

## MODEL APPLICATION

Year	Model	Beginning Frame No.
2009	KAF950G9	JK1AFDG1□9B500001 JK1AF950GGB600001
2010	KAF950GA	JK1AFDG1□AB502001 JK1AF950GGB600601
2010	KAF950HA	JK1AFDH1□AB500001
2011	KAF950GB	JK1AFDG1□BB503301 JK1AF950GGB601001
2012	KAF950GC	JK1AFDG1□CB505101 JK1AF950GGB601401

□:This digit in the frame number changes from one machine to another.



KAWASAKI HEAVY INDUSTRIES, LTD.  
Motorcycle & Engine Company

Part No.99924-1409-04

Printed in Japan



**MULE 4010 TRANS4×4**

**DIESEL**



# **Utility Vehicle Service Manual**

# Quick Reference Guide

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## LIST OF ABBREVIATIONS

A	ampere(s)	lb	pounds(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)		

## COUNTRY AND AREA CODES

EUR	Europe	US	United States
CA	Canada		

# 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 Service 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.

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## How to Use This Manual

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In this manual, the product is divided into its major systems and these systems make up the manual's chapters. 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.

For example, if you want engine oil information, use the Quick Reference Guide to locate the Engine Lubrication System chapter. Then, use the Table of Contents on the first page of the chapter to find the Engine Oil section.

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

### DANGER

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

### WARNING

**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

### NOTICE

**NOTICE** is used to address practices not related to personal injury.

This manual contains four more symbols 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

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## 1-2 GENERAL INFORMATION

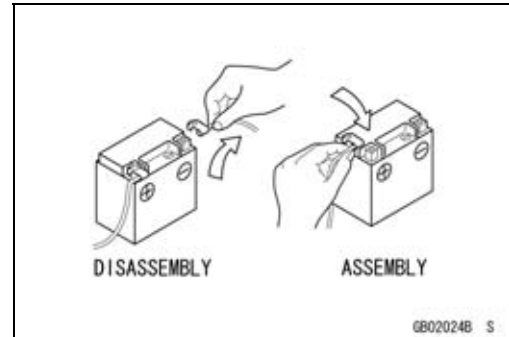
### Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a vehicle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following.

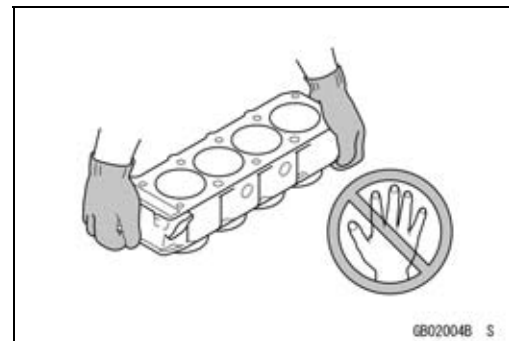
#### **Battery Ground**

Before completing any service on the vehicle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over. Disconnect the ground cable (–) first and then the positive (+). When completed with the service, first connect the positive (+) cable to the positive (+) terminal of the battery then the negative (–) cable to the negative terminal.



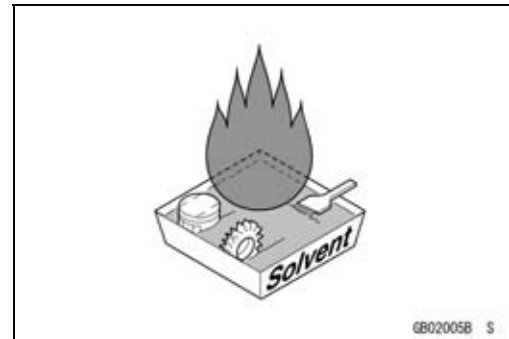
#### **Edges of Parts**

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



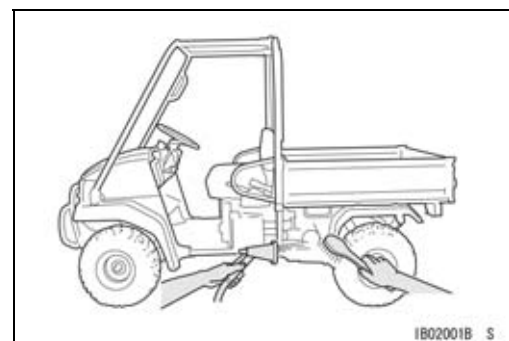
#### **Solvent**

Use a high-flush point solvent when cleaning parts. High-flush point solvent should be used according to directions of the solvent manufacturer.



#### **Cleaning Vehicle before Disassembly**

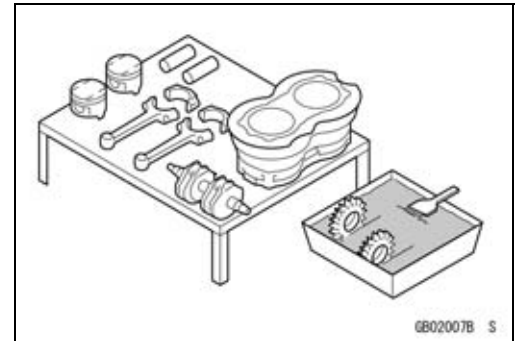
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



## Before Servicing

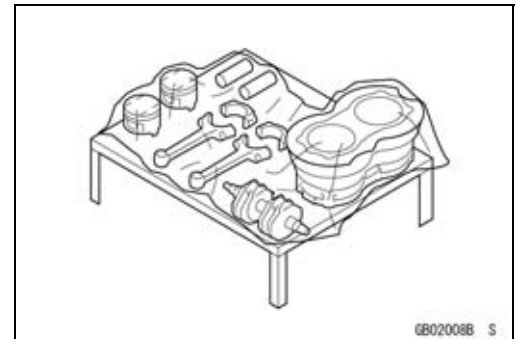
### **Arrangement and Cleaning of Removed Parts**

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



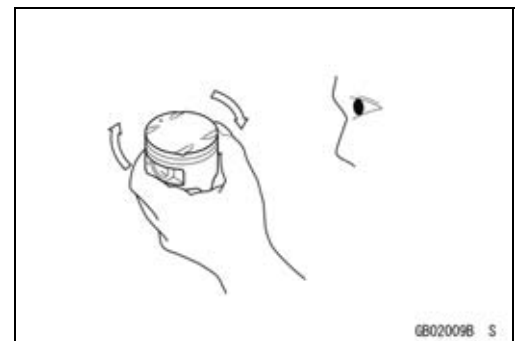
### **Storage of Removed Parts**

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



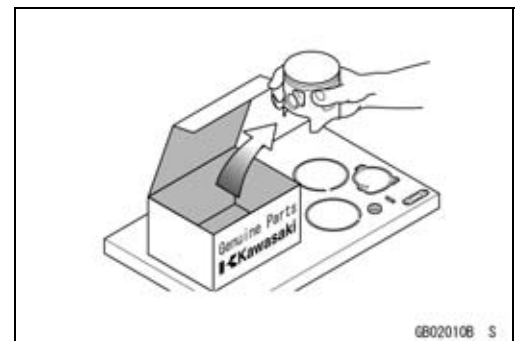
### **Inspection**

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



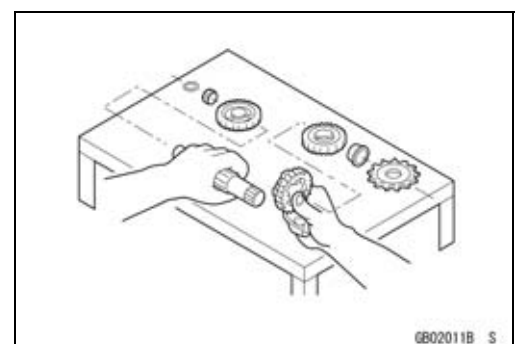
### **Replacement Parts**

Replacement Parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips, cotter pins or self-locking nuts must be replaced with new ones whenever disassembled.



