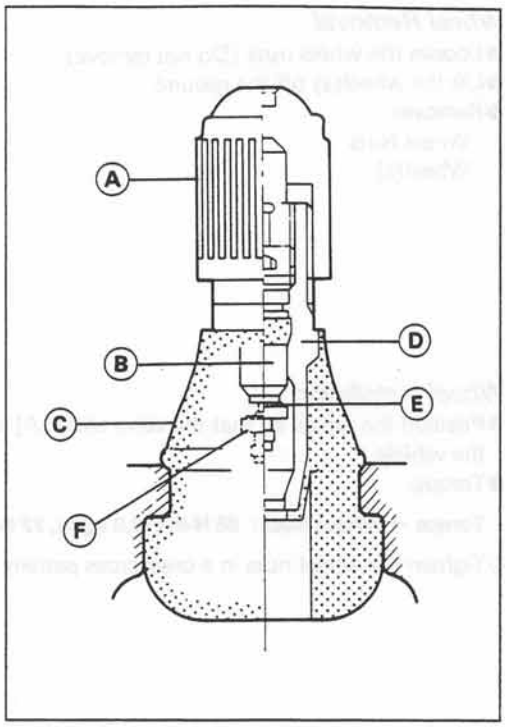
- ●If the tire is removed, inspect the air sealing surfaces [A] of the rim for scratches or nicks. Smooth the sealing surfaces with fine emery cloth if necessary.



Wheel (Rim) Replacement

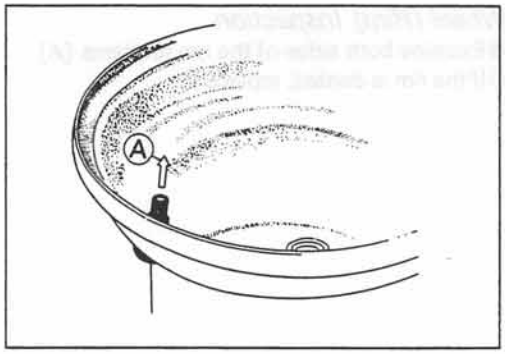
- ● Remove the wheel.
- ● Disassemble the tire from the rim.
- ○ Remove the valve stem and discard it.

CAUTION
Replace the air valve whenever the tire is replaced. **Do not reuse the air valve.**



Plastic Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

- ● Install a new air valve in the new rim.
- ○ Remove the valve cap, lubricate the stem with a soap and water solution, and pull the stem [A] through the rim from the inside out until it snaps into place.

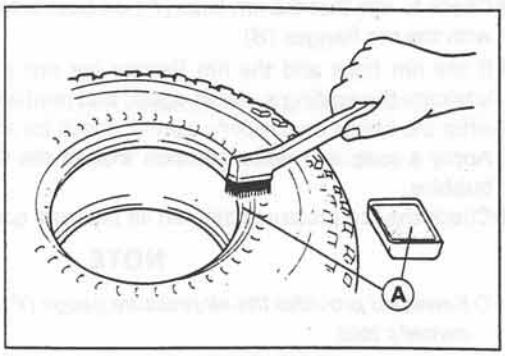


CAUTION
Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- ● Mount the tire on the new rim.
- ● Install the wheel.

Tires

Tire Removal



- Remove:
  Wheel
  Valve Core (let out the air)
- Lubricate the tire beads and rim flanges on both sides of the wheel with a soap and water solution, or water [A]. This helps the tire beads slip off the rim flanges.

CAUTION

Do not lubricate the tire beads and rim flanges with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

○ *The tires cannot be removed with hand tools because they fit the rims tightly.*

Tire Installation

- Inspect the rim.
- Check the tire for wear and damage.
- Replace the air valve with a new one.

CAUTION

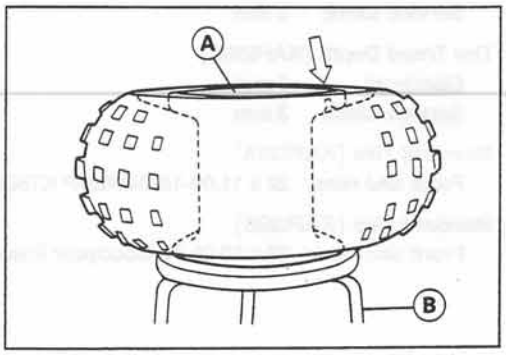
Replace the air valve whenever the tire is replaced.
Do not reuse the air valve.

- Lubricate the tire beads and rim flanges with a soap and water solution, or water.

⚠WARNING

Do not use the lubricant other than a water and soap solution, or water to lubricate the tire beads and rim because it may cause tire separation, and a hazardous condition may result.

- Install the tire on the rim using a suitable commercially available tire changer.
- Lubricate the tire beads again and center the tire on the rim.

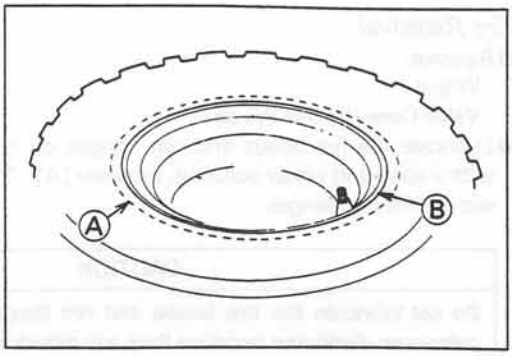


- Support the wheel rim [A] on a suitable stand [B] to prevent the tire from slipping off.
- Inflate the tire until the tire beads seat on the rim.

Maximum Tire Air Pressure (to seat beads when cold)
Front and Rear: 250 kPa (2.5 kg/cm², 36 psi)

⚠WARNING

Do not inflate the tire to more than the maximum tire air pressure. Overinflation can explode the tire with possibility of injury and loss of life.



- Check to see that the rim lines [A] on both sides of the tire are parallel with the rim flanges [B].

★If the rim lines and the rim flanges are not parallel, deflate the tire, lubricate the sealing surfaces again, and reinflate the tire.

- After the beads are properly seated, check for air leaks.
- Apply a soap and water solution around the tire bead and check for bubbles.
- Check the tire pressure using an air pressure gauge.

NOTE

Kawasaki provides the air pressure gauge (P/N 52005-1031) as the owner's tool.

Tire Air Pressure (when cold) [KAF620A]
Front: 80 kPa (0.8 kg/cm², 12 psi)
Rear: 180 kPa (1.8 kg/cm², 26 psi)

Tire Air Pressure (when cold) [KAF620B]
Front: 80 kPa (0.8 kg/cm², 12 psi)
Rear: 140 kPa (1.4 kg/cm², 20 psi)

- Install the wheel.
- Wipe off the soap and water solution, or water on the tire, and dry the tire before operation.

⚠WARNING

Do not operate the vehicle with the water and soap, or water still around the tire beads. They will cause tire separation, and a hazardous condition may result.

Tire Inspection

- Examine the tire for damage and wear.
- If the tire is cut or cracked, replace it.
- Lumps or high spots on the tread or sidewalls indicate internal damage requiring tire replacement.
- Remove any foreign objects from the tread. After removal, check for leaks with a soap and water solution.
- Measure the tread depth at the center of the tread with a depth gauge. Since the tire may wear unevenly, take measurements at several places.

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

Tire Tread Depth [KAF620A]
Standard: 13.2 mm
Service Limit: 3 mm

Tire Tread Depth [KAF620B]
Standard: 8 mm
Service Limit: 3 mm

Standard Tire [KAF620A]
Front and rear: 22 x 11.00-10 DUNLOP KT869A Tubeless

Standard Tire [KAF620B]
Front and rear: 20 x 10.00-10 Goodyear Power Rib Tubeless

Final Drive

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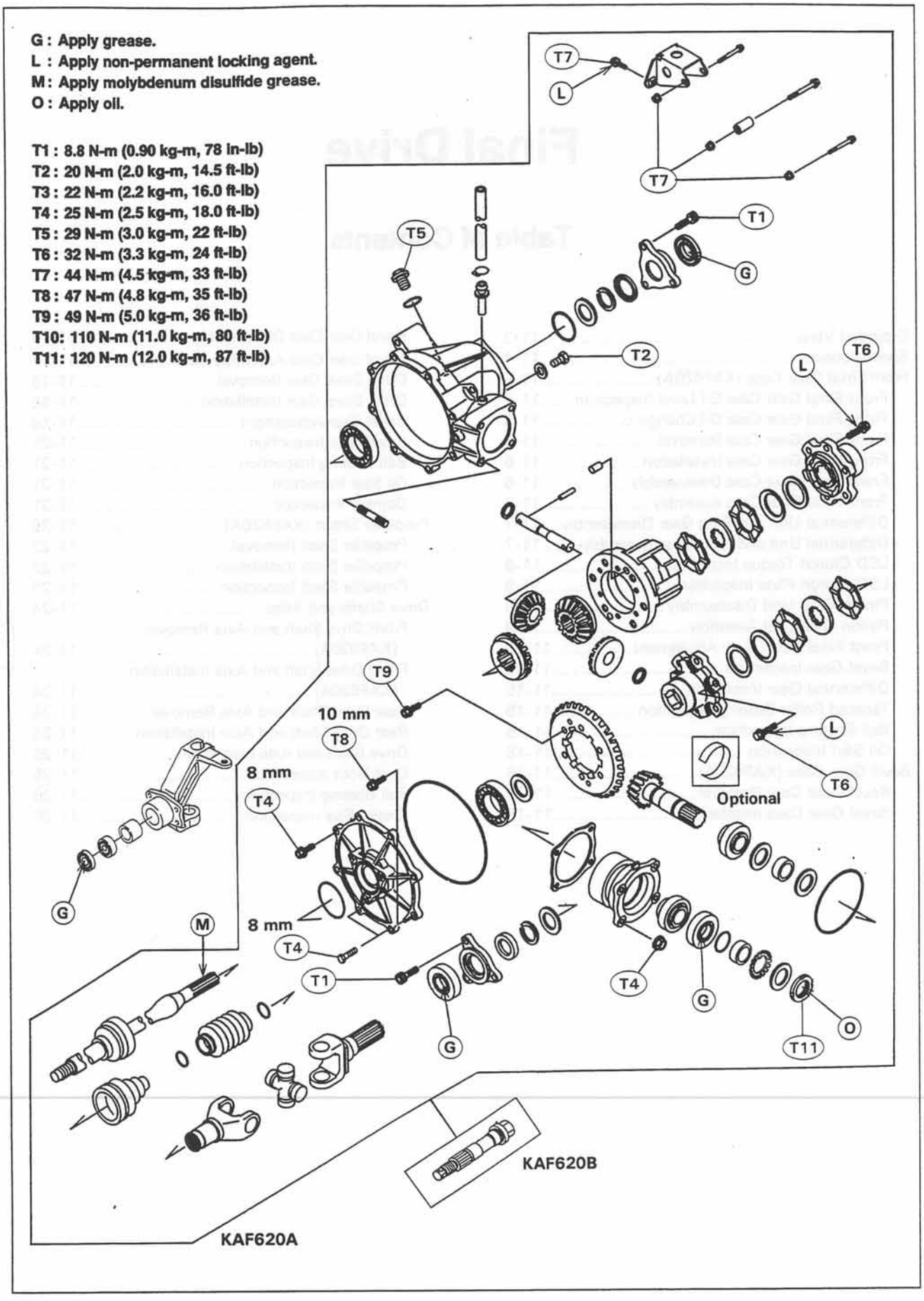
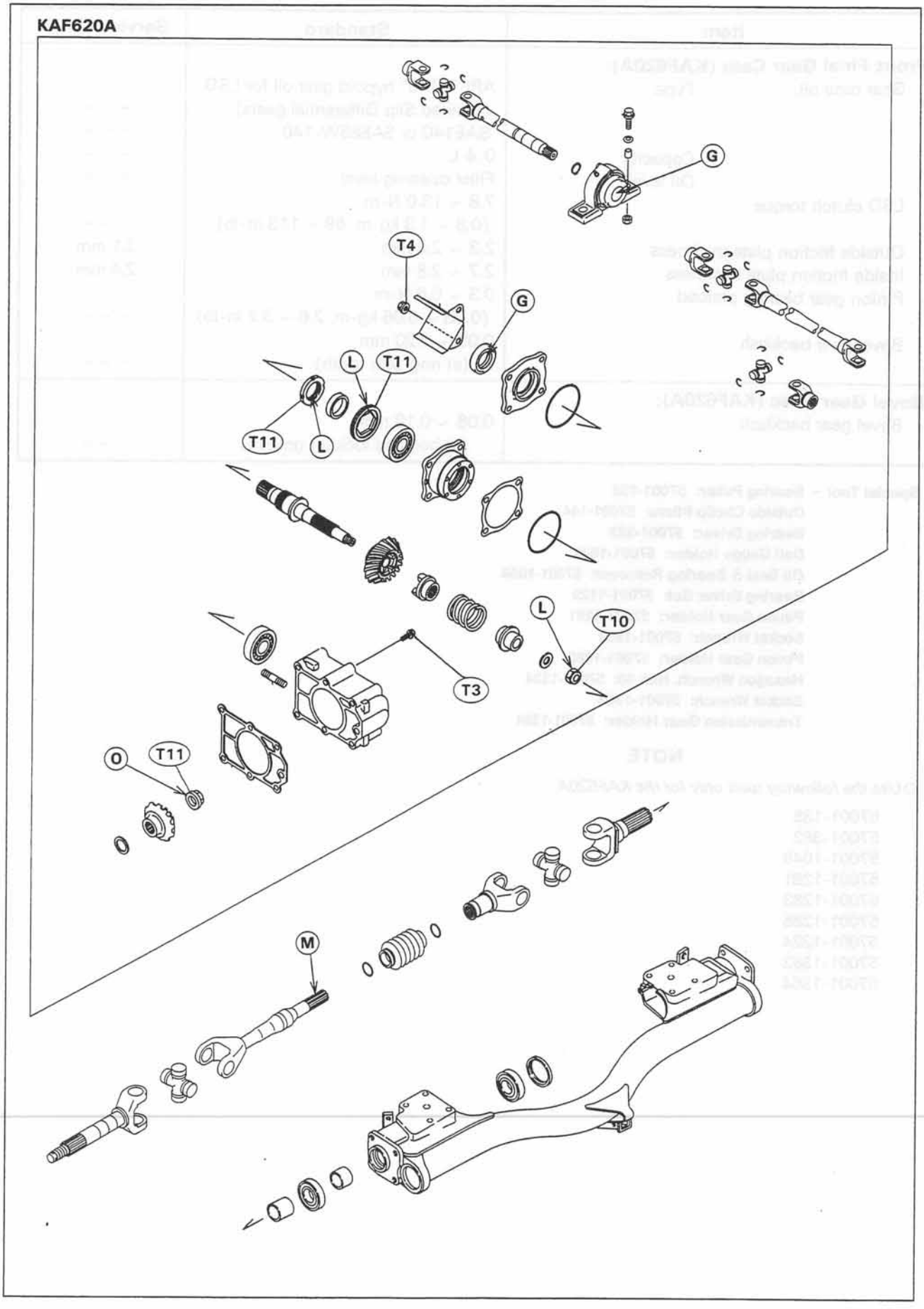
Exploded View



KAF620A



Specifications

Item	Standard	Service Limit
Front Final Gear Case (KAF620A):		
Gear case oil: Type	API "GL-5" hypoid gear oil for LSD (Limited Slip Differential gears)	- - -
	SAE140 or SAE85W-140	- - -
Capacity	0.4 L	- - -
Oil level	Filler opening level	- - -
LSD clutch torque	7.8 ~ 13.0 N-m (0.8 ~ 1.3 kg-m, 69 ~ 113 in-lb)	- - -
Outside friction plate thickness	2.3 ~ 2.4 mm	2.1 mm
Inside friction plate thickness	2.7 ~ 2.8 mm	2.4 mm
Pinion gear bearing preload	0.3 ~ 0.6 N-m (0.03 ~ 0.06 kg-m, 2.6 ~ 5.2 in-lb)	- - -
Bevel gear backlash	0.09 ~ 0.20 mm (at ring gear tooth)	- - -
Bevel Gear Case (KAF620A):		
Bevel gear backlash	0.08 ~ 0.18 mm (at housing locknut groove)	- - -

Special Tool – Bearing Puller: 57001-135
Outside Circlip Pliers: 57001-144
Bearing Driver: 57001-382
Dail Gauge Holder: 57001-1049
Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129
Pinion Gear Holder: 57001-1281
Socket Wrench: 57001-1283
Pinion Gear Holder: 57001-1285
Hexagon Wrench, Hex 40: 57001-1324
Socket Wrench: 57001-1363
Transmission Gear Holder: 57001-1364

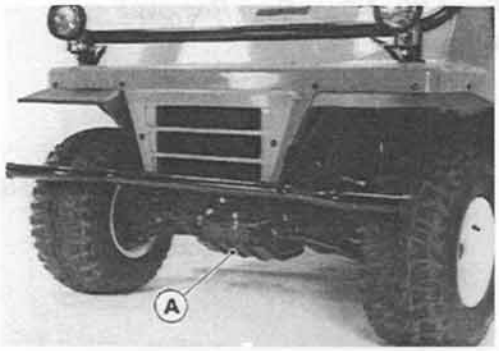
NOTE

○ *Use the following tools only for the KAF620A.*

57001-135
57001-382
57001-1049
57001-1281
57001-1283
57001-1285
57001-1324
57001-1363
57001-1364

Front Final Gear Case (KAF620A)

Front Final Gear Case Oil Level Inspection



- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Remove:
  Front Final Gear Case Skid Plate [A]
  Filler Cap [B]

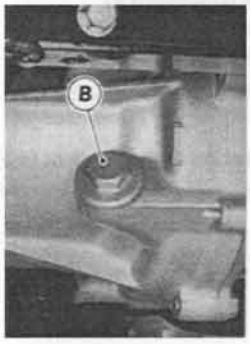
CAUTION
Be careful not to allow any dirt or foreign materials to enter the gear case.

- Check the oil level. The oil level should come to the bottom of the filler opening [C].

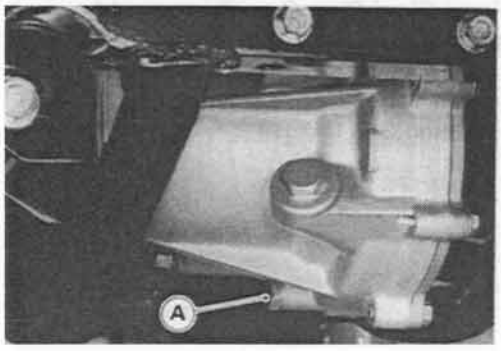
★If it is insufficient, first check the front final gear case for oil leakage, remedy it if necessary, and add oil through the filler opening. Use the same type and brand of oil that is already in the final gear case.

- Be sure the O-ring is in place, and tighten the filler cap.

Torque – Oil Filler Cap : 29 N-m (3.0 kg-m, 22 ft-lb)



Front Final Gear Case Oil Change



- Warm up the oil by running the vehicle so that the oil will pick up any sediment and drain easily. Then stop the vehicle.
- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Remove:
  Front Final Gear Case Skid Plate
- Place an oil pan beneath the front final gear case and remove the drain plug [A].

Front Final Gear Case Oil

Type :	**API "GL-5" hypoid gear oil for LSD (Limited Slip Differential gears) SAE 140 or SAE85W-140**
Capacity :	0.4 L

NOTE

○*"GL-5" indicates a quality and additive rating.*

- Be sure the O-ring is in place, and tighten the filler cap.

Torque – Oil Filler Cap : 29 N-m (3.0 kg-m, 22 ft-lb)

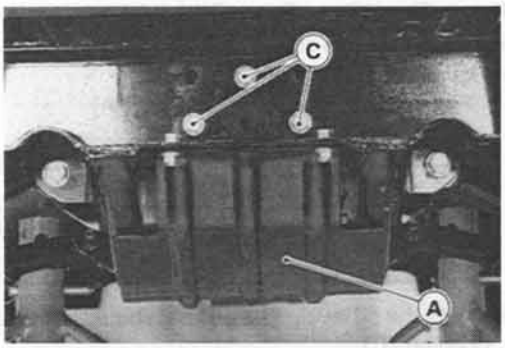
⚠WARNING
When draining or filling the final gear case, be careful that no oil gets on the tire or rim. Clean off any oil that inadvertently gets on them with a high-flash point solvent.

- After the oil has completely drained out, install the drain plug with a new aluminum gasket, and tighten it.

Torque – Oil Drain Plug : 20 N-m (2.0 kg-m, 14.5 ft-lb)

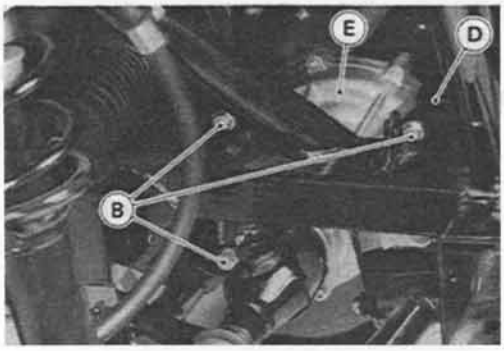
- Fill the gear case up to the bottom of filler opening with the oil specified above.

Front Final Gear Case Removal



- Remove:
  - Front Final Gear Case Skid Plate [A]
  - Front Final Gear Case Oil (drain)
  - Propeller Shafts
  - Front Axles and Drive Shafts
  - Front Final Gear Case Mounting Bolts and Nuts [B]
  - Front Final Gear Case Bracket Bolts [C]
  - Front Final Gear Case Bracket [D]
  - Front Final Gear Case [E]

Front Final Gear Case Installation

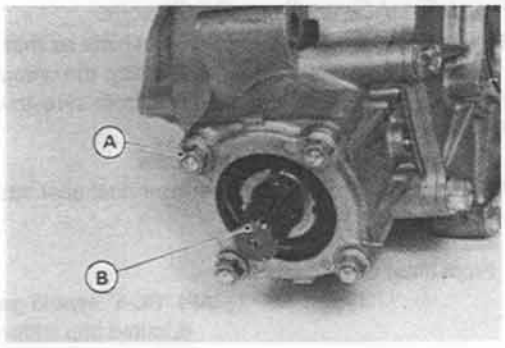


- Route the gear case vent hose correctly.
- Apply non-permanent locking agent:
  - Gear Case Bracket Bolt Threads
- Torque:

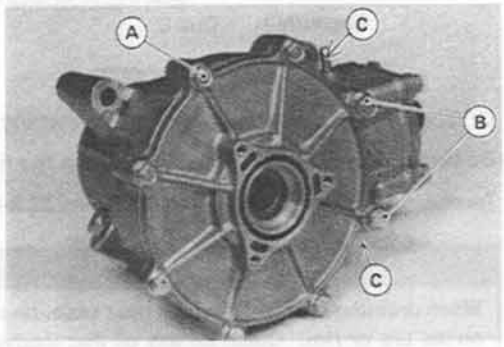
Torque – Gear Case Bracket Bolts: 44 N-m (4.5 kg-m, 33 ft-lb)
Gear Case Mounting Nuts: 44 N-m (4.5 kg-m, 33 ft-lb)

- Adjust:
  - Front Final Gear Case Oil

Front Final Gear Case Disassembly

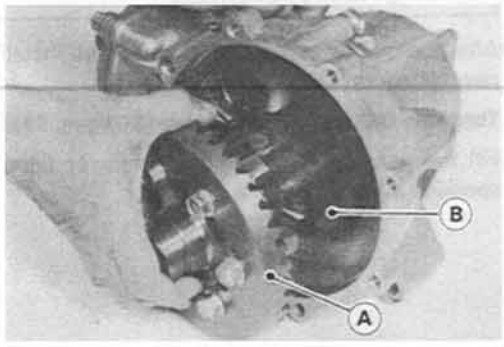


- Remove:
  - Front Final Gear Case
  - Bearing Housing Nuts [A]
  - Pinion Gear Unit [B]



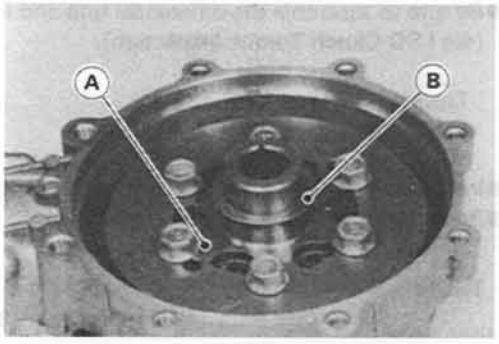
- Remove:
  - Ring Gear Cover Bolts
  - Ring Gear Cover

○ Remove the ring gear cover bolts, staring with the smaller bolts.
  - Smaller Bolts [A]
  - Larger Bolts [B]
  - Pry Points [C]



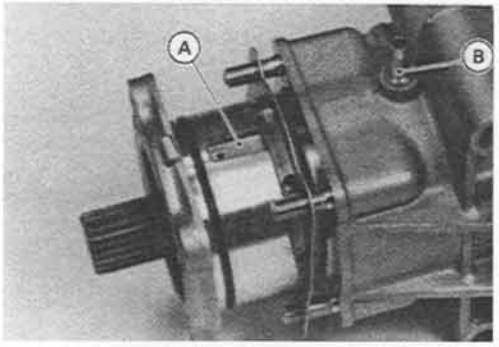
- Remove:
  - Ring Gear [A]
  - Differential Unit [B]

Front Final Gear Case Assembly



- Visually check the pinion gear and ring gear for scoring, chipping, or other damage.
- ★Replace the bevel gears as a set if either gear is damaged since they are lapped as a set in the factory to get the best tooth contact.
- Check that the ring gear is installed on the correct side of the differential caps [A] as shown.
- Install the following parts in the order listed.

Differential Unit and Ring Gear
Ring Gear Shim [B]
Ring Gear Cover Pinion Gear Unit

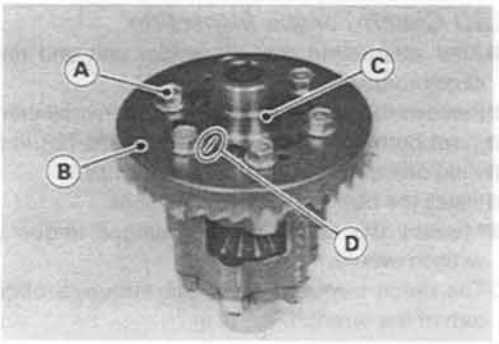


- Install the pinion gear unit with the ring gear side of the case facing down.
- Align the air vent passage [A] with the hose nipple [B].
- ○First tighten the 10 mm bolts, then tighten the 8 mm bolts.

Torque – 10 mm Ring Gear Cover Bolts : 47 N-m (4.8 kg-m, 35 ft-lb)
8 mm Ring Gear Cover Bolts : 25 N-m (2.5 kg-m, 18.0 ft-lb)
Pinion Gear Bearing Housing Nuts : 25 N-m (2.5 kg-m, 18.0 ft-lb)

- Adjust:
  Front Final Gear Backlash
  Front Final Gear Tooth-Contact

Differential Unit and Ring Gear Disassembly



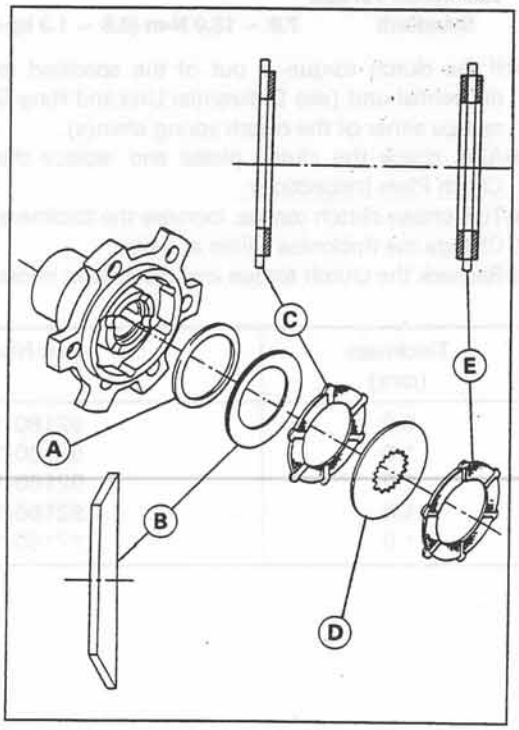
- Remove the differential unit and ring gear (see Front Final Gear Case Disassembly).

CAUTION
Do not interchange the right and left side parts in the differential unit.

- Remove the following parts to disassemble the differential unit.
  Ring Gear Bolts [A] Differential Caps [C]
  Ring Gear [B] Mark here to assemble later [D]
- ○The clutch plates, springs, spring shims, and side gears come out.

Differential Unit and Ring Gear Assembly

CAUTION
Be sure to install the right and left side parts of the unit in the original position.



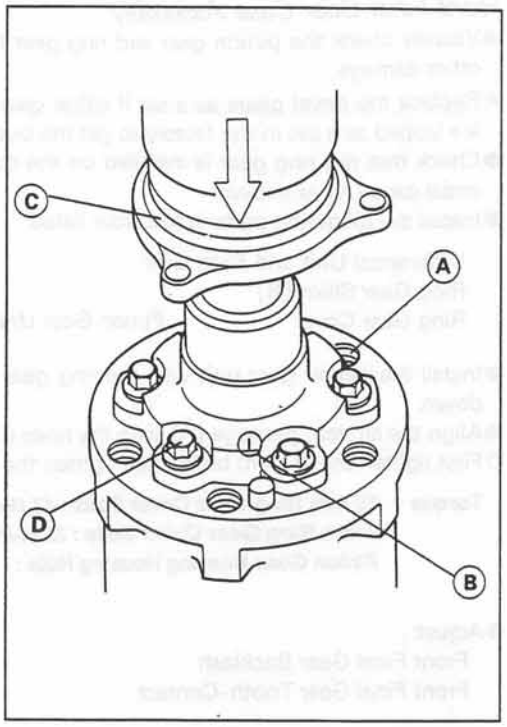
- Inspect the clutch plates (see Clutch Plate Inspection) and the other differential unit parts. Replace any damaged parts.
- Measure and record the thickness of the original clutch spring shim(s).
- Apply specified gear oil to the differential unit parts.
- Note direction and position of the friction plate and the clutch spring.
  Clutch Spring Shim(s) [A] Steel Plate [D]
  Clutch Spring [B] Inside Friction Plate [E]
  Outside Friction Plate [C]

●Be sure to assemble the differential unit and inspect the clutch torque (see LSD Clutch Torque Inspection).

Tapped Holes [A] for Ring Gear
Mark [B] for assembly

●Install the front axles [C] to center the steel plates.
●Apply non-permanent locking agent:
Differential Case Torx Bolts [D]

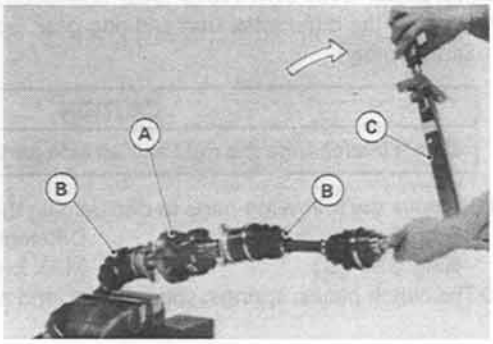
Torque – Differential Case Torx Bolts : 32 N-m (3.3 kg-m, 24 ft-lb)
Ring Gear Bolts : 49 N-m (5.0 kg-m, 36 ft-lb)



LSD Clutch Torque Inspection

●After assembling the differential unit and ring gear, check the LSD clutch torque.
●Remove the ring gear from the differential unit [A].
●Insert both front axles and drive shafts [B] in the unit.
●Hold one of the front axles with a vise.
●Install the hub nut on the other axle.
●Measure the clutch torque using a torque wrench [C]. Turn the wrench evenly.
○The clutch torque is the mean torque reading during about a quarter turn of the wrench.

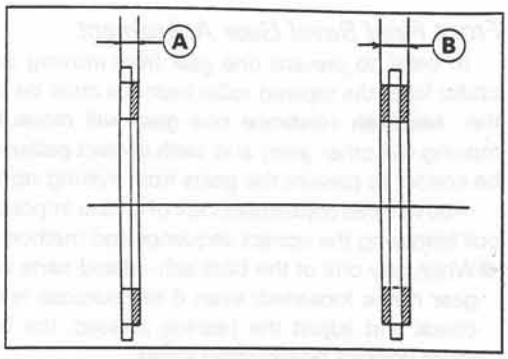
LSD Clutch Torque
Standard: 7.8 ~ 13.0 N-m (0.8 ~ 1.3 kg-m, 69 ~ 113 in-lb)



★If the clutch torque is out of the specified range, disassemble the differential unit (see Differential Unit and Ring Gear Disassembly) and replace either of the clutch spring shim(s).
●Also, check the clutch plates and replace them as necessary (see Clutch Plate Inspection).
●To increase clutch torque, increase the thickness of the shim(s).
○Change the thickness a little at a time.
●Recheck the clutch torque and readjust as necessary.

Thickness (mm)	Part Number
0.8	92180-1121
1.0	92180-1122
1.2	92180-1123
1.4	92180-1124
1.6	92180-1125

LSD Clutch Plate Inspection



●Visually inspect the friction plates and steel plates to see if they show any signs of seizure, overheating, or uneven wear.

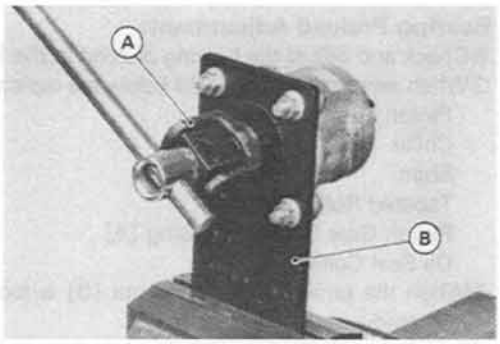
★If any plates show signs of damage, or if the friction plates have worn past the service limit, replace the friction plates and steel plates as a set.

Outside Friction Plate [A]
Inside Friction Plate [B]

Outside Friction Plate Thickness
Standard: 2.3 ~ 2.4 mm
Service Limit: 2.1 mm

Inside Friction Plate Thickness
Standard: 2.7 ~ 2.8 mm
Service Limit: 2.4 mm

Pinion Gear Unit Disassembly



●Remove the pinion gear unit (see Front Final Gear Case Disassembly).
●Pry open the toothed washer tab on the pinion gear slotted nut.
●Unscrew the pinion gear slotted nut.

Special Tool – Pinion Gear Holder: 57001-1281 [A]
Socket Wrench: 57001-1283 [B]

●Remove the slotted nut, flat washer, and toothed washer.
●Pull the pinion gear out of the bearing housing.
●Remove the tapered roller bearing inner race as necessary.

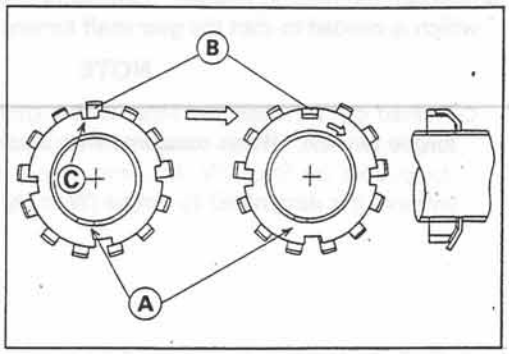
Special Tool – Bearing Puller: 57001-135

Pinion Gear Unit Assembly

●The pinion gear and ring gear are lapped as a set in the factory to get the best tooth contact. They must be replaced as a set.
●Visually inspect the tapered roller bearings for abrasion, color change, or other damage.
★If there is any doubt as to the condition of a bearing, replace the bearing housing and the bearings as a set.
●Be sure to check and adjust the pinion gear bearing preload and the bevel gear backlash and tooth contact, when any of the backlash-related parts are replaced (see Front Final Bevel Gear Adjustment).
○When the pinion gear slotted nut is loosened, even if the purpose is not to replace the parts, check and adjust the bearing preload.
●Fit the toothed washer claw [A] into the shaft.
●Apply an oil to the threads and seating surface of the pinion gear slotted nut, and tighten it.

Torque – Pinion Gear Slotted Nut : 120 N-m (12.0 kg-m, 87 ft-lb)

★If none of the toothed washer tabs [B] align, tighten the nut further just enough to align one of the tabs with a slot [C] in the nut.
●Bend the tab over the nut.



Front Final Bevel Gear Adjustment

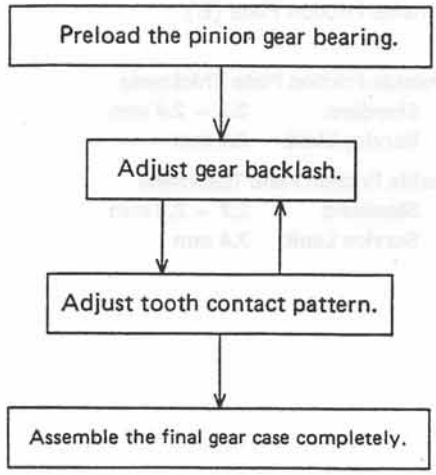
In order to prevent one gear from moving away from the other gear under load, the tapered roller bearings must be properly **preloaded.** Also the **backlash** (distance one gear will move back and forth without moving the other gear) and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

Above three adjustments are of critical importance and must be carried out following the correct sequence and method.

- When any one of the backlash-related parts are replaced or the pinion gear nut is loosened; even if the purpose is not to replace the parts, check and adjust the bearing preload, the bevel gear backlash, and tooth contact by replacing shims.
- The amount of backlash is influenced by the ring gear position more than by the pinion gear position.
- Tooth contact location is influenced by pinion gear position more than by ring gear position.

FD10

Front Final Bevel Gear Adjustment Procedure



Bearing Preload Adjustment:

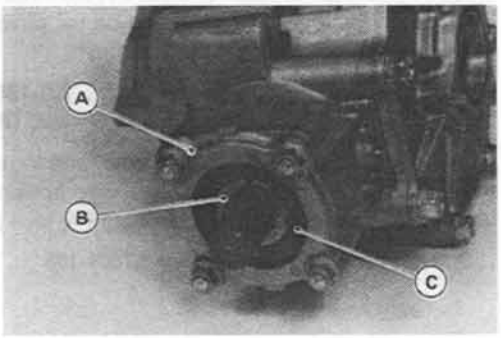
- Check and adjust the bearing preload in the following cases.

○When any of the parts listed below are replaced with new ones.

Pinion Gear
Collar
Shim
Tapered Roller Bearings
Pinion Gear Bearing Housing [A]
Oil Seal Collar

○When the pinion gear slotted nut [B] is loosened; even if the nut is not removed.

- Install the pinion gear bearing housing and tighten the pinion gear slotted nut to the specified torque (see Pinion Gear Unit Disassembly/Assembly).
- Do not install the oil seal [C] and O-rings, and do not lock the washer until the correct bearing preload is obtained.



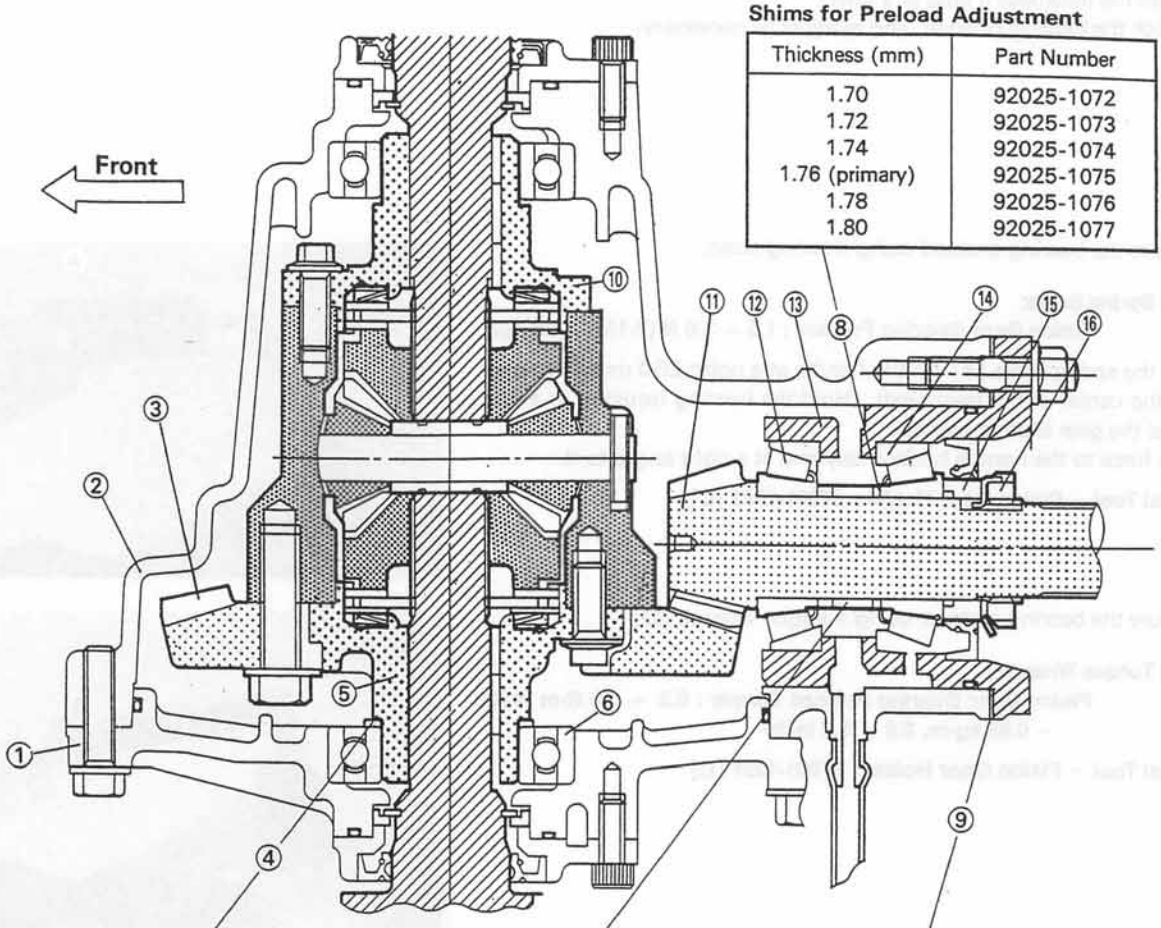
CAUTION
To start with, choose a shim or collar so that the bearings are just SNUG with NO play but also with NO preload. **An over-preload on the bearings could damage the bearings.**

- Apply specified gear oil to the bearings, and turn the gears more than 5 turns to allow the bearings to seat.
- Measure the bearing preload. Bearing preload is the force or torque which is needed to start the gear shaft turning.

NOTE

○*Preload can be measured either with a spring scale or a beam-type torque wrench. When measured with a spring scale, the preload is designated by force (N, kg), and when measured with a torque wrench, it is designated by torque (N-m, kg-m, in-lb).*

Front Final Gear Case (Backlash-Related Parts)



Shims for Preload Adjustment

Thickness (mm)	Part Number
1.70	92025-1072
1.72	92025-1073
1.74	92025-1074
1.76 (primary)	92025-1075
1.78	92025-1076
1.80	92025-1077

Ring Gear Shims for Backlash Adjustment

Thickness (mm)	Part Number
0.1	92025-1850
0.15	92025-1851
0.5	92025-1856
0.8	92025-1857
1.0 (primary)	92025-1849

Collar for Preload Adjustment

Thickness (mm)	Part Number
10.2	92027-1401
10.3	92027-1402
10.4	92027-1403
10.5	92027-1404
10.6	92027-1405
10.7 (primary)	92027-1406
10.8	92027-1407
10.9	92027-1408
11.0	92027-1409
11.1	92027-1410
11.2	92027-1411

Pinion Gear Shims for Tooth Contact Adjustment

Thickness (mm)	Part Number
0.1	92025-1919
0.15	92025-1920
0.5	92025-1921
0.8	92025-1922
1.0 (primary)	92025-1923
1.2	92025-1924

1. Ring Gear Cover
2. Front Final Gear Case
3. Ring Gear
4. Ring Gear Shims for Backlash Adjustment
5. Left Differential Cap
6. Ball Bearing
7. Collar for Preload Adjustment (affects preload only)
8. Shims for Preload Adjustment (affects preload only)
9. Pinion Gear Shims for Tooth Contact Adjustment
10. Right Differential Cap
11. Pinion Gear
12. Tapered Roller Bearing
13. Pinion Gear Bearing Housing
14. Tapered Roller Bearing (affects preload only)
15. Oil Seal Collar (affects preload only)
16. Pinion Gear Slotted Nut (affects preload only)

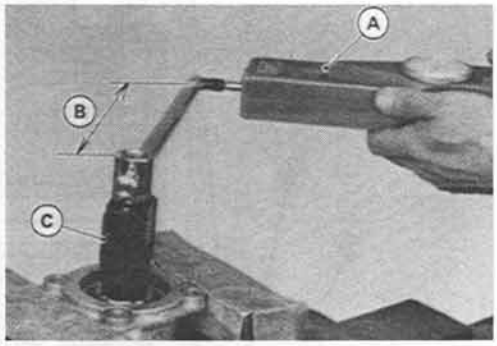
★If the preload is out of the specified range, replace the collar and/or shim(s).
○To increase preload, decrease the size of the shim(s) or collar. To decrease preload, increase the size of the shim(s) or collar.
○Change the thickness a little at a time.
●Recheck the bearing preload, and readjust as necessary.