### **Assembly Order**

In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



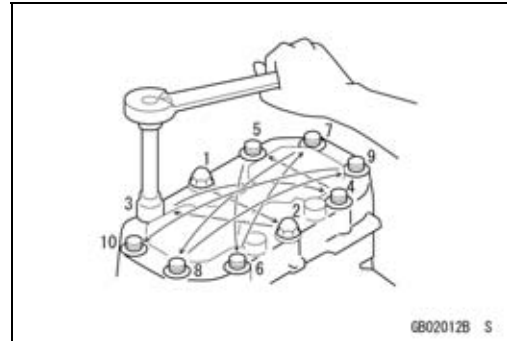


## 1-4 GENERAL INFORMATION

### Before Servicing

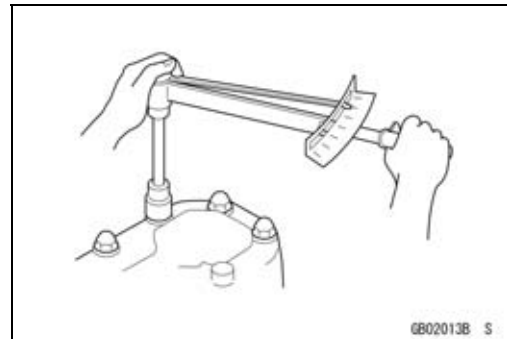
#### **Tightening Sequence**

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 according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



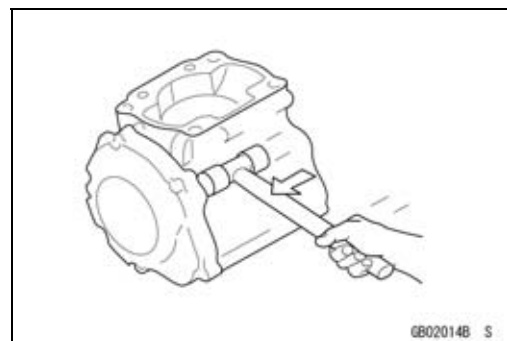
#### **Tightening Torque**

Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.



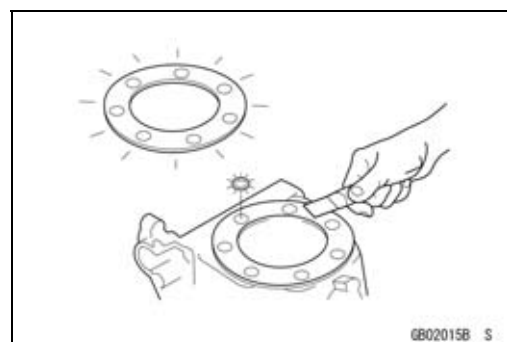
#### **Force**

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non-permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



#### **Gasket, O-ring**

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install the new gaskets and replace the used O-rings when re-assembling.



#### **Liquid Gasket, Non-permanent Locking Agent**

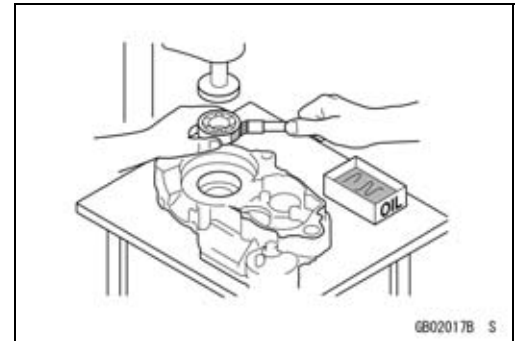
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



**Before Servicing**

**Press**

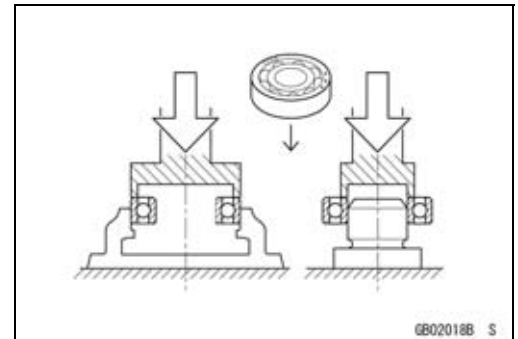
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



**Ball Bearing and Needle Bearing**

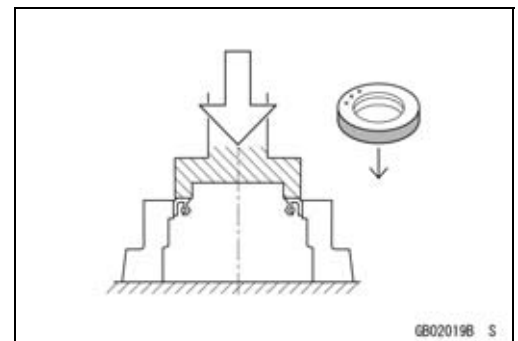
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.

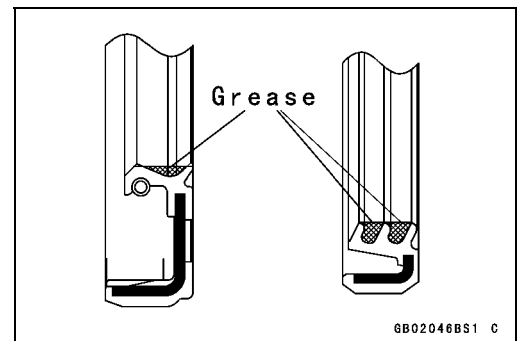


**Oil Seal, Grease Seal**

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.

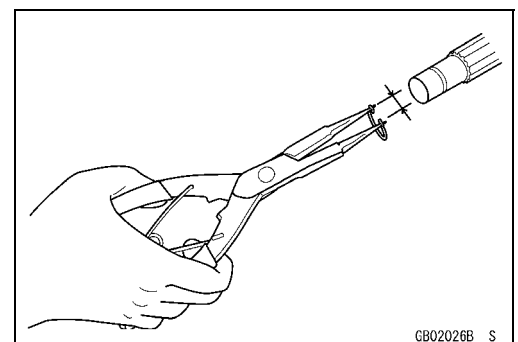


Apply specified grease to the lip of seal before installing the seal.



**Circlips, Cotter Pins**

Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.

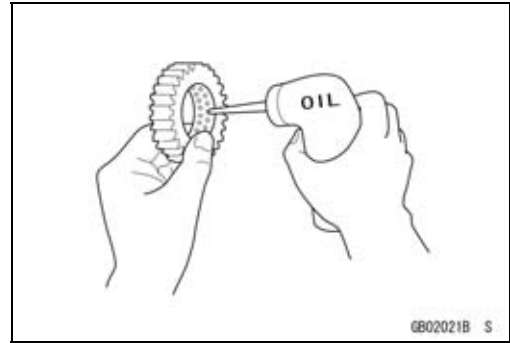


# 1-6 GENERAL INFORMATION

## Before Servicing

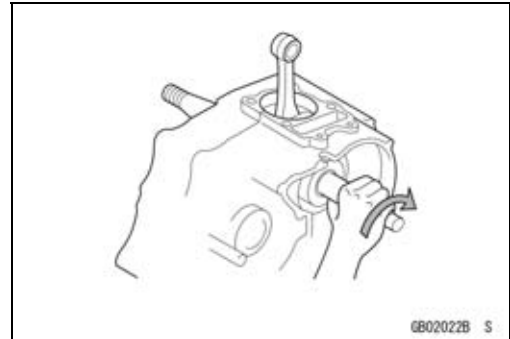
### **Lubrication**

It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



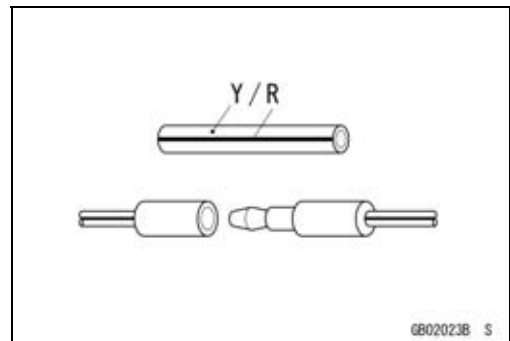
### **Direction of Engine Rotation**

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from right side).



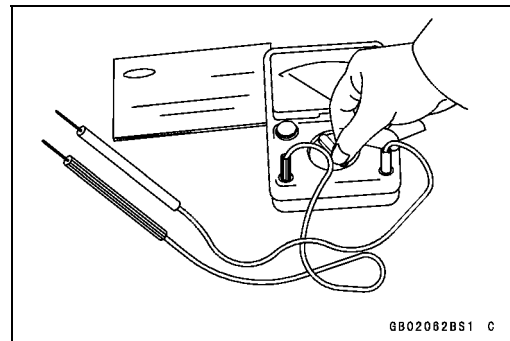
### **Electrical Wires**

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.



### **Instrument**

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.



Model Identification

KAF950G9 Left Side View



1803B040 P

KAF950G9 Right Side View



1803B041 P

Frame Number



1803B042 P

Engine Number



1803B019 P

# 1-8 GENERAL INFORMATION

## General Specifications

Items	KAF950G9 ~ GC/HA
<b>Dimensions</b>	
Overall Length	3 305 mm (130.12 in.)
Overall Width	1 486 mm (58.50 in.)
Overall Height	1 925 mm (75.79 in.)
Wheelbase	2 165 mm (85.24 in.)
Track:	
Front	1 160 mm (45.67 in.)
Rear	1 180 mm (46.46 in.)
Ground Clearance	180 mm (7.09 in.)
Seat Height:	
Front	855 mm (33.66 in.)
Rear	880 mm (34.64 in.)
Curb Weight	788 kg (1 738 lb)
Front	349 kg (770 lb)
Rear	439 kg (968 lb)
Fuel Tank Capacity	24.2 L (6.4 US gal.)
Cargo Bed (L × W × H):	
Long Bed	1 280 × 1 212 × 287 mm (50.39 × 47.72 × 11.30 in.)
Short Bed	770 × 1 212 × 287 mm (30.31 × 47.72 × 11.30 in.)
Seating Capacity:	
Front	2
Rear	2
<b>Performance</b>	
Minimum Turning Radius	3.9 m (12.8 ft)
<b>Engine</b>	
Type	4-stroke, OHV, Diesel, 3-cylinders
Cooling System	Liquid-cooled
Bore and Stroke	72 × 78 mm (2.83 × 3.07 in.)
Displacement	953 cm <sup>3</sup> (58.2 cu in.)
Compression Ratio	24.8
Maximum Horsepower	17.7 kW (24 PS) @3 600 r/min (rpm)
Maximum Torque	52 N·m (5.3 kgf·m, 38.4 ft·lb) @2 800 r/min (rpm)
Injection Pump	Denso VE type
Starting System	Electric starter
Cylinder Numbering Method	Right to left, 1-2-3
Firing Order	Right to left, 1-2-3
Valve Timing:	
Inlet:	
Open	10° BTDC
Close	45° ABDC
Duration	235°

**General Specifications**

Items	KAF950G9 ~ GC/HA
Exhaust: Open Close Duration Lubrication System Engine Oil: Grade Viscosity Capacity	45° BBDC 10° ATDC 235° Forced lubrication (wet sump) API CF or CF-4 SAE 10W-40 3.3 L (3.5 US qt)
<b>Drive Train</b> Primary Reduction System: Type Reduction Ratio Transmission Gear Ratio: Forward: High Low Reverse: Low Final Drive System: Type Reduction Ratio Overall Drive Ratio: Forward: High Low Reverse: Low Front Final Gear Case Oil: Type Viscosity Capacity Transmission Oil: Type Viscosity Capacity	Belt drive torque converter 3.7 ~ 0.98 1.821 (51/28) 3.750 (51/28 × 25/20 × 28/17) 4.220 (41/20 × 25/20 × 28/17) Gear 4WD/2WD 5.429 (76/14) 9.690 19.950 22.454 Hypoid gear oil for LSD (Limited Slip Differential gears) SAE 140 (GL-5) or SAE 90 (GL-6) 0.4 L (0.4 US qt) Hypoid gear oil SAE 90: above 5°C (41°F) or SAE 80: below 5°C (41°F) 2.5 L (2.6 US qt)
<b>Frame</b> Type Caster (Rake Angle) Camber Trail	Steel tube, Ladder 7.5° 0.8° 35 mm (1.4 in.)

# 1-10 GENERAL INFORMATION

## General Specifications

Items	KAF950G9 ~ GC/HA
<p>Tire: Front and Rear</p> <p>Rim Size: Front and Rear</p> <p>Steering Type</p> <p>Suspension: Front: Type Wheel Travel</p> <p>Rear: Type Wheel Travel</p> <p>Brake Type: Front and Rear</p> <p>Parking Brake Type</p>	<p>23 × 11.00-10, Tubeless</p> <p>10 × 8.5</p> <p>Rack and pinion (Electric power steering)</p> <p>MacPherson strut 100 mm (3.94 in.)</p> <p>De Dion axle 70 mm (2.76 in.)</p> <p>Drum (Hydraulic) Drum (Mechanical internal expansion)</p>
<p><b>Electrical Equipment</b></p> <p>Battery</p> <p>Headlight: Type Bulb</p> <p>Brake/Tail Light</p> <p>Reverse Light</p> <p>Alternator: Type Rated Output</p>	<p>12 V 52 Ah</p> <p>Semi-sealed beam 12 V 35 W × 2</p> <p>12 V 21/5 W × 2 (EUR) 12 V 10 W</p> <p>Three-phase AC 40 A, 12 V</p>
<p><b>Load Capacity</b></p> <p>Maximum Vehicle Load (Including Occupants and Cargo)</p> <p>Maximum Cargo Bed Load: Long Bed Short Bed</p>	<p>740 kg (1 632 lb)</p> <p>499 kg (1 100 lb) 318 kg (701 lb)</p>

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

**Unit Conversion Table**

**Prefixes for Units:**

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

**Units of Mass:**

kg	×	2.205	=	lb
g	×	0.03527	=	oz

**Units of Volume:**

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (IMP)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (IMP)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (IMP)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (IMP)
mL	×	0.06102	=	cu in

**Units of Force:**

N	×	0.1020	=	kg
N	×	0.2248	=	lb

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kg	×	9.807	=	N
kg	×	2.205	=	lb

**Units of Length:**

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in

**Units of Torque:**

N·m	×	0.1020	=	kgf·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb

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kgf·m	×	9.807	=	N·m
kgf·m	×	7.233	=	ft·lb
kgf·m	×	86.80	=	in·lb

**Units of Pressure:**

kPa	×	0.01020	=	kgf/cm <sup>2</sup>
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg

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kgf/cm <sup>2</sup>	×	98.07	=	kPa
kgf/cm <sup>2</sup>	×	14.22	=	psi
cmHg	×	1.333	=	kPa

**Units of Speed:**

km/h	×	0.6214	=	mph
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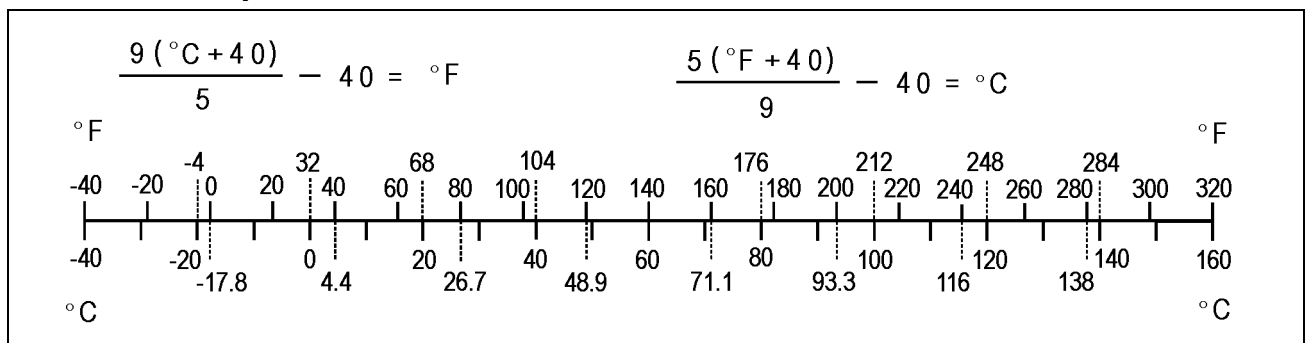
**Units of Power:**

kW	×	1.360	=	PS
kW	×	1.341	=	HP

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PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

**Units of Temperature:**





# Periodic Maintenance

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Bolts, Nuts and Fasteners Tightness Inspection .....	2-47

**Periodic Maintenance Chart**

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

OPERATION	FREQUENCY	Whichever comes first → ↓ Every	First Service	Regular Service					See Page
			After 50 h, or 1 000 km of use	Every 100 h, or 2 000 km of use	Every 250 h, or 5 000 km of use	Every 500 h, or 10 000 km of use	Every 800 h, or 16 000 km of use		
<b>ENGINE</b>									
Throttle pedal play - inspect			●			●			2-13
Idle speed - adjust			●		●				2-14
Fuel hoses and connections - inspect*			●		●				2-14
Fuel hose - replace	5 years								2-14
Fuel filter element - replace*							●		2-16
Fuel filter water - drain*				●					2-16
Radiator - clean*			●		●				2-17
Radiator hoses and connections - inspect*	1 year		●			●			2-17
Coolant - change	2 years								2-17
Cooling fan belt - inspect				●					2-20
Valve clearance - inspect*						●			2-22
Spark arrester - clean					●				2-24
Converter drive belt - inspect*					●				2-24
Converter drive belt deflection - inspect*					●				2-25
Converter driven pulley shoe - inspect*						●			2-26
Converter air cleaner element - clean*			●		●				2-27
Engine oil - change*	1 year		●	●					2-28
Oil filter - replace			●		●				2-29

●: Clean, adjust, lubricate, torque, or replace parts as necessary.

\*: Service more frequently when operated in mud, dust, or other harsh riding conditions.