●Measure the bearing preload using a spring scale.

Using Spring Scale:
Pinion Gear Bearing Preload : 1.5 ~ 3.0 N (0.15 ~ 0.30 kg)

○Hook the spring scale [A] on the handle at a point 200 mm [B] apart from the center of the gear shaft. Hold the bearing housing in a vise so that the gear shaft is vertical.
○Apply force to the handle horizontally and at a right angle to it.

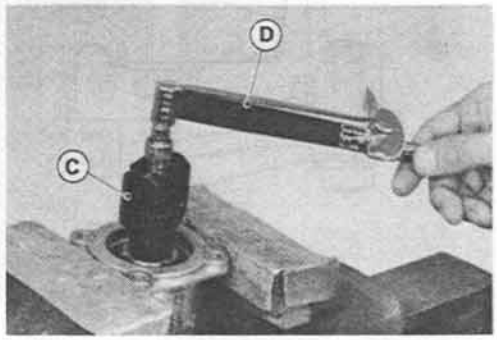
Special Tool – Pinion Gear Holder: 57001-1281 [C]



●Measure the bearing preload using a torque wrench [D].

Using Torque Wrench :
Pinion Gear Bearing Preload Torque : 0.3 ~ 0.6 N-m (0.03 ~ 0.06 kg-m, 2.6 ~ 5.2 in-lb)

Special Tool – Pinion Gear Holder: 57001-1281 [C]



Backlash Adjustment:
●Check and adjust the gear backlash when any of the backlash-related parts are replaced with new ones.
●Clean any dirt and oil off the bevel gear teeth.
●Assemble the front final gear case (see Front Final Gear Case Assembly). Do not install the O-rings during adjustment.
○Check the backlash during tightening of the ring gear cover bolts and stop tightening them immediately if the backlash disappears. Then, change the ring gear shim to a thinner one.
●Set up a dial gauge against a ring gear tooth to check gear backlash shown.
●To measure the backlash, move the left front axle (ring gear side) back and forth while holding the pinion gear steady. The difference between the highest and the lowest gauge reading is the amount of backlash.
★If the backlash is not within the limit, replace the ring gear shims. To increase backlash, decrease the thickness of the shim(s). To decrease backlash, increase the thickness of the shim(s).
○Change the thickness a little at a time.
●Recheck the backlash, and readjust as necessary.

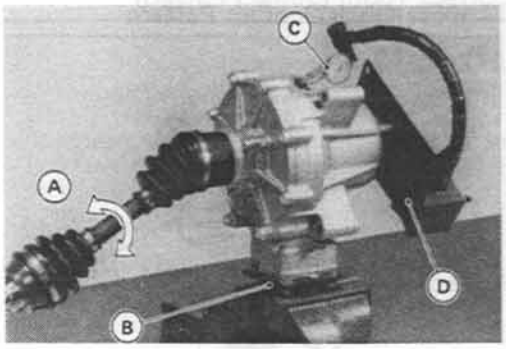
● Move the front axle back and forth [A]

Special Tool – Pinion Gear Holder: 57001-1285 [B]

Dial Gauge [C]

Special Tool – Dail Gauge Holder: 57001-1049 [D]

Final Bevel Gear Backlash
Standard: 0.09 ~ 0.20 mm (at ring gear tooth)



Tooth Contact Adjustment:

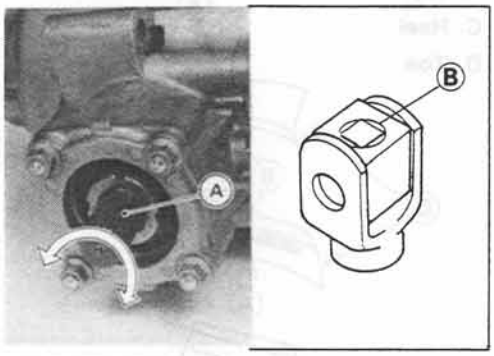
● Clean any dirt and oil off the bevel gear teeth.
● Apply checking compound to 4 or 5 teeth on the pinion gear.

NOTE

○ *Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*
○ *The checking compound must be smooth and firm, with the consistency of tooth paste.*
○ *Special compounds are available from automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use one of these for checking the bevel gears.*

● Assemble the front final gear case (see Front Final Gear Case Assembly). Do not install the O-rings during adjustment.
● Turn the pinion gear shaft [A] for one revolution in the drive and reverse (coast) direction, while creating a drag on the ring gear.
○ Use the pinion gear holder [B] and the left front axle.

Special Tool – Pinion Gear Holder: 57001-1281

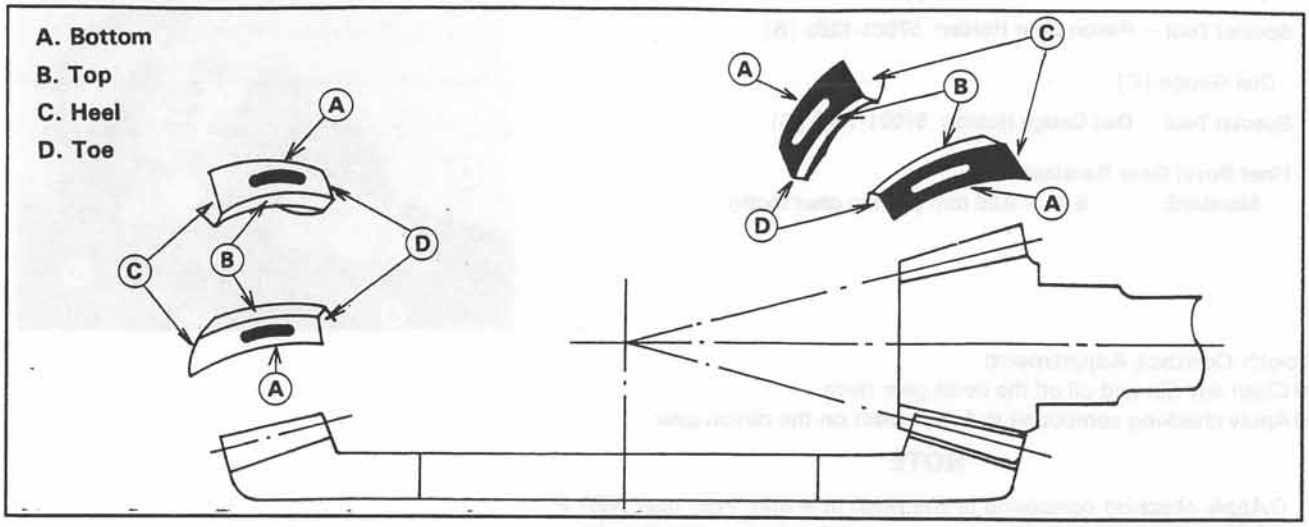


● Remove the ring gear and pinion gear unit to check the drive pattern and coast pattern of the bevel gear teeth.
○ The tooth contact patterns of both (drive and coast) sides should be centrally located between the top and bottom of the tooth. The drive pattern can be a little closer to the toe and the coast pattern can be a somewhat longer and closer to the toe.
★ If the tooth contact pattern is incorrect, replace the pinion gear shim(s), following the examples shown.
● Then erase the tooth contact patterns and check them again. Also check the backlash every time the shim(s) are replaced. Repeat the shim change procedure as necessary.

NOTE

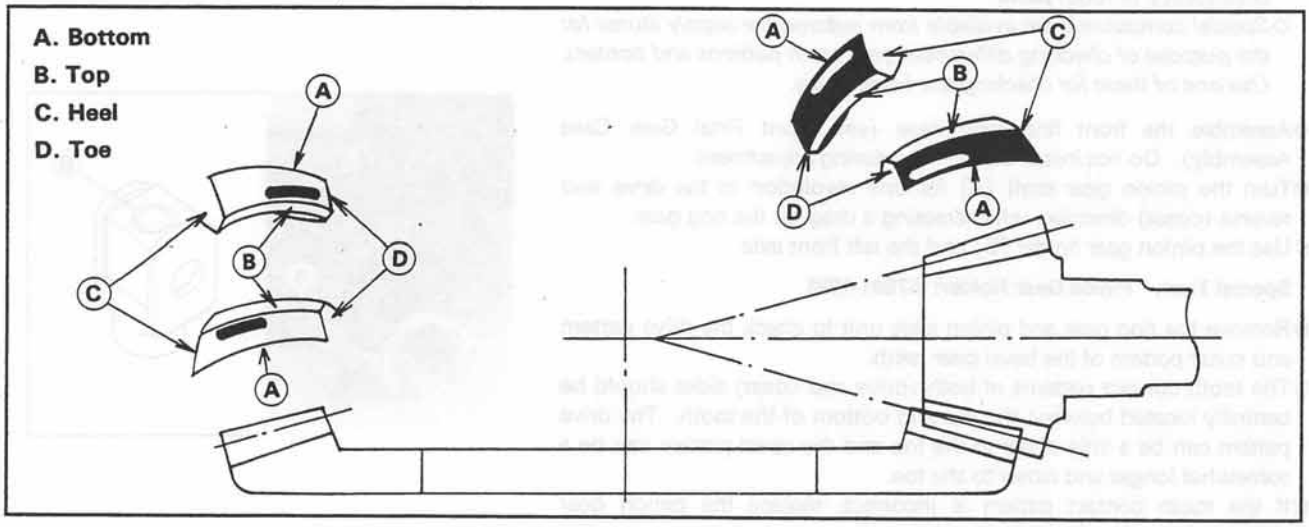
○ *If the backlash is out of the standard range after changing the pinion gear shim(s), change the ring gear shim(s) to correct the backlash before checking the tooth contact pattern.*

Correct Tooth Contact Pattern

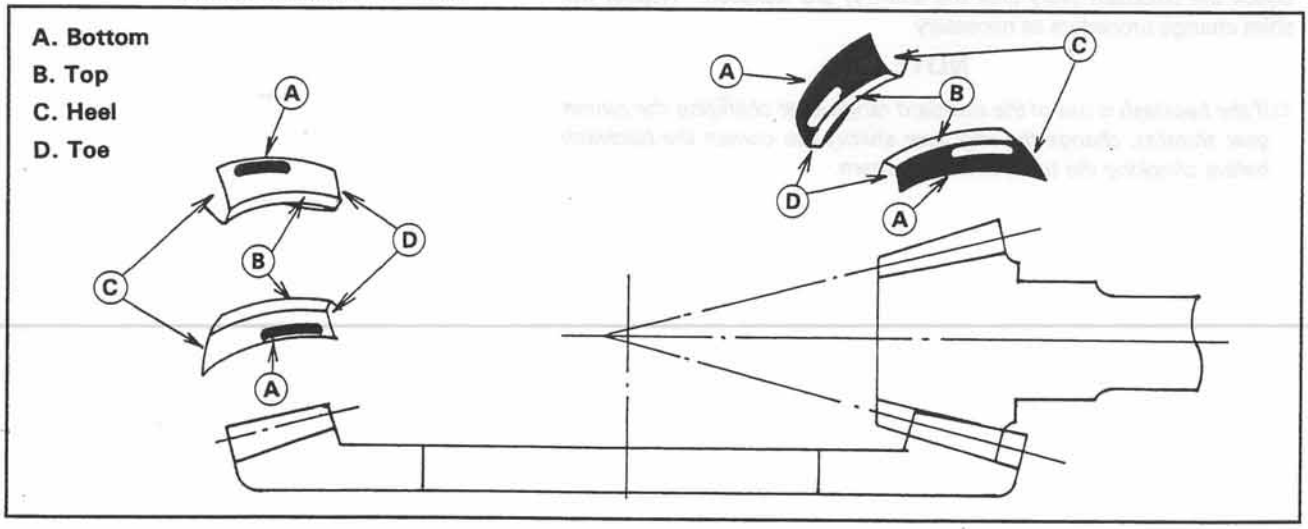


Incorrect Tooth Contact Patterns

Example 1 : Decrease the thickness of the pinion gear shim(s) by 0.05 mm to correct the pattern shown below. Repeat in 0.05 mm steps if necessary.



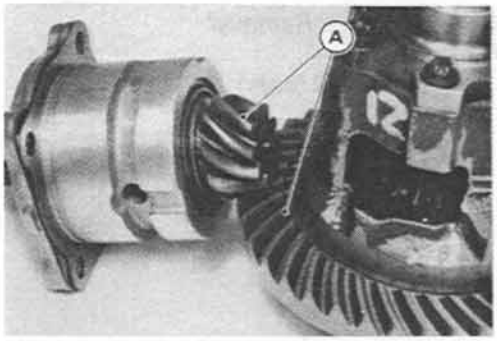
Example 2 : Increase the thickness of the pinion gear shim(s) by 0.05 mm to correct the pattern shown below. Repeat in 0.05 mm steps if necessary.



Bevel Gear Inspection

- Visually check the bevel gears [A] for scoring, chipping, or other damage.

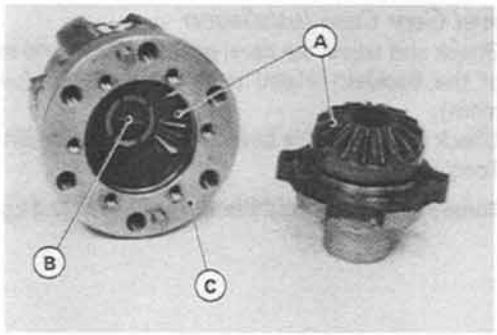
★Replace the bevel gears as a set if either gear is damaged.



Differential Gear Inspection

- Visually check the differential gears [A] for scoring, chipping, or other damage.
- Also, inspect the differential pinion gear shaft [B] and gear housing [C] where the differential gears rub.

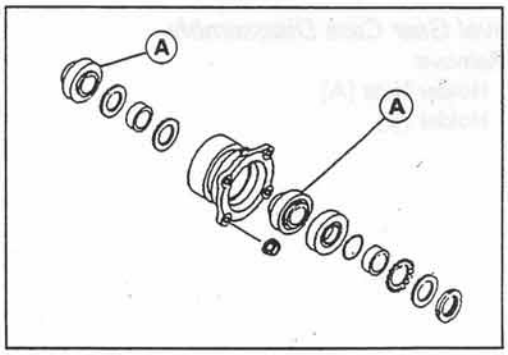
★If they are scored, discolored, or otherwise damaged, replace them as a set.



Tapered Roller Bearing Inspection

- Visually inspect the bearings [A] for abrasion, color change, or other damage.

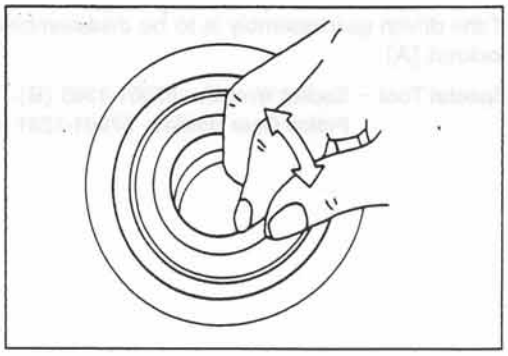
★If there is any doubt as to the condition of a bearing, replace it.



Ball Bearing Inspection

- Turn each bearing back and forth while checking for roughness or binding.

★If roughness or binding is found, replace the bearing.



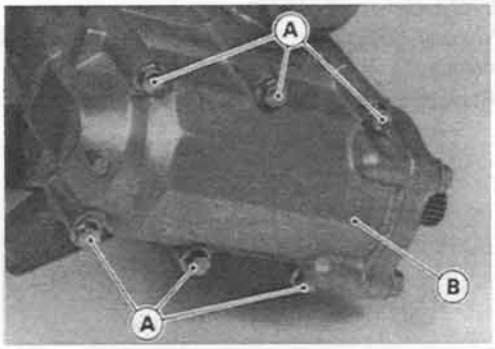
Oil Seal Inspection

- Visually inspect the oil seal.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.

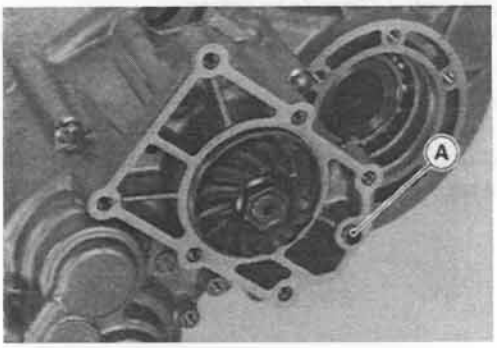
Bevel Gear Case (KAF620A)

Bevel Gear Case Removal



- Remove:
  Transmission Oil (drain)
  Cargo Bed
  Propeller Shafts
  Bevel Gear Case Bolts [A]
  Bevel Gear Case [B]

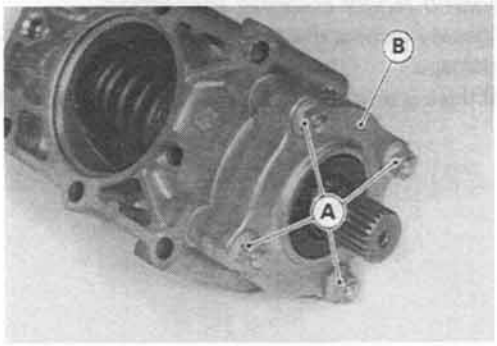
Bevel Gear Case Installation



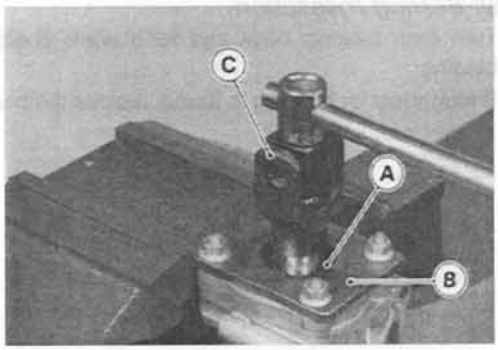
- Check and adjust the bevel gear backlash and tooth contact when any of the backlash-related parts are replaced (see Bevel Gear Adjustment).
- Check to see that the bevel gear case knock pin [A] is in place.
- Torque:

Torque – Bevel Gear Case Bolts: 22 N-m (2.2 kg-m, 16.0 ft-lb)

Bevel Gear Case Disassembly

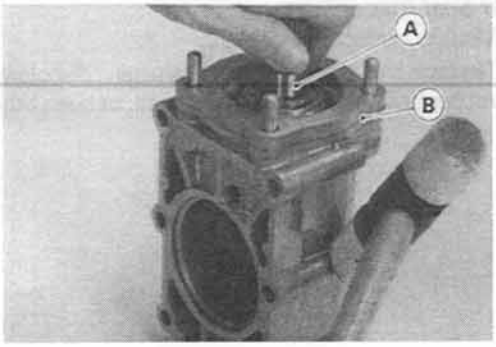


- Remove:
  Holder Nuts [A]
  Holder [B]



- If the driven gear assembly is to be disassembled, loosen the housing locknut [A].

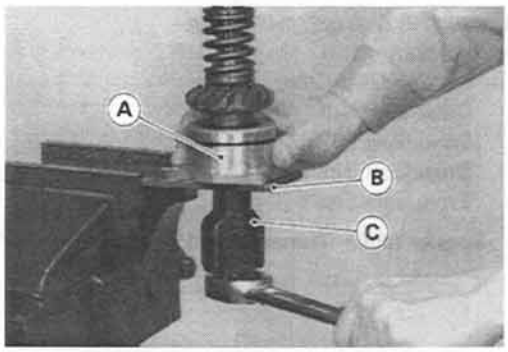
Special Tool – Socket Wrench: 57001-1363 [B]
Pinion Gear Holder: 57001-1281 [C]



- Remove:
  Driven Gear Assembly [A]
  Driven Gear Shim(s) [B]

● Remove:
Housing Locknut
Bearing Housing [A]

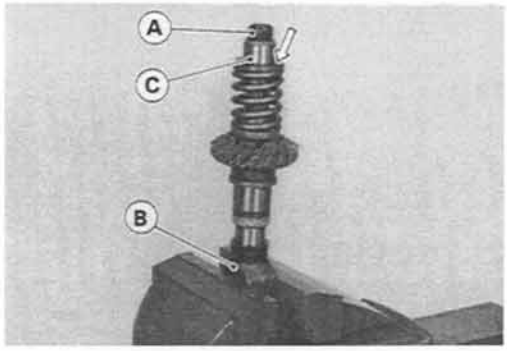
Special Tool – Socket Wrench: 57001-1363 [B]
Pinion Gear Holder: 57001-1281 [C]



● Remove:
Driven Gear Shaft Nut [A]

Special Tool – Pinion Gear Holder: 57001-1281 [B]

○ Pressing the spring seat [C], remove the driven gear shaft nut.

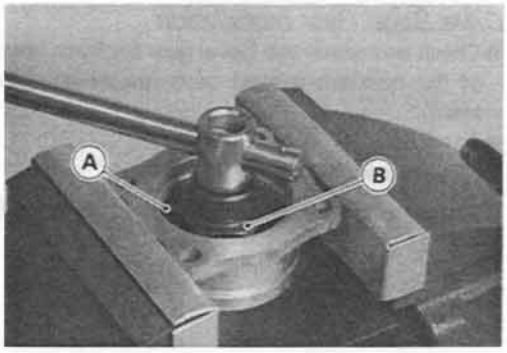


● Remove:
Bearing Holder [A]

Special Tool – Hexagon Wrench, Hex 40: 57001-1324 [B]

● Remove:
Ball Bearings

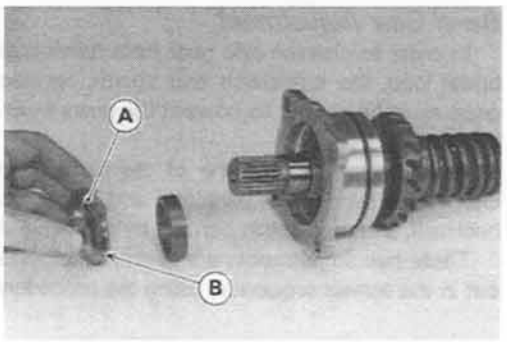
Special Tool – Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129



Bevel Gear Case Assembly

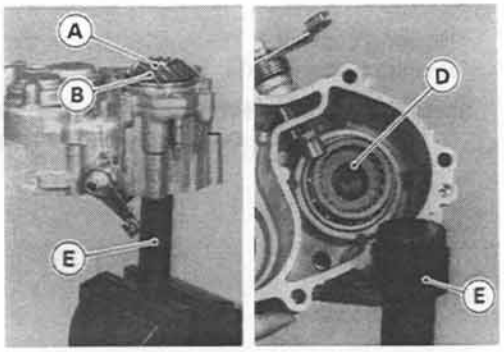
● Install the housing locknut [A] so that the chamfered side [B] faces to the bearing.
● Apply non-permanent locking agent:
Driven Gear Shaft Nut
Bearing Holder
Housing Locknut
● Torque:

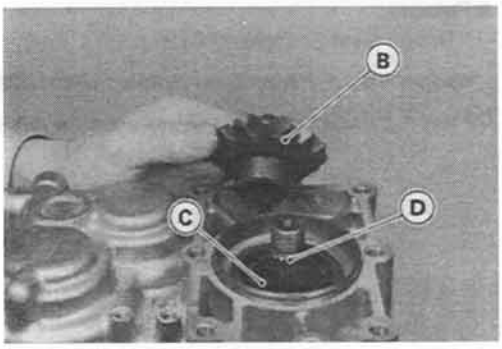
Torque – Driven Gear Shaft Nut: 110 N-m (11.0 kg-m, 80 ft-lb)
Bearing Holder: 120 N-m (12.0 kg-m, 87 ft-lb)
Housing Locknut: 120 N-m (12.0 kg-m, 87 ft-lb)



● Grease:
Holder Oil Seal Lips

Drive Bevel Gear Removal





- Remove:
  - Hi/Low Gear Case
  - Drive Gear Nut [A]
  - Drive Gear [B]
  - Drive Gear Shim(s) [C]
  - Drive Gear Shaft [D]

Special Tool – Transmission Gear Holder: 57001-1364 [E]

Drive Bevel Gear Installation

- Check and adjust the bevel gear backlash and tooth contact when any of the backlash-related parts are replaced (see Bevel Gear Adjustment).
- Apply oil:
  - Drive Gear Nut Seating Surface

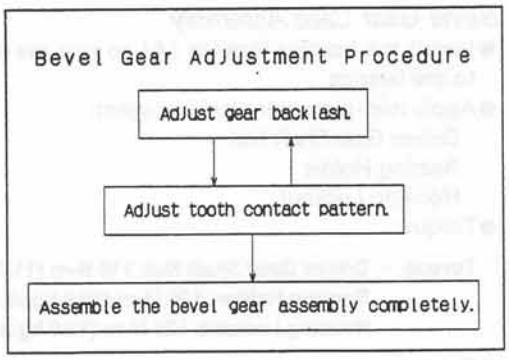
Torque – Drive Gear Nut: 120 N-m (12.0kg-m, 87 ft-lb)

Bevel Gear Adjustment

In order to prevent one gear from moving away from the other gear under load, the **backlash** and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

When replacing any one of the backlash-related parts, be sure to check and adjust the backlash and tooth contact. First adjust the backlash, and then tooth contact by replacing shims.

These two adjustments are of critical importance and must be carried out in the correct sequence, using the procedures shown.



Backlash Adjustment:

- Check and adjust the gear backlash when any of the backlash-related parts are replaced with new ones.
- Install the drive gear with the primary shim and assemble the driven gear with the primary shim. Do not install the bevel gear case holder during adjustment.
- Clean any dirt and oil off the bevel gear teeth.
- Install the bevel gear case and tighten the case bolts.
- Check the backlash while tightening the case bolts. Stop tightening them immediately if the backlash disappears and change the shim to a thinner one.

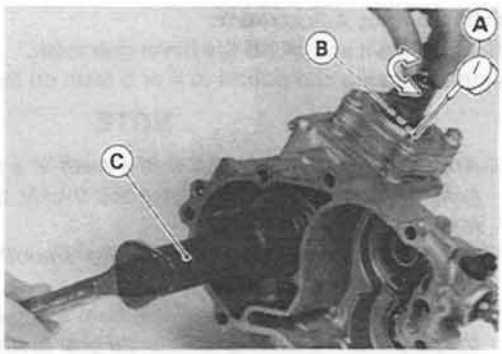
- Set up a dial gauge [A] against one of the grooves in the locknut [B].
- To measure the backlash, turn the shaft clockwise and counterclockwise while holding the drive bevel gear steady. The difference between the highest and lowest gauge readings is the amount of backlash.

Special Tool – Transmission Gear Holder: 57001-1364 [C]

★If the backlash is not within the limit, replace the shim(s) at the drive and/or driven gear. To increase backlash, decrease the thickness of the shim(s). To decrease backlash, increase the thickness of the shim(s).

★Change the thickness a little at a time.

- Recheck the backlash, and readjust as necessary.

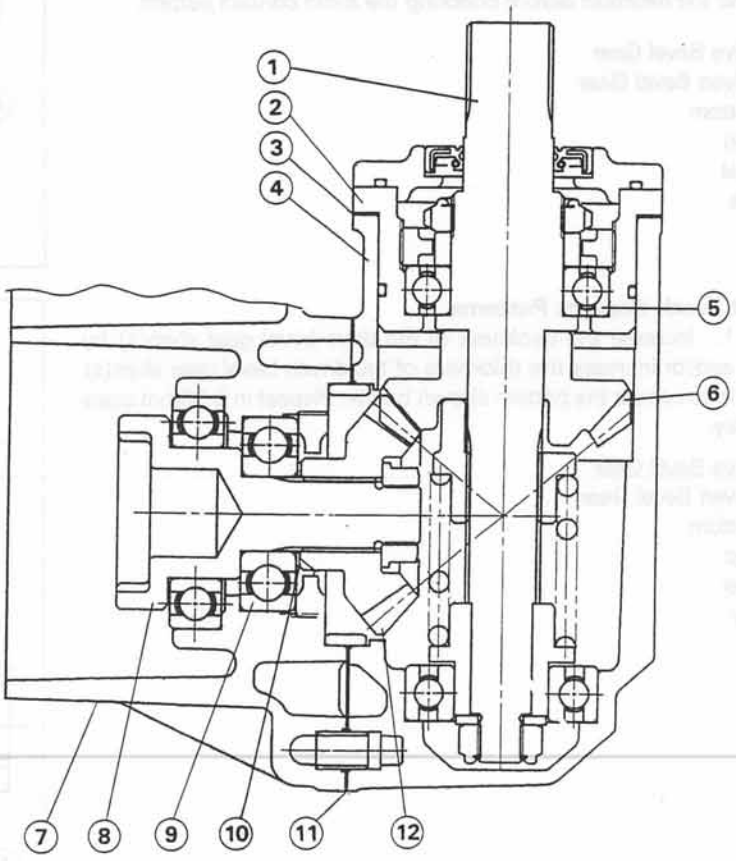


Bevel Gear Backlash

Standard: 0.08 ~ 0.18mm (at housing locknut groove)

Bevel Gear Case (Backlash-Related Parts)

1. Driven Gear Shaft
2. Bearing Housing
3. Driven Gear Shim(s)
4. Bevel Gear Case
5. Ball Bearing
6. Driven Bevel Gear
7. Hi/Low Gear Case
8. Drive Gear Shaft
9. Ball Bearing
10. Drive Gear Shim(S)
11. Gasket
12. Drive Bevel Gear



Driven Gear Shims (3)

Thickness(mm)	Part Number
0.1	92025-1859
0.15	92025-1860
0.5	92025-1861
0.8	92025-1862
1.0(primary)	92025-1858
1.2	92025-1863

Drive Gear Shims (10)

Thickness(mm)	Part Number
0.15	92025-1573
0.2	92025-1574
0.7	92025-1534
0.8	92025-1535
0.9	92025-1536
1.0(primary)	92025-1537
1.1	92025-1575
1.2	92025-1538
1.3	92025-1533

Tooth Contact Adjustment:

- Clean any dirt and oil off the bevel gear teeth.
- Apply checking compound to 4 or 5 teeth on the driven bevel gear.

NOTE

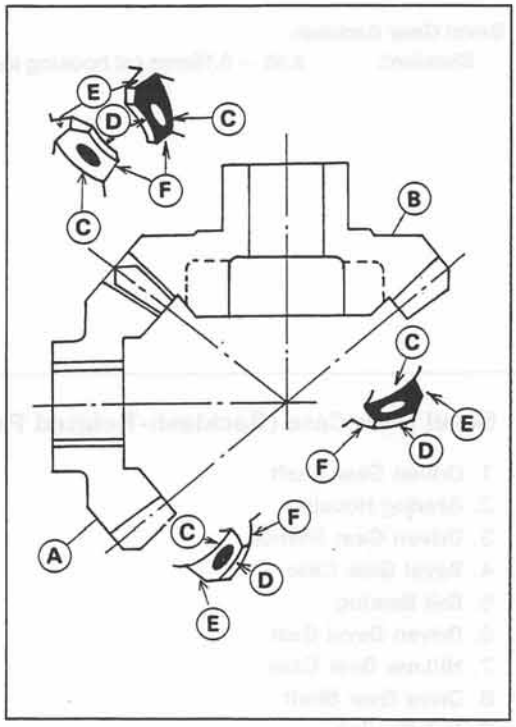
- *Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*
- *The checking compound must be smooth and firm with the consistency of tooth paste.*
- *Special compounds are available from automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use this for checking the bevel gears.*

- Turn the driven bevel gear for 3 or 4 turns in the drive and reverse (coast) directions, while creating a drag on the drive bevel gear.
- Check the drive pattern and coast pattern of the bevel gear teeth. The tooth contact patterns of both drive and coast sides should be centrally located between the top and bottom of the tooth, and a little closer to the toe of the tooth.
- ★If the tooth contact pattern is incorrect, replace the shim(s) at the drive bevel gear and shim(s) at the driven bevel gear, following the examples shown. Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shims are replaced. Repeat the shim change procedure as necessary.

NOTE

- *If the backlash is out of the standard range after changing shims, correct the backlash before checking the tooth contact pattern.*

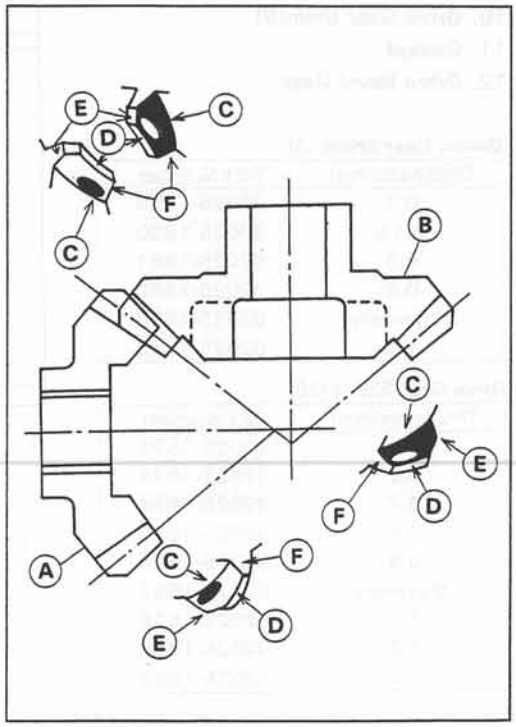
A. Drive Bevel Gear
B. Driven Bevel Gear
C. Bottom
D. Top
E. Heel
F. Toe



Incorrect Tooth Contact Patterns:

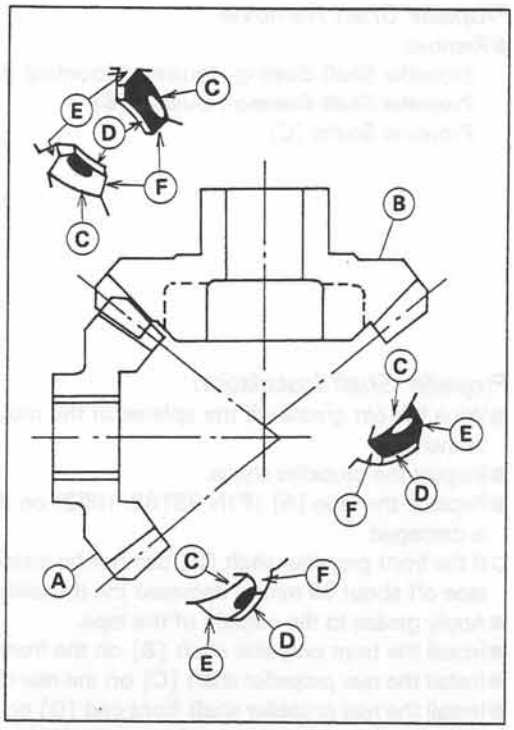
Example 1: Increase the thickness of the drive bevel gear shim(s) by 0.05mm, and/or increase the thickness of the driven bevel gear shim(s) by 0.05mm to correct the pattern shown below. Repeat in 0.05mm steps if necessary.

A. Drive Bevel Gear
B. Driven Bevel Gear
C. Bottom
D. Top
E. Heel
F. Toe



Example 2: Decrease the thickness of the drive bevel gear shim(s) by 0.05mm, and/or decrease the thickness of the driven bevel gear shim(s) by 0.05mm to correct the pattern shown below. Repeat in 0.05mm steps if necessary.

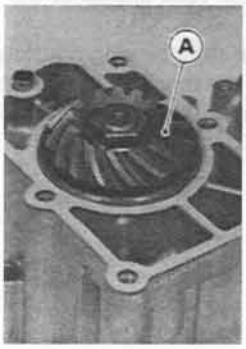
A. Drive Bevel Gear
B. Driven Bevel Gear
C. Bottom
D. Top
E. Heel
F. Toe

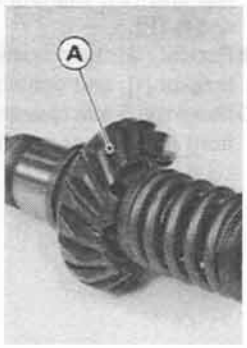


Bevel Gear Inspection

●Visually check the bevel gears [A] for scoring, chipping, or other damage.

★Replace the bevel gears as a set if either gear is damaged.





Ball Bearing Inspection

●Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

●Spin the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

Oil Seal Inspection

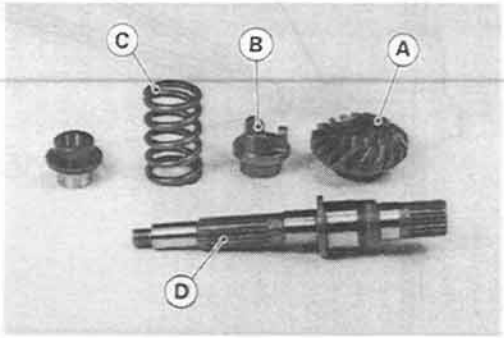
●Inspect the oil seals.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.

Damper Inspection

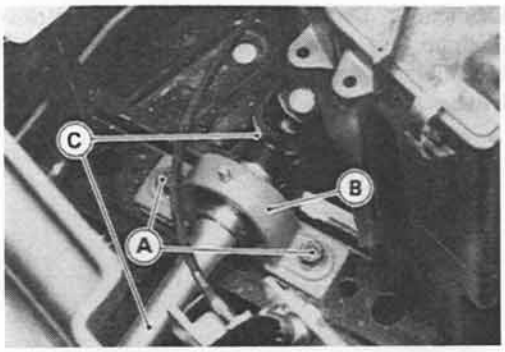
●Visually inspect the driven bevel gear [A], cam follower [B], spring [C], and shaft [D].

★Replace any part that appears damaged.



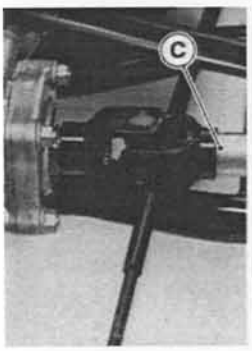
Propeller Shafts (KAF620A)

Propeller Shaft Removal

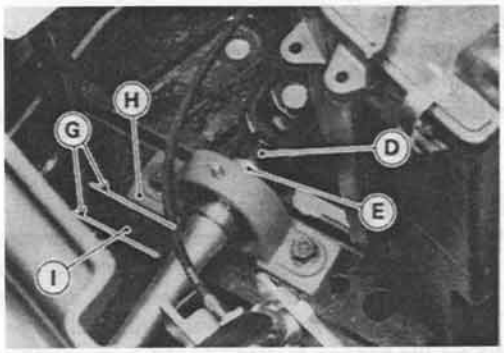


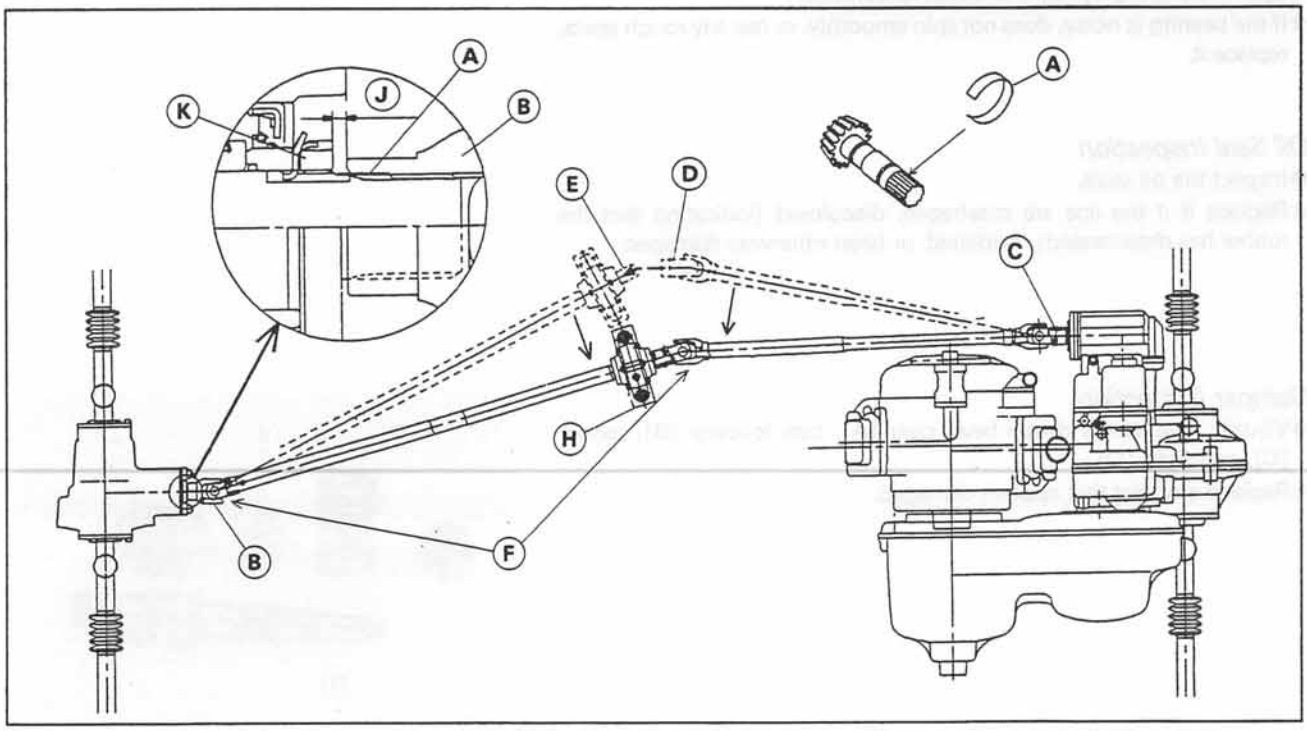
- Remove:
  Propeller Shaft Bearing Housing Mounting Bolts [A] and Nuts
  Propeller Shaft Bearing Housing [B]
  Propeller Shafts [C]

Propeller Shaft Installation



- Wipe the old grease off the splines of the propeller shafts, and grease to them.
- Inspect the propeller shafts.
- Replace the tape [A] (P/N 39188-1052) on the front pinion gear if it is damaged.
  - If the front propeller shaft [B] can not be installed on the tape, cut the tape off about 35 mm to decrease the thickness of the tapes.
- Apply grease to the outside of the tape.
- Install the front propeller shaft [B] on the front pinion gear.
- Install the rear propeller shaft [C] on the rear driven gear shaft.
- Install the rear propeller shaft front end [D] on the front propeller shaft rear end [E], aligning the yoke angles of the front and rear propeller shafts [F].
- Parallel [G] the propeller shaft bearing housing [H] with the mounting bracket [I], and tighten the mounting bolts and nuts.
  - Make the 3 mm clearance [J] between the front propeller shaft and the front pinion gear nut [K].





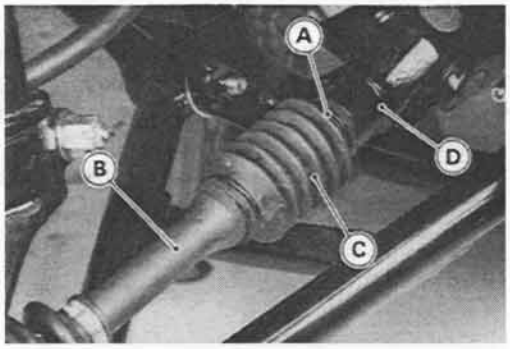
Propeller Shaft Inspection

- Visually inspect the splines of the propeller shafts.
- ★If they are twisted, badly worn, or chipped, replace the shafts.
- Check that the universal joint works smoothly without ratting or sticking.
- ★If it does not, the bearings of the joint are damaged. Replace the propeller shaft with a new one.

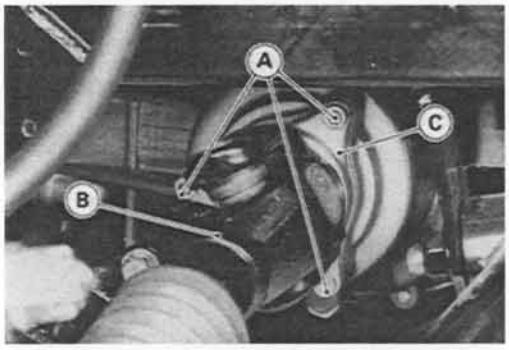
Drive Shafts and Axles

Front Drive Shaft and Axle Removal (KAF620A)

●Remove:
Steering Knuckle
Rubber Band [A]
Axle [B]
○Slide the dust boot [C] from the drive shaft [D] and pull out the axle.