## 2-4 PERIODIC MAINTENANCE

### Periodic Maintenance Chart

OPERATION	FREQUENCY	Whichever comes first → ↓ Every	First Service	Regular Service					See Page
			After 50 h, or 1 000 km of use	Every 100 h, or 2 000 km of use	Every 250 h, or 5 000 km of use	Every 500 h, or 10 000 km of use	Every 800 h, or 16 000 km of use		
<b>CHASSIS</b>									
Front final gear case oil and transmission case oil - change*		1 year	●			●			2-29, 2-30
Wheel nuts tightness - inspect			●		●				2-30
Tire wear - inspect*			●		●				2-30
Brake fluid level - inspect			●		●				2-31
Brake fluid - change		2 years							2-32
Brake pedal play - inspect*			●		●				2-33
Brake master cylinder cup and dust seal - replace		2 years							2-34
Brake hose and pipe - inspect			●		●				2-34
Brake hose - replace		4 years							2-35
Brake wear - inspect*					●				2-36
Brake wheel cylinder assembly - replace		2 years							2-37
Parking brake lever - inspect			●		●				2-39
Steering - inspect			●		●				2-41
Steering joint dust boots - inspect			●		●				2-41
Seat belt - inspect					●				2-42
Battery - inspect (Note 1)					●				2-42
Brake light switch - inspect			●		●				2-44
General lubrication - perform*					●				2-45
Bolts, nuts, and fasteners tightness - inspect			●		●				2-47

●: Clean, adjust, lubricate, torque, or replace parts as necessary.

\*: Service more frequently when operated in mud, dust, or other harsh riding conditions.

Note 1: Conventional Type Battery

**Torque and Locking Agent**

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or silicone sealant etc.

Letters used in the “Remarks” column mean:

- B: Apply brake fluid.
- EO: Apply engine oil.
- G: Apply grease.
- L: Apply a non-permanent locking agent.
- MO: Apply molybdenum disulfide grease oil solution.  
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
- R: Replacement Part
- S: Follow the specified tightening sequence.
- SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
<b>Fuel System</b>				
Air Cleaner Housing Mounting Bolts	20	2.0	15	
Air Vent Plug	5.0	0.51	44 in·lb	
Distributor Head Bolt	17	1.7	13	
Fuel Filter Mounting Bolts	20	2.0	15	
Fuel Injection Nozzles	59	6.0	44	
Fuel Injection Pipe Clamp Bolts	7.4	0.75	65 in·lb	
Fuel Injection Pipe Mounting Nuts	25	2.5	18	
Fuel Injection Pump Bracket Bolts	20	2.0	15	
Fuel Injection Pump Gear Nut	64	6.5	47	
Fuel Injection Pump Mounting Nuts	20	2.0	15	
Idle Adjusting Screw Locknut	6.9	0.70	61 in·lb	
Linkage Pipe Nuts	27	2.8	20	
Maximum Speed Set Screw Locknut	6.9	0.70	61 in·lb	
<b>Cooling System</b>				
Coolant Drain Plug	25	2.5	18	L
Coolant Inlet Bolts	7.8	0.80	69 in·lb	
Coolant Reserve Tank Bolt	4.4	0.45	39 in·lb	
Coolant Temperature Switch	27	2.8	20	L
Fan Mounting Bolts	8.8	0.90	78 in·lb	
Radiator Fan Mounting Bolts	6.0	0.61	53 in·lb	
Radiator Fan Switch (KAF950GB ~ GC)	23	2.3	17	
Radiator Fan Switch (KAF950G9 ~ GA/HA)	25	2.5	18	
Radiator Mounting Bolts	8.8	0.90	78 in·lb	
Radiator Screen Mounting Bolts	8.8	0.90	78 in·lb	
Shroud Mounting Bolts	6.0	0.61	53 in·lb	
Thermostat Housing Cap Bolts	7.8	0.80	69 in·lb	
Water Pipe Mounting Bolts	8.8	0.90	78 in·lb	
Water Pump Mounting Bolts and Nuts	20	2.0	15	
<b>Engine Top End</b>				
Cylinder Head Bolts	34	3.5	25	EO, S
Cylinder Head Cover Nuts	5.4	0.55	48 in·lb	

## 2-6 PERIODIC MAINTENANCE

### Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Exhaust Manifold Mounting Nuts	20	2.0	15	
Inlet Manifold Mounting Bolts	7.8	0.80	69 in·lb	
Inlet Manifold Mounting Nuts	7.8	0.80	69 in·lb	
Rocker Arm Components Mounting Nuts	20	2.0	15	
Valve Adjusting Screw Locknuts	11	1.1	97 in·lb	
Muffler Mounting Bolts	20	2.0	15	L
<b>Converter System</b>				
Air Cleaner Housing Mounting Bolts (KAF950GA/HA late models and KAF950GB ~ GC)	16	1.6	12	
Air Cleaner Housing Mounting Bolts (KAF950G9 and KAF950GA/HA early models)	20	2.0	15	
Converter Case Bolts (L = 55 mm)	27	2.8	20	L
Converter Case Bolts (L = 28 mm)	20	2.0	15	L
Converter Cover Bolts	4.4	0.45	39 in·lb	
Drive Pulley Bolt	93	9.5	69	
Drive Pulley Cover Bolts	13	1.3	115 in·lb	
Driven Pulley Bolt	93	9.5	69	L
Fan Cover Bolts	8.8	0.90	78 in·lb	
Inner Cover Bolts	4.4	0.45	39 in·lb	
Inner Cover Nut	8.8	0.90	78 in·lb	R
Ramp Weight Nuts	6.9	0.70	61 in·lb	R
Spider	275	28.0	203	
Wear Shoe Mounting Screws	1.1	0.11	10 in·lb	L
<b>Engine Lubrication System</b>				
Engine Oil Drain Plugs	34	3.5	25	
Oil Filter Stud Bolt	44	4.5	32	
Oil Nozzle	14	1.4	10	
Oil Pan Bolts and Nuts	7.8	0.80	69 in·lb	
Oil Pressure Switch	14	1.4	10	SS
Oil Pump Drive Gear Bolt	20	2.0	15	
Oil Strainer Mounting Bolt and Nuts	7.8	0.80	69 in·lb	
Relief Valve Bolt	39	4.0	29	
<b>Engine Removal/Installation</b>				
Engine Mounting Bolts	44	4.5	32	
Stay Rod Rear Nut	88	9.0	65	
<b>Crankshaft/Crankcase</b>				
Camshaft Drive Gear Bolt	43	4.4	32	
Camshaft Retainer Bolts	7.8	0.80	69 in·lb	
Connecting Rod Cap Nuts	36	3.7	27	
Coolant Drain Plug	25	2.5	18	L
Crankshaft Main Bearing Cap Bolts	59	6.0	44	
Crankshaft Pulley Bolt	98	10.0	72.3	EO
End Plate Bolts	39	4.0	29	

**PERIODIC MAINTENANCE 2-7**

**Torque and Locking Agent**

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Flywheel Mounting Bolts	44	4.5	32	L, S
Fuel Injection Pump Drive Gear Nut	64	6.5	47	
Idle Gear Bolts	25	2.5	18	
Oil Nozzle	14	1.4	10	
Oil Pump Drive Gear Bolt	20	2.0	15	
Oil Seal Retainer Bolts	5.4	0.55	48 in·lb	
Timing Gear Case Bolts	7.8	0.80	69 in·lb	
Timing Gear Case Cover Bolts	7.8	0.80	69 in·lb	
<b>Transmission</b>				
Bearing Holder	118	12.0	87.0	MO
Differential Gear Housing Bolts	57	5.8	42	L
Hi/Low Gear Case Bolts	20	2.0	15	
Neutral Switch	15	1.5	11	
Shift Arm Positioning Bolt	37	3.8	27	
Shift Shaft Stop Bolt	7.8	0.80	69 in·lb	
Transmission Case Bolts	8.8	0.90	78 in·lb	
Transmission Case Mounting Nuts	44	4.5	32	R
Transmission Oil Drain Plug	15	1.5	11	
<b>Wheels/Tires</b>				
Wheel Nuts	137	14.0	101	
<b>Final Drive</b>				
Bearing Holder	118	12.0	87.0	L
Bevel Gear Case Bolts	22	2.2	16	
Bevel Gear Case Holder Nuts	25	2.5	18	
Differential Case Cap Bolts	32	3.3	24	L
Drive Gear Nut	118	12.0	87.0	MO
Drive Shaft Cap Bolts	20	2.0	15	
Driven Gear Shaft Nut	108	11.0	79.7	L
Front Axle Cap Bolts	8.8	0.90	78 in·lb	
Gear Case Bracket Bolts	44	4.5	32	
Gear Case Mounting Nuts	44	4.5	32	R
Grease Nipple	2.3	0.23	20 in·lb	G
Housing Locknut	118	12.0	87.0	L
Oil Drain Plug	20	2.0	15	
Oil Filler Cap	29	3.0	21	
Pinion Gear Bearing Housing Nuts	25	2.5	18	
Pinion Gear Slotted Nut	118	12.0	87.0	MO
Propeller Shaft Bearing Housing Cover Bolts	3.4	0.35	30 in·lb	
Ring Gear Bolts	82	8.2	61	L
Ring Gear Cover Bolts (M10)	47	4.8	35	
Ring Gear Cover Bolts (M8)	25	2.5	18	
Speed Sensor Bolt	8.8	0.90	78 in·lb	