●Remove:
Drive Shaft Cap Bolts [A]
Drive Shaft [B] and Cap [C]

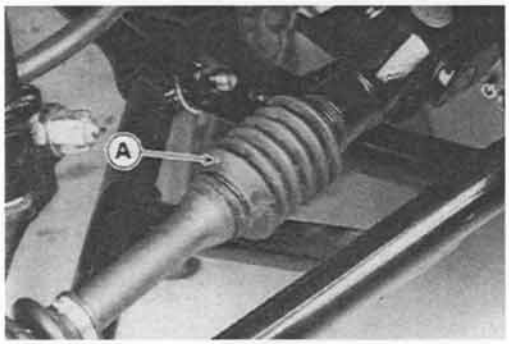


Front Drive Shaft and Axle Installation (KAF620A)

●Wipe the old grease off the splines of the drive shaft, axle, and cap oil seal, and grease them.
●Inspect the drive shaft and axle.
●Be sure to install the spacer in the recess of the front final gear case.
●Torque:

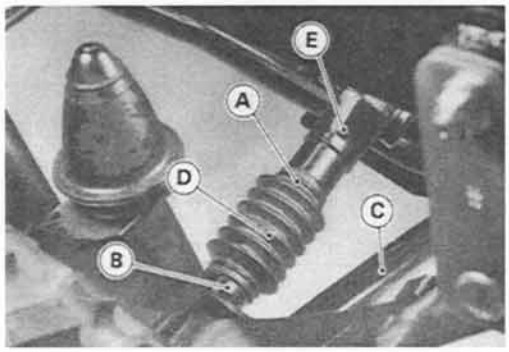
Torque – Drive Shaft Cap Bolts: 8.8 N-m (0.90 kg-m, 78 in-lb)

●If the dust boot was removed, install it on the axle so that the small hole [A] in the boot is toward the axle side.

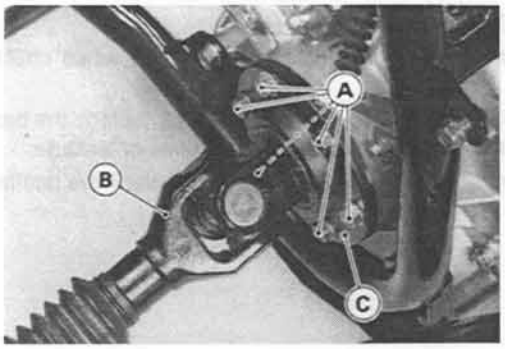


Rear Drive Shaft and Axle Removal

●Remove:
Rear Wheels
Rear Brake Drums
Rear Brake Panel Assemblies (with Brake Pipes and Hoses)
Leaf Springs
Rubber Bands [A]
Axles [B] and Axle Bracket [C]
○Slide the dust boots [D] from the drive shafts [E], and pull the one of the axles from the drive shaft, and then the other axle from the shaft.

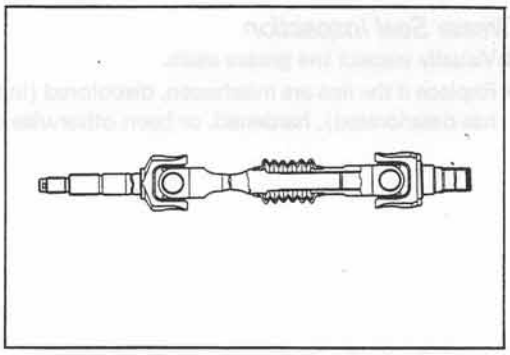


● Remove:
Drive Shaft Cap Bolts [A]
Drive Shaft [B] and Cap [C]
○ Set the differential shift lever into the UN-LOCK position.

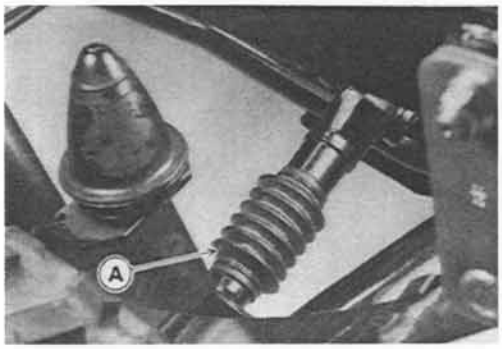


Rear Drive Shaft and Axle Installation

● Wipe the old grease off the splines of the drive shafts, axles, and cap oil seals, and grease them.
● Inspect the drive shafts and axles.
● Align the yoke angles of the drive shaft and axle.



● If the dust boot was removed, install it on the axle so that the small hole [A] in the boot is toward the axle side.
● Adjust:
Transmission Oil



Drive Shaft and Axle Inspection

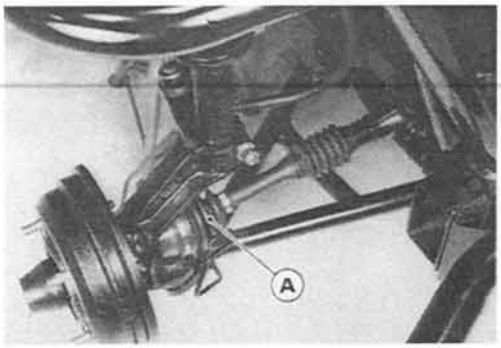
● Visually inspect the splines of the drive shaft and axle.
★ If they are twisted, badly worn, or chipped, replace the drive shaft and/or axle with a new one.
● Check that the universal joint and/or ball joint works smoothly without rattling or sticking.
★ If it does not, the bearings of the joint are damaged. Replace the drive shaft and/or axle with a new one.

Dust Boot Inspection

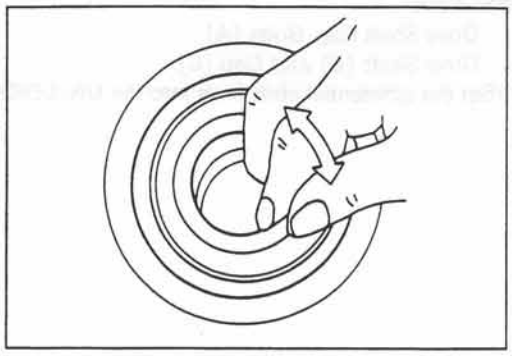
● Visually inspect the boot(s) in accordance with the Periodic Maintenance Chart or if the drive shafts or axles are noisy during operation.
★ If the dust boot is torn, worn, deteriorated, or leaks grease, replace it.

NOTE

○ *The front axle dust boot [A] is part of the axle. Axle replacement is necessary to replace the boot.*



Ball Bearing Inspection



- Turn each bearing back and forth while checking for roughness or binding.
- ★If roughness or binding is found, replace the bearing.
- Examine the bearing seal for tears or leakage.
- ★If the seal is torn or is leaking, replace the bearing.

Grease Seal Inspection

- Visually inspect the grease seals.
- ★Replace if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damage.

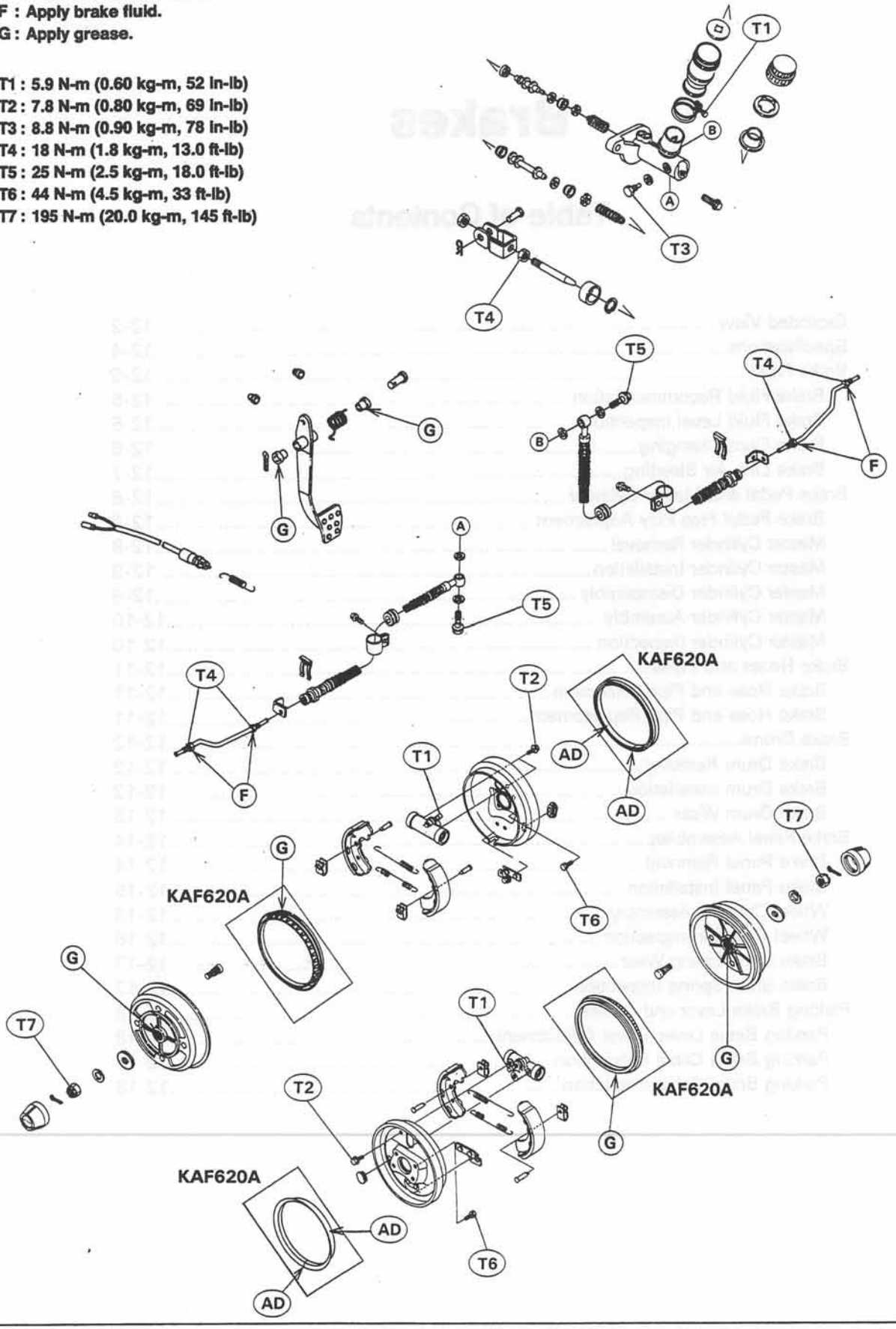
Brakes

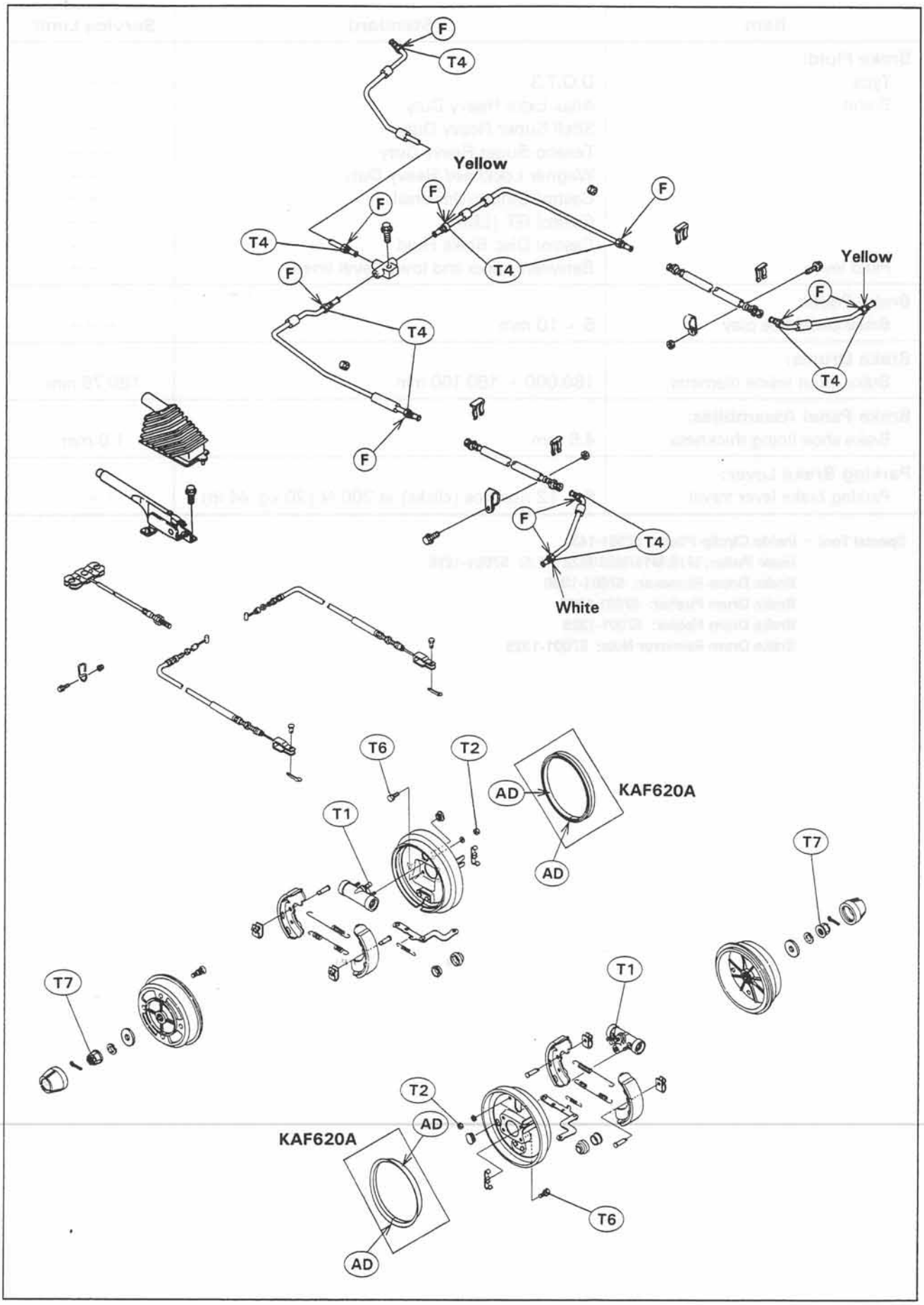
Table of Contents

Exploded View

AD : Apply adhesive agent.
F : Apply brake fluid.
G : Apply grease.

T1 : 5.9 N-m (0.60 kg-m, 52 in-lb)
T2 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T3 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T4 : 18 N-m (1.8 kg-m, 13.0 ft-lb)
T5 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T6 : 44 N-m (4.5 kg-m, 33 ft-lb)
T7 : 195 N-m (20.0 kg-m, 145 ft-lb)




F
T4
Yellow
F
F
F
T4
T4
F
T4
F
Yellow
F
T4
F
T4
White
T6
T2
AD
KAF620A
T1
AD
T7
T7
T1
T2
AD
KAF620A
T6
AD

Specifications

Item	Standard	Service Limit
Brake Fluid:		
Type	D.O.T.3	– – –
Brand	Atlas Extra Heavy Duty	– – –
	Shell Super Heavy Duty	– – –
	Texaco Super Heavy Duty	– – –
	Wagner Lockheed Heavy Duty	– – –
	Castrol Girling-Universal	– – –
	Castrol GT (LMA)	– – –
	Castrol Disc Brake Fluid	– – –
Fluid level	Between upper and lower level lines	– – –
Brake Pedal:		
Brake pedal free play	5 ~ 10 mm	– – –
Brake Drums:		
Brake drum inside diameter	180.000 ~ 180.160 mm	180.75 mm
Brake Panel Assemblies:		
Brake shoe lining thickness	4.5 mm	1.0 mm
Parking Brake Lever:		
Parking brake lever travel	8 ~ 12 notches (clicks) at 200 N (20 kg, 44 lb)	– – –

Special Tool – Inside Circlip Pliers: 57001-143
Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216
Brake Drum Remover: 57001-1260
Brake Drum Pusher: 57001-1261
Brake Drum Holder: 57001-1325
Brake Drum Remover Nuts: 57001-1326

Brake Fluid

Brake Fluid Recommendation

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

Recommended Brake Fluid

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

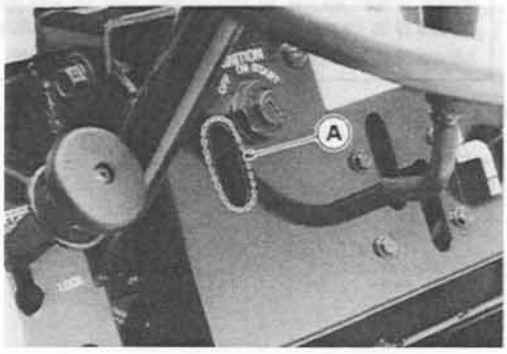
⚠WARNING

Never reuse old brake fluid.
Do not use fluid from a container that has been left unsealed or that has been open for a long time.
Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to ineffective. It may also cause the rubber brake parts to deteriorate.
Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
Don't add or change the fluid in the rain or when a strong wind is blowing.
If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE.

CAUTION

Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wipe up immediately.

Brake Fluid Level Inspection

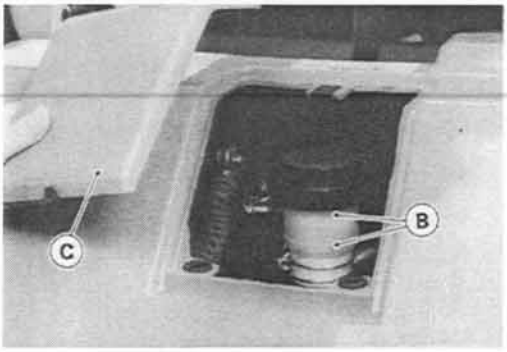


- With the vehicle on level ground, check that, through the inspection hole [A], the fluid level in the reservoir is between the upper (MAX) and lower (MIN) level lines [B].

★If the fluid level is lower than the lower level line, check for fluid leaks in the brake lines, and fill the reservoir to the upper level line.

⚠WARNING

Change the fluid in the brake system completely if the fluid level is low but the type and brand of the fluid already in the reservoir are unknown.



- Remove the maintenance cover [C].
- Apply the brake forcefully for a few seconds and check for fluid leakage around the fittings.

⚠WARNING

If the brake pedal has a soft or "spongy feeling" when it is applied, there might be air in the brake lines or the brake may be defective. Since it is dangerous to operate the vehicle under such conditions, have the brake system serviced immediately.

Brake Fluid Changing

- Remove the maintenance cover.
- Check that there is plenty of fluid in the reservoir.

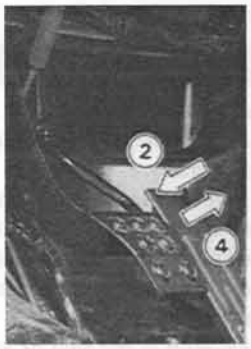
NOTE

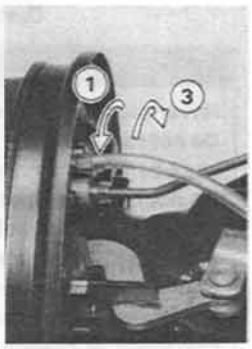
○*The fluid level must be checked several times during the fluid changing and replenished as necessary. If the fluid in the reservoir runs completely out any time during fluid changing, air bleeding must be done since air will have entered the line.*

- Remove the wheel for extra clearance.
- Connect a clear plastic hose to the bleed valve at the wheel cylinder, running the other end of the hose into a container.

NOTE

○*Start with the rear left or right wheel and finish with the front left or right wheel.*





- Open the bleed valve, apply pressure to the brake pedal, close the valve while the brake is applied, and then quickly release the pedal. Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
  1. Open bleed valve.
  2. Apply brake pedal and hold it.
  3. Close bleed valve.
  4. Release brake pedal.
- Torque:

Torque – Bleed Valves : 5.9 N-m (0.60 kg-m, 52 in-lb)

- Repeat the previous step for each wheel.
- When brake fluid changing is finished, add the fluid to the upper level in the reservoir.
- Apply the brake forcefully for a few seconds, and check for fluid leakage around the fittings.

⚠WARNING

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

- Install the removed parts.

Brake Line Air Bleeding

- Remove the maintenance cover.
- Check that there is plenty of fluid in the reservoir.

NOTE

○ *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.*

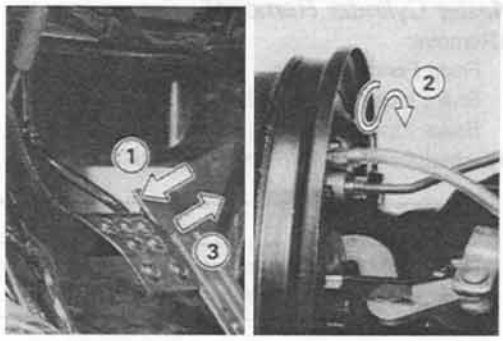
- With the reservoir cap off, slowly pump the brake pedal several times until no air bubbles can be see rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.
- Remove the wheel for extra clearance.
- Connect a clear plastic hose to the bleed valve at the wheel cylinder, running the other end of the hose into a container.

NOTE

○ *Start with the rear left or right wheel and finish with the front left or right wheel.*

- Pump the brake pedal a few times until it becomes hard to pump. Hold the pedal in the down position. Quickly open (turn counterclockwise) and close the bleed valve. Then release the pedal. Repeat this operation until no more air can be seen coming out into the plastic hose.

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



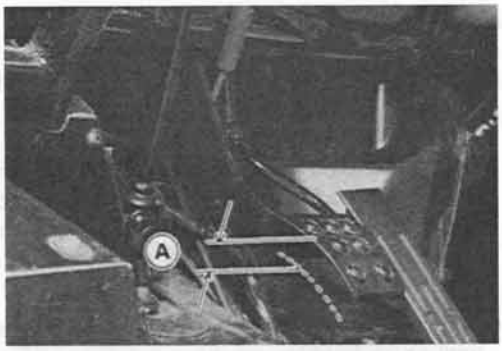
- Torque:

Torque – Bleed Valves : 5.9 N-m (0.60 kg-m, 52 in-lb)

- Repeat the previous step for each wheel.
- When air bleeding is finished, add fluid up to the upper level in the reservoir.
- Apply the brake forcefully for a few seconds, and check for fluid leakage around the fittings.
- Install the removed parts.

Brake Pedal and Master Cylinder

Brake Pedal Free Play Adjustment



● Check brake pedal free play [A].

Brake Pedal Free Play
Standard: 5 ~ 10 mm

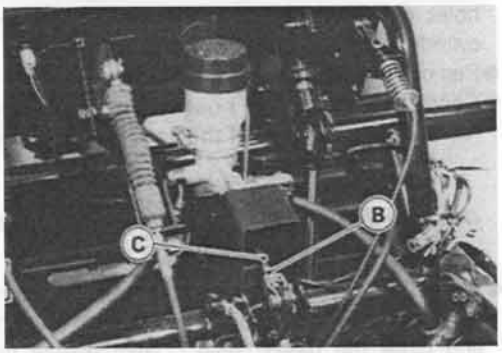
★ If free play is not correct, adjust it.

● Loosen the locknut [B] and turn the push rod [C] to obtain the correct amount of free play.

● Torque:

Torque – Push Rod Locknut : 18 N-m (1.8 kg-m, 13.0 ft-lb)

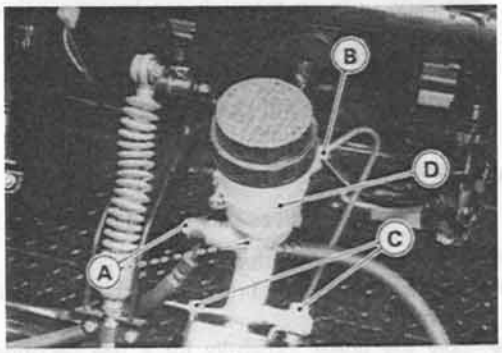
● Check for brake drag and braking effectiveness.



⚠WARNING

Incorrect adjustment with insufficient free play can cause brake heating and drag. Skidding and loss of control may result.

Master Cylinder Removal



● Remove:
Front Fender Upper
Brake Hose Banjo Bolts [A]
Brake Pipe Nipple [B] (unscrew)

● Immediately wipe up any brake fluid that spills.

CAUTION

Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

● Remove:
Master Cylinder Mounting Bolts [C]
Master Cylinder [D]

Master Cylinder Installation

- Use a new flat washer on each side of the brake hose fitting.
- Apply brake fluid:
  Brake Pipe Nipple Threads
- Torque:

Torque – Brake Hose Banjo Bolts : 25 N-m (2.5 kg-m, 18.0 ft-lb)
Brake Pipe Nipple: 18 N-m (1.8 kg-m, 13.0 ft-lb)

- Bleed the brake line after master cylinder installation.
- Adjust:
  Brake Pedal Free Play Adjustment
- Check that the brake line has proper fluid pressure and no fluid leakage.

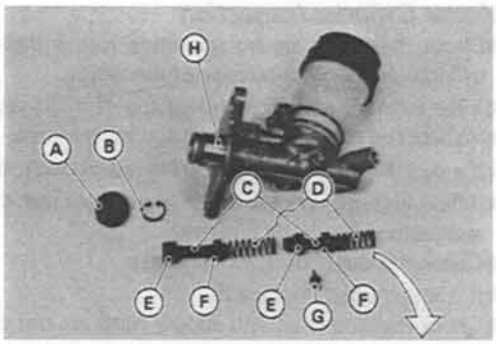
Master Cylinder Disassembly

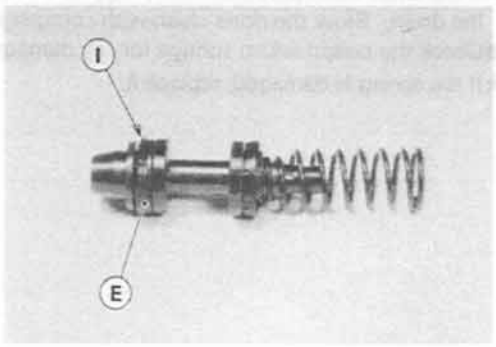
- Push the pistons in all the way with a screwdriver and remove the piston stop bolt.
- Remove the retainer with the circlip pliers and remove the pistons.

Special Tool – Inside Circlip Pliers: 57001-143

- Remove the pistons by lightly applying compressed air to where the brake pipe fits into the cylinder.

Dust Cover [A]
Retainer [B]
Pistons [C]
Springs [D]
Secondary Cup [E]
Primary Cup [F]
Piston Stop Bolt [G]
Master Cylinder [H]
Be careful of the secondary cup direction [I].





Master Cylinder Assembly

●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.

CAUTION
Use only 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 brake.

●Push the pistons in all the way with a screwdriver and install the piston stop bolt.

●Torque:

Torque – Piston Stop Bolt : 8.8 N-m (0.90 kg-m, 78 in-lb)
Reservoir Clamp Bolt : 5.9 N-m (0.60 kg-m, 52 in-lb)

Master Cylinder Inspection

●Check that there are no scratches, rust or pitting on the inside of the cylinder and on the outside of the piston.

★If the cylinder or piston shows any damage, replace them.

●Inspect the primary cups and secondary cups.

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

★If fluid leakage is noted at the brake push rod, the secondary cup of the rear piston should be replaced.

●Check the dust cover for damage.

★If it is damaged, replace it.

●Check that the relief and supply ports are not plugged.

★If the small relief port becomes plugged, the brake shoes will drag on the drum. Blow the ports clean with compressed air.

●Check the piston return springs for any damage.

★If the spring is damaged, replace it.

Brake Hoses and Pipes

Brake Hose and Pipe Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.
- ★Replace it if any cracks or bulges are noticed.
- The metal pipe will rust if the plating is damaged.
- ★Replace the pipe if it is rusted, cracked (especially check the fittings), or if the plating is badly scratched.

Brake Hose and Pipe Replacement

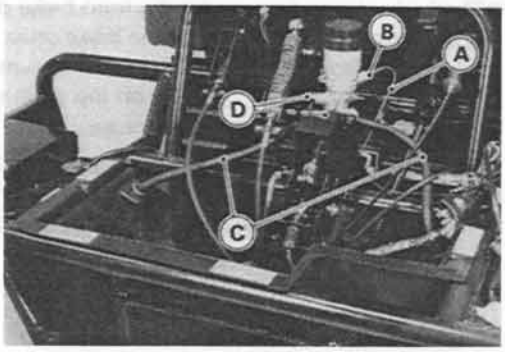
- To remove the metal pipes [A], unscrew the nipples [B].
- To remove the hoses [C], remove the banjo bolts [D] and/or pull out the retainers [E].
- Immediately wipe up any brake fluid that spills.

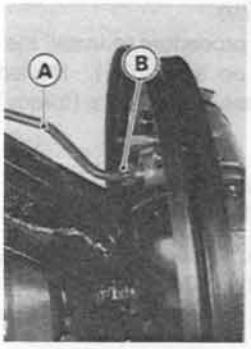
CAUTION
Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

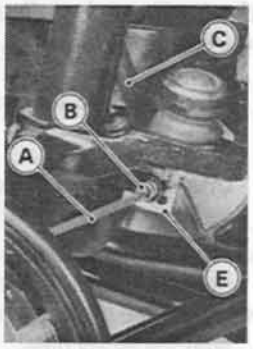
- Use a new aluminum washer for each side of the hose fittings at the master cylinder.
- Apply brake fluid:
  Brake Pipe Nipple Threads
- Torque:

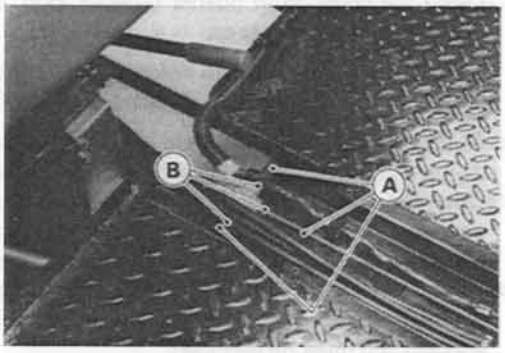
Torque – Brake Hose Banjo Bolts : 25 N-m (2.5 kg-m, 18.0 ft-lb)
Brake Pipe Nipples : 18 N-m (1.8 kg-m, 13.0 ft-lb)

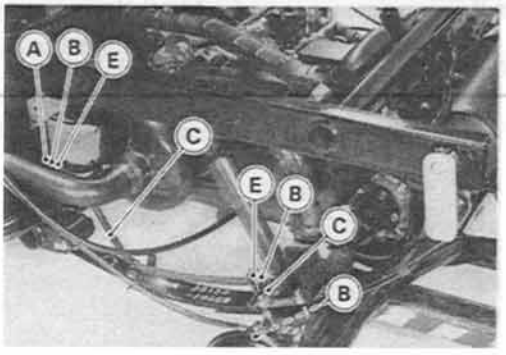
- Check that the brake line has proper fluid pressure and no fluid leakage.





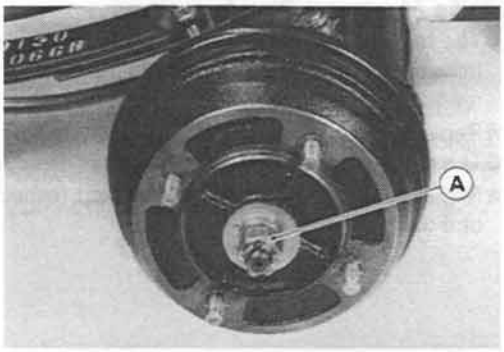






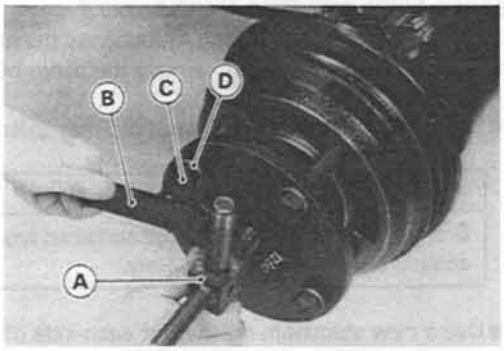
Brake Drums

Brake Drum Removal



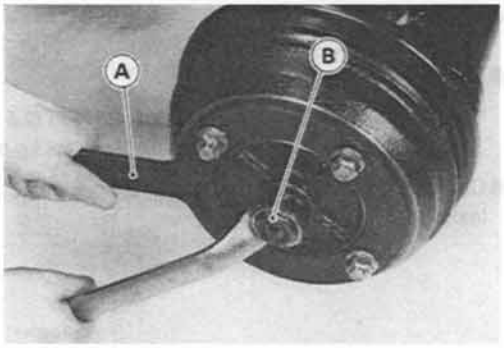
●Remove:
Wheel
Cotter Pin
Axle Nut [A]
○Loosen the axle nut, while applying the brake, and release the brake.

●The brake drums (except for the front brake drums on KAF620B) are press-fitted on the axles. Use the brake drum remover, stud nuts, and rotor puller (special tools) to remove the drums.
○Mount the brake drum remover on the drum studs with the stud nuts and washers (parts in the remover set).



Special Tool – Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216 [A]
Brake Drum Remover: 57001-1260 [B]
Brake Drum Remover Nuts: 57001-1326 [C]
Washers [D]

Brake Drum Installation



●Observe the following procedure to install the brake drums (except for the front brake drums on KAF620B). Replace the drum with a new one if its maximum press-fitting force (torque) is less than the service limit.

Drum Press-fitting Force (Torque)
Service Limit: 20 N-m (2.0 kg-m, 14.5 ft-lb)

○Apply a molybdenum disulfide lubricant (grease or oil type, either will do) to the splines on the drum.
○Mount the brake drum holder (special tool) securely to the drum studs with the wheel nuts.
○Using the brake drum pusher (special tool), drive the drum onto the axle until the pusher stops.

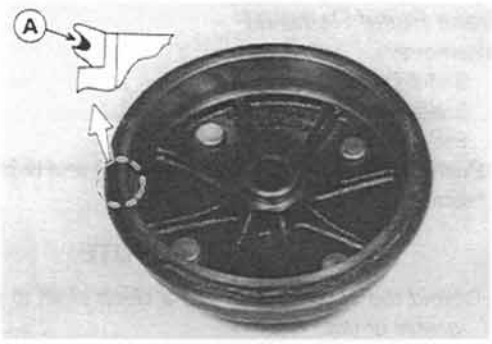
Special Tool – Brake Drum Holder: 57001-1325 [A]
Brake Drum Pusher: 57001-1261 [B]

○Apply a molybdenum disulfide lubricant (grease or oil type, either will do) to the threads and the seating face of the axle nut.
○Drive the drum further using the axle nut and washer instead of the pusher until the drum stops. At this time, use a torque wrench to turn the axle nut. Note the driving force (torque) of the nut.
★The drum must be press-fitted on the axle. If the maximum torque for driving the nut is less than the service limit, the drum will not be tight enough and must be replaced.
★If the maximum torque for driving the nut is more than the service limit, retighten the nut to the specified torque.
○Remove the brake drum holder.

● Grease [A]:
Front Brake Drum Grease Seal Lips
● Torque:

Torque – Axle Nut: 195 N-m (20.0 kg-m, 145 ft-lb)

● Do not press the drum bolts out.
★ If a drum bolt is damaged, replace the drum.

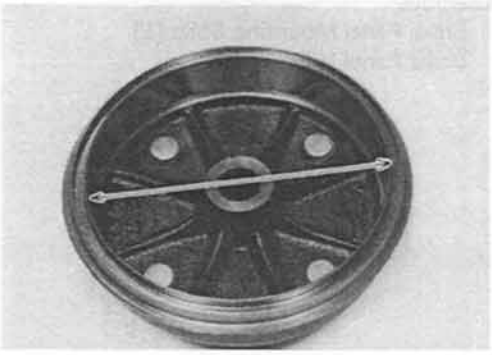


Brake Drum Wear

● Measure the inside diameter of the drum at several points.
★ If any measurement is greater than the service limit, replace the drum.
★ If the drum is worn unevenly or scored, lightly turn the drum on a brake drum lathe or replace it. Do not turn the drum beyond the service limit.

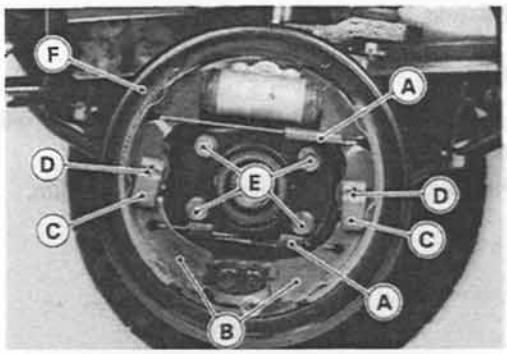
Brake Drum Inside Diameter

Standard:	**180.000 ~ 180.160 mm**
Service Limit:	**180.75 mm**



Brake Panel Assemblies

Brake Panel Removal

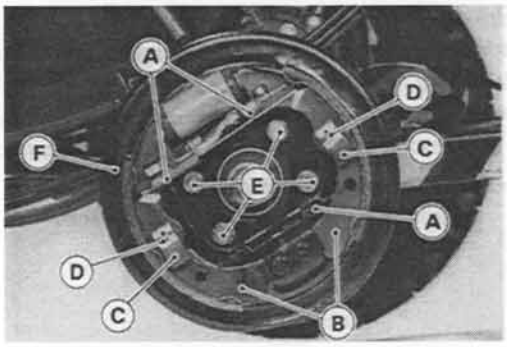


● Remove:
Brake Drum
Brake Shoe Springs [A]
Brake Shoes [B]

○ Push the shoe hold-down spring [C] and twist the pin [D] to remove them.

NOTE

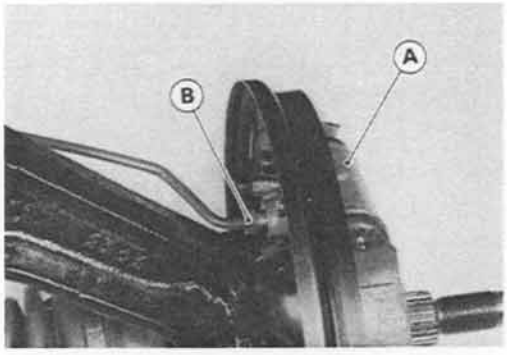
○ *Hold the brake shoes with a clean cloth to protect the linings from grease or dirt.*



● Remove:
Brake Panel Mounting Bolts [E]
Brake Panel [F]

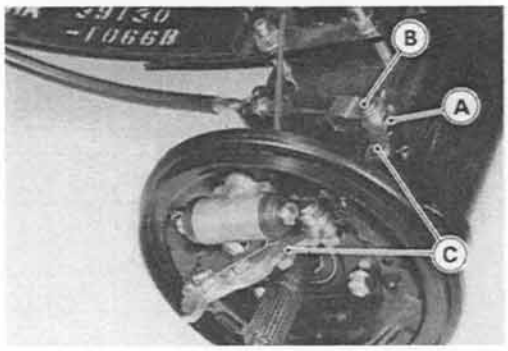
● Remove the following if the brake panel or brake wheel cylinder [A] is to be freed from the brake pipe.
Brake Pipe Nipple [B]

○ Immediately wipe up any brake fluid that spills.



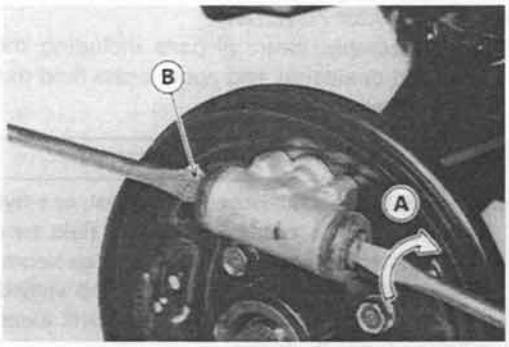
CAUTION
Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

● Remove the following for the rear brake panel removal.
Cotter Pin [A]
Clevis Pin [B]
Parking Brake Lever Linkage [C]



Brake Panel Installation

- Set the brake shoe clearance adjuster so that the drum can be re-installed on the panel assembly.

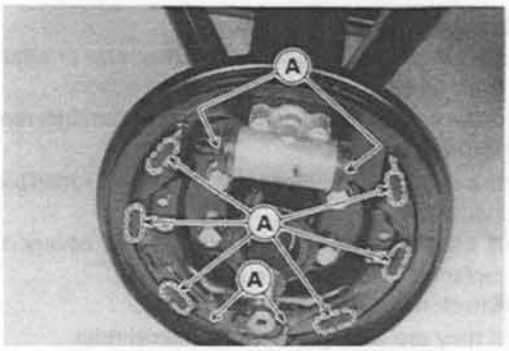


- Front brake; turn one of the wheel cylinder ends [A] while pushing it in. Keep the other end from turning [B] until both the ends of the pistons are back in the cylinder completely.

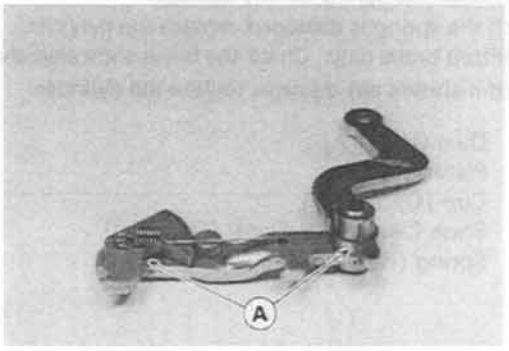
- Rear brake; pry the ratchet lever [A] with a screwdriver to reset the shoe clearance adjuster in its original position [B].

- Apply brake fluid:
  Brake Pipe Nipple Threads
- Torque:

Torque – Wheel Cylinder Mounting Bolts or Nuts: 7.8 N-m (0.80 kg-m, 69 in-lb)
Brake Panel Mounting Bolts: 44 N-m (4.5 kg-m, 33 ft-lb)
Brake Pipe Nipple: 18 N-m (1.8 kg-m, 13.0 ft-lb)



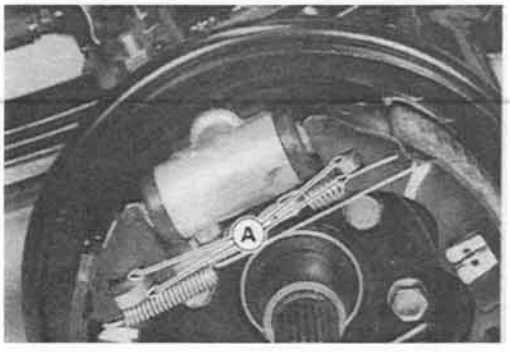
- Grease [A]:
  Brake Panel and Brake Shoe Contact Points
  Wheel Cylinder Piston Ends
  Brake Shoe Anchor Ends
- Grease (rear brake only) [A]:
  Shoe Clearance Adjuster Pivots
  Shoe Clearance Adjuster and Shoe Contact Points
- Bleed the brake line after drum installation.
- Check the brake system to be sure there is adequate braking power. Also be sure there is no brake drag, or fluid leakage.



⚠WARNING

Do not attempt to drive the vehicle until a complete brake pedal motion is obtained by pumping the brake pedal until the brake shoes contact the drum operating the shoe clearance adjuster until brake shoe to brake drum contact is made. The brake will not function on the first application of the pedal if this is not done.

- Adjust:
  Parking Brake Lever Travel Adjustment



Wheel Cylinder Assembly

● Before assembly, clean all parts including the wheel cylinder with brake fluid or alcohol, and apply brake fluid to the removed parts and the inner wall of the cylinder.

CAUTION

Use only 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 brake.

Wheel Cylinder Inspection

● Check that there are no scratches, rust or pitting on the inside of the cylinder and on the outside of the piston.

★ If the cylinder or piston shows any damage, replace the cylinder.

● Inspect the cups.

★ If a cup is worn, damaged, softened (rotted), or swollen, replace the cylinder.

★ If fluid leakage is noted at the dust covers, the cylinder should be replaced to renew the cup.

● Check the dust covers for damage.

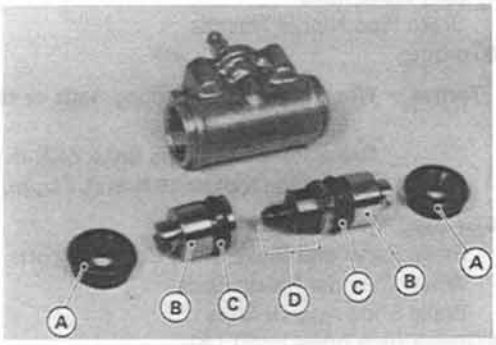
★ If they are damaged, replace the cylinder.