## 2-8 PERIODIC MAINTENANCE

### Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
<b>Brakes</b>				
Bleed Valves	5.4	0.55	48 in·lb	
Brake Hose Banjo Bolts	25	2.5	18	
Brake Pipe Nipples	18	1.8	13	B
Front Axle Nuts	196	20.0	145	
Front Brake Panel Mounting Bolts	44	4.5	32	L
Front Wheel Cylinder Mounting Bolts	10.3	1.1	91 in·lb	
Master Cylinder Reservoir Cap	3.4	0.35	30 in·lb	
Piston Stop Bolt	8.8	0.90	78 in·lb	
Push Rod Locknut	17.2	1.8	13	
Rear Axle Nuts	304	31.0	224	
Rear Brake Panel Mounting Bolts	44	4.5	32	L
Rear Wheel Cylinder Mounting Nuts	7.4	0.75	65 in·lb	
Reservoir Clamp Bolt	6.1	0.62	54 in·lb	
<b>Suspension</b>				
Damper Bracket Mounting Nuts	59	6.0	44	R, S
Front Suspension Arm Joint Nuts	78	8.0	58	
Front Suspension Arm Pivot Bolts	98	10.0	72.3	L
Leaf Spring Mounting Bolts (Front)	98	10.0	72.3	
Leaf Spring Mounting Nuts (Rear)	59	6.0	44	
Rear Shock Absorber Mounting Nuts	59	6.0	44	R
Strut Clamp Nuts	98	10.0	72.3	
Strut Locknuts	49	5.0	36	
Strut Mounting Locknuts	44	4.5	32	R
Tie-Rod End Nuts	34	3.5	25	
<b>Steering</b>				
EPS Unit Mounting Bolts	20	2.0	15	
Rack Guide Spring Cap Locknut	39	4.0	29	
Steering Gear Assembly Bracket Bolts	52	5.3	38	L
Steering Wheel Mounting Nut	52	5.3	38	R
Strut Clamp Nuts	98	10.0	72.3	
Tie-Rod End Locknuts	44	4.5	32	
Tie-Rod End Nuts	34	3.5	25	
Universal Joint Clamp Bolts	20	2.0	15	
<b>Frame</b>				
Battery Holder Mounting Nuts	17	1.7	13	
Center Bar Mounting Bolts	64	6.5	47	
Front Bar Mounting Bolts (Lower)	98	10.0	72.3	
Front Bar Mounting Bolts (Upper)	44	4.5	32	
Front Seat Bar Mounting Bolts	64	6.5	47	
Hood Latch Lever Mounting Bolts	37	3.8	27	L
Rear Bar Mounting Bolts (Lower)	64	6.5	47	
Rear Bar Mounting Bolts (Upper)	44	4.5	32	



**Torque and Locking Agent**

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rear Bar Mounting Nuts (Middle)	44	4.5	32	
Rear End Subframe Mounting Nuts	44	4.5	32	R
Screen Fixing Lever Screws	4.4	0.45	39 in·lb	L
Seat Belt Buckle Mounting Bolts	34	3.5	25	
Seat Belt Mounting Bolts	34	3.5	25	
Stay Rod Rear Nut	88	9.0	65	
Tail Gate Fixing Lever Screws	4.4	0.45	39 in·lb	L
Top Bar Mounting Bolts	44	4.5	32	
<b>Electrical System</b>				
Alternator Adjusting Bracket Bolts	20	2.0	15	
Alternator Mounting Bolt	39	4.0	29	
Alternator Pulley Locknut	11	1.1	97 in·lb	
Battery Holder Mounting Nuts	17	1.7	13	
Connecting Plate Nuts	1.2	0.12	11 in·lb	
Coolant Temperature Switch	27	2.8	20	L
Glow Plugs	17	1.7	13	
Neutral Switch	15	1.5	11	
Oil Pressure Switch	14	1.4	10	SS
Radiator Fan Switch (KAF950GB ~ GC)	23	2.3	17	
Radiator Fan Switch (KAF950G9 ~ GA/HA)	25	2.5	18	
Speed Sensor Bolt	8.8	0.90	78 in·lb	
Starter Motor End Cover Screws	1.5	0.15	13 in·lb	
Starter Motor Mounting Bolts	39	4.0	29	
Starter Motor Through Bolts	9.3	0.95	82 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 of Engine Parts**

Threads Diameter (mm)	Mark of bolt head	Torque		
		N·m	kgf·m	ft·lb
6	4T	3.9 ~ 4.9	0.40 ~ 0.50	35 ~ 43 in·lb
6	7T	7.8 ~ 9.8	0.80 ~ 1.0	69 ~ 87 in·lb
6	9T	12 ~ 15	1.2 ~ 1.5	104 ~ 130 in·lb
8	4T	10 ~ 14	1.0 ~ 1.4	87 ~ 120 in·lb
8	7T	18 ~ 22	1.8 ~ 2.2	13 ~ 16
10	4T	20 ~ 24	2.0 ~ 2.4	14 ~ 17
10	7T	39 ~ 44	4.0 ~ 4.5	29 ~ 33

## 2-10 PERIODIC MAINTENANCE

### Torque and Locking Agent

#### Basic Torque for General Fasteners of Frame Parts

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.8 ~ 7.9	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10 ~ 14
10	26 ~ 34	2.6 ~ 3.5	19 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45

**Specifications**

Item	Standard	Service Limit
<b>Fuel System</b>		
Throttle Pedal Play	5 ~ 10 mm (0.20 ~ 0.39 in.)	---
Idle Speed	850 ~ 950 r/min (rpm)	---
<b>Cooling System</b>		
Coolant:		
Type (Recommended)	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	4.4 L (4.7 US qt)	---
Fan Belt Deflection	9.5 ~ 11.5 mm (0.37 ~ 0.45 in.) at 98 N (10 kgf, 22 lb)	---
<b>Engine Top End</b>		
Valve Clearance	0.20 mm (0.0079 in.)	---
<b>Converter System</b>		
Belt Width	34.1 mm (1.34 in.)	32.6 mm (1.28 in.)
Belt Deflection	28 ~ 36 mm (1.10 ~ 1.42 in.)	---
Wear Shoe Width	---	16.4 mm (0.65 in.)
<b>Engine Lubrication System</b>		
Engine Oil:		
Grade	API CF or CF-4	---
Viscosity	SAE 10W-40	---
Capacity	3.0 L (3.2 US qt) (When filter is not removed)	---
	3.3 L (3.5 US qt) (When filter is removed)	---
Oil Level	Between F and L marks on dipstick	---
<b>Transmission</b>		
Transmission Oil:		
Type	Hypoid gear oil	---
Viscosity	SAE 90: above 5°C (41°F) or	---
	SAE 80: below 5°C (41°F)	---
Capacity	2.5 L (2.6 US qt)	---
Oil Level	Between H and L level lines on dipstick	---
<b>Wheels/Tires</b>		
Tire Tread Depth	13.2 mm (0.52 in.)	3 mm (0.12 in.)
<b>Final Drive</b>		
Front Final Gear Case Oil:		
Type	Hypoid gear oil for LSD (Limited Slip Differential gears)	---
Viscosity	SAE 140 (GL-5) or SAE 90 (GL-6)	---
Capacity	0.4 L (0.4 US qt)	---
Oil Level	Filler opening level	---