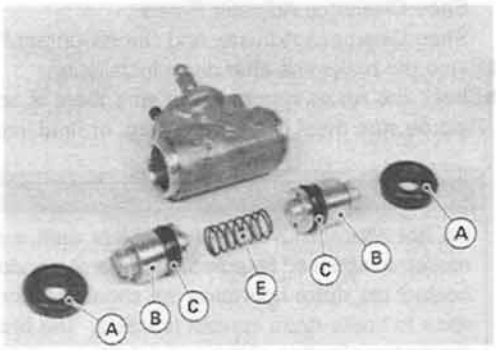
● Check the spring for any damage.

★ If the spring is damaged, replace the cylinder.

● Front brake only: Check the brake shoe clearance adjuster for damage.

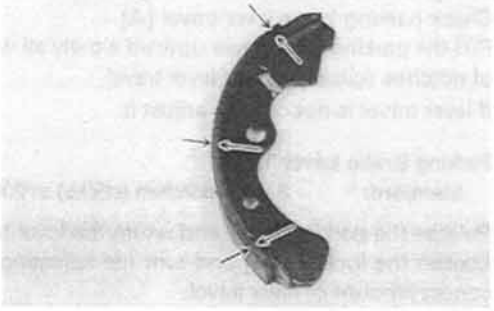
★ If it shows any damage, replace the cylinder.





Dust Cover [A]
Piston [B]
Cup [C]
Shoe Clearance Adjuster (Front) [D]
Spring (Rear) [E]

Brake Shoe Lining Wear



● Measure the lining thickness at several points.

Brake Shoe Lining Thickness

Standard:	**4.5 mm**
Service Limit:	**1.0 mm**

★ If any measurement is less than the service limit, replace both shoes as a set.

★ If the lining thickness is greater than the service limit, do the following before installing the shoes.

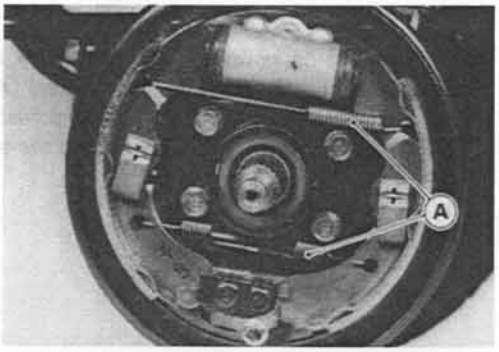
● File or sand down any high spots on the surface on the lining.

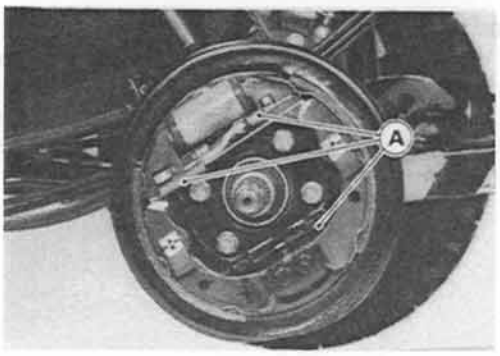
● Use a wire brush to remove any foreign particles from the lining.

● Wash off any oil or grease with an oilless solvent.

CAUTION
Do not use a solvent which will leave on oily residue or the shoes will have to be replaced.

Brake Shoe Spring Inspection



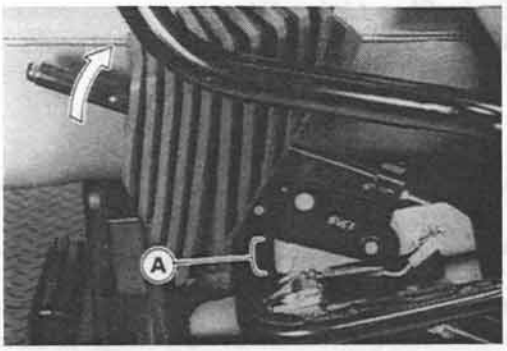


● Visually inspect the brake shoe springs [A] for breaks or distortion.

★ If the springs are damaged in any way, replace them.

Parking Brake Lever and Cables

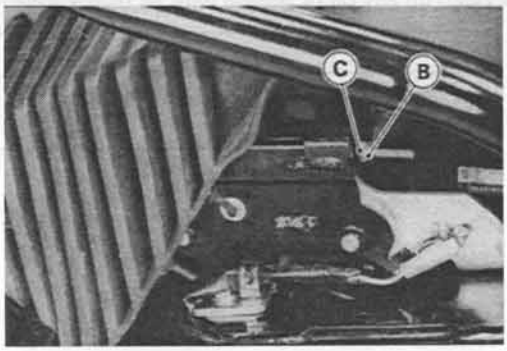
Parking Brake Lever Travel Adjustment



- Check parking brake lever travel [A].
- Pull the parking brake lever upward slowly all way. Count the number of notches (clicks) during lever travel.
- ★If lever travel is not correct, adjust it.

Parking Brake Lever Travel
Standard: 8 ~ 12 notches (clicks) at 200 N (20 kg, 44 lb)

- Release the parking brake and return the lever to its rest position.
- Loosen the locknut [B] and turn the adjusting nut [C] to obtain the correct amount of lever travel.
- Tighten the locknut.
- Check for brake drag and braking effectiveness.

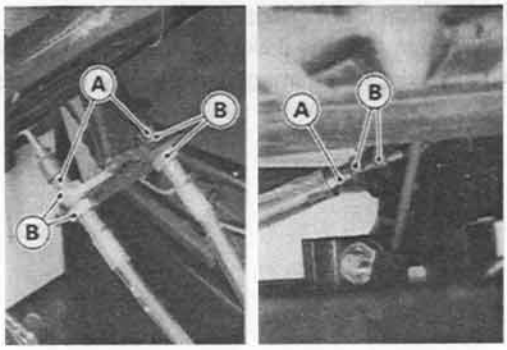


⚠WARNING

Incorrect adjustment with insufficient free play can cause brakes to overheat and drag. Skidding and loss of control may result.

NOTE

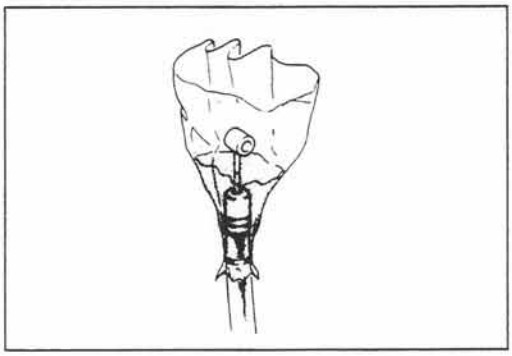
- *If the parking brake lever travel cannot be adjusted by using the adjusting nut at the lever, use the adjusters [A] at the parking brake lever and rear wheels. Do not forget to adjust both the left and right cables evenly, and then securely tighten the adjuster mounting nuts [B].*



Parking Brake Cable Lubrication

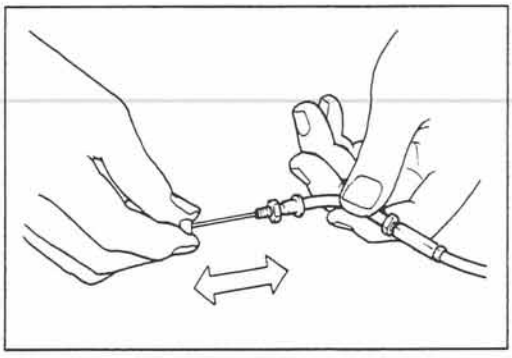
Whenever the parking brake cables are removed, lubricate the cables as follows.

- Apply a thin coating of grease to the cable upper ends.
- Lubricate the cable by seeping the oil between the cable and cable housing.



Parking Brake Cable Inspection

- With the cable disconnected at both ends, the cable should move freely within the cable housing.
- ★If the cable does not move freely after lubricating, or if the cable is frayed, or if the cable housing is kinked, replace the cable.



Suspension

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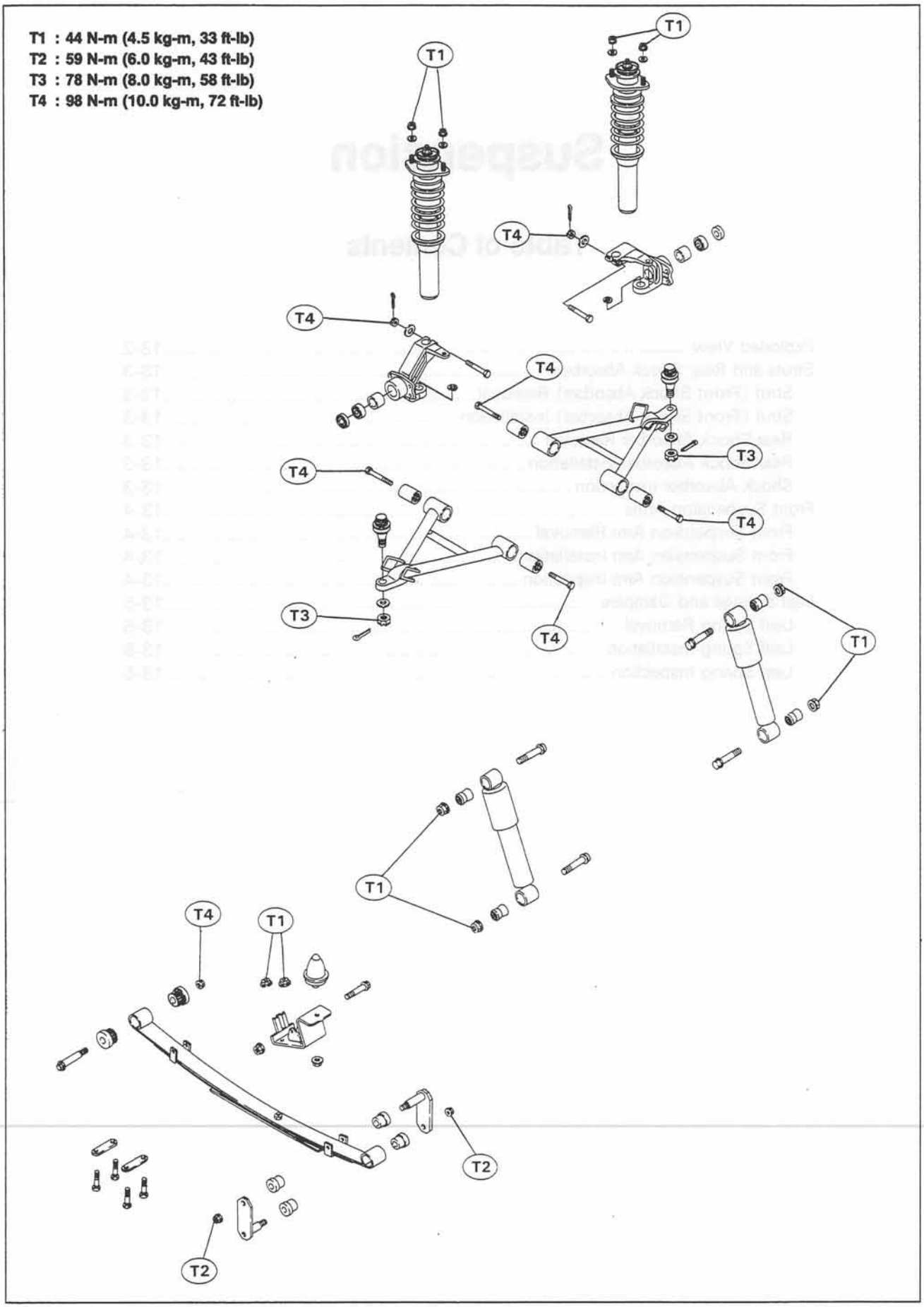
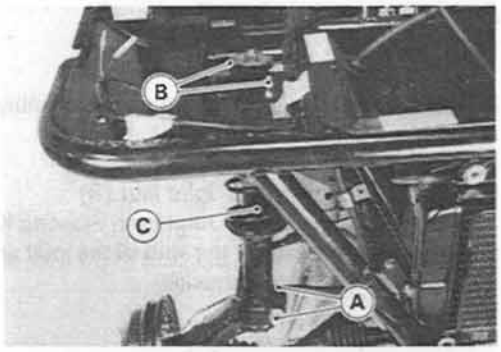
Exploded View



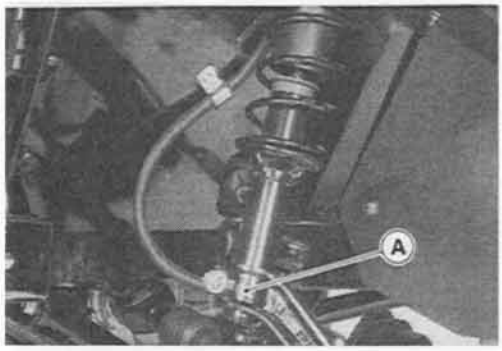
Struts and Rear Shock Absorbers

Strut (Front Shock Absorber) Removal



- Remove:
  - Front Fender Upper
  - Front Wheel
  - Strut Clamp Bolt and Nut [A]
  - Strut Mounting Nuts [B]
  - Strut (Front Shock Absorber) [C]

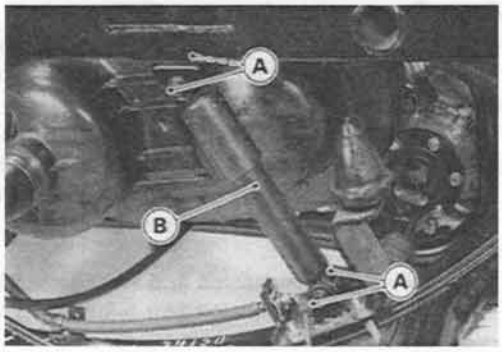
Strut (Front Shock Absorber) Installation



- Insert the strut to the steering knuckle [A] while aligning the notch on the strut with the clamp bolt hole on the steering knuckle.
- Torque:

Torque – Strut Mounting Nuts: 44 N-m (4.5 kg-m, 33 ft-lb)
Strut Clamp Nut: 98 N-m (10.0 kg-m, 72 ft-lb)

Rear Shock Absorber Removal



- Remove:
  - Rear Wheel
- Hold the rear brake drum and panel assembly in position.
- Remove:
  - Leaf Spring Mounting Bolts and Nuts (loosen)
  - Rear Shock Absorber Mounting Bolts and Nuts[A]
  - Rear Shock Absorber [B]

Rear Shock Absorber Installation

- Install the rear wheel temporarily and ground it to load the suspension.
- Torque:

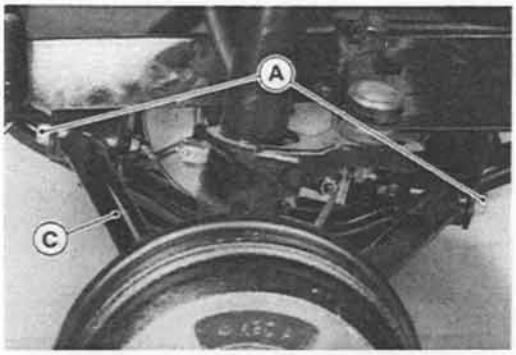
Torque – Rear Shock Absorber Mounting Nuts: 44 N-m (4.5 kg-m, 33 ft-lb)
Leaf Spring Mounting Nuts (front): 98 N-m (10.0 kg-m, 72 ft-lb)
Leaf Spring Mounting Nuts (rear): 59 N-m (6.0 kg-m, 43 ft-lb)

Shock Absorber Inspection

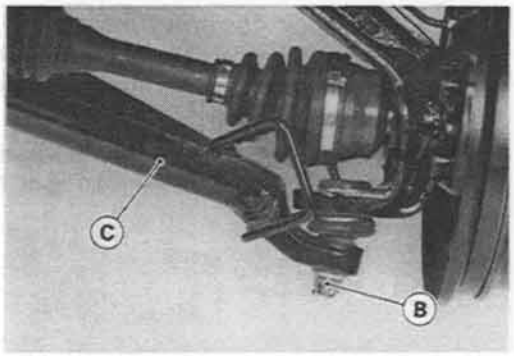
- Visually inspect the shock absorber for breaks or distortion.
- ★If the shock absorber is damaged in any way, replace it.
- Check for oil leakage at the shock absorber damper unit.
- ★If oil leakage is noted, the shock absorber should be replaced to renew the oil seal.
- Visually inspect the rubber bushings in the upper and/or lower mountings of the rear shock absorber.
- ★If they are worn, cracked, hardened, or otherwise damaged, replace them with new ones.

Front Suspension Arms

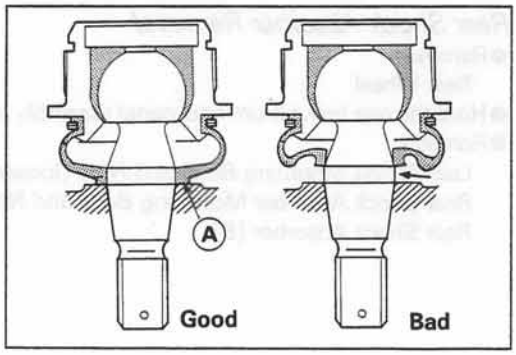
Front Suspension Arm Removal



- ●Remove:
  Front Wheel
- ●Hold the front brake drum and panel assembly in position.
- ●Remove:
  Front Suspension Arm Pivot Bolts [A]
  Front Suspension Arm Joint Nut [B]
  Front Suspension Arm Joint from Steering Knuckle
- ○Install a suitable nut on the stud of the joint and tap the nut to free the joint from the steering knuckle.
- ●Remove:
  Front Suspension Arm [C]



Front Suspension Arm Installation



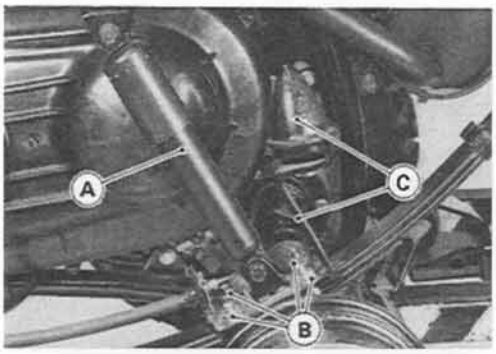
- ●Clean the tapered portion of the front suspension arm joint and the tapered hole of the steering knuckle, or the tapers will not fit snugly.
- ●Grease:
  Front Suspension Arm Joint Boot Sealing Surface [A]
- ●When the front suspension arm pivot bolts are tightened, install the arm joint to the steering knuckle to position the arm within its operating angle.
- ●Torque:
  Torque – Front Suspension Arm Pivot Bolts: 98 N-m (10.0 kg-m, 72 ft-lb)
  Front Suspension Arm Joint Nut: 78 N-m (8.0 kg-m, 58 ft-lb)

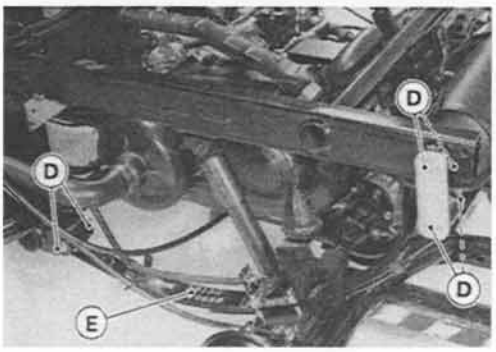
Front Suspension Arm Inspection

- ●Visually inspect the front suspension arm for breaks or distortion.
- ★If the front suspension arm is damaged in any way, replace it.
- ●Check the rubber bushings in the pivots.
- ★Replace any bushings that are worn, cracked, hardened, or otherwise damaged.

Leaf Springs and Dampers

Leaf Spring Removal





- Remove:
  Rear Wheel
- Hold the rear brake drum and panel assembly in position.
- Free the brake hose, pipe, and cable from the leaf spring.

○ Immediately wipe up any brake fluid that spills.

CAUTION
Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

- Remove:
  Rear Shock Absorber [A]
  Damper Bracket Mounting Nuts [B]
  Damper and Bracket [C]
  Leaf Spring Mounting Bolts and Nuts [D]
  Leaf Spring [E]

Leaf Spring Installation

- When installing the rubber bushings to the leaf spring, lubricate them with a soap and water solution.

CAUTION
Do not use engine oil or petroleum distillates to lubricate the bushings because they will deteriorate the rubber.

- Torque:

Torque – Damper Bracket Mounting Nuts: 44 N-m (4.5 kg-m, 33 ft-lb)
Brake Pipe Nipple: 18 N-m (1.8 kg-m, 13.0 ft-lb)

- Install the rear wheel temporarily and ground it to load the suspension during the mounting nut tightening.
- Torque:

Torque – Leaf Spring Mounting Nuts (front): 98 N-m (10.0 kg-m, 72 ft-lb)
Leaf Spring Mounting Nuts (rear): 59 N-m (6.0 kg-m, 43 ft-lb)
Rear Shock Absorber Mounting Nuts: 44 N-m (4.5 kg-m, 33 ft-lb)

- Bleed the brake line.

Leaf Spring Inspection

- Visually inspect the leaf spring for breaks or distortion.

★ If the leaf spring is damaged in any way, replace it.

- Check the rubber bushings in the mounts and the damper.

★ Replace any bushings or damper that are worn, cracked, hardened, or otherwise damaged.

Leaf Spring and Damper

Leaf Spring Removal

1. Remove
   - Rear Wheel
2. Unbolt the rear brake hose and parts assembly as necessary.
3. Free the brake hose and cable from the rear swing.
4. Disconnect shock absorber from leaf spring.

CAUTION
Brake hose cannot be twisted or bent sharply. Kinking or twisting the brake hose may impair proper braking.

5. Remove:
   - Rear Shock Absorbers (A)
   - Damper Bracket Bolts and Nuts (B)
   - Damper (C)
   - Leaf Spring Mounting Bolts and Nuts (D)
   - Leaf Spring (E)

Leaf Spring Installation

1. When replacing the rubber bushings in the leaf spring eyes, be sure to use a bush installation tool.

CAUTION
Do not use engine oil or grease. Rubber is subject to swelling by petroleum products and will deteriorate the rubber.

2. Clean:
   - Torque - Damper Bracket Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)
     Swing Arm Pivot Nuts: 98 N·m (10 kgf·m, 72 ft·lb)
3. Install Damper, Leaf Springs and Shock Absorbers by reversing the removal procedure.
4. Torque:
   - Torque - Leaf Spring Mounting Bolts (Shock Absorber Side): 59 N·m (6.0 kgf·m, 43 ft·lb)
     Leaf Spring Mounting Bolts (Frame Side): 59 N·m (6.0 kgf·m, 43 ft·lb)
     Rear Wheel Sprocket Mounting Nuts: 98 N·m (10 kgf·m, 72 ft·lb)
     Shock Absorber Mounting Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)
5. Adjust the chain slack.

Leaf Spring Disassembly

1. Remove nuts and the bushing to disassemble.
2. Clean the leaf springs in detergent and dry them thoroughly.
3. Check the rubber bushings in the eyelets and the damper.
4. Replace if damaged or excessively worn.

Steering

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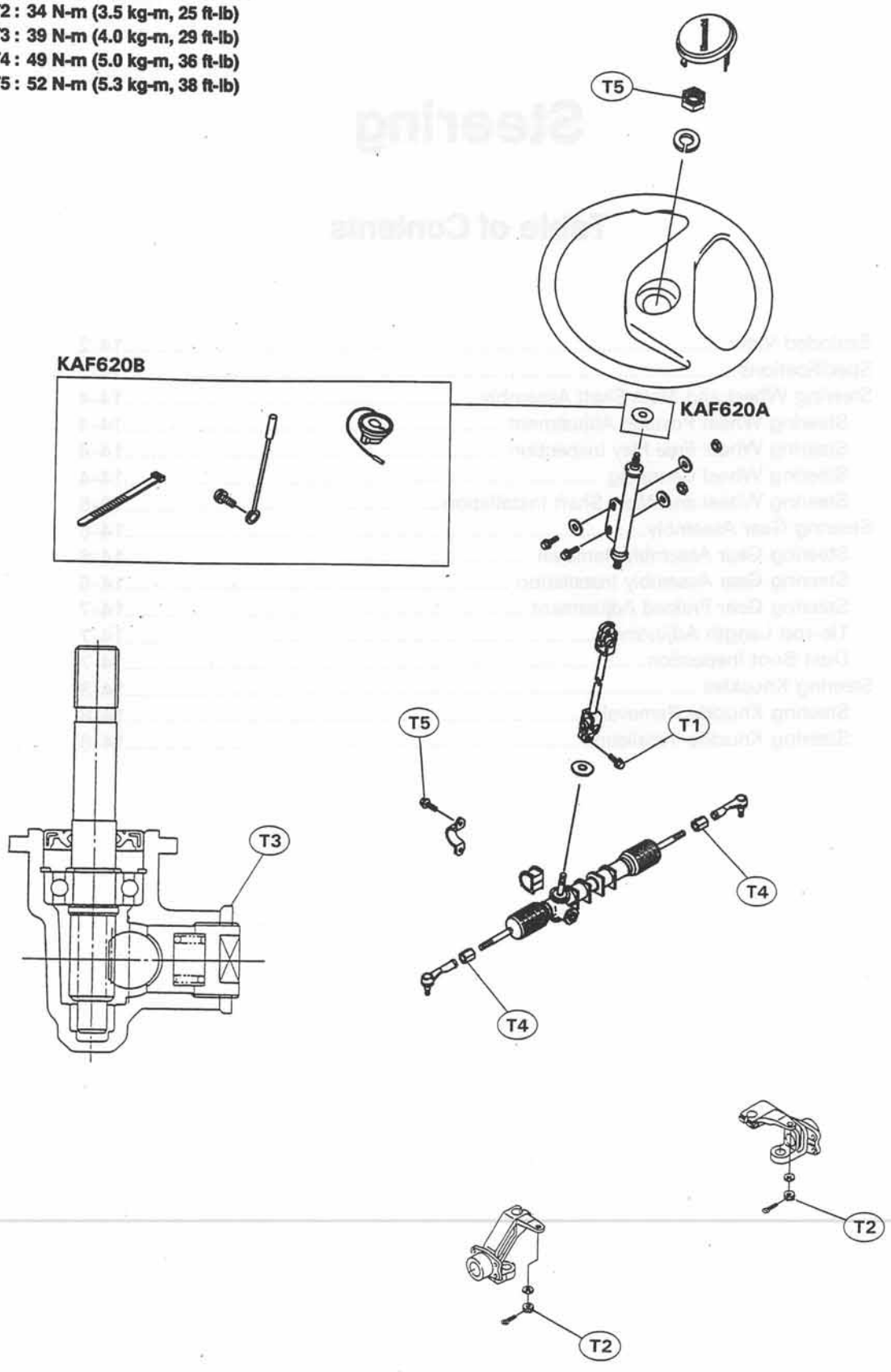
Exploded View

T1 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T2 : 34 N-m (3.5 kg-m, 25 ft-lb)
T3 : 39 N-m (4.0 kg-m, 29 ft-lb)
T4 : 49 N-m (5.0 kg-m, 36 ft-lb)
T5 : 52 N-m (5.3 kg-m, 38 ft-lb)

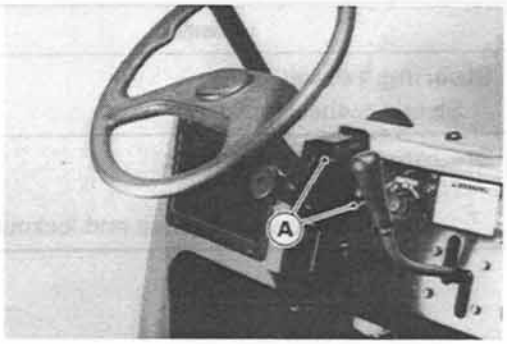


Specifications

Item	Standard	Service Limit
Steering Wheel:		
Steering wheel free play	0 ~ 20 mm	– – –
Steering Gear Assembly:		
Tire-rod length (distance between groove and locknut)	51.5 mm	– – –

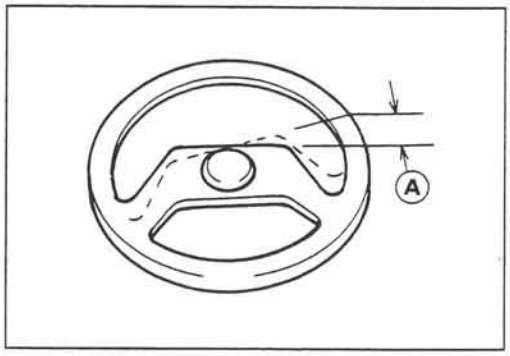
Steering Wheel and Main Shaft Assembly

Steering Wheel Position Adjustment



- Loosen the steering main shaft bracket mounting nuts [A].
- Adjust the steering wheel position.
- Tighten the main shaft bracket mounting nuts securely.

Steering Wheel Free Play Inspection



- Check steering wheel free play [A].

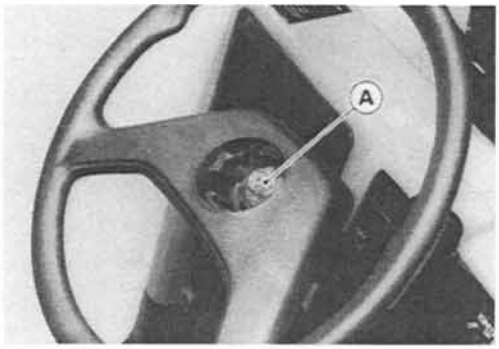
○ Set the front wheels straight ahead. Gently turn the steering wheel left and right. The steering wheel free play is the amount of travel in the steering wheel, before the front wheels begin to turn.

Steering Wheel Free Play
Standard: 0 ~ 20 mm

★ If steering wheel free play is not correct, inspect the following.
Steering Wheel Mounting Nut
Intermediate Shaft Clamp Bolts
Steering Gear Assembly Mounting Bracket Bolts
Steering Gear Assembly Mounting Rubber Dampers
Tie-rod End Nuts
Steering Gear Preload Adjustment

★ If the above bolts and nuts are tightened firmly, dampers are in good condition, and the preload is adjusted correctly, the steerig gear assembly is damaged and should be replaced as a unit.

Steering Wheel Centering



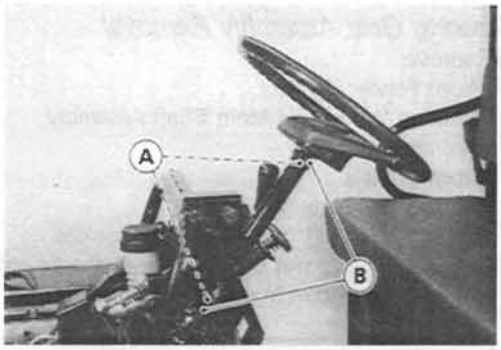
- Test ride the vehicle.

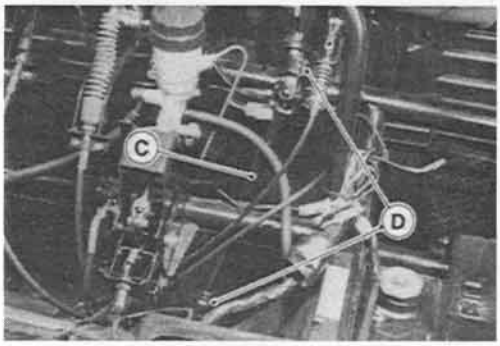
★ If the steering wheel is not straight when the vehicle is traveling in a straight line, do the followings.

- Check the tie-rod length and adjust it if necessary.
- Remove the cap and loosen the steering wheel mounting nut [A].
- Push the vehicle in a straight line with no one aboard, and stop it without turning the steering wheel.
- Remount the steering wheel so that it is straight ahead.

Torque – Steering Wheel Mounting Nut : 52 N-m (5.3 kg-m, 38 ft-lb)

Steering Wheel and Main Shaft Installation



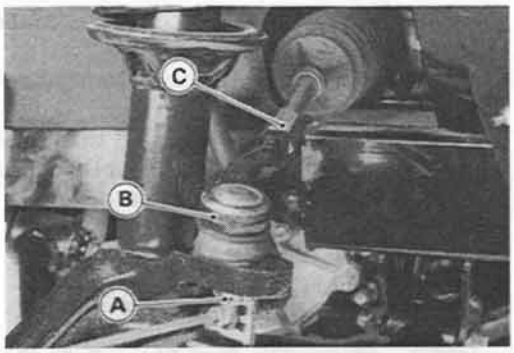


- Grease:
  Main Shaft Bushing [A] (Inside Surface and Flanged End)
  Dust Cover [B] Lips
- Connect the intermediate shaft [C] to the main shaft and the steering gear pinion in any position. Mount the steering wheel on the main shaft temporarily.
- Adjust:
  Steering Wheel Positon Adjustment
  Steering Wheel Centering
- Torque:

Torque – Intermediate Shaft Clamp Bolts [D]: 20 N-m (2.0 kg-m, 14.5 ft-lb)

Steering Gear Assembly

Steering Gear Assembly Removal

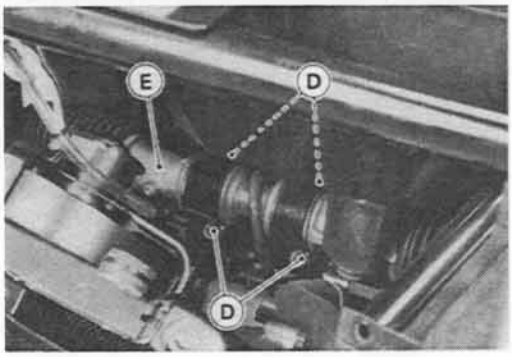


● Remove:
Front Fender Upper
Steering Wheel and Main Shaft Assembly
Radiator
Front Wheels
Tie-rod End Nuts [A]
Tie-rod Ends [B] from Steering Knuckles

○ Install a suitable nut on the stud of the tie-rod end joint and tap the nut to free the joint from the steerintg knuckle.

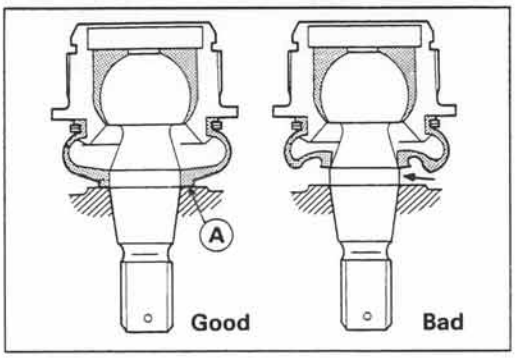
CAUTION

Do not loosen the tie-rod end locknuts [C], or the toe-in of the front wheels will be changed.



Steering Gear Assembly Bracket Bolts [D]
Steering Gear Assembly [E] and Brackets

Steering Gear Assembly Installation



● Adjust if necessary:
Steering Gear Preload Adjustment.
Tie-rod Length Adjustment

● Clean the tapered portion of the tie-rod end joint and the tapered hole of the steering knuckle, or the tapers will not fit snugly.

● Grease:
Tie-rod End Joint Boot Sealing Surfaces [A]

● Torque:

Torque – Steering Gear Assembly Bracket Bolts : 52 N-m (5.3 kg-m, 38 ft-lb)
Tie-rod End Nuts : 34 N-m (3.5 kg-m, 25 ft-lb)

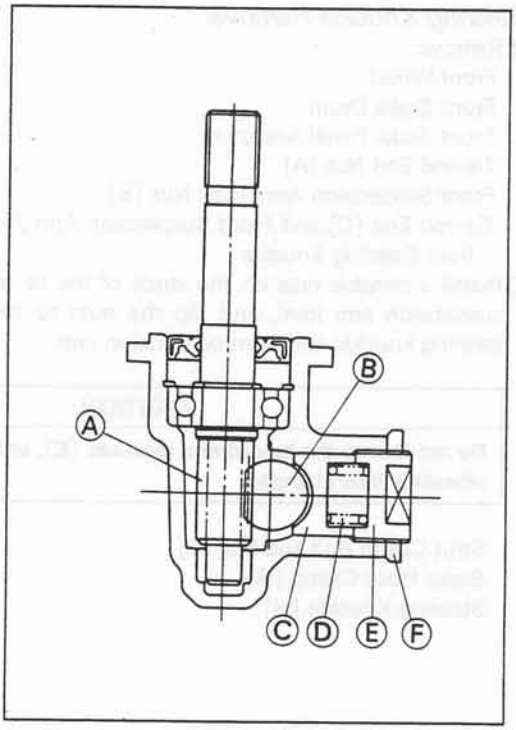
● Check:
Toe-in of Front Wheels

Steering Gear Preload Adjustment

- Loosen the locknut.
- Tighten the rack guide spring cap to 6.9 N-m (0.70 kg-m, 61 in-lb) of torque.
- Back off the cap 60 ~ 70 °.
- Tighten the locknut while preventing the cap from turing.

Torque – Rack Guide Spring Cap Locknut : 39 N-m (4.0 kg-m, 29 ft-lb)

Pinion [A]
Rack [B]
Rack Guide [C]
Spring [D]
Cap [E]
Locknut [F]



Tie-rod Length Adjustment

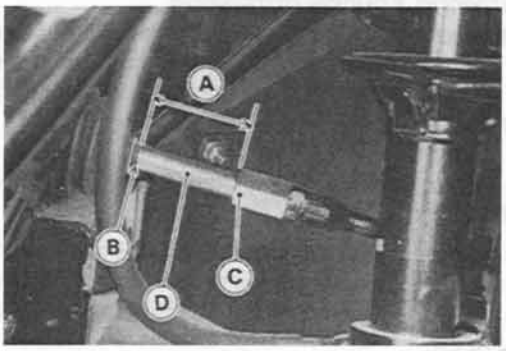
- Check the length [A] of the tie-rod distance between the rod groove [B] and the locknut [C]. This distance should be the specified value for both the left and right tie-rods.

Tie-rod Length (distance between groove and locknut)
Standard: 51.5 mm

★If it is not, adjust the tie-rod length.

- Loosen the locknut and turn the adjusting rod [D] to achieve the specified value.
- Torque:

Torque – Tie-rod End Locknuts : 49 N-m (5.0 kg-m, 36 ft-lb)



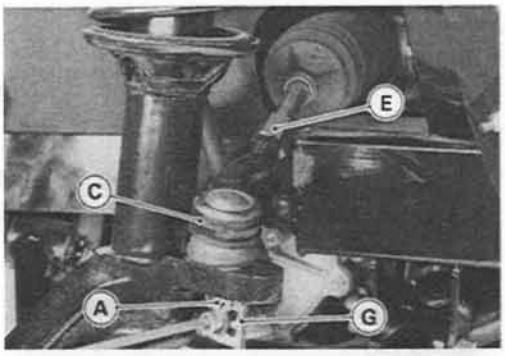
Dust Boot Inspection

- Visually inspect the dust boots at both the ends of the steering gear assembly.

★If there is any signs of deterioration, cracks, or damage, replace the steering gear assembly.

Steering Knuckles

Steering Knuckle Removal

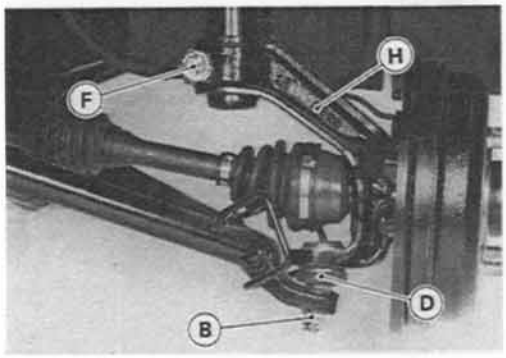


● Remove:
Front Wheel
Front Brake Drum
Front Brake Panel Assembly
Tie-rod End Nut [A]
Front Suspension Arm Joint Nut [B]
Tie-rod End [C] and Front Suspension Arm Joint [D] from Steering Knuckle

○ Install a suitable nuts on the studs of the tie-rod end joint and front suspension arm joint, and tap the nuts to free the joints from the steering knuckle and front suspension arm.

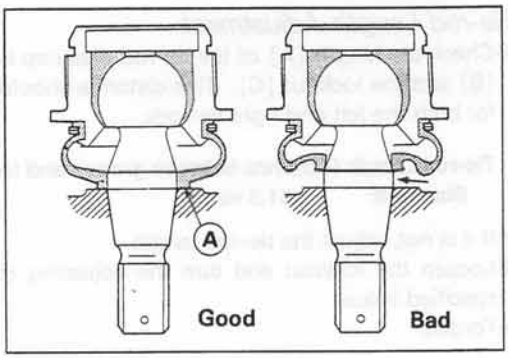
CAUTION

Do not loosen the tie-rod end locknuts [E], or the toe-in of the front wheels will be changed.



Strut Clamp Bolt and Nut [F]
Brake Hose Clamp [G]
Steering Knuckle [H]

Steering Knuckle Installation



● Clean the tapered portions of the front suspension arm joint and the tie-rod end joint and the tapered holes of the steering knuckle and the front suspension arm, or the tapers will not fit snugly.