## 2-12 PERIODIC MAINTENANCE

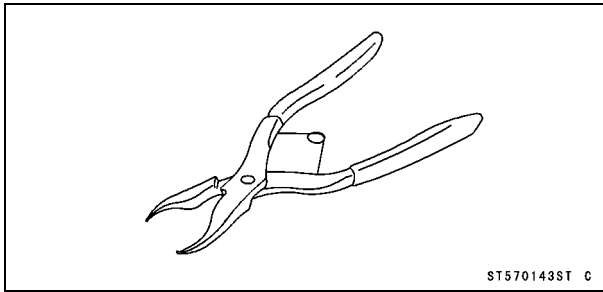
### Specifications

Item	Standard	Service Limit
<b>Brakes</b>		
Brake Fluid:		
Type	DOT3	---
Fluid Level	Between upper and lower level lines	---
Brake Pedal Play	2 ~ 10 mm (0.08 ~ 0.39 in.)	---
Brake Drum Inside Diameter	180.000 ~ 180.160 mm (7.0866 ~ 7.0929 in.)	180.75 mm (7.116 in.)
Brake Shoe Lining Thickness	4.5 mm (0.18 in.)	1.0 mm (0.04 in.)
Parking Brake Lever Travel	8 ~ 12 notches (clicks) at 200 N (20 kgf, 44 lb)	---
<b>Steering</b>		
Steering Wheel Free Play	0 ~ 20 mm (0 ~ 0.79 in.)	---
<b>Electrical System</b>		
Battery:		
Capacity	12 V 52 Ah	---
Voltage	12.6 V or more	---
Electrolyte Level*	Between upper and lower level	---
Specific Gravity*	1.265 at 20°C (68°F)	---
Switches:		
Brake Light Switch Timing	ON after 10 mm (0.39 in.) of pedal travel	---

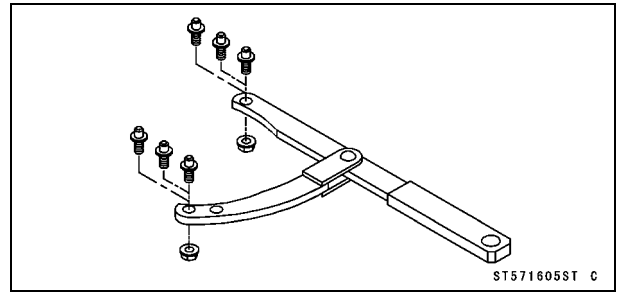
\*: Conventional Type Battery

**Special Tools**

**Inside Circlip Pliers:**  
**57001-143**



**Flywheel & Pulley Holder:**  
**57001-1605**



## 2-14 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

#### Fuel System

##### Throttle Pedal Play Inspection

- Check that the throttle pedal moves smoothly from full open to close.
- ★ If the throttle pedal does not return properly, lubricate the throttle cable and link (see Throttle Cable Lubrication in the Fuel System chapter).
- Check the throttle pedal play [A].

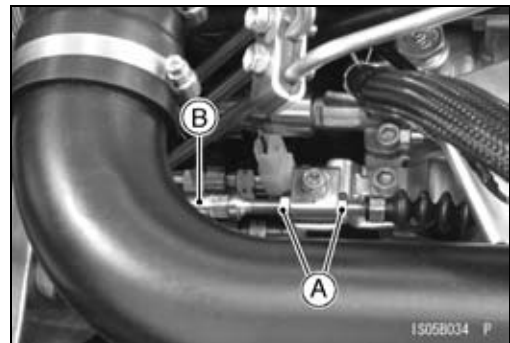
##### Throttle Pedal Play

Standard: 5 ~ 10 mm (0.20 ~ 0.39 in.)

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

##### Throttle Pedal Play Adjustment

- Tilt up the cargo bed.
- Loosen the adjuster mounting nuts [A] at the engine end of the cable.
- Slide the adjuster [B] until the proper amount of throttle pedal play is obtained.
- Tighten the adjuster 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.

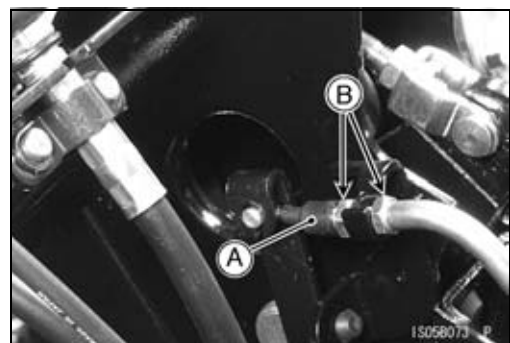


#### **⚠ WARNING**

**Operation with improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding condition. Follow the service manual to be make sure to correct any of these conditions.**

#### **NOTE**

- If the throttle pedal play can not be adjusted by using the adjuster at the engine end of the cable, use the cable adjuster [A] at the throttle pedal. Do not forget to securely tighten the adjuster mounting nuts [B].



**Periodic Maintenance Procedures**

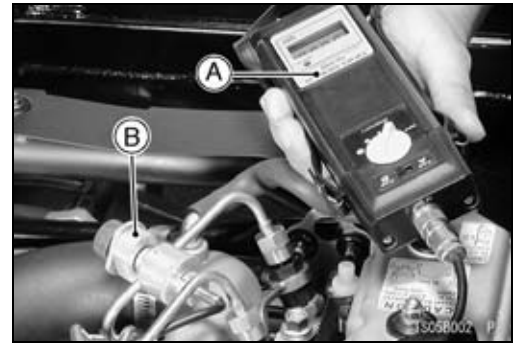
**Idle Speed Inspection**

- Start the engine and warm it up thoroughly.
- Tilt up the cargo bed.
- Check the idle speed with a suitable tachometer [A].  
Tachometer Adapter [B]

**Idle Speed**

**Standard: 850 ~ 950 r/min (rpm)**

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

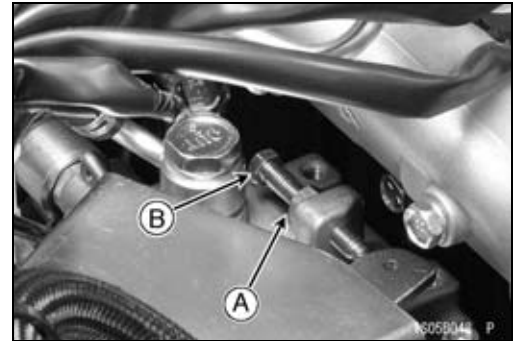


**Idle Speed Adjustment**

- Start the engine and warm it up thoroughly.
- Loosen the locknut [A].
- Turn the idle adjusting screw [B] at the injection pump until the idle speed is correct.
- Tighten:

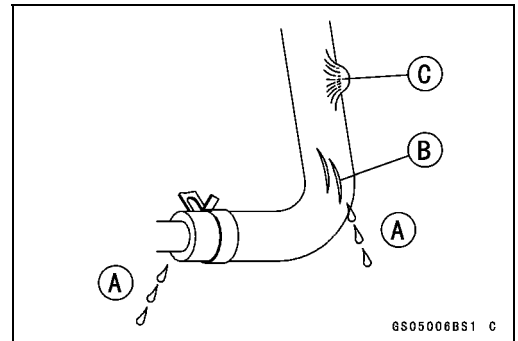
**Torque - Idle Adjusting Screw Locknut: 6.9 N·m (0.70 kgf·m, 61 in·lb)**

- Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.



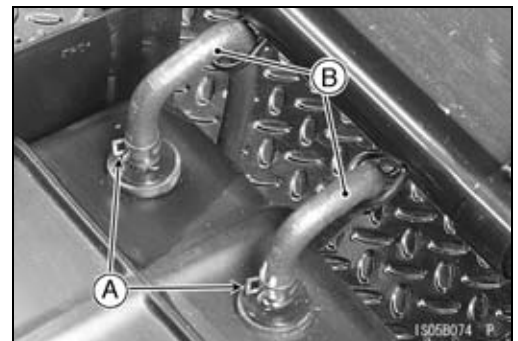
**Fuel Hoses and Connections Inspection**

- Tilt up the cargo bed and seat.
- Check the fuel hoses and fittings for deterioration, cracks and signs of leakage.
- ★ Replace the fuel hose if any fraying, leak [A], cracks [B] or bulges [C] are noticed.
- Check that the hoses are securely connected and clamps are installed correctly.
- When installing, run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and route the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- ★ Replace the hose if it has been sharply bent or kinked.