● Grease:
Axle Bearing Grease Seal Lips
Front Suspension Arm Joint Boot Sealing Surfaces [A]

● Torque:

Torque – Strut Clamp Nut : 98 N-m (10.0 kg-m, 72 ft-lb)
Front Suspension Arm Joint Nut : 78 N-m (8.0 kg-m, 58 ft-lb)
Tie-rod End Nut : 34 N-m (3.5 kg-m, 25 ft-lb)

● Check:
Toe-in of Front Wheels

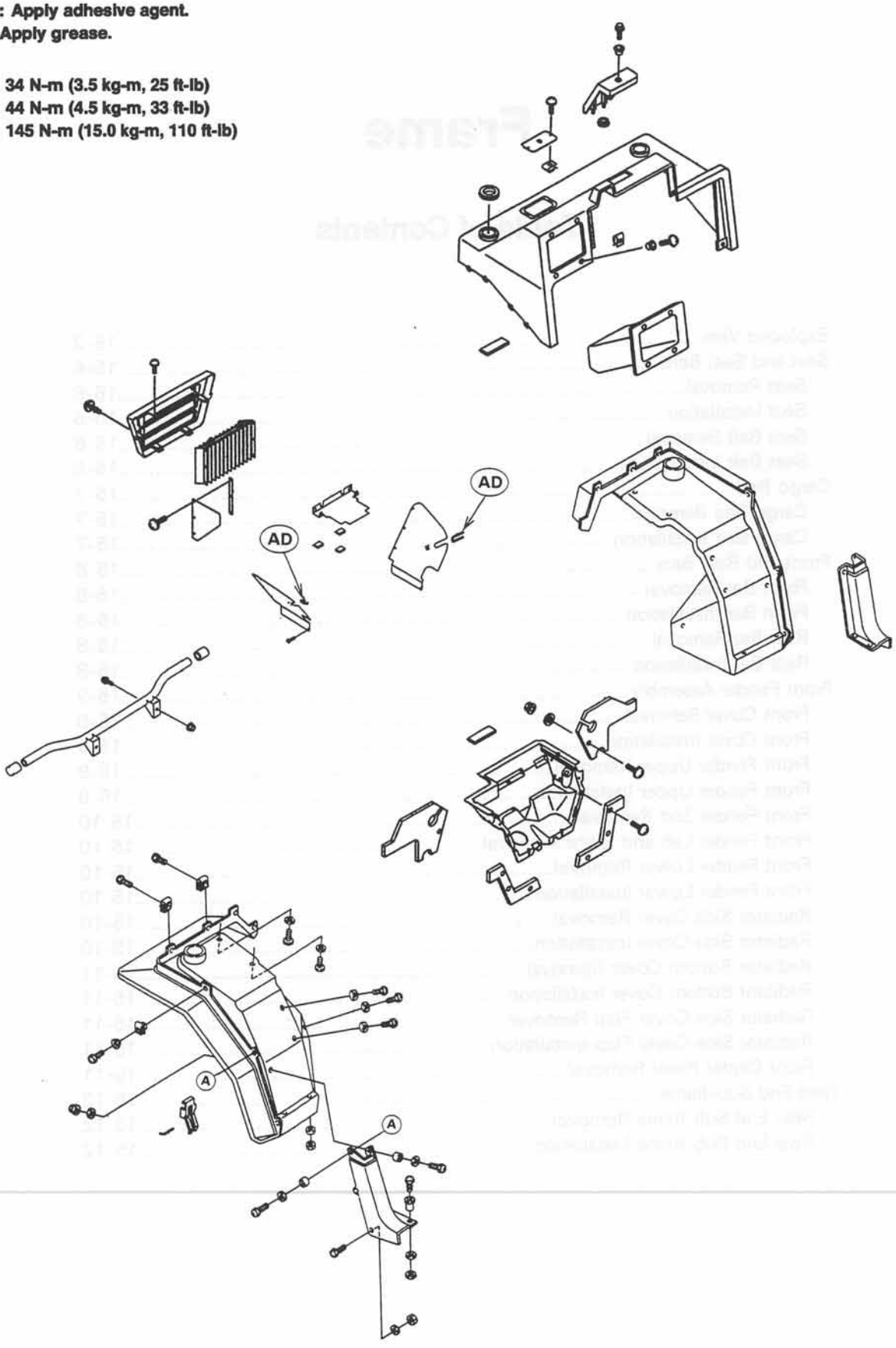
Frame

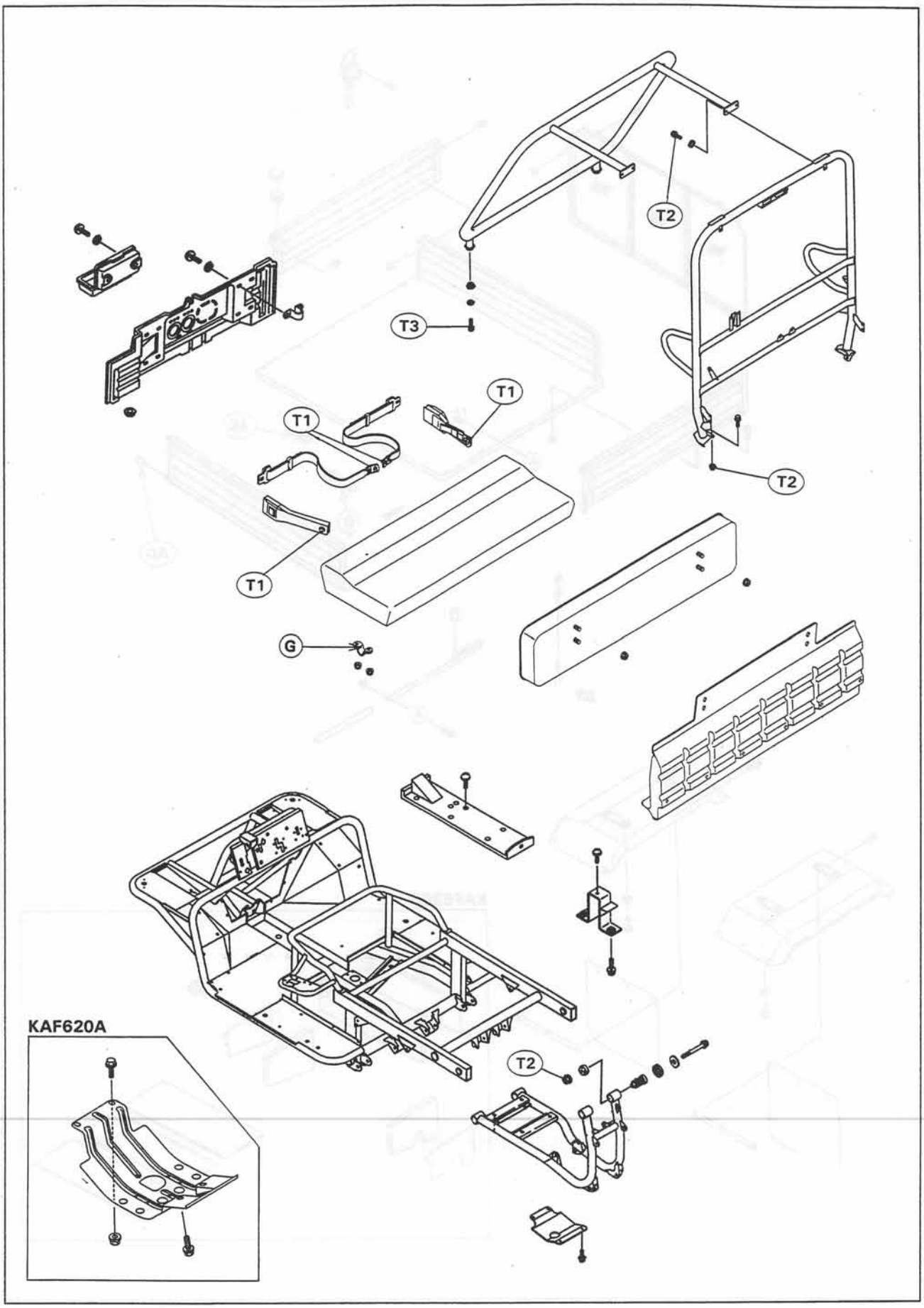
Table of Contents

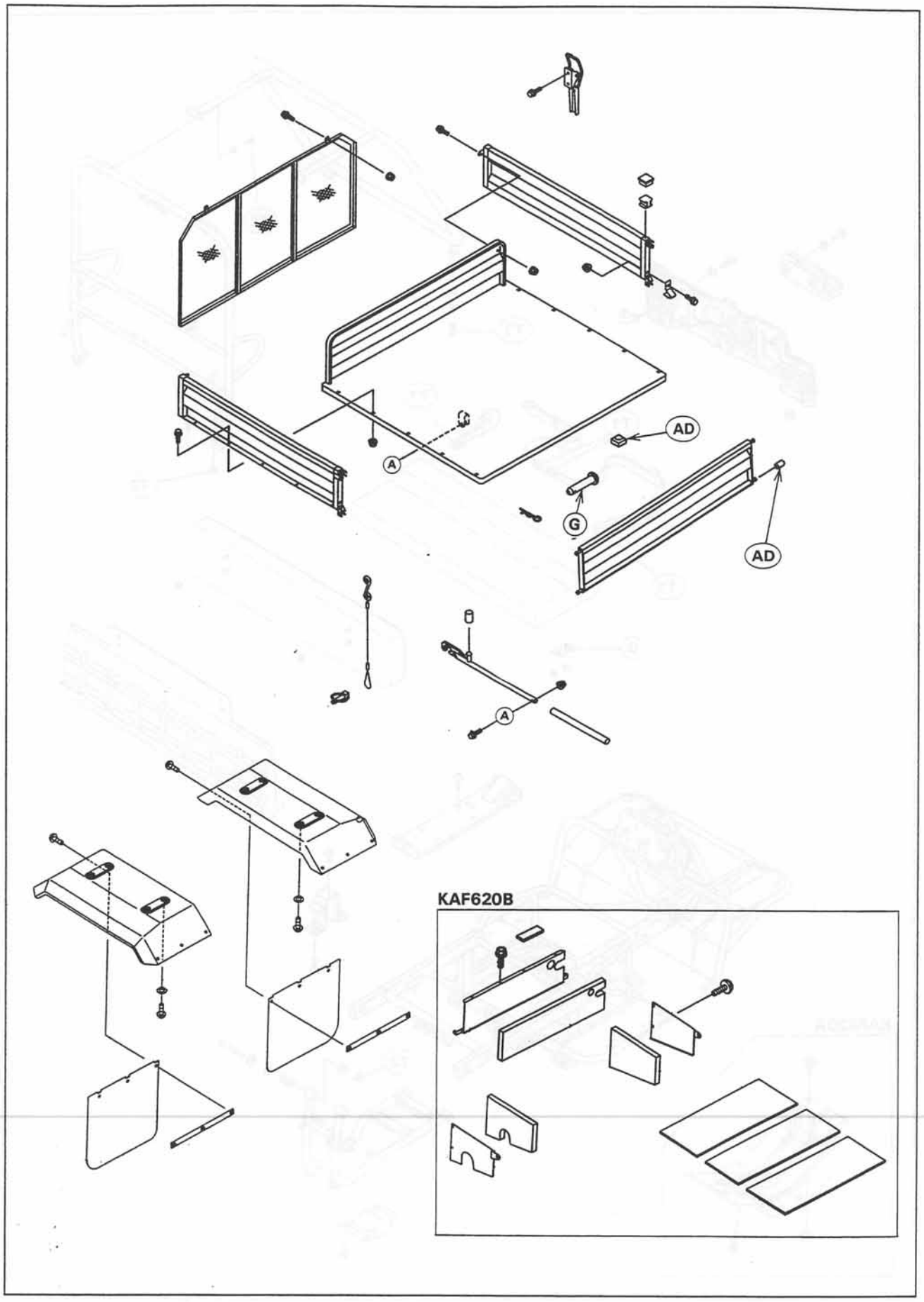
Exploded View

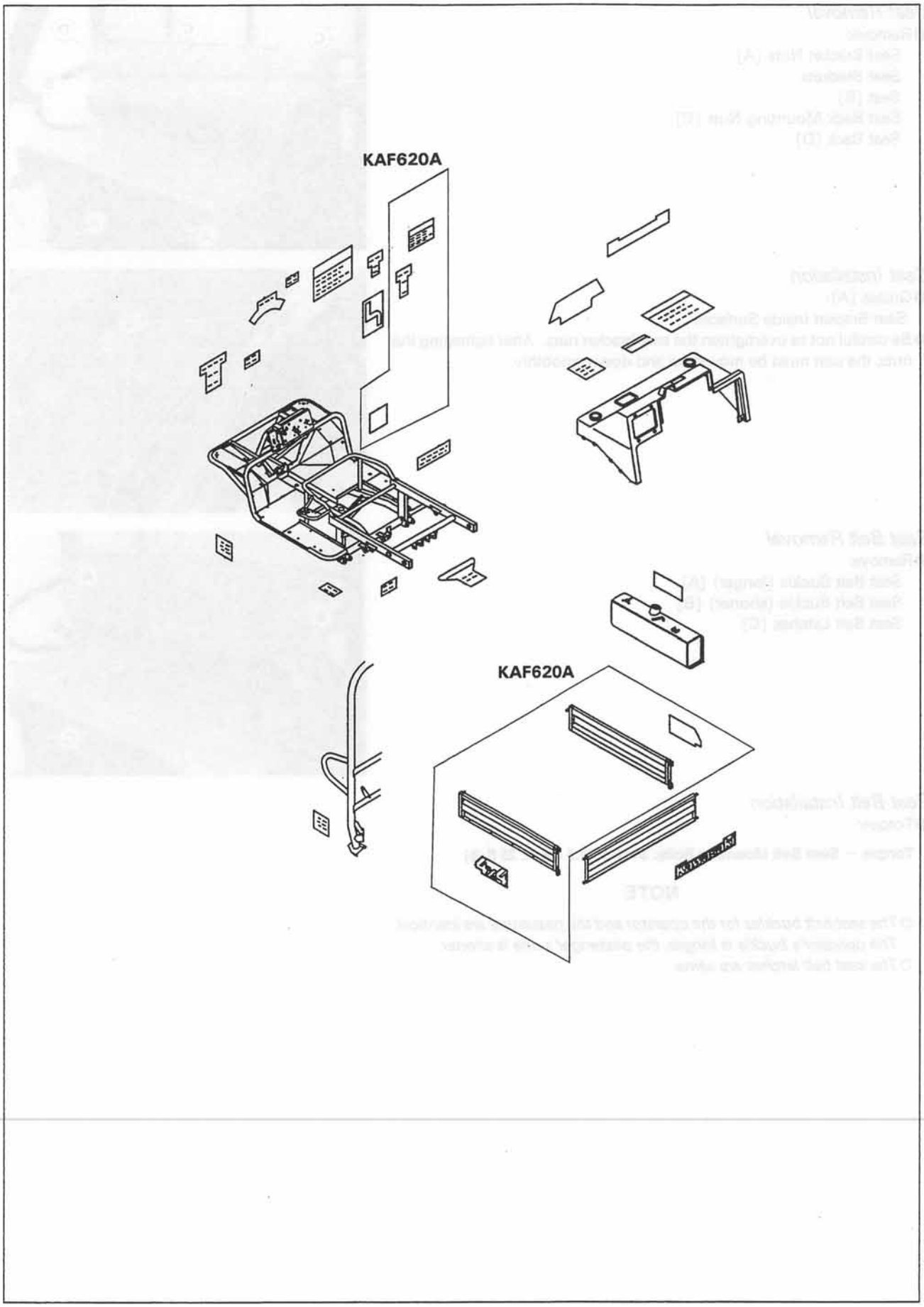
AD : Apply adhesive agent.
G : Apply grease.

T1 : 34 N-m (3.5 kg-m, 25 ft-lb)
T2 : 44 N-m (4.5 kg-m, 33 ft-lb)
T3 : 145 N-m (15.0 kg-m, 110 ft-lb)



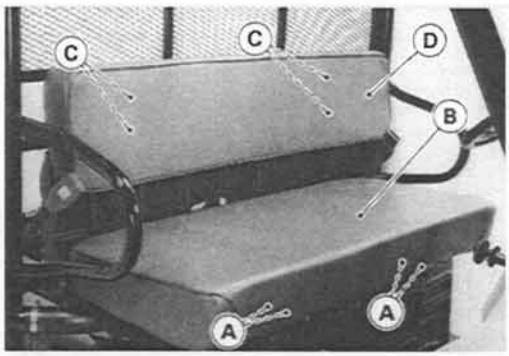

T2
T3
T1
T1
T2
T1
G
KAF620A
T2


AD
A
G
AD
A
KAF620B


KAF620A
KAF620A

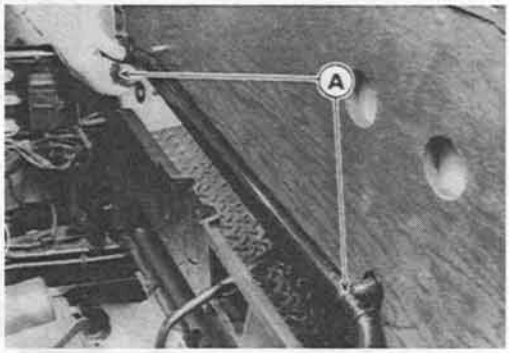
Seat and Seat Belts

Seat Removal



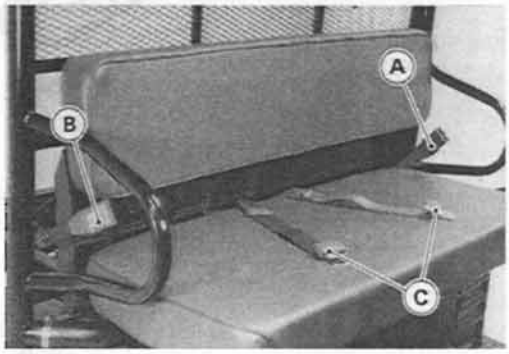
- Remove:
  - Seat Bracket Nuts [A]
  - Seat Brackets
  - Seat [B]
  - Seat Back Mounting Nuts [C]
  - Seat Back [D]

Seat Installation



- Grease [A]:
  - Seat Bracket Inside Surfaces
- Be careful not to overtighten the seat bracket nuts. After tightening the nuts, the seat must be moved up and down smoothly.

Seat Belt Removal



- Remove:
  - Seat Belt Buckle (longer) [A]
  - Seat Belt Buckle (shorter) [B]
  - Seat Belt Latches [C]

Seat Belt Installation

- Torque:

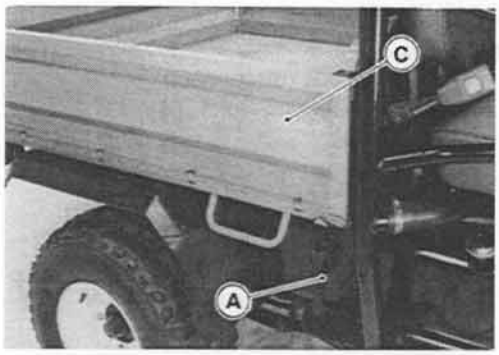
Torque – Seat Belt Mounting Bolts: 34 N-m (3.5 kg-m, 25 ft-lb)

NOTE

- *The seat belt buckles for the operator and the passenger are identical. The operator's buckle is longer, the passenger's one is shorter.*
- *The seat belt latches are same.*

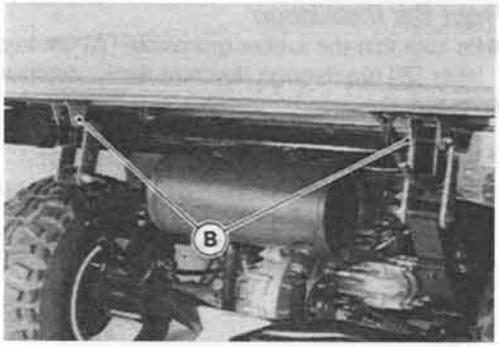
Cargo Bed

Cargo Bed Removal

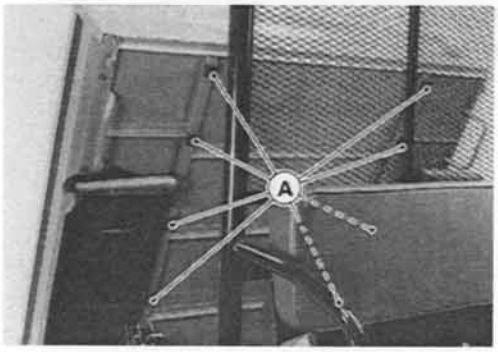


● Remove:
  Tail/Brake Light Assemblies
  Rear Fenders

○ To prevent damage to them, remove them before removing the cargo bed.
  Hooks (unlock) [A]
  Mounting Pins [B]
  Cargo Bed [C]



Cargo Bed Installation



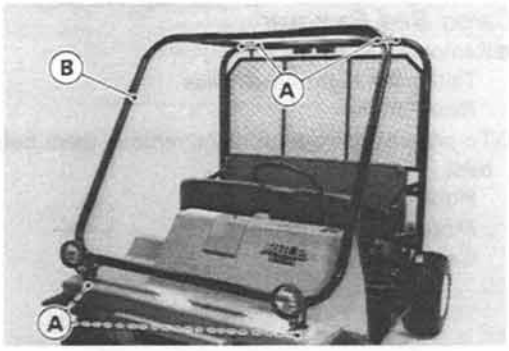
● Grease:
  Cargo Bed Mounting Pins

● Apply adhesive agent:
  Cargo Bed Rubber Dampers (Bottom) [A]
  Tail Gate Pivot Rubber Dampers (Left and Right)

Front and Rear Bars

Front Bar Removal

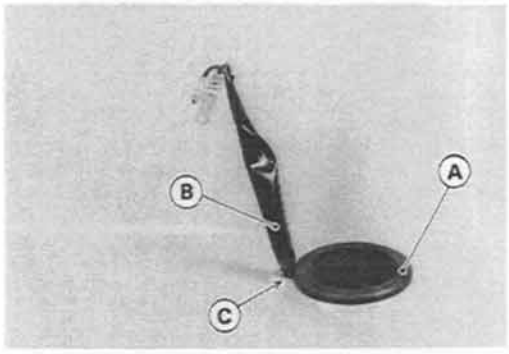
●Remove:
Headlight Leads (disconnect)
Front Bar Mounting Bolts [A]
Front Bar [B]



Front Bar Installation

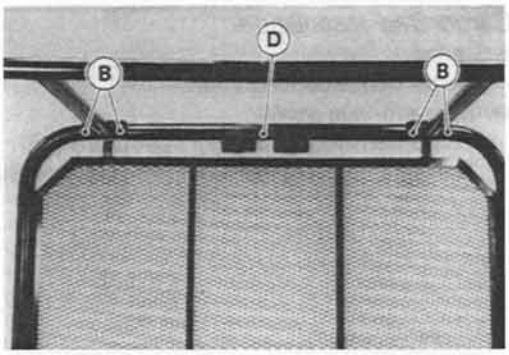
●Be sure that the rubber grommets [A] are in place and the headlight leads [B] run through the front fender notches [C].

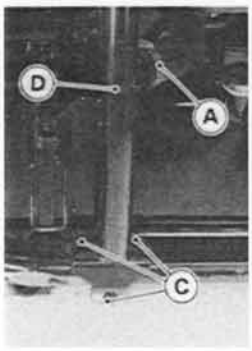
●Torque:
Torque – Front Bar Mounting Bolts (Lower): 145 N-m (15.0 kg-m, 110 ft-lb)
Front Bar Mounting Bolts (Upper): 44 N-m (4.5 kg-m, 33 ft-lb)

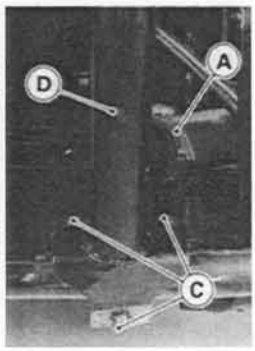


Rear Bar Removal

●Remove:
Air Duct Clamps (loosen) [A]
Front Bar Mounting Bolts (Upper) [B]
Rear Bar Mounting Bolts (Lower) [C]
Rear Bar [D]







Rear Bar Installation

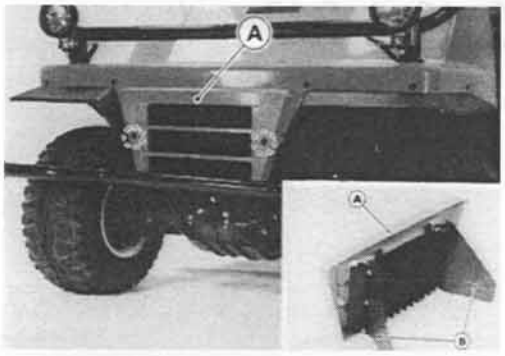
●Torque:

Torque – Front Bar Mounting Bolts (Upper): 44 N-m (4.5 kg-m, 33 ft-lb)
Rear Bar Mounting Bolts and Nuts (Lower): 44 N-m (4.5 kg-m, 33 ft-lb)

Front Fender Assembly

Front Cover Removal

● Remove:
Front Cover [A]

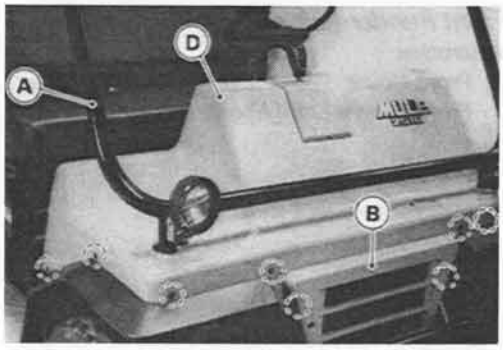


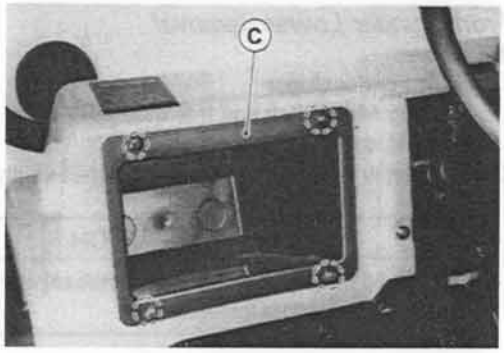
Front Cover Installation

● Install the left and right flaps [B] to the radiator sides.

Front Fender Upper Removal

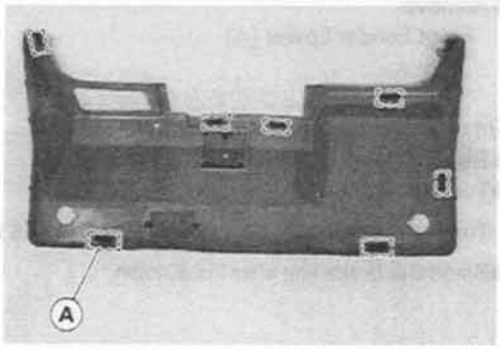
● Remove:
Front Bar [A]
Front Cover [B]
Glove Compartment [C]
Front Fender Upper [D]



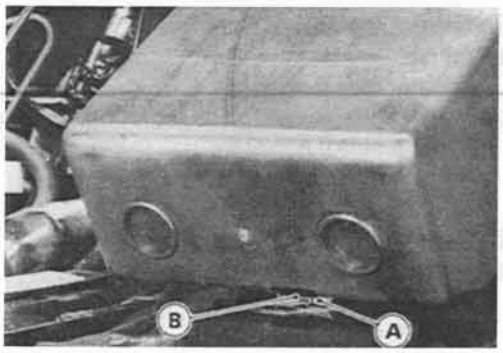


Front Fender Upper Installation

● Be sure that the rubber dampers [A] are in place.

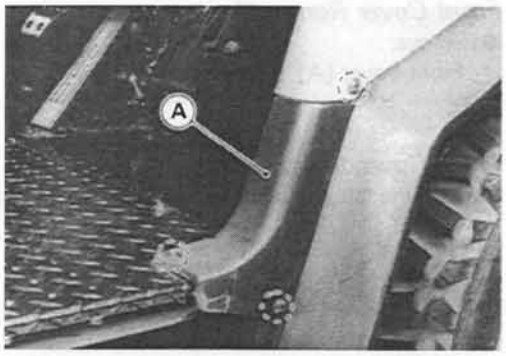


● Engage the hook [A] on the glove compartment with the hook [B] on the frame.



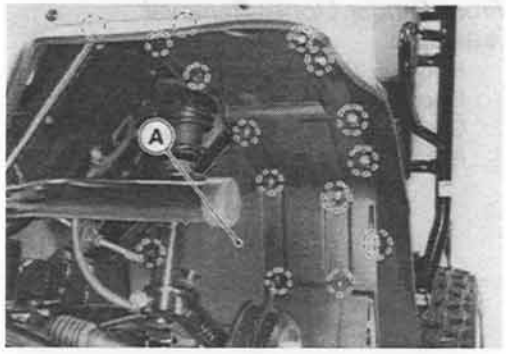
Front Fender End Removal

● Remove:
Front Fender Ends [A]



Front Fender Left and Right Removal

● Remove:
Front Cover
Front Fender Left [A] and Right

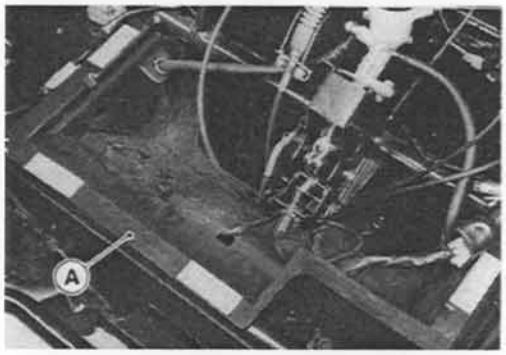


Front Fender Lower Removal

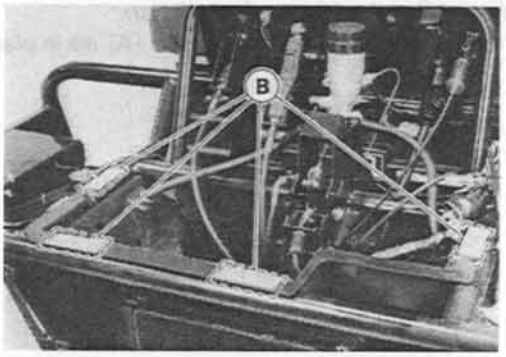
● Remove:
Front Fender Upper
Steering Main Shaft and Intermediate Shaft
Brake Hoses

○ Immediately wipe up any brake fluid that spills.

CAUTION
Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.



● Remove:
Front Fender Lower [A]



Front Fender Lower Installation

● Be sure that the dampers [B] are in place.
● Torque:

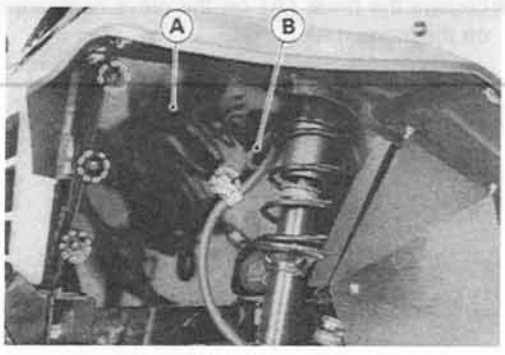
Torque – Brake Hose Banjo Bolts: 25 N-m (2.5 kg-m, 18.0 ft-lb)

● Bleed the brake line after installation.

Radiator Side Cover Removal

● Remove:
Radiator Side Covers [A]

○ Lift the front wheels off the ground, and loosen the strut upper mounting nuts if necessary.

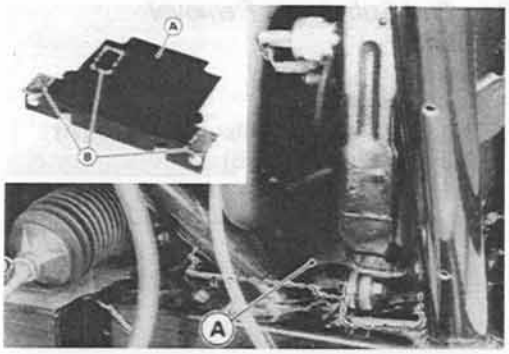


Radiator Side Cover Installation

● Apply adhesive agent:
Radiator Side Cover Trims [B]

Radiator Bottom Cover Removal

● Remove:
Front Fender Upper
Radiator Mounting Bolts
Radiator Bottom Cover [A]

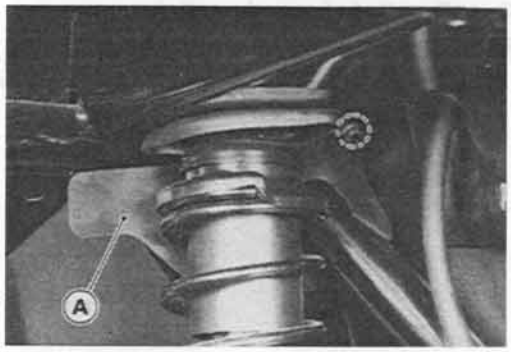


Radiator Bottom Cover Installation

● Be sure that the rubber dampers [B] are in place.

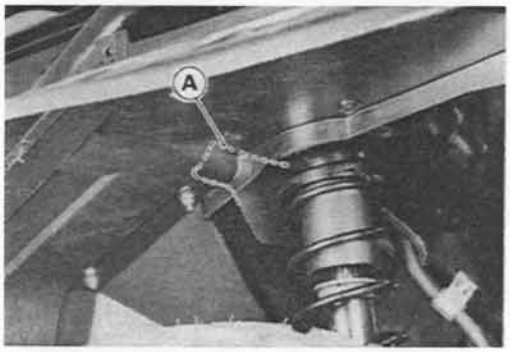
Radiator Side Cover Flap Removal

● Remove:
Radiator Side Cover
Radiator Side Cover Flap [A]



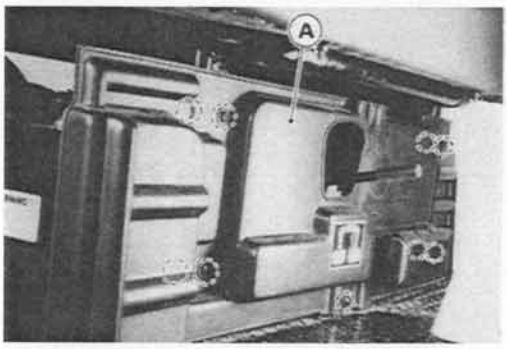
Radiator Side Cover Flap Installation

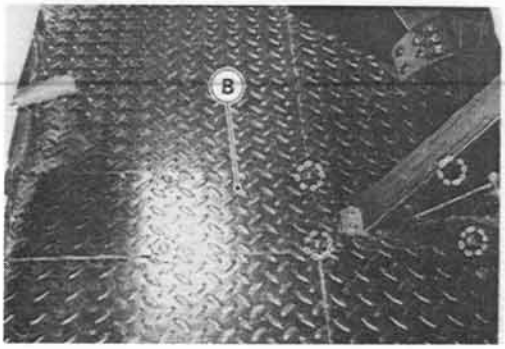
● Insert the flap outside end [A] between the front fender left or right and the frame pipe.



Floor Center Panel Removal

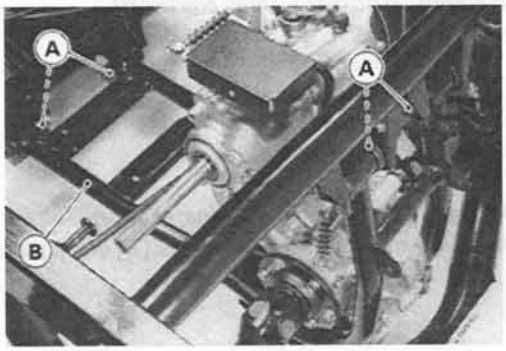
● Remove:
Seat Lower Cover [A]
Floor Center Panel [B]





Rear End Sub-frame

Rear End Sub-frame Removal



● Remove:
Engine
Transmission Case
Rear End Sub-frame Mounting Nuts [A]
Rear End Sub-frame [B]

Rear End Sub-frame Installation

● Torque:

Torque – Rear End Sub-frame Mounting Nuts: 44 N-m (4.5 kg-m, 33 ft-lb)

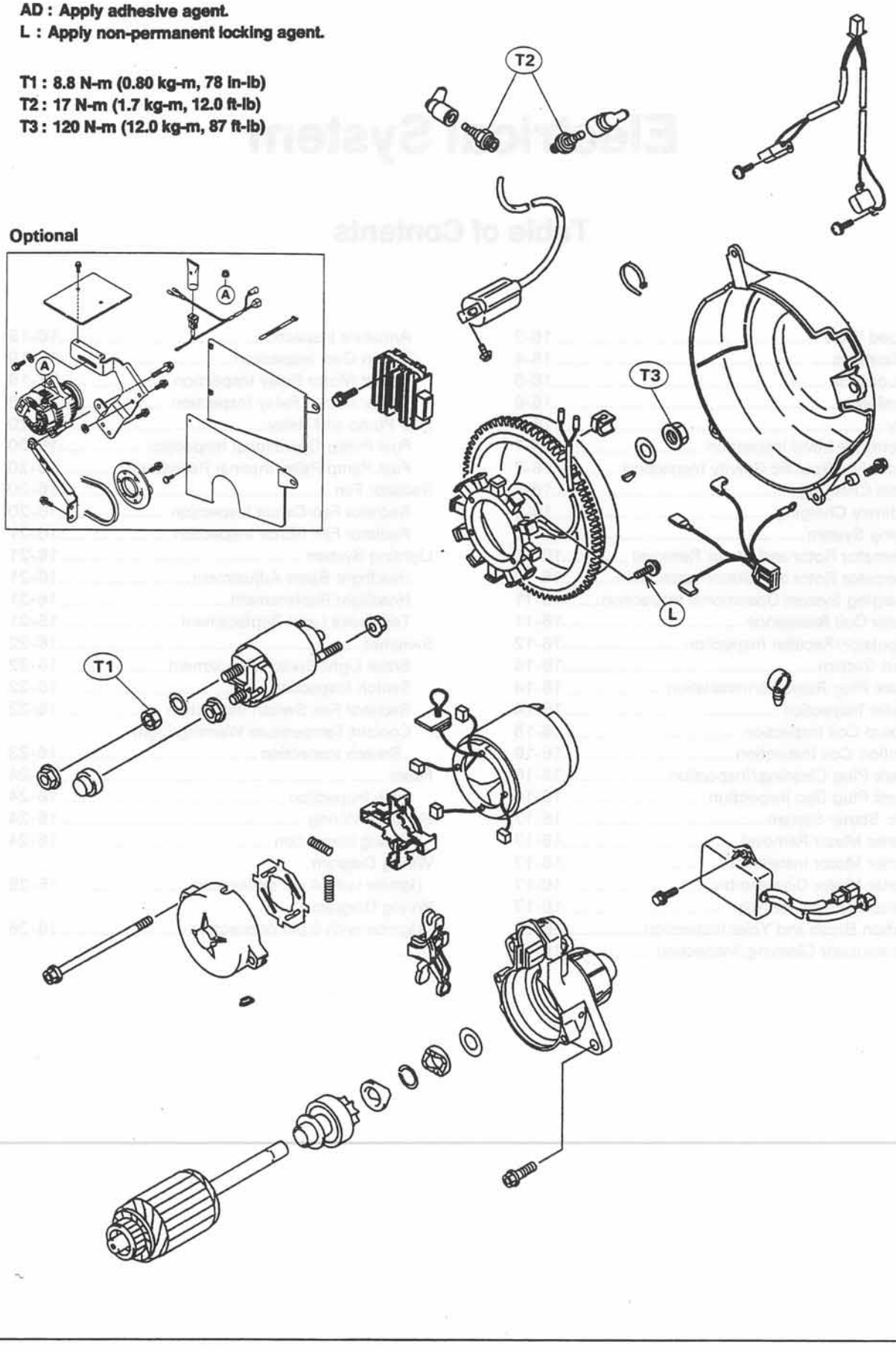
Electrical System

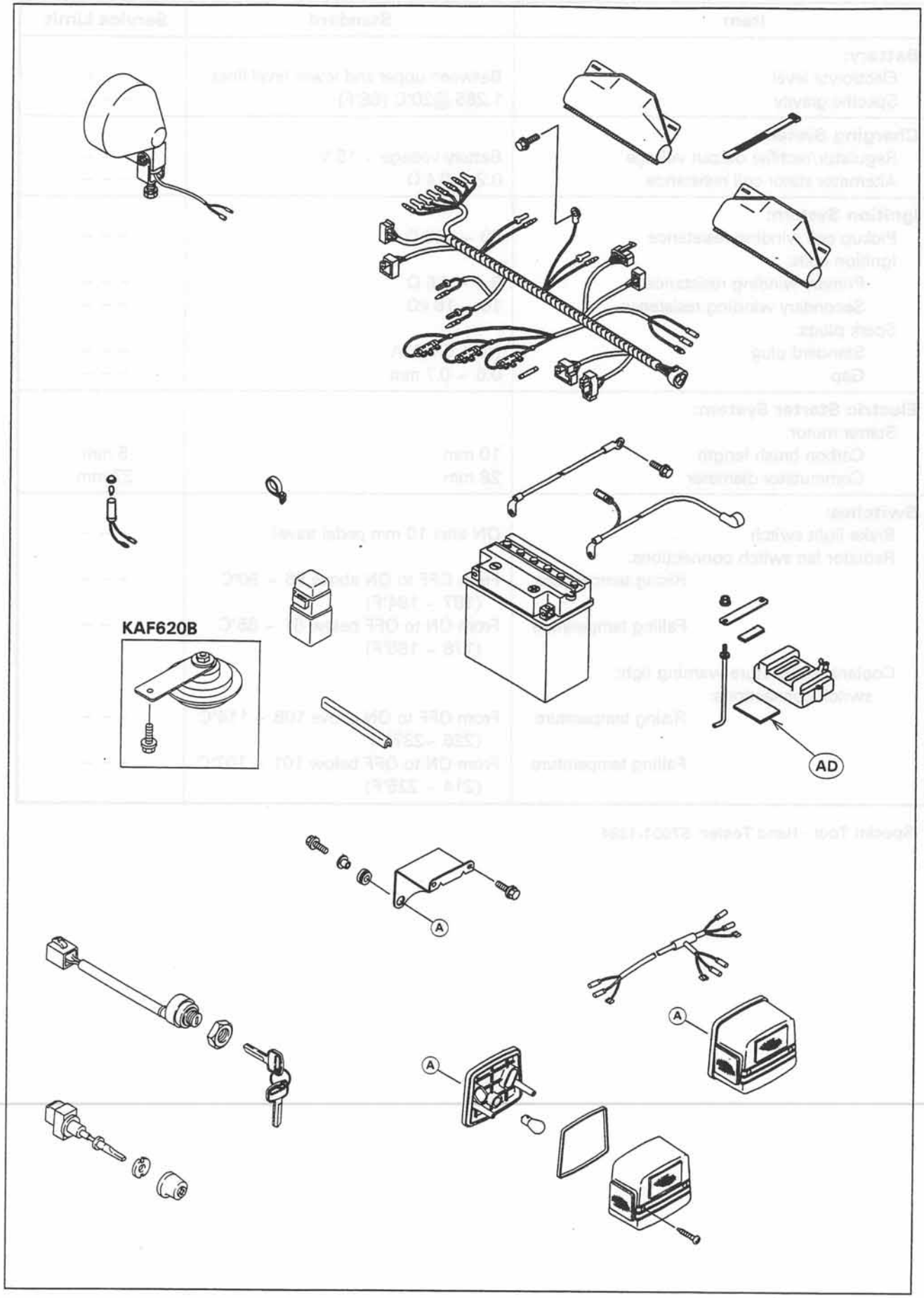
Table of Contents

Exploded View

AD : Apply adhesive agent.
L : Apply non-permanent locking agent.

T1 : 8.8 N-m (0.80 kg-m, 78 in-lb)
T2 : 17 N-m (1.7 kg-m, 12.0 ft-lb)
T3 : 120 N-m (12.0 kg-m, 87 ft-lb)




KAF620B
AD
A
A
A

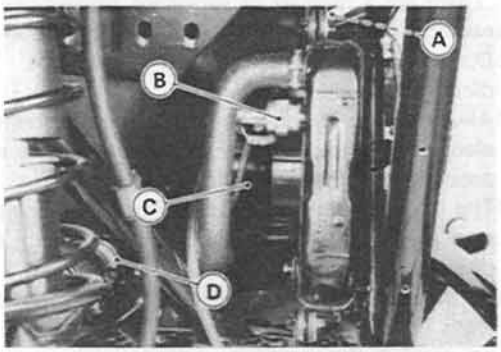
Specifications

Item	Standard	Service Limit
Battery:		
Electrolyte level	Between upper and lower level lines	– – –
Specific gravity	1.265 @20°C (68°F)	– – –
Charging System:		
Regulator/rectifier output voltage	Battery voltage ~ 15 V	– – –
Alternator stator coil resistance	0.2 ~ 0.4 Ω	– – –
Ignition System:		
Pickup coil winding resistance	90 ~ 130 Ω	– – –
Ignition coils:		
Primary winding resistance	3.4 ~ 4.6 Ω	– – –
Secondary winding resistance	10 ~ 16 kΩ	– – –
Spark plugs:		
Standard plug	NGK BMR2A	– – –
Gap	0.6 ~ 0.7 mm	– – –
Electric Starter System:		
Starter motor:		
Carbon brush length	10 mm	5 mm
Commutator diameter	28 mm	27 mm
Switches:		
Brake light switch	ON after 10 mm pedal travel	– – –
Radiator fan switch connections:		
Rising temperature	From OFF to ON above 86 ~ 90°C (187 ~ 194°F)	– – –
Falling temperature	From ON to OFF below 81 ~ 85°C (178 ~ 185°F)	– – –
Coolant temperature warning light switch connections:		
Rising temperature	From OFF to ON above 108 ~ 114°C (226 ~237°F)	– – –
Falling temperature	From ON to OFF below 101 ~ 107°C (214 ~ 225°F)	– – –

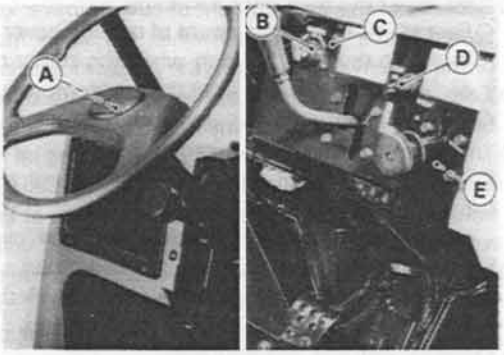
Special Tool - Hand Tester: 57001-1394

Parts Location

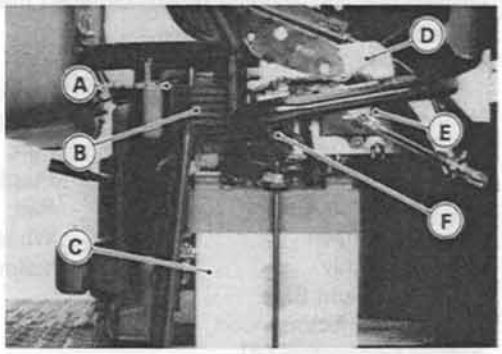
Horn (KAF620B) [A]
Radiator Fan Switch [B]
Radiator Fan [C]
Ground Lead (Horn Button, KAF620B) [D]



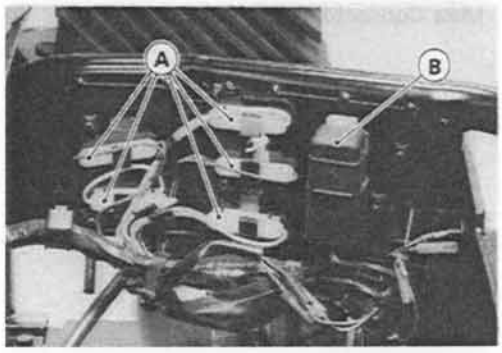
Horn Button (KAF620B) [A]
Ignition Switch [B]
Coolant Temperature Warning Light [C]
Light Switch [D]
Brake Light Switch [E]



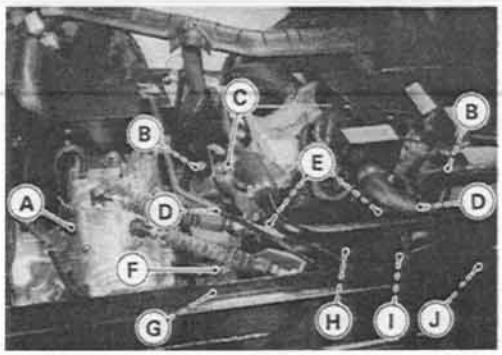
Ground Lead (Frame) [A]
Regulator/Rectifier [B]
Battery [C]
Parking Brake Light Switch [D]
Igniter [E]
Fuel Pump Relay [F]



Fuses [A]
Starter Circuit Relay [B]



Neutral Switch [A]
Spark Plugs [B]
Coolant Temperature Warning Light Switch [C]
Ignition Coils [D]
Pickup Coils [E]
Starter Motor/Relay [F]
Ground Lead (Engine) [G]
Alternator [H]
Oil Pressure Switch [I]
Fuel Pump [J]



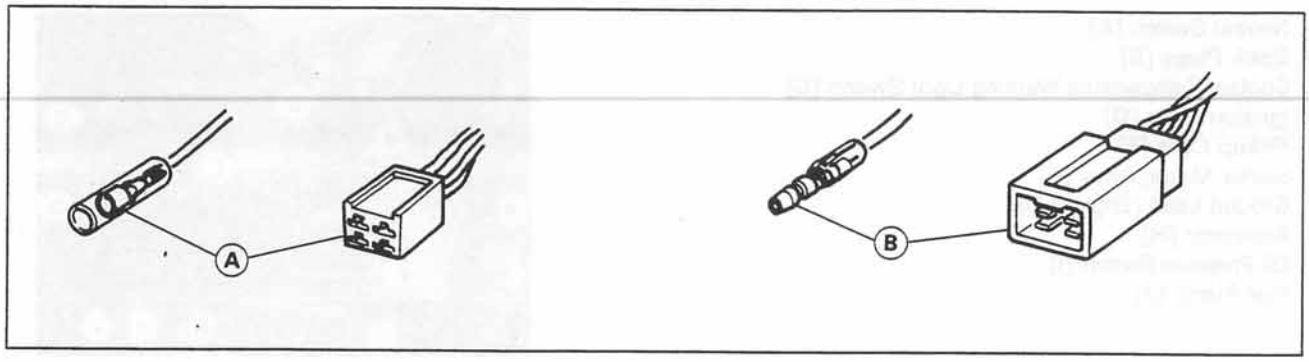
Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the ignition switch turned to the start position when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was brought on by some other item or items, they too must be repaired or replaced, or the replacement part will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Color Codes:

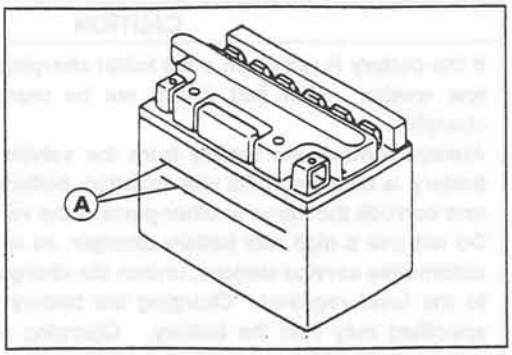
BK	Black	LG	Light Green
BL	Blue	O	Orange
BR	Brown	P	Pink
CH	Chocolate	PU	Purple
DG	Dark Green	R	Red
G	Green	W	White
GY	Gray	Y	Yellow
LB	Light Blue		

- Electrical Connectors:
  Female Connectors [A]
  Male Connectors [B]



Battery

Electrolyte Level Inspection



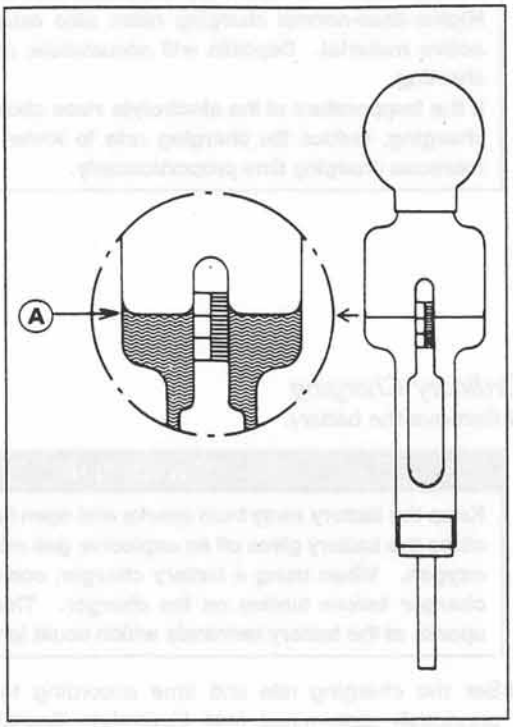
- The electrolyte level should be between the upper and lower level lines [A].