**Fuel Hoses Replacement**

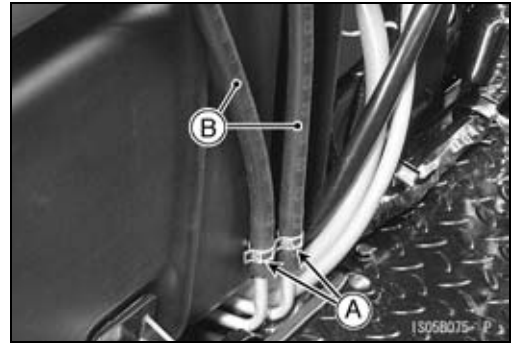
- Tilt up the cargo bed and seat.
- Remove:
  - Front Seat Lower Cover Front (see Floor Center Panel Removal in the Frame chapter)
  - Clamps [A]
  - Fuel Hoses [B]



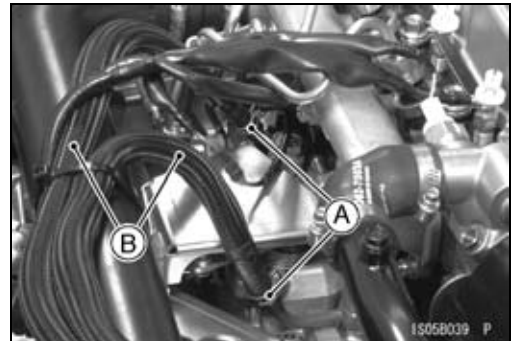
## 2-16 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures

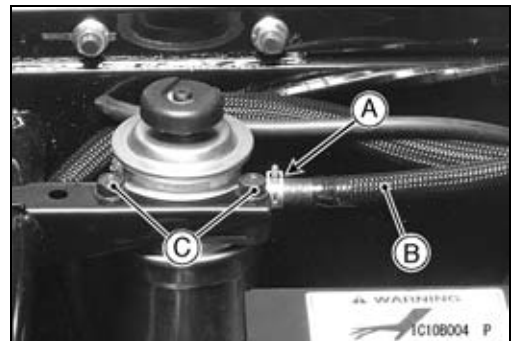
- Remove:  
Clamps [A]  
Fuel Hoses [B]



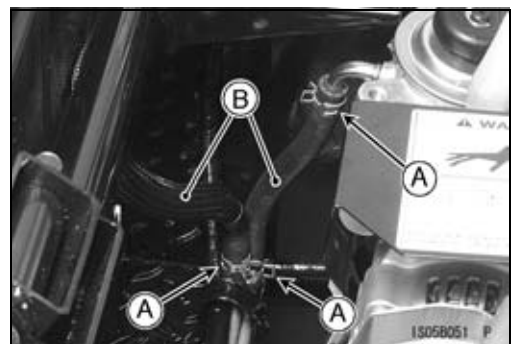
- Remove:  
Clamps [A]  
Fuel Hoses [B]



- Remove:  
Clamp [A]  
Fuel Hose [B]  
Fuel Filter Mounting Bolts [C]



- Remove:  
Clamps [A]  
Fuel Hoses [B]

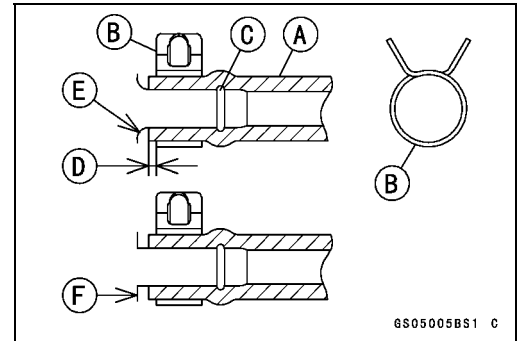


- When installing, run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.



**Periodic Maintenance Procedures**

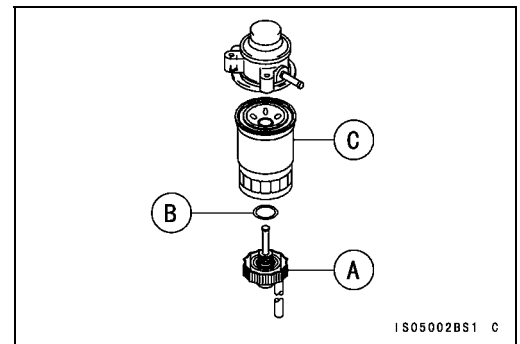
- Fit the fuel hose [A] onto the fitting fully and install the plate clamp [B] beyond the raised rib [C].  
1 ~ 2 mm (0.039 ~ 0.079 in.) [D]
- The hose end must reach the filler [E] or be as near as possible to the step [F].



- Bleed the air from the fuel filter (see Fuel Filter Installation in the Fuel System chapter).

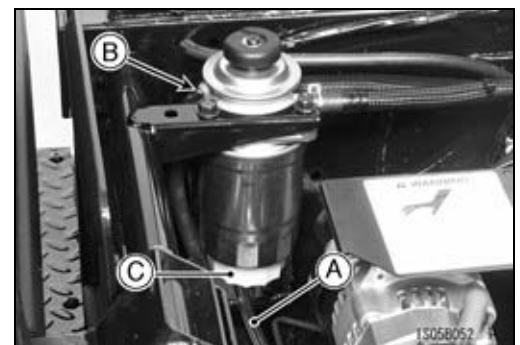
**Fuel Filter Element Replacement**

- Remove:
  - Fuel Filter (see Fuel Filter Removal in the Fuel System chapter)
  - Drain Cap [A]
  - O-ring [B]
  - Filter Cartridge [C]
- Use a suitable filter wrench.
- Install a new filter cartridge by hand until the gasket contacts the housing. Then tighten it 1/3 turn more.
- Install:
  - Drain Cap
  - New O-ring
  - Fuel Filter (see Fuel Filter Installation in the Fuel System chapter)



**Fuel Filter Water Draining**

- Tilt up the cargo bed.
- Place a suitable container under the filter drain hose [A].
- Loosen the air vent plug [B].
- Loosen the drain cap [C] approximately 1 turn, and drain water from the filter until only fuel flows from the filter.
- Tighten the drain cap securely.
- Bleed the air from the fuel filter (see Fuel Filter Element Replacement).
- Wipe off any spilled fuel.
- Start the engine, and check for fuel leakage.



## 2-18 PERIODIC MAINTENANCE

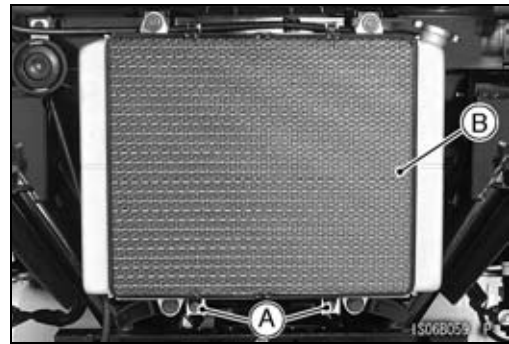
### Periodic Maintenance Procedures

#### Cooling System

##### Radiator Cleaning

#### NOTICE

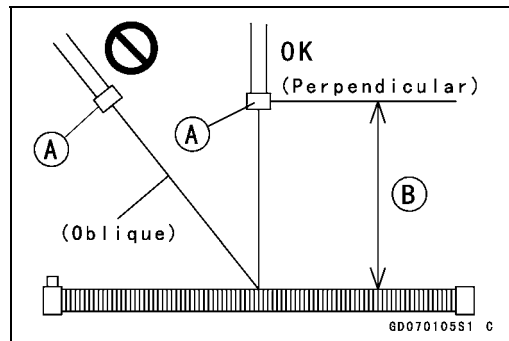
Clean the radiator screen and the radiator in accordance with the Periodic Maintenance Chart. In dusty areas, they should be cleaned more frequently than the recommended interval. After riding through muddy terrain, the radiator screen and the radiator should be cleaned immediately.



- Remove:
  - Front Cover (see Front Cover Removal in the Frame chapter)
  - 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.

#### NOTICE

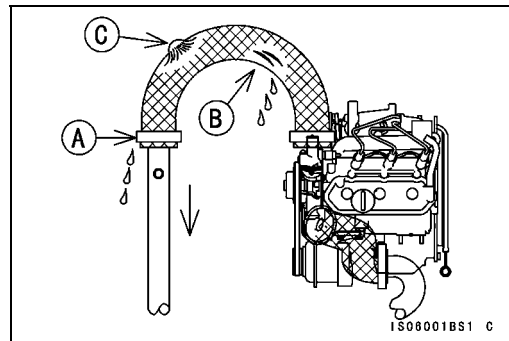
When cleaning the radiator with a steam cleaner, be careful of the following to prevent radiator damage. Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core. Hold the steam gun perpendicular to the core surface. Run the steam gun following the core fin direction.



- Install the radiator screen.
- Tighten:
  - Torque - Radiator Screen Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

##### Radiator Hose and Connection Inspection

- The high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained. 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 the hose if any fraying, cracks [B] or bulges [C] are noticed.
- Check that the hoses are securely connected and clamps are tightened correctly.