★If the level of electrolyte in any cell is below the lower level line, add only distilled water to the cell, until the level is at the upper level line.

CAUTION

Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.

Electrolyte Specific Gravity Inspection



- Check battery condition by testing the specific gravity of the electrolyte in each cell with a hydrometer.

○Read the level of the electrolyte [A] on the floating scale.

★If the specific gravity is below 1.20 (charge 60%), the battery needs to be charged.

NOTE

○*The specific gravity of the electrolyte varies with changes in temperature, so the specific gravity reading must be corrected for the temperature of the electrolyte.*

○*Celsius: Add 0.007 points to reading for each 1°C above 20° or subtract 0.007 points for each 1°C below 20°C.*

○*Fahrenheit: Add 0.004 points to reading for each 1°F above 68°F or subtract 0.004 points for each 1°F below 68°F.*

Initial Charging

- Remove the battery.

⚠WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.

- Fill each cell to the upper level line on the battery case with fresh electrolyte (specific gravity: 1.265) at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging.

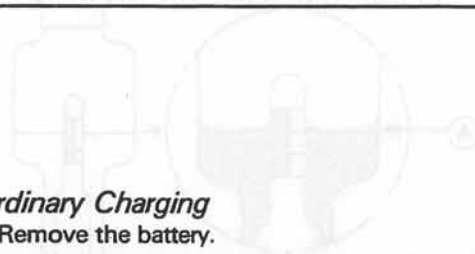
NOTE

○*If the electrolyte level drops, add electrolyte to the upper level line before charging.*

- Set the charging rate a 1/10 the battery capacity, and **charge it for 10 hours.** For example, if the battery is rated at 14 Ah, the charging rate would be 1.4 A.

CAUTION

If the battery is not given a full initial charging, it will discharge in a few weeks. After that it can not be charged by supplemental charging.
Always remove the battery from the vehicle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the vehicle.
Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.
If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.



Ordinary Charging

● Remove the battery.

⚠WARNING

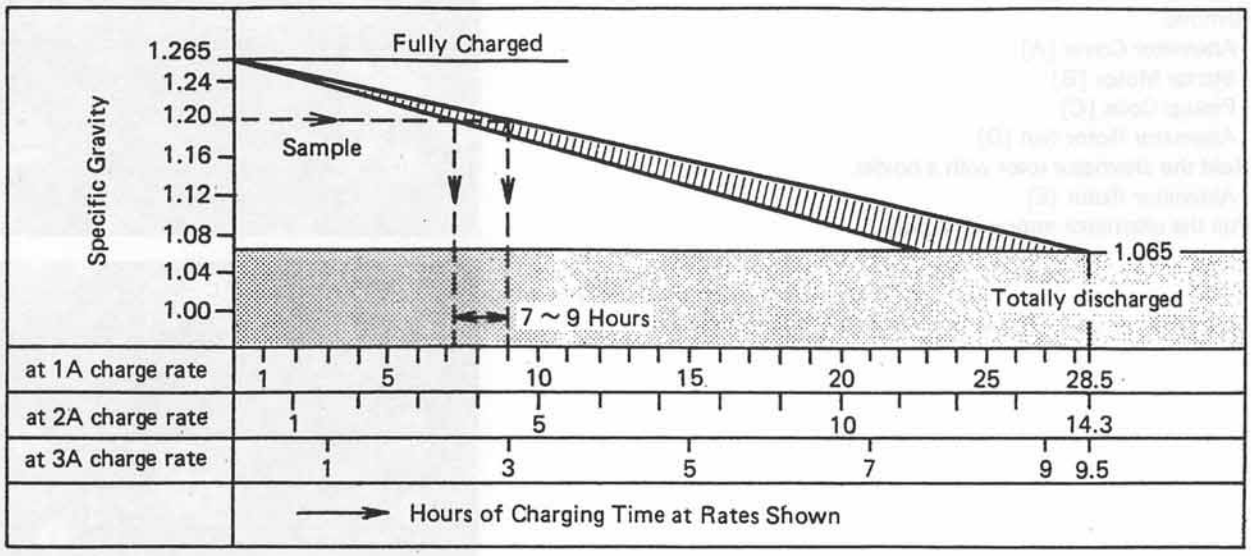
Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.

● Set the charging rate and time according to the battery condition previously determined (see Electrolyte Specific Gravity Inspection), using the Battery Charging Rate/Time Table.
● Check the electrolyte level after charging.

CAUTION

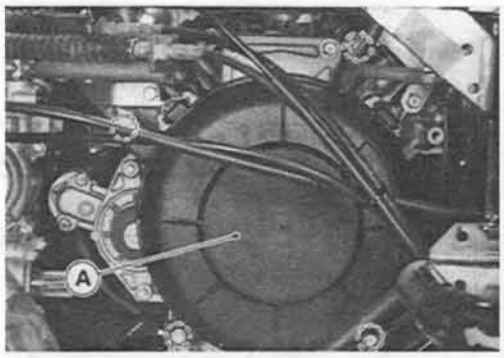
Always remove the battery from the vehicle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the vehicle.
Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.
If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

Battery Charging Rate/Time Table (12 V 19 Ah)

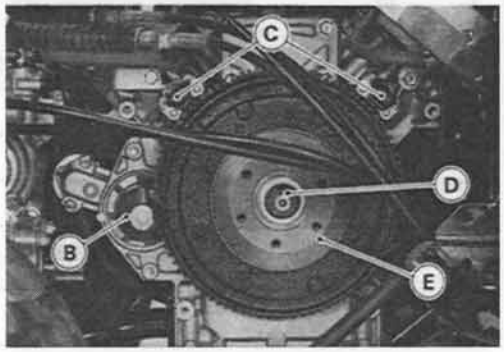


Charging System

Alternator Rotor and Stator Removal

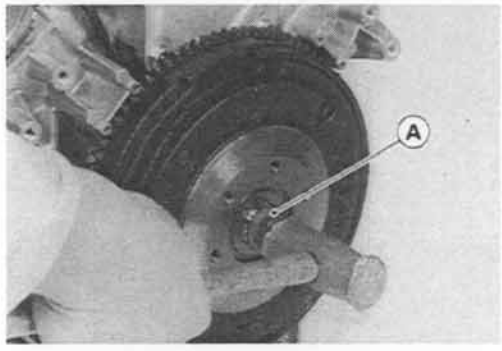


- ●Remove, if the engine is mounted on the frame:
  - Cargo Bed
  - Propeller Shafts
- ●Remove:
  - Alternator Cover [A]
  - Starter Motor [B]
  - Pickup Coils [C]
  - Alternator Rotor Nut [D]
- ○Hold the alternator rotor with a holder.
  - Alternator Rotor [E]
- ○Pull the alternator rotor with a puller.



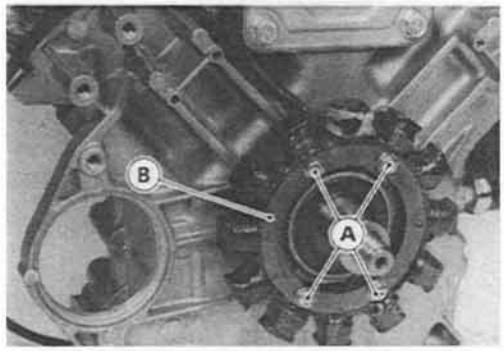
NOTE

○*If a puller is not available, screw the alternator rotor nut [A] flush with the shaft end to prevent damaged shaft end threads and tap sharply and squarely on the nut to break the rotor loose.*



CAUTION
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

- ●Remove:
  - Alternator Stator Mounting Screws [A]
  - Alternator Stator [B]

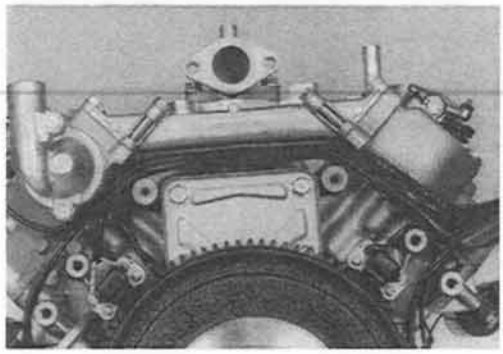


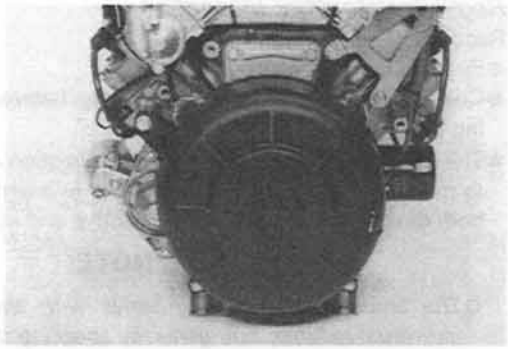
Alternator Rotor and Stator Installation

- ●Apply non-permanent locking agent:
  - Alternator Stator Mounting Screws
- ●Clean the inside of the alternator and end of the crankshaft or the taper will not fit snugly.
- ●Fit the rotor onto the crankshaft so that the key fits in the groove in the hub of the rotor.
- ●Torque:

Torque – Alternator Rotor Nut : 120 N-m (12.0 kg-m, 87 ft-lb)

- ●Route the electrical wires.



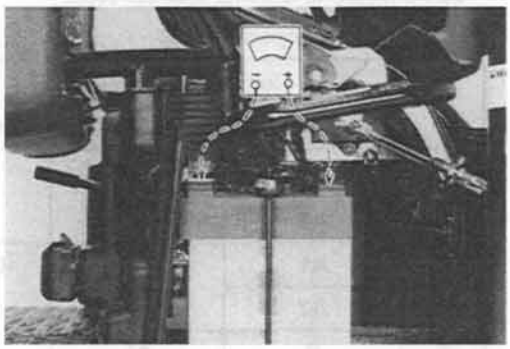


Charging System Operational Inspection

● Check battery condition.

NOTE

○ *Always check battery condition before condemning other parts of the charging system. The battery must be fully charged in order to conduct accurate charging system tests.*



● Warm up the engine to bring the components up to their normal operating temperatures.

● Measure regulator/rectifier output voltage at various engine speeds with the headlights turned on and then turned off.

○ Connect a voltmeter across the battery terminals.

★ The readings should show nearly battery voltage when the engine speed is low, and as the engine speed rises, the readings should also rise. But they must stay within the specified range.

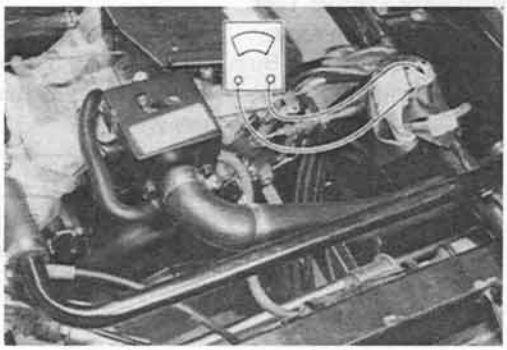
★ If the output voltage is much higher than the specification, the regulator/rectifier is defective, or the regulator/rectifier leads are loose or open.

★ If the output voltage does not rise as the engine speed increase then the regulator/rectifier is defective or the alternator output is insufficient for the loads.

Regulator/Rectifier Output Voltage

Standard: **Battery Voltage ~ 15 V**

Stator Coil Resistance



● Disconnect the alternator lead connector.

● Measure the stator coil resistance.

○ Connect an ohmmeter between the alternator leads.

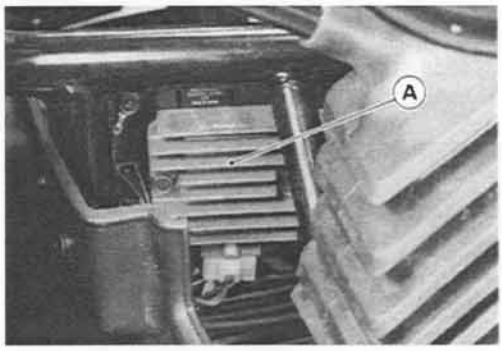
Stator Coil Resistance

Standard: **0.2 ~ 0.4 Ω**

★ If the meter does not read as specified, replace the alternator stator.

★ If the coil has normal resistance, but the voltage inspect showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Regulator/Rectifier Inspection



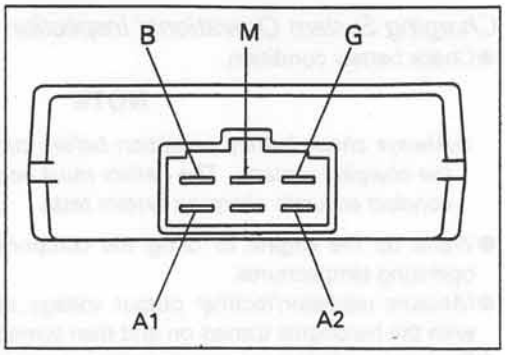
Rectifier Circuit Test:

- Remove the regulator/rectifier [A].
- Check the resistance in both directions between the terminals following the table.

★The resistance should be low in one direction and more than ten times as much in the other direction. If any two terminals are low or high in both directions, the rectifier is defective and must be replaced.

NOTE

○*The actual meter reading varies with the meter used and the individual rectifier, but, generally speaking the lower reading should be from zero to the first ½ of the scale.*



Rectifier Circuit Inspection

No.	Connections		Reading	Meter Range
	Meter (+) to	Meter (−) to		
1	A1	B	∞	x 10 Ω or x 100 Ω
2	A2			
3	A1	G	0 ~ ½ scale	
4	A2			
5	B	A1		
6		A2		
7	G	A1	∞	
8		A2		

Regulator Circuit Test:

- Prepare testing tools:

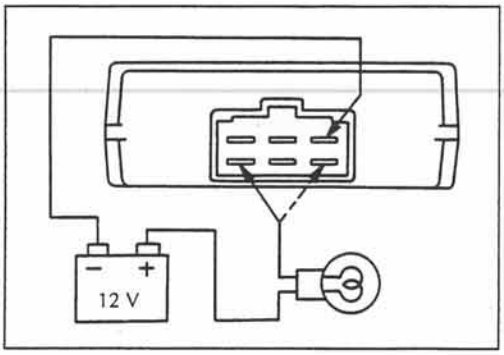
Test Light	Bulb rated 12 V and 3 ~ 6 W
Batteries	12 V battery and 6 V battery
Test Wires	5 auxiliary wires

CAUTION
The test light limits the current flow through the regulator/rectifier. Do not use an ammeter or multimeter in its place.

Regulator Circuit Test-1st Step:

- Connect the test light and the 12 V battery to the regulator/rectifier as shown.
- Check A1 and A2 terminals respectively.

CAUTION
The test light limits the current flow through the regulator/rectifier. Do not use an ammeter or multimeter in its place.



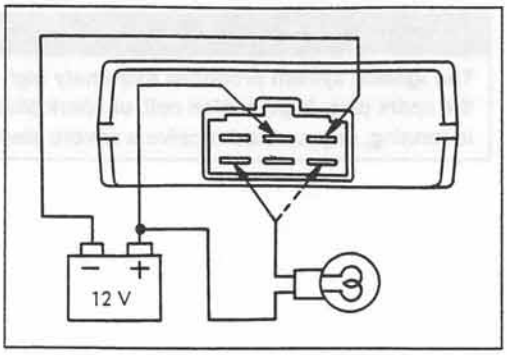
★If the test light turns on, the regulator/rectifier is defective. Replace it.
★If the test light does not turn on, continue the test.

Regulator Circuit Test-2nd Step:

- Connect the test light and the 12 V battery in the manner specified in the "Regulator Circuit Test-1st Step."
- Apply 12 V to M terminal.
- Check A1 and A2 terminals respectively.

★If the test light turns on, the regulator/rectifier is defective. Replace it.

★If the test light does not turn on, continue the test.



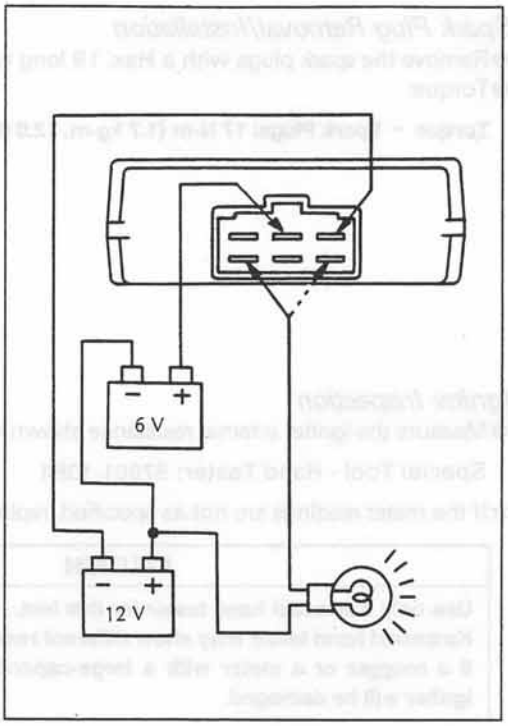
Regulator Circuit Test-3rd Step:

- Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step."
- Momentarily apply 18 V to M terminal by adding a 6 V battery.
- Check A1 and A2 terminals respectively.

CAUTION
Do not apply more than 18 V to the regulator/rectifier and do not leave the 18 V applied for more than a few seconds, or the unit will be damaged.

★If the test light did not light when the 18 V was applied momentarily to the voltage monitoring terminal, the regulator/rectifier is defective. Replace it.

★If the regulator/rectifier passes all of the tests described, it may still be defective. If the charging system still does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit.



Ignition System

⚠WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, high tension coil, or spark plug lead while the engine is running, or you could receive a severe electrical shock.

Spark Plug Removal/Installation

- Remove the spark plugs with a Hex. 19 long type socket wrench.
- Torque:

Torque – Spark Plugs: 17 N-m (1.7 kg-m, 12.0 ft-lb)

Igniter Inspection

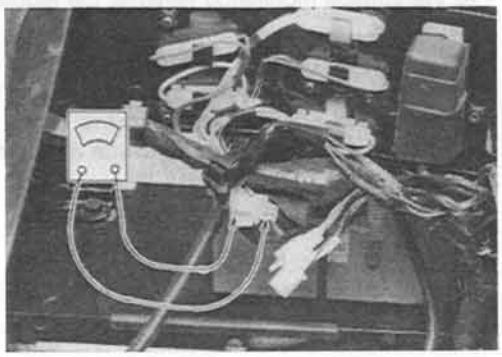
- Measure the igniter internal resistance shown in the table.

Special Tool - Hand Tester: 57001-1394

★If the meter readings are not as specified, replace the igniter.

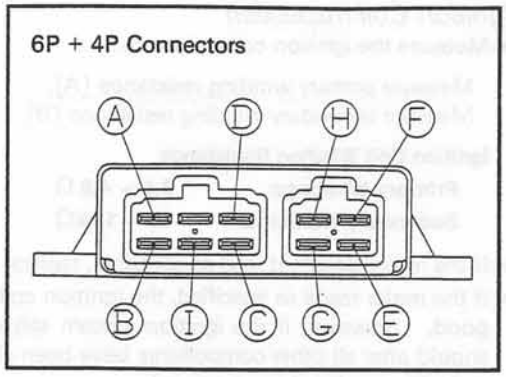
CAUTION

Use only Kawasaki hand tester for this test. A tester other than the Kawasaki hand tester may show different readings.
If a megger or a meter with a large-capacity battery is used, the igniter will be damaged.



Igniter Internal Resistance (4P + 4P Connectors, P/N. 21119-2120) **(× 1kΩ)**

Tester (−) Lead Connection	Tester (+) Lead Connection							
	W	BK/Y	BK/W	Y	G/W	P	W/BL	O/W
W	–	∞	1 ~ 8	4 ~ 16	2 ~ 8	4 ~ 16	2 ~8	2 ~ 10
BK/Y	∞	–	1 ~ 8	4 ~ 16	2 ~ 8	4 ~ 16	2 ~ 8	2 ~ 10
BK/W	∞	∞	–	1 ~ 6	0	1 ~ 6	0	0.5 ~ 2
Y	∞	∞	1 ~ 6	–	0	3 ~ 12	1 ~ 6	2 ~ 8
G/W	∞	∞	0	1 ~ 6	–	1 ~ 6	0	0.5 ~ 2
P	∞	∞	1 ~ 6	3 ~ 15	0.5 ~ 2	–	1 ~ 6	1 ~ 6
W/BL	∞	∞	0	1 ~ 6	2 ~ 8	1 ~ 6	–	0.5 ~ 2
O/W	∞	∞	0.5 ~ 2	2 ~ 8	0.5 ~ 2	2 ~ 8	0.5 ~ 2	–



Igniter Internal Resistance (6P + 4P Connectors, P/N. 21119-1456) **(× 1kΩ)**

Tester (−) Lead Connection	Tester (+) Lead Connection								
	A	B	C	D	E	F	G	H	I
A	–	∞	1~8	2~9	3~16	1~8	3~16	1~8	2~8
B	∞	–	1~8	2~9	3~16	1~8	3~16	1~8	2~8
C	∞	∞	–	0.1~2	1~6	0	1~6	0	0.1~1
D	∞	∞	0.1~2	–	2~8	0.1~2	2~8	0.1~2	1~3
E	∞	∞	1~6	2~8	–	1~6	3~12	1~6	1~6
F	∞	∞	0	0.1~2	1~6	–	1~6	0	0.1~1
G	∞	∞	1~6	2~8	3~12	1~6	–	1~6	1~6
H	∞	∞	0	0.1~2	1~6	0	1~6	–	0.1~1
I	∞	∞	0.1~1	0.1~3	1~7	0.1~1	1~7	0.1~1	–

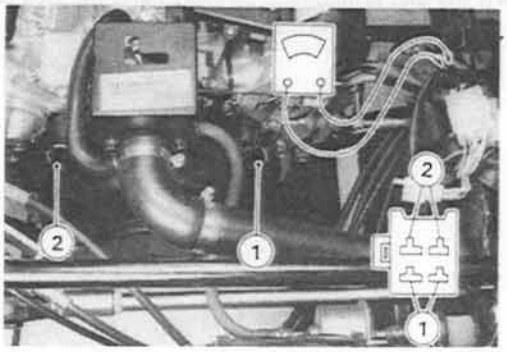
Pickup Coil Inspection

● Measure the pickup coil resistance.

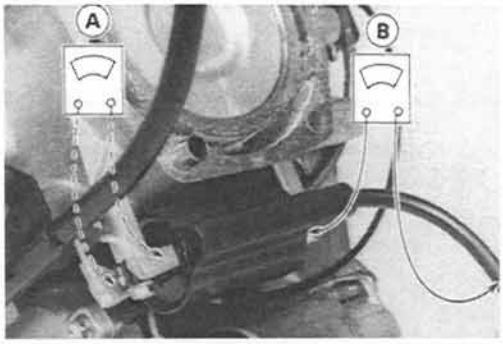
Pickup Coil Resistance

Standard: **90 ~ 130 Ω**

★If the resistance is not as specified, replace the pickup coil assembly.



Ignition Coil Inspection



● Measure the ignition coil resistance.

Measure primary winding resistance [A].
Measure secondary winding resistance [B].

Ignition Coil Winding Resistance

Primary Windings:	**3.4 ~ 4.6 Ω**
Secondary Windings:	**10 ~ 16 kΩ**

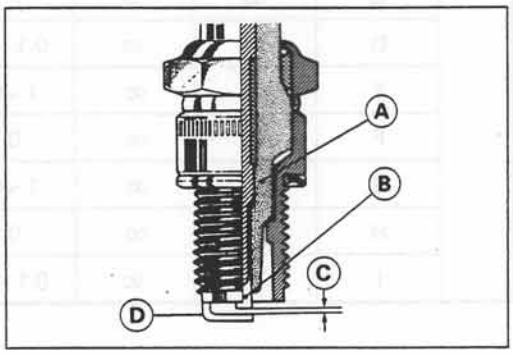
★If the meter does not read as specified, replace the coil.

★If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.

● Check the spark plug lead for visible damage.

★If the spark plug lead is damaged, replace the coil.

Spark Plug Cleaning/Inspection



● Clean the spark plug, preferably in a sandblasting 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 spark plug or its equivalent.

Insulator [A]	Plug Gap [C]
Center Electrode [B]	Side Electrode [D]

Spark Plug Gap Inspection

● Measure the gap with a wire-type thickness gauge.

★If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

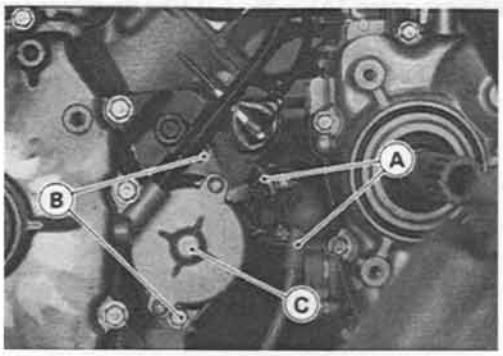
Spark Plug Gap

Standard:	**0.6 ~ 0.7 mm**

Electric Starter System

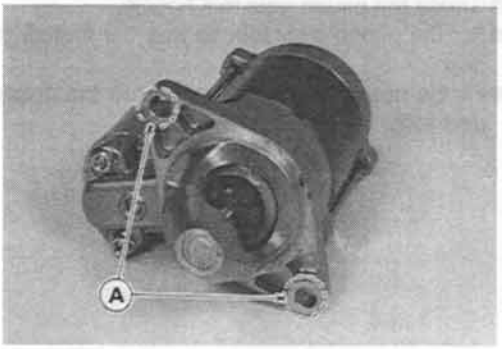
Starter Motor Removal

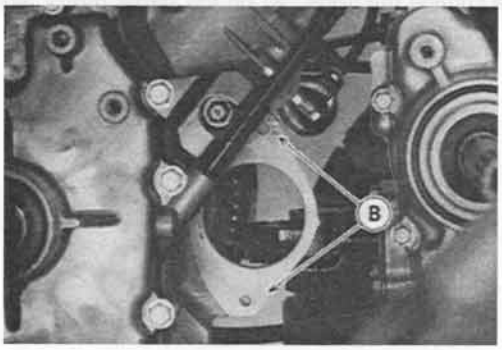
● Remove:
Torque Converter
Starter Motor Leads (from Starter Motor) [A]
Starter Motor Mounting Bolts [B]
Starter Motor [C]



Starter Motor Installation

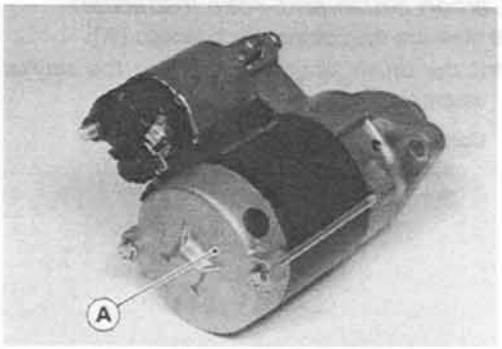
● Clean the starter motor legs [A] and the crankcase where the starter motor is grounded [B].





Starter Motor Disassembly

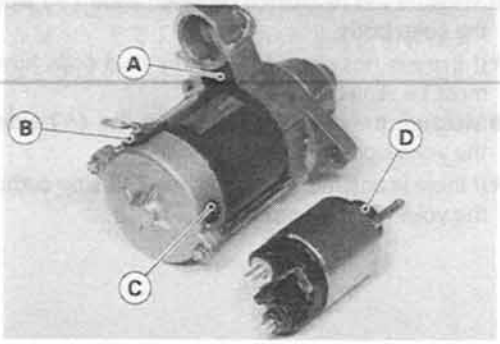
● Cover the starter motor with a clean cloth to keep the carbon brush springs from flying off while removing the end cover [A] and the brush holding plate.



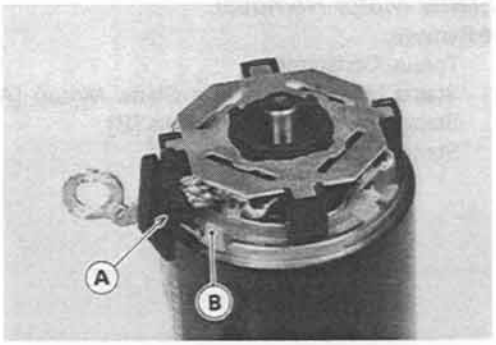
Starter Motor Assembly

● Inspect the dust seal [A], grommet [B], plug [C], and boot [D] for visible damage.

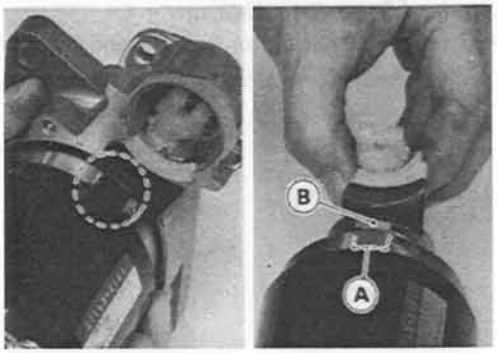
★ If they are damaged, replace the damaged parts.



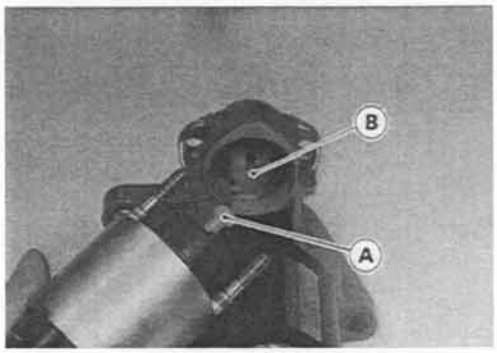
● Fit the notch [A] in the (−) lead grommet onto the projection [B] on the yoke.



● Grease the pinion gear fork fingers.
● Set the pinion gear fork so that the fingers fit into the groove in the gear.
● Fit the notch [A] in the yoke onto the projection [B] on the pinion gear fork.



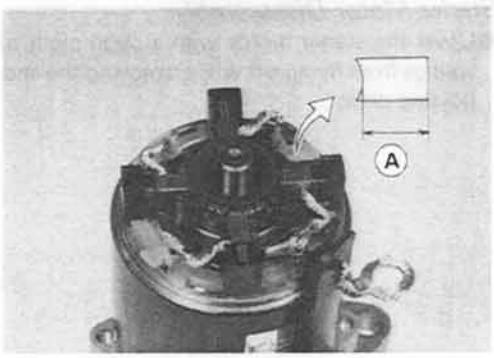
● Engage the hook [A] on the starter motor relay with the hook [B] on the pinion gear fork.



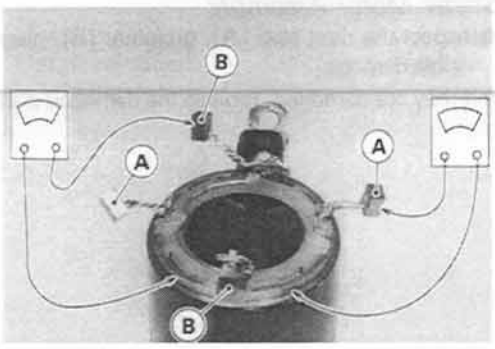
Carbon Brush and Yoke Inspection

● Measure the carbon brush length [A].
★ If the brush length is less than the service limit, replace the yoke assembly.

Carbon Brush Length
Standard: 10 mm
Service Limit: 5 mm



● Measure the resistance between each (−) side carbon brush [A] and the yoke body.
★ If there is not close to 0 Ω, the field coils have an open and the yoke must be replaced.
● Measure the resistance between the (+) side carbon brush [B] and the yoke body.
★ If there is any meter reading, the (+) side carbon brush has a short and the yoke must be replaced.

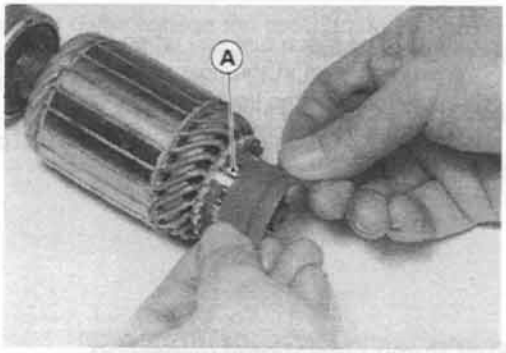


Commutator Cleaning/Inspection

- Smooth the commutator surface [A] if necessary with fine emery cloth, and clean out the grooves as illustrated.
- Measure the diameter of the commutator.

★Replace the starter motor with a new one if the commutator diameter is less than the service limit.

Commutator Diameter
Standard: 28 mm
Service Limit: 27 mm



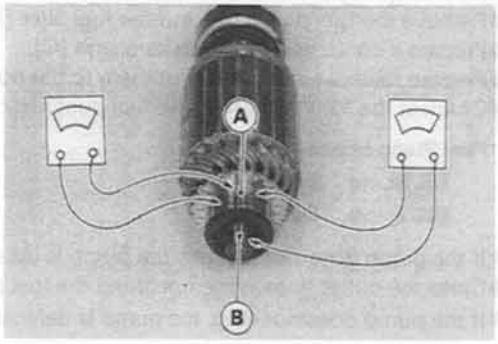
Armature Inspection

- Measure the resistance between each segment [A] and all the others.

★If the resistance is too high or even infinite, the armature winding has an open circuit.

- Measure the resistance between the commutator and the armature shaft [B].

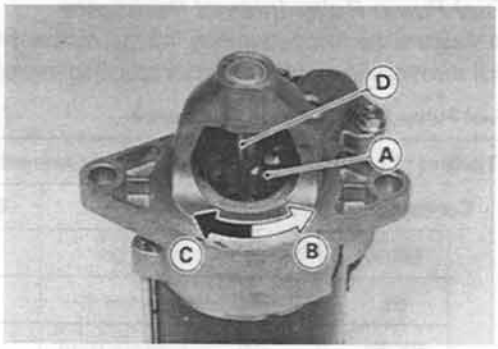
★If the resistance is less than infinite, the armature is shorted.



Pinion Gear Inspection

- Turn the pinion gear [A] by hand. It should turn counterclockwise freely [B], but should not turn freely clockwise [C]. It should turn with the shaft [D] clockwise.

★If the pinion gear does not operate as it should or if there is any worn or damaged part, replace it.

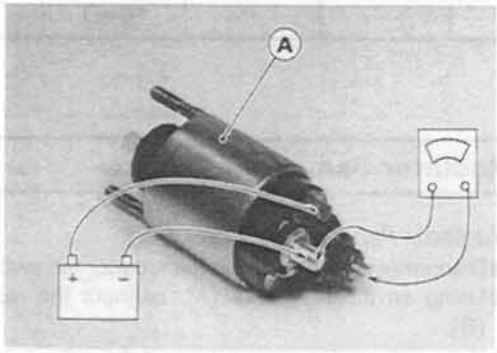


Starter Motor Relay Inspection

- Connect an ohmmeter and 12 V battery to the starter motor relay [A] as shown.

★If the relay does not work as specified, the relay is defective.

Testing Relay
Meter Range: x 1 Ω range
Criteria: When battery is connected → 0 Ω
When battery is disconnected → ∞

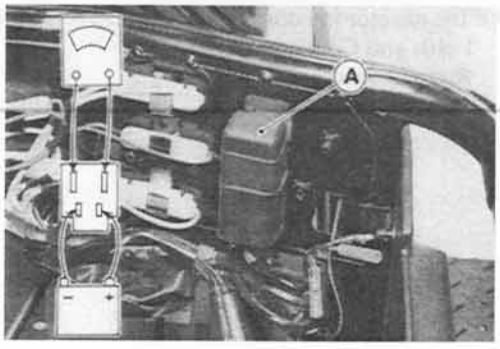


Starter Circuit Relay Inspection

- Connect an ohmmeter and 12 V battery to the starter circuit relay [A] as shown.

★If the relay does not work as specified, the relay is defective.

Testing Relay
Meter Range: x 1 Ω range
Criteria: When battery is connected → 0 Ω
When battery is disconnected → ∞



Fuel Pump and Relay

The fuel pump does not operate when the ignition switch is turned on alone. The pump operates when the engine is running.

When fuel level in the float chamber is low, the fuel pump operates to supply fuel into the float chamber.

When the fuel reaches a certain level, the fuel pressure rises, and stops the fuel pump.

Fuel Pump Operational Inspection

- Remove the fuel pump [A] and the fuel filter [B].
- Prepare a container filled with kerosene [C].
- Prepare the hoses, and connect them to the pump fittings.
- Connect the 12 V battery to the fuel pump leads.

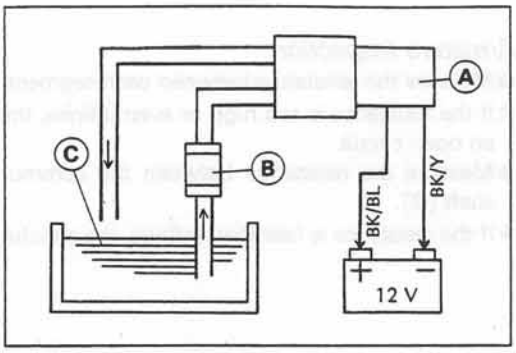
Fuel Pump Leads

BK/BL → Battery (+)
BK/Y → Battery (−)

★If the pump does not operate, the pump is defective.

- Close the outlet hose while operating the fuel pump.

★If the pump does not stop, the pump is defective.



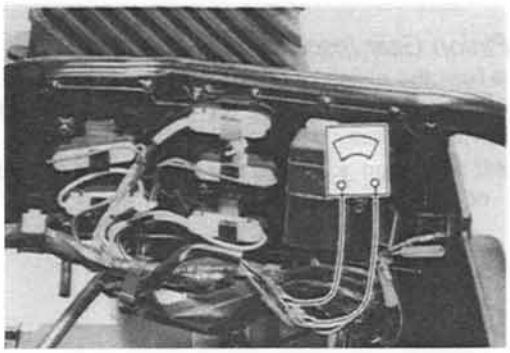
Fuel Pump Relay Internal Resistance

- Measure the fuel pump relay internal resistance shown in the table.

★If the measurements are not as specified, replace the relay.

Fuel Pump Relay Internal Resistance (× 1 kΩ)

Tester (−) Lead Connection	Tester (+) Lead Connection		
	BK/W	BL	BK/BL
BK/W	−	∞	∞
BL	∞	−	∞
BK/BL	∞	More than 10 kΩ	−



Radiator Fan

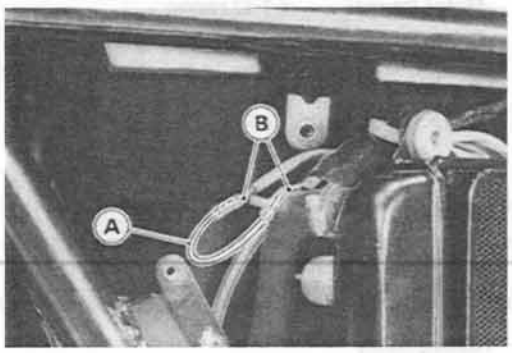
Radiator Fan Circuit Inspection

- Disconnect the leads from the radiator fan switch.
- Using an auxiliary wire [A], connect the radiator fan switch leads [B].

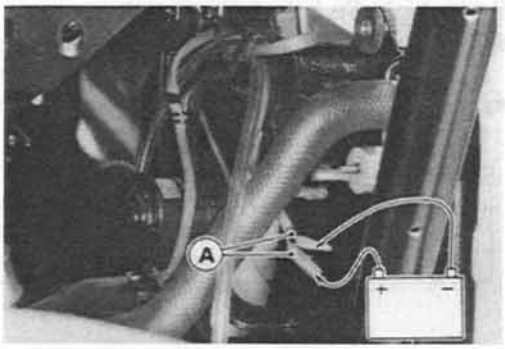
★If the radiator fan rotates, inspect the radiator fan switch.

★If the radiator fan does not rotate, inspect the following.

Leads and Connectors
Radiator Fan Fuse
Radiator Fan Motor



Radiator Fan Motor Inspection



- ●Disconnect the fan motor leads [A] from the fan.
- ●Using two auxiliary wires, supply battery power to the fan motor.

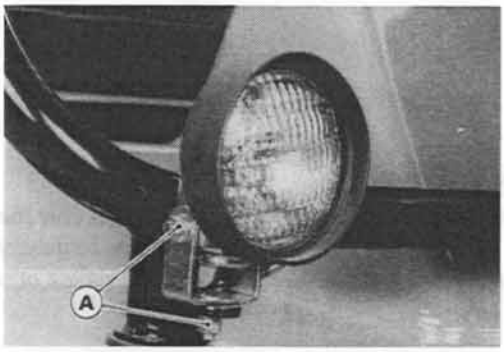
★If the fan does not rotate at this time, the fan motor is defective and must be replaced.

Radiator Fan Motor Leads

BL → Battery (+)
BK → Battery (−)

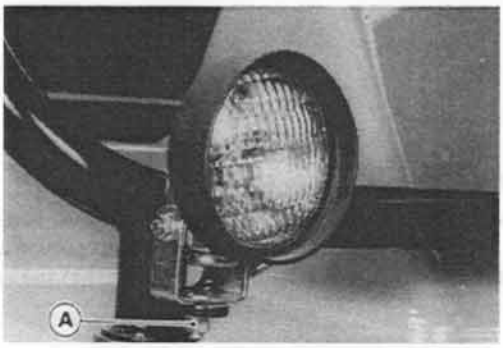
Lighting System

Headlight Beam Adjustment



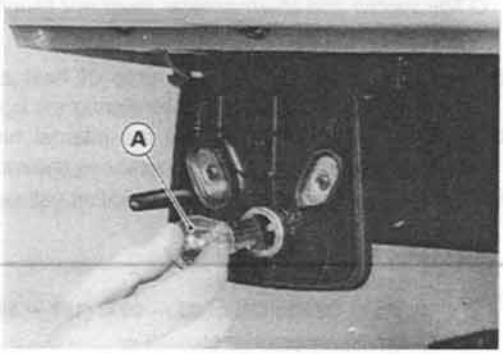
- ●Loosen the headlight mounting nuts [A] and tilt the headlight to adjust the headlight beam.
- ●Tighten the mounting nuts.

Headlight Replacement



- ●Replace the headlight as an assembly.
- ○Remove the mounting nut [A].
- ●Adjust the headlight beam after installation.

Tail/Brake Light Replacement



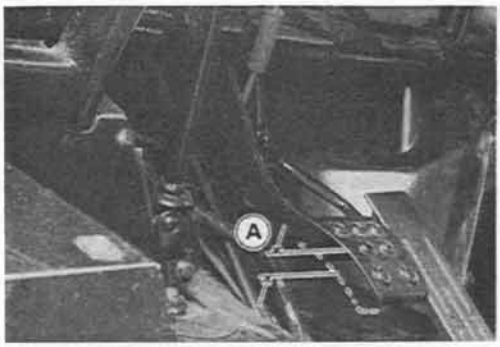
- ●Remove the lock pin type bulb [A].
- ○Remove the tail/brake light lens.
- ○Push the bulb in, turn it counterclockwise, and pull it out of the socket.

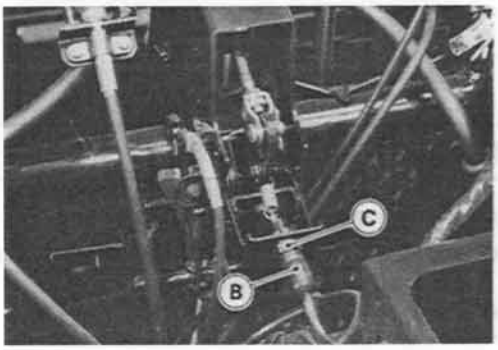
CAUTION
Do not use bulbs rated for greater wattage than the specified value.

- ○Be careful not to overtighten the lens mounting screws.

Switches

Brake Light Switch Adjustment





- Check the operation of the brake light switch by depressing the brake pedal. The brake light should go on after 10 mm of pedal travel [A].

★If it does not, adjust the brake light switch [B] up or down. To change the switch position, turn the adjusting nut [C].

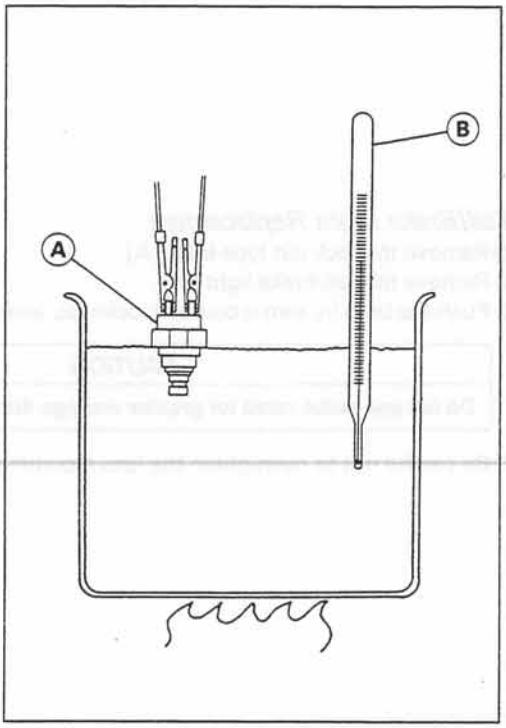
CAUTION
To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

Switch Inspection

- Using an ohmmeter, check to see that only the connections shown in the table (see Wiring Diagram) have continuity (about zero ohms).

★If the switch has an open or short, repair it or replace it with new one.

Radiator Fan Switch Inspection



- Suspend the switch [A] in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant.

NOTE

○ *The switch and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using an ohmmeter, measure the internal resistance of the switch across the terminals at the temperatures shown in the table.

★If the meter does not show the specified values, replace the switch.

Radiator Fan Switch Resistance

○ **Rising temperature:**
From OFF to ON at 86 ~ 90°C (187 ~ 194°F)

○ **Failing temperature:**
From ON to OFF at 81 ~ 85°C (178 ~ 185°F)
ON: Less than 0.5 Ω
OFF: More than 1 MΩ

Coolant Temperature Warning Light Switch Inspection

- Suspend the switch [A] in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant.

NOTE

○ *The switch and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using an ohmmeter, measure the internal resistance of the switch across the connector and the body at the temperatures shown in the table.

★If the meter does not show the specified values, replace the switch.

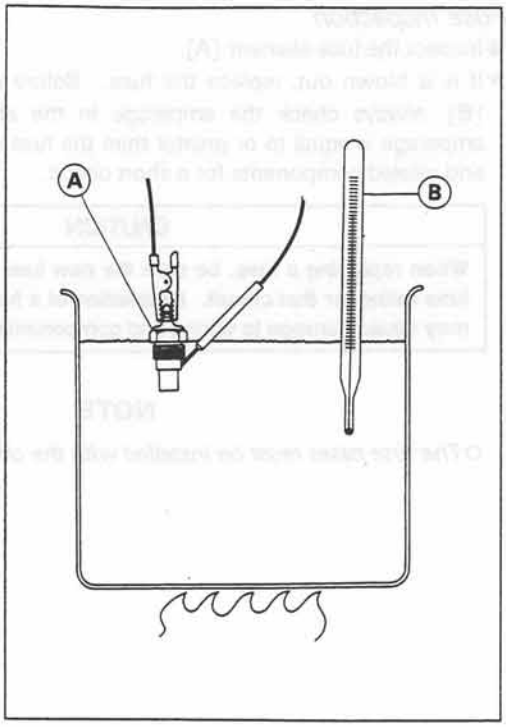
Coolant Temperature Warning Light Switch Resistance

○ **Rising temperature:**
From OFF to ON at 108 ~ 114°C (226 ~ 237°F)

○ **Falling temperature:**
From ON to OFF at 101 ~ 107°C (214 ~ 225°F)

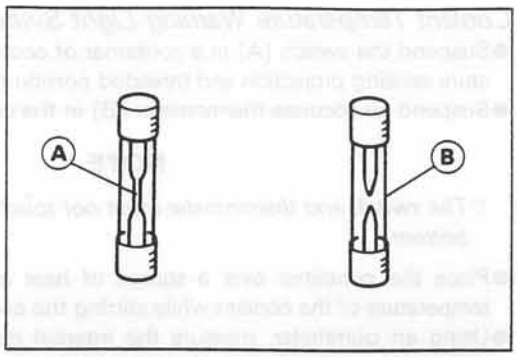
ON: Less than 0.5 Ω

OFF: More than 1 MΩ



Fuses

Fuse Inspection



● Inspect the fuse element [A].

★ If it is blown out, replace the fuse. Before replacing a blown fuse [B], always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

NOTE

○ *The fuse cases must be installed with the clamp side [C] down.*

Electrical Wiring

Wiring Inspection

● Visually inspect the wiring for signs of burning, fraying, etc.

★ If any wiring is poor, replace the damaged wiring.

● Pull each connector apart and inspect it for corrosion, dirt, and damage.

★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

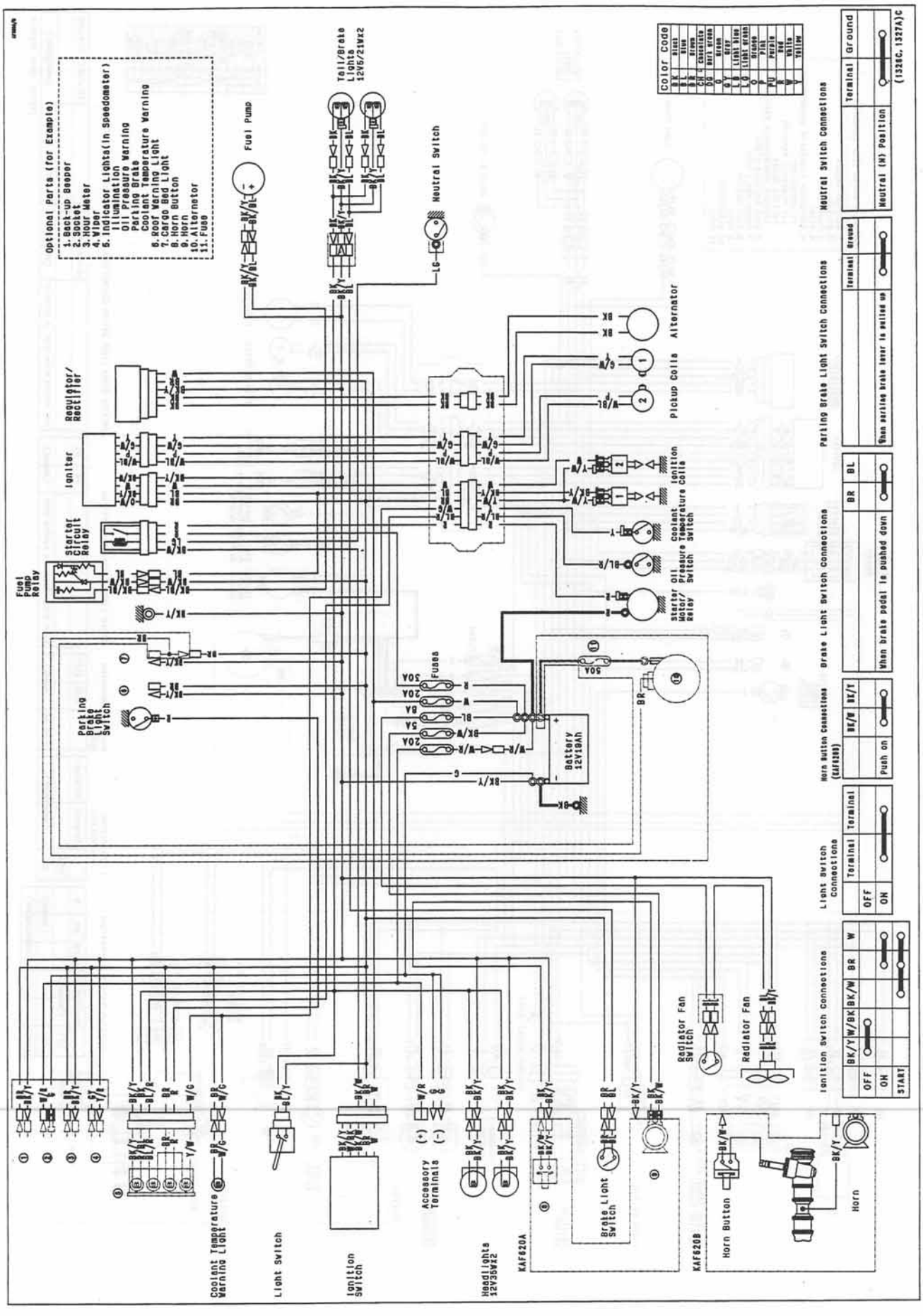
● Check the wiring for continuity.

○ Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

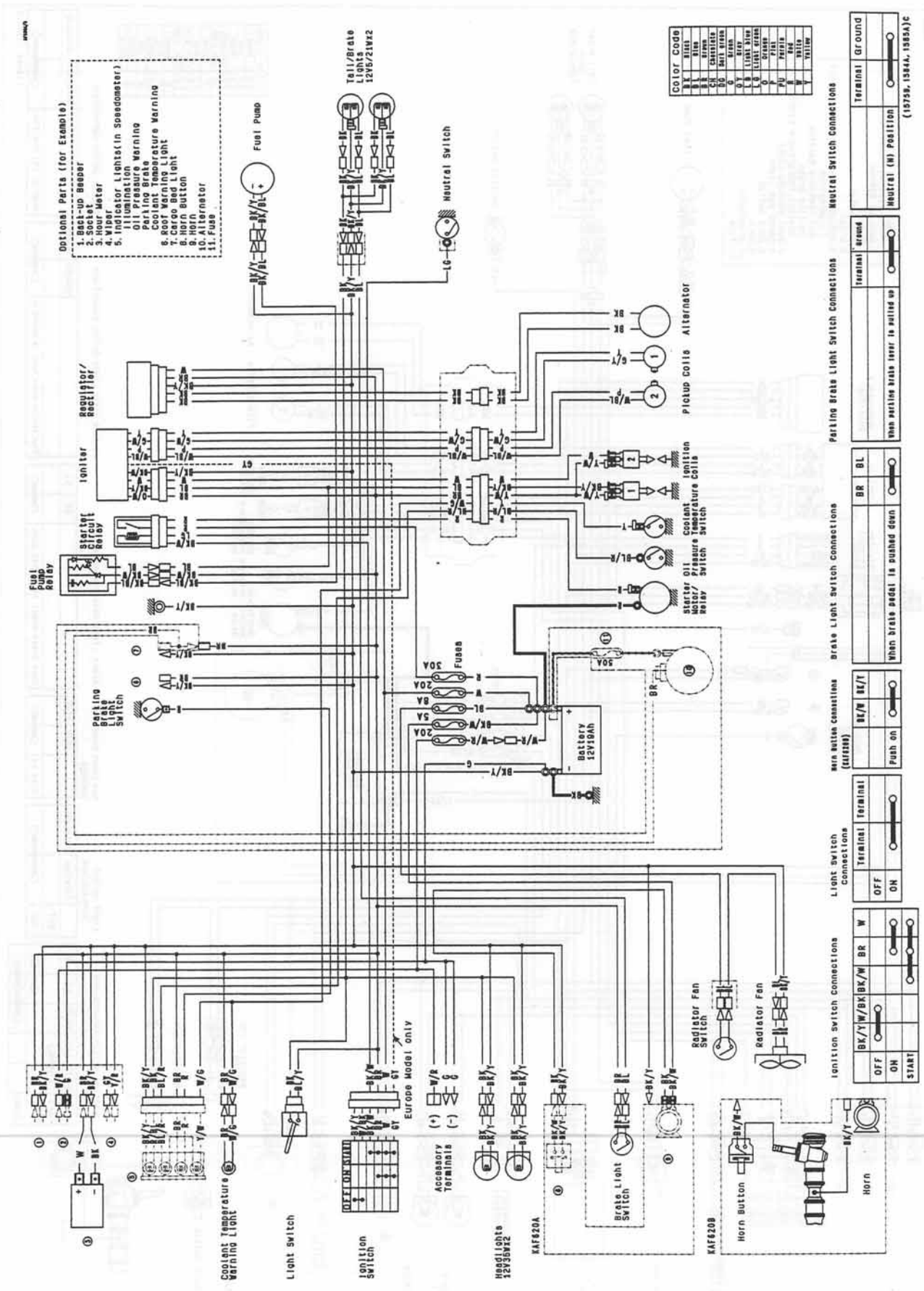
○ Measure the resistance between the ends of the leads.

★ If the resistance is not 0 Ω, the lead is defective. Replace the lead or the wiring loom if necessary.

Wiring Diagram (Igniter with 4 pin connector)



Wiring Diagram (Igniter with 6 pin connector)



Appendix

Table of Contents

Configuration of terminal on KAF620-E1

Igniter Connection

G	E	C	A
H	F	D	B

Harness Connection

G/W	BK/Y	BL	W
Y	BR	GY	

A:Pickup coil	G/W
B:Pickup coil	Y
C:Ground	BK/Y
D:Battery	BR
E:Ignition 1	BL
F:Ignition switch	GY
G:Ignition 2	W
H:no connection	

Troubleshooting Guide

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.

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Wiring open or shorted
- Ignition switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:
- Starter motor trouble
- Pinion or ring gear worn

Engine won't turn over:
- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Camshaft seizure

No fuel flow:
- Fuel tank air vent obstructed
- Fuel pump trouble
- Fuel filter clogged
- Fuel line clogged
- Fuel pump relay trouble
- Float valve clogged

Engine flooded:
- Fuel level too high
- Float valve worn or stuck open
- Starting technique faulty (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

No spark; spark weak:
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- Igniter trouble
- Ignition coil trouble
- Pickup coil trouble
- Ignition switch shorted
- Wiring shorted or open
- Fuse blown

Compression low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston rings 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:
- 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
- Igniter trouble
- Ignition coil trouble
- Pickup coil trouble

Fuel/air mixture incorrect:
- Pilot screw maladjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Air cleaner clogged, poorly sealed, or missing
- Choke valve stuck closed
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Fuel pump trouble
- Governor link mechanism malfunctioning

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 warped
- Cylinder head gasket damaged
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Other:
- Igniter trouble
- Engine oil viscosity too high
- Front final gear case oil viscosity too high (KAF620A)
- Drive train trouble
- Brake dragging

Poor Running or No Power at High Speed:

Firing incorrect:
- Spark plug dirty, broken, or maladjusted
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Igniter trouble
- Ignition coil trouble
- Pickup coil trouble

Fuel/air mixture incorrect:
- Choke valve stuck close
- Main jet clogged or wrong size
- Fuel level too high or too low
- Air bleed pipe holes clogged
- Air cleaner clogged, poorly sealed, or missing
- Water or foreign matter in fuel
- Fuel tank air vent obstructed
- Fuel line clogged

Fuel pump trouble
Governor link mechanism malfunctioning

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:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Igniter trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Overheating
Engine oil level too high
Engine oil viscosity too high
Front final gear case oil viscosity too high (KAF620A)
Drive train trouble

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Igniter trouble

Fuel/air mixture incorrect:
Main jet clogged or wrong size
Fuel level too low
Carburetor holder loose
Air cleaner clogged, poorly sealed, or missing

Compression high:
Carbon built up in combustion chamber

Engine load faulty:
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging

Converter and/or belt excessive heating:
Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Driven pulley spring broken or weak
Drive pulley spring broken or weak
Idle speed too high
Converter fan damaged

Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect

Front final gear case overheating (KAF620A):
Insufficient oil
Bevel gears maladjusted
LSD clutch maladjusted

Coolant incorrect:
Coolant level too low
Coolant deteriorated
Thick coolant

Cooling system component incorrect:
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan switch trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Radiator fan switch trouble
Thermostat trouble

Converter Operation Faulty:

Belt slipping:
Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Driven pulley spring broken or weak

Converter engagement speed too low:
Drive pulley spring broken or weak

Converter engagement speed too high:
Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Drive pulley weight doesn't move smoothly
Drive pulley movable sheave doesn't move smoothly
Drive or driven pulley movable sheave bush worn
Drive pulley weight or roller worn

Shifting too quickly:
Drive pulley spring weak
Driven pulley spring weak or incorrectly installed (too loose)

Shifting too slowly:
Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Drive pulley weight doesn't move smoothly
Drive pulley movable sheave doesn't move smoothly
Driven pulley spring incorrect installed (too tight)
Driven pulley movable sheave doesn't move smoothly

Gear Shifting Faulty:

Doesn't go into gear:
Shift arm bent or seizure
Gear stuck on the shaft
Shift cable maladjusted
Shift cable lubrication inadequate
Shift cable damaged

Jumps out of gear:
Shifter groove worn
Gear dogs worn
Shift arm positioning bolt spring weak or broken
Shift block worn
Transmission shaft, and/or gear splines worn
Shift cable maladjusted

Overshifts:
Shift arm positioning bolt spring weak or broken
Shift cable maladjusted

Abnormal Engine Noise:

Knocking:
Igniter trouble
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 pin holes worn

Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Rocker arm push rod runout excessive

Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken or stuck
Piston seizure or damaged
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose
Crankshaft bearing worn
Loose alternator rotor

Abnormal Drive Train Noise:

Converter noise:
Belt worn
Drive or driven pulley sheave worn
Drive or driven pulley movable sheave bush worn
Drive or driven pulley mount loose
Driven pulley shoe worn
Drive pulley weight or roller side washer worn
Drive pulley weight or roller worn

Transmission noise:
Bearings worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Transmission oil insufficient

Final drive noise:
Bearing worn
Gears worn or chipped
Metal chips jammed in gear teeth
Insufficient lubricant
Bevel gears maladjusted (KAF620A)
Worn LSD clutch friction plate (KAF620A)
Worn LSD clutch spring (KAF620A)
Universal joint damaged

Abnormal Frame Noise:

Shock absorber noise:
Shock absorber damaged

Brake noise:
Brake linings overworn or worn unevenly
Drum worn unevenly or scored
Brake spring(s) weak or broken
Foreign matter in hub
Brake not properly adjusted

Other noise:
Brackets, nuts, bolts, 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 stuck closed
Fuel level too high

Brown smoke:
Main jet too small
Fuel level too low
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Steering wheel hard to turn:
Steering shaft bearing damaged
Steering shaft lubrication inadequate
Steering shaft bent
Steering gear assembly damaged
Tire air pressure too low
LSD clutch maladjusted (KAF620A)

Noise when turning (KAF620A):
Damaged side gear or pinion (Front final gear case)
Worn clutch friction plate (Front final gear case)
Worn clutch spring (Front final gear case)

Steering wheel shakes or excessively vibrates:
Tire(s) worn
Suspension arm bushing worn
Tie-rod joint worn
Wheel rim warped
Axle shaft bearing worn
Steering wheel mount loose
Steering bolt or nut loose

Steering wheel pulls to one side:
Frame bent
Wheel misalignment
Suspension arm bent or twisted
Steering shaft bent
Steering gear assembly damaged
Front or rear tire air pressure unbalanced
Shock absorber unbalanced

Shock absorption unsatisfactory:
(Too hard)
Tire air pressure too high
Shock absorber damaged
(Too soft)
Shock absorber oil leaking
Shock absorber spring weak
Tire air pressure too low

Brake Doesn't Hold:

Air in the brake line
Brake fluid leak
Brake fluid deteriorated
Primary or secondary cup trouble
Master or wheel cylinder scratched inside
Brake not properly adjusted
Linings overworn or worn unevenly
Drum worn unevenly or scored
Oil, grease on lining and drum
Dirt, water between lining and drum
Overheated brakes

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)
Ignition switch trouble
Regulator/Rectifier trouble
Alternator trouble
Wiring faulty

Battery Overcharged:

Regulator/Rectifier trouble
Battery trouble

General Lubrication

Lubrication

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

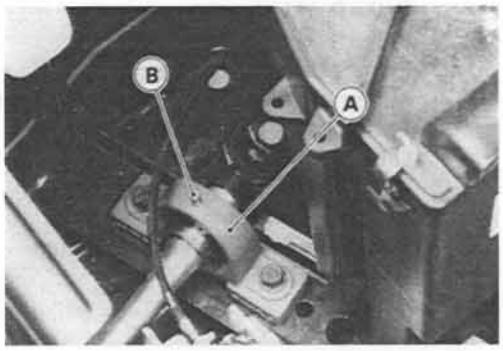
NOTE

○ *Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubricant.*

Pivots and Points: Lubricate with Grease.

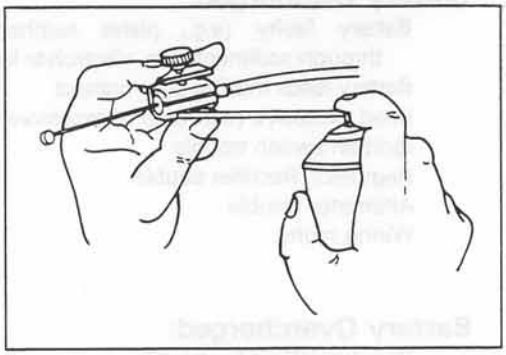
Seat Brackets
Cargo Bed Mounting Pins
Throttle Lever Pivot
Brake Pedal Pivot
Transmission Shift Control Lever Pivot
Differential Shift Cable Upper End
2WD/4WD Shift Lever Pivot (KAF620A)
Propeller Shaft Bearing (KAF620A) [A]

○ Grease the propeller shaft bearing using the grease nipple [B].



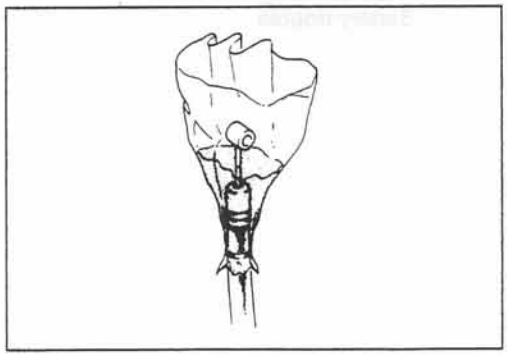
Cables: Lubricate with Rust Inhibitor.

Throttle Cable
Choke Cable
Differential Shift Cable
2WD/4WD Shift Cable (KAF620A)



Cables: Lubricate with Motor Oil.

Parking Brake Cables



Nut, Bolt, and Fastener Tightness

Tightness Inspection

● Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○ *Check the engine fastener tightness when the engine is cold (at room temperature).*

★ If there are loose fasteners, first loosen by ½ turn, then retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the basic torque table (see Torque and Locking Agent in the General Information chapter).

★ If cotter pins are damaged, replace them with new ones.

Nut, Bolt, and Fastener to be checked

Engine:
- Engine Mounting Bolts
- Exhaust Pipe Holder Nuts
- Exhaust Pipe and Muffler Clamp Bolt
- Muffler Mounting Bolts
- Throttle Level Pivot Clip
- Fuel Tank Holder Nuts

Transmission/Final Drive:
- Axle Nuts and Cotter Pins
- Drive Shaft Bracket Mounting Nuts
- Transmission Shift Cable Upper End Clip
- Transmission Shift Lever Clamp Bolt
- Differential Shift Lever Pivot Clip
- Differential Shift Cable Upper End Clip
- Differential Shift Lever Mounting Nut
- Front Final Gear Case Mounting Nuts (KAF620A)
- Front Final Gear Case Bracket Bolts (KAF620A)
- Propeller Shaft Bearing Mounting Nuts (KAF620A)
- 2WD/4WD Shift Lever Pivot Clip (KAF620A)
- 2WD/4WD Shift Lever Mounting Nut (KAF620A)
- Hi/Low Shift Lever Pivot Clip (KAF620A)
- Hi/Low Shift Cable Upper End Clip (KAF620A)
- Hi/Low Shift Lever Mounting Nut (KAF620A)

Wheels:
- Wheel Nuts

Brakes:
- Master Cylinder Mounting Bolts
- Master Cylinder Push Rod Clevis Pin Clip
- Parking Brake Lever Assembly Mounting Bolts
- Parking Brake Cable Lower End Clevis Pin Cotter Pins
- Brake Pedal Pivot Shaft Cotter Pin

Suspension:
- Suspension Arm Pivot Bolts
- Strut Mounting Nuts
- Strut Clamp Nuts and Cotter Pins
- Leaf Spring Mounting Nuts
- Shock Absorber Mounting Nuts

Steering:
- Steering Wheel Mounting Nut
- Intermediate Shaft Clamp Bolts
- Tie-rod End Nuts and Cotter Pins
- Tie-rod End Locknuts
- Suspension Arm Joint Nuts and Cotter Pins
- Steering Gear Assembly Mounting Bolts
- Main Shaft Bracket Mounting Bolts and Nuts

Frame:
- Front and Rear Bar Mounting Bolts and Nuts
- Front Guard Mounting Nuts
- Cargo Bed Hook Mounting Bolts
- Cargo Bed Mounting Pin Clips
- Screen Mounting Nuts
- Seat Bracket Nuts
- Seat Back Mounting Nuts
- Seat Belt Mounting Bolts
- Battery Holder Nuts
- Skid Plate Mounting Bolts
- Rear End Sub-frame Mounting Nuts

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	x 1 000 000
kilo	k	x 1 000
centi	c	x 0.01
milli	m	x 0.001
micro	μ	x 0.00001

Units of Mass:

kg	x	2.205	=	lb
g	x	0.03527	=	oz

Units of Volume:

L	x	0.2642	=	gal (US)
L	x	0.2200	=	gal (imp)
L	x	1.057	=	qt (US)
L	x	0.8799	=	qt (imp)
L	x	2.113	=	pint (US)
L	x	1.816	=	pint (imp)
mL	x	0.03381	=	oz (US)
mL	x	0.02816	=	oz (imp)
mL	x	0.06102	=	cu in

Units of Force:

N	x	0.1020	=	kg
N	x	0.2248	=	lb
kg	x	9.807	=	N
kg	x	2.205	=	lb

Units of Length:

km	x	0.6214	=	mile
m	x	3.281	=	ft
mm	x	0.03937	=	in

Units of Torque:

N-m	x	0.1020	=	kg-m
N-m	x	0.7376	=	ft-lb
N-m	x	8.851	=	in-lb
kg-m	x	9.807	=	N-m
kg-m	x	7.233	=	ft-lb
kg-m	x	86.80	=	in-lb

Units of Pressure:

kPa	x	0.01020	=	kg/cm²
kPa	x	0.1450	=	psi
kPa	x	0.7501	=	cm Hg
kg/cm²	x	98.07	=	kPa
kg/cm²	x	14.22	=	psi
cm Hg	x	1.333	=	kPa

Units of Speed:

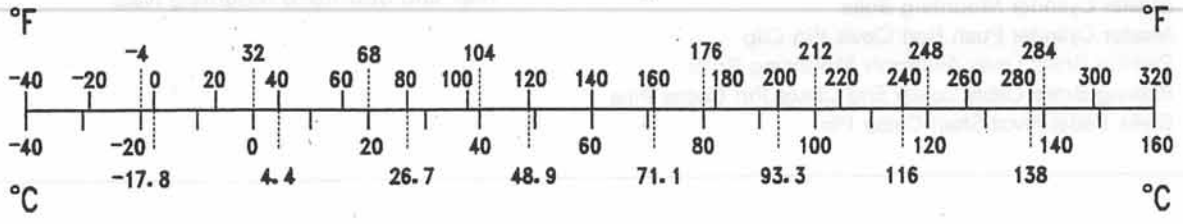
km/h	x	0.6214	=	mph

Units of Power:

kW	x	1.360	=	PS
kW	x	1.341	=	HP
PS	x	0.7355	=	kW
PS	x	0.9863	=	HP

Units of Temperature:

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



Supplement - 2000 Model

Table of Contents

How to Use this Manual

This "Supplement - 2000 Model" designed to be used in conjunction with the front part of this manual (up to 17-8) . The specifications and maintenance procedures described in this chapter are only those that are unique to the KAF620-A6/B6 model.

Complete and proper servicing of the KAF620-A6/B6 model therefore requires mechanics to read both this chapter and the front of this manual.

General Information

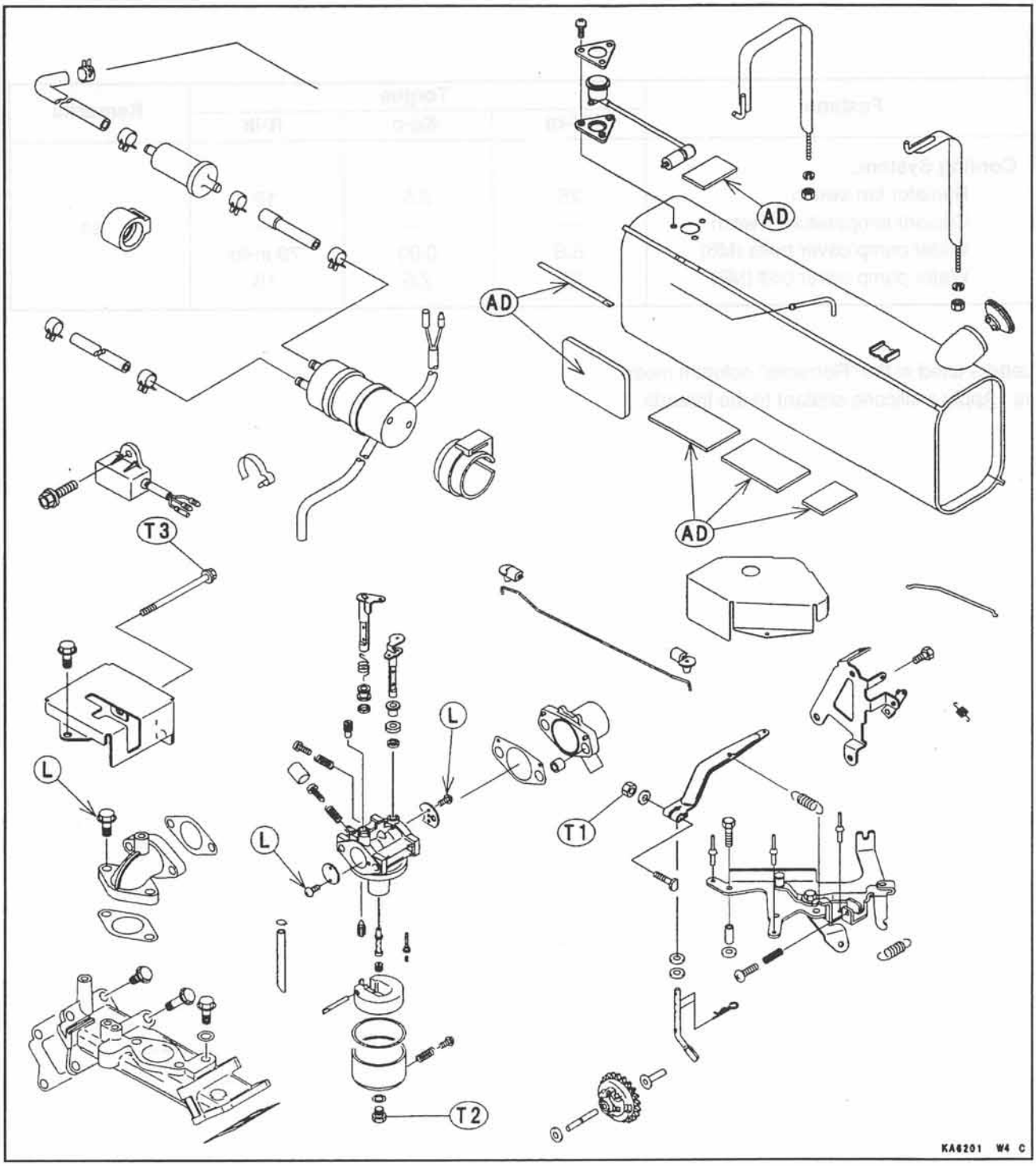
Torgue and Locking Agent

Fastener	Torgue			Remarks
	N-m	Kg-n	ft-lb	
Cooling System:				
Radiator fan switch	25	2.5	18	ss
Coolant temperature Switch	—	—	—	
Water pump cover bolts (M6)	8.8	0.90	78 in-lb	
Water pump cover bolt (M8)	25	2.5	18	

Letters used in the "Remarks" columm mean :
ss : Apply a silicone sealant to the threads.

Fuel system

Exploded View



AD : Apply adhesive agent.
G : Apply grease.
L : Apply non-permanent locking agent.

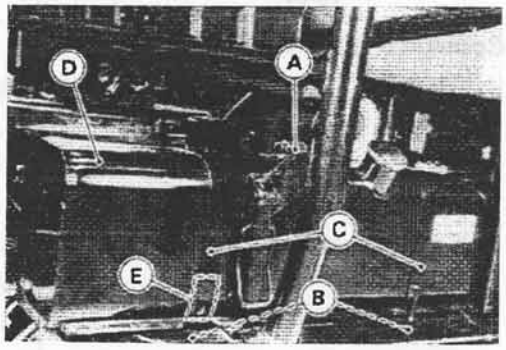
T1 : 7.4N-m (0.75 kg-m, 65 in-lb)
T2 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T3 : 15 N-m (1.5kg-m, 11.0 ft-lb)

Fuel Tank

Fuel Tank Removal

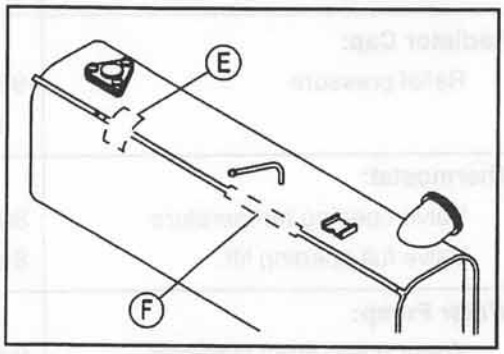
⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.



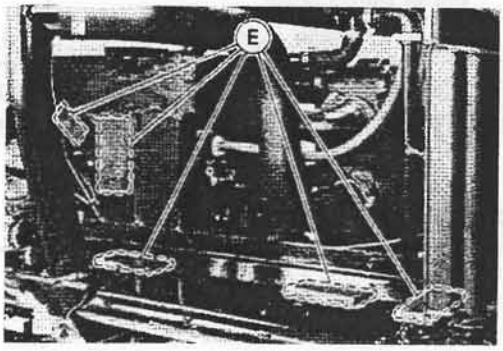
● Remove:
  Cargo Bed (tilt up)
  Fuel Hose [A] (disconnect)
  Fuel Tank Holder Nuts [B]
  Fuel Tank Holders [C]
  Fuel Tank [D]

○ Slide back the fuel tank and remove it from the vehicle.



Fuel Tank Installation

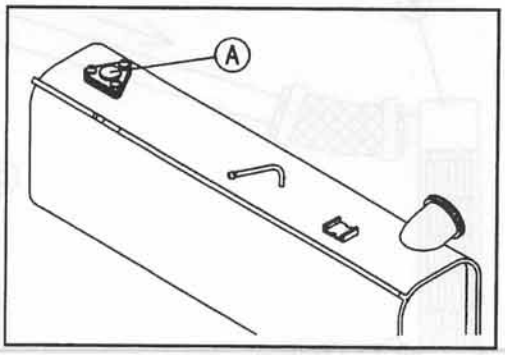
● If the rubber dampers [E] and/or trim [F] were removed, install them onto the frame or fuel tank applying an adhesive agent.



Fuel Tank Cleaning/Inspection

⚠WARNING

Clean the tank 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 tank.



● Remove the fuel tank and drain it.
● Remove the fuel level gauge [A].
● Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
● Pour the solvent out of the tank.
● Dry the tank with compressed air.
● Visually inspect the gaskets on the fuel level gauge and fuel tank cap for any damage.

☆ Replace the gaskets if they are damaged.

Cooling System

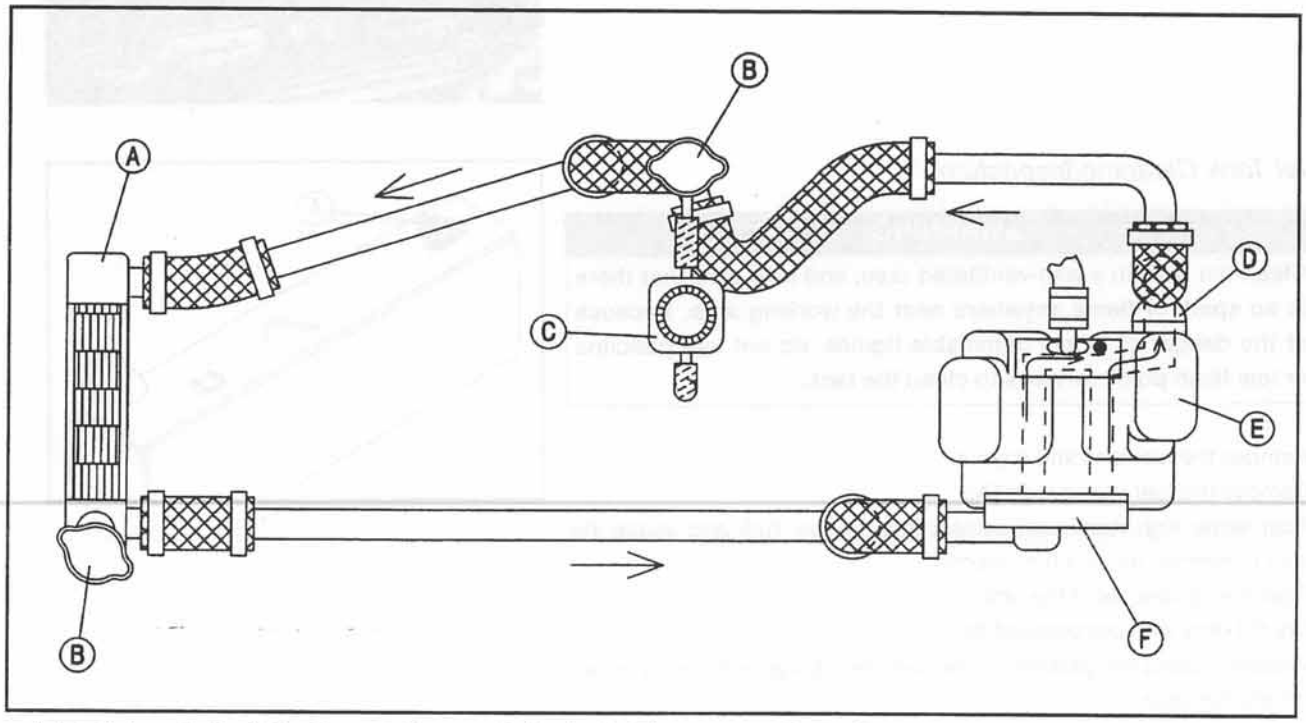
Specifications

Item	Standard	Service Limit
Coolant:		
Type	Permanent type of antifreeze (Soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)	- - -
Color	Green	- - -
Mixed ratio	Soft water 50%, coolant 50%	- - -
Freezing point	-35°C (-31°F)	- - -
Total amount	2.7 L	- - -
Radiator Cap:		
Relief pressure	93 ~ 123 kPa (0.95 ~ 1.25 kg/cm^2, 14 ~ 18 psi)	- - -
Thermostat:		
Valve opening temperature	80.5 ~ 83.5°C (177 ~ 182°F)	- - -
Valve full opening lift	8 mm or more @95°C (203°F)	- - -
Water Pump:		
Water pump shaft diameter	9.975 ~ 9.990 mm	9.94 mm
Water pump shaft bearing inside diameter	10.020 ~ 10.038 mm	10.09mm

Special Tool - Bearing Driver Set: 57001-1129

Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

Coolant Flow Chart

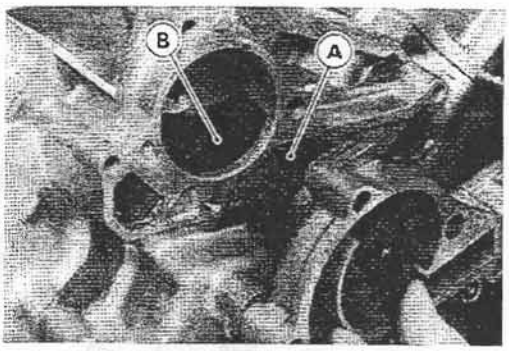


A. Radiator B. Radiator Cap C. Reservoir Tank D. Thermostat E. Engine F. Water Pump

Water Pump

Water pump Installation Note:

● Install the water pump housing turning the impeller so that the drive gear [A] engages with the camshaft gear [B], and tighten the water pump cover bolts with specified torgue.