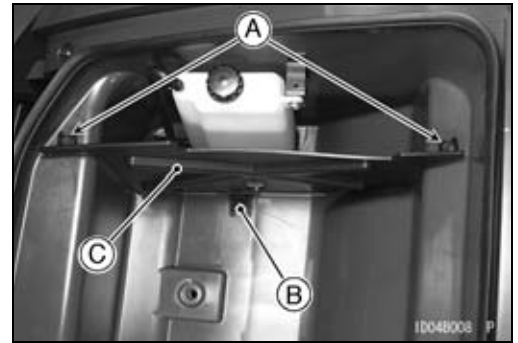
##### Coolant Change

#### ⚠ WARNING

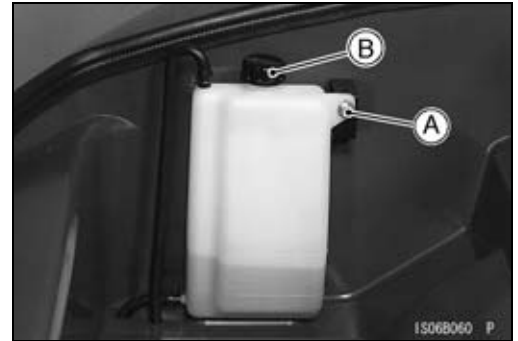
Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

**Periodic Maintenance Procedures**

- Tilt up the front cargo hood.
- Remove:
  - Quick Rivets [A]
  - Tapping Screw [B] and Collar
  - Partition [C]



- Remove the coolant reserve tank mounting bolts [A].
- Remove the cap [B] and pour the coolant into a container.
- Install the removed parts except the cap.



- Remove the front final gear case skid plate (see Front Final Gear Case Oil Level Inspection in the Final Drive chapter).
- Place a container under the drain plugs.
- Remove the coolant drain plugs [A] at water pipes.
- Place a funnel under the drain hole.



- Remove the radiator cap [A] in two steps.
  - First turn the cap counterclockwise to the first step.
  - Then push and turn it further in the same direction and remove the cap.



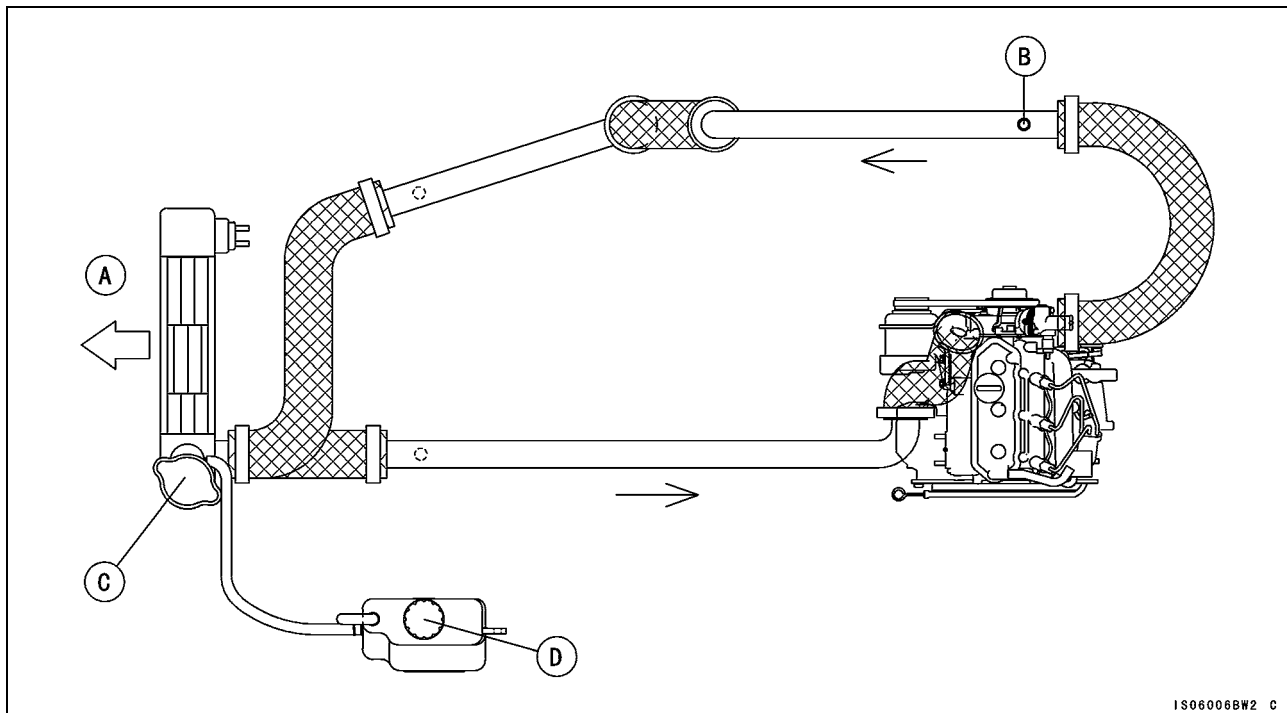
- Tighten the drain plugs.
- Install the reserve tank hose and reserve tank.
- Tighten:
  - Torque - Coolant Reserve Tank Bolt: 4.4 N·m (0.45 kgf·m, 39 in·lb)**
- Lift the front wheels 20 ~ 30 cm (7.9 ~ 11.8 in.) from the ground so that the radiator cap is the highest port of the system.
- Pour the coolant slowly into the radiator cap fitting.

**NOTE**

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

## 2-20 PERIODIC MAINTENANCE

### Periodic Maintenance Procedures



Front [A]

Air Bleeder Bolt [B]

Radiator Cap [C]

Reserve Tank Cap [D]

#### NOTICE

**Soft or distilled water must be used with antifreeze 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.**

#### Water and Coolant Mixture Ratio (Recommended)

Soft Water: 50%

Coolant: 50%

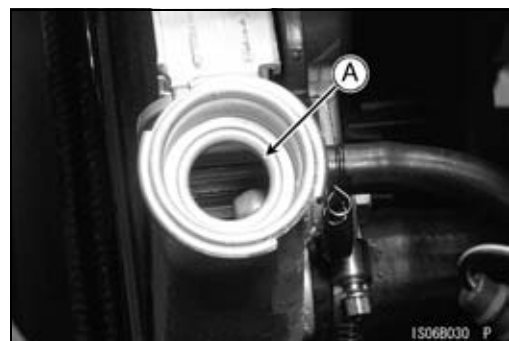
Freezing Point:  $-35^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$ )

Total Amount: 4.4 L (4.7 US qt)

#### NOTE

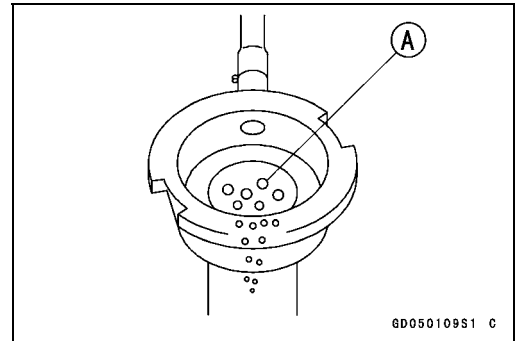
○Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.

- When the coolant begins to flow out the air bleeder bolt holes, tighten the air bleeder bolt.
- Fill the cooling system up to the filler neck [A] in the radiator cap fitting with coolant.



**Periodic Maintenance Procedures**

- 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.
- Lower the front wheels slowly.



- Fill the reserve tank up to the F (full) level line [A] with coolant.

**NOTICE**

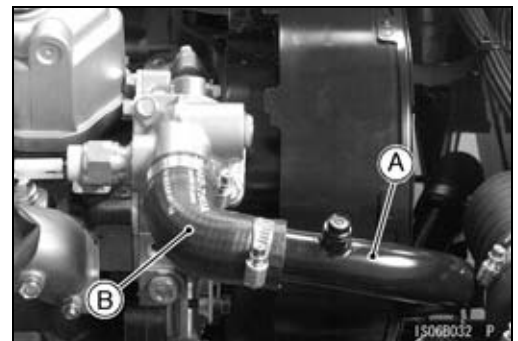
**Do not add more coolant above the F (full) level line.**

- Install the reserve tank cap [B].

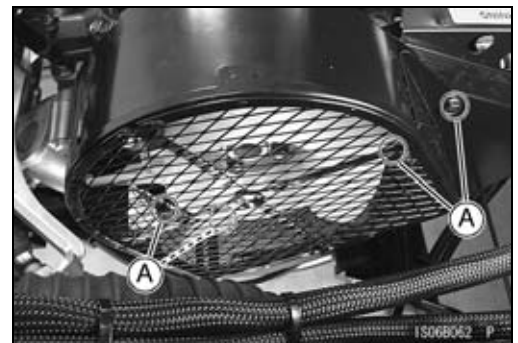


**Cooling Fan Belt Inspection**

- Tilt up the cargo bed.
- Remove:
  - Rear Propeller Shaft (see Propeller Shaft Removal in the Final Drive chapter)
  - Water Pipe [A] and Water Hose [B]



- Remove the fan cover bolts [A].



- Take off the fan cover [A].
- Rotate the fan blade [B], and position it as shown in the figure.





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