Torgue: Water pump cover Bolts:
(M6) 8.8 N-m (0.90 kg-m, 78 in-lb)
(M8) 25 N-m (2.5 kg-m, 18 ft-lb)

Thermostat

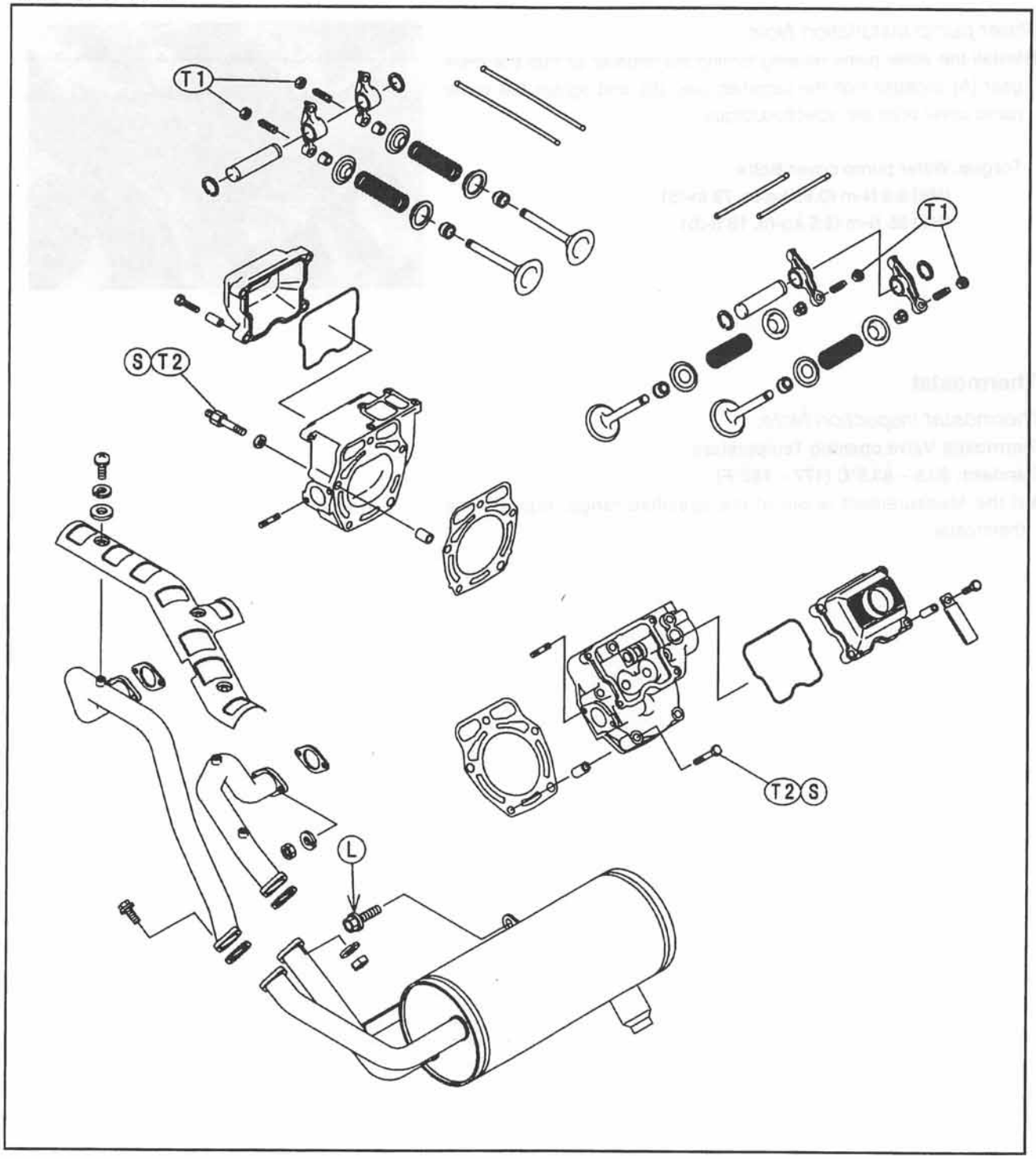
Thermostat Inspection Note:

Thermostat Valve opening Temperature
Standard: 80.5 ~ 83.5°C (177 ~ 182°F)

★If the Measurement is out of the specified range, replace the thermostat.

Engine Top End

Exploded View

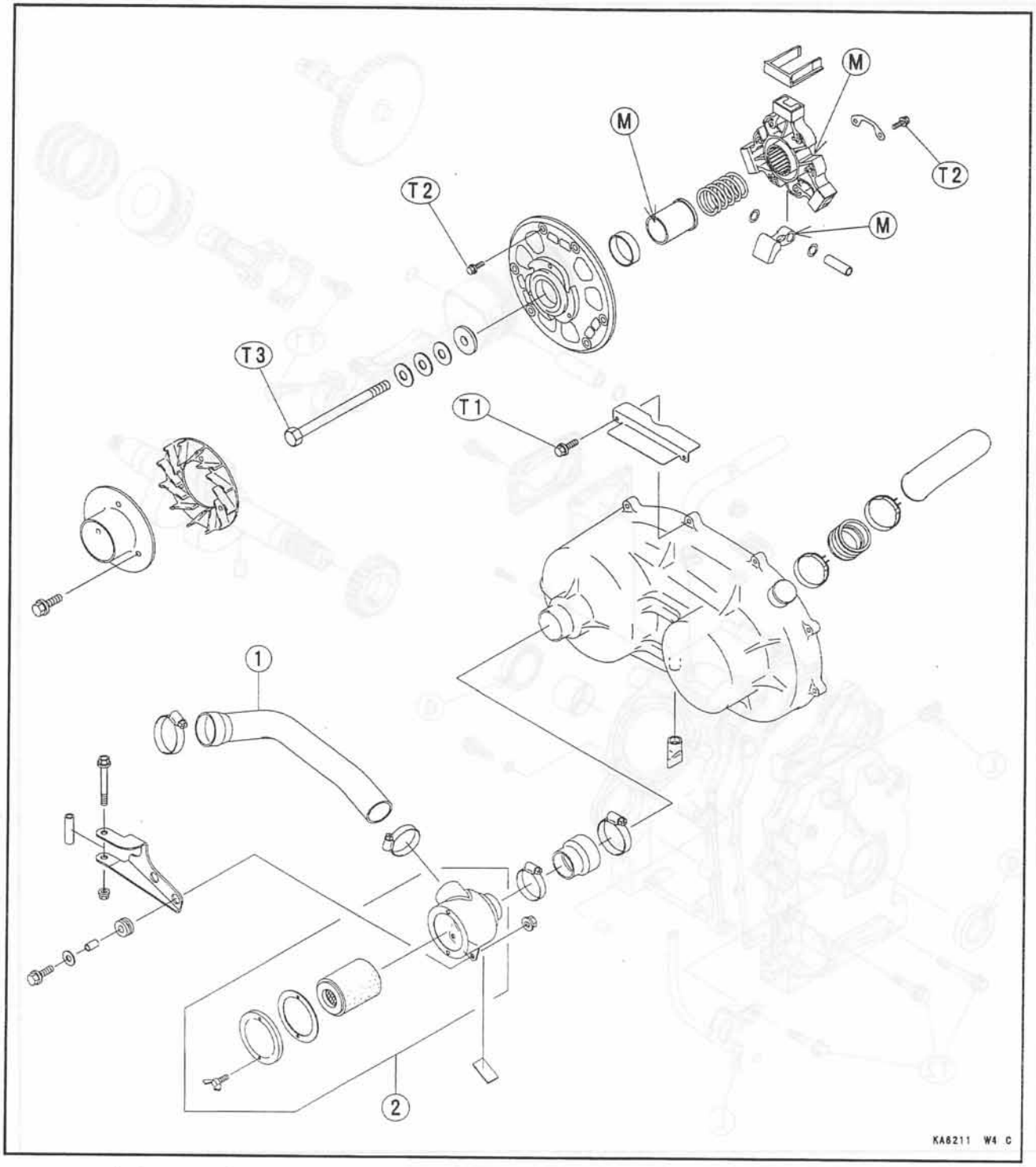


L : Apply non-permanent locking agent.
S : Follow specified tightening sequence

T1 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T2 : 22 N-m (2.2 kg-m, 16.0 ft-lb)

Converter System

Exploded View



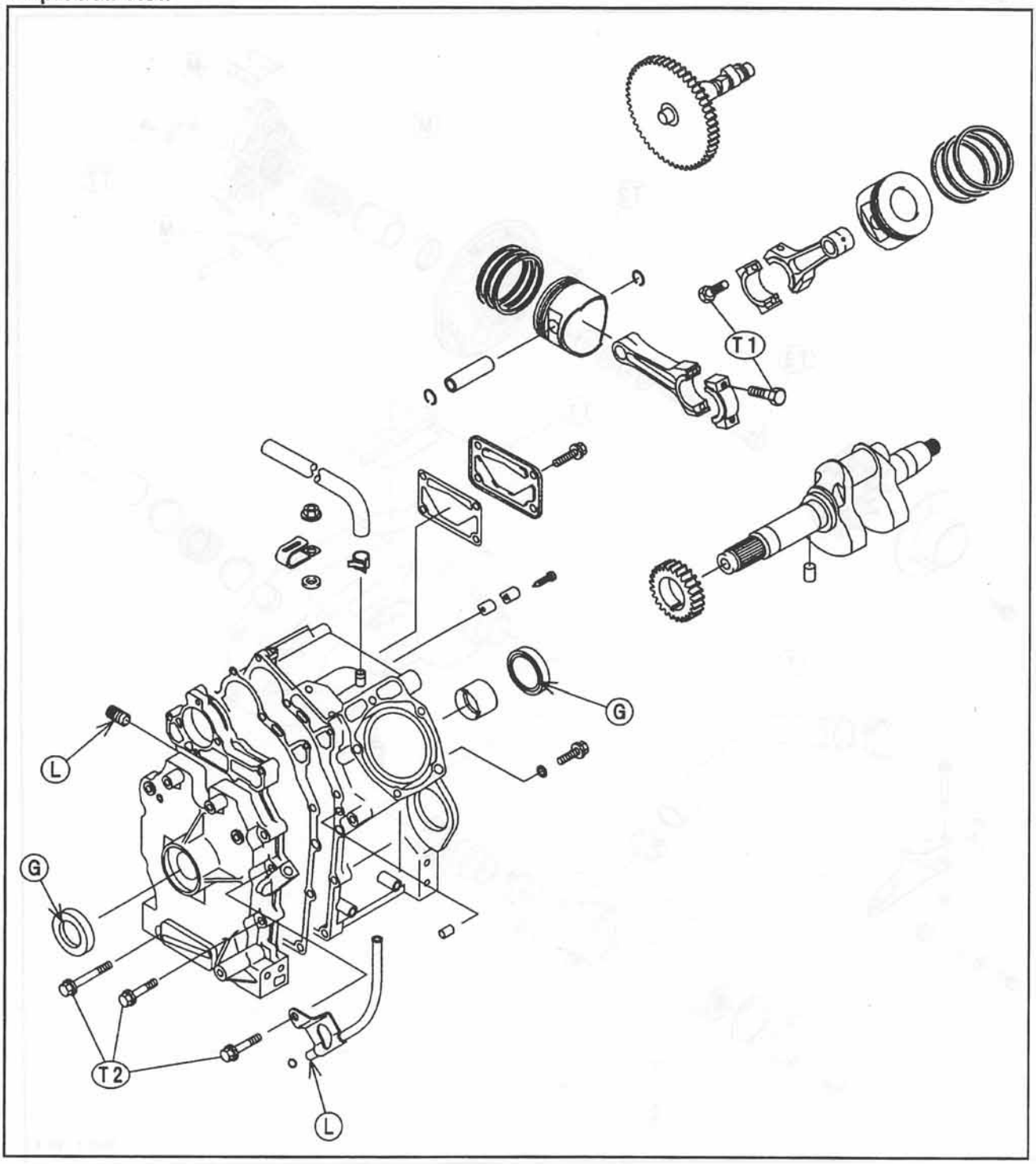
1. Converter Intake Duct
2. Air Filter

L : Apply non-permanent locking agent.
M : Apply molybdenum disulfide grease.

T1 : 1.5 N-m (0.15 kg-m, 13 in-lb)
T2 : 13 N-m (1.3 kg-m, 113 in-lb)
T3 : 93 N-m (9.5 kg-m, 69 ft-lb)

Engine Bottom End

Exploded View



G : Apply grease
L : Apply non-permanent locking agent.

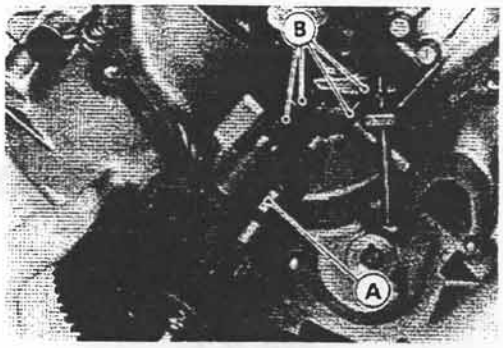
T1 : 21 N-m (2.1 kg-m, 15.0 ft-lb)
T2 : 22 N-m (2.2 kg-m, 16.0 ft-lb)

Camshaft and Tappets

Camshaft Removal

● Remove:
  Engine
  Cylinder Heads
  Crankcase Cover
  Camshaft [A]
  Tappets [B]

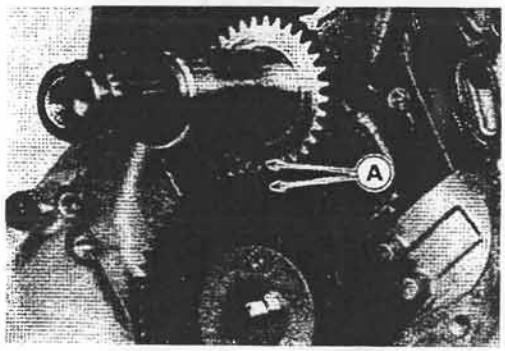
○ Turn the engine upside down to keep the tappets from catching the cam lobes.



Camshaft Installation

● Apply engine oil:
  Tappets
  Camshaft Journals
  Cam Surfaces

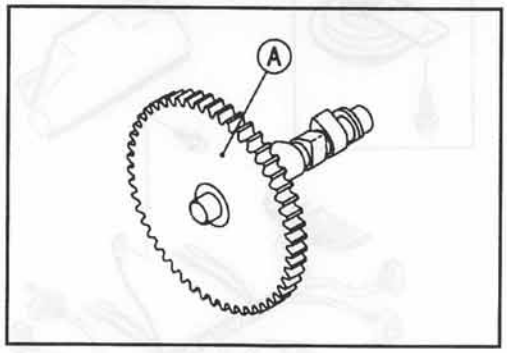
● Align the timing marks [A] on the camshaft and crankshaft gears.



NOTE

○ The camshaft and crankshaft gear are parts of the decided combination like below.

○ When replacing the camshuft, note the combination parts.
  camshaft : 12044-2239
  crankshaft gear : 59051-2112



Camshaft Inspection

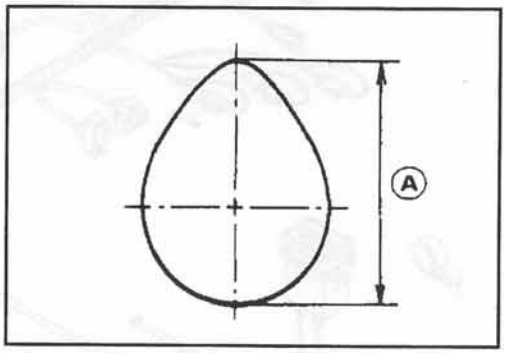
● Check the camshaft gear [A] for worn or broken teeth.

★ If excessively worn or broken teeth are observed, replace the camshaft.

Cam Wear

● Measure the cam height [A] of each cam.

★ If any cam has worn past the service limit, replace the camshaft.



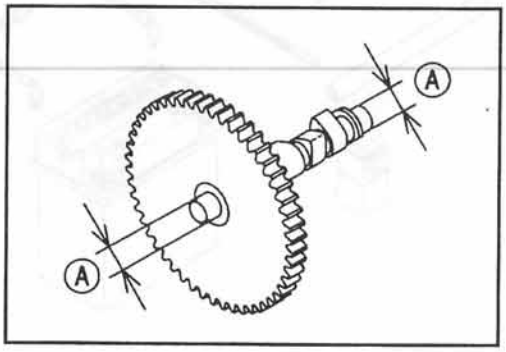
Cam Height

	Standard	Service Limit
Inlet	**25.719 ~ 25.809 mm**	**25.62 mm**
Exhaust	**25.962 ~ 26.052 mm**	**25.86 mm**

Camshaft Bearing/Journal Wear

● Measure the diameter [A] of the camshaft journals.

★ If any journal has worn past the service limit, replace the camshaft with a new one.

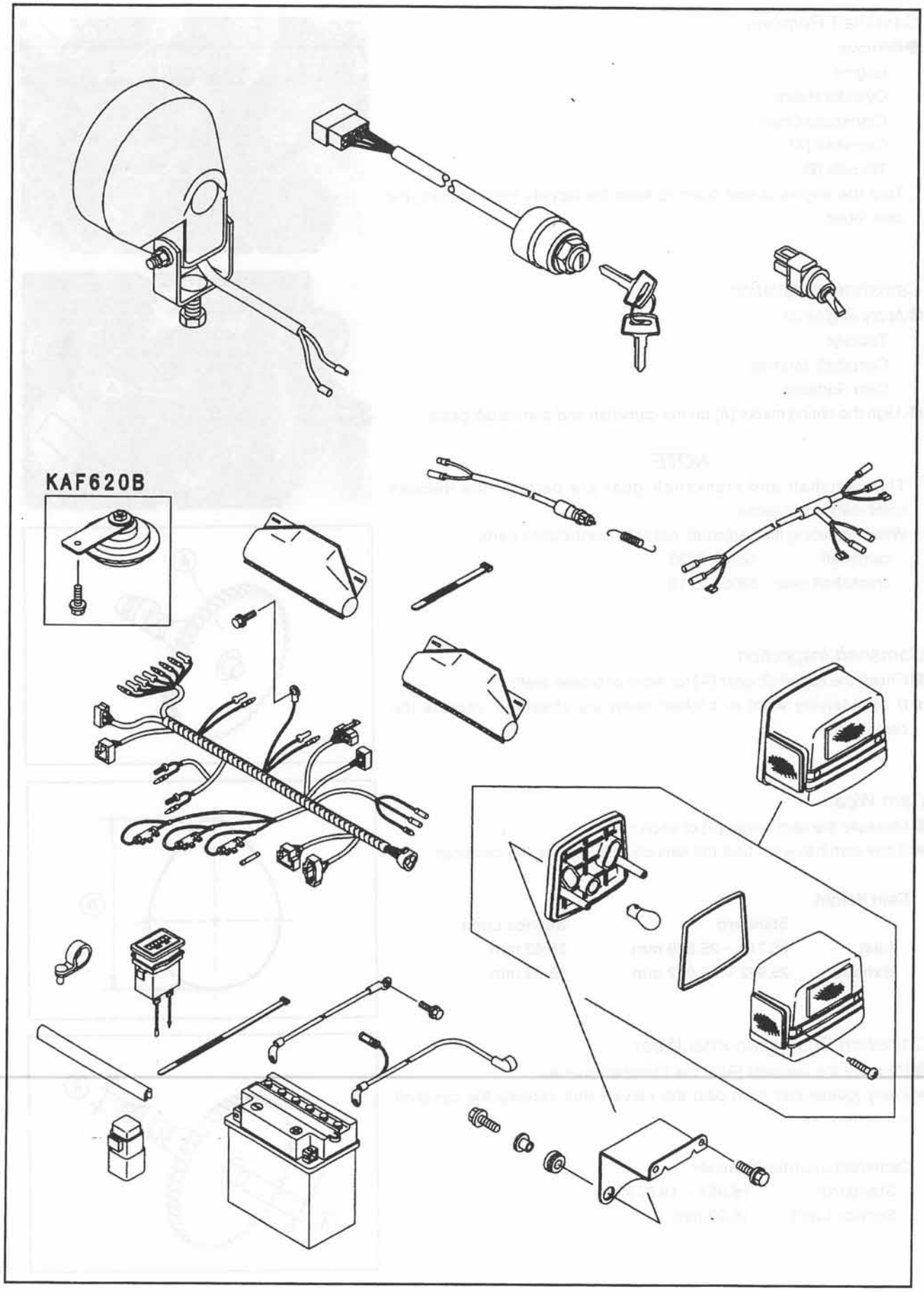


Camshaft Journal Diameter

Standard: **15.957 ~ 15.975 mm**
Service Limit: **15.93 mm**

Electrical System

Exploded View



Ignition System

⚠WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, high tension coil, or spark plug lead while the engine is running, or you could receive a severe electrical shock.

Spark Plug Removal/Installation

- Remove the spark plugs with a Hex: 19 long type socket wrench.
- Torque:

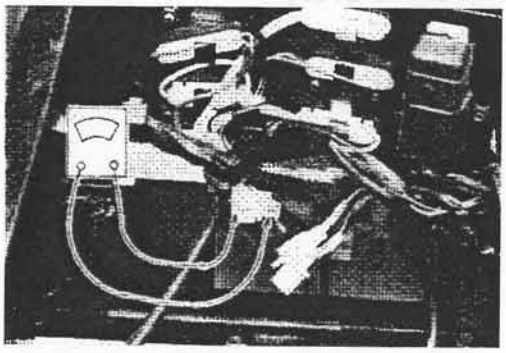
Torque - Spark Plugs: 17 N-m (1.7 kg-m, 12.0 ft-lb)

Igniter Inspection

- Measure the igniter internal resistance shown in the table.

Special Tool - Hand Tester: 57001-1394

★If the meter readings are not as specified, replace the igniter.

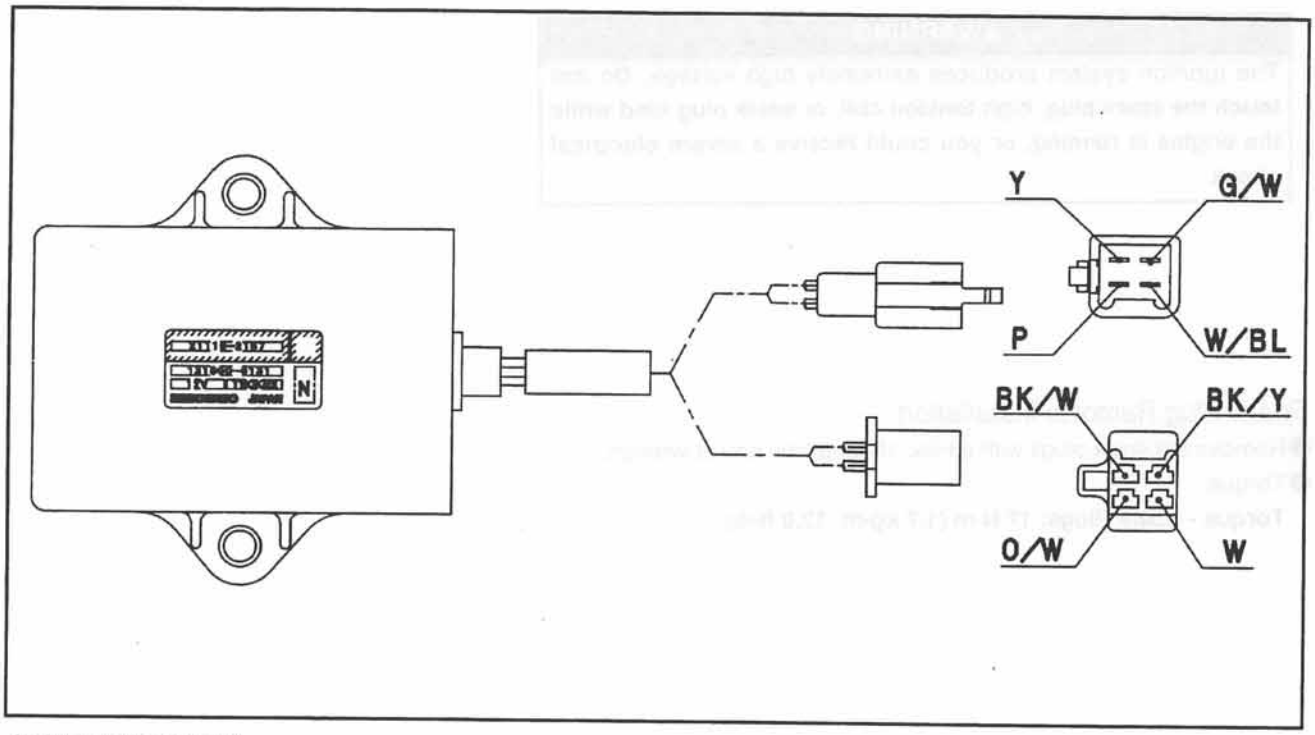


CAUTION

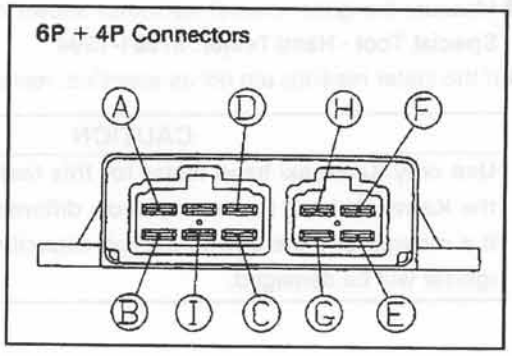
Use only Kawasaki hand tester for this test. A tester other than the Kawasaki hand tester may show different readings.
If a megger or a meter with a large-capacity battery is used, the igniter will be damaged.

Igniter Internal Resistance (4P + 4P Connectors P/N. 21119-2157) **(x 1kΩ)**

Tester (-) Lead Connection	Tester (+) Lead Connection							
	W	BK/Y	BK/W	Y	G/W	P	W/BL	O/W
W	-	∞	1 ~ 8	4 ~ 16	2 ~ 8	4 ~ 16	2 ~ 8	2 ~ 10
BK/Y	∞	-	1 ~ 8	4 ~ 16	2 ~ 8	4 ~ 16	2 ~ 8	2 ~ 10
BK/W	∞	∞	-	1 ~ 6	0	1 ~ 6	0	0.5 ~ 2
Y	∞	∞	1 ~ 6	-	0	3 ~ 12	1 ~ 6	2 ~ 8
G/W	∞	∞	0	1 ~ 6	-	1 ~ 6	0	0.5 ~ 2
P	∞	∞	1 ~ 6	3 ~ 15	0.5 ~ 2	-	1 ~ 6	1 ~ 6
W/BL	∞	∞	0	1 ~ 6	2 ~ 8	1 ~ 6	-	0.5 ~ 2
O/W	∞	∞	0.5 ~ 2	2 ~ 8	0.5 ~ 2	2 ~ 8	0.5 ~ 2	-



(P/N 21119-2157)



(P/N 21119-1456)

Igniter Internal Resistance (6P + 4P Connectors, P/N. 21119-1456) (x 1kΩ)

Tester (-) Lead Connection	Tester (+) Lead Connection								
	A	B	C	D	E	F	G	H	I
A	–	∞	1 ~ 8	2 ~ 9	3 ~ 16	1 ~ 8	3 ~ 16	1 ~ 8	2 ~ 8
B	∞	–	1 ~ 8	2 ~ 9	3 ~ 16	1 ~ 8	3 ~ 16	1 ~ 8	2 ~ 8
C	∞	∞	–	0.1 ~ 2	1 ~ 6	0	1 ~ 6	0	0.1 ~ 1
D	∞	∞	0.1 ~ 2	–	2 ~ 8	0.1 ~ 2	2 ~ 8	0.1 ~ 2	1 ~ 3
E	∞	∞	1 ~ 6	2 ~ 8	–	1 ~ 6	3 ~ 12	1 ~ 6	1 ~ 6
F	∞	∞	0	0.1 ~ 2	1 ~ 6	–	1 ~ 6	0	0.1 ~ 1
G	∞	∞	1 ~ 6	2 ~ 8	3 ~ 12	1 ~ 6	–	1 ~ 6	1 ~ 6
H	∞	∞	0	0.1 ~ 2	1 ~ 6	0	1 ~ 6	–	0.1 ~ 1
I	∞	∞	0.1 ~ 1	0.1 ~ 3	1 ~ 7	0.1 ~ 1	1 ~ 7	0.1 ~ 1	–

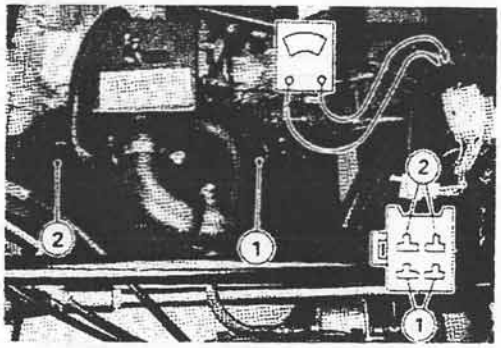
Pickup Coil Inspection

● Measure the pickup coil resistance.

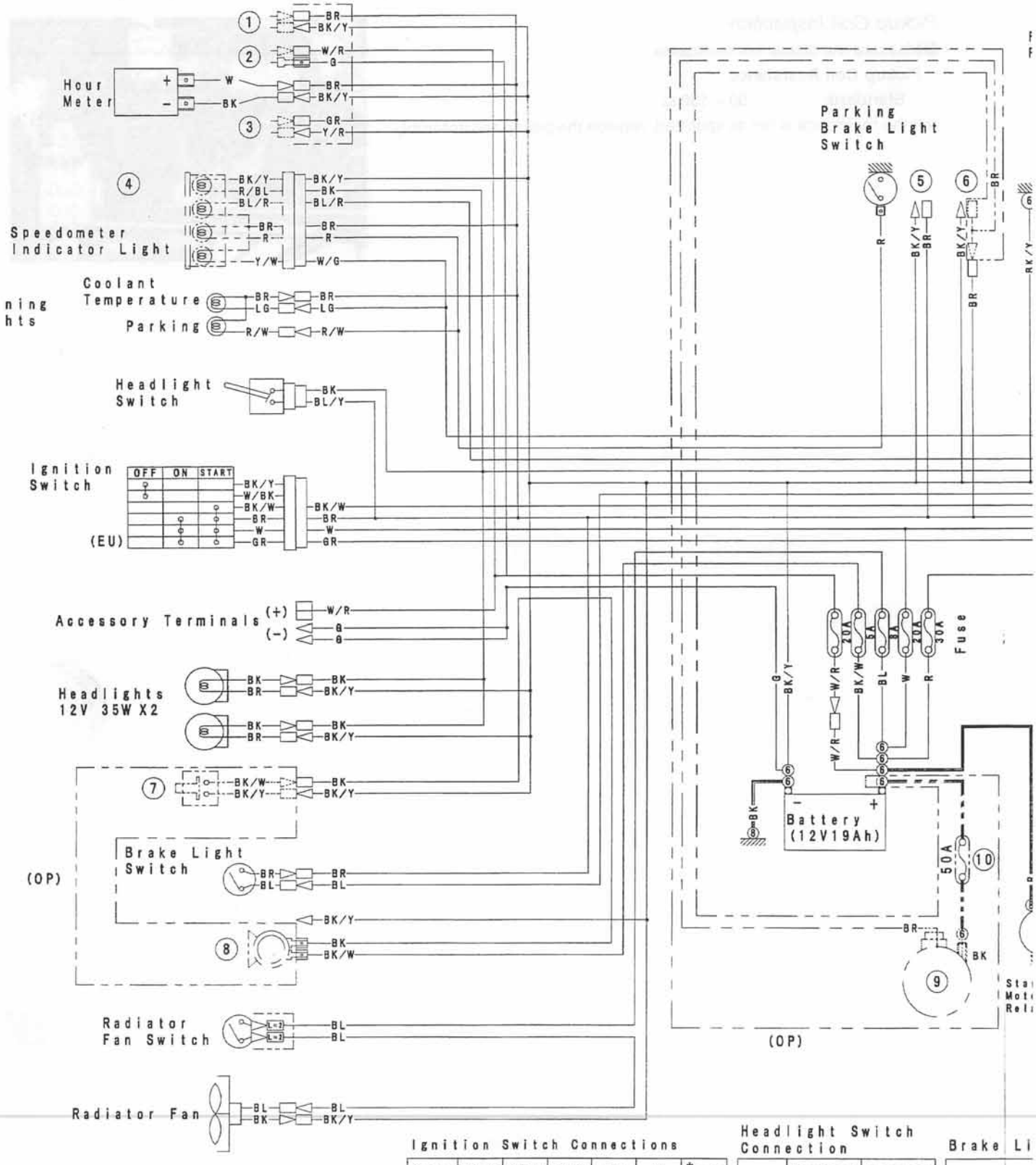
Pickup Coil Resistance

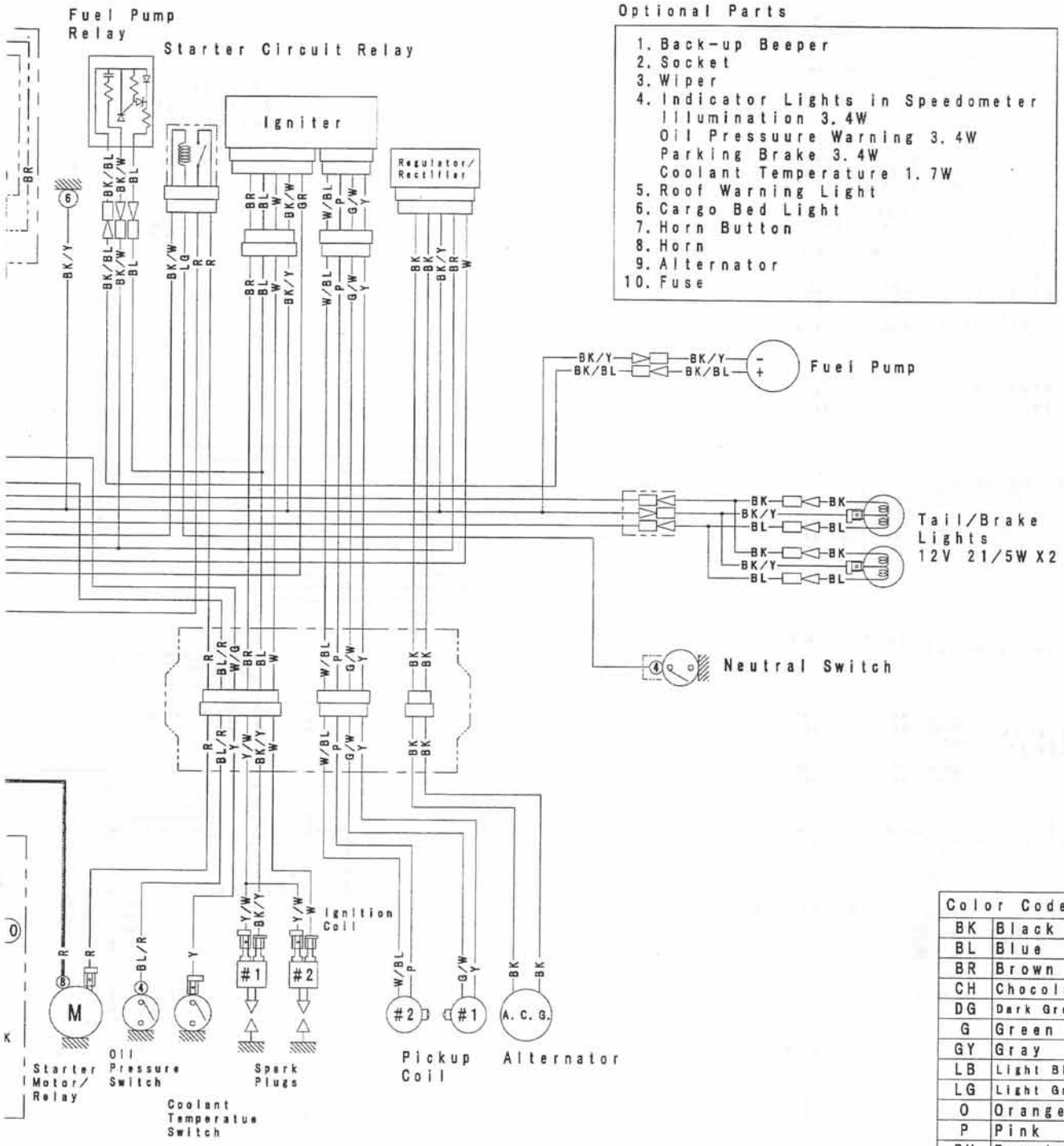
Standard: **90 ~ 130 Ω**

★ If the resistance is not as specified, replace the pickup coil assembly.



0-A6 Wiring Diagram





Color Code	
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark Green
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

ke Light Switch Connection

Color	BR	BL
brake pedal is pushed down	○—●	

Neutral Switch Connection

	Terminal	Ground
Neutral (N) Position	○—●	

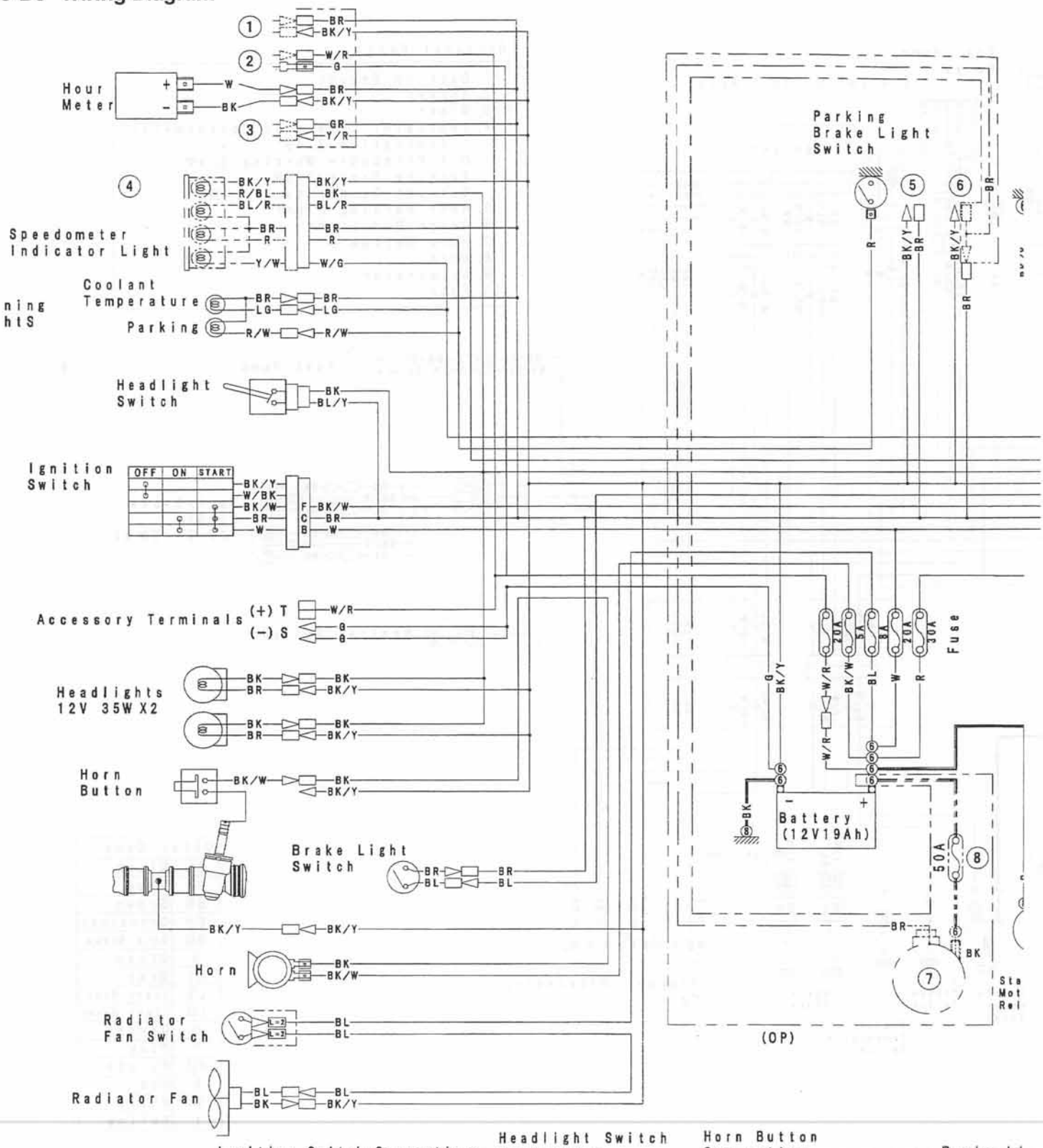
Parking Brake Light Switch Connection

	Terminal	Ground
When parking brake lever is pulled up	○—●	

(98051-1776A)
(98051-1793A)

AF620A01A3 C

0-B6 Wiring Diagram



Ignition Switch Connections

	BK/Y	W/BK	BK/W	BR	W
OFF	●	●			
ON			●	●	●
START				●	●

Headlight Switch Connection

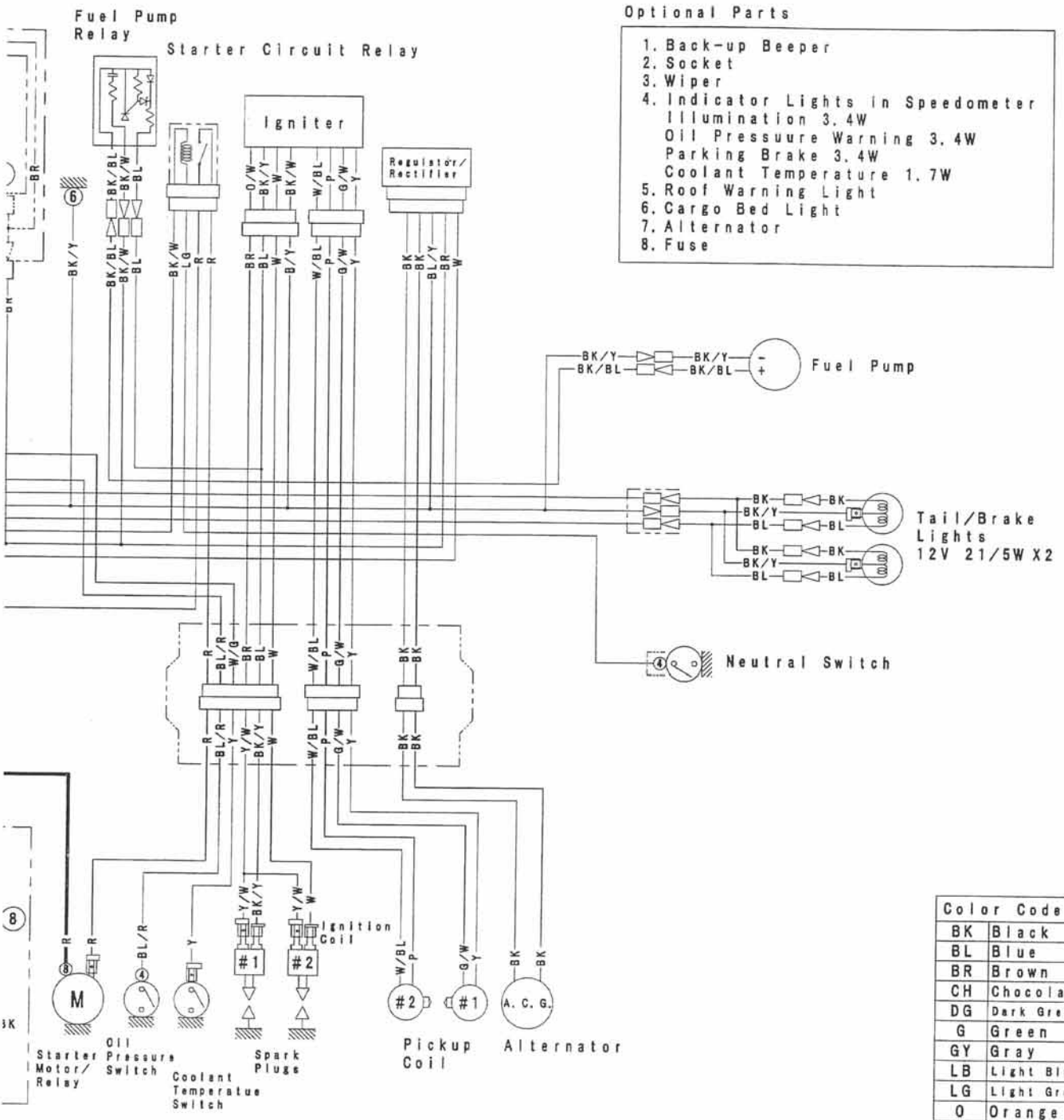
	Terminal	Terminal
OFF		
ON	●	●

Horn Button Connection

	BK/W	Steering shaft
Push on	●	●

Brake Li

When brake



Color Code	
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark Green
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

ke Light Switch Connection

	BR	BL
brake pedal is pushed down	○	●

Neutral Switch Connection

	Terminal	Ground
Neutral (N) Position	○	●

Parking Brake Light Switch Connection

	Terminal	Ground
When parking brake lever is pulled up	○	●

(98051-1777A)

AF620B01A3 C

MODEL APPLICATION

Year	Model	Beginning Frame No.
1993	KAF620-A1	JK1AFCA1□PB500001
	KAF620-B1	JK1AFCB1□PB500001
1996	KAF620-A2	JK1AFCA1□TB501351
	KAF620-B2	JK1AFCB1□TB501351
2000	KAF620-A6	JK1AFCA1□YB528101 or JK1AF620AAB602301
	KAF620-B6	JK1AFCB1□YB503401

□: This digit in the frame number changes from one machine to another

Kawasaki
KAWASAKI HEAVY INDUSTRIES, LTD.
Consumer Products & Machinery Group

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